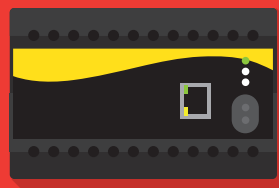
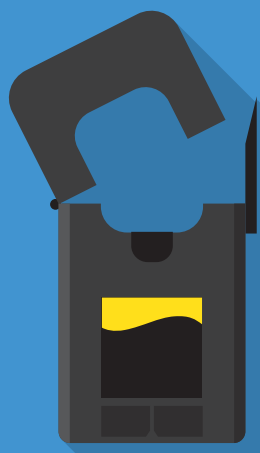
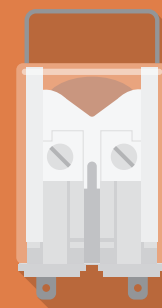
ENERDIS
CHAUVIN ARNOUX GROUP



GENERAL CATALOG

2017
2018





Measure up

THE CHAUVIN ARNOUX GROUP MEASUREMENT EXPERTS

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

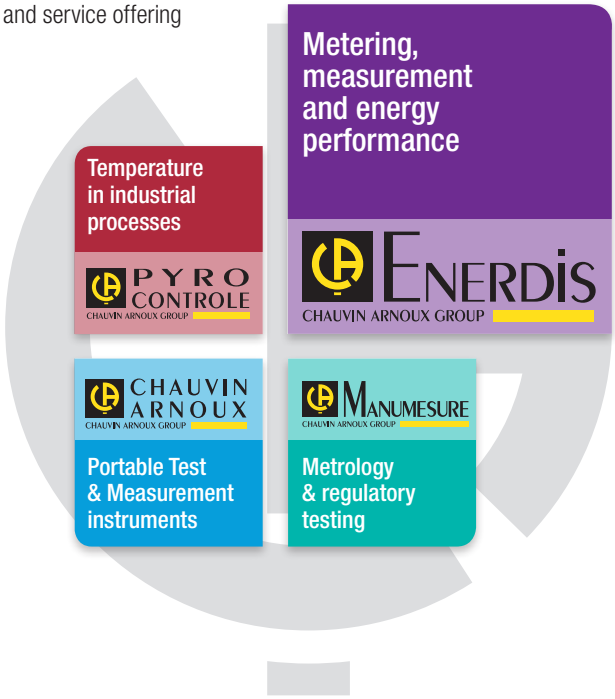
7 production sites

6 R&D departments worldwide

11% of revenues invested in R&D

4 FRENCH COMPANIES

promoting the product and service offering



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

ENERDIS

ENERDIS is specialized in fixed measurement, testing, metering and network supervision equipment, as well as energy efficiency solutions for all utilities. The company joined the CHAUVIN ARNOUX Group in 1998, taking advantage of the global R&D and integrated production structures to offer all-round expertise from electrical measurement through to energy performance management.

ACKNOWLEDGED KNOW-HOW IN KEY SECTORS

ENERGY

- Checking installations and the quality of the energy supplied.
- Managing energy flows: energy monitoring systems, meters, power monitors, logger current transformers.

INDUSTRY & TERTIARY

- From energy supply through to its transmission on site.
- Ensuring safety on installations, optimizing consumption and allocating consumption per cost centre.

TRANSPORT

A major partner on the rail market, Enerdis designs relays under the Chauvin Arnoux® brand for the rolling stock and substations.

QUALITY AND STANDARDS

ISO 9001 and ISO 14001 standards

ENERDIS is ISO 9001-certified (quality management) for its design, manufacturing and commercialization processes.

Our ISO 14001 certification (management of the environment) by the international organization INTERTEK shows our determination to reconcile business and protection of the environment.

These certifications, renewed regularly, demonstrate the long-term approach of our quality organization.

"EcoConception" EcoDesign label

Our internal EcoConception (EcoDesign) label rewards our involvement in an approach for recycling and recovery of the components in our measuring instruments from the design phase onwards..

International regulations

ENERDIS has succeeded in adapting its manufacturing processes to reduce its environmental impact and comply with the requirements of the RoHS standard concerning restriction of the use of certain hazardous substances.

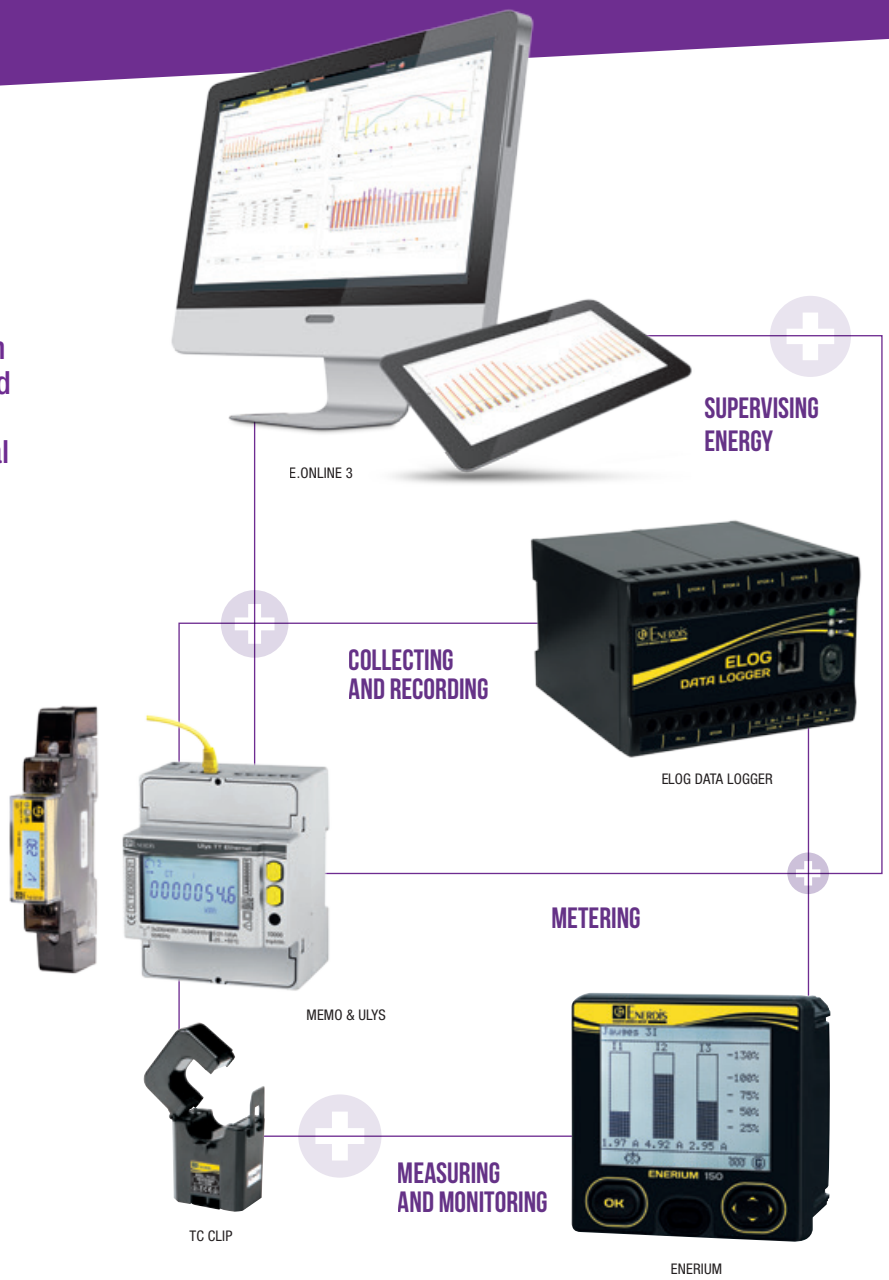
Our products comply with the European regulations and directives, such as REACH and MID.

Durability through integrated production

The infrastructure markets require products with extremely long life spans which remain available for several decades. Thanks to the Chauvin Arnoux Group's seven production sites, the products from Enerdis® are manufactured in-house.
This makes it possible to guarantee their specifications and their availability over time.
These sites are regularly audited by EDF CEIDRE for K3-qualified nuclear products, as well as by our major customers.

ENERDIS, THE ALL-ROUND EXPERT FROM

The extensive ENERDIS offering in instrumentation, panel meters and processing software enables our teams to provide you with a global solution. This couples measuring instruments and data processing software while interfacing with most of the existing systems. This offering is based around three major working areas:



An extensive ENERDIS offering for a global solution

ENERGY EFFICIENCY

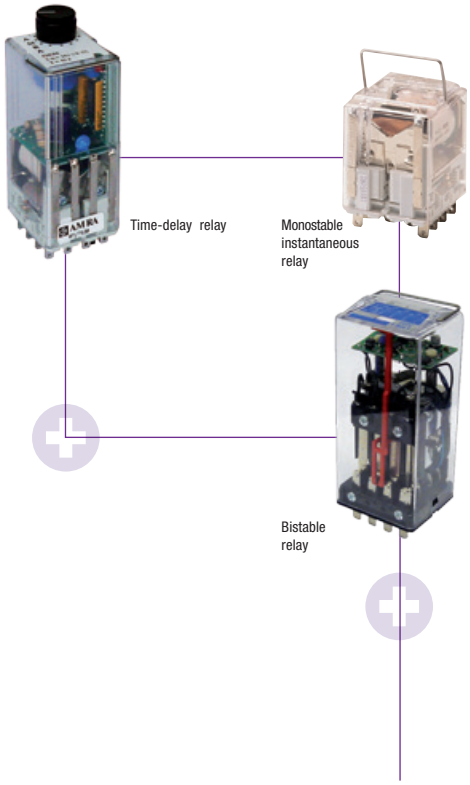
Considerable potential savings

Optimize energy consumption by eliminating waste: measure to identify sources of potential savings.

Monitor all the energy parameters in real time to react immediately to malfunctions or abnormal drift.

Rebill energy consumption precisely and fairly.

METERING TO NETWORK SUPERVISION



NETWORK SUPERVISION & PHYSICAL MEASUREMENT

Keeping your installations healthy

Monitor the operation of your electrical network

Indicate your system's status in real time

Alert in the event of abnormal operation or drift

Record all the activity on your network

Analyze the events according to reference frameworks

Present the analyses as standardized reports

CRITICAL AUXILIARY RELAYS

Reliability and safety are not optional

Technology developed for **intensive use** in **severe environments**: nuclear, rail, transmission networks & energy production

A wide range of instantaneous (multi-contact, bistable, fast-acting), time-delay and function relays. A choice of sockets with multiple connection technologies

Certifications: SNCF, RATP, EDF, ENEL, TERNA, K3, H

COMPLEMENTARY OFFERINGS
WITHIN THE GROUP

The Chauvin Arnoux Group is a worldwide player in measurement with all-round expertise in the electrical, thermal and energy management sectors and a complementary, comprehensive and innovative range of products.

Electrical energy quality

The quality of the electricity is a crucial technical characteristic to ensure that an electrical installation functions as rated. With Qualistar® network analyzers from CHAUVIN ARNOUX® for spot measurement campaigns and the MAP range from ENERDIS® for continuous measurements, you can perform a complete survey of the quality of the electricity supplied.

Energy diagnostics

Assessment of the consumption on an installation is essential to correctly size the points of consumption, establish the load profiles, clearly identify the types of energy and utilities to be generated and define detailed objectives (in financial or energy performance indices). Meters, power monitors, energy management software tools, power analyzers, hygrometers, luxmeters and infrared cameras all help to provide the most in-depth energy diagnosis possible.

Metrology and regulatory testing

To ensure long-term operation of your installations and guarantee their performance levels, the Chauvin Arnoux Group strives to offer you suitable solutions, whatever your sector of activity. Indeed, many parameters involved in the production processes may influence the results. This is why metrological verification, calibration and testing of the equipment are absolutely essential to ensure compliance with the quality standards. MANUMESURE, also part of the Group, provides these services in compliance with the standards and ensures traceability to the national reference standards.

Safety inspection on electrical installations with network analyzers

Infrared thermography with the latest-generation cameras from Chauvin Arnoux®

Temperature measurement and control with the sensors and recorders from Pyrocontrole®

A WEBSITE TO BACK UP THE CATALOG

**The Chauvin Arnoux Group offers internet users a totally-redesigned website which assists them while they browse.
This makes it much easier to share and combine information. A new web design with a single goal: to offer relevant, customized information on each of the Group's brands: Chauvin Arnoux®, Enerdis®, Pyrocontrole® and Manumesure.**

NEW FUNCTIONS

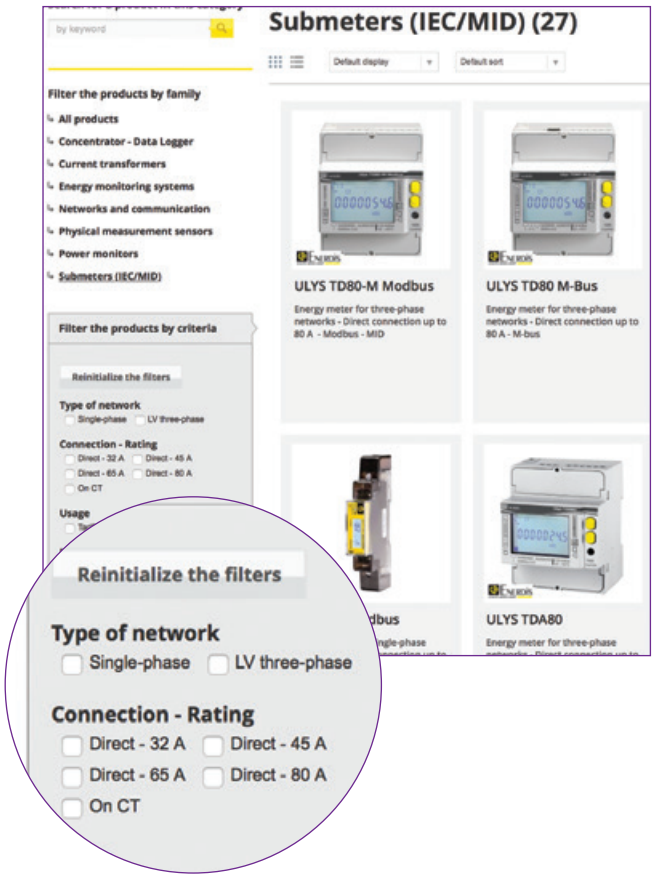
Product news, FAQ, downloading/registration/upgrading of software products, documentation available for free download, Case Studies, details of the standards: to find all the relevant information on our products, solutions, services, etc., take advantage of all the website's functions and numerous menus.

TRANSVERSE SKILLS

The Group has sought to multiply the points of entry to give internet users direct access to the information while limiting the number of clicks necessary. The transversality of the four companies' skills then becomes obvious. Moving from one site to another and from one skill to another, the Group's history, the training calendar, press reactions and career opportunities, everything helps to make your browsing simple, effective and quick.

A CLARIFIED PRODUCT OFFERING

Each company in the Group presents the full extent of its offering through its products, skills, applications or publications. Internet users have direct access to all the information linked to a product or product range. The search engine enables you to retrieve a product datasheet very quickly by simply entering a few keywords. Searches can also be refined thanks to "facet-driven" navigation based on the selection of technical parameters. In this way, users can very quickly target the product matching their requirements. This helps to save time for visitors who are increasingly in a hurry.



The whole website is multilingual: French, English, Spanish, Italian and German. And each subsidiary has its own site consistent with the Group's site.

ENERGY EFFICIENCY

ENERGY METERS AND POWER MONITORS

ENERGY METERS AND POWER MONITORS

Single-phase submeters

with communication

MEM04 Modbus

45 A direct input
Class 1 - MID

Energy meters for single-phase networks, direct connection up to 45 A.

page 28

ULYS MD80

80 A direct input
Class 1 - MID

Energy meters for single-phase networks, direct connection up to 80 A.

page 32

without communication

MEM03

32 A direct input
Class 1

Energy meters for single-phase networks, direct connection up to 32 A.

page 26

MEM04

45 A direct input
Class 1 - MID

Energy meters for single-phase networks, direct connection up to 45 A.

page 28

ULYS MD65

65 A direct input
Class 1 - MID

Energy meters for single-phase networks, direct connection up to 65 A.

page 30

Three-phase submeters

with built-in communication

ULYS TD80

80 A direct input
Class 1 - MID

Energy meter for three-phase networks, direct connection up to 80 A.

page 34

ULYS TT

Connection to CT
Class 1 - MID

Energy meter for three-phase networks, connection to CT.

page 36

without built-in communication

ULYS TDA80

80 A direct input
Class 1 - MID

Energy meter for three-phase networks, direct connection up to 80 A.

page 38

ULYS TTA

45 A direct input
Class 1 - MID

Energy meter for three-phase networks, connection to CT.

page 40

Communication modules

ULYSCOM

for ULYS MD80 - TDA80 - TTA

ModBus, M-bus and Ethernet communication modules.

page 42

Tariff meter

ALTYS

Class 0.5s - MID

Connected to the MV network. Handles all the tariff plans on the market.

page 44

Power monitors

96 x 96 cm format

ENERIUM 30
Class 1
Electrical energy.
page 48

ENERIUM 50
Class 0.5
Electrical energy.
page 48

ENERIUM 150
Class 0.5
Electrical energy.
page 48

144 x 144 cm format

ENERIUM 100
Class 0.5
Multi-energy.
page 48

ENERIUM 110
Class 0.5/0.2
Without display
Multi-energy.
page 48

ENERIUM 200
Class 0.5/0.2
Multi-energy.
page 48

ENERIUM 210
Class 0.5
Without display
Multi-energy.
page 48

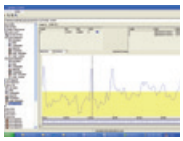
ENERIUM 300
Class 0.2
Qualimetry.
page 48

ENERIUM 310
Class 0.2
Without display
Qualimetry.
page 48

Related software

E.SET
Configuration software
Equipment status.
Functional use of
the inputs and outputs.
page 59

E.VIEW
Configuration and diagnostic software
Reading of the digital inputs and/or forcing of the digital and analog outputs.
page 60



E.VIEW+
Configuration, diagnostic and display software
Graphs, tables,
Fresnel diagram.
page 61

Metering solution

RENOV ENERGY
Metering solution
for renovating installations
Compatible with ULYS, TTA, TT,
Enerium 30 and Enerium 50.
page 62

ENERGY METERS AND POWER MONITORS

TYPE OF ELECTRICAL NETWORK

SINGLE-PHASE

WITH COMMUNICATION

Rating of upstream circuit-breaker

45 A

MEM04 Modbus
page 28

MEM04-M Modbus
page 28

> 45 A

ULYS MD80
page 32

ULYS MD80-M
page 32

WITHOUT COMMUNICATION

Rating of upstream circuit-breaker

32 A

MEM03
page 26

> 32 A

MEM04-M
page 28

ULYS MD65
page 30

ULYS MD65-M
page 30

All our meters are MID-certified and are identified by the suffix "-M"

THREE-PHASE

WITH INTEGRATED COMMUNICATION

Rating of upstream circuit-breaker

- 80 A
  - 
    ULYS TD80
    page 34
  - 
    ULYS TD80-M
    page 34
- > 80 A on CT
  - 
    ULYS TT
    page 36
  - 
    ULYS TT-M
    page 36

WITHOUT INTEGRATED COMMUNICATION

Rating of upstream circuit-breaker

- 80 A
  - 
    ULYS TDA80
    page 38
  - 
    ULYS TDA80-M
    page 38
- > 80 A on CT
  - 
    ULYS TTA
    page 40
  - 
    ULYS TTA-M
    page 40

PRODUCT SELECTION GUIDE
BY FUNCTIONS

			Submeters		
			page 26	page 28	page 30
					
			MEM03	**MEM04 MEM04-M**	**ULYS MD65 ULYS MD65-M**
Strengths			1 module	1 module MID version Modbus Communication	2 modules MID version
		Network	LV		
		Rating	32 A	45 A	65 A
		MID certified		MEM04-M MEM04-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		MEM04 Modbus MEM04-M Modbus	
	Tariff				
Multimeasurement	**Electrical parameters**	**Display**		inst, V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS	
		Communication		inst, V, U, I, P, Q, S, F, PF	
Input-output	**Pulse output(s)**		1		
	Tariff change input				
Communication	**RS485 port**			MEM04 Modbus MEM04-M Modbus	
	Ethernet Modbus				
	M-bus				
Metrology	**V/U/I**				
	P/Q/S				
	Eact		IEC: class 1 / MID: class B		
	Ereact				

Submeters

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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			IEC class 1 / MID class B	
2 modules	4 modules		4 modules	
■				
	3/4 wires		3/4 wires*	
■	■			
		insulated	insulated	insulated
kWh, kVArh, kVAh total & partial			kWh, kVArh, kVAh total & partial	
2 tariffs			2 tariffs	
inst, V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS			inst, V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS	
inst, V, U, I, P, Q, S, F, PF	inst, V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS		inst, V, U, I, P, Q, S, F, PF, 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 %			0,5 %	
1 %			1 %	
IEC: class 1 / MID: class B			IEC: class 1 / MID: class B	
IEC: class 2			IEC: class 2	

* depending on model

QUICK SELECTION GUIDE
FOR POWER MONITORS

ELECTRIC

Standard functions

Enerium 30
page 48

- Communication Modbus RS485
  - Without Input/ Output
    - ENERIUM 30 Ref. P01330823
  - With Inputs/ Outputs
    - ENERIUM 30 1S Ref. P01330824

Advanced functions

Enerium 50
page 48

Enerium 150
page 48

- Communication Modbus RS485
  - Without Input/ Output
    - ENERIUM 50 Ref. P01330805
    - ENERIUM 150 Ref. P01330809
  - With Inputs/ Outputs
    - ENERIUM 50 1E/1S Ref. P01330807
    - ENERIUM 150 0E/2S Ref. P01330811
- Communication Ethernet Modbus TCP
  - Without Input/ Output
    - ENERIUM 50 Ref. P01330806
    - ENERIUM 150 Ref. P01330810
  - With Inputs/ Outputs
    - ENERIUM 50 1E/1S Ref. P01330808
    - ENERIUM 150 0E/2S Ref. P01330812

APPLICATION

MULTI-ENERGY

Installation supervision

Enerium 100
page 48

Multi-energy management

Enerium 200
page 48

Data logger

Enerium 210
page 48

Power quality

Enerium 300
page 48

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 2E/2S
  Ref. P01330832
  ENERIUM 200 4E/2S
- 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 2E/4S
  Ref. P01330834
- ENERIUM 210 8E
  Ref. P01330835
- ENERIUM 300 4E/2S

CHOOSING YOUR POWER MONITOR

		Power monitors	
		page 48	page 48
			
		Enerium 30	Enerium 50
Electrical energy management	Accuracy	1 %	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
Multi-energy management	Pulse inputs for other meters (water, gas, etc.)		0, 1 or 2
	Inputs for analog quantities (temperature, flow rate, pressure, insolation, etc.)		
Installation supervision	Trend curves		
	Management of alarms on thresholds	2	16
	Alarms log (recordings)		64
	Fresnel diagram		
	Pulse or alarm outputs	0 or 1	0, 1 or 2
	Analog outputs		0 or 2
Power quality	THD / PF / Tan φ	■	■
	Harmonics by order with graphic representation		25
	Wave capture (U, V, I, In)		
	EN50160 analysis		
	Max. no. of input + output options	1	2
	RS485 - Modbus	■	■
	Ethernet - Modbus TCP		■
	Format (mm)	96 x 96	96 x 96
	Screenless version available		

Power monitors

page 48	page 48	page 48	page 48
			
Enerium 150	**Enerium 100**	**Enerium 200**	**Enerium 300**
0.5 %	0.5 %	0.2 %	0.2 %
■	■	■	■
■	■	■	■
■	■	■	■
8		8	8
0, 1 or 2	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	4
16	16	16	16
64	64	64	64
■	■	■	■
0, 1 or 2	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
0 or 2	0, 2, or 4	0, 2, or 4	0, 2, or 4
■	■	■	■
50	25	50	50
			16
			■
2	8	8	8
■	■	■	■
■	■	■	■
96 x 96	144 x 144	144 x 144	144 x 144
	ENERIUM 110	ENERIUM 210	ENERIUM 310

MID DIRECTIVE

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

European directive on measuring instruments dated 31st March 2004

- Directive transposed into national law of each country in 2006
- 2 specific European standards (EN 50470-1/ EN 50470-3) for energy meters, stipulating the particular requirements and type tests for energy meters

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 a meter 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.

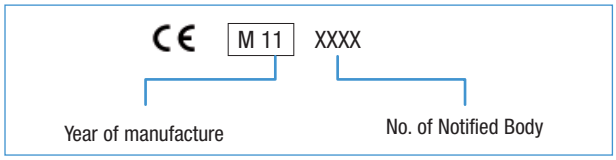
[1] Downstream of the meter at the network manager's point of supply.

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 **MEM04-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.

PERMANENT MEASUREMENT SYSTEM

KNOW ALL THE DETAILS: WHERE, WHEN, HOW, HOW MUCH?

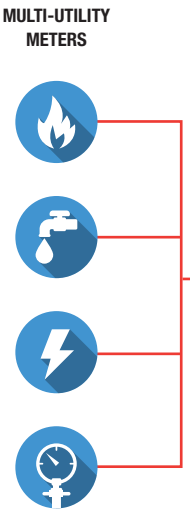
SUPERVISING, MANAGING AND EXCHANGING

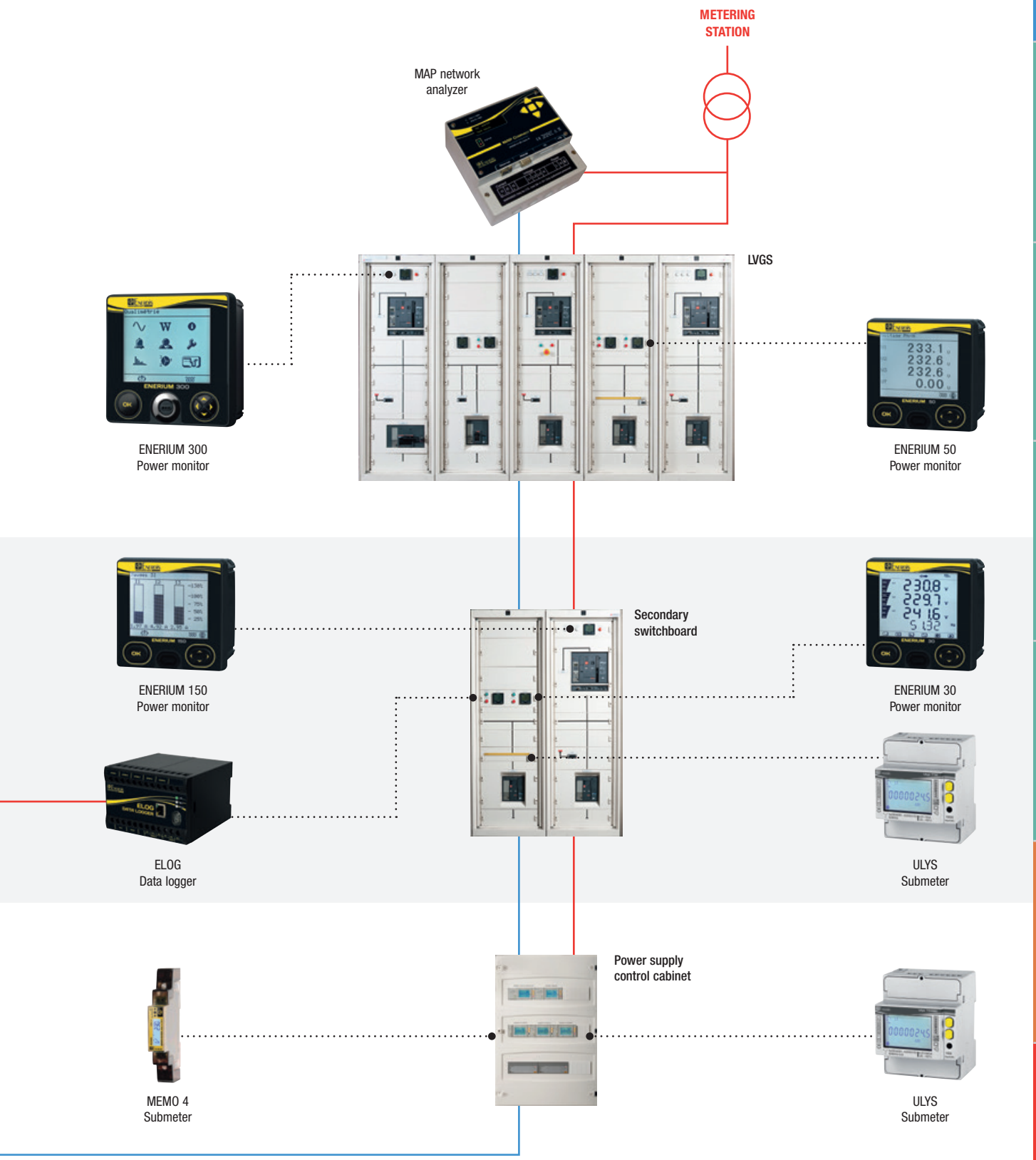
Supervision

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.




METERING STATION
MAP network analyzer
LVGS
ENERIUM 300
Power monitor
ENERIUM 50
Power monitor
ENERIUM 150
Power monitor
Secondary switchboard
ENERIUM 30
Power monitor
ELOG
Data logger
ULYS
Submeter
Power supply control cabinet
MEMO 4
Submeter
ULYS
Submeter

MEMO3
SINGLE-PHASE 32 A

Energy meters for single-phase networks.
32 A direct connection.

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.

- 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,
- automatic generation of consumption reports
- precise allocation of the energies consumed.

+
- 32 A nominal current
- Class 1 according to EN50470-3
- Compact: a single DIN module
- Pulse output as standard
- Sealable on phase and neutral terminals

ZOOM


Economical solution

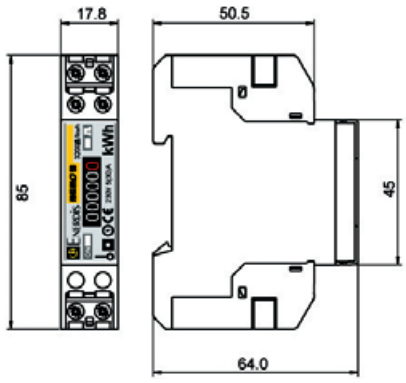

Sealable terminal covers


Pulse output as standard

ELECTRICAL SPECIFICATIONS

	MEM03
Current input	
Type	Single-phase
Rated current	32 A
Istart current	20 mA
Max. permanent current	50 A
Minimum current	20 mA
Voltage input	
Measurement range	0 to 99,999.9 kWh
Consumption	< 2 VA
Rated voltage	230V (-10%/+20%)
Frequency	50 / 60 Hz
Pulse output	
Type	insulated with open collector transistor
Weight	100 imp / kWh

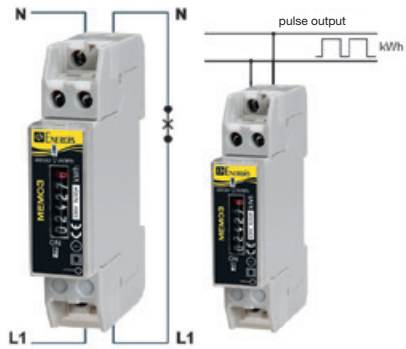
DIMENSIONS (IN MM)



MECHANICAL SPECIFICATIONS

	MEM03
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
Mounting	On 35 mm DIN rail
Weight	100 g

ELECTRICAL CONNECTIONS



ENVIRONMENT

	MEM03
Operating temperature	-20 °C to +50 °C
Storage temperature	-30 °C to +70 °C
Relative humidity	< 95 % to 40 °C

SCREEN ELEMENTS

	MEM03
Display	6 mechanical rolls - Height 4 mm
Metrological LED	Green flashing 3 ,200 times/kWh
Total (kWh)	Indicates the total consumption

TO ORDER

Model	Reference
MEM03	MEMN 003NA

ASSOCIATED PRODUCT

Current transformers

Cable primary, busbar primary, closed core or split core, etc.

page 115

MEMO4
SINGLE-PHASE 45 A

Energy meter for single-phase networks.
45 A direct connection.

DESCRIPTION

MEMO4 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.

+
- 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

ZOOM


Quick modification of the parameters via optical head


Lead-sealable terminal covers delivered as standard


Backlit LCD screen

ELECTRICAL SPECIFICATIONS

Current input	
Rated current (Imax)	45 A
Minimum 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

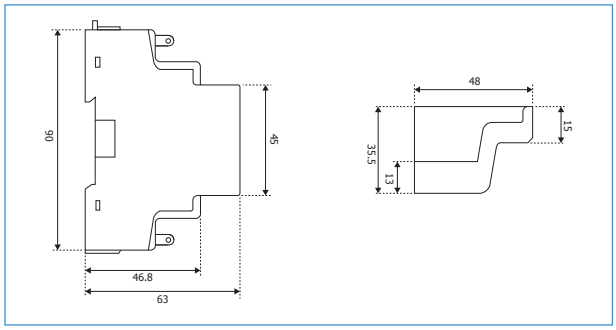
MECHANICAL SPECIFICATIONS

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

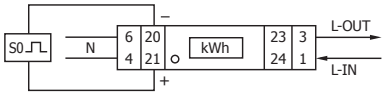
Operating temperature	-25 °C to +55 °C
Relative humidity in operation	≤ 75 %

DIMENSIONS (IN MM)

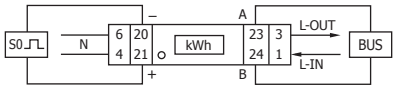


ELECTRICAL CONNECTIONS

MEMO4-M



MEMO4 Modbus
MEMO4-M Modbus



DIAGRAM

RS485 - Modbus RTU

TBM / CTM PLCs

Interfacing with all existing architectures

ELOG DATA LOGGER
Collection, recording and processing of metering data

TO ORDER

Model	Certification	Communication	Reference
MEMO4-M	MID	-	P01330751
MEMO4 Modbus	IEC	RS485 Modbus	P01330752
MEMO4-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

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYS MD65

SINGLE-PHASE 65 A

Energy meter for single-phase networks.
65 A direct connection.

- Full compliance with IEC 62053-21 standard – class 1
- Class B MID version for rebilling
- Compact: only 2 DIN modules
- Pulse output
- LCD screen

DESCRIPTION

ULYS MD65 is a single-phase active energy meter specially designed for low-voltage applications.

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

ZOOM

Display of energy index on a LCD screen

Sealable terminal cover

Direct connection up to 65 A

ELECTRICAL SPECIFICATIONS

Current input	
Type	Single-phase
Rated current	65 A
Istart current	40 mA
Minimum current	0.5 A
Voltage input	
Measurement range	0 to 999,999.9 kWh
Consumption	> 8 VA
Rated voltage	230 V (-20 % / +15 %)
Frequency	50/60 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

MECHANICAL SPECIFICATIONS

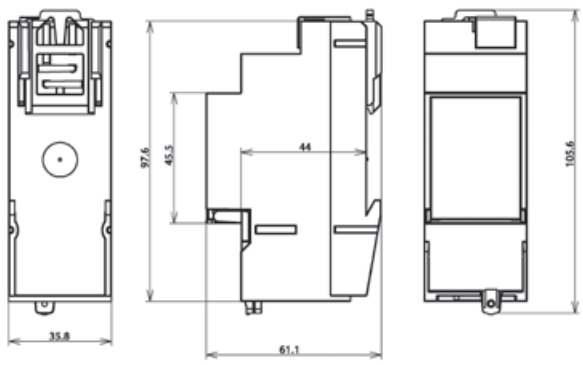
Protection rating	IP51
Power circuit connection	Screw connection terminal for 16 mm² wires
Pulse output connection	Screw connection terminal for 0.28 mm² wires (single strand)
Mounting	On DIN rail 35 mm
Weight	120 g

ENVIRONMENT

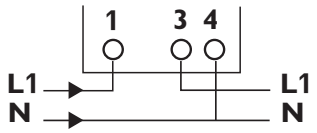
Operating temperature	-25 °C to +60 °C
Storage temperature	-40 °C to +70 °C
Relative humidity	75% average at 23°C ie 95% during 30 days at 23°C

TO ORDER	
Model	**Reference**
ULYS MD65	P01330920
ULYS MD65-M	P01330921

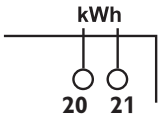
DIMENSIONS (IN MM)



ELECTRICAL CONNECTIONS



PULSE OUTPUT



SCREEN ELEMENTS

Display	LCD screen – digit height 5 mm
Number of digits	7 digits from 000,000.0 to 999,999.9

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

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E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYS MD80

SINGLE-PHASE 80 A

Energy meter for single-phase networks.
80 A direct connection.

DESCRIPTION

ULYS MD80 is an energy meter for use in single-phase networks.

This meter is designed for energy management applications or electricity rebilling on private networks (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 of the communication 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 or direct reading on screen)
- Sealable covers (delivered with lead for MID version)

+

- IEC class 1 / MID class B
- 4 quadrants
- Multiple measurements
- Compatible with ULYSCOM multi-communication protocol
- Compact: only 2 DIN modules

ZOOM


2 tariffs


4 quadrants metering with energy balance indicator


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

ELECTRICAL SPECIFICATIONS

Current input	
Type	Direct
Rated current	(5) 80 A
Istart current	20 mA
Voltage input	
Rated voltage	230 Vac (-15% / +10%)
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 35 mm² DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

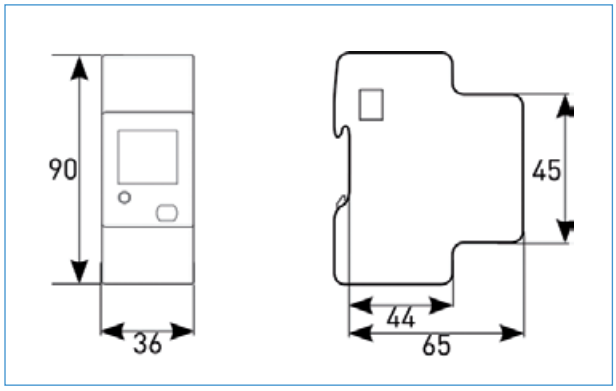
ENVIRONMENT

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

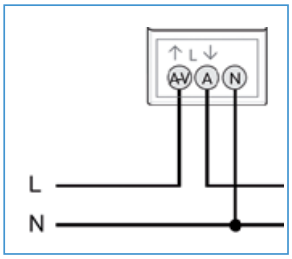
TO ORDER

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

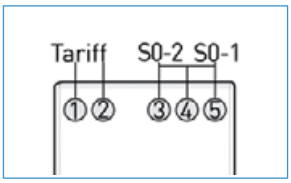
DIMENSIONS (IN MM)



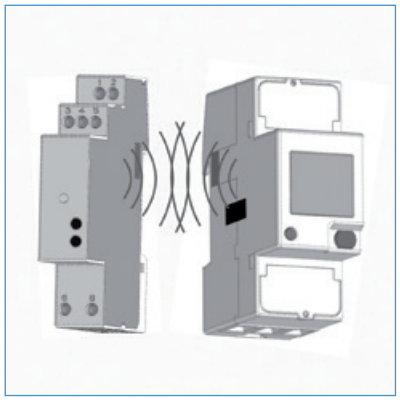
ELECTRICAL CONNECTIONS



Tariff inputs
& S0 pulse outputs



INFRARED CONNECTION



ASSOCIATED PRODUCTS

ULYSCOM
Communication modules
For ULYS MD80, TDA80 and TTA energy meters.
page 42

ELOG DATA LOGGER
Remote data retrieval unit
Automatic remote data retrieval, recording and storage of energy, climatic and process data.
page 70

E.ONLINE 3
Processing software
Multi-energy consumption measurement and management software.
page 82

ULYS TD80

THREE-PHASE 80 A

WITH INTEGRATED COMMUNICATION

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

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 cable for MID version)

+

- **Integrated communication depending on model: Ethernet, M-Bus, Modbus**
- **IEC class 1 / MID class B**
- **4 quadrants**
- **Multiple measurements**
- **Compact: only 4 DIN modules**

ZOOM

Built-in communication depending on model:
- Ethernet
- M-Bus
- Modbus

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

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

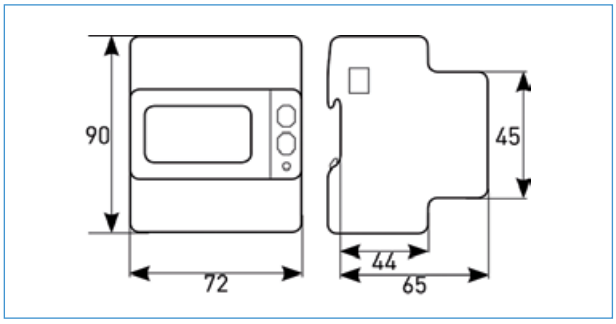
MECHANICAL SPECIFICATIONS

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

ENVIRONMENT

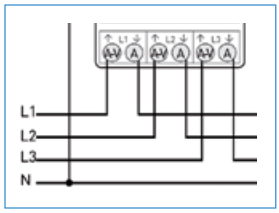
Operating temperature	- 25 °C to +55 °C
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max 80% without condensation

DIMENSIONS (IN MM)

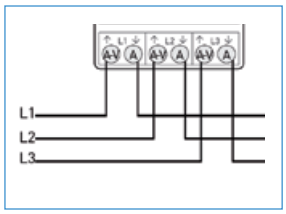


ELECTRICAL CONNECTIONS

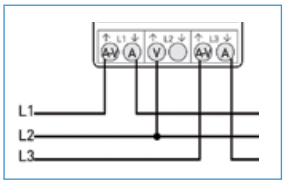
4 wires, 3 currents
All models

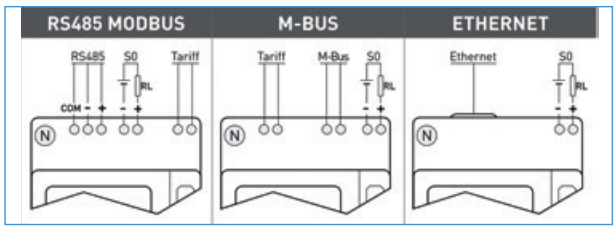


3 wires, 3 currents
M-bus models only



3 wires, 2 currents
M-bus models only





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

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

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E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYS TT

THREE-PHASE CT CONNECTION

WITH INTEGRATED COMMUNICATION

Energy meter for three-phase networks.
Connection on CT.

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 cable for MID version)

+

- **Integrated communication depending on model: Ethernet, M-Bus, Modbus**
- **IEC class 1 / MID class B**
- **4 quadrants**
- **Multiple measurements**
- **Compact: only 4 DIN modules**

ZOOM

Built-in communication depending on model:
- Ethernet
- M-Bus
- Modbus

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

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	Automatic adjustment according to CT ratio: from 1,000 pulses / kWh / kVArh to 0.1 pulse / kWh / kVArh
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

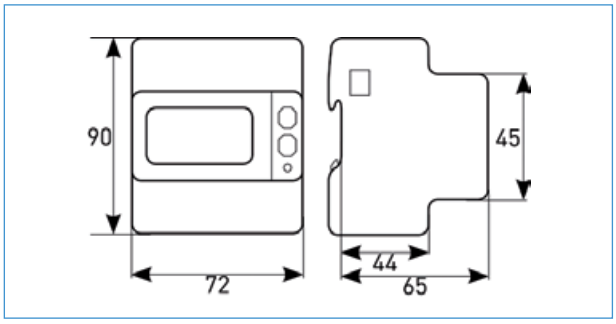
MECHANICAL SPECIFICATIONS

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

ENVIRONMENT

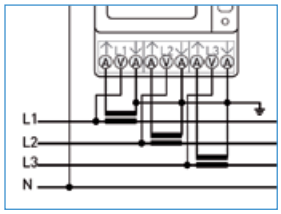
Operating temperature	- 25 °C to +55 °C
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max 80% without condensation

DIMENSIONS (IN MM)

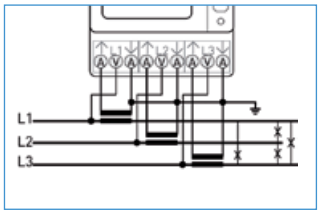


ELECTRICAL CONNECTIONS

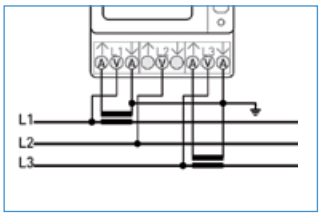
4 wires, 3 currents - All models

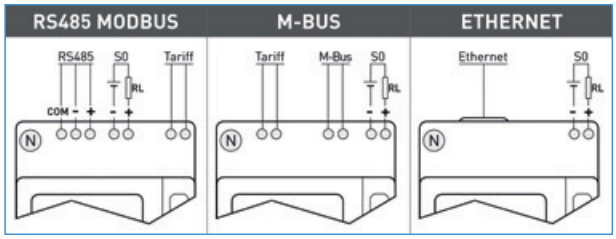


3 wires, 3 currents - M-bus models only



3 wires, 2 currents
M-bus models only





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

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

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E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYS TDA80

THREE-PHASE 80 A

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

DESCRIPTION

ULYS TDA80 is an energy meter for use in three-phase networks. This meter is designed for energy management applications or electricity rebilling on private networks (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 of the communication modules via the infrared port on the side of the product
- Multiple measurements: instantaneous P, Q and S, cumulative and partial energy index (V, U, I, PF, F via ULYSCOM)
- Sealable covers (delivered with cable for MID version)

+

- IEC class 1 / MID class B
- 4 quadrants
- Multiple measurements
- Compact: only 4 DIN modules
- Compatible with ULYSCOM multi-protocol communication modules

ZOOM

2 tariffs

Metering on all 4 quadrants with energy balance indicator

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

ELECTRICAL SPECIFICATIONS

Current input	
Type	Direct
Rated current (In)	(5) 80 A
Istart current (Ist)	20 mA
Voltage input	
Rated voltage	3 x 230/400 Vac… 3 x 240/415 Vac (+/- 20 %)
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 35 mm² DIN rail
Connection	Screw-on terminal strip for 35 mm² wire
Protection	IP51 front panel

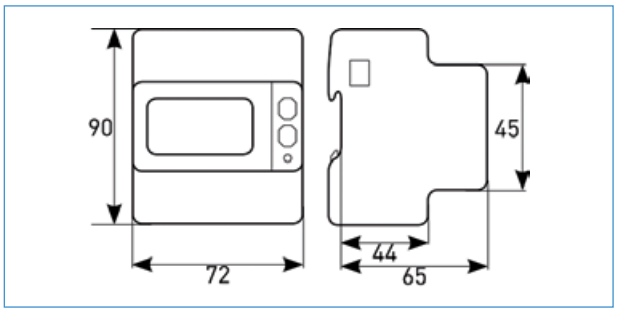
ENVIRONMENT

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

TO ORDER

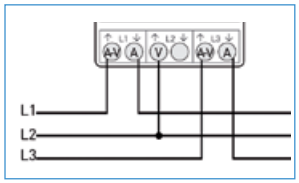
Model	Certification	Reference
ULYS TDA80	IEC	P01331012
ULYS TDA80-M	MID	P01331018

DIMENSIONS (IN MM)

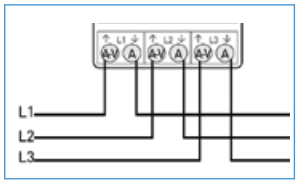


ELECTRICAL CONNECTIONS

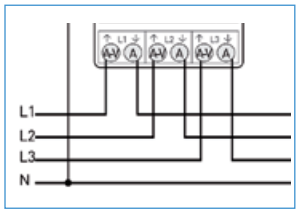
3 wires, 2 currents



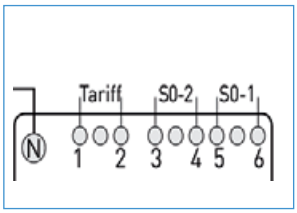
3 wires, 3 currents



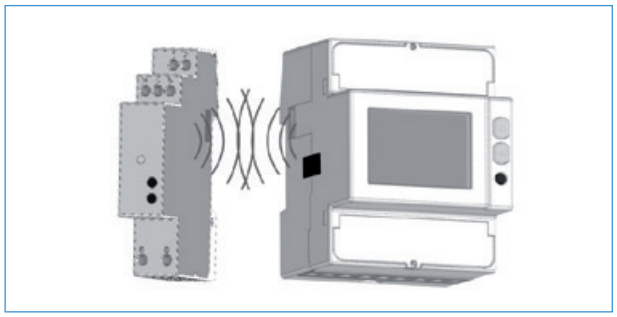
4 wires, 3 currents



Tariff inputs & pulse outputs



INFRARED CONNECTION



ASSOCIATED PRODUCTS

ULYSCOM

Communication modules

For ULYS MD80, TDA80 and TTA energy meters.

page 42

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYS TTA

THREE-PHASE CT CONNECTION

Energy meter for three-phase networks.
CT connection.

DESCRIPTION

ULYS TTA is an energy meter for use in three-phase networks. This meter is designed for energy management applications or electricity rebilling on private networks (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
- Multiple measurements: instantaneous P, Q and S, cumulative and partial energy index (V, U, I, PF, F via ULYSCOM)
- Sealable covers (delivered with cable for MID version)

+

- IEC class 1 / MID class B
- Multiple measurements
- Compatible with ULYSCOM multi-protocol communication modules
- Compact: only 4 DIN modules

ZOOM

2 tariffs

Metering on all 4 quadrants with energy balance indicator

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

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	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/kVArh to 0.1 pulse/kWh/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 35 mm² DIN rail
Connection	Screw-on terminal strip for 6 mm² wire
Protection	IP51 front panel

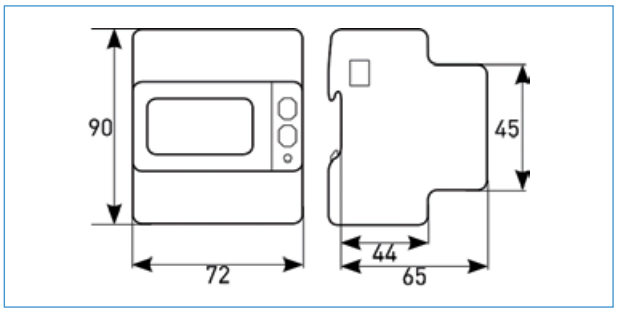
ENVIRONMENT

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

TO ORDER

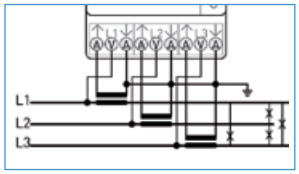
Model	Certification	Reference
ULYS TTA	IEC	P01331015
ULYS TTA-M	MID	P01331019

DIMENSIONS (IN MM)

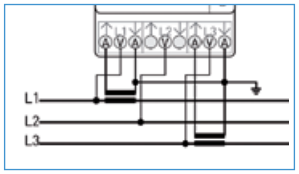


ELECTRICAL CONNECTIONS

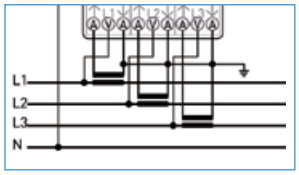
3 wires, 3 CTs



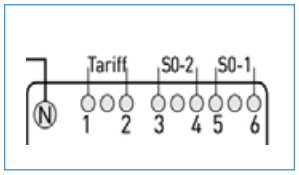
3 wires, 2 CTs



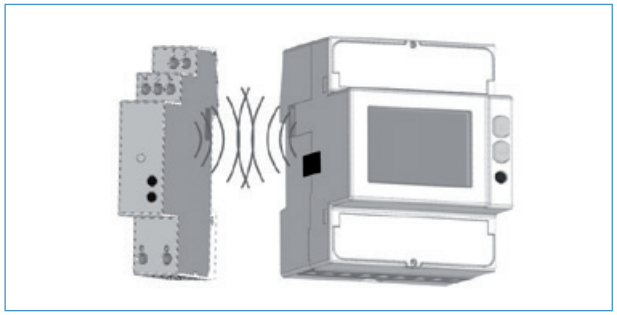
4 wires, 3 CTs



Tariff inputs & pulse outputs



INFRARED CONNECTION



ASSOCIATED PRODUCTS

ULYSCOM

Communication modules

For ULYS MD80, TDA80 and TTA energy meters.

page 42

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

ULYSCOM

Communication modules for ULYS MD80 - TDA80 - TTA energy meters.

- Multi-protocol communication modules: Ethernet, RS485, M-BUS
- Automatic recognition of the modules by the associated meters
- Direct interfacing between the measuring devices and Enerdis's energy management software or any other system

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 measuring devices and Enerdis's energy management software or any other system (e.g. programmable logic controllers).

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

ZOOM

Communication activity status indicator LED

Automatic detection by infrared link between the meter and ULYSCOM

Line termination resistance integrated directly in the ULYSCOM Modbus communication module

SPECIFICATIONS

ULYSCOM MODBUS

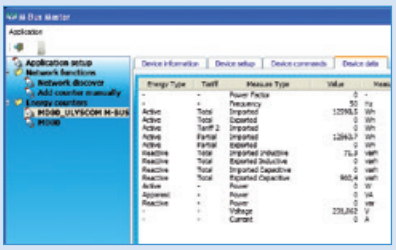
Enables the meters to be interfaced directly with the Enerdis energy management software E.online® or any other CTM / TBM system.

- 230 Vac +/- 20 % / 50 Hz / < 5 VA
- Configurable in RTU (8N1) or ASCII (7E2) mode
- Speed from 300 to 115,200 bauds
- 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 bauds
- Connection: 2 wires, M-Bus



ULYSCOM ETHERNET

Can be used to read measurements directly via integrated web pages and to see 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
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max. 80% without condensation

TO ORDER

Model	Reference
ULYSCOM Modbus	P01331030
ULYSCOM M-bus	P01331031
ULYSCOM Ethernet	P01331032

MECHANICAL SPECIFICATIONS

Format	ULYSCOM Modbus and M-bus: 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

ASSOCIATED PRODUCTS

ULYS MD80

80 A direct input
Class 1 - MID

Energy meter for single-phase networks, direct connection up to 80 A.

page 32

ULYS TDA80

80 A direct input
Class 1 - MID

Energy meter for three-phase networks, direct connection up to 80 A.

page 38

ULYS TTA

Connection to TC
Class 1 - MID

Energy meter for three-phase networks, connection to CT.

page 40

ALTYS
TARIFF METER

4-quadrant tariff meter for MV customers.

- MID class C
- Measurement on all 4 quadrants
- DLMS COSEM protocol
- Local upgrading of the application software
- 2 tariff frameworks
- Dynamic pricing
- Customer communication and customer information (CIS) outputs
- Calculation and storage of faults (dips, outages and voltage surges)
- Load and voltage curves

DESCRIPTION

The electronic **ALTYS** meter is intended for installation on consumer or producer sites connected to the MV electrical network.
The ALTYS meter should be viewed in the context of deregulation of the electricity market which led to the end of regulated pricing in France on 31/12/2015. It has been designed to handle tariff offers proposed by any electricity supplier.
The **ALTYS** meter offers the following main functions:

- Measurement of the energy values in both transit directions
- Management of two tariff frameworks independently: one Distributor framework and one Supplier framework
- Management of dynamic tariffs for each of the two tariff frameworks
- Storage of the load curves of the active and reactive energy consumed and produced, as well as the voltage supervision curve
- Simultaneous communication access to the distribution network manager and the customer

ZOOM

Customer communication access

High-speed optical interface

Standardized protocol

GENERAL SPECIFICATIONS

Metrological functions

- Index of consumed and produced energy values by tariff item
- Calculation of the power and energy overrun values in relation to the contractual power values
- Calculation of the average power values (5 or 10 min interval)
- Calculation of the operating times in each tariff period, for consumption and production
- Integration of Joule and Core losses
- Presentation of the data on the display

Tariff functions

- 2 tariff frameworks (Distributor and Supplier)
- 8 tariff items definable per framework
- Management of dynamic pricing by external contact or by programming

Qualimetry functions

- Calculation of the types of faults (voltage dip, outage or surge) according to their amplitude and the contractual thresholds programmed
- Storage of the fault characteristics (start date, end date, duration)

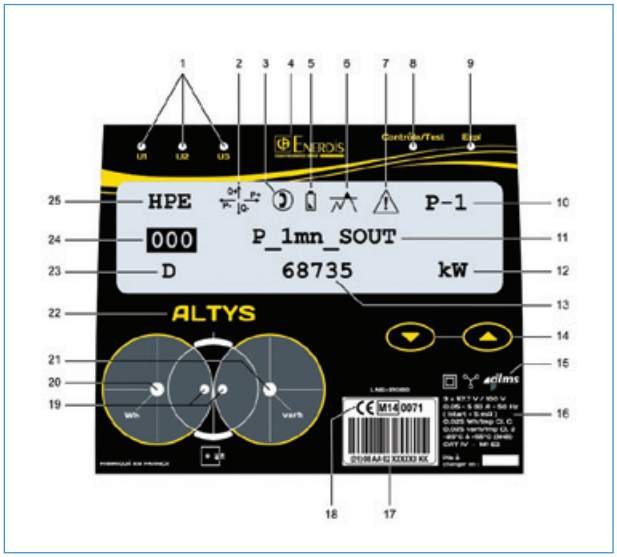
Interfaces

- DLMS Cosem operator communication
- Tariff change input
- Pulse outputs for active and reactive energy: CM, P+, P-, Q+, Q-
- Time pulse output: TP1- TP2
- DLMS Cosem customer communication
- Remote customer information (CIS)
- High-speed optical interface for programming, data retrieval and local upgrading of the meter's application software

LED indicators

- Voltage presence and energy flow direction LEDs per phase
- Control mode / test mode LED
- Fault LED
- Metrological LED for active energy
- Metrological LED for reactive energy

Display and LEDs



1 Voltage Presence LED - Fixed: Voltage present; Flashing: consumption
2 Current flow direction - Real flow, without correction
3 Communication pictogram - Fixed: in progress; Flashing: establishing
4 Manufacturer (Enerdis)
5 Low Battery pictogram - Please refer to the corresponding chapter
6 Overrun pictogram
7 No Tariff Application pictogram
If this pictogram lights up, contact your correspondent
8 Control Mode / Test Mode LED
9 Expl LED - LED reserved for the Operator
10 Data item period
11 Data item label
12 Data item unit
13 Data item value
14 Navigation buttons - Used to navigate among the data on the meter
15 Legal markings & Certification
16 Operating range
17 Serial number
18 CE & MID marking
19 Access to 62056-21 optical head
20 Active Energy metrological LED
In Wh, on the secondary, without taking the losses into account
21 Reactive Energy metrological LED
In varh, on the secondary, without taking the losses into account
22 Meter name
23 Framework to which the data item belongs
24 Number of data item
25 Current supplier tariff item

ELECTRICAL SPECIFICATIONS

Accuracy class	
Active energy	MID class C as per EN 50470-1-3
Reactive energy	Class 2 as per IEC 62053-23
Network	
Type	Three-phase, 4 wires
Current inputs	
Type	On CT
Rated current	5 A (6.5 A max.)
Inrush current	5 mA
Consumption	< 0.5 VA per phase
Voltage inputs	
Rated voltage	57.7 V / 100 V
Frequency	50 Hz
Operating range	75% to 110% of rated voltage
Consumption	2 W / 10 VA per phase
Auxiliary power supply	
Type	Self-powered
Tariff change input (C-C1)	
Characteristics	230 V – 50 Hz
Function	Application of a signal on this input will switch the meter to "dynamic" or "mobile peak" pricing
Pulse outputs	
Number	4
Quantities assigned	P+ / P- / Q+ / Q-
Characteristics	27 Vdc / 27 mA max.
Weight	1 pulse every 0.025 Wh This weight should be multiplied by the coefficient CT x VT to obtain a snapshot of the primary energy
Time pulse output	
Characteristics	230 V / 2 A – 50 Hz
Function	Closure for approx. 900 ms indicates that integration of the previous average power has been completed
Operator communication	
Connections	RJ45
Type	RS232 (specific cable not supplied with the meter)
Protocol	DLMS Cosem as per IEC 62056
Function	Reserved for Operator: Data retrieval and programming of the meter / Connection of an external modem (STN, GSM, GPRS, etc.)
Customer communication	
Connections	RJ45
Type	RS232 (specific cable not supplied with the meter)
Protocol	DLMS Cosem as per IEC 62056
Function	Reserved for Customer: Meter reading / Connection of an external modem (STN, GSM, GPRS, etc.)
Customer information (CIS)	
Connections	RJ45
Type	RS232
Characteristics	Min. 100 Ω / Max. 5 V
Communication mode	One-way
Function	Allows connection of an Energy Manager / cyclical generation of information for the customer
High-speed optical interface	
Reference standard	IEC 62056-21
Function	Retrieval of metering data, programming and local upgrading of the meter's application software

MECHANICAL SPECIFICATIONS

Format	330 mm x 180 mm x 100 mm
Weight	Meter alone: 2 kg / Meter in packaging: 3 kg
Mounting	Surface mounting / attached at 3 points
Ingress protection	IP 51
Access protection	By seals
Power terminal strip	Cable cross-section: 4 mm² / Max. tightening torque: 0.6 Nm
Input and output terminal strips	Collet capacity: 2.5 mm² / Max. tightening torque: 0.5 Nm

ENVIRONMENT

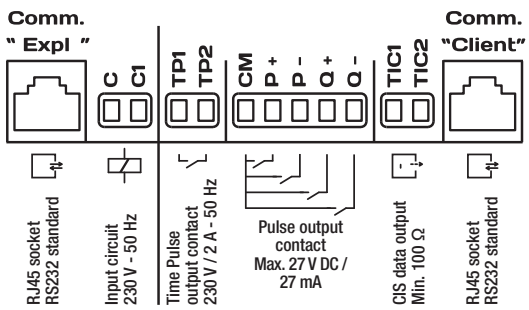
Climatic	
Rated operating temperature	-25°C to +55°C
Storage temperature	-28°C to +70°C
Relative humidity	Max. 80%
Electrical	
Overvoltage category	II

CONNECTIONS

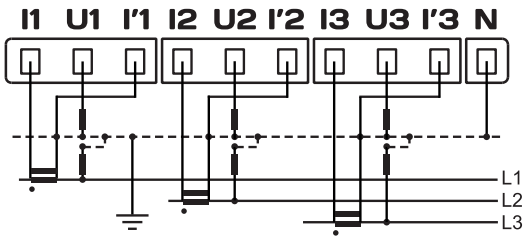
Operator access	
Terminals	**Functions**
"Expl" communication	Two-way "Operator" interface
C, C1	Input circuit for tariff change

Customer access	
Terminals	**Functions**
P+, P-, Q+, Q-, CM	Pulse output contacts
TP1, TP2	Time pulse output contacts
"Client" communication	Two-way "Customer" interface
"TIC"	One-way CIS customer information interface

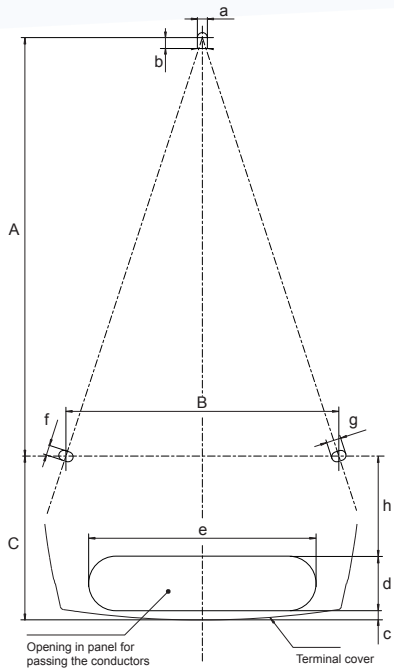
Communication terminal strip



Power terminal strip



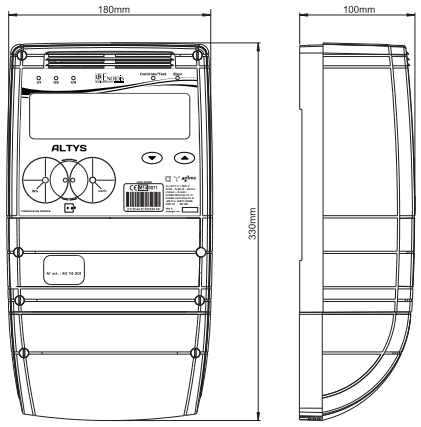
Terminals	Functions
I1	Phase 1 current input
U1	Phase 1 voltage input
I'1	Phase 1 current output
I2	Phase 2 current input
U2	Phase 2 voltage input
I'2	Phase 2 current output
I3	Phase 3 current input
U3	Phase 3 voltage input
I'3	Phase 3 current output
N	Neutral



with (in mm):

a = 5.5 ± 0.1
b ≥ 6
c ≥ 5
d = 20 ± 1
e = 125 ± 1
f = 5.5 ± 0.1
g = 8 ± 0.1
h = 55 ± 1
A = 230 ± 1
B = 150 ± 1
C = 90

DIMENSIONS / MOUNTINGS



TO ORDER

Model	Reference
ALTYS meter	P01331051

ASSOCIATED PRODUCTS

Low voltage current measurement transformers for tariff metering

page 32

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

USB optical head

P01330401

ENERIUM
RANGE

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

- 8 load curves
- 16 programmable alarms
- Graphics for easier data analysis
- Spectral analysis per phase up to the 50th order on V, U, I and In
- Qualimetry according to EN50160 standard

DESCRIPTION

A complete range of 6 power monitors ideal for:

- LV/MV/HV network supervision
- installation sizing
- energy management
- electrical network quality applications

ZOOM

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 analog inputs/outputs

SCREEN DISPLAYS

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

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

Harmonic analysis
Spectral analysis graph. THD measurement per phase on V, U, I and In. Up to 50th order.

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

Qualimetry
Log of events (dips, outages, overvoltages, overcurrents). Conformity graphs and statistics as per EN50160.

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

16 alarms
Programmable, viewing of alarms log, recording of the last 64 events, flashing of display if alarm.

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

Indication of connection errors at start-up

Preventive maintenance
Installation operating time.
Operating time of monitored equipment.

Power monitors

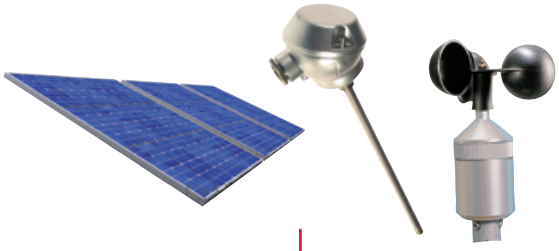
Flush-mounting 96 x 96 / Flush-mounting 144 x 144

	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
Backlit 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
Analog						
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
Analog	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

EXAMPLE OF APPLICATIONS

ANALOG INPUTS

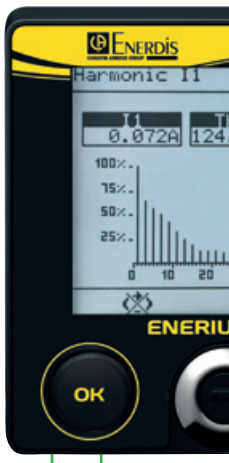


METERING INPUTS

water, gas, electricity

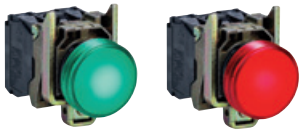
insolation, weather data, temperatures, etc.

CURRENT AND VOLTAGE INPUTS – LV/MV/HV NETWORKS



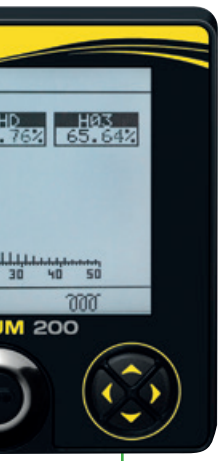
ANALOG OUTPUTS

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.

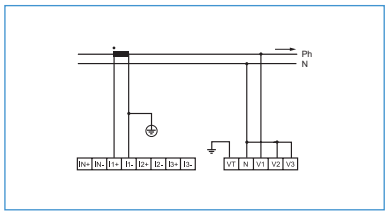
MEASUREMENTS

	1 S	min	max	average	min average	max average
V, U	■	■ except Enerium 30	■	■		■ except Enerium 30
Vearth	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30		■ except Enerium 30
I	■	■ except Enerium 30	■	■		■ except Enerium 30
In (calculated or measured)(1)	■	■ except Enerium 30	■	■	■ except Enerium 30	■ except Enerium 30
P (4 quadrants)	■		■ except Enerium 30	■ except Enerium 30		
Pt (4 quadrants)	■	■	■	■		■ except Enerium 30
Q (4 quadrants)	■		■ except Enerium 30	■ except Enerium 30		
Qt (4 quadrants)	■	■ except Enerium 30	■	■		■ except Enerium 30
S	■		■ except Enerium 30	■ except Enerium 30		
St	■	■	■	■		■ except Enerium 30
PF (4 quadrants)	■			■ except Enerium 30		
PFt (4 quadrants)	■			■	■ except Enerium 30	■ except Enerium 30
Cosφ (4 quadrants)	■ except Enerium 30			■ except Enerium 30		
Cosφt (4 quadrants)	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30
Tanφt (4 quadrants)	■			■	■ except Enerium 30	■ except Enerium 30
Frequency	■	■ except Enerium 30	■	■ except Enerium 30		
V crest factor	■ except Enerium 30			■ except Enerium 30		■ except Enerium 30
I crest factor	■ except Enerium 30			■ except Enerium 30		■ except Enerium 30
U unbalance	■ except Enerium 30			■ except Enerium 30		■ except Enerium 30
Harmonics on V, U, I	■ except Enerium 30					
Harmonics on In	■ except Enerium 30					
THD V, U, I	■			■		■ except Enerium 30
THD In	■		■ except Enerium 30	■		■ except Enerium 30
Active energy (receiver, generator)	■					
Reactive energy (Qcad1, 2, 3, 4)	■					
Apparent energy (receiver, generator)	■					
On-off input (pulse mode)	■ except Enerium 30					
Analog input (Enerium 100/200)	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30	■ except Enerium 30
Voltage presence hour meter (U)	■ except Enerium 30					
Load hour meter (I)	■					
Auxiliary power supply hour meter	■					

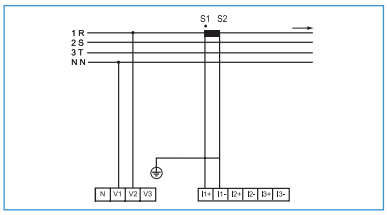
(1) On Enerium 30/50/150, calculated only

CONNECTION DIAGRAMS

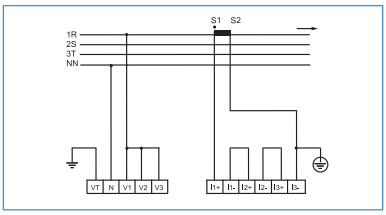
Single-phase



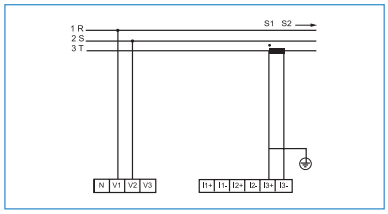
Balanced 3-phase, 4 wires - 1 CT
Except on Enerium 30



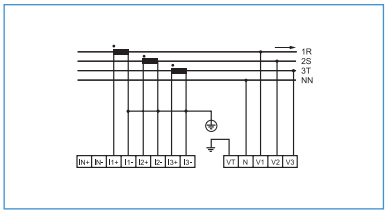
Balanced 3-phase, 4 wires - 1 CT
Enerium 30 only



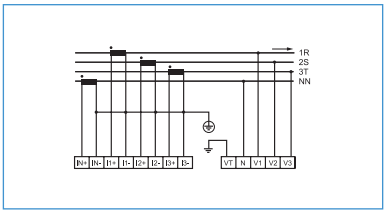
Balanced 3-phase, 3 wires - 1 CT
Enerium 30 only



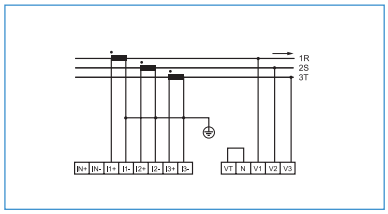
Unbalanced 3-phase, 4 wires - 3 CTs



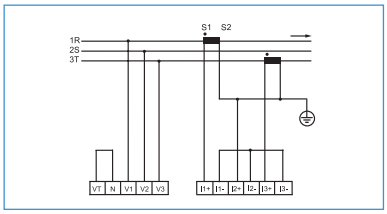
Unbalanced 3-phase, 4 wires - 4 CTs
Except on Enerium 30/50/150



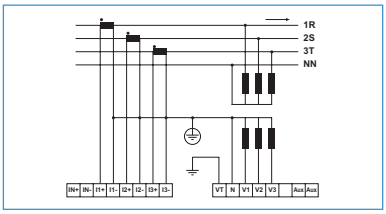
Unbalanced 3-phase, 3 wires - 3 CTs



Unbalanced 3-phase, 3 wires - 2 CTs



Example of connection to VT



TREND CURVES
(except on Enerium 30/50)

1S VALUES	
V, Vearth	■
U12, U23, U31	■
I1, I2, I3, In	■
Pt	■
Qt	■
St	■
PFt	■
U unbalance	■
THD V, U, I, In	■
Analog 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	■
Analog 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	■
Analog inputs (Enerium 200 only)	■

ALARMS

1S VALUES	
V1, V2, V3	■
Vearth	■ sauf Enerium 30
U12, U23, U31	■
I1,I2, I3, In	■
Pt	■
Qt	■
St	■
PFt	■
Cosφt	■ except Enerium 30
Tanφt	■
Frequency	■
U unbalance	■ except Enerium 30
THD V, U, I, In	■ except Enerium 30
3 hour meters: network presence, on-load presence, aux. source	■ except Enerium 30
Analog inputs (Enerium 100/200 only)	■ except Enerium 30
AVERAGE VALUES	
Pt Gen, Pt Rec	■ except Enerium 30
Qt Gen, Qt Rec	■ except Enerium 30
St	■ except Enerium 30
Tanφt (except on Enerium 30/50/150)	■ except Enerium 30
Analog inputs (Enerium 100/200 only)	■ except Enerium 30
ON-OFF INPUTS (Enerium 100/200/300 only)	■

ANALOG OUTPUTS (OPTION)
(except Enerium 30)

1S 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	■

CHARACTERISTICS

	ENERIUM 30 Class 1	ENERIUM 50/150 Class 0.5s	ENERIUM 100/200 Class 0.5s	ENERIUM 200 Class 0.2s	ENERIUM 300 Class 0.2s
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					
IEC 62053-21/22 IEC 62053-23/24	Active energy class 1 Reactive energy class 2	Active energy class 0.5s		Active energy class 0.2s	Active energy class 0.2s
		Reactive energy class 0.5s			
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	Active energy class 0.2 Reactive energy class 0.2
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			

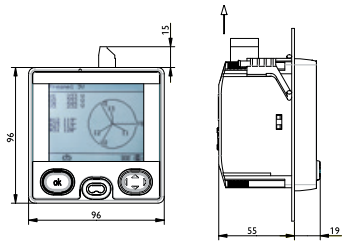
	ENERIUM 30 Class 1	ENERIUM 50/150 Class 0.5s	ENERIUM 100/200 Class 0.5s	ENERIUM 200 Class 0.2s	ENERIUM 300 Class 0.2s
RS485 output					
Connection	2 wires, half-duplex				
Protocol	ModBus / JBus RTU mode				
Speed (configurable)	2,400 - 4,800 - 9,600 - 19,200 - 34,800 (115,200 on ENERIUM 50/150)				
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 ± 20 % (< 10 VA) 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				
Analog inputs					
Scale			Configurable from 0 to +20 mA		
Power consumption			< 50 mW		
Input impedance			50 Ω		
Analog outputs					
Scale		Configurable between -20 and +20 mA			
Acceptable overload		500 Ω			
Response time		< 500 ms			
Storage					
Non-volatile memory	Configuration parameters – Recordings (curves, alarms, min-max, qualimetry events log, EN50160 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

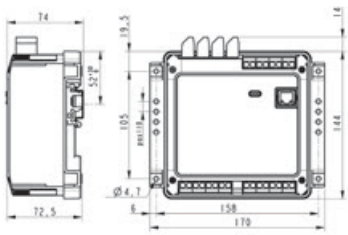
DIMENSIONS (IN MM)

Enerium 30/50/150



Enerium 100/200/300

Enerium 110/210/310



TO ORDER

STANDARD PRODUCTS

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

ACCESSORIES

Model	Reference
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

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	1 output (only on ENERIUM 30 / 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 Analog inputs (ENERIUM 100/200/300 only)

0	none
2	2 analog inputs
4	4 analog inputs
6	6 analog inputs
8	8 analog inputs

8 Analog outputs

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

9 Accuracy class

5	0.5s (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 analog inputs, no analog outputs, Class 0.2s

▶ order ENERIUM 200 01020002 :

1	200	2	0	3	0	4	0	5	2	6	0	7	0	8	0	9	2

ASSOCIATED PRODUCTS

E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

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ELOG DATA LOGGER

Remote data retrieval unit

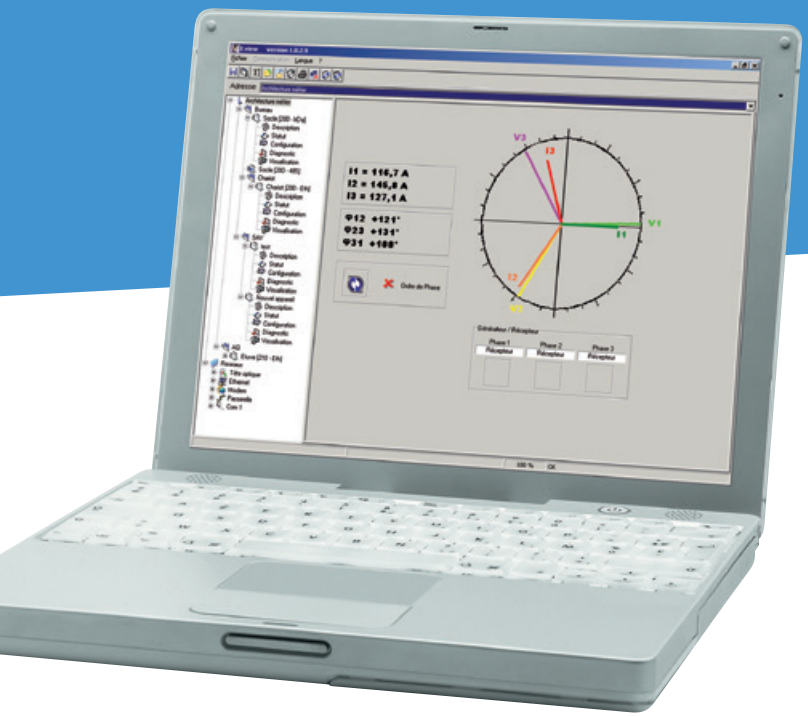
Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

Current transformers

Cable primary, busbar primary, closed core or split core, etc.

page 115



E.SET, E.VIEW AND E.VIEW +

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

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.

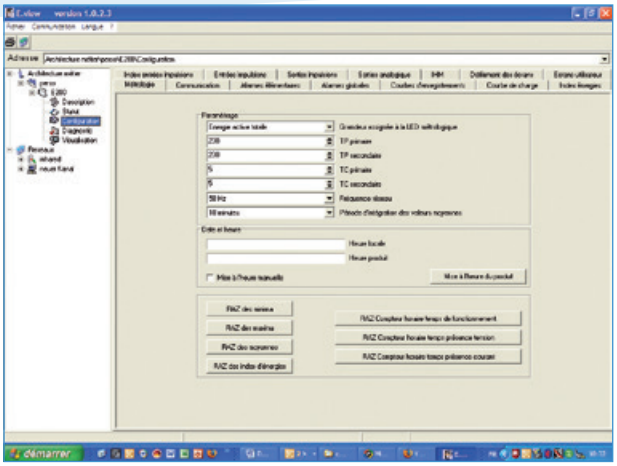
In addition, **E.View+** offers automatic elementary tables, bargraphs and curves.

+

- 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

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 (analog or on-off)
- Details of the slots: analog 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 analog 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 analog 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 analog 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

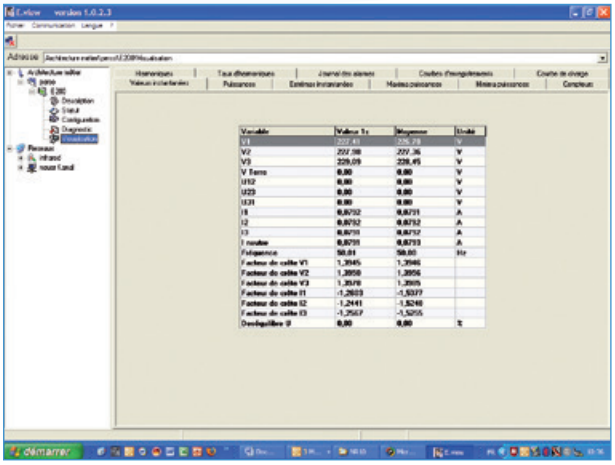
ASSOCIATED PRODUCTS

ENERIUM
Power monitors for all electrical networks compliant with the IEC 61557-12 standard.
page 48

ENERIUM
Optical reading head
page 56

E.VIEW

SAME BASIC CHARACTERISTICS AS E.SET, PLUS:



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 analog 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 analog outputs of ENERIUM.

- This concerns:
  - Pulse inputs
  - On-off inputs
  - On-off outputs
  - Analog 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

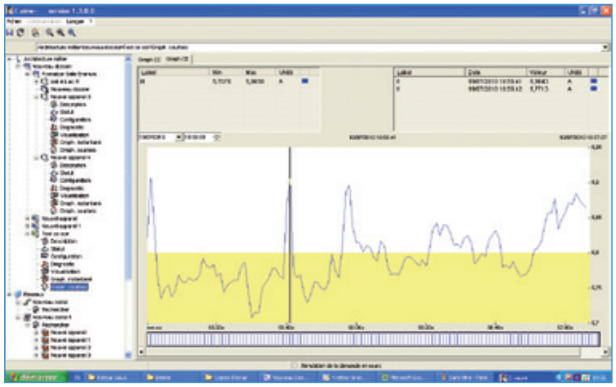
ASSOCIATED PRODUCTS

ENERIUM
Power monitors for all electrical networks compliant with the IEC 61557-12 standard.
page 48

ENERIUM
Optical reading head
page 56

E.VIEW +

SAME BASIC CHARACTERISTICS AS E.VIEW, PLUS:



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).

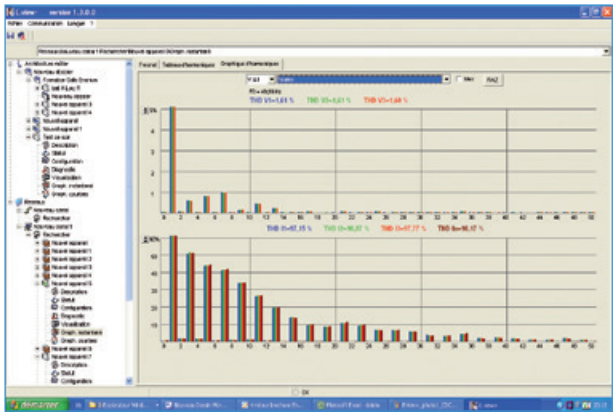
Example: the Fresnel diagram of the 3 phase voltages (3V): instantaneous values of the phase voltages and the values of the phases.

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 for all electrical networks compliant with the IEC 61557-12 standard.
page 48

ENERIUM
Optical reading head
page 56

RENOVENERGY

Metering solution for renovating installations.

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.

+

- 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

ZOOM

MID-certified ULYS TTA, TT for rebilling

TC CLIP transformers

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

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 ou 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, PF, 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	TT MODBUS	■	■
M-Bus communication output	TT M-BUS		
Ethernet communication output	TT ETHERNET		■
Local connection via USB/optical head			■
Analog outputs			■
Quick programming without software	■	■	
Compatible with the E.online energy management software	■	■	■

TC CLIP

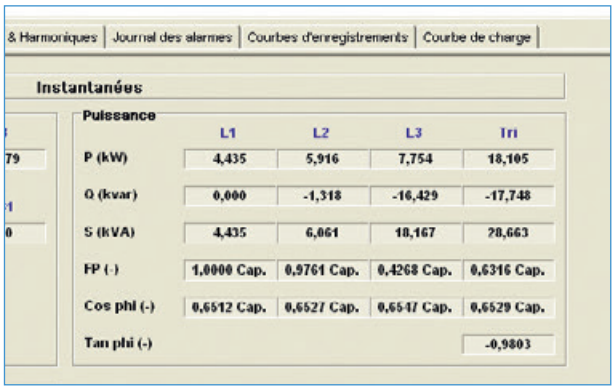
TC CLIP TRANSFORMER SELECTION GUIDE

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

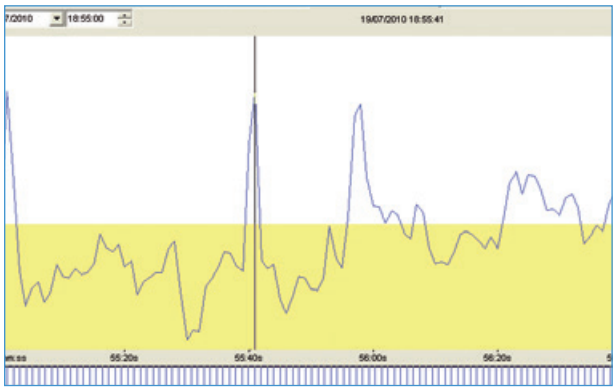
ASSOCIATED SOFTWARE

E.view | Compatible with Enerium 50

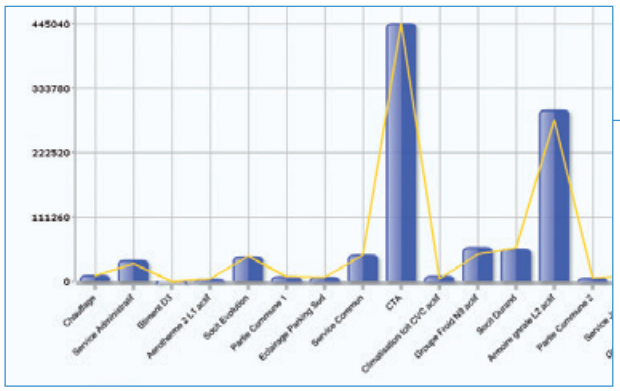


"Point-to-point" display software.
Demonstration version (limited to 29 days' use) delivered with each product.

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-online3 | Compatible ULYS TTA, Enerium 30 et 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

	Model	Reference
ENERIUM 30 - RS485 Modbus	IM 211	P01330823
ENERIUM 30 - RS485 Modbus, on-off output	IM 221	P01330824
ENERIUM 50 - RS485 Modbus	IM 321	P01330805
ENERIUM 50 - Ethernet Modbus	IM 321	P01330806
ENERIUM 50 - RS485 Modbus 1 on-off input - 1 on-off output	IM 321	P01330807
ENERIUM 50 - Ethernet Modbus 1 on-off input - 1 on-off output	IM 321	P01330808

+

Pack of 3 TC CLIPs

Model	Reference
PACK 3 TCC 176	P01379610
PACK 3 TCC 241	P01379605
PACK 3 TCC 242	P01379606
PACK 3 TCC 364	P01379607
PACK 3 TCC 366	P01379608

Submetering solution

Energy meters

	Model	Reference
ULYS TTA IEC	IM 210	P01331015
ULYS TTA MID	IM 210	P01331019
ULYS TT Modbus IEC	IM 210	P01331035
ULYS TT-M Modbus MID	IM 210	P01331037
ULYS TT M-bus IEC	IM 210	P01331043
ULYS TT-M M-bus MID	IM 210	P01331045
ULYS TT Ethernet IEC	IM 210	P01331039
ULYS TT-M Ethernet MID	IM 210	P01331041

+

Pack of 3 TC CLIPs

Model	Reference
PACK 3 TCC 176	P01379610
PACK 3 TCC 241	P01379605
PACK 3 TCC 242	P01379606
PACK 3 TCC 364	P01379607
PACK 3 TCC 366	P01379608

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

TC CLIP

Current transformers

Compact CT for integration in electrical installations without disconnecting the power cables.

page 138

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

Software

Software for configuration, installation diagnostics and display dedicated to the ENERIUM range of power monitors.

page 59

ENERGY EFFICIENCY

DATA LOGGERS AND SOFTWARE

DATA LOGGERS AND SOFTWARE

Data loggers

ELOG DATA LOGGER

Remote retrieval unit for all types of energy data

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

page 70

ENERIUM 210

Multi-energy, multi-utility data concentrator

Continuously stores the information from meters or analog sensors.

page 76

CCT

Pulse receiver allowing remote data retrieval

Collects and stores in real time the pulses from various energy meters or On-Off signals.

page 78

RADIOFREQUENCY

Data collector

Collects the data from the meters and sensors equipped with a radiofrequency transmission module.

page 80

Energy management and supervision software

E.ONLINE 3

Software

Software for monitoring and analyzing energy performance.

page 82

CHOOSING YOUR DATA LOGGER

Pulse receivers - Data logger

page 70 page 76 page 78 page 80




		ELOG DATA LOGGER	Enerium 210	CCT	RADIO-FREQUENCY
Electrical energy management	Accuracy		0.2 %		
	Measurement of P, Q, S, V, U, I 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	8	up to 31
	Analog inputs 0-20 mA/4-20 mA (temperature, flow rate, pressure, insolation, etc.)		0, 2, 4, 6 or 8		up to 31
Installation supervision	Management of alarms on thresholds		16		battery level
	Alarms log (recordings)		64		
	Fresnel diagram		via E.View		
	Pulse or alarm outputs		0, 2, 4, 6 or 8		
	Analog outputs		0, 2 or 4		
Power quality	THD / PF / Tan φ				
	Harmonics by order with graphic representation		50		
Recording capacity	Number of variable	100	12	8	up to 31
	Recording periodicity	from 5 s to 60 min	from 1 s to 60 min	from 1 s to 60 min	from 1 s to 250 min
Data export	csv, xml files				
Inputs / Outputs	RS485 - Modbus - Master	2	0	0	0
	RS485 - Modbus - Slave	0	1	1	1
	Ethernet	web services format JSON	Modbus TCP		
	Format (mm)	6 DIN modules	144 x 144	7 DIN modules	118 x 79 x 43 (L x H x W)

ELOG DATA LOGGER

Collect, record and export all your energy data.

- RS485 master and Ethernet communication
- Recording of 100 variables
- Remote data retrieval from all ModBus equipment
- Integrated web server
- Automatic export to FTP servers in csv or xml format

DESCRIPTION

ELOG is a **unit for automatic data retrieval, recording and storage of energy, climatic 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
- library of multi-equipment, multi-brand ModBus 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
- Automated export of csv and xml data files onto FTP servers

ZOOM

5 On-Off inputs

2 x RS485 ports (Modbus/Jbus RTU) in master mode

Ethernet port

MAIN FUNCTIONS

Remote data retrieval:

- in master mode on RS485 ModBus and Ethernet networks
- via 5 pulse inputs on multi-utility meters
- by ModBus driver for multi-brand, multi-function equipment
- of any sort of data to be collected (water, gas, temperature, etc.)
- whatever the origin of the data (pulses, analog signals, radio-frequency, RS Bus, Ethernet, etc.)

Recording of remote-retrieved data

- up to 100 variables
- for 3 calendar months with a recording interval > 1 minute
- for 3 calendar days with a recording interval < 1 minute

FTP Export

- programmable periodicity
- csv and xml files
- several file formats available
- specific formats on request

Time/date-stamping of the recorded data every:

- 5, 6, 10, 12, 15, 20, 30 or 60 seconds
- 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 or 60 minutes

Recording:

- of the instantaneous values
- of the energy indices

Local and/or remote configuration

- via integrated web pages
- using a web browser
- with paired login/password

Display of the data in real time using integrated web pages

PROCESSING

Web pages integrated in ELOG

It is no longer necessary to use a dedicated software solution or even a dedicated PC. All the data retrieved from the different types of equipment are accessible from any computer, tablet or equipped with a web browser.

Excel macro

An Excel macro allows you to recover the data and view them in table or graph form. It is supplied free of charge. The Excel application can be used to read the files exported in csv format automatically.

Third-party applications

The csv and xml files and the web services offer a very large number of possibilities for integrating and analyzing the data (standard or specific tools): Excel, Word, specialized analytical software, web pages, ERP, Big Data, TBM, CTM, E.online 3.

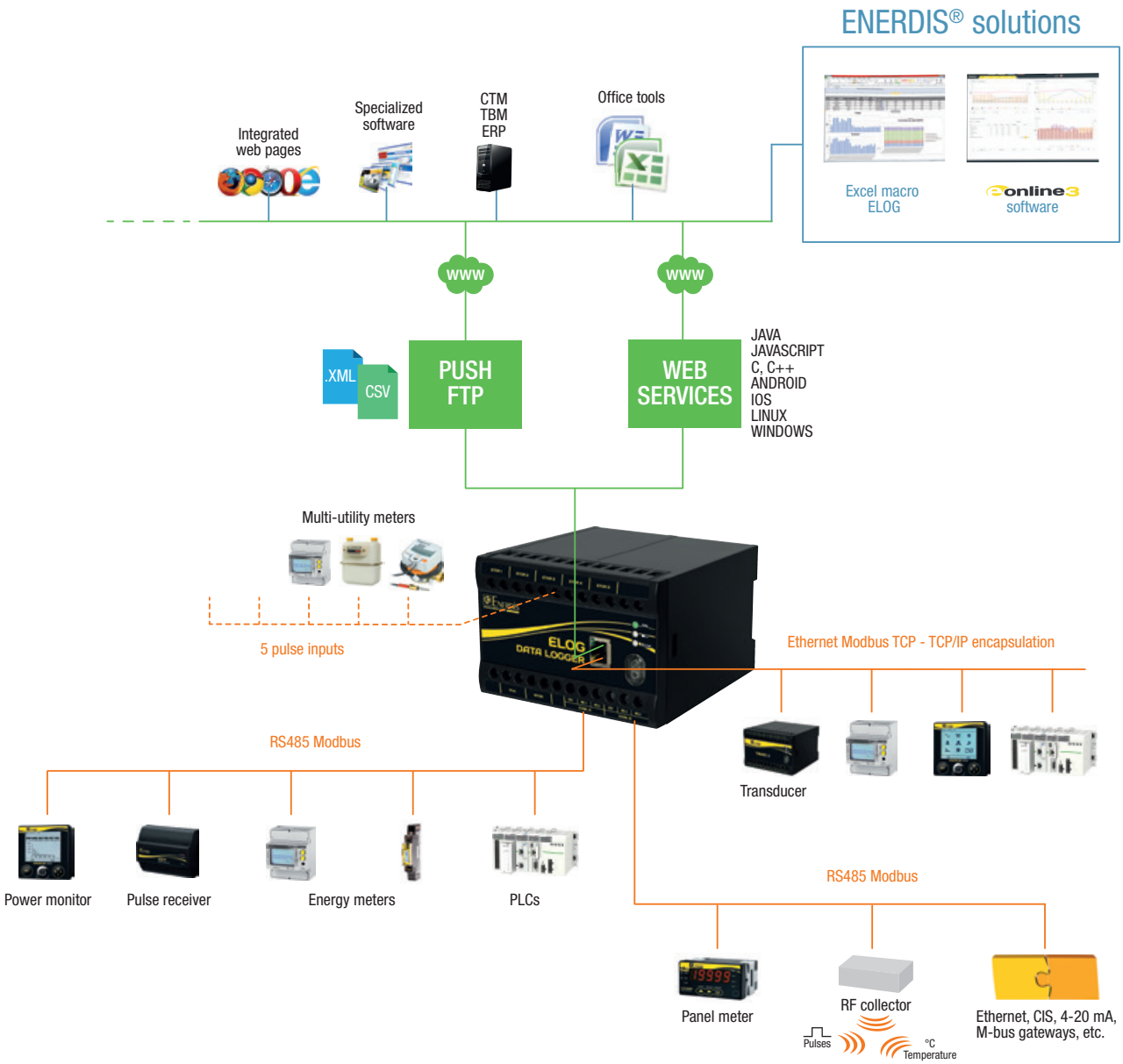
E.online 3 software

ELOG synchronizes automatically with the E.online 3 monitoring, analysis and performance supervision software.

Multi-platform, multi-language application

The web services (in JSON format using the http protocol) present in ELOG can be used to access the real-time values, recover the recorded data and facilitate integration of the product in any system using a wide range of programming languages: java, javascript, python, C, C++, etc.).

FUNCTIONAL DIAGRAM



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
- in PUSH FTP mode for automatic export of the csv and xml files of the recordings

ELECTRICAL SPECIFICATIONS

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

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	speed: 300 to 115,200 bauds 2 independent RS485 links (2 wires) - 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	FIFO

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

FILE EXPORT ONTO FTP SERVER

File format	csv, xml
Transmission periodicity	10, 15, 30 minutes or 1, 2, 3, 4, 6, 8, 12 hours/days/weeks/months
Number of programmable automatic tasks	PUSH FTP type - 15 max.- Independent - Multi-server FTP
Local FTP server	500 MB max. capacity - FIFO storage - For local file backups

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	100

MECHANICAL SPECIFICATIONS

Dimensions	120.5 x 120 x 81 mm (WxLxH)
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

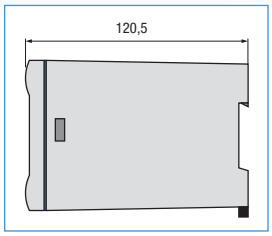
Climatic constraints	
Rated operating temperature	-10 to +55°C
Storage temperature	-25 to +70°C
Relative humidity as per IEC 62052-11 (standard for electrical metering applications)	<75%, annual average 95% for 30 days spread naturally over the year 85% occasionally on other days

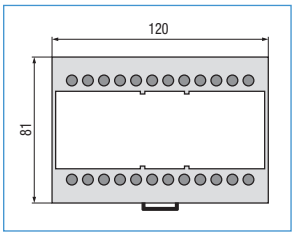
Safety constraints	
Standard	IEC 61010-1
Installation category	III
Pollution degree	2
Behaviour in fire	Complies with the UL94 standard, severity level V1

Mechanical constraints	
Protection rating according to IEC 60529	IP 20

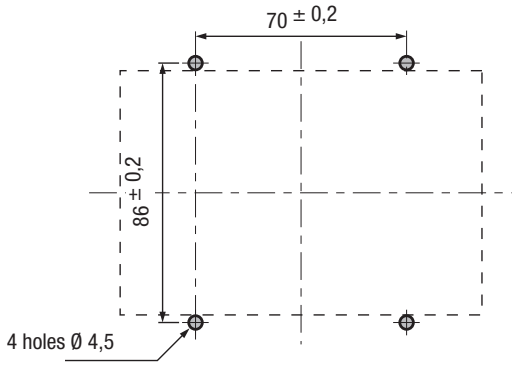
Electromagnetic constraints	
Standards	IEC 62052-11 / IEC 61000-4-2 / IEC 61000-4-3 / IEC 61000-4-4 / IEC 61000-4-5 / IEC 61000-4-6 / IEC 61000-4-8 / IEC 61000-4-11 / CISPR22

DIMENSIONS (IN MM)

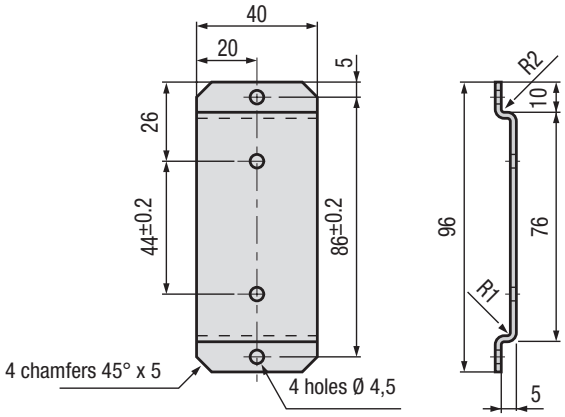




Drilling plan for mounting on switchboard



Accessory for mounting on switchboard with screws (option)



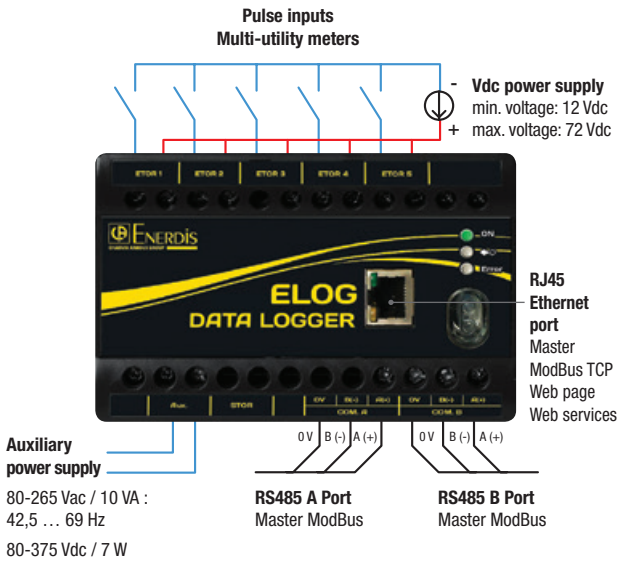
TO ORDER

Model	Reference
ELOG	P01331233

ACCESSORIES

Model	Reference
Switchboard mounting	ACCT 1006
Optical USB cable	P01330403

ELECTRICAL CONNECTIONS



ASSOCIATED PRODUCTS

ULYS

Energy meters

Single and three-phase energy meters with direct inputs or input on CT.

page 30

ENERIUM

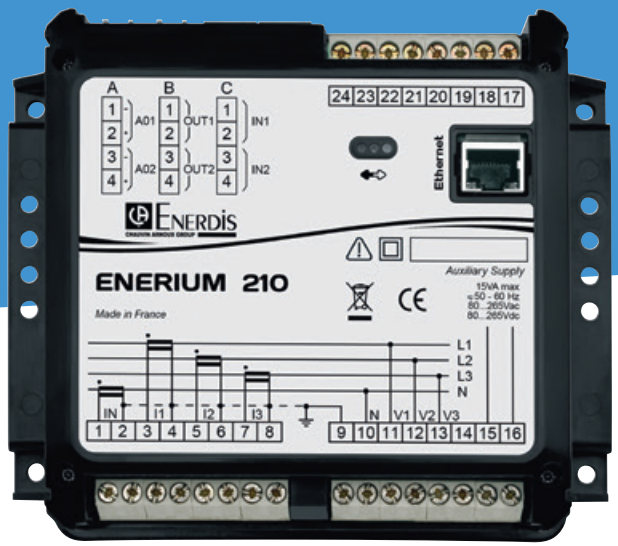
Power monitors for all electrical networks compliant with the IEC 61557-12 standard.

page 48

RADIOFREQUENCY

Data collectors for the data from meters and sensors equipped with a radiofrequency transmission module.

page 80



ENERIUM 210

Multi-energy, multi-utility data logger.

- 8 inputs for acquisition:
  - On-off
  - analog
- Ethernet & RS485 communication
- Multi-energy and multi-utility

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.

ZOOM

Programming and reading of the data by optical head

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

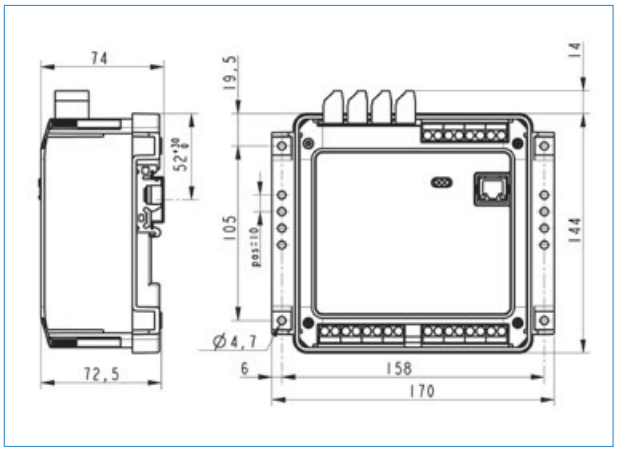
FURTHER INFORMATION

- **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

DIMENSIONS (IN MM)



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

Optical head is compulsory to configure the IP adress

ELECTRICAL CONNECTIONS

Please see page 52

TO ORDER

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

Accessory - Model	Reference
Optical head	P01330401

SOFTWARE

Model	Reference
E.Set	P01330501
E.view	P01330601
E.view+ / E.online 3	Consult us

ASSOCIATED PRODUCTS

E.View
Software for configuration and display of the electrical parameters.
page 60

ULYS
Energy meters
Single and three-phase energy meters with direct inputs or input on CT.
page 30

E.ONLINE 3
Processing software
Multi-energy consumption measurement and management software.
page 82

CCT RANGE

Remote-readable pulse receiver.

- 8 pulse inputs
- Pulse and event modes
- 28 days of recording

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.

ZOOM

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

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

SPECIAL FEATURES

The **CCT** accepts all types of metering measurement units (m3, m3/h, litres, kWh,etc.).
8 inputs can be programmed individually as metering-pulse inputs or digital inputs.

Pulse inputs:

- Energy management: storage of consumption profiles by recording the last 4032 average values for each of the 8 channels (e.g. 28 days' recording for a 10-minute integration period).
- Storage of the monthly consumption in the year and the general metering index.

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 1,500 ms
Auxiliary power supply	
Supply voltage	230 Vac
Operating range	-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

MECHANICAL SPECIFICATIONS

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

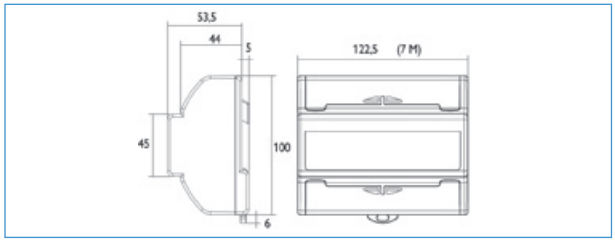
ENVIRONMENT

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

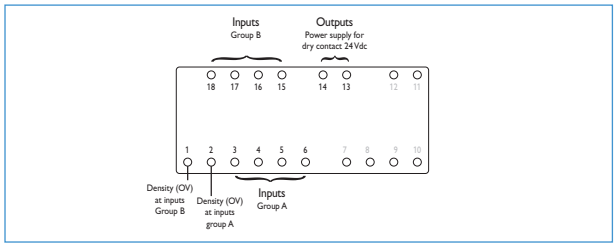
TO ORDER

Model	Reference
CCT	CCCT 1001
SESAME (Configuration software)	LOGG2001

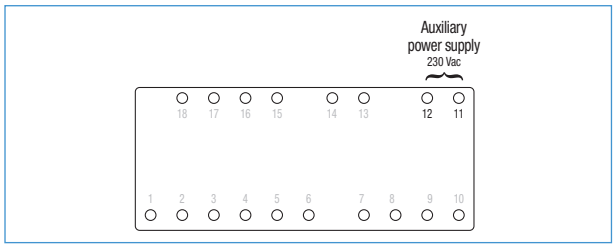
DIMENSIONS (IN MM)



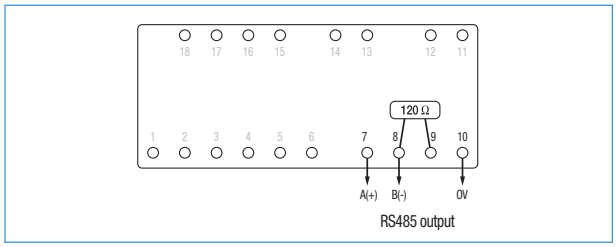
ELECTRICAL CONNECTIONS



AUXILIARY POWER SUPPLY



COMMUNICATION



ASSOCIATED PRODUCTS

ULYS
Energy meters

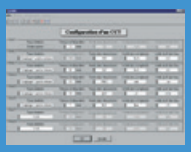
Single and three-phase energy meters with direct inputs or input on CT.

page 30

E.ONLINE 3
Processing software

Multi-energy consumption measurement and management software.

page 82



SÉSAME
Configuration software

RADIOFREQUENCY
DATA COLLECTOR

Radiofrequency remote data retrieval solution for remote operation of distant or isolated meters (water, gas, electricity, etc.).
Stand-alone communication solution independent of any company or process network.

+
- Wireless remote data retrieval from meters and sensors
- Very long-range transmission
- Quick implementation
- Battery life of more than 10 years

GENERAL SPECIFICATIONS

- High transmission power: 500 mW (2.5 km range)
- Large number of types of radiofrequency transmitters:
  - Pulses for electricity, water and gas meters, etc.
  - Indoor and outdoor temperatures
  - Humidity, CO_2
  - 4 - 20 mA signals
  - Alarm contact
  - ModBus RTU equipment
- IP40, IP60 or IP65 ingress protection
- An RF receiver can manage up to 31 RF transmitters
- The RF receiver is compatible with ELOG DATA LOGGER
- The recorded data can be processed via csv or xml files and by the E.online 3 software

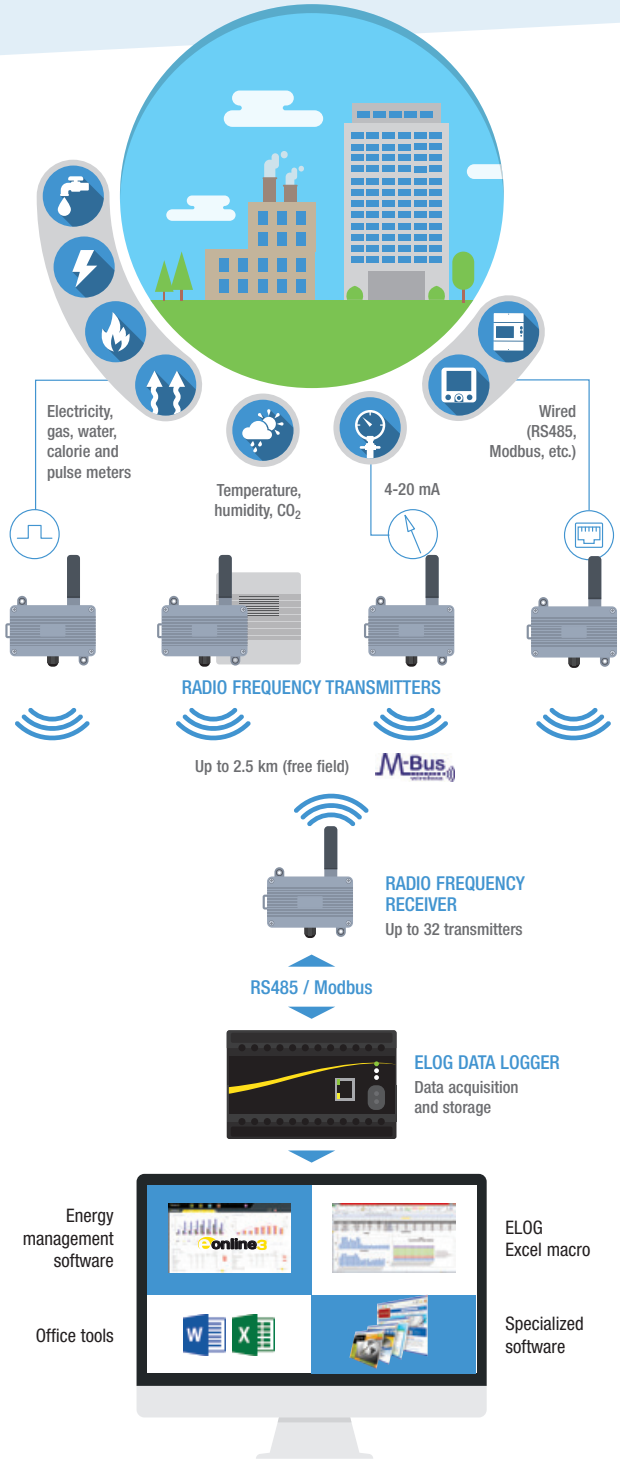
ZOOM

M-Bus wireless protocol
169 MHz – Very long range (2.5 km)

Measurement of pulses, temperature, 4 - 20 mA, etc.

	RF TRANSMITTERS	MODBUS RF TRANSMITTERS	RF REPEATER	RF RECEIVER
Protocol	Wireless M-Bus (WM-Bus) – EN13757-4 2011 – 169 MHz			
Transmission power	500 mW (27 dBm) 100 mW (27 dBm)*	500 mW (27 dBm)		-
Transmission	Adjustable from 1 to 250 minutes		-	-
Range	2.5 km in free field			
Power supply	Interchangeable battery (3.6 V Lithium battery)	7.5 – 24 Vdc		
Battery life span	10 years (transmission every 10 minutes)	-	-	-
Ingress protection	IP65 - IP40*	IP40	IP60	
Management	-	-	-	Up to 32 trans-mitters
Output	-	-	-	RS485 ModBus
Configuration	-	-	-	Via USB port
ABS casing	L 118 x H 79 x W 43 mm L 99 x H 85 x W 32 mm*	L 118 x H 79 x P 43 mm		
Mounting	Wall-mount and DIN rail Wall-mount only*	Wall-mount and DIN rail		
Operating temperature	-20 °C to +55 °C			

* For references P01330410 and P01330411



TO ORDER

Model	Reference
169 MHz RF Transmitter - Ambient temperature	P01330410
169 MHz RF Transmitter - Ambient temperature and humidity	P01330411
169 MHz RF Transmitter - Integrated temperature	P01330412
169 MHz RF Transmitter - Temperature by contact probe	P01330413
169 MHz RF Transmitter - 2 metering pulse inputs	P01330414
169 MHz RF Transmitter - 2 ATEX metering pulse inputs	P01330415
169 MHz RF Transmitter - CO_2 - Ambient temperature and humidity	P01330416
169 MHz RF Transmitter - 4 - 20 mA / 0 - 5 V / 0 - 10 V analog input	P01330417
169 MHz RF Transmitter - On-Off status report	P01330418
169 MHz RF Transmitter - ModBus RS485	P01330419
169 MHz RF repeater with screw-on antenna supplied	P01330420
Din rail for 169 MHz RF Repeater	P01330421
169 MHz RF Receiver - ModBus RS485 output - Antenna not supplied	P01330422
169 MHz antenna for screwing on receiver	P01330423
169 MHz long-range antenna - 5 m extension for receiver	P01330424
169 MHz long-range antenna - 10 m extension for receiver	P01330425
Din rail for 169 MHz RF receiver	P01330426
230 Vac - 12 Vdc power supply for receiver and repeater	P01330427
ELOG DATA LOGGER - Data collection and recording	P01331233
E.ONLINE 3 - Energy management software	EONLINE3-CFG
Radio frequency audit service	DOC PEE 1001

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

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ULYS

Energy meters

Single and three-phase energy meters with direct inputs or input on CT.

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E.ONLINE 3

Processing software

Multi-energy consumption measurement and management software.

page 82

E.ONLINE

Energy supervision, analysis and monitoring software.

- Real-time supervision of consumption
- Energy dashboards customizable for each user
- Analytical tools (tables, graphs, etc.)
- Production and automatic distribution of the analyses by email
- Definition of alarms and energy models

DESCRIPTION

The **E.online 3** software centralizes and consolidates all the energy monitoring data from the power monitors and meters on the electrical network, the ELOG DATA LOGGER data concentrators and the radiofrequency data collector.

The **E.online 3** software complies with the functional requirements of the Analyze part of a an EMIS (Energy Management Information System):

- **Part 1:** Meter - Measure
- **Part 2:** Collect - Historize
- **Part 3:** Analyze - Act

Our metering, measurement and data concentration equipment handle parts 1 and 2 of the EMIS.

This system supplies useful data for the energy review required for ISO 50001 certification.

SOFTWARE FUNCTIONS

Monitoring - Supervision
- Display the measurements and meter readings in real time
- Check the consistency of the measured and displayed data

Energy analysis tools
- Create your analyses using a library of preconfigured tables and graphs
- Customize the analyses according to responsibility parameters

Calculations - Virtual meters
- Calculate the Energy Performance Indices (EPI) and virtual meter values using preprogrammed formulae
- Allocate by energy usage, cost centre, etc.

Consolidate - Check
- The remote-retrieved data are available in real time for the analyses and alarms
- Erroneous data are identified automatically

Dashboards
- Customize the dashboards on your scope of action
- View the log of alarms in real time

Alarms - Energy models
- Apply energy models to the meters, virtual meters, EPI, etc.
- Receive targeted alerts on your scope of action

Sharing of reports
- Automatically distribute customized analyses by email
- Receive targeted analyses on your scope of action

Archiving - Exchanging data
- Store your data for a history over more than 10 years
- Access the MySQL database via SQL connectors

Supervise
Analyze

eonline3

Energy management software

Manual data input

Import of xml files

Collect
Historize

ELOG DATA LOGGER

- Ethernet
- Radio Frequency
- 2G - 3G network
- RS485 Modbus, etc.
- Pulse
- 4-20 mA

Meter
Measure

Tariff meters | Power monitors | Submeters | Pulse and analog signal receivers | PLCs

Energy, utilities, influencing quantities

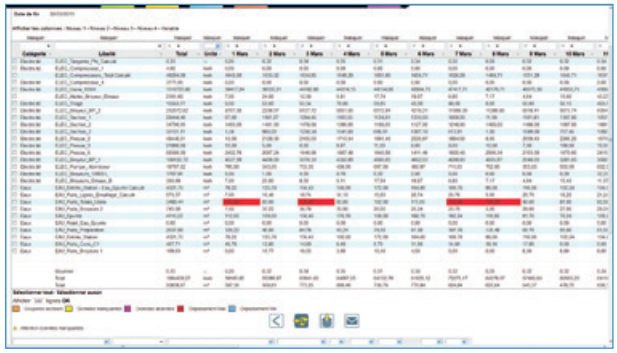
Electricity | Water | Gas | Heat Cold | Climatic parameters | Physical parameters

Customizable dashboards

- Dashboards customizable to match users' scope of action
- Real-time viewing of the alarms log
- Direct access to all the key energy reports
- Real-time updating of tables and graphs

Real-time monitoring

- Instantaneous display of the measurements and meter readings
- Automatic detection of threshold overruns
- Instantaneous detection of communication faults with the equipment
- Real-time aggregation of all the remote-retrieved data



Energy analyses and reports

- Library of graphs and tables for creating analyses
- Allocation of consumption:
  - by usage (lighting, air-conditioning, heating, auxiliary, etc.)
  - by utility (electricity, water, gas, etc.)
  - by entity (company, department, production unit, etc.)
- Calculation of energy and economic Performance Indices (kWhep or €/m2/year, kWh or €/part manufactured, kWh/degree day, eq TCO_2, …)
- Financial valuation of the consumption according to the energy costs
- Customized, targeted, automatic distribution of the analyses and reports by email
- Zoom in/Zoom out function in the graphs

Alarms

- Definition of threshold profiles used as models on the consumption and Energy Performance Indices
- Distribution of alerts on threshold overruns by email
- Log of alarms (date, time, values, overrun rate, etc.)

TO ORDER

	Model	Reference
E.online 3 SINGLE-STATION	E.online 3 SINGLE-STATION - 15 devices	P01335080
	E.online 3 SINGLE-STATION - 30 devices	P01335081
	E.online 3 SINGLE-STATION - 50 devices	P01335082
	E.online 3 SINGLE-STATION - CFG(1)	Product configured when ordering
E.online 3 SERVER	E.online 3 SERVER - 15 devices	P01335083
	E.online 3 SERVER - 30 devices	P01335084
	E.online 3 SERVER - 50 devices	P01335085
	E.online 3 SERVER - CFG(1)	Product configured when ordering
	SQL connector for E.online 3-CFG	Available as an option
	Generic Modbus driver for E.online 3-CFG	Available as an option

(1) Number of devices and user profiles specified when ordering:
- Max. number of devices: 4,000
- Max. number of user profiles: 200

COMMUNICATION ACCESSORIES

The communication accessories are necessary to ensure transmission of the data from the measuring equipment to the data loggers and the E.online 3 software.

Model	Reference
RS485 series network	
RS485 - USB converter / self-powered / portable	P01330365
Repeater/Dispatcher 2xRS485/RS485 - 19.2 to 28.8 Vdc (power supply: ACCJ1003)	ACCJ1002
Ethernet network	
Multi-host JBUS / ETHERNET gateway, DIN rail - 24 Vdc (power supply: P01376001)	P01330351
ADSL network	
WSFDV206 ADSL router modem - 19 to 60 Vdc (power supply: WSMRD24VDC reference 01NC5503)	P01330361
2G / 3G / 4G network	
WSMRD305DIN 3G router modem- 10 to 30 Vdc (power supply: WSMRD2024VDC reference 01NC5503)	01NC5503
Long-range remote antenna for WSMRD305DIN 3G router modem - 2.5 m cable	01NC5503
Long-range remote antenna for WSMRD305DIN 3G router modem - 5 m cable	01NC5503
ASIR615SU 3G-4G-WIFI router modem - 12 Vdc (AC/DC power pack incl.)	01NC5503
Long-range remote antenna for ASIR615SU 3G-4G-WIFI router modem - 3 m cable	01NC5503
Power supplies	
WSMRD2024VDC power supply- 85-264VAC (120-370VDC)/24VDC - 1.7A	01NC5503
DIN rail power supply 230 Vac/24-48 Vdc 30W DIN rail	P01376001
Power supply for Repeater/Dispatcher 2xRS485/RS485	ACCJ1003
Power supply 230 Vac/12 Vdc - 12 VA	ACCJ1004
Accessories for PULSE OUTPUT	
PULSE DOUBLER	01NC5503
Accessories for CIS output on tariff meters	
CIS-MODBUS module - 9 to 24 Vdc (power supply: P01376001)	P01330377
USB-CISMODBUS cable	P01330378
YELLOW CIS-PULSE - 230 Vac	01NC5503
BLUE-CIS-PULSE - 230 Vac	01NC5503

ASSOCIATED PRODUCTS

ELOG DATA LOGGER

Remote data retrieval unit

Automatic remote data retrieval, recording and storage of energy, climatic and process data.

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ENERIUM

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

page 48

ULYS

Energy meters

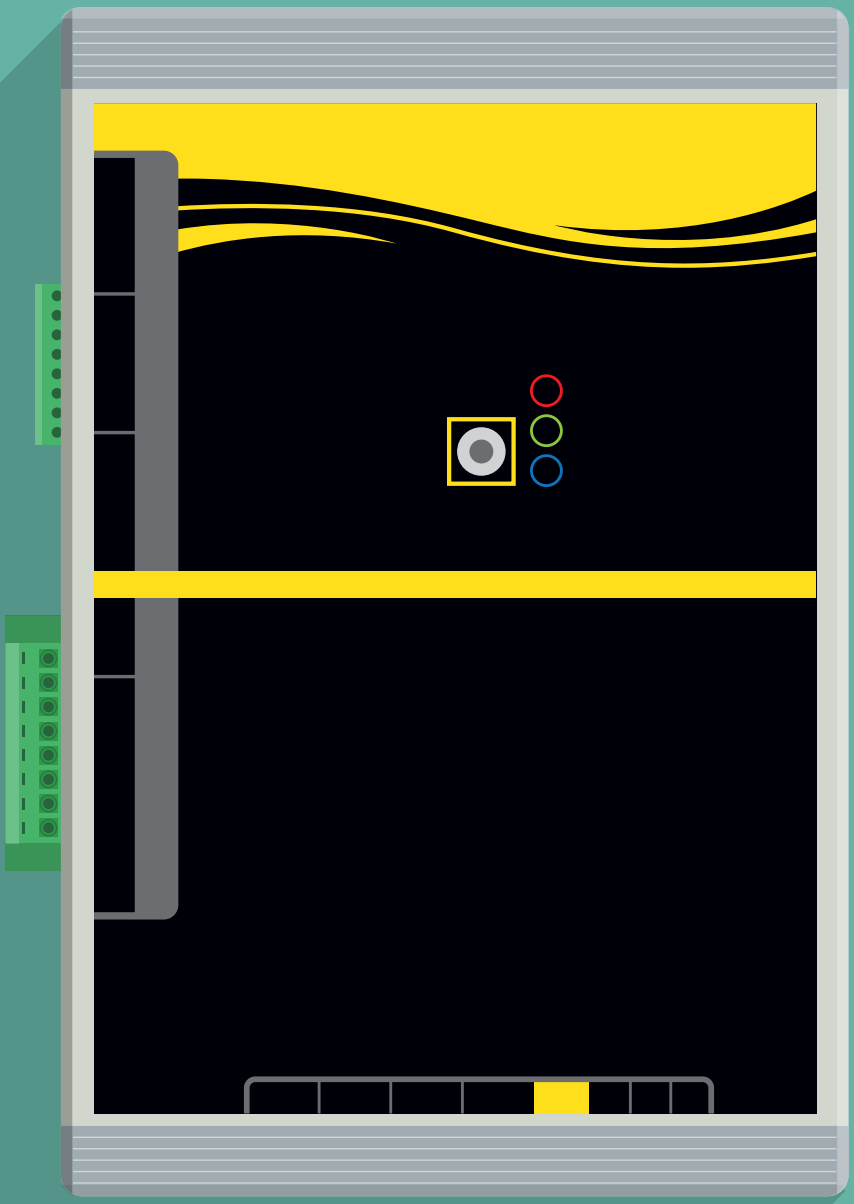
Single and three-phase energy meters with direct inputs or input on CT.

page 30

RADIOFREQUENCY

Data collectors for the data from meters and sensors equipped with a radiofrequency transmission module.

page 80



NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

NETWORK ANALYZERS

NETWORK ANALYZERS

Electrical network analyzers

Permanent analyzers - MAP range - Class A

MAP 607
Single-phase voltage quality analyzer
page 97

MAP 610
Three-phase voltage quality analyzer
page 99

MAP 620
Three-phase voltage/current network quality analyzer
page 99

MAP 640
Three-phase voltage/current network quality analyzer with HF transient capture
page 99

MAP Compact
Three-phase voltage/current power and network quality analyzer + Monitoring of EN50160 template
page 98

Power quality monitor

ENERIUM 300
Power monitor
Qualimetry according to EN50160
page 48

Non-intrusive analyzers - MAP range - Class A

MAP 612-NI
Non-intrusive three-phase voltage quality analyzer with quick connection
page 100

MAP 620-NI
Non-intrusive network analyzer - three-phase voltage/current
page 100

Management and analysis software

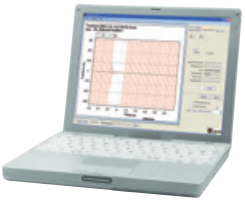
For MAP 607

Qual-SRT
Configuration and display
page 106

Qual-View
Settings, display and analysis
page 106

For MAP Compact

Qual-SRTc
Settings and display
page 106



Qual-View
Settings, display and analysis
page 106

For MAP 6XX range

E.Qual-Premium
Settings, display and analysis
page 106

E.Qual-Premium Server
Settings, remote data retrieval, display, administration and analysis
page 106

SELECTION GUIDE

BASED ON ITS SPECIFICATIONS

	MAP permanent analyzers				MAP non-intrusive analyzers	
		page 96-97			page 100	
						
	Single-phase	Three-phase				
	607	**610**	**620**	**640**	**612-NI**	**620-NI**
Installation						
Number of voltage channels	2	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 (Modbus TCP/IP available)		option	option	option	option	option
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 min	10 min	10 min	10 min	10 min
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
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 96-97				page 100	
						
	Single-phase	Three-phase				
	607	610	620	640	612-NI	620-NI
Calculated parameters						
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	■	■	■	■	■	■
Connection						
Quick / non-intrusive connection	■				■	■
Software						
Qual SRT / Qual-View	■					
E.Qual-Premium		■	■	■	■	■
E.Qual-Premium-Server	■ (import)	■	■	■	■	■

INFO & ADVICE

COVER ALL YOUR REQUIREMENTS FOR ENERGY QUALITY SUPERVISION AND ARBITRATION

UNDERSTANDING THE DETAILS OF YOUR ELECTRICITY BILL

It is essential to keep a close eye on your real energy consumption for energy monitoring because, when considerable power is involved, the electricity bill is also high. So measuring these high power values with mediocre accuracy means that uncertainty persists concerning actual energy consumption and the related cost.
This is why we recommend choosing measuring equipment with 0.2% accuracy, currently the highest accuracy standardized by the IEC 62053-22 international standard on metering active energy.

Electrical environments may also be **disturbed** (presence of harmonics, phase shift on the current and voltage, etc.), thus causing deterioration of the power factor. Energy measurement in these conditions is more complex. For such environments, the **accuracy of your equipment should be accompanied by the letter "s"**, guaranteeing that you have the most reliable energy measurement possible in disturbed environments..

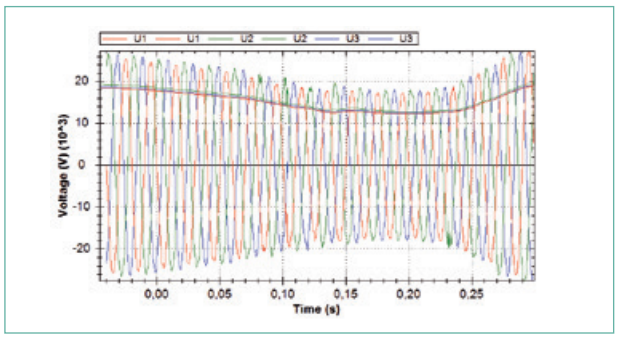
> If you choose 0.2s accuracy on your power monitor, it guarantees that you meter energy with the same accuracy as your tariff meter (or higher).

Estimate the impact of complex electricity consumption on your network to take quick action. Electricity differs from the other utilities (gas, water, etc.) due to the complexity of its composition and the wide variety of indicators which help to optimize its cost. **The apparent power is the most important thing to monitor** because it will determine the quantity of electrical energy and thus the subscription which you will need. To achieve savings, you therefore have to take into account the two components of the apparent energy which need to be reduced:

- **Reactive energy:**

The inductive loads on the network will create a mismatch between the current and voltage which naturally draws unwanted power. The rejection of this "reactive" power is limited to a certain proportion of the active power by the network administrators. This limitation may be performed by adding "compensation" solutions at the level of the load or at certain points in the network.

- **Distorting power:**



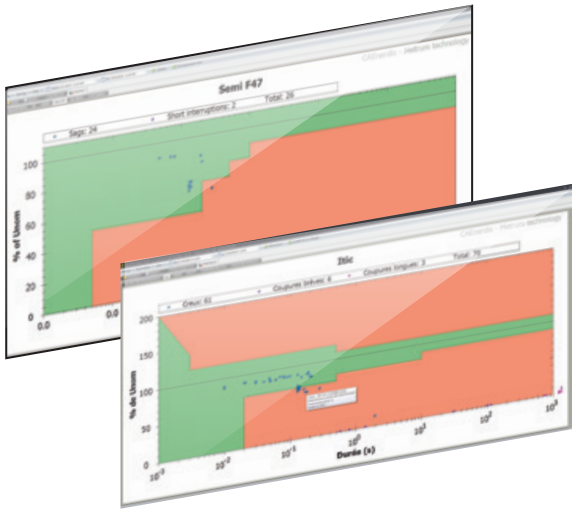
Distorting loads on the electrical network change the waveforms of the currents and voltages by producing signals whose frequencies are different from the rated frequency of the network. These signals, called harmonics, will have a large number of harmful effects, such as changing the voltage level of the network, drawing additional "distorting" power and increasing the currents in certain conductors. The harmonics, whose presence is also limited by the standard, can be corrected by filtering systems.

UNDERSTANDING ENERGY QUALITY AND HOW TO IMPROVE IT

You must **anticipate the losses and maintenance costs on the equipment** due to poor energy quality.
The variations of the main electrical quantities outside the tolerance ranges shorten the life span of the electronic equipment in the network. Constant monitoring of these quantities will enable you to establish a correlation between equipment maintenance and network energy quality.

Energy quality events such as dips, outages and voltage surges are bad for the operating continuity of electrical installations. The costs linked to production losses and production downtime after voltage dips may be high. **Recording to quantify and qualify the energy quality events will subsequently help to find the sources of the anomaly so that you can correct them. Sector-specific templates are available to qualify the dips in terms of their harmful effects** on specific equipment:

- The **ITIC template** for qualifying a dip which may corrupt data or damage computer bays
- The **SEMIF47 template** for qualifying a dip which may cause a fault in sensitive production-line tooling (such as semi-conductor production sites)



MONITORING THE COMMITMENTS CONCERNING THE ELECTRICITY SUPPLY

The **European standard** concerning energy supply quality is the **EN50160** standard. This describes the requirements covering the voltage and frequency at any point of connection.

All electricity suppliers must comply with this standard. By using an analyzer, you can check all the parameters and produce a compliance or non-compliance report.

Specific commitments may be agreed between the electricity suppliers and customers, limiting the annual number of outages or voltage dips. The use of an **analyzer** will enable the supplier to **confirm to customers that these commitments are met**, while also allowing the customer to contest fulfilment of the commitments if quality events occur.

To **provide indisputable information on energy quality** (events or electrical quantities), the measurement must be reproducible. The IEC 61000-4-30 standard specifies the methods for measuring the events and electrical quantities and also defines several classes, of which Class A is the most demanding.

This helps to guarantee that two different items of equipment connected to the same location will give identical results.

> Class A is the crucial criterion for choosing a network analyzer.

IDENTIFYING ALL THE DISTURBANCES

The difficult when troubleshooting stems from the fact that you are seeking to "trap" something about which you have no prior information. This makes it difficult to stipulate in advance the fault capture characteristics of your network analyzer. **The crucial criterion for the analyzer will be the sampling frequency**, which will define the minimum resolution at which a transient phenomenon will be detected.

- **For the most frequent requirements, a 12 kHz sampling frequency** (256 points per cycle) will be sufficient to analyze all the aspects of the events
- **For advanced troubleshooting**, requiring highly-accurate display of all the variations before and after the fault, **the sampling frequency of the equipment must be at least 2 MHz.**

> A high sampling frequency guarantees that all the information necessary for investigation has been recorded.

CHOOSING YOUR EQUIPMENT

A simple, economical solution for supervising energy quality

ENERIUM 300 (page 48)

Assess the impact of energy quality on your electrical feeder

The power monitor focused on energy quality

- Accuracy class 0.2s
- Storage of consumption data
- Recording of trend curves
- Harmonic analysis
- Events log (dips, outages, etc.)
- Monitoring of compliance with the EN50160 standard
- Capture of waveforms
- Up to 8 input/outputs

Switch to a higher gear with the MAP network analyzers

- Class A IEC 61000-4-30
- Capture of the most complex energy quality parameters
- Continuous data storage 24/7
- Production of turnkey reports and investigative tools using a wide range of software products

MAP COMPACT

Monitor your electrical network simply and effectively

The economical solution for analyzing your network

- A compact format for easier integration
- A screen for the basic information
- Access to the data locally via USB or remotely via Ethernet
- 3-channel voltage input, 230/400 VRMS
- 4-channel current input, 0 – 6 A RMS
- Auxiliary power supply: 175 – 255 Vac (10 s power reserve)
- 2 On-Off inputs/outputs

MAP 640

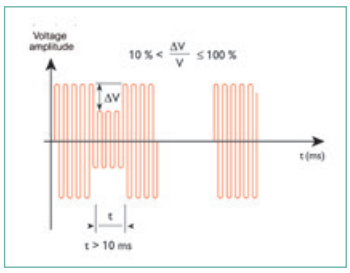
Don't miss any disturbances

The comprehensive product for transformer station environments

- 2 MHz HF transient capture
- 4 analog inputs and 2 On-Off outputs
- Generation of customized reports
- 3-channel voltage input, 400/690 VRMS
- 4-channel current input, 0 – 6 A RMS
- Access to the data locally via USB or remotely via Ethernet (Modbus TCP)
- Monitoring of the homopolar voltage (option)
- Auxiliary power supply: 175-255 Vac (10 s power reserve) or 24 Vdc

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

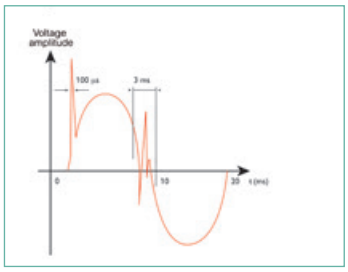


The nominal range of variation of the network voltage is set by the power distributor at ± 10% of the phase-to-phase voltage.

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.

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

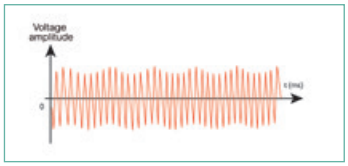
RAPID VARIATIONS



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 equipments	• 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

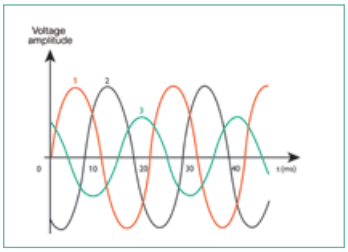
RAPID VOLTAGE VARIATIONS (FLICKER)



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.

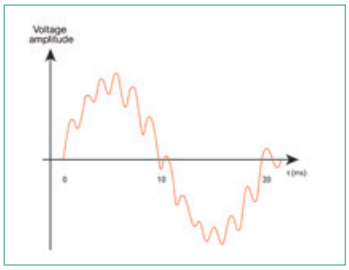
Faults generated	• Variation of brightness • Flickering of computer screens
Causes linked to disturbances due to equipments	• Arc furnaces • Laser printers • Air-conditioning systems
Causes linked to electrical power supply networks	• None
Parameters to be measured	• Short-term flicker (Pst) and long-term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

VOLTAGE UNBALANCE



Faults generated	• Current or voltage not phase-shifted by 120° and with different amplitudes
Causes linked to disturbances due to equipments	• 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

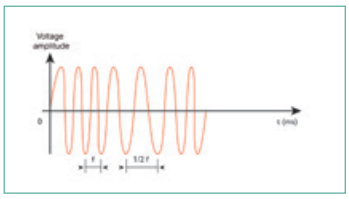


Harmonics: sinusoidal waves whose frequencies are multiples of 50 Hz superimposed on the fundamental wave.
Interharmonics: component of the signal superimposed on the fundamental wave (50 Hz) but which is not a multiple of the fundamental (e.g. 175 Hz).

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.

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 equipments	• 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

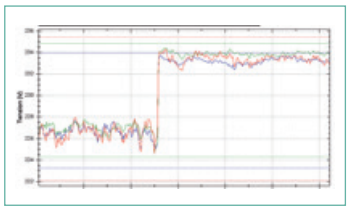


The average value of the fundamental frequency must be 50 Hz ± 1% in normal operating conditions.

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

Faults generated	• Process shutdown
Causes linked to disturbances due to equipments	• 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



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

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

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 equipments	• 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)

MAP
RANGE

Electrical network quality analyzers
HV / MV / LV – Class A.

- 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

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 network: 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…
The related software can be used either to analyze an isolated MAP unit or to manage and retrieve the data remotely from the equipment installed.
On some models, additional 20 mA analog 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

Various communication modes are available for remote recovery of the data and in-depth analysis of all the recorded parameters.
Thanks to its Modbus TCP/IP communication output, **the MAP range can be integrated into a PLC and CTM environment.**

ZOOM


Communication port: local, modem, built-in Ethernet

Status LED: phase sequence and template overrun


Communication couplers: local, modem, Ethernet

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

Inputs			
Voltage input (Phase-Neutral)	0-300 VRMS	Standard measurement (Class A)	1
Voltage input (Phase/Neutral-Earth)	0-300 VRMS, 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)	64MB
Sampling rate			12.8 kHz (x2)
Accuracy		Class A	< 0.1 %
Resolution			16 bit
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 (Lfl, 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 W)	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 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

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	■		EN50160
Frequency	■		EN50160
Unbalance	■		EN50160
Harmonics	■		EN50160
Flicker (Pst, Plt, Ifl)	■		EN50160
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

	Reference
MAP COMPACT without Ethernet	P01 3400 10
MAP COMPACT with Ethernet	P01 3400 20

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 analog inputs		4	4
Network quality parameters				
Voltage	Min, Max, average values	■	■	■
Frequency		■	■	■
Unbalance		■	■	■
Lfl, Pst and Plt flicker	Pst 10 min, Plt 2 h, Selectable storage range	■	■	■
Signalling voltages	< 3,000 Hz	■	■	■
THD-F		■	■	■
Individual harmonics	Up to 50th order	■	■	■
Interharmonics	Up to 50th group	■	■	■
Voltage surges	Number of times and variation (%)	■	■	■
Sliding reference	Complies with IEC 61000-4-30 Class A	■	■	■
Other parameters				
Current	Min, Max and average values		■	■
Current harmonics	Up to 50th order		■	■
Power measurement	P/Q/S, PF/cosφ		■	■
Energy measurement	in the software, active, reactive, apparent		■	■
Event-related				
Dips / overvoltages / interruptions / outages	1/2-1 cycles RMS, Class A	■	■	■
Calculation of event direction	Upstream/Downstream		■	■
Signature recording	12.8 kHz, half-period RMS curve	■	■	■
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤ 15 s	■	■	■
Waveform recording	Configurable up to 12.8 kHz	■	■	■
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤ 20 cycles	■	■	■
Transient	78.125 µsec	■	■	■
HF transients, peak detection	2 MHz			■
Recording of waveforms and HF transients				■
Power supply				
Power supply input range	85-264 Vac / 110-375 Vdc, (47-63 Hz)	■	■	■
Internal back-up		■	■	■
Compliance with standards				
IEC 61000-4-30, Class A	< 0.1%, reference standard	■	■	■
IEC 61000-4-7	Measurement of harmonics	■	■	■
IEC 61000-4-15	Flicker measurement	■	■	■
EN 50 160	Calculated in the equipment	■	■	■
Customized reports	Calculated in the equipment	■	■	■
PQDIF format		Option	Option	Option
Hardware				
Memory	128 MB Flash memory (NAND)	■	■	■
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		■	■	■
Communication				
RS-232	PC port	■	■	■
RS-232	Modems, external couplers, etc.	■	■	■
CL port	Current loop port	■	■	■
Ethernet port (RJ-45)	Ethernet port	Option	Option	Option
Mechanical specifications				
Dimensions (L x H x W) 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

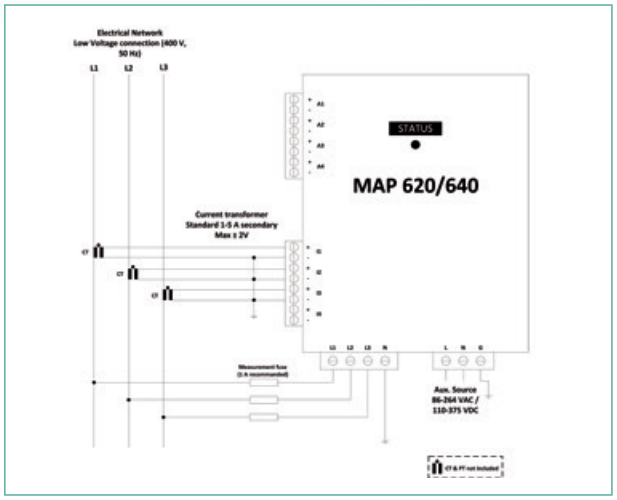
NON-INTRUSIVE ANALYZERS - THREE-PHASE

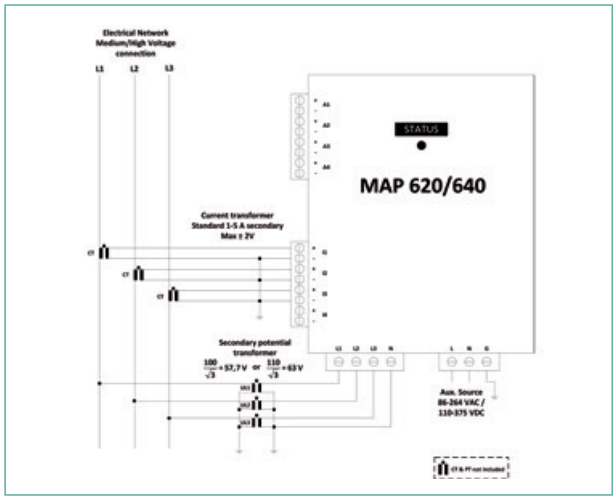
		Voltage	Voltage / Current
Inputs	**Specifications**	**MAP 612-NI**	**MAP 620-NI**
Voltage	275/400 VRMS, reference equipment (Class A)	3	3
Voltage range	400/690 V RMS	Option	Option
HF voltage	400/690 VRMS (6 kV), high frequency (2 MHz)		
Current via external sensor	120 A, 1.2 kA, 1 kA flex RMS selectable		4*
Network quality parameters			
Voltage	Min, Max, average values	■	■
Frequency		■	■
Unbalance		■	■
Lfl, Pst and Plt flicker	Pst 10 min, Plt 2 h, Selectable storage range	■	■
Signalling voltages	< 3,000 Hz	■	■
THD-F		■	■
Individual harmonics	Up to 50th order	■	■
Interharmonics	Up to 50th group	■	■
Voltage surges	Number of times and variation (%)	■	■
Sliding reference	Complies with IEC 61000-4-30 Class A	■	■
Other parameters			
Current	Min, Max and average values		■
Current harmonics	Up to 50th order		■
Power measurement	P/Q/S, FP/cosφ		■
Energy measurement in the software	in the software, active, reactive, apparent		■
Event-related			
Dips / overvoltages / interruptions / outages	1/2-1 cycles RMS, Class A	■	■
Calculation of event direction	Upstream/Downstream		■
Signature recording	12.8 kHz, half-period RMS curve	■	■
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤ 15 s	■	■
Waveform recording	Configurable up to 12.8 kHz		■
Pre-/post-triggering	Pre/post configurable, Pre+Post ≤ 20 cycles		■
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	■	■
Separate power supply input	85-264 Vac / 110-375 Vdc, (47-63 Hz)	Option	Option
Internal back-up		■	■
Compliance with standards			
IEC 61000-4-30, Class A	< 0.1%, reference standard	■	■
IEC 61000-4-7	Measurement of harmonics	■	■
IEC 61000-4-15	Flicker measurement	■	■
EN 50 160	Calculated in the equipment	■	■
Customized reports	Calculated in the equipment	■	■
PQDIF format		Option	Option
Hardware			
Memory	128 MB Flash memory (NAND)	■	■
Sampling frequency		12.8 kHz	12.8 kHz
Voltage accuracy		< 0.1 %	< 0.1 %
Resolution		16 bit	16 bit
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		■	■
Communication			
RS-232	PC port	■	■
RS-232	Modems, external couplers, etc.	■	■
Port CL	Current loop port		
Ethernet port (RJ-45)	Ethernet port	Option	Option
Mechanical specifications			
Dimensions (L x H x W) 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

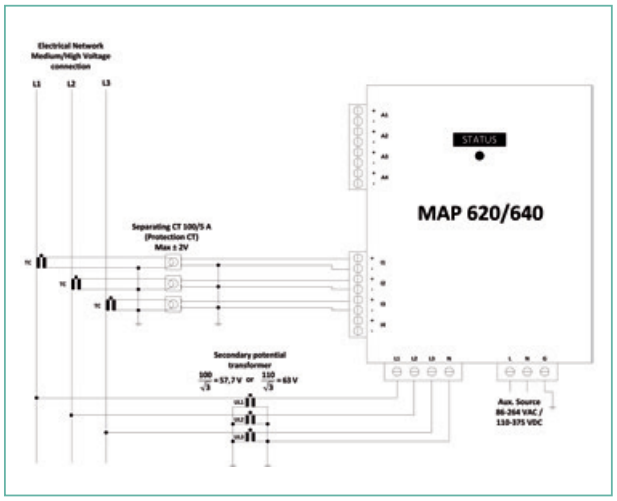
* Accessory for external power supply for flex

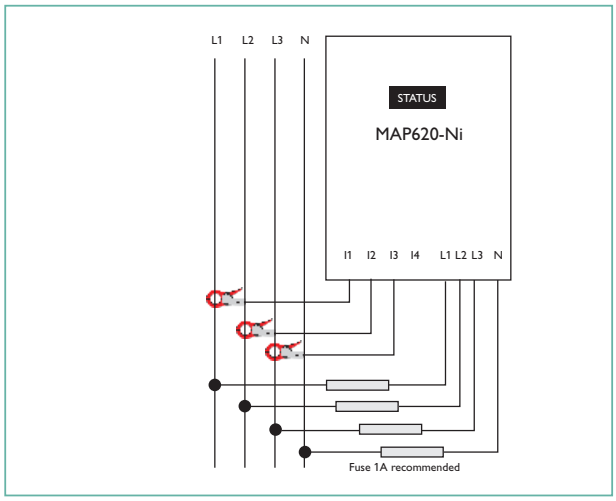
TO ORDER, PLEASE CONTACT US

ELECTRICAL CONNECTIONS

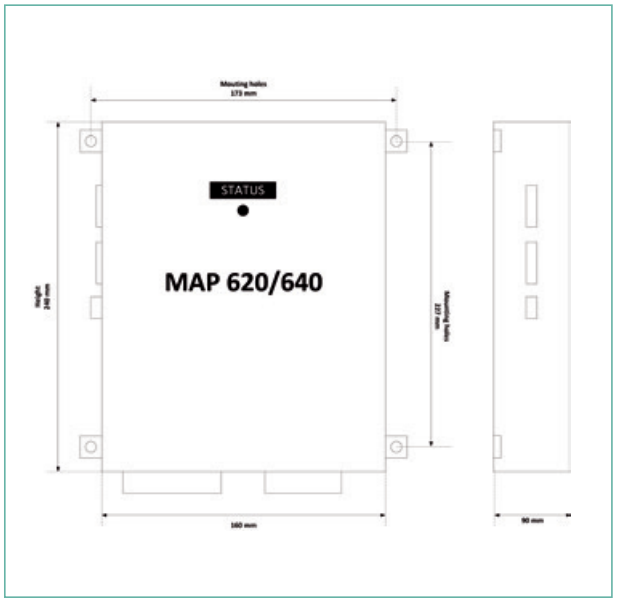








DIMENSIONS



CONNECTION SYSTEMS

MAP permanent analyzers

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

MAP non-intrusive analyzers

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) 

MAP NETWORK ANALYZER

TO ORDER

MAP6		0	C			6

Model

1 Three-phase - Voltage only

2 Three-phase - Voltage + Current

4 Three-phase - Voltage + Current + HF transients

Digital outputs

C With digital outputs

Communication

0 Without Ethernet port (COM and MODEM only)

E With Ethernet port (+ COM and MODEM)

Power supply

0 85 - 264 Vac / 110 - 375 Vdc

4 48 Vdc

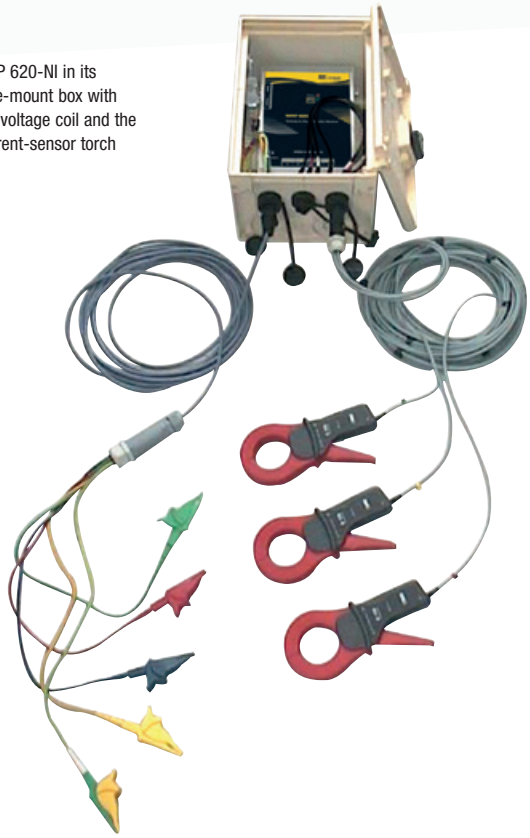
Voltage input

6 690 VRMS (Ph-Ph)

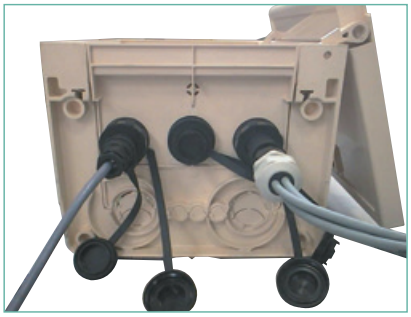
Example : Order the code MAP640CE46 for a MAP640 model with Ethernet port, 48 Vdc power supply + 690 VRMS voltage input.

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



TO ORDER, PLEASE CONTACT US

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

NOTES

MAP SOFTWARE
RANGE

Management and analysis software
for the MAP range.

DESCRIPTION

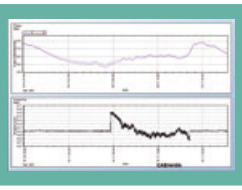
Depending on the model, the range of software for MAP allows:

- 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 email, SMS, etc.

+

- **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**
- **Qual-Web module for all your quality measurements in your web browser**

ZOOM



Graphic display of all the available parameters

Configuration and manual or automatic retrieval of the data

Generation of reports

RECOMMENDED CONFIGURATION

PC platform:

- operating system: Windows XP Pro SP3 / Vista / Seven / Server 2003 SP2 / Server 2008 / Server 2010
- processor frequency ≥ 2.0 GHz with dual-core architecture (e.g. Pentium or Intel Core 2 Duo)
- RAM ≥ 2 GB
- hard disk ≥ 250 GB with 240 MB free
- Ethernet network board

For the Equal-Premium Server version:
additional specifications :

- requires SQL Server
- processor frequency ≥ 2.0 GHz with dual-core architecture (e.g. Pentium or Intel Core 2 Duo)
- RAM ≥ 4 GB
- hard disk ≥ 500 GB, 1 GB free, base expansion 50/100 MB / unit / year

QUAL-SRT

For MAP 607 and MAP Compact

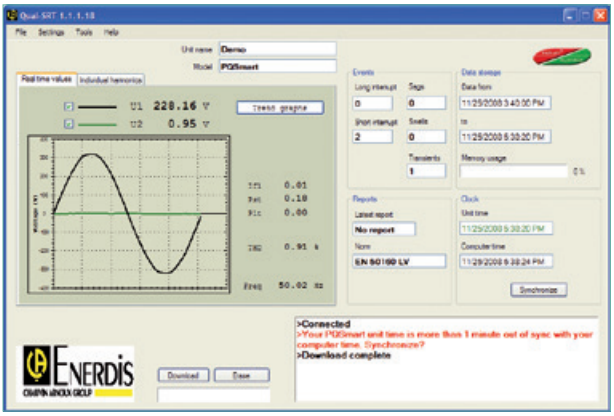
Configuration and real-time display module for "online" display of:

- the measurements
- the number of dips/ voltage surges / long outages / short outages / transients recorded
- the global status of the last EN50160 report
- the memory occupation rate
- the date and time on the equipment

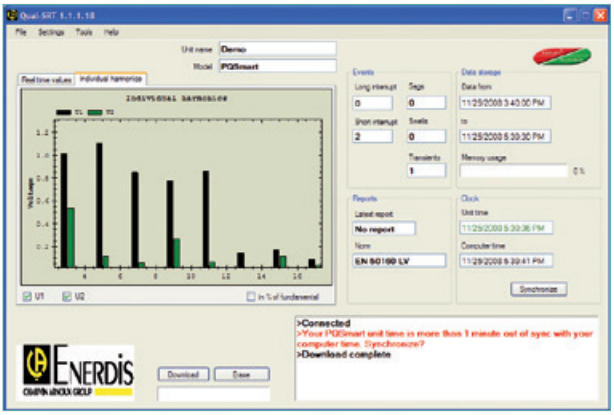
Dynamic views are also available: the trend graph (recorder-type view) and the bargraph of harmonics up to the 50th order. Thanks to the self-declaring ultra-fast USB2.0 link, this module can be used for almost instantaneous recovery of the data while deleting them from the equipment.

TO ORDER

Description	Reference
Configuration software for MAP 607	QUAL-SRT
Configuration software for MAP Compact	QUAL-SRTc



Qual-SRT: real-time display of the waveform connected to a MAP 607



Qual-SRT: real-time display of the harmonics bargraph

ASSOCIATED PRODUCTS

MAP 607
Single-phase voltage quality analyzer
page 97

MAP Compact
Compact power and network quality analyzer
page 98

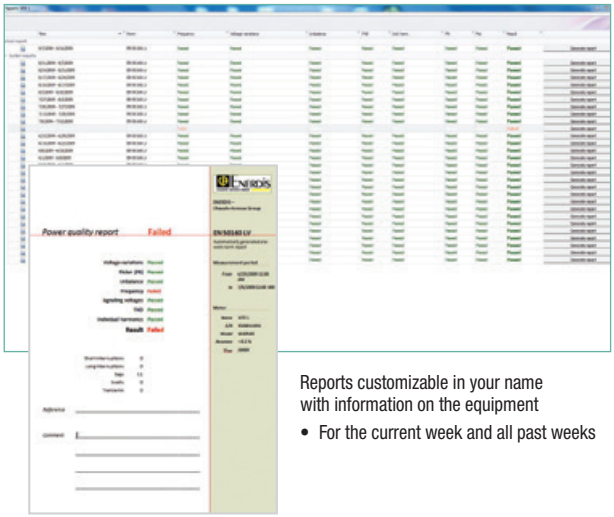
QUAL-VIEW

Analysis and report generation module for MAP network analyzers.

This provides a view of all the trend curves generated by the equipment, with the possibility of zooming and graphical display of the qualimetry template limits for each parameter.

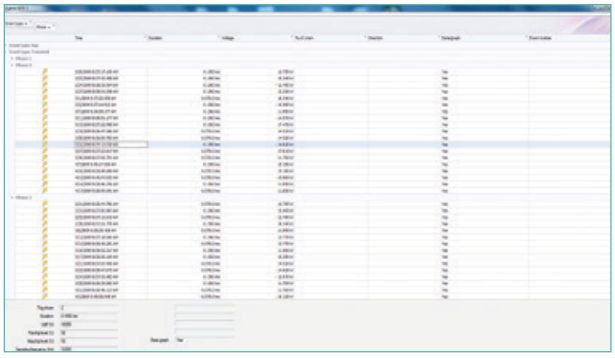
The event-based views such as the event signatures, waveforms and time/date-stamped events log can also be obtained by means of dedicated tabs in the Qual-View software.

- For discussing the quality of the energy supply at the point of connection
- Intuitive, user-friendly and simple to use in order to track the most complex phenomena
- For assessing the evolution of energy quality over time and measuring its impact on ageing of the installation and the size of your energy bill



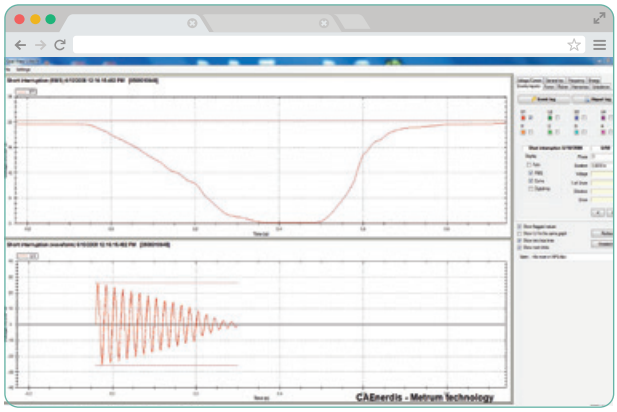
Reports customizable in your name with information on the equipment

- For the current week and all past weeks



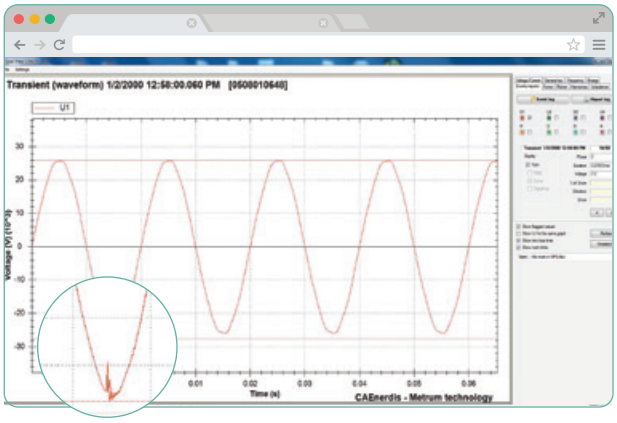
A history of all the events listed according to their type

- Relevant sorting systems (type, phase concerned, upstream/downstream, etc.)
- A summary of each time/date-stamped event along with a snapshot



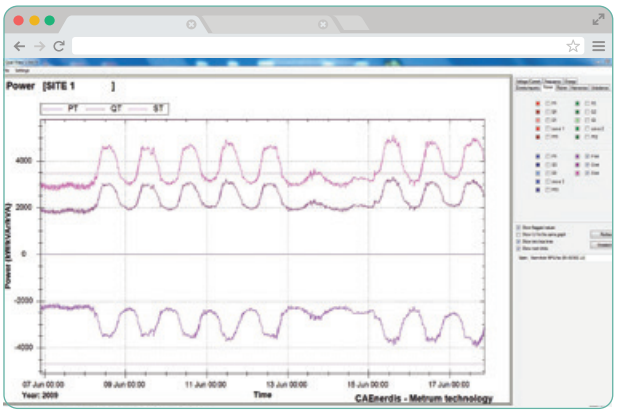
Understand the causes of network outages

- What happened?
- Does it come from my installation?
- Observe the waveform of the event affecting delivery of the energy as a voltage
- Compare this event with the waveform of the current

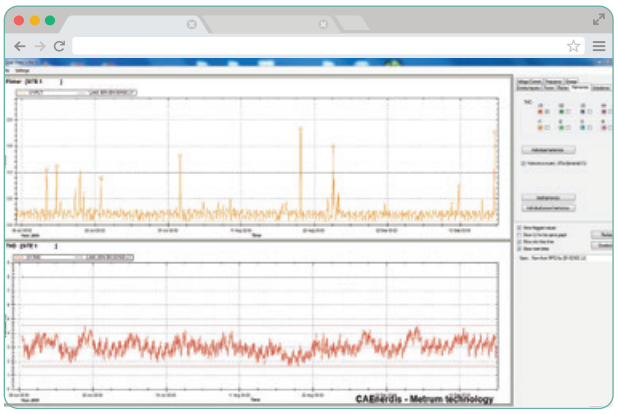


Benefit from all the tools needed for in-depth troubleshooting

- Zoom on the waveform at the time of the event (current or voltage)
- Display of the briefest phenomena distorting the waveform



An approach covering periods from 1 year down to 1 hour to detect the network's behaviour in the variations in power and active energy consumption



Maintaining the site and limiting the harmful effects of disturbances over the long term

- Benefit from a 10-minute approach for all the electrical quantities simultaneously:
  - The distorting power THDi vs. the apparent power S
  - Flicker disturbances
  - Frequency and unbalance
  - Harmonics and their components

TO ORDER

Description	Reference
Configuration, display and analysis software	MAP-QV

ASSOCIATED PRODUCTS

MAP 607

Single-phase voltage quality analyzer

page 97

MAP Compact

Compact power and network quality analyzer

page 98

MAP range

Three-phase network quality analyzer

page 96

E. QUAL-PREMIUM - E.QUAL-PREMIUM SERVER

Analysis and report generation modules for network analyzers in the MAP range.

E.Qual-Premium can be used to generate various views corresponding to the different parameters present in the measurement campaign recovered, including:

- views of the events
- views of the transients
- views of the trend curves
- views of the measurement campaign summaries
- reports generated directly in MS Word® format

The most extensive and critical electrical networks require special supervision of energy quality at the points of connection. See the processing software views on page 108.

E.Qual-Premium Server is a unique, user-friendly solution for managing from ten to several hundred network analyzers.

E.Qual-Premium Server also includes E.Qual-Premium:

- graphical multi-equipment views
- multi-equipment event logs
- statistical views

Peace of mind: all the data retrievals are performed automatically by a high-performance remote data-retrieval engine

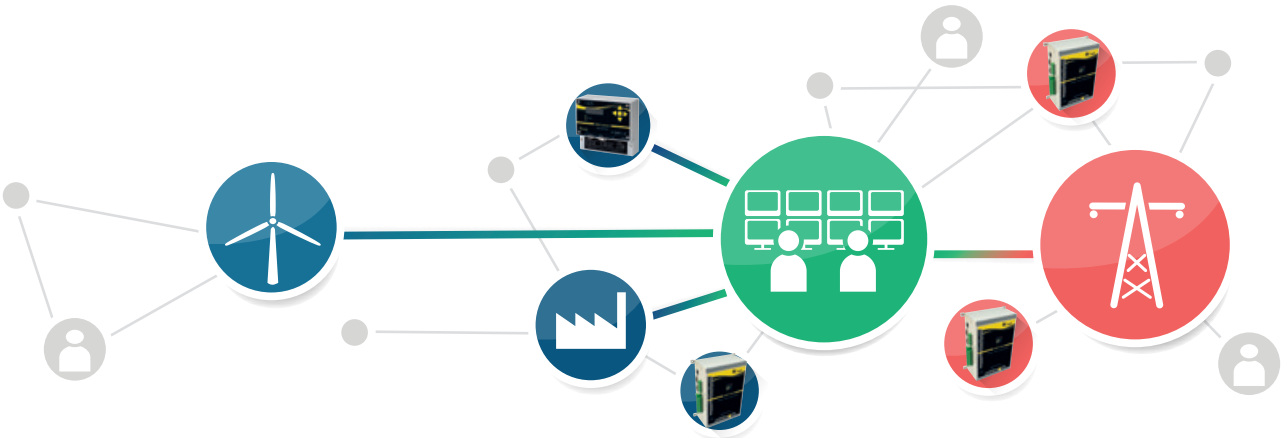
Complete: a history from the moment the equipment fleet was commissioned, allowing benchmarking of all the analyzers

Analysis: special tools for summarizing the measurements on the fleet of analyzers and sharing the information in concise form with the decision-makers and operators

	E.Qual-Premium	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		■
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		■

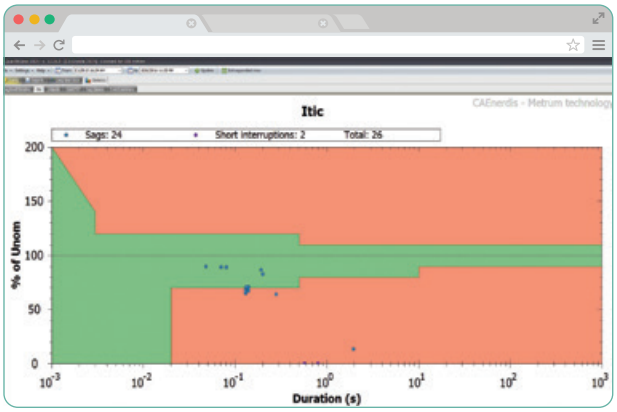
TO ORDER

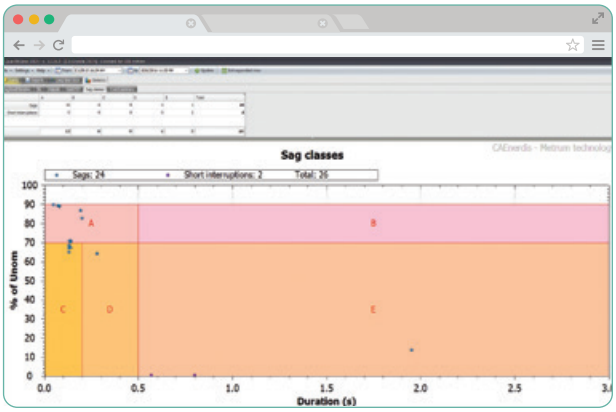
Model	Description	No. of licences	Reference
E.Qual-Premium	Configuration, display and analysis software	1	P01340120
E.Qual-Premium Server	Configuration, remote data retrieval, display, administration and analysis software	5	P01340123
E.Qual-Premium Server	Configuration, remote data retrieval, display, administration and analysis software	20	P01340122



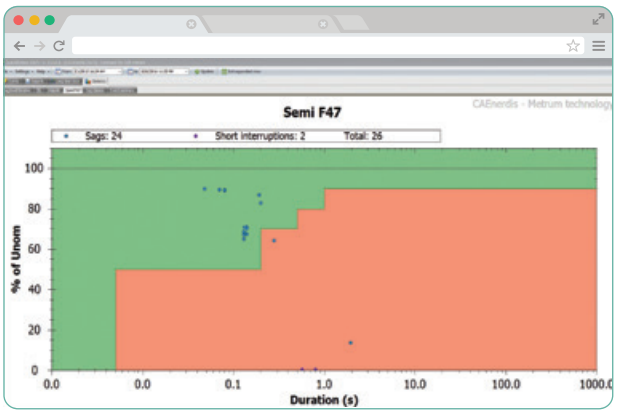
E.QUAL-PREMIUM SERVER

Analytical and statistical tools





The statistical distributions used for electrical network management



The sector-specific analytical tools for IT environments and sensitive industrial processes

ASSOCIATED PRODUCTS

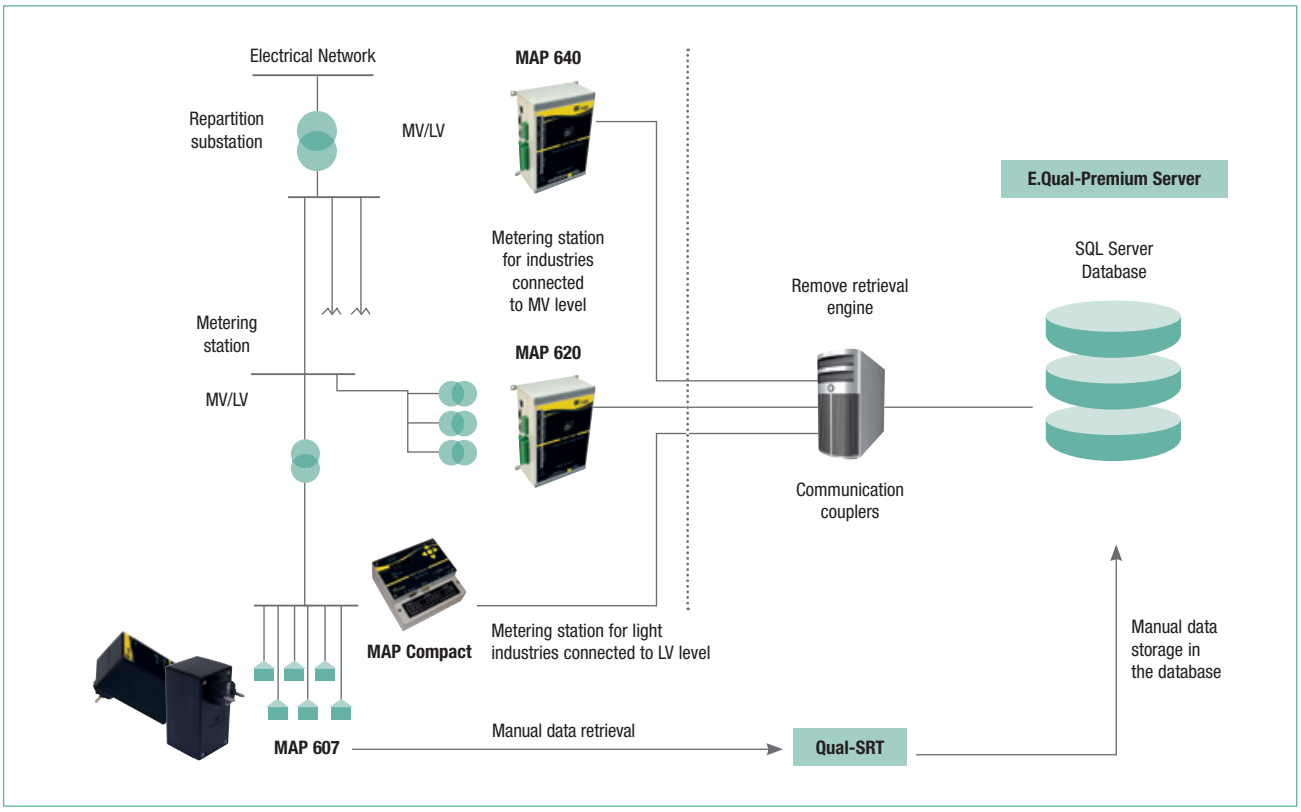
MAP range

Three-phase network quality analyzer

page 96

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.



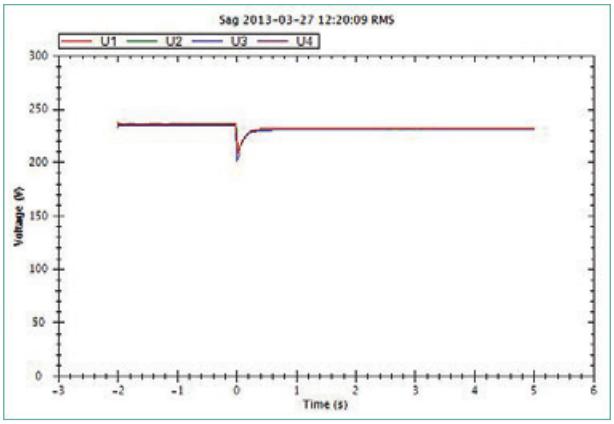
Components of an E.Qual-Premium Server with the network analyzers, the communication links, the database and the analysis and graphic display modules.

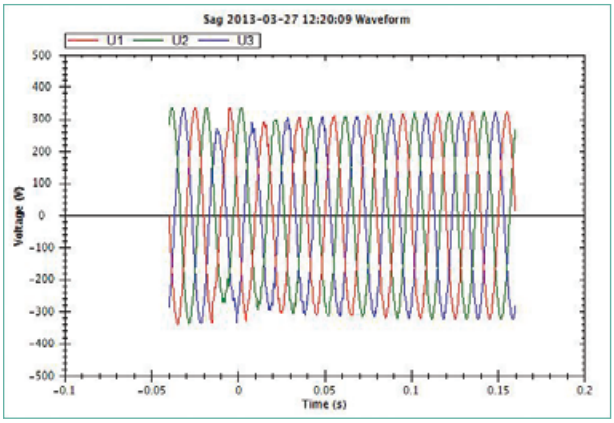
QUAL-WEB

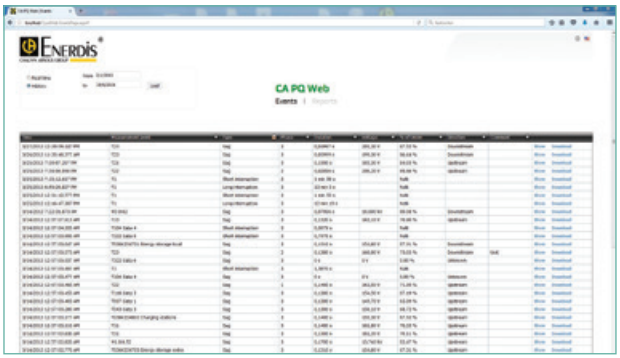
Key information from the qualimetry database available in a web browser.

Add-on module for E.Qual-Premium Server enabling transmission of the information from the database to other users (operators, customers, management, etc.) which does not require any local software installation.

- Management of EN50160 report generation and events
- Access manager: the administrator can limit access to a selection of devices for the various users.







NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

CURRENT TRANSFORMERS AND SHUNTS

CURRENT TRANSFORMERS AND SHUNTS

Tertiary and industrial current transformers

TCR
Wound primary
Class 0.5/1/3
page 125

TCR
Cable/busbar primary
Class 0.5/1/3
page 126

TCR
Busbar primary
Class 0.5/1/3
page 129

JVS
Cable/busbar primary
Class 0.2s
page 130

TCRO
Split core
Without conductor opening
page 134

TC CLIP
Split core
Small volume
page 138

Current transformers for tariff metering

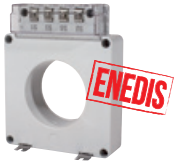
Core – Single-phase

JVR86
Wound primary
M8-M10
page 141

JVO 40-100
Cable primary
Ø 42 mm - Class 0.5
page 143

JVO 40-100 S
Cable busbar
Ø 40 mm - Class 0.2s
page 145

J3R 80B
Cable primary
Ø 66 mm - Class 0.5
page 141



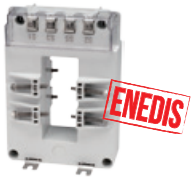
JVO 90-160S
Cable primary
Ø 90 mm - Class 0.2s
page 145

JVS 38B
Cable/ busbar primary
Ø 63 mm - Class 0.2s
page 132

JVP 1025
Busbar primary
100 x 20 - Class 0.5
page 141

JVP 1045
Busbar primary
100 x 40 - Class 0.5
page 141

JVP 1045B
Busbar primary
100 x 40 - Class 0.5
Two-rating
page 142



JVP 1145S
Busbar primary
100 x 12 - Class 0.2s
page 146

Current transformers for tariff metering

Plate-mounting - Three-phase

TRI 500
Single-rating

50 to 240 mm² cable clamp
Class 0.5

page 147

TRI 700
Three-rating

50 to 240 mm² cable clamp
Class 0.5

page 148

TRI 700 S
Two-rating

50 to 240 mm² cable clamp
Class 0.5

page 148

Current totalizers

JVM 15

CT designed to add together the instantaneous current values from the secondaries of 2 or 3 current transformers.

page 149

CT short-circuiter

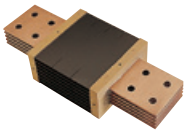
PRTC

Protection against the hazards due to opening of the secondary circuit of a low-voltage measurement CT.

page 150

Shunts

Class 0.5



76/2 - 77/2 range

1 to 4,000 A

A reference for measurement in demanding applications.

page 154

Class 1

SHMI range

1 to 6,000 A

Vast choice for industrial applications.

page 156

SHEL range

10 to 300 A

At low power, everything you need to facilitate implementation.

page 158

SHMO range

1 to 60 A

DIN-rail mounting.

page 158

CHOOSING YOUR TERTIARY AND INDUSTRIAL CURRENT TRANSFORMER

	TCR Wound primary		TCR / JVS Cable/busbar primary						
	page 125		page 126						
									
	TCR 10	**TCR 15**	**TCR 21**	**TCR 31**	**TCR 41 JVS 25B**	**TCR 51 JVS 26B**	**TCR 61 JVS 30B**	**TCR 71 JVS 38B**	**TCR 75 JVS 39B**
Accuracy class	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s
Wound primary (threaded rod)	Aperture 25 x 25	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						■	■	■ / ●	
1,000 A							■	■	
1,200 A							■	■	
1,500 A							■	■	■
2,000 A								■	■
2,500 A								■	■
3,000 A								■	■
4,000 A									■
5,000 A									
Strengths	Combining a high level of accuracy and compact design.		Extensive choice of primaries. Mounting accessories supplied as standard.						

■ 1 A or 5 A secondary as standard ■ 1 A on request ■ 5 A secondary only ● JVS only - 5 A secondary available

TCR / JVS Busbar primary			TCRO Split core					TC CLIP Split core				
page 129			page 134					page 138				
												
TCR 80 JVS 40	TCR 90 JVS 50	TCR 100 JVS 60	TCRO 2030	TCRO 5080	TCRO 8080	TCRO 80120	TCRO 80160	TCC 176	TCC 241	TCC 242	TCC 364	TCC 366
0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s	0.5 / 1 / 3 0.2s	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3	0.5 / 1 / 3	1	1	1	1	1
								Ø 17	Ø 24	Ø 24	Ø 36	Ø 36
100 x 20	100 x 30	125 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.				

■ 1 A secondary

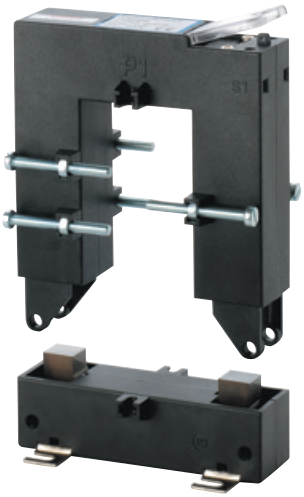
CHOOSING YOUR CURRENT TRANSFORMER
FOR TARIFF METERING

		Core - single-phase					
		page 141	page 143	page 144	page 141	page 145	page 132
							
		JVR 86	**JVO 40-100**	**JVO 40-100 S**	**J3R 80B**	**JVO 90-160 S**	**JVS 38B**
Type of connection	**Wound primary**	Ø M8/M10 > 75 A					
	Cable primary (diameter mm)		Ø 42	Ø 40	Ø 66	Ø 90	Ø 63
	Busbar primary (mm)						50 x 50 60 x 30 80 x 30
	Cable clamp (section mm²)						
Accuracy	**Accuracy class**	0.5	0.5	0.2s	0.5	0.2s	0.2s
	Precision power (VA)	20	7.5 (two-rating) / 15	7.5	15 (5 for 300 A 10 for 400 A)	7.5	10 (7.5 for 1,000 A)
Rating	**Single-rating**						
	Two-rating		200 - 500 A	200 - 500 A			
	Three-rating					500 - 1,000 - 2,000 A	
Primary	**5 / 5 A**	■*					
	20 / 5 A	■*					
	40 / 5 A	■*					
	50 / 5 A	■					
	60 / 5 A	■*					
	75 / 5 A	■					
	100 / 5 A	■*					
	150 / 5 A	■					
	200 / 5 A	■	■	■			
	250 / 5 A						
	300 / 5 A				■*		
	400 / 5 A				■*		
	500 / 5 A		■	■	■*	■	
	600 / 5 A				■*		
	750 / 5 A				■*		
	800 / 5 A						
	1,000 / 5 A				■*	■	■
	1,200 / 5 A						■
	1,250 / 5 A				■		
	1,500 / 5 A				■		■
	2,000 / 5 A					■	■
	2,500 / 5 A						■
	3,000 / 5 A						■

* Also available with 1 A secondary. Please contact us.

Core - Single-phase				Plate-mounting - Three-phase		
page 141	page 141	page 142	page 146	page 147	page 148	page 148
						
JVP 1025	JVP 1045	JVP 1045B	JVP 1145 S	TRI 500	TRI 700	TRI 700 S
100 x 20	100 x 40	100 x 40	100 x 12			
				50 to 240	50 to 240	50 to 240
0.5	0.5	0.5	0.2s	0.5	0.5	0.2s
15 (30 for 1,250 A)	15 (30 for 1,000 A)	7.5 (two-rating) / 15	7.5	15	3.75	7.5
		500 - 1,000 A 1,000 - 2,000 A				50 - 100 A 100 - 200 A 200 - 500 A
			500 - 1,000 - 2,000 A		100 - 200 - 500 A	
				■		
				■	■	■
				■		
				■	■	■
				■		
				■		
■		■	■	■	■	■
■	■			■		
	■	■	■			
■						
		■	■			

INFO & ADVICE



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 mm²	0.61 VA	0.025 VA
2.5 mm²	0.37 VA	0.015 VA
4 mm²	0.23 VA	0.009 VA
6 mm²	0.15 VA	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

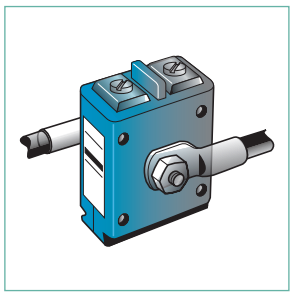
	Power (VA) on Class		
Primary	0.5	1	3
100 A	-	1	1.5
125 A	-	1	1.5
150 A	1	1.75	2.5
200 A	1.5	2.75	3.75
250 A	2	3.25	3.75
300 A	2.5	3.25	4
400 A	3	3.75	5
500 A	3.5	3.75	5
600 A	3.75	5	7.5

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

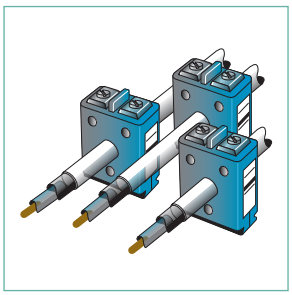
- Class 3 for a CT with a ratio of 150/5
- Class 1 for a CT with a ratio of 200/5
- Class 0.5 for a CT with a ratio of 250/5

CONNECTING A CURRENT TRANSFORMER

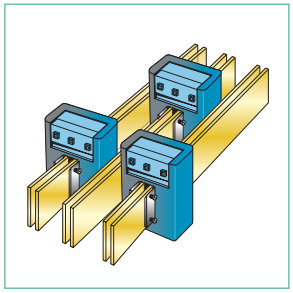
Enerdis current transformers offer 4 types of connection:



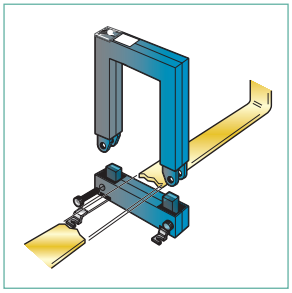
WOUND PRIMARY
for currents less than 200 A



CABLE PRIMARY
for currents between 40 and 2,500 A



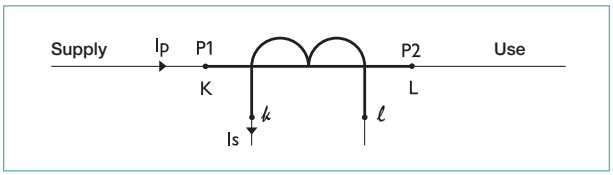
BUSBAR PRIMARY
for currents between 750 and 5,000 A

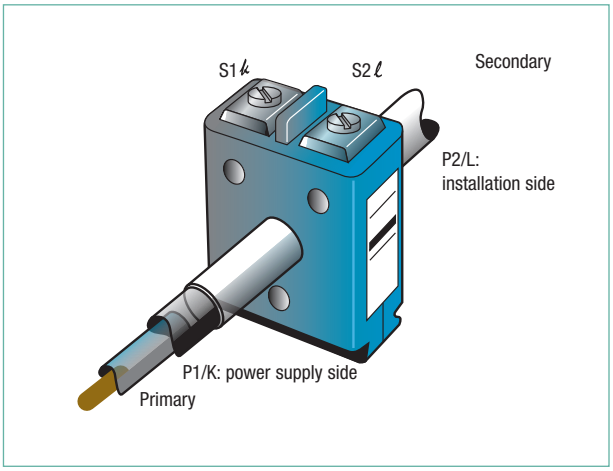


SPLIT CORE PRIMARY
for easy connection to an existing installation using a busbar or cable primary

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

FINANCIAL IMPACT OF A CT'S ACCURACY CLASS

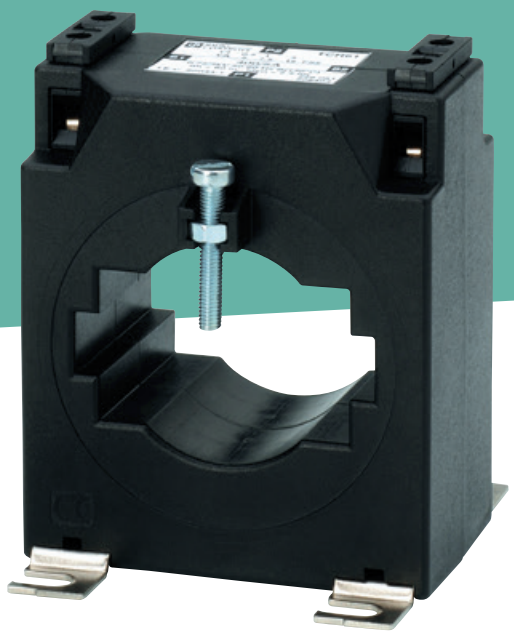
For a consumption of 12,000 MWh/year and a cost of 0.10 €/kWh

- 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 losses 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 shortcircuited.
When a CT is not in use (secondary open) the secondary must be short-circuited before powering up the system.
See page 150, PRTC transformer short-circuiter.



TCR
RANGE

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

- Complete range: primary currents from 5 to 5,000 A and 5 A or 1 A secondary currents
- DIN-rail mounting, plate mounting or clamped around the busbar
- Compact design

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 as standard depending on model)
Dry winding with self-extinguishing ABS covering (UL 94VO)

ZOOM

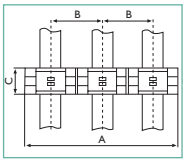
Outputs on split terminals enabling short-circuiting of the secondary current (M4 or cage for 4 mm² wire)

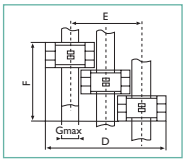
DIN rail mounting using supplied clip-on adapters for TCR 21 - 31 - 41 - 51

Supplied with bar clamp fitting accessories

Plate mounting using removable screw-on clips

3CT MOUNTING





Model	Dimensions A	B	C	D	E	F	G
TCR 10	-	-	-	-	-	-	-
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

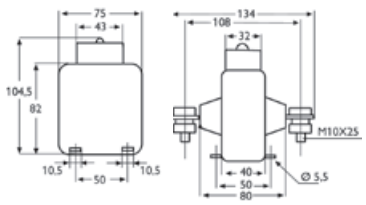
Model	DIN rail fittings	Plate mounting fittings	Sealable terminal cover*
TCR 10	1923 0021	■	■
TCR 15	■		
TCR 21	■	■	1923 0022
TCR 31	■	■	1923 0022
TCR 41	■	■	1923 0022
TCR 51	■	■	1923 0022
TCR 61		■	1923 0022
TCR 71		■	1923 0022
TCR 75		■	1923 0022
TCR 80		■	■
TCR 90		■	■
TCR 100		■	■

■ Standard accessories *sold in pairs

TCR WOUND PRIMARY

TCR 10

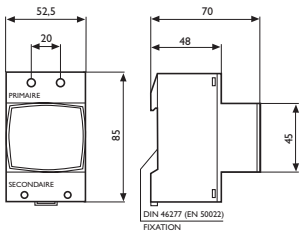
25 x 25 mm aperture



Primary	Power (VA) in 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 15

Primary: 16 mm² wire
Secondary: 4 mm² wire



Primary	Power (VA) in 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 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

Mounting accessories

DIN-rail mounting, plate-mounting and sealable terminal cover.

page 124

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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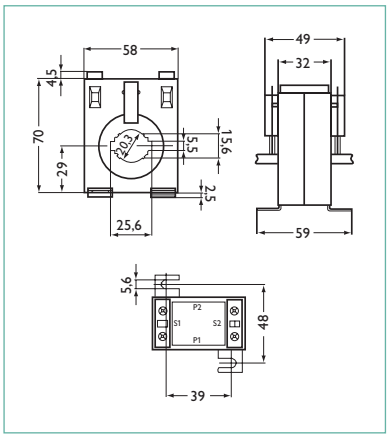
CABLE/BUSBAR PRIMARY

TCR 21

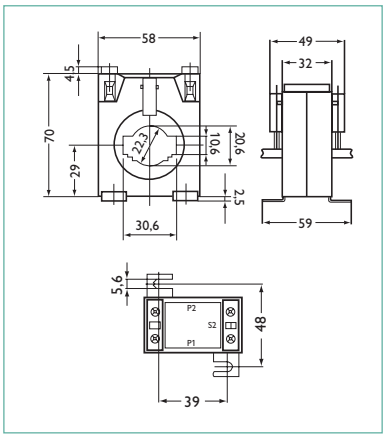
Cable Ø 20 mm
Bar: 15 x 10 mm
20 x 10 mm
25 x 5 mm



Primary	Power (VA) in 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

TCR 3

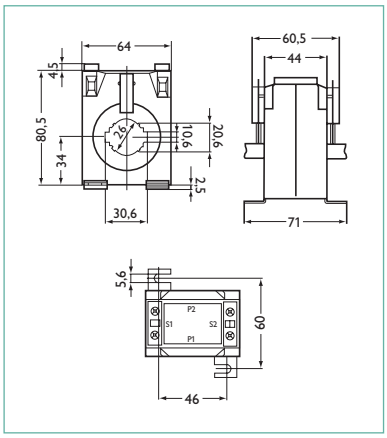
Cable Ø 22 mm
Bar: 20 x 12 mm
25 x 11 mm
30 x 10 mm



Primary	Power (VA) in 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

TCR 41

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



Primary	Power (VA) in 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

T O O R D E R

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

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

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

ASSOCIATED PRODUCTS

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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Mounting accessories

DIN-rail mounting, plate-mounting and sealable terminal cover.

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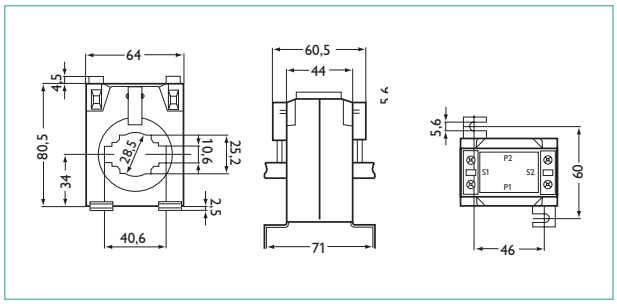
TCR 51

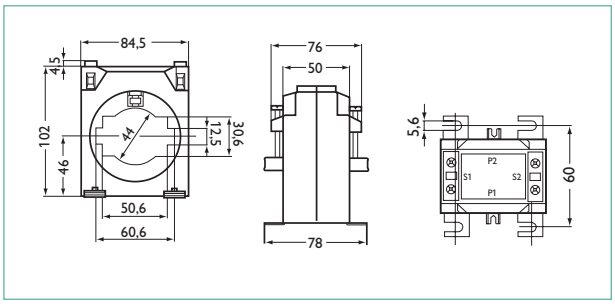
Cable Ø 28 mm
Bar: 20 x 25 mm
30 x 15 mm
40 x 10 mm



Primary	Power (VA) in 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) in 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
1,000 A	15	20	30	0.61
1,200 A	15	20	30	0.63
1,500 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
1,000 A	1921 4742B	1920 4742B
1,200 A	1921 4751B	1920 4751B
1,500 A	1921 4744B	1920 4744B

ASSOCIATED PRODUCTS

Mounting accessories

DIN-rail mounting, plate-mounting and sealable terminal cover.

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PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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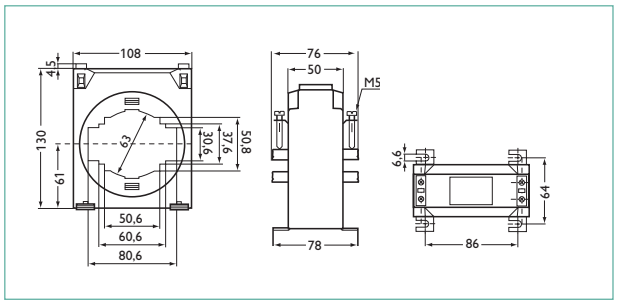
CABLE/BUSBAR PRIMARY

TCR 71

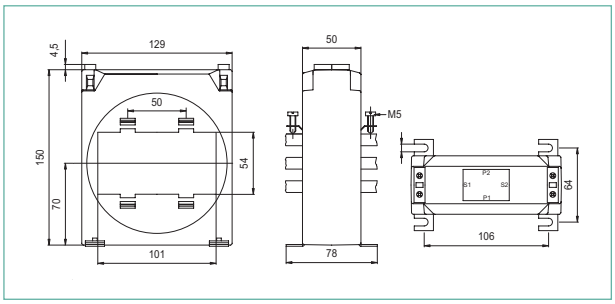
Cable Ø 63 mm
Bar: 50 x 50 mm
60 x 37 mm
80 x 30 mm



Primary	Power (VA) in 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
1,000 A	10	15	20	0.72
1,200 A	10	15	20	0.68
1,500 A	15	20	25	0.84
2,000 A	15	20	25	0.82
2,500 A	15	20	30	0.88
3,000 A	15	20	30	0.88

TCR 75

Bar: 3 x 100 mm x 10 mm



Primary	Power (VA) in class 0.5	1	3	Weight (kg)
1,500 A	5	20	30	1.47
2,000 A	15	20	30	1.55
2,500 A	20	30	40	1.63
3,000 A	30	40	60	1.71
4,000 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
1,000 A	1921 4642B	1920 4642B
1,200 A	1921 4651B	1920 4651B
1,500 A	1921 4644B	1920 4644B
2,000 A	1921 4645B	1920 4645B
2,500 A	1921 4646B	1920 4646B
3,000 A	1921 4647B	1920 4647B

Primary	Secondary 1 A	Secondary 5 A
1,500 A	1921 5044B	1920 5044B
2,000 A	1922 5045B	1920 5045B
2,500 A	1923 5046B	1920 4638B
3,000 A	1924 5047B	1920 5047B
4,000 A	1925 5049B	1920 5049B

ASSOCIATED PRODUCTS

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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Mounting accessories

DIN-rail mounting, plate-mounting and sealable terminal cover.

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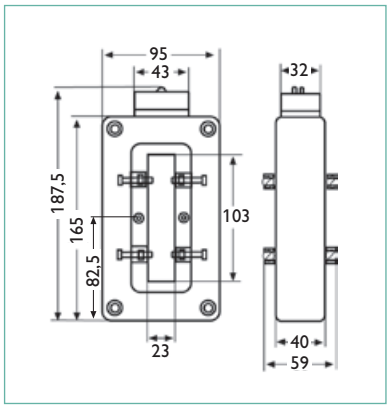
BUSBAR PRIMARY

TCR 80

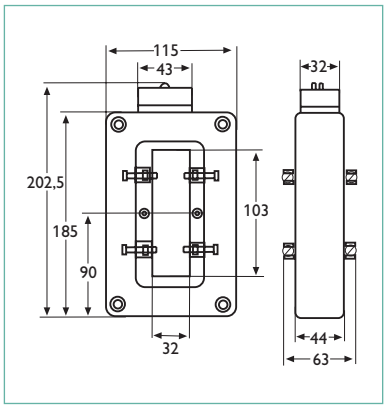
Bar: 100 x 20 mm



Primary	Power (VA) in class 0.5	1	3	Weight (kg)
750 A	15	20	30	0.80
800 A	15	20	30	0.80
1,000 A	15	20	30	0.76
1,200 A	15	20	30	0.76
1,500 A	15	30	40	0.76
2,000 A	20	40	50	0.76

TCR 90

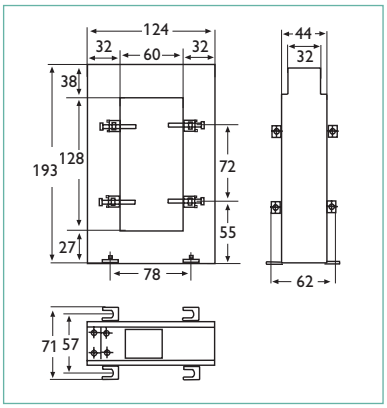
Bar: 100 x 30 mm



Primary	Power (VA) in class 0.5	1	3	Weight (kg)
1,500 A	15	30	40	0.76
2,000 A	20	40	50	0.82
2,500 A	20	40	50	0.78
3,000 A	20	45	60	0.90
4,000 A	35	50	70	0.90
2,000 A	20	40	50	0.76

TCR 100

Bar: 125 x 60 mm



Primary	Power (VA) in class 0.5	1	3	Weight (kg)
1,000 A	15	20	30	0.75
1,200 A	15	20	30	0.80
1,500 A	15	20	30	0.83
2,000 A	15	20	30	0.92
2,500 A	20	30	40	1.01
3,000 A	30	40	60	1.09
4,000 A	35	50	70	1.21
5,000 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
1,000 A	1921 5642	1920 5642
1,200 A	1921 5651	1920 5651
1,500 A	1921 5644	1920 5644
2,000 A	1921 5645	1920 5645

Primary	Secondary 1 A	Secondary 5 A
1,500 A	1921 6644	1920 6644
2,000 A	1921 6645	1920 6645
2,500 A	1921 6646	1920 6646
3,000 A	1921 6647	1920 6647
4,000 A	1921 6649	1920 6649

Primary	Secondary 1 A	Secondary 5 A
1,000 A	1921 6842	1920 6842
1,200 A	1921 6851	1920 6851
1,500 A	1921 6844	1920 6844
2,000 A	1921 6845	1920 6845
2,500 A	1921 6846	1920 6846
3,000 A	1921 6847	1920 6847
4,000 A	1921 6849	1920 6849
5,000 A		1920 6850

ASSOCIATED PRODUCT

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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JVS RANGE

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

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)

+
- Choice of primary from 100 to 5,000 A
- Accuracy class: 0.2 S for high-performance applications

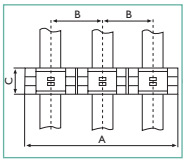
ZOOM

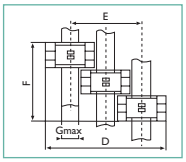

Removable, lead-sealable terminal cover supplied


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


Cabinet backplate fitting (or directly on busbar primary)

3CT MOUNTING





Dimensions

Model	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

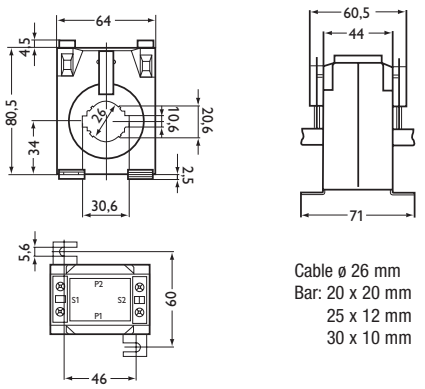
MOUNTING ACCESSORIES

Model	DIN-rail mounting fittings	Plate-mounting fittings	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

CABLE/BUSBAR PRIMARY

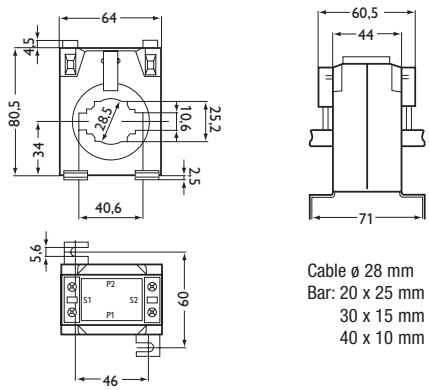
JVS 25B



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 150/5
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

DIN-rail mounting, plate-mounting and sealable terminal cover.

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PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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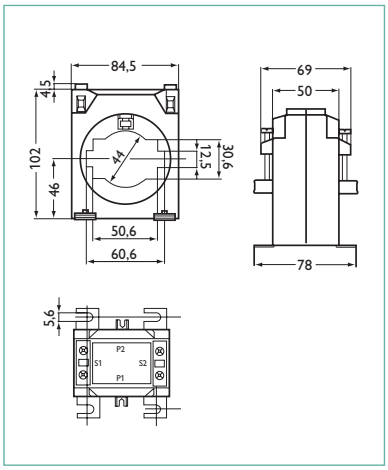
CABLE/BUSBAR PRIMARY

JVS 30B

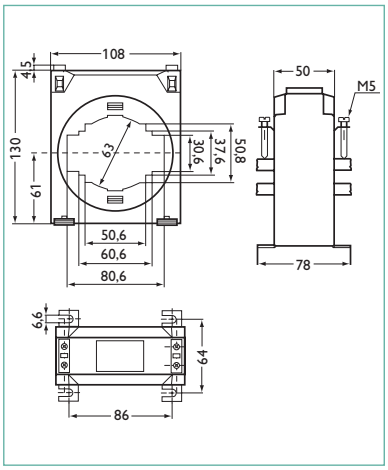
Cable Ø 44 mm
Bar: 50 x 30 mm
60 x 12 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
600 A	5	0.52
750 A	7.5	0.59
800 A	7.5	0.60
1,000 A	10	0.61
1,200 A	10	0.63
1,500 A	10	0.65

JVS 38B

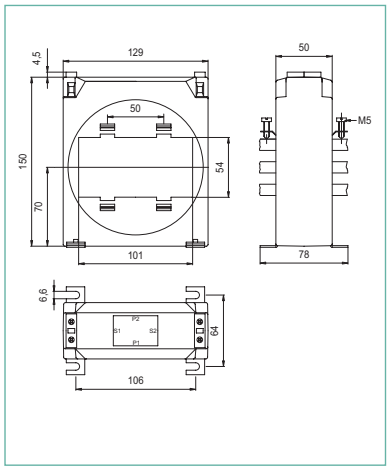
Câble Ø 63 mm
Bar: 50 x 50 mm
60 x 30 mm
80 x 30 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
1,000 A	7.5	0.72
1,200 A	10	0.68
1,500 A	10	0.84
2,000 A	10	0.82
2,500 A	10	0.88
3,000 A	10	0.88

JVS 39B

Bar: 3 x 100 x 10 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
1,500 A	10	1.47
2,000 A	10	1.55
2,500 A	15	1.63
3,000 A	20	1.71
4,000 A	25	1.83

T O O R D E R

Primary	Secondary 5 A
600 A	JVSB30 600/5
750 A	JVSB30 750/5
800 A	JVSB30 800/5
1,000 A	JVSB30 1000/5
1,200 A	JVSB30 1200/5
1,500 A	JVSB30 1500/5

Primary	Secondary 5 A
1,000 A	JVSB38 1000/5
1,200 A	JVSB38 1200/5
1,500 A	JVSB38 1500/5
2,000 A	JVSB38 2000/5
2,500 A	JVSB38 2500/5
3,000 A	JVSB38 3000/5

Primary	Secondary 5 A
1,500 A	JVSB39 1500/5
2,000 A	JVSB39 2000/5
2,500 A	JVSB39 2500/5
3,000 A	JVSB39 3000/5
4,000 A	JVSB39 4000/5

ASSOCIATED PRODUCTS

Mounting accessories

DIN-rail mounting, plate-mounting and sealable terminal cover.

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PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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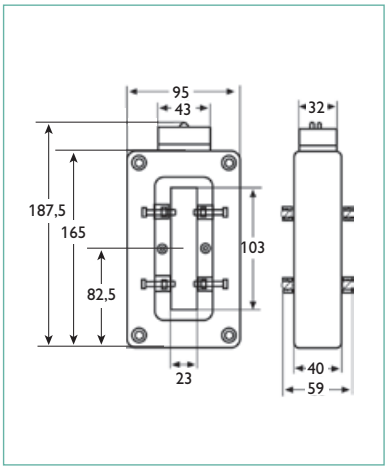
BUSBAR PRIMARY

JVS 40

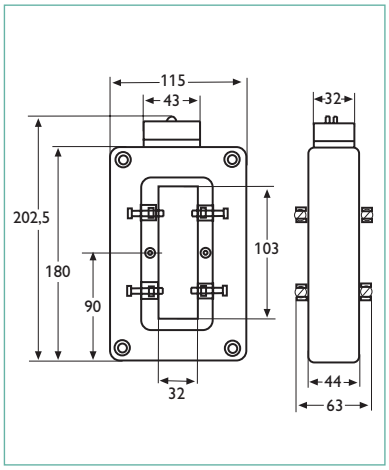
Bar: 100 x 20 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
1,000 A	1.5	0.76
1,200 A	4	0.76
1,500 A	10	0.76
2,000 A	10	0.76

JVS 50

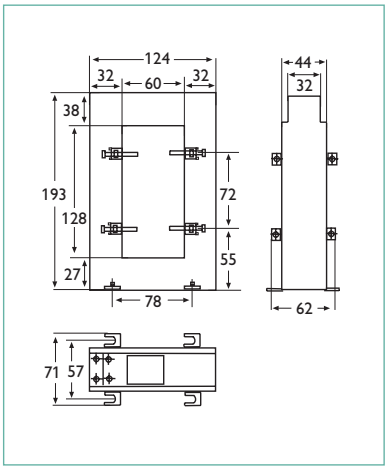
Bar: 100 x 30 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
1,500 A	10	0.76
2,000 A	10	0.82
2,500 A	10	0.78
3,000 A	10	0.90
4,000 A	10	0.90

JVS 60

Bar: 125 x 60 mm



Primary	Power (VA) in class 0.2 S	Weight (kg)
1,000 A	1.5	0.75
1,500 A	7.5	0.83
2,000 A	10	0.92
2,500 A	10	1.01
3,000 A	10	1.09
4,000 A	10	1.21
5,000 A	10	1.44

TO ORDER

Primary	Secondary 5 A
1,000 A	JVS40-1000/5
1,200 A	JVS40-1200/5
1,500 A	JVS40-1500/5
2,000 A	JVS40-2000/5

Primary	Secondary 5 A
1,500 A	JVS50-1500/5
2,000 A	JVS50-2000/5
2,500 A	JVS50-2500/5
3,000 A	JVS50-3000/5
4,000 A	JVS50-4000/5

Primary	Secondary 5 A
1,000 A	JVS60-1000/5
1,500 A	JVS60-1500/5
2,000 A	JVS60-2000/5
2,500 A	JVS60-2500/5
3,000 A	JVS60-3000/5
4,000 A	JVS60-4000/5
5,000 A	JVS60-5000/5

ASSOCIATED PRODUCT

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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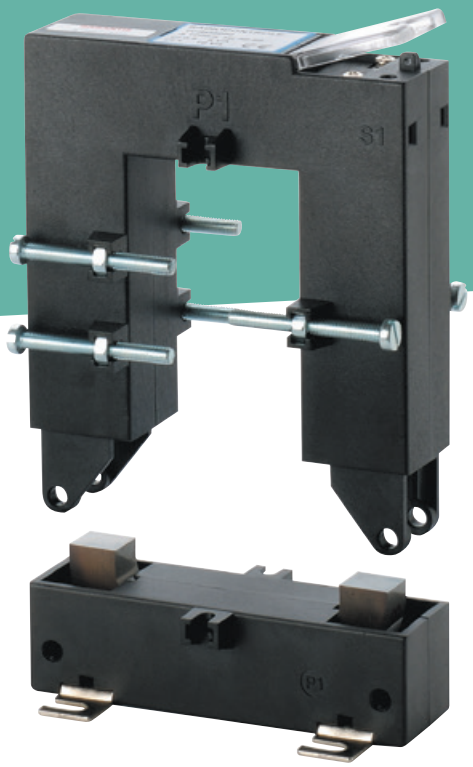


TCRO
RANGE

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

- Primary from 200 to 5,000 A and wide choice of primary options
- Fully opening 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)

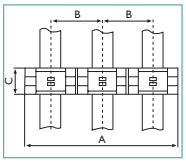
ZOOM

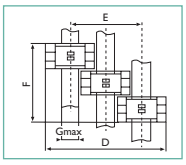
Plate mounting fitting

Bar clamp fitting

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

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

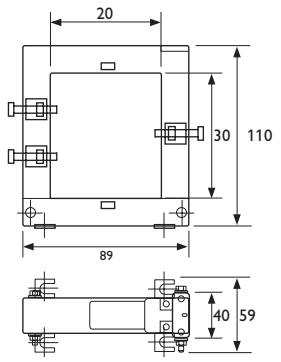
STANDARD MOUNTING ACCESSORIES

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

TCRO RANGE

TCRO 2030

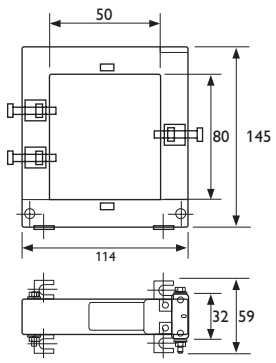
Bar: 20 x 30 mm



Primary	Power (VA) in 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

TCRO 5080

Bar: 50 x 80 mm



Primary	Power (VA) in 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
1,000 A	5	10	20	0.90

TO ORDER

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 secondary on request

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
1,000 A	1920 8442

1 A secondary on request

ASSOCIATED PRODUCT

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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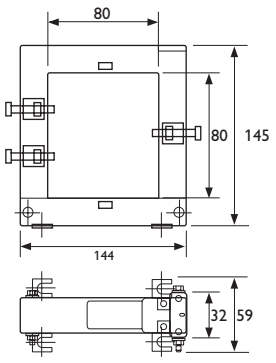
SPLIT CORE

TCRO 8080

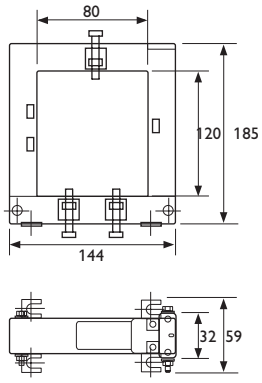
Bar: 80 x 80 mm



Primary	Power (VA) in 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
1,000 A	5	10	20	1.00

TCRO 80120

Bar: 80 x 120 mm



Primary	Power (VA) in 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
1,000 A	5	9	20	1.20
1,200 A	6	11	28	1.20
1,500 A	8	17	30	1.20

TO ORDER

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
1,000 A	1920 8542

1 A secondary on request

Primary	Secondary 5 A
500 A	1920 8636
600 A	1920 8638
800 A	1920 8641
1,000 A	1920 8642
1,200 A	1920 8643
1,500 A	1920 8644

1 A secondary on request

ASSOCIATED PRODUCT

PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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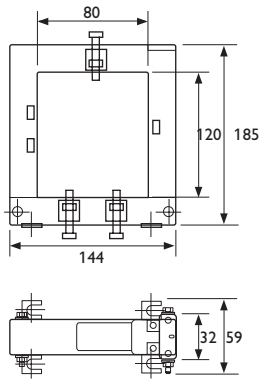
TCRO 80160

Bar: 80 x 160 mm



	Power (VA) in class			Weight (kg)
Primary	0.5	1	3	
1,000 A	10	15	20	3.50
1,500 A	15	20	25	3.50
2,000 A	15	20	25	3.50
2,500 A	15	20	25	3.50
3,000 A	20	25	30	3.50
4,000 A	20	25	30	3.50
5,000 A	20	25	30	3.50

TO ORDER	
Primary	Secondary 5 A
1,000 A	1920 8742
1,500 A	1920 8744
2,000 A	1920 8745
2,500 A	1920 8746
3,000 A	1920 8747
4,000 A	1920 8749
5,000 A	1920 8750

1 A secondary on request

TC CLIP
RANGE

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

- Quick and easy implementation without cutting off the power
- Built-in shortcircuiting 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®.

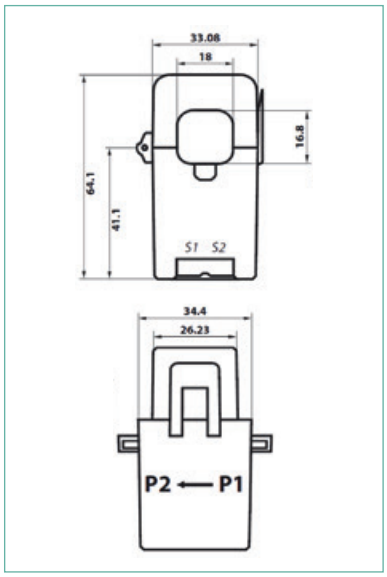
ZOOM

Reinforced hinge

Built-in short-circuiter

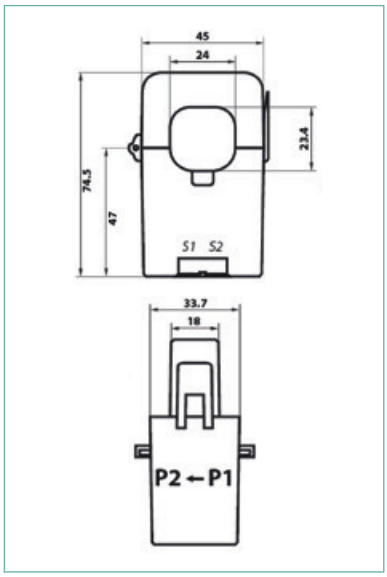
TCC176

Cable Ø 17 mm



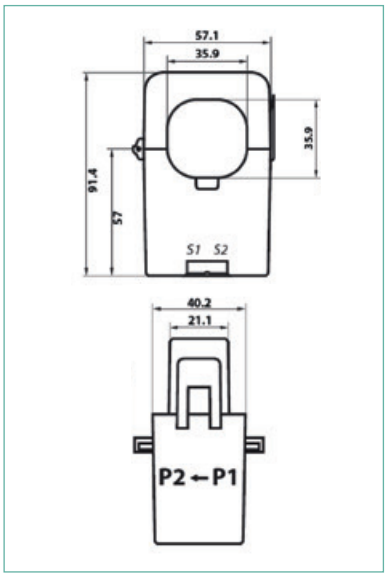
TCC241 / TCC242

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 PRODUCT

RENOV ENERGY

Metering solutions

Compatible with ULYS TTA, TT, Enerium 30 and Enerium 50.

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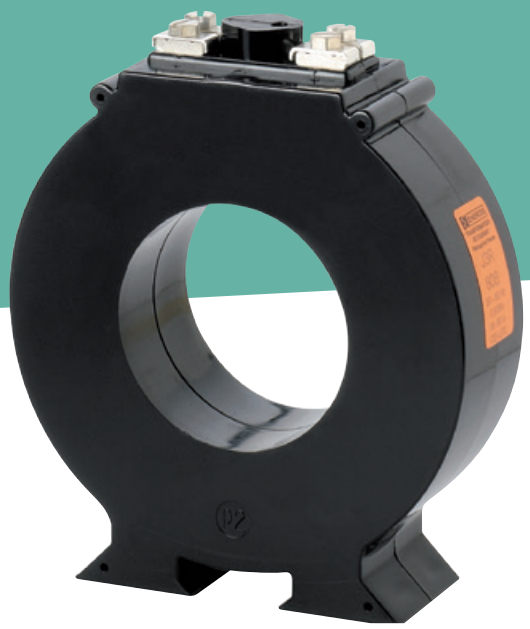


SINGLE-PHASE CORE CT RANGE

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

- 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)

The following CTs are still available. Please contact Enerdis:

- JVR 64 and JVR 75
- JVO 12-46 / JVO 18-51 / JVO 21-64 / JVO 21-75 / JVO 32-75 / JVO 36-75 and JVO 25 CR
- JVO 32 CR and JVP 624

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

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)

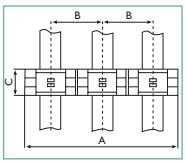
ZOOM

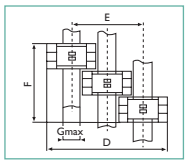
Sealable cover
M5 terminals with 2 grooves for dual connection on secondary

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

3CT MOUNTING

Model	Dimensions A	B	C	D	E	F	G
JVP 1025	344	115	45	252	138	137	22
JVP 1045	404	135	45	312	178	137	42



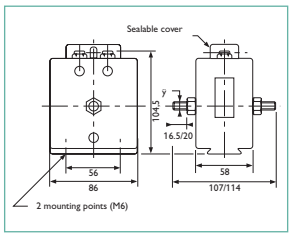


MOUNTING ACCESSORIES

Model	1 CT mounting rail	2 CT mounting rail	3 CT mounting rail
JVR	ACCE 7652	ACCE 7653	ACCE 7655
J3R 80 B	ACCE 7640		

JVR 86

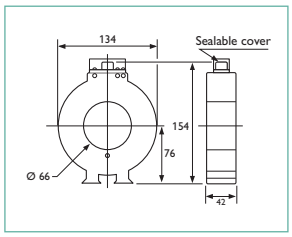
Ø M8/M10 > 75 A
Weight: 1.2 kg



	Power (VA) in class	
Primary	1	3
5 A	20	30
10 A	20	30
15 A	20	30
20 A	20	30
25 A	20	30
30 A	20	30
40 A	20	30
50 A	20	30
60 A	20	30
75 A	20	30
100 A	20	30
125 A	20	30
150 A	20	30
200 A	20	30

J3R 80 B

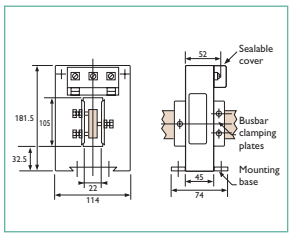
Cable Ø 66 mm
Weight: 1.6 kg



	Power (VA) in class		
Primary	0.5	1	3
200 A		5	10
250 A		5	10
300 A	5	10	15
400 A	10	20	25
500 A	15	20	25
600 A	15	20	25
750 A	15	20	25
800 A	15	20	25
1,000 A	15	20	25
1,250 A	15	20	25
1,500 A	15	20	25

JVP 1025

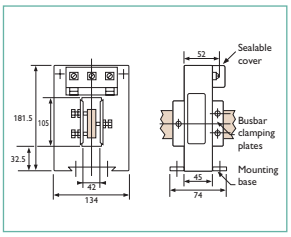
Bar: 100 x 20 mm
Weight: 2 kg



	Power (VA) in class	
Primary	1	3
200 A		5
250 A		5
300 A	10	20
400 A	5	30
500 A	15	15
600 A	15	15
750 A	20	20
800 A	20	30
1,000 A	30	30
1,250 A	30	30
1,500 A	30	30
2,000 A	30	30
2,500 A	30	30
3,000 A	30	30

JVP 1045

Bar: 100 x 40 mm
Weight: 2.5 kg



	Power (VA) in class	
Primary	1	3
300 A	5	5
400 A	5	10
500 A	10	15
600 A	15	15
750 A	20	20
800 A	20	20
1,000 A	30	30
1,250 A	30	30
1,500 A	30	30
2,000 A	30	30
2,500 A	30	30
3,000 A	30	30

TO ORDER

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

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
1,000 A	J3RC 7530
1,250 A	J3RC 7532
1,500 A	J3RC 7533
Sealable cover	ACCE 7671

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
1,000 A	JVPT 8899
1,250 A	JVPT 8900
1,500 A	JVPT 8901
2,000 A	JVPT 8902
2,500 A	JVPT 8921
3,000 A	JVPT 8922
Mounting plate (base)	ACCE 7669
Sealable cover	ACCE 7672

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
1,000 A	JVPU 8910
1,250 A	JVPU 8911
1,500 A	JVPU 8912
2,000 A	JVPU 8913
2,500 A	JVPU 8920
3,000 A	JVPU 8914
Mounting plate (base)	ACCE 7669
Sealable cover	ACCE 7672

CUSTOMIZED PRODUCT

	Model				Primary	Secondary	Class	Power	Frequency
	JVR 86	J3R 80 B	JVP 1025	JVP 1045					
Example	JVR 86				200 A	1 A	0.5	10 VA	60 Hz

ASSOCIATED PRODUCTS

Mounting accessories

Mounting rails
1 CT, 2 CT, 3 CT.

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PRTC

CT short-circuiter

Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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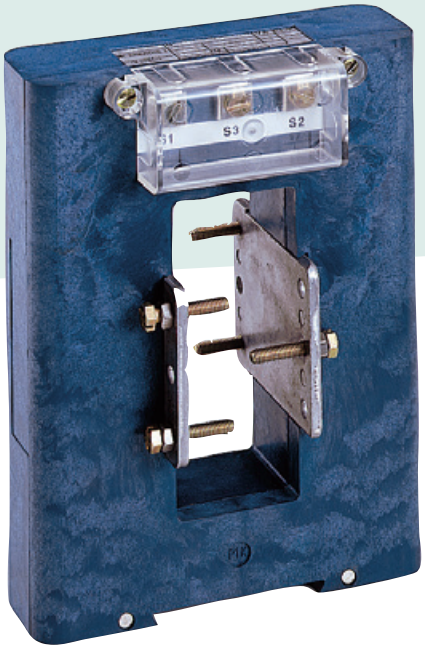


JVP 1045 B

Busbar primary 100 x 40 mm

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

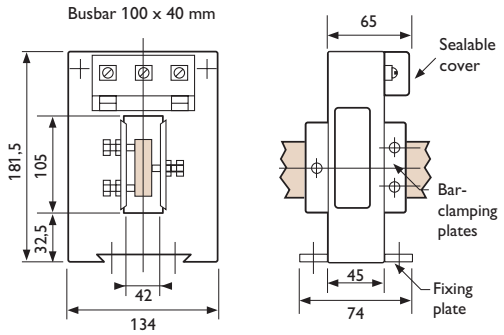
Dynamic current (Idyn): 2.5 Ith

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% at 40°C

Protection: Protection rating: IP 50
Dry winding in self-extinguishing ABS envelope (UL 94 VO)

- 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



TO ORDER

Primary	Power (VA) in class 0.5		Weight (kg)
	7.5	15	
	Secondary 5A		
500 A		JVPA 7569	2.50
1,000 A		JVPA 7573	2.50
2,000 A		JVPA 7576	2.50
500-1,000 A*	JVPA 7589	JVPA 7585	2.50
1,000-2,000 A*	JVPA 7590	JVPA 7588	2.50

JVO 40-100

Cable primary Ø 42 mm

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

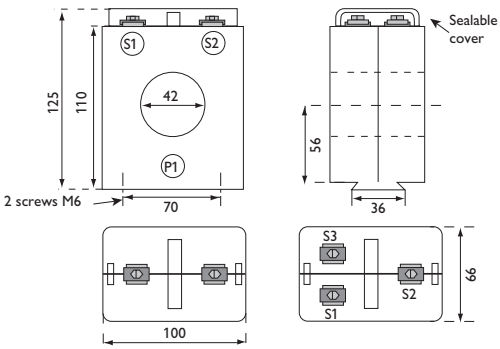
Dynamic current (Idyn): 2.5 Ith

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 % at 40 °C

Protection: Protection rating: IP 50
Dry winding in self-extinguishing ABS envelope (UL 94 VO)

- Delivered with sealable terminal cover for the secondary. M5 terminals with two grooves for double connection
- Mounting on symmetrical mounting rail or plate mounting



TO ORDER

	Power (VA) in class 0.5			Weight (kg)
	15	7,5	15	
Primary	Secondary 2.5 A	Secondary 5 A	Secondary 5 A	
200 A	JVON 7103		JVON 7100	0.97
500 A			JVON 7101	0.97
200-500 A		JVON 7104	JVON 7102	0.97
1-CT mounting rail		ACCE 7679		
2-CT mounting rail		ACCE 7680		
3-CT mounting rail		ACCE 7681		

JV0 40-100 S
Bi-rating

Cable primary Ø 40 mm

- Class 0.2s according to IEC 60044-1
- Particularly suitable for ENEDIS-qualified bi-rating electronic meters

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

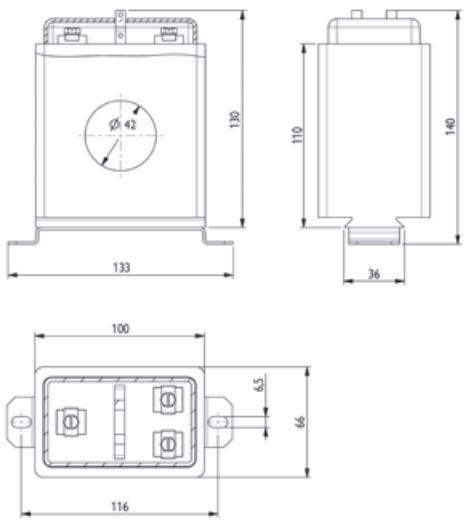
Rated withstand voltage: 3 kV (RMS value) at 50 Hz for 1 minute

Rated lightning impulse withstand voltage:
8 kV (peak value) – Wave 1.2/50 µs

Insulation class: E (heating limit: 75 K)

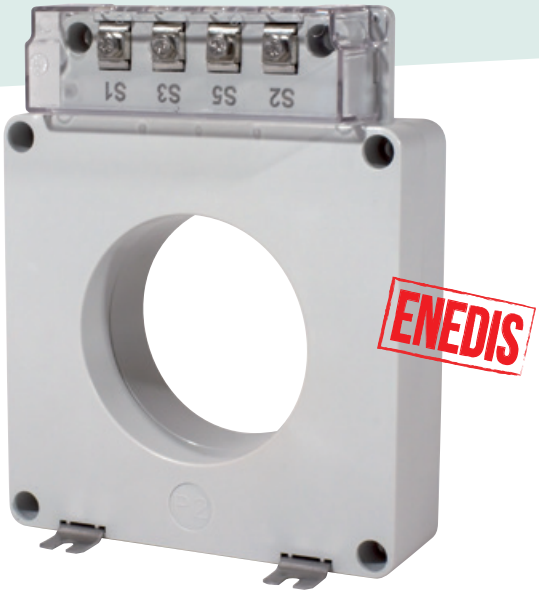
Weight: 1.1 kg

DIMENSIONS



TO ORDER

Model	Reference
JV0 40-100 S bi-rating	P01379512



JVO 90-160 S
Tri-rating

Cable primary Ø 90 mm

- Class 0.2s according to IEC 60044-1
- Particularly suitable for ENEDIS-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 (2 000/5 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

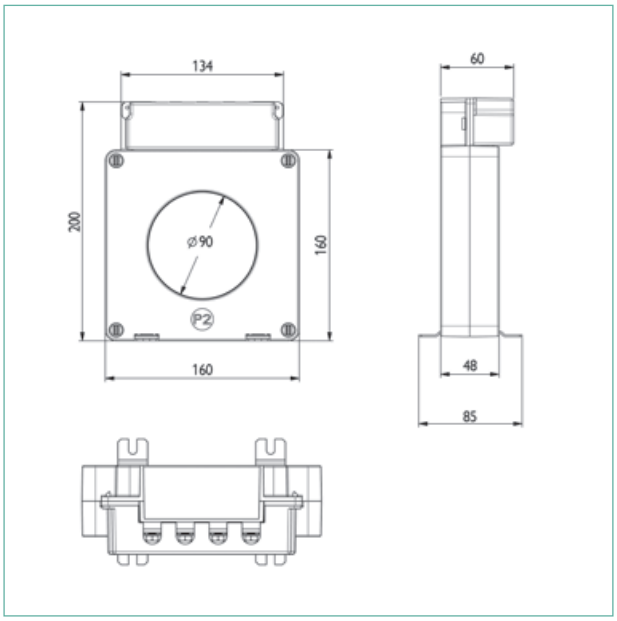
Rated withstand voltage: 3 kV (RMS value) at 50 Hz for 1 minute

Rated lightning impulse withstand voltage:
8 kV (peak value) – Wave 1.2/50 µs

Insulation class: E (heating limit: 75 K)

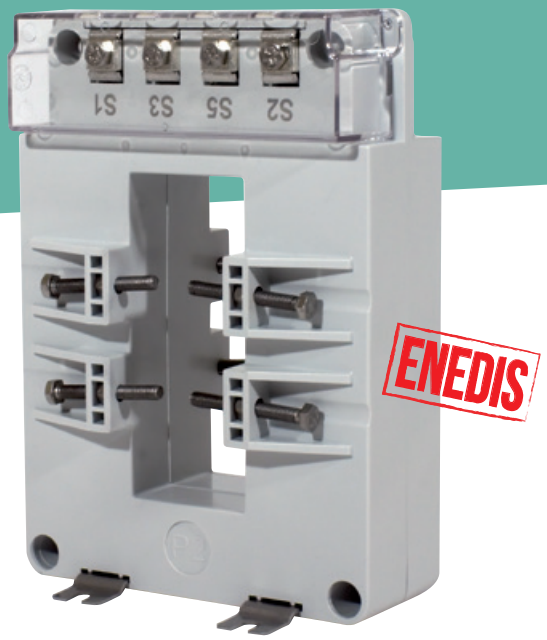
Weight: 1.9 kg

DIMENSIONS



TO ORDER

Model	Reference
JVO 90-160 S tri-rating	P01379513



JVP 1145 S
Tri-rating

Cable/busbar primary

- Class 0.2s according to IEC 60044-1
- Particularly suitable for ENEDIS-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

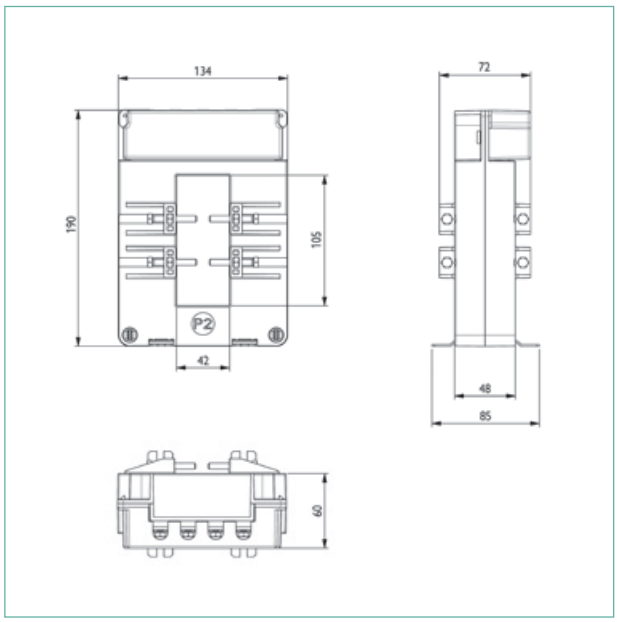
Rated withstand voltage: 3 kV (RMS value) at 50 Hz for 1 minute

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

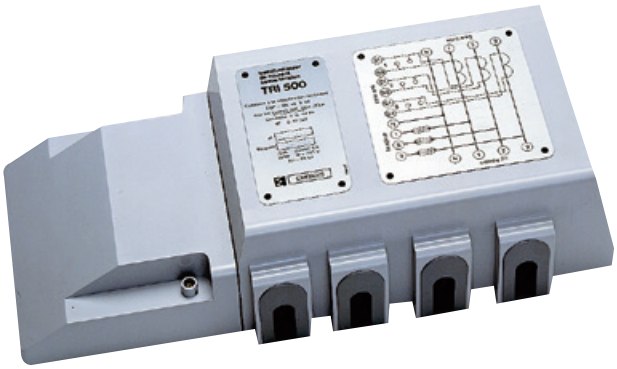
DIMENSIONS



TO ORDER

Model	Reference
JVP 1145 S tri-rating	P01379510

THREE-PHASE PLATE-MOUNTED CT RANGE



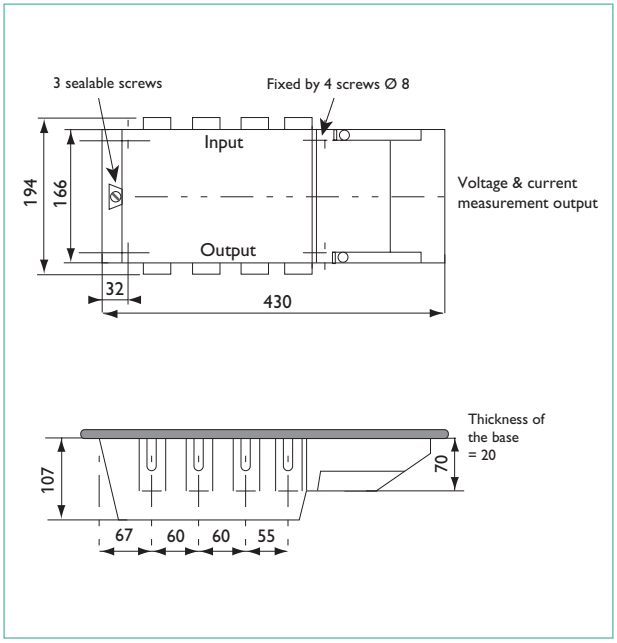
TRI 500

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

- Compliant with NF-C-42-502 standard
- Designed for three-phase LV metering

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

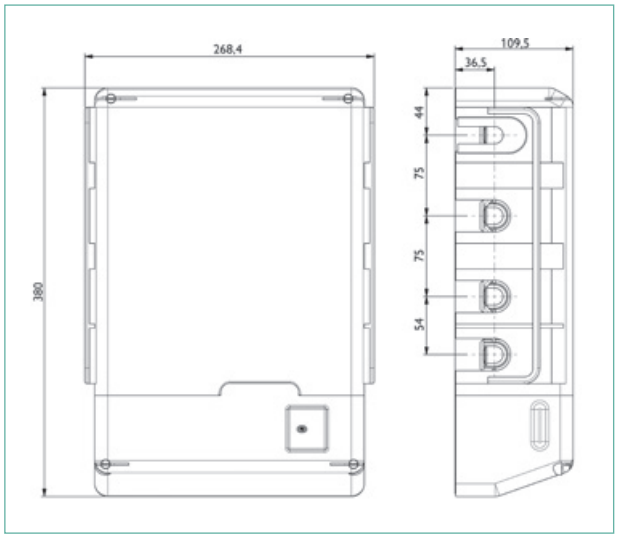
Model	Reference
50 A	TRI5 7823
100 A	TRI5 7825
150 A	TRI5 7826
200 A	TRI5 7827
300 A	TRI5 7828
500 A	TRI5 7831

75/5, 250/5, 400/5 and 600/5 also available. Please contact us.

TRI 700

- Class 0.2s according to IEC 60044-1
- Choice of primary conductor type: copper or aluminium
- Built-in short-circuiting switch

DIMENSIONS



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

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: SF = 2.3 (50 A); SF = 4.2 (100 A)

TRI700S 100-200/5 A: SF = 2.3 (100 A); SF = 4.2 (200 A)

TRI700S 200 - 500 / 5 A: SF = 2.3 (200 A); SF = 5 (500 A)

TRI700 100 - 200 - 500 / 5 A: SF = 4 (100 A); SF = 7 (200 A); SF = 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

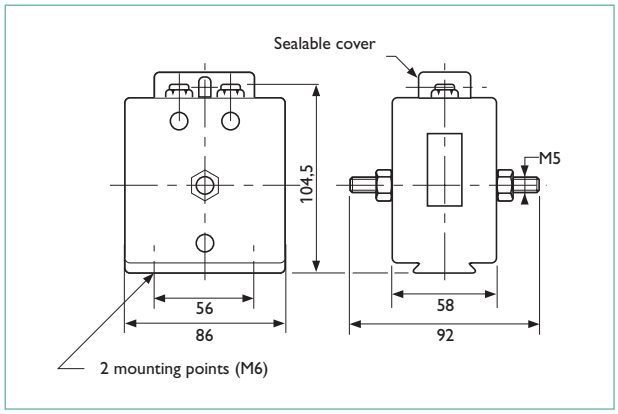
Insulation class: Bi-rating / tri-rating model:
E (heating limit: 75 K)

Weight: Bi-rating / tri-rating model: 9 Kg

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.

- Compact design
- Mounting on plate or rail

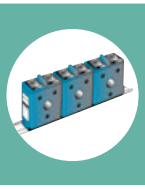


GENERAL SPECIFICATIONS

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 VO)

ZOOM

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



Mounting on plate or symmetrical rail

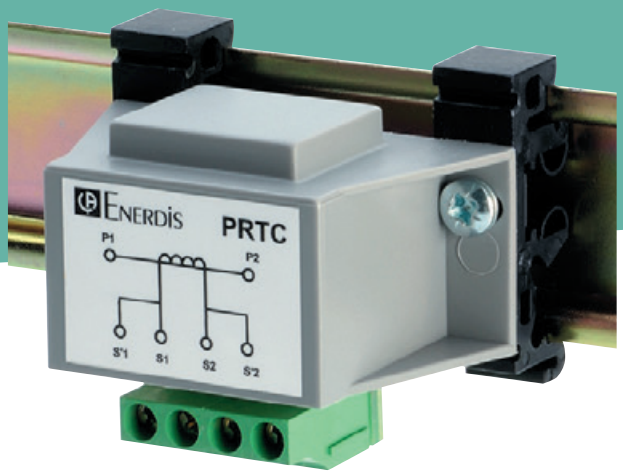
CABINET ACCESSORIES

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

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

TO ORDER

Model	Reference
5 + 5 A (Secondary 5 A)	JVMA 7523
5 + 5 + 5 A (Secondary 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.

- 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
- Allows users to work without shutting down the load beforehand

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

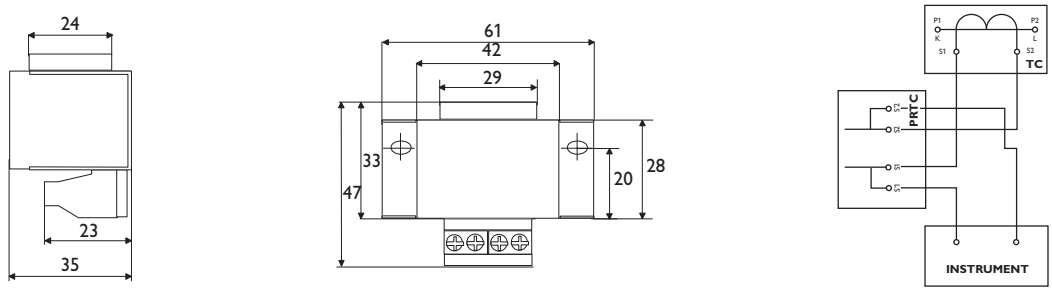
Peak protection voltage: 22 Vac

ZOOM

Mounting on DIN rail or plate

Four terminals available for 6 mm² wires

Connection diagram



TO ORDER

Model	Reference
Transformer short-circuit switch	PRTC 1001

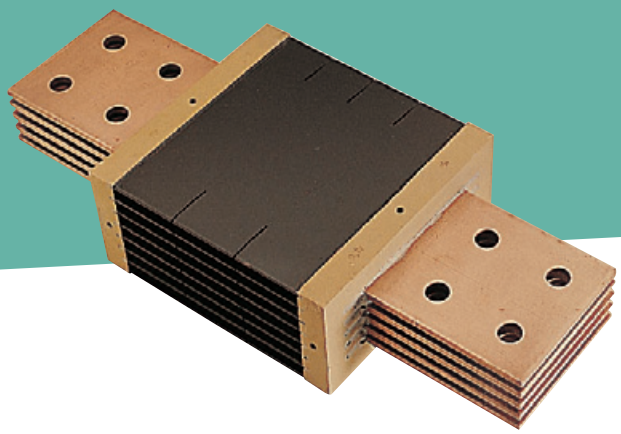
NOTES

CHOOSING YOUR SHUNTS

	76-2 and 77-2			SHMI		
	page 154			page 156		
						
	76-2	**76-2**	**77-2**	**SHMI**	**SHMI**	**SHMI**
Type	Eye connection on base	Eye connection	Blade connection for busbar	Screw connection	Eye connection	Connection to block for busbar
Voltage drop	100 mV					
Accuracy class	0.2 and 0.5				0.5 and 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			■		■	
1,000 A			■			■
1,250 A			■			■
1,500 A			■			■
2,000 A			■			■
2,500 A			■			■
3,000 A			■			■
4,000 A			■			■
5,000 A						■
6,000 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).		
	SPECIFIC PRODUCTS POSSIBLE IN THIS RANGE					

SHEL	SHMO
page 158	page 158
	

SHEL	SHMO
Direct connection to measuring component	Modular casing
100 mV	
1	
	■
	■
■	■
■	■
■	■
■	■
■	■
■	■
■	■
■	■
■	
■	
■	
■	
■	
■	
■	
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
in demanding applications.

- High-performance range
- High overload capacity

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)

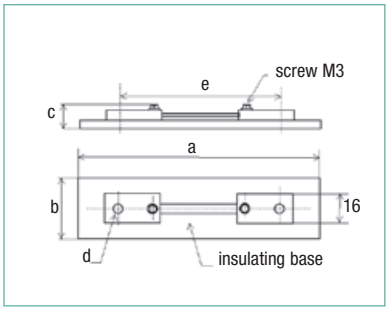
ZOOM

Protection against corrosion
with epoxy-modified acrylic paint

Large-area fittings
to facilitate heat dissipation

76-2
Eye connection on base

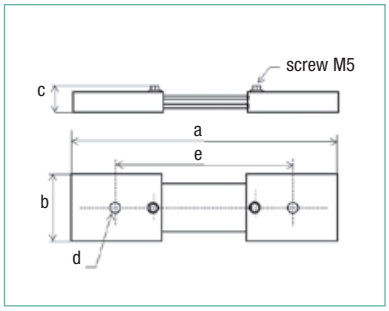
Voltage drop: 100 mV
Class 0.2 and 0.5



	Dimensions (mm)				
Current	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

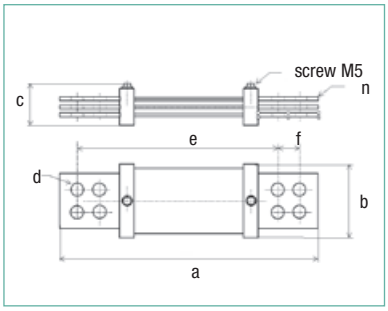
Voltage drop: 100 mV
Class 0.2 and 0.5



	Dimensions (mm)				
Current	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



	Dimensions (mm)						
Current	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
1,000 A	380	115	35	14	280	50	1
1,250 A	380	115	35	14	280	50	1
1,500 A	380	115	55	14	280	50	2
2,000 A	380	115	55	14	280	50	2
2,500 A	400	168	55	14	300	50	3
3,000 A	400	168	65	14	300	50	4
4,000 A	400	168	85	14	300	50	5

TO ORDER

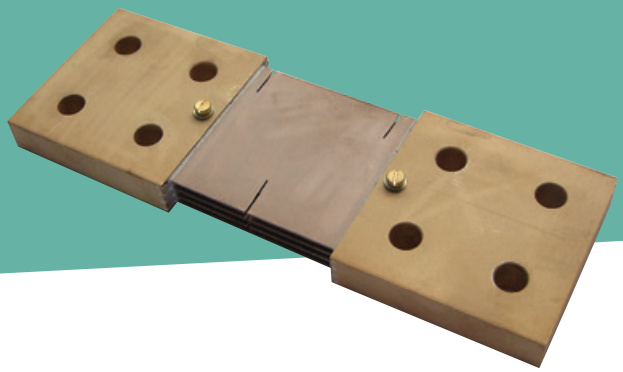
	Reference for 100 mV	
Current	Class 0.2	Class 0.5
1 A	SHUN 1200	SHUN 1300
1.25 A	SHUN 1201	SHUN 1301
1.5 A	SHUN 1202	SHUN 1302
2 A	SHUN 1203	SHUN 1303
2.5 A	SHUN 1204	SHUN 1304
3 A	SHUN 1205	SHUN 1305
4 A	SHUN 1206	SHUN 1306
5 A	SHUN 1207	P01 3042 11
6 A	SHUN 1208	SHUN 1308
7.5 A	SHUN 1209	SHUN 1309

	Reference for 100 mV	
Current	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

	Reference for 100 mV	
Current	Class 0.2	Class 0.5
600 A	SHUN 1227	P01 3042 48
750 A	SHUN 1228	P01 3042 41
1,000 A	SHUN 1229	P01 3042 42
1,250 A	SHUN 1230	P01 3042 49
1,500 A	SHUN 1231	P01 3042 43
2,000 A	SHUN 1232	P01 3042 44
2,500 A	SHUN 1233	P01 3042 45
3,000 A	SHUN 1234	P01 3042 46
4,000 A	SHUN 1235	P01 3042 47

CUSTOMIZED PRODUCT

	Model		Voltage drop	Accuracy class	Current
	76-2	77-2			
Example	77-2		50 mV	Class 0.2	800 A



SHMI
RANGE

Offering a vast range of industrial applications.

- Range with excellent performance/price trade-off
- A wide choice of voltage drops
- Compact design that respects accepted thermal dissipation requirements

ZOOM

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 2,000 A	1,2 In	2 In	5 In
> 2,000 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:

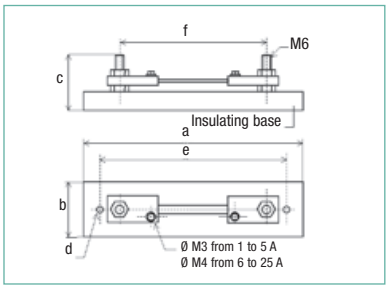
Accuracy and influence factor: IEC 60051-1 to 9
Preferred ratings and dimensions for 100 mV shunts:
NFC 42-151/152/153
Lead-free range: RoHS directive (2002/95/CE)

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
1 A to 25 A
Screw connection

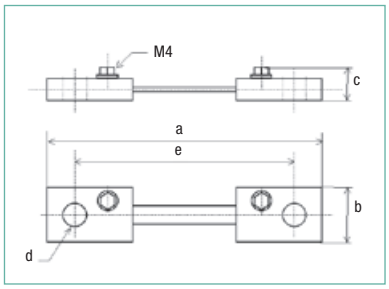
Voltage drop: 100 mV
Class 0.5 and 1



	Dimensions (mm)					
Current	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

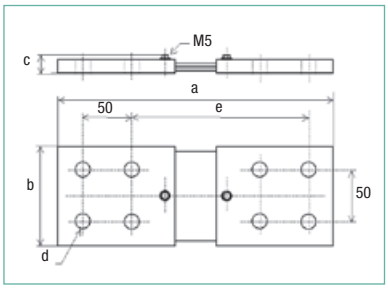
Voltage drop: 100 mV
Class 0.5 and 1



	Dimensions (mm)				
Current	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
1,000 A to 6,000 A
Busbar connection block

Voltage drop: 100 mV
Class 0.5 and 1



	Dimensions (mm)				
Current	a	b	c	d	e
1,000 A	290	100	20	14.5	190
1,250 A	290	100	25	14.5	190
1,500 A	290	100	25	14.5	190
2,000 A	290	100	35	14.5	190
2,500 A	290	100	45	14.5	190
3,000 A	290	100	45	14.5	190
4,000 A	330	150	45	16.5	230
5,000 A	330	150	45	16.5	230
6,000 A	330	150	45	16.5	230

TO ORDER

	Reference for 100 mV	
Current	Class 0.5	Classe 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

	Reference for 100 mV	
Current	Class 0.5	Classe 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

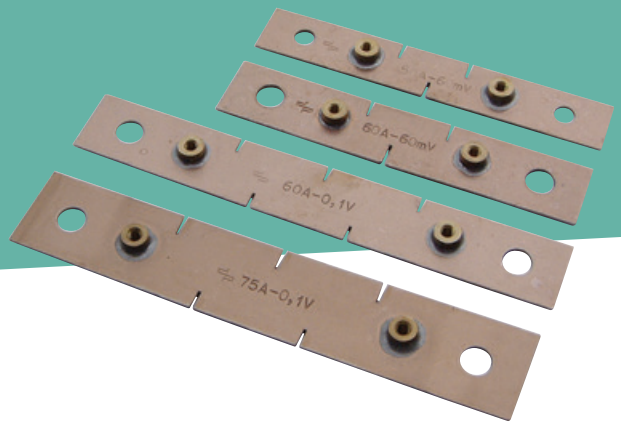
	Reference for 100 mV	
Current	Class 0.5	Classe 1
1,000 A	2901 0361	2901 0161
1,250 A	2901 0362	2901 0162
1,500 A	2901 0363	2901 0163
2,000 A	2901 0364	2901 0164
2,500 A	2901 0365	2901 0165
3,000 A	2901 0366	2901 0166
4,000 A	2901 0368	2901 0168
5,000 A	2901 0369	2901 0169
6,000 A	2901 0370	2901 0170

CUSTOMIZED PRODUCT

	Model	Voltage drop	Accuracy class	Current
	SHMI			
Example	SHMI	50 mV	Class 0.5	3,000 A

ASSOCIATED PRODUCT

Mounting accessories
Screws, bolts and cables
Ratings from 1 to 750 A.
page 156



SHEL AND SHMO RANGES

For simplified installation on low-power networks.

- Economy range for construction (SHEL) and for simplified installation (SHMO)
- Direct connection to measuring component (SHEL)
- 1 V 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

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

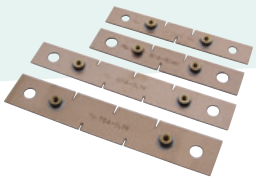
Permitted overloads:

On average and in normal operating conditions

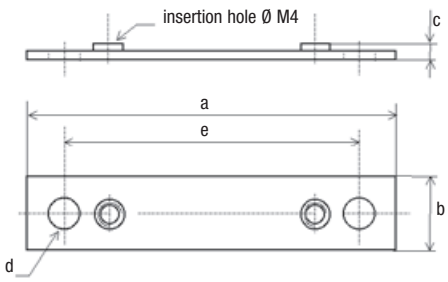
Compliance with standards:

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

SHEL



Voltage drop: 100 mV Class 1



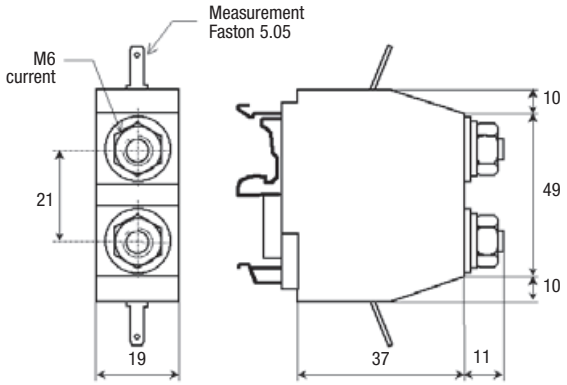
	Dimensions (mm)				
Current	a	b	c	d	e
10 A	150	10	5	6.5	122
15 A	150	12	5	6.5	122
20 A	150	12	5	6.5	122
25 A	150	15	5	6.5	122
30 A	150	15	5	6.5	122
40 A	150	15	5	6.5	122
50 A	150	20	5	6.5	122
60 A	150	25	5	8.5	122
75 A	150	30	5	8.5	122
100 A	150	20	6	8.5	122
125 A	150	25	6	8.5	122
150 A	150	30	6	8.5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

T O O R D E R

	Reference for 100 mV
Current	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

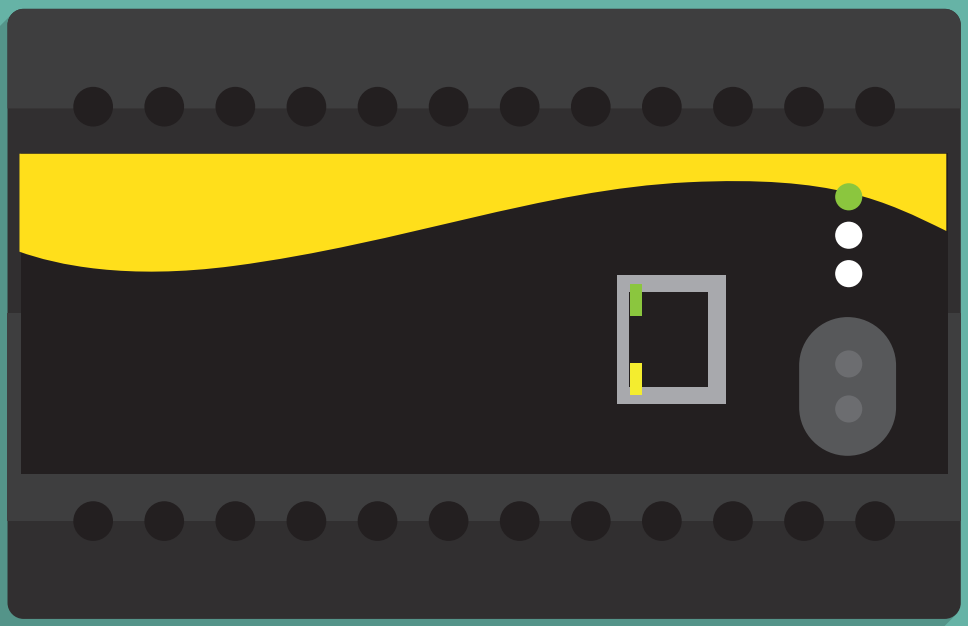


T O O R D E R

	Reference for 100 mV
Current	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 PRODUCT

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



NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

TRANSDUCERS

TRANSDUCERS

Digital transducers

1, 2, 3 or 4 configurable analog outputs / Class 0.1
1 Ethernet or RS485 digital output

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

TRIAD 2

Configured at the factory
AC quantities

Programmable digital transducers, 1 to 4 analog outputs. Configurable accuracy class.

page 168

TRIAD 2

Configurable via TRIADJUST 2
AC quantities

Programmable digital transducers, 1 to 4 analog outputs. Configurable accuracy class.

page 168

Multi-function
2 or 4 configurable analog outputs / Class 0.2
2 or 4 alarm / pulse outputs
1 Ethernet or RS485 digital output

Vac | Uac | Iac | P | Q | S | F | PF
Cosφ | kWh | kVArh | kVAh

MICAR 2

Configured at the factory
AC quantities

Multi-function digital transducers.
2 or 4 analog outputs.
Class 0.2.

page 184

MICAR 2

Configurable via E.view+
AC quantities

Multi-function digital transducers.
2 or 4 analog outputs.
Class 0.2.

page 184

1 configurable analog output

Vdc | Idc | Ω | T°

C.A 3420

DC quantities
Physical quantities

Programmable digital transducer.

page 194

Analog transducers

For nuclear environments

Vac | Iac | P | Q

T82N

1 analog output / Class 0.5

Suitable for the requirements of the nuclear market.

page 196

Self-powered
1 analog output / Class 0.5

Vac | Uac | Iac

Self-powered TSPU

Voltage

Self-powered analog transducers for converting an AC voltage. 1 analog output. Class 0.5 – All types of network.

page 202

Self-powered TSPI

Current

Self-powered analog transducers designed to convert an AC current. 1 analog output. Class 0.5 – All types of networks.

page 202

Communication solution

ELINK 61850

ModBus / IEC 61850 gateway

For TRIAD 2 transducers.

page 206

INFO & ADVICE

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

FACTORY-PROGRAMMED OR USER-PROGRAMMABLE?

Factory-programmed

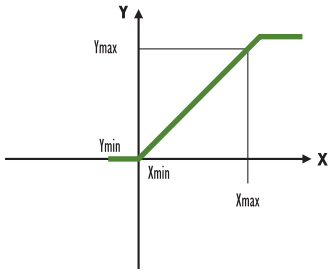
If the specifications of the measurements required are known, a **factory-programmed** transducer can be used.

User-programmable

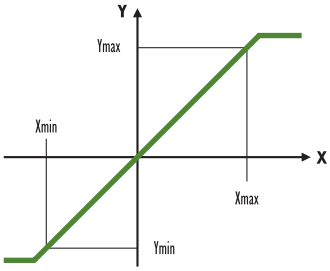
If the precise specifications of the measurements are not known, choose a **user-programmable** transducer. You can then program it accordingly when the specifications are known and you can modify the settings if these specifications change.

WHICH TRANSFER CURVES SHOULD YOU CHOOSE?

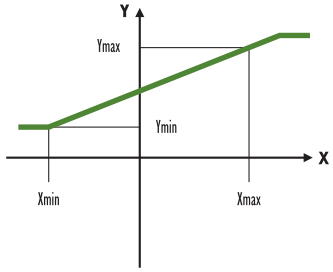
Linear



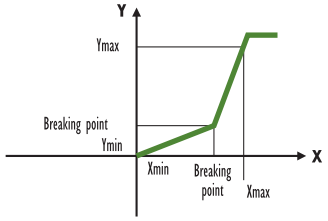
Linear without offset



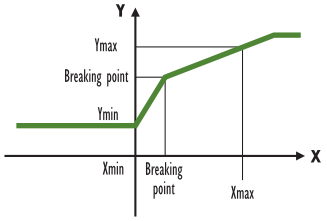
Linear with offset



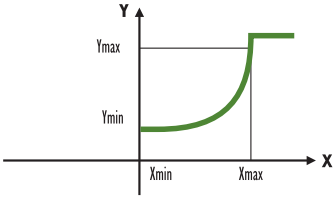
Linear with 2 extended slopes



Linear with 2 slopes



Quadratic



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.

EDF TYPE HN 44-S-80 AND IEC 61000-6-5 SPECIFICATIONS

When designing our products, we take into account the requirements and constraints linked to EDF's technical specifications to ensure that they can withstand severe environments.

- electrical power stations
- switching stations
- source stations

Compliance with the requirements of the leading French electricity supplier helps ENERDIS to achieve recognition nationally and international.

ADVANTAGES OF ANALOG 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, analog and digital panel meters, measurement relays, PLCs, RTUs, etc.).

Response time

The response time of an analog output enables real-time viewing of all electrical parameters (for example, SCADA application, dispatching, control and monitoring of industrial processes).

Resistance to disturbances

Analog 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 metres without signal amplification).

Reliability

Analog 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 changes on installations

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 data retrieval

Using the commands available in the ModBus mapping, a transducer can be operated via a digital supervision system and retrieve remotely 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 alarms, date-stamping or energy index functions.

SELECTION GUIDE

	TSP 2		TRIAD 2	MICAR 2	C.A 3420	T82N
	page 202		page 168	page 184	page 194	page 196
						
	TSPU	TSPI				
Measurements						
Iac		■	■	■		■
Vac	■		■	■		■
Uac	■		■	■		
Vearth				■		
Ineutral				■		
Idc					■	
Vdc					■	
P			■	■		■
Q			■	■		■
S			■	■		
F			■	■		
PF			■	■		
Cosφ			■	■		
Tanφ			■			
φ			■			
φ (U' – U")			■			
T°					■	
Ω					■	
kWh				■		
kVArh				■		
kVAh				■		
Options						
Number of analog outputs	1	1	4	4	1	1
RS485			■	■		
Ethernet			■	■		
Pulse output				■		
Alarm output				■		
Relay output				■		
Programmable			■	■	■	
Plug-in versions						■
Self-powered	■	■	(1)	(1)		

(1) By looping the input voltage

TRIAD 2
RANGE

Programmable digital transducers
with 1 to 4 analog outputs.
Programmable accuracy class.

+
- Up to 4 programmable analog outputs
- 4 kV insulation
- Configurable and modifiable: using the TRIADJUST 2 software
- Adjustable accuracy within Class 0.1 as per IEC 60688
- Digital output available as an option

MAIN SPECIFICATIONS

Quantities measured: 1, 2, 3, 4 to be chosen from I, V, U, F, PF, 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 and 5 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: ± 1mA, ± 5mA, ± 20mA, ± 1V, ± 10V

Response time down to 50 ms

Operating frequency: 50 or 60 Hz

Auxiliary power supply with wide dynamic range: 80 to 265 V ac/dc or 19 to 58 Vdc

Compliance with CE directive

Digital technology

ZOOM

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

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 analog 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 H0042-1

MOUNTING ACCESSORIES

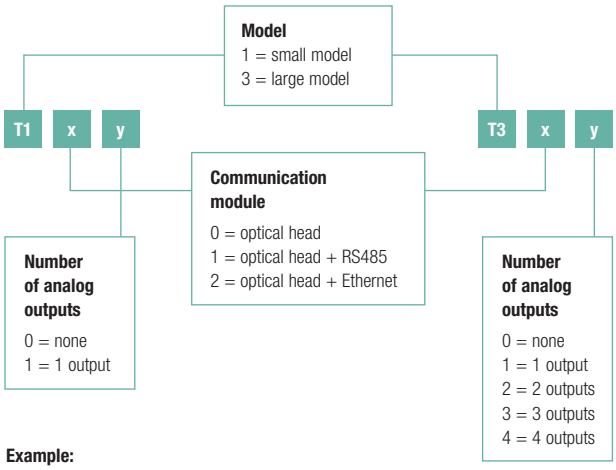
Model	Reference
Plate mounting for T1xy	ACCT 1007
Plate mounting for T3xy	ACCT 1006

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 analog outputs

Network	Function	T1xy model	T3xy model
Single-phase	V	■	■
	I	■	■
	F	■	■
	P	■	■
	Q	■	■
	S	■	■
	PF	■	■
	Tanφ	■	■
	Cosφ	■	■
	φ	■	■
Balanced 3-phase, 3 wires	U12, U23, U31	■	■
	I1, I2, I3	■	■
	F	■	■
	Pt	■	■
	Qt	■	■
	St	■	■
	PFt	■	■
	Tanφ	■	■
	Cosφt	■	■
	φt	■	■
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	■	■
	PF1, PF2, PF3, PFt	■	■
	Tanφ	■	■
	Cos (φ1, φ2, φ3, φt)	■	■
	φ1, φ2, φ3, φt	■	■
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		■
	PF1, PF2, PF3, PFt		■
	Tanφ		■
	Cos (φ1, φ2, φ3, φt)		■
	φ1, φ2, φ3, φt		■
	φ (U12/U23, U23/U31, U31/U12)		■
	φ (V1/V2, V2/V3, V3/V1)		■
Split-phase	V1, V2		■
	U12		■
	I1, I2		■
	F		■
	P1, P2, Pt		■
	Q1, Q2, Qt		■
	S1, S2, St		■
	PF1, PF2, PFt		■
	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 MV (ph-ph)	
Acceptable overloads	T1: 300 Vac permanent - 460 Vac / 10s T3: 520 Vac permanent - 800 Vac / 10s	
Consumption	< 0.2 VA	
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	Low level
	T1: 3.3 VA to 8.5 VA max. T3: 9 VA to 20 VA max.	T1: 3.2 W to 5.5 W max. T3: 5.5 W to 11 W max.
Analog outputs		
Rated values	Current	Tension
	± 1mA, ± 5mA, ± 20mA	± 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 bauds	10 base T	2,400 to 115,200 bauds
Parity	-	-	Even, odd or none
JBus addresses	-	-	1 to 247
Transmission length	2 m	100 m	As per 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, PF, Tanφ, Cosφ, φ, φU, φV**	± 1 %	± 0.5 %	± 0.2 %	± 0.15 %	± 0.1 %

* RT: Response time for F = 50 Hz

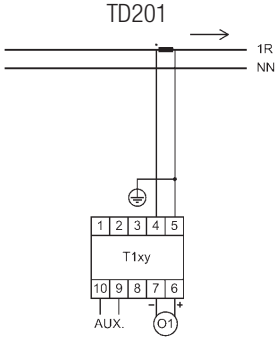
* These values may change according to the input and output measurement ranges

** Phase angle between voltages for φU and φV

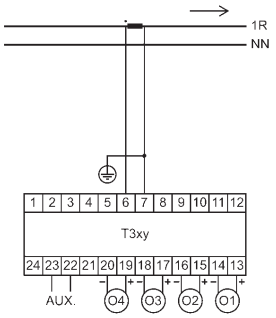
ELECTRICAL CONNECTIONS - SINGLE-PHASE NETWORK

I1, F:

TD201

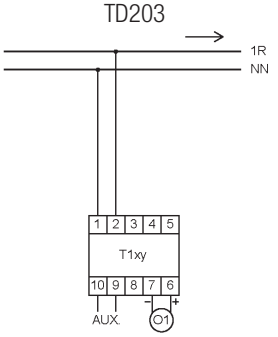


TD202

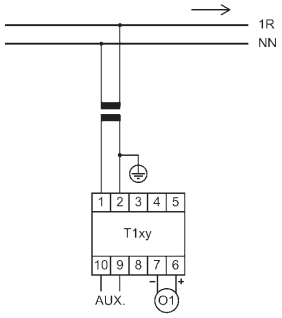


V1, F:

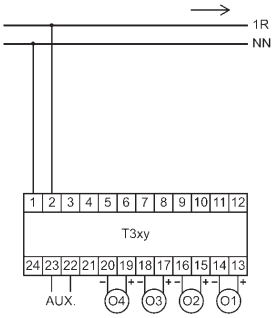
TD203



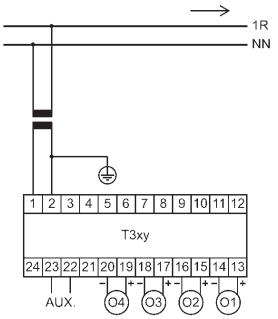
TD204



TD205

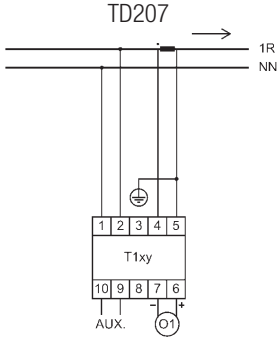


TD206

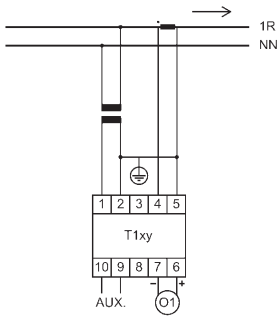


V1, I1, P1, Q1, S1, PF1, F, TANφ, Cosφ1, φ1:

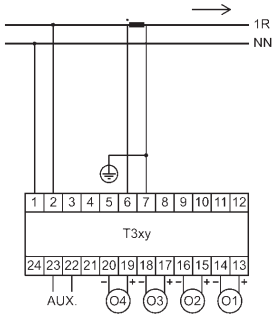
TD207



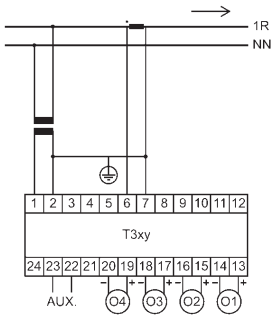
TD208



TD209



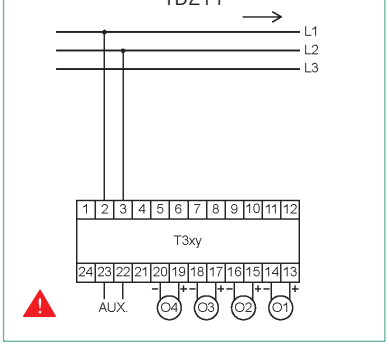
TD210



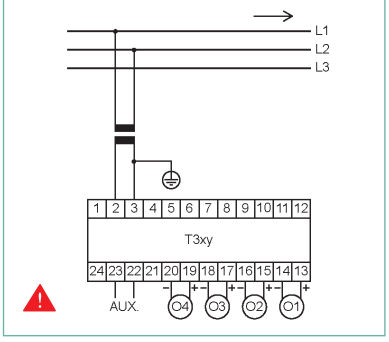
BALANCED 3-PHASE, 3-WIRE NETWORK

U12, U23, U31, F:

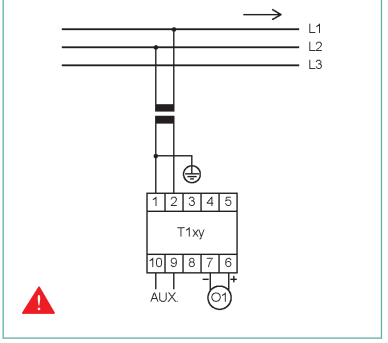
TD211



TD212

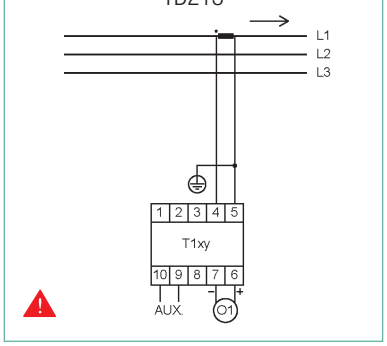


TD237

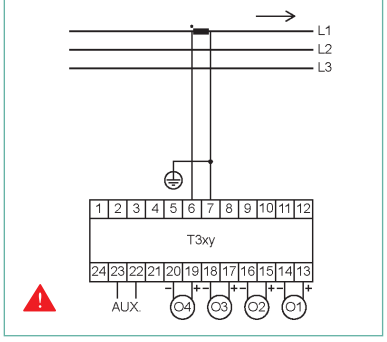


I1, I2, I3, F:

TD213

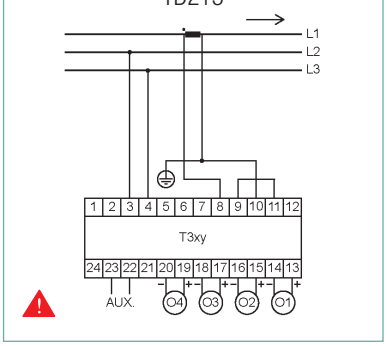


TD214

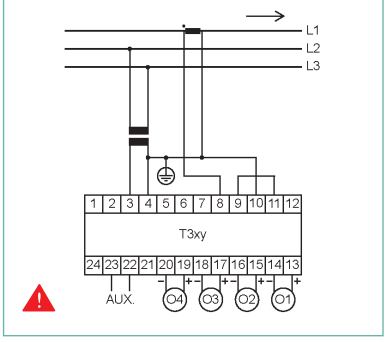


U12, U23, U31, I1, I2, I3, Pt, St, Qt, PFt, F, TANφ, Cosφt, φt:

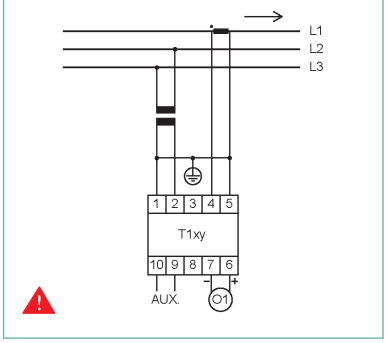
TD215



TD216



TD238

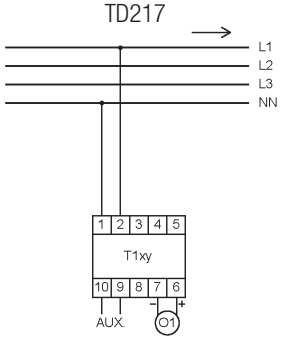


Phase rotation authorized

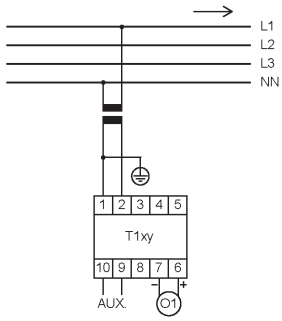
BALANCED 3-PHASE, 4-WIRE NETWORK

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

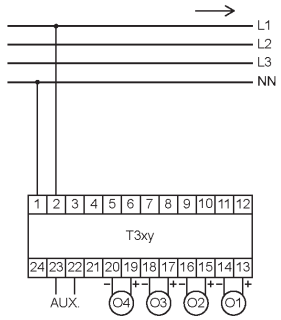
TD217



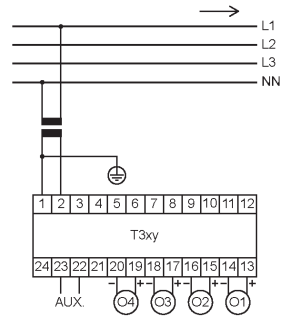
TD218



TD219

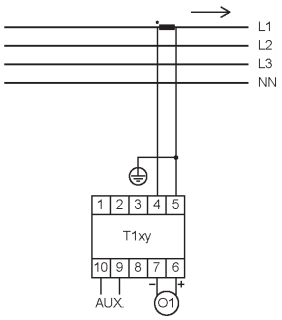


TD220

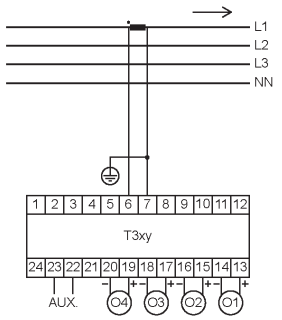


I1, I2, I3, F:

TD221



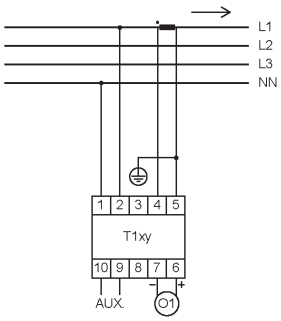
TD222



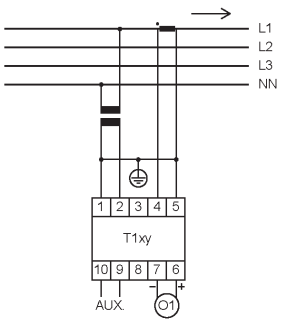
Phase rotation authorized

V1, V2, V3, U12, U23, U31, I1, I2, I3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt:

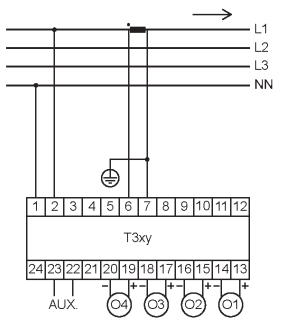
TD223



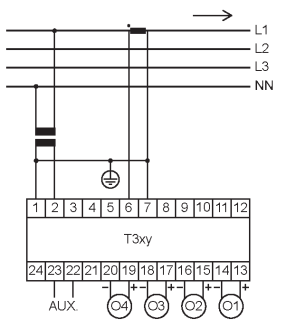
TD224



TD225



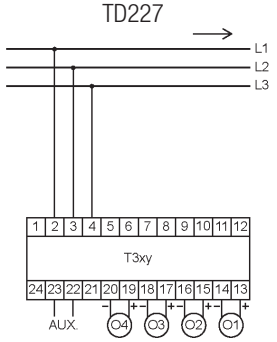
TD226



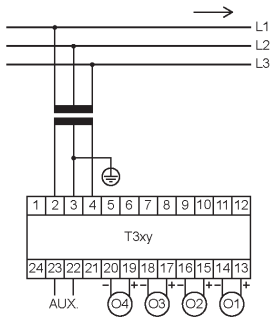
UNBALANCED 3-PHASE, 3-WIRE NETWORK

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

TD227

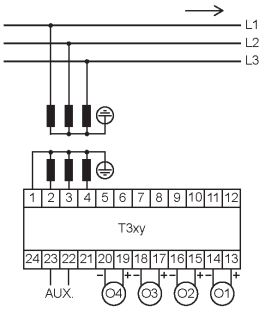


TD227D



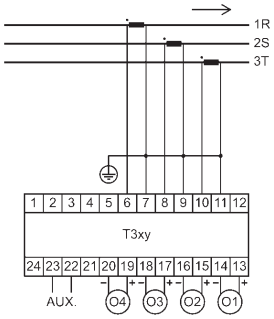
V1, V2, V3, U12, U23, U31, F,
Angle (V1/V2, V2/V3, V3/V1),
Angle (U12/U23, U23/U31, U31/U12):

TD227Y

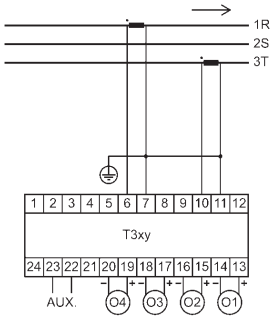


I1, I2, I3, F:

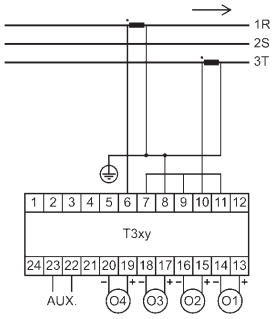
TD228



TD229



TD230

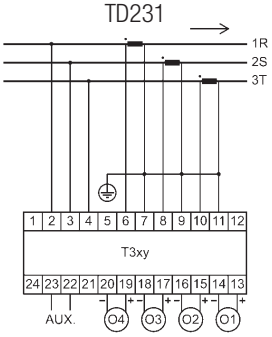


UNBALANCED 3-PHASE, 3-WIRE NETWORK (CONTINUED)

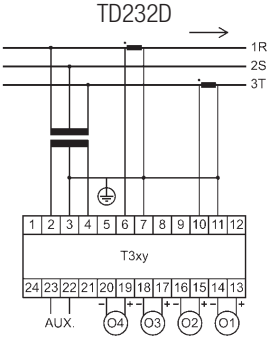
U12, U23, U31, I1, I2, I3, Pt, St, Qt, PFt, F, TANφ, Cosφt, φt, Angle (U12/U23, U23/U31, U31/U12):

V1, V2, V3, U12, U23, U31, I1, I2, I3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

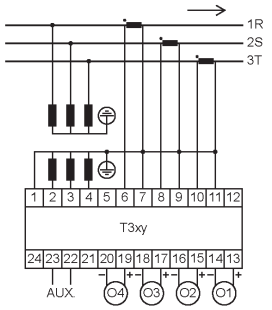
TD231



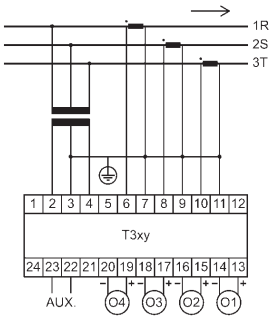
TD232D



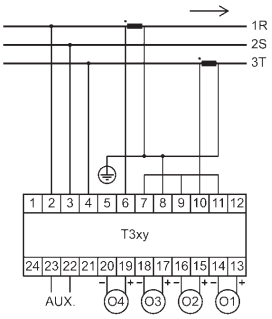
TD231Y



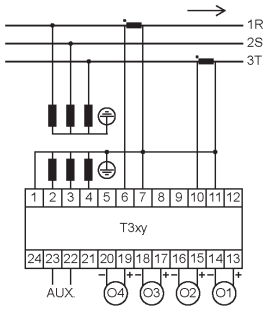
TD231D



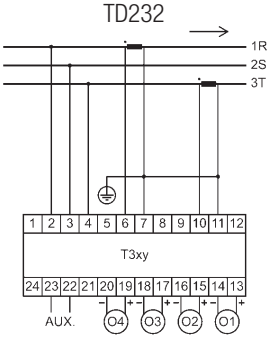
TD233



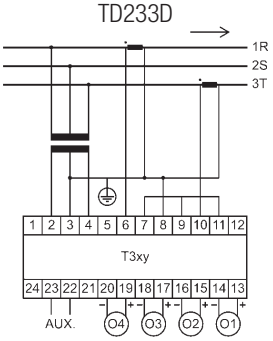
TD232Y



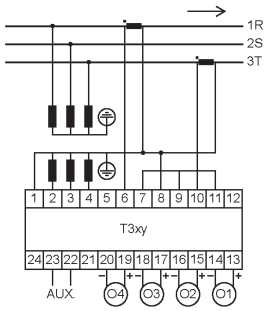
TD232



TD233D



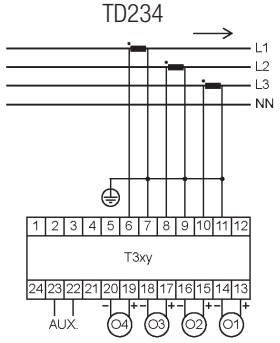
TD233Y



UNBALANCED 3-PHASE, 4-WIRE NETWORK

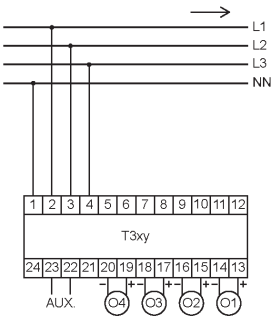
I1, I2, I3, F:

TD234

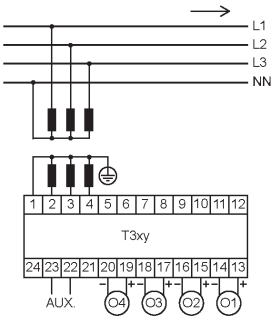


V1, V2, V3, U12, U23, U31, F, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD235

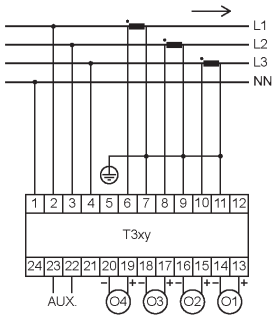


TD235Y

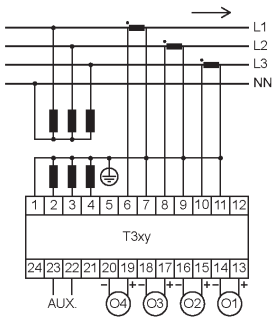


V1, V2, V3, U12, U23, U31, I1, I2, I3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD236

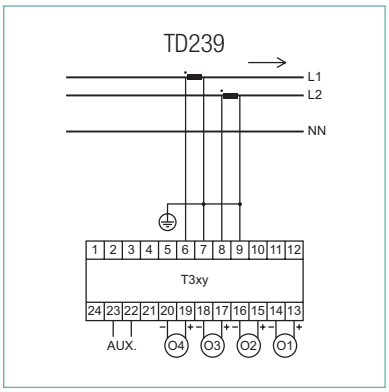


TD236Y

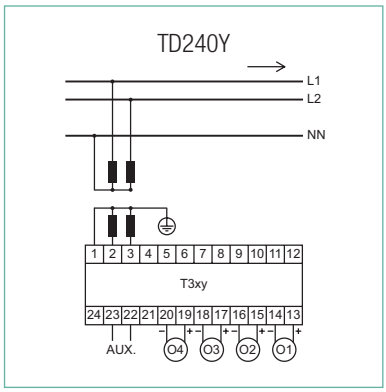


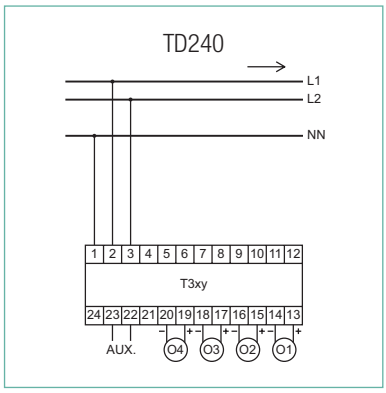
SPLIT-PHASE

I1, I2, F:

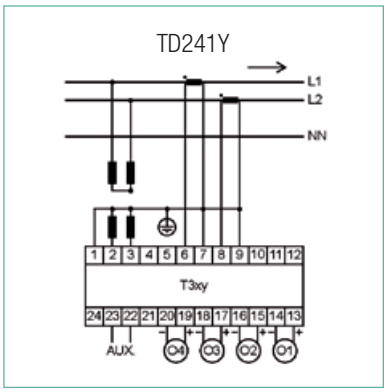


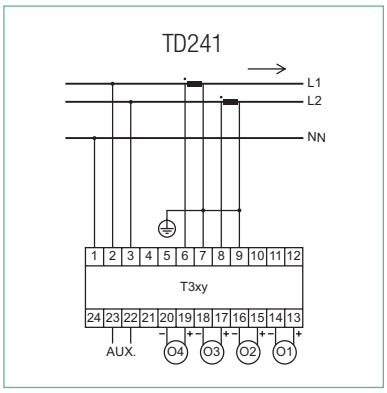
V1, V2, U12, F, Angle (V1/V2) rad, Angle (V1/V2) deg:



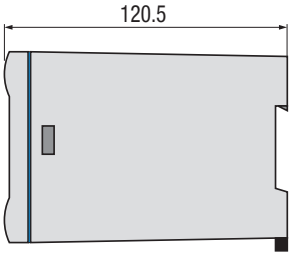


V1, V2, U12, I1, I2, P1, P2, Pt, Q1, Q2, Qt, S1, S2, St, PF1, PF2, PFt, F, tanφ, Angle (V1/V2) rad, Angle (V1/V2) deg, cos φ1, cos φ2, cosφt, φ1 Fonda rad, φ2 Fonda rad, φt Fonda rad, φ1 Fonda deg, φ2 Fonda deg, φt Fonda. deg, Angle V1/V2 Fonda deg, I1 (signed), I2 (signed):



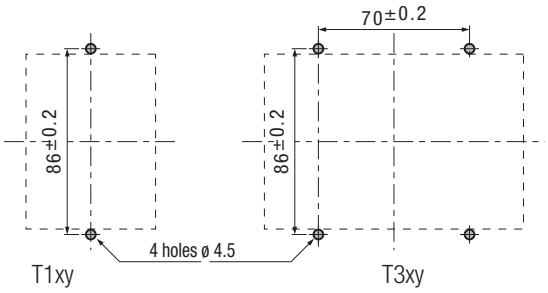


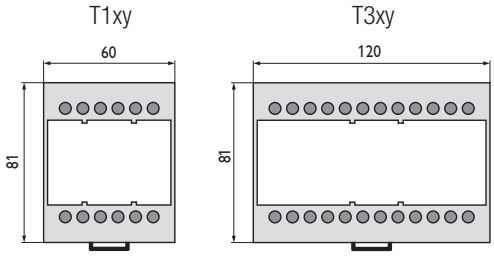
DIMENSIONS (IN MM)



All models

Panel drilling diagram for plate mounting

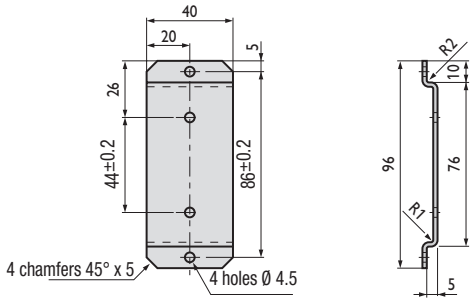




Weight: 320 g

Weight: 700 g

Accessory for plate mounting with screw (option)



TRIAD 2 PROGRAMMABLE VIA TRIADJUST 2

TO ORDER

			T1 – SMALL MODEL (60 x 81 x 120.5 mm)		T3 – LARGE MODEL (120 x 81 x 120.5 mm)							
			Without tropicalization	With tropicalization	Without tropicalization				With tropicalization			
			Number of outputs	Number of outputs	Number of outputs				Number of outputs			
Link	Output	Alimentation	1	1	1	2	3	4	1	2	3	4
Optical	± 20 mA	80 - 265 V AC/DC	P01380001	P01380002	P01380101	P01380103	P01380105	P01380107	P01380102	P01380104	P01380106	P01380108
		19 - 58 V DC	P01380003	P01380004	P01380109	P01380111	P01380113	P01380115	P01380110	P01380112	P01380114	P01380116
	± 10 V	80 - 265 V AC/DC	P01380005	P01380006	P01380117	P01380119	P01380121	P01380123	P01380118	P01380120	P01380122	P01380124
		19 - 58 V DC	P01380007	P01380008	P01380125	P01380127	P01380129	P01380131	P01380126	P01380128	P01380130	P01380132

TRIAD 2 FACTORY-PROGRAMMABLE

1 Model - Frequency

T1	Small model – 1 analog output
T3	Large model – 1 to 4 analog 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 Vac / 110-375 Vdc
1	19-58 V DC

5 Tropicalization

0	Without
1	With

6 Inputs

Voltage	Indicate direct voltage to be measured or the VT ratio
Current	Indicate direct current to be measured or the CT ratio

7 Number of analog 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 Analog 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 Analog output ratings*

0	- 20 mA to + 20 mA
1	- 5 mA to + 5 mA
2	- 1 mA to + 1 mV
3	- 10 V to + 10 V
4	- 1 V to + 1 V

* Attention: option 0 is not suitable for use with the -5 mA to +5 mA and -1 mA to +1 mA ratings. Option 3 is not suitable for use with the -1 V to +1 V rating.

To simplify the procedure when ordering you can send us the form on page 181.

FACTORY-PROGRAMMED TRIAD 2: ORDER FORM

1 - Model / Hz

☐ T1 or ☐ T3
☐ 50 Hz or ☐ 60 Hz

2 - Network

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

3 - Communication / Connection

☐ Ethernet or ☐ RS485
☐ Tropicalization
Connection diagram: TD ☐☐☐☐ cf: p.172

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	PF1 PF2 PF3 PFt	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 analog 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 - Analog 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[2]

	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[2]

	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[2]

	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[2]

	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.
(2) These values may change according to the input and output measurement ranges.

TRIADJUST 2
SOFTWARE

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

- 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

DESCRIPTION

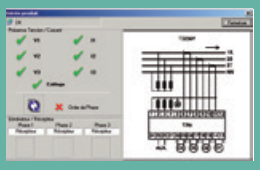
The **TRIADJUST 2** software allows quick, unlimited programming of all your TRIAD 2's parameters.

Using a PC and the optical lead supplied in each kit, connect your product's auxiliary power supply to dialog 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 analog 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.

ZOOM

Configuration
- Inputs / Outputs
- Communication
- Connection diagram
- Response time



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

Display
- Instantaneous quantities (in digital or analog form)

Recording
- In real time in exported file

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

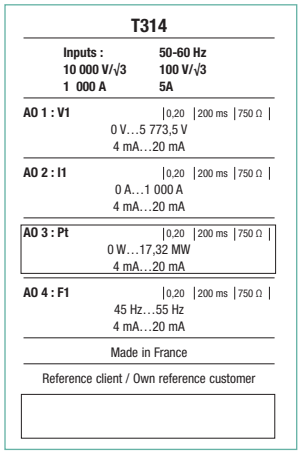
TRIADJUST 2 KIT

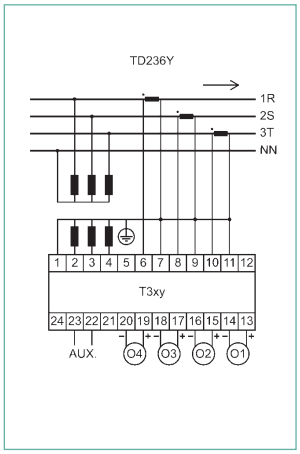
The TRIADJUST 2 configuration kit comprises:

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

LABELS

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

Accessories	Reference
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

Configurable via TRIADJUST 2

Programmable digital transducers, 1 to 4 analog outputs. Configurable accuracy class.

page 168

MICAR 2
RANGE

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

+

- Class 0.2 insulation 4 kV
- Up to 4 configurable analog 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

ZOOM

Local communication via optical head

Remote communication via Ethernet network

Simplified connection with screw-on terminal strip

ELECTRICAL SPECIFICATIONS

Voltage input	
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 input	
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
Analog 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)	1 200, 2 400, 4 800, 9 600 bauds/s (by default)
Parity	Even, odd or none
JBus addresses	1 to 247
Ethernet output	
Type	RJ45 - 8-pin
Protocol	ModBus / TCP
Speed	Compatible with 10baseT

METROLOGICAL SPECIFICATIONS

Analog outputs

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

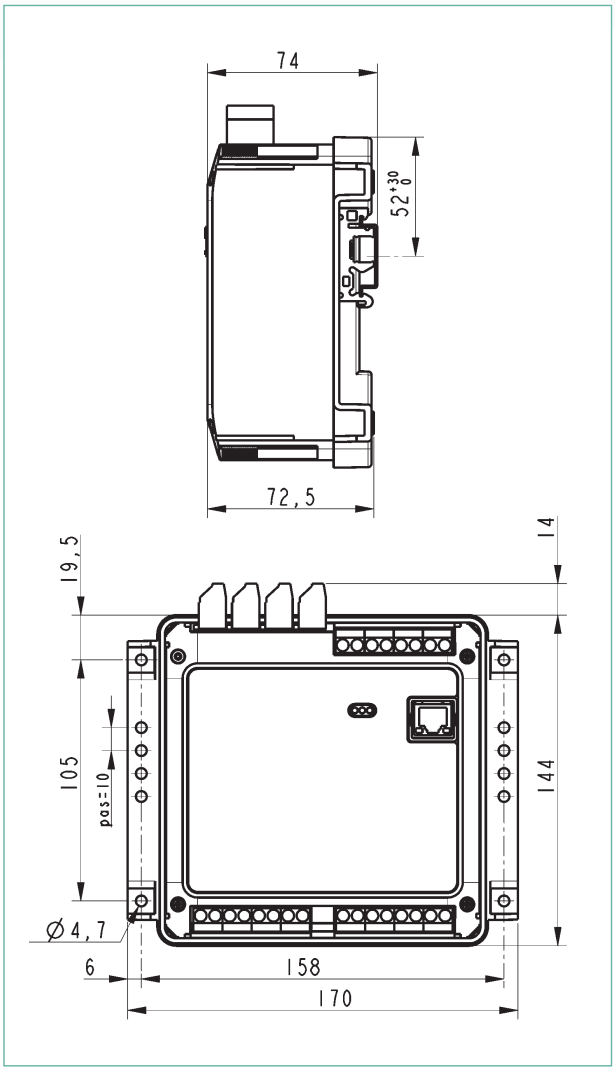
Digital communication output

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	PF between 0.5 inductive and 0.8 capacitive U between 99 % and 101 % of Un (2) I between 10 % and 130 % of In	±0.2 % of P ±0.02 % of Pn
Q	PF between 0.5 inductive and -0.5 capacitive U between 99 % and 101 % of Un (2) I between 10 % 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
PF, Cosφ	PF 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 0.5 s according to IEC 62053-22
Reactive energy	Class 2 according to IEC 62053-23
Énergie apparente	±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

Climatic specifications	
Operating temperature	10 °C to +55 °C
Operating humidity	95 % to 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

MECHANICAL SPECIFICATIONS

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

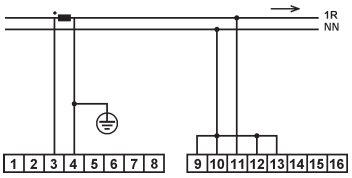
FUNCTIONS

		On-off output			
Measurements	Analog output	Alarm relay	Pulse output	Communication output	Display with E.view+
V1, V2, V3, Vearth	■	■		■	■
U12, U23, U31	■	■		■	■
I1, I2, I3, Ineutral	■	■		■	■
P1, P2, P3	■			■	■
Pt	■	■		■	■
Q1, Q2, Q3	■			■	■
Qt	■	■		■	■
S1, S2, S3	■			■	■
St	■	■		■	■
PF1, PF2, PF3	■			■	■
PFt	■	■		■	■
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			■	■	■

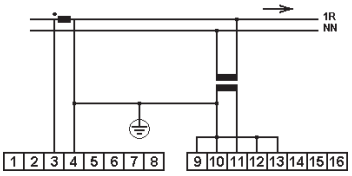
ELECTRICAL CONNECTIONS SINGLE-PHASE NETWORKS

I1, V1, P1, S1, Q1, PF1, Cosφ1, F :

TD301 configuration



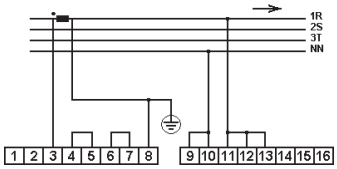
TD302 configuration



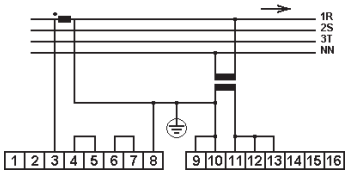
BALANCED 3-PHASE NETWORK WITH 4 WIRES

I1, I2, I3, V1, V2, V3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F :

TD303 configuration



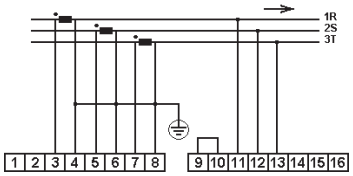
TD304 configuration



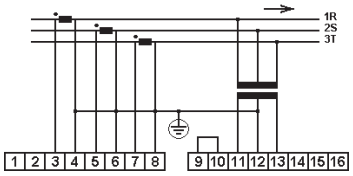
UNBALANCED 3-PHASE NETWORK WITH 3 WIRES

I1, I2, I3, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F :

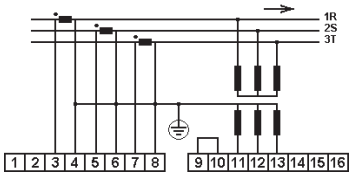
TD320 configuration



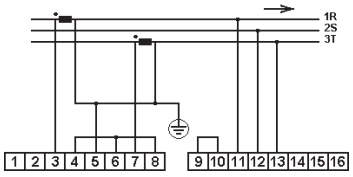
TD320D configuration



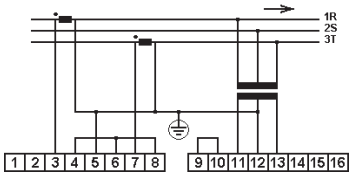
TD320Y configuration



TD324 configuration



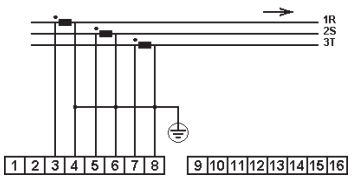
TD324D configuration



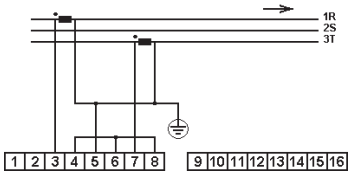
UNBALANCED 3-PHASE NETWORK WITH 4 WIRES

I1, I2, I3 :

TD322 configuration

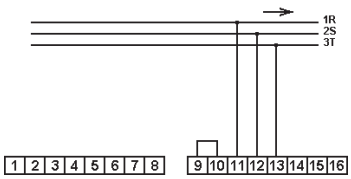


TD323 configuration

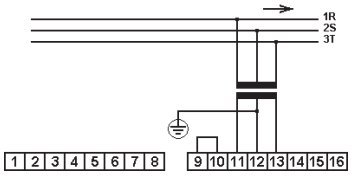


U12, U23, U31 :

TD321 configuration



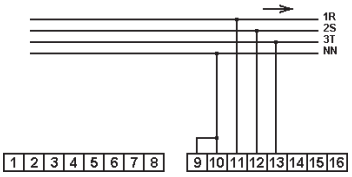
TD321D configuration



UNBALANCED 3-PHASE NETWORK WITH 4 WIRES

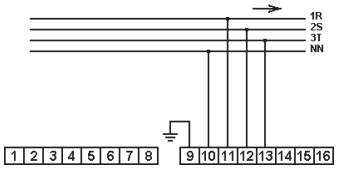
V1, V2, V3, U12, U23, U31, F :

TD317 configuration



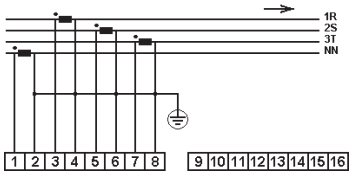
V1, V2, V3, Vearth, U12, U23, U31, F :

TD337 configuration

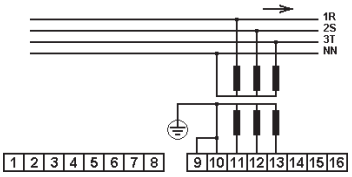


I1, I2, I3, Ineutral :

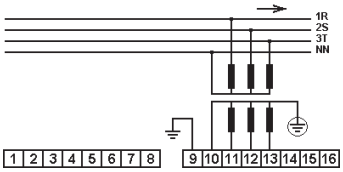
TD334 configuration



TD317Y configuration

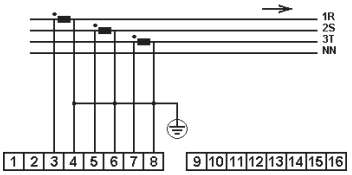


TD337Y configuration



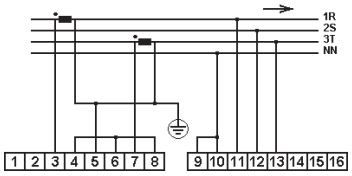
I1, I2, I3 :

TD314 configuration

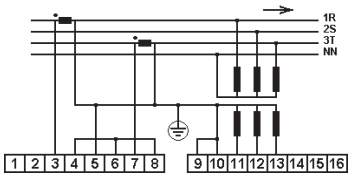


I1, I2, I3, V1, V2, V3, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, Cosφ1, Cosφ2, Cosφ3, Cosφt, F :

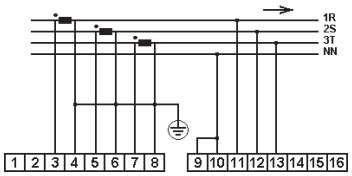
TD315 configuration



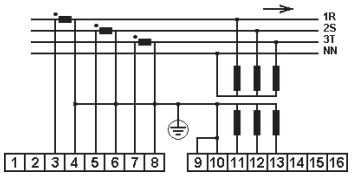
TD315Y configuration



TD318 configuration

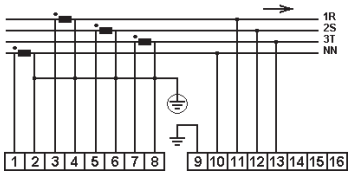


TD318Y configuration

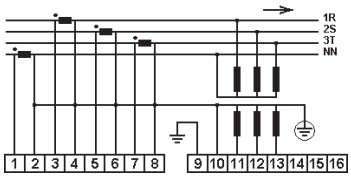


I1, I2, I3, Ineutral, V1, V2, V3, Vearth, U12, U23, U31, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, PF1, PF2, PF3, PFt, Cosφ1, Cosφ2, Coσφ3, Coσφt, F :

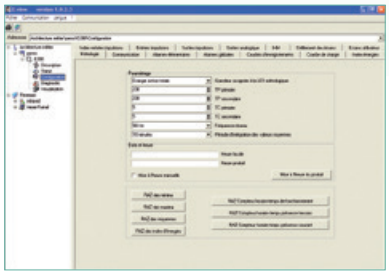
TD338 configuration



TD338Y configuration

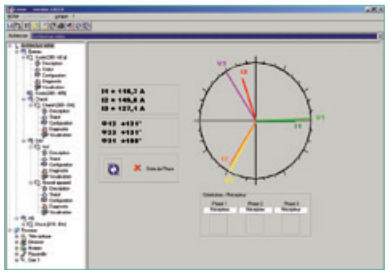


The **E.view+** software can be used with the **MICAR 2** range for configuration, installation diagnosis and display of the electrical quantities.



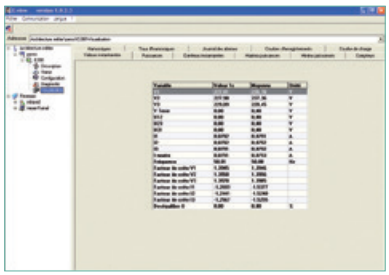
Configuration

- 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 analog and on-off outputs remotely



Display

- View the basic electrical quantities in real time
- View the harmonics in histogram format

TO ORDER

Product	Reference
MICAR with tailored configuration	Complete the order form
Programmable MICAR 2, power supply 80-264 V AC/DC, RS485, 2 analog outputs (without programming kit)	P01 330 840
Programmable MICAR 2, power supply 80-264 V AC/DC, RS485, 4 analog outputs (without programming kit)	P01 330 841

Programming kit	Reference
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*	Reference
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

Analog panel meters

Round / square barrel

For viewing an instantaneous and variable quantity.

page 234

Digital panel meters

Formats: 24 x 48
48 x 96

For displaying an analog value clearly and precisely.

page 210

Current transformers

Cable primary, busbar primary, closed core or split core, etc.

page 116

E.view+ software

Configuration, diagnostic and display software

page 61

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)
- ☐ 2 on-off outputs or
- ☐ Tropicalization
- ☐ 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	PF1 PF2 PF3 PFt	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 ☐ V

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 ☐ V

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 ☐ V

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 ☐ V

(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.

- Operation in SIL 2 environment
- Quick, simple mounting on DIN rail
- Compact design
- Universal input: RTD, TC, Ohm, mA, V and potentiometer
- Intuitive programming panel
- AC and DC power supply with wide dynamic range

DESCRIPTION

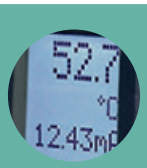
The **C.A 3420** can be used to convert any input signal into a stable, standardized low-level DC voltage or current signal : temperatures from thermocouples or thermometric resistors, linear resistances from potentiometers, voltages (mVdc et Vdc) and currents (mAdc) for DC networks.

When used with the C.A 3401 programming panel, the **C.A 3420** transducer is particularly flexible, covering more than a hundred industrial applications.

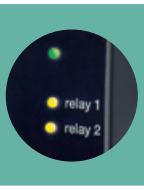
Usable in installations rated SIL 2 (Safety Integrity Level), the **C.A 3420** guarantees high reliability and safety:

- 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)

ZOOM


LCD screen for easy reading


Plug-in C.A 3401 programming panel



LED operating status indicators

TECHNICAL SPECIFICATIONS

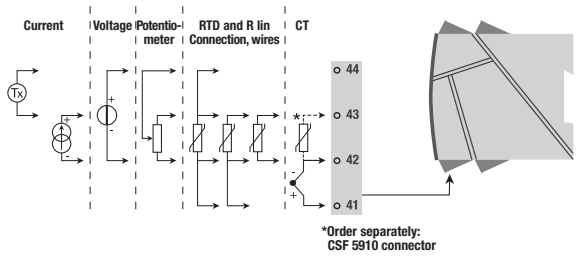
Input	
mA input	0/4…20 mA
V input	0/0.2…1V ; 0/1…5V ; 0/2…10V
RTD	2, 3 and 4 wires Pt10…Pt100…Pt1000 Ni50…Ni1000 Cu10…Cu100
Thermocouple types	B, E, J, K, L, N, R, S, T, U, W3, W5, LR
Potentiometer	10 Ω… 100 kΩ
Linear resistance	0 Ω… 10 kΩ
Outputs	
2 relay outputs	250 VRMS / 2 A
mA output	0/4…20 mA (max. 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

TO ORDER

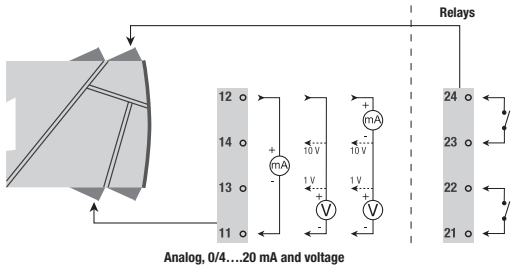
Model	Reference
C.A 3420 transducer pack + C.A 3401 front panel	P01676020
Compensated cold-junction connector for thermocouple	P01672301

CONNECTION DIAGRAMS

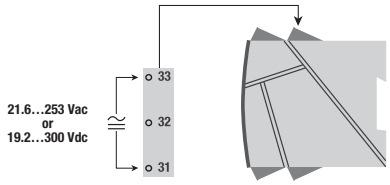
Input signals



Output signals



Power supply



ASSOCIATED PRODUCTS

Analog panel meters

Round / square barrel

For viewing an instantaneous and variable quantity.

page 234

Digital panel meters

Formats: 24 x 48
48 x 96

For displaying an analog value clearly and precisely.

page 210

Current transformers

Cable primary, busbar primary, closed core or split core, etc.

page 116

Thermocouple / probe

See Pyrocontrole Catalog

T82N
RANGE

Nuclear environments.
Analog transducers for AC electrical quantities, class 0.5.

DESCRIPTION

The **T82N** models measure an AC electrical quantity and convert it into a standardized, low-level DC current or voltage signal (e.g. 4...20 mA).

They are normally used in conjunction with analog or digital measuring instruments (panel meters, recorders, etc.), centralized supervision systems (PLCs, SCADA, building management automation systems, etc.) and are also incorporated in measurement and control loops.

+

- Ideal for the requirements of the nuclear market
- Plate-mounted and plug-in versions
- Configurable on request: Input quantities, transfer curve, output signal, etc.

ZOOM

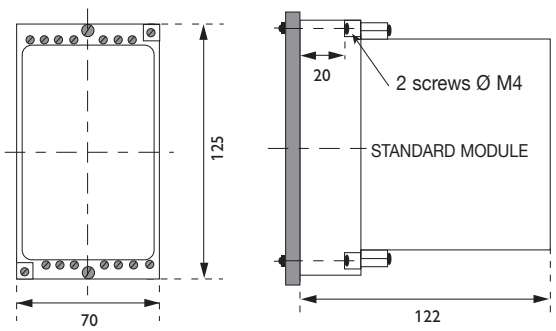
Plug-in version with special socket for plate mounting or DIN rail mounting

ELECTRICAL SPECIFICATIONS

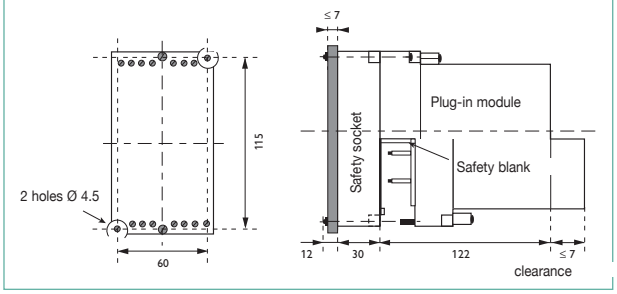
- **Inputs**
  - Short-term overload:
    U input: 2 Un during 1s repeated 10 times
    I input: 20 In during 1s repeated 10 times
  - DC overload :
    U input: 1.2 Un
    I input: 1.2 Un
  - Frequency:
    50 Hz (45….55 Hz)
    60 Hz (55….65 Hz)
- **Analog output**
  - Accuracy: class 0.5 according to IEC 60688 April 2013
  - Response time: 120 ms to 260 ms at 95 % of output current
  - Current output operating resistance: 20 V / Is
  - Influence of operating resistance: ± 0.1 % from 0 Ω to max. operating resistance
  - Peak-to-peak ripple: 0,2 à 0,4 %
- **Auxiliary power supply**
  - Operating range:
    ± 10 % from 100/√3 Vac to 440 Vac
    ± 20 % from 24 to 125 Vdc
  - Consumption :
    ≤ 3 VA from 100/√3 to 440 Vac
    ≤ 3 W from 24 to 125 Vdc

DIMENSION (IN MM)

T82N plate-mounting module



T82N plug-in module



REFERENCE STANDARDS

- **Electromagnetic compatibility:** 2014/30/CE(CEM)
  IEC 61326-1 (07/2013)
- **Safety:** 2006/95/CE
  IEC 61010-1 (01/2011)
- **Metrological:** IEC 60688 (04/2013)
- **Climatic:** IEC 60688 (04/2013)
- **Mechanical:** IEC 60068-2-6 (04/2008)
  IEC 60068-2-27 (07/2009)

OPERATING ENVIRONMENT

- **Operating temperature:** -10 to +60 °C
- **Operating humidity:** Up to 95 % at 45 °C
- **Storage temperature:** -25 to +70 °C

CASINGS

- **Screw connection** terminals, 2 x 2.5 mm² or 1 x 6 mm²
- **IP20 protection** rating as per IEC 60529
- **Weight:** 0.60 to 0.85 kg (Socket: 0.25 kg)

MOUNTING ACCESSORIES

- Connection socket for plug-in module

	Socket	
Model	**Type**	**Reference**
UAR 1210B	5	EMBB 4005
IAR 1210B	4	EMBB 4004
PAR 1232B	3	EMBB 4003
QAR 1232B	3	EMBB 4003

- Mounting on DIN rail for plate-mounting or plug-in module

Model	**Reference**
Mounting on symmetrical DIN rail	PDIN SYME
Mounting on asymmetrical DIN rail	PDIN ASYM

ELECTRICAL CONNECTIONS

See document MS 0/1-7343.

Vac

RMS AC VOLTAGE

Model		UAR 1210 B
Transfer curve		
Linear		■
Module		
Fixed / plate-mounting		0.7 kg
Measurement input		
Voltage Un		Direct or on VT: "100/√3" "110/√3" "115/√3" "120/√3" "132/√3" "90" "100" "110" "115" "120" "127" "132" "138" "180" "220" "250" "300" "360" "380 Vac
Frequency Fn		50 Hz ±5 Hz and 60 Hz ±5 Hz
Measurement range 0…Xmax		0…1.25 Un
Consumption		1kΩ/ V or 0.4 VA at 400 Vac
Analog output		
Current	**0…Ymax**	"0/1 mA" "0/2.5 mA" "0/5 mA" "0/10 mA" "0/20 mA"
	Ymin…Ymax	"1/5 mA" "2/10 mA" "4/20 mA"
Voltage	**0…Ymax**	"0/1 V" "0/5 V" "0/10 V"
	Ymin…Ymax	"1/5 V" "2/10 V"
Accuracy		0.5 %
Auxiliary supply		
Alternating current		"100/√3 Vac" "110/√3 Vac" "115/√3 Vac" "100 Vac" "110 Vac" "115 Vac" "127 Vac" "220 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac" "440 Vac"
Direct current		"24 Vdc" "48 Vdc" "110 Vdc" "125 Vdc"
Module protection rating		
Plate-mounting		IP20

CUSTOMIZED PRODUCT

	Model	Module	Direct Un or on VT	Measurement range	Fn	Analog output	Auxiliary supply	Protection	Tropicalization
Example	UAR 1210 B	Fixed	Direct 100 Vac	0…120 Vac	50 Hz	4-20 mA	220 Vac	IP 20	☑

ASSOCIATED PRODUCTS

Normeurope analog panel meters

Round / square barrel

For viewing an instantaneous and variable quantity.

page 250

Sockets

For plug-in modules

page 197

Mounting on DIN rail

Plate-mounting or plug-in

page 197

Iac

RMS AC VOLTAGE

Model		IAR 1210 B
Transfer curve		
Linear		■
Module		
Fixed / plate-mounting		0.7 kg
Measurement input		
Current In		Direct or on CT: "0.5" "0.6" "1" "1.2" "1.3" "1.5" "2.5" "5" "6" "6.5" "7" "7.5" "10"
Frequency Fn		50 Hz ±5 Hz and 60 Hz ±5 Hz
Measurement range 0…Xmax		0 to In and 0 to 1.3 In if CT present
Consumption		≤ 0.2 VA
Analog output		
Current	**0…Ymax**	"0/1 mA" "0/2.5 mA" "0/5 mA" "0/10 mA" "0/20 mA"
	Ymin…Ymax	"1/5 mA" "2/10 mA" "4/20 mA"
Voltage	**0…Ymax**	"0/1 V" "0/5 V" "0/10 V"
	Ymin…Ymax	"1/5 V" "2/10 V"
Accuracy		0.5 %
Auxiliary supply		
Alternating current		"100/√3 Vac" "110/√3 Vac" "115/√3 Vac" "100 Vac" "110 Vac" "115 Vac" "127 Vac" "220 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac" "440 Vac"
Direct current		"24 Vdc" "48 Vdc" "110 Vdc" "125 Vdc"
Module protection rating		
Fixed / plate-mounting		IP20

CUSTOMIZED PRODUCT

	Model	Module	Direct In or on CT	Measurement range	Fn	Analog output	Auxiliary supply	Protection	Tropicalization
Example	IAR 1210 B	Fixed	1 000 / 5 A	0…1 300 A	50 Hz	4…20 mA	48 Vdc	IP 20	☑

ASSOCIATED PRODUCTS

Normeurope analog panel meters

Round / square barrel

For viewing an instantaneous and variable quantity.

page 250

Sockets

For plug-in modules

page 197

Mounting on DIN rail

Plate-mounting or plug-in

page 197

P

ACTIVE POWER

Model		PAR 1232 B
Network + connections		
Balanced three-phase - 3 wires		■
Unbalanced three-phase - 3 / 4 wires		■
Transfer curve		
Linear		■
Module		
Fixed / plate-mounting		0.85 kg
Measurement input		
Current In		Direct or on CT: "1" "5"
Ph-N voltage Un		Direct ou sur VT "57.73" "63.51" "66.4" "230"
Ph-Ph voltage Un		Direct or on VT: "100" "110" "115" "120" "127" "230" "240" "380" "400"
Frequency Fn		50 Hz ±5 Hz and 60 Hz ±5 Hz
Measurement range 0…Xmax		±1.35 ≥Sn(1) ≥ ±0.50
Consumption		I input: ≤ 0.2 VA ; U input: ≥ 500 Ω/ V
Analog output		
Current	**0…Ymax**	"0/1 mA" "0/2.5 mA" "0/5 mA" "0/10 mA" "0/20 mA"
	Ymin…Ymax	"1/5 mA" "2/10 mA" "4/20 mA" "1/3/5 mA" "2/6/10 mA" "4/12/20 mA" "-1/0/1 mA" "-2.5/0/2.5 mA" "-5/0/5 mA" "-10/0/10 mA" "-20/0/20 mA
Voltage	**0…Ymax**	"0/1 V" "0/5 V" "0/10 V"
	Ymin…Ymax	"1/5V" "2/10V" "-1/0/1V" "-5/0/5V" "-10/0/10 V
Accuracy		0.5 %
Auxiliary supply		
Alternating current		"100/√3 Vac" "110/√3 Vac" "115/√3 Vac" "100 Vac" "110 Vac" "115 Vac" "127 Vac" "220 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac" "440 Vac"
Direct current		"24 Vdc" "48 Vdc" "110 Vdc" "125 Vdc"
Self-powered		For voltages "100 Vac" "110 Vac" "115 Vac" "120 Vac" " 127 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac"
Module protection rating		
Fixed / plate-mounting		IP20

(1) Sn = √ x I x cos φ (single-phase network) Sn = 3 x √ x I x cos φ (Balanced three-phase, Unbalanced three-phase 4 wires)
Sn = √3 x U x I x cos φ (Balanced three-phase, Unbalanced three-phase 3 wires)

Parameters to be specified when ordering

CUSTOMIZED PRODUCT

	Model	Network	Module	Direct In or on CT	Direct Un or on VT	Measurement range	Fn	Analog output	Auxiliary supply	Protection	Tropicalization
Example	PAR 1232 B	Unbal. 3ph 4 wires	Fixed	TC 1000/5 A	TT 20 kV/100 V	0…2.77 MW	50 Hz	4…20 mA	220 Vac	IP 20	☑

ASSOCIATED PRODUCTS

Normeurope analog panel meters
Round / square barrel
For viewing an instantaneous and variable quantity.
page 250

Sockets
For plug-in modules
page 197

Mounting on DIN rail
Plate-mounting or plug-in
page 197

Q

REACTIVE POWER

Model		QAR 1232 B
Network + connections		
Unbalanced three-phase - 3 / 4 wires		■
Transfer curve		
Linear		■
Module		
Fixed / plate-mounting		0.85 kg
Measurement input		
Current In		Direct or on CT: "1" "5"
Ph-N voltage Un		Direct or on VT "57.73" "63.51" "66.4" "230"
Ph-Ph voltage Un		Direct or on VT "100" "110" "115" "120" "127" "230" "240" "380" "400"
Frequency Fn		50 Hz ±5 Hz and 60 Hz ±5 Hz
Measurement range 0…Xmax		±1.35 ≥Sn(1) ≥ ±0.50
Consumption		I input: ≤ 0.2 VA ; U input: ≥ 500 Ω/ V
Analog output		
Current	**0…Ymax**	"0/1 mA" "0/2.5 mA" "0/5 mA" "0/10 mA" "0/20 mA"
	Ymin…Ymax	"1/5 mA" "2/10 mA" "4/20 mA" "1/3/5 mA" "2/6/10 mA" "4/12/20 mA" "-1/0/1 mA" "-2.5/0/2.5 mA" "-5/0/5 mA" "-10/0/10 mA" "-20/0/20 mA
Voltage	**0…Ymax**	"0/1 V" "0/5 V" "0/10 V"
	Ymin…Ymax	"1/5V" "2/10V" "-1/0/1V" "-5/0/5V" "-10/0/10 V
Accuracy		0.5 %
Auxiliary supply		
Alternating current		"100/√3 Vac" "110/√3 Vac" "115/√3 Vac" "100 Vac" "110 Vac" "115 Vac" "127 Vac" "220 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac" "440 Vac"
Direct current		"24 Vdc" "48 Vdc" "110 Vdc" "125 Vdc"
Self-powered		For voltages "100 Vac" "110 Vac" "115 Vac" "120 Vac" " 127 Vac" "230 Vac" "240 Vac" "380 Vac" "400 Vac"
Module protection rating		
Fixed / plate-mounting		IP20

(1) Sn = √ x I x cos φ (single-phase network) Sn = 3 x √ x I x cos φ (Balanced three-phase, Unbalanced three-phase 4 wires)
Sn = √3 x U x I x cos φ (Balanced three-phase, Unbalanced three-phase 3 wires)

Parameters to be specified when ordering

CUSTOMIZED PRODUCT

	Model	Network	Module	Direct In or on CT	Direct Un or on VT	Measurement range	Fn	Analog output	Auxiliary supply	Protection	Tropicalization
Example	QAR 1232 B	Unbal. 3ph 4 wires	Fixed	TC 1000/5 A	TT 20 kV/100 V	0…2.77 MW	50 Hz	4…20 mA	220 Vac	IP 20	☑

ASSOCIATED PRODUCTS

Normeurope analog panel meters

Round / square barrel

For viewing an instantaneous and variable quantity.

page 250

Sockets

For plug-in modules

page 197

Mounting on DIN rail

Plate-mounting or plug-in

page 197

TSP 2
RANGE

Self-powered transducers designed
to convert an AC current or an AC voltage.
1 analog output.
Class 0.2 - For all types of electrical network.

MAIN SPECIFICATIONS

TSPU

Quantities measured: Vac, Uac

Accuracy: Class 0.2

Inputs: AC voltage: 57.5 V to 400 V (fixed ratings)

Analog output ratings: 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 ratings)

Analog output ratings: 0-10 mA, 0-20 mA

Operating frequency: 45 to 65 Hz

+
- Self-powered
- Wide choice of output ratings
- Response time of 100 ms for TSPI and 200 ms for TSPU

ZOOM

Accessibility and safety:
large-dimension terminals
Insulated circuits

Ergonomic: easy mounting on DIN rail or switchboard

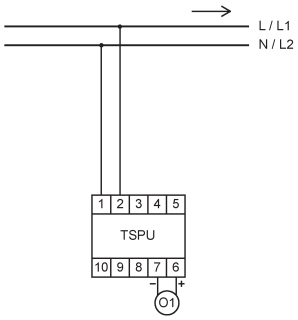
FUNCTIONS

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

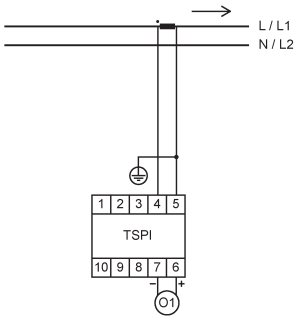
TSPU

TD002



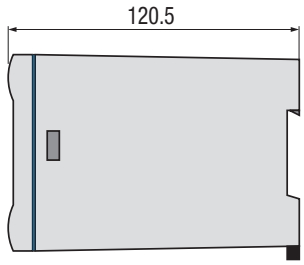
TSPI

TD001

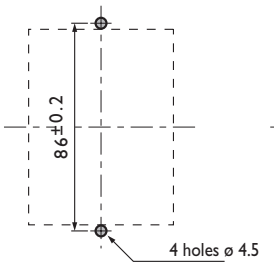


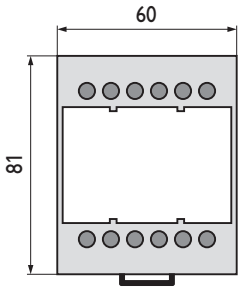
Terminal 1 can be connected either on the neutral or on one phase of the electrical network

DIMENSIONS (IN MM)

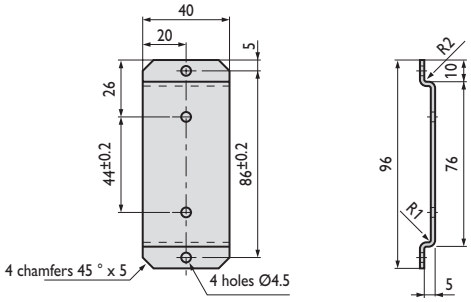


Panel drilling diagram for plate mounting





Accessory for plate mounting with screw (option)



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 single-wire 6 mm² conductors or 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
Analog 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 0.5: 10…100 % of In	Class 0.5 : 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	
		without	with
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	
		without	with
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…20 mA**	P01 3752 06	P01 3752 38
0…69,3 V	**0…10 mA**	P01 3752 09	P01 3752 41
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	
		without	with
0…110 V	**0…10 mA**	P01 3752 17	P01 3752 49
0…120 V	**0…10 mA**	P01 3752 21	P01 3752 53
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

ELINK 61850

IEC 61850 network communication gateway for TRIAD 2 transducers and ENERIUM power monitors.

- Communication
  - IEC 61850 server – Edition 2
  - Modbus RS485 master
- Invisible: TRIAD 2 and ENERIUM seen as native products
- Simple implementation via web pages
- High-performance: up to 20 slave units

DNV·GL
DNV KEMA is now DNV GL

DESCRIPTION

The ELINK 61850 network gateway enables communication between ENERIUM power monitors and TRIAD 2 transducers via the IEC 61850 protocol.
In this way, the ENERIUM and TRIAD products can be seen as native IEC 61850 products by any IEC 61850 supervision system or SCADA / RTU client PLC.

- **Independent:** ELINK 61850 allows IEC 61850 communication without calling your choice or qualification of an Enerdis measurement solution into question
- **Installation upgrading:** ELINK 61850 interfaces with equipment already in place and allows you to modernize your installation to transition towards digital stations
- **Complete:** All the electrical measurements from the Enerdis measuring equipment are carried by the IEC 61850 communication protocol:
  - Instantaneous measurements for TRIAD 2
  - Instantaneous measurements, min/max/avg, energy and energy quality for ENERIUM
- **Customizable:** the teams at Enerdis respond quickly to offer solutions allowing you to adapt ELINK 61850 to fit your configurations

ZOOM


IEC 61850 server Ethernet port


2 x RS485 ports (Modbus/jbus RTU) in master mode

ELECTRICAL SPECIFICATIONS

Auxiliary power supply	
AC network	80 to 265 Vac - 10 VA / 42.5 to 69 Hz
DC network	80 to 265 Vdc - 7 W
Outputs	
Power reserve	2.5 seconds at 230 Vac

COMMUNICATION

IEC 61850 protocol	
Parts	IEC 61850-1, IEC 61850-5, IEC 61850-7
Logical nodes supported	MMXU, MMXN, MSTA, MMTR (Triad2/Enerium) MHAI, MHAN (Enerium)
Ethernet port	RJ45 - 8 contacts / 10 - 100 baseT
RS485A and RS485B ports	Type : Independent RS485 - 2 isolated wires Protocol: Modbus RTU mode Operation: Master mode Half-duplex speed: 300 to 115,200 bauds

MECHANICAL SPECIFICATIONS

Weight	560 g
Mounting	On DIN rail
Connection **Cable cross-sections**	Screw terminal block 6 mm² single-strand wire- 4 mm² multi-strand wire
Dimensions	120.5 x 120 x 81 mm (W x L x H)

ENVIRONMENTAL CONSTRAINTS

Operating temperature	-10 °C to +55 °C
Storage temperature	-25 °C to +70 °C
Ingress protection	IP20
Pollution degree	2
Installation category	III
Safety standard	IEC 61010
Electromagnetic standards	IEC 61000-4-2/3/4/5/6/8/11/12/18 - CISPR22 IEC 61000-6-5 (Zone 2)

ELECTRICAL CONNECTIONS

IEC 61850

RJ45 Ethernet port
10/100 Base T

Auxiliary power supply
80-265 Vac / 10 VA : 42.5 … 69 Hz
80 - 265 Vdc / 7 W

RS485 A port
ModBus master

RS485 B port
ModBus master

TO ORDER

Model	Reference
ELINK 61850	P01 3808 50

ASSOCIATED PRODUCTS

TRIAD 2
Digital transducers
1 to 4 analog outputs.
Class 0.1.
page 168

ENERIUM
Power meters
Multi-energy, qualimetry.
page 48


189999

NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

PANEL METERS AND SYNCHROCOUPLER

DIGITAL PANEL METERS AND SYNCHROCOUPLER

µDIGI1 and µDIGI2 ranges

µDIGI1

24 x 48 mm-format programmable panel meters for industrial use.

page 214

µDIGI2

48 x 96 mm-format programmable panel meters for industrial user.

page 218

C.A 2150 and C.A 2200 ranges

C.A 2150

48 x 96 mm-format programmable digital panel meters for all types of industrial applications.

page 222

C.A 2200

48 x 96 mm-format programmable digital panel meters for universal use.

page 226

Synchronization unit

Synchrocoupler

Synchronization units for LV networks.

page 230

SELECTION GUIDE

		µDIGI1 & µDIGI2 ranges		C.A 2150 & C.A 2200 ranges	
		page 214	page 218	page 222	page 226
					
		µDIGI1	**µDIGI2**	**C.A 2150**	**C.A 2200**
Format of front panel		24 x 48	48 x 96	48 x 96	48 x 96
Display range (counts)		-1,999 / +9,999	-1,999 / +9,999	-19,999 / +19,999	-32,000 / +32,000
Measurement functions	**AC ammeter**	µDIGI1 E	µDIGI2 E	C.A 2150-E	
	AC voltmeter	µDIGI1 E	µDIGI2 E	C.A 2150-E	
	Frequencymeter	µDIGI1 F		C.A 2150-D	C.A 2200-D
	DC ammeter	µDIGI1 E	µDIGI2 E	C.A 2150-E	
	DC voltmeter	µDIGI1 E	µDIGI2 E	C.A 2150-E	
	Process signals	µDIGI P/LP	µDIGI2 P	C.A 2150-M	C.A 2200-P
	Thermocouple thermometer	µDIGI1 T	µDIGI2 P	C.A 2150-M	C.A 2200-T
	Pt 100 thermometer	µDIGI1 T	µDIGI2 P	C.A 2150-M	C.A 2200-T
	Ohmmeter		µDIGI2 P		
	Tachometer	µDIGI1 F	µDIGI2 TAC	C.A 2150-D	C.A 2200-D
	Meter			C.A 2150-D	C.A 2200-D
	Timer			C.A 2150-D	C.A 2200-D
	Load cell			C.A 2150-M	C.A 2200-C
	Potentiometer		µDIGI2 P	C.A 2150-M	C.A 2200-P
Special functions	**MIN/MAX**	µDIGI1 ALP		C.A 2150-E/D/M	C.A 2200-D/P/T/C
Output(s)	**Analog output**			Option	Option
	RS232 output			Option	Option
	RS485 output	µDIGI1 ALP		Option	Option
	Threshold output(s)		Option	Option	Option
	BCD output				Option
User-programmable					
Strengths		Economical programmable range for industrial use.		Programmable range for universal use.	

INFO & ADVICE

Digital panel meters are used to display an analog 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 permanent instability of the low-weighted displays (units) on the panel meter.

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.

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, ratings and outputs are increasingly equipped with digital interfaces (RS232, RS485) for remote communication, analog 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.

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 analog panel meters, which are suitable for both indoor and outdoor use). They must also support emissions induced and emitted by the electrical equipment.

Maintenance

Unlike the analog 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

µDIGI 1
RANGE

24 x 48 mm programmable panel meters
for industrial use.

+
- 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

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.

ZOOM

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

µDIGI 1-LP

4-20mA process signal

- **Input:** 4-20 mA
- **Display range:** -1,999… 9,999

TO ORDER

Power supply	Reference
Self-powered (active loop)	P01 330 000

µDIGI 1-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

TO ORDER

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 041
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 042

µDIGI 1-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

TO ORDER

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 031
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 032

µDIGI 1-F

Frequency, rpm, pulse

- **Frequency meter:**
  0.01 Hz… 7 KHz (voltage 10 to 600 Vac)
- **Tachometer:**
  Magnetic
  Vin > 30 mV rms (60Hz)
  Vin > 300 mV rms (6kHz)

  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 = 5V (internal)
  Rc = 3.9 kΩ (internal)
  Fc = 20 Hz
- **Display range:** 0… 9,999

TO ORDER

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 021
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 022

µDIGI 1-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)
  40 Hz… 1 KHz
- **Display range:**
  -1,999… 9,999 (dc)
  0… 9,999 (ac)

TO ORDER

Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 011
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 012

µDIGI 1-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**

TO ORDER

Power supply	Option	Reference
85 - 265 Vac & 100 - 300 Vdc		P01 330 051
22 - 53 Vac & 10.5 - 70 Vdc		P01 330 051
85 - 265 Vac & 100 - 300 Vdc	RS485	P01 330 061
22 - 53 Vac & 10.5 - 70 Vdc	RS485	P01 330 062

ASSOCIATED PRODUCTS

Current transformers & shunts
Tertiary, industrial, tariff
5 to 5,000 A.
page 116

Tachometric sensor
Please contact us

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

Thermocouple / probe
See Pyrocontrole Catalog

DISPLAY

	µDIGI1-LP	µDIGI1-P	µDIGI1-E	µDIGI1-T	µDIGI1-F	µDIGI1-ALP
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	±0.1 % +3 counts
µDIGI1-P	
µDIGI1-E	±0.2 % +3 counts - ±0.4 % +4 counts for 100 V/Aac inputs
µDIGI1-T	**Pt100** °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

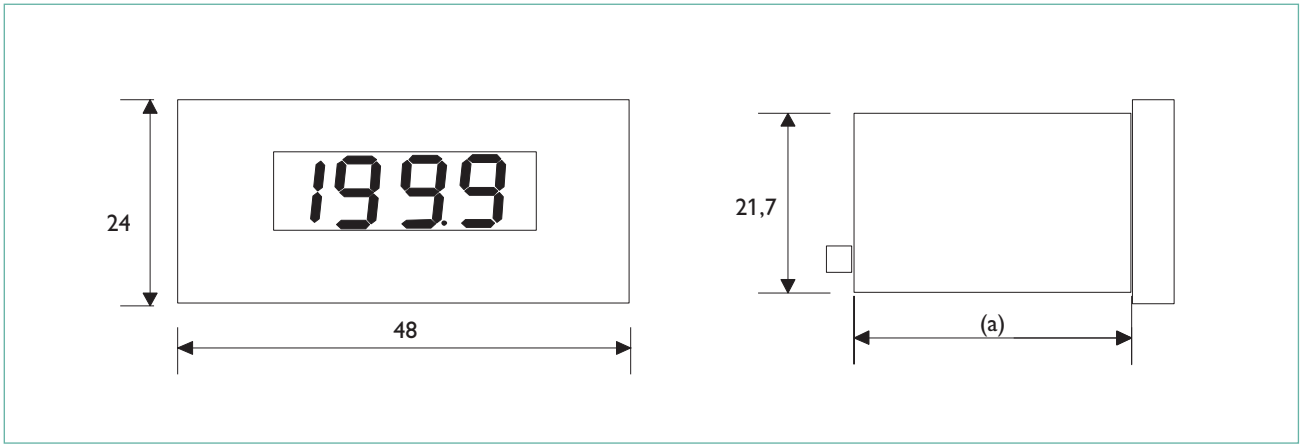
POWER SUPPLY

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 (< 3W for µDIGI1-ALP)

STANDARDS

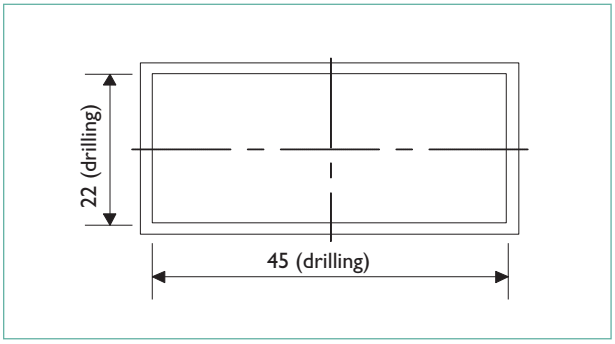
Insulation – dielectric strength: EN 611010-1 (category II installation)
EMC – immunity/emission: EN 61000-4-2, EN 61000-4-3, EN 61000-4-4 / EN 55022
(EN 610000-4-6 for µDIGI1-LP and µDIGI1-ALP – EN 61000-4-5 and EN 61000-4-11 for µDIGI1-ALP)

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)



µDIGI2
RANGE

Programmable panel meters in 48 x 96 mm format for industrial applications.

- Economical single-function range
- Instant fitting without tools

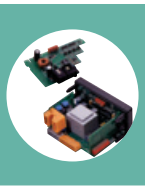
DESCRIPTION

- Display on 4 digits
- MIN/MAX values stored
- Power supply with large dynamic range
- Programming on front panel

ZOOM

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 BOARD

	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

TO ORDER

Supply	Reference
20/265 Vac - 11/265 Vdc	P01 330 081

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

TO ORDER

Supply	Reference
20/265 Vac - 11/265 Vdc	P01 330 080

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

CONSULT US

ASSOCIATED PRODUCTS

Accessories and option boards
Mounting, alarm board
page 218

Current transformers & shunts
Tertiary, industrial, tariff
5 to 5,000 A.
page 116

Tachometric sensor
Please contact us

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

Thermocouple / probe
See Pyrocontrole Catalog

DISPLAY

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

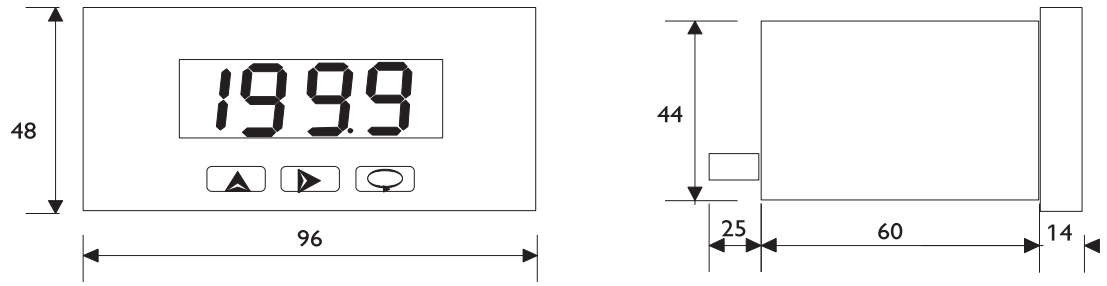
POWER SUPPLY

Voltage	20/265 Vac - 50/60 Hz – 11/265 Vdc
Consumption	3 VA/3 W

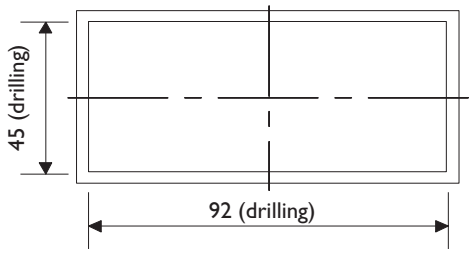
STANDARD

Low voltage directive 73/23/CEE
Insulation - dielectric strength IEC 61010-1

DIMENSIONS (IN MM)



PANEL DRILLING SPECIFICATIONS (IN MM)



C.A 2150
RANGE

48 x 96 mm programmable digital panel meters for all types of industrial applications.

- Multi-function products
- 3 display colours
- 4 alarms as standard
- Instant mounting without tools
- Serial link for remote processing of the measurements
- RS232 or RS485

DESCRIPTION

The **C.A 2150-E** is a 4-in-1 programmable panel meter which can be configured for TRMS Vac or Iac signals and Vdc or Idc signals.

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 configuration software, available free of charge from www.enerdis.com, can be used to read the measurement directly, and to 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.

ZOOM

3 display colours

Quick connection using plug-in connectors (spring-cage type)

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 AL 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

* Extra boards (addition or replacement)

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 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:** Vin > 120 mVeff
- **NAMUR sensor:**
  -50...+800 °C / -58...+1,472 °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 1CO relays	4 x 1CO relays	4 NPN optocouplers
Max. voltage	250 Vac or 12 Vdc	250 Vac or 50 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	RS232	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)

Analog 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
Max. load	> 500 Ω	< 800 Ω

DISPLAY

	C.A 2150-E	C.A 2150-M			C.A 2150-D		
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
Protection rating	IP 65 on front panel
Mounting	On panel using self-locking strap
Weight	C.A 2150-D: 160 g C.A 2150-E: 135 g C.A 2150-M: 160 g

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

Universal	85 - 265 Vac / 100 - 300 Vdc
Low voltage	10.5 - 70 Vdc / 22 - 53 Vac
Consumption	5 W without option, 8 W max.

ACCURACY

		Process / Load / Ω	Temperature	Freq. / Tacho.	Meter
Max. error on reading	**Vac: ± 0.30 % R** **Iac: ± 0.30 % R** **Vdc: ± 0.05 % R** **Idc: ± 0.10 % R**	± 0.1 % R + 1 digit	TC ± 0.4 % R ± 0.6 °C ± 0.4 % R ± 1 °F Pt100 ± 0.2 % R ± 0.6 °C ± 0.2 % R ± 1 °F	0.005 % R	0.01 % R
Resolution	**2 V rating: 0.1 mV** **20 V rating: 1 mV** **200 V rating: 10 mV** **600 V rating: 10 mV** **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	

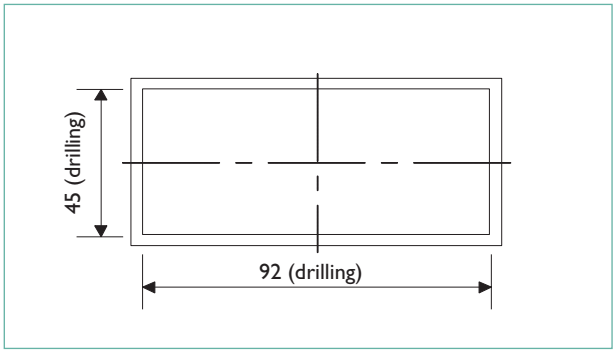
SPECIAL FUNCTIONS

- Reset to factory configuration
- Change of display colour
- Total or partial locking of programming by code
- Display with 2 levels of brightness

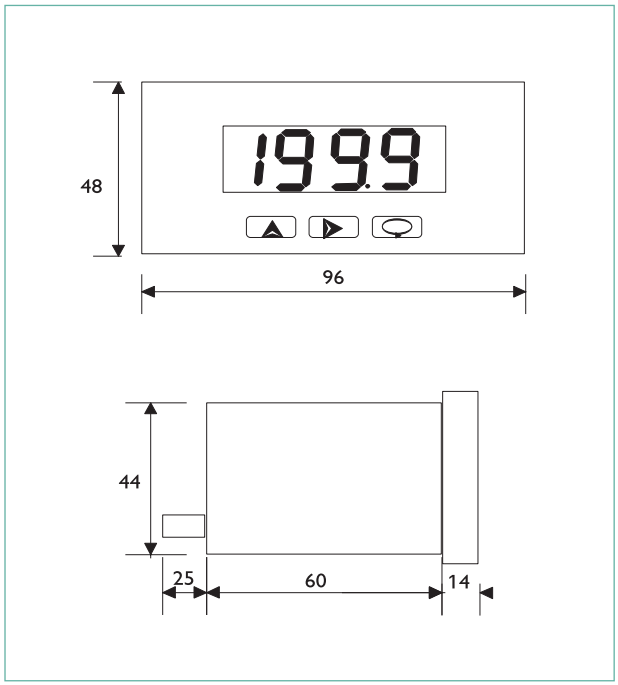
STANDARDS

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

PANEL DRILLING SPECIFICATIONS (IN MM)



DIMENSIONS (IN MM)



CUSTOMIZED PRODUCT

Model			Auxiliary power supply	Alarm		Analog output			Digital communication		
C.A 2150-E	C.A 2150-M	C.A 2150-D	**1:** 85-265 Vac & 100-300 Vdc	**X:** None	**1:** 2 relays	**X:** None	**1:** 4-20 mA	**2:** 0-10 V	**X:** None	**1:** RS 232	**2:** RS 435
			2: 22-53 Vac & 10.5-70 Vdc	**2:** 4 relays	**3:** 4 transistors						
Example	C.A 2150-M		1	X		1			1		

TO ORDER

Power supply	C.A 2150-E	C.A 2150-M	C.A 2150-D
85 - 65 Vac / 100 - 300 Vdc	P01308005	P01308001	P01308003
22 - 53 Vac / 10.5 - 70 Vdc	P01308006	P01308002	P01308004

ASSOCIATED PRODUCTS

Accessories and option boards
Mounting, alarm board
page 218

Current transformers & shunts
Tertiary, industrial, tariff
5 to 5,000 A.
page 116

Tachometric sensor
Please contact us

PYRO CONTROLE
CHAUVIN ARNOUX GROUP

Thermocouple / probe
See Pyrocontrole Catalog

C.A 2200
RANGE

48 x 96 mm programmable digital panel meters for universal use.

- Recording of maximum and minimum values of input variable
- Serial link for remote processing of measurements
- Linearization of input signal over 11 segments

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.

ZOOM


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

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 AL 4 NPN board	P01 3193 04
C.A 2200 analog 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

* Extra boards (addition or replacement)

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 / -3 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:** -10 to 800 °C / -148 to 1,472 °F

C.A 2200-D

Frequency meter / Tachometer / Meter / 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 PRODUCT

	Model		Auxiliary power supply			Alarm		Analog output	Digital communication	
	C.A 2200-P	C.A 2200-C	**1:** 115/230 Vac	**3:** 24/48 Vac	**5:** 10/30 Vac	**X:** without	**1:** 2 relays	**X :** without	**X:** without	**2:** RS232
	C.A 2200-T	C.A 2200-D				**2:** 4 relays	**3:** 4 transistors	**1 :** 0-10 V/4-20 mA	**3:** RS485	**4:** BCD
Example	C.A 2200-P		1			X		X	3	

* Choice of the BCD output cancels the alarm and analog outputs

ASSOCIATED PRODUCTS

Accessories and option boards
Mounting, alarm board
page 218

Current transformers & shunts
Tertiary, industrial, tariff
5 to 5,000 A.
page 116

Tachometric sensor
Please contact us

Thermocouple / probe
See Pyrocontrole Catalog

DISPLAY

	C.A 2200-P	C.A 2200-C	C.A 2200-T	C.A 2200-D
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 VO as per UL
Weight	475 g (without option)
	850 g (with option)
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

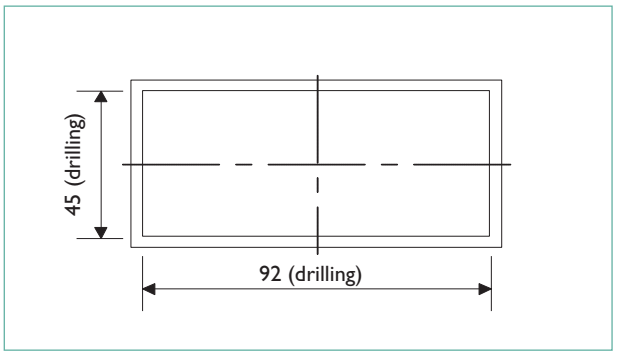
POWER SUPPLY

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

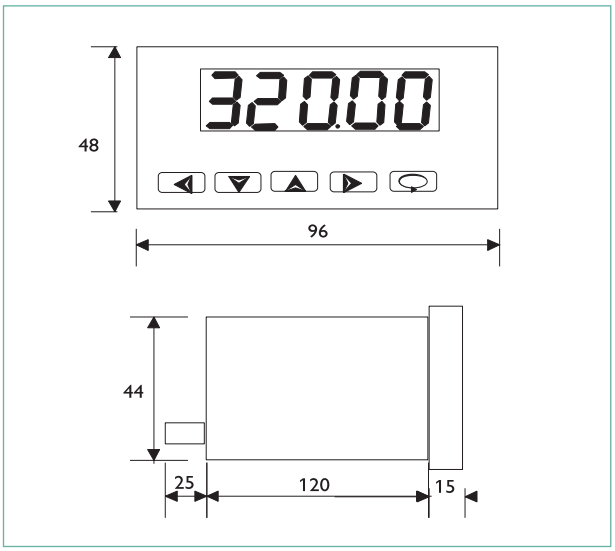
STANDARDS

Low voltage directive 73/23/EEC
Insulation - dielectric strength IEC 61010-1

PANEL DRILLING SPECIFICATIONS (IN MM)



DIMENSIONS (IN MM)



SYNCHROCOUPLER
RANGE

Synchronization instruments for LV networks.

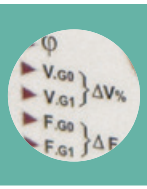
- Integration in 96 x 96 format
- 1 synchronization command
- 1 control command
- 3 command modes for synchronization
- Adjustment in just a few seconds (PID model)

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 (proportional and integral)
- an external control loop for opening the coupling relay
- four front panel keys for programming,display and messages (password option included)

ZOOM



Display of deviations between setpoint and measurement

LED display of 3 measurements: phase, frequency and voltage

User-programmable

SYNCHROCOUPLER

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

TO ORDER	
Power supply	**Reference**
24 VDC	LS9N 421X
48 VDC	LS9N 422X
110 VAC	LS9N 423X
230 VAC	LS9N 424X
400 VAC	LS9N 425X

SYNCHROCOUPLER PID

Display: as for synchrocoupler

PID adjustment method (Proportional Integral Derivative) for faster and more accurate synchronization than with conventional synchrocouplers

- **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

TO ORDER	
Power supply	**Reference**
24 VDC	LS9N 441X
48 VDC	LS9N 442X
110 VAC	LS9N 443X
230 VAC	LS9N 444X
400 VAC	LS9N 445X

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 change-over 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
Installation category	3
Pollution level	2

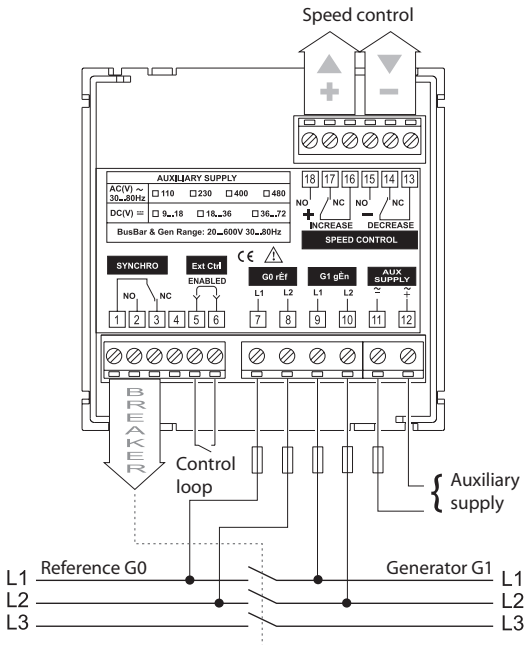
MECHANICAL SPECIFICATIONS

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

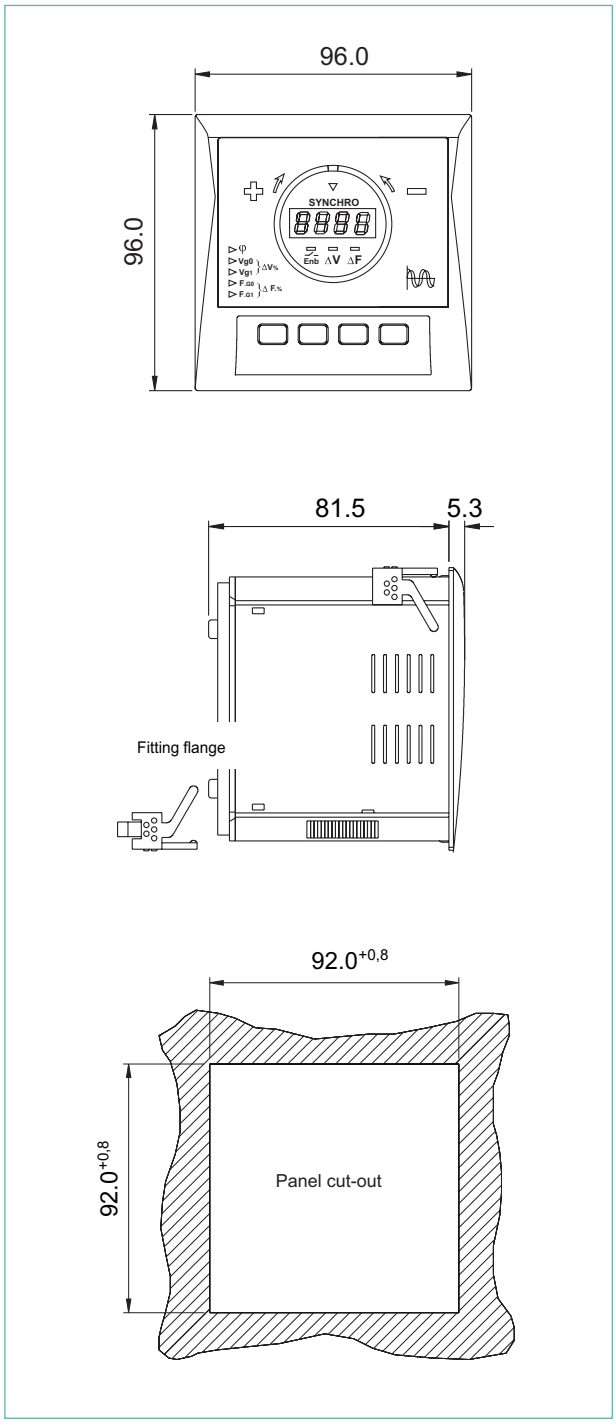
STANDARDS

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)



ANALOG PANEL METERS

Classic range

For standard applications

AC ammeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 242

AC ammeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 244

AC voltmeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 245

Frequency meter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 246

Wattmeter
Varmeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 247

Phasemeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 247

DC ammeter

Analog panel meters with round barrels for day-to-day industrial requirements.

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DC voltmeter

Analog panel meters with round barrels for day-to-day industrial requirements.

page 249

Normeurope range

For severe environments

AC ammeter

Analog panel meters with round barrels for severe operating constraints.

page 252

AC voltmeter

Analog panel meters with round barrels for severe operating constraints.

page 254

Frequency meter

Analog panel meters with round barrels for severe operating constraints.

page 255

Maximum ammeter

Analog panel meters with round barrels for severe operating constraints.

page 256

Wattmeter Varmeter

Analog panel meters with round barrels for severe operating constraints.

page 257

Phasemeter

Analog panel meters with round barrels for severe operating constraints.

page 258

Synchronization units

Analog panel meters with round barrels for severe operating constraints.

page 259

DC ammeter

Analog panel meters with round barrels for severe operating constraints.

page 260

DC voltmeter

Analog panel meters with round barrels for severe operating constraints.

page 261

Command function

Analog panel meters with round barrels for severe operating constraints.

page 262

COHO/LK range

Hour meters

COHO

Totalize the operating time of a machine or piece of equipment with the aim of checking or repairing it.

page 264

LK

Totalize the operating time of a machine or piece of equipment with the aim of checking or repairing it.

page 265

CHOOSING
AN ANALOG PANEL METER

	CLASSIC			
		page 240		page 244
				
Front panel drilling				
Round barrel	■	■	■	■
Square barrel				
Front panel				
Format	48 x 48	72 x 72	96 x 96	48 x 48
Standard functions				
AC Ammeter	■ 90°	■ 240°	■	■ 90°
AC Voltmeter	■ 90°	■ 240°	■	
Pointer dial frequency meter		■ 90°	■	
Vibrating reed frequency meter		■	■	
Maximum demand ammeter				
Wattmeter / Varmeter		■ 90°	■ 240°	
Phasemeter		■ 90°	■ 240°	
DC Ammeter	■ 90°	■ 240°	■	
DC Voltmeter	■ 90°	■ 240°	■	
Hour meter				
Synchronization equipment				
Synchronoscope				
Double vibrating reed frequency meter				
Differential voltmeter				
Command functions meter				
AC Current / AC Voltage				
DC Current / DC Voltage				
Temperature				
Strengths	CLASSIC, the model for day-to-day industrial applications. Ammeter available for explosive atmospheres (ATEX).			

NORMEUROPE				COHO / LK	
page 250				page 264-265	
					
				COHO	LK
					LK
48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	48 x 48
90° 250°					
90° 250°					
	90° 250°				
	1 x 9 reeds				
	90°				
	90° 250° 360°				
90° 250°					
90° 250°					
		360°			
	2 x 9 reeds				
	90° 250°				
		90°			
		90°			
		90°			
NORMEUROPE, the industry reference for the production, transmission and distribution of electrical energy for severe operating constraints.				COHO, the industry reference for severe operating constraints, and LK for standard applications.	

INFO & ADVICE

The essential function of the analog 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 standardss

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.

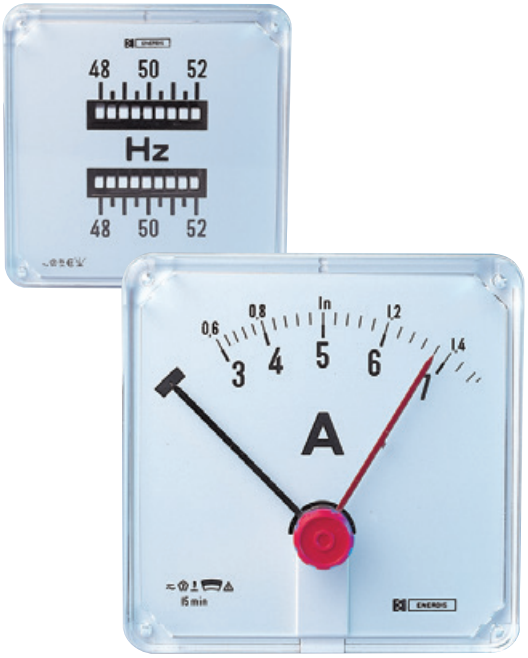
SPECIAL FUNCTIONS

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 phase shifts 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 rated voltage.



HOW TO CONNECT A PANEL METER

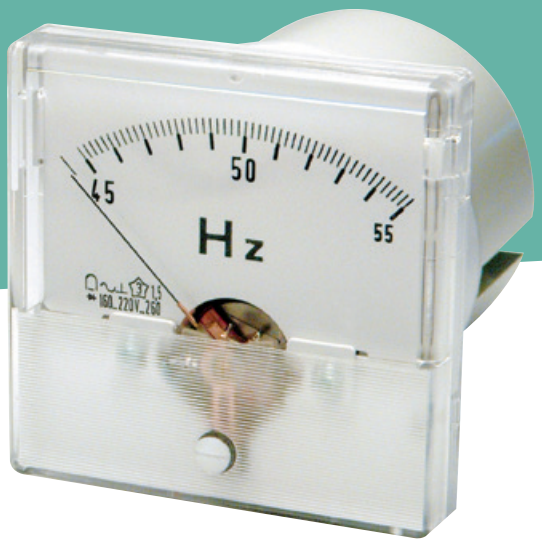
The analog panel meter is easy to mount and connect.
The dial contains an array of pictograms and the terminals have polarity markers. A user guide is supplied only for complex functions.

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).



CLASSIC
RANGE

Analog panel meters with round barrels for day-to-day industrial requirements.

+
- Attractive acquisition and installation costs
- Multiple customization possibilities for switchboard and machine manufacturers

ZOOM


Slimline and easy to install

Accurate


Rugged

GENERAL SPECIFICATIONS

Reference standard: IEC 60051-1

Accuracy: accuracy class 1.5
(±1.5 % error at full scale)

Front-panel protection: IP52 reference IEC 60529

Isolation test: reference IEC 61010-1 Category III

Max. operating voltage: 650 Vac

Mechanical shocks: reference standard IEC 60068-2-27

Vibration withstand: reference IEC 60068-2-6

Environment: reference 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 mounting on panel
Panel thickness: 8 mm max.

Materials:
Barrel: ABS
Front panel: polymethyl methacrylate
Additional casing: ABS
Dial: ABS/PC, black markings on white background.
Black bar needle

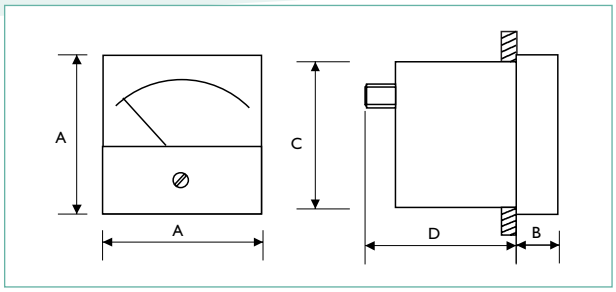
Operating position: Calibration for vertical position (±10°)

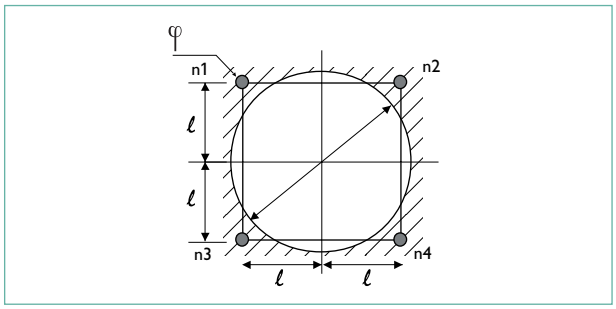
Overloads :
Voltmeter and frequencymeter
- 1.2 Un permanent
- 2 Un for 5 s

Ammeter
- 1.3 In permanent
- 10 In for 5 s

Extreme values: recommendation, IEC 60 051-1 standard
1 - 1.2 -1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 - 8 - 9 and their decimal multiples and sub-multiples

DIMENSIONS AND DRILLING OF THE PANEL





A x A Format		48 x 48	72 x 72	96 x 96
B (mm)		12	13	14
C (mm)		44	65	65
D 90° (mm)		48	35	35
D 240° (mm)			70	70
Ø (mm)		45	67	67
l (mm)		20	28.5	40
ni IP52 (mm)		n1	n1-n4	n1-n4
ni IP55 (mm)		n1	n1-n2-n3-n4	n1-n2-n3-n4
e (mm)		Ø 3.5	Ø 4	Ø 4
Standard mounting		clamp	2 studs M3	2 studs M3
Weight (kg)	90°	0.18	0.18	0.18
	240°	0.25	0.25	0.25
Connection		M5	M5	M5

MECHANICAL FORMATS

Deflection	90°			240°	
Format	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Non-standard mounting and front-panel tightness					
IP55 (4-stud mounting and zero reset seal)	■	■	■	■	■
Mounting by automatic clip	■				
Mounting strap	■ as standard	■	■	■	■
Non -standard front-panel cover					
Locator index	■	■	■		
Non-standard dial format					
Creation of dial markings (after feasibility study)	■	■	■	■	■
Colour marking	■	■	■	■	■
Colour area	■	■	■	■	■
Black background with white markings	■	■	■	■	■
Markings not in standard documentation	■	■	■	■	■
Double scale		■	■	■	■

ACCESSORIES

Deflection	90°			240°	
Format	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Front-panel sealed gasket	1890 0011	1890 0009	1890 0010	1890 0009	1890 0010
Cylindrical ring fastener		N003 34A00		N003 34A00	
Standard dial	■	■	■	■	■
Customized dial (on request)	■	■	■	■	■
Flask of antistatic liquid	9030 00676	9030 00676	9030 00676	9030 00676	9030 00676
Insulation cap for terminals	0026 2803	0026 2803	0026 2803	0026 2803	0026 2803
Faston terminal connections	■	■	■	■	■

AC AMMETER

- **Deflection** 90°

Standard-scale model
Accuracy class:1.5
Measuring component:
moving iron 50 to 60 Hz,
rectified moving coil 50 to 10,000 Hz
Pseudo-linear scale (moving iron)
Interchangeable dial
Consumption: 1 VA

Motor-scale models
Accuracy class: 1.5
Measuring component:
moving iron 50-60 Hz
Pseudo-linear scale
Calibrated 0-In up to 2/3 of deflection, with overload zone beyond
Interchangeable dial
Consumption: 1 VA

- **Deflection** 240°

In standard-scale model
Accuracy class: 1.5
Measuring component:
rectified moving coil 50 to 10,000 Hz
Linear scale
Consumption: 0.5 VA

Motor-scale models
Accuracy class: 1.5
Measuring component:
rectified moving coil
50 to 10,000 Hz
Linear scale
Calibrated 0-In up to 2/3 of deflection, with overload zone beyond
Consumption: 0.5 VA

FEASIBILITY LIMITS

	Deflection	90°			240°	
Format		**48 x 48**	**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
Direct connection						
Standard scale	**moving iron**	100 mA to 30 A	100 mA to 30 A	100 mA to 30 A		
	moving coil		100 mA to 30 A	100 mA to 30 A	100 mA to 30 A	100 mA to 30 A
Motor scale	**moving iron 6 In max.**	1-30 A	1-30 A	1-30 A		
	moving coil 3 In		1-30 A	1-30 A	1-30 A	1-30 A
Connection on CT						
Standard scale	**moving iron**	1-6.5 A	1-6.5 A	1-6.5 A		
	moving coil		1-6.5 A	1-6.5 A	1-6.5 A	1-6.5 A
Motor scale	**moving iron 6 In max.**	1-5 A	1-5 A	1-5 A		
	moving coil 3 In		1-5 A	1-5 A	1-5 A	1-5 A

DIRECT CONNECTION

	Deflection	moving iron 90°			240°	
Format		**48 x 48**	**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
Rating	**Scale In**					
5 A	**0-5 A**	1048 1207	1082 1207	1083 1207	2074 1207	2075 1207
10 A	**0-10 A**	1048 1212	1082 1212	1083 1212	2074 1212	2075 1212
20 A	**0-20 A**	1048 1215	1082 1215	1083 1215	2074 1215	2075 1215
30 A	**0-30 A**	1048 1217	1082 1217	1083 1217	2074 1217	2075 1217
	Scale 3 In					
5 A	**0-5/15 A**	1048 9507	1082 9507	1083 9507	2074 9507	2075 9507
10 A	**0-10/30 A**	1048 9512	1082 9512	1083 9512	2074 9512	2075 9512
20 A	**0-20/60 A**	1048 9515	1082 9515	1083 9515	2074 9515	2075 9515
	Scale 5 In					
5 A	**0-5/25 A**	1048 9607	1082 9607	1083 9607		

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

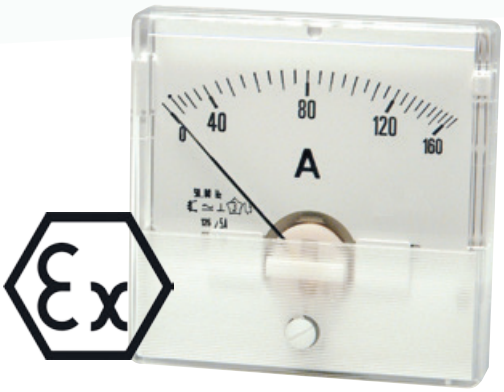
CONNECTION TO 5 A CT

	Deflection	moving iron 90°			moving iron 90°			240°	
		Separate panel meter and dial			Complete panel meter			Complete panel meter	
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
	Scale 1.3 In	Panel meter only							
		1048 1299	1082 1299	1083 1299					
CT ratio	Scale 1.3 In	Dial only							
5/5 A	0-6.5 A	1961 0507	1962 0507	1963 0507	1048 2407	1082 2407	1083 2407	2074 9107	2075 9107
10/5 A	0-13 A	1961 0512	1962 0512	1963 0512	1048 2412	1082 2412	1083 2412	2074 9112	2075 9112
15/5 A	0-19.5 A	1961 0514	1962 0514	1963 0514	1048 2414	1082 2414	1083 2414	2074 9114	2075 9114
20/5 A	0-26 A	1961 0515	1962 0515	1963 0515	1048 2415	1082 2415	1083 2415	2074 9115	2075 9115
25/5 A	0-32.5 A	1961 0516	1962 0516	1963 0516	1048 2416	1082 2416	1083 2416	2074 9116	2075 9116
30/5 A	0-39 A	1961 0517	1962 0517	1963 0517	1048 2417	1082 2417	1083 2417	2074 9117	2075 9117
40/5 A	0-52 A	1961 0518	1962 0518	1963 0518	1048 2418	1082 2418	1083 2418	2074 9118	2075 9118
50/5 A	0-65 A	1961 0519	1962 0519	1963 0519	1048 2419	1082 2419	1083 2419	2074 9119	2075 9119
60/5 A	0-78 A	1961 0521	1962 0521	1963 0521	1048 2421	1082 2421	1083 2421	2074 9121	2075 9121
75/5 A	0-97.5 A	1961 0523	1962 0523	1963 0523	1048 2423	1082 2423	1083 2423	2074 9123	2075 9123
100/5 A	0-130 A	1961 0525	1962 0525	1963 0525	1048 2425	1082 2425	1083 2425	2074 9125	2075 9125
125/5 A	0-162.5 A	1961 0526	1962 0526	1963 0526	1048 2426	1082 2426	1083 2426	2074 9126	2075 9126
150/5 A	0-195 A	1961 0528	1962 0528	1963 0528	1048 2428	1082 2428	1083 2428	2074 9128	2075 9128
200/5 A	0-260 A	1961 0530	1962 0530	1963 0530	1048 2430	1082 2430	1083 2430	2074 9130	2075 9130
250/5 A	0-325 A	1961 0531	1962 0531	1963 0531	1048 2431	1082 2431	1083 2431	2074 9131	2075 9131
300/5 A	0-390 A	1961 0533	1962 0533	1963 0533	1048 2433	1082 2433	1083 2433	2074 9133	2075 9133
400/5 A	0-520 A	1961 0535	1962 0535	1963 0535	1048 2435	1082 2435	1083 2435	2074 9135	2075 9135
500/5 A	0-650 A	1961 0536	1962 0536	1963 0536	1048 2436	1082 2436	1083 2436	2074 9136	2075 9136
600/5 A	0-780 A	1961 0538	1962 0538	1963 0538	1048 2438	1082 2438	1083 2438	2074 9138	2075 9138
750/5 A	0-975 A	1961 0540	1962 0540	1963 0540	1048 2440	1082 2440	1083 2440	2074 9140	2075 9140
800/5 A	0-1.04 kA	1961 0541	1962 0541	1963 0541	1048 2441	1082 2441	1083 2441	2074 9141	2075 9141
1,000/5 A	0-1.3 kA	1961 0542	1962 0542	1963 0542	1048 2442	1082 2442	1083 2442	2074 9142	2075 9142
1,200/5 A	0-1.56 kA	1961 0551	1962 0551	1963 0551	1048 2451	1082 2451	1083 2451	2074 9151	2075 9151
1,500/5 A	0-1.95 kA	1961 0544	1962 0544	1963 0544	1048 2444	1082 2444	1083 2444	2074 9144	2075 9144
2,000/5 A	0-2.6 kA	1961 0545	1962 0545	1963 0545	1048 2445	1082 2445	1083 2445	2074 9145	2075 9145
2,500/5 A	0-3.25 kA	1961 0546	1962 0546	1963 0546	1048 2446	1082 2446	1083 2446	2074 9146	2075 9146
3,000/5 A	0-3.9 kA	1961 0547	1962 0547	1963 0547	1048 2447	1082 2447	1083 2447	2074 9147	2075 9147
4,000/5 A	0-5.2 kA	1961 0549	1962 0549	1963 0549	1048 2449	1082 2449	1083 2449	2074 9149	2075 9149
5,000/5 A	0-6.5 kA	1961 0550	1962 0550	1963 0550	1048 2450	1082 2450	1083 2450	2074 9150	2075 9150
	Scale 3 In	Panel meter only							
		1048 9597	1082 9597	1083 9597					
CT ratio	Scale 3 In	Dial only							
5/5 A	0-5/15 A	1961 0607	1962 0607	1963 0607	1048 2607	1082 2607	1083 2607	2074 9207	2075 9207
10/5 A	0-10/30 A	1961 0612	1962 0612	1963 0612	1048 2612	1082 2612	1083 2612	2074 9212	2075 9212
15/5 A	0-15/45 A	1961 0614	1962 0614	1963 0614	1048 2614	1082 2614	1083 2614	2074 9214	2075 9214
20/5 A	0-20/60 A	1961 0615	1962 0615	1963 0615	1048 2615	1082 2615	1083 2615	2074 9215	2075 9215
25/5 A	0-25/75 A	1961 0616	1962 0616	1963 0616	1048 2616	1082 2616	1083 2616	2074 9216	2075 9216
30/5 A	0-30/90 A	1961 0617	1962 0617	1963 0617	1048 2617	1082 2617	1083 2617	2074 9217	2075 9217
40/5 A	0-40/120 A	1961 0618	1962 0618	1963 0618	1048 2618	1082 2618	1083 2618	2074 9218	2075 9218
50/5 A	0-50/150 A	1961 0619	1962 0619	1963 0619	1048 2619	1082 2619	1083 2619	2074 9219	2075 9219
60/5 A	0-60/180 A	1961 0621	1962 0621	1963 0621	1048 2621	1082 2621	1083 2621	2074 9221	2075 9221
75/5 A	0-75/225 A	1961 0623	1962 0623	1963 0623	1048 2623	1082 2623	1083 2623	2074 9223	2075 9223
100/5 A	0-100/300 A	1961 0625	1962 0625	1963 0625	1048 2625	1082 2625	1083 2625	2074 9225	2075 9225
125/5 A	0-125/375 A	1961 0626	1962 0626	1963 0626	1048 2626	1082 2626	1083 2626	2074 9226	2075 9226
150/5 A	0-150/450 A	1961 0628	1962 0628	1963 0628	1048 2628	1082 2628	1083 2628	2074 9228	2075 9228
200/5 A	0-200/600 A	1961 0630	1962 0630	1963 0630	1048 2630	1082 2630	1083 2630	2074 9230	2075 9230
250/5 A	0-250/750 A	1961 0631	1962 0631	1963 0631	1048 2631	1082 2631	1083 2631	2074 9231	2075 9231
300/5 A	0-300/900 A	1961 0633	1962 0633	1963 0633	1048 2633	1082 2633	1083 2633	2074 9233	2075 9233
400/5 A	0-400/1,200 A	1961 0635	1962 0635	1963 0635	1048 2635	1082 2635	1083 2635	2074 9235	2075 9235
500/5 A	0-500/1,500 A	1961 0636	1962 0636	1963 0636	1048 2636	1082 2636	1083 2636	2074 9236	2075 9236
600/5 A	0-600/1,800 A	1961 0638	1962 0638	1963 0638	1048 2638	1082 2638	1083 2638	2074 9238	2075 9238
750/5 A	0-750/2,250 A	1961 0640	1962 0640	1963 0640	1048 2640	1082 2640	1083 2640	2074 9240	2075 9240
800/5 A	0-800/2,400 A	1961 0641	1962 0641	1963 0641	1048 2641	1082 2641	1083 2641	2074 9241	2075 9241
1,000/5 A	0-1/3 kA	1961 0642	1962 0642	1963 0642	1048 2642	1082 2642	1083 2642	2074 9242	2075 9242
1,200/5 A	0-1.2/3.6 kA	1961 0651	1962 0651	1963 0651	1048 2651	1082 2651	1083 2651	2074 9251	2075 9251
1,500/5 A	0-1.5/4.5 kA	1961 0644	1962 0644	1963 0644	1048 2644	1082 2644	1083 2644	2074 9244	2075 9244
2,000/5 A	0-2/6 kA	1961 0645	1962 0645	1963 0645	1048 2645	1082 2645	1083 2645	2074 9245	2075 9245
2,500/5 A	0-2.5/7.5 kA	1961 0646	1962 0646	1963 0646	1048 2646	1082 2646	1083 2646	2074 9246	2075 9246
3,000/5 A	0-3/9 kA	1961 0647	1962 0647	1963 0647	1048 2647	1082 2647	1083 2647	2074 9247	2075 9247
4,000/5 A	0-4/12 kA	1961 0649	1962 0649	1963 0649	1048 2649	1082 2649	1083 2649	2074 9249	2075 9249
5,000/5 A	0-5/15 kA	1961 0650	1962 0650	1963 0650	1048 2650	1082 2650	1083 2650	2074 9250	2075 9250
To be specified	Scale 1 In				1048 1297C	1082 1297C	1083 1297C	2074 9193C	2075 9193C
To be specified	Scale 1.3 In				1048 1299C	1082 1299C	1083 1299C	2074 9293C	2075 9293C
To be specified	Scale 3 In				1048 9597C	1082 9597C	1083 9597C		
To be specified	Scale 5 In				1048 9697C	1082 9697C	1083 9697C		

CUSTOMIZED PRODUCT

	Instrument	Deflection	Measuring component	Format	Scale	CT ratio rating	Frequency
Examples	Complete panel meter	90°	coil	72 x 72	0-12/36A	direct 12A	60 Hz
	Panel meter only	90°	iron	48 x 48	In	CT/1A	50 Hz
	Dial only	90°	iron	48 x 48	0-225/675A	CT225/1A	50 Hz

AC AMMETER



GENERAL SPECIFICATIONS

Highest network voltage: 500 V
Network frequency: 25 to 100 Hz
Consumption: 0.7 VA max at In
Accuracy class: 1.5
Storage temperature: - 25 to + 70 ° C
Operating temperature: - 25 to + 55 ° C
Permanent overload: 1.2 In
Instantaneous overload: 10 In/5s
Isolation of instrument in relation to earth: 3kV - 50 Hz - 1 min
Front-panel ingress protection: IP 52 (panel mounting)
Mounting on vertical panel via front; one version can be fitted with an adapter for mounting on DIN rail.

INTERCHANGEABLE DIAL

A basic instrument (1 A or 5A) equipped with an interchangeable dial and connected to the “measurement terminals” of a CT enables you to read the current flowing through the CT without recalibration.

Example: CT 1,000 A/5 A - basic instrument 5 A - interchangeable dial 0-1 KA

DIRECT CONNECTION

	Deflection	90°	
Format		48 x 48	
Mounting		On front panel	On DIN rail
Rating	Scale In		
1 A	0 – 1 A	1051 1300	1052 1300
5 A	0 – 5 A	1051 2300	1052 2300
	Scale 1.3 In		
1 A	0 – 1.3 A	1051 1400	1052 1400
5 A	0 – 6.5 A	1051 2400	1052 2400
	Scale 3 In		
1 A	0 – 1 / 3 A	1051 1600	1052 1600
5 A	0 – 5 / 15 A	1051 2600	1052 2600
	Scale 5 In		
1 A	0 – 1 / 5 A	1051 1700	1052 1700
5 A	0 – 5 / 25 A	1051 2700	1052 2700
	Scale 6 In		
1 A	0 – 1 / 6 A	1051 1800	1052 1800
5 A	0 – 5 / 30 A	1051 2800	1052 2800

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

AC VOLTMETER

- **Deflection** 90°

Standard-scale model
Accuracy class: 1.5
Measuring component:
moving iron 50/60 Hz, and
rectified moving coil 50-10,000 Hz
Pseudo-linear scale (iron)
Interchangeable dial
Consumption: 3.5 to 6 VA
depending on rating

- **Deflection** 240°

Standard-scale model
Accuracy class: 1.5
Measuring component:
rectified moving coil 50 - 10,000 Hz
Linear scale
Consumption: 1 mA

FEASIBILITY LIMITS

Deflection	90°			240°	
Format	**48 x 48**	**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
Direct connection					
moving iron	6-600 V	6-600 V	6-600 V	6 to 600 V	6 to 600 V
moving coil	3-600 V	3-600 V	3-600 V		
Connection to VT					
moving iron	from 100/√3 V				
moving coil	from 100/√3 V			from 100/√3 V	

DIRECT CONNECTION

Deflection		90°			240°	
Format		**48 x 48**	**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
Rating	**Scale Vn**					
15 V	**0-15 V**	1048 0214	1082 0214	1083 0214	2074 0214	2075 0214
30 V	**0-30 V**	1048 0217	1082 0217	1083 0217	2074 0217	2075 0217
60 V	**0-60 V**	1048 0221	1082 0221	1083 0221	2074 0221	2075 0221
150 V	**0-150 V**	1048 0228	1082 0228	1083 0228	2074 0228	2075 0228
250 V	**0-250 V**	1048 0231	1082 0231	1083 0231	2074 0231	2075 0231
300 V	**0-300 V**	1048 0233	1082 0233	1083 0233	2074 0233	2075 0233
500 V	**0-500 V**	1048 0236	1082 0236	1083 0236	2074 0236	2075 0236

CONNECTION TO VT

Deflection		90°			240°	
Format		**48 x 48**	**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
VT ratio	**Scale**	Always specify VT ratio when ordering				
VT/100 √3V	**1.2 Vn**	1048 0621C	1082 0621C	1083 0621C	2084 0621C	2085 0621C
VT/100 V	**1.2 Vn**	1048 0625C	1082 0625C	1083 0625C	2084 0625C	2085 0625C

CUSTOMIZED PRODUCT

	Connection	Deflection	Measuring component	Format	Scale	VT rating or ratio	Frequency
Example	direct	240°	moving coil	96 x 96	Vn	110 V	50 Hz

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

FREQUENCYMETER

Pointer frequencymeter
Deflection 90°
Accuracy class: 0.5 Fn
Measuring component: moving coil
+ frequency converter
Operating range: 0.8 Un to 1.15 Un

Consumption: 1 VA with 100 V, 1.5 VA with 230 V, 2 VA with 400 V
CH version with built-in hour meter from 0 to 99999.9 hours
in 96 x 96 format

FEASIBILITY LIMITS

Voltage: 57.7 V to 440 V
Frequency: 50 to 400 Hz

	Deflection	90°		
Format		**48 x 48**	**96 x 96**	**96 x 96 CH**
Rated voltage	**Measurement range**			Hour meter
100 V	**45-55 Hz**	3582 3511	3583 3511	3583 3371
	55-65 Hz	3582 3521	3583 3521	3583 3381
230 V	**45-55 Hz**	3582 3512	3583 3512	3583 3372
	55-65 Hz	3582 3522	3583 3522	3583 3382
400 V	**45-55 Hz**	3582 3513	3583 3513	3583 3373
	55-65 Hz	3582 3523	3583 3523	3583 3383

CUSTOMIZED PRODUCT

	Format	Voltage	Measurement range	Hour meter
Example	72 x 72	150 V	350-450 HZ	☑

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241

TRIAD 2
Digital transducers
1 to 4 analog outputs.
Class 0.1.
page 168

WATTMETER VARMETER

PHASEMETER

- **Panel meter**

Deflection 90° 240°
Accuracy class: 1.5
Measuring component: moving coil
Linear scale

- **Panel meter**

See transducers page 161

PANEL METER

Deflection		90°		240°	
Format		**72 x 72**	**96 x 96**	**72 x 72**	**96 x 96**
Rating	**Scale Vn**				
0 - 20 mA	**0 left**	2086 1415C	2087 1415C	2084 1415C	2085 1415C
4 - 20 mA	**0 left**	2086 1490C	2087 1490C	2084 1490C	2085 1490C

TRANSDUCERS

See transducers page 161

CUSTOMIZED PRODUCT

Wattmeter / Varmeter

	Panel meter	Transducer model	CT ratio	Direct/VT	Voltage or VT ratio	Start/end of scale	Auxiliary power supply
Example	2085 1490C	TRIAD 2	500/5 A	VT	20 kV / 110 V	-20...+20 MW	110 Vac

Phasemeter

	Panel meter	Transducer model	Current	Highest voltage	Start/end of scale	Auxiliary power supply
Example	2086 1415C	TRIAD 2	1 A	440 V	0.5 cap/1/0.5 ind	230 Vac

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241

TRIAD 2
Digital transducers
1 to 4 analog outputs. Class 0.1.
page 168

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

DC AMMETER

- **Deflection** 90°

Accuracy class: 1.5
Measuring component: moving coil
Linear scale
Voltage drop:
20 mV for rating ≥ 1.25 mA
variable for rating < 1.25 mA

- **Deflection** 240°

Accuracy class: 1.5
Measuring component: moving coil
Linear scale
Voltage drop:
40 mV for rating ≥ 6 mA
variable for rating < 6 mA

FEASIBILITY LIMITS

Deflection		90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Connection	Zero position					
Direct	Left or central	50 µA to 30 A			250 µA to 30 A	
Process signal	Left or offset	0-1 mA to 0-20 mA and 4-20 mA			0-1 mA to 0-20 mA and 4-20 mA	
On shunt	Left or central	50 mV to 300 mV			50 mV to 300 mV	

DIRECT CONNECTION

Deflection		90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Rating	Scale					
5 A	0-5 A	2048 1207	2086 1207	2087 1207	2084 1207	2085 1207
10 A	0-10 A	2048 1212	2086 1212	2087 1212	2084 1212	2085 1212
15 A	0-15 A	2048 1214	2086 1214	2087 1214	2084 1214	2085 1214
25 A	0-25 A	2048 1216	2086 1216	2087 1216	2084 1216	2085 1216
		Always specify start and end of scale when ordering				
0-20 mA	Process	2048 1415C	2086 1415C	2087 1415C	2084 1415C	2085 1415C
4-20 mA	Process	2048 1490C	2086 1490C	2087 1490C	2084 1490C	2085 1490C

CONNECTION TO 100 mV SHUNT

Deflection		90°		
Format		48 x 48	72 x 72	96 x 96
Panel meter only		2048 5293	2086 5293	2087 5293
Shunt	Scale	Dial only		
5 A	0-5 A	2961 0307	2962 0307	2963 0307
10 A	0-10 A	2961 0312	2962 0312	2963 0312
15 A	0-15 A	2961 0314	2962 0314	2963 0314
20 A	0-20 A	2961 0315	2962 0315	2963 0315
25 A	0-25 A	2961 0316	2962 0316	2963 0316
30 A	0-30 A	2961 0317	2962 0317	2963 0317
40 A	0-40 A	2961 0318	2962 0318	2963 0318
50 A	0-50 A	2961 0319	2962 0319	2963 0319
60 A	0-60 A	2961 0321	2962 0321	2963 0321
75 A	0-75 A	2961 0323	2962 0323	2963 0323

Deflection		90°		
Format		48 x 48	72 x 72	96 x 96
Panel meter only		2048 5293	2086 5293	2087 5293
Shunt	Scale	Dial only		
100 A	0-100 A	2961 0325	2962 0325	2963 0325
125 A	0-125 A	2961 0326	2962 0326	2963 0326
150 A	0-150 A	2961 0328	2962 0328	2963 0328
200 A	0-200 A	2961 0330	2962 0330	2963 0330
250 A	0-250 A	2961 0331	2962 0331	2963 0331
300 A	0-300 A	2961 0333	2962 0333	2963 0333
400 A	0-400 A	2961 0335	2962 0335	2963 0335
500 A	0-500 A	2961 0336	2962 0336	2963 0336
600 A	0-600 A	2961 0338	2962 0338	2963 0338
1000 A	0-1000 A	2961 0342	2962 0342	2963 0342

Deflection		90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Rating	Scale	Always specify the rated current of the shunt				
50 mV	Gauche	2048 5093C	2086 5093C	2087 5093C	2084 0319C	2085 0319C
60 mV	Gauche	2048 5193C	2086 5193C	2087 5193C	2084 0321C	2085 0321C
100 mV	Gauche	2048 5293C	2086 5293C	2087 5293C	2084 0325C	2085 0325C
50 mV	Central	3048 5093C	3086 5093C	3087 5093C	3084 0319C	3085 0319C
60 mV	Central	3048 5193C	3086 5193C	3087 5193C	3084 0321C	3085 0321C
100 mV	Central	3048 5293C	3086 5293C	3087 5293C	3084 0325C	3085 0325C

CUSTOMIZED PRODUCT

	Connection	Deflection	Format	Zero position	Rating	Start/end of scale
Example	Shunt 2000 A	240°	96 x 96	central	60 mV	-2000 +2000A

DC VOLTMETER

- **Deflection** 90°

Accuracy class: 1.5
Measuring component: moving coil
Linear scale
Consumption: 1 mA

- **Deflection** 240°

Accuracy class: 1.5
Measuring component: moving coil
Linear scale
Consumption: 5 mA for Un < 5 V
0.5 mA for Un ≥ 5 V

FEASIBILITY LIMITS

	Deflection	90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Connection	Zero position					
Direct	Left or central	50 mV to 600 V			50 mV to 600 V	
Process signal	Left and offset	0-1 V to 0-10 V			0-1 V to 0-10 V	

DIRECT CONNECTION

	Deflection	90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Rating	Linear scale					
15 V	0-15 V	2048 0214	2086 0214	2087 0214	2084 0214	2085 0214
30 V	0-30 V	2048 0217	2086 0217	2087 0217	2084 0217	2085 0217
60 V	0-60 V	2048 0221	2086 0221	2087 0221	2084 0221	2085 0221
75 V	0-75 V	2048 0223	2086 0223	2087 0223	2084 0223	2085 0223
150 V	0-150 V	2048 0228	2086 0228	2087 0228	2084 0228	2085 0228
300 V	0-300 V	2048 0233	2086 0233	2087 0233	2084 0233	2085 0233
Rating	Expanded scale					
30 V	20-30 V		2086 3290	2087 3220		
60 V	40-60 V		2086 3291	2087 3221		

READING OF PROCESS SIGNAL

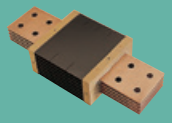
	Deflection	moving iron 90°			240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Rating	Scale	Always specify the start and end of scale when ordering				
0-1 V	Process	2048 0401C	2086 0401C	2087 0401C	2084 0401C	2085 0401C
0-10 V	Process	2048 0412C	2086 0412C	2087 0412C	2084 0412C	2085 0412C

CUSTOMIZED PRODUCT

	Connection	Deflection	Format	Zero position	Rating	Start/end of scale
Examples	direct process signal	90° 240°	48 x 48 96 x 96	gauche gauche	0 - 200 V 0 - 10 V	0 - 200 V 0 - 400 m³

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 241



SHUNTS
1 to 6,000 A
Vast choice whatever your application.
page 152

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

NORMEUROPE
RANGE

Round barrel analog panel meters
for high-level operating constraints.

- Wide client reference base: main utilities, marine applications, energy producers and distributors
- Wide choice of functions, formats, ratings and options
- Long product life span

ZOOM

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 mounting on panel
- Panel thickness: 8 mm max.

Materials:
Barrel: self-extinguishing polycarbonate
Front panel: polymethyl methacrylate (glass option NEL)
Additional terminal: Bakelite socket, ABS cover
Dial: light alloy, black markers on white background
Black knife-edge arrow pointer

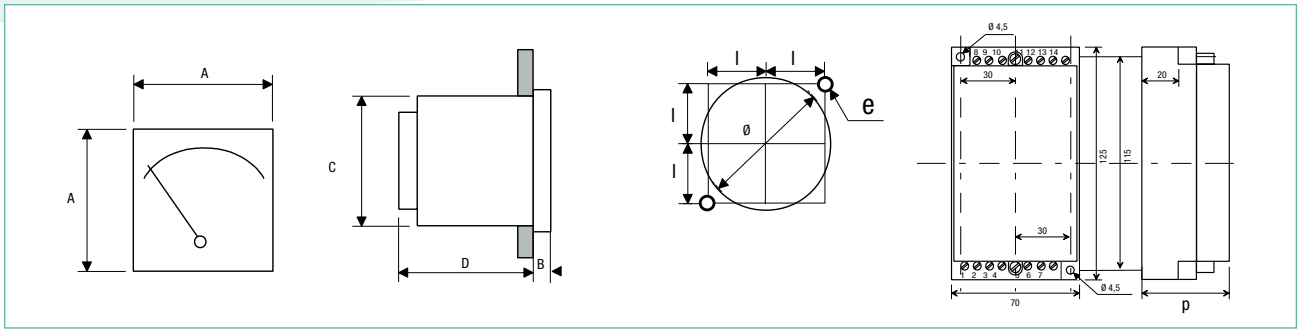
Operating position: calibrated for vertical position (± 10%)

Overloads:
Voltmeter and frequency meter
- 1.2 Un permanent
- 2 Un during 5 seconds

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



	Panel meter				Additional unit	
A x A 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 or blades	46	29 if 20 A max, 39 if 25 A max or more		24.5		
D 250°deflection	58	71		66		
D 360°deflection			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 (mm)	Ø3.5	Ø4.5	Ø4.5	Ø5.5	P=48	P=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 front panel		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 (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 (on request)	■	■	■	■	■	■	■	■
Flask of antistatic liquid	9030 00676							
Insulation sleeve for terminals	ACCQ 1001							

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, with overload zone beyond
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, with overload zone beyond
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		■	■	■		■	■	■

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

CONNECTION ON CT 5 A

Deflection		Moving iron 50 Hz 90°			Moving iron 50 Hz 90°				250°			
		Panel meter and dial separate			Complete panel meter				Complete panel meter			
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
Ratio	Scale	Panel meter only										
		A90A 0487	A90A 0486	A90A 0485								
CT	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 0611	■
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 0612	■
40/5 A	0-52 A	CADR 0113	CADR 0463	CADR 0443	A90A 0213	A90A 0313	A90A 0513	■	■	■	A250 0613	■
50/5 A	0-65 A	CADR 0114	CADR 0464	CADR 0444	A90A 0214	A90A 0314	A90A 0514	■	■	■	A250 0614	■
60/5 A	0-80 A	CADR 0115	CADR 0465	CADR 0445	A90A 0215	A90A 0315	A90A 0515	■	■	■	A250 0615	■
75/5 A	0-100 A	CADR 0116	CADR 0466	CADR 0446	A90A 0216	A90A 0316	A90A 0516	■	■	■	A250 0616	■
100/5 A	0-130 A	CADR 0117	CADR 0467	CADR 0447	A90A 0217	A90A 0317	A90A 0517	■	■	■	A250 0617	■
125/5 A	0-165 A	CADR 0118	CADR 0468	CADR 0448	A90A 0218	A90A 0318	A90A 0518	■	■	■	A250 0618	■
150/5 A	0-200 A	CADR 0119	CADR 0469	CADR 0449	A90A 0219	A90A 0319	A90A 0519	■	■	■	A250 0619	■
200/5 A	0-260 A	CADR 0120	CADR 0470	CADR 0450	A90A 0220	A90A 0320	A90A 0520	■	■	■	A250 0620	■
250/5 A	0-325 A	CADR 0121	CADR 0471	CADR 0451	A90A 0221	A90A 0321	A90A 0521	■	■	■	A250 0621	■
300/5 A	0-400 A	CADR 0122	CADR 0472	CADR 0452	A90A 0222	A90A 0322	A90A 0522	■	■	■	A250 0622	■
400/5 A	0-520 A	CADR 0123	CADR 0473	CADR 0453	A90A 0223	A90A 0323	A90A 0523	■	■	■	A250 0623	■
500/5 A	0-650 A	CADR 0124	CADR 0474	CADR 0454	A90A 0224	A90A 0324	A90A 0524	■	■	■	A250 0624	■
600/5 A	0-800 A	CADR 0125	CADR 0475	CADR 0455	A90A 0225	A90A 0325	A90A 0525	■	■	■	A250 0625	■
750/5 A	0-1 kA	CADR 0126	CADR 0476	CADR 0456	A90A 0226	A90A 0326	A90A 0526	■	■	■	A250 0626	■
800/5 A	0-1.04 kA	CADR 0135	CADR 0481	CADR 0487	■	■	■	■	■	■	■	■
1,000/5 A	0-1.3 kA	CADR 0127	CADR 0477	CADR 0457	A90A 0227	A90A 0327	A90A 0527	■	■	■	A250 0627	■
1,250/5 A	0-1.65 kA	CADR 0128	CADR 0478	CADR 0458	A90A 0228	A90A 0328	A90A 0528	■	■	■	A250 0628	■
1,500/5 A	0-2 kA	CADR 0129	CADR 0479	CADR 0459	A90A 0229	A90A 0329	A90A 0529	■	■	■	A250 0629	■
2,000/5 A	0-2.6 kA	CADR 0130	CADR 0480	CADR 0460	A90A 0230	A90A 0330	A90A 0530	■	■	■	A250 0630	■
2,500/5 A	0-3.25 kA	CADR 0131	CADR 0482	CADR 0488	■	A90A 0331	A90A 0531	■	■	■	■	■
3,000/5 A	0-4 kA	CADR 0132	CADR 0483	CADR 0489	■	A90A 0332	A90A 0532	■	■	■	■	■
4,000/5 A	0-5.2 kA	CADR 0133	CADR 0484	CADR 0490	■	■	■	■	■	■	■	■
5,000/5 A	0-6.5 kA	CADR 0134	CADR 0485	CADR 0491	■	■	■	■	■	■	■	■
Ratio	Scale	Panel meter only										
		A90A 0107	A90A 0106	A90A 0105								
CT	3 In	Dial only										
5/5 A	0-5/15 A	CADR 0139	CADR 0169	CADR 0059	A90A 0239	A90A 0339	A90A 0539	■	■	■	A250 0639	■
10/5 A	0-10/30 A	CADR 0140	CADR 0170	CADR 0060	A90A 0240	A90A 0340	A90A 0540	■	■	■	A250 0640	■
15/5 A	0-15/45 A	CADR 0141	CADR 0171	CADR 0061	A90A 0241	A90A 0341	A90A 0541	■	■	■	A250 0641	■
20/5 A	0-20/60 A	CADR 0142	CADR 0172	CADR 0062	A90A 0242	A90A 0342	A90A 0542	■	■	■	A250 0642	■
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 0643	■
40/5 A	0-40/120 A	CADR 0144	CADR 0174	CADR 0064	A90A 0244	A90A 0344	A90A 0544	■	■	■	A250 0644	■
50/5 A	0-50/150 A	CADR 0145	CADR 0175	CADR 0065	A90A 0245	A90A 0345	A90A 0545	■	■	■	A250 0645	■
60/5 A	0-60/180 A	CADR 0146	CADR 0176	CADR 0066	A90A 0246	A90A 0346	A90A 0546	■	■	■	A250 0646	■
75/5 A	0-75/225 A	CADR 0147	CADR 0177	CADR 0067	A90A 0247	A90A 0347	A90A 0547	■	■	■	A250 0647	■
100/5 A	0-100/300 A	CADR 0148	CADR 0178	CADR 0068	A90A 0248	A90A 0348	A90A 0548	■	■	■	A250 0648	■
125/5 A	0-125/375 A	CADR 0149	CADR 0179	CADR 0069	A90A 0249	A90A 0349	A90A 0549	■	■	■	A250 0649	■
150/5 A	0-150/450 A	CADR 0150	CADR 0180	CADR 0070	A90A 0250	A90A 0350	A90A 0550	■	■	■	A250 0650	■
200/5 A	0-200/600 A	CADR 0151	CADR 0181	CADR 0071	A90A 0251	A90A 0351	A90A 0551	■	■	■	A250 0651	■
250/5 A	0-250/750 A	CADR 0152	CADR 0182	CADR 0072	A90A 0252	A90A 0352	A90A 0552	■	■	■	A250 0652	■
300/5 A	0-300/900 A	CADR 0153	CADR 0183	CADR 0073	A90A 0253	A90A 0353	A90A 0553	■	■	■	A250 0653	■
400/5 A	0-0.4/1.2 kA	CADR 0154	CADR 0184	CADR 0074	A90A 0254	A90A 0354	A90A 0554	■	■	■	A250 0654	■
500/5 A	0-0.5/1.5 kA	CADR 0155	CADR 0185	CADR 0075	A90A 0255	A90A 0355	A90A 0555	■	■	■	A250 0655	■
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	■	■	■	■	■	■	■	■
1,000/5 A	0-1/3 kA	CADR 0159	CADR 0189	CADR 0079	■	■	■	■	■	■	■	■
1,200/5 A	0-1.2/3.6 kA	CADR 0160	CADR 0190	CADR 0080	■	■	■	■	■	■	■	■
1,500/5 A	0-1.5/4.5 kA	CADR 0161	CADR 0191	CADR 0081	■	■	■	■	■	■	■	■
2,000/5 A	0-2/6 kA	CADR 0162	CADR 0192	CADR 0082	■	■	■	■	■	■	■	■
2,500/5 A	0-2.5/7.5 kA	CADR 0163	CADR 0193	CADR 0083	■	■	■	■	■	■	■	■
3,000/5 A	0-3/9 kA	CADR 0164	CADR 0194	CADR 0084	■	■	■	■	■	■	■	■
4,000/5 A	0-4/12 kA	CADR 0165	CADR 0195	CADR 0085	■	■	■	■	■	■	■	■
5,000/5 A	0-5/15 kA	CADR 0166	CADR 0196	CADR 0086	■	■	■	■	■	■	■	■

CUSTOMIZED PRODUCT

	Instrument	Deflection/Motor scale	Format	Scale	Rating CT ratio	Frequency
Examples	Complete meter	90° iron 250° coil	72 x 72 144 x 144	0-15/90A 0-1.25/2.5 kA	direct 15A CT 1,250/5 A	50 Hz 60 Hz

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 Vn ; 1.2 Vn	**moving iron**	15 to 600 V							
	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 PRODUCT

	Connection	Deflection / Measure	Format	Scale	Rating/VT ratio	Frequency
Examples	direct on VT	90° iron 250°	72 x 72 96 x 96	Vn 1.2 Vn	15 V 20 / 0.11 Kv	50 Hz 60 Hz

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

FREQUENCY METER

Pointer frequency meter

- **Deflection** 90° 250°

Accuracy class: 0.5 of Fn
Measuring component: moving coil and frequency converter
Linear scale
Operating range: 0.80 Un to 1.15 Un
With additional "A" unit for 48 x 48 format with 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

Deflection:		90°		
Format		72 x 72	96 x 96	144 x 144
Rated voltage	Measurement range			
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	■	■	■

Deflection:		250°		
Format		72 x 72	96 x 96	144 x 144
Rated voltage	Measurement range			
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 PRODUCT

	Deflection	Format	Voltage	Measurement range
Examples	90° 250°	72 x 72 144 x 144	100 V 110 V	45-55 Hz 45-65 HZ

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

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	Rating	Graduation	Deflection 90° 72 x 72	96 x 96
101B		8 min	7.5 A	According to primary CT / 5 A		
		15 min				
131B	With relay, breaking capacity 10 VA resistive, 250 Vac max or 0.5 A	8 min				
		15 min				
161B	With hour meter 230 V - 50 Hz, 99,999.99 h	8 min				
		15 min				

Parameters to be indicated when ordering

CUSTOMIZED PRODUCT

	Format	Model	Integration time	Primary CT	Hour meter supply
Examples	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
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

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

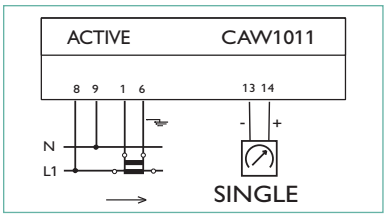
Operating range:
between 0.8 and 1.3 Sn
Voltage 0.8 to 1.15 Un
Current 0 to 1.2 In
Frequency ± 5 Hz

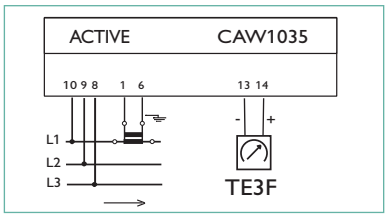
FEASIBILITY LIMITS

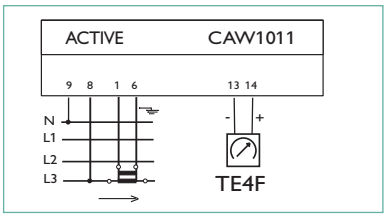
Voltage 57.7 V to 440 V

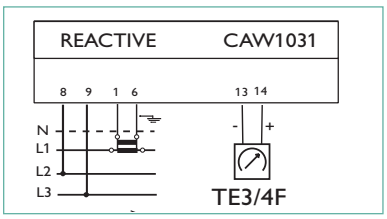
		Network	Frequency	Current	Voltage	Deflection 90°			Deflection 250°		
				Connection		72 x 72	96 x 96	144 x 144	72 x 72	96 x 96	144 x 144
Single phase	mono	active	50 Hz or 60 Hz or 400 Hz	on TC/1 A or TC/5 A	direct 230 V or 400 V						
Balanced three-phase 3 wires	TE3F	active									
	TE3F	reactive									
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									

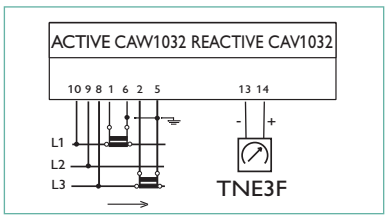
Parameters to be indicated when ordering

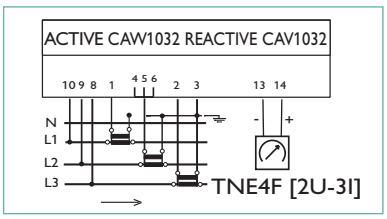












CUSTOMIZED PRODUCT

	Network	Deflection	Format	Frequency	CT ratio	Direct/VT	Voltage or VT ratio	Scale beginning	Scale ending
Examples	Active single Reactive balanced three-phase 3 wires	90° 250°	72 x 72 96 x 96	50 Hz 60 Hz	1,000/5 A 400/5 A	Direct VT	230 V 20 kV/115 V	0 kW -12 MVAr	250 kW +12 MVAr

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

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

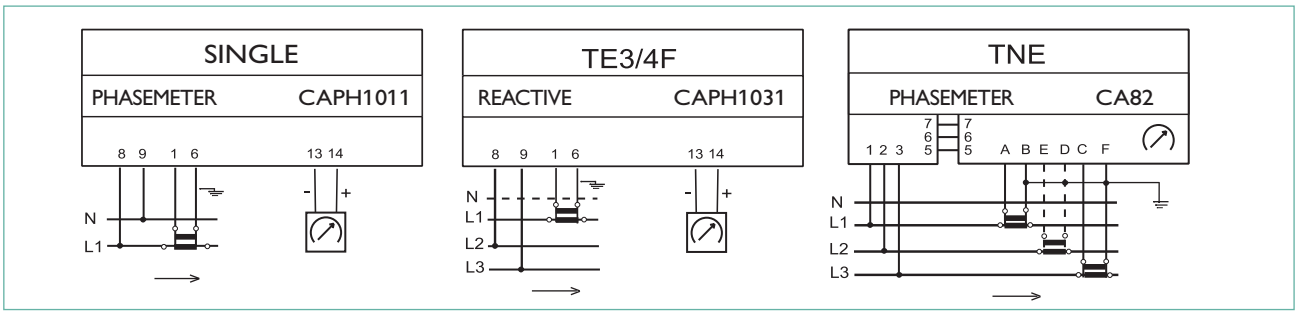
FEASIBILITY LIMITS

Voltage 57.7 to 440 V, other measurement ranges

					Deflection 90°			Deflection 250°			Deflection 360°	
Network	Frequency	Secondary CT	Voltage	Measurement range	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 PRODUCT

	Network	Deflection	Format	Frequency	CT secondary	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
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
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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"

Vibrating-reed double frequency meter

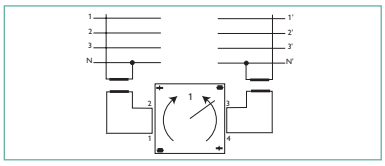
Accuracy class: 0.5
Consumption: 3 VA
Operating range: 0.8 to 1.15 Un
Measuring component:
vibrating reed in field of coil
Amplitude of vibration:
proportional to V^2

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

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

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	■	■	■

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 069	■
230 V	■	■	■
400 V	■	■	■

CUSTOMIZED PRODUCT

	Format	Frequency	Voltage	Phase lamp
Examples	144 x 144 96 x 96	50 Hz 60 Hz	100 V 440	With Without

CUSTOMIZED PRODUCT

	Format	Frequency	Voltage
Examples	96 x 96 72 x 72	48-52 Hz 58-62 Hz	100/√3 V 415 V

CUSTOMIZED PRODUCT

	Deflection	Format	Voltage	Measurement range
Examples	90° 250°	144 x 144 96 x 96	100 V 100/3 V	±25% ±50%

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

DC AMMETER

- **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 rating ≥ 50 mA
variable for rating < 50 mA

- **Deflection** 250°

Accuracy class: 1.5
Measuring component: Moving coil
Linear scale
Voltage drop: 100 mV for rating ≥ 10 mA
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				50 mV 60 mV 100 mV 120 mV 150 mV 300 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

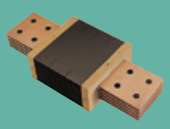
	Deflection	90°				250°			
Format		48 x 48	72 x 72	96 x 96	144 x 144	48 x 48	72 x 72	96 x 96	144 x 144
Shunt	**Scale 1.2 In**								
5 A	**0-6 A**	■	■	■	■	■	■	■	■
10 A	**0-12 A**	■			■	■	■	■	■
15 A	**0-18 A**	■	■	■	■	■	■	■	■
20 A	**0-24 A**	■	■	■	■	■	■	■	■
25 A	**0-30 A**	■	■ C90S 1403	■ C90S 1503	■	■	■	■	■
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**	■	■	■	■	■	■	■	■
1,000 A	**0-1,200 A**	■	■	■	■	■	■	■	■

CUSTOMIZED PRODUCT

	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 0-1,500 rpm

ASSOCIATED PRODUCTS

Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251



SHUNTS
1 to 6,000 A
Vast choice whatever your application.
page 152

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 mV				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 1.2 In								
15 A	0-18 A	■	■	■	■	■	■	■	■
30 A	0-36 A	■	■ C90S 1425	■ C90S 1525	■	■	■	■	■
60 A	0-72 A	■	■ C90S 1426	■ C90S 1526	■	■	■	■	■
75 A	0-90 A	■	■	■	■	■	■	■	■
150 A	0-180 A	■	■ C90S 1428	■ C90S 1528	■	■	■	■ C250 1928	■
300 A	0-360 A	■	■	■	■	■	■	■	■

CUSTOMIZED PRODUCT

	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
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116

COMMAND FUNCTION METER

- **Deflection** 90°

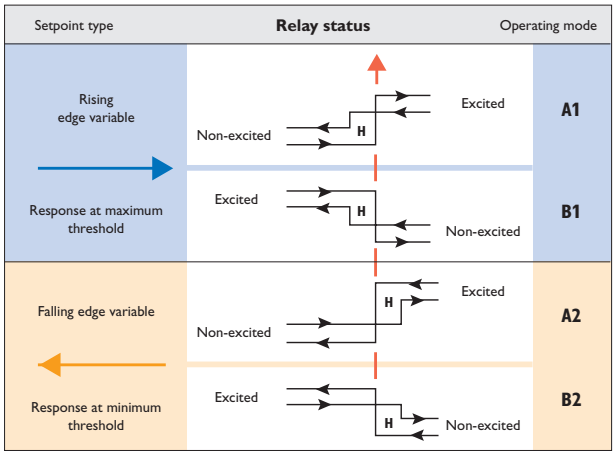
Format : 96 x 96
Accuracy class: 1.5
Threshold index (with or without indicator)
Consumption:
I input: 1 VA (if AC); 100 mV (if DC)
V input:1 mA (if AC); 1 mA (if DC > 0.5 V and 5 mA if below)
Relay: adjustable from 0 to 100% of scale (accuracy threshold ± 1%)
Response time < 500 ms; Hysteresis: 1% ± 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 changeover contacts	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 300mV		24 Vdc to 125 Vdc		
DC voltmeter		Direct from 0.1 to 400 V				
Temperature		Pt 100 2 / 3 wire JKNST thermocouple				

Parameters to indicate when ordering

OPERATING RELAY STATUS



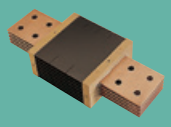
CUSTOMIZED PRODUCT

	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

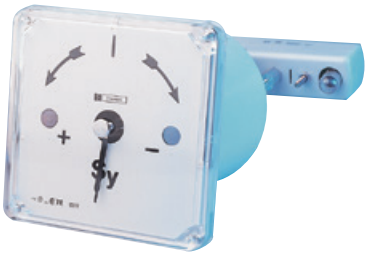
Accessories
Seal, ring fastener, dial, sleeve, etc.
page 251

Current transformers
Cable primary, busbar primary, closed core or split core, etc.
page 116



SHUNTS
1 to 6,000 A
Vast choice whatever your application.
page 152

SYNCHRONIZATION COLUMN



SYNCHRONOSCOPE

VIBRATING-REED DOUBLE FREQUENCY METER

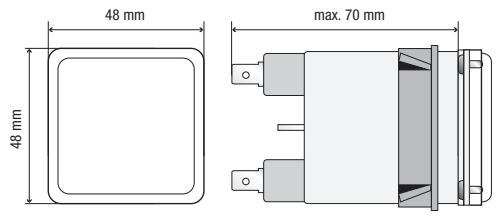
DIFFERENTIAL VOLTMETER

PHASEMETER

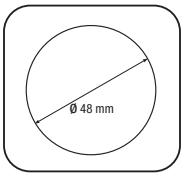
COHO
RANGE

Hour meters for totalling the operating time of machines or equipment for control and maintenance.

- For severe environments
- High-reliability range



Panel drilling



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

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,
variant: IP55

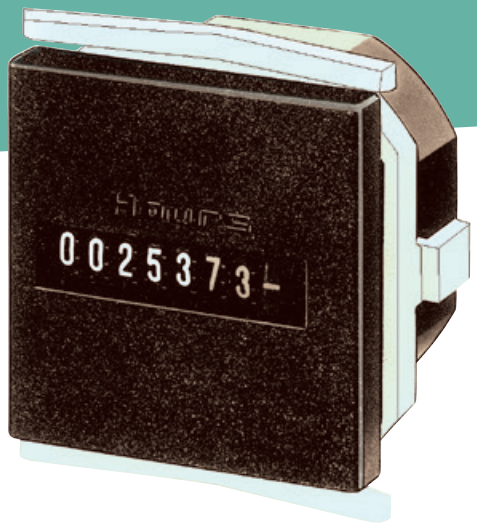
Electromagnetic compatibility
(emission and immunity): EN 61326-1

Mounting:
Standard version: elastic joint
IP55 version: joint + strap

Weight: 180 g

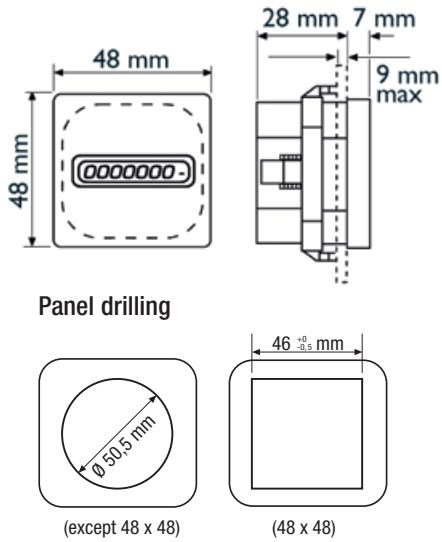
Connection: 6.35 Faston clips + terminal covers included

LK RANGE



Hour meters (7 or 8 digits) for totalling the operating time of machines or equipment for control and maintenance.

- Easy to install
- Economical



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

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%

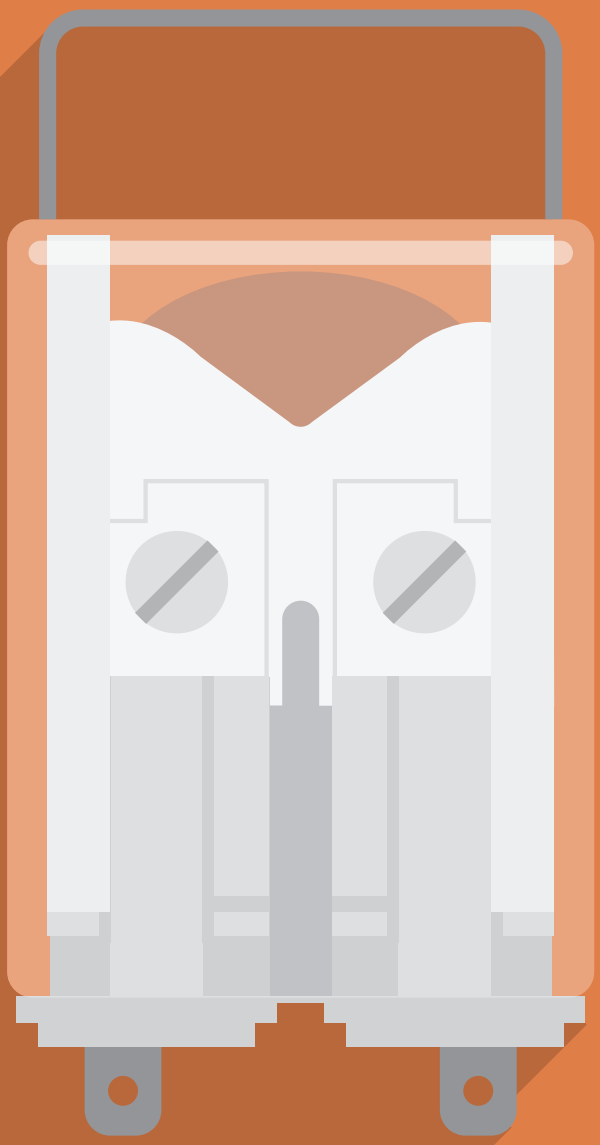
Environment:
Operating temperature: -15°C to +50°C
Relative humidity: < 95% at +45°C

Protection rating on front panel: IP52

Mounting: self-locking flange

Weight: 50 g

Connection: 6.35 lugs or Faston clips



CRITICAL AUXILIARY RELAYS

AUXILIARY RELAYS

AUXILIARY RELAYS

Instantaneous relays

Monostable
catalog 906130103


Bistable
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.

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.

APPLICATIONS AND CONFORMITY

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

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 / ENEL: LV15/1, LV15/2 / LV16/1, LV16/2, LV16/3, LV16/4, LV16/5

	Energy		Railway	
	EDF (1)	ENEL (1) – TERNA (1)	Rolling stock	Substation
Relay ranges	RE 3000N (48 Vdc and 125 Vdc)	POK/POKS	F-OK B	POK/BiPOK – POKS/BiPOKS
	OKB184 (48 Vdc 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

RELAY SELECTION GUIDE BY FUNCTIONS

See all our automation relays in the Relays Catalog:

- at our website **www.enerdis.com** in the Publications section
- with your Enerdis contact, specifying the **reference 906130103**

In	Model	Monostable	Bistable	Fast-acting	
				Monostable	Bistable
5 – 10 A	POK, BiPOK, TriPOK	■			
10 A	OKN, OKFc, OKB184, OKSCd, OKSGcCd, OKSFcUIC	■			
13 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	
▨					
▨					
▨					
					▨
					▨
▨					
	▨				
		▨			
			▨		
				▨	
	▨				

SERVICES AND TRAINING

SERVICES AND TRAINING

Combined know-how in a demanding technological context.

- More than 25 years' experience
- Multiple areas of expertise
- A dedicated team of applications engineers
- Service provided all over the world

DESCRIPTION

Enerdis offers you the benefits of **more than 25 years' experience and know-how in all aspects of electrical energy and in the most demanding business sectors:** energy production, transmission and distribution, major industries, infrastructure, tertiary, etc.

Enerdis proposes a set of services to help you succeed in your projects, with support from an applications team composed of specialized engineers:

- Basic design studies - Engineering
- Surveys and technical audits
- Commissioning
- Training courses
- On-site and remote maintenance contracts
- Specific development
- Certificate of conformity and verification certificate
- Factory acceptance
- Repairs - After-Sales service

BASIC DESIGN STUDIES - ENGINEERING

Drafting of technical proposals on the basis of specifications or special technical clauses, visit and on-site technical inspection.

SURVEYS AND TECHNICAL AUDITS

Pre-project inspection of the sites to identify the requirements and gather all the technical data.
Size an extension or upgrade of the functional installations.
Find the causes and solutions for your on-site technical problems.

COMMISSIONING

Operations in France and abroad to set up the equipment, check its installation and roll out the processing and analysis software. Commissioning includes adjusting the parameter settings of the equipment and related software to ensure that the operator can get the system up and running quickly and easily.

TRAINING COURSES

The training services on our equipment and software help to optimize the operation of your installations and make them autonomous so that they can be upgraded.
Enerdis, a certified training organization since 1993 - certification no. 11.92.16273.92.

ON-SITE AND REMOTE MAINTENANCE

With a maintenance contract, you benefit from:

- a privileged relationship for user assistance
- preventive maintenance
- upgrading of the products and software
- specific on-site assistance
- tailored services sized to match your needs

SPECIFIC DEVELOPMENTS

Enerdis's engineering and manufacturing resources enable it to develop equipment according to specifications with specific features to meet the requirements of the most demanding applications in the energy sector: tariff meters, high-precision current transformers, etc., for RTE and ENEDIS.

CERTIFICATE OF CONFORMITY AND VERIFICATION CERTIFICATE

On request, Enerdis can deliver its products with specific certificates:

- The certificate of conformity confirms compliance with the stipulations of an order delivered by the industrial company / supplier as per the NF L 00-015C standard
- The verification certificate establishes a table of the measurement deviations between the equipment and a reference instrument. This document complies with the FDX07-011 documentation booklet

FACTORY ACCEPTANCE

The customer or a mandated organization is present during the final tests of the products before shipment. Measurements to check the equipment's accuracy and dielectric tests may be performed. The checks are performed on a unit-by-unit basis or by sampling.

REPAIRS - AFTER-SALES SERVICE

Manumesure, a company in the Chauvin Arnoux Group, provides after-sales service for the instruments from the Group's brands, with a particular focus on Enerdis products. Manumesure's expertise is backed by dedicated human and technical resources, computerization and traceability of the diagrams, centralized management of replacement parts and metrological traceability to the national standards.

ENERDIS, A CERTIFIED TRAINING ORGANIZATION SINCE 1993 - CERTIFICATION NO. 11.92.16273.92

WE ARE IN THE BEST POSITION TO TRAIN YOU

As a manufacturer, we constantly innovate, developing new technologies which we fully master. This know-how guarantees that we possess thorough knowledge of the environments in which our solutions are installed.
As a measuring equipment manufacturer, we design and produce most of the instruments that we offer and with which you work. This means that we can draw on our comprehensive knowledge of the products to offer you training on our most technical equipment and on the energy information systems which form the foundation of our expertise. Practical exercises and concrete case studies are presented and analyzed so that you quickly learn and adopt the best professional practices, particularly in terms of compliance with the applicable standards and regulations.

TRAINING CERTIFICATES

For all our training courses which do not lead to a qualification, we test and confirm the knowledge acquired by the trainees by means of a multiple-choice test. If their test results are satisfactory, each trainee is awarded a training certificate.

Training courses at the Chauvin Arnoux Group's historic site in Paris

- Expert training instructors acknowledged in their fields
- Innovative demonstration equipment for easier understanding and handling
- A limited number of participants to ensure high-quality dialog

TRAINING IS A FUNDAMENTAL ADVANTAGE IN ANYONE'S CAREER PATH.

- To boost skills development
- To gain access to the various levels of qualification
- To obtain professional authorizations

NOTES

ABBREVIATIONS

AC OR ac	alternating current
CL	class
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 or rated 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 or rated voltage
V	phase-neutral voltage
VT (OR PT)	voltage or potential transformer

INDEX