Broadband-Communication Systems

HFC

Catalogue 2008/2009

KATHREIN

Antennen · Electronic

The products listed in this catalogue are intended for exclusive use in TV and radio reception systems.
Any claims under the warranty or claims for liability are excluded in case of misuse.
The reception systems are only allowed to be mounted, installed, repaired and earthed by qualified specialist personnel who are familiar with and follow the applicable safety stipulations, regulations and standards.
With the publication of this catalogue, the 2006 issue is no longer valid. This catalogue may be valid beyond 2008.
If in doubt, please enquire about its validity at our plant or on the Internet.

Technical values

The indicated technical values were defined according to the specifications of the trade association for reception antennas in the ZVEI.
The values for the amplifiers were determined in accordance with EN 50083 and EN 60728.
The calculation values for the mechanical stability of the antenna components (wind loads and bending moments) comply with EN 60728-11.

Appearance and values for the listed articles correspond to the situation at the time this catalogue went to press.
Please understand that we must reserve the right to make changes to the appearance and the values.

General Terms and Conditions

The respective valid version of our General Terms and Conditions (general delivery and payment terms) applies.
The packaging units stated in the catalogue are the minimum order units.
In Germany:
Our products are sold through wholesalers. Our specialist retailer and specialist trade clients will be charged the net prices for catalogue articles by the wholesalers.

In other countries, please request the price list from our representatives in your own country
(Addresses are found on pages 208-210).

“Quality leads the way”

As the world's oldest and largest antenna manufacturer, every day we live our motto “Quality leads the way”.
Our mission includes always looking for the optimal solution for our customers.
Our quality and environment management system covers all areas of the organisation and has been certified by TÜV in accordance with EN ISO 9001 and EN ISO 14001.

Complete range

Professional satellite reception systems

Optical transmission systems

Fibre to the Home

Amplifier systems

Complete range

KOM monitoring system

Data technology

Multimedia-capable in-house distribution

Taps and splitters

Cables, plugs and accessories

Technical appendix

Addresses

Type overview

Type overview

Type overview

Professional satellite reception systems

Satellite reception systems

Offset parabolic antennas

CAS 124	216236
CAS 180	216235
ZAS 124	218662
ZAS 180	218661
ZAS 181	218667
ZAS 186	218676
ZAS 189	23710017

- Aluminium reflector, powder-coated
- Feed system support of squared aluminium tubing and an aluminium feed system mounting plate
- Mast clamp of aluminium and stainless steel
- Optimal electrical data at lowest mechanical dimensions with offset-feeding
- Multi-feed systems can be mounted using compact feed systems.

  Up to two compact feed systems for reception of satellites 3° to 6° apart can be mounted onto the feed system support.

  For any other combination, an additional multifeed-adaptor plate is required
- The following components are required:

‣ **For CAS 124:**
ZAS 124 feed system support (order no. 218662) and
ZAS 180 azimuth/elevation support (order no. 218661)

‣ **For CAS 180:**
ZAS 181 feed system support (order no. 218667) and
ZAS 186 azimuth/elevation support (order no. 218676)

‣ AZ fine adjustment for CAS 180/CAS 124:
ZAS 189 (order no. 23710017)

‣ Stand mast for CAS 124:
ZSO 120 (order no. 376214), ZSO 125 (order no. 376215)

‣ Stand mast for CAS 180:
ZSO 180 (order no. 23710014), ZSO 181 (order no. 23710015)

CAS 180 with feed system EAS 485 and feed system mounting plate ZAS 181 on azimuth/elevation support ZAS 186

Azimuth/elevation support ZAS 186

Satellite reception systems

Technical data

Type		CAS 124	CAS 180
Order no.		216236	216235
Diameter	m	1.2	1.8
Reception range	GHz	10.70-12.75	10.70-12.75
Antenna gain at 10.70-11.70 GHz	dBi	41.50	44.50
Antenna gain at 11.70-12.50 GHz	dBi	42.15	45.15
Antenna gain at 12.50-12.75 GHz	dBi	42.50	45.50
Half-power beam width	°	1.43	0.9
System performance (G/T)		See feed system	See feed system
Cross polarisation decoupling	dB	> 30	> 30
Wind load [1)]	N	1296	3396
Mast clamp range ZAS 180/ZAS186	mm	75-114	75-114
Setting range Elevation	°	5-50	5-50
Setting range Azimuth	°	360	360
Dimensions width	mm	1234	1980
Max. dimensions height	mm	1501	1511
Max. dimension protrusion (from centre of mast without feed system)	mm	1353	1900
Dimensions (L x W x H)	mm	1430 x 1430 x 370	2230 x 2120 x 390
Weight appr. net/gross	kg	18.4/30.7	60.0/81.5

[1)] At a dynamic pressure of 800 N/m² acc. to DIN 57855 and VDE 0855

Satellite reception systems

Offset parabolic antennas

CAS 09/HD 216258
CAS 90/HD 216259

- Comprising reflector, feed system support and mast clamp
- Reflector of fine core aluminium, powder-coated
- Feed system support of galvanised sheet steel, plastic-coated
- Clamping piece made of sheet steel, hot-dip galvanised
- Optimal electrical data at lowest mechanical dimensions due to offset-feed
- Available in graphite and white
- Without any additional components, two universal feed systems for the reception of satellites 3° to 4° or 6° apart (e.g. ASTRA/ EUTELSAT-HOTBIRD) can be mounted onto the LNB boom.

For any other combination, additionally the ZAS 90 multifeed adaptor plate is required. For multifeed reception, Kathrein recommend a reflector diameter of at least 90 cm.

Type			CAS 09/HD	CAS 90/HD
Order no.			216258	216259
Diameter/colour		mm	987/white	987/graphite
Reception range		GHz	10.70-12.75	
Antenna gain at 10.70-11.70 GHz		dBi	38.6	
Antenna gain at 11.70-12.50 GHz		dBi	39.2	
Antenna gain at 12.50-12.75 GHz		dBi	39.6	
Half power beam width [1]		°	< 1.9	
Cross polarisation decoupling		dB	> 27	
Wind load [2]		N	730	
Max. permissible wind speed		km/h	190	
Mast clamp range		mm	48-90	
Setting range	Elevation Azimuth	°	5-50 360	
Dimensions	Width Height max. Protrusion max. [3]	mm	987 1030 880	
Dimensions (L x W x H)		mm	1015 x 1015 x 210	
Weight appr. (net/gross)		kg	9.3/11.9	

[1] At mid-band
[2] At a dynamic pressure of 800 N/m² acc. to EN 50083, part 1
[3] From centre of mast without feed system

Accessories for satellite reception systems

Azimuth fine adjustment CAS 124/180

ZAS 189 23710017

The azimuth fine adjustment is an adjustment aid for easy, accurate positioning of professional satellite reception antennas. The fine adjustment can be removed after adjustment has been made.

- For azimuth adjustment when mounting the parabolic antenna CAS 124/180
- Enables easy, exact azimuth alignment
- Can be removed after adjustment, therefore re-usable many times

Type		ZAS 189
Order no.		23710017
Azimuth positioning	Angle degree/ degree per screw shackle turn	1.8
Suitable for mast diameters from ... to	mm	76 ... 114
Weight	kg	2.3

Multifeed adaptor plate for CAS 180

ZAS 188 23710018

The multifeed adaptor plate is applied for multifeed reception of satellite combinations using the CAS 180 parabolic antenna, which are not possible with the standard mounting plate ZAS 181 (typical orbit spacing: up to max. 10.5°).

- ZAS 188 adaptor plate is suitable for the CAS 180 fitted with the ZAS 181 feed system support
- Kathrein feed systems in both compact or modular form e.g. EAS 483, EAS 484 or EAS 485, EAS 124 und EAS 126 can be used
- The ZAS 188 offers infinite adjustability of feed systems. This enables optimal adjustment of satellite combinations in any order
- For settings, see manual

Note:
Due to lack of space, for orbit position spacing less than 4.5° (e.g. 19.2°/23.5°) either two compact feed systems (e.g. EAS 484) must be mounted or one modular and one compact feed system (e.g. EAS 485). This combination is possible for satellite spacing up to 3°. For an arrangement with two modular systems such as EAS 485, a satellite spacing of min. 4.5° is required.

Accessories for satellite reception systems

Multifeed adaptor plate for CAS 180

ZAS 187 218688

The multifeed adaptor plate is applied for multifeed reception of satellite combinations using the CAS 180 parabolic antenna, which are not possible with the standard mounting plate ZAS 181 (typical orbit spacing: up to max. 10.5°).

- ZAS 187 adaptor plate is suitable for the CAS 180 fitted with the ZAS 181 feed system support
- EAS 484 feed system for professional applications may be used for multifeed applications
- The predetermined raster enables implementation of the arrangements below (see table)

Allocation of the feed systems							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
ASTRA 2 28.2°	x x	x x	x x	DFS 23.5°	x x	x x	ASTRA 1 19.2°
x x	DFS 23.5°	x x	x x	ASTRA 1 19.2°	x x	EUTELSAT 16°	x x
ASTRA 1 19.2°	x x	x x	EUTELSAT 16°	x x	EUTELSAT 13°	x x	EUTELSAT 10°
EUTELSAT 16°	x x	x x	EUTELSAT 13°	x x	EUTELSAT 10°	x x	EUTELSAT 7°
x x	x x	ASTRA 1 19.2°	x x	EUTELSAT 16°	x x	EUTELSAT 13°	x x
x x	x x	EUTELSAT 16°	x x	EUTELSAT 13°	x x	EUTELSAT 10°	x x
x x	x x	x x	ASTRA 1 19.2°	x x	EUTELSAT 16°	x x	x x
x x	x x	x x	EUTELSAT 16°	x x	EUTELSAT 13°	x x	x x
x x	x x	x x	EUTELSAT 13°	x x	EUTELSAT 10°	x x	x x
x x	x x	x x	EUTELSAT 10°	x x	EUTELSAT 7°	x x	x x
x x	x x	x x	Telecom 2B -5°	x x	Telecom 2A -8°	x x	x x
22.3	22.5	23.7	24.4	24.7	24.4	23.7	22.3
G/T [dBi/K]							

Note:
Due to lack of space, for orbit position spacing less than 4.5° (e.g. 19.2°/23.5°) either two compact feed systems (e.g. EAS 484) must be mounted or one modular and one compact feed system (e.g. EAS 485).
This combination is possible for satellite spacing up to 3°. For an arrangement with two modular systems such as EAS 485, a satellite spacing of min. 4.5° is required.

Satellite reception systems

Parabolic antenna

CAS 23 316200
ZAS 27 318601
ZSO 123 376228

- No permanent deformation at wind speeds up to 200 km/h
- May be operated with an antenna heating system
- Conforms to the technical delivery conditions of Kabel Deutschland
- The following components are required (2.2 m installation):

  - Parabolic antenna: CAS 23 (order no. 316200)
  - Azimuth/Elevation support: ZAS 27 (order no. 318601)
  - Struts for CAS 23: ZSO 123 (order no. 376228)
  - Stand masts: ZSO 23 (order no. 376212)
    ZSO 27 (order no. 23710012)

Type			**CAS 23**
Order no.			316200
Diameter		m	2.2
Material used for reflector			Aluminium
Reception range		GHz	10.70-12.75
Antenna gain at 10.95-11.70 GHz		dBi	46.10-46.60
Antenna gain at 11.70-12.50 GHz		dBi	46.60-47.20
Antenna gain at 12.50-12.75 GHz		dBi	47.20-47.40
Half-power beam width		°	0.84
System performance G/T			See feed system
Cross polarisation decoupling		dB	> 30
Wind load [1)]		kN	12
Setting range	Elevation Azimuth		10-40 360
Weight appr.		kg	51

[1)] At a dynamic pressure of 2 kN/m²

Satellite reception systems

General safety instructions

The Kathrein parabolic antennas CAS 09/90/09 HD (90 cm Ø), CAS 120/124 (120 cm Ø), CAS 180 (180 cm Ø) and CAS 23 (220 cm Ø) were designed to comply with the VDE regulations 0855, part 1 (= EN 50083) and fulfil the European standard ETS 300019-2-4 (12.94) regarding vibration requirements.

On choosing the installation site, building-specific characteristics (e.g. vibration-prone buildings) and thereby caused excessive working loads and wind loads acc. to DIN 1055-4 (2005-03) or DIN 4131 must be considered.

The dynamic properties of the antenna and the structure can mutually influence each other and cause detrimental changes.

Non-observance of these standards and instructions may result in antenna parts being detached!

Feed system without LNB

EAS 124 227243

- Offset feed system without LNB; for application with specific LNBs
- Module offset housing
- With R120 waveguide interface
- One polarisation
- Suitable for CAS 06-CAS 180 offset parabolic antennas
- Power supply over drop cable
- LNB and cable connections are fully protected in a ventilated housing, protection class: IP 54

Note: For multifeed allocation, please observe the notes on ZAS 187 and ZAS 188.

Type		EAS 124
Order no.		227243
Suitable for offset parabolic antennas		CAS 06, 075, 09/90/HD, 124, 180
Wave guide interface		R120
Polarisation		One polarisation level
Input frequency	GHz	10.70-12.75
Dimensions incl. protective cap (W x H x D)	mm	393 × 129 × 116
Packing dimensions (W x H x D)	mm	405 × 115 × 115
Weight gross	kg	2.0

Satellite reception systems

Feed system without LNB

EAS 126 227249

- Offset feed system without LNB; for application with specific LNBs
- Module offset housing
- Two polarisations
- With two R120 waveguide interfaces
- Suitable for CAS 06-CAS 180 offset parabolic antennas
- Power supply over drop cable
- LNB and cable connections are fully protected in a ventilated housing, protection class: IP 54

Note: For multifeed allocation, please observe the notes on ZAS 187 and ZAS 188.

Type		EAS 126
Order no.		227249
Suitable for offset parabolic antennas		CAS 06, 075, 09/90/HD/90R, 124, 180
Wave guide interfaces		R120
Polarisation		Two polarisation levels
Input frequency	GHz	10.70-12.75
Dimensions incl. protective cap (W x H x D)	mm	393 × 129 × 116
Packing dimensions (W x H x D)	mm	405 × 115 × 115
Weight gross	kg	2.1

Satellite reception systems

Professional quatro feed system for centrally-fed parabolic antennas

EAS 272 23410003 CE

- To retro-fit existing antenna installations
- To receive satellites such as ASTRA, EUTELSAT/HOTBIRD, Telecom, Türksat
- The feed system conforms to the technical specifications of Kabel Deutschland
- Feed system with two polarisations and two frequency ranges (low and high band or analogue and digital)
- For linear polarisation
- Equipped with a quatro LNB for professional use (4 outputs)
- Power supply via drop cable
- LNB and cable connections are fully protected in a ventilated housing, protection category: IP 54
- Included in delivery scope:
  - Completely mounted LNB block incl. OMT and feed-horn
  - Protective cap with two cable ducts

Please note:
Struts and LNB support collar are not included in delivery scope. If a CAS 23 is newly set-up, the ZAS 27 Az/El support and ZSO 123 struts are required.

Type		EAS 272
Order no.		23410003
For centrally-fed parabolic antennas		CAS 015, 16, 18, 22, 23
Polarisation horizontal		Low band/high band
Polarisation vertical		Low band/high band
Input frequency low band/high band	GHz	10.70-11.70/11.70-12.75
Feed system noise figure at 25° C low band/high band	dB	1.2/1.2
Gain	dB	51
Output frequency low band/high band	MHz	950-1950/1100-2150
Oscillator frequency low band/high band	GHz	9.75/10.60
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 015/16	dB/K	22.3/23.3
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 018	dB/K	24.0/25.0
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 22/23	dB/K	25.8/26.7
Polarisation decoupling	dB	29
Output		4 x F socket
Impedance	Ω	75
Supply voltage LNB	V	+11.5 to 19 (optionally via any output)
Current drain LNB	mA	< 250
Dimensions (mounted)	mm	ø 175 x 272
Weight gross/net	kg	2.05/1.9

Satellite reception systems

Quatro feed system for semi-professional use for offset parabolic antennas

EAS 483 23410001 CE

- To receive satellites such as ASTRA, EUTELSAT/HOTBIRD, Telecom, Türksat
- The feed system conforms to the technical specifications of Kabel Deutschland
- Feed system with two polarisations and two frequency ranges (low and high band or analogue and digital)
- For linear polarisation
- Equipped with a quatro LNB for professional use (4 outputs)
- Power supply via drop cable, remote feeding possible via any output
- Polarisation and frequency range are independent from supply voltage
- Multifeed-suitable due to compact design
- LNB and cable connections are fully protected in a ventilated housing, protection category: IP 54

Type		EAS 483
Order no.		23410001
Suitable for offset parabolic antennas		CAS 120/CAS 124
Polarisation horizontal		Low band/high band
Polarisation vertical		Low band/high band
Input frequency low band/high band	GHz	10.70-11.70/11.70-12.75
Feed system noise figure at 25° C low band/high band	dB	1.1/1.1
Gain	dB	55
Output frequency low band/high band	MHz	950-1950/1100-2150
Oscillator frequency low band/high band	GHz	9.75/10.60
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz)	dB/K	19.4/20.2
Polarisation decoupling	dB	27
Output		4 × F socket
Impedance	Ω	75
Supply voltage LNB	V	+11.5 to 19 (optionally via any output)
Current drain LNB	mA	< 250
Dimensions incl. protective cap (W x H x D)	mm	250 × 44 × 148
Dimensions (W x H x D)	mm	270 × 60 × 165
Weight gross	kg	1.4

Satellite reception systems

Quatro feed system for professional use

EAS 484 23410004 CE

- To receive satellites such as ASTRA, EUTELSAT/HOTBIRD, Telecom, Türksat
- Due to its compact design, suitable for multifeed reception with CAS 124/180
- The feed system conforms to the technical specifications of Kabel Deutschland
- Feed system with two polarisations each and input frequency range (low and high band or analogue and digital)
- For linear polarisation
- Equipped with quatro LNB for professional use (4 outputs)
- Power supply via drop cable
- LNB and cable connections are fully protected in a ventilated housing, protection category: IP 54

Type		EAS 484
Order no.		23410004
Suitable for parabolic antennas		CAS 120/ 124/ 180
Polarisation horizontal		Low band/high band
Polarisation vertical		Low band/high band
Input frequency low band/high band	GHz	10.70-11.70/11.70-12.75
Feed system noise figure at 25° C low band/high band	dB	1.2/1.2
Gain	dB	51
Output frequency low band/high band	MHz	950-1950/1100-2150
Oscillator frequency low band/high band	GHz	9.75/10.60
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 120/124	dB/K	20.6/21.6
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 180	dB/K	23.8/24.8
Polarisation decoupling	dB	27
Output		4 × F socket
Impedance	Ω	75
Supply voltage LNB	V	+11.5 to 19 (optionally via any output)
Current drain LNB	mA	< 250
Dimensions incl. protective cap (W x H x D)	mm	250 × 44 × 148
Packing dimensions (W x H x D)	mm	270 × 60 × 165
Weight gross	kg	1.4

Satellite reception systems

Quatro feed system for professional use for offset parabolic antennas

EAS 485 23410002 CE

- To receive satellites such as ASTRA, EUTELSAT/HOTBIRD, Telecom, Türksat
- The feed system conforms with the technical specifications of Kabel Deutschland
- Feed system with two polarisations and frequency ranges each (low and high band or analogue and digital)
- For linear polarisation
- Equipped with quatro LNB for professional use (4 outputs)
- Power supply via drop cable
- LNB and cable connections are fully protected in a ventilated housing, protection category: IP 54
- Module offset housing
- Multifeed-allocation with ZAS 188 at CAS 180 possible

Type		EAS 485
Order no.		23410002
Suitable for offset parabolic antennas		CAS 120/ 124/ 180
Polarisation horizontal		Low band/high band
Polarisation vertical		Low band/high band
Input frequency low band/high band	GHz	10.70-11.70/11.70-12.75
Feed system noise figure at 25° C low band/high band	dB	1.2/1.2
Gain	dB	51
Output frequency low band/high band	MHz	950-1950/1100-2150
Oscillator frequency low band/high band	GHz	9.75/10.60
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 120/124	dB/K	20.6/21.6
System figure of merit (G/T) (at 11.30 GHz/12.50 GHz) CAS 180	dB/K	23.8/24.8
Polarisation decoupling	dB	29
Output		4 × F socket
Impedance	Ω	75
Supply voltage LNB	V	+11.5 to 19 (optionally via any output)
Current drain LNB	mA	< 250
Dimensions incl. protective cap (W x H x D)	mm	292 × 116 × 133
Packing dimensions (W x H x D)	mm	306 × 121 × 121
Weight gross/net	kg	1.8/1.7

Accessories for satellite reception systems

Heating systems for CAS 124/180

ESO 124	271982
ESO 180	271984
ESO 125	26910035
ESO 128	26910057
ESO 126	26910036
ESO 129	26910058

ESO 124/ESO 180:

- For use with the Kathrein offset parabolic antennas CAS 124/CAS 180
- Prevents ice and snow build-up on the reflector surface
- Special plastic panels with integrated heat insulation guarantee effective heat distribution
- Integrated temperature switch to prevent over-heating

ESO 125:

- High-power heating for CAS 124, 1340 W/230 V_{AC}

ESO 128:

- High-power heating for CAS 180, 2750 W/230 V_{AC}

ESO 126:

- Heating for ZAS 124 feed system support (CAS 124 offset parabolic antenna), 113 W/230 V_{AC}; protection category: IP 56
- For operation with ESO 97/99

ESO 129:

- Heating for ZAS 181 feed system support (CAS 180 offset parabolic antenna), 181 W/ 230 V_{AC}; protection category: IP 56
- For operation with ESO 97/99

ESO 126

ESO 129

Accessories for satellite reception systems

Technical data

Type		ESO 124	ESO 180
Order no.		271982	271984
Suitable for offset parabolic antenna		CAS 124	CAS 180
Requisite controller and sensor		ESO 97/ESO 99	ESO 97/ESO 99
Number of heating segments		2	4
Mains voltage per segment	V_{AC}	230 + 6 %/- 10 %	230 + 6 %/- 10 %
Mains frequency	Hz	50/60	50/60
Nominal current	A	3	6
Total power consumption	W	650	1400
Weight per segment	kg	App. 1.5	App. 1.5
Protection category		IP 65	IP 65
Over-heating protection		60° C contact element	60° C contact element in segments 1 + 4

Reflector heating system for CAS 23

ESO 75 371914

- For use with the CAS 23 Kathrein parabolic antenna
- Prevents ice and snow build-up on the reflector surface
- Special plastic panels with integrated heat insulation ensure proper heat distribution
- Heating elements are protected against humidity and fail-safe even at high temperatures
- Required controller and sensors: ESO 99 and ESO 101

Type		ESO 75
Order no.		371914
Number of heating segments	pc.	6
Mains voltage per segment	V_{AC}	230
Mains frequency	Hz	50/60
Current drain per segment	A	1.4
Total current drain	A	8.2
Power consumption per segment	W	315
Total power consumption	W	1890
Weight per segment	kg	App. 1.3
Protection category		IP 65

Accessories for satellite reception systems

Outside temperature controller for ESO 124/ESO 180

ESO 97 271986

- To control the ESO 124/ESO 180 Kathrein reflector heating panels
- Electronic two-point control unit with variable temperature threshold
- The reflector is heated when the outside temperature sinks below a set value

Type		ESO 97
Order no.		271986
Suitable for reflector heating panels		ESO 124/ESO 180
Voltage supply	V_{AC}	230 ± 10 %/50 Hz
Contact loading		Max. 16 A/230 V
Measurement input		PT 100 (2-conductor)
Setting range	°C	-5 to +15
Ambient temperature	°C	-30 to +80
Type of control		Two-point control
Output		Relay contact
Signalling		Heating ON (yellow)
Housing material		Poly-carbonate
Dimensions (W × H × D)	mm	254 × 180 × 90
Weight app.	kg	1.5
Cable entry points		2 × PG 7; 4 × PG 9; 1 × PG 16

Accessories for satellite reception systems

Reflector heating system for CAS 09/90/HD/90R

ESO 95 271983

- For use with CAS 09/90/HD/90R parabolic antennas
- Prevents build-up of ice and snow on the reflector surface
- Special plastic sheeting with integrated heat insulation ensures proper heat dissipation
- Integrated temperature switch to prevent over-heating
- Required controller: ESO 96 outside temperature control unit

ZSO 127:
- Complete set, including:
  - CAS 90/HD parabolic antenna
  - ESO 95 mounted reflector heating system
  - ESO 96 reflector outside temperature control unit
- Colour: graphite grey without labelling

Type		ESO 95
Order no.		271983
Suitable for parabolic antennas		CAS 09/90/HD/90R
Required controller		ESO 96
Number of heating segments	pc.	1
Mains voltage per segment	V_{AC}	230 ± 6 %/-10 %
Mains frequency	Hz	50/60
Nominal current	A	1.5
Total power consumption	W	345
Weight per segment, app.	kg	1.5
Protection category		IP 65
Over-heating protection		60° C break contact element
Packing unit/weight	pc./kg	1/6.5

Accessories for satellite reception systems

Reflector outside temperature control unit

ESO 96 271985

- To control the ESO 95 reflector heating panel
- Electronic two-point controller with variable temperature threshold
- Reflector is heated when the outside temperature sinks below the set value
- Tension-belt for mast mounting

Type		ESO 96
Order no.		271985
Suitable for reflector heating		ESO 95
Voltage supply	V_{AC}	230 ± 10 %/50 Hz
Power switch		Max. 16 A/230 V
Test input		PT 100, 2-lead
Variable setting range	°C	-5 to +15
Ambient temperature range	°C	-30 to +80
Type of control		Two-point controller
Output		Relay contact
Signal lamp		Heating ON (yellow)
Housing material		Poly-carbonate
Dimensions	mm	130 x 130 x 75
Mast clamp range	mm	48-90
Weight	kg	App. 0.7
Cable entry points		1 x PG 7; 1 x PG 11; 1 x PG 16
Packing unit/weight	pc./kg	1/1.0

Accessories for satellite reception systems

Heating system control unit

ESO 99	271988
ESO 101	271990
ELSM 124/180	26910001

- To control the ESO 75/124/180 Kathrein reflector heating systems
- The following parameters are analysed:
  - Outdoor temperature
  - Reflector temperature
  - Ice and snow formation on the reflector
  - Fouling
- The reflector is heated when the outside and reflector temperatures sink below set values and when ice or snow are on the reflector surface
- Signalises fouling on the reflector surface
- Over-heating protection
- Manual or remotely switched mode
- **ESO 101** (order no. 271990):
  - Suitable sensors with terminal box to control the ESO 99
  - Opto-sensor to identify ice or snow formation and fouling
  - Temperature sensors to measure the outdoor and reflector temperatures
- **ELSM 124/180** (order no. 26910001):
  - To mount the opto-sensors onto the boom of the ZAS 124 or ZAS 181 feed system supports
  - Suitable for CAS 124 or CAS 180

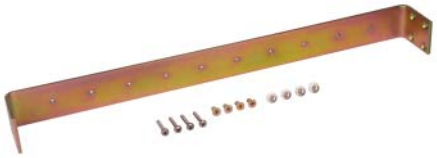
Type		**ESO 99**
Order no.		271988
Nominal voltage	V_{AC}	230
Operational temperature	°C	-20 to +60
Temperature setting range		
Ambient temperature upper threshold/lower threshold	°C	-3 to +5/-25 to -5
Reflector temperature	°C	+20 to +60
Switching hysteresis	°C	1
Residual heat time	min	3-180

Accessories for satellite reception systems

4-way 75/50 Ω transformation element

EMU 75-50 23710003
ZAS 79 23710005

- The EMU 75-50 serves as transformation element between a 50 Ω and a 75 Ω connection point (e.g. EAS 485 with 50 Ω outgoing feeder)
- Transformer elements remote-feed suitable
- To be used only in weatherproof rooms or housings (protection category: at least IP 54)
- **ZAS 79** - order no. 23710005:
  - The ZAS 79 cabinet is solely designed for insertion of an EMU 75-50 4-way transformation element (not included in the delivery scope)
  - The internal cabling required to connect the EMU 75-50 is built in, the required fastenings are included in the package
  - For mast mounting of the ZAS 79, two mounting rails, two clips with tensioning belts and the appropriate fastenings are supplied. The mast clamp range is Ø 34 mm to Ø 300 mm
  - The housing is ventilated to avoid condensation water from developing
- **ZSO 38** - order no. 23710007: wall mounting for EMU 75-50
- **ZSO 39** - order no. 23710008: installation frame/mounting angle for EMU 75-50



ZSO 39

Type		EMU 75-50
Order no.		23710003
Frequency range	MHz	950-2150
Through loss	dB	0.2
Adaptation	dB	20
Screening factor 950-1000 MHz	dB	65
Screening factor 1000-2150 MHz	dB	55
Impedance (SMA socket)	Ω	50
Impedance (F socket)	Ω	75
Remote feed current (max.)	A	2
Temperature range	°C	-25 to +65
Protection category		To be used only in weatherproof rooms (at least IP 54)
Dimensions (W x H x D)	mm	135 × 85 × 24
Packing dimensions (W x H x D)	mm	195 × 125 × 40
Weight	kg	0.12
Packing unit/weight	pc./kg	1/0.54

Accessories for satellite reception systems

Cable connection box

TVK 44 23710004

- TVK 44 cable connection box as interface between the flexible connection cables of a feed system and the outgoing feeder to a signal processing system
- Cable connection box with earthing point
- Remote-feed suitable

Type		TVK 44
Order no.		23710004
Frequency range	MHz	950-2150
Through loss	dB	0.2
Return loss	dB	20
Impedance	Ω	75
Remote feed current (max.)	A	2
Connections		8 × F socket
Temperature range	°C	-25 to +65
Protection category		IP 54
Dimensions (W × H × D)	mm	155 × 148 × 122
Packing dimensions (W × H × D)	mm	225 × 183 × 145
Weight	kg	1.5
Packing unit	pc.	1

Accessories for satellite reception systems

Mast brackets

ZSO 115 276277
ZSO 215 23710016

- **ZSO 115:**
  - Mast bracket for 219 mm-Ø piping
  - Suitable for the CAS 124 parabolic antenna
- **ZSO 215:**
  - Mast bracket for 219 mm-Ø piping
  - Suitable for the CAS 180 parabolic antenna
  - Conforms to the technical conditions of delivery of Kabel Deutschland

ZSO 115

ZSO 215

Type		ZSO 115	ZSO 215
Order no.		276277	23710016
Wind load	kN	0.29	0.52
Torque on pipe supports	kNm	0.9	1.65
Transferable torque on 219 mm-Ø piping	kNm	3.66	3.82
Weight (app.)	kg	27	50

Accessories for satellite reception systems

Mounting accessories

ZAS 33	23710010
ZAS 34	23710011
ZAS 128	23710001
ZAS 138	23710013
ZSO 28	23710002
ZSO 29	23710019

ZAS 128

ZSO 28

ZAS 33

Type	Order no.	Description
ZAS 33	23710010	Tension-belt clamp 60-120 mm Ø for TVK 44
ZAS 34	23710011	Tension-belt clamp 120-300 mm Ø for TVK 44
ZAS 128	23710001	Wall mounting for CAS 124
ZAS 138	23710013	Wall mounting for CAS 180
ZSO 28	23710002	Installation set for ZAS 128/ZAS 138 (2 x ZSO 28 required)
ZSO 29	23710019	Compound anchor for ZSO 180/181 at CAS 180

Accessories for satellite reception systems

Mounting accessories

ZSO 01	276201
ZSO 21	276278
ZSO 22	276279
ZSO 25	276281
ZSO 38	23710007
ZSO 39	23710008
ZSO 40	23710009

ZSO 01

ZSO 25

ZSO 39

Type	Order no.	Description
ZSO 01	276201	Cable earthing kit 3/8“
ZSO 21	276278	Adhesive anchors for ZSO 120/125
ZSO 22	276279	Clamping plates for ZSO 120/125
ZSO 25	276281	Clamping plates for ZSO 23/27/180/181
ZSO 38	23710007	Wall mounting for EMU 75-50, also for mounting in the ZAS 79 cabinet
ZSO 39	23710008	Installation frames/mounting angle for EMU 75-50
ZSO 40	23710009	Installation frames/mounting angle for EMU 75-50 on a grating

Accessories for satellite reception systems

Stand-alone stub masts

ZSO 120	376214
ZSO 125	376215
ZSO 180	23710014
ZSO 181	23710015
ZSO 23	376212
ZSO 27	23710012

- Can be taken apart
- Conform to the technical conditions of delivery of Kabel Deutschland

ZSO 180

Type		**ZSO 120**	**ZSO 125**	**ZSO 180**	**ZSO 181**	**ZSO 23**	**ZSO 27**
Order no.		376214	376215	23710014	23710015	376212	23710012
Suitable for parabolic antenna		CAS 124		CAS 180		CAS 23	
Wind load	kN	5.7		7.53		12	
Torque on pipe socket	kNm	0.9		1.62		4.7	
Forces active on the attachment points (wind speed: 200 km/h)							
- Pressure	kN	6.2	8.6	19.6	18.8	20.5	20.1
- Pull	kN	4.9	8.9	18.3	13.1	20.5	15.9
Dimensions (Ø/height)	mm	114/1405	114/2405	114/2640	114/1455	194/2550	194/1650
Weight (app.)	kg	56	70	200	137	171	129
Radial load (shearing strain)	kN	8.7	11.2	10.9	9.6	14.3	10.4

Accessories for satellite reception systems

Sat-IF amplifier

VPP 71 330002 CE

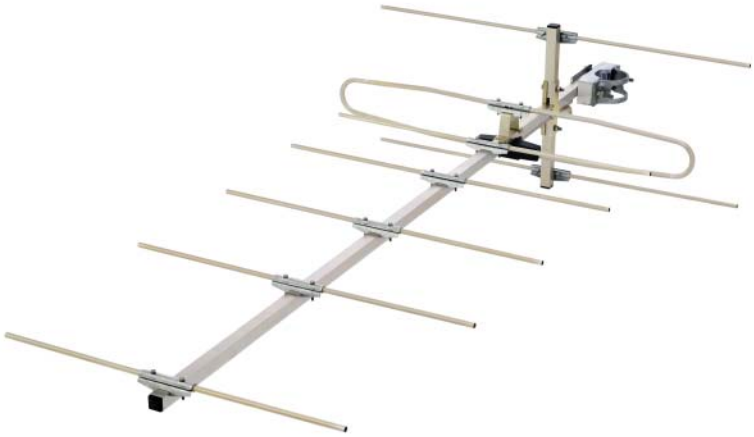
- To amplify the Sat-IF range (950-2750 MHz)
- For outdoor mounting
- Amplifier is remotely supplied via the output or input socket
- RF connections: N socket
- Conforms to the technical conditions of delivery of Kabel Deutschland

Type		VPP 71
Order no.		330002
Frequency range	MHz	950-2750
Impedance	Ω	50
Gain at 950 MHz/2750 MHz	dB	10 ± 1/18 ± 1
Max. output level in FM signal/QPSK	dBm	-30/-40
Noise figure at 950 MHz/2750 MHz	dB	15 ± 1/5 ± 1
Operational voltage	V	12-20
Current drain	mA	Max. 70

Terrestrial reception antennas

VHF channel antennas

CVP 09/5-6	214310
CVP 09/7-8	214311
CVP 09/9-10	214312
CVP 09/11-12	214309



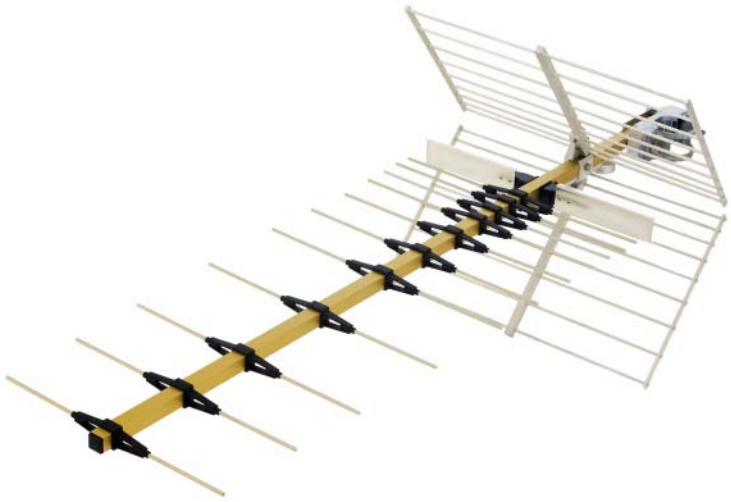
- Element supports of hot-dip galvanised steel and weather-proof, temperature-resistant and UV light resistant plastics
- Designed for wind speeds up to max. 162 km/h
- Optimised clamp designed for masts/brackets and mounting brackets with 90 mm Ø
- Connection: IEC sockets 2.4/9.5 DIN 45325 with M 14 external thread and weather protection cap
- Conform to the technical conditions of delivery of Kabel Deutschland

Type		CVP 09/5-6	CVP 09/7-8	CVP 09/9-10	CVP 09/11-12
Order no.		214310	214311	214312	214309
Channels		5-6	7-8	9-10	11-12
Gain	dB	8.5-9.5	8.5-9.5	8.5-9.5	8.5-9.5
Reception range	MHz	174-188	188-202	202-216	216-230
Impedance	Ω	75	75	75	75
Front-to-back ratio	dB	25-30	27-30	26-31	26-30
Dimensions (L x W x H)	mm	1900 × 930 × 408	1790 × 860 × 408	1700 × 815 × 408	1620 × 760 × 408
Wind load (at V = 162 km/h)	N	169	164	157	153
Mast clamp torque	Nm	62	62	62	62
Weight	kg	4.6	4.5	4.4	4.3

Terrestrial reception antennas

UHF channel-group antennas

CUP 12/21-30 214275
CUP 12/28-37 214276
CUP 12/38-50 214277
CUP 12/49-60 214278
CUP 12/61-68 214279



- Element supports of hot-dip galvanised steel and weather-proof, temperature-resistant and UV light resistant plastics
- Designed for wind speeds up to max. 162 km/h
- Optimised clamp designed for masts/brackets and mounting brackets with 90 mm Ø
- Connector: IEC socket 2.4/9.5 DIN 45325 with M 14 external thread and weather protection cap
- Conform to the technical conditions of delivery of Kabel Deutschland

Type		CUP 12/21-30	CUP 12/28-37	CUP 12/38-50	CUP 12/49-60	CUP 12/61-68
Order no.		214275	214276	214277	214278	214279
Channels		21-30	28-37	38-50	49-60	61-68
Gain	dB	11-12.5	11-13	11-12.5	12-13	11-13
Reception range	MHz	470-550	526-606	606-710	694-790	790-854
Impedance	Ω	75	75	75	75	75
Front-to-back ratio	dB	28-35	28-35	28-35	28-35	28-35
Dimensions (L × W × H)	mm	1640 × 600 × 580	1460 × 600 × 580	1330 × 600 × 580	1210 × 600 × 580	1150 × 600 × 580
Wind load (at V = 162 km/h)	N	216	216	216	216	216
Torque on mast clamp	Nm	47.6	47.6	47.6	47.6	47.6
Weight	kg	5.1	5	4.9	4.8	4.7

Terrestrial reception antennas

FM antenna

AFP 07 210345

- Yagi FM reception antenna
- Connection: N socket
- Mast clamping piece-Ø: 90 mm
- Conform to the technical conditions of delivery of Kabel Deutschland

Type		AFP 07
Order no.		210345
Band		FM
Gain	dB	7-8
Reception range	MHz	87.5-108
Impedance	Ω	50
Return loss	dB	> 14
Side-lobe attenuation horizontal	dB	> 25
Side-lobe attenuation vertical	dB	> 20
Wind load (at V = 162 km/h)	N	407
Mast clamp torque	Nm	214
Dimensions (L x W x H)	mm	2370 × 2060 × 1140
Weight	kg	12.3

Terrestrial reception antennas

FM antenna 75 Ω

CFP 09 214251

- Element supports of hot-dip galvanised steel and weather-proof, temperature-resistant and UV light resistant plastics
- Designed for wind speeds of up to max. 162 km/h
- Optimised clamp designed for masts/brackets and mounting brackets with 90 mm Ø
- Connection: IEC sockets 2.4/9.5 DIN 45325 with M 14 external thread and weather protection cap
- Conform to the technical conditions of delivery of Kabel Deutschland

Type		CFP 09
Order no.		214251
Band		FM
Gain	dB	7-9
Reception range	MHz	87.5-108
Impedance	Ω	75
Front-to-back ratio	dB	18-25
Dimensions (L x W x H)	mm	2860 × 1900 × 660
Wind load (at V = 162 km/h)	N	336
Mast clamp torque	Nm	190
Weight	kg	9.1

Accessories for terrestrial reception antennas

Mounting accessories

ZTA 15 218130
ZTA 25 218131

- **ZTA 15:** single bracket
- **ZTA 25:** twin bracket

ZTA 15

ZTA 25

Type		ZTA 15	ZTA 25
Order no.		218130	218131
		For one antenna with 500 N wind load	For two antennas with 500 N wind load each
Pipe diameter	mm	90	90
Wind load (at V = 162 km/h)	N	105	194
Weight	kg	10	17

Brackets for mast-Ø > 125 mm on request

Accessories for satellite reception systems

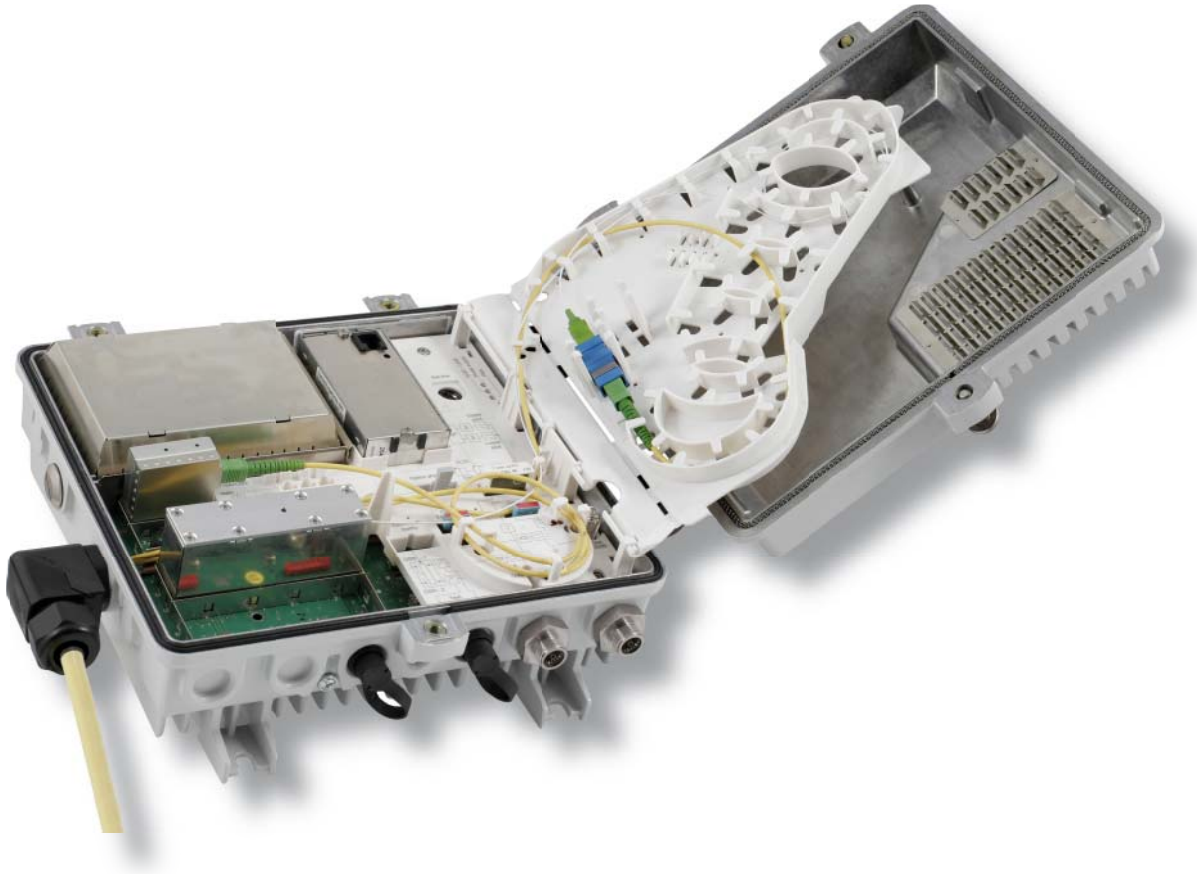
Cable set for EAS 48x

LSO 77 23710006

- To connect the feed system to the TVK 44 cable connection box
- Suitable for CAS 124 and CAS 180 offset parabolic antennas
- One cable set consists of four cables, each 3.30 m long

Type		LSO 77
Order no.		23710006
Length (4 cables)	mm	3300 each
Plug		F
Impedance	Ω	75
Weight	kg	0.5
Packing unit	pc.	1

Optical transmission systems



Optical transmitters

Externally modulated transmitters, 19“ design

ESA 1085XA-E 24610252
ESA 1085XA-E 24610140

- Opto-electrical conversion of forward path signals
- Designed for operation with optical amplifiers (EDFAs)
- Excellent parameters enable design of optical distribution systems over 100 km in length
- Very low-noise, narrow-band DFB laser
- Optical modulator with 2 optical outputs
- Automatic RF gain control: CW carrier, video or manual
- Settable SBS threshold up to 19 dBm
- Service interface: HTTP/SNMP Ethernet
- LC display and LEDs on front panel
- Optical wave length: 1558.98 nm (ITU channel 23)
- Additional wave lengths and optical output levels on request
- Optical interfaces: E-2000, 0.1 dB-type (other connectors on request)
- Test socket: -20 dB
- Two power supply modules, hot-pluggable
- Design: 19“ racking, 1 height unit, depth: 600 mm
- Power supply: 230 V_{AC} or 48 V_{DC}, type dependant

Type		ESA 1085XA-E	ESA 1085XA-E
Order no.		24610252	24610140
Optical interfaces		E-2000	
Optical wave length	nm	1558.98	
Optical output level	dBm	2 x 8.5	
Relative intensity noise (RIN)	dBc/Hz	-160	
Input level, per TV channel, nominal	dBµV	80	
AGC dynamic range	dB	+3 ... -6	
Return loss at 47 MHz	dB	20 -1.5/oct., > 15	
Frequency range	MHz	47-1000	
Frequency response 47-862 MHz	dB	± 0.75	
Test socket	dB	-20 ± 1	
RF interface		F connector (female)	
Voltage supply	V	100 ... 240 $_{AC}$	± 36 ... ± 72 $_{DC}$
Power consumption	W	60	

Optical amplifiers

Optical amplifiers, 19“ design

OBV 1616	24910037
OBV 3216	24910036
OBV 820	24910035
OBV 1620	24910034

OBV 1616

- Amplifies optical signals in the 1550 nm range
- Optical output power 16.5 or 20 dBm, 8-32 outputs, type dependant
- Monitors optical input and output levels as well as pump laser current
- ErYb-doped optical amplifier
- Low noise figure
- LC display, LEDs and input keys on front panel
- RS 485 interface for management
- Ideal for FttH or HFC applications
- Optical interfaces: type-dependant E-2000, SC/APC or LC/APC on request
- Design: 19“ racking, 1 height unit (HU)

Type		OBV 1616	OBV 3216	OBV 820	OBV 1620
Order no.		24910037	24910036	24910035	24910034
Optical wave length	nm	1545-1565	1545-1565	1545-1565	1545-1565
Optical return loss	dB	45	45	45	45
Optical input level	dBm	-5 ... +10	-5 ... +10	-5 ... +10	-5 ... +10
Noise figure (at 0 dBm)	dB	< 5.5	< 5.5	< 5.5	< 5.5
Optical output power per output	dBm	16.5	16.5	20	20
Optical decoupling, input	dB	35	35	35	35
Optical decoupling, output	dB	35	35	35	35
No. of outputs		16	32	8	20
Power consumption, max.	W	45	45	40	45
Supply voltage	V_{AC}	100 ... 240	100 ... 240	100 ... 240	100 ... 240

Optical broadband platform

19“ Broadband platform for optical modules

KBP 4000R 25010022
KBP 4048R 25010021

- Up to 16 modules can be inserted into the broadband platform
- Equipped with 2 redundant power supply and cooling fan units
- Power supplies can be exchanged under operation
- Plug-in control panel with LC display, status LEDs and input keys
- Bus for:
  - 24 V_{DC} module power supply
  - RS 485 remote monitoring and control interface
  - Controller management
- Models available for 100 ... 240 V_{AC} and 48/60 V_{DC} powering
- Automatic slot detection of plugged module
- Design: 19“ racking, 4 height units (HU)
- Can be adapted to ETSI defined cabinets

Note:
The net element controller module Ethernet NCM 10 is required if modules are to be tuned to other settings and for monitoring purposes

Type		KBP 4000R	KBP 4048R
Order no.		25010022	25010021
Input voltage	V	AC: 100-240	DC: 36-72
Power consumption max.	W	< 240	
Power consumption of inserted modules max.	W	< 192	
Dimensions (W x H x D)	mm	483 x 102 x 476	
Weight	kg	12	

Optical broadband platform

Net element controller module Ethernet

NCM 10 26210079 CE

- For management and monitoring of active modules in the 19“ broadband platform KBP 40xx
- Conversion of RS 485 data to SNMP/Ethernet and Webbrowser/ Ethernet protocol
- Interface to displays and input keys on the front panel
- Automatic recognition of all modules connected to the RS 485 bus
- Ethernet interface 10/100 Mbit/s for SNMPv1 and Webserver
- Flash microcontroller technology for rapid and simple software updates via Ethernet interface
- LEDs for status display
- Low power consumption

Note:
Up to three broadband platforms KBP 40xxR can be managed and monitored by one NCM 10 module

Type		NCM 10
Order no.		26210079
Power consumption	W	2.5

Optical broadband platform

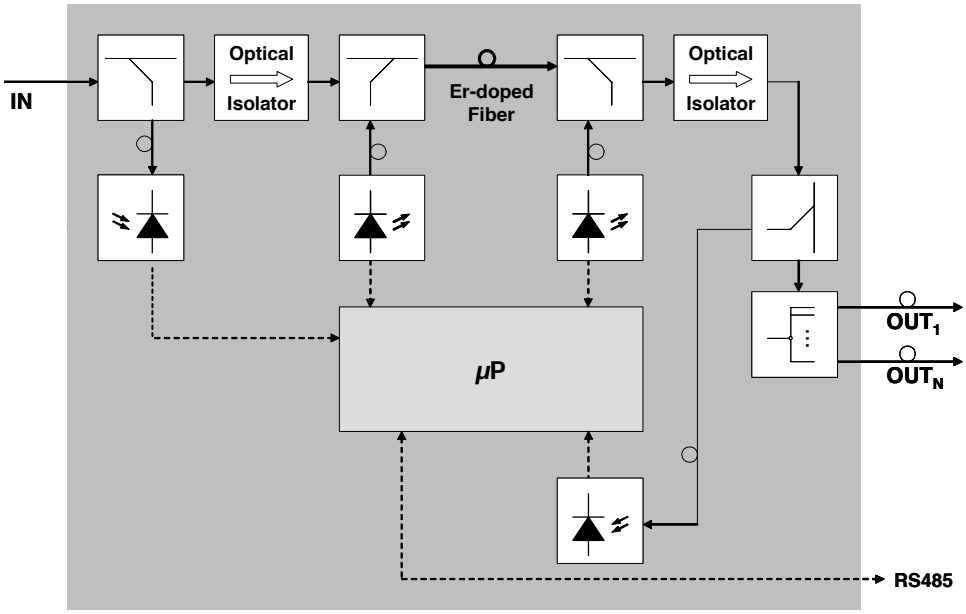
Optical amplifiers

OBM 113S-E	24910028
OBM 213S-E	24910029
OBM 413D-E	24910030
OBM 116S-E	24910031
OBM 216D-E	24910032
OBM 416D-E	24910033

OBM 113S-E

- Amplification of optical signals in the 1550 nm range
- Optical output power 13 or 16 dBm, 1-4 outputs, depending on type
- Monitoring of optical input and output levels and pump laser current
- 1 or 2 pump lasers, type dependant
- Automatic switch-off in case of low input level
- Low noise figure
- Stand-by mode for low power consumption
- Requires two or three slots in the optical broadband platform KBP 40xxR
- Optical interfaces: E-2000, 0.1 dB-type (other connectors on request)

Block diagramme



Optical broadband platform

Technical data

Type		OBM 113S-E	OBM 213S-E	OBM 413D-E	OBM 116S-E	OBM 216D-E	OBM 416D-E
Order no.		24910028	24910029	24910030	24910031	24910032	24910033
Optical wave length	nm	1540-1560					
Optical interfaces		E-2000					
Optical return loss	dB	50					
Optical input level	dBm	-4 ... +10					
Noise figure (at 0 dBm)	dB	< 4.8					
Optical output level per output	dBm	13	13	13	16	16	16
Optical output power tolerance (1551-1556/1548-1560 nm)	dB	± 0.5/0.8					
No. of outputs		1	2	4	1	2	4
No. of pump lasers		1	1	2	1	2	2
Power consumption operation	W	12	12	24	12	24	36
Power consumption stand-by	W	6	6	10	6	10	10
No. of required slots in KBP 40xxR		2	2	2	2	2	2

Optical broadband platform

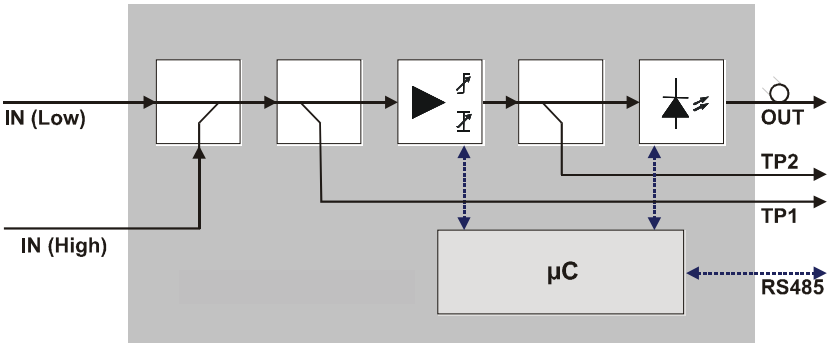
Directly modulated broadcast transmitters, 1310 nm

OTA 1303X-E	24610217
OTA 1305X-E	24610216
OTA 1308X-E	24610193
OTA 1311X-E	24610194
OTA 1313X-E	24610195
OTA 1314X-E	24610196

OTA13xx X-E

- Opto-electrical conversion of forward path signals
- High linear, low noise laser with pre-distortion technology
- Optical output power between 3 and 14 dBm
- Optical output level adjustable 0 to -3 dB (relative)
- Dual RF input (Low/High) to adapt to different input levels
- Electronic tuning elements for attenuation, slope, output level, Optical Modulation Index (OMI) etc.
- Automatic load control for constant OMI
- RS 485 Interface
- Optical interfaces: E-2000, 0.1 dB-type (other connectors on request)
- Test socket for input signal
- Test socket for optical output level or RF signal

Block diagramme



Optical broadband platform

Technical data

Type		OTA 1303X-E	OTA 1305X-E	OTA 1308X-E	OTA 1311X-E	OTA 1313X-E	OTA 1314X-E
Order no.		24610217	24610216	24610193	24610194	24610195	24610196
Nominal optical output level	dBm	3	5	8	11	13	14
Optical wave length	nm	1310					
Optical output level range (relative)	dB	0 to -3					
Optical return loss	dB	> 45					
RF frequency range	MHz	5-1000					
Nominal input level (5 % OMI) (Low input)	dBµV	73					
Nominal input level (5 % OMI) (High input)	dBµV	87					
Attenuation range, electronically settable	dB	0-24					
Slope range, electronically settable	dB	-3 ... +16					
Return loss at 47 MHz	dB	20 -1.5/oct., > 15					
Return loss 5-65 MHz	dB	> 18					
Impedance	Ω	75					
Power consumption	W	12					

Optical broadband platform

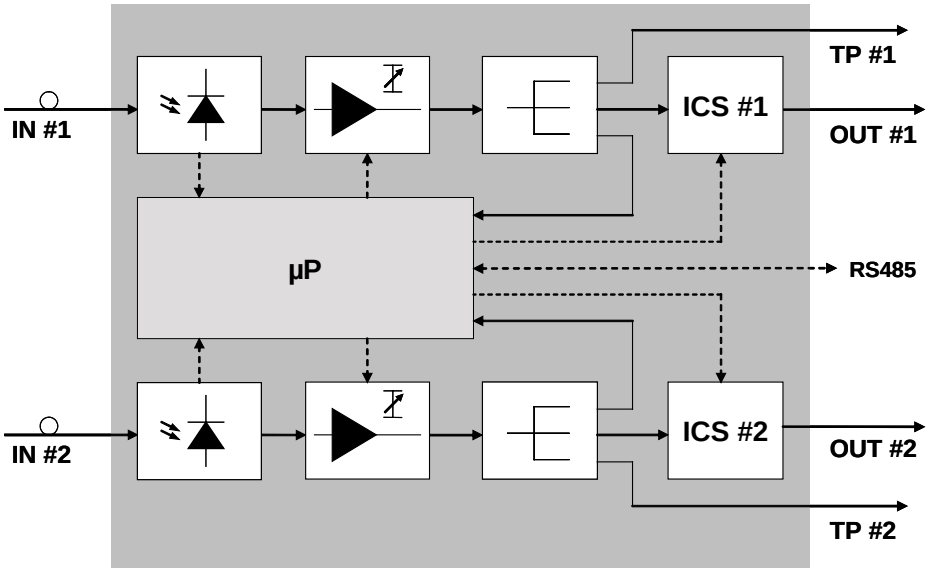
Optical return path receivers, twin

ORM 20E	24710015
ORM 21E	24710016

CE

- Opto-electrical conversion of return path signals
- Two receivers, with individual shut-down
- Two separate outputs with test sockets
- Redundant operation possible
- Optical power monitoring on all inputs
- Pilot-controlled
- Wide optical input power range
- RS 485 Interface
- Stand-by mode for unused receiver to reduce the power consumption
- Very low power consumption
- Optical interfaces: E-2000, 0.1 dB-type (other connectors on request)

Block diagramme



Optical broadband platform

Technical data

Type		ORM 20E	ORM 21E
Order no.		24710015	24710016
Optical interface		E-2000	
Optical wave length	nm	1280-1610	
Optical input level range	dBm	-11 to +2	-16 to -3
Optical return loss	dB	> 40	
RF frequency range	MHz	5-65	
RF output level at OMI = 5 %	dBµV	80/86	70/76
Frequency response	dB	± 0.75	
Return loss	dB	> 19	
Pilot control range	dB	26	
Optical modulation index pilot	%	5	
Test sockets	dB	20	

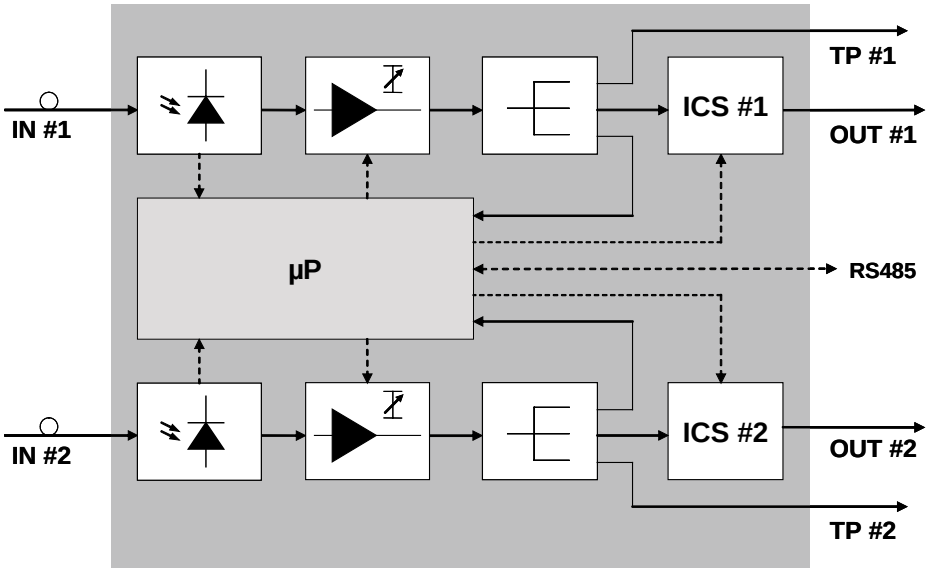
Optical broadband platform

Optical return path receiver, twin

ORM 22E 24710026 CE

- Opto-electrical conversion of return path signals
- Two receivers, with individual shut-down
- Two separate outputs with test sockets
- Redundant operation possible
- Optical power monitoring on all inputs
- Pilot-controlled
- Wide optical input power range
- RS 485 Interface
- Line code evaluation
- Stand-by mode for unused receiver to reduce the power consumption
- Very low power consumption
- Optical interfaces: E-2000, 0.1 dB-type (other connectors on request)

Block diagramme



Optical broadband platform

Technical data

Type		ORM 22E
Order no.		24710026
Optical interface		E-2000
Optical wave length	nm	1280-1610
Optical input level range	dBm	-16 to +2
Optical return loss	dB	> 40
RF frequency range	MHz	5-160
RF output level at OMI = 5 %	dBµV	90
Frequency response	dB	± 0.75
Return loss	dB	> 19
Pilot control range	dB	36
Optical modulation index pilot	%	5
Test sockets	dB	20
Impedance	Ω	75
Power consumption normal operation	W	3.5
Power consumption stand-by	W	1.5

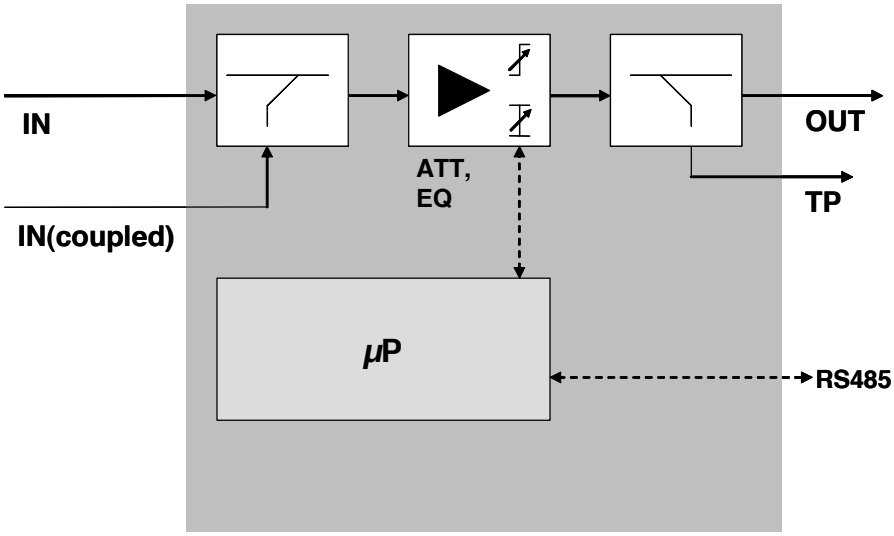
Optical broadband platform

Broadband amplifier, 5-1000 MHz

TVO 1024 25110033 CE

- Broadband amplifier for universal use in forward and return paths
- For use in the optical broadband platform KOBRA
- Automatic load control (can be switched off)
- Frequency range: 5-1000 MHz
- Gain: 0 ... 24 dB, electronically settable
- Slope: 0 ... 16 dB, electronically settable
- Main input for broadcast signals and secondary input for narrowcast signals
- Test socket for output signal
- Stand-by mode for minimum power consumption
- RS 485 interface

Block diagramme



Optical broadband platform

Technical data

Type		TVO 1024
Order no.		25110033
Frequency range	MHz	5-1000
Gain, electronically settable	dB	0 to 24
Slope, electronically settable	dB	0 to 16
Frequency response (7-870 MHz)	dB	± 0.8
Frequency response (5-1000 MHz)	dB	± 1.5
Input level narrowcast input [1], relative to main input	dB	+ 14
Max. output level [2], CSO > 60 dB, CTB > 60 dB	dBµV	106
Return loss 5-65 MHz	dB	> 18
Return loss 47-1000 MHz	dB	18 -1/oct., > 15
Noise figure 5-870 MHz	dB	6.5
Noise figure 870-1000 MHz	dB	7.5
Impedance	Ω	75
Power consumption normal operation	W	9
Power consumption stand-by mode	W	1

[1] 14 dB directional coupler
[2] CENELEC raster, 42 channels, flat

Optical receivers

Optical compact receiver

ORA 9022	24710023
ORD 20	24810040
ORD 21	24810092

Note:
The IEC connectors shown are not included in the scope of delivery.

- Modular FTTC fibre node
- Internal optical interfaces for full outdoor operation (protection class IP 54)
- Optical interfaces optionally on the device exterior to enable external connection
- Innovative operational concept: using electronic tuning elements, set using HTE 10 hand-held unit
- Electronically settable return path matrix:
  - Redundant operation
  - Return path segmentation
  - Automatic switch-over in case of signal interruption
- WDM couplers or splitters can be integrated optionally
- Latest GaAs-MMIC technology
- Fully redundant operation in forward and return path possible
- 1 or 2 receiver modules pluggable
- 1 or 2 high level outputs (2 separate end stages)
- Output level up to 112 dBµV
- „Plug-and-Play“ by combination of AGC (optical input) and ALSC (2 pilots)
- Automatic levelling in the forward path
- Extremely low-noise receiver (best device in its class)
- 1 or 2 return path transmitter modules pluggable for segmentation or redundancy, see OSR 900x
- Optical return path transmitter modules available in DFB/CWDM technology

Note:
An ORD 2x receiver module is required for operation. If configured with one output, no insert card is required for the output insert position.

- Monitorable by optional HMS transponder module
- Easy module replacement
- Highly efficient switched mode power supply unit
- Die-cast housing with PG 11 connections
- LED indicates operational mode
- 2 integrated diplex filters 65/85 MHz
- Ingress Control Switch at each return path input
- Ingress test point for each return path input (externally accessible), can be optionally used as a broadband input
- Many EMS functions
- Optical connectors: SC/APC or E-2000

Optical receivers

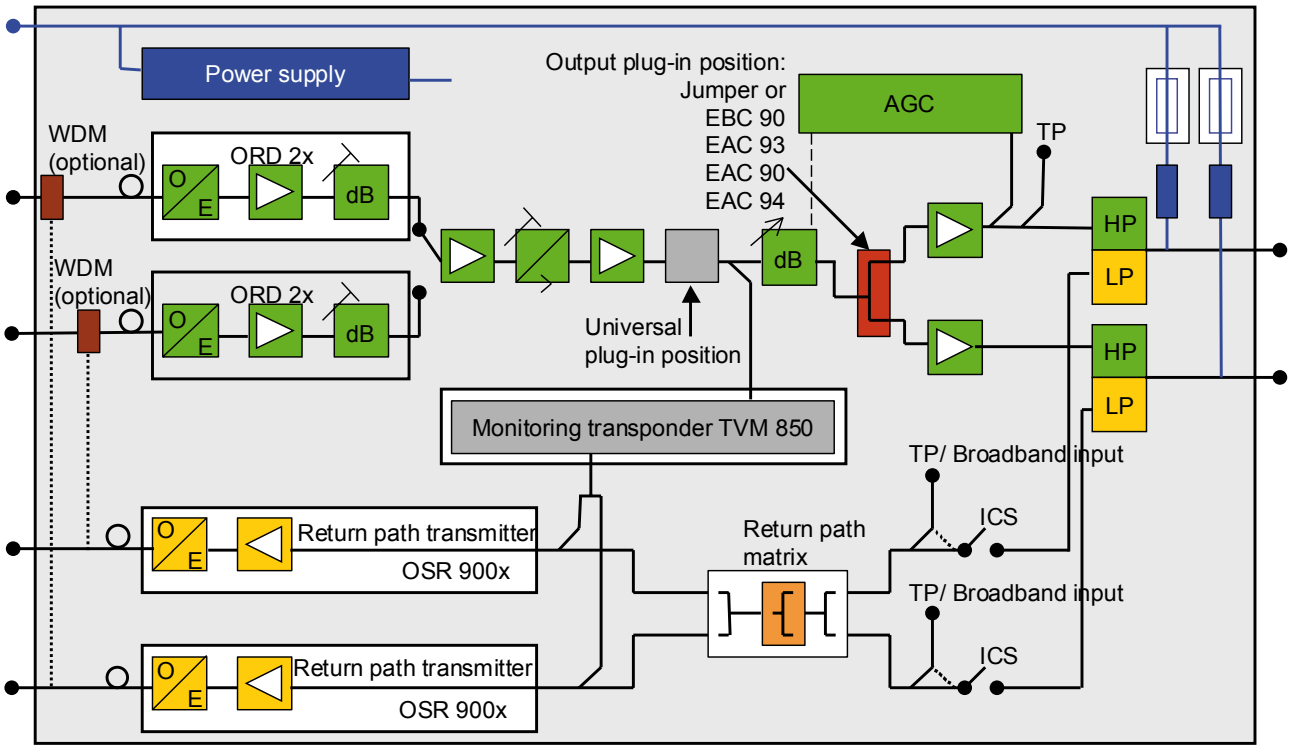
Technical data

Type		ORA 9022	
Order no.		24710023	
Operation with receiver module		ORD 20	ORD 21
Forward path			
Frequency range	MHz	85-862	
Optical wavelength	nm	1280-1580	
Optical return loss	dB	> 40	
Optical input level range, 1310 nm, nominal	dBm	-7 ... -1 [1]	-7 ... +2
Optical input level range, 1550 nm, nominal	dBm	-8 ... -2 [1]	-8 ... +1
Max. optical input power (permanent)	dBm	+3	
Nominal optical modulation index (OMI)	%	4.4	
Impedance	Ω	75	
Number of outputs (internally settable)		1 or 2	
Max. output level, per output (practical operation)	dBµV	112	
Output pre-emphasis 85-862 MHz	dB	0-9	
Frequency response	dB	± 1.5	
Equivalent noise current density, input	pA/√Hz	4	5
Max. output level acc. to CENELEC [2]			
CSO > 60 dB	dBµV	116	
CTB > 60 dB	dBµV	113	
Return loss (at 85 MHz)	dB	19 -1.5/oct., > 16	
Hum modulation ratio at 7 A: 85-862 MHz	dB	> 67	
Return path (general): see also product information OSR 900x			
Frequency range (through diplex filter)	MHz	5-65	
Frequency range (through broadband inputs)	MHz	5-200	
Impedance	Ω	75	
Return loss	dB	18	
Frequency response (total)	dB	± 1.5	
Input level for OMI of 8 % (per channel)	dBµV	65	
Attenuation ICS	dB	0/6/40	
POWER SUPPLY			
Input voltage range	V_{AC}	30-72	
Mains frequency range	Hz	47-63	
Power consumption incl. an ORD 2x, 1/2 active outputs	W	28/33	
Power consumption fully-equipped, 1/2 active outputs	W	38/43	
GENERAL DATA			
Radiated interference power 5-30 MHz	dBpW	< 27-20	
Radiated interference power 30-862 MHz	dBpW	< 20	
RF connections (external)		PG 11	
Ingress test sockets/broadband inputs (external)		F connectors (female)	
Dimensions (W x H x D)	mm	280 [3] × 125 × 244	
Weight	kg	3.1	
Housing material		Aluminium diecast, varnished	
Remote feed current on the outputs	A	< 7	
Remote feed current feed-in (power passing)	A	< 10	

[1] Higher input level possible for slightly lower values (CSO)
[2] Measurement conditions: output level 110 dBµV, 9 dB pre-emphasis
[3] 307 mm incl. hinges

Optical receivers

Block diagramme



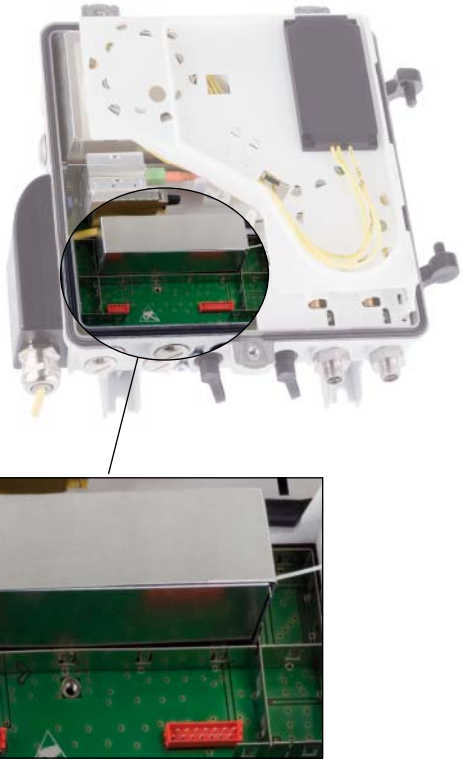
Accessories

- ORD 20 (order no. 24810040): Receiver module, -8 ... -1 dBm
- ORD 21 (order no. 24810092): Wide-range receiver module, -8 ... +2 dBm
- OSR 900x (order no. 246102xx): Return path transmitter
- HTE 10 (order no. 25010005): Hand-held unit, see page 88
- EBC 90 (order no. 24510053): Splitter (2 outputs symmetrical)
- EAC 93 (order no. 24510057): Tap-off 2.5/6 dB
- EAC 90 (order no. 24510052): Tap-off 1.5/10 dB
- EAC 94 (order no. 24510058): Tap-off 0.8/20 dB

Optical transmitters

Optical return path transmitters

OSR 9003	24610201
OSR 9006-C11	24610203
OSR 9006-C12	24610204
OSR 9006-C13	24610205
OSR 9006-C14	24610206
OSR 9006-C15	24610207
OSR 9006-C16	24610208
OSR 9006-C17	24610209
OSR 9006-C18	24610210



- Optical return path transmitter modules used in the ORA 9022 and ORA 920
- Opto-electrical conversion of return path signals
- DFB laser with optical isolator
- Optical output level +6 dBm or respectively +3 dBm
- 8 different CWDM wave lengths can be selected, additional wave lengths on request

Type		OSR 9003	OSR 9006-Cxx
Order no.		24610201	246102xx
Optical wave length	nm	1310	1471/1491/1511/1531/ 1551/1571/1591/1611
Optical output level	dBm	+3	+6
Frequency range (via diplexer in ORA 9022/ORA 920)	MHz	5-65	
Frequency range (via broadband input in ORA 9022/ORA 920)	MHz	5-200	
Relative Intensity Noise (RIN)	dB/Hz	-155	
Impedance	Ω	75	
Return loss (5 MHz)	dB	> 18	
Frequency response	dB	± 1.0	

Accessories for ORA 9022

Tap/splitter plug-in cards for VGP 90xx, VGF/VGO 938/939 distribution network amplifiers and optical compact receiver ORA 9022

EAC 90	24510052
EAC 93	24510057
EAC 94	24510058
EBC 90	24510053

- Plug-in modules to extend the corresponding devices to two outputs
- May also be used to generate a loop-through output on the amplifier

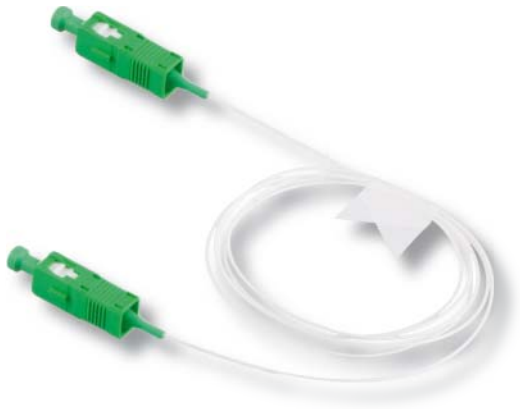
Type		EAC 90	EAC 93	EAC 94	EBC 90
Order no.		24510052	24510057	24510058	24510053
Frequency range	MHz	5-862	5-862	5-862	5-862
Through loss [1] 5-450 MHz	dB	< 1.3	< 2.6	< 0.6	< 3.5
Through loss [1] 450-862 MHz	dB	< 1.5	< 2.9	< 0.8	< 3.7
Tap loss	dB	10	6	20	Equivalent to through loss
Decoupling 5-40 MHz	dB	> 28	> 23	> 30	> 20
Decoupling above 40 MHz	dB	> 28-1.5/Oct.	> 23	> 30	> 20

[1] Through loss is the signal attenuation between the amplifier's signal output and output 1 when used in the output insert position or between input and tap input when used in the amplifier's input insert position

Optical accessories

Optical patch cables

OFC 90/SC 24810101
OFC 90/SC-E 24810102



- Optical patch cables for universal application
- Available types:
  - OFC 90/SC: SC/APC 8° both sides
  - OFC 90/SC-E: one plug SC/APC 8°, one plug E-2000 8°
- Fit for use in the optical compact receivers ORA 9022 and ORA 920 [1)]

Type		OFC 90/SC	OFC 90/SC-E
Order no.		24810101	24810102
Length	cm	90	90
Patch cable diameter	mm	0.9	0.9

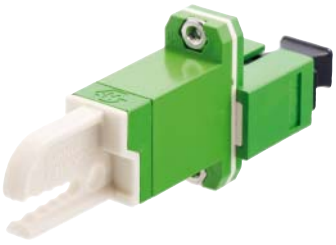
[1)] Only OFC 90/SC

Optical couplers

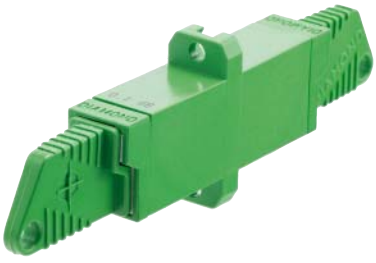
OKU 01/SC 24810031
OKU 01/SC-E 24810099
OKU 01/E 24810100

- Optical couplers for universal application
- Available types:
  - OKU 01/SC: SC/APC both sides
  - OKU 01/SC-E: Optical connection adapter SC/APC to E-2000
  - OKU 01/E: E-2000 both sides
- Fit for use in the optical compact receiver ORA 9022

OKU 01/SC



OKU 01/SC-E

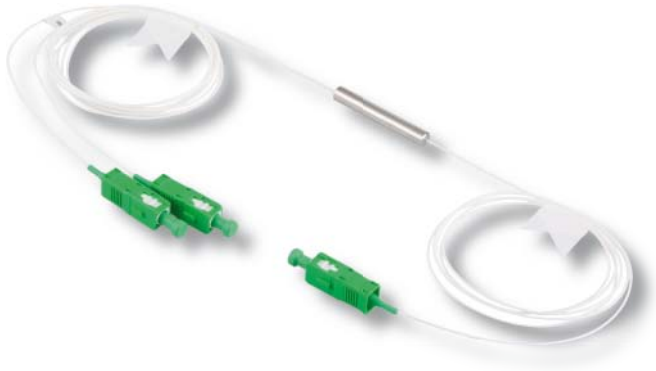


OKU 01/E

Optical accessories

Optical Mux/Demux, mini-tube design

BWMR 1310/1550 24810098



- Optical multiplexer/demultiplexer:
  - Wave lengths: 1310/1550 nm
  - Application e.g. multiplexing/demultiplexing forward path/return path
- High reliability
- High isolation
- Low insertion loss
- Design: mini tube
- Optical connections:
  - 900 µm fibres
  - SC/APC connector
- Particularly suitable for use in the optical compact receiver ORA 9022

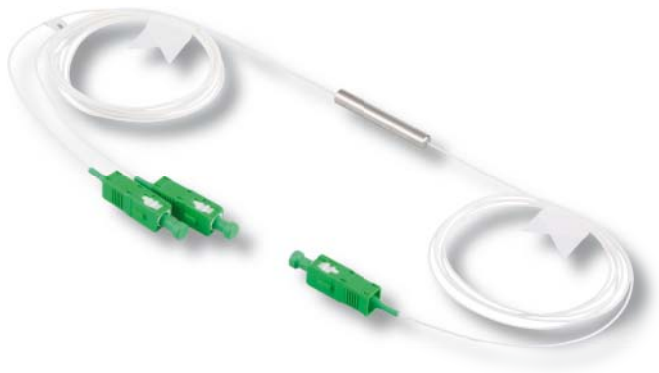
Type		BWMR 1310/1550
Order no.		24810098
Wave length, Pass Channel	nm	1310 ± 40
Wave length, Reflect Channel	nm	1550 ± 50
Insertion loss, Pass Channel [1)]	dB	0.7
Insertion loss, Reflect Channel [1)]	dB	0.45
Directional loss, Pass/Reflect Channel (forward path/return path)	dB	50
Optical return loss	dB	45
Max. optical power	mW	500
Dimensions (length x diameter)	mm	39 x 5.5

[1)] Without connectors

Optical accessories

Optical splitter, mini-tube design

BOVR 02-SC 24810097



- Optical splitter for universal application
- Low insertion loss
- Optimised for 1310 and 1550 nm wave lengths
- High reliability
- Design: mini tube
- Optical connections:
  - 900 µm fibres
  - SC/APC connector
- Particularly suitable for use in the optical compact receiver ORA 9022

Type		BOVR 02-SC
Order no.		24810097
Optical wave length	nm	1310 ± 40 and 1460 ... 1625
Splitter type		1:2
Splitting ratio	%	50/50
Insertion loss [1)]	dB	3.6
Optical isolation, outputs	dB	50
Dimensions: length x diameter	mm	66 x 3.5

[1)] Without connectors

Optical compact receivers

Optical compact receiver

ORA 920E	24710024
ORA 920SC	24710025
ORD 20	24810040
ORD 21	24810092

Note:
The IEC connectors shown are not included in the scope of delivery.

- Modular fibre node
- Distribution of CATV frequency multiplex signals
- GaAs-MMIC technology
- Innovative operational concept:
  - Settings made using slide switches
  - Device settings can be reproduced exactly
  - No insert cards or attenuation pads required
- Configurable for 1 or 2 outputs
- Extremely low-noise receiver (best device in its class)
- Constant optical light control (AGC)
- DFB/CWDM optical return path transmitter modules can be plugged in (optional)
- Integrated diplex filter 65/85 MHz
- Separate broadband input up to 200 MHz in return path
- Monitorable by HMS transponder (optional)
- Highly efficient switched mode power supply unit
- Die-cast aluminium housing
- Ingress Control Switch
- Optical connectors: SC/APC or E-2000

Note:
At least one ORD 20 or ORD 21 plug-in module required for operation.
If the ORD 20 is used, the OFC 90/SC optical patch cable is required.
For the configuration with only one output, no insert card is required.

Optical compact receivers

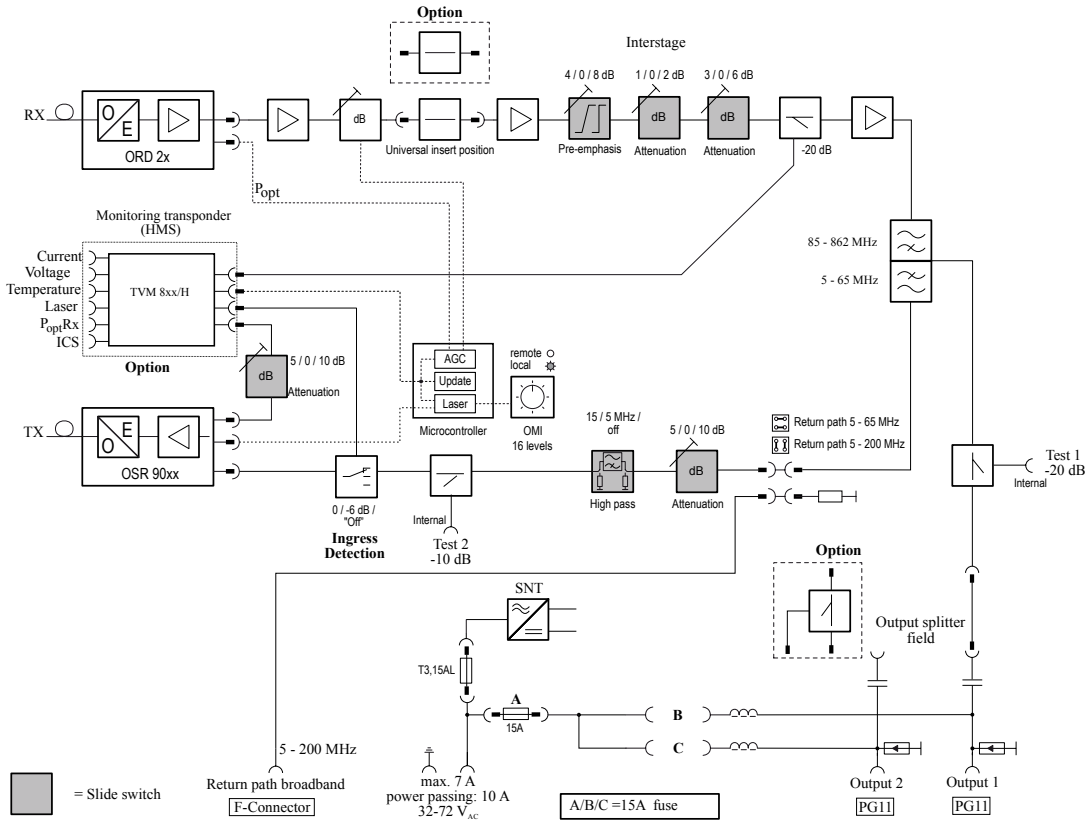
Technical data

Type (Order no.)		**ORA 920E** (24710024) **ORA 920SC** (24710025)	
Operation with receiver module		ORD 20	ORD 21
Forward path			
Frequency range	MHz	85-862	
Optical wave length	nm	1260 to 1600	
Photo-diode sensitivity at 1550 nm	A/W	0.9	
	dB	> 45	
Optical input level range, 1310 nm, nominal	dBm	-7 ... -1	-7 ... +2
Optical input level range, 1550 nm, nominal	dBm	-8 ...- 2	-8 ... +1
Max. optical input power (permanent)	dBm	+3	
Nominal optical modulation index (OMI)	%	4.1	
Impedance	Ω	75	
Number of outputs		1 or 2	
Output level (1 output at 4.1 % OMI)	dBµV	110	
Frequency response	dB	± 1.0	
Equivalent noise current density, input	pA√Hz	4	5
Max. output level acc. to CENELEC [1)]			
CSO > 60 dB	dB	110	
CTB > 60 dB	dB	110	
Return loss (40 MHz)	dB	18 -1.5/oct.	
Return path (general): see also OSR 900x data			
Frequency range (through diplex filter, broadband inputs)	MHz	5-65/5-200	
Impedance	Ω	75	
Return loss (5-65 MHz)	dB	20	
Frequency response	dB	± 1.0	
Input level for OMI of 8 % (per channel)	dBµV	65	
Attenuation ICS	dB	0/6/40	
Power supply			
Perm. input voltage range	V_{AC}	32 ... 72	
Max. remote feed current on each output	A	7	
Max. remote feed current/feed-in(power passing)	A	10	
General data			
RF outputs/broadband input (external)		PG 11/F socket	
Dimensions (W x H x D)	mm	218 x 176 x 86	
Weight	kg	2.3	
Housing material		Aluminium diecast	
Protection category according to DIN EN 60529		IP 52	
Temperature range	°C	-20 ... +55	

[1)] Measurement conditions: Output level 110 dBµV, 4 dB slope

Optical compact receivers

Block diagramme



Modules/Accessories

- ORD 20 (order no. 24810040) - Receiver module , -8 ... -1 dBm
- ORD 21 (order no. 24810092) - Wide-range receiver module, -8 ... +2 dBm
- OSR 900x (order no. 24610xxx) - Return path transmitter, +3 dBm bzw. +6 dBm/CWDM, see page 59
- TVM 850H (order no. 26210077) - HMS monitoring transponder
- EBC 90 (order no. 24510053) - Splitter (2 symmetrical outputs)
- EAC 90 (order no. 24510052) - Tap 1.5/10 dB
- EAC 93 (order no. 24510057) - Tap 2.5/6 dB
- EAC 94 (order no. 24510058) - Tap 0.8/20 dB
- OFC 90/SC (order no. 24810101) - Optical patch cable SC/APC - SC/APC

Optical transmitters

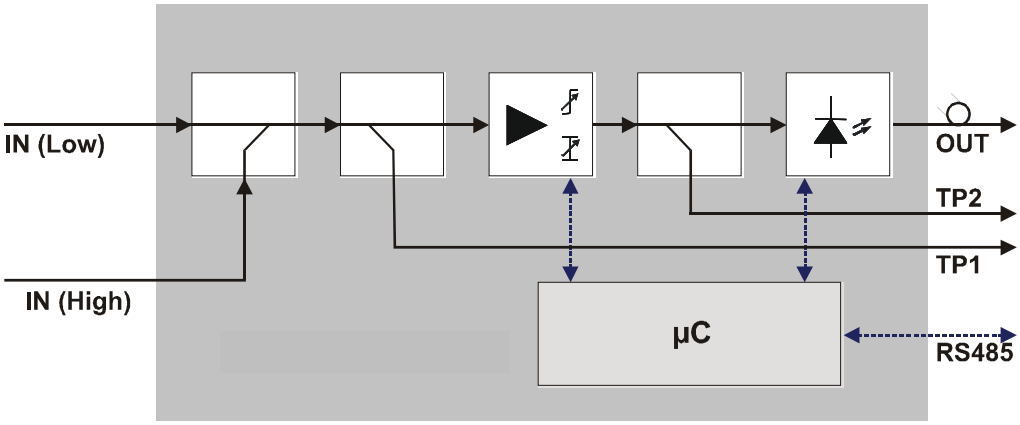
Directly modulated broadcast transmitters, 1310 nm

OSA 1303X-E	24610215
OSA 1305X-E	24610211
OSA 1308X-E	24610212
OSA 1311X-E	24610137
OSA 1313X-E	24610138
OSA 1314X-E	24610139

CE

- Opto-electrical conversion of forward path signals
- High-linear low noise laser with pre-distortion technology
- Optical output power: 11 dBm (OSA 1311X), 13 dBm (OSA 1313X) or 14 dBm (OSA 1314X) respectively
- Optical output power: 3 dBm (OSA 1303X), 5 dBm (OSA 1305X) or 8 dBm (OSA 1308X) respectively
- Dual RF input (Low/High) to adapt to different input levels
- Electronic tuning elements for attenuation, slope, output level, Optical Modulation Index (OMI) etc.
- Automatic load control for constant OMI
- LON interface
- Optical interfaces: E-2000, 0.1 dB type
- RF interfaces: IEC sockets
- Test socket for input signal
- Test socket for optical output level or RF signal

Block diagramme



Optical transmitters

Technical data

Type		OSA 1303X-E/1305X-E/1308X-E/1311X-E/1313X-E/1314X-E
Order no.		24610215/..211/..212/..137/..138/..139
Optical interface		E-2000
Optical wave length	nm	1310
Nominal optical output level	dBm	3/5/8/11/13/14
Optical output level adjustment	dB	0 to - 3
Optical return loss	dB	> 45
RF frequency range	MHz	5-1000
Nominal input level (5 % OMI) (low input)	dBµV	73
Nominal input level (5 % OMI) (high input)	dBµV	87
Attenuation range, electronically settable	dB	0-24
Slope range, electronically settable	dB	-3 ... +16
Return loss at 47 MHz	dB	20 -1.5/oct., > 15
Return loss 5-65 MHz	dB	> 18
Impedance	Ω	75
Power consumption	W	12
Test socket (output)	dB	-20

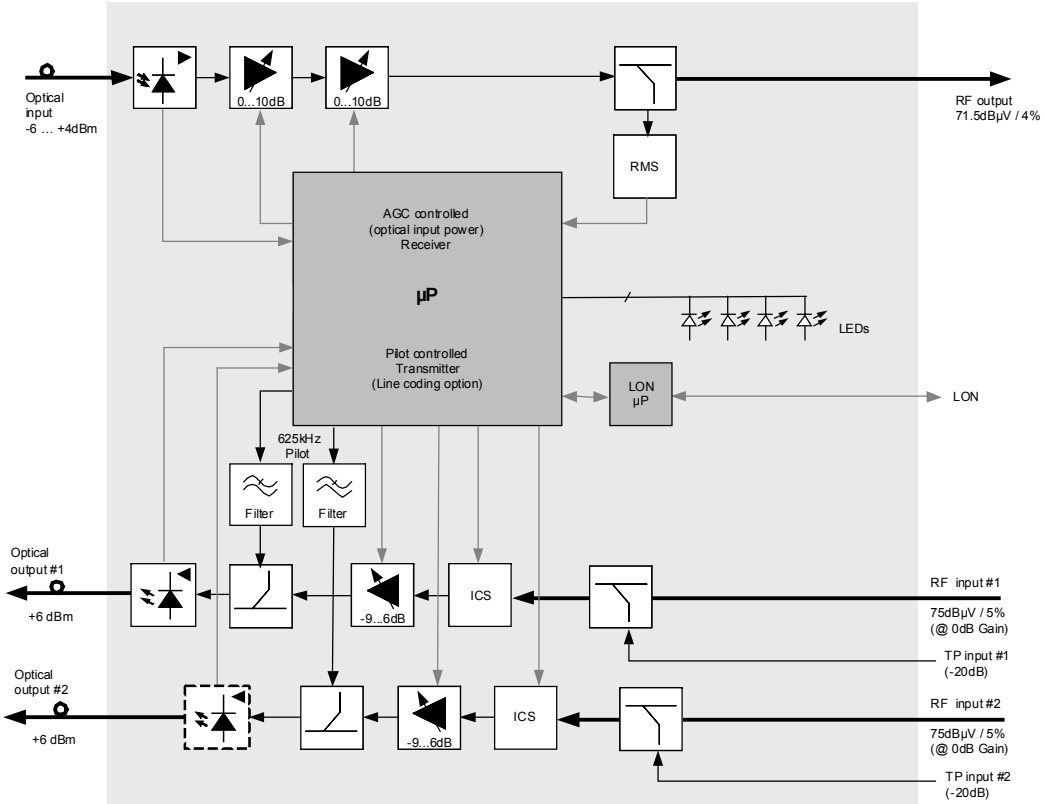
Optical transceivers

Optical transceivers, 2 return path transmitters 6 dBm

OTR 926E-C11-C12	24610132
OTR 926E-C13-C14	24610133
OTR 926E-C15-C16	24610134
OTR 926E-C17-C18	24610135

- The optical transceivers are used in glass-fibre amplifier stations
- Opto-electrical conversion of forward path signals and electro-optical conversion of return path signals
- Two optical return path transmitters
- CWDM DFB lasers with optical isolator, 6 dBm
- Extremely low-noise optical receiver with software-configurable RF output level
- Configurable optical transmitters, each equipped with one input test socket
- Controlled optical output level and pilot-controlled optical modulation index
- Ingress Control Switch (ICS)
- Several management features:
  - Optical input and output level monitoring
  - Line code ID for optical transmitters

Block diagramme



Optical transceivers

Technical data

Type		OTR 926E-C11-C12/-C13-C14/-C15-C16/-C17-C18
Order no.		2461013x
Optical interfaces		E-2000
OPTICAL RECEIVER		
Wave length range	nm	1280-1610
Optical input level	dBm	-6 to +4
Optical return loss	dB	> 45
Equivalent input noise current at P_{opt} in = -4 dBm	pA/√Hz	6.0
RF frequency range	MHz	47-870
Nominal output level (4 % OMI)	dBµV	71.5
Return loss at 85 MHz	dB	> 19 - 1/oct., > 16 min.
Impedance	Ω	75
OPTICAL TRANSMITTER		
Wave lengths	nm	1471-1491/1511-1531/1551-1571/1591-1611 ± 3
Optical output level	dBm	6
RF frequency range	MHz	5-160
Nominal input level (5 % OMI)	dBµV	75 (± 6 software-configurable)
Relative intensity noise (RIN)	dB/Hz	-149
Impedance	Ω	75
Return loss	dB	18
Test socket (per transmitter)	dB	-20 ± 1.5
Pilot frequency	kHz	625
Power consumption	W	9

Optical transceivers

Optical transceiver, 1 return path transmitter 3 dBm

OTR 910E-3 24610110 CE

- The optical transceiver is used in glass-fibre amplifier stations
- Opto-electrical conversion of forward path signals and electro-optical conversion of return path signals
- One return path transmitter, 1310 nm DFB laser with optical isolator, 3 dBm
- Extremely low-noise optical receiver with software-configurable RF output level
- Configurable optical transmitter with input test socket
- Controlled optical output level and pilot-controlled optical modulation index
- Ingress Control Switch (ICS)
- Several management features:
  - Optical input and output level monitoring
  - Line code ID for optical transmitter

Type		OTR 910E-3
Order no.		24610110
Optical interfaces		E-2000
OPTICAL RECEIVER		
Wave length range	nm	1280-1610
Optical input level	dBm	-6 to +4
Optical return loss	dB	> 45
Equivalent input noise current at P_{opt} in = -4 dBm	pA/√Hz	6.0
RF frequency range	MHz	47-870
Nominal output level (4 % omi)	dBµV	71.5
Return loss at 85 MHz	dB	> 19 - 1/oct., > 16 min.
Impedance	Ω	75
OPTICAL TRANSMITTER		
Wave length	nm	1310 ± 30
Optical output level	dBm	3
RF frequency range	MHz	5-160
Nominal input level (5 % omi)	dBµV	75 (± 6 software-configurable)
Relative intensity noise (RIN)	dB/Hz	-149
Impedance	Ω	75
Return loss	dB	18
Test socket	dB	-20 ± 1.5
Pilot frequency	kHz	625
Power consumption	W	8.5

Optical return path components

Optical return path receiver, 4-way

ORR 40E 24710012 CE

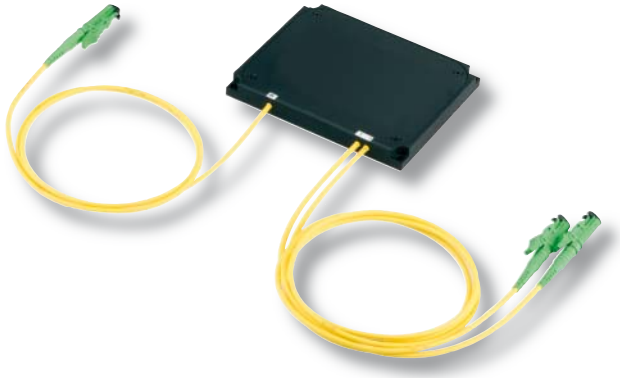
- Opto-electrical conversion of return path signals
- Four individual receivers, each can be disabled separately
- Redundant operation possible
- Optical power detection on all inputs
- Pilot-controlled
- Wide optical input power range
- LON interface
- Linecode ID recognition
- Very low power consumption
- Optical interfaces: E-2000, 0.1 dB-type
- RF interfaces: IEC sockets

Type		ORR 40E
Order no.		24710012
Optical interfaces		E-2000
Optical wave length	nm	1280-1610
Optical input level range	dBm	-11 ... +2
Optical return loss	dB	40
RF frequency range	MHz	5-160
RF output level at OMI = 5 %	dBµV	75
Frequency response	dB	± 0.75
Return loss at 47 MHz	dB	20
Pilot frequency range	kHz	590-640
Pilot control range	dB	26
Optical modulation index pilot	%	5
Test socket	dB	-20 ± 1.5

Optical accessories

Optical splitters

BOV 002 24810029
BOV 003 24810042
BOV 004 24810039
BOV 008 24810054



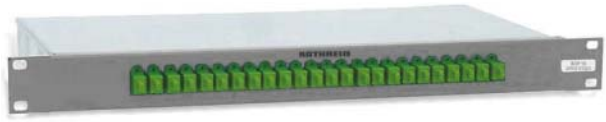
- Optical splitters for universal application
- Low insertion loss
- Optimised for 1310 and 1550 nm wave lengths
- Optical connectors: E-2000
  (other connector types on request)
- High reliability
- Ultra-compact design, including pigtails

Type		BOV 002	BOV 003	BOV 004	BOV 008
Order no.		24810029	24810042	24810039	24810054
Optical wave length	nm	1310 and 1550	1310 and 1550	1310 and 1550	1310 and 1550
Splitting ratio		1:2	1:3	1:4	1:8
Typ. insertion loss [1)]	dB	3.2	4.9	6.3	9.5
Max. insertion loss [1)]	dB	3.6	5.5	7.0	10.6
Uniformity	dB	0.7	1.1	1.4	2.1
Optical isolation, outputs	dB	50	50	50	50

[1)] Without connector

Optical passive racking 19“, 1 HU

KOP 10 25010023



Similar to picture

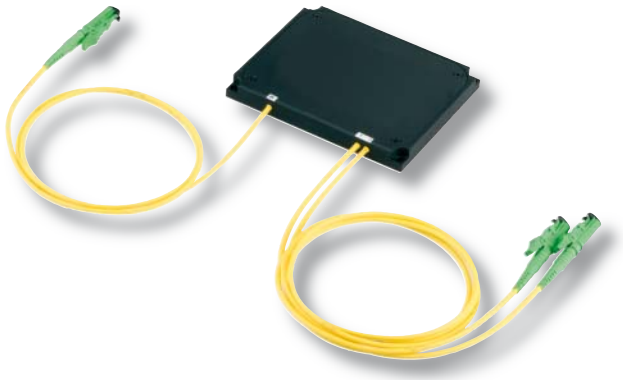
- 19“ racking for passive optical components
- Universal application
- Can be equipped with up to 24 OKU 01/SC or OKU 01/E optical connectors
- Unused openings can be covered with protective caps
- Ideal for integration of the optical splitters BOV 00x or taps BOC 0xx

Note:
The optical connectors displayed are not included in the scope of delivery.

Optical accessories

Optical taps

BOC 003	24810055
BOC 004	24810056
BOC 005	24810057
BOC 006	24810058
BOC 007	24810059
BOC 008	24810060
BOC 009	24810061
BOC 010	24810062
BOC 012	24810063
BOC 014	24810064



- Optical splitters for universal application
- Low insertion loss
- Optimised for 1310 and 1550 nm wave lengths
- Optical connectors: E-2000
  (other connector types on request)
- Ultra-compact design, including pigtails

Type		BOC 003	BOC 004	BOC 005	BOC 006	BOC 007
Order no.		24810055	24810056	24810057	24810058	24810059
Optical wave length	nm	1310 and 1550	1310 and 1550	1310 and 1550	1310 and 1550	1310 and 1550
Typ. tap loss [1)]	dB	3.2	4	5	6	7
Tap loss tolerance	dB	± 0.4	± 0.5	± 0.6	± 0.7	± 0.7
Typ. through loss [1)]	dB	3.2	2.6	1.9	1.5	1.2
Through loss tolerance	dB	± 0.4	± 0.4	± 0.4	± 0.4	± 0.4
Optical isolation, outputs	dB	50	50	50	50	50

Type		BOC 008	BOC 009	BOC 010	BOC 012	BOC 014
Order no.		24810060	24810061	24810062	24810063	24810064
Optical wave length	nm	1310 and 1550	1310 and 1550	1310 and 1550	1310 and 1550	1310 and 1550
Typ. tap loss [1)]	dB	8	9	10	12	14
Tap loss tolerance	dB	± 0.8	± 0.9	± 0.9	± 1.3	± 1.5
Typ. through loss [1)]	dB	0.9	0.8	0.6	0.5	0.4
Through loss tolerance	dB	± 0.3	± 0.3	± 0.3	± 0.3	± 0.3
Optical isolation, outputs	dB	50	50	50	50	50

[1)] Without connectors

Fibre to the Home

Optical network termination units

Fibre Management Box

FMB 100 25810005

System design:

The modular optical network termination unit can be fitted with an optical receiver for TV/radio and a media converter to convert optical signals into electrical Ethernet signals. The FMB 100 fibre management box is used as the base housing for all system modules and also includes a fibre management tray.

The DCK 100 voltage converter provides the required operational voltage for the media converters. Thus, all modules can be supplied over one single power supply (NCF 100).

Characteristics:

- Modular system design
- Housing with integrated fibre tray
- Separate fibres for TV/radio and data
- The following components are included in the modular optical network termination unit system:
  - FMB 100 Fibre Management Box (base housing)
  - ORC 100/ORC 100SC - optical receiver module for analogue and digital TV/radio signals
  - MCO 110S/ MSW 110S/ MSW 120S - Media converter module for bi-directional data transmission, acc. to IEEE 802.3u
  - NCF 100 - Power supply unit
  - DCK 100 - Voltage converter
- LEDs displaying status and error occurrence
- Low power consumption
- Simple retro-fitting or refitting of functional modules
- Rapid and simple installation:
  - Designed for either on-wall or under-plaster fibre installation
  - Fibre inserts prepared to accept micro-duct systems
  - Primarily clip-on connections: Slot in - ready to go!
  - Retaining clips for protective covers and splices
- Manipulation protection with seal
- Attractive design
- Compact dimensions
- Technical data - see appropriate module

Base housing

Type		FMB 100
Order no.		25810005
Function		Base housing for modules, integrated fibre tray, seal
Dimensions (W x H x D)	mm	183 x 125 x 38

Optical network termination units

Optical receiver module

ORC 100SC 25810011

The ORC 100SC optical receiver module for TV/radio is inserted in the FMB 100 Fibre Management Box.

The NCF 100 power supply unit is required for operation.

Characteristics:

- Optical receiver modules for analogue and digital TV/radio signals
- Wave length: 1300-1600 nm
- Plug-and-Play due to constant optical source control
- Excellent output parameters for indoor signal distribution
- LEDs to indicate status and errors
- Low power consumption

Type		ORC 100SC
Order no.		25810011
Function		Optical receiver for TV/radio
Optical data		
Fibre type		Singlemode (1 fibre)
Wave length	nm	1290 to 1580
Optical input power	dBm	-7.25 to -3 [1]
Optical connector		SC/APC
Electrical data		
Frequency range	MHz	47-862
Output level (controlled)	dBµV	75
Intermodulation spacing [2] CSO/CTB	dB	68/80
Nominal voltage	V_{DC}	8
Power consumption	W	2

[1] Lower input power possible at reduced output level
[2] Output level: 75 dBµV; 42 channels, CENELEC plan acc. to EN 50083-3

Optical network termination units

Optical media converter module

MSW 110S 26210040

The MSW 110S media converter module is used in the FMB 100 Fibre Management Box.

The DCK 100 voltage converter and the NCF 100 power supply unit are required for operation.

Characteristics:

- Media converter module for bidirectional data transfer acc. to IEEE 802.3u
- 100 MBit/s optical and electrical
- With integrated switch 10/100 MBit/s
- Transmission and reception via singlemode fibre
- Optical transmission length: up to 15 km
- Electrical transmission length: up to 100 m
- Auto negotiation
- Auto cross-over
- LEDs indicate status and errors

Type		MSW 110S
Order no.		26210040
Function		Media converter with integrated switch
Optical data		
Fibre type		Singlemode
Number of fibres		1
Interface		100BaseF
Wave length		
Transmitter	nm	1310
Receiver	nm	1550
Optical connector		SC
Max. path length optical	km	15
Electrical data		
Interface		10/100BaseT
Data rate Ethernet	MBit/s	10/100
Max. path length electrical	m	100
Nominal voltage	V_{DC}	3.3
Power consumption	W	1.5

Optical network termination units

Power supply unit and voltage converter

NCF 100 25810006
DCK 100 25810007

NCF 100 power supply unit provides voltage supply to functional modules in the optical network termination unit (FMB 100).
When used in conjunction with the MSW 110S media converter, the DCK 100 voltage converter is additionally required. DCK 100 supplies the required operational voltage for the media converters, enabling all modules to be supplied with only one power supply unit (NCF 100).

- LED to indicate the operational voltage in the optical receiver module
- Low power consumption due to switch-mode power supply unit

POWER SUPPLY UNIT

Type		NCF 100
Order no.		25810006
Input voltage	V_{AC}	198-253
Output voltage	V_{DC}	8
Max. output current	A_{DC}	0.85

VOLTAGE CONVERTER

Type		DCK 100
Order no.		25810007
Function		Supplies 3.3 V_{DC} operational voltage for the media converter
Input voltage	V_{DC}	8
Ouput voltages	V_{DC}	8 [1] and 3.3

[1] Loop-through input voltage

Optical network termination units

Optical network termination units, 4-port Ethernet

MSW 400 V 26210088
MSW 400 VC 26210098

- Optical network termination units for Fibre-to-the-Home (FttH)
- Data module with multiple features:
  - MAN: 100 Base Fx (Singlemode fibre)
  - Integrated switch
  - 4 x 10/100 BaseT (connectors RJ 45)
  - QoS: Priority setting
  - VLAN tagging
  - Auto cross-over and auto negotiation
  - 2 x telephone connections for analogue phones (RJ 11)
  - Two telephone calls can be made simultaneously (VoIP)
  - VoIP: SIP 2.0 (RFC 3261)
  - Different voice codecs available, G.711 as standard
  - G3 Fax
- Model with optical receiver for CATV:
  - Optical CATV receiver for multi-channel television and radio signals (AM-VSB, FM and QAM) with a bandwidth of 47 ... 1000 MHz
  - Extremely low-noise
  - High output level
  - Wide input level/wave length ranges
- Integrated fibre management
- Access protection through seal
- Status LEDs
- Available models:
  - MSW 400 V (data module with 4 x Ethernet and 2 x phone/VoIP)
  - MSW 400 VC (data module with 4 x Ethernet, CATV module and 2 x phone/VoIP)
  - Additional models on request

Technical data

Type		MSW 400 VC
Order no.		26210098
Data module		
Optical data		
Fibre type		Singlemode 9/125µm
Optical connector		SC/PC
Interface		100 Base Fx
Wave length		
Transmitter	nm	1310
Receiver	nm	1550
Standard		IEEE802.3u 100Base Bx

Optical network termination units

Technical data

Type		MSW 400 VC
Order no.		26210098
Electrical data		
Interface		4 x 10/100 BaseT
Connector		4 x RJ-45
Data rate Ethernet	Mbit/s	10/100
Mode		Auto negotiation, auto cross-over, half/full-duplex, integrated four-port store and forward switch
Standard		IEEE802.3 10Base-T, IEEE802.3u 100BaseTX and IEEE802.3x
Layer 2 protocols		RFC 2236-IGMP snooping V2
Telephony		
Interface		2 x POTS (a/b)
Connector		RJ 11
VoIP protocol		SIP 2.0 (RFC 3261)
Codec		G.711 [1)]
Comfort Noise		CNG (Comfort Noise Generation)
Fax		G3
Management		
Protocols		ARP, IP, ICMP, UDP, DHCP, SYSLOG, TFTP, NTP
DHCP		DHCP Option 67 Autoconfig File, DHCP Option 66 TFTP Server
SNMP		SNMP v1, v2c
Switch		
Switch operation mode		Store and Forward
VLAN		IEEE 802.3Q (VLAN)
Quality of Service / Class of Service		IEEE 802.1p (Class of Serv.), RFC 2474 / 2475 (Diffserv)
Security		Broadcast Storm Protection
Traffic Shaping		Ingress/Egress Rate Limiting
Optical receiver for CATV		
Optical data		
Fibre type		Singlemode 9/125 µm
Optical connector		SC/APC
Wave length	nm	1280 ... 1610
Optical input level	dBm	-10 ... -3
Electrical data		
Frequency range	MHz	47-1000
Impedance	Ω	75
Equivalent input noise current density	pA/√ Hz	4
Output level	dBµV	80 ... 100

[1)] Additional Codecs on request

Amplifier systems

Compact amplifiers

Compact amplifiers, controlled

VGP 9033 24410053
VGP 9041 24410054

- Modern, monitorable compact amplifiers for interactive HFC networks
- Innovative operational concept: using electronic tuning elements, set using HTE 10 hand-held unit (fewer plug-in cards and attenuation pads required, repeatable device settings)
- Integrated frequency-agile 2-Pilot control enables quick commissioning:
  - Automatic levelling in the forward path, thus no need for time-consuming manual levelling
  - Automatic presetting of the return path is possible
- Remote configuration of all setting parameters via monitoring system (can be activated/deactivated)
- High gain (up to 40 dB), variable settable in interstage-position
- Latest GaAs-MMIC technology
- Very high output levels at lowest intermodulation products, even for interstage operation
- Loop-through input and output splitter can be configured
- De-emphasis (inverse-equalisation) insert position
- Remote feeding: 7 A per input/output, local feeding: 10 A
- Insert position for monitoring transponder (HMS)
- Highly efficient switch-mode power supply
- Test socket on input/output and at return path amplifier
- Integrated return path amplifier, variable gain
- Ingress Control Switch
- Aluminium die-cast housing with PG 11 connections

Accessories

- EBC 01E (order no. 24510078): Input null card, for operation without loop-through input
- EBC 00 (order no. 24510060): Output null card, for operation with one output
- EBC 90 (order no. 24510053): Splitter (2 outputs symmetrical)
- EAC 93 (order no. 24510057): Tap (3/6 dB)
- EAC 90 (order no. 24510052): Tap (1.5/10 dB)
- EAC 94 (order no. 24510058): Tap (0.8/20 dB)

See page 101

- TVM 850H (order no. 26210077): Monitoring transponder HMS (5-42 MHz), frequency agile
- HTE 10 (order no. 25010005): Hand-held unit

Note:
The input and output plug-in positions must be equipped with EAC/EBC xx for operation. The other plug-in positions are already equipped with null cards.

Compact amplifiers

Technical data

Type		VGP 9033	VGP 9041
Order no.		24410053	24410054
Forward path			
Frequency range	MHz	85-862	
Gain	dB	33	40
Return loss	dB	19 -1.5 dB/oct.	
Frequency response (85-862 MHz at 25 °C)	dB	± 0.5	
Max. output level CENELEC [1] - CTB > 60 dB	dBµV	114	
Max. output level CENELEC [1] - CSO > 60 dB	dBµV	116	
Attenuation range, electronically settable in 0.5 dB steps	dB	0-16	
Slope range, electronically settable in 0.5 dB steps	dB	0-20	
Pre-emphasis, electronically settable in 1 dB steps	dB	2-9	
Noise figure at minimum pre-emphasis	dB	6	
Adjustment range, sloped 85-862 MHz	dB	± 2	
Adjustment range, parallel	dB	± 3	
Frequency range lower pilot Pu [2]	MHz	82.5-230	
Frequency range upper pilot Po [2]	MHz	420-630	
Pilot level (PAL/CW/QAM) 606 MHz	dBµV	83-112	
Hum modulation ratio at 7 A	dB	70	
Return path			
Frequency range	MHz	5-65	
Gain	dB	30	
Frequency response at 25 °C	dB	± 0.5	
Input level density (CINR = 50 dB) at 30 dB gain	dBµV/Hz	-9	
Dynamic range: CINR > 50 dB, 5-65 MHz at 30 dB gain	dB	21	
Dynamic range: CINR > 50 dB, 5-65 MHz at 20 dB gain	dB	26	
Noise figure	dB	6	
Attenuation, switchable in 1 dB steps	dB	0-30	
Slope, switchable in 7 steps	dB	1-8	
ICS switch (attenuation switchable over EMS or HTE 10 hand-held unit)	dB	0/6/> 45	
Hum modulation ratio at 7 A/> 15 MHz	dB	60	

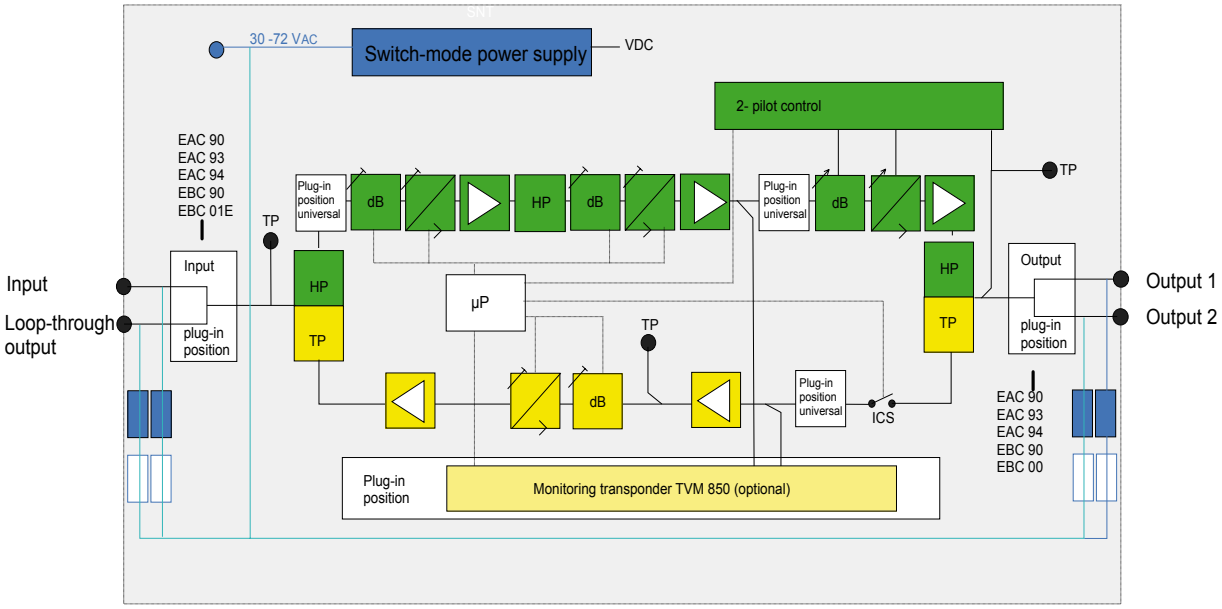
Compact amplifiers

Technical data

Type		VGP 9033	VGP 9041
Order no.		24410053	24410054
General data			
Voltage supply	V_{AC}	30-72	
Power consumption	W	23	
Max. remote feed current per in/output	A	7	
Max. remote feed current in local feeding (power passage)	A	10	
RF connections		PG 11	
Housing protection category		IP 67	
Ambient temperature range	°C	-20 to +55	
Screening factor		Conforms to CENELEC EN 50083-2	
Overvoltage protection acc. to IEC 60-2		2 kV (1.2/50 µs)	
Dimensions (W × H × D)	mm	240 × 95 × 240 [3]	
Network management (optional)			
Monitorable/settable parameters		Operational voltage; current; temperature; electronic tuning elements; pilot setting and alarm; automatic levelling of forward path; automatic presetting of return path; return path gain; ICS switch; remote inventory data	

[1] 9 dB slope
[2] Set using HTE 10 hand-held unit
[3] Width incl. hinges: 267 mm

Block diagramme



Accessories for compact amplifiers

Null cards for VGP 90xx compact amplifiers

EBC 01E 24510078
EBC 00 24510060

- Plug-in modules for operation of the VGP 90xx compact amplifiers with an input or output
- **EBC 01E**: For operation on the input insert position
- **EBC 00**: For operation on the output insert position

Type		EBC 01E	EBC 00
Order no.		24510078	24510060
Frequency range	MHz	5-862	5-862
Through loss [1)]	dB	0.45	0.4

[1)] Through loss is the signal attenuation between the amplifier's signal output and the output 1 when used in the output insert position or between input and the tap input when used in the input insert position (loop-through input distribution field)

C-line pre-emphasis equaliser

ERC 22 24510085

- Generates pre-emphasis based on the C-line specifications of Kabel Deutschland
- For use in the amplifiers VGP 9033 and VGP 9041
- Application in the universal input insert position (“Forward 1“)

Type		ERC 22
Order no.		24510085
Transmission range	MHz	50-862
Nominal impedance	Ω	75
Pre-emphasis		For C-lines
Basic loss (bei 862 MHz)	dB	1
Return loss	dB	23 -1/oct.

Accessories for electronically adjustable amplifiers

Hand-held unit

HTE 10	25010005
TDK 10	26210054
TDK 12	26210076

With the HTE 10 hand-held unit one is able to set correspondingly equipped amplifier components on site.

Using the ‘Up‘ and ‘Down‘, ‘Menu‘ and ‘Enter‘ buttons, one is able to change and set the values on the 4-digit display. The display is illuminated and easy to read.

The hand-held unit has the following functions:

- All appropriately equipped amplifiers or modules can be set and operated
- All settings are displayed
- The last settings are saved (copy function)
- Characteristics:
  - The hand-held unit is power-supplied from the respective module
- Distances:
  - Data transfer between HTE 10 and the amplifier or module over max. 14 m
  - Standard connection cable: 2 m (included in the delivery scope)
  - Can be extended to 14 m (TDK 10)
- 4-digit display, illuminated
- Language: English
- Splash-proof/shock-proof
- Ambient conditions:
  - Ambient temperature: -20 to +50 °C
  - Suitable for outdoor application
  - Protection category: IP 54
- Control signal: serial, RS 232
- Connection: Sub-D 9-pin
- Accessories (not included in the delivery scope):
  TDK 10 - order no. 26210054: Connection cable 14 m
  TDK 12 - order no 26210076: PC connection cable for HTE 10 (for software update)

Compact amplifiers

Distribution network amplifier

VGF 939 24410082

- Newest GaAs-MMIC technology
- Innovative operation:
  - Settings carried out on slide switches
  - Device settings can be reproduced exactly
  - Fewer insert cards and attenuation pads required
- Integrated diplexers for optimised data
- Very high output level at lowest intermodulation interference products (also for interstage attenuation)
- Pluggable loop-through output
- One or two output(s) configurable
- Built-in active return path with various setting possibilities
- Return path can also be operated passively
- 15 MHz high pass in the return path can be activated
- Ingress Control Switch (ICS)
- HMS monitorable (option)
- Insert position for additional functions in the forward path (e.g. de-emphasis)
- Bi-directional test socket on the amplifier input
- Directional coupler test socket on the forward path output and at return path amplifier
- Test socket on return path input
- Insertion of test signals for the return path possible
- LED as function indicator
- Highly efficient switched mode power supply unit
- Advanced remote power concept:
  - Newly developed remote feed coils
  - Remote feed current: Max. 7 A per connection, local insertion max. 10 A totally
  - Remote feeding possibilities: By choice via all RF connections or local connector (power passing)
- Surge absorber on all RF connections and in the switched mode power supply unit
- Power management: Unused amplifier stage switch-off for reduced power consumption
- Diecast housing with PG 11 connectors
- Easy connection of large cable fittings due to extended thread distance
- Outdoor operation possible: Housing protection class IP 54
- Test sockets: F connectors (internal)

Note:
The PG 11-IEC (f) adaptors are not included in the delivery scope

Accessories

- EBC 90 (order no. 24510053) - 2-way splitter
- EAC 93 (order no. 24510057) - Tap 2.5/6 dB
- EAC 90 (order no. 24510052) - Tap 1.5/10 dB
- EAC 94 (order no. 24510058) - Tap 0.8/20 dB
- ERZ 940 (order no. 24510059) - De-emphasis equalizer (cable simulator) 862 MHz, 7 dB fixed
- ERZ 630 (order no. 24510108) - Equaliser 85-630 MHz, switchable 0-16 dB in 2 dB steps
- ERS 800 (order no. 24510109) - System equaliser 862 MHz
- TVM 850/H (order no. 26210077) - Monitoring transponder HMS (5-42 MHz), frequency agile

Note:
For operation with one input and one output no plug-in cards are required

Compact amplifiers

Technical data

Type		VGF 939	Remarks
Order no.		24410082	
Frequency range	MHz	85-862	
Gain	dB	38	
Gain setting range, Interstage	dB	30-38	
Frequency response	dB	± 0.5	85-862 MHz, at 25 °C
Attenuation setting range, at input	dB	0-26	
Pre-emphasis setting range, at input or resp. Interstage	dB	0-26 or resp. 0/4/8	
Return loss, at 40 MHz	dB	18-1.5/oct.	
Noise figure	dB	4	at 38 dB gain
Max. operational level: CENELEC raster [1)]	dBµV	114/116	CTB: 60 dB/CSO: 60 dB (pre-emphasis 4 dB)
Hum modulation ratio	dB	60/70	at 7 A, 5-65/85-865 MHz
Return path			
Frequency range	MHz	5-65	
Gain (input stage bridged), active operation	dB	30 (21)	
Gain, passive operation	dB	-2	
Frequency response	dB	0.5	
Attenuation setting range, at input or resp. Interstage	dB	4/0/8 or resp. 0-16	
Pre-emphasis setting range, Interstage	dB	0/3/6	
Ingress Control Switch (ICS)	dB	8/< 40	attenuated/switched-off
Max. output level at 30 and 21 dB gain	dBµV	107/116	60-dB IMA2/IMA3 (EN 60728-3/50083-5)
Input level density	dBµV/Hz	-8	CINR at 50 dB (EN 60728-3/item 4.7)
Dynamic range at 30 dB gain (5-65 MHz) [2)]	dB	17	
Dynamic range at 21 dB gain (5-65 MHz) [2)]	dB	25	
Noise figure	dB	5	
NETWORK MANAGEMENT			
Monitorable parameters		Internal voltage supply, internal current drain, internal temperature, ICS switch	
Test sockets			
Test socket 1 (on amplifier input), bi-directional	dB	20	
Test socket 2 (on amplifier output), directional coupler	dB	20	Possibility to feed in return path signals (5-65 MHz); if button is kept pressed, the arriving return path signal can be measured
Test socket 3 (in return path amplifier), directional coupler	dB	10	Attenuation relative to return path input

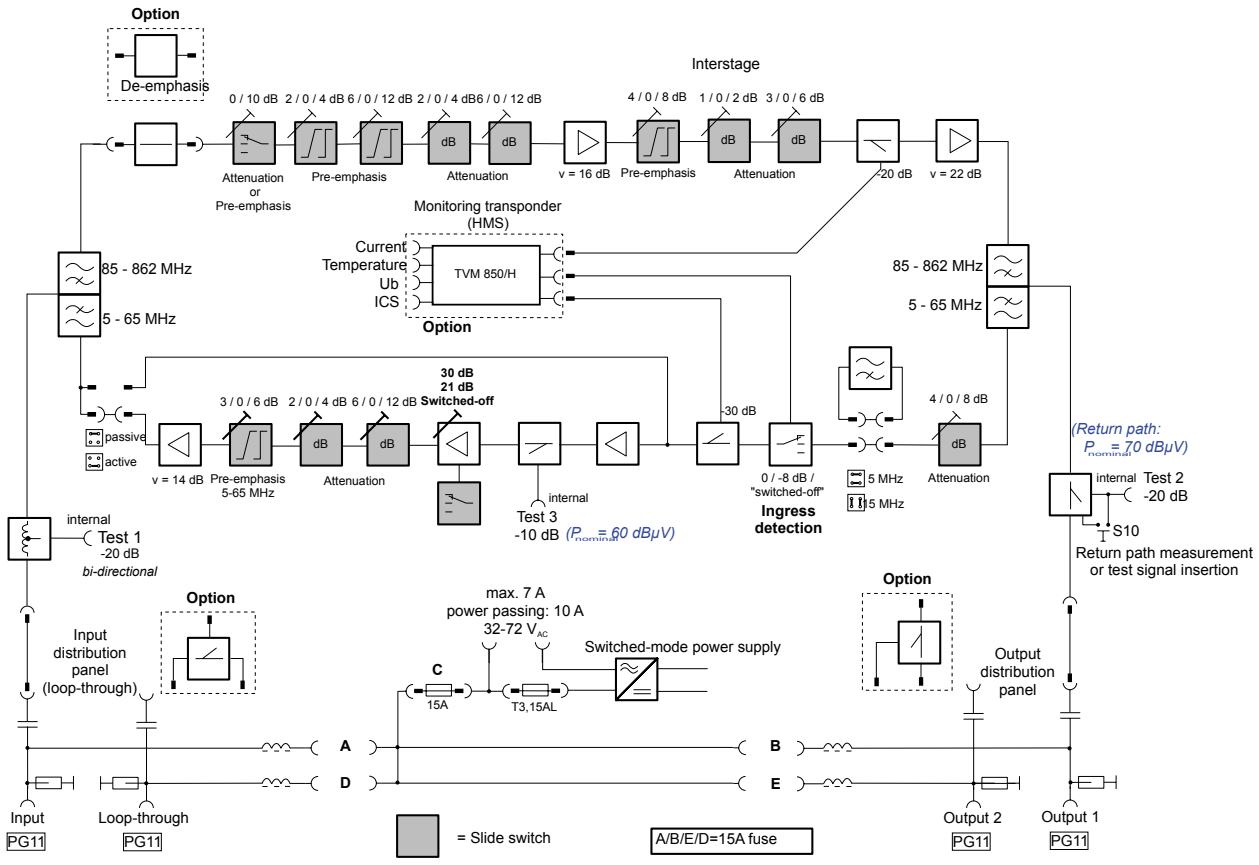
Compact amplifiers

Technical data

Type		VGF 939	Remarks
Order no.		24410082	
SWITCHED-MODE POWER SUPPLY			
Input voltage range	V_{AC}	32-72	
Mains frequency range	Hz	47-63	
Max. remote feed current	A	7	per input or output
Max. remote feed current, local insertion	A	10	
Power consumption	W	15	Return path amplifier active
General data			
Ambient temperature range	°C	-20 to +55	data-conform operation
RF connections		PG 11	
Test sockets		F connector	
Housing protection class (acc. to EN 60529)		IP 54	
Dimensions (W x H x D)	mm	240 × 77 × 170	
Packing unit/weight	pc./kg	1(10)/2.2	

[1] CENELEC: 42 channels
[2] When the 15 MHz high pass is connected, the dynamic range increases by 3 dB

Block diagramme



Compact amplifiers

Distribution network amplifiers

VGO 938	24410071
VGF 938	24410055

- Newest GaAs-MMIC technology
- Innovative operation:
  - Settings carried out on slide switches
  - Device settings can be reproduced exactly
  - Fewer insert cards and attenuation pads required
- Variable frequency ranges due to pluggable diplexers (option)
- Very high output level at lowest intermodulation products (also for interstage operation)
- Pluggable loop-through output
- One or two output(s) configurable
- Built-in active return path with various setting possibilities
- 15 MHz high pass in the return path can be activated
- Ingress Control Switch (ICS)
- De-emphasis (inverse-equalisation) switchable (characteristics optimised for BK network upgrade)
- HMS or KOM monitorable (option)
- Insert position for additional functions in the forward path (e.g. de-emphasis over the entire frequency range)
- Bi-directional test socket on the amplifier input
- Directional coupler test socket on the forward path output and return path amplifier output
- Test socket on return path input
- Insertion of test signals for the return path possible
- LED as function indicator
- Highly efficient switched mode power supply unit
- VGO 938 - locally fed
- VGF 938 - remotely fed, 38-65 V AC
  - Remote feed current: max. 5 A, local feeding with max. 7 A
  - Remote feeding possibilities: Optionally over all RF connections and local connection (power passing)
- Surge absorber on all RF connections and in the switched mode power supply unit
- Diecast housing with PG 11 connectors
- Test sockets: F connectors (internal)

Note:
For operation with one output or input, no insert card is required.

Compact amplifiers

Technical data

Type		VGO 938	VGF 938	Notes
Order no.		24410071	24410055	
		Locally fed	Remotely fed	
Forward path				
Frequency range	MHz	47/85-862		Depending on plugged return path filter
Gain	dB	38/35/32		
Frequency response	dB	± 0.5		47/85-862 MHz, at 25 °C
Attenuation adjustment range	dB	0-16		On amplifier input
Pre-emphasis setting range	dB	0-16 and 0/4/8		On amplifier input and interstage
De-emphasis setting range	dB	0/4/8		On amplifier input 450-862 MHz
Noise figure	dB	4		At 38 dB gain
Max. operational level: ANGA raster [1)]	dBµV	114/116		CTB: 66 dB/CSO: 64 dB (pre-emphasis -4 dB and gain 38 dB)
Max. operational level: CENELEC raster [2)]	dBµV	114/116		CTB: 60 dB/CSO: 60 dB (pre-emphasis -4 dB and gain 38 dB)
Hum modulation ratio	dB	-	60/70	I = 5 A, (5-30 MHz)/ I = 5 A, (47-862 MHz)
Return path				
Frequency range	MHz	5-30/65		Depending on plugged return path filter
Gain (input stage bridged)	dB	30 (21)		
Frequency response	dB	0.5		
Attenuation adjustment range	dB	4/0/8 / 0-16		On input/on output
Pre-emphasis	dB	0/3/6		On output (5-65 MHz)
Ingress Control Switch (ICS)	dB	6/> 40		Attenuated/switched off
Max. output level at 30 and 21 dB gain	dBµV	107/116		60-dB IMod2/IMod3 (EN 50083-3/5) up to 65 MHz
Input level density 30 dB gain	dBµV/Hz	-10		CINR at 50 dB (EN 50083-3/point 4.7)
Dynamic range (5-65 MHz) [3)]	dB	17		
Input level density 21 dB gain	dBµV/Hz	-10		CINR at 50 dB (EN 50083-3/point 4.7)
Dynamic range (5-65 MHz) [3)]	dB	25		
Noise figure	dB	5		
NETWORK MANAGEMENT				
Monitorable parameters		Internal voltage supply, internal power consumption, internal temperature, ICS		

Compact amplifiers

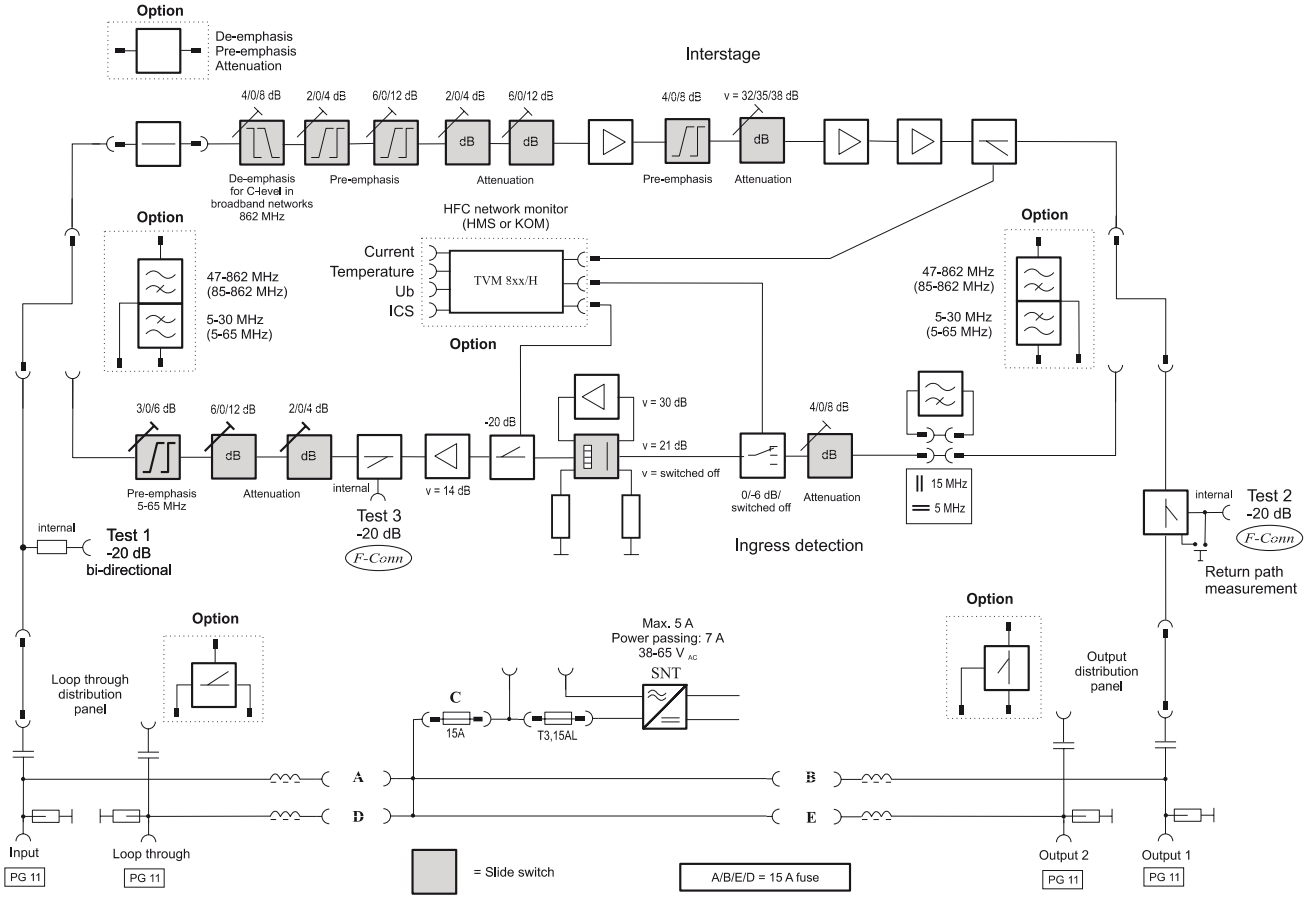
Technical data

Type		VGO 938	VGF 938	Notes
Order no.		24410071	24410055	
		Locally fed	Remotely fed	
Test sockets				
Test socket 1 (on amplifier input)	dB	20		5-862 MHz bi-directional, internal
Test socket 2 (on amplifier output)	dB	20		5-862 MHz with directional coupler, external - possibility of feeding in return path signals (5-65 MHz); if button (S10) is kept pressed, the arriving return path signal can be measured
Test socket 3 (on return path output)	dB	20		5-65 MHz with directional coupler, external
SWITCHING POWER SUPPLY				
Input voltage range	V_{AC}	198-253	38-65	
Mains frequency range	Hz	47-63	47-63	
Max. remote feed current	A	-	5	On inputs and outputs
Nominal input power	W	15	15	incl. return path amplifier
General data				
Ambient temperature range	°C	-20 to +55	-20 to +55	
RF connections		PG 11	PG 11	
Test sockets		F connector	F connector	
Housing protection category (to EN 60529)		IP 50	IP 54	IP 54: outdoor use in weather-proof cabinet
Dimensions (W x H x D)	mm	225 × 55 × 155	225 × 55 × 155	
Packing unit/weight	pc./kg	1(10)/1.8	1(10)/1.8	

[1] Full-band operation acc. to ANGA raster (without band I) 44 PAL and 46 QAM-TV and 30 FM channels (FM: -4 dB/QAM: -10 dB)
[2] CENELEC: 42 channels
[3] When the 15 MHz high pass is connected, the dynamic range increases by 3 dB

Compact amplifiers

Block diagramme



Accessories

- WFS 903 (order no. 24510047) - Return path filter (diplexer) 30/47 MHz (2 per packing unit)
- WFS 906 (order no. 24510064) - Return path filter (diplexer) 65/85 MHz (2 per packing unit)
- EBC 90 (order no. 24510053) - 2-way splitter
- EAC 90 (order no. 24510052) - 1.5/10 dB tap
- EAC 93 (order no. 24510057) - 2.5/6 dB tap
- EAC 94 (order no. 24510058) - 1/20 dB tap
- ERZ 940 (order no. 24510059) - De-emphasis equaliser (cable simulation) 862 MHz, 7 dB fixed
- ERZ 630 (order no. 24510108): Equaliser 85-630 MHz, switchable 0-16 dB in 2 dB steps
- ERS 800 (order no. 24510109) - System equaliser 862 MHz
- TVM 840/H (order no. 26210031) - Monitoring transponder HMS (5-8 MHz)
- TVM 840/H (order no. 26210064) - Monitoring transponder HMS (8-13 MHz)
- TVM 840/H (order no. 26210050) - Monitoring transponder HMS (13-19 MHz)

Compact amplifiers

House connection/distribution network amplifiers

VOS 950	24410077
VOS 951	24410076

- Latest GaAs-MMIC technology
- Innovative operational concept:
  - Settings via slide switches
  - Device settings can be reproduced exactly
  - No plug-in cards and variable attenuators needed
- Variable frequency ranges due to pluggable diplexers (option)
- Very high output level at lowest intermodulation products (also for Interstage mode)
- Built-in active return path with various setting possibilities
- 15 MHz high pass can be activated in the return path
- Ingress Control Switch (ICS)
- De-emphasis (Inverse-equalisation) switchable (progression optimised for BK network upgrade, 450-862 MHz)
- HMS or KOM monitorable (option)
- Plug-in module for additional functions in the forward path (e.g. de-emphasis over entire frequency range 47-862 MHz)
- Bi-directional test socket on amplifier input with inductive coupling
- Directional coupler test socket on forward path output and on return path amplifier output
- Test socket on return path input
- Coupling-in of test signals for the return path is possible
- LED function display
- Highly efficient switched mode power supply unit
- VOS 950 - locally fed, F connectors
- VOS 951 - remotely fed, PG-11 connectors
  - Remote feed current: max. 5 A
  - Remote feeding options: Either via all RF connections or local connection (Power passing)
- Surge absorbers on all RF connections and in switched mode power supply unit
- Diecast housing
- Test sockets: F connectors

Compact amplifiers

Technical data

Type		VOS 950	VOS 951	Notes
Order no.		24410077	24410076	
		locally fed	remotely fed	
Forward path				
Frequency range	MHz	47/ 85-862		Dependent on plugged diplexer
Gain	dB	38/35/32		Interstage setting
Frequency response	dB	1		
Attenuation setting range	dB	0-16		On amplifier input
Pre-emphasis setting range	dB	0-16 and 0/6		On input of amplifier and Interstage
De-emphasis setting range	dB	0/4/8		On input of amplifier 450-862 MHz
Noise figure	dB	4		At 38 dB and 35 dB gain
Max. operational level: CENELEC raster [1)]	dBµV	112/116		CTB: 60 dB/CSO: 60 dB (pre-emphasis -6 dB and gain 38 dB)
Hum modulation ratio	dB	-	60/70	I = 5 A, (5-30 MHz)/ I = 5 A, (47-862 MHz)
Return path				
Frequency range	MHz	5-30/65		
Gain, switchable	dB	30/21		
Frequency response	dB	0.5		
Attenuation setting range	dB	0-16/0-16		On input/on output
Pre-emphasis setting range	dB	0/3/6		On output(5-65 MHz)
Ingress Control Switch (ICS)	dB	6/> 40		Attenuated/switched off
Max. output level at 30 and 21 dB gain	dBµV	107/116		60 dB IMA2/IMA3 (EN 50083-3/5) up to 65 MHz
Input level density 30 dB gain	dBµV/Hz	-10		CINR at 50 dB (EN 50083-3/point 4.7)
Dynamic range (5-65 MHz) [2)]	dB	17		
Input level density 21 dB gain	dBµV/Hz	-10		CINR at 50 dB (EN 50083-3/point 4.7)
Dynamic range (5-65 MHz) [2)]	dB	25		
Noise figure	dB	5		
NETWORK MANAGEMENT				
Monitorable parameters		Level forward path, current, temperature, operational voltage, operation point return path amplifier		

Compact amplifiers

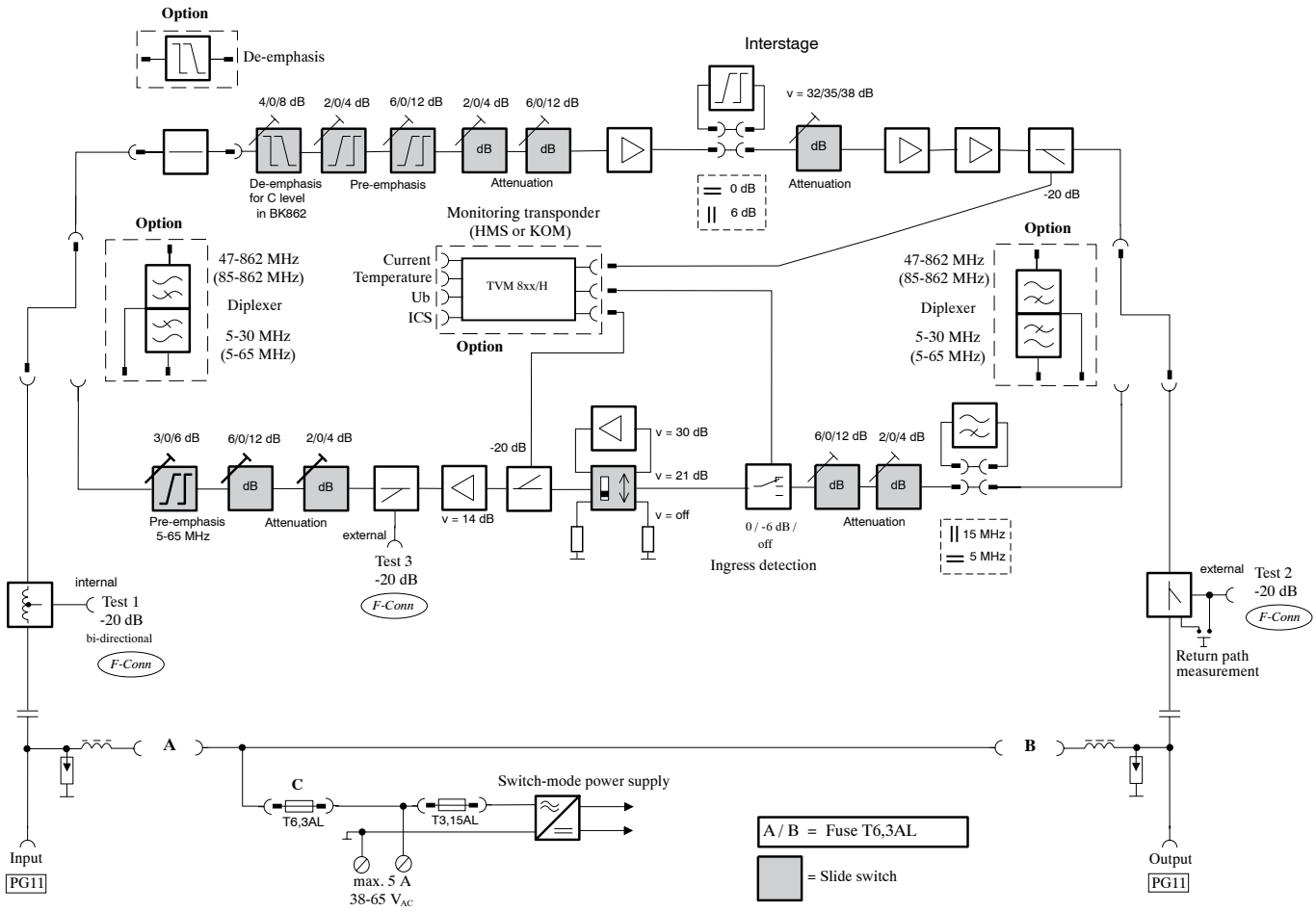
Technical data

Type		VOS 950	VOS 951	Notes
Order no.		24410077	24410076	
Test sockets				
Test socket 1 (on amplifier input)	dB	20		5-862 MHz bi-directional, internal
Test socket 2 (on amplifier output)	dB	20		5-862 MHz with directional coupler, external - return path signals can be fed in (5-65 MHz); if push-button is kept pressed (S10), the incoming return path signal can be measured
Test socket 3 (on return path output)	dB	20		5-65 MHz with directional coupler, external
SWITCHING POWER SUPPLY				
Input voltage range	V_{AC}	198-253	38-65	
Nominal frequency range	Hz	47-63	47-63	
Max. remote feed current	A	-	5	
Power consumption	W	11	12	Return path amplifier active
General data				
Ambient temperature range	°C	-20 to +55	-20 to +55	
RF connections		F connector	PG 11	
Test sockets		F connector	F connector	
Housing protection class (to EN 60529)		IP 50	IP 54	IP 54: Outdoor use in weather-proof cabinet
Dimensions (W x H x D)	mm	225 × 55 × 155	225 × 55 × 155	
Packing unit/weight	pc./kg	1(10)/1.8	1(10)/1.8	

[1] CENELEC: 42 channels, the level values also apply when the interstage attenuation is connected
[2] With connected 15 MHz high pass the dynamic range increases by 3 dB

Compact amplifiers

Block diagramme



Accessories

- WFS 903 (order no. 24510047) - Return path filter (diplexer) 30/47 MHz (2 per packing unit)
- WFS 906 (order no. 24510064) - Return path filter (diplexer) 65/85 MHz (2 per packing unit)
- ERZ 940 (order no. 24510059) - De-emphasis equaliser (cable simulation) 862 MHz, 7 dB
- ERZ 630 (order no. 24510108) - Equaliser 85-630 MHz, switchable 0-16 dB in 2 dB steps
- ERS 800 (order no. 24510109) - System equaliser 862 MHz
- TVM 840/H (order no. 26210031) - Monitoring transponder HMS (5-8 MHz)
- TVM 840/H (order no. 26210064) - Monitoring transponder HMS (8-13 MHz)
- TVM 840/H (order no. 26210050) - Monitoring transponder HMS (13-19 MHz)

Accessories for compact amplifiers

Return path filters

WFS 903 24510047
WFS 906 24510064

- Suitable for the VOS 9xx and VGF/VGO 938 house connection/ distribution network amplifiers
- Consists of two filter boards, complete for input and output
- Please order separately (not included in the delivery scope of VOS 9xx and VGF/VGO 938)
- Packing unit/weight (pc./kg): 1 (10)/0.06

Type Order no.		Frequency range (MHz) return path		Frequency range (MHz) forward path	
		5-30	30-65	47-85	85-862
WFS 903 24510047	Through loss (dB)	0.5		0.5	0.5
WFS 906 24510064	Through loss (dB)	0.3	0.3		0.3

De-emphasis equaliser

ERZ 940 24510059

- Cable-analogue 7 dB
- For insertion in the input slot of VOS/VGF 9xx

Type		**ERZ 940**
Order no.		24510059
Transmission range	MHz	47-862
Nominal impedance	Ω	75
De-emphasis	dB	7 ± 1
Basic loss (at 47 MHz)	dB	0.3
Return loss	dB	20 - 3

Accessories for compact amplifiers

Tap/splitter plug-in cards for VGP 90xx, VGF/VGO 938/939 distribution network amplifiers and optical compact receiver ORA 9022

EAC 90 24510052
EAC 93 24510057
EAC 94 24510058
EBC 90 24510053

- Plug-in modules to extend the corresponding devices to two outputs
- May also be used to generate a loop-through output on the amplifier

Type		EAC 90	EAC 93	EAC 94	EBC 90
Order no.		24510052	24510057	24510058	24510053
Frequency range	MHz	5-862	5-862	5-862	5-862
Through loss [1] 5-450 MHz	dB	< 1.3	< 2.6	< 0.6	< 3.5
Through loss [1] 450-862 MHz	dB	< 1.5	< 2.9	< 0.8	< 3.7
Tap loss	dB	10	6	20	Equivalent to through loss
Decoupling 5-40 MHz	dB	> 28	> 23	> 30	> 20
Decoupling above 40 MHz	dB	> 28-1.5/Oct.	> 23	> 30	> 20

[1] Through loss is the signal attenuation between the amplifier's signal output and output 1 when used in the output insert position or between input and tap input when used in the amplifier's input insert position

20 dB measurement adaptor

ERM 22 273269

- High-impedance probe head with 20 dB connection loss
- To carry out level measurements without shutting down undecoupled test sockets
- Required for VGF 81 and ORA 820/821

Type		ERM 22
Order no.		273269
Frequency range	MHz	5-862
Tap loss	dB	20
Return loss on output	dB	> 14

Accessories for compact amplifiers

System equaliser

ERS 800 24510109

- System equaliser for use in special applications
- Characteristics:
  - Cable-equivalent pre-emphasis 47-700 MHz: 3 dB (at 47-862 MHz: 4 dB)
  - Cable-equivalent pre-emphasis in the range 700-862 MHz: 3 dB (equivalent to additional emphasis in the range 700-862 MHz by 2 dB)
- For insertion in the input slot of the VOS/VGF 9xx

Type		ERS 800
Order no.		24510109
Transmission range	MHz	47-862
Nominal impedance	Ω	75
Cable-equivalent pre-emphasis, 47-700/(equivalent at 47-862) MHz	dB	3/(4)
Cable-equivalent pre-emphasis in the range 700-862 MHz	dB	3
Basic loss (at 862 MHz)	dB	0.5
Return loss	dB	> 15

Equaliser, 630 MHz

ERZ 630 24510108

- Equaliser 47-630 MHz
- Switchable in 2-dB steps from 2-18 dB (cable equivalent)
- For insertion in the VOS/VGF 9xx input insert position

Type		ERZ 630
Order no.		24510108
Transmission range	MHz	47-630
Nominal impedance	Ω	75
Equalisation, settable in 2-dB steps	dB	2-18
Basic loss (at 47/630 MHz)	dB	0.5/1.5

BK amplifier system

A amplifier

TVB 811K 25110015 CE

- TVB 811K A amplifier provides the output levels for A (and B) lines with corresponding pre-emphasis, in the coax amplifier point
- 2-pilot control integrated in the module for fine equalisation of the coax cable and exect control of the attenuation deviations caused by changes in temperature
- Cascadable up to 20 times (BK2K2)
- 2 outputs (2 x A-line level)
- LEDs indicate alarms in case of RF signal failure and monitoring function errors
- On the test socket, the RF output signal of the A/B lines, lowered by 20 dB, can be tapped off
- Additionally, the TVB 811K provides an output to tap off the forward monitoring carrier

Type		TVB 811K
Order no.		25110015
Impedance	Ω	75
Frequency range	MHz	85-862
Input level (flat)	dBµV	71.5
Nominal output level AB/C at 862 MHz	dBµV	96
Slope (qkx characteristics)	dB	6
Pilot frequency lower pilot	MHz	121
Pilot frequency upper pilot	MHz	610
Control range cable equivalent at 862 MHz	dB	-6.5 to +2.5
Test socket (reference AB/C output)	dB	-20
EMF output (reference AB/C output)	dB	-20

BK amplifier system

Trunk amplifier

TVB 815K 25110016 CE

- TVB 815K trunk amplifier provides the output levels for the A/B lines in the coax amplifier point, with corresponding pre-emphasis
- Fine equalisation of the coax cable and exact deviation control of the attenuation caused by variations in temperature with a 2-pilot control integrated in the module
- Cascadable up to 20 times (BK2K2)
- 5 outputs (5 x AB-line level)
- LEDs indicate alarms in case of RF signal failure and in case of any faulty monitoring function
- On the test socket, the RF signal of the A/B lines, lowered by 20 dB, can be tapped off
- Additionally, TVB 815K provides an output to tap off a forward monitoring carrier
- For field lengths of 25 dB and a frequency range up to 862 MHz, use the TVB 816K High Gain, order no. 25110030 together with the equaliser ERZ 925A, order no. 272687.
  Technical data of TVB 816K are identical to those of the TVB 815K with exception of the higher gain

Type		TVB 815K
Order no.		25110016
Impedance	Ω	75
Frequency range	MHz	85-862
Input level (flat)	dBµV	71.5
Nominal output level AB/C at 862 MHz	dBµV	96
Slope (qKx characteristics)	dB	6-7
Pilot frequency lower pilot	MHz	121
Pilot frequency upper pilot	MHz	610
Control range cable equivalent at 862 MHz	dB	-6.5 to +2.5
Test socket (reference AB/C output)	dB	-20
EMF output (reference AB/C output)	dB	-20

BK amplifier system

Trunk amplifier

TVB 816K 25110030 CE

- TVB 816K trunk amplifier provides the output levels for the A/B lines in the coax amplifier point, with corresponding pre-emphasis
- Fine equalisation of the coax cable and exact deviation control of the attenuation caused by variations in temperature with a 2-pilot control integrated in the module
- 5 outputs (5 x AB-line level)
- LEDs indicate alarms in case of RF signal failure and in case of any faulty monitoring function
- On the test socket, the RF signal of the A/B lines, lowered by 20 dB, can be tapped off
- Additionally, the TVB 816K provides an output to tap off a forward monitoring carrier
- For field length of 25 dB and a frequency range up to 862 MHz
- Suitable equaliser: ERZ 925A, order no. 272687

Type		TVB 816K
Order no.		25110030
Impedance	Ω	75
Frequency range	MHz	85-862
Input level (flat)	dBµV	69.5
Nominal output level AB/C at 862 MHz	dBµV	96
Slope (qKx characteristics)	dB	6-7
Pilot frequency lower pilot	MHz	121
Pilot frequency upper pilot	MHz	610
Control range cable equivalent at 862 MHz	dB	-6.5 to +2.5
Test socket (reference AB/C output)	dB	-20
EMF output (reference AB/C output)	dB	-20

BK amplifier system

Bridger amplifier

TVC 810 25110018 CE

- TVC 810 bridger amplifier provides the required high output level in the coax amplifier point for the C lines, with corresponding pre-emphasis and in conformity with the appropriate KDG specifications
- To adjust the amplifier to the different cable topologies, the slope of the output signal can be set to 16, 19 and 22 dB (111-862 MHz) with an adjustable pre-emphasis (display on LEDs)
- The pre-emphasis can be set on site, either on the device or via the management system
- A diplexer in the output splits up the upstream and downstream signals
- The output signal can be distributed to two outputs, with an integrated splitter that is connected from the outside via a cable
- Due to an optional 15 MHz high-pass filter (factory default setting) in the return path, the interferences coming from net level 4 are lowered
- LEDs indicate alarm in case the RF signal fails and in any case of faulty monitoring functions
- On the test socket, the RF signal of the C output in downstream, lowered by 20 dB, can be tapped off

Type		**TVC 810**
Order no.		25110018
Impedance	Ω	75
RF forward path		
Frequency range	MHz	85-862
Nominal output level C at 862 MHz	dBµV	125
Gain at 862 MHz and slope setting 22 dB	dB	29
Slope between 111 and 862 MHz in slope setting 16 dB	dB	10
Slope between 111 and 862 MHz in slope setting 19 dB	dB	13
Slope between 111 and 862 MHz in slope setting 22 dB	dB	16
Pilot frequency	MHz	610
Test socket (reference to C output)	dB	-20
RF return path		
Frequency range	MHz	5-65
Insertion loss diplex filter 15-65 MHz	dB	< 1 dB
RF splitters		
Splitting loss	dB	< 4 dB

BK amplifier system

System equaliser-amplifier

TVS 800 25110029 CE

- The system equaliser-amplifier is used to equalise cable-specific frequency responses
- If required, it can be pre-connected to a trunk amplifier
- Contains various independent saddle and hump equalisers with different centre frequencies and settable amplitudes
- Circuitry through loss is compensated by an integrated amplifier
- LEDs display alarms in case of RF signal failure and monitoring function errors
- All parameters can be selected electronically on site

Type		TVS 800
Order no.		25110029
Impedance	Ω	75
Frequency range	MHz	85-862
Input level	dBµV	71.8 ... 75.8
Gain	dB	0
Frequency response	dB	± 0.5
Noise figure	dB	5.5

Return path amplifier and HMS monitoring transponder

TVR 12 25110012
TVR 12TR 25110019

- TVR 12 and TVR 12TR return path amplifiers couple the return path signals of the A/B and C lines in the coax or fibre glass amplifier point
- The return path amplifiers can be cascaded up to 20 times in net level 3 or 2.2d
- Fine adjustment of slope and output level can be carried out on the device using the keypad
- A second output for redundant operation is available for application in the fibre amplifier point
- TVR 12 and TVR 12TR return path amplifiers may be used in both amplifier points in BK 450 technology and in modern BK systems up to 614 or 862 MHz

TVR 12 TR:

- The HMS transponder for amplifier point monitoring is integrated in the return path amplifier
- Easy commissioning due to automatic presetting of the electronic actuators

Type		TVR 12	TVR 12TR
Order no.		25110012	25110019
RF DATA (RF INPUTS 1-5)			
Impedance	Ω	75	
Frequency range	MHz	5-65	
Nominal input level	dBµV	75	
Through loss Ingress Control Switch (ICS) 1st setting	dB	0	
Through loss Ingress Control Switch (ICS) 2nd setting	dB	8	
Through loss Ingress Control Switch (ICS) 3rd setting	dB	> 45	
Nominal gain at 65 MHz in mode “High Gain“	dB	19	
Nominal gain at 65 MHz in mode “Low Gain“	dB	9	
Parallel loss in mode “High Gain“ (settable in 0.5 dB steps)	dB	0-15.5	
Parallel loss in mode “Low Gain“ (settable in 0.5 dB steps)	dB	0-9	
Pre-emphasis qkx cable equivalent (settable in 0.5 dB steps)	dB	0-5	
INTEGRATED HMS TRANSPONDER		No	Yes
Frequency range downstream (settable in 50 kHz steps)	MHz	-	75-90
Frequency range upstream (settable in 50 kHz steps)	MHz	-	5-42

Accessories for the BK amplifier system

Equalisers

ERZ 906B2	25710051
ERZ 910B2	25710052
ERZ 914B2	25710053
ERZ 918B2	25710054
ERZ 922B2	25710055
ERZ 925B2	25710056
ERZ 925A	272687

- ERZ 9xx equalisers are used to equalise of the frequency and cable length-dependent attenuation of the coax cable between the BK amplifier points
- Additionally, they equalise the typical frequency filter-edge loss of two remote feeding diplexers
- Fine equalisation of the coax cable through the pilot control of the line amplifier
- The respective fine equaliser type is recognised by the monitoring system
- ERZ 925A for use with TVB 816K in 862 MHz networks

Type		ERZ 906B2	ERZ 910B2	ERZ 914B2	ERZ 918B2	ERZ 922B2	ERZ 925B2	ERZ 925A
Order no.		25710051	25710052	25710053	25710054	25710055	25710056	272687
Field length	dB	6	10	14	18	22	25	25
For cable type		qKx	qKx	qKx	qKx	qKx	qKx	qKx
Frequency range	MHz	85-862	85-862	85-862	85-862	85-862	85-630	85-862

Accessories for the BK amplifier system

Equalisers

ERZ 918B2T	25710061
ERZ 922B2T	25710062
ERZ 925B2T	25710063
ERZ 925T	25710126
ERZ 918B2K	25710069
ERZ 922B2K	25710070
ERZ 925B2K	25710071
ERZ 925K	25710127

- The equalisers ERZ 9xxB2x are used for equalisation of the frequency and cable-length dependent attenuation of the coax cable between the BK amplifier points
- Additionally, they equalise the typical filter edge loss of two remote feeding diplexers
- Fine equalisation of the coax cable via the pilot control of the line amplifier
- The respective fine equaliser type is recognised by the monitoring system
- ERZ 925T and ERZ 925 K for use with TVB 816K in 862 MHz networks

Type		ERZ 918B2T	ERZ 922B2T	ERZ 925B2T	ERZ 925T	ERZ 918B2K	ERZ 922B2K	ERZ 925B2K	ERZ 925K
Order no.		25710061	25710062	25710063	25710126	25710069	25710070	25710071	25710127
Field length	dB	18	22	25	18	22	25	25	25
For cable type		tKx	tKx	tKx	kKx	kKx	kKx	kKx	kKx
Frequency range	MHz	85-862	85-862	85-630	85-862	85-862	85-862	85-630	85-862

0 dB duct

ERN 800 24510045

- The 0 dB duct is inserted in the equaliser insert position of the trunk amplifier if no input equaliser is required
- Impedance: 75 Ω
- Insertion loss: < 0.2 dB

Accessories for the BK amplifier system

65/85 MHz remote feed diplexer

WFS 865 222283

- WFS 865 remote feed diplexer splits up the RF signals transmitted in the frequency multiplex (forward and return path) and the superimposed remote feed voltage and/or couples them
- Remote feed diplexers are inserted on the coax input and on all trunk outputs of an amplifier point
- The remote feed diplexer is directly plugged onto the screwed cable gland on the BK diecast housing with the plug for the input and output, and is protected by a clamping fixture
- Remote feed currents of up to 8 A can be conducted
- The return path signal, lowered by 30 dB, can be tapped-off on a test socket

Type		WFS 865
Order no.		222283
Impedance	Ω	75
Forward path		
Frequency range	MHz	85-862
Through loss	dB	< 0.5
Return path		
Frequency range	MHz	5-65
Through loss	dB	< 1.1
REMOTE FEEDING		
Remote feed voltage (45-65 Hz)	V_{AC}	< 65
Nominal current	A	< 8
Short circuit current	A	< 11

Interlock for remote feed diplexer

ZFS 10 25710034

- To mechanically mount the remote feed diplexers and splitters in the BK housing
- To mount two adjoining components

Accessories for the BK amplifier system

Attenuator, pluggable

ERD 100 25710xxx

- Attenuator, pluggable
- Frequency range: 5-862 MHz
- Attenuation from 1 to 25 dB in 1 dB steps
- To insert into IEC sockets
- With protection clamp for BK modules

Type	ERD 100												
Order no. 25710...	...099	...100	...101	...102	...103	...104	...105	...106	...107	...108	...109	...110	...111
Attenuation (dB)	1	2	3	4	5	6	7	8	9	10	11	12	13

Order no. 25710...	...112	...113	...114	...115	...116	...117	...118	...119	...120	...121	...122	...123
Attenuation (dB)	14	15	16	17	18	19	20	21	22	23	24	25

Accessories for the BK amplifier system

2-way C splitter

EBC 802 272644 CE

- The 2-way C splitter distributes the output signal of a C amplifier to two outputs
- To avoid overvoltages, the inner conductors of the splitter outputs are electrically isolated and furnished with surge absorbers
- The C splitter is directly plugged onto the screwed cable gland on the BK diecast housing with an output, and protected with a clamping fixture

Type		EBC 802
Order no.		272644
Impedance	Ω	75
Frequency range	MHz	5-862
Distribution loss 5-450 MHz	dB	< 3.8
Distribution loss 450-862 MHz	dB	< 4.3
Decoupling of outputs (10-65 MHz)	dB	> 20
Decoupling of outputs (85-862 MHz)	dB	23 -1 dB/oct.
Return loss (10-65 MHz)	dB	> 20
Return loss (85-862 MHz)	dB	23 -1 dB/oct.

Accessories for the BK amplifier system

3-way C splitter

EBC 803 272669 CE

- The 3-way C splitter distributes the output signal of a C amplifier to three outputs
- To avoid overvoltages, the inner conductors of the splitter outputs are electrically isolated and furnished with surge absorbers
- The C splitter is directly plugged onto the screwed cable gland on the BK diecast housing with an output, and protected with a clamping fixture

Type		EBC 803
Order no.		272669
Impedance	Ω	75
Frequency range	MHz	5-862
Distribution loss 5-450 MHz output 1	dB	< 3.8
Distribution loss 450-862 MHz output 1	dB	< 4.3
Distribution loss 5-450 MHz outputs 2 and 3	dB	7.6
Distribution loss 450-862 MHz outputs 2 and 3	dB	< 8.6
Decoupling of outputs (10-65 MHz)	dB	> 20
Decoupling of outputs (85-862 MHz)	dB	23 -1/oct.
Return loss (10-65 MHz)	dB	> 20
Return loss (85-862 MHz)	dB	23 -1/oct.

Accessories for the BK amplifier system

Amplifier housing

GMG 51 279129

- Amplifier housing for the insertion of BK transmission system components
- Additionally, it has the following functions:
  - Dissipation of the emerging lost heat
  - RF-proof screening to meet the EMC demands
  - Splash guard
- Additionally, a housing with 6 insert positions is available (see GMG 52, order no. 279128)

Type		GMG 51
Order no.		279129
Number of insert positions		12
Dimensions (W x H x D)	mm	618 x 435 x 190

Feed-in filter

GMZ 51 25010002

- GMZ 51 feed-in filter for the insertion of the feed-in conductor into the BK housing for local supply of the amplifier point
- To prevent radiation and/or irradiation over the remote feed conductors
- Connections:
  - Input: screw-type terminal
  - Output: blade terminal

Type		GMZ 51
Order no.		25010002
Nominal current	A	6.5
Short-circuit current	A	11
Remote feed voltage	V	< 65

Accessories for the BK amplifier system

Remote-feed splitter cap

KAP 10 25010013

- KAP 10 cap to plug onto unused contacts on the remote-feed diplexer as protection against contact
- Packing unit: 100 pcs.

75 Ω terminating resistor

EMK 98 273153

- The EMK 98 terminating resistor is used for the termination of unused outputs
- Connector: IEC 2.4/9.5
- Impedance: 75 Ω

Optical lead-through

ZGF 01 25510001

- ZGF 01 lead-through to insert optical cables (pigtails) into the inside of the amplifier point housing
- Up to four optical cables with a diameter of max. 4 mm each may be inserted
- It is installed on an unoccupied cable entry point (PG 11) on the amplifier housing
- Protection category if correctly installed: IP 54
- Length: app. 70 mm, max. diameter: 27 mm

GGA 8 amplifier system

Branch amplifier

VGU 80 24410033 CE

The VGU 80 amplifier is a broadband amplifier for the frequency range from 47 to 862 MHz. It is usually used as a tap amplifier or output amplifier after the optical receivers.

Functions:

- Amplification of the forward path signals (47-862 MHz)
- Electronic variable attenuator on the input
- Electronic pre-emphasis on the input
- Tap output to feed the line and trunk amplifiers
- Tap output for the forward carriers of the monitoring system
- Test socket to control the output signal
- Inventory Data System

All settings are made electronically via a hand-held unit, see HTE 10 (order no. 25010005)

NMS functions:

- Attenuation settings
- Pre-emphasis setting
- Remote Inventory Data

Type		VGU 80
Order no.		24410033
Frequency range	MHz	47-862
Nominal gain	dB	18
Frequency response	dB	± 0.4
Tap output	dB	-15
Variable attenuator electronic, input	dB	0-10
Pre-emphasis electronic, input	dB	0-5
Test socket	dB	-20
Noise figure	dB	11
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 110 dBµV, flat		
CSO	dB	64
CTB	dB	64
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 110 dBµV, 5 dB pre-emphasis		
CSO	dB	67
CTB	dB	67
Operating voltage	V_{DC}	24
Current drain	mA	500

GGA 8 amplifier system

Trunk amplifier with input switch

VGU 80AB 24410038 CE

The VGU 80AB amplifier is a broadband amplifier for the frequency range from 47 to 862 MHz, usually used as a launch amplifier after optical receivers.
The amplifier has two inputs enabling automatic redundancy if used with the OTR 9xx optical transceiver.

Functions:
- Amplification of forward signals in the 47-862 MHz range
- Switching between the main and redundant optical receivers
- Electronic variable attenuator on the input
- Electronic pre-emphasis on the input
- Tap output to feed line and trunk amplifiers
- Tap output for the forward carriers of the monitoring system
- Test socket output
- Inventory Data System

All settings are made electronically via a hand-held unit, see HTE 10 (order no. 25010005)

NMS Functions:
- Attenuation settings
- Pre-emphasis setting
- Redundant switch tuning
- Remote Inventory Data

Type		VGU 80AB
Order no.		24410038
Frequency range	MHz	47-862
Nominal gain	dB	17
Frequency response	dB	± 0.4
Tap output	dB	-15
Variable attenuator electonic, input	dB	0-10
Pre-emphasis electronic, input	dB	0-5
Test socket	dB	-20
Noise figure	dB	12
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, flat		
CSO	dB	66
CTB	dB	66
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, 5 dB pre-emphasis		
CSO	dB	68
CTB	dB	68
Operating voltage	V_{DC}	24
Current drain	mA	520

GGA 8 amplifier system

Bridger amplifier

VGS 40 24410003 CE

The VGS 40 amplifier is a broadband amplifier for the frequency range 47-862 MHz and is used as trunk and/or distribution amplifier.

- High-linear amplifier up to 862 MHz
- 33 dB gain at 862 MHz
- Electronic tuning of attenuation
- Electronic change-over between 2-way and 4-way splitter
- Inventory Data System

All settings are made electronically via a hand-held unit, see HTE 10 (order no. 25010005)

Type		VGS 40
Order no.		24410003
Frequency range	MHz	47-862
Impedance	Ω	75
Nominal gain	dB	33
Setting range of the attenuator on the input	dB	0-10
Setting range variable attenuator interstage	dB	0-10
Setting range pre-emphasis	dB	5-10
Noise figure	dB	7
Max. perm. operational level [1)]	dBµV	112
CSO in max. operational level	dB	68
CTB in max. operational level	dB	64
Tap loss test socket	dB	20
Supply voltage	V_{DC}	24
Current drain	mA	< 930
RF SPLITTER		
Through loss 2-way splitter	dB	4
Through loss 4-way splitter	dB	8

[1)] Allocation with 41 channels acc. to CENELEC up to 862 MHz (without Ch2)

GGA 8 amplifier system

GGA 8 trunk amplifiers 862 MHz

VGP 83	24410034	CE
VGP 85	24410036	

VGP 8x is a broadband amplifier for the frequency range from 47 to 862 MHz which not only serves as a pilot-controlled, but also as an uncontrolled line amplifier for long cascades. The amplifier receives the control factors necessary for control from the pilot receiver.

- Amplification of forward path signals: 47-862 MHz
- Plug-in position for fixed equaliser
- Integrated electronic fine equaliser
- Electronic variable attenuator on the input and interstage
- Electronic pre-emphasis (interstage) with additional cable type equalisation
- Slope actuator for deviation control of frequency-dependent gain or attenuation
- Parallel-actuator for deviation control of frequency-independent gain or attenuation
- Pilot tap-off to feed the pilot receiver
- Tap output to feed line and trunk amplifiers
- Tap output for forward carrier of the monitoring system
- Test socket to control the output signal
- Inventory Data System
- All settings are made electronically via a hand-held unit, see HTE 10 (order no. 25010005)

GGA 8 amplifier system

Technical data

Type		VGP 83	VGP 85
Order no.		24410034	24410036
Frequency range	MHz	47-862	47-862
Impedance	Ω	75	75
Return loss (at 40 MHz)	dB	> 20 -1/oct.	> 20 -1/oct.
Nominal gain at 862 MHz controlled/uncontrolled	dB	30/33	37/40
Control range	dB	± 3	± 3
Noise figure	dB	6.5	6.5
Setting range of variable attenuator on input	dB	0-12	0-12
Setting range of equaliser on input	dB	0-5	0-5
Setting range of variable attenuator Interstage controlled/uncontrolled	dB	3-12/0-12	3-8/0-9
Setting range of de/pre-emphasis 47-862 MHz (only in uncontrolled operation)	dB	± 2.5	± 2.5
Pre-emphasis 47-862 MHz/cable type equaliser	dB	5/± 0.6	5/± 0.6
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, flat [1)]			
CSO	dB	65	65
CTB	dB	66	66
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, 5 dB pre-emphasis [1)]			
CSO	dB	68	68
CTB	dB	68	68
Tap loss pilot receiver	dB	22 ± 0.3	22 ± 0.3
Tap loss tap output	dB	15 ± 0.3	15 ± 0.3
Tap loss test socket	dB	20 ± 0.3	20 ± 0.3
Tap loss monitoring transponder	dB	20 ± 1	20 ± 1
Supply voltage	V_{DC}	24 ± 2 %	24 ± 2 %
Current drain	mA	< 850	< 820
Front connections - RF/service interface		IEC socket acc. to DIN IEC 60169/Mini DIN (8-pin)	

[1)] Interstage attenuation max. 8 dB

GGA 8 amplifier system

GGA 8 trunk amplifiers 606 MHz

VGP 83-6	24410035	CE
VGP 85-6	24410015	

VGP 8x-6 is a broadband amplifier for the frequency range from 47 to 606 MHz which not only serves as a pilot-controlled, but also as an uncontrolled line amplifier for long cascades.

The amplifier receives the control factors necessary for control from the pilot receiver.

- Amplification of forward signals: 47-606 MHz
- Plug-in position for fixed equaliser
- Integrated electronic fine equaliser
- Electronic variable attenuators on the input and interstage
- Electronic pre-emphasis (interstage) with additional cable type equalisation
- Slope actuator for deviation control of frequency-dependent gain or attenuation
- Parallel-attenuator for deviation control of frequency-independent gain or attenuation
- Pilot decoupling to feed the pilot receiver
- Tap output to feed line and trunk amplifiers
- Tap output for forward carrier of the monitoring system
- Test socket to control the output signal
- Inventory Data System
- All settings are made on a hand-held unit, see HTE 10 (order no. 25010005)

GGA 8 amplifier system

Technical data

Type		VGP 83-6	VGP 85-6
Order no.		24410035	24410015
Frequency range	MHz	47-606	47-606
Impedance	Ω	75	75
Return loss (at 40 MHz)	dB	> 20 -1/oct.	> 20 -1/oct.
Nominal gain at 606 MHz controlled/uncontrolled	dB	33/36	38/41
Control range	dB	± 3	± 3
Noise figure	dB	6	6
Setting range of variable attenuator on the input	dB	0-12	0-12
Setting range of equaliser on the input	dB	0-5	0-5
Setting range of variable attenuator Interstage controlled/uncontrolled	dB	3-12/0-12	3-8/0-9
Setting range of de/pre-emphasis 47-606 MHz (only in uncontrolled operation)	dB	± 2.5	± 2.5
Pre-emphasis 47-606 MHz/cable type equaliser	dB	5/± 0.6	5/± 0.6
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, flat [1)]			
CSO	dB	71	71
CTB	dB	72	72
Intermodulation ratios CENELEC, 862 MHz, 41 channels, 108 dBµV, 5 dB pre-emphasis [1)]			
CSO	dB	71	75
CTB	dB	75	75
Tap loss pilot receiver	dB	22 ± 0.3	22 ± 0.3
Tap loss tap output	dB	15 ± 0.3	15 ± 0.3
Tap loss test socket	dB	20 ± 0.3	20 ± 0.3
Tap loss monitoring transponder	dB	20 ± 1	20 ± 1
Supply voltage	V_{DC}	24 ± 2 %	24 ± 2 %
Current consumption	mA	< 850	< 820
Front connections - RF/service interface		IEC socket acc. to DIN IEC 60169/Mini DIN (8-pin)	

[1)] Interstage attenuation max. 8 dB

GGA 8 amplifier system

Pilot receivers

VGP 08	24410070
VGP 08	24410032
VGP 08	24410056
VGP 08	24410063

- VGP 08 pilot receiver generates the control voltage for the parallel and slope controller in the controlled line amplifier to balance the temperature-dependent cable loss changes of the line cable

- Functions:
  - Selection, amplification and alignment of the two pilot frequencies that are tapped off the line amplifier output
  - Generation of proportional DC-voltage manipulated variables that conform to the RF levels of the upper and lower pilots
  - Alarm via LED and message over the bus system in case of pilot failure or control range overstepping

Type		VGP 08	VGP 08	VGP 08	VGP 08
Order no.		24410070	24410032	24410056	24410063
Pilot frequency lower pilot (CW signal/analogue carrier)	MHz	80.15	83.25	87.40	140.25
Pilot frequency lower pilot (QAM signal)	MHz	121			
Pilot frequency range upper pilot (QAM signal/analogue carrier)	MHz	420-650			
Setting the pilot frequency in QAM signal		On mid-channel			
Setting the pilot frequency in analogue carrier		On video carrier frequency			
Frequency setting in increments upper pilot	kHz	250			
Input level range upper pilot (analogue carrier)	dBµV	73-85			
Input level range upper pilot (QAM signal)	dBµV	63-75			
Input level range lower pilot (relative to upper pilot)	dB	0 ... -12			
Operating voltage	V_{DC}	24			
Current drain	mA	< 180			

GGA 8 amplifier system

5-65 MHz return path amplifier

VGR 09C 24410025 CE

VGR 09C is used in GGA 8 amplifier points as return path amplifier.

- Integrated 65/85 MHz diplexer
- Two line inputs with max. 18 dB gain
- One distribution network input with max. 27 dB gain
- All inputs with Ingress Control switches
- Electronic tuning of attenuation/slope
- Inventory Data System
- All settings are made electronically using a hand-held unit, see HTE 10 (order no. 25010005)

Type		VGR 09C
Order no.		24410025
Frequency range	MHz	5-65
Nominal gain line inputs	dB	18
Nominal gain distribution network input	dB	27
Setting range of variable attenuator	dB	0-15
Setting range of slope equaliser	dB	0.9-8.2
Frequency response (5-64 MHz, incl. 2 WFS 65 diplexers)	dB	0.5
Ingress Control switch attenuation (“attenuate“)	dB	6
Ingress Control switch attenuation (“switch off“)	dB	> 45
Input level density [1] line inputs	dBµV/Hz	0
Input level density [1] distribution network input	dBµV/Hz	-9
Dynamic range	dB	25
Operating voltage	V	24
Current drain	mA	< 220
FORWARD/RETURN PATH DIPLEXER		
Forward path	MHz	85-862
Out-of-band loss 5-65 MHz	dB	> 36
Through loss 85-862 MHz	dB	< 0.8

[1] At 50 dB CINR

GGA 8 amplifier system

5-65 MHz return path amplifier

VGR 09D 24410069 CE

VGR 09D is used in GGA 8 amplifier points as a return path amplifier.

- Integrated 65/85 MHz diplexer
- Two line inputs with max. 21 dB gain
- One distribution network input with max. 27 dB gain
- All inputs with Ingress Control switches
- Electronic tuning of attenuation/slope
- Inventory Data System
- All settings are made electronically using a hand-held unit, see HTE 10 (order no. 25010005)

Type		VGR 09D
Order no.		24410069
Frequency range	MHz	5-65
Nominal gain line inputs	dB	21
Nominal gain distribution network input	dB	27
Setting range of variable attenuator	dB	0-25
Setting range of slope equaliser	dB	0.6-8.2
Frequency response (5-64 MHz, incl. 2 WFS 65 diplexers)	dB	0.5
Ingress Control switch attenuation (“attenuate“)	dB	6
Ingress Control switch attenuation (“switch off“)	dB	> 45
Input level density [1] line inputs	dBµV/Hz	-2
Input level density [1] distribution network input	dBµV/Hz	-8
Dynamic range	dB	24
Operating voltage	V	24
Current drain	mA	200
FORWARD/RETURN PATH DIPLEXER		
Forward path	MHz	85-862
Out-of-band loss 5-65 MHz	dB	> 36
Through loss 85-862 MHz	dB	< 0.8

[1] At 50 dB CINR

Accessories for the GGA 8 amplifier system

862 MHz equaliser for GGA 8

ERN 8xx 245100xx

- In connection with the fine equaliser built in the line amplifier, the pluggable equalisers for networks up to 862 MHz are used for equalisation of the line cable‘s frequency-dependent attenuation
- Frequency range: 85-862 MHz
- Change in slope: < ± 0.15 dB [1)]
- Frequency deviation of the pilot frequency at 83.25 MHz compared to 85 MHz: < 0.2 dB
- Electronic equaliser characteristics in GGA 8 amplifiers
- Equaliser null card: ERN 800 (order no. 24510045)

Type		ERN 803	ERN 807	ERN 811	ERN 815	ERN 819	ERN 823	ERN 827	ERN 831	ERN 835
Order no.		24510034	24510035	24510036	24510037	24510038	24510039	24510040	24510041	24510042
Field length	dB	3	7	11	15	19	23	27	31	35
Basic loss	dB	16	12	8	4	1.3	1.4	1.5	1.7	1.9
Slope 85-862 MHz	dB	2.25	5.2	8.2	11.15	14.1	17.1	20.05	23.05	26

[1)] Relating to the ideal curve to equalise EUPEN 7161 cables and 2 × WFS 65

Accessories for the GGA 8 amplifier system

606 MHz equalisers for GGA 8

ERN 603	24510056
ERN 607	24510055
ERN 611	24510051
ERN 615	24510044
ERN 619	24510043
ERN 623	24510030
ERN 627	24510031
ERN 631	24510032
ERN 635	24510033

- In connection with the line amplifier's built-in fine equaliser, the pluggable equalisers for networks up to 606 MHz are used for equalisation of frequency-dependent attenuation of the line cable
- Frequency range: 85-606 MHz
- Change in slope: < ± 0.15 dB [1)]
- Frequency deviation of the pilot frequency at 83.25 MHz compared to 85 MHz: < 0.2 dB
- Electronic equaliser identification in GGA 8 amplifiers
- Equaliser null card: ERN 800 (order no. 24510045)

Type		ERN 603	ERN 607	ERN 611	ERN 615	ERN 619	ERN 623	ERN 627	ERN 631	ERN 635
Order no.		24510056	24510055	24510051	24510044	24510043	24510030	24510031	24510032	24510033
Field length	dB	3	7	11	15	19	23	27	31	35
Basic loss	dB	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.5	1.5
Slope 85-606 MHz	dB	2.0	4.8	7.5	10.2	12.9	15.6	18.4	21.1	23.8

[1)] Relating to the ideal curve to equalise EUPEN 7161 cables and 2 × WFS 65

Accessories for electronically adjustable amplifiers

Hand-held unit

HTE 10	25010005
TDK 10	26210054
TDK 12	26210076

With the HTE 10 hand-held unit one is able to set correspondingly equipped amplifier components on site.

Using the ‘Up‘ and ‘Down‘, ‘Menu‘ and ‘Enter‘ buttons, one is able to change and set the values on the 4-digit display. The display is illuminated and easy to read.

The hand-held unit has the following functions:

- All appropriately equipped amplifiers or modules can be set and operated
- All settings are displayed
- The last settings are saved (copy function)
- Characteristics:
  - The hand-held unit is power-supplied from the respective module
- Distances:
  - Data transfer between HTE 10 and the amplifier or module over max. 14 m
  - Standard connection cable: 2 m (included in the delivery scope)
  - Can be extended to 14 m (TDK 10)
- 4-digit display, illuminated
- Language: English
- Splash-proof/shock-proof
- Ambient conditions:
  - Ambient temperature: -20 to +50 °C
  - Suitable for outdoor application
  - Protection category: IP 54
- Control signal: serial, RS 232
- Connection: Sub-D 9-pin
- Accessories (not included in the delivery scope):
  TDK 10 - order no. 26210054: Connection cable 14 m
  TDK 12 - order no 26210076: PC connection cable for HTE 10 (for software update)

Accessories for the GGA 8 amplifier system

Input/output diplexers

WFS 65 222278
WFS 930 222288

- The input/output diplexer separates and/or combines the RF signals of the forward and return paths and enables insertion/ extraction of the remote feed voltages
- The input/output diplexers are installed on the input and on the line outputs of an amplifier point
- Equipped with a surge absorber to protect any following components
- The RF signal, lowered by 30 dB, can be tapped off on the test socket

Type		WFS 65	WFS 930
Order no.		222278	222288
Impedance	Ω	75	75
RF forward path			
Transmission range	MHz	85-862	47-862
Through loss	dB	0.4	0.9
Suppression loss	dB	4-65 MHz: > 38	5-30 MHz: > 38
Return loss	dB	24 at 85 MHz, -1.5/oct.	23 at 47 MHz, -1/oct.
RF return path			
Transmission range	MHz	4-65	5-30
Through loss	dB	0.7	< 1.1
Suppression loss	dB	85-862 MHz: > 38	47-862 MHz: > 38
Return loss	dB	> 23	> 20
RANGE BETWEEN FORWARD AND RETURN PATH			
Frequency range	MHz	65-85	30-47
Decoupling	dB	> 18	> 16
REMOTE FEEDING			
Remote feed voltage	V	< 65	< 65
Nominal current	A	6.5	8
Short circuit current	A	11	12
TEST SOCKET			
Transmission range	MHz	4-65/85-862	5-30/47-862
Tap loss	dB	30	30

Accessories for the GGA 8 amplifier system

Remote feed diplexer

WFS 900 222287

- The remote feed diplexer separates and/or combines the RF signals (forward path/return path) and the remote feed voltage
- Equipped with a surge absorber to protect the adjacent components
- The RF signal, lowered by 30 dB, can be tapped off on the test socket

Type		WFS 900
Order no.		222287
RF PARAMETERS		
Frequency range	MHz	5-862
Through loss	dB	< 0.8
Return loss 5-9 MHz	dB	> 20
Return loss 9-862 MHz	dB	> 23, from 47 MHz -1/oct.
REMOTE FEEDING		
Remote feed voltage	V_{AC}	< 65
Nominal current	A_{AC}	8
Short circuit current	A_{AC}	12
TEST SOCKET		
Frequency range	MHz	5-862
Through loss	dB	30

Accessories for the GGA 8 amplifier system

1-way tap

EAC 62 272399

- 1-way tap to split or combine RF signals in GGA amplifiers
- May be plugged directly onto an IEC socket
- Connections:
  Input: IEC plug
  Outputs: IEC socket

Type		EAC 62
Order no.		272399
Impedance	Ω	75
Frequency range	MHz	4-862
Through loss	dB	1.2
Tap loss	dB	10
Directional loss (4-40 MHz)	dB	> 25
Directional loss (40-862 MHz)	dB	> 27 -1.5/Oct.
Return loss	dB	> 20 -1.5/Oct.
Screening factor	dB	> 75

2-way splitter

EBC 62 272596

- The 2-way splitter is used to split or combine RF signals in GGA amplifier points
- May be directly plugged onto an IEC socket
- Connections:
  Input: IEC plug
  Ouputs: IEC socket

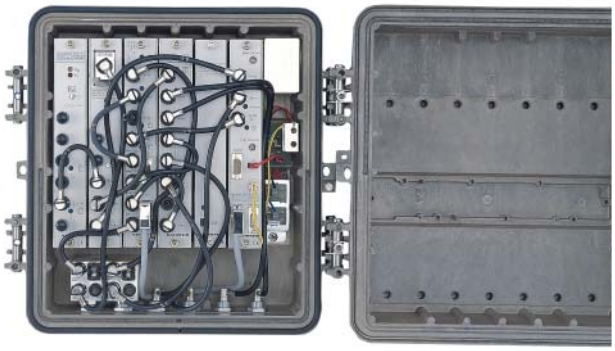
Type		EBC 62
Order no.		272596
Impedance	Ω	75
Frequency range	MHz	4-862
Split loss	dB	3.5 ± 0.5
Decoupling of outputs (4-40 MHz)	dB	> 18
Decoupling of outputs (40-862 MHz)	dB	> 20 -1.5/oct.
Return loss	dB	> 20 -1.5/oct.
Screening factor	dB	> 75

Accessories for the GGA 8 amplifier system

Amplifier housing

GMG 52 279128

- Chromated amplifier housing to insert GGA 6/GGA 8 amplifier system components
- Additionally it has the following functions:
  - Dissipation of emerging lost heat
  - RF-proof screening to meet the EMC demands
  - Splash guard
- A housing with 12 insert positions is also available, see GMG 51 (order no. 279129)



Type		GMG 52
Order no.		279128
Number of insert positions		6
Dimensions (W x H x D)	mm	420 x 435 x 202

Feed-in filter

GMZ 52 279145

- GMZ 52 feed-in filter for the insertion of the remote feed conductor into the BK housing for local supply of the amplifier point
- To prevent radiation and/or irradiation over the remote feed conductors
- Connections:
  - Output: cable 1.5 mm²
  - Input: screw- type terminal

Type		GMZ 52
Order no.		279145
Nominal current	A_{AC}	11
Short-circuit current	A_{AC}	15
Remote feed voltage	V_{AC}	< 65

Power supply units

Power supply units for BK and GGA 6/GGA 8 amplifier systems

TFN 40 236626
TFN 41 236676

CE

- On the back panel bus of the BK/GGA die-cast housing, these power supply units supply the controlled, highly constant supply voltage which is required to feed the active units
- For redundant operation, two power supply units can be connected in parallel
- The secondary voltage can be checked on the measurement socket on the front panel

Type		TFN 40	TFN 41
Order no.		236626	236676
Input voltage AC	V_{AC}	38-65	28-55
Input voltage DC	V_{DC}	50-75	-
Output voltage	V_{DC}	24 ± 2 %	
Output current	A_{DC}	0.2-3.0	
Max. output power	W	72	
Output overcurrent limitation	A_{DC}	4	
Output overvoltage protection static	V_{DC}	26.4	
Output overvoltage protection dynamic (t < 1 s)	V_{DC}	28	

Power supply units

Power supply unit

TFN 42 236675 CE

- To locally feed the modules in a 19“ rack (e.g. TOG 05)
- Supplies a constant, short-circuit-proof and ungrounded operational voltage
- For redundant operation, two power supply units can be connected in parallel

Type		TFN 42
Order no.		236675
Input voltage	V_{AC}	230
Input voltage range	V_{AC}	187-253
Output voltage	V_{DC}	24 ± 2 %
Output current	A_{DC}	0.2-3.0
Max. output power	W	72
Current limitation	A_{DC}	3.4
Overvoltage protection	V_{DC}	26 ± 2.4 %
Power consumption	W	88

Power supply units

Power supply unit BK/GGA8

TFN 43 24410057 CE

- On the back panel bus of the BK/GGA die-cast housing, these power supply units provide the controlled, highly constant supply voltage required to feed the active units
- Supplies a constant, short-circuit proof and ungrounded voltage
- For redundant operation, two power supply units can be connected in parallel
- High output current up to 3.5 A

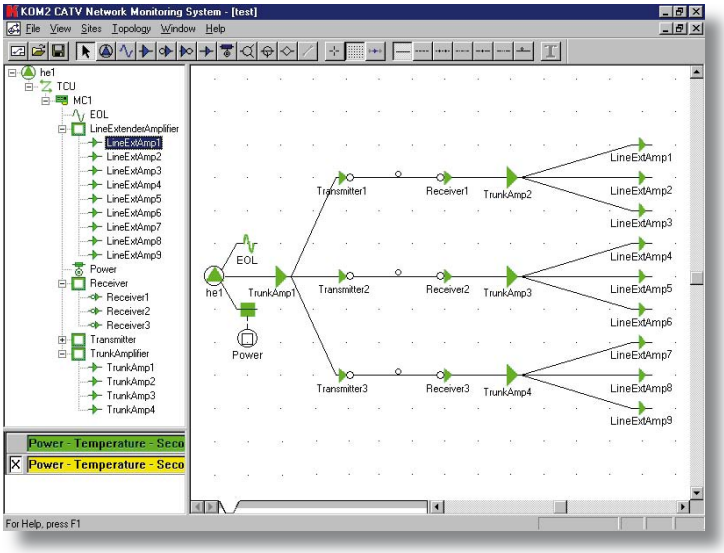
Type		TFN 43
Order no.		24410057
Input voltage, operation at remote feed transformer 65 V_{AC}	V_{AC}	32-65
Input voltage, operation at 90 V_{DC}	V_{DC}	40-90
Output voltage	V_{DC}	24 ± 2 %
Max. output current	A_{DC}	3.5
Max. output power	W	84
Output overvoltage protection static and dynamic t < 1s	V_{DC}	26-28
Primary power consumption	W	97

KOM monitoring system

KOM software

Single-user licences

SOM 30-499	26110018
SOM 30-999	236481



Various software models are available for the KOM system. They differ in the number of transponders they can maximally monitor.
Both single and multi-user licences are available.

Using the single-user licence SOM 30, an HFC system can be controlled and the monitoring software operated from one site.

Using the multi-user licence SOM 31, the HFC network can be monitored from three different sites.
We can offer individual licencing solutions for large network operators with several independant cable networks.

The KOM monitoring system can be integrated into higher-ranked systems over an SNMP interface.

The software module SOM 32 (SNMP agent) undertakes this task. In a superordinated monitoring system (network manager), the KOM system functions as an “element manager“.
The SIMS software SOM 33 is integrated in the KOM software. The common user interface guarantees homogenous control. Return path spectra are displayed in one or more separate windows. The display method can be varied by the user.

For SOM 31, see “Multi-user licences“, for SOM 32 and SOM 33, see “Additional software“.

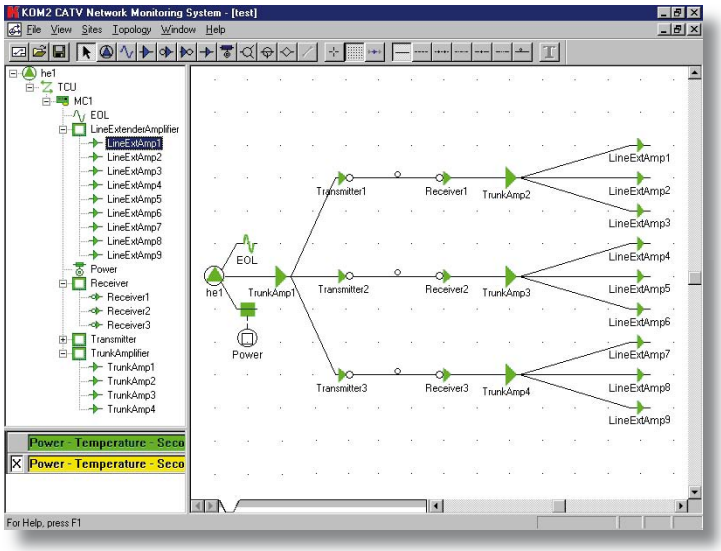
- Single-user licences to monitor 499 or 999 transponders
- Visualisation of network topology
- Display of operational parameters
- Simple establishment of alarm thresholds
- Differentiation of alarm types using colour codes
- Extensive alarm management with report and filter capability
- Allocation of multiple level user rights for system administration
- Upgradable to monitor further transponders
- KOM software includes the following services (2 years):
  - Reception of software updates
  - Telephone-based user support
  - User support with coded remote access to the KOM software by Kathrein specialists
- KOM software for operation on an additional server PC
  (PC not in delivery scope, please request present hardware pre-requisites)

Type	**SOM 30-499**	**SOM 30-999**
Order no.	26110018	236481
Licence	Single-user	Single-user
No. of monitorable transponders	499	999

KOM software

Multi-user licences

SOM 31-99	236473
SOM 31-999	236477
SOM 31-2499	236478
SOM 31-4999	236479
SOM 31-UNL	236480
SOM 34-SERVER	26110005



Various software models are available for the KOM system. They differ in the number of transponders they can maximally monitor.

Both single and multi-user licences are available. Using the single-user licence SOM 30, an HFC system can be controlled and the monitoring software operated from one site.

With the multi-user licence SOM 31, the HFC network can be monitored from three different sites.

With the SOM 34, we can offer individual licencing solutions for large network operators with several independant cable networks. The KOM monitoring system can be integrated into higher-ranked systems over an SNMP interface.

The software module SOM 32 (SNMP agent) undertakes this task. In a superordinated monitoring system (network manager), the KOM system functions as an “element manager“.

The SIMS software SOM 33 is integrated in the KOM software. The common user interface guarantees homogenous control. Return path spectra are displayed in one or more separate windows. The display method can be varied by the user.

For SOM 30, see “single-user licences“, for SOM 32 and SOM 33, see “Additional software“.

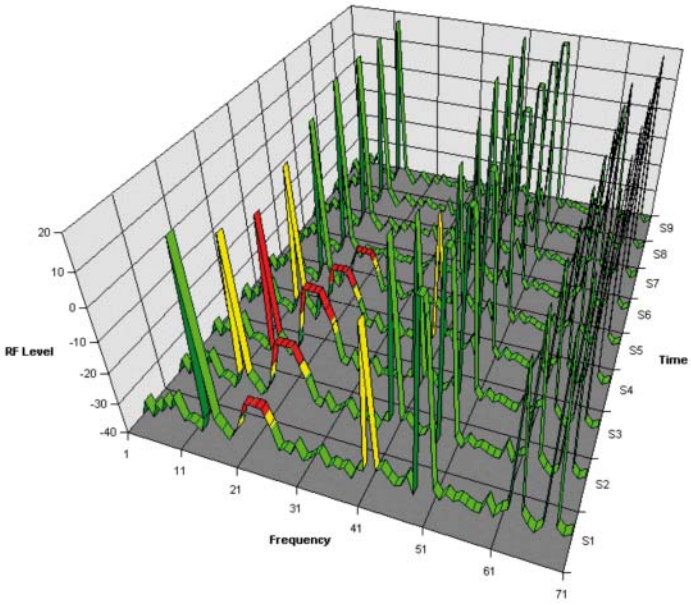
- Multi-user licences to monitor 99 and more transponders
- Additional server licence SOM 34 for installation in separate HFC nets (base: a SOM 31-x multi-user licence)
- Visualisation of network topology
- Display of operational parameters
- Simple establishment of alarm thresholds
- Differentiation of alarm types using colour codes
- Extensive alarm management with report and filter capability
- Allocation of multiple level user rights for system administration
- Upgradable to monitor further transponders
- KOM software includes the following services (2 years):
  - Reception of software updates
  - Telephone-based user support
  - User support with coded remote access to the KOM software by Kathrein specialists
- KOM software for operation on an additional server PC
  (PC not in delivery scope, please request present hardware pre-requisites)

Type	SOM 31-99	SOM 31-999	SOM 31-2499	SOM 31-4999	SOM 31-UNL	SOM 34-SERVER
Order no.	236473	236477	236478	236479	236480	26110005
Licence	Multi-user	Multi-user	Multi-user	Multi-user	Multi-user	Multi-user
No. of monitorable transponders	99	999	2499	4999	Unlimited	Corresponding to base licence

KOM software

Additional software

SOM 32-SNMP 236476
SOM 33-SIMS 26110003



KOM software single and multi-user licences can also be extended with additional software packages.

The KOM monitoring system can be bound into a higher-order system over an SNMP interface.

The software module SOM 32 (SNMP agent) undertakes this task. In a superordinated monitoring system (network manager), the KOM system functions as an “element manager“.

The SIMS software SOM 33 is integrated into the KOM software. The common user interface guarantees a rapid and homogenous control. Return path spectra is displayed in one or more separate windows.

For further details on the SIMS system, see SIMS insert card 9125+.

SOM 32

- SNMP agent for integration into a higher-ranked monitoring system

SOM 33

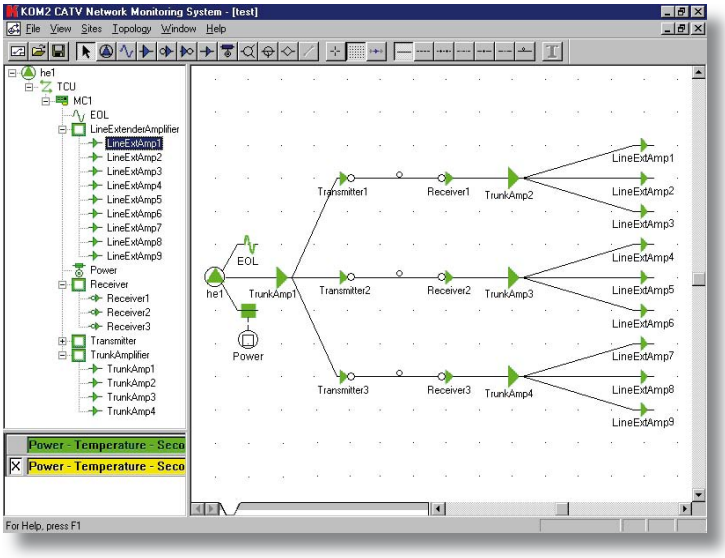
- SIMS software enables integration into an existing KOM software SOM 30/31:
  - Rapid analysis of return path spectra
  - Simple establishment of alarm masks with two alarm thresholds
  - Normalising function
  - Two- or three-dimensional display of spectra is possible

Type	SOM 32-SNMP	SOM 33-SIMS
Order no.	236476	26110003
Licence	SNMP agent	SIMS software

KOM software

KOM Starter Kit

SOM Starter-199 26110022



The starter kit is specially designed to monitor smaller HFC networks. The complete package includes all required components:

- 1 single-user licence for 199 transponders
- 1 TCU 40 central unit
- 1 TDS 32B HMS modem card
- Software services for one or two years

Note:
The starter kit does not require a separate server PC for operation of KOM software. SOM 199 software is installed on the TCU 40 central unit.

The functionality is equivalent to each individual component. For details, refer to each component.

It is possible to upgrade the package to monitor further transponders. Additional software (e.g. SIMS) can also be installed; in this case, a server PC for SOM software operation may be required.

TCU 40

- Complete package for small networks, comprising:
  - Single-user licence SOM 199 to monitor up to 199 transponders
  - Central unit TCU 40
  - HMS modem card TDS 32B
- Same functionality as SOM 30-xx
- Upgradable to monitor further transponders
- KOM software includes the following services (1 year, 2 years optional):
  - Reception of software updates
  - Telephone-based user support
  - User support with coded remote access to the KOM software by Kathrein specialists

TDS 32B

Type	SOM Starter-199
Order no.	26110022
Licence	Single-user
Number of monitorable transponders	199

KOM hardware

Central unit

TCU 40 26210048 CE

TCU 40 central unit is a special computer for communication and control tasks within the KOM system. It is designed as 19“ racking with four units of height.

The connection between the TCU 40 and the PC on which the SOM 3x operating software runs can be made using a TCP/IP network or a crossed network cable.

The TCU 40 already features an Ethernet interface for this purpose. The central unit collects the information delivered by the transponders and modem cards. This process is carried out by a special software.

TCU 40 transfers the data via the network to the server-processor. The data is then saved in a SQL data bank. Up to six modem cards can be inserted into each TCU 40.

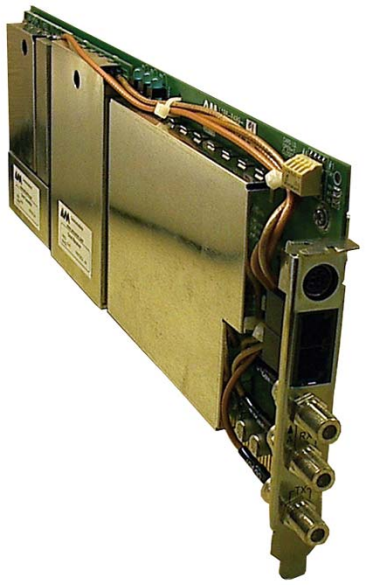
Modem cards with KOM, AM and HMS protocol for various frequency ranges in each protocol are available.

- KOM central unit
- Designed for the insertion of up to six modem cards
- Full HMS support
- Multi protocol compatible
- Communication with server PC via TCP/IP network or crossed network cable
- 19“ racking, 4 HU
- Incl. special communication software and VNC for remote control

KOM hardware

Modem cards

TDS 31B	236812
TDS 31C	26210041
TDS 32B	26210027
TDS 32C	26210051



All communication in the KOM system is carried out through the modem cards. Each TDS 3x modem card can communicate with up to 1000 (for HMS up to 500) transponders.

There are several types for different protocols and frequency ranges. They are designed with a frequency-agile RF transmitter and two frequency-agile RF receivers.

The modem cards support the HMS or AM protocol and are available for various forward and return path frequencies.

- Modem cards for use in the central unit TCU 40
- Various models are available for HMS and AM protocols
- Two return path inputs for each modem card
- Cards for different frequency ranges are available
- Up to 1000 (for HMS up to 500) transponders with each modem card
- 2 x RS 485 interfaces (e.g. connection of a TAM 9700 telemetry chassis)

Type		TDS 31B	TDS 31C	TDS 32B	TDS 32C
Order no.		236812	26210041	26210027	26210051
Protocol		AM	AM	HMS	HMS
Frequency range forward path	MHz	72-93	94-120	48-162	48-162
Frequency range return path	MHz	5.5-18	5.5-18	5.5-18	18-45

KOM hardware

Telemetry chassis

TAM 9700 26210002
TAM 9700 26210011

The TAM 9700 telemetry chassis is a module carrier which can be used for both the SIMS system (Scanning Ingress Monitoring System) and for protocol converters.

Various hardware cards can be inserted. When used in the SIMS system, the card 9125+ must be inserted. The TAM 9700 is designed as a 19“ rack of 2 HU.

Communication with the main unit TCU 40 is made either per RF over the AM protocol, or via the built-in RS 485 interface.

- Module carrier for various KOM system hardware cards
- Operated with the SIMS system or with protocol conversion
- Up to eight cards can be inserted
- 19“ racking, 2 HU
- Built-in transponder (AM protocol)
- RS 485 interface

Type		TAM 9700	TAM 9700
Order no.		26210002	26210011
Forward path frequency	MHz	76.0 [1)]	89.9 [1)]
Return path frequency	MHz	8.0 [1)]	7.5 [1)]

[1)] Other communication frequencies on request

KOM hardware

SIMS Insert card

9125+ 26210012

The SIMS system comprises both hardware and software components which would be integrated in an existing KOM system.

In the telemetry chassis TAM 9700 one can insert up to eight special insert cards 9125+ each equipped with a 4-channel spectrum analyser. This enables measurements of signal levels at frequencies from 5-75 MHz (in 5 kHz steps) at a resolution of 0.5 dB and an accuracy of ± 2 dB over a 70 dB measurement range.

A complete 1400-point spectrum measurement is carried out for each of the 9125+ card's four inputs per second. This process is continuously repeated in the background. All data are compared with the user-defined "Alarm masks", which are defined for RF ranges for each section of the spectrum.
An alarm mask can be simply set up using "Drag-and-Drop" graphic functions. The standardising function sets up an automatic alarm mask for an active spectrum. This can then be changed as required.

The SIMS system can control up to 100 different alarm masks for return path spectrums.

Using the SIMS system, one can detect and localise unwanted ingress disturbances in the return path.

- Insert card for the SIMS system
- 4 inputs on each insert card
- Installation in the telemetry chassis TAM 9700
- Required software: SOM 33-SIMS

Type	9125+
Order no.	26210012
Function	SIMS Insert card

KOM hardware

End-of-line monitor

TLM 31 236343 CE

The TLM 31 is an economical solution for end-of-line monitoring. It is meant to control RF signals at the end of a passive distribution network. The unit is powered and receives its RF feed-in directly from the the HFC distribution network.

- Control of RF signals at the end of a passive HFC network
- Measurement of the RF signal level in forwards path (carrier of monitoring signal)
- Measurement of the remote feed voltage
- Measurement of the temperature
- AM protocol

Type		TLM 31
Order no.		236343
Frequency forward path (carrier of monitoring signal)	MHz	89.9 [1)]
Frequency return path (carrier of monitoring signal)	MHz	7.5 [1)]

[1)] Other communication frequencies available on request

KOM hardware

Monitoring transponder HMS protocol, frequency-agile

TVM 850/H 26210077

- Monitoring transponder for compact and house connection amplifiers and optical compact receivers (see table)
- Monitors various parameters such as voltage, current drain and internal temperature
- Controls the Ingress-Control switch in correspondingly equipped devices
- Transmission in the HMS protocol
- Frequency-agile in range 5-42 MHz

Type		TVM 850/H
Order no.		26210077
Input frequency range	MHz	75-90.5
Input level range	dBµV	50-95
Output frequency range	MHz	5-42
Max. output level	dBµV	105
Power consumption	W	1
Monitoring protocol		HMS
Suitable for		VGF 939, VGP 90xx, ORA 9022

KOM hardware

Monitoring transponders HMS protocol

TVM 840/V	26210033
TVM 840/V	26210032
TVM 840/V	26210037
TVM 840/H	26210031
TVM 840/H	26210050
TVM 840/H	26210064
TVM 840/H	26210034
TVM 840/H	26210060
TVM 840/H	26210069

- Monitoring transponders for compact and house connection amplifiers and optical compact receivers
- Monitors various parameters such as voltage, current drain and internal temperature
- Controls the Ingress-Control switch in correspondingly equipped devices
- Transmission in the HMS protocol
- Variants for different frequency ranges
- See table for the available variants

Type		**TVM 840/V**	**TVM 840/V**	**TVM 840/V**	**TVM 840/H**	**TVM 840/H**	**TVM 840/H**	**TVM 840/H**	**TVM 840/H**	**TVM 840/H**
Order no.		26210033	26210032	26210037	26210031	26210064	26210050	26210034	26210069	26210060
Input frequency range	MHz	75-90.5	75-90.5	75-90.5	75-90.5	75-90.5	75-90.5	75-90.5	75-90.5	75-90.5
Input level range	dBµV	50-95	50-95	50-95	50-95	50-95	50-95	50-95	50-95	50-95
Output frequency range	MHz	5-8	8-13	13-19	5-8	8-13	13-19	5-8	8-13	13-19
Max. output level	dBµV	110								
Voltage supply	V	12/5								
Current drain	mA	30/150								
Monitoring protocol		HMS								
Suitable for		VGF 8xxx			VOS 9xx/VGF 938			ORA 82x		

KOM hardware

Monitoring transponders HMS protocol

TVM 40L 26210046
TVM 40L 26210047

- Monitoring transponders for GGA 8/GGA 6 and BK components
- Monitor various parameters such as voltage, current drain and internal temperature
- Transmission in the HMS protocol

Type		TVM 40L	TVM 40L
Order no.		26210046	26210047
Input frequency range	MHz	75-128	
Input level range	dBµV	60-100	
Output frequency range	MHz	5-42	
Max. output level	dBµV	107	
Voltage supply	V_{DC}	24	
Current drain	mA_{DC}	100	
Monitoring protocol		HMS	
Suitable for		GGA 8	BK

Data technology

CMTS

Cable Modem Termination System

CGW 120	26210052
CGW 120E	26210053

The CGW 120/120E is a Cable Modem Termination System (CMTS) for small and medium-sized cable nets.

The simple handling enables rapid commissioning.

Two versions are available for operation in DOCSIS 1.1lite and EURODOCSIS 1.1.
A transmitter for the forward path (64/256 QAM) and two return path receivers (QPSK or 16-QAM) allow rapid and secure broadband services.

The CMTS supports the relevant Docsis/EuroDocsis 1.1 “Quality-of-Service“ standards. This ensures that Voice-over-IP (VoIP) services can be offered at guaranteed data rates.

The data traffic with the cable modems is encoded with all the security features of Baseline Privacy Plus (BPI+).

- DOCSIS/EuroDOCSIS 1.1lite
- Supports all the relevant Quality-of-Service standards for VoIP services
- Integrated layer-3 filtering for internal data traffic without data export
- Remote controllable over the SNMP or with CLI commands
- Web Interface
- Stand-alone use, as provisioning base functions are already included
- Front-panel sited operation elements with integrated displays
- Installation: 19“ installation or free-standing

CMTS

Technical data

Type		CGW 120	CGW 120E
Order no.		26210052	26210053
Forward path			
Operational mode		DOCSIS 1.1lite	EuroDOCSIS 1.1lite
Channel bandwidth	MHz	6	8
Frequency range (centre frequency)	MHz	91-857	112-858
Modulation type		64 or 256 QAM	
Forward Error Correction		Reed Solomon	
Output level	dBµV	110-121	
Output impedance	Ω	75	
Return loss	dB	13	
Return path			
Frequency range	MHz	5-42	5-65
Channel bandwidth	MHz	Variable 0.2-3.2	
Modulation type		QPSK or 16 QAM	
Forward Error Correction		Reed Solomon Block Code and Trellis Code	
Input level	dBµV	56-86	
General			
Mains powering	V_{AC}	95-264	
Power consumption (max.)	W	150	
Ambient temperature range	°C	0 to +50	
Relative humidity	%	10-90, non-condensing	
Dimensions (W x H x D)	mm	483 × 88 × 343	
Weight	kg	7.3	

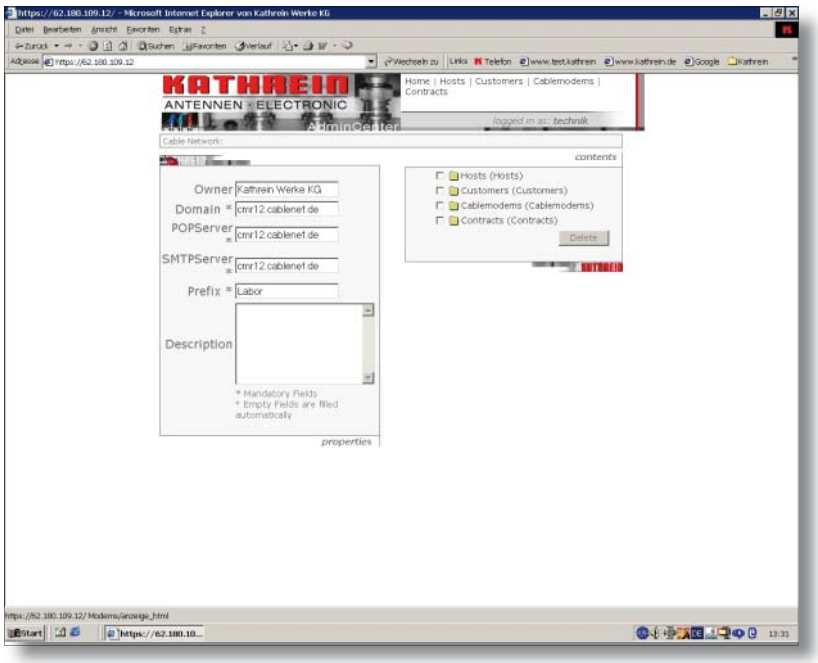
Cable modem management software

Cable Modem Management Software

CMS 100	26110006
CMS 100C	26110007
CMS 110	26110008
CMS 111	26110009
CMS 112	26110010
CMS 120	26110011
CMS 130	26110012

The Kathrein Cable Modem Management Software (CMS) is an economical solution allowing the administration of cable net subscribers, the provisioning of cable modems and network monitoring.

It is generally suitable for all cable networks working with data transmission according to the DOCSIS or EuroDOCSIS standards.



- **CMS 100 Base Software**
  Base software for simple customer administration with registration of modem and hosts; administration of IP addresses; laying down QoS profiles etc.

- **CMS 100C**
  Base software for max. 300 cable modems.
  Same functionality as offered with the CMS 100.
  Upgrading to full CMS 100 functionality is possible

- **CMS 110 Basic package Billing**
  Allows e.g. definition of tariffs and billing orders (single order, monthly).
  Generates billing and booking lists, which can be imported into existing book-keeping software or be used as a basis for serial letters for postal billing

- **CMS 111 Additional billing package Invoice Posting**
  Enables automatic invoice posting (PDF files) per e-mail and generation of a DTAUS-file to pass on invoice data to a credit institute (Bank direct debit)

- **CMS 112 Additional billing package Traffic Evaluation**
  (function must be supported by the CMTS)
  Allows the evaluation of data traffic per modem, division of internal/external data traffic, invoicing according to data traffic

- **CMS 120 CMS 120 Additional package Monitoring**
  Allows monitoring of operational data of CMTS and modems with statistical evaluation (book-keeping technical data, RF data, modems and CMTS)

- **CMS 130 CMS 130 Additional package ISP Services**
  Allows the integration of ISP services such as FTP, HTTP and E-Mail

Cable modems

DOCSIS/EuroDOCSIS Cable modem dual-mode

DCM 52 I+ 26210059

The DCM 52I+ from Kathrein is a cable modem compatible with DOCSIS or EuroDOCSIS 2.0.

It is outstandingly well-suited for data transfer in HFC networks. TurboDox® enables the highest download speed for TCP applications.

The DCM 52I+ automatically recognises if the protocol is DOCSIS or EuroDOCSIS, allowing easy operation without manual intervention.

Ultra-compact design and a wide scope of delivery round off the product‘s profile.

- Simple registration on DOCSIS or EuroDOCSIS-CMTS without any special hardware/software settings
- Fitted with TurboDox® allowing a considerable increase in download speeds for TCP applications
- USB and Ethernet interfaces
- Comprehensive SNMP management support:
  MIB-II; Ethernet-like MIB, Bridge MIB, Cable Device MIB, Baseline Privacy Interface MIB, RF Interface MIB
- Automatic switchover to DOCSIS or EuroDOCSIS
- Delivery scope:
  modem, power supply, CD with instruction notes and drivers, network cable, USB cable

Cable modems

Technical data

Type		DCM 52 I+
Order no.		26210059
Receiver (downstream)		
Modulation		64/256 QAM
Symbol rate DOCSIS	MSym/sec	5057 (64 QAM)/5361 (256 QAM)
Symbol rate EuroDOCSIS	MSym/sec	6952 (64 QAM)/6952 (256 QAM)
Frequency range DOCSIS/EuroDOCSIS	MHz	91 to 857/112 to 858
Channel bandwidth DOCSIS/EuroDOCSIS	MHz	6/8
Input level range	dBµV	45 to 75
Input impedance	Ω	75
Transmitter (upstream)		
Modulation	TDMA	QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM
	S-CDMA	QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, 128 QAM
Symbol rate	kSym/sec	160, 320, 640, 1280, 2560
Frequency range DOCSIS/EuroDOCSIS	MHz	5 to 42/5 to 65
Channel bandwidth	kHz	200, 400, 800, 1600, 3200, 6400
Output level range	dBµV	68 to 118 (TDMA: QPSK), 68 to 115 (TDMA: 16 QAM), 68 to 114 (TDMA: > 16 QAM), 68 to 113 (S-CDMA)
Output impedance	Ω	75
Network characteristics		
MAC protocol		Excentis EuroDOCSIS 2.0/MCNS DOCSIS 2.0
User protocol		UDP, IP, ARP, ICMP, DHCP, TFTP, SNMP, http
Management		SNMP, MIB-II, Ethernet-like MIB, Bridge MIB, Cable Device MIB, Baseline privacy Interface MIB, RF Interface MIB
Security		Baseline Privacy/Baseline Privacy Plus
DA filtering		32 Unicast addresses
Connections		
to PC		RJ-45 10/100 BaseT (half/full duplex, auto-sensing)
		USB B type
to CATV network		F-type socket
Power supply		
Input nominal voltage	V_{AC}	230 (external plug-in power supply unit)
Power consumption	W	< 9
Other		
Dimensions (W x H x D)	mm	120 x 142 x 30
Operating temperature range	°C	0 to 40

Cable modems

DCG 10 (Docsis/EURODocsis) WLAN cable modem router

DCG 10 26210066 CE

- Docsis/EURODocsis 1.1/2.0 compatible cable modem
- Hybrid-mode: Automatic switch-over to DOCSIS or EuroDOCSIS
- Integrated router with 4 × 10/100BaseT and 1 × USB
- Integrated Wireless LAN Access Point
- Conforms with 802.11G standard (up to 54 Mbit/s)
- Auto MDI/MDI-X Detection RJ-45 10/100 BaseT Ethernet switch (Auto Cross-over)
- Security due to WPA encryption or 64 bit/128 bit WEP (Wireless Encryption Protocol)
- Integrated DHCP server, firewall and NAT gateway
- High upstream speeds up to 30 Mbit/s as in Docsis/EURODocsis 2.0
- Full SNMP management support
- Configuration and management over standard browser
- Front panel LEDs for network status and activity
- Delivery scope: Modem, power supply unit, CD with instructions and drivers, network cable, USB cable

Type		DCG 10
Order no.		26210066
Electrical characteristics		
Transmission characteristics		MCNS DOCSIS 1.1/2.0 or tComlabs EuroDocsis 1.1/2.0
RF connection		F (female)
LAN connections		4 × RJ-45, Ethernet 10/100BaseT
Wireless		Access Point as in 802.11G
PC interface		USB B
Voltage supply/power		12 V/9 W
Software characteristics		
Standards		MCNS DOCSIS 1.1/2.0 or tComlabs EuroDocsis 1.1/2.0
		802.11G, 802.1d
Protocols and services		UDP, IP, ARP, ICMP, DHCP, TFTP, SNMP, HTTP
Router functions		MAC address filtering, IP address filtering, DHCP server function (RFC 1541) for internal IP addresses
		NAT function (RFC 1631) with port and address-mapping, VPN pass-through
Security		Baseline Privacy based on DES and RSO encryption, firewall with Stateful Packet Inspection technology
		Application content filtering, with option to restrict access to certain WEB applications
		Denial of Service (DoS) attacks, i.e. MIMEflood, Octopus, Teardrop, Opentear, Twinge, Smurf, Overdrop, Jolt, Tentacle etc, prevention
SNMP management		Standard SNMP, MIB2, Ethernet-like MIB, Bridge MIB, RF Interface MIB, Cable Device MIB, Baseline privacy Interface MIB
Software download		TFTP
Diagnosis		Power on Self Diagnostic
Configuration/management		With standard browser, configuration files can be downloaded
Commissioning		Plug-and-Play
Dimensions (W × H × D)	mm	180 x 30 x 160

Cable modems

VoIP cable modems

DCV 12 26210095
DCV 12S 26210096

CE

- Docsis/EURODocsis 1.1/2.0 compatible cable modems
- Integrated Voice Ports for two analogue telephones
- PacketCable/Euro PacketCable 1.5 compatible
- Ethernet 10/100BaseT connection
- Full QoS support for disturbance-free voice and data transfer
- Comprehensive SNMP management support
- Configuration and management over standard browser
- Front panel LEDs
- Optional battery backup for up to 4 or 8 hours stand-by operation
- Delivery scope: modem, power supply unit, CD with instructions and drivers, network cable, USB cable
- DCV 12 - Order no. 26210095 - Telephony protocol MGCP/NCS
- DCV 12S - Order no. 26210096 - Telephony protocol RFC 3261 SIP

Type		DCV 12	DCV 12S
Order no.		26210095	26210096
Electrical characteristics			
Transmission characteristics		MCNS DOCSIS 1.1/2.0 or Excentis EuroDOCSIS 1.1/2.0	
RF connection		F (female)	
LAN connection		RJ-45, Ethernet 10/100BaseT	
Telephone interfaces (a/b)		RJ-11	
PC interface		USB B	
Input frequency range DOCSIS/EuroDOCSIS	MHz	91 ... 857/108 ... 862	
Input level	dBµV	45 ... 75	
Transmission frequency range DOCSIS/EuroDOCSIS	MHz	5 ... 42/5 ... 65	
Output level	dBµV	68 ... 113/118 [1]	
Power consumption (stand-by/max. operation)	W	4/8	
Software characteristics			
Standards		MCNS DOCSIS 1.1/2.0 bzw. Excentis EuroDOCSIS 1.1/2.0	
Telephony protocol		MGCP/NCS	RFC 3261 SIP
		PacketCable 1.5	
Protocols and Services		UDP, IP, ARP, ICMP, DHCP, TFTP, SNMP, HTTP	
Language codices		G.711, G.723.1, G.729.A, G.729.E	
Jitter Buffer		Supports Auto Jitter Buffering for voice transfer	
Configuration		Auto configuration - DHCP, TFTP, ToD Client	
Fax transmission		T.38	
Language transmission			
Voice Activity Detection (VAD)		Voice Activity Detection with Comfort Noise generation	
Echo suppression		G.165/168 Echo Cancellation up to 16 ms	
SNMP management	Standard SNMP, MIB2, Ethernet-like MIB, Bridge MIB, RF Interface MIB, Cable Device MIB, Baseline privacy Interface MIB, MCNS MIB, PacketCable 1.5 MIBs		
Software download		TFTP	
Diagnosis		Power on self-diagnostic and over standard browser	
Commissioning		Plug-and-Play	
Dimensions (H × W × D)	mm	181 x 41 x 163	

[1] Dependant on the modulation procedure

Multimedia-capable in-house distribution

Connection points and network terminations

House transfer point 1000 MHz

EVK 60 25010032

The house transfer point is the interface between the broadband communication network and the subscriber (house distribution system).

- HF connections: screw terminals
- Test socket: IEC
- Protection category: IP 54
- Equipped with: EVZ 66 (slot A) and EVZ 67 (slot B)
- Accessories:
  - EVZ 61 (BN 25010024) - Module high-pass filter 47 MHz
  - EVZ 62 (BN 25010025) - Module high-pass filter 85 MHz
  - EVZ 63 (BN 25010026) - Module low-pass filter 518 MHz
  - EVZ 64 (BN 25010027) - Module equaliser
  - EVZ 65 (BN 25010028) - Measuring module
  - EVZ 66 (BN 25010030) - Module passage/termination
  - EVZ 67 (BN 25010031) - Module passage

Type			**EVK 60**			
Order no.			25010032			
Frequency range		MHz	5-47	47-470	470-862	862-1000
Through loss	without high-pass filter	dB	< 0.5	< 0.8	< 1.4	< 2
	with high-pass filter	dB	> 60	< 1.0	< 1.6	-
Decoupling attenuation		dB	> 45	> 45	> 45	> 40
Screening factor		dB	> 85	> 80	> 75	> 75
Impedance		Ω	75			
Return loss	without voltage surge conductor	dB	> 18	> 18 -1.5/oct. (from 47 MHz); but > 14		> 12
	with voltage surge conductor	dB	> 18	> 18 -1.5/oct. (from 47 MHz); but > 12		> 10
Temperature range		°C	-20 to +55			

- Technical and mechanical data conform to EN 50083-2
- Includes clamp for voltage surge conductor, H1 design on input X1 enables retrofitting
- Test voltage effective value between the inner and outer conductor without a voltage surge conductor 2 kV; at 50 Hz/10 s
- Decoupling capacitor on output X4, U ≤ 400 V according to EN 132400 (VDE 05605T1-1)

Connection points and network terminations

House transfer point

EVK 59 273180

The house transfer point is the interface between the broadband communication network and the subscriber (house distribution system)

- Connections input/output: clamp-connection

Type		EVK 59			
Order no.		273180			
Impedance	Ω	75			
Temperature range	°C	-20 to +55			
Connection input		Clamp-connection (max. 2.2/8.8 mm) [1]			
Connection output		Clamp-connection (max. 1.7/7.5 mm) [1]			
Frequency range	MHz	5-47	47-450	450-606	606-862
Return loss	dB	> 20	> 20 -1.0/oct. (from 47 MHz on)		
Through loss	dB	< 0.8	< 0.8	< 1.2	< 1.5
Screening factor	dB	> 75	> 75	> 75	> 75

[1] Inner conductor/outer conductor

Connection points and network terminations

Subscriber transfer point

EVK 80 273186 CE

- Double electrical isolation
- High screening factor
- Protects the cable network against overvoltages caused by the subscriber
- Suitable for standard in-wall outlets with screwed fixing
- Meets all valid EU standards
- Connections:
  - Input: clamp-connection
  - Output: IEC socket, central

Note:
The guidelines and standards comply with the current EC declaration on conformity.

Type		EVK 80	EVK 80
Order no.		273186	273186
Frequency range	MHz	5-30	30-862
Return loss	dB	> 18	> 20-1.5/oct. (f_{start} = 40 MHz)
Through loss	dB	< 1.0	< 1.0
Screening factor [1]	dB	> 75	30-470 MHz: > 75 470-862 MHz: > 65
Voltage loading capacity (DC) of the electrical isolation, t = 1 min. [2]	V	2120	
Leakage current (AC) [2] at U_{AC} = 230 V, f = 50 Hz	mA	< 0.7	
Impedance	Ω	75	
Temperature range	°C	+10 to +55	

[1] EN 50083-2 (class B)
[2] Acc. to EN 60065

Modem outlets

Modem outlet (selective)

ESM 20 21110008

- Fulfils:
  EN 50083-1
  EN 50083-2
- For interactive CATV/HFC networks
- End outlet for stub and star-wired distribution systems with very low connection loss
- Very high isolation between modem and TV/radio outlet ports suppresses disturbance of TV/Radio reception by the modem
- Ingress-noise blocking function stops irradiation of unwanted disturbing signals from subscriber appliances
- Selective signal splitting to TV and radio outlet ports
- Stable die-cast housing
- With screw and claw fixing, suitable for installation boxes with a diameter between 55-65 mm
- Combinable with nearly all installation programmes
- Connections: TV: IEC (plug)
  Radio: IEC (socket)
  Modem: F (socket)
- Screening factor: 5-300 MHz: > 85 dB
  300-470 MHz: > 80 dB
  470-862 MHz: > 75 dB
- Packing unit/weight (pc./kg): 10 (50)/1.1

Type		ESM 20
Order no.		21110008
TV connection		
Frequency range	MHz	47-68/111-862
Connection loss	dB	4
RADIO connection		
Frequency range	MHz	87.5-108
Connection loss	dB	5
MODEM connection		
Frequency range	MHz	5-862 MHz
Connection loss	dB	4
Internal decoupling [1)]		
In range 5-34 MHz	dB	> 78
In ranges 47-68/111-862 MHz	dB	> 25
In range 87-108 MHz	dB	> 25

[1)] Between modem and TV/radio ports

Modem outlets

Modem outlets (broadband)

ESM 30 274429
ESM 31 274430

- Fulfil: EN 50083-1 and EN50083-2
- For interactive CATV/HFC networks
- Extremely high isolation between modem and TV/radio outlet ports suppresses disturbance of TV/Radio reception by the modem
- Ingress-noise blocking function suppresses the irradiation of unwanted interference signals from subscriber appliances
- Broadband signal splitting to TV and radio outlet ports
- Integrated solution without external filter, providing higher network protection from manipulation by subscribers
- **ESM 30:** End outlet for stub and star-wired systems with very low connection loss
- **ESM 31:** Directional coupler for loop-through systems
- Stable die-cast housing
- With screw and claw fixing, suitable for installation boxes with a diameter of 55-65 mm
- Suitable for nearly all installation programmes
- Packing unit/weight (pc/kg): 10 (50)/1.1

- Connections: TV: IEC (plug)
  Radio: IEC (socket)
  Modem: F (socket)
- Screening factor: 5-300 MHz: > 85 dB
  300-470 MHz: > 80 dB
  470-862 MHz: > 75 dB

Type		ESM 30	ESM 31
Order no.		274429	274430
TV connection			
Frequency range	MHz	80-862	80-862
Connection loss	dB	6	14
Radio connection			
Frequency range	MHz	80-862	80-862
Connection loss	dB	6	14
Modem connection			
Frequency range	MHz	5-862	5-862
Connection loss	dB	6.5	14
Passage			
Frequency range	MHz	-	5-862
Internal decoupling [1]			
In range 5-47 MHz	dB	> 78	> 78
In range 47-65 MHz	dB	> 42	> 42
In range 80-862 MHz	dB	> 30	> 30
Directional loss [2]			
In range 5-65 MHz	dB	-	60
In range 87.5-470 MHz	dB	-	30
In range 470-862 MHz	dB	-	30

[1] Between modem and TV/radio connection
[2] Between output and TV/radio connection

Modem outlets

Modem outlets (selective)

ESM 40 274456
ESM 41 274457
ESM 42 274458

- Fulfil: EN 50083-1 and EN 50083-2
- For interactive CATV/HFC networks
- Very high isolation between modem and TV/radio outlet ports suppresses disturbance of TV/radio reception by the modem
- Ingress-noise blocking function stops irradiation of unwanted interference signals from subscriber appliances
- Selective signal splitting to TV and radio outlet ports
- Integrated solution without external filter, providing higher network protection from manipulation by subscribers
- **ESM 40:** End outlet for stub and star-wired systems with very low connection loss
- **ESM 41/ESM 42:** Directional coupler for loop-through systems
- Stable die-cast housing
- With screw and claw fixing, suitable for installation boxes with a diameter of 55-65 mm
- Suitable for nearly all installation programmes
- Connections: TV: IEC (plug)
  Radio: IEC (socket)
  Modem: F (socket)

- Screening factor: 5-300 MHz: > 85 dB
  300-470 MHz: > 80 dB
  470-862 MHz: > 75 dB

- Packing unit/weight (pc./kg): 10 (50)/1.1

Type		ESM 40	ESM 41	ESM 42
Order no.		274456	274457	274458
TV CONNECTION				
Frequency range	MHz	111-862	118-862	118-862
Tap loss	dB	4	13.5	10
RADIO CONNECTION				
Frequency range	MHz	87.5-108	87.5-108	87.5-108
Tap loss	dB	4.5	15	11.5
MODEM CONNECTION				
Frequency range	MHz	5-862	5-862	5-862
Tap loss	dB	< 65 MHZ: 1 > 65 MHz: 3.5	13.5	10
Passage				
Frequency range	MHz	-	5-862	5-862
Through loss	dB	-	< 1.5	< 2.5
DECOUPLING INTERNAL [1]				
In range 5-47 MHz	dB	> 75	> 78	> 78
In range 47-65 MHz	dB	> 45	> 70	> 50
In range 87-108 MHz	dB	> 16	> 42	> 42
In range 108-862 MHz	dB	> 25	> 30	> 30
Directional loss [2]				
In range 5-65 MHz	dB	-	60	60 [3]
In range 87.5-470 MHz	dB	-	30	33
In range 470-862 MHz	dB	-	30	30

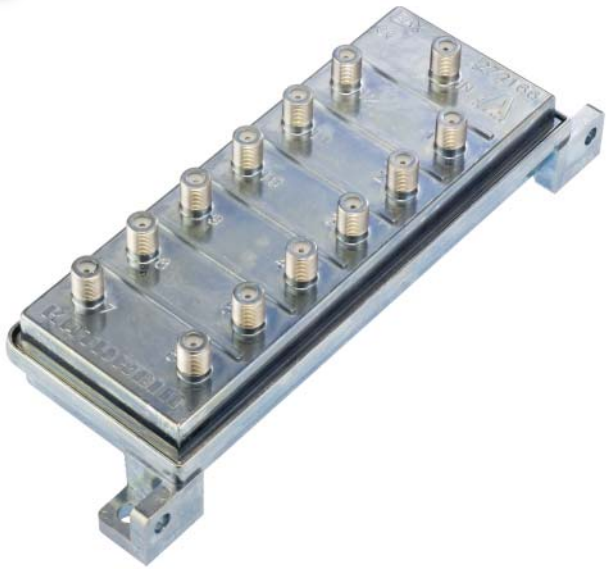
[1] Between modem and TV/radio connection
[2] Between output and TV/radio connection
[3] To the radio connection > 45 dB

Taps and splitters

Taps

12-way terminating taps

EAX 15 272166
EAX 16 272168



EAX 15: Terminating tap with continuous attenuation

EAX 16: Terminating tap with slope
(tap loss decreases the higher the frequency is)

- Return-path compatible terminating taps
- High corrosion resistance due to chromated surface
- Connections:
  Inputs and outputs: F-type socket

Type		EAX 15	EAX 16
Order no.		272166	272168
Frequency range	MHz	5-862	5-862
Tap loss			
Connection 1	dB	11.6	25.5-9.0
Connection 2	dB	11.8	25.5-9.0
Connection 3	dB	13.2	25.5-10.6
Connection 4	dB	15.2	25.5-11.6
Connection 5	dB	15.8	25.5-12.6
Connection 6	dB	17.0	25.5-13.3
Connection 7	dB	17.3	25.5-14.3
Connection 8	dB	18.3	25.5-15.3
Connection 9	dB	19.5	25.5-15.8
Connection 10	dB	19.8	25.5-16.7
Connection 11	dB	20.7	25.5-17.8
Connection 12	dB	20.2	25.5-18.1
Decoupling loss 5-40 MHz	dB	> 28	> 40
Decoupling loss 40-862 MHz	dB	> 36	> 36
Return loss 5-40 MHz	dB	> 14	> 16
Return loss 40-862 MHz	dB	> 20 dB at 40 MHz, -1.5/oct.	> 20 dB at 40 MHz, -1.5/oct.
Screening factor	dB	> 75	> 75

Taps

1-way taps for outdoor installation

EAN 208 24510086
EAN 212 24510087
EAN 216 24510088

- Frequency range: up to 1 GHz
- Through-line and tap are remote-feed capable
- Low through loss
- High screening factor - class A
- High corrosion resistance
- Protection category: IP 65 [1)]
- Easy installation
- Connections: 5/8“-24 (female)
- Mounting bracket for wall mounting ZMP 200 optionally available

Type		EAN 208	EAN 212	EAN 216
Order no.		24510086	24510087	24510088
Frequency range	MHz	5-1000	5-1000	5-1000
Impedance	Ω	75	75	75
Tap loss	dB	8.5	12	16
Frequency response (tap)	dB	± 1.5	± 1.5	± 1.5
Through loss 5-862 MHz	dB	1.7	1.2	0.8
Through loss 862-1,000 MHz	dB	2.6	2.0	1.4
Directional loss [2)]	dB	25	20	25
Return loss	dB	> 16		
Max. remote feed voltage	V_{AC}	90		
Max. remote feed current [3)]	A	15		
Hum modulation ratio at 10 A, 10-1,000 MHz	dB	> 60		
Screening factor		Acc. to EN 50083-2 (class A)		
Temperature range	°C	-40 to +60		
Dimensions (W x H x D)	mm	152 x 124 x 65		

[1)] When suitable plugs are used
[2)] Between output and tap
[3)] Remote feeding between input, output and tap

Taps

2-way taps for outdoor installation

EAO 208	24510089
EAO 211	24510090
EAO 214	24510091
EAO 217	24510092
EAO 220	24510093
EAO 223	24510094
EAO 226	24510095
EAO 229	24510096

- Frequency range: up to 1 GHz
- Through-line is remote-feed capable
- Changeable RF part for taps:
  - e.g. to change the tap loss
  - uninterruptible - RF path and remote feed current for through-line always remain connected
- Low through loss
- High screening factor - class A
- High corrosion resistance
- Protection category: IP 65 [1)]
- Easy installation
- Connections:
  - Input and output: 5/8“-24 (female)
  - Taps: F (female)
- Mounting bracket for wall mounting ZMP 200 optionally available

Type		EAO 208	EAO 211	EAO 214	EAO 217	EAO 220	EAO 223	EAO 226	EAO 229
Order no.		24510089	24510090	24510091	24510092	24510093	24510094	24510095	24510096
Frequency range	MHz	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000
Impedance	Ω	75	75	75	75	75	75	75	75
Tap loss	dB	9	11.5	14.5	17	20	23.5	26	29
Frequency response (tap)	dB	± 1.8	± 1.8	± 1.8	± 1.8	± 1.8	± 1.8	± 1.8	± 1.8
Through loss 5-862 MHz	dB	2.6	1.5	1.2	1.0	0.8	0.6	0.6	0.6
Through loss 862-1000 MHz	dB	2.6	2.2	1.2	1.0	1.2	1.2	1.2	1.2
Directional loss [2)]	dB	20	25	25	25	25	25	30	35
Return loss	dB	> 16							
Max. remote feed voltage	V_{AC}	90							
Max. remote feed current [3)]	A	12							
Hum modulation ratio at 12 A	dB	> 70							
Screening factor		Acc. to EN 50083-2 (class A)							
Temperature range	°C	-40 to +60							
Dimensions (W x H x D)	mm	100 x 94 x 64							

[1)] When suitable plugs are used
[2)] Between output and taps
[3)] Remote feeding only between input and output

Taps

4-way taps for outdoor installation

EAP 208	24510097
EAP 211	24510098
EAP 214	24510099
EAP 217	24510100
EAP 220	24510101
EAP 223	24510102
EAP 226	24510103
EAP 229	24510104

- Frequency range: up to 1 GHz
- Through-line is remote-feed capable
- EAP 208: 4-way end-tap, not remote-feed capable
- Changeable RF part for taps:
  - e.g. to change the tap loss
  - uninterruptible - RF path and remote feed current for through-line always remain connected
- Low through loss
- High screening factor - class A
- High corrosion resistance
- Protection category: IP 65 [1)]
- Easy installation
- Connections:
  - Input and output: 5/8“-24 (female)
  - Taps: F (female)
- Mounting bracket for wall mounting ZMP 200 optionally available

Type		EAP 208	EAP 211	EAP 214	EAP 217	EAP 220	EAP 223	EAP 226	EAP 229
Order no.		24510097	24510098	24510099	24510100	24510101	24510102	24510103	24510104
Frequency range	MHz	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000	5-1000
Impedance	Ω	75	75	75	75	75	75	75	75
Tap loss	dB	8	12.5	14.5	17.5	20.5	23	25.5	28.5
Frequency response (tap)	dB	± 1.5	± 1.5	± 2.0	± 1.5	± 2.0	± 1.5	± 1.5	± 1.5
Through loss 5-862 MHz	dB	-	3.0	2.0	1.2	1.0	0.7	0.7	0.8
Through loss 862-1000 MHz	dB	-	4.0	3.0	1.7	1.7	1.3	1.3	1.3
Directional loss [2)]	dB	-	30	25	25	25	25	25	25
Return loss	dB	> 16	> 16	> 16	> 16	> 16	> 16	> 16	> 16
Max. remote feed voltage	V_{AC}	- [4)]	90	90	90	90	90	90	90
Max. remote feed current	A	- [4)]	12	12	12	12	12	12	12
Hum modulation ratio at 12 A	dB	- [4)]	> 70	> 70	> 70	> 70	> 70	> 70	> 70
Screening factor		Acc. to EN 50083-2 (class A)							
Temperature range	°C	-40 to +60							
Dimensions (W x H x D)	mm	100 x 94 x 64							

[1)] When suitable plugs are used
[2)] Between output and taps
[3)] Remote feeding between input and output
[4)] No remote feeding possible

Splitters

Splitters and feed-in diplexer for outdoor installation

EBK 202	24510105
EBK 203	24510106
WFS 202	24510107

- Frequency range: up to 1 GHz
- Inputs and outputs remote-feed capable
- Low through loss
- High screening factor - class A
- High corrosion resistance
- Protection category: IP 65 [1)]
- Easy installation
- Connections: 5/8“-24 (female)
- Mounting bracket for wall mounting ZMP 200 optionally available

Type		EBK 202	EBK 203	WFS 202
Order no.		24510105	24510106	24510107
Frequency range	MHz	5-1000	5-1000	5-1000
Impedance	Ω	75	75	75
Splitting loss 5-862 MHz	dB	4.0	2 x 7.3/1 x 4.0	-
Splitting loss 862-1000 MHz	dB	4.5	2 x 8.5/1 x 4.5	-
Through loss 5-1000 MHz	dB	-	-	0.4
Decoupling loss [2)]	dB	20	25	-
Return loss	dB	> 16	> 16	> 20
Max. remote feed voltage	V_{AC}	90		
Max. remote feed current	A	15		
Hum modulation ratio at 10 A, 10-1000 MHz	dB	> 60		
Screening factor		Acc. to EN 50083-2 (class A)		
Temperature range	°C	-40 to +60		
Dimensions (W x H x D)	mm	152 x 124 x 65		

[1)] When suitable plugs are used
[2)] Between the outputs

Accessories for taps and splitters

Mounting bracket for wall mounting

ZMP 200 25010029

- For wall mounting of taps and splitters EAN 2xx, EAO 2xx, EAP 2xx, EBK 2xx, WFS 202
- High corrosion resistance
- Easy installation
- With earthing connection

Taps with flexible connection cables

1-way taps with flexible connection cables, KES design

EAT 80	272137
EAT 81	272476
EAT 85	272138
EAT 86	272477
EAT 90	272140
EAT 91	272478

EAT 80, EAT 85 and EAT 90
- Connection cable length: 180 mm

EAT 81, EAT 86 and EAT 91
- Connection cable length: 390 mm

- Suitable for underground or above-ground installation
- Connection type: 4/20 (KES)
- Capacitive separation of inner conductors
- Accessories:
  - Cable end plugs (KES): EMP 06, EMP 07 and EMP 08
  - KES terminating resistor: EMK 92
  - Heat shrink tubing: ESO 61

Type		EAT 80	EAT 81	EAT 85	EAT 86	EAT 90	EAT 91
Order no.		272137	272476	272138	272477	272140	272478
Frequency range	MHz	4-862		4-862		4-862	
Impedance	Ω	75		75		75	
Tap loss	dB	10		15		20	
Through loss	dB	< 1.9		< 1.4		< 1.3	
Decoupling tap	dB	> 31		> 33		> 33	
Decoupling output	dB	> 20					
Return loss	dB	> 15					
Screening factor	dB	> 75					

Taps with flexible connection cables

1-way taps with flexible connection cables and 3.5/12 connectors

EAT 82	25210018
EAT 87	25210019
EAT 92	25210020

CE

- Connection cable length: 390 mm
- Suitable for underground or above-ground installation
- Connection technology: 3.5/12 (male)
- Capacitive separation of the inner conductors
- Accessories:
  - Heat shrink tubing: ESO 61

Type		EAT 82	EAT 87	EAT 92
Order no.		25210018	25210019	25210020
Frequency range	MHz	4-862	4-862	4-862
Impedance	Ω	75	75	75
Tap loss	dB	10	15	20
Through loss	dB	< 1.9	< 1.4	< 1.3
Decoupling tap	dB	> 31	> 33	> 33
Decoupling output	dB	> 20		
Return loss	dB	> 15		
Screening factor	dB	> 75		

Taps with flexible connection cables

2-way taps with flexible connection cables, KES design

EAU 80	272147
EAU 81	272624
EAU 85	272148
EAU 86	272625
EAU 90	272149
EAU 91	272626

EAU 80, EAU 85 and EAU 90
- Connection cable length: 180 mm

EAU 81, EAU 86 and EAU 91
- Connection cable length: 390 mm
- Suitable for underground and above-ground installation
- Connection type: 4/20 (KES)
- Capacitive separation of the inner conductor
- Accessories:
  - Cable end plugs (KES): EMP 06, EMP 07 and EMP 08
  - KES terminating resistor: EMK 92
  - Heat shrink tubing: ESO 61

Type		EAU 80	EAU 81	EAU 85	EAU 86	EAU 90	EAU 91
Order no.		272147	272624	272148	272625	272149	272626
Frequency range	MHz	4-862		4-862		4-862	
Impedance	Ω	75		75		75	
Tap loss	dB	10		15		20	
Through loss	dB	< 3.0		< 2.1		< 1.8	
Decoupling tap	dB	> 30					
Decoupling output	dB	> 20					
Return loss	dB	> 15					
Screening factor	dB	> 75					

Taps with flexible connection cables

2-way taps with flexible connection cables and 3.5/12 connectors

EAU 82	25210021
EAU 87	25210022
EAU 92	25210023

CE

- Connection cable length: 390 mm
- Suitable for underground and above-ground installation
- Connection type: 3.5/12 (male)
- Capacitive separation of the inner conductors
- Accessories:
  - Heat shrink tubing: ESO 61

Type		EAU 82	EAU 87	EAU 92
Order no.		25210021	25210022	25210023
Frequency range	MHz	4-862	4-862	4-862
Impedance	Ω	75	75	75
Tap loss	dB	10	15	20
Through loss	dB	< 3.0	< 2.1	< 1.8
Decoupling tap	dB	> 30		
Decoupling output	dB	> 20		
Return loss	dB	> 15		
Screening factor	dB	> 75		

Taps with flexible connection cables

3-way taps with flexible connection cables, KES design

EAR 80	272238
EAR 85	272239
EAR 90	272241

CE

- Suitable for underground or above-ground installation
- Connection type: 4/20 (KES)
- Capacitive separation of inner conductors
- Accessories:
  - Cable end plugs (KES): EMP 06, EMP 07 and EMP 08
  - KES terminating resistor: EMK 92
  - Heat shrink tubing: ESO 61
- Connection cable length: 180 mm

Type		EAR 80	EAR 85	EAR 90
Order no.		272238	272239	272241
Frequency range	MHz	4-862	4-862	4-862
Impedance	Ω	75	75	75
Tap loss	dB	10	15	20
Through loss	dB	< 4.6	< 2.9	< 2.3
Decoupling tap	dB	> 30		
Decoupling output	dB	> 20		
Return loss	dB	> 15		
Screening factor	dB	> 75		

Taps with flexible connection cables

4-way taps with flexible connection cables, KES design

EAV 80	272276
EAV 81	24510001
EAV 85	272277
EAV 86	24510002
EAV 90	272278
EAV 91	24510003

CE

EAV 80, EAV 85 and EAV 90
- Connection cable length: 180 mm

EAV 81, EAV 86 and EAV 91
- Connection cable length: 390 mm
- Suitable for underground and above-ground installation
- Connection type: 4/20 (KES)
- Capacitive separation of the inner conductors
- Accessories:
  - Cable end plugs (KES): EMP 06, EMP 07 and EMP 08
  - KES terminating resistor: EMK 92
  - Heat shrink tubing: ESO 61

Type		EAV 80	EAV 81	EAV 85	EAV 86	EAV 90	EAV 91
Order no.		272276	24510001	272277	24510002	272278	24510003
Frequency range	MHz	4-862		4-862		4-862	
Impedance	Ω	75		75		75	
Tap loss	dB	10		15		20	
Through loss	dB	< 5.9		< 3.6		< 2.7	
Decoupling tap	dB	> 30					
Decoupling output	dB	> 20					
Return loss	dB	> 15					
Screening factor	dB	> 75					

Taps with flexible connection cables

4-way taps with flexible connection cables and 3.5/12 connectors

EAV 82	25210024
EAV 87	25210025
EAV 92	25210026

CE

- Connection cable length: 390 mm
- Suitable for underground and above-ground installation
- Connection technology: 3.5/12 (male)
- Capacitive separation of the inner conductors
- Accessories:
  - Heat shrink tubing: ESO 61

Type		EAV 82	EAV 87	EAV 92
Order no.		25210024	25210025	25210026
Frequency range	MHz	4-862	4-862	4-862
Impedance	Ω	75	75	75
Tap loss	dB	10	15	20
Through loss	dB	< 5.9	< 3.6	< 2.7
Decoupling tap	dB	> 30		
Decoupling output	dB	> 20		
Return loss	dB	> 15		
Screening factor	dB	> 75		

Splitters with flexible connection cables

2-way splitters with flexible connection cables, KES design

EBU 30 272598
EBU 31 24510022

EBU 30:
- Connection cable length: 180 mm

EBU 31:
- Connection cable length: 390 mm
- Suitable for underground and above-ground mounting
- Connection type: 4/20 (KES)
- Capacitive separation of the inner conductors
- Accessories:
  - Cable end plugs (KES): EMP 06, EMP 07 and EMP 08
  - KES terminating resistor: EMK 92
  - Heat shrink tubing: ESO 61

Type		EBU 30	EBU 31
Order no.		272598	24510022
Frequency range	MHz	4-862	
Impedance	Ω	75	
Distribution loss	dB	< 3.7	
Decoupling of outputs	dB	> 17	
Return loss	dB	> 20 [1)]	
Screening factor	dB	> 80	

[1)] Up to 47 MHz > 10 dB

Splitters with flexible connection cables

2-way splitter with flexible connection cables and 3.5/12 connectors

EBU 32 25210027 CE

- Connection cable length: 390 mm
- Suitable for underground and above-ground mounting
- Connection type: 3.5/12 (male)
- Capacitive separation of the inner conductors
- Accessories:
  - Heat shrink tubing: ESO 61

Type		EBU 32
Order no.		25210027
Frequency range	MHz	4-862
Impedance	Ω	75
Distribution loss	dB	< 3.7
Decoupling of outputs	dB	> 17
Return loss	dB	> 20 [1)]
Screening factor	dB	> 80

[1)] Up to 47 MHz > 10 dB

Cables, plugs and accessories

Cabinets and mounting accessories

19” cabinet

TUG 100	24310003
ESO 06	24310005
ZSO 210	24310007
ZSO 200	24310004
ZSO 74	276249
TGZ 10	236430
TGZ 15	24310006

TUG 100 (order no. 24310003)
- For the installation of headends in 19“ cabinets
- Can be fitted with 19“ base units and 19“ module carriers from both front and rear
- Design: 41 units of height (= 2 m)
  Width: 60 cm, depth: 60 cm
- Dimensions (mm):
  600 x 2000 x 600 without glass door
  600 x 2000 x 670 with glass door
- Packing unit/weight (pc./kg): 1/31 net

ESO 06 (order no. 24310005)
- Two side and rear panels for TUG 100
- Packing unit/weight (pc./kg): 1/37 net

ZSO 210 (order no. 24310007)
- Glass door for TUG 100
- Packing unit/weight (pc./kg): 1/19.7 net

ZSO 200 (order no. 24310004)
- Rail set for TUG 100
- To mount any 19“ racking (not required for base units and TGZ 1x module racking)
- Packing unit/weight (pc./kg): 1/1.4

ZSO 74 (order no. 276249)
- Front panel (1 HU)
- For cable passage and ventilation
- Packing unit/weight (pc./kg): 1/0.2

ZSO 74

TGZ 10 (order no. 236430)
- To mount the other headend components into TUG 100
- Dimensions (mm): 483 x 267 x 198 (19“, 6 HU)
- Packing unit/weight (pc./kg): 1/3.3

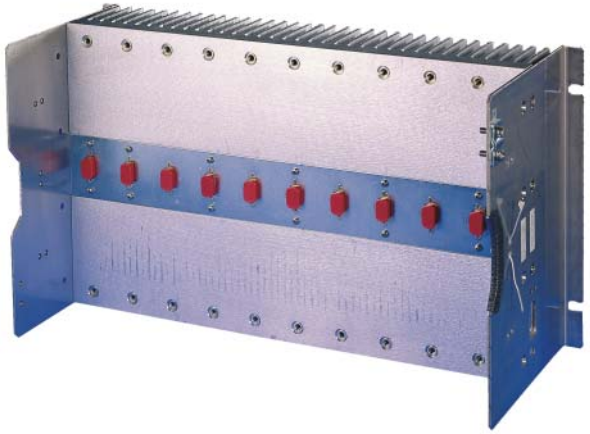
TGZ 15 (order no. 24310006)
- To mount EAX 24/26/28 and EBC 06/08 as splitters and couplers (e.g. in optical transmission and reception stations)
- Dimensions (mm): 483 x 221 x 190 (19“, 5 HU)
- Packing unit/weight (pc./kg): 1/2.9

TGZ 15 equipped

Cabinets and mounting accessories

19” BK module carrier

TOG 05 236198



- In the component carrier one can insert up to 10 BK modules
- Power supply and signalling to the individual modules via 9-pin multi-terminal bus
- Design: 19“ rack, 6 units of height
- Three power supply sections to separately supply inserted modules
- Wall mounting is possible

Type		TOG 05
Order no.		236198
Screening factor	dB	> 30
Operating voltage	V_{DC}	< 30
Voltage drop terminal bus - module insertion position (at max. current drain per 1 A, insertion positions 1-6)	mV_{DC}	< 100
Operational current per terminal (cooling vane temperature < 70 °C)	A_{DC}	< 5
Dimensions (W x H x D)	mm	483 x 266 x 183

Cables

Coaxial cables

LCM 33 271623
LCM 50 271622
LCM 96 271624

- Impedance: 75 Ω
- Frequency range: 0.15-2400 MHz
- Conform to EN 50117

LCM 33

LCM 50

Type		LCM 33	LCM 50	LCM 96
Order no.		271623	271622	271624
		Underground cable		
Halogen-free		Yes		
Diameter inner conductor	mm	3.3 Cu	2.2 Cu	1.1 Cu
Diameter isolation on inner conductor	mm	13.5 PE (bamboo)	8.8 PE (bamboo)	7.3 PE (cell rim)
Diameter outer conductor	mm	14 Cu welded	9.3 Cu welded	7.8 Cu welded
Diameter of cable	mm	17.0	12.5	11.0
Material used for outer isolation		PE black	PE black	PE black
Max. dynamic power	N	550	350	300
Copper content	kg/km	194	109	58
Bending radius [1]	mm	> 280	> 150	> 150
Attenuation at 20° and dB/100 m				
f = 50 MHz		1.2	1.8	3.6
f = 100 MHz		1.7	2.6	5.2
f = 200 MHz		2.4	3.9	7.6
f = 300 MHz		3.1	4.9	9.5
f = 450 MHz		4.0	6.0	12.0
f = 800 MHz		5.5	8.7	16.4
f = 1000 MHz		7.0	10.0	19.0
f = 1750 MHz		9.2	14.4	26.1
f = 2050 MHz		10.3	15.9	28.8
f = 2400 MHz		11.5	17.7	31.7
Return loss (dB)				
5-450 MHz		> 28	> 28	> 28
450-1000 MHz		> 26	> 26	> 26
1000-2400 MHz		> 22	> 22	> 22
Coupling resistance				
5-30 MHz	mΩ/m	< 0.1	< 0.1	< 0.1
DC resistance	Ω/km	4.5	8.6	25.5
Screening factor (dB)				
30-100 MHz		> 120	> 120	> 120
100-500 MHz		> 120	> 120	> 120
500-1000 MHz		> 120	> 120	> 120
1000-2000 MHz		> 110	> 110	> 100
2000-2400 MHz		> 100	> 100	> 100
Temperature range	°C	-20 to +50	-20 to +50	-20 to +50
Weight/100 m	kg	35.0	18.5	15.0

[1] Value for non-recurring bending; for repeated bending: × 2.5

Cable fittings and plugs

PG 11 connectors

EMP 26	275281
EMP 28	275283
EMP 29	275284
EMP 30	275285
EMP 31	275286
EMP 32	275287

EMP 26

- **Plugs**
  - EMP 26 (order no. 275281): plug for LCD 90/95/99/110/111 cables
  - EMP 28 (order no. 275283): plug for LCM 14/17 cables

- **Cable fittings**
  - EMP 29 (order no. 275284): cable fitting for LCM 33 cable
  - EMP 30 (order no. 275285): cable fitting for LCM 50 cable
  - EMP 31 (order no. 275286): cable fitting for LCM 96 cable

- **75 Ω terminating resistor**
  - EMP 32 (order no. 275287): 75 Ω terminating resistor, suitable for remote feeding

EMP 32

PG 11 connectors

EMP 34	275289
EMP 35	275300
EMU 29	273243
EMP 01	275260

EMP 34

- **Adaptors:**
  - EMP 34 (order no. 275289): PG 11 to IEC socket with M14 external thread
  - EMP 35 (order no. 275300): PG 11 to F socket (female)
  - EMU 29 (order no. 273243): PG 11 adaptor ring to 5/8“

- **Dummy cap:**
  - EMP 01 (order no. 275260): PG 11 dust cap to cover unused outputs on an amplifier or housing

EMP 01

Cable fittings and plugs

Cable fittings

EMK 104 273195
EMK 105 273196
EMK 106 273197

- **Cable fittings**
  - EMK 104 (order no. 273195): F cable fitting for LCM 33 cable
  - EMK 105 (order no. 273196): F cable fitting for LCM 50 cable
  - EMK 106 (order no. 273197): F cable fitting for LCM 96 cable

  Refer to our SAT catalogue for more F connectors

EMK 104

EMK 106

IEC connectors

EMK 180 25010014
EMK 181 25010015

- Cable plugs for professional applications
- Frequency range: up to 3 GHz
- Connection technology: IEC with M14 locking nut

EMK 180

Type		EMK 180	EMK 181
Order no.		25010014	25010015
Suitable for cables		LCD 99	LCM 14
Frequency range	MHz	0.3-3000	0.3-3000
Impedance	Ω	75	75
Return loss	dB	> 15	> 16
Voltage capacity	kV	3.5	2.5
Max. current load	A	8	8
Screening factor	dB	> 100	> 100

Cable fittings and plugs

5/8” cable fittings

EMP 40 275305
EMP 42 275307
EMP 43 275308
EMP 44 275309
EMP 45 275310

- 5/8“ cable fittings
- Frequency range: up to 3 GHz
- Protection class: IP 67

EMP 40

EMP 44

Type		EMP 40	EMP 42	EMP 43	EMP 44	EMP 45
Order no.		275305	275307	275308	275309	275310
Suitable for cable type		LCD 90/95/99/110/111	LCM 14	LCM 33	LCM 50	LCM 96
Frequency range	MHz	0-3000				
Impedance	Ω	75				
Return loss	dB	< 40 MHz: 22; > 40 MHz: 22 -1.5/oct.				
Voltage capacity	kV	1.5				
Max. current load	A	3	10			
Screening factor up to 1000 MHz	dB	> 75				
Screening factor 1000-3000 MHz	dB	> 55				

Cable transfer point/housing duct

EVK 73 275247

- Housing duct: PG 11
- Cable transfer point-transition: IEC socket to socket 3.5/12
- Impedance: 75 Ω

Cable fittings and plugs

5/8” connectors

EMP 47	275312
EMP 48	275313
EMP 49	275314
EMP 51	275315
EMP 46	275311
EMP 52	275316

EMP 47

- **Adaptors:**
  - EMP 47 (order no. 275312) 5/8“ plug to IEC socket (M14) angled
  - EMP 48 (order no. 275313) 5/8“ to IEC socket (M14)
  - EMP 49 (order no. 275314) 5/8“ plug to F socket angled
  - EMP 51 (order no. 275315) 5/8“ plug to F socket

EMP 46

- **75 Ω terminating resistor:**
  - EMP 46 (order no. 275311) 75 Ω terminating resistor, voltage capacity up to 100 V

- **Remote feeding connector:**
  - EMP 52 (order no. 275316) remote feeding connector for cables with an inner conductor diameter up to 2.3 mm

EMP 52

N connector

EMK 53	273249

- Cable end plug N plug
- For Flexwell cables 3/8“

Cable fittings and plugs

KES connectors

EMP 02	375200
EMP 03	275273
EMP 07	25010006
EMP 08	25010010
EMP 10	275267
EMK 92	273215
ESO 61	271946

EMP 03

- **Cable end plugs:**
  - EMP 07 (order no. 25010006) for cable nKx
  - EMP 08 (order no. 25010010) for cable qKx
- **75 Ω terminating resistor:**
  - EMK 92 (order no. 273215)
- **KES/KES connecting sleeve:**
  - EMP 10 (order no. 275267)
- **Adaptors:**
  - EMP 02 (order no. 375200) KES socket to 3.5/12 (male)
  - EMP 03 (order no. 275273) housing duct KES socket to IEC
- **Heat shrink sleeve:**
  - ESO 61 (order no. 271946)
    BK 25/7 heat shrink sleeve, length: 170 mm,
    available in a set (content 10 pcs.)

EMP 10

Ingress test socket

EVK 74	25010012

- Duct: PG 11
- Adaptor: IEC socket to F socket
- Impedance: 75 Ω
- Waterproof termination unit with protective cap
- External contact point to a unit-internal test socket in an amplifier housing (GMG 51/GMG 52)

Cables

RF connection cables (blue)

TVK 901	236799
TVK 902	236798
TVK 903	236797
TVK 904	236796
TVK 905	236795
TVK 906	236794
TVK 907	236793
TVK 908	236779
TVK 909	236778
TVK 930	25210034

TVK 906

- TVK 90x RF connection cables for the internal RF cabling in BK and GGA amplifier points
- Conform to TS 0131/96 technical specifications
- The cables are UV resistant, halogen-free and flame-retardant
- Connector: IEC angled connector
- Impedance: 75 Ω
- Screening factor: > 85 dB
- Frequency range: 1-1000 MHz
- Available in the following lengths:
  - TVK 901: 150 mm
  - TVK 902: 200 mm
  - TVK 903: 250 mm
  - TVK 930: 300 mm
  - TVK 904: 350 mm
  - TVK 905: 450 mm
  - TVK 906: 600 mm
  - TVK 907: 900 mm
  - TVK 908: 1200 mm
  - TVK 909: 1500 mm
- Colour: blue

  Other lengths on request

Cables

RF connection cables (green and white)

TVK 901G	25210014
TVK 901W	25210015
TVK 904G	25210016
TVK 904W	25210017
TVK 927G	25210032
TVK 927W	25210033

TVK 904G

- TVK 90x RF connection cables for internal RF cabling in BK and GGA amplifier points
- The cables are UV resistant, halogen-free and flame-retardant
- Connector: IEC angled connector
- Impedance: 75 Ω
- Screening factor: > 85 dB
- Frequency range: 1-1000 MHz
- Available in the following lengths and colours:
  - TVK 901G: 150 mm, green
  - TVK 901W: 150 mm, white
  - TVK 927G: 270 mm, green
  - TVK 927W: 270 mm, white
  - TVK 904G: 350 mm, green
  - TVK 904W: 350 mm, white

  Other lengths on request

Cables

Power supply cables

TVK 04	236900
TVK 05	236924
TVK 01	236914

- TVK 04 and TVK 05 power supply cables are used to distribute the remote feed voltage inside BK or GGA amplifier points
- Connections: blade terminals acc. to DIN 46247
- Colour: black
- Available in the following lengths:
  - TVK 04: 210 mm
  - TVK 05: 500 mm
  - TVK 01: 700 mm

TVK 04

Technical appendix

Technical appendix

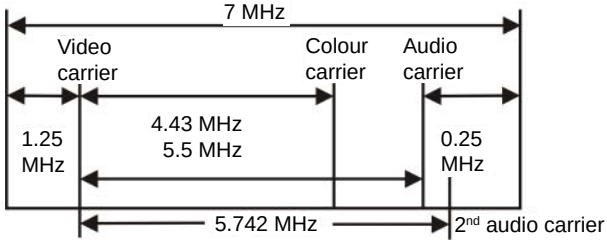
Television standards

Country	VHF	UHF	Colour system
Albania	**B**	**G**	PAL
Algeria	**B**	**G**	PAL
Argentina	**N**	**-**	PAL
Australia	**B**	**B**	PAL
Austria	**B**	**G**	PAL
Bahrain	**B**	**G**	PAL
Belgium	**B**	**H**	PAL
Bulgaria	**D**	**K**	SECAM
Canada	**M**	**M**	NTSC
China	**D**	**K**	PAL
Croatia	**B**	**G**	PAL
Cyprus	**B**	**G**	SECAM
Czech Republic	**D**	**K**	SECAM
Denmark	**B**	**G**	PAL
Egypt	**B**	**G**	SECAM
England	**-**	**I**	PAL
Estonia	**D**	**K**	SECAM
Finland	**B**	**G**	PAL
France	**L**	**L**	SECAM
Germany	**B**	**G**	PAL
Gibraltar	**B**	**G**	PAL
Greece	**B**	**G**	PAL
Holland	**B**	**G**	PAL
Hongkong	**-**	**I**	PAL
Hungary	**D**	**G**	PAL
Iceland	**B**	**G**	PAL
India	**B**	**-**	PAL
Indonesia	**B**	**-**	PAL
Iran	**B**	**G**	SECAM
Iraq	**B**	**G**	SECAM
Ireland	**I**	**I**	PAL
Israel	**B**	**G**	PAL
Italy	**B**	**G**	PAL
Japan	**M**	**M**	NTSC
Jordan	**B**	**G**	PAL
Korea	**M**	**M**	NTSC
Kuwait	**B**	**G**	PAL
Latvia	**D**	**K**	SECAM

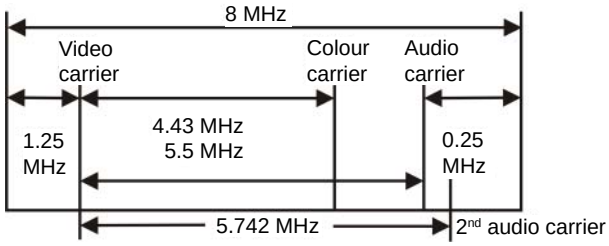
Country	VHF	UHF	Colour system
Lebanon	**B**	**G**	SECAM
Libya	**B**	**G**	SECAM
Lithuania	**D**	**K**	SECAM
Luxembourg	**B**	**G/L**	PAL
Malaysia	**B**	**G**	PAL
Malta	**B**	**-**	PAL
Mexico	**M**	**M**	NTSC
Monaco	**-/L**	**G**	PAL/SECAM
Morocco	**B**	**G**	SECAM
New Zealand	**B**	**G**	PAL
Nigeria	**B**	**I**	PAL
Oman	**B**	**G**	PAL
Pakistan	**B**	**-**	PAL
Philippines	**M**	**-**	NTSC
Poland	**D**	**K**	SECAM
Portugal	**B**	**G**	PAL
Qatar	**B**	**G**	PAL
Romania	**D**	**K**	PAL
Russia	**D**	**K**	SECAM
Saudi-Arabia	**B**	**G**	SECAM
Singapore	**B**	**G**	PAL
Slovakia	**D**	**K**	SECAM
Slovenia	**B**	**G**	PAL
South Africa	**I**	**I**	PAL
Spain	**B**	**G**	PAL
Sri Lanka	**B**	**-**	PAL
Sweden	**B**	**G**	PAL
Switzerland	**B**	**G**	PAL
Syria	**B**	**G**	PAL
Thailand	**B**	**G**	PAL
Tunisia	**B**	**G**	SECAM/PAL
Turkey	**B**	**G**	PAL
United Arab Emirates	**B**	**G**	NTSC
USA	**M**	**M**	NTSC
Vietnam	**D**	**K**	SECAM
Yemen	**B**	**-**	PAL
Yugoslavia	**B**	**G**	PAL

CCIR standard		B	D	G	H	I	K	K1	L	M	N
Lines		625	625	625	625	625	625	625	625	625	625
Channel bandwidth	MHz	7	8	8	8	8	8	8	8	6	6
Video bandwidth	MHz	5	6	5	5	5.5	6	8	6	4.2	4.2
Audio/video level spacing	MHz	+ 5.5 (+ 5.742)	+ 6.5	+ 5.5 (+ 5.742)	+ 5.5	+ 6	+ 6.5	+ 6.5	+ 6.5	+ 4.5	+ 4.5
Vestigial sideband	MHz	0.75	0.75	0.75	1.25	1.25	0.75	1.25	1.25	0.75	0.75
Video modulation		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Pos.	Neg.	Neg.
Audio modulation		FM	FM	FM	FM	FM	FM	FM	AM	FM	FM

Channel allocation B I, USB, B III, OSB standard B



Channel allocation ESB B IV, B V standard G



Technical appendix

Channel allocation

Range	Channel	Channel limits (MHz)	Video carrier (MHz)	1st audio carrier [1] (MHz)	Midfrequency (DVB-T) (MHz)
Standard B & G	Europe (and H, I, K, L for B IV/V) [2]				
I	2	47-54	48.25	53.75	50.5
	3	54-61	55.25	60.75	57.5
	4	61-68	62.25	67.75	64.5
Lower special channel range (USB)	S 2	111-118	112.25	117.75	114.5
	S 3	118-125	119.25	124.75	121.5
	S 4	125-132	126.25	131.75	128.5
	S 5	132-139	133.25	138.75	135.5
	S 6	139-146	140.25	145.75	142.5
	S 7	146-153	147.25	152.75	149.5
	S 8	153-160	154.25	159.75	156.5
	S 9	160-167	161.25	166.75	163.5
	S 10	167-174	168.25	173.75	170.5
III	5	174-181	175.25	180.75	177.5
	6	181-188	182.25	187.75	184.5
	7	188-195	189.25	194.75	191.5
	8	195-202	196.25	201.75	198.5
	9	202-209	203.25	208.75	205.5
	10	209-216	210.25	215.75	212.5
	11	216-223	217.25	222.75	219.5
	12	223-230	224.25	229.75	226.5
Upper special channel range (OSB)	S 11	230-237	231.25	236.75	233.5
	S 12	237-244	238.25	243.75	240.5
	S 13	244-251	245.25	250.75	247.5
	S 14	251-258	252.25	257.75	254.5
	S 15	258-265	259.25	264.75	261.5
	S 16	265-272	266.25	271.75	268.5
	S 17	272-279	273.25	278.75	275.5
	S 18	279-286	280.25	285.75	282.5
	S 19	286-293	287.25	292.75	289.5
	S 20	293-300	294.25	299.75	296.5
Expanded special channel range (ESB)	S 21	302-310	303.25	308.75	306.0
	S 22	310-318	311.25	316.75	314.0
	S 23	318-326	319.25	324.75	322.0
	S 24	326-334	327.25	332.75	330.0
	S 25	334-342	335.25	340.75	338.0
	S 26	342-350	343.25	348.75	346.0
	S 27	350-358	351.25	356.75	354.0
	S 28	358-366	359.25	364.75	362.0
	S 29	366-374	367.25	372.75	370.0
	S 30	374-382	375.25	380.75	378.0
	S 31	382-390	383.25	388.75	386.0
	S 32	390-398	391.25	396.75	394.0
	S 33	398-406	399.25	404.75	402.0
	S 34	406-414	407.25	412.75	410.0
	S 35	414-422	415.25	420.75	418.0
	S 36	422-430	423.25	428.75	426.0
	S 37	430-438	431.25	436.75	434.0
	S 38	438-446	439.25	444.75	442.0
IV	21	470-478	471.25	476.75	474.0
	22	478-486	479.25	484.75	482.0
	23	486-494	487.25	492.75	490.0
	24	494-502	495.25	500.75	498.0
	25	502-510	503.25	508.75	506.0
	26	510-518	511.25	516.75	514.0
	27	518-526	519.25	524.75	522.0
	28	526-534	527.25	532.75	530.0
	29	534-542	535.25	540.75	538.0
	30	542-550	543.25	548.74	546.0
	31	550-558	551.25	556.75	554.0
	32	558-566	559.25	564.75	562.0
	33	566-574	567.25	572.75	570.0
	34	574-582	575.25	580.75	578.0
	35	582-590	583.25	588.75	586.0
	36	590-598	591.25	596.75	594.0
	37	598-606	599.25	604.75	602.0

Range	Channel	Channel limits (MHz)	Video carrier (MHz)	1st audio carrier [1] (MHz)	Midfrequency (DVB-T) (MHz)
V	38	606-614	607.25	612.75	610.0
	39	614-622	615.25	620.75	618.0
	40	622-630	623.25	628.75	626.0
	41	630-638	631.25	636.75	634.0
	42	638-646	639.25	644.75	642.0
	43	646-654	647.25	652.75	650.0
	44	654-662	655.25	660.75	658.0
	45	662-670	663.25	668.75	666.0
	46	670-678	671.25	676.75	674.0
	47	678-686	679.25	684.75	682.0
	48	686-694	687.25	692.75	690.0
	49	694-702	695.25	700.75	698.0
	50	702-710	703.25	708.75	706.0
	51	710-718	711.25	716.75	714.0
	52	718-726	719.25	724.75	722.0
	53	726-734	727.25	732.75	730.0
	54	734-742	735,35	740.75	738.0
	55	742-750	743.25	748.75	746.0
	56	750-758	751.25	756.75	754.0
	57	758-766	759.25	764.75	762.0
	58	766-774	767.25	772.75	770.0
	59	774-782	775.25	780.75	778.0
	60	782-790	783.25	788.75	786.0
	61	790-798	791.25	796.75	794.0
	62	798-806	799.25	804.75	802.0
	63	806-814	807.25	812.75	810.0
	64	814-822	815.25	820.75	818.0
	65	822-830	823.25	828.75	826.0
	66	830-838	831.25	836.75	834.0
	67	838-846	839.25	844.75	842.0
	68	846-854	847.25	852.75	850.0
	69	854-862	855.25	860.75	858.0
Standard D OIRT					
B I	R I	48.5-56.5	49.75	56.25	
	R II	58-66	59.25	65.75	
	R III	76-84	77.25	83.75	
(B II)	R IV	84-92	85.25	91.75	
	R V	92-100	93.25	99.75	
Special channels	s1	110-118	111.25	117.75	
	s2	118-126	119.25	125.75	
	s3	126-134	127.25	133.75	
	s4	134-142	135.25	141.75	
	s5	142-150	143.25	149.75	
	s6	150-158	151.25	157.75	
	s7	158-166	159.25	165.75	
	s8	166-174	167.25	173.75	
(B III)	R VI	174-182	175.25	181.75	
	R VII	182-190	183.25	189.75	
	R VIII	190-198	191.25	197.75	
	R IX	198-206	198.25	205.75	
	R X	206-214	207.25	213.75	
	R XI	214-222	215.25	221.75	
	R XII	222-230	223.25	229.75	
Special channels	s9	230-238	231.25	237.75	
	etc.	...	...	...	
	s38	462-470	463.25	469.75	

[1] 2nd audio carrier = video carrier + 5.742 MHz

[2] Deviant audio carriers

Standard I: audio carrier = video carrier + 6 MHz
Standard K, L: audio carrier = video carrier + 6.5 MHz

Technical appendix

Channel allocation

Range	Channel	Channel limits (MHz)	Video carrier (MHz)	Audio carrier (MHz)
Standard B	Italy			
I	A	52.5-59.5	53.75	59.25
	B	61-68	62.25	67.75
(II)	C	81-88	82.25	87.75
(III)	D	174-181	175.25	180.75
	E	182.5-189.5	183.75	189.25
	F	191-198	192.25	197.75
	G	200-207	201.25	206.75
	H	209-216	210.25	215.75
	H_1	216-223	217.25	222.75
	H_2	223-230	224.25	229.75
Standard L	France			
I	2	49.00-57.00	55.75	49.25
	3	53.75-61.75	60.50	54.00
	4	57.00-65.00	63.75	57.25
III	5	174.75-182.75	176.00	182.50
	6	182.75-190.75	184.00	190.50
	7	190.75-198.75	192.00	198.50
	8	198.75-206.75	200.00	206.50
	9	206.75-214.75	208.00	214.50
	10	214.75-222.75	216.00	222.50
Standard I	Ireland			
I	A	44.5-52.5	45.75	51.75
	B	52.5-60.5	53.75	59.75
	C	60.5-68.5	61.75	67.75
III	D	174-182	175.25	181.25
	E	182-190	183.25	189.25
	F	190-198	191.25	197.25
	G	198-206	199.25	205.25
	H	206-214	207.25	213.25
	I	214-222	215.25	221.25
	J	222-230	223.25	229.25
Standard I	South Africa			
III	4	174-182	175.25	181.25
	5	182-190	183.25	189.25
	6	190-198	191.25	197.25
	7	198-206	199.25	205.25
	8	206-214	207.25	213.25
	9	214-222	215.25	221.25
	10	222-230	223.25	229.25
	11	230-238	231.25	237.25
	(12)	238-246	not	used
	13	246-254	247.43	253.443
Standard M	USA			
I	A 02	54-60	55.25	59.75
	A 03	60-66	61.25	65.75
	A 04	66-72	67.25	71.75
	A 05	76-82	77.25	81.75
	A 06	82-88	83.75	87.75
III	A 07	174-180	175.25	179.75
	A 08	180-186	181.25	185.75
	A 09	186-192	187.25	191.75
	A 10	192-198	193.25	197.75
	A 11	198-204	199.25	203.75
	A 12	204-210	205.25	209.75
	A 13	210-216	211.25	215.75

Range	Channel	Channel limits (MHz)	Video carrier (MHz)	Audio carrier (MHz)
Standard M	USA			
IV	A 14	470-476	471.25	475.75
	A 15	476-482	477.25	481.75
	A 16	482-488	483.25	487.75
	A 17	488-494	489.25	493.75
	A 18	494-500	495.25	499.75
	A 19	500-506	501.25	505.75
	A 20	506-512	507.25	511.75
	A 21	512-518	513.25	517.75
	A 22	518-524	519.25	523.75
	A 23	524-530	525.25	529.75
	A 24	530-536	531.25	535.75
	A 25	536-542	537.25	541.75
	A 26	542-548	543.25	547.75
	A 27	548-554	549.25	553.75
	A 28	554-560	555.25	559.75
	A 29	560-566	561.25	565.75
	A 30	566-572	567.25	571.75
	A 31	572-578	573.25	577.75
	A 32	578-584	579.25	583.75
	A 33	584-590	585.25	589.75
	A 34	590-596	591.25	595.75
	A 35	596-602	597.25	601.75
	A 36	602-608	603.25	607.75
	A 37	608-614	609.25	613.75
	A 38	614-620	615.25	619.75
	A 39	620-626	621.25	625.75
	A 40	626-632	627.25	631.75
	A 41	632-638	633.25	637.75
	A 42	638-644	639.25	643.75
V	A 43	644-650	645.25	649.75
	A 44	650-656	651.25	655.75
	A 45	656-662	657.25	661.75
	A 46	662-668	663.25	667.75
	A 47	668-674	669.25	673.75
	A 48	674-680	675.25	679.75
	A 49	680-686	681.25	685.75
	A 50	686-692	687.25	691.75
	A 51	692-698	693.25	697.75
	A 52	698-704	699.25	703.75
	A 53	704-710	705.25	709.75
	A 54	710-716	711.25	715.75
	A 55	716-722	717.25	721.75
	A 56	722-728	723.25	727.75
	A 57	728-734	729.25	733.75
	A 58	734-740	735.25	739.75
	A 59	740-746	741.25	745.75
	A 60	746-752	747.25	751.75
	A 61	752-758	753.25	757.75
	A 62	758-764	759.25	763.75
	A 63	764-770	765.25	769.75
	A 64	770-776	771.25	775.75
	A 65	776-782	777.25	781.75
	A 66	782-788	783.25	787.75
	A 67	788-794	789.25	793.75
	A 68	794-800	795.25	799.75
	A 69	800-806	801.25	805.75
	A 70	806-812	807.25	811.75
	A 71	812-818	813.25	817.75
	A 72	818-824	819.25	823.75
	A 73	824-830	825.25	829.75
	A 74	830-836	831.25	835.75
	A 75	836-842	837.25	841.75
	A 76	842-848	843.25	847.75
	A 77	848-854	849.25	853.75
	A 78	854-860	855.25	859.75
	A 79	860-866	861.25	865.75
	A 80	866-872	867.25	871.75
	A 81	872-878	873.25	877.75
	A 82	878-884	879.25	883.75
	A 83	884-890	885.25	889.75

Technical appendix

CENELEC channel plan

The output levels for broadband amplifiers were determined according to the following channel assignment:

Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan [1] 19/29/42 channels
I	2	48.25	●
	3	55.25	
	4	62.25	
	Pilot	80.15	
Lower special channel range (USB)	S 2	112.25	
	S 3	119.25	●
	S 4	126.25	
	S 5	133.25	
	S 6	140.25	
	S 7	147.25	
	S 8	154.25	
	S 9	161.25	
	S 10	168.25	
III	5	175.25	●
	6	182.25	
	7	189.25	
		191.25	●
	8	196.25	
	9	203.25	
		207.25	●
	10	210.25	
	11	217.25	
		223.25	●
	12	224.25	
Upper special channel range (OSB)	S 11	231.25	●
	S 12	238.25	
	S 13	245.25	
		247.25	●
	S 14	252.25	
	S 15	259.25	
		263.25	●
	S 16	266.25	
	S 17	273.25	
	S 18	280.25	
	S 19	287.25	●
	S 20	294.25	
Expanded special channel range (ESB)	S 21	303.25	
	S 22	311.25	●
	S 23	319.25	
	S 24	327.25	●
	S 25	335.25	
	S 26	343.25	●
	S 27	351.25	
	S 28	359.25	●
	S 29	367.25	
	S 30	375.25	●
	S 31	383.15	
	S 32	391.25	●
	S 33	399.25	
	S 34	407.25	●
	S 35	415.25	
	S 36	423.25	●
	S 37	431.25	
	S 38	439.25	●

Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan [1] 19/29/42 channels
Expanded special channel range (ESB)	S 39	447.25	●
	S 40	455.25	
	S 41	463.25	●
IV	21	471.25	
	22	479.25	●
	23	487.25	
	24	495.25	●
	25	503.25	
	26	511.25	●
	27	519.25	
	28	527.25	●
	29	535.25	
	30	543.25	●
	31	551.25	
	32	559.25	
	33	567.25	●
	34	575.25	
	35	583.25	●
	36	591.25	
	37	599.25	●
V	38	607.25	
	39	615.25	
	40	623.25	
	41	631.25	
	42	639.25	
	43	647.25	
	44	655.25	
	45	663.25	●
	46	671.25	
	47	679.25	●
	48	687.25	
	49	695.25	●
	50	703.25	
	51	711.25	●
	52	719.25	
	53	727.25	●
	54	735.25	
	55	743.25	●
	56	751.25	
	57	759.25	●
	58	767.25	
	59	775.25	●
	60	783.25	
	61	791.25	●
	62	799.25	
	63	807.25	●
	64	815.25	
	65	823.25	●
	66	831.25	
	67	839.25	●
	68	847.25	
	69	855.25	●

[1] As per EN 60728-3,
19 channels up to 450 MHz, 29 channels up to 606 MHz, 42 channels up to 862 MHz

Technical appendix

Catalogue data

1. Impedance

The technical data supplied in this catalogue refer to an impedance of 75 Ω, unless stated otherwise.

2. Gain values

The gain values for terrestrial antennas refer to the dipole. For terrestrial antenna gain values that refer to the isotropic radiator, the following applies: catalogue value + 2.15 dB.
The gain values for parabolic antennas refer to the isotropic radiator.

3. Wind load values

The stated values are based on a dynamic pressure of 800 N/m^2.
A dynamic pressure of 800 N/m^2 corresponds to a wind speed of 35.8 m/s or 129 km/h i.e. wind force 12.
When installed greater than 20 m above ground or greater than eight stories high, a dynamic pressure of 1,100 N/m^2 must be applied. A dynamic pressure of 1,100 N/m^2 corresponds to a wind speed of 42 m/s or 150 km/h.

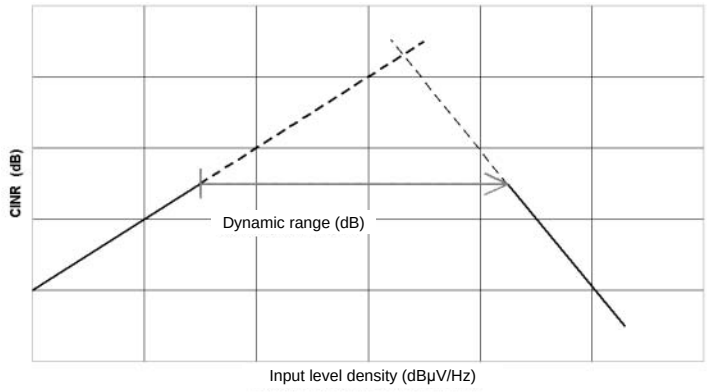
Conversion factor = wind load (800 N/m^2) x 1.37

Unless otherwise stated, a maximum permissible wind speed of 150 km/h applies to the antennas.

4. Maximum output/operating level

For	Determined from measuring procedures	Signal-to-noise ratio
TV channel amplifiers	EN 50083-5/Point 3.1	54 dB, 3rd order
Range amplifiers	EN 50083-5/point 3.3, point 3.2	60 dB, 2nd order *) 66 dB, 3rd order
In-house connection amplifiers/ broadband amplifiers	EN 60728-3	60 dB CTB 60 dB CSO
Return path amplifier	EN 60728-3/Point 4.7	**CINR** (see figure below)
Sat amplifiers	EN 60728-3	35 dB, 2nd order 35 dB, 3rd order

*) For interference products induced by signals in the FM range



CINR (Composite Intermodulation Noise Ratio)

The graphic is only meant to improve your understanding of the terms “input level frequency” and “dynamic range”.
No electrical data can be derived from it.
See EN 60728-3 (point 4.7) as well.

Technical appendix

Catalogue data

5. Labelling

Kathrein uses the CE mark to indicate the conformity of the products to the respective directives (EMC and Low Voltage Directive) and the standards 60728-11, EN 50083-2 and EN 60065 including their supplements.
Receivers also conform to the standards EN 55013, EN 55020 and EN 61000.

Labelling is found in the catalogue and where possible on the product, packaging, usage information and operating manuals.

The class A label is used to provide products with identification indicating the conformance with increased shielding requirements of class A in the EN 50083-2.

Labelling is found in the catalogue and where possible on the product, packaging, usage information and operating manuals.

On active products, the class A label documents that they also conform to EN 50083-2.

Labelling is found in the catalogue and where possible on the product.
The class A label is a registered trademark® of ZVEI.

Kathrein has packaging/disposal contracts for all packaging placed in circulation in Germany with ISD-INTERSEROH-Dienstleistungs GmbH

Contract no. 80312

Kathrein has packaging/disposal contracts for all packaging placed in circulation in Germany that is marked with the “Grüner Punkt” with DSD-Duales-System-Deutschland AG

Contract no. 2761008

Kathrein is licensed in accordance with the requirements of the EU directive (WEEE 2002/96/EC) and the German Elektro-G in the Elektro-Altgeräte-Register (EAR) (waste electrical equipment register) as a manufacturer

WEEE reg. no. DE 38438502

This symbol indicates that electronic equipment is not household waste, in accordance with directive 202/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 on used electrical and electronic equipment, it must be disposed of properly

6. Published values

Values published for individual components and parts are typical values.
Values published for amplifiers and optical products have been established according to EN 50083 and are also to be understood as being typical.

7. Changes, errors

The appearance of the listed articles and any values related to the articles were valid at the time this catalogue went to press. Please understand that we reserve the right to make changes and errors are excepted.

You will find continuously updated data in our product database on the internet at “www.kathrein.de”.

Technical appendix

Planning and installation instructions

1. Mast calculation

The calculated values for the mechanical stability of the antenna components (wind loads and bending moments) correspond with EN 60728-11.
When selecting the installation site, take into account the structural features of the building (e.g. susceptibility to oscillation, roof characteristics, installation on cylindrical structures), which could lead to increased wind loads according to DIN 1055, part 4/2001-03 or DIN 4131. The dynamic properties of the antenna and the structure can mutually influence each other and cause detrimental changes.

2. EMC limit values

For **active** devices, according to EN 50083-2, the following values apply for the maximum permitted **radiated interference**:

5-30 MHz: 27-20 dBpW
30-950 MHz: 20 dBpW
950-2500 MHz: 43 dBpw

For **passive** devices according to EN 50083-2, the following limit values apply for the **screening factor**:

Frequency range (MHz)	Threshold value (dB) Class A	Class B
5-30	85	75
30-300	85	75
300-470	80	75
470-950	75	65
950-3000	55	55

For **coaxial cable** according to EN 50117, the following limit values apply for **coupling resistance** and **screening attenuation**:

Coupling resistance

Frequency range (MHz)	Threshold value mΩ/m Class A	Class B
5-30	≤ 5	≤ 15

Screening attenuation

Frequency range (MHz)	Threshold value (dB) Class A	Class B
30-1000	85	75
1000-2000	75	65
2000-3000	65	55

Technical appendix

3. Signal-to-noise ratio/noise figure

The signal-to-noise ratio is the difference between the level of the useful signal and the noise level.
The noise figure indicates by how many dB an amplifier additionally reduces the signal-to-noise ratio.
The noise level on a 75 Ω resistor, referred to the bandwidth of a TV channel (5 MHz), is 2 dBµV.

Signal-to-noise ratio = level on amplifier input - noise figure - 2 dBµV

Example calculation: Antenna signal level = 50 dBµV, noise figure = 4 dB
► **Signal-to-noise ratio** = 50 dBµV - 4 dB - 2 dBµV = 44 dB

4. Signal-to-noise ratio, picture quality

Signal-to-noise ratio	more than 46 dB	37 dB	30 dB	less than 26 dB
Noise	noise-free	visible, but not annoying	clearly visible, annoying	noise predominates
Picture quality	very good	good	poor	inadequate

Earthing wires for antenna systems (as per EN 60728-11)

Copper	16-mm² solid wire (Ø: 4.5 mm), bare or insulated
Aluminium	25-mm² solid wire (Ø: 5.6 mm), insulated
Steel, galvanised	50-mm² solid wire (Ø: 8 mm) or ribbon, 2.5 x 20 mm (as per DIN 48801)

Potential equalisation wire

Copper	4 mm² (Ø: 2.3 mm), bare or insulated

Usable level limits for antenna outlets (as per EN 50083-7)

Range	Level dBµV Min.	Max.
VHF (Mono)	40	70
VHF (stereo)	50	70
AM-RSB television and radio	60	80*)
Frequency-modulated TV signals	47	77
DVB (64 QAM)	47	67
DVB (QPSK)	47	77

*) 77 dBµV for systems distributing more than 20 channels

Media law

The media laws of individual countries govern the permission for channel reception.

Technical appendix

Guidelines, standards

The product standards of the EN 60728-11 and EN 60728 series apply to antenna reception and distribution systems.

1. Overview of the European standards series EN 50083 and EN 60728-11

Cable distribution systems for television signals, audio signals and interactive multimedia services

EN 60728-11:	**1. Safety requirements**
EN 50083-2	**2. Electromagnetic compatibility of equipment**
EN 60728-3	3. Active broadband equipment for coaxial cable networks
EN 50083-4	4. Passive broadband equipment for coaxial distribution networks
EN 50083-5	5. Equipment for head stations
EN 50083-6	6. Optical equipment
EN 50083-7	7. System requirements
EN 50083-8	8. Electromagnetic compatibility of cable distribution networks
EN 50083-9	9. Interfaces for CATV/SMATV headends and comparable professional devices for DVB/MPEG 2 transport streams
EN 50083-10	10. Return channel system requirements

EN 60728, part 11 concerns all pertinent safety regulations such as earthing, lightning protection, potential equalisation, mechanical stability, etc. and refers to the applicable standards EN 60065 or EN 60950 for power supplies, etc.

EN 50083 part 2 contains all the important regulations pertaining to EMC such as the screening factor, (ir)radiation of unwanted signals, short-circuit current, noise suppression etc.

Low Voltage Directive 2006/95/EC

EMC Directive 2004/108/EC

The CE mark of Kathrein products confirms conformity with these standards.

2. Explanations of safety specifications EN 60728-11

With calculation examples, VDE papers volume 6, 4th revised edition 2005

3. Standard overview coaxial cable for cable distribution systems EN 50117

EN 50117-1	Generic specification	
EN 50117-2	Basic specification for cable for cable distribution systems	
EN 50117-2-1	Interior installation cable	(5-1000 MHz)
EN 50117-2-2	Exterior cable	(5-1000 MHz)
EN 50117-2-3	Splitter and line cable	(5-1000 MHz)
EN 50117-2-4	Interior installation cable	(5-3000 MHz)
EN 50117-2-5	Exterior cable	(5-3000 MHz)
EN 60966-2-4	Connecting cable for radio and TV sets	

4. Mechanical stability standards

DIN 1055, part 4	Structural load specifications
DIN 4131	Antenna support structures made from steel

5. RGA guidelines 8th edition, version: August 2000

Issued by the broadcasting reception system workgroup

6. Technical guidelines for large community antenna systems

Issued by the trade association for satellite & cable in the ZVEI

Technical appendix

Guidelines, standards

7. Recommendations from the ANGA-ZVEI forum

TV cable networks: guaranteed future due to installation of interactive broadband networks

Part I/Part II	Network installation - May 2006
Part III	Access networks - August 1999
Part IV	Technology for measurements on DVB - September 1998
Part V	Cable modems - July 2001
Part VI	Planning guidelines - May 2004
Part VII	Selection criteria for head-ends - May 2004
Part VIII	Installation strategy for optical fibre networks

Passive components for network infrastructure

Sources

DIN standards **EN standards**	BEUTH-Verlag GmbH Burggrafenstrasse 4-7, 10787 Berlin
RGA guidelines	VDE-Verlag Postfach 12 01 43, 10591 Berlin
Technical specifications	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. Fachverband Satellit & Kabel Stresemannallee 13, 60596 Frankfurt
ANGA/ZVEI recommendations	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. Fachverband Satellit & Kabel Stresemannallee 13, 60596 Frankfurt

Addresses

International representatives

Europe

Austria	KATHREIN-Vertriebs-Ges.m.b.H	Gnigler Str. 56 A-5020 Salzburg	Tel.: +43 662 87 5531/32 Fax: +43 662 878 3449	E-Mail: salzburg@kathrein-gmbh.at Internet: www.kathrein-gmbh.at
		Landesstr. 18 A-6176 Völs	Tel.: +43 512 304 602 Fax: +43 512 304 602 13	E-Mail: innsbruck@kathrein-gmbh.at Internet: www.kathrein-gmbh.at
		Herta-Kräftner-Gasse 4A A-1210 Wien	Tel.: +43 1 332 2321 Fax: +43 1 332 2321 22	E-Mail: wien@kathrein-gmbh.at Internet: www.kathrein-gmbh.at
		Harter Str. 29 A-8101 Gratkorn / Graz	Tel.: +43 3124 23 620 Fax: +43 3124 23 6209	E-Mail: graz@kathrein-gmbh.at Internet: www.kathrein-gmbh.at
Belgium	Nokia Siemens Networks	Atealaan 34 B-2200 Herentals	Tel.: +32 14 25 3537 Fax: +32 14 25 2549	E-Mail: info@nsn.com Internet: www.nokiasiemensnet-works.com
Bulgaria	Marcotec Sofia Ltd.	17 Elemag str. BG-1113 Sofia	Tel.: +359 2 866 2210 Fax: +359 2 865 9605	E-Mail: marcotec@cablebg.net
Croatia	Skyline Zagreb d. o. o.	Dujsinova 3 HR-10000 Zagreb	Tel.: +385 1 614 5319 Fax: +385 1 614 5319	E-Mail: pa@skyline.si Internet: www.skyline.si
Czech Republic	AEC Elektrotechnika spol. s.r.o.	Na rovinách 6/390 CZ-14000 Praha 4 Lhotka	Tel.: +420 241 710 048 Fax: +420 241 710 003	E-Mail: info@aec-eltech.cz Internet: www.aec-eltech.cz
Denmark	Intensa Danmark	Park Allé 287 A DK-2605 Brøndby	Tel.: +45 70 224 228 Fax: +45 70 226 228	E-Mail: bo@dk.intensa.se Internet: www.dk.intensa.se
Denmark	Erik Blichfeld A/S	Birkemosevej 11 - P.O.Box 400 DK-6000 Kolding	Tel.: +45 75 522 020 Fax: +45 75 567 007	E-Mail: info@blichfeld.dk Internet: www.blichfeld.dk
Finland	Oy Trafin AB	Poltolinja 17 D SF-40520 Jyväskylä	Tel.: +358 9 887 0020 Fax: +358 9 804 4833	E-Mail: jouni.rautio@trafin.fi Internet: www.trafin.fi
France	KATHREIN France	B.P.51,7 Rue des Gardes F-91371 Verrières le Buisson Cedex	Tel.: +33 1 6953 6453 Fax: +33 1 6953 6454	E-Mail: kathrein@kathrein.fr Internet: www.kathrein.fr
Greece	LYRA S.A.	Fylis Str. 16 GR-10433 Athens	Tel.: +30 210 823 1188 Fax: +30 210 823 1680	E-Mail: iva@otenet.gr
Hungary	Rakotrade Kft	Guyon Richard U. 13 H-1026 Budapest	Tel.: +36 1 200 6968 Fax: +36 1 200 6971	E-Mail: rakotrade@t-online.hu Internet: www.rakotrade.hu
Iceland	Smith & Norland	Nóatúni 4 IS-105 Reykjavik	Tel.: +354 520 3000 Fax: +354 520 3011	E-Mail: halldorh@sminor.is Internet: www.sminor.is
Ireland	Aertech Communications Ltd.	Naas IRL- Co. Kildare	Tel.: +353 45 487 866 Fax: +353 45 487826	E-Mail: info@aertech.ie
Italy	SIRA Sistemi Radio	Via Senatore Simonetta, 26 I-20040 Caponago (MI)	Tel.: +39 02 9596 11 Fax: +39 02 9596 1311	E-Mail: info@sira.mi.it Internet: www.sira.mi.it
Luxembourg	Nokia Siemens Networks S.A.	20, Rue des Peupliers L-1017 Luxembourg	Tel.: +352 26 424 328 Fax: +352 26 424 327	E-Mail: info@nsn.com Internet: www.nokiasiemensnet-works.com
Malta	FalCom Ltd.	P. O. Box Falcon Alliance, Luqa Airport / Gate 1 MAL- Luqa	Tel.: +356 21 257 126 Fax: +356 21 257 128	E-Mail: info@falconalliance.com Internet: www.falconalliance.com
Netherlands	Nokia Siemens Networks Nederland B.V.	Prinses Beatrix Laan 800 NL-2595 BN Den Haag	Tel.: +31 70 333 2700 Fax: +31 70 333 2654	E-Mail: info@nsn.com Internet: www.nokiasiemensnet-works.com
Norway	TANTEC Norge A.S.	Vestvollveien 6 D N-2019 Skedsmokorset	Tel.: +47 64 838 100 Fax: +47 64 838 101	E-Mail: firmapost@tantec.no Internet: www.tantec.no
Poland	KATHREIN Poland Sp. z o.o.	ul. Bokserska 64 PL-02-690 Warszawa	Tel.: +48 22 420 2122 Fax: +48 22 420 2111	E-Mail: info@kathrein.pl Internet: www.kathrein.pl
Portugal	Antnet Comunicaçoes S.A.	Av. 9 de Julho, no. 2A P-2665-520 Venda do Pinheiro	Tel.: +351 21 966 7400 Fax: +351 21 966 7409	E-Mail: mail@antnet.pt Internet: www.antnet.pt

International representatives

Europe

Romania	ROMKATEL S.R.L.	Str. Dristor 5, Bl. A 20, SC.2, Parter, Ap.16 RO-031531 Bucharest	Tel.: +40 21 322 7440 Fax: +40 21 320 4408	E-Mail: office@romkatel.ro Internet: www.romkatel.ro
Russia	Please contact the KATHREIN Head Office at Rosenheim/Germany	P.O.Box 100 444 D-83004 Rosenheim/Germany	Tel.: +49 8031 184 380 Fax: +49 8031 184 385	E-Mail: catv@kathrein.de Internet: www.kathrein.de
Serbia	PANOS engineering d.o.o.	Bul.Oslobodjenja 127/IX SCG-21000 Novi Sad	Tel.: +381 21 4720 644 Fax: +381 21 4720 693	E-Mail: office@panosing.com Internet: www.panosing.com
Slovenia	SKYLINE d.o.o.	Celovska 150 SI-1000 Ljubljana	Tel.: +386 1 500 5001 Fax: +386 1 500 5005	E-Mail: pa@skyline.si Internet: www.skyline.si
Spain	ESB Sistemas España S.L.	Poligono Industrial Fuente del Jarro, c/Coheters Nave 5 E-46988 Paterna (Valencia)	Tel.: +34 96 134 0797 Fax: +34 96 134 0800	E-Mail: esb@esbsistemas.com Internet: www.esbsistemas.com
Sweden	Elektroskandia AB	Norrvikenleden 97 S-19183 Sollentuna	Tel.: +46 8 923 500 Fax: +46 8 923 980	E-Mail: kundsupport. teledatasakerhet@ elektroskandia.se Internet: www.elektroskandia.se
Switzerland	Please contact the KATHREIN Head Office at Rosenheim/Germany	P.O.Box 100 444 D-83004 Rosenheim/Germany	Tel.: +49 8031 184 380 Fax: +49 8031 184 385	E-Mail: catv@kathrein.de Internet: www.kathrein.de
Turkey	SIEMENS San. ve Ticaret A.S.	Yakacik CAD. No. 111 TR-34870 Kartal - Istanbul	Tel.: +90 216 459 2000 Fax: +90 216 459 2011	E-Mail: webmaster.tr@ siemens.com Internet: www.siemens.com.tr
	ORYAYIN Ortak Yayincilik A.S.	Selimiye Kisla Cad. No. 34 TR-81160 Üsküdar - Istanbul	Tel.: +90 216 310 7479 Fax: +90 216 310 8602	E-Mail: info@oryayin.com Internet: www.oryayin.com
United Kingdom	PFJ Communications Ltd.	Unit 1 Tilcon Avenue GB- Baswich, Stafford ST 18 OYJ	Tel.: +44 1785 259 090 Fax: +44 1785 257 920	E-Mail: pfjworksuk@aol.com

Africa

Egypt	Lord Telecommunications Co.	5, Abd Alla Ebn Abas St., District #7 - Naser City, Cairo	Tel.: +20 2 401 5023 Fax: +20 2 401 7916	E-Mail: ltc@tedata.net.eg
Morocco	Electra S.A.	Boulevard Ahl Loghlam, P. O. Box 2569 E MA-20250 Casablanca	Tel.: +212 2 2753 531 Fax: +212 2 2753 554	E-Mail: b.e.primarios@ primarios.ma
South Africa	TV*AE Ltd.	P.O.Box 2074 ZA- Pineton 3600, KZN	Tel.: +27 31 701 0196 Fax: +27 31 701 8850	E-Mail: info@tvae.co.za Internet: www.tvae.co.za
	KATHREIN- South Africa (Pty) Ltd.	P.O.Box 1008 ZA-7129 Sommerset West	Tel.: +27 21 8818 200 Fax: +27 21 8818 201	E-Mail: kathrein@kathrein.co.za Internet: www.kathrein.co.za
Tunesia	TELETEK	71, Rue Alain Savary C 64 TU-1003 Tunis	Tel.: +216 71 772 288 / 773 388 Fax: +216 71 770 553	E-Mail: teletek@gnet.tn

America

Brazil	KATHREIN Mobilcom Brasil Ltda.	Rua das Baiadeiras, 280/290 BRA-04675-210 Sao Paulo - SP	Tel.: +55 11 5685 4290 Fax: +55 11 5685 4292	E-Mail: marketing@ kathrein.com.br Internet: www.kathrein.com.br
USA	KATHREIN Inc.	P.O. Box 4580 USA- Medford, OR 97501	Tel.: +1 541 779 6500 Fax: +1 541 779 3991	E-Mail: mail@kathrein.com Internet: www.kathrein-scala.com

International representatives

Asia

China	KATHREIN China (HK) Ltd.	9 Hoi Shing Road PRC- Hong Kong -Tsuen Wan, N.T.	Tel.: +852 24 920 598 Fax: +852 24 923 518	E-Mail: mail@kathreinchina.com Internet: www.kathreinchina.com
India	KATHREIN - India Private Limited	Industry Manor, Prabhadevi IND-400 025 Mumbai (Bombay)	Tel.: +91 22 6652 6600 Fax: +91 22 6652 6699	E-Mail: sales@kathrein.co.in Internet: www.kathrein.co.in
Iran	Simaran P. J. S. Co.	P. O. Box 15875 - 5995 IR-15856 Theran	Tel.: +98 21 8833 8245 Fax: +98 21 883 5073	E-Mail: info@simaran.com Internet: www.simaran.com
	Antenkar Co.	Delpazir Str. 15336, Dr. Behesti Ave., POBox 15875-3777 IR- Tehran - Iran	Tel.: +98 21 4498 5787 Fax: +98 21 4498 5788	E-Mail: info@antenkar-co.com
Israel	Telran Communications Ltd.	10 HaSadan Str. IL- Holon 58815	Tel.: +972 3 557 5110 Fax: +972 3 521 4524	E-Mail: office@telran.co.il Internet: www.telran.co.il
Japan	SUMISHO MACHINERY TRADE CORP	Triton Square Office Tower Z21F, 1-8-12, Harumi, Chuo-ku JP- Tokyo 104-6222	Tel.: +81 3 5144 9234 Fax: +81 3 5144 9296	E-Mail: kathrein@smtcorp.co.jp Internet: www.smtcorp.co.jp
Korea	KATHREIN ASIA Seoul Co., Ltd.	713 Suseo-dong, Kangnam-Gu ROK-135-539 Seoul	Tel.: +82 2 204 070 15/16/17 Fax: +82 2 204 070 18	E-Mail: kathrein@kathrein.co.kr Internet: www.kathrein.co.kr
Malaysia	KATHREIN SEA (M) SDN BHD	UEP Subang Jaya MAL-47630 Subang Jaya / Selangor Darul Ehsan	Tel.: +60 3 8024 8089/ 9089 Fax: +60 3 8024 7089	E-Mail: kathrein@ kathreinmalaysia.com
Thailand	KATHREIN Indochina Co. Ltd.	17/151 Moo 1 Sukonthasawat Road TH- Latphrao District, Latphrao, Bangkok 10230	Tel.: +66 2 5788 3003 / 2523 Fax: +66 2 5709 289	E-Mail: chavawin@cscoms.com Internet: www. kathreinindochina.com
United Arab Emirates & GCC-Countries	KATHREIN Middle East	P.O.Box 293607 UAE- DAFZA-Dubai Airport	Tel.: +971 4204 5040 Fax: +971 4204 5042	E-Mail: contact@kathrein.ae

Australia

Australia	Maser Technology Group Pty Ltd	Unit 9, 15B Rodborough Rd, P. O. Box 6298 AUS-NSW 2086 Frenchs Forest	Tel.: +61 2 9452 6062 Fax: +61 2 9452 6340	E-Mail: info@maser.com.au Internet: www.maser.com.au

Addresses in Germany

Head office

KATHREIN-Werke KG
Anton-Kathrein-Straße 1-3
83004 Rosenheim
Germany

Tel.: +49 8031 184-0
Fax: +49 8031 184-306

E-mail:
Business unit SAT - sat@kathrein.de
Business unit HFC - catv@kathrein.de

Internet:
www.kathrein.de

Service centres in Germany

ESC Elektronik Service Chiemgau GmbH
Bahnhofstraße 108
83224 Grassau
Germany

Hotline:
Tel.: +49 8641 9545-0
Fax: +49 8641 9545-35 or 9545-36

E-mail: service@esc-kathrein.de
Internet: www.esc-kathrein.de

Direct access:	
Spare part orders/repairs	-15
Exports	-21
Reception systems/HFC	-45
Signal meters	-25
Receivers	-40
Car radio antennas	-15

Technical support service

KATHREIN-Werke KG
Anton-Kathrein-Straße 1-3
83004 Rosenheim
Germany

Hotline:
Tel.: +49 8031 184-700
Fax: +49 8031 184-676

E-mail:
technische-kundenberatung@kathrein.de

Kathrein - a strong group

worldwide

Kathrein
Rosenheim

CityCom
Amerang

ESC
Katek
Schomandl
Grassau

A. Knitter GmbH
Berlin

Kathrein Sachsen GmbH
Kathrein Burgstädt GmbH
Mühlau

Kathrein Mobilcom
Nördlingen

Kathrein Austria
Kufstein

Sira
Milan

Kathrein France
Paris

Rakotrade
Budapest

ROMKATEL S.R.L.
Bukarest

Kathrein Poland
Warsaw

KEL MONTÁŽNÍ TECHNIKA, spol. s.r.o.
Bela

AEC Elektrotechnika
Prague

Kathrein Romania
Timişoara

Kathrein Inc., Scala Division
Medford

Kathrein Mobilcom Brasil
Olimpus
São Paulo

Kathrein S.A.
Somerset West

Kathrein India
Bombay

Kathrein SEA
Kuala Lumpur

Kathrein Indochina
Bangkok

Kathrein Technology (China) Ltd.
Tat Fook
Shenzhen

Kathrein Asia
Seoul

Kathrein Middle East
Dubai

In all: 57 Kathrein-group members, as of 12/2007

Internet: http://www.kathrein.de · e-mail: catv@kathrein.de

KATHREIN-Werke KG · Phone +49 8031 184-0 · Fax +49 8031 184-385
Anton-Kathrein-Str. 1-3 · P.O. Box 100 444 · 83004 Rosenheim · GERMANY

KATHREIN

Antennen · Electronic