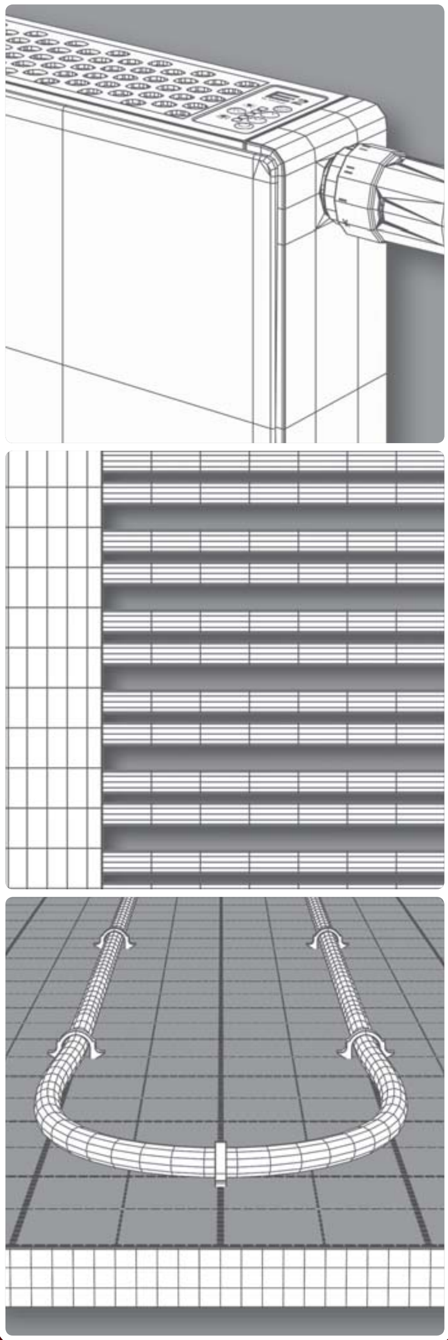
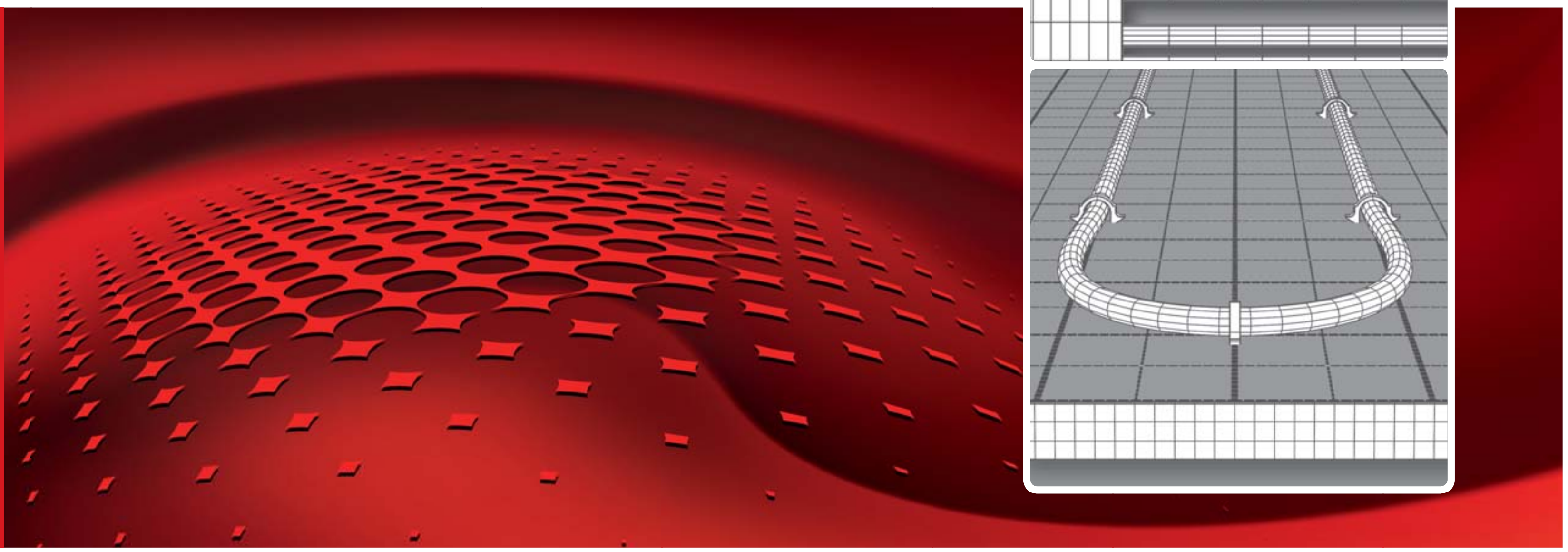
VOGEL&NOOT

HEAT EMISSION SYSTEMS.

TECHNICAL DATA 2014





heatingthroughinnovation.

CONTENT

Technology 2014

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FULL-RANGE SUPPLIER.

Efficient, comfortable and aesthetic heat distribution

VOGEL&NOOT is the full-range supplier in innovative radiator and underfloor heating systems for any temperature range – especially for low temperature operation with renewable energy sources.

Panel, bathroom and design radiators, convectors

Multifunctional panel radiators with the T6 technology, comfortable bathroom and individually configured design radiators as well as shapely convectors from **VOGEL&NOOT**, have a broad flow temperature range and an ideal range of applications to match.

E2-technology

The intelligent E2 technology provides quick control convenience even at low temperatures and always with the highest level of efficiency – also in combination with underfloor heating systems.

FLOORTEC underfloor heating systems

With its six different underfloor heating systems, **VOGEL&NOOT** fulfils all the requirements of cryogenic heat distribution. Continuously optimised components ensure an even better efficiency. The complete system warranty offers the highest level of safety and comfort for planning, installation and operation.

The sign of highest energy efficiency

The ECO seal of quality on all radiators from **VOGEL&NOOT** stands for compatibility with all (renewable) energy sources and thus for economically as well as ecologically efficient heat distribution.

Efficient heat distribution for the planet

VOGEL&NOOT has set itself the objective of providing the world with resource-conserving heat distribution solutions, because climate protection will only work when the heat generated is released efficiently into rooms.

ENVIRONMENT AND CLIMATE PROTECTION.

Contribution to the climate by improving the ecological balance

As a leader in progressive thinking on "green" heat distribution using renewable energies, **VOGEL&NOOT** demonstrates a high level of responsibility about the efficient use of our planet and its resources, for example with a strict ECO training course, the focus on low temperature heat distribution and the compatibility with renewable energies as well as a permanent production optimisation and product development. **VOGEL&NOOT** has been a member of Klimabündnis Österreich since 2011.

Innovation as the driving force for climate protection
VOGEL&NOOT conducts intensive research & development and maintains a strong innovation network with internal and external energy and trend experts, universities and renowned research institutions.

Renewable energies, the future of heat distribution
Compatibility is an essential quality for heat distribution systems using renewable, low temperature energy sources such as heat pumps, solar technology, etc. **VOGEL&NOOT** radiators with the ECO quality seal ensure low CO_2 emissions and thermal comfort for all system temperatures in modern insulated buildings up to a flow temperature below 40°C.

VOGEL&NOOT is a member of Klimabündnis Österreich. This network is active in 18 European countries and has set itself the objective of effectively reducing environmentally harmful emissions and protecting our planet's resources.

„we are“ a member of the Klimabündnis

QUALITY
AS A SIGN OF
MAXIMUM SAFETY

Quality as a sign of maximum safety

The radiators manufactured by **VOGEL&NOOT** meet numerous internationally recognised quality standards and the manufacturing processes at all of the production sites have been ISO certified. Furthermore, the quality and performance data of **VOGEL&NOOT** panel radiators are constantly reviewed and confirmed by accredited European institutions. **VOGEL&NOOT** panel radiators have also been awarded the seal of approval of the German Committee for Terms and Conditions of Sale (RAL), which documents the special quality of the product compared with many other radiator manufacturers.

Bests with RAL Quality Seal

For architects, designers and builders, the RAL seal of approval for **VOGEL&NOOT** radiators symbolises the high quality of the product in the areas of processing and handling. These quality assessments, which are controlled by independent institutions, vouch for the enduring safety and long life of service of the product.

Highest customer confidence

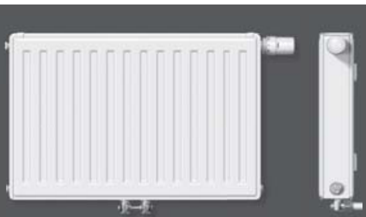
Our customers know that with each product, they can expect excellent properties in terms of the material, surface condition and durability. **VOGEL&NOOT** radiators thus exceed many requirements and outperform numerous standards (such as, for instance, the European Standard EN 442 or the CE marking). A perfected manufacturing process guarantees the best performances with precise welding, reliable leak-testing and glossy surface treatment - safety combined with a fantastic visual appearance!

Contents

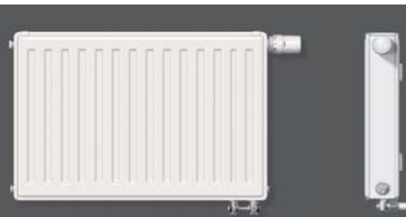
ULOW-E2

ULOW-E2 LOW-TEMPERATURE RADIATOR

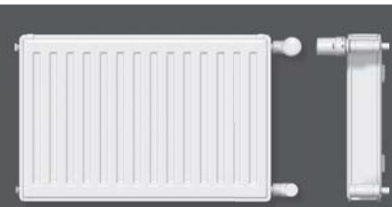
PROFILE RADIATORS



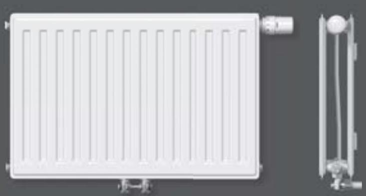
T6-CENTRALLY CONNECTED RADIATOR



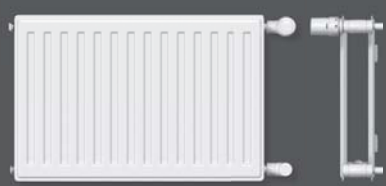
MULTI-FUNCTIONAL VALVE RADIATOR



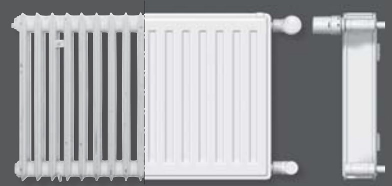
COMPACT RADIATOR



HYGIENE T6-CENTRALLY CONNECTED RADIATOR

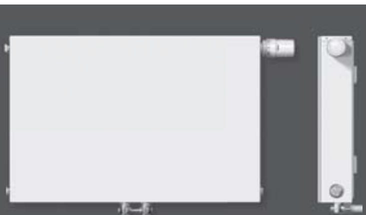


HYGIENE COMPACT RADIATOR

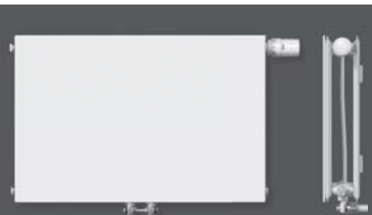


REPLACEMENT PANEL RADIATOR

PLAN RADIATORS



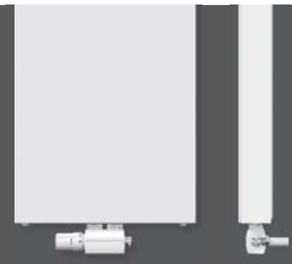
T6-PLAN CENTRALLY CONNECTED RADIATOR



HYGIENE T6-PLAN CENTRALLY CONNECTED RADIATOR

VERTICAL RADIATORS

VERTICAL- CENTRALLY CONNECTED RADIATOR



PLAN-VERTICAL- CENTRALLY CONNECTED RADIATOR

BASICS

ULOW-E2 LOW-TEMPERATURE RADIATOR

E2 Technology

An unmatched concept
The ULOW-E2 low-temperature radiator, with its E2 technology is the realisation of a unique product concept, that offers efficient, economic and aesthetic heat emission.

reddot design award
winner 2013

Beauty and economy in one
An avant-garde design meets all the demands of a modern interior and stylishly enhances any living space. Because of the small additional investment costs needed for the ULOW-E2's higher efficiency, it quickly pays for itself. Manual temperature control in each room makes for maximum comfort in every one of them.

Powerful and intelligent
On the one hand, the ULOW-E2 gives a high proportion of radiant heat thanks to its water-filled panels, whilst on the other, it provides optimised, on-demand convection. Intelligent control, switches between static and dynamic operation and ensures quick heat emission and short reaction times, with high efficiency and a maximum of thermal comfort at supply temperatures of 40° C and less.

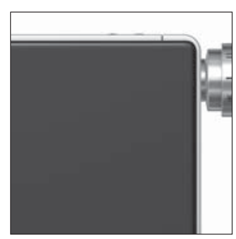
The advantages of the ULOW-E2 low-temperature radiator at a glance.

Low-temperature compatible
The ULOW-E2 low-temperature radiator gives problem-free use at supply temperatures of 40° C and less, with all modern, conventional energy sources (oil or gas burning heating systems, &c), as well as all renewable energy sources (heat pumps, solar heating, &c).

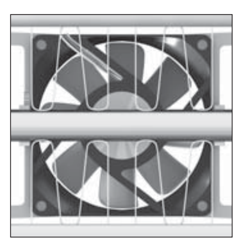
Intelligent control
What makes the ULOW-E2 so special is that it is fitted with fans that enhance natural convection, combined with an intelligent control system that can switch between static and dynamic operation either fully automatically, or according to the user's operating requirements. The fans serve as a supplement and are only switched on when needed, as this equipment provides high basic performance even in static operation.

High savings potential
Choosing it in preference to other products currently available on the market can give you huge energy savings, because of the significantly lower ambient operational temperatures. With the ULOW-E2, operating the entire heating system is much more energy-efficient.

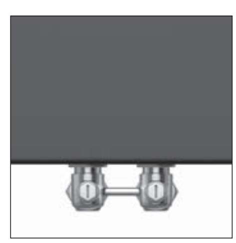
State-of-the-art design
The ULOW-E2's extremely elegant plane optics and its futuristically reduced artistic style appeal to persons with a sophisticated awareness of their furnishings, whilst the rounded soft-line edges exude stylish harmony. VOGEL&NOOT are trend-setting trail blazers with their completely new round-aperture optics – another prominent feature is the classy looking, intuitive touchpad control panel.



Heat emission in next to no time and a short reaction time
Because of its high proportion of radiant heat and its on-demand fan-optimised convection, the ULOW-E2 ensures fast heat emission and short reaction times. In winter any night-time drop in temperature or heat loss from ventilating room can be compensated for, no problem, in next to no time.



Tried and tested central-connection technology
In today's flexible building industry pre-piping has become indispensible. In this respect central-connection technology contributes significantly to reductions both in installation time and costs and in susceptibility to faults. It also ensures maximum freedom in planning and installation.



Technology

A higher proportion of radiant heat
In contrast to simple convectors the ULOW-E2 gives a much higher proportion of radiant heat, thanks to its water-filled panels to front and rear.

Ideal for renovations and new buildings
After thermal renovation and the fitting of a modern heating source, the conditions for installing the ULOW-E2 are ideal. We recommend using ULOW-E2 low-temperature radiators on their own in renovations, but in combination with other heat emission systems in new buildings.

Versatile electrical connection
To connect the ULOW-E2 to the power supply, there is a choice of two options – a plug connection or a direct cable connection. The power cable length is fully adjustable.

Extremely easy installation
The ULOW-E2 is delivered as a ready to connect product, and can be installed just like any standard radiator - it's easy, efficient, flexible and inexpensive. Particularly with renovations this is very important.

System compatibility
Operating in combinations in new buildings, the ULOW-E2 is perfectly compatible with other low-temperature heat emission systems, such as under-floor heating, under-floor convectors, wall heating, &c. As the ambient operational temperatures are mutually consistent, it is possible to install both on a single heating circuit.

Living in comfort all year round
In winter the ULOW-E2 works as an efficient low-temperature radiator, with high-level control quality, to give perfect heating comfort. And then the summer breeze-effect ensures that on hot days the atmosphere in your living area is pleasantly cool thanks to gentle movement of the air.

RENOVATION, A NEW BUILDING OR SIMPLY GREATER THERMAL COMFORT.

Renovations: monovalent operation
Provided thermal renovation ensures a good standard of insulation, or a modern heating source has been fitted, the conditions for installing the ULOW-E2 are ideal. Operation with all energy sources (oil, gas, firewood, pellets, district heating or a heat pump) at a supply temperature of 40 °C and less is perfectly possible.

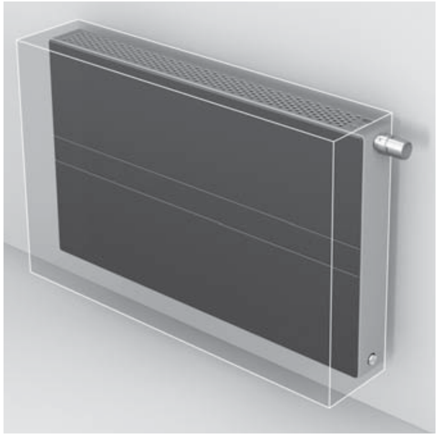
In new buildings: combined operation
In modern style new buildings good standards of thermal insulation already apply and modern reduced-temperature heating systems (oil- or gas-fired) are installed, or renewable low-temperature energy sources are used (firewood, pellets, and/or district heating or heat pumps). The ULOW-E2 with supply temperature as low as 40 °C and less is compatible with these heat sources.

For sure, the ULOW-E2 can in principle also be used for monovalent operation in new buildings. However, combined operation with other low-temperature heat-emission systems, such as under-floor heating, under-floor convectors, wall heating, &c is particularly recommended. Combined operation is recommended for spaces that require fast room heating and short reaction times (bedroom, fitness room, work space, etc.).

THE UNIQUE ULOW-E2 CONCEPT.

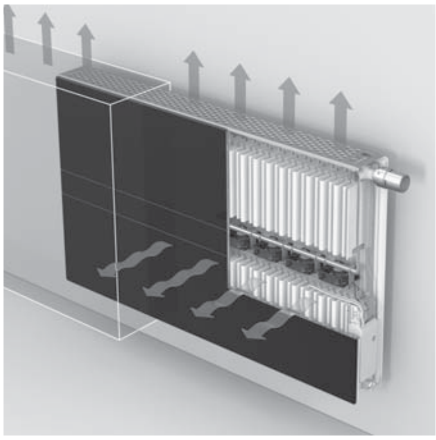
The ULOW-E2 as compared with commercially available fan convectors:

- Fan convectors generally provide either no radiant warmth or only very little. The ULOW-E2 combines convection and radiant heat, thanks to its water-charged panels.
- In static operation the ULOW-E2 is superior to commercially available fan convectors on account of its high level of basic performance. This is because aluminium heat exchangers without fan support are less efficient.
- With most fan convectors, the fans are switched on whenever the heater is in service. The ULOW-E2 has an intelligent control mechanism, which switches automatically between static and dynamic operation. It only starts the fans when it is turned full-on, or when additional output is required.
- Fan convectors are strictly limited in their designer- and architectural pretensions, because of their clumsy construction. With its distinctive 'round-hole-look', the ULOW–E2 sets new standards in radiator design. Its slim profile and elegant plane surfaces are the perfect complement to any modern living environment.
- Maintenance and cleaning of fan convectors is usually an unpleasant, time-consuming chore. The ULOW-E2, by contrast, can be cleaned just like a standard flat radiator. The rows of fans just pull out to the side, with no tools required.
- With its high performance specifications, the ULOW-E2 offers top of the range price-for-quality value.
- Fan convectors are made up of very many individual parts, some of which are complex and can only be fitted on-site. By comparison, the ULOW-E2 is delivered as a ready-to-plug-in product.
- Fan convectors do not have central connections. With the ULOW-E2 these come as standard across the range, guaranteeing maximum flexibility for planning and installation.
- Installation of fan convectors is expensive and time consuming. The ULOW-E2 can for the most part be installed with no tools needed.



ULOW-E2: slim profile and modern design

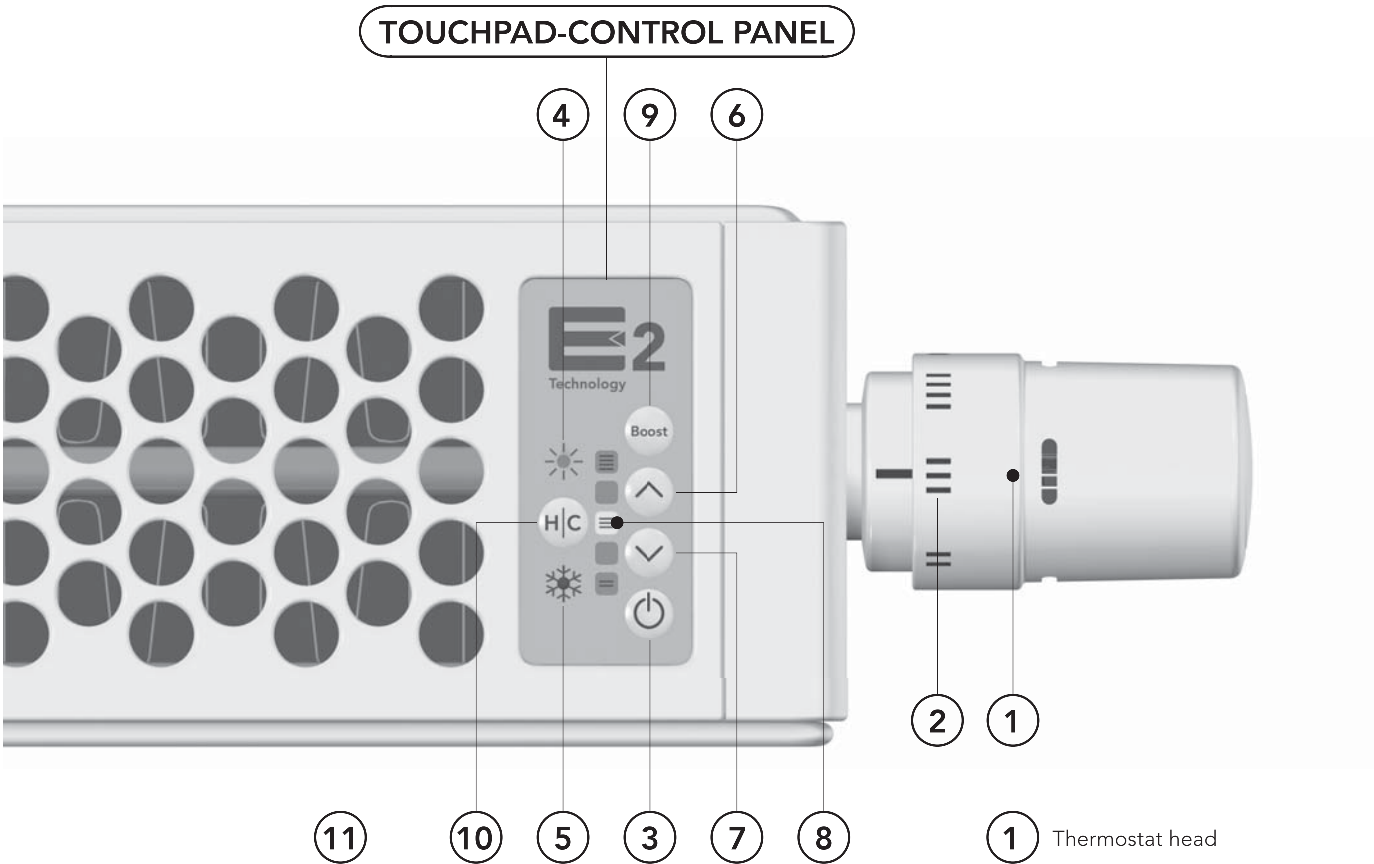
FAN CONVECTORS:
Clumsy appearance and broad bulky structure

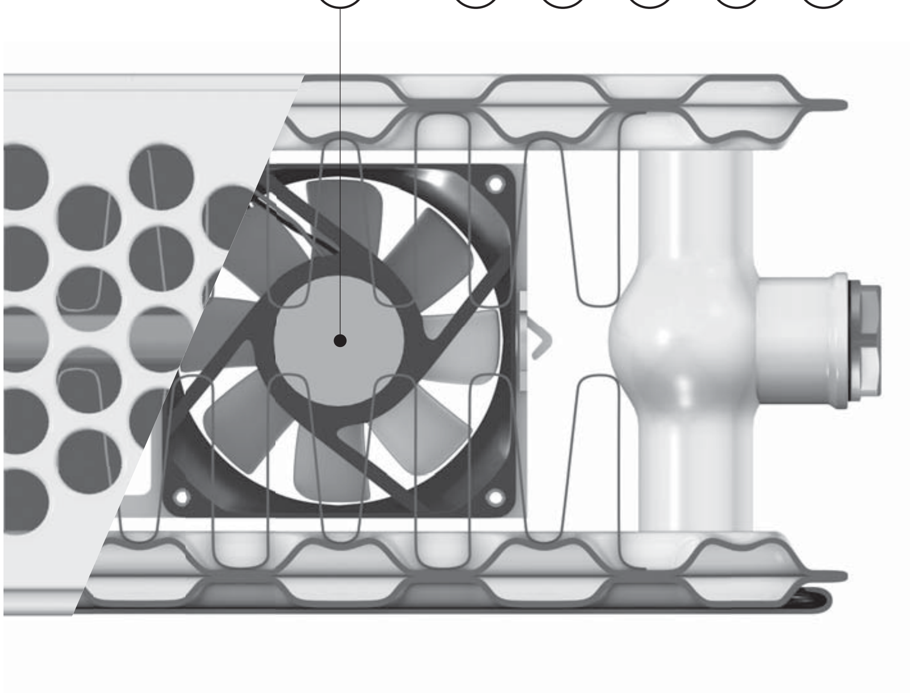


ULOW-E2: radiant heat and convection

FAN CONVECTORS:
little radiant heat

Functional and control elements





1. Thermostat head
2. Temperature scale THERMOSTAT
3. main switch ON/OFF
4. Heating icon, RED
5. Cooling icon, BLUE
6. UP button
7. DOWN button
8. Temperature icon
9. Boost button
10. Heating/Cooling button
11. Fans

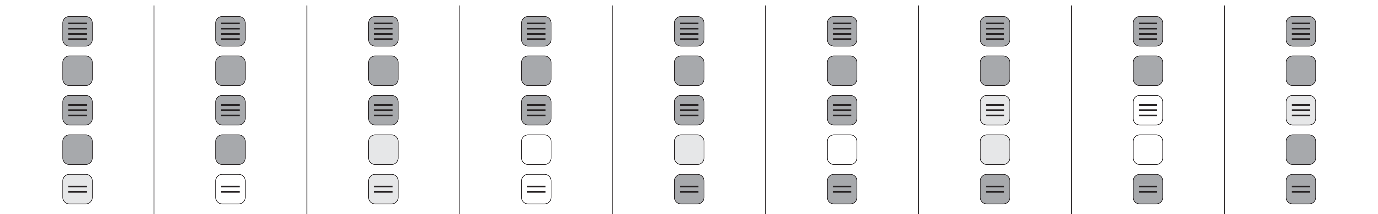
Functional and control elements

Settings instructions

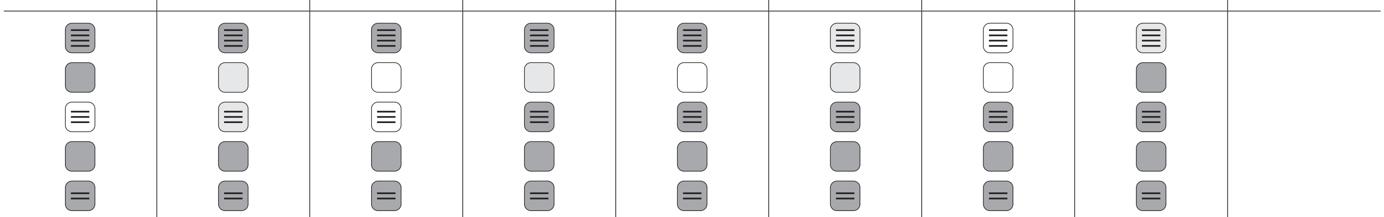
The thermostat head (**1**) is always the radiator's **MAIN CONTROL FUNCTION**, with the temperature scale (**2**) showing the setting selected. The ULOW-E2 is equipped with a clearly arranged **TOUCHPAD CONTROL PANEL**, with which the settings for the radiator's I**NDIVIDUAL FUNCTIONS** can be entered.

The main switch ON/OFF (**3**) switches the electronics on or off. When the heating icon's (**4**) red light shows, the heating mode is on. The factory setting for desired room temperature on first operation is 22° C. With the UP button (**6**) or the DOWN button (**7**) you can reset the temperature in 1° C increments, between 18 and 26° C. The new setting is displayed by the LED temperature icon (**8**).
The Boost button (**9**) activates 'Boost Mode', in which the power to the fans (**11**) is increased to its maximum value.
The maximum duration of 'Boost Mode' is preset by the factory at 120 mins. As

Temperature settings



18 °C 1st LED dimly lights	**18,5 °C** 1st LED strong lights	**19 °C** 1st and 2nd LED dimly lights	**19,5 °C** 1st and 2nd LED strong lights	**20 °C** 2nd LED dimly lights	**20,5 °C** 2nd LED strong lights	**21 °C** 2nd and 3rd LED dimly lights	**21,5 °C** 2nd and 3rd LED strong lights	**22 °C** 3rd LED dimly lights



22,5 °C 3rd LED strong lights	**23 °C** 3rd and 4th LED dimly lights	**23,5 °C** 3rd and 4th LED strong lights	**24 °C** 4th LED dimly lights	**24,5 °C** 4th LED strong lights	**25 °C** 4th and 5th LED dimly lights	**25,5 °C** 4th and 5th LED strong lights	**26 °C** 5th LED dimly lights	

soon as the selected room temperature is reached, the system automatically switches to 'Comfort Mode'.
With the Heating/Cooling button (**10**) you can switch from heating operation to cooling operation, and the cooling icon (**5**) lights up in blue.
For "Dry Comfort Cooling" operation some adaptations in the boiler house will be needed, particularly to ensure that temperatures do not fall below the dew-point. In addition the thermostat head needs to be fully opened anti-clockwise, and with extremely high room temperatures it may also occasionally be necessary to remove the thermostat head.

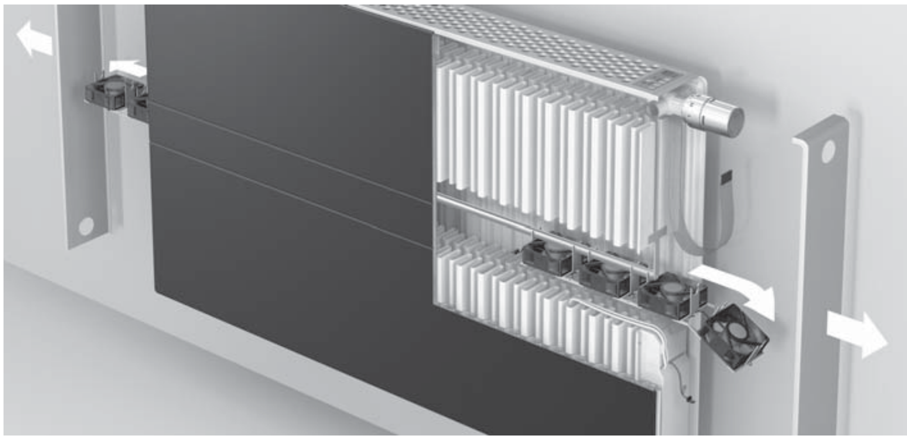
Pressing the Heating/Cooling button (**10**) again activates the "Air Circulation Mode" and the blue cooling icon (**5**) starts to blink. In this case the fans (**11**) operate independently of the temperature sensors. The factory-setting of 12 volts can be reduced to 8 or 5 volts, and vice versa, by pressing the UP (**6**) and DOWN (**7**) buttons. If you press the Heating/Cooling button (**10**) once more, you return to the heating mode.
For more detailed information see the operating instructions, enclosed with every ULOW-E2 low-temperature radiator delivery.

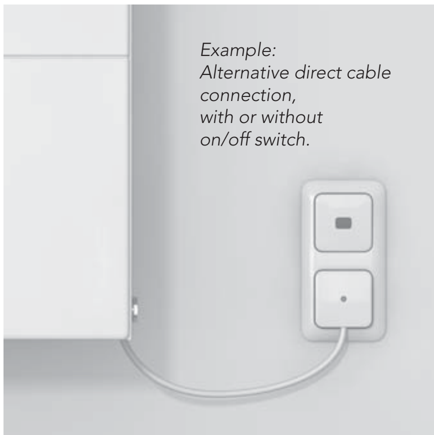
Service access, electrical connection und secure wall mounting

Versatile electrical connection
Connecting the ULOW-E2 to the power supply, can be done in a variety of ways and can fit in with every structural and architectural condition. The position of the cable is fully adjustable within an overall length of 1.20 m.

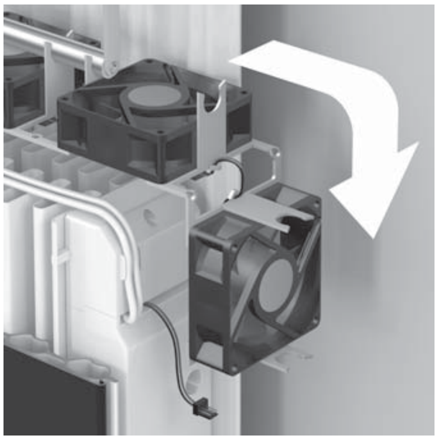
Tool-free service access
What is so special about service access for the ULOW-E2 is that not a single tool is required for removing and replacing the component parts. All functional units and electrical components are freely accessible and can be fitted by means of plug connections and clamp joints. This saves money and time for maintenance and cleaning. A ULOW-E2 is cleaned just the same way as a standard flat radiator. The fans sit on gliding cradles and can easily be slid out or in from the side of the radiator.

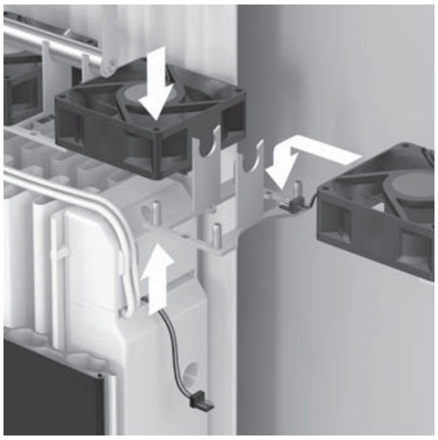
Example:
Standard plug connection.





Example:
Alternative direct cable connection,
with or without
on/off switch.





The sliding cradles for the fans are made of extremely flexible and resistant plastic. They can be bent to an angle of 90°. This is particularly useful for narrow niches and narrow side clearance with walls. Should the fan need to be replaced, press down the sliding cradle by hand and remove it from the plug connection/clamp-joint.

Secure wall installation
For wall-mounting the ULOW-E2, use only mounting brackets or wall-mounting systems with integrated connection locking.

Technical specification

Connections:
4 x G ½ internal thread and
2 x G ¾ external thread, underside centre.

Maximum positive operating pressure:
Standard design: 10 bar

Maximum operating temperature: 60 °C

Safety class: IP14
Supply voltage: 230 V

Material: cold-rolled sheet steel conforming to EN 442-1, 1 mm thick zinc-plated front panel.

Connecting dimensions: central distance between supply and return 50 mm.

Casing: consists of a perforated metal top-cover and two closed removable side panels.

Coating: 1. Primer coating conforming to DIN 55900 part 1, stoved at 190° C;
2. Especially robust electrostatic powder coating conforming to DIN 55900 part 2, in RAL 9016, stoved at 210° C.

Standard design: powder coating in RAL 9016 (Traffic White).

Packaging: 1. Cardboard packaging; 2. Edge protection; 3. Shrink wrapped.
The device can be installed in packaging.

Connection modes: all models are factory-fitted with mounting brackets and can optionally be connected as valve radiators with central connection or as compact radiators. With single-pipe systems, a one-pipe manifold is absolutely essential. The side panels and top-cover are allowed for in the performance specifications.

Noise levels: comfort operation: between 20 and 25 dB; boost operation: 34 dB.
These values apply at a distance of 2m, in conformity with VDI 2081.
(Overall dimensions: 600 x 1000 mm).

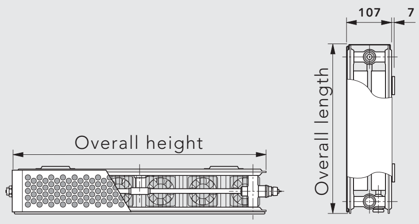
Scope of delivery: thermostat valve with factory-adjusted k_v configurations including mounting cap; drain plug, dummy plug and special vent plug, all factory sealed; as well as completely pre-installed fan sets with microprocessor and thermistor control unit; an integrated low-voltage transformer with ready to plug in mains cable; and a visually attractive operating panel (in the top cover), all included in the purchase price.

Not designed for use with free-standing console-feet!

ULOW-E2 LOW-TEMPERATURE RADIATOR

Heat outputs

Heat outputs - ULOW-E2, model 22 PTM



Mode of operation		Static operation			Comfort operation			Boost operation		
Overall height (mm)		500	600	900	500	600	900	500	600	900
Radiator exponent n (for 45/35/20, 40/35/20 und 35/30/20)		1,305	1,317	1,339	1,139	1,129	1,164	1,112	1,112	1,106
Overall length (mm)										
400	45/35/20	163	184	233	252	272	324	294	317	375
	40/35/20	140	157	198	220	238	282	257	277	328
	35/30/20	89	100	126	149	162	189	176	189	225
600	45/35/20	245	276	349	379	409	486	440	475	562
	40/35/20	210	236	298	331	357	423	385	416	492
	35/30/20	134	150	188	224	242	284	263	284	337
800	45/35/20	327	368	466	505	545	648	587	634	750
	40/35/20	280	314	397	441	476	564	514	554	656
	35/30/20	179	200	251	298	323	378	351	378	450
1000	45/35/20	409	460	582	631	681	810	734	792	937
	40/35/20	349	393	496	551	595	705	642	693	820
	35/30/20	224	250	314	373	404	473	439	473	562
1200	45/35/20	490	552	698	757	817	972	881	950	1124
	40/35/20	419	472	595	661	714	846	770	832	984
	35/30/20	268	300	377	448	485	568	527	568	674
1400	45/35/20	572	644	815	883	953	1134	1028	1109	1312
	40/35/20	489	550	694	771	833	987	899	970	1148
	35/30/20	313	350	440	522	566	662	615	662	787
1600	45/35/20	654	736	931	1010	1090	1296	1174	1267	1499
	40/35/20	559	629	794	882	952	1128	1027	1109	1312
	35/30/20	358	400	502	597	646	757	702	757	899
1800	45/35/20	735	828	1048	1136	1226	1458	1321	1426	1687
	40/35/20	629	707	893	992	1071	1269	1156	1247	1476
	35/30/20	402	450	565	671	727	851	790	851	1012
2000	45/35/20	817	920	1164	1262	1362	1620	1468	1584	1874
	40/35/20	699	786	992	1102	1190	1410	1284	1386	1640
	35/30/20	447	500	628	746	808	946	878	946	1124

ULOW-E2 weight

Overall height (mm)		500	600	900
Overall length (mm)	Model	22 PTM	22 PTM	22 PTM
400	kg	15,70	17,59	25,19
600	kg	22,43	25,20	36,57
800	kg	29,18	32,82	47,95
1000	kg	36,11	40,62	59,51
1200	kg	42,85	48,24	70,90
1400	kg	49,69	55,94	82,37
1600	kg	56,53	63,65	93,84
1800	kg	63,46	71,45	105,41
2000	kg	70,20	79,07	116,79

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

T6-CENTRALLY CONNECTED RADIATOR.

Heat emission
The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 11 VM	0445
Type 21 VM-S	0447
Type 22 VM	0448
Type 33VM	0449

and in accordance with OENORM (Austrian standard) EN 442 at the Technological Commercial Museum, Vienna.

Material
T6-CENTRALLY CONNECTED RADIATORS are made of cold-rolled sheet steel, and in accordance with EN 442-1, with a stylish and robust fluting with ribs at 40 mm intervals.

Equipment
Each T6-CENTRAL CONNECTION RADIATOR is equipped with an integrated T-valve set, and suitable for double-pipe and single-pipe systems with a single-pipe manifold; it comes with a fitted valve top with a pre-set k_v-value, a protective cap and welded suspension brackets on the back. The drain plug and the pivoting special vent plug, as well as the dummy plug are fitted with seals. All types of radiator are equipped with a detachable top cover and two closed side panels.

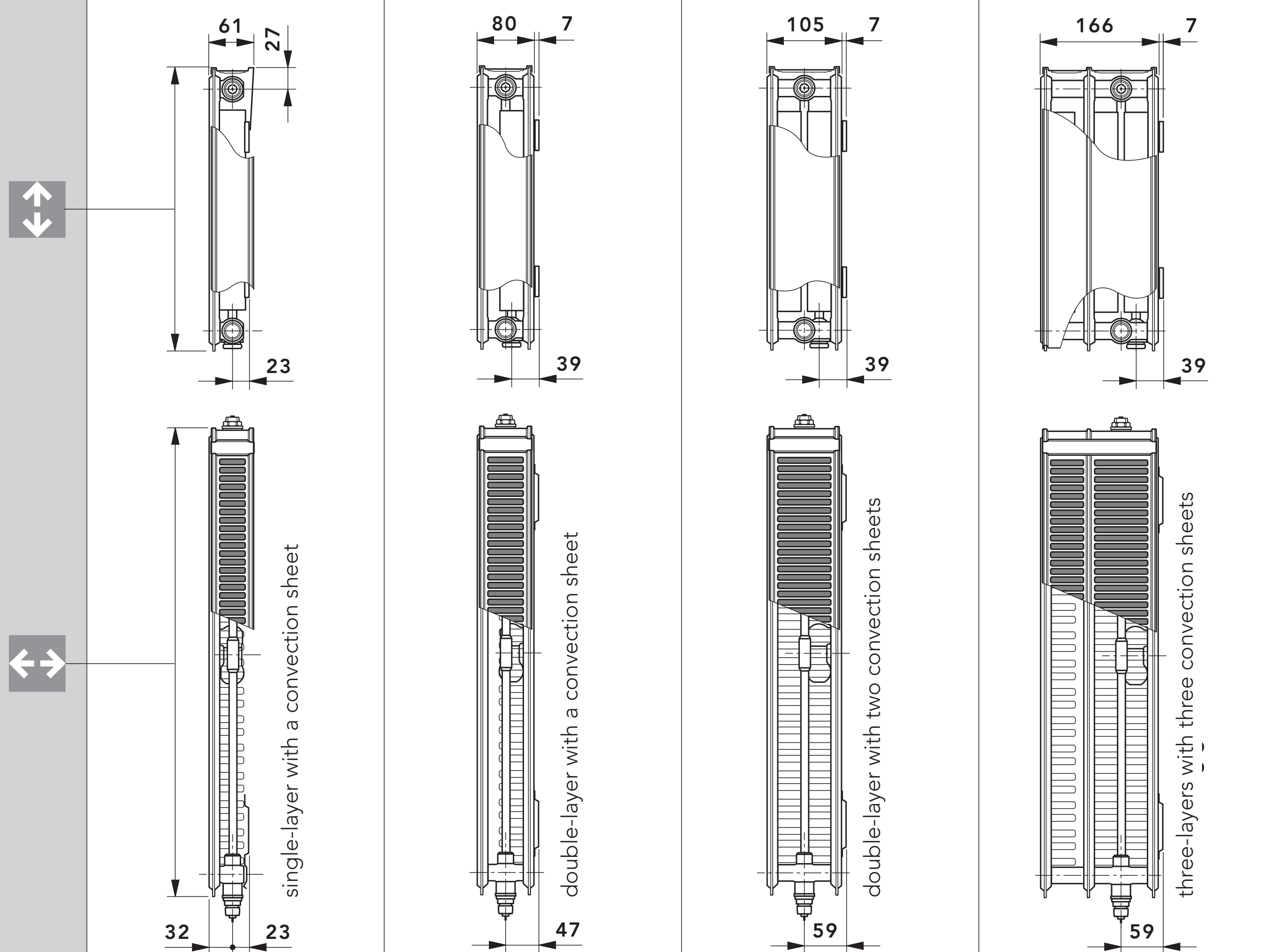
Paint coating
1. Undercoating in accordance with DIN 55900 part 1, stoved at 190° C.
2. Finish in accordance with DIN 55900 part 2, in standard colour 9016 (on request available in many standard colours and sanitary-ware colours at an extra charge), applied electrostatically in a modern powder coating facility. This especially resistant coating is stoved at an object temperature of 210° C.

Packaging
1. Cardboard packaging
2. Edge protection
3. Shrink foil

Overview of models

Overview of models

Type	11 VM	21 VM-S	22 VM	33 VM



Type	11 VM					21 VM-S					22 VM					33 VM				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	up to 2400		up to 2600		up to 2000	up to 2400		up to 3000		up to 2000	up to 3000				up to 2000	up to 3000	up to 2200			up to 1800
Steps	all overall length starting with 400 mm available in steps of 200 mm, additionally 520, 720, 920, 1120 and 1320 mm																			

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Description and delivery equipment

The T6-CENTRALLY CONNECTED RADIATOR, with its welded-in set of T-shaped valves, sets new standards in the field of centre-connection technology. Besides its elegant appearance, the T6-CENTRALLY CONNECTED RADIATOR grabs the attention because of its unique patented features. It is suitable for all purposes and easy for the heating engineer to install. It also has many other striking advantages, as listed below:

T6-CENTRALLY CONNECTED COMPLETE RADIATORS -
wall bracket fastenings make this a flexible solution

VARIABLE CONNECTIONS -
the built-in valve and its thermostat head can be switched from the right to the left-hand side – with no need to turn the radiator and without crossing over the supply and return.

VARIABLE TYPES -
with all multi-layered radiators the distance between the connection and the wall is standardised (this also applies to all single-layered radiators, if a special angle fish-plate is used).

VARIABLE SIZES -
you are free to choose the overall radiator length and height at any time, and even subsequently change your mind.

PERFECT PRE-ASSEMBLY -
fitting pre-installation piping and system testing are possible even without having the radiators there.

Consequently T6-CENTRALLY CONNECTED RADIATOR truly serves to solve your problems. To round off all the advantages mentioned before, the versatility of the T6-CENTRALLY CONNECTED RADIATOR regarding style and colouring offers a wide scope for design. By using the removable, unique and colourful decor-clips you can give individuality, also subsequently.

The T6-CENTRALLY CONNECTED RADIATOR is - with its welded in set of T-shaped valves - suitable for double-pipe installations as well as single-pipe installations, using a single-pipe manifold.

Additionally to the central connection from the bottom, the sophisticated design makes possible other connections used at compact radiators, such as the single-sided and two-sided connection. **Radiators are delivered ready for double-pipe installation and with a factory-adjusted k_v-setting, appropriate to the radiator output.**

For district heating installations with a big difference between water supply and return temperature, a valve unit that allows a precise and stepless adjustment is available on request.

By using universal supply and return connections, commercially available pipes (external thread 3⁄4“) made of copper, steel, plastic or alloy, can be connected; the corresponding accessories and the commercially obtainable shut-off valve have to be used.

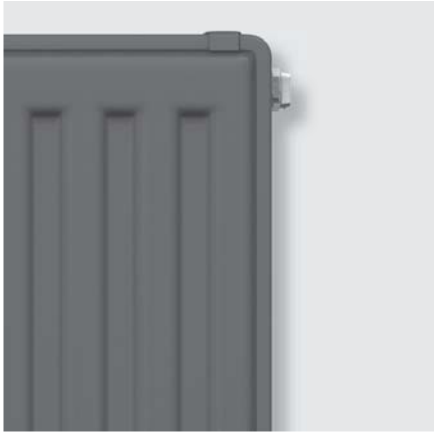
The following thermostat heads can be directly fitted at the radiator: „RA 2000“ and „RAW“ by Danfoss, „VK“ by Heimeier, „D“ by Herz, „thera DA“ by MNG, as well as „UNI XD“ by Oventrop. The radiator will be delivered with a protective cap.

The operation parameters are specified with a positive operating pressure of 10 bar and an operating temperature of 110° C. With single-pipe installations, a cycle’s maximum radiator power of about 10 kW at $\Delta T=T_1-T_2=20$ K (at $T_1 = 90°$ C) has to be taken into account.

Thus the T6-CENTRALLY CONNECTED RADIATOR has to be regarded as revolutionary for the new generation of centrally-connected radiators. With this type of radiator - with its ideal functioning of the whole radiator-valve unit, its superb heating output, compared with the motivation to install thermostat heads, saving heating energy becomes evident.

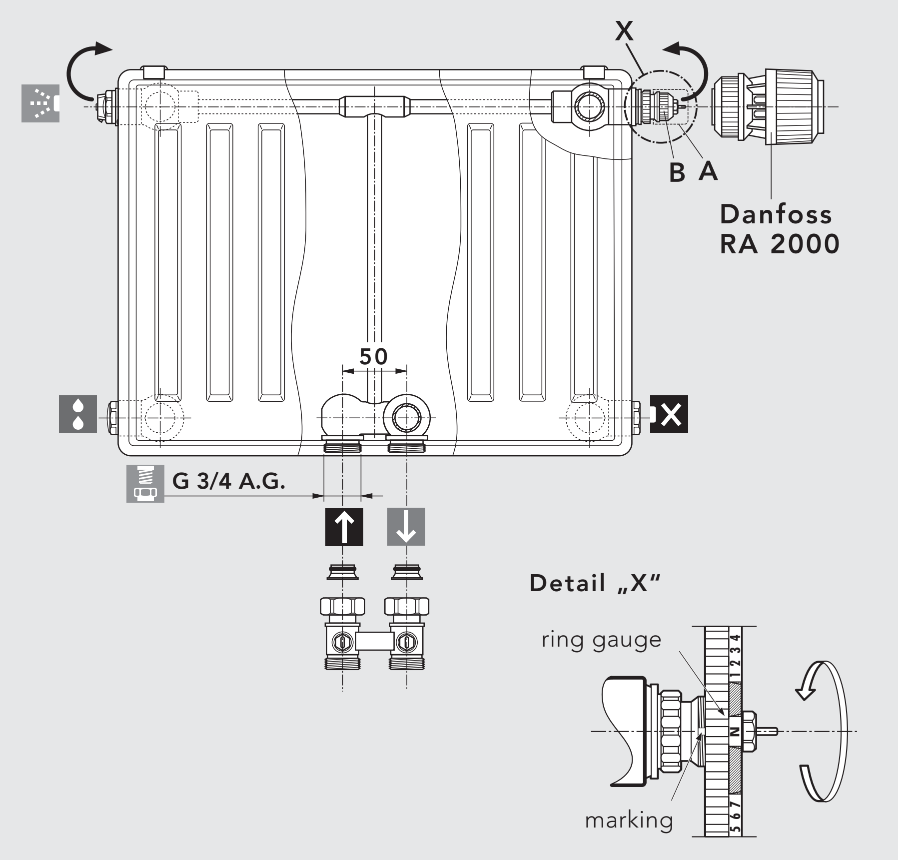
Our valve radiators’ connections (external thread G 3⁄4“) comply in construction and tolerance with the specifications, in accordance with DIN V 3838. If conically sealed drain cocks are used (single-pipe and double-pipe operation), where an adjustment of tolerance of distance to the centre is not possible, we must repudiate liability for any damage connected to this.

Therefore we recommend to use only flat sealed drain cocks, or drain cocks where an adjustment of tolerance of the distance to the centre is possible.



T6 AND T6-HYGIENE CENTRALLY CONNECTED RADIATOR

Double-pipe operation - Adjustment tips for built-in valve



Setting instructions:
VOGEL&NOOT valve radiators are factory-fitted for double-pipe installations. Each individual radiator is fitted with a pre-adjusted valve insert, appropriate to the radiator output. The pre-set k_v-value is also marked in colour on the front surface.

Please note:
Should customised adjustments be required, the pre-set kv-values can be altered as needed.
Swapping the right-hand side built-in valve to the left-hand side is no problem at all at any time.
Radiator are delivered with protective caps. After removing the protective cap (pos. A) the following thermostat heads can be fitted directly to the built-in valve (pos. B): **"RA 2000", "RAW" by Danfoss, "VK" by Heimeier, "D" by Herz, "thera DA" by MNG and "UNI XD" by Oventrop.**

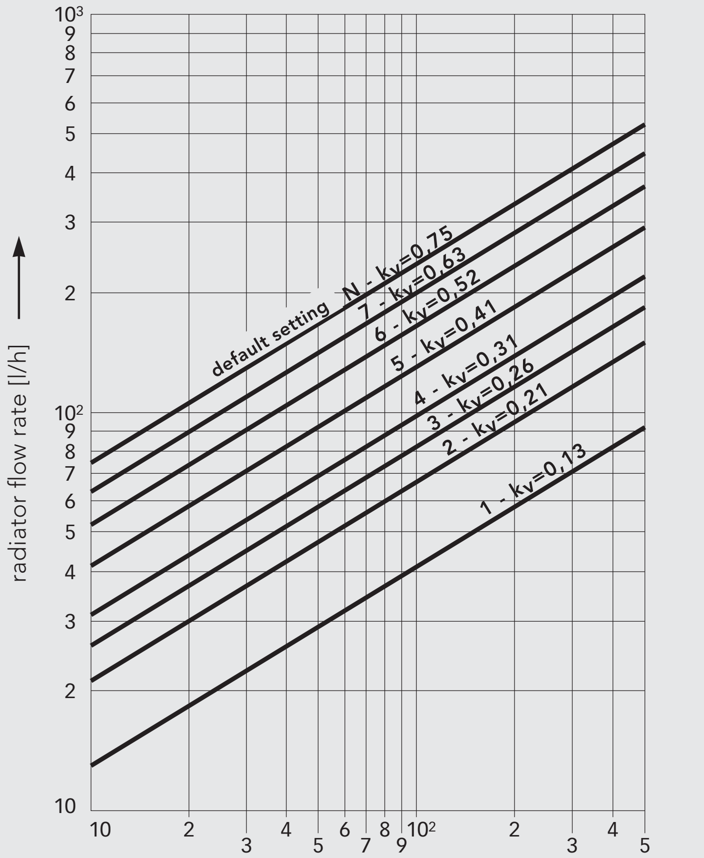
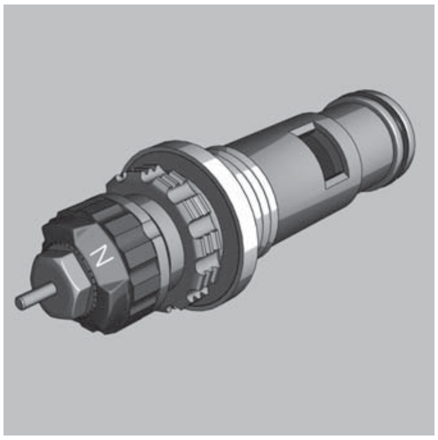


Chart 1
Pressure drop [mbar] – double-pipe operation with a proportional deviation of 2K.



k_v-value chart					
Pre-setting	1,1	3,9	5,2	6,5	N
kv-value up to	0,13	0,30	0,42	0,56	0,72
Colour of the adjustment ring	white	black	green	blue	red

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

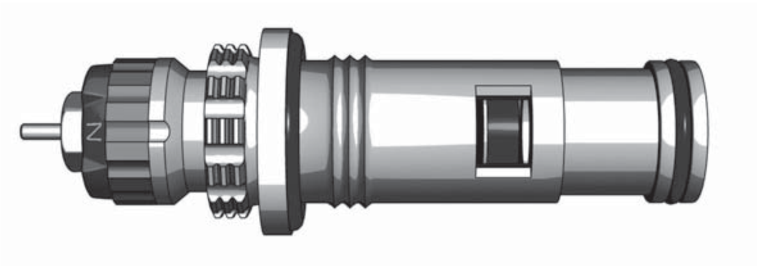
Hydraulic calibration

The hydraulic calibration of the heat emission system has two essential effects: saving on energy costs and CO_2 reduction. It ensures that all radiators receive the required flow rate of heating water. This is the only way that optimal heat output performance be achieved, guaranteeing thermal comfort, with economical and ecologically responsible operation.

Any radiator requires a specific flow rate of heating water, according to its position in the distribution system. The circulation pump serves to distribute heat in all rooms equally and in accordance with the required ambient temperature. Yet, in most systems the warm heating water flows back along the line of least resistance, which is usually through the radiator located next to the circulation pump.

This means that the radiators furthest from the circulation pump are inadequately supplied with heating water, whereas the nearest are oversupplied! Very often the reason why rooms are inadequately heated or overheated is attributed to either an under-size pump or heating sources that are too weak. However, larger pumps, high supply temperatures and heating controls make the negative effects worse: lack of comfort and high energy costs, as well as higher CO_2 emissions and more noise.

The only effective remedy for this is hydraulic calibration, with the appropriate k_v-value, pre-adjusted by the factory. This makes the resistance of all the radiators in the distribution system similar, and they get an optimal rate of heating water flow.



Factory pre-adjustment

VOGEL&NOOT valve radiators are already factory-fitted with pre-set and adjustable valve inserts, appropriate to the heat output. The valve inserts fitted as standard allow for 8 main k_v-value settings and 7 intermediate settings.
The factory-adjusted k_v-value settings include 5 of 15 possible settings, and are calculated for standard heating systems with a pressure difference of 100 mbar.

Advantages of the valve inserts in VOGEL&NOOT valve radiators

Continuously opening and infinitely variable control apron

- Finer adjustment
- Reliable operation
- More easily cleaned valve inserts

Colour-coded valves

- Set k_v-value immediately visible

The advantages of factory-adjusted valve settings

- Optimal hydraulic calibration for buildings with operational areas up to 1,000m2
- Better energy evaluation of buildings (DIN EN 18599)
- Credits for the Energy Passport
- Saves time and costs for heating planners, installers and plumbers
- Up to 6% energy saving, after hydraulic calibration
- Up to 20% less energy needed for circulation pump

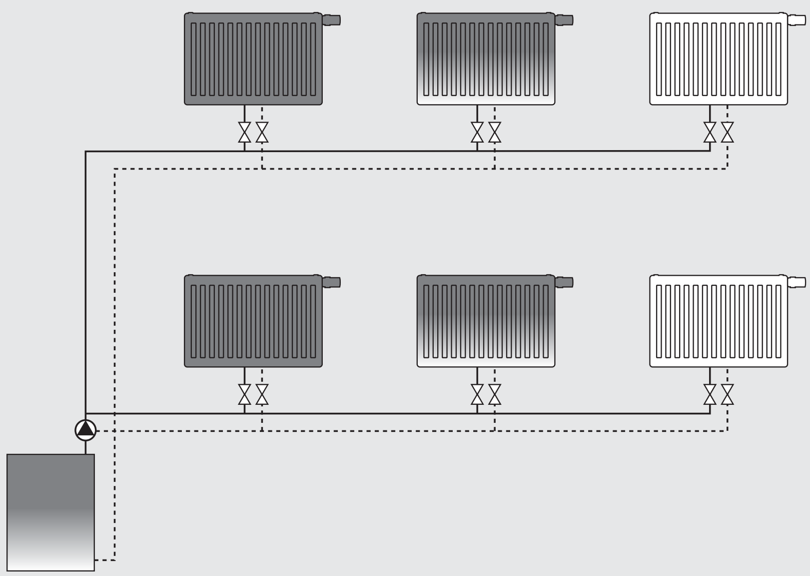
T6-CENTRALLY CONNECTED RADIATOR

Valve pre-adjustment

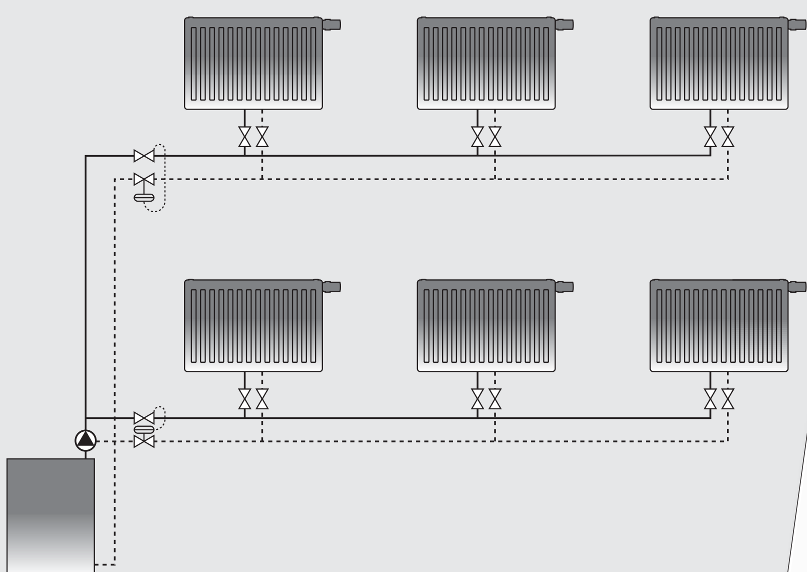
The advantages of hydraulic calibration

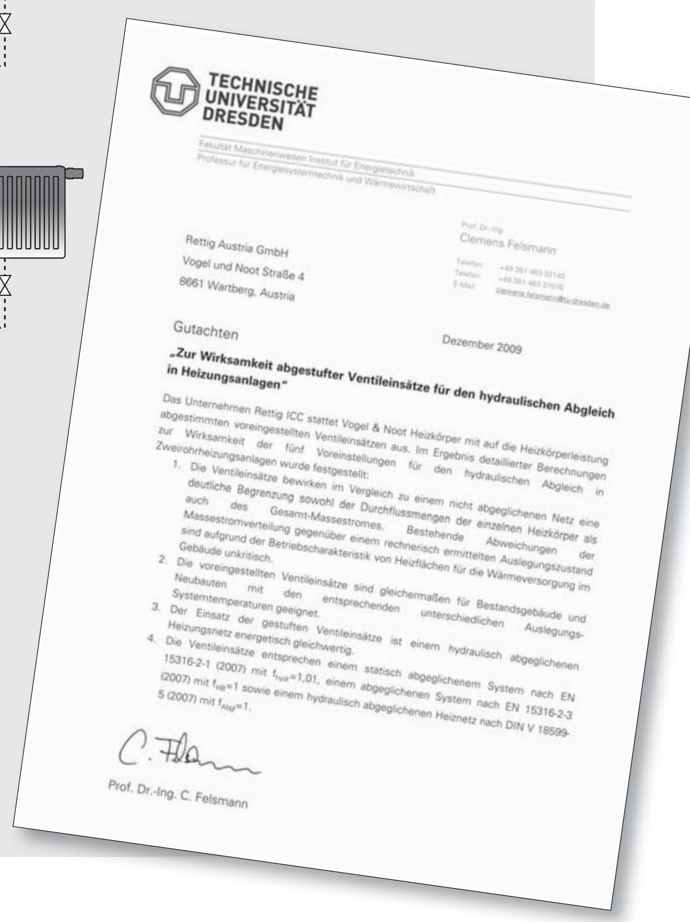
- Up to 6% energy saving
- CO_2 reduction
- Increased comfort
- Complies with Energy-Efficiency regulations

A system without hydraulic calibration



A system with hydraulic calibration





TECHNISCHE UNIVERSITÄT DRESDEN

Fakultät Maschinenwesen Institut für Energietechnik
Professur für Energiesystemtechnik und Wärmewirtschaft

Prof. Dr.-Ing.
Clemens Felsmann

Rettig Austria GmbH
Vogel und Noot Straße 4
8661 Wartberg, Austria

Gutachten

Dezember 2009

„Zur Wirksamkeit abgestufter Ventileinsätze für den hydraulischen Abgleich in Heizungsanlagen"

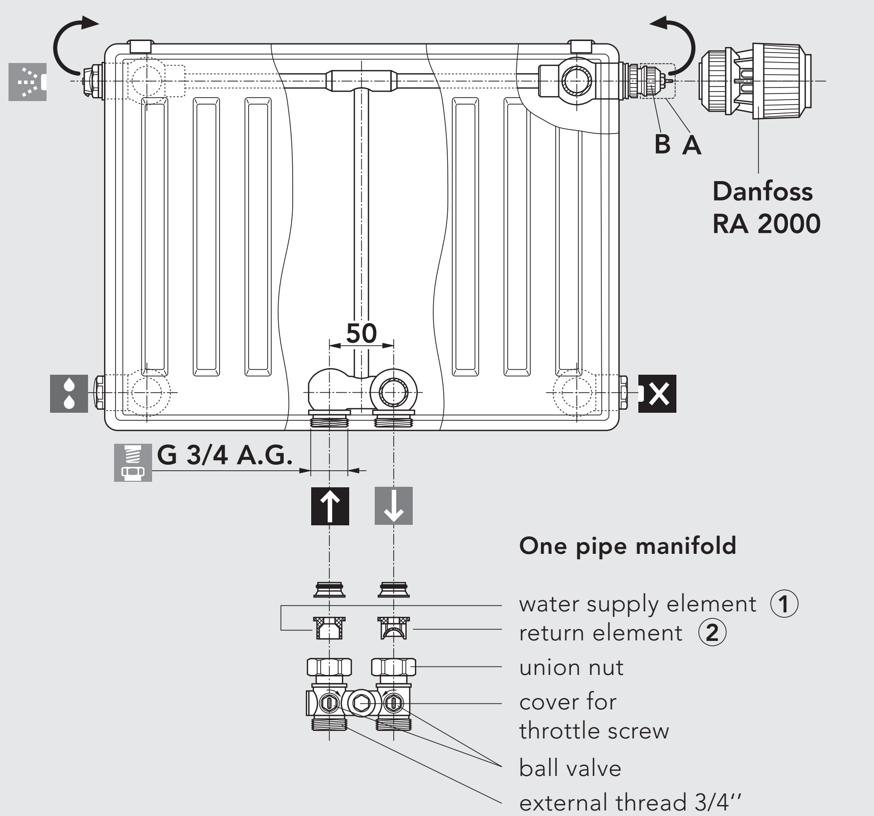
Das Unternehmen Rettig ICC stattet Vogel & Noot Heizkörper mit auf die Heizkörperleistung abgestimmten voreingestellten Ventileinsätzen aus. Im Ergebnis detaillierter Berechnungen zur Wirksamkeit der fünf Voreinstellungen für den hydraulischen Abgleich in Zweirohrheizungsanlagen wurde festgestellt:

1. Die Ventileinsätze bewirken im Vergleich zu einem nicht abgeglichenen Netz eine deutliche Begrenzung sowohl der Durchflussmengen der einzelnen Heizkörper als auch des Gesamt-Massestromes. Bestehende Abweichungen der Massestromverteilung gegenüber einem rechnerisch ermittelten Auslegungszustand sind aufgrund der Betriebscharakteristik von Heizflächen für die Wärmeversorgung im Gebäude unkritisch.
2. Die voreingestellten Ventileinsätze sind gleichermaßen für Bestandsgebäude und Neubauten mit den entsprechenden unterschiedlichen Auslegungs-Systemtemperaturen geeignet.
3. Der Einsatz der gestuften Ventileinsätze ist einem hydraulisch abgeglichenen Heizungsnetz energetisch gleichwertig.
4. Die Ventileinsätze entsprechen einem statisch abgeglichenem System nach EN 15316-2-1 (2007) mit f_{hydr}=1,01, einem abgeglichenen System nach EN 15316-2-3 (2007) mit f_{HB}=1 sowie einem hydraulisch abgeglichenen Heiznetz nach DIN V 18599-5 (2007) mit f_{Abgl}=1.

C. Felsmann

Prof. Dr.-Ing. C. Felsmann

Single-pipe operation - Factory-adjusted built-in valve



In single-pipe operation, setting the built-in valve on N.

The radiator will be delivered with a protective cap. After removing the protective cap (item A) the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000" and „RAW" by Danfoss, „VK" by Heimeier, „theraDA" by MNG, as well as „UNI XD" by Oventrop.**

Caution:
During the installation take care that the return element (2) has been installed at the water return, and the supply element (1) at the water supply.

Changing the built-in valve from the right- to the left-hand side can easily be done at any time.

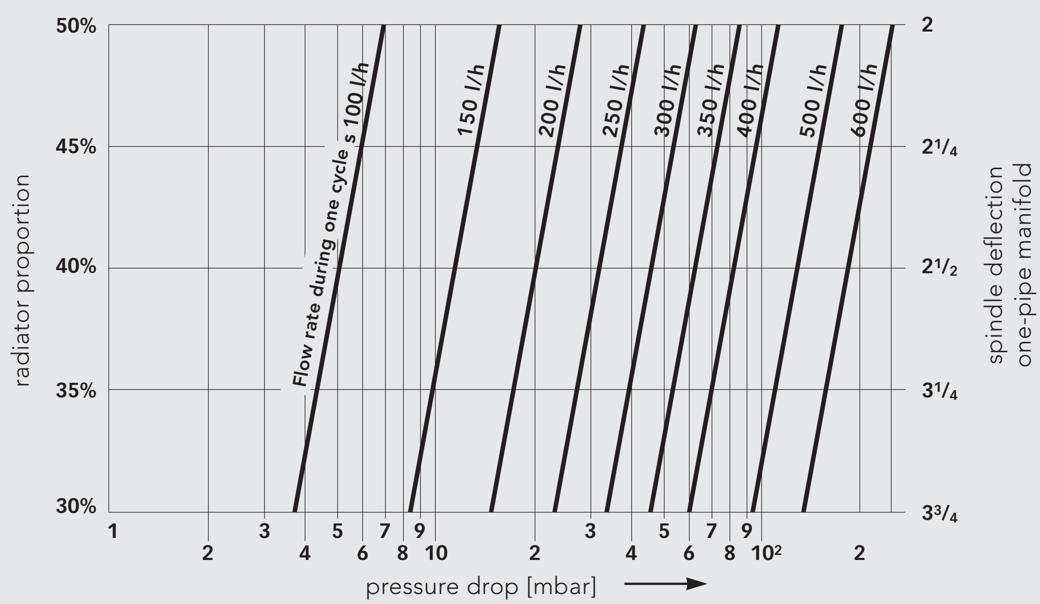


Chart 2
pressure drop [mbar] - single-pipe operation with a proportional deviation of 2K.

Default setting:

radiator proportion 30%: 3,75 revolutions *

radiator proportion 35%: 3,25 revolutions *

radiator proportion 40%: 2,50 revolutions *

radiator proportion 45%: 2,25 revolutions *

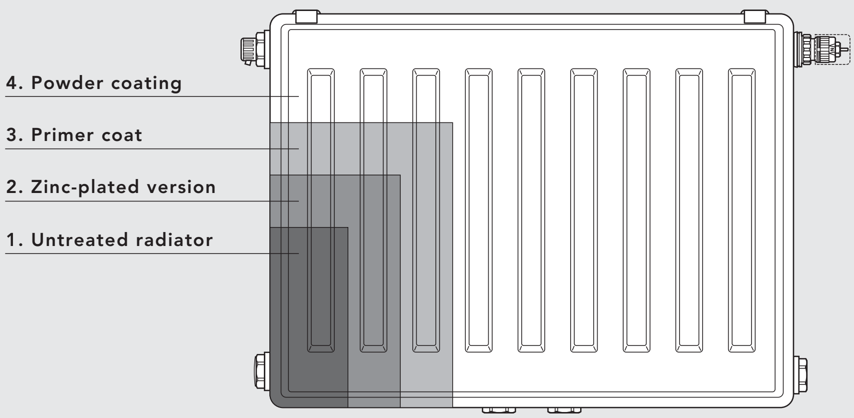
radiator proportion 50%: 2,00 revolutions *

*...when starting, turn the bypass spindle of the one-pipe manifold **to the right** as far as it will go.

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

Please take into account the maximum power per cycle (regarding single-pipe installations) of about 10 kW
$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

Zinc-plated version - COMPACT RADIATORS and T6 CENTRAL CONNECTION RADIATORS



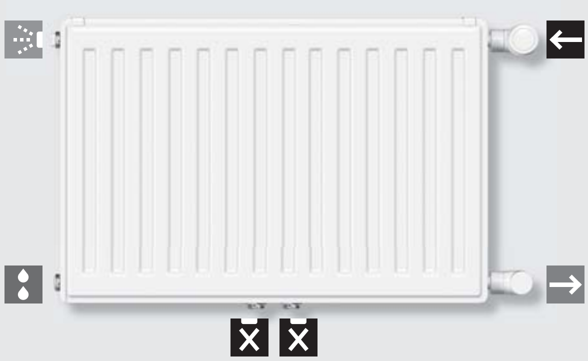
With zinc-plated radiators attention should be paid to special ordering and delivery instructions:

- All models of the series COMPACT RADIATORS and T6 CENTRAL CONNECTION RADIATORS are available
- Production is available only by special request.
- Radiators that have already been manufactured and delivered cannot be returned.
- The delivery period for this radiator is 4 - 6 weeks.
- The production is carried out for an additional charge to the currently recommended retail price.
- Our general warranty conditions apply.

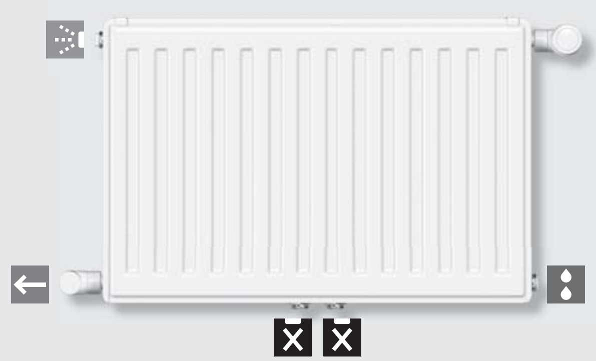
In areas of use that require higher corrosion protection, in rooms with aggressive surroundings and/or humid atmosphere (such as in indoor-swimming pools, saunas, public toilets, &c) we recommend using a zinc-plated version of our COMPACT RADIATORS and T6 CENTRAL CONNECTION RADIATORS. These radiators are galvanised, before the primer coat and powder coating is applied.
Prior to ordering radiators for these areas of use you should get information about the planned location for installing the radiator and in accordance to this, define its limits of use.

Connection modes - double-pipe system

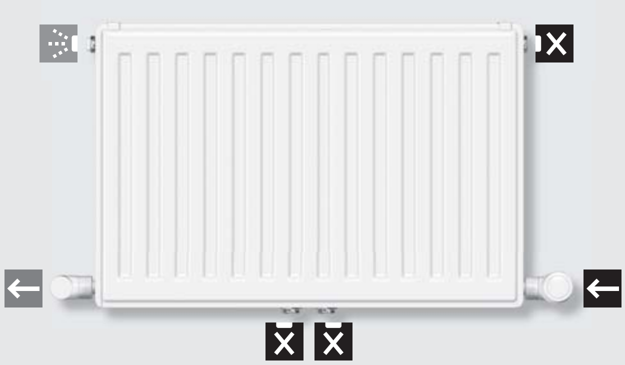
A:Single-sided connection



B: Connection both sides

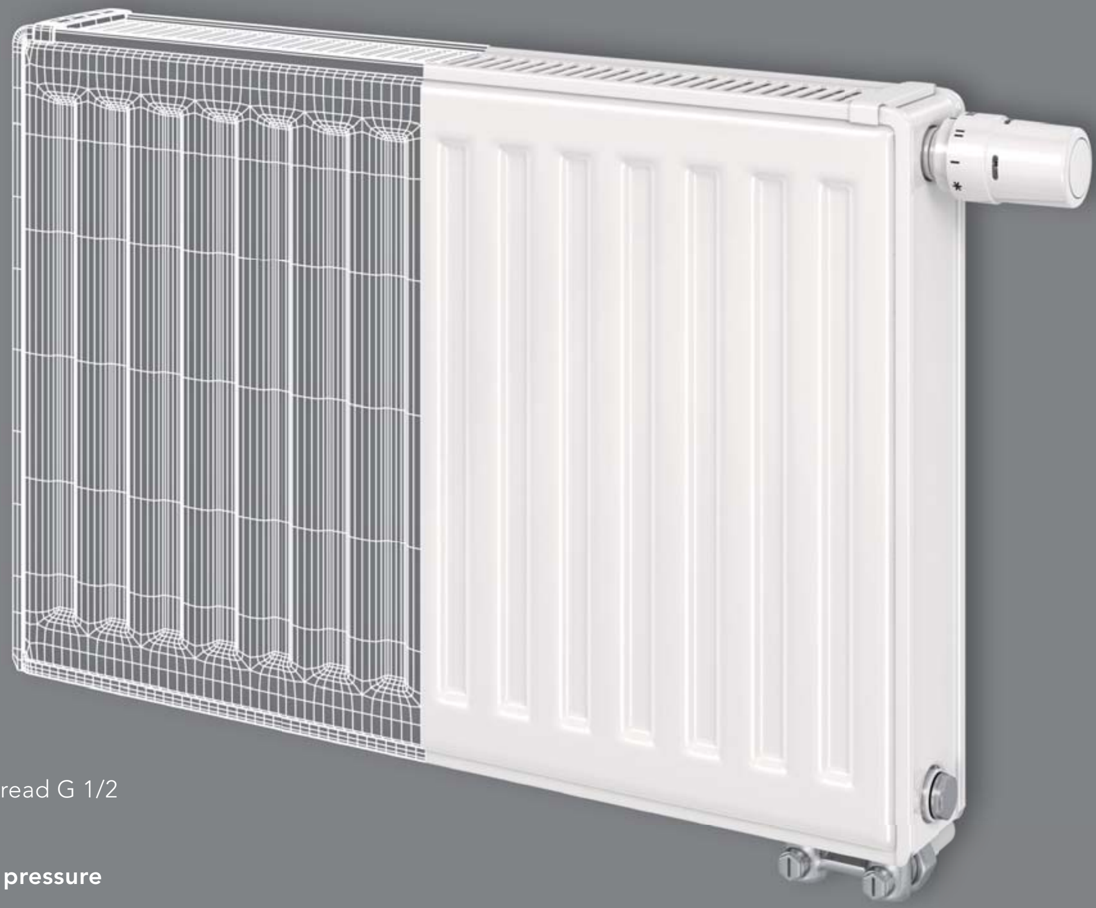


C: Connection on top **Warning: Lower performance**



Caution:
When using the T6-CENTRALLY CONNECTED RADIATOR as a **compact radiator**, the 3/4" screwing caps made of plastic have to be replaced by nickel-plated brass caps (accessory). Available under the item number: AZ0PL000C0002000. Additionally the plastic part of the special vent plug has to be removed.

MULTI-FUNCTIONAL VALVE RADIATOR.



Connections
4 x internal thread G 1/2
2 x G 3/4"

Test positive pressure
13 bar

Max. positive operating pressure 10 bar

Max. operating temperature 110 °C

Heat emission

The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 11 KV	0445
Type 21 KV-S	0447
Type 22 KV	0448
Type 33 KV	0449

and in accordance with OENORM (Austrian standard) EN 442 at the Technological Commercial Museum, Vienna.

Material

MULTI-FUNCTIONAL VALVE RADIATORS are made of cold-rolled sheet steel, in accordance with EN 442-1, with a stylish and robust fluting, with ribs at 40 mm intervals.

Equipment

Each MULTI-FUNCTIONAL VALVE RADIATOR is equipped with an integrated valve set, and suitable for double-pipe and single-pipe systems with a single-pipe manifold; it comes with a fitted valve top with a pre-set k_v-value, a protective cap and welded suspension brackets on the back, (brackets only when defined as such); type 11 only available with brackets. The drain plug and the pivotable vent plug, as well as the dummy plug are fitted with seals. All radiators are equipped with a detachable top cover and two closed side panels.

Paint coating

1. Undercoating in accordance with DIN 55900 part 1, stoved at 190° C.
2. Finish in accordance with DIN 55900 part 2, in standard colour 9016 (on request available in many standard colours and sanitary-ware colours at an extra charge), applied electrostatically in a modern powder coating facility. This especially resistant coating is stoved at an object temperature of 210° C.

Packaging

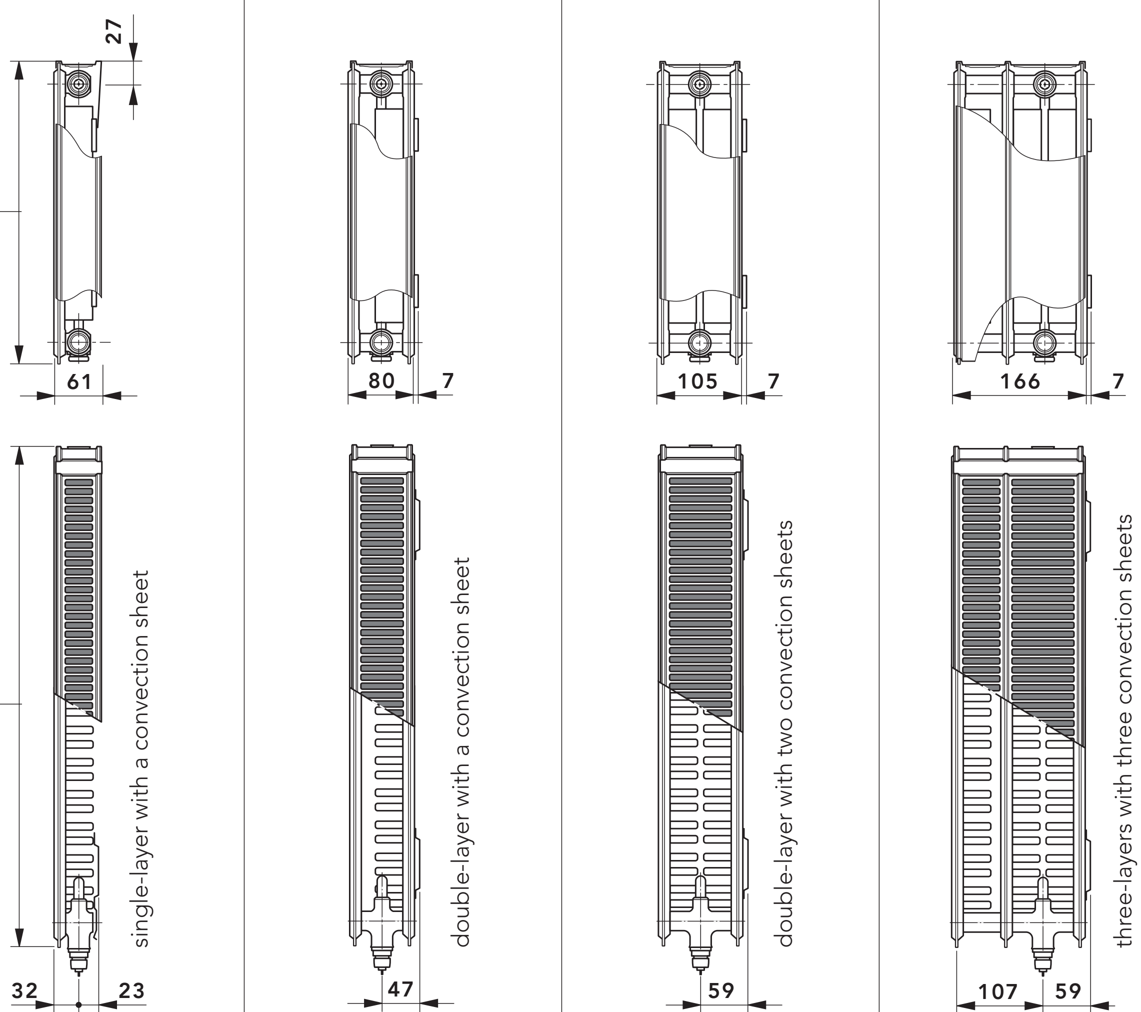
1. Cardboard packaging
2. Edge protection
3. Shrink foil

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Overview of models

Overview of models

Type	11 KV	21 KV-S	22 KV	33 KV



Type	11 KV					21 KV-S					22 KV					33 KV				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	up to 2400		up to 2600		up to 2000	up to 2400		up to 3000		up to 2000	up to 3000				up to 2000	up to 3000	up to 2200			up to 2000
Steps	any overall length starting with 400 mm available in steps of 200 mm, additionally 520, 720, 920, 1120 and 1320 mm																			

Description and delivery equipment

The MULTIFUNCTIONAL VALVE RADIATOR with its welded valve unit has been designed in a most trend-setting way: it can meet all requirements regarding connections.

This radiator will convince you not only because of its simple and fast installation but also because of its versatility and elegant appearance, as the valve unit is covered up by the heating panel.

What's more, through the optimal function of the whole radiator-valve unit, through the maximum heat output and, last but not least, through the motivation to install thermostat heads, saving heating energy becomes evident.

The MULTIFUNCTIONAL VALVE RADIATOR with its welded valve unit is suitable for double-pipe as well as for single-pipe installations, using a one-pipe manifold. Additionally to the connection possibility at the bottom, the sophisticated design also offers connection possibilities, known from compact radiators, such as single-sided or two-sided connections. **The radiator is delivered ready for double-pipe installation, with a factory-adjusted k_v-setting, appropriate to the radiator output.**

For district heating installations with a big difference between water supply and return temperature, a steplessly adjustable valve element is available on request.
By using universal supply and return connections with external thread 3/4", commercially available pipes made of copper, precision steel or plastic, can be connected, using the correspondi-ng accessories and the commercially obtainable shut-off valve.
The decor-clips (standard make in standard colour 9016) offer many possibilities for design. They are available in many standard and sanitary-ware colours, as well as with metallic surfaces, i.e. gilded.

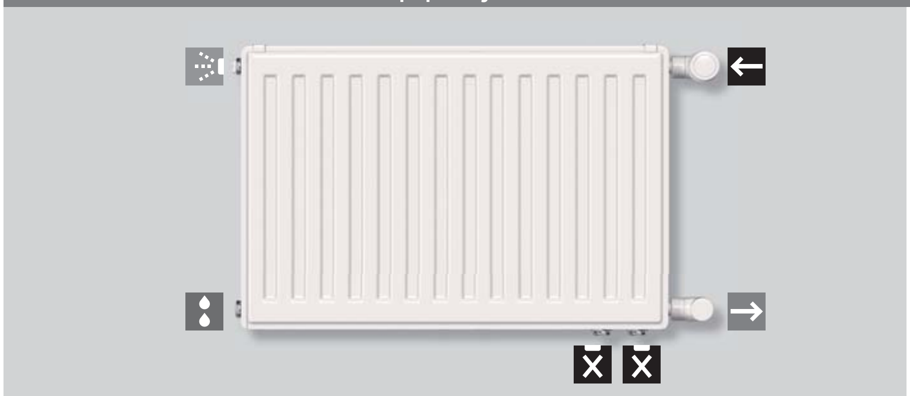
The following thermostat heads can be installed directly onto the radiator: „RA 2000" and „RAW" by Danfoss, „VK" by Heimeier, „theraDA" by MNG, as well as „UNI XD" by Oventrop. At delivery the radiator is equipped with a protective cap.

The operation parameters are specified as follows: positive operating pressure 10 bar, operating temperature 110° C. With single-pipe installations a maximum heat output of about 10 kW at $\Delta T=T_1-T_2=20$ K (at T_1 = 90 °C) per ring has to be taken into accout.

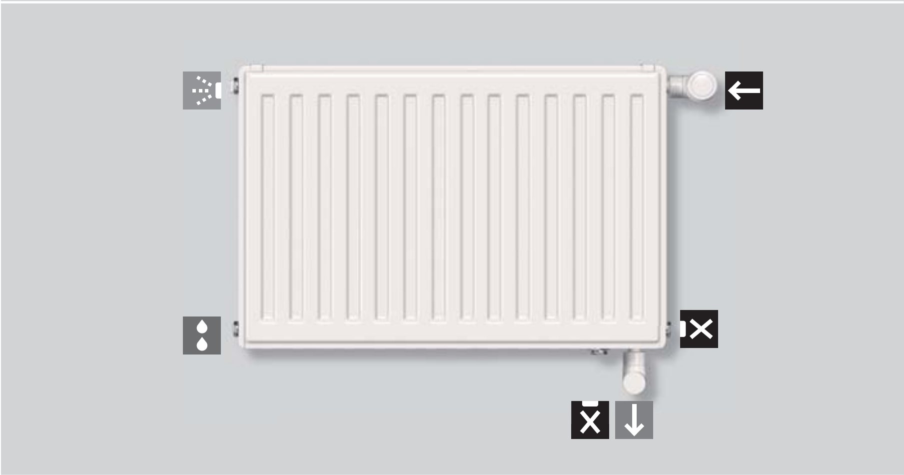
MULTI-FUNCTIONAL VALVE RADIATOR

Connection modes - double-pipe system

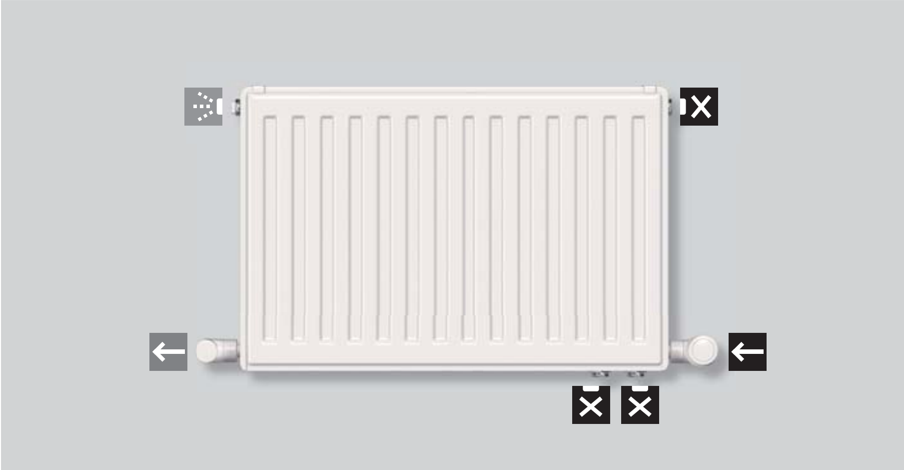
Connection modes - double-pipe system



A:
Single-sided connection

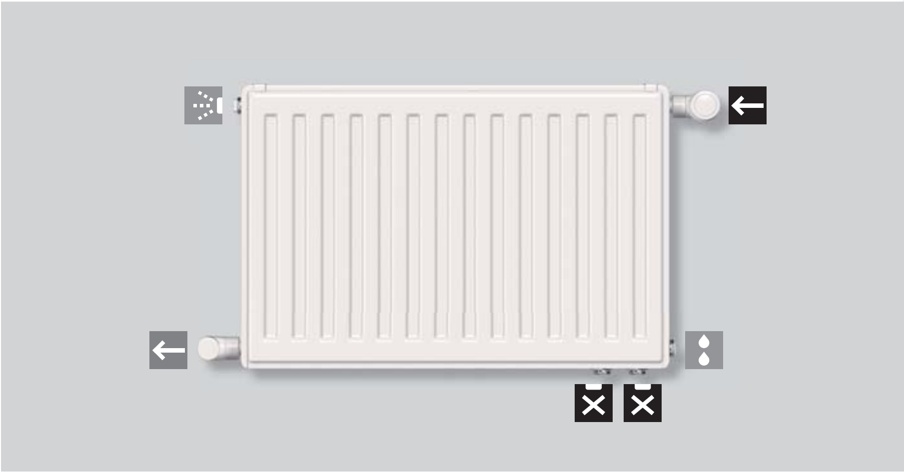


B:
Connection both sides



C:
Connection on top

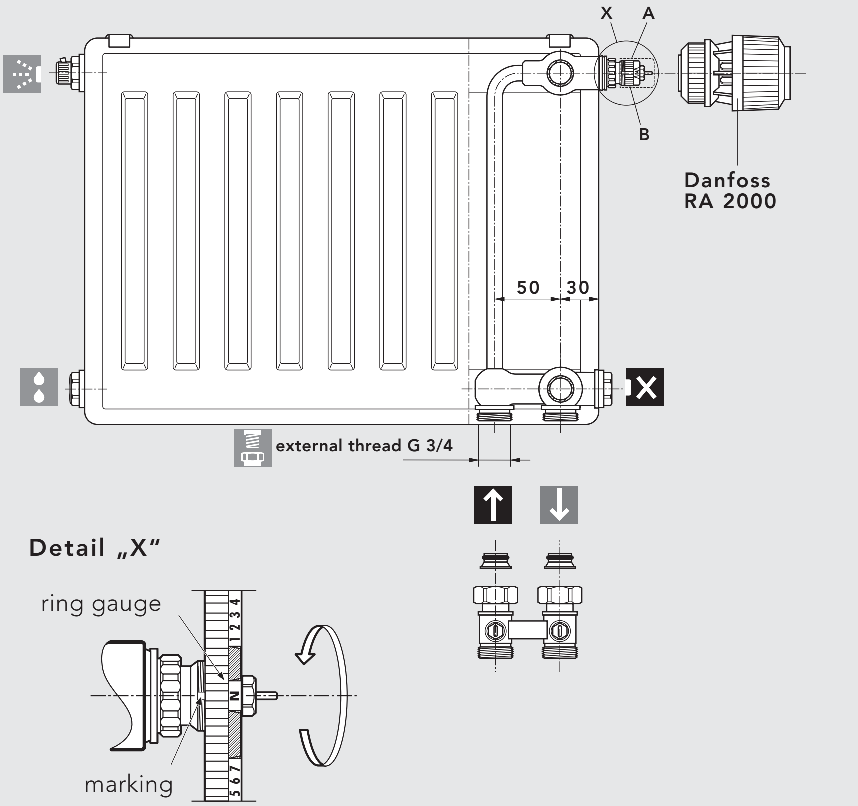
(Warning: Lower performance)



D:
Single-sided connection

Attention:
If the multifunctional valve radiator is used as compact radiator, the crew caps made of plastic have to be replaced by nickel-plated brass caps (accessory).
Order number: AZ0PL000C0002000

Adjustment tips for built-in valve



Setting instructions:
VOGEL&NOOT valve radiators are factory-fitted for double-pipe installations. Each individual radiator is fitted with a pre-adjusted valve insert, appropriate to the radiator output. The preset k_v-value is also marked in colour on the front surface.

Please note:
Should customised adjustments be required, the pre-set k_v-values can be altered as needed.

Radiator are delivered with protective caps. After removing the protective cap (pos. A) the following thermostat heads can be fitted directly to the built-in valve (pos. B): **"RA 2000", "RAW" by Danfoss, "VK" by Heimeier, "D" by Herz, "thera DA" by MNG and "UNI XD" by Oventrop.**

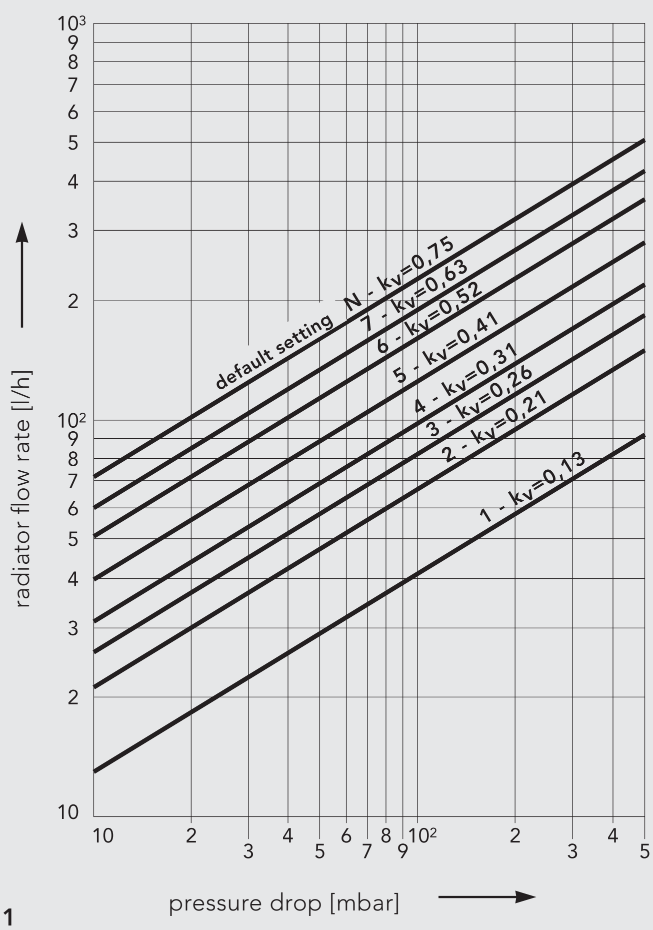
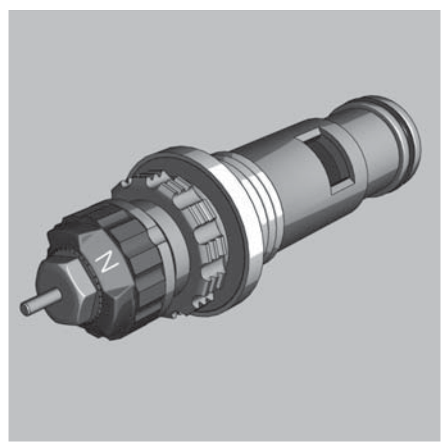


Chart 1
Pressure drop [mbar] – double-pipe operation with a proportional deviation of 2K.

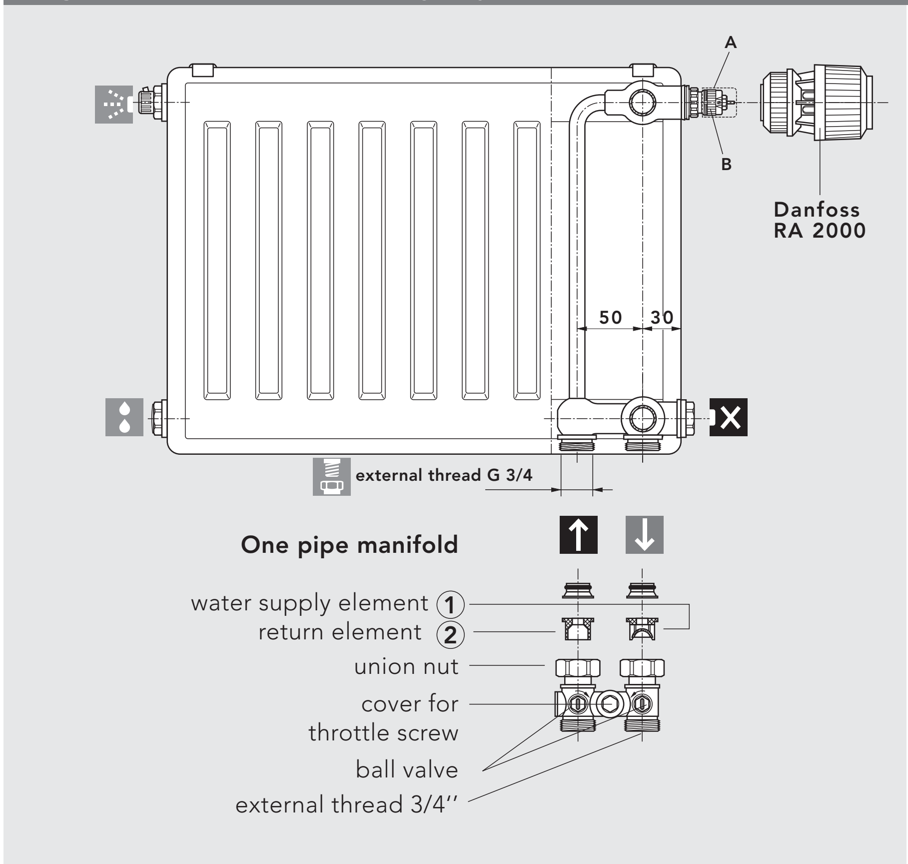


k_v-value chart					
Pre-setting	1,1	3,9	5,2	6,5	N
kv-value up to	0,13	0,30	0,42	0,56	0,72
Colour of the adjustment ring	white	black	green	blue	red

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

Single-pipe operation - factory-adjusted built-in valve

Single-pipe operation - factory-adjusted built-in valve



In single-pipe operation, setting the built-in valve on N.

The radiator will be delivered with a protective cap. After removing the protective cap (item A) the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000" and „RAW" by Danfoss, „VK" by Heimeier, „theraDA" by MNG, as well as „UNI XD" by Oventrop.**

Caution:
During the installation take care that the return element 2 has been installed at the water return, and the supply element 1 at the water supply.

Changing the built-in valve from the right- to the left-hand side can easily be done at any time.

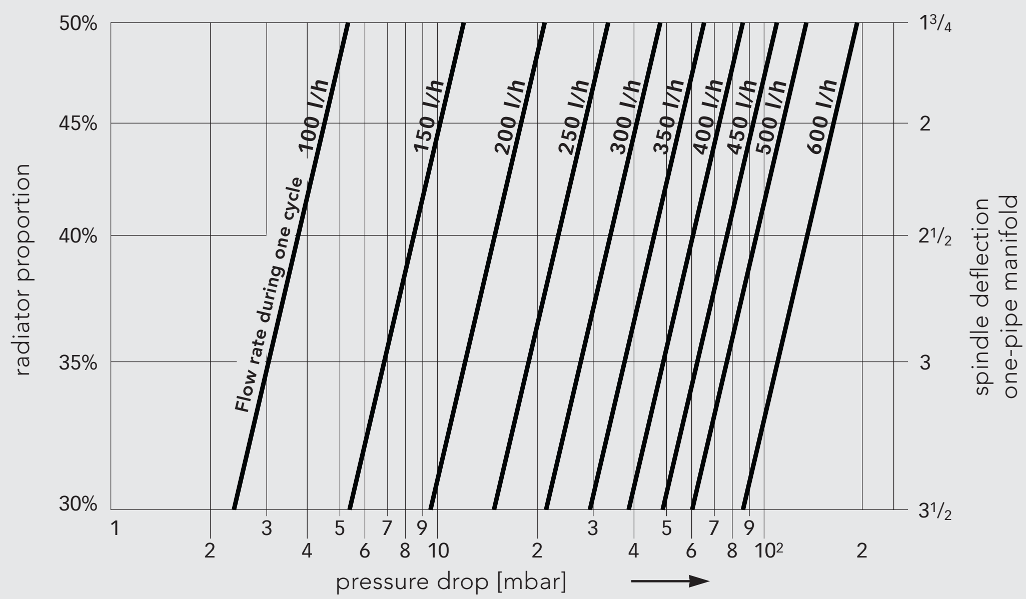


Chart 2
pressure drop [mbar] - single-pipe operation with a proportional deviation of 2K.

Default setting:

radiator proportion 30%: 3,50 revolutions *

radiator proportion 35%: 3,00 revolutions *

radiator proportion 40%: 2,50 revolutions *

radiator proportion 45%: 2,00 revolutions *

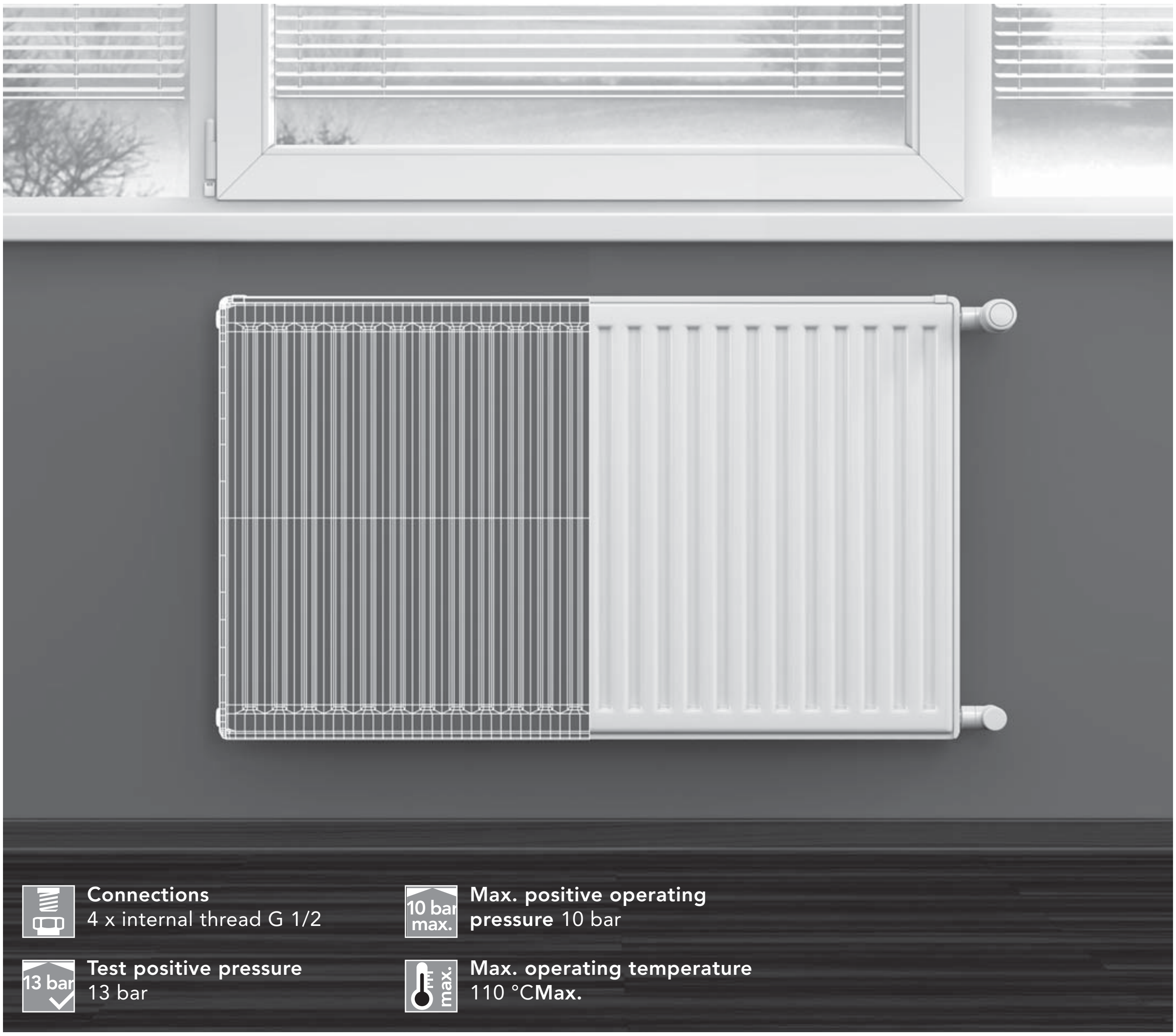
radiator proportion 50%: 1,75 revolutions *

*...when starting, turn the bypass spindle of the one-pipe manifold **to the right** as far as it will go..

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

Please take into account the maximum power per cycle (regarding single-pipe installations) of about 10 kW
$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

COMPACT RADIATOR



Heat emission
The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 10	0443
Type 11 K	0445
Type 21 K-S	0447
Type 22 K	0448
Type 33 K	0449

and in accordance with OENORM (Austrian standard) EN 442 at the Technological Commercial Museum, Vienna.

Material
COMPACT RADIATORS are made of cold-rolled sheet steel, and in accordance with EN 442-1, with a stylish and robust fluting, with ribs at 40 mm intervals.

Equipment
Each COMPACT RADIATOR is equipped with wall brackets that are welded onto the back. The radiator types 11 K, 21 K-S, 22 K and 33 K are equipped with a detachable top cover and two closed side panels.

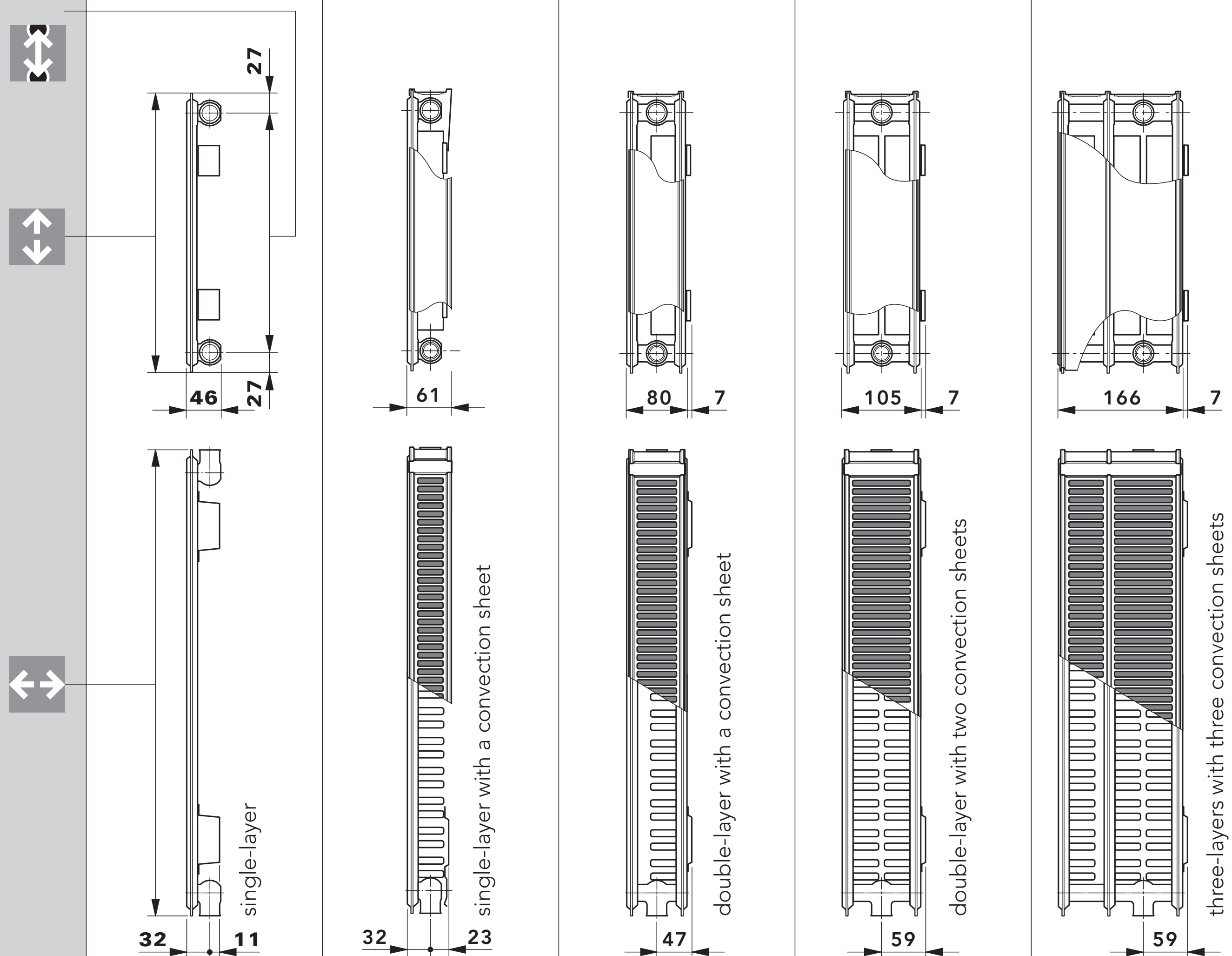
Paint coating
1. Undercoating in accordance with DIN 55900 part 1, stoved at 190° C.
2. Finish in accordance with DIN 55900 part 2, in standard colour 9016 (on request available in many standard colours and sanitary-ware colours at an extra charge), applied electro-statically in a modern powder coating facility. This especially resistant coating is stoved at an object temperature of 210° C.

Packaging
1. Cardboard packaging
2. Edge protection
3. Shrink foil

Overview of models

OVERVIEW OF MODELS

Type	10	11 K	21 K-S	22 K	33 K

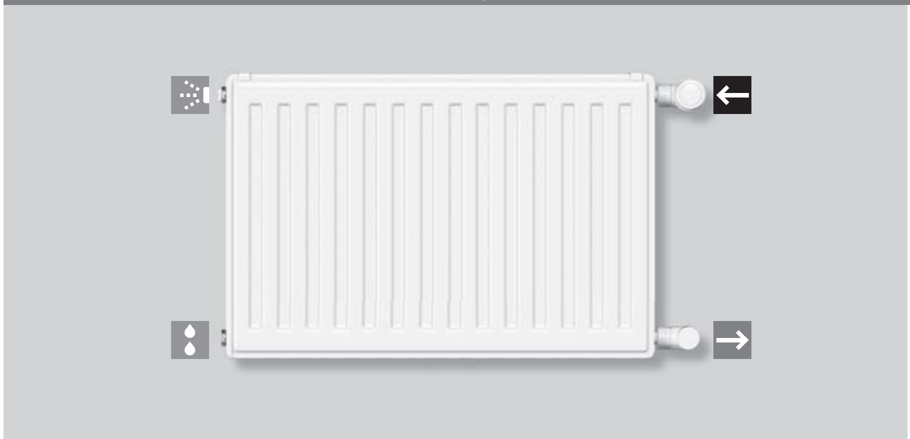


Type	10					11 K					21 K-S					22 K					33 K				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	up to 1200		up to 2400	up to 2600	up to 1400	up to 2400		up to 2600		up to 2000	up to 2400		up to 3000		up to 2000	up to 3000				up to 2000	up to 3000	up to 2200			up to 2000
Steps	all overall length starting with 400 mm available in steps of 200 mm, additionally 520, 720, 920, 1120 and 1320 mm																								

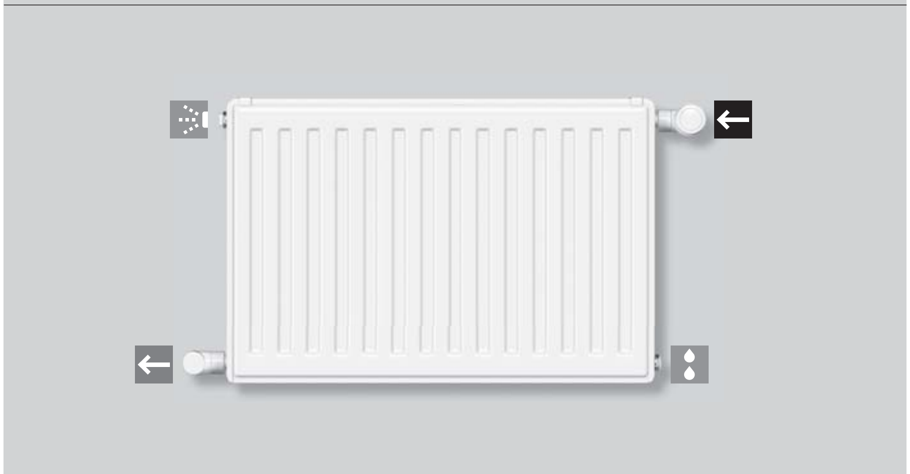
Guarantee statements are available to download at **www.vogelundnoot.com/download**

Connection modes - double-pipe and single-pipe system

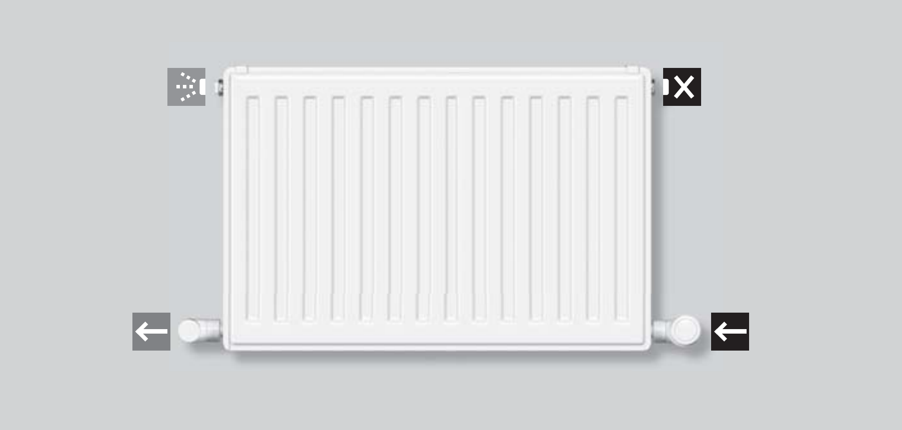
Connection modes - double-pipe system



A: Single-sided connection

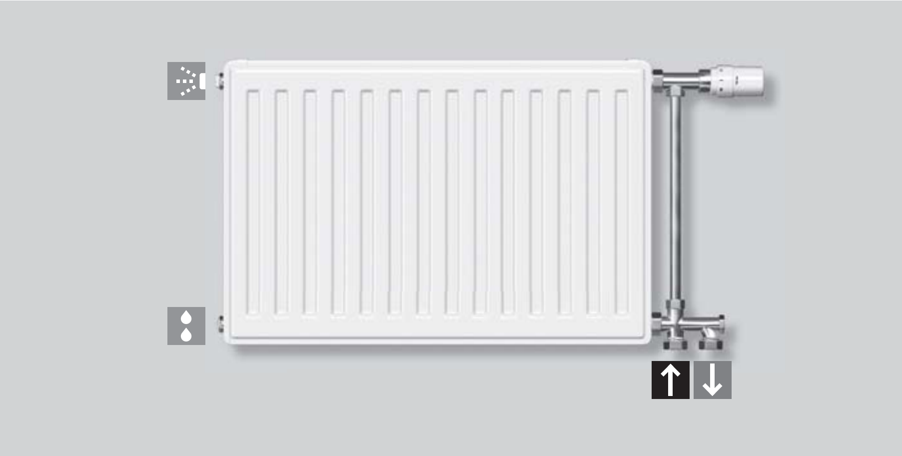


B: Connection both sides



C: Connection on top
Warning: Lower performance

Connection modes - single-pipe system



COMPACT RADIATORS can easily be converted for a single-pipe connection, provided that four-way valves with a by-pass pipe are used.

T6-RADIATOR / MULTI-FUNCTIONAL RADIATOR / COMPACT RADIATOR

Outputs - temperature group 90/70/20° C

90/70/20° C

Side panels and top cover of COMPACT-, T6- and MULTI-FUNCTIONAL VALVE RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **90** - return temperature **70** - room temperature **20° C**

Height [mm]		300					400					500					600					900				
Length [mm]	Type / Power	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM
400	**Watt**	176	288	427	558	796	224	362	534	695	992	271	430	625	787	1140	317	478	689	875	1251	446	659	949	1173	1649
520	**Watt**	228	374	555	725	1035	292	470	694	903	1289	353	559	812	1023	1482	412	621	896	1138	1626	579	856	1233	1524	2144
600	**Watt**	263	432	640	837	1194	337	543	801	1042	1488	407	645	937	1181	1710	475	717	1034	1313	1877	668	988	1423	1759	2474
720	**Watt**	316	518	769	1005	1433	404	651	961	1250	1785	488	774	1124	1417	2052	570	860	1241	1576	2252	802	1186	1707	2111	2969
800	**Watt**	351	576	854	1116	1592	449	723	1068	1389	1984	543	859	1249	1574	2280	634	955	1379	1751	2502	891	1318	1897	2345	3299
920	**Watt**	404	662	982	1284	1830	516	832	1229	1598	2281	624	988	1437	1810	2622	729	1099	1585	2013	2878	1025	1515	2182	2697	3793
1000	**Watt**	439	720	1067	1395	1990	561	904	1335	1737	2479	678	1074	1562	1968	2850	792	1194	1723	2188	3128	1114	1647	2371	2931	4123
1120	**Watt**	492	806	1195	1563	2228	628	1013	1496	1945	2777	760	1203	1749	2204	3192	887	1338	1930	2451	3503	1247	1845	2656	3283	4618
1200	**Watt**	527	864	1281	1674	2388	673	1085	1602	2084	2975	814	1289	1874	2361	3420	951	1433	2068	2626	3753	1337	1977	2846	3518	4948
1320	**Watt**		950	1409	1842	2626		1194	1763	2292	3273	895	1418	2061	2598	3762	1046	1577	2275	2889	4129	1470	2174	3130	3869	5443
1400	**Watt**		1008	1494	1953	2786		1266	1870	2431	3471	950	1504	2186	2755	3990	1109	1672	2412	3064	4379	1559	2306	3320	4104	5772
1600	**Watt**		1152	1708	2232	3183		1447	2137	2778	3967	1085	1719	2499	3149	4560	1268	1911	2757	3501	5004		2635	3794	4690	6597
1800	**Watt**		1296	1921	2511	3581		1628	2404	3126	4463	1221	1934	2811	3542	5130	1426	2150	3102	3939	5630		2965	4269	5276	7422
2000	**Watt**		1440	2135	2790	3979		1809	2671	3473	4959	1357	2149	3123	3936	5700	1585	2389	3446	4377	6255		3294	4743	5863	8246
2200	**Watt**		1584	2348	3069	4377		1989	2938	3820	5455	1492	2363	3435	4329	6271	1743	2628	3791	4814	6881					
2400	**Watt**		1728	2562	3348	4775		2170	3205	4168		1628	2578	3748	4723		1901	2866	4136	5252						
2600	**Watt**				3627	5173				4515			2793	4060	5116		2060	3105	4480	5690						
2800	**Watt**				3907	5571				4862				4372	5510				4825	6127						
3000	**Watt**				4186	5969				5210				4685	5904				5169	6565						
Radiatorexponent n		**1,274**	**1,330**	**1,327**	**1,329**	**1,331**	**1,283**	**1,342**	**1,334**	**1,353**	**1,357**	**1,292**	**1,330**	**1,323**	**1,334**	**1,351**	**1,301**	**1,319**	**1,310**	**1,343**	**1,333**	**1,305**	**1,332**	**1,321**	**1,340**	**1,354**

Type programme		
	COMPACT Radiator	T6-Centrally connected radiator and MULTI-FUNCTIONAL VALVE Radiator

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Outputs - temperature group 75/65/20° C and 70/55/20° C

Panel radiators

75/65/20° C

Side panels and top cover of COMPACT-, T6- and MULTI-FUNCTIONAL VALVE RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **75** - return temperature **65** - room temperature **20° C**

Height [mm]		300					400					500					600					900				
Length [mm]	Type / Power	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM
400	Watt	139	226	335	438	624	178	283	419	543	774	214	337	491	617	891	250	376	543	685	981	351	517	746	918	1288
520	Watt	181	294	436	569	812	231	368	544	706	1007	279	438	638	802	1159	325	488	706	891	1276	457	672	969	1194	1675
600	Watt	209	339	503	657	937	266	425	628	814	1162	322	506	736	926	1337	375	563	814	1028	1472	527	775	1118	1378	1933
720	Watt	251	407	603	788	1124	320	510	754	977	1394	386	607	883	1111	1604	450	676	977	1233	1766	632	930	1342	1653	2319
800	Watt	278	452	670	876	1249	355	566	838	1086	1549	429	674	982	1234	1782	500	751	1086	1370	1962	702	1034	1491	1837	2577
920	Watt	320	520	771	1007	1436	408	651	963	1248	1781	493	776	1129	1420	2050	575	864	1248	1576	2257	808	1189	1715	2112	2963
1000	Watt	348	565	838	1095	1561	444	708	1047	1357	1936	536	843	1227	1543	2228	625	939	1357	1713	2453	878	1292	1864	2296	3221
1120	Watt	390	633	939	1226	1748	497	793	1173	1520	2168	600	944	1374	1728	2495	700	1052	1520	1919	2747	983	1447	2088	2572	3608
1200	Watt	418	678	1006	1314	1873	533	850	1256	1628	2323	643	1012	1472	1852	2674	750	1127	1628	2056	2944	1054	1550	2237	2755	3865
1320	Watt		746	1106	1445	2061		935	1382	1791	2556	708	1113	1620	2037	2941	825	1239	1791	2261	3238	1159	1705	2460	3031	4252
1400	Watt		791	1173	1533	2185		991	1466	1900	2710	750	1180	1718	2160	3119	875	1315	1900	2398	3434	1229	1809	2610	3214	4509
1600	Watt		904	1341	1752	2498		1133	1675	2171	3098	858	1349	1963	2469	3565	1000	1502	2171	2741	3925		2067	2982	3674	5154
1800	Watt		1017	1508	1971	2810		1274	1885	2443	3485	965	1517	2209	2777	4010	1125	1690	2443	3083	4415		2326	3355	4133	5798
2000	Watt		1130	1676	2190	3122		1416	2094	2714	3872	1072	1686	2454	3086	4456	1250	1878	2714	3426	4906		2584	3728	4592	6442
2200	Watt		1243	1844	2409	3434		1558	2303	2985	4259	1179	1855	2699	3395	4902	1375	2066	2985	3769	5397					
2400	Watt		1356	2011	2628	3746		1699	2513	3257		1286	2023	2945	3703		1500	2254	3257	4111						
2600	Watt				2847	4059				3528			2192	3190	4012		1625	2441	3528	4454						
2800	Watt				3066	4371				3800				3436	4320				3800	4796						
3000	Watt				3285	4683				4071				3681	4629				4071	5139						
Radiatorexponent n		1,274	1,330	1,327	1,329	1,331	1,283	1,342	1,334	1,353	1,357	1,292	1,330	1,323	1,334	1,351	1,301	1,319	1,310	1,343	1,333	1,305	1,332	1,321	1,340	1,354

Type programme: COMPACT Radiator; T6-Centrally connected radiator and MULTI-FUNCTIONAL VALVE Radiator

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

70/55/20° C

Side panels and top cover of COMPACT-, T6- and MULTI-FUNCTIONAL VALVE RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **70** - return temperature **55** - room temperature **20° C**

Height [mm]		300					400					500					600					900				
Length [mm]	Type / Power	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM
400	Watt	113	182	270	353	503	144	228	337	436	621	174	272	396	497	716	202	303	439	551	790	284	416	602	739	1034
520	Watt	147	237	351	459	654	187	296	438	566	807	226	353	515	646	930	263	394	570	716	1027	369	541	782	960	1344
600	Watt	170	273	405	529	754	216	342	506	654	932	261	407	594	745	1073	304	455	658	826	1185	426	624	902	1108	1551
720	Watt	204	328	486	635	905	260	410	607	784	1118	313	489	713	894	1288	364	546	790	991	1422	511	749	1083	1330	1861
800	Watt	226	364	540	706	1006	288	455	674	871	1242	348	543	792	994	1431	405	606	877	1102	1580	568	832	1203	1477	2068
920	Watt	260	419	621	812	1157	332	524	775	1002	1429	400	625	911	1143	1646	465	697	1009	1267	1817	653	957	1384	1699	2378
1000	Watt	283	455	675	882	1257	360	569	843	1089	1553	434	679	990	1242	1789	506	758	1097	1377	1975	710	1041	1504	1847	2585
1120	Watt	317	510	756	988	1408	404	638	944	1220	1739	487	761	1108	1391	2003	567	849	1228	1542	2212	795	1165	1684	2068	2895
1200	Watt	340	546	811	1059	1509	433	683	1011	1307	1863	521	815	1188	1491	2147	607	909	1316	1652	2370	852	1249	1805	2216	3102
1320	Watt		601	892	1165	1660		751	1113	1438	2050	574	896	1306	1640	2361	668	1000	1448	1818	2607	938	1374	1985	2438	3412
1400	Watt		637	946	1235	1760		797	1180	1525	2174	608	951	1386	1739	2504	708	1061	1535	1928	2765	994	1457	2106	2585	3618
1600	Watt		728	1081	1412	2012		911	1349	1743	2485	695	1087	1584	1988	2862	809	1212	1755	2203	3160		1665	2406	2955	4135
1800	Watt		819	1216	1588	2263		1025	1517	1961	2795	782	1222	1781	2236	3220	911	1364	1974	2479	3555		1873	2707	3324	4652
2000	Watt		910	1351	1765	2515		1139	1686	2178	3106	869	1358	1979	2485	3578	1012	1516	2193	2754	3951		2081	3008	3693	5169
2200	Watt		1001	1486	1941	2766		1252	1854	2396	3416	956	1494	2177	2733	3935	1113	1667	2413	3030	4346					
2400	Watt		1092	1621	2118	3018		1366	2023	2614		1043	1630	2375	2981		1214	1819	2632	3305						
2600	Watt				2294	3269				2832			1766	2573	3230		1315	1970	2852	3580						
2800	Watt				2470	3521				3050				2771	3478				3071	3856						
3000	Watt				2647	3772				3268				2969	3727				3290	4131						
Radiatorexponent n		1,274	1,330	1,327	1,329	1,331	1,283	1,342	1,334	1,353	1,357	1,292	1,330	1,323	1,334	1,351	1,301	1,319	1,310	1,343	1,333	1,305	1,332	1,321	1,340	1,354

Type programme: COMPACT Radiator; T6-Centrally connected radiator and MULTI-FUNCTIONAL VALVE Radiator

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

T6-RADIATOR / MULTI-FUNCTIONAL RADIATOR / COMPACT RADIATOR

Outputs - temperature group 55/45/20° C and 45/40/20° C

55/45/20° C

Side panels and top cover of COMPACT-, T6- and MULTI-FUNCTIONAL VALVE RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **55** - return temperature **45** - room temperature **20° C**

Height [mm]		300					400					500					600					900				
Length [mm]	Type / Power	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM
400	Watt	73	115	170	222	316	92	143	212	272	387	111	171	250	312	447	129	191	278	345	497	180	262	380	463	645
520	Watt	95	149	221	289	411	120	185	275	354	503	144	222	325	406	581	167	249	361	449	646	234	340	494	602	839
600	Watt	109	172	255	333	475	138	214	318	408	581	166	256	375	468	670	193	287	417	518	745	271	393	570	695	968
720	Watt	131	206	306	400	570	166	257	381	490	697	199	308	450	562	805	232	345	500	621	894	325	471	684	834	1161
800	Watt	146	229	340	444	633	184	285	424	544	774	222	342	500	624	894	257	383	556	690	993	361	523	760	926	1290
920	Watt	167	264	391	511	728	212	328	487	626	890	255	393	574	718	1028	296	440	639	794	1142	415	602	873	1065	1484
1000	Watt	182	286	425	555	791	231	357	530	680	968	277	427	624	781	1117	322	479	695	863	1242	451	654	949	1158	1613
1120	Watt	204	321	477	622	886	258	400	593	762	1084	310	479	699	874	1252	360	536	778	966	1391	505	733	1063	1297	1806
1200	Watt	218	344	511	667	949	277	428	635	816	1161	332	513	749	937	1341	386	574	834	1035	1490	541	785	1139	1390	1935
1320	Watt		378	562	733	1044		471	699	898	1278	366	564	824	1030	1475	425	632	917	1139	1639	595	864	1253	1529	2129
1400	Watt		401	596	778	1107		499	741	952	1355	388	598	874	1093	1564	450	670	973	1208	1738	631	916	1329	1621	2258
1600	Watt		458	681	889	1266		571	847	1088	1549	443	684	999	1249	1788	515	766	1112	1380	1987		1047	1519	1853	2580
1800	Watt		516	766	1000	1424		642	953	1224	1742	499	769	1124	1405	2011	579	861	1251	1553	2235		1178	1709	2085	2903
2000	Watt		573	851	1111	1582		713	1059	1360	1936	554	855	1249	1561	2235	643	957	1390	1725	2483		1309	1899	2316	3225
2200	Watt		630	936	1222	1740		785	1165	1496	2129	610	940	1374	1717	2458	708	1053	1529	1898	2732					
2400	Watt		687	1021	1333	1898		856	1271	1632		665	1026	1499	1873		772	1149	1668	2070						
2600	Watt				1444	2057				1768			1111	1623	2030		836	1244	1807	2243						
2800	Watt				1555	2215				1904				1748	2186				1946	2415						
3000	Watt				1666	2373				2040				1873	2342				2085	2588						
Radiatorexponent n		1,274	1,330	1,327	1,329	1,331	1,283	1,342	1,334	1,353	1,357	1,292	1,330	1,323	1,334	1,351	1,301	1,319	1,310	1,343	1,333	1,305	1,332	1,321	1,340	1,354
Type programme		COMPACT Radiator										T6-Centrally connected radiator and MULTI-FUNCTIONAL VALVE Radiator														

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

45/40/20° C

Side panels and top cover of COMPACT-, T6- and MULTI-FUNCTIONAL VALVE RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **45** - return temperature **40** - room temperature **20° C**

Height [mm]		300					400					500					600					900				
Length [mm]	Type / Power	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM	10	11 K 11 KV 11 VM	21 K-S 21 KV-S 21 VM-S	22 K 22 KV 22 VM	33 K 33 KV 33 VM
400	Watt	50	78	116	152	216	64	97	144	184	262	76	117	171	213	303	88	131	191	234	339	124	178	260	315	437
520	Watt	66	102	151	197	280	83	126	188	240	341	99	152	222	277	394	115	170	248	305	440	161	232	338	410	568
600	Watt	76	117	174	227	324	96	145	216	276	393	115	175	256	319	455	133	196	286	352	508	186	268	390	473	655
720	Watt	91	141	209	273	388	115	175	260	332	472	138	210	307	383	545	159	236	343	422	609	223	321	467	567	786
800	Watt	101	156	232	303	432	128	194	289	369	524	153	233	341	425	606	177	262	381	469	677	248	357	519	630	874
920	Watt	116	180	267	349	496	147	223	332	424	603	176	268	393	489	697	204	301	439	539	779	285	410	597	725	1005
1000	Watt	126	195	290	379	539	159	242	361	461	655	191	291	427	532	758	221	327	477	586	846	310	446	649	788	1092
1120	Watt	141	219	325	424	604	179	272	404	516	734	214	326	478	596	849	248	367	534	656	948	347	500	727	882	1223
1200	Watt	151	234	349	455	647	191	291	433	553	786	229	350	512	638	909	265	393	572	703	1016	372	535	779	945	1311
1320	Watt		258	383	500	712		320	476	608	865	252	385	563	702	1000	292	432	629	774	1117	409	589	857	1040	1442
1400	Watt		274	407	531	755		339	505	645	917	267	408	598	745	1061	310	458	667	821	1185	434	625	909	1103	1529
1600	Watt		313	465	606	863		388	577	737	1048	306	466	683	851	1212	354	524	763	938	1354		714	1039	1260	1748
1800	Watt		352	523	682	971		436	649	829	1179	344	525	768	957	1364	398	589	858	1055	1523		803	1169	1418	1966
2000	Watt		391	581	758	1079		485	722	922	1310	382	583	854	1064	1515	442	655	953	1172	1693		892	1299	1575	2184
2200	Watt		430	639	834	1187		533	794	1014	1441	420	641	939	1170	1667	487	720	1049	1289	1862					
2400	Watt		469	697	910	1295		582	866	1106		459	700	1024	1276		531	786	1144	1407						
2600	Watt				985	1402				1198			758	1110	1383		575	851	1239	1524						
2800	Watt				1061	1510				1290				1195	1489				1335	1641						
3000	Watt				1137	1618				1382				1280	1595				1430	1758						
Radiatorexponent n		1,274	1,330	1,327	1,329	1,331	1,283	1,342	1,334	1,353	1,357	1,292	1,330	1,323	1,334	1,351	1,301	1,319	1,310	1,343	1,333	1,305	1,332	1,321	1,340	1,354
Type programme		COMPACT Radiator										T6-Centrally connected radiator and MULTI-FUNCTIONAL VALVE Radiator														

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Panel radiators

T6 / MULTI-FUNCTIONAL

Weight in kg of T6-CENTRALLY connected and MULTI-FUNCTIONAL VALVE RADIATORS

Height [mm]		300				400				500				600				900			
Length [mm]	Type / weight	11 KV 11 VM	21KV-S 21VM-S	22 KV 22 VM	33 KV 33 VM	11 KV 11 VM	21KV-S 21VM-S	22 KV 22 VM	33 KV 33 VM	11 KV 11 VM	21KV-S 21VM-S	22 KV 22 VM	33 KV 33 VM	11 KV 11 VM	21KV-S 21VM-S	22 KV 22 VM	33 KV 33 VM	11 KV 11 VM	21KV-S 21VM-S	22 KV 22 VM	33 KV 33 VM
400	kg	5,67	7,75	8,94	12,93	7,08	9,78	11,50	16,74	7,91	11,34	13,10	19,10	8,69	12,83	14,63	21,35	12,03	18,48	21,13	31,01
520	kg	6,80	9,53	11,08	16,13	8,62	12,18	14,44	21,14	9,66	14,18	16,48	24,16	10,64	16,08	18,42	27,03	14,96	23,37	26,85	39,58
600	kg	7,56	10,72	12,51	18,27	9,64	13,78	16,41	24,08	10,83	16,07	18,73	27,53	11,95	18,25	20,95	30,81	16,92	26,63	30,67	45,29
720	kg	8,69	12,50	14,65	21,48	11,17	16,18	19,35	28,48	12,58	18,90	22,11	32,59	13,90	21,49	24,74	36,49	19,85	31,52	36,39	53,86
800	kg	9,45	13,69	16,08	23,61	12,20	17,78	21,31	31,42	13,75	20,79	24,37	35,96	15,21	23,66	27,27	40,27	21,80	34,78	40,20	59,57
920	kg	10,58	15,54	18,31	26,95	13,73	20,24	24,34	35,96	15,50	23,70	27,83	41,16	17,16	26,98	31,15	46,08	24,73	39,74	46,01	68,27
1000	kg	11,34	16,72	19,74	29,09	14,75	21,84	26,30	38,90	16,66	25,59	30,09	44,53	18,47	29,14	33,68	49,87	26,68	43,00	49,83	73,98
1120	kg	12,48	18,51	21,88	32,30	16,28	24,24	29,24	43,30	18,42	28,42	33,47	49,59	20,43	32,39	37,47	55,54	29,61	47,89	55,55	82,55
1200	kg	13,23	19,69	23,31	34,44	17,31	25,84	31,21	46,24	19,58	30,32	35,72	52,96	21,73	34,56	40,00	59,33	31,56	51,15	59,37	88,26
1320	kg	14,62	21,48	25,45	37,64	19,14	28,24	34,15	50,64	21,64	33,15	39,10	58,02	23,99	37,81	43,80	65,01	34,80	56,03	65,09	96,82
1400	kg	15,37	22,73	26,97	39,91	20,17	29,90	36,20	53,72	22,81	35,11	41,44	61,53	25,30	40,04	46,41	68,93	36,75	59,36	68,99	102,67
1600	kg	17,26	25,70	30,54	45,26	22,72	33,90	41,10	61,06	25,72	39,83	47,07	69,96	28,56	45,46	52,74	78,39	41,63	67,51	78,53	116,94
1800	kg	19,16	28,84	34,30	50,84	25,28	38,07	46,20	68,64	28,64	44,73	52,90	78,63	31,82	51,04	59,25	88,09	46,51	75,83	88,26	131,46
2000	kg	21,05	31,81	37,87	56,18	27,84	42,07	51,10	75,98	31,56	49,46	58,53	87,06	35,08	56,46	65,57	97,55	51,40	83,98	97,80	
2200	kg	22,94	34,78	41,44	61,52	30,39	46,07	56,01	83,32	34,48	54,19	64,17	95,49	38,34	61,87	71,89	107,01				
2400	kg	25,33	37,75	45,02	66,87	33,56	50,06	60,91		38,01	58,91	69,80		42,21	67,29	78,22					
2600	kg			48,59	72,21			65,82		40,93	63,64	75,43		45,47	72,70	84,54					
2800	kg			52,16	77,55			70,72			68,37	81,07			78,12	90,86					
3000	kg			55,73	82,89			75,63			73,09	86,70			83,54	97,18					

Type programme: T6-CENTRALLY CONNECTED RADIATOR and MULTI-FUNCTIONAL VALVE RADIATOR

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

COMPACT

Weight in kg of COMPACT RADIATORS

Height [mm]		300					400					500					600					900				
Length [mm]	Type / weight	10	11 K	21 K-S	22 K	33 K	10	11 K	21 K-S	22 K	33 K	10	11 K	21 K-S	22 K	33 K	10	11 K	21 K-S	22 K	33 K	10	11 K	21 K-S	22 K	33 K
400	kg	3,29	4,91	6,99	8,18	12,17	4,01	6,31	9,01	10,73	15,97	4,73	7,12	10,55	12,31	18,31	5,42	7,86	12,01	13,80	20,53	7,71	11,14	17,59	20,23	30,12
520	kg	4,00	6,05	8,78	10,33	15,38	4,93	7,84	11,41	13,67	20,37	5,88	8,87	13,38	15,69	23,37	6,77	9,82	15,26	17,60	26,20	9,74	14,07	22,48	25,96	38,69
600	kg	4,47	6,81	9,96	11,76	17,52	5,55	8,87	13,01	15,63	23,31	6,64	10,03	15,28	17,94	26,74	7,67	11,12	17,42	20,13	29,99	11,09	16,02	25,74	29,77	44,40
720	kg	5,18	7,94	11,75	13,90	20,72	6,47	10,40	15,40	18,58	27,71	7,78	11,79	18,11	21,32	31,80	9,02	13,08	20,67	23,92	35,66	13,12	18,95	30,63	35,50	52,96
800	kg	5,66	8,70	12,93	15,33	22,86	7,09	11,42	17,00	20,54	30,65	8,54	12,95	20,00	23,57	35,17	9,91	14,39	22,84	26,45	39,45	14,48	20,91	33,89	39,31	58,67
920	kg	6,37	9,83	14,78	17,56	26,20	8,02	12,96	19,47	23,57	35,19	9,68	14,70	22,90	27,04	40,36	11,26	16,34	26,15	30,33	45,26	16,51	23,83	38,84	45,12	67,37
1000	kg	6,84	10,59	15,97	18,99	28,34	8,63	13,98	21,07	25,53	38,13	10,45	15,87	24,79	29,29	43,74	12,16	17,65	28,32	32,86	49,05	17,86	25,79	42,10	48,94	73,09
1120	kg	7,55	11,72	17,75	21,13	31,54	9,56	15,51	23,47	28,47	42,53	11,59	17,62	27,63	32,67	48,79	13,51	19,60	31,57	36,65	54,72	19,89	28,72	46,99	54,66	81,65
1200	kg	8,02	12,48	18,94	22,56	33,68	10,18	16,53	25,07	30,43	45,47	12,35	18,79	29,52	34,93	52,17	14,41	20,91	33,74	39,18	58,51	21,25	30,67	50,25	58,48	87,36
1320	kg		13,86	20,72	24,70	36,89		18,37	27,47	33,38	49,87	13,67	20,85	32,36	38,31	57,22	15,94	23,17	36,98	42,97	64,18	23,46	33,90	55,14	64,20	95,93
1400	kg		14,62	21,98	26,21	39,16		19,39	29,13	35,42	52,94	14,43	22,01	34,31	40,65	60,73	16,83	24,47	39,22	45,59	68,11	24,81	35,86	58,47	68,10	101,77
1600	kg		16,51	24,95	29,79	44,50		21,95	33,13	40,33	60,29	16,60	24,93	39,04	46,28	69,16	19,35	27,73	44,63	51,91	77,57		40,74	66,62	77,64	116,05
1800	kg		18,40	28,09	33,55	50,08		24,51	37,30	45,43	67,87	18,60	27,85	43,94	52,11	77,84	21,69	30,99	50,22	58,43	87,27		45,62	74,94	87,37	130,57
2000	kg		20,30	31,06	37,12	55,43		27,06	41,30	50,33	75,21	20,51	30,77	48,67	57,74	86,27	23,93	34,26	55,63	64,75	96,73		50,50	83,09	96,91	144,84
2200	kg		22,19	34,03	40,69	60,77		29,62	45,29	55,24	82,55	22,41	33,68	53,39	63,37	94,70	26,18	37,52	61,05	71,07	106,19					
2400	kg		24,58	37,00	44,26	66,11		32,78	49,29	60,14		24,31	37,21	58,12	69,01		28,43	41,39	66,47	77,39						
2600	kg				47,83	71,45				65,05			40,13	62,85	74,64		30,68	44,65	71,88	83,71						
2800	kg				51,41	76,80				69,95				67,57	80,28				77,30	90,04						
3000	kg				54,98	82,14				74,86				72,30	85,91				82,71	96,36						

Type programme: COMPACT RADIATOR

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

HYGIENE RADIATOR

HYGIENE COMPACT RADIATOR
Connections:
4 x G 1/2" I. G.

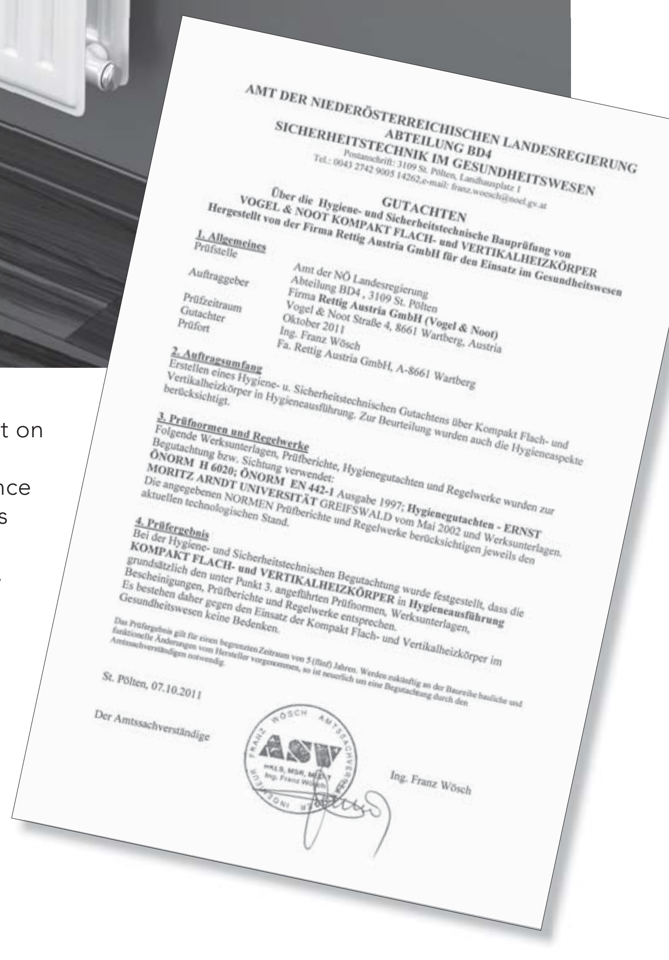
T6-HYGIENE CENTRALLY CONNECTED RADIATOR
Connections:
4 x G 1/2" I. G. and
2 x G 3/4" A. G.
lower edge, in the centre

The proof of suitability for the installation of **HYGIENE COMPACT RADIATORS** and **T6 HYGIENE CENTRALLY CONNECTED RADIATORS** in rooms with particular hygienic requirements is highlighted by the hygiene certificate issued by Ernst Moritz Arndt University of Greifswald.

The HYGIENE RADIATORS have been specially designed for use in hospitals and for installation in rooms subject to particular hygiene requirements.

Advantages:
- No collection of dust and dirt on covers or sides
- Large inner separation distance without small-scale structures
- Easy to clean
- Rounded corners and edges, finished to a high level

In order to offer the necessary alternatives for installation as well as complying with the hygiene requirements and guidelines, the hygiene radiators are available in T6 and compact designs.



AMT DER NIEDERÖSTERREICHISCHEN LANDESREGIERUNG
ABTEILUNG BD4
SICHERHEITSTECHNIK IM GESUNDHEITSWESEN
Postanschrift: 3109 St. Pölten, Landhausplatz 1
Tel.: 0043 2742 9005 14262, e-mail: franz.woesch@noel.gv.at

GUTACHTEN
Über die Hygiene- und Sicherheitstechnische Bauprüfung von VOGEL & NOOT KOMPAKT FLACH- und VERTIKALHEIZKÖRPER Hergestellt von der Firma Rettig Austria GmbH für den Einsatz im Gesundheitswesen

1. Allgemeines

Prüfstelle	Amt der NÖ Landesregierung Abteilung BD4, 3109 St. Pölten
Auftraggeber	Firma **Rettig Austria GmbH (Vogel & Noot)** Vogel & Noot Straße 4, 8661 Wartberg, Austria
Prüfzeitraum	Oktober 2011
Gutachter	Ing. Franz Wösch
Prüfort	Fa. Rettig Austria GmbH, A-8661 Wartberg

2. Auftragsumfang
Erstellen eines Hygiene- u. Sicherheitstechnischen Gutachtens über Kompakt Flach- und Vertikalheizkörper in Hygieneausführung. Zur Beurteilung wurden auch die Hygieneaspekte berücksichtigt.

3. Prüfnormen und Regelwerke
Folgende Werksunterlagen, Prüfberichte, Hygienegutachten und Regelwerke wurden zur Begutachtung bzw. Sichtung verwendet:
ÖNORM H 6020; ÖNORM EN 442-1 Ausgabe 1997; **Hygienegutachten - ERNST MORITZ ARNDT UNIVERSITÄT GREIFSWALD** vom Mai 2002 und Werksunterlagen.
Die angegebenen NORMEN Prüfberichte und Regelwerke berücksichtigen jeweils den aktuellen technologischen Stand.

4. Prüfergebnis
Bei der Hygiene- und Sicherheitstechnischen Begutachtung wurde festgestellt, dass die **KOMPAKT FLACH- und VERTIKALHEIZKÖRPER** in **Hygieneausführung** grundsätzlich den unter Punkt 3. angeführten Prüfnormen, Werksunterlagen, Bescheinigungen, Prüfberichte und Regelwerke entsprechen.
Es bestehen daher gegen den Einsatz der Kompakt Flach- und Vertikalheizkörper im Gesundheitswesen keine Bedenken.

Das Prüfergebnis gilt für einen begrenzten Zeitraum von 5 (fünf) Jahren. Werden zukünftig an der Baureihe bauliche und funktionelle Änderungen vom Hersteller vorgenommen, so ist neuerlich um eine Begutachtung durch den Amtssachverständigen notwendig.

St. Pölten, 07.10.2011

Der Amtssachverständige

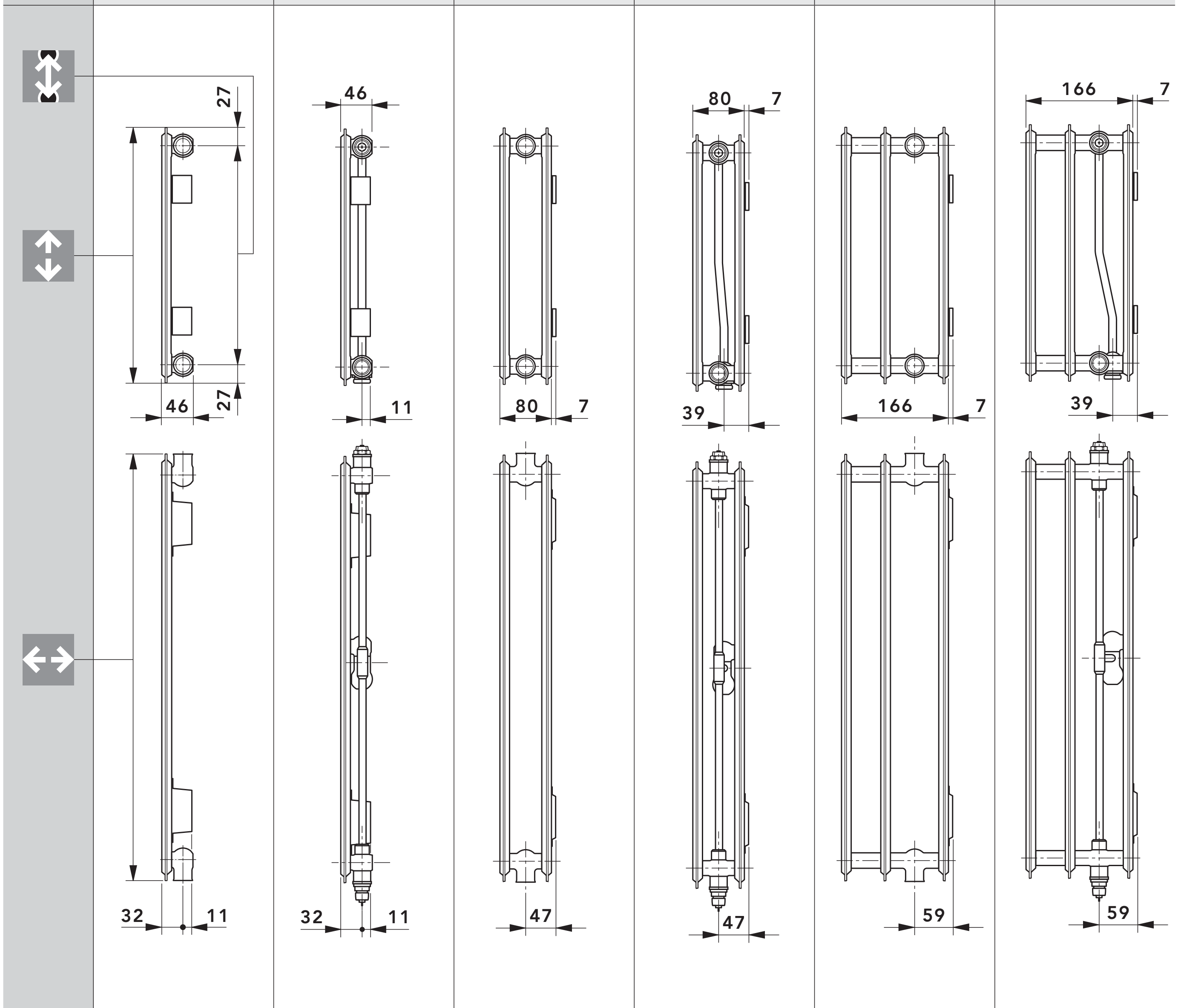
FRANZ WÖSCH AMTSSACHVERSTÄNDIGER INGENIEUR
ASW
HKLS, MSR, MEKT
Ing. Franz Wösch

Ing. Franz Wösch

Overview of models

Overview of models

Type	10	10 VM	20	20 VM	30	30 VM



Panel radiators

	single-layer					double-layer					triple-layer				
Type	10 / 10 VM					20 / 20 VM					30 / 30 VM				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	up to 1200		up to 2400	up to 2600	up to 1400	up to 2400		up to 3000		up to 2000	up to 3000	up to 2200			up to 1800
Gradation	All overall lengths from 400 m in gradations of 200 mm; also 520, 720, 920, 1120 and 1320 mm														

Twin-pipe operation, single-pipe operation, types of connection

N.B.: Please refer to the appropriate sections concerning the **T6 CENTRALLY CONNECTED RADIATOR** on pages 22 - 26 for technical information on the connection settings.

HEIZKÖRPER RAL GÜTEZEICHEN AUS STAHL — DIN EN 442 — EN ISO 9001 — CE — EN 442 GEPRÜFT — 55 45 DIE *neue* WÄRME

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Outputs - temperature group 90/70/20° C

90/70/20° C — Output data in watts in accordance with **DIN EN 442** and/or **ÖNORM EN 442** Feed temperature **90** - return temperature **70** - room temperature **20 °C**

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Output	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM
400	Watt	176	298	432	224	376	541	271	452	645	317	524	747	446	729	1047
520	Watt	228	387	561	292	489	703	353	587	839	412	681	971	579	948	1361
600	Watt	263	447	647	337	565	811	407	677	968	475	786	1121	668	1094	1570
720	Watt	316	536	777	404	678	973	488	813	1162	570	943	1345	802	1313	1884
800	Watt	351	596	863	449	753	1082	543	903	1291	634	1048	1494	891	1459	2093
920	Watt	404	685	993	516	866	1244	624	1039	1485	729	1205	1718	1025	1677	2407
1000	Watt	439	745	1079	561	941	1352	678	1129	1614	792	1310	1868	1114	1823	2617
1120	Watt	492	834	1208	628	1054	1514	760	1265	1807	887	1467	2092	1247	2042	2931
1200	Watt	527	894	1295	673	1129	1622	814	1355	1936	951	1572	2241	1337	2188	3140
1320	Watt		983	1424		1242	1785	895	1490	2130	1046	1729	2466	1470	2407	3454
1400	Watt		1043	1510		1318	1893	950	1581	2259	1109	1834	2615	1559	2553	3663
1600	Watt		1192	1726		1506	2163	1085	1807	2582	1268	2096	2989		2917	4187
1800	Watt		1341	1942		1694	2434	1221	2032	2905	1426	2358	3362		3282	4710
2000	Watt		1489	2158		1882	2704	1357	2258	3227	1585	2620	3736		3647	5233
2200	Watt		1638	2373		2071	2974	1492	2484	3550	1743	2881	4109			
2400	Watt		1787	2589		2259		1628	2710		1901	3143				
2600	Watt			2805					2936		2060	3405				
2800	Watt			3021					3162			3667				
3000	Watt			3237					3387			3929				
Radiator exponent n		1,274	1,278	1,288	1,283	1,282	1,288	1,292	1,287	1,288	1,301	1,291	1,288	1,305	1,294	1,317
Model range			HYGIENE COMPACT RADIATORS and T6-HYGIENE CENTRE-CONNECTION RADIATORS													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Outputs - temperature group 75/65/20° C and 70/55/20° C

75/65/20° C

Output data in watts in accordance with **DIN EN 442** and/or **ÖNORM EN 442** Feed temperature **75** - return temperature **65** - room temperature **20 °C**

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Output	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM
400	**Watt**	139	236	341	178	298	428	214	357	510	250	414	591	351	576	823
520	**Watt**	181	307	444	231	387	556	279	464	664	325	538	768	457	749	1070
600	**Watt**	209	354	512	266	447	641	322	536	766	375	621	886	527	864	1235
720	**Watt**	251	425	614	320	536	770	386	643	919	450	745	1063	632	1037	1482
800	**Watt**	278	472	682	355	596	855	429	714	1021	500	828	1182	702	1152	1646
920	**Watt**	320	543	785	408	685	983	493	822	1174	575	952	1359	808	1325	1893
1000	**Watt**	348	590	853	444	745	1069	536	893	1276	625	1035	1477	878	1440	2058
1120	**Watt**	390	661	955	497	834	1197	600	1000	1429	700	1159	1654	983	1613	2305
1200	**Watt**	418	708	1024	533	894	1283	643	1072	1531	750	1242	1772	1054	1728	2470
1320	**Watt**		779	1126		983	1411	708	1179	1684	825	1366	1950	1159	1901	2717
1400	**Watt**		826	1194		1043	1497	750	1250	1786	875	1449	2068	1229	2016	2881
1600	**Watt**		944	1365		1192	1710	858	1429	2042	1000	1656	2363		2304	3293
1800	**Watt**		1062	1535		1341	1924	965	1607	2297	1125	1863	2659		2592	3704
2000	**Watt**		1180	1706		1490	2138	1072	1786	2552	1250	2070	2954		2880	4116
2200	**Watt**		1298	1877		1639	2352	1179	1965	2807	1375	2277	3249			
2400	**Watt**		1416	2047		1788		1286	2143		1500	2484				
2600	**Watt**			2218					2322		1625	2691				
2800	**Watt**			2388					2500			2898				
3000	**Watt**			2559					2679			3105				
Radiator exponent n		**1,274**	**1,278**	**1,288**	**1,283**	**1,282**	**1,288**	**1,292**	**1,287**	**1,288**	**1,301**	**1,291**	**1,288**	**1,305**	**1,294**	**1,317**
Model range			HYGIENE COMPACT RADIATORS and T6-HYGIENE CENTRE-CONNECTION RADIATORS													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

70/55/20° C

Output data in watts in accordance with **DIN EN 442** and/or **ÖNORM EN 442** Feed temperature **70** - return temperature **55** - room temperature **20 °C**

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Output	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM
400	**Watt**	113	192	277	144	242	347	174	290	414	202	336	479	284	467	665
520	**Watt**	147	249	360	187	315	451	226	377	538	263	436	623	369	607	864
600	**Watt**	170	288	415	216	363	520	261	435	621	304	503	719	426	700	997
720	**Watt**	204	345	498	260	436	624	313	522	745	364	604	863	511	840	1196
800	**Watt**	226	384	553	288	484	694	348	580	828	405	671	958	568	933	1329
920	**Watt**	260	441	637	332	556	798	400	667	952	465	772	1102	653	1073	1529
1000	**Watt**	283	479	692	360	605	867	434	724	1035	506	839	1198	710	1167	1661
1120	**Watt**	317	537	775	404	677	971	487	811	1159	567	940	1342	795	1307	1861
1200	**Watt**	339	575	830	433	726	1041	521	869	1242	607	1007	1438	852	1400	1994
1320	**Watt**		633	913		798	1145	574	956	1366	668	1108	1581	938	1540	2193
1400	**Watt**		671	969		847	1214	608	1014	1449	708	1175	1677	994	1634	2326
1600	**Watt**		767	1107		968	1387	695	1159	1656	809	1342	1917		1867	2658
1800	**Watt**		863	1245		1089	1561	782	1304	1863	911	1510	2157		2100	2991
2000	**Watt**		959	1384		1210	1734	869	1449	2070	1012	1678	2396		2334	3323
2200	**Watt**		1055	1522		1331	1908	956	1594	2277	1113	1846	2636			
2400	**Watt**		1151	1660		1452		1043	1739		1214	2014				
2600	**Watt**			1799					1884		1315	2182				
2800	**Watt**			1937					2029			2349				
3000	**Watt**			2076					2173			2517				
Radiator exponent n		**1,274**	**1,278**	**1,288**	**1,283**	**1,282**	**1,288**	**1,292**	**1,287**	**1,288**	**1,301**	**1,291**	**1,288**	**1,305**	**1,294**	**1,317**
Model range			HYGIENE COMPACT RADIATORS and T6-HYGIENE CENTRE-CONNECTION RADIATORS													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

HYGIENE COMPACT RADIATORS / T6-HYGIENE CENTRALLY CONNECTED RADIATOR

Outputs - temperature group 55/45/20° C and 45/40/20° C

55/45/20° C

Output data in watts in accordance with **DIN EN 442** and/or **ÖNORM EN 442** Feed temperature **55** - return temperature **45** - room temperature **20 °C**

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Output	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM
400	Watt	73	123	177	92	155	221	111	185	264	129	214	306	180	297	420
520	Watt	94	160	230	120	201	288	144	241	344	167	278	398	234	387	546
600	Watt	109	184	265	138	232	332	166	278	397	193	321	459	271	446	630
720	Watt	131	221	318	166	279	399	199	333	476	232	385	551	325	535	756
800	Watt	145	246	353	184	310	443	222	370	529	257	428	612	361	595	840
920	Watt	167	283	406	212	356	509	255	426	608	296	492	704	415	684	966
1000	Watt	182	307	442	231	387	554	277	463	661	322	535	765	451	743	1050
1120	Watt	203	344	495	258	433	620	310	518	740	360	599	857	505	833	1176
1200	Watt	218	369	530	277	464	664	332	555	793	386	642	918	541	892	1260
1320	Watt		406	583		511	731	366	611	872	425	706	1010	595	981	1386
1400	Watt		430	618		542	775	388	648	925	450	749	1071	631	1041	1470
1600	Watt		492	707		619	886	443	740	1057	515	856	1224		1189	1680
1800	Watt		553	795		697	997	499	833	1190	579	963	1377		1338	1890
2000	Watt		614	883		774	1107	554	926	1322	643	1070	1530		1487	2100
2200	Watt		676	972		851	1218	610	1018	1454	708	1177	1683			
2400	Watt		737	1060		929		665	1111		772	1284				
2600	Watt			1148					1203		836	1391				
2800	Watt			1237					1296			1498				
3000	Watt			1325					1388			1605				
Radiator exponent n		1,274	1,278	1,288	1,283	1,282	1,288	1,292	1,287	1,288	1,301	1,291	1,288	1,305	1,294	1,317

Model range: HYGIENE COMPACT RADIATORS and T6-HYGIENE CENTRE-CONNECTION RADIATORS

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

45/40/20° C

Output data in watts in accordance with **DIN EN 442** and/or **ÖNORM EN 442** Feed temperature **45** - return temperature **40** - room temperature **20 °C**

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Output	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM	10 10 VM	20 20 VM	30 30 VM
400	Watt	50	85	122	64	107	153	76	128	183	88	148	211	124	205	288
520	Watt	65	111	159	83	139	199	99	166	237	115	192	275	161	266	374
600	Watt	75	128	183	96	161	229	115	192	274	133	221	317	186	307	431
720	Watt	91	153	220	115	193	275	138	230	329	159	266	380	223	369	518
800	Watt	101	170	244	128	214	306	153	256	365	177	295	423	248	410	575
920	Watt	116	196	281	147	246	352	176	294	420	204	340	486	285	471	661
1000	Watt	126	213	305	159	268	382	191	320	456	221	369	528	310	512	719
1120	Watt	141	238	342	179	300	428	214	358	511	248	413	592	347	574	805
1200	Watt	151	255	366	191	321	459	229	384	548	265	443	634	372	615	863
1320	Watt		281	402		353	504	252	422	602	292	487	697	409	676	949
1400	Watt		298	427		375	535	267	447	639	310	517	740	434	717	1007
1600	Watt		340	488		428	612	306	511	730	354	590	845		820	1150
1800	Watt		383	549		482	688	344	575	821	398	664	951		922	1294
2000	Watt		425	610		535	764	382	639	913	442	738	1056		1025	1438
2200	Watt		468	671		589	841	420	703	1004	487	812	1162			
2400	Watt		511	732		642		459	767		531	886				
2600	Watt			793					831		575	960				
2800	Watt			854					895			1033				
3000	Watt			915					959			1107				
Radiator exponent n		1,274	1,278	1,288	1,283	1,282	1,288	1,292	1,287	1,288	1,301	1,291	1,288	1,305	1,294	1,317

Model range: HYGIENE COMPACT RADIATORS and T6-HYGIENE CENTRE-CONNECTION RADIATORS

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Weights

Panel radiators

T6-HYGIENE

Weight in kg for T6-HYGIENE centre-connection radiators

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Weight	10 VM	20 VM	30 VM	10 VM	20 VM	30 VM	10 VM	20 VM	30 VM	10 VM	20 VM	30 VM	10 VM	20 VM	30 VM
400	kg	4,05	6,30	9,16	4,78	7,76	11,35	5,53	9,24	13,54	6,25	10,66	15,64	8,60	15,24	22,45
520	kg	4,76	7,69	11,23	5,71	9,59	14,07	6,67	11,51	16,93	7,59	13,33	19,64	10,63	19,26	28,46
600	kg	5,23	8,62	12,62	6,33	10,80	15,88	7,43	13,02	19,17	8,49	15,12	22,30	11,99	21,95	32,48
720	kg	5,94	10,01	14,69	7,25	12,63	18,61	8,57	15,27	22,56	9,84	17,79	26,29	14,01	25,97	38,49
800	kg	6,41	10,94	16,07	7,87	13,85	20,43	9,33	16,79	24,80	10,74	19,57	28,95	15,38	28,65	42,50
920	kg	7,12	12,39	18,29	8,79	15,73	23,29	10,47	19,11	28,32	12,08	22,31	33,09	17,40	32,75	48,65
1000	kg	7,59	13,32	19,67	9,41	16,96	25,10	11,23	20,62	30,58	12,99	24,10	35,75	18,75	35,43	52,67
1120	kg	8,30	14,72	21,75	10,33	18,78	27,83	12,39	22,88	33,95	14,34	26,77	39,75	20,79	39,46	58,68
1200	kg	8,78	15,64	23,12	10,95	19,99	29,65	13,15	24,39	36,20	15,23	28,55	42,41	22,14	42,13	62,69
1320	kg		17,03	25,20		21,82	32,36	14,46	26,66	39,58	16,76	31,23	46,41	24,35	46,16	68,71
1400	kg		18,02	26,72		23,10	34,32	15,23	28,22	41,97	17,66	33,08	49,21	25,70	48,92	72,86
1600	kg		20,34	30,18		26,14	38,85	17,40	32,00	47,60	20,18	37,54	55,87		55,63	82,88
1800	kg		22,83	33,88		29,36	43,64	19,39	35,93	53,47	22,51	42,16	62,77		62,50	93,15
2000	kg		25,15	37,33		32,40	48,17	21,30	39,71	59,09	24,76	46,62	69,42		69,21	103,17
2200	kg		27,47	40,79		35,43	52,72	23,20	43,48	64,72	27,00	51,08	76,09			
2400	kg		29,79	44,25		38,48		25,11	47,24		29,25	55,55				
2600	kg			47,70					51,02		31,50	60,00				
2800	kg			51,16					54,78			64,46				
3000	kg			54,62					58,56			68,92				

Typenprogramm: T6-HYGIENE centre-connection radiators

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

HYGIENE COMPACT

Weights in kg for HYGIENE compact radiators

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Weight	10	20	30	10	20	30	10	20	30	10	20	30	10	20	30
400	kg	3,29	5,55	8,41	4,01	6,99	10,57	4,73	8,45	12,75	5,42	9,83	14,82	7,70	14,34	21,56
520	kg	4,00	6,94	10,48	4,94	8,82	13,30	5,87	10,71	16,14	6,77	12,51	18,81	9,74	18,36	27,57
600	kg	4,48	7,87	11,87	5,55	10,03	15,11	6,64	12,23	18,38	7,67	14,29	21,48	11,09	21,05	31,58
720	kg	5,19	9,26	13,94	6,48	11,86	17,84	7,78	14,48	21,77	9,01	16,96	25,47	13,12	25,07	37,60
800	kg	5,66	10,18	15,32	7,09	13,07	19,66	8,54	15,99	24,01	9,91	18,75	28,13	14,48	27,76	41,61
920	kg	6,37	11,64	17,53	8,02	14,96	22,52	9,68	18,32	27,53	11,26	21,49	32,26	16,51	31,86	47,76
1000	kg	6,84	12,56	18,91	8,64	16,18	24,33	10,44	19,82	29,78	12,17	23,27	34,93	17,86	34,53	51,77
1120	kg	7,55	13,96	20,99	9,56	18,00	27,05	11,59	22,09	33,16	13,51	25,95	38,93	19,90	38,56	57,79
1200	kg	8,02	14,89	22,37	10,18	19,22	28,87	12,35	23,60	35,41	14,41	27,73	41,59	21,25	41,24	61,80
1320	kg		16,28	24,45		21,05	31,59	13,67	25,86	38,79	15,94	30,40	45,59	23,46	45,27	67,81
1400	kg		17,27	25,97		22,33	33,55	14,44	27,43	41,18	16,84	32,26	48,39	24,81	48,03	71,96
1600	kg		19,59	29,43		25,37	38,08	16,60	31,21	46,81	19,35	36,71	55,05		54,73	81,99
1800	kg		22,08	33,12		28,58	42,87	18,60	35,14	52,67	21,69	41,34	61,95		61,61	92,25
2000	kg		24,40	36,58		31,63	47,40	20,50	38,92	58,30	23,93	45,80	68,60		68,32	102,28
2200	kg		26,71	40,04		34,66	51,95	22,41	42,68	63,93	26,18	50,25	75,26			
2400	kg		29,04	43,50		37,70		24,32	46,45		28,43	54,72				
2600	kg			46,95					50,22		30,67	59,18				
2800	kg			50,41					53,99			63,64				
3000	kg			53,87					57,77			68,10				

Model range: HYGIENE COMPACT RADIATORS

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

REPLACEMENT PANEL RADIATOR.

Heat emission
The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 21 K-S	0447
Type 22 K	0448
Type 33 K	0449

and in accordance with OENORM (Austrian standard) EN 442 at the Technological Commercial Museum, Vienna.

Material
REPLACEMENT PANEL RADIATORS are made of cold-rolled sheet steel, in accordance with EN 442-1, with a stylish and robust fluting with ribs at 40 mm intervals.

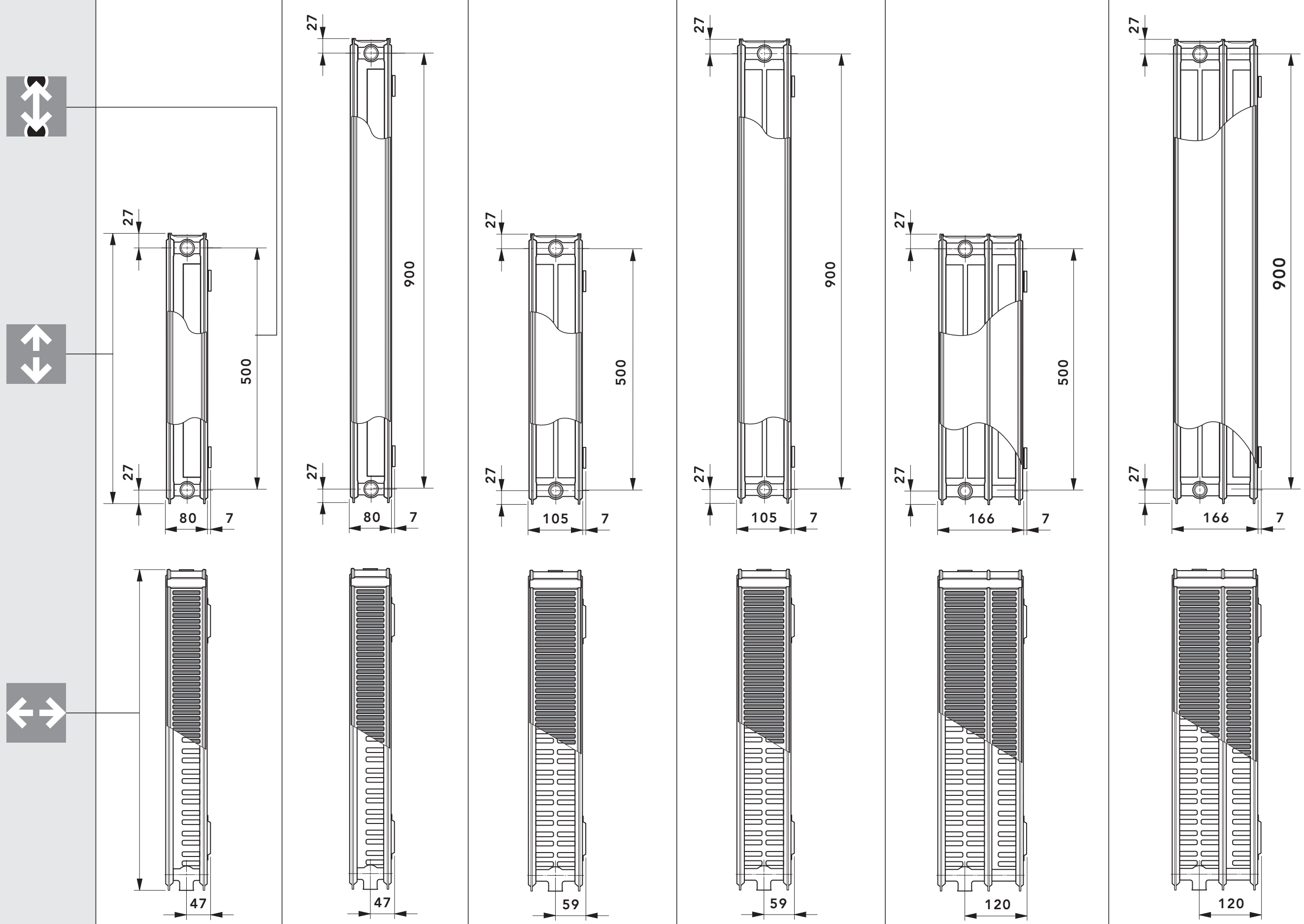
Equipment
Each REPLACEMENT PANEL RADIATORS is equipped with wall brackets that are welded onto the back. The radiator types 21 K-S, 22 K and 33 K are equipped with a detachable top cover and two closed side panels. With every REPLACEMENT PANEL RADIATOR you get a fit-up aid, made of cardboard.

Paint coating
1. Undercoating in accordance with DIN 55900 part 1, stoved at 190° C.
2. Finish in accordance with DIN 55900 part 2, in standard colour 9016 (on request available in many standard colours and sanitary-ware colours at an extra charge), applied electrostatically in a modern powder coating facility. This especially resistant coating is stoved at an object temperature of 210° C.

Packaging
1. Cardboard packaging
2. Edge protection
3. Shrink foil

Overview of models

Type	21 K-S		22 K		33 K	



Type	21 K-S		22 K		33 K	
Height [mm]	554	954	554	954	554	954
Length [mm]	400 bis 3000	400 bis 3000	400 bis 3000	400 bis 3000	400 bis 3000	400 bis 3000
Bossspacing [mm]	500	900	500	900	500	900
Steps	any overall length starting with 400 and 600 mm available in steps of 200 mm					

Guarantee statements are available to download at **www.vogelundnoot.com/download**

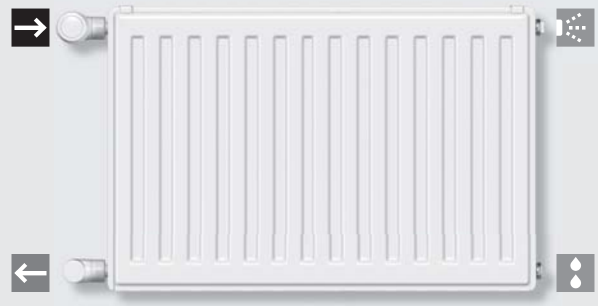
REPLACEMENT PANEL RADIATOR

Connection modes - Double-pipe system / Replacement adapter

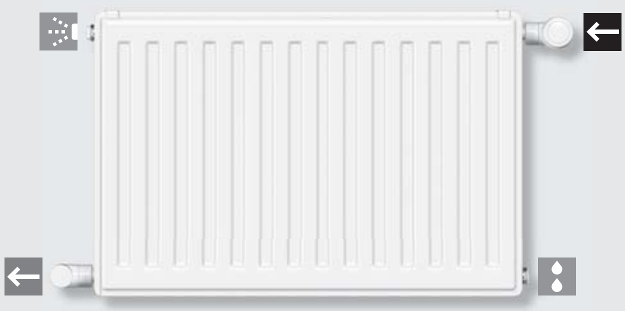
Connection modes - Double-pipe system

A: connection single-sided, on the right

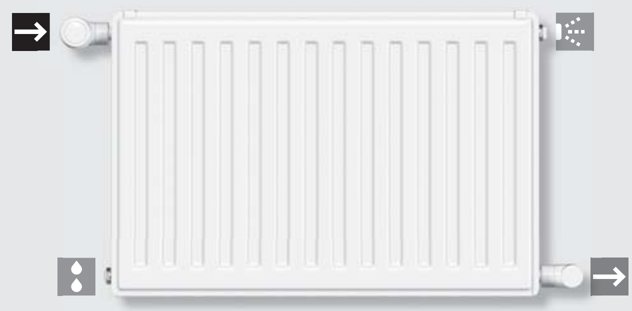
B: connection single-sided, on the left



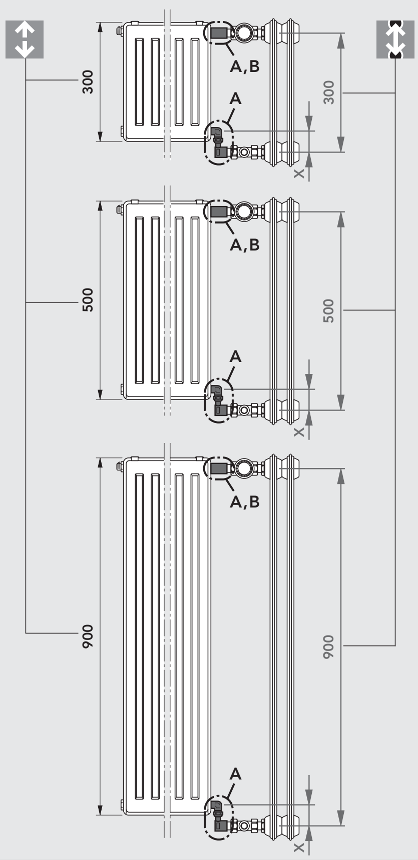
C: connection both-sides, on the right



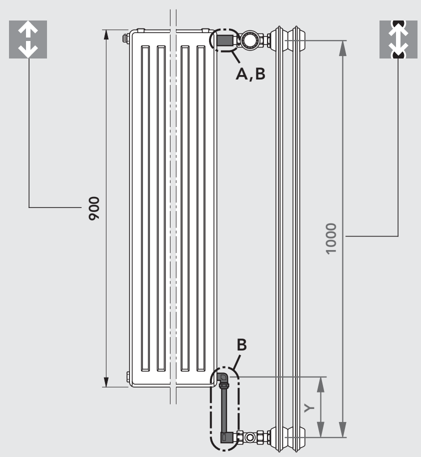
D: connection both-sides, on the left



Replacement adapter - Examples of using Replacement adapters



Boss spacing 200, 300, 500, 600 and 900



Non-standard distances are not at all a problem!

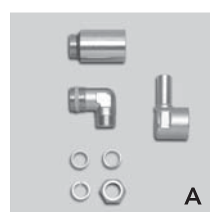
The Replacement adapter has been developed for non-standard boss spacing. Any distance problems are solved very easily by the use of this adapter.

Note:
The Replacement adapter comes with a fit-up aid, made of cardboard.

Boss spacing 1000

Replacement adapter
to replace radiators with a boss spacing of 200, 300, 500, 600 or 900 mm.

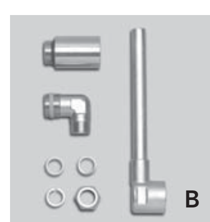
Measure **X**:
From 45 mm up to 58 mm continuously adjustable.



Artikel Nr.: AZ0MM090A0001000

Replacement adapter
to replace radiators with a boss spacing of 1000 mm.

Measure **Y**:
from 145 up to 158 mm continuously adjustable.



Artikel Nr.: AZ0MM100A0001000

By trimming the pipe by a maximum of 85 mm, the measure **Y** can be reduced (from 60 up to 73 mm).

REPLACEMENT PANEL RADIATOR

Outputs - temperature groups and weights

REPLACEMENT PANEL RADIATOR

Weight in kg

Height [mm]		554			954		
Length [mm]	Type / Weight	21 K-S	22 K	33 K	21 K-S	22 K	33 K
400	kg	11,38	13,16	19,57	18,27	20,91	31,17
520	kg	14,46	16,78	24,98	23,36	26,83	40,02
600	kg	16,51	19,19	28,59	26,75	30,78	45,92
720	kg	19,58	22,81	34,01	31,84	36,70	54,78
800	kg	21,63	25,22	37,61	35,23	40,65	60,68
920	kg	24,77	28,92	43,16	40,38	46,65	69,67
1000	kg	26,82	31,34	46,77	43,77	50,60	75,57
1120	kg	29,89	34,95	52,18	48,86	56,52	84,43
1200	kg	31,94	37,36	55,79	52,25	60,47	90,33
1320	kg	35,01	40,98	61,21	57,33	66,39	99,18
1400	kg	37,13	43,48	64,95	60,79	70,42	105,22
1600	kg	42,25	49,51	73,98	69,27	80,29	119,98
1800	kg	47,54	55,73	83,24	77,91	90,34	134,98
2000	kg	52,67	61,76	92,26	86,39	100,21	149,73
2200	kg	57,79	67,79	101,28	94,87	110,08	164,49
2400	kg	62,91	73,82	110,30	103,35	119,94	179,25
2600	kg	68,04	79,85	119,33	111,82	129,81	194,01
2800	kg	73,16	85,88	128,35	120,30	139,68	208,76
3000	kg	78,28	91,91	137,37	128,78	149,55	223,52
Type programme		REPLACEMENT RADIATOR					

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Side panels and top cover of REPLACEMENT PANEL RADIATORS are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442**

Temperature pairings		90/70/20° C*						75/65/20° C*						70/55/20° C*						55/45/20° C*						45/40/20° C*					
Height [mm]		554			954			554			954			554			954			554			954			554			954		
Length [mm]	Type / Power	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K	21 K-S	22 K	33 K
400	Watt	659	830	1161	996	1207	1683	518	650	911	781	945	1321	418	523	734	628	759	1064	264	329	461	395	475	670	181	224	315	269	323	457
520	Watt	856	1079	1509	1295	1570	2188	673	846	1184	1015	1228	1717	544	680	954	817	987	1383	343	427	600	513	618	870	235	291	409	349	420	594
600	Watt	988	1245	1741	1494	1811	2525	777	976	1366	1171	1417	1981	627	785	1100	943	1139	1596	396	493	692	592	713	1004	271	336	472	403	484	685
720	Watt	1186	1494	2090	1793	2173	3030	932	1171	1639	1405	1701	2377	753	942	1321	1131	1367	1915	476	592	831	711	856	1205	325	403	566	484	581	822
800	Watt	1317	1660	2322	1992	2415	3366	1036	1301	1822	1562	1890	2642	836	1047	1467	1257	1519	2128	528	657	923	789	951	1339	362	448	629	538	646	913
920	Watt	1515	1909	2670	2291	2777	3871	1191	1496	2095	1796	2173	3038	962	1204	1687	1446	1746	2447	608	756	1061	908	1093	1540	416	515	724	618	742	1050
1000	Watt	1647	2075	2902	2490	3018	4208	1295	1626	2277	1952	2362	3302	1045	1309	1834	1571	1898	2660	660	822	1154	987	1188	1674	452	559	787	672	807	1142
1120	Watt	1844	2324	3251	2789	3381	4713	1450	1821	2550	2186	2645	3698	1171	1466	2054	1760	2126	2979	740	920	1292	1105	1331	1875	506	627	881	753	904	1279
1200	Watt	1976	2489	3483	2988	3622	5050	1554	1951	2732	2342	2834	3962	1254	1570	2201	1885	2278	3129	793	986	1384	1184	1426	2009	542	671	944	806	968	1370
1320	Watt	2174	2738	3831	3287	3984	5555	1709	2146	3006	2577	3118	4359	1380	1727	2421	2074	2506	3511	872	1085	1523	1303	1568	2209	597	738	1038	887	1065	1507
1400	Watt	2306	2904	4063	3486	4226	5891	1813	2276	3188	2733	3307	4623	1463	1832	2568	2200	2658	3724	925	1150	1615	1382	1663	2343	633	783	1101	941	1130	1598
1600	Watt	2635	3319	4644	3984	4829	6733	2072	2602	3643	3123	3779	5283	1672	2094	2935	2514	3037	4256	1057	1315	1846	1579	1901	2678	723	895	1259	1075	1291	1827
1800	Watt	2964	3734	5224	4482	5433	7575	2331	2927	4099	3514	4252	5944	1881	2355	3301	2828	3417	4788	1189	1479	2077	1776	2139	3013	814	1007	1416	1210	1453	2055
2000	Watt	3294	4149	5805	4980	6037	8416	2590	3252	4554	3904	4724	6604	2091	2617	3668	3142	3796	5320	1321	1643	2307	1974	2376	3348	904	1119	1573	1344	1614	2283
2200	Watt	3623	4564	6385	5478	6641	9258	2849	3577	5009	4294	5196	7264	2300	2879	4035	3457	4176	5852	1453	1808	2538	2171	2614	3682	994	1231	1731	1479	1775	2512
2400	Watt	3952	4979	6966	5976	7244	10099	3108	3902	5465	4685	5669	7925	2509	3141	4402	3771	4556	6384	1585	1972	2769	2368	2852	4017	1085	1343	1888	1613	1937	2740
2600	Watt	4282	5394	7546	6474	7848	10941	3367	4228	5920	5075	6141	8585	2718	3402	4769	4085	4935	6916	1717	2136	3000	2566	3089	4352	1175	1454	2045	1747	2098	2968
2800	Watt	4611	5809	8127	6972	8452	11783	3626	4553	6376	5466	6614	9246	2927	3664	5135	4399	5315	7448	1849	2300	3230	2763	3327	4687	1266	1566	2203	1882	2259	3197
3000	Watt	4940	6224	8707	7470	9055	12624	3885	4878	6831	5856	7086	9906	3136	3926	5502	4714	5695	7980	1981	2465	3461	2961	3565	5022	1356	1678	2360	2016	2421	3425
Radiator-exponent n		1,318	1,336	1,331	1,335	1,345	1,330	1,318	1,336	1,331	1,335	1,345	1,330	1,318	1,336	1,331	1,335	1,345	1,330	1,318	1,336	1,331	1,335	1,345	1,330	1,318	1,336	1,331	1,335	1,345	1,330
Type programme			REPLACEMENT RADIATORS												* SUPPLY TEMPERATURE/RETURN TEMPERATURE/ROOM TEMPERATURE																

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

T6-PLAN CENTRALLY CONNECTED RADIATOR.

Connections 4 x internal thread G 1/2 and 2 x external thread G 3/4 bottom centre

Max. positive operating pressure 10 bar

Test positive pressure 13 bar

Max. operating temperature 110 °C

T6 Technology

Heat emission

The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 11 PM	0680
Type 21 PM-S	0682
Type 22 PM	0683
Type 33 PM	0684

and in accordance with OENORM (Austrian standard) EN 442 at the Technological Commercial Museum, Vienna.

Material

T6-PLAN CENTRALLY CONNECTED RADIATORS are made of cold-rolled sheet steel, in accordance with EN 442-1, and a galvanised front panel (1mm thick).

Equipment

Each T6-PLAN CENTRAL CONNECTION RADIATOR is equipped with an integrated T-valve set, and suitable for double-pipe and single-pipe systems with a single-pipe manifold; it comes with a fitted valve top with a pre-set k_v-value, a protective cap and welded suspension brackets on the back. The drain plug and the pivoting special vent plug, as well as the dummy plug are fitted with seals. All types of radiator are equipped with a detachable top cover and two closed side panels.

Paint coating

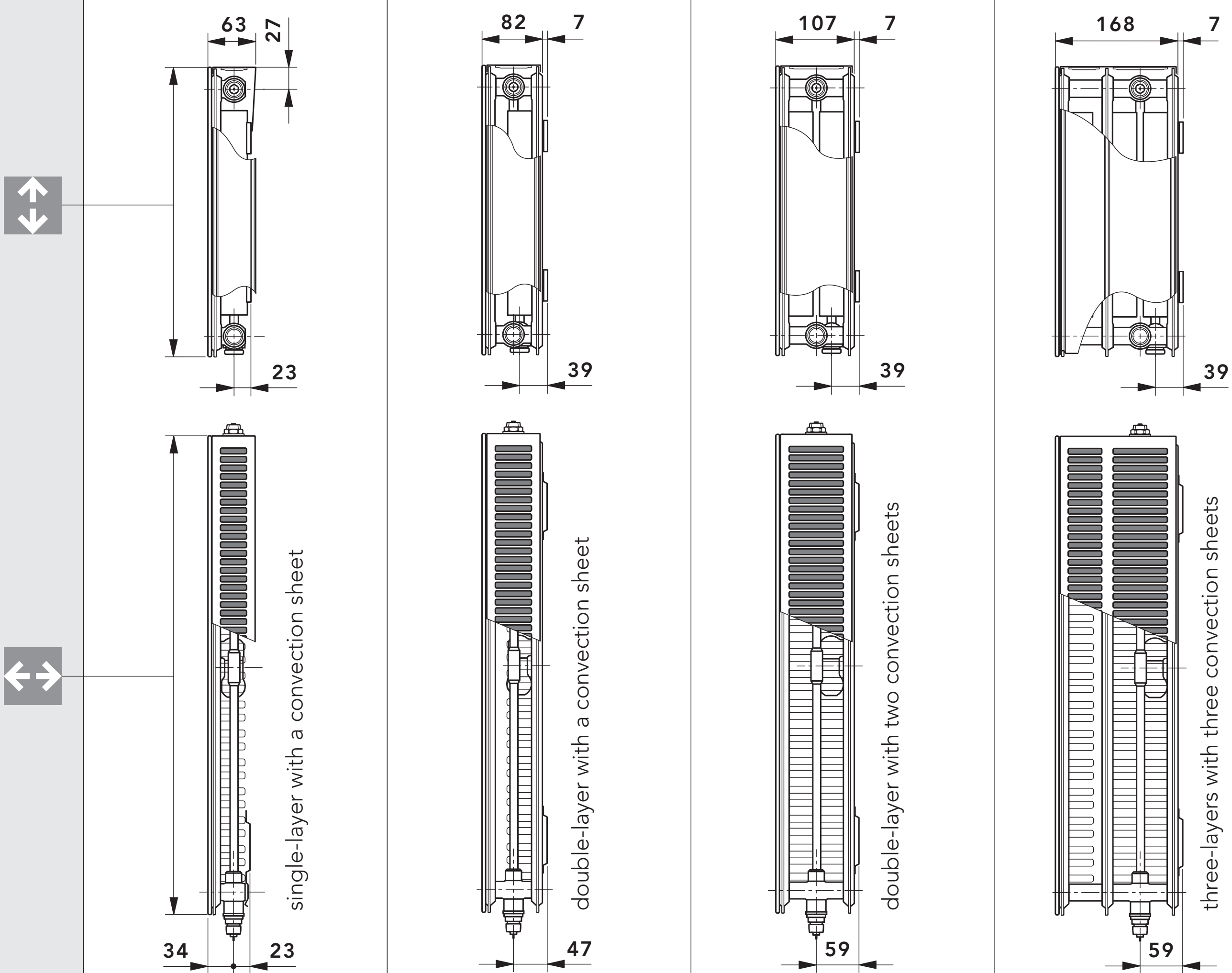
1. Undercoating in accordance with DIN 55900 part 1, stoved at 190° C.
2. Finish in accordance with DIN 55900 part 2, in standard colour 9016 (on request available in many standard colours and sanitary-ware colours at an extra charge), applied electrostatically in a modern powder coating facility. This especially resistant coating is stoved at an object temperature of 210° C.

Packaging

1. Cardboard packaging
2. Edge protection
3. Shrink foil

Overview of models

Type	11 PM	21 PM-S	22 PM	33 PM



Type	11 PM					21 PM-S					22 PM					33 PM				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	bis 2400		bis 2600		bis 2000	bis 2400		bis 3000		bis 2000	bis 3000				bis 2000	bis 3000	bis 2200			bis 1800
Steps	all overall length starting with 400 mm available in steps of 200 mm, additionally 520, 720, 920, 1120 and 1320 mm																			

Guarantee statements are available to download at **www.vogelundnoot.com/download**

T6-PLAN CENTRALLY CONNECTED RADIATOR

Description and delivery equipment / Connection modes - Double-pipe system

Description and delivery equipment

The T6-PLAN Centrally connected radiator, with its welded-in set of T-shaped valves, sets new standards in the field of centre-connection technology. Beside its elegant appearance, the T6-PLAN Centrally connected radiator attracts attention because of its unique patented features, its all-purpose suitability and easy installation for the heating-installer, leaving aside a multitude of other striking advantages.
Consequently the T6-PLAN Centrally connected radiator truly serves to solve your problems.

To round off all the advantages mentioned above, the versatility of the T6-PLAN Centrally connected radiator regarding style and colouring offers a wide scope for design.

The T6-PLAN Centrally connected radiator radiator is - with its welded in set of T-shaped valves - suitable for double-pipe installations as well as single-pipe installations, using a one-pipe manifold.

Additionally to the central connection from the bottom, the sophisticated design makes possible other connections known from compact radiators, such as the single-sided and two-sided connection. **The radiator is delivered ready for double-pipe installation, with a factory-adjusted k_v-setting, appropriate to the radiator output.**

For district heating installations with a big difference between water supply and return temperature, a valve unit with a stepless - and therefore precise - adjustment is available on request.

By using universal supply and return connections, commercially available pipes (external thread 3/4") made of copper, steel, plastic or alloy, can be connected; the corresponding accessories and the commercially obtainable shut-off valve have to be used.

The following thermostat heads can be directly fitted at the radiator: „RA 2000" and „RAW" by Danfoss, „VK" by Heimeier, „D" by Herz, „thera DA" by MNG, as well as „UNI XD" by Oventrop. The radiator will be delivered with a protective cap.

The operation parameters are specified with a positive operating pressure of 10 bar and an operating temperature of 110° C. With single-pipe installations, a cycle´s maximum radiator power of about 10 kW at DT=T1-T2=20 K (at T1 = 90 °C) has to be taken into account.

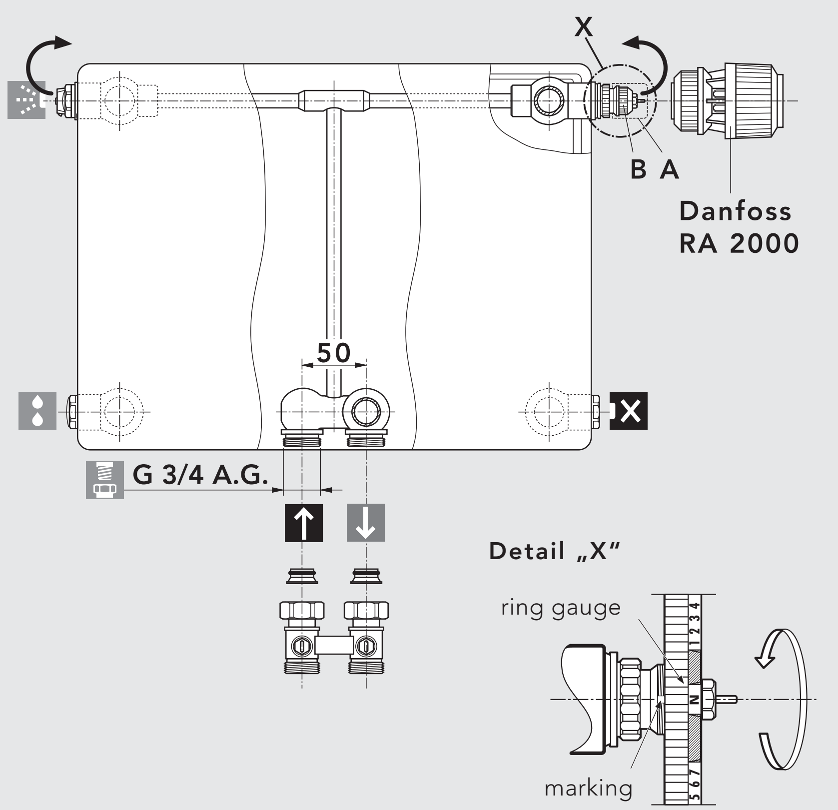
Consequently the T6-PLAN Centrally connected radiator is revolutionary in the field of the new generation of centrally-connected radiator technology.

Thus the T6-PLAN Centrally connected radiator has to be regarded as groundbreaking for the new generation of centrally-connected radiators. With this type of radiator - with its ideal functioning of the whole radiator-valve unit, its superb heating output, combined with the motivation to install thermostat heads, saving heating energy becomes evident.

Our valve radiators´ connections (external thread G 3⁄4) comply in construction and tolerance with the specifications, in accordance with DIN V 3838. If conically sealed drain cocks are used (single-pipe and double-pipe operation), where an adjustment of tolerance of distance to the centre is not possible, we must repudiate liability for any damage connected to this.

Therefore we recommend to use only flat sealed drain cocks, or drain cocks where an adjustment of tolerance of the distance to the centre is possible.

Double-pipe operation - Adjustment tips for built-in valve



Setting instructions:
VOGEL&NOOT valve radiators are factory-fitted for double-pipe installations. Each individual radiator is fitted with a pre-adjusted valve insert, appropriate to the radiator output. The preset k_v-value is also marked in colour on the front surface.

Please note:
Should customised adjustments be required, the pre-set kv-values can be altered as needed.
Swapping the right-hand side built-in valve to the left-hand side is no problem at all at any time.
Radiator are delivered with protective caps. After removing the protective cap (pos. A) the following thermostat heads can be fitted directly to the built-in valve (pos. B): **"RA 2000", "RAW" by Danfoss, "VK" by Heimeier, "D" by Herz, "thera DA" by MNG and "UNI XD" by Oventrop.**

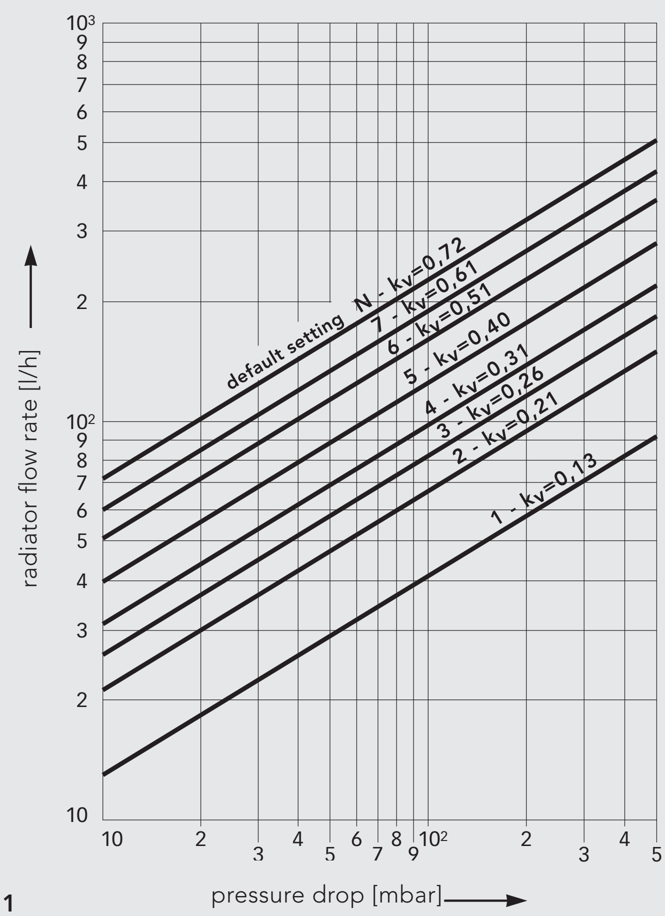
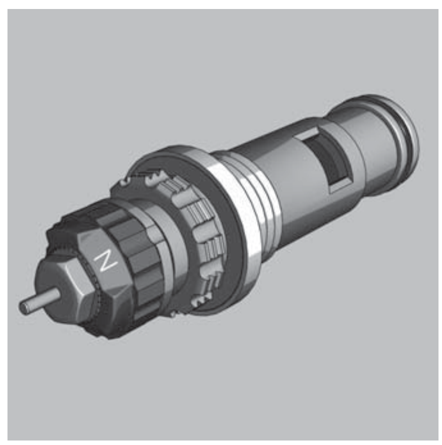


Chart 1
Pressure drop [mbar] – double-pipe operation with a proportional deviation of 2K.



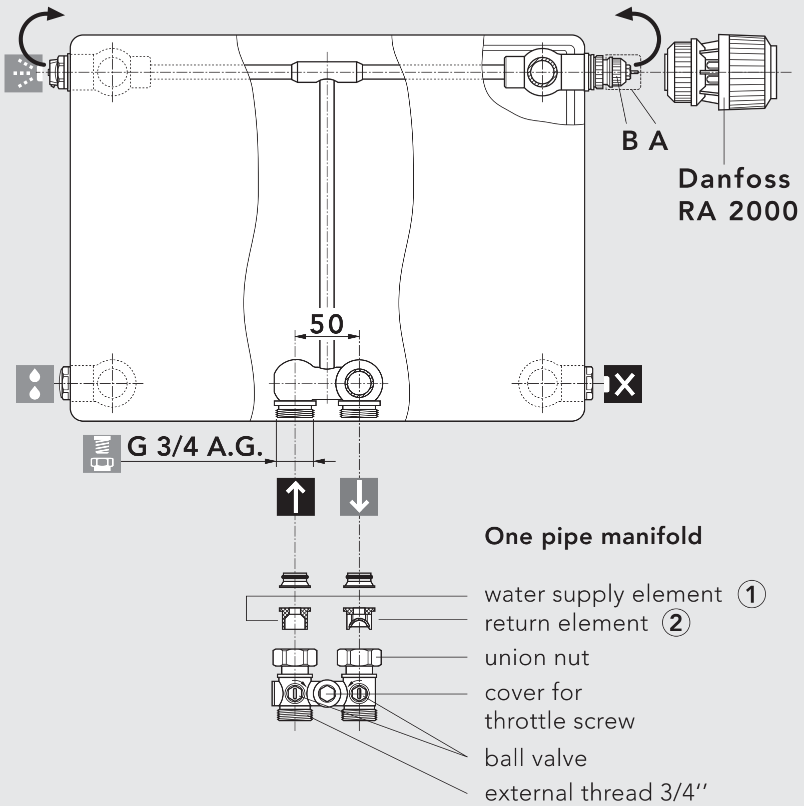
k_v-value chart

Pre-setting	1,1	3,9	5,2	6,5	N
kv-value up to	0,13	0,30	0,42	0,56	0,72
Colour of the adjustment ring	weiß	schwarz	grün	blau	rot

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

Single-pipe operation - Factory-adjusted built-in valve

Single-pipe operation - Factory-adjusted built-in valve



In single-pipe operation, setting the built-in valve on N.

The radiator will be delivered with a protective cap. After removing the protective cap (item A) the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000“ and „RAW“ by Danfoss, „VK“ by Heimeier, „theraDA“ by MNG, as well as „UNI XD“ by Oventrop.**

Caution:
During the installation take care that the return element 2 has been installed at the water return, and the supply element 1 at the water supply.

Changing the built-in valve from the right- to the left-hand side can easily be done at any time.

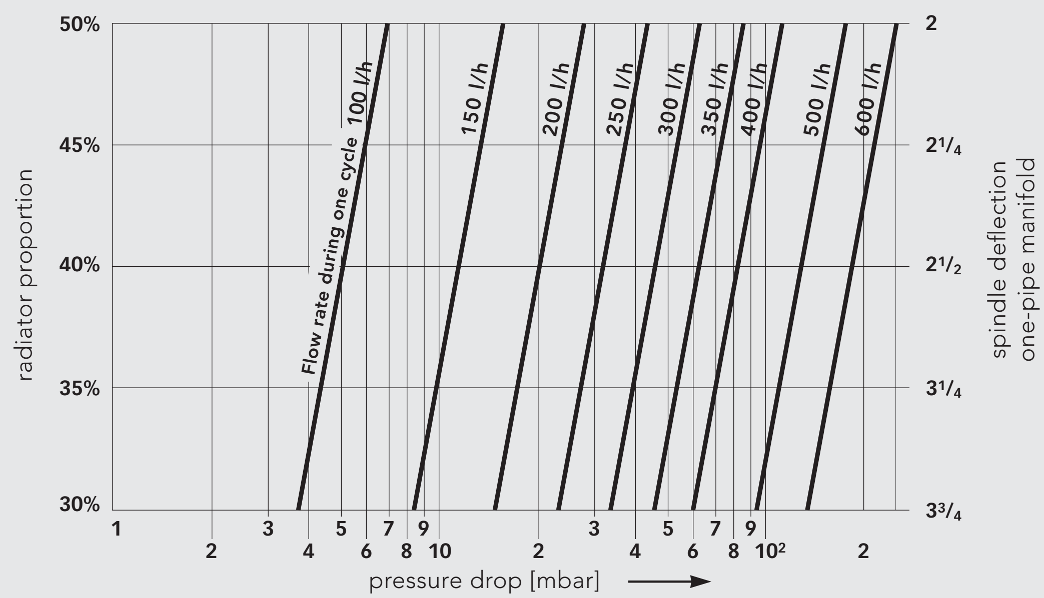


Chart 2
pressure drop [mbar] - single-pipe operation with a proportional deviation of 2K.

Default setting:

radiator proportion 30%: 3,75 revolutions *

radiator proportion 35%: 3,25 revolutions *

radiator proportion 40%: 2,50 revolutions *

radiator proportion 45%: 2,25 revolutions *

radiator proportion 50%: 2,00 revolutions *

*...when starting, turn the bypass spindle of the one-pipe manifold **to the right** as far as it will go.

Of course it is also possible to change the pre-adjusted valve setting when the equipment is operating at pressure.

Please take into account the maximum power per cycle (regarding single-pipe installations) of about 10 kW
$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

90/70/20° C

Side panels and top cover of T6-PLAN Centrally connected radiators are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **90** - return temperature **70** - room temperature **20° C**

Height [mm]		300				400				500				600				900			
Length [mm]	Type / Power	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	**Watt**	270	399	544	796	336	503	681	994	398	595	774	1091	428	660	852	1233	611	901	1150	1612
520	**Watt**	352	518	707	1035	437	654	885	1293	518	773	1006	1419	556	858	1108	1603	794	1172	1495	2096
600	**Watt**	406	598	815	1194	504	755	1021	1492	598	892	1160	1637	642	990	1278	1850	916	1352	1725	2418
720	**Watt**	487	718	978	1433	605	906	1225	1790	717	1071	1392	1964	770	1188	1534	2220	1099	1622	2070	2902
800	**Watt**	541	798	1087	1592	672	1006	1362	1989	797	1190	1547	2182	856	1320	1704	2466	1222	1802	2300	3224
920	**Watt**	622	917	1250	1831	773	1157	1566	2287	916	1368	1779	2510	984	1518	1960	2836	1405	2073	2645	3708
1000	**Watt**	676	997	1359	1990	840	1258	1702	2486	996	1487	1934	2728	1070	1650	2130	3083	1527	2253	2875	4030
1120	**Watt**	757	1117	1522	2229	941	1409	1906	2784	1116	1665	2166	3055	1198	1848	2386	3453	1710	2523	3220	4514
1200	**Watt**	811	1196	1631	2388	1008	1510	2042	2983	1195	1784	2321	3274	1284	1980	2556	3700	1832	2704	3450	4836
1320	**Watt**	892	1316	1794	2627	1109	1661	2247	3282	1315	1963	2553	3601	1412	2178	2812	4070	2016	2974	3795	5320
1400	**Watt**	946	1396	1903	2786	1176	1761	2383	3480	1394	2082	2708	3819	1498	2310	2982	4316	2138	3154	4025	5642
1600	**Watt**	1082	1595	2174	3184	1344	2013	2723	3978	1594	2379	3094	4365	1712	2640	3408	4933	2443	3605	4600	6448
1800	**Watt**	1217	1795	2446	3582	1512	2264	3064	4475	1793	2677	3481	4910	1926	2970	3834	5549	2749	4055	5175	7254
2000	**Watt**	1352	1994	2718	3980	1680	2516	3404	4972	1992	2974	3868	5456	2140	3300	4260	6166	3054	4506	5750	
2200	**Watt**	1487	2193	2990	4378	1848	2768	3744	5469	2191	3271	4255	6002	2354	3630	4686	6783				
2400	**Watt**	1622	2393	3262	4776	2016	3019	4085		2390	3569	4642		2568	3960	5112					
2600	**Watt**			3533	5174			4425		2590	3866	5028		2782	4290	5538					
2800	**Watt**			3805	5572			4766			4164	5415			4620	5964					
3000	**Watt**			4077	5970			5106			4461	5802			4950	6390					
Radiatorexponent n		**1,311**	**1,328**	**1,308**	**1,314**	**1,321**	**1,327**	**1,328**	**1,342**	**1,313**	**1,299**	**1,322**	**1,327**	**1,303**	**1,302**	**1,337**	**1,333**	**1,328**	**1,326**	**1,349**	**1,336**
Type programme			T6-PLAN CENTRALLY CONNECTED RADIATOR																		

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

T6-PLAN CENTRALLY CONNECTED RADIATOR

Outputs - temperature groups 75/65/20° C and 70/55/20° C

75/65/20° C

Side panels and top cover of T6-PLAN Centrally connected radiators are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **75** - return temperature **65** - room temperature **20° C**

Height [mm]		300				400				500				600				900			
Length [mm]	Type / Power	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	Watt	213	313	428	626	264	395	534	778	314	469	608	857	338	520	668	967	480	708	899	1264
520	Watt	277	407	557	814	343	514	695	1012	408	610	790	1114	439	677	868	1257	623	920	1169	1643
600	Watt	319	470	643	940	396	593	802	1168	470	704	912	1285	506	781	1001	1451	719	1061	1349	1895
720	Watt	383	564	771	1128	475	711	962	1401	564	845	1094	1542	608	937	1202	1741	863	1274	1619	2274
800	Watt	426	626	857	1253	528	790	1069	1557	627	938	1216	1714	675	1041	1335	1934	959	1415	1798	2527
920	Watt	489	720	985	1441	607	909	1229	1790	721	1079	1398	1971	776	1197	1535	2225	1103	1627	2068	2906
1000	Watt	532	783	1071	1566	660	988	1336	1946	784	1173	1520	2142	844	1301	1669	2418	1199	1769	2248	3159
1120	Watt	596	877	1200	1754	739	1107	1496	2180	878	1314	1702	2399	945	1457	1869	2708	1343	1981	2518	3538
1200	Watt	638	940	1285	1879	792	1186	1603	2335	941	1408	1824	2570	1013	1561	2003	2902	1439	2123	2698	3791
1320	Watt	702	1034	1414	2067	871	1304	1764	2569	1035	1548	2006	2827	1114	1717	2203	3192	1583	2335	2967	4170
1400	Watt	745	1096	1499	2192	924	1383	1870	2724	1098	1642	2128	2999	1182	1821	2337	3385	1679	2477	3147	4423
1600	Watt	851	1253	1714	2506	1056	1581	2138	3114	1254	1877	2432	3427	1350	2082	2670	3869	1918	2830	3597	5054
1800	Watt	958	1409	1928	2819	1188	1778	2405	3503	1411	2111	2736	3856	1519	2342	3004	4352	2158	3184	4046	5686
2000	Watt	1064	1566	2142	3132	1320	1976	2672	3892	1568	2346	3040	4284	1688	2602	3338	4836	2398	3538	4496	
2200	Watt	1170	1723	2356	3445	1452	2174	2939	4281	1725	2581	3344	4712	1857	2862	3672	5320				
2400	Watt	1277	1879	2570	3758	1584	2371	3206		1882	2815	3648		2026	3122	4006					
2600	Watt			2785	4072			3474		2038	3050	3952		2194	3383	4339					
2800	Watt			2999	4385			3741			3284	4256			3643	4673					
3000	Watt			3213	4698			4008			3519	4560			3903	5007					
Radiatorexponent n		1,311	1,328	1,308	1,314	1,321	1,327	1,328	1,342	1,313	1,299	1,322	1,327	1,303	1,302	1,337	1,333	1,328	1,326	1,349	1,336
Type programme		T6-PLAN CENTRALLY CONNECTED RADIATOR																			

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

70/55/20° C

Side panels and top cover of T6-PLAN Centrally connected radiators are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **70** - return temperature **55** - room temperature **20° C**

Height [mm]		300				400				500				600				900			
Length [mm]	Type / Power	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	Watt	172	252	346	506	213	318	431	626	253	380	490	690	273	421	537	779	386	570	722	1017
520	Watt	224	328	450	658	277	414	560	814	329	494	638	898	355	548	698	1012	502	742	939	1322
600	Watt	258	379	520	759	319	478	646	939	380	570	736	1036	410	632	806	1168	580	856	1084	1525
720	Watt	310	454	624	911	383	573	775	1127	456	684	883	1243	492	758	967	1402	696	1027	1300	1830
800	Watt	344	505	693	1012	426	637	862	1252	506	760	981	1381	546	842	1074	1558	773	1141	1445	2034
920	Watt	396	581	797	1164	489	732	991	1440	582	874	1128	1588	628	969	1236	1791	889	1312	1662	2339
1000	Watt	430	631	866	1265	532	796	1077	1565	633	950	1226	1726	683	1053	1343	1947	966	1426	1806	2542
1120	Watt	482	707	970	1417	596	892	1206	1753	709	1064	1373	1933	765	1179	1504	2181	1082	1597	2023	2847
1200	Watt	516	757	1039	1518	638	955	1292	1878	760	1140	1471	2071	820	1264	1612	2336	1159	1711	2167	3050
1320	Watt	568	833	1143	1670	702	1051	1422	2066	836	1254	1618	2278	902	1390	1773	2570	1275	1882	2384	3355
1400	Watt	602	883	1212	1771	745	1114	1508	2191	886	1330	1716	2416	956	1474	1880	2726	1352	1996	2528	3559
1600	Watt	688	1010	1386	2024	851	1274	1723	2504	1013	1520	1962	2762	1093	1685	2149	3115	1546	2282	2890	4067
1800	Watt	774	1136	1559	2277	958	1433	1939	2817	1139	1710	2207	3107	1229	1895	2417	3505	1739	2567	3251	4576
2000	Watt	860	1262	1732	2530	1064	1592	2154	3130	1266	1900	2452	3452	1366	2106	2686	3894	1932	2852	3612	
2200	Watt	946	1388	1905	2783	1170	1751	2369	3443	1393	2090	2697	3797	1503	2317	2955	4283				
2400	Watt	1032	1514	2078	3036	1277	1910	2585		1519	2280	2942		1639	2527	3223					
2600	Watt			2252	3289			2800		1646	2470	3188		1776	2738	3492					
2800	Watt			2425	3542			3016			2660	3433			2948	3760					
3000	Watt			2598	3795			3231			2850	3678			3159	4029					
Radiatorexponent n		1,311	1,328	1,308	1,314	1,321	1,327	1,328	1,342	1,313	1,299	1,322	1,327	1,303	1,302	1,337	1,333	1,328	1,326	1,349	1,336
Type programme		T6-PLAN CENTRALLY CONNECTED RADIATOR																			

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

T6-PLAN CENTRALLY CONNECTED RADIATOR

Outputs - temperature groups 55/45/20° C and 45/40/20° C

55/45/20° C

Side panels and top cover of T6-PLAN Centrally connected radiators are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **55** - return temperature **45** - room temperature **20° C**

Height [mm]		300				400				500				600				900			
Length [mm]	Type / Power	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	**Watt**	109	159	220	320	134	201	271	392	160	242	310	435	174	268	337	490	244	359	452	638
520	**Watt**	141	206	285	417	175	261	353	510	209	314	402	565	226	348	438	636	317	467	587	830
600	**Watt**	163	238	329	481	202	301	407	588	241	362	464	652	260	401	506	734	365	539	677	958
720	**Watt**	196	286	395	577	242	361	488	706	289	435	557	783	312	482	607	881	438	647	813	1149
800	**Watt**	218	318	439	641	269	402	542	784	321	483	619	870	347	535	674	979	487	718	903	1277
920	**Watt**	250	365	505	737	309	462	624	902	369	556	712	1000	399	615	776	1126	560	826	1039	1468
1000	**Watt**	272	397	549	801	336	502	678	980	401	604	774	1087	434	669	843	1224	609	898	1129	1596
1120	**Watt**	305	445	615	897	376	562	759	1098	449	676	867	1217	486	749	944	1371	682	1006	1264	1788
1200	**Watt**	326	476	659	961	403	602	814	1176	481	725	929	1304	521	803	1012	1469	731	1078	1355	1915
1320	**Watt**	359	524	725	1057	444	663	895	1294	529	797	1022	1435	573	883	1113	1616	804	1185	1490	2107
1400	**Watt**	381	556	769	1121	470	703	949	1372	561	846	1084	1522	608	937	1180	1714	853	1257	1581	2234
1600	**Watt**	435	635	878	1282	538	803	1085	1568	642	966	1238	1739	694	1070	1349	1958	974	1437	1806	2554
1800	**Watt**	490	715	988	1442	605	904	1220	1764	722	1087	1393	1957	781	1204	1517	2203	1096	1616	2032	2873
2000	**Watt**	544	794	1098	1602	672	1004	1356	1960	802	1208	1548	2174	868	1338	1686	2448	1218	1796	2258	
2200	**Watt**	598	873	1208	1762	739	1104	1492	2156	882	1329	1703	2391	955	1472	1855	2693				
2400	**Watt**	653	953	1318	1922	806	1205	1627		962	1450	1858		1042	1606	2023					
2600	**Watt**			1427	2083			1763		1043	1570	2012		1128	1739	2192					
2800	**Watt**			1537	2243			1898			1691	2167			1873	2360					
3000	**Watt**			1647	2403			2034			1812	2322			2007	2529					
Radiatorexponent n		**1,311**	**1,328**	**1,308**	**1,314**	**1,321**	**1,327**	**1,328**	**1,342**	**1,313**	**1,299**	**1,322**	**1,327**	**1,303**	**1,302**	**1,337**	**1,333**	**1,328**	**1,326**	**1,349**	**1,336**
Type programme			T6-PLAN CENTRALLY CONNECTED RADIATOR																		

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

45/40/20° C

Side panels and top cover of T6-PLAN Centrally connected radiators are taken into consideration in the heat outputs

Radiator power data in watts, in accordance with **DIN EN 442** supply temperature **45** - return temperature **40** - room temperature **20° C**

Height [mm]		300				400				500				600				900			
Length [mm]	Type / Power	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	**Watt**	75	108	151	220	92	137	185	266	110	166	212	297	119	184	230	334	166	246	306	435
520	**Watt**	97	141	196	285	120	178	241	346	143	216	275	386	155	239	298	434	216	319	398	565
600	**Watt**	112	163	226	329	138	206	278	400	165	250	317	445	179	276	344	500	249	368	460	652
720	**Watt**	135	195	271	395	166	247	333	480	198	300	381	534	215	331	413	600	299	442	552	783
800	**Watt**	150	217	302	439	184	274	370	533	220	333	423	594	238	368	459	667	332	491	613	870
920	**Watt**	172	249	347	505	212	316	426	613	253	383	487	683	274	423	528	767	382	565	705	1000
1000	**Watt**	187	271	377	549	230	343	463	666	275	416	529	742	298	460	574	834	415	614	766	1087
1120	**Watt**	209	304	422	615	258	384	519	746	308	466	592	831	334	515	643	934	465	688	858	1217
1200	**Watt**	224	325	452	659	276	412	556	799	330	499	635	890	358	552	689	1001	498	737	919	1304
1320	**Watt**	247	358	498	725	304	453	611	879	363	549	698	979	393	607	758	1101	548	810	1011	1435
1400	**Watt**	262	379	528	769	322	480	648	932	385	582	741	1039	417	644	804	1168	581	860	1072	1522
1600	**Watt**	299	434	603	878	368	549	741	1066	440	666	846	1187	477	736	918	1334	664	982	1226	1739
1800	**Watt**	337	488	679	988	414	617	833	1199	495	749	952	1336	536	828	1033	1501	747	1105	1379	1957
2000	**Watt**	374	542	754	1098	460	686	926	1332	550	832	1058	1484	596	920	1148	1668	830	1228	1532	
2200	**Watt**	411	596	829	1208	506	755	1019	1465	605	915	1164	1632	656	1012	1263	1835				
2400	**Watt**	449	650	905	1318	552	823	1111		660	998	1270		715	1104	1378					
2600	**Watt**			980	1427			1204		715	1082	1375		775	1196	1492					
2800	**Watt**			1056	1537			1296			1165	1481			1288	1607					
3000	**Watt**			1131	1647			1389			1248	1587			1380	1722					
Radiatorexponent n		**1,311**	**1,328**	**1,308**	**1,314**	**1,321**	**1,327**	**1,328**	**1,342**	**1,313**	**1,299**	**1,322**	**1,327**	**1,303**	**1,302**	**1,337**	**1,333**	**1,328**	**1,326**	**1,349**	**1,336**
Type programme			T6-PLAN CENTRALLY CONNECTED RADIATOR																		

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

T6-PLAN CENTRALLY CONNECTED RADIATOR

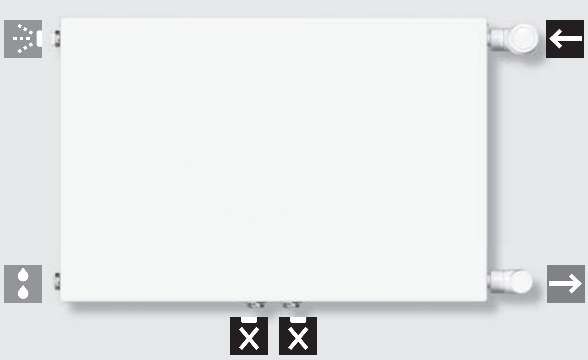
Weights / Connection modes - Double-pipe system

T6-PLAN		Weight in kg of T6-PLAN CENTRALLY CONNECTED RADIATORs																			
Height [mm]		300				400				500				600				900			
Length [mm]	Type / Weight	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM	11 PM	21PM-S	22 PM	33 PM
400	kg	6,81	8,89	10,08	14,07	8,59	11,29	13,01	18,25	9,79	13,22	14,98	20,98	10,93	15,07	16,87	23,59	15,38	21,83	24,47	34,36
520	kg	8,28	11,01	12,56	17,62	10,58	14,14	16,40	23,10	12,10	16,61	18,92	26,60	13,56	18,99	21,33	29,94	19,31	27,72	31,20	43,93
600	kg	9,27	12,43	14,22	19,98	11,90	16,04	18,67	26,34	13,64	18,88	21,54	30,34	15,31	21,61	24,31	34,17	21,93	31,64	35,68	50,30
720	kg	10,75	14,55	16,71	23,53	13,88	18,89	22,06	31,20	15,95	22,28	25,49	35,96	17,93	25,53	28,77	40,52	25,86	37,53	42,40	59,87
800	kg	11,73	15,97	18,36	25,89	15,21	20,79	24,32	34,43	17,49	24,54	28,11	39,71	19,69	28,14	31,75	44,75	28,48	41,46	46,88	66,24
920	kg	13,20	18,16	20,93	29,57	17,19	23,70	27,80	39,42	19,80	28,00	32,14	45,46	22,31	32,12	36,30	51,23	32,40	47,41	53,69	75,94
1000	kg	14,19	19,57	22,59	31,94	18,51	25,60	30,06	42,66	21,34	30,27	34,77	49,21	24,06	34,74	39,28	55,47	35,03	51,34	58,17	82,32
1120	kg	15,66	21,69	25,07	35,49	20,50	28,45	33,46	47,52	23,66	33,66	38,71	54,83	26,69	38,66	43,74	61,81	38,95	57,23	64,90	91,89
1200	kg	16,65	23,11	26,73	37,85	21,82	30,35	35,72	50,75	25,20	35,93	41,33	58,57	28,44	41,27	46,72	66,04	41,57	61,16	69,38	98,27
1320	kg	18,37	25,23	29,21	41,40	24,11	33,20	39,11	55,61	27,81	39,32	45,27	64,19	31,37	45,19	51,18	72,39	45,81	67,04	76,10	107,83
1400	kg	19,36	26,71	30,95	43,90	25,43	35,17	41,46	58,98	29,35	41,65	47,99	68,07	33,12	47,87	54,24	76,76	48,43	71,04	80,67	114,34
1600	kg	21,82	30,25	35,09	49,81	28,74	39,92	47,12	67,08	33,20	47,32	54,56	77,44	37,50	54,40	61,68	87,34	54,97	80,85	91,87	130,29
1800	kg	24,28	33,96	39,42	55,96	32,05	44,84	52,97	75,41	37,06	53,15	61,32	87,04	41,88	61,10	69,31	98,15	61,52	90,84	103,27	146,47
2000	kg	26,74	37,50	43,56	61,87	35,35	49,59	58,62	83,50	40,91	58,81	67,88	96,41	46,26	67,64	76,75	108,73	68,07	100,65	114,47	
2200	kg	29,20	41,04	47,70	67,78	38,66	54,34	64,28	91,59	44,76	64,47	74,45	105,77	50,64	74,17	84,19	119,31				
2400	kg	32,16	44,58	51,84	73,69	42,58	59,09	69,93		49,22	70,13	81,02		55,62	80,70	91,63					
2600	kg			55,98	79,60			75,59		53,08	75,79	87,59		60,00	87,24	99,07					
2800	kg			60,12	85,51			81,25			81,45	94,16			93,77	106,51					
3000	kg			64,26	91,42			86,90			87,11	100,72			100,30	113,95					
Type programme			T6-PLAN CENTRALLY CONNECTED RADIATOR																		

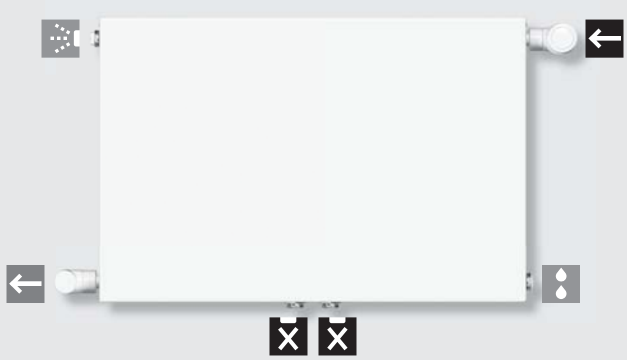
The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Connection modes - Double-pipe system

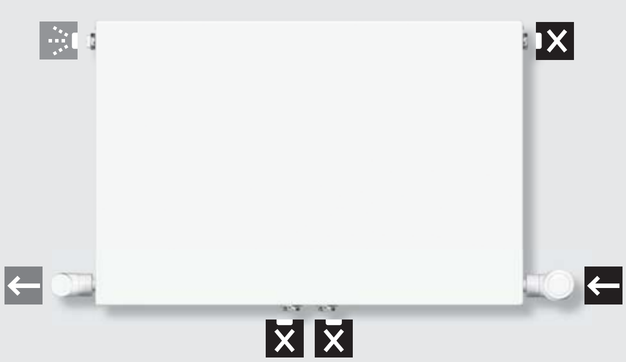
A: Single-sided connection



B: Connection both sides



C: Connection on top **Warning:** Lower performance



Caution: When using the T6-PLAN CENTRALLY CONNECTED RADIATOR as a **compact radiator**, the 3/4" screwing caps made of plastic have to be replaced by nickel-plated brass caps (accessory). Available under the item number: AZ0PL000C0002000. Additionally the plastic part of the special vent plug has to be removed.

T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR.

Materials
T6 PLANE HYGIENE CENTRAL CONNECTION RADIATORS
are made of cold-rolled sheet steel, in acc. with EN 442-1
and equipped with a zinc-plated front panel 1mm thick.

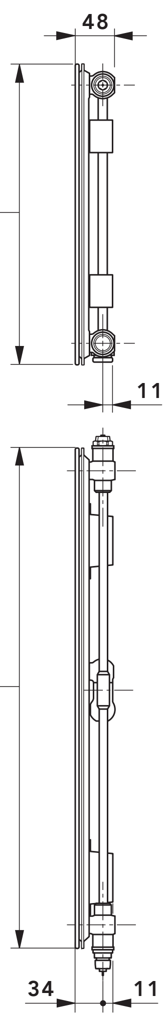
Equipment
Each T6 PLANE HYGIENE CENTRAL CONNECTION RADIATOR
is equipped with a built-in T-shaped valve set suitable for two-pipe systems and single-pipe systems using a one-pipe manifold; equipped with a fitted valve bonnet with kv pre-setting including protection cap, and suspension brackets welded onto the back, including drain plug and pivotable special vent plug as well as a dummy plug, all of them sealed.

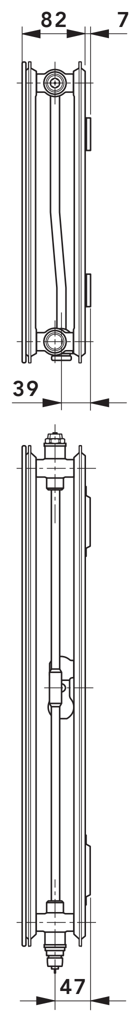
Painting
1. Primer coat, in acc. with DIN 55900, part 1, stoved at 190°C.
2. Electrostatic finish, in acc. with DIN 55900, part 2, in RAL 9016 (on request and against a surcharge available in many RAL and Sanitary Ware colours) in a state-of-the-art powder coating plant. The especial y robust coating is stoved at an object temperature of 210 °C.

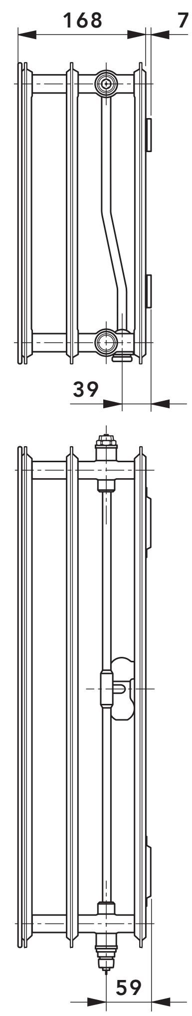
Packaging
1. Cardboard
2. Edge protection
3. Shrink foil

Overview of models

Type	10 PM	20 PM	30 PM







	10 PM	20 PM	30 PM
	single-layer	double-layer	triple-layer

Type	10 PM					20 PM					30 PM				
Height [mm]	300	400	500	600	900	300	400	500	600	900	300	400	500	600	900
Length [mm]	bis 1200		bis 2400	bis 2600	bis 1400	bis 2400		bis 3000		bis 2000	bis 3000	bis 2200			bis 1800
Steps	any overall length starting with 400 mm available in steps of 200 mm; additional 520, 720, 920, 1120 and 1320 mm														

Two-pipe system, One-pipe system, connection types

Attention: for technical information about the connection settings, please see the relevant chapters in PLANE T6 CENTRAL CONNECTION RADIATOR (pages 53 – 54).

EN ISO 9001

DIE *neue* WÄRME

Guarantee statements are available to download at **www.vogelundnoot.com/download**

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Outputs - temperature group 90/70/20° C

90/70/20° C — Output data in watts   Feed temperature **90** - return temperature **70** - room temperature **20** °C

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Power	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	Watt	156	282	420	199	352	519	239	419	612	276	483	703	375	664	967
520	Watt	203	367	546	259	458	674	311	545	796	358	627	914	488	863	1257
600	Watt	234	423	630	299	528	778	359	629	918	413	724	1055	563	996	1451
720	Watt	281	507	756	359	634	933	430	754	1102	496	869	1266	676	1195	1741
800	Watt	313	564	840	398	704	1037	478	838	1225	551	965	1406	751	1328	1934
920	Watt	359	648	966	458	810	1193	550	964	1408	634	1110	1617	864	1527	2225
1000	Watt	391	705	1050	498	880	1296	598	1048	1531	689	1206	1758	939	1659	2418
1120	Watt	438	789	1176	558	986	1452	669	1173	1714	772	1351	1969	1051	1859	2708
1200	Watt	469	846	1260	598	1056	1556	717	1257	1837	827	1448	2109	1126	1991	2902
1320	Watt	516	930	1386	657	1162	1711	789	1383	2021	910	1592	2320	1239	2190	3192
1400	Watt	547	987	1470	697	1232	1815	837	1467	2143	965	1689	2461	1314	2323	3385
1600	Watt	625	1128	1680	797	1408	2074	956	1676	2449	1103	1930	2813	1502	2655	3869
1800	Watt	703	1269	1890	897	1584	2334	1076	1886	2755	1240	2171	3164	1690	2987	4352
2000	Watt	781	1410	2100	996	1760	2593	1195	2095	3062	1378	2413	3516	1877	3319	4836
2200	Watt	859	1551	2310	1096	1936	2852	1315	2305	3368	1516	2654	3867	2065	3651	5320
2400	Watt	938	1692	2520	1195	2112	3111	1434	2514	3674	1654	2895	4219	2253	3983	5803
2600	Watt	1016	1833	2730	1295	2288	3371	1554	2724	3980	1792	3136	4570	2441	4314	6287
2800	Watt	1094	1974	2940	1395	2464	3630	1673	2933	4286	1929	3378	4922	2628	4646	6770
3000	Watt	1172	2115	3150	1494	2640	3889	1793	3143	4592	2067	3619	5274	2816	4978	7254
Radiator exponent n		1,2685	1,2715	1,2628	1,2579	1,2709	1,2672	1,2473	1,2702	1,2716	1,2367	1,2696	1,2760	1,2603	1,2759	1,2964
Type programme		T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR														

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR

Outputs - temperature groups 75/65/20° C and 70/55/20° C

75/65/20° C

Output data in watts Feed temperature **75** - return temperature **65** - room temperature **20** °C

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Power	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	Watt	124	224	334	158	279	412	190	332	486	220	383	557	298	526	764
520	Watt	161	291	434	206	363	535	248	432	631	286	498	724	388	684	993
600	Watt	186	335	500	238	419	617	286	499	728	330	574	836	448	789	1145
720	Watt	223	402	600	285	503	741	343	598	874	396	689	1003	537	947	1374
800	Watt	248	447	667	317	558	823	381	665	971	440	766	1114	597	1052	1527
920	Watt	285	514	767	364	642	947	438	765	1117	506	880	1282	686	1210	1756
1000	Watt	310	559	834	396	698	1029	476	831	1214	550	957	1393	746	1315	1909
1120	Watt	347	626	934	444	782	1152	533	931	1360	616	1072	1560	836	1473	2138
1200	Watt	372	671	1001	475	838	1235	571	997	1457	660	1148	1672	895	1578	2291
1320	Watt	409	738	1101	523	921	1358	628	1097	1602	726	1263	1839	985	1736	2520
1400	Watt	434	783	1168	554	977	1441	666	1163	1700	770	1340	1950	1044	1841	2673
1600	Watt	496	894	1334	634	1117	1646	762	1330	1942	880	1531	2229	1194	2104	3054
1800	Watt	558	1006	1501	713	1256	1852	857	1496	2185	990	1723	2507	1343	2367	3436
2000	Watt	620	1118	1668	792	1396	2058	952	1662	2428	1100	1914	2786	1492	2630	3818
2200	Watt	682	1230	1835	871	1536	2264	1047	1828	2671	1210	2105	3065	1641	2893	4200
2400	Watt	744	1342	2002	950	1675	2470	1142	1994	2914	1320	2297	3343	1790	3156	4582
2600	Watt	806	1453	2168	1030	1815	2675	1238	2161	3156	1430	2488	3622	1940	3419	4963
2800	Watt	868	1565	2335	1109	1954	2881	1333	2327	3399	1540	2680	3900	2089	3682	5345
3000	Watt	930	1677	2502	1188	2094	3087	1428	2493	3642	1650	2871	4179	2238	3945	5727
Radiator exponent n		1,2685	1,2715	1,2628	1,2579	1,2709	1,2672	1,2473	1,2702	1,2716	1,2367	1,2696	1,2760	1,2603	1,2759	1,2964
Type programme			T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

70/55/20° C

Output data in watts Feed temperature **70** - return temperature **55** - room temperature **20** °C

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Power	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	Watt	101	182	272	129	227	335	155	270	395	180	311	453	243	427	619
520	Watt	131	236	353	168	295	435	202	352	513	234	405	589	316	556	804
600	Watt	151	273	408	194	341	502	233	406	592	270	467	679	365	641	928
720	Watt	182	327	489	232	409	603	280	487	711	324	561	815	438	769	1113
800	Watt	202	364	543	258	454	670	311	541	790	360	623	906	486	855	1237
920	Watt	232	418	625	297	522	770	358	622	908	414	716	1042	559	983	1423
1000	Watt	252	455	679	323	568	837	389	676	987	450	779	1132	608	1069	1546
1120	Watt	283	509	761	362	636	938	435	757	1106	504	872	1268	681	1197	1732
1200	Watt	303	546	815	387	681	1005	466	811	1185	540	934	1359	729	1282	1856
1320	Watt	333	600	897	426	749	1105	513	892	1303	594	1028	1494	802	1411	2041
1400	Watt	353	636	951	452	795	1172	544	946	1382	630	1090	1585	851	1496	2165
1600	Watt	404	727	1087	516	908	1340	622	1082	1580	720	1246	1811	973	1710	2474
1800	Watt	454	818	1223	581	1022	1507	700	1217	1777	810	1401	2038	1094	1924	2783
2000	Watt	504	909	1359	646	1135	1675	777	1352	1975	900	1557	2264	1216	2137	3093
2200	Watt	555	1000	1494	710	1249	1842	855	1487	2172	990	1713	2491	1337	2351	3402
2400	Watt	605	1091	1630	775	1363	2010	933	1622	2370	1080	1869	2717	1459	2565	3711
2600	Watt	656	1182	1766	839	1476	2177	1011	1758	2567	1170	2024	2943	1580	2779	4020
2800	Watt	706	1273	1902	904	1590	2345	1088	1893	2765	1260	2180	3170	1702	2992	4330
3000	Watt	757	1364	2038	968	1703	2512	1166	2028	2962	1350	2336	3396	1824	3206	4639
Radiator exponent n		1,2685	1,2715	1,2628	1,2579	1,2709	1,2672	1,2473	1,2702	1,2716	1,2367	1,2696	1,2760	1,2603	1,2759	1,2964
Type programme			T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR

Outputs - temperature groups 55/45/20° C and 45/40/20° C

T6 PLAN HYGIENE

55/45/20° C

Output data in watts Feed temperature **55** - return temperature **45** - room temperature **20** °C

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Power	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	Watt	65	117	175	83	146	215	101	174	254	117	200	290	157	274	394
520	Watt	84	152	228	108	190	280	131	226	330	152	260	377	204	356	512
600	Watt	97	175	263	125	219	323	151	261	380	175	300	436	235	411	591
720	Watt	117	210	315	150	263	388	181	313	457	211	360	523	282	493	709
800	Watt	130	234	350	167	292	431	201	347	507	234	400	581	313	548	788
920	Watt	149	269	403	192	336	496	232	400	583	269	460	668	361	630	906
1000	Watt	162	292	438	208	365	539	252	434	634	292	500	726	392	685	984
1120	Watt	182	327	490	233	408	603	282	486	710	328	560	813	439	768	1103
1200	Watt	195	350	525	250	438	646	302	521	761	351	600	871	470	822	1181
1320	Watt	214	385	578	275	481	711	332	573	837	386	660	958	517	905	1299
1400	Watt	227	409	613	292	511	754	352	608	888	409	700	1016	549	959	1378
1600	Watt	259	467	700	333	583	862	403	695	1014	468	801	1161	627	1096	1575
1800	Watt	292	526	788	375	656	970	453	782	1141	526	901	1307	705	1234	1772
2000	Watt	324	584	875	417	729	1077	503	869	1268	585	1001	1452	784	1371	1969
2200	Watt	357	642	963	458	802	1185	554	956	1395	643	1101	1597	862	1508	2166
2400	Watt	389	701	1050	500	875	1293	604	1042	1522	702	1201	1742	940	1645	2363
2600	Watt	422	759	1138	542	948	1400	654	1129	1649	760	1301	1887	1019	1782	2560
2800	Watt	454	818	1225	583	1021	1508	705	1216	1775	819	1401	2032	1097	1919	2757
3000	Watt	486	876	1313	625	1094	1616	755	1303	1902	877	1501	2178	1176	2056	2953
Radiator exponent n		1,2685	1,2715	1,2628	1,2579	1,2709	1,2672	1,2473	1,2702	1,2716	1,2367	1,2696	1,2760	1,2603	1,2759	1,2964
Type programme			T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

45/40/20° C

Output data in watts Feed temperature **45** - return temperature **40** - room temperature **20** °C

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Power	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	Watt	45	81	122	58	101	150	70	121	176	82	139	201	109	190	271
520	Watt	59	105	158	75	132	195	91	157	229	107	181	261	142	247	353
600	Watt	68	122	183	87	152	224	105	181	264	123	208	302	164	285	407
720	Watt	81	146	219	104	182	269	127	217	317	148	250	362	196	342	488
800	Watt	90	162	243	116	202	299	141	241	352	164	278	402	218	380	542
920	Watt	104	186	280	133	233	344	162	277	405	188	319	463	251	437	624
1000	Watt	113	203	304	145	253	374	176	301	440	205	347	503	273	475	678
1120	Watt	126	227	341	162	283	419	197	338	493	229	389	563	305	532	759
1200	Watt	135	243	365	174	304	449	211	362	528	246	417	603	327	570	814
1320	Watt	149	267	402	191	334	494	232	398	581	270	458	664	360	627	895
1400	Watt	158	284	426	203	354	524	246	422	616	287	486	704	382	665	949
1600	Watt	180	324	487	232	405	599	281	482	704	328	556	805	436	760	1085
1800	Watt	203	365	548	261	455	673	316	542	792	369	625	905	491	855	1220
2000	Watt	225	405	609	290	506	748	352	603	880	410	694	1006	545	949	1356
2200	Watt	248	446	669	319	557	823	387	663	968	451	764	1106	600	1044	1492
2400	Watt	270	486	730	348	607	898	422	723	1055	492	833	1207	654	1139	1627
2600	Watt	293	527	791	377	658	973	457	784	1143	533	903	1307	709	1234	1763
2800	Watt	315	567	852	406	708	1047	492	844	1231	574	972	1408	764	1329	1898
3000	Watt	338	608	913	435	759	1122	527	904	1319	615	1042	1509	818	1424	2034
Radiator exponent n		1,2685	1,2715	1,2628	1,2579	1,2709	1,2672	1,2473	1,2702	1,2716	1,2367	1,2696	1,2760	1,2603	1,2759	1,2964
Type programme			T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR													

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Weights

T6-PLAN HYGIENE

Weights in kg for T6-PLAN HYGIENE centrally connected radiator

Height [mm]		300			400			500			600			900		
Length [mm]	Type / Weight	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM	10 PM	20 PM	30 PM
400	kg	5,19	7,44	10,30	6,28	9,27	12,85	7,41	11,12	15,42	8,49	12,90	17,88	11,95	18,59	25,80
520	kg	6,24	9,17	12,71	7,67	11,55	16,03	9,10	13,94	19,36	10,50	16,24	22,55	14,97	23,60	32,80
600	kg	6,93	10,32	14,32	8,59	13,07	18,15	10,24	15,83	21,98	11,85	18,47	25,65	17,00	26,96	37,49
720	kg	7,99	12,06	16,75	9,96	15,33	21,32	11,95	18,65	25,93	13,87	21,82	30,32	20,02	31,98	44,50
800	kg	8,69	13,22	18,36	10,88	16,86	23,44	13,08	20,53	28,55	15,22	24,05	33,43	22,05	35,33	49,17
920	kg	9,74	15,01	20,91	12,25	19,20	26,75	14,78	23,41	32,62	17,23	27,46	38,24	25,08	40,43	56,33
1000	kg	10,43	16,17	22,52	13,17	20,72	28,86	15,92	25,30	35,26	18,58	29,69	41,35	27,10	43,78	61,01
1120	kg	11,48	17,90	24,93	14,54	23,00	32,04	17,63	28,12	39,19	20,60	33,03	46,01	30,13	48,80	68,02
1200	kg	12,19	19,05	26,54	15,46	24,51	34,16	18,76	30,00	41,81	21,94	35,26	49,13	32,15	52,14	72,70
1320	kg		20,79	28,96		26,78	37,32	20,64	32,83	45,75	24,14	38,62	53,79	35,36	57,17	79,72
1400	kg		22,01	30,71		28,37	39,58	21,78	34,77	48,52	25,49	40,91	57,04	37,38	60,59	84,53
1600	kg		24,90	34,73		32,15	44,87	24,88	39,48	55,08	29,13	46,49	64,82		68,96	96,21
1800	kg		27,95	39,00		36,13	50,41	27,80	44,34	61,88	32,57	52,23	72,83		77,51	108,16
2000	kg		30,83	43,01		39,91	55,69	30,66	49,06	68,44	35,94	57,80	80,60		85,89	119,85
2200	kg		33,73	47,05		43,70	60,98	33,49	53,76	75,00	39,30	63,38	88,39			
2400	kg		36,61	51,07		47,50		36,33	58,47		42,66	68,96				
2600	kg			55,10					63,17		46,03	74,53				
2800	kg			59,13					67,87			80,10				
3000	kg			63,15					72,58			85,69				

Type programme: T6-PLAN HYGIENE CENTRALLY CONNECTED RADIATOR

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

VERTICAL CENTRALLY CONNECTED RADIATOR.

Heat emission
The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 10	0358
Type 20	0359
Type 21	0324
Type 22	0325

Material
VERTICAL RADIATORS are manufactured from cold-rolled sheet steel in line with EN 442-1 and have an elegant, stable profile with 40 mm beading.

Configuration
Each VERTICAL RADIATOR is equipped with suspension brackets welded onto the rear side. The 20 K radiator model is also supplied with two side grills.

Coating
1. Primer in accordance with DIN 55900 part 1, fired at 190° C.
2. The top coat, in accordance with DIN 55900 part 2, in RAL 9016 (available in many RAL and sanitary colours on request, for a supplement), is applied electrostatically in a modern powder coating plant. The resistant coating, which is particularly important, is fired with the radiator at a temperature of 210° C.

Packaging
1. Cardboard containers
2. Edge protection
3. Shrink wrap

Connections
4 x G 1/2 I.G

Test positive pressure
13 bar

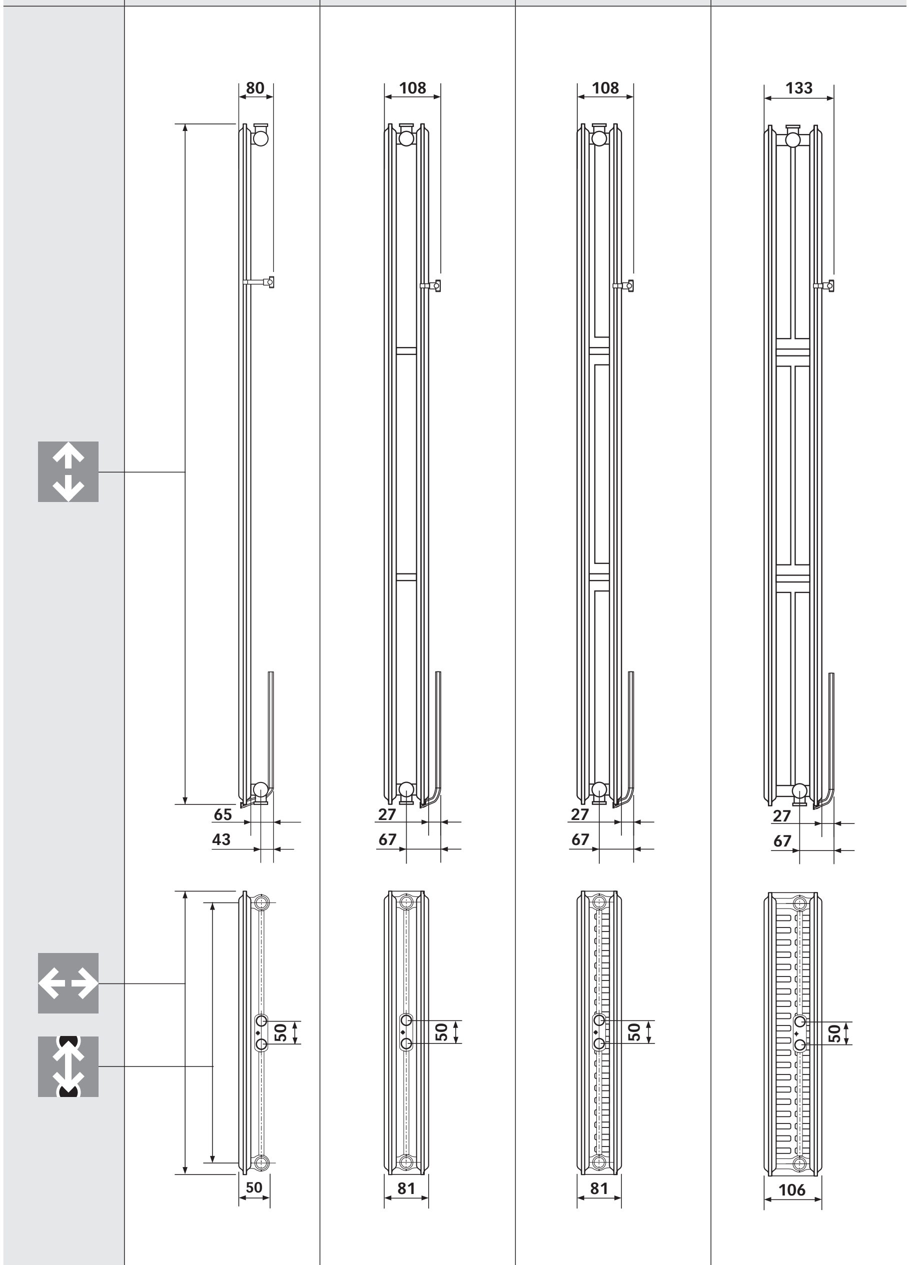
Max. positive operating pressure 10 bar

Max. operating temperature 110 °C

VERTICAL CENTRALLY CONNECTED RADIATOR

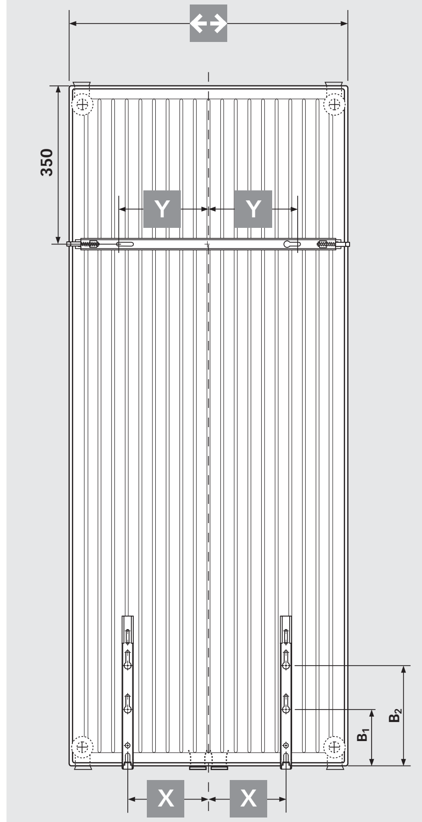
Overview of models / illustration showing location for welding of suspended straps

Overview of models



Type	10				20			21			22			
Height [mm]	1500	1800	1950	2100	1800	1950	2100	1800	1950	2100	1800	1950	2100	2300
Length [mm]	- 450 600 -	- 450 600 750			300 450 600 750			300 450 600 750			300 450 600 -	300 450 600 750		- - - 750
Hub spacing [mm]	Length - 56 mm													

Location of suspended straps



Type	10	20, 21, 22
B_1	170	150
B_2	270	250

[mm]				
↔	300	450	600	750
X	75	100	175	250
Y	25	95	170	245

HEIZKÖRPER RAL GÜTEZEICHEN AUS STAHL

CE

DIN EN EURONORM 442

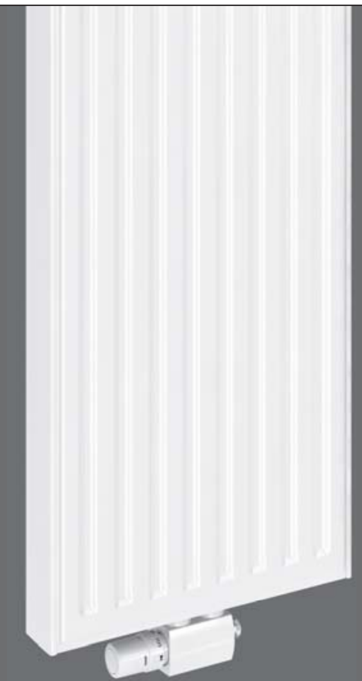
55 45 DIE *neue* WÄRME

EN ISO 9001

Guarantee statements are available to download at **www.vogelundnoot.com/download**

VERTICAL CENTRALLY CONNECTED RADIATOR

Outputs / weights / water volume



360 ° views available at www.vogelundnoot.com

Weight in kg and water content in litre, for the CENTRAL-CONNECTION VERTICAL RADIATOR

Height [mm]		1500	1800				1950				2100				2300
Length [mm]	Type / Weight	10	10	20	21	22	10	20	21	22	10	20	21	22	22
300	kg	-	-	21,4	24,92	28,16	-	23,12	27,4	30,7	-	24,52	29,08	33,24	-
450	kg	14,1	16,86	32,1	37,38	42,24	17,4	34,68	41,1	46,05	18,06	36,78	43,62	49,86	-
600	kg	18,8	22,48	42,8	49,84	56,32	23,2	46,24	54,8	61,4	24,08	49,04	58,16	66,48	-
750	kg	-	28,1	53,5	62,3	-	29	57,8	68,5	76,75	30,1	61,3	72,7	83,1	88,7
Length [mm]	Type / Water volume	10	10	20	21	22	10	20	21	22	10	20	21	22	22
300	l	-	-	6,48	6,48	6,48	-	6,94	6,94	6,94	-	7,40	7,40	7,40	-
450	l	4,42	4,56	9,72	9,72	9,72	4,98	10,41	10,41	10,41	5,4	11,10	11,10	11,10	-
600	l	5,90	6,08	12,96	12,96	12,96	6,64	13,88	13,88	13,88	7,2	14,80	14,80	14,80	-
750	l	-	7,60	16,20	16,20	-	8,30	17,35	17,35	17,35	9,00	18,50	18,50	18,50	20,00
Type programme			VERTICAL CENTRALLY CONNECTED RADIATOR												

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

VERTICAL CENTRALLY CONNECTED RADIATOR

Radiator power data in watts, in accordance with **DIN EN 442**

Temperature pairings		75/65/20° C*													
Height [mm]		1500	1800				1950				2100				2300
Length [mm]	Type / Power	10	10	20	21	22	10	20	21	22	10	20	21	22	22
300	Watt	-	-	819	963	1132	-	877	1020	1192	-	935	1081	1252	-
450	Watt	650	765	1229	1445	1698	819	1315	1530	1788	876	1403	1621	1877	-
600	Watt	867	1020	1638	1926	2264	1092	1753	2040	2384	1168	1870	2162	2503	-
750	Watt	-	1275	2048	2408	-	1365	2192	2550	2980	1460	2338	2702	3129	3329
Radiator exponent n		1,2976	1,3246	1,3094	1,3384	1,3566	1,3381	1,3135	1,3422	1,3619	1,3516	1,3176	1,3371	1,3672	1,3671

Temperature pairings		55/45/20° C*													
Height [mm]		1500	1800				1950				2100				2300
Length [mm]	Type / Power	10	10	20	21	22	10	20	21	22	10	20	21	22	22
300	Watt	-	-	420	486	566	-	448	514	594	-	477	546	623	-
450	Watt	335	389	629	729	849	413	672	771	892	439	716	819	934	-
600	Watt	447	518	839	972	1132	551	896	1028	1189	585	954	1092	1245	-
750	Watt	-	648	1049	1215	-	689	1120	1285	1486	732	1193	1365	1556	1656
Radiator exponent n		1,2976	1,3246	1,3094	1,3384	1,3566	1,3381	1,3135	1,3422	1,3619	1,3516	1,3176	1,3371	1,3672	1,3671

Type programme: VERTICAL CENTRALLY CONNECTED RADIATOR

* Feed temperature / return temperature / room temperature

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

PLAN VERTICAL CENTRALLY CONNECTED RADIATOR.

Heat emission
The specification was verified in accordance with DIN EN 442 at The Technical University, Stuttgart (Registration at WSP-Cert Product Certification Centre, Stuttgart), under the numbers:

Type 21	0323
Type 22	0900

Material
PLAN VERTICAL RADIATORS are manufactured from cold-rolled sheet steel in line with EN 442-1 and have an elegant, stable profile with 40 mm beading.

Configuration
Each PLAN VERTICAL RADIATOR is equipped with suspension brackets welded onto the rear side. The 20 K radiator model is also supplied with two side grills.

Coating
1. Primer in accordance with DIN 55900 part 1, fired at 190° C.
2. The top coat, in accordance with DIN 55900 part 2, in RAL 9016 (available in many RAL and sanitary colours on request, for a supplement), is applied electrostatically in a modern powder coating plant. The resistant coating, which is particularly important, is fired with the radiator at a temperature of 210° C.

Packaging
1. Cardboard containers
2. Edge protection
3. Shrink wrap

Connections: 2 x G 1/2 internal thread, at the bottom centre, centric distance: 50 mm and 4 x G ½ internal thread, at the side, downward and upward.

8 bar
Test positive pressure: 8 bar

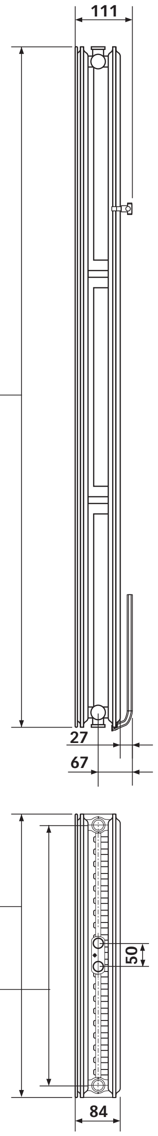
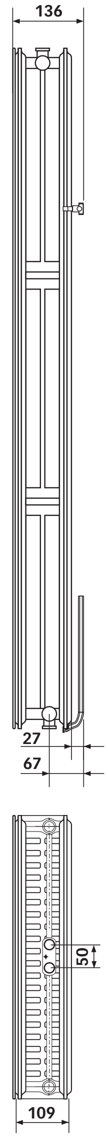
6 bar max.
Max. positive operating pressure:
6 bar

max.
Max. operating temperature:
110 °C

PLAN VERTICAL CENTRALLY CONNECTED RADIATOR

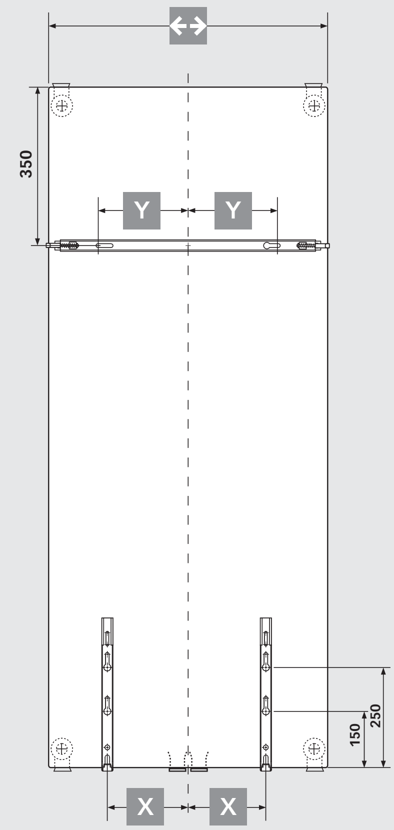
Overview of models / illustration showing location for welding of suspended straps

Overview of models

Type	21	22
		

Type	21			22		
Height [mm]	1800	1950	2100	1800	1950	2100
Length [mm]	300 450 600 750			300 450 600 -	300 450 600 750	
Hub spacing [mm]	Length - 56 mm					

Location of suspended straps



	[mm]			
	300	450	600	750
X	75	100	175	250
Y	25	95	170	245

Guarantee statements are available to download at **www.vogelundnoot.com/download**

PLAN VERTICAL CENTRALLY CONNECTED RADIATOR

Outputs / weights / water volume

Weight in kg and water content in litre, for the PLAN VERTICAL CENTRALLY CONNECTED RADIATOR

Height [mm]		1800		1950		2100	
Length [mm]	Type / Weight	21	22	21	22	21	22
300	kg	30,08	33,48	32,8	37,12	35,12	39,28
450	kg	45,12	50,22	49,2	55,68	52,68	58,92
600	kg	60,16	66,96	65,6	74,24	70,24	78,56
750	kg	75,2	-	82	92,8	87,8	98,2
Length [mm]	Type / Water volume	21	22	21	22	21	22
300	l	6,48	6,48	6,94	6,94	7,4	7,4
450	l	9,72	9,72	10,41	10,41	11,1	11,1
600	l	12,96	12,96	13,88	13,88	14,8	14,8
750	l	16,2	-	17,35	17,35	18,5	18,5
Type programme			PLAN VERTICAL CENTRALLY CONNECTED RADIATOR				

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

Radiator power data in watts, in accordance with **DIN EN 442**

Temperature pairings		75/65/20° C*						55/45/20° C*					
Height [mm]		1800		1950		2100		1800		1950		2100	
Length [mm]	Type / Power	21	22	21	22	21	22	21	22	21	22	21	22
300	Watt	886	1046	936	1103	978	1161	452	528	476	532	495	587
450	Watt	1329	1569	1404	1654	1467	1742	678	792	714	798	743	881
600	Watt	1772	2092	1873	2205	1957	2323	903	1056	953	1065	990	1175
750	Watt	2216	-	2341	2756	2446	2903	1129	-	1191	1331	1238	1468
Radiator exponent n		1,3192	1,3387	1,3231	1,4255	1,3327	1,3343	1,3192	1,3387	1,3231	1,4255	1,3327	1,3343
Type programme			PLAN VERTICAL CENTRALLY CONNECTED RADIATOR					* Feed temperature / return temperature / room temperature					

The availability of any type of radiator, as well as range of sizes, is in accordance with the production programme, as stated in the price list.

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

GENERAL TECHNICAL INFORMATION

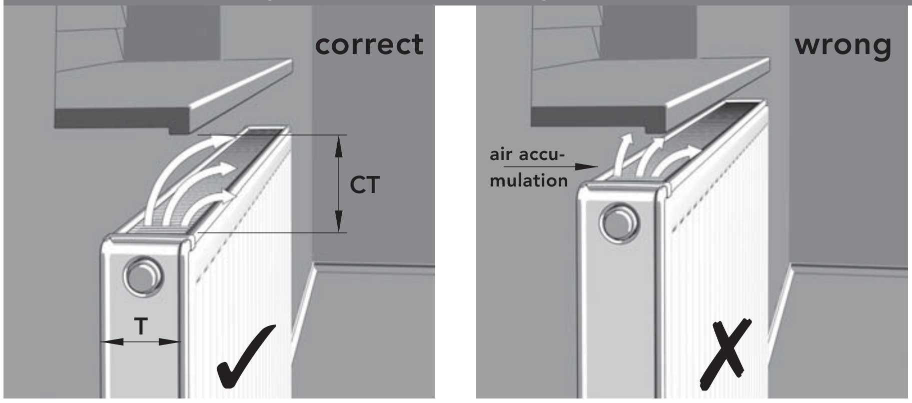
Flat radiators are triple-packed

The packaging is done such that it does not need to be removed during the installation and the connection. The packaging will not be removed until the flat´s occupation. That will keep the product pristine, right through to the hand over.

Installation of wrapped radiators, and run of a test heating up to t_1 40°C possible.

1. **Cardboard packaging**
2. **Edge protection**
3. **Shrink foil**

Installation under your window and in your alcove



Optimum performance can only be guaranteed, if the air circulation is not restricted. This means that above and below the radiator there must be enough clearance. The clearance above the radiator is usually calculated according to the formula: **radiator width + 10 %.**

Clearance top CT = W x 1,1

In case this value cannot be maintained, because of constructional constraints, performance will be lower.

Water volume in litre/m of flat radiator

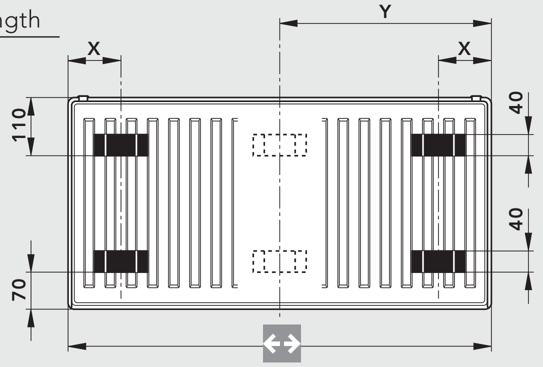
Overall height [mm] / Radiator type	300	400	500	554	600	900	954
10, 10 VM,10 PM, 11 K, 11 KV, 11 VM, 11 PM	2,0	2,6	3,3	-	3,7	5,1	-
20, 20 K, 20 VM, 20 PM	3,9	5,0	6,1	-	7,1	10,2	-
21 K-S, 21 KV-S, 21 VM-S, 21 PM-S	3,9	5,0	6,1	6,7	7,1	10,2	11,3
22 K, 22 KV, 22 VM, 22 PM	3,9	5,0	6,1	6,7	7,1	10,2	11,3
30, 30 PM	6,0	7,6	9,4	-	10,8	15,6	-
33 K, 33 KV, 33 VM, 33 PM	6,0	7,6	9,4	10,2	10,8	15,6	16,5

Image of how the brackets are welded on flat radiator*

Radiator type	Measure X [mm]
10, 10 VM, 10 PM	100
11 K, 11 KV, 11 VM, 11 PM	93
20, 20 VM, 20 PM	100
21 K-S, 21 KV-S, 21 VM-S, 21 PM-S	100
22 K, 22 KV, 22 VM, 22 PM	100
30, 30 VM, 30 PM, 33 K, 33 KV, 33 VM, 33 PM	100

$$\text{Measure Y} = \frac{\text{Overall length}}{2}$$

for all radiators from an overall length of 1800 mm onwards.

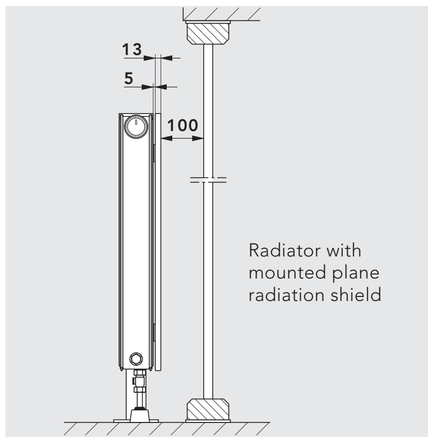


* VERTICAL RADIATORS excluded

PLAN RADIATED HEAT-REFLECTOR

Installing the radiator (with brackets) in front of windows increases heat loss, due to the radiation across the glass surface. Thanks to the plane radiation shield it is possible to minimise heat loss.

The new plane radiation shield
- represents a successful solution also in terms of appearance because of the radiation shield's consistent cover and short distance to the radiator;
- it is also a perfect match with the plane heating surfaces;
- due to convection between radiator and plane radiation shield it feeds back into the room the majority of thermal heat, which would otherwise be lost;
- installation is dead easy, without the need of any additional special tools.



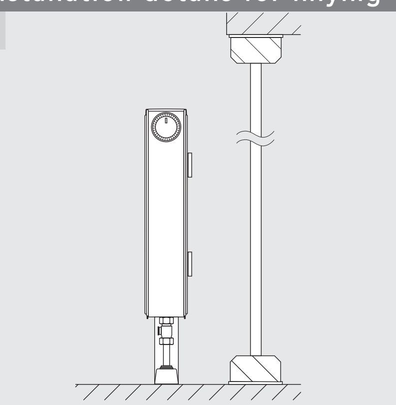
Depth of plane radiation shield: 13 mm

clear width: 5 mm
between cover grid and
plane radiation shield.
Minimum clearance of 100 mm between window surface and plane radiation shield.

The minimum clearance between window surface and plane radiation shield (100mm) complies with the recommendations of leading window surface manufacturers.

Installation details for inlying consoles, for flat radiators with brackets

1



2

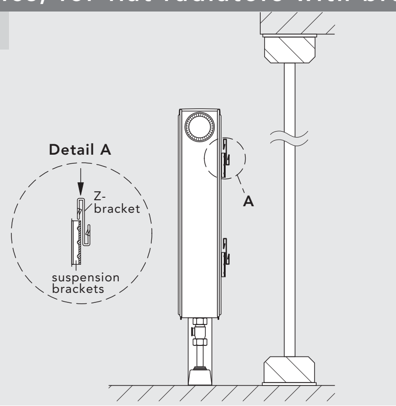
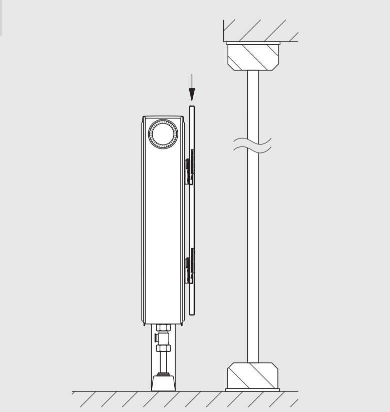


Image 1: Radiator with inlying stand consoles, in front of a transparent outside surface.

Image 2: Install the Z-bracket (included in the delivery equipment) on the **four suspension brackets.**

Note: If the length of the radiator is 2000, 2400 or 2800 mm, the Z-brackets must be installed as much as possible in the middle.

3



4

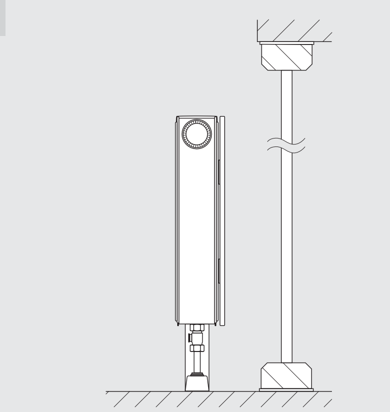


Image 3: Align PLAN RADIATED HEAT-REFLECTOR according to the radiator length; put it into position right over the Z-brackets and push it down.

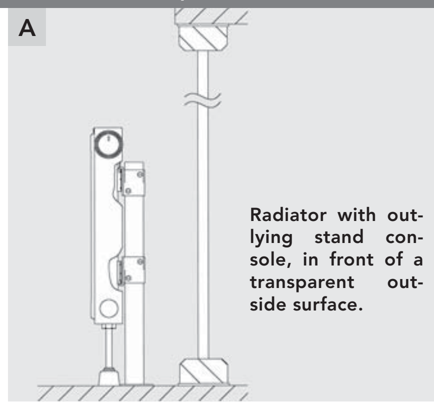
Image 4: Radiator with installed PLAN RADIATED HEAT-REFLECTOR.

Note:
Due to production reasons there are drill holes at the flat that must face the ground during the installation.

Installation details for outlying stand consoles, for radiators with brackets

For installing the outlying stand consoles only use - independently from the type of heating surface - mounting brackets with the order number **AZ0MS000F0001000** for fixation, including the necessary accessories for installing the PLAN RADIATED-HEAT REFLECTOR **(image B, detail A).**

A



Radiator with outlying stand console, in front of a transparent outside surface.

Symbol representations on radiators on 400 mm and more in length

Symbol representations on all radiator heights

B

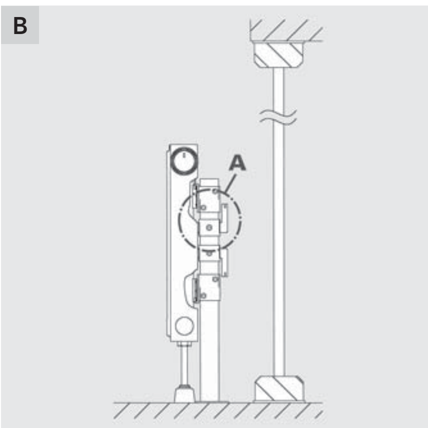
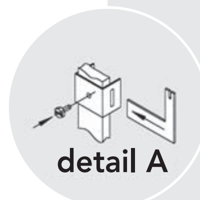
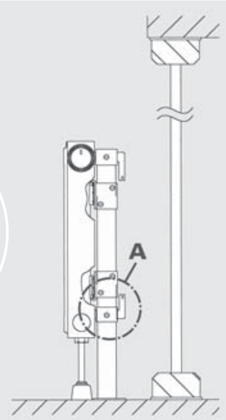


Image B:
Install U-shaped clamp (available as accessory) on the stand console, using the brackets.

Note:
From a radiator length of 1800 mm onwards, also the fixing devices on top have to be installed centrally on the stand console brackets.



B



C

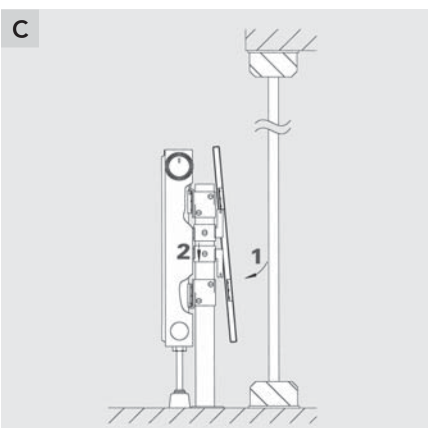
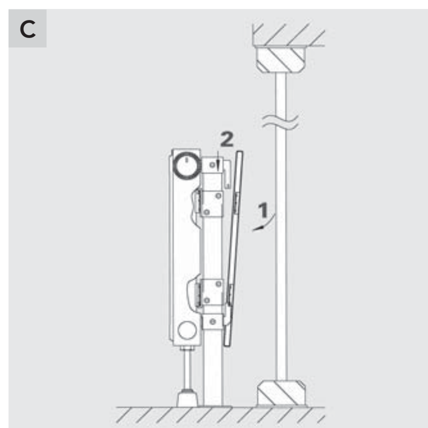


Image C:
Put the PLAN RADIATED HEAT-REFLECTOR into the fixing devices on top, aligning it up according to the radiator length. (Attention: The drill holes at the flat must face the ground). Make sure that the PLAN RADIATED HEAT-REFLECTOR is aligned in the height according to the top edge of the radiator. Then install the PLAN RADIATED HEAT-REFLECTOR above the suspension brackets using the fixing devices at the bottom.

C



D

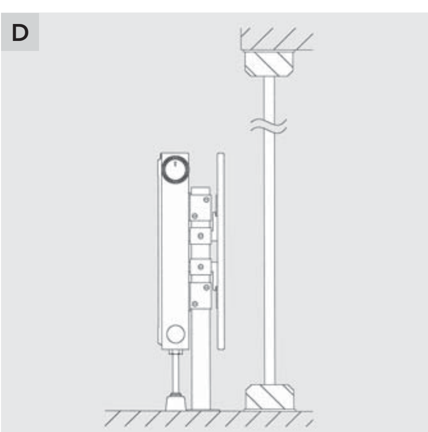
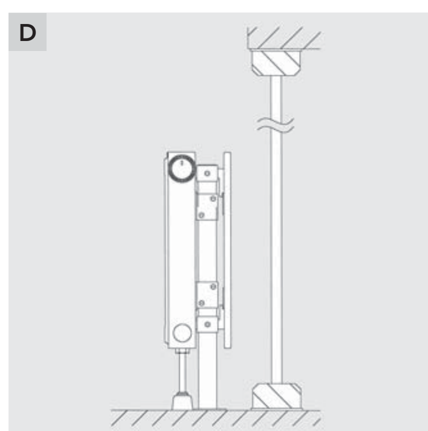


Image D:
Radiator with installed PLAN RADIATED HEAT REFLECTOR.

D

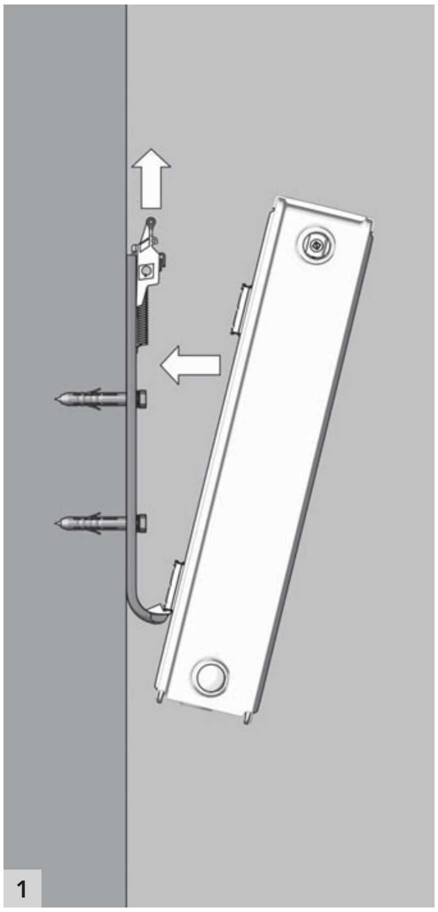


... the flexible Monclac console

The MONCLAC CONSOLE (suitable for all heating surfaces with welded-on brackets, except Replacement and vertical radiators) allows an easy, rapid and robust installation of the radiator still in the packaging. It can generally be used for radiator models with the respective overall height.

The fact that the Monclac console is equipped with an integrated lifting and shift protection represents a cutting-edge advantage in terms of safety.

The Monclac console consists of: 2 Monclac consoles (zinc-plated), with sound insulation inserts and integrated lifting and shift protection, screws and dowels, installation instructions in PE shrink foil.
Wall clearance: between finished wall surface and radiator bracket: 27mm.

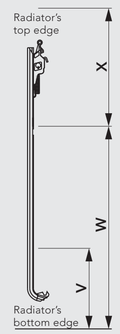


1

Drilling dimensions for panel radiators

Height [mm]	Value **V** [mm]	Value **W** [mm]	Value **X** [mm]
300	-	135	
400		235	
500	139	335	165
600		435	
900		735	

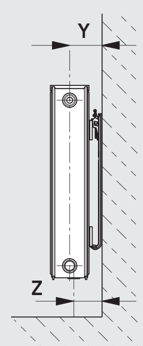
wall rail for **Height 300 - 900**



The Monclac bracket is consistent with TÜV-Rheinland's requirements (in terms of force loads).

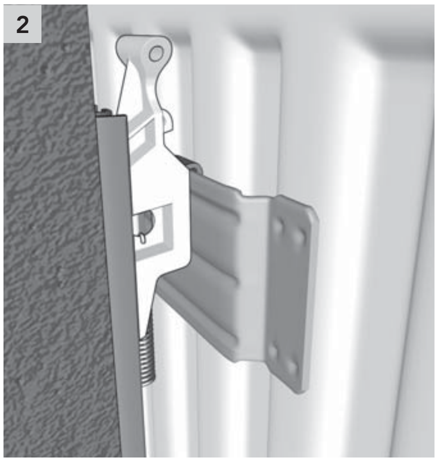
Connection to wall clearances

Radiator models	Height [mm]	Value **Y** [mm]	Value **Z** [mm] *
10, 10 VM, 10 PM	300 - 900	38	-
11 K, 11 KV, 11 VM, 11 PM	300 - 900	50	50 **
20, 20 K, 20 VM, 20 PM	300 - 900	74	66
21 K-S, 21 KV-S, 21 VM-S, 21 PM-S	300 - 900	74	66
22 K, 22 KV, 22 VM, 22 PM	300 - 900	86	66
30, 30 VM, 33 K, 33 KV, 33 VM, 33 PM, 30PM	300 - 900	86	66



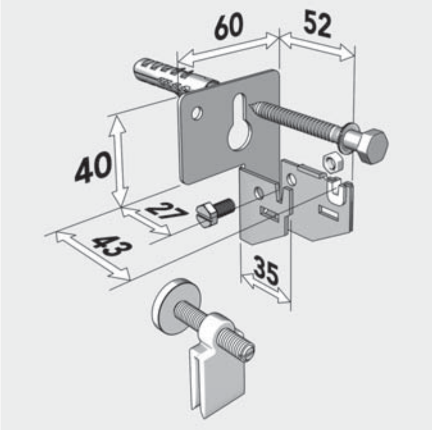
* This only applies to the T6 CENTRAL CONNECTION RADIATOR
** when using a special angle bracket, a consistent clearance of 66mm between connection and wall is also possible for the 11VM model.

2



FASTENING SET SPECIAL ANGLE-FISHPLATE

For surface mounting,
consisting of:
2 angle-fishplates with sound-absorbing filter
2 spacers
2 hexagon head wood screws and
2 dowels.



Specially designed for pinpoint pre-assembly, in conjunction with profiles (item no: AZ0FT200R0H01000, AZ0FT060R1V01000, AZ0FT090R1V01000).

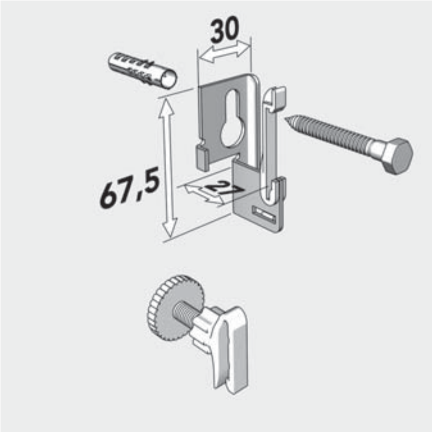
With 11 VM and 11 PM models, wall clearance can be adjusted for multi-layered T6 radiators, in cases where pre-assembly on the assembly bracket was multi-layered at the position.

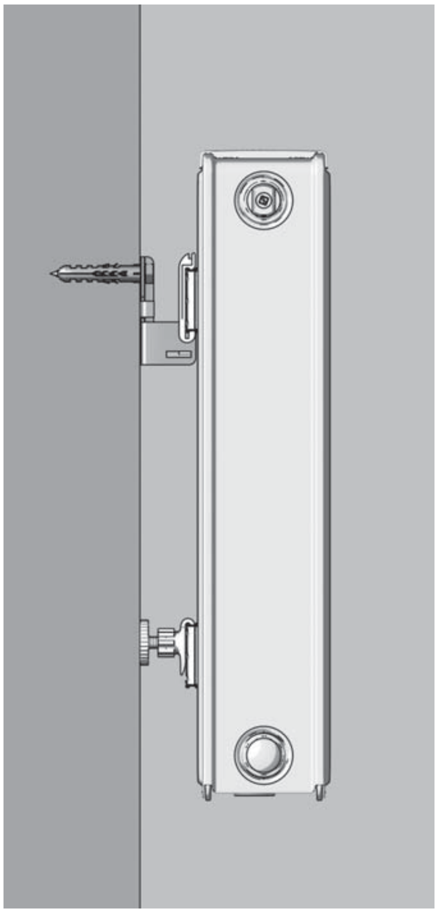
Wall clearance:
Between finished wall and T6 radiator mounting link = 27 mm to 43 mm

Panel radiators

ANGLE BRACKET WITH SHIFT PROTECTION FASTENING SET

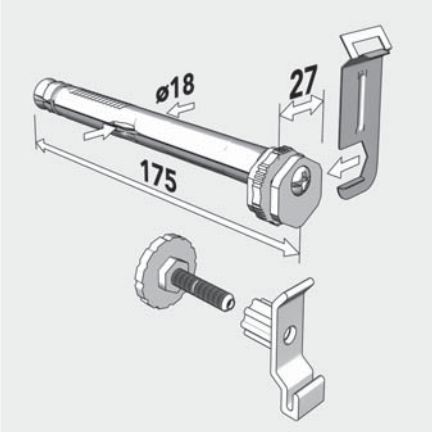
Suitable for surface mounting, each consisting of:
two angle brackets, noise insulation inserts
with integrated lifting protection,
hexagonal wood screws and dowels.
Wall clearance: between the finished wall surface and
radiator's bracket: 27mm





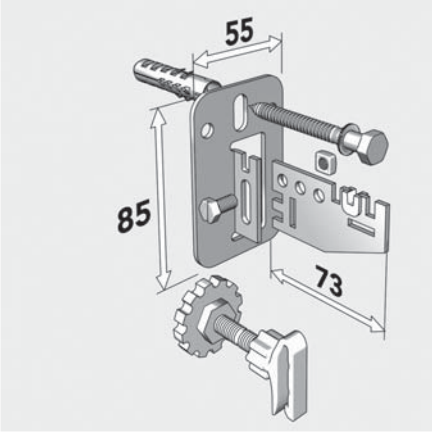
DRILLED CONSOLE SET WITH LIFTING PROTECTION FASTENING SET FOR ALL-PURPOSE ANGLE-FISHPLATE

Length: 160mm, consisting of:
2 drilled consoles,
2 distance holders and
2 lifting protections



FASTENING SET FOR ALL-PURPOSE ANGLE-FISHPLATE

For finished as well as unfinished wall surfaces, consisting of:
2 adjustable angle-fishplates with sound-absorbing filter
2 hexagon head wood screws with dowels and
2 spacers.



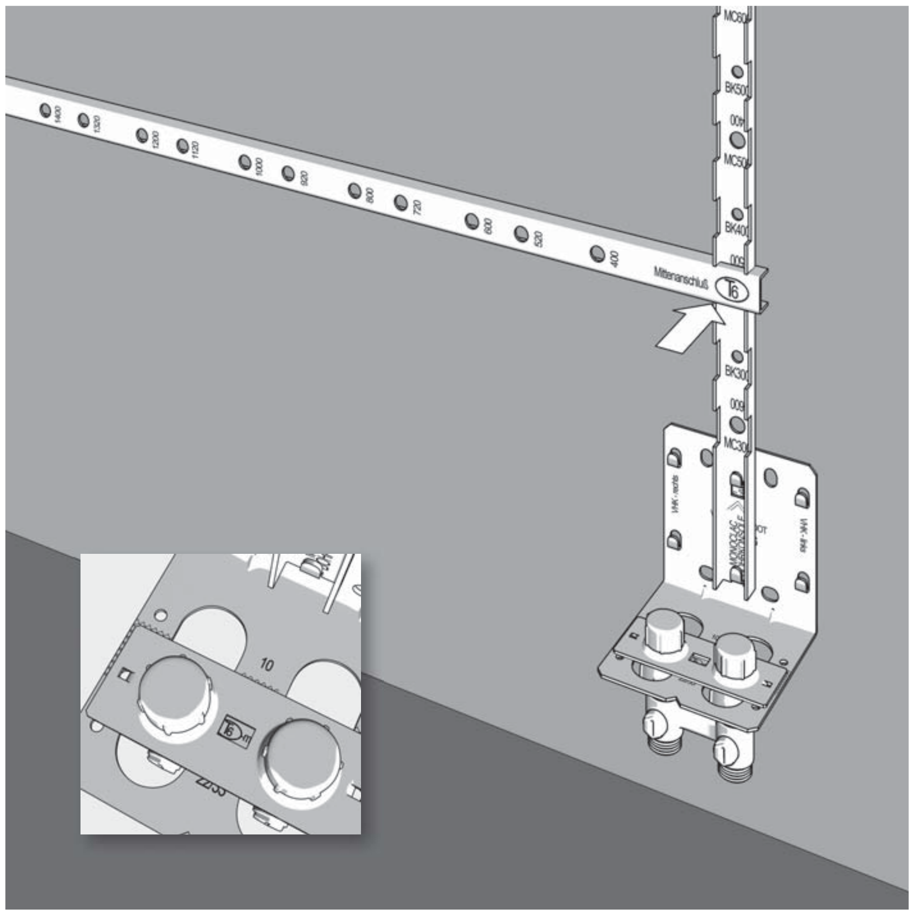
Wall clearance:
Between finished wall and radiator mounting link = 11, 20, 30, 46, 56 and 66 mm

T6 MOUNTING ON FINISHED WALL SURFACES

T6 MOUNTING ON FINISHED WALL SURFACES
By using the 3/4“external thread mounting template
it is possible to install all the heating pipes without the radiator,
and the whole pipe system can be pressure-tested as well.
The radiators will be delivered only after completion of the building work.

Fitting of the horizontal mounting rail for positioning the first
Monclac consoles / drilled consoles / special angle brackets fastening. Side-inverted fitting
of the horizontal mounting rail for positioning the
second Monclac consoles /
drilled consoles / special angle brackets fastening

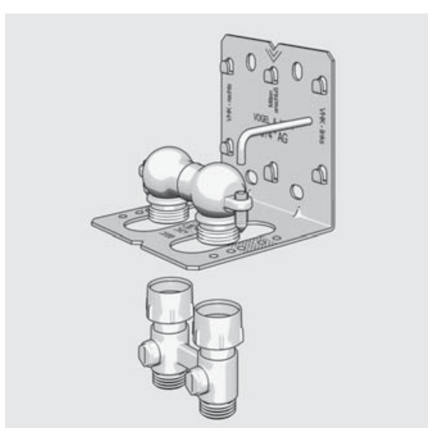
It makes possible very precise pre-mounting of the Monclac
console / drilled console / special angle bracket
when using a moulding set.



The 3/4“external thread mounting template consists of a mounting bracket set and a moulding set.
The 3/4“external thread mounting template consists of:

- 1 mounting bracket incl. connection bracket
- 2 dowels
- 2 screws
- 2 washers
- 2 caps - 1/2“internal thread
- 2 1/2“- 3/4“adapters

When using the flush elbow together with the 3/4“external thread mounting template the system can be flushed and tested without the radiators.

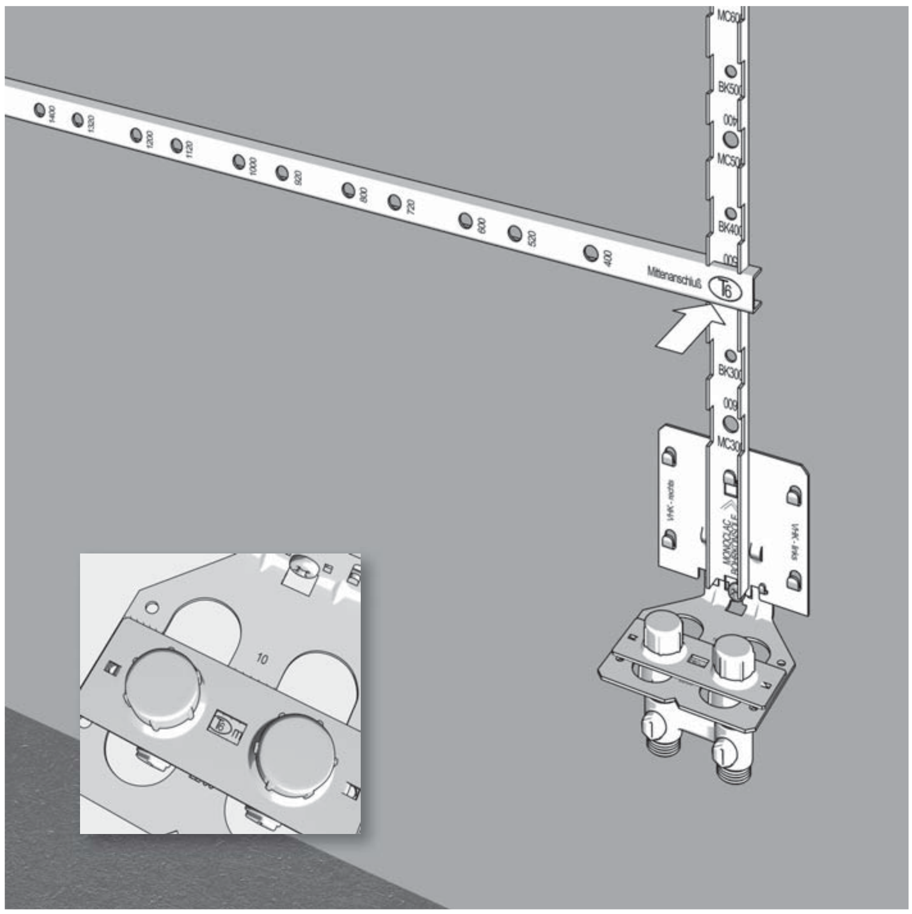


Attaching the vertical mounting rail.With radiators, with an overall length of 1800 mm and more, central mounting drill hole is marked. With the special angle bracket AZ0BU00012002000 the vertical mounting rails AZ0FT060R1V01000 are to be used for overall heights of 300 - 600mm, as well as AZ0FT090R1V01000 for overall height of 900mm.
The window in the connection bracket serves to check if the correct overall depth has been selected.

T6 INSTALLATION ON AN UNFINISHED WALL SURFACES

Apart from the advantages of a complete installation. Of the heating pipes without the radiators, and the possibility to pressure-test the piping system, the 3/4“external thread mounting template has been designed for mounting on unfinished wall surfaces, especially for unplastered brick walls. The compact design and unique fastening system using a special drilled console ensure that also the wall behind the mounting bracket can be plastered.

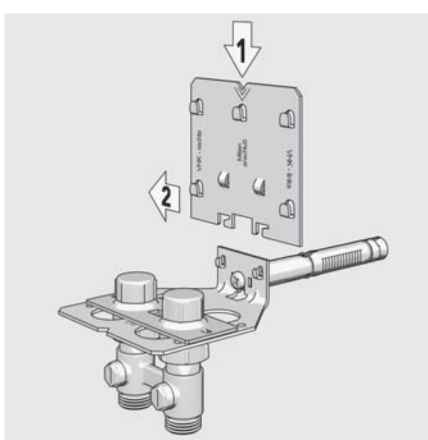
After the plastering attach the horizontal mounting rail for positioning the first Monclac consoles / drilled consoles / special angle brackets fastening. Side-inverted fitting of the horizontal mounting rail for positioning the second Monclac consoles / drilled consoles / special angle brackets.



It makes possible very precise premounting of the Monclac console / drilled console / special angle bracket when using a moulding set.

The 3/4“external thread mounting template for mounting on unfinished wall surfaces consists of a mounting bracket for mounting on unfinished wall surfaces and a moulding set. The 3/4“external thread mounting template for mounting on unfinished wall surfaces consists of:

1 mounting bracket
  Incl. connection bracket
1 special drilled console
2 caps - G 1/2“ DIN ISO 228
2 1/2“- 3/4“adapters
  DIN ISO 228
2 1/2“- 3/4“ Adapter



By using the adapter plate you can also enjoy all advantages of the moulding set. Attaching the adapter plate to the mounting bracket for the mounting on unfinished wall surfaces only requires a few simple hand movements. For flushing and testing the system without radiators, you can of course use the flush elbow in connection with the 3/4“external thread mounting template for the mounting on unfinished wall surfaces.

Attaching the vertical mounting rail. With radiators, with an overall length of 1800 mm and more, the central mounting drill hole is marked. With the special angle bracket AZ0BU00012002000 the vertical mounting rails AZ0FT060R1V01000 are to be used for overall heights of 300 - 600mm, as well as AZ0FT090R1V01000 for overall height of 900mm. The window in the connection bracket serves to check if the correct overall depth has been selected.

Transfer Table - Simplified procedure for the domain of standard and low-temperature (ST/LT)

The conversion factors in the table state to which extent the heat emission has to be altered under other operating conditions, compared to the following standard-design data:

supply temperature t_1 **75 °C**
return temperature t_2 **65 °C**
room temperature t_r **20 °C**

Because an average exponent of 1.3 has been used for both the calculation of the heat outputs and the specification of the conversion factor, a slight performance variation from the calculated value is possible.

The standard heat emission Φ_S of a radiator covering the required heat $\Phi_{HL,i}$ at the chosen operating conditions, is calculated according to the formula:

$$\Phi_S = \Phi_{HL,i} \text{ x } f$$

Φ_S = standard heat emission, in accordance with EN 442
$\Phi_{HL,i}$ = required heat, in accordance with EN 12831
f = conversion factor from the table

Example:
The required heat of a room is 1000 W, in accordance with EN 12831.
Design data: t_1 50 °C
t_2 40 °C
t_r 20 °C

Factor **f** according to the table = **2,50**

supply tempe-ratur °C	return tempe-ratur °C	room temperature °C						
		12	15	18	20	22	24	26
90	80	0,61	0,64	0,68	0,71	0,74	0,77	0,81
	70	0,67	0,72	0,76	0,80	0,83	0,87	0,91
80	70	0,74	0,79	0,84	0,88	0,93	0,97	1,03
	60	0,83	0,89	0,96	1,01	1,07	1,13	1,20
	50	0,96	1,04	1,13	1,20	1,28	1,37	1,47
75	**65**	0,82	0,88	0,95	**1,00**	1,05	1,12	1,18
	60	0,88	0,94	1,02	1,08	1,14	1,21	1,29
	55	0,94	1,01	1,10	1,17	1,24	1,32	1,42
70	65	0,87	0,94	1,01	1,07	1,13	1,19	1,27
	60	0,93	1,00	1,08	1,15	1,22	1,30	1,39
	55	0,99	1,08	1,17	1,25	1,33	1,42	1,53
	50	1,07	1,17	1,28	1,37	1,47	1,58	1,71
65	60	0,98	1,07	1,16	1,23	1,31	1,40	1,50
	55	1,05	1,15	1,26	1,34	1,43	1,54	1,66
	50	1,14	1,25	1,37	1,47	1,59	1,71	1,86
	45	1,24	1,37	1,52	1,64	1,78	1,94	2,13
60	55	1,13	1,23	1,36	1,45	1,56	1,68	1,82
	50	1,22	1,34	1,48	1,60	1,73	1,87	2,05
	45	1,33	1,47	1,65	1,78	1,94	2,13	2,36
	40	1,47	1,64	1,86	2,03	2,24	2,50	2,80
55	50	1,31	1,45	1,62	1,75	1,90	2,07	2,28
	45	1,43	1,60	1,80	1,96	2,15	2,37	2,64
	40	1,59	1,78	2,03	2,24	2,48	2,78	3,15
	35	1,78	2,03	2,36	2,64	2,99	3,43	4,02
50	45	1,56	1,75	1,98	2,17	2,40	2,67	3,00
	40	1,73	1,96	2,25	2,50	2,79	3,15	3,61
	35	1,94	2,24	2,63	2,96	3,38	3,92	4,64
	30	2,24	2,64	3,20	3,70	4,39	5,39	6,99
45	40	1,90	2,17	2,53	2,83	3,19	3,66	4,25
	35	2,15	2,50	2,96	3,37	3,89	4,58	5,52

$$\Phi_S = \Phi_{HL,i} \text{ x } f = 1000 \text{ Watt x } 2{,}50 = 2500 \text{ Watt}$$

A radiator has to be installed that emits 2500 W under the standard- design (75/65/20).

Exact method for the performance calculation

Using the formula $\Phi = \Phi_S \left[\frac{\Delta T}{\Delta T_S}\right]^n$ any performance differing from the standard can be calculated.

Φ = Radiator power [W]

Φ_S = Standard radiator power in accordance with EN 442 [W]

ΔT = Arithmetic radiator excess temperature [K]

ΔT_S = Arithmetic radiator excess temperature 50 K, at a standard state of 75 °C / 65 °C / 20 °C

n = Radiator exponent

Please note: if the condition

$$c = \frac{t_2 - t_r}{t_1 - t_r} < 0{,}7$$

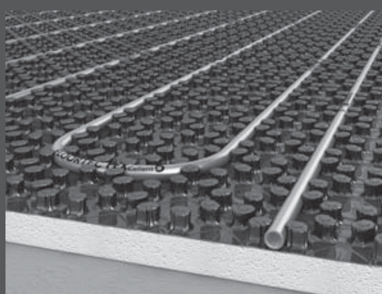
is met, the excess temperatures will be specified logarithmically.

$$\Delta T_{arithmetic} = \frac{t_1 + t_2}{2} - tr$$

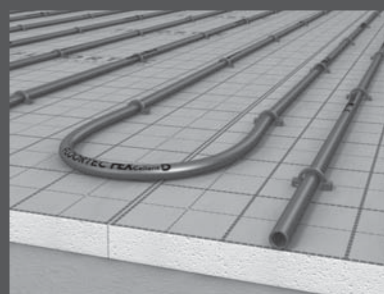
$$\Delta T_{logarithmic} = \frac{t_1 - t_2}{\ln \frac{t_1 - t_r}{t_2 - t_r}}$$

Use our radiator power calculator on www.vogelundnoot.com

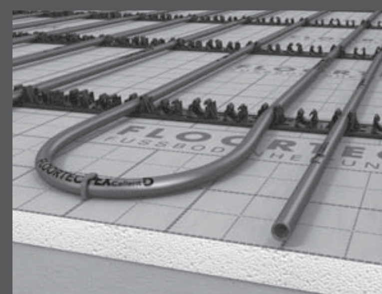
General information



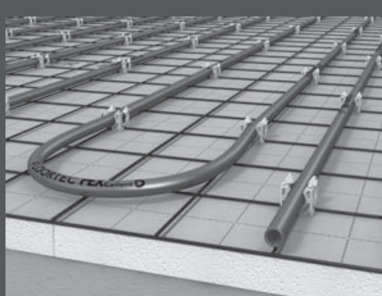
Preformed plate system UNI



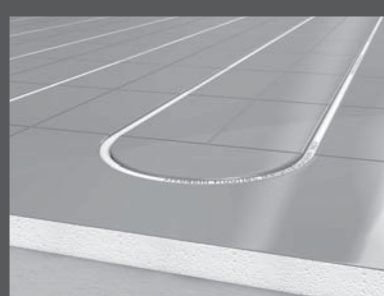
Stapler system



Rail-mounting system



Grid mat system



Dry system

Attention:
The dry system is short-term not available for all markets, because of necessary certifications.

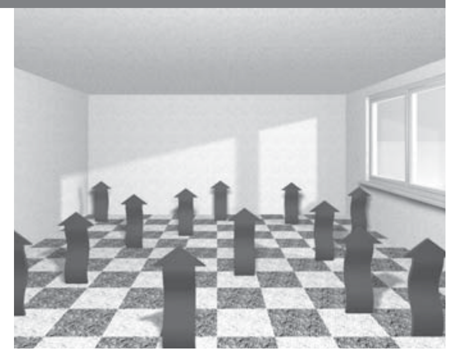
Outputs

Tender offer documents are available to download at **www.vogelundnoot.com/download**

Information to assist decision-making/benefits offered by the system

All benefits offered by FLOORTEC surface heating at a glance:

- Comfort thanks to gentle radiated heat
- A healthy level of heat and no nuisance from dust
- Safety thanks to the highest quality raw materials and workmanship
- Economical thanks to low temperature and short installation times
- Independent of the layout of the building and rooms



Modern heating systems have considerably higher requirements to fulfil today than they did a few years ago: convenience, comfort energy-savings, low environmental impact and futuristic technology have become key concepts, including when it comes to choosing the right heating system.
The FLOORTEC Underfloor heating systems fulfil these expectations, because this is where you demand functional perfection:

A comfortable level of heat is evenly spread across the entire floor, the heat distribution in the room is optimal and energy is conserved.
Thanks to the gentle, comfortable radiated heat provided by the FLOORTEC surface heating system, it is now possible to reduce room temperature by 1 to 2 K, without sacrificing comfort. As a result, you could make additional energy savings of 6 to 12%.
The highly developed technology of components designed to work in harmony ensures safety, a long service life and cost-effectiveness.

The hot water-based surface heating system offers two significant benefits:
1. The extremely low floor surface temperatures prevent burning of dust and dust flurries (see image) due to the high proportion of radiated heat.
2. There are no temperature-dependent air draughts in the case of hot water-based surface heating and the proportion of convection is relatively small.

Studies have shown that Underfloor heating systems not only keep dust flurries to a minimum, but also minimise the growth of mites. This means that neither are the mucous membranes of the nose irritated, nor are any allergic reactions triggered. The gentle heat of the floor removes moisture from the carpet and therefore removes the means of subsistence for bacteria and microbes.

Comfort

Heated surface heating structures provide a comfortable living climate while making economical use of the energy supplied. In order to fulfil the requirements of functionality and living comfort, a number of aspects must be taken into account when planning and manufacturing these components. In accordance with ÖNORM EN 1264, the limit values for surface temperatures of Underfloor heating systems have been set as follows:

- + 29 °C for sleeping areas, living areas and office spaces
- + 33 °C for the bathroom
- + 35 °C for peripheral areas with large glazed surface areas

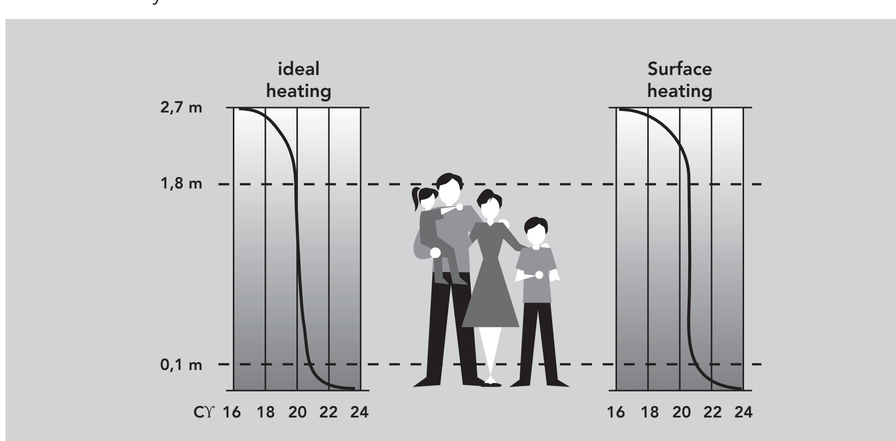
These temperatures are only reached on very few days of the year, however. With Underfloor heating systems, the even distribution of the surface temperature of a floor is essentially determined by the following:

- The spacing of the heating pipes
- The mean temperature of the hot water
- The thermal resistance of the floor covering used

The comfort level experienced by humans is determined by the following climate factors:

- Ambient temperature
- Air humidity
- Air speed
- Temperature of the surfaces enclosing a space
- Temperature distribution in the room

The image below makes it easy to see that the temperature distribution achieved by the surface heating system is practically identical with the ideal temperature gradient from the perspective of physiological perception of heat.



Standards and regulations

In the interests of ensuring a long-lasting and cost-effective system solution, the components of a heating system are subject to a whole series of DIN standards, regulations, guidelines and laws. During the project planning and implementation of a surface heating system, the building planner or the contractor is responsible for correctly selecting and sizing the insulating layers (system panels) in accordance with the statutory regulations and standards, particularly with regard to the construction of heated flooring.

The following DIN/ÖNORM standards and regulations must be observed when planning and installing a surface heating system:

• **DIN 1055**	Actions on structures
• **DIN 4102**	Fire behaviour of building materials and components
• **DIN 4108/ ÖNORM B8110**	Thermal protection and energy economy in buildings
• **DIN 4109**	Sound insulation in buildings
• **DIN 4726**	Warm water Underfloor heating systems and radiator connecting systems - Plastics piping systems and multilayer piping systems
• **ÖNORM EN 1264–1 bis 4**	Surface heating, systems and components
• **DIN 18161**	Cork products as insulating building materials
• **DIN 18164**	Cellular plastics as insulating building materials
• **DIN 18165**	Fibrous insulation materials for building
• **DIN 18195**	Waterproofing of buildings
• **DIN 18202**	Tolerances in building construction
• **DIN 18336**	Waterproofing
• **DIN 18352**	Wall and floor tiling
• **DIN 18353**	VOB [German Construction Contract Procedures] Part C: General technical specifications in constructions contracts, Laying of floor screed
• **DIN 18356**	Floor covering works
• **DIN 18560/ ÖNORM B2232**	Floor screeds in building construction
• **EnEV**	Energy saving ordinance

The planner shall be responsible for carrying out project planning correctly and only implementing those parts that comply with the generally accepted technical regulations.

General requirements

Underfloor heating systems are primarily divided into two different types, depending on their structure. They differ in the arrangement of the heating pipes and the load distribution layer.

We distinguish between

- Wet installation systems and
- Dry installation system

The FLOORTEC floor heating systems described in this technical information brochure are wet installation systems and are used in conjunction with wet screed.
The other designs in this brochure exclusively concern variants of this type.
In both of these systems, the heating pipes are laid within the heated screed and above the insulation layer, which lies across the entire surface of a load-bearing substrate.

Determining the size of the heat insulation

It offers architects, planners and heating installers the opportunity to adjust the insulation thickness as they see fit, down to the lowest level of thermal insulation, and therefore to integrate this into the building design as a whole. The EnEV ordinance sets the accepted technical regulations as the minimum requirement for the insulation layer.
This complies with ÖNORM EN 1264 Part 4. This standard prescribes a minimum thermal resistance of insulation of $R\lambda_{insulation}$ = 1.25 m² K/W for floors against unheated rooms and surfaces against ground soil. For surfaces against outside air (external rated temperature from -5 °C to - 15 °C), a minimum thermal resistance of $R\lambda_{insulation}$ = 2.0 m² K/W is prescribed. These values are given as minimum insulation standards. The insulation that is to actually be laid is determined in accordance with the specifications of energy considerations for the entire building.
These must be recorded in an 'energy pass' in accordance with the EnEV standard. This energy pass should be given to the building services planner or the contractor as early as possible to enable them to select and determine the required insulation properties and thicknesses in good time.
The thermal resistances for the other instances in which surface heating is used are laid down in the ÖNORM EN 1264 standard.
In practice, only the thermal resistance that must be created by the insulation layer is of interest. Table 1 (see page 87) therefore lists the residual resistance of the insulation layer and the associated insulation layer cover in the case of floor heating in a floor over an unheated cellar. In this case, as per Table 1, a 15 cm-thick concrete covering is required. The thermal resistance R is determined on the basis of the required U-value in accordance with the relationship R = 1/k [m² K/W]:

Thermal resistance R:
R = 1/k [m² K/W]

The total thermal resistance is the sum of all parts providing resistance in the floor structure:
$R_{total} = R\lambda_{insulation} + R_{floor} + R\alpha$

The resistances $R\lambda_{insulation}$ and $R\alpha$ can then only be taken into consideration if the floor heating lies on the floor over an unheated cellar or outside air. $R\alpha$ is determined with $R\alpha$ = 0.17 m² K/W against a cellar and $R\alpha$ = 0.04 m² K/W for floors against outside air in accordance with the standard. The R-values of the individual layer thicknesses are calculated according to the following formula:

R-values of layer thicknesses:
R = d/λ [W/m²]

Heat and impact noise insulation

The noise insulation in a building has a significant influence on quality of living. It is therefore necessary to plan and implement special measures to insulate against impact noise.
Floating floor screed with floor heating improves the noise insulation of the floor, because it reduces the transfer of impact sound in the floor construction. The improvement of noise insulation demands a design without a sound bridge, which requires especially careful work.
The impact noise insulation must be fitted across the entire surface.
Noise-insulating materials are simultaneously used as heat insulation. It should be noted, however, that not all commercially available heat insulation materials also have noise impact insulation properties. The PST layer of FLOORTEC system panels comply with the stated technical data.

Design and installation notes

If a building is equipped with surface heating, the following points should be taken into consideration as early as the building planning stage:

- Heat insulation of the building
- Use of the various rooms
- Required construction heights
- Type of building construction
- Influence from other heat sources
- Type of heat generation

Sealing the structure

Parts of the building that rest on soil, i.e. cellar floors and ground level floors in buildings without cellars, must be sealed off from ground moisture and unpressurised water. The architect is responsible for determining such cases and the type of sealing, which is then carried out by specialist contractors.

Load-bearing substrate (sub-floor)

The sub-floor must fulfil the requirements of DIN 18560 and be sufficiently dry and rigid. The surface must not feature any significant unevenness, as stipulated in Table 3 of DIN 18202 “Tolerances in building construction”. Any large pieces of dirt such as plaster and mortar residues must be cleared from the substrate, which must also be thoroughly swept, prior to installing the floor heating. If possible, the laying of pipelines or ductwork onto the sub-floor should be avoided, as cutting into system elements will result in the heat and noise impact insulation properties being diminished.

Structural requirements

In so far as wall plaster is provided, this must be applied all the way down to the sub-floor and finished in accordance with DIN 18560 Part 2, “Structural Requirements”. All external doors and windows should be fully installed and openings to the buildings must be closed, at least temporarily, in order to protect the screed to be applied from damage caused by damp and extreme temperature fluctuations. Until the screed is applied, it should be ensured that no unauthorised persons are able to enter the construction site, in order to rule out any damage to the laid system. The setting out points should be clearly and visibly marked by the site management team in all rooms. All installation works should be completed and checked. The structural requirements in accordance with DIN 18560 Part 2, Section 4 must be observed.

Surface joints

Apart from at enclosing walls (expansion joints), additional surface joints are to also be provided on large or geometrically offset surfaces. The width-length ratio of individual surfaces should not exceed 1:2 (Fig. 1). It must also be ensured that structural joints are in the same positions in the screed to be laid over the top.

Permitted bay sizes, criteria
The size of individual bays should not exceed 40 m². If bays are square, e.g. 6.50 m x 6.50 m, thermal load will be minimal.

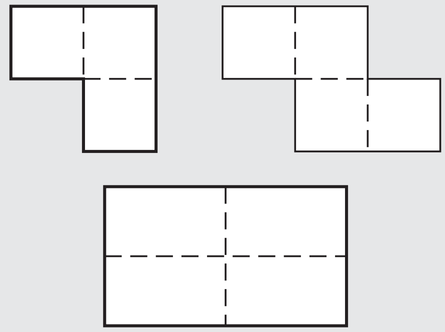


Fig. 1 surface joints

Expansion joints crossing heating pipes
Whenever underfloor heating screeds are used, expansion joints should only be crossed by connecting pipelines at a single level. It is absolutely essential that the arrangement of the heating pipes is coordinated with each of the screed bays. The connecting pipes that cross an expansion joint must be provided with flexible protective bushings (stapler system) or tubes (pre-formed plate system) measuring approximately 0.4 m in length (Fig. 2).

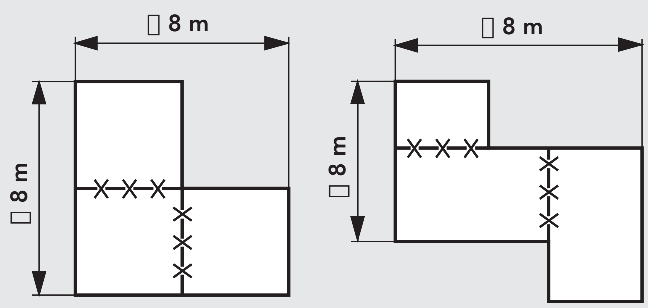


Fig. 2 bay sizes

Underfloor heating screed (Initial application)

After installing the FLOORTEC floor heating, no further works may be carried out prior to applying the underfloor heating screed onto the laid floor.

Screed strength
In the case of floor heating systems, the underfloor heating screed is applied directly onto the system elements with the pipework fixed onto it. **An additional protective film is not necessary!** The screed strengths are determined in accordance with DIN 18560 Part 2 (Table 1). The FLOORTEC system is constructed in accordance with "Bauart A1" [construction type A1].

Where screed layers are applied (ZE20/AE20), it is generally the case that pipework covering must measure at least 45 mm. In accordance with DIN 18560, the pipe covering may be reduced to at least 30 mm where screed of a higher strength class is used (subject to a performance test) (please take note of the manufacturing guidelines). Where footfall impact is greater than is usual in living areas (1.5 kN/m²), larger pipework coverings or higher screed strength classes are necessary (DIN 1055). In addition to its function of distributing impact, the underfloor heating screed also serves to transfer heat from the heating pipework to the room through the floor covering.

In order to ensure the most effective transfer of heat from the heating pipes to the screed, the heating pipe must be fully enclosed by screed.

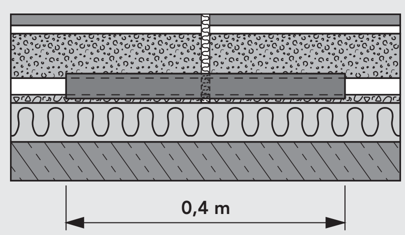


Fig. 3 Expansion joints

Screed type	Construction type	Bending tensile strength class or hardness class according to DIN EN 13813	Screed thickness in mm min.	Pipework covering in mm min.
Calcium sulphate self-levelling CAF screed	A B, C	F4 F4	40 + d 35	40
Calcium sulphate screed	A B, C	F4 F4	45 + d 45	45
Cement-based screed	A B, C	F4 F4	45 + d 45	45
Mastic asphalt screed	A B, C	IC 10 IC 10	25 + d 25	15

1) d is the external diameter of the heating element.

2) The compressibility of the insulation layer must be no more than 5 mm.

3) The total distances of the heating elements from the top and bottom surfaces of the screed layer must be at least 45 mm.

Underfloor heating screed (initial application)

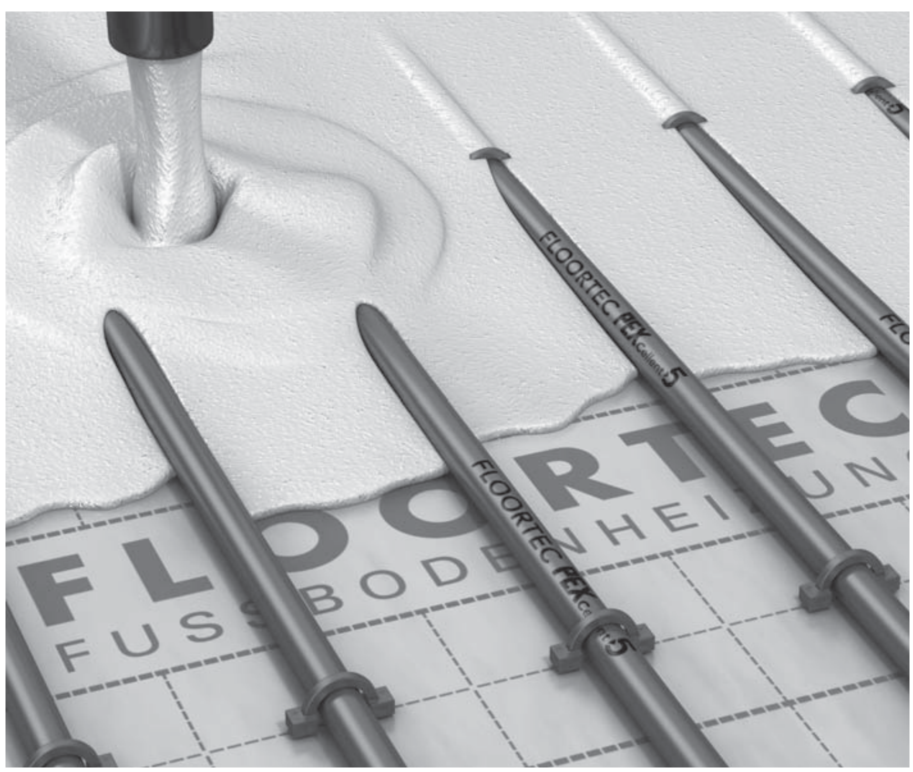
Underfloor heating screed emulsion
The addition of screed additive to cement-based screed serves to ensure the plastification of the underfloor heating screed. The additive W 200 is used for conventional cement-based screed and 45 mm-pipework covering. The recommended dose is 0.2 litres/m^2 depending on the screed thickness.

Reinforcement
According to DIN 18560 Part 2, the reinforcement of screed layers on insulation layers is in principle not necessary. A reinforcement is advisable however in the case of cement-based screeds applied for the purpose of laying a stone or ceramic covering. The reinforcement does not perform any static function and it cannot prevent the formation of cracks in the screed; it can only minimise the width of any cracks that may form. If reinforcement is provided in the form of steel reinforcing mesh, this must be placed in the middle third of the screed layer in accordance with DIN 18560.

Thermal load of underfloor heating screed
Due to the thermal load and heat-induced expansion of the screed layer, expansion joints must be fitted directly in connection with floor heating constructions. Expansion joints allow the adjoining areas of screed to move freely towards one another and away from one another at the point of separation, without one impeding the movement of the other.
These joints may reach widths of approximately 10 mm under certain conditions, depending on the type of expansion joint material that has been laid between the screed areas. Screed has expansion coefficients of 0.012 mm/mK. According to this, if the temperature rises due to a heated floor construction from 10 °C to 40 °C, an area of screed measuring 8 m along the edge will expand by 8 m x 0.012 mm/mK x 30K. This expansion area increased by a safety factor should be ensured around the screed in all directions. In the event of improper functioning of temperature control, particularly if the maximum limit facility of the floor heating system fails, the screed may be subject to increased thermal load and therefore greater expansion. In the case of anhydrite self-levelling screeds, the manufacturer's treatment guidelines must be followed. In general, this type of floor is not subject to a maximum bay size. If dummy joints are created in underfloor heating screed, they must be cut no deeper than a third of the thickness of the screed floor. A plan of the joints is to be created that shows the arrangement and type of joints. The plan of the joints is to be created by the site planner and must be presented to the installer as part of the technical specifications.

Heating up
Before beginning to lay the floor coverings, the screed must be heated up. In the case of cement-based screed, this must not begin any earlier than 21 days, or 7 days in the case of anhydrite self-levelling screed, after the screed works were completed. The process of heating up begins at a supply temperature of 25 °C, which is to be maintained for three days.
Then the rated supply temperature of the floor heating system is set and maintained constant for 4 days. A record is to be kept during the process of heating up; the blank form for recording details of the heating-up process is available as a download at www.vogelundnoot.com/download.

NEW!
Screed CM measurement device
Item no.: FBRADDISCMSET0A0



Underfloor heating screed (initial application)

Important notes when using self-levelling screed:

- In principle, anhydrite self-levelling screed is suitable for use with FLOORTEC system elements. However, it should be noted that the installer must take care to seal off the joints along the periphery.
- In principle, no screed additive can be mixed into anhydrite self-levelling screed.
- In accordance with DIN 18560 Part 2, if the nominal thickness is being reduced in the case of anhydrite self-levelling screed, a performance test must be carried out to test load-bearing capacity.

The maximum moisture content of screed to determine when the screed is ready for a floor covering to be applied

The time when screed is ready to be covered applies in general to all heating systems when using underfloor heating screed and must be tested by the floor layer prior to laying the floor coverings.

	Top floor layer	Cement-based screed target [%]	Calcium sulphate screed target [%]
Floor covering 1	Textiles and elastic coverings	1,8	0,3
Floor covering 2	Parquet	1,8	0,3
Floor covering 3	Laminate floor	1,8	0,3
Floor covering 4	Ceramic tiling or natural/concrete stone	2,0	0,3

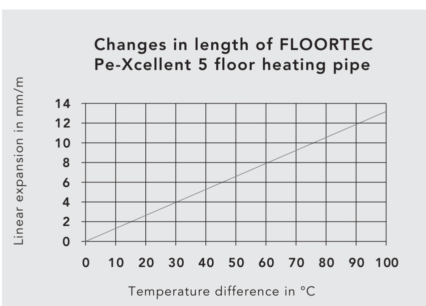
System components

Dimensions and weight

- Wall thickness: 2 mm
- Density: 938 kg/m^3
- Smallest bending radius 5 x d_a

Thermal and mechanical specifications

- Linear expansion coefficient: 1.5 x 10^{-4} [K-1]
- Thermal conductivity: 0.41 W/m^2 K
- Operating temperature: up to 90 °C
- Max. operating pressure: 8 bar]
- Surface roughness (according to Prandtl-Colebrook): ε = 0.0015 mm



Pe-Xcellent 5 floor heating pipe – technical data

Technical data	Pre-formed plate UNI, rail-mounts	Pre-formed plate UNI, staplers, grid mat, rail-mounts	Staplers, rail mounts
Dimension	14 x 2	17 x 2	20 x 2
Linear expansion coefficient in mm/m x K (at room temperature)	0,15		
Thermal conductivity in W/m x K	0,41		
Max. operating temperature in °C	90		
Max. operating pressure in bar	8		
Water capacity in l/m	0,079	0,133	0,201
Bending radius in mm	5 x d_a		
Crosslinking level in %	≥60		
Oxygen permeability in mg/m^2 x d	< 0,32		

General information

Aluminium composite heating pipe – technical data

Technical data	Pre-formed plate, stapler, rail-mount, grid mat and dry system
Dimension	16 x 2
Linear expansion coefficient in mm/m x K	0,026
Thermal conductivity in m^2 K/W	0,43
Max. operating temperature in °C	90
Max. operating pressure in bar	8
Water capacity l/m	0,113
Bending radius in mm	5 x d_a

Pe-Xcellent 5 floor heating pipe

The quality of a floor heating system is determined by the quality of the heating pipe that is used:

All FLOORTEC heating pipes are characterised by:

- Excellent creep-rupture strength
- Highly resilient
- Easy to lay

The FLOORTEC safety heating pipe is available in the nominal widths 14 x 2 mm and 17 x 2 mm. Both nominal widths 14 x 2 mm and 17 x 2 mm are supplied in rolls of 200 – 600 m. The FLOORTEC roll-out device makes it easy to lay the pipe. FLOORTEC Pe-Xcellent 5 floor heating pipes (DIN 4729) are manufactured in accordance with DIN 16892 and are oxygen diffusion-tight to DIN 4726. In order to guarantee the consistently high quality of the pipe, the pipe is subject to continuous quality control during the manufacturing process.

Take account of thermal linear expansion when laying the Pe-Xcellent 5 floor heating pipes. In order to prevent greater forces being exerted on fixture points such as manifolds, the pipe should be allowed the capacity to expand. This can be achieved by means of a change of direction or expansion bends.

Installation notes for heating pipes

Attention: when choosing the pipes, please ensure that they comply with the standard and that the dimensions correspond with the nominal measurements of the threaded joint.

1. Cutting the pipe to size
Cut the pipe to be used to size using the pipe cutter, cutting at a right angle to the central axis.

2. Deburring and calibrating
Select the deburring and calibration tool suitable for the pipe dimension, insert it completely into the pipe and turn it clockwise. This calibrates and chamfers the end of the pipe in a single step. Remove any shavings from the end of the pipe after completing this step. Check the end of the pipe to ensure it is clean and fully deburred (using a rotating bezel).

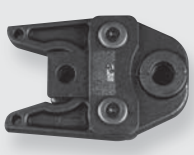
3. Fit a screw nut and clamping ring
The screw nut and clamping ring are to be slid onto the end of the pipe in the correct order. In the case of metal-plastic composite pipes, ensure there is a galvanic isolation element (by means of a plastic insulating disc) between the pipe bushing and the central aluminium layer of the metal-plastic composite pipe. The bushing is then inserted (with the plastic insulating disc if applicable) into the end of the pipe until it engages.

4. Fitting the taper
The free end of the pipe is to be inserted voltage-free with the taper of the bushing into the taper of the threaded joint and screwed tight with the screw nut located on the end of the pipe.

5. Fitting the screw nut
Tighten the screw nut using an open-ended spanner, taking note of the data in the table below.
Caution: in the case of pipes that are led around a bend for connection, the end of the straight pipe after the threaded joint must measure at least 1.5 times the length of the external diameter of the pipe.
Attention: When tightening, at least until the clamping ring has engaged with the pipe, the pipe including the bushing must be pressed until it engages. If this is not done, the pipe could slip out of the connection. If necessary, provide a counterforce at the screw-on nipples or the valve.

6. Directions for watertightness testing
The watertightness test for a heating installation takes place in accordance with VOB (DIN 18380); for a bathroom installation, in accordance with DIN 1988 Part 2, paragraph 11.1.2.

thread type		M 22 x 1,5	G 3/4	G 1
angle of rotation with open-ended spanner	number of turns	1 1/4	1	1
	degrees	450°	360°	360°

Image	Model/description	m no.
	FLOORTEC calibration tool for heating pipe 16 x 2 mm	FAYTTCA1620000A0
	FLOORTEC press-fit coupling for aluminium composite heating pipe 16 x 2 mm	FAY5S16M16M200A0
	FLOORTEC crimping pliers for aluminium composite pipe 16 x 2 mm	FAYTTJPML00016A0
	FLOORTEC pipe cutter for pipe dimensions up to < 63 mm	FAYTA00CUTTER1A0

Stainless steel heating loop manifold

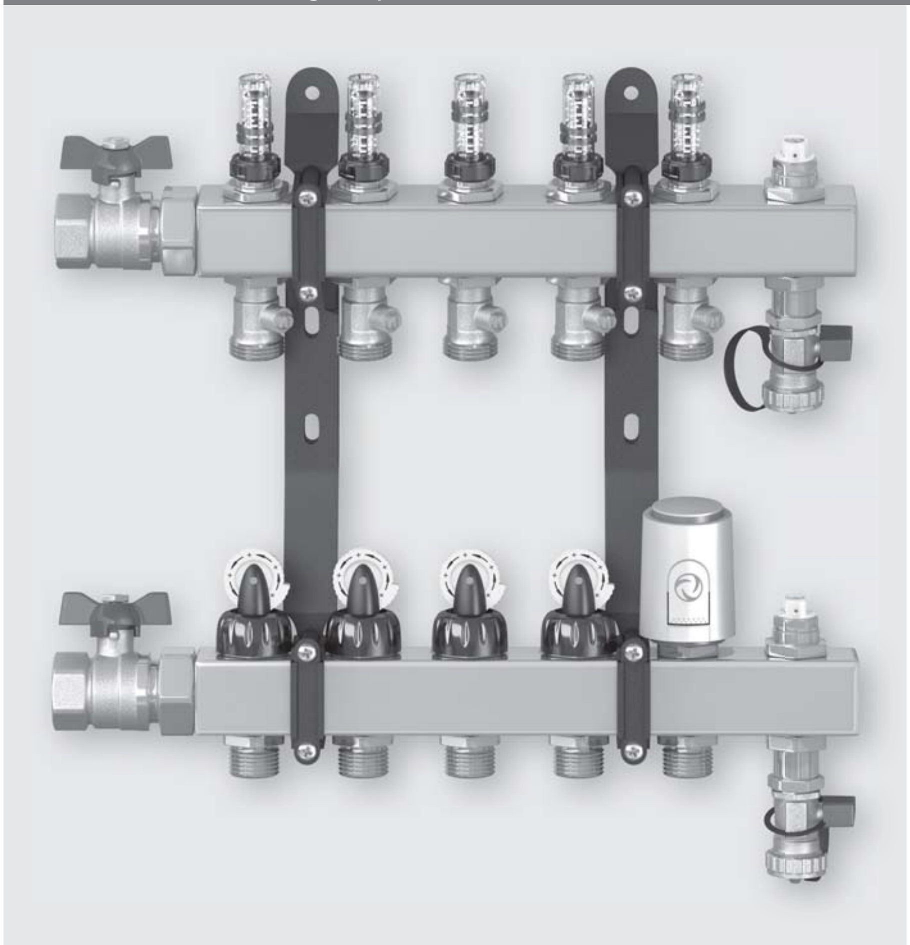


Fig. 1 Supply – built-in balancing top section

Fig. 2: Return – built-in manually adjustable valves

Floor heating loop manifold
Stainless steel EN1264-4

The modern FLOORTEC heating loop manifold systems ensure the optimum distribution of heat throughout your home.

Description

Thanks to their innovative technology, they are reliable and work according to your needs while being especially cost-effective. The new integrated shut-off facility for each heating loop enables, in a simple manner, the independent balancing and shut-off functions in accordance with the EN 1264-4 standard. The manifold valves are ready for use with FLOORTEC adjusting drives. The manual adjustment handles make it possible to set the flow manually and reselect this easily. Different valve settings generate different flow rates. They therefore ensure the regulation of room temperature in individual rooms that is tailored precisely to the needs of your customers.
The hand-operated vents make it possible to bleed the supply and return pipe and therefore increase the operating safety level and user comfort. The floor heating loop manifolds are pre-mounted onto plastic brackets and delivered in robust, non-slip cardboard packaging. Designed for two to twelve heating loops, it fulfils every requirement when it comes to performance and a long service life. The modern FLOORTEC heating loop manifold systems ensure the optimum distribution of heat throughout the home.

Installation site

For fitting on an ascending pipe on the left or the right, or overhead

Functioning

Supply and return bars of the manifold are connected to the heating system. The threaded joints that are also available allow for easy connection of hot/cold loops to the two to twelve Euro cone outlets. The configured flow rate is set on the top meter for each circuit. It is easy to shut off the balancing valve independently using the key provided. The manual adjustment handle or room thermostat with adjusting drives provide comfort tailored to each individual room.

Building categories

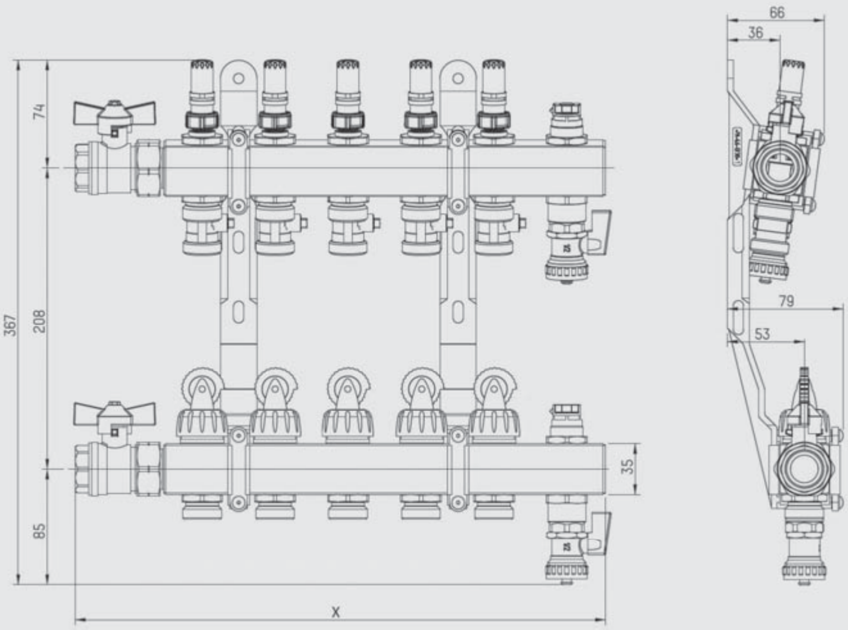
- Residential buildings, family home developments, multi-family homes
- Residential homes and nursing homes
- Administrative and service buildings
- Hotels and restaurants
- Schools and gymnasiums, sports facilities
- Business and industrial buildings

Benefits

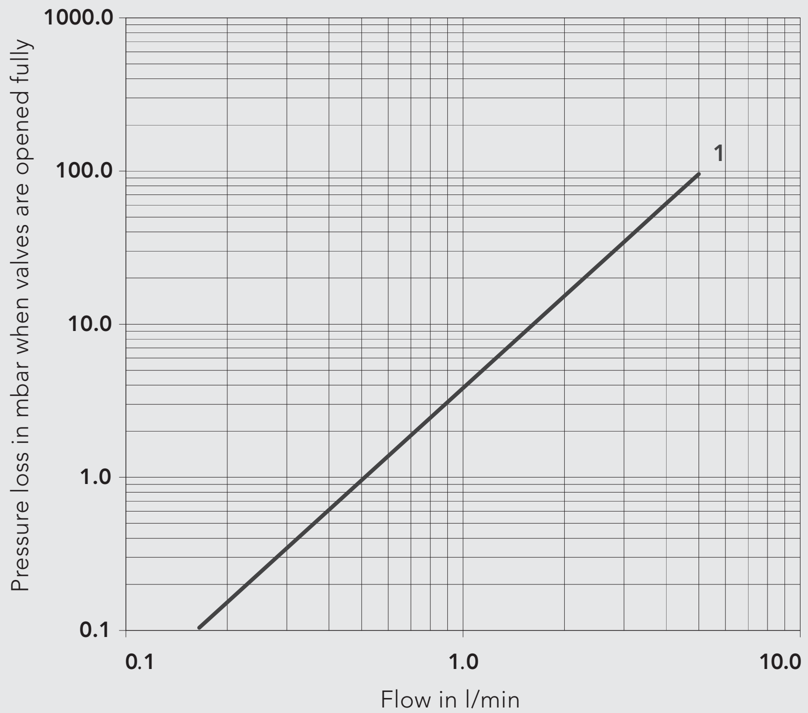
- Complies with the EN 1264-4 standard
- Lightweight, modern and robust manifold made from stainless steel
- Balancing using the tried-and-tested supply pipe top meters with red position indicator
- Ball valve for highly accurate flow setting
- Manual adjustment handle with a graduated scale printed on it, to enable the setting to be reselected
- Pre-mounted onto a plastic bracket to allow firm mounting without rattling
- 100% watertightness test

Stainless steel heating loop manifold

Stainless steel heating loop manifold



Pressure loss diagram



1 TopMeter Supply 0 – 5 l/min: k_{VS} = 0,97

Technical data

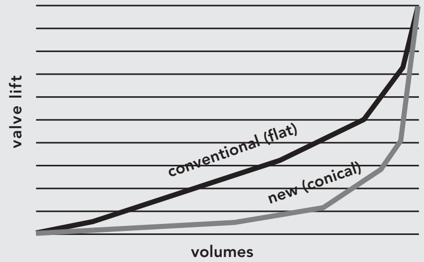
General:
- Temperature of medium: -10 °C to +70 °C
- Max. operating pressure P_{Bmax}:
  - High end: 6 bar
  - Value: 6 bar

  Connect: 8 bar
- Display accuracy: ± 10% of display value
- K_{vs} value and measurement range according to the “pressure loss diagram”
- Heating loop connections: ¾” Euro cone

Material:
- Bar: stainless steel
- Interior: nickel-plated brass, heat-proof and impact-resistant plastics
- Seals: EPDM O-rings
- Mounting bracket: plastic, reinforced with fibre-glass

Flow media:
- Heating water (VDI 2035; SIA Guideline 384/1; ÖNORM H 5195-1)
- Cold water in accordance with DIN 1988-7

valve meter forms and their effect



Stainless steel heating loop manifold

Heating loop	Length in mm	Depth in mm	Boiler connection in inches	Distance between each connecting piece to heating loop connection in mm	Item no.
2	213	79	3/4	50	FBVMSST0231324A0
3	263	79	3/4	50	FBVMSST0331324A0
4	313	79	3/4	50	FBVMSST0431324A0
5	363	79	3/4	50	FBVMSST0531324A0
6	413	79	3/4	50	FBVMSST0631324A0
7	463	79	3/4	50	FBVMSST0731324A0
8	513	79	3/4	50	FBVMSST0831324A0
9	563	79	3/4	50	FBVMSST0931324A0
10	613	79	3/4	50	FBVMSST1031324A0
11	663	79	3/4	50	FBVMSST1131324A0
12	713	79	3/4	50	FBVMSST1231324A0

Model	Function	Item no.
FLOORTEC Adjusting drive 24 V	NC	FBVAMEOA024NC2A0
FLOORTEC Adjusting drive 230 V	NC	FBVAMEOA230NC2A0

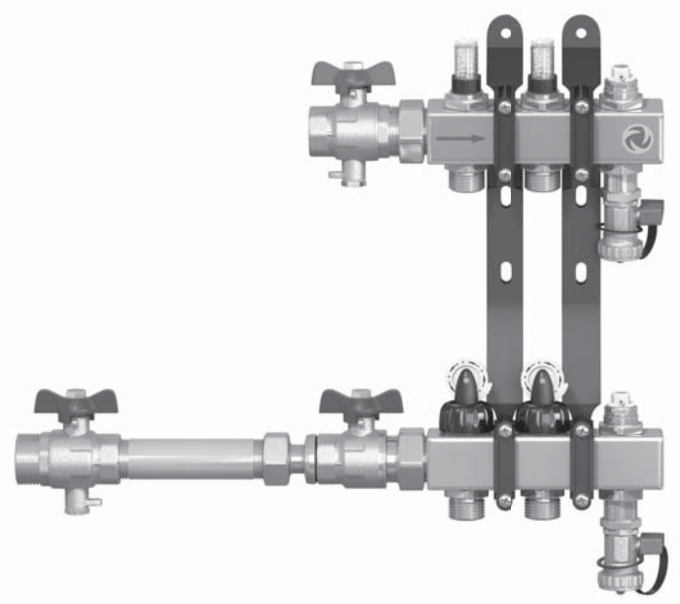
Adjusting drive for stainless steel manifolds

Any deviation from the room temperature target value triggers the adjusting drive to relay an appropriate lift movement to the valve. The controller and the adjusting drive work in accordance with the “OPEN/CLOSED” principle. Variable rhythmic opening and closing also results in virtually constant control, independently of the heating output requirements.halten.

Technical data
- Design: currentless closed (NC)
- Nominal voltage (AC): 24 V or 230 V version
- Permissible voltage deviation ± 10%
- Current peak (<150 ms): ≤ 1.5 A (24 V) / ≤ 0.3 A (230 V)
- Recommended fuse: 0.35 A inactive, in accordance with DIN 41662
- Continuous power rating (approx. 3 min): 1 W
- Opening time: approx. 3 min
- Closing time: approx. 5 min
- Nominal lift: 4 mm
- Nominal closure force: 100 N ± 7%
- Ambient temperature: 0....50 °C
- Connection cable length: 1 m
- Connection pipe: 2 x 0.75 mm^2, white PVC
- Drive protection mode IP 54
- Electrical components protection mode IP 65
- Protection class II
- Technical data comply with the applicable EN standards. The product has been given a CE conformity mark.

System components and accessories

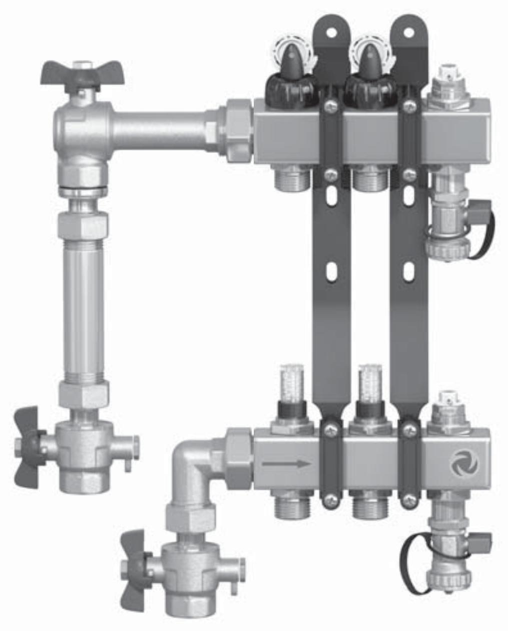
FLOORTEC horizontal heat meter UNI for use with the FLOORTEC stainless steel manifold



Item no.: FBVAMONOHORUNIA0

FLOORTEC UNI vertical heat meter for use with the FLOORTEC stainless steel manifold

Attention:
When connecting to the FLOORTEC manifold, the versions with supply top meter (item no. FBVMSST0231324A0-FBVMSST1231324A0), the positions of the supply and return bars should be swapped around in so far as they are mounted in a manifold cabinet. This means, the supply bar should be underneath, while the return bar is above.



Item no.: FBVAMONOVERUNIA0

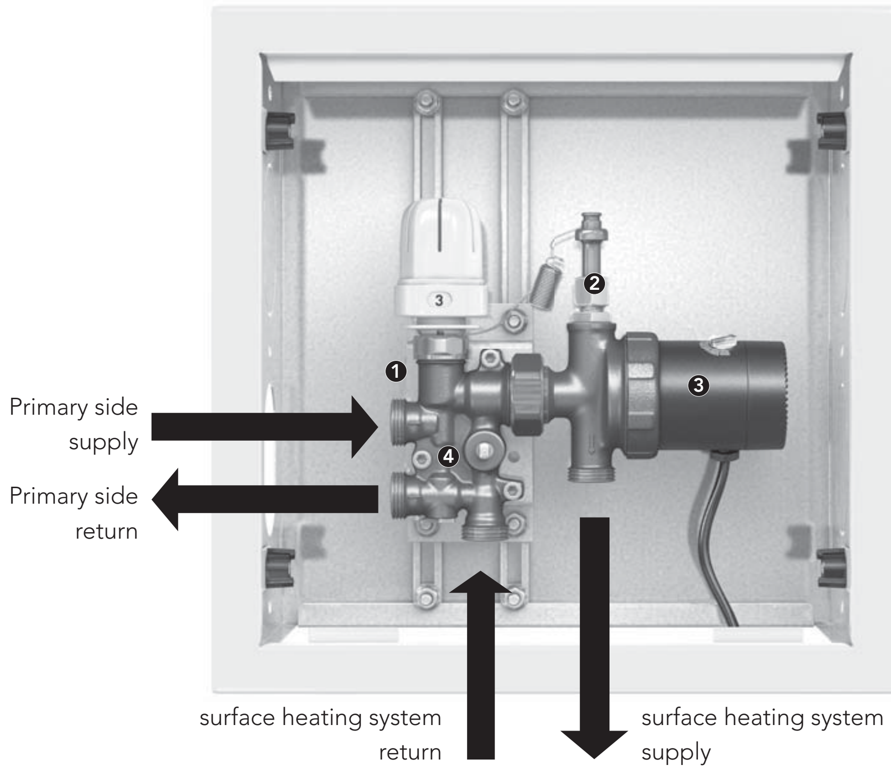
Compact control station

Mixing station for systematic connection of small Underfloor heating systems up to approximately 25 m2 (max. 80 m aluminium composite pipe 16 x 2 mm or max. 2 x 80 m with duplex threaded joint) to the one-pipe and two-pipe systems.

Product benefits
- Easy connection to the existing radiator system
- Excellent heat distribution by constantly quiet spherical motor pump
- Room temperature control including excess temperature safety device

Technical features
- Mixing module (Euro cone ¾" connection) including shaftless spherical motor-circulator pump
- Integrated constant temperature -control unit (20-70 °C) for additional connection of a room thermostat for room temperature control
- Holder can be mounted at the front or at the back
- Frost prevention
- Excess temperature limit on supply of 55 °C
- Adjustable bypass for connection to a single pipe system
- Temperature sensor

❶ Supply excess temperature limit of 55 °C
❷ Temperature sensor
❸ Excellent heat distribution by constantly quiet spherical motor pump
❹ Adjustable bypass for connection to a single pipe system



General information

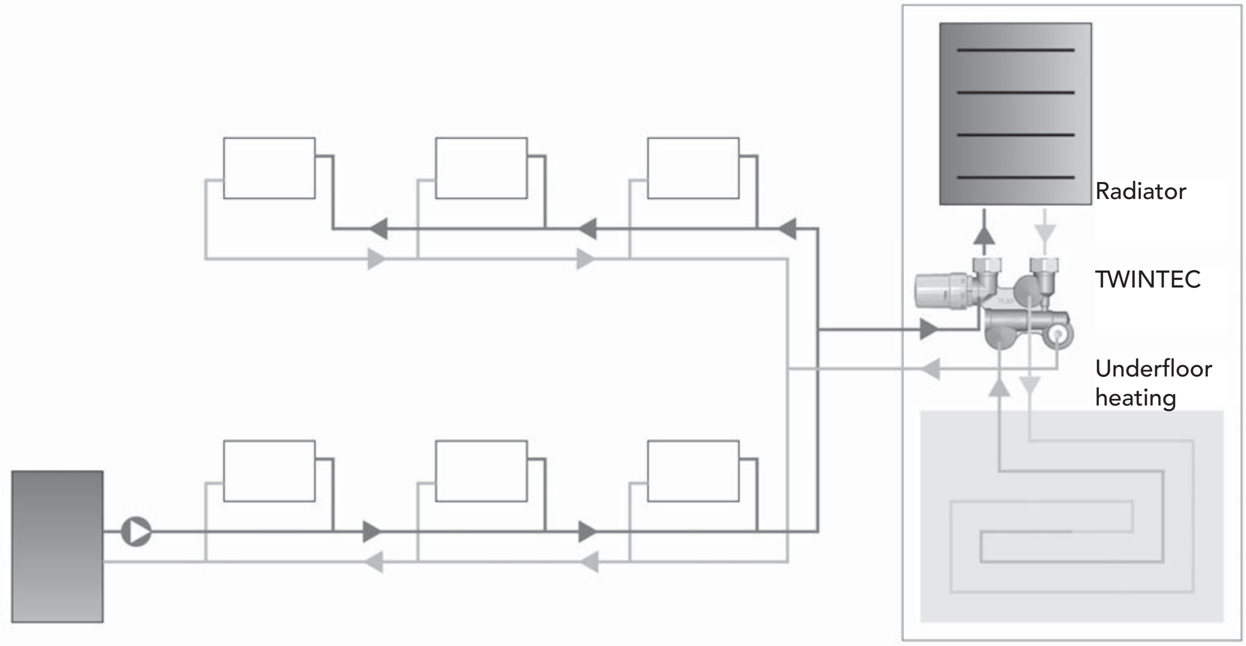
Max. system pressure	1 MPa (10 bar)
Max. system temperature	80° C (radiator/boiler circuit), 55° C (floor circuit)
Max. differential pressure	100 kPa (1 bar) in radiator/boiler circuit
Electrical connection	1x 230 V / 50 Hz
Power consumption	8 Watts

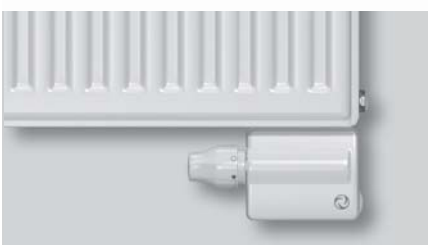
Image	Model/description	Item no.
	FLOORTEC Compact control station Mini mixer station for underfloor heating– 3/4' Mixer set with integrated constant temperature control unit (20-70 °C) for additional connection of a room thermostat for room temperature control	FBRMANIKRST010A0
Optional:		
	FLOORTEC duplex threaded joint (set of 2)	FBVAMFNE34M340A0
	FLOORTEC Compact cabinet sheet steel (in white) in RAL 9010. Alcove dimensions: H 330 x W 320 x D 115–170 mm	FBVCWS00F40040A0

Twintec

TWINTEC is the intelligent element that connects the radiators and the surface heating.

- TWINTEC connects the radiator to the surface heating and provides efficient control combined with a high level of comfort.
- A single thermostatic head allows conflict-free control and provides the user with a comfortable, convenient means of operation.
- Thanks to the serial connection, the surface heating is supplied with water at the appropriate temperature in line with the radiator.
- An integrated return temperature limit function provides additional protection
- Guarantees the flow through the (design) radiator even if the return temperature limit function is activated
- TWINTEC is suitable for both new-builds and for renovation projects and it can be combined with a multitude of radiators.

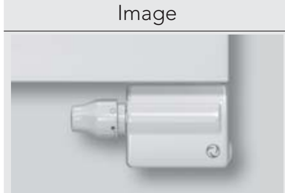
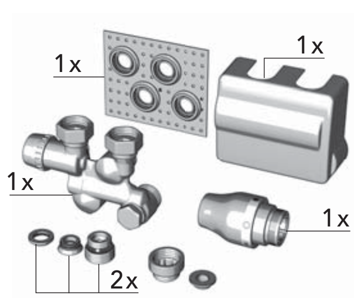




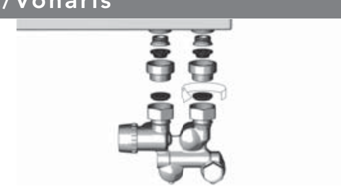
TWINTEC in combination with panel radiators

TWINTEC in combination with convectors and heating panels

TWINTEC in combination with towel warmers and design radiators

Image	Model/description	Item no.:	Scope of delivery
	**TWINTEC** with covering and thermostatic head in RAL 9016 Traffic White	FBROTHETWITE2GAR9016	
	**TWINTEC** with covering and thermostatic head, chrome-plated	FBROTHETWITE2GASCHRO	

Optional TWINTEC accessories – for use with panel radiators and Kontec/Vonaris

	2 adapters incl. 2 flat gaskets	FBROTHETWITECAA0	

In-wall manifold cabinet – standard

Item no.	Width	Model	Internal width	Height	Depth
FBVCFS03A63040A0	400	FLOORTEC manifold cabinet for 2 - 3 heating loops	393	630 - 730	110 - 165
FBVCFS05A63050A0	500	FLOORTEC manifold cabinet for 4 - 5 heating loops	493		
FBVCFS07A63070A0	700	FLOORTEC manifold cabinet for 6 - 7 heating loops	693		
FBVCFS10A63085A0	850	FLOORTEC manifold cabinet for 8 - 10 heating loops	843		
FBVCFS12A63100A0	1000	FLOORTEC manifold cabinet for 11 - 12 heating loops	993		
FBVCFS00A63120A0	1200	FLOORTEC manifold cabinet for 12 + heat meter	1193		

In-wall manifold cabinet - Depth 80 mm

Item no.	Width	Model	Internal width	Height	Depth
FBVCFS03H63040A0	400	FLOORTEC manifold cabinet for 2 - 3 heating loops	393	630 - 730	80 - 125
FBVCFS05H63050A0	500	FLOORTEC manifold cabinet for 4 - 5 heating loops	493		
FBVCFS07H63070A0	700	FLOORTEC manifold cabinet for 6 - 7 heating loops	693		
FBVCFS10H63085A0	850	FLOORTEC manifold cabinet for 8 - 10 heating loops	843		
FBVCFS12H63100A0	1000	FLOORTEC manifold cabinet for 11 - 12 heating loops	993		
FBVCFS00H63120A0	1200	FLOORTEC manifold cabinet for 12 + heat meter	1193		

General information

The housing is manufactured from galvanised sheet steel. The depth of the attachable frame of the standard in-wall manifold cabinet with door can be extended from 110 to 165 mm, while that of the 80 mm in-wall manifold cabinet can be extended from 80 to 125 mm and is supplied as a coated version (RAL 9010/Pure White). The vertical universal fixtures will fit most manifold types.
Cut-out feedthroughs enable the supply and return lines to be securely guided in. The door is also fitted with a lock and the body of the cabinet is fitted with pull-out feet.

On-wall manifold cabinet – standard

Item no.	Width	Model	Internal width	Height	Depth
FBVCWS03F63040A0	473	FLOORTEC manifold cabinet for für 2 - 3 heating loops	393	645	130
FBVCWS05F63050A0	573	FLOORTEC manifold cabinet for für 4 - 5 heating loops	493		
FBVCWS07F63070A0	773	FLOORTEC manifold cabinet for für 6 - 7 heating loops	693		
FBVCWS10F63085A0	923	FLOORTEC manifold cabinet for für 8 - 10 heating loops	843		
FBVCWS12F63100A0	1073	FLOORTEC manifold cabinet for für 11 - 12 heating loops	993		
FBVCWS00F63120A0	1273	FLOORTEC manifold cabinet for für 12 + heat heating loops	1193		

The housing is manufactured from galvanised sheet steel. The cabinet including the door has a depth of 130 mm (non-adjustable) and a fixed height of 645 mm (rear wall is non-removable). It is supplied as a coated version (RAL 9010/Pure White). The vertical universal fixtures will fit most manifold types. The door is also fitted with a counter-sunk lock.

Control technology

The actual heat output to be provided by the heat generation and heat distribution system is only a fraction of the output of the installed system during most of the year. Every heating system must therefore be run using the power that provides for the current heat requirements of the building. For reasons of comfort and economy, a control facility is required to carry out automatic adjustment in the residential rooms.

Apart from that, the legislator requires a control facility for the boiler and the heating surface that depends on the external temperature.

In addition, equipment that functions independently must be installed in relation to the heat distribution system in order to control the room temperature on a room-by-room basis.

The FLOORTEC room temperature control systems not only comply with the statutory provisions, but also implement them in an economical and efficient way.

General information

The architect and planner must take account of the statutory regulations and standards when planning the control facilities. The systems engineer must undertake the approaches necessary to ensure optimum operation. The following standards and laws must be complied with in this regard:

Standards and guidelines

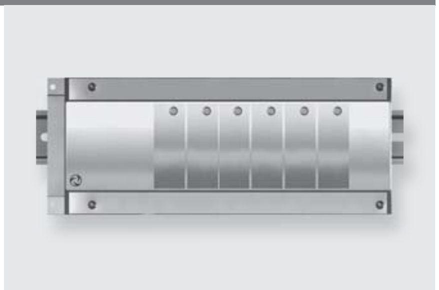
• **EnEV**	Energy saving ordinance
• **DIN 18380**	Installation of central heating systems and hot water supply systems
• **DIN 18382**	Electrical supply systems rated in buildings
• **DIN 18386**	Building automation and control systems
• **VDI 0100**	Erection of power installations with nominal voltages up to 1000 V
• **VDI 2073**	Hydraulic circuits in heating, ventilation and air conditioning
• **VDE 44574**	Electric room heating: charging controls of storage heaters

Room temperature control

The control facility in an individual room is based on the functional principle of two-point control. When heat is required, the valve opens and then closes when room temperature has been reached. The two-point control is the most commonly used system in the field of heating technology. In this system, a room thermostat monitors the air temperature. When the temperature falls below that set for the room, the thermostat responds and sends the appropriate message to the relevant adjusting drive on the heating loop manifold.
The thermal feedback in the thermostat simulates the temperature rise after switching off, therefore preventing temperature overshoot.

Connection module

The connection module serves the central wiring of the FLOORTEC room thermostats and adjusting drives in the 24 V and 230 V versions, which must be in accordance with requirements of the VDE standard.



NEW Control

Click-mounting function of the 24V and 230V room controllers

To facilitate installation, the wired room controllers consist of a flush-mounted base to be fixed permanently and an operating component that is plugged into it. This enables the controllers to be removed at any time. This is a valuable advantage when it comes to painting and decorating works, because it makes the work easier and the controllers are protected from damage and soiling when removed. The protective cap that is also supplied also protects the flush-mounted base.

FLOORTEC 24 V/230 V analogue room thermostat

- Electronic P-controller
- Room sensor
- Click-mounting on a flush-mounted connection unit
- Just 25 mm deep
- Mechanical min./max. limit function
- LED to indicate on/off status

Analogue room thermostat

FLOORTEC 24 V NA/230 V NA analogue room thermostat

Same functions as the analogue thermostat, but with the following additional features:

- Electronic PI-controller (2-point or PWM)
- With night setback
- Suitable for heating and cooling
- LED indicator (red LED = heating; blue LED = cooling)

Push button

FLOORTEC 24 V/230 V digital room thermostat

- Electronic PI-controller (2-point or PWM)
- LCD display, orange backlight
- Suitable for heating and cooling
- Room sensor, optional connection to a floor sensor
- 3 different basic control modes are possible:
  Room temperature control
  Room temperature control and floor temperature limit function (min./max.)
  Floor temperature control

Digital room thermostat

FLOORTEC 24 V/230 V touchscreen room thermostat

Same functions as the digital thermostat,
but with the following additional features:

- Graphic LCD display
- Automatic summer/winter switching
- Programming possible in 3 different time slots
- Self-optimisation function
- Week and holiday programme
- Integrated hygrostat for use when cooling mode is activated

Touchscreen room thermostat

FLOORTEC 24 V/230 V programming unit room thermostat

Same functions as the digital thermostat,
but with the following additional features:

- Graphic LCD display
- Automatic summer/winter switching
- Programming possible in 3 different time slots
- Self-optimisation function
- Week and holiday programme
- Integrated hygrostat for use when cooling mode is activated

Programming unit room thermostat

Floor sensor

FLOORTEC connection module

- Basic module for use with up to 6 room temperature controllers
- With integrated boiler and pump module
- Extension module for 4 or 6 additional room temperature controllers
- Extension module for heating and cooling operation
- ‘Top hat’ rail mounting

Connection module

Project planning

The principles for testing and project planning in relation to hot water and Underfloor heating systems are laid down in the applicable standard ÖNORM EN 1264 Warmwasser-Flächenheizungen [Water-based surface embedded heating and cooling systems] Parts 1 to 4. In contrast to panel radiators with multi-layer structure and/or convection panels, it is not possible to make any changes to the construction of thermal convection surfaces of surface heating. Consequently, every surface heating system, with identical floor, air, covering and wall temperatures, provides the same heat output.

The corresponding equation is as follows:

θ	=	$8{,}92 \cdot (\theta_{Fm} - \theta_i)^{1,1}$, with
θ_i	=	internal temperature in °C according to the standard
θ_{Fm}	=	Average floor surface temperature in °C
q	=	Heat flow density in W/m²

The characteristic base line, as it is known, illustrates the relationship between the floor temperature, the room temperature and the specific heat output, independently of the system.

Part 3 of the ÖNORM EN 1264 standard describes in detail the process of how surface heating should be laid for a building plan. The following preconditions are important with regard to the layout of surface heating:

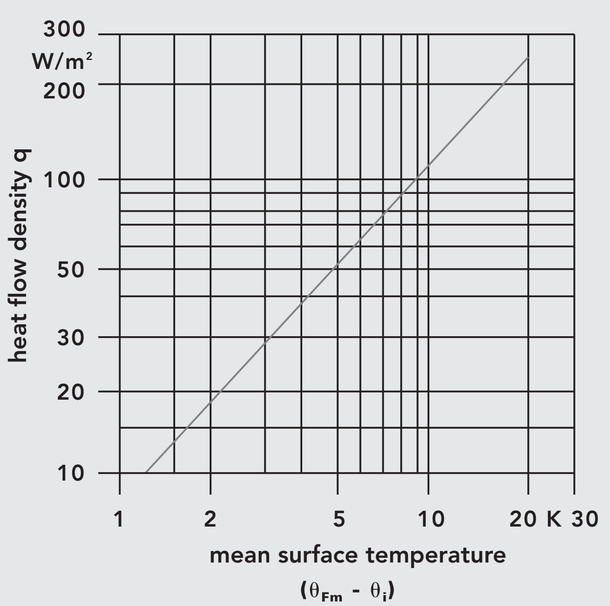
- Compliance with the statutory heat insulation regulations
- Limitation of the flow of heat downwards
- Heat requirement calculation in accordance with ÖNORM H7500
- Max. permissible floor surface temperature in accordance with ÖNORM EN 1264 at the lowest standard external temperature in accordance with ÖNORM H7500. This lays down the output criteria of hot water Underfloor heating systems.

The corresponding values are as follows:

living areas:	$\theta_{F\ max} \leq$	29 °C
peripheral areas (1 m Breit):	$\theta_{F\ max} \leq$	35 °C
baths, showers:	$\theta_{F\ max} \leq$	33 °C

On average during the heating period, the surface temperatures in a room with a room temperature of 20 °C lie at approximately 23 °C.

Note: As a rule, with regard to the floor surface to be heated, the entire surface area of the room is available, on which to lay out the surface. In order to prevent any unnecessary disparities in the underfloor heating screed between the cold and warm surfaces (for example: in the kitchen, living room 20% of the surface is covered with items of furniture), part of the heating pipes should also be laid underneath the areas covered by cupboards.



As there is often no clarity regarding the properties of the floor coverings in the planning stage, the DIN standard now sets the binding stipulation that all living areas are to be assessed using the following uniform thermal resistance:

The corresponding equation is as follows:

$R_{\lambda B}$ = 0,10 m² K/W

In the case of baths
$R_{\lambda\ Dämm}$ = 0 m² K/W

The assessment of each room begins with the least favourable room, i.e. the room with the greatest specific heating requirements q [W/m²]. The spread for this room is set at 5 K.

It is possible to derive the distance between the pipe VA and the rated excess temperature of the heating components ∆θH,des from the characteristic base line for $R_{\lambda B}$ = 0,10 m².

The distance to be maintained between the pipes when laying should be chosen in such a way to ensure that the maximum surface temperature $\theta_{F\ max}$ = 29 °C for residential areas is never exceeded.

In peripheral areas, this is: $\theta_{F\ max}$ = 35 °C.

The corresponding limiting curves are marked on the characteristic line fields.

Project planning

The following are sufficiently accurate for standard structures: for wet screed with su = 45 mm and U = 1.2 W/m2Km^{2}K

R_o of the floor construction upwards						
$R_{\lambda B}$			0,00	0,05	0,10	0,15
R_o			0,1305	0,1805	0,2305	0,2805
R_u of the floor downwards	ÖNORM EN **1264**	R_u =	**0,75**	with similar use		
		R_u =	**1,25**	against earth, with different use, against unheated rooms		
		R_u =	**2,00**	against external air		

General information

Formula symbols

Symbol	Description	Measurement unit
$\Delta\theta_{H,des}$	Rated heating medium excess temperature	K
$\Delta\theta_{H}$	Mean heating medium excess temperature	K
$\Delta\theta_{H,j}$	Rated heating medium excess temperature of the other rooms	K
$\Delta\theta_{V,des}$	Rated excess temperature of the heating medium in supply	K
θ_R	Return temperature	°C
θ_V	Supply temperature	°C
$\theta_{F\,max}$	Maximum floor surface temperature	°C
$\theta_{F\,m}$	Mean floor surface temperature	°C
θ_i	Standard internal temperature	°C
θ_u	Temperature in the room underneath the room equipped with underfloor heating	°C
σ	Spread between heating loop supply and return	K
σ_u	Spread between the heating loop supply and return of other rooms	K
A_F	heating floor surface	m^2
q	Heat flow density on the floor surface	W/m^2
c_w	Specific heat capacity of water	W s/kg K

Symbol	Description	Measurement unit
$\dot{m}_h$	Rated heating medium flow	kg/h
su	Thickness of the covering over the heating pipe	m
Ro	upper partial thermal contact resistance of the floor	m^2 K/W
Ru	Lower partial thermal contact resistance of the floor	m^2 K/W
$R_{\alpha o}$	Heat transmission resistance upwards	m^2 K/W
$R_{\alpha u}$	Heat transmission resistance downwards	m^2 K/W
$R_{\lambda B}$	Thermal resistance of the floor covering	m^2 K/W
$R_{\lambda Dämm}$	Thermal resistance of the insulation	m^2 K/W
$R_{\lambda Decke}$	Thermal resistance of the ceiling	m^2 K/W
$R_{\lambda Putz}$	Thermal resistance of the ceiling plaster	m^2 K/W
L_A	Length of the connecting heating loop pipeline	m
L_R	Length of the heating loop pipeline	m
VA	Distance between the heating loop pipes when laid	m
$\Delta p_{HKR,R}$	Pressure loss from pipeline	mbar
R	Specific pipe resistance	Pa/m

Overview of load distribution layers/screeds	
Calcium sulphate screed AE 20, e.g. Maxitplan 490... (anhydrite self-levelling screed)	
Advantage	Quick and easy to lay, price
Disadvantage	Heating-up stage is necessary, not suitable for commercial wet rooms, high level of moisture introduced into the building, high installation thickness
Ready for covering with a floor	No earlier than 21 days, depending on residual moisture
Covering	35-40 mm above the upper edge of the pipe, depending on manufacturer and quality
Cement-based screed ZE 20	
Advantage	Suitable for use in wet rooms, possible to lay as mortar bed for natural stone
Disadvantage	Heating-up stage is necessary, cupping is possible, high level of moisture introduced into the building
Ready for covering with a floor	No earlier than 28 days, depending on residual moisture
Covering	45 mm above the upper edge of the pipe
Cement-based self-levelling screed ZE 20 (Maxitplan 440)	
Advantage	Quick and easy to lay like calcium sulphate screed, suitable for use in wet rooms, no cupping
Disadvantage	Heating-up stage is necessary, high level of moisture introduced into the building
Ready for covering with a floor	No earlier than 22 days, depending on residual moisture
Covering	> 45 mm
Blanke PERMAT	
Advantage	Lowest possible thickness for tiles or adhesive parquet, easy handling, only minimal introduction of moisture, the floor is already capable of bearing weight and withstanding heat after 24 hours, also suitable for greater loads
Disadvantage	Stringent requirement for the sub-floor to be even
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours, depending on the version
Covering	3.5 mm + adhesive + top covering
Lazemoflex mortar bed	
Advantage	Minimal thickness of 8-15 mm, ready for covering after a short time also directly in the mortar bed, the floor is already capable of bearing weight after 24 hours, important in renovation measures, little mass to be heated up by the floor heating system enabling rapid response times, also suitable for use in moist rooms and rooms bearing greater loads.
Disadvantage	Price, can only be heated after 28 days
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours
Covering	8-15 mm + top covering
Mortar bed	
Advantage	Natural stone or ceramic tiles can be laid immediately in the single-layer cement mortar bed, saves time and minimal thickness instead of protective screed layers with separate mortar bed in the middle
Disadvantage	Time-consuming, high level of skill required of the tile layer
Ready for covering with a floor	Laying and floor covering in one go
Covering	> 45 mm + natural stone
Dry screed boards (manufactured by Knauf)	
Advantage	Minimal thickness, can be walked on and the floor covering laid immediately, possibility of compensating for unevenness by filling in, no additional moisture in the building
Disadvantage	Price
Ready for covering with a floor	Can be covered immediately
Covering	22 mm

Overview of load distribution layers/screeds	
Screed tile	
Advantage	Minimal thickness, rapid response time, can be laid as the visible floor
Disadvantage	Very limited selection of colours if laid as the visible floor
Ready for covering with a floor	Laying and floor covering in one go or after 24 hours
Covering	20 mm or 20 mm + floor covering
Real wood plank flooring (laid as a floating floor; manufactured by JUNCKERS)	
Advantage	Minimal thickness of 17-25 mm, the floor is capable of bearing loads immediately after laying, important in renovation measures
Disadvantage	Price, insulating effect of wood
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	17-25 mm (incl. felt layer if laid as floating floor)
Real wood plank flooring (laid and screwed down; manufactured by JUNCKERS)	
Advantage	Minimal thickness of 14-22 mm, the floor is capable of bearing loads immediately after laying, important in renovation measures, also for greater load-bearing requirements
Disadvantage	Price, insulating effect of wood, heat output is poorer than if the felt layer is screwed down
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	14-22 mm
Laminate (laid as a floating floor; manufactured by ALLOC)	
Advantage	Minimal thickness of 11-13 mm, floor is capable of bearing loads immediately after laying, little mass to be heated by the underfloor heating enabling rapid response times
Disadvantage	Little mass, therefore problems with impact noise under certain conditions
Ready for covering with a floor	Laid flooring material is the same as the floor covering
Covering	approx. 12 mm
Metal anti-slip flooring	
Advantage	Extremely low thickness of 4-6 mm, can be covered further immediately
Disadvantage	Price
Ready for covering with a floor	can be covered further immediately
Covering	4-6 mm + floor covering

Overview of types of floor covering

The principle applies that an $R_{\lambda B}$ of > 0.15 m^2 K/W is unsuitable for underfloor heating, as the insulation value of the combined floor layer cannot guarantee that the underfloor heating will operate correctly.

Ceramic floor coverings/Stone	
Thermal conductivity	Very good ($R_{\lambda B}$ = 0.01 – 0.1 m2 K/W)
Laying	Using tile adhesive and grout on top of screed or Blanke PERMAT Using Lazemoflex directly as mortar bed covering or in the thick bedding mortar
Important	Permanently flexible adhesives should be used (suitable for underfloor heating)
Strip parquet	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,15 m^2 K/W
Laying	Glued down using parquet adhesive on top of a load distribution layer
Important	Permanently flexible adhesives should be used (suitable for underfloor heating)
Parquet boards (made by JUNCKERS), thickness 14 mm, (floating floor)	
Thermal conductivity	$R_{\lambda B}$ = 0,15 m^2 K/W floating floor
Laying	Floating with intermediate layer
Important	Maximum permitted surface temperature of 27 °C
Parquet boards (made by JUNCKERS), thickness 14 mm and 20 mm (glued down)	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,15 m^2 K/W when fully glued down on top of wet and dry screed
Laying	Fully glued down on top of load distribution layer
Important	Maximum permitted surface temperature of 27°C
Parquet boards (made by JUNCKERS), thickness 14 mm and 20 mm (on battens)	
Thermal conductivity	$R_{\lambda B}$ = 0,80 – 0,13 m^2 K/W
Laying	The boards are screwed down onto battens, between which the FLOORTEC dry system elements are located. The underside of the boards must be laid directly in contact with the elements.
Important	Maximum permitted surface temperature of 27°C
Laminate (made by ALLOC)	
Thermal conductivity	$R_{\lambda B}$ = 0,10 – 0,12 m^2 K/W
Laying	Laid as a floating floor on wet/dry screeds or directly onto system elements (only in living areas)
Important	A PE film must additionally be laid underneath the laminate as a moisture barrier.
Plastic floor covering	
Thermal conductivity	$R_{\lambda B}$ = ca. 0,10 m^2 K/W
Laying	Glued onto a load distribution layer
Important	Determine compatibility with underfloor heating (manufacturer's approval)
Carpets	
Thermal conductivity	max. $R_{\lambda B}$ = 0,15 m^2 K/W
Laying	Glued onto a load distribution layer
Important	Determine compatibility with underfloor heating (manufacturer's approval)

Fast calculation for Stapler system (DIN tested N. reg. 7F147) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,00 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	150	129	112	97	84	73
	18	128	110	95	82	72	62
	20	113	97	84	73	63	55
	22	98	84	73	63	55	48
	24	83	71	62	53	46	40
	26	68	58	50	44	38	33
40 bei FLOW 45 °C RETURN 35 °C	15	188	162	140	121	105	92
	18	165	142	123	107	93	81
	20	150	129	112	97	84	73
	22	135	117	101	87	76	66
	24	120	104	90	78	67	59
	26	105	91	78	68	59	51
45 bei FLOW 50 °C RETURN 40 °C	15	226	194	168	146	126	110
	18	203	175	151	131	114	99
	20	188	162	140	121	105	92
	22	173	149	129	112	97	84
	24	158	136	117	102	88	77
	26	143	123	106	92	80	70
50 bei FLOW 55 °C RETURN 45 °C	15	263	227	196	170	147	128
	18	241	207	179	155	135	117
	20	226	194	168	146	126	110
	22	211	181	157	136	118	103
	24	195	168	145	126	109	95
	26	143	123	106	92	80	70
55 bei FLOW 60 °C RETURN 50 °C	15	301	259	224	194	168	147
	18	278	240	207	180	156	136
	20	263	227	196	170	147	128
	22	248	214	185	160	139	121
	24	233	201	173	150	131	114
	26	143	123	106	92	80	70

Floor covering: e.g. ceramic tiles – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,05 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	107	95	84	75	66	59
	18	91	81	71	63	56	50
	20	81	71	63	56	50	44
	22	70	62	55	48	43	38
	24	59	52	46	41	36	32
	26	48	43	38	34	30	27
40 bei FLOW 45 °C RETURN 35 °C	15	134	119	105	93	83	74
	18	118	104	92	82	73	65
	20	107	95	84	75	66	59
	22	97	85	76	67	60	53
	24	86	76	67	60	53	47
	26	75	66	59	52	46	41
45 bei FLOW 50 °C RETURN 40 °C	15	161	142	126	112	99	88
	18	145	128	113	101	89	80
	20	134	119	105	93	83	74
	22	123	109	97	86	76	68
	24	113	100	88	78	70	62
	26	102	90	80	71	63	56
50 bei FLOW 55 °C RETURN 45 °C	15	188	166	147	131	116	103
	18	172	152	134	119	106	94
	20	161	142	126	112	99	88
	22	150	133	118	104	93	82
	24	140	123	109	97	86	77
	26	102	90	80	71	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	215	190	168	149	132	118
	18	199	176	155	138	123	109
	20	188	166	147	131	116	103
	22	177	157	139	123	109	97
	24	166	147	130	116	103	91
	26	102	90	80	71	63	56

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

N. reg. 7F147

Fast calculation for Stapler system (DIN tested N. reg. 7F147) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	83	75	68	61	55	50
	18	71	64	58	52	47	43
	20	63	56	51	46	42	38
	22	54	49	44	40	36	33
	24	46	41	37	34	31	28
	26	38	34	31	28	25	23
40 bei FLOW 45 °C RETURN 35 °C	15	104	94	85	77	69	63
	18	92	83	75	67	61	55
	20	83	75	68	61	55	50
	22	75	68	61	55	50	45
	24	67	60	54	49	44	40
	26	58	53	47	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	125	113	102	92	83	75
	18	113	101	92	83	75	68
	20	104	94	85	77	69	63
	22	96	86	78	71	64	58
	24	88	79	71	64	58	53
	26	79	71	64	58	53	48
50 bei FLOW 55 °C RETURN 45 °C	15	146	131	119	107	97	88
	18	133	120	109	98	89	80
	20	125	113	102	92	83	75
	22	117	105	95	86	78	70
	24	108	98	88	80	72	65
	26	79	71	64	58	53	48
55 bei FLOW 60 °C RETURN 50 °C	15	167	150	136	123	111	100
	18	154	139	126	113	103	93
	20	146	131	119	107	97	88
	22	138	124	112	101	92	83
	24	129	116	105	95	86	78
	26	79	71	64	58	53	48

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screed layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²]					
		Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	68	62	57	52	48	44
	18	58	53	48	44	41	37
	20	51	47	43	39	36	33
	22	44	40	37	34	31	29
	24	37	34	31	29	26	24
	26	31	28	26	23	22	20
40 bei FLOW 45 °C RETURN 35 °C	15	85	78	71	65	60	55
	18	75	69	63	57	53	48
	20	68	62	57	52	48	44
	22	61	56	51	47	43	39
	24	54	50	46	42	38	35
	26	48	44	40	37	33	31
45 bei FLOW 50 °C RETURN 40 °C	15	102	93	86	78	72	66
	18	92	84	77	70	65	59
	20	85	78	71	65	60	55
	22	78	72	66	60	55	50
	24	71	65	60	55	50	46
	26	65	59	54	50	45	42
50 bei FLOW 55 °C RETURN 45 °C	15	119	109	100	91	84	77
	18	109	100	91	84	77	70
	20	102	93	86	78	72	66
	22	95	87	80	73	67	61
	24	89	81	74	68	62	57
	26	65	59	54	50	45	42
55 bei FLOW 60 °C RETURN 50 °C	15	136	125	114	104	96	88
	18	126	115	105	97	88	81
	20	119	109	100	91	84	77
	22	112	103	94	86	79	72
	24	106	97	88	81	74	68
	26	65	59	54	50	45	42

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Preformed plate system UNI 14 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

  Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm] 60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	141	117	97	82	69
	18	120	99	83	70	59
	20	106	87	73	61	52
	22	92	76	63	53	45
	24	78	64	54	45	38
40 bei FLOW 45 °C RETURN 35 °C	15	177	146	122	102	86
	18	155	128	107	90	76
	20	141	117	97	82	69
	22	127	105	88	74	62
	24	113	93	78	65	55
45 bei FLOW 50 °C RETURN 40 °C	15	212	175	146	123	104
	18	191	157	132	110	93
	20	177	146	122	102	86
	22	162	134	112	94	79
	24	148	122	102	86	73
50 bei FLOW 55 °C RETURN 45 °C	15	247	204	171	143	121
	18	226	187	156	131	111
	20	212	175	146	123	104
	22	198	163	136	115	97
	24	184	152	127	106	90
55 bei FLOW 60 °C RETURN 50 °C	15	282	233	195	164	138
	18	261	216	180	151	128
	20	247	204	171	143	121
	22	233	192	161	135	114
	24	219	181	151	127	107

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

  Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm] 60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	102	87	75	65	56
	18	87	74	64	55	48
	20	77	65	56	49	42
	22	66	57	49	42	36
	24	56	48	41	36	31
40 bei FLOW 45 °C RETURN 35 °C	15	128	109	94	81	70
	18	112	96	82	71	62
	20	102	87	75	65	56
	22	92	78	67	58	50
	24	82	70	60	52	45
45 bei FLOW 50 °C RETURN 40 °C	15	153	131	112	97	84
	18	138	118	101	87	76
	20	128	109	94	81	70
	22	117	100	86	74	64
	24	107	91	79	68	59
50 bei FLOW 55 °C RETURN 45 °C	15	179	152	131	113	98
	18	163	139	120	103	90
	20	153	131	112	97	84
	22	143	122	105	91	78
	24	133	113	97	84	73
55 bei FLOW 60 °C RETURN 50 °C	15	204	174	150	129	112
	18	189	161	139	120	104
	20	179	152	131	113	98
	22	168	144	124	107	92
	24	158	135	116	100	87

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

N. reg. 7F271-F

Fast calculation for Preformed plate system UNI 14 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room tempe-rature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	80	70	62	54	48
	18	68	59	52	46	41
	20	60	52	46	41	36
	22	52	45	40	35	31
	24	44	38	34	30	26
40 bei FLOW 45 °C RETURN 35 °C	15	100	87	77	68	60
	18	88	77	68	60	53
	20	80	70	62	54	48
	22	72	63	55	49	43
	24	64	56	49	43	38
45 bei FLOW 50 °C RETURN 40 °C	15	120	105	92	81	72
	18	108	94	83	73	65
	20	100	87	77	68	60
	22	92	80	71	62	55
	24	84	73	65	57	50
50 bei FLOW 55 °C RETURN 45 °C	15	140	122	108	95	84
	18	128	112	99	87	77
	20	120	105	92	81	72
	22	112	98	86	76	67
	24	104	91	80	71	63
55 bei FLOW 60 °C RETURN 50 °C	15	160	140	123	109	96
	18	148	129	114	100	89
	20	140	122	108	95	84
	22	132	115	102	90	79
	24	124	108	96	84	75

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 Underfloor heating system Preformed Plate with heating pipe
  FLOORTEC Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room tempe-rature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	59	53	47	42
	18	56	50	45	40	36
	20	49	44	39	35	32
	22	43	38	34	31	27
	24	36	32	29	26	23
40 bei FLOW 45 °C RETURN 35 °C	15	82	73	66	59	53
	18	72	65	58	52	46
	20	66	59	53	47	42
	22	59	53	47	42	38
	24	53	47	42	38	34
45 bei FLOW 50 °C RETURN 40 °C	15	98	88	79	71	63
	18	89	79	71	63	57
	20	82	73	66	59	53
	22	75	67	60	54	49
	24	69	62	55	49	44
50 bei FLOW 55 °C RETURN 45 °C	15	115	103	92	82	74
	18	105	94	84	75	68
	20	98	88	79	71	63
	22	92	82	74	66	59
	24	85	76	68	61	55
55 bei FLOW 60 °C RETURN 50 °C	15	131	117	105	94	84
	18	121	108	97	87	78
	20	115	103	92	82	74
	22	108	97	87	78	70
	24	102	91	81	73	65

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	130	112	97	84	73
	18	110	95	83	72	62
	20	97	84	73	63	55
	22	84	73	63	55	48
	24	71	62	53	46	40
40 bei FLOW 45 °C RETURN 35 °C	15	162	140	122	106	92
	18	143	123	107	93	81
	20	130	112	97	84	73
	22	117	101	88	76	66
	24	104	90	78	68	59
45 bei FLOW 50 °C RETURN 40 °C	15	195	168	146	127	110
	18	175	151	131	114	99
	20	162	140	122	106	92
	22	149	129	112	97	84
	24	136	118	102	89	77
50 bei FLOW 55 °C RETURN 45 °C	15	227	196	170	148	128
	18	208	179	156	135	117
	20	195	168	146	127	110
	22	182	157	136	118	103
	24	169	146	126	110	95
55 bei FLOW 60 °C RETURN 50 °C	15	259	224	194	169	147
	18	240	207	180	156	136
	20	227	196	170	148	128
	22	214	185	160	139	121
	24	201	174	151	131	114

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	95	84	75	66	59
	18	81	71	63	56	50
	20	71	63	56	50	44
	22	62	55	49	43	38
	24	52	46	41	36	32
40 bei FLOW 45 °C RETURN 35 °C	15	119	105	93	83	74
	18	104	92	82	73	65
	20	95	84	75	66	59
	22	85	76	67	60	53
	24	76	67	60	53	47
45 bei FLOW 50 °C RETURN 40 °C	15	142	126	112	99	88
	18	128	113	101	89	80
	20	119	105	93	83	74
	22	109	97	86	76	68
	24	100	88	78	70	62
50 bei FLOW 55 °C RETURN 45 °C	15	166	147	131	116	103
	18	152	134	119	106	94
	20	142	126	112	99	88
	22	133	118	104	93	82
	24	123	109	97	86	77
55 bei FLOW 60 °C RETURN 50 °C	15	190	168	149	133	118
	18	176	156	138	123	109
	20	166	147	131	116	103
	22	157	139	123	109	97
	24	147	130	116	103	91

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation

N. reg. 7F147
N. reg. 7F261

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	75	68	61	55	50
	18	64	58	52	47	43
	20	56	51	46	42	38
	22	49	44	40	36	33
	24	41	37	34	30	28
40 bei FLOW 45 °C RETURN 35 °C	15	94	85	77	69	63
	18	83	75	67	61	55
	20	75	68	61	55	50
	22	68	61	55	50	45
	24	60	54	49	44	40
45 bei FLOW 50 °C RETURN 40 °C	15	113	102	92	83	75
	18	101	92	83	75	68
	20	94	85	77	69	63
	22	86	78	71	64	58
	24	79	71	64	58	53
50 bei FLOW 55 °C RETURN 45 °C	15	131	119	107	97	88
	18	120	109	98	89	80
	20	113	102	92	83	75
	22	105	95	86	78	70
	24	98	88	80	72	65
55 bei FLOW 60 °C RETURN 50 °C	15	150	136	123	111	100
	18	139	126	113	103	93
	20	131	119	107	97	88
	22	124	112	101	91	83
	24	116	105	95	86	78

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	62	57	52	48	44
	18	53	48	44	41	37
	20	47	43	39	36	33
	22	40	37	34	31	28
	24	34	31	29	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	78	71	65	60	55
	18	69	63	57	53	48
	20	62	57	52	48	44
	22	56	51	47	43	39
	24	50	46	42	38	35
45 bei FLOW 50 °C RETURN 40 °C	15	93	86	78	72	66
	18	84	77	70	65	59
	20	78	71	65	60	55
	22	72	66	60	55	50
	24	65	60	55	50	46
50 bei FLOW 55 °C RETURN 45 °C	15	109	100	91	84	77
	18	100	91	84	76	70
	20	93	86	78	72	66
	22	87	80	73	67	61
	24	81	74	68	62	57
55 bei FLOW 60 °C RETURN 50 °C	15	125	114	104	96	88
	18	115	105	97	88	81
	20	109	100	91	84	77
	22	103	94	86	79	72
	24	97	88	81	74	68

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Preformed plate system UNI 16 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	142	118	100	85	72
	18	122	102	86	72	61
	20	107	90	76	64	54
	22	93	78	66	55	47
	24	79	66	55	47	40
40 bei FLOW 45 °C RETURN 35 °C	15	179	150	126	106	90
	18	157	132	111	94	79
	20	143	120	101	85	72
	22	129	108	91	77	65
	24	115	96	81	68	58
45 bei FLOW 50 °C RETURN 40 °C	15	215	180	149	128	108
	18	193	162	136	115	97
	20	179	150	126	106	90
	22	165	138	116	98	83
	24	150	126	106	89	76
50 bei FLOW 55 °C RETURN 45 °C	15	250	210	176	149	126
	18	229	192	161	136	115
	20	215	180	151	128	108
	22	200	168	141	119	101
	24	186	156	131	111	93
55 bei FLOW 60 °C RETURN 50 °C	15	285	239	200	170	144
	18	265	221	186	157	133
	20	250	210	176	149	126
	22	236	198	166	140	119
	24	222	186	156	132	111

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
  In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

General information

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	103	89	77	67	58
	18	88	76	66	57	49
	20	77	67	58	50	44
	22	67	58	50	43	38
	24	57	49	42	37	32
40 bei FLOW 45 °C RETURN 35 °C	15	129	111	96	84	73
	18	114	98	85	74	64
	20	103	89	77	67	58
	22	93	80	69	60	52
	24	83	71	62	53	46
45 bei FLOW 50 °C RETURN 40 °C	15	155	134	115	100	87
	18	139	120	104	90	78
	20	129	111	96	84	73
	22	119	102	89	77	67
	24	108	93	81	70	61
50 bei FLOW 55 °C RETURN 45 °C	15	181	156	135	117	102
	18	165	142	123	107	93
	20	155	134	116	100	87
	22	144	125	108	94	81
	24	134	116	100	87	75
55 bei FLOW 60 °C RETURN 50 °C	15	206	178	153	134	114
	18	191	165	143	124	107
	20	181	156	135	117	102
	22	170	147	127	110	96
	24	160	138	120	104	90

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

N. reg. 7F270-F

Fast calculation for Preformed plate system UNI 16 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	81	71	63	56	50
	18	69	61	54	48	42
	20	61	53	47	42	37
	22	52	46	41	36	32
	24	44	39	35	31	27
40 bei FLOW 45 °C RETURN 35 °C	15	101	89	79	70	62
	18	89	78	69	61	55
	20	81	71	63	56	50
	22	73	64	57	50	45
	24	65	57	50	45	40
45 bei FLOW 50 °C RETURN 40 °C	15	121	107	95	84	74
	18	109	96	85	75	67
	20	101	89	79	70	62
	22	93	82	73	64	57
	24	85	75	66	59	52
50 bei FLOW 55 °C RETURN 45 °C	15	141	125	110	98	87
	18	129	114	101	89	79
	20	121	107	95	84	74
	22	113	100	88	78	69
	24	105	93	82	73	65
55 bei FLOW 60 °C RETURN 50 °C	15	161	142	125	111	98
	18	149	132	117	103	92
	20	141	125	110	98	87
	22	133	117	104	92	82
	24	125	110	98	87	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with heating pipe **FLOORTEC Aluminium composite pipe 16 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m²) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperaturere

Average pipe temperature [°C]	Raum-Temperatur [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	60	54	48	43
	18	56	51	46	41	37
	20	50	45	40	36	33
	22	43	39	35	31	28
	24	36	33	29	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	83	74	67	60	54
	18	73	65	59	53	48
	20	66	60	54	48	43
	22	60	54	48	43	39
	24	53	48	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	99	89	80	72	65
	18	89	80	72	65	59
	20	83	74	67	60	54
	22	76	68	62	55	50
	24	70	62	56	51	46
50 bei FLOW 55 °C RETURN 45 °C	15	116	104	94	84	76
	18	106	95	86	77	69
	20	99	89	80	72	65
	22	93	83	75	67	61
	24	86	77	70	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	132	119	106	96	86
	18	123	110	99	89	80
	20	116	104	94	84	76
	22	109	98	88	79	72
	24	103	92	83	75	67

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	147	127	110	96	83	72
	18	125	108	94	81	71	62
	20	111	95	83	72	62	54
	22	96	83	72	62	54	47
	24	81	70	61	53	46	40
40 bei FLOW 45 °C RETURN 35 °C	15	184	159	138	120	104	91
	18	162	140	121	105	91	80
	20	147	127	110	96	83	72
	22	133	114	99	86	75	65
	24	118	102	88	76	66	58
45 bei FLOW 50 °C RETURN 40 °C	15	221	191	165	143	125	109
	18	199	172	149	129	112	98
	20	184	159	138	120	104	91
	22	170	146	127	110	96	83
	24	155	133	116	100	87	76
50 bei FLOW 55 °C RETURN 45 °C	15	258	222	193	167	145	127
	18	236	203	176	153	133	116
	20	221	191	165	143	125	109
	22	206	178	154	134	116	101
	24	192	165	143	124	108	94
55 bei FLOW 60 °C RETURN 50 °C	15	295	254	220	191	166	145
	18	273	235	204	177	154	134
	20	258	222	193	167	145	127
	22	243	210	182	158	137	119
	24	228	197	171	148	129	112

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	106	94	83	74	66	58
	18	90	79	70	63	56	50
	20	79	70	62	55	49	44
	22	69	61	54	48	43	38
	24	58	51	46	41	36	32
40 bei FLOW 45 °C RETURN 35 °C	15	132	117	104	92	82	73
	18	116	103	91	81	72	64
	20	106	94	83	74	66	58
	22	95	84	75	66	59	53
	24	85	75	66	59	52	47
45 bei FLOW 50 °C RETURN 40 °C	15	158	140	124	111	98	88
	18	143	126	112	99	89	79
	20	132	117	104	92	82	73
	22	121	108	95	85	75	67
	24	111	98	87	77	69	61
50 bei FLOW 55 °C RETURN 45 °C	15	185	164	145	129	115	102
	18	169	150	133	118	105	93
	20	158	140	124	111	98	88
	22	148	131	116	103	92	82
	24	137	122	108	96	85	76
55 bei FLOW 60 °C RETURN 50 °C	15	211	187	166	147	131	117
	18	195	173	153	136	121	108
	20	185	164	145	129	115	102
	22	174	154	137	122	108	96
	24	164	145	129	114	102	90

General information

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

N. reg. 7F147
N. reg. 7F261

Fast calculation for Stapler system (DIN tested N. reg 7F147) • Grid mat system (DIN tested N. reg 7F261) • Stapler system

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	82	74	67	61	55	50
	18	70	63	57	52	47	42
	20	62	56	50	46	41	37
	22	53	48	44	39	36	32
	24	45	41	37	33	30	27
40 bei FLOW 45 °C RETURN 35 °C	15	103	93	84	76	69	62
	18	91	82	74	67	61	55
	20	82	74	67	61	55	50
	22	74	67	60	55	50	45
	24	66	59	54	49	44	40
45 bei FLOW 50 °C RETURN 40 °C	15	123	111	101	91	83	75
	18	111	100	91	82	74	67
	20	103	93	84	76	69	62
	22	95	85	77	70	63	57
	24	86	78	71	64	58	52
50 bei FLOW 55 °C RETURN 45 °C	15	144	130	118	106	96	87
	18	132	119	107	97	88	80
	20	123	111	101	91	83	75
	22	115	104	94	85	77	70
	24	107	97	87	79	72	65
55 bei FLOW 60 °C RETURN 50 °C	15	165	149	134	122	110	100
	18	152	137	124	112	102	92
	20	144	130	118	106	96	87
	22	136	123	111	100	91	82
	24	128	115	104	94	85	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC 30-2 FBH insulation roll with heating pipe **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	67	62	57	52	47	44
	18	57	52	48	44	40	37
	20	51	46	42	39	36	33
	22	44	40	37	34	31	28
	24	37	34	31	28	26	24
40 bei FLOW 45 °C RETURN 35 °C	15	84	77	71	65	59	55
	18	74	68	62	57	52	48
	20	67	62	57	52	47	44
	22	61	56	51	47	43	39
	24	54	49	45	41	38	35
45 bei FLOW 50 °C RETURN 40 °C	15	101	93	85	78	71	65
	18	91	83	76	70	64	59
	20	84	77	71	65	59	55
	22	77	71	65	60	55	50
	24	71	65	59	54	50	46
50 bei FLOW 55 °C RETURN 45 °C	15	118	108	99	91	83	76
	18	108	99	90	83	76	70
	20	101	93	85	78	71	65
	22	94	86	79	72	66	61
	24	88	80	73	67	62	57
55 bei FLOW 60 °C RETURN 50 °C	15	135	123	113	104	95	87
	18	125	114	105	96	88	81
	20	118	108	99	91	83	76
	22	111	102	93	85	78	72
	24	104	96	88	80	74	68

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation for the Preformed plate system UNI 17 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	143	120	101	85	72
	18	121	102	86	72	61
	20	107	90	75	64	54
	22	93	78	65	55	47
	24	79	66	55	47	39
40 bei FLOW 45 °C RETURN 35 °C	15	179	149	126	106	90
	18	157	131	111	93	79
	20	143	120	101	85	72
	22	129	108	91	76	65
	24	114	96	80	68	57
45 bei FLOW 50 °C RETURN 40 °C	15	214	179	151	127	108
	18	193	161	136	115	97
	20	179	149	126	106	90
	22	164	137	116	98	83
	24	150	126	106	89	75
50 bei FLOW 55 °C RETURN 45 °C	15	250	209	176	149	126
	18	229	191	161	136	115
	20	214	179	151	127	108
	22	200	167	141	119	101
	24	186	155	131	110	93
55 bei FLOW 60 °C RETURN 50 °C	15	286	239	201	170	144
	18	264	221	186	157	133
	20	250	209	176	149	126
	22	236	197	166	140	118
	24	221	185	156	132	111

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

General information

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm] 60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	103	89	77	67	58
	18	88	76	66	57	49
	20	77	67	58	50	44
	22	67	58	50	43	38
	24	57	49	42	37	32
40 bei FLOW 45 °C RETURN 35 °C	15	129	111	96	84	73
	18	113	98	85	74	64
	20	103	89	77	67	58
	22	93	80	69	60	52
	24	83	71	62	53	46
45 bei FLOW 50 °C RETURN 40 °C	15	155	134	116	100	87
	18	139	120	104	90	78
	20	129	111	96	84	73
	22	119	102	89	77	67
	24	108	93	81	70	61
50 bei FLOW 55 °C RETURN 45 °C	15	180	156	135	117	102
	18	165	142	123	107	93
	20	155	134	116	100	87
	22	144	125	108	94	81
	24	134	116	100	87	75
55 bei FLOW 60 °C RETURN 50 °C	15	206	178	154	134	116
	18	191	165	143	124	107
	20	180	156	135	117	102
	22	170	147	127	110	96
	24	160	138	119	104	90

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

N. reg. 7F268-F

Fast calculation for the Preformed plate system UNI 17 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	81	71	63	56	50
	18	69	61	54	48	42
	20	61	53	47	42	37
	22	52	46	41	36	32
	24	44	39	35	31	27
40 bei FLOW 45 °C RETURN 35 °C	15	101	89	79	70	62
	18	89	78	69	62	55
	20	81	71	63	56	50
	22	73	64	57	50	45
	24	65	57	50	45	40
45 bei FLOW 50 °C RETURN 40 °C	15	121	107	95	84	74
	18	109	96	85	75	67
	20	101	89	79	70	62
	22	93	82	73	64	57
	24	85	75	66	59	52
50 bei FLOW 55 °C RETURN 45 °C	15	141	125	110	98	87
	18	129	114	101	89	79
	20	121	107	95	84	74
	22	113	100	88	78	69
	24	105	93	82	73	65
55 bei FLOW 60 °C RETURN 50 °C	15	161	142	126	112	99
	18	149	132	117	103	92
	20	141	125	110	98	87
	22	133	118	104	92	82
	24	125	110	98	87	77

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC UNI 30-2 FBH Preformed Plate with **FLOORTEC Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]				
		60	120	180	240	300
35 bei FLOW 40 °C RETURN 30 °C	15	66	60	54	48	43
	18	56	51	46	41	37
	20	50	45	40	36	33
	22	43	39	35	31	28
	24	36	33	29	27	24
40 bei FLOW 45 °C RETURN 35 °C	15	83	74	67	60	54
	18	73	65	59	53	48
	20	66	60	54	48	43
	22	60	54	48	43	39
	24	53	48	43	39	35
45 bei FLOW 50 °C RETURN 40 °C	15	99	89	80	72	65
	18	89	80	72	65	59
	20	83	74	67	60	54
	22	76	68	62	55	50
	24	70	63	56	51	46
50 bei FLOW 55 °C RETURN 45 °C	15	116	104	94	84	76
	18	106	95	86	77	70
	20	99	89	80	72	65
	22	93	83	75	67	61
	24	86	77	70	63	56
55 bei FLOW 60 °C RETURN 50 °C	15	132	119	107	96	87
	18	123	110	99	89	80
	20	116	104	94	84	76
	22	109	98	88	80	72
	24	103	92	83	75	67

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation 20 x 2 mm

Floor covering: e.g. no floor covering – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,00 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	152	133	115	100	87	76
	18	129	113	98	85	74	65
	20	114	100	86	75	66	57
	22	99	87	75	65	57	50
	24	83	73	63	55	48	42
40 bei FLOW 45 °C RETURN 35 °C	15	190	167	144	126	109	95
	18	167	147	127	110	96	84
	20	152	133	115	100	87	76
	22	137	120	104	90	79	69
	24	121	107	92	80	70	61
45 bei FLOW 50 °C RETURN 40 °C	15	228	200	173	151	131	114
	18	205	180	156	136	118	103
	20	190	167	144	126	109	95
	22	175	153	132	115	101	88
	24	159	140	121	105	92	80
50 bei FLOW 55 °C RETURN 45 °C	15	266	233	202	176	153	133
	18	243	213	184	161	140	122
	20	228	200	173	151	131	114
	22	213	187	161	141	122	107
	24	197	173	150	131	114	99
55 bei FLOW 60 °C RETURN 50 °C	15	304	267	230	201	175	152
	18	281	247	213	186	162	141
	20	266	233	202	176	153	133
	22	250	220	190	166	144	126
	24	235	207	179	156	135	118

Floor covering: e.g. ceramic tile – heat output
Performance tables in accordance with ÖNORM EN 1264 for
$R_{\lambda,B}$ = **0,05 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:

- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	108	97	86	77	68	61
	18	92	82	73	65	58	52
	20	81	72	65	58	51	46
	22	70	63	56	50	44	40
	24	60	53	47	42	38	34
40 bei FLOW 45 °C RETURN 35 °C	15	136	121	108	96	86	76
	18	119	106	95	84	75	67
	20	108	97	86	77	68	61
	22	98	87	78	69	62	55
	24	87	77	69	61	55	49
45 bei FLOW 50 °C RETURN 40 °C	15	163	145	129	115	103	92
	18	146	130	116	104	92	82
	20	136	121	108	96	86	76
	22	125	111	99	88	79	70
	24	114	101	91	81	72	64
50 bei FLOW 55 °C RETURN 45 °C	15	190	169	151	134	120	107
	18	173	155	138	123	109	98
	20	163	145	129	115	103	92
	22	152	135	121	108	96	85
	24	141	126	112	100	89	79
55 bei FLOW 60 °C RETURN 50 °C	15	217	193	172	154	137	122
	18	201	179	159	142	127	113
	20	190	169	151	134	120	107
	22	179	159	142	127	113	101
	24	168	150	134	119	106	95

General information

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

Fast calculation 20 x 2 mm

Floor covering: e.g. carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,10 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	84	76	69	63	57	52
	18	71	65	59	54	49	44
	20	63	57	52	47	43	39
	22	55	50	45	41	37	34
	24	46	42	38	35	31	28
40 bei FLOW 45 °C RETURN 35 °C	15	105	96	87	79	72	65
	18	92	84	76	69	63	57
	20	84	76	69	63	57	52
	22	76	69	62	57	51	47
	24	67	61	56	50	46	41
45 bei FLOW 50 °C RETURN 40 °C	15	126	115	104	95	86	78
	18	113	103	94	85	77	70
	20	105	96	87	79	72	65
	22	97	88	80	72	66	60
	24	88	80	73	66	60	54
50 bei FLOW 55 °C RETURN 45 °C	15	147	134	121	110	100	91
	18	134	122	111	101	92	83
	20	126	115	104	95	86	78
	22	118	107	97	88	80	73
	24	109	99	90	82	74	67
55 bei FLOW 60 °C RETURN 50 °C	15	168	153	139	126	114	104
	18	155	141	128	117	106	96
	20	147	134	121	110	100	91
	22	139	126	115	104	94	85
	24	130	118	108	98	89	80

Floor covering: e.g. parquet, thick carpet – heat output
Performance tables in accordance with ÖNORM EN 1264 for $R_{\lambda,B}$ = **0,15 m² K/W**

- FLOORTEC Stapler system with FLOORTEC **Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm**
- Rapid laying (only in order to determine approximate positioning)
- Performance table (W/m2) to be used when compiling offers and tenders
- Valid for a screeded layer of 45 mm above the heating pipes.

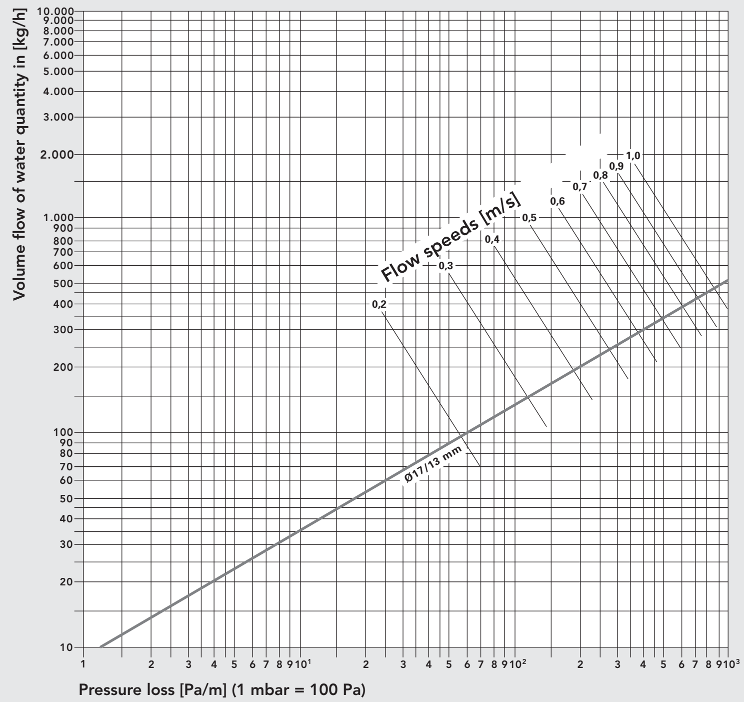
Maximum permitted floor temperatures:
- 29 °C in living areas at a room temperature of 20 °C
- 33 °C in bathrooms at a room temperature of 24 °C
- 35 °C in peripheral zones at a room temperature of 20 °C
- In exceptional cases, 35 °C is also permitted in areas such as swimming pool buildings with an increased room temperature

Average pipe temperature [°C]	Room temperature [°C]	Heat flow density q [W/m²] – Tube spacing of heating pipes [mm]					
		50	100	150	200	250	300
35 bei FLOW 40 °C RETURN 30 °C	15	69	63	58	53	49	45
	18	58	54	49	45	42	38
	20	51	47	44	40	37	34
	22	45	41	38	35	32	29
	24	38	35	32	29	27	25
40 bei FLOW 45 °C RETURN 35 °C	15	86	79	73	67	61	57
	18	75	69	64	59	54	50
	20	69	63	58	53	49	45
	22	62	57	52	48	44	41
	24	55	50	46	43	39	36
45 bei FLOW 50 °C RETURN 40 °C	15	103	95	87	80	74	68
	18	93	85	78	72	66	61
	20	86	79	73	67	61	57
	22	79	72	67	61	56	52
	24	72	66	61	56	51	47
50 bei FLOW 55 °C RETURN 45 °C	15	120	110	102	93	86	79
	18	110	101	93	85	78	72
	20	103	95	87	80	74	68
	22	96	88	81	75	69	63
	24	89	82	75	69	64	59
55 bei FLOW 60 °C RETURN 50 °C	15	137	126	116	107	98	90
	18	127	117	107	99	91	84
	20	120	110	102	93	86	79
	22	113	104	96	88	81	75
	24	106	98	90	83	76	70

Important note when using the Fast calculation:
The specific heat output q/m² and the floor covering must be known. This pre-calculation can only be carried out for one specific, predetermined flow temperature. Once the required flow temperature has been selected, only the relevant horizontal temperature block will apply. The desired heat flow density (q/m²), the desired room temperature and the desired floor covering can be used in order to determine the laying pattern of the underfloor heating.

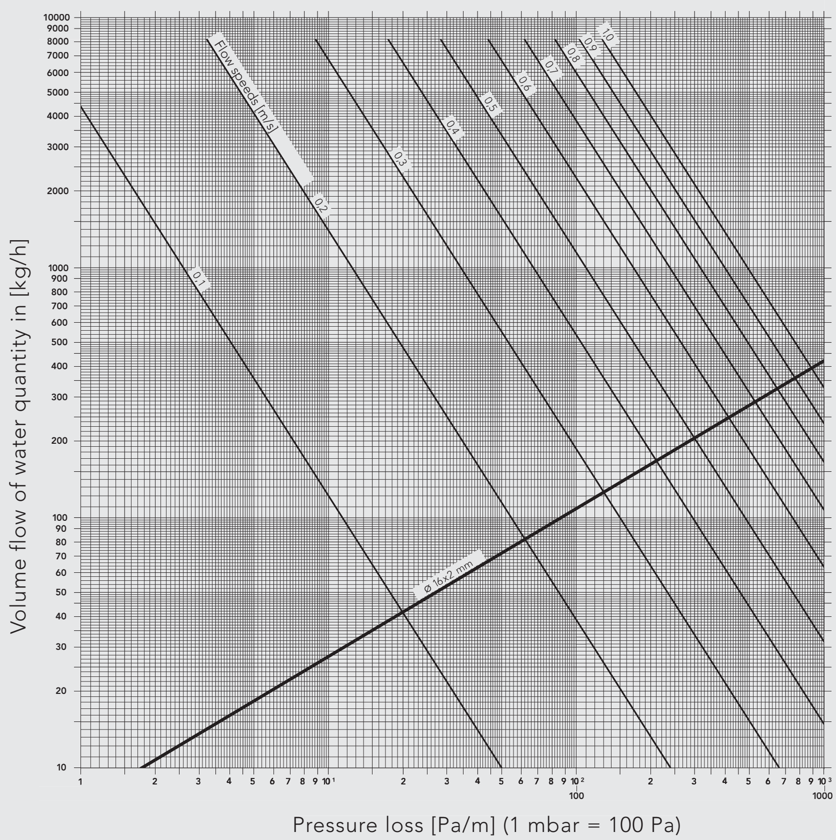
Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm and aluminium composite pipe 16 x 2 mm

Pressure loss Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm



General information

Pressure loss in heating pipe - aluminium composite 16 x 2 mm



DIN Geprüft N. reg. 7F147
N. reg. 7F261

Stapler system , Grid mat system, Stapler system and Pe-xcellent 5 underfloor heating pipe 17 x 2 mm

Room temperature		15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	68	61	54	48	43	53	47	42	37	33	43	38	34	30	27	32	29	25	23	20	20	18	16	14	12
	Surface temperature [°C]	21,4	20,7	20,1	19,6	19,1	23,1	22,6	22,1	21,7	21,3	24,2	23,8	23,4	23,0	22,7	25,2	24,9	24,6	24,3	24,1	26,1	25,8	25,7	25,5	25,3
35 °C (40/30)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	93	82	73	65	58	78	69	62	55	49	68	61	54	48	43	58	52	46	41	36	48	43	38	34	30
	Surface temperature [°C]	23,4	22,5	21,8	21,1	20,5	25,2	24,4	23,8	23,2	22,7	26,4	25,7	25,1	24,6	24,1	27,5	26,9	26,4	26,0	25,6	28,6	28,2	27,7	27,4	27,0
40 °C (45/35)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	117	104	92	82	73	102	91	81	72	64	93	82	73	65	58	83	74	65	58	52	73	65	58	51	46
	Surface temperature [°C]	25,4	24,3	23,3	22,5	21,7	27,2	26,2	25,4	24,6	24,0	28,4	27,5	26,8	26,1	25,5	**29,6**	28,8	28,1	27,5	26,9	**30,8**	**30,1**	**29,5**	28,9	28,4
45 °C (50/40)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	141	125	111	98	88	127	112	100	88	79	117	104	92	82	73	107	95	84	75	67	98	87	77	68	61
	Surface temperature [°C]	27,3	26,0	24,9	23,9	23,0	**29,1**	28,0	27,0	26,0	25,2	**30,4**	**29,3**	28,3	27,5	26,7	**31,6**	**30,6**	**29,7**	28,9	28,2	**32,8**	**31,9**	**31,1**	**30,4**	**29,7**
50 °C (55/45)	Inter-pipe spacing [cm]	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30	10	15	20	25	30
	Pipe length m/m2 [m]	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3	9,7	6,4	4,9	3,7	3,3
	Maximum size of loop [m²]	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42	14	21	28	37	42
	Water quantity inside heating pipe [l/m²]	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44	1,29	0,85	0,65	0,49	0,44
	Heat output W/m2 [W]	165	146	130	115	103	150	133	118	105	94	141	125	111	98	88	131	116	103	92	82	122	108	96	85	76
	Surface temperature [°C]	**29,2**	27,7	26,4	25,2	24,2	**31,0**	**29,7**	28,5	27,4	26,5	**32,3**	**31,0**	**29,9**	28,9	28,0	**33,5**	**32,3**	**31,3**	**30,3**	**29,5**	**34,8**	**33,6**	**32,7**	**31,8**	**31,0**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

Preformed plate system UNI – Pe-xcellent 5 underfloor heating pipe 14 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	79	68	58	50	43	62	53	45	39	34	50	43	37	31	27	37	32	27	24	20	23	20	17	14	12
	Surface temperature [°C]	22,3	21,3	20,5	19,8	19,2	23,8	23,0	22,4	21,8	21,3	24,8	24,1	23,6	23,1	22,7	25,7	25,2	24,8	24,4	24,1	26,4	26,0	25,8	25,5	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	107	92	79	68	58	90	77	66	57	49	79	68	58	50	43	68	58	50	43	37	56	48	41	35	30
	Surface temperature [°C]	24,6	23,3	22,2	21,3	20,5	26,2	25,1	24,2	23,4	22,7	27,3	26,3	25,5	24,8	24,2	28,3	27,5	26,8	26,1	25,6	**29,3**	28,6	28,0	27,5	27,0
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	135	115	99	85	74	119	101	87	75	64	107	92	79	68	58	96	82	70	61	52	85	72	62	53	46
	Surface temperature [°C]	26,8	25,3	23,9	22,8	21,8	28,5	27,1	25,9	24,9	24,0	**29,6**	28,3	27,2	26,3	25,5	**30,7**	**29,5**	28,5	27,7	27,0	**31,7**	**30,7**	**29,8**	**29,1**	28,4
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	169	139	119	102	89	146	125	107	92	80	135	115	99	85	74	124	106	91	78	67	113	96	83	71	61
	Surface temperature [°C]	29,0	27,1	25,6	24,2	23,1	**30,7**	29,0	27,6	26,4	25,3	**31,8**	**30,3**	28,9	27,8	26,8	**33,0**	**31,5**	**30,3**	**29,2**	28,3	**34,1**	**32,7**	**31,6**	**30,6**	**29,8**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35	7	14	21	28	35
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	191	163	140	120	104	174	149	128	110	95	163	139	119	103	89	152	130	111	96	83	141	120	103	89	77
	Surface temperature [°C]	**31,2**	29,0	27,2	25,6	24,3	**32,9**	**30,9**	**29,2**	27,8	26,6	**34,0**	**32,1**	**30,6**	**29,2**	28,1	**35,2**	**33,4**	**31,9**	**30,6**	**29,6**	**36,3**	**34,6**	**33,3**	**32,1**	**31,1**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

Geprüft N. reg. 7F268-F

Preformed plate system UNI, Aluminium composite pipe 16 x 2 mm

Flow/return	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]	80	69	60	52	45	63	54	47	41	35	51	44	38	33	28	38	33	29	25	21	23	20	17	15	13
	Surface temperature [°C]	22,4	21,5	20,7	20,0	19,4	23,9	23,2	22,5	22,0	21,5	24,9	24,3	23,7	23,3	22,9	25,7	25,3	24,9	24,5	24,2	26,4	26,1	25,8	25,6	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]	109	94	82	71	61	92	80	69	60	52	80	70	60	52	45	69	59	51	45	39	57	49	43	37	32
	Surface temperature [°C]	24,7	23,5	22,5	21,6	20,8	26,3	25,3	24,4	23,6	22,9	27,4	26,5	25,7	25,0	24,4	28,4	27,6	26,9	26,3	25,8	**29,4**	28,7	28,1	27,6	27,2
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]	137	119	103	89	77	120	104	90	78	68	109	94	82	71	61	98	84	73	63	55	86	75	65	56	48
	Surface temperature [°C]	27,0	25,5	24,2	23,1	22,1	28,7	27,3	26,2	25,2	24,3	**29,7**	28,5	27,5	26,6	25,8	**30,8**	**29,7**	28,8	27,9	27,2	**31,9**	**30,9**	**30,0**	**29,3**	28,6
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]	165	143	124	107	93	149	129	111	96	83	137	119	103	89	77	126	109	94	82	71	115	99	86	74	64
	Surface temperature [°C]	**29,2**	27,5	25,9	24,6	23,4	**30,9**	**29,3**	27,9	26,7	25,6	**32,0**	**30,5**	**29,2**	28,1	27,1	**33,1**	**31,7**	**30,5**	**29,5**	28,6	**34,2**	**32,9**	**31,8**	**30,9**	**30,0**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]	193	167	145	125	109	177	153	132	115	99	166	143	124	107	93	154	133	116	100	87	143	124	107	93	80
	Surface temperature [°C]	**31,4**	**29,4**	27,6	26,1	24,7	**33,1**	**31,2**	**29,6**	28,2	26,9	**34,2**	**32,5**	**30,9**	**29,6**	28,4	**35,3**	**33,7**	**32,3**	**31,0**	**29,9**	**34,9**	**33,6**	**32,4**	**31,4**	

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

N. reg. 7F268-F

General information

Preformed plate system UNI, Pe-Xcellent 5 underfloor heating pipe 17 x 2 mm

	Room temperature	15 °C					18 °C					20 °C					22 °C					24 °C				
30 °C (35/25)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	80	69	60	51	45	62	54	47	40	35	50	44	38	32	28	38	33	28	24	21	23	20	17	15	13
	Surface temperature [°C]	22,3	21,4	20,6	19,9	19,3	23,9	23,1	22,5	21,9	21,4	24,8	24,2	23,7	23,2	22,8	25,7	25,2	24,8	24,5	24,2	26,4	26,1	25,8	25,6	25,4
35 °C (40/30)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	109	94	81	70	60	91	79	68	59	51	80	69	60	51	45	68	59	51	44	38	57	49	42	36	31
	Surface temperature [°C]	24,7	23,5	22,4	21,5	20,7	26,3	25,2	24,3	23,6	22,9	27,3	26,4	25,6	24,9	24,3	28,4	27,6	26,9	26,3	25,7	**29,4**	28,7	28,1	27,6	27,1
40 °C (45/35)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	137	118	102	88	76	120	103	89	77	67	109	94	81	70	60	97	84	72	63	54	86	74	64	55	48
	Surface temperature [°C]	27,0	25,4	24,1	23,0	22,0	28,6	27,3	26,1	25,1	24,2	**29,7**	28,5	27,4	26,5	25,7	**30,8**	**29,7**	28,7	27,9	27,1	**31,8**	**30,8**	**30,0**	**29,2**	28,6
45 °C (50/40)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	165	142	123	106	92	148	127	110	95	82	137	118	102	88	76	125	108	93	81	70	114	98	85	73	64
	Surface temperature [°C]	**29,2**	27,4	25,8	24,5	23,3	**30,8**	**29,2**	27,8	26,6	25,5	**32,0**	**30,4**	**29,1**	28,0	27,0	**33,1**	**31,7**	**30,5**	**29,4**	28,5	**34,1**	**32,9**	**31,8**	**30,8**	**30,0**
50 °C (55/45)	Inter-pipe spacing [cm]	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Pipe length m/m2 [m]	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4	16,7	8,3	5,5	4,2	3,4
	Maximum size of loop [m²]	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41	8	16	25	33	41
	Water quantity inside heating pipe [l/m²]	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27	1,32	0,66	0,43	0,33	0,27
	Heat output W/m2 [W]]	192,6	166	143	124	107	176	152	131	113	98	165	142	123	106	92	154	132	114	99	85	142	123	106	92	79
	Surface temperature [°C]	**31,3**	**29,3**	27,5	25,9	24,6	**33,0**	**31,1**	**29,5**	28,1	26,8	**34,2**	**32,4**	**30,8**	**29,5**	28,3	**35,3**	**33,6**	**32,2**	**30,9**	**29,8**	**36,4**	**34,8**	**33,5**	**32,3**	**31,3**

Surface temperatures printed in bold do NOT comply with ÖNORM EN 1264!

DIN Geprüft **N. reg. 7F403-F**

Dry screed panels – 20 mm Fermacell

- FLOORTEC Aluminium composite heating pipe 16 x 2 mm
- **Fermacell 2E22 20 mm**

Average pipe temperature	Room temperature	Floor finish $R_{\lambda,B}$ Tiles/stone 0,00		Parquet, laminate, artificial fibres 0,05		Carpet 0,10		Velour, parquet, wooden floorboards 0,15	
		VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm	VA = 125 mm	VA = 250 mm
°C	°C	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²	W/m²
30	15	79	60	60	48	49	40	41	35
	18	63	48	48	39	39	32	33	28
	20	52	40	40	32	33	27	27	23
	22	42	32	32	26	26	22	22	19
	24	31	24	24	19	20	16	16	14
	26	21	16	16	13	13	11	11	9
35	15	105	80	81	65	65	54	55	46
	18	89	68	68	55	56	46	47	39
	20	79	60	60	48	49	40	41	35
	22	68	52	52	42	42	35	36	30
	24	58	44	44	36	36	30	30	25
	26	47	36	36	29	29	24	25	21
40	15	131	101	101	81	82	67	69	58
	18	115	89	89	71	72	59	60	51
	20	105	80	81	65	65	54	55	46
	22	94	72	72	58	59	49	49	42
	24	84	64	64	52	52	43	44	37
	26	73	56	56	45	46	38	38	32
45	15	157	121	121	97	98	81	82	70
	18	142	109	109	87	88	73	74	63
	20	131	101	101	81	82	67	69	58
	22	121	93	93	74	75	62	63	53
	24	110	85	85	68	69	57	58	49
	26	100	76	76	61	62	51	52	44
50	15	184	141	141	113	114	94	96	81
	18	168	129	129	103	104	86	88	74
	20	157	121	121	97	98	81	82	70
	22	147	113	113	90	91	76	77	65
	24	136	105	105	84	85	70	71	60
	26	126	97	97	78	78	65	66	56
55	15	210	161	161	129	131	108	110	93
	18	194	149	149	120	121	100	102	86
	20	184	141	141	113	114	94	96	81
	22	173	133	133	107	108	89	91	76
	24	163	125	125	100	101	84	85	72
	26	152	117	117	94	95	78	80	67

Maximum surface temperature in living areas 29°C, in peripheral zones 35 °C and in bathrooms 33 °C

Heat output in accordance with DIN EN 1264

STRONGBOARD FL

- FLOORTEC Aluminium composite heating pipe 16 x 2 mm
- **STRONGBOARD FL**

General information

Average pipe temperature	Room temperature	Floor finish $R_{\lambda,B}$															
		Tiles 0,00				Tiles 0,015				Tiles 0,05				Parquet 15 mm, wooden floorboards 20 mm 0,15			
		VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature	VA = 125 mm	Surface temperature	VA = 250 mm	Surface temperature
°C	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C	W/m²	°C
30	15	100,6	24,0	75,6	22,0	89,9	23,2	69,1	21,4	63,5	21,0	49,9	19,8	45,5	19,4	36,2	18,6
	18	80,1	25,3	60,2	23,7	71,5	24,6	55,0	23,2	50,5	22,8	39,7	21,9	36,2	21,6	28,8	20,9
	20	66,3	26,2	49,8	24,8	59,2	25,6	45,5	24,4	41,8	24,1	32,9	23,3	30,0	23,0	23,9	22,4
	22	52,3	27,0	39,4	25,9	46,8	26,5	36,0	25,6	33,0	25,3	26,0	24,6	23,7	24,4	18,9	24,0
	24	38,1	27,7	28,7	26,9	34,1	27,4	26,2	26,7	24,1	26,5	18,9	26,0	17,2	25,8	13,7	25,5
35	15	134,7	15,0	101,3	24,1	120,4	25,6	92,6	23,4	85,0	22,8	66,8	21,2	60,9	20,7	48,5	19,7
	18	114,3	28,2	85,9	25,8	102,1	27,2	78,5	25,2	72,1	24,7	56,7	23,4	51,6	22,9	41,2	22,0
	20	100,6	29,0	75,6	27,0	89,9	28,2	69,1	26,4	63,5	26,0	49,9	24,8	45,5	24,4	36,2	23,6
	22	86,9	29,9	65,3	28,1	77,7	29,2	59,7	27,6	54,8	27,2	43,1	26,2	39,3	25,8	31,3	25,1
	24	73,2	30,8	55,0	29,2	65,4	30,1	50,3	28,8	46,1	28,5	36,3	27,6	33,1	27,3	26,4	26,7
40	15	168,7	29,5	126,8	26,2	150,7	28,1	115,9	25,3	106,4	24,5	83,7	22,7	76,2	22,0	60,8	20,7
	18	148,3	30,9	111,5	27,9	132,5	29,6	101,9	27,2	93,5	26,5	73,6	24,8	67,0	24,3	53,4	23,1
	20	134,7	31,8	101,3	29,1	120,4	30,6	92,6	28,4	85,0	27,8	66,8	26,2	60,9	25,7	48,5	24,7
	22	121,1	32,7	91,0	30,3	108,2	31,7	83,2	29,6	76,4	29,0	60,1	27,7	54,7	27,2	43,6	26,2
	24	107,4	33,6	80,8	31,4	96,0	32,7	73,8	30,8	67,8	30,3	53,3	29,1	48,6	28,7	38,7	27,8
45	15	202,6	32,1	152,3	28,2	181,1	30,4	139,3	27,2	127,8	26,2	100,6	24,0	91,6	23,3	73,0	21,8
	18	182,3	33,5	137,0	30,0	162,9	32,0	125,3	29,0	115,0	28,2	90,5	26,2	82,4	25,5	65,7	24,1
	20	168,7	34,5	126,8	31,2	150,7	33,1	115,9	30,3	106,4	29,5	83,7	27,7	76,2	27,0	60,8	25,7
	22	155,1	35,4	116,6	32,3	138,6	34,1	106,6	31,5	97,8	30,8	77,0	29,1	70,1	28,5	55,9	27,3
	24	141,5	36,3	106,4	33,5	126,4	35,1	97,2	32,8	89,2	32,1	70,2	30,5	64,0	30,0	51,0	28,9
50	15	236,5	34,7	177,8	30,2	211,4	32,8	162,6	29,0	149,2	27,9	117,4	25,4	106,9	24,6	85,2	22,8
	18	216,2	36,1	162,5	32,0	193,2	34,4	148,6	30,9	136,4	29,9	107,3	27,6	97,7	26,8	77,9	25,2
	20	202,6	37,1	152,3	33,2	181,1	35,4	139,3	32,2	127,8	31,2	100,6	29,0	91,6	28,3	73,0	26,8
	22	189,1	38,1	142,1	34,4	168,9	36,5	129,9	33,4	119,2	32,6	93,8	30,5	85,5	29,8	68,1	28,3
	24	175,5	39,0	131,9	35,6	156,8	37,5	120,6	34,7	110,7	33,9	87,1	31,9	79,3	31,3	63,2	29,9
55	15	270,4	37,2	203,3	32,2	241,7	35,1	185,9	30,8	170,6	29,6	134,2	26,8	122,2	25,8	97,4	23,8
	18	250,1	38,7	188,0	34,0	223,5	36,7	171,9	32,7	157,7	31,6	124,1	29,0	113,0	28,1	90,1	26,2
	20	236,5	39,7	177,8	35,2	211,4	37,8	162,6	34,0	149,2	32,9	117,4	30,4	106,9	29,6	85,2	27,8
	22	223,0	40,7	167,6	36,4	199,3	38,8	153,3	35,3	140,6	34,3	110,7	31,9	100,8	31,1	80,3	29,4
	24	209,4	41,6	157,4	37,6	187,1	39,9	143,9	36,5	132,1	35,6	103,9	33,3	94,7	32,6	75,4	31,0

Maximum surface temperature in living areas 29°C, in peripheral zones 35 °C and in bathrooms 33 °C

Heat output in accordance with DIN EN 1264

Preformed plate system UNI

Preformed plate

Screed emulsion

Pe-Xcellent 5
Underfloor heating pipe

Edge
insulation strips

Guarantee statements available at **www.vogelundnoot.at/garantieerklaerungen**

Description / Applications

Fig. 1: Laying of Pe-Xcellent 5 underfloor heating pipe

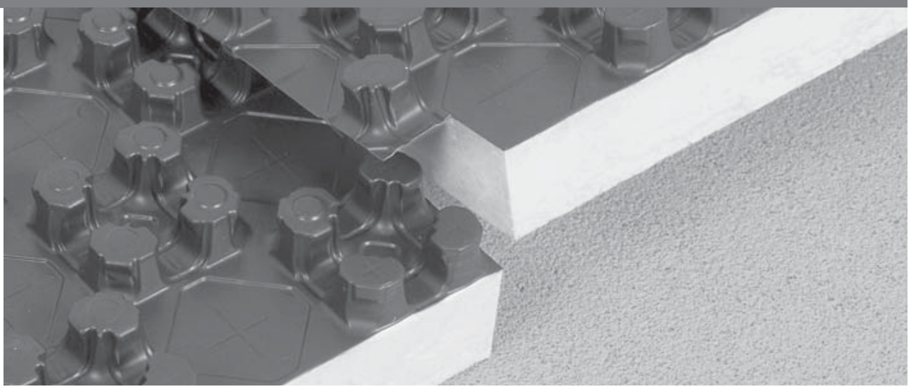


Fig. 4: Method for the linking of preformed plates together

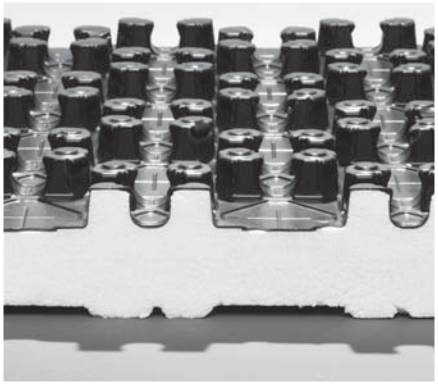


Fig. 2: Preformed plate – 30-2 mm

Fig. 3: Preformed plate – 11 mm

Off-cuts

A carefully-conceived overlapping method means that the preformed sheets can be laid in a way that off-cuts are unlikely to occur. (Fig. 4)

Preformed plate system

A PST preformed plate measuring 0.84 m wide and 1.44 m long provides highly-effective thermal and impact noise insulation. The 30-2 preformed plate (fig. 2) reduces impact noise by 28 dB. Another product in the range is the Preformed Plate 11 (Fig. 3), which is used in situations involving high traffic loads (of up to 75 kN/m^2).

Simply use your foot to press the flexible easy-to-lay 14-17mm system pipe into the walk-proof raised pipe-retaining burls.

Edge insulation strips

The edge insulation strip is deployed against walls, columns and doorframes. This ensures that the requirements of the DIN 18560 standard are met, by preventing the screed from coming into contact with the static elements and therefore forming a sound-bridge. It also provides a rapid and clean seal with the insulating layers on the floor. The fitting time will depend upon the size of the room involved.

Noise insulation properties

The impact noise insulation roll complies with the DIN 4109 standard "Sound insulation in buildings" and, depending on the version, provides a significant improvement in audible impact noise.

Fire protection properties in accordance with DIN 4102

FLOORTEC Impact noise insulation roll: building material class B2.

Protection against moisture

The film covering on the upper size of each element provides optimum protection against moisture and complies with the DIN 18560 standard.

In accordance with our high quality standards, all FLOORTEC products comply with the relevant quality, DIN and manufacturing standards.

Useful accessories

- Settlement joints made simple – using the rounded profile and the settlement joint strip (Fig. 1). Simply press in the rounded profile at the location where the settlement joint is to be created, pull off the adhesive strip from the settlement joint strip and stick it onto the rounded profile. This is a quick and clean way to create a separation between two areas of screed.

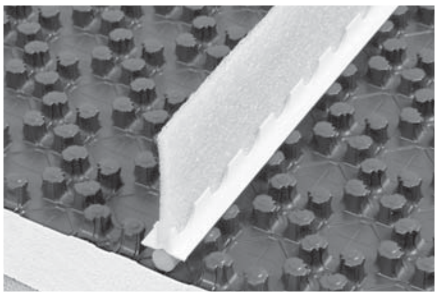
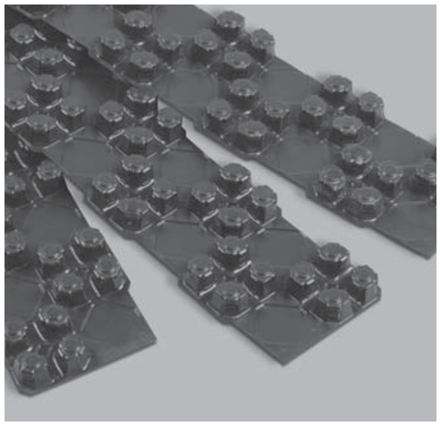


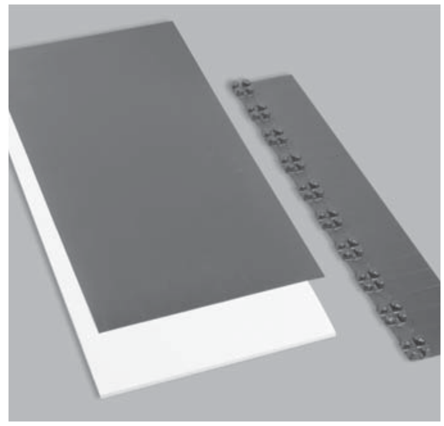
Fig. 1: Rounded profile with settlement joint strip

- The flow and return pipes in the vicinity of the settlement joint, fitted with the joint protection sheath (Fig. 2).

Multi-purpose connecting element



FLOORTEC Multiset 30-2 – the safe way for pipes to pass through door apertures, in combination with the settlement joint strip. The pipes should be fitted with the settlement joint protection sheath (Fig. 3).



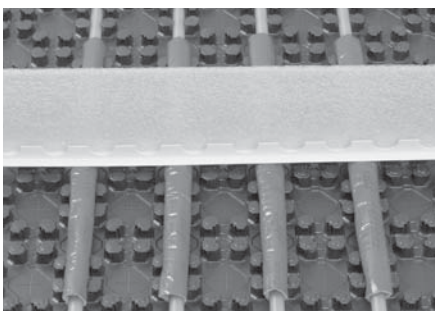


Fig. 2: Heating pipe fitted with joint protection sheath

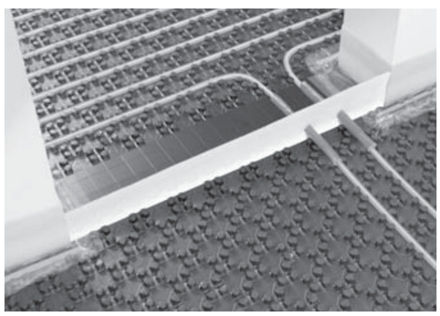
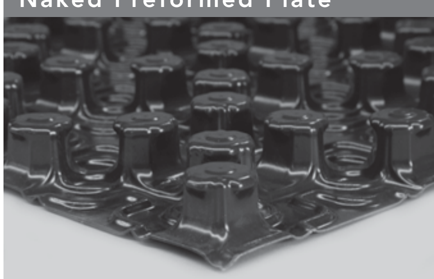


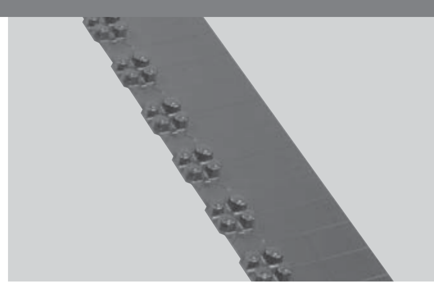
Fig. 3: FLOORTEC Multiset 30-2

Fig. 4: Attach the heating pipe to the manifold and you're done!

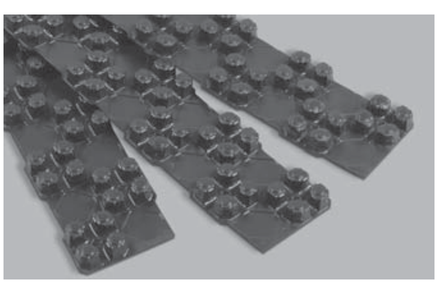
Naked Preformed Plate



Naked Preformed Plate



Doorway transition element



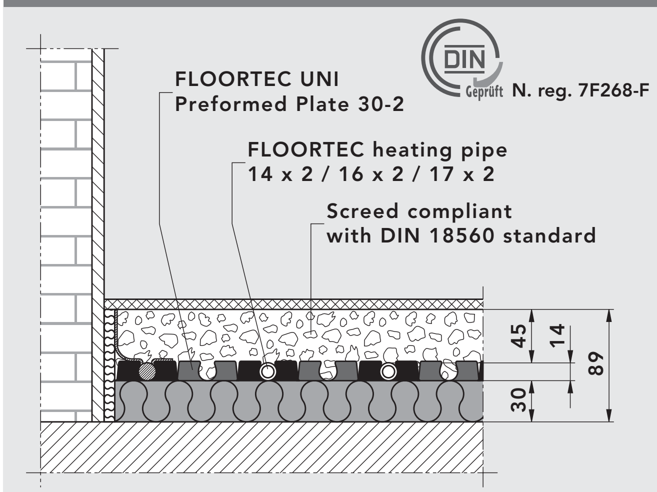
Connecting element

Retaining screw

Technical data	Naked Preformed Plate
Item no.	FBHWA014587147A0
Pipe diameter	14 - 17 mm
Useable area per plate	1,20 m²
Spacing when laid in straight runs	60 mm
Spacing when laid in a diagonal	84 mm
Dimensions of plate, including overlap	1.470 x 870 mm
Overall height of plate	20 mm
Packaging units – no. of items / per box	14
Push-button principle	yes

N. reg. 7F268-F

Floor sections



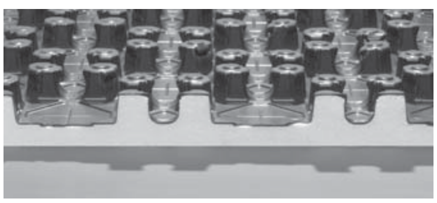
FLOORTEC Preformed plate system UNI 30-2

- Preformed Plate underfloor heating system
- DIN-tested
- Includes impact-noise insulation

FLOORTEC Preformed plate system UNI 11

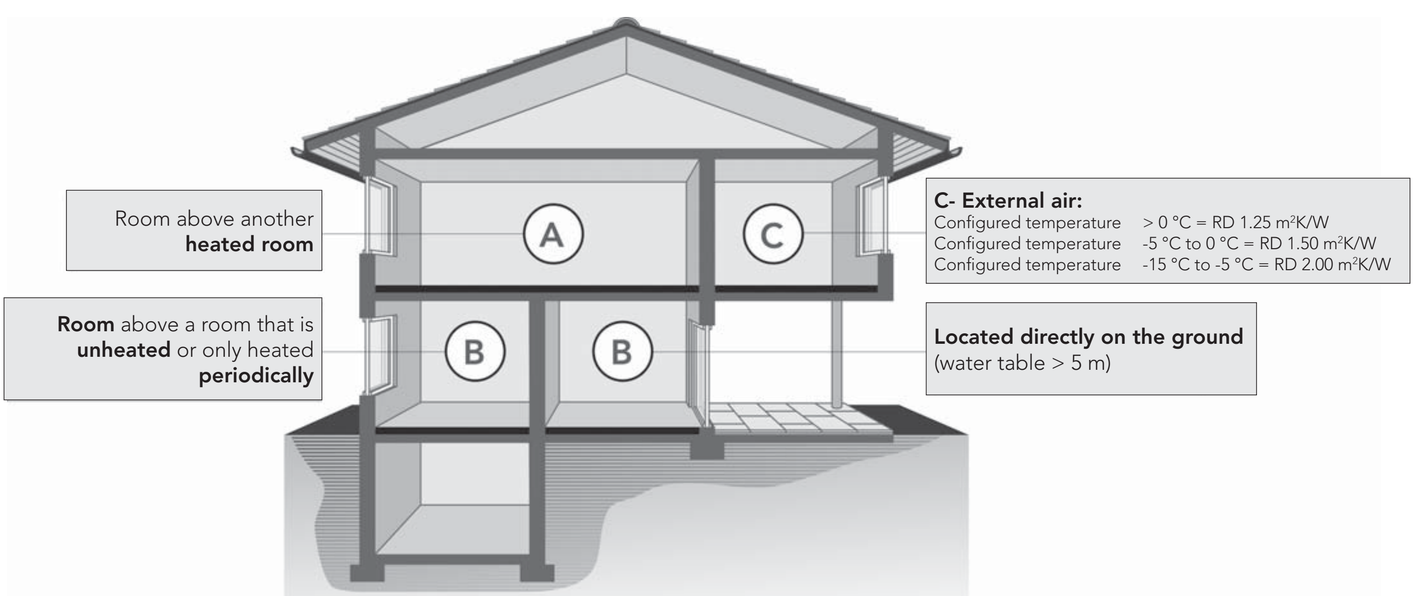
- Preformed Plate underfloor heating system
- DIN-tested

Sample construction heights for floors with high-traffic load



FLOORTEC UNI Preformed Plate 11 system	
Effective Rλ:	≥ 0,34 m² K/W
Pressure load:	75 kN/m²**

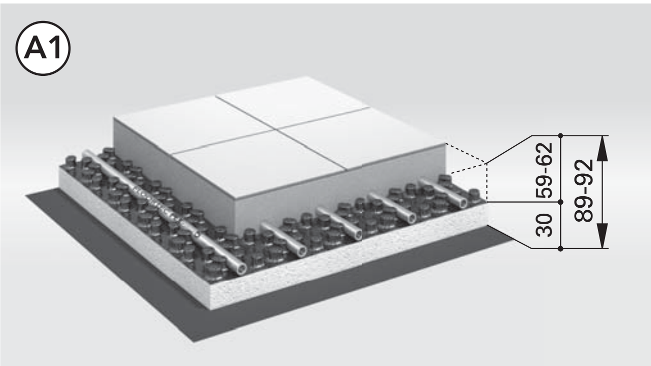
Underfloor heating compliant with ÖNORM EN 1264-4



Floor sections

Minimum construction heights in accordance with ÖNORM EN 1264-4, incorporating the EnEV

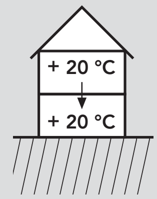
Separating floor in a residential building
above rooms used for the same purpose



FTN floor section 89-92 mm

EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 89-92

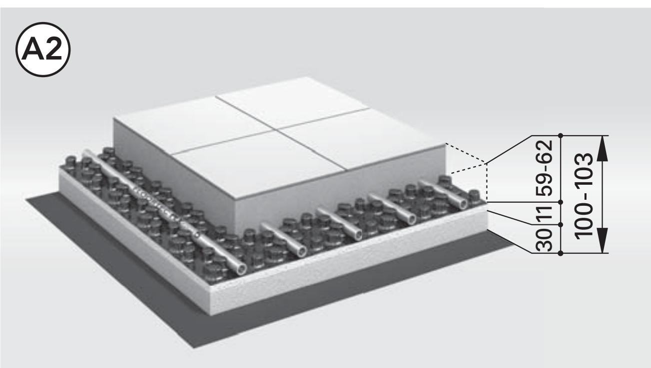
Required Rλ:	≥ 0,75 m^2 K/W
Effective $R\lambda_{insulation}$:	0,75 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5 kN/m^2**



Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0

Preformed plate system

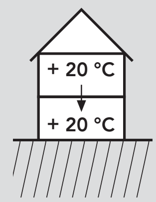
Separating floor in a residential building
above rooms used for the same purpose



FTN floor section 100-103 mm

EnEV – FLOORTEC Preformed plate system UNI 11 BH 100-103

Required Rλ:	≥ 0,75 m^2 K/W
Effective $R\lambda_{insulation}$:	0,97 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$:	0 dB*
Pressure load:	3,5 kN/m^2**



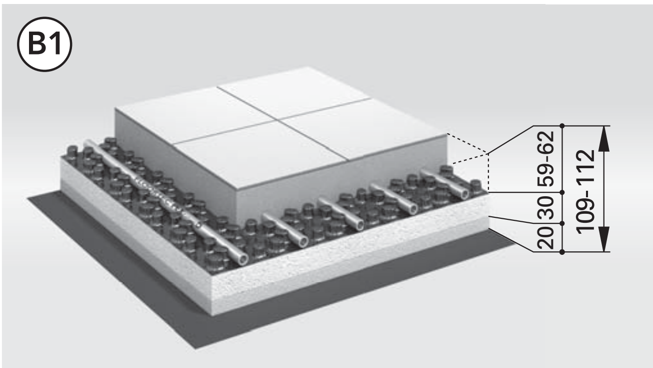
Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PTS SE 30 mm insulation (part of the building itself)

Type	Application	Use	Item number	Effective Rλinsulation m^2 K/W	Name	WLG	Total height of floor construction
A	Heated room situated below **RD = 0,75 m^2 K/W**	A1	FBHD4300084144A0	0,75	Thermal and impact-noise insulation 30-2	040	89-92 mm
		A2	FBHD1110084144A0	0,97	Thermal insulation 11	035	100 -103 mm
			Forms part of the building itself		Thermal and impact-noise insulation PST SE 30-3	045	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m^2
- **KN/m^2 for perpendicular floor service load, as set out in DIN 1055.

Floor sections

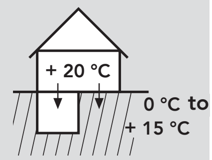
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 109-112 mm

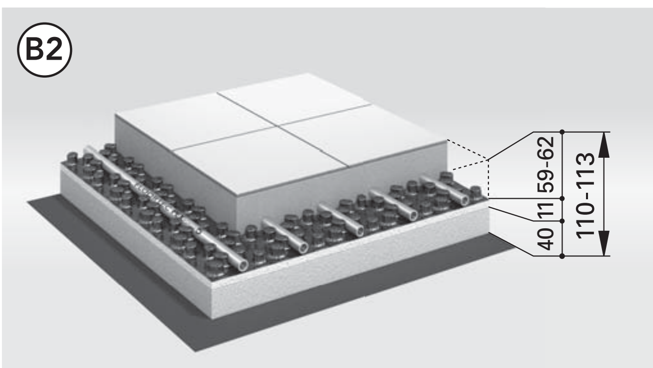
EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 109-112

Required R_λ: ≥ 1,25 m² K/W
Effective $R\lambda_{insulation}$: 1,25 m² K/W
Degree of improvement in impact-noise $L_{w,R}$: 28 dB*
Pressure load: 5,0 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0
Additional insulation PST 20 mm (part of the building itself)

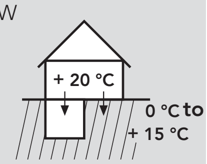
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 110-113 mm

EnEV - FLOORTEC-Noppensystem UNI 11 BH 110-113

Required $R\lambda$: ≥ 1,25 m² K/W
Effective $R\lambda_{insulation}$: 1,31 m² K/W
Degree of improvement in impact-noise $L_{w,R}$: 0 dB*
Pressure load: 5,0 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PTS SE 40 mm insulation (part of the building itself)

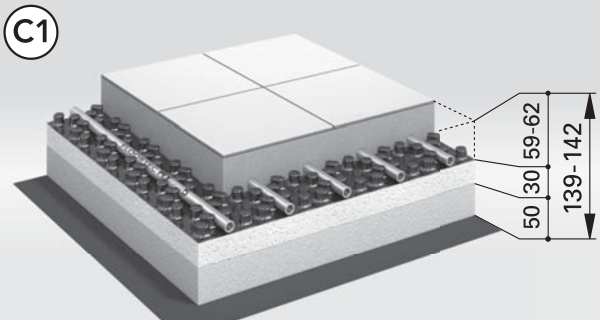
Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
B	Unheated room or room heated at intervals, situated below or directly on the ground **RD = 1,25 m² K/W**	B1	FBHD4300084144A0	1,25	Thermal and impact-noise insulation 30-2	040	109 - 112 mm
			Forms part of the building itself		Thermal and impact-noise insulation PST 20-2	040	
		B2	FBHD1110084144A0	1,31	Thermal insulation 11	035	110 - 113 mm
			Forms part of the building itself		Thermal insulation PS-SE 40 mm	040	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

Floor sections

Separating floor in a residential building
against outdoor air

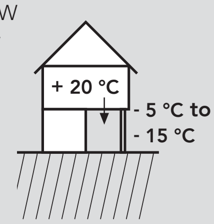
C1



FTN floor section 139-142 mm

EnEV – FLOORTEC Preformed plate system UNI 30-2 BH 139-142

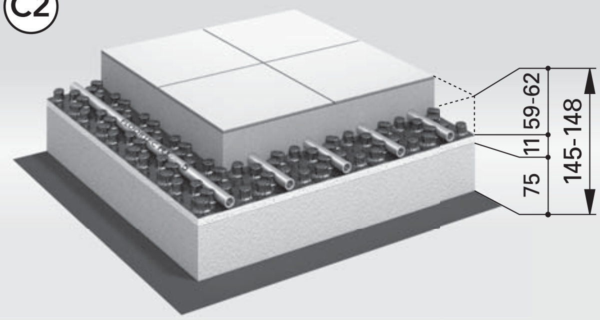
Required R_λ: ≥ 2,00 m² K/W
Effective $R\lambda_{insulation}$: 2,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$: 28 dB*
Pressure load: 5,0 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 30-2 mm FBHD4300084144A0
Additional insulation PUR 50 mm (part of the building itself)

Separating floor in a residential building
against outdoor air

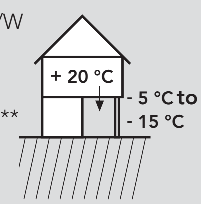
C2



FTN floor section 145-148 mm

EnEV – FLOORTEC Preformed plate system UNI 11 BH 145-148

Required R_λ: ≥ 2,00 m² K/W
Effective $R\lambda_{insulation}$: 2,18 m² K/W
Degree of improvement in impact-noise $L_{w,R}$: 0 dB*
Pressure load: 3,5 kN/m²**



Floor construction consisting of:
UNI Preformed Plate 11 mm FBHD1110084144A0
Additional PS SE 75 mm insulation (part of the building itself)

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
C	Room above external air temperature **RD = 2,00 m² K/W**	C1	FBHD4300084144A0	2,75	Thermal and impact-noise insulation 30-2	040	139-142 mm
			Forms part of the building itself		Thermal insulation PUR 50 mm	025	
		C2	FBHD1110084144A0	2,18	Thermal and impact-noise insulation 11	040	145-148 mm
					Thermal insulation PS-SE 75 mm		

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

DIN Geprüft N. reg. 7F268-F

List of materials required

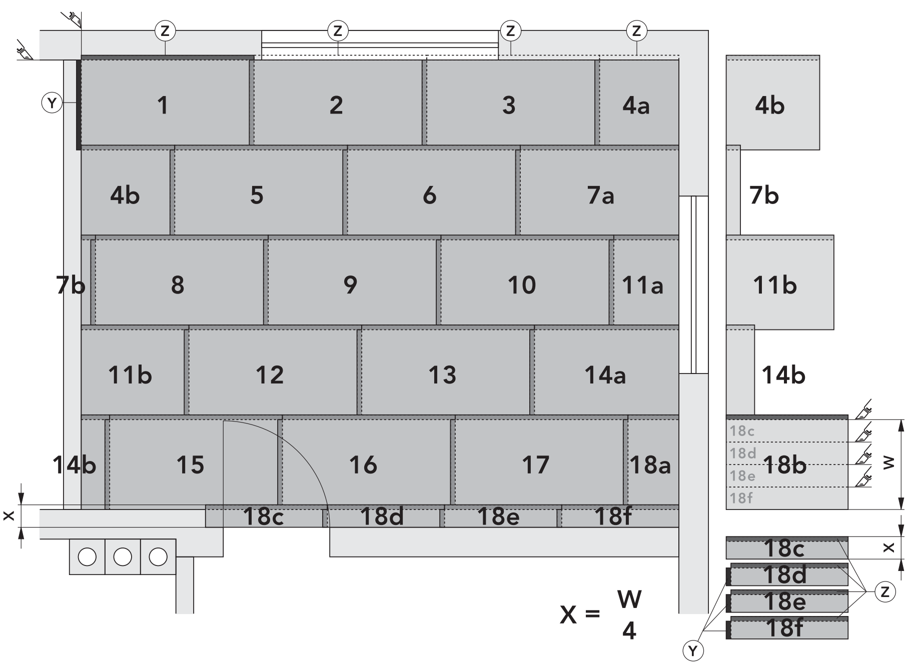
Preformed plate system UNI – Laying spacings in cm	6	12	18	24	30
Pipe with damp-proof membrane **FBCXC5C1420...A0** **FBCXC5C1720...A0** **FBBPTAC1620.....A0**	ca. 16,70 m	ca. 8,30 m	ca. 5,50 m	ca. 4,20 m	ca. 3,40 m
optionally including: FLOORTEC UNI Preformed plate **FBHD4300084144A0** **FBHD1110084144A0**	1,00 m^2 1,00 m^2	1,00 m^2 1,00 m^2	1,00 m^2 1,00 m^2	1,00 m^2 1,00 m^2	1,00 m^2 1,00 m^2
Edge insulation strips per m^2 **FBROTHEPI81600A0**	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m	ca. 1,00 m
Screed additive per m^2 **FBROTHECE20000A0**	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.	ca. 0,2 lt.

Laying of the Preformed plate system UNI

The Preformed plate system UNI is fitted in accordance with the FLOORTEC Preformed plate system UNIs installation guide. Overlapping the covering film (25 mm) creates a closed impact noise insulation layer over the entire surface, which, after the pipes have been laid, is ready for the application of the cement or self-levelling screed. Thanks to the carefully conceived cutting and overlapping technology in each system element, the number of off-cuts remains very low. The overall surface should be laid so that it is joint-free and free of voids. Any open interfaces that are necessary due to the configuration of the building itself should be sealed off before the screed is applied. The DIN 18560 standard requires that the impact-noise insulation layer must not be interrupted.

Important: Before laying the first row of UNI System Preformed plates, the **Y** and **Z** overlap (25 mm) on the UNI System Preformed Plate **1** must be cut off. Only the **Z** overlap needs to be cut-off from System Preformed Plates **2, 3** and **4a**. The **Z** overlap must also be removed from UNI System Preformed Plate **18b**, as only then can it be sub-divided into 4 equally-sized parts (**18c, 18d, 18e** and **18f**). The **Y** and **Z** overlaps must now be recreated on the plates created in this way, except in the case of plate **18c**, which only requires the **Z** overlap. This can be achieved by turning the plate around and cutting off a 25 mm-wide strip of the polystyrene foam.

Typical installation:



Installation of edge insulation strips

The first stage in the installation process is to fit the FLOORTEC edge insulation strip to all vertical building components, such as external and internal walls, columns and door frames (Figure 1), without leaving gaps.

In order to avoid heat and sound bridges from being created, it is important that none of the underfloor heating screed, plaster or joint sealant or other materials are able to penetrate into the edge joints during the installation. Only once the floor-laying process is complete should any part of the edge insulation strip that is still visible be removed.

In the case of multi-layer insulation layers, the edge insulation strip must be fitted before the uppermost insulation layer is applied. While the screed is being applied, the edge insulation strip should be secured so that is unable to change position. Due to their exposure to heat, underfloor heating screeds experience a greater expansion than unheated floor constructions. For this reason, a gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used with System Preformed Plates.

The edge insulation strip is made up of closed-cell PE-foam, with a side-bonded film apron compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid on top of the preformed plate (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges.

The rounded PE profile is also used with this in order to fix the film strip in position (Fig. 2).

Figure 1: Edge insulation strip with additional strip of film

Figure 2: Fixing the additional strip of film

Installation of System Preformed Plates

Installation is carried out across the full surface-area of the room, in accordance with the current regulations. In the case of floors between equally heated spaces and over spaces used for a different purpose, that standard is the ÖNORM EN 1264. In the case of ceilings on top of unheated spaces, on top of the ground itself or over external air, installation is carried out in accordance with EnEV.

The large-sized system elements (1.2 m2) are installed, as usual, from left to right (Figure 1). Thanks to the carefully-developed cutting and overlapping technology, there will be hardly any off-cuts. Most of the time, the next row will begin with the piece cut off at the end of the previous one.

Adjoining edges must be connected together using the FLOORTEC connecting element, in order to prevent the formation of heat and sound bridges and to prevent screed water from penetrating the gap.

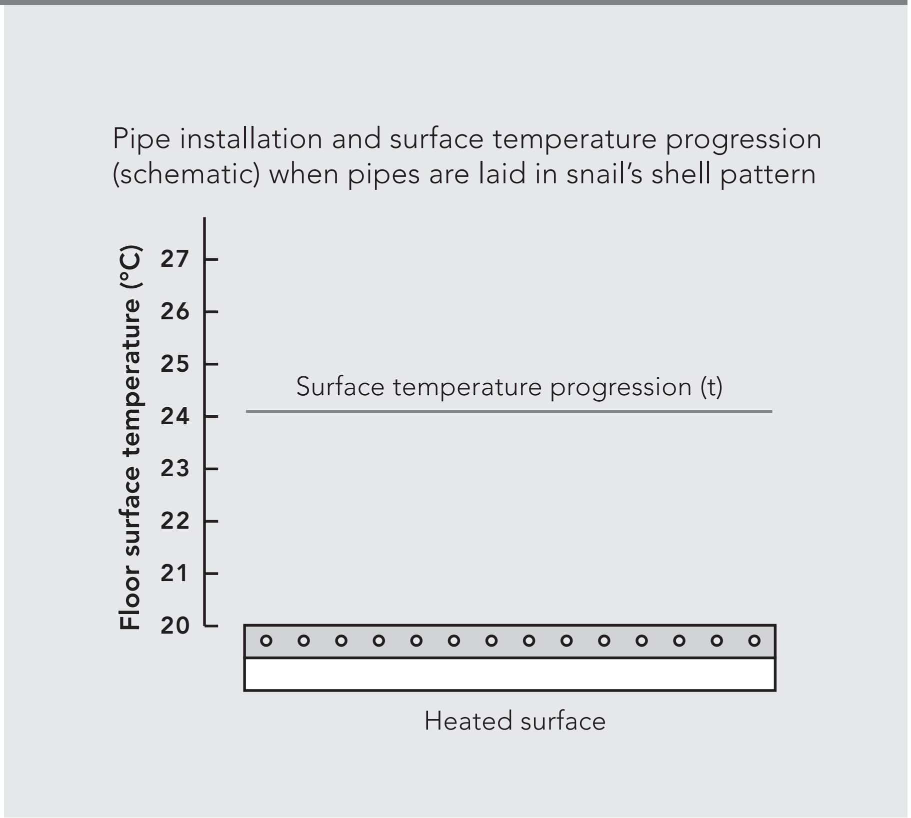
Figure 1:
Installation of system elements

N. reg. 7F268-F

Possible configurations/pipe installation

The snail's shell installation pattern (Figure 2), on the other hand, offers an even surface temperature progression, as the flow and return sections of the pipe are located alternately adjacent to one another. Once installed, the spacing between heating pipes will be between 60 and 300 mm. In living spaces, the maximum floor temperature dictates that the minimum spacing is 120 mm, whilst the spacing must also not exceed 300 mm, as this will create variations in temperature across the floor. Nowadays, the snail's shell installation pattern is preferred for the installation of underfloor heating pipes using self-levelling screeds.

In order to achieve higher heat flows, it is also possible to reduce the spacing between the pipes. This technique is often used at the edges of the room, in front of windows and external surfaces, in order to compensate for the cold radiation effect. Installers are able to choose to set up the areas at the edge of the room as a separate heating loop (Figure 4) or to integrate them into the existing heating loop (Figure 3). These are then referred to as integrated peripheral areas.



Surface temperature progression when pipes are laid in snail's shell pattern

Figure 2:
Snail's shell installation pattern

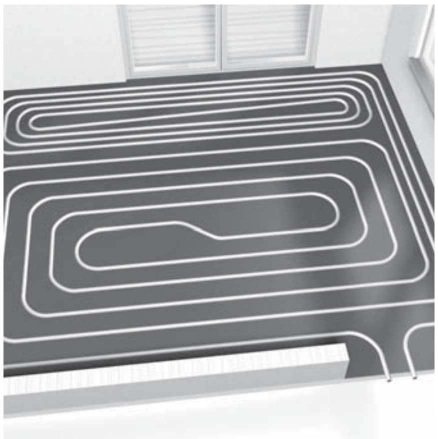


Figure 3:
Snail's shell installation pattern with integrated peripheral area

Figure 4:
Snail's shell pattern with separate peripheral area

Safety pipe

Installation of heating pipes
The installation of the heating pipes is carried out using the spacings determined in the project planning documentation.
Starting at the heating loop manifold, the heating pipe is laid onto the system elements in accordance with the specified spacing. Bend radii of below 5 x Da are not permitted. Heating loops should, if possible, be laid from a single length of pipe; joints should be avoided and if they are required, should only be located in a straight section of pipe and should be indicated on the revised plan. Heating pipes must consist of heating loops no longer than 120m (using 14 x 2 mm FLOORTEC Pe-Xcellent 5) or 140 m (using 16 x 2 mm FLOORTEC aluminium composite pipe or 17 x 2 mm FLOORTEC Pe-Xcellent 5 pipe). Protective bushings should be used whenever the heating pipes are required to pass through movement joints, walls or ceilings. The heating pipes are fixed to the FLOORTEC Preformed Plates by pressing the heating pipe down into the raised burls.

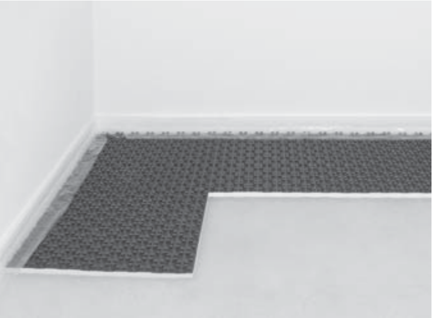
Pressure test
Once installation is complete, the system should be filled and vented. The installed system should be subjected to a pressure test lasting at least 24 hours, in accordance with ÖNORM EN 1264. The test pressure should be at least double the maximum permitted operating pressure of the heating system, or a minimum of 6 bar. The tightness and test pressure should be recorded in accordance with the tightness testing protocol. If there is a risk of frost, a frost protection compound should be added to the heating fluid.
If, in the future, a frost protection compound is no longer required in order to operate the system, it should be removed by draining the system and flushing it at least 3 times with water. While the screed is being applied, the heating loops should also be subjected to test pressure, so that any external damage is immediately noticeable. Once the pressure test is complete, all adapters on the heating loop manifold should be checked.

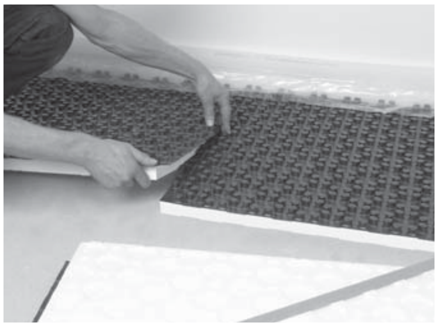
Laying the System Preformed Plate – step by step


Install the edge insulation strip with lateral film apron.

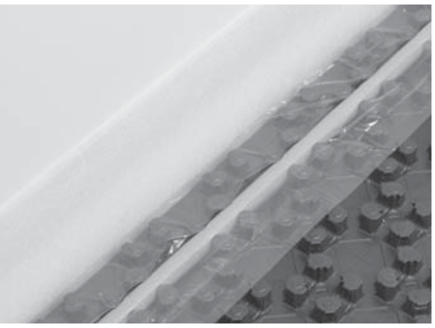

Lay the plates from left to right.


Continue laying the FLOORTEC System Preformed Plates.


Always begin the next row with the piece cut off at the end of the previous row.


The plates can be laid quickly and cleanly, using the overlapping technique.


Fix the film on the edge insulation strip with….


...the rounded PE profile.


Simply use your feet to press the flexible and easy-to-lay Pe-Xcellent 5 underfloor heating pipe (14 x 2 mm, 17 x 2 mm) or the aluminium composite pipe (16 x 2) into the walkable raised burls on the preformed plates.

Stapler system.

Guarantee statements available at **www.vogelundnoot.at/garantieerklaerungen**

Description / Area of application

An underfloor heating system is only as good as its individual components and the way in which their functions have been harmonised with one another. From a technical perspective, each FLOORTEC underfloor heating system has been conceived for the area of application concerned so as to ensure optimum integration between the components concerned, thereby guaranteeing the functional capability of the system.

All FLOORTEC underfloor heating systems can be installed by two people and no off-cuts are generated.

Heat and impact-noise insulation roll
A track of PST Styropor, 1 metre wide and 10 m long, forms a highly-effective heat and impact-noise insulation system (Figure 1). Angled cuts have been inserted into the track at regular intervals. This enables it to be coiled up into an oval shape for transportation purposes and enables the tracks to be laid quickly once on site. After installation, the cuts will close up again, forming a homogenous insulating layer.

Webbing film
A connecting film has been laminated onto the heat and impact-noise insulation roll (figure 2). The tacker cover layer made from webbing film forms the basis for a rapid, problem-free and safe installation. Installation: the Tacker installation device pushes the Tacker heating-pipe retention clips (Figures 3 and 4), which are fitted with barbs on each side, over the heating pipe and down into the insulating layer. The Tacker heating-pipe retention clips are therefore hooked into the PST and are held safely in position in the insulating layer by the webbing film. The webbing film incorporates a high degree of protection to prevent the clips from being torn out, thereby ensuring that the underfloor heating pipe is held firmly in place at all times.

A lined grid has been printed on onto the upper side of the webbing film, in order to ensure that a uniform spacing is maintained while laying the underfloor heating pipe.

The very latest feature of the insulating rolls is that they incorporate a 3 cm overlapping self-adhesive strip at the joints.

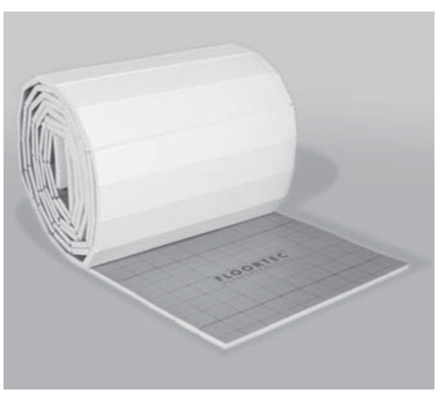


Figure 1:
FLOORTEC insulation roll 30-2

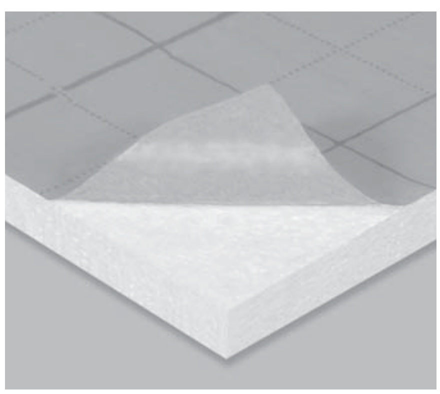


Figure 2:
Insulation roll with webbing film

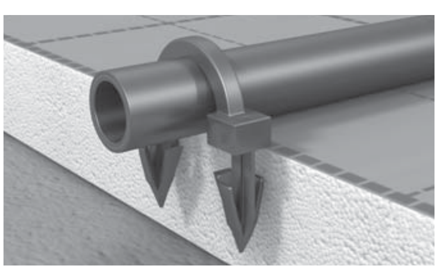


Figure 3:
3D Tacker clips

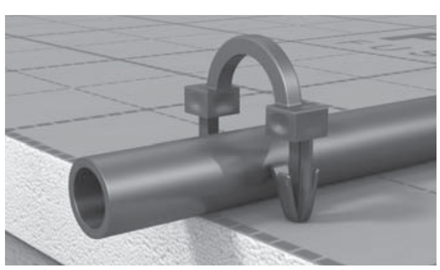


Figure 4:
3D Tacker clips

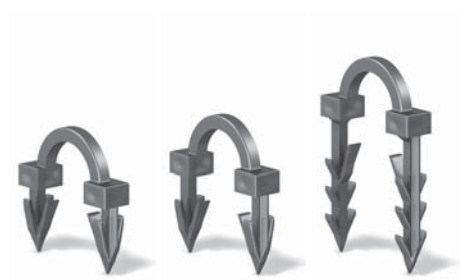


Figure 5:
3D Tacker clips available in 3 sizes
short (standard), medium and long

Description / Areas of application

Edge insulation strip
The edge insulation strip (Figure 5) is used to form a seal against vertical elements such as walls, columns or doorframes, fulfilling the requirement of the DIN 18560 standard by preventing the screed from coming into contact with static elements and forming sound bridges. The edge insulation strip forms a rapid and clean seal with the insulation layers on the floor.
The installation time will depend upon the situation in each room.

Installation of the edge insulation strip
The first stage is to install the FLOORTEC edge insulation strip (Figure 5) to all vertical parts of the building such as outer and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other foreign substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, a gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with Tacker Plates. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron and pre-prepared tear-off slits compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be fixed together using self-adhesive tape (Figure 6).

Off-cuts
All FLOORTEC system elements can be laid without off-cuts. The latest feature of the insulation rolls is that they now have a 3-cm overlapping self-adhesive strip at the edges. Even small off-cuts can be laid and used, which means no material is wasted.

Noise protection properties
The impact-noise insulation roll complies with the DIN 4109 standard "Sound Insulation in Buildings" and, depending on the version, provides considerable protection against impact noise.

Fire protection properties compliant to DIN 4102
The FLOORTEC impact-noise insulation roll: construction material class B2.

Moisture protection
The film cover on the upper side of the element guarantees optimum protection against moisture, compliant with DIN 18560.

PUR – folding strip WLG 025
Made from CFC-free PUR foam system with Tacker-compatible aluminium strip webbing, gridded covering layer and ALU/PE foam strip below – 5 mm (Figure 7).

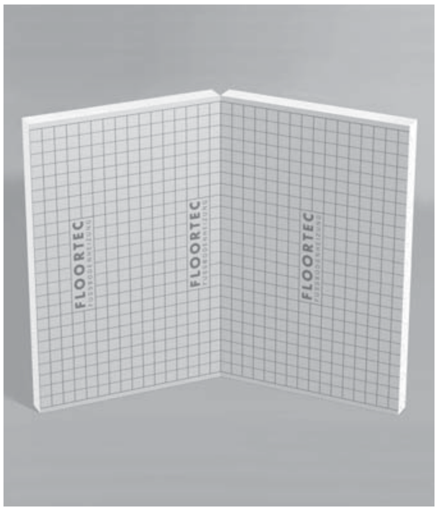


Figure 7: PUR folding strip – WLS 025

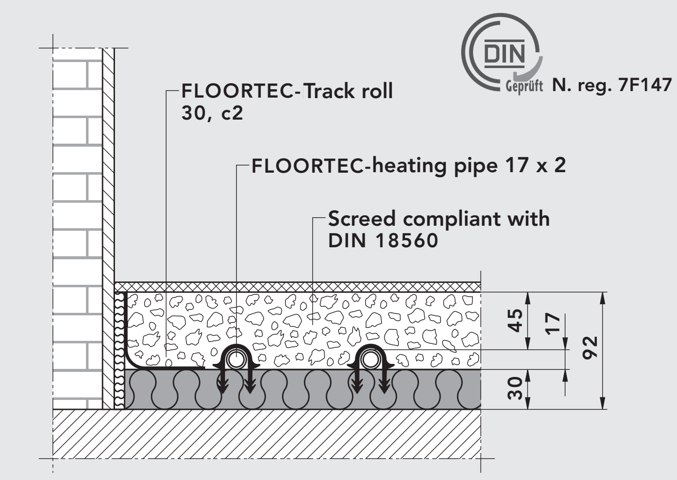
Figure 5: FLOORTEC edge insulation strip

Figure 6: Sealing down the film apron

FLOORTEC 3D UNI Tacker installation device
Suitable for use with all FLOORTEC Tacker clips (SHORT, MEDIUM and LONG). FLOORTEC Tacker installation devices are used as a time-saving means of attaching heating pipes to an underfloor consisting of genuine FLOORTEC Stapler system impact-noise insulating plates, incorporating a patented anchoring webbing.

In line with the high level of quality we set out to provide, all FLOORTEC products meet the relevant quality, DIN and manufacturing standards.

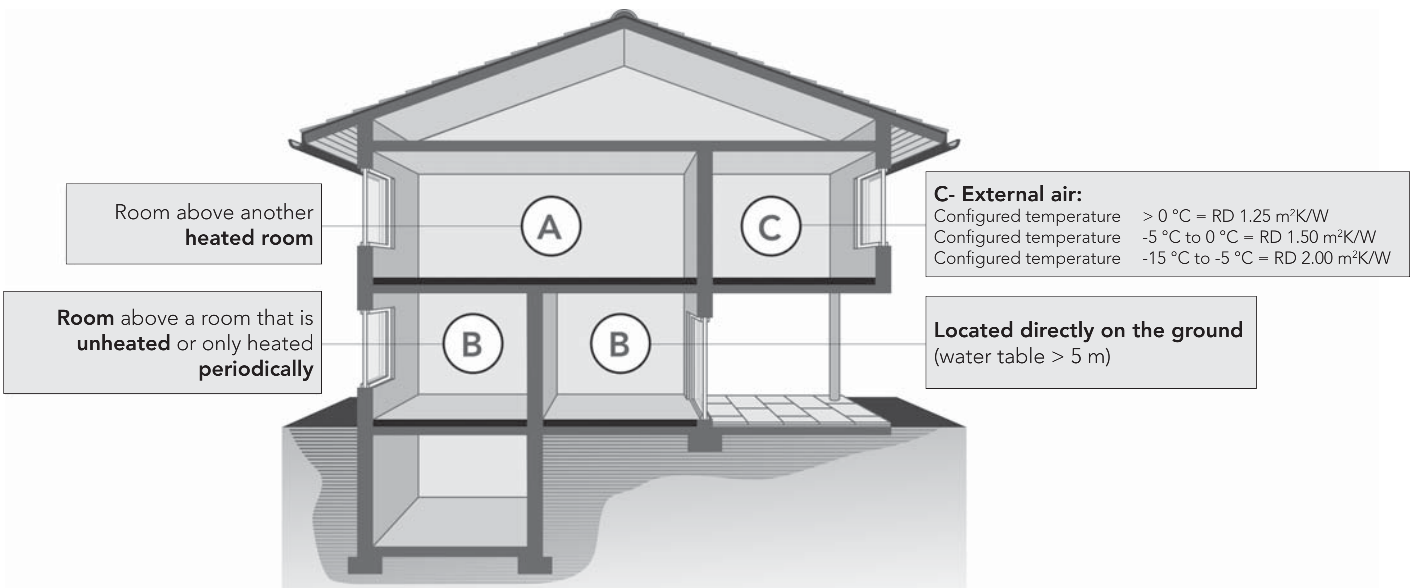
Floor sections



FLOORTEC Track roll 30, c2
- Stapler system underfloor heating technology
- DIN-tested
- Plastic gridded cover layer including webbing
- Heat and impact-noise insulation, covering an area of 10 m^2

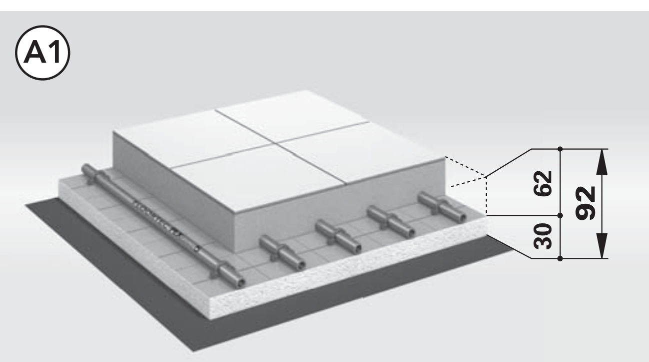
FLOORTEC PUR folding plate
- Stapler system underfloor heating technology
- Aluminium covering layer
- 5 mm PE impact-noise insulation
- 2 folding tracks

Underfloor heating, incorporating the ÖNORM EN 1264-4



Minimum construction heights, in accordance with ÖNORM EN 1264-4, including the EnEV

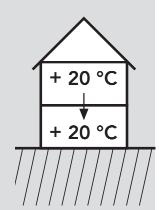
Separating floor in a residential building
above rooms used for the same purpose



FTT floor section 92 mm

EnEV - FLOORTEC-Stapler system 30-2 TD BH 92

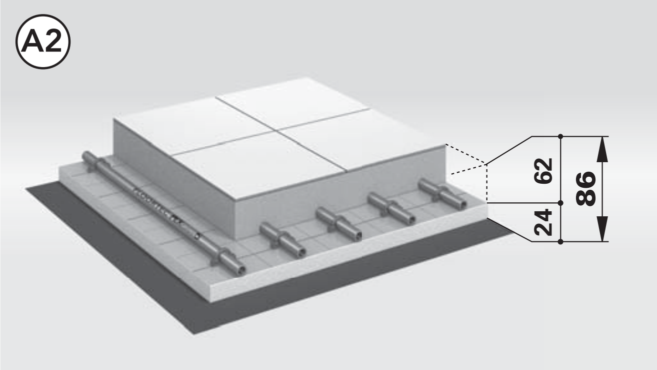
Required R_{λ}:	≥ 0,75 m^2 K/W
Effective $R_{\lambda,\text{insulation}}$:	0,75 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m^2**



Floor construction consisting of:
Impact-noise insulation 30-2mm FBIC4301001000A0

Floor sections

Separating floor in a residential building
above rooms used for the same purpose

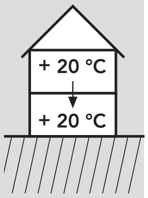


FTT floor section 86 mm

EnEV - FLOORTEC-Stapler system PUR 24 TD BH 86

Required R_{λ}:	≥ 0,75 m² K/W
Effective $R_{\lambda\ insulation}$:	0,86 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	20 dB*
Pressure load:	50 kN/m²**

Floor construction consisting of:
PUR folding plate 24 mm FBIF7241250160A0



Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
A	Heated room situated below **RD = 0,75 m² K/W**	A1	FBIC4301001000A0	0,75	Thermal and impact-noise insulation 30-2	040	92 mm
		A2	FBIF7241250160A0	0,86	PUR Folding strip 24 mm including impact-noise improvement (20 dB)	025	86 mm

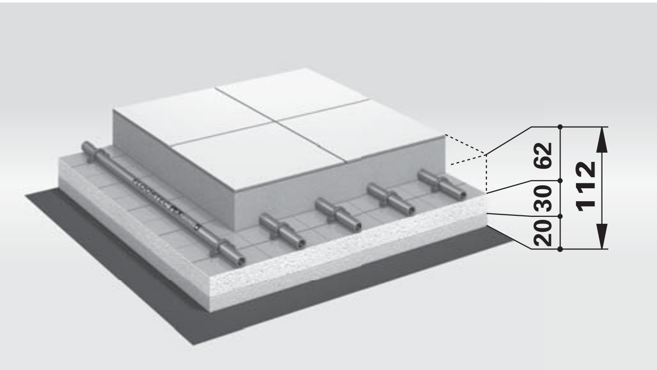
Stapler system

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m2 for perpendicular floor service load, as set out in DIN 1055.

N. reg. 7F147

Floor sections

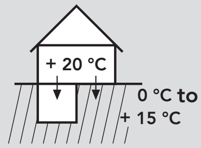
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTT floor section 112 mm

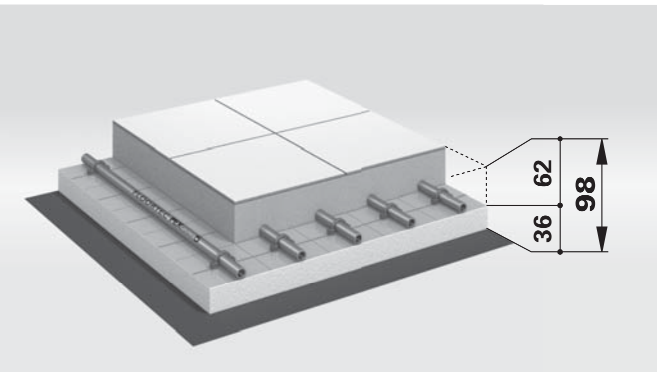
EnEV - FLOORTEC-Stapler system 30-2 TD BH 112

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\,\text{insulation}}$:	1,25 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m²**



Floor construction consisting of:
Impact-noise insulation 30-2 mm FBIC4301001000A0
Additional insulation PS SE 20 mm (part of the building itself)

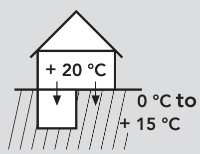
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTN floor section 98 mm

EnEV - FLOORTEC-Stapler system PUR 36 TD BH 98

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\,\text{Dämm}}$:	1,34 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	20 dB*
Pressure load:	50 kN/m²**



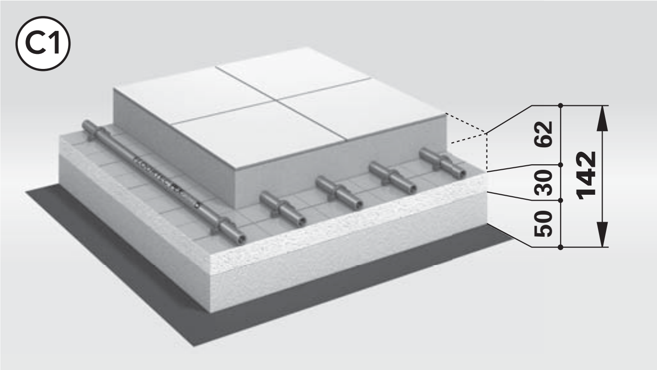
Floor construction consisting of:
PUR Folding plate 36 mm FBIF7361250160A0

Type	Application	Use	Item number	Effective Rλinsulation m² K/W	Name	WLG	Total height of floor construction
B	Unheated room or room heated periodically situated below, or directly on the ground **RD = 1,25 m² K/W**	B1	FBIC4301001000A0	1,25	Thermal and impact-noise insulation 30-2	040	112 mm
			Forms part of the building itself		Thermal insulation PS-SE 20 mm	040	98 mm
		B2	FBIF7361250160A0	1,34	PUR Folding strip 36 mm inc. impact-noise improvement (20 dB)	025	

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m2
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

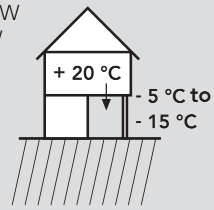
Floor sections

Separating floor in a residential building
above external air



EnEV - FLOORTEC-Stapler system 30-2 TD BH 142

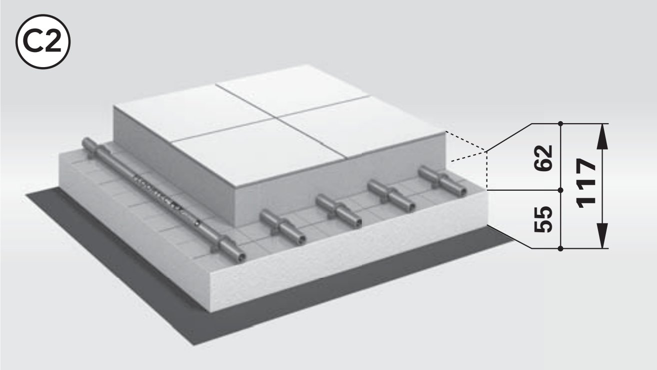
Required R_{λ} :	≥ 2,00 m^2 K/W
Effective $R_{\lambda\ insulation}$:	2,00 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	5,0 kN/m^2**



Floor construction consisting of:
Impact-noise insulation 30-2 mm FBIC4301001000A0
Additional insulation PS SE 50 mm (part of the building itself)

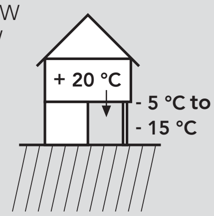
FTT floor section 142 mm

Separating floor in a residential building
above external air



EnEV - FLOORTEC-Stapler system PUR 55 TD BH 117

Required R_{λ}:	≥ 2,00 m^2 K/W
Effective $R_{\lambda\ insulation}$:	2,10 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$:	20 dB*
Pressure load::	50 kN/m^2**



Floor construction consisting of:
PUR Folding plate 55 mm FBIF7551250160A0

FTN floor section 117 mm

Stapler system

Type	Application	Use	Item number	Effective Rλinsulation m^2 K/W	Name	WLG	Total height of floor construction
C	Outer air temperature below **RD = 2,00 m^2 K/W**	C1	FBIC4301001000A0	2,00	Thermal and impact-noise insulation 30-2	040	142 mm
			Forms part of the building itself		Thermal insulation PS-SE 50 mm	040	
		C2	FBIF7551250160A0	2,10	PUR Folding strip 55 mm inc. impact-noise improvement (20 dB)	025	117 mm

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m^2
- **KN/m^2 for perpendicular floor service load, as set out in DIN 1055.

Installation of system elements additional insulation

Two methods for installing the system elements have been found to be satisfactory:

- Continuous installation:

The first FLOORTEC system elements are first laid along a wall (consecutive numbers 1 to 6). The installer then begins the next row by laying the remaining portion of element 2 (no. 2 in the picture). It is essential to make sure that the edge that is cut by hand is placed against the edge insulation strip.

- Important:

When two layers are being installed one on top of another (additional insulation), it is always important to make sure that the joints in the second layer do not coincide with those in the first layer. Wherever two system elements come together, the joint should be sealed using adhesive tape, in order to prevent the screed from penetrating beneath the insulation. If an anhydrite self-levelling screed is being used, all joints, therefore including the film apron of the edge insulation strip, must be sealed tightly using adhesive tape.

Installation is carried out across the full surface-area of the room, in accordance with the current regulations. In the case of floors between equally heated spaces and over spaces used for a different purpose, the applicable standard the ÖNORM EN 1264. In the case of floors on top of unheated spaces, on top of the ground itself or over external air, installation is carried out in accordance with EnEV.

The prefabricated system rolls can be laid quickly and almost entirely without off-cuts.

Pieces can be cut to fit any remaining areas using a separating knife and any off-cuts can be reused. Any edges must be cut to fit against the edge insulation strips. Any joints between elements must be covered using the self-adhesive FLOORTEC adhesive tape, in order to avoid heat and sound bridges.

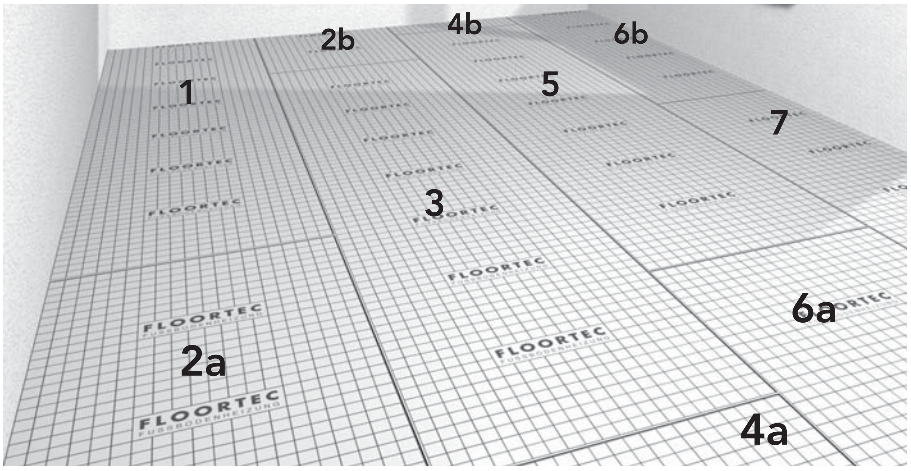
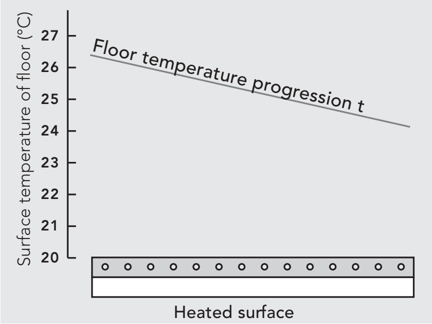


Figure 1: Continuous installation

Floor temperature progression when heating pipe routed in a meandering pattern (schematic)

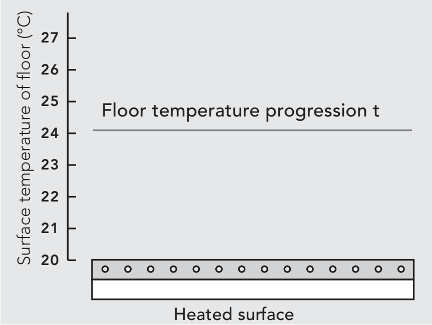


Development of surface temperature when heating pipe laid in meandering pattern.

- Cross-joint installation:

The first row of system elements is installed in a similar way to the one used in the continuous installation method. When installing the next row, the installer begins with a new element no. 3. The off-cuts of the elements are used to complete gaps in the vicinity of the wall. In this cases too, it is essential to make sure that the edges cut by hand are always placed against the edge insulation strip.

Floor temperature progression when heating pipe routed in a snail's shell pattern (schematic)



Development of surface temperature when heating pipe laid in a snail's shell pattern.

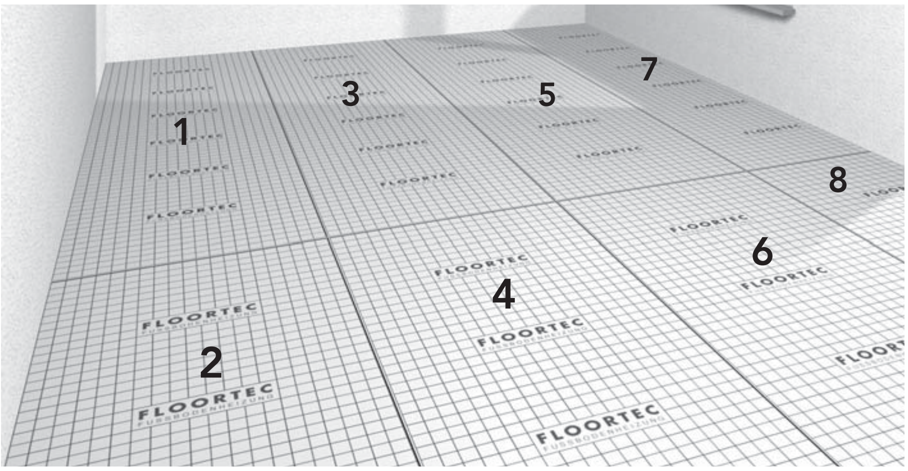


Figure 2: Cross-joined installation

Possible installation configurations/pipe installation

Heating pipes can be laid in one of two basic patterns:
Each method of installation has been assigned a characteristic and highly simplified surface temperature progression.

In the case of the meandering installation pattern (Figure 1), the heated water normally enters the room with the flow on the outer surface of the room and cools off as it flows through each of the meanders. As a result, surface temperatures are higher near the point where the heated water enters the room.

The snail's shell installation pattern (Figure 2), on the other hand, offers a more even surface temperature progression, as the flow and return sections of the pipe are located alternately adjacent to one another.
Once installed, the spacing between heating pipes will be between 100 and 300 mm. In living spaces, the maximum surface temperature of the floor dictates that the minimum spacing must be 150 mm, whilst the spacing must also not exceed 300 mm, as this will create variations in temperature across the floor. Nowadays, the snail's shell installation pattern is generally preferred for the installation of underfloor heating pipes underneath a self-levelling screed. In the case of dry-laid systems, the meandering pattern is preferred, due to the configuration of the heat conduction modules.

In order to achieve higher heat flows, it is also possible to reduce the spacing between the pipes. This technique is often used at the edges of the room, in front of windows and external surfaces, in order to compensate for the cold radiation effect. Installers are able to choose to set up the areas at the edge of the room as a separate heating loop (Figure 3) or to integrate them into the existing heating loop (Figure 4).

These are then referred to as integrated peripheral areas, which can be configured either using a meandering pattern or a snail's shell pattern.

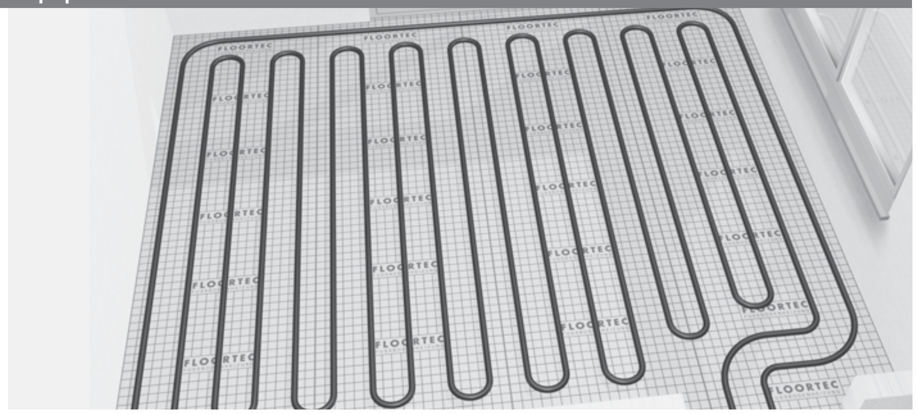


Figure 1: Meandering installation pattern

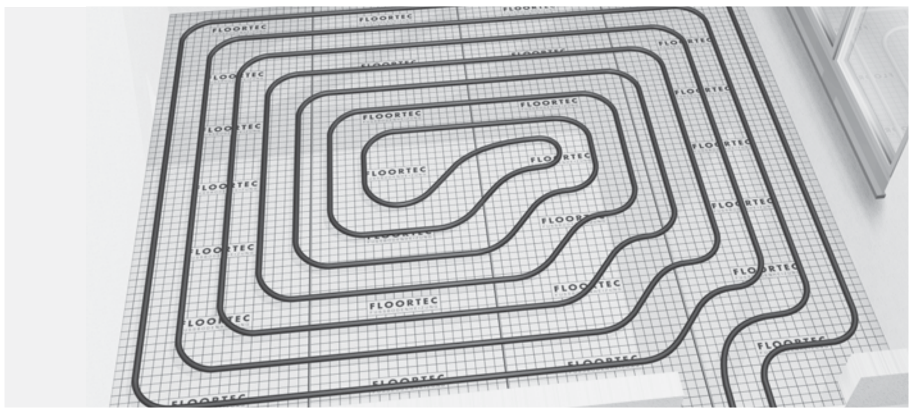


Figure 2: Snail's shell installation pattern

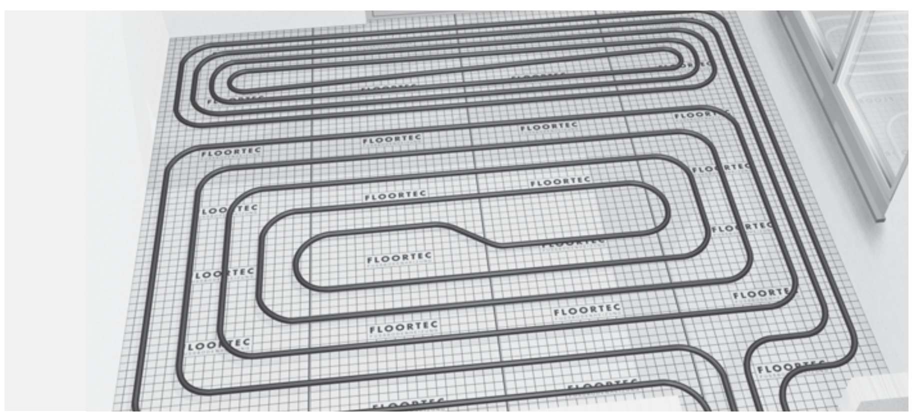


Figure 3: Snail's shell pattern with separate peripheral area

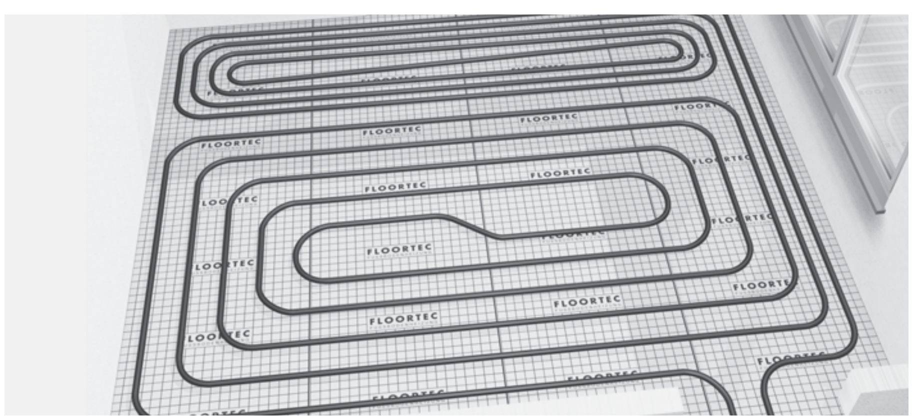


Figure 4: Snail's shell installation pattern with integrated peripheral area

Safety pipe

Installation of heating pipe
The installation of the heating pipes is carried out using the spacings determined in the project planning documentation.
Starting at the heating loop manifold, the heating pipe is laid onto the system elements in accordance with the specified spacing. Bend radii of below 5 x Da are not permitted. Heating loops should, if possible, be laid from a single length of pipe; joints should be avoided and if they are required, should only be located in a straight section of pipe and should be indicated on the revised plan. Heating pipes using 17 x 2 Pe-Xcellent 5 piping must consist of heating loops no longer than 140 m. Protective bushings should be used whenever the heating pipes are required to pass through movement joints, walls or ceilings. The heating pipes are fixed to the FLOORTEC Thermal and Impact-Noise Insulation roll using the Tacker installation device.

Pressure test
Once installation is complete, the system should be filled and vented. The completed system should be subjected to a pressure test lasting at least 24 hours, in accordance with ÖNORM EN 1264. The test pressure should be at least 1.3 times' the maximum permitted operating pressure of the heating system. The tightness and test pressure should be recorded, in accordance with the tightness testing protocol. If there is a risk of frost, a frost protection compound should be added to the heating fluid.

If, in the future, a frost protection compound is no longer required in order to operate the system, it should be removed by draining the system and flushing it at least 3 times with water. While the screed is being applied, the heating loops should also be subjected to test pressure, so that any external damage is immediately noticeable. Once the pressure test is complete, all adapters on the heating loop manifold should be checked.

System installation – step by step

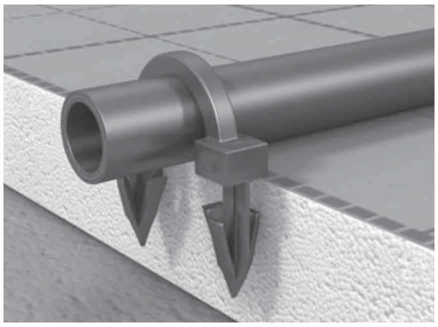
Install the edge insulation strip with its attached film apron.

Unroll and lay out the Stapler system elements.

Seal the edge insulation strips using adhesive tape (if a self-levelling screed is to be applied)

The rolls of insulation include a 3-cm self-adhesive strip and overlap at the joins.

Fasten the Stapler system heating pipe to the system elements, using the….



...patented anchoring clips.

Attach the heating pipe to the manifold and you're done!

List of materials required

Stapler system – pipe spacings in cm	5	10	15	20	25	30
Pipe with damp proof membrane **FBCXC5C1420...A0** **FBCXC5C1720...A0** **FBCXC5C2020...A0** **FBBPTAC1620.....A0**	approx. 17,50 m	approx. 9,70 m	approx. 6,40 m	approx. 4,90 m	approx. 3,70 m	approx. 3,30 m
FLOORTEC Insulation roll **FBIC4301001000A0**	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2
Pipe clips 6 mm **FBIACLI1200000A0**	approx. 34 Stk.	approx. 16 Stk.	approx. 10 Stk.	approx. 9 Stk.	approx. 8 Stk.	approx. 6 Stk.
Edge insulation strips per m^2 F**BROTHEPI81600A0**	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m^2 F**BROTHECE20000A0**	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

3D UNI Tacker device

Stapler system

- FLOORTEC 3D UNI Tacker device, suitable for the installation of all types of FLOORTEC Tacker clips (SHORT, MEDIUM and LONG). FLOORTEC Tacker device for the rapid installation of heating pipes to genuine FLOORTEC Stapler system impact-noise insulation underfloors with integrated patented woven anchoring layer.

Item no: FBIATOOL203D00A0

- 3D SHORT Tacker clip (standard), 38 mm for Pe-Xcellent 5 underfloor heating pipe 14 – 17 x 2 mm

Item no: FBIACLI1203DS0A0

- 3D MEDIUM Tacker clip
42 mm for Pe-Xcellent 5 underfloor heating pipe 20 x 2 mm
U clips in magazine form for the rapid fixing of heating pipes onto genuine FLOORTEC Stapler system impact-noise thermal insulation with integrated woven anchoring layer, using the 3D UNI tacker device.

Item no: FBIACLI1203DM0A0

- 3D LONG Tacker clip
58 mm for special floor constructions

Item no: FBIACLI2203DL0A0

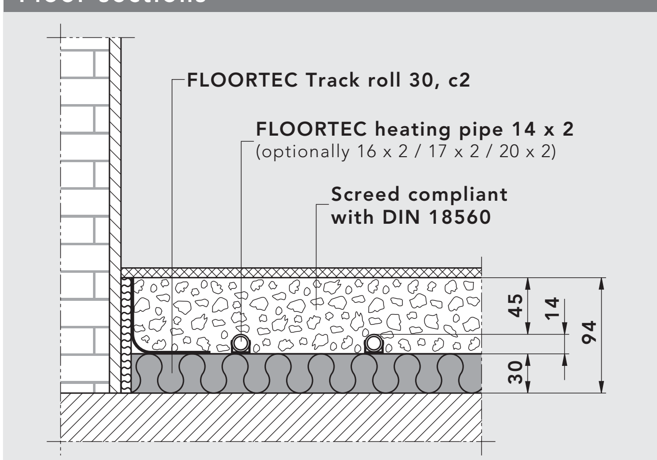
Rail-mounting system

Guarantee statements available at **www.vogelundnoot.at/garantieerklaerungen**

List of materials required

Stapler system – pipe spacings in cm	5	10	15	20	25	30
Pipe with damp proof membrane FBCXC5C1420...A0 FBCXC5C1720...A0 FBCXC5C2020...A0 FBBPTAC1620.....A0	approx. 17,50 m	approx. 9,70 m	approx. 6,40 m	approx. 4,90 m	approx. 3,70 m	approx. 3,30 m
Cliprail **FBJIU051420100A0**	1,00 m	1,00 m	1,00 m	1,00 m	1,00 m	1,00 m
Covering film **FBROTHECOFOIL0A0**	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2
Clip **FBJIAUCL000000A0**	3 Stk.	3 Stk.	3 Stk.	3 Stk.	3 Stk.	3 Stk.
Edge insulation strips per m^2 **FBROTHEPI81600A0**	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m^2 **FBROTHECE20000A0**	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

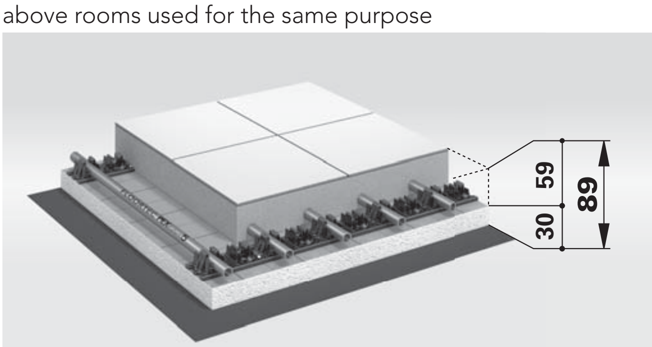
Floor sections



Important!
All floor sections have been calculated as if they are using Pe-Xcellent 5 underfloor heating pipe 14 x 2 mm!

FLOORTEC Stapler system
- Underfloor heating Stapler system – technology

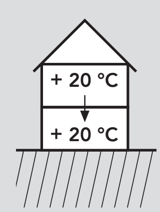
Separating floor in a residential building
above rooms used for the same purpose



FTV floor section 89 mm

EnEV – FLOORTEC Stapler system 30-2 BH 89
Required R_{λ}: ≥ 0,75 m^2 K/W
Effective $R_{\lambda\ insulation}$: 0,75 m^2 K/W
Degree of improvement in impact-noise $L_{w,R}$: 28 dB*
Pressure load: 5,0 kN/m^2**

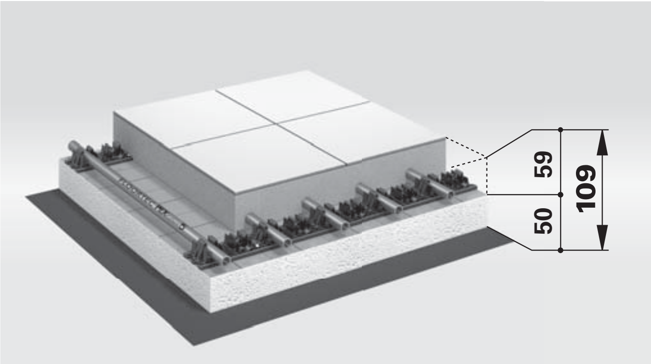
Floor section consisting of:
FLOORTEC 30-2 mm insulation and Cliprail FBJIU051420100A0



1 ULOW-E2
Profile panel radiators
Plan panel radiators
Vertical radiators
2 General information
Preformed plate system
Stapler system
Special systems

Floor sections

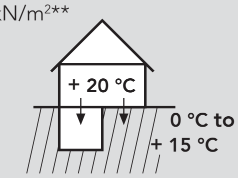
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTV floor section 109 mm

EnEV – FLOORTEC Stapler system PS 50 BH 109

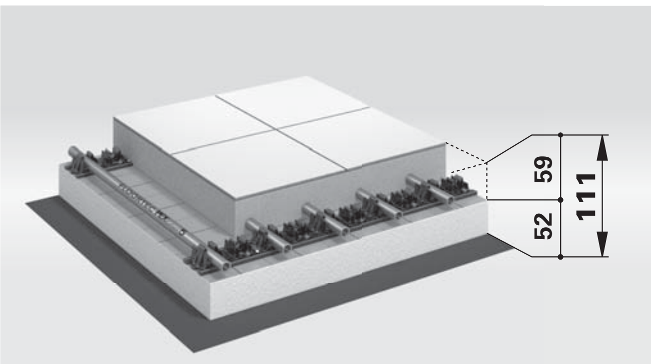
Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\ insulation}$:	1,25 m² K/W
Pressure load:	3,5 kN/m²**



Floor construction consisting of:
PS SE 50 mm insulation
(part of the building itself)
and Cliprail FBJIU051420100A0

- The height indications (in mm) relate to a screeded layer without floor finish. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

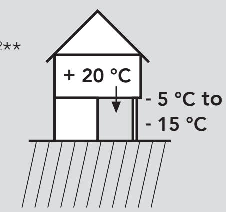
Separating floor in a residential building
above external air



FTV floor section 111 mm

EnEV - FLOORTEC-Stapler system 52 BH 89

Required R_{λ}:	≥ 2,00 m² K/W
Effective $R_{\lambda\ insulation}$:	2,08 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Pressure load:	50,0 kN/m²**



Floor construction consisting of:
PUR folding plate 52 mm
(part of the building itself)
and Cliprail FBJIU051420100A0

Installation of the edge insulation strip

The first stage is to install the FLOORTEC edge insulation strip (Figure 1) to all vertical parts of the building such as external and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other foreign substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, an expansion gap of 5 mm be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with the Stapler system. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron and prepared tear-off slits compliant with DIN 18560. It is important to ensure that the PE film attached to the FLOORTEC edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be fixed together using self-adhesive tape (Figure 2).

Figure 1: FLOORTEC edge insulation strip

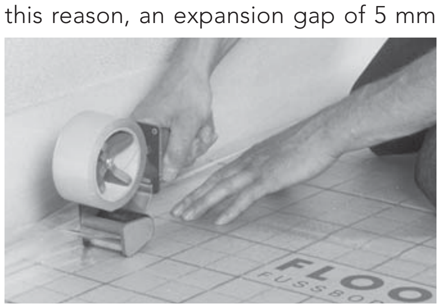


Figure 2: Sealing down the film apron

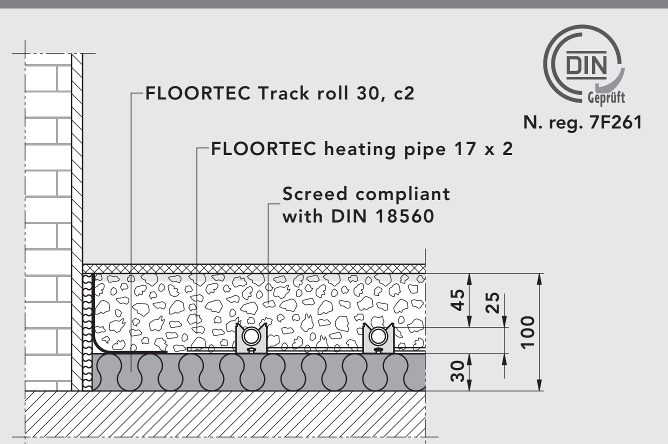
Grid mat system

Guarantee statements available at **www.vogelundnoot.at/garantieerklaerungen**

List of materials required

Grid mat system – pipe spacings in cm	**5**	**10**	**15**	**20**	**30**
Pipe with damp proof membrane FBCXC5C1720...A0 FBBPTAC1620.....A0	approx. 20 m	approx. 10 m	approx. 6,60 m	approx. 5 m	approx. 3,30 m
Grid mat FBGMG3...A0	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2
Covering film FBROTHECOFOIL0A0	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2	1,00 m^2
Mesh connector FBGAMCP0000000A0	2 Stk.	2 Stk.	2 Stk.	2 Stk.	2 Stk.
Mesh clip FBGAPCP1617000A0	23 Stk.	15 Stk.	10 Stk.	7 Stk.	4 Stk.
Edge insulation strips per m^2 FBROTHEPI81600A0	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m	approx. 1,00 m
Screed additive per m^2 FBROTHECE20000A0	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.	approx. 0,2 lt.

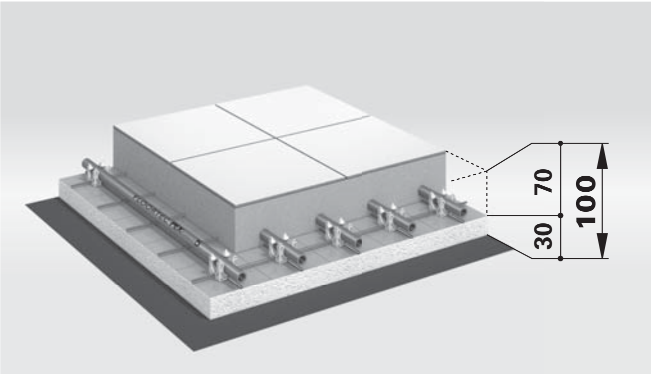
Floor sections



FLOORTEC Grid mat system
- Underfloor heating Grid mat system – technology

Floor sections

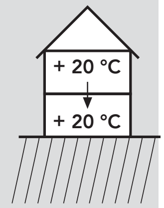
Separating floor in a residential building above rooms used for the same purpose



FTG floor section 100 mm

EnEV - FLOORTEC-Grid mat system BH 100

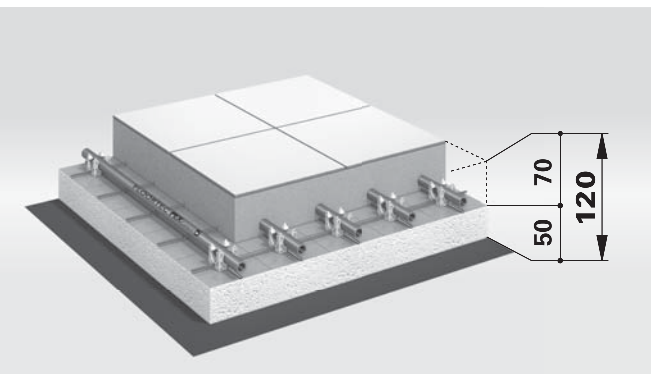
Required R_{λ}:	≥ 0,75 m² K/W
Effective $R_{\lambda\,\text{insulation}}$:	0,75 m² K/W
Degree of improvement in impact-noise $L_{w,R}$:	28 dB*
Compression load:	5,0 kN/m²**



Floor section consisting of:
WTS track roll 30-2 mm FBIC4301001000A0
and mesh FBGMG3…….A0

- The height indications (in mm) relate to a screeded layer without floor covering. The strength of the screed will be compliant with the DIN 18560 standard.
- in accordance with DIN 4109 in the case of a screeded mass across a horizontal surface of ≥ 70 kg/m²
- **KN/m² for perpendicular floor service load, as set out in DIN 1055.

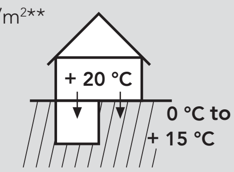
Separating floor in a residential building
above rooms used for a different purpose, as well as on top of the ground or above unheated spaces



FTG floor section 120 mm

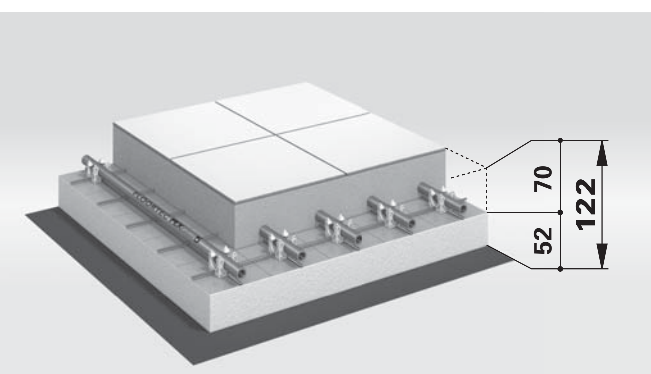
EnEV – FLOORTEC Mesh system 50 BH 120

Required R_{λ}:	≥ 1,25 m² K/W
Effective $R_{\lambda\,\text{insulation}}$:	1,25 m² K/W
Compression load:	5,0 kN/m²**



Floor construction consisting of:
PS SE 50 mm insulation
(fitted by the building contractor)
and Grid mat FBGMG3……….A0

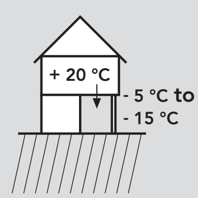
Separating floor in a residential building
above external air



FTG floor section 122 mm

EnEV - FLOORTEC-Grid mat system 52 BH 122

Required R_{λ}:	≥ 2,00 m² K/W
Effective $R_{\lambda\,\text{insulation}}$:	2,08 m² K/W
Compression load:	50 kN/m²**



Floor construction consisting of:
PUR 52 mm insulation
(fitted by the building contractor)
and Grid mat FBGMG3………A0

DIN Geprüft N. reg. 7F261

Installation of the edge insulation strip

The first stage is to install the FLOORTEC edge insulation strip (Figure 1) to all vertical parts of the building such as external and internal walls, columns and doorframes, without leaving any gaps. In order to avoid heat and sound bridges, it is important that while work is underway, no underfloor heating screed, plaster, joint-sealant or other substances are able to penetrate the floor edges. The part of the edge insulation strip that is still visible may only be removed once the laying of the floor is complete. In the case of multiple layers of insulation, the edge insulation strip must be fitted before the uppermost insulating layer is laid. It must also be secured in order to prevent it from moving while the screed is being applied. Due to their exposure to heat, underfloor heating screeds experience a greater degree of expansion than unheated floor constructions. For this reason, an expansion gap of 5 mm must be allowed on all sides to enable expansion to take place. The edge insulation strip is intended for use with cement screeds and self-levelling screeds that are used in conjunction with the Grid mat system. The edge insulation strip itself is made up of closed-cell PE-foam, with a side-bonded film apron compliant with DIN 18560. It is important to ensure that the PE film attached to the edge insulation strip is laid over the junction between the edge insulation strip and the composite plates (this is essential when using a self-levelling screed), in order to prevent cement sludge or the water contained in the screed from penetrating beneath and forming sound bridges. The edge insulation strip and system elements should be masked using self-adhesive tape (Figure 2).

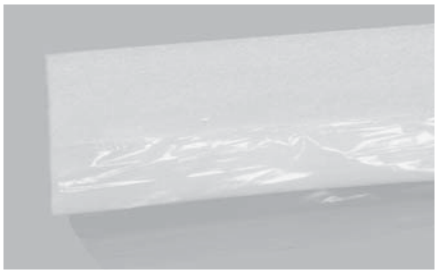


Figure 1: FLOORTEC edge insulation strip

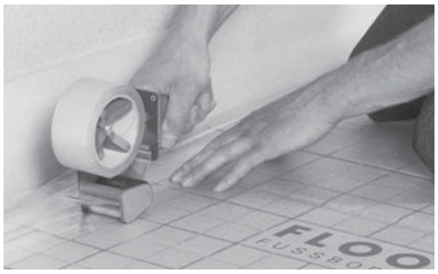
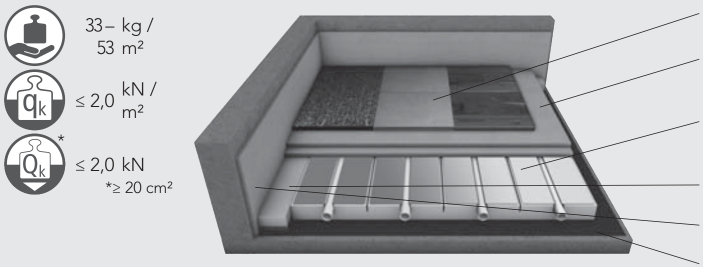


Figure 2: Sealing down the film apron

Dry system



Guarantee statements available at **www.vogelundnoot.at/garantieerklaerungen**

General

Wet and dry: the difference between the systems

In a conventional dry system, the pipes are fitted within an insulation layer made from polystyrene. Without a heat conduction plate, the heat in the pipe would only be transferred at the points where the pipe comes into contact with the support layer and screed layer. In a wet system, in other words, in an underfloor heating system in which the pipes are almost completely enveloped by the screed, the transfer of heat takes place across the entire surface area of the pipe.

It is in this respect that dry systems fitted with aluminium heat conduction plates demonstrate their particular strength. The pipe first transfers its heat to the heat conduction plate and then via a significantly increased area to the supporting or screed layer.

The distinction between wet systems and dry systems does not, therefore, relate to the question as to whether the load distribution layer (or the screed) is a wet, self-levelling screed or a dry screed, but whether the heating pipe lies within a “wet” screed or a dry insulation layer.

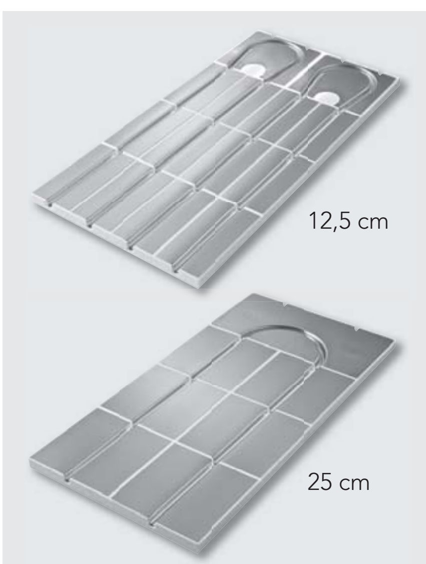
Turning elements

One of the particular features of the FLOORTEC Dry system is the distinction between straight elements and turning elements.

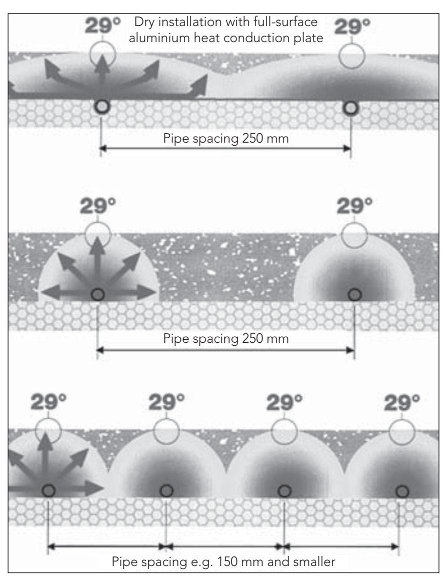
The unique FLOORTEC Dry system does not only include a full-surface heat conduction plate made from 0.5 mm thick aluminium on its straight elements, but also on its turning elements as well. The heat conduction plate is glued to the underfloor and insulation plate at the factory. The benefit of this is that the areas in which the pipe changes direction, which generally account for around 20% of the area of the room, also form a usable heating surface. And it is at the edges of the room (next to external walls in particular) that protection against cold external air is especially desirable.

Brief explanation:

If the areas in which the pipe changes direction do not include a heat conduction plate, the heating effect of those areas is almost zero. As an area of around 25 cm is generally required for the pipe to change direction and that is the case on both sides, the effective heating area of the floor is reduced by around half a metre. In a room that is 2 metres wide, this is equivalent to 25% of the area of the room. If the room is 3 metres wide, it would be 16%.On the other hand, the additional heat transfer achieved by a pipe spacing of 12.5 cm, compared to a pipe spacing of 25 cm, is around 15-30% (depending on the type of floor construction). If we then take account of the fact that the FLOORTEC system elements do not display that weakness, it is only too easy to recognise that installing a pipe at a spacing of 12.5 cm (turning element without a heat conduction surface) provides no effective benefits compared to the installation of a heating pipe at a spacing of 25 cm, in which the pipe-turning areas also incorporate an aluminium heat conduction plate (FLOORTEC Dry system). Quite the opposite: in order to achieve a roughly comparable heating capacity within the room, a heating pipe measuring double the number of linear metres would need to be fitted and larger manifolds would need to be installed.



Turning elements incorporating pipe spacings of 25 cm and 12.5 cm



Comparison of the FLOORTEC Dry system with other systems on the market that incorporate a heat conduction plate.

Dry system

N. reg.7F403-F

General information

Aluminium versus steel as a heat conducting medium. The difference.

The thermal conductivity of aluminium is > 200 W/mK, whereas steel achieves a thermal conductivity value of around 50 W/mK. This means that an aluminium plate will dissipate the heat four times more rapidly than steel.
Note:
The thermal conductivity of screeds is approximately 1 to 1.5 W/mK.

The greater the heating capacity at the same system temperatures, the lower the system temperatures that are required to achieve the same heating capacity.leistungswerten.

Performance comparison: Wet and dry systems / effective heating surface areas

Wet system *)	FLOORTEC Dry system
Pipe spacing 25 cm **40 W/m²** (= 100 %)	Pipe spacing 25 cm **52 W/m²** (= 130 %)

Note: Approximate indications per m2 when heating pipes covered with a cement screed to a depth of 45 cm and a tiled surface are operated at a heat source excess temperature of 10 K (e.g. 33/27/20 °C heat output), using an aluminium composite heating pipe.

*) Details may vary from those indicated, depending on the supplier and the system involved

The progression in heating costs provides an additional reason to opt for a system with a high heating capacity per m², or for a system with the lowest possible heat source excess temperature per m².

The lower the necessary system temperatures, the lower the ongoing heating costs will be. The reason for this is that if one reduces the heat source excess temperature by 1 K, a saving of 2% will be achieved in the heating costs.

Necessary system temperatures for a desired heating capacity of 50 W/m²

Wet system *)	FLOORTEC Dry system
Pipe spacing 25 cm **13,5 K** **(36/31/20 °C)**	Pipe spacing 25 cm **9,5 K** **(32/27/20 °C)**

Note: Approximate indications per m2 when heating pipes covered with a cement screed to a depth of 45 cm and a tiled surface.

*) Details may vary from those indicated, depending on the supplier and the system involved

N. reg.7F403-F

General information

Reaction time
The effect of the comparatively large heating capacity per m2 arises as a result of the dry method of construction and the aluminium heat conduction plate (see illustrations).
The purpose of the aluminium heat conduction plate with a thermal conductivity of > 200 W/mK (the thermal conductivity of steel is approx. 50 W/mK and of screed approximately 1.4 W/mK) is to dissipate the heat from the heating pipe across a large area and to transfer the heat rapidly to the screed across the entire surface area of the floor. There is no difference with regard to the screed that lies above the pipes (the thickness of the screed above the pipe). On the one hand, however, the mass of screed that in a wet system would envelop the pipe is not present in the dry system, whilst on the other hand, the screed is heated from below across its entire surface area. This gives rise to a significantly more rapid reaction speed than can be achieved using a wet system.

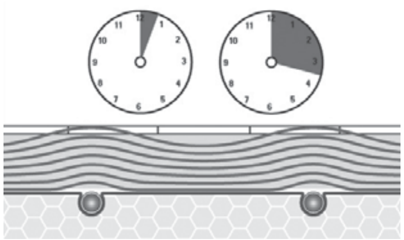
Thermographic images
The strength and type of material of the heat conduction plate has a major influence on the thermal conductivity. For example, a heat conduction plate made from a piece of aluminium 0.5 mm thick cannot be compared to a "system plate" onto which has been pressed a thin film of metal. That would simply serve the purpose of providing a visual effect, and would not enhance the thermal conductivity.

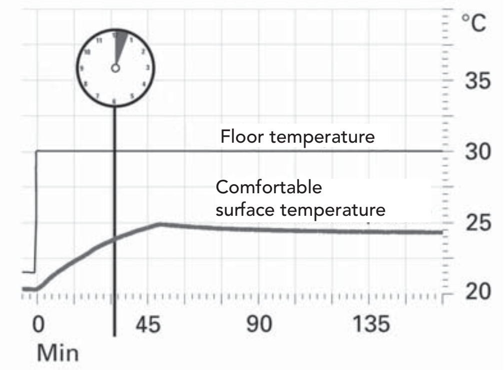
Variations in floor construction
All types of floor construction can, in principle, be created using a dry system (these can be used on top of a cement underfloor, a wooden beam construction or a raised floor system). There really are no limitations. There are also next to no limitations with regard to the types of material that can be placed on top of the underfloor heating system. Almost everything is possible – a conventional cement or anhydrite screed, a dry screed with screed tiles, dry screed elements made from plaster, cement or poured asphalt.

It is also possible to lay laminate flooring or real wood parquet directly on top of the FLOORTEC Dry system. Specialist solutions are available for particular problems. For example, tiles with a special substrate layer can be laid directly on top of the FLOORTEC system plates, enabling an overall floor section height of only 45 to 50 mm to be achieved (details on page 100)

FLOORTEC Dry system with 35-mm screed

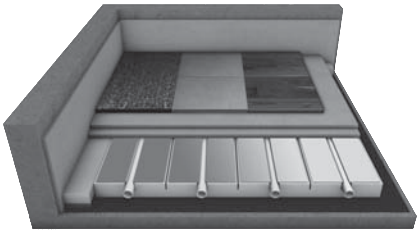
Conventional underfloor heating with heating pipe inside 60-mm screed





Dry system

Dry screed element (Fermacell 20 mm)



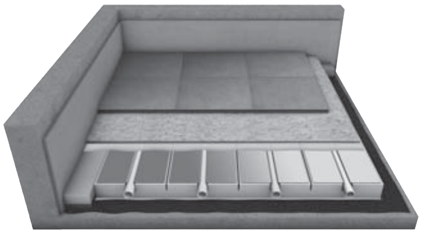
33– 53 kg / m²

q_k ≤ 2,0 kN / m²

Q_k* ≤ 2,0 kN

*≥ 20 cm²

STRONGBOARD FL | Tile



~ 37 kg / m²

q_k ≤ 2,0 kN / m²

Q_k* ≤ 2,0 kN

*≥ 20 cm²

N. reg.7F403-F

Benefits

In order to operate a conventional heating system that makes use of radiators, flow temperatures of between 50 and 70 °C are generally required, so that a flow of air is generated within the room concerned and the radiator is able to dissipate its heat into the room. A state-of-the-art surface heating system generally operates at a flow temperature of between 30 and 45 °C, however, depending on the construction of the floor itself. Reducing the heating water temperature gives rise to a considerable potential saving. These low heating water temperatures also take the form of system-based requirements that serve the purpose of enabling the economical use of heat pumps. The use of solar panels is also available as an additional source of renewable energy.
The perception of having achieved the comfortable temperature in the room occurs between 1 and 2 Kelvin (degrees of room temperature) sooner than is the case when the room is heated using a conventional radiator-based system. By reducing the room air temperature by the same amount of 1 to 2 Kelvin in comparison to a conventional radiator-based heating system, an additional saving of 6 to 12% can be achieved. Put simply, this is due to the reduction in the difference between the room temperature and the outside temperature.
The underfloor heating is integrated into the floor, which means that when planning the architecture of a building or designing a room, it is not necessary take account of any heated surfaces.

Conclusion

- No variation in temperature on the floor surface, thanks to the use of aluminium heat conduction plates.

- The shortest possible reaction time, due to the thin construction that lies on top of the aluminium heat conduction plate and due to the heat dissipation area. It is not the pipe that transfers the heat upwards, but the large surface area of the aluminium.

- The aluminium heat conduction plate is glued to the insulating layer in the factory. This means that no further action is required to lay the heat conduction profile.

- The FLOORTEC Dry system is the only system that includes the pipe turning areas, through the use of aluminium heat conduction plates.

- For floor constructions with wet or dry screeds, a complete separation of roles is achieved by means of the separation between the heating and the screed, due to the separation and conduction layer.

- Is also suitable for cooling

Compared to other manufacturers, the spacing between the FLOORTEC Omega channels in which the aluminium composite pipe is located is < 16mm. While the heating pipe is in use, this guarantees almost 100% contact between the heat conduction plate and the pipe, thereby ensuring the optimum transfer of heat.

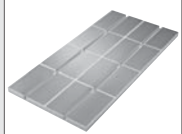
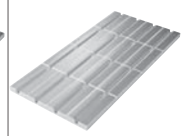
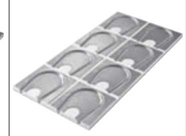
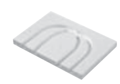
In a direct comparison, the installation of the aluminium composite pipe therefore appears more time-consuming, however it enables air columns between the pipe and the plate to be excluded. This is especially significant, due to the fact that air is an insulator.

FLOORTEC Dry system

System components

DIN Geprüft N. reg.7F403-F

System elements

Pipe spacing [mm]	250		125		250 / 125	
	Straight element with heat conduction plate	Head element with heat conduction plate	Peripheral zone element	Head element with heat conduction plate	Edge filler piece without aluminium	Dual-turn head element without aluminium
						
Dimensions of system plates W x L x D [mm]	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**1000 x 500 x 30**	**250 x 375 x 30**
Item number	FBF41843050100A0	FBF51843050100A0	FBF41443050100A0	FBF51443050100A0	FBFAW003501000A0	FBF01843037025A0

	Material properties
Base plate	EPS 035 DEO dm
Heat conduction plate	Aluminium 0.5 mm with pipe grooves (omega shape, edged)
Fire-resistance class	B 1
Raw density	30 kg/m^3
Heat conductivity category	WLG 035
Compressive strength on compression 10% in kPa (kN/m^2)	240 kPa (10 kN/m^2)

Accessories

Image	Item no.	Description
	**FBROTHEPI81600A0**	**FLOORTEC** edge insulation strip 8 x 160 x 25,000 mm
	**FBFAW0RAHOLZTDA0**	**FLOORTEC** Dry system wooden framing 1000 x 45 x 30 mm
	**FBFAC00000CP0000**	**FLOORTEC** Load distribution plate 1000 x 1000 mm

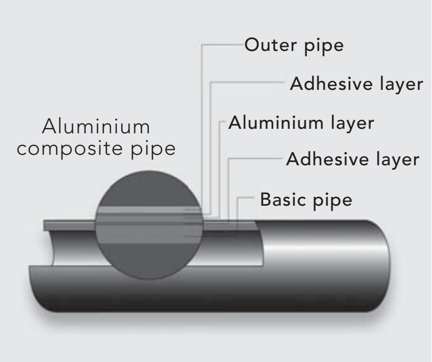
Heating pipe

FLOORTEC Aluminium composite pipe 16 x 2 mm

The FLOORTEC Aluminium composite pipe combines all of the benefits of plastic and metal pipes:

- 100% oxygen-tight and water vapour diffusion-tight
- Minimal linear expansion
- Thermal conductivity is better than that of plastic pipes
- Minimal sound transfer
- Easy to bend, even at low temperatures, highly resistant to pressure and temperature
- Smooth surfaces = minimal loss of pressure
- As light as a plastic pipe
- Retains its curved shape and is dimensionally stable

A PB, PE or RT pipe or a PE-X-pipe may not be used, as their high linear expansion may give rise to cracking noises.



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Technical data	
Material	Highly temperature-resistant polythene, with an aluminium layer
Pipe dimension [mm]	16 x 2
Weight [kg per linear metre]	0,104
Water capacity [litres per linear metre]	0,113
Roll length [m]	200 / 400
Max. operating temperature [°C]	90
Max. operating pressure [bar]	8
Thermal conductivity [W/mK]	0,43
Linear expansion coefficient [mm/mk]	0,026
Surface roughness k (according to Prandtl-Colebrook) [mm]	0,007
Oxygen diffusion in the total area of application [mg/ l d]	< 0,005
Minimum bend radius = 5 x dA [mm]	80

Edge insulation strip / technical data	
Material	**PE-edge insulation strip**
Dimensions [mm]	160 x 8
Film apron to be stuck to the separating layer	Yes
Can be used for	All types of screed that are applied cold

Function
The edge insulation strip is intended to insulate all vertical parts of the building from the noise that is generated within the screed plate, dry screed plate and the floor coverings (tiles, parquet).

Installation
The edge insulation strip must be fitted to all walls and vertical parts of the building, such as pipes. If the height of the floor section will exceed the width of the edge insulation strip, the edge insulation strip is applied before the final insulation layer is applied.
The edge insulation strip must always extend to the upper surface of the floor covering. The edge insulation strip must be secured in order to prevent it changing position while the screed is being applied. Care should be taken to ensure that the corners are formed correctly and that sufficient overlap is allowed any joints.
The edge insulation strip may only be secured above screed level.

Important!

The edge insulation strip may only be cut off once the entire floor covering has been fitted (in the case of tiled floors especially, only once the grout has been applied).


PE edge insulation strip

Requirements regarding the sub-floor

The FLOORTEC Dry system imposes particular demands with regard to the sub-floor, especially when directly compared to the installation of a wet system. Any unevenness in the sub-floor that is not levelled out will, for example, give rise to hollows that could lead to the breakage of the load distribution layer. The reason for this is that in certain situations, the bridging section may become too large for the load distribution layer (span).

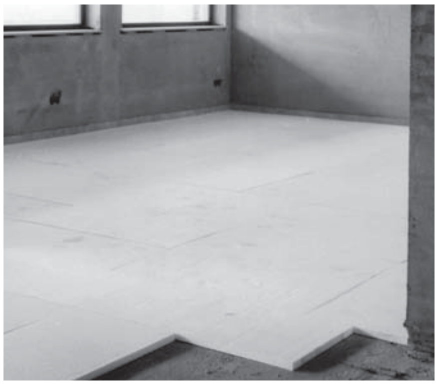
Before installation, you should check:
Site

- Clean, dry and swept clean
- Windows have been installed and glazed (or emergency glazing installed, at the very least)
- Plastering and installation work have been completed
- The height of the floor section, including the floor covering, is known (setting-out)

Sub-floor

- Concrete floor: completely dry
- Wooden joisted floor: sufficient stability
- Floor is completely even, including in every corner

Unevenness
Depending on the type of floor section required, the degrees of unevenness permitted in the DIN 18202 standard must not be exceeded. In the case of a floor section that makes use of wet screeds above the heating layer, the tolerances given in Table 4, line 2 will apply. In the case of a floor section constructed using wet screed over the heating layer, the tolerances of Table 4, line 2 apply. In the case of a floor section constructed using a dry system with dry screed plates, laminate or solid wood plank flooring or special constructions for tiles, such as bare PERMAT or Lazemoflex, the values in Table 4, line 4 will apply, as these types of floor section are incapable of compensating for any unevennesses in the sub-floor, in other words, the elements must be perfectly flat and flush with one another.
It is also important to ensure that the angle tolerances in Table 5 are not exceeded, as a dry system floor cannot be adjusted later to account for any unevennesses.



Dry system

TIP
The angle tolerances must also be adhered to, as the floor covering may otherwise, especially in the case of a dry system floor, be fitted with a slope. The subsequent adjustment of a sloping floor is generally more expensive than it would be before the underfloor heating elements have been installed.

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Levelling of unevenness / levelling of heights in accordance with DIN 18560

If the permitted tolerances have been exceeded, retrospective measures (in accordance with DIN 18560) will need to be taken in order to rectify those faults. It is therefore recommended, in the case of new-build projects in particular, to inform the contractor that is responsible for the construction of the surfaces that require laying, namely the cellar ceiling and the ceilings of each floor of the building, of the intention to fit a dry system that imposes increased requirements with regard to the evenness and angular nature of the floors. Informing the contractor well in advance may save on the cost of subsequent improvement work. In cases that nevertheless require subsequent levelling work to be carried out, especially during the rehabilitation and renovation of older properties, the following types of treatment are available in order to create an even floor surface.

Levelling using	Self-levelling levelling compound	Levelling fill	Levelling screed	Levelling mortar with air voids or polystyrene components
Unevenness	< 30 mm	> 10 mm to > 100 mm	> 30 mm to 80 mm	> 40 mm to 100 mm
Benefits	Self-levelling Also suitable for the treatment of parts of a room (flow creates transition to untreated sections)	Suitable for sections of floor Can be used to fill in bundles of pipes Installed dry – no additional moisture introduced into the building Available in small quantities	Stable underfloor Additional work on the surface is no problem Bundles of pipes can generally be covered without any problem	Tolerance levelling and insulation in one product Dries rapidly for further processing of surfaces
Manufacturer	Maxit	Knauf Perlite	Maxit	Maxit
Walkable	After 24 hours	Walkable after the load distribution layer has been fitted	After 24 to 48 hours	After 24 to 48 hours
Ready for installation of floorcovering	After 24 to 72 hours, depending on the thickness of the layer (manufacturer's instructions)	Immediately	Generally after 28 days, if the levelling screed or levelling mortar is cement-based	
Note	Used to level small areas and minor discrepancies in height Also suitable for use in parts of areas Maximum layer thickness as specified by the manufacturer must be observed	Used to correct moderate discrepancies in height and medium-sized areas	Suitable for medium-sized areas, depending on the version used	Use only makes sense to level large areas

The manufacturer's processing instructions must be followed. These should be requested from the manufacturer directly.

* If a levelling fill is used, an additional load distribution layer must always be installed immediately above the levelling fill, in order avoid the occurrence of a point load on top of the fill during the later stages of floor construction (especially when laying pipes and the possible migration of the fill materials that could occur).

Additional heat insulation

EPS (DEO)

Expanded rigid foam from 20 mm – high compressive strength from 200 kPa

XPS (DEO)

Expanded rigid foam from 30 mm increased compressive strength (from 300 kPa at 30 mm, 500 kPa from 40 mm)

Wood fibre insulation (DEO)

Thermal insulation 150 kPa

Requirements with regard to the sub-floor

1m max. 3mm

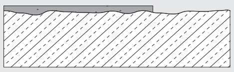
A level, smooth and load-bearing subfloor is essential evenness tolerances compliant with DIN 18202, Table 3

		Local measurements as limit values in mm at a spacing between measuring points in m				
Line	Relates to	0,1 m	1 m	4 m	10 m	15 m
4	Finished level floors with increased requirements, e.g. with self-levelling fillers	1 mm	3 mm	9 mm	12 mm	15 mm

Wooden beam floors must be twist-resistant and deflection-free

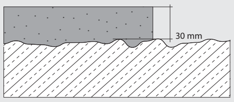
Recommended actions, according to the height of unevennesses

A Unevennesses from 3 mm to 30 mm



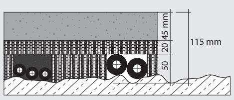
Small unevennesses can be levelled by skimming: up to 6 mm of skim (e.g. weber.floor 4010), up to 30 mm with a filler (e.g. weber.floor 4160)
Subfloors should first be primed (e.g. weber.floor 4716)

B Unevennesses from 30 mm



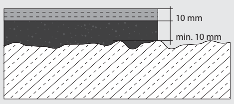
Bound fill (such as Fermacell)
Levelling screed (e.g. weber.floor 4341) – alternative dry method available – dry filling → D
Sub-floor should be primed first of all (e.g. weber.floor 4716)
Pipe channels of up to 50 mm can be levelled using composite screed (if pipes are higher → C)

C Bridging over pipes from 30 mm and increased-height construction > 110 mm



With a screed on top of a layer of insulation

D Dry fill between 10 and 50 mm for small unevennesses



Bound fill (such as Fermacell)
Cover with a load distribution plate (10 mm plaster fibreboard)

Insulating layers below the FLOORTEC Dry system

Impact-noise insulation

Purpose

Impact-noise insulation is intended to minimise the noises generated by walking in the neighbouring dwelling, in stairwells or in one's own home. This type of insulation has a particular effect upon the quality of life, especially in the case of buildings that contain more than one apartment or in multi-storey office buildings.

DIN 4109 imposes precise requirements for a variety of residential buildings and workplaces that must be adhered to in order to provide the level of protection required in living areas.

Planning

The requirements and the planning of the impact-noise insulation should be carried out by a trained building planner, in order to ensure that the installation is in keeping with the state of the art. Subsequent measures to improve insulation levels against impact noise are usually not possible without great expense.

Materials

The types of material that have proven their worth for the purpose of impact-noise insulation especially include EPS plates or wood fibre boards. The use of mineral insulation panels is not permitted.

	Improvement in impact-noise ▯, LW, R Db*
20 mm impact-noise insulation EPS DES 040 dm, sg 20-2	**28**
30 mm impact-noise insulation EPS DES 040 dm, sg 30-3	**29**

*) when combined with a 70 kg/m2 screed

Note/TIP
Below the FLOORTEC Dry system, no insulation materials that are too soft may be used for the purpose of insulation or impact-noise insulation. Otherwise, this could lead to difficulties when the pipe is laid in the system plate, or could cause the dry elements applied above to become unstable.

Installation

Impact-noise insulation must be laid in a continuous layer and as near as possible to the source of the impact-noise itself. If installation pipes have been laid on the subfloor, these should be laid within the levelling insulation layer, the height of which should at least correspond to the height of the empty pipes or the insulated supply pipes.
It is also necessary to take into account that the entire floor construction is free of sound bridges and is insulated against any vertical parts of the building.

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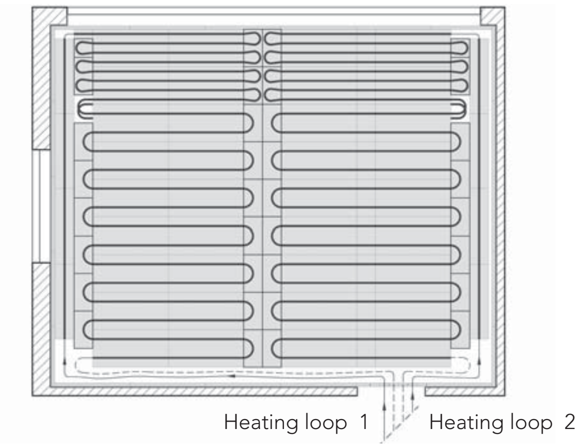
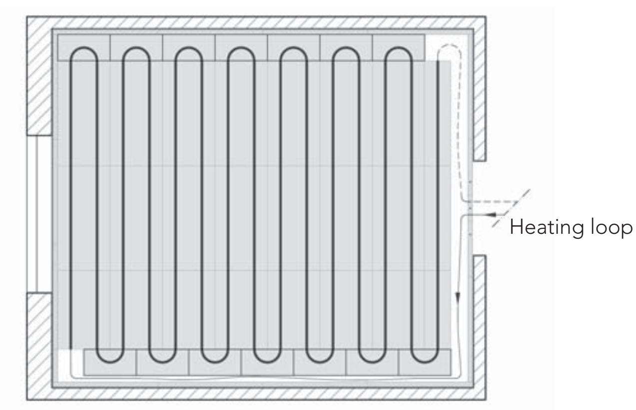
Residential room – 2 heating loops – 28 m²



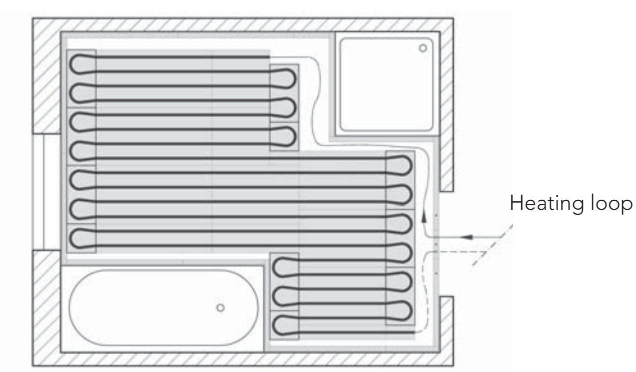
Start off in front of the French window with laying pattern for peripheral areas (125 mm). After 1 metre, switch to the pattern for residential rooms. Always select equally sized heating loops. Lay the supply pipes along the outer wall and cut any missing pipe channels out of the RA elements in an undulating shape using a hot-cutter.

Bedroom – 1 heating loop – 17 m²



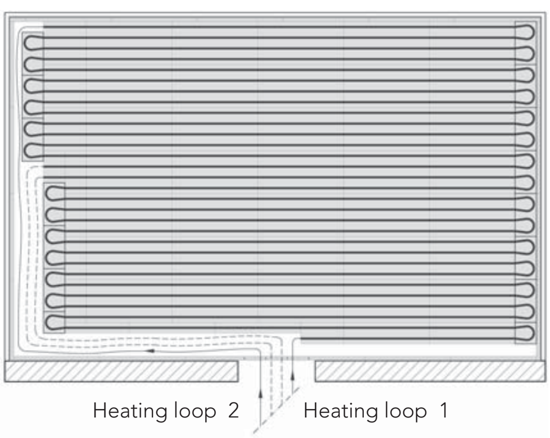
In rooms without floor-level windows, the installation pattern for residential rooms can be used. The heating loop begins in front of the window and the supply pipe is laid along the outer wall and the pipe channels are cut out of the RA elements using a hot-cutter.

Bathroom – 1 heating loop – 9 m²



Unheated shower and bathtub areas are laid out with RA elements and edged with framing wood. The heated area is then laid out using the pattern for peripheral areas (125 mm).
Installation tip: secure the head sections whenever there are frequent changes of direction or short lengths of pipe.

Conservatory – 2 heating loops, 24 m²



For areas with large areas of external glazing, the installation pattern for peripheral areas is recommended (125 mm). Supply pipes are cut into the RA elements in an undulating shape using the hot-cutter.

Dry screed plates

In order to lay dry screed plates, a stable and load-bearing sub-floor will be required, with sufficient lateral load distribution and a low vibration capacity when subjected to dynamic loads.
In the vicinity of corridors and doors, the additional load distribution plates will be required at the joints of the dry screed plates.

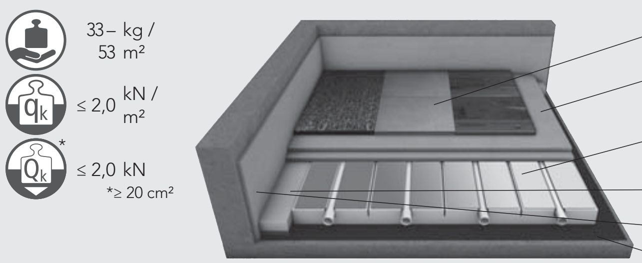
The particular benefits of dry screed:

- The low height of the floor section; a height from approx. 62 mm, including tiles, is possible
- No waiting times when laying the dry screed on top of the underfloor heating
- No waiting times between the installation of the dry screed and the installation of the final floor covering
- No moisture is introduced to the building, making dry screed ideal for use in the renovation of old buildings or situations in which the construction of the floor generates problems
- Ideally suited for the installation on top of wooden beamed floors
- Simple, clean and quick to process

Unevennesses and levelling of heights

The use of fills under the dry screed plates or underfloor heating is ideally suited for the levelling out of heights, thermal insulation and impact-noise insulation. The use of fills generally requires a minimum application quantity of 10 mm.
An additional layer of cover plates must be applied on top of the fill. Various types of product are available for this purpose. In addition to the use of single-layer dry screed plates, fibreboards or OSB boards can be used. It is not permissible for FLOORTEC Dry system plates to be laid on top of a fill. Cover plates are necessary, in order to avoid the formation of distortions in the fill that could be caused by the unavoidable walking over the filled area that would occur while laying the system elements and the aluminium composite pipe. Distortions of that type in the fill would no longer ensure that the dry screed plates were laid fully flat on top of the FLOORTEC Dry system plates and that could result in the formation of fractures.

Typical floor section



The maximum permitted flow temperature using KNAUF Perlite Aquapanel ® Cement Board Floor panels is 70 °C. This maximum flow temperature is only required, however, in the case of a floor section with 35 mm dry screed plates and a textile floor covering with poor thermal conductivity, combined with a heating requirement of 100 Watts/m2 in the room concerned. As such combinations occur only rarely, a flow temperature of 35 to 40 °C can generally be expected. Please consult the following tables and diagrams in order to find the specific performance data.

In order to enable all construction materials to adapt effectively to the operating temperature that is ultimately used, the temperature of the underfloor heating should be increased gradually at first.

Information

If you have any further questions regarding underfloor heating and dry screeds, please contact us directly or if you have any specific questions regarding the different types of floor sections, have any other technical questions or would like information about any additional installation instructions, please contact:

KNAUF PERLITE GmbH
Postfach 10 30 64, D-44030 Dortmund
T: +49 231 99 80 01, F: +49 231 99 80-138
www.knauf-perlite.de

Fermacell GmbH
Düsseldorfer Landstraße 395
D-47259 Duisburg
T: +49 203 60880-3, F: +49 203 60880-8349
www.fermacell.de

DIN Geprüft N. reg.7F403-F

Underfloor heating and parquet flooring / General

Contrary to frequently-voiced opinions, there is absolutely nothing wrong with fitting wooden parquet flooring on top of underfloor heating. It is true, of course, that wood has an insulating effect and not every type of wood is equally well-suited for installation on top of an underfloor heating system. It is therefore important to remember that oak or Douglas fir are generally better-suited than beech or maple. The reason for this has nothing to do with their ability to tolerate temperature, but with the way in which the different types of wood respond to changes in humidity and moisture levels. That is why it is important to ensure that during the winter months, heated rooms maintain a sufficient relative humidity of 50-60%.

It is also important to remain aware of the fact that wood is not an inert material and is continually changing. Gaps can never be entirely ruled out. If the manufacturer's installation and processing instructions are adhered to, it can mostly be assumed that the number of gaps that will be formed will be kept within limits.

A number of different types of parquet can be fitted on top of an underfloor heating system. The most frequently encountered type will certainly be the floating or glued-down installation of 2 or 3-layered parquet strips on a screeded floor. These often take the form of ready-sealed parquet, which once installed requires no final treatment. A glued-down 2 or 3-layered parquet floor is preferable to a floating parquet floor, as the heat transfer is significantly better in the case of a glued-down floor, due to the fact that air pockets have an insulating effect. The use of impact-noise insulation mats or layers of felt beneath the parquet floor will also reduce the effectiveness of the underfloor heating. Please be aware that glue should only be applied to parquet flooring on the surface that touches the layer beneath, and not to the tongue and groove. If glue is also applied to the tongue and the groove, each individual plank will no longer be able to move independently.

That will then cause the floor to form what is, in effect, a single, large panel of wood, which can only move across its entire length and breadth. This may result in the formation of visible cracks measuring several centimetres.

The manufacturer of the parquet flooring of your choice will be able to provide you with the relevant heat conductivity resistance. The spread that exists between the various values for heat conductivity resistance is very high, as they fluctuate, depending on the type of wood and the number of layers involved.

With regard to the permissible surface temperatures, it is important to be aware that the majority of parquet flooring manufacturers have approved their flooring products for a maximum surface temperature (measured directly on the upper surface of the wood) of 27 °C, assuming that each individual type of parquet flooring or type of wood has been approved for use in conjunction with underfloor heating in the first place.

Direct installation of solid wood planks

An alternative approach is to install solid wooden planks directly on top of the FLOORTEC Dry system plates. A variation that is frequently encountered is to lay solid wooden planks onto a system of battens. The battens do not, however, play any part in dissipating the load that is brought to bear on the floor, but actually connect the solid wooden planks together. In the solution shown in the floor section illustrated, the planks lie directly on top of the system plates, thereby ensuring a good heat flow from the underfloor heating to the wooden planked floor.

In installations of this type, it is important to remember that the battens must be no thicker than 28 mm and the planked floor must be screwed down (and not nailed!) to the battens. The system of battens effectively hovers above the underfloor insulation. This serves to ensure that the planked floor does derive support from the battens, thereby ensuring that no air cushions are created beneath the wood.

In this type of installation, it is a good idea before the wooden floor is fitted to lay the separation and sliding layer on top of the FLOORTEC Dry system plates. This will provide additional protection to the wood against increases in moisture levels from below (similarly, the same also applies to the floating installation of planked flooring).

For further information, please contact the manufacturer of your parquet flooring. The manufacturer must be the one that provides fundamental approval for the installation of a parquet floor on top of underfloor heating.

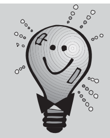
Project planning datasheet

Tailor-made planning to produce a cost-effective heating system...

That is why we need to collect detailed information so that we can produce a precise and detailed plan of your surface heating solution.

That information will include:
- **EnEV Energy certificate**
- **An outline drawing to scale**
- **Precise sectional drawings**
- **Heat protection certificate or precise details of the part of the building involved**

In order to make your task and our task easier, please fill in the full address of all persons involved below.



And please do not forget:
Our calculation can only be as precise as your details allow it to be!.

Wholesale organisation:

Branch ______________________________

Contact person ______________________________

Street ______________________________

Postcode, locality ______________________________

Telephone ______________________________

Fax ______________________________

Heating engineer:

Name of company ______________________________

Contact person ______________________________

Street ______________________________

Postcode, locality ______________________________

Telephone ______________________________

Fax ______________________________

Building-owner:

Name ______________________________

Street ______________________________

Postcode, locality ______________________________

Telephone ______________________________

Please complete this form in full!

Details:

Item required for this form to be processed:
Full house-plans to a scale of 1:50 or 1:100.

Note: If insufficient information is provided, standard values will need to be used in order to perform the calculation. In the case of the different versions of insulation available, the minimum requirements in accordance with ÖNORM EN 1264 will be included.
Floor coverings will be defined in terms of the DIN standard value.
Room temperatures will be compliant with the standard.

System: ◯ FLOORTEC Preformed plate system UNI ◯ FLOORTEC 3D Stapler system
◯ FLOORTEC Dry system ◯ ______________

Heating pipe: Pe-Xcellent: ◯ 14 x 2 mm ◯ 17 x 2 mm
◯ 20 x 2 mm
Aluminium: ◯ 16 x 2 mm

Heating system:

Surface heating ◯ In the cellar ◯ On the ground-floor ◯ On the upper floor ◯ In the attic

Radiators ◯ In the cellar ◯ On the ground-floor ◯ On the upper floor ◯ In the attic

Unheated storeys ◯ Cellar ◯ Attic

Building has a cellar ◯ Yes ◯ No

U-values [W/m²k]:

Cellar	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Ground floor	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Attic	Internal	Ground	External air
Floor			
External wall			
Exterior window			
Ceiling			

Heating: ◯ Boiler ◯ Heat pump
max. flow temperature ______ °C

Location of manifold – please mark this clearly on your plans!

Manifold cabinet: ◯ Recessed into plasterwork ◯ Mounted on top of plasterwork

Manifold cabinet size
for heat meter ◯ Yes ◯ No

Control ◯ Yes ◯ No

Other: ____

____

Record for initial heating as a function-test for pipe systems on insulating panels in wet screed

Client: ______________________________

Building/property: ______________________________

Section or part of building
Storey/dwelling: ______________________________

Part of complex: ______________________________

Requirements
Initial heating must be carried out on the underfloor heating system in order to carry out a functional test. The test will provide the heating engineer with evidence that a fault-free installation has been fitted. Whenever a cement-based screed has been used, the tasks listed below may not begin until at least 21 days after screeding work is complete and no sooner than 7 days (or any period specified by the manufacturer) after screeding work is complete when a calcium sulphate screed has been used.

In accordance with DIN 1264-4, the flow temperature of between 20 °C and 25 °C must be maintained for at least 3 days and after that the maximum rated temperature must be maintained for at least 4 days. Any instructions issued by the manufacturer that contradict the standard or this protocol (e.g. in the case of self-levelling screeds) should be observed and recorded.

Documentation

1) Type of screed (name of manufacturer, if applicable) ______________________________
   Binder used ______________________________
   Predetermined setting time ______________________________

2) Completion of work on the heating screed (date)

3) Start of initial heating (date)

4) Temperature increased to maximum rated temperature (date):
   Maximum flow temperature t_v max = _______ °C maintained for at least 4 days

5) End of initial heating (date)
   If a risk of frost applies, relevant protective measures (e.g. frost protection operation) should be initiated.

6) Was initial heating interrupted? ◯ Yes ◯ No
   If yes: from ____________ to ____________

7) The rooms were ventilated draught-free and all windows and doors closed once the surface heating was switched off.
   ◯ Yes ◯ No

8) The heated floor area was left uncovered during initial heating
   ◯ Yes ◯ No

9) The system was approved for further construction work at an external temperature of ____________°C.
   The system was not operational at that time.
   The floor was heated at that time at a flow temperature of ____________°C.

Record for initial heating as a functional test for pipe systems on insulation panels in a wet screed

Important:

Depending on the heat capacity of the heat source, initial heating should be carried out in stages if necessary. All heating loops within each screeded area must however be heated simultaneously.

Initial heating does not serve to ensure that the screed has achieved the moisture content required for floor covering to be applied.

When switching off the surface heating after the heating-up phase, the screed should be protected from drafts or excessively rapid cooling until it has cooled completely.

Confirmation

______________________	______________________	______________________
Place/date	Place/date	Place/date
______________________	______________________	______________________
Building-owner/Client Stamp/Signature	Site manager/Architect Stamp/Signature	Heating engineer Stamp/Signature

CM-measurement – working instructions

The purpose of the CM (combination moisture) measurement is to determine the moisture content in the screed in order to decide whether the screed is ready for the floor covering to be applied. Samples may only be taken for the purpose of CM measurement at the designated measuring points. It is essential to ensure that when preparing the samples, as little moisture is lost as possible. This means therefore:

- That the taking and preparation of samples must be carried out as quickly as possible
- That the preparation of samples may not be undertaken in direct sunlight or in a draught
- That the sample should only be broken into small pieces in order for it to be completely pulverized in the CM-device, with the help of the 4 ball-bearings.

Before samples are taken, the following measures should be taken:

- Check, whether the CM-device is airtight (if necessary using a calibration substance), replacing the rubber seal if necessary.
- Place 4 ball-bearings inside the CM device.
- If necessary, attach a weighing scale to the container of the device.
- Have a bowl, hammer and spoon at the ready.
- Prepare the record (indicating the construction site, storey, room, testing date, tester and test outcome)

When carrying out the test, you should proceed as follows:

1. Always take an average sample from the entire cross-section of the screed. In the case of parquet floors, the boundary values conventionally require the lower to middle area to be measured. The average sample taken from under a parquet floor must therefore be taken from the lower to middle area.

2. Break up the average sample in the bowl into sufficiently small pieces in order to enable it to be completely pulverized in the CM-device due to the action of the ball-bearings.

3. Weigh off the test material with the spoon: Calcium sulphate screed 100 g, recently-laid cement-based screed 20 g, screed that is almost ready for the application of the floor covering 50g

4. Carefully place the test material into the CM device, along with the ball-bearings. This can be carried out more easily by using a funnel with a large outlet.

5. Hold the CM device at an angle and fill the glass ampoule with calcium carbide.

6. Close the CM device firmly and the shake vigorously, until the indication on the manometer rises.

7. Completely pulverize the test material using the ball-bearings, by making circular movements and vigorous movements back and forth. Ensure that the manometer is not placed under pressure. Duration: 2 minutes.

8. Five minutes after sealing the CM device as under no. 7, shake for a further minute.

9. Ten minutes after sealing the CM device, briefly shake once again (for 10 seconds) and read off the value. Determine the moisture according to the calibration chart and enter it in the record. Note: in the case of screeds bound together with calcium sulphate, a further rise in pressure is possible. Disregard this, as it is due to chemically (firmly) bound water.

10. Empty the CM device and clean it. Important: while emptying, checking the test material. If it has not been completely pulverized, repeat the test including the taking of samples and then break up the test material into even smaller pieces using the hammer.

11. Dispose of the test material, in accordance with the manufacturer's instructions.

Documentation (record for CM-measurement in accordance with working instructions)

Client: ____________________

Building/Property: ____________________

Section or part of building
Storey/Dwelling: ____________________

Part of complex: ____________________

For details of requirements, please see the preceding work instructions.

Documentation

Measurement no.	1	2[1]	3[1]
Room no.			
Tester			
Date			

Weight	g			
Manometer reading	bar			
Water content[2]	%			
Screed thickness	mm			

[1] Only required, if the screed was too moist at the time of the previous measurement
[2] From the conversion table supplied by the manufacturer of the CM device; this is equivalent to the CM percentage

Confirmation

Place/date	Place/date	Place/date
Building-owner/Client Stamp/Signature	Site manager/Architect Stamp/Signature	Heating engineer Stamp/Signature

Record relating to the heating of the screed so that it is ready to receive the final floor covering

Client: ______________________________

Building/Property: ______________________________

Section or part of building
Storey/Dwelling: ______________________________

Part of complex: ______________________________

Requirements
Heating in order to ensure that the screed is ready to receive the final floor covering must be carried out in accordance with the requirements of Procedural Protocol NB1 and NB2. The steps listed below under documentation must be undertaken in that regard.

Heating in order to ensure that the screed is ready to receive the final floor covering should generally be carried out immediately after the initial heating. The heating should not be switched off or the flow temperature reduced. At that point in time, a cement screed will be at least 28 days old, whilst a calcium sulphate screed will be at least 14 days old. These numbers of days must be added to the numbers of days required for the heating of the screed that are listed below, when estimating the number of days until the screed is ready for the final floor covering. Generally speaking, a period of at least 14 days should be scheduled for the heating of screeds up to 70 mm thick, whilst screeds thicker than 70 mm will require a correspondingly longer period of time.

Documentation

Did the heating of screed to make it ready to receive the final floor covering begin immediately after the initial heating?

Yes ◯ Please continue in Table 2

No ◯ Please continue in Table 1

Heating began on ____________ (Night-time reduction and temperature control relating to external temperature switched off)

Table 1

Days of heating	Target flow temperature	Actual flow temperature as read	Date, time	Tester
Day 1	25 °C			
Day 2	35 °C			
Day 3	45 °C			
Day 4	55 °C			

[1)] or the maximum rated flow temperature

Please continue in Table 2

Record relating to the heating of the screed so that it is ready to receive the final floorcovering

Table 2

Days of heating	Target flow temperature	Flow temperature as read	Date, time	Tester
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	Film test carried out[2)3)]			
Day ...	55 °C			
Day ...	55 °C			
Day ...	55 °C			
Day ...	Film test carried out once again[2)3)]			
Day ...	Readiness tested[2)]	CM measurement		

Table 3: Reducing the temperature having determined the readiness of the screed (without night-time set-back)

Days of heating	Target flow temperature	Flow temperature as read	Date, time	Tester
Day ...	45 °C [1)]			
Day ...	35 °C			
Day ...	25 °C			
Day ...	Heating onto automatic			

1) Heating of screed automatically controlled?
◯ Yes ◯ No (preceding records no longer apply)

What make/type?

2) Heating of screed completed (date):

3) During the heating, were the rooms ventilated according to the instructions of the screed manufacturer?
◯ Yes ◯ No

4) Was the heated area of floor free of building materials and other items covering it or placed above it?
◯ Yes ◯ No

5) Did more than 7 days elapse between the final cooling day or the determination of the moisture content and the day on which the laying of the floor covering commenced?
◯ Yes ◯ No

6) If so, the system should be heated again for at least two days before laying begins according to the instructions or otherwise at the maximum rated flow temperature and a new moisture measurement carried out. Have the maximum moisture values given in Table 4 not been exceeded?
◯ Yes ◯ No

[1)] or the maximum rated flow temperature
[2)] according to the indication/instruction of the building-owner/architect
[3)] If moisture is detected, heating should be carried out again. If no moisture is detected, carry out a CM measurement.

Record relating to the heating of the screed so that it is ready to receive the final floor covering

Table 4

	Floor covering	Cement-based screed – target (%)	Calcium sulphate screed – target (%)
ObBo 1	Textile floor coverings and elastic floor coverings	1,8	0,3
ObBo 2	Parquet	1,8	0,3
ObBo 3	Laminate flooring	1,8	0,3
ObBo 4	Ceramic tiles or natural/concrete working stones	2,0	0,3

Table 5: Moisture levels detected

Room no.	Room	Floor covering	Measuring point, if applicable	Target value – Target (%)	Actual value – Target (%)

Laying of floor covering began on (date): ______________________________

Laying of floor covering completed on (date): ___________________________

Confirmation by date/signature (In so far as involved, assigned, monitored or carried out)

	Assigned by building-owner/client:	Monitored by Site Manager/Architect:	Carried out by heating engineer	Carried out by person laying floor covering
Heating to make screed ready for floor covering				
Film test				
Moisture measurement				

Preparatory measures for the laying of floor coverings on cement-based screeds and calcium sulphate screeds

Initial remarks
In order to guarantee optimum functionality in the long term, every heated floor requires planning and coordination with regard to the heating system, the insulating layer, the screed and the various types of floor covering. When carrying out the construction of these types of floors, it is extremely important that the floor fulfils the requirements applicable to the trade, in addition to the relevant standards. The goods supplied and the work carried out must correspond to the state of the art, the current datasheet, the installation and laying guidelines of each of the system-provider and manufacturer in each case.

Screed/functional testing/Readiness to receive the final floor covering
Once the screed has been applied and has completed the corresponding drying period and once initial heating has taken place, determining whether the screed is ready to receive the floor covering forms a pre-requisite for the application of the floor covering. In so far as the screed is to be made ready to receive the floor covering by heating it up, the heating of the construction should be undertaken in accordance with the P7 “Protocol for the heating of the screed”. This forms a pre-requisite for the preparation and laying of all types of floor covering. Before laying the floorcovering, the readiness of the screed must be evidenced by the carrying out of a CM measurement in accordance with P6 “CM-measurement”. The maximum moisture levels of the screed specified in Table 4 of P7 “Protocol for the heating of the screed” form the indicator that the screed is ready for the laying of the floor covering. If, during the CM-measurement, the values listed in Table 4 are exceeded, further heating and drying measures must be carried out. Once these have taken place, the readiness of the screed must be determined by carrying out a further CM measurement. In order that the number of the marked measurement points is sufficient, electronic or interim film tests are recommended in order to estimate the moisture content, before a further CM measurement is carried out. Sufficient dryness will have been practically achieved, if at the maximum flow temperature there are no traces of moisture under a 50 cm by 50 cm PE-film secured at the edges with adhesive tape, before a period of 24 hours has elapsed. The interim tests and the additional CM measurement(s) are specialist services. The CM measurement may only be carried out at the designated measurement points. Moisture tests carried out at measurement points that are unmarked may give rise to damage to the heating system.

Special measures (heating to make the screed ready for the floor covering, laying and use)
The Client is obliged to carry out and confirm the heating to make the screed ready for the floor covering in accordance with P7 “Protocol for the heating of the screed”. In doing so, he/she must observe the following details:

• When heating the screed in a hot-water surface heating installation, a flow temperature of 25 °C should be set and then increased each day by 10 K, until the maximum heat output is achieved (a flow temperature no higher than 55 °C). This should then be maintained until the screed is ready for the floor covering. When cooling down, the flow temperature should be reduced by 10 K each day, until a flow temperature of 25 °C is achieved. The heating up and cooling down phases should be carried out in accordance with the indicated time schedule. During heating up and cooling down, the moisture in the room should be released by means of brief ventilation at fixed intervals. Draughts should be avoided.

• While heating is underway, the heated area of floor should be free of building materials and other items covering it or placed above it.

• The time schedule contains the minimum number of heating days over and above the initial heating period and relates to screeds of up to 70 mm thick. Every additional day provides additional security. Heating to make the screed ready to receive the final floor covering should take place immediately before the floor coverings are actually laid.

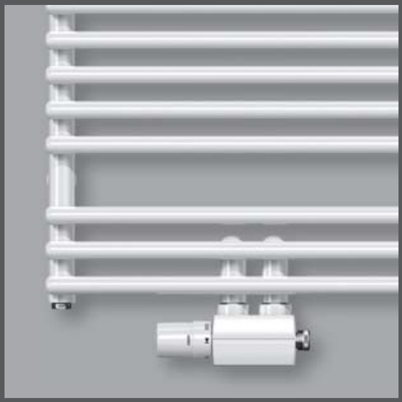
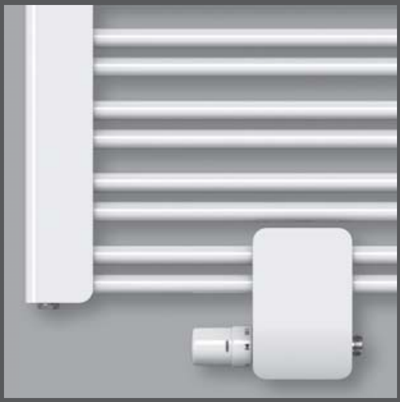
• The floor coverings should be laid at a screed surface temperature of no less than 18 °C (depending on the ambient temperature, this is equivalent to a flow temperature of 20-25 °C and at a relative humidity specific to the materials concerned. The screed temperature must be held for at least 3 days prior to, during and after laying has been carried out.

• In the case of hydraulic laying mortars without additives, the surface temperature of the screed must be at least 5 °C.

• Once glued-down floor coverings have been completed, the values listed above for the screed temperature and humidity must be maintained for 7 days (e.g. for curing and drying times of adhesives, etc.).

• In the case of floating floors, especially laminate flooring, the evenness requirements in accordance with DIN 18202, Table 3, line 4 are of particular importance. It is necessary to pay attention to the selection of suitable heat insulation substrate, in combination with the floor element.

• The room air conditions required for the floor covering itself should also be adhered to while the floor covering is in use. The relevant instructions in the care instructions should be followed.

Trend-setters with stylish features

With cutting-edge towel warmers and design radiators, **VOGEL&NOOT** is the obvious choice for high quality, individual heating system design: the combination of the very latest concepts with innovative heat emission technology means that products from **VOGEL&NOOT** provide high-calibre solutions to satisfy even the most discerning aesthetic requirements. Intuitive operation and practical functions have always been a feature of the all-encompassing design you have come to expect from **VOGEL&NOOT**. A hint of luxury adds an exciting touch in your home, while concentrated heat emission from functional radiators in the bathroom form an essential component that provides a multitude of benefits. Why not let yourself be inspired?

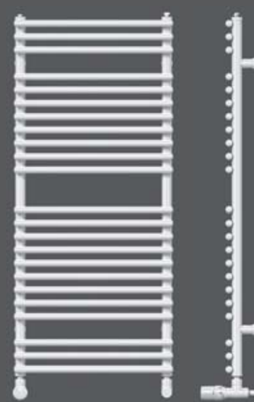
TOWEL WARMERS AND DESIGN RADIATORS

Towel warmers

Contents

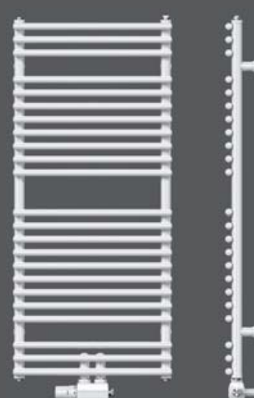

DION in RAL 9016


DION in Chrome



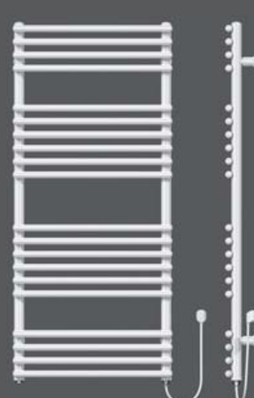

DION-VM in RAL 9016


DION-VM in Chrome




DELLA Electric in RAL 9016


DELLA Electric in Chrome

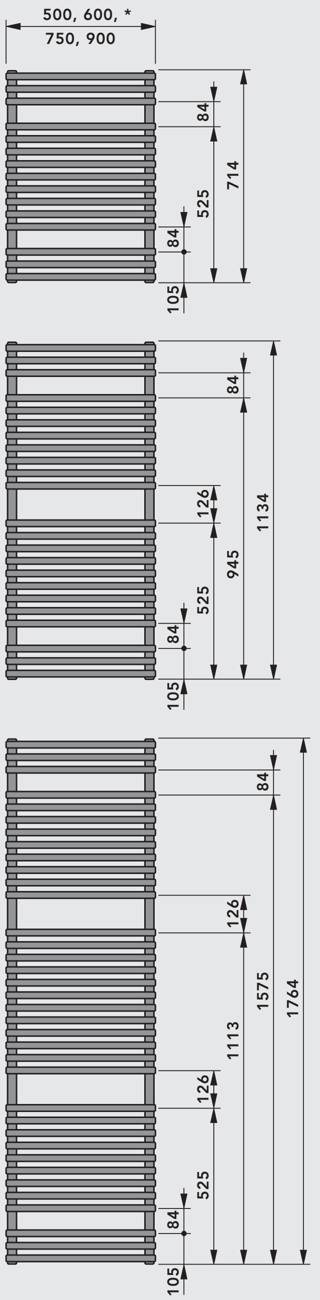


Tender offer documents are available to download at www.vogelundnoot.com/download

DION Towel Warmer RAL 9016 and Chrome

Technical information

Dimensions [mm]



* in chrome finish: overall length 500 and 600 mm

DION RAL 9016

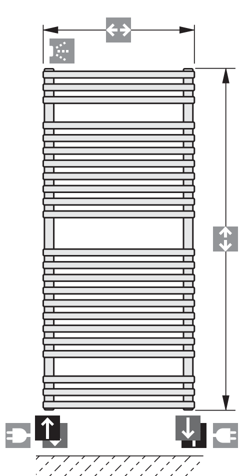
Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power (1) Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watts	Weight kg	Water content l
700 (714)	500	374	304	265	196	161	1,270	300	2,8	6,8
	600	437	353	306	223	183	1,314	300	3,2	7,8
	750	529	428	372	272	223	1,302	300	3,9	9,2
	900	617	500	435	319	262	1,291	300	4,6	10,6
1100 (1134)	500	568	458	397	289	236	1,322	300	4,5	10,4
	600	663	536	464	339	277	1,314	300	5,3	11,8
	750	802	649	564	412	338	1,302	600	6,4	13,9
	900	937	760	661	485	398	1,291	600	7,5	16,0
1800 (1764)	500	886	712	616	447	364	1,341	600	7,5	15,8
	600	1035	833	721	523	427	1,336	600	8,5	18,2
	750	1252	1009	874	635	519	1,328	900	9,9	21,7
	900	1462	1180	1022	745	609	1,321	900	11,3	25,2

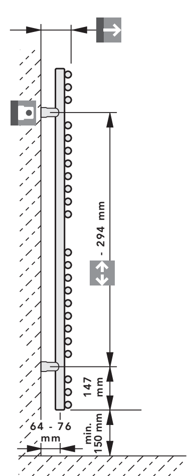
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

DION chrome

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power (1) Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watts	Weight kg	Water content l
1100 (1134)	500	388	315	274	202	166	1,279	300	4,5	10,4
	600	452	368	321	237	195	1,264	300	5,3	11,8
1800 (1764)	500	603	489	425	311	255	1,295	300	7,5	15,8
	600	701	570	497	366	302	1,271	600	8,5	18,2

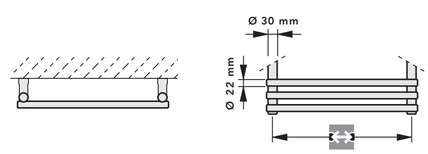
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C





Overall depth (incl. wall clearance)
97 - 109 mm

Boss spacing
overall length - 40 mm



Connections
4 x internal thread G 1/2 and Connection options
In line with drawing

Test overpressure
13 bar

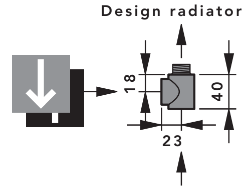
Max. operating overpressure
10 bar

Maximum operating temperature
110 °C

Accessories: PTC electric heating element
All DION towel warmers fitted with an electric heating element can also be used when the regular heating system is switched off. It is **essential** to take into account the power ratings assigned to the electric heating elements.

Free accessories
- A pivotable vent plug, G 1/2, nickel-plated brass, self-sealing
- A dummy plug, G 1/2 nickel-plated brass
- A wall mounting set
- A fitting aid
- An instruction sheet

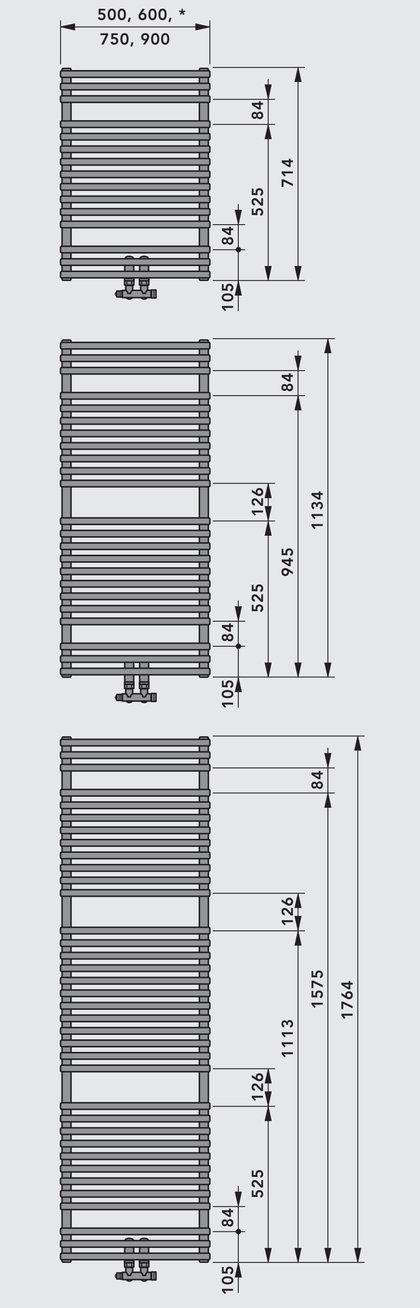
Special connector (chrome-plated) is to be used when using the DION towel warmer in electric heating mode!



DION-VM Towel Warmer RAL 9016 and Chrome

Technical information

Dimensions [mm]



* in chrome finish: overall length 500 and 600 mm

DION-VM RAL 9016

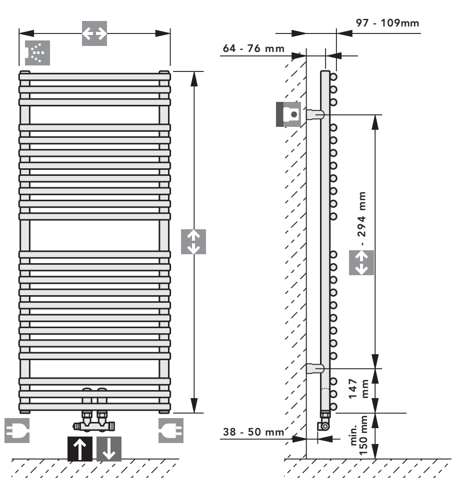
Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power (1) Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watts	Weight kg	Water content l
700 (714)	500	374	304	265	196	161	1,270	300	2,8	6,8
	600	437	353	306	223	183	1,314	300	3,2	7,8
	750	529	428	372	272	223	1,302	300	3,9	9,2
	900	617	500	435	319	262	1,291	300	4,6	10,6
1100 (1134)	500	568	458	397	289	236	1,322	300	4,5	10,4
	600	663	536	464	339	277	1,314	300	5,3	11,8
	750	802	649	564	412	338	1,302	600	6,4	13,9
	900	937	760	661	485	398	1,291	600	7,5	16,0
1800 (1764)	500	886	712	616	447	364	1,341	600	7,5	15,8
	600	1035	833	721	523	427	1,336	600	8,5	18,2
	750	1252	1009	874	635	519	1,328	900	9,9	21,7
	900	1462	1180	1022	745	609	1,321	900	11,3	25,2

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

DION-VM chrome

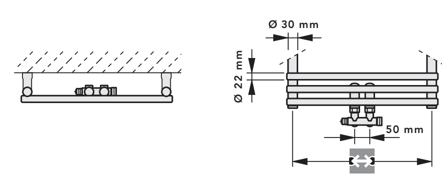
Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power (1) Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watts	Weight kg	Water content l
1100 (1134)	500	388	315	274	202	166	1,279	300	4,5	10,4
	600	452	368	321	237	195	1,264	300	5,3	11,8
1800 (1764)	500	603	489	425	311	255	1,295	300	7,5	15,8
	600	701	570	497	366	302	1,271	600	8,5	18,2

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C



Overall depth (incl. wall clearance)
97 - 109 mm

Boss spacing
overall length - 40 mm



Connections
2 x external thread G 3/4 (valve connection set) and 4 x internal thread 1/2
Connection options
In line with drawing

Test overpressure
13 bar

Max. operating overpressure
10 bar

Maximum operating temperature
110 °C

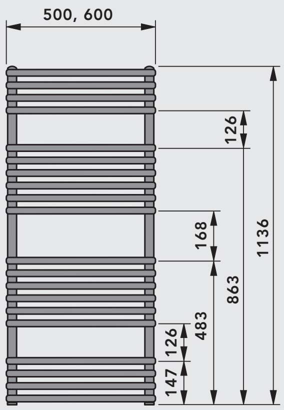
Accessories: PTC electric heating element
All DION-VM towel warmers fitted with an electric heating element can also be used when the regular heating system is switched off. It is **essential** to take into account the power ratings assigned to the electric heating elements.

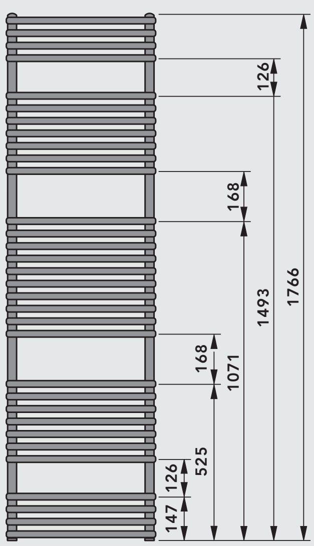
Free accessories
- A pivotable vent plug, G 1/2, nickel-plated brass, self-sealing
- Three dummy plugs in the design with valves
- A wall mounting set
- A fitting aid
- An instruction sheet

DELLA Elektro Towel Warmer RAL 9016 and Chrome

Technical information

Dimensions [mm]



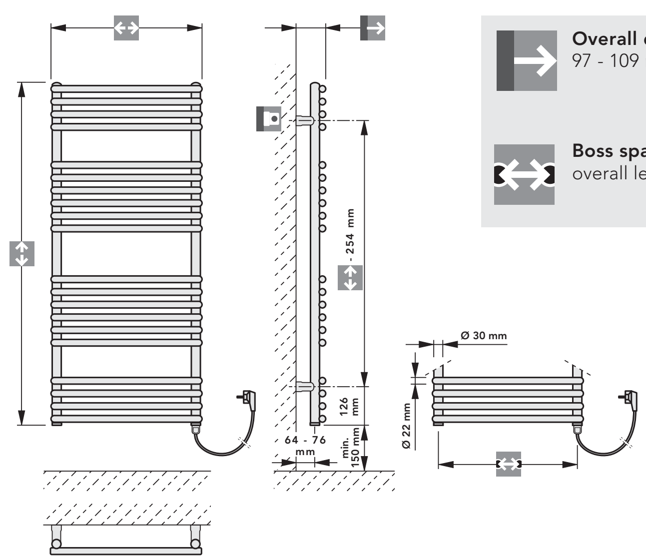


DELLA electric RAL 9016

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power Watts at 60°C	Nominal voltage [V]	Protection mode	Weight kg
1100 (1136)	**500**	400	AC 230	IP 24	13,3
	600	400	AC 230	IP 24	15,3
1800 (1766)	**500**	600	AC 230	IP 24	21,0
	600	600	AC 230	IP 24	24,0

DELLA electric chrome

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power Watts at 60°C	Nominal voltage [V]	Protection mode	Weight kg
1100 (1136)	**500**	300	AC 230	IP 24	13,3
	600	400	AC 230	IP 24	15,3
1800 (1766)	**500**	400	AC 230	IP 24	21,0
	600	600	AC 230	IP 24	24,0



Overall depth (incl. wall clearance)
97 - 109 mm

Boss spacing
overall length - 40 mm

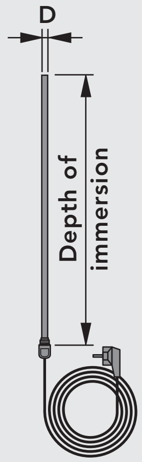
Description
With their built-in electric heating, the electric radiators of the DELLA Elektro family provide an elegant addition to any bathroom.

Self-regulation effect - The temperature-dependent PTC heating element controls the temperature of the heat-transfer liquid independently by modifying its electrical resistance. This cannot be adjusted manually.

Free accessories:
- A wall mounting set matching the radiator colour
- A fitting aid
- An instruction sheet

ÖVE tested

PTC electric heating elements



Electric heating element	EH 300 * EHS 300 **	EH 600 * EHS 600 **	EH 900 * EHS 900 **
Nominal voltage Nominal input EH Depth of immersion EH Diameter **D** EH Cable length EH	AC 230 Volt 300 Watts at 60 °C 245 mm 11 mm 1500 mm	AC 230 Volt 600 Watts at 60°C 450 mm 11 mm 1500 mm	AC 230 Volt 900 Watts at 60 °C 620 mm 11 mm 1500 mm
Item no. with safety plug *	**AZ1EH030A0001000**	**AZ1EH062A0001000**	**AZ1EH092A0001000**
with safety plug and switch **	**AZ1EH030B0001000**	**AZ1EH062B0001000**	**AZ1EH092B0001000**
Designs: * with safety plug ** with safety plug and switch	Protection mode IP 64 IP 40		

All DION and DION-VM towel warmers fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Digital room thermostat

Digital room thermostat with infrared transfer incl. PTC electric heating element, for the purpose of regulating the temperature of the towel warmer. The infrared transmitter features an easy-to-understand LCD display that shows the room temperature, target temperature, operating mode and BOOST symbol at the same time.

The BOOST function allows you to activate operation for a continuous period of time (without thermostat function) from 5 minutes up to 5 hours. Three pre-defined modifiable programmes enable you to select one or two BOOST cycles per day.

The infrared control set is especially suitable for installation at a subsequent date, as a safety plug can be exchanged for a receiver at a later date.

	Infrared control set		
	EH 300 Set	**EH 600 Set**	**EH 900 Set**
	PTC-electric heating element		
Nominal voltage Nominal input EH Depth of immersion EH Diameter D EH Cable length EH	AC 230 Volt 300 Watts at 60 °C 245 mm 11 mm 1500 mm	AC 230 Volt 600 Watts at 60°C 450 mm 11 mm 1500 mm	AC 230 Volt 900 Watts at 60 °C 620 mm 11 mm 1500 mm
	Digital room thermostat transmitter		
Setting range for room temperatures	Between + 5 °C and + 30 °C		
Setting range for BOOST cycle duration	Between 5 minutes and 5 hours		
Display area for room temperatures	from + 0 °C to + 40 °C		
Static deviation	< 0,3 K		
Power supply	2 alkaline cells, LR03 model		
Range	Approx. 10 metres (all directions) Approx. 15 metres (in an unobstructed straight line)		
Interval of Infrared transmissions	Every 10 minutes		
Operational temperature	Between –10 °C and +50 °C		
Storage temperature	Between –20 °C and +60 °C		
Air humidity	Maxium of 90 %, at +25 °C		
Protection mode	IP 31		
Dimensions	120 x 80 x 35 mm (height x length x depth)		
	Digital room thermostat receiver		
Supply voltage	230 VAC +/- 10%		
Mains frequency	50 Hz		
Input power	< 5 VA		
Output	1 N/O contact (not potential free)		
Switching capacity	Ohm resistive load: max. 10A/2000W		
Operational temperature	Between –10 °C and +40 °C		
Storage temperature	Between –20 °C and +60 °C		
Air humidity	Maxium of 90 %, at +20 °C		
Protection mode	IP 24		
Dimensions	117 x 81 x 30 mm (height x length x depth)		
Digital room thermostat, transmitter and receiver **AND** electrical heating element			
Item no.	AZ1CT030I0001000	AZ1CT060I0001000	AZ1CT090I0001000
Digital room thermostat, transmitter and receiver WITHOUT electrical heating element			
Item no.	AZ1CT000I0001000		

Accessories

Accessoires

Clothes rail

Bath towel rail

Glass shelf

Hand towel ring

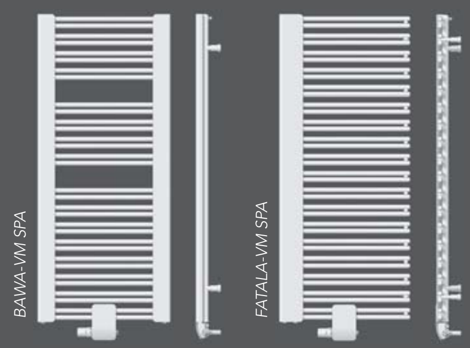
Hand towel rail

Accessoir Overall length [mm]	Item no.	**DION / DION-VM** Overall length [mm]				**DELLA Elektro** Overall length [mm]	
		500	**600**	**750**	**900**	**500**	**600**
CLOTHES RAIL chromee-plated (incl. two fastening kits)							
492	AZ1CR049C200100SCHRO	•	•	•	•	•	•
596	AZ1CR060C200100SCHRO		•	•	•		•
804	AZ1CR080C200100SCHRO				•		
BATH TOWEL RAIL chromee-plated (incl. two fastening kits)							
500	AZ1BT050C200100SCHRO	•	•	•	•	•	•
600	AZ1BT065C200100SCHRO		•	•	•		•
GLASS SHELF (incl. two fastening kits)							
300	AZ1GS030C200100SCHRO	•	•	•	•	•	•
500	AZ1GS050C200100SCHRO	•	•	•	•	•	•
650	AZ1GS065C200100SCHRO			•	•		
HAND TOWEL RING chromee-plated (incl. fastening kit)							
	AZ1HT000C200100SCHRO	•	•	•	•	•	•
HAND TOWEL RAIL chromee-plated (incl. fastening kit)							
	AZ1TR000C200100SCHRO	•	•	•	•	•	•

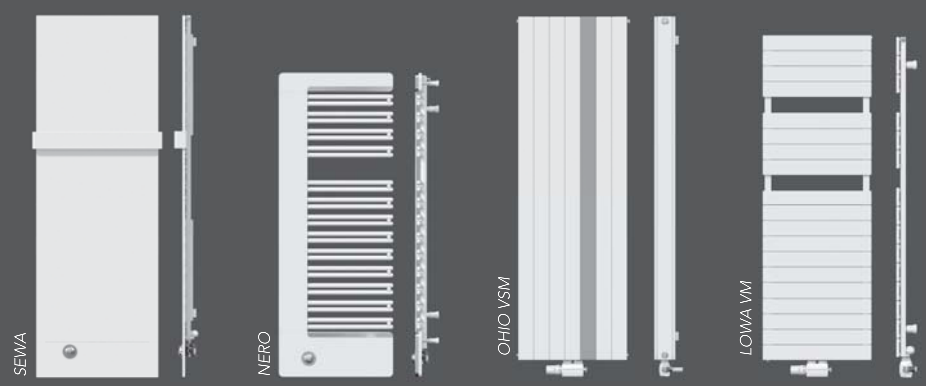
Guarantee statements are available to download at **www.vogelundnoot.com/download**

Design radiator

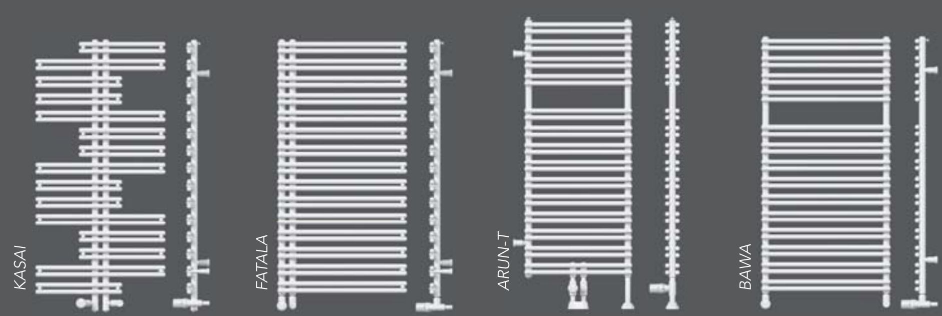
Contents



Trend & Style



Architecture & Design



Universal & Modern

Country house & Classics

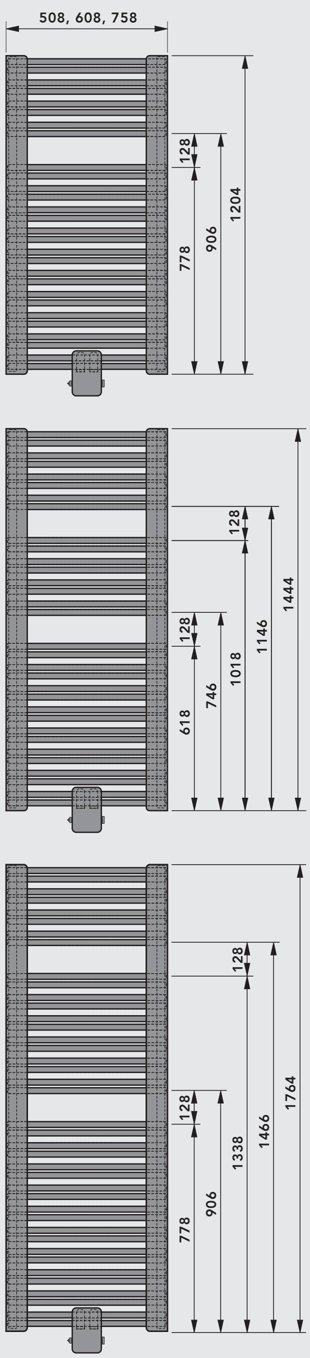
Basics

Tender offer documents are available to download at www.vogelundnoot.com/download

1
ULOW-E2
Profile panel radiators
Plan panel radiators
Vertical radiators
2
General information
Preformed plate system
Stapler system
Special systems
3
Towel warmers
Design radiators

Technical data

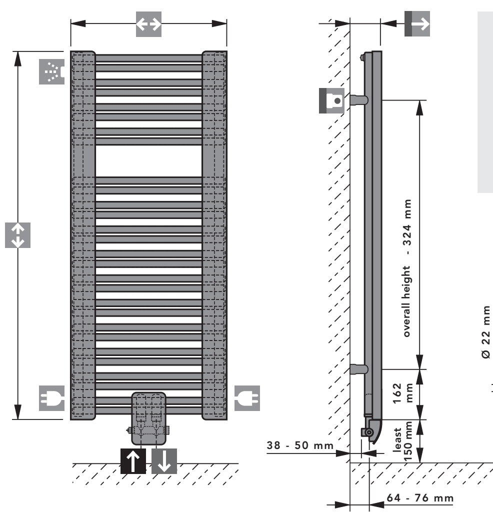
Dimensions [mm]



BAWA-VM SPA

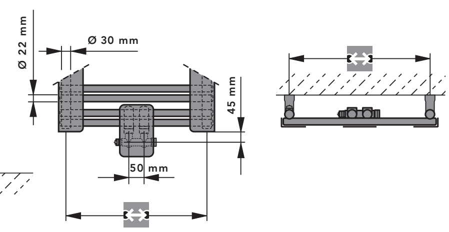
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [(1)] in Watts 75/65/20 °C	Radiator exponent n	E-heat element Output [(2)] Watt	Weight kg	Water content l
1200 (1204)	508	629	1,2010	300	14,64	5,40
	608	738	1,2012	300	16,34	6,30
	758	898	1,2014	600	18,89	7,65
1500 (1444)	508	747	1,2270	300	17,25	6,58
	608	876	1,2246	600	19,28	7,59
	758	1066	1,2209	600	22,32	9,10
1800 (1764)	508	885	1,2605	600	20,63	8,10
	608	1038	1,2546	600	23,08	9,25
	758	1263	1,2458	600	26,76	10,98

[(1)] Tested in accordance with ÖNORM EN 442 [(2)] at 60° C

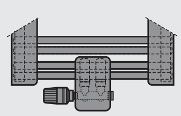


Depth (incl. wall projection)
for an overall length of 508 .... 102 - 114 mm
for an overall length of 608 .... 102 - 114 mm
for an overall length of 758 .... 102 - 114 mm

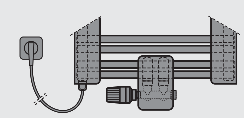
Overall length - 50 mm

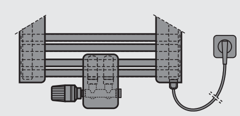


Connection example without electric heating element



Connection examples with electric heating element





Connections
2 x external thread G 3/4 (for valve connection set)
2 x internal thread G 1/2 and
1 x internal thread G 1/4 (for vent plugs)
Connection options
In line with drawing

13 bar
Test overpressure
13 bar

10 bar max.
Maximum positive operating pvressure
10 bar

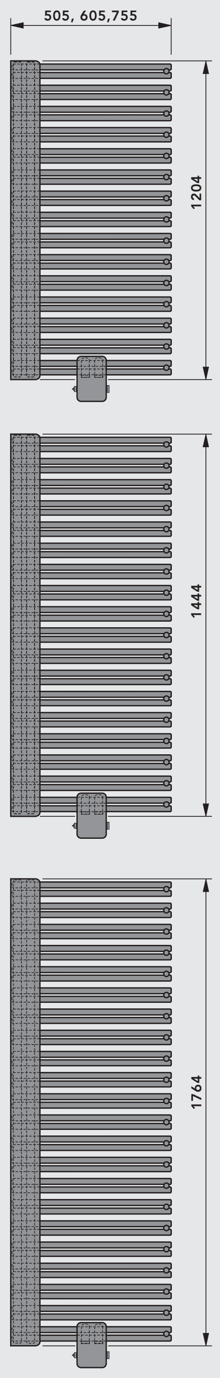
max.
Maximum operating temperature
110 °C

Standard basic configuration, as supplied
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass self-sealing, factory-sealed
- A valve connection set in an angled two-pipe design
- A covering rosette matching the radiator colour
- A wall mounting set matching the radiator colour
- A fitting aid
- An instruction sheet

Accessory: PTC electric heating element
All BAWA-VM SPA radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

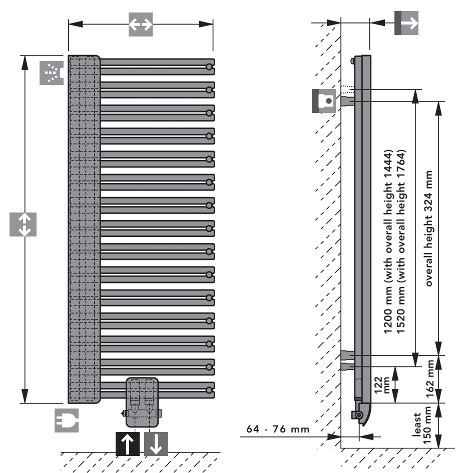
Dimensions [mm]



FATALA-VM SPA

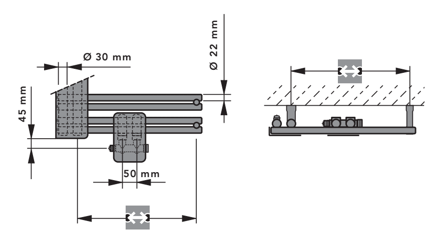
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1200 (1204)	**505** **605** **755**	583 704 887	1,2305 1,2085 1,1754	300 300 600	15,67 17,61 20,52	5,55 6,63 8,25
1500 (1444)	**505** **605** **755**	699 844 1064	1,2438 1,2072 1,1523	300 600 600	18,27 19,81 22,12	6,45 7,19 8,30
1800 (1764)	**505** **605** **755**	855 1032 1300	1,2436 1,2213 1,1878	600 600 600	22,12 24,96 29,22	8,30 9,98 12,50

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

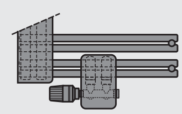


Depth (incl. wall projection)
for an overall length of 505 .... 102 - 114 mm
for an overall length of 605 .... 102 - 114 mm
for an overall length of 755 .... 102 - 114 mm

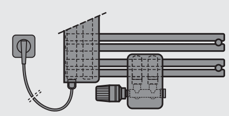
Overall length - 95 mm



Connection example without electric heating element



Connection examples with electric heating element



Connections
2 x external thread G 3/4 (for valve connection set)
2 x internal thread G 1/2 and
1 x internal thread G 1/4 (for vent plugs)
Connection options
In line with drawing

13 bar
Test overpressure
13 bar

10 bar max.
Maximum positive operating pvressure
10 bar

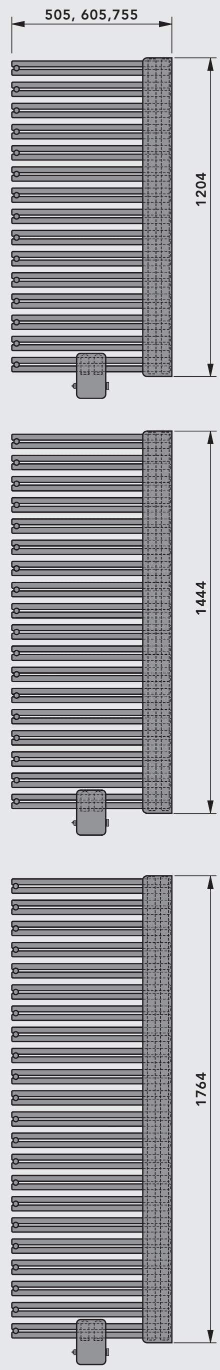
max.
Maximum operating temperature
110 °C

Standard basic configuration, as supplied
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass self-sealing, factory-sealed
- A valve connection set in an angled two-pipe design
- A covering rosette matching the radiator colour
- A wall mounting set matching the radiator colour
- A fitting aid
- An instruction sheet

Accessory: PTC electric heating element
All FATALA-VM SPA radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

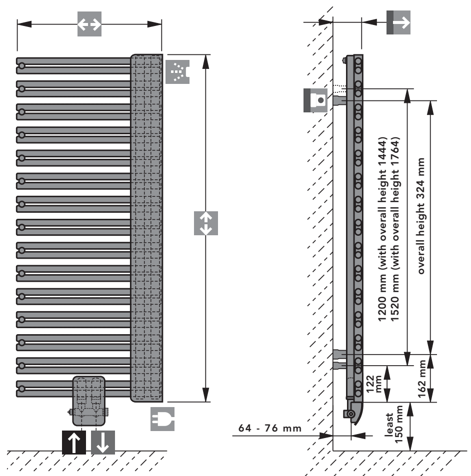
Dimensions [mm]



FATALA-VM SPA Design radiator, left hand design

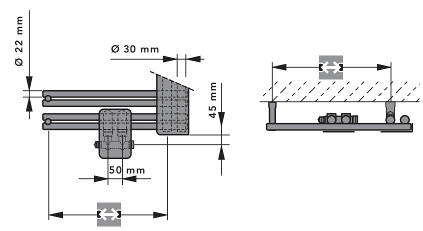
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts 75/65/20 °C	Radiator exponent n	E-heat element Output [2] Watt	Weight kg	Water content l
1200 (1204)	**505**	583	1,2305	300	15,67	5,55
	605	704	1,2085	300	17,61	6,63
	755	887	1,1754	600	20,52	8,25
1500 (1444)	**505**	699	1,2438	300	18,27	6,45
	605	844	1,2072	600	19,81	7,19
	755	1064	1,1523	600	22,12	8,30
1800 (1764)	**505**	855	1,2436	600	22,12	8,30
	605	1032	1,2213	600	24,96	9,98
	755	1300	1,1878	600	29,22	12,50

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

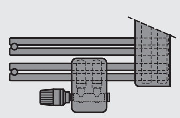


Depth (incl. wall projection)
for an overall length of 505 .... 102 - 114 mm
for an overall length of 605 .... 102 - 114 mm
for an overall length of 755 .... 102 - 114 mm

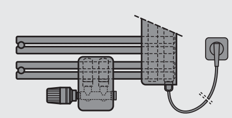
Overall length - 95 mm



Connection example without electric heating element



Connection example with electric heating element



Connections
2 x external thread G 3/4 (for valve connection set)
2 x internal thread G 1/2 and
1 x internal thread G 1/4 (for vent plugs)
Connection options
In line with drawing

Test overpressure
13 bar

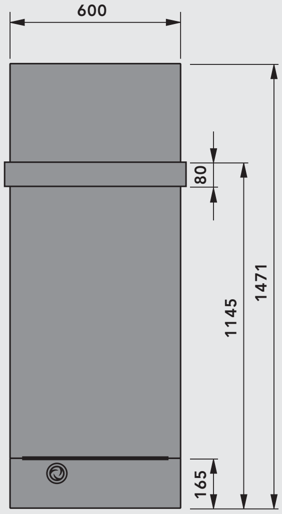
Maximum positive operating pvressure
10 bar

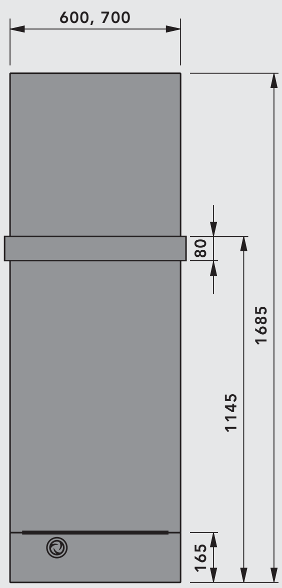
Maximum operating temperature
110 °C

Standard basic configuration
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass self-sealing, factory-sealed
- A valve connection set in an angled two-pipe design
- A covering rosette matching the radiator colour
- A wall mounting set matching the radiator colour
- A fitting aid
- An instruction sheet

Accessory: PTC electric heating element
All FATALA-VM SPA, left hand design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Dimensions [mm]

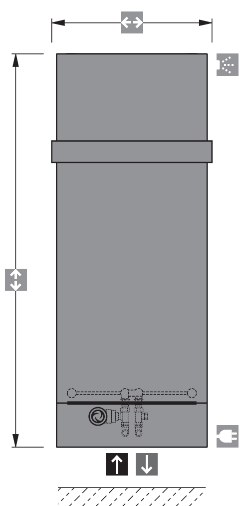


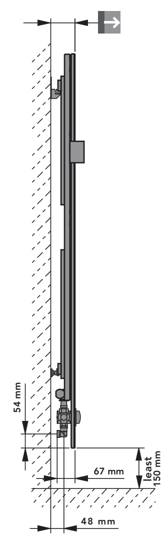


SEWA

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	Heat output (1) in Watts 70/55/20 °C	Heat output (1) in Watts 55/45/20 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1500 (1471)	600	779	637	414	1,239	600	40,0	5,6
1700 (1685)	600	914	749	490	1,221	600	46,0	6,5
	700	1045	857	560	1,220	600	52,8	7,5

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C





Overall depth (incl. wall clearance)
for an overall length of 600 .... 90 mm
for an overall length of 700 .... 90 mm

X
for an overall length of 600 .... 564 mm
for an overall length of 700 .... 664 mm

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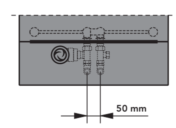
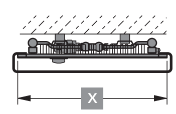
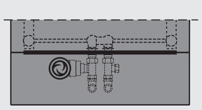




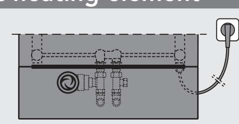
FATALA-VM SPA
left hand design

SEWA

Connection example without electric heating element



Connection example with electric heating element



Connections
2 x G 3/4 External thread
(Valve connection set)
Connection modes
see diagram

5 bar max.
Maximum permissible operating pressure
5 bar

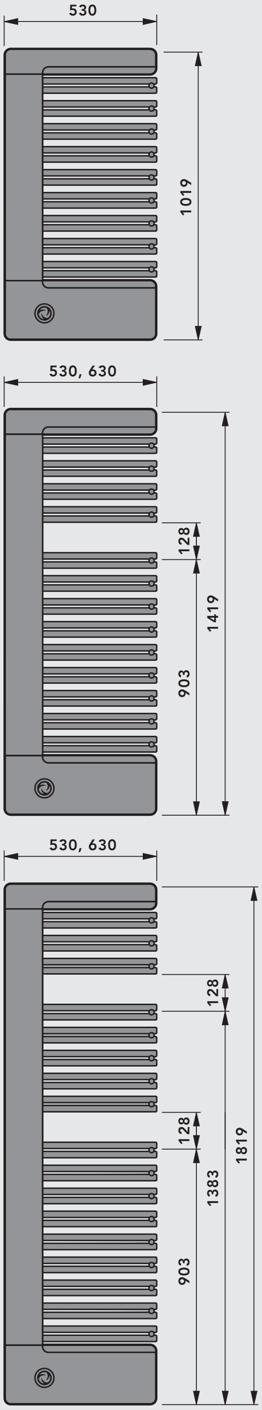
max.
Maximum operating temperature
110 °C

Standard basic configuration
- 1 towel rail
- An integrated valve connection set incl. thermostat head
- A pivotable vent plug, G ¼, and
- A dummy plug, G 3/8, nickel-plated brass, self-sealing, factory-sealed
- A wall mounting set with spacers
- 2 mounting brackets, alternatively: 2 extensions
- Instruction sheet

Accessory: PTC electric heating element
All SEWA design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

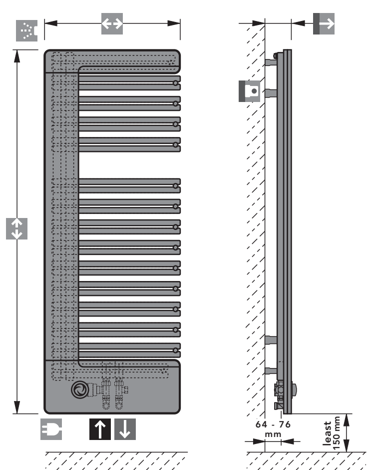
Dimensions [mm]



NERO

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts 75/65/20 °C	70/55/20 °C	55/45/20 °C	Radiator exponent n	E-heat element Output [2] Watt	Weight kg	Water content l
1000 (1019)	**530**	451	361	225	1,366	300	17,6	4,1
1400 (1419)	**530** **630**	614 721	503 590	327 384	1,232 1,218	300 600	22,1 25,0	5,5 6,6
1800 (1819)	**530** **630**	794 968	649 792	422 515	1,407 1,246	600 600	27,0 30,0	7,2 8,3

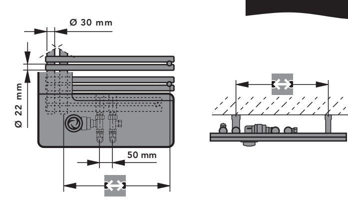
[1] Tested in accordance with ÖNORM EN 442 [2] at 60° C



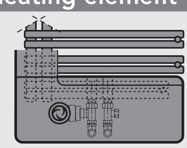
Overall depth (incl. wall clearance)
for an overall length of 530 .... 106 - 118 mm
for an overall length of 630 .... 106 - 118 mm

Overall length - 170 mm

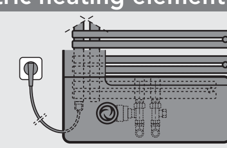
MADE IN AUSTRIA



Connection example without electric heating element



Connection example with electric heating element



Connections
2 x G 1/2 Internal thread
1 x G 1/4 Internal thread (for vent plug)
2 x G 3/4 External thread (mounting brackets or extensions)
Connection modes
see diagram

13 bar
Test overpressure
13 bar

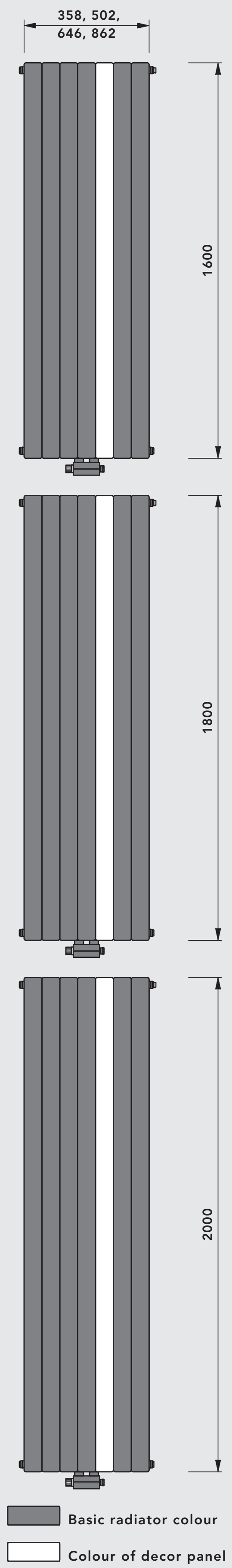
10 bar max.
Maximum positive operating pressure
10 bar

max.
Maximum operating temperature
110 °C

Standard basic configuration
- An integrated valve connection set incl. thermostat head
- A pivotable vent plug, G ¼, nickel-plated, self-sealing, factory-sealed
- A wall mounting set matching the radiator colour
- 2 mounting brackets, alternatively: 2 extensions
- Fitting aid
- Instruction sheet

Accessory: PTC electric heating element
All NERO design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

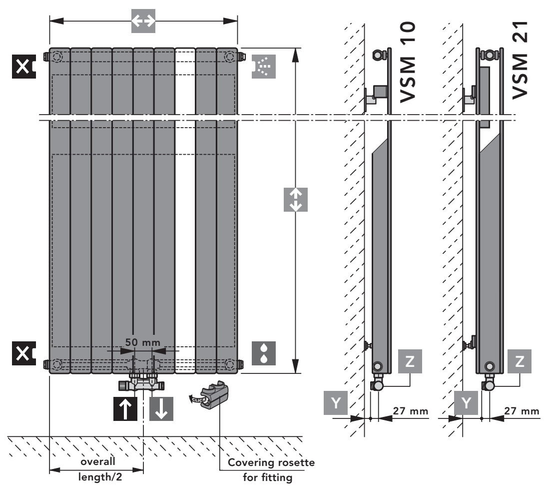
Dimensions [mm]



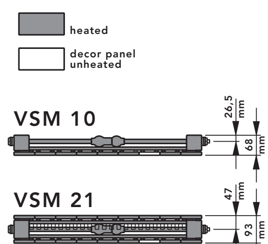
OHIO VSM

Nominal height (Overall height) [mm]	Over-all length [mm]	Heat output (1) in Watts 75/65/20 °C VSM 10	75/65/20 °C VSM 21	70/55/20 °C VSM 10	70/55/20 °C VSM 21	70/55/24 °C VSM 10	70/55/24 °C VSM 21	55/45/20 °C VSM 10	55/45/20 °C VSM 21	55/45/24 °C VSM 10	55/45/24 °C VSM 21	Radiator exponent n VSM 10	Radiator exponent n VSM 21	Weight kg VSM 10	Weight kg VSM 21	Water content l VSM 10	Water content l VSM 21
[mm]	[mm]																
1600 (1600)	358	622	1140	495	907	426	779	304	556	246	449	1,399	1,404	15,9	37,4	4,1	8,1
	502	872	1598	695	1272	597	1092	427	780	345	630	1,399	1,404	22,3	52,4	5,7	11,4
	646	1123	2057	895	1637	769	1406	549	1004	444	811	1,399	1,404	28,7	67,4	7,3	14,7
	862	1498	2745	1193	2185	1025	1877	733	1340	592	1082	1,399	1,404	38,3	90,0	9,8	19,6
1800 (1800)	358	708	1285	564	1024	484	880	346	630	280	509	1,401	1,397	17,8	41,0	4,5	8,7
	502	993	1801	791	1435	679	1234	486	882	392	713	1,401	1,397	24,9	57,4	6,3	12,2
	646	1278	2318	1018	1847	875	1588	625	1136	505	918	1,401	1,397	32,0	73,9	8,1	15,7
	862	1706	3093	1359	2465	1167	2119	834	1515	674	1225	1,401	1,397	42,8	98,6	10,8	21,0
2000 (2000)	358	799	1436	637	1147	548	988	393	709	318	575	1,390	1,381	19,6	44,5	5,0	9,9
	502	1120	2014	894	1609	769	1386	551	995	446	806	1,390	1,381	27,5	62,5	7,0	13,9
	646	1442	2592	1150	2071	990	1783	709	1280	574	1038	1,390	1,381	35,4	80,4	9,0	17,9
	862	1924	3458	1535	2763	1320	2379	946	1708	766	1384	1,390	1,381	47,2	107,3	11,9	23,9

(1) Tested in accordance with ÖNORM EN 442



Z Connection fitting Two-pipe operation – angled design



NERO

OHIO VSM

Connections
2 x G 3/4 External thread (bottom centre)
Connection modes
see diagram

Maximum operating temperature
110 °C

5 bar max.
Maximum positive operating pressure
Standard design:
5 bar

8 bar max.
Maximum positive operating pressure
High-pressure design
(supplement of 10 %): 8 bar

Standard basic configuration
- A drain plug, G ½, and
- A pivotable vent plug, G ½, nickel-plated brass, self-sealing, factory-sealed
- A valve connection set with angled two-pipe design
- Covering rosette in matching radiator colour
- Instruction sheet

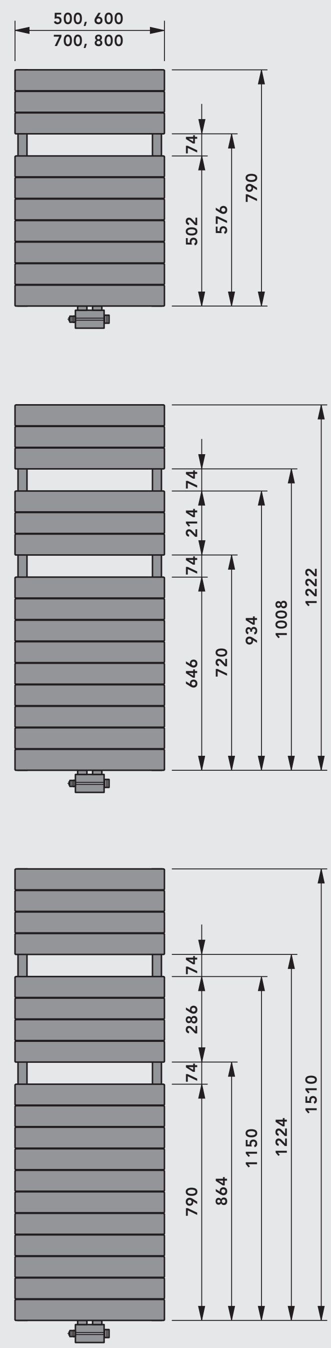
Angled connection fitting Z		
Mounting	Model	Dimension Y
*	VSM 10	*
WA 11	VSM 21	63 mm

Note:
VSM models are only available with welded-on brackets.

- For the installation of the VSM 21 model use the WA 11 wall fastening set.
- *For the installation of the VSM 10 model with the angled connection fitting Z, please use the appropriate drill consoles or angled fastening set in order to obtain the necessary wall clearance.

Technical data

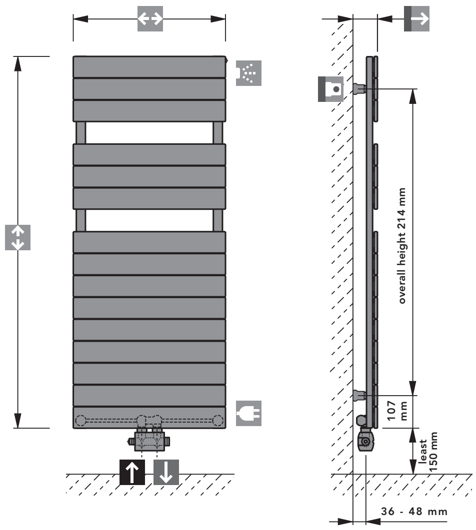
Dimensions [mm]



LOWA VM

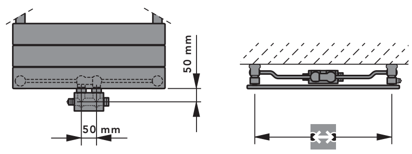
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
800 (790)	500	416	341	299	223	185	1,223	300	12,6	3,0
	600	487	400	350	262	217	1,217	300	14,5	3,5
	700	557	457	401	300	250	1,211	300	16,4	4,0
	800	626	515	452	338	282	1,205	300	18,3	4,5
1250 (1222)	500	608	498	435	324	268	1,233	300	18,8	4,5
	600	713	585	512	382	317	1,221	300	21,6	5,2
	700	815	670	587	439	365	1,210	600	24,4	5,9
	800	915	753	661	496	413	1,198	600	27,2	6,6
1500 (1510)	500	727	595	520	387	321	1,234	600	23,5	5,7
	600	852	696	609	452	374	1,242	600	27,1	6,6
	700	974	795	694	514	425	1,250	600	30,7	7,5
	800	1094	892	778	575	475	1,258	600	34,3	8,4

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

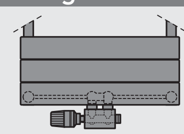


Overall depth (incl. wall clearance)
for an overall length of 500 .... 75 - 87 mm
for an overall length of 600 .... 75 - 87 mm
for an overall length of 700 .... 75 - 87 mm
for an overall length of 800 .... 75 - 87 mm

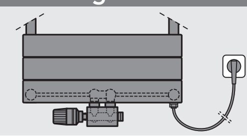
Overall length - 40 mm



Connection example without electric heating element



Connection example with electric heating element



Connections
2 x G 3/4 External thread (Valve connection set)
1 x G 3/8 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

5 bar max.

Maximum positive operating pressure
5 bar

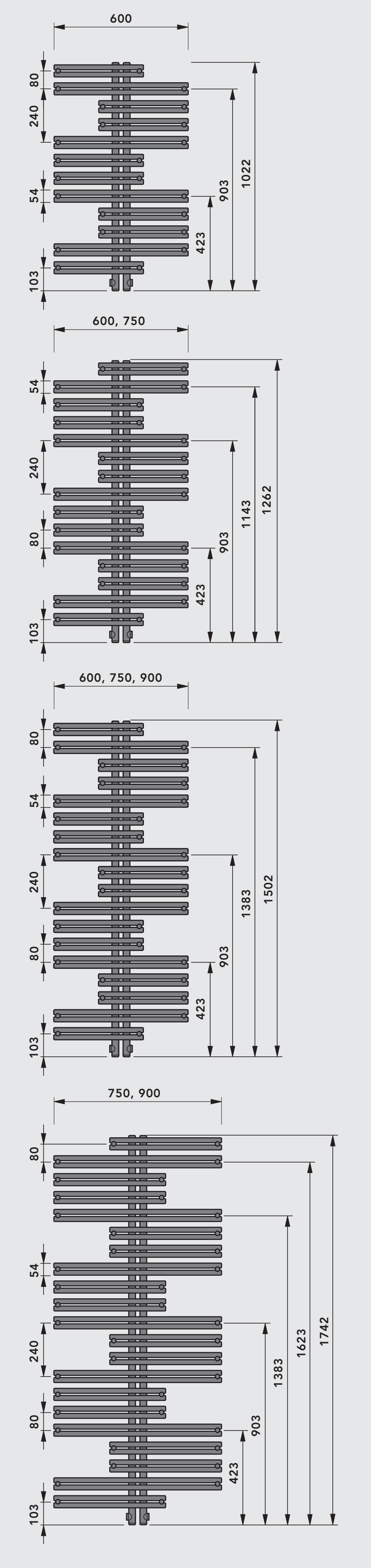
Maximum operating temperature
110 °C

Standard basic configuration
- A pivotable vent plug, G 1/4, and
- A dummy plug, G 3/8, nickel-plated brass, self-sealing, factory-sealed
- Valve connection set in an angled two-pipe design
- Covering rosette in matching radiator colour
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Accessory: PTC electric heating element G 3/8
All Design radiators with flat tubes which are fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

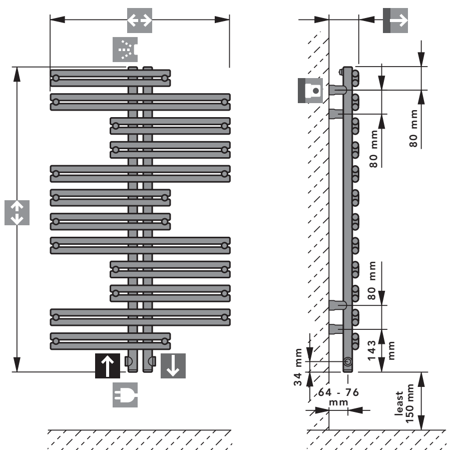
Dimensions [mm]

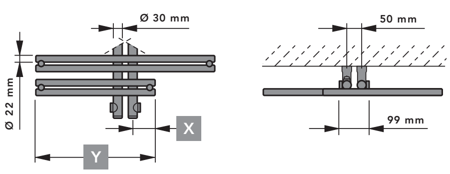


KASAI

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1000 (1022)	**600**	499	407	355	262	217	1,259	300	10,6	4,4
1300 (1262)	**600**	613	500	437	323	267	1,253	300	13,3	5,3
	750	739	606	530	395	328	1,225	600	15,7	5,7
1500 (1502)	**600**	724	591	516	383	317	1,247	600	16,0	6,1
	750	870	711	622	462	383	1,238	600	18,7	6,7
	900	1030	843	738	549	455	1,232	600	21,6	7,6
1800 (1742)	**750**	1008	822	718	532	440	1,252	600	21,7	7,7
	900	1194	976	854	634	525	1,239	600	24,9	9,2

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C





Overall depth (incl. wall clearance)
for an overall length of 600 .... 97 - 109 mm
for an overall length of 750 .... 97 - 109 mm
for an overall length of 900 .... 97 - 109 mm

Mounting nozzle
With overall heights of 1000 and 1500 mm, the 2 mounting nozzles on top are rotated 90°!

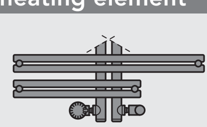
X
for an overall length of 600 .... 75 mm
for an overall length of 750 .... 100 mm
for an overall length of 900 .... 125 mm

Y
for an overall length of 600 .... 400 mm
for an overall length of 750 .... 500 mm
for an overall length of 900 .... 600 mm

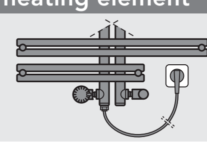
LOWA VM

KASAI

Connection example without electric heating element



Connection example with electric heating element



Connections
4 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

13 bar

Test overpressure
13 bar

10 bar max.

Maximum positive operating pressure
10 bar

max.

Maximum operating temperature
110 °C

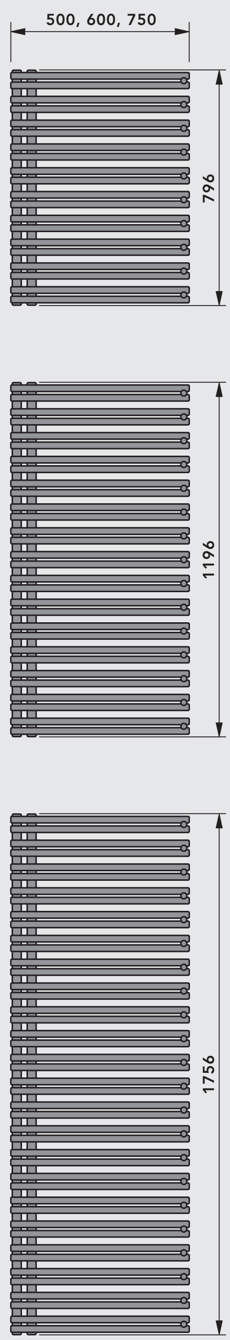
Accessory: PTC electric heating element
KASAI design radiators equipped with an electric heating element can also be used at times when the regular heating system is switched off. It is absolutely necessary to take account of the power-ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass, self-sealing
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

FATALA Design radiator

Technical data

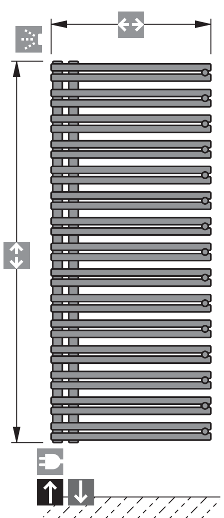
Dimensions [mm]

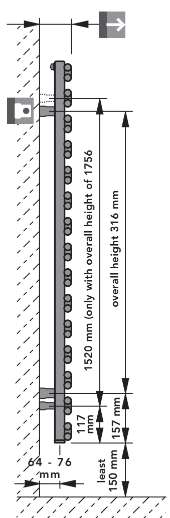


FATALA

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
800 (796)	**500**	446	368	323	243	203	1,189	300	8,8	3,8
	600	530	437	384	289	241	1,189	300	10,0	4,3
	750	653	538	473	356	297	1,189	300	11,9	5,0
1200 (1196)	**500**	650	535	469	352	293	1,202	300	12,9	5,9
	600	773	636	558	418	348	1,202	600	14,8	6,7
	750	955	786	690	517	430	1,202	600	17,6	8,0
1800 (1756)	**500**	897	733	641	476	394	1,241	600	19,2	8,0
	600	1081	883	772	573	475	1,241	600	21,8	9,5
	750	1357	1109	969	720	596	1,241	900	25,7	11,7

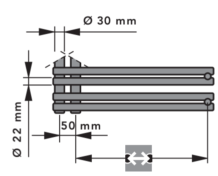
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

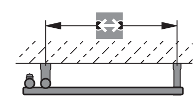




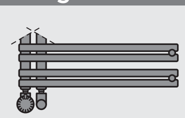
Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm
for an overall length of 750 .... 97 - 109 mm

Overall length - 90 mm

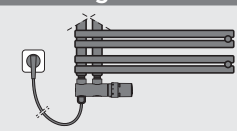




Connection example without electric heating element



Connection example with electric heating element



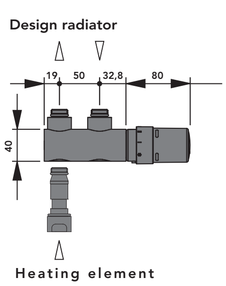
Connections
2 x G 1/2 Internal thread (bottom left) and 1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

A special adapter (chrome-plated) should be used for the electric heating insert with the FATALA Design radiator!



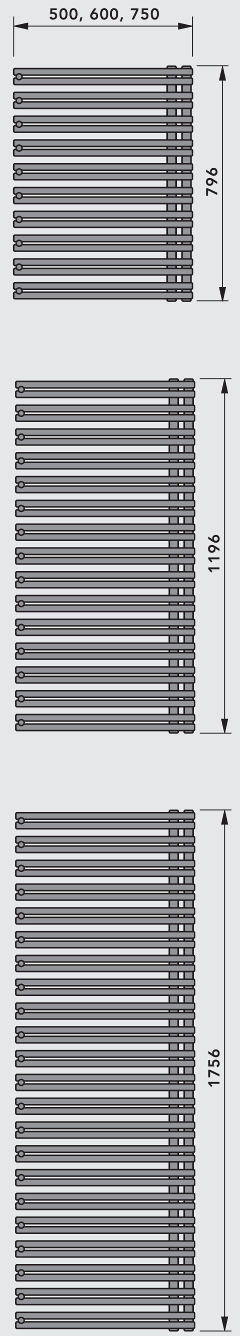
Accessory: PTC electric heating element
All FATALA design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, nickel-plated, self-sealing
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

FATALA Design radiator left hand design

Technical data

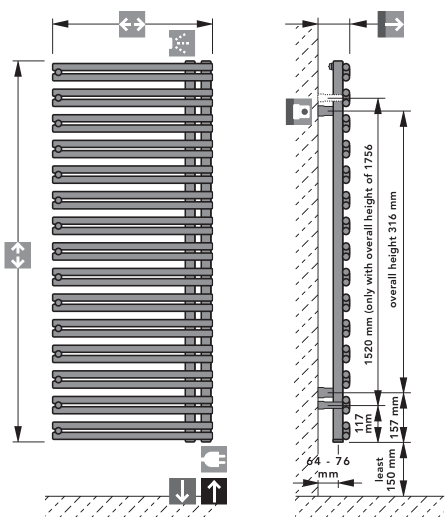
Dimensions [mm]



FATALA left hand design

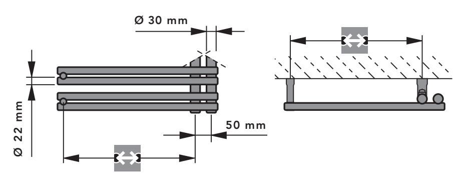
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
800 (796)	500	446	368	323	243	203	1,189	300	8,8	3,8
	600	530	437	384	289	241	1,189	300	10,0	4,3
	750	653	538	473	356	297	1,189	300	11,9	5,0
1200 (1196)	500	650	535	469	352	293	1,202	300	12,9	5,9
	600	773	636	558	418	348	1,202	600	14,8	6,7
	750	955	786	690	517	430	1,202	600	17,6	8,0
1800 (1756)	500	897	733	641	476	394	1,241	600	19,2	8,0
	600	1081	883	772	573	475	1,241	600	21,8	9,5
	750	1357	1109	969	720	596	1,241	900	25,7	11,7

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

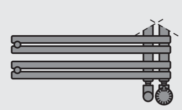


Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm
for an overall length of 750 .... 97 - 109 mm

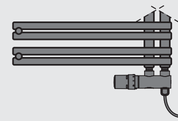
Overall length - 90 mm



Connection example without electric heating element



Connection example with electric heating element



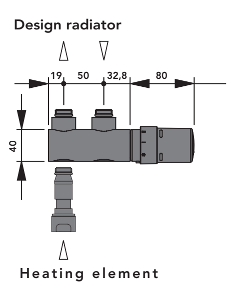
Connections
2 x G 1/2 Internal thread (bottom left) and 1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

A special adapter (chrome-plated) should be used for the electric heating insert with the FATALA Design radiator!



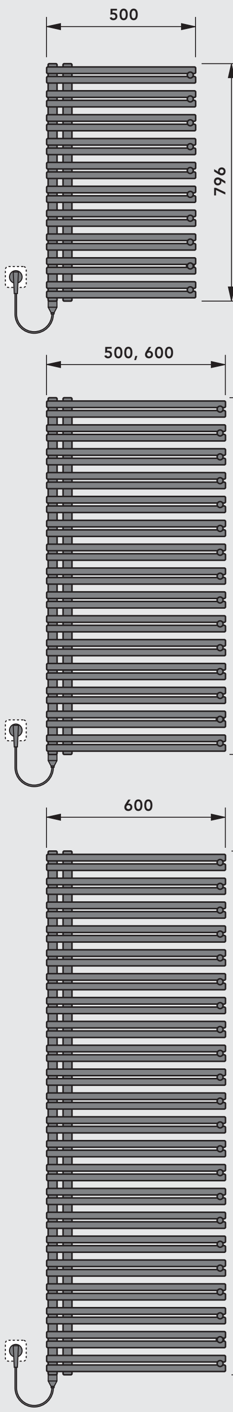
Accessory: PTC electric heating element
All FATALA left hand design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, nickel-plated, self-sealing
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

FATALA Design radiator - electric only operation

Technical data

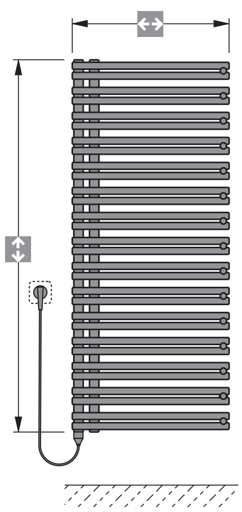
Dimensions [mm]

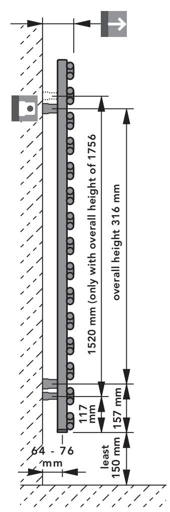


FATALA electric only operation

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power [(2)] Watt	Nominal voltage [V]	Protection mode	Weight kg
800 (796)	**500**	300	AC 230	IP 24	12,6
1200 (1196)	**500**	400	AC 230	IP 24	18,7
	600	600	AC 230	IP 24	21,4
1800 (1756)	**600**	900	AC 230	IP 24	31,1

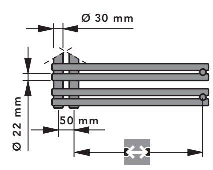
[(2)] at 60° C

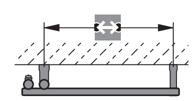




Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm

Overall length - 90 mm





Description
With their built-in electric heating, the electric radiators of the FATALA-E family are elegant Design and bathroom radiators.

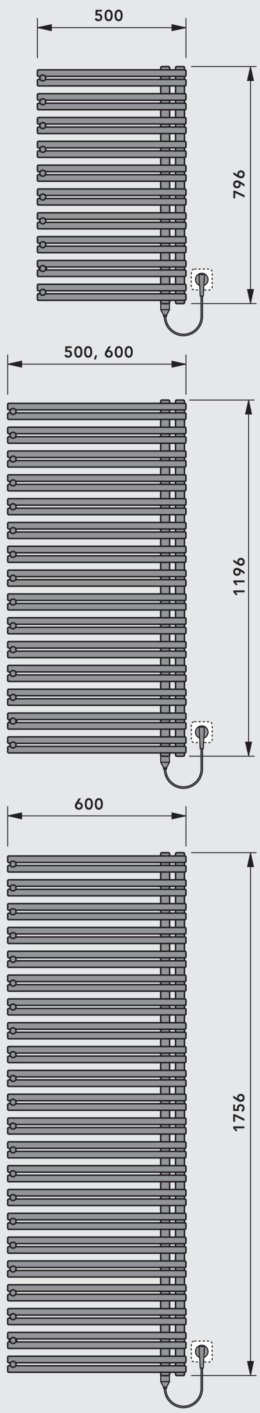
Self-regulation effect – the temperature-dependent PTC heating element automatically controls the temperature of the heat-transfer liquid by modifying its electrical resistance.

Standard basic configuration:
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

FATALA Design radiator left hand design - electric only operation

Technical data

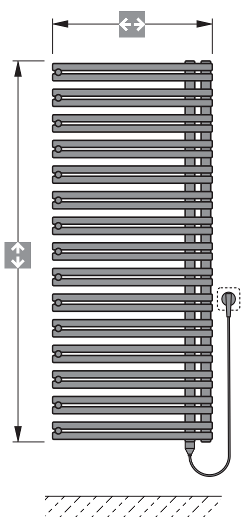
Dimensions [mm]

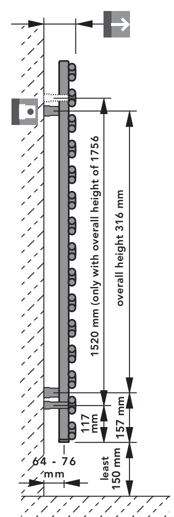


FATALA left hand design - electric only operation

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power [(2)] Watt	Nominal voltage [V]	Protection mode	Weight kg
800 (796)	**500**	300	AC 230	IP 24	12,6
1200 (1196)	**500** **600**	400 600	AC 230 AC 230	IP 24 IP 24	18,7 21,4
1800 (1756)	**600**	900	AC 230	IP 24	31,1

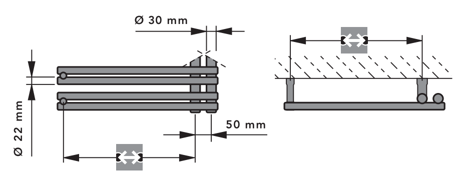
[(2)] at 60° C





Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm

Overall length - 90 mm



FATALA electric only operation

FATALA left hand design, electric only operation

Description
With their built-in electric heating, the electric radiators of the FATALA-E, left-hand design family are elegant Design and bathroom radiators.

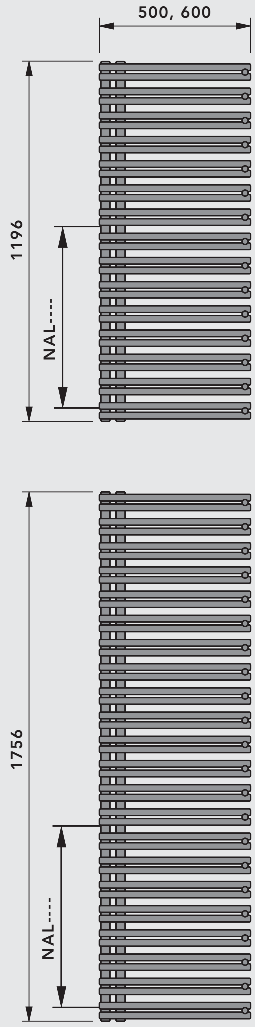
Self-regulation effect – the temperature-dependent PTC heating element automatically controls the temperature of the heat-transfer liquid by modifying its electrical resistance.

Standard basic configuration:
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

ÖVE tested

Technical data

Connection modes [mm]



Connection on the left-hand side NAL

NAL0500, NAL0446
NAL0900, NAL0546
NAL1000, NAL0846
NAL0946

NAL0560
NAL0960

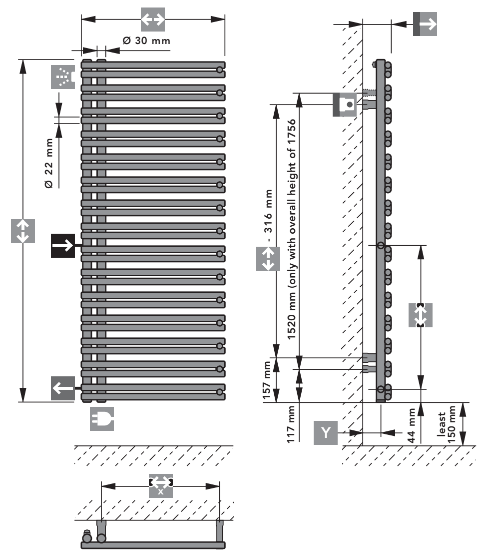
Standard basic configuration:

- Pivotable vent plug, nickel plated brass G 1/4, self-sealing, and 2 dummy plugs G 1/2
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

FATALA Replacement radiators

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1200 (1196)	500 600	650 773	535 636	469 558	352 418	293 348	1,202 1,202	300 600	12,9 14,8	5,9 6,7
1800 (1756)	500 600	897 1081	733 883	641 772	476 573	394 475	1,241 1,241	600 600	19,2 21,8	8,0 9,5

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C



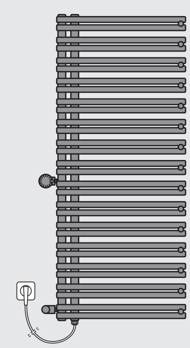
Overall length -90 mm

Connection dimensions
without distance holders... 64 - 76
with 1 distance holder set... 76 - 88
with 2 distance holder sets... 88 - 100
with 3 distance holder sets... 100 - 112

Overall depth (incl. wall clearance)
without distance holders... 97 - 109
with 1 distance holder set... 109 - 121
with 2 distance holder sets... 121 - 133
with 3 distance holder sets... 133 - 145

Boss spacing
500, 900, 1000,
446, 546, 846, 946, 560 and 960 mm
Other centre distances upon request.

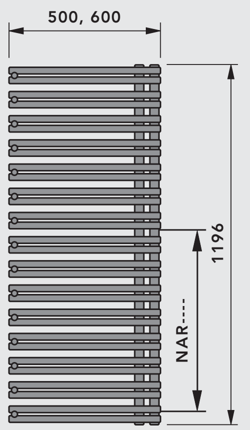
Connection examples using an electronic heating element

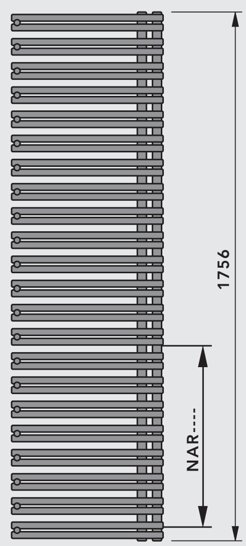


FATALA Replacement radiators left hand design

Technical data

Connection modes [mm]





Connection on the right-hand side NAR

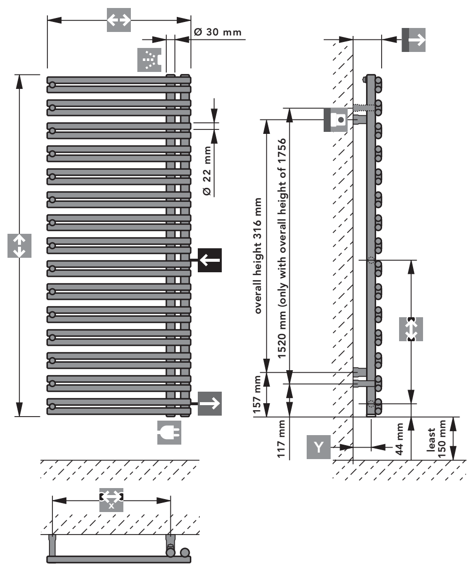
NAR0500, NAR0446
NAR0900, NAR0546
NAR1000, NAR0846
NAR0946

NAR0560
NAR0960

FATALA Replacement radiators left hand design

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output [2] Watt	Weight kg	Water content l
1200 (1196)	**500** **600**	650 773	535 636	469 558	352 418	293 348	1,202 1,202	300 600	12,9 14,8	5,9 6,7
1800 (1756)	**500** **600**	897 1081	733 883	641 772	476 573	394 475	1,241 1,241	600 600	19,2 21,8	8,0 9,5

[1] Tested in accordance with ÖNORM EN 442 [2] at 60° C



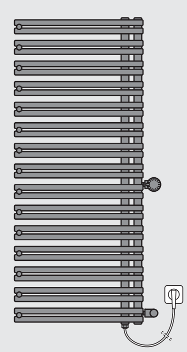
Overall length -90 mm

Connection dimensions
without distance holders... 64 - 76
with 1 distance holder set... 76 - 88
with 2 distance holder sets... 88 - 100
with 3 distance holder sets... 100 - 112

Overall depth (incl. wall clearance)
without distance holders... 97 - 109
with 1 distance holder set... 109 - 121
with 2 distance holder sets... 121 - 133
with 3 distance holder sets... 133 - 145

Boss spacing
500, 900, 1000,
446, 546, 846, 946, 560 and 960 mm
Other centre distances upon request.

Connection examples using an electronic heating element

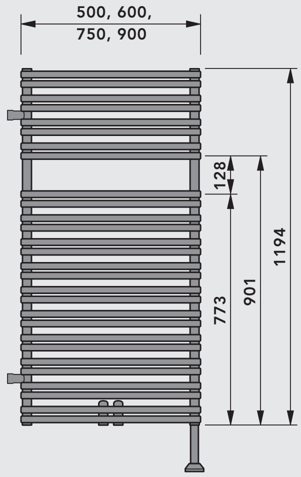


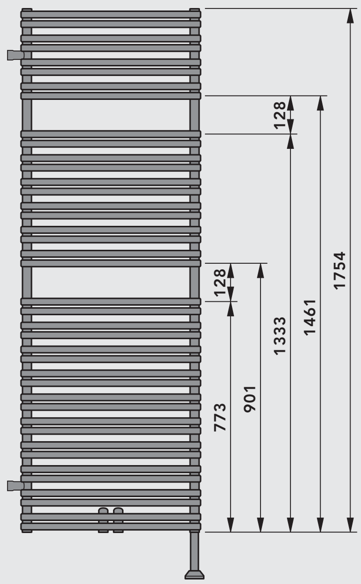
Standard basic configuration:
- Pivotable vent plug, nickel plated brass G 1/4, self-sealing, and 2 dummy plugs G 1/2
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

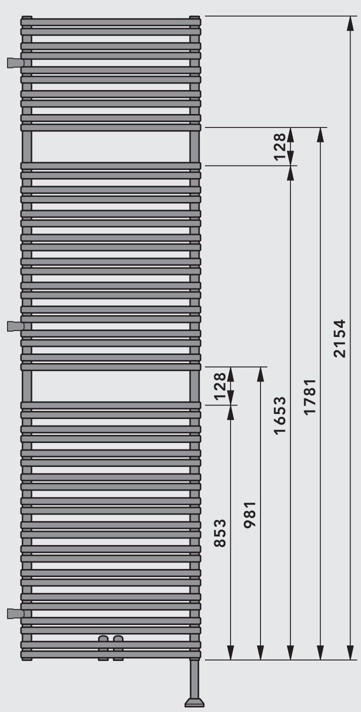
ARUN-T Design radiator

Technical data

Dimensions [mm]



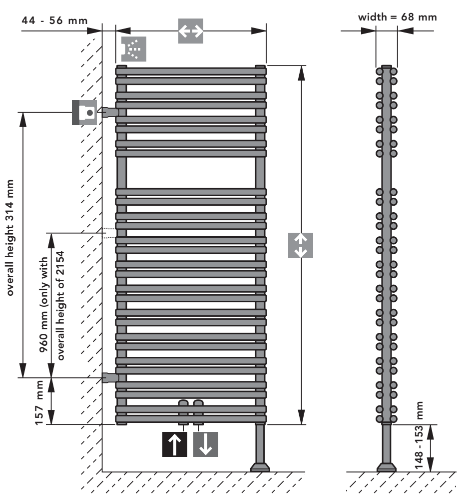


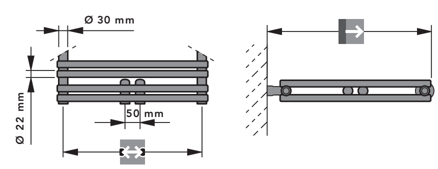


ARUN-T

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [(1)] in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	Weight kg	Water content l
1200 (1194)	500	885	721	628	464	382	1,265	20,8	9,4
	600	1061	866	756	560	463	1,251	24,2	11,2
	750	1326	1086	950	708	587	1,229	29,4	14,0
	900	1590	1307	1146	858	714	1,208	34,4	16,6
1800 (1754)	500	1222	994	865	638	525	1,274	28,8	14,2
	600	1466	1195	1043	771	637	1,258	34,9	16,6
	750	1831	1498	1311	975	808	1,233	42,1	20,0
	900	2196	1804	1583	1184	985	1,209	49,5	23,4
2200 (2154)	500	1445	1164	1008	733	598	1,330	37,1	17,3
	600	1724	1389	1202	874	714	1,330	43,3	20,4
	750	2145	1728	1496	1087	888	1,330	52,5	25,1
	900	2560	2062	1786	1298	1060	1,330	61,6	29,5

(1) Tested in accordance with ÖNORM EN 442

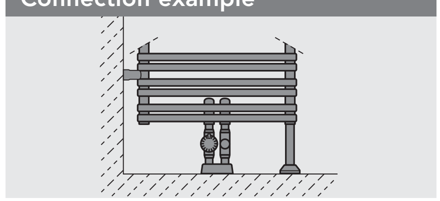




Overall depth (incl. wall clearance)
for an overall length of 500 .... 544 - 556 mm
for an overall length of 600 .... 644 - 656 mm
for an overall length of 750 .... 794 - 806 mm
for an overall length of 900 .... 944 - 956 mm

Overall length - 40 mm

Connection example



Connections
5 x G 1/2 Internal thread and
1 x G 1/2 Internal thread blind sleeve for floor fastening
Connection modes see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

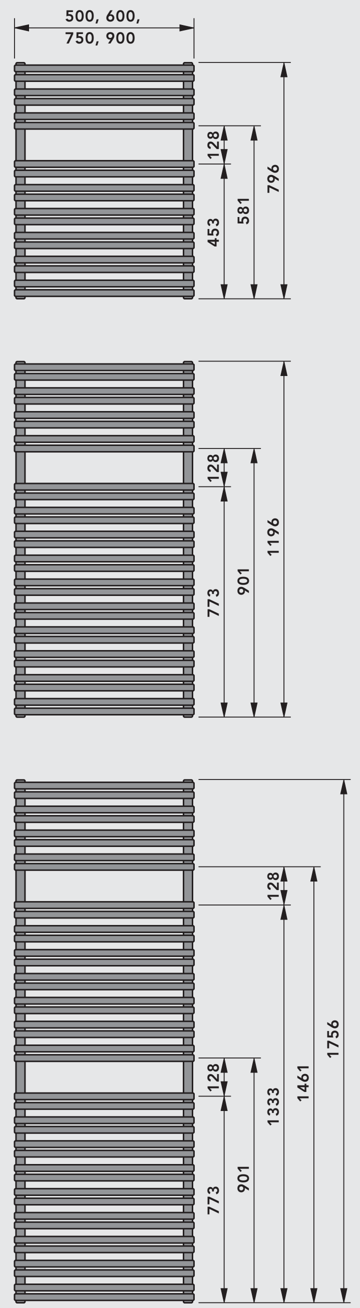
Maximum operating temperature
110 °C

Standard basic configuration
- A pivotable vent plug, G 1/2, and two dummy plugs, G 1/2, nickel-plated brass, self-sealing
- A wall and floor fastening set matching the radiator colour
- Fitting aid
- Instruction sheet

BAWA Design radiator

Technical data

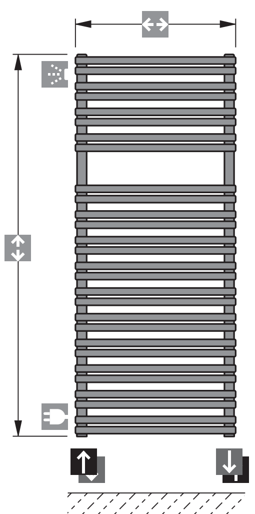
Dimensions [mm]

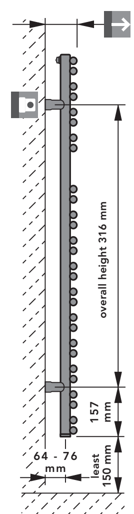


BAWA

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
800 (796)	500	420	340	299	225	187	1,1888	300	7,7	3,6
	600	493	401	353	265	221	1,1897	300	8,8	4,1
	750	600	491	432	324	271	1,1911	300	10,5	4,9
	900	704	580	510	383	320	1,1924	300	12,1	5,7
1200 (1196)	500	629	531	466	348	290	1,2010	300	11,8	5,4
	600	738	617	541	404	336	1,2012	600	13,5	6,3
	750	898	740	649	485	403	1,2014	600	16,1	7,7
	900	1053	859	753	563	468	1,2017	600	18,6	9,0
1800 (1756)	500	885	717	626	464	384	1,2605	600	16,9	8,1
	600	1038	846	739	548	453	1,2546	600	19,4	9,3
	750	1263	1036	905	671	555	1,2458	900	23,0	11,0
	900	1482	1222	1068	791	654	1,2370	900	26,7	12,7

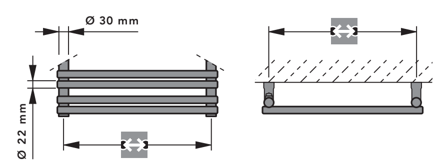
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C





Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm
for an overall length of 750 .... 97 - 109 mm
for an overall length of 900 .... 97 - 109 mm

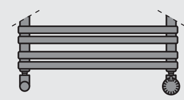
Boss spacing
Overall length - 40 mm

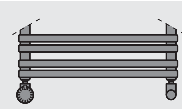


ARUN-T

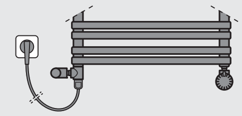
BAWA

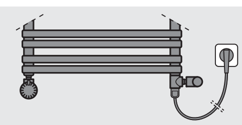
Connection example without electric heating element





Connection example with electric heating element





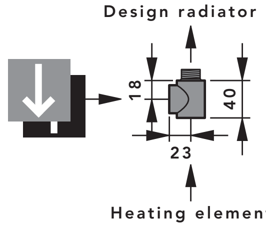
Connections
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

A special adapter (chrome-plated) should be used for the electric heating insert with the BAWA Design radiator!

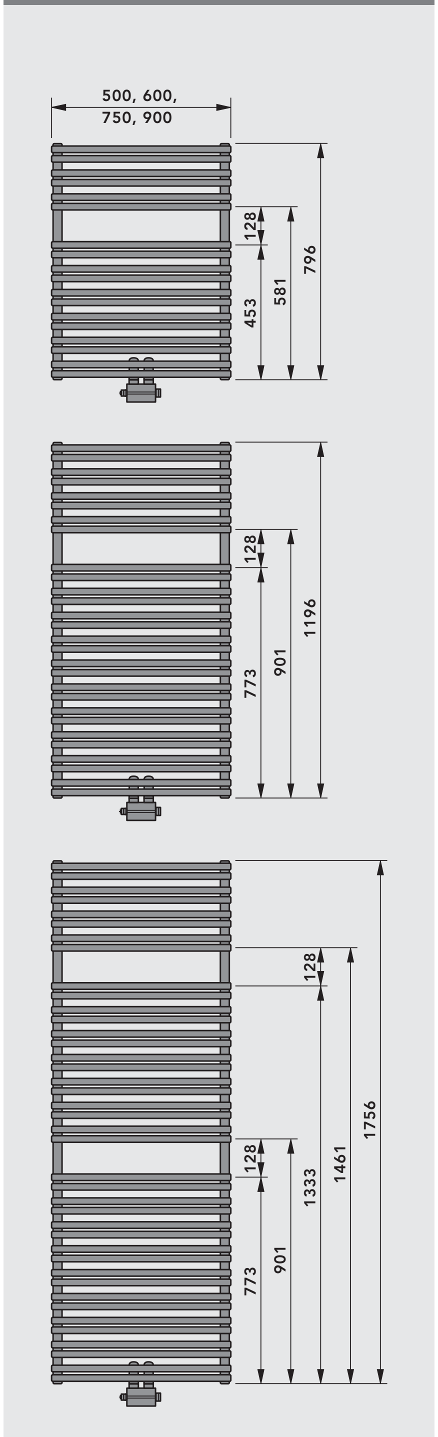


Accessory: PTC electric heating element
All BAWA design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, nickel-plated brass, self-sealing
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Technical data

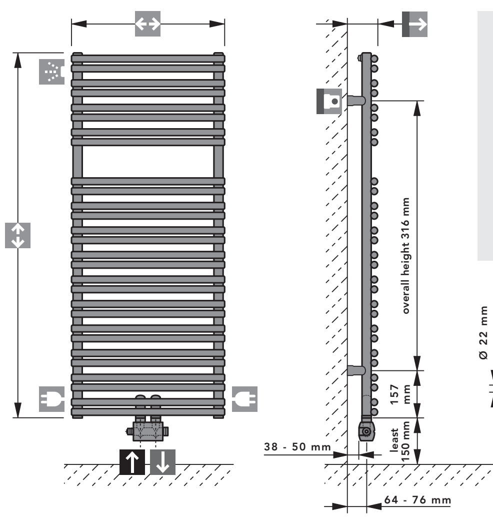
Dimensions [mm]



BAWA-VM

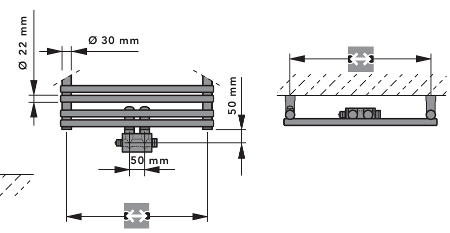
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
800 (796)	500	420	340	299	225	187	1,1888	300	7,7	3,6
	600	493	401	353	265	221	1,1897	300	8,8	4,1
	750	600	491	432	324	271	1,1911	300	10,5	4,9
	900	704	580	510	383	320	1,1924	300	12,1	5,7
1200 (1196)	500	629	531	466	348	290	1,2010	300	11,8	5,4
	600	738	617	541	404	336	1,2012	600	13,5	6,3
	750	898	740	649	485	403	1,2014	600	16,1	7,7
	900	1053	859	753	563	468	1,2017	600	18,6	9,0
1800 (1756)	500	885	717	626	464	384	1,2605	600	16,9	8,1
	600	1038	846	739	548	453	1,2546	600	19,4	9,3
	750	1263	1036	905	671	555	1,2458	900	23,0	11,0
	900	1482	1222	1068	791	654	1,2370	900	26,7	12,7

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

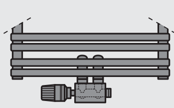


Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm
for an overall length of 750 .... 97 - 109 mm
for an overall length of 900 .... 97 - 109 mm

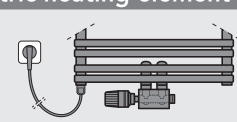
Overall length - 40 mm

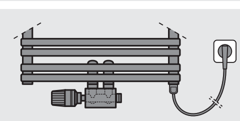


Connection example without electric heating element



Connection example with electric heating element





Connections
2 x G 3/4 External thread (valve connection set),
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

13 bar

Test overpressure
13 bar

10 bar max.

Maximum positive operating pressure
10 bar

max.

Maximum operating temperature
110 °C

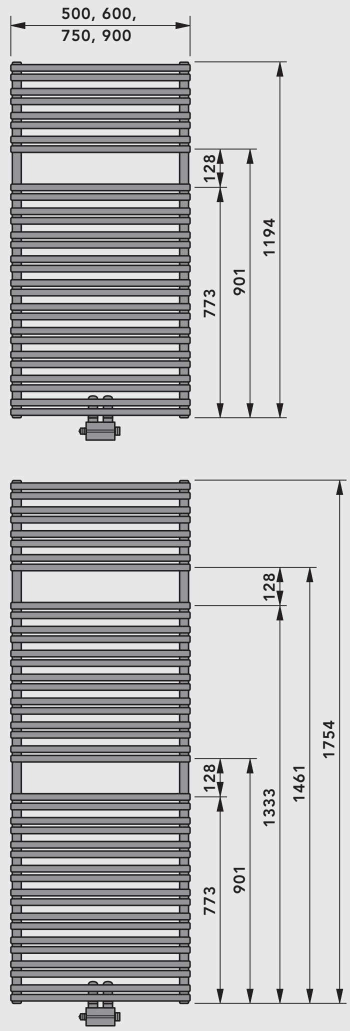
Standard basic configuration
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass self-sealing, factory-sealed
- Valve connection set in an angled two-pipe design
- Covering rosette in matching radiator colour
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Accessory: PTC electric heating element
All BAWA-VM design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

BAWA-T VM Design radiator

Technical data

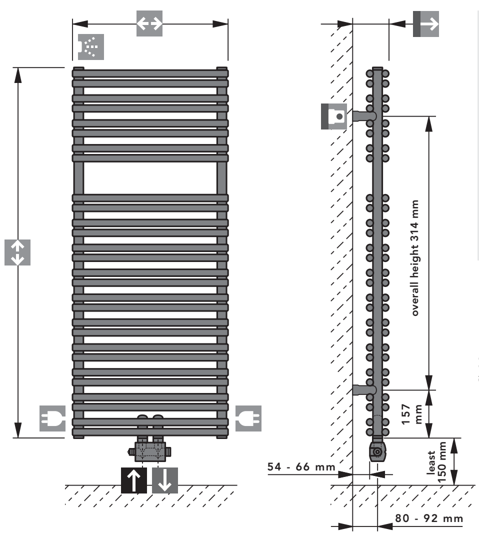
Dimensions [mm]



BAWA-T VM

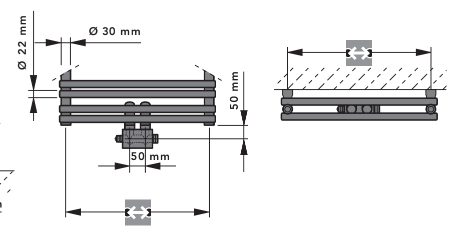
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1200 (1196)	500	885	721	628	464	382	1,265	600	21,6	9,2
	600	1061	866	756	560	463	1,251	600	25,0	10,9
	750	1326	1086	950	708	587	1,229	600	30,1	13,3
	900	1590	1307	1146	858	714	1,208	900	35,2	15,8
1800 (1756)	500	1222	994	865	638	525	1,274	600	30,8	13,1
	600	1466	1195	1043	771	637	1,258	900	35,7	15,6
	750	1831	1498	1311	975	808	1,233	900	43,1	19,3
	900	2196	1804	1583	1184	985	1,209	900	50,5	23,0

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C



Overall depth (incl. wall clearance)
for an overall length of 500 .... 113 - 125 mm
for an overall length of 600 .... 113 - 125 mm
for an overall length of 750 .... 113 - 125 mm
for an overall length of 900 .... 113 - 125 mm

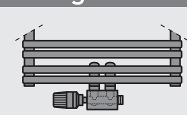
Overall length - 40 mm



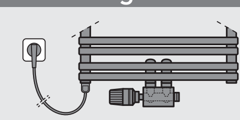
BAWA-VM

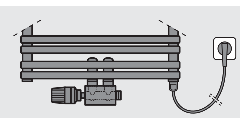
BAWA-T VM

Connection example without electric heating element



Connection example with electric heating element





Connections
2 x G 3/4 External thread (valve connection set) and 4 x G 1/2 Internal thread
Connection modes
see diagram

13 bar
Test overpressure
13 bar

10 bar max.
Maximum positive operating pressure
10 bar

max.
Maximum operating temperature
110 °C

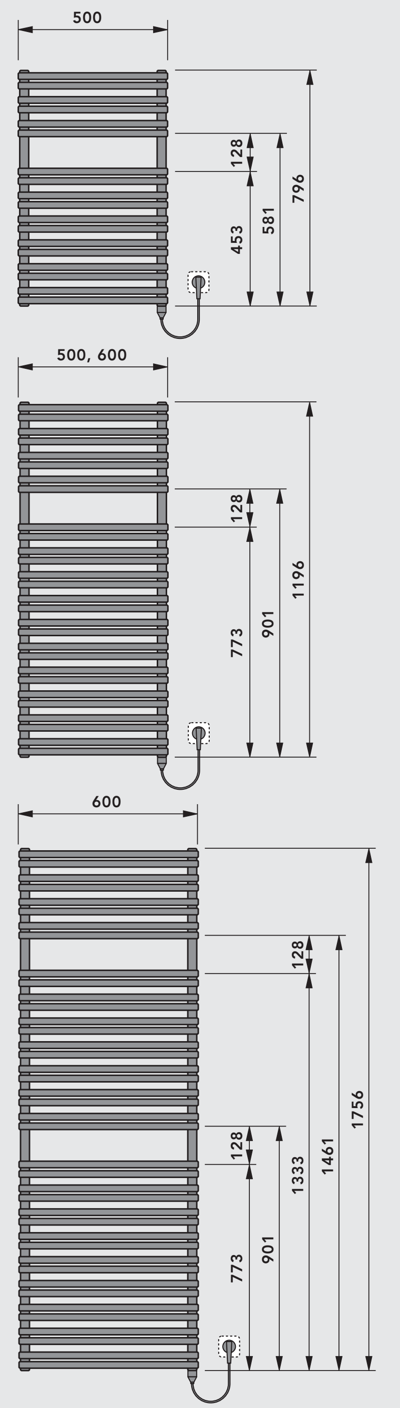
Standard basic configuration
- A pivotable vent plug, G 1/2, and three dummy plugs, G 1/2, nickel-plated brass self-sealing, factory-sealed
- Valve connection set in an angled two-pipe design
- Covering rosette in matching radiator colour
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Accessory: PTC electric heating element
All BAWA-T VM radiators fitted with an electric heating element can also be used at times when the regular heating system is switched off.

It is absolutely necessary to take account of the power-ratings assigned to the electric heating elements.

Technical data

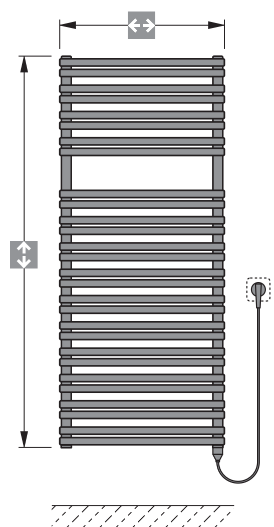
Dimensions [mm]

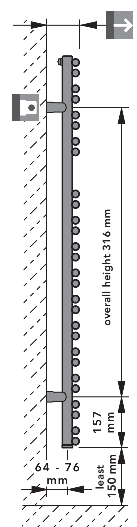


BAWA electric only operation

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power [(2)] Watt	Nominal voltage [V]	Protection mode	Weight kg
800 (796)	500	300	AC 230	IP 24	11,3
1200 (1196)	500 600	400 600	AC 230 AC 230	IP 24 IP 24	17,1 19,7
1800 (1756)	600	900	AC 230	IP 24	28,5

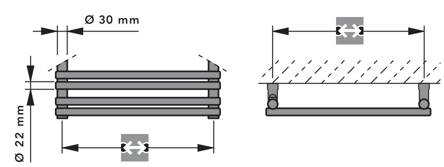
[(2)] at 60° C





Overall depth (incl. wall clearance)
for an overall length of 500 .... 97 - 109 mm
for an overall length of 600 .... 97 - 109 mm

Overall length - 40 mm



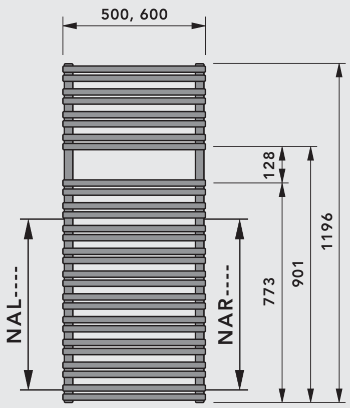
Description
With their built-in electric heating, the electric radiators of the BAWA-E family are elegant Design and bathroom radiators.

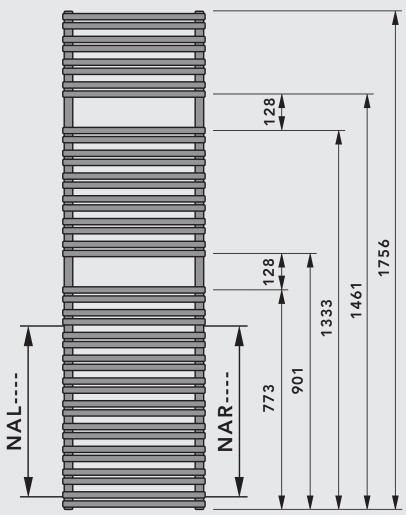
Self-regulation effect – the temperature-dependent PTC heating element automatically controls the temperature of the heat-transfer liquid by modifying its electrical resistance.

Standard basic configuration:
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

ÖVE tested

Connection modes [mm]





Connection on the left-hand side NAL

NAL0500, NAL0446
NAL0900, NAL0546
NAL1000, NAL0846
NAL0946
NAL0560
NAL0960

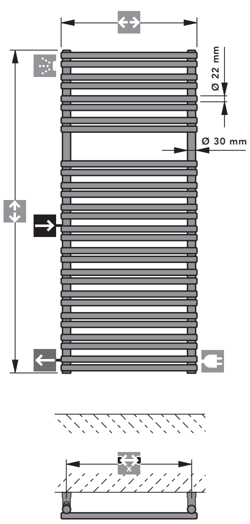
Connection on the right-hand side NAR

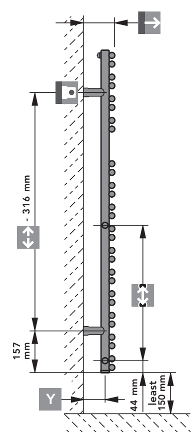
NAR0500, NAR0446
NAR0900, NAR0546
NAR1000, NAR0846
NAR0946
NAR0560
NAR0960

BAWA Replacement radiators

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1200 (1196)	**500** **600**	629 738	531 617	466 541	348 404	290 336	1,2010 1,2012	300 600	11,8 13,5	5,4 6,3
1800 (1756)	**500** **600**	885 1038	717 846	626 739	464 548	384 453	1,2605 1,2546	600 600	16,9 19,4	8,1 9,3

(1) (1) Tested in accordance with ÖNORM EN 442
(2) at 60 °C





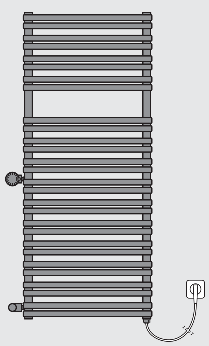
Overall length -90 mm

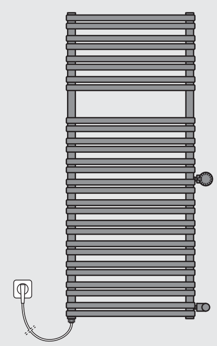
Connection dimensions
without distance holders... 64 - 76
with 1 distance holder set... 76 - 88
with 2 distance holder sets... 88 - 100
with 3 distance holder sets... 100 - 112

Overall depth (incl. wall clearance)
without distance holders... 97 - 109
with 1 distance holder set... 109 - 121
with 2 distance holder sets... 121 - 133
with 3 distance holder sets... 133 - 145

Boss spacing
500, 900, 1000,
446, 546, 846, 946, 560 and 960 mm
Other centre distances upon request.

Connection examples using an electronic heating element

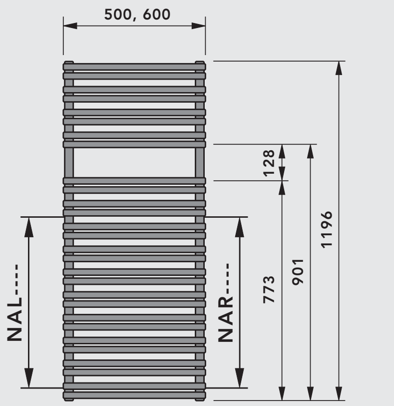


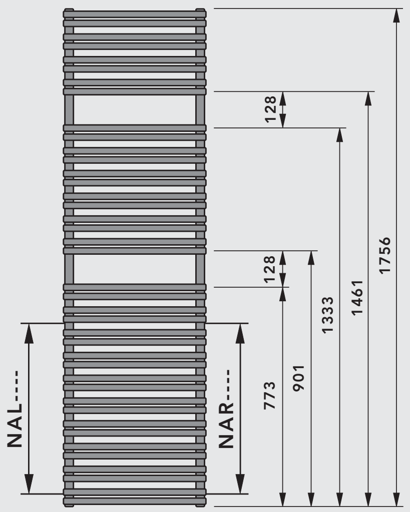


Standard basic configuration:
- A pivotable vent plug, G 1/4, nickel-plated brass, self-sealing and 2 dummy plugs, G 1/2
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Technical data

Connection modes [mm]





Connection on the left-hand side NAL
NAL0500, NAL0446
NAL0900, NAL0546
NAL1000, NAL0846
NAL0946

NAL0560
NAL0960

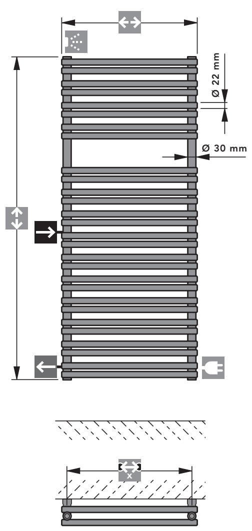
Connection on the right-hand side NAR
NAR0500, NAR0446
NAR0900, NAR0546
NAR1000, NAR0846
NAR0946

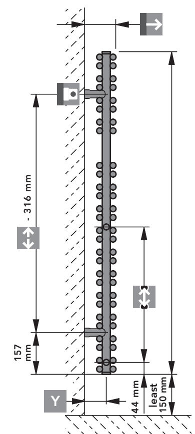
NAR0560
NAR0960

BAWA Replacement radiators

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts					Radiator exponent n	E-heat element Output [2] Watt	Weight kg	Water content l
		75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C				
1200 (1196)	500	885	721	628	464	382	1,265	600	21,6	9,2
	600	1061	866	756	560	463	1,251	600	25,0	10,9
1800 (1756)	500	1222	994	865	638	525	1,274	600	30,8	13,1
	600	1466	1195	1043	771	637	1,258	900	35,7	15,6

[1] (1) Tested in accordance with ÖNORM EN 442
[2] at 60 °C





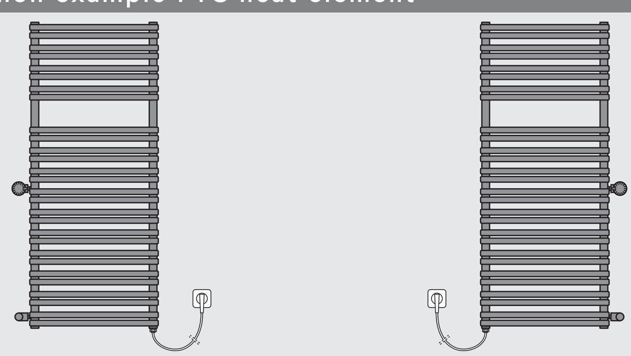
Overall length -40 mm

Connection dimensions
without distance holders... 80 - 92
with 1 distance holder set... 92 - 104
with 2 distance holder sets... 104 - 116
with 3 distance holder sets... 116 - 128

Overall depth (incl. wall clearance)
without distance holders... 113 - 125
with 1 distance holder set... 125 - 137
with 2 distance holder sets... 137 - 149
with 3 distance holder sets... 149 - 161

Boss spacing
500, 900, 1000,
446, 546, 846, 946, 560 and 960 mm
Other centre distances upon request.

Connection example PTC-heat element



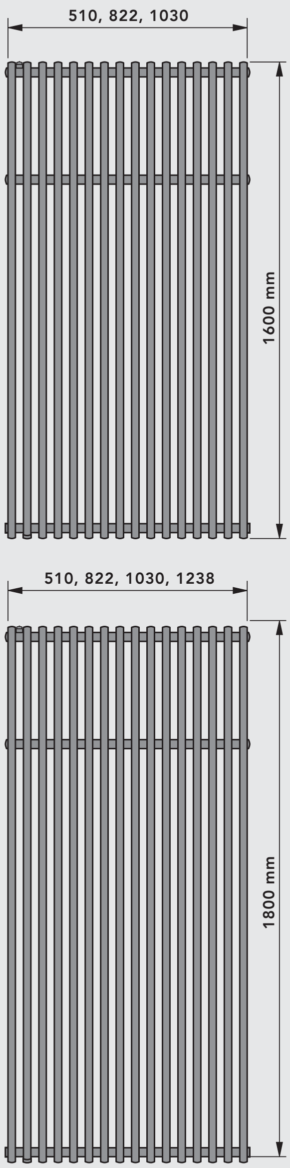
Standard basic configuration:

- Pivotable vent plug, nickel plated brass G 1/2, self-sealing, and 2 dummy plugs G 1/2
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

VELINO Design radiator

Technical data

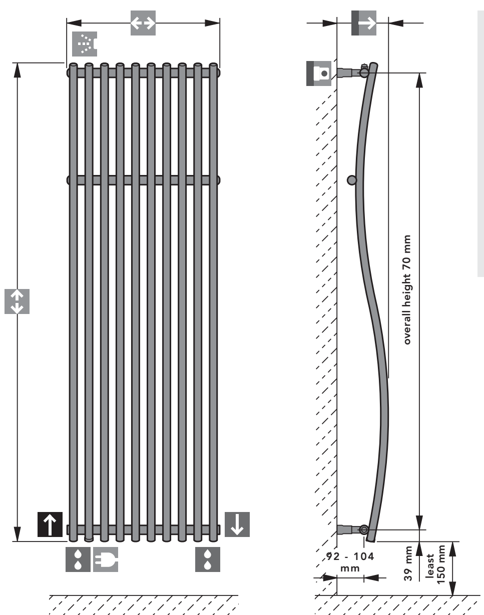
Dimensions [mm]



VELINO

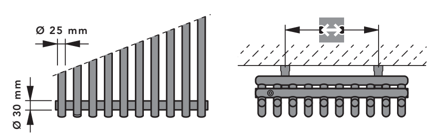
Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt	Weight kg	Water content l
1600 (1600)	**510**	850	691	602	444	365	1,273	615	13,5	6,5
	822	1359	1105	963	709	584	1,273	615	21,6	10,4
	1030	1699	1382	1204	887	731	1,273	615	27,0	13,0
1800 (1800)	**510**	948	771	671	494	407	1,274	615	15,0	7,7
	822	1516	1232	1074	791	651	1,274	615	24,0	12,3
	1030	1895	1541	1342	988	814	1,274	615	30,0	15,4
	1238	2274	1849	1610	1186	977	1,274	615	35,8	18,5

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C C



Overall depth (incl. wall clearance)
bei Overall height 1600 .... 169 - 181 mm
bei Overall height 1800 .... 177 - 189 mm

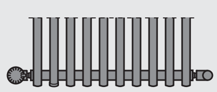
for an overall length of 510 .... 312 mm
for an overall length of 822 .... 624 mm
for an overall length of 1030 .... 832 mm
for an overall length of 1238 .... 1040 mm



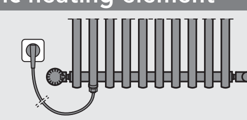
BAWA-T replacement

VELINO

Connection example without electric heating element



Connection example with electric heating element



Connections
3 x G 1/2 Internal thread and
3 x G 1/4 Internal thread (for vent and drain plugs)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

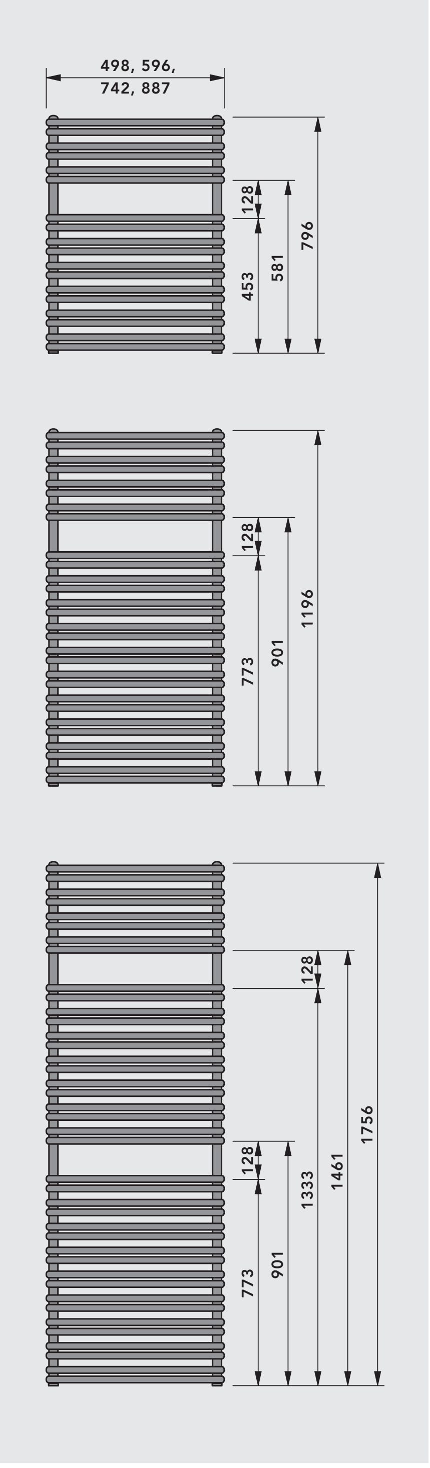
Maximum operating temperature
110 °C

Standard basic configuration
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/4, as well as a dummy plug, G 1/2, nickel-plated brass, self-sealing
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

Accessory: PTC electric heating element
All VELINO design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

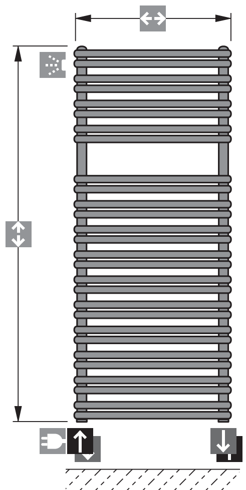
Dimensions [mm]

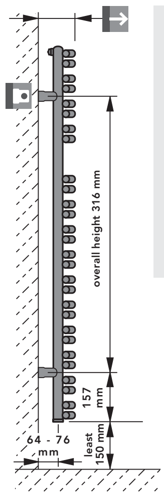


CAVALLY

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output [2] Watts	Weight kg	Water content l
800 (796)	498	440	364	321	242	203	1,169	300	7,7	3,6
	596	528	437	385	291	243	1,167	300	8,8	4,1
	742	659	545	481	363	304	1,165	300	10,5	4,9
	887	790	654	577	436	366	1,162	600	12,1	5,7
1200 (1196)	498	649	533	467	350	291	1,211	300	11,8	5,4
	596	778	641	563	423	353	1,191	600	13,5	6,3
	742	972	805	710	537	450	1,162	600	16,1	7,7
	887	1165	969	857	653	550	1,133	600	18,6	9,0
1800 (1756)	498	920	754	661	493	409	1,221	600	16,9	8,1
	596	1103	908	798	598	499	1,197	600	19,4	9,3
	742	1378	1141	1006	762	638	1,161	900	23,0	11,0
	887	1651	1375	1218	930	783	1,124	900	26,7	12,7

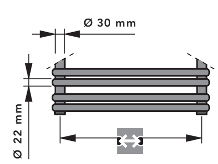
[1] Tested in accordance with ÖNORM EN 442 [2] at 60° C

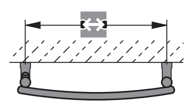




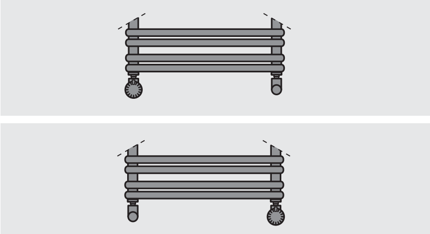
Overall depth (incl. wall clearance)
for an overall length of 498 ....119 - 131 mm
for an overall length of 596 ....128 - 140 mm
for an overall length of 742 ....146 - 158 mm
for an overall length of 887 ....164 - 176 mm

Boss spacing
for an overall length of 498 .... 451 mm
for an overall length of 596 .... 548 mm
for an overall length of 742 .... 691 mm
for an overall length of 887 .... 835 mm

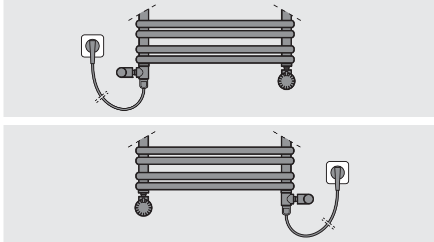




Connection example without electric heating element



Connection example with electric heating element



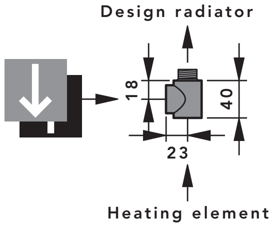
Connections
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

A special adapter (chrome-plated) should be used for the electric heating insert with the CAVALLY Design radiator!



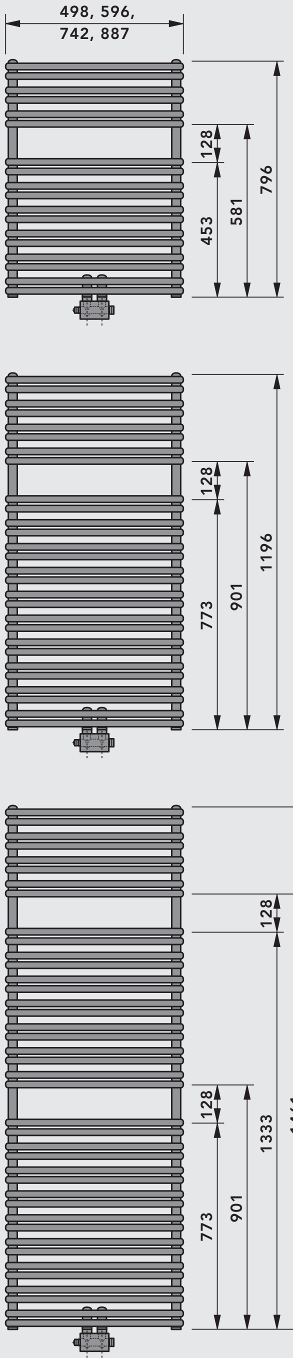
Accessory: PTC electric heat element
All CAVALLY design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, nickel-plated brass, self-sealing
- Wall fastening set matching the radiator colour
- Fitting aid
- Instruction sheet

CAVALLY-VM Design radiator

Technical data

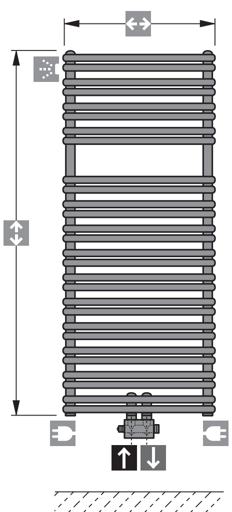
Dimensions [mm]

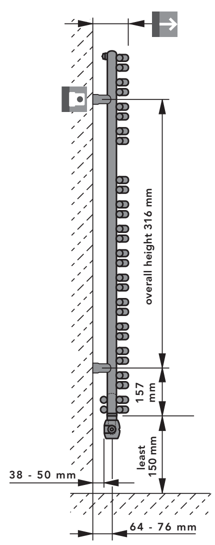


CAVALLY-VM

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output [1] in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output [2] Watt	Weight kg	Water content l
800 (796)	498	440	364	321	242	203	1,169	300	7,7	3,6
	596	528	437	385	291	243	1,167	300	8,8	4,1
	742	659	545	481	363	304	1,165	300	10,5	4,9
	887	790	654	577	436	366	1,162	600	12,1	5,7
1200 (1196)	498	649	533	467	350	291	1,211	300	11,8	5,4
	596	778	641	563	423	353	1,191	600	13,5	6,3
	742	972	805	710	537	450	1,162	600	16,1	7,7
	887	1165	969	857	653	550	1,133	600	18,6	9,0
1800 (1756)	498	920	754	661	493	409	1,221	600	16,9	8,1
	596	1103	908	798	598	499	1,197	600	19,4	9,3
	742	1378	1141	1006	762	638	1,161	900	23,0	11,0
	887	1651	1375	1218	930	783	1,124	900	26,7	12,7

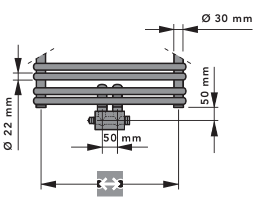
[1] Tested in accordance with ÖNORM EN 442 [2] at 60° C

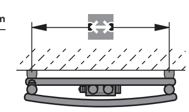




Overall depth (incl. wall clearance)
for an overall length of 498 .... 119 - 131 mm
for an overall length of 596 .... 128 - 140 mm
for an overall length of 742 .... 146 - 158 mm
for an overall length of 887 .... 164 - 176 mm

for an overall length of 498 .... 451 mm
for an overall length of 596 .... 548 mm
for an overall length of 742 .... 691 mm
for an overall length of 887 .... 835 mm

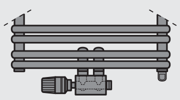




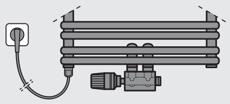
CAVALLY

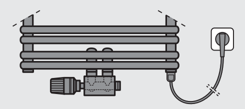
CAVALLY-VM

Connection example without electric heating element



Connection example with electric heating element





Connections
2 x G 3/4 External thread (valve connection set),
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes see diagram

13 bar

Test overpressure
13 bar

10 bar max.

Maximum positive operating pressure
10 bar

max.

Maximum operating temperature
110 °C

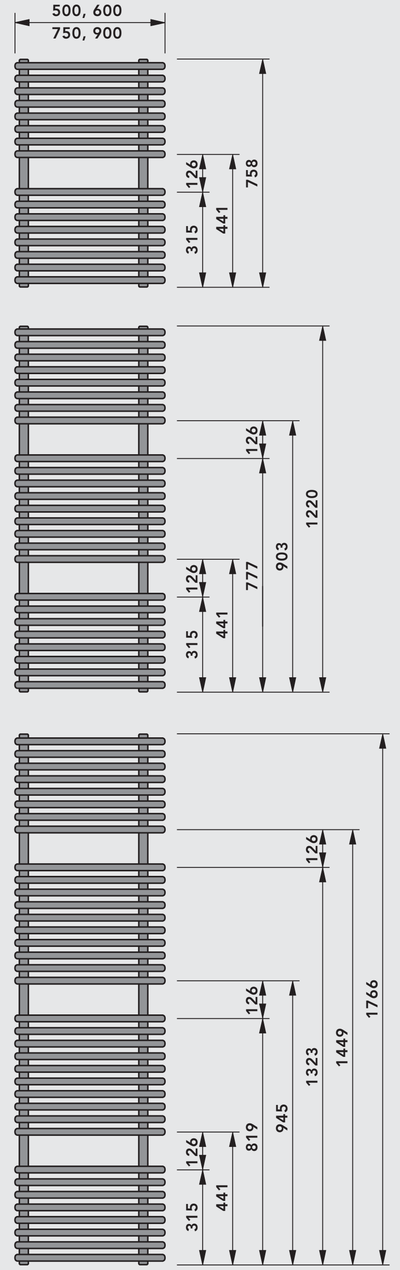
Standard basic configuration

- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass, self-sealing, factory-sealed
- A valve connection set with angled two-pipe design
- Covering rosette in matching radiator colour
- Wall fastening set matching the radiator colour
- Fitting aid
- Instruction sheet

Accessory: PTC electric heat element
All CAVALLY-VM design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Technical data

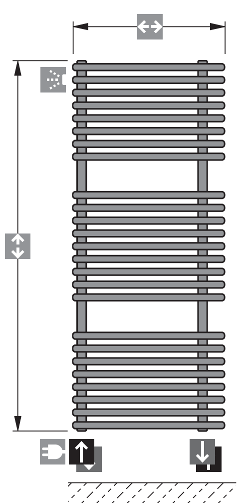
Dimensions [mm]

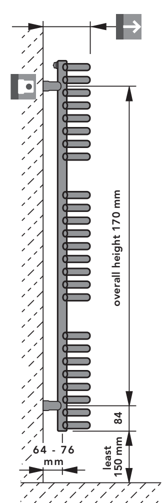


FULDA

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt: Colour paint	chrome-plated / gold plated	Weight kg	Water content l
800 (758)	**500**	405	343	307	240	205	1,024	300	-	7,2	3,2
	600	474	401	359	281	240	1,024	300	300	8,2	3,7
	750	574	486	435	340	291	1,024	300	300	9,7	4,5
	900	671	568	508	398	340	1,024	300	300	11,2	5,3
1200 (1220)	**500**	620	509	446	333	276	1,219	300	300	11,1	5,2
	600	724	594	520	389	323	1,219	600	300	12,7	6,0
	750	877	719	630	471	391	1,219	600	300	15,0	7,1
	900	1025	841	737	550	457	1,219	600	600	17,4	8,3
1800 (1766)	**500**	870	712	623	463	384	1,235	600	300	15,9	7,4
	600	1021	835	731	543	450	1,235	600	600	18,2	8,5
	750	1241	1015	888	660	547	1,235	900	600	21,7	10,1
	900	1456	1191	1042	775	642	1,235	900	900	25,2	11,7

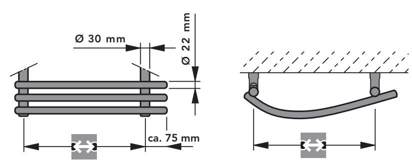
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C



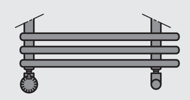


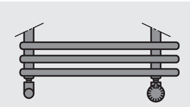
Overall depth (incl. wall clearance)
for an overall length of 500 .... 146 - 158 mm
for an overall length of 600 .... 155 - 167 mm
for an overall length of 750 .... 171 - 183 mm
for an overall length of 900 .... 180 - 192 mm

Boss spacing
for an overall length of 500 .... 400 mm
for an overall length of 600 .... 495 mm
for an overall length of 750 .... 645 mm
for an overall length of 900 .... 795 mm

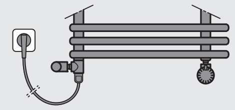


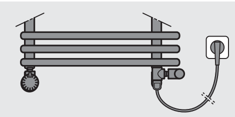
Connection example without electric heating element





Connection example with electric heating element





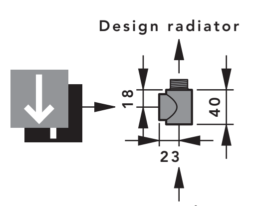
Connections
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

A special adapter (chrome-plated) should be used for the electric heating insert with the FULDA Design radiator!



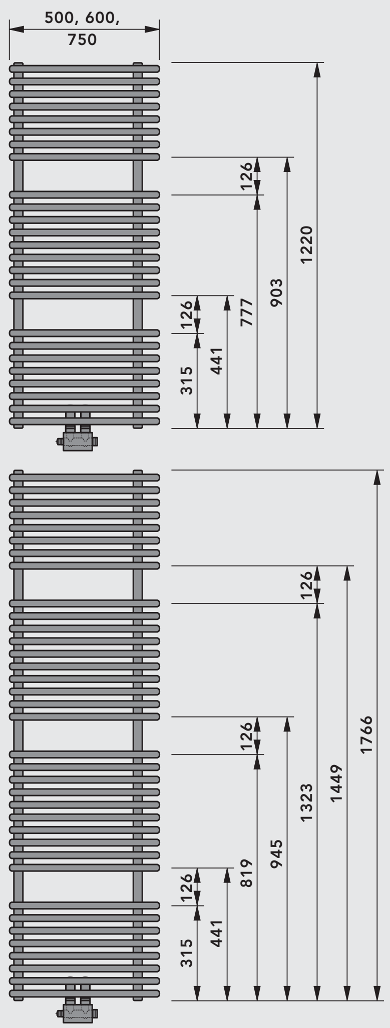
Accessory: PTC electric heating element
All FULDA design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, nickel-plated brass, self-sealing
- Wall fastening set matching the radiator colour
- Fitting aid
- Instruction sheet

FULDA-VM Design radiator

Technical data

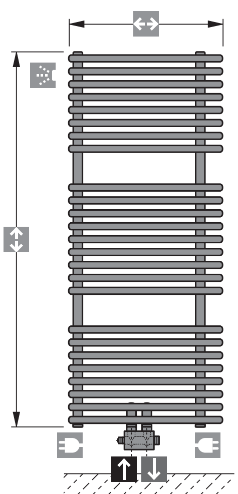
Dimensions [mm]

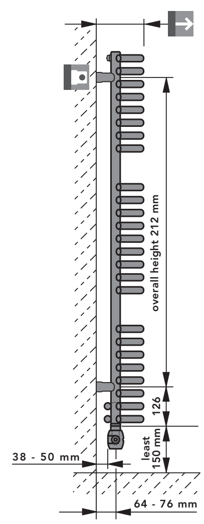


FULDA-VM

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt: Colour paint	E-heat element Output (2) Watt: chrome-plated / gold plated	Weight kg	Water content l
1200 (1220)	**500**	620	509	446	333	276	1,219	300	300	11,1	5,2
	600	724	594	520	389	323	1,219	600	300	12,7	6,0
	750	877	719	630	471	391	1,219	600	300	15,0	7,1
1800 (1766)	**500**	870	712	623	463	384	1,235	600	300	15,9	7,4
	600	1021	835	731	543	450	1,235	600	600	18,2	8,5
	750	1241	1015	888	660	547	1,235	900	600	21,7	10,1

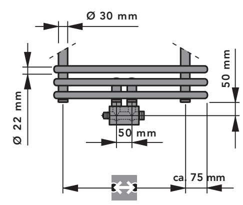
(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C

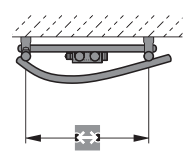




Overall depth (incl. wall clearance)
for an overall length of 500 .... 146 - 158 mm
for an overall length of 600 .... 155 - 167 mm
for an overall length of 750 .... 171 - 183 mm

for an overall length of 500 .... 400 mm
for an overall length of 600 .... 495 mm
for an overall length of 750 .... 645 mm

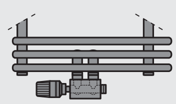




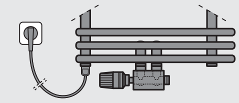
FULDA

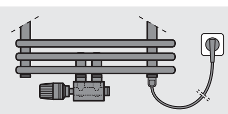
FULDA-VM

Connection example without electric heating element



Connection example with electric heating element





Connections
2 x G 3/4 External thread (Valve connection set)
2 x G 1/2 Internal thread and
1 x G 1/4 Internal thread (for vent plug)
Connection modes
see diagram

Test overpressure
13 bar

Maximum positive operating pressure
10 bar

Maximum operating temperature
110 °C

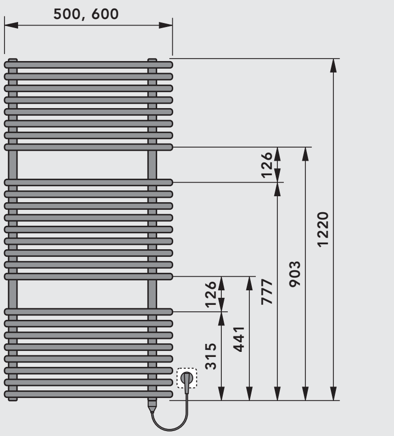
Standard basic configuration
- A pivotable vent plug, G 1/4, and two dummy plugs, G 1/2, nickel-plated brass, self-sealing, factory-sealed
- A valve connection set with angled two-pipe design
- Covering rosette in matching radiator colour
- Wall fastening set matching the radiator colour
- Fitting aid
- Instruction sheet

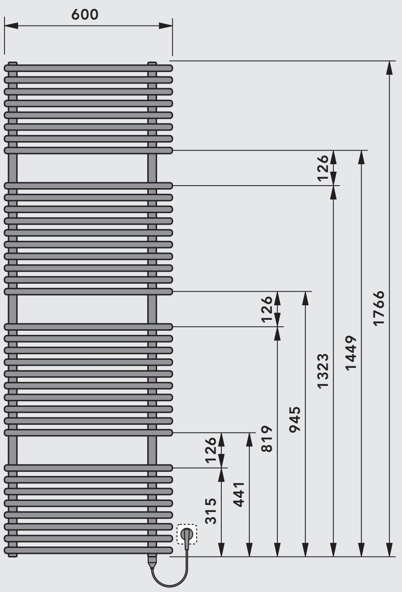
Accessory: PTC electric heating element
All FULDA-VM design radiators fitted with an electric heating element can also be used when the regular heating system is switched off. It is essential to take into account the power ratings assigned to the electric heating elements.

FULDA Design radiator - electric only operation

Technical data

Dimensions [mm]

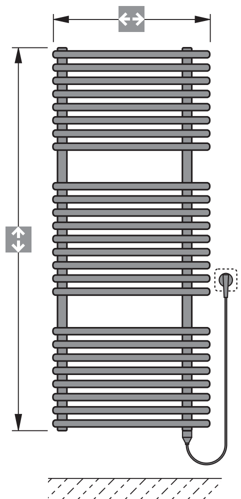


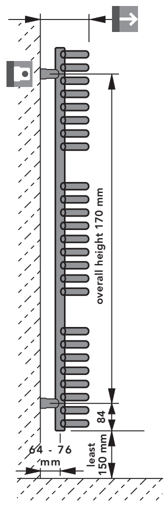


FULDA electric only operation

Nominal height (Overall height) [mm]	Overall length [mm]	Nominal power (2) Watts	Nominal power (2) Watts (chrome-plated / gold plated)	Nominal voltage [V]	Protection mode	Weight kg
1200 (1196)	**500** **600**	400 600	300 400	AC 230 AC 230	IP 24 IP 24	16,3 18,6
1800 (1766)	**600**	900	600	AC 230	IP 24	26,6

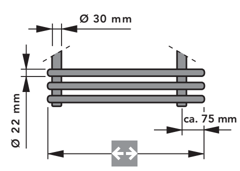
(2) at 60° C

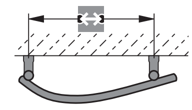




Overall depth (incl. wall clearance)
for an overall length of 500 .... 146 - 158 mm
for an overall length of 600 .... 155 - 167 mm

for an overall length of 500 .... 400 mm
for an overall length of 600 .... 495 mm





Description:
With their built-in electric heating, the electric radiators of the FULDA-E family are elegant Design and bathroom radiators.

Self-regulation effect – the temperature-dependent PTC heating element automatically controls the temperature of the heat-transfer liquid by modifying its electrical resistance.

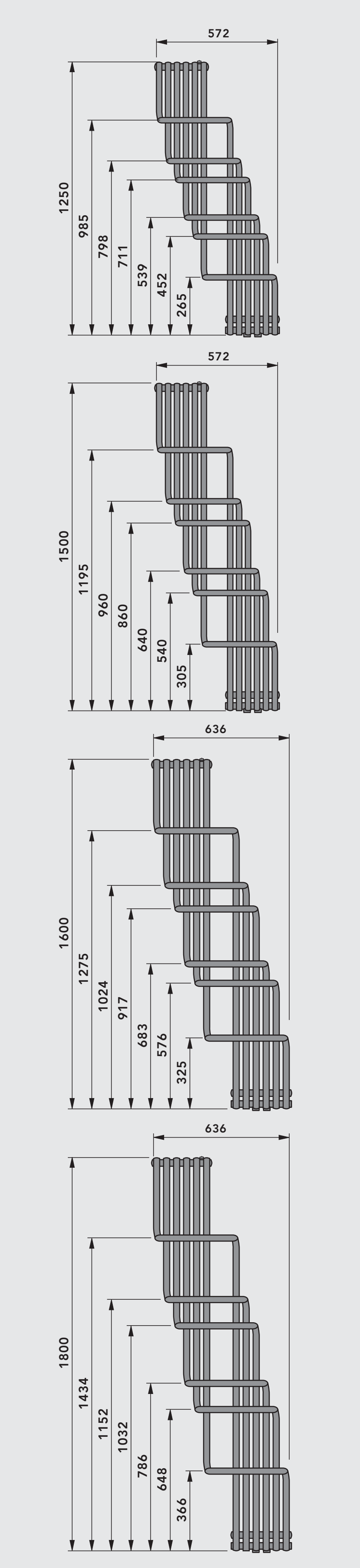
Standard basic configuration:
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet

ÖVE tested

SEINE-V Design radiator

Technical data

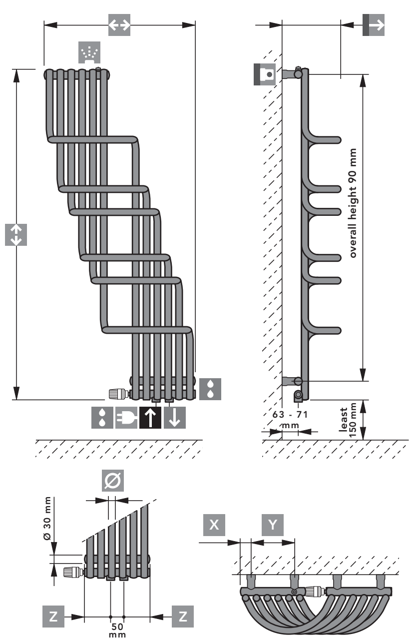
Dimensions [mm]



SEINE-V

Nominal height (Overall height) [mm]	Overall length [mm]	Heat output (1) in Watts 75/65/20 °C	70/55/20 °C	70/55/24 °C	55/45/20 °C	55/45/24 °C	Radiator exponent n	E-heat element Output (2) Watt: Colour paint	chrome-plated / gold plated	Weight kg	Water content l
1200 (1250)	**572**	486	396	345	254	210	1,267	300	-	8,0	4,2
1500 (1500)	**572**	550	447	390	287	237	1,270	300	300	9,0	4,7
1600 (1600)	**636**	675	550	480	355	293	1,260	300	300	10,8	6,6
1800 (1800)	**636**	735	598	521	385	317	1,267	300	300	11,8	7,2

(1) Tested in accordance with ÖNORM EN 442 (2) at 60° C



Overall depth (incl. wall clearance)
for an overall length of 572 .... 225 - 237 mm
for an overall length of 636 .... 251 - 263 mm

Pipe diameter
for an overall length of 572 .... 25 mm
for an overall length of 636 .... 28 mm

Measurement X
for an overall length of 572 .... 41,5 mm
for an overall length of 636 .... 44 mm

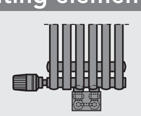
Measurement Y
for an overall length of 572 .... 164 mm
for an overall length of 636 .... 184 mm

Measurement Z
for an overall length of 572 .... 98,5 mm
for an overall length of 636 .... 111 mm

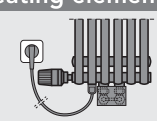
FULDA electric only operation

SEINE-V

Connection example without electric heating element



Connection example with electric heating element



Connections
4 x G 1/2 Internal thread and
2 x G 1/4 Internal thread (for vent and drain plugs)
Connection modes
see diagram

13 bar

Test overpressure
13 bar

10 bar max.

Maximum positive operating pressure
10 bar

max.

Maximum operating temperature
110 °C

Accessory: PTC electric heating element
All SEINE-V design radiators equipped with an electric heating element can also be used at times when the regular heating system is switched off. It is absolutely necessary to take account of the power-ratings assigned to the electric heating elements.

Standard basic configuration
- A pivotable vent plug, G 1/4, and a dummy plug, G 1/4, as well as a dummy plug, G 1/2, nickel-plated brass, self-sealing, factory-sealed
- A wall mounting set matching the radiator colour
- Fitting aid
- Instruction sheet
- Valve including construction cover

Simplified procedures for standard and low-temperature (ST/LT)

The conversion factors in the table show the extent to which heat output varies under other operating conditions than those specified in the following standard-design data:

Supply temperature t_1 **75 °C**
Return temperature t_2 **65 °C**
Room temperature t_r **20 °C**

Because an average exponent of 1.3 has been used both for the calculation of performance data and for specifying the conversion factor, a slight variation in performance from the calculated values is possible.

The standard heating power Φ_S of a radiator to give the required heat output $\Phi_{HL,i}$ with the chosen operating conditions, is calculated according to the formula:

$$\Phi_S = \Phi_{HL,i} \times f$$

Φ_S = standard heating power, in accordance with EN 442
$\Phi_{HL,i}$ = required heat output, in accordance with EN 12831
f = conversion factor from the table

Example:
The required heat output for a room, from a 600 Watts base in accordance with EN 12831:

Variable data: t_1 65 °C
t_2 55 °C
t_r 22 °C

Factor **f** according to the table = **1,43**

supply temperature °C	return temperature °C	room air temperature °C 12	15	18	20	22	24	26
90	80	0,61	0,64	0,68	0,71	0,74	0,77	0,81
	70	0,67	0,72	0,76	0,80	0,83	0,87	0,91
80	70	0,74	0,79	0,84	0,88	0,93	0,97	1,03
	60	0,83	0,89	0,96	1,01	1,07	1,13	1,20
	50	0,96	1,04	1,13	1,20	1,28	1,37	1,47
75	**65**	0,82	0,88	0,95	**1,00**	1,05	1,12	1,18
	60	0,88	0,94	1,02	1,08	1,14	1,21	1,29
	55	0,94	1,01	1,10	1,17	1,24	1,32	1,42
70	65	0,87	0,94	1,01	1,07	1,13	1,19	1,27
	60	0,93	1,00	1,08	1,15	1,22	1,30	1,39
	55	0,99	1,08	1,17	1,25	1,33	1,42	1,53
	50	1,07	1,17	1,28	1,37	1,47	1,58	1,71
65	60	0,98	1,07	1,16	1,23	1,31	1,40	1,50
	55	1,05	1,15	1,26	1,34	1,43	1,54	1,66
	50	1,14	1,25	1,37	1,47	1,59	1,71	1,86
	45	1,24	1,37	1,52	1,64	1,78	1,94	2,13
60	55	1,13	1,23	1,36	1,45	1,56	1,68	1,82
	50	1,22	1,34	1,48	1,60	1,73	1,87	2,05
	45	1,33	1,47	1,65	1,78	1,94	2,13	2,36
	40	1,47	1,64	1,86	2,03	2,24	2,50	2,80
55	50	1,31	1,45	1,62	1,75	1,90	2,07	2,28
	45	1,43	1,60	1,80	1,96	2,15	2,37	2,64
	40	1,59	1,78	2,03	2,24	2,48	2,78	3,15
	35	1,78	2,03	2,36	2,64	2,99	3,43	4,02
50	45	1,56	1,75	1,98	2,17	2,40	2,67	3,00
	40	1,73	1,96	2,25	2,50	2,79	3,15	3,61
	35	1,94	2,24	2,63	2,96	3,38	3,92	4,64
	30	2,24	2,64	3,20	3,70	4,39	5,39	6,99
45	40	1,90	2,17	2,53	2,83	3,19	3,66	4,25
	35	2,15	2,50	2,96	3,37	3,89	4,58	5,52

$$\Phi_S = \Phi_{HL,i} \times f = 600 \text{ Watts} \times 1{,}43 = 858 \text{ Watts}$$

A radiator has to be installed that emits 858 Watts under normal (75/65/20) conditions.

Exact method for the performance calculation for standard and low-temperature (ST/LT)

Using the formula $\Phi = \Phi_S \left[\frac{\Delta T}{\Delta T_S}\right]^n$ any performance differing from the standard can be calculated.

Φ = Heating power [W]
Φ_S = Standard heating power in accordance with EN 442 [W]
ΔT = Arithmetic radiator excess temperature [K]
ΔT_S = Arithmetic radiator excess temperature 50 K, from a standard base of 75°C / 65°C / 20°C
n = Radiator exponent

Please note: if the condition $c = \frac{t_2 - t_r}{t_1 - t_r} < 0{,}7$ is met, the excess temperatures will be specified logarithmically.

$$\Delta T_{arithmetic} = \frac{t_1 + t_2}{2} - tr \qquad \Delta T_{logarithmic} = \frac{t_1 - t_2}{\ln \frac{t_1 - t_r}{t_2 - t_r}}$$

To use our radiator performance calculator, go to www.vogelundnoot.com

Two pipe operation

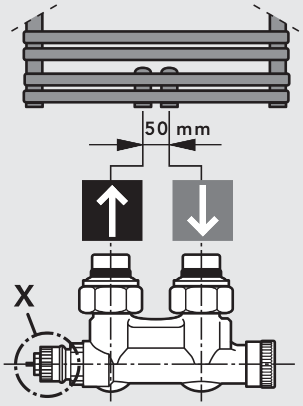


Fig. 1

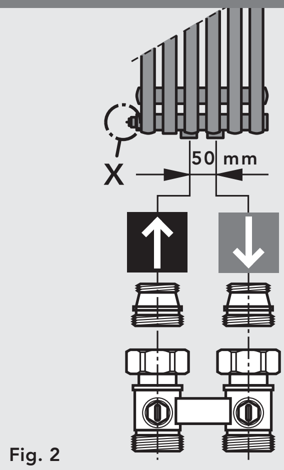
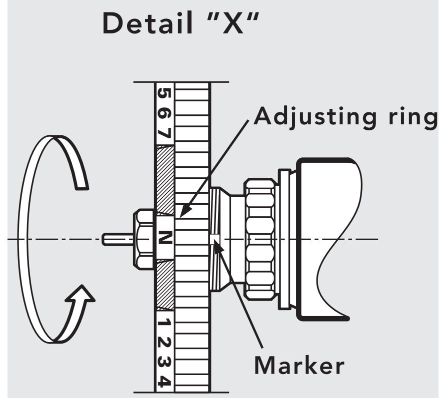


Fig. 2



Guideline values for presetting – basis: Supply temperature **70 °C** Return temperature **55 °C** Room temperature **20 °C**

Guide values for the Kv-value setting, at a proportional deviation of 2K for FULDA-VM, LOWA-VM, CAVALLY-VM, BAWA-VM, BAWA-T VM and OHIO VSM (Fig. 1):

K_v = 0,12 up to 450 W presetting **4**
K_v = 0,19 up to 700 W presetting **5**
K_v = 0,27 bis 1000 W presetting **6**
K_v = 0,33 up to 1200 W presetting **7**
K_v = 0,48 over 1200 W presetting **N**

Guide values for the K_v-value setting, at a proportional deviation of 2K for SEINE-V (Fig. 2):

K_v = 0,13 up to 500 W presetting **1**
K_v = 0,21 over 500 W presetting **2**

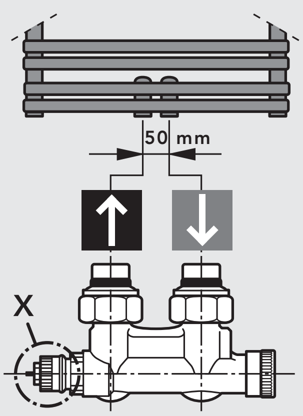
Setting instructions

- Remove the protective cap and the sensor element.
- Lift the adjusting ring and turn it anticlockwise, as far as to the presetting required – the set value (1, 2, ...7, N) must be positioned in line with the marker.
- Presetting is possible in steps of 0.5 between 1 and 7. The „N"setting, cancels all presetting.

Note:

Settings in the hatched areas are to be avoided.
It is easy to set the precise value required without using any special tools.
The following thermostat heads can be directly fitted: **„RA 2000"**, or **„RAW"** from **Danfoss, „VK"** from **Heimeier**, **„D"** from **Herz**, **„thera DA"** from **MNG**, and **„UNI XD"** from **Oventrop**.

Single pipe operation



with FULDA-VM, LOWA-VM, CAVALLY-VM, BAWA-VM, BAWA-T VM and OHIO VSM

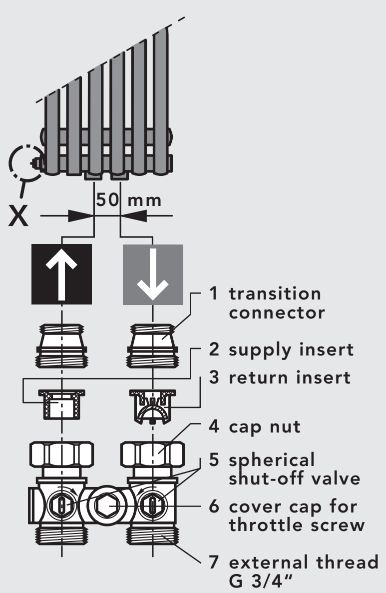
Accessories: connection set for single-pipe operation

Set value at a proportional deviation of 2K (guideline value): **radiator proportion 40% is the fixed setting**

The following thermostat heads can be directly fitted: **„RA 2000"**, or „**RAW"** from **Danfoss**, **„VK"** from **Heimeier**, **„D"** from **Herz**, **„thera DA"** from **MNG**, and **„UNI XD"** from **Oventrop**.

It is not necessary to preset the valve.

Single pipe operation for SEINE-V



Set value at a proportional deviation of 2K (guideline value):

radiator proportion 30 % - 3,50 rotations = RECOMMENDED SETTING
radiator proportion 35 % ..... 3,00 rotations
radiator proportion 40 % ..... 2,50 rotations
radiator proportion 45 % ..... 2,00 rotations
radiator proportion 50 % ..... 1,75 rotations

Note:

When installing the single-pipe manifold take care that the return insert 3 is fitted into the return, and the supply insert 2 into the supply. Before setting the radiator proportion remove the covering cap 6 from the single-pipe manifold; the bypass shaft located below it needs to be turned to the right as far as it will go.

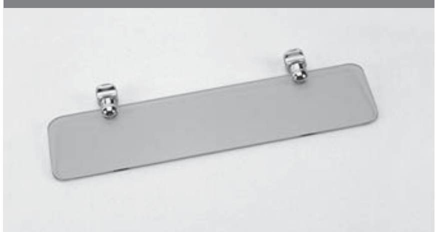
The following thermostat heads can be directly fitted: **„RA 2000"**, or „**RAW"** from **Danfoss**, **„VK"** from **Heimeier**, **„D"** from **Herz**, **„thera DA"** from **MNG**, and **„UNI XD"** from **Oventrop**.

It is not necessary to preset the valve because it has been factory-adjusted to presetting N.

Clothes rail

Bath towel rail

Glass shelf



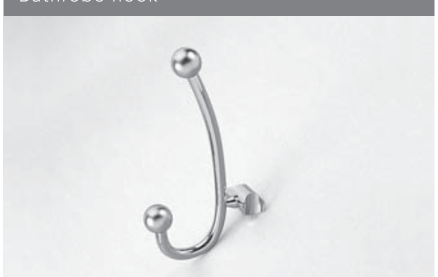
Hand towel ring

Hand towel rail

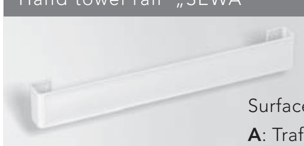
Surfaces:
A Available only in chrome-plate

Surfaces:
1B Chrome-plated
2B RAL colour
3B Sanitary ware colour

Bathrobe hook



Hand towel rail „SEWA“



Surfaces:
A: Traffic white
B: RAL colour
C: Sanitary ware colour

Accessoires

Accessoir Overall length [mm]	Item no.	**BAWA** Overall length [mm]				**ARUN-T** Overall length [mm]				**FULDA** Overall length [mm]			
		500	600	750	900	500	600	750	900	500	600	750	900
CLOTHES RAIL chrome-plated (incl. two fastening kits)													
492	AZ1CR049C100100SCHRO	•	•	•	•	•	•	•	•				
492	AZ1CR049C300100SCHRO												
596	AZ1CR060C100100SCHRO		•	•	•		•	•	•				
596	AZ1CR060C300100SCHRO												
804	AZ1CR080C100100SCHRO				•				•				
804	AZ1CR080C300100SCHRO												
1012	AZ1CR101C300100SCHRO												
BATH TOWEL RAIL chrome-plated (incl. two fastening kits)													
500	AZ1BT050C100100SCHRO	•	•	•	•	•	•	•	•				
650	AZ1BT065C100100SCHRO			•	•			•	•				
GLASS SHELF (incl. two fastening kits)													
300	AZ1G-S030C100100SCHRO	•	•	•	•	•	•	•	•				
500	AZ1G-S050C100100SCHRO	•	•	•	•	•	•	•	•				
650	AZ1G-S065C100100SCHRO			•	•			•	•				
HAND TOWEL RING chrome-plated (incl. fastening kit)													
	AZ1HT000C100100SCHRO	•	•	•	•	•	•	•	•				
	AZ1HT000C200100SCHRO									•	•	•	•
HAND TOWEL RAIL chrome-plated, RAL or Sanitary Ware colours, see colour chart (incl. fastening kit)													
A	AZ1TR000C100100SCHRO	•	•	•	•	•	•	•	•				
A	AZ1TR000C200100SCHRO									•	•	•	•
A	AZ1TR000C300100SCHRO												
1B	AZ1TR000C400100SCHRO												
2B	AZ1TR000C400100R												
3B	AZ1TR000C400100S												
BATHROBE HOOK chrome-plated (incl. fastening kit)													
	AZ1BH000C000100SCHRO												
HAND TOWEL RAIL „SEWA“, RAL or Sanitary Ware colours, see colour chart (incl. fastening kit)													
A	AZ1TR060C0001000												
B	AZ1TR060C000100R												
C	AZ1TR060C000100S												
A	AZ1TR070C0001000												
B	AZ1TR070C000100R												
C	AZ1TR070C000100S												

	CAVALLY Overall length [mm]				KASAI Overall length [mm]			VELINO Overall length [mm]				FATALA Overall length [mm]			OHIO VSM Overall length [mm]				SEWA Overall length [mm]	
	498	596	742	887	600	750	900	510	822	1030	1238	500	600	750	358	502	646	862	600	700
					•	•	•					•	•	•						
								•	•	•	•									
					•	•	•						•	•						
									•	•	•									
						•	•													
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										•	•									
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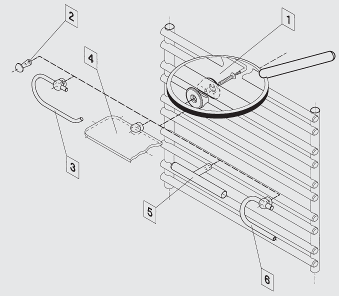
Design radiator families BAWA, CAVALLY, FULDA, FATALA, KASAI and ARUN-T



1 **Fastening kit Ø 32**
or use with Design radiators of the BAWA, CAVALLY, FATALA, KASAI and ARUN-T product families; consisting of:
2 clips (half shells)
1 flat-headed screw, with a hexagonal socket, DIN 7991 M6 x 35
1 hexagon socket screw key, SW 4 **or**

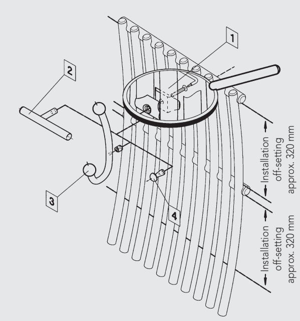
1 **Fastening kit Ø 40**
for use with Design radiators of the FULDA product family; consisting of:
2 clips (half shells)
1 flat-headed screw, with a hexagon socket, DIN 7991 M6 x 40
1 hexagonal socket screw key, SW 4

2 **Hand towel rail** and
3 **Hand towel ring**
for use with Design radiators of the BAWA, CAVALLY, FULDA, FATALA, KASAI and ARUN-T product families;

4 **Glass shelf** (not for use with the CAVALLY) as well as
5 **Clothes rail** and
6 **Bath towel rail**
for use with Design radiators of the BAWA, CAVALLY, FATALA, KASAI and ARUN-T product families.

Accessories

Design radiator family VELINO



1 **Clip set**
consisting of:
2 clips (half shells)
1 flat-headed screw, with a hexagonal socket, DIN 7991 M6 x 40
1 hexagonal socket screw key, SW 4

2 **Clothes rail**

3 **Bathrobe hook**

4 **Hand towel rail**

Digital room thermostat

Digital room thermostat with infrared transmission, (incl. PTC-electric heating element)for room temperature control using the Design radiators. The infrared transmitter has a clear LCD display, simultaneously showing the room temperature, target temperature, operationmode and the BOOST symbol.

Using the BOOST function you can activate continuous operation (without thermostatic control) for between 5 minutes and 5 hours.

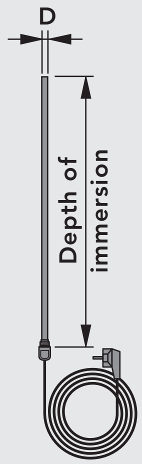
1 or 2 BOOST cycles may be set for each day, using 3 preset and adjustable programmes.

The infrared control unit is especially suitable for subsequent installation, because it simply involves plugging the receiver into a safety socket.

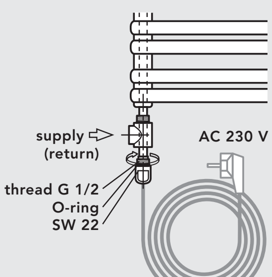
The infrared control set is available for all Design radiator models (exceptions: VELINO, SEWA, LOWA-VM and OHIO VSM!).

	Infrared control set		
	EH 300 Set	**EH 600 Set**	**EH 900 Set**
	PTC-electric heating element		
Nominal voltage Nominal input EH Depth of immersion EH Diameter **D** EH Cable length EH	AC 230 Volt 300 Watts at 60 °C 245 mm 11 mm 1500 mm	AC 230 Volt 600 Watts at 60° CC 450 mm 11 mm 1500 mm	AC 230 Volt 900 Watts at 60 °C 620 mm 11 mm 1500 mm
	Digital room thermostat transmitter		
Setting range for room temperatures	Between + 5 °C and + 30 °C		
Setting range for BOOST cycle duration	Between 5 minutes and 5 hours		
Display area for room temperatures	from + 0 °C to + 40 °C		
Static deviation	< 0,3 K		
Power supply	2 alkaline cells, LR03 model		
Range	Approx. 10 metres (all directions) Approx. 15 metres (in an unobstructed straight line)		
Interval of Infrared transmissions	Every 10 minutes		
Operational temperature	Between –10 °C and +50 °C		
Storage temperature	Between –20 °C and +60 °C		
Air humidity	Maxium of 90 %, at +25 °C		
Protection mode	IP 31		
Dimensions	120 x 80 x 35 mm (height x length x depth)		
	Digital room thermostat receiver		
Supply voltage	230 VAC +/- 10%		
Mains frequency	50 Hz		
Input power	< 5 VA		
Output	1 N/O contact (not potential free)		
Switching capacity	Ohm resistive load: max. 10A/2000W		
Operational temperature	Between –10 °C and +40 °C		
Storage temperature	Between –20 °C and +60 °C		
Air humidity	Maxium of 90 %, at +20 °C		
Protection mode	IP 24		
Dimensions	117 x 81 x 30 mm (height x length x depth)		
Digital room thermostat, transmitter and receiver **AND** electrical heating element			
Item no.	**AZ1CT030I0001000**	**AZ1CT060I0001000**	**AZ1CT090I0001000**
Digital room thermostat, transmitter and receiver **WITHOUT** electrical heating element			
Item no.	**AZ1CT000I0001000**		

PTC-electrical heating element, for use with all models, with the exception of: LOWA-VM, SEWA, OHIO VSM and VELINO



Electrical heating element	**EH 300 * EHS 300 ****	**EH 600 * EHS 600 ****	**EH 900 * EHS 900 ****
Nominal voltage Nominal input EH Depth of immersion EH Diameter **D** EH Cable length EH	AC 230 Volt 300 Watts at 60 °C 245 mm 11 mm 1500 mm	AC 230 Volt 600 Watts at 60° CC 450 mm 11 mm 1500 mm	AC 230 Volt 900 Watts at 60 °C 620 mm 11 mm 1500 mm
Item no. with safety plug *	**AZ1EH030A0001000**	**AZ1EH062A0001000**	**AZ1EH092A0001000**
with safety plug and switch **	**AZ1EH030B0001000**	**AZ1EH062B0001000**	**AZ1EH092B0001000**
Ausführungen: * with safety plug ** with safety plug and switch	protection mode IP 64 IP 40		



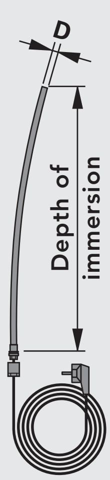
Design radiators fitted with an electric heating element can also be used at times when the regular heating system is switched off (exceptions: the LOWA-VM, SEWA, OHIO VSM and VELINO models).

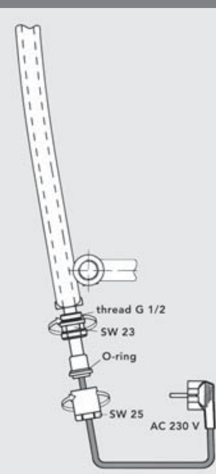
Self-adjusting effect – the temperature-dependent PTC-heating element automatically controls the water temperature in the radiator by adjusting its electrical resistance.

After the installation of the PTC-electrical heating element proceed as follows:
Fill the heating system with water and vent it. Before start-up, the radiator must be completely filled and vented. Always ensure that the water inside can expand so as to reach the expansion receptacle. For operation with the electrical heating insert we recommend closing the radiator's thermostat valve, to prevent heat being diverted into the rest of the distribution system.

Which electrical heating element to use:
Appropriate electrical heating elements and their insertion, positioning and fastening modes are specified in the tables given in the technical brochures, as well as in the installation sheets for the respective Design radiator families. It is absolutely essential to adhere to these instructions.

The VELINO electrical heating element



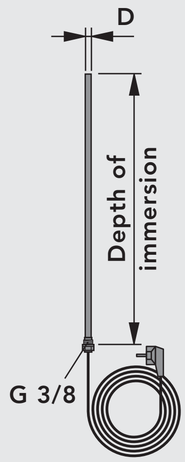


Electrical heating element	**EHR 615 * EHRS 615 ****
Nominal voltage Nominal input EH Depth of immersion EH Diameter **D** EH Cable length EH	AC 230 Volt 615 Watts 610 mm 12,5 mm 1500 mm
Item no. with safety plug *	**AZ1EH062A1001000**
with safety plug and switch **	**AZ1EH062B1001000**
Design: * with safety plug ** with safety plug and switch	protection mode IP 54 IP 40

Appropriate electrical heating elements and their insertion, positioning and fastening modes are specified in in the tables in the technical brochures and the installation sheets for the VELINO Design radiator family. It is absolutely essential to adhere to these instructions.

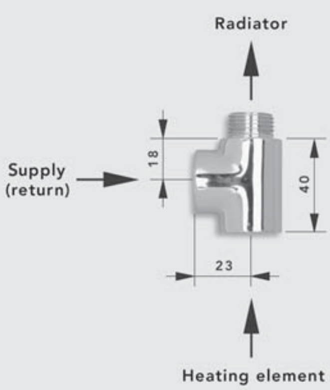
Electrical heating elements

The LOWA-VM and SEWA electrical heating element, G 3/8



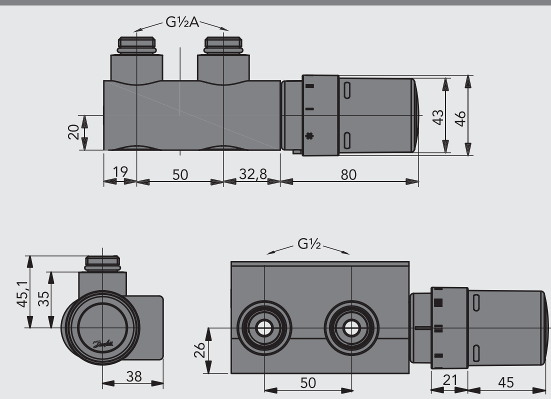
Electrical heating element	**E 300 * ES 300 ****	**E 600 * ES 600 ****
Nominal voltage Nominal input EH Depth of immersion EH Diameter **D** EH Cable length EH	AC 230 Volt 300 Watts 515 mm 12,5 mm 1500 mm	AC 230 Volt 600 Watts 750 mm 12,5 mm 1500 mm
Item no. with safety plug *	**AZ1EH030A2001000**	**AZ1EH060A2001000**
with safety plug and switch **	**AZ1EH030B2001000**	**AZ1EH060B2001000**
Design: * with safety plug ** with safety plug and switch	protection mode IP 54 IP 40	

Special adapter



Special adapter (chrome-plated)
A special adapter needs to be used for Design radiators without a 1/2" socket for the electrical heating element, as shown in the adjacent diagram. (Applies to the following models: BAWA, CAVALLY, FULDA, and FATALA/standard design.)

Design valve set



With the FATALA and FATALA left, the Design valve set for the electric heater in connection with the transition piece for the G 1/2" electric heating element is to be used open!

Product description and scope of delivery

VOGEL&NOOT Design radiators are top quality brand-name products, suitable for use in all areas because of the wide range of models and designs on offer. Depending on the models in question, the following basic designs are available.

Standard connection design
Delivered with dummy and vent plugs, as well as a wall mounting set matching the radiator colour

Central valve connection design
Delivered ready to install, with factory-sealed dummy and vent plugs, as well as a wall mounting set matching the radiator colour (exception: the OHIO model will be delivered with mounting brackets). For the SEINE-V a built-in valve set. For the BAWA-VM, BAWA-T-VM, LOWA-VM, FULDA-VM, CAVALLY-VM and the OHIO VSM models a valve connection set and a covering rosette in matching radiator colour are included as well. For the NERO and SEWA models an integrated connection set with a thermostat head comes included.

Room partition design
The ARUN-T model is used as a room partition. With the ARUN-T model a room can be divided in a highly distinctive way, making it a very attractive design element for any living area. Delivered with dummy and vent plugs as well as a wall and floor mounting set matching the radiator colour.

Purely electrical operation design
The electrical radiators of the BAWA-E, FULDA-E and FATALA-E family are designed to give purely electrical heating, without being connected to the central heating system. Self-adjusting effect – the temperature-dependent PTC heating element automatically controls the temperature of the heat-transfer liquid by modifying its electrical resistance. Delivered with wall mountings matching the radiator colour.

Operating conditions
For all models a maximum operating temperature of 110° C applies.

Mounting set
Each Design radiator is equipped with wall mounting on the rear side, suitable for both horizontal and vertical radiator alignment. (Exception: OHIO models are delivered with mounting brackets.)

Paint coatings
An eco-friendly double coat of top-quality covering, in accordance with DIN 55900; anodic dip painting with electro dip paint, using water-soluble paint; electro-statically powder coated, with processed surfaces electrolytically coated. For the SEINE and FULDA models with chrome-plated or gold-plated surfaces, the reduced output is about 25%.

Packaging
Support protection, protection of the visible surfaces, two layers of corrugated cardboard, and PE foil.

Quality certificates

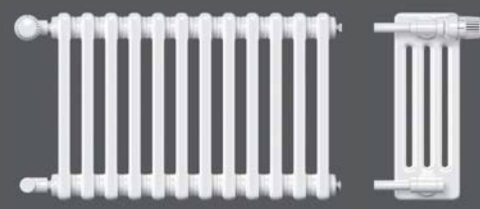
Strong brands of the highest quality
Besides its high level of expertise in design and its enthusiasm for innovation **VOGEL&NOOT** offers its customers strong brands that meet the highest quality standards. All the production sites' processes are certified in accordance with ISO. The quality and performance specifications of the Design radiators are constantly being verified by recognised European institutions.

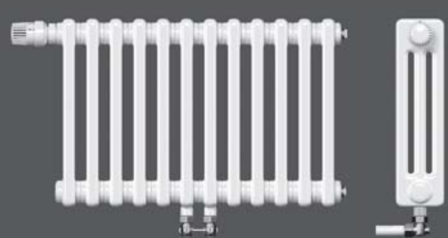
The standards that the quality certificates require us to maintain are there to give you security, the best heating performance and premium product quality. For the **VOGEL&NOOT** warranty conditions, please see the installation sheet, which is enclosed with each Design radiator.

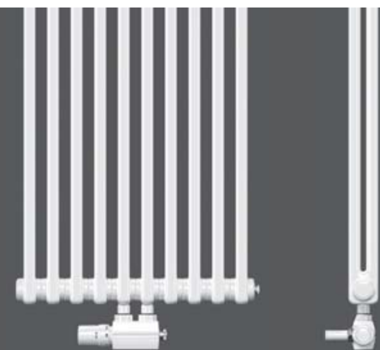
Guarantee statements are available to download at **www.vogelundnoot.com/download**

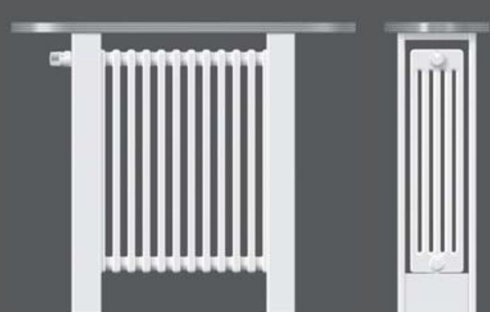
heatingthroughinnovation.

Contents









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Profile panel radiators
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LASERLINE STANDARD

Overall heights 155 - 3000 mm
Any height between 300 and 3000 mm is available to the nearest millimetre at the customer's request.

Overall length 200 - 2500 mm
Scope of delivery in a single block by model up to a max. overall length of 2100 mm is possible, otherwise supplied in block parts including plugs, nipples and gaskets.

Overall depth
2-column: 63 mm
3-column: 101 mm
4-column: 139 mm
5-column: 177 mm
6-column: 215 mm

Connections
4 x 1/2" internal thread (front)
also suitable for the boss spacings of older DIN-compliant steel or cast iron radiators
Further possible connections: 3/8", 3/4" and 1"

10 bar max.
Max. operating pressure
10 Heated bar tables

max.
Max. operating temperature 110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Design Column radiators made from precision-engineered steel pipes and fully laser-welded head pieces connected to completed radiators or blocks.
Pipes and head pieces flattened on the external sides to increase the heat output. No protruding welding burrs either inside or outside. The boss spacing is the overall height minus 65 mm. Connections for the supply, return, vent plug and drain are located on the front. The surfaces have been pre-treated and subject to electrophoretic immersion coating and cured powder coating.

Packaging
Environmentally friendly transport packaging with side protection (enclosing cardboard packaging), and shrink-wrapped.

Safety
Construction in line with work safety requirements in accordance with the guidelines of the statutory accident insurer (GUV). Tested and registered in accordance with European standard EN 442 Reg. No. 6R0900. Complies with the old BAGUV guidelines. Awarded a hygiene certificate.

Technical data
Boss size: 1", element length: 50 mm

Attention!
The manufacturer's length tolerance is 0 to + 1%. Please take this into account during pre-assembly!

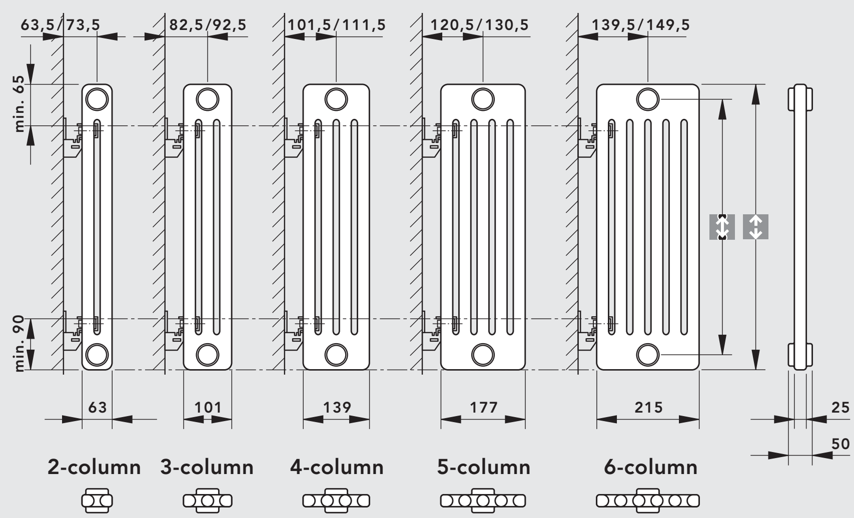
Note:
In the case of LaserLine Column radiators that are composed of blocks and are to be connected by means of nipples, the overall length increases by 30 mm (15 mm for each of the screw plugs!)

Fixing and scope of delivery
Delivery without fixings and connection materials (see Accessories)

Coating
In accordance with DIN 55 900, with electrophoretic immersion coating and cured powder coating in RAL 9016 Traffic White, other RAL colours and bathroom suite colours are available upon request.

Models overview, dimensions and block lengths

Models overview



Note:
The entire Laserline series is manufactured without clip brackets as standard. The delivery does not include fixings, or vent plugs or dummy plugs.

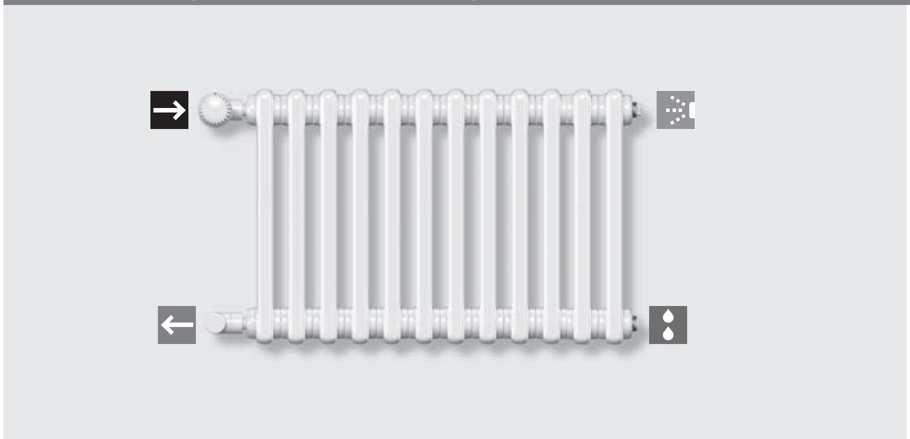
Boss spacing:
Overall height – 65 mm

Model	Overall height [mm]	Max. elements per block	Nipples supplied by manufacturer max. elements
2-column	155 - 800	42	60
	801 - 1000	42	48
	1001 - 2400	19	-
	2401 - 3000	16	-
3-column	155 - 800	42	60
	801 - 1000	42	48
	1001 - 2400	19	-
	2401 - 3000	16	-
4-column	155 - 800	42	60
	801 - 1000	32	48
	1001 - 1850	19	-
	1851 - 2000	18	19
	2001 - 2200	16	19
	2201 - 2500	14	16
	2501 - 2800	12	16
	2801 - 3000	11	16
5-column	155 - 665	42	60
	666 - 750	37	53
	751 - 800	32	48
	801 - 1000	26	40
	1001 - 1400	19	-
	1401 - 1500	18	19
	1501 - 1600	17	19
	1601 - 1800	16	19
	1801 - 2000	14	19

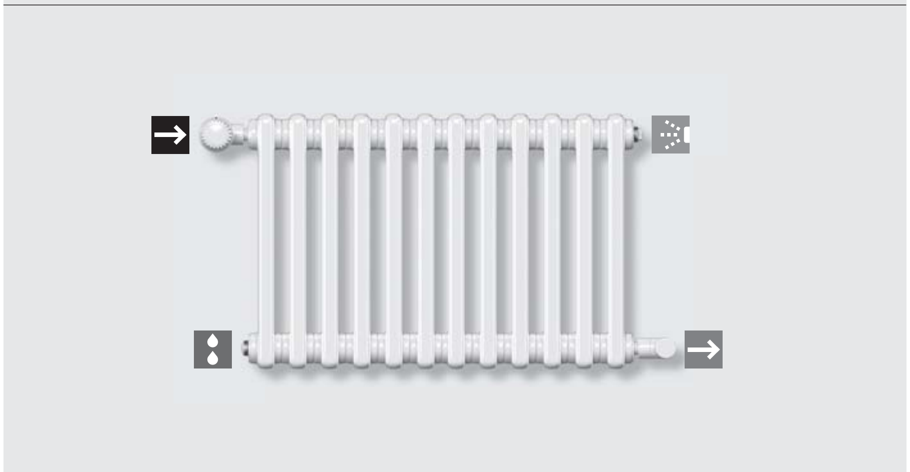
Model	Overall height [mm]	Max. elements per block	Nipples supplied by manufacturer max. elements
5-column	2001 - 2200	12	18
	2201 - 2500	11	16
	2501 - 2800	10	14
	2801 - 3000	9	13
6-column	155 - 500	42	60
	501 - 600	35	52
	601 - 665	32	48
	666 - 750	28	42
	751 - 800	26	42
	801 - 900	24	36
	901 - 1000	22	33
	1001 - 1200	19	-
	1201 - 1400	16	19
	1401 - 1500	15	19
	1501 - 1600	14	19
	1601 - 1800	13	19
	1801 - 1900	12	18
	1901 - 2000	11	17
	2001 - 2100	11	16
	2101 - 2300	10	15
	2301 - 2500	9	14
	2501 - 2600	9	13
	2601 - 2800	8	12
	2801 - 3000	8	11

Standard heights [mm]	Boss spacing [mm]
155	90
300	235
350	285
365	300
400	335
415	350
450	385
500	435
550	485
565	500
600	535
665	600
750	685
900	835
965	900
1000	935
1065	1000
1100	1035
1200	1135
1500	1435
1800	1735
2000	1935
2200	2135
2500	2435
2800	2735
3000	2935

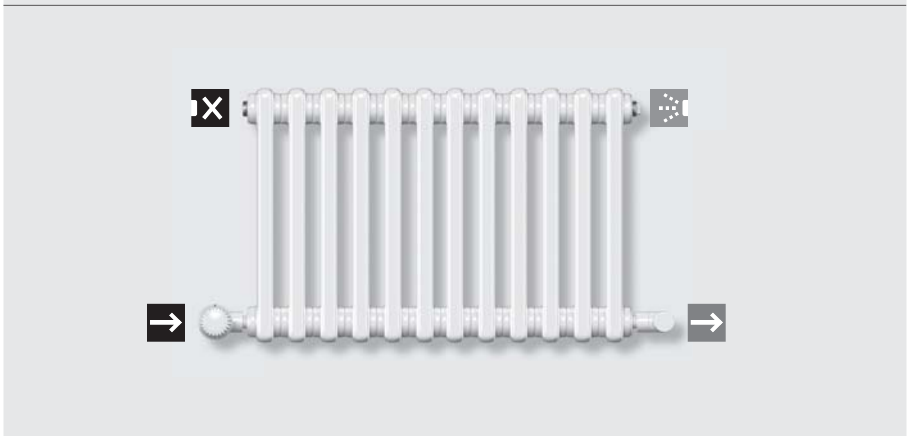
Connection types – double pipe system



A: Single-sided connection

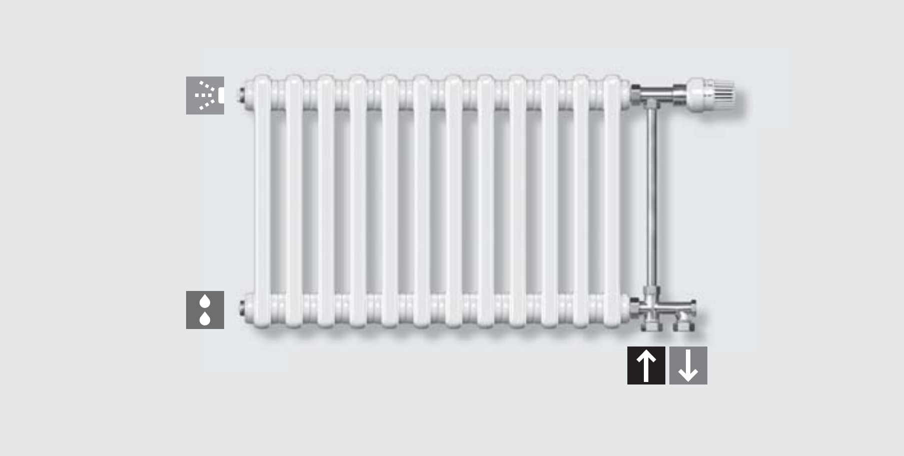


B: Connection **on both sides**



C: Connection **on top**

Connection type – single pipe system



Heat output conversion

Excess temperatures ΔT

The table values have been calculated by arithmetic or logarithms and have been rounded up or down in line with practical considerations. It is therefore usually not necessary to make calculations yourself.

Supply temperature t_1 °C	Room air temperature t_r °C	Return temperature t_2 °C 70	65	60	55	50	45	40
		ΔT						
	15	65	62	59	56	53	50	46
	18	62	59	56	53	50	46	43
90	20	60	57	54	51	48	44	40
	22	58	55	52	49	46	42	38
	24	56	53	50	47	43	40	36
	15	63	60	57	54	51	48	44
	18	60	57	54	51	48	44	41
85	20	58	55	52	49	46	42	39
	22	56	53	50	47	44	40	36
	24	54	51	48	45	41	38	34
	15	60	58	55	52	49	46	42
	18	57	55	52	49	46	42	39
80	20	55	53	50	47	44	40	37
	22	53	51	48	45	42	38	35
	24	51	49	46	43	39	36	32
	15	58	55	53	50	47	44	40
	18	55	52	50	47	44	41	37
75	20	53	50	48	45	42	38	35
	22	51	48	46	43	40	36	33
	24	49	46	44	41	37	34	30
	15	-	53	50	48	45	42	38
	18	-	50	47	45	42	39	35
70	20	-	48	45	43	40	36	33
	22	-	46	43	40	37	34	31
	24	-	44	41	38	35	32	29
	15	-	-	48	45	43	40	36
	18	-	-	45	42	39	36	33
65	20	-	-	43	40	37	34	31
	22	-	-	41	38	35	32	29
	24	-	-	39	36	33	30	27
	15	-	-	-	43	40	37	34
	18	-	-	-	40	37	34	31
60	20	-	-	-	38	35	32	29
	22	-	-	-	36	33	30	27
	24	-	-	-	34	31	28	25
	15	-	-	-	-	38	35	32
	18	-	-	-	-	35	32	29
55	20	-	-	-	-	33	30	27
	22	-	-	-	-	31	28	25
	24	-	-	-	-	29	26	23
	15	-	-	-	-	-	33	30
	18	-	-	-	-	-	30	27
50	20	-	-	-	-	-	28	25
	22	-	-	-	-	-	26	23
	24	-	-	-	-	-	24	21

Conversion factor U_f

Conversion factor U_f to determine the heat output for ΔT other than 50 K

ΔT K	U_f	ΔT K	U_f
65	1,408	43	0,821
64	1,380	42	0,796
63	1,352	41	0,771
62	1,324	40	0,747
61	1,296	39	0,723
60	1,268	38	0,699
59	1,241	37	0,675
58	1,213	36	0,651
57	1,186	35	0,627
56	1,159	34	0,604
55	1,132	33	0,581
54	1,105	32	0,558
53	1,079	31	0,535
52	1,052	30	0,513
51	1,026	29	0,491
50	1,000	28	0,469
49	0,974	27	0,447
48	0,948	26	0,426
47	0,922	25	0,404
46	0,897	24	0,383
45	0,871	23	0,363
44	0,846	22	0,342
43	0,821	21	0,322
44	0,796		

The standard heat output
In accordance with DIN EN 442, this relates to t_1 = 75 °C, t2 = 65 °C, tr = 20 °C Excess temperature ΔT = 50 K.
In order to determine other ΔT, a conversion factor is used as shown above.

Example
VOGEL&NOOT Laserline tube radiator, model 6050, 10 elements

Standard heat output at ΔT = 50 K: 103.76 Watts/element x 10 elements = 1037.6 Watts.
Supply of 70 °C, return of 55 °C, room temperature 18 °C gives ΔT = 45 K (see table on the left).

Conversion factor U_f = 0.871 (see table above).
Actual heat output: 1037.6 x 0.871 = 903.75 Watts

Output tables

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900						
Attention: the 155 mm-height radiator cannot be mounted using the radiator mounts!		**2-columns** 63 mm	**3-columns** 101 mm	**4-columns** 139 mm	**5-columns** 177 mm	**6-columns** 215 mm
Increments	All lengths from 200 to 2500 mm in increments of 50 mm, the element width is 50 mm.					
Overall height **155** mm	**Model**	**2016**	**3016**	**4016**	**5016**	**6016**
	Output/element in Watts	12,66	17,51	22,83	28,71	34,80
Boss spacing 90 mm	Water capacity/element in litres	0,27	0,39	0,51	0,63	0,75
	Weight when empty/ element in kg	0,30	0,45	0,61	0,76	0,93
Overall height **300** mm	**Model**	**2030**	**3030**	**4030**	**5030**	**6030**
	Output/element in Watts	25,24	35,40	45,56	55,98	66,39
Boss spacing 235 mm	Water capacity/element in litres	0,40	0,57	0,75	0,93	1,11
	Weight when empty/ element in kg	0,52	0,78	1,05	1,30	1,57
Overall height **350** mm	**Model**	**2035**	**3035**	**4035**	**5035**	**6035**
	Output/element in Watts	28,96	40,50	52,04	63,99	75,93
Boss spacing 285 mm	Water capacity/element in litres	0,44	0,64	0,84	1,03	1,23
	Weight when empty/ element in kg	0,60	0,89	1,20	1,49	1,86
Overall height **365** mm	**Model**		**3037**	**4037**	**5037**	**6037**
	Output/element in Watts		42,01	53,96	66,36	78,76
Boss spacing 300 mm	Water capacity/element in litres		0,66	0,86	1,06	1,27
	Weight when empty/ element in kg		0,91	1,22	1,54	1,86
Overall height **400** mm	**Model**	**2040**	**3040**	**4040**	**5040**	**6040**
	Output/element in Watts	32,63	45,52	58,40	71,87	85,33
Boss spacing 335 mm	Water capacity/element in litres	0,49	0,70	0,92	1,14	1,35
	Weight when empty/ element in kg	0,68	1,00	1,35	1,67	2,02
Overall height **415** mm	**Model**		**3042**	**4042**		**6042**
	Output/element in Watts		47,01	60,29		88,12
Boss spacing 350 mm	Water capacity/element in litres		0,72	0,95		1,39
	Weight when empty/ element in kg		1,03	1,37		2,08
Overall height **450** mm	**Model**	**2045**	**3045**	**4045**	**5045**	**6045**
	Output/element in Watts	36,26	50,47	64,68	79,64	94,60
Boss spacing 385 mm	Water capacity/element in litres	0,53	0,76	1,01	1,24	1,48
	Weight when empty/ element in kg	0,75	1,12	1,49	1,86	2,24
Overall height **500** mm	**Model**	**2050**	**3050**	**4050**	**5050**	**6050**
	Output/element in Watts	39,87	55,38	70,88	87,32	103,76
Boss spacing 435 mm	Water capacity/element in litres	0,57	0,83	1,09	1,34	1,60
	Weight when empty/ element in kg	0,83	1,23	1,64	2,04	2,46
Overall height **550** mm	**Model**	**2055**	**3055**	**4055**	**5055**	**6055**
	Output/element in Watts	43,46	60,25	77,03	94,93	112,83
Boss spacing 485 mm	Water capacity/element in litres	0,62	0,89	1,17	1,45	1,73
	Weight when empty/ element in kg	0,91	1,34	1,79	2,23	2,68

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900						
		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Increments	All lengths from 200 to 2500 mm in increments of 50 mm, the element width is 50 mm.					
Overall height 565 mm	**Model**	**2057**	**3057**	**4057**	**5057**	**6057**
	Output/element in Watts	44,53	61,70	78,86	97,20	115,54
Boss spacing 500 mm	Water capacity/element in litres	0,63	0,91	1,20	1,48	1,76
	Weight when empty/ element in kg	0,93	1,38	1,84	2,29	2,75
Overall height 600 mm	**Model**	**2060**	**3060**	**4060**	**5060**	**6060**
	Output/element in Watts	47,02	65,07	83,12	102,48	121,83
Boss spacing 535 mm	Water capacity/element in litres	0,66	0,96	1,26	1,55	1,85
	Weight when empty/ element in kg	0,98	1,46	1,94	2,42	2,91
Overall height 665 mm	**Model**	**2067**	**3067**	**4067**	**5067**	**6067**
	Output/element in Watts	51,64	71,31	90,97	112,20	133,42
Boss spacing 600 mm	Water capacity/element in litres	0,72	1,04	1,37	1,69	2,01
	Weight when empty/ element in kg	1,08	1,60	2,14	2,66	3,20
Overall height 750 mm	**Model**	**2075**	**3075**	**4075**	**5075**	**6075**
	Output/element in Watts	57,65	79,40	101,15	124,80	148,45
Boss spacing 685 mm	Water capacity/element in litres	0,80	1,15	1,51	1,86	2,22
	Weight when empty/ element in kg	1,21	1,79	2,39	2,97	3,58
Overall height 900 mm	**Model**	**2090**	**3090**	**4090**	**5090**	**6090**
	Output/element in Watts	68,22	93,57	118,92	146,79	174,65
Boss spacing 835 mm	Water capacity/element in litres	0,93	1,34	1,76	2,17	2,59
	Weight when empty/ element in kg	1,44	2,13	2,84	3,53	4,24
Overall height 965 mm	**Model**	**2097**	**3097**	**4097**		**6097**
	Output/element in Watts	72,80	99,69	126,57		185,91
Boss spacing 900 mm	Water capacity/element in litres	0,99	1,42	1,87		2,75
	Weight when empty/ element in kg	1,54	2,28	3,04		4,53
Overall height 1000 mm	**Model**	**2100**	**3100**	**4100**	**5100**	**6100**
	Output/element in Watts	75,26	102,97	130,67	161,31	191,95
Boss spacing 935 mm	Water capacity/element in litres	1,02	1,47	1,93	2,38	2,84
	Weight when empty/ element in kg	1,59	2,36	3,14	3,91	4,69
Overall height 1065 mm	**Model**	**2107**	**3107**	**4107**	**5107**	**6107**
	Output/element in Watts	72,71	109,07	138,29	170,72	203,15
Boss spacing 1000 mm	Water capacity/element in litres	1,04	1,55	2,04	2,52	3,00
	Weight when empty/ element in kg	1,76	2,46	3,24	4,15	4,98
Overall height 1100 mm	**Model**	**2110**	**3110**	**4110**	**5110**	**6110**
	Output/element in Watts	82,30	112,34	142,38	175,77	209,16
Boss spacing 1035 mm	Water capacity/element in litres	1,11	1,60	2,10	2,59	3,10
	Weight when empty/ element in kg	1,75	2,59	3,44	4,28	5,14

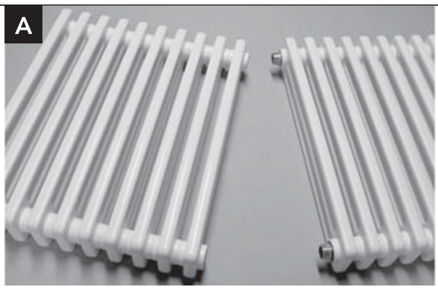
Output tables

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900						
		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Increments	All lengths from 200 to 2500 mm in increments of 50 mm, the element width is 50 mm.					
Overall height 1200 mm	Model	**2120**	**3120**	**4120**	**5120**	**6120**
	Output/element in Watts	89,35	121,70	154,04	190,17	226,29
Boss spacing 1135 mm	Water capacity/element in litres	1,19	1,73	2,27	2,80	3,33
	Weight when empty/ element in kg	1,90	2,81	3,74	4,65	5,58
Overall height 1500 mm	Model	**2150**	**3150**	**4150**	**5150**	**6150**
	Output/element in Watts	110,64	149,80	188,95	233,18	277,41
Boss spacing 1435 mm	Water capacity/element in litres	1,46	2,11	2,77	3,42	4,08
	Weight when empty/ element in kg	2,36	3,49	4,64	5,77	6,92
Overall height 1800 mm	Model	**2180**	**3180**	**4180**	**5180**	**6180**
	Output/element in Watts	132,23	178,08	223,92	276,14	328,35
Boss spacing 1735 mm	Water capacity/element in litres	1,72	2,49	3,27	4,04	4,82
	Weight when empty/ element in kg	2,82	4,17	5,53	6,88	8,25
Overall height 2000 mm	Model	**2200**	**3200**	**4200**	**5200**	**6200**
	Output/element in Watts	146,83	197,10	247,36	304,85	362,34
Boss spacing 1935 mm	Water capacity/element in litres	1,90	2,75	3,61	4,46	5,31
	Weight when empty/ element in kg	3,12	4,62	6,13	7,63	9,15

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900						
		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Increments	All lengths from 200 to 1250 mm in increments of 50 mm, the element width is 50 mm.					
Overall height 2200 mm	Model	**2220**	**3220**	**4220**	**5220**	**6220**
	Output/element in Watts	161,63	216,28	270,93	333,68	396,42
Boss spacing 2135 mm	Water capacity/element in litres	2,08	3,01	3,94	4,87	5,81
	Weight when empty/ element in kg	3,43	5,07	6,73	8,38	10,04
Overall height 2500 mm	Model	**2250**	**3250**	**4250**	**5250**	**6250**
	Output/element in Watts	184,23	245,44	306,30	377,21	447,78
Boss spacing 2435 mm	Water capacity/element in litres	2,34	3,39	4,45	5,50	6,55
	Weight when empty/ element in kg	3,89	5,75	7,63	9,49	11,37
Overall height 2800 mm	Model	**2280**	**3280**	**4280**	**5280**	**6280**
	Output/element in Watts	207,36	275,09	342,82	421,18	499,53
Boss spacing 2735 mm	Water capacity/element in litres	2,61	3,78	4,95	6,12	7,29
	Weight when empty/ element in kg	4,34	6,43	8,53	10,61	12,71
Overall height 3000 mm	Model	**2300**	**3300**	**4300**	**5300**	**6300**
	Output/element in Watts	223,10	295,18	367,25	450,78	534,30
Boss spacing 2935 mm	Water capacity/element in litres	2,79	4,03	5,29	6,53	7,79
	Weight when empty/ element in kg	4,65	6,88	9,12	11,35	13,60

Tube radiator nipples

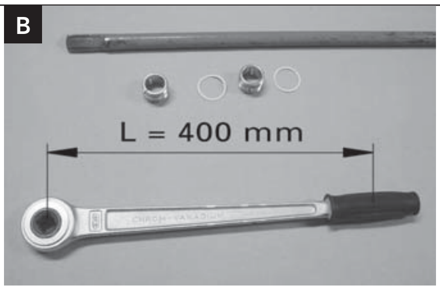
A



Lay both block parts on an even surface.

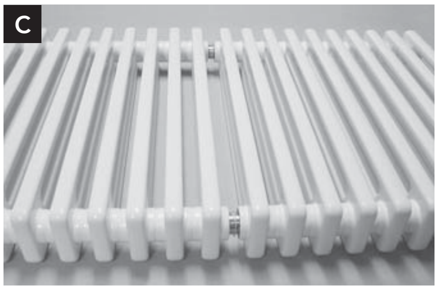
Carefully remove any colour residue and dirt from the ports. Only use original **VOGEL&NOOT** ***LaserLine*** nipples and gaskets.
Turn both nipples (approx. one pitch of a screw thread) into the ports of a block; ensure the corresponding nipple is used for the left-handed/right-handed thread. The left thread is marked! (The thread surround is knurled).
Push one gasket onto each nipple.

B



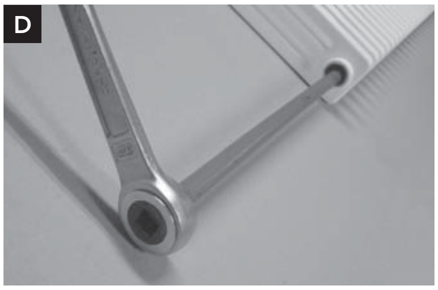
Nipple turning keys are available in lengths of 0.75 m, 1 m, 1.50 m and 2.20 m. Ratchet with 400 mm lever arm.

C



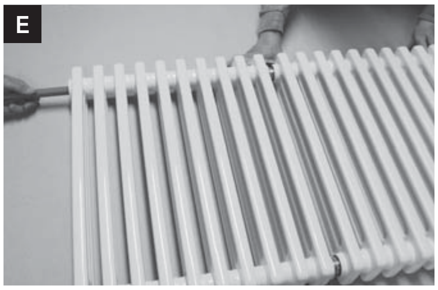
Fit the second block onto the nipples.

D



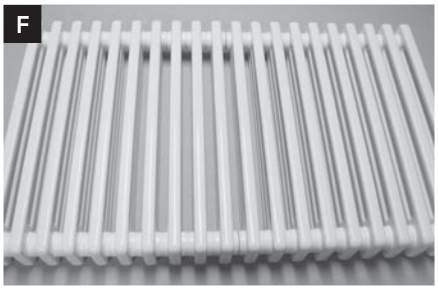
Guide the nipple turning key through a port of the last block that was fixed up to the nipple. The square drive of the nipple turning key is provided for the purpose of using the ratchet.

E



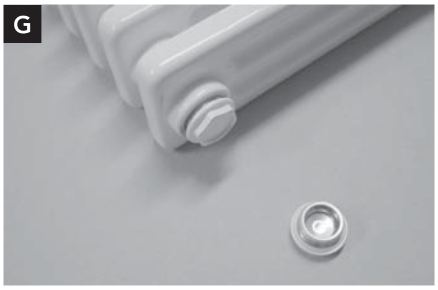
Use the nipple turning key to tighten both nipples alternately. The torque should be 90 +/- 10 Nm. Nipples only tightened on one side will cause leaks!

F



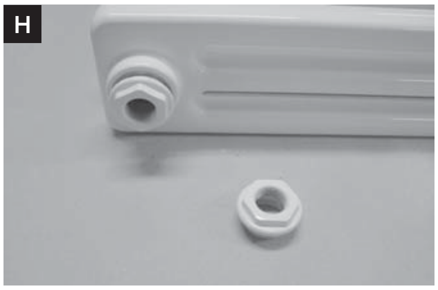
Using the 400 mm-long ratchet with a weight force (on the handle) of 22.5 kg, this will bring about a fastening torque of 90 Nm.

G



Remember that the dummy plug will add 15 mm to the length of the radiator.

H

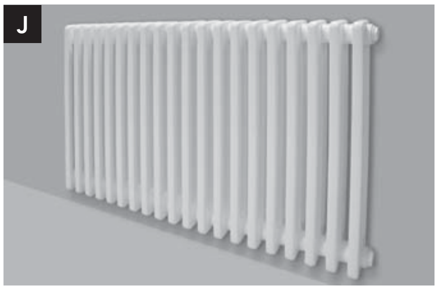


Remember that the screw plugs with plug gaskets will also add 15 mm to the length of the radiator.

I

Use the plastic key in order to prevent damage to the plugs.

J



Tube radiator ready for connection.

Attention!
The manufacturer's length tolerance is 0 to +1%. Please take this into account in the pre-assembly!

Note:
In the case of **VOGEL&NOOT** ***LaserLine*** Column radiators that are composed of blocks and are to be connected by means of nipples, the overall length increases by 30 mm (15 mm for each of the screw plugs!).

Block lengths

In order to facilitate the dispatch and transport of **VOGEL&NOOT Laserline** steel Column radiators to and around the construction site, **VOGEL&NOOT Laserline** radiators in larger lengths are supplied in individual element blocks according to model and overall height.

Nipple instructions

VOGEL&NOOT Laserline steel Column radiators supplied in block parts are fixed together on the construction site and connected to one another by nipples. Only the original **VOGEL&NOOT** gaskets supplied with the items are to be used to seal off the nipple ports and the screw plugs at the construction site. Thread paste or similar sealant is not permitted.

The bosses of the individual element blocks and the nipples feature a 1” right-handed thread and a 1” left-handed thread. Two studs are arranged opposite one another on the inside of the nipple, against which the flanges of the nipple turning key will catch during assembly.
In order to ensure the sound sealing of the nipple ports and screw plugs, it is necessary to adhere to the following instructions carefully:

- Lay the block parts horizontally on an even, level surface. In order to protect the coating from damage, cardboard or similar material should be laid underneath.
- Carefully remove any colour residue and dirt from the sites to be sealed and the surfaces of the bosses.
- Only use original **VOGEL&NOOT** Laserline nipples and **VOGEL&NOOT** 1.5 mm gaskets (EPDM, white). Thread paste or similar sealant is not permitted.
- Turn both nipples approximately one pitch of a screw thread into the ports/ bosses of a block, ensuring the corresponding one is used for the right-handed/left-handed thread (the surrounds of the left threads are knurled).
- Place a gasket onto each nipple along the central axis so that it is radially aligned.
- Fit the next block part onto the nipple.
- Guide the nipple turning key through a port of the block that was fitted last up to the nipple. The square drive of the nipple turning key is provided for the purpose of using the ratchet. The depth of insertion can already be measured beforehand and marked on the nipple turning key. Only fault-free nipple tools may be used.
- Use the nipple turning key and the ratchet to tighten both nipples alternately and tighten the block parts equally together in this way. Unequal degrees of tightening will result in leaks.

The torque should be 90 +/- 10 Nm 1).
The nipples and screw plugs must never be tightened with excessive force! Nipples only tightened on one side will cause leaks!

Installation of the screw plugs

The **VOGEL&NOOT Laserline** steel radiators are sealed after the nipples to the end elements by screw plugs and connected, for the purpose of the supply and return connection, by means of the pipelines. Screw plugs with right-handed and left-handed threads and gaskets are supplied with the radiator blocks.

Attention:
The screw plug length (approx. 15 mm per plug) is to be added to the radiator length.

- Only the original **VOGEL&NOOT** screw plugs and **VOGEL&NOOT** 2.6 mm gaskets (EPDM, white) supplied with the radiator blocks are to be used. Thread paste or similar sealant is not permitted.
- Mating surfaces and threads are to be checked to ensure they appear undamaged and clean.
- Fit the gaskets onto the screw plugs.
- Screw on the plugs by hand, ensuring the correct one is used for the right-handed and left-handed threads. Before fitting the plug collar, the gasket must once more be aligned radially, so that the entire profile seals effectively and the gasket does not become misshapen.
- Screw plugs should only be tightened using a suitable tool (ring spanner or open-jawed spanner). The torque should be 90 +/- 10 Nm 1). The use of a pipe wrench or similar is not permitted.
- The 1” pipe thread of the element blocks is not suitable for direct fitting onto pipes; in order to ensure proper sealing, the screw plugs (with a 1” adapter if necessary– see Accessories) and the supplied gaskets must always be used.

Mounting a long radiator

VOGEL&NOOT Laserline steel radiators of larger overall lengths must be lifted upright and positioned onto the wall brackets by at least two people. In order to prevent bowing of the radiators, suitable auxiliary fittings (Heated bar tabless, shelves, tubing etc.) should be used if necessary. The required number of brackets (load-bearing points) must be taken into consideration.

Exchange of element blocks

When changing element blocks, the original **VOGEL&NOOT** nipples, screw plugs and gaskets must be used. The aforementioned directions must be followed.

[1] Example

The fastening torque should be 90 Nm. If using the 400 mm ratchet and weight force (on the handle) of 22.5 kg, this will bring about a fastening torque of 90 Nm.

Radiator exponents "n"

2-column (per radiator element)		
Model	Overall height [mm]	Radiator exponent n
2016	155	**1,21**
2030	300	**1,22**
2035	350	**1,23**
-	-	-
2040	400	**1,23**
-	-	-
2045	450	**1,23**
2050	500	**1,24**
2055	550	**1,24**
2057	565	**1,24**
2060	600	**1,24**
2067	665	**1,25**
2075	750	**1,25**
2090	900	**1,26**
2097	965	**1,27**
2100	1000	**1,27**
-	-	-
2110	1100	**1,28**
2120	1200	**1,28**
2150	1500	**1,30**
2180	1800	**1,32**
2200	2000	**1,33**
2220	2200	**1,34**
2250	2500	**1,34**
2280	2800	**1,34**
2300	3000	**1,30**

3-column (per radiator element)		
Model	Overall height [mm]	Radiator exponent n
3016	155	**1,22**
3030	300	**1,23**
3035	350	**1,23**
3037	365	**1,23**
3040	400	**1,24**
3042	415	**1,24**
3045	450	**1,24**
3050	500	**1,25**
3055	550	**1,26**
3057	565	**1,26**
3060	600	**1,26**
3067	665	**1,27**
3075	750	**1,28**
3090	900	**1,29**
3097	965	**1,29**
3100	1000	**1,30**
3107	1065	**1,30**
3110	1100	**1,30**
3120	1200	**1,31**
3150	1500	**1,33**
3180	1800	**1,34**
3200	2000	**1,34**
3220	2200	**1,34**
3250	2500	**1,34**
3280	2800	**1,33**
3300	3000	**1,32**

4-column (per radiator element)		
Model	Overall height [mm]	Radiator exponent n
4016	155	**1,22**
4030	300	**1,23**
4035	350	**1,24**
4037	365	**1,24**
4040	400	**1,25**
4042	415	**1,25**
4045	450	**1,26**
4050	500	**1,26**
4055	550	**1,27**
4057	565	**1,27**
4060	600	**1,28**
4067	665	**1,29**
4075	750	**1,30**
4090	900	**1,31**
4097	965	**1,32**
4100	1000	**1,32**
4107	1065	**1,33**
4110	1100	**1,33**
4120	1200	**1,34**
4150	1500	**1,35**
4180	1800	**1,35**
4200	2000	**1,35**
4220	2200	**1,35**
4250	2500	**1,34**
4280	2800	**1,30**
4300	3000	**1,32**

5-column (per radiator element)		
Model	Overall height [mm]	Radiator exponent n
5016	155	**1,24**
5030	300	**1,24**
5035	350	**1,25**
5037	365	**1,25**
5040	400	**1,26**
-	-	-
5045	450	**1,26**
5050	500	**1,27**
5055	550	**1,28**
5057	565	**1,28**
5060	600	**1,28**
5067	665	**1,29**
5075	750	**1,30**
5090	900	**1,31**
-	-	-
5100	1000	**1,32**
5107	1065	**1,33**
5110	1100	**1,33**
5120	1200	**1,34**
5150	1500	**1,35**
5180	1800	**1,35**
5200	2000	**1,35**
5220	2200	**1,34**
5250	2500	**1,33**
5280	2800	**1,31**
5300	3000	**1,30**

6-column (per radiator element)		
Model	Overall height [mm]	Radiator exponent n
6016	155	**1,24**
6030	300	**1,25**
6035	350	**1,26**
6037	365	**1,26**
6040	400	**1,26**
6042	415	**1,27**
6045	450	**1,27**
6050	500	**1,28**
6055	550	**1,28**
6057	565	**1,28**
6060	600	**1,29**
6067	665	**1,29**
6075	750	**1,30**
6090	900	**1,31**
6097	965	**1,32**
6100	1000	**1,32**
6107	1065	**1,32**
6110	1100	**1,33**
6120	1200	**1,33**
6150	1500	**1,34**
6180	1800	**1,35**
6200	2000	**1,34**
6220	2200	**1,34**
6250	2500	**1,32**
6280	2800	**1,30**
6300	3000	**1,28**

LASERLINE CENTRALLY CONNECTED VALVE

Overall heights 155 - 3000 mm
Any height between 300 and 3000 mm is available to the nearest millimetre at the customer's request.

Overall lengths
200 - max. 1500 mm

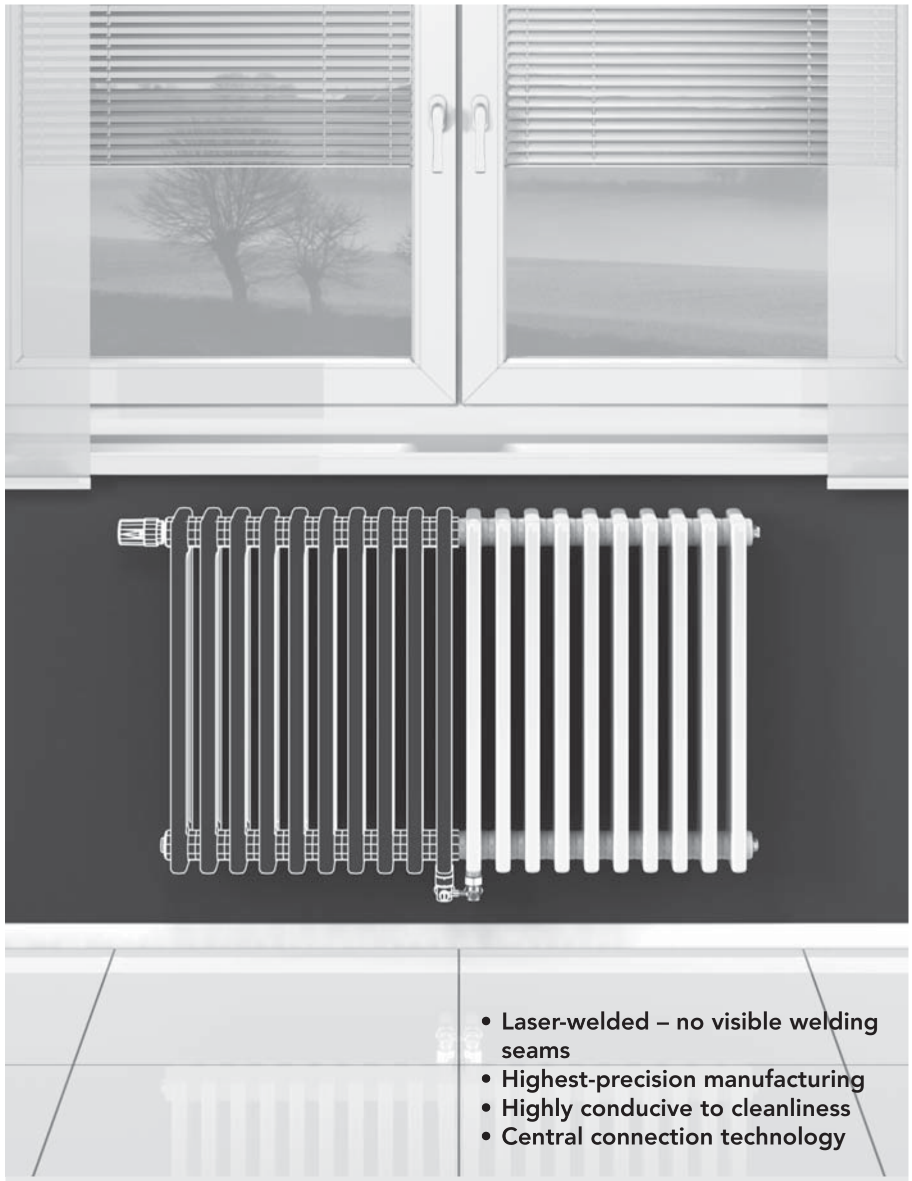
Overall depth
2-column: 63 mm
3-column: 101 mm
4-column: 139 mm
5-column: 177 mm
6-column: 215 mm

Connections
4 x 1/2" internal thread front right and left, 2 x 1/2" internal thread at the bottom centrall, distance of 50 mm with integrated thermostatic valve at the top

10 bar max.

Max. operating pressure
10 Heated bar tables

Max. operating temperature 110 °C



Guarantee statements are available to download at **www.vogelundnoot.com/download**

Design Column radiators made from precision-engineered steel pipes and fully laser-welded head pieces connected to completed radiators. Only an even number of elements is possible
Pipes and head pieces flattened on the exterior to increase the heat output. No protruding welding burrs either inside or outside. With built-in presettable control valve.

Packaging
Environmentally friendly transport packaging with side protection (enclosing cardboard packaging), and shrink-wrapped.

Safety
Construction in line with work safety requirements in accordance with the guidelines of the statutory accident insurer (GUV). Tested and registered in accordance with European standard EN 442 Reg. No. 6R0900. Complies with the old BAGUV guidelines. Awarded a hygiene certificate.

Technical data
Boss size: 1", element length: 50 mm

Attention!
The manufacturer's length tolerance is 0 to + 1%. Please take this into account during pre-assembly!

Note:
The Laserline centrally connected valve radiator consists of one block (according to supply range) and cannot be joined by nipples.

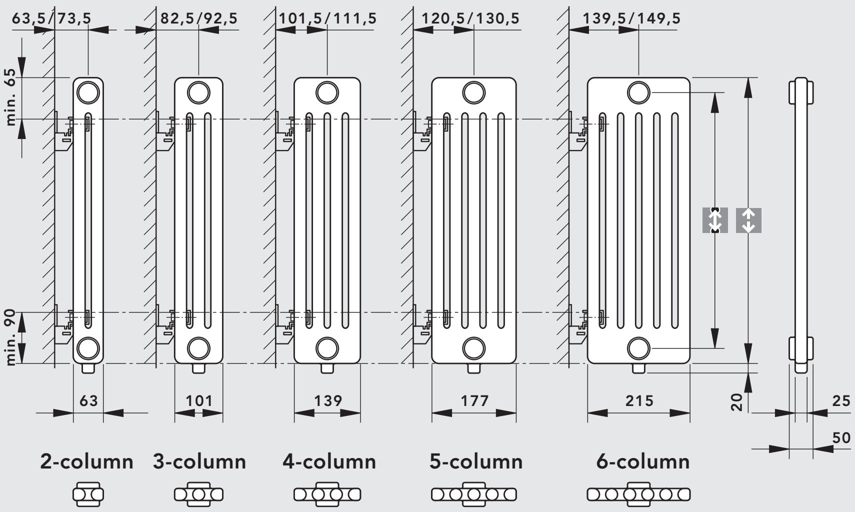
Fixing
See Accessories (not included in scope of delivery)

Scope of delivery
Includes thermostatic valve suitable for thermostatic heads with port thread M 30 x 1.5 mm; air vent and 2 x drain plugs G 1/2".

Coating
In accordance with DIN 55900, with electrophoretic immersion coating and cured powder coating in RAL 9016 Traffic White, other RAL colours and bathroom suite colours are available upon request.

Models overview, radiator dimensions

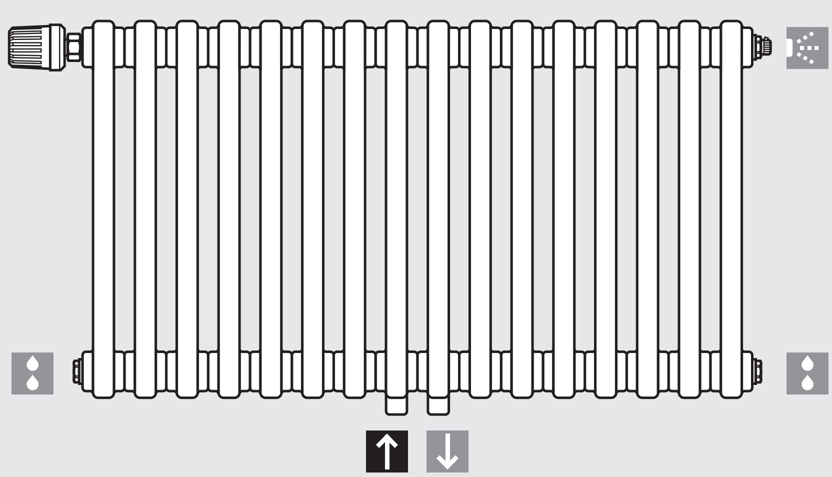
Models overview



Note:
The entire Laserline centrally connected valve series is manufactured without clip brackets. The delivery does not include fixings, but does include the necessary plugs and thermostatic valve!

Overall height – 65 mm

Connection



Attention: The supply must always be connected on the side with the valve.

Max. number of elements per block

Model	Overall height [mm]	Max. no. of elements per block
2-column	155 - 1000	30
	1001 - 2400	18
	2401 - 3000	16
3-column	155 - 1000	30
	1001 - 2400	18
	2401 - 3000	16
4-column	155 - 1000	30
	1001 - 2000	18
	2001 - 2200	16
	2201 - 2500	14
	2501 - 2800	12
	2801 - 3000	10
5-column	155 - 800	30
	801 - 1000	26
	1001 - 1500	18
	1501 - 1800	16
	1801 - 2000	14
	2001 - 2200	12
	2201 - 2800	10
	2801 - 3000	8
6-column	155 - 665	30
	666 - 750	28
	751 - 800	26
	801 - 900	24
	901 - 1000	22
	1001 - 1200	18
	1201 - 1400	16
	1401 - 1600	14
	1601 - 1900	12
	1901 - 2300	10
	2301 - 3000	8

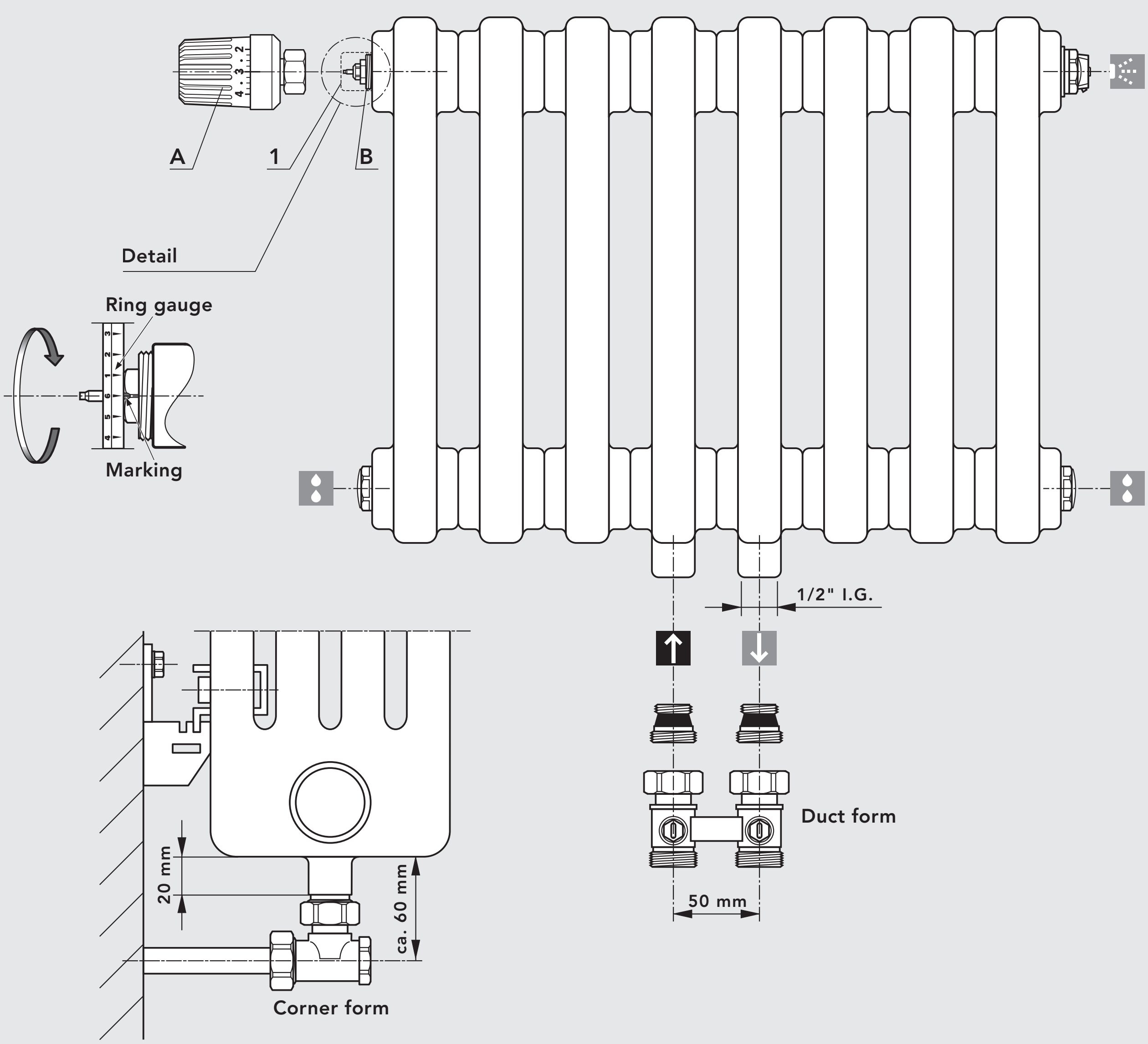
Central connection of valve is only possible with an even number of elements! No specially-produced lengths are possible (maximum number of elements!)

Double pipe operation

The desired setting values can be set easily and accurately without the need for special tools (see diagram below). The radiator is supplied with the protective cap already fitted. After removing the protective cap (item 1) the thermostatic heads (item A not in the scope of delivery) with M 30 x 1.5 mm port threads of the brands Heimeier, Honeywell-MNG and Oventrop, or special thermostatic heads "RAW-K" made by Danfoss and the Herz "H" thermostatic head can be fitted directly onto the built in valve (item B) .

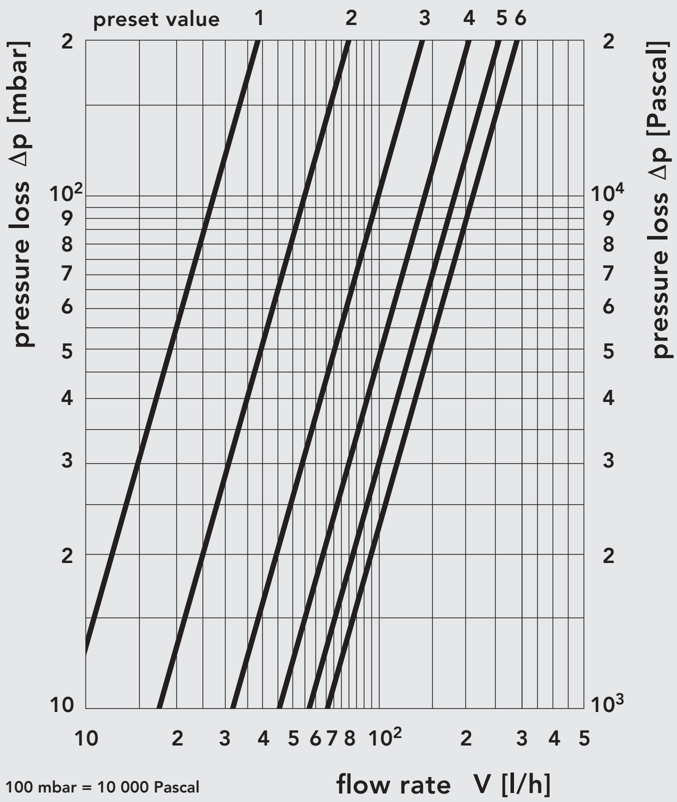
Setting notes:

- Remove the protective cap or thermostatic head
- Turn the ring gauge anti-clockwise to the desired setting – the desired setting value (1 6) must be positioned above the marking
- The pre-set value can be selected in increments of 1 and 6
- The valve is set to the pre-set value 6 by the manufacturer



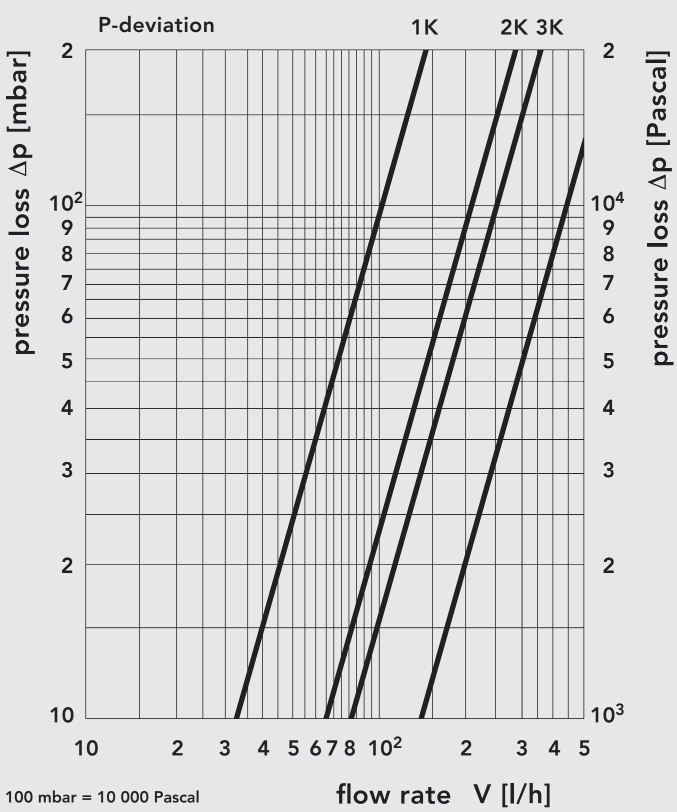
Attention: the supply must always be connected on the side with the valve

Flow rate at 2 K P-deviation



100 mbar = 10 000 Pascal

Flow rate at preset value 6



100 mbar = 10 000 Pascal

VE*	1	2	3	4	5	6
k_v	0,047	0,126	0,269	0,417	0,6	0,7

* VE = preset value

The presettable control valve is built in by the manufacturer and is delivered with the thermostatic valve.
Port thread M 30 x 1.5 mm.

The available models and heat outputs are in line with the tables on the next pages. The thermostatic valve is located in the upper boss of the radiator on the front left.

LASERLINE-VM

LASERLINE CENTRALLY CONNECTED VALVE

Output tables

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Attention: the height 155 mm cannot be mounted using the radiator mounts!						
Increments	All lengths from 200 to 1500 mm in increments of 100 mm, the element width is 50 mm.					
Overall height **155 mm**	**Model**	**2016**	**3016**	**4016**	**5016**	**6016**
	Output/element in Watts	12,66	17,51	22,83	28,71	34,80
Boss spacing 90 mm	Water capacity/element in litres	0,27	0,39	0,51	0,63	0,75
	Weight when empty/ element in kg	0,30	0,45	0,61	0,76	0,93
Overall height **300 mm**	**Model**	**2030**	**3030**	**4030**	**5030**	**6030**
	Output/element in Watts	25,24	35,40	45,56	55,98	66,39
Boss spacing 235 mm	Water capacity/element in litres	0,40	0,57	0,75	0,93	1,11
	Weight when empty/ element in kg	0,52	0,78	1,05	1,30	1,57
Overall height **350 mm**	**Model**	**2035**	**3035**	**4035**	**5035**	**6035**
	Output/element in Watts	28,96	40,50	52,04	63,99	75,93
Boss spacing 285 mm	Water capacity/element in litres	0,44	0,64	0,84	1,03	1,23
	Weight when empty/ element in kg	0,60	0,89	1,20	1,49	1,86
Overall height **365 mm**	**Model**		**3037**	**4037**	**5037**	**6037**
	Output/element in Watts		42,01	53,96	66,36	78,76
Boss spacing 300 mm	Water capacity/element in litres		0,66	0,86	1,06	1,27
	Weight when empty/ element in kg		0,91	1,22	1,54	1,86
Overall height **400 mm**	**Model**	**2040**	**3040**	**4040**	**5040**	**6040**
	Output/element in Watts	32,63	45,52	58,40	71,87	85,33
Boss spacing 335 mm	Water capacity/element in litres	0,49	0,70	0,92	1,14	1,35
	Weight when empty/ element in kg	0,68	1,00	1,35	1,67	2,02
Overall height **450 mm**	**Model**	**2045**	**3045**	**4045**	**5045**	**6045**
	Output/element in Watts	36,26	50,47	64,68	79,64	94,60
Boss spacing 385 mm	Water capacity/element in litres	0,53	0,76	1,01	1,24	1,48
	Weight when empty/ element in kg	0,75	1,12	1,49	1,86	2,24
Overall height **500 mm**	**Model**	**2050**	**3050**	**4050**	**5050**	**6050**
	Output/element in Watts	39,87	55,38	70,88	87,32	103,76
Boss spacing 435 mm	Water capacity/element in litres	0,57	0,83	1,09	1,34	1,60
	Weight when empty/ element in kg	0,83	1,23	1,64	2,04	2,46
Overall height **550 mm**	**Model**	**2055**	**3055**	**4055**	**5055**	**6055**
	Output/element in Watts	43,46	60,25	77,03	94,93	112,83
Boss spacing 485 mm	Water capacity/element in litres	0,62	0,89	1,17	1,45	1,73
	Weight when empty/ element in kg	0,91	1,34	1,79	2,23	2,68
Overall height **600 mm**	**Model**	**2060**	**3060**	**4060**	**5060**	**6060**
	Output/element in Watts	47,02	65,07	83,12	102,48	121,83
Boss spacing 535 mm	Water capacity/element in litres	0,66	0,96	1,26	1,55	1,85
	Weight when empty/ element in kg	0,98	1,46	1,94	2,42	2,91

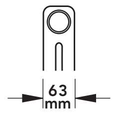
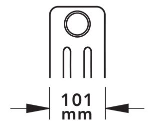
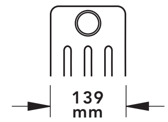
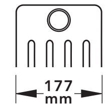
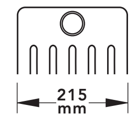
We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Output tables

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Increments	All lengths from 200 to 1500 mm in increments of 100 mm, the element width is 50 mm.					
Overall height 665 mm	**Model**	**2067**	**3067**	**4067**	**5067**	**6067**
	Output/element in Watts	51,64	71,31	90,97	112,20	133,42
Boss spacing 600 mm	Water capacity/element in litres	0,72	1,04	1,37	1,69	2,01
	Weight when empty/ element in kg	1,08	1,60	2,14	2,66	3,20
Overall height 750 mm	**Model**	**2075**	**3075**	**4075**	**5075**	**6075**
	Output/element in Watts	57,65	79,40	101,15	124,80	148,45
Boss spacing 685 mm	Water capacity/element in litres	0,80	1,15	1,51	1,86	2,22
	Weight when empty/ element in kg	1,21	1,79	2,39	2,97	3,58
Overall height 900 mm	**Model**	**2090**	**3090**	**4090**	**5090**	**6090**
	Output/element in Watts	68,22	93,57	118,92	146,79	174,65
Boss spacing 835 mm	Water capacity/element in litres	0,93	1,34	1,76	2,17	2,59
	Weight when empty/ element in kg	1,44	2,13	2,84	3,53	4,24
Overall height 1000 mm	**Model**	**2100**	**3100**	**4100**	**5100**	**6100**
	Output/element in Watts	75,26	102,97	130,67	161,31	191,95
Boss spacing 935 mm	Water capacity/element in litres	1,02	1,47	1,93	2,38	2,84
	Weight when empty/ element in kg	1,59	2,36	3,14	3,91	4,69

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900		2-columns 63 mm	3-columns 101 mm	4-columns 139 mm	5-columns 177 mm	6-columns 215 mm
Increments	All lengths from 200 to 1000 mm in increments of 100 mm, the element width is 50 mm.					
Overall height 1065 mm	**Model**		**3107**	**4107**	**5107**	**6107**
	Output/element in Watts		109,07	138,29	170,72	203,15
Boss spacing 1000 mm	Water capacity/element in litres		1,55	2,04	2,52	3,00
	Weight when empty/ element in kg		2,46	3,24	4,15	4,98
Overall height 1100 mm	**Model**	**2110**	**3110**	**4110**	**5110**	**6110**
	Output/element in Watts	82,30	112,34	142,38	175,77	209,16
Boss spacing 1035 mm	Water capacity/element in litres	1,11	1,60	2,10	2,59	3,10
	Weight when empty/ element in kg	1,75	2,59	3,44	4,28	5,14
Overall height 1200 mm	**Model**	**2120**	**3120**	**4120**	**5120**	**6120**
	Output/element in Watts	89,35	121,70	154,04	190,17	226,29
Boss spacing 1135 mm	Water capacity/element in litres	1,19	1,73	2,27	2,80	3,33
	Weight when empty/ element in kg	1,90	2,81	3,74	4,65	5,58

Output tables

Standard heat output (Watts) at 75/65/20 °C in accordance with EN 442, DIN registration number 6R0900		2-columns 	3-columns 	4-columns 	5-columns 	6-columns 
Increments	All lengths from 200 to 1000 mm in increments of 100 mm, the element width is 50 mm.					
Overall height 1500 mm	Model	2150	3150	4150	5150	6150
	Output/element in Watts	110,64	149,80	188,95	233,18	277,41
Boss spacing 1435 mm	Water capacity/element in litres	1,46	2,11	2,77	3,42	4,08
	Weight when empty/ element in kg	2,36	3,49	4,64	5,77	6,92
Overall height 1800 mm	Model	2180	3180	4180	5180	6180
	Output/element in Watts	132,23	178,08	223,92	276,14	328,35
Boss spacing 1735 mm	Water capacity/element in litres	1,72	2,49	3,27	4,04	4,82
	Weight when empty/ element in kg	2,82	4,17	5,53	6,88	8,25
Overall height 2000 mm	Model	2200	3200	4200	5200	6200
	Output/element in Watts	146,83	197,10	247,36	304,85	362,34
Boss spacing 1935 mm	Water capacity/element in litres	1,90	2,75	3,61	4,46	5,31
	Weight when empty/ element in kg	3,12	4,62	6,13	7,63	9,15
Overall height 2200 mm	Model	2220	3220	4220	5220	6220
	Output/element in Watts	161,63	216,28	270,93	333,68	396,42
Boss spacing 2135 mm	Water capacity/element in litres	2,08	3,01	3,94	4,87	5,81
	Weight when empty/ element in kg	3,43	5,07	6,73	8,38	10,04
Overall height 2500 mm	Model	2250	3250	4250	5250	6250
	Output/element in Watts	184,23	245,44	306,30	377,21	447,78
Boss spacing 2435 mm	Water capacity/element in litres	2,34	3,39	4,45	5,50	6,55
	Weight when empty/ element in kg	3,89	5,75	7,63	9,49	11,37
Overall height 2800 mm	Model	2280	3280	4280	5280	6280
	Output/element in Watts	207,36	275,09	342,82	421,18	499,53
Boss spacing 2735 mm	Water capacity/element in litres	2,61	3,78	4,95	6,12	7,29
	Weight when empty/ element in kg	4,34	6,43	8,53	10,61	12,71
Overall height 3000 mm	Model	2300	3300	4300	5300	6300
	Output/element in Watts	223,10	295,18	367,25	450,78	534,30
Boss spacing 2935 mm	Water capacity/element in litres	2,79	4,03	5,29	6,53	7,79
	Weight when empty/ element in kg	4,65	6,88	9,12	11,35	13,60

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

LASERLINE TWIN

Overall heights
1000, 1200, 1500
and 1800 mm

Overall length
500 mm (10 elements)
600 mm (12 elements)

Overall depth
2-column: 63 mm

Connections
2x 1/2" internal thread at the bottom in the centre, spacing of 50 mm, Air vent on the top right at the side G 1/2"
Possible connections
1 x 1/2" internal thread bottom right for electric heating elements

Max. operating pressure
10 Heated bar tables

Max. operating temperature
110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

- **Laser-welded – no visible welding seams**
- **Highest-precision manufacturing**
- **Highly conducive to cleanliness**
- **With fixings and towel rail**

Design Column radiators are fully laser-welded. Pipes and head pieces are flattened on the exterior to increase the heat output.

Fixing
Clip brackets welded on at the back

Scope of delivery
Delivery complete with mounting brackets, wall brackets, fixing screws and anchor bolts; includes height-adjustable towel rail in matching radiator colour with chrome-plated holders.

Coating
In accordance with DIN 55 900, with electrophoretic immersion coating and cured powder coating in RAL 9016 Traffic White, other RAL colours and bathroom suite colours are available upon request.

Safety
Construction in line with work safety requirements in accordance with the guidelines of the statutory accident insurer (GUV).

Packaging
Environmentally friendly transport packaging with side protection (enclosing cardboard packaging), and shrink-wrapped.

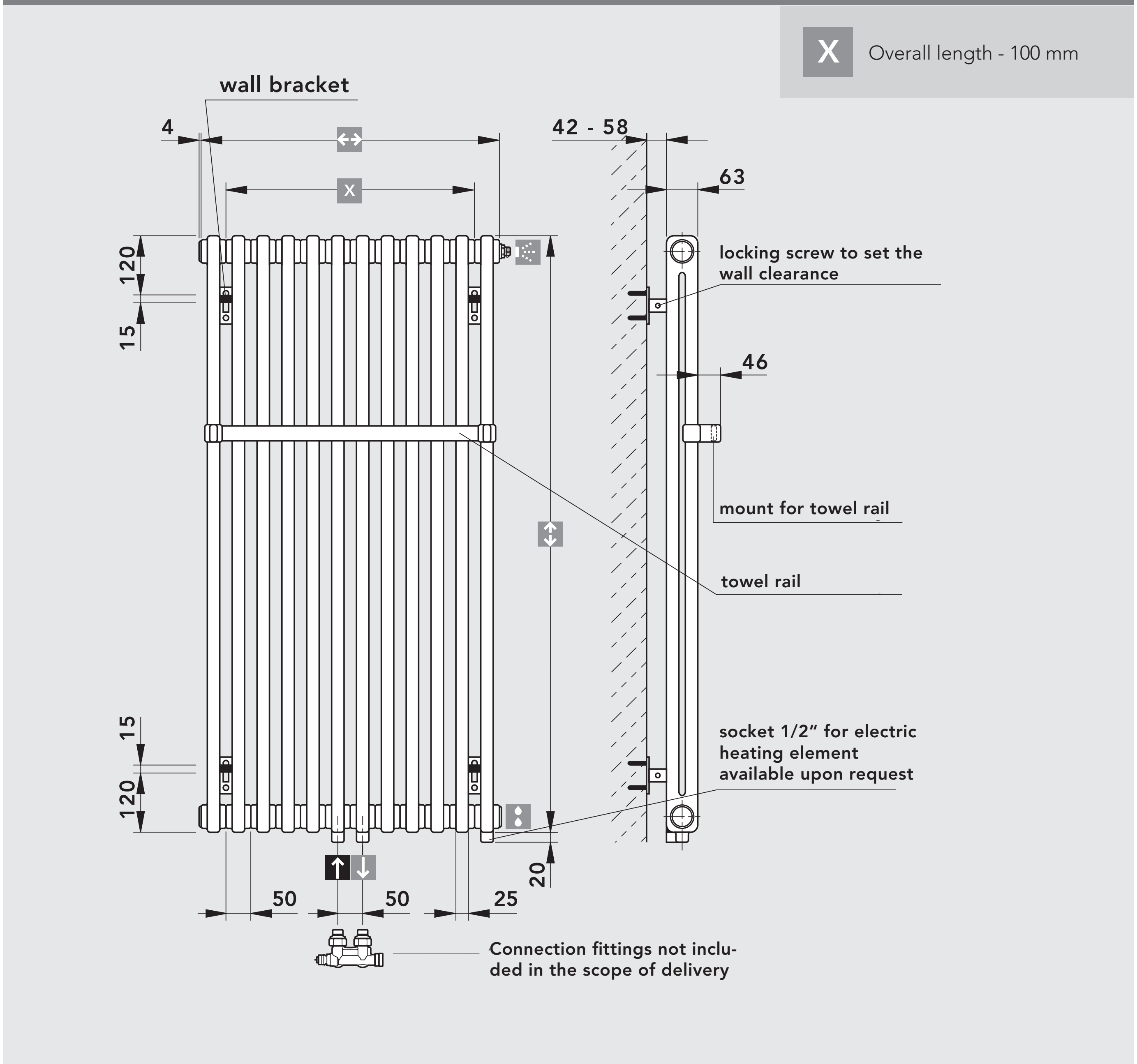
Connections
The VOGEL&NOOT Laserline Twin tube radiator is centrally connected via 2 G 1/2" ports on the bottom. The supply port on the radiator is always located on the left, while the return port is on the right. The distance between the ports is 50 mm. If requested, an additional 1/2" port can be added in production to the last element for the purpose of connecting an electric heating element, which is available in the accessories range. This enables the Laserline Twin to also be used when the heating system is switched off.

Attention! The manufacturer's length tolerance is 0 to + 1%. Please take this into account during pre-assembly!

Overview of models, outputs and special designs

* Standard heat output in accordance with EN 442 in Watts, DIN registration number 6R0900						
Overall height [mm]			1000	1200	1500	1800
			2-columns 63 mm	2-columns 63 mm	2-columns 63 mm	2-columns 63 mm
Model			2100	2120	2150	2180
Elements	Overall length [mm]					
10	500	Watt 75/65/20° *	753	893	1106	1322
		Water capacity in litres	10,20	11,90	14,60	17,20
		Weight when empty in kg	15,90	19,00	23,60	28,20
		Radiator exponent n	1,27	1,28	1,30	1,32
12	600	Watt 75/65/20° *	904	1072	1328	1587
		Water capacity in litres	12,20	14,30	17,50	20,60
		Weight when empty in kg	19,10	22,80	28,30	33,80
		Radiator exponent n	1,27	1,28	1,30	1,32

Technical data



The accessories (valve closure fitting and cover cap) can be found in the price list.

LASERLINE Architecture Heated bar tables

EN 442 GEPRÜFT

DIE *neue* WÄRME

HEIZKÖRPER RAL GÜTEZEICHEN AUS STAHL

EN ISO 9001

DIN EN EURONORM 442

Overall heights
940 (750) mm or
1090 (900) mm
(radiator heights shown in brackets)

Overall length
720 (700) mm, 920 (900) mm oder 1120 (1100) mm
(radiator lengths shown in brackets)

Overall depth
Version with 4 columns 224 mm
Version with 5 columns 262 mm

Connections
Supply 1/2” internal thread bottom left, return 1/2” internal thread bottom right;
With built-in presettable thermostatic valve, thermostatic head port thread M 30 x 1.5 mm top left, vent plug top right G 1/2”

10 bar max.

Max. Operating pressure
10 Heated bar tables

max.

Max. Operating temperature
110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

- **Laser-welded – no visible welding seams**
- **Highest-precision manufacturing**
- **Highly conducive to cleanliness**
- **Unique design options**

Design Column radiators in Heated bar tables counter-style, fully laser-welded. Pipes and head pieces are flattened on the exterior to increase the heat output, boss spacing 1”. Element length is 50 mm, with design set.

Fixing
Design set for easy, durable installation and to conceal the ports, with option for the overlay to be affixed at the time of installation.

Scope of delivery
Delivery complete with bracket, design set, with thermostatic head (Oventrop Uni LH) without overlay.

Coating
In accordance with DIN 55 900, with electrophoretic immersion coating and cured powder coating in RAL 9016 Traffic White, other RAL colours and bathroom suite colours are available upon request.

Safety
Construction in line with work safety requirements in accordance with the guidelines of the statutory accident insurer (GUV).

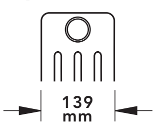
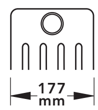
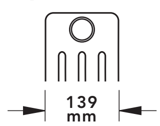
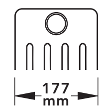
Packaging
Environmentally friendly transport packaging with side protection (enclosing cardboard packaging), and shrink-wrapped.

Attention!
The manufacturer’s length tolerance is 0 to + 1%. Please take this into account during pre-assembly!

LASERLINE Architecture Heated bar tables

Overview of models, outputs and overlay

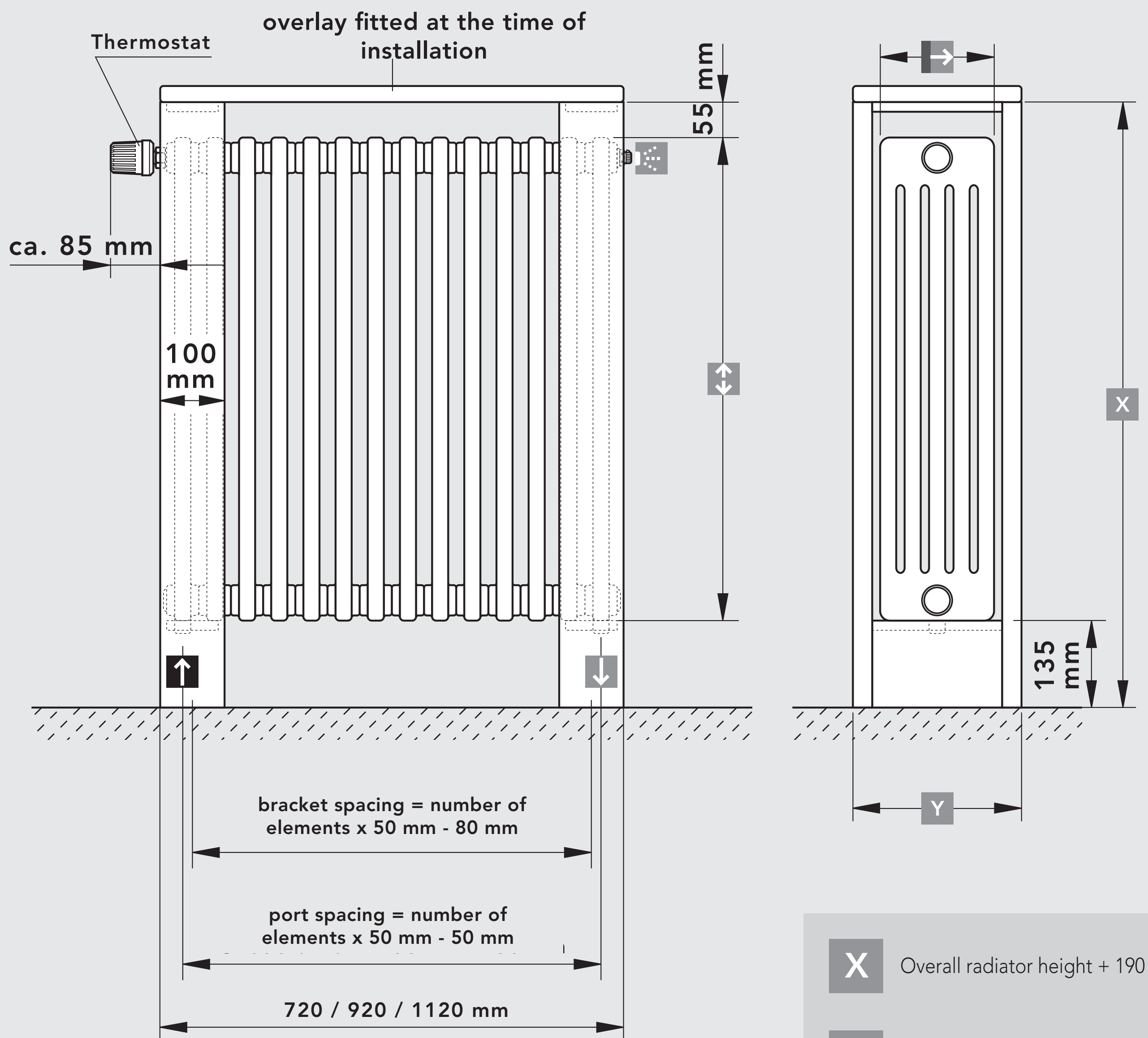
Technical data

Overall height of Heated bar tables structure [mm]			940		1090	
Radiator height [mm]			750		900	
Overall depth of Heated bar tables structure [mm]			224	262	224	262
Radiator depth			4-columns 	5-columns 	4-columns 	5-columns 
Model			4075	5075	4090	5090
Elements	Overall length [mm]					
14	720 (700)*	Watt 75/65/20° **	1417	1747	1665	2055
		Water capacity in litres	21,2	26,1	24,7	30,4
		Weight when empty in kg	50	58	58	68
		Radiator exponent n	1,30	1,30	1,31	1,31
18	920 (900)*	Watt 75/65/20° **	1822	2246	2140	2642
		Water capacity in litres	27,2	33,5	31,7	39,1
		Weight when empty in kg	59	70	69	82
		Radiator exponent n	1,30	1,30	1,31	1,31
22	1120 (1100)*	Watt 75/65/20° **	2226	2746	2616	3230
		Water capacity in litres	33,3	41,0	38,8	47,8
		Weight when empty in kg	69	82	81	97
		Radiator exponent n	1,30	1,30	1,31	1,31

* Overall height of radiator
** Standard heat output in accordance with EN 442 in Watts DIN registration number 6R0900

Overlay (beech plywood) for Heated bar tables counter	dimensions of overlay	for model	Item no.	weight in kg
	1150 x 350 x 35	4075 and 4090 in OL 700 mm	AZ13DZ8340901400	~9
	1350 x 350 x 35	4075 and 4090 in OL 900 mm	AZ13DZ8340901800	~10
	1550 x 350 x 35	4075 and 4090 in OL 1100 mm	AZ13DZ8340902200	~11
	1150 x 400 x 35	5075 and 5090 in OL 700 mm	AZ13DZ8350901400	~10
	1350 x 400 x 35	5075 and 5090 in OL 900 mm	AZ13DZ8350901800	~11
	1550 x 400 x 35	5075 and 5090 in OL 1100 mm	AZ13DZ8350902200	~12

Technical data



X	Overall radiator height + 190 mm
Y	Overall radiator depth + 85 mm

LASERLINE Architecture HEATED BENCHES

Overall heights
422 mm (4 Elements),
472 mm (5 Elements),
522 mm (6 Elements),
572 mm (7 Elements)

Overall length
1850 to 3150 mm

Overall depth
370 mm

Connections
Supply 1/2” internal thread bottom left, return 1/2” internal thread bottom right; With built-in presettable thermostatic valve, thermostatic head port thread M 30 x 1.5 mm bottom left, vent plug top right G 1/2”

10 bar max.
Max. Operating pressure
10 Heated bar tables

Max. Operating temperature
110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

- **Laser-welded – no visible welding seams**
- **Highest-precision manufacturing**
- **Highly conducive to cleanliness**
- **Unique design options**

Design Column radiators in Heated benches style, fully laser-welded. Pipes and head pieces are flattened on the exterior to increase the heat output, boss spacing 1”.
Element length is 50 mm, with 4 to 7 stacked elements.

Fixing
Design set for easy, durable installation and to conceal the ports, with option for the overlay to be affixed at the time of installation.

Scope of delivery
Delivery complete with bracket and design set, with thermostatic head (Oventrop Uni LH) without overlay.

Coating
In accordance with DIN 55 900, with electrophoretic immersion coating and cured powder coating in RAL 9016 Traffic White, other RAL colours and bathroom suite colours are available upon request.

Safety
Construction in line with work safety requirements in accordance with the guidelines of the statutory accident insurer (GUV).

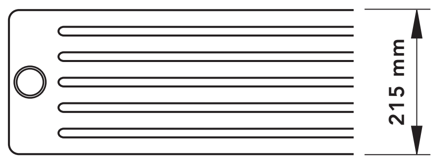
Packaging
Environmentally friendly transport packaging with side protection (enclosing cardboard packaging), and shrink-wrapped.

Attention!
The manufacturer’s length tolerance is 0 to + 1%. Please take this into account during pre-assembly!

LASERLINE Architecture HEATED BENCHES

Overview of models, outputs and overlay

Technical data

Overall length of Heated benches structure [mm]			**1850**	**2150**	**2350**	**2850**	**3150**
Radiator length [mm]			**1500**	**1800**	**2000**	**2500**	**2800**
Overall depth of Heated benches structure [mm]			**370**				
Radiator depth			**6-columns** 				
Model			**6150**	**6180**	**6200**	**6250**	**6280**
Elements	**Overall height [mm]**						
4	**422 (200)***	Watt 75/65/20° **	1411	1696	1886	2362	2648
		Water capacity in litres	16,4	19,3	21,3	26,2	29,2
		Weight when empty in kg	37,5	42,8	46,4	55,3	64,2
		Radiator exponent n	1,32	1,31	1,31	1,30	1,29
5	**472 (250)***	Watt 75/65/20° **	1742	2097	2334	2929	3287
		Water capacity in litres	20,4	24,1	26,6	32,8	36,5
		Weight when empty in kg	45,2	51,9	56,4	67,5	78,6
		Radiator exponent n	1,28	1,28	1,28	1,29	1,29
6	**522 (300)***	Watt 75/65/20° **	1934	2337	2606	3285	3695
		Water capacity in litres	24,5	29,0	31,9	39,3	43,8
		Weight when empty in kg	52,9	60,9	66,3	79,6	93
		Radiator exponent n	1,29	1,28	1,28	1,28	1,28
7	**572 (350)***	Watt 75/65/20° **	2204	2670	2982	3770	4247
		Water capacity in litres	28,6	33,8	37,2	45,9	51,1
		Weight when empty in kg	60,6	70,0	76,3	91,8	107,4
		Radiator exponent n	1,29	1,29	1,30	1,31	1,32

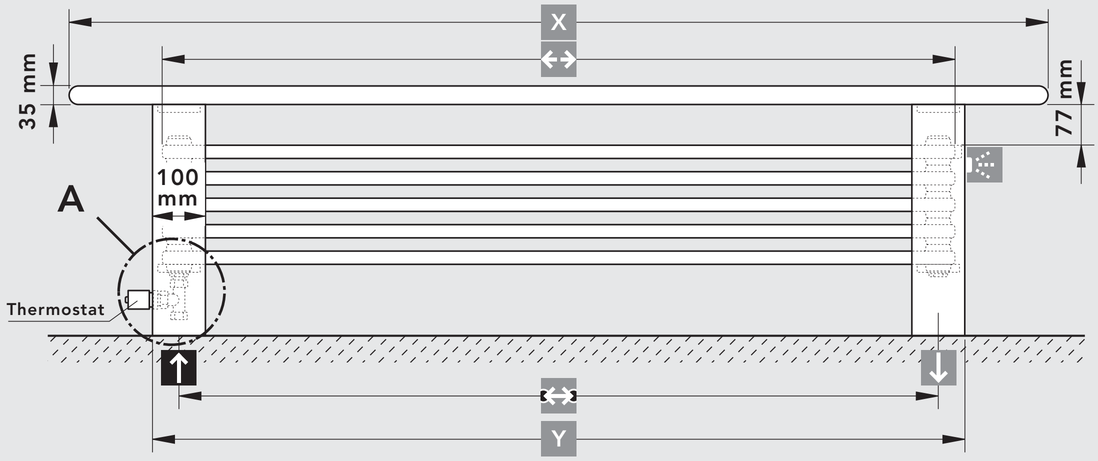
* Overall radiator height
** Standard heat output in accordance with EN 442 in Watts DIN registration number 6R0900

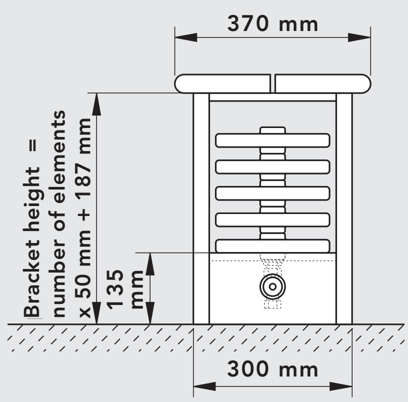
Heated benches overlay					
Item no.	AZ13DZ8361500000	AZ13DZ8361800000	AZ13DZ8362000000	AZ13DZ8362500000	AZ13DZ8362800000
Weight in kg	~23	~26	~29	~34	~38

Heated benches overlay (beech plywood)

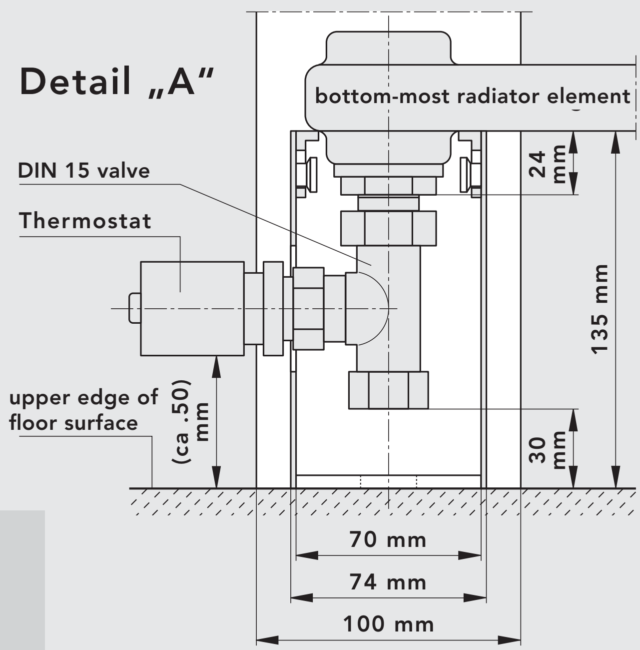
- Made from bonded beechwood (plywood) approx. 35 mm thick
- Rounded on all sides, in two parts, in four parts for lengths exceeding 2850 m
- Surface of the beech veneered with colour-less Desmophen/Desmodur coating, semi-gloss, twice-coated, splash-proof
- Prepared for easy mounting onto the Architecture mounting bracket, required fixing materials are supplied

Technical data





Detail „A“



Boss spacing:
Overall radiator length - 65 mm

X Overall radiator length + 350 mm

Y **Bracket length:**
Overall radiator length + 35 mm

Attention: A third bracket must be used in the middle for radiators exceeding 2000 mm in length!

Accessories

Fixing

The standard delivery of Laserline Column radiators does not include any fixings. These are to be selected depending on use from the range of accessories and are to be ordered separately. However, connection sets with angle brackets and connection sets with drilled brackets are available as standard fixtures. These sets each include the appropriate number of brackets, radiator mounts, the necessary screws and anchor bolt (suitability to be checked by the customer!) and an instruction sheet*. When installing, it is recommended that the upper radiator brackets are mounted immediately below the upper boss.

In addition, the accessories range includes drilled tension brackets, floor brackets and wall brackets in various designs and sizes for fixing in conjunction with radiator mounts. A special adjustable wall bracket makes it possible to set a very wide range of wall clearances.

The Laserline tube radiator is also available in a special design with welded-on clip brackets.

It is essential to note in each case the number of fixing points that are required (see next pages). A fixing point is understood to be any load-bearing fixture (spacing brackets and clamping holders are not fixing points). A fixing point above (recommended position directly underneath the boss) and a fixing point underneath (Fig. 1) in each case form a vertical fixture axis.

The load-bearing capacity and stability of the walls must be checked as to whether they can support the intended load in each case. Clip brackets are not supplied with the standard design of the Laserline tube radiator.

Both floor brackets and circular floor brackets are available for free-standing installation of the Laserline Column radiators. The floor brackets also offer the option to fit a height-adjustable window Heated benches support. Both brackets can be used for radiator lengths of up to 1000 mm. A SINGLE floor bracket/circular floor bracket is recommended per fixture axis. In the case of extraordinary loads, it is recommended that the wall bracket for use in public areas should be used (e.g. in schools).

**Attention: the radiator with the overall height of 155 mm can only be mounted with circular floor brackets or with wall brackets WK 155.*

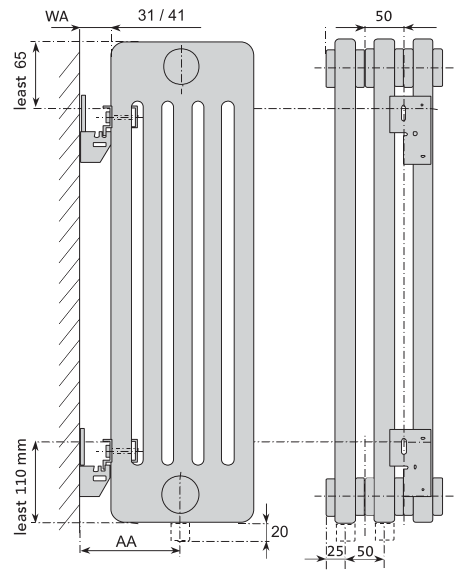
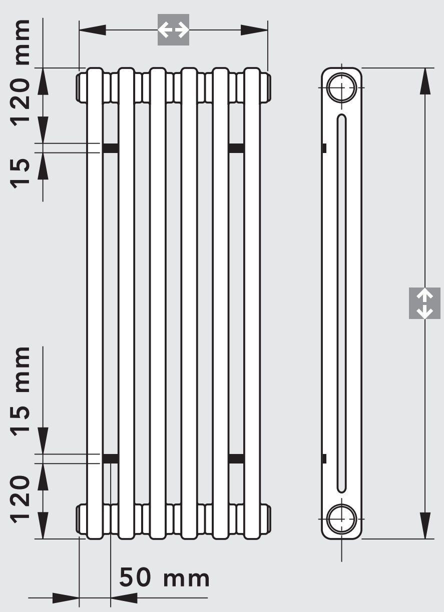


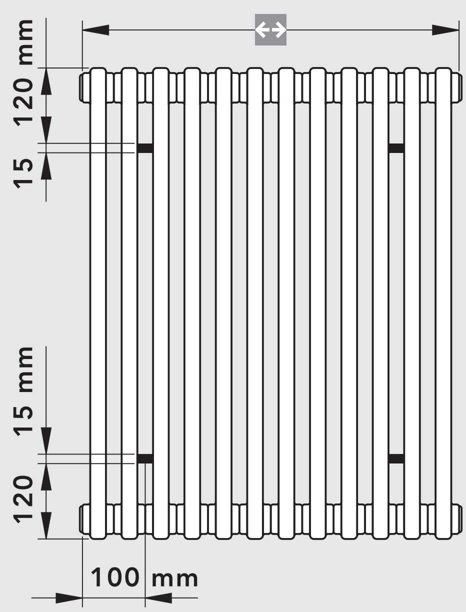
Fig. 1 *Fixing and connection dimensions for connection set with angled bracket. The 4-part set includes 4 x the items shown below right, while the 6-part set includes 6 x these items.*

		Angled bracket set	
Model	Overall depth	wall clearance WA	connection clearance AA
2-column	63	31 / 41	63,5 / 73,5
3-column	101	31 / 41	82,5 / 92,5
4-column	139	31 / 41	101,5 / 111,5
5-column	177	31 / 41	120,5 / 130,5
6-column	215	31 / 41	139,5 / 149,5

Overall length:
n x 50 mm



Arrangement of mounting clip brackets from outside for 4-6 elements

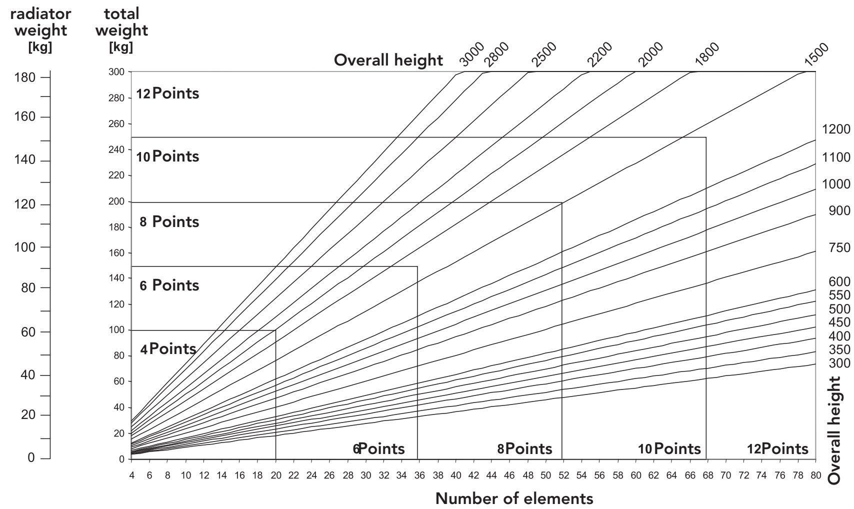


Arrangement of mounting clip brackets from outside for 7-20 elements

Accessories

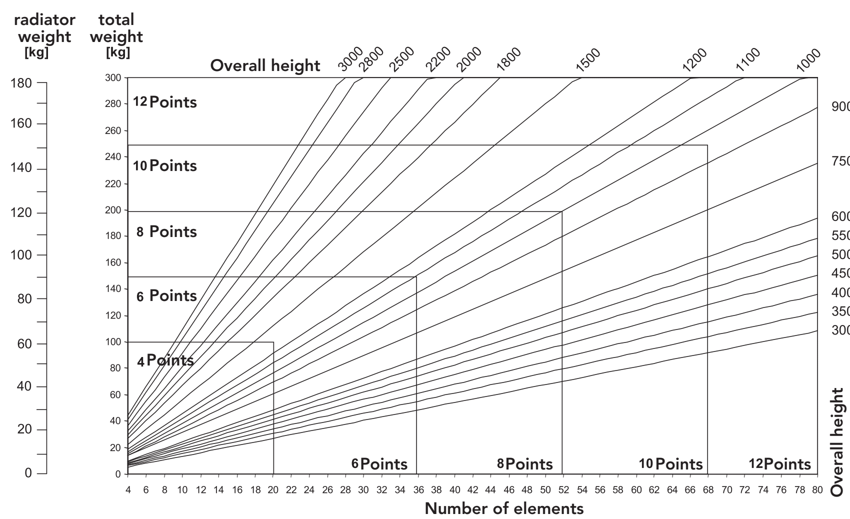
2-column:
Maximum block lengths and required fixing points

Overall height [mm]	Max. elements per block
up to 1000	40
up to 3000	19



3-column:
Maximum block lengths and required fixing points

Overall height [mm]	Max. elements per block
up to 1000	40
up to 2200	19
up to 3000	14



4-column:
Maximum block lengths and required fixing points

Overall height [mm]	Max. elements per block
up to 750	40
up to 1000	30
up to 1500	19
up to 2200	14
up to 3000	10

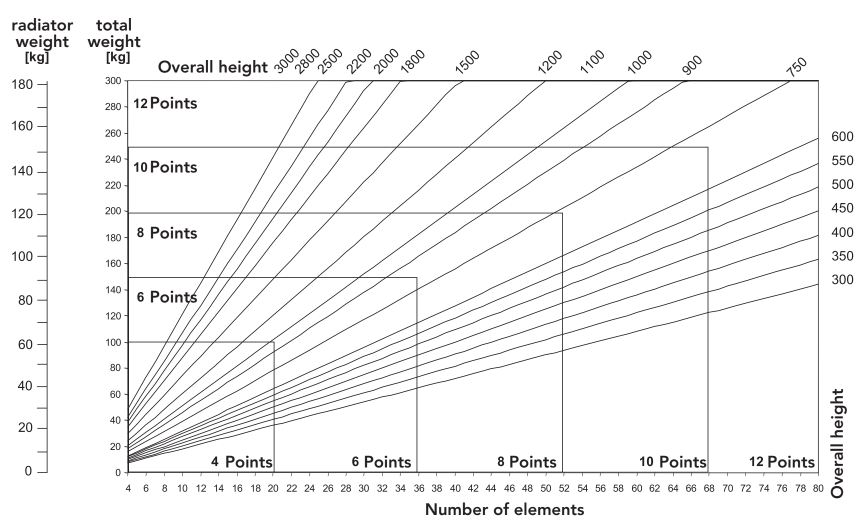


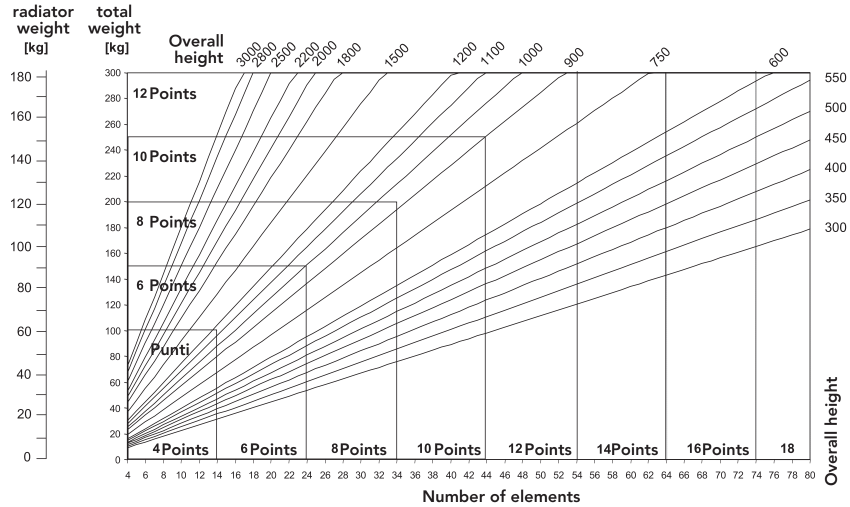
Fig. 2 *Determining the necessary fixing points for the 2-, 3- and 4-Column radiators. A fixing point above (recommended position directly underneath the boss) and a fixing point at the bottom in each case (Fig. 1) form a vertical fixture axis.*

Accessories

5-column:

Maximum block lengths and required fixing points

Overall height [mm]	Max. elements per block
up to 600	40
up to 665	35
up to 750	30
up to 1000	25
up to 1200	19
up to 1500	15
up to 2500	10
up to 3000	8



6-column:

Maximum block lengths and required fixing points

Overall height [mm]	Max. elements per block
up to 500	40
up to 600	35
up to 665	30
up to 750	25
up to 1000	20
up to 1200	15
up to 1500	13
up to 2000	10
up to 2500	8
up to 3000	7

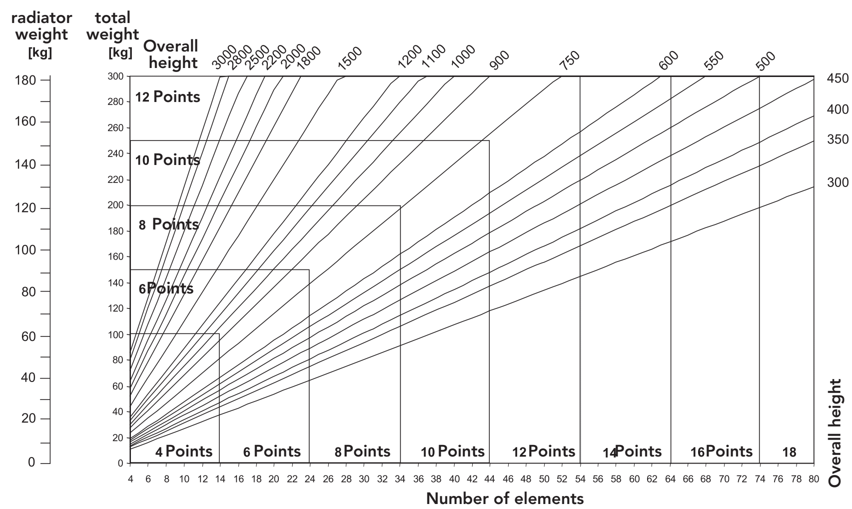
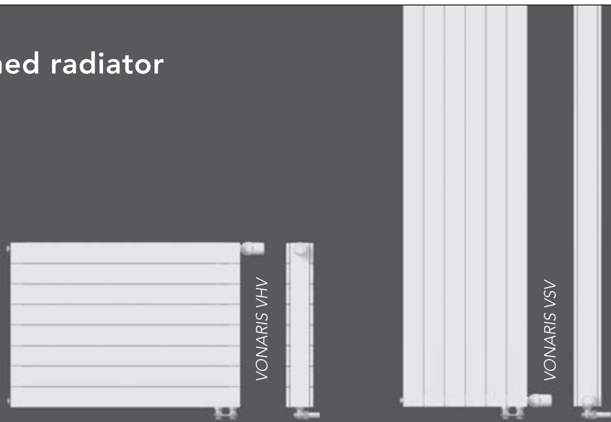


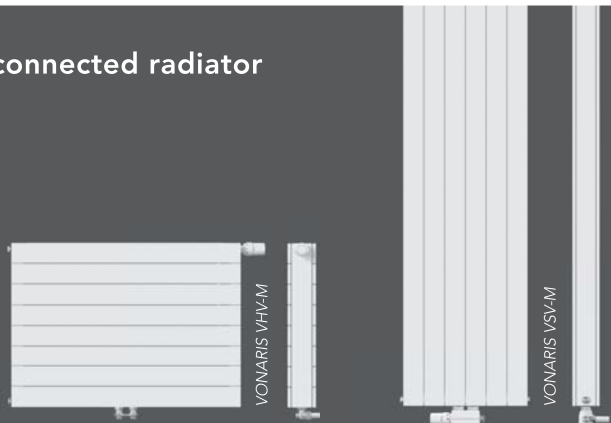
***Abb. 3** Determining the necessary fixing points for the 5- and 6-Column radiators. A fixing point above (recommended position directly underneath the boss) and a fixing point at the bottom in each case (Fig. 1) form a vertical fixture axis.*

Note:
A SINGLE floor bracket/circular floor bracket is recommended per fixture axis.
The radiator with the overall height of 155 mm can only be mounted with circular floor brackets or with wall brackets WK 155.

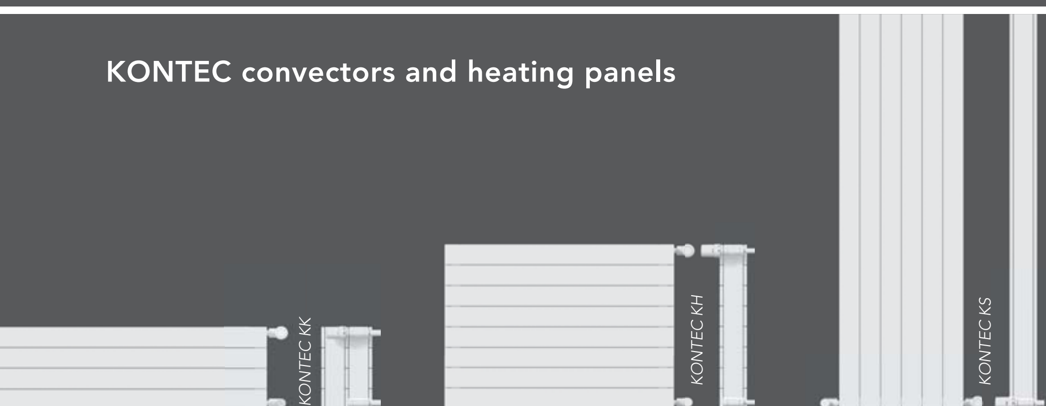
VONARIS solitary finished radiator



VONARIS-M Centrally connected radiator



KONTEC convectors and heating panels



Basics

INTRATHERM Trench convectors

from page 315


FMK


F1T


F1P

VONARIS SOLITARY FINISHED RADIATORS.

EN 442 GEPRÜFT

DIE neue WÄRME

DIN EN 442

Connections:
horizontal design:
2 x external thread G 3/4", bottom right (by special order, bottom left).
vertical design:
2 x external thread G 3/4", bottom right (by special order, bottom left).

5 bar max.

Maximum positive operating pressure
Standard design: 5 bar

8 bar max.

Maximum positive operating pressure:
High-pressure design 8 bar

max.

Maximum operating temperature: 110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

VONARIS: the solitary finished radiator in a fully welded horizontal design, with 1 to 4 layers of steel rectangular water-flow pipes arranged one-behind-the-other, each layer consisting of from 2 to 11 pipes arranged one-above-the-other.

Vertical design: with 1 or 2 layers of steel rectangular water-flow pipes, arranged one-behind-the-other, each layer consisting of from 3 to 12 steel pipes, arranged side-by-side.
A 2 mm space between the heating pipes guarantees additional resistance to corrosion. VONARIS solitary finished radiators are equipped with a built-in valve set, suitable for either double-pipe or single-pipe operation, using a one-pipe manifold, with a factory-fitted valve (already installed) and protective cap.

VONARIS solitary finished radiators will normally be delivered with side panels. The horizontal design is also equipped with a top cover. VONARIS solitary finished radiators, are not delivered with brackets as standard (exception: VHV 11, overall height 358 to 790 mm, does include brackets). For the vertical design, brackets are included. The VONARIS solitary finished radiator comes with a drain plug and a pivoting vent plug (with the vertical design, a dummy plug too), all of them factory-sealed.
VONARIS solitary finished radiators are Design radiators that are just waiting to be connected.

Standard design: rectangular steel pipes, 70 x 11 x 1.5 mm
High-pressure design: rectangular steel pipes, 70 x 11 x 2.0 mm

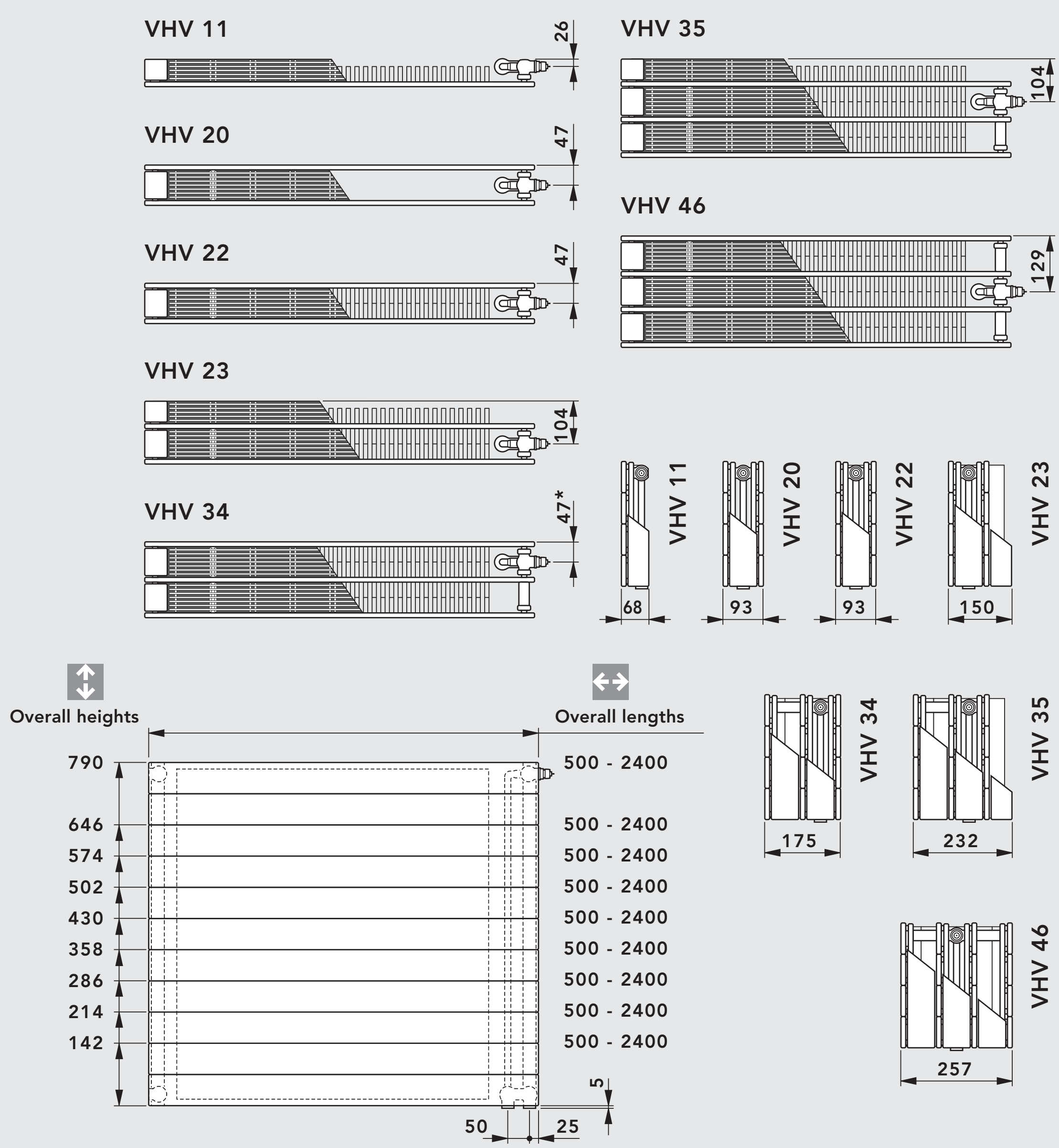
WVO design: models 22, 34 and 47 (in the horizontal design and up to an overall height of 286 mm) are also available with a rear-welded heat reflector (no water-flow). The VHV 20 model (at overall heights of 358 to 574 mm), and the VHV 22 model (overall heights 358 to 646 mm) may have a heat reflector fitted subsequently.

Dimensions:
Horizontal design: overall lengths between 500 mm and 1400 mm are available (at increments of 100 mm), and between 1600 and 4000 mm (at increments of 200 mm).
Horizontal design: the available overall heights are 142, 214, 286, 358, 430, 502, 574, 646, and 790 mm.
Vertical design: overall lengths between 214 and 862 mm are available (at increments of 72 mm)
Vertical design: overall heights of 1600, 1800, and 2000 mm are available.

Coatings:
1. Undercoat: electrophoretic, using water-soluble paints, conforming to DIN 55900 part 1, stoved at 165° C;
2. Finish: electrostatic powder coating, conforming to DIN 55900 part 2, in a state-of-the-art facility. (On request, and at a supplementary charge, a range of RAL and sanitary ware colours can be offered.) This particularly robust coating is stoved at an object temperature of 180° C.

Packaging:
1. Cardboard packaging
2. Edge protection
3. Shrink foil

Horizontal design, VHV models



Schematic diagram

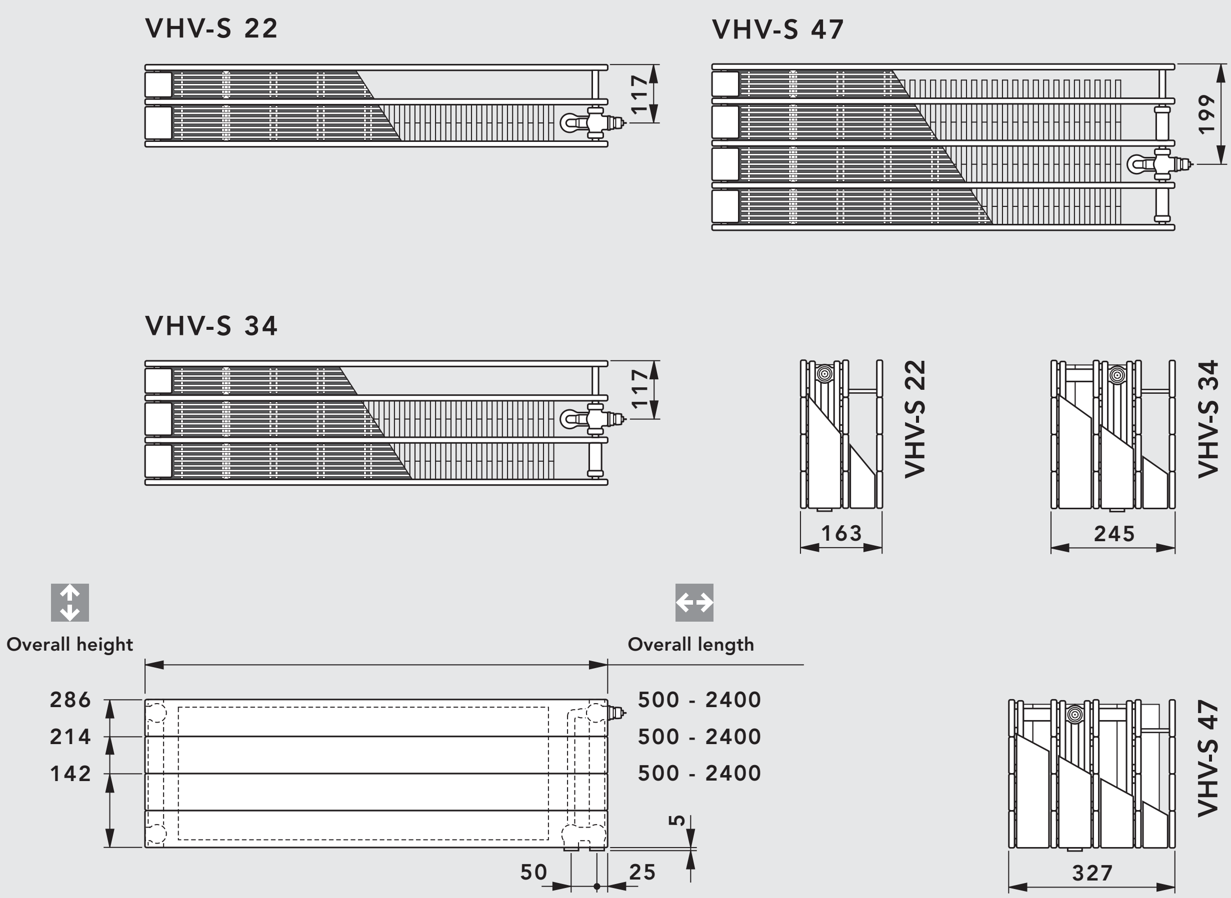
* **Please note:** If the VHV 34 model is turned and used as a left-hand design, the distance between the **VONARIS** rear panel and the connection point is 129 mm.

Model	VHV 11				VHV 20					VHV 22					VHV 23		VHV 34		VHV 35		VHV 46	
Overall height [mm]	214	286	358	430	142	214	286	358	430	142	214	286	358	430	142	214	142	214	142	214	142	214
	502	574	646	790	502	574	646	790		502	574	646	790		286		286		286		286	
Overall length [mm]	500 - 2400 mm (for special overall lengths see output tables)																					
Increments	100 mm (for overall lengths of 1400 mm and above: 200 mm)																					

The VHV-S models

With their factory-welded heat reflector (no water-flow), the WVO designs return a major part of the otherwise lost heat to the room. They do so by means of convection between radiator and heat reflector.

Model overview / connection dimensions: horizontal design, VHV-S models

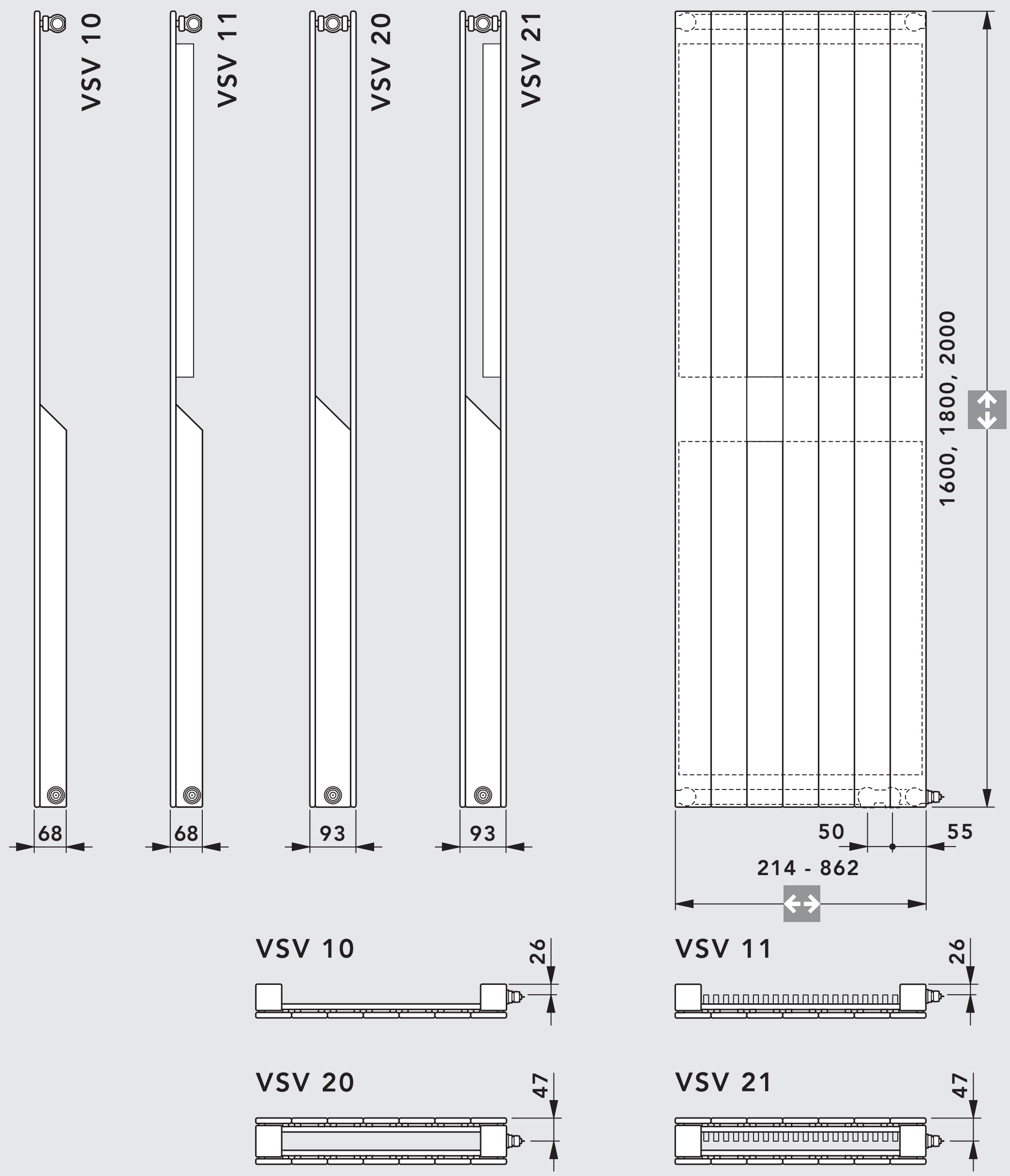


Schematic diagram

Model	VHV-S 22			VHV-S 34			VHV-S 47		
Overall height [mm]	142	214	286	142	214	286	142	214	286
Overall length [mm]	500 - 2400 mm (for special overall lengths see output tables)								
Increments	100 mm (for overall lengths of 1400 mm and above: 200 mm)								

model overview / connection dimensions

Vertical design, VSV models

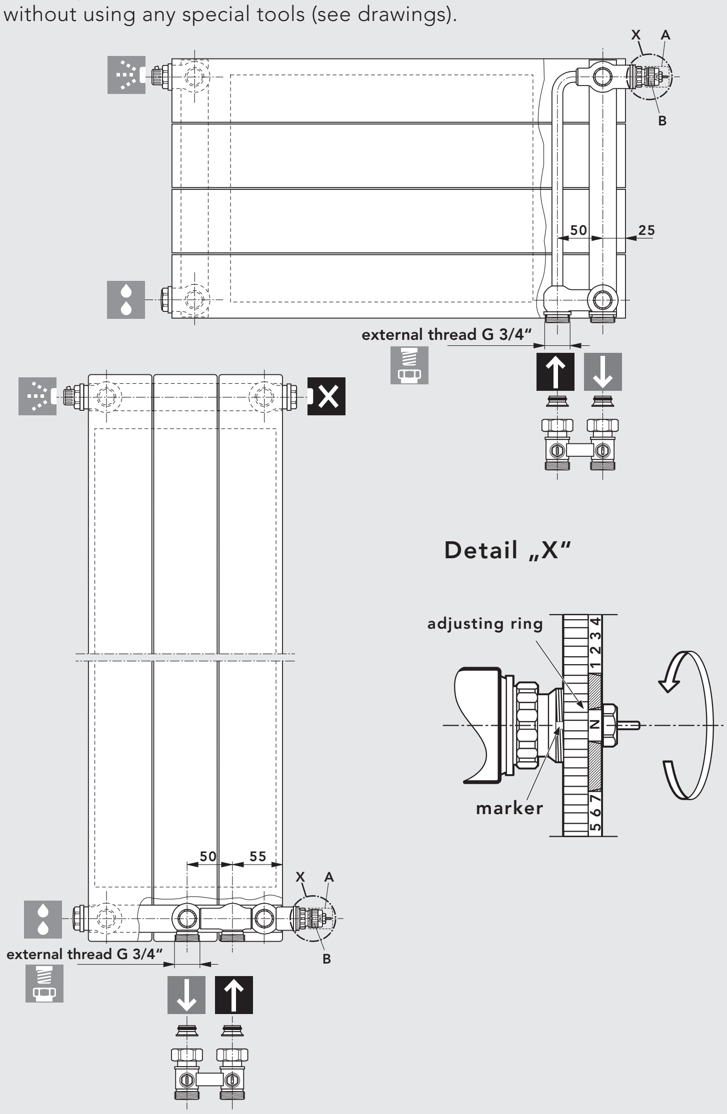


Schematic diagram

Model	VSV 10			VSV 11			VSV 20			VSV 21		
Overall height [mm]	1600	1800	2000	1600	1800	2000	1600	1800	2000	1600	1800	2000
Overall length [mm]	214 – 862 mm											
Increments	72 mm											

Horizontal and vertical designs

It is easy to set the precise values required without using any special tools (see drawings).



Schematic diagram

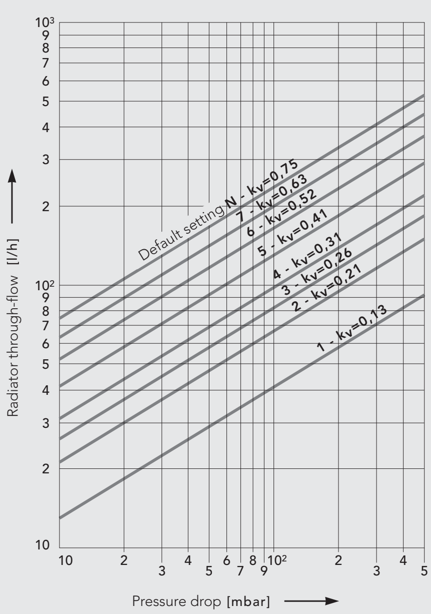


Chart 1:

Pressure drop [mbar] – double-pipe operation at 2K proportional offset.

It is of course possible to adjust the valve default setting, whilst there is pressure in the heating system.

The radiator will be delivered with a fitted protective cap. After removing the protective cap (item A), the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000“, or „RAW“ from Danfoss, „VK“ from Heimeier, „D“ from Herz, „thera DA“ from MNG, and „UNI XD“ from Oventrop.**

Adjustment tips:

- Remove protective cap and sensor
- Lift the adjusting ring and turn it anticlockwise, to the setting required – the set value (1, 2, ...7, N) needs to be directly in line with the marker.
- Presetting is possible in steps of 0.5 between 1 and 7. The „N“setting, cancels all presetting.

Note: Settings in the hatched areas must be avoided.

Guideline values for default settings

Basis:

Supply temperature	**70 °C**
Return temperature	**55 °C**
Room temperature	**20 °C**

Default setting **1** k_v = 0.13
For radiators up to about 500 W

Default setting **2** k_v = 0.21
For radiators up to about 800 W

Default setting **3** k_v = 0.26
For radiators up to about 1000 W

Default setting **4** k_v = 0.31
For radiators up to about 1200 W

Default setting **5** k_v = 0.41
For radiators up to about 1600 W

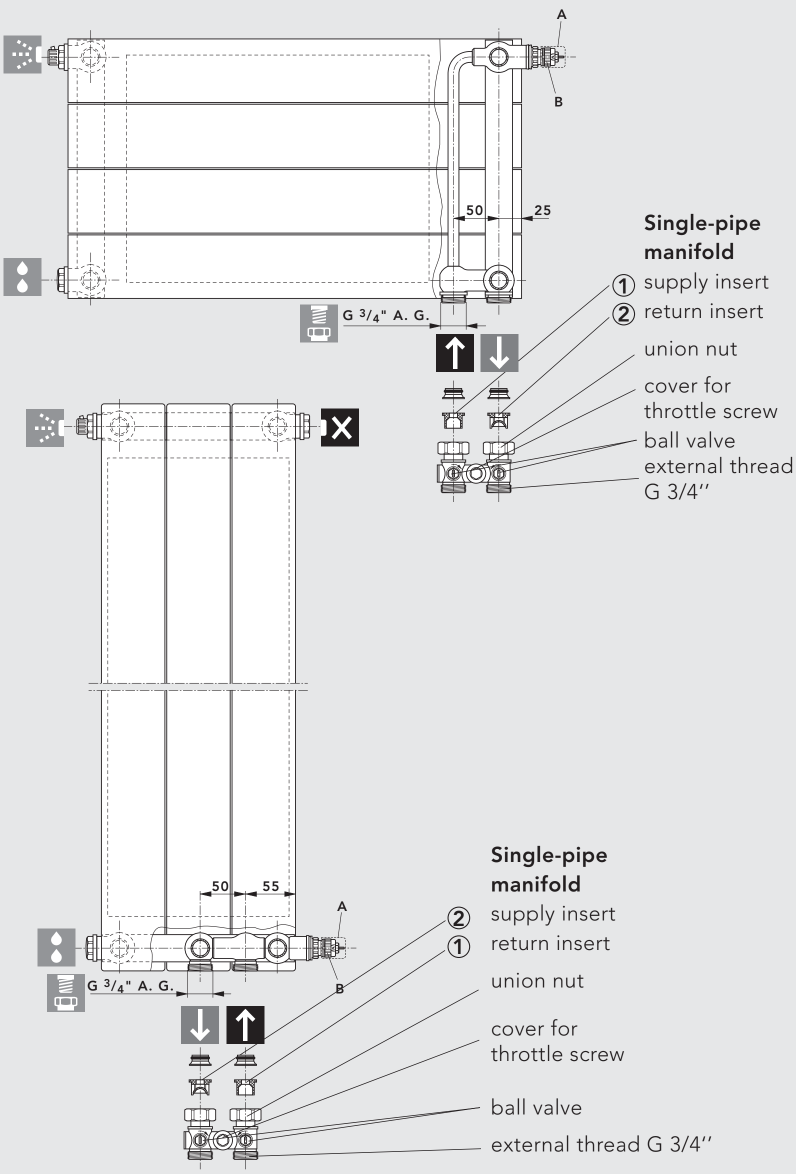
Default setting **6** k_v = 0.52
For radiators up to about. 2000 W

Default setting **7** k_v = 0.63
For radiators up to about 2400 W

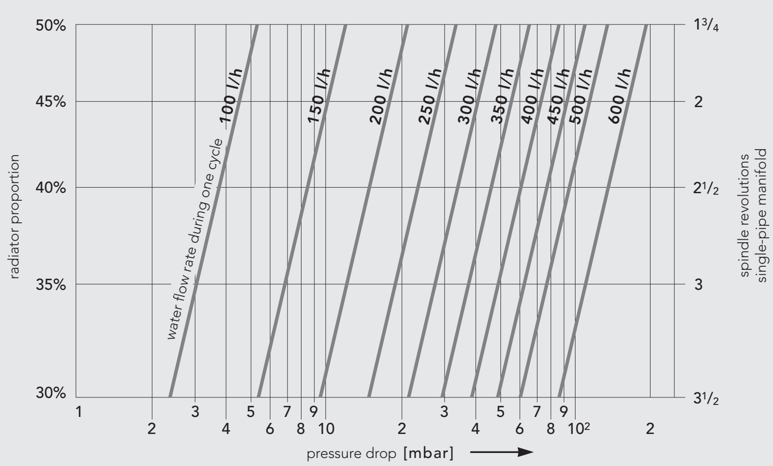
Default setting **N** k_v = 0.75
For radiators of more than 2400 W

Horizontal and vertical designs

A valve default setting is not necessary as the valve will be delivered factory-adjusted (default setting N).



Schematic diagram



The radiator will be delivered with a fitted protective cap. After removing the protective cap (item A), the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000“, or „RAW“ from Danfoss, „VK“ from Heimeier, „D“ from Herz, „thera DA“ from MNG, and „UNI XD“ from Oventrop.**

Please note!

Horizontal design:
During the installation of the single-pipe manifold ensure that the return insert **2** is installed in the water return, and the supply insert **1** in the water supply.

Vertical design:
Prior to the installation of the one-pipe manifold it is essential to swap over the supply insert and the return insert so that the supply insert **1** is installed in the water supply, and the return insert **2** in the water return.

Default setting when using a single-pipe manifold:

radiator proportion 30% --- 3.50 revolutions *

radiator proportion 35% --- 3.00 revolutions *

radiator proportion 40% --- 2.50 revolutions *

radiator proportion 45% --- 2.00 revolutions *

radiator proportion 50% --- 1.75 revolutions *

*… before starting, turn the bypass spindle of the single-pipe manifold to the right as far as it will go.

Chart 2:

Pressure drop [mbar] – single-pipe operation with a proportional deviation of 2K.
It is of course possible to change the radiator proportion, whilst there is pressure in the heating system.

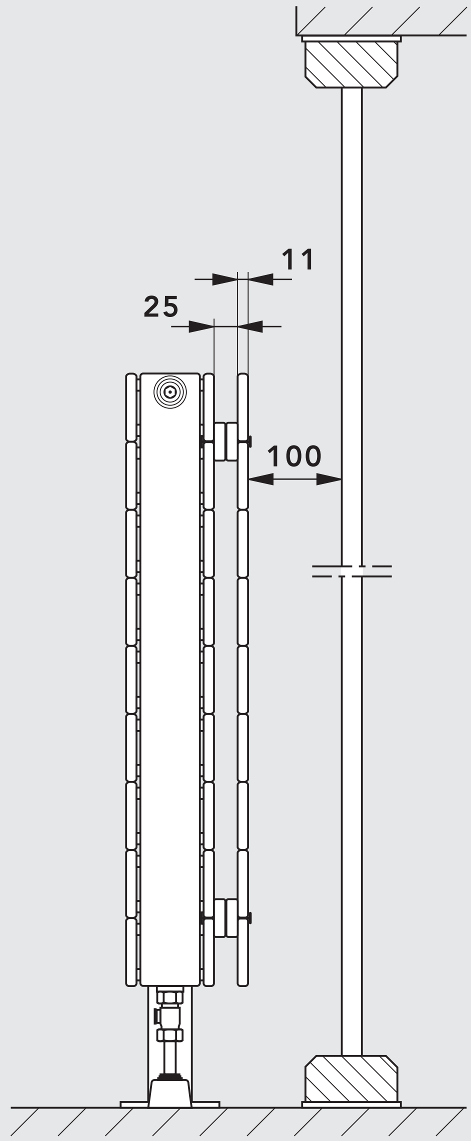
Please take account of the maximum power per cycle (for single-pipe installations) of about 10 kW:

$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

VHV 20 and VHV 22 models, in horizontal design

The new heat reflector

- is available for the VHV 20 model (OH 358 - 573 mm) and the VHV 22 model (OH 358 – 646 mm), in horizontal design
- returns a major part of the otherwise lost heat to the room, by means of convection between the VONARIS solitary finished radiator and the heat reflector.



Schematic diagram

Design:
Electrophoretically coated and finish in RAL 9016 (on request and at an extra charge, available in a range of RAL and Sanitary Ware colours); delivered with 8 push-in brackets, 8 stabilising brackets, 4 Z-brackets, an installation sheet, and packaging

Note:
When ordering a horizontal design with heat reflector, it is essential to use the SK 22(VHV 20) or SK 23 (VHV 22) stand consoles.

VONARIS solitary finished radiators with a fitted heat reflector (see diagram right)

Depth: 11 mmheat reflector

Internal depth: 25 mm between heating pipe and heat reflector

Minimum clearance*: 100 mm between window surface and heat reflector

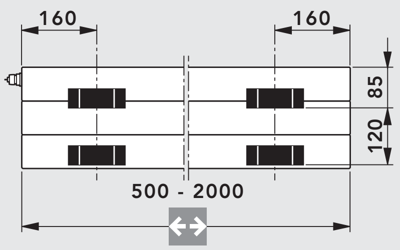
VONARIS Wall mounting WA 11

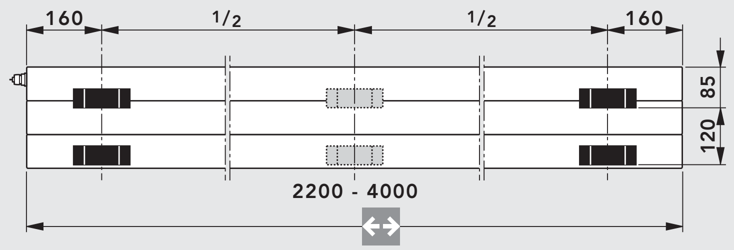
welded bracket positions

Wall mounting WA 11 for models VHV 11 and VHV 23

Model | **Wall mounting WA 11 for VHV 11 or VHV 23**

Overall height from 214 mm to 286 mm

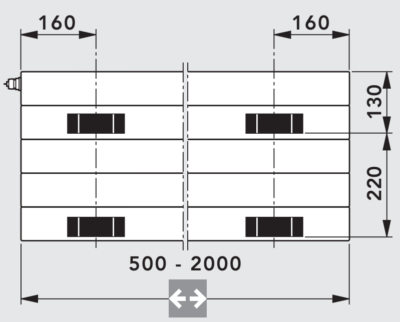


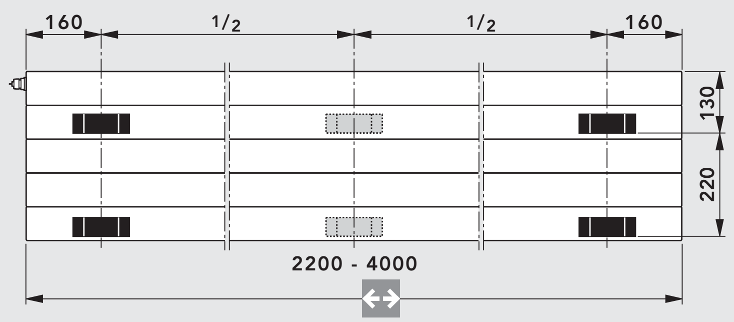


Note: special order

VHV 11 for Wall mounting WA 11

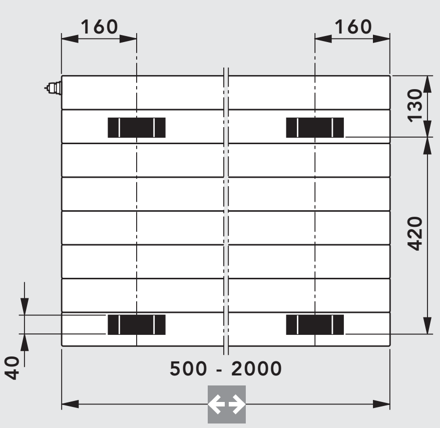
Overall height from 214 mm to 286 mm

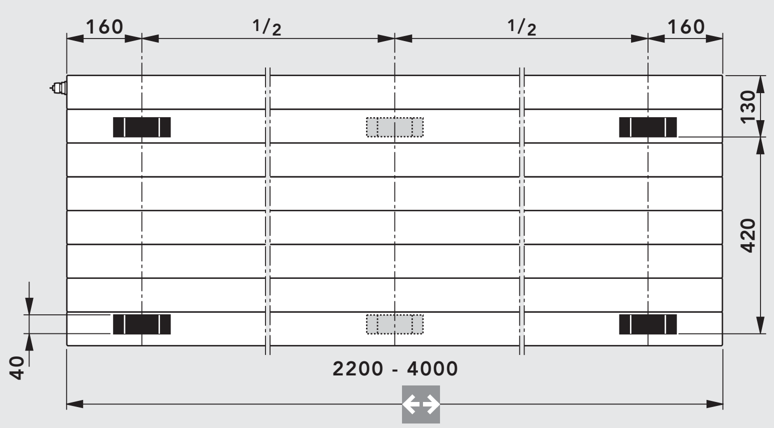




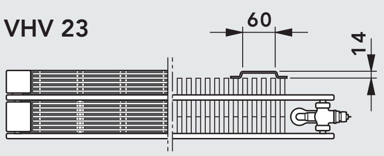
VHV 11 for Wall mounting WA 11

Overall height from 214 mm to 286 mm

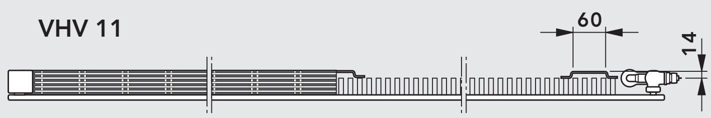




VHV 23



VHV 11



Schematic diagram

Attention! With the horizontal design only the models VHV-M 10/11 (OH 358 - 790 mm) are by default supplied with brackets. If the models VHV-M 20 (OH 358 - 790 mm), VHV-M 22 (OH 214 - 790) and VHV-M 34 (142 – 286 mm) are wall-mounted using wall mounting WA 11, you are required to order these models as a special version, equipped with brackets.

VONARIS Wall mounting WA 11

drilling measurements and wall clearance

Wall mounting WA 11 for models VHV 11 and VHV 23

Wall mounting WA 11 is suitable for the horizontal versions of the following models: VHV-M 11 (OH 214 - 790 mm) and VHV 23 (OH 214 und 286 mm) equipped with brackets. It ensures easy, rapid and robust mounting of the **VONARIS** central-connection radiators still in the packaging.

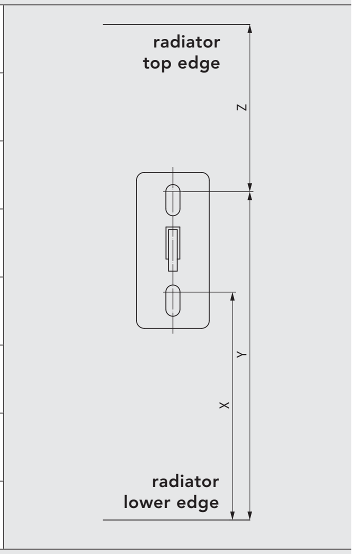
Wall mounting WA 11 for BH 214 – 790 mm

Drilling dimensions for wall mounting

Ab einer Overall length von 2200 mm 3 Konsolen

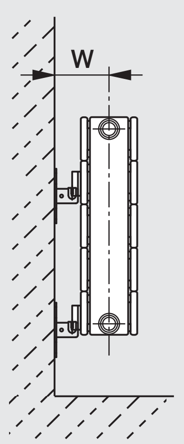
Overall radiator height [mm]	Value **X** [mm]	Value **Y** [mm]	Value **Z** [mm]
214	**104**	**162**	**52**
286	**176**	**234**	**52**
358	**203**	**261**	**97**
430	**275**	**333**	**97**
502	**347**	**405**	**97**
574	**419**	**477**	**97**
646	**491**	**549**	**97**
790	**635**	**693**	**97**

Wall mounting WA 11 for **BH 214 – 790 mm**



Schematic diagram

Connection – wall clearance



Horizontal design model	Overall height [mm]	Measurement **W** [mm]
VHV 11	214 - 790	**45**
VHV 23	214 - 286	**123,5**

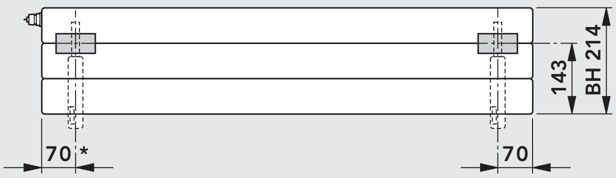
Schematic diagram

positions of the insertion (push-in) brackets

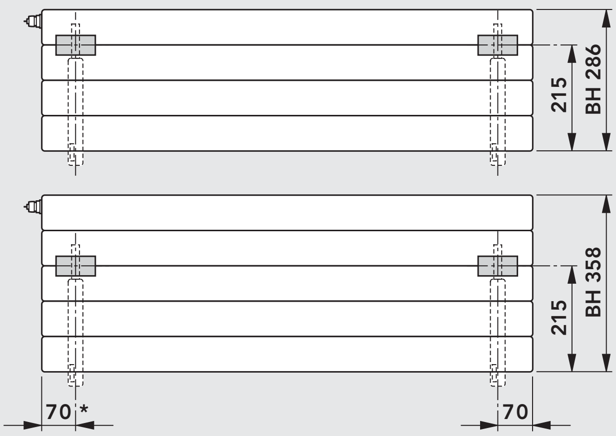
VONOFIX rapid-installation console for the VHV models

VHV 20 and 22 models: OH 214 – 790 mm, VHV 34 model: OH 214 and 286 mm

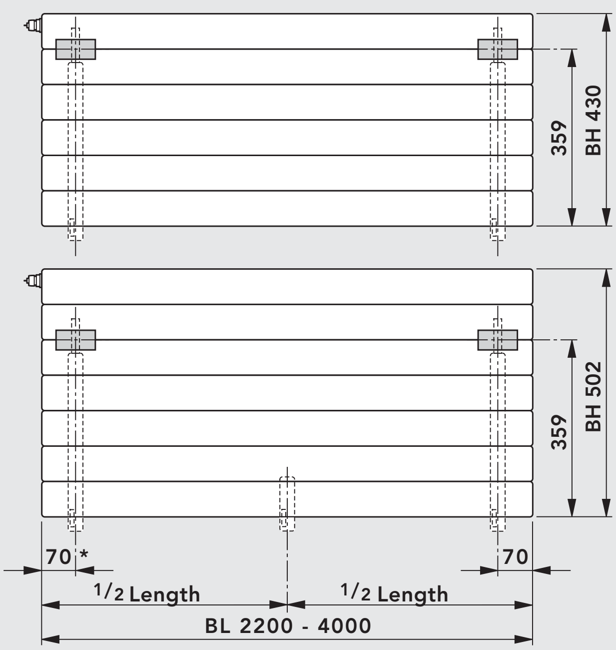
OH 214: for the **VONOFIX 1**



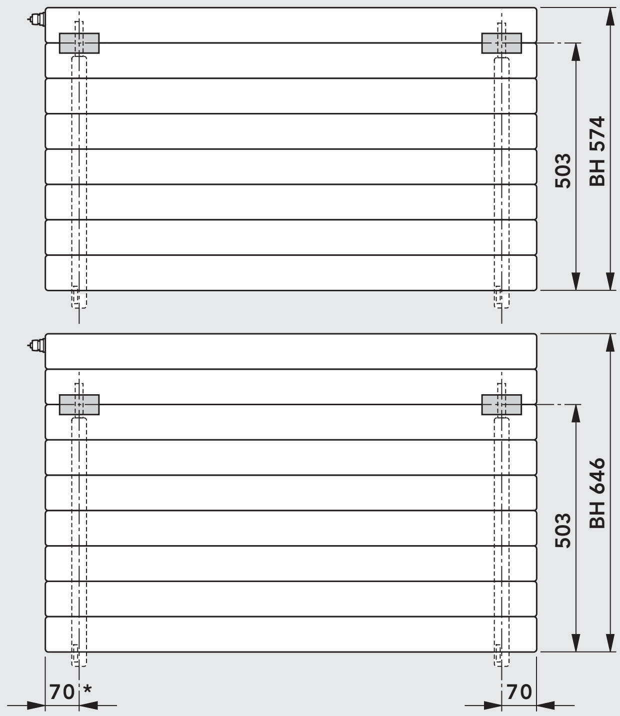
OH 286 and 358: for the **VONOFIX 2**



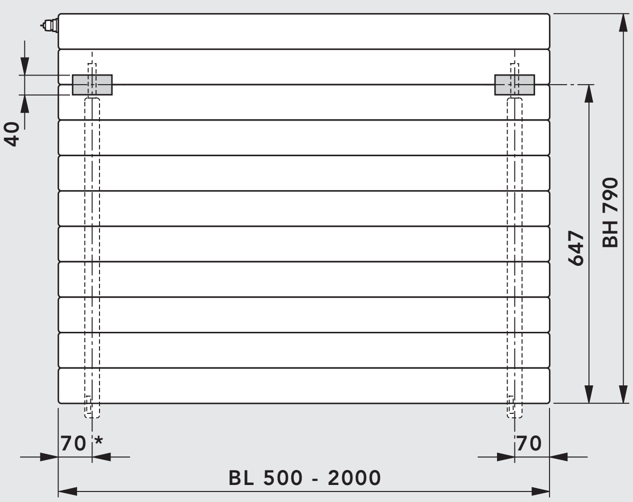
OH 430 and 502: for the **VONOFIX 3**



OH 574 and 646: for the **VONOFIX 4**



OH 790: for the **VONOFIX 5**



Note: for an overall length of 2200 mm and greater an additional piece of foot console must be used!

Schematic diagram

VONARIS

Important: the installation of VHV models with insertion (push-in) brackets is only feasible when using the **VONOFIX** rapid-installation console!

*If you are using a right-angled valve block to connect your VHV models, please leave clearance of **110 mm**, instead of **70 mm**, from the radiator's outside edge for the installation of **VONOFIX**.

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

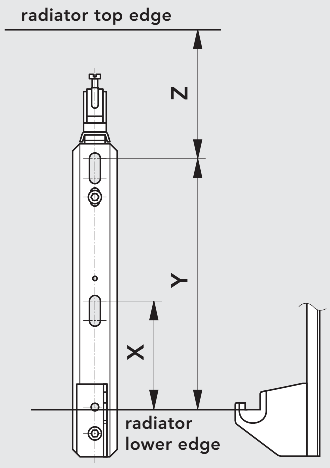
drilling measurements and wall clearance

VONOFIX rapid-installation console for the VHV models

The **VONARIS** solitary finished radiator can be installed easily, quickly and securely. This is made possible by the **VONOFIX** rapid-installation console for the horizontal designs of the VHV 20, VHV 22 (OH 214 – 790 mm) and VHV 34 (OH 214 and 286 mm) models.

Wall rails for OH 214 – 790 mm

Drilling measurements for the VONOFIX 1 - 5



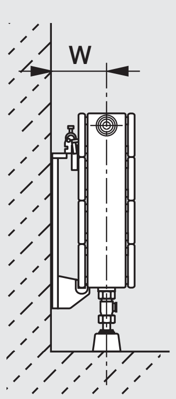
Schematic diagram

Overall radiator height [mm]	Value **X** [mm]	Value **Y** [mm]	Value **Z** [mm]
214	–	**125**	**89**
286	**100**	**197**	**89**
358	**100**	**197**	**161**
430	**100**	**341**	**161**
502	**100**	**341**	**161**
574	**100**	**485**	**89**
646	**100**	**485**	**89**
790	**100**	**629**	**161**

The **VONOFIX** rapid-installation console consists of:

- 2 wall consoles (zinc-plated), with sound-proofing filters, screws and dowels
- 2 stabilising brackets
- 2 insertion (push-in) brackets
- (For an overall length of 2200 mm and greater, 1 additional piece of foot console)

Connection – wall clearance



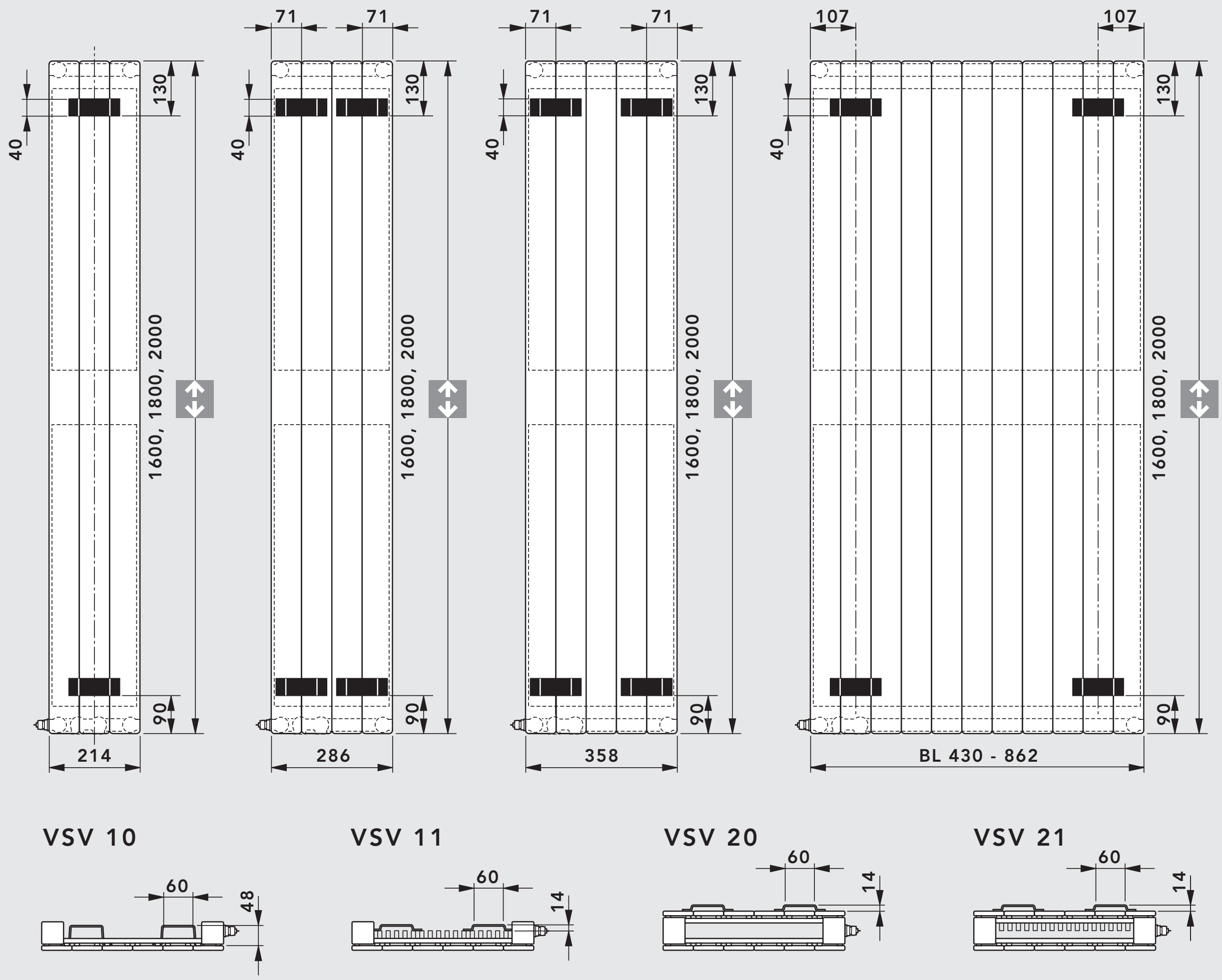
Schematic diagram

Horizontal design model	Overall height [mm]	Measurement **W** [mm]
VHV 20	358 – 790	**91**
VHV 22	214 – 790	**91**
VHV 34	214 – 286	**91***

***Note:** if the **VHV 34** is turned round and used as a left-hand design model, the measurement **W** is **172 mm**.

VSV models

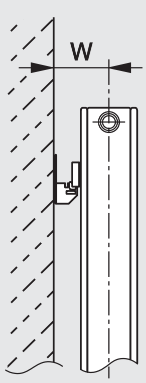
Overall length [mm]	214	286	358	430 - 862



Schematic diagram

Wall clearance measurements: WA 10 and WA 11 wall mounting brackets for the VSV models

Connection – wall clearance

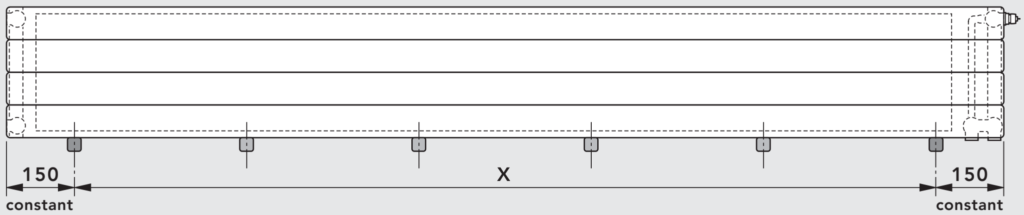


Wall mounting brackets model	Vertical design model	Measurement W [mm]
WA 10	VSV 10/11*	**35**
WA 10	VSV 20/21	**79,5**
WA 11	VSV 10/11*	**45**
WA 11	VSV 20/21	**89,5**

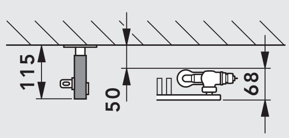
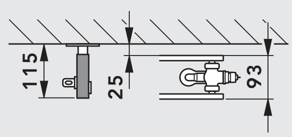
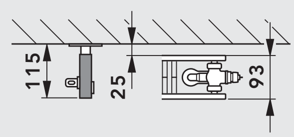
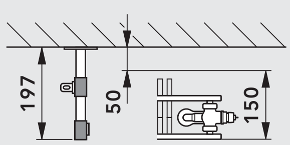
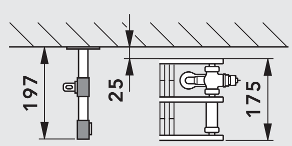
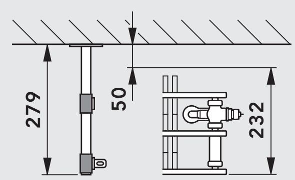
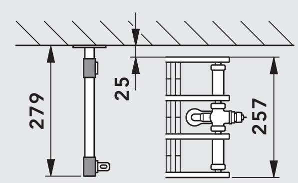
***Note**: if you are installing the VSV 10 or VSV 11 models with a right-angled-design connection, please use the appropriate drilling consoles or angle-fishplate mounting brackets, to achieve the required wall clearance.

Schematic diagram

Wall consoles WK 10 – 12: positioning for VHV models (up to an overall height of 286 mm)

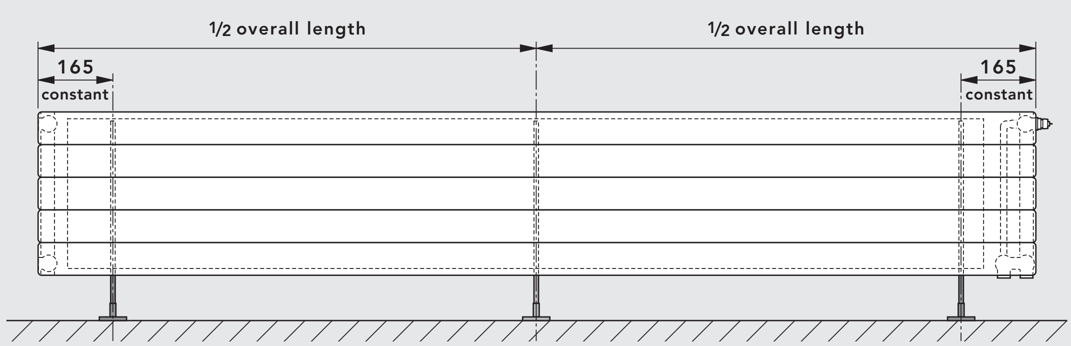


Note: when using more than 2 wall consoles the additional wall consoles must be placed at regular intervals along the line X.

WK 10 wall console			
VHV 11	**VHV 20**	**VHV 22**	
			
WK 11 wall console		**WK 12 wall console**	
VHV 23	**VHV 34**	**VHV 35**	**VHV 46**
			

Schematic diagram

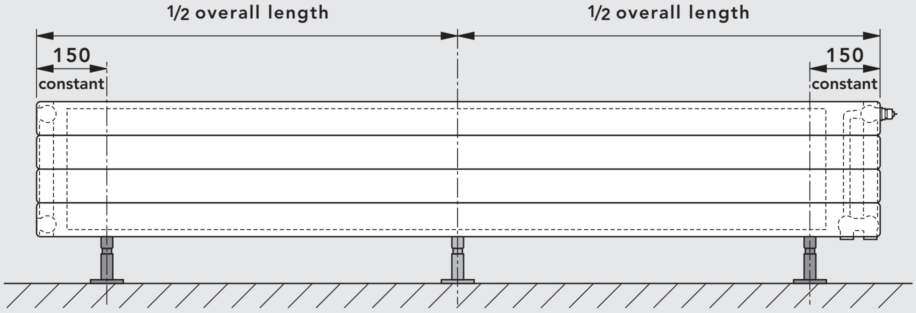
Stand consoles SK 22 and SK 23: positioning for VHV models (for an overall height of 358 mm and greater)



Note: for an overall length of **2200 mm** and greater, a **3rd** stand console must be used!

Schematic diagram

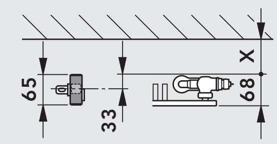
Stand consoles SK 10 – 19: positioning for the VHV/VHV-S models (up to an overall height of 286 mm)



Note: for an overall length of **2200 mm** and greater, a **3rd** stand console must be used!

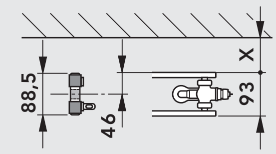
SK 10 / SK 11

VHV 11



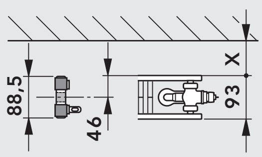
SK 12 / SK 13

VHV 20

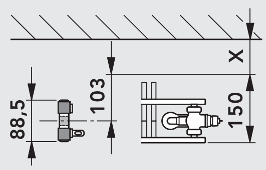


SK 12 / SK 13

VHV 22

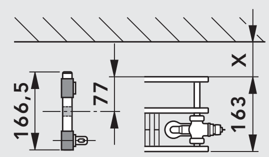


VHV 23

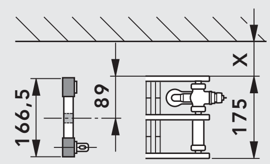


SK 14 / SK 15

VHV-S 22

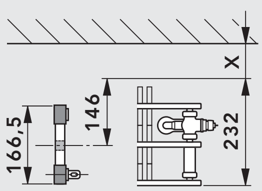


VHV 34

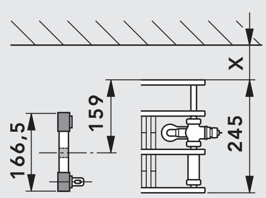


SK 14 / SK 15

VHV 35

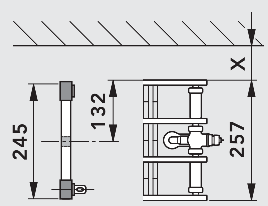


VHV-S 34



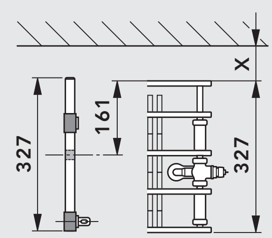
SK 16 / SK 17

VHV 46



SK 18 / SK 19

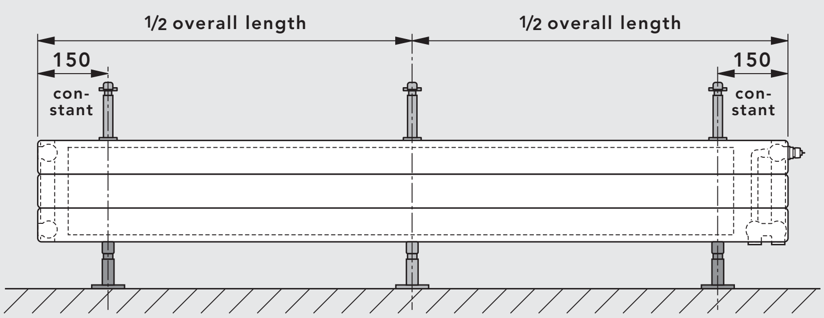
VHV-S 47

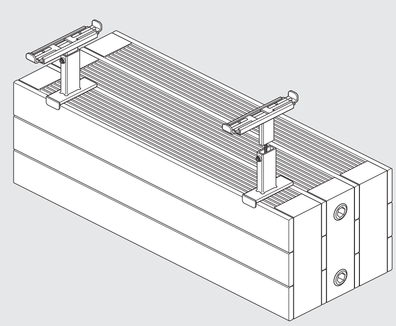


Schematic diagram

Window sill support FBT 20: positioning for the VHV/VHV-S models (up to an overall height of 286 mm)

Window sill support for subsequent installation with the **VHV/VHV-S 22–47** models of the **VONA-RIS** solitary finished radiator (**up to an overall height of 286 mm**)





Note: for an overall length of **2200 mm** and greater, a **3rd** stand console must be used!

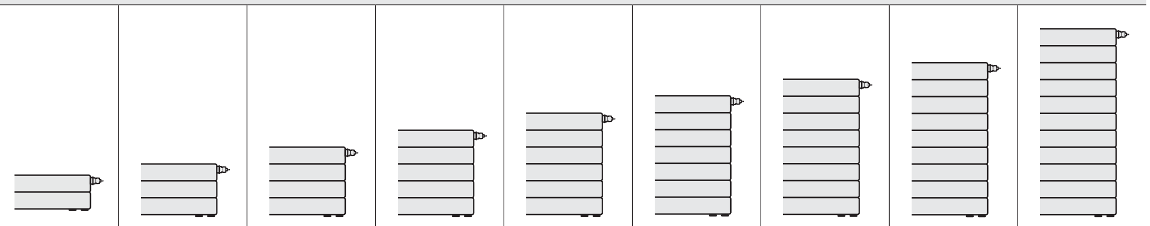
Schematic diagram

VONARIS

heating outputs

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications

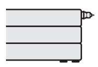
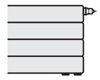


Overall height [mm]	**142**	**214**	**286**	**358**	**430**	**502**	**574**	**646**	**790**
Increments	all overall lengths from 500 to 1400 mm in increments of 100 mm, all overall lengths from 1600 to 4000 mm in increments of 200 mm								
Model		**VHV 11***	**VHV 11***	**VHV 11***	**VHV 11***	**VHV 11***	**VHV 11***	**VHV 11***	**VHV 11***
Overall depth [mm]		**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**
Watts / m 75/65/20		464	577	667	760	845	921	989	1105
Watts / m 70/55/20		374	464	540	615	683	743	797	889
Watts / m 55/45/20		236	291	344	391	433	470	503	558
Water content l / m		1,67	2,22	2,78	3,33	3,87	4,44	4,99	6,12
Weight kg / m		11,14	14,51	16,71	19,85	22,99	26,15	29,29	33,55
Radiator exponent **n**		1,32	1,34	1,30	1,30	1,31	1,32	1,32	1,34
Model	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**	**VHV 20**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20	304	440	561	654	757	859	960	1063	1271
Watts / m 70/55/20	249	359	458	533	617	699	781	863	1032
Watts / m 55/45/20	161	232	296	344	398	449	502	553	661
Water content l / m	2,18	3,34	4,44	5,55	6,66	7,77	8,88	9,99	12,22
Weight kg / m	9,26	13,27	17,28	21,29	25,30	29,31	33,31	37,32	45,33
Radiator exponent **n**	1,24	1,25	1,25	1,26	1,26	1,27	1,27	1,28	1,28
Model	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**	**VHV 22**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20	641	838	1032	1197	1343	1474	1592	1699	1886
Watts / m 70/55/20	519	674	825	963	1079	1182	1274	1357	1500
Watts / m 55/45/20	330	423	510	605	675	736	790	838	919
Water content l / m	2,18	3,34	4,44	5,55	6,66	7,77	8,88	9,99	12,22
Weight kg / m	13,97	20,59	27,23	30,89	36,93	42,96	49,01	55,05	63,06
Radiator exponent **n**	1,30	1,34	1,38	1,34	1,35	1,36	1,37	1,38	1,41

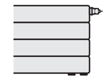
* For aesthetic reasons these models should not be fitted in front of a window.

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications

			
Overall height [mm]	**142**	**214**	**286**
Increments	all overall lengths from 500 to 1400 mm in increments of 100 mm, all overall lengths from 1600 to 4000 mm in increments of 200 mm		
Model	**VHV-S 22**	**VHV-S 22**	**VHV-S 22**
Overall depth [mm]	**163**	**163**	**163**
Watts / m 75/65/20	641	838	1032
Watts / m 70/55/20	519	674	825
Watts / m 55/45/20	330	423	510
Water content l / m	2,18	3,34	4,44
Weight kg / m	19,43	28,34	37,24
Radiator exponent **n**	1,30	1,34	1,38
Model	**VHV 23***	**VHV 23***	**VHV 23***
Overall depth [mm]	**150**	**150**	**150**
Watts / m 75/65/20	797	1035	1261
Watts / m 70/55/20	645	832	1008
Watts / m 55/45/20	410	522	623
Water content l / m	2,18	3,34	4,44
Weight kg / m	17,02	24,84	32,66
Radiator exponent **n**	1,30	1,34	1,38
Model	**VHV 34**	**VHV 34**	**VHV 34**
Overall depth [mm]	**175**	**175**	**175**
Watts / m 75/65/20	1050	1394	1723
Watts / m 70/55/20	856	1123	1377
Watts / m 55/45/20	552	707	851
Water content l / m	3,33	4,99	6,66
Weight kg / m	23,93	35,18	46,42
Radiator exponent **n**	1,26	1,33	1,38
Model	**VHV-S 34**	**VHV-S 34**	**VHV-S 34**
Overall depth [mm]	**245**	**245**	**245**
Watts / m 75/65/20	1050	1394	1723
Watts / m 70/55/20	856	1123	1377
Watts / m 55/45/20	552	707	851
Water content l / m	3,33	4,99	6,66
Weight kg / m	29,39	42,92	56,44
Radiator exponent **n**	1,26	1,33	1,38

* For aesthetic reasons these models should not be fitted in front of a window.

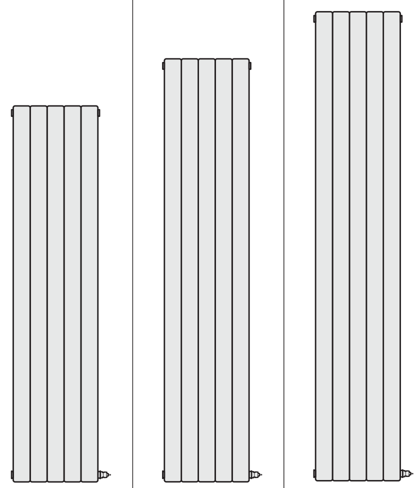
			
Overall height [mm]	**142**	**214**	**286**
Increments	all overall lengths from 500 to 1400 mm in increments of 100 mm, all overall lengths from 1600 to 4000 mm in increments of 200 mm		
Model	**VHV 35***	**VHV 35***	**VHV 35***
Overall depth [mm]	**232**	**232**	**232**
Watts / m 75/65/20	1197	1651	1971
Watts / m 70/55/20	971	1326	1570
Watts / m 55/45/20	619	828	964
Water content l / m	3,33	4,99	6,66
Weight kg / m	26,98	39,42	51,86
Radiator exponent **n**	1,29	1,35	1,40
Model	**VHV 46**	**VHV 46**	**VHV 46**
Overall depth [mm]	**257**	**257**	**257**
Watts / m 75/65/20	1454	2072	2447
Watts / m 70/55/20	1179	1664	1949
Watts / m 55/45/20	752	1040	1197
Water content l / m	4,53	6,79	9,06
Weight kg / m	33,89	49,76	65,62
Radiator exponent **n**	1,29	1,35	1,40
Model	**VHV-S 47**	**VHV-S 47**	**VHV-S 47**
Overall depth [mm]	**327**	**327**	**327**
Watts / m 75/65/20	1522	2302	2667
Watts / m 70/55/20	1240	1846	2128
Watts / m 55/45/20	800	1149	1311
Water content l / m	4,53	6,79	9,06
Weight kg / m	41,27	60,50	79,74
Radiator exponent **n**	1,26	1,36	1,39

* For aesthetic reasons these models should not be fitted in front of a window.

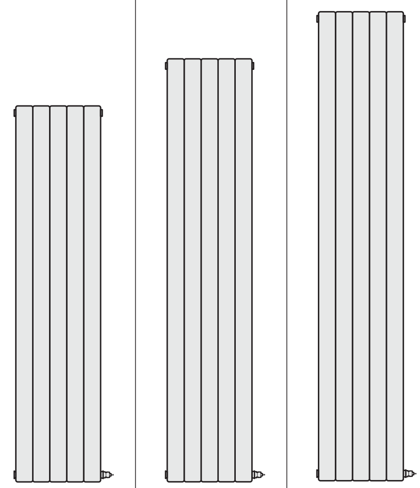
heating outputs

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications



Overall height [mm]	**1600**	**1800**	**2000**
Overall length [mm]	**214, 286, 358, 430, 502, 574, 646, 718, 790, 862**		
Model	**VSV 10**	**VSV 10**	**VSV 10**
Overall depth	**68 mm**	**68 mm**	**68 mm**
Watts / m 75/65/20	1738	1979	2232
Watts / m 70/55/20	1384	1577	1781
Watts / m 55/45/20	850	968	1097
Water content l / m	11,37	12,47	13,85
Weight kg / m	44,45	49,60	54,75
Radiator exponent **n**	1,40	1,40	1,39
Model	**VSV 11**	**VSV 11**	**VSV 11**
Overall depth	**68 mm**	**68 mm**	**68 mm**
Watts / m 75/65/20	1979	2209	2450
Watts / m 70/55/20	1584	1768	1964
Watts / m 55/45/20	983	1097	1223
Water content l / m	11,37	12,47	13,85
Weight kg / m	63,39	68,53	73,69
Radiator exponent **n**	1,37	1,37	1,36



Overall height [mm]	**1600**	**1800**	**2000**
Overall length [mm]	**214, 286, 358, 430, 502, 574, 646, 718, 790, 862**		
Model	**VSV 20**	**VSV 20**	**VSV 20**
Overall depth	**93 mm**	**93 mm**	**93 mm**
Watts / m 75/65/20	2932	3301	3672
Watts / m 70/55/20	2332	2629	2929
Watts / m 55/45/20	1427	1615	1805
Water content l / m	22,74	24,34	27,71
Weight kg / m	85,44	95,46	105,48
Radiator exponent **n**	1,41	1,40	1,39
Model	**VSV 21**	**VSV 21**	**VSV 21**
Overall depth	**68 mm**	**68 mm**	**68 mm**
Watts / m 75/65/20	3184	3588	4012
Watts / m 70/55/20	2536	2857	3206
Watts / m 55/45/20	1557	1755	1983
Water content l / m	22,74	24,34	27,71
Weight kg / m	104,37	114,39	124,42
Radiator exponent **n**	1,40	1,40	1,38

VONARIS-M CENTRAL-CONNECTION RADIATOR

EN 442 GEPRÜFT
DIN EN EURONORM 442
EN ISO 9001
DIE *neue* WÄRME

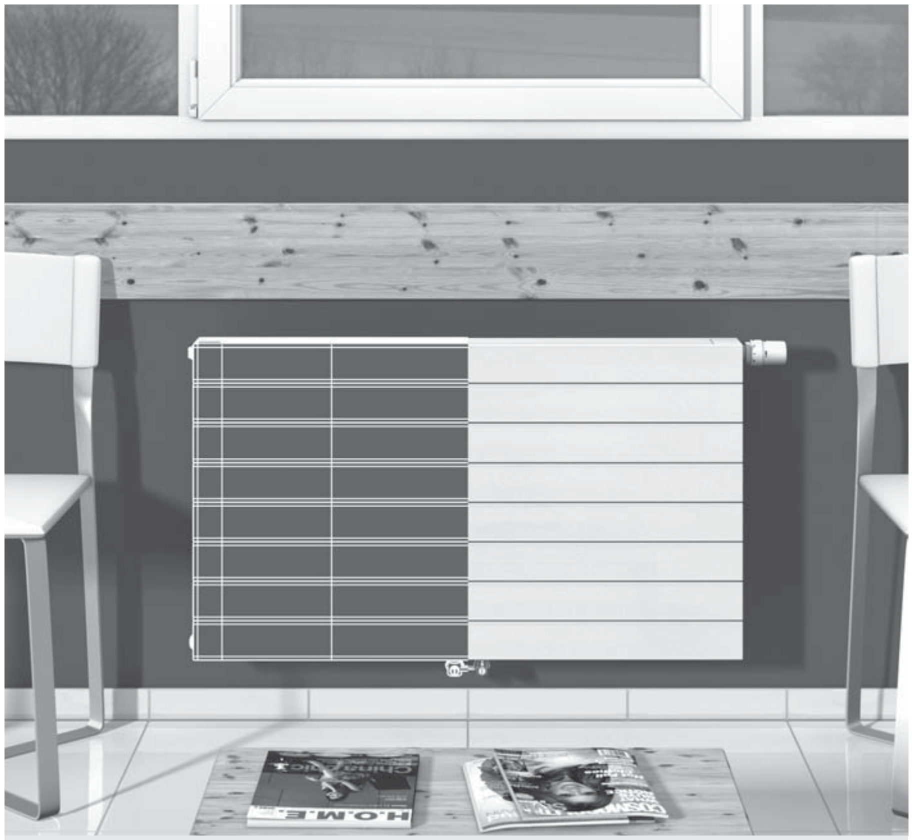
Connections:
Horizontal design: 2 x external thread G 3/4“, bottom centre

Vertical design: 2 x external thread G 3/4“, bottom centre

5 bar max.
Maximum positive operating pressure
Standard design: **5 bar**

8 bar max.
Maximum positive operating pressure:
High-pressure design: **8 bar**

max.
Maximum operating temperature: 110° C



Guarantee statements are available to download at **www.vogelundnoot.com/download**

VONARIS: the central-connection radiator in a fully welded horizontal design, with from 1 to 4 layers of steel rectangular water-flow pipes, arranged one-behind-the-other, each layer consisting of from 2 to 11 pipes arranged one-above-the-other. Vertical design with 1 or 2 layers of steel rectangular water-flow pipes, arranged one-behind-the-other, each layer consisting of from 3 to 12 steel pipes, arranged side-by-side.

A 2 mm space between the heating pipes guarantees additional resistance to corrosion. **VONARIS** central-connection radiators are equipped with a built-in valve set, suitable for either double-pipe or single-pipe operation, using a one-pipe manifold, with a factory-fitted valve (already installed) and protective cap.

Vertical central-connection radiators are delivered with a connection set, including a factory-fitted valve, a protective cap and a cover. Depending on the customer’s preferences they will also be ready for double-pipe or single-pipe operation and for angled or through-flow connection. **VONARIS** central-connection radiators are usually delivered with side panels. The horizontal design also comes equipped with a top cover. With the **VONARIS** central-connection radiators, brackets are not included as a matter of course (exception: VHV-M 11, where brackets are included).
The **VONARIS** central-connection radiator comes with a drain plug and a pivoting vent plug (with the vertical design, also two dummy plugs), all of them factory-sealed. **VONARIS** central-connection radiators are Design radiators that are ready to connect.
Standard design: rectangular steel pipes, 70 x 11 x 1.5 mm
High-pressure design: rectangular steel pipes, 70 x 11 x 2.0 mm

Dimensions:
Horizontal design: overall lengths between 500 mm and 1400 mm are available (at increments of 100 mm), and between 1600 mm and 2400 mm (at increments of 200 mm)
Horizontal design: the available overall heights are 142, 214, 286, 358, 430, 502, 574, 646 and 790 mm
Vertical design: overall lengths between 214 mm and 862 mm are available
(at increments of 72 mm)
Vertical design: overall heights of 1600, 1800 and 2000 mm are available.

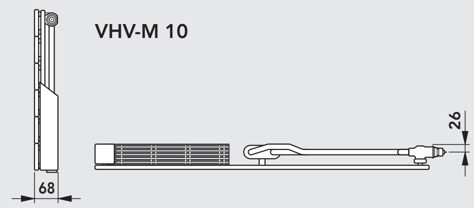
Coatings:
1. Undercoat: electrophoretic, using water-soluble paints, conforming to DIN 55900 part 1, stoved at 165° C;
2. Finish: electrostatic powder coating, conforming to DIN 55900 part 2, in a state-of-the-art facility. (On request, and at a supplementary charge, a range of RAL and sanitary ware colours can be offered.) This particularly robust coating is stoved at an object temperature of 180° C.

Packaging: 1. Cardboard packaging
2. Edge protection
3. Shrink foil

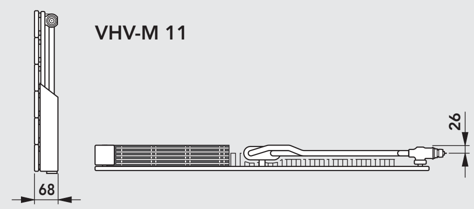
model overview / connection dimensions

Horizontal design, VHV-M models

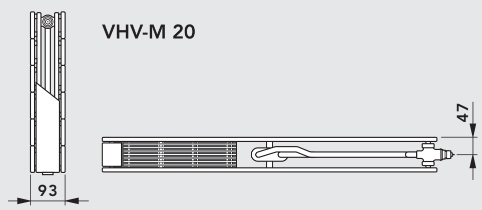
VHV-M 10



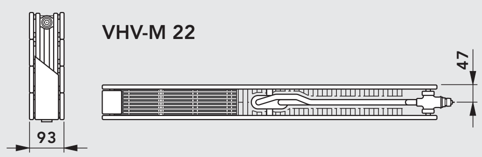
VHV-M 11



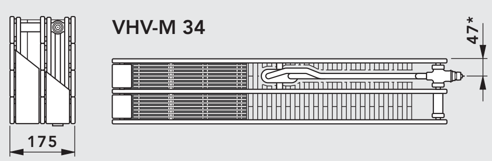
VHV-M 20



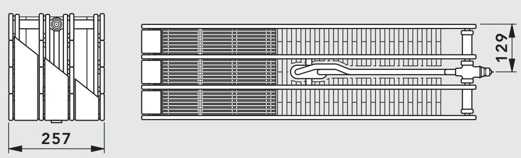
VHV-M 22

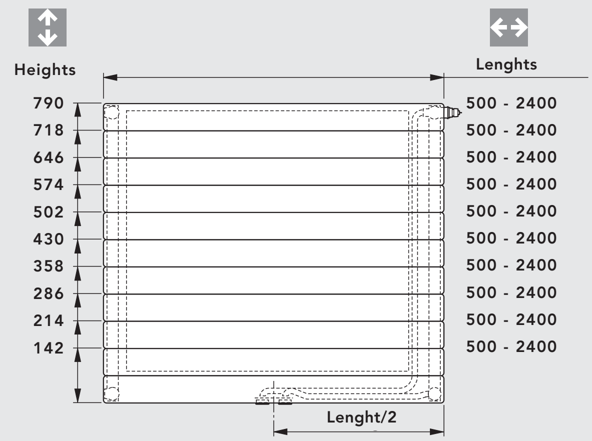


VHV-M 34



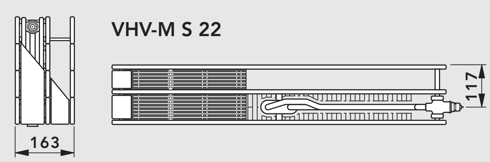
VHV-M 46



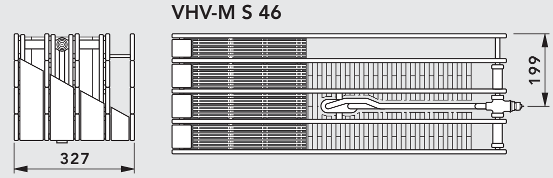


Horizontal design, VHV-M S models

VHV-M S 22



VHV-M S 46



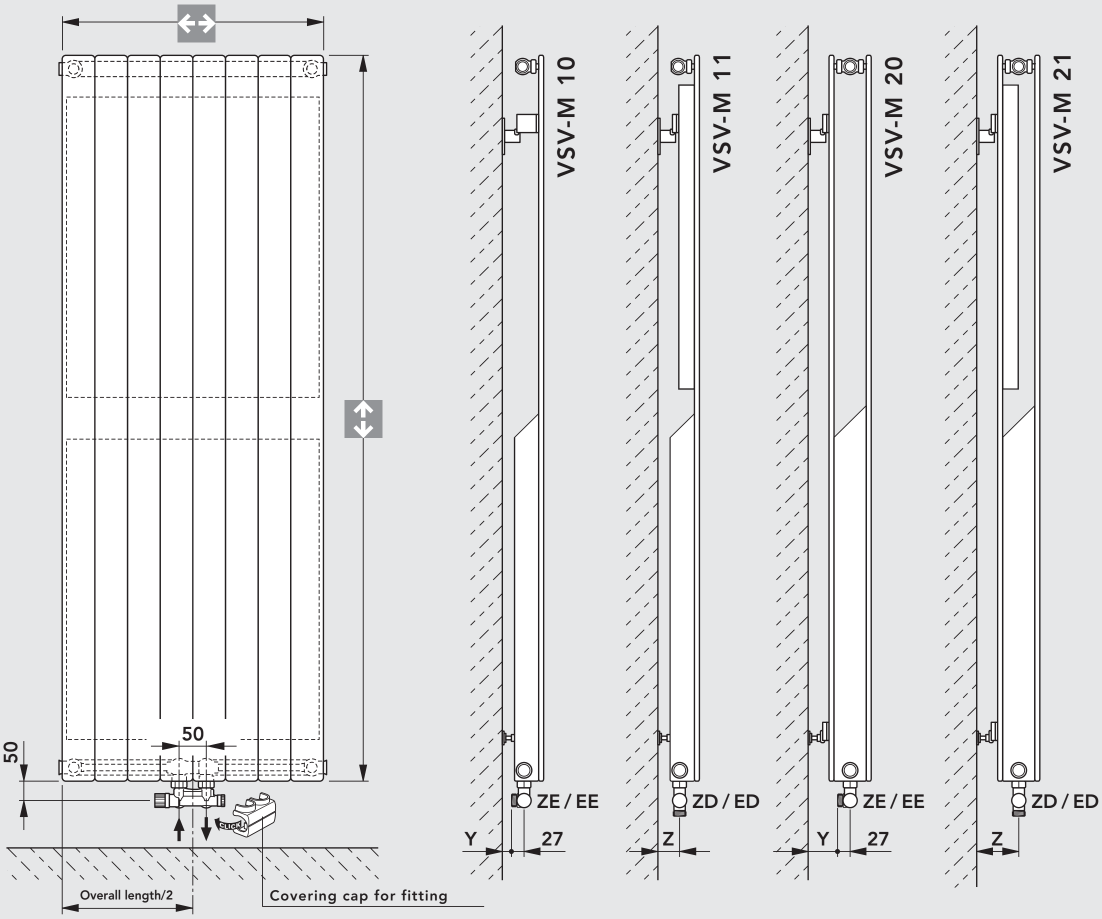
The WVO version with factory-welded, not water-bearing radiation shield through convection between radiator and radiation shield back the majority of the otherwise lost heat in the room.

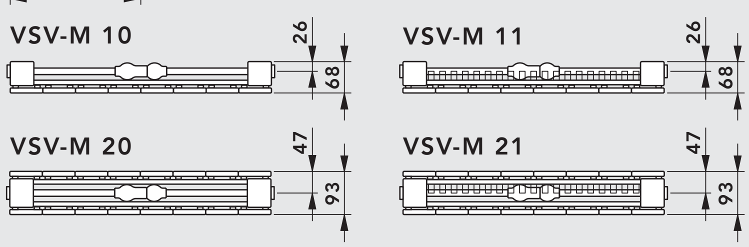
Schematic diagram

* Note: if the VHV-M 34 model is turned around so that the valve is located to the left, the distance between the **VONARIS** rear panel and the connection point is **129 mm**.

Model	VHV-M 10			VHV-M 11			VHV-M 20			VHV-M 22			VHV-M S 22		VHV-M 34		VHV-M 46		VHV-M S 46	
Overall height [mm]	358	430	502	358	430	502	358	430	502	214	286	358	214	286	142	214	142	214	142	214
	574	646	718	574	646	718	574	646	718	430	502	574			286		286		286	
	790			790			790			646	718	790								
Overall length [mm]	500 - 2400 mm																			
Increments	100 mm (for an overall length of 1400 mm and greater: 200 mm)																			

Model overview / connection dimensions: vertical design, VSV-M models





Connection set

- **ZE** Double-pipe operation angled design
- **ZD** Double-pipe operation through-flow design
- **EE** Single-pipe operation angled design
- **ED** Single-pipe operation through-flow design

Angled design connection set

Fastening set	Model	Measurement Y [mm]
*	VSV-M 10	*
WA 10	VSV-M 20/21	**53**
*	VSV-M 11	*
WA 11	VSV-M 20/21	**63**

Connection set in through-flow design

Fastening set	Model	Measurement Z [mm]
WA 10	VSV-M 10/11	35
WA 10	VSV-M 20/21	79,5
WA 11	VSV-M 10/11	45
WA 11	VSV-M 20/21	89,5

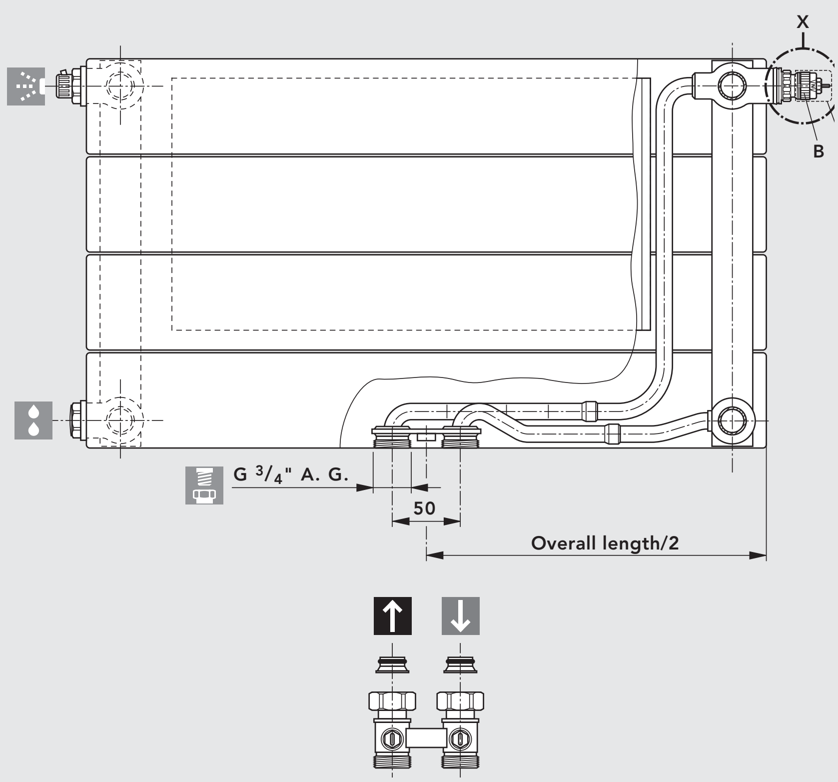
Schematic diagram

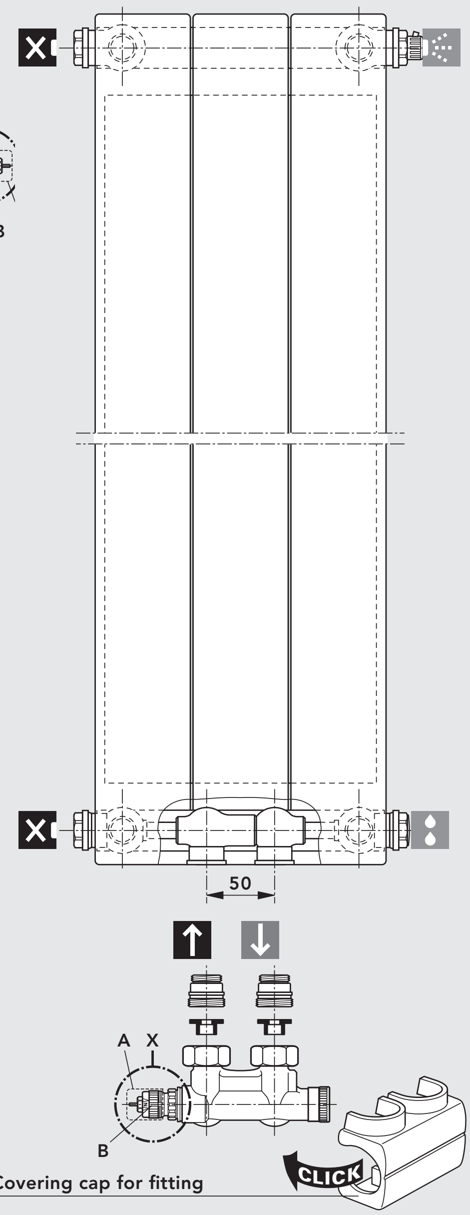
*** Note:** when installing the VSV-M 10 and VSV-M 11 models with an angled connection set (ZE, EE), please use the appropriate drill consoles and angled fishplates to ensure that the required distance from the wall is maintained.

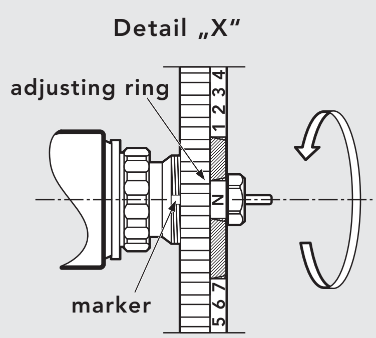
Model	VSV-M 10			VSV-M 11			VSV-M 20			VSV-M 21		
Overall height	600	800	1000	800	1000	1200	600	800	1000	800	1000	1200
	1200	1400	1600	1400	1600	1800	1200	1400	1600	1400	1600	1800
	1800	2000	2200	2000	2200		1800	2000	2200	2000	2200	
[mm]	2400	2600					2400	2600				
Overall length [mm]	214 - 862 mm											
Increments	72 mm											

Horizontal and vertical designs

It is easy to set the precise values required **without** using any special tools (see drawings).







Note:
Settings in the hatched area must be avoided.

Schematic diagram

The radiator will be delivered with a fitted protective cap. After removing the protective cap (item A), the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000“, or „RAW“ from Danfoss, „VK“ from Heimeier, „D“ from Herz, „thera DA“ from MNG, and „UNI XD“ from Oventrop**.

Adjustment tips:

- Remove protective cap and sensor
- Lift the adjusting ring and turn it anti-clockwise, to the setting required – the set value (1, 2, ...7, N) needs to be directly in line with the marker.
- Presetting is possible in steps of 0.5 between 1 and 7. The „N“setting, cancels all presetting.

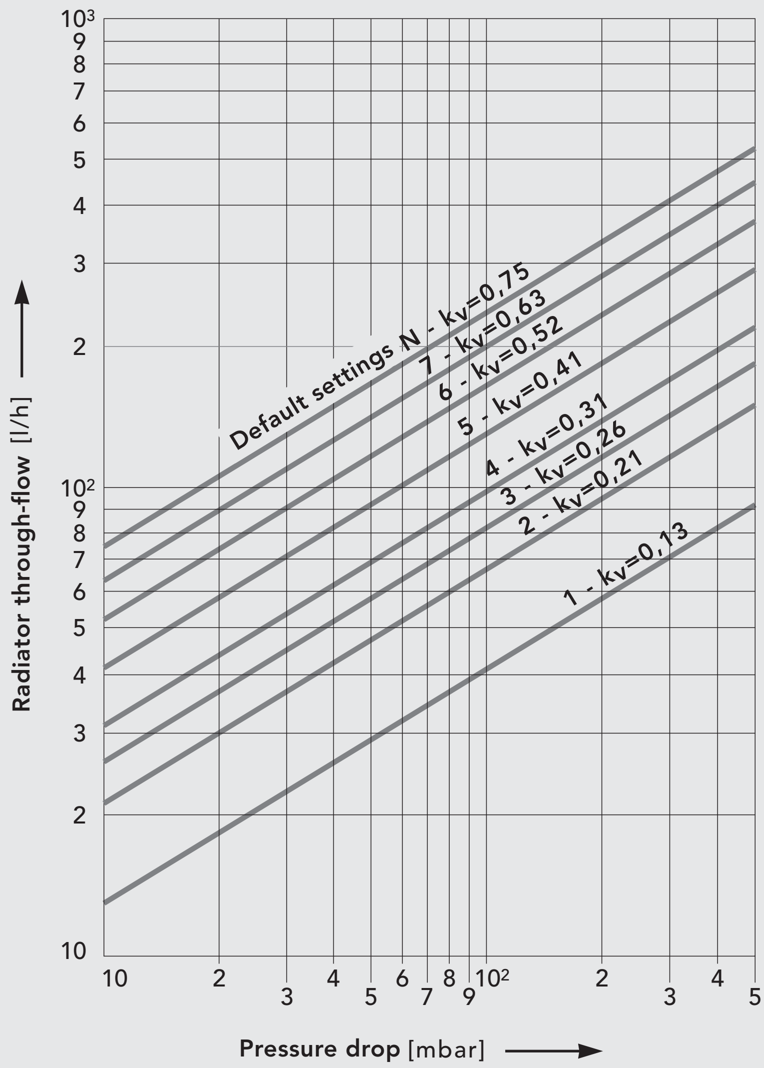
Horizontal design

Guideline values for default settings

Basis:
Supply temperature **70 °C**

Return temperature **55 °C**

Room temperature **20 °C**



Default setting 1 k_v = 0.13
For radiators up to about 500 W

Default setting 2 k_v = 0.21
For radiators up to about 800 W

Default setting 3 k_v = 0.26
For radiators up to about 1000 W

Default setting 4 k_v = 0.31
For radiators up to about 1200 W

Default setting 5 k_v = 0.41
For radiators up to about 1600 W

Default setting 6 k_v = 0.52
For radiators up to about 2000 W

Default setting 7 k_v = 0.63
For radiators up to about 2400 W

Default setting N k_v = 0.75
For radiators of more than 2400 W

Chart A:

Pressure drop [mbar] – double-pipe operation at 2K proportional offset.

It is of course possible to adjust the valve default setting, whilst there is pressure in the heating system.

Vertical design

Guideline values for default settings

Basis:
Supply temperature **70 °C**

Return temperature **55 °C**

Room temperature **20 °C**

Default setting **4** k_v = 0.12
For radiators up to about 450 W

Default setting **5** k_v = 0.19
For radiators up to about 700 W

Default setting **6** k_v = 0.27
fFor radiators up to about 1000 W

Default setting **7** k_v = 0.33
For radiators up to about 1200 W

Default setting **N** k_v = 0.48
For radiators of more than 1200 W

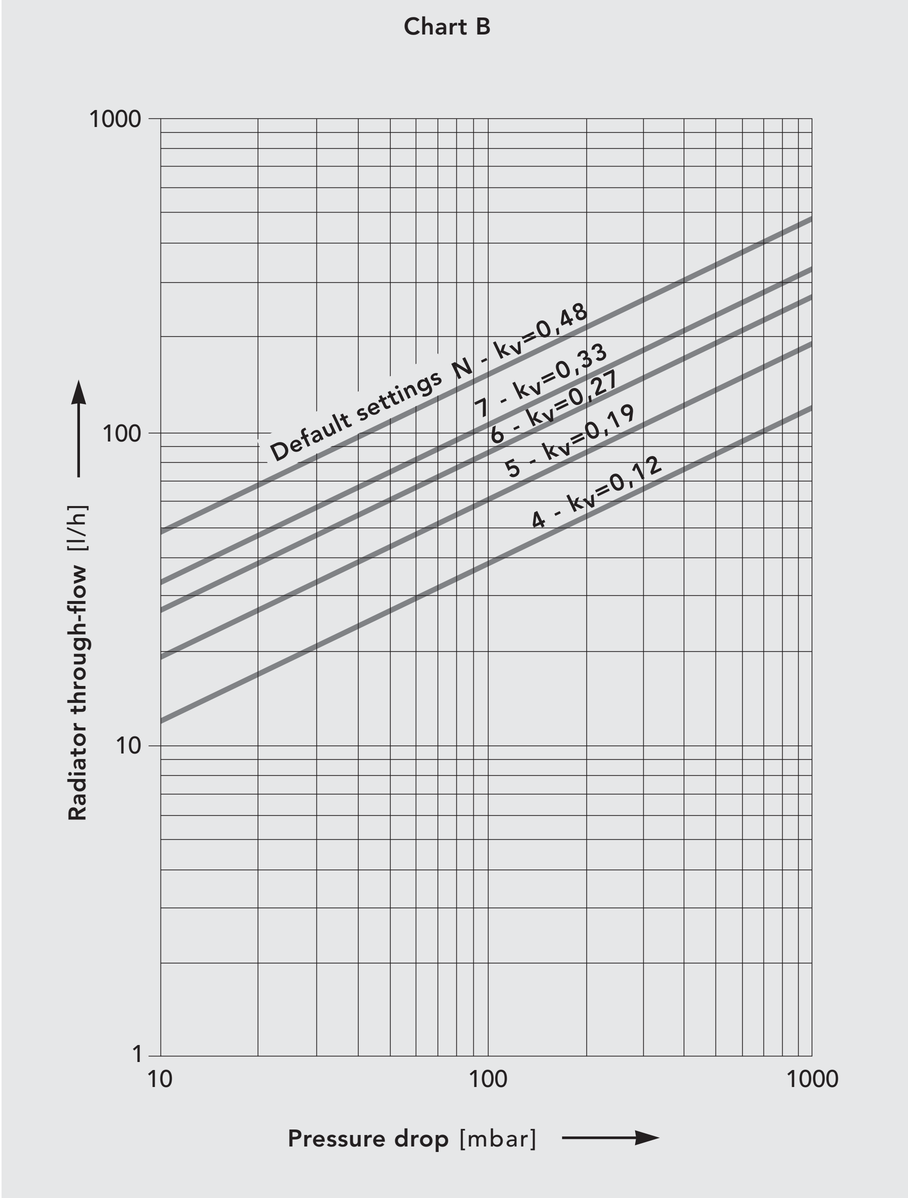


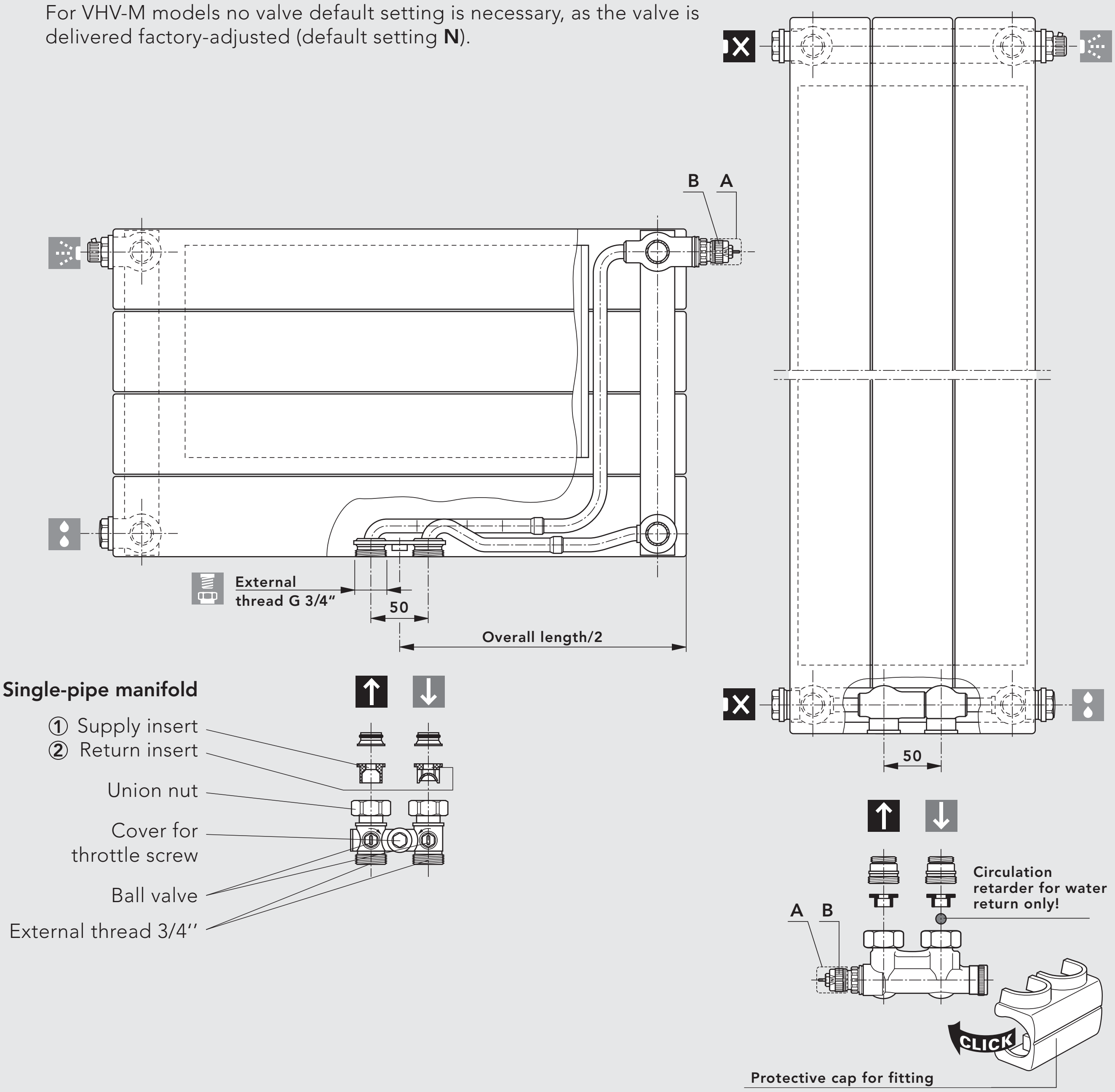
Chart B:

Pressure drop [mbar] – double-pipe operation at 2K proportional offset.

It is of course possible to adjust the valve default setting, whilst there is pressure in the heating system.

Horizontal and vertical design

For VHV-M models no valve default setting is necessary, as the valve is delivered factory-adjusted (default setting **N**).



Schematic diagram

The radiator valve (VHV-M models) and the connection set (VSV-M models) will both be delivered with a fitted protective cap. After removing the protective cap (item A), the following thermostat heads can be installed directly onto the built-in valve (item B): **„RA 2000", or „RAW" from Danfoss, „VK" from Heimeier, „D" from Herz, „thera DA" from MNG, and „UNI XD" from Oventrop**.

Please note!

Horizontal design:
During the installation of the single-pipe manifold ensure that the return insert ② is installed in the water return, and the supply insert ① in the water supply.

Vertical design:
When fitting the single-pipe operation connection set, ensure that the **circulation retarder** is installed in the water return.

Horizontal design

Default setting when using a single-pipe manifold:

radiator proportion 30 % --- 3.50 revolutions*

radiator proportion 35 % --- 3 revolutions*

radiator proportion 40 % --- 2.50 revolutions*

radiator proportion 45 % --- 2 revolutions*

radiator proportion 50 % --- 1.75 revolutions*

*… before starting, turn the bypass spindle of the single-pipe manifold to the **right as far as it will go**.

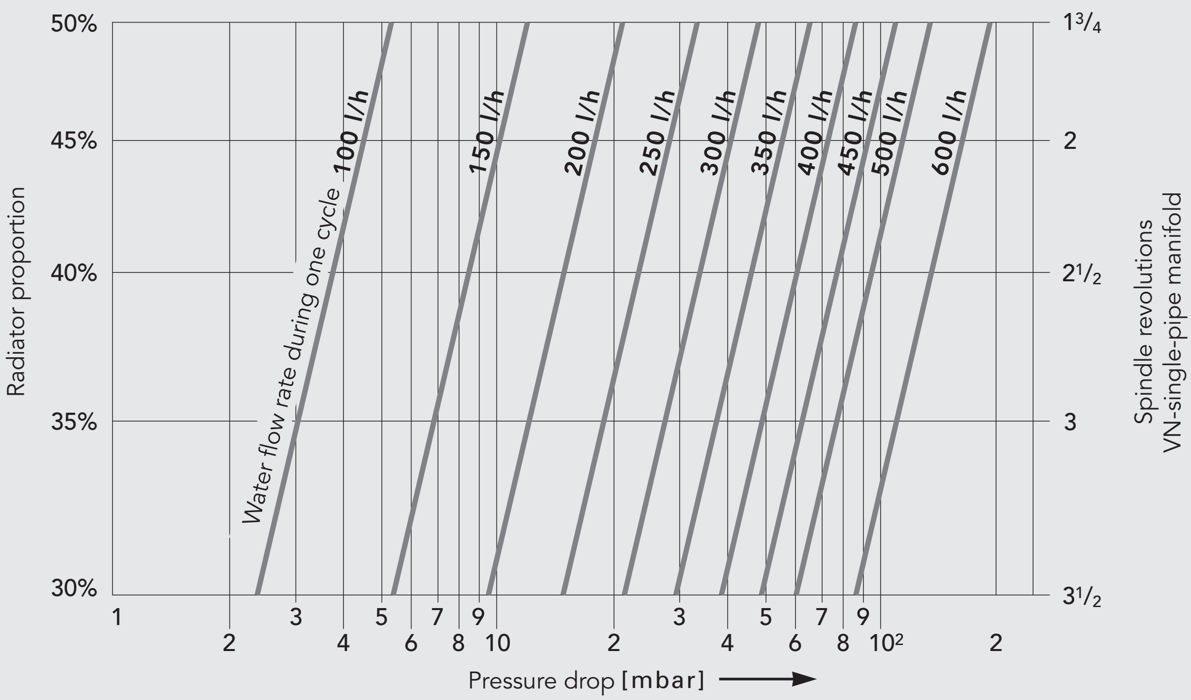


Diagram:

Pressure drop [mbar] – single-pipe operation with a proportional deviation of 2K.

It is of course possible to change the radiator proportion, whilst there is pressure in the heating system.

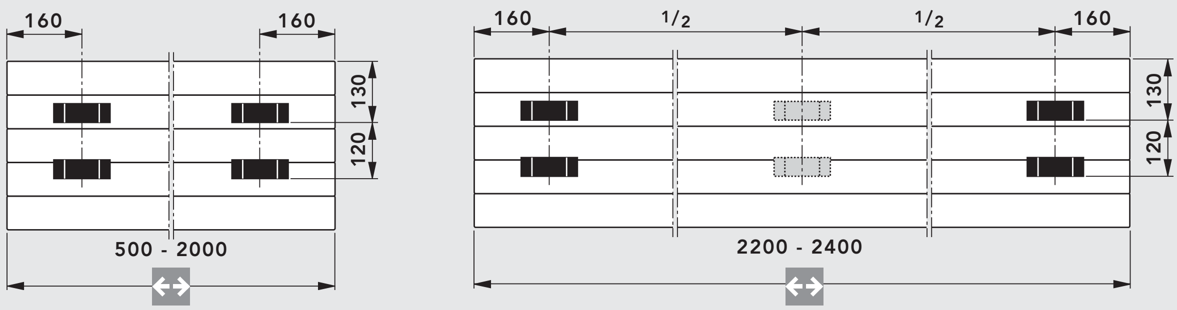
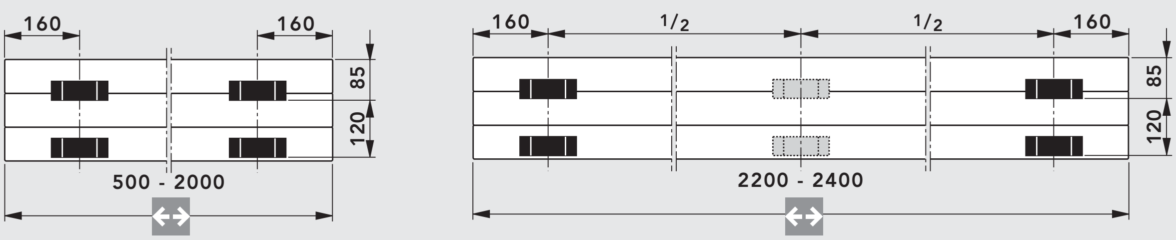
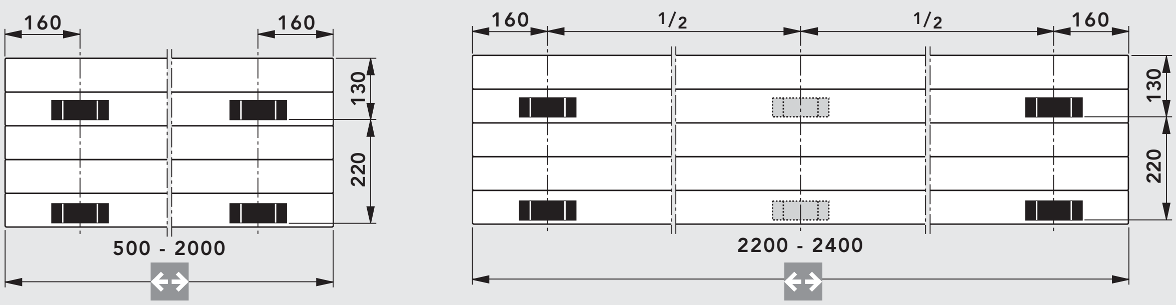
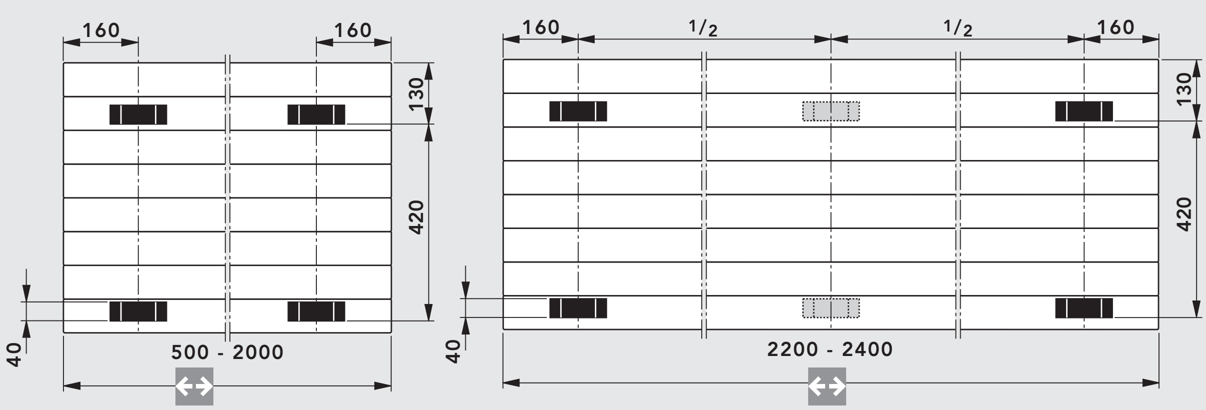
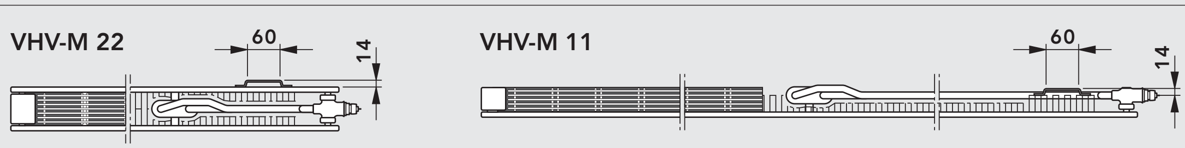
Please take account of the maximum power per cycle (for single-pipe installations) of about 10 kW:
$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

Vertical design

The connection set radiator proportion comes preset at 40 %.

Please take account of the maximum power per cycle (for single-pipe installations) of about 10 kW:
$\Delta T = T_1 - T_2 = 20$ K (at $T_1 = 90$ °C).

welded bracket postions

Wall mounting WA 11 for models VHV-M 10, VHV-M 11, VHV-M 20, VHV-M 22 and VHV-M 34	
Model	**VHV-M 10 / 11 for wall mounting WA 11**
Overall height 358 mm	
	VHV-M 22 or rather VHV-M 34 for wall mounting WA 11
Overall height 214 mm and 286 mm	
	VHV-M 10 / 11, VHV-M 20/22 for wall mounting WA 11
Overall height 430 mm to 574 mm VHV-M 10/11, 358 mm to 502 mm VHV-M 20/22	
	VHV-M 10 / 11, VHV-M 20/22 for wall mounting WA 11
Overall height 646 mm to 790 mm VHV-M 10/11, 574 mm to 790 mm VHV-M 20/22	
	
	Schematic diagram

Attention! With the horizontal design only the models VHV-M 10/11 (OH 358 - 790 mm) are by default supplied with brackets. If the models VHV-M 20 (OH 358 - 790 mm), VHV-M 22 (OH 214 - 790) and VHV-M 34 (142 – 286 mm) are wall-mounted using wall mounting WA 11, you are required to order these models as a special version, equipped with brackets.

VONARIS-M Wall mounting WA 11

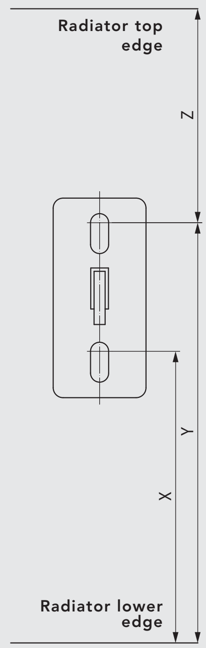
drilling measurements and wall-clearance

Wall mounting WA 11 for models VHV-M 10, VHV-M 11, VHV-M 20, VHV-M 22 und VHV-M 34

Wall mounting WA 11 is suitable for the horizontal versions of the following models: VHV-M 10 (OH 358 - 790 mm), VHV-M 11 (OH 358 - 790 mm), VHV-M 20 (BH 358 - 790 mm), VHV-M 22 (OH 214 - 790 mm) and VHV-M 34 (OH 214 and 286 mm) equipped with brackets. It ensures easy, rapid and robust mounting of the VONARIS central-connection radiators still in the packaging.

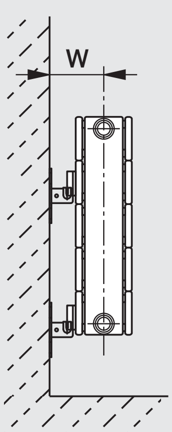
Wall mounting WA 11 for OH 214 - 790

Drilling measurements for the Wandaufhängung WA 11					
From an overall length of 2200 mm: 3 consoles					
Model	VHV-M Overall height [mm]	Value **X** [mm]	Value **Y** [mm]	Value **Z** [mm]	**Wall mounting WA 11**
VHV-M 22, 34	214	**104**	**162**	**52**	
VHV-M 22, 34	286	**176**	**234**	**52**	
VHV-M 10, 11	358	**203**	**261**	**97**	
VHV-M 20, 22	358	**203**	**261**	**97**	
VHV-M 10, 11, 20, 22	430	**275**	**333**	**97**	
VHV-M 10, 11, 20, 22	502	**347**	**405**	**97**	
VHV-M 10, 11	574	**419**	**477**	**97**	
VHV-M 20, 22	574	**419**	**477**	**97**	
VHV-M 10, 11, 20, 22	646	**491**	**549**	**97**	
VHV-M 10, 11, 20, 22	718	**563**	**621**	**97**	
VHV-M 10, 11, 20, 22	790	**635**	**693**	**97**	



Schematic diagram

Connection – wall clearance



Horizontal design model	Overall height [mm]	Value **W** [mm]
VHV-M 10	358 - 790	**45**
VHV-M 11	358 - 790	**45**
VHV-M 20	358 - 790	**89**
VHV-M 22	214 - 790	**89**
VHV-M 34	214 / 286	**89**

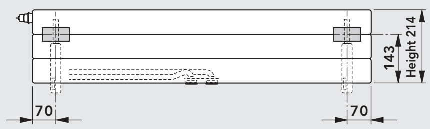
Schematic diagram

bracket positioning for insertion (push-in) brackets

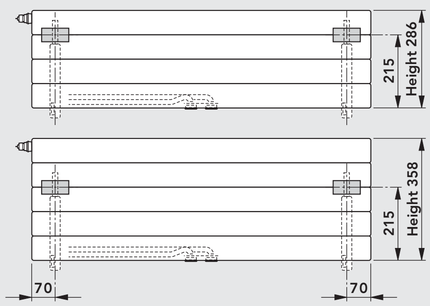
VONOFIX rapid-installation console for the VHV-M models

VHV-M 10 models: OH 358 - 790 mm, VHV-M 20 models: OH 358 - 790 mm,
VHV-M 22 models: OH 214 - 790 mm and VHV-M 34 models: OH 214 and 286 mm

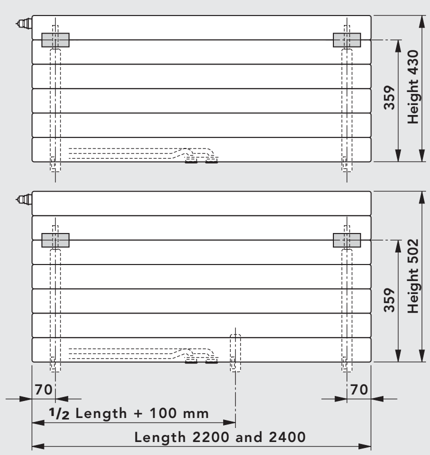
OH 214: for **VONOFIX 1**



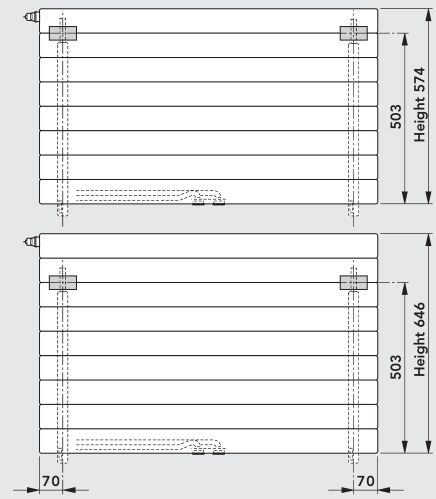
OH 286 and 358: for **VONOFIX 2**



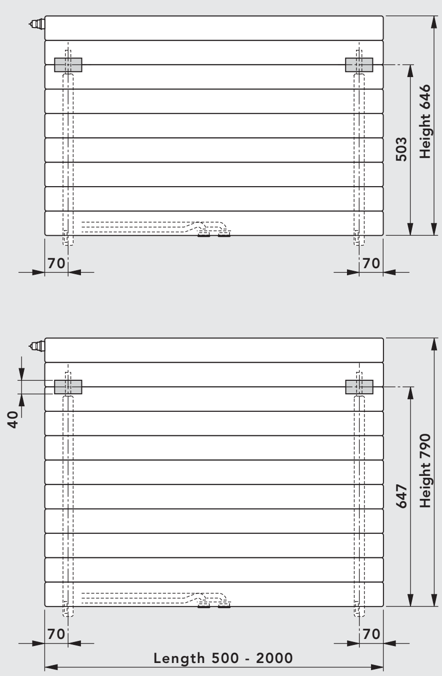
OH 430 and 502: for **VONOFIX 3**



OH 574 and 646: for **VONOFIX 4**



OH 718 and OH 790: for **VONOFIX 5**



Note! for an overall length of 2200 mm and greater an additional piece of foot console must be used!

Schematic diagram

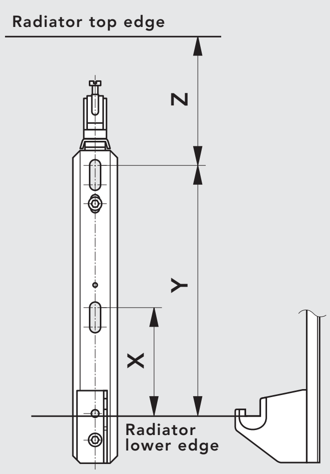
Important: the installation of VHV-M models with insertion (push-in) brackets is only feasible when using the **VONOFIX** rapid-installation console!

VONOFIX rapid-installation console for the VHV-M models

The **VONARIS** central connection radiator can be installed easily, quickly and securely. This is made possible by the **VONO-FIX** rapid-installation console for the horizontal designs of the VHV-M 20 (OH 358 - 790 mm), VHV-M 22 (OH 214 - 790 mm) and the VHV-M 34 (OH 214 and 286 mm) models.

Wall rails for OH 214 – 790 mm

Drilling measurements for the VONOFIX 1 - 5



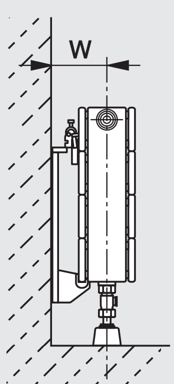
Overall radiator height [mm]	Value **X** [mm]	Value **Y** [mm]	Value **Z** [mm]
214	**–**	**125**	**89**
286	**100**	**197**	**89**
358	**100**	**197**	**161**
430	**100**	**341**	**89**
502	**100**	**341**	**161**
574	**100**	**485**	**89**
646	**100**	**485**	**161**
718	**100**	**629**	**89**
790	**100**	**629**	**161**

Schematic diagram

The **VONOFIX** rapid-installation console consists of:

2 wall consoles (zinc-plated), with sound-proofing filters, screws and dowels
2 stabilising brackets
2 insertion (push-in) brackets
(For an overall length of 2200 mm and greater, 1 additional piece of foot console)

Connection – wall clearance



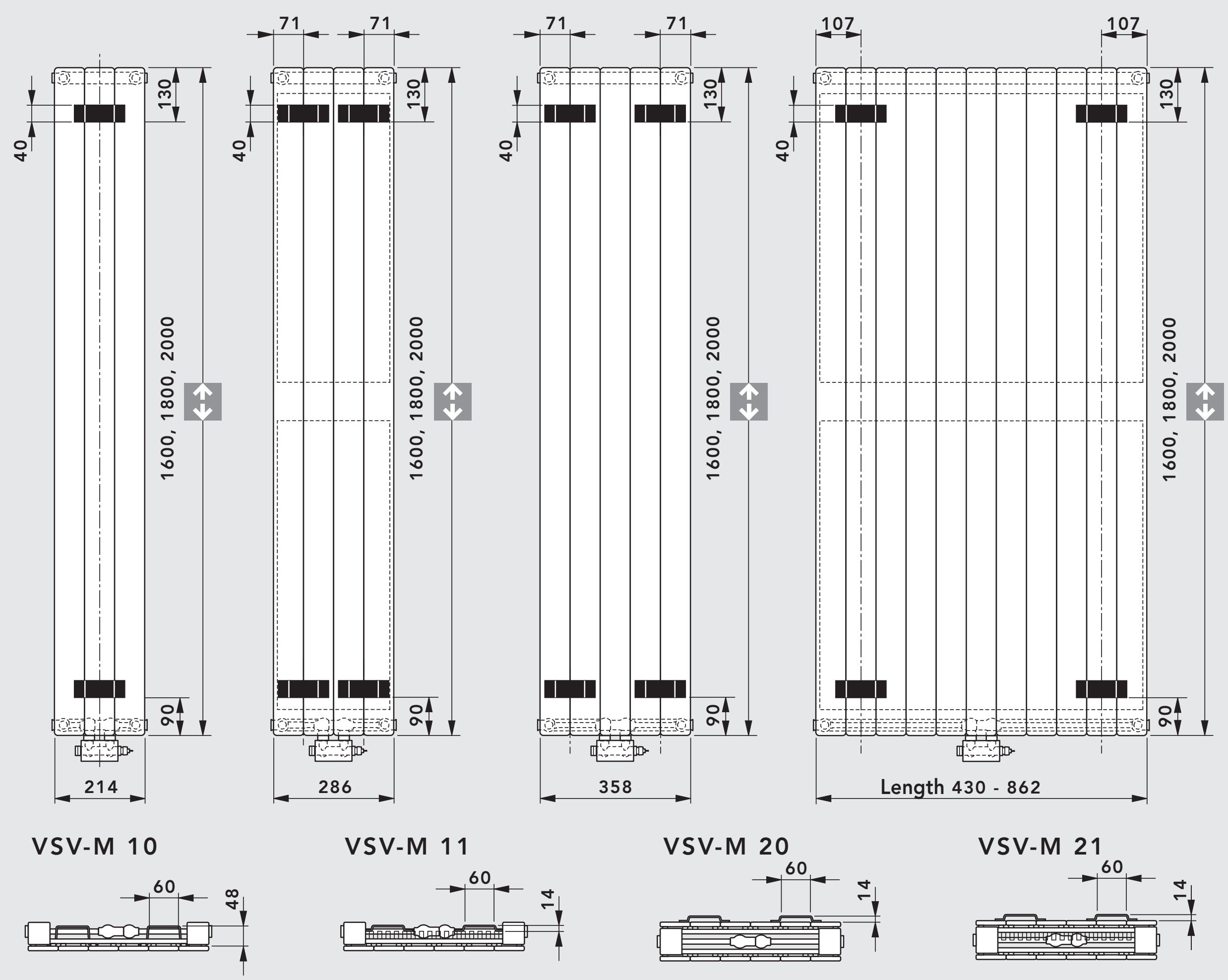
Horizontal design model	Overall height [mm]	Value **W** [mm]
VHV-M 20	358 – 790	**91**
VHV-M 22	214 – 790	**91**
VHV-M 34	214 – 286	**91***

* **Note:** if the **VHV-M 34** is turned round and used as a left-hand design model, the measurement **W is 172 mm.**

Schematic diagram

VSV-M models

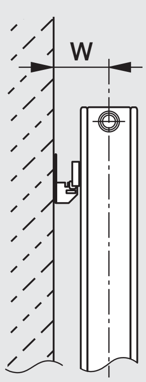
Overal length [mm]	214	286	358	430 - 862



Schematic diagram

Wall clearance measurements: WA 10 and WA 11 wall mounting brackets for the VSV-M models

Connection – wall clearance

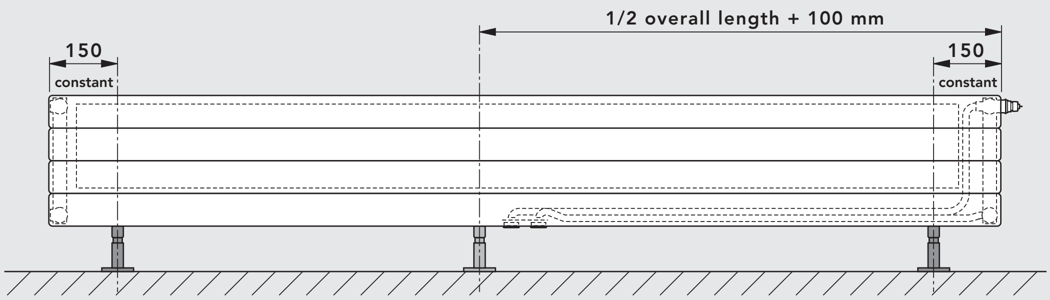


Wall mounting brackets model	Vertical design model	Value **W** [mm]
WA 10	VSV-M 10/11*	**35**
WA 10	VSV-M 20/21	**79,5**
WA 11	VSV-M 10/11*	**45**
WA 11	VSV-M 20/21	**89,5**

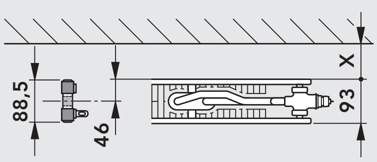
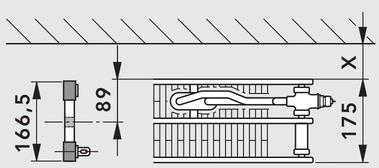
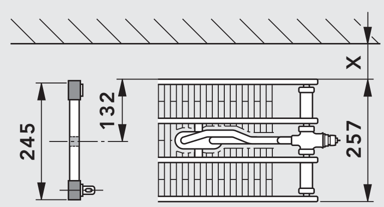
***Note!** if you are using **WA 10** or **WA 11** wall mounting brackets for the installation of the **VSV-M 10** or **VSV-M 11** model with a right-angled-design connection, please follow the instructions in the diagram on page 267.

Schematic diagram

SK 12 – 17 stand consoles: positioning with the VHV-M models (up to an overall height of 286 mm)



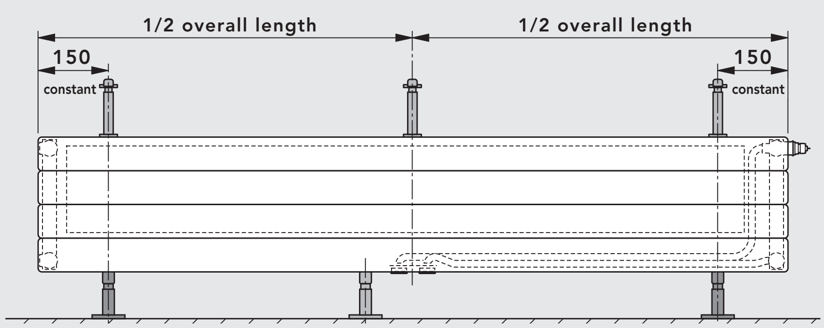
Note: for an overall length of **2200 mm** and greater, a 3rd stand console must be used!

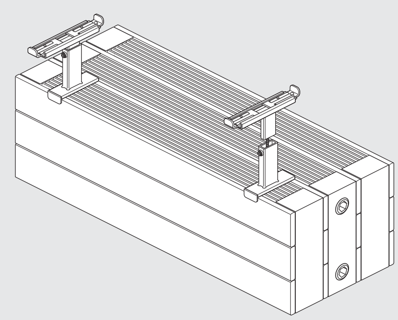
SK 12 / SK 13 VHV-M 22	SK 14 / SK 15 VHV-M 34	SK 16 / SK 17 VHV-M 46
		

Schematic diagram

FBT 20 window sill support: positioning for the VHV-M models (up to an overall height of 286 mm)

Window sill support for subsequent installation with the **VHV-M 22 – 46 models** of the **VONARIS-M** central connection radiator (up to an overall height of 286 mm)

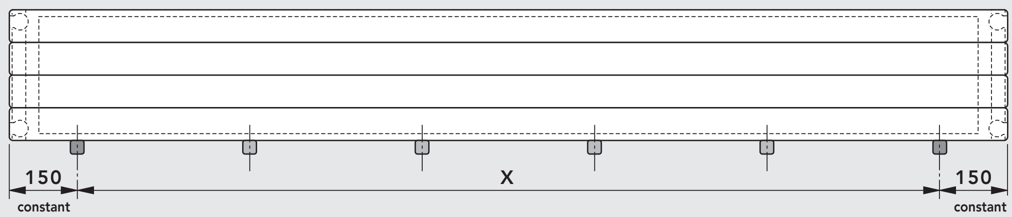




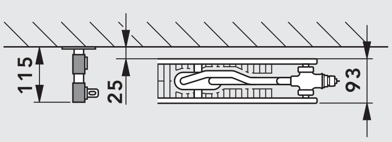
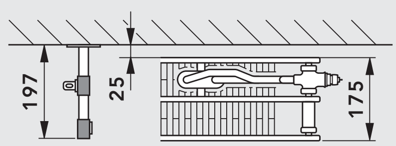
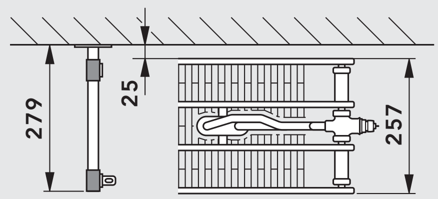
Note: for an overall length of more than **2200 mm**, a 3rd window sill support must be used!

Schematic diagram

Wall mounting positions VONARIS-M



Attention: if more than 2 wall consoles are used, any additional wall consoles are to be used at regular distances from each other along a length of X.

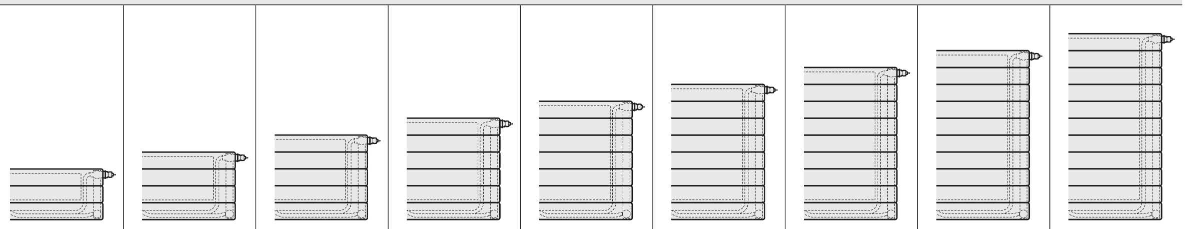
WK 10-M VHV-M 22	WK 11-M VHV-M 34	WK 12 VHV-M 46
		

Schematic diagram

heating outputs

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications



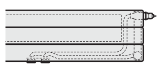
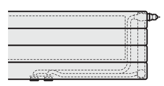
Overall height [mm]	**214**	**286**	**358**	**430**	**502**	**574**	**646**	**718**	**790**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.								
Model			**VHV-M 10***	**VHV-M 10***	**VHV-M 10***	**VHV-M 10***	**VHV-M 10***	**VHV-M 10***	**VHV-M 10***
Overall depth [mm]			**68**	**68**	**68**	**68**	**68**	**68**	**68**
Watts / m 75/65/20			394	458	523	588	655	720	795
Watts / m 70/55/20			322	374	427	480	534	590	647
Watts / m 55/45/20			209	243	276	311	344	380	416
Water content l / m			2,76	3,33	3,87	4,44	4,99	5,55	6,12
Weight kg / m			11,91	14,04	16,17	18,29	20,43	22,60	24,68
Radiator exponent **n**			1,24	1,24	1,25	1,25	1,26	1,26	1,27
Model			**VHV-M 11***	**VHV-M 11***	**VHV-M 11***	**VHV-M 11***	**VHV-M 11***	**VHV-M 11***	**VHV-M 11***
Overall depth [mm]			**68**	**68**	**68**	**68**	**68**	**68**	**68**
Watts / m 75/65/20			625	718	804	886	965	1043	1105
Watts / m 70/55/20			505	583	652	717	781	844	889
Watts / m 55/45/20			320	372	415	456	497	537	558
Water content l / m			2,78	3,33	3,87	4,44	4,99	5,55	6,12
Weight kg / m			16,71	19,85	22,99	26,15	29,29	31,42	33,55
Radiator exponent **n**			1,31	1,29	1,29	1,30	1,30	1,30	1,34
Model			**VHV-M 20**	**VHV-M 20**	**VHV-M 20**	**VHV-M 20**	**VHV-M 20**	**VHV-M 20**	**VHV-M 20**
Overall depth [mm]			**93**	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20			654	757	859	960	1063	1166	1271
Watts / m 70/55/20			533	617	699	781	864	947	1032
Watts / m 55/45/20			344	397	450	501	554	607	660
Water content l / m			5,55	6,66	7,77	8,88	9,99	11,10	12,22
Weight kg / m			21,29	25,30	29,31	33,31	37,32	41,32	45,33
Radiator exponent **n**			1,26	1,26	1,27	1,27	1,28	1,28	1,28
Model	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**	**VHV-M 22**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20	769	938	1100	1268	1405	1534	1654	1767	1886
Watts / m 70/55/20	621	756	885	1021	1130	1232	1326	1414	1500
Watts / m 55/45/20	393	477	555	642	708	769	825	877	919
Water content l / m	3,34	4,44	5,55	6,66	7,77	8,88	9,99	11,11	12,22
Weight kg / m	20,59	27,23	30,89	36,93	42,96	49,01	55,05	59,05	63,06
Radiator exponent **n**	1,31	1,32	1,34	1,33	1,34	1,35	1,36	1,37	1,41

* For aesthetic reasons these models should not be fitted in front of a window.

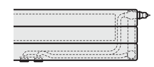
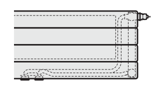
We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications

		
Overall height [mm]	**214**	**286**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.	
Model	**VHV-M S 22**	**VHV-M S 22**
Overall depth [mm]	**163**	**163**
Watts / m 75/65/20	769	938
Watts / m 70/55/20	621	756
Watts / m 55/45/20	393	477
Water content l / m	3,34	4,44
Weight kg / m	28,34	37,24
Radiator exponent **n**	1,31	1,32

* For aesthetic reasons these models should not be fitted in front of a window.

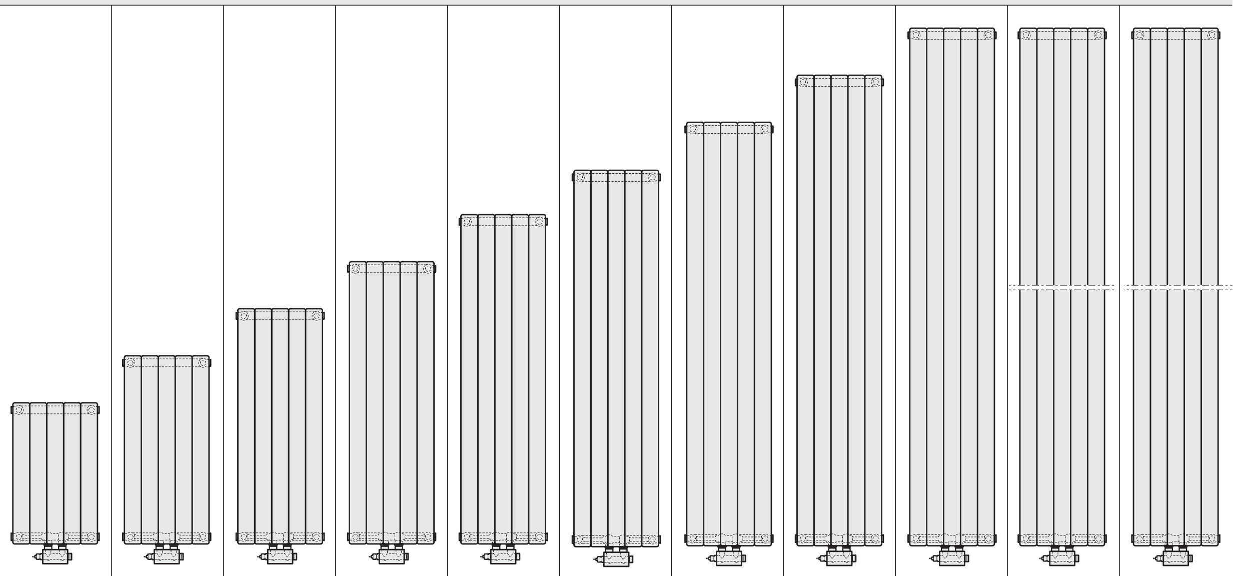
			
Overall height [mm]	**142**	**214**	**286**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.		
Model	**VHV-M 34**	**VHV-M 34**	**VHV-M 34**
Overall depth [mm]	**175**	**175**	**175**
Watts / m 75/65/20	953	1357	1616
Watts / m 70/55/20	773	1094	1296
Watts / m 55/45/20	493	690	808
Water content l / m	3,33	4,99	6,66
Weight kg / m	23,93	35,18	46,42
Radiator exponent **n**	1,29	1,32	1,36
Model	**VHV-M 46**	**VHV-M 46**	**VHV-M 46**
Overall depth [mm]	**257**	**257**	**257**
Watts / m 75/65/20	1433	1895	2357
Watts / m 70/55/20	1160	1525	1885
Watts / m 55/45/20	738	957	1168
Water content l / m	4,53	6,79	9,06
Weight kg / m	33,89	49,76	65,62
Radiator exponent **n**	1,30	1,34	1,37
Model	**VHV-M S 46**	**VHV-M S 46**	**VHV-M S 46**
Overall depth [mm]	**327**	**327**	**327**
Watts / m 75/65/20	1433	1895	2357
Watts / m 70/55/20	1160	1525	1885
Watts / m 55/45/20	738	957	1168
Water content l / m	4,53	6,79	9,06
Weight kg / m	39,35	57,50	75,64
Radiator exponent **n**	1,30	1,34	1,37

* For aesthetic reasons these models should not be fitted in front of a window.

heating outputs

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

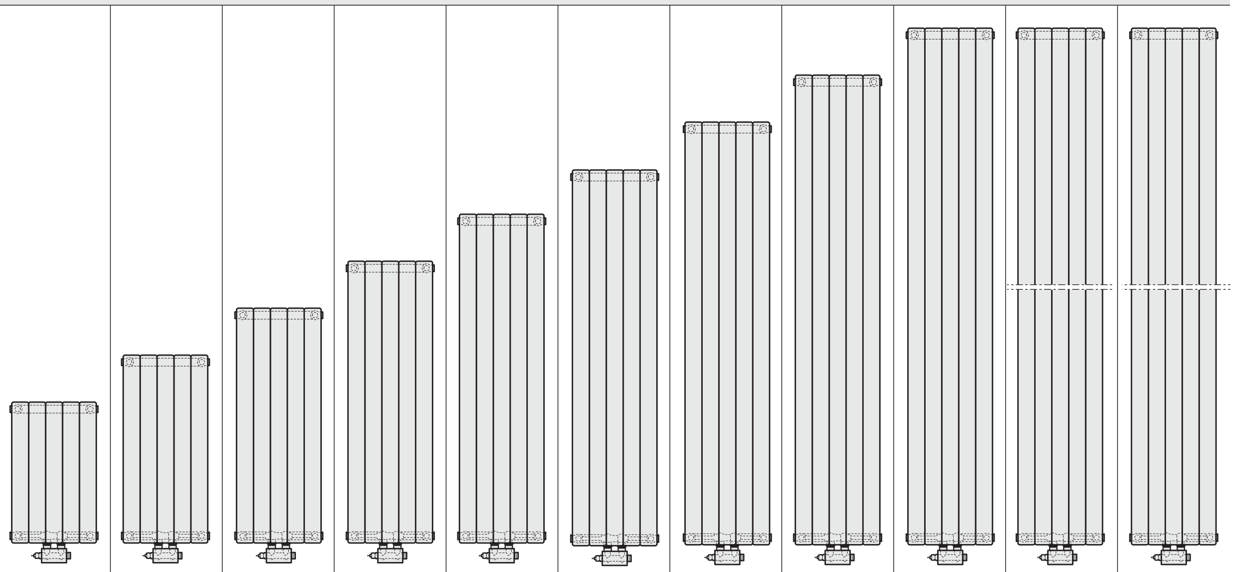
Side panels and top cover are included in the heat output specifications



Overal height [mm]	**600**	**800**	**1000**	**1200**	**1400**	**1600**	**1800**	**2000**	**2200**	**2400**	**2600**
Overall lengh [mm]	**214, 286, 358, 430, 502, 574, 646, 718, 790, 862**										
Model	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**	**VSV-M 10**
Overall depth [mm]	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**
Watts/m 75/65/20	657	861	1069	1284	1506	1738	1979	2232	2495	2771	3060
Watts/m 70/55/20	533	694	857	1023	1200	1384	1577	1781	1994	2219	2455
Watts/m 55/45/20	340	438	534	629	737	850	968	1097	1234	1378	1530
Water content l / m	5,17	6,41	7,65	8,89	10,13	11,37	12,47	13,85	15,24	16,48	17,72
Weight kg / m	18,70	23,85	29,--	34,15	39,30	44,45	49,60	54,75	59,70	64,85	70,--
Radiator exponent **n**	1,29	1,32	1,36	1,40	1,40	1,40	1,40	1,39	1,38	1,37	1,36
Model		**VSV-M 11**	**VSV-M 11**	**VSV-M 11**	**VSV-M 11**	**VSV-M 11**	**VSV-M 11**	**VSV-M 11**	**VSV-M 11**		
Overall depth [mm]		**68**	**68**	**68**	**68**	**68**	**68**	**68**	**68**		
Watts/m 75/65/20		1123	1331	1541	1757	1979	2209	2450	2701		
Watts/m 70/55/20		897	1065	1234	1407	1584	1768	1964	2172		
Watts/m 55/45/20		554	660	768	874	983	1097	1223	1361		
Water content l / m		6,41	7,65	8,89	10,13	11,37	12,47	13,85	15,24		
Weight kg / m		42,79	47,94	53,09	58,24	63,39	68,53	73,69	78,84		
Radiator exponent **n**		1,38	1,37	1,36	1,37	1,37	1,37	1,36	1,34		

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442**, at **75/65/20° C**

Side panels and top cover are included in the heat output specifications



Overall height [mm]	**600**	**800**	**1000**	**1200**	**1400**	**1600**	**1800**	**2000**	**2200**	**2400**	**2600**
Overall lengh [mm]	**214, 286, 358, 430, 502, 574, 646, 718, 790, 862**										
Model	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**	**VSV-M 20**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**
Watts/m 75/65/20	1118	1479	1840	2202	2566	2932	3301	3672	4046	4423	4803
Watts/m 70/55/20	899	1185	1468	1750	2041	2332	2629	2929	3232	3539	3849
Watts/m 55/45/20	564	737	905	1070	1249	1427	1615	1805	1997	2194	2395
Water content l / m	10,34	12,82	15,30	17,78	20,26	22,74	24,34	27,71	30,48	32,96	35,44
Weight kg / m	35,34	45,36	55,38	65,40	75,42	85,44	95,46	105,48	115,50	125,52	135,54
Radiator exponent **n**	1,34	1,36	1,36	1,41	1,41	1,41	1,40	1,39	1,38	1,37	1,36
Model		**VSV-M 21**	**VSV-M 21**	**VSV-M 21**	**VSV-M 21**	**VSV-M 21**	**VSV-M 21**	**VSV-M 21**	**VSV-M 21**		
Overall depth [mm]		**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**		
Watts/m 75/65/20		1704	2059	2421	2795	3184	3588	4012	4455		
Watts/m 70/55/20		1355	1636	1922	2222	2536	2857	3206	3569		
Watts/m 55/45/20		829	999	1173	1359	1557	1755	1983	2219		
Water content l / m		12,82	15,30	17,78	20,26	22,74	24,34	27,71	30,48		
Weight kg / m		64,29	74,31	84,33	94,35	104,37	114,39	124,42	134,64		
Radiator exponent **n**		1,41	1,42	1,42	1,41	1,40	1,40	1,38	1,36		

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

CONVECTORS & HEATING PANELS

Connections:
2 x internal thread G 1/2", welded-in for supply and return. Vent and drain plugs (or dummy plug) are factory sealed and are fitted according to the customer's specifications.

5 bar max.
Maximum positive operating pressure
Standard design: **5 bar**

8 bar max.
Maximum positive operating pressure:
High-pressure design **8 bar**

max.
Maximum operating temperature: 110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

KONTEC convectors and horizontal heating panels are radiators in fully welded designs, with either 1 to 5 layers of steel rectangular water-flow pipes arranged one-behind-the-other (for convectors), or 1 or 2 such layers (for horizontal heating panels). In each layer, the convectors have between one and four pipes arranged one-above-the-other; the horizontal heating panels have from 5 to 11 pipes.
KONTEC vertical heating panels consist of 1 or 2 layers of steel rectangular water-flow pipes, arranged one-behind-the-other, with 2 to 12 steel pipes, arranged side-by-side.

A 2 mm space between the heating pipes guarantees additional resistance to corrosion. **KONTEC** convectors and horizontal heating panels come with side panels and top covers; **KONTEC** vertical heating panels come with side panels. **KONTEC** heating panels are delivered with welded mounting brackets.

All **KONTEC** convectors and heating panels are also delivered with factory-sealed drain plugs and pivotable vent plugs. (Exception: bottom-opposite-end connection models come with a dummy plug instead of the drain plug.)
Standard design: rectangular steel pipes, 70 x 11 x 1.5 mm

High-pressure design: rectangular steel pipes, 70 x 11 x 2.0 mm

WVO-design: KONTEC convectors are also available with a welded heat reflector (no water-flow).

Convector dimensions:
Overall lengths: between 500 mm and 1400 mm (at increments of 100 mm), and between 1600 mm and 4000 mm (at increments of 200 mm)
Overall heights: 70 mm, 142 mm, 214 mm and 286 mm

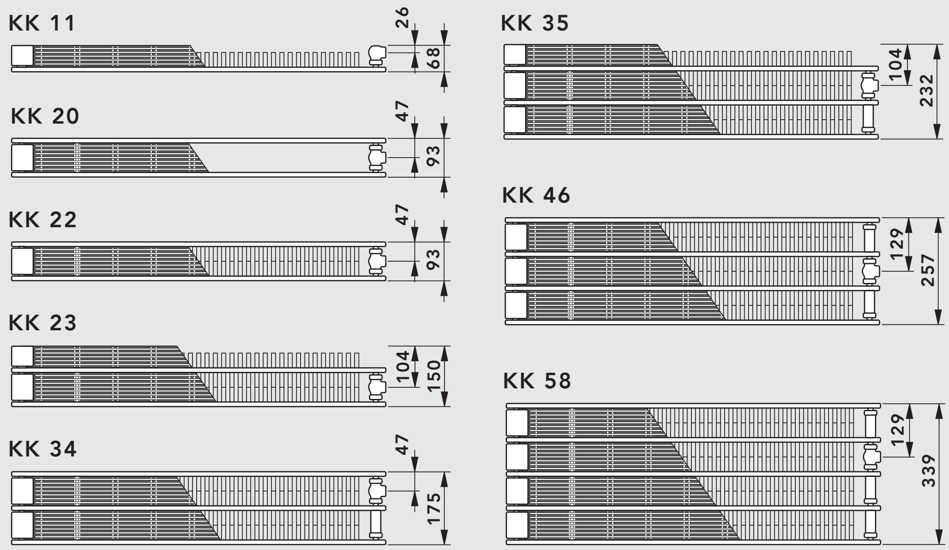
Horizontal heating panel dimensions:
Overall lengths: between 500 mm and 1400 mm (at increments of 100 mm), and between 1600 mm and 4000 mm (at increments of 200 mm)
Overall heights: 358 mm, 430 mm, 502 mm, 574 mm, 646 mm and 790 mm

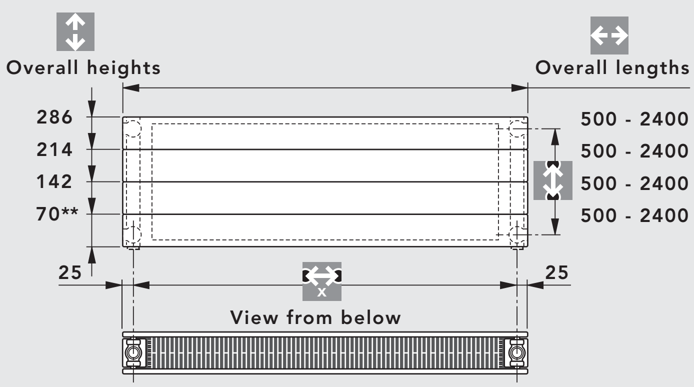
Vertical heating panel dimensions:
Overall lengths: between 142 mm and 862 mm (at increments of 72 mm)
Overall heights: between 1600 mm and 2200 mm (at increments of 200 mm)

Coatings:
1. Undercoat: electrophoretic, using water-soluble paints, conforming to DIN 55900 part 1, stoved at 165° C;
2. Finish: electrostatic powder coating, conforming to DIN 55900 part 2, in a state-of-the-art facility. (On request, and at a supplementary charge, a range of RAL and sanitary ware colours can be offered.) This particularly robust coating is stoved at an object temperature of 180° C.

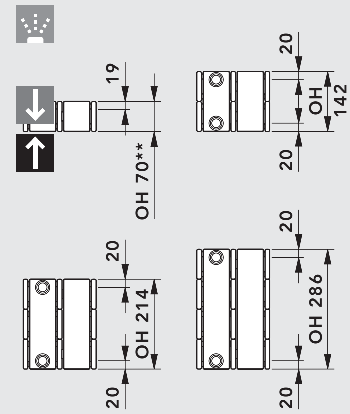
Packaging: 1. Cardboard packaging
2. Edge protection
3. Shrink foil

Horizontal design, KK models





Side connections:



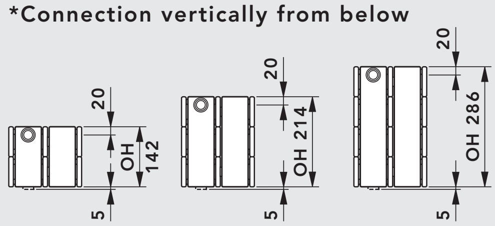
Overall height [mm]		70**	142	214	286
Boss spacing NA [mm]		**32**	**102**	**174**	**246**
Boss spacing NAS* [mm]		**Overall length - 50 mm**			

Note: with an OH of 70 mm, vertical connection from below is not available!

* Models with an overall height of 142, 214 or 286 mm can also be delivered with supply and return connections vertically from below (as special designs and with a supplementary charge).

** Only available with top-bottom, opposite-ends, side-connection.

***Connection vertically from below**



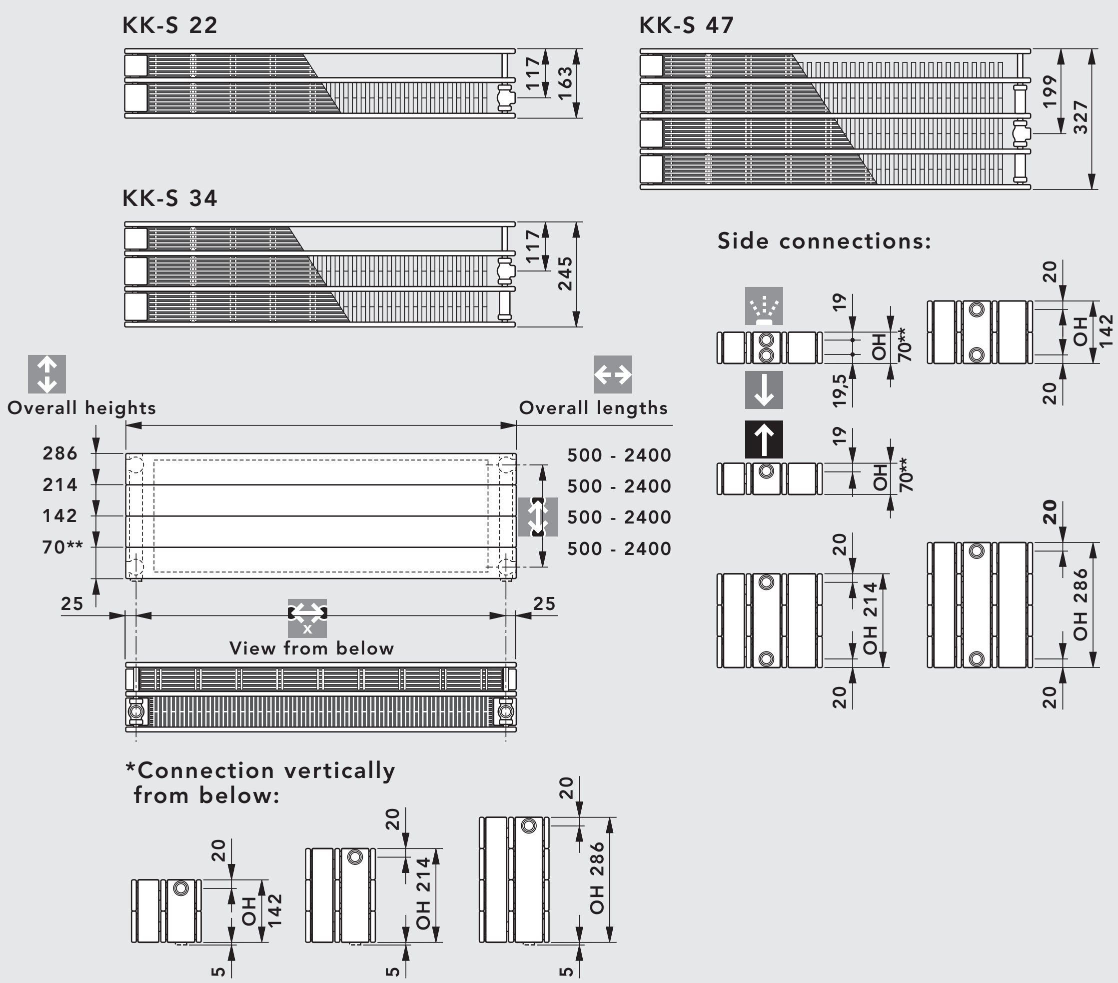
Schematic diagram

Model	KK 11		KK 20		KK 22		KK 23		KK 34		KK 35		KK 46		KK 58	
Overall height [mm]	-	-	-	142	70	142	70	142	70	142	70	142	70	142	70	142
	214	286	214	286	214	286	214	286	214	286	214	286	214	286	214	286
Overall lenght [mm]	**500 – 2400 mm (for special overall lengths see output charts), model 58 up to 2200 mm**															
Increments	**100 mm (for an overall length of 1400 mm and greater: 200 mm)**															

The KK-S models

With their factory-welded heat reflector (no water-flow), the WVO designs return a major part of the otherwise lost heat to the room. They do so by means of convection between radiator and heat reflector.

Model overview / connection dimensions: KK-S models, horizontal design



Overall height [mm]	70**	142	214	286
Boss spacing NA [mm]	**32**	**102**	**174**	**246**
Boss spacing NAS* [mm]	**Overall length - 50 mm**			

Note: with an OH of 70 mm, vertical connection from below is not available!

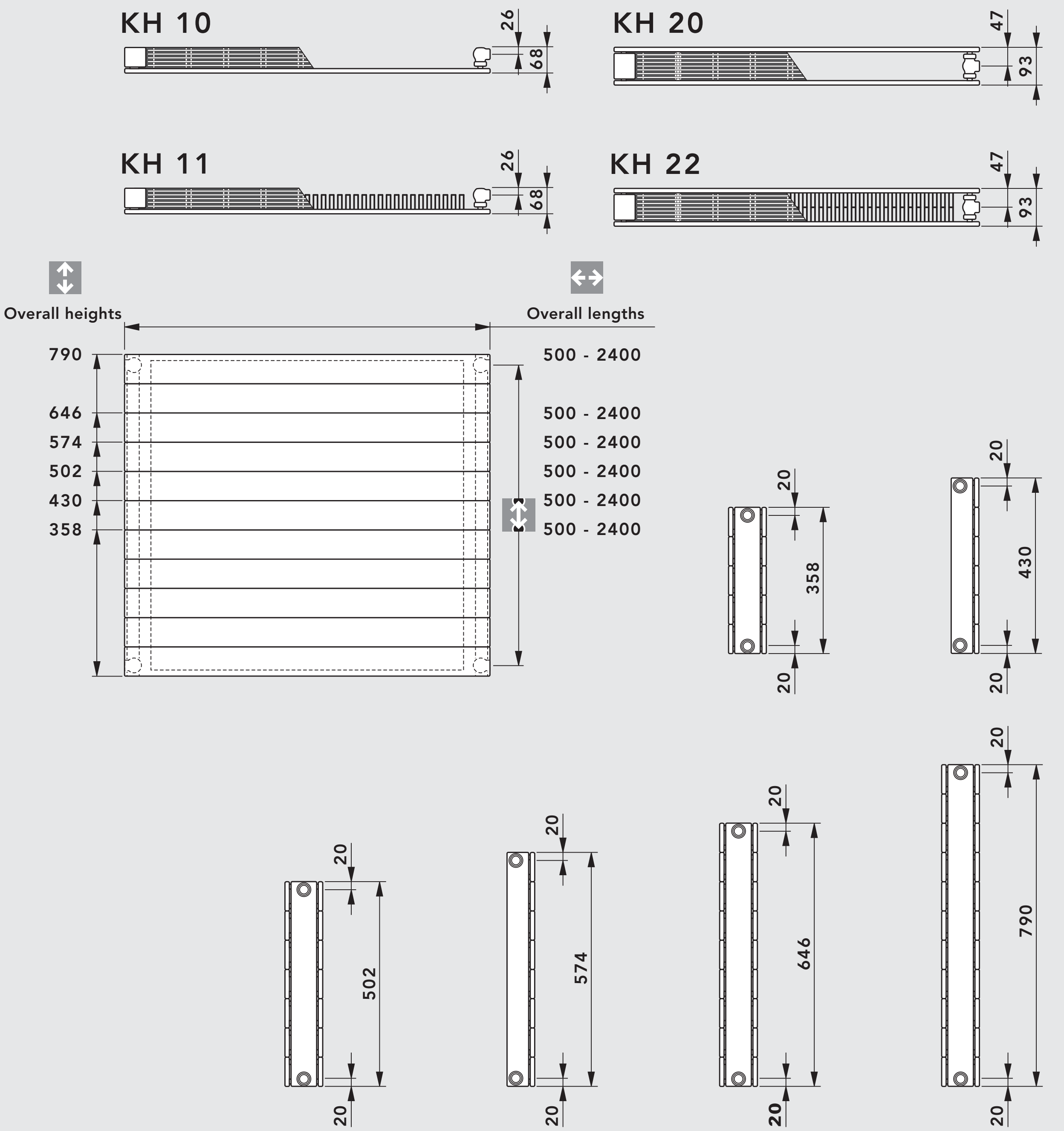
* Models with an overall height of 142, 214 or 286 mm can also be delivered with supply and return connections vertically from below (as special designs and with a supplementary charge).

** Only available with top-bottom, opposite-ends, side-connection.

Schematic diagram

Model	KK-S 22				KK-S 34				KK-S 47			
Overall height [mm]	70	142	214	286	70	142	214	286	70	142	214	286
Overall length [mm]	500 – 2400 mm (for special overall lengths see output charts)											
Increments	100 mm (for an overall length of 1400 mm and greater: 200 mm)											

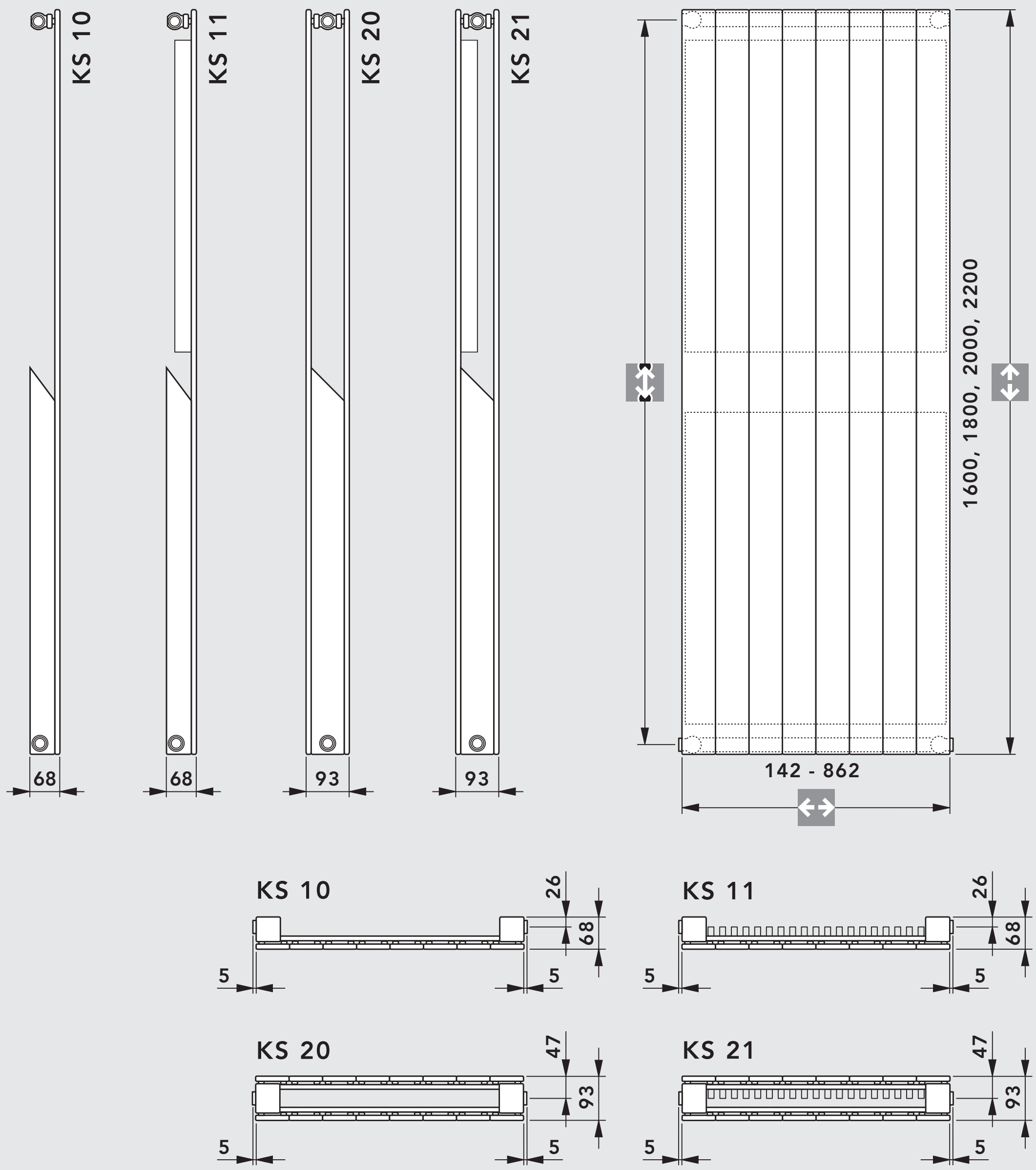
KH models horizontal design



Overall height [mm]	358	430	502	574	646	790	Schematic diagram
Boss spacing NA [mm]	**318**	**390**	**462**	**534**	**606**	**750**	

Model	KH 10			KH 11			KH 20			KH 22		
Overall height [mm]	358	430	502	358	430	502	358	430	502	358	430	502
	574	646	790	574	646	790	574	646	790	574	646	790
Overall length [mm]	500 – 2400 mm (for special overall lengths see output charts)											
Increments	100 mm (for an overall length of 1400 mm and greater: 200 mm)											

KS models vertical design



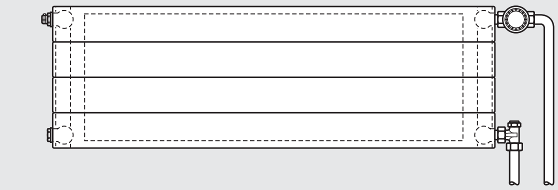
Overall height [mm]	1600	1800	2000	2200	Schematic diagram
Boss spacing NA [mm]	**1550**	**1750**	**1950**	**2150**	

Model	KS 10		KS 11		KS 20		KS 21	
Overall height [mm]	1600	1800	1600	1800	1600	1800	1600	1800
	2000	2200	2000	2200	2000	2200	2000	2200
Overall length [mm]	142 - 862 mm							
Increments	72 mm							

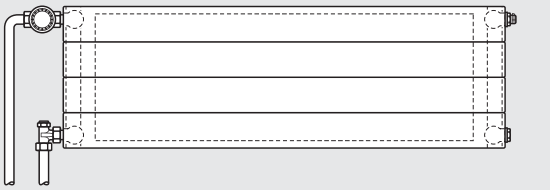
KK and KK-S models

Double-pipe system

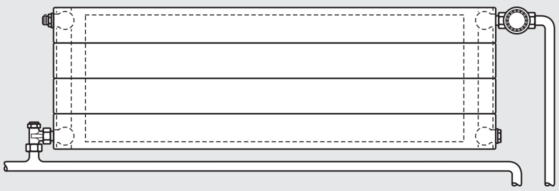
Single-sided connection, right



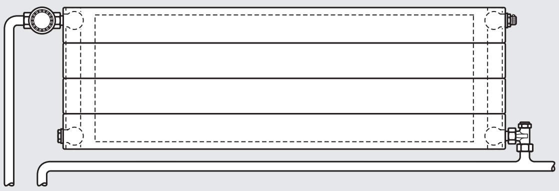
Single-sided connection, left



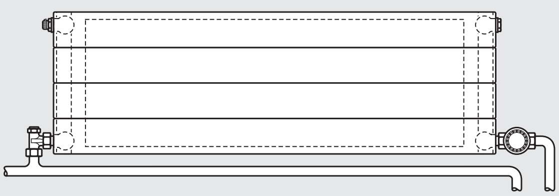
Top-bottom, opposite-end, side-connection, right-side supply



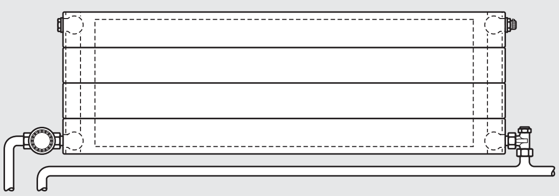
Top-bottom, opposite-end, side-connection, left-side supply



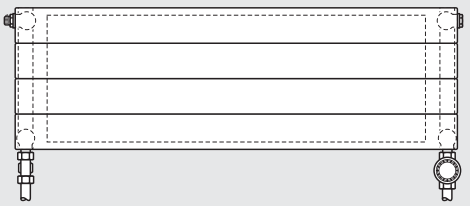
Bottom-only, opposite-end, side-connection, right-side supply Note: reduced heat output



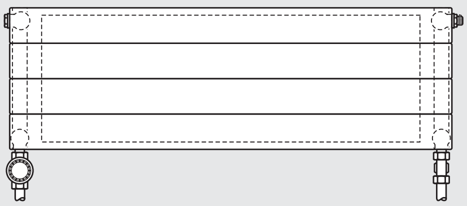
Bottom-only, opposite-end, side-connection, left-side supply Note: reduced heat output



Vertical connection from below, bottom-only, opposite-end, right-side supply Note: reduced heat output



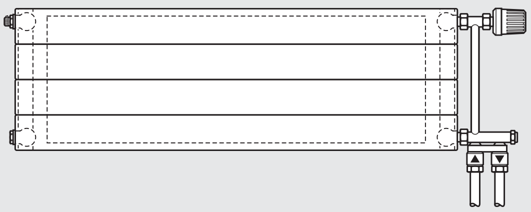
Vertical connection from below, bottom-only, opposite-end, left-side supply Note: reduced heat output



Single-pipe system

KONTEC convectors can easily be converted for use with a single-pipe system. In this case, however, 4-way valves with a by-pass pipe need to be used.

Recommendation:
For reasons of appearance the **VONARIS** valve design is the preferred option for this connection mode.



Schematic diagram

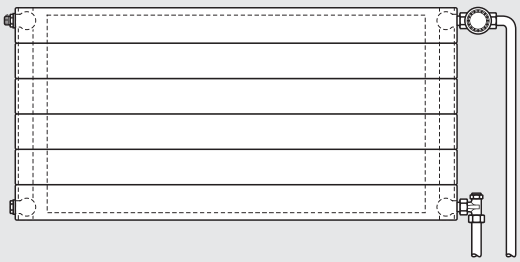
Note: when ordering your **KONTEC** convector (see price list “Description of the Ordering Process“) the 4 connections must be accurately specified and assigned. This is for technical production reasons. No subsequent changes to the connections on your **KONTEC** convector are possible!

connection modes for heating panels

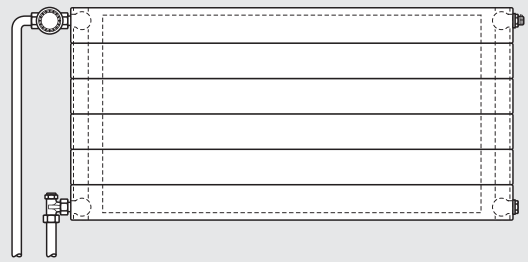
Typen KH

Double-pipe system

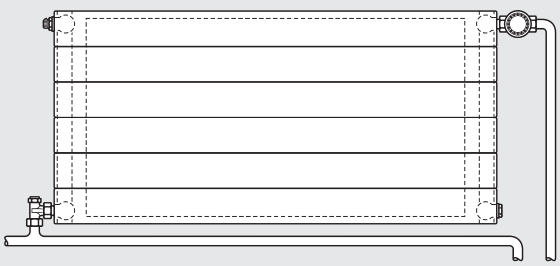
Single-sided connection, right



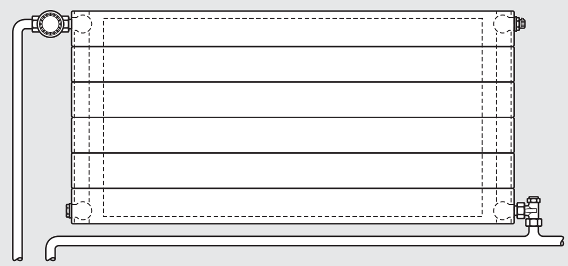
Single-sided connection, left



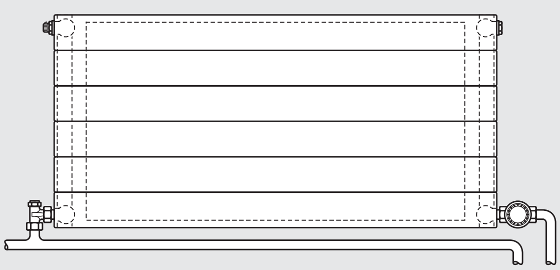
Top-bottom, opposite-end, side-connection, right-side supply



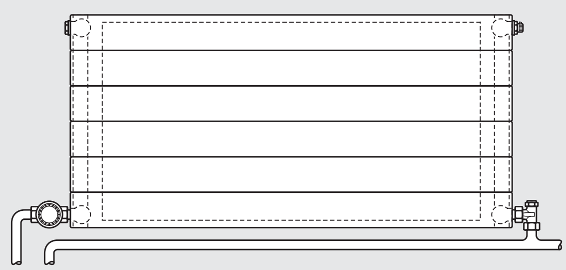
Top-bottom, opposite-end, side-connection, left-side supply



Bottom-only, opposite-end, side-connection, right-side supply
Note: reduced heat output



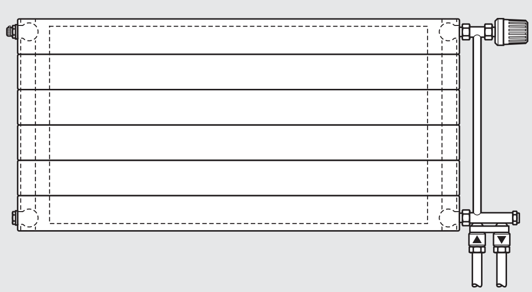
Bottom-only, opposite-end, side-connection, left-side supply
Note: reduced heat output



Single-pipe system

KONTEC convectors can easily be converted for use with a single-pipe system. In this case, however, 4-way valves with a by-pass pipe need to be used.

Recommendation:
For reasons of appearance the **VONARIS** valve design is the preferred option for this connection mode.



Schematic diagram

Note: when ordering your **KONTEC** KH model heating panels, (see price list 344, "Description of the Ordering Process") the 4 connections must be accurately specified and assigned. This is for technical production reasons. No subsequent changes to the connections on your **KONTEC** KH model heating panels are possible!

Typen KS

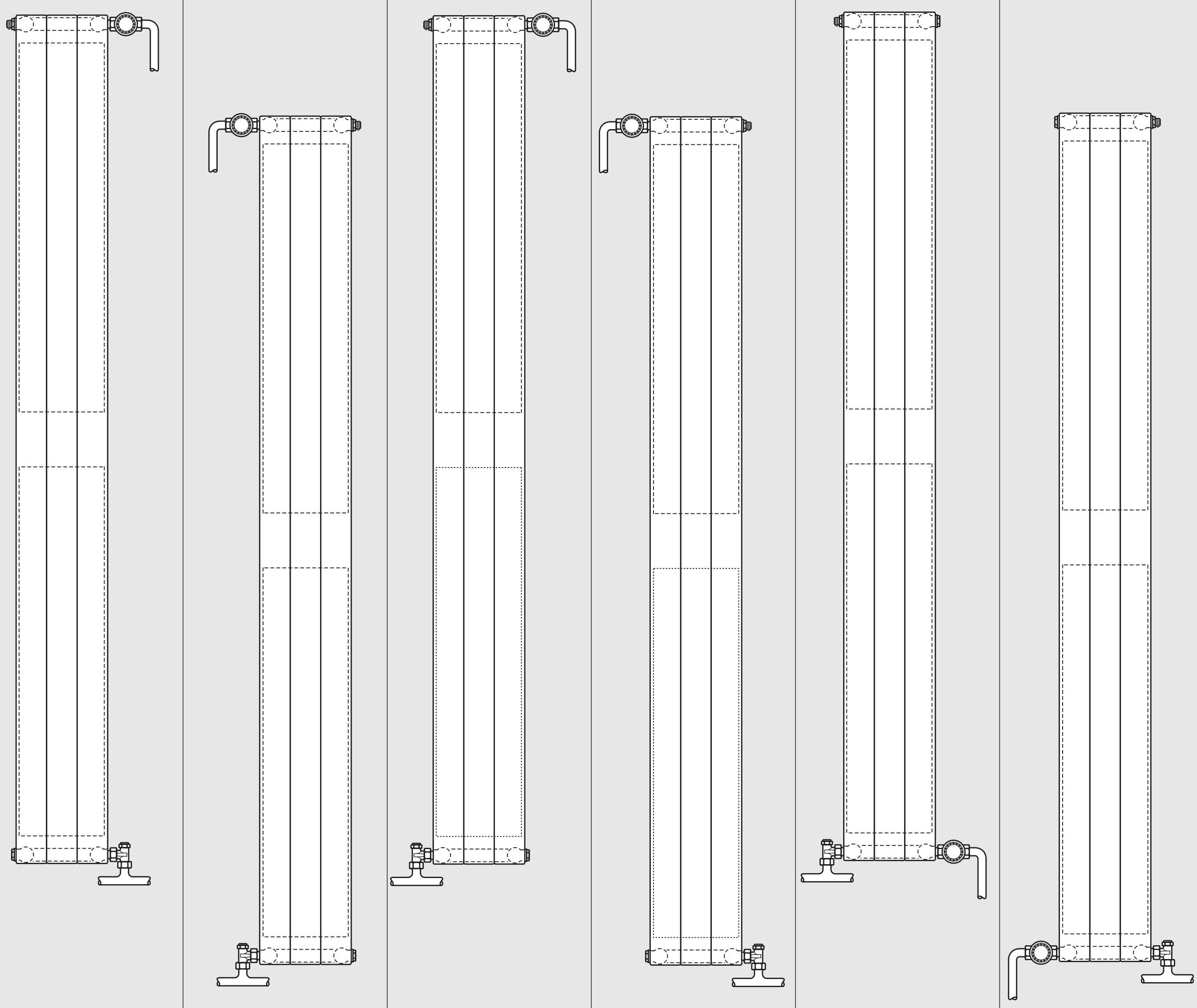
Double-pipe system

Note: with **KONTEC** KS model heating panels, single-pipe connection is not possible!

Single-sided connection, right

Top-bottom, opposite-end, side-connection, right-side supply

Bottom-only, opposite-end, side-connection, right-side supply



Single-sided connection, left

Top-bottom, opposite-end, side-connection, left-side supply

Bottom-only, opposite-end, side-connection, right-side supply

Schematic diagram

Note: when ordering your **KONTEC** KS model heating panel (see price list “Description of the Ordering Process“) the 4 connections must be accurately specified and assigned. This is for technical production reasons. No subsequent changes to the connections on your **KONTEC** KS model heating panel are possible!

KH 20 and KH 22 models, horizontal designs

The new heat reflector

• is available for the KH 20 (OH 358 – 574 mm) and the KH 22 (OH 358 - 646 mm) models in horizontal design

• returns a major part of the other-wise lost heat to the room, by means of convection between the KONTEC heating panel and the heat reflector.

Design:
Electrophoretic coating and finish in RAL 9016 (on request and at an extra charge, in a range of RAL and Sanitary Ware colours); delivered with 8 push-in brackets, 8 stabilising brackets, 4 Z-brackets, an installation sheet, and packaging

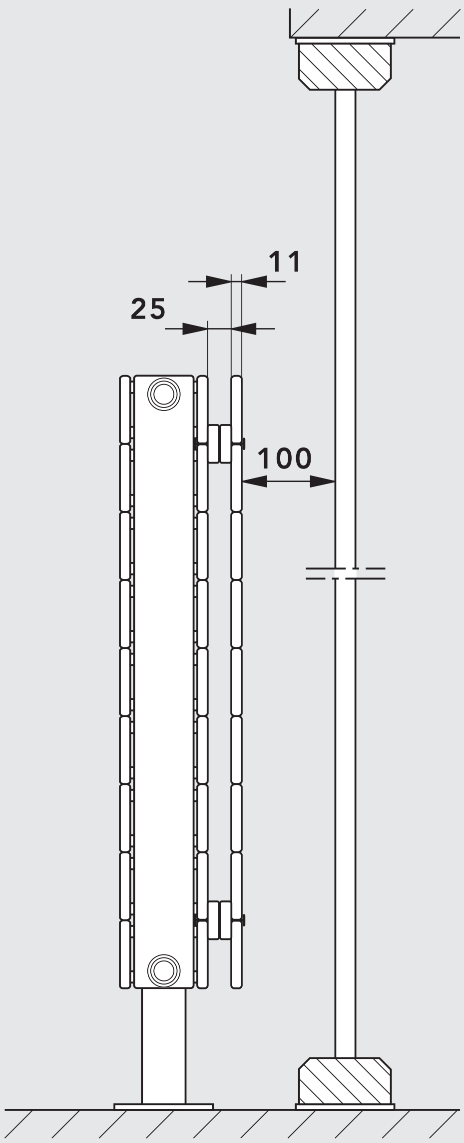
Note: when ordering one of the horizontal designs with a heat reflector, it is also essential to use either an **SK 22 (KH 20)** or an **SK 23 (KH 22) stand console**.

KONTEC heating panel with fitted heat reflector
(see image to the right)

Width: 11 mm heat reflector

Internal depth:25 mm between heating pipe and heat reflector

Minimum clearance*: 100 mm
between window surface and heat reflector



Schematic diagram

* The minimum clearance between window surface and heat reflector (100 mm) complies with the recommendations of leading window surface manufacturers.

KONTEC Wall mounting WA 11

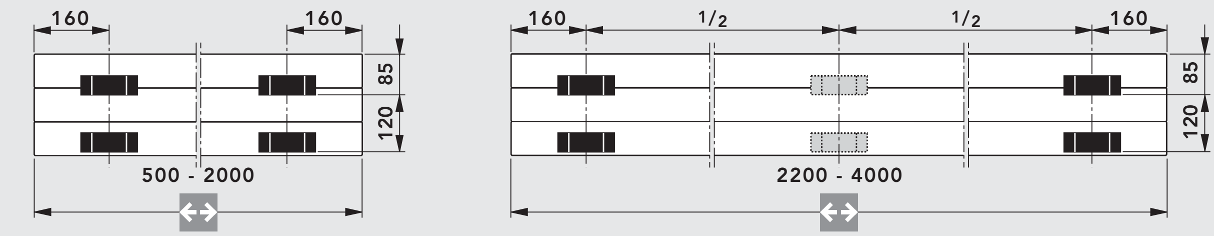
welded bracket position

Wall mounting WA 11 for all KK (Convectors) models

Type — **Wall mounting WA 11 for KK 11 to KK 34**

Overall height

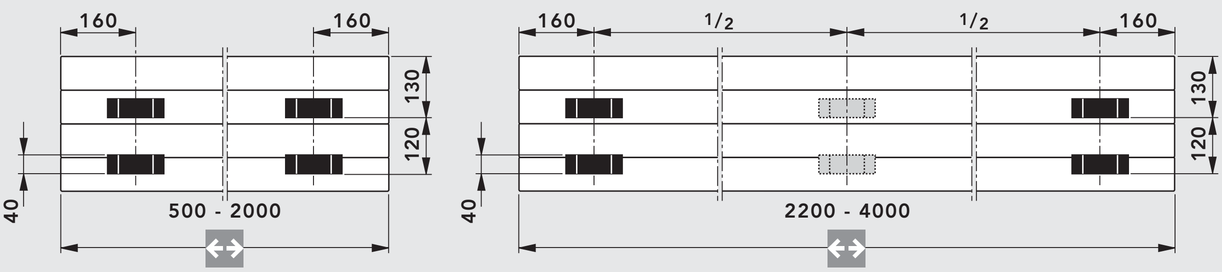
214 mm

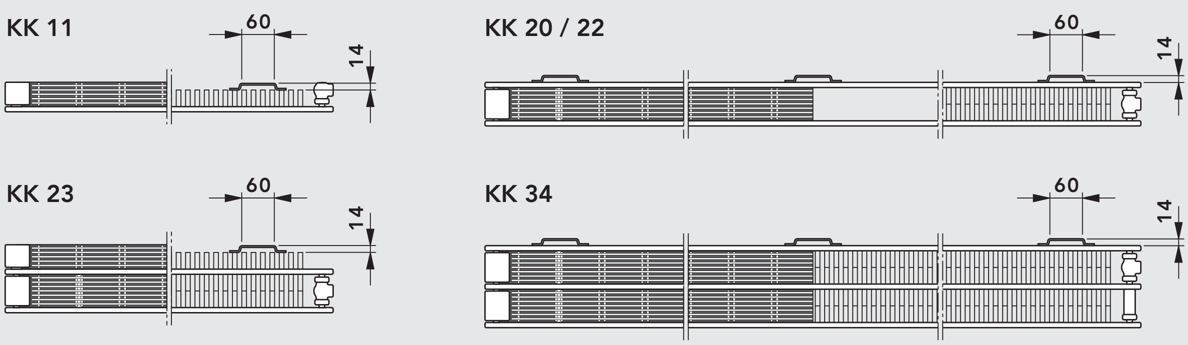


Wall mounting WA 11 for KK 11 to KK 34

Overall height

286 mm





Schematic diagram

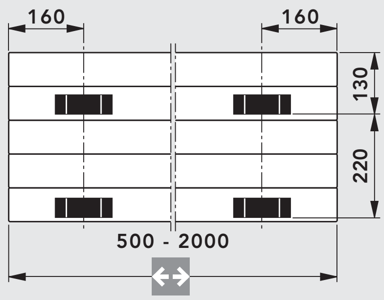
Attention! Convectors are by default supplied without brackets. If wall mounting WA 11 is used, you are required to order the convector as a special version, equipped with brackets. Convectors with an OH of 70 or 142 mm cannot be supplied with mounting brackets.

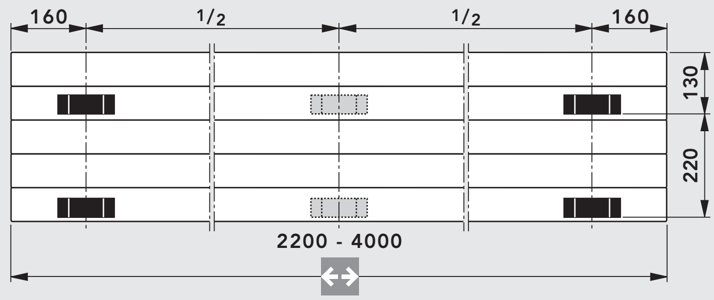
KONTEC Wall mounting WA 11

welded bracket positions

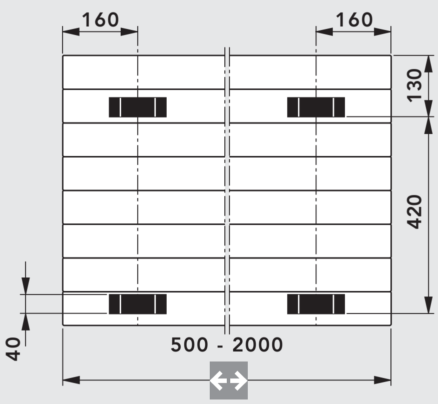
Wall mounting WA 11 for all KH (heating wall models horizontal design) models

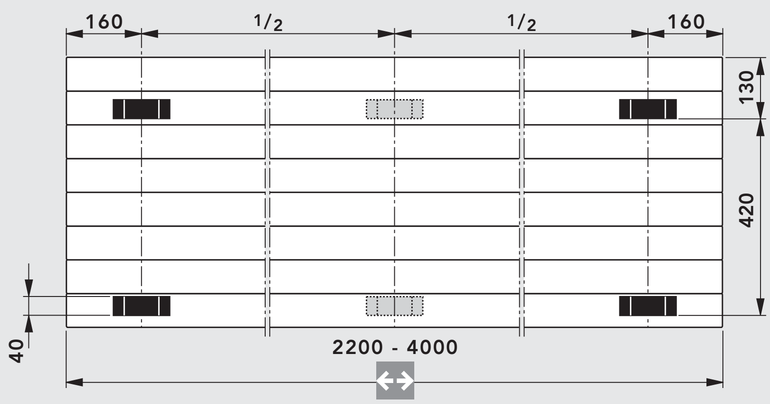
Type	Wall mounting WA 11 for KH 10 to KH 24
Overall height from 358 mm to 502 mm	

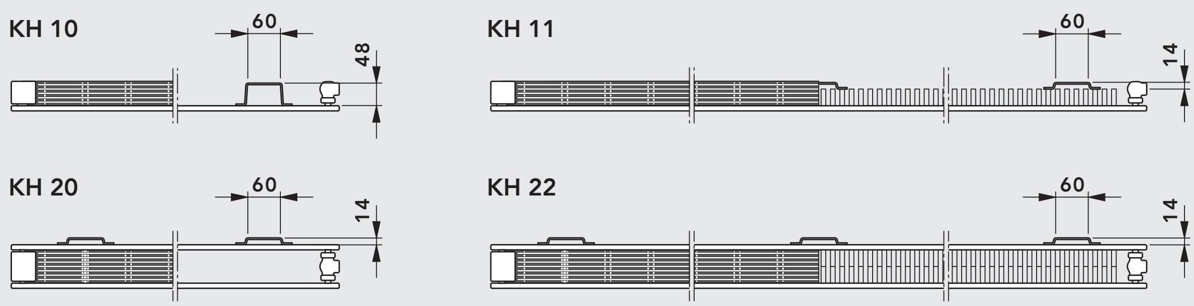




	Wall mounting WA 11 for KH 10 to KH 24
Overall height from 574 mm to 790 mm	







Schematic diagram

KONTEC Wall mounting WA 11

Drilling and wall clearance dimensions

Wall mounting WA 11 for types KK (convectors) and KH (Vertical heating panels)

Wall mounting WA 11 is suitable for convector models **KK** (OH 214 and 286 mm, with brackets) and heating wall models **KH** (OH 358 - 790 mm). It ensures easy, rapid and robust mounting of **KONTEC** convectors or **KONTEC** heating panels still in the packaging.

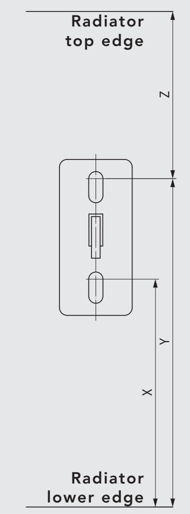
Wall mounting WA 11 for OH 214 - 790

Wall mounting WA 11 drilling dimensions

From an overall length of 2200 mm: 3 consoles

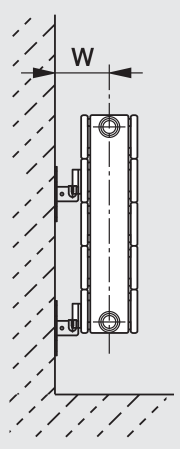
Overall height [mm]	Value **X** [mm]	Value **Y** [mm]	Value **Z** [mm]
214	**104**	**162**	**52**
286	**131**	**189**	**97**
358	**203**	**261**	**97**
430	**275**	**333**	**97**
502	**347**	**405**	**97**
574	**419**	**477**	**97**
646	**491**	**549**	**97**
790	**635**	**693**	**97**

Wall mounting WA 11 for **OH 214 – 790 mm**



Schematic diagram

Connection – wall clearance



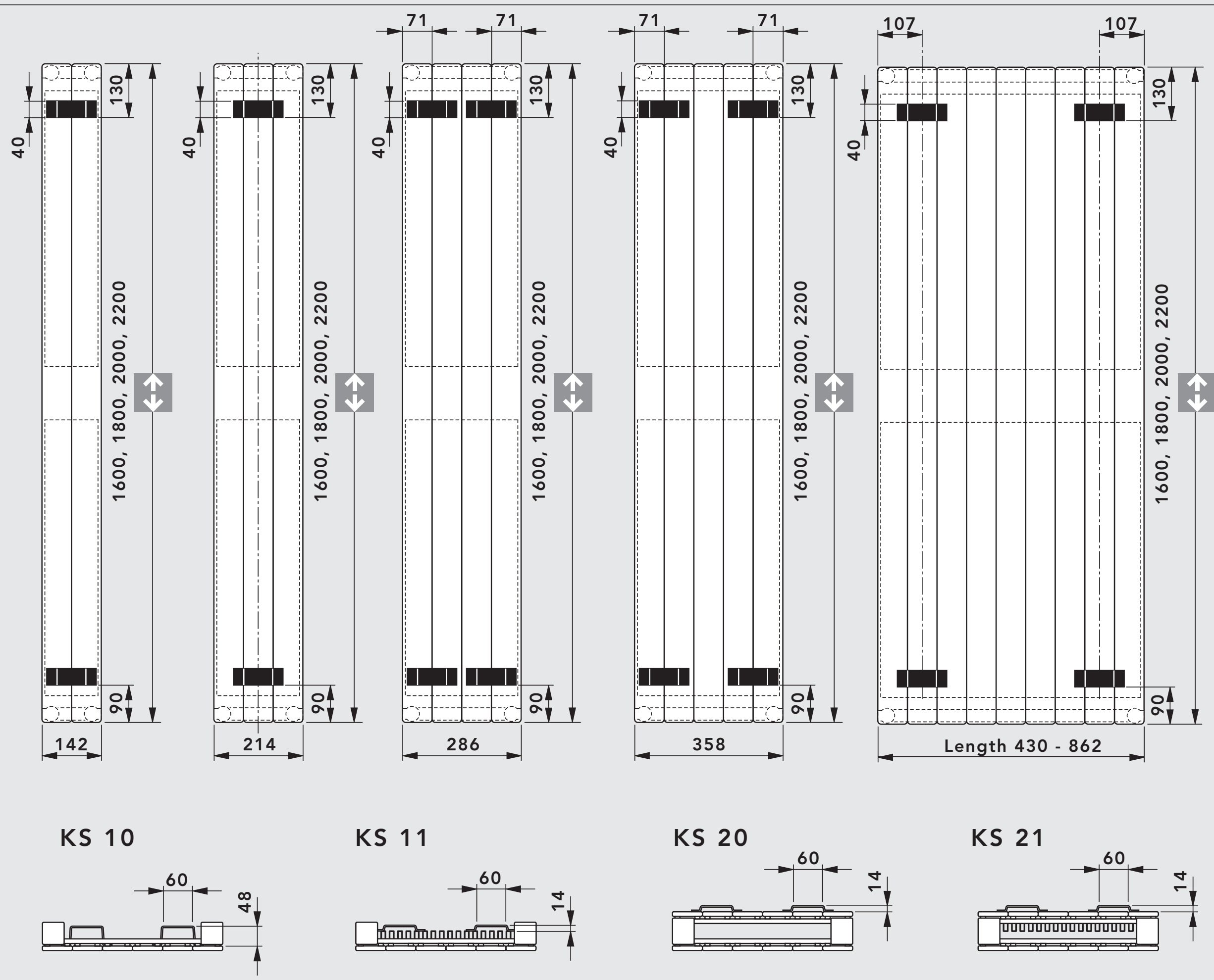
Convector and heating panel models	Overall height [mm]	Measurement **W** [mm]
KK 11	214, 286	**45**
KK 20, KK 22, KK 34	214, 286	**89**
KK 23	214, 286	**123,5**
KH 10, KH 11	358 - 790	**45**
KH 20, KH 22	358 - 790	**89**

Schematic diagram

positions of the insertion (push-in) brackets

KS models

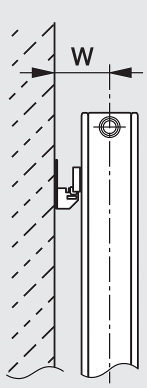
Overall length [mm]	142	214	286	358	430 - 862



Schematic diagram

Wall clearance: WA 10 and WA 11 wall mounting brackets for the KS models

Connection – wall clearance

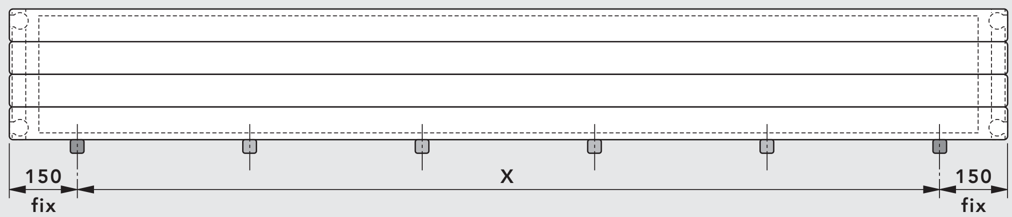


Wall mounting type	vertical design	Measure **W** [mm]
WA 10	KS 10/11*	**35**
WA 10	KS 20/21	**79,5**
WA 11	KS 10/11*	**45**
WA 11	KS 20/21	**89,5**

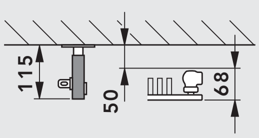
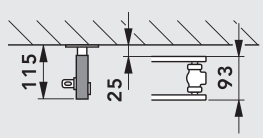
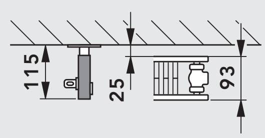
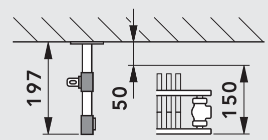
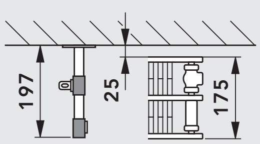
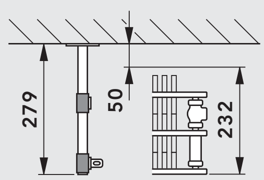
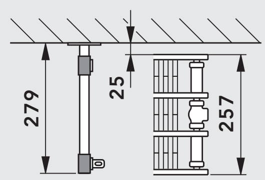
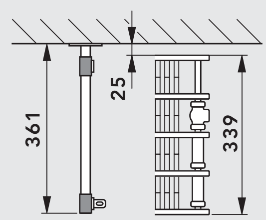
***Note:** if you are installing the KS 10 and KS 11 models with a right-angleddesign connection, please use the appropriate drilling consoles or angle-fishplate mounting brackets, to achieve the required wall clearance.

Schematic diagram

Wall consoles WK 10 – 13: positioning for KK models (convectors)

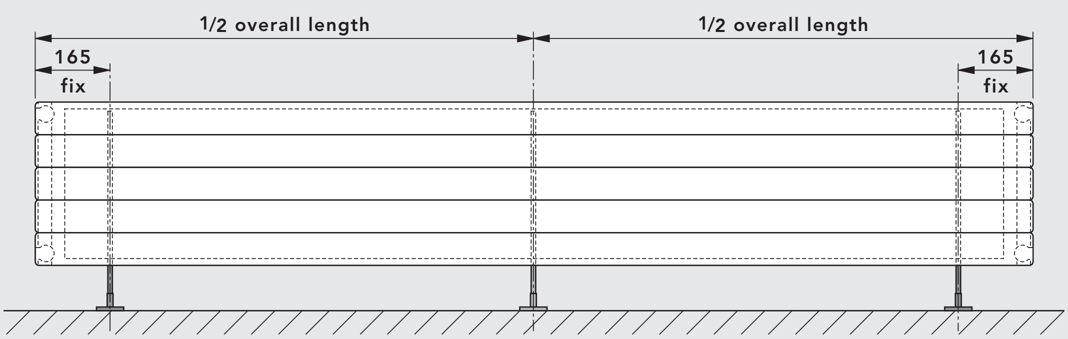


Note: when using more than 2 wall consoles the additional wall consoles must be placed at regular intervals along the line X.

WK 10 wall console			WK 11 wall console
KK 11	KK 20	KK 22	KK 23
			
WK 11 wall console	**WK 12 wall console**		**WK 13 wall console**
KK 34	KK 35	KK 46	KK 58
			

Schematic diagram

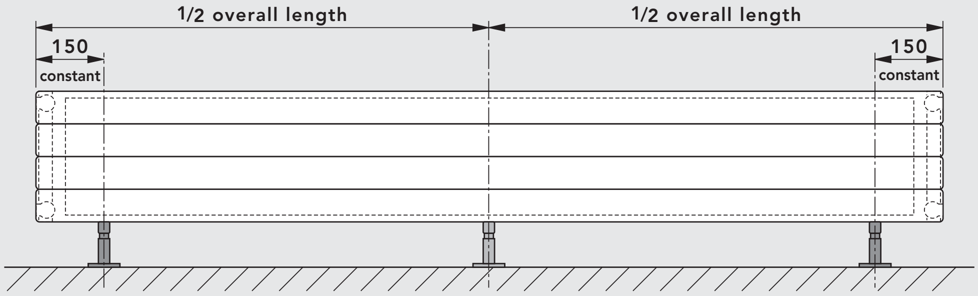
Stand consoles SK 22 and SK 23: positioning for KH models (horizontal design heating panels)



Note: for an overall length of **2200 mm** and greater, a 3rd stand console must be used!

Schematic diagram

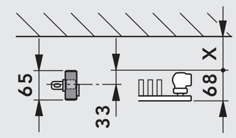
Stand consoles SK 10 - 19: positioning for KK / KK-S models



Note: for an overall length of 2200 mm and greater, a 3rd stand console must be used!

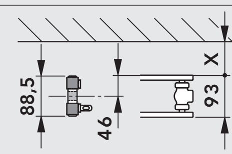
SK 10 / SK 11

KK 11



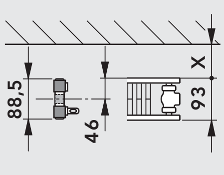
SK 12 / SK 13

KK 20

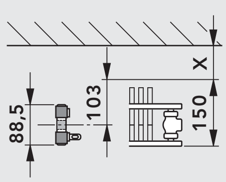


SK 12 / SK 13

KK 22

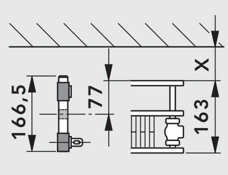


KK 23

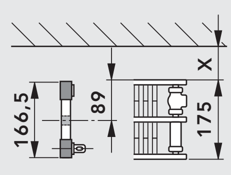


SK 14 / SK 15

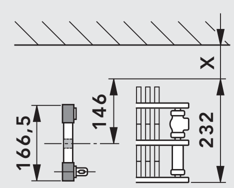
KK-S 22



KK 34

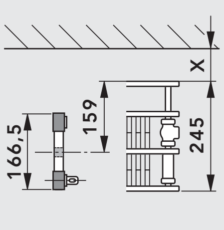


KK 35



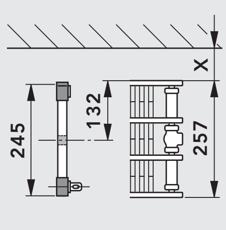
SK 14 / SK 15

KK-S 34



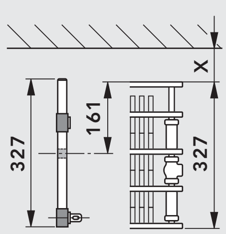
SK 16 / SK 17

KK 46

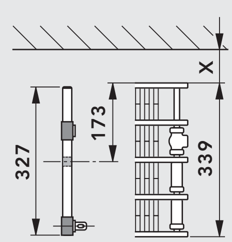


SK 18 / SK 19

KK-S 47



KK 58

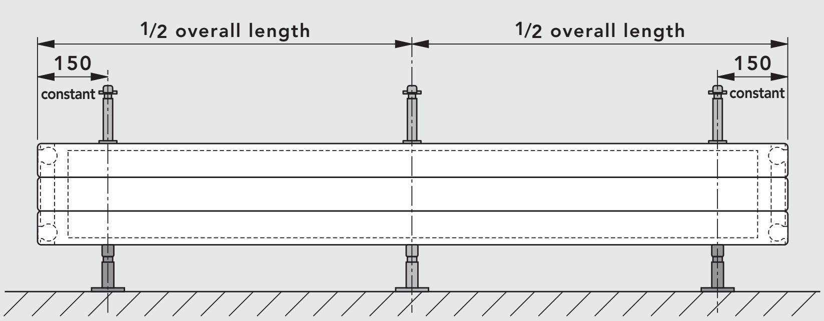


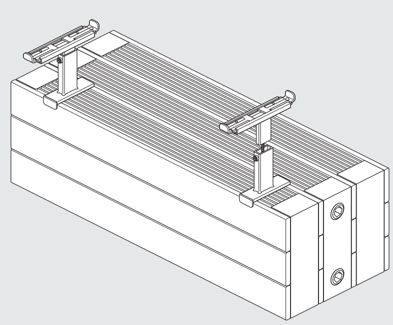
Measurement X: chosen distance between the wall or window surface and the back of the convector.

Schematic diagram

Window sill support FBT 20: positioning for KK / KK-S models

Window sill support for subsequent installation with the **KK / KK-S 22 – 58** models of **KONTEC** convectors





Note: for an overall length of more than **2200 mm**, a 3rd window sill support must be used!

Schematic diagram

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442,** at **75/65/20° C**

Side panels and top cover are included in the heat output specifications

Overall height [mm]	**70**	**142**	**214**	**286**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.			
Model			**KK 11***	**KK 11***
Overall depth [mm]			**68**	**68**
Watts / m 75/65/20			464	577
Watts / m 70/55/20			374	464
Watts / m 55/45/20			236	291
Water content l / m			1,67	2,22
Weight kg / m			11,14	14,51
Radiator exponent **n**			1,32	1,34
Model		**KK 20**	**KK 20**	**KK 20**
Overall depth [mm]		**93**	**93**	**93**
Watts / m 75/65/20		304	440	561
Watts / m 70/55/20		249	359	458
Watts / m 55/45/20		161	232	296
Water content l / m		2,18	3,34	4,44
Weight kg / m		9,26	13,27	17,28
Radiator exponent **n**		1,24	1,25	1,25
Model	**KK 22**	**KK 22**	**KK 22**	**KK 22**
Overall depth [mm]	**93**	**93**	**93**	**93**
Watts / m 75/65/20	424	641	838	1032
Watts / m 70/55/20	345	519	674	825
Watts / m 55/45/20	222	330	423	510
Water content l / m	1,10	2,18	3,34	4,44
Weight kg / m	7,34	13,97	20,59	27,23
Radiator exponent **n**	1,27	1,30	1,34	1,38
Model	**KK-S 22**	**KK-S 22**	**KK-S 22**	**KK-S 22**
Overall depth [mm]	**163**	**163**	**163**	**163**
Watts / m 75/65/20	424	641	838	1032
Watts / m 70/55/20	345	519	674	825
Watts / m 55/45/20	222	330	423	510
Water content l / m	1,10	2,18	3,34	4,44
Weight kg / m	10,53	19,43	28,34	37,24
Radiator exponent **n**	1,27	1,30	1,34	1,38

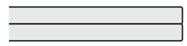
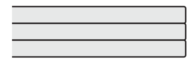
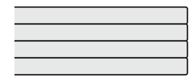
* For aesthetic reasons these models should not be fitted in front of a window.

Overall height [mm]	**70**	**142**	**214**	**286**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.			
Model	**KK 23***	**KK 23***	**KK 23***	**KK 23***
Overall depth [mm]	**150**	**150**	**150**	**150**
Watts / m 75/65/20	524	797	1035	1261
Watts / m 70/55/20	427	645	832	1008
Watts / m 55/45/20	275	410	522	623
Water content l / m	1,10	2,18	3,34	4,44
Weight kg / m	9,20	17,02	24,84	32,66
Radiator exponent **n**	1,26	1,30	1,34	1,38
Model	**KK 34**	**KK 34**	**KK 34**	**KK 34**
Overall depth [mm]	**175**	**175**	**175**	**175**
Watts / m 75/65/20	661	1050	1394	1723
Watts / m 70/55/20	545	856	1123	1377
Watts / m 55/45/20	360	552	707	851
Water content l / m	1,68	3,33	4,99	6,66
Weight kg / m	12,68	23,93	35,18	46,42
Radiator exponent **n**	1,19	1,26	1,33	1,38
Model	**KK-S 34**	**KK-S 34**	**KK-S 34**	**KK-S 34**
Overall depth [mm]	**245**	**245**	**245**	**245**
Watts / m 75/65/20	661	1050	1394	1723
Watts / m 70/55/20	545	856	1123	1377
Watts / m 55/45/20	360	552	707	851
Water content l / m	1,68	3,33	4,99	6,66
Weight kg / m	15,87	29,39	42,92	56,44
Radiator exponent **n**	1,19	1,26	1,33	1,38

* For aesthetic reasons these models should not be fitted in front of a window.

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442,** at **75/65/20° C**

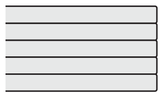
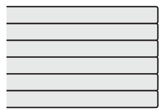
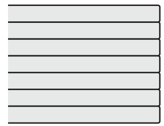
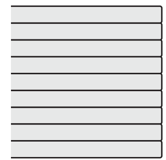
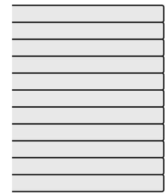
Side panels and top cover are included in the heat output specifications

				
Overall height [mm]	**70**	**142**	**214**	**286**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.			
Model	**KK 35***	**KK 35***	**KK 35***	**KK 35***
Overall depth [mm]	**232**	**232**	**232**	**232**
Watts / m 75/65/20	809	1197	1651	1971
Watts / m 70/55/20	661	971	1326	1570
Watts / m 55/45/20	429	619	828	964
Water content l / m	1,69	3,33	4,99	6,66
Weight kg / m	14,54	26,98	39,42	51,86
Radiator exponent **n**	1,24	1,29	1,35	1,40
Model	**KK 46**	**KK 46**	**KK 46**	**KK 46**
Overall depth [mm]	**257**	**257**	**257**	**257**
Watts / m 75/65/20	950	1454	2072	2447
Watts / m 70/55/20	778	1117	1661	1949
Watts / m 55/45/20	507	748	1034	1197
Water content l / m	2,26	4,53	6,79	9,06
Weight kg / m	18,02	33,89	49,76	65,62
Radiator exponent **n**	1,23	1,30	1,36	1,40
Model	**KK-S 47**	**KK-S 47**	**KK-S 47**	**KK-S 47**
Overall depth [mm]	**327**	**327**	**327**	**327**
Watts / m 75/65/20	986	1522	2302	2667
Watts / m 70/55/20	817	1240	1846	2128
Watts / m 55/45/20	545	800	1149	1311
Water content l / m	2,26	4,53	6,79	9,06
Weight kg / m	22,04	41,27	60,50	79,74
Radiator exponent **n**	1,16	1,26	1,36	1,39
Model	**KK 58**	**KK 58**	**KK 58**	**KK 58**
Overall depth [mm]	**339**	**339**	**339**	**339**
Watts / m 75/65/20	1023	1659	2592	3022
Watts / m 70/55/20	849	1354	2081	2411
Watts / m 55/45/20	569	876	1301	1486
Water content l / m	2,83	5,68	8,52	11,36
Weight kg / m	23,36	43,85	64,34	85,82
Radiator exponent **n**	1,15	1,25	1,35	1,39

* For aesthetic reasons these models should not be fitted in front of a window.

Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442,** at **75/65/20° C**

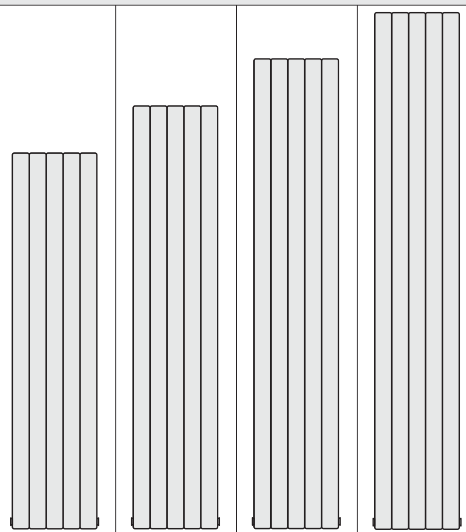
Side panels and top cover are included in the heat output specifications

						
Overall height [mm]	**358**	**430**	**502**	**574**	**646**	**790**
Increments	As regards all overall lengths between 500 and 1400 mm, use increments of 100 mm, and overall lengths between 1600 and 2400 mm, use increments of 200 mm.					
Model	**KH 10**	**KH 10**	**KH 10**	**KH 10**	**KH 10**	**KH 10**
Overall depth [mm]	**68**	**68**	**68**	**68**	**68**	**68**
Watts / m 75/65/20	394	458	523	588	655	795
Watts / m 70/55/20	322	374	427	480	534	647
Watts / m 55/45/20	209	243	276	311	344	416
Water content l / m	2,76	3,33	3,87	4,44	4,99	6,12
Weight kg / m	11,91	14,04	16,17	18,29	20,43	24,68
Radiator exponent **n**	1,24	1,24	1,25	1,25	1,26	1,27
Model	**KH 11***	**KH 11***	**KH 11***	**KH 11***	**KH 11***	**KH 11***
Overall depth [mm]	**68**	**68**	**68**	**68**	**68**	**68**
Watts / m 75/65/20	667	760	845	921	989	1105
Watts / m 70/55/20	540	615	683	743	797	889
Watts / m 55/45/20	344	391	433	470	503	558
Water content l / m	2,78	3,33	3,87	4,44	4,99	6,12
Weight kg / m	16,71	19,85	22,99	26,15	29,29	33,55
Radiator exponent **n**	1,30	1,30	1,31	1,32	1,32	1,34
Model	**KH 20**	**KH 20**	**KH 20**	**KH 20**	**KH 20**	**KH 20**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20	654	757	859	960	1063	1271
Watts / m 70/55/20	533	617	699	781	863	1032
Watts / m 55/45/20	344	398	449	502	553	661
Water content l / m	5,55	6,66	7,77	8,88	9,99	12,22
Weight kg / m	21,29	25,30	29,31	33,31	37,32	45,33
Radiator exponent **n**	1,26	1,26	1,27	1,27	1,28	1,28
Model	**KH 22**	**KH 22**	**KH 22**	**KH 22**	**KH 22**	**KH 22**
Overall depth [mm]	**93**	**93**	**93**	**93**	**93**	**93**
Watts / m 75/65/20	1197	1343	1474	1592	1699	1886
Watts / m 70/55/20	963	1079	1182	1274	1357	1500
Watts / m 55/45/20	605	675	736	790	838	919
Water content l / m	5,55	6,66	7,77	8,88	9,99	12,22
Weight kg / m	30,89	36,93	42,96	49,01	55,05	63,06
Radiator exponent **n**	1,34	1,35	1,36	1,37	1,38	1,41

* For aesthetic reasons these models should not be fitted in front of a window.

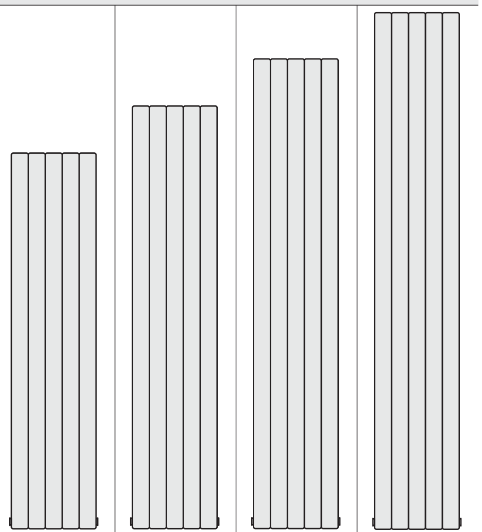
Heating output in compliance with **DIN EN 442**, and **ÖNORM EN 442,** at **75/65/20° C**

Side panels and top cover are included in the heat output specifications



Overall height [mm]	**1600**	**1800**	**2000**	**2200**
Overall length [mm]	**142, 214, 286, 358, 430, 502, 574, 646, 718, 790, 862**			
Type	**KS 10**	**KS 10**	**KS 10**	**KS 10**
Overall depth	**68**	**68**	**68**	**68**
Watts / m 75/65/20	1738	1979	2232	2495
Watts / m 70/55/20	1384	1577	1781	1994
Watts / m 55/45/20	850	968	1097	1233
Water content l / m	11,37	12,47	13,85	15,24
Weight kg / m	44,45	49,60	54,75	59,70
Radiator exponent **n**	1,40	1,40	1,39	1,38
Type	**KS 11**	**KS 11**	**KS 11**	**KS 11**
Overall depth	**68**	**68**	**68**	**68**
Watts / m 75/65/20	1979	2209	2450	2701
Watts / m 70/55/20	1584	1768	1964	2173
Watts / m 55/45/20	983	1097	1223	1362
Water content l / m	11,37	12,47	13,85	15,24
Weight kg / m	63,39	68,53	73,69	78,83
Radiator exponent **n**	1,37	1,37	1,36	1,34

* For aesthetic reasons these models should not be fitted in front of a window.



Overall height [mm]	**1600**	**1800**	**2000**	**2200**
Overall length [mm]	**142, 214, 286, 358, 430, 502, 574, 646, 718, 790, 862**			
Type	**KS 20**	**KS 20**	**KS 20**	**KS 20**
Overall depth	**93**	**93**	**93**	**93**
Watts / m 75/65/20	2932	3301	3672	4046
Watts / m 70/55/20	2332	2629	2929	3233
Watts / m 55/45/20	1427	1615	1805	1999
Water content l / m	22,74	24,34	27,71	30,48
Weight kg / m	85,44	95,46	105,48	115,50
Radiator exponent **n**	1,41	1,40	1,39	1,38
Type	**KS 21**	**KS 21**	**KS 21**	**KS 21**
Overall depth	**93**	**93**	**93**	**93**
Watts / m 75/65/20	3184	3588	4012	4455
Watts / m 70/55/20	2536	2857	3206	3572
Watts / m 55/45/20	1557	1755	1983	2224
Water content l / m	22,74	24,34	27,71	30,48
Weight kg / m	104,37	114,39	124,42	134,44
Radiator exponent **n**	1,40	1,40	1,38	1,36

* For aesthetic reasons these models should not be fitted in front of a window.

REPLACEMENT
USING CONVECTORS & HEATING PANELS

Connections:
2 x 1/2“internal thread, welded on, for flow and return, venting and drainage, according to the customer’s specifications.

Maximum positive operating pressure:
Standard design: 5 bar

Maximum positive operating pressure:
High-pressure design: 8 bar

Maximum operating temperature:110 °C

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Convectors & heating panels are radiators in a completely welded design, with 2 or 3 water-bearing rectangular steel pipes arranged behind each other and 4 or 8 on top of each other. Between the heating pipes there is a gap of 2 mm in order to ensure high resistance to corrosion. Each convector or heating wall is equipped with side panels and a top cover. They are also supplied with a drain plug and a pivotable vent plug, all of the factory sealed.

Painting:
1. Primer coat with electro-dip coating using water-soluble paint, in acc. with DIN 55900, part 1, stoved at 165 °C.
2. Electrostatic finish in acc. with DIN 55900, part 2, in RAL 9016 (on request in many RAL and Sanitary Ware colours), in a state-of-the-art powder coating plant.The especially robust coating is stoved at an object temperature of 180 °C.

Standard design:
Rectangular steel pipes: 70 x 11 x 1.5 mm

High-pressure version:
Rectangular steel pipes: 70 x 11 x 2 mm
Please note: surcharge of 10%

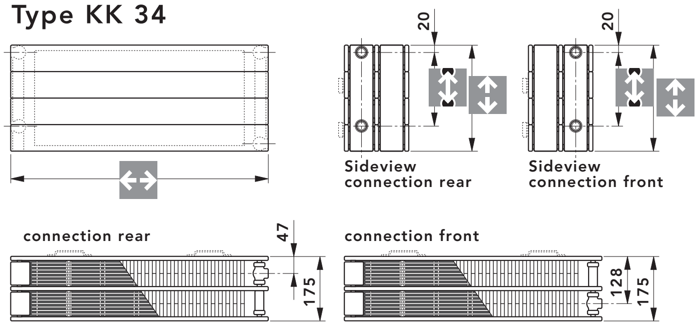
Packaging:
1. Cardboard
2. Edge protection
3. Shrink foil

Heating output in compliance with DIN EN 442, and ÖNORM EN 442, at 75/65/20° C

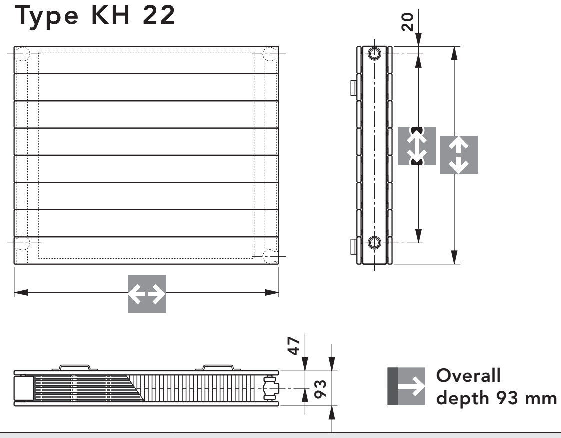
Side panels and top cover are included in the heat output specifications

Overall depth 175 mm

Type KK 34



Type KH 22



Overall height [mm]	286			574		
Boss spacing NA [mm]	200			500		
Model	KK 34			KH 22		
Overall length [mm]	heating outputs [Watts]	Water content [Liter]	Weight [Kg]	heating outputs [Watts]	Water content [Liter]	Weight [Kg]
500	862	3,33	23,21	796	4,44	24,51
600	1034	4,00	27,85	955	5,33	29,41
700	1206	4,66	32,49	1114	6,22	34,31
800	1378	5,33	37,14	1274	7,10	39,21
900	1551	5,99	41,78	1433	7,99	44,11
1000	1723	6,66	46,42	1592	8,88	49,01
1100	1895	7,33	51,06	1751	9,77	53,91
1200	2068	7,99	55,70	1910	10,66	58,81
1300	2240	8,66	60,35	2070	11,54	63,71
1400	2412	9,32	64,99	2229	12,43	68,61
1600	2757	10,66	74,27	2547	14,21	78,42
1800	3101	11,99	83,56	2866	15,98	88,22
2000	3446	13,32	92,84	3184	17,76	98,02
2200	3791	14,65	102,12	3502	19,54	107,82
2400	4135	15,98	111,41	3821	21,31	117,62
Radiator exponent **n**	**1,38**			**1,37**		

Simplified procedure for the domain of standard and low-temperature (ST/LT)

The conversion factors in the table state to which extent the heat emission has to be altered under other operating conditions, compared to the following standard-design data:

supply temperature t_1 **75 °C**
return temperature t_2 **65 °C**
room temperature t_r **20 °C**

Because an average exponent of 1.3 has been used for both the calculation of the performance data and the specification of the conversion factor, a slight performance variation from the calculated value is possible.

The standard heat emission Φ_S of a radiator covering the required heat $\Phi_{HL,i}$ at the chosen operating conditions, is calculated according to the formula:

$$\Phi_S = \Phi_{HL,i} \times f$$

Φ_S = standard heat emission, in accordance with EN 442
$\Phi_{HL,i}$ = required heat, in accordance with EN 12831
f = conversion factor from the table

Example:
The required heat of a room is 1000 W, in accordance with EN 12831.

Design data: t_1 50 °C, t_2 40 °C, t_r 20 °C

Factor **f** according to the table = **2.50**

Supply temperature °C	Return temperature °C	Room temperature °C 12	15	18	20	22	24	26
90	80	0,61	0,64	0,68	0,71	0,74	0,77	0,81
	70	0,67	0,72	0,76	0,80	0,83	0,87	0,91
80	70	0,74	0,79	0,84	0,88	0,93	0,97	1,03
	60	0,83	0,89	0,96	1,01	1,07	1,13	1,20
	50	0,96	1,04	1,13	1,20	1,28	1,37	1,47
75	**65**	0,82	0,88	0,95	**1,00**	1,05	1,12	1,18
	60	0,88	0,94	1,02	1,08	1,14	1,21	1,29
	55	0,94	1,01	1,10	1,17	1,24	1,32	1,42
70	65	0,87	0,94	1,01	1,07	1,13	1,19	1,27
	60	0,93	1,00	1,08	1,15	1,22	1,30	1,39
	55	0,99	1,08	1,17	1,25	1,33	1,42	1,53
	50	1,07	1,17	1,28	1,37	1,47	1,58	1,71
65	60	0,98	1,07	1,16	1,23	1,31	1,40	1,50
	55	1,05	1,15	1,26	1,34	1,43	1,54	1,66
	50	1,14	1,25	1,37	1,47	1,59	1,71	1,86
	45	1,24	1,37	1,52	1,64	1,78	1,94	2,13
60	55	1,13	1,23	1,36	1,45	1,56	1,68	1,82
	50	1,22	1,34	1,48	1,60	1,73	1,87	2,05
	45	1,33	1,47	1,65	1,78	1,94	2,13	2,36
	40	1,47	1,64	1,86	2,03	2,24	2,50	2,80
55	50	1,31	1,45	1,62	1,75	1,90	2,07	2,28
	45	1,43	1,60	1,80	1,96	2,15	2,37	2,64
	40	1,59	1,78	2,03	2,24	2,48	2,78	3,15
	35	1,78	2,03	2,36	2,64	2,99	3,43	4,02
50	45	1,56	1,75	1,98	2,17	2,40	2,67	3,00
	40	1,73	1,96	2,25	2,50	2,79	3,15	3,61
	35	1,94	2,24	2,63	2,96	3,38	3,92	4,64
	30	2,24	2,64	3,20	3,70	4,39	5,39	6,99
45	40	1,90	2,17	2,53	2,83	3,19	3,66	4,25
	35	2,15	2,50	2,96	3,37	3,89	4,58	5,52

$$\Phi_S = \Phi_{HL,i} \times f = 1000 \text{ Watts} \times 2{,}50 = 2500 \text{ Watts}$$

A radiator has to be installed that emits 2500 W under the standard design (75/65/20).

Exact method for the performance calculation for the domain of standard and low-temperature (ST/LT)

Using the formula $\Phi = \Phi_S \left[\frac{\Delta T}{\Delta T_S}\right]^n$ any performance differing from the standard can be calculated.

Φ = Radiator power [W]
Φ_S = Standard radiator power in accordance with EN 442 [W]
ΔT = Arithmetic radiator excess temperature [K]
ΔT_S = Arithmetic radiator excess temperature 50 K, at a standard state of 75 °C / 65 °C / 20 °C
n = Radiator exponent

Please note: if the condition $c = \frac{t_2 - t_r}{t_1 - t_r} < 0.7$ is met, the excess temperatures will be specified logarithmically.

$$\Delta T_{arithmetic} = \frac{t_1 + t_2}{2} - tr \qquad \Delta T_{logarithmic} = \frac{t_1 - t_2}{\ln \frac{t_1 - t_r}{t_2 - t_r}}$$

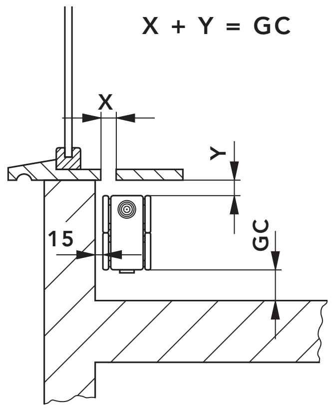
Use our radiator performance calculator under www.vogelundnoot.com

Technical information subject to change.

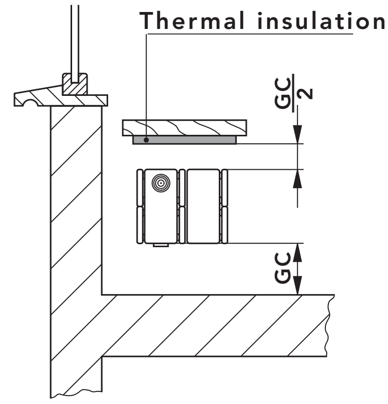
Horizontal design of VONARIS, VONARIS-M and KONTEC

Radiator placement

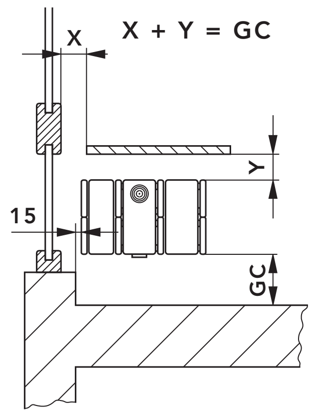
Placement below a window parapet



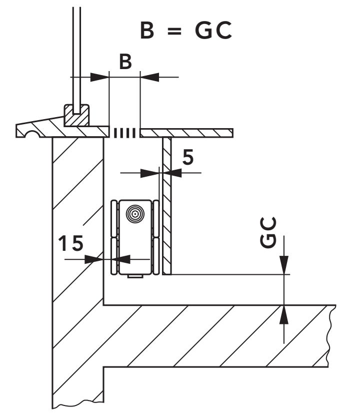
Placement under a bench



Placement behind a glass surface



Placement below a shop window



Schematic diagram

Recommended minimum clearance for convectors

GC = ground clearance in mm

The minimum ground clearance recommended here apply for all images on the pages 306 and 307!

GC [mm]	VONARIS Model	VONARIS OH [mm]	VONARIS-M Model	VONARIS-M OH [mm]	KONTEC Model	KONTEC OH [mm]
60	VHV 11	214, 286	VHV-M 11	214, 286	KK 11	214, 286
60	VHV 20	142	VHV-M 20	142	KK 20	142
60	VHV 22	142	VHV-M 22	142	KK 22	70, 142
70	VHV 23	142	VHV-M 23	142	KK 23	70, 142
80	VHV 20	214, 286	VHV-M 20	214, 286	KK 20	214, 286
80	VHV 22	214, 286	VHV-M 22	214, 286	KK 22	214, 286
90	VHV 23	214, 286	VHV-M 23	214, 286	KK 23	214, 286
100	VHV 34	142	VHV-M 34	142	KK 34	70, 142
110	VHV 34	214, 286	VHV-M 34	214, 286	KK 34	214, 286
120	VHV 35	142	VHV-M 35	142	KK 35	70, 142
130	VHV 35	214, 286	VHV-M 35	214, 286	KK 35	214, 286
130	VHV 46	142	VHV-M 46	142	KK 46	70, 142
130	-	-	-	-	KK 58	70
140	-	-	-	-	KK 46	214, 286
140	-	-	-	-	KK 58	142
150	-	-	-	-	KK 58	214, 286

Horizontal design of VONARIS, VONARIS-M and KONTEC

Radiator placement

Placement behind a screen

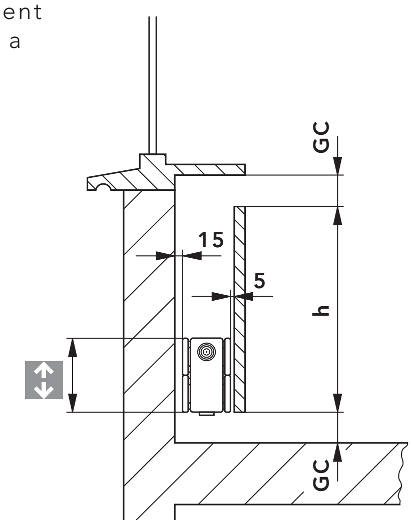


Image 1

Placement behind a desk

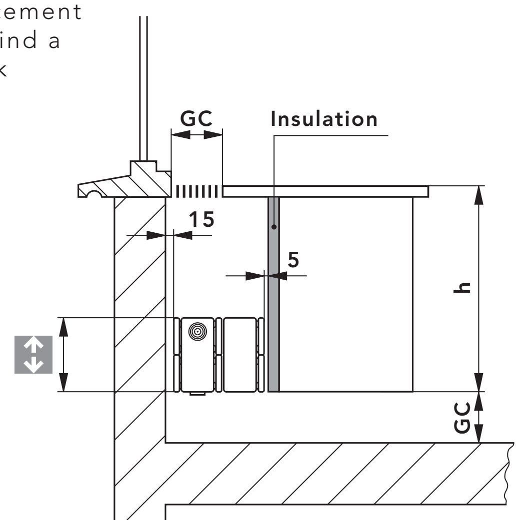


Image 2

Schematische Darstellung

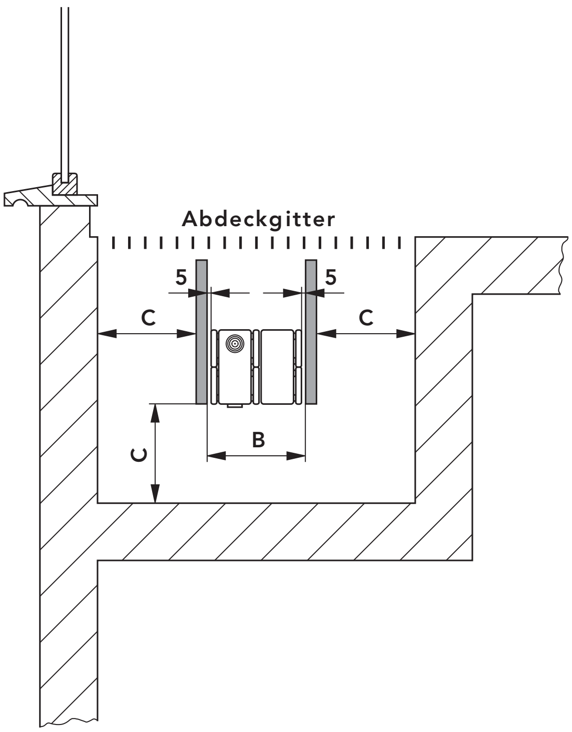
Note:
Screens and desks should be movable so that the radiators and conduits can be cleaned.

Percentage increase of the radiator's heat emission due to the chimney effect, as Illustrated with the placement in picture 1 and picture 2.

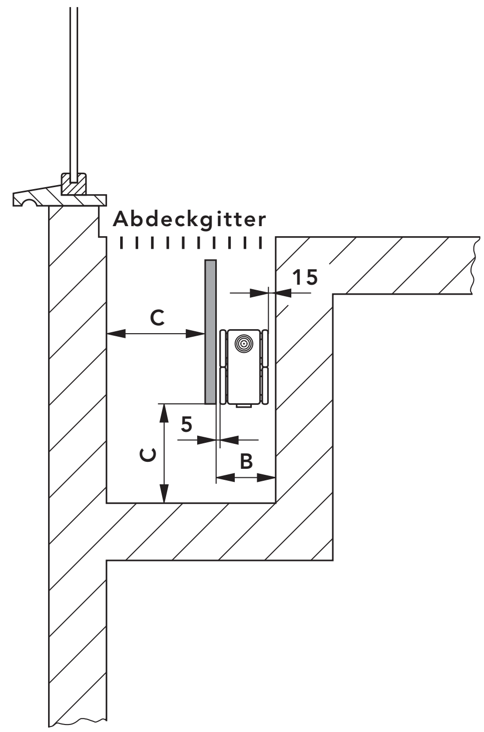
h [mm]	Percentage increase of the heat emission			
	OH 70 mm	OH 142 mm	OH 214 mm	OH 286 mm
150	14	-	-	-
200	20	8	-	-
250	26	12	2	-
300	30	15	6	-
350	33	19	9	3
400	36	22	12	6
450	39	25	15	9
500	41	28	17	11
600	46	32	21	14
700	50	35	24	18
800	-	38	27	21

Horizontal design of VONARIS, VONARIS-M and KONTEC

Placement of the radiators in regard to floor conduits



B = Overall radiator depth + 10 mm
C ≥ B



B = Overall radiator depth + 20 mm
C ≥ B

Schematic diagram

The screening between the radiator surfaces and conduit walls must be made of heat-insulating materials (e. g.: timber, plastics etc.).

Take care that the lower edge of the screening corresponds to the lower edge of the radiator. The top edge of the screening should be fitted as near to the floor conduit cover as possible.

The cover grids of the floor conduit should be designed in a way that the open cross-sectional area amounts to at least 60 %.

We recommend to use cover grids that can easily be taken off in order to facilitate the cleaning of the floor conduit.

The heat emission of radiators installed in floor conduits (subsurface heating) is reduced at about 20 %, compared with the values given in the heat output index.

Guide table for the selection and number of required fastening systems for VONARIS solitary finished radiators

Guide for the selection and number of required stand consoles
for types VHV and VHV-S (WVO design), up to an overall height of 286 mm

Stand consoles for the horizontal design, up to OH 286 mm

Radiator model	VHV 11		VHV 20		VHV 22		VHV-S 22		VHV 23	
Overall lenght [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 10 for finished floors	**2**	**3**								
SK 11 for unfinished floors	**2**	**3**								
SK 12 for finished floors			**2**	**3**	**2**	**3**			**2**	**3**
SK 13 for unfinished floors			**2**	**3**	**2**	**3**			**2**	**3**
SK 14 for finished floors							**2**	**3**		
SK 15 for unfinished floors							**2**	**3**		

Radiator model	VHV 34		VHV-S 34		VHV 35		VHV 46		VHV-S 47	
Overall lenght [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 14 for finished floors	**2**	**3**	**2**	**3**	**2**	**3**				
SK 15 for unfinished floors	**2**	**3**	**2**	**3**	**2**	**3**				
SK 16 for finished floors							**2**	**3**		
SK 17 for unfinished floors							**2**	**3**		
SK 18 for finished floors									**2**	**3**
SK 19 for unfinished floors									**2**	**3**

Guide for the selection and number of required **stand consoles**
for types VHV 11, VHV 20 and VHV 22

Stand consoles suitable for the horizontal design with or without a heat reflector, for types VHV 11, VHV 20 and VHV 22, with an overall height of 358, 430, 502, 574 and 646 mm

Radiator model	VHV 11		VHV 20		VHV 22	
Overall lenght [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 22			**2**			
SK 22				**3**		
SK 23	**2**				**2**	
SK 23		**3**				**3**

Guide table for the selection and number of required fastening systems for VONARIS solitary finished radiators

Guide for the selection and number of required **wall consoles**
for types VHV, up to an overall height of 286 mm

Wall consoles for the horizontal design, up to OH 286 mm

Radiator model		VHV 11		VHV 20		VHV 22		VHV 23	
Wall console model		WK 10		WK 10 - M		WK 10 - M		WK 11-M	
Overall length [mm]		between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000
Overall height [mm]	142			2	3	2	3	2	3
	214	2	3	2	3	2	3	2	3
	286	2	3	2	3	2	3	2	3

Radiator model		VHV 34		VHV 35		VHV 35		VHV 35	
Wall console model		WK 11-M		WK 12		WK 12		WK 12	
Overall length [mm]		between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 1800	between 2000 and 2600	between 2800 and 3600	between 3800 and 4000
Overall height [mm]	142	2	3	2	3				
	214	2	3	2	3				
	286	2	3			2	3	4	5

Radiator model		VHV 46		VHV 46		VHV 46		VHV 46	
Wall console model		WK 12		WK 12		WK 12		WK 12	
Overall length [mm]		between 500 and 2000	between 2200 and 3000	between 500 and 1800	between 2000 and 2800	3000	between 500 and 1400	between 1600 and 2200	between 2400 and 2800
Overall height [mm]	142	2	3						
	214			2	3	4			
	286					5	2	3	4

Guide table for the selection and number of required fastening systems for VONARIS solitary finished radiators

Guide for the selection and number of required **VONOFIX rapid installation consoles**
for types VHV 20, VHV 22 and VHV 34

VONOFIX rapid installation consoles for overall heights of 214, 286, 358, 430, 502, 574, 646 and 790 mm

Radiator model		VHV 20		VHV 22		VHV 34	
Overall length [mm]		up to 2000	from 2200 with foot console	up to 2000	from 2200 with foot console	up to 2000	from 2200 with foot console
Overall height [mm]	VONOFIX 1 (set for 214)	1	1	1	1	1	1
	VONOFIX 2 (set for 286)	1	1	1	1	1	1
	VONOFIX 2 (set for 358)	1	1	1	1		
	VONOFIX 3 (set for 430)	1	1	1	1		
	VONOFIX 3 (set for 502)	1	1	1	1		
	VONOFIX 4 (set for 574)	1	1	1	1		
	VONOFIX 4 (set for 646)	1	1	1	1		
	VONOFIX 5 (set for 790)	1	1	1	1		

Guide table for the selection and number of required fastening systems for VONARIS solitary finished radiators

Guide for the selection and number of required **VONOFIX rapid installation consoles** for types VSV 10, VSV 11, VSV 20 and VSV 21

Wall mounting brackets for the vertical design

Radiator model	**VSV 10**		**VSV 11**		**VSV 20**		**VSV 21**	
Overall length [mm]	**214**	**ab 286**	**214**	**ab 286**	**214**	**ab 286**	**214**	**ab 286**
WA 10, set	**1**		**1**		**1**		**1**	
WA 11, set of 2		**1**		**1**		**1**		**1**

Guide table for the selection and number of required fastening systems for VONARIS central connection radiators

Guide for the selection and number of required **stand consoles** for types VHV-M up to an overall height of 286 mm.

Stand consoles for the horizontal design, up to OH 286 mm

Radiator model	**VHV-M 22**		**VHV-M S 22**		**VHV-M 34**		**VHV-M 46**		**VHV-M S 46**	
Overall length [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 12 for finished floors	**2**	**3**								
SK 13 for unfinished floors	**2**	**3**								
SK 14 for finished floors			**2**	**3**	**2**	**3**				
SK 15 for unfinished floors			**2**	**3**	**2**	**3**				
SK 16 for finished floors							**2**	**3**		
SK 17 for unfinished floors							**2**	**3**		
SK 18 for finished floors									**2**	**3**
SK 19 for unfinished floors									**2**	**3**

Guide table for the selection and number of required fastening systems for VONARIS central connection radiators

Guide for the selection and number of required **wall fastening brackets** for types VSV-M 10, VSV-M 11, VSV-M 20 and VSV-M 21

Wall fastening brackets for the vertical design

Radiator model		**VHV-M 22**		**VHV-M 34**		**VHV-M 46**	
Wall console model		**WK 10 - M**		**WK 11 - M**		**WK 12**	
Overall length [mm]		between 500 and 2000	between 2200 and 2400	between 500 and 2000	between 2000 and 2400	between 500 and 2000	between 2200 and 2400
Overall height [mm]	**142**	**2**	**3**				
	214			**2**	**3**	**4**	
	286					**5**	**2**

Guide table for the selection and number of required fastening systems for VONARIS central connection radiators

Guide for the selection and number of required **VONOFIX rapid installation consoles** for types VHV-M 20, VHV-M 22 and VHV-M 34

VONOFIX rapid installation consoles for overall heights of 214, 286, 358, 430, 502, 574, 646 and 790 mm

Radiator model		VHV-M 20		VHV-M 22		VHV-M 34	
Overall length [mm]		up to 2000	from 2200 with foot console	up to 2000	from 2200 with foot console	up to 2000	from 2200 with foot console
Overall height [mm]	VONOFIX 1 (set for 214)			1	1	1	1
	VONOFIX 2 (set for 286)			1	1	1	1
	VONOFIX 2 (set for 358)	1	1	1	1		
	VONOFIX 3 (set for 430)	1	1	1	1		
	VONOFIX 3 (set for 502)	1	1	1	1		
	VONOFIX 4 (set for 574)	1	1	1	1		
	VONOFIX 4 (set for 646)	1	1	1	1		
	VONOFIX 5 (set for 718)	1	1	1	1		
	VONOFIX 5 (set for 790)	1	1	1	1		

Guide for the selection and number of required **wall fastening brackets** for types VSV-M 10, VSV-M 11, VSV-M 20 and VSV-M 21

Wall fastening brackets for the vertical design

Radiator model	VSV-M 10*		VSV-M 11*		VSV-M 20		VSV-M 21	
Overall length [mm]	214	ab 286	214	ab 286	214	ab 286	214	ab 286
WA 10, set	1		1		1		1	
WA 11, set of 2		1		1		1		1

***Note:** when installing the VSV-M 10 and VSV-M 11 models with an angled connection set (**ZE**, **EE**), please use the appropriate drill consoles and angled fishplates to ensure that the required distance from the wall is maintained.

Guide table for the selection and number of required fastening systems for KONTEC convectors

Guide for the selection and number of required **stand consoles** for **KONTEC convectors**, types KK and KK-S (WVO design)

Stand consoles for convectors **without brackets**

Radiator model	KK 11		KK 20		KK 22		KK-S 22	
Overall length [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 10 for finisched floors	2	3						
SK 11 for unfinished floors	2	3						
SK 12 for finisched floors			2	3	2	3		
SK 13 for unfinished floors			2	3	2	3		
SK 14 for finisched floors							2	3
SK 15 for unfinished floors							2	3

Guide table for the selection and number of required fastening systems for KONTEC convectors

Guide for the selection and number of required **stand consoles**
for **KONTEC convectors**, types KK and KK-S (WVO design)

Stand consoles for convectors **without brackets**

Radiator model	KK 23		KK 34		KK-S 34		KK 35	
Overall length [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 12 for finished floors	2	3						
SK 13 for unfinished floors	2	3						
SK 14 for finished floors			2	3	2	3	2	3
SK 15 for unfinished floors			2	3	2	3	2	3

Radiator model	KK 46		KK-S 47		KK 58	
Overall length [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 16 for finished floors	2	3				
SK 17 for unfinished floors	2	3				
SK 18 for finished floors			2	3	2	3
SK 19 for unfinished floors			2	3	2	3

Guide table for the selection and number of required fastening systems for KONTEC convectors

Guide for the selection and number of required wall consoles
for KONTEC convectors, type KK

Wall consoles for convectors **without brackets**

Radiator model		KK 11		KK 20		KK 22		KK 23		KK 34	
Wall console model		WK 10		WK 10 - M		WK 10 - M		WK 11-M		WK 11-M	
Overall length [mm]		between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000	between 500 and 2000	between 2200 and 4000
Overall height [mm]	**70**			2	3	2	3	2	3	2	3
	142			2	3	2	3	2	3	2	3
	214	2	3	2	3	2	3	2	3	2	3
	286	2	3	2	3	2	3	2	3	2	3

Radiator model		KK 35		KK 35		KK 35		KK 46		KK 46	
Wall console model		WK 12		WK 12		WK 12		WK 12		WK 12	
Overall length [mm]		between 500 and 2000	between 2200 and 4000	between 500 and 1800	between 2000 and 2600	between 2800 and 3600	between 3800 and 4000	between 500 and 2000	between 2200 and 3000	between 500 and 1900	between 2000 and 2800
Overall height [mm]	**70**	2	3					2	3		
	142	2	3					2	3		
	214	2	3							2	3
	286			2	3	4	5				

Guide table for the selection and number of required fastening systems for KONTEC convectors

Guide for the selection and number of required **wall consoles** for **KONTEC convectors**, type KK

Wall consoles for convectors **without brackets**

Radiator model		KK 46		KK 46		KK 58		KK 58		KK 58	
Wall console model		WK 12		WK 12		WK 13		WK 13		WK 13	
Overall length [mm]		3000	between 500 and 1400	between 1500 and 2200	between 2400 and 2800	between 500 and 2000	2200	between 500 and 1700	between 1800 and 2200	between 500 and 1100	between 1200 and 1700
Overall height [mm]	70					2	3				
	142							2	3		
	214	4								2	3
	286	5	2	3	4		6				

Radiator model		KK 58		KK 58		KK 58	
Wall console model		WK 13		WK 13		WK 13	
Overall length [mm]		between 1800 and 2200	between 500 and 800	between 900 and 1300	between 1400 and 1700	between 1800 and 2000	
Overall height [mm]	70						
	142						
	214	4					
	286		2	3	4	5	

Guide table for the selection and number of required fastening systems for KONTEC convectors

Guide for the selection and number of required fastening systems for KONTEC heating panels

Stand consoles, suitable for horizontal heating panels with or without heat reflector, for types KH 11, KH 20 and KH 22

Radiator model	KH 11		KH 20		KH 22	
Overall length [mm]	up to 2000	from 2200	up to 2000	from 2200	up to 2000	from 2200
SK 22			2			
SK 22				3		
SK 23	2				2	
SK 23		3				3

Guide for the selection and number of required **wall fastening brackets** for vertical **KONTEC** heating panels, type KS

Wall fastening brackets for vertical heating panels

Radiator model	KS 10		KS 11		KS 20		KS 21	
Overall length [mm]	up to 214	from 286	up to 214	from 286	up to 214	from 286	up to 214	from 286
WA 10, set	1		1		1		1	
WA 11, set of 2		1		1		1		1

Benefits
- 3 basic types FMK, F1T and F1P
- Standard design with or without a fan, for two-pipe system
- An unlimited number of non-standard designs (non-standard lengths)
- Trench design without frame; trench design with a U-frame, which obscures the convector trench from view; trench design with an L-frame or Z-frame, which covers the gap between the trench and the floor
- Removable, accessible roll-up grille or rigid linear grille made from anodised aluminium, stainless steel, beech or oak. The wood grilles are treated with oil as standard. The aluminium grille is available in various shades: natural, black, or light or dark bronze
- Black-coated components such as the trench, cover and convection plates ensure that they integrate harmoniously with the look of the room
- The cover plate, which protects the trench during transport and installation, is included in the delivery
- A universal option for installation in living areas, hotels, administrative buildings, shopping centres, airport concourses, motor showrooms, conservatories or swimming pools, to name but a few
- **VOGEL&NOOT** provides its customers with reputable brands that offer the highest standards of quality. The production processes at all of our production sites are ISO-certified. The quality and performance specifications of our underfloor convectors are tested by recognised European institutes. The requirements that these quality hallmarks require us to achieve are there to ensure that the products we supply offer are safe, provide the best heating performance and are of the highest quality
- Easy installation and uninstallation of the heat exchangers and fans
- Safe, low voltage of fan power units (12V)
- Increased performance, extended service life, minimal noise level, reduced electricity consumption and therefore reduced operating costs thanks to the new EC motors

VOGEL&NOOT

Key

Heating function

Natural convection

Forced convection

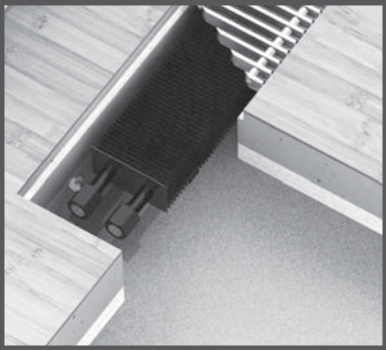
Connection to the two-pipe distribution

Contents

Trench convector with natural convection (without a fan), noiseless operation. The convection plates increase heat output and increase safety when cleaning the convectors. This model is intended for heating.

Trench convector with forced convection (12 V EC cross-flow fan). This variant provides the solution where the FMK is no longer sufficient. This model is also intended for heating.

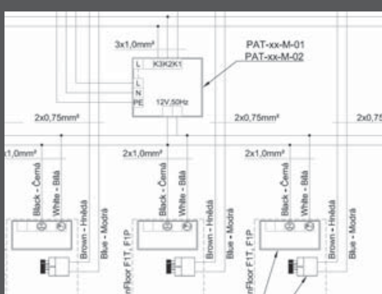
Trench convector with even more powerful forced convection (12 V EC tangential fan), which guarantees even faster delivery of heat. This variant is available for situations requiring a level of performance that exceeds that of the F1T.



In view of various individual requirements expressed by our customers, we have expanded our product range to include individual heat exchangers that are installed in the Intratherm Trench convectors as standard. The individually installed heat exchangers are suitable for use in reconstructions of cellars, loft spaces or attics, as well as for installation in window sills or for installation in channels or gutters. Brackets for the installation of heat exchangers in floors or in the wall are also supplied as accessories with the heat exchangers.

Contents

The cover grilles are practically the only visible part of the floor convectors and for this reason a great deal of attention is paid to the material and the finish of the grilles. Apart from this design aspect, the cover grille also performs technical functions – namely accessibility and distribution. The cover grille ensures even load-bearing, which is spread over the edges of the trench onto the base, while at the same time the shape of the bars determines the air flow.



The heat output of the convector can be controlled either by hot water or by air (only in the design with a fan). Quantitative control of the hot water takes place via the thermostatic valve lift (thermostatic head controlled by remote control setting or adjusting drive of the room thermostat).
Control by means of air (F1T and F1P) is effected by the fan revolution speed. The speed of revolutions can be controlled manually or automatically using a room thermostat.

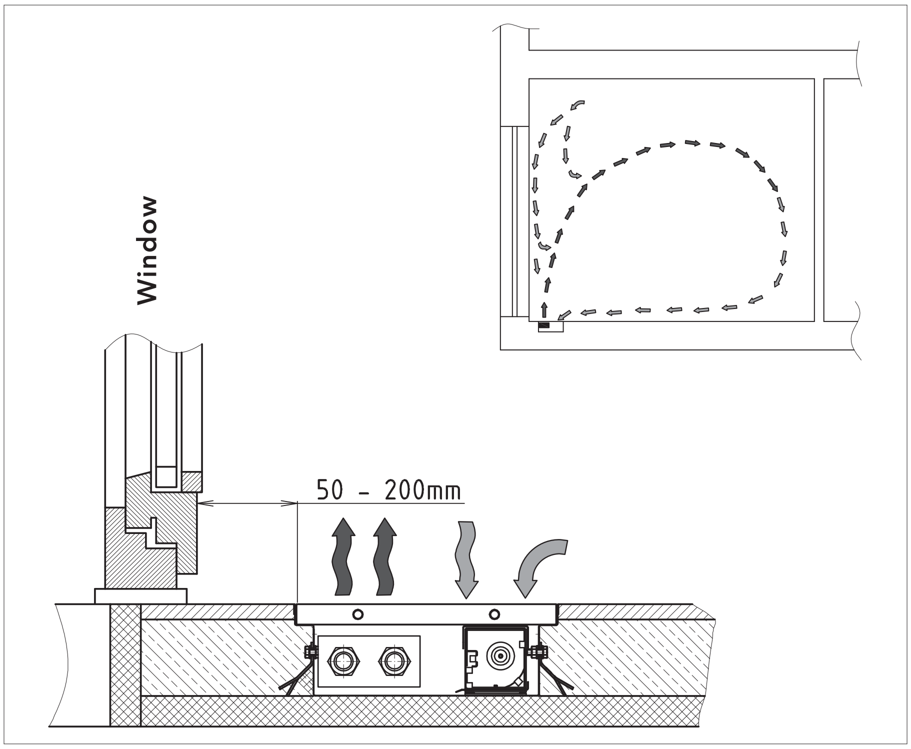
The optimum functioning of the convector depends, of course, on its installation. In order to ensure problem-free operation, it is essential that the system is set correctly and fixed properly to the base. The convectors can be embedded fully in concrete or fixed mechanically in the raised floor.

Tender offer documents are available to download at **www.vogelundnoot.at/download**

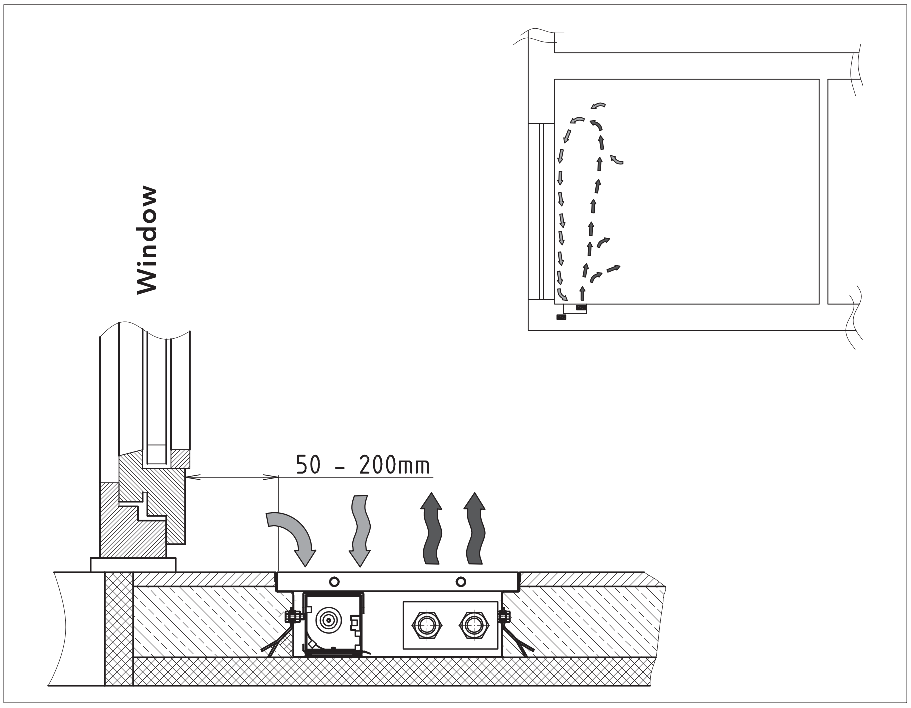
Introduction

The Trench convectors from **VOGEL&NOOT** offer the optimum system-based solution for areas in which the conventional radiator is undesirable for aesthetic reasons or due to space constraints. The Trench convectors are intended for use in hidden installations that are integrated into the floor. In many settings, such conservatories, entrances and office or administrative buildings, more stringent requirements are set with regard to appearance. Thanks to the efficient, low-noise fans, the convectors are able to provide high performance at minimum depths (at least 90 mm) and are therefore ideally suitable for inclusion in renovation works and new-build projects alike. Removable, walkable grilles in a variety of shapes, materials and shades provide a cover for an efficient copper/aluminium heat exchanger (with or without a fan) located in the convector trench.

With a variety of heights, lengths, depths and a number of power variants, the Intratherm series offers the most effective solution, whatever the layout. The fully rust-proof copper-aluminium heat exchanger responds rapidly to the different temperature requirements in the room. The Trench convector counteracts the uncomfortable influx of cold air next to glazed walls, therefore effectively preventing the intrusion of cold air into the room and promoting air circulation even in large rooms.



The positioning of the heat exchanger on the window side is a common variant that ensures even circulation of air within the entire room.



The positioning of the heat exchanger of the convector towards the centre of the room ensures the function of a 'heat barrier' so that cold air close to the window is screened off.

INTRATHERM FMK.

Fan-less convectors that provide natural convection

Imagine a simple, economical and entirely low-noise variant with minimal operating costs. The FMK convectors contain no fan and are intended for heating, based on the principle of free convection by natural air circulation. The heat output of the convector is controlled by a thermostatic valve, which in turn is operated by an adjusting drive (possibly in the form of thermostatic heads that can be set remotely).

- 3 standard heights (90, 110 and 140 mm)
- 5 standard widths (180, 260, 290, 340 and 420 mm)
- Lengths: from 800 mm

Technical specification:
- Heat output, measured in accordance with EN 442
- Test overpressure 13 bar
- Max. operating overpressure 10 bar
- Maximum operating temperature 110 °C

DIN EN 442 EURONORM · EN ISO 9001 · CE · EN 442 GEPRÜFT · 55 45 DIE *neue* WÄRME

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Intratherm FMK – Fan-less convectors that provide natural convection

Intratherm FMK standard delivery includes:

- A convector trench that is galvanized on both sides and is coated in RAL 9005 Black paint.
- A trench with universally insertable heat exchanger supports, which enable the convector to be connected from the right and the left
- Front and side components of the trench with perforations for the water connection and feeding the cable, enabling the heat exchanger to be connected from the right and the left
- Fully corrosion-proof copper/aluminium heat exchanger with minimal water content, with air vent, coated in RAL 9005 Black
- A pair of convective plates to increase heat output and safety during maintenance
- Cover plate for the water connection
- All trench components coated in RAL 9005 Black as standard
- Wooden cover plate, which protects the convector trench and the heat exchanger during transport and installation
- Accessories supplied as standard: setting screws M8 x 30 for setting the position of the trench, floor screed anchors for the fixing of the trench into concrete, rubber bushings for the perforations, flexible stainless steel connecting hoses with seal, anchor brackets for setting the trench height
- Impact-noise insulation between the grille and the trench

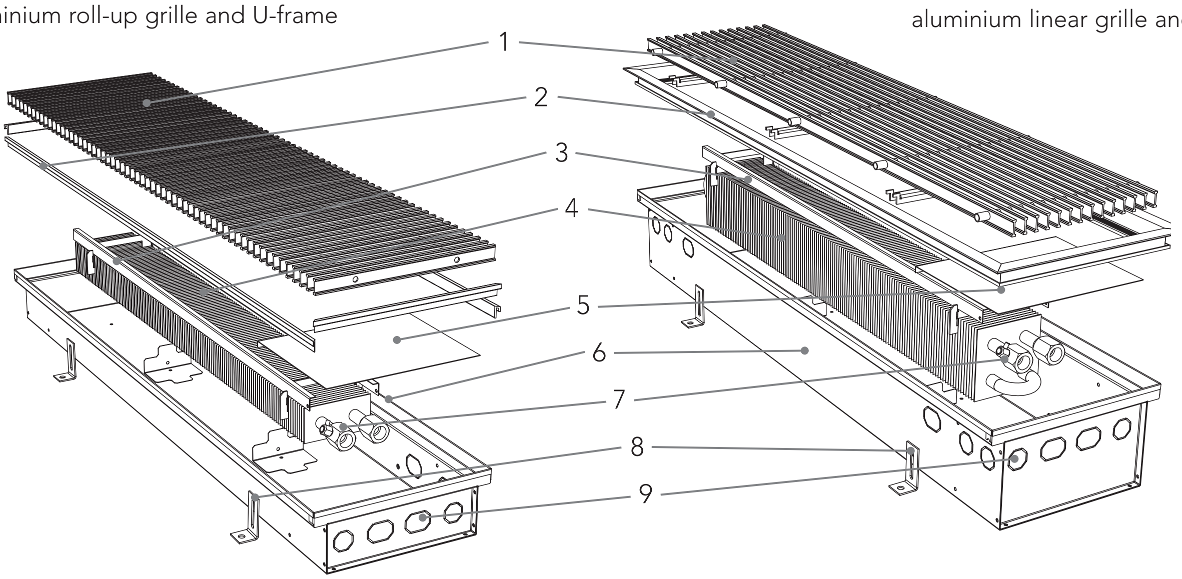
Extras:

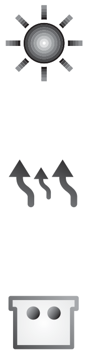
- Trench made from brushed stainless steel plate
- Accessories: thermostatic valve, lockshield valve, thermostatic head with remote controller, adjusting drive, room thermostat
- Insulation of the trench floor, three-sided insulation of the trench
- Coatings for the trench, heat exchanger and other components in a different RAL colour

Construction of the Intratherm FMK Trench convector

FMK 260 x 1250 x 90 mm with an aluminium roll-up grille and U-frame

FMK 260 x 1250 x 140 mm with an aluminium linear grille and Z-frame





Key

1 Roll-up grille or linear grille	6 Convector trench
2 Frame (O, U, L, Z)	7 Air vent
3 Convection plate	8 Adjustable anchor brackets
4 Fins of heat exchanger	9 Perforations
5 Cover plate	

Due to the nature of their construction, linear grilles are only suitable for the heights 110 mm and 140 mm.

Intratherm FMK galvanized – outputs

- Convector lengths are available accurate to within 1 cm
- Lengths over 5 m available upon request

Width (mm)	180			260			290			340			420		
Height (mm)	90	110	140	90	110	140	90	110	140	90	110	140	90	110	140
Length (mm)	Heat output [W] at 75/65/20 °C														
750	116	134	147	152	179	220	156	199	242	201	237	306	253	290	360
900	150	173	190	196	231	285	201	257	313	260	306	397	327	376	466
1000	173	199	219	226	266	328	232	296	361	299	353	457	376	432	537
1100	196	225	248	256	301	371	263	335	408	338	399	517	426	489	607
1200	219	251	277	285	336	414	293	374	456	378	446	577	476	546	678
1250	230	264	291	300	354	436	308	393	480	397	469	607	500	575	713
1300	242	278	305	315	371	458	324	413	503	417	492	637	525	603	749
1400	264	304	334	345	406	501	354	452	551	456	539	697	575	660	819
1500	287	330	363	374	441	544	385	491	598	496	585	757	624	717	890
1700	333	382	421	434	512	630	446	569	693	574	678	877	723	831	1031
1750	344	395	435	449	529	652	461	588	717	594	701	907	748	859	1066
1900	378	435	478	493	582	717	507	647	788	653	771	997	822	945	1172
2000	401	461	507	523	617	760	537	685	836	692	817	1058	872	1002	1243
2100	424	487	536	553	652	803	568	724	883	732	864	1118	921	1058	1313
2250	458	526	579	597	704	868	614	783	955	791	933	1208	996	1144	1419
2300	470	539	594	612	722	889	629	802	978	810	957	1238	1020	1172	1455
2500	515	592	651	672	792	976	690	880	1073	889	1049	1358	1120	1286	1596
2700	561	644	709	731	862	1062	751	958	1168	968	1142	1478	1219	1400	1737
2750	572	657	723	746	879	1084	766	978	1192	987	1166	1508	1243	1428	1772
2900	606	697	767	790	932	1148	812	1036	1263	1046	1235	1598	1318	1514	1878
3000	629	723	795	820	967	1192	843	1075	1311	1086	1282	1658	1367	1571	1949
3100	652	749	824	850	1002	1235	873	1114	1358	1125	1328	1719	1417	1628	2020
3250	686	788	867	894	1055	1300	919	1172	1429	1184	1398	1809	1491	1713	2125
3300	698	801	882	909	1072	1321	934	1192	1453	1204	1421	1839	1516	1741	2161
3500	743	854	939	969	1142	1407	995	1270	1548	1282	1514	1959	1615	1855	2302
3700	789	906	997	1028	1212	1494	1056	1348	1643	1361	1607	2079	1714	1969	2443
3750	812	932	1026	1058	1247	1537	1087	1387	1691	1400	1653	2139	1764	2026	2514
3900	834	958	1055	1088	1282	1580	1117	1425	1738	1440	1700	2199	1813	2083	2584
4000	857	985	1083	1117	1317	1623	1148	1464	1786	1479	1746	2259	1863	2140	2655
4100	880	1011	1112	1147	1352	1666	1178	1503	1833	1519	1792	2319	1912	2197	2726
4250	926	1063	1170	1207	1422	1753	1239	1581	1928	1597	1885	2440	2011	2310	2867
4300	926	1063	1170	1207	1422	1753	1239	1581	1928	1597	1885	2440	2011	2310	2867
4500	971	1115	1228	1266	1493	1839	1300	1659	2023	1676	1978	2560	2110	2424	3008
4700	1017	1168	1285	1325	1563	1926	1361	1737	2118	1755	2071	2680	2209	2538	3149
4750	1040	1194	1314	1355	1598	1969	1392	1776	2166	1794	2118	2740	2259	2595	3220
4900	1062	1220	1343	1385	1633	2012	1423	1815	2213	1833	2164	2800	2308	2652	3291
5000	1085	1246	1372	1415	1668	2055	1453	1854	2261	1873	2210	2860	2358	2709	3361

Outputs for stainless steel and wooden grilles/weights and water capacity/dimensions/item numbers

Intratherm FMK – outputs for stainless steel and wooden grille

The maximum length of the convector is unlimited. Convectors over 3500 mm in length can be created by fitting together multiple modules and feature at least two heat exchangers.
For heat output, measured in accordance with EN 442; coefficients for converting heat output – see page 352.

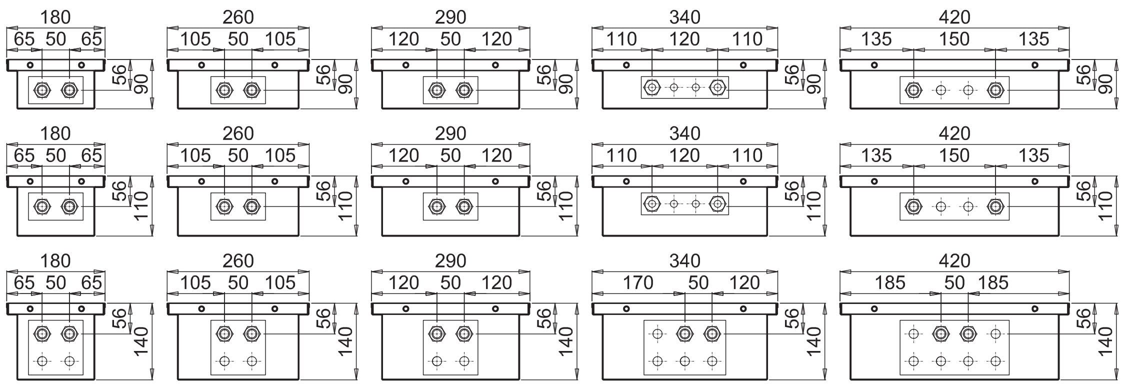
All heat outputs shown relate to the aluminium version. In the case of stainless steel and wooden grilles, the heat output value needs to be multiplied by a correction factor (see adjacent table).

Grille	Free cross-section (%)	Correction factor (-)
Aluminium	0,71	1,00
Wood	0,58	0,95
Stainless steel	0,58	0,95

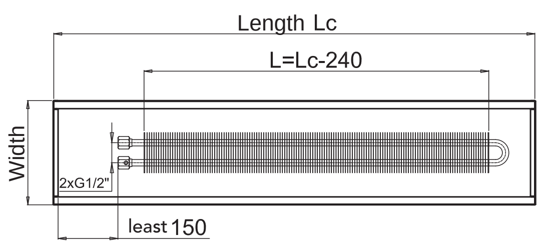
Intratherm FMK – Weight and water capacity

Width (mm)	180			260			290			340			420		
Height (mm)	90	110	140	90	110	140	90	110	140	90	110	140	90	110	140
Weight (kg/m)	5,9	6,1	7,8	6,4	6,7	8,4	6,9	7,1	8,8	8,0	8,3	10,8	9,9	10,2	14,1
Water capacity (l/m)	0,3	0,3	0,7	0,3	0,3	0,7	0,3	0,3	0,7	0,4	0,4	1,0	0,7	0,7	1,4

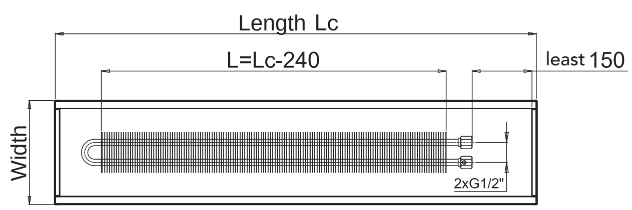
Intratherm FMK – Dimensions



Connection from the left



Connection from the right



The convector connection can be selected at the installation site itself by turning the heat exchanger.

For details regarding control and the recommended circuit diagrams, see page 340.

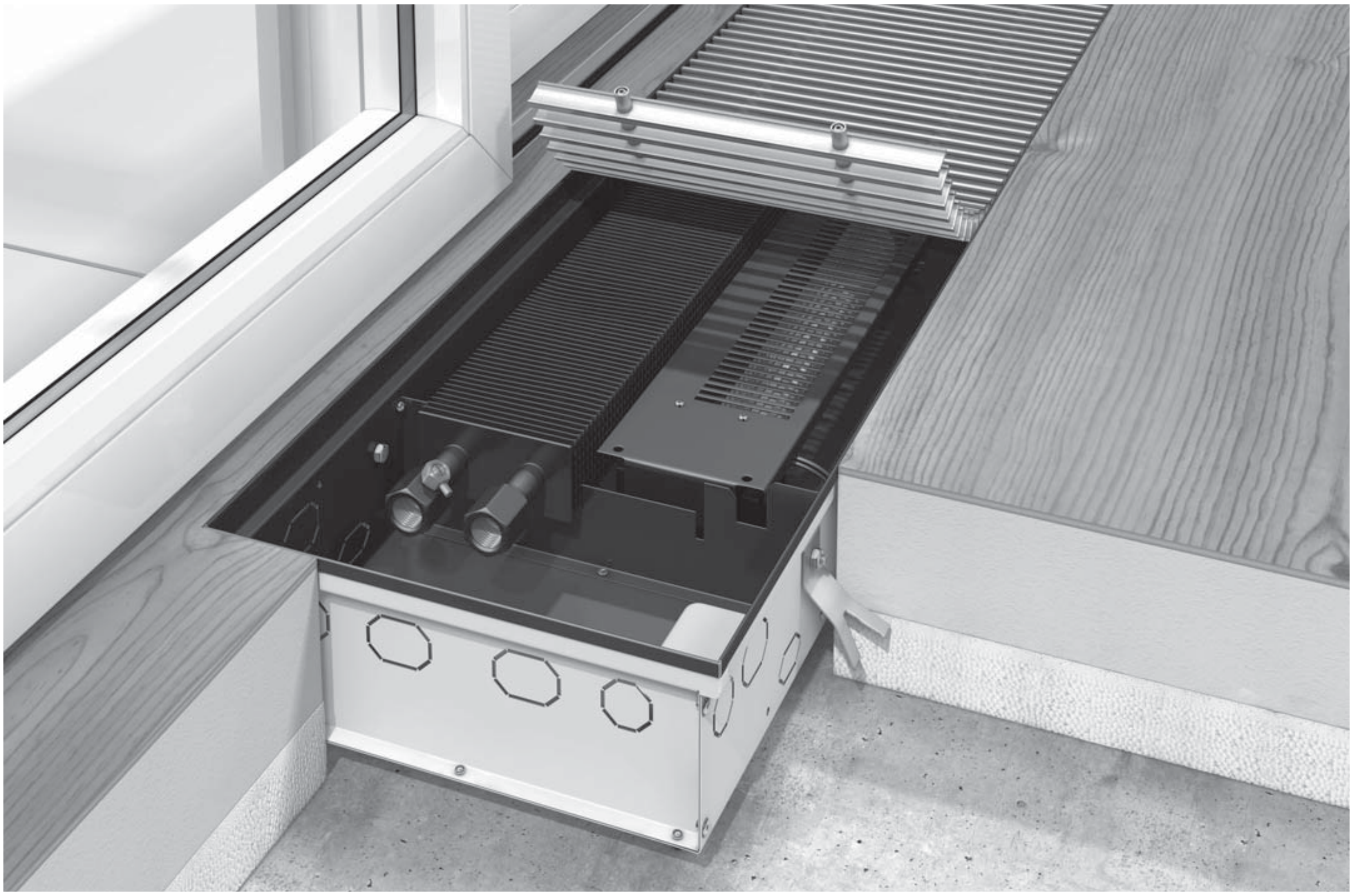
For a choice of accessories, see price list.

Correction factor for conversion of heat output
For a table with correction factors for converting the heat output, see page 352.

Pressure losses
For diagrams of pressure losses of the heat exchanger for convectors, see page 353.

INTRATHERM F1T.

Efficient basic version with 12 V cross-flow fan (EC motor) for heating



This new generation of Intratherm F1T Trench convectors succeeds the original series of FMT convectors with fans. It offers a cost-effective variant with increased heat output, reduced noise level and minimal operating costs. The length of the fan has been chosen in such a way that the largest possible area of the heat exchanger is supplied with air. The heat output of the convector can be controlled either by hot water or by the air from the fan. All fans are fitted with energy-saving 12 V EC motors.

- 2 standard heights (90 and 140 mm)
- 3 standard widths (260, 290 and 340 mm)
- Lengths from 800 mm

Technical specification:
- Heat output, measured in accordance with EN 442
- Test overpressure 13 bar
- Max. operating overpressure 10 bar
- Maximum operating pressure 110 °C

Benefits of the new technical solution
- Effective use of the space inside the trench
- Optimised length of fan relative to the heat exchanger
- Increase in heat output
- Reduction of the price of the convector, in relation to heat output
- Considerable reduction in electrical power used by the convector
- Considerable reduction in operating costs
- Reduction of the noise level

DIN EN 442 EN ISO 9001 CE EN 442 GEPRÜFT DIE neue WÄRME

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Intratherm F1T – efficient basic variant with 12V cross-flow fan (EC motor) for heating

Intratherm F1T standard delivery includes:

- A trench consisting of a plate galvanized on both sides and coated in RAL 9005 Black
- Front and side components of the trench with perforations for the water connection and feeding the cable, which enable the heat exchanger and fan to be connected from the right and the left
- Fully corrosion-proof copper/aluminium heat exchanger with minimal water content, with air vent, coated in RAL 9005 Black
- Cross-flow fan with 12 V EC motor
- EC fan drive with minimal electrical consumption
- Cover plate for the water connection
- All trench components coated in RAL 9005 Black as standard
- Wooden cover plate, which protects the trench, the heat exchanger and the fan during transport and installation
- Accessories supplied as standard: setting screws M8 x 30 for setting the position of the trench, floor screed anchors for the fixing of the trench into the concrete, rubber bushings for the perforations, flexible stainless steel connecting hoses with seal, anchor brackets for setting the trench height
- Impact-noise insulation between the grille and the trench

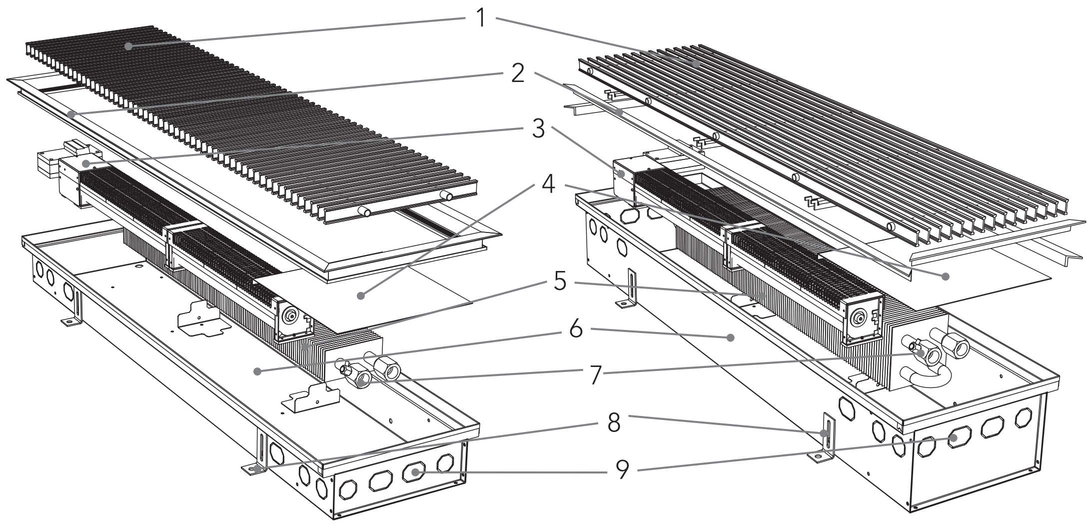
Extras:

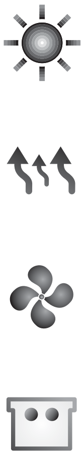
- Trench made from brushed stainless steel plate
- Accessories: thermostatic valve, lockshield valve, thermostatic head with remote controller, adjusting drive, room thermostat with speed setting switch
- Insulation of the trench floor, three-sided insulation of the trench
- Coatings for the trench, heat exchanger and other components in a different RAL colour

Construction of the Intratherm F1T Trench convector

F1T 260 x 1250 x 90 mm with an aluminium roll-up grille and Z-frame

F1T 260 x 1250 x 140 mm with an aluminium linear grille and L-frame





Key

1 Roll-up grille or linear grille
2 Frame (O, U, L, Z)
3 Fan
4 Cover plate
5 Fins of heat exchanger
6 Convector trench
7 Air vent
8 Adjustable anchor brackets
9 Perforations

Due to the nature of their construction, linear grilles are only suitable for the 140 mm height.

Intratherm F1T – Outputs

- Convector lengths are available accurate to within 1 cm
- Lengths over 5 m available upon request

Width (mm)		260						290						340					
Height (mm)		90			140			90			140			90			140		
Revolution speed		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Length (mm)		Heat output [W] at 75/65/20 °C																	
800		468	617	781	685	902	1142	610	803	1016	898	1182	1496	714	940	1190	1016	1338	1693
900		552	727	920	808	1063	1346	718	946	1197	1058	1393	1763	841	1108	1402	1197	1576	1996
1000		636	837	1060	930	1225	1550	827	1089	1379	1218	1604	2030	969	1275	1614	1379	1815	2298
1100		719	947	1199	1052	1386	1754	936	1233	1560	1379	1815	2298	1096	1443	1827	1560	2054	2600
1200		845	1112	1408	1236	1627	2060	1045	1376	1742	1619	2131	2698	1288	1695	2146	1832	2413	3054
1250		845	1112	1408	1236	1627	2060	1045	1376	1742	1619	2131	2698	1288	1695	2146	1832	2413	3054
1300		887	1167	1478	1297	1708	2162	1154	1519	1923	1699	2237	2832	1351	1779	2252	1923	2532	3205
1400		929	1223	1548	1358	1789	2264	1208	1591	2014	1779	2343	2966	1415	1863	2358	2014	2651	3356
1500		1054	1388	1757	1542	2030	2570	1372	1806	2286	2020	2659	3366	1606	2114	2677	2286	3010	3810
1600		1054	1388	1757	1542	2030	2570	1372	1806	2286	2020	2659	3366	1606	2114	2677	2286	3010	3810
1700		1221	1608	2035	1787	2352	2978	1589	2093	2649	2340	3082	3901	1861	2450	3101	2649	3487	4414
1750		1221	1608	2035	1787	2352	2978	1589	2093	2649	2340	3082	3901	1861	2450	3101	2649	3487	4414
1800		1305	1718	2175	1909	2514	3182	1698	2236	2830	2501	3293	4168	1988	2618	3314	2830	3726	4717
1900		1305	1718	2175	1909	2514	3182	1698	2236	2830	2501	3293	4168	1988	2618	3314	2830	3726	4717
2000		1472	1938	2454	2154	2836	3590	1916	2522	3193	2821	3715	4702	2243	2954	3739	3193	4204	5321
2100		1556	2049	2593	2276	2997	3794	2025	2666	3374	2982	3926	4969	2371	3121	3951	3374	4443	5624
2200		1640	2159	2733	2399	3158	3998	2134	2809	3556	3142	4137	5236	2498	3289	4164	3556	4682	5926
2250		1640	2159	2733	2399	3158	3998	2134	2809	3556	3142	4137	5236	2498	3289	4164	3556	4682	5926
2300		1640	2159	2733	2399	3158	3998	2134	2809	3556	3142	4137	5236	2498	3289	4164	3556	4682	5926
2400		1723	2269	2872	2521	3319	4202	2242	2952	3737	3302	4348	5504	2626	3457	4376	3737	4921	6229
2500		1890	2489	3151	2766	3642	4610	2460	3239	4100	3623	4770	6038	2880	3793	4801	4100	5398	6833
2600		1974	2599	3290	2888	3803	4813	2569	3382	4282	3783	4981	6305	3008	3960	5013	4281	5637	7136
2700		2058	2709	3430	3010	3964	5017	2678	3526	4463	3943	5192	6572	3135	4128	5226	4463	5876	7438
2750		2058	2709	3430	3010	3964	5017	2678	3526	4463	3943	5192	6572	3135	4128	5226	4463	5876	7438
2800		2058	2709	3430	3010	3964	5017	2678	3526	4463	3943	5192	6572	3135	4128	5226	4463	5876	7438
2900	Galvanized*	2141	2820	3569	3133	4125	5221	2787	3669	4644	4104	5403	6840	3263	4296	5438	4644	6115	7740
3000		2309	3040	3848	3378	4447	5629	3004	3956	5007	4424	5825	7374	3518	4632	5863	5007	6593	8345
3100		2309	3040	3848	3378	4447	5629	3004	3956	5007	4424	5825	7374	3518	4632	5863	5007	6593	8345
3200		2392	3150	3987	3500	4608	5833	3113	4099	5189	4585	6036	7641	3645	4800	6075	5188	6831	8647
3250		2476	3260	4127	3622	4769	6037	3222	4242	5370	4745	6247	7908	3773	4967	6288	5370	7070	8950
3300		2476	3260	4127	3622	4769	6037	3222	4242	5370	4745	6247	7908	3773	4967	6288	5370	7070	8950
3400		2643	3480	4406	3867	5092	6445	3440	4529	5733	5066	6670	8443	4028	5303	6713	5733	7548	9554
3500		2643	3480	4406	3867	5092	6445	3440	4529	5733	5066	6670	8443	4028	5303	6713	5733	7548	9554
3600		2811	3701	4684	4112	5414	6853	3657	4816	6096	5386	7092	8977	4283	5639	7138	6096	8026	10159
3700		2811	3701	4684	4112	5414	6853	3657	4816	6096	5386	7092	8977	4283	5639	7138	6096	8026	10159
3750		2811	3701	4684	4112	5414	6853	3657	4816	6096	5386	7092	8977	4283	5639	7138	6096	8026	10159
3800		2811	3701	4684	4112	5414	6853	3657	4816	6096	5386	7092	8977	4283	5639	7138	6096	8026	10159
3900		2811	3701	4684	4112	5414	6853	3657	4816	6096	5386	7092	8977	4283	5639	7138	6096	8026	10159
4000		2944	3877	4907	4308	5672	7179	3832	5045	6386	5643	7429	9404	4486	5907	7477	6386	8408	10643
4100		3028	3987	5047	4430	5833	7383	3940	5188	6567	5803	7640	9671	4614	6075	7690	6567	8647	10945
4200		3112	4097	5186	4552	5994	7587	4049	5332	6749	5963	7852	9939	4741	6243	7902	6749	8886	11248
4250		3112	4097	5186	4552	5994	7587	4049	5332	6749	5963	7852	9939	4741	6243	7902	6749	8886	11248
4300		3112	4097	5186	4552	5994	7587	4049	5332	6749	5963	7852	9939	4741	6243	7902	6749	8886	11248
4400		3279	4317	5465	4797	6316	7995	4267	5618	7112	6284	8274	10473	4996	6578	8327	7111	9363	11852
4500		3279	4317	5465	4797	6316	7995	4267	5618	7112	6284	8274	10473	4996	6578	8327	7111	9363	11852
4600		3279	4317	5465	4797	6316	7995	4267	5618	7112	6284	8274	10473	4996	6578	8327	7111	9363	11852
4700		3363	4428	5605	4920	6477	8199	4376	5762	7293	6444	8485	10740	5124	6746	8540	7293	9602	12155
4750		3530	4648	5883	5164	6800	8607	4594	6048	7656	6765	8907	11275	5379	7082	8964	7656	10080	12759
4800		3530	4648	5883	5164	6800	8607	4594	6048	7656	6765	8907	11275	5379	7082	8964	7656	10080	12759
4900		3614	4758	6023	5287	6961	8811	4702	6192	7837	6925	9118	11542	5506	7250	9177	7837	10319	13062
5000		3781	4978	6302	5531	7283	9219	4920	6478	8200	7246	9540	12076	5761	7585	9602	8200	10797	13667

* Floor trench coated in RAL 9005 Black (epoxy polyester coating), made from galvanized steel on both sides

Outputs for versions with stainless steel and wooden grilles/weights and water capacity/dimensions

Intratherm F1T – Outputs

The maximum length of the convector is unlimited. Convectors over 3500 mm in length can be created by fitting together multiple modules and feature at least two heat exchangers.

Heat output, measured in accordance with EN 442; coefficients for converting heat output – see page 352.

All heat outputs shown relate to the aluminium version. In the case of stainless steel and wooden grilles, the heat output value needs to be multiplied by a correction factor (see adjacent table).

Grille	Free cross-section (%)	Correction factor (-)
Aluminium	0,71	1,00
Wood	0,58	0,95
Stainless steel	0,58	0,95

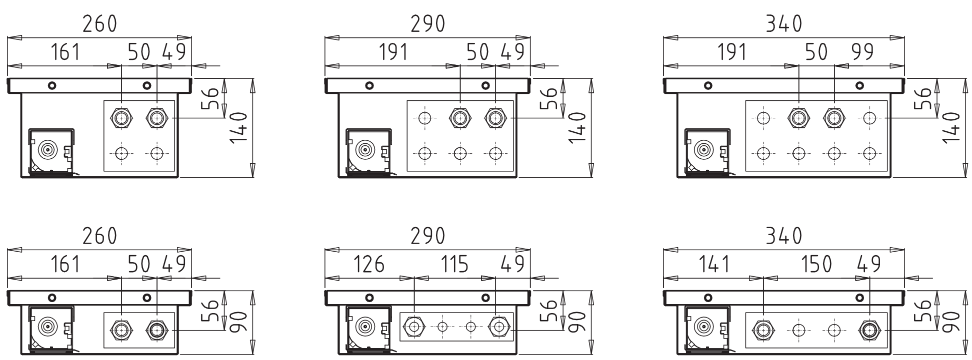
Intratherm F1T – electric output

Convector length (mm)	800 - 1900	2000 - 3500	3600 - 3900	4000 - 7000
Number of fans	1	2	3	4
Electric output (VA)	10	20	30	40

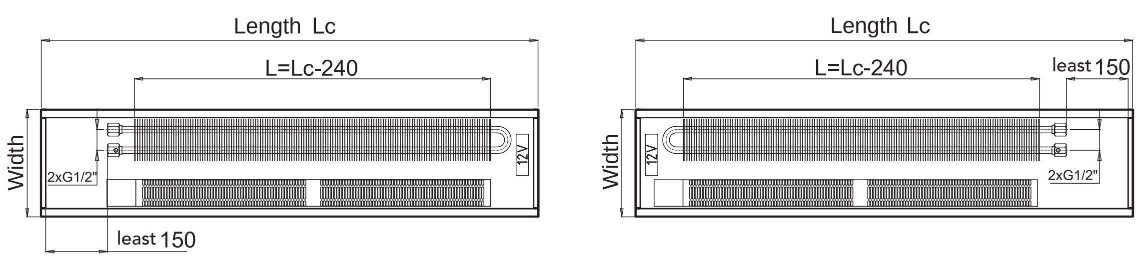
Intratherm F1T – Weight and water capacity

Width (mm)	260		290		340	
Height (mm)	90	140	90	140	90	140
Weight (kg/m)	7,8	9,7	8,7	11,2	10,1	13,9
Water capacity (l/m)	0,3	0,7	0,4	1,0	0,7	1,4

Intratherm F1T – Dimensions



Connection from the left **Connection from the right**



The convector connection can be selected at the installation site itself by turning the heat exchanger.

Intratherm F1T – sound level L_{pA}													
Convector length	**(mm)**	800 - 900	1000 - 1400	1500 - 1900	2000 - 2250	2300 - 2700	2750 - 3500	3550 - 3900	3950 - 4700	4750 - 4900	4950 - 5150	5200 - 5350	5400 - 7000
Number of impellers	**(-)**	1	2	3	4	5	6	7	8	9	10	11	12
Revolution speed 3	**dB(A)**	27,1	28,2	29	29,7	30,3	30,9	31,3	31,8	32,2	32,5	32,8	33,1
Revolution speed 2	**dB(A)**	25,5	26,6	27,4	28,1	28,7	29,3	29,7	30,2	30,5	30,9	31,2	31,5
Revolution speed 1	**dB(A)**	17	18,1	18,9	19,6	20,2	20,8	21,2	21,7	22	22,4	22,7	23

Sound level L_{pA} in dB(A) at a distance of 1 m from the convector

The convector connection can be selected at the installation site itself by turning the heat exchanger.

For details regarding control and the recommended circuit diagrams, see page 340.

For a choice of accessories, see price list.

Correction factor for conversion of heat output
For a table with correction factors for converting the heat output, see page 352.

Pressure losses
For diagrams of pressure losses of the heat exchanger for convectors, see page 353.

INTRATHERM F1P.

An even more efficient variant with 12V tangential fan (EC motor) for heating

The Intratherm F1P Trench convectors succeed the original series of FPT convectors with fans. They offer a cost-effective variant with increased heat output, reduced noise level and minimal operating costs. The length of the fan has been chosen in such a way that the largest possible area of the heat exchanger is supplied with air. The heat output of the convector can be controlled either by hot water or by the air from the fan. All fans are fitted with energy-saving 12 V EC motors.

- Standard height 90 mm
- 2 standard widths (180, 260 mm)
- Lengths from 800 mm

Technical specification:
- Heat output, measured in accordance with EN 442
- Test overpressure 13 bar
- Max. operating overpressure 10 bar
- Maximum operating pressure 110 °C

Benefits of the new technical solution
- Effective use of the space inside the trench
- Optimised length of fan relative to the heat exchanger
- Increase in heat output
- Reduction of the price of the convector, in relation to heat output (see F1T)
- Considerable reduction in electrical power used by the convector
- Considerable reduction in operating costs
- Reduction of the noise level

DIN EN EURONORM 442 · EN ISO 9001 · CE · EN 442 GEPRÜFT · 55/45 DIE neue WÄRME

Guarantee statements are available to download at **www.vogelundnoot.com/download**

Intratherm F1P – even more efficient variant with 12V tangential fan (EC motor) for heating

Intratherm F1P standard delivery includes:

- A trench made of steel, galvanized on both sides and coated in RAL 9005 Black
- Front and side components of the trench with perforations for the water connection and feeding the cable, enabling the heat exchanger and fan to be connected from the right and the left
- Fully corrosion-proof copper/aluminium heat exchanger with minimal water content, with air vent, coated in RAL 9005 Black
- Tangential fan with 12 V EC motor
- EC fan drive with minimal electrical consumption
- Cover plate for the water connection
- All trench components coated in RAL 9005 Black as standard
- Wooden cover plate, which protects the trench, the heat exchanger and the fan during transport and installation
- Accessories supplied as standard: setting screws M8 x 30 for setting the position of the trench, floor screed anchor for fixing the trench into the concrete, rubber bushings for the perforations, flexible stainless steel connecting hoses with seal, anchor brackets for setting the trench height
- Impact-noise insulation between the grille and the trench

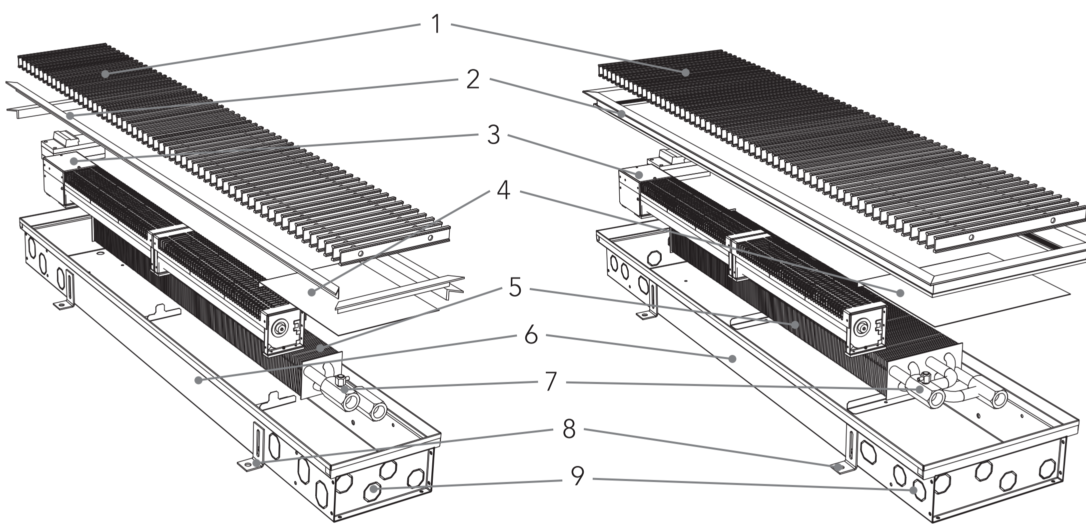
Extras:

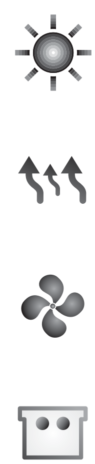
- Trench made from brushed stainless steel sheeting
- Accessories: thermostatic valve, lockshield valve, thermostatic head with remote controller, adjusting drive, room thermostat with speed setting switch
- Insulation of the trench floor, three-sided insulation of the trench
- Coatings for the trench, heat exchanger and other components in a different RAL colour

Construction of the Intratherm F1P Trench convector

F1P 180 x 1250 x 90 mm with an aluminium roll-up grille with L-frame

F1P 260 x 1250 x 140 mm with an aluminium linear grille and Z-frame





Key

1 Roll-up grille
2 Frame (O, U, L, Z)
3 Fan
4 Cover plate
5 Fins of the heat exchanger
6 Convector trench
7 Air vent
8 Adjustable anchor brackets
9 Perforations

Due to the nature of the construction, the 90 mm height only allows for the use of roll-up grilles.

Intratherm F1P – Outputs

- Convector lengths are available accurate to within 1 cm
- Lengths over 5 m available upon request

Width (mm)		180			260		
Height (mm)		90			90		
Revolution speed		1	2	3	1	2	3
Length (mm)		Heat output [W] at 75/65/20 °C					
800	Galvanized*	395	520	659	579	762	965
900	Galvanized*	395	520	659	579	762	965
1000	Galvanized*	625	823	1041	915	1205	1525
1100	Galvanized*	625	823	1041	915	1205	1525
1200	Galvanized*	625	823	1041	915	1205	1525
1250	Galvanized*	855	1125	1424	1252	1648	2086
1300	Galvanized*	855	1125	1424	1252	1648	2086
1400	Galvanized*	855	1125	1424	1252	1648	2086
1500	Galvanized*	1084	1428	1807	1588	2091	2647
1600	Galvanized*	1084	1428	1807	1588	2091	2647
1700	Galvanized*	1084	1428	1807	1588	2091	2647
1750	Galvanized*	1314	1730	2190	1925	2534	3208
1800	Galvanized*	1314	1730	2190	1925	2534	3208
1900	Galvanized*	1314	1730	2190	1925	2534	3208
2000	Galvanized*	1544	2033	2573	2261	2977	3769
2100	Galvanized*	1544	2033	2573	2261	2977	3769
2200	Galvanized*	1544	2033	2573	2261	2977	3769
2250	Galvanized*	1774	2335	2956	2598	3420	4329
2300	Galvanized*	1774	2335	2956	2598	3420	4329
2400	Galvanized*	1774	2335	2956	2598	3420	4329
2500	Galvanized*	2003	2638	3339	2934	3863	4890
2600	Galvanized*	2003	2638	3339	2934	3863	4890
2700	Galvanized*	2003	2638	3339	2934	3863	4890
2750	Galvanized*	2233	2940	3722	3271	4306	5451
2800	Galvanized*	2233	2940	3722	3271	4306	5451
2900	Galvanized*	2233	2940	3722	3271	4306	5451

Width (mm)		180			260		
Height (mm)		90			90		
Revolution speed		1	2	3	1	2	3
Length (mm)		Heat output [W] at 75/65/20 °C					
3000	Galvanized*	2463	3243	4105	3607	4749	6012
3100	Galvanized*	2463	3243	4105	3607	4749	6012
3200	Galvanized*	2463	3243	4105	3607	4749	6012
3250	Galvanized*	2693	3545	4488	3944	5192	6573
3300	Galvanized*	2693	3545	4488	3944	5192	6573
3400	Galvanized*	2693	3545	4488	3944	5192	6573
3500	Galvanized*	2693	3545	4488	3944	5192	6573
3600	Galvanized*	2693	3545	4488	3944	5192	6573
3700	Galvanized*	2858	3763	4763	4186	5511	6976
3750	Galvanized*	2858	3763	4763	4186	5511	6976
3800	Galvanized*	2858	3763	4763	4186	5511	6976
3900	Galvanized*	2858	3763	4763	4186	5511	6976
4000	Galvanized*	3088	4066	5146	4522	5954	7537
4100	Galvanized*	3088	4066	5146	4522	5954	7537
4200	Galvanized*	3088	4066	5146	4522	5954	7537
4250	Galvanized*	3317	4368	5529	4859	6397	8098
4300	Galvanized*	3317	4368	5529	4859	6397	8098
4400	Galvanized*	3317	4368	5529	4859	6397	8098
4500	Galvanized*	3547	4671	5912	5195	6840	8659
4600	Galvanized*	3547	4671	5912	5195	6840	8659
4700	Galvanized*	3547	4671	5912	5195	6840	8659
4750	Galvanized*	3777	4973	6295	5532	7284	9220
4800	Galvanized*	3777	4973	6295	5532	7284	9220
4900	Galvanized*	3777	4973	6295	5532	7284	9220
5000	Galvanized*	4007	5275	6678	5868	7727	9780

* Floor trench coated in RAL 9005 Black (epoxy polyester coating), made from steel, galvanized on both sides.

Intratherm F1P - Outputs

The maximum length of the convector is unlimited. Convectors over 3500 mm in length can be created by fitting together multiple modules and feature at least two heat exchangers.

Heat output, measured in accordance with EN 442; coefficients for converting heat output – see page 352.

All heat outputs shown relate to the aluminium version. In the case of stainless steel and wooden grilles, the heat output value needs to be multiplied by a correction factor (see adjacent table).

Grille	Free cross-section (%)	Correction factor (-)
Aluminium	0,71	1,00
Wood	0,58	0,95
Stainless steel	0,58	0,95

INTRATHERM F1P

Outputs/electrical power/weights and water capacity/dimensions/sound level/item numbers

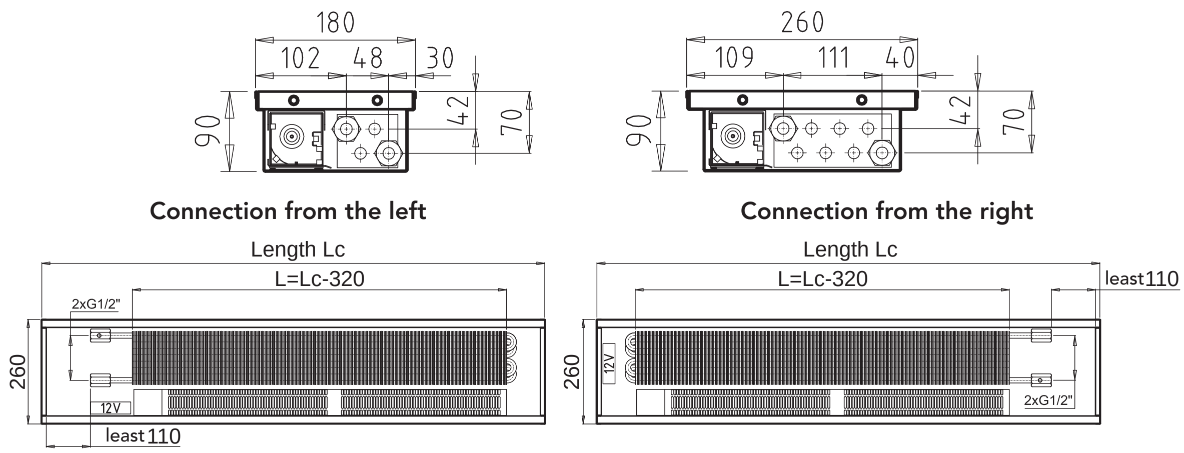
Intratherm F1P – electrical power

Convector length (mm)	800 - 1900	2000 - 3500	3600 - 3900	4000 - 7000
Number of fans	1	2	3	4
Electrical power	10	20	30	40

Intratherm F1P – Weight and water capacity

Width (mm)	180	260
Height (mm)	90	90
Weight kg/m)	7,2	9,0
Water capacity (l/m)	0,4	0,7

Intratherm F1P – Dimensions



The convector connection can be selected at the installation site itself by turning the heat exchanger.

Intratherm F1T – sound level L_{pA}

Convector length	(mm)	800 - 900	1000 - 1400	1500 - 1900	2000 - 2250	2300 - 2700	2750 - 3500	3550 - 3900	3950 - 4700	4750 - 4900	4950 - 5150	5200 - 5350	5400 - 7000
Number of impellers	(-)	1	2	3	4	5	6	7	8	9	10	11	12
Revolution speed 3	dB(A)	27,1	28,2	29	29,7	30,3	30,9	31,3	31,8	32,2	32,5	32,8	33,1
Revolution speed 2	dB(A)	25,5	26,6	27,4	28,1	28,7	29,3	29,7	30,2	30,5	30,9	31,2	31,5
Revolution speed 1	dB(A)	17	18,1	18,9	19,6	20,2	20,8	21,2	21,7	22	22,4	22,7	23

Sound level L_{pA} in dB(A) at a distance of 1 m from the convector

The convector connection can be selected at the installation site itself by turning the heat exchanger.

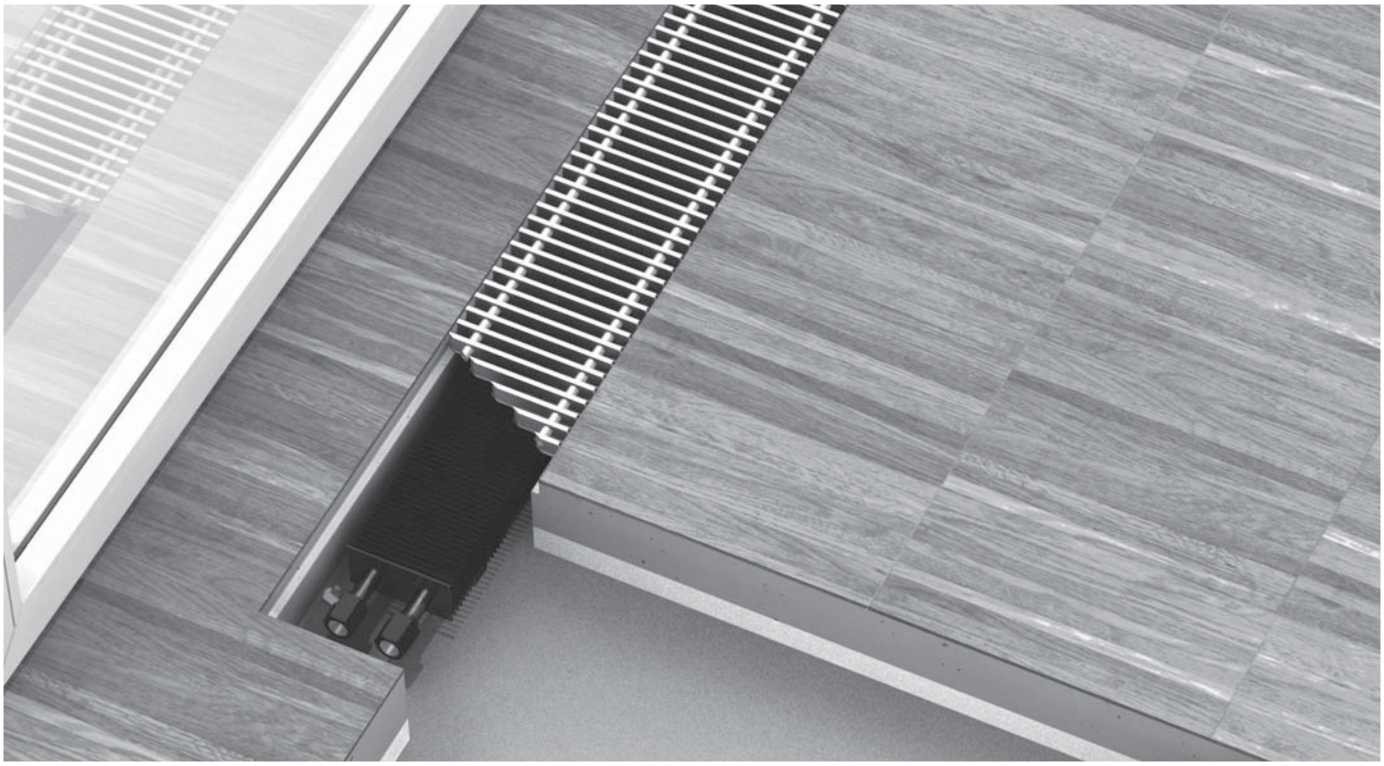
For details regarding control and recommended circuit diagrams, see page 340.

For a choice of accessories, see price list.

Correction factor for conversion of heat output
For a table with correction factors for converting the heat output, see page 352.

Pressure losses
For diagrams of pressure losses of the heat exchanger for convectors, see page 353.

INDIVIDUAL HEAT EXCHANGERS.



Heat exchangers

In view of a variety of individual requirements expressed by our customers, we have expanded our product range to include individual heat exchangers that are installed in the Intratherm Trench convectors as standard. The individually installed heat exchangers are suitable for use in reconstructions of cellars, loft spaces or attics, as well as for installation in window sills or for installation in channels or gutters. Consoles for the installation of heat exchangers in floors or in the wall are also supplied as accessories with the heat exchangers.

Models and designs of heat exchangers

The standard range of heat exchangers comprises 125 combinations of dimensions, which equates to 5 models of heat exchanger in 25 lengths ranging from 675 mm to 3375 mm. The LVF 09 and 19 and LVR 10, 15 and 20 heat exchangers are the basic models. The heat exchangers in the LVF series, with an overall height of 50 mm and a width of 100 or 200 mm are suitable for use wherever it is necessary to minimise the height of the construction. The LVR series of heat exchangers, with a uniform height of 100 mm and available in widths of 100, 150 and 200 mm, are suitable for use in cases where higher heat output is required. All heat exchangers come with copper pipes and aluminium plate-fins. They can be supplied with a coating in RAL 9005 Black upon request. Every heat exchanger features an air vent and two connections with a G 1/2” female screw thread.

Technical specification:
- Heat output, measured in accordance with EN 442
- Test overpressure 13 bar
- Max. operating overpressure 10 bar
- Maximum operating temperature 110 °C
- Installation of the heat exchanger to an enclosed hot water system

Outputs

Length of heat exchanger L_1 (mm)	Finned length of heat exchanger (mm)	LVF-09	LVF-19	LVR-10	LVR-15	LVR-20
		50 x 100 mm	**50 x 200 mm**	**100 x 100 mm**	**100 x 150 mm**	**100 x 200 mm**
		Heat output [W] at 75/65/20 °C				
675	560	327	732	505	739	963
775	660	368	824	569	831	1083
875	760	408	915	632	923	1203
975	860	449	1007	695	1016	1324
1075	960	490	1098	758	1108	1444
1175	1060	531	1190	821	1200	1564
1275	1160	572	1281	884	1293	1685
1375	1260	613	1373	948	1385	1805
1475	1360	653	1464	1011	1477	1925
1575	1460	694	1556	1074	1570	2046
1675	1560	735	1647	1137	1662	2166
1775	1660	776	1739	1200	1754	2286
1875	1760	817	1830	1263	1847	2407
1975	1860	858	1922	1327	1939	2527
2075	1960	898	2013	1390	2031	2647
2175	2060	939	2105	1453	2124	2768
2275	2160	980	2196	1516	2216	2888
2375	2260	1021	2288	1579	2308	3008
2475	2360	1062	2379	1642	2401	3129
2575	2460	1103	2471	1706	2493	3249
2775	2660	1184	2654	1832	2678	3490
2875	2760	1225	2745	1895	2770	3610
2975	2860	1266	2837	1958	2862	3730
3175	3060	1348	3020	2085	3047	3971
3375	3260	1429	3203	2211	3232	4212

The height of the casing of LVF-09 and LVF-19 measures 90 mm and the height of the casing of LVR-10, LVR-15 and LVR-20 measures 140 mm. The underside of the heat exchanger sits 100 mm above the floor. The outputs shown relate to 100% free cross-section.

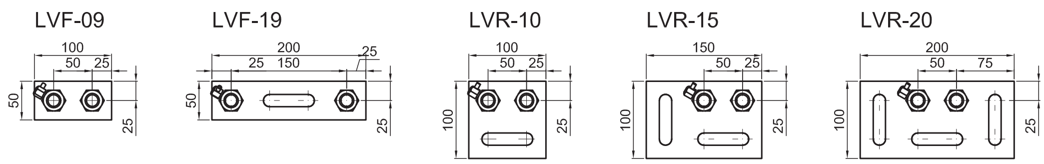
INTRATHERM Individual heat exchangers

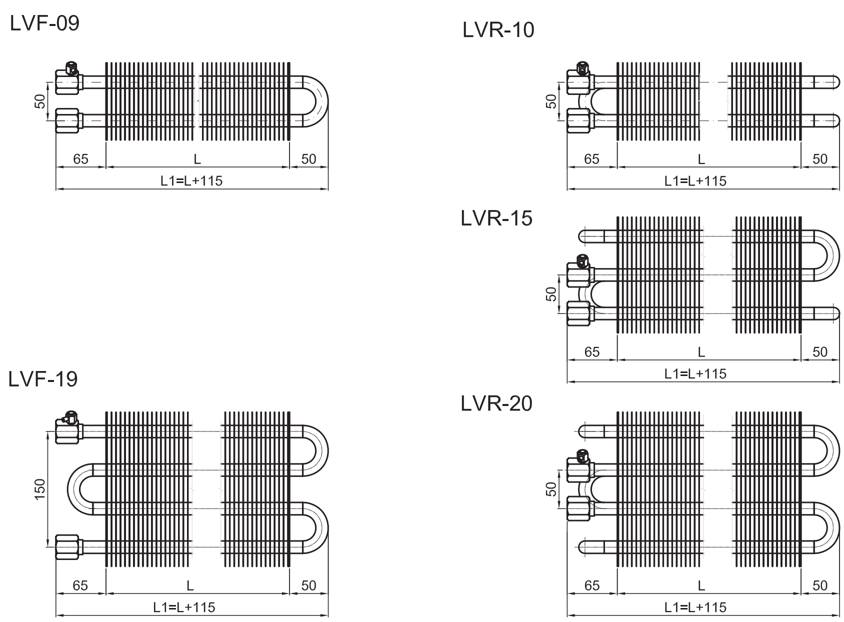
Weight and water capacity/dimensions/item numbers

Weight and water capacity

Heat exchanger type	LVF-09	LVF-19	LVR-10	LVR-15	LVR-20
Weight (kg/m)	1,4	2,6	2,4	3,5	4,6
Water capacity (l/m)	0,3	0,7	0,7	1,0	1,4

Heat exchanger dimensions





The convector connection can be selected at the installation site itself by turning the heat exchanger.

For details regarding control and recommended circuit diagrams, see page 340.

For a choice of accessories, see price list.

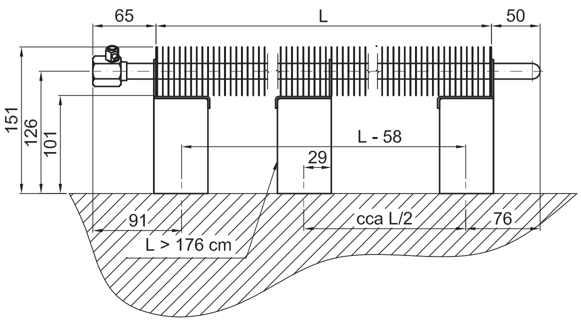
Correction factor for conversion of heat output
For a table with correction factors for converting the heat output, see page 352.

Pressure losses
For diagrams of pressure losses of the heat exchanger for convectors, see page 353.

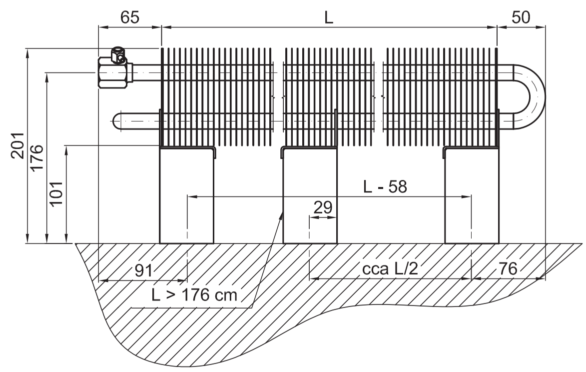
Installation of heat exchangers

Floor bracket

LVF-09 and LVF-19



LVR-10, LVR-15 and LVR-20



Finned lengths >1760 mm (3 fasteners)

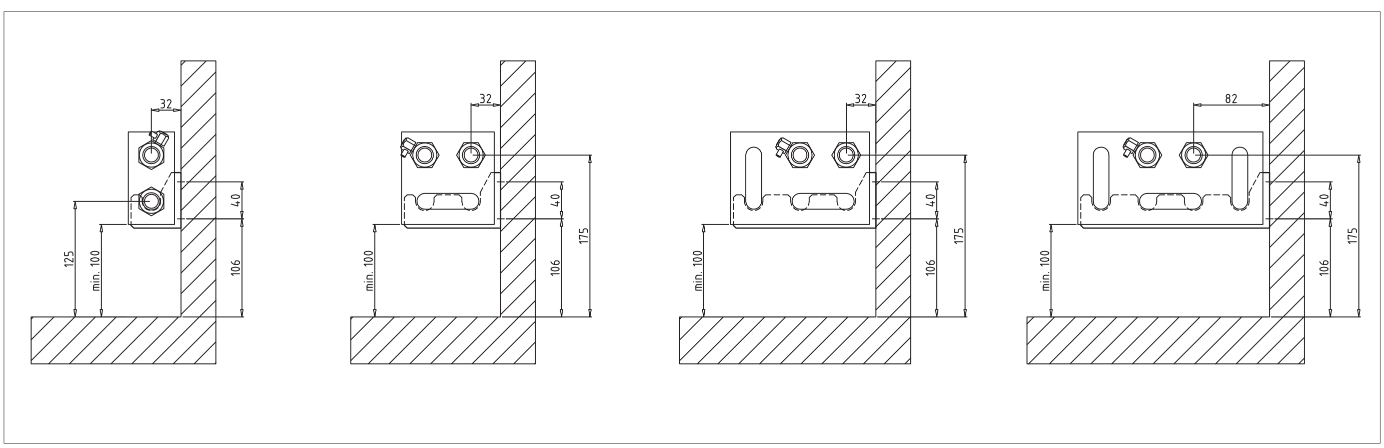
Installation of the individual heat exchangers

- The surrounding material must be able to withstand the local temperature
- The heat exchangers must be installed onto brackets on the floor or on the wall by the installer
- In order to ensure problem-free ventilation, the heat exchanger must be installed in a horizontal position
- In order to guarantee maximum heat output, the free flow of air into and out of the heat exchanger must be ensured; obstructions to the inlet and outlet reduce heat output

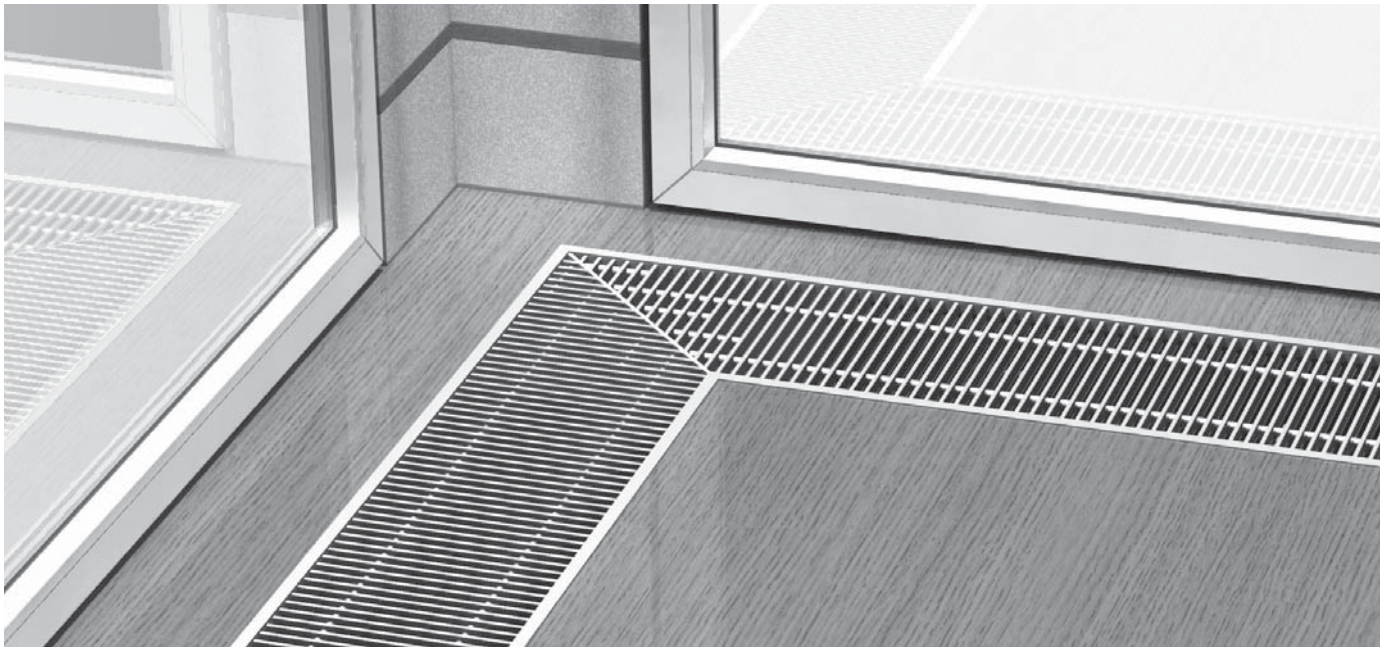
Note

The heat output of heat exchangers built into floor channels is reduced by around 30% compared against the values shown in the output table for a 60% free cross-section of the cover grille.

Wall bracket



COVER GRILLES FOR FLOOR CONVECTORS.



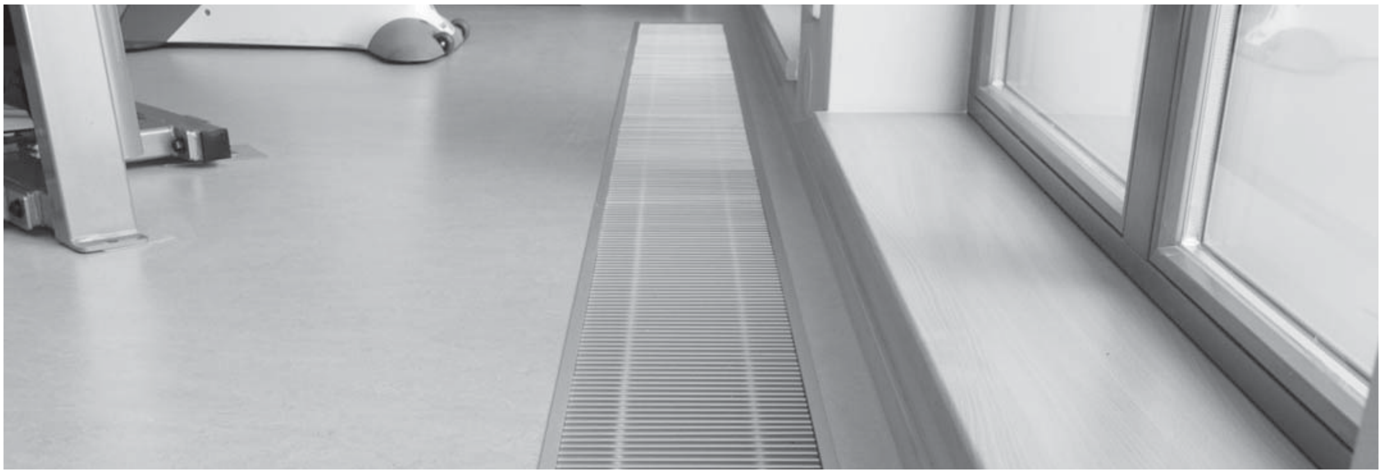
The cover grilles are practically the only visible part of the Trench convectors and for this reason a great deal of attention is paid to the material and the finish of the grilles. Apart from this design aspect, the cover grille also performs technical functions. It ensures even load-bearing, which is spread over the edges of the trench onto the base, while at the same time the shape of the bars determines the air flow. The air flow of the cover grille is characterised by the parameter of the free cross-section of the grille. The cover grilles are supplied separately or together with the convectors. The product range is not restricted to standard dimensions but also provides for special solutions according to customer requirements.

Technical designs

VOGEL&NOOT offers two basic technical variants – roll-up grille or linear grille. In the case of the roll-up grille, the bars and a series of spacer rings are all fixed onto a spring, which enables the grille to roll out. The linear grille cannot be used with trenches greater than 90 mm in height for reasons relating to construction.

Materials

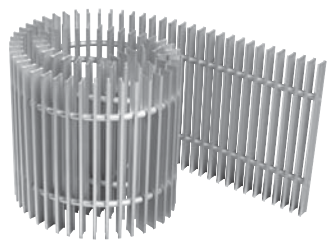
The cover grilles are manufactured from aluminium, stainless steel or wooden bars. All grilles come in the standard height of 20 mm. The grilles made from anodised aluminium are available in the colours natural, dark bronze, light bronze or black as standard. The grilles with wooden bars are available in beech and oak. Both designs can be supplied as untreated, polished or varnished. Dimensional stability cannot be guaranteed for untreated wooden grilles, as they may expand depending on moisture levels.



Overview of cover grilles

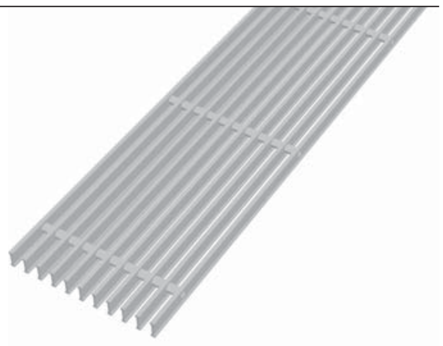
Aluminium roll-up grille
Coloured finish (anodised):
- natural
- light bronze
- dark bronze
- black

Free cross-section: 71%
PMO, PMU, PML, PMZ

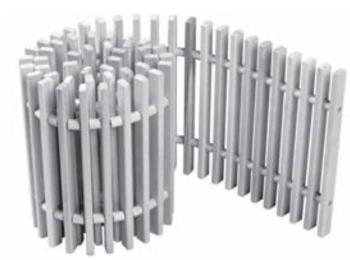


Aluminium linear grille
Coloured finish (anodised):
- natural
- light bronze
- dark bronze
- black

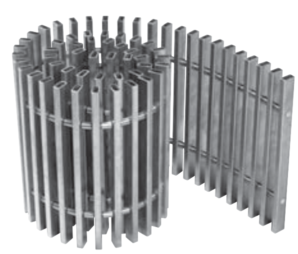
Free cross-section: 71%
Not suitable for use with convectors of 90 mm in height.
PMO, PMU, PML, PMZ



Wooden roll-up grille
Grille with oak or beech bars.
The grille is treated with a protective agent – colourless oil – as standard.
Free cross-section: 58%
PMO, PMU, PML, PMZ



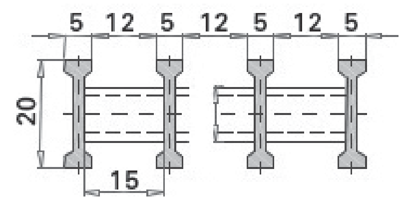
Stainless steel roll-up grille (polished or glass bead-blasted)
Material: 1.4301
Free cross-section: 58%
PMO, PMU, PML, PMZ



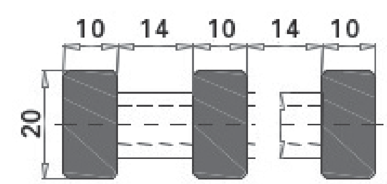
Stainless steel linear grille (polished or glass bead-blasted)
Material: 1.4301
Free cross section: 58%
Not suitable for use with convectors of 90 mm in height.
PMO, PMU, PML, PMZ

Roll-up grille dimensions

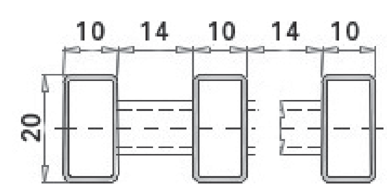
Aluminium roll-up grille and linear grille



Wooden grille (roll-up grille only)



Stainless steel roll-up and linear grille



Bar dimensions and bar spacings are the same for roll-up and linear grilles.

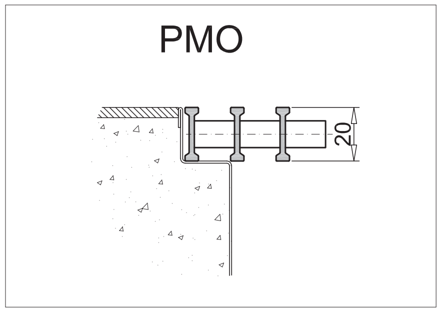
For the overview of colours, see the price list.

Frame designs

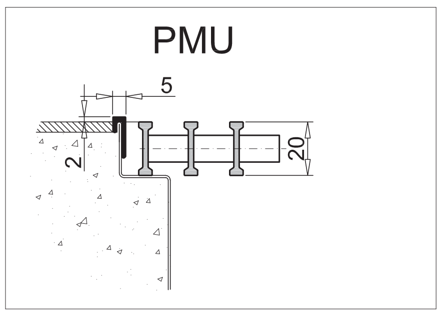
Anodised aluminium frames

The frames are used to cover the intersection between the convector trench and the completed floor. U frames and L-frames are available in the same colours as the aluminium grilles. Z-frames are only available as natural aluminium.

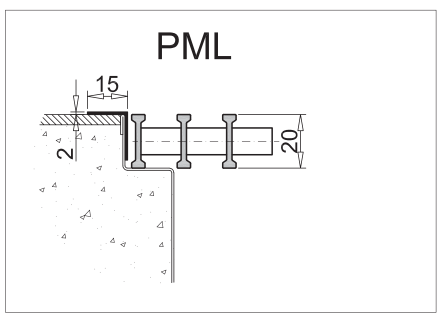
Frameless design



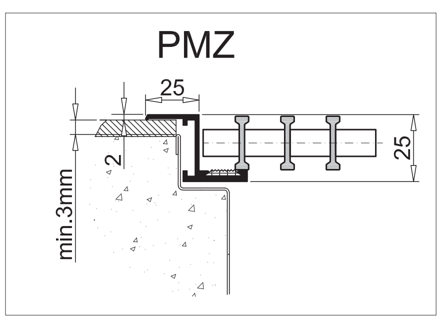
U-frame design



L-frame design



Z-frame design



The Z-frame, L-frame and U-frame must all be ordered together with the grille. It is not possible to place a subsequent order for the frame for a grille that has already been delivered. If using the Z-frame, the trench is to be laid 3-5 mm below the level of the completed floor (see diagram). The Z-frame is delivered as a whole unit that is ready to install. We recommended that the frame is affixed to the floor with silicone sealant.

The L-frame consists of individual profiles that are prepared for mounting on the completed floor. The L frame is affixed on the inside with double-sided adhesive tape.

In the event that the floor trench is damaged or deformed as a result of improper installation, the manufacturer shall not accept any responsibility in relation to the installation of the frame.

INTRATHERM Cover grilles

Material overview/weights

Grille materials

- Natural beech
- Varnished beech
- Natural oak
- Varnished oak

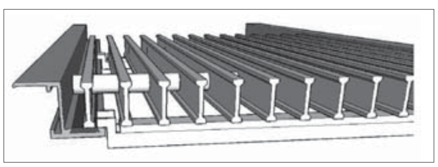
- Natural aluminium
- Black aluminium
- Dark bronze aluminium
- Light bronze aluminium

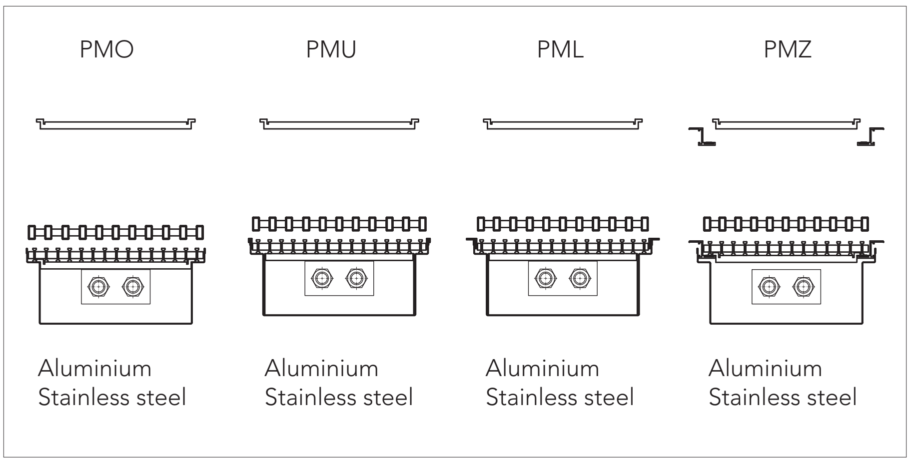
- Stainless steel

For the colour overview, see the price list

Supports for the linear grilles

To prevent warping of the linear grille, the accompanying load-bearing spacers must be used as supports. The load--bearing spacers are laid approximately 30 cm apart. For reasons relating to construction, rigid grilles cannot be used with convectors greater than 90 mm in height (FMK, F1T, F1P).





Grille – Weight

Width (mm)		180				240				260				290				340				420			
Type of grille		PMO	PMU	PML	PMZ	PMO	PMU	PML	PMZ	PMO	PMU	PML	PMZ	PMO	PMU	PML	PMZ	PMO	PMU	PML	PMZ	PMO	PMU	PML	PMZ
Weight (kg/m)	Aluminium	2,0	2,2	2,3	3,1	2,6	2,8	2,9	3,7	2,8	3,0	3,1	3,9	3,1	3,3	3,4	4,2	3,6	3,8	3,9	4,7	4,3	4,6	4,7	5,6
	Beech, oak	1,4	1,6	1,7	2,5	1,8	2,0	2,1	3,0	1,9	2,2	2,3	3,1	2,1	2,4	2,5	3,3	2,4	2,7	2,8	3,7	3,0	3,3	3,4	4,2
	Stainless steel	3,6	3,8	3,9	4,6	4,7	4,9	5,0	5,7	5,1	5,3	5,4	6,0	5,7	5,9	6,0	6,6	6,6	6,8	6,9	7,5	8,0	8,3	8,4	9,0

We reserve the right to amend typing errors and make technical changes. Valid from 1 February 2014.

Controlling the heat output of the Intratherm convector

Note:
1) Installation and start-up is to be carried out by an authorised specialist company
2) During the installation, it must be ensured that the convector is in a voltage-free state
The heat output of the convector can be controlled either by means of hot water or by air (only in the version with a fan). The quantity of hot water is adjusted by the thermostatic valve lift (thermostatic head with remote control setting or adjusting drive controlled by the room thermostat).

Control by means of air (F1T, F1P) is effected by the revolution speed. The revolution speed can be controlled either manually or automatically via a room thermostat.

Type of heat output control – a list of accessories to choose from

	Item no.	Description
1. Heat output control by hot water (FMK)		
1.1	AZAPTH01	Thermostatic head with remote control
1.2	AZAPPT01	Room thermostat
1.3	AZAPTP01, AZAPTP02	Thermal adjusting drive (01 – opened currentless, 02 – closed currentless)
2. Heat output control by air (F1T, F1P)		
2.1	AZAPSP01	Manual fan speed switch
2.2	AZAPPT02	Room thermostat with manual speed switch
2.3	AZAPER05	Room thermostat with automatic speed switch
2.4	AZAPER06	Room thermostat with automatic speed switch and 7-day programmable function

A PAT-controller must always be ordered with a convector for the purpose of controlling the fan revolution speed. The model of controller (transformers) depends on the total number of connected fans and the type of controller (on the surface, flush-mounted or in the trench).

PAT revolution speed controller for F1T and F1P

The control of heat output using fans is always effected by PAT transformers (3-step speed control). The size of the PAT transformers (02, 04, 06 or 08) depends on the number of motors. The number of motors per PAT transformer and the output can be found in the table below. The PAT transformers are available as surface or flush-mounted versions and as a version for fitting in the convector trench.

AZAPATxxM controller

AZAPATxxM transformers can be ordered as either surface or flush-mounted versions, but not as a version for fitting in the convector trench. AZAPATxxM transformers can also be switched on/off in parallel. This offers the option to control multiple convectors simultaneously using a single speed switch. A single speed switch can control up to 200 AZAPATxxM transformers.

Version	Model	Electric output (VA)	Max. number of connectable motors		Cable recommended for connecting the convector	Thermostat	
			F1T (EC)	F1P (EC)	F1T (EC), F1P (EC)	mechanical	electronic
Surface-mounted	AZAPAT02M01	90	8	8	CYKY-O 2x1,5	AZAPSP01 AZAPTP02	AZAPER05 AZAPER06
	AZAPAT04M01	160	15	15	CYKY-O 2x1,5		
	AZAPAT06M01	300	24	24	CYKY-O 2x2,5		
	AZAPAT08M01	300	30	31	CYKY-O 2x2,5		
Unterputz	AZAPAT02M02	90	8	8	CYKY-O 2x1,5		
	AZAPAT04M02	160	15	15	CYKY-O 2x1,5		
	AZAPAT06M02	300	24	24	CYKY-O 2x2,5		

PAT speed controller for F1T and F1P

AZAPATxxT controller
AZAPATxxT transformers are available as a surface- or flush-mounted version. The number of motors per PAT transformer and the output can be found in the table below.

Version	Model	Electric output (VA)	Max. number of connectable motors		Cable recommended for connecting the convector	Thermostat	
			F1T (EC)	F1P (EC)	F1T (EC), F1P (EC) F1T (EC), F1P (EC)	mechanical	electronic
Surface-mounted	AZAPAT02T01	90	8	8	CYKY-O 2x1,5	PSP-01, PTP-02	not possible
	AZAPAT04T01	160	15	15	CYKY-O 2x1,5		not possible
	AZAPAT06T01	300	24	24	CYKY-O 2x2,5		not possible
	AZAPAT08T01	300	30	30	CYKY-O 2x2,5		not possible
Flush-mounted	AZAPAT02T02	90	8	8	CYKY-O 2x1,5		not possible
	AZAPAT04T02	160	15	15	CYKY-O 2x1,5		not possible
	AZAPAT06T02	300	24	24	CYKY-O 2x2,5		not possible
in the convector trench	AZAPAT02T041	90	8	8	CYKY-J 5x1,5 (1 Leiter für die Erdung der Wanne)		not possible
	AZAPAT04T041	160	15	15			not possible
	AZAPAT06T041	300	24	24			not possible

Note:
The AZAPATxxT speed controllers cannot be operated with the AZAPER05 and AZAPER06 thermostats.
The AZAPATxxT speed controllers cannot be switched on/off in parallel.

The AZAPATxxT041 controller
- Transformer in the convector trench
- Protection mode IP 68
- Only in combination with the mechanical thermostats (AZAPSP01, AZAPPT02)
- A control module must be used with other thermostats (AZAPER05 and AZAPER06)

The AZAPATxxT041 controller is suitable for installation directly in the convector trench.
The number of connectable motors is the same as in the case of the AZAPATxxT01 and AZAPATxxT02 controllers (see table above). A control component must always be used for operating the electric thermostats (AZAPER05 and AZAPER06).

Control components

Version	Number of controlled AZAPATxxT041 controllers	Dimensions (mm)
Surface-mounted		
AZAPATRM0101	1	165x120x63
AZAPATRM0201	2	230x185x90
AZAPATRM0301	3	325x255x120
AZAPATRMU4101	4	230x185x120
AZAPATRMU5101	5	
AZAPATRMU6101	6	
Flushmounted		
AZAPATRM0102	1	170x170x71
AZAPATRM0202	2	230x230x84
In the convector trench		
AZAPATRM0104	1	165x120x63

Dimensions of the AZAPATxxT041 controller

Cylindrical	Output	Max. power	Width	Height
	VA	A	mm	mm
AZAPAT02T041	90	7,5	Ø105	53
AZAPAT04T041	160	13,3	Ø125	53
AZAPAT06T041	300	24	Ø132	63

Intratherm – electrical circuits

Cable lines to the floor convectors F1T and F1P

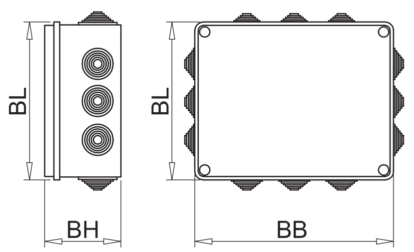
The length of the cable between the convector and the speed controller (PAT) should not exceed 10 m. If this length is exceeded, a cable with a cross-section greater than the recommended one must be used, so that the potential drop in the cable does not exceed 1 V (recommended potential drop 0.5 V).

PAT transformers in the surface-mounted version are connected to the fused line (D6A) using a two core cable 2 x 1.5 mm2. PAT transformers in the flush-mounted version are connected to the fused line using a three core cable 3 x 1.5 mm2 (e.g. CYKY 3A x 1.5). To protect the switching circuit, a safety fuse is contained inside the controller.

A cable measuring 5 x 0.75 mm2 is used to connect the PAT transformer with the speed controller or the speed controller with the room thermostat.

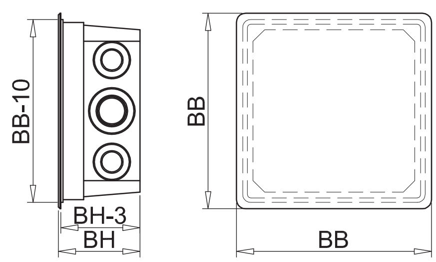
Dimensions of the PAT speed controller

Surface-mounted version



Model	Length BL (mm)	Width BB (mm)	Height BH (mm)	Weight (kg)
PAT-02-T, PAT-02-M-01	230	185	90	2,2
PAT-04-T, PAT-04-M-01	230	185	90	2,9
PAT-06-T, PAT-06-M-01	230	185	90	4,2
PAT-08-T, PAT-08-M-01	325	255	120	4,8

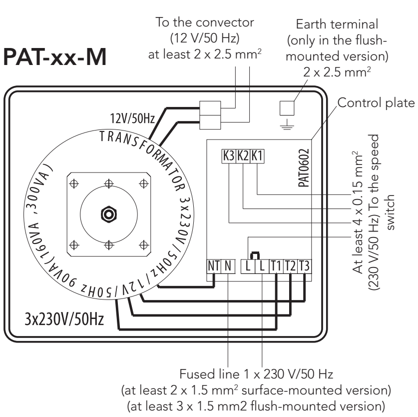
Flush-mounted version



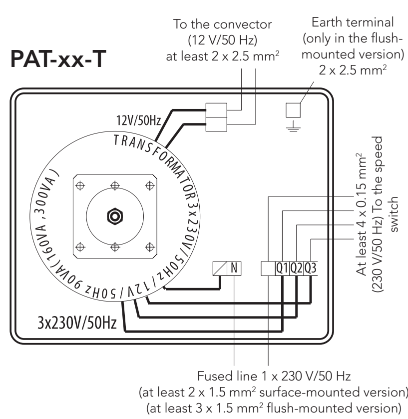
Model	Length BL (mm)	Width BB (mm)	Height BH (mm)	Weight (kg)
PAT-02-T, PAT-02-M-02	170	170	71	1,7
PAT-04-T, PAT-04-M-02	230	230	84	2,7
PAT-06-T, PAT-06-M-02	230	230	84	4,0
PAT-08-T, PAT-08-M-02	not possible			

Internal diagram of the PAT speed controller

PAT-xx-M

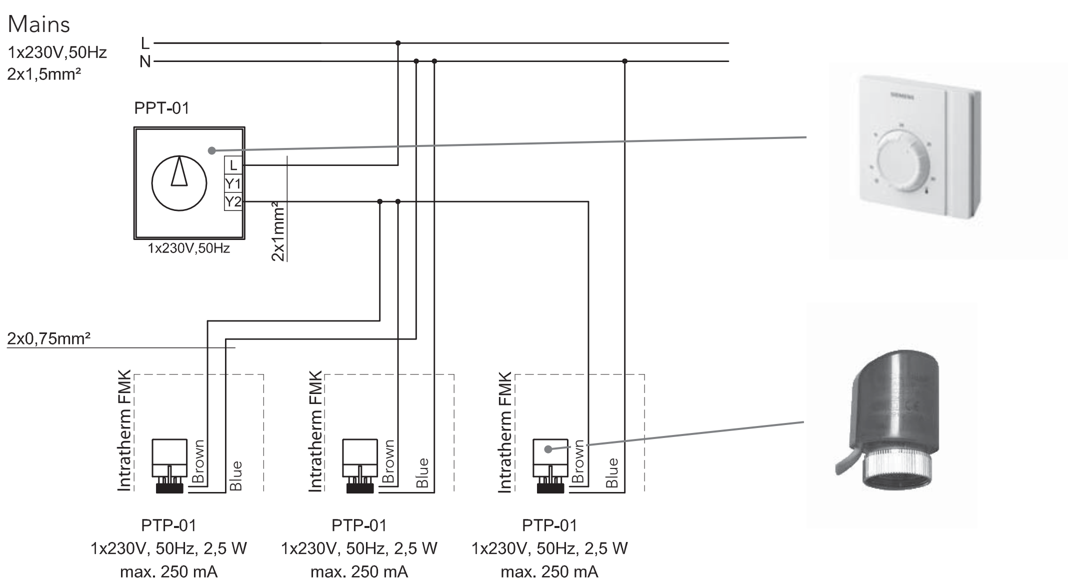


PAT-xx-T

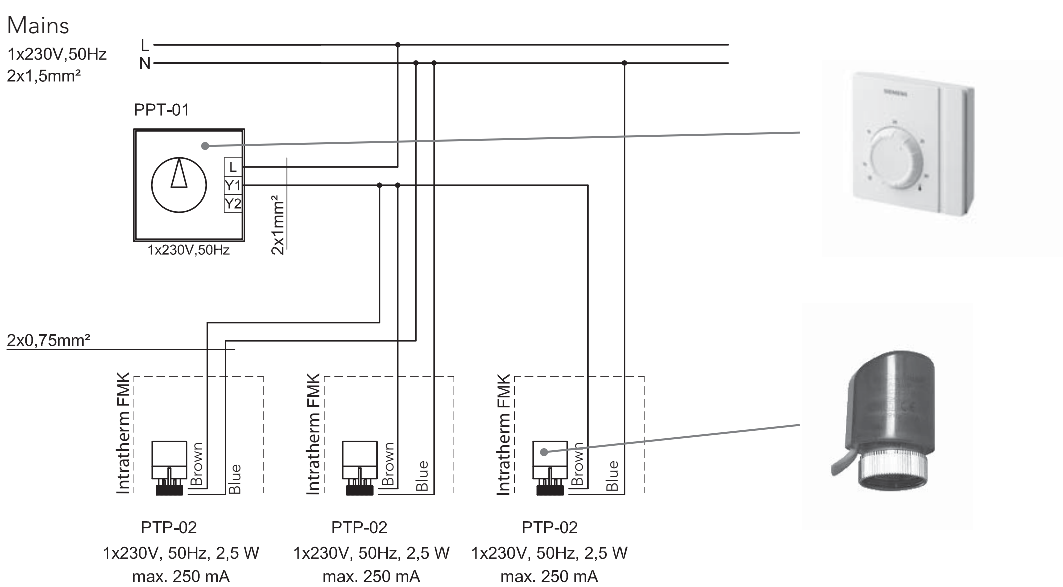


Intratherm – recommended circuit diagrams

Block diagram no. 1 – Intratherm FMK, controlled with adjusting drive – PTP-01 (currentless open)



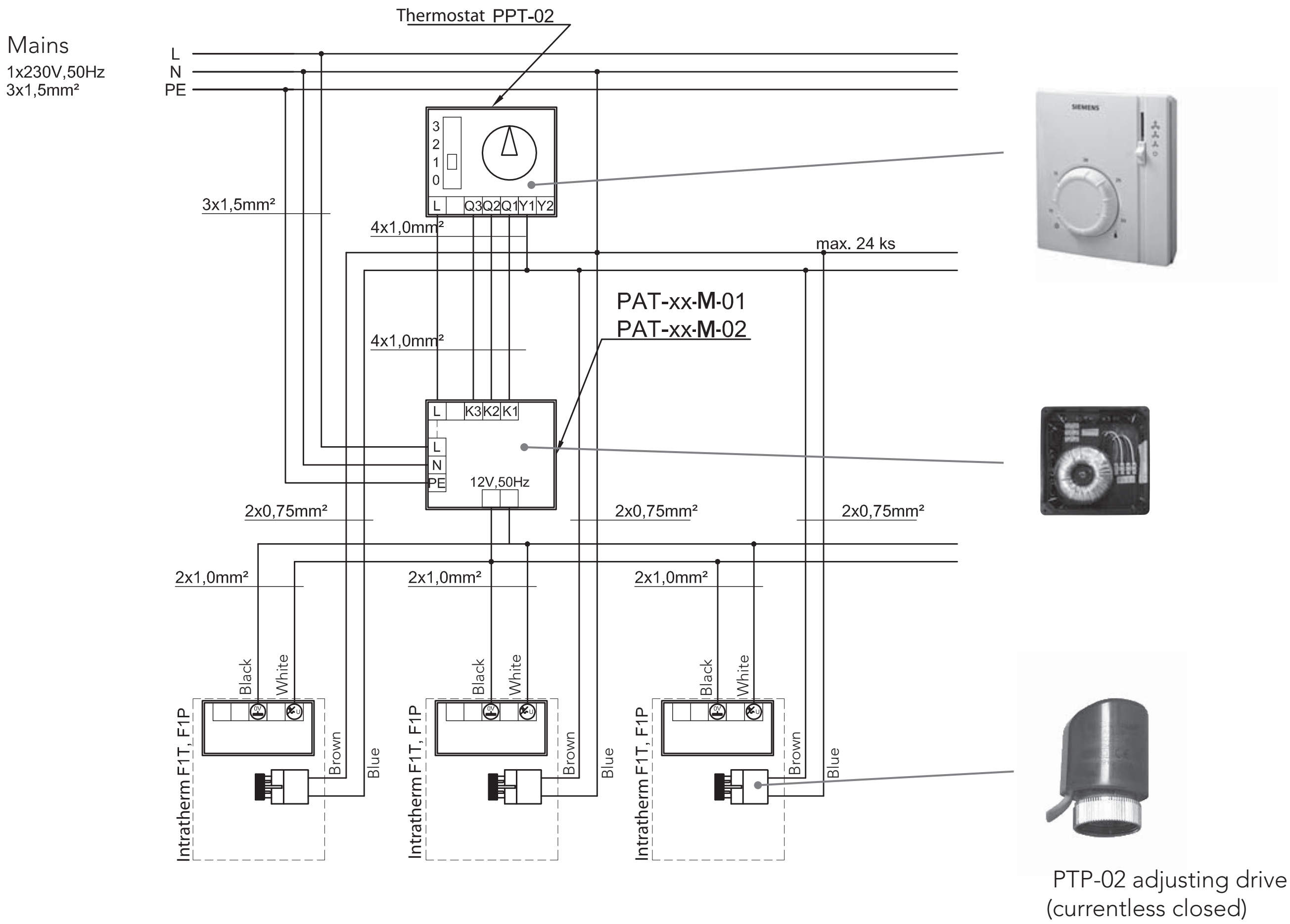
Block diagram no. 2 – Intratherm FMK, controlled with adjusting drive – PTP-02 (currentless closed)



Note:
1) Always use a residual current device when using an adjusting drive.
2) A maximum of 24 adjusting drives can be connected to a single thermostat.

Intratherm – recommended circuit diagrams

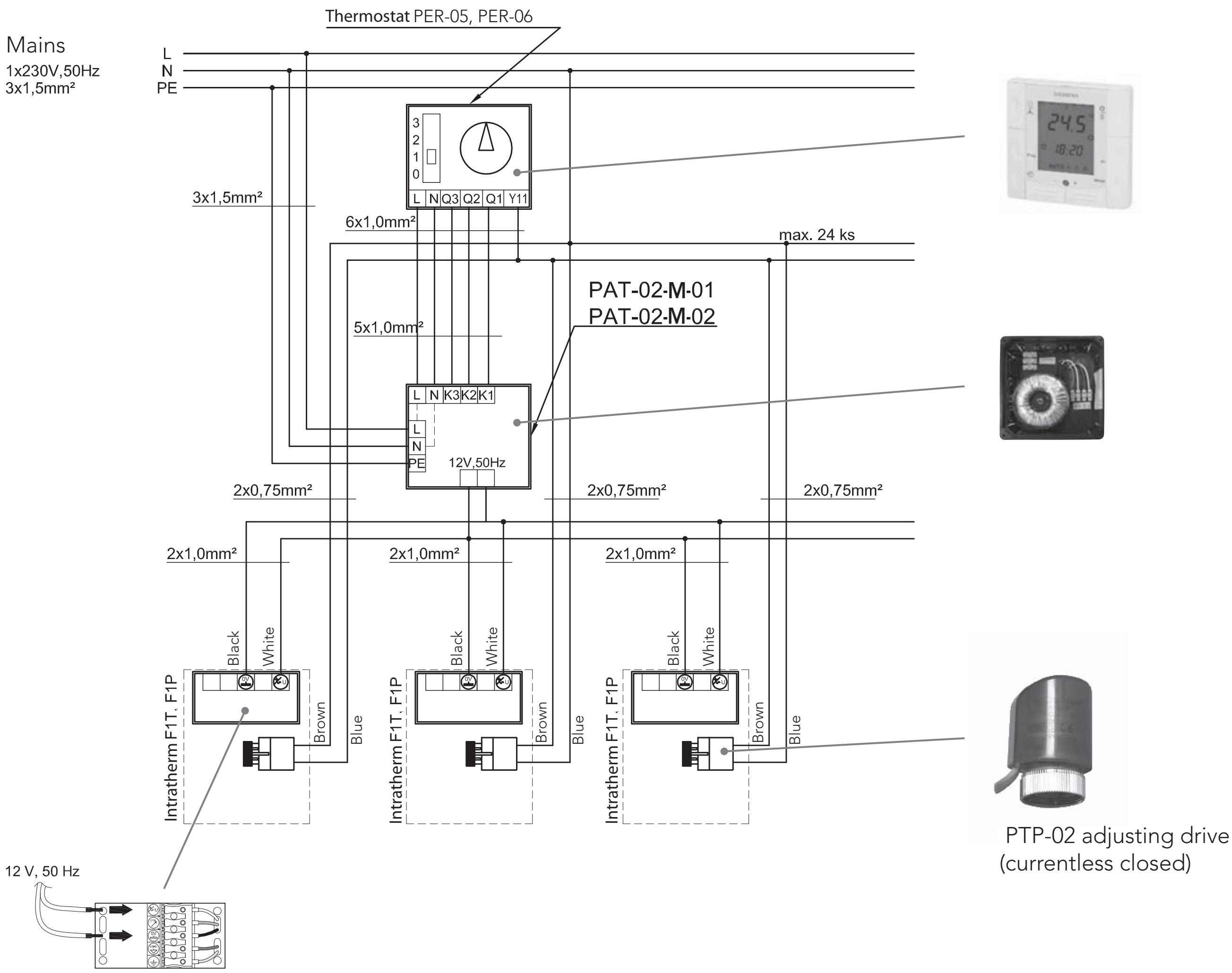
Block diagram no. 3 – Intratherm F1T with the PPT-02 thermostat and the PAT-xx-M external transformer



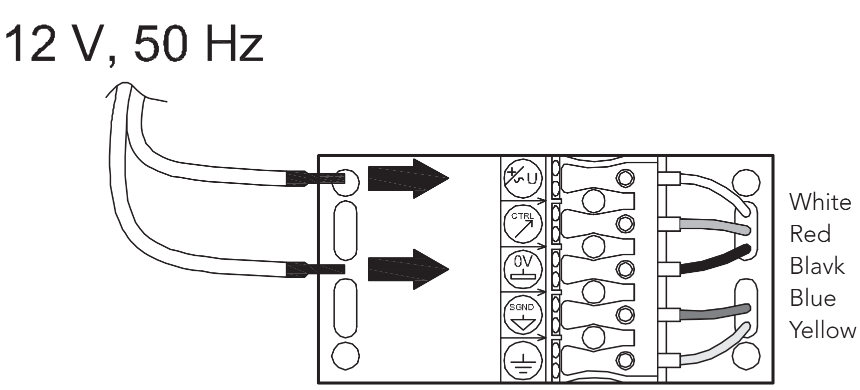
Note:
1) Always use a residual current device when using an adjusting drive
2) Observe the maximum number of connected fans per PAT controller
3) The circuit diagrams apply in the case of the flush-mounted version; in the case of the surface-mounted version, the PAT controllers are only connected with a two core cable.

Intratherm – recommended circuit diagrams

Block diagram no. 4 – Intratherm F1T with the PER-05 or PER-06 thermostat and the PAT-xx-M external transformer

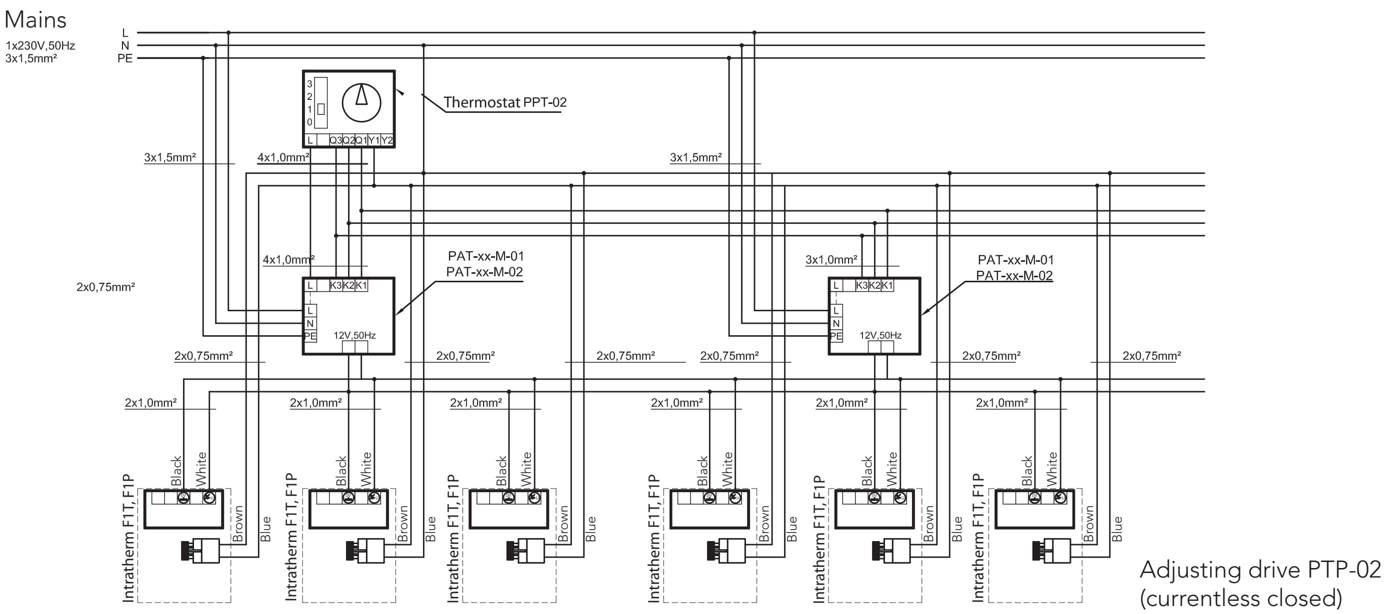


Block diagram no. 5 – Intratherm F1T, F1P – detailed diagram of the terminal block of the EC motors

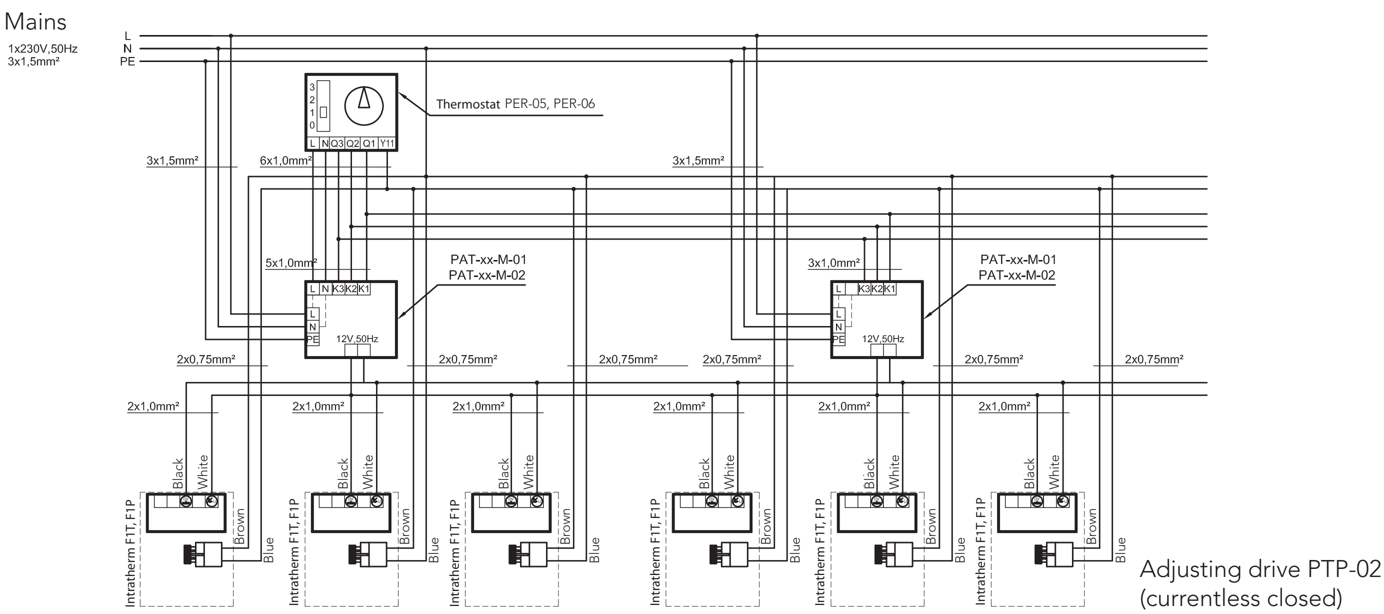


Intratherm – recommended circuit diagrams

Block diagram no. 6 – Intratherm F1T, F1P with PPT-02 thermostat and the PAT-xx-M external transformers (parallel operation of the transformers)

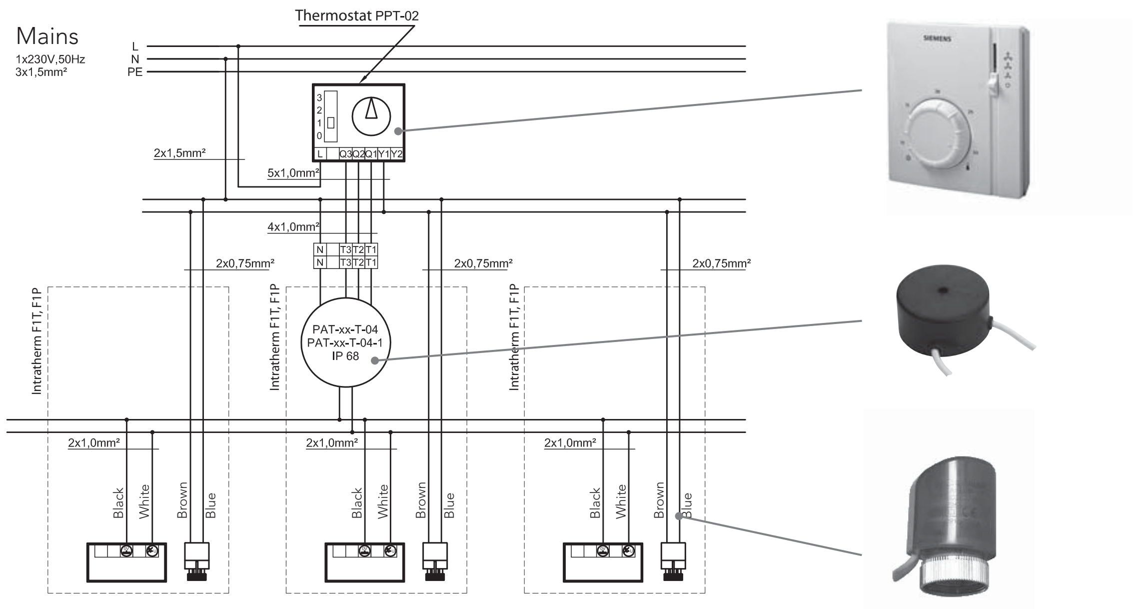


Block diagram no.7 – Intratherm F1T, F1P with PER-05 or PER-06 thermostats and the PAT-xx-M external transformers (parallel operation of the transformers)



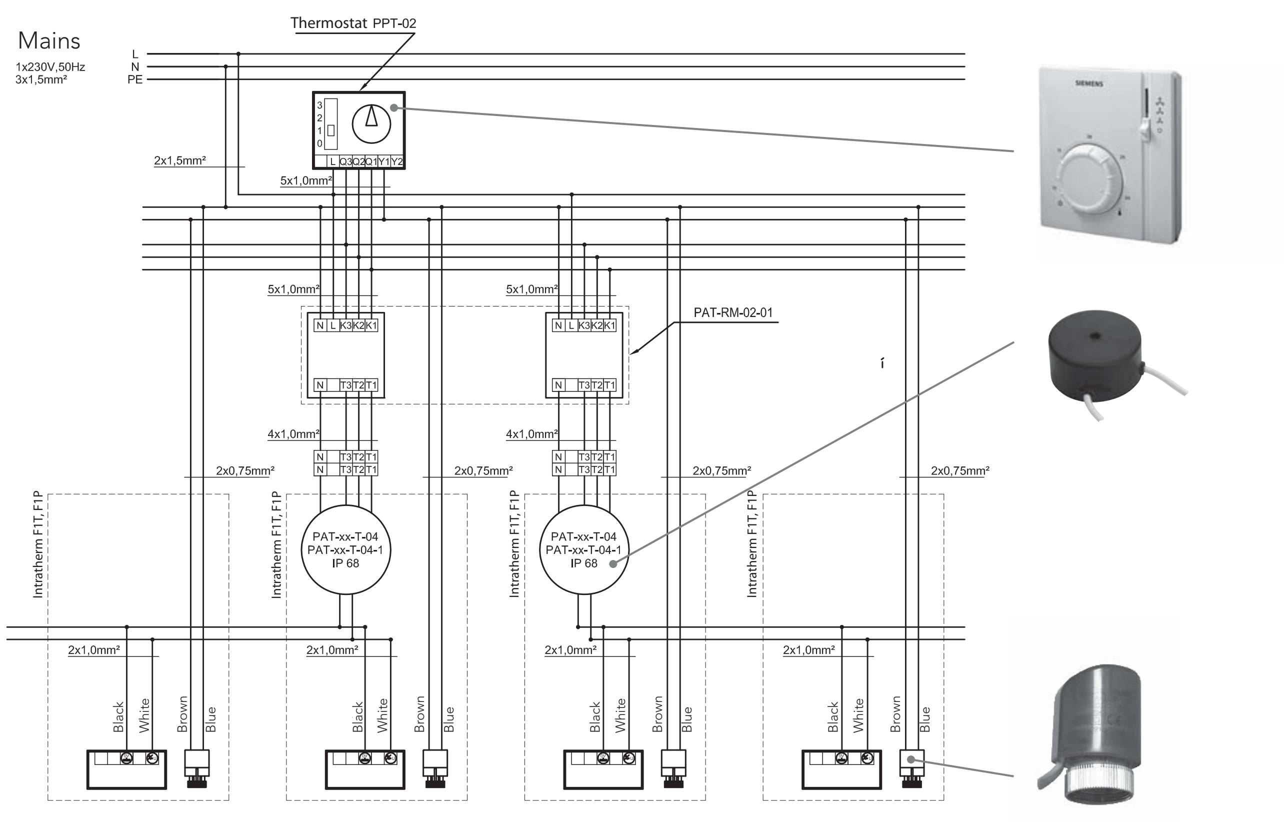
Intratherm – recommended circuit diagrams

Block diagram no. 8 – Intratherm F1T, F1P with the PPT-02 thermostat and the PAT-xx-T-04 controller, installed in the trench



Adjusting drive PTP-02
(currentless closed)

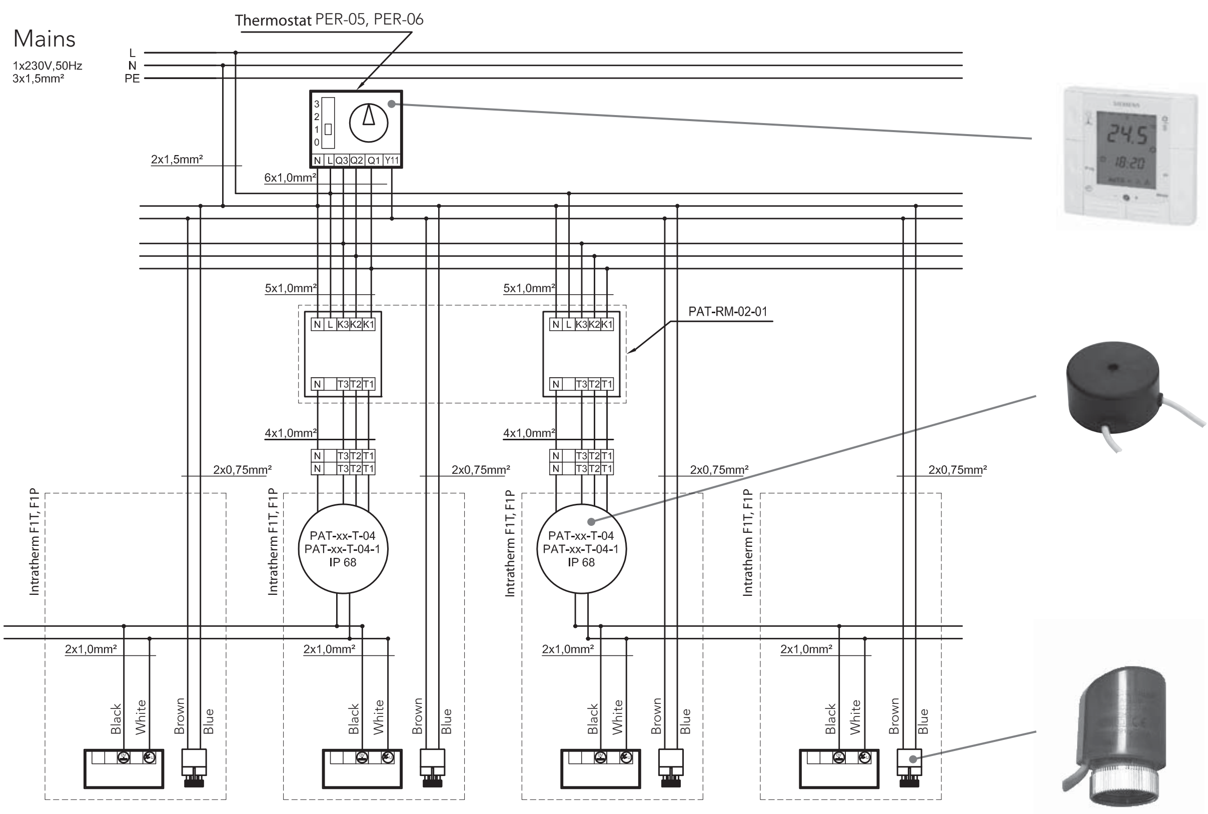
Block diagram no. 9 – Intratherm F1T, F1P with the PPT-02 thermostat, the PAT-RM control module and the PAT-xx-T-04 controller, installed in the trench



Adjusting drive PTP-02
(currentless closed)

Intratherm – recommended circuit diagrams

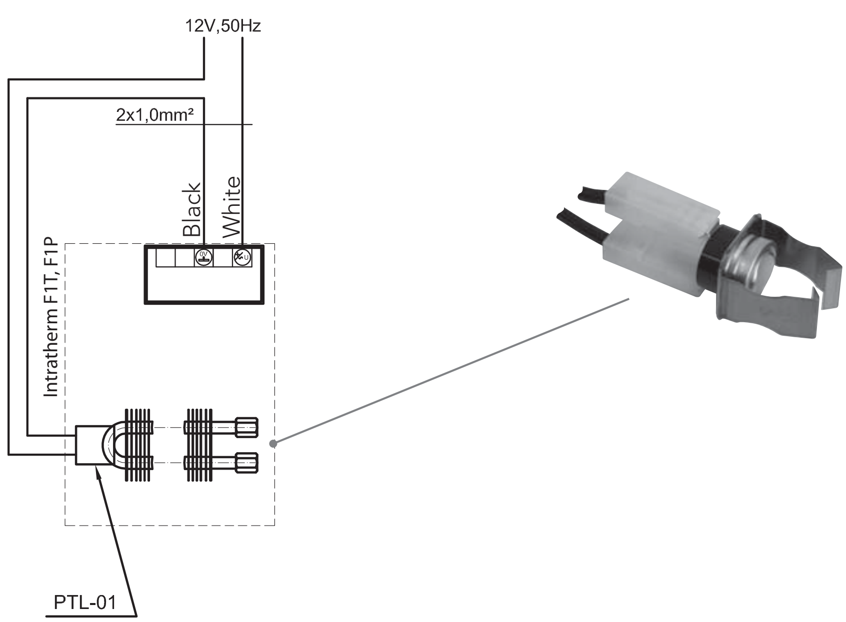
Block diagram no. 10 – Intratherm F1T, F1P with the PER-05 or PER-06 thermostat, the PAT-RM control module and the PAT-xx-T-04 controller, installed in the trench



Adjusting drive PTP-02
(currentless closed)

Note:
1) Observe the maximum number of connected fans per PAT controller
2) The PAT-xx-T controllers cannot be connected in parallel
3) The PAT-xx-T controllers cannot be operated using the PER-05 and PER-06 thermostats

Block diagram no. 11 – Intratherm F1T, F1P with an assembly allowing for limited use of a PTL-01 fan



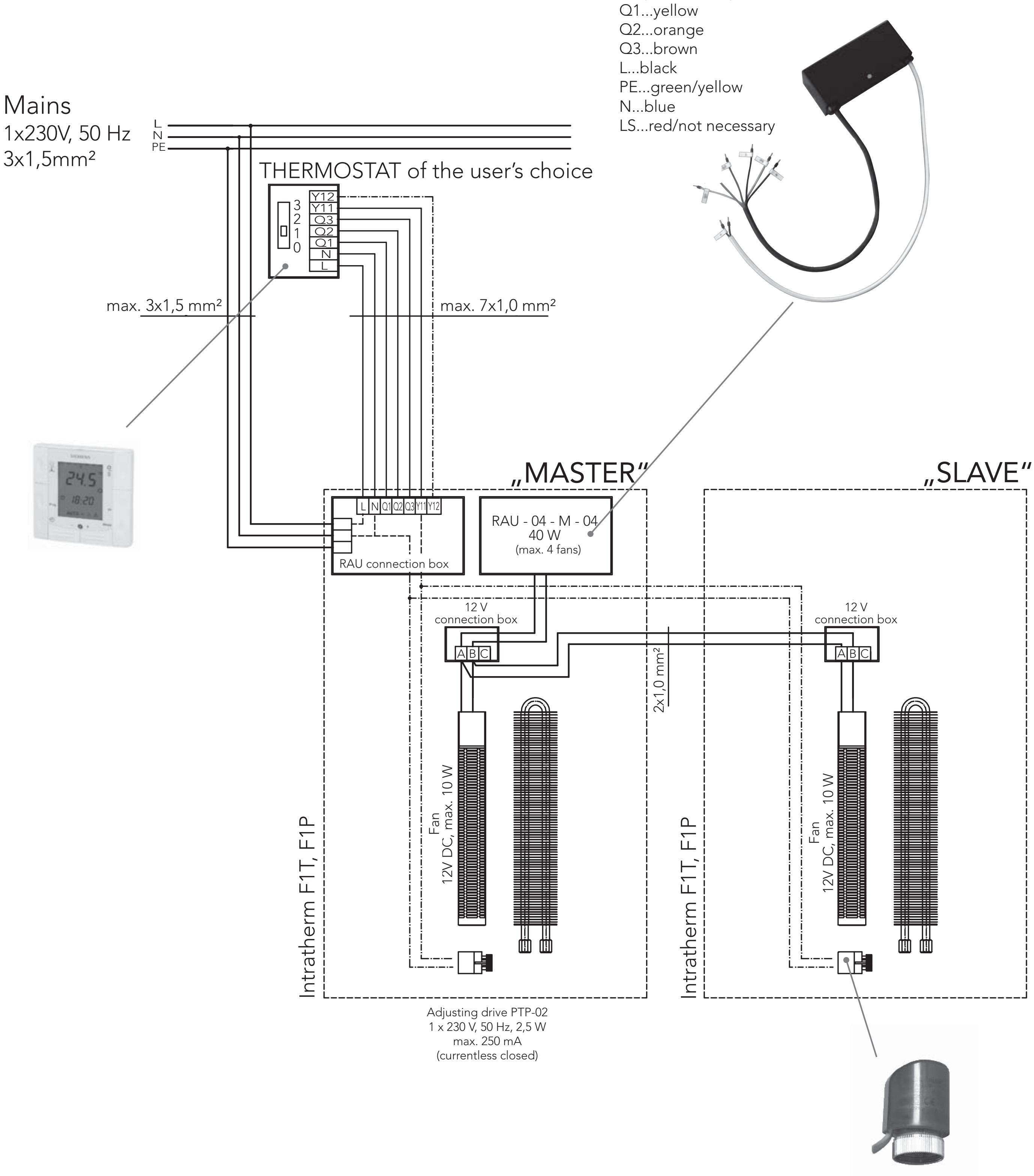
Fan cut-out when the hot water temperature falls below 35 °C. Installation directly at the heat exchanger.

Intratherm – recommended circuit diagrams

Block diagram no. 12

Speed controller: RAU-04-M-04 (max. 40 Watts)
- Installation in the convector trench
- Electric power max. 40 Watts (4 motors)
- Parallel switching is possible
- Operation by means of thermostat of the user's choice

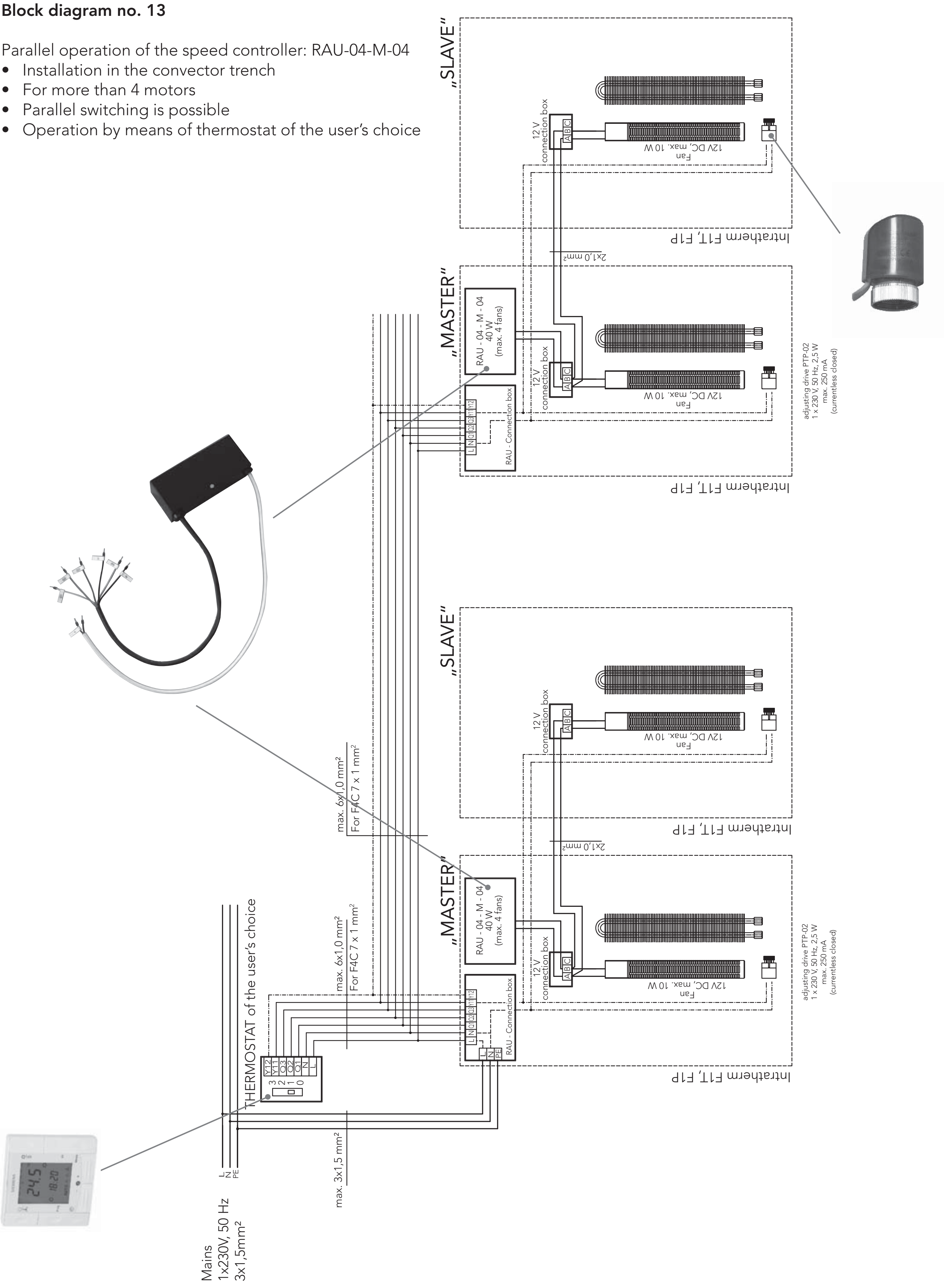
These colour indications may vary.
Orientation according to the cable diagrams during installation.
Q1...yellow
Q2...orange
Q3...brown
L...black
PE...green/yellow
N...blue
LS...red/not necessary



Intratherm – recommended circuit diagrams

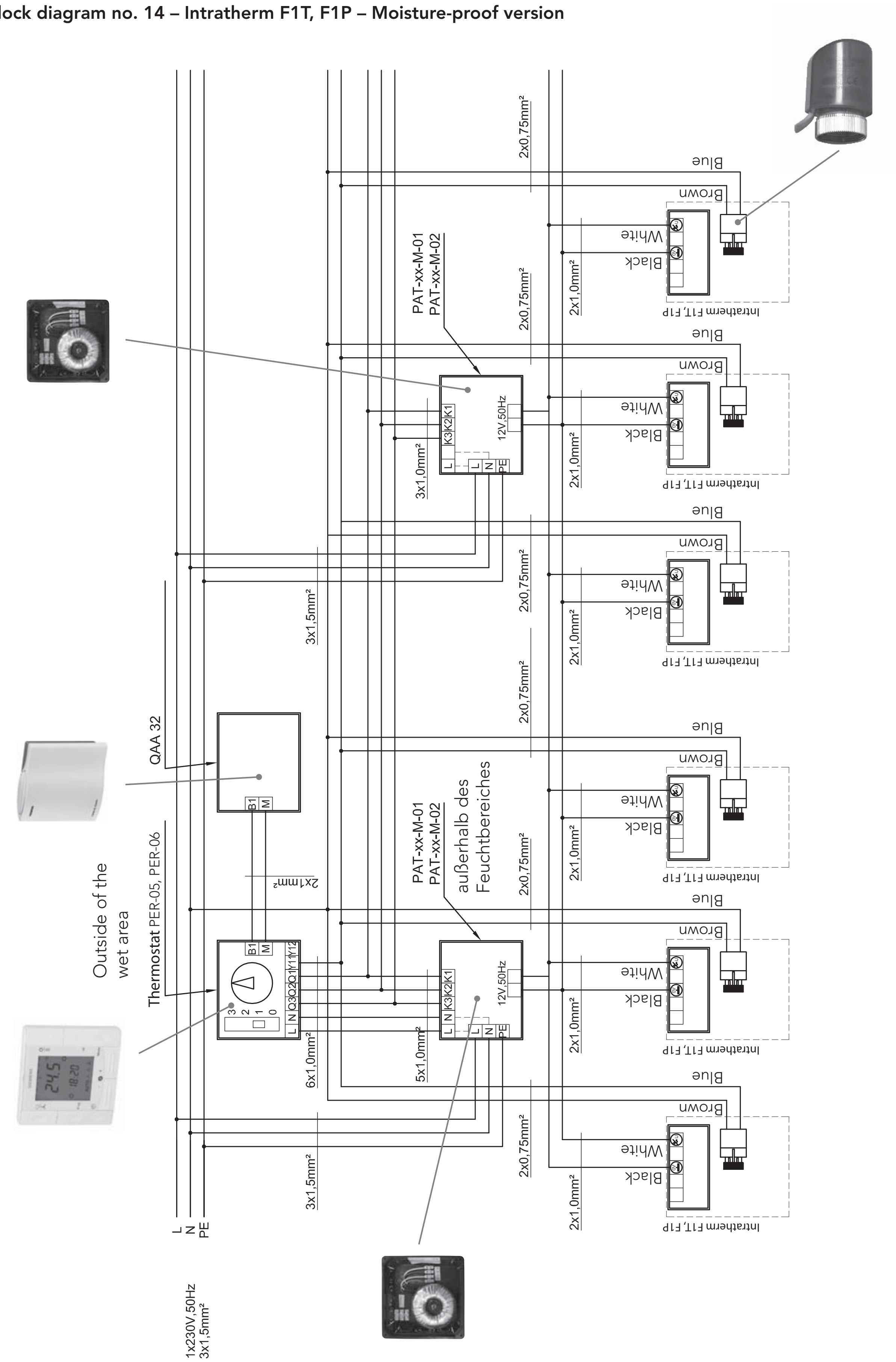
Block diagram no. 13

Parallel operation of the speed controller: RAU-04-M-04
- Installation in the convector trench
- For more than 4 motors
- Parallel switching is possible
- Operation by means of thermostat of the user's choice



Intratherm – recommended circuit diagrams

Block diagram no. 14 – Intratherm F1T, F1P – Moisture-proof version



Conversion table

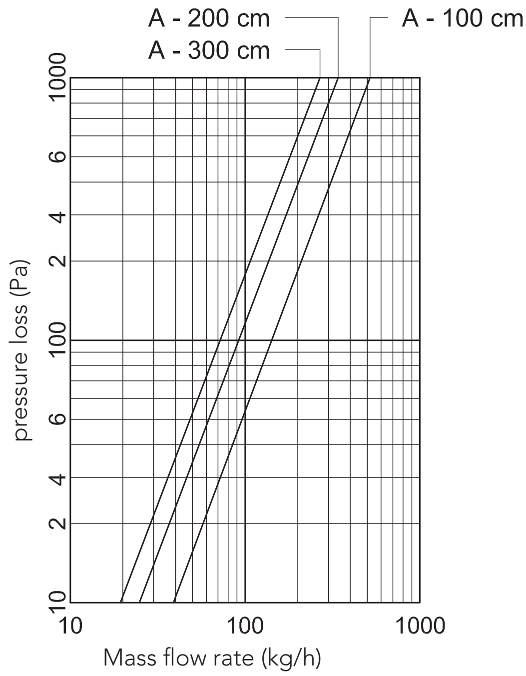
Factor K1 for converting the heat output

Coefficient K1 for converting the heat output

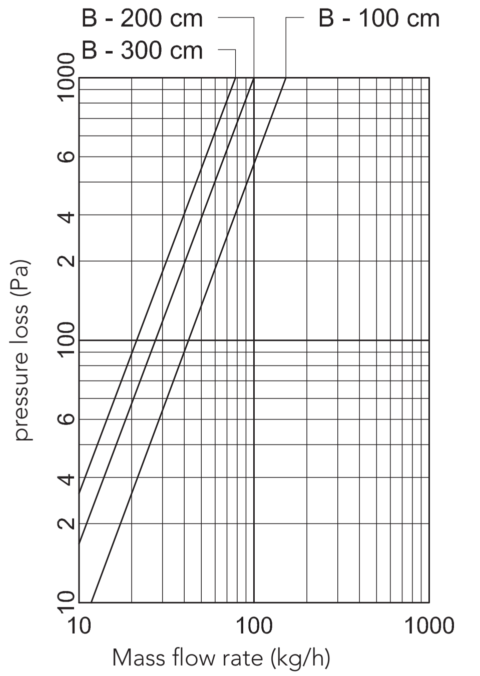
Supply tempera-ture (°C)	Air tem-perature (°C)	FMK convector – without fan; exponent n = 1.4															
		35	40	45	50	55	60	65	70	75	80	85	Return temperature (°C)				
90	15	0,78	0,88	0,98	1,08	1,17	1,26	1,35	1,43	1,52	1,61	1,69		0,52	0,46	15	45
	20	0,63	0,73	0,83	0,93	1,02	1,11	1,19	1,28	1,36	1,45	1,53		0,42	0,36	20	
	24	0,51	0,62	0,72	0,81	0,90	0,99	1,08	1,36	1,24	1,32	1,4		0,33	0,28	24	
85	15	0,73	0,83	0,93	1,02	1,11	1,19	1,28	1,36	1,45	1,53		0,62	0,57	0,51	15	50
	20	0,59	0,69	0,78	0,82	0,96	1,05	1,13	1,21	1,29	1,37		0,52	0,46	0,40	20	
	24	0,47	0,58	0,67	0,76	0,85	0,93	1,01	1,09	1,17	1,25		0,44	0,38	0,32	24	
80	15	0,69	0,78	0,87	0,96	1,05	1,13	1,21	1,29	1,37		0,73	0,67	0,61	0,55	15	55
	20	0,55	0,64	0,73	0,82	0,90	0,99	1,07	1,14	1,22		0,62	0,57	0,51	0,44	20	
	24	0,44	0,54	0,63	0,71	0,79	0,87	0,95	1,03	1,10		0,54	0,48	0,42	0,35	24	
75	15	0,64	0,73	0,82	0,90	0,99	1,07	1,14	1,22		0,84	0,78	0,72	0,66	0,59	15	60
	20	0,51	0,60	0,69	0,77	0,85	0,92	1,00	1,07		0,73	0,67	0,61	0,55	0,48	20	
	24	0,40	0,50	0,58	0,66	0,74	0,82	0,89	0,96		0,64	0,59	0,53	0,46	0,39	24	
70	15	0,60	0,69	0,77	0,85	0,92	1,00	1,07		0,95	0,89	0,83	0,77	0,70	0,63	15	65
	20	0,47	0,58	0,64	0,71	0,79	0,86	0,93		0,84	0,78	0,72	0,66	0,59	0,52	20	
	24	0,37	0,46	0,54	0,61	0,68	0,76	0,83		0,75	0,69	0,63	0,57	0,50	0,42	24	
65	15	0,56	0,64	0,71	0,79	0,86	0,93		1,06	1,00	0,94	0,88	0,81	0,74	0,67	15	70
	20	0,43	0,51	0,59	0,66	0,73	0,80		0,95	0,89	0,83	0,77	0,70	0,63	0,55	20	
	24	0,33	0,41	0,49	0,56	0,63	0,70		0,86	0,80	0,74	0,68	0,61	0,54	0,46	24	
60	15	0,51	0,59	0,66	0,73	0,80		1,17	1,11	1,05	0,99	0,92	0,86	0,78	0,71	15	75
	20	0,39	0,47	0,54	0,60	0,67		1,06	1,00	0,94	0,88	0,81	0,74	0,67	0,59	20	
	24	0,30	0,37	0,44	0,51	0,57		0,97	0,91	0,85	0,79	0,72	0,65	0,58	0,49	24	
55	15	0,47	0,54	0,60	0,67		1,28	1,22	1,16	1,10	1,04	0,97	0,90	0,83	0,75	15	80
	20	0,35	0,42	0,49	0,55		1,17	1,11	1,05	0,99	0,92	0,86	0,78	0,71	0,62	20	
	24	0,27	0,33	0,40	0,46		1,08	1,02	0,96	0,90	0,83	0,77	0,89	0,61	0,52	24	
50	15	0,42	0,49	0,55		1,40	1,34	1,28	1,21	1,15	1,08	1,01	0,94	0,87	0,78	15	85
	20	0,31	0,37	0,43		1,28	1,22	1,16	1,10	1,04	0,97	0,90	0,83	0,75	0,66	20	
	24	0,23	0,29	0,35		1,19	1,13	1,07	1,01	0,95	0,88	0,81	0,73	0,65	0,56	24	
45	15	0,37	0,43		1,51	1,45	1,39	1,33	1,26	1,20	1,13	1,06	0,98	0,91	0,82	15	90
	20	0,27	0,33		1,40	1,34	1,28	1,21	1,15	1,08	1,01	0,94	0,87	0,78	0,69	20	
	24	0,19	0,25		1,30	1,25	1,19	1,12	1,06	0,99	0,92	0,85	0,77	0,68	0,59	24	
Return temperature (°C)					85	80	75	70	65	60	55	50	45	40	35	Air tem-perature (°C)	Supply tempera-ture (°C)
F1T and F1P convector with fan; exponent n = 1.1																	

Example:
FMK-26-100-11, heat output for 75/65/20 °C: QN = 266 W, flow temperature: 50 °C, return temperature: 45 °C, air temperature: 24 °C, correction factor K1 = 0.35
Corrected heat output for 50/45/24 °C: QS x K1 = 266 W x 0.35 = 93 W

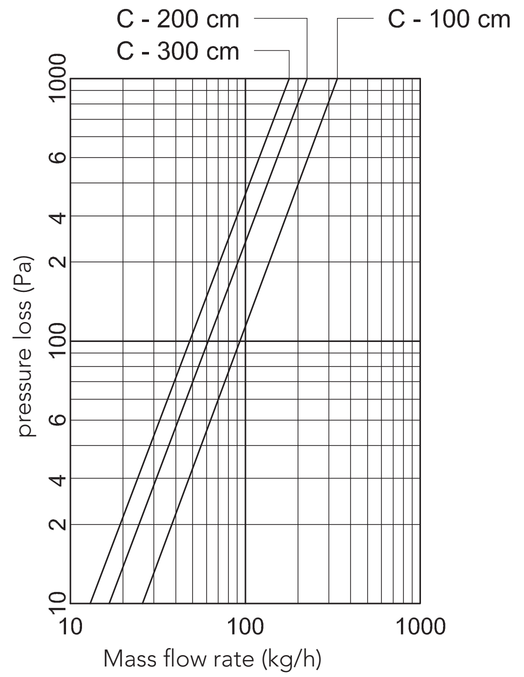
Intratherm pressure losses



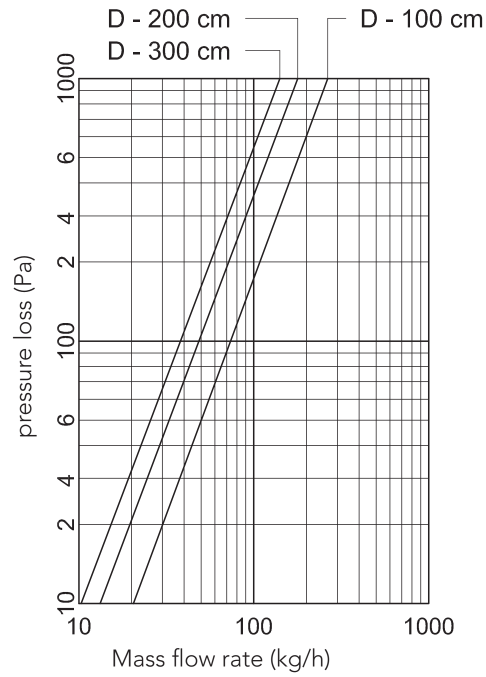
1	FMK-18-LLL-09, FMK-18-LLL-11
2	FMK-26-LLL-09, FMK-26-LLL-11
3	FMK-29-LLL-09, FMK-29-LLL-11
4	F1T-26-LLL-09
5	LVF-09-LLL-10, LVF-09-LLL-11



1	FMK-34-LLL-09, FMK-34-LLL-11
2	F1T-29-LLL-09
3	LVF-14-LLL-10, LVF-14-LLL-11



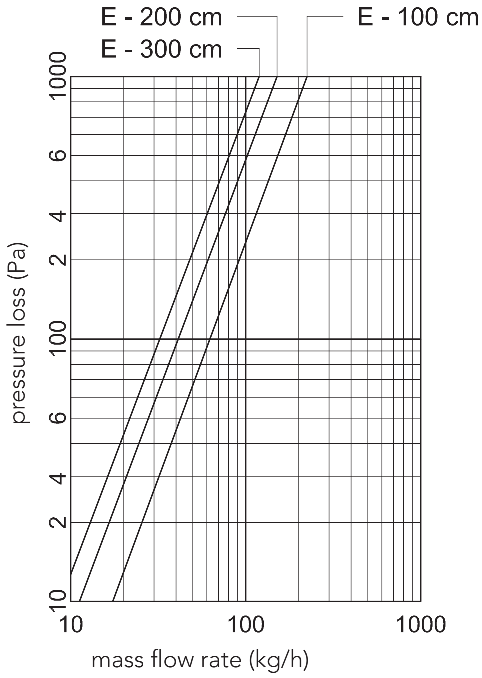
1	FMK-42-LLL-09, FMK-42-LLL-11
2	F1T-34-LLL-09
3	FMK-18-LLL-14
4	FMK-26-LLL-14, F1T-26-LLL-14
5	LVF-19-LLL-10, LVF-19-LLL-11
6	LVR-10-LLL-10, LVR-10-LLL-11



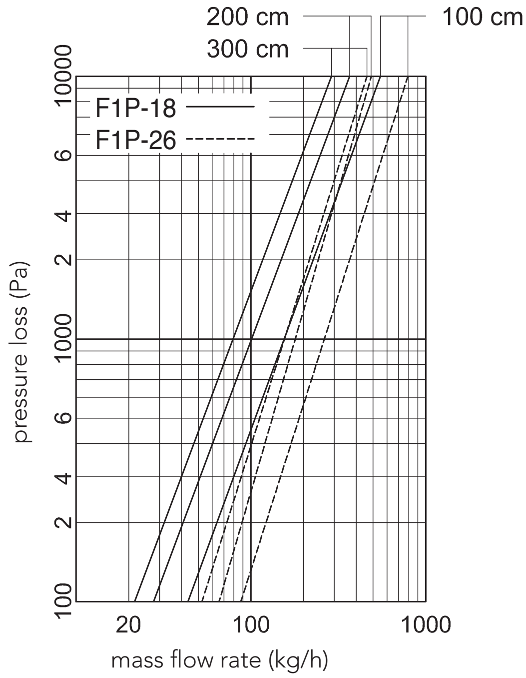
1	FMK-34-LLL-14
2	F1T-29-LLL-14
3	LVR-15-LLL-10, LVR-15-LLL-11

LLL = Total length of convector in cm

Intratherm pressure losses



1	FMK-42-LLL-14
2	F1T-34-LLL-14
3	LVR-20-LLL-10, LVR-20-LLL-11

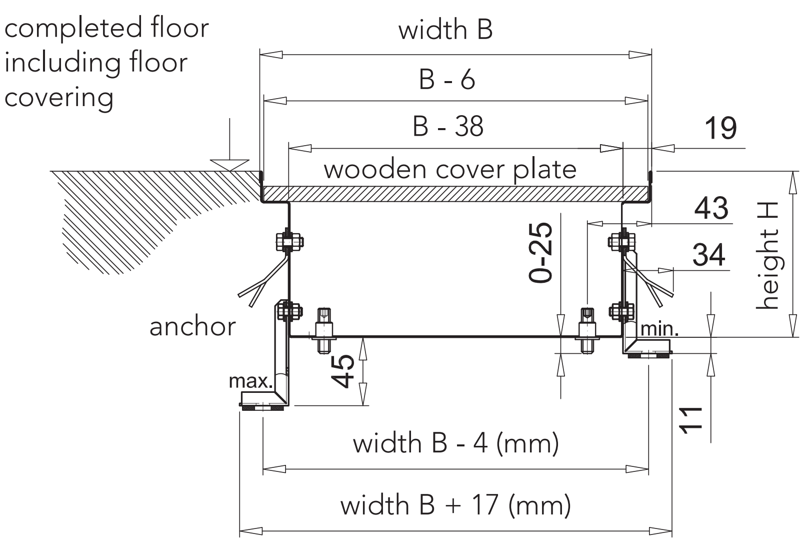


1	F1P-18-LLL-09
2	F1P-26-LLL-11

Installation of the trench convectors

Recommended installation of the convector with embedding of the trench in concrete

1) Prepare the convector for installation by placing the anchors with the screws in the drill holes provided and pushing out the openings for the pipework and cable feed. The rubber bushings are then fitted.
2) Place the trench onto the unfinished floor and position it using the adjustable screws (M8 x 30) or the anchor brackets in such a way that the top of the convector lies at the level of the floor including the screed (horizontal alignment of the trench). Attention: if using the Z-frame, the trench must be laid 3-5 mm below the level of the finished floor!
3) Use insulation (upon request) for the purpose of noise reduction and heat insulation
4) Connect the heat exchanger to the pipelines and carry out electrical installation.
5) For the moisture-proof version, connect the drainage facility in the trench floor to the drain.
6) Carry out another pressure test and test the functioning of the fans
7) Check the correct fit of the trench again
8) The wooden cover plate is refitted in the trench
9) Then embed the trench in concrete: the entire area underneath and around the convector trench up to approximately 1/3 of the height of the trench is filled evenly with light concrete; there must be no air bubbles remaining underneath the convector trench, as these are the cause of sound reverberation; the floor of the trench must lie on top of a concrete base layer. The remaining uncovered area is to be filled evenly with screed.
10) Only remove the wooden cover plate once all works have been completed
11) Fit the grille on top of the convector

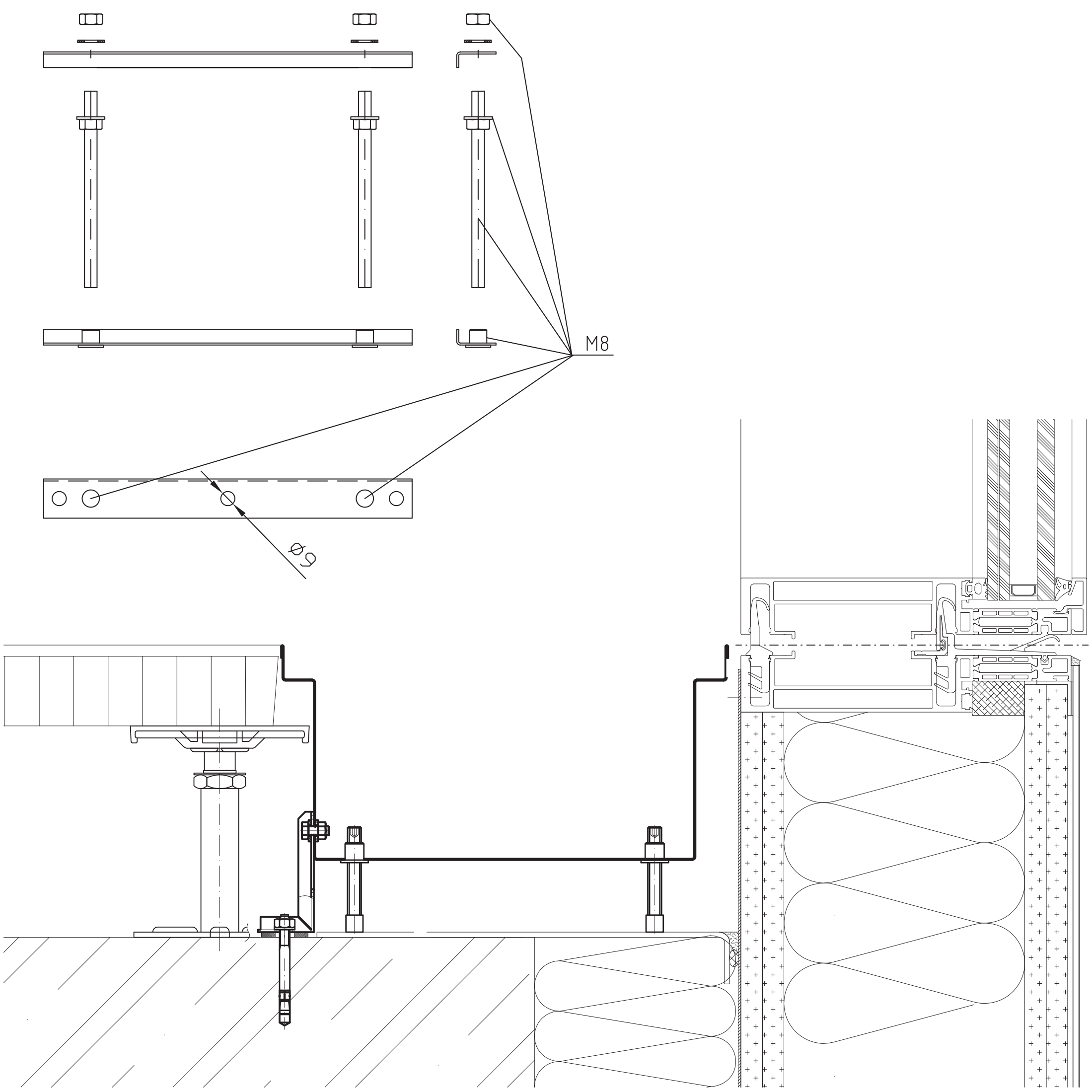


Installation of the trench convector

Recommended installation of the convector in the cavity floor using footfall impact-resistant height adjustment

1) The position of the drill hole (anchor bolt) is marked on the base
2) The footfall impact-resistant height adjustment is fitted onto the convector trench
3) The openings for the pipework and cable feed are pushed out and the rubber bushings are then fitted
4) Place the trench onto the unfinished floor and position it using the footfall impact-resistant height adjustment in such a way that the top of the convector lies at the level of the floor including the screed (horizontal alignment of the trench).
   Attention: If using the Z-frame, the trench is to be laid 3-5 mm below the level of the finished floor!
5) Use insulation (upon request) for the purpose of noise reduction and heat insulation
6) Connect the heat exchanger to the pipelines and carry out electrical installation.
7) For the moisture-proof version, connect the drainage facility in the trench floor to the drain.
8) Carry out a pressure test and test the functioning of the fans
9) Check the correct fit of the trench again
10) The wooden cover plate is refitted in the trench
11) Only remove the wooden cover plate once all works have been completed
12) Fit the grille on top of the convector

Height adjustment

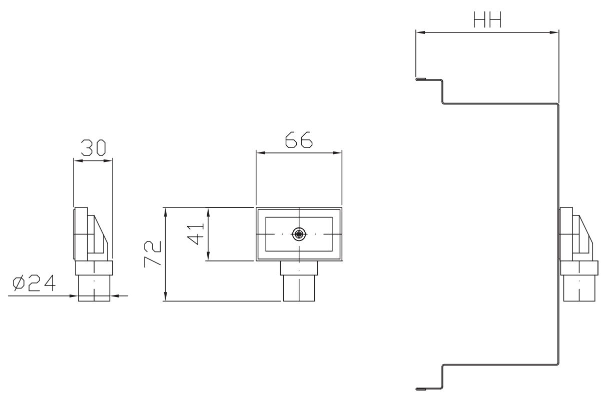


Installation of the trench convector

Recommended installation of the moisture-proof version

The installation of convectors in a moisture-proof version proceeds according to the previously-listed points (see pages 355, 356)

1)The convector trench, the trench components and the grille are manufactured from corrosion-proof material
2) All joints on the trench are sealed with bathroom silicone sealant.
3) The floor of the convector trench is equipped with a drainage facility (see drawing below)
4) The waste water pipe must be fitted at an ensured gradient.
5) It is recommended that the installer should fit the water drain with an odour trap
6) The thermostat and the transformer must be fitted outside of the wet area
7) The electrical components must be connected via a residual current device



Definition of operating conditions

The operating conditions of Intratherm convectors have been defined as follows:

- Max. operating overpressure (10 bar)
- Maximum water operating temperature 110 °C
- Installation of the floor convectors in the enclosed hot water system
- Safe voltage of fan drives installed in the standard way is 12 V
- Defined non-corrosive and non-saline composition of swimming pool water

Maintenance and cleaning

- Remove dirt from the convector trench (vacuum clean, wipe down) periodically (before and after the heating season as a minimum)
- Clean the heat exchanger with a soft brush
- Remove dust on the floor of the housing with a vacuum cleaner
- Remove any other dirt using a damp cloth
- Check the waste water drain on the floor of the trench in the moisture-proof version
- Check the functioning of the individual fan drives while not in use for extended periods (prior to the heating season)

Recommended measures in the event of reduced output

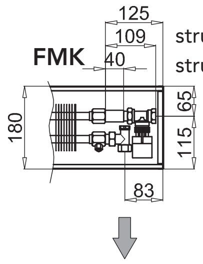
Check:

- The installation of the heat exchanger (horizontal position)
- The supply temperature in the heat exchanger
- The ventilation of the heat exchanger
- The circulation of hot water in the system (function of the system pump)
- The settings of the thermostatic valve, the thermostatic head, the lockshield valve
- The functioning of the fans

Recommended connection examples

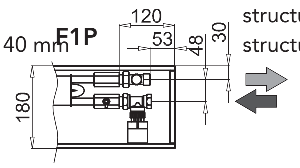
FMK

structure width 180 mm
structure height 90, 110, 140 mm



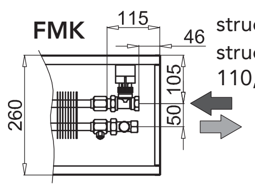
F1P

structure width 180 mm
structure height 90 mm



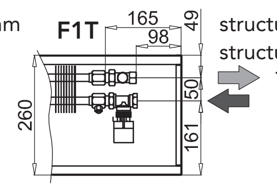
FMK

structure width 260 mm
structure height 90, 110, 140 mm



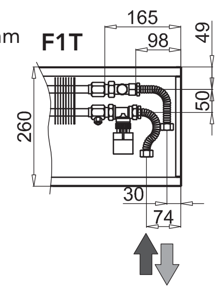
F1T

structure width 260 mm
structure height 90, 140 mm



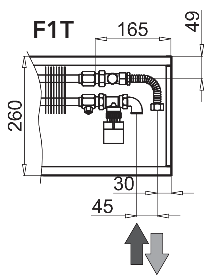
F1T

structure width 260 mm
structure height 90, 140 mm



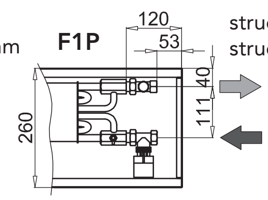
F1T

structure width 260 mm
structure height 90, 140 mm



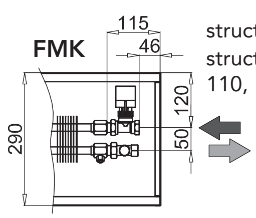
F1P

structure width 260 mm
structure height 90 mm



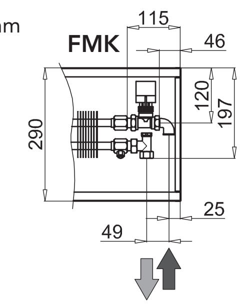
FMK

structure width 290 mm
structure height 90, 110, 140 mm



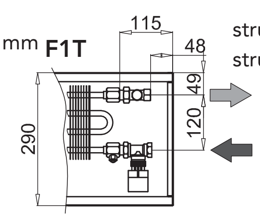
FMK

structure width 290 mm
structure height 90, 110, 140 mm



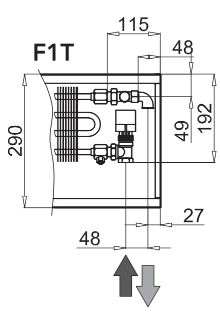
F1T

structure width 290 mm
structure height 90 mm



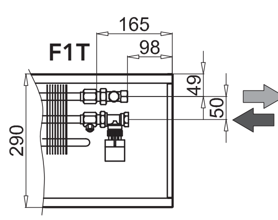
F1T

structure height 90 mm



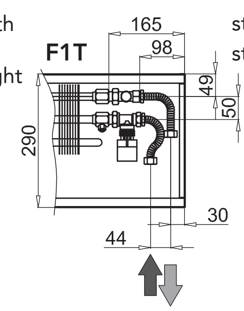
F1T

structure width 290 mm
structure height 140 mm



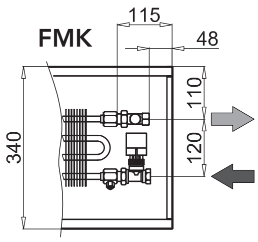
F1T

structure width 290 mm
structure height 140 mm



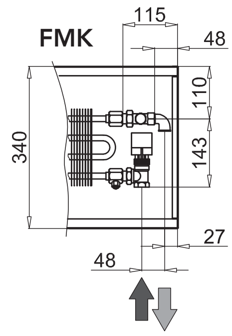
Recommended connection examples

FMK



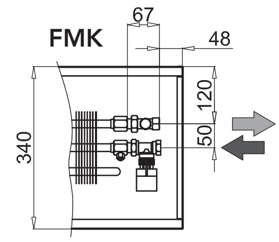
structure width 340 mm
structure height 90,110 mm

FMK



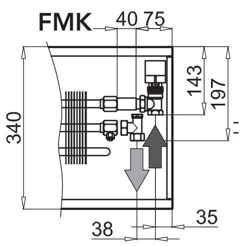
structure width 340 mm
structure height 90,110 mm

FMK



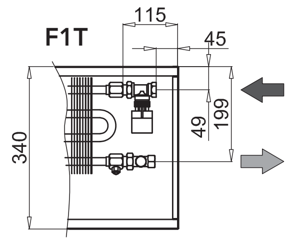
structure width 340 mm
structure height 140 mm

FMK



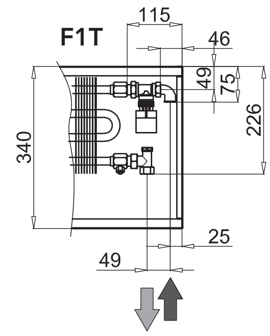
structure width 340 mm
structure height 140 mm

F1T



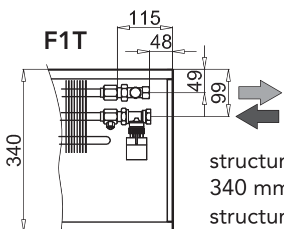
structure width 340 mm
structure height 90 mm

F1T



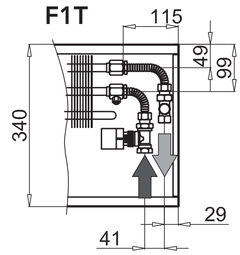
structure width 340 mm
structure height 90 mm

F1T



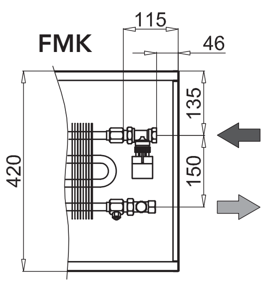
structure width 340 mm
structure height 140 mm

F1T



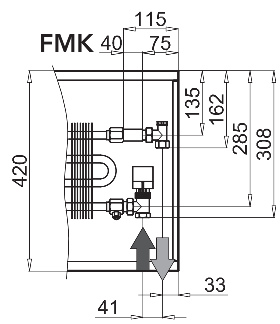
structure width 340 mm
structure height 140 mm

FMK



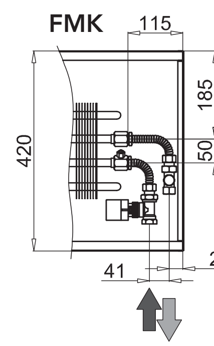
structure width 420 mm
structure height 90, 110mm

FMK



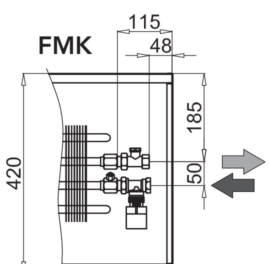
structure width 420 mm
structure height 90, 110mm

FMK



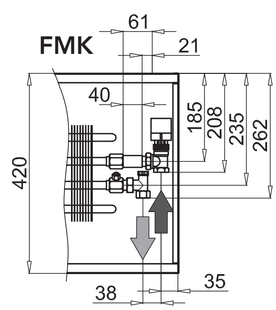
structure width 420 mm
structure height 90, 110mm

FMK



structure width 420 mm
structure height 140 mm

FMK



structure width 420 mm
structure height 140 mm

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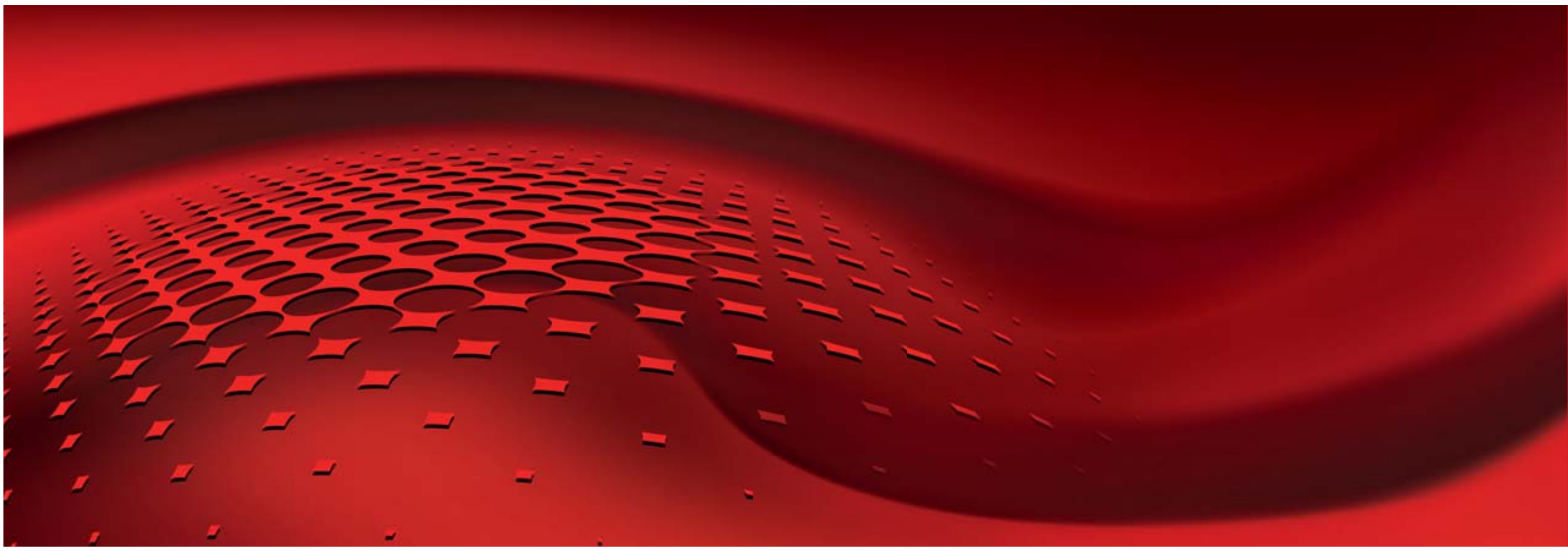

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