ENERDIS®
CHAUVIN ARNOUX GROUP

General catalog

2015
2016

Measure up

Remote data retrieval from meters
Energy saving
ISO 50001
Energy rebilling
EN 50160 metering plan

Analysis of electrical disturbances
Reduction of penalties
Optimization of subscribed power
Protection of the industrial process

High-accuracy measurement
Network supervision
Severe environment
Multi-function
Precise display

High rupture capacity
Rail applications - Nuclear qualification
Control of critical automatic systems - EMC immunity

GENERAL TABLE OF CONTENTS

About the CHAUVIN ARNOUX Group

Founded in 1893 by **Raphaël Chauvin and René Arnoux**, **CHAUVIN ARNOUX is an expert** in measurement of electrical and physical quantities in the industrial and tertiary sectors.

Total control of product design and manufacturing in-house enables the Group to propose its customers a very broad product and service offering which meets all their needs.

The Group's quality policy ensures that the products delivered comply with its commitments and with both the national and international standards in terms of metrology, the environment and user safety

A few figures

100	million euros in sales revenues
10	subsidiaries spread across the world
900	staff
7	production sites
6	R&D departments worldwide
11%	of revenues invested in R&D

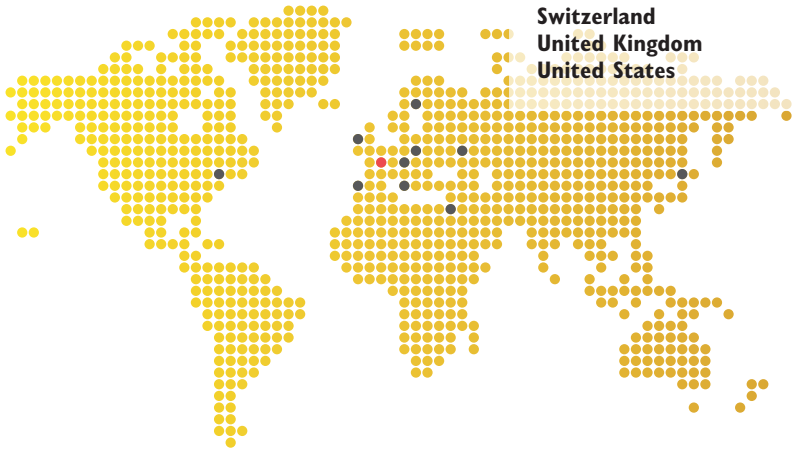
CHAUVIN ARNOUX
is a major force on the measurement market in **France** and **internationally**.

7 PRODUCTION SITES

3 in Normandy (France)
1 in Lyon (France)
1 in Milan (Italy)
1 in Dover (USA)
1 in Shanghai (China)

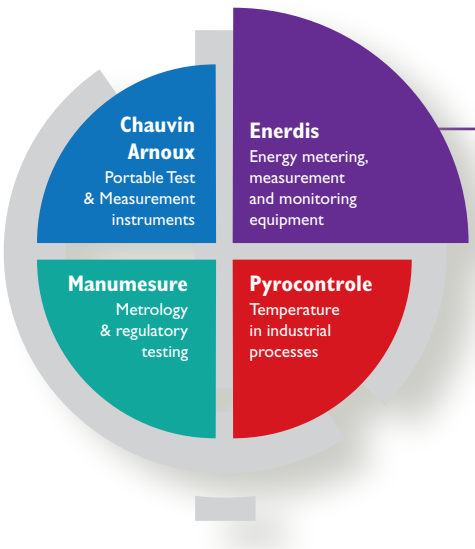
10 SUBSIDIARIES WORLDWIDE

Germany
Austria
China
Spain
Italy
Lebanon
Sweden
Switzerland
United Kingdom
United States



4 FRENCH COMPANIES

promoting the product and service offering



ENERDIS Chauvin Arnoux Group

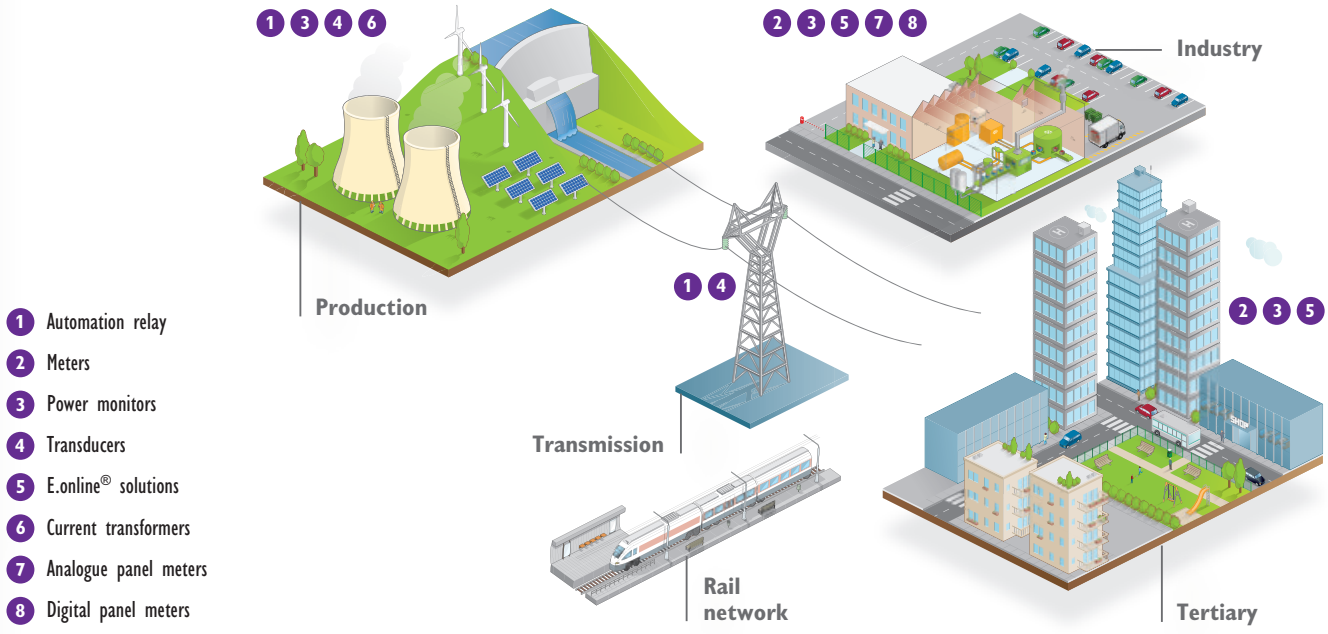
Enerdis completes the Chauvin Arnoux Group's global offering by designing permanent measuring equipment for electrical installations. **Enerdis is a French company which is an expert in energy intelligence**, specializing in fixed equipment for measurement, testing and supervision of electrical networks and energy systems.

A precursor in energy management, Enerdis proposes global expertise from help with diagnostics through to the implementation of complete solutions (products, software and services) adapted to each type of environment (industrial, tertiary, building). These systems comply with the international regulatory and standardization framework.

Its extensive **offering of products and systems** enables Enerdis **to cover all the measurement requirements** from the energy production site through to the point of consumption by integrating all the transmission networks and distribution systems.

SOLUTIONS FOR EACH MEASUREMENT REQUIREMENT

From energy supply through to its distribution on site



FROM ELECTRICAL MEASUREMENT TO ENERGY PERFORMANCE MANAGEMENT

Every year in the Engineering Department at Antony (France), where the company has its Head Office, **innovative products are developed** in fields such as **metering** (tariff meters or submeters), **electrical network supervision and quality** (power monitors, analyzers, etc.), **communication systems and software** to supervise energy flows.

- Energy performance
- Power quality
- Automation relays
- Measurement and instrumentation

Energy efficiency:

Measurement plays a key role in the definition, success and long-term performance of **an energy optimization approach**.
That's why it is crucial not to skip any of the steps involved, which are applicable in the context of:

- an energy performance contract handled by an external service company
- an "energy plan" handled in-house by company staff.

Chauvin Arnoux - One-off measurements

1 DIAGNOSTICS

- **Analyze** energy bills in order to identify:
  - energy-hungry installations
  - production processes
  - the cost structure
  - the existing organization
- **Acquire** knowledge of the installation by one-off measurements so that you can determine the types of energy and utilities to be managed and the specific target (in €) to be reached.

2 DETAILED ANALYSIS

- **Analyze** the behaviour of the installations very precisely by **long-term measurement campaigns** leading to a detailed audit which then serves as the reference for a **Measurement and Verification Plan (MVP)**
- **Assess** the potential energy savings and **determine** the minimum requirements by:
  - improving the power factor
  - carrying out a power survey with measurement of the energy consumed
  - searching for heat losses

- *Instruments for one-off measurements: wattmeter • infrared camera • light meter*

- *Instruments for measurement campaigns: network analyzer • infrared camera • light meter • hygrometer • plug & play recorder*

the 4 phases of the approach

The methodology usually followed is divided into **four phases**, each including a precise objective, clearly-identified actors and detailed specifications of the deliverables.

One of **Enerdis**'s missions is to accompany its contacts, whether customers or expert channels, in this process in order to offer them solutions which match their requirements in the context of a **global, long-term approach**.

Enerdis - Permanent measurement system

3 IMPLEMENTATION

- Set up a **global energy management solution** for energy control of the whole installation.
- Propose **suitable solutions for each requirement**.

4 MANAGEMENT & MAINTENANCE

- **Support the approach** by adapting the system to any specific local features and integrating the approach into an existing system. **Commissioning assistance** and **user training** are also provided and a system maintenance contract is proposed.

Measurement and Verification Plan (MVP)

- **Complete, renovate or install a permanent measurement system** for longer-lasting performance.
  E.online system • Network analyzer • energy meters • power monitors • graphic recorder
  Solutions: *power factor correction • harmonic filtering • power control • temperature control and sensors.*

All **Chauvin Arnoux** Group products sold under the **Chauvin Arnoux**, **Enerdis** and **Pyrocontrole** brands are ideal for use at all levels of the energy value chain, whatever the sector of activity (building, infrastructure, industry and residential), **guaranteeing performance and comfort**.

Energy meters and power

Energy meters

Single-phase

With communication

MEM04 Modbus
45 A direct input
Class 1 - MID
► page 22

ULYS MD80
80 A direct input
Class 1 - MID
► page 26

Without communication

MEM03
32 A direct input
Class 1 - MID
► page 20

MEM04
45 A direct input
Class 1 - MID
► page 22

ULYS MD65
65 A direct input
Class 1 - MID
► page 24

Three-phase

With integrated communication

ULYS TD80
80 A direct input
Class 1 - MID
► page 28

ULYS TT
CT connection
Class 1 - MID
► page 30

Without integrated communication

ULYS TDA80
80 A direct input
Class 1 - MID
► page 32

ULYS TTA
CT connection
Class 1 - MID
► page 34

Communication modules

ULYSCOM
fur ULYS MD80 - TDA80 - TTA
► page 36

monitors

Power monitors

Flush mounting 96 x 96

ENERIUM 30
► page 38

ENERIUM 50
► page 38

ENERIUM 150
► page 38

Flush mounting 144 x 144

ENERIUM 100
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ENERIUM 110
► page 38

ENERIUM 200
► page 38

ENERIUM 210
► page 38

ENERIUM 300
► page 38

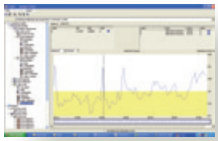
ENERIUM 310
► page 38

Associated software

E.SET
Configuration software
► page 49

E.VIEW
Configuration and diagnosis software
► page 50

E.VIEW+
Configuration, diagnosis and display software
► page 51



Metering solution

RENOV ENERGY
► page 52

Quick selection guide for meters

TYPE OF ELECTRICAL NETWORK

SINGLE-PHASE

With communication

RATING OF UPSTREAM CIRCUIT-BREAKER

45 A

MEMO4
Modbus
► page 22

MEMO4-M
Modbus
► page 22

> 45 A

ULYS MD80
► page 26

ULYS MD80-M
► page 26

Without communication

RATING OF UPSTREAM CIRCUIT-BREAKER

32 A

MEMO3
► page 20

MEMO3-M
► page 20

> 32 A

MEMO4-M
► page 22

ULYS MD65
► page 24

ULYS MD65-M
► page 24

All our meters are MID-certified.
References end is "-M", such as MEMO4-M, are fully comply with the MID.

THREE-PHASE

With integrated communication

RATING OF UPSTREAM CIRCUIT-BREAKER

- 80 A
  - 
    ULYS TD80
    ► page 28
  - 
    ULYS TD80-M
    ► page 28
- > 80 A on TC
  - 
    ULYS TT
    ► page 30
  - 
    ULYS TT-M
    ► page 30

Without integrated communication

RATING OF UPSTREAM CIRCUIT-BREAKER

- 80 A
  - 
    ULYS TDA80
    ► page 32
  - 
    ULYS TDA80-M
    ► page 32
- > 80 A on TC
  - 
    ULYS TTA
    ► page 34
  - 
    ULYS TTA-M
    ► page 34

Product selection guide by functions

			Energy meters		
			► page 20	► page 22	► page 24
					
			MEMO3 **MEMO3-M**	**MEMO4** **MEMO4-M**	**ULYS MD65** **ULYS MD65-M**
Strengths			1 module MID version	1 module MID version Modbus Communication	2 modules MID version
		Network	**LV**		
		Rating	**32 A**	**45 A**	**65 A**
		MID certified	MEMO3-M	MEMO4-M MEMO4-M Modbus	ULYS MD65-M
		Accuracy class	IEC Class 1 / MID Class B		
Installations	Mounting	Modular (DIN modules)	1 module		2 modules
	Network	Single-phase			
		Three-phase			
	Current input	Direct			
		On CT			
Energy metering and management	Total energy	Display	kWh total	kWh, kVArh, kVAh total & partial	kWh total
		Communication		MEMO4 Modbus MEMO4-M Modbus	
	Tariff				
Multi-measurement	Electrical parameters	Display		inst, V, U, I, P, Q, S, F, FP, ΣP, ΣQ, ΣS	
		Communication		inst, V, U, I, P, Q, S, F, FP	
Input-output	Pulse output(s)		1		
	Tariff change input				
Communication	RS485 port			MEMO4 Modbus MEMO4-M Modbus	
	Ethernet Modbus				
	M-bus				
Metrology	V/U/I				
	P/Q/S				
	Eact		IEC: class 1 / MID: class B		
	Ereact				

Energy meters

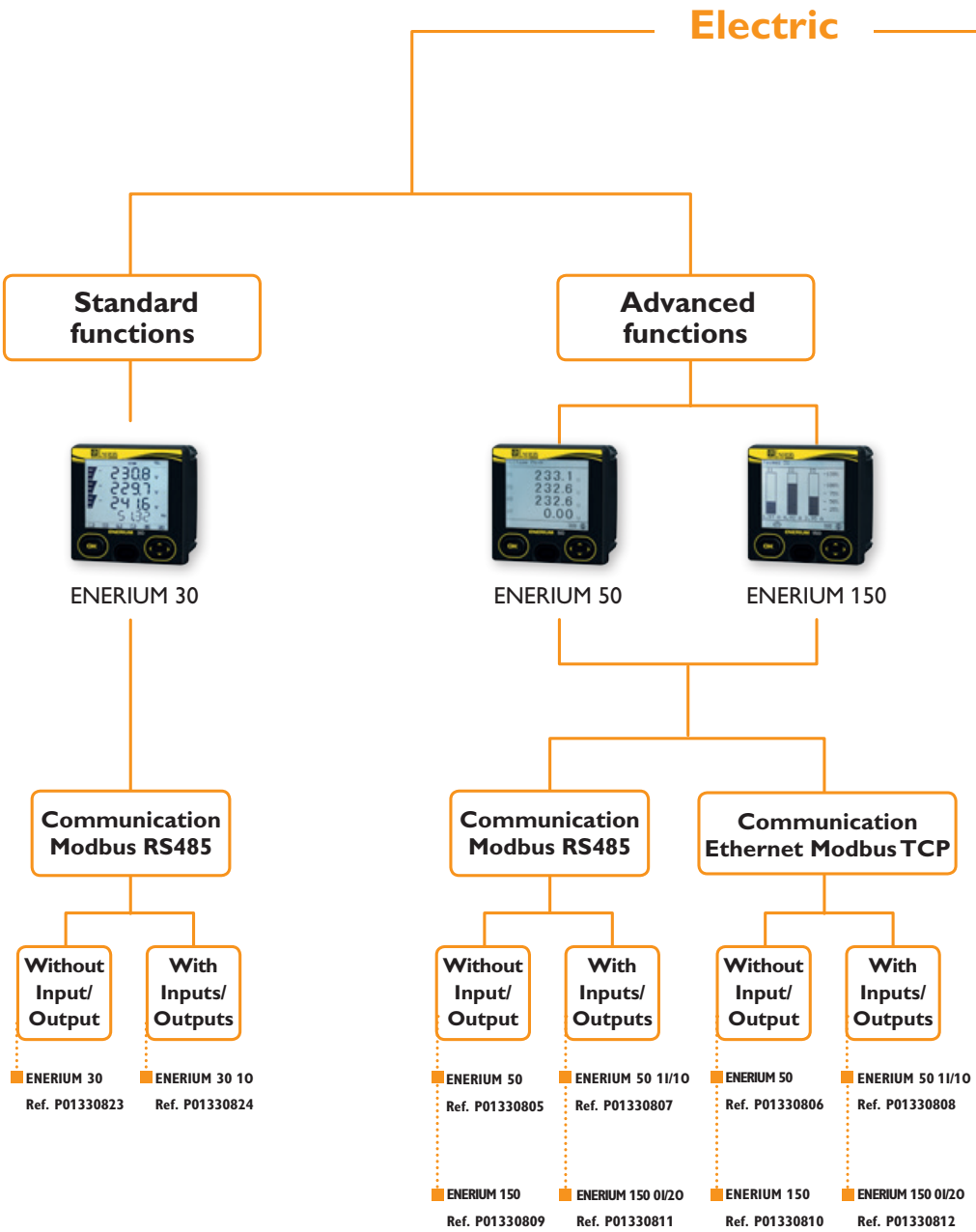
► page 26	► page 32	► page 34	► page 28	► page 30
				
ULYS MD80 **ULYS MD80-M**	**ULYS TDA80** **ULYS TDA80-M**	**ULYS TTA** **ULYS TTA-M**	**ULYS TD80** **ULYS TD80-M**	**ULYS TT** **ULYS TT-M**
Multi-communication protocols Multi-measurement MID version	Multi-communication protocols Multi-measurement MID version	Multi-communication protocols Multi-measurement MID version	4 modules Integrated communication MID version	4 modules Integrated communication MID version
LV				
80 A		**on CT**	**80 A**	**on CT**
ULYS MD80-M	ULYS TDA80-M	ULYS TTA-M	ULYS TD80-M	ULYS TT-M
IEC class 1 / MID class B				
2 modules	4 modules			
	3/4 wires		3/4 wires*	
		Insulated		Insulated
kWh, kVArh, kVAh total & partial			kWh, kVArh, kVAh total & partial	
2 tariffs			2 tariffs	
inst, V, U, I, P, Q, S, F, FP, ΣP, ΣQ, ΣS			inst, V, U, I, P, Q, S, F, FP, ΣP, ΣQ, ΣS	
inst, V, U, I, P, Q, S, F, FP	inst, V, U, I, P, Q, S, F, FP, ΣP, ΣQ, ΣS		inst, V, U, I, P, Q, S, F, FP, ΣP, ΣQ, ΣS	
2			1	
1			1*	
via ULYSCOM communication modules			ULYS TD80 Modbus / -M	ULYS TT Modbus / -M
			ULYS TD80 Ethernet / -M	ULYS TT Ethernet / -M
			ULYS TD80 M-bus / -M	ULYS TT M-bus / -M
0,5 %				
1 %				
IEC: class 1 / MID: class B				
IEC: class 2				

* depending on model

Quick selection guide for power

Energy meters and power monitors

▲ Energy performance



I: Input
O: Output

monitors

APPLICATION — **Multi-energy**

- **Installation supervision** → ENERIUM 100
- **Multi-energy management** → ENERIUM 200
- **Data logger** → ENERIUM 210
- **Power quality** → ENERIUM 300




ENERIUM 100 — ENERIUM 200 — ENERIUM 210 — ENERIUM 300

Communication Modbus RS485

Without Input/Output

- **ENERIUM 100**
  Ref. P01330831
- **ENERIUM 300**
  Ref. P01330816 (STD supply)
  Ref. P01330818 (low level supply)

With Inputs/Outputs

- **ENERIUM 100 2I/2O**
  Ref. P01330832
- **ENERIUM 200 4I/2O**
  Ref. P01330833

Communication Ethernet Modbus TCP

Without Input/Output

- **ENERIUM 300**
  Ref. P01330817 (STD supply)
  Ref. P01330819
  (low level supply)

With Inputs/Outputs

- **ENERIUM 200 2I/4O**
  Ref. P01330834
- **ENERIUM 210 8I**
  Ref. P01330835
- **ENERIUM 300 4I/2O**

Choosing your power monitor

		Power monitors		
		► page 38	► page 38	► page 38
		 **Enerium 30**	 **Enerium 50**	 **Enerium 150**
Electrical energy management	Accuracy	1 %	0.5 %	0.5 %
	Measurement of V, U, I Inst. Min/Max Avg.	■	■	■
	Measurement of P, Q, S Inst. Min/Max Avg.	■	■	■
	Energy produced and consumed	■	■	■
	Consumption curves (10 min. avg. values)	-	8	8
Multi-energy management	Pulse inputs for other meters (water, gas, etc.)	-	0, 1 or 2	0, 1 or 2
	Inputs for analogue quantities (temperature, flow rate, pressure, insolation, etc.)	-	-	-
Installation supervision	Trend curves	-	-	4
	Management of alarms on thresholds	2	16	16
	Alarms log (recordings)	-	64	64
	Fresnel diagram	-	-	■
	Pulse or alarm outputs	0 or 1	0, 1 or 2	0, 1 or 2
	Analogue outputs	-	0 or 2	0 or 2
Power quality	THD / PF / Tan φ	■	■	■
	Harmonics by order with graphic representation	-	25	50
	Wave capture (U, V, I, In)	-	-	-
	EN50160 analysis	-	-	-
	Max. no. of input + output options	1	2	2
	RS485 – Modbus	■	■	■
	Ethernet – Modbus TCP	-	■	■
	Format (mm)	96 x 96	96 x 96	96 x 96
	Screenless version available	-	-	-

Power monitors

► page 38	► page 38	► page 38
 **Enerium 100**	 **Enerium 200**	 **Enerium 300**
0.5 %	0.2 %	0.2 %
■	■	■
■	■	■
■	■	■
-	8	8
0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
4	4	4
16	16	16
64	64	64
■	■	■
0, 2, or 4	0, 2, or 4	0, 2, or 4
0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
■	■	■
25	50	50
-	-	16
-	-	■
8	8	8
■	■	■
■	■	■
144 x 144	144 x 144	144 x 144
ENERIUM 110	ENERIUM 210	ENERIUM 310

WHAT IS THE MID?

The MID (Measuring Instruments Directive - 2004/22/CE) is a European Directive issued in 2004 which applies to devices and systems with a measuring function in order to protect the interests of consumers, particularly in the context of commercial transactions.

These measuring instruments may be active electrical energy meters (Annex MI003 of the Directive), water, gas or heat meters, weighing instruments, etc.

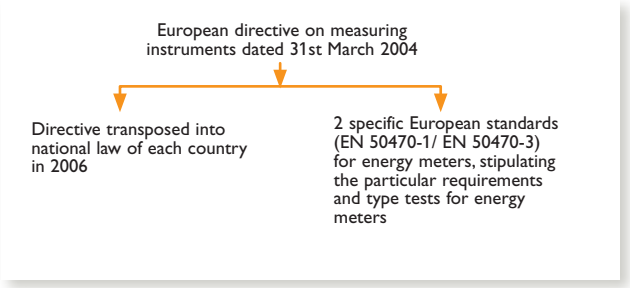
Scope

The MID covers three types of usage: "Measurements of residential, commercial and light industrial use". A minimum meter accuracy class is imposed for each usage category as stipulated in the Directive 2004/22/CE:

- Where a Member State imposes measurement of residential use, it shall allow such measurement to be performed by means of any Class A meter. For specified purposes the Member State is authorized to require any Class B meter.
- Where a Member State imposes measurement of commercial and/or light industrial use, it shall allow such measurement to be performed by any Class B meter. For specified purposes the Member State is authorized to require any Class C meter.

The MID does not however apply to *"Energy meters on which the [Ph-Ph] voltage between the connection terminals exceeds 600 V"*

Regulatory Context



CONDITIONS OF APPLICATION

In the European Union, the use of MID-certified meters on "private"[1] electrical networks has been made mandatory in the context of active energy billing based on consumption readings by index differences.

Typical examples include: camping sites, holiday rentals, student accommodation, office buildings, shopping centres, marinas, exhibition halls, electric vehicle recharging stations, etc.

As the MID is applicable to all European Union Member States, certification of ammeter by a Notified Body (NB) means that no other testing by a national legal metrological service is required. So a MID-certified Enerdis meter can be used as an active energy billing meter in all European Union countries.

The Directive also imposes product certification according to the EN50470-1/-3 standard, as well as design certification (Module B) and manufacturing process certification (Module D) by a Notified Body, in order to ensure product traceability and guarantee its metrological value, thus helping to protect consumers.

[1] Downstream of the meter at the network manager's point of supply.

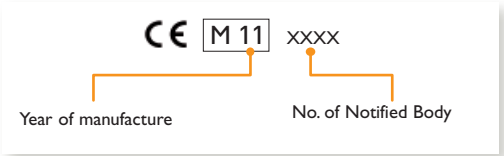
ACCURACY CLASSES AND METER IDENTIFICATION

The EN50470-1/-3 defines three specific accuracy Classes: A, B and C. These are comparable to the IEC62053-21/-22 active energy metering standards:

Class A is equivalent to 2% accuracy, Class B to 1 % and Class C to 0.5 %.

For total compatibility with the Directive, there must be regulatory marking for meter traceability. In addition to the manufacturer's name and the product reference, this regulatory marking comprises:

- A reference to Module D certification



- A reference issued by the Notified Body certifying conformity with regard to the Module B design inspection
- The meter's serial number

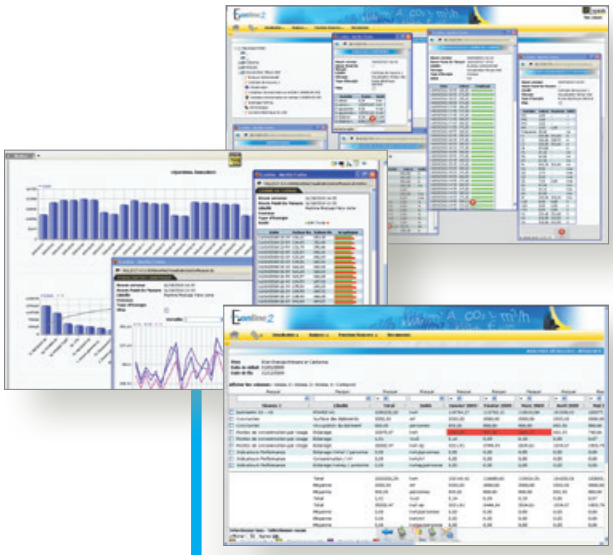
A declaration of conformity is enclosed with each product sold.

THE ENERDIS PRODUCTS CONCERNED

- All active energy meters whose references end in "M", such as the **MEMO3-M** and **MD65-M** for example, also identified by the MID logo in our catalogue, fully comply with the MID.
- The Directive does not cover current transformers, power monitors or the additional functions (other than active measurement) offered by smart meters.

KNOW ALL THE DETAILS: WHERE, WHEN, HOW, HOW MUCH? SUPERVISING, MANAGING AND EXCHANGING

E.online2®



Supervision

E.online®, a professional tool which remotely processes and analyses all the electrical data from an installation via the products associated with it.

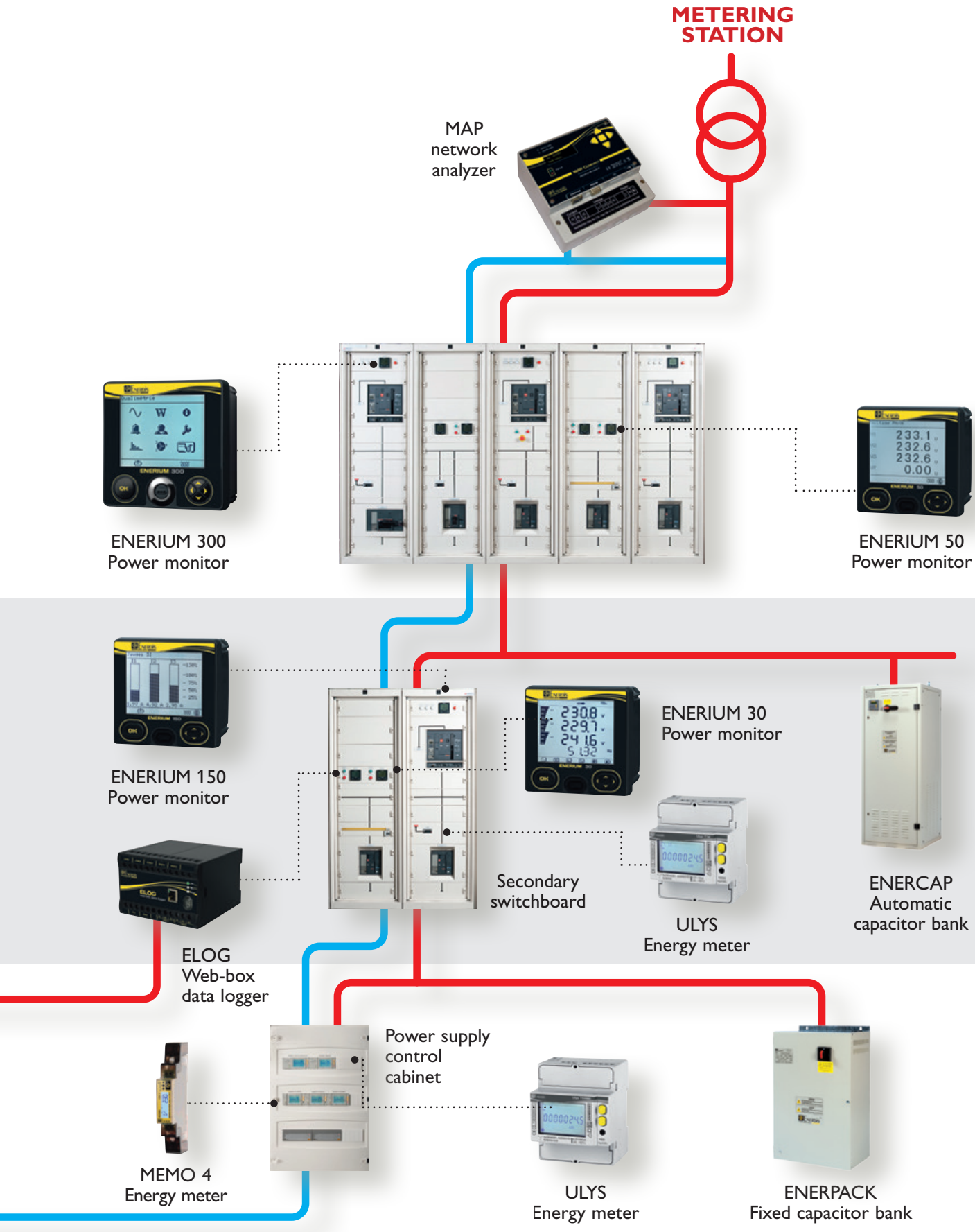
Metering and measurement

A full range of energy meters and power monitors that comply with the most demanding standards to ensure optimum accuracy.

Compensation and filtering

Fixed or automatic cabinet-mounted power factor correction solutions, a hybrid system for compensation and filtering and harmonic filtering equipment.

MULTI-UTILITY METERS


METERING STATION
MAP network analyzer
ENERIUM 300 Power monitor
ENERIUM 50 Power monitor
ENERIUM 150 Power monitor
ENERIUM 30 Power monitor
Secondary switchboard
ENERCAP Automatic capacitor bank
ULYS Energy meter
ELOG Web-box data logger
Power supply control cabinet
MEMO 4 Energy meter
ULYS Energy meter
ENERPACK Fixed capacitor bank

MEMO 3 single-phase 32 A

Energy meters for single-phase networks 32 A direct connection

PRODUCT ADVANTAGES

- **32 A** nominal current
- **CLASS 1** according to **IEC 62053-21 MID CLASS B** according to **EN50470-3**
- **COMPACT:** a single **DIN** module
- **PULSE OUTPUT** as standard
- **SEALABLE** on phase and neutral terminals

MID certification

Sealable terminal covers

Pulse output as standard

Description

MEMO 3 is the economical solution from ENERDIS for monitoring the electricity consumption of customers on single-phase 230 V networks. Equipped with mechanical display, the **MEMO 3** offers Class 1 accuracy, in total compliance with IEC standard 62053-21.

MEMO 3-M is the perfectly adapted solution for rebilling electricity on private network. Fully compliant with MID standard, **MEMO 3-M** energy meter is dedicated to electricity commercial applications as campsites, marinas, holiday rentals and outdoor accommodation facilities:
- DIN rail mounting with direct connection for 32 A network
- Sealable cover (phase and neutral terminals)
- Pulse output as standard

Associated with **E.online**® energy management software, it offers remote processing of energy consumption via PC, thus enabling you to produce consumption reports automatically and establish an accurate breakdown of the energies consumed.

Electrical specifications

Current input	MEMO3	MEMO3-M
Type	Single phase	
Rated current	32 A	
Istart current	20 mA	
Max. permanent current	50 A	
Max. current	20 mA	0,25 A
Voltage input		
Measurement range	0 à 99 999,9 kWh	0 à 999 999,99 kWh
Consumption	< 2 VA	active 0,4 W
Rated voltage	230 V (-10 %/+20 %)	230 V (-20 %/+15 %)
Frequency	50 / 60 Hz	50 Hz
Sortie impulsions		
Type	insulated with open-collector transistor	optocoupler 5 - 30 Vdc / 20 mA
Weight	100 imp / kWh	1 000 imp / kWh

Mechanical specifications

	MEMO3	MEMO3-M
Protection rating	IP 51 on front panel	
Power circuit connection	Screw connection terminal for 6 mm² flexible wires (10 mm² for rigid wires)	
Pulse out connection	Screw connection terminal for 2.5 mm² wires Tightening torque 0.8 Nm	
Sealing system	On phase and neutral terminals	All terminals
Mounting	On 35 mm DIN rail	
Weight	100 g	70 g

Environment

	MEMO3	MEMO3-M
Operating temperature	-20 °C to +50 °C	-10 °C to +55 °C
Storage temperature	-30 °C to +70 °C	-30 °C to +85 °C
Relative humidity	< 95 % to 40 °C	

Screen elements

	MEMO3	MEMO3-M
Display	6 mecanical rolls Height 4 mm	LCD backlit screen Height of numbers 5 mm
Metrological led	Green flashing 3,200 times/kWh	Green flashing 2,000 times/kWh (600 ms if inversion L1/L2)
Total (kWh)	Indicates the total consumption	

Associated products

Data retrieval solutions

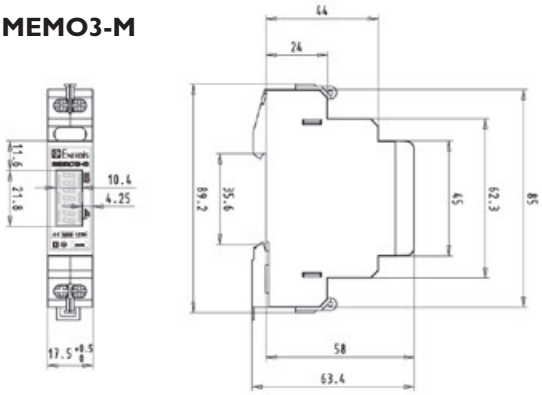
► page 56

E.online monitoring software

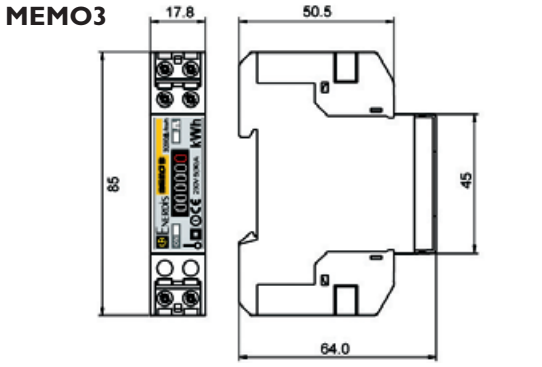
► page 68

Dimensions (in mm)

MEMO3-M



MEMO3



Electrical connections

MEMO3-M

MEMO3

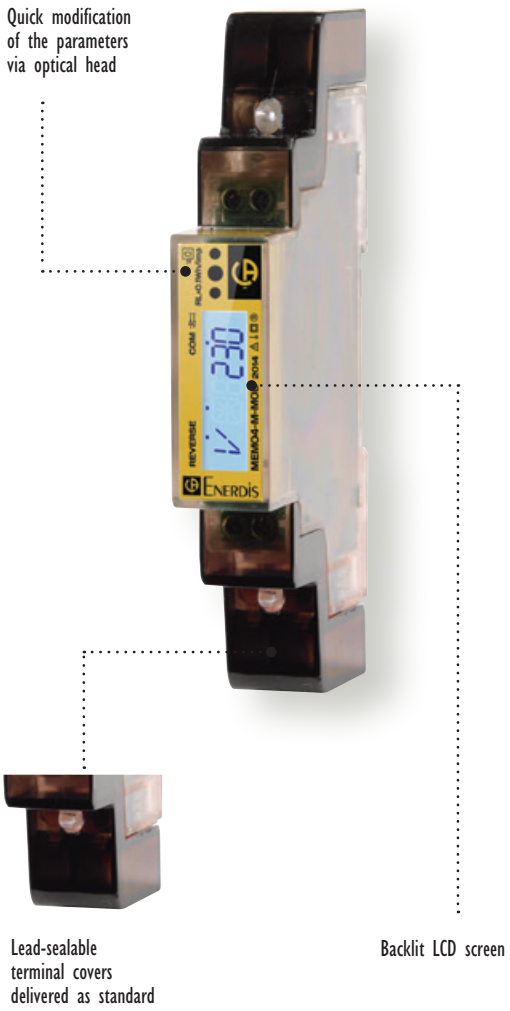
TO ORDER	
Model	Reference
MEMO3	MEMN 003NA
MEMO3-M	P01330700
Terminal covers (x10)	P01330701

MEMO 4 single-phase 45 A

Energy meter for single-phase networks
45 A direct connection

PRODUCT ADVANTAGES

- **INTEGRATED RS485** Modbus COMMUNICATION
- Resettable **PARTIAL METERING INDEX**
- **TWO-WAY METERING**
- **DOUBLE-TARIFF** metering
- Adjustable **PULSE WEIGHT**
- **MULTI-MEASUREMENT DISPLAY** of up to 15 quantities
- **MID** Class B



Description

MEMO 4 is a versatile range of **single-phase meters for low-voltage networks**. These meters are ideal for **metering** and **submetering** in all sectors of activity (tertiary, industry, data centers, vehicle recharging stations, etc.) and can monitor **energy consumption for electricity rebilling** on private networks **(MID version).**

- Distribution of active and reactive power
- 1 pulse output as standard (adjustable weight)
- MID version for energy rebilling on private networks (MEMO 4-M and MEMO 4-M Modbus)
- Tariff change via communication system (MEMO 4 Modbus and MEMO 4-M Modbus)
- Multiple measurements:
  - Instantaneous quantities: V, I, PF and F
  - Instantaneous quantities and energy index according to the direction of the energy and the tariff: P, Q and S
- RS485 Modbus communication output (MEMO 4 Modbus and MEMO 4-M Modbus)
- Two-way energy metering (consumed and generated)
- Resettable partial active energy index

If you use your MEMO 4 with a remote data-retrieval solution and the **E.online** energy management software, you can recover your energy consumption data remotely on your PC so that you can automatically generate consumption reports and allocate consumption fairly.

Electrical specifications

Current input	
Rated current (Imax)	45 A
Min. current (Imin)	250 mA
Istart current (Ist)	20 mA
Voltage input	
Rated voltage (Un)	230 Vac (-15% / + 10%)
Consumption	≤ 2 W
Frequency	50 Hz (±10%)
Metrological LED	
Weight	10,000 pulses/kWh
Pulse output	
Weight	Programmable (0.01 - 0.1 - 1 - 10 - 100 - 1,000 - 2,000 - 10,000 pulses/kWh)
Accuracy	
Active energy	Class 1 according to IEC 62053-21
	MID class B according EN 50470-1-3
Infrared output	
Wave length IR	900 - 1,000 nm
Protocol	IEC 62056-21/2002 (IEC 1107)
Communication	
Bus type	RS485
Protocol	MODBUS RTU with 16 bit CRC
Transmission speed	1,200 - 2,400 - 4,800 - 9,600 bauds/s (by default)
Address	0 - 247 (by default 2 last digits of SN)
Bus maximum loads	60
Maximum distance	1,000 m

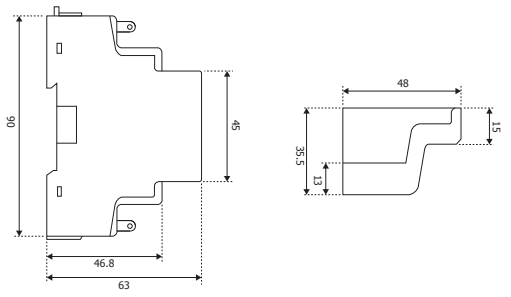
Mechanical specifications

Protection rating	IP 51 on front panel
Power circuit connection	Max 10 mm²
Pulse output connection or communication	Max 2.5 mm²
Mounting	On 35 mm DIN rail
Weight	80 g

Environment

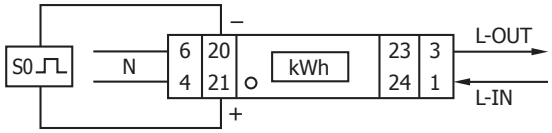
Operating temperature	-25 °C to +55 °C
Relative humidity	≤ 75 %

Dimensions (in mm)

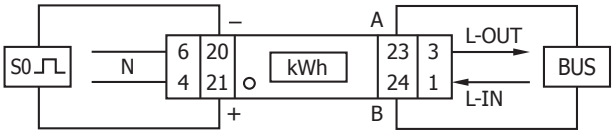


Electrical connections

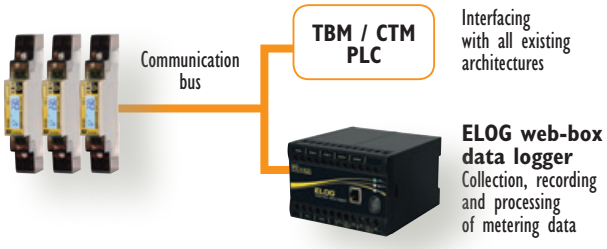
MEMO4-M



MEMO4 Modbus / MEMO4-M Modbus



Diagram



TO ORDER

Model	Certification	Communication	Reference
MEMO 4-M	MID	-	P01330751
MEMO 4 Modbus	IEC	RS485 Modbus	P01330752
MEMO 4-M Modbus	MID	RS485 Modbus	P01330753

Accessories	Reference
MEMO 4 optical head	P01330790

To facilitate quick programming of your MEMO 4 meters, an adapter is supplied with the optical head.

Associated products

Data retrieval solutions

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E.online monitoring software

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ULYS MD65 single-phase 65 A

Energy meter for single-phase networks
65 A direct connection

PRODUCT ADVANTAGES

- **FULL COMPLIANCE WITH IEC 62053-21 STANDARD – Class 1**
- **MID VERSION** for rebilling Class B
- **COMPACT:** only 2 DIN modules
- **PULSE OUTPUT**
- **LCD SCREEN**

Display of energy index on a LCD screen

Sealable terminal cover

Direct connection up to 65 A

Description

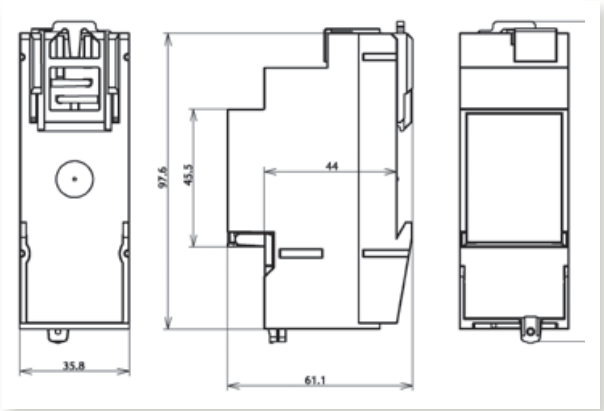
ULYS MD65 is an active energy meter for use in single-phase networks. This meter is designed for energy management applications on medium-power single-phase networks.
In particular, it is ideal for 63/65 A feeders in installations such as Buildings/Offices/Data centres/Shopping centres/Airports.

- Active energy metering for single-phase networks
- 1 pulse output can be connected to a data logger
- 65 A direct current inputs
- Display of the energy
- MID version available on request for rebilling

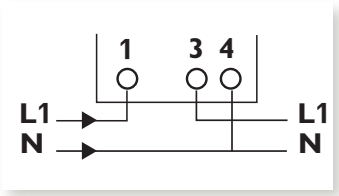
Electrical specifications

Current input	
Type	single phase
Rated current	65 A
Istart current	40 mA
Max. permanent current	0.5 A
Voltage input	
Measurement range	0 to 999,999.9 kWh
Consumption	> 8 VA
Rated voltage	230 V (-20% / +15%)
Frequency	50 Hz / 60 Hz
Pulse output	
Type	Insulated 5,000 VAC
Duration	Ton ≥ 85 ms / Toff ≥ 155 ms
Weight	1,000 pulses / kWh
Max voltage	350 Vdc/ac
Max current	130 mA
Accuracy	
Active energy	Class 1 as per IEC 62053-21 Class B according to EN 50470-3 (MID)
Metrological LED	
Characteristics	flashing red – 1,000 times / kWh

Dimensions (in mm)



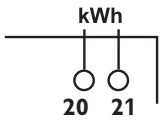
Electrical connections



Mechanical specifications

Protection rating	IP51
Power circuit connection	Screw connection terminal for 16 mm² wires
Pulse output connection	Screw connection terminal for 0.28 mm² wires (single strand)
Mounting	On DIN rail 35 mm
Weight	120 g

Pulse output



Environment

Operating temperature	-25°C to +60°C
Storage temperature	-40°C to +70°C
Relative humidity	75% average at 23°C ie 95% during 30 days at 23°C

Screen elements

Display	LCD screen
Digit height	5 mm
Numbers	7 digits from 000,000.0 to 999,999.9

TO ORDER

Model	Certification	Reference
ULYS MD65	IEC	P01330920
ULYS MD65-M	MID	P01330921

Associated products

Data retrieval solutions

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E.online monitoring software

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ULYS MD80 single-phase 80 A

Energy meter for single-phase networks
80 A direct connection

PRODUCT ADVANTAGES

- **IEC Class 1**
  MID CLASS B
- **4 QUADRANTS**
- **MULTI-MEASUREMENTS**
- **COMPATIBLE WITH ULYSCOM**
  multi-communication protocols
- **COMPACT:** only 2 DIN modules

2 tariffs

4 quadrants metering with energy balance indicator

2 pulses outputs as standard assignable to P, Q, S

Description

ULYS MD80 is an energy meter for use in single-phase networks.
This meter is designed for energy management applications or rebilling (MID version).
It is ideal for 80 A feeders in installations such as Building/Offices/Shopping centres.

- 2 pulse outputs as standard features assignable to P, Q or S
- 80 A direct current inputs
- Indication of connection errors
- MID version available for rebilling
- Tariff-change input as a standard feature (2 tariffs)
- Compatible with ULYSCOM communication modules (RS485, M-Bus, Ethernet)
- Automatic detection modules via the infrared port on the side of the product
- Multi-measurement: instantaneous P, Q and S, cumulative and partial energy index (V, I, PF, F via ULYSCOM)
- Sealable covers (delivered with lead for MID version)

Electrical specifications

Current input	
Type	direct
Rated current	(5) 80 A
Istart current	20 mA
Voltage input	
Rated voltage	230...240 Vac (± 20%)
Input consumption	7.5 VA max. per phase
Measurement range	0 to 9,999,999.9 kWh
Frequency	50/60 Hz
Tariff change input	
T1	No voltage
T2	from 80 Vac/Vdc to 276 Vac/Vdc max.
Pulse output	
Type	Optically isolated 250 Vac/dc
Number	2 assignable to Ea, Eq, or Es
Pulse weight	500 pulses/kWh, /kVArh, /kVAh
Pulse duration	50 ms
Max current	100 mA
Metering (accuracy)	
Active energy	Class 1 according to IEC 62053-21 MID Class B according to EN 50470-1-3
Reactive energy	Class 2 according to IEC 62053-23
Metrological LED	
(Weight)	1,000 pulses/kWh

Mechanical specifications

Format	2 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

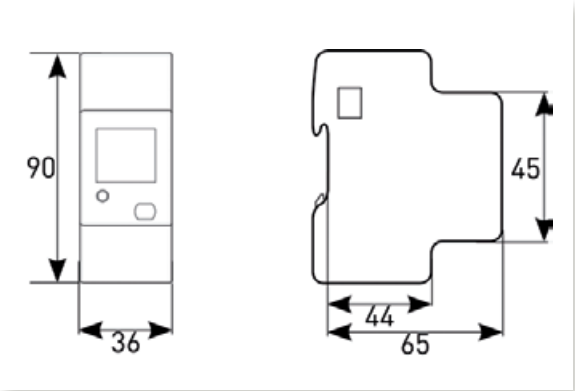
Environment

Operating temperature	-25°C to +55°C
Storage temperature	-25°C to +75°C
Relative humidity	Max 80% without condensation

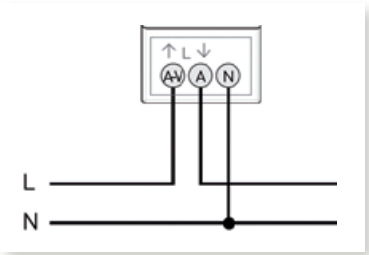
TO ORDER

Model	Certification	Reference
ULYS MD80	IEC	P01331010
ULYS MD8-M	MID	P01331011

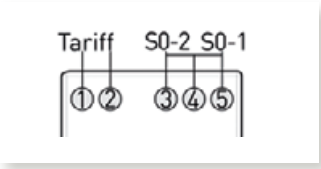
Dimensions (in mm)



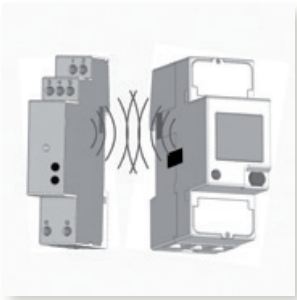
Electrical connections



Tariff inputs & S0 pulse outputs



Infrared connection



Associated products

ULYSCOM Communication modules

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E.online monitoring software

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Data retrieval solutions

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ULYS TD80 three-phase 80 A with integrated communication

Energy meter for three-phase networks
Direct connection up to 80 A

PRODUCT ADVANTAGES

- **INTEGRATED COMMUNICATION** depending on model: Ethernet, M-Bus, Modbus
- **IEC Class 1 MID CLASS B**
- **4 QUADRANTS**
- **MULTIPLE MEASUREMENTS**
- **COMPACT:** only 4 DIN modules

Customizable display of up to 15 electrical quantities

Measurement in all 4 quadrants with energy balance indicator

1 pulse output as standard, configurable as P, Q or S

Description

The **ULYS TD80** is an energy meter designed for use on three-phase networks. It is an ideal solution for energy management applications or for electricity rebilling on private networks (MID version). It is particularly suitable for 80 A applications in buildings, shopping malls, etc.

- Integrated communication depending on model: Ethernet, M-bus or Modbus
- Small size (4 modules)
- Display customizable by means of predefined user profiles
- 1 pulse output as standard, configurable as P, Q or S
- Direct inputs for current up to 80 A
- Connection error indicator
- MID version available for electricity rebilling
- Tariff-change input as standard (double tariff) except on Ethernet model
- Direct display of multiple measurements: instantaneous P, Q and S, total and partial energy indices, V, U, I, PF, F
- Lead-sealable terminal covers (delivered with lead for MID version)

Electrical specifications

Current input	
Type	Direct
Rated current (In)	(5) 80 A
Istart current (Ist)	20 mA
Voltage input	
Rated voltage (Un)	3 x 230/400 Vac... 3 x 240/415 Vac (±20%)
Consumption	7.5 VA max. per phase
Frequency	50/60 Hz
Tariff change input (M-bus and Modbus models)	
T1	No voltage
T2	from 80 Vac/Vdc to 276 Vac/Vdc max.
Pulse output	
Type	Optically isolated 250 Vac/dc
Number	1 assignable to Ea, Eq, or Es
Weight	100 pulses/kWh, /kVArh, /kVAh
Accuracy	
Active energy	Class 1 according to IEC 62053-21
	MID class B according EN 50470-1-3
Reactive energy	Class 2 according to IEC 62053-23
Metrological LED	
Weight	1,000 pulses/kWh
Communication	
Ethernet	IEEE 802.3 standard Modbus TCP, HTTP, NTP and DHCP protocols Integrated web pages
Modbus	EIA RS485 standard RS485 bus Modbus RTU / ASCII protocol Speed: 300... 57,600 bauds
M-bus	IEC 13757-1-2-3 standard M-bus protocol Speed: 300... 9,600 bauds

Mechanical specifications

Format	4 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

Environment

Operating temperature	-25°C to +55°C
Storage temperature	-25°C to +75°C
Relative humidity	Max 80% without condensation

Associated products

Data retrieval solutions

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E.online monitoring software

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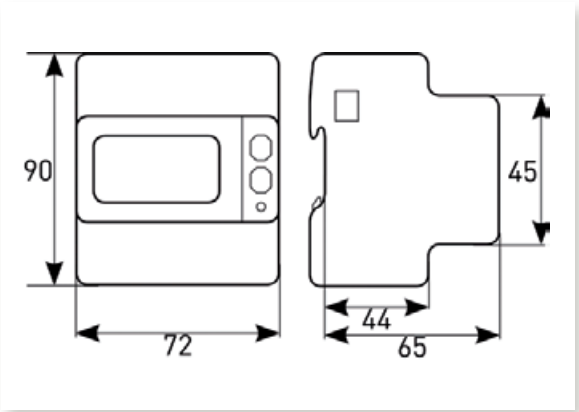
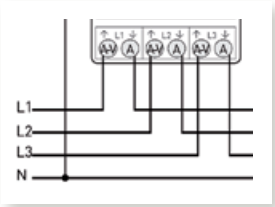
Dimensions (in mm)

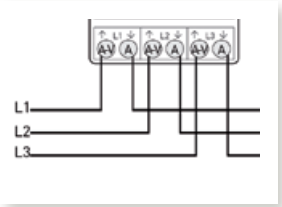


Electrical connections

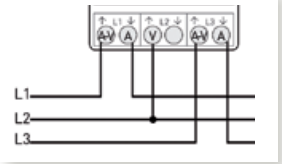
4 wires, 3 currents
All models

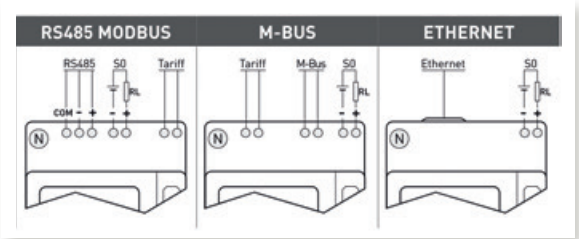


3 wires, 3 currents
M-bus model



3 wires, 2 currents
M-bus model





TO ORDER

Model	Certification	Reference
ULYS TD80 Modbus	IEC	P01331034
ULYS TD80-M Modbus	MID	P01331036
ULYS TD80 M-bus	IEC	P01331042
ULYS TD80-M M-bus	MID	P01331044
ULYS TD80 Ethernet	IEC	P01331038
ULYS TD80-M Ethernet	MID	P01331040

ULYS TT three-phase CT connection with integrated communication

Energy meter for three-phase networks
Connection on CT

PRODUCT ADVANTAGES

- **INTEGRATED COMMUNICATION** depending on model: Ethernet, M-Bus, Modbus
- **IEC Class 1 MID CLASS B**
- **4 QUADRANTS**
- **MULTIPLE MEASUREMENTS**
- **COMPACT:** only 4 DIN modules

Customizable display of up to 15 electrical quantities

Measurement in all 4 quadrants with energy balance indicator

1 pulse output as standard, configurable as P, Q or S

Description

The **ULYS TT** is an energy meter designed for use on three-phase networks.
It is an ideal solution for energy management applications or for electricity rebilling on private networks (MID version).

- Integrated communication depending on model: Ethernet, M-bus or Modbus
- Small size (4 modules)
- Display customizable by means of predefined user profiles
- 1 pulse output as standard, configurable as P, Q or S
- 1 or 5 A isolated inputs
- Connection error indicator
- MID version available for electricity rebilling
- Tariff-change input as standard (double tariff) except on Ethernet model
- Direct display of multiple measurements: instantaneous P, Q and S, total and partial energy indices, V, U, I, PF, F
- Lead-sealable terminal covers (delivered with lead for MID version)

Electrical specifications

Current input	
Type	On CT 1 or 5 A
Rated current (In)	5 A
Istart current (Ist)	20 mA
Voltage input	
Rated voltage (Un)	3 x 230/400 Vac... 3 x 240/415 Vac (±20%)
Consumption	7.5 VA max. per phase
Frequency	50/60 Hz
Tariff change input (M-bus and Modbus models)	
T1	No voltage
T2	from 80 Vac/Vdc to 276 Vac/Vdc max.
Pulse output	
Type	Optically isolated 250 Vac/dc
Number	1 assignable to Ea, Eq, or Es
Weight	100 pulses/kWh, /kVArh, /kVAh
Accuracy	
Active energy	Class 1 according to IEC 62053-21
	MID class B according EN 50470-1-3
Reactive energy	Class 2 according to IEC 62053-23
Metrological LED	
Weight	1,000 pulses/kWh
Communication	
Ethernet	IEEE 802.3 standard Modbus TCP, HTTP, NTP and DHCP protocols Integrated web pages
Modbus	EIA RS485 standard RS485 bus Modbus RTU / ASCII protocol Speed: 300... 57,600 bauds
M-bus	IEC 13757-1-2-3 standard M-bus protocol Speed: 300... 9,600 bauds

Mechanical specifications

Format	4 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

Environment

Operating temperature	-25°C to +55°C
Storage temperature	-25°C to +75°C
Relative humidity	Max 80% without condensation

Associated products

Data retrieval solutions

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E.online monitoring software

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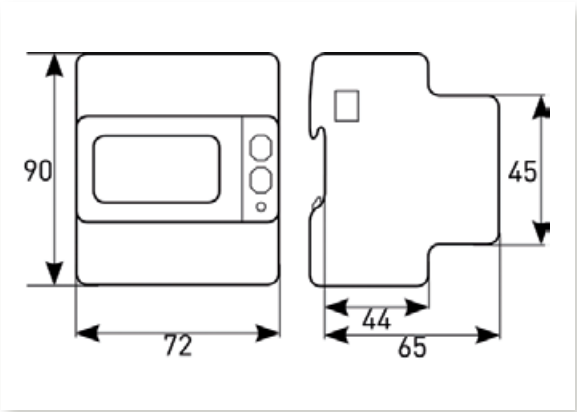
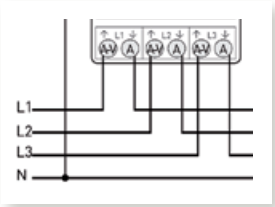
Dimensions (in mm)

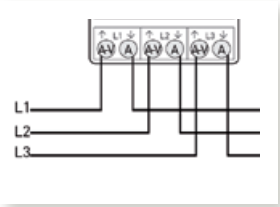


Electrical connections

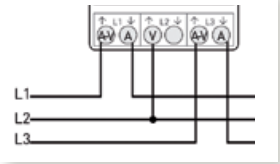
4 wires, 3 currents
All models

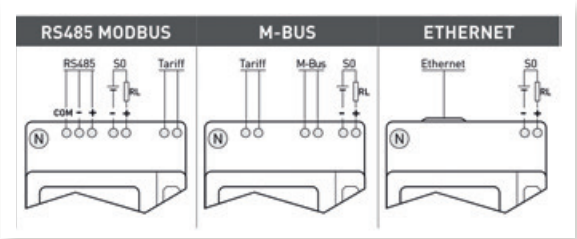


3 wires, 3 currents
M-bus model



3 wires, 2 currents
M-bus model





TO ORDER

Model	Certification	Reference
ULYS TT Modbus	IEC	P01331035
ULYS TT-M Modbus	MID	P01331037
ULYS TT M-bus	IEC	P01331043
ULYS TT-M M-bus	MID	P01331045
ULYS TT Ethernet	IEC	P01331039
ULYS TT-M Ethernet	MID	P01331041

ULYS TDA80 three-phase 80 A

Energy meter for three-phase LV networks
80 A direct connection

PRODUCT ADVANTAGES

- **IEC Class 1**
  MID CLASS B
- **4 QUADRANTS**
- **MULTI-MEASUREMENTS**
- **COMPACT:** only 4 DIN modules
- **COMPATIBLE WITH ULYSCOM**
  multi-communication protocols

2 tariffs

4 quadrants metering with energy balance indicator

2 pulses outputs as standard assignable to P, Q, S

Description

ULYS TDA80 is an energy meter for use in three-phase networks.
This meter is designed for energy management applications or rebilling (MID version).
It is ideal for 80 A feeders in installations such as Building/Offices/Shopping centres

- 2 pulse outputs as standard features assignable to P, Q or S
- 80 A direct current inputs
- Indication of connection errors
- MID version available for rebilling
- Tariff-change input as a standard feature (2 tariffs)
- Compatible with ULYSCOM communication modules (RS485, M-bus, Ethernet)
- Automatic detection modules via the infrared port on the side of the product
- Multi-measurement: instantaneous P, Q and S, cumulative and partial energy index (V, U, I, PF, F via ULYSCOM)
- Sealable covers (delivered with lead for MID version)

Electrical specifications

Current input	
Type	direct
Rated current	(5) 80 A
Istart current	20 mA
Voltage input	
Rated voltage	3 x 230/400 Vac... 3 x 240/415 Vac (± 20%)
Input consumption	7.5 VA max. per phase
Measurement range	0 to 9,999,999.9 kWh
Frequency	50/60 Hz
Tariff change input	
T1	No voltage
T2	80 Vac/dc to 276 Vac/dc max.
Pulse output	
Type	Optically isolated 250 Vac/dc
Number	2 assignable to Ea, Eq, or Es
Pulse weight	100 pulses/kWh, /kVArh, /kVAh
Pulse duration	50 ms
Max current	100 mA
Metering (accuracy)	
Active energy	Class 1 according to IEC 62053-21 MID Class B according to EN 50470-1-3
Reactive energy	Class 2 according to IEC 62053-23
Metrological LED	
(Weight)	1,000 pulses/kWh

Mechanical specifications

Format	4 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

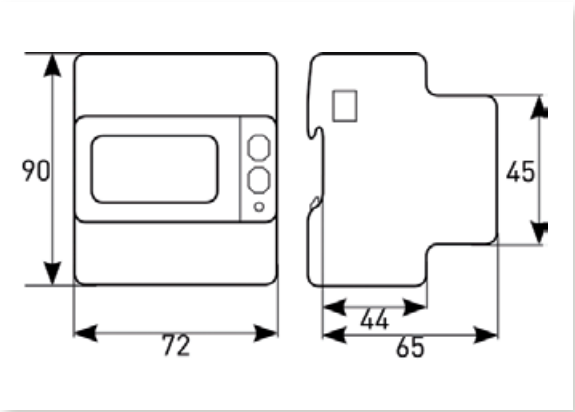
Environment

Operating temperature	-25°C to +55°C
Storage temperature	-25°C to +75°C
Relative humidity	Max 80% without condensation

TO ORDER

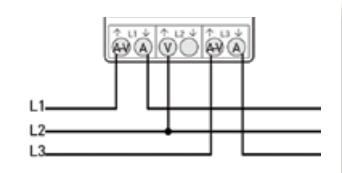
Model	Certification	Reference
ULYS TDA	IEC	P01331012
ULYS TDA80-M	MID	P01331018

Dimensions (in mm)

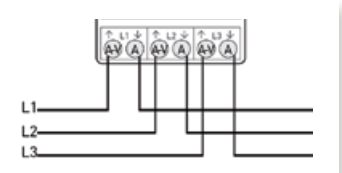


Electrical connections

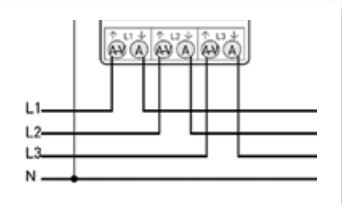
4 wires, 2 currents



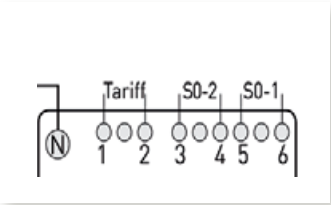
3 wires, 3 currents



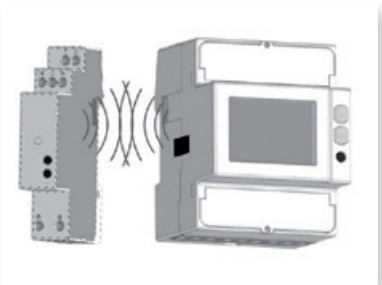
4 wires, 3 currents



Tariff inputs & S0 pulse outputs



Infrared connection



Associated products

ULYSCOM Communication modules

► page 36

E.online monitoring software

► page 68

Data retrieval solutions

► page 56

ULYS TTA three-phase CT connection

Energy meter for three-phase LV networks
CT connection

PRODUCT ADVANTAGES

- **IEC Class 1**
  MID CLASS B
- **MULTI-MEASUREMENTS**
- **COMPATIBLE WITH ULYSCOM**
  multi-communication protocols
- **COMPACT:** only 4 DIN modules

2 tariffs

4 quadrants metering with energy balance indicator

2 pulses outputs as standard assignable to P, Q, S

Description

ULYS TTA is an energy meter for use in three-phase networks.
This meter is designed for energy management applications or rebilling (MID version).

- 2 pulse outputs as standard features assignable to P, Q or S
- 1 or 5 A isolated inputs
- Indication of connection errors
- MID version available for rebilling
- Tariff-change input as a standard feature (2 tariffs)
- Compatible with ULYSCOM communication modules (RS485, M-bus, Ethernet)
- Automatic detection modules via the infrared port on the side of the product
- Multi-measurement: instantaneous P, Q and S, cumulative and partial energy index (V, U, I, PF, F via ULYSCOM)
- Sealable covers (delivered with lead for MID version)

Electrical specifications

Current input	
Type	On CT 1 or 5 A
Rated current	5 A
Istart current	20 mA
Voltage input	
Rated voltage	3 x 230/400 Vac... 3 x 240/415 Vac (± 20%)
Input consumption	7.5 VA max. per phase
Measurement range	0 to 9,999,999.9 kWh
Frequency	50/60 Hz
Tariff change input	
T1	No voltage
T2	80 Vac/dc to 276 Vac/dc max.
Pulse output	
Type	Optically isolated 250 Vac/dc
Number	2 assignable to Ea, Eq, or Es
Pulse weight	set automatically according to CT ratio: from 1,000 pulses/kWh to 0.1 pulses, kVArh
Pulse duration	50 ms
Max current	100 mA
Metering (accuracy)	
Active energy	Class 1 according to IEC 62053-21 MID Class B according to EN 50470-1-3
Reactive energy	Class 2 according to IEC 62053-23
Metrological led	
(Weight)	1,000 pulses/kWh

Mechanical specifications

Format	4 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 6 mm² wire
Protection	IP51 front panel

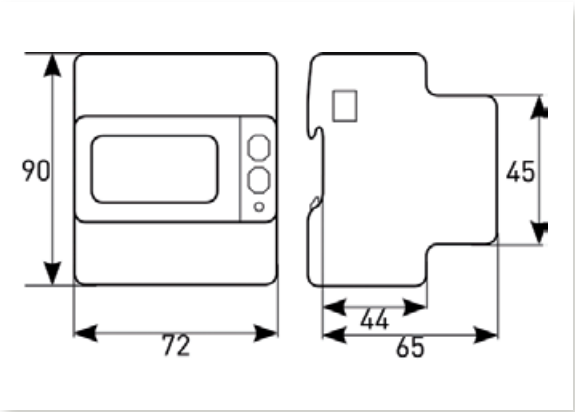
Environment

Operating temperature	-25°C to +55°C
Storage temperature	-25°C to +75°C
Relative humidity	Max 80% without condensation

TO ORDER

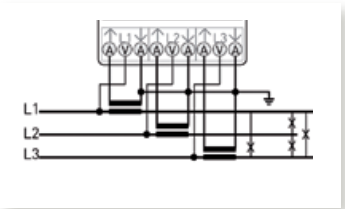
Model	Certification	Reference
ULYS TTA	IEC	P01331015
ULYS TTA-M	MID	P01331019

Dimensions (in mm)

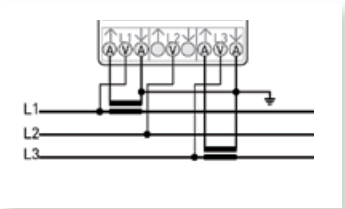


Electrical connections

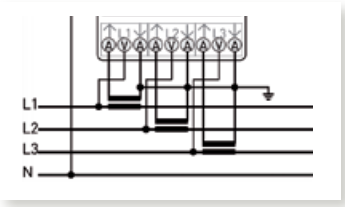
3 wires, 3 CTs



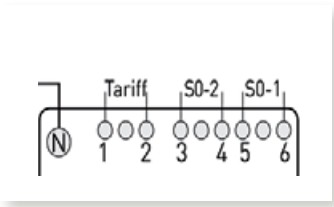
3 wires, 2 CTs



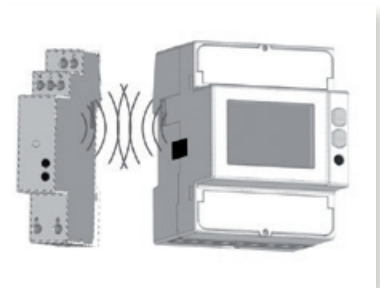
4 wires, 3 CTs



Tariff inputs & S0 pulse outputs



Infrared connection



Associated products

ULYSCOM Communication modules

▶ page 36

E.online monitoring software

▶ page 68

Data retrieval solutions

▶ page 56

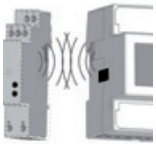
ULYSCOM

Communication modules for ULYS MD80 – TDA80 - TTA energy meters

PRODUCT ADVANTAGES

- **MULTI-PROTOCOL** communication modules: **ETHERNET, RS485, M-BUS**
- **AUTOMATIC RECOGNITION** of the modules by the associated meters
- **DIRECT INTERFACING:** between the metering point and Enerdis's energy management software or any other system

Communication activity status indicator LED



No-connection infrared link automatic detection between meter and ULYSCOM

Line termination resistance integrated directly in the RS485 module

Description

ULYSCOM communication modules are suitable for single-phase or three-phase meters (ULYS MD80 – TDA – TTA range).

ULYSCOM modules allow direct interfacing between the metering point and Enerdis's energy management software or any other system (e.g. programmable logic controllers).

ULYSCOM modules gives access to all electrical quantities measured by the meter, as well as additional quantities such as V, U, I, PF and F.

Specifications

ULYSCOM RS485

Enables the meters to be interfaced directly with the Enerdis energy management software E.online® or with a CTM / TBM programmable logic controller.

- 230 Vac +/- 20 % / 50 Hz / < 5 VA
- Configurable RTU (8N1) or ASCII (7E2) mode
- Speed from 300 to 115,200 bps
- Integrated 120 Ω line termination resistance (directly activatable on the module)
- Connection: 2 wires, half-duplex

ULYSCOM M-BUS

Delivered with the free M-Bus MASTER software to configure and read the quantities measured by the energy meter.

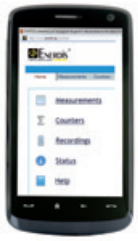
- Self-powered on the communication bus
- Speed from 300 to 38,400 bps
- Connection: 2 wires, M-Bus

ULYSCOM ETHERNET

Can be used to read measurements directly via integrated web pages and to view an overview of consumption covering several weeks with a simple web browser.

Direct measurement readings via integrated web pages.

- 230 Vac +/- 20 % / 50 Hz / < 5 VA
- Compatible with 10 or 100 base T
- Connection: RJ45



Environment

Operating temperature	-25°C to +55°C (-15°C to +60°C for ULYSCOM KNX)
Storage temperature	-25°C to +75°C
Relative humidity	Max. 80% without condensation

Mechanical specifications

Format	ULYSCOM RS485, M-Bus and KNX: 1 DIN module ULYSCOM Ethernet: 2 DIN modules
Mounting	On DIN rail
Connection	Screw-on terminal strip for 6 mm² wire
Protection	IP51 face avant

TO ORDER

Communication modules	Reference
ULYSCOM MODBUS RS485	P01331030
ULYSCOM M-BUS	P01331031
ULYSCOM ETHERNET MODBUS TCP	P01331032

Associated products

ULYS MD80
Single-phase meter
80 A direct input

► page 26

ULYS TDA80
Three-phase meter
80 A direct input

► page 32

ULYS TTA
Three-phase meter
CT connection

► page 34

ENERIUM Range

Power monitors for all electrical networks compliant with the IEC 61557-12 standard

PRODUCT ADVANTAGES

- **8 LOAD CURVES**
- **16 PROGRAMMABLE ALARMS**
- **GRAPHICS FOR** easier data analysis
- **SPECTRAL ANALYSIS** per phase up to the 50th order on U, I and In
- **QUALIMETRY** according to **EN50160 STANDARD**

Optical head for:
- programming
- reading the data
- upgrading the firmware

Ethernet output (Modbus/TCP)
RS485 output (Modbus/Jbus RTU)

Screenless version for DIN-rail mounting or plate mounting

Up to 8 on-off or analogue inputs/outputs

Description

A complete range of 6 power monitors ideal for:
- LV/MV/HV network supervision
- installation sizing
- energy management
- electrical network quality applications

Screen displays

Display
Real-time display of instantaneous, average…
Time/date-stamped recording of min and max values

16 alarms
Programmable, viewing of alarms log, recording of the last 64 events

Recording
Indices and consumption curves (electricity, water, gas).
Temperature curves and trend curves

Customizable screens
3 screens with 4 display lines each to organize the information as you wish

Qualimetry
Measurement of THD per phase on U, I and In.
Spectral analysis per phase up to the 50th order on U, I and In

Quick programming
Current transformer ratios and communication parameters can be set on the front panel or remotely

Graphics
For easier data analysis. Fresnel diagram. Gauge for V, U, I, P

Indication of connection errors

Qualimetry
Log of the last 1024 events (dips, outages, overvoltages, overcurrents).
Waveform capture (V-U-I-In)
Statistical analysis graphs as per EN50160

Preventive maintenance
Installation operating time.
Operating time of monitored equipment

Functional specification

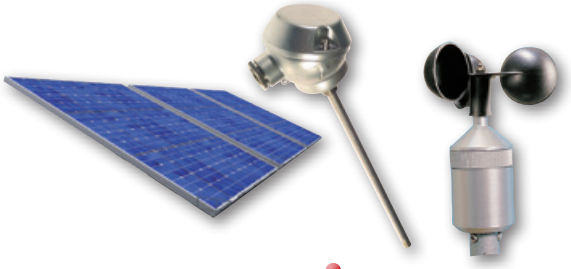
	Power monitor					
	Flush-mounting 96 x 96			Flush-mounting 144 x 144		
						
	Enerium 30	Enerium 50	Enerium 150	Enerium 100	Enerium 200	Enerium 300
	ELECTRICAL ENERGY			MULTI-ENERGY		POWER QUALITY
Functional specifications						
Accuracy class (IEC61557-12)	1	0.5	0.5	0.5	0.5 or 0.2	0.2
Format	96 x 96 mm	96 x 96 mm	96 x 96 mm	144 x 144 mm	144 x 144 mm	144 x 144 mm
Graphic LCD screen	✓	✓	✓	✓	✓	✓
Version without display	-	-	-	Enerium 110	Enerium 210	Enerium 310
Mounting	Flush-mounted, DIN rail* or plate-mounted*	Flush-mounted, DIN rail* or plate-mounted*	Flush-mounted, DIN rail* or plate-mounted*	Flush-mounted, DIN rail* or plate-mounted (Enerium 110)	Flush-mounted, DIN rail* or plate-mounted (Enerium 210)	Flush-mounted, DIN rail* or plate-mounted (Enerium 310)
Harmonics						
Max. order	-	25	50	25	50	50
Recording functions						
8 load curves	-	✓	✓	-	✓	✓
4 trend curves	-	-	✓	✓	✓	✓
Alarms						
Number of alarms	2	16	16	16	16	16
Time/date-stamped events recorded	-	64	64	64	64	64
Qualimetry functions						
Qualimetry according to EN50160	-	-	-	-	-	✓
V, U, I and In waveform capture	-	-	-	-	-	16
Storage of last 1024 events (dips, outages, overvoltages) with time/date-stamping	-	-	-	-	-	✓
Inputs / outputs						
Max. number	1	2	2	8	8	8
Inputs (optional)						
On-off (pulses or alarm)	-	0, 1 or 2	0, 1 or 2	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
Analogue	-	-	-			
Outputs (optional)						
On-off (pulses or alarm)	0 or 1	0, 1 or 2	0, 1 or 2	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
Analogue	0	0 or 2	0 or 2	0, 2 or 4	0, 2 or 4	0, 2 or 4
Graphics						
Fresnel	-	-	✓	✓	✓	✓
Gauges	✓	-	✓	-	-	-
Histograms of harmonic orders	-	-	✓	-	✓	✓
Communication interface						
Optical / USB	-	Front	Front	Front or rear	Front or rear	Front or rear
Ethernet or RS485	RS485	✓	✓	✓	✓	✓
Metrological LED	-	-	-	✓	✓	✓
Other functions						
Programming on front panel	✓	✓	✓	✓	✓	✓
Programming via software	-	✓	✓	✓	✓	✓

* With mounting kit

ENERIUM Range

Example of applications

ANALOGUE INPUTS



METERING INPUTS

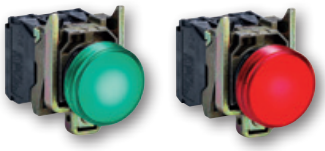
water, gas, electricity

insolation, weather data, temperatures, etc.

CURRENT AND VOLTAGE INPUTS – LV/MV/HV NETWORKS

ANALOGUE OUTPUTS

ALARM RELAY OUTPUTS



SYNCHRO PULSE INPUTS

STORAGE OF STATUSES AND ALARMS

E.ONLINE® ENERGY MANAGEMENT SOFTWARE

PLCs FOR CTM/TBM SUPERVISION

PLC OUTPUTS (ALARM/PULSE)

Inputs

Communication

Outputs

Photos: Chauvin Arnoux - Schneider Electric.

Measurements

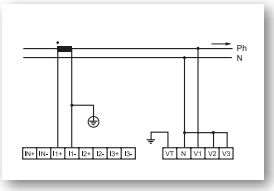
	I S	min	max	average	min average	max average
V, U	●	○	●	●		○
Vearth	○	○	○	○		○
I	●	○	●	●		○
In (calculated or measured)(1)	●	○	●	●	○	○
P (4 quadrants)	●		○	○		
Pt (4 quadrants)	●	●	●	●		○
Q (4 quadrants)	●		○	○		
Qt (4 quadrants)	●	○	●	●		○
S	●		○	○		
St	●	●	●	●		○
FP (4 quadrants)	●			○		
FPt (4 quadrants)	●			●	○	○
Cosφ (4 quadrants)	○			○		
Cosφt (4 quadrants)	○	○	○	○	○	○
Tanφt (4 quadrants)	●			●	○	○
Frequency	●	○	●	○		
V crest factor	○			○		○
I crest factor	○			○		○
U unbalance	○			○		○
Harmonics on V, U, I	○					
Harmonics on In	○					
THD V, U, I	●			●		○
THD In	●		○	●		○
Active energy (receiver, generator)	●					
Reactive energy (Qcad1, 2, 3, 4)	●					
Apparent energy (receiver, generator)	●					
On-off input (pulse mode)	○					
Analogue input (Enerium 100/200)	○	○	○	○	○	○
Voltage presence hour meter (U)	○					
Load hour meter (I)	●					
Auxiliary power supply hour meter	●					

○ Except on Enerium 30

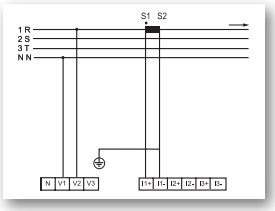
(1) on Enerium 30/50/150, calculated only

Connection diagrams

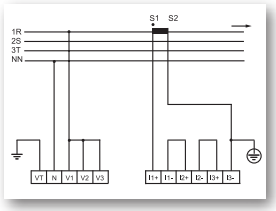
Single-phase



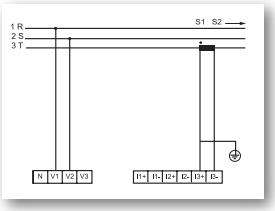
Balanced 3-phase,
4 wires - 1 CT
Except on Enerium 30



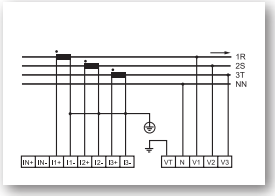
Balanced 3-phase,
4 wires - 1 CT
Enerium 30 only



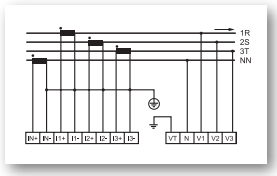
Balanced 3-phase,
3 wires - 1 CT
Enerium 30 only



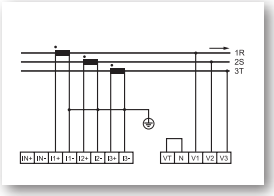
Unbalanced 3-phase,
4 wires - 3 CTs



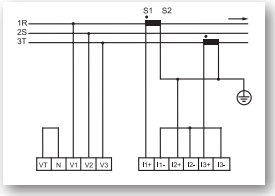
Unbalanced 3-phase,
4 wires - 4 CTs
Except on Enerium 30/50/150



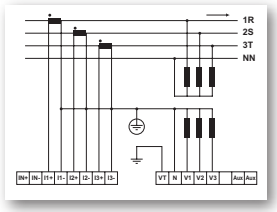
Unbalanced 3-phase,
3 wires - 3 CTs



Unbalanced 3-phase,
3 wires - 2 CTs



Example of connection to VT



Trend curves
(except on Enerium 30/50)

IS VALUES	
V, Vearth	●
U12, U23, U31	●
I1, I2, I3, In	●
Pt	●
Qt	●
St	●
PFt	●
U unbalance	●
THD V, U, I, In	●
Analogue inputs (Enerium 100/200 only)	●
AVERAGE VALUES	
V1, V2, V3	●
U12, U23, U31	●
I1, I2, I3, In	●
Gen: P1, P2, P3, Pt	●
Rec: P1, P2, P3, Pt	●
Analogue inputs (Enerium 100/200 only)	●
Gen: PF1, PF2, PF3, PFt	●
Rec: PF1, PF2, PF3, PFt	●
Gen: Cosφ1, Cosφ2, Cosφ3, Cosφt	●
Rec: Cosφ1, Cosφ2, Cosφ3, Cosφt	●
Tanφt	●
Frequency	●
Crest factor V1, V2, V3	●
Crest factor I1, I2, I3	●
THD U12, U23, U31	●
THD I1, I2, I3, Ineutral	●
THD V1, V2, V3	●

Load curves
(except on Enerium 30/100 and 110)

AVERAGE VALUES	
Pt Gen, Pt, Rec	●
Qcad1, Qcad2, Qcad3, Qcad4,	●
St Gen, St Rec	●
On-off inputs	●
Analogue inputs (Enerium 200 only)	●

Alarms

IS VALUES	
V1, V2, V3	●
Vearth	○
U12, U23, U31	●
I1,I2, I3, In	●
Pt	●
Qt	●
St	●
PFt	●
Cosφt	○
Tanφt	●
Frequency	●
U unbalance	○
THD V, U, I, In	○
3 hour meters: network presence, on-load presence, aux. source	○
Analogue inputs (Enerium 100/200 only)	○
AVERAGE VALUES	
Pt Gen, Pt Rec	○
Qt Gen, Qt Rec	○
St	○
Tanφt (except on Enerium 30/50/150)	○
Analogue inputs (Enerium 100/200 only)	○
ON-OFF INPUTS (Enerium 100/200/300 only)	●

○ Except Enerium 30

Analogue outputs (option)
(Except Enerium 30)

IS VALUES	
V1, V2, V3, Vearth	●
U12, U23, U31	●
I1, I2, I3, In	●
Pt	●
Q1, Q2, Q3	●
Qt	●
S1, S2, S3	●
St	●
PF1, PF2, PF3	●
PFt	●
Cosφ1, Cosφ2, Cosφ3,	●
Cosφt,	●
Tanφt,	●
Frequency	●

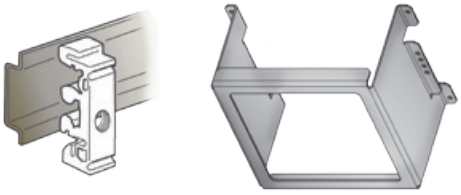
General specifications

	ENERIUM 30 Class 1	ENERIUM 50/150 Class 0.5 s	ENERIUM 100/200 Class 0.5 s	ENERIUM 200 Class 0.2 s	ENERIUM 300 Class 0.2 s
Electrical network					
Max. phase-to-phase voltage measured	650 kV				
VT ratio	VT primary: 100 V to 650 kV VT secondary: 100 V to 480 V				
Max. current measured	25,000 A				
CT ratio	CT primary: 1 A to 25,000 A CT secondary: 1 A or 5 A				
Max. power measured	2 GW				
Voltage inputs (AC)					
Measurement range	5 to 130 % of Vn for Vn = 57.7 / 230 V (ph-N) 5 to 130 % of Un for Un = 100 / 400 V (ph-ph)				
Crest factor	2				
Measurement accuracy (U and V)	0.5 % from 20 % to 130 % of Un / Vn	0.2 % from 20 % to 130 % of Un/Vn			
Overvoltage	Transient U = 800 V for 24 hours Permanent 130 % of 400 V = 520 V				
Frequency	50/60 Hz	50/60 Hz or 400 Hz	50/60 Hz	50/60 Hz or 400 Hz	50/60 Hz
Consumption	< 0.1 VA	< 0.15 VA	< 0.1 VA		
Input impedance	0.45 MΩ	0.44 MΩ	1 MΩ		
Current inputs (AC)					
Measurement range	1 % to 130 % of In for In = 5 A				
Crest factor	3				
Measurement accuracy	0.5 % from ≥ 10 % to ≤ 130 %	0.2 % from ≥ 10 % to ≤ 130 % 0.5 % from ≥ 5 % to ≤ 10 % 1 % from ≥ 1 % to ≤ 5 %			
Acceptable overload	Transient I = 250 A for 1 second Permanent 130 % of 5 A = 6.5 A				
Consumption	< 0.15 VA				
Compliance with standards					
IEC62053-22	Active energy Class 1 Reactive energy Class 2	Active energy Class 0.5 s Reactive energy Class 0.5 s		Active energy Class 0.2 s	
IEC61557-12 PMD SD/SS	V,I Class 0.5 P,S Class 0.5	V,I Class 0.2 P,S Class 0.5	Class 0.5	Class 0.2	Class 0.2
		Active energy Class 0.5 Reactive energy Class 0.5		Active energy Class 0.2 Reactive energy Class 0.5	
Multi-measurement (accuracies)					
Active power and energy	1 % for 5 % In ≤ I ≤ Imax	0.5 % for 5 % In ≤ I ≤ Imax		0.2 % for 5 % In ≤ I ≤ Imax	
Reactive power and energy	2 % for 5 % In ≤ I ≤ Imax	0.5 % for 5 % In ≤ I ≤ Imax			
Apparent power and energy	1 % for 5 % In ≤ I ≤ Imax	0.5 % for 5 % In ≤ I ≤ Imax			
Power factor (PF) and cosφ	± 0.05 counts when 0.5 inductive < PF < 0.5 ± 0.1 counts when 0.2 inductive < PF < 0.2 capacitive	± 0.02 counts when 0.5 inductive < PF < 0.5 capacitive ± 0.05 counts when 0.2 inductive < PF < 0.2 capacitive			
Frequency	± 0.1% from 42.5 to 69 Hz				
Sampling frequency	6.4 kHz to 50 Hz				
THD-I. THD-V and THD-U	± 0.5 counts				
Harmonics order by order	–	± 0.5 counts			

	ENERIUM 30 Class 1	ENERIUM 50/150 Class 0.5 s	ENERIUM 100/200 Class 0.5 s	ENERIUM 200 Class 0.2 s	ENERIUM 300 Class 0.2 s
RS485 output					
Connection	2 wires, half-duplex				
Protocol	ModBus / JBus RTU mode				
Speed (configurable)	2,400 - 4,800 - 9,600 - 19,200 - 34,800 (115,200 on ENERIUM 50/150)				
Parity	Even, odd or none				
JBus addresses	1 to 247				
Ethernet output					
Type	-	RJ45 - 8 pins			
Protocol	-	ModBus/TCP			
Speed (configurable)	-	Compatible with 10, 100 and 1,000 base T			
Auxiliary power supply					
Power supply	110 to 400 Vac (< 10 VA) 42.5 Hz to 69 Hz 155 to 565 Vdc	80 to 265 Vac (< 15 VA) 42.5 to 69 Hz 110 to 375 Vdc 19 to 57 Vdc (< 7.5 W)	80 to 265 Vac (< 20 VA) - 42.5 to 69 Hz 110 to 375 Vdc 19 to 57 Vdc (< 10 W)		
Digital inputs (on-off or metering pulse)					
Operating voltage	-	Up to 70 Vdc max	High level: 10 to 110 Vdc Low level: 0 to 5 Vac		
Min. signal width	-	High: 30 ms Low: 30 ms			
Consumption	-	< 0.5 W			
Pulse or alarm relay outputs					
Type	Static relay				
Operating voltage	70 Vdc max 33 Vac max	24 to 110 Vdc ± 20% 24 to 230 Vac ± 10%			
Max. current	100 mA	100 mA			
Compliance with standard	IEC 62053-31				
Analogue inputs					
Scale	-	-	Configurable between -20 to +20 mA		
Power consumption	-	-	< 50 mW		
Input impedance	-	-	50 Ω		
Analogue outputs					
Scale	-	Configurable between -20 to +20 mA			
Acceptable overload	-	500 Ω			
Response time	-	< 500 ms			
Storage					
No-volatile memory	Configuration parameters – Recordings (curves, alarms, min-max, qualimetry events log, IEC 50160 statistics)				
RAM	Capture of waveforms				
Environmental specifications					
Operating temperature	-10°C to +55°C (K55 according to IEC61557-12)				
Operating humidity	95% at 40°C				
Storage temperature	-25°C to +70°C				
Safety specifications					
Pollution	2				
Behaviour in fire	UL 94, severity V1				
Installation category	3				

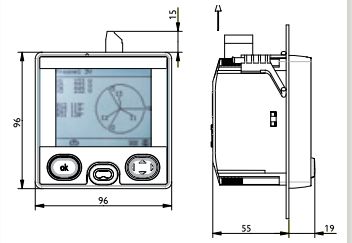
Accessories

Kit for DIN-rail or plate mounting



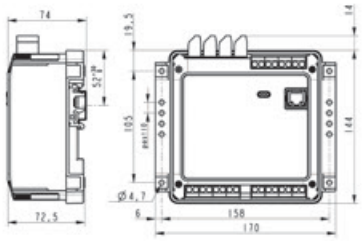
Dimensions (in mm)

ENERIUM 30/50/150



ENERIUM 100/200/300

ENERIUM 110/210/310



TO ORDER

Standard ENERIUM

Model	Frequency	Accuracy class	Power supply	Communication	On-off inputs	On-off outputs	Analogue outputs	Reference
ENERIUM 30	50/60 HZ	1	110 to 400 Vac / 155 to 565 Vdc	RS485	0	0	0	P01330823
ENERIUM 30	50/60 HZ	1	110 to 400 Vac / 155 to 565 Vdc	RS485	0	1	0	P01330824
ENERIUM 50	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	0	0	0	P01330805
ENERIUM 50	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	0	0	0	P01330806
ENERIUM 50	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	1	1	0	P01330807
ENERIUM 50	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	1	1	0	P01330808
ENERIUM 150	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	0	0	0	P01330809
ENERIUM 150	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	0	0	0	P01330810
ENERIUM 150	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	0	2	0	P01330811
ENERIUM 150	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	0	2	0	P01330812
ENERIUM 100	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	0	0	0	P01330831
ENERIUM 100	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	2	2	0	P01330832
ENERIUM 200	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	RS485	4	2	0	P01330833
ENERIUM 200	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	2	2	2	P01330834
ENERIUM 210	50/60 HZ	0.5 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	8	0	0	P01330835
ENERIUM 300	50/60 HZ	0.2 s	80 to 265 Vac / 110 to 375 Vdc	RS485	0	0	0	P01330816
ENERIUM 300	50/60 HZ	0.2 s	80 to 265 Vac / 110 to 375 Vdc	Ethernet	0	0	0	P01330817
ENERIUM 300	50/60 HZ	0.2 s	19 to 58 Vdc	RS485	0	0	0	P01330818
ENERIUM 300	50/60 HZ	0.2 s	19 to 58 Vdc	Ethernet	0	0	0	P01330819

Accessories

Optical head for ENERIUM 50/150	P01330403
Optical head for ENERIUM 100/110 - 200/210 – 300/310	P01330401
DIN-rail mounting kit for ENERIUM 30/50/150	P01330830
DIN-rail mounting kit for ENERIUM 100/200/300	P01330360
690 V / 400 V resistive voltage adapter (for wind-turbine applications)	P01330402
Power supply for On-Off inputs 85 to 256 Vac/12 Vdc – 3.5 A (42 W)	ACCJ1004

Software

E.set	P01330501
E.View	P01330601
E.View+	P01330610

Configured products

ENERIUM | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

1 Model

50	ENERIUM 50 – Electrical energy – Load curves - Format 96 x 96
150	ENERIUM 50 + Trend curves - Format 96 x 96
100	ENERIUM 100 – Multi-energy - Trend curves - Format 144 x 144
110	ENERIUM 100 screenless version - Format 144 x 144
200	ENERIUM 100 + Load curves - Format 144 x 144
210	ENERIUM 200 screenless version - Format 144 x 144
300	ENERIUM 200 + Qualimetry
310	ENERIUM 300 screenless version

2 Frequency of network measured

0	50/60 Hz
1	400 Hz (except on Enerium 100 / 200 class 0.5s / 300)

3 Auxiliary power supply

0	80 to 265 Vac / 110 to 375 Vdc
1	19.2 to 58 Vdc

4 Communication

0	RS485
1	Ethernet

Note: with choices 5, 6, 7 and 8, it is possible to have a maximum of 8 inputs and/or outputs (ENERIUM 100-110/200-210).
Note: for the Enerium 50/150, choices 5 and 6 only allow the following combinations: 0-0, 1-1, 2-0, 0-2.

5 Metering (or On-Off) inputs

0	none
1	1 input (only on ENERIUM 50/150)
2	2 inputs
4	4 inputs (except on ENERIUM 50/150)
6	6 inputs (except on ENERIUM 50/150)
8	8 inputs (except on ENERIUM 50/150)

6 On-Off outputs

0	none
1	output (only on ENERIUM 50/150)
2	2 outputs
4	4 outputs (except on ENERIUM 30/50/150)
6	6 outputs (except on ENERIUM 30/50/150)
8	8 outputs (except on ENERIUM 30/50/150)

7 Analogue inputs (ENERIUM 100/200/300 only)

0	none
2	2 analogue inputs
4	4 analogue inputs
6	6 analogue inputs
8	8 analogue inputs

8 Analogue outputs

0	none
2	2 outputs
4	4 outputs (except on ENERIUM 50/150)

9 Accuracy class

5	0.5 s (except on ENERIUM 300)
2	0.2s (ENERIUM 200/210/300/310 only)

Example: Enerium 200, frequency 50/60 Hz, 80 to 264 Vac auxiliary power supply, RS485 communication, 2 on-off inputs, no on-off outputs, no analogue inputs, no analogue outputs, Class 0.2s
=> order ENERIUM 200 01020002 • 1-200 • 2-1 • 3-1 • 4-0 • 5-2 • 6-0 • 7-0 • 8-0 • 9-2

Associated products

Data retrieval solutions
► page 56

E.online monitoring software
► page 68

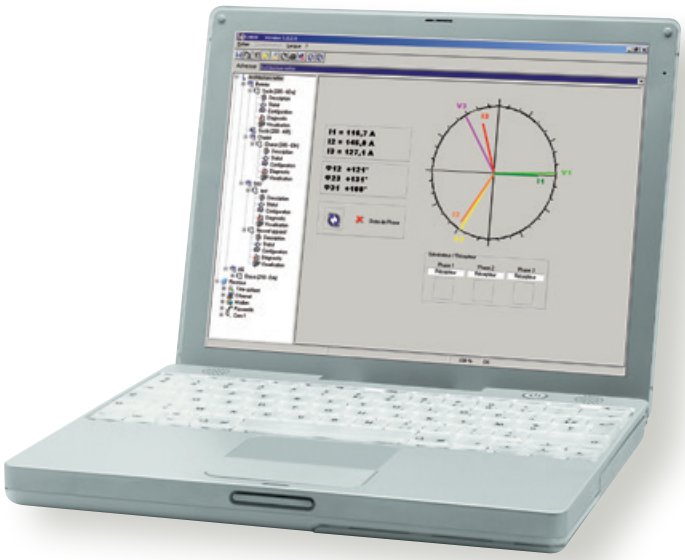
Current transformers
► page 102

E.SET, E.VIEW and E.VIEW +

Configuration, installation diagnosis and display software for the ENERIUM range of power monitors

PRODUCT ADVANTAGES

- **CONFIGURATION** of the whole range of ENERIUM power monitors
- **DIAGNOSIS** of the installation
- **DISPLAY** of the electrical parameters
- **PROVISION** of the recordings in .txt format



Description

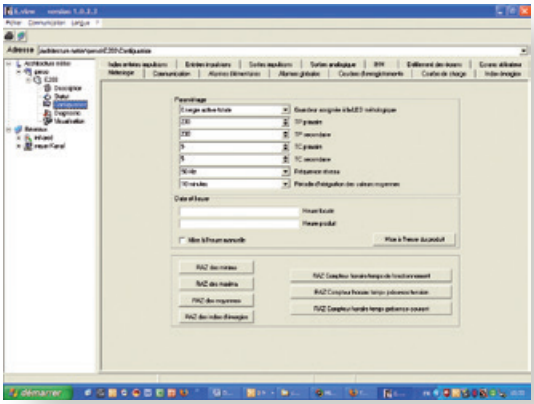
The **E.Set** software allows remote configuration of the power monitors in the ENERIUM range via the RS485 network, the Ethernet network or the optical head. With **E.Set**, it is possible to program at any time the products' communication parameters (address, speed, parity, etc.) and the configuration parameters (CT ratio, VT ratio, alarm thresholds, etc.).

E.View enables the inputs and outputs of the ENERIUM power monitors to be controlled remotely. **E.View** also allows display of the electrical parameters and retrieval in .txt format of the recordings of the load curves, the trend curves and the alarm log.

In addition, **E.View+** offers automatic elementary tables, bargraphs and curves.

Functionality	E.Set	E.View	E.View +
Description	•	•	•
Status	•	•	•
Configuration	•	•	•
Diagnosis		•	•
Display		•	•
Graphs			•

E.SET



Description

- The tabs are used to define the hardware status of the Enerium and the functional use of the inputs (on-off) and outputs (analogue or on-off)
- Details of the slots: analogue output card, on-off I/O card
- Communication (Ethernet, RS485)

Configuration of the ENERIUM power monitors

- Configuration of the communication parameters
- Modification of the date and time
- Configuration of the CTs,VTs, alarm status, thresholds, etc.
- Adjustment and activation of the alarms
- Programming of the analogue outputs
- Programming of the inputs/outputs
- Zero reset of the meters, the overruns, the log, etc.

Networking assistance

- Communication test on a power monitor chosen among the monitors in the RS485 or Ethernet network
- Automatic detection of all the products in the RS485 or Ethernet networks, with display of the communication parameters (address, speed, parity, stop bit) and the type of configuration (CT and VT ratios) for each power monitor

Status

This page is used solely to view the status of the Enerium (voltage and current inputs, phase order, time synchronization, elementary alarms, global alarms, pulse and analogue outputs).

- Operation (correct or incorrect) of the voltage, current and phase order quantities
- Status of the global alarms
- Status of the elementary alarms
- Status of the pulse outputs and analogue outputs

Backup and loading of configurations

- Saving and import of a configuration
- Downloading of a configuration from one power monitor onto another power monitor via the PC
- Writing of the new configuration
- Self-diagnosis of the configuration

Customization of the screens

- Programming of the 3 customizable screens

Means of communication

- Ethernet
- RS485/RS232
- Modem
- Optical head (infrared)

TO ORDER

Model	Reference
E.Set software	P01330501

Associated products

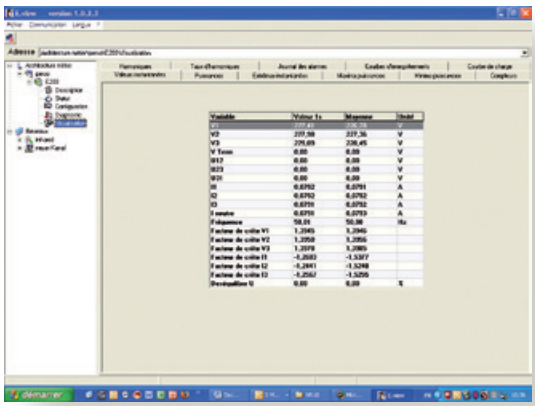
ENERIUM
Power monitors

page 38

ENERIUM
Optical reading head

page 46

E.VIEW



Same basic characteristics as E.Set

Display of the basic parameters

- Supervision of the electrical network by displaying the essential parameters measured by ENERIUM
- Consultation of the instantaneous and average values of the electrical quantities required to operate the electrical network
- Examples of display possibilities
  - Instantaneous values
  - Instantaneous extreme values
  - Maximum/minimum power values
  - Energy meters
  - Maximum odd harmonic values per order
  - Total harmonic distortion (THD)
  - Alarm log
  - Trend curves
  - Load curves

Remote control of the inputs/outputs

All the inputs and outputs can be controlled remotely and separately. This function can be used, for example, to simulate an analogue output in order to verify the integration of an ENERIUM power monitor in the process.

Retrieval of the records in .txt format

- Load curves
- Trend curves
- Alarm log

Diagnosis of the installation

This page can be used to read the digital inputs, as well as to read and/or force the digital and analogue outputs of ENERIUM.

- This concerns:
  - Pulse inputs
  - On-off inputs
  - On-off outputs
  - Analogue outputs
- Detection of phase order reversal
  - Presence of voltage
  - Presence of current
  - Status of the current ratings being used by the power monitor
  - Indication of the generator/receiver mode of phases 1, 2 and 3
- Status of the alarms
- Status of the alarm relays
- Detection of external time synchronization errors
- Malfunction of an option card
- Saturation and possible loss of a pulse on the on-off outputs
- Trend curve memory occupancy
- Load curve memory occupancy

TO ORDER

Model	Reference
E.View software	P01330601

Associated products

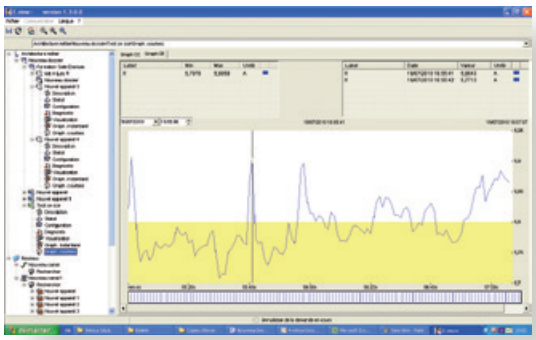
ENERIUM
Power monitors

► page 38

ENERIUM
Optical reading head

► page 46

E.VIEW +



► Same basic characteristics as E.View

► Load curve graphing tab

Users have the possibility of viewing several quantities at the same time and positioning horizontal or vertical reference lines. A zoom function is also available. This tab includes an information area and tables for each curve.

► Trend curve graphing tab

The logic is the same as for the load curve graphing tab.

► Fresnel tab

This comprises 3 different tabs: 3V, 3I or 3V+3I. The information is refreshed in real time. For each of the tabs, there is an information area (mode: inductive/capacitive, receiver/generator, phase order OK or not).

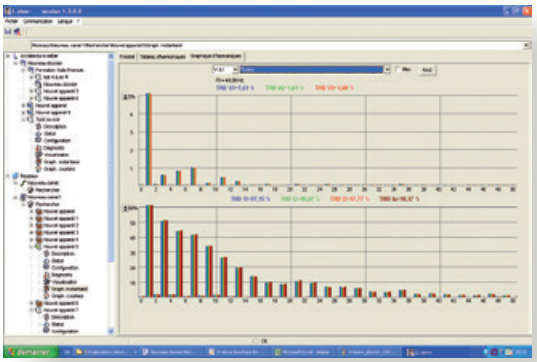
Example: the Fresnel diagram of the 3 phase voltages (3V): instantaneous values of the phase voltages and the values of the phases.

► Harmonics tab in table format

- Harmonics order by order in V&I or U&I.
- The data is presented in table form.
- X axis: V1 [%] V2 [%] V3 [%] I1 [%] I2 [%] I3 [%]
- Y axis: the orders: 1, 2, 3 ... 50, with the possibility of other classifications: odd value multiple of 3, odd value not a multiple of 3, or even only.

► Harmonics tab in graph format

- 8 graph pages in bargraph format with the same logic as the table format:
  - 50 harmonic orders in V&I
  - 50 harmonic orders in U&I
  - Odd harmonics not a multiple of 3 in V&I
  - Odd harmonics not a multiple of 3 in U&I
  - Odd harmonics multiple of 3 in V&I
  - Odd harmonics multiple of 3 in U&I
  - Even harmonics in V&I
  - Even harmonics in U&I



TO ORDER

Model	Reference
E.View+ software	P01330610

► Associated products

ENERIUM
Power monitors

► page 38

ENERIUM
Optical reading head

► page 46

RENOVENERGY

Metering solution for renovating installations

PRODUCT ADVANTAGES

- **COMPACT SOLUTION** for confined environments
- **EASY IMPLEMENTATION** without cutting off the power
- **COMPATIBILITY** with ULYS TTA, TT, Enerium 30 and Enerium 50
- RS485, Ethernet and M-Bus **COMMUNICATION**

MID-certified ULYS TTA, TT for rebilling

TC CLIP transformers

One Ethernet output (Modbus TCP) RS485 output (Modbus/Jbus RTU)

Description

RENOVENERGY is a metering solution which is easy to install. The **TC CLIP** current transformers from Enerdis®, **used with ENERIUM®** power monitors or **ULYS** energy meters, allow renovation, modernization and the addition of metering points in existing installations.

The current transformers in the **RENOVENERGY** range are specially designed for easy installation on existing electrical switchboards where the available space is often limited.

The **TC CLIP** range of transformers, available in versions from 100 to 600 A, can be installed without disconnecting the power cables from the existing installation. This can be done without cutting off the power supply, so it is quicker.

The solution

General feeder solution


ENERIUM 30


TC CLIP

Submetering solution


ULYS TT


TC CLIP

Metering selection guide

	ULYS TTA ULYS TT	ENERIUM 30	ENERIUM 50
Network/connection			
Single-phase 230 Vac or three-phase 230/400 Vac 50/60 Hz	●	●	●
Connection to TC Clip	●	●	●
Mounting			
Mounting	On DIN rail	Flush-mounting or DIN rail with Kit	Flush-mounting or DIN rail with Kit
Format	4 modules	96 x 96 mm	96 x 96 mm
Energy consumption			
Electrical energy consumed and produced	●	●	●
kWh / kVARh / kVAh	●	●	●
Partial index with zero reset	●	●	-
Tariff change input	●	-	-
IEC or MID certification (rebilling)	IEC or MID	IEC	IEC
Accuracy of active energy when used with the TC Clip range	1 %	1 %	1 %
Stored consumption curves (kWh, kVArh, kVAh)	-	-	●
Recording of the consumption on remote meters (pulse inputs)	-	-	●
Monitoring / Analysis			
Measurement of V, U, I, In, FP	●	●	●
Measurement of P, Q, S	●	●	●
Storage of Min and Max	-	●	●
Alarm management	-	●	●
Energy performance index (THD, tan φ, FP, cos φ)	-	●	●
Harmonic analysis up to 25th order	-	-	●
Communication			
Pulse or alarm outputs	1 to 2 pulse outputs	1 pulse or alarm output	1 pulse or alarm output
RS485 Modbus communication output	ULYS TT MODBUS	●	●
M-Bus communication output	ULYS TT M-BUS	-	-
Ethernet communication output	ULYS TT ETHERNET	-	●
Local connection via USB/optical head	-	-	●
Analogue outputs	-	-	●
Quick programming without software	●	●	-
Compatible with the E.online energy management software	●	●	●

TC CLIP transformer selection guide

	TCC 176	TCC 241	TCC 242	TCC 364	TCC 366
Primary	60 A	100 A	250 A	400 A	600 A
Secondary	1 A				
Accuracy class	3%	1%			
Diameter	17 mm	24 mm	24 mm	36 mm	36 mm
Dimensions (mm)	64 x 33 x 34.4	75.5 x 45 x 34	75.5 x 45 x 34	91 x 57 x 40.5	91 x 57 x 40.5

TC CLIP

TC CLIPs sold individually

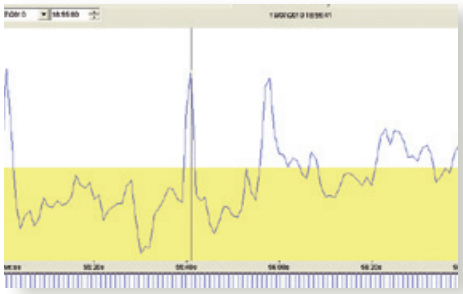
P01379609	Single TCC 176
P01379601	Single TCC 241
P01379602	Single TCC 242
P01379603	Single TCC 364
P01379604	Single TCC 366

Associated software

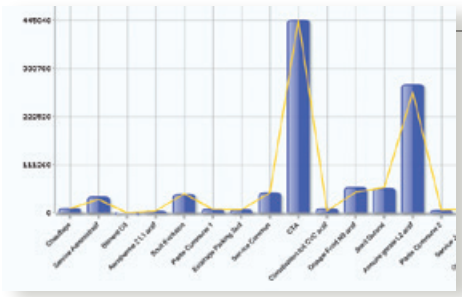
E.view | Compatible with Enerium 50

"Point-to-point" display software.
Demonstration version (limited to 29 days' use) delivered with each product.

E.view+ | Compatible with Enerium 50



Advanced version of E.view including **graph display.**
Demonstration version (limited to 29 days' use) delivered with each product.



E.online2® | Compatible with ULYS TTA, Enerium 30 and Enerium 50

Software for **simultaneous multi-product** display.
Compatible with all meter/power monitor brands. **Valuation in monetary units (€) and T.CO$_2$, etc.**

TO ORDER

General feeder solution

Power monitors	
P01330823	ENERIUM 30 – RS485 Modbus
P01330824	ENERIUM 30 – RS485 Modbus, on-off output
P01330805	ENERIUM 50 – RS485 Modbus
P01330806	ENERIUM 50 – Ethernet Modbus
P01330807	ENERIUM 50 – RS485 Modbus 1 on-off input - 1 on-off output
P01330808	ENERIUM 50 – Ethernet Modbus 1 on-off input - 1 on-off output

Pack of 3 TC CLIPs	
P01379610	PACK 3 TCC 176
P01379605	PACK 3 TCC 241
P01379606	PACK 3 TCC 242
P01379607	PACK 3 TCC 364
P01379608	PACK 3 TCC 366

Submetering solution

Energy meters	
P01331015	ULYS TTA IEC
P01331019	ULYS TTA MID
P01331035	ULYS TT Modbus IEC
P01331037	ULYS TT-M Modbus MID
P01331043	ULYS TT M-bus IEC
P01331045	ULYS TT-M M-bus MID
P01331039	ULYS TT Ethernet IEC
P01331041	ULYS TT-M Ethernet MID

Pack of 3 TC CLIPs	
P01379610	PACK 3 TCC 176
P01379605	PACK 3 TCC 241
P01379606	PACK 3 TCC 242
P01379607	PACK 3 TCC 364
P01379608	PACK 3 TCC 366

► Associated products

ULYSCOM
Communication modules
► page 36

E.SET, E.VIEW, E.VIEW+
Software
► page 48

TC CLIP
Current transformers
► page 121

Data loggers and software

Data loggers

ELOG
Web-box data logger
Unité de télérelève
► page 58

ENERIUM 210
Multi-energy and
multi-utility data logger
► page 64

CCT
Pulse receiver
► page 66

Energy management and supervision software

Processing software

E.ONLINE 2
► page 68

Communication solutions

► page 77

Choosing your data logger

		Pulse receivers - Data logger		
		► page 58	► page 64	► page 66
		 ELOG	 Enerium 210	 CCT
Electrical energy management	Accuracy		0,2 %	
	Measurement of V, U, I Inst. Min/Max Avg.		■	
	Measurement of P, Q, S Inst. Min/Max Avg.		■	
	Energy produced and consumed		■	
Multi-energy management	Pulse inputs for other meters (water, gas, etc.)	5	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
	Analog inputs 0-20 mA/4-20 mA (temperature, flow rate, pressure, insolation, etc.)		0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
Installation supervision	Management of alarms on thresholds		16	-
	Alarms log (recordings)		64	50
	Fresnel diagram		■	-
	Pulse or alarm outputs		0, 2, or 4	-
	Analogue outputs		0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
Power quality	THD / PF / Tan φ	-	■	-
	Harmonics by order with graphic representation	-	50	-
	Wave capture (U, V, I, In)	-	-	-
	EN50160 analysis	-	-	-
Recording capacity	Number of variable	50	12	8
	Recording periodicity	from 5 s to 60 min	from 1 s to 60 min	from 1 min to 60 min
Inputs / Outputs	RS485 - Modbus - Master	2	0	0
	RS485 - Modbus - Slave	0	1	1
	Ethernet	web services format JSON	Modbus TCP	
	Format (mm)	6 modules DIN	144 x 144	7 modules DIN
	Screenless version available	-	-	-

ELOG

Web-box data logger

PRODUCT ADVANTAGES

- **COMMUNICATION**
  RS485, Master Ethernet
- **50 TREND CURVES**
- **5 PULSE INPUTS**
- **MULTI-EQUIPMENT INTEROPERABILITY**
- **WEB SERVICE**
  Web pages

5 On-Off pulse inputs

2 x RS485 ports
(Modbus/RTU bus)
Master mode

Ethernet port (Modbus TCP)
Web master mode

Description

ELOG is a unit for automatic remote retrieval, recording and storage of energy, climate and process data from meters, sensors, power monitors, PLCs, etc., connected to a communication network or equipped with pulse outputs.

- data logger for remote data retrieval and recording
- Multi-equipment, multi-brand drivers
- RS485 ModBus and Ethernet ModBus TCP master mode inputs
- web pages for configuration and supervision
- 5 pulse inputs for processing the metering data
- Web services for data processing

Main functions

- **Remote data retrieval**:
  - in master mode on RS485 ModBus and Ethernet networks
  - via the pulse inputs on multi-utility meters
  - by driver with multi-brand and multi-function equipment
  - of all types of data to be collected (water, gas, temperature, etc.)
  - whatever the origin of the data (pulses, analogue signals, radio frequency, RS bus, Ethernet, etc.)
- **History of remote-retrieved data**
  - on 50 variables
  - over a 3-month period for recording intervals > 1 minute
  - over a 3-day period for recording intervals < 1 minute
- **Time/date-stamping** of the recorded data:
  - every 5, 6, 10, 12, 15, 20, 30 or 60 seconds
  - every 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 or 60 minutes
- **Trend curves**
  - son the instantaneous values
  - on the energy indices
  - on a character string
- Local and/or remote **configuration**
  - via integrated web pages
  - using a web browser
  - with login/password
- **Viewing** of the data in real time via integrated web pages

Processing

Web pages integrated in ELOG

It is not necessary to have a dedicated software solution or even a dedicated PC. All the **data** retrieved from the various types of equipment are **accessible** on any **computer**, **tablet** or **smartphone** equipped with a web browser.

Office applications

An Excel application can be used to retrieve the data and view them in table or graph form.

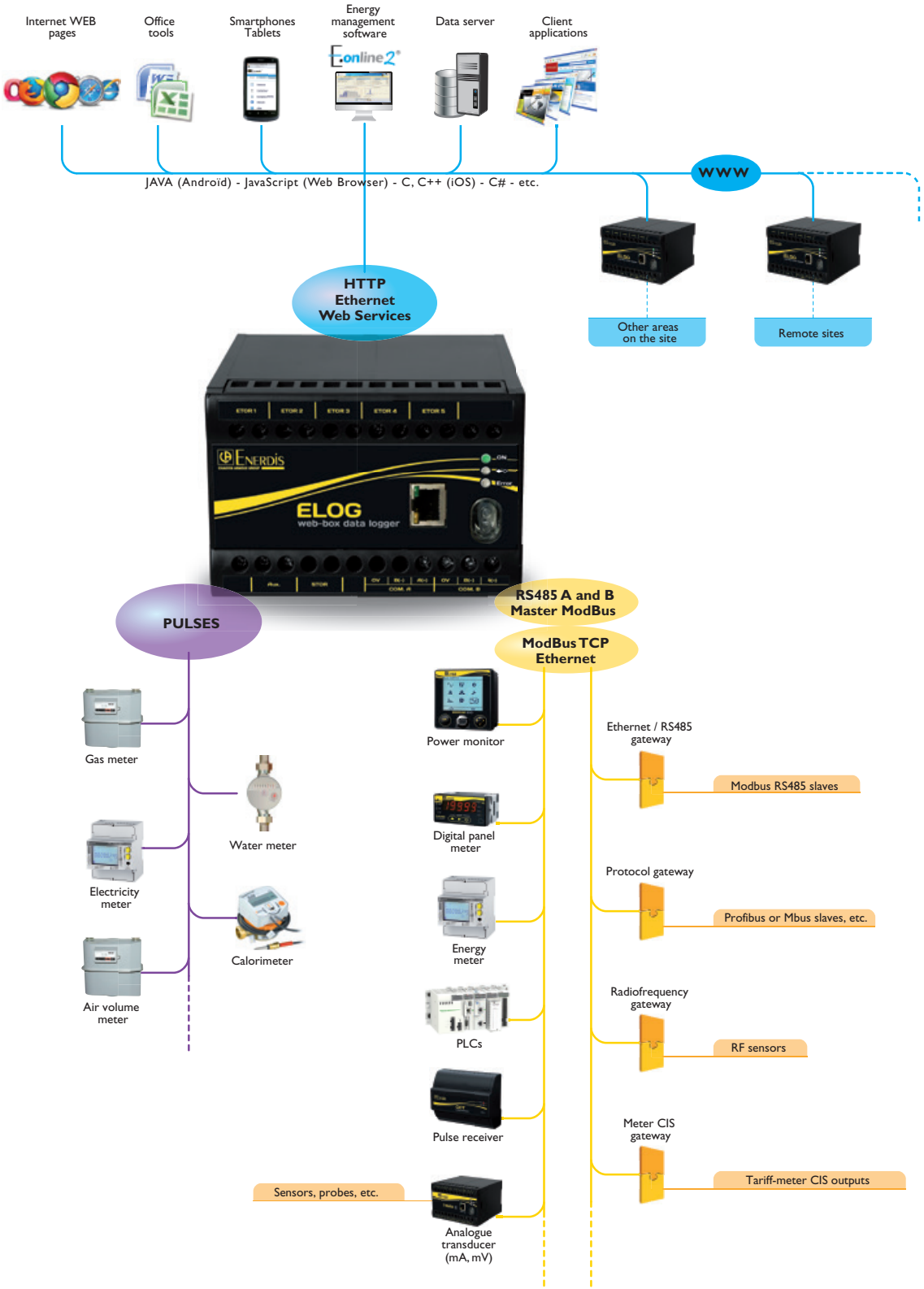
E.online 2 software

ELOG automatically synchronizes with the E.online energy performance monitoring, analysis and supervision software for remote retrieval and processing of all the recorded data.

Multi-platform, multi-language application

The web services (in JSON with the http protocol) in ELOG can be used to access the real-time values and retrieve the recorded data, facilitating integration of the product in any system using multiple programming languages: java, javascript, python, C, C++, etc.

Functional diagram



Photos: Chauvin Arnoux – Schneider Electric – Elster

Inputs / Outputs

5 pulse inputs (on-off)
- for connecting the metering pulse outputs of the multi-utility meters (electricity, water, gas, calories, etc.)
- the number of pulses emitted is proportional to the energy consumption measured by the meter
- for each input, ELOG continuously calculates and stores the consumption data

2 x RS485 serial ports
- ModBus protocol in master mode
- for real-time readings of the variables and continuous recording of the values
- to communicate with multi-brand equipment compatible with the ModBus protocol

1 x RJ45 Ethernet port
- in ModBus TCP master mode: for real-time readings of the variables and continuous recording of the values
- in web server mode: for configuring ELOG and viewing the variables in real time
- in Ethernet network mode: for integration in a global Ethernet network, remote processing of the data and retrieval of the stored data
- in processing mode via the web services

Electrical specifications

Auxiliary power supply	
AC network	80 to 265 Vac - 10 VA - 42.5 to 69 Hz
DC network	80 to 375 Vdc - 7 W

Inputs	
Number of input	5
Operating mode	metering pulse input
Pulse interpretation	logic level 1: 12 to 72 Vdc logic level 0: 0 to 5 Vdc pulse duration: 30 ms min. at level 1 and then 30 ms min. at level 0 frequency : 0 to 16.67 Hz

Communication

Communication interfaces	
RS485 A and RS485 B	type: 2 or 3-wire RS485 (shielding) protocol: ModBus RTU mode operation: master mode - half duplex reference standard: EIA485
Ethernet	type: RJ45 - 8 pins Protocols: HTTP in slave mode - ModBus TCP, encapsulated ModBus TCP in master mode speed: 10-100 baseT

Storage	
Recording periodicity	every 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60 minutes every 5, 6, 10, 12, 15, 20, 30 and 60 seconds
Depth	3 months on per-minute data - 3 days on per-second data
Storage mode	Interchangeable memory card
Capacity	8 GB
Immunity to micro-outages	2.5 sec power reserve (at 230 Vac)

Clock	
Accuracy	±20 ppm (±20 sec every 11.5 days)
NTP synchronization	yes
Back-up	30 days max. in the absence of an auxiliary power source

Functional limits

Max. number of configurable drivers	100
Number of simple variables per driver	30
Number of composite variables per driver	10
Max. number of devices.	100
Max. number of trend curves	50

Mechanical specifications

Dimensions	120.5 x 120 x 81 mm (D x L x H)
Weight	560 g
Number of terminals	24 (20 used)
Connection	screw terminal strip
Cable cross-section	6 mm² single-strand - 4 mm² multi-strand
Tightening torque	0.4 Nm maximum admissible on the terminal

Environmental constraints

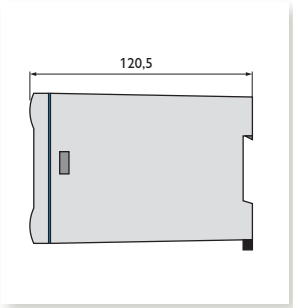
Climatic constraints	
Rated operating temperature	-10 to +45°C
Operating temperature limit	-25 to +55°C
Storage temperature	-25 to +70°C
Relative humidity as per IEC 62052-11 (standard for electrical metering applications)	<75%, annual average 95% for 30 days spread naturally over the year 85% occasionally on other days

Safety constraints	
Standard	IEC 61010-1
Installation category	III
Pollution degree	2
Behaviour in fire	Complies with the UL94 standard, severity level V1

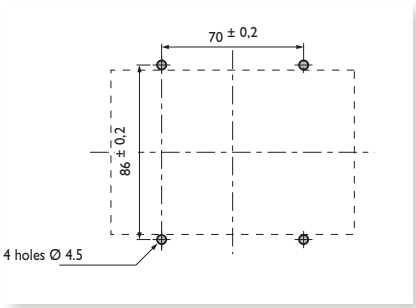
Mechanical constraints	
Protection rating according to IEC 60529	IP 20

Electromagnetic constraints	
Standards	IEC 62052-11 / IEC 61000-4-2 / IEC 61000-4-3 / IEC 61000-4-4 / IEC 61000-4-5 / IEC 61000-4-6 / IEC 61000-4-8 / IEC 61000-4-11 / CISPR22

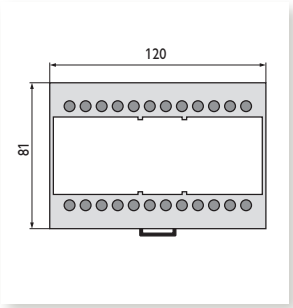
Dimensions (in mm)

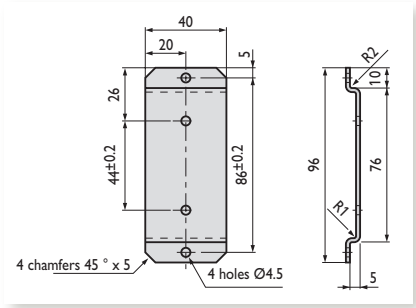


Drilling plan for mounting on switchboard



Accessory for mounting on switchboard with screws (option)





TO ORDER

Model	Reference
ELOG	P01331230

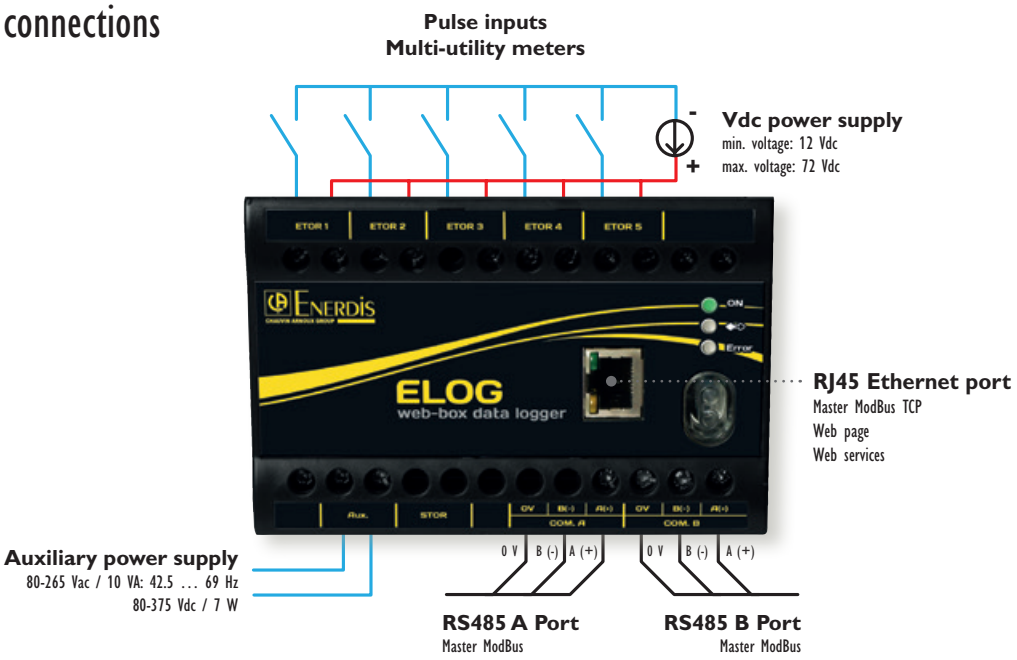
Accessories

Model	Reference
Switchboard mounting	ACCT 1006
Optical USB cable	P01330403

ELOG ecosystem

Model	Reference
24 Vdc power supply for the pulse inputs	P01376001
CIS module - RS485 Modbus RTU	P01330377
USB cable for CIS module - RS485 Modbus RTU	P01330378
Radiofrequency module - RS485 Modbus RTU	P01330488
Multi-host Modbus / Ethernet gateway, DIN rail (power supply: P01376001)	P01330351

Electrical connections



Associated products

ULYS
Energy meters
page 6

ENERIUM
Power monitors
page 38

E.online
Processing software
page 68

ENERIUM 210

Multi-energy, multi-utility data logger

PRODUCT ADVANTAGES

8 INPUTS
for acquisition:
- On-off
- analogue

ETHERNET & RS485 COMMUNICATION

MULTI-ENERGY
and multi-utility

Programming and reading of the data by optical head

Ethernet output (Modbus TCP)
RS485 output (Modbus/Jbus RTU)

Description

ENERIUM 210 is a multi-energy data logger which continuously records the data from meters (pulse output) or temperature or flow-rate **sensors** (0-20 mA / 4-20 mA signals). Equipped as standard with an RS485 ModBus or Ethernet ModBus TCP output, it allows remote data retrieval.

Further information

- **Recording (8 load curves / 4 trend curves)**
- Multi-energy consumption indices and curves (water, gas, electricity, etc.)
- Temperature curves
- Trend curves

Electrical specifications

Auxiliary power supply	
Supply voltage	80 to 265 Vac / 110 to 375 Vdc
Consumption	20 VA / 10 W
Digital inputs (on-off or pulses)	
Operating voltage	High level: 10 to 110 Vdc Low level: 0 to 5 Vdc
Min. signal width	High level: 30 ms Low level: 30 ms
Consumption	< 0.5 W
Ethernet output	
Type	RJ45 – 8 pins
Protocol	ModBus/TCP
Speed (configurable)	Compatible with 10, 100 and 1000 base T networks

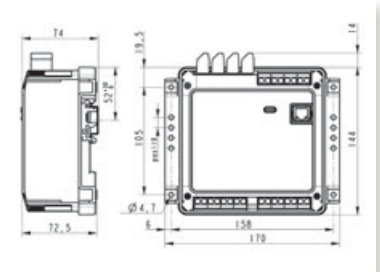
Mechanical specifications

Weight	700 g
Mounting	DIN-rail or plate mounting
Connection	screw terminal strip

Environment

Operating temperature	-10°C to +55°C (K55 according to EN 61557-12)
Storage temperature	-25°C to +70°C
Relative humidity	95% to 40°C
Installation category	3
Pollution degree	2
Behaviour in fire	UL94, severity V1

Dimensions (in mm)



Electrical connections

Please see ▶ page 42

Optical head is compulsory to configure the IP adress

TO ORDER

Model	Reference
Enerium 210 - 50/60 Hz - 80 to 265 Vac / 110 to 375 Vdc - Ethernet - 8 metering inputs	P01330835

For the RS485 version, please contact us

Accessory	Reference
Optical head	P01330401

Software

Model	Reference
E.view	P01330601
E.view+ / E.online 2	Consult us

Associated products

ULYS
Energy meters

▶ page 6

E.online
Processing software

▶ page 68

CCT Range

Remote-readable pulse receiver

PRODUCT ADVANTAGES

- With its **RS485 DIGITAL OUTPUT**, the **CCT** makes the **ULYS** range of energy meters particularly good at communicating. When used with these meters and the E.online energy management and monitoring software, it offers users a global solution for monitoring and managing all their metering points.
- **CALCULATION** and **STORAGE** of load curves on the basis of the meters' pulse outputs.

POWER LED: power supply presence (fixed: reset, flashing: battery fault)

COM LED: data exchange on the RS485 (flashing according to RS485 transmission speed)

Description

The **CCT** collects and stores pulses coming from different energy meters (electricity, water, gas) or digital signals (circuit breaker status, alarm triggering, etc.) in real time, and transmits the information to an energy management system, such as **E.online**, via its RS485 digital link.

Special features

The **CCT** accepts all types of metering measurement units (m^3, m^3/h, litres, kWh,etc.). 8 inputs can be programmed individually as metering-pulse inputs or digital inputs.

Pulse inputs:
- Energy management: recording of load curves of the last 4,032 average values for active and reactive powers for each of the 8 input channels (for example, 28 days of recording with a 10-minute integration period).
- Recording of the last 12 monthly metering indices and general indices.

Digital input:
- Counting and time-stamping of events: time-stamping of status change of a digital input and recording of all digital input statuses.
- Recording of the last 50 status changes.

Electrical specifications

Pulse/digital inputs	
Pulse weight	from 0.1 to 100
Stream integration time	1 to 60 minutes, in 1-minute increments
Pulse input voltage	24 to 60 Vac/dc ± 20%
Consumption	0.1 VA to 24 Vac/dc 0.5 VA to 48 Vac/dc
Pulse duration	30 to 1500 ms
Auxiliary power supply	
Supply voltage	230 Vac
Domain of use	-20% / +15%
Consumption	5 VA
Power supply output	
Metering inputs	24 Vdc – 100 mA
Digital outputs	
1 RS485 output / 2 shielded wires + half-duplex	
Protocol	ModBus/JBus RTU mode
Speed	600, 1200, 2400, 4800, 9600 and 19200 bauds
Parity	Even, odd or no parity
Stop bits	1 or 2
Bus addresses	1 to 255

Environment

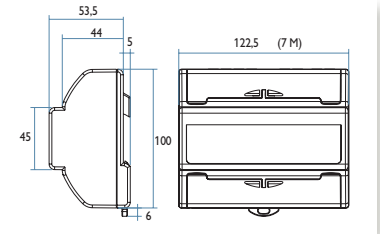
Operating temperature	-20°C to +55°C
Storage temperature	-25°C to +70°C
Relative humidity	95%
Data storage	10 years at +25°C
Installation category	3
Pollution level	2

Mechanical specifications

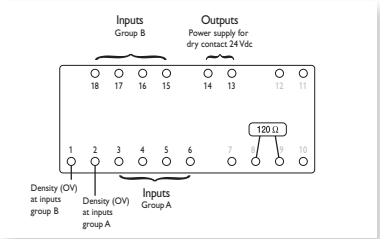
Weight	450 g
Mounting	Mounting on DIN rail
Terminal	6 mm² screw connection terminals

Model		Reference
CCT	Remote-readable pulse receiver	CCCT 1001

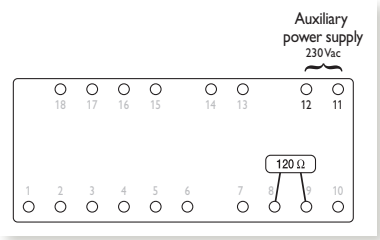
Dimensions (in mm)



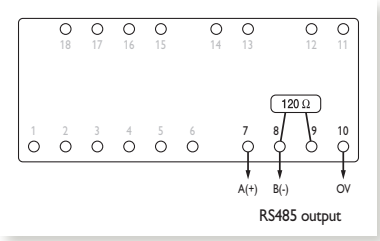
Electrical connections



Auxiliary power supply



Communication



Associated products

ULYS
energy meters

► page 6

E.online
monitoring software

► page 68

SESAME
configuration software

► contact us

E.ONLINE Range

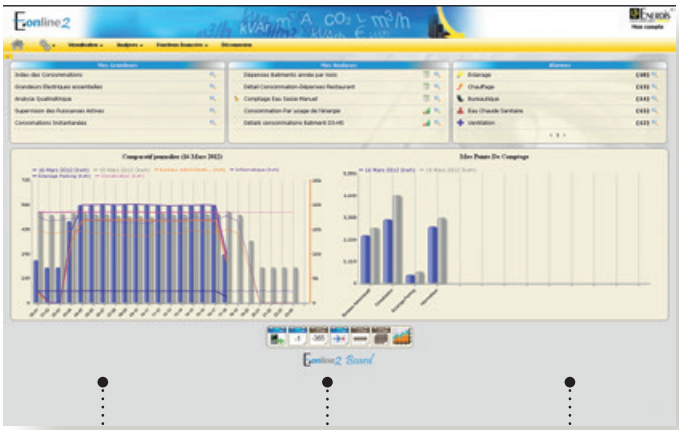
Multi-energy consumption measurement and management software

Management and supervision software

▲ Energy performance

PRODUCT ADVANTAGES

- **AUTOMATIC REMOTE DATA RETRIEVAL** from meters, power monitors and PLCs
- Customized **DASHBOARDS**
- **MULTI-SITES, MULTI-USER, MULTI-ENERGY** management
- **PRINTING / EMAIL DISTRIBUTION** of energy reports and alerts
- **REAL-TIME DISPLAY** of measurements
- **CALCULATION FUNCTIONS** and mathematical formulae



Detailed, interactive, structured analysis of consumption

Management of alerts on threshold overruns (consumption, ratio, etc.)

Real-time display of measurements and consumption data

► Descriptions

E.online is **software** specially designed for controlling, monitoring, managing and supervising consumption. Its dedicated functions make it an effective tool for improving and supervising energy performance.

E.online is a useful tool for energy actors in industry; the tertiary sector and infrastructures.

The software's main functions are:

- Automatic collection of the data from meters, power monitors, PLCs, etc.
- Real-time display of all the measurements
- Presentation of the results in energy units, accounting units, carbon footprint units, etc.
- Printing and automatic email distribution of alerts and energy reports
- Definition of ratios and standard or specific energy performance indices
- user profile by customizing the application via dashboards, dedicated reports, information authorization functions
- etc.

E.online can be accessed via a simple web browser WEB (Firefox, Google Chrome, Internet Explorer, etc.) using a profile and password specific to each user.

The **global solution** comprises **several parts**:

1 measuring instruments,
2 accessories and communication solutions,
3 computer resources
4 E.online software.

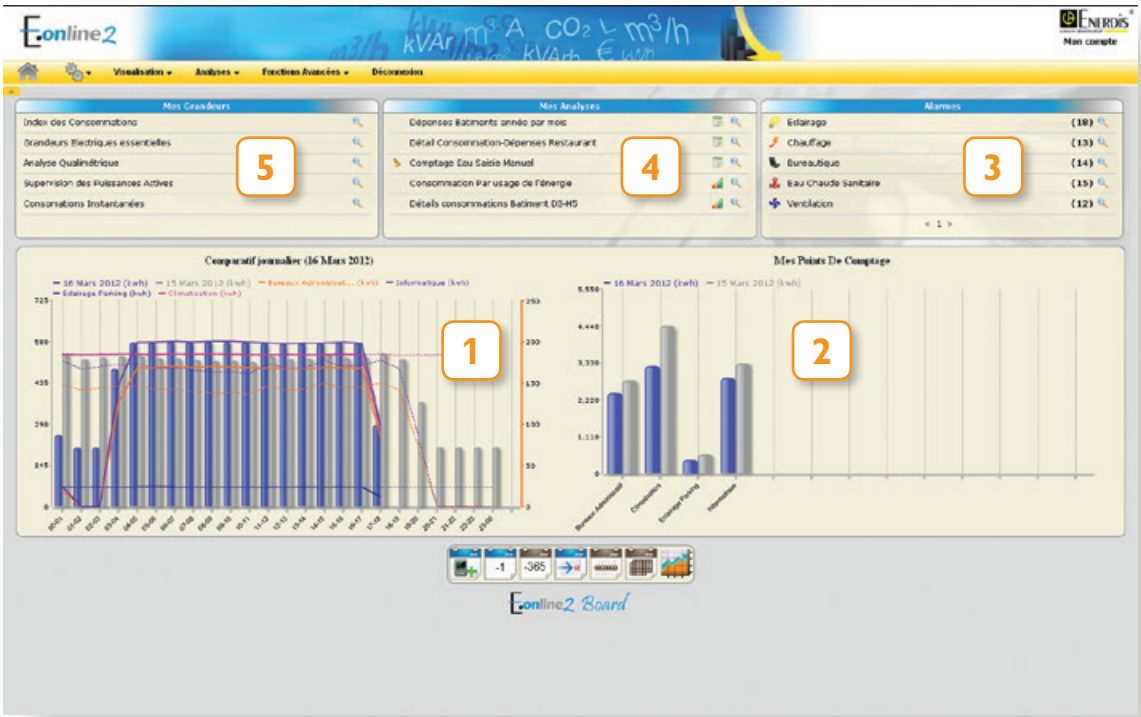
ENERDIS can handle all the stages and proposes technical solutions for all the parts. To guarantee optimum, long-term operation and immediate use, ENERDIS provides verification, commissioning and training services. The maintenance contract completes the set of services for long-term monitoring of the installation and updates.

This symbol identifies major advantages.

Description

Dashboard

This can be customized for each E.online2 user profile. On a single page, it provides a real-time overview of the changes in consumption compared with a history, displays the alarms in progress and constantly updates the energy reports defined.



1
- **Real-time evolution** of the measurements, consumption data, ratios, indices, etc.
- Display of the values for **hours, days and months**
- **Immediate comparison** with the history: day-1, month-1, year-1
- Tracing of the temperature, performance indicator, etc., with **superimposed curves**

2
- **Real-time evolution** of the consumption data by energy usage, utility, category, building, industrial process, etc.
- **Display for the current day, month or year**
- **Immediate comparison** with history of day-1, month-1 and/or year-1

3
- Display of **alarms in progress**
- Access to the alarms log (details of the alarms, acknowledgement function)

4
- **Display** of **constantly-updated** analyses and reports

5
- Access to **customized pages** for viewing **real-time measurements**

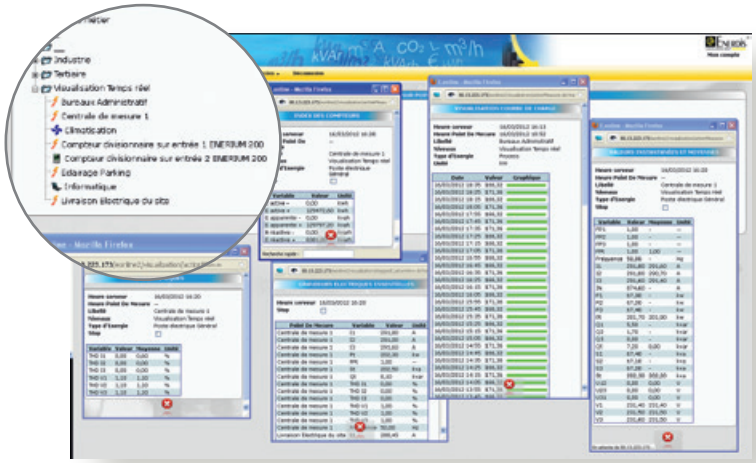
Real-time display / alerts and overruns

The measurements from ENERDIS® instruments and multi-manufacturer products can be displayed in real time on standard or customized pages.

The multi-windowing functions can be used to display several viewing screens simultaneously.

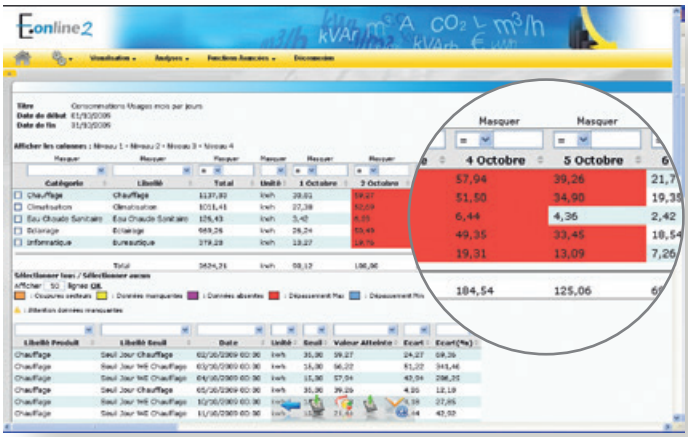
An instrument can be selected in a tree-structure diagram of the installation.

Users can program alarms to generate threshold overrun alerts automatically.



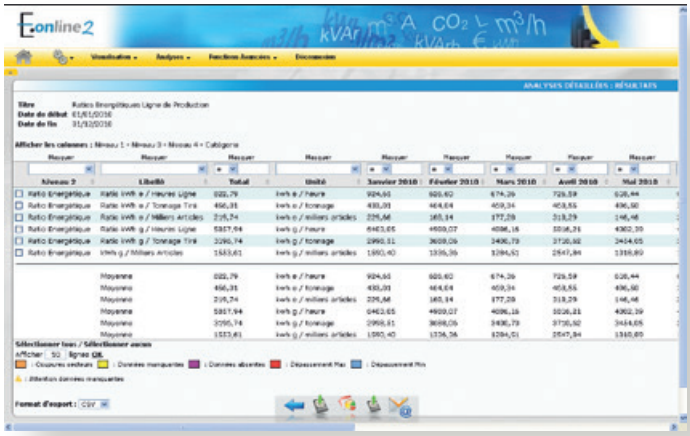
- Display of the **quantities measured** by the instruments (energy index, voltage, current, active, reactive and apparent power values, tangent phi, frequency, harmonics, flow rate, etc.)
- Management of the **ENERDIS® products and multi-manufacturer instruments** already in place
- Configuration of **multi-product** and **multi-quantity** display pages
- Scheduling of **measurement sessions** on selected products and measured quantities (recorded data exportable in csv format)

- Configuration of **multi-level** thresholds on measured or calculated quantities
- **Distribution of email alerts** for any values outside the programmed profiles
- Identification of the **overruns in the reports** using specific colours
- **Detailed description of the alert** (min. or max. values reached, time/date-stamping and duration of the overrun, threshold values, etc.)

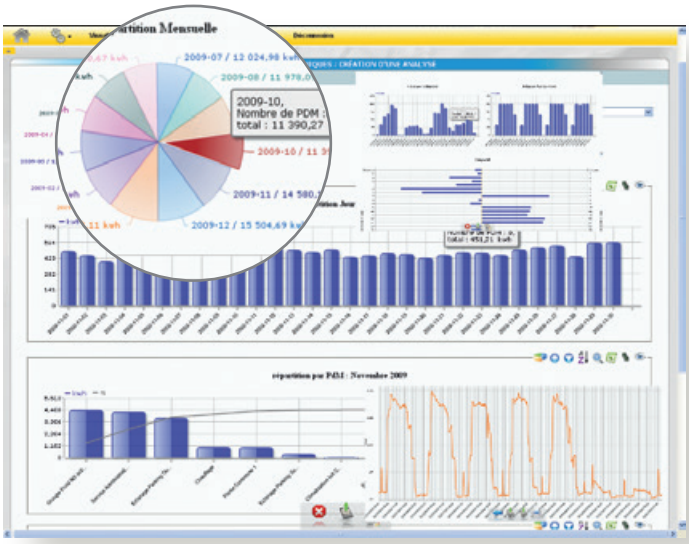


Energy analyses and reports

The energy analyses and reports printed on request (or constantly updated) can be used to detail the evolution of consumption, energy performance indices and all the data from the measurements or the E.online2 calculation functions. Using the energy indices retrieved remotely for the simplest instruments and the consumption trend curve for the more advanced, E.online2 stores and logs the data to print out reports in table and graph form.



- Display of the **measured and calculated data** (consumption, temperature, production data, building occupancy rates, performance index, ratio, etc.)
- **Multi-energy** tables in measured, Carbon-footprint, financial and specific units
- Display of data **per hour, day, month, year or between two dates without restrictions**
- **Comparison of data** per period, process, energy type, etc. (benchmarking)

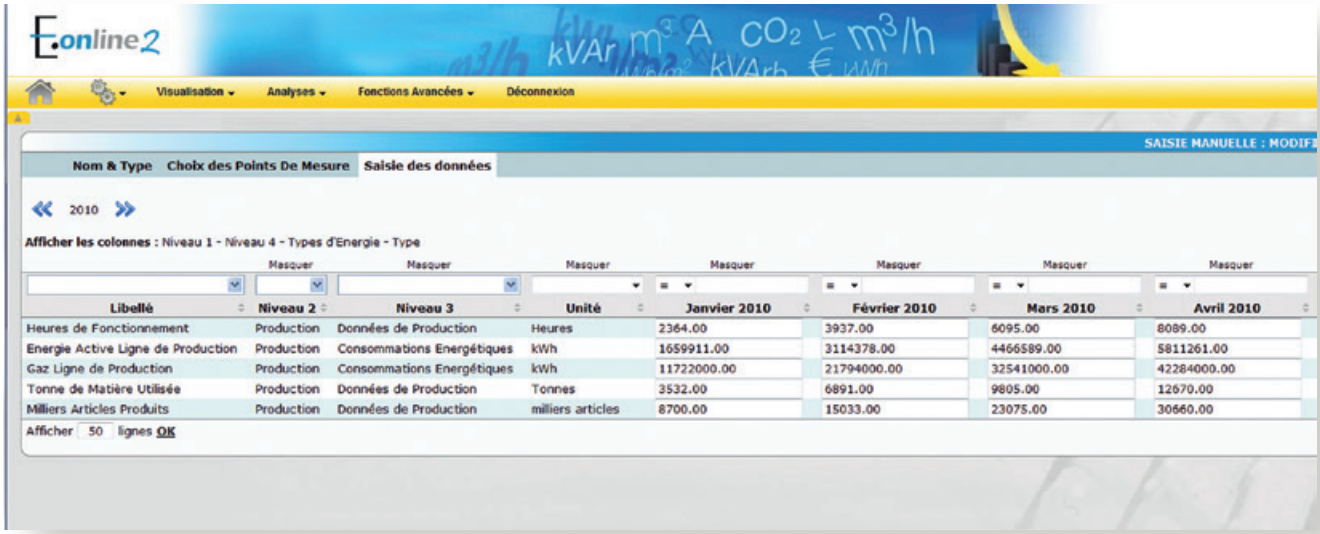


- **Observation of the evolution** of consumption data and energy spending
- Instantaneous generation of **graphical analyses**
- Configuration of energy **tariff contracts**
- Data **Sorting** and **Filtering** functions
- **Detection of incomplete data** (mains outages, communication errors, absence of measurements, etc.)
- **Recording of analysis templates** (library)
- **Export** of analyses in html, pdf and csv formats
- Instantaneous generation of **graphical analyses**
- **Identification** of the most energy-hungry work areas and periods (PARETO graph)
- **"Zoom-in" function** for zooming from the macro level (year) to the micro level (10 min. values) simply by clicking
- **Graphic representation** (bar / pie)
- **Superimposition of data** (e.g. Temperature vs. consumption)
- Etc.

Manual input

Acquisition of the data needed to draw up an energy overview of a system cannot always be automatic (e.g. production data, electromechanical meter, building occupancy rate, etc.).

E.online2's manual input tools can be used to build up the most exhaustive database possible.

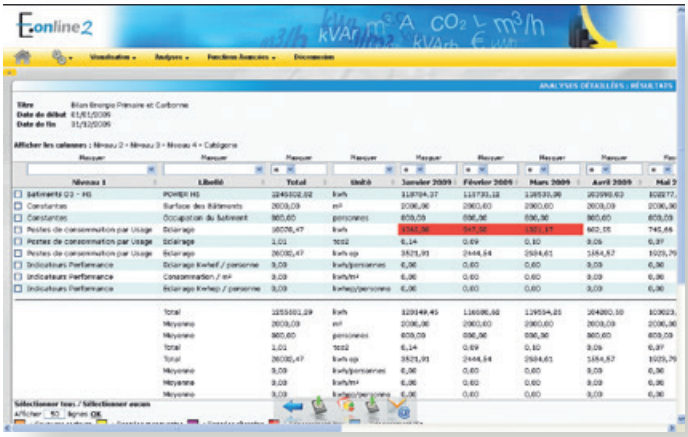


- Types of data input: **cumulated index, index difference, average and instantaneous values**
- Interface for inputting values for the **hours, days, months or years**
- Used for **energy reporting, ratios, virtual devices, formulae, etc.**

Calculation functions (virtual device, ratio, formulae, conversion rules)

Analysis of a system's or organization's energy performance sometimes requires the calculation of a large number of parameters using simple (division, addition, subtraction, etc.) or complex formulae.

The conversion function can be used to display the results in several units (e.g. kWhef, kWhep, TCO_2) or to convert a measurement unit into a contractual unit (e.g. cubic metre of gas into kWh)

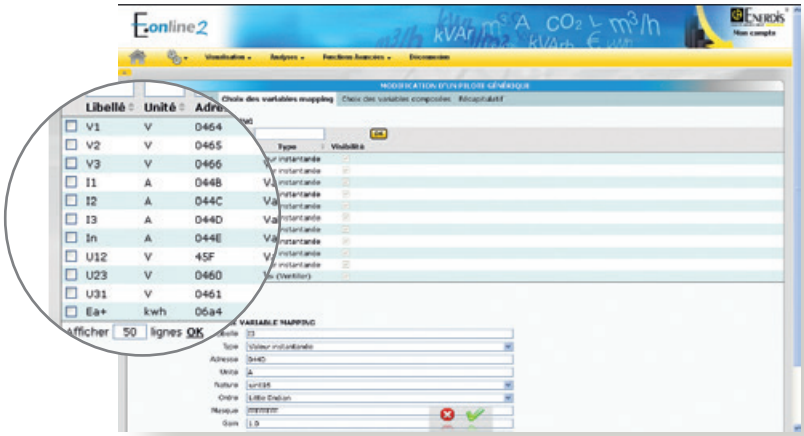


- Arithmetical functions (summing, subtraction) on the devices, e.g. sum of consumption:
  - per usage (lighting, air-conditioning, heating, auxiliary, etc.)
  - per utility (electricity, water, gas, etc.)
  - per entity (company, department, production unit, etc.)
- Configuration of energy Performance Indices
  - (kWh EP/m^2), (kg eq-CO_2/m^2), (m^3/m^2), (kg waste/m^2), etc.
  - (kWh/unit produced), (kWh/operating hours), etc.
- Conversion of the data into contractual units (primary energy, TCO_2, etc.) in the results of energy overviews
- Conversion of the volumes measured (m^3 of gas) into kWh

Generic driver

The generic driver function enables E.online2 to communicate with other manufacturers' products in addition to ENERDIS instruments.

The generic drivers for products from the main manufacturers are available in a library.



- **Communication with all ModBus and ModBus-TCP products**
- **Integration of the communication products already in place on the installation**
- Calculation of the consumption profiles (trend curves) from the energy indices
- Management of a **library of reusable drivers**

SQL connector

The SQL connector is used to create a link (ODBC link) between the E.online2 database and a third-party system database (TBM, CTM, ERP, etc.). The data are updated periodically and automatically by E.online2.

- **Automatic updating** of the data in the mySQL tables
- **Standard reading of the tables via ODBC link**

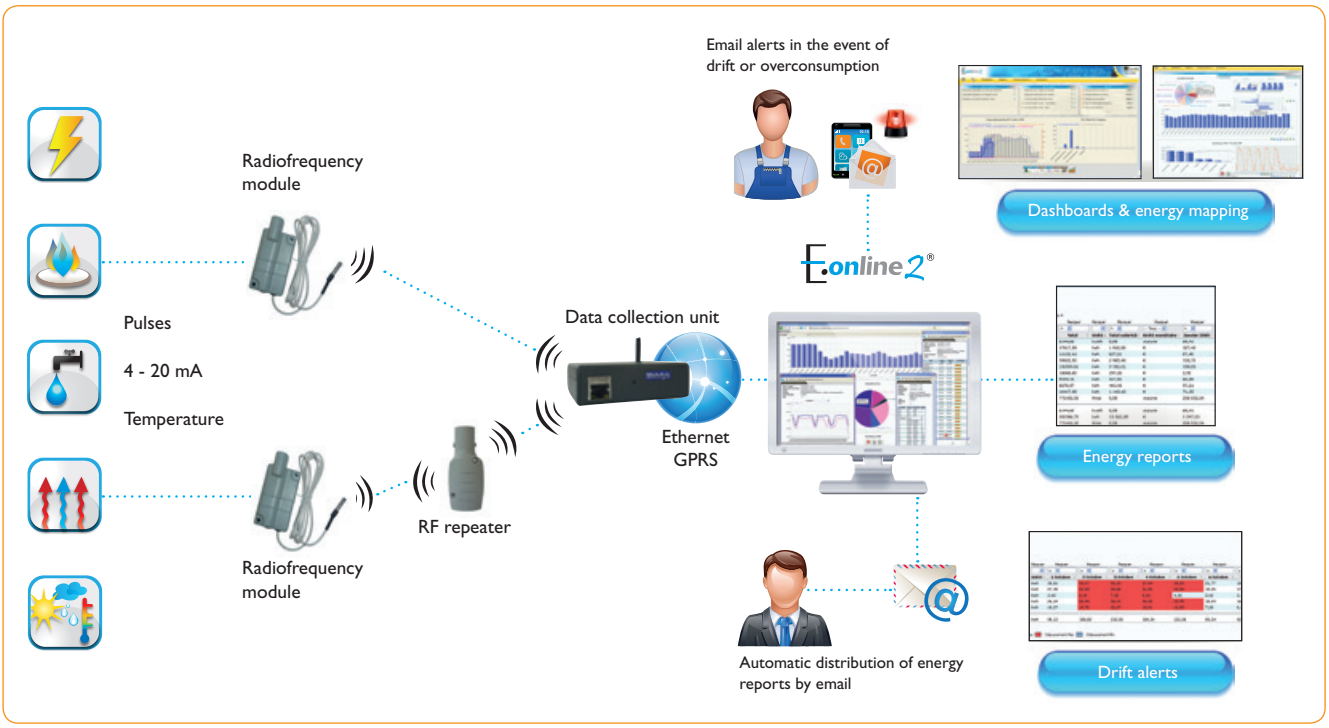
Radiofrequency solution

On some sites, it is sometimes complex and **technically costly to operate devices which are isolated** or remote from any existing communication structures on the site (Ethernet network, wired bus, etc.).

This is very often the case for water and gas meters installed outside the main buildings. The absence of a power supply **also prevents the use of conventional operating modes** such as communicating meters or pulse receivers.

The Radiofrequency solution is particularly suitable for this type of configuration. The meter's pulse output is simply connected to a Radiofrequency module equipped with an autonomous internal power supply. The consumption data (e.g. hourly energy indices) are transmitted periodically by radio waves to a remote data logger. The data logger can handle several tens of Radiofrequency modules.

Radiofrequency modules can also be used to record 4-20 mA signals and temperatures.



Technical data concerning the E.online software

- Web application
- Installation on Server (multi-station) or dedicated PC (single-station)
- Use from a Web browser
- Server application: compatible with Windows Server 2003, Windows Server 2008, Windows Server 2012
- Dedicated PC application: compatible with Windows XP PRO, Windows Vista and Windows 7
- Connection to E.online by means of a user name and password
- Remote retrieval engine: C++ technology
- Application server: Apache Tomcat with JAVA J2EE technology
- Web interface: Ajax, Flash
- DBMS (database management system): MySQL

TO ORDER

E.online 2® without options

Model	Metering points	Reference
E.online 2 single-station	15	P01335050
E.online 2 single-station	30	P01335060
E.online 2 single-station	50	P01335070
E.online 2 server	15	P01335055
E.online 2 server	30	P01335065
E.online 2 server	50	P01335075

E.online 2® configurable version

Version	Single-station or server version
Max. number of devices	between 15 and 1,000
Max. number of user profiles	between 1 and 250 (1)
Options	Manual input generic driver SQL connector

(1): One administrator account by default

Radiofrequency solutions

Model	Reference
RF module, 1 pulse input	P01330380
RF module, 2 pulse inputs	P01330381
RF module, 4 pulse inputs	P01330382
RF module, 1 pulse input, ATEX	P01330383
RF module, 1 temperature input (integrated probe)	P01330384
RF module, 2 temperature inputs (integrated probes)	P01330385
RF module, 1 x 4-20 mA analogue input	P01330386
RF module, 1 pulse input, with interchangeable battery	P01330480
RF module, 2 pulse inputs, with interchangeable battery	P01330481
RF module, 4 pulse inputs, with interchangeable battery	P01330482
RF module, 1 ATEX pulse input, with interchangeable battery	P01330483
RF module, 1 temperature input (built-in probe), with interchangeable battery	P01330484
RF module, 2 temperature inputs (built-in probes), with interchangeable battery	P01330485
RF module, 1 x 4-20 mA analog input, with interchangeable battery	P01330486
Interchangeable battery for module	P01330487
Radiofrequency repeater	P01330387
Radiofrequency data logger – Ethernet output	P01330388
Radiofrequency data logger – GPRS output	P01330389
5 m remote RF antenna	P01330489
10 m remote RF antenna	P01330490
20 m remote RF antenna	P01330491

Communication solutions

Ethernet	
Multi-host JBUS / Ethernet gateway, DIN rail - 24 Vdc (power supply: P01376001)	P01330351
230 Vac / 24-48 Vdc 30 W power supply, DIN rail	P01376001
4 x RS485 / Ethernet repeaters/dispatchers - 230 Vac	P01330375
Mounting bracket for 4 x RS485/ Ethernet repeaters/dispatchers	P01330374
RS485 - RJ10 cable for 4 x RS485/ Ethernet repeaters/dispatchers	P01330376
5-port Ethernet switch, 10-100 BaseTx - 10 to 60 Vdc (power supply: P01376001)	01NC5503
WS250 ADSL router modem - 10 to 28 Vdc (power supply: P01376001)	P01330361
DGCW 3G router modem - 230 Vac	P01330370
Omnidirectional remote antenna, 3G DGCW router	P01330371
Directional remote antenna, 3G DGCW router	P01330372
FME-SMA adapter for directional antenna	P01330373
Mounting bracket for 3G DGCW router	P01330374
3G WS310 router modem - 10 to 60 Vdc (power supply: P01376001)	P01330362
External antenna for 3G - WS310 - WS330 router modem	P01330363
Self-powered RS485 Modbus - USB converter	P01330365

Serial link	
RS485/RS232 CONVERTER - DIN RAIL - 230 VAC	P01330350
2 x RS485/RS485 repeaters/dispatchers - 19.2 to 28.8 Vdc (power supply: ACCJ1003)	ACCJ1002
Power supply for 2 x RS485/RS485 repeaters/dispatchers	ACCJ1003
4 x RS485/RS485-RS232 repeaters/dispatchers - 230 Vac	ACCJ1001

STN and GSM link	
STN - RS232 desktop modem - 230 Vac	MODV2000
STN modem, DIN rail, RS485, ROHS - 230 Vac	P01330352
STN modem, DIN rail, RS485 - 12 Vdc (power supply: ACCJ1004)	MODV2002
230 Vac/12 Vdc - 12 VA power supply	ACCJ1004
STN modem, RTC DIN rail, GSM - RS485 WS - 9.6 to 57.6 Vdc (power supply: P01376001)	P01330379

Radiofrequency	
RF-RS485-ETH-WS80 modem Radiofrequency / RS485-RS232-Ethernet gateway / 10 to 30 Vdc (power supply: P01376001)	01NC5503
RF-RS485 Modbus RTU-WS805U modem Radiofrequency / RS485 Modbus RTU gateway /- 10 to 30 Vdc (power supply:P01376001)	01NC5503
Remote antenna for RF-RS485-ETH-WS80 and WS805U modem	01NC5503
4 m cable for remote antenna	01NC5503
FME-SMA adapter for remote antenna	01NC5503
Radiofrequency - RS485 Modbus RTU module	P01330488

Analyzers

Power quality analyzers

Permanent analyzers - MAP range - Class A

MAP 607
Single-phase voltage quality analyzer
► page 85

MAP 610
Three-phase voltage quality analyzer
► page 84

MAP 620
Three-phase voltage/current power quality analyzer
► page 84

MAP 640
Three-phase voltage/current power quality analyzer with HF transient capture
► page 84

MAP Compact
Three-phase voltage/current power quality analyzer + Energy - Monitoring of EN50160 template
► page 91

Power quality monitor

ENERIUM 300
Power monitor
Qualimetry according to EN50160
► page 38

Non-intrusive analyzers - MAP range - Class A

MAP 612-NI
Non-intrusive three-phase voltage quality analyzer with quick connection
► page 87

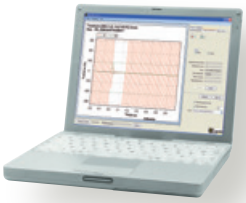
MAP 620-NI
Non-intrusive power analyzer - three-phase voltage/current
► page 87

Management and analysis software

For MAP 607

Qual-SRT
Configuration and real-time display software
► page 93

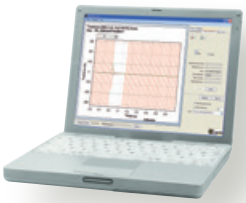
Qual-View
Analysis software for measurement campaigns
► page 93



For MAP Compact

Qual-SRTc
Configuration and real-time display software
► page 92

Qual-View
Analysis software for measurement campaigns
► page 92



E.Qual-Premium Server
Management software for "medium and large configurations".
Client/server software for configuration, automatic data retrieval, multi-equipment analysis, statistical display, report generation and management of the measurements in a database
► page 94

For MAP 6XX range

E.Qual-Premium
Management software for "small configurations".
Point-to-point software for configuration, data retrieval, analysis and report generation
► page 94

E.Qual-Premium Server
Management software for "medium and large configurations".
Client/server software for configuration, automatic data retrieval, multi-equipment analysis, statistical display, report generation and management of the measurements in a database
► page 94

Choosing your power quality analyzer

Based on its specifications

	Permanent analyzers				Non-intrusive analyzers	
	page 85	page 84			page 87	
						
	Single-phase	Three-phase				
	MAP 607	**MAP 610**	**MAP 620**	**MAP 640**	**MAP 612-NI**	**MAP 620-NI**
Installation						
Number of voltage channels	1	3	3	3	3	3
Number of HF voltage channels				3		
Number of current channels			4	4		4
Number of 0 – 20 mA inputs			4	4		
Sampling						
Sampling frequency	12.8 kHz	12.8 kHz	12.8 kHz	12.8 kHz	12.8 kHz	12.8 kHz
Frequency for fast transients				2 MHz		
Communication						
Mini USB	•					
CL port			•	•		
Internal Ethernet port		option	option	option	external	external
Local RS232 port		•	•	•	•	•
Remote RS232 port		•	•	•	•	•
Memory						
Capacity	64 MB	128 MB	128 MB	128 MB	128 MB	128 MB
Internal clock						
GPS synchronization via external coupler		•	•	•		
DCF synchronization via external coupler		•	•	•		
Back-up power supply and connections						
Internal power reserve	1 s	10 s	10 s	10 s	10 s	10 s
Power reserve via external UPS		10 mn	10 mn	10 mn	10 mn	10 mn
Voltage connections	Standardized plug	Screw-on	Screw-on	Screw-on	4 mm banana	4 mm banana
Current connections			Screw-on	Screw-on		1/4 turn (BNC type connection)
Strengths	Retrieval of measurements via USB 2.0 port - Plug & Play system.	Predefined reports as per EN50160. Possibility of programming a customized profile. Compliance with profile calculated in the product, thus minimizing the data to be transferred. Immediate indication of compliance with profile by LED on front panel. Possibility of managing the whole MAP600 range with the same software line.				

► Based on its functions

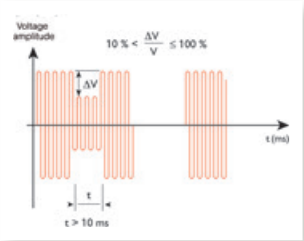
	Permanent analyzers				Non-intrusive analyzers	
	► page 85	► page 84			► pages 87	
						
	Single-phase	Three-Phase				
	MAP 607	**MAP 610**	**MAP 620**	**MAP 640**	**MAP 612-NI**	**MAP 620-NI**
Parameters calculated						
Voltage	•	•	•	•	•	•
Frequency	•	•	•	•	•	•
Unbalance	•	•	•	•	•	•
THD	•	•	•	•	•	•
Harmonics (up to 50th order)	•	•	•	•	•	•
Flicker: Pst (10 min), Plt (2 h) and Lfl (inst.)	•	•	•	•	•	•
Signalling voltages	•	•	•	•	•	•
Power harmonics			•	•		•
P, Q and S power values			•	•		•
Power factors, tangents			•	•		•
Voltage events						
Dips	•	•	•	•	•	•
Interruption / outage	•	•	•	•	•	•
Transients	•	•	•	•	•	•
Fast variations	•	•	•	•	•	•
Event log	•	•	•	•	•	•
HF transients				•		
Event capture and recording						
Signature	•	•	•	•	•	•
Waveforms	•	•	•	•	•	•
Customizable power quality reports	•	•	•	•	•	•
Connexion						
Quick / non-intrusive connection	•				•	•
IP65 connection						
Software						
Qual SRT / Qual-View	•					
E.Qual-Premium		•	•	•	•	•
E.Qual-Premium-Server	• (import)	•	•	•	•	•

Info & advice

Power supply faults and deteriorating electrical power quality cause disturbances which adversely affect the operation of electro-technical equipment. What are the disturbances involved? What are their causes and consequences?

SLOW VARIATIONS AND INTERRUPTIONS

The amplitude of the voltage is usually the primary contractual commitment given by the power distributor. It is nevertheless subject to abnormal variations which may reach a level close to 0.

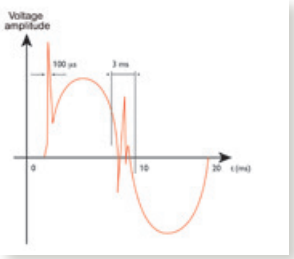


The nominal range of variation of the network voltage is set by the power distributor at ± 10% of the phase-to-phase voltage.

Faults generated	► Voltage surge or dip ► Micro-interruptions < 10 ms ► Short interruptions < 3 min and long interruptions > 3 min
Causes linked to disturbances due to equipments	► Heavy loads connected to a network whose short-circuit power at a delivery point is undersized ► High-power motors, transformers and capacitor banks ► Internal faults in the electrical installation
Causes linked to electrical power supply networks	► Atmospheric phenomena and accidental short-circuits ► Transmission and distribution network management problems
Parameters to be measured	► Amplitude and duration of the variation

RAPID VARIATIONS

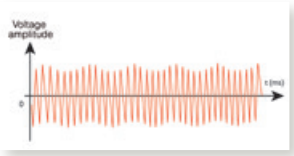
Digital analyzers with a high sampling frequency are necessary to measure transient overvoltages.



Faults generated	► Transient overvoltages (<10 ms)
Causes linked to disturbances due to equipment	► Switching of more or less inductive loads causing transient overvoltages at high frequency ► Switching of 2 thyristors causing a very brief short-circuit between the 2 phases
Causes linked to electrical power supply networks	► Atmospheric phenomena (lightning)
Parameters to be measured	► Maximum amplitude and duration of the transient

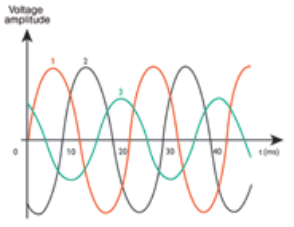
RAPID VOLTAGE VARIATIONS (FLICKER)

The discomfort caused by rapid variations in the brightness of lighting is measured by the flicker value. Effects on people: headache, irritability, epileptic fit, etc.



Faults generated	► Variation of brightness ► Flickering of computer screens
Causes linked to disturbances due to equipment	► Arc furnaces ► Laser printers ► Air-conditioning systems
Causes linked to electrical power supply networks	► None
Parameters to be measured	► Short-term flicker (Pst) and long-term flicker (Plt)

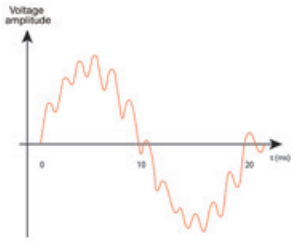
VOLTAGE UNBALANCE



Faults generated	► Current or voltage not phase-shifted by 120° and with different amplitudes
Causes linked to disturbances due to equipment	► Load absorbing power in an unbalanced way on the 3 phases ► Disconnection of one electrical power supply phase
Causes linked to electrical power supply networks	► Disconnection of one electrical power supply phase
Parameters to be measured	► Level of unbalance, direct, inverse and homopolar voltage or current

HARMONICS AND INTERHARMONICS

The current consumed by the loads no longer has a pure sinusoidal waveform. The current distortion implies a voltage distortion that also depends on the impedance of the source.



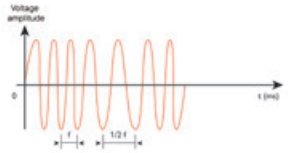
Harmonics: sinusoidal waves whose frequencies are multiples of 50 Hz superimposed on the fundamental wave.

Interharmonics: component of the signal superimposed on the fundamental wave (50 Hz) but which is not a multiple of the fundamental (e.g. 175 Hz).

Faults generated	► Functional synchronization problems, switching ► Untimely tripping of circuit-breakers ► Induced heating reducing the life span of rotating machines, capacitors, power transformers and neutral conductors
Causes linked to disturbances due to equipment	► EQUIPMENT containing power electronics: variable speed drives, uninterruptible power supplies, dimmers, welding units
Causes linked to electrical power supply networks	► Propagation of harmonic pollution from customers supplied by the same electrical network
Parameters to be measured	► Global THD ► Harmonics order by order in % and RMS value

FREQUENCY VARIATIONS

Frequency fluctuations are observed on non-interconnected networks and networks connected to electrical generator sets.

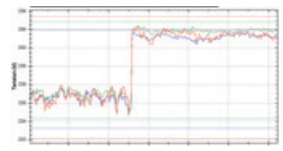


The average value of the fundamental frequency must be 50 Hz ± 1% in normal operating conditions.

Faults generated	► Process shutdown
Causes linked to disturbances due to equipment	► Autonomous source control fault
Causes linked to electrical power supply networks	► After an overload on networks that are not interconnected or on an electrical generator set
Parameters to be measured	► Frequency F(Hz)

VOLTAGE SURGES

The maximum number of voltage surges during an observation period is usually monitored.



Surges of a few per cent which do not cause the voltage to deviate from the template ± 10 %.

Faults generated	► Contributes to flicker, malfunction of the control systems acting on the phase angle, acceleration/deceleration torque of motors ► Damage to sensitive electronic equipment
Causes linked to disturbances due to equipment	► Operations: motor startup, activation of a capacitor bank, activation of an inductance, etc.
Causes linked to electrical power supply networks	► Activation of load adjustment systems ► Variation of production by independent producers (wind turbines, solar panels, etc.)
Parameters to be measured	► Voltage surges according to the IEC 61000-3-3 standard, difference between two stable states (voltage change less than or equal to 0.5 % for 1 second) ► The characteristics of voltage surges are: duration (time between two stable states), largest voltage variation in relation to previous stable state (Umax), difference between the two stable states (Ustat)

FOCUS

Standards

For electrical power distributors, it is crucial to deliver a quality product, which means sinusoidal, balanced three-phase voltage below a rated value at a frequency of 50 Hz. It also means remaining consistent with the bill delivered to the end-user. To help distributors and users to monitor and improve electrical network quality, several standards have been drawn up.

The **EN 50160** standard defines the main characteristics of the quality of the voltage supplied by the LV and MV public distribution network at the customer delivery point: frequency, amplitude of the waveform, symmetry of the three-phase voltages during a predefined observation period. It indicates the limits or values of the voltage specifications that any customer has a right to expect.

The **IEC 61000-4-30** standard, meanwhile, has been established to measure the various voltage quality parameters and obtain reliable, reproducible and comparable results whatever the measurement instrument used and whatever the environmental conditions. This standard defines the methods for measuring each parameter and how to interpret the results. It also stipulates the precautions necessary when installing measurement instruments on live circuits.

MAP Range

HV / MV / LV electrical power quality analyzers – Class A

PRODUCT ADVANTAGES

- **COMPLIANT** with the EN 61000-4-30 standard, Class A
- **DETECTION** of the fault **LOCATION DIRECTION** (upstream/downstream) for products with current channels
- **ANALYSIS OF TRANSIENTS** with a high, variable sampling frequency
- **MEASUREMENT OF HARMONICS** (up to 50th order) and **INTERHARMONICS** (up to 50th group)
- **FLICKER MEASUREMENT:** Ifl, Pst, Plt
- **PROCESSING** of the data according to the EN 50160 standard

Communication port: local, modem, integrated Ethernet, multi-point

Status LED: phase order and template overrun

Communication couplers: local, modem, Ethernet

General specifications

The products in the **MAP** range, mounted on a platen or on the cabinet backplate, measure all the parameters of HV/MV/LV electrical networks: RMS voltage, frequency, THD, level of unbalance, positive/negative/zero sequence voltage, flicker, harmonics up to the 50th order, interharmonics up to the 50th group. For products with current channels: RMS current, THDI, active, reactive and apparent power, cos φ, power factor, power values of harmonics, energy values (calculated by the software).

The products in the **MAP** range record and, via the associated software, provide detailed, comprehensive and continuous analysis of the quality of the electricity supplied according to the applicable standards, particularly EN 50160: voltage variations (voltage dips, swells and outages), rapid variations (transient overvoltages), flicker or rapid voltage fluctuations…

Various communication modes are available for remote retrieval of the data and detailed analysis of all the parameters recorded. On some models, additional 20 mA analogue inputs can be used to:

- monitor physical parameters from a 20 mA transducer
- monitor statuses such as circuit-breaker contacts and protection relays via suitable couplers
- trigger waveform capture by a digital channel via a digital input/20 mA signal coupler
- check the equipment transmitting binary signals

MAP 607

Single-phase analyzer – Class A

- 2 voltage channels: phase/neutral and phase/neutral-earth
- Plug & play: no driver required
- USB 2.0 communication port
- Configuration for voltage dips, overvoltages and transient disturbances
- Class A according to IEC 61000-4-30
- Measurement of all the power quality parameters according to the predefined standard (EN 50160, etc.)
- Direct indication on the product:
  Green LED: parameters OK
  Red LED: parameters outside profile

Management and analysis software

- Qual-SRT: configuration and real-time display
- Qual-view: analysis and reports

Inputs			
Voltage input (Phase-Neutral)	0-300 V RMS	Standard measurement (Class A)	1
Voltage input (Phase/Neutral-Earth)	0-300 V RMS, 700 Vpk		1
Power supply			
Power supply range		Power supply via voltage input	Yes
Internal back-up			Yes
Compliance with standards			
Sliding reference			Yes
IEC 61000-4-30, Class A	< 0.1%	Reference equipment	Yes
IEC 61000-4-7		Measurement of harmonics	Yes
IEC 61000-4-15		Flicker measurement	Yes
EN 50 160 (European Norm)		Calculated in the unit	Yes
PQDIF format			Option
Hardware			
Memory		Circular Flash Memory (NAND)	64 MB
Sampling rate			12.8 kHz (x 2)
Accuracy		Class A	< 0.1%
Resolution			16 bits
Input impedance – Input voltage			10 MΩ
Anti-aliasing filter			Yes
Bandwidth			3.5 kHz
PLL Synchronization			Yes
Communication			
USB port	2.0 (full-speed)	For PC connection, detected automatically Driver not required	Yes
Measurement specifications			
All power quality parameters are measured and stored		Voltage (avg/min/max), Frequency, THD, Harmonics (up to 50th order), Flicker (Ifl, Pst, Plt)	Yes
Analysis of rapid disturbances		Dips/swells (RMS 1/2 cycle), transients	Yes
Waveform capture		Programmable pre-time and post-time	Max. duration 200 cycles
Mechanical specifications			
Housing	For 230 V socket	Humidity: 10% - 85% without condensation	
Dimensions (L x H x D)	120 x 65 x 65 mm		
Weight	0.3 kg	Safety: EN 61 010-1	
Operating temperature	-10°C +55°C	EMC: EN 58 081-1,2; EN 50 082-1,2	

TO ORDER

	Reference
Package includes: - MAP607 - mini USB cable - Qual-view and Qual-SRT software - carrying case	MAP607-P

MAP Range

Permanent analyzers - Three-phase

		Voltage	Voltage / Current	
Inputs	**Specifications**	**MAP 610**	**MAP 620**	**MAP 640**
Voltage	0-275/400 VRMS, 400/690 V (option)	3	3	3
HF voltage	0-275 VRMS (6 kV), high frequency (2 MHz)	-	-	3
Current	0-6 A RMS	-	4	4
General	0-20 mA analogue inputs	-	4	4
Network quality parameters				
Voltage	Min, Max, average values	X	X	X
Frequency		X	X	X
Unbalance		X	X	X
Lfl, Pst and Plt flicker	Pst 10 min, Plt 2 h, Selectable storage range	X	X	X
Signalling voltages	< 3,000 Hz	X	X	X
THD-F		X	X	X
Individual harmonics	Up to 50th order	X	X	X
Interharmonics	Up to 50th group	X	X	X
Voltage surges	Number of times and variation (%)	X	X	X
Sliding reference	Complies with IEC 61000-4-30 Class A	X	X	X
Other parameters				
Current	Min, Max and average values	-	X	X
Current harmonics	Up to 50th order	-	X	X
Power measurement	P/Q/S, PF/cosφ	-	X	X
Energy measurement in the software	active, reactive, apparent	-	X	X
Event-related				
Dips / overvoltages / interruptions / outages	1/2-1 cycles RMS, Class A	X	X	X
Calculation of event direction	Upstream/Downstream	-	X	X
Signature recording	12.8 kHz, half-period RMS curve	X	X	X
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤15 s	X	X	X
Waveform recording	Configurable up to 12.8 kHz	X	X	X
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤20 cycles	610-300	X	X
HF transients, peak detection	2 MHz	610-300	X	X
Recording of waveforms and HF transients		-	-	X
Power supply				
Power supply input range	85-264 Vac / 110-375 Vdc, (47-63 Hz)	X	X	X
Internal back-up		X	X	X
Compliance with standards				
IEC 61000-4-30, Class A	< 0.1%, reference standard	X	X	X
IEC 61000-4-7	Measurement of harmonics	X	X	X
IEC 61000-4-15	Flicker measurement	X	X	X
EN 50 160	Calculated in the equipment	X	X	X
Customized reports	Calculated in the equipment	X	X	X
PQDIF format		Option	Option	Option
Hardware				
Memory	128 MB Flash memory (NAND)	X	X	X
Sampling frequency		12.8 kHz	12.8 kHz	12.8 kHz / 2 MHz
Voltage accuracy		< 0.1 %	< 0.1 %	< 0.1 %
Resolution		16 bit	16 bit	16/10 bit
Standard bandwidth / HF		3.5 kHz / -	3.5 kHz / -	3.5 kHz / 1 MHz
Input impedance - voltage input		1 MΩ	1 MΩ	1 MΩ
Input impedance – current input		-	10 mΩ	10 mΩ
Anti-aliasing filter		X	X	X
Communication				
RS-232	PC port	X	X	X
RS-232	Modems, external couplers, etc.	X	X	X
CL port	Current loop port	X	X	X
Ethernet port (RJ-45)	Ethernet port	Option	Option	Option
Mechanical specifications				
Dimensions (L x H x D) in mm		160 x 240 x 60	160 x 240 x 90	160 x 240 x 90
Weight		1.3 kg	1.3 kg	1.7 kg
Operating temperature		-10°C / +50°C	-10°C / +50°C	-10°C / +50°C

TO ORDER, GO TO PAGE 88

Non-intrusive analyzers - Three-phase

		Voltage	Voltage / Current
Inputs	**Specifications**	**MAP 612-NI**	**MAP 620-NI**
Voltage	275/400 VRMS, reference equipment (Class A)	3	3
Voltage range	400/690 V RMS	Option	Option
HF voltage	high frequency (2 MHz)	-	-
Current via external sensor	120 A, 1.2 kA, 1 kA flex RMS selectable	-	4*
Network quality parameters			
Voltage	Min, Max and average values	X	X
Frequency		X	X
Unbalance		X	X
Lfl, Pst and Plt flicker	Pst 10 min, Plt 2 h, Selectable storage range	X	X
Signalling voltages	< 3,000 Hz	X	X
THD-F		X	X
Individual harmonics	Up to 50th order	X	X
Interharmonics	Up to 50th group	X	X
Voltage surges	Number of times and variation (%)	X	X
Sliding reference	Complies with IEC 61000-4-30 Class A	X	X
Other parameters			
Current	Min, Max and average values	-	X
Current harmonics	Up to 50th order	-	X
Power measurement	P/Q/S, FP/cosφ	-	X
Energy measurement in the software	active, reactive, apparent	-	X
Event-related			
Dips / overvoltages / interruptions / outages	1/2-1 cycles RMS, Class A	X	X
Calculation of event direction	Upstream/Downstream	-	X
Signature recording	12.8 kHz, half-period RMS curve	X	X
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤15 s	X	X
Waveform recording	Configurable up to 12.8 kHz	-	X
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤20 cycles	-	X
HF transients, peak detection	2 MHz	-	-
Recording of waveforms and HF transients		-	-
Power supply			
Power supply input range	85-264 Vac, (47-63 Hz) powered on phase 1 measurement	X	X
Separate power supply input	85-264 Vac / 110-375 Vdc, (47-63 Hz)	Option	Option
Internal back-up		X	X
Compliance with standards			
IEC 61000-4-30, Class A	< 0.1%, reference standard	X	X
IEC 61000-4-7	Measurement of harmonics	X	X
IEC 61000-4-15	Flicker measurement	X	X
EN 50 160	Calculated in the equipment	X	X
Customized reports	Calculated in the equipment	X	X
PQDIF format		Option	Option
Hardware			
Memory	128 MB Flash memory (NAND)	X	X
Sampling frequency		12.8 kHz	12.8 kHz
Voltage accuracy		< 0.1 %	< 0.1 %
Resolution		16 bits	16 bits
Standard bandwidth / HF		3.5 kHz / -	3.5 kHz / -
Input impedance – voltage input		1 MΩ	1 MΩ
Input impedance – current input		-	ext. sensor
Anti-aliasing filter		X	X
Communication			
RS 232	PC port	X	X
RS 232	Modems, external couplers, etc.	X	X
CL Port	Current loop port	-	-
Ethernet port (RJ-45)	Ethernet port	Option	Option
Mechanical specifications			
Dimensions (L x H x D) in mm		160 x 240 x 60	160 x 240 x 90
IP65 casing and connections		-	-
Weight		1.3 kg	1.3 kg
Operating temperature		-10 °C / +50 °C	-10 °C / +50 °C

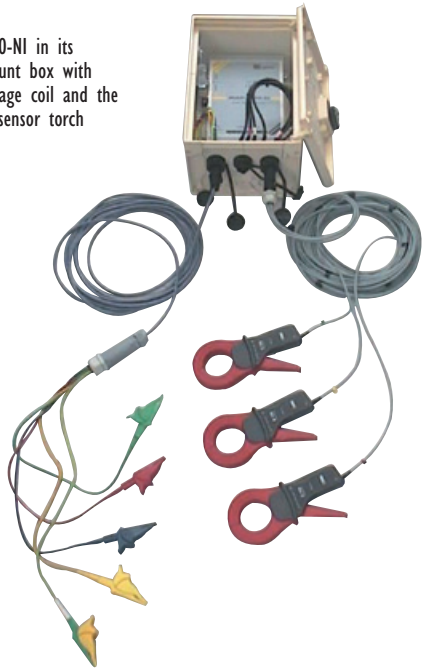
* Accessory for external power supply for flex

TO ORDER, PLEASE CONTACT US

MAP Range

Self-powered analyzer – Measurement in pole-mounted boxes

MAP 620-NI in its pole-mount box with the voltage coil and the current-sensor torch



Output via leakproof connectors on the underside of the box

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Environment

Operating temperature:
-10°C to + 50°C
Relative humidity:
10% - 85%, without condensation
Installation category:
Category III, 600 V (300 V for the MAP607)
Pollution level: 2

Compliance with standards

Measurements:
- EN 61000-4-30: Voltage quality measurement method (Class A RMS values)
- EN 61000-4-7: General guide to harmonic and interharmonic measurements
- EN 61000-4-15: Test and measurement technique: flickermeter

Safety (Low Voltage Directive):
- EN 61010-1: Safety rules for electrical equipment for measurement, testing and laboratory use
- EN 60950: Safety of data processing equipment

Communication:
- Protocol compatible with the associated Qual-SRT, E.Qual-Premium and E.Qual-Premium Server software, TCP/IP encapsulation on internal Ethernet port (option)

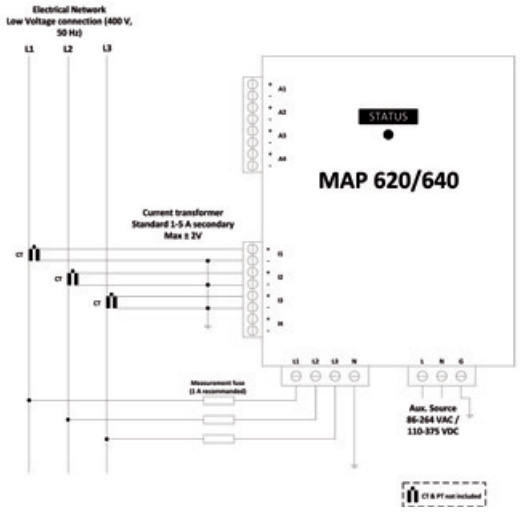
Electromagnetic compatibility:
- EN 61326-1: Instructions concerning EMC for electrical measurement, control and laboratory equipment including:
- EN 61000-4-2: Electrostatic discharge Level 3 (Air 8 kV / Contact 4 kV)
- EN 61000-4-3: Immunity to radiated electrostatic fields – Level 3 (10 V/m)
- EN 61000-4-4: Fast electrical transients – Level 4 (2 kV)
- EN 61000-4-5: Immunity to voltage surges – Level 4 (common mode 2 kV, differential mode 1 kV)
- EN 61000-4-6: Immunity to conducted disturbances – Level 3 (3 Vrms)
- EN 61000-4-8: Level 4 (30 A/m)
- EN 61000-4-11: Level 0 (duration 0.5 period – voltage dip and short interruption 100% U)
- EN 61000-4-12: Level 3 (common mode 2.5 kV / diff. mode 1.0 kV)
- CISPR 16-2-1, CISPR 16-2-3, EN55011 (EN5022 required by the generic standard EN 61326)

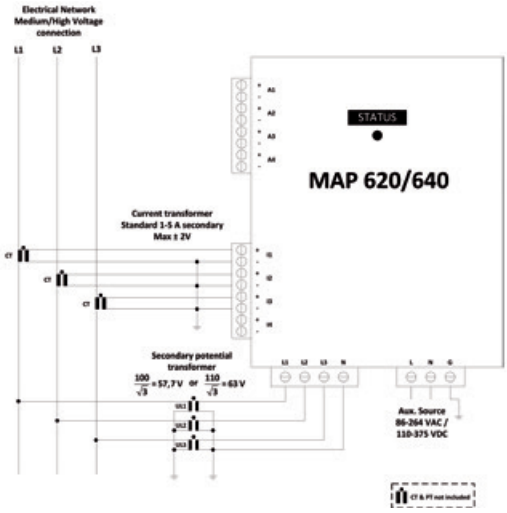
Mechanical specifications

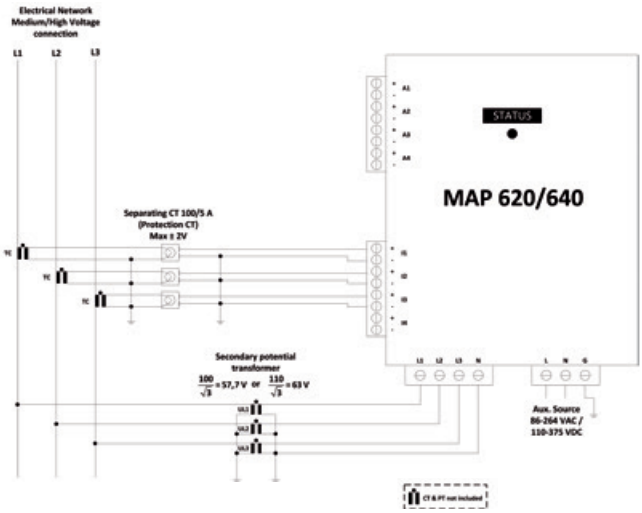
Weight:
- 1.3 kg (MAP 610, MAP612-NI, MAP 620 and MAP640)
- Mechanical shock test: EN60068-2-27: table 1: 30 g/18 m sec

Connection:
- 4 mm² cable for U and I
- 2.5 mm² cable for inputs/outputs

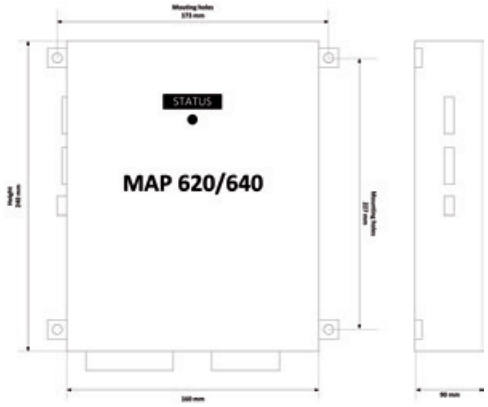
Electrical connections

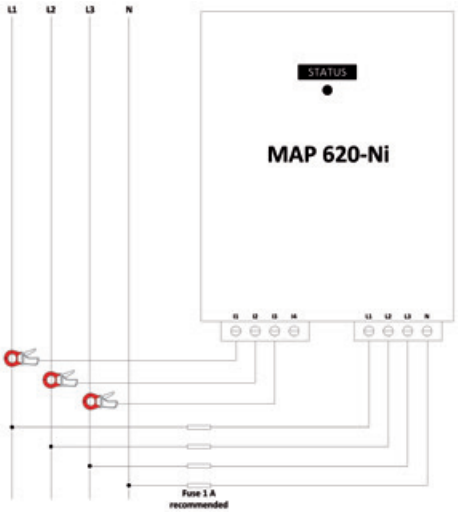






Dimensions

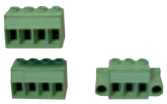
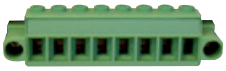




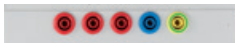
MAP Range

Connection systems

Permanent analyzers MAP

	MAP 610	MAP 620	MAP 640	MAP Compact
	Screw-on connectors			Screw-on connectors
Voltage				
Current	-			

Non-intrusive MAP

MAP 612-NI / Nix	MAP 620-NI / Nix
Quick connection systems	¼ turn connection systems
612-NI 	620-NI 
612-Nix (independent power supply) 	620-Nix (independent power supply) 

TO ORDER

MAP6 X 0 X X X X

Model
- 1: Three-phase voltage only
- 2: Three-phase voltage + Current
- 4: Three-phase voltage + Current + HF transient capture

Digital outputs
- -: No digital outputs
- C: Digital outputs

Communication
- 0: Without Ethernet port (only COM and MODEM)
- E: Without Ethernet port (+ COM and MODEM)

Power supply
- 0: Standard power supply (85-264 Vac / 110-375 Vdc)
- 4: 48 Vdc power supply

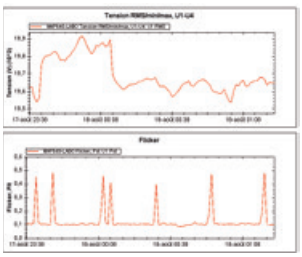
Voltage input range
- 0: Standard voltage input range (0-275/400 VRMS)
- 6: 690 VRMS (L-L) voltage input

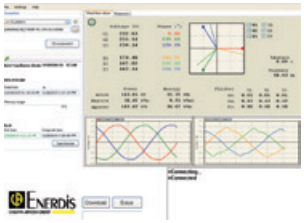
Example: • **order MAP640-E40** for a MAP640 Model + Without digital outputs + Ethernet port + 48 Vdc power supply
• **order MAP610C046** for a MAP610 Model + With digital outputs + Without Ethernet port + 48 Vdc power supply + 690 VRMS voltage inputs

MAP Compact

Compact Power Quality Analyzer– Class A with monitoring of EN50160 template and calculation of energy values

- Built-in display
- Measurement compliant with IEC 61000-4-30 Class A
- Integrated EN50160 report generation function
- Recording of voltage dips / swells / outages
- Waveform capture with programmable pre-time and post-time
- Measurement of power and energy values as primary quantities
- Communication interfaces
- Compact format for installation in existing cabinets
- Configuration and display software: Qual-SRTc, Qual-View
- Management and analysis software: E.Qual-Premium Server





Specifications

Inputs		Characteristics	
PH/N, PH/PH voltage input	3	0-364/0-630 VRMS	Impedance 1 MΩ
Current input	3	0-6 A RMS	Impedance 10 mΩ
CT and VT ratio	•	-	-
Sampling and algorithmic conformity			
Sampling	-	12.8 kHz / 16 bits	Anti-aliasing filter and PLL synchronization
Bandwidth	-	3.5 kHz	-
Network quality	-	IEC 61000-4-30 Class A	-
Harmonics	-	IEC 61000-4-7	50th order
Flicker	-	IEC 61000-4-15	-
Voltage surges	-	IEC 61000-3-3	-
Template monitoring	-	EN50160	-
Parameters measured			
Voltage	•	-	EN 50160
Frequency	•	-	EN 50160
Unbalance	•	-	EN 50160
Harmonics	•	-	EN 50160
Flicker (Pst, Plt, Ifl)	•	-	EN 50160
Current	•	-	10 mn
Power	•	P/Q/S, FP, cosφ	Selectable integration
Energy	•	kWh, kVArh	Selectable integration
Storage, communication and display			
Mini-USB	•	-	-
CL port	•	-	-
RS232 port	•	-	-
Ethernet port	Available as an option	-	-
Storage capacity	Flash, circular	64 MB	-
Display	Navigation keys	3 lines	U, I, events
Power supply and power reserve			
Power supply	-	175 Vac to 255 Vac	-
Internal power reserve	-	10 s	-
Mechanical specifications			
Dimensions	-	155 x 165 x 68 mm	-
Weight	-	0.9 kg	-
Operating temperature	-	-10°C to +55°C	-
Advantages	Integrated EN50160 reports Display Measurement of network quality and energy in kWh / kVarh Compact format		

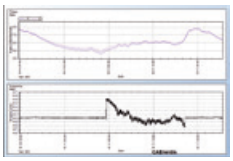
TO ORDER, PLEASE CONTACT US

MAP Software Range

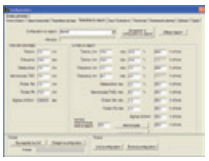
Management and analysis software

PRODUCT ADVANTAGES

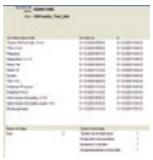
- **PARTICULARLY USER-FRIENDLY** software
- **ANALYSIS** and **DIAGNOSTICS** according to the applicable standards
- **SET-UP** of all the parameters in the EN 50160 standard on **A SINGLE SCREEN**



Graphic display of all the available parameters



Configuration and manual or automatic retrieval of the data



Generation of reports

► Description

Depending on the model, the range of software for MAP allows:

- configuration of the **MAP**
- creation of call sessions
- display of the electrical parameters (monitoring mode)
- retrieval of recorded data
- analysis of the disturbances and transients
- EN 50160 analysis
- a point-to-point or client/server architecture
- an automatic data retrieval engine
- multi-equipment analysis sessions
- external synchronization by server
- an event viewer module for standby control rooms
- report printing
- transmission of alarms by e-mail, SMS, etc.

► Recommended configuration

PC platform
Operating system: Windows 2000, ME, XP
Processor: Pentium II
Frequency: 400 MHz
Memory: 128 MB RAM
Hard disk space: 70 MB

Software for MAP 607

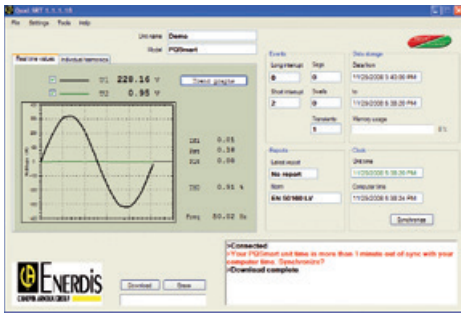
Qual-SRT and Qual-View

Qual-SRT and Qual-View are dedicated software modules for the MAP607 single-phase network analyzer.
Qual-SRT: configuration and real-time display module for "online" display of:

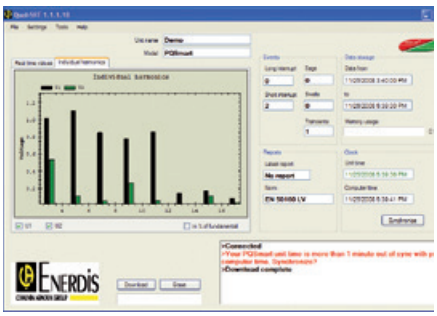
- the measurements on the MAP607's two channels
- the number of dips / swells / long interruptions / short interruptions / transients recorded
- the overall status of the last EN 50160 report
- the memory occupation rate
- the equipment date and time

Dynamic views are also available: trend curve (logger-type view) and bargraph of harmonics up to the 50th order. Thanks to the ultra-fast self-declaring USB 2.0 link, this module can also be used for almost instantaneous recovery of the data and deletion of the data from the equipment.

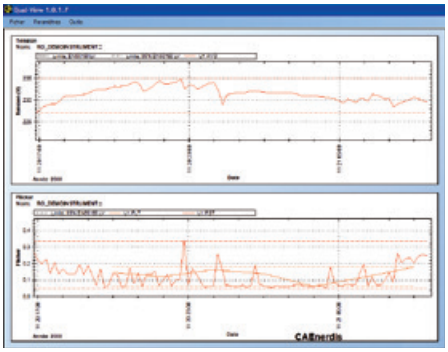
Qual-View: analysis and report generation module for MAP607-type data.
This provides a view of all the trend curves generated by the equipment and includes zoom and graphic display functions concerning the limits of the power quality profile for each parameter.
Event-related views such as event signatures, waveforms and time/date-stamped event log can also be obtained using dedicated tabs in the Qual-View software. It is possible to apply a power quality profile to the measurement campaign retrieved from the MAP607.



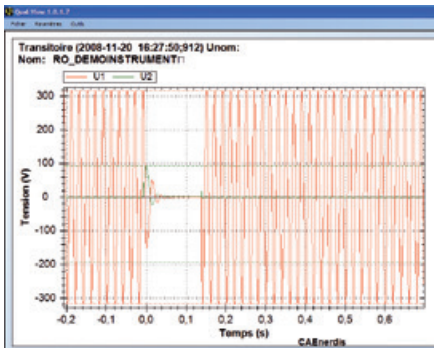
Qual-SRT: real-time display of the waveform in connection with a MAP607



Qual-SRT: real-time display of harmonics bargraph



Qual-View: graphic display of the measurement campaign retrieved (trends)



Qual-View: display of the waveform of a retrieved event (interruption)

TO ORDER

Model	Reference
Configuration software	QUAL-SRT
Display software	QUAL-VIEW

Associated products

MAP range

► page 84

Single-phase network analyzer

► page 85

MAP Software Range

Management and analysis software for the MAP range

E.Qual-Premium and E.Qual-Premium Server

The **E.Qual-Premium** software can be used to generate different views corresponding to the different parameters present in the measurement campaign recovered with:
- the views of the events
- the views of the transients
- the views of trend curves
- the views of the measurement campaign summaries
- the reports generated directly in MS Word® format and, in addition for the client / server version **E.Qual-Premium Server:**
- the multi-equipment graphic views
- the multi-equipment event logs
- the statistical views

The E.Qual-Premium and E.Qual-Premium Server software modules are compatible with all the products in the MAP range.

	E.Qual-Premium	E.Qual-Premium Server5	E.Qual-Premium Server
Architecture			
Point to point	•	•	•
Multi-equipment by successive targeting	•	•	•
Management of measurements in database	-	•	•
Multi-site / multi-equipment	-	•	•
Client / Server architecture	-	•	•
Number of devices managed	5	5	> 5
Data transfer			
Manual	•	•	•
Selective transfer	•	•	•
Automatic transfer	-	•	•
Communication log	-	•	•
Measurement display			
Real-time waveform and vectorial	•	•	•
Recorded curves	•	•	•
Curves with multi-equipment parameters	-	•	•
Global measurement campaign	-	•	•
Event display			
List of events	•	•	•
Waveform and fast RMS	•	•	•
Sorted views	-	•	•
Statistical view of events	-	•	•
Report generation			
Standard report covering one week	•	•	•
Report covering customizable period	-	•	•

Management and analysis software for the MAP range

	E.Qual-Premium	E.Qual-Premium Server5	E.Qual-Premium Server
Architecture			
Multilingual structure	•	•	•
Multi-equipment point-to-point by successive targeting	•	•	•
Number of devices managed	5	5	> 5
Licence for managing additional equipment	•	-	•
Measurement management in file mode	•	•	•
Measurement management in SQL Server database	-	•	•
Multi-site / multi-equipment	-	•	•
Client / Server and single-station Client / Server architecture	-	•	•
Possibility of remote clients	-	•	•
Data transfer and type			
Manual transfer	•	•	•
Automatic transfer	-	•	•
Selective transfer between start date and end date	•	•	•
Transfer of average, minimum and maximum values	•	•	•
Transfer of harmonics and interharmonics order by order	•	•	•
Transfer of frequencies	•	•	•
Transfer of summarized events	•	•	•
Transfer of half-period RMS curve signatures	•	•	•
Transfer of waveforms	•	•	•
Transfer of EN50160 reports and customized profiles	•	•	•
Real-time display			
Measurement time period	•	•	•
Voltage / current / power values / unbalance / frequency	•	•	•
Dip / swell / transient counter	•	•	•
Macroscopic status of internal power quality report	•	•	•
U/I waveforms and Fresnel vector	•	•	•
THD U / THD I	•	•	•
Individual harmonics up to 50th order	•	•	•
Bargraph of U/I harmonics up to 50th order	•	•	•
Flicker indicator: Lfl, Pst, Plt	•	•	•
Configuration			
CT / VT ratios	•	•	•
Storage intervals	•	•	•
Max / min limits of profile	•	•	•
Statistical integration (X%) for each parameter	•	•	•
Limit for dips / swells	•	•	•
Pre-time and post-time for RMS signature and waveform	•	•	•
Limit for transients	•	•	•
Pre-time and post-time for transients	•	•	•
Alarm events	•	•	•
SMS alarms	•	•	•
Unit, scale factor and offset for general inputs	•	•	•
Triggering on digital channels	option	option	option
Measurement campaign analysis			
Graph of average values	•	•	•
Superimposing of half-period min / max envelope	•	•	•
Superimposing of min/max limit reached	•	•	•
Superimposing of power quality profile min/max limit	•	•	•
Multi-curve / multi-parameter graph	•	•	•
Zoom in / out	•	•	•
Synchronized zoom on several curves	•	•	•
Synchronized displacement of several curves	•	•	•

	E.Qual-Premium	E.Qual-Premium Server5	E.Qual-Premium Server
Analysis of events			
Filtered lists of summarized events	•	•	•
Detailed view of event parameters	•	•	•
Fast RMS envelope event view	•	•	•
Graphic overlay of U/I envelope	•	•	•
Fast RMS envelope view displacement	•	•	•
Event waveform view	•	•	•
Superimposing of U/I waveform	•	•	•
Zoom in / out	•	•	•
Waveform view displacement	•	•	•
Event	•	•	•
Functions on the views			
Graphic copy in clipboard	•	•	•
Graphic recording on hard disk	•	•	•
Configuration of graph axis scales	•	•	•
Graphic printing configuration	•	•	•
Graphic printing	•	•	•
Report generation			
Standard report generation	•	•	•
Customized report generation	•	•	•
One-week report generation	•	•	•
Customizable-period report generation	option	•	•
Multi-site / multi-equipment mode			
Regional multi-base data source	-	•	•
Possibility of inserting retrieved file in base	-	•	•
Multi-parameter / multi-equipment graphics	-	•	•
Summarized multi-equipment event impact view	-	•	•
Multi-equipment list of summarized events	-	•	•
Interactive viewer: list / summarized view / detailed view	-	•	•
Multi-equipment event list sorting	-	•	•
Filtered multi-equipment summarized event list	-	•	•
Advanced event list filter	-	•	•
Event CSV export	-	•	•
Multi-equipment communication log	-	•	•
ITIC statistical viewer	-	•	•
SEMI47 statistical viewer	-	•	•
UNIPEDE table statistical viewer	-	•	•
Measurement campaign Excel export	-	•	•
Measurement campaign PQDIF export	-	option	option
Overview of energy values in selectable interval	-	•	•
CSV export of energy values	-	•	•
Administration of automatic remote retrieval			
Frequency of automatic remote retrieval	-	•	•
Frequency: never/immediate/10 min / hour / day / week	-	•	•
Normal transfer / all data / with harmonics	-	•	•
Possibility of automatic deletion after retrieval	-	•	•
Automatic remote retrieval start date / time	-	•	•
Communication for remote retrieval for each device	-	•	•

MAP Software Range

Management and analysis software for the MAP range

General specifications

Parameters according to EN 50160

- Network frequency
- Power supply voltage
- Slow and rapid voltage variations
- Short and long outages
- Voltage dips and asymmetries
- Harmonic and interharmonic voltages
- 50 Hz transient overvoltages

Flicker

- Flicker measurement according to EN 61000-4-15: short-term flicker (Pst), long-term flicker (Plt)

Voltage and current

- TRMS value and average value
- Peak value and crest factor

Power / Energy values

- Active power produced and consumed
- Inductive or capacitive reactive power
- Apparent power, power factor and Cos φ
- Active energy produced and consumed
- Inductive or capacitive reactive energy
- Apparent energy

Harmonic breakdown up to 50th order

- Harmonics: current, voltage, power in relation to the fundamental and in absolute terms
- Phase shift of each harmonic order
- Global THD global and order by order
- Recognition of the direction of each harmonic order

Analysis of three-phase system unbalance

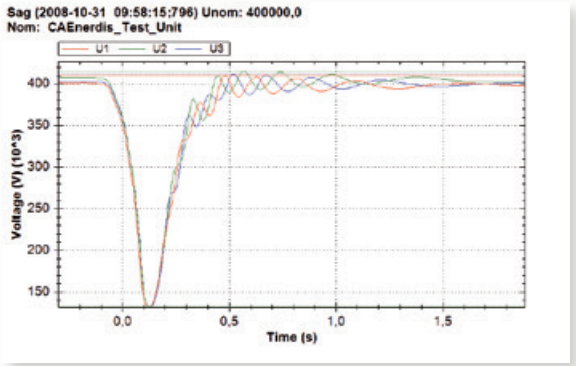
- Measurement of a system's symmetry: positive, negative, zero sequence components
- Phase shift
- Vectorial representation of voltage and current

Analysis on networks

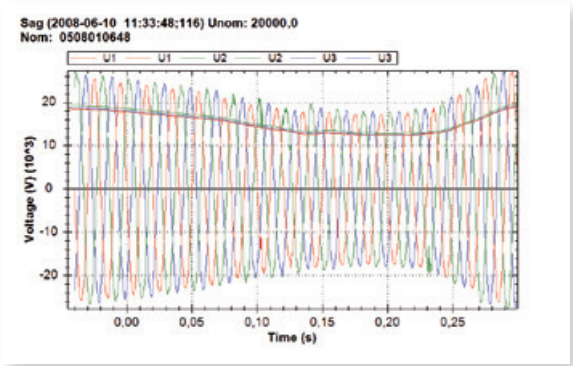
- Recording of "short-circuit" events (faultograph function)
- Location of the fault, duration of the phenomenon
- Analysis of the network impedance
- Analysis of remote control signals: definition and verification of the frame
- Verification of equipment operation (capacitors, filters, circuit-breakers)

Dip / overvoltage / interruption / outage events

After retrieving the data recorded by the MAP network analyzers, the dip/overvoltage/interruption/outage events captured when outside the programmed profile can be displayed in different views available in the E.Qual-Premium software. The zoom function can be used on the views.



View of the signature curve of a voltage dip, obtained using the fast RMS values refreshed every half-period. The pre-time and post-time for recording are those programmed in the MAP network analyzer.

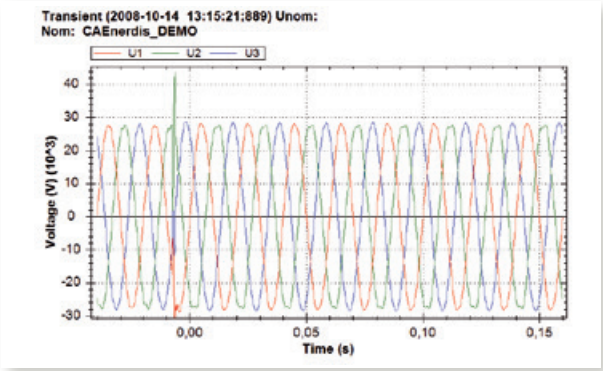


View of the signature curve of a voltage dip superimposed with the waveforms of the real signals on the three phases. The waveforms are displayed with a high resolution matching the sampling rate, i.e. 12,800 Hz. The event-related view is given directly in the primary quantity, taking into account the CT and VT transformation ratios of the substation where the measurements were taken.

Management and analysis software for the MAP range

Subcyclic transients

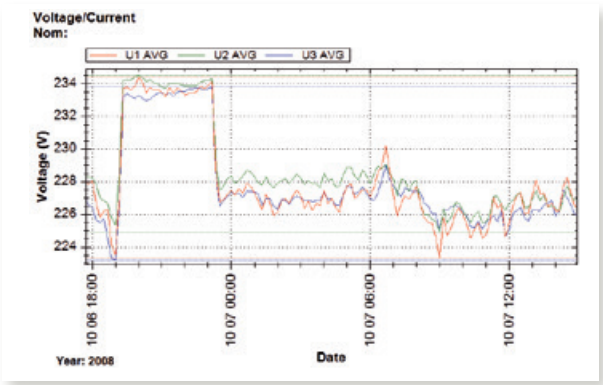
With the fast transient capture mode, transient events can be viewed with a resolution of 12.8 KHz or 2 MHz, depending on the MAP model. The detection templates are in positive and/or negative dV/dT.



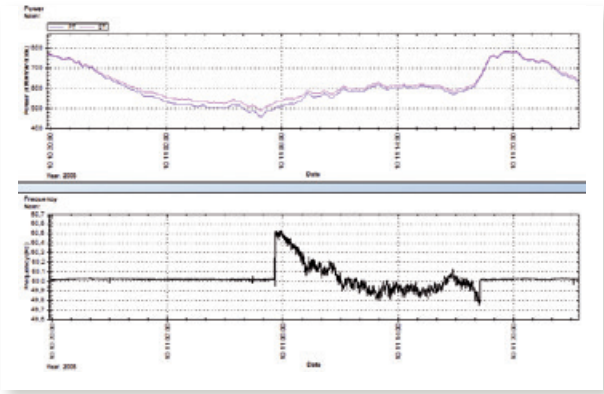
Three-phase view of a fast transient affecting the network's phases.

Trend curves of the parameters recorded by the MAPs

The E.Qual-Premium software can manage a large number of trend curves. After retrieval the curves containing all the parameters covered by the EN 50160 standard, as well as the power values, power factors and Cos φ can be viewed and zoomed on.

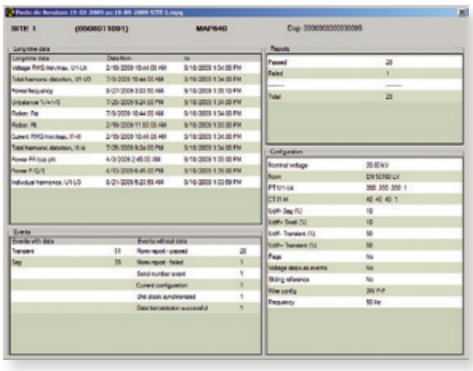


View of the trend curves of the three-phase voltages during a MAP measurement campaign, as analysed by the graphic module of the E.Qual-Premium software.



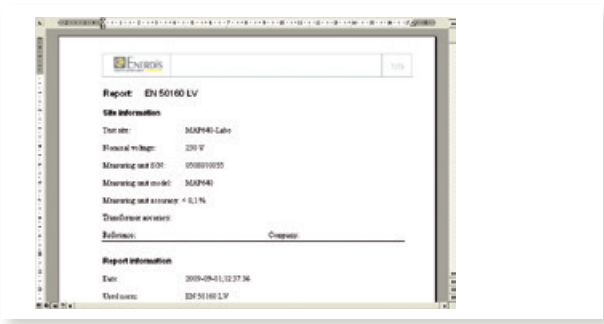
Stacked view of two different graphs from the same measurement campaign. The E.Qual-Premium software allows you to stack as many curves as you wish.

Summary of the measurement campaign



View of the summary of the measurement campaign with the time periods present for each type of parameter.

Power Quality report view



View of preformatted or customized reports generated directly in MS Word® format. It is possible to create new report models which will then be added to the existing report model library.

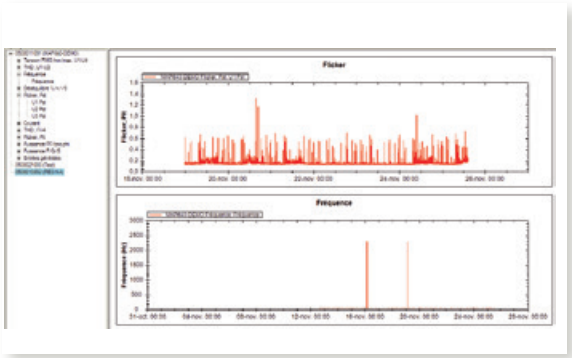
MAP Software Range

Management and analysis software for the MAP range

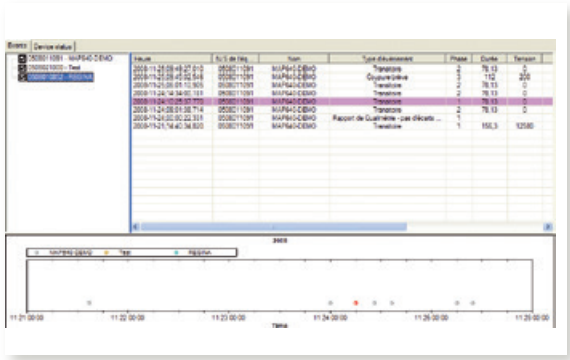
Software
▲ Power Quality

E.Qual-Premium Server

The client/server version of the E.Qual-Premium Server software provides a multi-equipment, multi-parameter view of the measurements recovered by the automatic remote retrieval engine. It is then possible to put together totally customized views by "dragging and dropping" the parameters of different equipment items into the display area. Summarized and statistical views are also available.

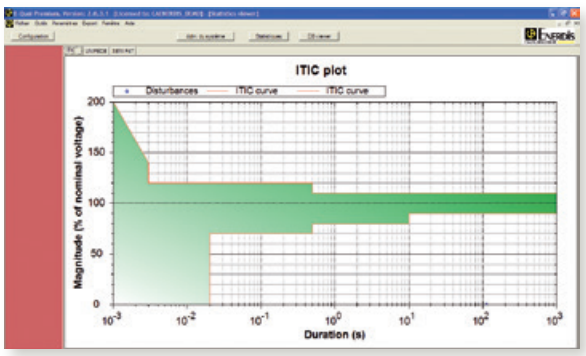


Multi-equipment view with the client/server version of E.Qual-Premium. The parameters featuring in the view are chosen in the equipment / parameters / phases tree structure located on the left-hand side of the analysis window.

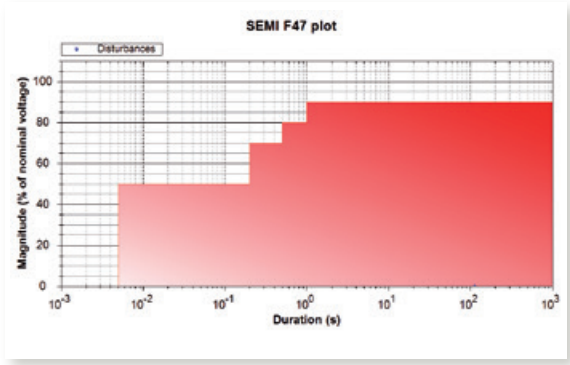


Multi-equipment log view of the dip / overvoltage / interruption / outage events. A summarized view shows the occurrence times of all the events recovered by the automatic remote retrieval engine. When you select an event in the list, the same event is automatically highlighted in the summarized view. You can open the RMS / waveform signature view by double-clicking on the event.

► Statistical views of the impacts of dips / overvoltages / interruptions and outages compared with standardized templates such as the ITI profile, SEMI 47 and UNIPEDE table.



Statistical view of the dip / overvoltage / interruption / outage events compared with the ITI template

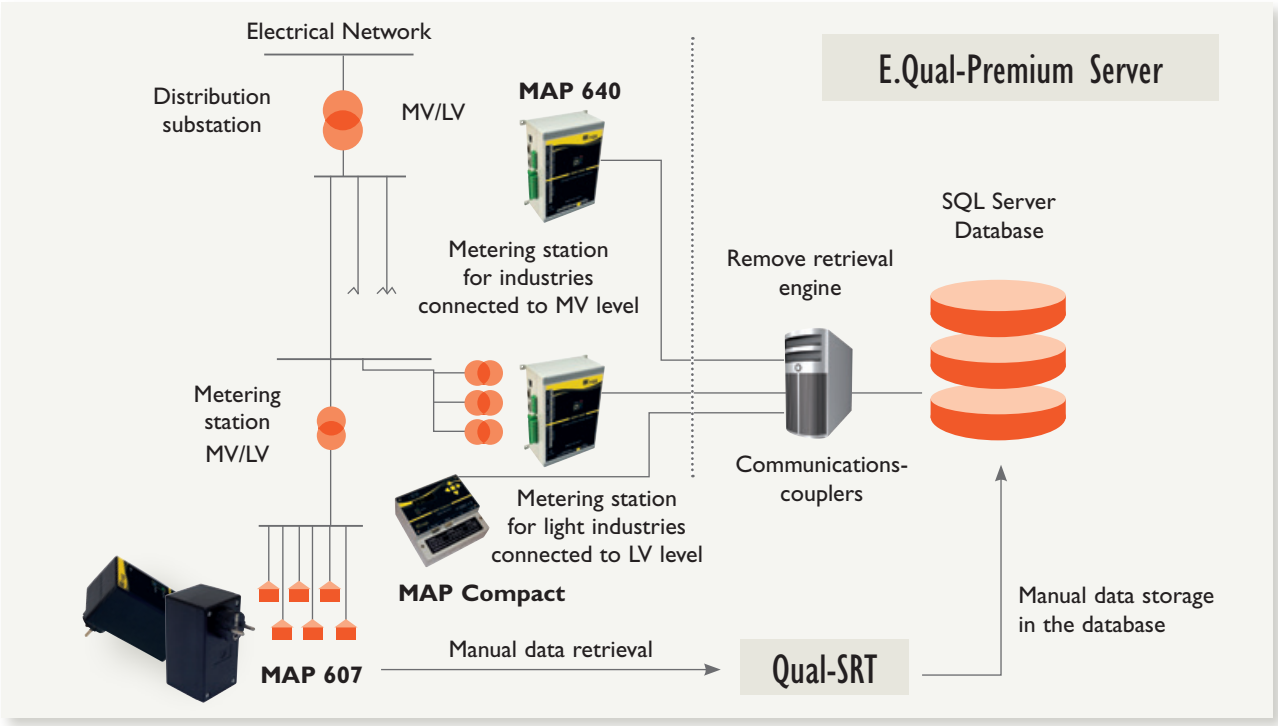


Statistical view of the dip / overvoltage / interruption / outage events compared with the SEMI 47 template.

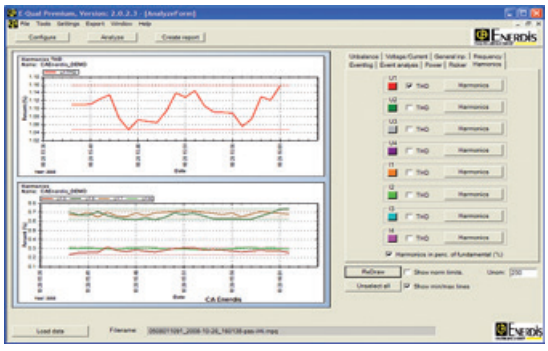
Management and analysis software for the MAP range

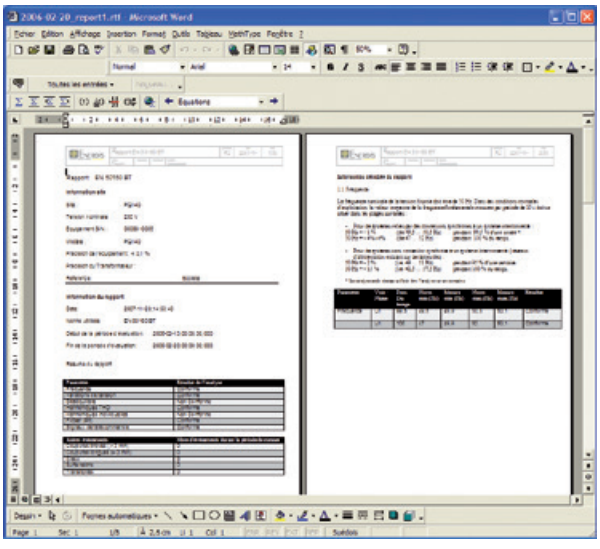
E.Qual-Premium Server architecture

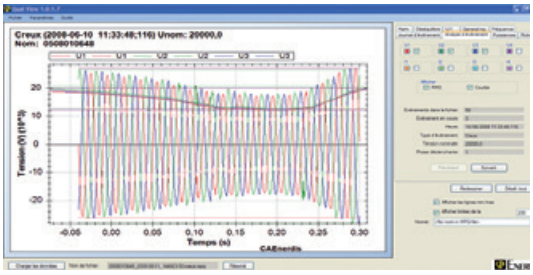
The E.Qual-Premium Server architecture is ideal for applications where you want to analyse the energy quality measurements gathered from several points in the electrical network and compile data supplied by different models in the MAP range. Thanks to its automatic remote retrieval engine, the E.Qual-Premium Server software is capable of transferring the data from the different network analyzers and integrating them into the system's SQL-server® base. The multi-equipment analysis module can then use the measurements stored in the database to generate composite views and statistics grouping information from several measurement points.



Components of an E.Qual-Premium Server with the network analyzers, the communication links, the database and the analysis and graphic display modules.







Audit and Troubleshooting Department

Engineers ready to listen and support any approach for electrical network optimization.

PRODUCT ADVANTAGES

- A **DEDICATED TEAM** to support your project
- **CUSTOMIZED AUDITS** based on your specifications
- Targeted studies **FROM DOWNSTREAM OF THE MV/LV TRANSFORMER THROUGH TO YOUR TERMINAL DISTRIBUTION SYSTEM**

Enerdis uses Chauvin Arnoux® and Metrix® instruments for its troubleshooting activities

Experts carry out a totally customized study

Description

The specialized engineers comprising the **ENERDIS TROUBLESHOOTING DEPARTMENT** propose electrical network auditing services. The goal is to help you identify the main features of your industrial, tertiary and infrastructure networks.

Analysis of the parameters liable to cause malfunctions or excessive loads on the installations.
Recommendation of solutions to meet the energy quality requirements.

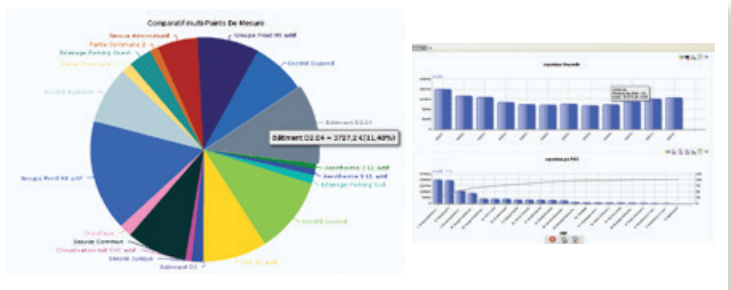
Power supply faults and deterioration of electrical power supply quality cause disturbances whose cost is a major concern for industrial companies. Prevention is the best strategy for dealing with harmonic distortion, outages, voltage variations and transient phenomena.

Consequences of harmonic currents on the network
Often underestimated, harmonic currents cause problems at the level of both the distribution system and the installation:
- overheating of the neutral
- overheating of the transformers
- untimely tripping of protective devices
- overloading of capacitors
- skin effect in the conductors

The Enerdis Audit and Troubleshooting Department helps you to gain a better understanding of your electrical network and supports you in your search for suitable solutions.

Power quality

- Measurement of the energy quality parameters and compliance with the levels required by the EN 50160 standard
- Evaluation of the parameters outside the template and analysis of the danger for equipment and loads downstreams
- Evaluation of the interconnection parameters over several integration periods for measurement periods of up to one week



Study of the need for Power Factor Correction

- Evaluation of the power factor (cos φ) with activation of different types of loads
- Study of the need for Power Factor Correction to avoid penalties during the period of reference
- Recommendations for capacitor bank sizing: type of fixed/regulated compensation, standard type of reinforcement, H or SAH

Study of harmonic pollution

- Measurement of harmonic pollution and evaluation at different points in the electrical distribution system
- Correlation with the activation of loads causing disturbances
- Global survey of harmonic pollution over a cycle representative of the site's load profile
- Recommendation of filtering solutions

Study of load profile

- Global energy survey of the site with study of the power components over a significant load period
- Evaluation of the load on the site's MV/LV transformers and possible overloading
- Evaluation of the load profile observed and the threshold effects on the tariff contract

Study of common-mode components

- Measurement of the common-mode currents liable to cause untimely tripping of CBs
- Measurement of the common-mode voltages liable to cause malfunctioning of sensitive downstream loads

Customized audits

In the context of the TROUBLESHOOTING activity, a made-to-measure audit can be performed. Our experts carry out a customized survey of the different technical points stipulated in your specifications.

Work method: keeping as close as possible to the statement of requirements

- Contact to assess the precise requirements in a partnership between the customer and ENERDIS
- Drafting of a customized technical and sales offer
- Definition of a work schedule and the work method proposed
- Troubleshooting inspection by experienced staff with all the necessary electrical authorizations needed for on-site measurement work
- Instrumentation of the measurement points defined in the troubleshooting work method and recording of relevant measurements
- Generation of a troubleshooting report with recommendations

Current transformers (CTs) &

Standard industrial transformers

TCR
Wound primary
► page 113

TCR
Cable/busbar primary
► page 114

TCR
Busbar primary
► page 117

TCRO
Split core
► page 118

TC CLIP
Split core
► page 121

Adaptable industrial transformers

JVR
Wound primary
► page 124

JVO
Cable primary
► page 125

JVO
Cable/busbar primary
► page 126

JVP
Busbar primary
► page 128

Transformers for energy metering

JVS
Cable/busbar primary
► page 130

JVS
Busbar primary
► page 132

shunts

Transformers for price metering

Single-phase, single-rating

JVP 1045B
► page 134

JVO 40-100
► page 135

Single-phase, multi-rating

JVO 40-100S
► page 136

JVO 90-160S
► page 137

JVS 1145S
► page 138

Three-phase, single-rating

TRI 500
► page 139

Three-phase, multi-rating

TRI 700
► page 140

Current summation

JVM 15
► page 141

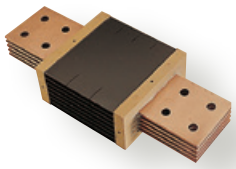
Associated product

PRTC
CT short-circuiting switch
► page 142

Shunts

Class 0.5

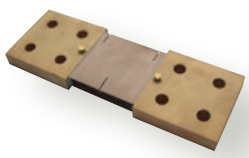
76/2 – 77/2 range
► page 145



SHMO range
DIN rail mounting
► page 150

Class 1

SHMI range
► page 147



SHEL range
► page 149

Choosing your **standard industrial**

Choosing your adaptable industrial current transformer: page 106
Choosing your transformer for energy metering: page 108

		TCR Wound primary			TCR Cable/busbar primary						
		► page 113			► page 114						
											
		TCR 10	**TCR 11**	**TCR 15**	**TCR 21**	**TCR 31**	**TCR 41**	**TCR 51**	**TCR 61**	**TCR 71**	**TCR 75**
Wound primary (threaded rod)		aperture 25 x 25	Ø M6	wire 16 mm²							
Cable primary (mm)					Ø 20	Ø 22	Ø 26	Ø 28	Ø 44	Ø 63	
Busbar primary (mm)					15 x 10 20 x 10 25 x 5	20 x 12 25 x 11 30 x 10	20 x 20 25 x 12 30 x 10	20 x 25 30 x 15 40 x 10	50 x 30 60 x 12	50 x 50 60 x 37 80 x 30	3 x 100 x 10
Primary	5 A										
	10 A										
	15 A										
	20 A										
	25 A										
	30 A										
	40 A										
	50 A										
	60 A										
	75 A										
	100 A										
	125 A										
	150 A										
	200 A										
	250 A										
	300 A										
	400 A										
	500 A										
	600 A										
	750 A										
	800 A										
	1000 A										
	1200 A										
	1500 A										
	2000 A										
	2500 A										
	3000 A										
	4000 A										
	5000 A										
Strengths		Combining a high level of accuracy and compact design.			Come in a wide range of primaries. Mounting accessories supplied as standard.						

5 A or 1 A secondary as standard

5 A secondary as standard
1 A on request

5 A secondary only

current transformer

TCR Busbar primary			TCRO Split core					TC CLIP Split core				
► page 117			► page 118					► page 121				
												
TCR 80	**TCR 90**	**TCR 100**	**TCRO 2030**	**TCRO 5080**	**TCRO 8080**	**TCRO 80120**	**TCRO 80160**	**TCC 176**	**TCC 241**	**TCC 242**	**TCC 364**	**TCC 366**
								Ø 17	Ø 24	Ø 24	Ø 36	Ø 36
100 x 20	100 x 30	1025 x 60	20 x 30	50 x 80	80 x 80	80 x 120	80 x 160					
Complete products for 100 and 125 mm busbar type.			A wide range suitable for most primaries. Installation without disconnecting busbars.					Implementation without disconnecting the power cables. Compact format.				

Choosing your **adaptable industrial**

Choosing your standard industrial current transformer: page 104
Choosing your transformer for energy metering: page 108

		JVR Wound primary			JVO Cable primary						
		► page 124			► page 125						
											
		JVR 64	JVR 75	JVR 86	JVO 12-46	JVO 18-51	JVO 21-64	JVO 21-75	JVO 32-75	JVO 36-75	J3R 80 B
Wound primary (threaded rod)		M8	M8 - M10	M8 - M10							
Cable primary (mm)					Ø 12	Ø 18	Ø 21	Ø 21	Ø 32	Ø 36	Ø 66
Busbar primary (mm)											
Primary	5 A										
	10 A										
	15 A										
	20 A										
	25 A										
	30 A										
	40 A										
	50 A										
	60 A										
	75 A										
	100 A										
	125 A										
	150 A										
	200 A										
	250 A										
	300 A										
	400 A										
	500 A										
	600 A										
	750 A										
	800 A										
	1000 A										
	1200 A										
	1250 A										
	1500 A										
	2000 A										
	2500 A										
	3000 A										
Strengths		Primary connection via threaded rod for more compact size.			A wide choice of primaries.						
		SPECIFIC PRODUCTS POSSIBLE IN THIS RANGE									

5 A secondary as standard / 1 A on request

current transformer

JVO Cable/busbar primary		JVP Busbar primary		
► page 126		► page 128		
				
JVO 25 CR	**JVO 32 CR**	**JVP 624**	**JVP 1025**	**JVP 1045**
32.5 x 10.5	40.5 x 10.5	65 x 22	105 x 22	105 x 42
JVO version for cable or busbar primary.		A wide choice of busbars from 60 to 100 mm.		
SPECIFIC PRODUCTS POSSIBLE IN THIS RANGE				

Choosing your current transformer for

Choosing your standard industrial current transformer: page 104
Choosing your adaptable industrial current transformer: page 106

		JVS Cable/busbar primary					JVS Busbar primary		
		► page 130 					► page 132 		
		JVS 25B	**JVS 26B**	**JVS 30B**	**JVS 38B**	**JVS 39B**	**JVS 40**	**JVS 50**	**JVS 60**
Cable primary (mm)		Ø 26	Ø 28	Ø 44	Ø 63				
Busbar primary (mm)		20 x 20 25 x 12 30 x 10	20 x 25 30 x 15 40 x 10	50 x 30 60 x 12	50 x 50 60 x 30 80 x 30	3 x 100 x 10	100 x 20	100 x 30	125 x 60
Primary	100 A								
	150 A								
	200 A								
	250 A								
	300 A								
	400 A								
	500 A								
	600 A								
	750 A								
	800 A								
	1000 A								
	1200 A								
	1500 A								
	2000 A								
	2500 A								
	3000 A								
	4000 A								
	5000 A								
Strengths		High-accuracy range with very low phase shift, ideal for electronic measurement instruments, including energy metering							

5 A secondary as standard

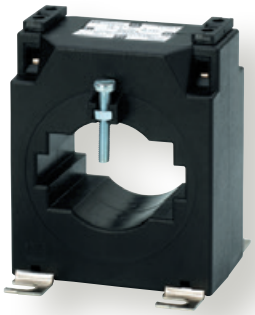
5 A secondary as standard with individual test certificate

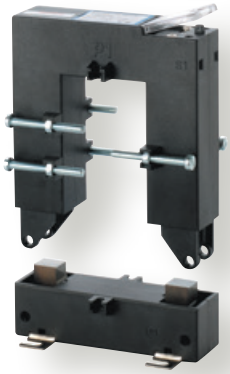
1 A secondary with individual test certificate on request

energy and price metering

	Single-phase single-rating		Single-phase multi-rating			Three-phase single-rating	Three-phase multi-rating			
	► pages 134-135		► pages 136-137-138			► page 139	► page 140			
										
	JVP 1045 B	**JVO 40-100**	**JVO 40-100 S bi-rating**	**JVO 90-160 S tri-rating**	**JVS 1145 S tri-rating**	**TRI 500**	**TRI 700 S 50-100/5 A**	**TRI 700 S 100-200/5 A**	**TRI 700 S 200-500/5 A**	**TRI 700 100-200-500/5 A**
Accuracy class (according to EN 600044-1)	0.5	0.5	0.2s	0.2s	0.2s	0.5	0.2s	0.2s	0.2s	0.5
Cable primary (diameter in mm)		Ø 42 mm	Ø 40 mm	Ø 90 mm	Ø 40 mm					
Busbar primary (mm)	100 x 40				63 x 12 100 x 12					
Cable clamp (section in mm²)						22 to 240 mm²	50 to 240 mm²	50 to 240 mm²	50 to 240 mm²	50 to 240 mm²
Primary (secondary 5 A) 50 A										
100 A										
150 A										
200 A										
300 A										
500 A										
1000 A										
2000 A										

TRANSFORMERS





Function

Current transformers power low-voltage measuring instruments and isolate them from the network. They supply their secondary winding with a standard current proportional to the primary current. They are divided into four main families:

- wound primaries;
- split-core primaries;
- cable primaries;
- busbar primaries.

These transformers can be used with all types of measuring instruments: ammeters, energy meters, power monitors, etc.

How to choose a current transformer?

The choice is based on two main criteria:

- the current on the primary (transformation ratio Ip / 5 A);
- the type of installation.

In other words, the choice **depends on the type of cable or busbar** on the installation and the **intensity of the currents flowing through them**.

Determining a CT's accuracy class

The accuracy class of a current transformer depends on the transformer's apparent power (VA) and the consumption of the entire measurement line. It is the result of the measurement errors of each element in the line and must therefore be less than or equal to the accuracy class of the measuring instrument which it supplies, particularly for energy metering where accuracy has a direct impact on billing. For a given accuracy class, the measurement line's consumption must not exceed the current transformer's apparent power (VA).

Example of measurement chain consumption at 20 °C

	Power dissipated per metre of line (2 ways)	
Copper-wire section (mm²)	Secondary 5 A	Secondary 1 A
1.5	0.61	0.025 VA
2.5	0.37	0.015 VA
4	0.23	0.009 VA
6	0.15	0.006 VA

Enerium 50 Power Monitor	0.15 VA
5 m of double 2.5 mm² wire	0.37 x 5 = 1.85 VA
Measurement line consumption	**0.15 + 1.85 = 2 VA**

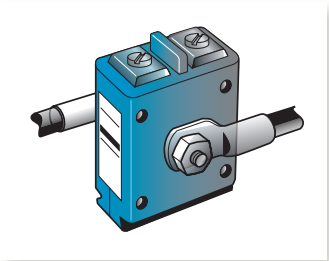
The transformer's accuracy class can then be deduced from the results obtained by referring to the table opposite (provided as an example):

- Class 3 for a CT with a ratio of 150/5
- Class 1 for a CT with a ratio of 200/5
- Class 0.5 for a CT with a ratio of 250/5

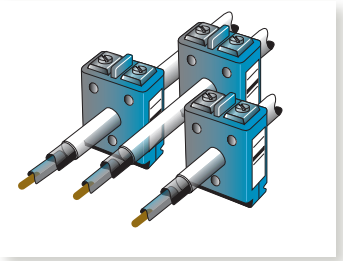
	Power (VA) on Class		
Primary	0.5	1	3
100 A	-	1	1.5
125 A	-	1	1.5
150 A	1	1.75	2.5
200 A	1.5	2.75	3.75
250 A	2	3.25	3.75
300 A	2.5	3.25	4
400 A	3	3.75	5
500 A	3.5	3.75	5
600 A	3.75	5	7.5

SELECTING A TRANSFORMER

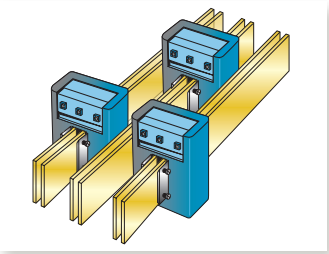
Enerdis current transformers offer 4 types of connection:



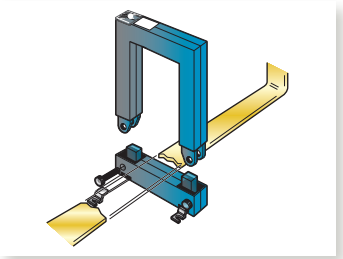
WOUND PRIMARY
for currents less than 200 A



CABLE PRIMARY
for currents between 40 and 2,500 A



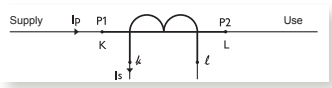
BUSBAR PRIMARY
for currents between 750 and 5,000 A

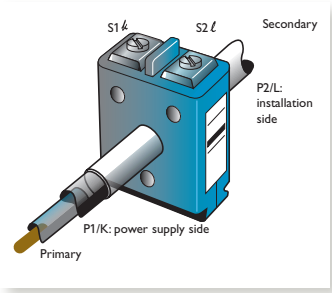


SPLIT CORE PRIMARY
for easy connection to an existing installation using a busbar or cable primary

CONNECTING YOUR CT

It is important to always install the transformer in the right direction, especially on three-phase networks, so as not to invert the phase shift between the current and the voltage on one or more of the phases.





Accuracy limit tables according to the IEC 60044-1 standard

Class	Limit errors – Table 1 ± Error (in %) depending on In (in %)			
	5	20	100	120
0.2	0.75	0.35	0.20	0.20
0.5	1.50	0.75	0.50	0.50
1	3.00	1.50	1.00	1.00

Class	Limit errors – Table 2 ± Error (in %) depending on In (in %)				
	1	5	20	100	120
0.2 S	0.75	0.35	0.20	0.20	0.20
0.5 S	1.50	0.75	0.50	0.50	0.50

FOCUS

Financial impact of a TC's accuracy class

For a consumption of 12,000 MWh/year and a cost of € 0.10/kWh

- CT class 1: ±120,000 kWh = ±€ 12,000
- CT class 0.5: ±60,000 kWh = ±€ 6,000
- CT class 0.2S: ±2,500 kWh = ±€ 2,500

This calculation takes into account neither the class of the measuring instruments, nor loss occurring on the network cables.

CT safety rules

You must never open the secondary circuit of a CT supplied on the primary. The very high voltage created may cause bodily harm or irreparable damage to the transformer.
Before working on the secondary of a CT, it must be short-circuited.
When a CT is not in use (secondary open) the secondary must be short-circuited before powering up the system.

TCR Range

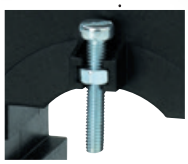
CTs designed for submetering. Accuracy class 0.5/1/3

PRODUCT ADVANTAGES

- **EXTENDED RANGE:** primary currents from 5 to 5,000 A and 5 A or 1 A secondary currents
- **DIN RAIL MOUNTING:** on plate mounting or fixed around busbars
- **COMPACT DESIGN**

Outputs on split terminals enabling short-circuiting of the secondary current (M4 or cage for 4 mm² wire).

DIN rail mounting using supplied clip-on adapters for **TCR** 21 - 31 - 41 - 51.



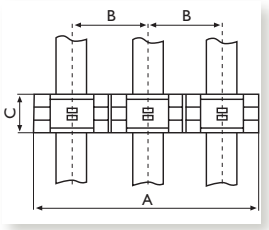
Supplied with bar clamp fitting accessories.

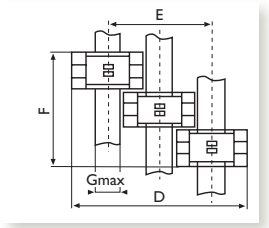
Plate mounting using removable screw-on clips.

► General specifications

Reference standards:
EN 60044-1 (ex IEC 185)
Maximum network voltage:
720 Vac
Dielectric test voltage:
3 kV/50 Hz/1 min
Frequency response: 50/60 Hz
Short-circuit thermal current (Ith): 60 In - 1 second
Dynamic current (Idyn): 2.5 Ith
Safety factor: < 5

Operating conditions
Temperature: -10°C to +50°C
Relative humidity: < 90%
Protection
Protection rating: IP 50 (terminal covers supplied)
Dry winding with self-extinguishing ABS covering (UL 94VO)





► 3CT Mounting

Model	Dimensions A	B	C	D	E	F	G
TCR 10	-	-	-	-	-	-	-
TCR 11	-	-	-	-	-	-	-
TCR 15	-	-	-	-	-	-	-
TCR 21	176	59	32	143.6	85.6	98	25.6
TCR 31	176	59	32	148.6	90.6	98	30.6
TCR 41	194	65	44	160.6	96.6	134	30.6
TCR 51	194	65	44	170.6	106.6	134	40.6
TCR 61	255.5	85.5	50	231.6	147.1	152	60.6
TCR 71	326	109	50	298.6	190.6	152	80.6
TCR 80	287	96	59	215	120	179	23
TCR 90	347	116	44	264	149	134	32
TCR 100	374	125	44	310	186	134	60

► Mounting accessories

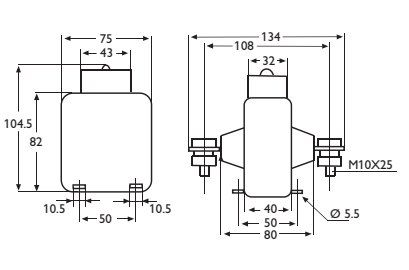
Model	DIN rail fittings	Plate mounting fittings	Sealable terminal cover*
TCR 10	1923 0021	•	•
TCR 11	1923 0021	•	•
TCR 15	•		
TCR 21	•	•	1923 0022
TCR 31	•	•	1923 0022
TCR 41	•	•	1923 0022
TCR 51	•	•	1923 0022
TCR 61		•	1923 0022
TCR 71		•	1923 0022
TCR 75		•	1923 0022
TCR 80		•	•
TCR 90		•	•
TCR 100		•	•

• Standard accessories * sold in pairs

TCR Wound primary

TCR 10

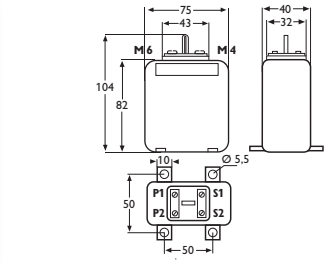
25 x 25 mm aperture



Primary	Power (VA) class 0.5	1	3	Weight (kg)
5 A	15	20	30	0.70
10 A	15	20	30	0.70
15 A	15	20	30	0.70
20 A	15	20	30	0.70
25 A	15	20	30	0.70
30 A	15	20	30	0.70
40 A	15	20	30	0.70
50 A	15	20	30	0.80
60 A	15	20	30	0.80
75 A	15	20	30	0.75
100 A	15	20	30	0.70
125 A	15	20	30	0.70
150 A	15	20	30	0.70

TCR 11

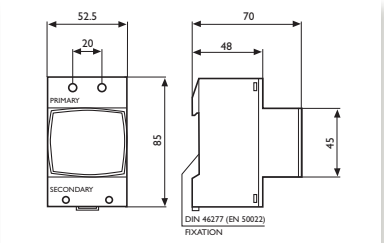
Ø M4 and M6



Primary	Power (VA) class 1	Weight (kg)
5 A	5	0.50
10 A	5	0.50
15 A	5	0.50
20 A	5	0.50
25 A	5	0.50
30 A	5	0.50
40 A	5	0.50
50 A	5	0.50
60 A	5	0.50

TCR 15

Primary: 16 mm² wire
Secondary: 4 mm² wire



Primary	Power (VA) class 0.5	1	3	Weight (kg)
5 A	2.5	5	7	0.28
10 A	2.5	5	7	0.28
15 A	2.5	5	7	0.28
20 A	2.5	5	7	0.28
25 A	2.5	5	7	0.28
30 A	2.5	5	7	0.28
40 A	2.5	5	7	0.28
50 A	2.5	5	7	0.28

TO ORDER

Primary	Secondary 1 A	Secondary 5 A
5 A	1921 1507	1920 1507
10 A	1921 1512	1920 1512
15 A	1921 1514	1920 1514
20 A	1921 1515	1920 1515
25 A	1921 1516	1920 1516
30 A	1921 1517	1920 1517
40 A	1921 1518	1920 1518
50 A	1921 1519	1920 1519
60 A	1921 1521	1920 1521
75 A	1921 1523	1920 1523
100 A		1920 1525
125 A		1920 1526
150 A		1920 1528

Primary	Secondary 1 A	Secondary 5 A
5 A	1921 1607	1920 1607
10 A	1921 1612	1920 1612
15 A	1921 1614	1920 1614
20 A	1921 1615	1920 1615
25 A	1921 1616	1920 1616
30 A	1921 1617	1920 1617
40 A	1921 1618	1920 1618
50 A	1921 1619	1920 1619
60 A	1921 1621	1920 1621

Primary	Secondary 1 A	Secondary 5 A
5 A	1921 1707	1920 1707
10 A	1921 1712	1920 1712
15 A	1921 1714	1920 1714
20 A	1921 1715	1920 1715
25 A	1921 1716	1920 1716
30 A	1921 1717	1920 1717
40 A	1921 1718	1920 1718
50 A	1921 1719	1920 1719

► Associated products

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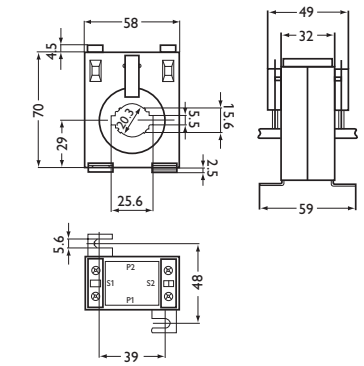
TCR Range

Cable/busbar primary

TCR 21

Cable Ø 20 mm
Bar: 15 x 10 mm - 20 x 10 mm
25 x 5 mm

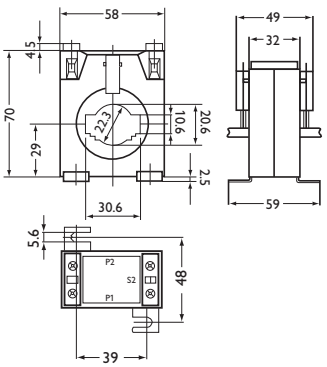


Primary	Power (VA) class 0.5	1	3	Weight (kg)
40 A	-	-	1.5	0.41
50 A	-	-	3	0.42
60 A	-	1.25	3.5	0.43
75 A	-	2	3.5	0.44
100 A	1.5	2.5	3.75	0.44
125 A	1.75	3.5	5	0.45
150 A	2.5	3.5	5	0.29
200 A	3.75	5	5	0.30
250 A	5	7.5	7.5	0.31

Primary	Secondary 1 A	Secondary 5 A
40 A	1921 2318B	1920 2318B
50 A	1921 2319B	1920 2319B
60 A	1921 2321B	1920 2321B
75 A	1921 2323B	1920 2323B
100 A	1921 2325B	1920 2325B
125 A	1921 2326B	1920 2326B
150 A	1921 2328B	1920 2328B
200 A	1921 2330B	1920 2330B
250 A	1921 2331B	1920 2331B

TCR 31

Cable Ø 22 mm
Bar: 20 x 12 mm - 25 x 11 mm
30 x 10 mm

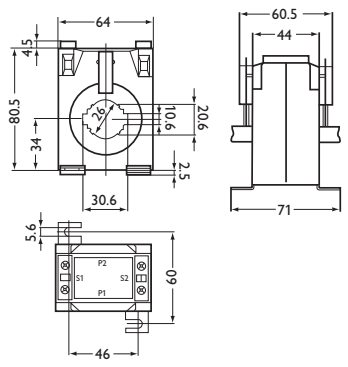


Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	1	1.5	0.53
125 A	-	1	2	0.53
150 A	1	2	2.5	0.53
200 A	2.5	3	3.5	0.54
250 A	3.5	3.75	5	0.54
300 A	3.5	3.75	5	0.51
400 A	3.5	5	7.5	0.51
500 A	5	7.5	10	0.51
600 A	5	7.5	10	0.52

Primary	Secondary 1 A	Secondary 5 A
100 A	1921 2425B	1920 2425B
125 A	1921 2426B	1920 2426B
150 A	1921 2428B	1920 2428B
200 A	1921 2430B	1920 2430B
250 A	1921 2431B	1920 2431B
300 A	1921 2433B	1920 2433B
400 A	1921 2435B	1920 2435B
500 A	1921 2436B	1920 2436B
600 A	1921 2438B	1920 2438B

TCR 41

Cable Ø 26 mm
Bar: 20 x 20 mm - 25 x 12 mm
30 x 10 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	1.75	3.75	7.5	0.53
125 A	3.75	7.5	10	0.53
150 A	5	7.5	10	0.53
200 A	7.5	10	10	0.54
250 A	7.5	10	15	0.54
300 A	10	10	15	0.51
400 A	10	10	15	0.51
500 A	15	15	20	0.51
600 A	15	20	25	0.51

Primary	Secondary 1 A	Secondary 5 A
100 A	1921 2525B	1920 2525B
125 A	1921 2526B	1920 2526B
150 A	1921 2528B	1920 2528B
200 A	1921 2530B	1920 2530B
250 A	1921 2531B	1920 2531B
300 A	1921 2533B	1920 2533B
400 A	1921 2535B	1920 2535B
500 A	1921 2536B	1920 2536B
600 A	1921 2538B	1920 2538B

TO ORDER

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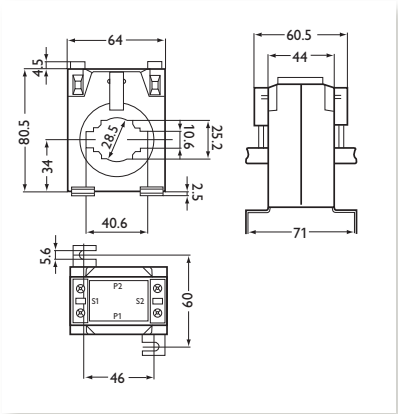
TCR 51

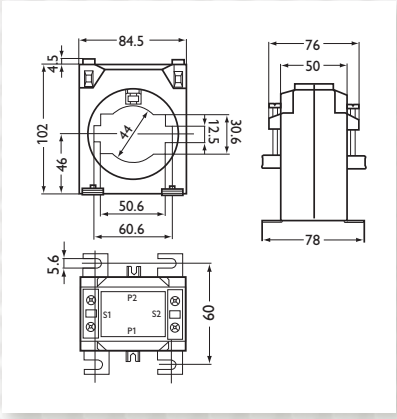
Cable Ø 28 mm
Bar: 20 x 25 mm - 30 x 15 mm
40 x 10 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	0.5	1	2.5	0.36
125 A	0.75	1.5	3.75	0.37
150 A	1	3.5	5	0.37
200 A	3.5	5	7.5	0.38
250 A	5	7.5	10	0.39
300 A	5	7.5	10	0.40
400 A	5	7.5	10	0.41
500 A	7.5	10	15	0.41
600 A	7.5	10	15	0.42
750 A	10	15	20	0.43
800 A	10	15	20	0.44

TCR 61

Cable Ø 44 mm
Bar: 50 x 30 mm - 60 x 12 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
400 A	5	7.5	10	0.5
500 A	7.5	10	15	0.52
600 A	10	15	20	0.52
750 A	15	20	25	0.59
800 A	15	20	30	0.60
1000 A	15	20	30	0.61
1200 A	15	20	30	0.63
1500 A	15	20	30	0.65

TO ORDER

Primary	Secondary 1 A	Secondary 5 A
100 A	1921 3425B	1920 3425B
125 A	1921 3426B	1920 3426B
150 A	1921 3428B	1920 3428B
200 A	1921 3430B	1920 3430B
250 A	1921 3431B	1920 3431B
300 A	1921 3433B	1920 3433B
400 A	1921 3435B	1920 3435B
500 A	1921 3436B	1920 3436B
600 A	1921 3438B	1920 3438B
750 A	1921 3440B	1920 3440B
800 A	1921 3441B	1920 3441B

Primary	Secondary 1 A	Secondary 5 A
400 A	1921 4735B	1920 4735B
500 A	1921 4736B	1920 4736B
600 A	1921 4738B	1920 4738B
750 A	1921 4740B	1920 4740B
800 A	1921 4741B	1920 4741B
1000 A	1921 4742B	1920 4742B
1200 A	1921 4751B	1920 4751B
1500 A	1921 4744B	1920 4744B

Associated products

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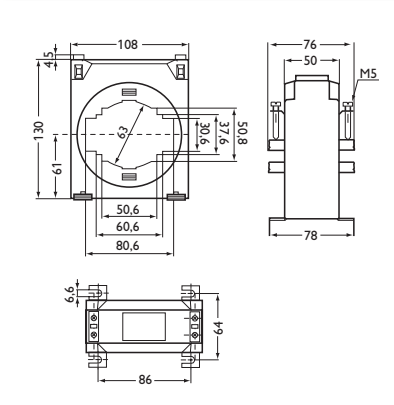
TCR Range

Cable/busbar primary

TCR 71

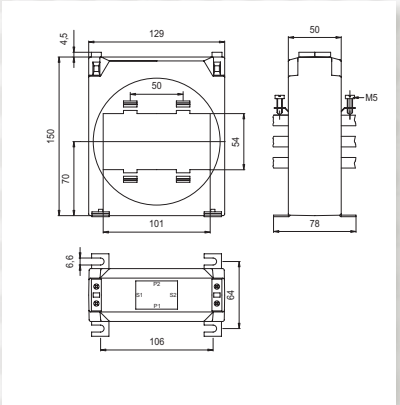
Cable Ø 63 mm
Bar: 50 x 50 mm - 60 x 37 mm
80 x 30 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
400 A	5	7.5	10	0.82
500 A	5	7.5	10	0.80
600 A	7.5	10	15	0.83
750 A	7.5	10	15	0.88
800 A	7.5	10	15	0.66
1000 A	10	15	20	0.72
1200 A	10	15	20	0.68
1500 A	15	20	25	0.84
2000 A	15	20	25	0.82
2500 A	15	20	30	0.88
3000 A	15	20	30	0.88

TCR 75

Bar: 3 x 100 mm x 10 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
1500 A	15	20	30	1.47
2000 A	15	20	30	1.55
2500 A	20	30	40	1.63
3000 A	30	40	60	1.71
4000 A	35	40	60	1.87

TO ORDER

Primary	Secondary 1 A	Secondary 5 A
400 A	1921 4635B	1920 4635B
500 A	1921 4636B	1920 4636B
600 A	1921 4638B	1920 4638B
750 A	1921 4640B	1920 4640B
800 A	1921 4641B	1920 4641B
1000 A	1921 4642B	1920 4642B
1200 A	1921 4651B	1920 4651B
1500 A	1921 4644B	1920 4644B
2000 A	1921 4645B	1920 4645B
2500 A	1921 4646B	1920 4646B
3000 A	1921 4647B	1920 4647B

Primary	Secondary 1 A	Secondary 5 A
1500 A	1921 5044B	1920 5044B
2000 A	1922 5045B	1920 5045B
2500 A	1923 5046B	1920 5046B
3000 A	1924 5047B	1920 5047B
4000 A	1925 5049B	1920 5049B

► Associated products

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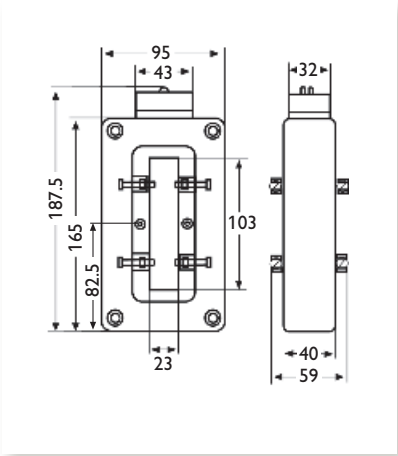
TCR Range

Busbar primary

TCR 80

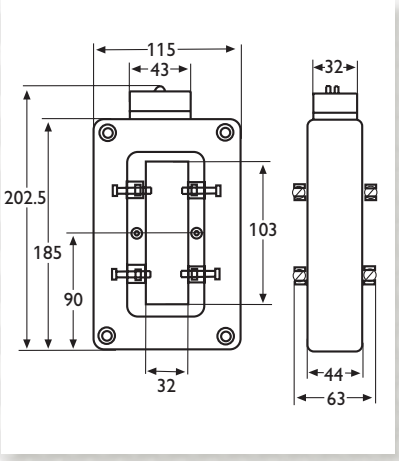
Bar: 100 x 20 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
750 A	15	20	30	0.80
800 A	15	20	30	0.80
1000 A	15	20	30	0.76
1200 A	15	20	30	0.76
1500 A	15	30	40	0.76
2000 A	20	40	50	0.76

TCR 90

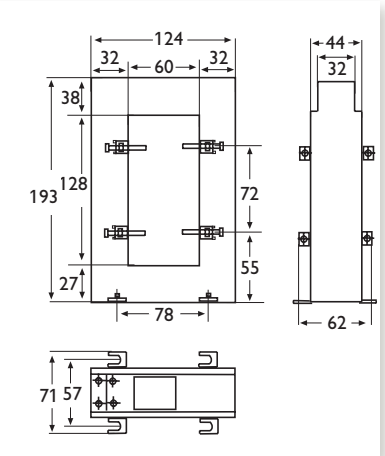
Bar: 100 x 30 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
1500 A	15	30	40	0.76
2000 A	20	40	50	0.82
2500 A	20	40	50	0.78
3000 A	20	45	60	0.90
4000 A	35	50	70	0.90

TCR 100

Bar: 125 x 60 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
1000 A	15	20	30	0.75
1200 A	15	20	30	0.80
1500 A	15	20	30	0.83
2000 A	15	20	30	0.92
2500 A	20	30	40	1.01
3000 A	30	40	60	1.09
4000 A	35	50	70	1.21
5000 A	40	60	80	1.44

TO ORDER

Primary	Secondary 1 A	Secondary 5 A
750 A	1921 5640	1920 5640
800 A	1921 5641	1920 5641
1000 A	1921 5642	1920 5642
1200 A	1921 5651	1920 5651
1500 A	1921 5644	1920 5644
2000 A	1921 5645	1920 5645

Primary	Secondary 1 A	Secondary 5 A
1500 A	1921 6644	1920 6644
2000 A	1921 6645	1920 6645
2500 A	1921 6646	1920 6646
3000 A	1921 6647	1920 6647
4000 A	1921 6649	1920 6649

Primary	Secondary 1 A	Secondary 5 A
1000 A	1921 6842	1920 6842
1200 A	1921 6851	1920 6851
1500 A	1921 6844	1920 6844
2000 A	1921 6845	1920 6845
2500 A	1921 6846	1920 6846
3000 A	1921 6847	1920 6847
4000 A	1921 6849	1920 6849
5000 A		1920 6850

► Associated products

PRTC
CT protection unit

► page 142

TCRO Range

CTs designed for insertion on electrical installations without opening the conductor.

PRODUCT ADVANTAGES

PRIMARY
from 200 to 5,000 A and wide choice of primary options

FULLY OPENING
primary

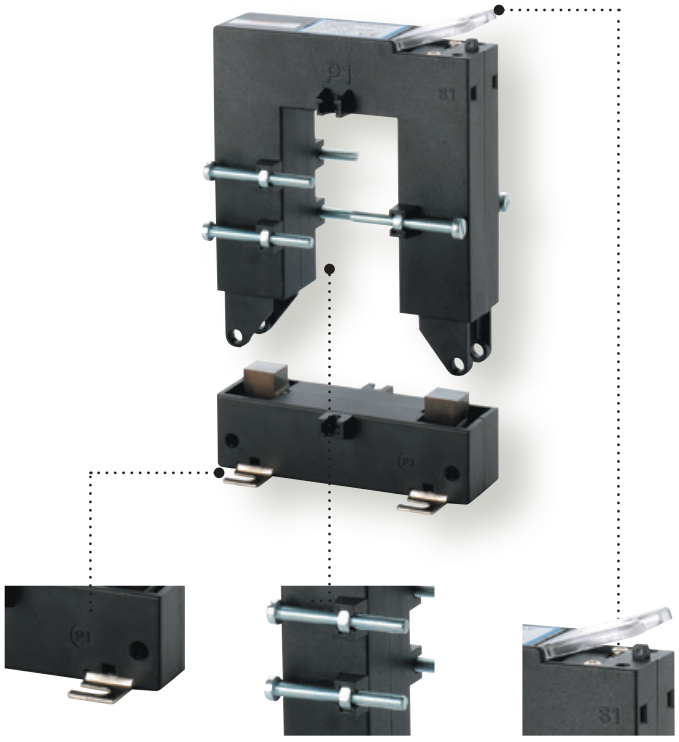


Plate mounting fitting

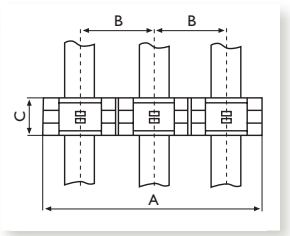
Bar clamp fitting

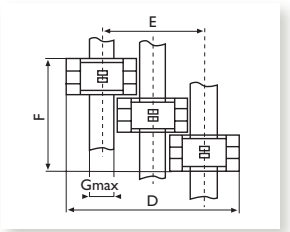
Captive sealable terminal covers. Split output terminals enabling risk-free short-circuiting of the secondary current (cage for 4 mm² wire)

► General specifications

Reference standard:
EN 60044-1 (ex IEC 185)
Maximum network voltage:
720 Vac
Dielectric test voltage:
3 kV/50 Hz/1 min
Frequency response: 50/60 Hz
Short-circuit thermal current (Ith): 60 In - 1 second
Dynamic current (Idyn): 2.5 Ith
Safety factor: < 5

Operating conditions:
Temperature: -10°C to +50°C
Relative humidity: < 90%
Protection:
Protection rating: IP 50
(terminal covers supplied)
Dry winding with self-extinguishing ABS covering (UL 94 VO)





► 3CT Mounting

Model	Dimensions A	B	C	D	E	F	G
TCRO 2030	269	90	40	200	111	122	20
TCRO 5080	344	115	32	280	166	98	50
TCRO 8080	434	145	32	370	226	98	80
TCRO 80120	434	145	32	370	226	98	80
TCRO 80160	554	185	52	450	266	158	80

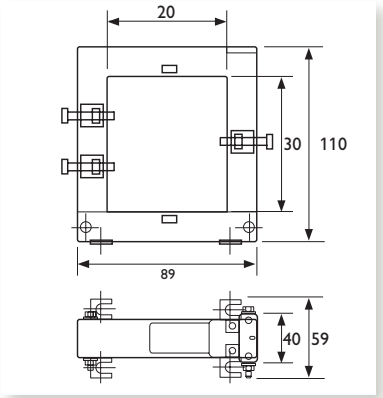
► Mounting accessories

Model	Plate mounting fittings	Busbar clamp
TCRO 2030	•	•
TCRO 5080	•	•
TCRO 8080	•	•
TCRO 80120	•	•
TCRO 80160	•	•

• Standard accessories

TCRO 2030

Bar: 20 x 30 mm



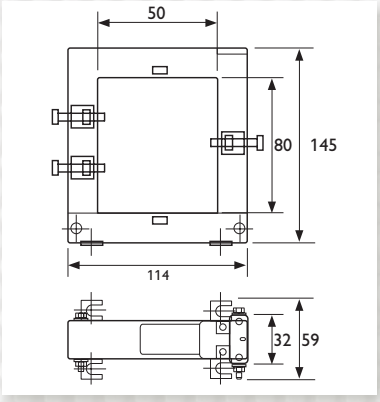
Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	1.5	0.75
150 A	-	-	2	0.75
200 A	-	1.5	2.5	0.75
250 A	-	2	4	0.75
300 A	1.5	4	6	0.75
400 A	2.5	6	10	0.75

Primary	Secondary 5 A
100 A	1920 8328
150 A	1920 8329
200 A	1920 8330
250 A	1920 8331
300 A	1920 8333
400 A	1920 8335

1 A on request

TCRO 5080

Bar: 50 x 80 mm



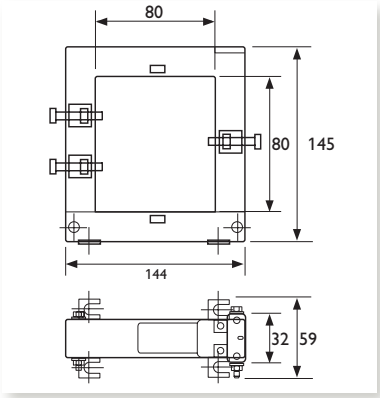
Primary	Power (VA) class 0.5	1	3	Weight (kg)
250 A	1	2	4	0.90
300 A	1.5	3	6	0.90
400 A	1.5	3	10	0.90
500 A	2.5	5	15	0.90
600 A	2.5	5	17.5	0.90
800 A	3	7	18	0.90
1000 A	5	10	20	0.90

Primary	Secondary 5 A
250 A	1920 8431
300 A	1920 8433
400 A	1920 8435
500 A	1920 8436
600 A	1920 8438
800 A	1920 8441
1000 A	1920 8442

1 A secondary on request

TCRO 8080

Bar: 80 x 80 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
250 A	1	2	4	1.00
300 A	1.5	3	6	1.00
400 A	1.5	3	10	1.00
500 A	2.5	5	15	1.00
600 A	2.5	5	17.5	1.00
800 A	3	7	18	1.00
1000 A	5	10	20	1.00

Primary	Secondary 5 A
250 A	1920 8531
300 A	1920 8533
400 A	1920 8535
500 A	1920 8536
600 A	1920 8538
800 A	1920 8541
1000 A	1920 8542

1 A secondary on request

TO ORDER

Associated products

PRTC
CT protection unit

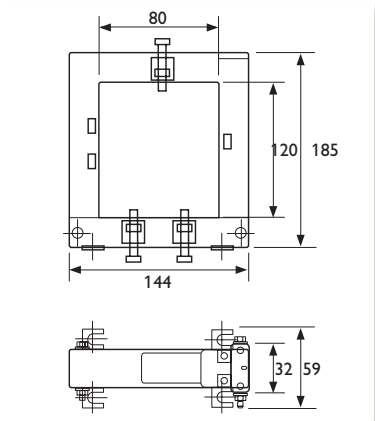
► page 142

TCRO Range

Split core

TCRO 80120

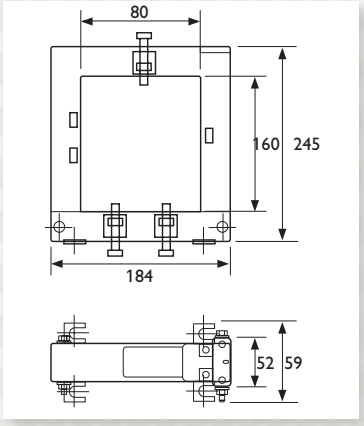
Bar: 80 x 120 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
500 A	-	4	12	1.20
600 A	-	5	14	1.20
800 A	3	7	18	1.20
1000 A	5	9	20	1.20
1200 A	6	11	28	1.20
1500 A	8	17	30	1.20

TCRO 80160

Bar: 80 x 160 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
1000 A	10	15	20	3.50
1500 A	15	20	25	3.50
2000 A	15	20	25	3.50
2500 A	15	20	25	3.50
3000 A	20	25	30	3.50
4000 A	20	25	30	3.50
5000 A	20	25	30	3.50

TO ORDER

Primary	Secondary 5 A
500 A	1920 8636
600 A	1920 8638
800 A	1920 8641
1000 A	1920 8642
1200 A	1920 8643
1500 A	1920 8644

1 A on request

Primary	Secondary 5 A
1000 A	1920 8742
1500 A	1920 8744
2000 A	1920 8745
2500 A	1920 8746
3000 A	1920 8747
4000 A	1920 8749
5000 A	1920 8750

1 A on request

► Associated products

PRTC
CT protection unit

► page 142

TC CLIP Range

Very compact current transformer for inclusion on electrical installations without disconnecting the power cables

PRODUCT ADVANTAGES

- **QUICK AND EASY IMPLEMENTATION** without cutting off the power
- Built-in **SHORT-CIRCUITING SWITCH**
- **REINFORCED HINGE**
- **VERY COMPACT**
- **PRIMARY** from 60 to 600 A

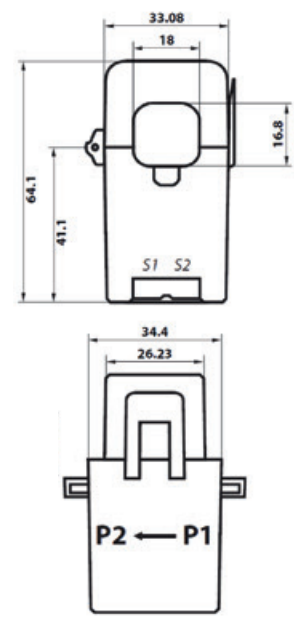
General specifications

Maximum network voltage: 720 Vac
Dielectric test voltage: 3 kV 50 Hz 1 min
Secondary current: 1 A
Power: 0.5 VA
Frequency: 50/60 Hz
Operating temperature: -20°C to +50°C
Storage temperature: -30°C to 90°C
Accuracy class: 1 %

The **TC CLIP** models are compatible with all the measuring products with input on CT available on the market, and particularly ENERIUM power monitors and ULYS submeters from ENERDIS®

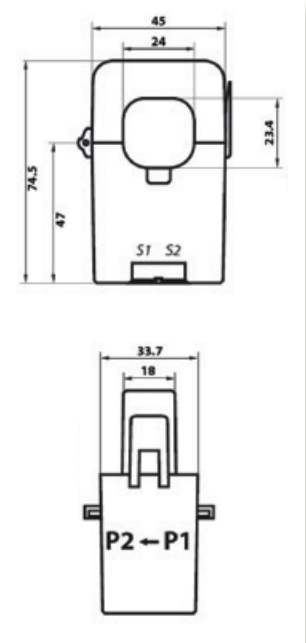
TCC176

Cable Ø 17 mm



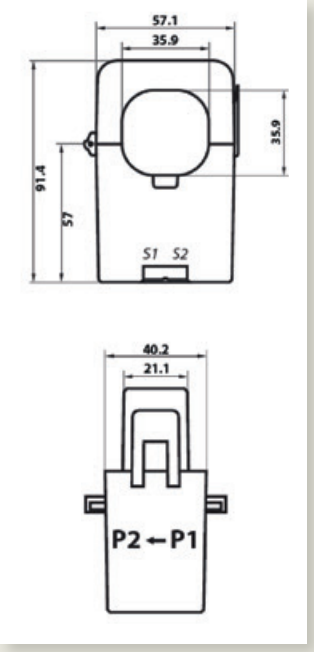
TCC241 / TCC242

Cable Ø 24 mm



TCC364 / TCC366

Cable Ø 36 mm



	TCC 176	TCC 241	TCC 242	TCC 364	TCC 366
Primary	60 A	100 A	250 A	400 A	600 A
Secondary	1A				
Power	0,2 VA	0,5 VA			
Accuracy class	3 %	1 %			
Diameter	17 mm	24 mm	24 mm	36 mm	36 mm
Dimensions (mm)	64 x 33 x 34,4	74,5 x 45 x 34	74,5 x 45 x 34	91 x 57 x 40,5	91 x 57 x 40,5
Weight (g)	128	162	187	263	300

TO ORDER

Model	Primary / Secondary	Reference
TCC 176	60 A / 1 A	P01379609
TCC 241	100 A / 1 A	P01379601
TCC 242	250 A / 1 A	P01379602
TCC 364	400 A / 1 A	P01379603
TCC 366	600 A / 1 A	P01379604

Pack of 3 TC CLIP	Reference
Pack of 3 TCC 176	P01379610
Pack of 3 TCC 241	P01379605
Pack of 3 TCC 242	P01379606
Pack of 3 TCC 364	P01379607
Pack of 3 TCC 366	P01379608

► Associated products

RENOV ENERGY
Metering solutions

► page 52

JVR-JVO-JVP Ranges

CTs designed to supply analogue or digital measurement instruments.
Accuracy class 0.5/1/3

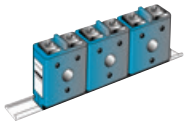
PRODUCT ADVANTAGES

COMPLETE RANGE:
primary from 1 to 3,000 A and 5 A or 1 A secondary

TOTALLY ADAPTABLE RANGE
for specific requirements (primary, secondary, power class, frequency)

Sealable cover
M5 terminals with
2 grooves for dual
connection on secondary

Central pipe accessory on cable primary JVO for compact lateral primary connection

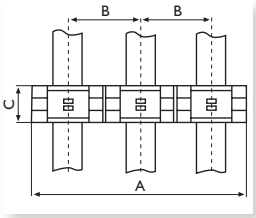


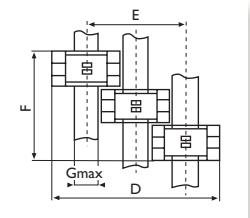
Mounting on symmetrical rail (except for JVP) or plate mounting in cabinet

General specifications

Reference standard: EN 60044-1 (ex IEC 185)
Maximum network voltage: 720 Vac
Dielectric test voltage: 3 kV/50 Hz/1 min
Frequency response: 50/60 Hz
Short-circuit thermal current (Ith):
JVO, JVP: 80 In
JVR 86: 60 In
JVR 64, JVR 75: 40 In

Dynamic current (Idyn): 2.5 Ith
Safety factor: 5 in Class 1
Operating conditions:
Temperature: -5°C to +50°C
Relative humidity: 93% at 40°C
Protection:
Protection rating: IP 50 (with terminal cover supplied)
Dry winding with self-extinguishing ABS covering (UL 94 VO)





3 CT mounting

Model	Dimensions A	B	C	D	E	F	G
JVO 25 CR	227	76	45	184.5	109.5	137	32.5
JVO 32 CR	260	87	58	214.5	128.5	176	40.5
JVP 624	296	99	35	220	122	107	22
JVP 1025	344	115	45	252	138	137	22
JVP 1045	404	135	45	312	178	137	42

Mounting accessories

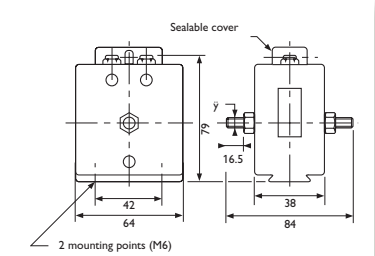
For model	1CT mounting rail	2CT mounting rail	3CT mounting rail
JVR	ACCE 7652	ACCE 7653	ACCE 7655
JVO 12-18	ACCE 7650	ACCE 7651	ACCE 7654
JVO 21-25-32-36	ACCE 7652	ACCE 7653	ACCE 7655
J3R 80 B	ACCE 7640		

JVR-JVO-JVP Ranges

JVR – Wound primary

JVR 64

Ø M8

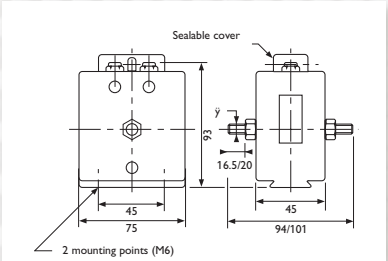


Primary	Power (VA) class 0.5	1	3	Weight (kg)
5 A	*	5	5	0.45
10 A	*	5	5	0.45
15 A	*	5	5	0.45
20 A	*	5	5	0.45
25 A	*	5	5	0.45
30 A	*	5	5	0.45
40 A	*	5	5	0.45
50 A	*	5	5	0.45
60 A	*	5	5	0.45
75 A	*	5	5	0.45
100 A	*	5	5	0.45

*On request

JVR 75

Ø M8/M10 > 75 A

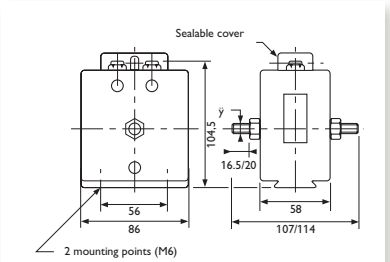


Primary	Power (VA) class 0.5	1	3	Weight (kg)
5 A	*	10	10	0.6
10 A	*	10	10	0.6
15 A	*	10	10	0.6
20 A	*	10	10	0.6
25 A	*	10	10	0.6
30 A	*	10	10	0.6
40 A	*	10	10	0.6
50 A	*	10	10	0.6
60 A	*	10	10	0.6
75 A	*	10	10	0.6
100 A	*	10	10	0.6
125 A	*	10	10	0.6
150 A	*	10	10	0.6
200 A	*	10	10	0.6

*On request

JVR 86

Ø M8/M10 > 75 A



Primary	Power (VA) class 0.5	1	3	Weight (kg)
5 A	*	20	30	1.2
10 A	*	20	30	1.2
15 A	*	20	30	1.2
20 A	*	20	30	1.2
25 A	*	20	30	1.2
30 A	*	20	30	1.2
40 A	*	20	30	1.2
50 A	*	20	30	1.2
60 A	*	20	30	1.2
75 A	*	20	30	1.2
100 A	*	20	30	1.2
125 A	*	20	30	1.2
150 A	*	20	30	1.2
200 A	*	20	30	1.2

*On request

TO ORDER

Primary	Secondary 5 A
5 A	JVRA 8700
10 A	JVRA 8701
15 A	JVRA 8702
20 A	JVRA 8703
25 A	JVRA 8704
30 A	JVRA 8705
40 A	JVRA 8706
50 A	JVRA 8707
60 A	JVRA 8708
75 A	JVRA 8709
100 A	JVRA 8710
Sealable cover	ACCE 7668

Primary	Secondary 5 A
5 A	JVRB 8725
10 A	JVRB 8726
15 A	JVRB 8727
20 A	JVRB 8728
25 A	JVRB 8729
30 A	JVRB 8730
40 A	JVRB 8731
50 A	JVRB 8732
60 A	JVRB 8733
75 A	JVRB 8734
100 A	JVRB 8735
125 A	JVRB 8736
150 A	JVRB 8737
200 A	JVRB 8738
Sealable cover	ACCE 7668

Primary	Secondary 5 A
5 A	JVRC 8742
10 A	JVRC 8743
15 A	JVRC 8744
20 A	JVRC 8745
25 A	JVRC 8746
30 A	JVRC 8747
40 A	JVRC 8748
50 A	JVRC 8749
60 A	JVRC 8750
75 A	JVRC 8751
100 A	JVRC 8752
125 A	JVRC 8753
150 A	JVRC 8754
200 A	JVRC 8755
Sealable cover	ACCE 7668

Customized product

	Model	Primary	Secondary	Class	Power	Frequency
Example	JVR 64	100 A	1 A	1	5 VA	50 Hz

JVR 64
JVR 75
JVR 86

Associated products

Mounting accessories
▶ page 123

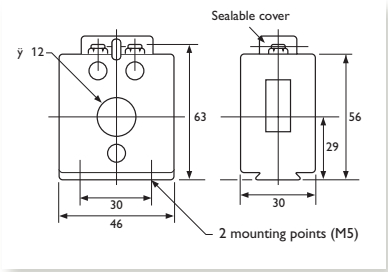
PRTC
CT protection unit
▶ page 142

JVR-JVO-JVP Ranges

JVO – Cable primary

JVO 12-46

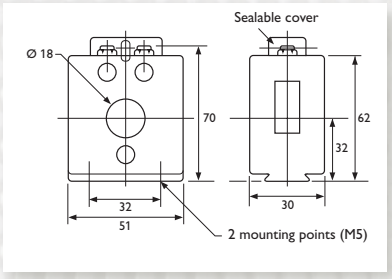
Cable Ø 12 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
40 A	-	-	1.5	0.20
50 A	-	-	2	0.20
60 A	-	-	2.5	0.20
75 A	-	-	3	0.20
100 A	-	-	4	0.20
125 A	-	-	5	0.20
150 A	-	-	5	0.20

JVO 18-51

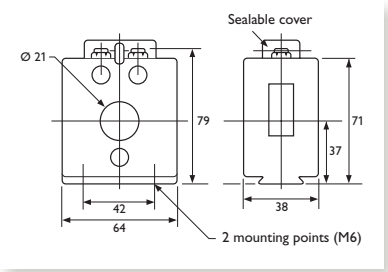
Cable Ø 18 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	2	0.25
125 A	-	2.5	3	0.25
150 A	-	3	4	0.25
200 A	-	4	6	0.25
250 A	-	5	7	0.25
300 A	-	5	8	0.25

JVO 21-64

Cable Ø 21 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	4	0.35
125 A	-	-	5	0.35
150 A	-	-	5	0.35
200 A	-	5	5	0.35
250 A	-	5	5	0.35
300 A	*	5	10	0.35
400 A	*	5	10	0.35
500 A	*	10	20	0.35
600 A	*	10	20	0.35

*On request

TO ORDER

Primary	Secondary 5 A
40 A	JVOA 8759
50 A	JVOA 8760
60 A	JVOA 8761
75 A	JVOA 8762
100 A	JVOA 8763
125 A	JVOA 8764
150 A	JVOA 8765
Central tube	ACCE 7660

Primary	Secondary 5 A
100 A	JVOB 8769
125 A	JVOB 8770
150 A	JVOB 8771
200 A	JVOB 8772
250 A	JVOB 8773
300 A	JVOB 8774
Central tube	ACCE 7661

Primary	Secondary 5 A
100 A	JVOC 8778
125 A	JVOC 8779
150 A	JVOC 8780
200 A	JVOC 8781
250 A	JVOC 8782
300 A	JVOC 8783
400 A	JVOC 8784
500 A	JVOC 8785
600 A	JVOC 8786
Central tube	ACCE 7662
Sealable cover	ACCE 7668

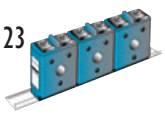
Customized product

	Model	Primary	Secondary	Class	Power	Frequency
Example	JVO 18-51	100 A	1 A	1	3 VA	50 Hz

JVO 12-46
JVO 18-51
JVO 21-64

Associated products

Mounting accessories
► page 123



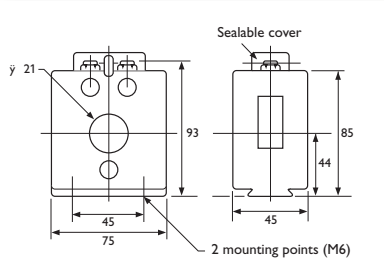
PRTC CT protection unit
► page 142

JVR-JVO-JVP Ranges

JVO – Cable primary

JVO 21-75

Cable Ø 21 mm

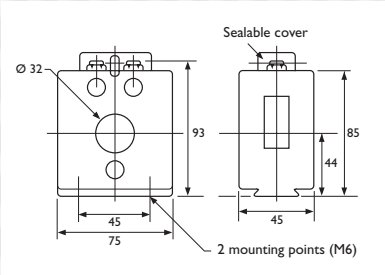


Primary	Power (VA) class 0.5	1	3	Weight (kg)
50 A	-	-	5	0.65
60 A	-	-	5	0.65
75 A	-	-	10	0.65
100 A	-	4	10	0.65
125 A	-	5	10	0.65
150 A	*	10	15	0.65
200 A	*	10	15	0.65
250 A	*	15	20	0.65
300 A	*	15	20	0.65
400 A	*	20	30	0.65
500 A	*	30	30	0.65
600 A	*	30	30	0.65

*On request

JVO 32-75

Cable Ø 32 mm

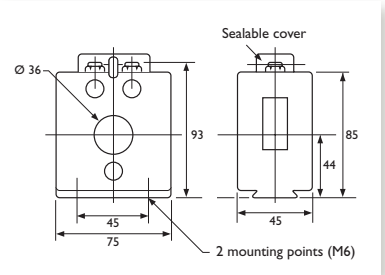


Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	5	0.65
125 A	-	-	5	0.65
150 A	-	5	10	0.65
200 A	-	5	10	0.65
250 A	*	5	15	0.65
300 A	*	10	15	0.65
400 A	*	10	15	0.65
500 A	*	10	20	0.65
600 A	*	10	20	0.65

*On request

JVO 36-75

Cable Ø 36 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	5	0.45
125 A	-	-	5	0.45
150 A	-	-	10	0.45
200 A	-	5	10	0.45
250 A	*	5	15	0.45
300 A	*	5	15	0.45
400 A	*	5	15	0.45
500 A	*	10	20	0.45
600 A	*	20	20	0.45

*On request

TO ORDER

Primary	Secondary 5 A
50 A	JVOE 8795
60 A	JVOE 8796
75 A	JVOE 8797
100 A	JVOE 8798
125 A	JVOE 8799
150 A	JVOE 8800
200 A	JVOE 8801
250 A	JVOE 8802
300 A	JVOE 8803
400 A	JVOE 8804
500 A	JVOE 8805
600 A	JVOE 8806
Central tube	ACCE 7663
Sealable cover	ACCE 7668

Primary	Secondary 5 A
100 A	JVOF 8814
125 A	JVOF 8815
150 A	JVOF 8816
200 A	JVOF 8817
250 A	JVOF 8818
300 A	JVOF 8819
400 A	JVOF 8820
500 A	JVOF 8821
600 A	JVOF 8822
Sealable cover	ACCE 7668

Primary	Secondary 5 A
100 A	JVOG 8829
125 A	JVOG 8830
150 A	JVOG 8831
200 A	JVOG 8832
250 A	JVOG 8833
300 A	JVOG 8834
400 A	JVOG 8835
500 A	JVOG 8836
600 A	JVOG 8837
Sealable cover	ACCE 7668

Customized product

	Model	Primary	Secondary	Class	Power	Frequency
Example	JVR 32-75	500 A	1 A	0.5	10 VA	50 Hz

JVR 21-75
JVR 32-75
JVR 36-75

Associated products

Mounting accessories
► page 123

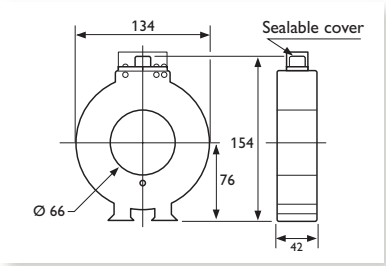
PRTC
CT protection unit
► page 142

JVR-JVO-JVP Ranges

JVO – Cable primary

J3R 80 B

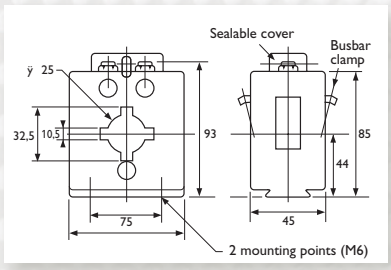
Cable Ø 66 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
200 A	-	5	10	1.6
250 A	-	5	10	1.6
300 A	5	10	15	1.6
400 A	10	20	25	1.6
500 A	15	20	25	1.6
600 A	15	20	25	1.6
750 A	15	20	25	1.6
800 A	15	20	25	1.6
1000 A	15	20	25	1.6
1250 A	15	20	25	1.6
1500 A	15	20	25	1.6

JVO 25 CR

Cable Ø 25 mm
Bar: 32 x 10 mm

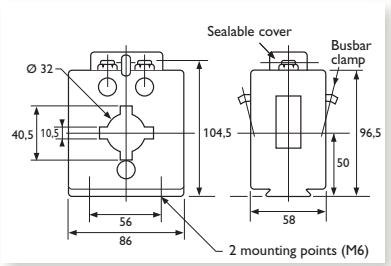


Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	5	0.6
125 A	-	-	5	0.6
150 A	-	-	5	0.6
200 A	-	5	10	0.6
250 A	*	5	15	0.6
300 A	*	5	15	0.6
400 A	*	10	15	0.6
500 A	*	20	20	0.6
600 A	*	20	20	0.6

*On request

JVO 32 CR

Cable Ø 32 mm
Bar: 40 x 10 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	5	0.9
125 A	-	-	10	0.9
150 A	-	5	15	0.9
200 A	-	5	15	0.9
250 A	*	10	20	0.9
300 A	*	10	30	0.9
400 A	*	15	30	0.9
500 A	*	15	30	0.9
600 A	*	15	30	0.9

*On request

TO ORDER

Primary	Secondary 5 A
200 A	J3RC 7514
250 A	J3RC 7524
300 A	J3RC 7525
400 A	J3RC 7528
500 A	J3RC 7527
600 A	J3RC 7529
750 A	J3RC 7526
800 A	J3RC 7531
1000 A	J3RC 7530
1250 A	J3RC 7532
1500 A	J3RC 7533
Sealable cover	ACCE 7671

Primary	Secondary 5 A
100 A	JVOD 8850
125 A	JVOD 8851
150 A	JVOD 8852
200 A	JVOD 8853
250 A	JVOD 8854
300 A	JVOD 8855
400 A	JVOD 8856
500 A	JVOD 8857
600 A	JVOD 8858
Busbar clamp	ACCE 7665
Sealable cover	ACCE 7668

Primary	Secondary 5 A
100 A	JVOH 8866
125 A	JVOH 8867
150 A	JVOH 8868
200 A	JVOH 8869
250 A	JVOH 8870
300 A	JVOH 8871
400 A	JVOH 8872
500 A	JVOH 8873
600 A	JVOH 8874
Busbar clamp	ACCE 7666
Sealable cover	ACCE 7668

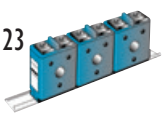
Customized product

	Model	Primary	Secondary	Class	Power	Frequency
Example	JVR 25 CR	600 A	1 A	0.5	10 VA	60 Hz

J3R 80 B
JVO 25 CR
JVO 32 CR

Associated products

Mounting accessories
► page 123



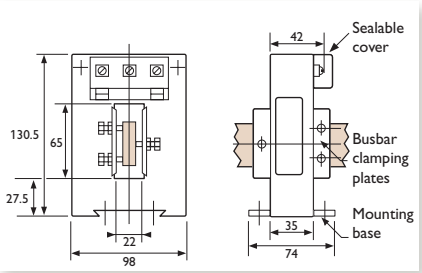
PRTC CT protection unit
► page 142

JVR-JVO-JVP Ranges

JVP – Busbar primary

JVP 624

Bar: 63 x 20 mm



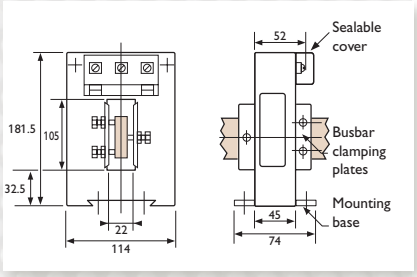
Primary	Power (VA) class 0.5	1	3	Weight (kg)
100 A	-	-	5	1.2
125 A	-	-	5	1.2
150 A	-	-	5	1.2
200 A	-	-	5	1.2
250 A	-	5	15	1.2
300 A	-	5	15	1.2
400 A	*	10	15	1.2
500 A	*	15	20	1.2
600 A	*	20	20	1.2
750 A	*	20	20	1.2
800 A	*	20	20	1.2
1000 A	*	20	20	1.2

*On request

Primary	Secondary 5 A
100 A	JVPR 8879
125 A	JVPR 8880
150 A	JVPR 8881
200 A	JVPR 8882
250 A	JVPR 8883
300 A	JVPR 8884
400 A	JVPR 8885
500 A	JVPR 8886
600 A	JVPR 8887
750 A	JVPR 8888
800 A	JVPR 8890
1000 A	JVPR 8889
Mounting base	ACCE 7669
Sealable cover	ACCE 7672

JVP 1025

Bar: 100 x 20 mm



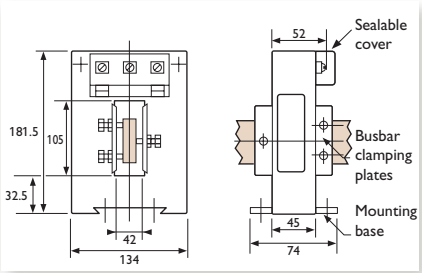
Primary	Power (VA) class 0.5	1	3	Weight (kg)
200 A	-	-	5	2
250 A	-	-	5	2
300 A	-	10	20	2
400 A	*	5	30	2
500 A	*	15	15	2
600 A	*	15	15	2
750 A	*	20	20	2
800 A	*	20	30	2
1000 A	*	30	30	2
1250 A	*	30	30	2
1500 A	*	30	30	2
2000 A	*	30	30	2
2500 A	*	30	30	2
3000 A	*	30	30	2

*On request

Primary	Secondary 5 A
200 A	JVPT 8890
250 A	JVPT 8891
300 A	JVPT 8892
400 A	JVPT 8893
500 A	JVPT 8896
600 A	JVPT 8897
750 A	JVPT 8898
800 A	JVPT 8895
1000 A	JVPT 8899
1250 A	JVPT 8900
1500 A	JVPT 8901
2000 A	JVPT 8902
2500 A	JVPT 8921
3000 A	JVPT 8922
Mounting base	ACCE 7669
Sealable cover	ACCE 7672

JVP 1045

Bar: 100 x 40 mm



Primary	Power (VA) class 0.5	1	3	Weight (kg)
300 A	-	5	5	2.5
400 A	*	5	10	2.5
500 A	*	10	15	2.5
600 A	*	15	15	2.5
750 A	*	20	20	2.5
800 A	*	20	20	2.5
1000 A	*	30	30	2.5
1250 A	*	30	30	2.5
1500 A	*	30	30	2.5
2000 A	*	30	30	2.5
2500 A	*	30	30	2.5
3000 A	*	30	30	2.5

*On request

Primary	Secondary 5 A
300 A	JVPU 8906
400 A	JVPU 8918
500 A	JVPU 8907
600 A	JVPU 8908
750 A	JVPU 8909
800 A	JVPU 8919
1000 A	JVPU 8910
1250 A	JVPU 8911
1500 A	JVPU 8912
2000 A	JVPU 8913
2500 A	JVPU 8920
3000 A	JVPU 8914
Mounting base	ACCE 7669
Sealable cover	ACCE 7672

TO ORDER

Customized product

Model	Primary	Secondary	Class	Power	Frequency
Example JVP 1025	1000 A	1 A	0.5	10 VA	50 Hz

JVP 624
JVP 1025
JVP 1045

Associated products

PRTC
CT protection unit

► page 143

JVS Range

CTs designed to supply electronic measurement instruments, power monitors, digital transducers, etc.

PRODUCT ADVANTAGES

CHOICE OF PRIMARY
from 100 to 5,000 A

ACCURACY CLASS:
0.2 S for high-performance applications

Captive sealable terminal covers

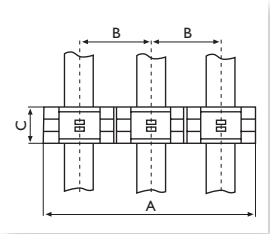
Split output terminals enabling risk-free short-circuiting of the secondary current (M4 or cage for 4 mm² wire)

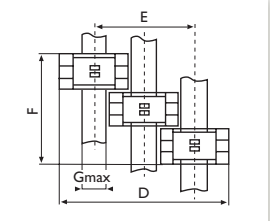
Cabinet base fitting (or directly on busbar primary)

General specifications

Reference standard: EN 60044-1 (ex IEC 185)
Maximum network voltage: 720 Vac
Dielectric test voltage: 3 kV/50 Hz/1 min
Frequency response: 50/60 Hz
Short-circuit thermal current (Ith): 60 In - 1 second
Dynamic current (Idyn): 2.5 Ith

Safety factor: < 5
Operating conditions:
Temperature: -10°C to +50°C
Relative humidity: < 90%
Protection:
Protection rating: IP 50 (terminal covers supplied)
Dry winding with self-extinguishing ABS covering (UL 94 VO)





3CT Mounting

Model	Dimensions A	B	C	D	E	F	G
JVS 25B	243.5	81.5	60.5	189	108.5	183.5	26
JVS 26B	243.5	81.5	60.5	191	110.5	183.5	28
JVS 30B	308	103	69	250	148	209	44
JVS 38B	392	131	69	325	195	209	63
JVS 40	287	96	40	215	120	122	23
JVS 50	347	116	44	264	149	134	32
JVS 60	374	125	44	310	186	134	60

Mounting accessories

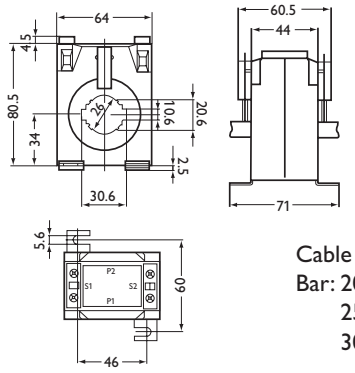
Model	Plate mounting fittings	Busbar clamp	Sealable terminal cover*
JVS 25B	•	•	1923 0022
JVS 26B	•	•	1923 0022
JVS 30B	•	•	1923 0022
JVS 38B	•	•	1923 0022
JVS 39B	•	•	1923 0022
JVS 40	•	•	•
JVS 50	•	•	•
JVS 60	•	•	•

• Standard accessories
* sold in pairs

JVS Range

Cable/busbar primary

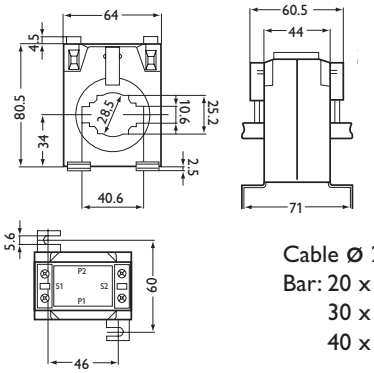
JVS 25B



Cable Ø 26 mm
Bar: 20 x 20 mm
25 x 12 mm
30 x 10 mm

Primary	Power (VA) in class 0.2 S	Weight (kg)
100 A	1	0.53
150 A	2.5	0.53
200 A	3.5	0.54
250 A	5	0.54
300 A	5	0.51
400 A	7.5	0.51

JVS 26B



Cable Ø 28 mm
Bar: 20 x 25 mm
30 x 15 mm
40 x 10 mm

Primary	Power (VA) in class 0.2 S	Weight (kg)
150 A	1	0.37
200 A	1.25	0.38
250 A	1.5	0.39
300 A	1.75	0.4
400 A	1	0.41
500 A	5	0.41
600 A	5	0.42
750 A	7.5	0.43
800 A	7.5	0.44

TO ORDER

Primary	Secondary 5 A
100 A	JVSB25 100/5
150 A	JVSB25 150/5
200 A	JVSB25 200/5
250 A	JVSB25 250/5
300 A	JVSB25 300/5
400 A	JVSB25 400/5

Primary	Secondary 5 A
150 A	JVSB26 100/5
200 A	JVSB26 200/5
250 A	JVSB26 250/5
300 A	JVSB26 300/5
400 A	JVSB26 400/5
500 A	JVSB26 500/5
600 A	JVSB26 600/5
750 A	JVSB26 750/5
800 A	JVSB26 800/5

► Associated products

Mounting accessories
► page 129

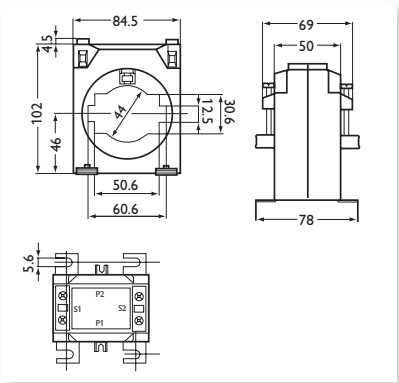
PRTC
CT protection unit
► page 142

JVS Range

Cable/busbar primary

JVS 30B

Cable Ø 44 mm
Bar: 50 x 30 mm
60 x 12 mm

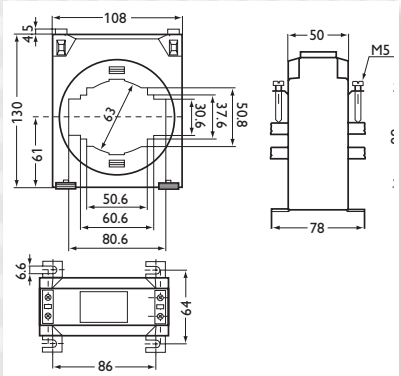


Primary	Power (VA) Class 0.2 S	Weight (kg)
600 A	5	0.52
750 A	7.5	0.59
800 A	7.5	0.60
1000 A	10	0.61
1200 A	10	0.63
1500 A	10	0.65

Primary	Secondary 5 A
600 A	JVSB30 600/5
750 A	JVSB30 750/5
800 A	JVSB30 800/5
1000 A	JVSB30 1000/5
1200 A	JVSB30 1200/5
1500 A	JVSB30 1500/5

JVS 38B

Cable Ø 63 mm
Bar: 50 x 50 mm
60 x 30 mm
80 x 30 mm

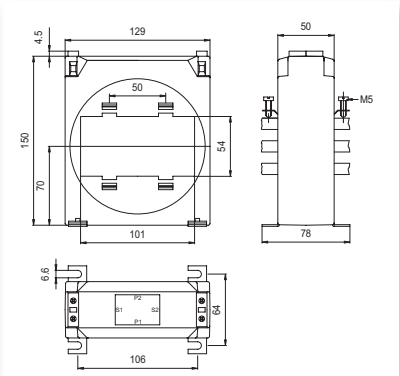


Primary	Power (VA) Class 0.2 S	Weight (kg)
1000 A	7,5	0.72
1200 A	10	0.68
1500 A	10	0.84
2000 A	10	0.82
2500 A	10	0.88
3000 A	10	0.88

Primary	Secondary 5 A
1000 A	JVSB38 1000/5
1200 A	JVSB38 1200/5
1500 A	JVSB38 1500/5
2000 A	JVSB38 2000/5
2500 A	JVSB38 2500/5
3000 A	JVSB38 3000/5

JVS 39B

Bar: 3 x 100 x 10 mm



Primary	Power (VA) Class 0.2 S	Weight (kg)
1500 A	10	1.47
2000 A	10	1.55
2500 A	15	1.63
3000 A	20	1.71
4000 A	25	1.83

Primary	Secondary 5 A
1500 A	JVSB39 1500/5
2000 A	JVSB39 2000/5
2500 A	JVSB39 2500/5
3000 A	JVSB39 3000/5
4000 A	JVSB39 4000/5

TO ORDER

Associated products

Mounting accessories
► page 129

PRTC
CT protection unit
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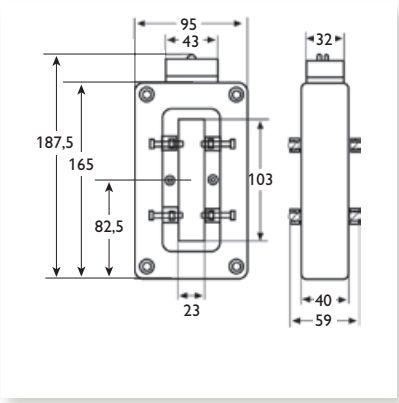
JVS Range

Busbar primary

JVS 40

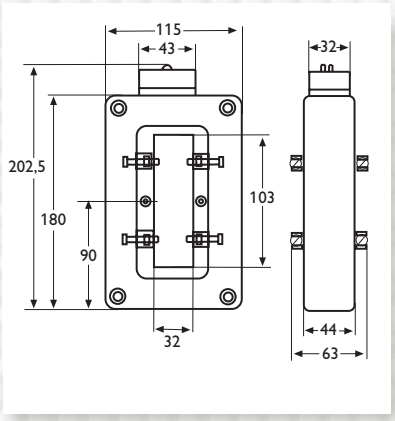
Bar: 100 x 20 mm



Primary	Power (VA) Class 0.2 S	Weight (kg)
1000 A	1.5	0,76
1200 A	4	0,76
1500 A	10	0.76
2000 A	10	0.76

JVS 50

Bar: 100 x 30 mm



Primary	Power (VA) Class 0.2 S	Weight (kg)
1500 A	10	0.76
2000 A	10	0.82
2500 A	10	0.78
3000 A	10	0.90
4000 A	10	0.90

TO ORDER

Primary	Secondary 5 A
1000 A	JVS40-1000/5
1200 A	JVS40-1200/5
1500 A	JVS40-1500/5
2000 A	JVS40-2000/5

Primary	Secondary 5 A
1500 A	JVS50-1500/5
2000 A	JVS50-2000/5
2500 A	JVS50-2500/5
3000 A	JVS50-3000/5
4000 A	JVS50-4000/5

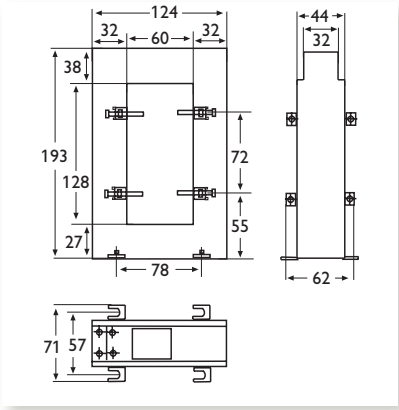
► Associated products

PRTC
CT protection unit

► page 142

JVS 60

Bar: 125 x 60 mm



Primary	Power (VA) Class 0.2 S	Weight (kg)
1000 A	1.5	0.75
1500 A	7.5	0.83
2000 A	10	0.92
2500 A	10	1.01
3000 A	10	1.09
4000 A	10	1.21
5000 A	10	1.44

TO ORDER

Primary	Secondary 5 A
1000 A	JVS60-1000/5
1500 A	JVS60-1500/5
2000 A	JVS60-2000/5
2500 A	JVS60-2500/5
3000 A	JVS60-3000/5
4000 A	JVS60-4000/5
5000 A	JVS60-5000/5

Associated products

PRTC
CT protection unit

page 142

Single-phase, single-rating: JVP1045 B

Transformers for tariff metering

JVP1045 B

Busbar primary

PRODUCT ADVANTAGES

DELIVERED WITH SEALABLE PROTECTIVE COVER for the secondary. Simple M5 terminals

DIRECT MOUNTING on primary busbar by means of plate and tightening screw or panel mounting with mounting plate

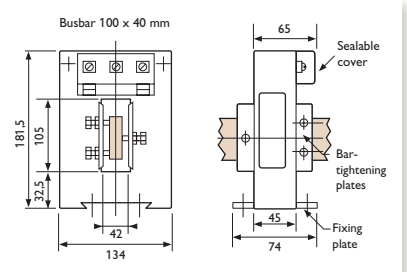
General specifications

Reference standard:
EN 60044-1 (ex-IEC 185)
and NFC 42-502
Maximum network voltage:
720 Vac
Dielectric test voltage:
3 kV/50 Hz/1 min
Frequency response:
50/60 Hz
Thermal short-circuit current (Ith) : 80 In
Dynamic current (Idyn):
2.5 Ith

Safety factor:
10 in class 0.5
Except * SF = 6.4/10.5
and **SF = 4.7/8.2
Operating conditions:
Temperature: -20°C to +60°C
Relative humidity: 93% to 40°C
Protection:
Protection rating: IP 50
Dry winding in self-extinguishing ABS envelope (UL 94 VO)

TO ORDER

Primary	Power (VA) in class 0.5		Weight (kg)
	7.5	15	
	Secondary 5 A		
500 A		JVPA 7569	2.50
1000 A		JVPA 7573	2.50
2000 A		JVPA 7576	2.50
500-1000 A*	JVPA 7589	JVPA 7585	2.50
1000-2000 A**	JVPA 7590	JVPA 7588	2.50



Single-phase, single-rating: JVO 40-100

Transformers for tariff metering

JVO 40-100

Cable primary

PRODUCT ADVANTAGES

DELIVERED WITH SEALABLE TERMINAL COVER
for the secondary. Simple M5 terminals with two grooves for double connection

MOUNTING ON SYMMETRICAL MOUNTING RAIL
or panel mounting

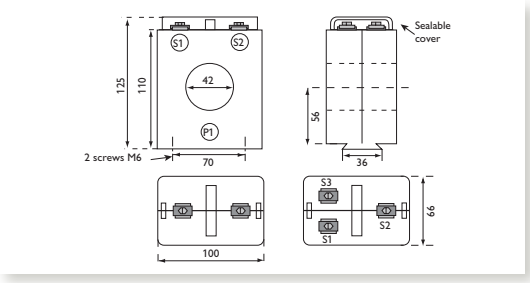
General specifications

Reference standard:
EN 60044-1 (ex-IEC185) and NFC 42-502
Maximum network voltage:
720 Vac
Dielectric test voltage:
3 kV/50 Hz/1 min
Frequency response:
50/60 Hz
Thermal short-circuit current (Ith) **:** 80 In
Dynamic current (Idyn)**:**
2.5 Ith

Safety factor:
10 in class 0.5
Except * SF = 6.4/10.5
and **SF = 4.7/8.2
Operating conditions:
Temperature: -5 °C to +50 °C
Relative humidity: 93 % to 40 °C
Protection:
Protection rating: IP 50
Dry winding in self-extinguishing ABS envelope (UL 94 VO)

TO ORDER

	Power (VA) in class 0.5			
	15	7.5	15	Weight
Primary Secondary	2.5 A	5 A	5 A	(kg)
200 A	JVON 7103		JVON 7100	0.97
500 A			JVON 7101	0.97
200-500		JVON 7104	JVON 7102	0.97
1-CT mounting rail		ACCE 7679		
2-CT mounting rail		ACCE 7680		
3-CT mounting rail		ACCE 7681		



Single-phase, multi-rating: JVO 40-100 S

Transformers for tariff metering – ERDF application

JVO 40-100 S

Cable primary Ø 40 mm

General specifications

Cable primary: Ø 40 mm
Transformation ratio:
200 - 500 / 5 A
Accuracy class: 0.2s
Precision power: 7.5 VA
Highest network voltage: 720 Vac
Rated frequency: 50/60 Hz
Rated short-circuit thermal current (Ith)**:** 20 kA for 1 s
Rated dynamic current (Idyn)**:** 2.5 Ith
Safety factor:
SF = 3 (200/5 A); SF = 6 (500/5 A)
Rated thermal current: 1.2 Ipn
Operating temperature:
-25°C to +40°C

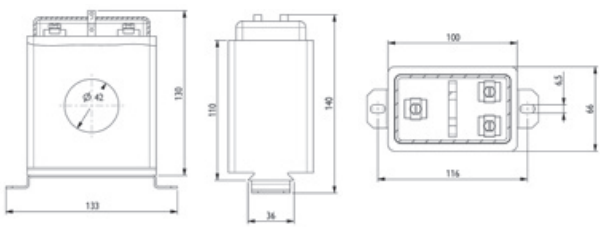
Type of casing:
Self-extinguishing thermoplastic (UL94V0)
Protection: IP30
Mechanical shock resistance: IK7
Rated withstand voltage:
3 kV (RMS value) at 50 Hz for 1 minute
Rated lightning impulse withstand voltage:
8 kV (peal value) – Wave 1.2/50 µs
Insulation class:
E (heating limit: 75 K)
Weight: 1.1 kg

TO ORDER

Model	Reference
JVO 40-100 S bi-rating	P01379512

Dimensions

Bi-rating



Single-phase, multi-rating: JVO 90-160 S

Transformers for tariff metering – ERDF application

JVO 90-160 S

Cable primary Ø 90 mm

PRODUCT ADVANTAGES

- **CLASS 0.2s ACCORDING TO IEC 60044-1**
- Particularly **SUITABLE FOR ERDF-QUALIFIED TRI-RATING ELECTRONIC METERS**

General specifications

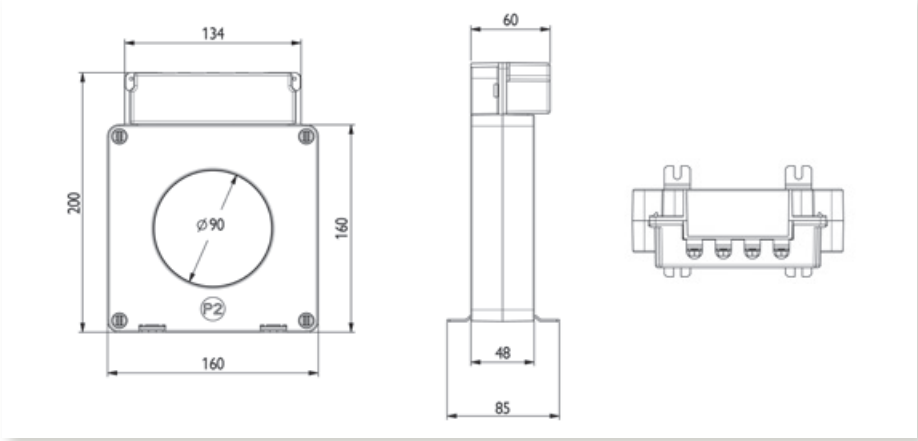
Cable primary: Ø 90 mm
Transformation ratio:
500-1,000-2,000/5 A
Accuracy class: 0.2s
Precision power: 7.5 VA
Highest network voltage: 720 Vac
Rated frequency: 50/60 Hz
Rated short-circuit thermal current (Ith)**:** 30 kA for 1 s
Rated dynamic current (Idyn)**:** 2.5 Ith
Safety factor:
SF = 4 (500/5 A); SF = 6 (1 000/5 A) ;
SF = 9 (2000/5 A)
Rated thermal current: 1.2 Ipn
Operating temperature:
-25°C to +40°C

Type of casing:
Self-extinguishing thermoplastic (UL94V0)
Protection: IP30
Mechanical shock resistance: IK7
Rated withstand voltage:
3 kV (RMS value) at 50 Hz for 1 minute
Rated lightning impulse withstand voltage:
8 kV (peak value) – Wave 1.2/50 µs
Insulation class: E(heating limit: 75 K)
Weight: 1.9 kg

TO ORDER

Model	Reference
JVO 90-160 S tri-rating	P01379513

Dimensions



Single-phase, multi-rating: JVP 1145 S

Transformers for tariff metering – ERDF application

JVP 1145 S

Cable/busbar primary

PRODUCT ADVANTAGES

- **CLASS 0.2s ACCORDING TO IEC 60044-1**
- Particularly **SUITABLE FOR ERDF-QUALIFIED TRI-RATING ELECTRONIC METERS**

► General specifications

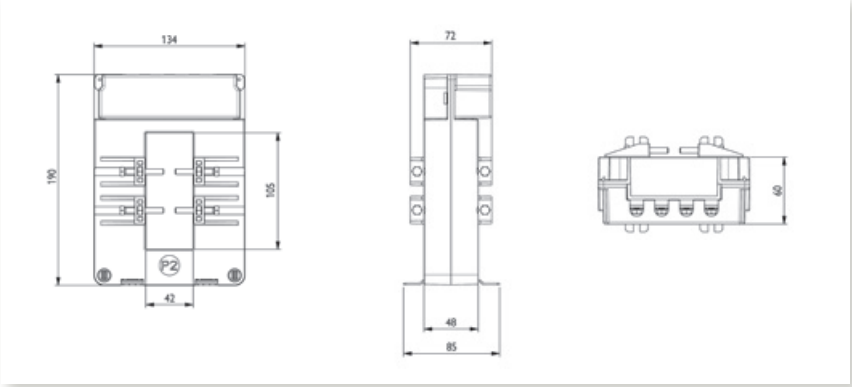
Cable primary:
Busbar: 63 x 12 mm or 100 x 12 mm
Cable: Ø 40 mm
Transformation ratio:
500 – 1,000 – 2,000 / 5 A
Accuracy class: 0.2s
Precision power: 7.5 VA
Highest network voltage: 720 Vac
Rated frequency: 50/60 Hz
Rated short-circuit thermal current (Ith)**:** 30 kA for 1 s
Rated dynamic current (Idyn)**:** 2.5 Ith
Safety factor:
SF = 3 (500/5 A); SF = 4 (1000/5 A);
SF = 6 (2000/5 A)
Rated thermal current: 1.2 Ipn

Operating temperature:
-25°C to +40°C
Type of casing:
Self-extinguishing thermoplastic (UL94V0)
Protection: IP30
Mechanical shock resistance: IK7
Rated withstand voltage:
3 kV (RMS value) at 50 Hz for 1 minute
Rated lightning impulse withstand voltage:
8 kV (peak value) – Wave 1.2/50 µs
Insulation class: E (heating limit: 75 K)
Weight: 1.7 kg

TO ORDER

Model	Reference
JVP 1145 S tri-rating	P01379510

► Dimensions



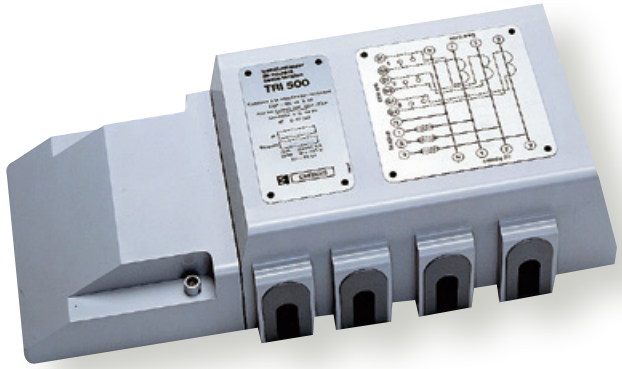
Single-phase, multi-rating: TRI 500

Transformers for tariff metering

TRI 500

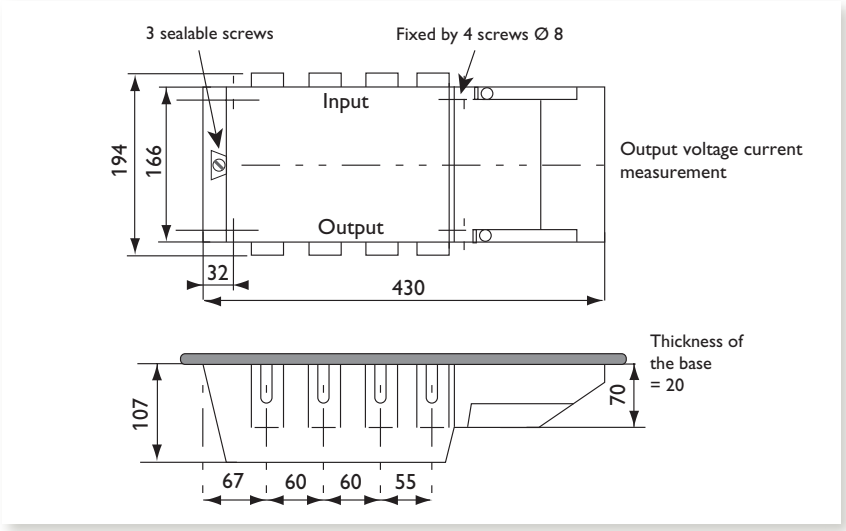
PRODUCT ADVANTAGES

- **COMPLIANT** with **NF-C-42-502** standard
- **DESIGNED FOR THREE-PHASE LV METERING**



General specifications

Maximum network voltage: 500 Vac
Dielectric test voltage: 2 kV - 50 Hz - 1 min
Rated withstand voltage: 8 kV
Frequency response: 50 Hz
Primary via cable clamp: conductors from 50 to 240 mm²



Primary	Power (VA) Class 0.5	Weight (kg)
50 A	15	7.50
100 A	15	7.50
150 A	15	7.50
200 A	15	7.50
300 A	15	7.50
500 A	15	7.50

TO ORDER

Primary	5 A Secondary
50 A	TRI5 7823
100 A	TRI5 7825
150 A	TRI5 7826
200 A	TRI5 7827
300 A	TRI5 7828
500 A	TRI5 7831

Three-phase, multi-rating: TRI 700

Transformers for tariff metering – ERDF application

PRODUCT ADVANTAGES

- **CLASS 0.2S ACCORDING TO IEC 60044-1**
- **CHOICE OF PRIMARY CONDUCTOR** type: copper or aluminium
- Built-in short-circuiting switch

► General specifications

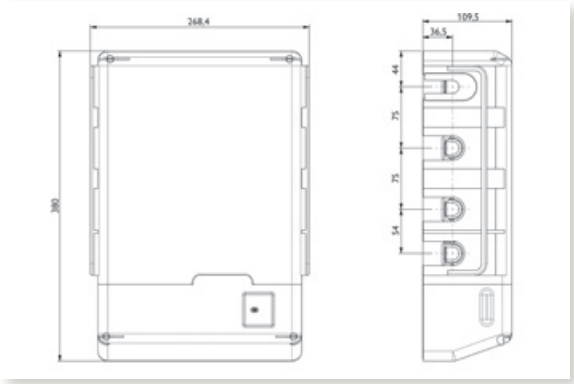
Primary via cable clamp:
Conductor cross-section from 50 mm² to 240 mm²
Transformation ratio:
TRI700S bi-rating model 50 A - 100 A / 5 A
TRI700S bi-rating model 100 A - 200 A / 5 A
TRI700S bi-rating model 200 A - 500 A / 5 A
TRI700 tri-rating model 100 A - 200 A - 500 A / 5 A
Accuracy class:
Bi-rating model 0.2s; tri-rating model: 0.5
Precision power:
Bi-rating model: 7.5 VA; tri-rating model: 3.75 VA
Maximum network voltage:
Bi-rating / tri-rating model: 720 Vac
Rated frequency:
Bi-rating / tri-rating model: 50/60 Hz
Rated thermal short-circuit current (Ith):
Bi-rating / tri-rating model:
80 Ipn with a maximum of 20 kA for 1 s
Rated dynamic current (Idyn):
Bi-rating / tri-rating model: 2.5 Ith
Safety factor:
TRI700S 50 - 100 / 5 A:
FS = 2.3 (50 A); FS = 4.2 (100 A)
TRI700S 100-200/5 A:
FS = 2.3 (100 A); FS = 4.2 (200 A)
TRI700S 200 - 500 / 5 A:
FS = 2,3 (200 A); FS = 5 (500 A)
TRI700 100 - 200 - 500 / 5 A:
FS = 4 (100 A); FS = 7 (200 A); FS = 10 (500 A)

Rated thermal current:
Bi-rating / tri-rating model: 1.2 Ipn
Operating temperature:
Bi-rating / tri-rating model: -25°C to +40°C
Type of casing:
Bi-rating / tri-rating model:
Self-extinguishing thermoplastic (UL94V0)
Protection rating:
With additional cover: IP40
Mechanical shock resistance:
Bi-rating / tri-rating model: (IK7)
Rated withstand voltage:
Bi-rating / tri-rating model: 3 kV
(RMS value) at 50 Hz for 1 minute
Lightning impulse withstand voltage:
Bi-rating / tri-rating model:
(8 kV) (peak value) – Wave 1.2/50 µs
Insulation class:
Bi-rating / tri-rating model:
E (heating limit: 75 K)
Weight: Bi-rating / tri-rating model: 9 Kg

TO ORDER

Model	Reference
TRI 700 tri-rating	P01379514
TRI 700 S bi-rating 50 - 100 / 5 A	P01379515
TRI 700 S bi-rating 100 - 200 / 5 A	P01379516
TRI 700 S bi-rating 200 - 500 / 5 A	P01379517

► Dimensions



Current summation: JVM 15

CT designed for adding or subtracting instantaneous values from the secondaries of 2 or 3 current transformers. Used to supply measuring or metering instruments on installations with several feeder and feed points.

PRODUCT ADVANTAGES

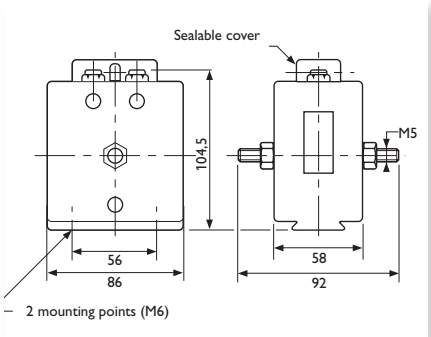
- **COMPACT DESIGN**
- Mounting on plate or rail

Sealable cover.
Terminal connections:
M5; 2 secondary slots for double connections;
primary side connections.

Mounting on plate or symmetrical rail

General specifications

Reference standard:
EN 60044-1 (Ex IEC 185)
Maximum network voltage: 720 Vac
Dielectric test voltage:
3 kV/50 Hz/1 min
Frequency response: 50/60 Hz
Short-circuit thermal current (Ith): 80 In - 1 second
Dynamic current (Idyn): 2.5 Ith
Safety factor: < 5
Internal power: 4 VA
Operating conditions:
Temperature: -5°C to +60°C
Relative humidity: 93% at 40°C
Protection:
Protection rating:
IP 40 (module casing) and IP 10 (terminals)
Dry winding with self-extinguishing ABS covering (UL 94 V0)



	Power (VA)	class		Weight
Primary	0.5	1	3	(kg)
5+5 A	15	20	30	1.20
5+5+5 A	15	20	30	1.20

Cabinet accessories

Model	1 CT slide rail mounting	2 CT slide rail mounting	3 CT slide rail mounting
JVM 15	ACCE 7652	ACCE 7653	ACCE 7655

TO ORDER

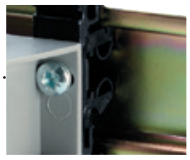
Primary	Secondary 5 A
5+5 A	JVMA 7523
5+5+5 A	JVMA 7524
Sealable cover	ACCE 7668

Transformer short-circuit switch

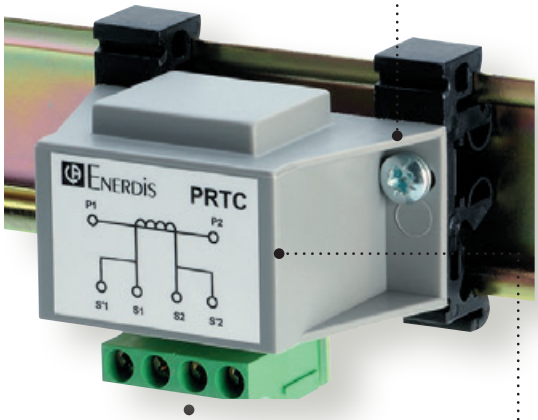
Protection against the dangers caused by opening the secondary circuit on low-voltage measurement CTs

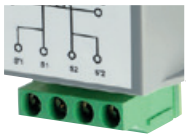
PRODUCT ADVANTAGES

- **PROTECTS USERS AND EQUIPMENT AGAINST OVERVOLTAGES** caused by opening the CT 5 A or 1 A secondary
- **AUTOMATIC SHORT-CIRCUITING** of CT secondary to which it is permanently connected
- Equipment connected on CT secondary side can be operated by user without supply interruption



Mounting on DIN rail or plate





Four terminals available for 6 mm² wires

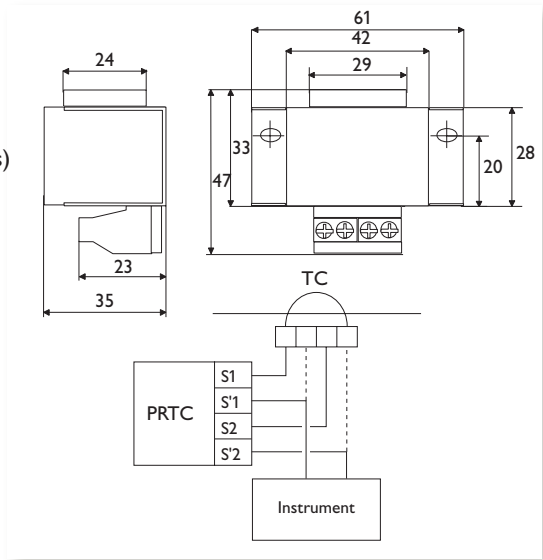
Connection diagram

► General specifications

Reference standards:
NFC 15100 art 411-1)
Connections: double terminals capable of receiving 6 mm² cables. DIN rail mounting (supplied with fittings) or plate mounting using clamp bolts.
Weight: 90 g

Operating conditions:
Temperature: -10°C to +50°C
Relative humidity: < 95%

Protection:
Protection rating: IP 20
Self-extinguishing polyamide casing (UL 94VO)
Measurement current:
5 A/50 Hz or 1 A/50 Hz
Maximum permitted current:
25 Aac
Peak voltage: 22 Vac

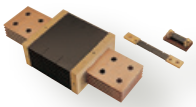


TO ORDER

Reference	PRTC 1001

Notes

Choosing your shunt

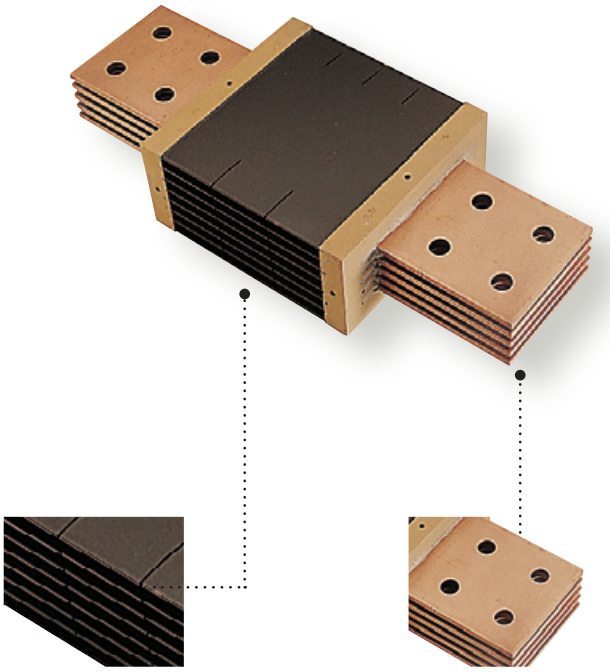
	76-2 and 77-2			SHMI			SHEL	SHMO
	► page 145			► page 147			► page 149	► page 150
								
	76-2	**76-2**	**77-2**	**SHMI**	**SHMI**	**SHMI**	**SHEL**	**SHMO**
Type	Eye connection on base	Eye connection	Plate connection for busbar	Screw connection	Eye connection	Connection to block for busbar	Direct connection to measuring component	Modular casing
Voltage drop	100 mV							
Accuracy class	0.2 and 0.5				0.5 and 1		1	
1 A								
1.25 A								
1.5 A								
2 A								
2.5 A								
3 A								
4 A								
5 A								
6 A								
7.5 A								
10 A								
15 A								
20 A								
25 A								
30 A								
40 A								
50 A								
60 A								
75 A								
100 A								
125 A								
150 A								
200 A								
250 A								
300 A								
400 A								
500 A								
600 A								
750 A								
1000 A								
1250 A								
1500 A								
2000 A								
2500 A								
3000 A								
4000 A								
5000 A								
6000 A								
Strengths	High-performance range. High overload capacity. Treated against corrosion.			Range with a good performance/price trade-off. Large choice of voltage drop ratings (on request).			The most economical range.	Range for mounting on DIN 46277 rail.
	SPECIFIC PRODUCTS POSSIBLE IN THIS RANGE							

76-2 and 77-2 Ranges

A reference for measurements on demanding applications

PRODUCT ADVANTAGES

- HIGH-PERFORMANCE RANGE
- HIGH OVERLOAD CAPACITY



Protection against corrosion with epoxy-modified acrylic paint

Large-area fittings to facilitate heat dissipation

General specifications

Accuracy class defined in the following domain:
Over the whole measurement range, for an ambient temperature of:
- -10°C to +35°C (Class 0.2)
- -25°C to +40°C (Class 0.5 and 1)

For a blade temperature of 80°C
For a shunt current ≤ 5 mA

Permitted rated calibres:
In = 1 A – 1.25 A – 1.5 A - 2 A – 2.5 A - 3 A - 4 A - 5 A - 6 A – 7.5 A;
their multiples or sub-multiples

Voltage drops:
50 mV - 60 mV - 100 mV - 150 mV - 200 mV - 300 mV - 1 V

Permitted overloads:
On average and in normal operating conditions

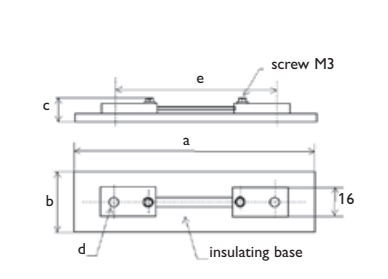
I rated (In)	2 h	5 s Class 0.2	5 s Class 0.5 and 1
< 250 A	1.2 In	2 In	10 In
250 to 2,000 A	1.2 In	2 In	5 In
> 2,000 A	1.2 In	2 In	2 In

Compliance with standards:
Accuracy and influence factor:
IEC 60051-1 to 9
Preferred calibres and dimensions for 100 mV shunts:
NFC 42-151/152/153z
Lead-free range: RoHS directive (2002/95/CE)

76-2 and 77-2 Ranges

76-2
Eye connection on base

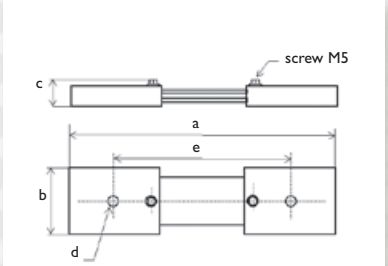
Voltage drop: 100 mV
Class 0.2 and 0.5



Current	Dimensions (mm) a	b	c	d	e
1 A	150	20	13	6	130
1.25 A	150	20	13	6	130
1.5 A	150	20	13	6	130
2 A	150	20	13	6	130
2.5 A	150	20	13	6	130
3 A	150	20	13	6	130
4 A	150	20	13	6	130
5 A	150	20	13	6	130
6 A	150	20	13	6	130
7.5 A	150	20	13	6	130

76-2
Eye connection

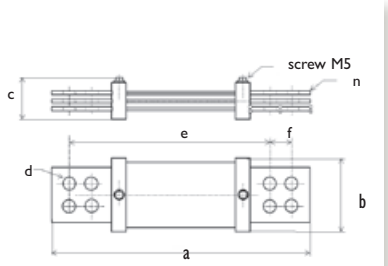
Voltage drop: 100 mV
Class 0.2 and 0.5



Current	Dimensions (mm) a	b	c	d	e
10 A	160	16	11	6	130
15 A	160	16	11	6	130
20 A	160	16	11	6	130
25 A	160	16	11	6	130
30 A	190	25	11	10	160
40 A	190	25	11	10	160
50 A	190	25	11	10	160
60 A	190	25	11	10	160
75 A	190	25	11	10	160
100 A	190	32	11	10	160
125 A	220	32	13	14	180
150 A	220	32	13	14	180
200 A	220	32	13	14	180
250 A	220	50	13	14	180
300 A	220	50	13	14	180
400 A	240	60	17	18	200
500 A	240	60	17	18	200

77-2
Blade connection for bar

Voltage drop: 100 mV
Class 0.2 and 0.5



Current	Dimensions (mm) a	b	c	d	e	f	n
600 A	280	80	35	11	220	25	1
750 A	280	80	35	11	220	25	1
1000 A	380	115	35	14	280	50	1
1250 A	380	115	35	14	280	50	1
1500 A	380	115	55	14	280	50	2
2000 A	380	115	55	14	280	50	2
2500 A	400	168	55	14	300	50	3
3000 A	400	168	65	14	300	50	4
4000 A	400	168	85	14	300	50	5

TO ORDER

Current	Reference for 100 mV Class 0.2	Class 0.5
1 A	SHUN 1200	SHUN 1300
1,25 A	SHUN 1201	SHUN 1301
1,5 A	SHUN 1202	SHUN 1302
2 A	SHUN 1203	SHUN 1303
2,5 A	SHUN 1204	SHUN 1304
3 A	SHUN 1205	SHUN 1305
4 A	SHUN 1206	SHUN 1306
5 A	SHUN 1207	P01 3042 11
6 A	SHUN 1208	SHUN 1308
7,5 A	SHUN 1209	SHUN 1309

Current	Reference for 100 mV Class 0.2	Class 0.5
10 A	SHUN 1210	P01 3042 01
15 A	SHUN 1211	P01 3042 08
20 A	SHUN 1212	P01 3042 02
25 A	SHUN 1213	P01 3042 09
30 A	SHUN 1214	P01 3042 03
40 A	SHUN 1215	P01 3042 10
50 A	SHUN 1216	P01 3042 04
60 A	SHUN 1217	P01 3042 12
75 A	SHUN 1218	P01 3042 13
100 A	SHUN 1219	P01 3042 05
125 A	SHUN 1220	P01 3042 15
150 A	SHUN 1221	P01 3042 16
200 A	SHUN 1222	P01 3042 06
250 A	SHUN 1223	P01 3042 17
300 A	SHUN 1224	P01 3042 07
400 A	SHUN 1225	P01 3042 18
500 A	SHUN 1226	P01 3042 14

Current	Reference for 100 mV Class 0.2	Class 0.5
600 A	SHUN 1227	P01 3042 48
750 A	SHUN 1228	P01 3042 41
1000 A	SHUN 1229	P01 3042 42
1250 A	SHUN 1230	P01 3042 49
1500 A	SHUN 1231	P01 3042 43
2000 A	SHUN 1232	P01 3042 44
2500 A	SHUN 1233	P01 3042 45
3000 A	SHUN 1234	P01 3042 46
4000 A	SHUN 1235	P01 3042 47

▶ Customized products

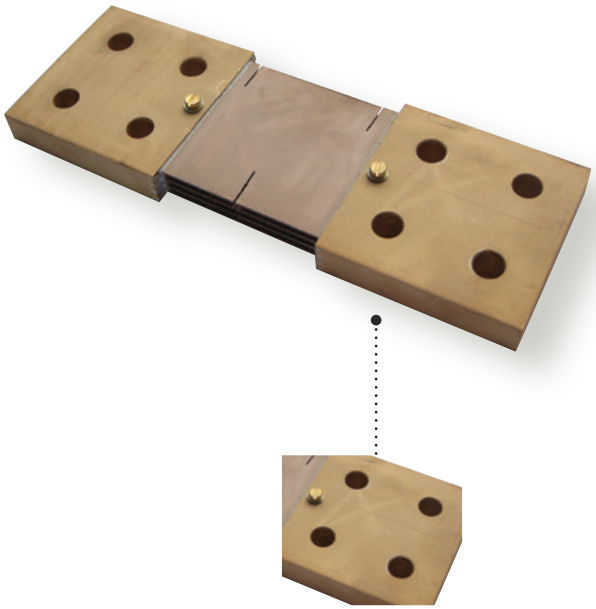
	Model	Voltage drop	Accuracy class	Current
Example	77-2	50 mV	Class 0.2	800 A

SHMI Range

Offering a vast range of industrial applications

PRODUCT ADVANTAGES

- Range with excellent **PERFORMANCE/PRICE** trade-off
- **A WIDE CHOICE** of voltage drops
- **COMPACT DESIGN** that respects accepted thermal dissipation requirements



Easy-to-connect brass plates

► General specifications

Accuracy class defined in the following domain:
Over the entire measurement range
For an ambient temperature of:
-10°C to +35°C (class 0.2)
-25°C to +40°C (class 0.5 and 1)
For a blade temperature of 80°C
For a shunt current ≤ 5 mA

Permitted rated calibres:
In = 1 A - 1.25 A - 1.5 A - 2 A - 2.5 A - 3 A - 4 A - 5 A - 6 A - 7.5 A
and their multiples or sub-multiples

Permitted overloads:
On average and in normal operating conditions

I nominal (In)	2 h	5 s class 0.2	5 s class 0.5 and 1
< 250 A	1.2 In	2 In	10 In
250 to 2000 A	1.2 In	2 In	5 In
> 2000 A	1.2 In	2 In	2 In

Voltage drops:
50 mV - 60 mV - 100 mV - 150 mV - 200 mV - 300 mV - 1 V

Compliance with standards:
Accuracy and influence factor:
IEC 60051-1 to 9
Preferred ratings and dimensions for 100 mV shunts:
NFC 42-151/152/153
Lead-free range: RoHS directive (2002/95/CE)

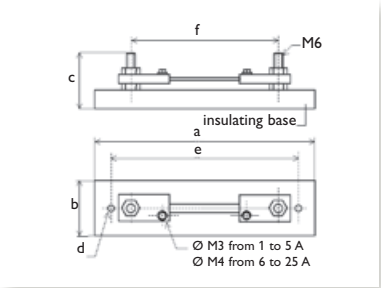
► Mounting accessories

Kit of screw connectors + lead for shunt	Reference
1 to 25 A range	2919 9901
30 to 75 A range	2919 9902
100 A range	2919 9903
125 to 200 A range	2919 9904
250 to 500 A range	2919 9905
600 A and 750 A range	2919 9906

SHMI Range

SHMI
SHMI 1 A to 25 A
screw connection

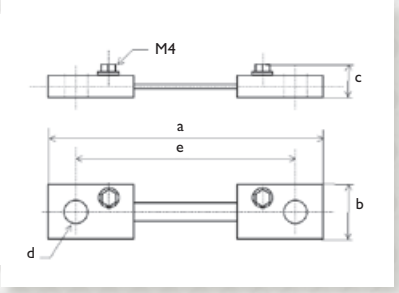
Voltage drop: 100 mV
Class 0.5 and 1



Current	Dimensions (mm) a	b	c	d	e	f
1 A	162	25	40	3.5	152	110
2 A	162	25	40	3.5	152	110
2.5 A	162	25	40	3.5	152	110
3 A	162	25	40	3.5	152	110
4 A	162	25	40	3.5	152	110
5 A	162	25	40	3.5	152	110
6 A	162	25	40	3.5	152	110
7.5 A	162	25	40	3.5	152	110
10 A	162	25	40	3.5	152	110
15 A	162	25	40	3.5	152	110
20 A	162	25	40	3.5	152	110
25 A	162	25	40	3.5	152	110

SHMI
30 A to 750 A
eye connection

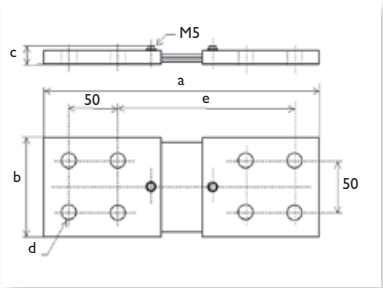
Voltage drop: 100 mV
Class 0.5 and 1



Current	Dimensions (mm) a	b	c	d	e
30 A	150	16	10	8.5	130
40 A	150	16	10	8.5	130
50 A	150	16	10	8.5	130
60 A	150	16	10	8.5	130
75 A	150	16	10	8.5	130
100 A	150	21	10	8.5	130
125 A	150	32	10	8.5	130
150 A	150	32	10	8.5	130
200 A	150	32	14	8.5	130
250 A	210	52	13	14.5	180
300 A	210	52	13	14.5	180
400 A	210	52	17	14.5	180
500 A	210	52	17	14.5	180
600 A	210	52	22	14.5	180
750 A	210	52	22	14.5	180

SHMI
SHMI 1,000 A to 6,000 A
busbar connection block

Voltage drop: 100 mV
Class 0.5 and 1



Current	Dimensions (mm) a	b	c	d	e
1000 A	290	100	20	14.5	190
1250 A	290	100	25	14.5	190
1500 A	290	100	25	14.5	190
2000 A	290	100	35	14.5	190
2500 A	290	100	45	14.5	190
3000 A	290	100	45	14.5	190
4000 A	330	150	45	16.5	230
5000 A	330	150	45	16.5	230
6000 A	330	150	45	16.5	230

TO ORDER

Current	Reference for 100 mV Class 0.5	Class 1
1 A	2901 0301	2901 0101
2 A	2901 0303	2901 0103
2.5 A	2901 0304	2901 0104
3 A	2901 0305	2901 0105
4 A	2901 0306	2901 0106
5 A	2901 0307	2901 0107
6 A	2901 0308	2901 0108
7.5 A	2901 0310	2901 0110
10 A	2901 0312	2901 0112
15 A	2901 0314	2901 0114
20 A	2901 0315	2901 0115
25 A	2901 0316	2901 0116

Current	Reference for 100 mV Class 0.5	Class 1
30 A	2901 0317	2901 0117
40 A	2901 0318	2901 0118
50 A	2901 0319	2901 0119
60 A	2901 0321	2901 0121
75 A	2901 0323	2901 0123
100 A	2901 0325	2901 0125
125 A	2901 0326	2901 0126
150 A	2901 0328	2901 0128
200 A	2901 0330	2901 0130
250 A	2901 0331	2901 0131
300 A	2901 0333	2901 0133
400 A	2901 0335	2901 0135
500 A	2901 0336	2901 0136
600 A	2901 0338	2901 0138
750 A	2901 0340	2901 0140

Current	Reference for 100 mV Class 0.5	Class 1
1000 A	2901 0361	2901 0161
1250 A	2901 0362	2901 0162
1500 A	2901 0363	2901 0163
2000 A	2901 0364	2901 0164
2500 A	2901 0365	2901 0165
3000 A	2901 0366	2901 0166
4000 A	2901 0368	2901 0168
5000 A	2901 0369	2901 0169
6000 A	2901 0370	2901 0170

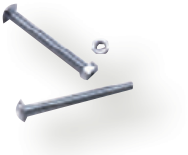
▶ Customized products

	Model	Voltage drop	Accuracy class	Current
Example	SHMI	50 mV	Class 0.2	3000 A

▶ Associated products

Mounting accessories

▶ page 147

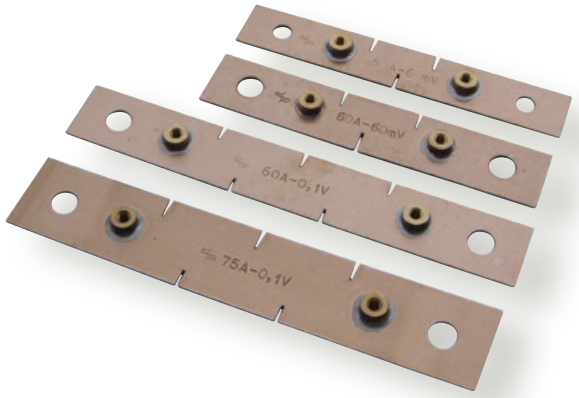


SHEL and SHMO Ranges

For simplified installation on low-power networks

PRODUCT ADVANTAGES

- **ECONOMY RANGE** for construction (SHEL) and for simplified installation (SHMO)
- **DIRECT CONNECTION** to measuring component (SHEL)
- **MODULAR CASING** for quick and easy mounting (SHMO)
- **COMPACT DESIGN** (SHEL)



General specifications

Accuracy class 1 defined in the following domain:
Over the entire measurement range
For an ambient temperature of -25°C to +40°C
For a blade temperature of 80°C
For a shunt current ≤ 5 mA

Permitted rated calibres:
In = 1 A - 1.25 A - 1.5 A - 2 A - 2.5 A - 3 A - 4 A - 5 A - 6 A - 7.5 A and their multiples or sub-multiples
Max. 300 A for SHEL and 60 A for SHMO

Permitted rated calibres:
50 mV - 60 mV - 100 mV

Permitted overloads:
On average and in normal operating conditions

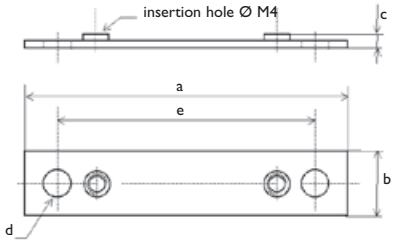
I nominal (In)	2 h	5 s
< 250 A	1.2 In	10 In
≥ 250 A	1.2 In	5 In

Compliance with standards:
Accuracy and influence factor: IEC 60051-1 to 9
Lead-free range: RoHS directive (2002/95/CE)

SHEL and SHMO Ranges

SHEL

Voltage drop: 100 mV Class 1



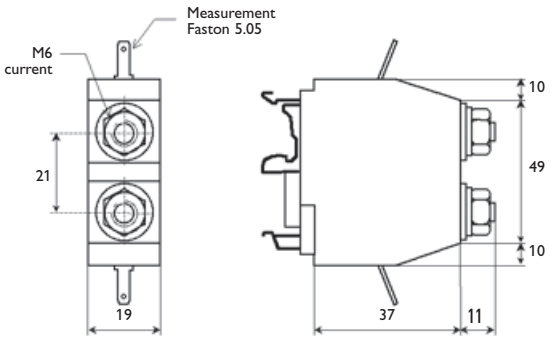
Current	Dimensions (mm) a	b	c	d	e
10 A	150	10	5	6.5	122
15 A	150	12	5	6.5	122
20 A	150	12	5	6.5	122
25 A	150	15	5	6.5	122
30 A	150	15	5	6.5	122
40 A	150	15	5	6.5	122
50 A	150	20	5	6.5	122
60 A	150	25	5	8.5	122
75 A	150	30	5	8.5	122
100 A	150	20	6	8.5	122
125 A	150	25	6	8.5	122
150 A	150	30	6	8.5	122
200 A	150	40	6	10.5	122
250 A	150	50	6	10.5	122
300 A	150	60	6	10.5	122

TO ORDER

Current	Reference for 100 mV Class 1
10 A	2901 0246
15 A	2901 0247
20 A	2901 0227
25 A	2901 0228
30 A	2901 0229
40 A	2901 0230
50 A	2901 0231
60 A	2901 0232
75 A	2901 0233
100 A	2901 0235
125 A	2901 0236
150 A	2901 0237
200 A	2901 0238
250 A	2901 0239
300 A	2901 0248

SHMO

Voltage drop: 100 mV Class 1



TO ORDER

Current	Reference for 100 mV Class 1
1 A	2925 0101
5 A	2925 0107
10 A	2925 0112
15 A	2925 0114
20 A	2925 0115
25 A	2925 0116
30 A	2925 0117
40 A	2925 0118
50 A	2925 0119
60 A	2925 0121

▶ Customized products

	Model	Voltage drop	Accuracy class	Current
Example	SHEL	50 mV	Class 1	80 A

Notes

Transducers

TRIAD 2 - programmable digital transducers

1, 2, 3 or 4 configurable analogue outputs / Class 0.2
1 Ethernet or RS485 digital output

Factory-programmed TRIAD 2
AC quantities
► page 158

TRIAD 2 programmable via TRIADJUST 2
AC quantities
► page 159

Vac Uac Iac P Q S F FP Tanφ Cosφ φ φU φV

MICAR 2 - programmable multi-function digital transducers

2 or 4 configurable analogue outputs / Class 0.2
2 or 4 alarm/pulse outputs
1 Ethernet or RS485 digital output

Factory-programmed MICAR 2
AC quantities
► page 174

MICAR 2 programmable via E.view+
AC quantities
► page 180

Vac Uac Iac P Q S F FP Cosφ kWh kVArh kVAh

C.A 3420 - universal digital transducer
1 configurable analogue input

DC quantities / Physical quantities
► page 182

Vdc Idc Ω T°

TSP 2 - self-powered analogue transducers
1 analogue output / Class 0.2

TSPU
Voltage measurement
► page 184

Vac Uac

TSPI
Current measurement
► page 184

Iac

Infos & advice

Transducers measure AC, DC or physical quantities and transmit them as a standard analogue signal (Vcc or mA).

FACTORY-PROGRAMMED OR USER-PROGRAMMABLE?

Factory-programmed

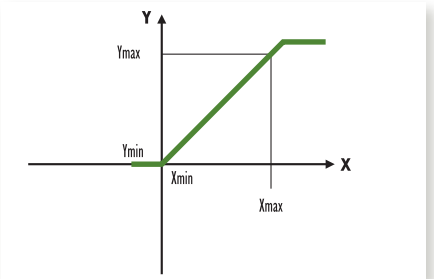
If the specifications of the measurements required are known, a **factory-programmed** transducer can be used.

User-programmable

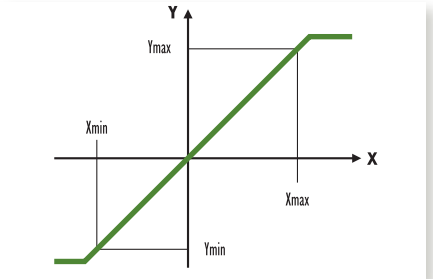
If the precise specifications of the measurements are not known, choose a **user-programmable** transducer. You can then program it accordingly when the specifications are known and you can modify the settings if these specifications change.

WHICH TRANSFER CURVES SHOULD YOU CHOOSE?

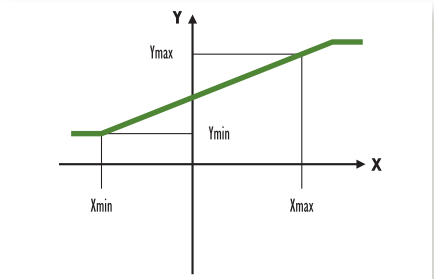
Linear



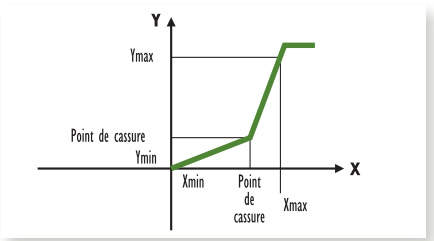
Linear without offset



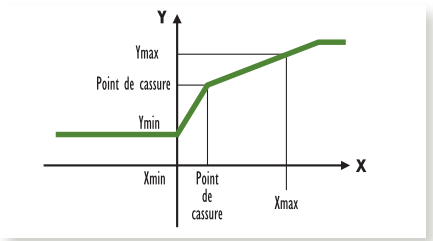
Linear with offset



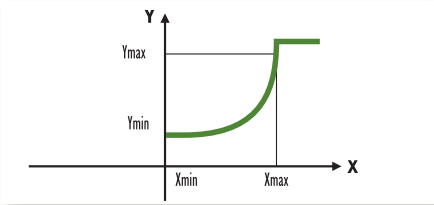
Linear with 2 extended slopes



Linear with 2 slopes



Quadratic



FOCUS

Accuracy class and IEC 688 standard

The IEC 688 standard defines the accuracy class as the limits of the intrinsic error expressed as a percentage of the output interval.
Example:
For a measurement range of 0 - 1,000 kW, an output interval of 16 mA (output 4-20 mA) and an accuracy class of 0.2, the intrinsic error is:

$$\frac{0.2}{100} \times 16 \text{ mA} = \pm 0.032 \text{ mA}$$

representing a measurement uncertainty of ±2 kW over the complete measurement range 0 - 1,000 kW.

Advantages of analogue outputs

- **Universality:** the nature of the output signal from the measurement transducer enables quick and easy connection to a wide range of instruments (recorders, controllers, calculators, analogue and digital panel meters, measurement relays, PLCs, RTUs, etc.).
- **Response time:** the response time of an analogue output enables real-time viewing of all electrical parameters (for example, SCADA application, dispatching, control and monitoring of industrial processes).
- **Resistance to disturbances:** analogue signals (current outputs in particular) are not significantly affected by electromagnetic disturbances. A single shielded-pair wire enables you to transmit the output signal over very long distances (several hundred meters without signal amplification).
- **Reliability:** analogue transducer technology offers the advantage of several decades of application and use, benefiting from wide experience in such varied fields as industry, building automation and electrical network supervision (dispatching).

Advantages of programmable transducers

The configuration software associated with transducers enables you to adapt transducer specifications to application needs at all times and stages of the application.

- **Reduction of stocks and maintenance costs**
  A programmable transducer can replace any other product as necessary, helping to reduce stocks for maintenance.
- **Quickly and easily replaceable products**
  Programmability makes it easy to replace products quickly, thus cutting maintenance time.
- **Adaptable to installation evolutions**
  The programmable transducer can be modified at all times, especially in the case of modification of initial specifications or information unavailable at the outset.

Advantages of digital outputs

- **Remote access for easy maintenance:** with digital outputs, it is possible to create a communicating network so that you can set the products' parameters remotely.
- **Remote meter-reading:** using the commands available in the ModBus mapping, a transducer can be operated via a digital supervision system and remote-read all the electrical quantities available per product on the same bus.
- **Extra functions:** the digital outputs on our transducers can be used to access functions which were previously unavailable, such as alarm, date-stamping or energy index functions.

Selection guide

	TSP 2		TRIAD 2	MICAR 2	C.A 3420
	► page 184		► page 158	► page 174	► page 182
					
	TSPU	**TSPI**			
Measurements					
Iac		•	•	•	
Vac	•		•	•	
Uac	•		•	•	
V_{earth}				•	
$I_{neutral}$				•	
Idc					•
Vdc					•
P			•	•	
Q			•	•	
S			•	•	
F			•	•	
PF			•	•	
Cosφ			•	•	
Tanφ			•		
φ			•		
φ (U' – U")			•		
T°					•
Ω					•
kWh				•	
kVArh				•	
kVAh				•	
Options					
Number of analogue outputs	1	1	4	4	1
RS485			•	•	
Ethernet			•	•	
Pulse output				•	
Alarm output				•	
Relay output			•	•	
Programmable			•	•	•
Plug-in versions					
Version Rack					
Self-powered	•	•	(1)	(1)	

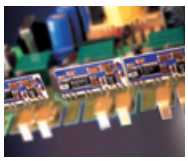
(1) By looping the input voltage

TRIAD 2 Range

Programmable digital transducers with 1 to 4 analogue outputs
Programmable accuracy class

PRODUCT ADVANTAGES

- Up to 4 **PROGRAMMABLE ANALOGUE OUTPUTS**
- **4 kV INSULATION**
- **CONFIGURABLE AND MODIFIABLE** using the TRIADJUST 2 software
- **ADJUSTABLE** accuracy within Class 0.1 as per IEC 60688
- **ADJUSTABLE RESPONSE TIME** down to 50 ms
- **DIGITAL OUTPUT** available as an **OPTION**



Multi-function, economical instrument with 4 functions in the same casing

Communication, Ethernet RS 485 or optical head

Accessibility and safety: large-dimension terminals Insulated circuits

Ergonomic: easy mounting on DIN rail or switchboard

► Main specifications

Quantities measured: 1, 2, 3, 4 to be chosen from I, V, U, F, FP, P, Q, S, cosφ, φ, φU, φV, tanφ
Configuration of TRIAD 2: in factory or by the user with the TRIADJUST 2 software
Accuracy (programmable): Class 0.1 / 0.15 / 0.2 /0.5 / 1
Current inputs: 1 A, 5 A and 10 A
Voltage inputs: 100 to 480 V (ph-ph) or 100 / √3 to 480 / √3 V (ph-N)
Transfer curves: linear, 2 slopes or quadratic
Output signals: ± 1 mA, ± 5 mA, ± 20 mA, ± 1 V, ± 10 V
Response time in Class 0.2: 200 ms
Operating frequency: 50 or 60 Hz
Auxiliary power supply with wide dynamic range: 80 to 265 V ac/dc or 19 to 58 V dc
Compliance with CE directive
Digital technology

TRIAD 2 Programmable model

Factory-programmable

- **The transducer delivered is ready to operate and can be connected to the electrical network in order to deliver output signals tailored for your installation.**
- To benefit from this, you simply need to know the exact specifications of your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase , 3 or 4 wires.
  - Type of electrical connections.
  - Number of electrical quantities to be measured: 1, 2, 3 or 4.
  - Precise measurement ranges of the input/output quantities to be measured.

Users can modify a factory configuration at any time with the TRIADJUST 2 software if the specifications of the electrical network change.

Programmable via TRIADJUST 2

- **With the TRIADJUST 2 software and one of the 3 communication modes available (Ethernet, RS485 or optical head) you can program all the parameters characterizing a TRIAD 2 transducer.**
- To do so, simply choose a model which suits your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase, 3 or 4 wires.
  - Number of analogue outputs required (1, 2 3 or 4).
  - Value of the auxiliary source.
- You are then free to configure the TRIAD 2 transducer delivered as you wish and to print out the stickers corresponding to the parameters programmed.

Environment and standards

EMC IMMUNITY (standard of reference: IEC 60688, IEC 61326-1, IEC 61000-6-5)	
Shock voltage as per IEC 61000-4-5	2 kV in differential mode 4 kV in common mode
Oscillating wave as per IEC 61000-4-12	1 kV in differential mode 2.5 kV in common mode
Fast electrical transients in bursts as per IEC 61000-4-4	2 kV on power supply 2 kV on inputs/outputs
Electrostatic discharge as per IEC 61000-4-2	8 kV in the air 6 kV in contact
EM radiated field as per IEC 61000-4-3	10 V/m (80 MHz to 3 GHz)
Voltage dips as per IEC 61000-4-11	30% reduction during 20 ms 60% reduction during 1 s
Voltage interruptions as per IEC 61000-4-11	100% reduction during 100 ms 100% reduction during 100 ms

EMC emissions	
Radiated and conducted	As per CISPR11
Climatic specifications (IEC 60068 2-1/2-2/2-30)	
Operating temperature	-10°C to +55°C
Storage temperature	-40°C to +70°C
Relative humidity	≤ 95% to 55°C
Safety specifications (IEC 61010-1)	
Installation category	3
Pollution level	2
Fire resistance	UL94, severity V0
Mechanical specifications (IEC 60068 2-6/2-27/2-29/2-32/2-63)	
Protection rating	IP 20
Mechanical shocks	IEC 60068-2-27
Vibrations	IEC 60068-2-6
Drop test with packaging	NF 0042-1

Mounting accessories

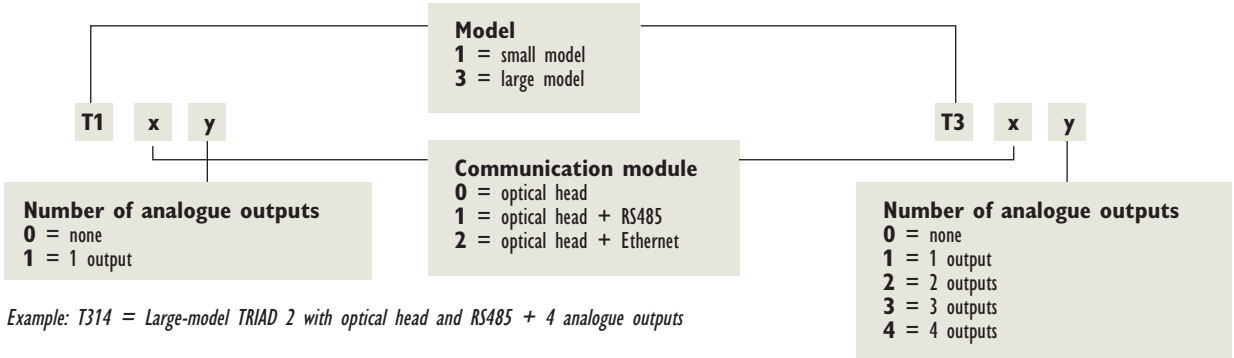
Model	Reference
Plate mounting for T1xy	ACCT 1007
Plate mounting for T3xy	ACCT 1006

Casing

Weight	320 g (T1xy) / 700 g (T3xy)
Mounting	DIN rail 43700 or plate mounting
Connection	Terminals with mobile stirrup clamp with screw for 4 single-wire 6 mm² conductors or 2 multi-wire 4 mm² conductors

Hardware identification

The TRIAD 2 T1xy and T3xy are fully configurable with the TRIADJUST 2 software which allows users to modify the characteristics of their products right up to the last minute.



Example: T314 = Large-model TRIAD 2 with optical head and RS485 + 4 analogue outputs

TRIAD 2 Range

Network	Function	T1xy model	T3xy model
Single-phase	V	•	•
	I	•	•
	F	•	•
	P	•	•
	Q	•	•
	S	•	•
	FP	•	•
	Tanφ	•	•
	Cosφ	•	•
	φ	•	•
Balanced 3-phase, 3 wires	U12, U23, U31	•	•
	I1, I2, I3	•	•
	F	•	•
	Pt	•	•
	Qt	•	•
	St	•	•
	FPt	•	•
	Tanφ	•	•
	Cosφt	•	•
	φt	•	•
	I1, I2, I3 signed	•	•
Balanced 3-phase, 4 wires	V1, V2, V3	•	•
	U12, U23, U31	•	•
	I1, I2, I3	•	•
	F	•	•
	P1, P2, P3, Pt	•	•
	Q1, Q2, Q3, Qt	•	•
	S1, S2, S3, St	•	•
	FP1, FP2, FP3, FPt	•	•
	Tanφ	•	•
	Cos (φ1, φ2, φ3, φt)	•	•
	φ1, φ2, φ3, φt	•	•
	I1, I2, I3 signed	•	•
Unbalanced 3-phase, 3/4 wires	V1, V2, V3		•
	U12, U23, U31		•
	I1, I2, I3		•
	F		•
	P1, P2, P3, Pt		•
	Q1, Q2, Q3, Qt		•
	S1, S2, S3, St		•
	FP1, FP2, FP3, FPt		•
	Tanφ		•
	Cos (φ1, φ2, φ3, φt)		•
	φ1, φ2, φ3, φt		•
	φ (U12/U23, U23/U31, U31/U12)		•
	φ (V1/V2, V2/V3, V3/V1)		•
	I1, I2, I3 signed		•
Split-phase	V1, V2		•
	U12		•
	I1, I2		•
	F		•
	P1, P2, Pt		•
	Q1, Q2, Qt		•
	S1, S2, St		•
	FP1, FP2, FPt		•
	Tanφ		•
	Cos (φ1, φ2, φt)		•
	φ1, φ2, φt		•
	φ (V1/V2)		•
	I1 signed, I2 signed		•

TRIAD 2
Programmable model

Electrical specifications

Voltage input		
Rated value	T1: from 57.7 Vac to 276 Vac max. T3: from 57.7 Vac to 480 Vac max.	
Frequency	50 Hz: 42.5...57.5 Hz 60 Hz: 51...69 Hz	
Max. measured voltage on primary	1,000 kV (ph-ph)	
Acceptable overloads	T1: 300 Vac permanent - 460 Vac / 10s T3: 520 Vac permanent - 800 Vac / 10s	
Consumption	< 0.2 A	
Input impedance	400 kΩ	
Current inputs		
Rated value	0 to 10 A max.	
Max. measured current on primary	40,000 A	
Acceptable overload	50 In / 1 s	
Consumption	< 0.15 VA	
Auxiliary power supply		
High level	80 / 265 Vac (50/60 Hz) – 110 to 375 Vdc	
Low level	19 / 58 Vdc	
Consumption	**High level** T1: 8.5 VA max. T3: 20 VA max.	**Low level** T1: 5 W max. T3: 10 W max.
Analogue outputs		
Rated values	**Current** ± 1 mA, ± 5 mA, ± 20 mA	**Voltage** ± 1 V, ± 10 V
Acceptable resistive load	15 V / Io (1)	≤ 1 kΩ
Acceptable capacitive load	0.1 µF	0.1 µF
Overrun	1.2 Io (1)	1.2 Uo (1)
Peak-peak residual wave	± 0.2% of Io (1)	± 0.2% of Uo (1)
Programmable response time	50 ms – 100 ms – 200 ms – 500 ms – 1 s	
Transfer curve	Linear, 2 slopes or quadratic	

(1) Io = output current, Uo = output voltage

Communication

	Optical head	Ethernet	RS485
Connection	USB (PC) Optical (product)	RJ45	2 wires Half-duplex
Protocol	MODBUS RTU mode	MODBUS / TCP RTU mode	MODBUS / JBUS RTU mode
Speed	38,400 baud	10 base T	2,400 to 115,200 baud
Parity	-	-	Even, odd or none
JBus addresses	-	-	1 to 247
Transmission length	2 m	100 m	1.2 km as EIA 485

Metrological specifications

Measurements	Accuracy class over measurement range (as per IEC 60688)				
	RT = 50 ms	RT = 100 ms	RT = 200 ms	RT = 500 ms	RT = 1s
V, U, I, F, P, Q, S, FP, Tanφ, Cosφ, φ, φU, φV	± 1%	± 0.5%	± 0.2%	± 0.15%	± 0.1%

* RT: Response time for F = 50 Hz

** Phase angle between voltages

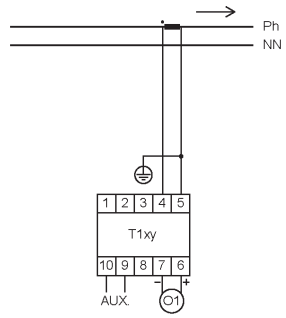
TRIAD 2 Range

Electrical connections

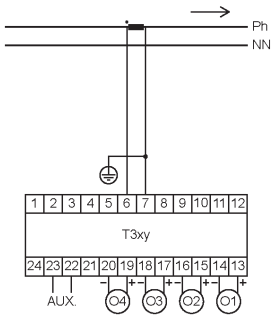
Single-phase network

I1, F:

TD201

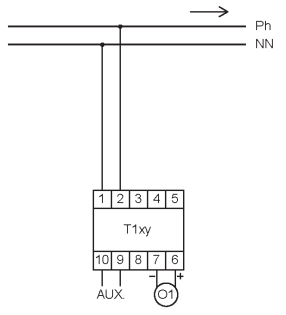


TD202

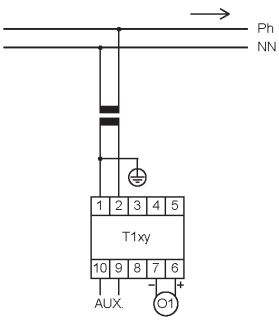


V1, F:

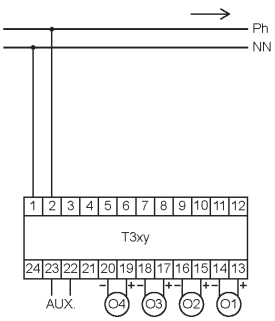
TD203



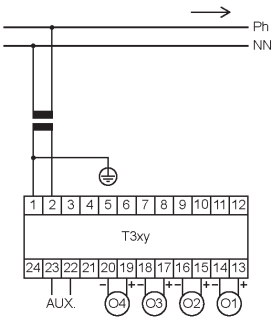
TD204



TD205

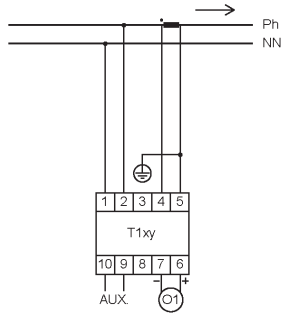


TD206

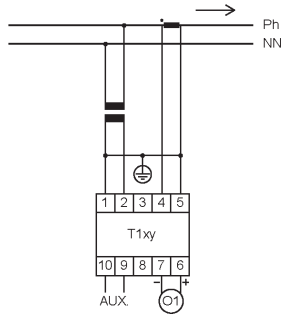


V1, I1, I1 signed, P1, Q1, S1, FP1, F, TANφ, Cosφ1, φ1:

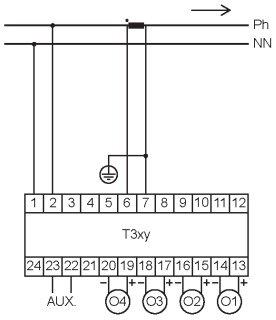
TD207



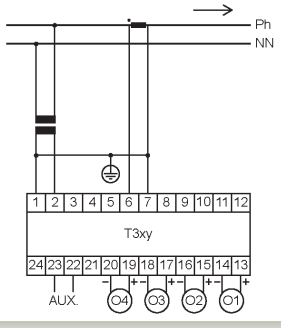
TD208



TD209



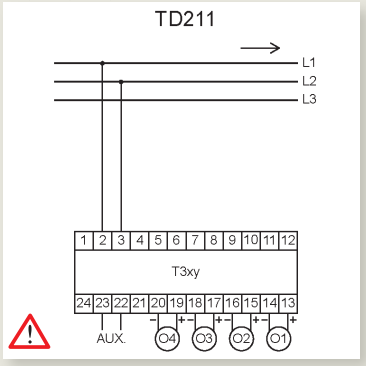
TD210



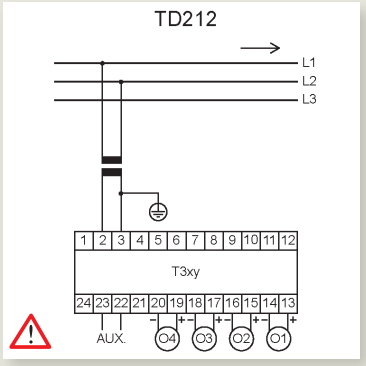
Balanced 3-phase, 3-wire network

U12, U23, U31, F:

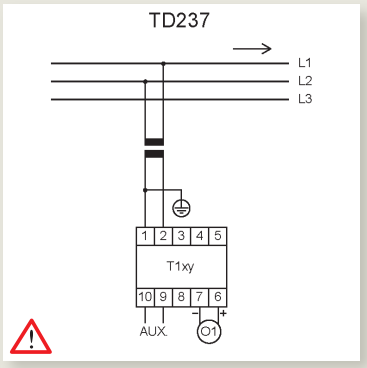
TD211



TD212

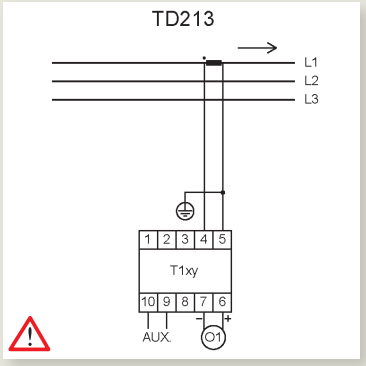


TD237

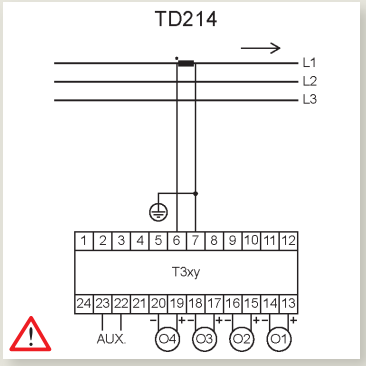


I1, I2, I3, F:

TD213

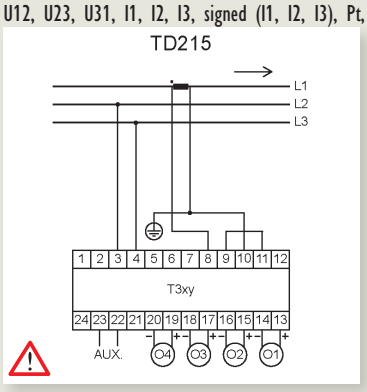


TD214

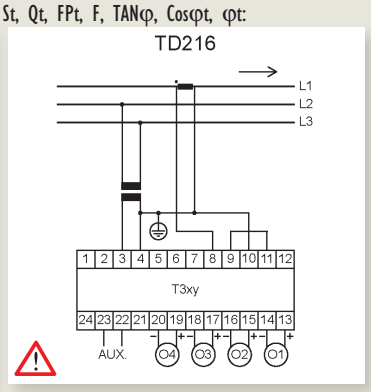


U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), Pt, St, Qt, FPt, F, TANφ, Cosφt, φt:

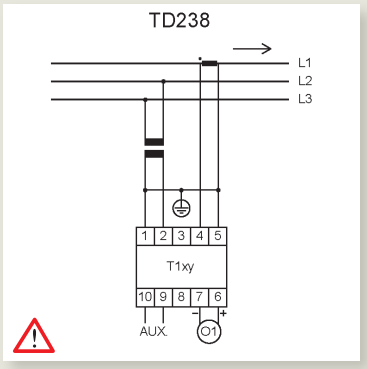
TD215



TD216



TD238



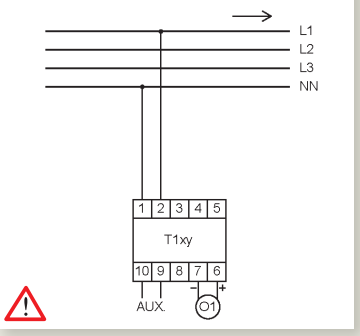
Phase rotation authorized

TRIAD 2 Range

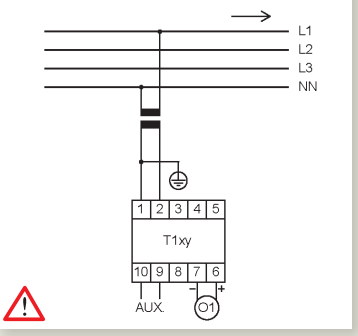
Balanced 3-phase, 4-wire network

V1, V2, V3, U12, U23, U31 F:

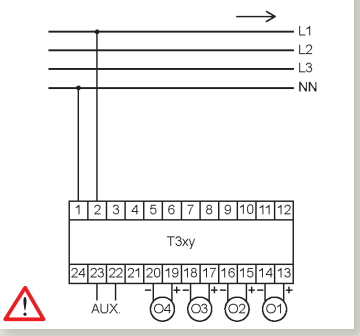
TD217



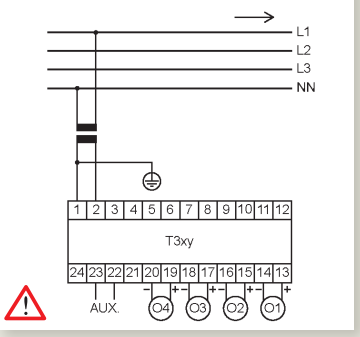
TD218



TD219

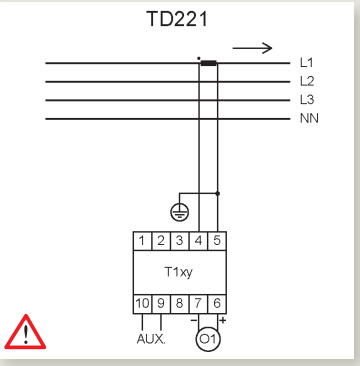


TD220

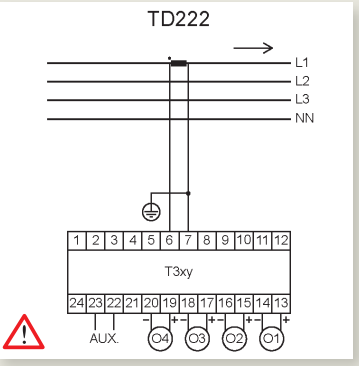


I1, I2, I3, F:

TD221



TD222

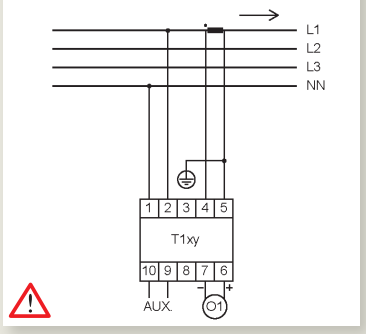


Phase rotation authorized

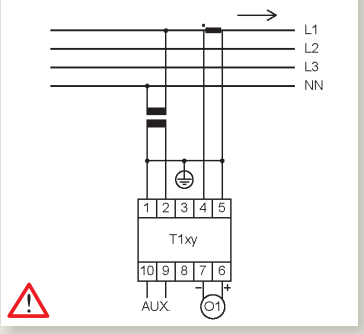
Balanced 3-phase, 4-wire network (continued)

V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt:

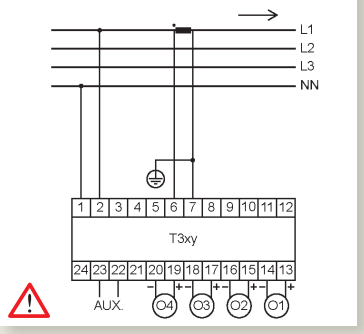
TD223



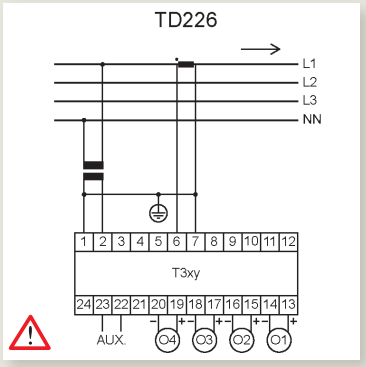
TD224



TD225



TD226

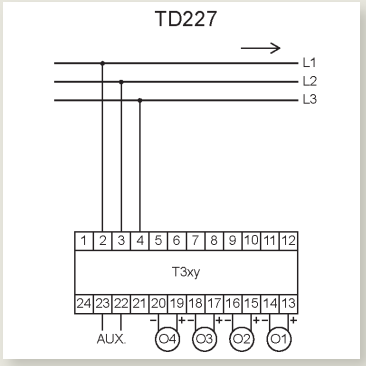


Phase rotation authorized

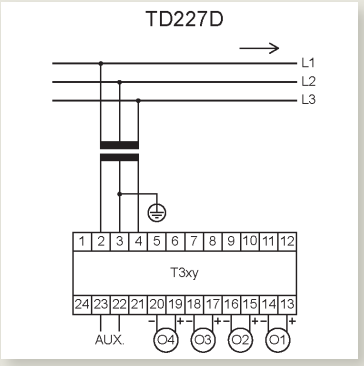
Unbalanced 3-phase, 3-wire network

U12, U23, U31, F, Angle (U12/U23, U23/U31, U31/U12):

TD227

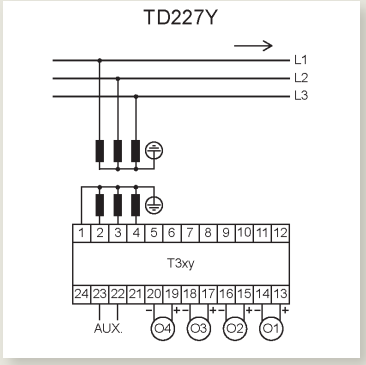


TD227D



V1, V2, V3, U12, U23, U31, F,
Angle (V1/V2, V2/V3, V3/V1),
Angle (U12/U23, U23/U31, U31/U12):

TD227Y

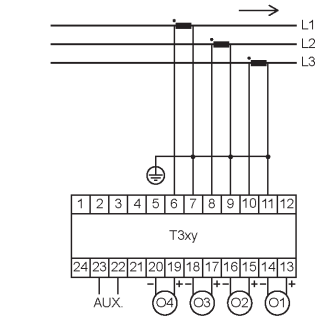


TRIAD 2 Range

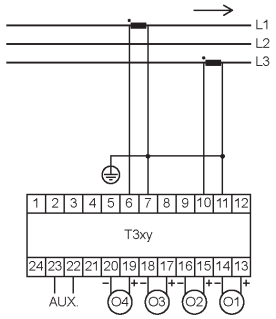
Unbalanced 3-phase, 3-wire network (continued)

I1, I2, I3, F:

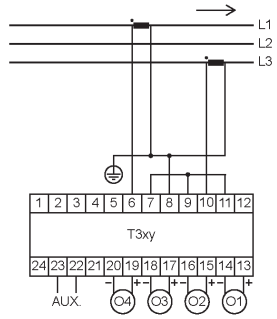
TD228



TD229

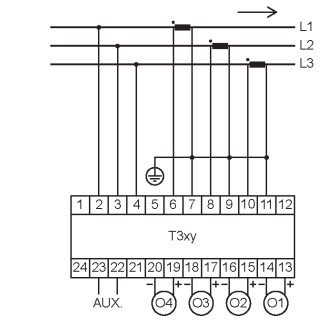


TD230

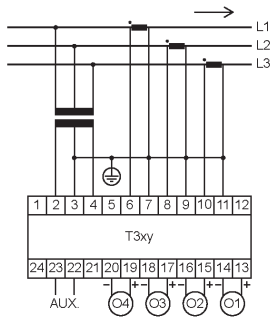


U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), Pt, St, Qt, FPt, F, TANφ, Cosφt, φt, Angle (U12/U23, U23/U31, U31/U12):

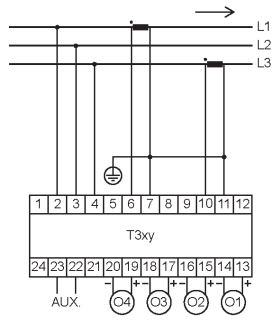
TD231



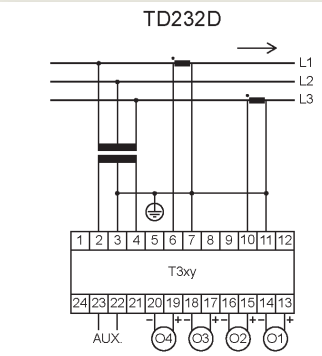
TD231D



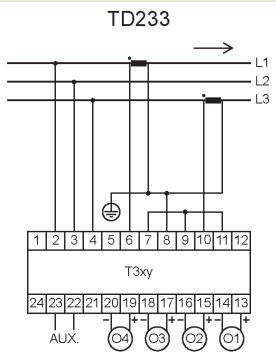
TD232



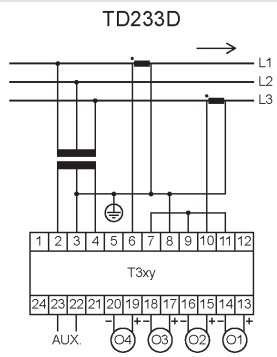
TD232D



TD233

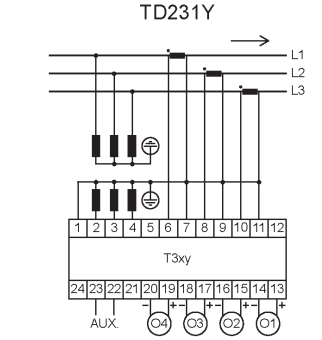


TD233D

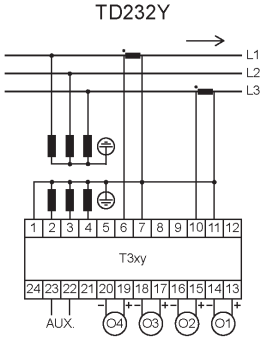


V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

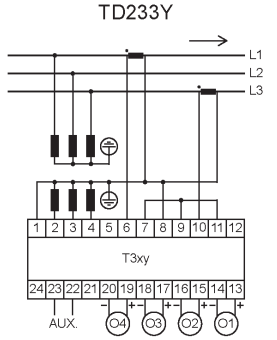
TD231Y



TD232Y



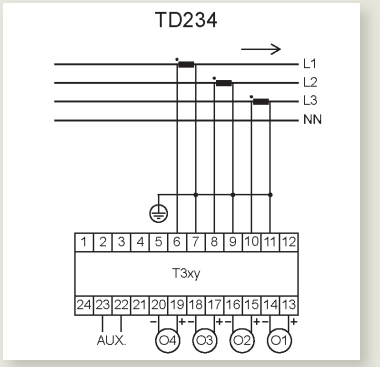
TD233Y



Unbalanced 3-phase, 4-wire network

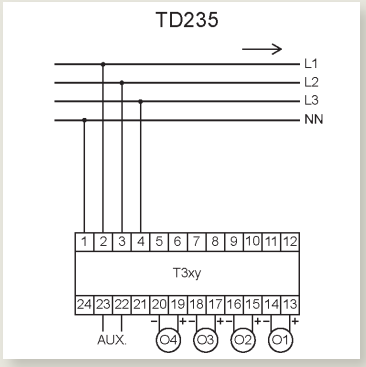
I1, I2, I3, F:

TD234

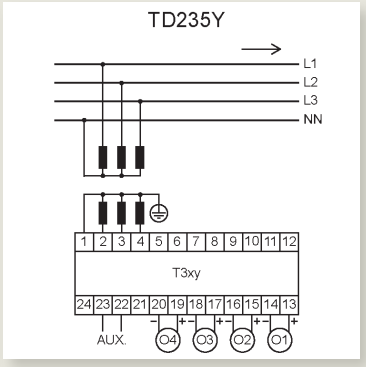


V1, V2, V3, U12, U23, U31, F, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD235

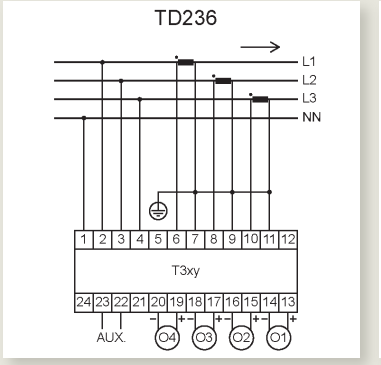


TD235Y

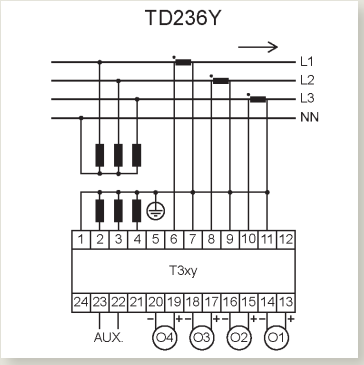


V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt
Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD236



TD236Y

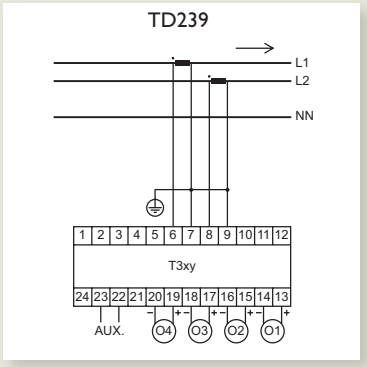


TRIAD 2 Range

Split-phase

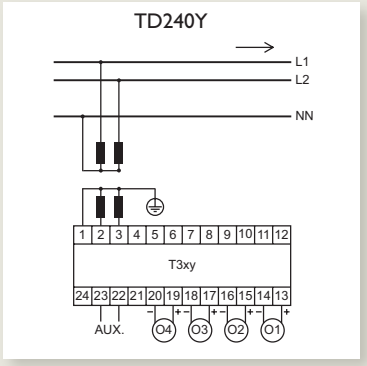
I1, I2, F:

TD239

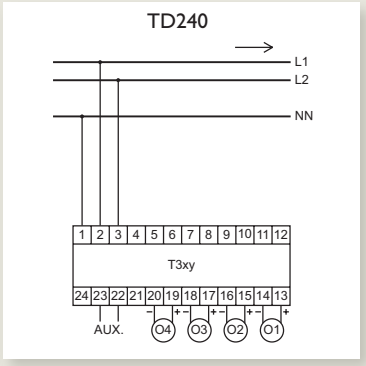


V1, V2, U12, F, Angle (V1/V2) rad, Angle (V1/V2) deg:

TD240Y

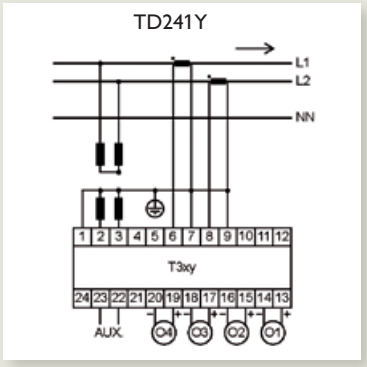


TD240

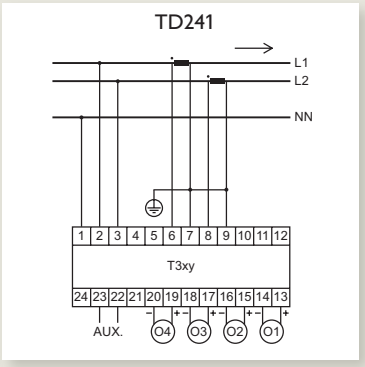


V1, V2, U12, I1, I2, P1, P2, Pt, Q1, Q2, Qt, S1, S2, St, FP1, FP2, FPt, F, tan φ, Angle (V1/V2) rad, Angle (V1/V2) deg, cos φ1, cos φ2, cosφt, φ1 Fonda rad, φ2 Fonda rad, φt Fonda rad, φ1 Fonda. deg, φ2 Fonda. deg, φt Fonda. deg, Angle V1/V2 Fonda deg, I1 (signed), I2 (signed):

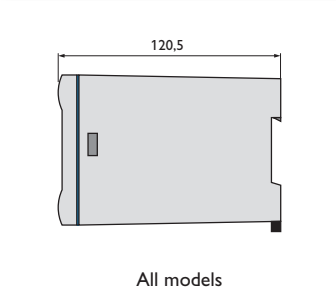
TD241Y



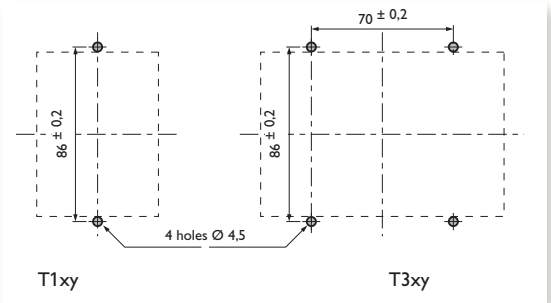
TD241

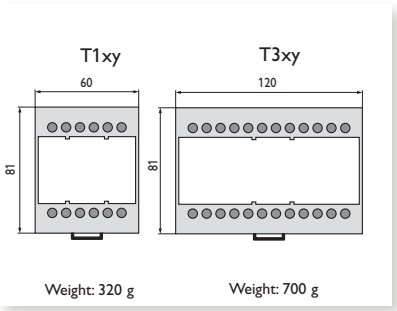


Dimensions (in mm)

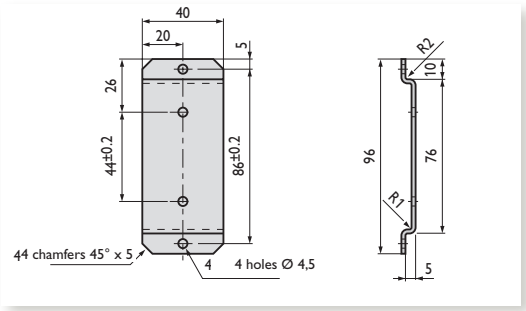


Panel drilling diagram for plate mounting





Accessory for plate mounting with screw (option)



TRIAD 2 Range

TRIAD 2 programmable via TRIADJUST 2

TO ORDER

T1 – SMALL MODEL (60 x 81 x 120.5 mm)

			Without tropicalization	With tropicalization
			Number of output	Number of output
Link	Output	Supply	1	1
Optical	± 20 mA	80-265 V AC/DC	P01380001	P01380002
		19-58 V DC	P01380003	P01380004
	± 10 V	80-265 V AC/DC	P01380005	P01380006
		19-58 V DC	P01380007	P01380008

T3 – LARGE MODEL (120 x 81 x 120.5 mm)

			Without tropicalization				With tropicalization			
			Number of output(s)				Number of output(s)			
Link	Output	Supply	1	2	3	4	1	2	3	4
Optical	± 20 mA	80-265 V AC/DC	P01380101	P01380103	P01380105	P01380107	P01380102	P01380104	P01380106	P01380108
		19-58 V DC	P01380109	P01380111	P01380113	P01380115	P01380110	P01380112	P01380114	P01380116
	± 10 V	80-265 V AC/DC	P01380117	P01380119	P01380121	P01380123	P01380118	P01380120	P01380122	P01380124
		19-58 V DC	P01380125	P01380127	P01380129	P01380131	P01380126	P01380128	P01380130	P01380132

TRIAD 2 factory-programmable

1 Model - Frequency
T1: small model – 1 analogue output
T3: large model – 1 to 4 analogue output(s)

0: 50 Hz
1: 60 Hz

2 Network
0: Single-phase
1: Balanced 3-phase, 3 wires
2: Balanced 3-phase, 4 wires
3: Unbalanced 3-phase, 3 wires
4: Unbalanced 3-phase, 4 wires
5: Split-phase

3 Communication - Connection
0: Without
1: RS485
2: Ethernet
Indicate the diagram number. E.g. TD204

4 Supply
0: 80-265 V AC/DC
1: 19-58 V DC

5 Tropicalization
0: Without
1: With

6 Inputs
Indicate direct voltage to be measured or the VT ratio
Indicate direct current to be measured or the CT ratio

7 Number of analogue outputs
0: Without (Choice of a minimum communication)
1: 1 output
2: 2 outputs (T3 model only)
3: 3 outputs (T3 model only)
4: 4 outputs (T3 model only)

8 Analogue outputs
Indicate for each output:

a- Quantity to be measured
b- Transfer curve
c- Input signal: Min – Breaking point - Max
d- Input unity
e- Output signal: Min – Breaking point - Max

9 Analogue output calibres
0: -20 mA to +20 mA
1: -5 mA to +5 mA
2: -1 mA to +1 mA
3: -10 V to +10 V
4: -1 V to +1 V

To simplify the procedure when ordering you can send us the form on page 237.

Factory-programmed TRIAD 2: order form

1 - Model / Hz

☐ T1 or ☐ T3
☐ 50 Hz or ☐ 60 Hz

2 - Network

☐ Single-phase
☐ 3-wire balanced three-phase
☐ 4-wire balanced three-phase
☐ 3-wire unbalanced three-phase
☐ 4-wire unbalanced three-phase
☐ Split-phase

3 - Communication / Connection

☐ Ethernet or ☐ RS485

Connection diagram: TD ☐☐☐☐ cf: p162 to p168

4 - Power supply

☐ 80 to 265 Vac (50/60 Hz) / 110 to 375 Vdc or ☐ 19 to 58 Vdc

5 - Tropicalization

☐ With ☐ Without

6 - Inputs

Current

With current transformer or Direct

Primary / Secondary: ____ / ____ A

Direct: ____ A

Voltage

With voltage transformer or Direct

Primary / Secondary: ____ / ____ V

Direct: ____ V

☐ Phase-phase ☐ Phase-neutral (√3)

Available quantities

V1 V2 V3 | U12 U23 U31 | I1 I2 I3 | F | P1 P2 P3 Pt | Q1 Q2 Q3 Qt | S1 S2 S3 St

FP1 FP2 FP3 FPt | TANφ | COSφ1 COSφ2 COSφ3 COSφt | φ1 φ2 φ3 φt

φU12/23 φU23/31 φU31/12 | V1/2 V2/3 V3/1 | I1 I2 I3 signed

7 - Number of analogue outputs

☐ 0: Without (Choice of a minimum communication)
☐ 1: 1 output
☐ 2: 2 outputs (T3 model only)
☐ 3: 3 outputs (T3 model only)
☐ 4: 4 outputs (T3 model only)

8 / 9 - Analogue outputs calibres

Output 1

Quantity and measurement range (x)

☐ Indicate quantity to be measured

Min ____ breaking point ____ Max ____ Unit [1] ____

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min ____ Breaking point ____ Max ____ ☐ mA ☐ V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%:	1 s	0.8 s
☐ 0.15%:	0.5 s	0.4 s
☐ 0.2%:	0.2 s	0.16 s
☐ 0.3%:	100 ms	80 ms
☐ 1%:	50 ms	40 ms

Output 2

Quantity and measurement range (x)

☐ Indicate quantity to be measured

Min ____ breaking point ____ Max ____ Unit [1] ____

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min ____ Breaking point ____ Max ____ ☐ mA ☐ V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%:	1 s	0.8 s
☐ 0.15%:	0.5 s	0.4 s
☐ 0.2%:	0.2 s	0.16 s
☐ 0.3%:	100 ms	80 ms
☐ 1%:	50 ms	40 ms

Output 3

Quantity and measurement range (x)

☐ Indicate quantity to be measured

Min ____ breaking point ____ Max ____ Unit [1] ____

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min ____ Breaking point ____ Max ____ ☐ mA ☐ V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%:	1 s	0.8 s
☐ 0.15%:	0.5 s	0.4 s
☐ 0.2%:	0.2 s	0.16 s
☐ 0.3%:	100 ms	80 ms
☐ 1%:	50 ms	40 ms

Output 4

Quantity and measurement range (x)

☐ Indicate quantity to be measured

Min ____ breaking point ____ Max ____ Unit [1] ____

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min ____ Breaking point ____ Max ____ ☐ mA ☐ V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%:	1 s	0.8 s
☐ 0.15%:	0.5 s	0.4 s
☐ 0.2%:	0.2 s	0.16 s
☐ 0.3%:	100 ms	80 ms
☐ 1%:	50 ms	40 ms

[1] Please indicate the unit of the measurement range, e.g. W, kW or MW

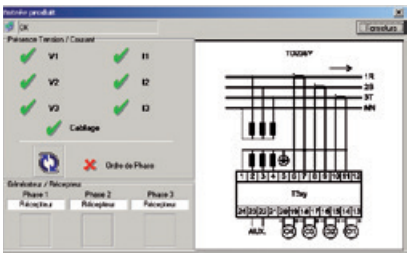
TRIADJUST 2 software

Designed for quick configuration and display of all the parameters of your TRIAD 2 transducers

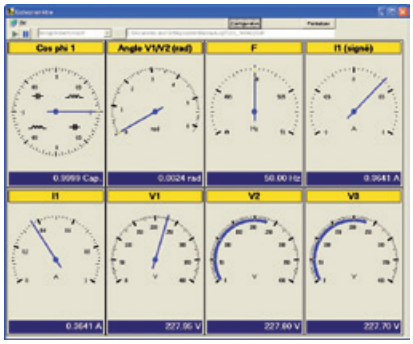
PRODUCT ADVANTAGES

- **CONFIGURATION** via **OPTICAL HEAD, ETHERNET** or **RS485**
- **ACCESS** to **ALL** the **TRIAD 2 PARAMETERS**
- **DIAGNOSIS** of the **INSTALLATION**
- **LABEL PRINTING** on **ALL TYPES OF LASER PRINTERS**

Configuration
- Inputs / Outputs
- Communication
- Connection diagram
- Accuracy class
- Set-up function protected by password



Diagnosis
- Voltage inputs
- Current inputs
- Cabling
- Phase order
- Analogue outputs
- Fresnel



Display
- Instantaneous quantities (in digital or analogue form)

Recording
- In real time in exported file

► Description

The **TRIADJUST 2** software allows quick, unlimited programming of all your TRIAD 2's parameters.

Using a PC and the optical lead supplied in each kit, connect your product's auxiliary power supply to dialogue with total security. Depending on your TRIAD 2's configuration, remote communication is possible via RS485 or Ethernet.
In the Windows™ environment, initialize or simply modify the quantities measured, the measurement ranges and the analogue outputs on the transducers installed.
TRIADJUST 2 also offers other functions such as **DIAGNOSIS** of your network, instantaneous **DISPLAY** of the electrical quantities and REAL-TIME **RECORDING** of the measurements in an exported file.

You can also print labels indicating the configurations and connections of your products.

► Minimum configuration

Platform: PC
Operating system: Windows 2000 or XP
Processor: Pentium-compatible
RAM: 128 MB
Hard disk: 40 GB
Drive: CD-ROM
Communication port:
Local: USB 1.1 minimum
Remote: RS485 and/or Ethernet

KIT TRIADJUST 2

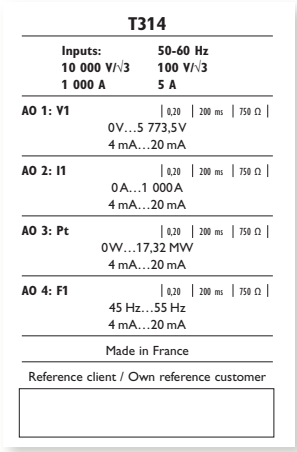
The **TRIADJUST 2 configuration kit** comprises:
- The TRIADJUST 2 software
- An optical / USB lead
- 30 sheets of blank labels
- A 230 x 185 x 45 mm carrying case

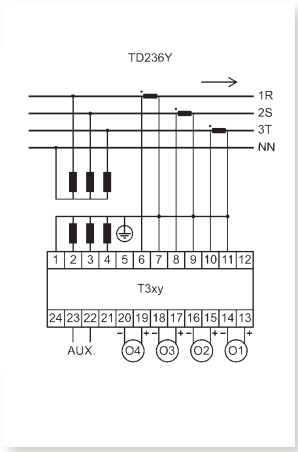
TRIADJUST 2 "PREMIER"

This module is a **complete tool** designed for distributors or any user needing to program a large number of transducers
The TRIADJUST 2 "PREMIER" configuration workstation comprises:
- The TRIADJUST 2 software
- An optical / USB lead
- A benchtop power-supply base
- 210 sheets of blank labels
- A 500 x 400 x 270 mm carrying case

Labels common to both kits

A sheet contains two labels, one for the configuration of the inputs/outputs and the other for the programmed connection diagram. The labels can be printed on all types of laser printers.





TO ORDER

Model	Reference
TRIADJUST 2 kit	P01380410
TRIADJUST 2 "PREMIER" workstation	P01380420
Accessories	
Set of 30 sheets of blank labels	P01380400
Optical/USB lead	P01330403

THE TRIADJUST 2 SOFTWARE ALONE CAN BE DOWNLOADED FREE OF CHARGE from the support area of the www.enerdis.com website

Associated product

TRIAD 2 programmable with TRIADJUST 2

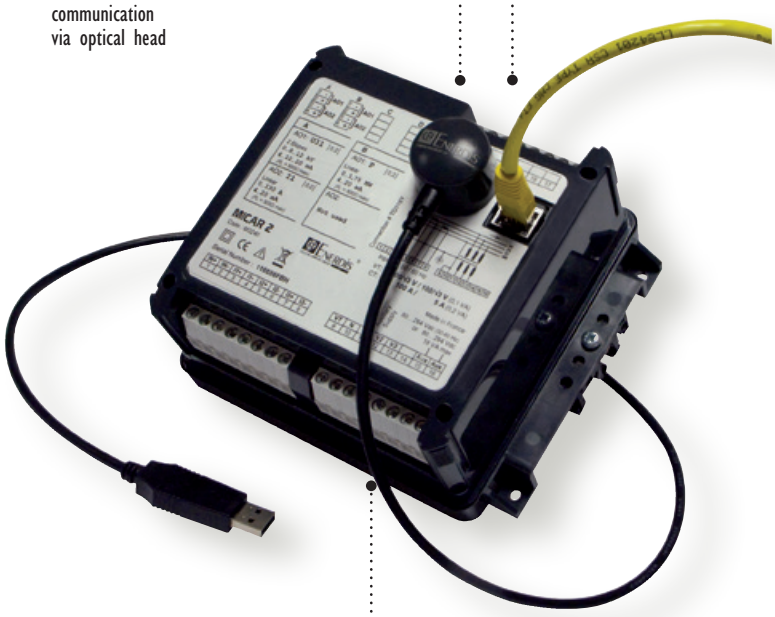
► page 159

MICAR 2 Range

Multi-function digital transducers
2 or 4 analogue outputs / Class 0.2

Local communication via optical head

Remote communication via Ethernet network



Simplified connection with screw-on terminal strip

PRODUCT ADVANTAGES

- **CLASS 0.2** Insulation 4 kV
- Up to 4 **CONFIGURABLE ANALOGUE OUTPUTS**
- Option of 2 or 4 **ON-OFF** outputs
- **COMMUNICATION** and programming via optical head or remotely via Ethernet network or RS485 output
- **ELECTRICAL NETWORK SUPERVISION** and display of the energy values, harmonics and THD using the **E.view+** software

General specifications

Quantities measured:
Choice of 1, 2, 3 or 4 among 32 electrical quantities
Configuration: in factory or by user with the **E.view+** software
Accuracy: Class 0.2
Current inputs: 1 A and 5 A
Voltage inputs: 100 to 400 V (ph-ph) or 100 / √3 to 400 / √3 V (ph-N)
Transfer curves: linear, 2 slopes, quadratic
Output signal: configurable between - 20 mA and + 20 mA
Response time: 350 ms
Operating frequency: 50 or 60 Hz
Auxiliary source with wide dynamic range: 80 to 264 V ac/dc or 19 to 57 Vdc
Compliance with CE directive

Electrical specifications

Voltage inputs	
Rated value	100 V ≤ Un ≤ 400 V (ph-ph) 57.7 ≤ Vn ≤ 230 V (ph-N)
Frequency	50/60 Hz
Max. phase-to-phase voltage measured	650 kV (ph-ph)
Acceptable overvoltage	800 V for 24 hours. 552 V permanent
Consumption	< 0.2 VA
Input impedance	2 MΩ
Current inputs	
Rated value (In)	1 A and 5 A
Max. current measured on primary	25,000 A
Acceptable overload	6.5 A permanent, 250 A for 1 second, 5 times every 5 minutes
Consumption	< 0.15 VA
Auxiliary power supply	
High level (standard)	80 to 265 Vac / 80 to 264 Vdc (< 15 VA)
Low level (option)	19.2 to 57 Vdc
Pulse outputs or alarm relays	
Type	static relay
Operating voltage	24 to 110 Vdc ± 20% 24 to 115 Vac –10% +15%
Max. current	100 mA
Compliance with standard	IEC 62053-31
Analogue output	
Scale	Configurable between –20 mA and +20 mA
Acceptable load	500 Ω, 10 V/I output
Typical response time	350 ms
RS 485 output	
Connection	2 wires, half-duplex
Protocol	ModBus / JBus RTU mode
Speed (configurable)	2,400 – 4,800 - 9,600 – 19,200 – 38,400
Parity	even, odd or none
JBus addresses	1 to 247
Ethernet output	
Type	RJ45 – 8-pin
Protocol	ModBus/TCP
Speed (configurable)	Compatible with 10baseT

MICAR 2 Range

Metrological specifications

Analogue outputs

Type	Conditions	Accuracy class
-20...+20 mA	Measurement of I, U, V, P, S, FP and F	Class 0.2 according to IEC 60688
	Measurement of Q	Class 0.5 according to IEC 60688

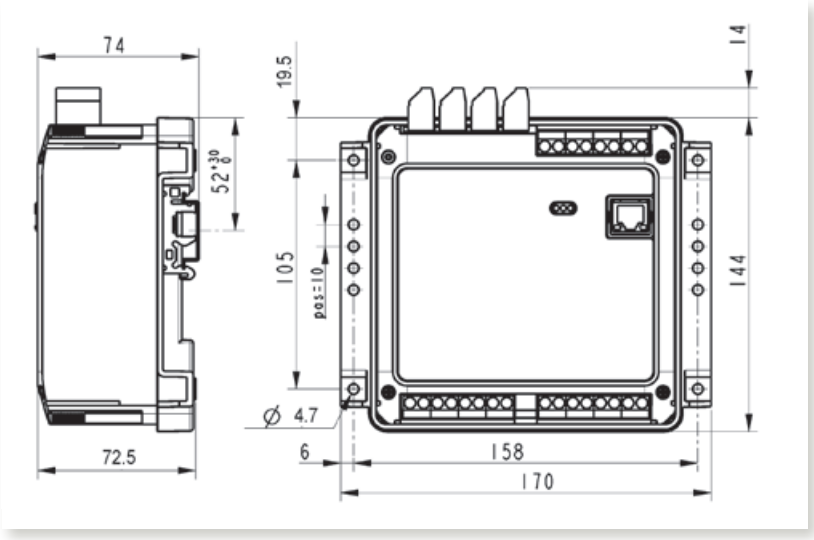
Digital communication output

Standard quantity	Conditions	Accuracy class
V	V between 10% and 120% of Vn(1)	±0.2% of V ±0.02% of Vn
U	U between 10% and 120% of Un(2)	±0.2% of U ±0.02% of Un
I	I between 5% and 130% of In	±0.2% of I ±0.02% of In
F	F between 42.5 Hz and 69 Hz	±0.1 Hz
P	FP between 0.5 inductive and 0.8 capacitive • U between 99% and 101% of Un(2) • I between 5% and 130% of In	±0.2% of P ±0.02% of Pn
Q	FP between 0.5 inductive and –0.5 capacitive • U between 99% and 101% of Un(2) • I between 5% and 130% of In	±0.5% of Q ±0.05% of Qn
S	U between 99% and 101% of Un(2) • I between 5% and 130% of In	±0.2% of S ±0.02% of Sn
FP, Cosφ	FP between 0.5 inductive and 0.5 capacitive * U between 99% and 101% of Un(2) * I between 5% and 130% of In	±0.02 counts

(1) Vn from 57.7 V to 230 V (2) Un from 100 V to 400 V

Special quantity	Accuracy class
Active energy	Class 0.5s according to IEC 62053-22
Reactive energy	Class 2 according to IEC 62053-23
Apparent energy	±0.5%
THD-I, THD-V and THD-U	±0.5 counts
Harmonics order by order on U, V and I	±0.5 counts

Dimensions



Environmental specifications

Climate specifications	
Operating temperature	-10°C to +55°C
Operating humidity	95% at 40°C
Storage temperature	-25°C to +70°C
Safety specifications	
Degree of pollution	2
Behaviour in fire	UL94, severity V1
Installation category	3
Mechanical specifications	
Protection rating	IP51 on front panel and IP20 on rear panel
Mechanical shocks	IEC 61010-1
Vibrations	IEC 60068-2-6 (method A)
Free fall with packaging	NF H 0042-1
Electromagnetic compatibility	
Generic standard	IEC 61326-1

Mounting accessories

Weight	700 g
Mounting	DIN 43700 rail or platen
Connection	Screw terminals for 6 mm² rigid or flexible wires on current measurement inputs and 2.5 mm² for the other accesses

Functions

Measurement	Analogue output	On-off output: Alarm relay	On-off output: Pulse output	Communication output	Display with E.view+
V1, V2, V3, Vearth	•	•		•	•
U12, U23, U31	•	•		•	•
I1, I2, I3, In	•	•		•	•
P1, P2, P3	•			•	•
Pt	•	•		•	•
Q1, Q2, Q3	•			•	•
Qt	•	•		•	•
S1, S2, S3	•			•	•
St	•	•		•	•
FP1, FP2, FP3	•			•	•
FPt	•	•		•	•
Cosφ1, Cosφ2, Cosφ3,	•			•	•
Cosφt	•	•		•	•
Frequency	•	•		•	•
Crest factor V1, V2, V3				•	•
Crest factor I1, I2, I3				•	•
Unbalance U				•	•
Harmonics: V1, V2, V3, U12, U23, U31, I1, I2, I3				•	•
THD: V1, V2, U12, U23, U31, I1, I3				•	•
Active energy: receiver, generator			•	•	•
Reactive energy: Qcad1, Qcad2, Qcad3, Qcad4			•	•	•
Apparent energy: receiver, generator			•	•	•

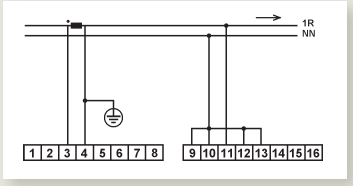
MICAR 2 Range

Electrical connections

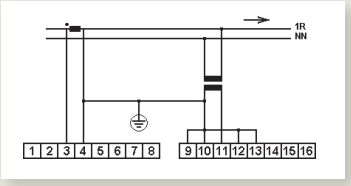
Configurations for single-phase networks

I1, V1, P1, S1, Q1, FP1, Cosφ1, F:

TD301 configuration



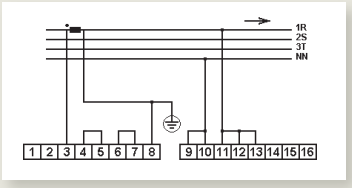
TD302 configuration



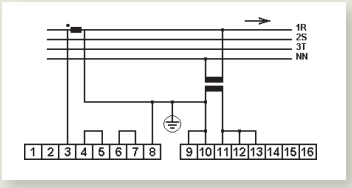
Balanced 3-phase network with 4 wires

I1, I2, I3, V1, V2, V3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, Fp2, Fp3, FPt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F:

TD303 configuration



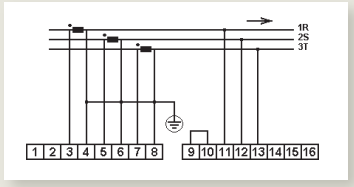
TD304 configuration



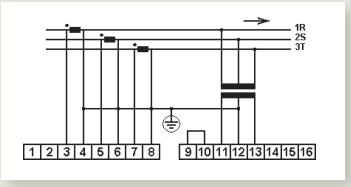
Unbalanced 3-phase network with 3 wires

I1, I2, I3, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F:

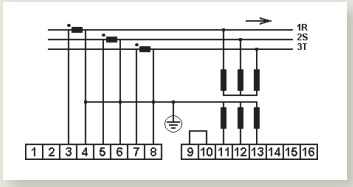
TD320 configuration



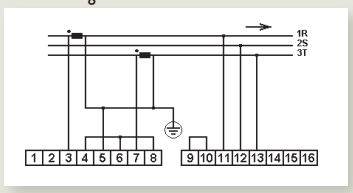
TD320D configuration



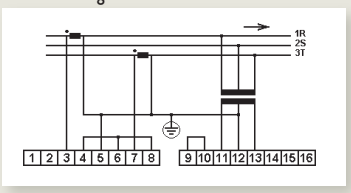
TD320Y configuration



TD324 configuration

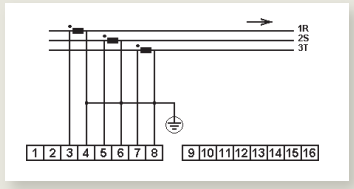


TD324D configuration

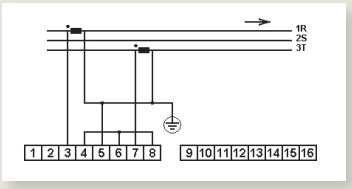


I1, I2, I3:

TD322 configuration

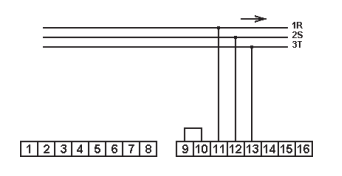


TD323 configuration

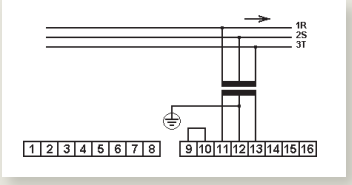


U12, U23, U31:

TD321 configuration



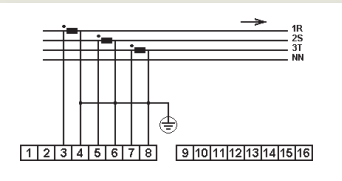
TD321D configuration



Unbalanced 3-phase network with 4 wires

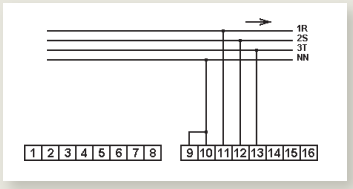
I1, I2, I3:

TD314 configuration

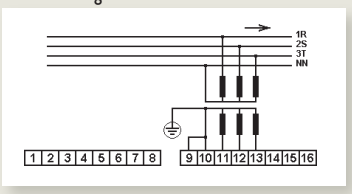


V1, V2, V3, U12, U23, U31, F:

TD317 configuration

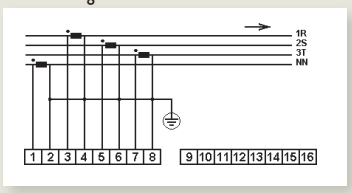


TD317Y configuration



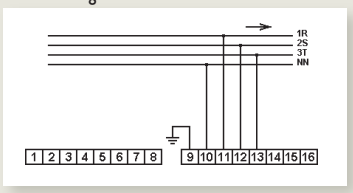
I1, I2, I3, Ineutral:

TD334 configuration

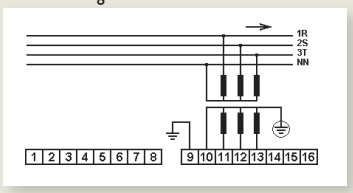


V1, V2, V3, Vearth, U12, U23, U31, F:

TD337 configuration

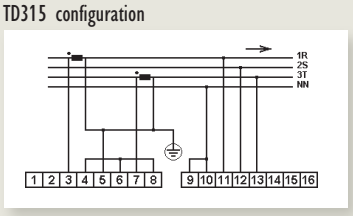


TD337Y configuration

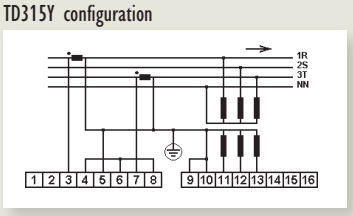


I1, I2, I3, V1, V2, V3, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F:

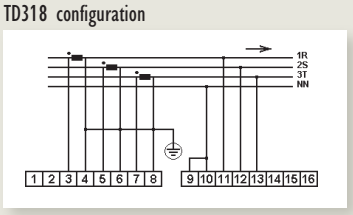
TD315 configuration



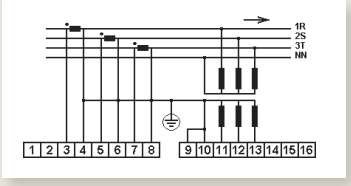
TD315Y configuration



TD318 configuration

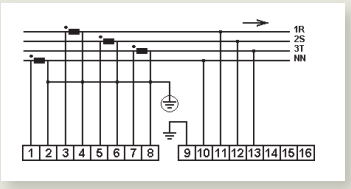


TD318Y configuration

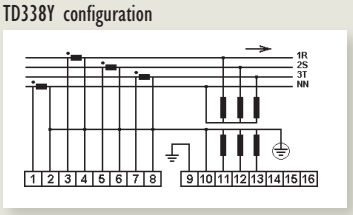


I1, I2, I3, Ineutral, V1, V2, V3, Vearth, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F:

TD338 configuration

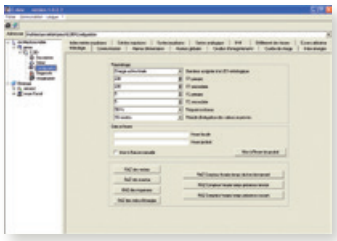


TD338Y configuration



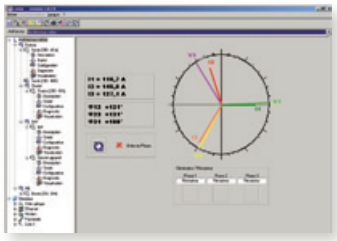
MICAR 2 Range

The **E.view+** software can be used with the **MICAR 2** range for configuration, installation diagnosis and display of the electrical quantities.



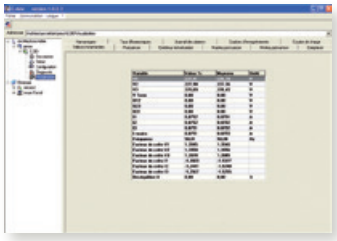
Configuration

- Configure your MICAR 2 transducers remotely via the RS485, Ethernet or local area network using the optical head
- Program the products' communication parameters and the configuration parameters (CT ratio, VT, alarm thresholds, etc.)



Diagnosis

- View the phase order and the Fresnel diagram
- Control the analogue and on-off outputs remotely



Display

- View the basic electrical quantities in real time
- View the harmonics in histogram format

TO ORDER

Product	Code
MICAR with tailored configuration	Complete the order form
Programmable MICAR 2, power supply 80-264 V AC/DC, RS485, 2 analogue outputs (without programming kit)	P01 330 840
Programmable MICAR 2, power supply 80-264 V AC/DC, RS485, 4 analogue outputs (without programming kit)	P01 330 841

Programming kit	Code
MICAR 2 – RS485 kit containing 1 optical head + 1 set of 50 labels + RS485 output + 1 E.view+ CD	P01 330 842
MICAR 2 – Ethernet kit containing 1 optical head + 1 set of 50 labels + Ethernet output + 1 E.view+ CD	P01 330 843

Accessories*	Code
Set of 50 labels for RS485 output	P01 330 844
Set of 50 labels for Ethernet output	P01 330 845

* labels printable only on laser printers

► Associated products

Analogue panel meters
► page 218

Digital panel meters
► page 188

CT Current transformers
► page 102

E.view+ software
► page 51

Factory-programmed MICAR 2: order form

1 – Network

- ☐ Single-phase
- ☐ Balanced 3-phase, 3 wires
- ☐ Balanced 3-phase, 4 wires
- ☐ Unbalanced 3-phase, 3 wires
- ☐ Unbalanced 3-phase, 4 wires

2 – Frequency

- ☐ 50 Hz
- or
- ☐ 60 Hz

3 – Connection options

- ☐ Ethernet (no RS485)
- ☐ Tropicalization
- ☐ 2 on-off outputs or ☐ 4 on-off outputs
- Connection configuration: TD ☐☐☐☐

4 - Power supply

☐ 80 to 265 Vac (50/60 Hz) / 80 to 264 Vdc or ☐ 19 to 57 Vdc

5 – Inputs

Current

With current transformer or Direct

Primary / Secondary: ____ / ____ A

Direct: ____ A

Voltage

With voltage transformer or Direct

Primary / Secondary: ____ / ____ V

Direct: ____ V

☐ Phase-phase ☐ Phase-neutral

Quantities available

V1	V2	V3	Vearth	U12	U23	U31	I1	I2	I3	Ineutral	P1	P2	P3	Pt	Q1	Q2	Q3	Qt	S1	S2	S3	St
FP1	FP2	FP3	FPt	COSφ1	COSφ2	COSφ3	COSφt	F														

Output 1

Quantity and measurement range (x)

☐ Indicate the quantity to be measured

Min	Breaking point	Max	Unit (1)

Transfer curve

- ☐ Linear
- ☐ 2 slopes
- ☐ Quadratic

Output signal (y)

Min	Breaking point	Max	
			mA

Output 2

Quantity and measurement range (x)

☐ Indicate the quantity to be measured

Min	Breaking point	Max	Unit (1)

Transfer curve

- ☐ Linear
- ☐ 2 slopes
- ☐ Quadratic

Output signal (y)

Min	Breaking point	Max	
			mA

Output 3

Quantity and measurement range (x)

☐ Indicate the quantity to be measured

Min	Breaking point	Max	Unit (1)

Transfer curve

- ☐ Linear
- ☐ 2 slopes
- ☐ Quadratic

Output signal (y)

Min	Breaking point	Max	
			mA

Output 4

Quantity and measurement range (x)

☐ Indicate the quantity to be measured

Min	Breaking point	Max	Unit (1)

Transfer curve

- ☐ Linear
- ☐ 2 slopes
- ☐ Quadratic

Output signal (y)

Min	Breaking point	Max	
			mA

(1) Please indicate the unit for the measurement range, e.g. W, kW or MW.

C.A 3420 range

Universal programmable digital transducer
DC quantities / physical quantities

PRODUCT ADVANTAGES

- Operation in **SIL 2** environment
- **QUICK, SIMPLE MOUNTING** on **DIN** rail
- **UNIVERSAL INPUT:** RTD, TC, Ohm, mA, V and potentiometer
- Intuitive **PROGRAMMING PANEL**
- **AC** and **DC POWER SUPPLY** with **WIDE DYNAMIC RANGE**

LCD screen for easy reading

Plug-in C.A 3401 programming panel

LED operating status indicators

► Description

The **C.A 3420** can be used to convert any input signal into a stable, standardized low-level DC voltage or current signal : temperatures from thermocouples or thermometric resistors, linear resistances from potentiometers, voltages (mVdc et Vdc) and currents (mAdc) for DC networks.

When used with the C.A 3401 programming panel, the **C.A 3420** transducer is particularly flexible, covering more than a hundred industrial applications.

Usable in installations rated SIL 2 (Safety Integrity Level), the **C.A 3420** guarantees high reliability and safety:

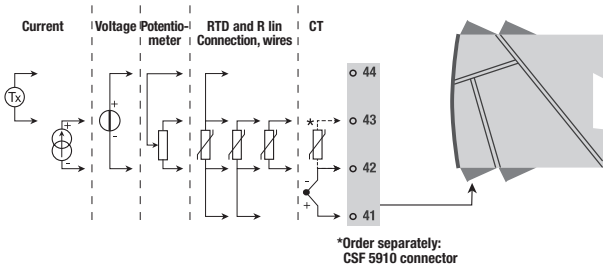
- 2.3 kVac triple galvanic insulation between the input, the power supply and the output
- Advanced sensor error detection with alarm / relay output or analog output
- Programming protected by password (C.A 3401)

Technical specifications

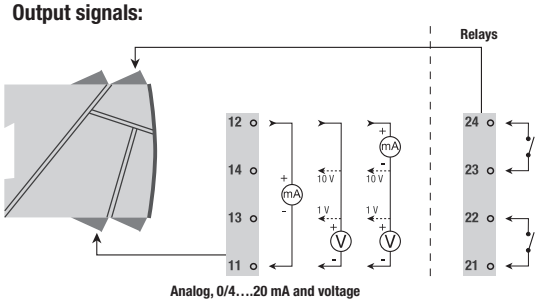
Input	
mA input	0/4…20 mA
V input	0/0,2…1 V ; 0/1…5 V ; 0/2…10 V
RTD	2, 3 and 4 wires Pt10…Pt100…Pt1000 Ni50…Ni1000 Cu10…Cu100
CT types	B, E, J, K, L, N, R, S, T, U, W3, W5, LR
Potentiometer	10 Ω… 100 kΩ
Linear resistance	0 Ω… 10 kΩ
Outputs	
2 relay outputs	250 VRMS / 2 A
mA output	0/4…20 mA (max. 800 Ω / 16 V)
V output	0/0,2…1 ; 0/1…5 ; 0/2…10 Vdc
Mechanical dimensions	
Power supply	21,6…250 Vac, 50…60 Hz or 19,2… 300 Vdc
Protection	IP20
Dimensions, without/with C.A 3401 (H x L x W)	109 x 23.5 x 104/116 mm
Weight, without/with C.A 3401	170 g / 185 g
Mounting	DIN rail
Approvals and certifications	CE / Standards: EN 61010-1, EN 61326-1 SIL
Environment	
Operating temperature	-20 °C to +60°C
Relative humidity	< 95 % RH

Connection diagrams

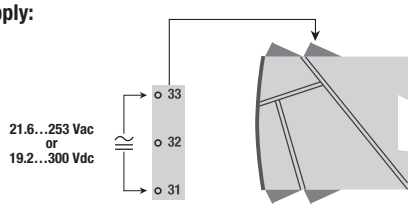
Input signals:



Output signals:



Power supply:



TO ORDER

Model	Description	Reference
Pack	Transducer + panel pack	P01 6760 20

Associated products

Analogue panel meters

► page 218

Digital panel meters

► page 188

CT Current transformers

► page 102

Thermocouple / probe

► Pyrocontrole catalogue

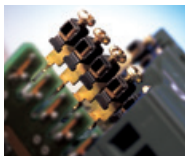
PYRO CONTROLE
CHAUVIN ARNOUX GROUP

TSP 2 Range

Self-powered version for applications requiring the conversion of a single AC current or voltage quantity. 1 analogue output class 0.2 for all type of electrical network

PRODUCT ADVANTAGES

- **SELF-POWERED**
- **CLASS 0.2**
- **WIDE CHOICE OF INPUTS CALIBRED**
- **RESPONSE TIME** of 100 ms for **TSPI** and 200 ms for **TSPU**



Accessibility and safety: large-dimension terminals Insulated circuits

Ergonomic: easy mounting on DIN rail or switchboard

Main specifications

TSPU
Quantity measured: Vac, Uac
Accuracy: Class 0.2
Inputs: AC voltage: 57.5 V to 400 V (fixed calibres)
Analogue output calibres: 0-10 mA, 0-20 mA, 0-5 V, 0-10 V
Operating frequency: 45 to 65 Hz

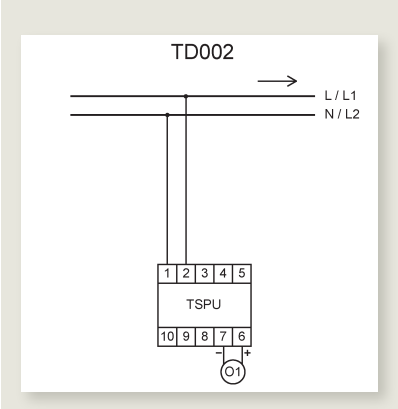
TSPI
Quantity measured: Iac
Accuracy: Class 0.2
Inputs: AC current: 1 A or 5 A (fixed calibres)
Analogue output calibres: 0-10 mA, 0-20 mA
Operating frequency: 45 to 65 Hz

Functions

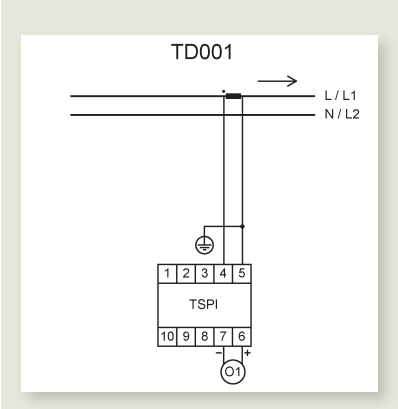
Network	Function	TSPI model	TSPU model
Single phase	V		•
	I	•	
Balanced 3-phase 3 wires	U12 or U23 or U31		•
	I1 or I2 or I3	•	
Balanced 3-phase 4 wires	V1 or V2 or V3 or U12 or U23 or U31		•
	I1 or I2 or I3	•	
Unbalanced 3-phase 3 wires	U12 or U23 or U31		•
	I1 or I2 or I3	•	
Unbalanced 3-phase 4 wires	V1 or V2 or V3 or U12 or U23 or U31		•
	I1 or I2 or I3	•	

Electrical connections

TSPU



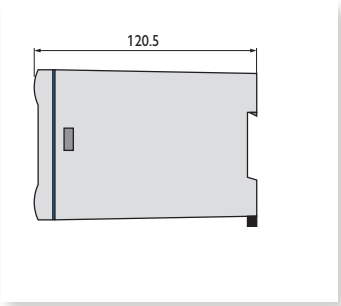
TSPI

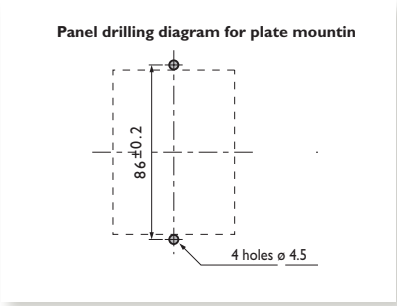


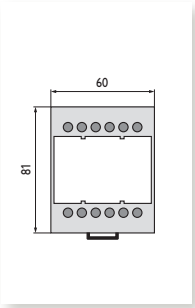
⚠ The terminal 1 can be connected either on the neutral or on one phase of the electrical network

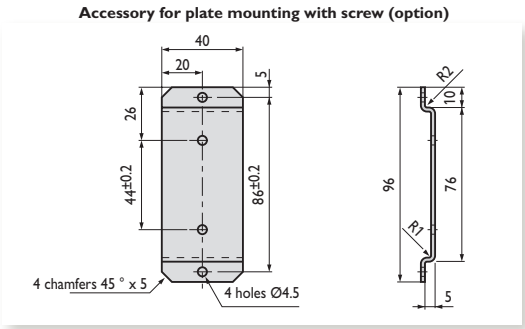
TSP 2 Range

Dimensions (in mm)









Environment and standards

Standard of reference: IEC 60688	
EMC IMMUNITY	
Shock voltage	IEC 61000-4-5
Oscillating wave	IEC 61000-4-12
Fast electrical transients in bursts	IEC 61000-4-4
Electrostatic discharge	IEC 61000-4-2
EM radiated field	IEC 61000-4-3

Climatic specifications (IEC 60068 2-1 / 2-2 / 2-30)	
Operating temperature	-10°C to +55°C
Storage temperature	-40°C to +70°C
Relative humidity	≤ 95% at 55°C
Safety specifications (IEC 61010-1)	
Installation category	3
Pollution level	2
Fire resistance	UL94, severity V0
Mechanical specifications	
Protection rating	IP 20
Mechanical shocks	IEC 60068-2-27
Vibrations	IEC 60068-2-6
Drop test with packaging	NF H0042-1

Mounting accessories

Model	Reference
Plate mounting	ACCT 1007

Casing

Weight	320 g
Mounting	DIN rail 43700 or plate mounting
Connection	Terminals with mobile stirrup clamp with screw for 4 single-wire 6 mm² conductors or 2 multi-wire 4 mm² conductors

Electrical and metrological specifications

Model	TSPI I (rms)	TSPU U or V (rms)
Current or voltage input		
Rated value	In = 1 or 5 A	Vn = 100/√3, 110/√3, 120/√3 V Un = 100, 110, 120, 230, 400 V
Frequency Fn	46...65 Hz	46...65 Hz
Measurement range 0...Xmax	0...100% of In	0...100% of Un/Vn
Consumption	2 VA	2 VA
Maximum overloads	2 In permanent 20 In / 1 s 40 In / 0.5 s	1.5 Un permanent 2 Un / 1 s 4 Un / 0.5 s
Analogue output		
Transfer curve	linear	
0...Ymax	0...10 mA 0...20 mA	0...10 mA 0...20 mA 0...5 V 0...10 V
Accuracy	Class 0.2: 10...100% of In	Class 0.2: 50...100% of Vn / Un
Response time	< 100 ms	< 200 ms
Operating resistance	15 V /Is	≥ 1 kΩ
Peak-peak residual wave	40 µA	20 mV
Auxiliary power supply		
Self-powered	•	•

Parameters to be indicated when ordering

TO ORDER

TSPI

Input	Output	Tropicalization with	Tropicalization without
0...1 A	0...10 mA	P01 3751 01	P01 3751 05
	0...20 mA	P01 3751 02	P01 3751 06
0...5 A	0...10 mA	P01 3751 03	P01 3751 07
	0...20 mA	P01 3751 04	P01 3751 08

TSPU

Input	Output	Tropicalization with	Tropicalization without
0...57.7 V	0...10 mA	P01 3752 01	P01 3752 33
	0...20 mA	P01 3752 02	P01 3752 34
	0...5 V	P01 3752 03	P01 3752 35
	0...10 V	P01 3752 04	P01 3752 36
0...63.5 V	0...10 mA	P01 3752 05	P01 3752 37
	0...20 mA	P01 3752 06	P01 3752 38
	0...5 V	P01 3752 07	P01 3752 39
	0...10 V	P01 3752 08	P01 3752 40
0...69.3 V	0...10 mA	P01 3752 09	P01 3752 41
	0...20 mA	P01 3752 10	P01 3752 42
	0...5 V	P01 3752 11	P01 3752 43
	0...10 V	P01 3752 12	P01 3752 44
0...76.2 V	0...10 mA	P01 3752 65	P01 3752 66
0...100 V	0...10 mA	P01 3752 13	P01 3752 45
	0...20 mA	P01 3752 14	P01 3752 46
	0...5 V	P01 3752 15	P01 3752 47
	0...10 V	P01 3752 16	P01 3752 48

TSPU

Input	Output	Tropicalization with	Tropicalization without
0...110 V	0...10 mA	P01 3752 17	P01 3752 49
	0...20 mA	P01 3752 18	P01 3752 50
	0...5 V	P01 3752 19	P01 3752 51
	0...10 V	P01 3752 20	P01 3752 52
0...120 V	0...10 mA	P01 3752 21	P01 3752 53
	0...20 mA	P01 3752 22	P01 3752 54
	0...5 V	P01 3752 23	P01 3752 55
	0...10 V	P01 3752 24	P01 3752 56
0...230 V	0...10 mA	P01 3752 25	P01 3752 57
	0...20 mA	P01 3752 26	P01 3752 58
	0...5 V	P01 3752 27	P01 3752 59
	0...10 V	P01 3752 28	P01 3752 60
0...400 V	0...10 mA	P01 3752 29	P01 3752 61
	0...20 mA	P01 3752 30	P01 3752 62
	0...5 V	P01 3752 31	P01 3752 63
	0...10 V	P01 3752 32	P01 3752 64

Digital panel meters, recorder

µDIGI1 and µDIGI2 ranges

µDIGI1
► page 194

µDIGI2
► page 198

C.A 2150 and C.A 2200 ranges

C.A 2150
► page 202

C.A 2200
► page 206

and synchrocoupler

ENERTRACE - Graphic recorder

Plug & play
► page 210

Synchrocoupleur

Synchronization instruments
► page 214

Selection guide

		µDIGI1 & µDIGI2 ranges	
		► page 194	► page 198
			
		µDIGI1	**µDIGI2**
Format of front panel		24 x 48	48 x 96
Display resolution (counts)		32000	32000
Display range (counts)		-1,999 / +9,999	-1,999 / +9,999
Measurement functions	AC ammeter	µDIGI1 E	µDIGI2 E
	AC voltmeter	µDIGI1 E	µDIGI2 E
	Frequencymeter	µDIGI1 F	
	DC ammeter	µDIGI1 E	µDIGI2 E
	DC voltmeter	µDIGI1 E	µDIGI2 E
	Process signals	µDIGI P/LP	µDIGI2 P
	Thermocouple thermometer	µDIGI1 T	µDIGI2 P
	Pt 100 thermometer		µDIGI2 P
	Ohmmeter		µDIGI2 P
	Tachometer	µDIGI1 F	µDIGI2 TAC
	Meter		
	Timer		
	Load cell		
	Potentiometer		µDIGI2 P
Special functions	MIN/MAX	µDIGI1 ALP	
Output(s)	Analogue output		
	RS232 output		
	RS485 output	µDIGI1 ALP	
	Threshold output(s)		Option
	BCD output		
User-programmable			
Strengths		Economical programmable range for industrial use.	

C.A 2150 & C.A 2200 ranges

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► page 206

CA 2150	CA 2200
48 x 96	48 x 96
32000	65000
-19,999 / +19,999	-32,000 / +32,000
C.A 2150-E	
C.A 2150-E	
C.A 2150-D	C.A 2200-D
C.A 2150-E	
C.A 2150-E	
C.A 2150-M	C.A 2200-P
C.A 2150-M	C.A 2200-T
C.A 2150-M	C.A 2200-T
C.A 2150-D	C.A 2200-D
C.A 2150-D	C.A 2200-D
C.A 2150-D	C.A 2200-D
C.A 2150-M	C.A 2200-C
C.A 2150-M	C.A 2200-P
Option	Option
Option	Option
Option	Option
Option	Option
	Option
Programmable range for universal use.	

Digital panel meters are used to display an analogue value clearly and precisely. The digital processing enables these instruments to display different values, and allows connection to external measurement or supervision systems.

Several criteria influence the choice of a digital panel meter, the first being the scale or the measurement range, defined by the variation range of the signal to be measured.

The resolution

The number of display counts defines the resolution of the panel meter. The resolution is the necessary variation of the measurement signal required to vary the reading by one point. For a given rating, the greater the display capacity, the better the resolution.

For example, for an 11-bit (2,000-counts) panel meter with a 20 V range, the resolution is 10 mV.

However, for industrial applications, it is not always wise to choose a digital panel meter of too high resolution. The measurement signal may be subject to noise interference, resulting in the permanent instability of lightweight display units.

Accuracy

Accuracy, which is not to be confused with resolution, defines the maximum variation between the instrument reading and the true value of the signal measured.

It is expressed as follows:
E = x% of the reading ± y counts.

The first term depends on the conversion method and the precision of the components, while the second depends on the various drift, dispersion, fluctuation and noise factors that can affect the instrument. The error is therefore constant over the entire measurement range. This is one of the main advantages of the digital panel meter over the galvanometer, where the most accurate readings are obtained at the end of the scale.

Format

The format and weight of the instrument must also be taken into account, as they affect the sizing of electrical cabinets. The format 48 x 96 (DIN standard 43700) is the industrial standard. Alongside this, panel meters of reduced dimensions, such as the 25 x 75, have proven especially useful for smaller-sized machines and embedded equipment.

Display

The visibility of panel meter display characters is directly linked to the light difference between the digits and the screen background. LEDs, LCDs and backlit LCDs offer different levels of readability. LED technology, used on most of the ENERDIS range of digital panel meters, offers the best display contrast. A choice of red, green and amber colours also ensures they are easy to read.

Display only or multifunction products?

Panel meters are increasingly universal, and must be able to display both strong signals, such as the voltage of a network, and weak signals such as process signals.

Instruments with multiple inputs, calibres and outputs are increasingly equipped with digital interfaces (RS232, RS485) for remote communication, analogue outputs, and relay or alarm interfaces for connection to logic controllers.

Number of digits and display counts

The display of a digital panel meter is characterized by the number of digits. We speak, for example, of 3 1/2 digit or 4 3/4 digit panel meters.

A full digit has 10 possible states, in other words all values between 0 and 9.

A 1/2 digit has a maximum value of 1 and is capable of 2 states: 0 and 1.

A 3/4 digit can display a maximum value equal to 3 and has 4 states: 0, 1, 2, 3.

We can therefore expect a 3 1/2 digit panel meter to be capable of counting up to 2,000 (0 to 1,999), and a 4 3/4 digit panel meter to be capable of counting up to 40,000 (0 to 3,999). For this, the real display range of the apparatus must not be inferior.

FOCUS

How to get the best out of your panel meter

► Environment

Digital panel meters, in general, are intended for indoor use, their electronic circuit being sensitive to difficult climatic environments (in contrast to analogue panel meters, which are suitable for both indoor and outdoor use). They must also support emissions stimulated and emitted by the electrical equipment.

► Maintenance

Unlike the analogue panel meter, the digital panel meter accepts low currents (maximum 600 V and 5 A). It therefore requires minimal precautions for the use of currents and voltages.

µDIGI1 Range

24 x 48 mm programmable panel meters for industrial use

PRODUCT ADVANTAGES

- **SIMPLE PROGRAMMING** using 3 keys
- Instant **MOUNTING WITHOUT TOOLS**
- **COMPACT DIMENSIONS**
- **16-POINT LINEARIZATION** of the input signals and display with **4 LEVELS OF BRIGHTNESS** for µDIGI1-ALP

Plug-in connectors for quick and easy connection

Display with 4 levels of brightness

Remote configuration of the µDIGI1-ALP via the RS485 serial link

Programming

Quick and easy:

- **Local** programming using the 3 keys of the keyboard. Only the instructions required for the application are shown. No mistakes are possible. Access to programming can be protected on all the instruments.

- **Remote** programming with the **µDIGI1-PRG** software available free from www.enerdis.com for the µDIGI1-ALP with RS485 option.

µDIGI1-LP
4-20 mA process signal

- **Input:**
  4-20 mA
- **Display range:**
  -1,999...+9,999

Power supply	Reference
Self-powered (active loop)	P01 330 000

µDIGI1-P
U/I process signal

- **Input:**
  -10… +10 Vdc
  -20… +20 Vdc
  -200… +200 Vdc (1 MΩ)
  -100… +100 mVdc (100 MΩ)
  -20… +20 mAdc (12.1 Ω)
- **Display range:**
  -1,999… 9,999

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 031
22 - 53 Vac & 10,5 - 70 Vdc	P01 330 032

µDIGI1-E
U/I voltage and current

- **Input:**
  600 Vac
  100 Vac
  -199,9… +600 Vdc
  -100… +100 Vdc (3 MΩ)
  5 Aac
  1 Aac
  -1,999… +5 Adc
  -1… + 1 Adc (14 mΩ)
- **Display range:**
  -1,999… 9,999 (dc)
  -0… 9,999 (ac)

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 011
22 - 53 Vac & 10,5 - 70 Vdc	P01 330 012

µDIGI1-T
Temperature (Pt100 and thermocouple)

- **Pt100:** -200… +800°C
  -100… +200°C
  -328… +1,472°F
  -148… +392°C
- **J:** -50… +850°C
  -58… +1,562°F
- **K:** -50…+ 1,250°C
  -58… +2,282°F
- **T:** -200… +400°C
  -328… +752°F
- **Display range:**
  -1,999… 9,999

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 041
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 042

µDIGI1-F
Frequency, rpm, pulse

- **Frequency meter:**
  0.01 Hz… 7 KHz (voltage 10 to 600 Vac)
- **Tachometer:**
  Magnetic
  Vin > 30 mV rms (60 Hz)
  Vin > 300 mV rms (6 kHz)
  NAMUR
  Rc = 1.5 kΩ; Ion < 1 mA ; Ioff > 3 mA
  NPN/PNP
  Rc = 3.9 kΩ (NPN); 1.5 kΩ (PNP)
  "0" < 2.4 V / "1" > 2.6 V
  Encoder/TTL/24V
  "0" < 2.4 V / "1" > 2.6 V
  SWITCH
  Vc = 5 V (internal)
  Rc = 3.9 kΩ (internal)
  Fc = 20 Hz
- **Display range:**
  0… 9,999

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 021
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 022

µDIGI1-ALP
Process signal with alarms

- **Input:**
  -10… +10 Vdc
  -60… +60 Vdc (1 MΩ)
  -100… +100 mVdc (100 MΩ)
  -20… +20 mAdc (12.1 mΩ)
- **Display range:**
  -1,999… 9,999
- **15-segment signal linearization**
- **Display with 4 levels of brightness**

Power supply	Option	Reference
85 - 265 Vac & 100 - 300 Vdc	-	P01 330 051
22 - 53 Vac & 10.5 - 70 Vdc	-	P01 330 052
85 - 265 Vac & 100 - 300 Vdc	RS485	P01 330 061
22 - 53 Vac & 10.5 - 70 Vdc	RS485	P01 330 062

µDIGI1 Range

24 x 48 mm programmable panel meters for industrial use

Display

	µDIGI1-LP	µDIGI1-P	µDIGI1-E	µDIGI1-T	µDIGI1-F	µDIGI1-ALP
Display resolution	32,000 counts					
Measurement rate	62/s	25/s				
Display range	-1,999… 9,999	-1,999… 9,999	-1,999… 9,999 (dc) 0… 9,999 (ac)	-1,999… 9,999	0… 9,999	-1,999… 9,999
7-segment red LED display		Height 10 mm				Height 8 mm
Reading	4 digits					
Polarity	Automatic					
Overrun	OVE display					
Decimal position	Programmable using software					

Accuracy

µDIGI1-LP µDIGI1-P	±0.1% +3 counts
µDIGI1-E	±0.2% +3 counts - ±0.4% +4 counts for 100 V/Aac inputs
µDIGI1-T	**Pt 100** °C: ±0.2% + 1 count (Res 1°) - ±0.2% +4 counts (Res 0.1°) °F: ±0.2% + 2 counts (Res 1°) - ±0.2% +7 counts (Res 0.1°) **J, K and T thermocouples** °C: ±0.4% + 2 counts (Res 1°) °F: ±0.4% + 4 counts (Res 1°)
µDIGI1-F	±0.01% +1 count
µDIGI1-ALP	±0.1% +1 count

Mechanical specifications

Material	Polycarbonate as per UL94 V-0
Weight	60 g – 40 g (µDIGI1-LP) – 70 g (µDIGI1-ALP)
Protection rating	Front panel IP 65
Mounting	On panel with self-locking strap

Environment

Operating temperature	-10°C to +60°C
Storage temperature	-25°C to +85°C
Relative humidity	< 95% at +40°C
Max. altitude	2,000 m

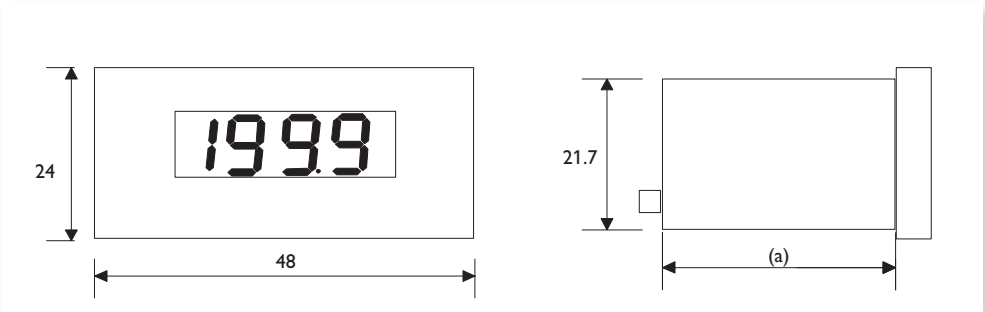
Power supply

High level	85/265 Vac 50/60 Hz - 100/300 Vdc
Low level	22/53 Vac 50/60 Hz - 10.5/70 Vdc
Consumption	≤ 2.2 W (< 3 W for µDIGI1-ALP)

Standards

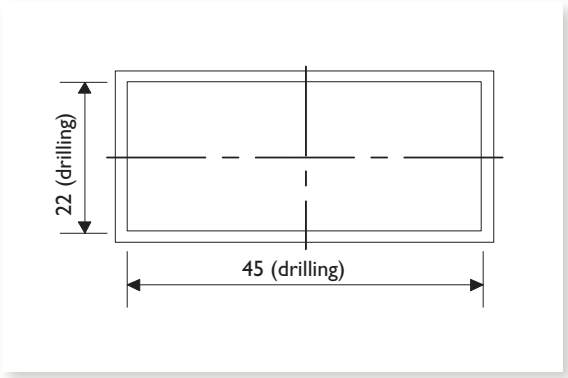
Insulation – dielectric strength: EN 611010-1 (category II installation)
EMC – immunity/emission: EN 61000-4-2, EN 61000-4-3, EN 61000-4-4 / EN 55022
(EN 610000-4-6 for µDIGI1-LP and µDIGI1-ALP – EN 61000-4-5 and EN 61000-4-11 for µDIGI1-ALP)

Dimensions (in mm)



	µDIGI1-LP	µDIGI1-P	µDIGI1-E	µDIGI1-T	µDIGI1-F	µDIGI1-ALP
(a)	40 mm	70 mm				100 mm

Panel drilling specifications (in mm)



Associated products

Current transformers & shunts

► page 102

Tachometric sensor

► Contact us

Thermocouple / probe

► Pyrocontrole Catalogue

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

µDIGI2 Range

Programmable panel meters in 48 x 96 mm format for industrial applications

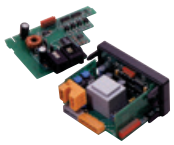
PRODUCT ADVANTAGES

ECONOMICAL
single-function range

INSTANT FITTING
without tools

Simple programming with 3 keys on front panel

Accessories for surface and DIN rail mounting



Easy installation of option boards

Quick connection using plug-in connectors

Mounting accessories

	Reference
Multi-position fitting with DIN rail adapter	P01 3194 01
Back fitting with 2 DIN rail adapters	P01 3194 02

Option boards

	Reference
2-relay alarm board	P01 3193 01

µDIGI2 E

- **DC voltage:**
  600 V
  200 V
  20 V
- **DC current:**
  5 A
  1 A
  100 mV
  60 mV
- **AC voltage:**
  600 V
  200 V
  20 V
- **AC current:**
  5 A
  1 A
  100 mV
  60 mV

Supply	Reference
20/265 Vac - 11/265 Vdc	P01330081

µDIGI2 P

- **Process:**
  ±20 mA
  10 V
  200 V
  dynamo-tachometer
- **Temperature:**
  Thermocouple J
  Thermocouple K
  Thermocouple T
  Thermocouple N
  Pt 100
  Pt 1000
- **Potentiometer:**
  100 Ω to 100 kΩ
- **Resistance:**
  1 kΩ
  10 kΩ
  50 kΩ

Supply	Reference
20/265 Vac - 11/265 Vdc	P01330080

µDIGI2 TAC

- **Frequency**:
  0 to 999.9 Hz
- **Speed**:
  0 to 9,999 counts
- **Magnetic sensor**:
  Vin > 120 mVrms
- **NAMUR sensor**
- **Encoder** TTL/24V
  or NPN/PNP
- **Dry contact**
- **Voltage**:
  0 to 10 Vac

Supply	Reference
115/230 Vac (3 VA)	5330 081F
24/48 Vac (3 VA)	5330 082F
12 Vdc (3 W)	5330 083F
24 Vdc (3 W)	5330 084F
48 Vdc (3 W)	5330 085F

µDIGI2 Range

Programmable panel meters in 48 x 96 mm format for industrial applications

Display

Display resolution	32,000 counts
Display range	-9,999…9,999 (TAC: 0… 9,999)
Display indicators	Red LED 7 segments
	Height 14 mm
Reading	4 digits
Polarity	Automatic
Overrun	OVE displayed
Decimal position	Programmable by software
Measurement rate	20 measurements / second (TAC: 0.1 Hz to 7 kHz)

Accuracy

Vdc, Adc, Aac		±0.05% R
Vac	±20 V	±0.1% R
	±200 V	±0.25% R
	±600 V	±0.35% R
Process signal		±0.1% R
Temperature	Thermocouple J, K, N	±0.1% R
	Thermocouple T	±0.2% R
	PT 100 / PT 1000	±0.15% R
Potentiometer		±0.1% R
Resistance		±0.1% R
Tachometer		±0.1% ±3 counts

Mechanical specifications

Material	Polycarbonate V0 as per UL94
Weight	150 g
Protection rating	IP 65 on front panel
Fitting	On panel using strap

Environment

Operating temperature	-10°C to +60°C
Storage temperature	-25°C to +85°C
Relative humidity	< 95% at +40°C
Maximum altitude	2,000 m

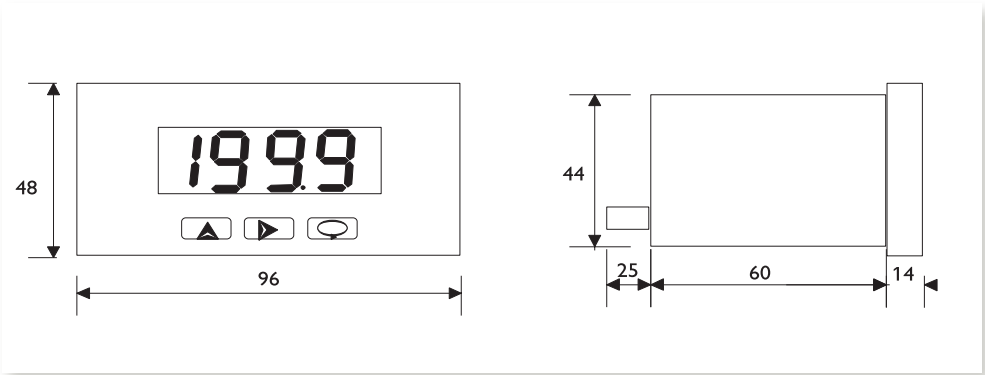
Power supply

Voltage	20/265 Vac - 50/60 Hz – 11/265 Vdc
Consumption	3 VA / 3 W

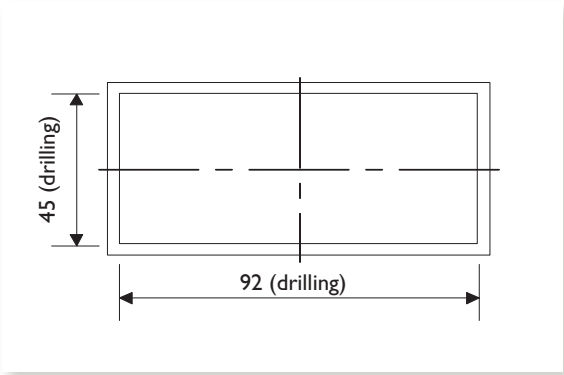
Standard

Low voltage directive 73/23/CEE
Insulation - dielectric strength IEC 61010-1

Dimensions (in mm)

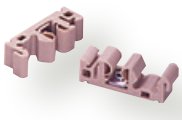


Panel drilling specifications (in mm)



Associated products

Accessories and option boards
► page 198



CT Current transformers and shunts
► page 102

Tachometer probe
► Contact us

Thermocouple / probe
► Pyrocontrole Catalogue

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

C.A 2150 Range

48 x 96 mm programmable digital panel meters for all types of industrial applications

PRODUCT ADVANTAGES

- **MULTI-FUNCTION PRODUCTS**
- **3 DISPLAY COLOURS**
- **4 ALARMS** as standard
- **INSTANT MOUNTING WITHOUT TOOLS**
- **SERIAL LINK** for remote processing of the measurements

3 display colours

Remote configuration via the RS232 or RS485 serial link

Quick connection using plug-in connectors (spring-cage type)

Description

The **C.A 2150-E** is a programmable multi-rating panel meter which measures TRMS Vac or Iac quantities and Vdc or Idc quantities.

The **C.A 2150-M** is a 4-in-1 programmable panel meter which can be configured for process, temperature, load cell or potentiometer signals.

The **C.A 2150-D** is a 4-in-1 programmable panel meter which can be configured for the following applications: meter, tachometer, frequencymeter and chronometer.

The serial link can be used to transfer the measurements onto a PC.

The CA2150-PRG software, available free of charge from www.enerdis.com, can be used to read the measurement directly, configure and remotely program one or more connected panel meters.

It can also be used to save and recover the configuration of an existing panel meter.

Option boards*

Model	Reference
C.A 2XXX AL 2-relay board	P01 3193 01
C.A 2XXX AL 4-relay board	P01 3193 03
C.A 2XXX 4 NPN board	P01 3193 04
C.A 2XXX COM RS232 board	P01 3193 06
C.A 2XXX COM RS485 board	P01 3193 07
C.A 2150 0 – 10 V output board	P01 3193 10
C.A 2150 4 – 20 mA output board	P01 3193 11

* Extra boards (addition or replacement)

Accessories

Model	Reference
Multi-position mounting with 2 DIN rail adapters	P01 3194 01
Connector + 1 m RS232 cable	P01 3194 03
Connector + 1 m RS485 cable	P01 3194 04

C.A 2150-E

AC input voltage rating (TRMS)

- 2 V with 75 kΩ
- 20 V, 200 V or 600 V with 850 kΩ

AC input current rating (TRMS)

- 200 mA with 0.75 Ω
- 1 A or 5 A with 0,014 Ω
- 50 mV, 60 mV or 100 mV with 1.5 MΩ

DC input voltage rating

- 2 V with 100 kΩ
- 20 V, 200 V or 600 V with 850 kΩ

DC input current rating

- 200 mA with 0.75 Ω
- 1 A or 5 A with 0.014 Ω
- 50 mV, 60 mV or 100 mV with 1.8 MΩ

C.A 2150-M

DC U/I process signals

- **Voltage**: 0...±10 V with 1 mΩ
- **Current**: 0...±20 mA with 15 Ω

Temperature

- J thermocouple: -50...+800°C / -58...+1472°F
- K thermocouple: -50...+1,200°C / -58...+2,192°F
- T thermocouple: -150...+400°C / -302...+752°F
- Pt 100: -100...+800°C / -148...+1,472°F

Load cells

- 0...±15 mV with 100 mΩ
- 0...±30 mVdc with 100 mΩ
- 0...±150 mV with 100 mΩ

Potentiometer

- 200 Ω...100 kΩ

C.A 2150-D

Frequencymeter / Tachometer

- **Fmin**: 0.01 Hz
- **Fmax without relay option**: 19 kHz
- **Fmax with relay option**: 9.9 kHz

Meter / Chronometer

- **Fmax without relay option**: 20 kHz
- **Fmax with relay option**: 15 kHz

Types of inputs:

- **Voltage**: 10…300 Vac
- **Magnetic sensor**: Vin > 60 mVrms (F < 1 kHz)
  Vin > 120 mVrms (F > 1 kHz)
- **NAMUR sensor**: Rc = 3.3 kΩ
  Ion < 1 mAdc
  Ioff > 3 mAdc
- **TTL encoder/24 Vdc**:
  "0" < 2.4 Vdc / "1" > 2.6 Vdc
  Rc = 3.3 kΩ
- **Dry contact**:
  Vc = 5 Vdc / Rc = 3.9 kΩ / Fc = 20 Hz

Available options

Relay card

	Board with 2 alarms on relays	Board with 4 alarms on relays	Board with 4 alarms on NPN
Outputs	2 x 1RT relays	4 x 1RT relays	4 NPN optocouplers
Max. voltage	250 Vac or 12 Vdc	250 Vac or 125 Vdc	50 Vdc
Max. current	8 A at 250 Vac or 8 A at 24 Vdc	500 mA at 125 Vac or 1 A at 30 Vdc	50 mA at 50 Vdc

Communication board

Type of link	RS232C	RS485
Protocol	ISO1745, C.A protocol or ModBus/RTU	
Speed	1,200, 2,400, 4,800, 9,600 or 19,200 bauds	
Output connector	RJ9-4	RJ11-6 with dual adapter (input + output)

Analogue output board

Output	0... 10 V	4... 20 mA
Accuracy	0.1% ±1 digit	
Temperature coeff.	0.2 mV per K	0.5 µA per K
Charge maxi	> 500 Ω	< 800 Ω

Customized product

Example: **C.A 2150-M** — Auxiliary power supply: **1** — Alarm: **X** — Analogue output: **1** — Digital communication: **1**

Auxiliary power supply	Alarm	Analogue output	Digital communication
85-265 Vac & 100-300 Vdc: **1**	None: **X**	None: **X**	None: **X**
22-53 Vac & 10.5-70 Vdc: **2**	2 relays: **1**	4-20 mA: **1**	RS232: **1**
	4 relays: **2**	0-10 V: **2**	RS485: **2**
	4 transistors: **3**		

C.A 2150 Range

48 x 96 mm programmable digital panel meters

Display

	C.A 2150-E	C.A 2150-M			C.A 2150-D		
Display resolution	32,000 counts	32,000 counts			32,000 counts		
Measurement rate	50 ms	Process/load	Pt100	Tc	Meter/chrono	Freq./Tacho.	
		50 ms	250 ms	100 ms	100 ms	0.1 to 9.9 s	
Display range	± 19,999	± 19,999			Meter	Chrono	Freq./Tacho.
					± 99,999	0 to 999.9	0 to 99,999
Displays	7-segment programmable colour LED (red, green, amber), height 14 mm						
Reading	5 digits						
Polarity	automatic						
Overrun	OvEr / -OvEr						
Decimal position	by programming						

Sensor excitation

24 Vdc	Process (60 mA)	(30 mA)
10 Vdc / 5 Vdc	(60 mA)	
8 Vdc		(30 mA)
< 1 mAdc	Pt100	

Mechanical specifications

Material	polycarbonate as per UL 94 V-0
Weight	160 g (C.A 2150-E: 135 g)
Protection rating	IP 65 on front panel
Mounting	On panel using self-locking strap

Environment

Operating temperature	-10°C to +60°C
Storage temperature	-25°C to +80°C
Relative humidity	< 95% at 40°C
Maximum altitude	2,000 m

Power supply

High level	85/265 Vac 50/60 Hz - 100/300 Vdc
Low level	22/53 Vac 50/60 Hz - 10.5/70 Vdc
Consumption	5 W without option, 8 W max.

Accuracy

	C.A 2150-E	C.A 2150-M		C.A 2150-D	
		Process/load/Ω	Temperature	Freq. / Tacho.	Meter
Max. error on reading	Vac: ±0.30% Iac: ±0.30% Vdc: ±0.05% Idc: ±0.10%	±0.1% + 1 digit	TC ±0.4% R ± 0.6°C ±0.4% R ± 1°F Pt100 ±0.2% ± 0.6°C ±0.2% ± 1°F	0.005% R	0.01% R
Resolution	2 V rating: 0.1 mV 20 mV rating: 1 mV 200 V rating: 10 mV 600 V rating: 0.1 V 200 mA rating: 0.01 mA 1 / 5 A rating: 0.1 mA 50/60 / 100 mV rating: 0.01 mV	Process: voltage 1 mV / current 1 µA Load cell: 1 µV Temperature: 0.1° / 1° (selectable)		Frequency: 0.01 Hz Chronometer: 0.01 s	
Temperature coefficient	100 ppm /°C	100 ppm/°C		50 ppm/°C	
Warm-up time	15 minutes	10 minutes		5 minutes	

Special functions

- Reset to factory configuration
- Change of display colour
- Total or partial locking of programming by code
- Display with 2 levels of brightness

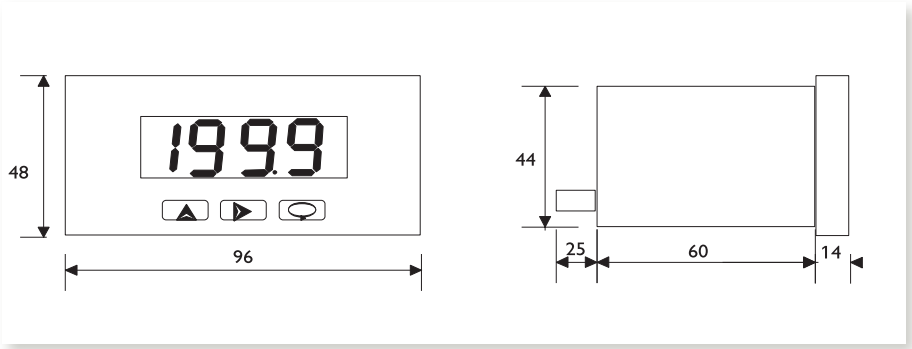
Standards

Insulation – dielectric strength: EN 611010-1 (Category II installation)

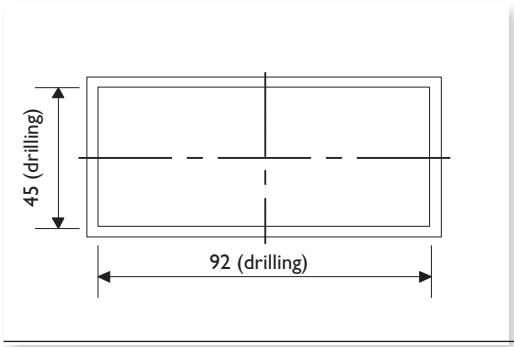
EMC - Immunity: EN 61000-4-2 EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6 and EN 61000-4-11

EMC - emission: EN 55022

Dimensions (in mm)



Panel drilling specifications (in mm)



Associated products

Current transformers and shunts

► page 102

Tachometer sensor

► Contact us

Thermocouple / probe

► Pyrocontrole Catalogue

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

C.A 2200 Range

48 x 96 mm programmable digital panel meters for universal use

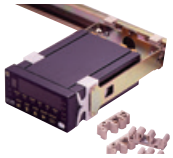
PRODUCT ADVANTAGES

RECORDING
of maximum and minimum values of input variable

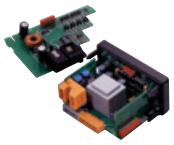
SERIAL LINK
for remote processing of measurements

LINEARIZATION
of input signal over 11 segments

Simple programming using 5 keys on front panel



Accessories for surface or DIN rail mounting



Very simple installation of option boards

Quick connection using plug-in connectors

Description

On the 4 instruments, two digital filters can be activated to stabilize the display of measurements depending on the processing conditions.

The measurement display can be disabled remotely by closing a contact. The display and reset of MAX and MIN values can also be activated remotely.

On the **C.A 2200-P** and **C.A 2200-C**, activation and cancellation of the OFFSET function can also be controlled remotely. The OFFSET command functions may be modified by the user, with 26 functions in all being pre-programmed on the instruments.

On the **C.A 2200-P** and **C.A 2200-C** models, the display can also be set to flashing mode to indicate an alarm threshold overrun.

Option boards*

Model	Reference
C.A 2XXX AL 2-relay board	P01 3193 01
C.A 2XXX AL 4-relay board	P01 3193 03
C.A 2XXX 4 NPN board	P01 3193 04
C.A 2200 analogue output board	P01 3193 05
C.A 2200 BCD output board	P01 3193 08
C.A 2XXX COM RS232 board	P01 3193 06
C.A 2XXX COM RS485 board	P01 3193 07

* Extra boards (addition or replacement)

Accessories

Model	Reference
Multi-position fitting with 2 DIN rail adapters	P01 3194 01
Rear fitting with 2 DIN rail adapters	P01 3194 02
Connector + 1 m RS232 cable	P01 3194 03
Connector + 1 m RS485 cable	P01 3194 04
Kit of 4 x C.A 2200 screw connectors	P01 3194 06

C.A 2200-P
Process signal U/I DC

- **Voltage**: 0 to ±10 V with 1 MΩ
- **Current**: 0 to ±20 mA with 15 Ω
- **Potentiometer**: 200 Ω to 100 kΩ

C.A 2200-C
Load cell

- 0 to ±15 mVdc with 100 MΩ
- 0 to ±30 mVdc with 100 MΩ
- 0 to ±60 mVdc with 100 MΩ
- 0 to ±300 mVdc with 100 MΩ

C.A 2200-T
Temperature

- tc J: -50 to 850°C / -58 to 1,562°F
- tc K: -50 to 1,200°C / -58 to 2,192°F
- tc T: -200 to 400°C / -328 to 752°F
- tc R: 0 to 1,700°C / -32 to 3,092°F
- tc S: 0 to 1,700°C / -32 to 3,092°F
- tc E: -50 to 1,000°C / -58 to 1,892°F
- Pt 100: -100 to 800°C / -148 to 1,472°F

C.A 2200-D
Frequency meter / Tachometer
Counter / Chronometer

- **Magnetic sensor:** Vin > 120 mVrms
- **NAMUR sensor:**
  Ion < 1 mAdc / Ioff > 3 mAdc / Rc = 1 kΩ
- **TTL/24V encoder or NPN/PNP sensor:**
  "1" > 1.6 Vdc / "0" < 1.5 Vdc
- **Dry contact:** Vc = 5 V / Rc = 3.9 kΩ/ Fc = 100 Hz
- **Voltage:** 10 to 650 Vac (Fmin 0.1 Hz / Fmax 2 kHz)

Customized products

	Model	Auxiliary power supply	Alarm	Analogue output	Digital communication
Example	C.A 2200-P	1	X	X	3
		115/230 Vac 1	without: X	without : X	without: X
		24/48 Vac 3	2 relays: 1	0-10 V/4-20 mA : 1	RS232: 2
		10/30 Vdc 5	4 relays: 2		RS485: 3
			4 transistors: 3		BCD: 4*

* Choice of the BCD output cancels the alarm and analogue outputs

C.A 2200 Range

Programmable digital panel meters in 48 x 96 format for universal use

Display

	C.A 2200-P	C.A 2200-C	C.A 2200-T	C.A 2200-D
Display resolution	65,000 counts			
Display range	±32,000	±32,000	±32,000	Counter: ±32,000 Tachometer: 0...99,999 Chronometer: 0.00 s to 9,999.9 h Frequency meter: 0 to 25,000
Display indicators	Red LED 7 segments, Height 14 mm			
Reading	5 digits			
Polarity	automatic			
Overrun	OVE displayed			
Decimal position	Programmable by software			
Display blocking	MAX/MIN function			
Measurement rate	16 measurements / second			
Response time	62 ms (250, 425, or 775 ms depending on filter programmed)			

Function

	C.A 2200-P	C.A 2200-C	C.A 2200-T	C.A 2200-D
OFFSET function	on keyboard	on keyboard	by programming	on keyboard
Remote control (4 logical inputs)	26 pre-programmed functions		18 pre-programmed functions	Display blocking: MIN/MAX/RESET and clear MIN/MAX/RESET display

Sensor excitation

	C.A 2200-P	C.A 2200-C	C.A 2200-T	C.A 2200-D
Sensor excitation	120 mA at 5 or 10 V or 30 mA at 24 V	120 mA at 5 or 10 V	-	8 V or 24 Vdc / 30 mA

Accuracy

	C.A 2200-P	C.A 2200-C	C.A 2200-T	C.A 2200-D
Measurements	0.15 µA or 0.3 µA	0.01% R ±2 counts	0.1°C or 1°C	0.01% R ±1 count
Temperature coefficient	50 ppm/°C	100 ppm/°C	100 ppm/°C	50 ppm/°C

Mechanical specifications

Material	Polycarbonate V0 as per UL
Weight	475 g (without option)
	850 g (with options)
Protection rating	IP 65 on front panel
Fitting	On panel using self-locking strap

Environment

Operating temperature	0 to +50°C
Storage temperature	-25 to +85°C
Relative humidity	< 95% at +40°C

Power supply

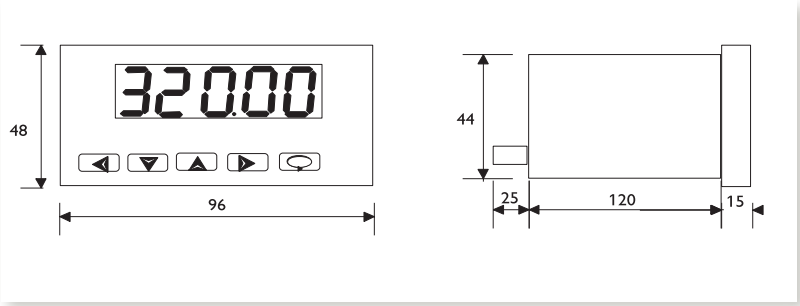
AC voltage	bivoltage 115/230 Vac ±15% 50/60 Hz
	bivoltage 24/48 Vac ±15% 50/60 Hz
Consumption	5 VA without option, 10 VA max
DC voltage	10 to 30 Vdc
Consumption	5 W without option, 10 W max

Standards

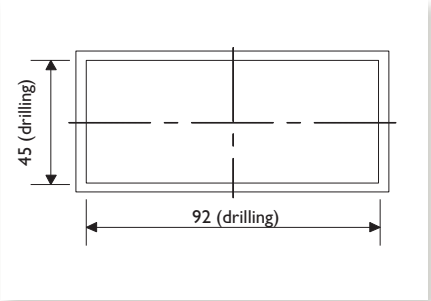
Low voltage directive 73/23/EEC

Insulation - dielectric strength IEC 61010-1

Dimensions (in mm)



Panel drilling specifications (in mm)



Associated products

Current transformers and shunts

► page 102

Tachometer sensor

► Contact us

Thermocouple / probe

► Pyrocontrole Catalogue

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

ENERTRACE Range

"Plug & Play" paperless recorder

PRODUCT ADVANTAGES

- **VERY-HIGH-RESOLUTION TFT VGA SCREEN,** 6.4", 256 colours
- Up to 18 **CONFIGURABLE MEASUREMENT CHANNELS**
- Data backup on Compact Flash card (up to 1 GB)
- **ETHERNET** link and **PROCESSING SOFTWARE** provided as standard

512 MB memory card as standard

6 slots for 3 types of input/output cards (logical, relay, analogue)

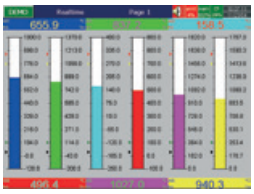
Portable version available

Description

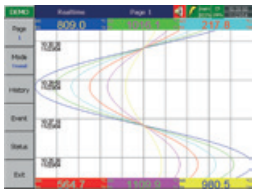
ENERTRACE is a "plug & play" paperless recorder suitable for all types of processes. It is equipped with an 18-bit converter for optimum measurement accuracy and a polling rate of 200 ms per channel.

- Inputs / outputs which can be configured and extended: up to 18 analogue measurement channels (mV,V,mA,T°,etc.) or 12 isolated and configurable logical inputs and up to 12 relay outputs, depending on the combinations.
- Computer processing of the data via a PC link
- Remote adjustment and configuration via an RS232, RS485 or Ethernet link
- Recording of data over a period of several months
- Simplified maintenance due to the absence of parts subject to wear or requiring replacement (paper, pens, etc.)
- Auxiliary power supply with broad dynamic range: 90 to 264 Vac / 11 to 370 Vdc

Display



Bargraph mode
Vertical display of 6 bargraphs.
Configurable scale for each bargraph.
Bars identified by colour and process label. High and low alarms marked "Hi/Lo".



Graphic curves mode
Vertical or horizontal display of 6 curves in real time
Simple switching from one page to another using the "Page" function
Constant display of the date and time, as well as a pictogram if there is an alarm or the memory is full.

Log of alarms
Display of all time / date-stamped alarms.
"Browse" function for choosing the alarms to be cleared.
Different colours for different alarm statuses.

Electrical specifications

Auxiliary power supply
Alternating current, operating domain and consumption: 90... 264 Vac, 47...63 Hz, 60 VA, 30 W max.
Direct current, operating domain and consumption: 11...370 Vdc, 60 VA, 30 W max.
Analogue input board
Channels: 3 per card
Resolution: 18 bits
Polling rate: 200 ms
Maximum value: -2 Vdc min., 12 Vdc max. (for standard board)
Temperature drift: ±1.5 µV/°C - except for mA inputs; ±3.0 µV/°C for mA inputs
Influence of line resistance: TC: 0.2 µV/Ω and 3-wire Pt100: 2.6°C/Ω. of difference between 2 branches
Sensor break-induced current: 200 nA
Common-mode rejection: 120 dB
Serial-mode rejection: 55 dB
Insulation voltage between channels: 430 Vac
Sensor failure detection: sensor open-circuit for TC, Pt100 and mV inputs - below 1 mA for the 4-20 mA input - below 1 mA for the 4-20 mA input - not applicable to the other inputs
Response time after sensor failure: 0.1 sec for 4-20 mA and 1.5 V and 10 sec for CT, Pt100 and mV

Type	Scale	Accuracy at 25°C	Impedance
Analogue input board, negative U/I			
-20 +20 mA	-22 ... +22 mA	± 0.1%	70.5 Ω
-60 +60 mVdc	-62 ... +62 mVdc	± 0.1%	2.2 MΩ
-2 + 2 Vdc	-2.2 ... +2.2 Vdc	± 0.1%	332 kΩ
20 +20 Vdc	-22 ... +22 Vdc	± 0.1%	332 kΩ
Standard analogue input board			
mV	-8 ... 70 mV	±0.05%	2.2 MΩ
mA	-3 ... 27 mA	±0.05%	70.5 Ω
V	-0.12 ... 1.15 V	±0.05%	332 kΩ
0/5 V	-1.3 ... 11.5 V	±0.05%	332 kΩ
1/5 V	-1.3 ... 11.5 V	±0.05%	332 kΩ
0/10 V	-1.3 ... 11.5 V	±0.05%	332 kΩ
J*	120 ... 1,000°C	±1°C	2.2 MΩ
K*	-200 ... 1,370°C	±1°C	2.2 MΩ
Pt100 (DIN)*	-210 ... 700°C	±0.4°C	1.3 kΩ

* Other types of temperature probes: please contact us

Logical input boards
Channels: 6 per board
Low level: -5 V minimum, 0.8 V max.
High level: 2 V minimum, 5 V max.
External pull-down resistance: 1 Ω max.
External pull-up resistance: 1.5 MΩ min.
Relay output boards
Relays: 6 per boards
Contact type: N.O (normally open)
Relay type: 5 A/240 Vac
Number of cycles: 200,000 resistive load
Analogue current output boards
Measurement input transcription card with function for possible multiplication, addition or subtraction of inputs
Type: 0-20 mA and 4-20 mA

Communication

Serial communication module	
Interface	RS232 - RS422 or RS485
Protocol	ModBus RTU
Address	1 to 247
Speed	0.3 to 38.4 kbits/s
Data bits	7 or 8 bits
Parity bit	none, even or odd
Stop bit	1 or 2 bits
ETHERNET communication module	
Protocol	ModBus TCP/IP, 10BaseT with automatic polarity correction
Ports	AUI and RJ-45 with auto-detection capability

Environment

Operating temperature	+5°C to +50°C
Storage temperature	-25°C to +60°C
Relative humidity	20 to 80% RH
Insulation resistance	20 MΩ min. (at 500 Vdc)
Dielectric strength	3 kVac at 50/60 Hz for 1 minute
Vibration resistance	10-55 Hz, 10 m/s^2 for 2 hours
Shock resistance	3 m/s^2 (3 g) in operation, 100 g during transport
Infrared sensor	detection of human presence up to 2 m away (screen saver)
Weight	1.9 kg

Standards

Safety	UL873 (11th edition 1994) CSA: C22.2 N° 24-93 CE: EN61010-1 (IEC 1010-1) Overvoltage category II, pollution degree 2
Protection class for indoor use	Cabinet front panel IP30, wiring IP20
EMC emission	EN50081-2. EN61326 (EN55011 class B. EN61000-3-2. EN61000-3-3)
Immunity	EN50082-2. EN61326 (EN61000-4-2. EN61000-4-3. EN61000-4-4. EN61000-4-5. EN61000-4-6. EN61000-4-11. EN50204)

Configuration software

TracerManager 1: configuration and retrieval of historical data on PC
TracerManager 2: configuration, retrieval and display of real-time data on PC
Minimum configuration required: PC 200 MHz - 64 MB RAM

Internal memory: 8 MB

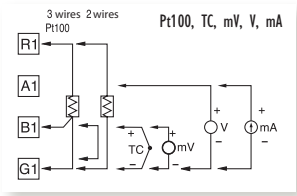
Compact Flash extension up to 4 GB

ENERTRACE Range

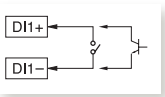
"Plug & Play" paperless recorder

► Electrical connections

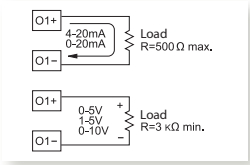
Analogue inputs



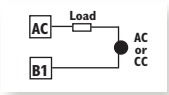
Logical inputs



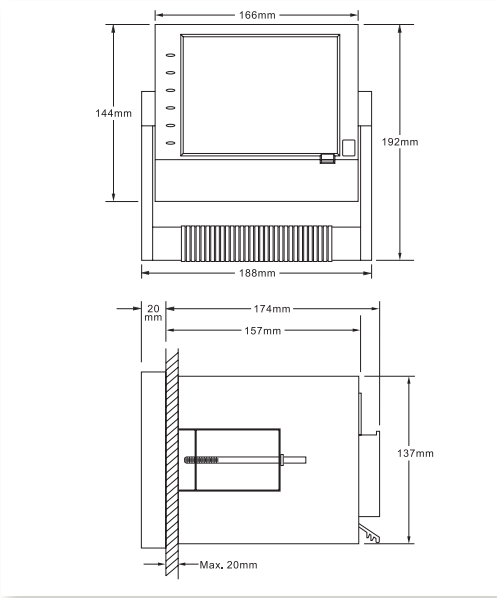
Analogue inputs



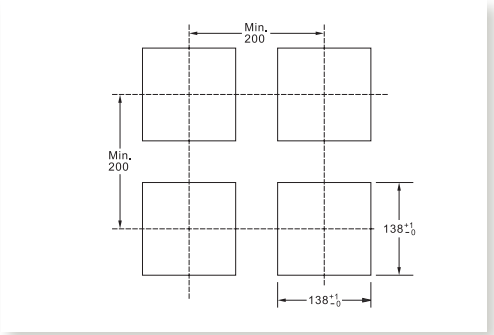
Relay outputs



► Dimensions



► Panel cut-outs



► Associated products

Transducers

► page 152

CT Current transformers

► page 102

TO ORDER

ENERTRACE

1	2	3	4		5	6	7	8		9	10	11	12

1 Power supply — **Code**

4	90-264 Vac 47-63 Hz /110-370 Vdc	**standard**
6	11-18 Vdc	
7	18-36 Vdc	
8	36-72 Vdc	

2 Analogue inputs — **LR00112-000***

0	no analogue input	0 slot
3	3 analogue inputs	1 slot
6	6 analogue inputs	2 slots
A	9 analogue inputs	3 slot
B	12 analogue inputs	4 slots
C	15 analogue inputs	5 slots
D	18 analogue inputs	6 slots

3 Logical inputs — **LR00113-000***

0	no logical input	0 slot
1	6 logical inputs	1 slot
2	12 logical inputs	2 slots

4 Relay outputs — **LR00114-000***

0	no relay	0 slot
1	6 relays	1 slot
2	12 relays	2 slots

5 Communication

0	via Ethernet	**standard**
1	RS232/422/485 (3 in 1) + Ethernet interface	

6 Configuration software

1	"TracerManager1"	**standard**

7 ENERTRACE software

0	basic version
1	calculation, counter and totalizer functions

8 Compact Flash

1	1 GB	**standard**

9 ENERTRACE mounting

1	version for cabinet mounting	**standard**
2	portable version with carrying handle	

10 Option

0	no option	
1	24 Vdc power supply for transmitters (6 max.) [1 slot]	**LR00115-000***

11 Analogue outputs — **LR00123-000***

0	no analogue output	0 slot
3	3 analogue mA outputs	1 slot
6	6 analogue mA outputs	2 slots
A	9 analogue mA outputs	3 slots

12 Negative U/I analogue inputs — **LR00128-000***

0	no negative U/I input	0 slot
3	3 negative U/I inputs	1 slot
6	6 negative U/I inputs	2 slots
A	9 negative U/I inputs	3 slots
B	12 negative U/I inputs	4 slots
C	15 negative U/I inputs	5 slots
D	18 negative U/I inputs	6 slots

ACCESSORIES:

"TracerManager2" software	**LR00132-000***
4 GB Compact Flash memory	**LR00121-000***
Flash/USB adapter	**LR00127-000***

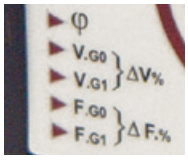
*Can be sold separately

SYNCHROCOUPLER Range

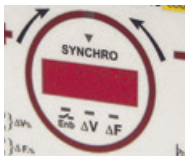
Synchronization instruments for LV networks

PRODUCT ADVANTAGES

- **INTEGRATED IN A 96 X 96 FORMAT**
- 1 synchronization command
- 1 control command
- 3 command modes for synchronization
- Adjustment in just a few seconds (PID model)



Display of deviations between setpoint and measurement



LED display of 3 measurements: phase, frequency and voltage

User-programmable

Description

The **SYNCHROCOUPLER** is an automatic synchronization instrument for generator sets. It includes:
- a control relay for assisted manual coupling or automatic coupling with time delay control
- two control relays (fast/slow) for speed adjustment
- an external control loop for opening the coupling relay
- four front panel keys for programming,display and messages (password option included)

SYNCHROCOUPLEUR

Display:

- Phase angle variations by 30 LEDs arranged in a circle
- Voltages, frequencies, variations (in %) on 4 digits
- Frequency variations ±, status of coupler relay, conditions obtained in phase, frequency and voltage

Power Supply	Reference
24 VDC	LS9N 421X
48 VDC	LS9N 422X
110 VAC	LS9N 423X
230 VAC	LS9N 424X
400 VAC	LS9N 425X

SYNCHROCOUPLEUR PID

Display: as for synchrocoupler

PID adjustment method (Proportional Integral Derivative) for synchronization that is faster and more accurate than with conventional synchronous couplers

- **Proportional:** proportional correction of measurement errors
- **Integral:** guarantees reduction of adjustment error to 0
- **Derivative:** brings greater stability to the system, enabling you to anticipate the inertia of generator sets (e.g. hydroelectric)

Power Supply	Reference
24 VDC	LS9N 441X
48 VDC	LS9N 442X
110 VAC	LS9N 443X
230 VAC	LS9N 444X
400 VAC	LS9N 445X

SYNCHROCOUPLER Range

Synchronization instruments for LV networks

Electrical specifications

Measurements	
Rated voltage range	110 to 600 V
Frequency	35 Hz...80 Hz
Permanent overvoltage	800 V
Consumption	< 500 µA
Relay output	
With sealed inverter contact	8 A - 250 Vac / 5 A - 30 Vdc
Multi-measurement (accuracy)	
Phase angle deviation	± 0.5°
Frequency	± 0.01 Hz
Voltage (RMS)	Class 1 ± 2 digits
Auxiliary power supply	
AC voltage	-10% / +15%
Frequency	35 Hz...450 Hz
Consumption	10 VA

Environment

Operating temperature	-10°C to +65°C
Storage temperature	-40°C to +70°C
Relative humidity	< 90% at 40°C
Protection rating	3
Pollution level	2

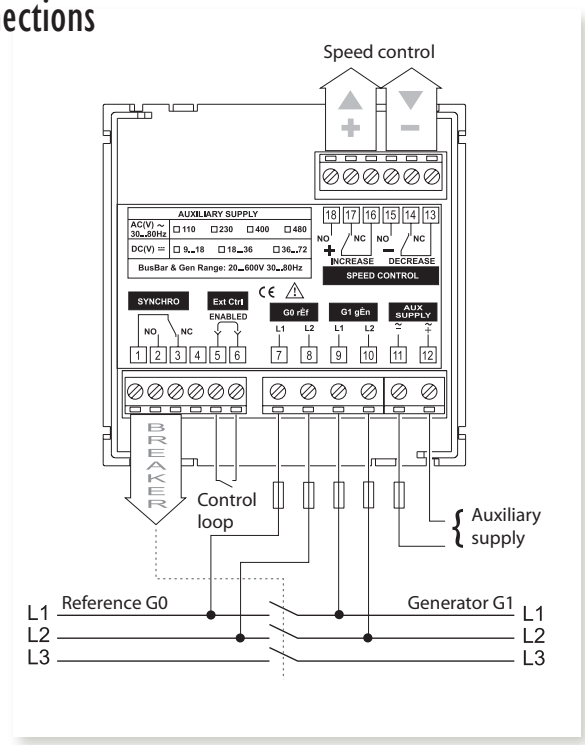
Mechanical specifications

Casing materials	
Casing and flange	Self-extinguishing black ABS
Front panel	Light grey polycarbonate
Protection rating	IP 54 front panel (IP 65 optional)
Weight	350 g
Connection	Holder for 2.5 mm wire
Fitting	Mounting on 8 mm front panel

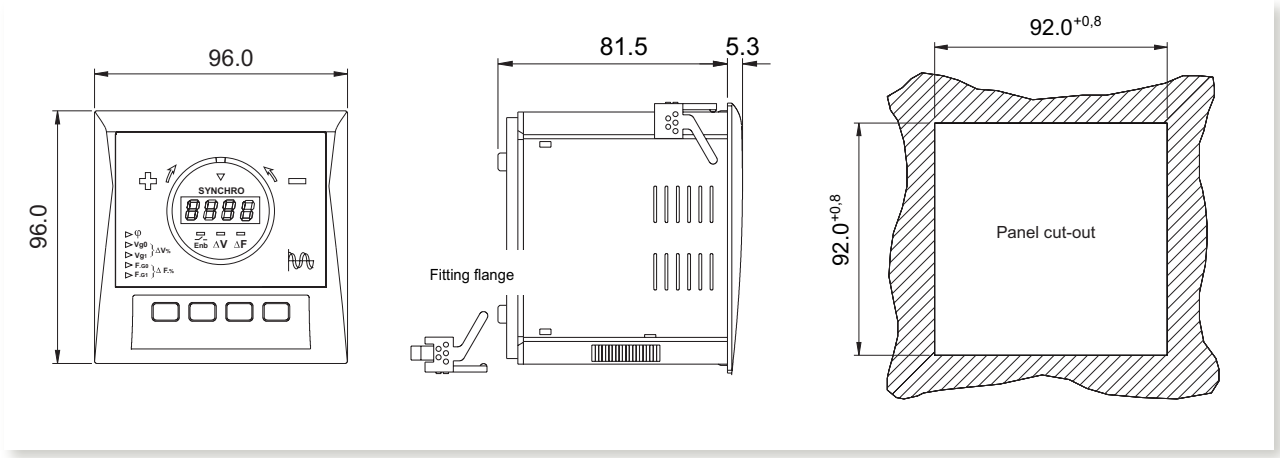
Standards

Reference standards	
Safety	IEC 61010-1
Dimensions	DIN 43700
EMC	EN 61326-1
ANSI function	Nos. 25 and 90
Resistance to shock	IEC 60068-2-27
Resistance to vibrations	IEC 60068-2-6
Environment	IEC 60068-1

Electrical connections



Dimensions and drilling specifications (mm)



Analogue panel meters

Normeurope range

Normeurope range
► page 222

AC ammeter
► page 226

AC voltmeter
► page 226

Frequency meter
► page 227

Maximum demand ammeter
► page 228

Wattmeter Varmeter
► page 229

Phasemeter
► page 230

Synchronization equipment
► page 231

DC ammeter
► page 232

DC voltmeter
► page 233

Command function meter
► page 234

COHO/LK ranges

COHO hour meters
► page 236

LK hour meters
► page 237

Choosing an analogue panel meter

	NORMEUROPE				COHO / LK	
	► page 222				► pages 236/237	
						
Front panel drilling						
Round barrel					COHO	LK
Square barrel						LK
Front panel						
Format	48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	48 x 48
Standard functions						
AC Ammeter	90°			250°		
AC Voltmeter	90°			250°		
Pointer dial frequency meter			90°	250°		
Vibrating reed frequency meter		1 x 9 reeds				
Maximum demand ammeter			90°			
Wattmeter / Varmeter	90°			250°		
Phasemeter		90°	250°	360°		
DC Ammeter	90°			250°		
DC Voltmeter	90°			250°		
Hour meter						
Synchronization equipment						
Synchronoscope				360°		
Double vibrating reed frequency meter		2 x 9 reeds				
Differential voltmeter			90°	250°		
Command functions meter						
AC Current / AC Voltage			90°			
DC Current / DC Voltage			90°			
Temperature			90°			
Strengths	NORMEUROPE, the industry reference for the production, transportation and distribution of electrical energy for high-level operating constraints.				COHO, the industry reference for high limit operating environments and LK for standard applications.	

Info & advice

The essential function of the analogue panel meter is to display instantaneous and variable values. It shows the pointer's position and movement, both required for monitoring industrial processes.

SELECTING A PANEL METER

As a panel meter is a low-cost item, it is easily installed at the various command and monitoring points: the switchboard panels of LV distribution networks, motor drive control units or automation device panels.

Functions

Choose the quantity to be displayed in order to monitor and control a known risk. For an electrical line, for example, the voltage is selected as it is crucial for ensuring user safety.

Ergonomics

Choose the instrument size depending on the distance between the operator and the mounting panel. Choose the pointer deflection: a deflection of 240°may be preferred to the usual 90°deflection, to facilitate the reading of extended ranges.

Environmental constraints and standards

It is important to take into account mechanical specifications, environmental restrictions, standards in force, consumption and compatibility with sensors, in order to choose the appropriate dial ranges and calibration scales.

Options and accessories

Panel meters, though robust by nature, are nevertheless sensitive to degraded environments. It is therefore recommended to choose customized solutions for military applications, for onboard rail applications or for explosive atmospheres.

MOVING IRON OR MOVING COIL?

The electric current is read directly by a sensor guiding the pointer movement.
The two most usual types are:

Moving iron

The moving iron panel meter is composed of a fixed magnet and a mobile magnet, mutually repellent and placed in the field of a coil powered by the current to be measured. The moving iron panel meter carries out measurements in true RMS.
Calibrated for alternating current, it can also measure values in direct current but with a diminished accuracy rating of about 3. The scale can be normal, motor or expanded.

Moving coil

The moving coil panel meter is composed of a coil traversed by the current to be measured which pivots around a permanently fixed magnet. Due to its low consumption, the moving coil panel meter is the ideal instrument for the measurement of low direct current values. Its scale is linear.

SPECIAL FUNCTIONS

Maximum demand ammeters

The maximum demand ammeter or thermal ammeter indicates the RMS current for a given period. It is designed to control slow overloads on transformers, cables, etc.

Synchronization equipment

Necessary for the paralleling of generators or network-network or network-alternator coupling. The user can thus ensure that the voltage to be synchronized and the reference voltage are of the same frequency and amplitude and are in phase before carrying out the coupling.

The **synchronoscope**, used to synchronize 2 different sources, indicates the moment when their phaseshifting and frequencies are identical. The pointer indicates the central position and remains stationary.

The **vibrating-reed dual frequency meter** enables you to synchronize the frequency of a source with a reference source.

The **double voltmeter**, composed of two independent moving iron measuring elements, is used to synchronize the voltages of two different sources, and indicates the voltage present on each.

The **differential or zero voltmeter** is powered by the voltages of two different sources and indicates the percentage difference between the source to be synchronized and the nominal voltage.

The **phase rotation sequence indicator** enables you to verify that the phase rotation sequence of a three-phase system is respected.

FOCUS

How to connect a panel meter

The analogue panel meter is easy to mount and connect. The dial contains an array of pictograms and terminals indicating polarity markers. A user guide is supplied only for complex functions.

The precautions to be taken concern:

- the cross-section of connecting wires and their lugs;
- the mounting or replacement of dials when they are interchangeable;
- heat loss, if the panel meters are enclosed in very small volumes.

Maintenance of your panel meter

Check regularly that the connection terminals of the panel meter are tightened correctly when a strong current is passed through it.

Clean regularly to avoid the accumulation of static electricity on the plastic transparent surface of the dial (cleaning with soapy water is sufficient).

NORMEUROPE Range

Round barrel analogue panel meters for high-level operating constraints

PRODUCT ADVANTAGES

- **WIDE CLIENT REFERENCE BASE:** main utilities, marine applications, energy producers and distributors
- **WIDE CHOICE** of functions, formats, ratings and options
- **LONG PRODUCT LIFE SPAN**

Accurate

Slim-line, small barrel diameter, multiple connection possibilities

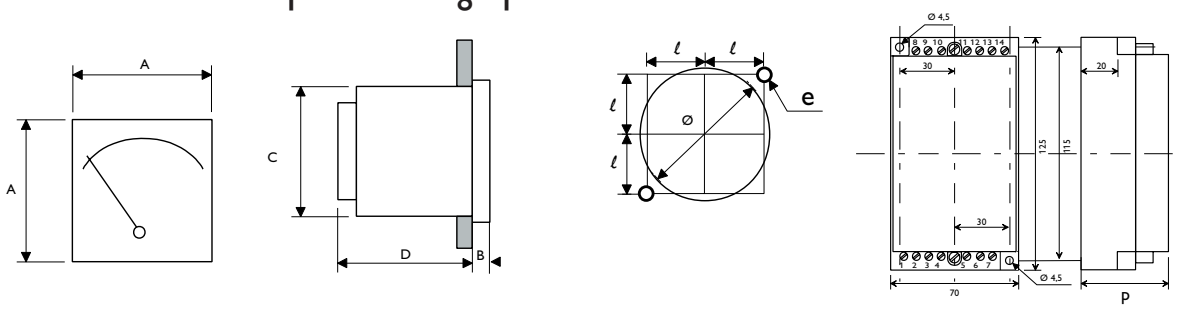
Attractive design and easy to read

General specifications

Standard: IEC 60051-1
Accuracy: class 1.5
(± 1.5% error margin at full scale)
Front panel protection: IEC 60529
(see presentation table)
Insulation test:
IEC 61010-1 Category III
Maximum service voltage: 650 Vac
Mechanical shock resistance:
IEC 68-2-27
Vibration resistance: IEC 60068-2-6
Environment: IEC 68-1
Reference temperature: 23°C ± 2°C
Operating temperature: -25°C to +50°C
Storage temperature: -25°C to +70°C
Relative humidity: < 90% at 40°C
Mounting:
• Front panel mounting
• Panel thickness: 8 mm max.

Materials:
Barrel: self-extinguishing polycarbonate
Front panel: polymethyl methacrylate (glass option NEL)
Additional terminal: socket in Bakelite, cover in ABS
Dial: light alloy, black markers on white background
Black knife-edge arrow pointer
Operating position:
calibrated for vertical position (± 10%)
Overloads:
Voltmeter and frequency meter
- 1.2 Un permanent
- 2 Un during 5 secs
Ammeter
- 1.3 In permanent
- 10 In during 5 secs
Extreme values:
Safety recommendation IEC 60 051-1
1-1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 - 8 - 9 and their multiples and decimal sub-multiples

Dimensions and panel drilling specifications



A x A		Panel meter				Additional unit	
Format		48 x 48	72 x 72	96 x 96	144 x 144	A	B
B	(mm)	8	13	14	20		
C	(mm)	diam. 44	diam. 55	diam. 80	diam. 80		
D 90° deflection	(mm)	46	29 if 20 A max, 39 if 25 A max or more		24.5		
D 250° deflection or blades	(mm)	58	71		66		
D 360° deflection	(mm)			128 phasem. 108 synchro	131 phasem. 104 synchro		
D command unit	(mm)			93			
Ø	(mm)	45	58	88	138		
ℓ	(mm)	20.25	26.5	34	55		
e or p	(mm)	3.5	4.5	4.5	5.5	48	122
Weight	(kg)	0.20	0.25	0.30	0.45	0.30	0.70
Terminal		M4 and Faston up to 20 A, M6 for higher values				cage for 4 mm² wire	

Mechanical specifications

Deflection		90°				250°			
Format		48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Panel mounting and tightness									
Protection: front panel IP 40; unit IP 20 360° panel meters all with 4 studs		2 studs M2.5	2 studs M4	2 studs M4	2 studs M5	2 studs M2.5	2 studs M4	2 studs M4	2 studs M5
Option Ring fastener	IP 40 front panel	48 mm drill	58 mm drill	88 mm drill		48 mm drill	58 mm drill	88 mm drill	
Option Sealed gasket	IP 52 front panel	2 studs M2.5	2 studs M4	2 studs M4	2 studs M5	2 studs M2.5	2 studs M4	2 studs M4	2 studs M5
Option Reinforced mounting+gasket	IP 52 front panel	4 studs M2.5	4 studs M4	4 studs M4	4 studs M5	4 studs M2.5	4 studs M4	4 studs M4	4 studs M5
Option Watertight (except Imax)	IP 54 front panel		4 studs M4	4 studs M4	4 studs M5	4 studs M2.5	4 studs M4	4 studs M4	4 studs M5
Option Marine (except Imax)	IP 55 full unit		4 studs M4	4 studs M4	4 studs M5	4 studs M2.5	4 studs M4	4 studs M4	4 studs M5
Non-standard front cover									
NEL (in glass with black surround)			•	•			•	•	
NEL non-reflecting glass (matt surface with black surround)			•	•	•		•	•	•
Dial non-standard options									
Creation of dial markings (where feasible)		•	•	•	•	•	•	•	•
Colour marking		•	•	•	•	•	•	•	•
Colour zone		•	•	•	•	•	•	•	•
Black background, white markings		•	•	•	•	•	•	•	•
Markings not in standard documentation		•	•	•	•	•	•	•	•
Double scale			•	•	•	•	•	•	•

Accessories

Deflection	90°				250°			
Format	48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Front panel sealed gasket	2465 001	2314 375	2314 376	2465 004	2465 001	2314 375	2314 376	2465 004
Fitting clip (without seal)	2328 558	2302 348	2307 086		2328 558	2302 348	2307 086	
Standard dial	•	•	•	•	•	•	•	•
Customized dial	•	•	•	•	•	•	•	•
Antistatic liquid	9030 00676							
Insulation sleeve for terminals	ACCQ 1001							

NORMEUROPE Range

AC Ammeter

Deflection 90°
Standard scale model
Accuracy class: 1.5
Measuring component: moving iron 50-60-400 Hz and rectified moving coil 50-10,000 Hz
Pseudo linear scale (moving iron)
Interchangeable dial, except 144 x 144
Consumption: 1 VA
Motor scale model
Accuracy class: 1.5
Measuring component: moving iron 50-60-400 Hz
Pseudo linear scale
Calibrated 0-In up to 2/3 of deflection, beyond overload zone
Interchangeable 90° dial, except 144 x 144 format
Consumption: 1 VA

Deflection 250°
Standard scale model
Accuracy class: 1.5
Measuring component: rectified moving coil 50-10,000 Hz
Linear scale
With additional unit "A" in 48 x 48 format
Consumption: 0.5 VA
Motor scale model
Accuracy class: 1.5
Measuring component: rectified moving coil 50-10,000 Hz
Linear scale
Calibrated 0-In up to 2/3 of deflection,beyond overload zone
With additional unit "A" in 48 x 48 format
Consumption: 0.5 VA

Feasibility limits

Deflection		90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Direct connection									
Standard scale	moving iron	0.5 to 15 A	0.5 to 50 A						
	moving coil		1 mA to 25 A			1 mA to 25 A			
Motor scale	moving iron 2 to 6 In	0.5 to 12 A	0.5 to 40 A						
	moving coil 2/3/5 In					0.5 to 20 A			
Connection on CT									
Standard scale	moving iron	1 to 6.6 A							
	moving coil	1.3 to 6.6 A				1.2 to 6.6 A			
Motor scale	moving iron 2 to 6 In	1 A and 5 A							
	moving coil 2/3/5 In					1 A and 5 A			

Direct connection

Deflection		Moving iron. 50 Hz 90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Rating	**Scale In**								
5 A	0-5 A	•	A90A 0302	A90A 0502	•	•	•	•	•
10 A	0-10 A	•	A90A 0303	A90A 0503	•	•	•	•	•
20 A	0-20 A		A90A 0304	A90A 0504	•		•	•	•
30 A	0-30 A		A90A 0305	A90A 0505	•				
50 A	0-50 A		A90A 0307	A90A 0507	•				
Rating	**Scale 3 In**								
5 A	0-5/15 A	•	•	A90A 0533	•	•	•	•	•
10 A	0-10/30 A	•	•	A90A 0534	•	•	•	•	•
20 A	0-20/60 A		•	A90A 0535	•		•	•	•
30 A	0-30/90 A		•	A90A 0536	•				
40 A	0-40/120 A		•	A90A 0537	•				
Rating	**Scale 5 In**								
5 A	0-5/25 A		•	•	•		•	•	•

Customized products

	Instruments	Deflection/Motor scale	Format	Scale	Rating CT ratio	Frequency
Example	**Complete Ind**	**90° iron 250° coil**	**72 x 72 144 x 144**	**0-15/90 A 0-1.25/2.5 kA**	**direct 15 A TC 1250/5 A**	**50 Hz 60 Hz**

Connection on CT 5 A

Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Deflection		Moving iron 50 Hz 90° Panel meter and dial separate			Moving iron 50 Hz 90° Complete panel meter				Complete panel meter 250°			
Ratio	Scale	Complete panel meter										
		A90A 0487	A90A 0486	A90A 0485								
TC	1.3 In	Dial only										
5/5 A	0-6.5 A	CADR 0136	CADR 0702	CADR 0492	•	•	•	•	•	•	•	•
10/5 A	0-13 A	CADR 0137	CADR 0703	CADR 0493	•	•	•	•	•	•	•	•
15/5 A	0-20 A	CADR 0138	CADR 0704	CADR 0494	•	•	•	•	•	•	•	•
20/5 A	0-26 A	CADR 0111	CADR 0461	CADR 0441	A90A 0211	A90A 0311	A90A 0511	•	•	•	A250 A0611	•
25/5 A	0-32.5 A	CADR 0110	CADR 0701	CADR 0486	•	•	•	•	•	•	•	•
30/5 A	0-40 A	CADR 0112	CADR 0462	CADR 0442	A90A 0212	A90A 0312	A90A 0512	•	•	•	A250 A0612	•
40/5 A	0-52 A	CADR 0113	CADR 0463	CADR 0443	A90A 0213	A90A 0313	A90A 0513	•	•	•	A250 A0613	•
50/5 A	0-65 A	CADR 0114	CADR 0464	CADR 0444	A90A 0214	A90A 0314	A90A 0514	•	•	•	A250 A0614	•
60/5 A	0-80 A	CADR 0115	CADR 0465	CADR 0445	A90A 0215	A90A 0315	A90A 0515	•	•	•	A250 A0615	•
75/5 A	0-100 A	CADR 0116	CADR 0466	CADR 0446	A90A 0216	A90A 0316	A90A 0516	•	•	•	A250 A0616	•
100/5 A	0-130 A	CADR 0117	CADR 0467	CADR 0447	A90A 0217	A90A 0317	A90A 0517	•	•	•	A250 A0617	•
125/5 A	0-165 A	CADR 0118	CADR 0468	CADR 0448	A90A 0218	A90A 0318	A90A 0518	•	•	•	A250 A0618	•
150/5 A	0-200 A	CADR 0119	CADR 0469	CADR 0449	A90A 0219	A90A 0319	A90A 0519	•	•	•	A250 A0619	•
200/5 A	0-260 A	CADR 0120	CADR 0470	CADR 0450	A90A 0220	A90A 0320	A90A 0520	•	•	•	A250 A0620	•
250/5 A	0-325 A	CADR 0121	CADR 0471	CADR 0451	A90A 0221	A90A 0321	A90A 0521	•	•	•	A250 A0621	•
300/5 A	0-400 A	CADR 0122	CADR 0472	CADR 0452	A90A 0222	A90A 0322	A90A 0522	•	•	•	A250 A0622	•
400/5 A	0-520 A	CADR 0123	CADR 0473	CADR 0453	A90A 0223	A90A 0323	A90A 0523	•	•	•	A250 A0623	•
500/5 A	0-650 A	CADR 0124	CADR 0474	CADR 0454	A90A 0224	A90A 0324	A90A 0524	•	•	•	A250 A0624	•
600/5 A	0-800 A	CADR 0125	CADR 0475	CADR 0455	A90A 0225	A90A 0325	A90A 0525	•	•	•	A250 A0625	•
750/5 A	0-1 kA	CADR 0126	CADR 0476	CADR 0456	A90A 0226	A90A 0326	A90A 0526	•	•	•	A250 A0626	•
800/5 A	0-1.04 kA	CADR 0135	CADR 0481	CADR 0487	•	•	•	•	•	•	•	•
1000/5 A	0-1.3 kA	CADR 0127	CADR 0477	CADR 0457	A90A 0227	A90A 0327	A90A 0527	•	•	•	A250 A0627	•
1250/5 A	0-1.65 kA	CADR 0128	CADR 0478	CADR 0458	A90A 0228	A90A 0328	A90A 0528	•	•	•	A250 A0628	•
1500/5 A	0-2 kA	CADR 0129	CADR 0479	CADR 0459	A90A 0229	A90A 0329	A90A 0529	•	•	•	A250 A0629	•
2000/5 A	0-2.6 kA	CADR 0130	CADR 0480	CADR 0460	A90A 0230	A90A 0330	A90A 0530	•	•	•	A250 A0630	•
2500/5 A	0-3.25 kA	CADR 0131	CADR 0482	CADR 0488	•	A90A 0331	A90A 0531	•	•	•	•	•
3000/5 A	0-4 kA	CADR 0132	CADR 0483	CADR 0489	•	A90A 0332	A90A 0532	•	•	•	•	•
4000/5 A	0-5.2 kA	CADR 0133	CADR 0484	CADR 0490	•	•	•	•	•	•	•	•
5000/5 A	0-6.5 kA	CADR 0134	CADR 0485	CADR 0491	•	•	•	•	•	•	•	•
Ratio	Scale	Complete panel meter										
		A90A 0107	A90A 0106	A90A 0105								
TC	3 In	Dial only										
5/5 A	0-5/15 A	CADR 0139	CADR 0169	CADR 0059	A90A 0239	A90A 0339	A90A 0539	•	•	•	A250 A0639	•
10/5 A	0-10/30 A	CADR 0140	CADR 0170	CADR 0060	A90A 0240	A90A 0340	A90A 0540	•	•	•	A250 A0640	•
15/5 A	0-15/45 A	CADR 0141	CADR 0171	CADR 0061	A90A 0241	A90A 0341	A90A 0541	•	•	•	A250 A0641	•
20/5 A	0-20/60 A	CADR 0142	CADR 0172	CADR 0062	A90A 0242	A90A 0342	A90A 0542	•	•	•	A250 A0642	•
25/5 A	0-25/75 A	CADR 0167	CADR 0168	CADR 0087	•	•	•	•	•	•	•	•
30/5 A	0-30/90 A	CADR 0143	CADR 0173	CADR 0063	A90A 0243	A90A 0343	A90A 0543	•	•	•	A250 A0643	•
40/5 A	0-40/120 A	CADR 0144	CADR 0174	CADR 0064	A90A 0244	A90A 0344	A90A 0544	•	•	•	A250 A0644	•
50/5 A	0-50/150 A	CADR 0145	CADR 0175	CADR 0065	A90A 0245	A90A 0345	A90A 0545	•	•	•	A250 A0645	•
60/5 A	0-60/180 A	CADR 0146	CADR 0176	CADR 0066	A90A 0246	A90A 0346	A90A 0546	•	•	•	A250 A0646	•
75/5 A	0-75/225 A	CADR 0147	CADR 0177	CADR 0067	A90A 0247	A90A 0347	A90A 0547	•	•	•	A250 A0647	•
100/5 A	0-100/300 A	CADR 0148	CADR 0178	CADR 0068	A90A 0248	A90A 0348	A90A 0548	•	•	•	A250 A0648	•
125/5 A	0-125/375 A	CADR 0149	CADR 0179	CADR 0069	A90A 0249	A90A 0349	A90A 0549	•	•	•	A250 A0649	•
150/5 A	0-150/450 A	CADR 0150	CADR 0180	CADR 0070	A90A 0250	A90A 0350	A90A 0550	•	•	•	A250 A0650	•
200/5 A	0-200/600 A	CADR 0151	CADR 0181	CADR 0071	A90A 0251	A90A 0351	A90A 0551	•	•	•	A250 A0651	•
250/5 A	0-250/750 A	CADR 0152	CADR 0182	CADR 0072	A90A 0252	A90A 0352	A90A 0552	•	•	•	A250 A0652	•
300/5 A	0-300/900 A	CADR 0153	CADR 0183	CADR 0073	A90A 0253	A90A 0353	A90A 0553	•	•	•	A250 A0653	•
400/5 A	0-0.4/1.2 kA	CADR 0154	CADR 0184	CADR 0074	A90A 0254	A90A 0354	A90A 0554	•	•	•	A250 A0654	•
500/5 A	0-0.5/1.5 kA	CADR 0155	CADR 0185	CADR 0075	A90A 0255	A90A 0355	A90A 0555	•	•	•	A250 A0655	•
600/5 A	0-0.6/1.8 kA	CADR 0156	CADR 0186	CADR 0076	•	A90A 0356	A90A 0556	•	•	•	•	•
750/5 A	0-0.75/2.25 kA	CADR 0157	CADR 0187	CADR 0077	•	A90A 0357	A90A 0557	•	•	•	•	•
800/5 A	0-0.80/2.4 kA	CADR 0158	CADR 0188	CADR 0078	•	•	•	•	•	•	•	•
1000/5 A	0-1/3 kA	CADR 0159	CADR 0189	CADR 0079	•	•	•	•	•	•	•	•
1200/5 A	0-1.2/3.6 kA	CADR 0160	CADR 0190	CADR 0080	•	•	•	•	•	•	•	•
1500/5 A	0-1.5/4.5 kA	CADR 0161	CADR 0191	CADR 0081	•	•	•	•	•	•	•	•
2000/5 A	0-2/6 kA	CADR 0162	CADR 0192	CADR 0082	•	•	•	•	•	•	•	•
2500/5 A	0-2.5/7.5 kA	CADR 0163	CADR 0193	CADR 0083	•	•	•	•	•	•	•	•
3000/5 A	0-3/9 kA	CADR 0164	CADR 0194	CADR 0084	•	•	•	•	•	•	•	•
4000/5 A	0-4/12 kA	CADR 0165	CADR 0195	CADR 0085	•	•	•	•	•	•	•	•
5000/5 A	0-5/15 kA	CADR 0166	CADR 0196	CADR 0086	•	•	•	•	•	•	•	•

Associated products

Accessories

► page 223

CT Current transformers

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NORMEUROPE Range

AC Voltmeter

Deflection 90°
Standard scale model
Accuracy class: 1.5
Measuring component: moving iron 50-60-400 Hz and rectified moving coil 50-10,000 Hz
Pseudo linear scale (iron)
Interchangeable dial, except 144 x 144
Consumption: 4.5 VA max
Extended scale model
Accuracy class: 1.5
Measuring component: moving iron 50-60-400 Hz
Pseudo linear scale
Consumption: 2.5 VA
With additional "A" unit for 48 x 48 format in 250° and 90° if value < 100 V

Deflection 250°
Standard scale model
Accuracy class: 1.5
Measuring component: rectified moving coil 50-10,000 Hz
Linear scale
Impedance 1 kΩ/V
Extended scale model
Accuracy class: 1.5
Measuring component: rectified moving coil 50-10,000 Hz
Linear scale
Impedance 2 kΩ/V
With additional "A" unit in 48 x 48 format in 250° and 90° if value < 100 V

Feasibility limits

Deflection		90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Direct connection									
Scale	Moving iron	15 to 600 V							
Vn: 1.2 Vn	Moving coil	1.5 to 600 V				3 to 600 V			
Extended scale		10-15, 20-30, 40-70, 75-120, 80-120, 90-130, 90-140, 100-150, 200-300, 400-600 V				40-70, 80-120, 96-144, 100-150, 400-600 V			
Connection on VT									
Scale according to client specifications		from Un/ 100/√3 V				from Un/ 100/√3 V			

Direct connection

Deflection		Iron 50 Hz 90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Rating	**Scale Vn**								
15 V	0-15 V	•	•	•	•	•	•	•	•
30 V	0-30 V	•	•	•	•	•	•	•	•
60 V	0-60 V	•	•	•	•	•	•	•	•
150 V	0-150 V	•	•	•	•	•	•	•	•
250 V	0-250 V	A90V 0266	A90V 0366	A90V 0566	•	•	•	A250 0666	•
300 V	0-300 V	A90V 0268	A90V 0368	A90V 0568	•	•	•	A250 0668	•
500 V	0-500 V	A90V 0267	A90V 0367	A90V 0567	•	•	•	A250 0667	•
Rating	**Extended scale**								
230 V	150-260	•	•	A90V 0588	•	•	•	•	•
400 V	300-450	•	•	A90V 0589	•	•	•	•	•

Connection on VT

Deflection		Iron 50 Hz 90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
VT ratio	**Scale**								
TT/100 V	0-1.2 Vn	•	•	•	•	•	•	•	•
TT/100/√3 V	0-1.2 Vn	•	•	•	•	•	•	•	•

Customized products

	Connection	Deflection / Measure	Format	Scale	Rating VT ratio	Frequency
Example	direct on TV	90° iron 250° coil	72 x 72 96 x 96	Vn 1.2 Vn	15 V 20 / 0.11 kV	50 Hz 60 Hz

Associated products

Accessories
► page 223

Frequency meter

Pointer frequency meter

Deflection 90° 250°

Accuracy class: 0.5 of Fn
Measuring component: moving coil and frequency converter
Linear scale
Domain of use: 0.80 Un to 1.15 Un
With additional "A" unit for 48 x 48 format in 250° and 90° if value < 100 V
Consumption: 3 VA

Feasibility constraints

Voltage 57.7 V to 440 V and frequency 50 to 400 Hz

Format		72 x 72	96 x 96	144 x 144
Rated voltage	Measurement range	Deflection 90°		
100 V	45-55 Hz	•	•	•
	55-65 Hz	•	•	•
230 V	45-55 Hz	•	FA90 0681	•
	55-65 Hz	•	•	•
400 V	45-55 Hz	•	FA90 0682	•
	55-.65 Hz	•	•	•

Format		72 x 72	96 x 96	144 x 144
Rated voltage	Measurement range	Deflection 250°		
100 V	45-55 Hz	•	•	•
	55-65 Hz	•	•	•
230 V	45-55 Hz	•	•	•
	55-65 Hz	•	•	•
400 V	45-55 Hz	•	•	•
	55-65 Hz	•	•	•

Customized products

	Deflection	Format	Voltage	Measurement range
Example	90° 250°	72 x 72 144 x 144	100 V 110 V	45-55 Hz 45-65 Hz

Associated products

Accessories

► page 223

NORMEUROPE Range

Maximum demand ammeter

Deflection 90°

Accuracy class: 3
Measuring component: spiralled double reed (I rms avg.)
Frequency: 0-400 Hz
Overload capacity:
1.5 In permanent
10 In for 1 s
Consumption: 3 VA
Pointer guided by measurement component and adjustable by button on front panel

Feasibility limits

Hour meter power supply from 24 V to 440 V at 50 or 60 Hz for model 161B.

Connection on CT

Model (I max)		Integration Time	Calibre	Graduation	Deflection 90° 72 x 72	Deflection 90° 96 x 96
101B		8 min	7.5 A	according to primary CT / 5 A	•	
		15 min			•	•
131B	With relay, breaking capacity	8 min			•	•
	10 VA resistive, 250 Vac max or 0.5 A	15 min			•	•
161B	With hour meter	8 min			•	•
	230 V - 50 Hz, 99,999.99 h	15 min			•	•

• Parameters to be indicated when ordering

Customized products

	Format	Model	Integration time	Primary CT	Hour meter supply
Example	72 x 72 96 X 96	101 B 161 B	15' 8'	100 / 5 A 600 / 5 A	100 V - 60 Hz

Associated products

Accessories
► page 223

CT Current transformers
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Wattmeter Varmeter

Deflection 90° 250°

Linear scale, measurement range according to client specifications (absorbed or generated power)
Measuring component:
moving coil 2 mA and electrical circuit in additional "B" unit.
Accuracy class: 1.5
Consumption:
Current circuit 0.3 VA at In
Voltage circuit 2.5 VA at Un

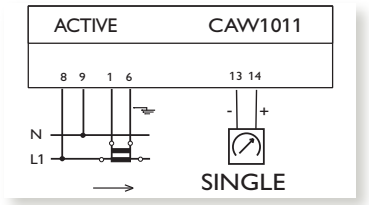
Overload capacity:
Current circuit:
1.5 In permanent
10 In for 5 s
30 In for 3 s
Voltage circuit:
1.3 permanent
2 Un for 10 s
Domain of use:
between 0.8 and 1.3 Sn
Voltage 0.8 to 1.15 Un
Current 0 to 1.2 In
Frequency ± 5 Hz

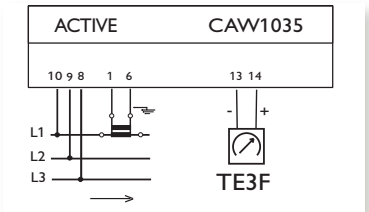
Feasibility limits

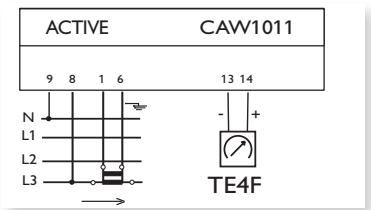
Voltage 57.7 V to 440 V

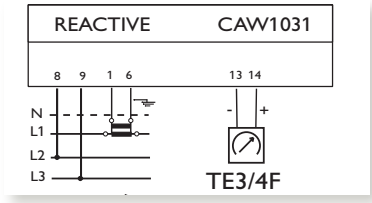
Network			Frequency	Current	Voltage	Deflection 90°			Deflection 250°		
				Connection		72 x 72	96 x 96	144 x 144	72 x 72	96 x 96	144 x 144
Single phase	mono	active	50 Hz or 60 Hz or 400 Hz	on TC/1 A or TC/5 A	direct 230 V or 400 V	•	•	•	•	•	•
Balanced three-phase 3 wires	TE3F	active									
	TE3F	reactive									
Balanced three-phase 4 wires	TE4F	active									
	TE4F	reactive									
Unbalanced three-phase 3 wires	TNE3F	active			on TT 100/√3 110/√3 100 110 - 230 or 400 V						
	TNE3F	reactive									
Unbalanced three-phase 4 wires	TNE4F	active									
	TNE4F	reactive									

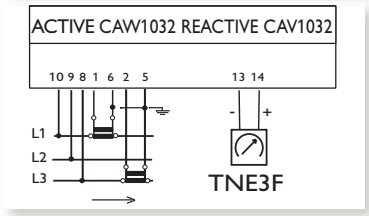
• Parameters to be indicated when ordering

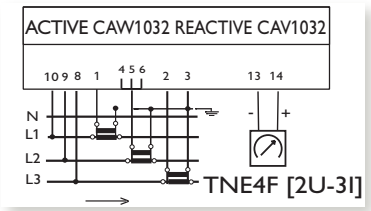












Customized products

	Network	Deflection	Format	Frequency	CT ratio	Direct / VT	Voltage or VT ratio	Scale beginning	Scale ending
Examples	Active single	90°	72 x 72	50 Hz	1000 / 5 A	Direct	230 V	0 kW	250 kW
	Reactive balanced three-phase 3 wires	250°	96 x 96	60 Hz	400 / 5 A	TT	20 kV / 115 V	- 12 Mvar	+ 12 MVar

Associated products

Accessories
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CT Current transformers
► page 102

NORMEUROPE Range

Phasemeters

Deflection 90° 250°
Scale in cos φ
Measuring component:
Moving coil and electronic circuit in additional "B" unit.
Accuracy class: 2.5
Consumption:
Circuit current 0.3 VA
Circuit voltage 0.2 VA
Overload capacity:
Current circuit 2 In permanent
10 In for 5 s
Voltage circuit 1.3 Un permanent
2 Un for 10 s

Operating range:
Voltage 0.8 to 1.2 Un
Current 0.2 to 1.2 In
Frequency ± 5 Hz

Deflection 360°
Scale 4 quadrants in cos φ
Additional "B" unit
Accuracy class: 1.5
Consumption:
Current circuit 0.5 VA
Voltage circuit 10 VA
Overload capacity:
Current circuit 1.2 In permanent
10 In for 5 s
Voltage circuit 1.2 Un permanent
2 Un for 5 s

Operating range:
Voltage 0.8 to 1.2 Un
Current 0.2 to 1.2 In
Frequency ± 5 Hz

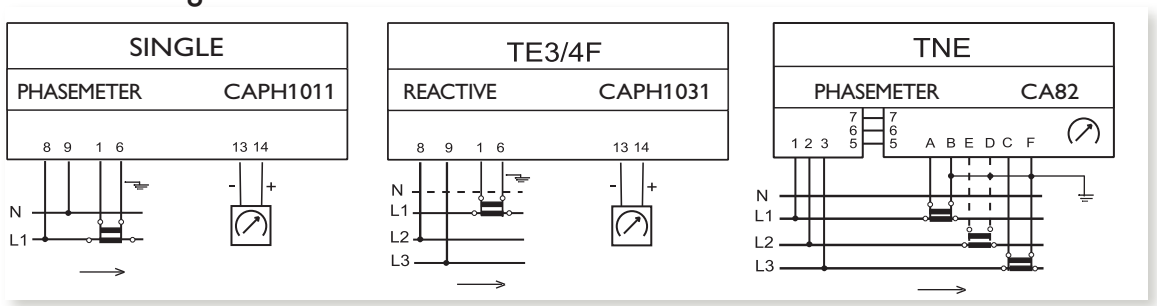
► Feasibility limits

Voltage 57.7 to 440 V, other measurement ranges

Network	Frequency	Secondary CT	Voltage	Measurement range	Deflection 90°			Deflection 250°			Deflection 360°	
					72 x 72	96 x 96	144 x 144	72 x 72	96 x 96	144 x 144	96 x 96	144 x 144
Single or balanced 3-phase 3/4 wires	50 Hz or 60 Hz	1 A or 5 A	100 V 110 V 230 V 400 V	0.5 lead/1/0.2 lag 0.5 lead/1/0.5 lag	•	•	•	•	•	•		
Unbalanced 3-phase 3/4 wires				-1 / 0 / +1							•	•

• Parameters to indicate when ordering

► Block diagram



► Customized products

	Network	Deviation	Format	Frequency	Secondary CT	Voltage	Measurement range
Examples	SINGLE Unbalanced three-phase	250° 360°	72 x 72 144 x 144	50 Hz 60 Hz	5 A 1 A	230 V 440 V	0.5 lead /1/0.5 lag -1 / 0 / +1

► Associated products

Accessories
► page 223

CT Current transformers
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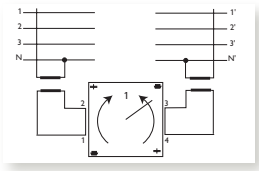
Synchronizers

Synchronoscope

Deflection 360°
Accuracy class: 1.5
Three-phase network:
2-wire connection
Consumption:
Reference current 1.5 VA
Circuit generator 5 VA
Operating range: 0.8 to 1.2 Vn
Overload capacity: 1.2 Vn
permanent 2 Vn for 5 s
Additional unit "B"

Feasibility limits

Voltage 57.7 V to 440 V



Deflection		360°	
Format		**96 x 96**	**144 x 144**
Frequency	**Voltage**		
50 Hz	100/√3 V	•	•
	100 V	SYNC 0686	•
	230 V	SYNC 0687	•
	400 V	•	•
60 Hz	100/√3 V	•	•
	100 V	•	•
	230 V	•	•
	400 V	•	•
Phase lamp		2318635001	2318635001

Customized products

	Format	Frequency	Voltage	Phase lamp
Examples	144 x 144 96 x 96	50 Hz 60 Hz	100 V 440	With Without

Vibrating-reed double frequency meter

Accuracy class: 0.5
Consumption: 3 VA
Operating range: 0.8 to 1.15 Un
Measuring component: vibrating reed in field of coil
Amplitude of vibration: proportional to V^2

Feasibility limits

Voltage 57.7 V to 440 V

		2 rows of 9 segments		
Format		**72 x 72**	**96 x 96**	**144 x 144**
Frequency	**Voltage**			
48-52 Hz	100/√3 V	•	•	•
	100 V	•	FL12 0677	•
	230 V	•	FL12 0678	•
	400 V	•	FL12 0679	•
58-62 Hz	100/√3 V	•	•	•
	100 V	•	•	•
	230 V	•	•	•
	400 V	•	•	•

Customized products

	Format	Frequency	Voltage
Examples	96 x 96 72 x 72	48-52 Hz 58-62 Hz	100/√3 V 415 V

Differential Voltmeter

Deflection 90° 250°
Accuracy class: 2.5
Consumption: 0.5 VA per circuit
Frequency: 50-60 Hz
Measurement range
0.75 to 1.25 Un
Additional unit "B"

Feasibility limits

Measurement range,other...
Voltage 57.7 V to 440 V

Deflection		90°		
Format		**72 x 72**	**96 x 96**	**144 x 144**
Voltage Un				
100/√3 V		•	•	•
100 V		•	BASS 0591	•
230 V		•	BASS 0592	•
400 V		•	BASS 0593	•

Deflection		250°		
Format		**72 x 72**	**96 x 96**	**144 x 144**
Voltage Un				
100/√3 V		•	•	•
100 V		•	C250 0691	•
230 V		•	•	•
400 V		•	•	•

Customized products

	Deflection	Format	Voltage	Measurement range
Examples	90° 250°	144 x 144 96 x 96	100 V 100/√3 V	± 25% ± 50%

Associated products

Accessories

► page 223

NORMEUROPE Range

DC Anmeter

Deflection 90°
Accuracy class: 1.5
(option class 1 except 48 x 48)
Measuring component:
Moving coil
Linear scale
Interchangeable dial, except 144 x 144
Voltage drop:
60 mV for 50 mA rating
variable for rating < 50 mA

Deflection 250°
Accuracy class: 1.5
Measuring component:
Moving coil
Linear scale
Voltage drop: 100 mV for 10 mA
rating variable for rating < 10 mA

Feasibility limits

Deflection		90°				250°			
Format		48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Direct connection	Zero position, left or central	50 mA to 20 A		50 µA to 75 A		500 µA to 12 A			
Process signal connection	Zero position set	4-20 mA	10-50 mA	2-10 mA		4-20 mA	10-50 mA	2-10 mA	4-23,2 mA
Shunt connection	Zero position, left or central	50 mV 60 mV 100 mV 120 mV 150 mV 300 mV 360 mV		150 mV 300 mV		50 mV 60 mV 100 mV 120 mV			

Direct connection

Deflection		90°				250°			
Format		48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Rating	Scale								
5 A	0-5 A	•	•	•	•	•	•	•	•
10 A	0-10 A	•	•	•	•	•	•	•	•
15 A	0-15 A	•	•	•	•				
25 A	0-25 A		•	•	•				

Connection on 100 mV shunt

Deflection		90°				250°			
Format		48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Shunt	Scale 1.2 In								
5 A	0-6 A	•	•	•	•	•	•	•	•
10 A	0-12 A	•	C90S 1400	C90S 1500	•	•	•	•	•
15 A	0-18 A	•	•	•	•	•	•	•	•
20 A	0-24 A	•	•	•	•	•	•	•	•
25 A	0-30 A	•	C90S 1403	C90S 1503	•	•	•	•	•
30 A	0-36 A	•	•	•	•	•	•	•	•
40 A	0-48 A	•	•	•	•	•	•	•	•
50 A	0-60 A	•	C90S 1406	C90S 1506	•	•	•	•	•
60 A	0-72 A	•	•	•	•	•	•	•	•
75 A	0-90 A	•	C90S 1408	C90S 1508	•	•	•	•	•
100 A	0-120 A	•	C90S 1409	C90S 1509	•	•	•	•	•
125 A	0-150 A	•	•	•	•	•	•	•	•
150 A	0-180 A	•	C90S 1411	C90S 1511	•	•	•	•	•
200 A	0-240 A	•	•	•	•	•	•	•	•
250 A	0-300 A	•	C90S 1413	C90S 1513	•	•	•	•	•
300 A	0-360 A	•	•	•	•	•	•	•	•
400 A	0-480 A	•	•	•	•	•	•	•	•
500 A	0-600 A	•	C90S 1416	C90S 1516	•	•	•	•	•
600 A	0-720 A	•	•	•	•	•	•	•	•
1000 A	0-1200 A	•	•	•	•	•	•	•	•

Customized products

	Connection	Deflection	Format	Zero position	Rating	Beginning/end of scale
Examples	direct process signal	90° 250°	72 x 72 96 x 96	left set	60 A 4-20 mA	0-60 A 0-1500 rpm

Associated products

Accessories
► page 223

Shunts
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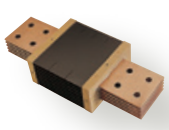


DC Voltmeter

Deflection 90°
Accuracy class: 1.5
(option class 1 except 48 x 48)
Measuring component:
Moving coil
Linear scale
Consumption:
1 mA for Un ≥ 500 mV
5 mA for Un < 500 mV

Deflection 250°
Accuracy class: 1.5
Measuring component:
Moving coil
Linear scale
Consumption:
1 mA for Un ≥ 1 V
2 mA for Un ≥ 1 V (central zero)
5 mA for Un < 1 V

Feasibility limits

Deflection		90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Direct connection	Zero position, left or central		50 mV to 600 V				50 mV to 600 V		
Process signal connection	Zero position, left		from 50 mV				from 50 mV		
	Set zero position						1-5 V 2-10 V		

Direct connection

Deflection		90°				250°			
Format		**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**	**48 x 48**	**72 x 72**	**96 x 96**	**144 x 144**
Rating	**Scale**								
15 V	0-15 V	•	•	•	•	•	•	•	•
30 V	0-30 V	•	C90S 1425	C90S 1525	•	•	•	•	•
60 V	0-60 V	•	C90S 1426	C90S 1526	•	•	•	•	•
75 V	0-75 V	•	•	•	•	•	•	•	•
150 V	0-150 V	•	C90S 1428	C90S 1528	•	•	•	C250 1928	•
300 V	0-300 V	•	•	•	•	•	•	•	•

Customized products

	Deflection	Format	Zero position	Rating	Beginning / end of scale
Examples	90° 250°	72 x 72 48 x 48	left central	75 V 400 V	0-75 V 400 V - 0 - 400 V

Associated products

Accessories

► page 223

NORMEUROPE Range

Command function meter

Deflection 90°

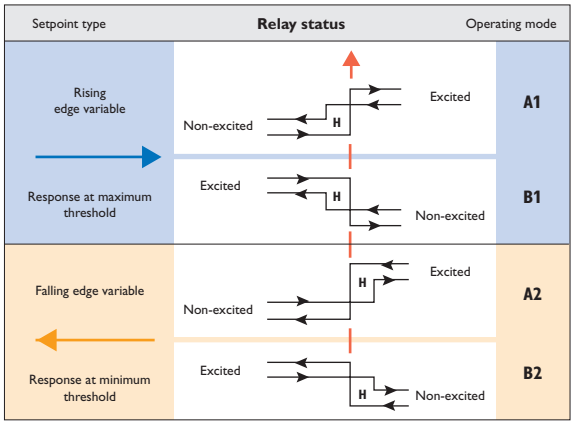
Format: 96 x 96
Accuracy class: 1.5
Threshold index (with or without indicator)
Consumption:
I input: 1 VA (if AC); 100 mV (if DC)
V input:1 mA (if AC); 1 mA (if DC > 0.5 V and 5 mA if below)
Relay: adjustable from 0 to 100% of scale (accuracy threshold ± 1%)
Response time < 500 ms; Hysteresis: 1% ± 0.5%
Breaking capacity 5A / 230 V - 50 Hz - resistive
Triple insulation
measurement / power / relay contacts: 2 kV - 50 Hz - 1min
Auxiliary power supply
Tolerance: +10%, -15%; Frequency: 50 - 400 Hz
Consumption: 2.6 VA max

Feasibility limits

Function	Zero position frequency	Rating	Graduation	Auxiliary supply	Number of relays	Mode
AC ammeter	Frequency 50 or 60 Hz	Direct or on CT 1 mA to 7.5 A	according to client specifications	100 Vac to 400 Vac	1 or 2 change overcontact	A1 A2 B1 B2
AC voltmeter		Direct or on VT from 4 to 600 V				
DC ammeter	Left or central zero position	Direct 1mA to 1A shunt 50 to 300 mV		24 Vdc to 125 Vdc		
DC voltmeter		Direct from 0.1 to 400 V				
Temperature		Pt100 2/3 wire JKNST thermocouple				

Parameters to be specified when ordering

Operating relay status



Customized products

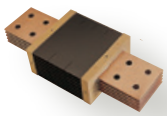
	Function	Frequency	Rating	Graduation	Auxiliary supply	Number of relays	Mode
Example	Temperature	50 Hz	Pt100 3 wire	0-120°C with indicator	125 Vdc	1R changeover contact	A2

Associated products

Accessories
page 223

CT Current transformers
page 102

Shunts
page 144



SYNCHRONIZATION Column

Synchronoscope

Vibrating-reed double frequency meter

Differential voltmeter

Phasemeter

COHO Range

Hour meters for totalling the operating time of machines or equipment for control and maintenance

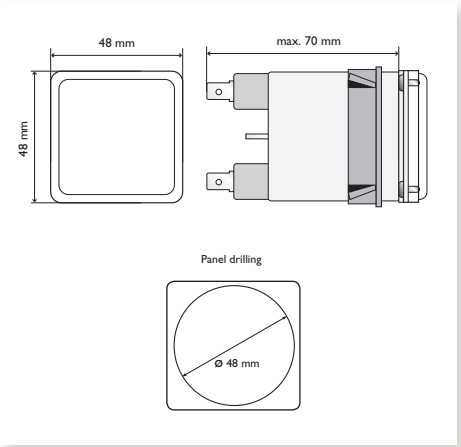
PRODUCT ADVANTAGES

- FOR SEVERE ENVIRONMENTS
- ENHANCED RELIABILITY RANGE

General specifications

Reference standard: NFC 42310
Display: without reset function, white on black background, decimals in red
Height of digits: 4 mm
AC and DC capacity: 99,999.99 h
Operating indicator: scrolling 1/100 h every 36 s
Motor in Vac/Vdc: pulse + electronic counter
Consumption:
0.5 VA in 24 Vac/dc, 1.5 VA in 48 Vac/dc, 2 VA in 110/230 Vac, 6 VA in 400 Vac
Operating range:
Voltage Vac: -15% +10%
Frequency: ± 5 Hz
Voltage Vdc: ± 20%

Insulation: double
Dielectric test voltage:
5.5 kV - 50 Hz - 1 min
Environment:
Operating temperature: -10°C to +60°C
Relative humidity: < 95% at +45°C
Protection rating on front panel:
standard: IP50, option: IP55
Electromagnetic compatibility
(emission and immunity): EN 61326-1
Mounting:
Standard version: elastic joint
IP55 version: joint + strap
Weight: 180 g
Connection: 6.35 Faston clips + terminal covers included



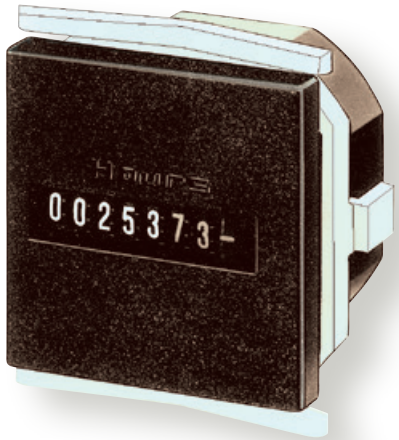
Format		48 x 48 (IP50)	48 x 48 (IP55)
Frequency	Voltage		
50 Hz	24 V	COHO 0606	COHO 1606
	48 V	COHO 0607	COHO 1607
	110 V	COHO 0608	COHO 1608
	230/400 V	COHO 0610	COHO 1610
60 Hz	24 V	COHO 0627	COHO 1627
	48 V	COHO 0628	COHO 1628
	110 V	COHO 0629	COHO 1629
	230/400 V	COHO 0631	COHO 1631
DC	24 V	COHO 0604	COHO 1604
	48 V	COHO 0605	COHO 1605

LK Range

Hour meters (7 or 8 digits) for totalling the operating time of machines or equipment for control and maintenance

PRODUCT ADVANTAGES

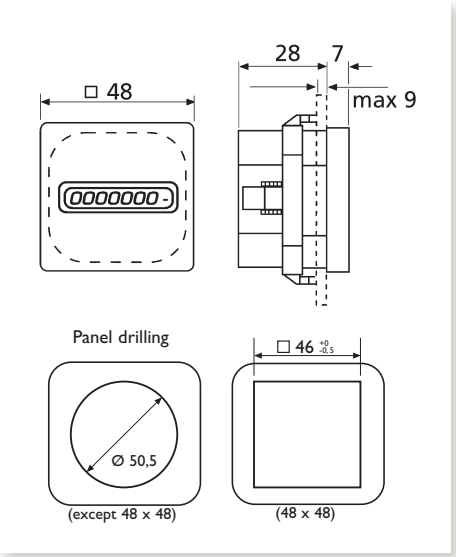
- EASY TO INSTALL
- ECONOMICAL



General specifications

Display: without reset function,
white on black background,decimals in red
Height of digits: 4 mm
AC capacity: 99,999.99 h
DC capacity: 999,999.99 h
Operating indicator in Vac: ridged roll
Operating indicator in Vdc: continuous scrolling 1/100h every 36 s
Motor in Vac: synchronous
Motor in Vdc: step-by-step
Consumption: Vdc: ≤ 750 mW
Vac: ≤ 1.65 VA

Insulation: single
Dielectric test voltage: 2 kV - 50 Hz - 1 min
Operating range:
Voltage Vac: ± 10%
Frequency: ± 10%
Voltage Vdc: ± 10%
Environment:
Operating temperature: -15°C to +50°C
Relative humidity: < 95% at +45°C
Protection rating on front panel: IP52
Mounting: self-locking flange
Weight: 50 g
Connection: 6.35 lugs or Faston clips



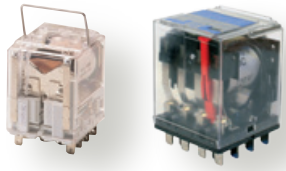
Format		48 x 48	55 x 55	72 x 72
Frequency	Voltage			
50 Hz	24 V	LK4N 001N	LK5N 001N	LK7N 001N
	48 V	LK4N 003N	LK5N 003N	LK7N 003N
	115 V	LK4N 005N	LK5N 005N	LK7N 005N
	230 V	LK4N 007N	LK5N 007N	LK7N 007N
	400 V	LK4N 009N	LK5N 009N	LK7N 009N
60 Hz	24 V	LK4N 002N	LK5N 002N	LK7N 002N
	48 V	LK4N 004N	LK5N 004N	LK7N 004N
	115 V	LK4N 006N	LK5N 006N	LK7N 006N
	230 V	LK4N 008N	LK5N 008N	LK7N 008N
	400 V	LK4N 010N	LK5N 010N	LK7N 010N
DC	10-30 V	LK4N 011N	LK5N 011N	LK7N 011N
	36-80 V	LK4N 012N	LK5N 012N	LK7N 012N
	110-130 V	LK4N 013N	LK5N 013N	LK7N 013N
front panel only			LK5N 0000	LK7N 0000

Automation relays

Instantaneous relays

Monostables

► catalog 906130103

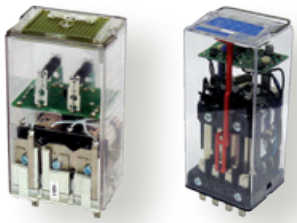


Bistables

► catalog 906130103

Fast-acting

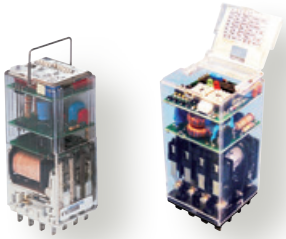
► catalog 906130103



Time-delay relays

Time-delay

► catalog 906130103



Solid-state timer

► catalog 906130103

Function relays

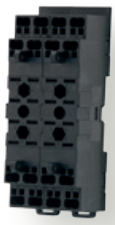
Flash relay, impulse relay, step relay, control relay

► catalog 906130103

Sockets and accessories

Rear connection, front connection, screw connection, Faston connection, blade connection, spring connection: various sockets are available. Enerdis® also proposes a complete range of accessories: **locking spring, bar-mounting strap,** bar for panel mounting, DIN-rail fitting, **safety blank, etc.**

► catalog 906130103



The reference for industrial relays

The French measurement instrument designer and manufacturer Chauvin Arnoux Group is acknowledged as a major player in the electrical sector. At the heart of electrical measurement activities, it plays a crucial role in the implementation of energy management and control systems.
Its scope covers applications as diverse as basic measurement of electrical parameters, network monitoring – from energy production through to distribution to end-users – safety of property and people, equipment maintenance and energy supply quality.

Nuclear power, petrochemicals, rail transport, industry: there are relays for every sector of activity. Some are covered by particularly strict standards so that they can handle the constraints of the environment in which they will be operating:

- Temperature withstand
- Fire resistance
- Resistance to corrosive gases
- Shock resistance
- Vibration resistance
- Dust resistance
- Contact materials
- Type of magnetic circuit
- Surface treatments and finishes

► Three brands, one business

Inside the Chauvin Arnoux Group, **Enerdis** offers the electrical industry and the tertiary sector all the fixed electrical switchboard equipment necessary to measure, control and monitor the power distribution chain. Drawing on more than sixty years' experience, the group proposes its **expertise in control relays for severe environments** such as the nuclear industry, petrochemicals or rail transport. It is also backed by the expertise and know-how of the Group's Italian subsidiary, **AMRA Spa**, which has been making electro-mechanical relays since 1975. With its integration of relays made by **RIA – MTI**, a well-known manufacturer since 1957, Enerdis is now a major player in the world of control relays.

► Specific standards and certifications

RAIL
NF-F 16-101, NF-F 16-102 (materials),
NF-F 62002, CF 62003, UIC 616-0,
SNCF and RATP-approved relays: F-OK B, F-OK TBAO, F-OK TBOR

ENERGY
Category K3 (seismic stresses), EDF qualification for use in nuclear power stations. **Enerdis relays are recommended by EDF for EPRs** (European Pressurized Reactors).
EDF: HM-2A / 03 / 111 / A
ENEL: LV15/1, LV15/2 / LV16/1, LV16/2, LV16/3, LV16/4, LV16/5

► Applications and conformity

	Energy		Railway	
	EDF (1)	ENEL (1) – TERNA (1)	Rolling stock	Substation
Relay ranges	RE 3000N (48 Vdc et/*and 125 Vdc*)	POK / POKS	F-OK B	POK / BiPOK – POKS / BiPOKS
	OKB184 (48 Vdc et/*and 125 Vdc*)	BiPOK / BiPOKS	F-OK TBAO / TBOR	OK-TmS
		OKTmS	POK / BiPOK – POKS / BiPOKS	OK T
		OKBA	OK SFcUIC	RCME / RDME
		RV	OK SCd	RDTE
		BAS8	BiPOK-RA	RGME
		RMME1y	OK-TmS	RGMZ
		RDTE	OK T	RGBE
		RMNE1y	UTM	RMME
		RMBZ	OKRe-L / OKCL / TOK-L	RMNE
		RGME	OKRe-FP / TOK-FP	RMBE
		RGLE13	RGMZ59	RMDE
		RGBE	OKPP	OKSFc
		RMMV1y	OKPh	
		OKSFc – OKFc		
		RCME – RDME		
		RGMV1y		
		RGBZ		
		RMBZ		

(1) EDF: French national electricity company
ENEL: Italian national electrical power production company
TERNA: Italian national electrical power distribution company

Product selection guide by functions

In	Model	Monostable	Bistable	Fast-acting	
				Monostable	Bistable
5 – 10 A	POK, BiPOK, TriPOK	■			
10 A	OKN, OKFc, OKB184, OKSCd, OKSGcCd, OKSFcUIC	■			
10 A	F-OK B	■			
10 A	OK Bi		■		
10 A	OK BA		■		
10 A	BAS8		■		
10 A	RE3000, RE3000S, RE3000N	■			
5 – 7 A	RI	■			
5 A	RV			■	
10 A	RCME, RDME	■			
12 A	RGME	■			
12 A	RGMZX	■			
12 A	RGBE		■		
10 A	RGMV1			■	
12 A	RGBZ				■
10 A	RMME	■			
10 A	RMNE	■			
10 A	RMBE		■		
10 A	RMBZ		■		
10 A	RMDE		■		
10 A	RMMV1			■	
10 A	RMMZ11			■	
10 A	RMBZ30				■
5 A	OK TmF, OK TmS				
5 A	OK TaB, OK TrB, OK TtB				
10 A	TOK				
-	F-OK TBAO / TBOR				
-	UTM				
10 A	RDTE				
5 – 10 A	OKCL, OKRe-L, TOK-L				
5 – 10 A	OKFP, OKRe-FP, TOK-FP				
10 A	BiPOKS-PP				
4 A	OKPh				
12 A	RGLE13				

Time-delay	Function				Solid-state timer
	Flash	Impulse	Step by step	Control	

Index of abbreviations

Cl	class
AC or ac	alternating current
CT	current transformer
DC or dc	direct current
E	energy
Eact	active energy
Eapp	apparent energy
Ereact	reactive energy
FS	full scale
g	acceleration of gravity (9.81 m/s^2)
Gb	gigabyte
HV	high-voltage
I	current (A, kA)
I/O	input/output
IEC	International Electrotechnical Commission
In	nominal current
IP	protection level
IR	infrared
K	Kelvin temperature gradient
Kb	kilobyte
LCD	liquid crystal display
LED	light-emitting diode
LV	low voltage
Mb	megabyte
min	minute
mm	millimetre
ms	millisecond
MV	medium voltage
NC	"normally closed ("break" relay contact)"
NO	"normally open ("make" relay contact)"
P	active power (W, kW, MW)
PC	personal computer
PF	power factor
PID	proportional integral derivative
PPM	parts per million diameter (in mm)
PR	protection rating (often expressed as IP)
Q	reactive power
R	reading accuracy (in %)
RMS	root mean square
S	apparent power (in VA, kVA, MVA...)
s	second
STN	switched telephone network
TC	thermocouple
THD	total harmonic distortion
TRMS	True RMS
U	phase-phase voltage
Un	nominal voltage
V	phase-neutral voltage
VT (or PT)	voltage or potential transformer

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See the complete **automation relays** offering to meet all the requirements of industry, the energy sector, rail, etc.

906 131 080 - Ed. 9 - 05/2015 - Non-contractual document - Specifications are to be confirmed at time of ordering - Photos and diagrams are non-contractual.

CHAUVIN ARNOUX GROUP