

GENERAL CATALOG 2022



ENERGY METERING PLAN

Remote data retrieval from meters
Energy saving
ISO 50001
Energy rebilling

METERS AND POWER MONITORS



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DATA LOGGERS



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NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

High-accuracy measurement
Network supervision
Severe environments
Multi-function
Accurate display

CURRENT TRANSFORMERS AND SHUNTS



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CRITICAL AUXILIARY RELAYS

High breaking capacity
Railway applications
Nuclear qualification
Control of critical automated systems
EMC immunity

AUXILIARY RELAYS



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SERVICES AND TRAINING

Combined know-how

SERVICES AND TRAINING



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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

1,000
staff

6 R&D departments
worldwide

8
production sites

11%
of revenues invested in R&D

Chauvin Arnoux Energy

Chauvin Arnoux Energy, a company in the Chauvin Arnoux Group, is specialized in fixed equipment for measuring and supervising electrical networks to meet the needs of cutting-edge industries for intensive use in severe environments

Our key sectors

ELECTRICAL POWER GENERATION

Chauvin Arnoux Energy meets the specific needs of the nuclear sector by providing expertise developed and acknowledged for more than thirty years.



ELECTRIC POWER TRANSMISSION AND DISTRIBUTION

Chauvin Arnoux Energy proposes solutions for energy billing and network balancing for the players in the power transmission and distribution sector.



RAIL

A major partner of the rail industry, Chauvin Arnoux Energy designs automation relays for the rolling stock and substations.



NAVAL

Chauvin Arnoux Energy produces customized solutions for navigation and control in the context of shipping applications.



A French brand with integrated production

Chauvin Arnoux Energy, a French company in the Chauvin Arnoux Group, handles all aspects of product manufacturing; from design through to final testing of the equipment. Our teams guarantee the quality and reliability of all the instruments we supply, as well as support lasting decades.

A long-term offering

Our thorough mastery of our industrial know-how in our factories in France and our ability to keep abreast of the changes in the markets (materials used in our equipment) enable us to guarantee constant quality and long-term availability for our products.

CHAUVIN ARNOUX ENERGY, THE NETWORKS EXPERT

The extensive CHAUVIN ARNOUX ENERGY 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 CHAUVIN ARNOUX ENERGY offering for a global solution

ENERGY METERING PLAN

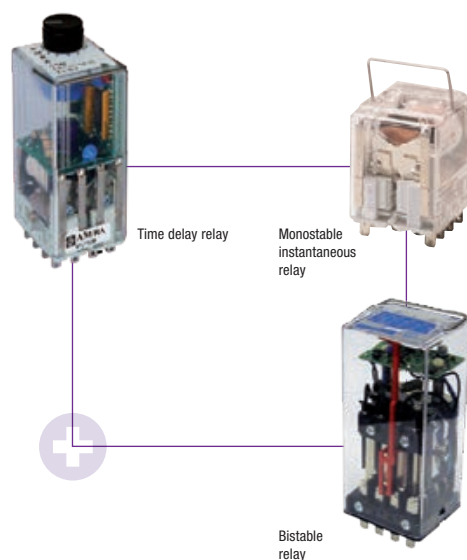
Considerable potential savings

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.

FROM METERING TO SUPERVISION



NETWORK SUPERVISION & PHYSICAL MEASUREMENT

Keeping your installations healthy

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

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 CHAUVIN ARNOUX ENERGY® 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 Pyrocontrol®



PRINT & DIGITAL FOR COMPLEMENTARY COMMUNICATION

More traditional communication or digital communication: for Chauvin Arnoux, there's no need to choose. The important thing is to speak the same language as you! Constantly seeking dialog with all its partners and customers/prospects, the Chauvin Arnoux Group relies on diverse print and digital communication media, giving priority to multi-channel communication.

A WELL-STRUCTURED WEBSITE

Whatever the device used (smartphone, tablet, PC), Chauvin Arnoux proposes a website which accompanies users as they browse.

Finding, sharing and combining information is easier and **offering relevant, customized information** on each of the Group's companies is one of the Group's focuses every day.

Chauvin Arnoux, Chauvin Arnoux Energy, Pyrocontrole, Indatech and Manumasure each presents the full extent of its offering through its products, skills, applications and publications, on the basis of a common identity based on the structured image of the Group.

ONLINE SALES

Beginning this year, the Group is proposing online sales of its top products. With just a few clicks, you can order the products and accessories you need. They can then be delivered to your site or to a pick-up point.

PRESENCE ON SOCIAL MEDIA

Keep up to date with all Chauvin Arnoux's news on the three main social media and our Youtube channel.

 **Facebook:**
<https://www.facebook.com/ChauvinArnouxEnergyFrance>

 **Twitter:**
https://twitter.com/CA_EnergyFr

 **LinkedIn:**
<https://www.linkedin.com/chauvinarnouxenergy>

 **Youtube:**
<https://www.youtube.com/c/chauvinarnouxgroup>

PUBLICATIONS TO STAY IN CONTACT

Sales literature, catalogs, customer magazine, review for education: Chauvin Arnoux constantly strives to provide publications which meet your expectations.

With nearly 50,000 copies distributed and a strong presence in distribution networks worldwide, the magazine Contact Measurement News relays the Group's news through corporate and technical articles from the Group's five subsidiaries. Overviews of the standards, product presentations, new applications, production organization or reports on subsidiaries offer transparent information appreciated by our customers – some since the first edition in black and white.





ENERGY METERING PLAN

METERS AND POWER MONITORS

12	OVERVIEW OF THE RANGE
16	SELECTION GUIDE
26	SUBMETERS
46	MULTICHANNEL METERS
52	TARIFF METERS
56	POWER MONITORS

METERS AND POWER MONITORS

MEMO range of submeters for simple metering functions

Single-phase networks



MEMO MD32

32 A direct input
Class 1

Energy meter for single-phase networks with direct connection up to 32 A.

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MEMO MD65

65 A direct input
Class 1

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

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Three-phase networks



MEMO TD80

80 A direct input
Classe 1

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

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ULYS range of submeters for advanced metering functions

Single-phase networks



ULYS MD45-M

45 A direct input
MID Class B
Built-in communication

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

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ULYS MD100-M

100 A direct input
MID Class B
Built-in communication

Energy meter for single-phase networks with direct connection up to 100 A.

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Three-phase networks



ULYS TDA80-M

80 A direct input
MID Class B
Communication with ULYSCOM modules

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

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ULYS TTA-M

Connection to CT
MID Class B
Communication with ULYSCOM modules

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

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ULYS TD80-M

80 A direct input
MID Class B
Built-in communication

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

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ULYS TT-M

Connection to CT
MID Class B
Built-in communication

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

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Metering solution



ULYS FLEX

On Rogowski coils

Measurement from 0.3 A to 20,000 A
Built-in RS485 communication.

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rail

Tariff meter



ALTYS

Class 0.5s - MID

Connected to the MV network. Takes into account all the tariff offers on the market.

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Power monitors

96 x 96 mm format



MEMO P200

Class 0.5

Electrical energy.

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ENERIUM 50

Class 0.5

Electrical energy.

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ENERIUM 150

Class 0.5

Electrical energy.

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144 x 144 mm format



ENERIUM 100

Class 0.5

Multi-energy.

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ENERIUM 110

Class 0.5/0.2

Without display

Multi-energy.

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ENERIUM 200

Class 0.5/0.2

Multi-energy.

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ENERIUM 210

Class 0.5

Without display

Multi-energy.

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ENERIUM 300

Class 0.2

Qualimetry.

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ENERIUM 310

Class 0.2

Without display

Qualimetry.

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Associated software



E.VIEW

Configuration and diagnostic software

Reading of the digital inputs and/or forcing of the digital and analog outputs.

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QUICK SELECTION GUIDE

FOR SUBMETERS



Optimized inventory

A limited number of references corresponding to the most widely-used electrical feeders.



Clear, simple display

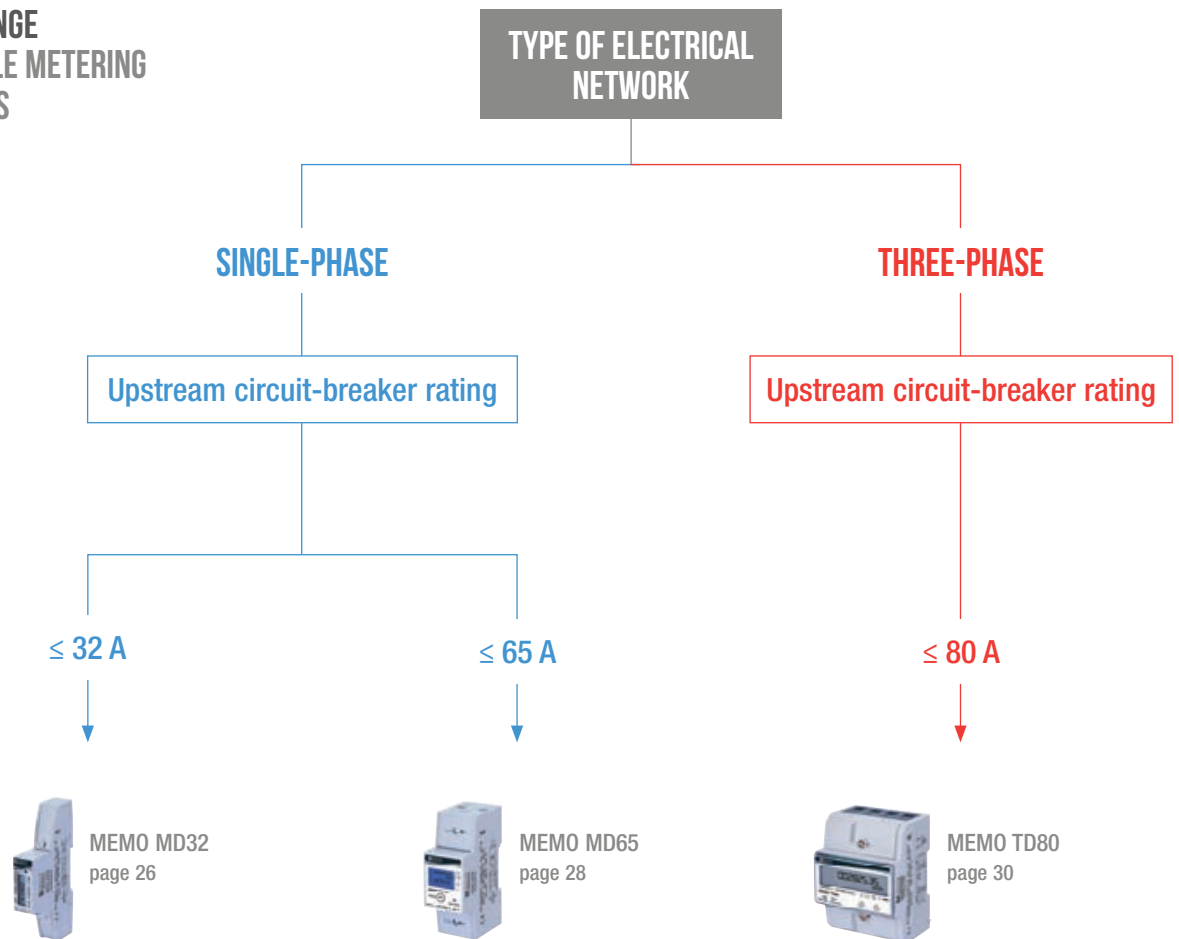
Direct access to your consumption data.



No parameter settings

Operational as soon as it is powered up

MEMO RANGE FOR SIMPLE METERING FUNCTIONS





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Interoperability

Built-in communication (Modbus, M-bus, Ethernet) and pulse outputs in a highly compact casing.



Fair rebilling

MID, double tariff, partial metering.

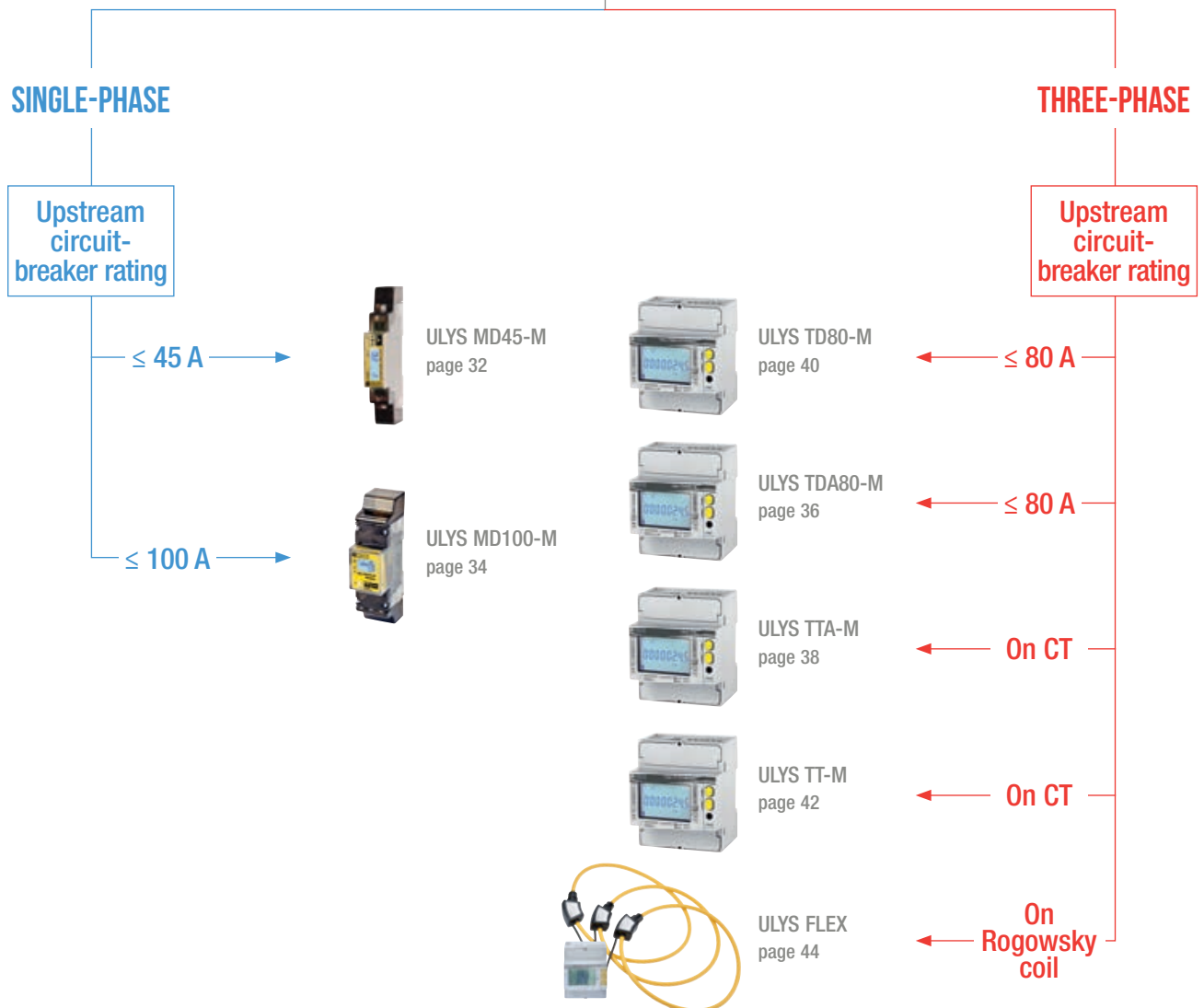


Customizable multiple measurements

Configurable display. Local or remote access via web pages or FTP push.

ULYS RANGE FOR ADVANCED METERING AND MEASUREMENT FUNCTIONS

TYPE OF ELECTRICAL NETWORK



METER SELECTION GUIDE

BY FUNCTIONS

MEMO range

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MEMO MD32

MEMO MD65

MEMO TD80

Single-phase

Three-phase

Strengths		1 module	2 modules	4 modules
	Rating	32 A	65 A	80 A
	 MID certification	no	no	no
	Accuracy class	IEC Class 1	IEC Class 1	IEC Class 1
Installation	Format DIN modules	1	2	4
	Auxiliary power supply	Self-powered		
	Rated voltage	230 Vac	230 Vac	230/400 Vac
	Inputs Direct/Sensors	32 A	65 A	80 A
Energy metering and management	Display and communication (if relevant)	total kWh	total and partial kWh	total and partial kWh
Multi-measurement	Display and communication (if it exists)	-	-	-
Recording / Push FTP		-	-	-
Inputs / Outputs	Pulse output(s)	1	1	1
	Tariff change input	-	-	-
Communication	RS485 Modbus	-	-	-
	Ethernet Modbus	-	-	-



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ULYS range

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ULYS MD45-M		ULYS MD100-M		ULYS TDA80-M ULYS TD80-M		ULYS TTA-M ULYS TT-M		ULYSFLEX Modbus	
Single-phase				Three-phase					
Multi-measurement Integrated communication MID version				Multiprotocol communication Multi-measurement MID version					
45 A		100 A		80 A		On CT 1/5 A		0.3 to 20000 A	
yes		yes		yes		yes		no	
MID Class B				MID Class B		IEC Class 1			
1		2		4		4		4	
Self-powered				85-265 Vac					
230 Vac		230 Vac		230/400 Vac		230/400 Vac		10/17 to 285/495 Vac	
Direct 45 A		Direct 100 A		Direct 80 A		Isolated 1/5A		On Rogowski coils	
Bidirectional ,kWh, total kVAh and partial kWh		Bidirectional ,kWh, total kVAh and partial kWh		Bidirectional, kWh, kVAh, total, partial and per-phase kVAh		Bidirectional, kWh, kVAh, total, partial and per-phase kVAh		Bidirectional, kWh, kVAh, total and per-phase kVAh	
V, I, P, Q, S, F, PF		V, I, P, Q, S, F, PF		V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS		V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS		V, U, I, P, Q, S, F, PF, ΣP, ΣQ, ΣS	
-		-		Recording and Push FTP on Ethernet version					
1		2		2 on TDA80-M - 1 on TD80-M		2 on TTA-M - 1 on TT-M		1 (alarm or pulse)	
ULYS MD45-M		ULYS MD100-M		1 (except Ethernet model)		1 (except Ethernet model)		no	
ULYS MD45-M Modbus		ULYS MD100-M Modbus		ULYS TDA80-M Modbus		ULYS T-M Modbus		ULYS FLEX Modbus	
-		-		ULYS TDA80-M Ethernet		ULYS TT-M Ethernet		-	

* depending on model

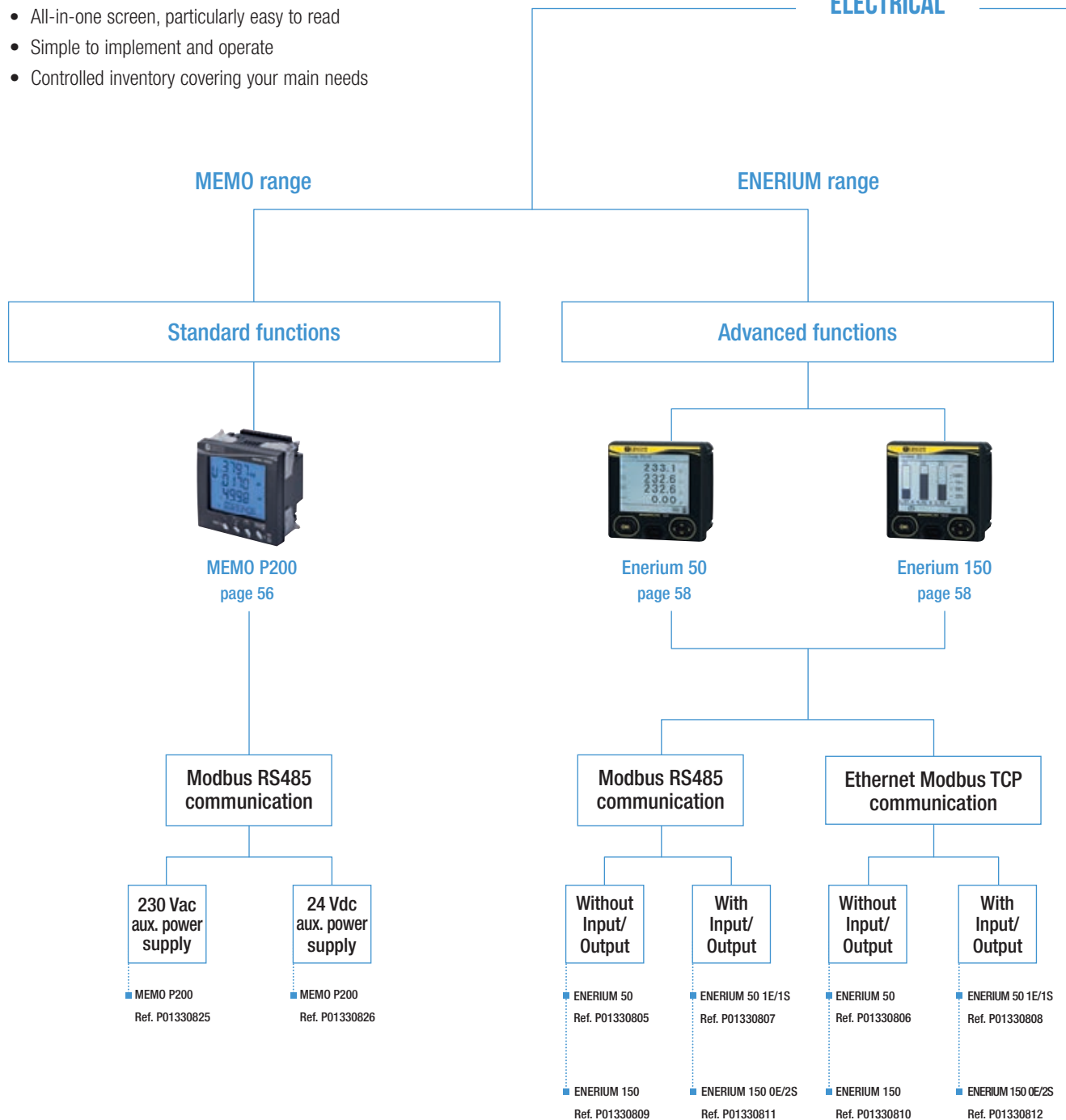
QUICK SELECTION GUIDE

FOR POWER MONITORS

MEMO

- All-in-one screen, particularly easy to read
- Simple to implement and operate
- Controlled inventory covering your main needs

ELECTRICAL





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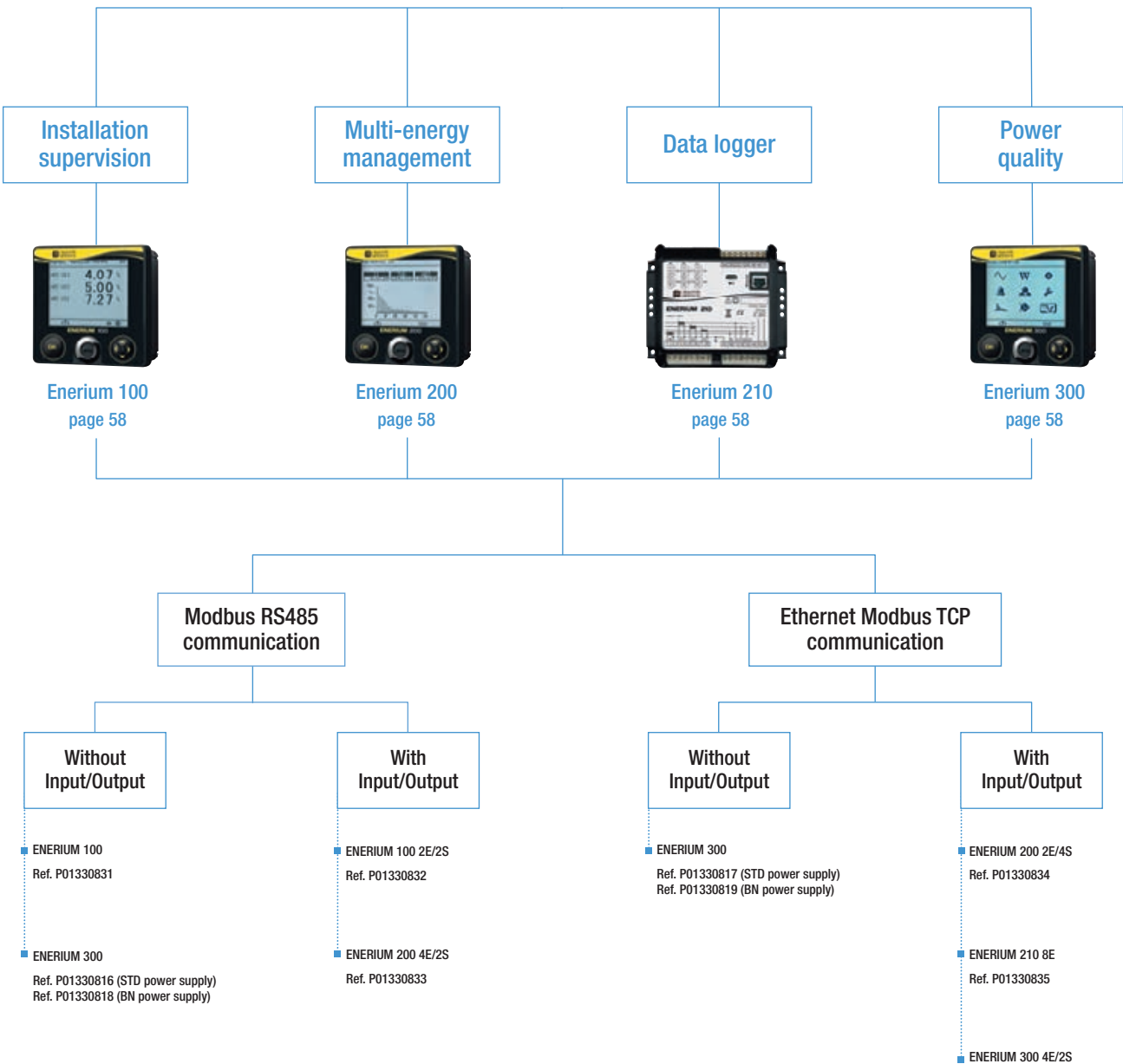
APPLICATION

MULTI-ENERGY

ENERIUM

- Accuracy suitable for the most critical MV/LV measurements
- The history and diagnostic tools to understand everything about your electrical feeder
- Unique on the market: up to 8 totally-integrated inputs/outputs (on-off or analog)
- Energy quality measurement at the heart of a power monitor

ENERIUM range



CHOOSING YOUR POWER MONITOR

MEMO

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ENERIUM

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		MEMO P200	Enerium 50
Electrical energy management	Accuracy	0.5 %	0.5 %
	Measurement of V, U, I Inst. Min/Max Avg.	■	■
	Measurement of P, Q, S Inst. Min/Max Avg.	■	■
	Energy generated and consumed	■	■
Multi-energy management	Consumption curves (10-min. average values)		8
	Inputs for pulses from other meters (water, gas, etc.)		0, 1 or 2
Installation monitoring	Inputs for analog quantities (temp., flow rate, pressure, insolation, etc.)		
	Trend curves		
	Management of alarms on thresholds		16
	Alarms log (recordings)		64
	Graph (Fresnel)		
Power quality	Pulse or alarm outputs	1 (pulse)	0, 1 or 2
	Analog outputs		0 or 2
	THD / PF / Tan φ	■	■
	Harmonics by orders with graphical representation		25
	Waveform 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	
Available in version without display			



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ENERIUM

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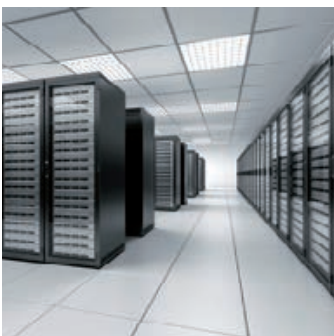
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Enerium 150	Enerium 100	Enerium 200	Enerium 300
0.5 %	0.5 %	0.2 %	0.2 %
■	■	■	■
■	■	■	■
■	■	■	■
8		8	8
0, 1 or 2	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8	0, 2, 4, 6 or 8
4	4	4	4
16	16	16	16
64	64	64	64
■	■	■	■
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.

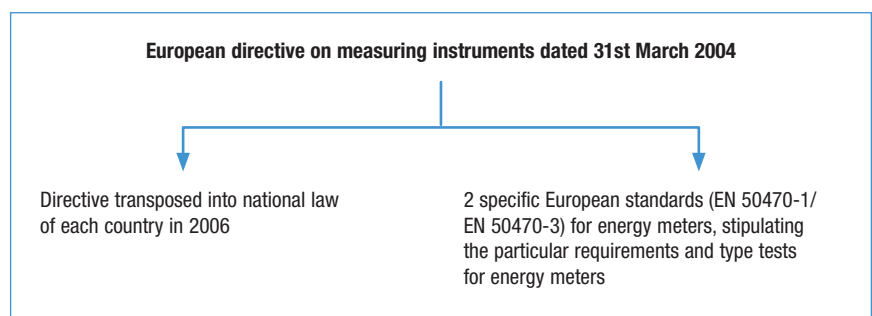
SCOPE

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:

- In **residential** use, “(...) any meter of at least Class A is sufficient (...) but a Class B meter is required in the following cases:
 - when the current I_{max} is greater than or equal to 45 A, in the case of a single-phase connection, or 15 A in the case of a three-phase connection;
 - when the meter records the consumption data corresponding to specific time slots in separate registers (...).”
- In **commercial** use or **light industry** “(...) a meter of at least Class B is required. A Class C meter may be required, however”.

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

REGULATORY CONTEXT



CONDITIONS OF APPLICATION

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

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

As the MID is applicable to all European Union Member States, certification of a meter by a Notified Body (NB) means that no other testing by a national legal metrological service is required. So a MID-certified Chauvin Arnoux Energy 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.

CHAUVIN ARNOUX ENERGY PRODUCTS CONCERNED

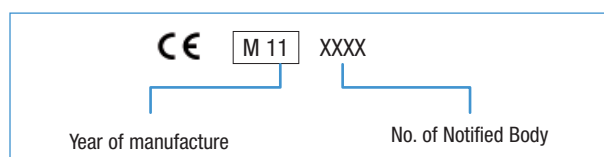
- The active energy meters whose references end in "M", such as the **ULYS MD45-M**, also identified with the MID logo in our catalog, fully comply with the MID.
- The directive does not apply, in particular, to current transformers, power monitors and the additional functions (other than active energy measurement) offered by smart meters.

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.

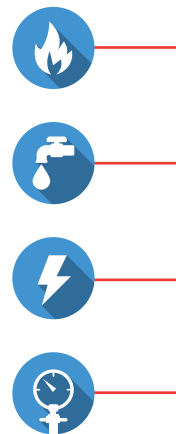
PERMANENT MEASUREMENT SYSTEM

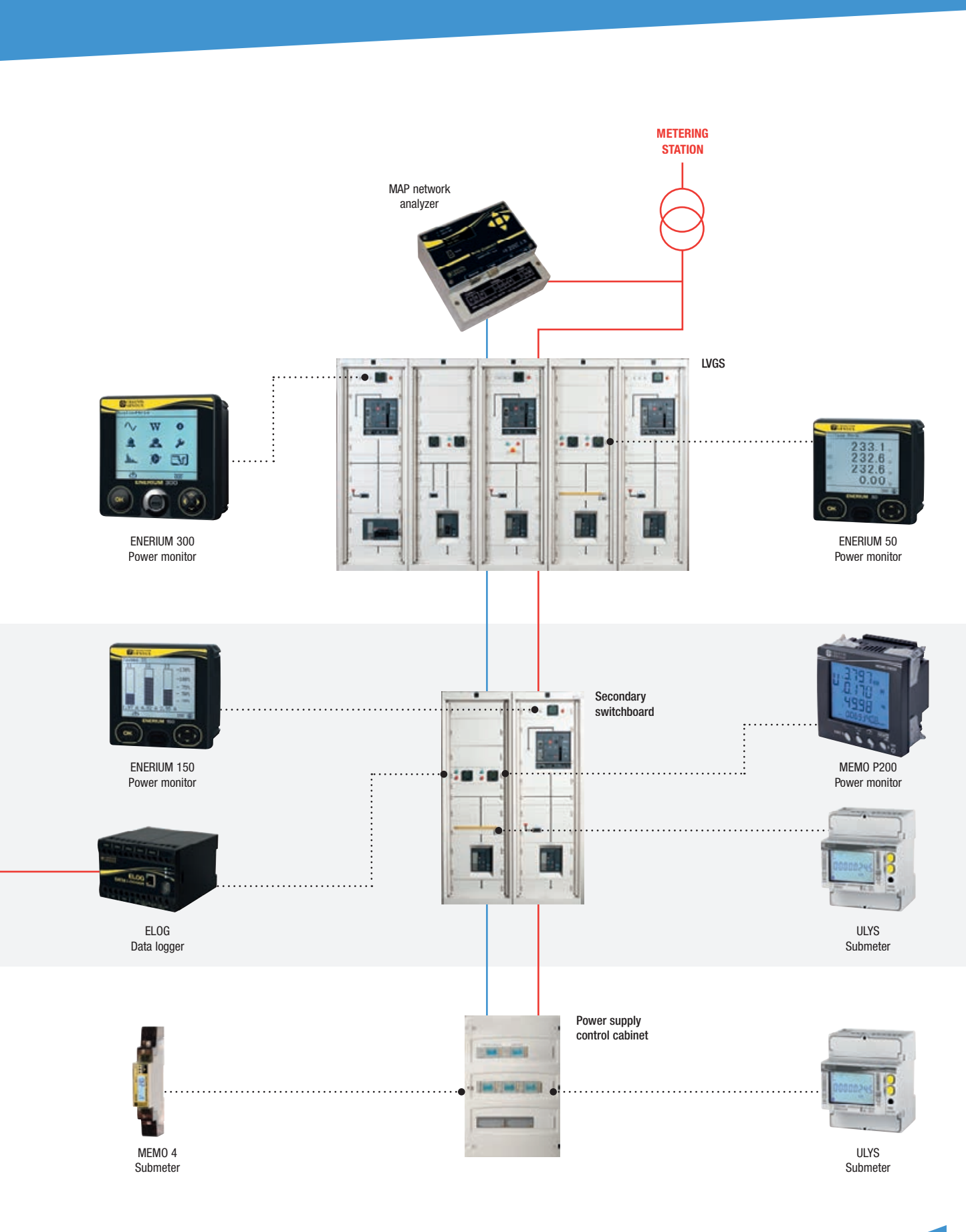
**KNOW ALL THE DETAILS:
WHERE, WHEN, HOW, HOW MUCH?
SUPERVISING, MANAGING AND EXCHANGING**

Metering and measurement

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

MULTI-UTILITY METERS





MEMO MD32

SINGLE-PHASE 32 A



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

GENERAL SPECIFICATIONS

The **MEMO** range of meters is the economical solution for measuring electrical consumption on a 230 V single-phase network.

Equipped with a digital display, the **MEMO MD32** offers Class 1 accuracy, in total compliance with the IEC 62053-21 standard.

- Mounting on DIN rail with direct connection up to 32 A
- Sealable cover (phase and neutral terminals)
- Pulse output as standard



- 32 A rated current
- Class 1 as per IEC 62053-21
- Compact: only one DIN module
- Pulse output as standard
- Sealing system on the phase and neutral terminals

ZOOM



Economical solution



Sealable terminal covers



Pulse output as standard



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ELECTRICAL SPECIFICATIONS

Current input	
Type	Single-phase
Rated current (I _{max})	(5) 32 A
Inrush current (I _{st})	20 mA
Voltage input	
Rated voltage (U _n)	230 Vac (± 20 %)
Consumption	≤ 8 VA - ≤ 0.4W
Rated frequency	50 / 60 Hz
Pulse output	
Duration	80 ms
Weight	1,000 pulses / kWh
Maximum voltage	12-27 Vdc
Maximum current	27 mA
Accuracy	
Active energy	Class 1 as per IEC 62053-21
Metrological LED	
Weight	1,000 pulses / kWh

MECHANICAL SPECIFICATIONS

Ingress protection	IP 50 front panel
Power circuit connection	Screw terminal strip up to 12 mm ² for flexible wires (10 mm ² for rigid wires)
Pulse output connection	Screw terminal strip for 1.5 mm ² wires
Sealing system	On the phase and neutral terminals
Mounting	On 35 mm DIN rail
Weight	80 g

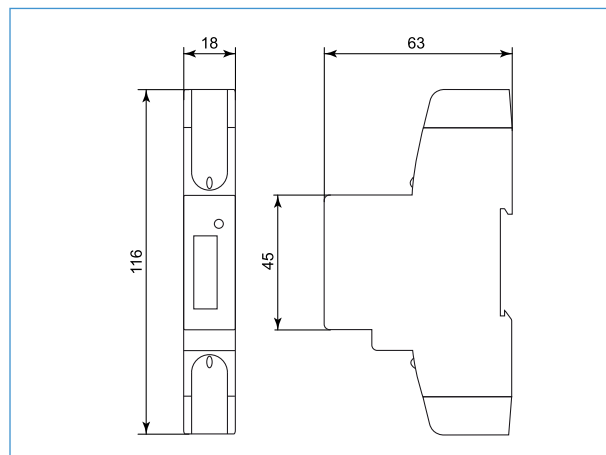
ENVIRONMENT

Operating temperature	-25 °C to +55 °C
Storage temperature	-25 °C to +70 °C
Relative humidity in operation	75 % max

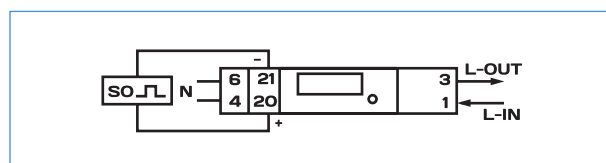
DISPLAY

Display	LCD, 5 + 2 digits
Total (kWh)	Indication of total consumption

DIMENSIONS (MM)



ELECTRICAL CONNECTIONS



TO ORDER

Model	Reference
MEMO MD32	P01330740

ASSOCIATED PRODUCT



DATA LOGGERS

Remote data retrieval unit, multi-energy data concentrator, data collector, etc.

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MEMO MD65

SINGLE-PHASE 65 A



Energy meter for single-phase networks.
Direct connection up to 65 A.

GENERAL SPECIFICATIONS

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

Equipped with a 2-line digital display, the MEMO MD65 offers simultaneous display of the cumulated and partial index.

- Active energy measurement on single-phase networks
- 1 pulse output which can be connected to a data logger
- Direct current inputs up to 65 A
- Display of the total and partial active energy



- Class 1 as per IEC 62053-21
- Compact: only 2 DIN modules
- Pulse output
- LCD screen

ZQOM



Display of energy index
on an LCD screen



Sealable terminal cover



Direct connection
up to 65 A



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nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input	
Type	Single-phase
Rated current (I _{max})	(5) 65 A
Inrush current (I _{st})	20 mA
Voltage input	
Rated voltage (U _n)	230 V (±30 %)
Consumption	≤ 8 VA
Frequency	50/60 Hz
Pulse output	
Duration	90 ms
Weight	1,000 pulses/kWh
Maximum voltage	12-27 Vdc
Maximum current	27 mA
Accuracy	
Active energy	Class 1 as per IEC 62053-21
Metrological LED	
Weight	1,000 pulses / kWh

MECHANICAL SPECIFICATIONS

Ingress protection	IP50
Power circuit connection	Screw terminal strip for 25 mm ² wires
Pulse output connection	Screw terminal for 1.5 mm ² wires
Mounting	On 35 mm DIN rail
Weight	160 g

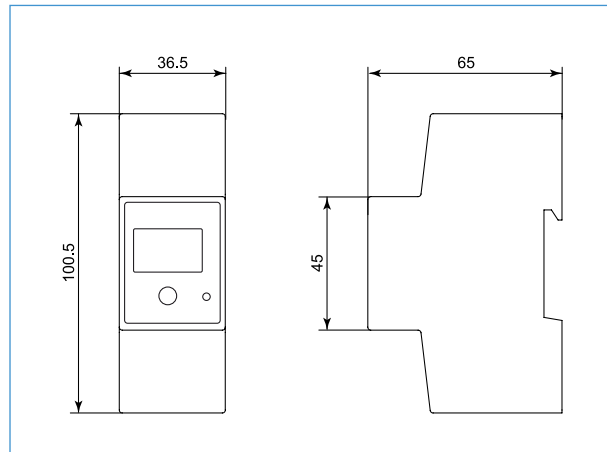
ENVIRONMENT

Operating temperature	-25 °C to +65 °C
Storage temperature	-25 °C to +70 °C
Relative humidity in operation	75 % max

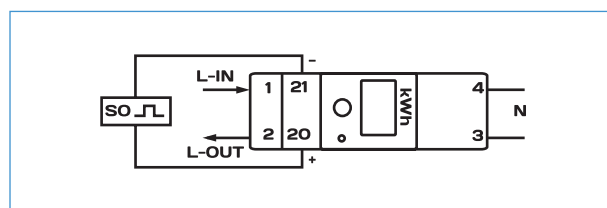
DISPLAY

Display	LCD
Number of digits	Total/partial Ea: 6+1

DIMENSIONS (MM)



ELECTRICAL CONNECTIONS



TO ORDER

Model	Reference
MEMO MD65	P01330741

ASSOCIATED PRODUCT



DATA LOGGERS

Remote data retrieval unit, multi-energy data concentrator, data collector, etc.

page 76

MEMO TD80

THREE-PHASE 80 A



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

DESCRIPTION

MEMO TD80 is an energy meter for use on three-phase networks.

- 1 pulse output as standard
- Direct current inputs up to 80 A
- Multi-measurement: cumulated and partial index
- Sealable terminal covers



- Class 1 as per IEC 62053-21
- 4 DIN modules
- Pulse output as standard

ZOOM



Display of the energy index on LCD screen



Sealable terminal covers



Direct connection up to 80 A



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input	
Type	Direct
Rated current (I _{max})	(5) 80 A
Inrush current (I _{st})	20 mA
Voltage input	
Rated voltage (U _n)	3 x 230/400 Vac (±20%)
Consumption	≤ 8 VA - ≤ 0.4 W
Frequency	50/60 Hz
Pulse output	
Duration	30 ms
Weight	100 pulses/kWh
Maximum voltage	12-27 Vdc
Maximum current	27 mA
Accuracy	
Active energy	Class 1 as per IEC 62053-21
Metrological LED	
Weight	1,000 pulses / kWh 1,000 pulses / kVArh

MECHANICAL SPECIFICATIONS

Format	4 DIN modules
Mounting	On 35 mm DIN rail
Power circuit connection	Screw terminal strip for 35 mm ² wires
Pulse output connection	Screw terminal strip for 1.5 mm ² wires
Ingress protection	IP50 front panel

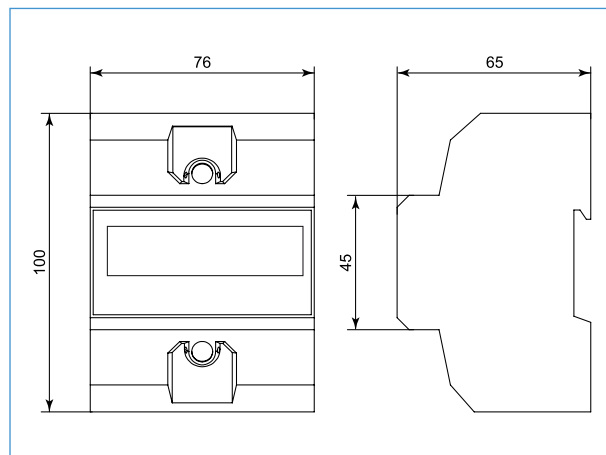
ENVIRONMENT

Operating temperature	- 25 °C to +65 °C
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max. 85 % without condensation

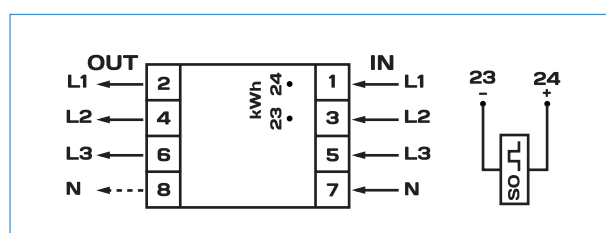
DISPLAY

Display	LCD
Number of digits	6+2

DIMENSIONS (MM)



ELECTRICAL CONNECTIONS



T O O R D E R

Model	Reference
MEMO TD80	P01330745

ASSOCIATED PRODUCT



DATA LOGGERS

Remote data retrieval unit, multi-energy data concentrator, data collector, etc.

page 76

ULYS MD45

SINGLE-PHASE 45 A



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

GENERAL SPECIFICATIONS

- Display and parameters programmable using the touch-sensitive key on the front panel
- Power-off meter
- Tariff-change input on ULYS MD45-M
- 1 pulse output as standard (weight configurable)
- MID version for energy rebilling on private networks
- Multi-measurement:
 - Instantaneous quantities: V, I, P, Q, S, FPP and F
 - Instantaneous quantities and energy indices according to energy direction and tariff
- RS485 Modbus communication (ULYS MD45-M Modbus)
- Bidirectionality of the energy (consumed and generated)
- Reinitializable partial active energy index

When used with a remote meter-reading solution and energy management software, you can recover your energy consumption data remotely on your PC so that you can automatically generate consumption reports and allocate the consumption fairly.



- Built-in RS485 Modbus communication
- Reinitializable partial meter index
- Bidirectional metering
- Double-tariff metering
- Totally configurable on front panel or via optical head
- Customizable multi-measurement display
- MID Class B

ZOOM



Quick parameter modification using touch-sensitive button on front panel or optical head



Sealable terminal covers delivered as standard



Backlit LCD screen



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input	
Rated current (I _{max})	45 A
Minimum current (I _{min})	250 mA
Inrush current (I _{st})	20 mA
Voltage input	
Rated voltage (U _n)	230 Vac (-15% / +10%)
Consumption	≤ 2 W
Rated frequency	50 Hz (± 10%)
Tariff change input (ULYS MD45-M only)	
T1	0 V
T2	230 Vac
Metrological LED	
Weight	10,000 pulses / kWh
Pulse output	
Weight	Parameterizable (0.01 - 0,1 - 1 - 10 - 100 - 1,000 - 2,000 - 10,000 pulses / kWh)
Duration	≤ 5,625 W: 32 ms > 5,625 W: 11.2 ms
Accuracy	
Active energy	MID Class B as per EN 50470-1-3
Infrared output	
IR wavelength	900 - 1,000 nm
Protocol	IEC 62056-21:2002 (IEC 1107)
Communication (ULYS MD45-M Modbus only)	
Type of bus	RS485
Protocol	MODBUS RTU with 16-bit CRC
Transmission speed	1200, 2400, 4800, 9600 bauds/s (by default)
Addresses	0 - 247 (by default: last 2 digits of SN)
Maximum bus loads	60
Maximum distance	1,000 meters
Parameter settings	Using button on front panel and optical head

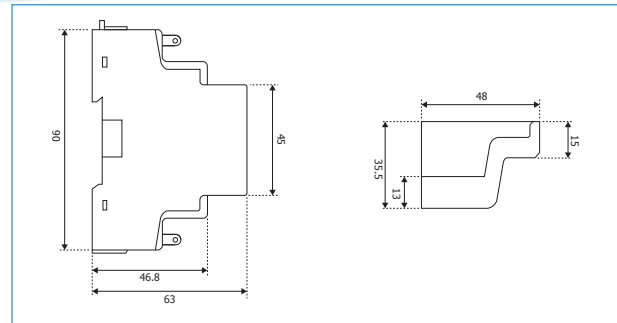
MECHANICAL SPECIFICATIONS

Ingress protection	IP 51 front panel
Power circuit connection	Max 10 mm ²
Pulse output or communication connection	Max 1.5 mm ²
Mounting	On 35 mm DIN rail
Weight	80 g

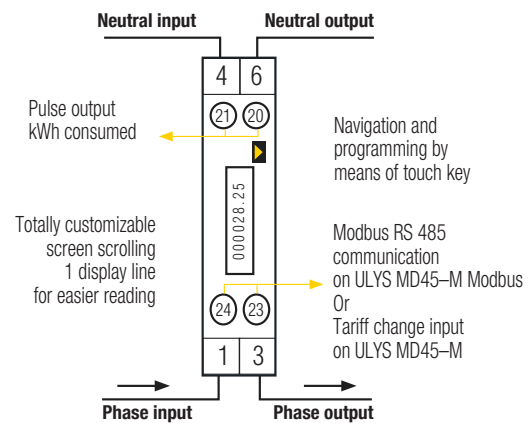
ENVIRONMENT

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

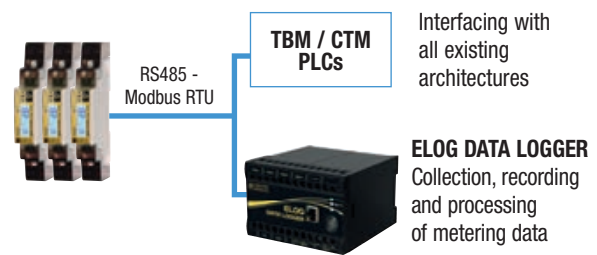
DIMENSIONS (MM)



ELECTRICAL CONNECTIONS



BLOCK DIAGRAM



T O O R D E R

Model	Certification	Communication	Reference
ULYS MD45-M	MID	-	P01330754
ULYS MD45-M Modbus	MID	RS485 Modbus	P01330756

Accessories	Reference
USB optical head	P01330790

To simplify programming of the ULYS MD45 meters, an adapter is supplied with the optical head.

ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data retrieval unit
Automatic remote data retrieval, recording and storage of energy, climate and process data.

page 76

ULYS MD100

SINGLE-PHASE 100 A



Energy meter for single-phase networks.
Direct connection up to 100 A.

DESCRIPTION

ULYS MD100 is an energy meter designed for use on single-phase networks. It is the solution dedicated to applications for energy management or electricity rebilling on private networks (MID version). It is particularly suitable for applications up to 100 A in buildings and shopping malls.

- 2 pulse outputs as standard (weight configurable)
- Direct current inputs up to 100 A
- MID version available for electricity rebilling on private networks
- Tariff-change input (ULYS MD100-M)
- RS485 Modbus communication (ULYS MD100-M Modbus)
- Multi-measurement:
 - Instantaneous quantities: V, I, P, Q, S, PF and F
 - Instantaneous quantities and energy index according to energy directionality and tariff
- Bidirectional energy (consumed and generated)
- Reinitializable partial active energy index

When used with a remote data-retrieval solution and energy management software, your consumption data can be recovered remotely on your PC to automatically generate consumption reports and allocate the consumption fairly.

- + MID Class B
- Built-in RS485 Modbus communication
- Reinitializable partial active energy index
- Bidirectional metering
- Double-tariff metering
- Entirely configurable on front panel or optical head
- Customizable multi-measurement display

ZOOM



2 tariffs



Sealable terminal covers delivered as standard



Backlit LCD screen



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input		
Type	direct	
Rated current (I _n)	100 A	
Inrush current (I _{st})	20 mA	
Voltage input		
Rated voltage (U _n)	230 Vac (-15% / +10%)	
Consumption	≤ 2 W/Phase - ≤ 10 VA/Phase	
Rated frequency	50 Hz ±10 %	
Tariff change input (ULYS MD100-M only)		
T1	0 V	
T2	230 Vac	
Metrological LED		
Weight	10 000 pulses/kWh/kvarh	
Pulse output		
Number	2 (kWh import / export)	
Weight	10,000/2,000/1,000/100/10/1/0.1/0.01 pulses/kWh	
Duration	1,000/100/10/1/0.1/0.01 pulses/kWh	31 ms
	2,000 pulses/kWh ≤ 30 kW	31 ms
	2,000 pulses/kWh > 30 kW	15 ms
	10,000 pulses/kWh ≤ 6 kW	31 ms
	10,000 pulses/kWh > 6 kW	15 ms
10,000 pulses/kWh >12 kW	5 ms	
Accuracy		
Active energy	MID Class B as per EN 50470-1-3	
Communication (ULYS MD100-M Modbus only)		
Type of bus	RS485	
Protocol	MODBUS RTU with 16-bit CRC	
Transmission speed	1200, 2400, 4800, 9600 bauds/s (by default)	
Addresses	0 - 247 (by default: last 2 digits of SN)	
Maximum bus loads	60	
Maximum distance	1,000 meters	
Parameter settings	Using button on front panel and optical head	

MECHANICAL SPECIFICATIONS

Ingress protection	IP51 front panel
Format	2 DIN modules
Power circuit connection	Screw terminal strip for 35 mm ² wires
Pulse output or communication connection	Max 1.5 mm ²
Mounting	On 35 mm DIN rail
Weight	160 g

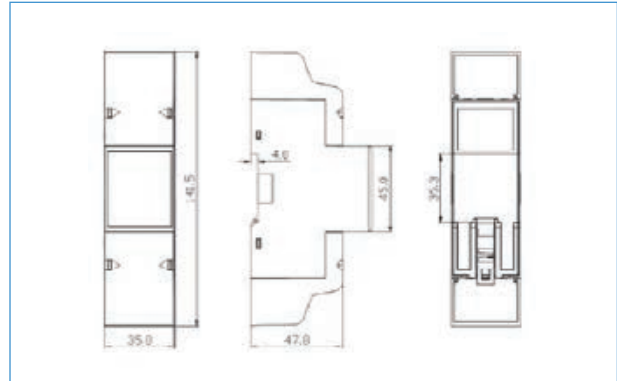
ENVIRONMENT

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

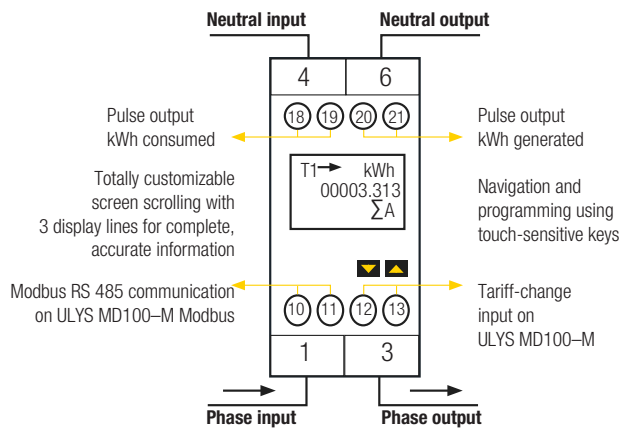
T O O R D E R

Model	Certification	Reference
ULYS MD100-M	MID	P01330760
ULYS MD100-M Modbus	MID	P01330761

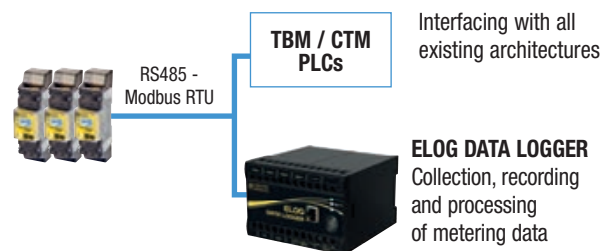
DIMENSIONS (MM)



ELECTRICAL CONNECTIONS



BLOCK DIAGRAM



ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data retrieval unit
Automatic remote data retrieval, recording and storage of energy, climate and process data.

page 76

ULYS TDA80-M

THREE-PHASE 80 A



Energy meter for three-phase networks.
Direct connection up to 80 A.
This MID meter is dedicated to energy management or electricity rebilling applications on private networks.

DESCRIPTION

ULYS TDA80 is an energy meter designed for use on three-phase networks. It is the dedicated solution for energy management and electricity rebilling applications on private networks (MID version). It is particularly suitable for 80 A applications in buildings and shopping malls.

- 2 pulse outputs as standard, assignable to Ea, Eq or Es
- Direct current inputs up to 80 A
- Connection error indicator
- MID version available for electricity rebilling
- Tariff-change input as standard (double tariff)
- Multi-measurement: instantaneous P, Q and S, cumulated and partial energy index (V, U, I, PF, F via ULYSCOM)
- Sealable terminal covers (delivered with seals for the MID version)



- MID Class B
- 4 quadrants
- Multi-measurement
- Compact: only 4 DIN modules

ZOOM



2 tariffs



Measurement in all 4 quadrants with energy balance indicator



2 pulse outputs as standard, assignable to Ea, Eq or Es



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input	
Type	direct
Rated current (In)	(5) 80 A
Inrush 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
Measurement range	0 to 9 999 999.9 kWh
Frequency	50/60 Hz
Tariff change input	
T1	No voltage
T2	80 Vac/Vdc to 276 Vac/Vdc max.
Pulse output	
Type	Optically isolated, 250 Vac/dc
Number	2 configurable as Ea, Eq, or Es
Weight	100 pulses/kWh, /kVArh, /kVAh
Duration	50 ms
Max. current	100 mA
Accuracy	
Active energy	MID Class B as per EN 50470-1-3
Reactive energy	Class 2 as per IEC 62053-23
Metrological LED	
Weight	1,000 pulses/kWh

MECHANICAL SPECIFICATIONS

Format	4 DIN modules
Mounting	On 35 mm DIN rail
Connection	Screw terminal strip for 35 mm ² wires
Ingress protection	IP51 front panel

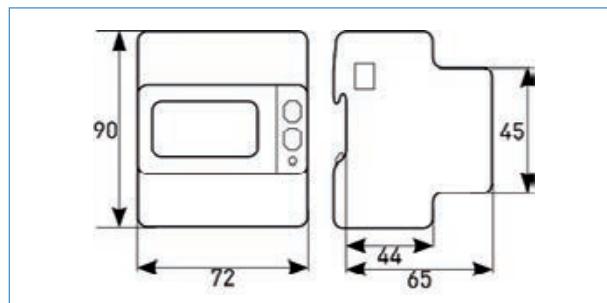
ENVIRONMENT

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

T O O R D E R

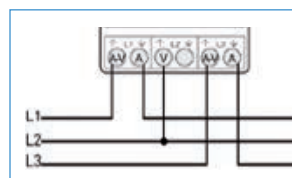
Model	Certification	Reference
ULYS TDA80-M	MD	P01331018

DIMENSIONS (MM)

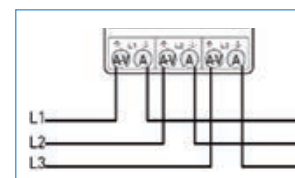


ELECTRICAL CONNECTIONS

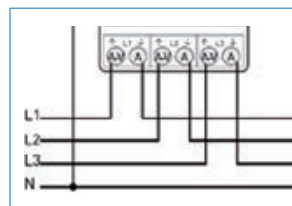
3 wires, 2 currents



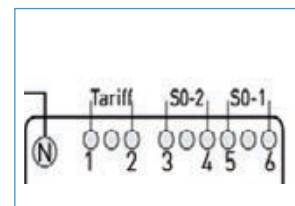
3 wires, 3 currents



4 wires, 3 currents



Tariff inputs & pulse outputs



ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data retrieval unit

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

page 76

ULYS TTA-M

THREE-PHASE WITH CT CONNECTION



Energy meter for three-phase networks.
CT connection.

DESCRIPTION

ULYS TTA is an energy meter for use in three-phase networks. It is the dedicated solution for energy management applications or electricity rebilling on private networks (MID version).

- 2 pulse outputs as standard features assignable to Ea, Eq or Es
- 1 or 5 A isolated inputs
- Indication of connection errors
- MID version available for rebilling
- Tariff-change input as a standard feature (2 tariffs)
- 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)



- MID Class B
- Multi-measurement
- Compact: only 4 DIN modules

ZQOM



2 tariffs



Metering on all
4 quadrants with energy
balance indicator



2 pulse outputs
as standard assignable
to Ea, Eq or Es



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

ELECTRICAL SPECIFICATIONS

Current input	
Type	On CT, 1 or 5 A
Rated current (In)	5 A
Inrush 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
Measurement range	0 to 9 999 999.9 kWh
Frequency	50/60 Hz
Tariff change input	
T1	No voltage
T2	80 Vac/Vdc to 276 Vac/Vdc max.
Pulse output	
Type	Optically isolated, 250 Vac/dc
Number	2 configurable as Ea, Eq, or Es
Weight	Automatic adjustment according to CT ratio: from 1,000 pulses/kWh/kVAh to 0.1 pulses/kWh/kVAh
Duration	50 ms
Max. current	100 mA
Accuracy	
Active energy	MID Class B as per EN 50470-1-3
Reactive energy	Class 2 as per IEC 62053-23
Metrological LED	
Weight	1,000 pulses/kWh

MECHANICAL SPECIFICATIONS

Format	4 DIN modules
Mounting	On 35 mm DIN rail
Connection	Screw terminal strip for 6 mm ² wires
Ingress protection	IP51 front panel

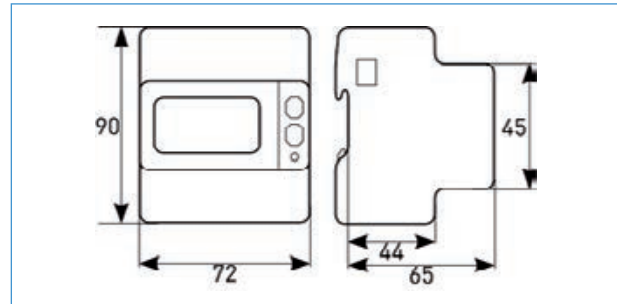
ENVIRONMENT

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

TO ORDER

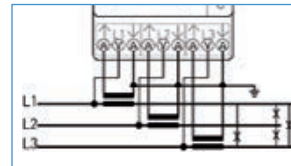
Model	Certification	Reference
ULYS TTA-M	MID	P01331019

DIMENSIONS (MM)

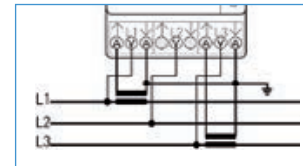


ELECTRICAL CONNECTIONS

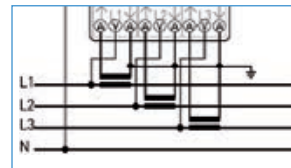
3 wires - 3 CTs



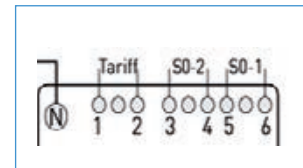
3 wires - 2 CTs



4 wires - 3 CTs



Tariff inputs & pulse outputs



ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data retrieval unit

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

page 76



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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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, /kVAh, /kVAh
Accuracy	
Active energy	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

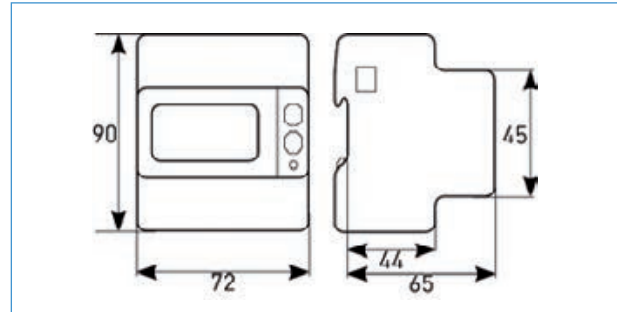
MECHANICAL SPECIFICATIONS

Format	4 DIN modules
Mounting	On 35 mm DIN rail
Connection	Screw-on terminal strip for 35 mm ² wire
Protection	IP51 front panel

ENVIRONMENT

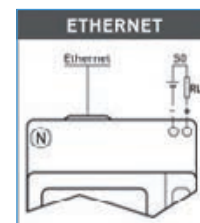
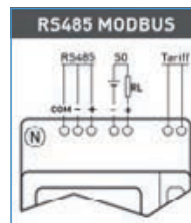
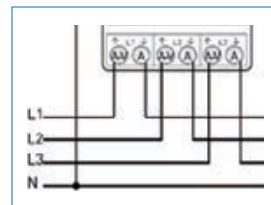
Operating temperature	- 25 °C to +55 °C
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max 80% without condensation

DIMENSIONS (MM)



ELECTRICAL CONNECTIONS

4 wires, 3 currents
All models



T O O R D E R

Model	Certification	Reference
ULYS TD80-M Modbus	MID	P01331036
ULYS TD80-M Ethernet	MID	P01331040

ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data retrieval unit

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

page 76



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, assignable to Ea, Eq or Es
- 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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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 / kVAh to 0.1 pulse / kWh / kVAh
Accuracy	
Active energy	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

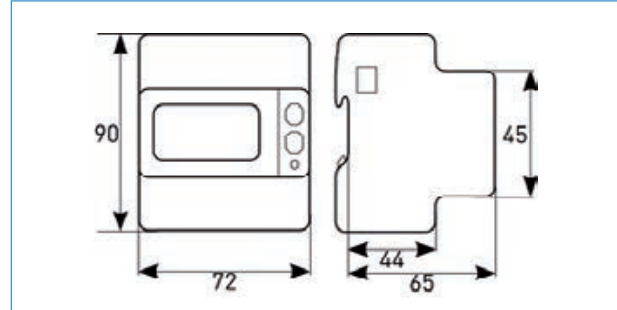
MECHANICAL SPECIFICATIONS

Format	4 DIN modules
Mounting	On 35 mm DIN rail
Connection	Screw-on terminal strip for 35 mm ² wire
Protection	IP51 front panel

ENVIRONMENT

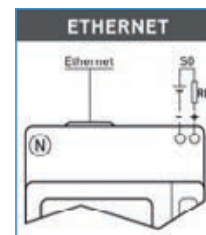
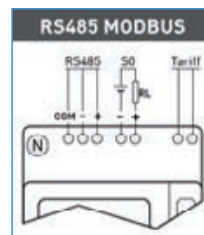
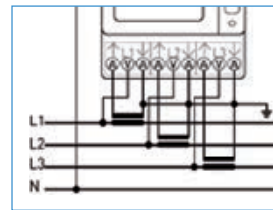
Operating temperature	- 25 °C to +55 °C
Storage temperature	- 25 °C to +75 °C
Relative humidity	Max 80% without condensation

DIMENSIONS (MM)



ELECTRICAL CONNECTIONS

4 wires, 3 currents - All models



TO ORDER

Model	Certification	Reference
ULYS TT-M Modbus	MID	P01331037
ULYS TT-M Ethernet	MID	P01331041

ASSOCIATED PRODUCT



ELOG DATA LOGGER

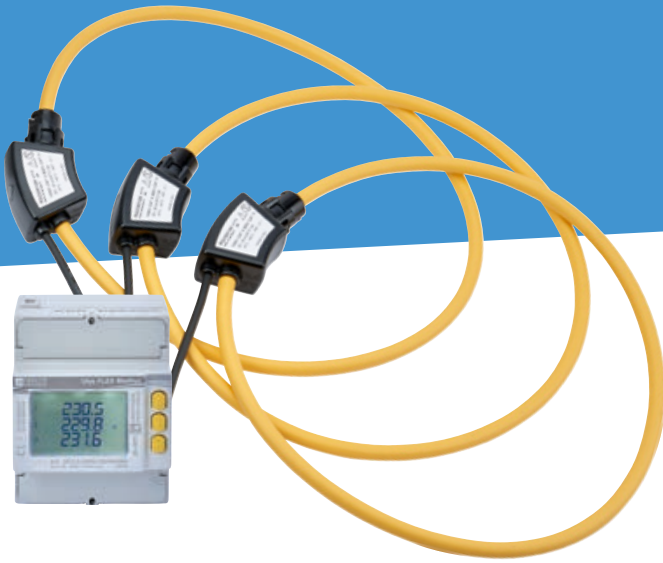
Remote data retrieval unit

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

page 76

ULYS FLEX

MODBUS



Metering solution on Rogowski coils.



- Quick implementation
- Reduced installation costs
- Wide dynamic range for measurement (0.3 A to 20,000 A)
- RS485 Modbus RTU communication

DESCRIPTION

- Installation on busbars or conductors with large dimensions or cross-sections
- Possibility of inserting the flexible coils in confined spaces
- Mounting of the ULYS FLEX Modbus without cutting off the electrical feeder
- Accuracy class guaranteed across a large current measurement range (from 5 % to 100 % of full scale)

ZOOM



Built-in RS485 communication



Mounting without cutting off the electrical circuit



1 pulse output as standard, assignable to Ea, Eq or Es

ELECTRICAL SPECIFICATIONS

Auxiliary power supply	
Voltage range	85 ... 265 V _{AC}
Safety	300 V CAT III
Max. consumption	1,6 VA - 1W
Type-T fuse (for external mounting)	250 mA
Frequency	50/60 Hz
Voltage measurement	
Voltage range	3x10/17 ... 3x285/495 V _{AC} — 50/60 Hz
Safety	300 V CAT III
Min. voltage for FFT calculation	20/35 V _{AC} (multiplied by the VT ratio) with direct connection
Current measurement	
Maximum value	3 ratings (FSA) selectable: 500 A (700 A max), 4,000 A (5,600 A max) or 20,000 A (28,000 A max)
Inrush current (I_{sr})	0.3 A for FSA 500 A, 1 A for FSA 4,000 A, 10 A for FSA 20,000 A
Min. current for FFT calculation	70 A for FSA 500 A, 400 A for FSA 4,000 A, 1,500 A for FSA 20,000 A 2 % accuracy of harmonics ± 2 digits



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energy production



energy transmission & distribution



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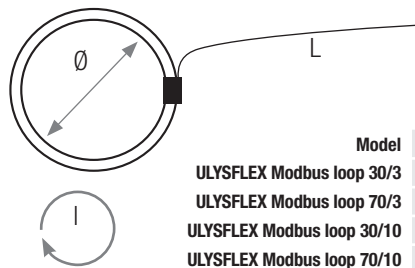
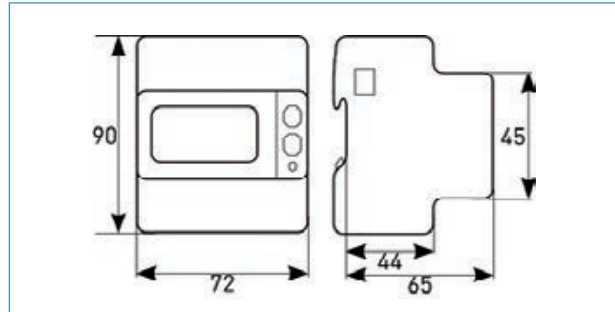
energy efficiency



rail

Accuracy	
Voltage	± 0.2 % of reading in range from 10 % FS ... FS (FS = full-screen value)
Current	± 0.4 % of reading from 5 % FS ... FS
Power	± 0.5 % of reading ± 0.1 % FS (PF=1)
Frequency	± 0.1 % of reading ± 1 digit in the range 45 ... 65 Hz
Active energy	Class 1 in compliance with IEC/EN 62053-21 (meter + coils)
Reactive energy	Class 2 in compliance with IEC/EN 62053-23 (meter + coils)
Screen & keyboard	
Display	Backlit LCD, 43 x 29 mm - 3 lines, 4 digits + symbols
Keyboard	3 keys + 1 protected button
Communication port	
Type	Optically isolated RS485
Protocols	MODBUS RTU/ASCII
Baud rate	300 ... 57,600 bps
Digital output (DO)	
Type	Passive optically-isolated polarized electronic output
Maximum values (compliant with IEC/EN 62053-31)	27 V _{DC} - 27 mA
Energy pulse length (for DO in Pulse mode)	50 ± 2 ms ON time
Maximum frequency	8 pulses per sec (8 Hz)
Maximum reaction time (for DO in Alarm mode)	1 s

DIMENSIONS (MM)



Model	l (cm)	Ø (cm)	L (m)
ULYSFLEX Modbus loop 30/3	30	10	3
ULYSFLEX Modbus loop 70/3	70	22	3
ULYSFLEX Modbus loop 30/10	30	10	10
ULYSFLEX Modbus loop 70/10	70	22	10

MECHANICAL SPECIFICATIONS

Dimensions LxHxW	72 x 90 x 65 mm
Weight	436 g
Connection	Measurement terminal strip (A & V): 1.5 ... 6 mm ² Terminal strips for digital output, power supply and RS485 port: 0.14 ... 2.5 mm ²
Ingress protection	IP51 front panel - IP 20 terminal strips
Pollution degree	2

ENVIRONMENT

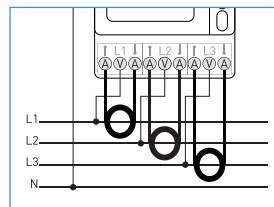
Operating temperature	- 25 °C to +55 °C
Storage temperature	25 °C to +75 °C
Relative humidity	Max. 80 % without condensation
Product operating altitude	< 2,000 m
Vibration or shock (sinusoidal amplitude)	50 Hz ± 0.075 mm

STANDARDS

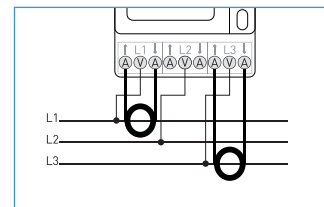
Directives	2066/95/EC, 2004/108/EC
Safety	EN61010-1, EN 61010-2-030, EN 61010-2-032
Electromagnetic compatibility (EMC)	EN61326-1, EN 55011, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5 EN 61000-4-6, EN 61000-4-11, EN 61000-6-2

ELECTRICAL CONNECTIONS

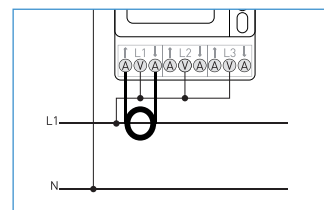
Three-phase 4 wires, 3 Rogowski coils



Three-phase 3 wires, 2 Rogowski coils



Single-phase, 1 Rogowski coil



TO ORDER

Model	Reference
ULYSFLEX Modbus loop 30/3	P01331046
ULYSFLEX Modbus loop 70/3	P01331047
ULYSFLEX Modbus loop 30/10	P01331048
ULYSFLEX Modbus loop 70/10	P01331049

ASSOCIATED PRODUCT



ELOG DATA LOGGER

Remote data-retrieval unit

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

page 76

ULYS MCM

MULTI-CHANNEL METER



Multi-channel power monitor and energy meter

DESCRIPTION

Ulys MCM is the innovative solution for centralizing measurements on multiple electrical feeders:

- Compact
- Compatible with all power ratings
- Quick connection
- Easy to integrate

The Ulys MCM is available in versions with 9 or 18 three-phase measurement channels.



Compact: 18 meters in one!
 Quick to set up
 Wide range of sensors for any type of conductor and current
 Comprehensive measurement of all the electrical parameters
 Flexible communication

ZOOM



18 METERS IN ONE



COMPACT



COMPATIBLE WITH A LARGE NUMBER OF SENSORS

ACCESSORIES



CURRENT SENSORS

Clip-on current transformers (5 sizes available) and MiniFlex flexible sensors based on Rogowski technology.



ADAPTER FOR CURRENT SENSORS

Supplied directly when you purchase a pack of 3 current sensors.



SCREEN

Supplied directly when you purchase a pack of 3 current sensors



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TECHNICAL SPECIFICATIONS

Feature	Specifications	
Système électrique	1P2F, 3P3F, 3P4F	
Nominal specifications of inputs	Voltage (Umin – Umax)	43-690 V~ between phases
	Voltage (Vmin – Vmax)	25-400 V~ between phases and neutral
	Measurement category	600 V Cat III
	Frequency	45-65 Hz
	Current	0-333 mA (max 0.5 V p-p) Impedance: 20 kΩ
	On-off (DI)	1 point, 80-250 V~, external power supply
	NTC temperature	25°C, 10 kΩ, (β(25/85)=3 970°k)
Auxiliary power supply	Voltage	100-240 V~
	Frequency	50-60 Hz
	Max. voltage (L-N)	Short term: 1,440 V~ Long term: 490 V~
	consumption	0,05-0,08 A
	Overvoltage category	300 V Cat II
Communication	Modbus RS485	
	Modbus TCP	
	RS232	
On-off output contact (DO)	1 NO (normally open) SPST (single pole, single throw)	

SOFTWARE

Ulys MCM UTILITY is the software for managing the ULYS MCM. It can be used for:

- Electrical configuration of the Ulys MCM (voltages and currents of each electrical feeder, etc.)
- Configuration of the Ulys MCM's communication (address, type of communication, etc.) and diagnostics
- Storage of the configuration file to import/export them from one product to the other
- Real-time display of the general quantities and electrical values across all the channels

Ulys MCM UTILITY can be downloaded directly from our website.

MEASUREMENT PERFORMANCE SPECIFICATIONS

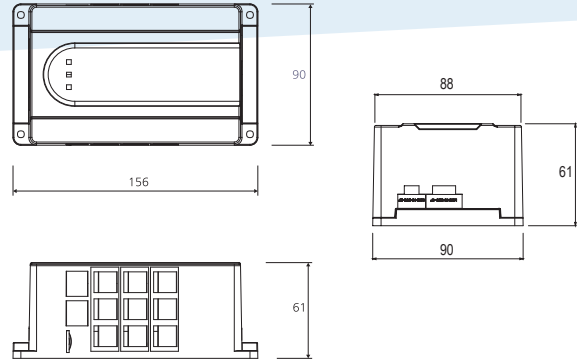
Quantity	Standard	ULYS MCM	ULYS MCM and MF300/MF300
Active power (P) measurements	IEC 61557-12: 2018	0.5	1
Active energy (Ea)	IEC 61557-12: 2018	0.5	1
	IEC 62053-21: 2003		
Reactive power (Q) measurements	IEC 62053-22: 2003	1	2
	IEC 61557-12: 2018		
Reactive energy (Er)	IEC 61557-12: 2018	2	2
	IEC 62053-23: 2003		
RMS line current (I) measurements	IEC 61557-12: 2018	0.2	0.5
RMS voltage measurements (U/V)	IEC 61557-12: 2018	0.1	0.1

ELECTRICAL QUANTITIES MEASURED

Quantity	Unit	Range
Phase-to-neutral voltage	V	0.00 - 9,999,999.99
Phase-to-phase voltage	V	0.00 - 9,999,999.99
Current	A	0.00 - 9,999,999.99
Active power	W	±0 - 999,999,999
Reactive power	Var	±0 - 999,999,999
Apparent power	VA	0 - 999,999,999
Frequency	Hz	45.00 - 65.00
Power factor	%	± 100.00
NTC temperature	°C	-20.0 - 100.00
Voltage unbalance	%	0.0 - 100.00
Current unbalance	%	0.0 - 100.00
Phase shift angle	°	0.0 - 360.00
Total Harmonic Distortion*	%	0.0 - 100.00
Active energy	KWh	0.0 - 9,999,999.9
Reactive energy	KVarh	0.0 - 9,999,999.9
Apparent energy	KVAh	0.0 - 9,999,999.9

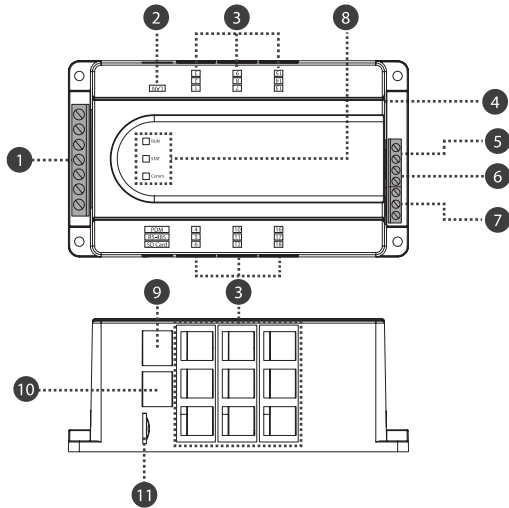
*Power equivalent: please refer to user's guide

INSTALLATION CONDITIONS



Description	Condition
Temperature	-10°C to +55°C (nominal operating range)
	-25°C to +70°C (storage range)
Relative humidity	5-80 % RH without condensation
Altitude	≤ 2,000 m
Degree of pollution	2
Location	Indoors

RACCORDEMENT



N°	Désignation	Description
1	Input voltage	Input voltage terminal for the measurements
2	Ethernet port	Communication with master (Modbus slave) Protocol: Modbus TCP/IP Speed: 10/100 Mbit/s
3	CT 1 to 18 port	RJ12 connectors for connection to the current sensor
4	Temperature sensor	NTC temperature sensor: NTC temperature measurement at the level of the port
5	Output	Borne de sortie TOR Spécifications nominales : 250 V~/5 A, 30 VCC/5A résistive
6	On-off input	Borne d'entrée TOR Spécifications nominales : tension d'entrée de verrouillage de 80-250 V~ requise
7	Auxiliary power supply	Fourniture de l'alimentation auxiliaire de l'ULYS MCM
8	Status LED	RUN: normal operation STAT: normal metering Comm: normal communication (flashing LED in normal status)
9	RS232 port	Communication with the PC or ULYS MCM D remote display
10	RS485 port	RS485 port for connecting the PC or an external PLC
11	SD card slot	Do not disconnect the card: the system makes use of it



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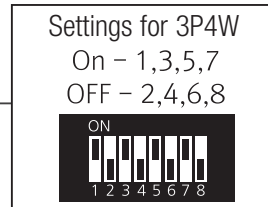
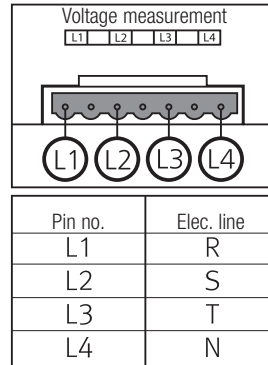
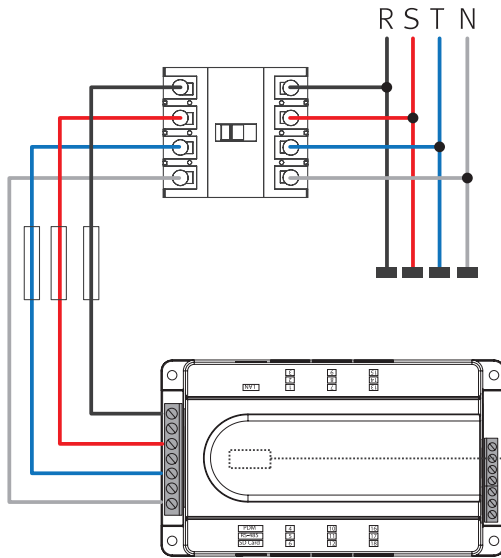
energy efficiency



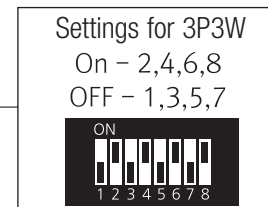
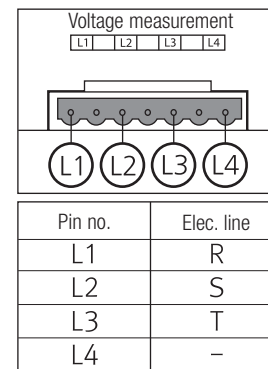
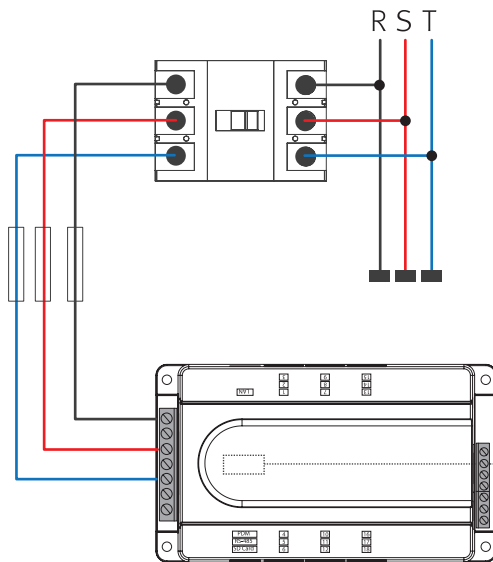
railway

CONNECTION OF THE VOLTAGE MEASUREMENT INPUTS

Wiring of 4-wire three-phase system



Wiring of 3-wire three-phase system



TO ORDER

P01331062 ULYS-MCM9

P01331064 ULYS-MCM18

ACCESSORIES

CURRENT SENSORS

OUR SENSORS ARE DELIVERED IN PACKS OF 3 DIRECTLY CONNECTED TO THE CONNECTION ADAPTER (CODE PO1379643)

MF300 and MF3000 openable flexible current sensors (Rogowski coils)

TC CLIP sensors : TCC V 105, TCC V 161, TCC V 242, TCC V 364, TCC V 366



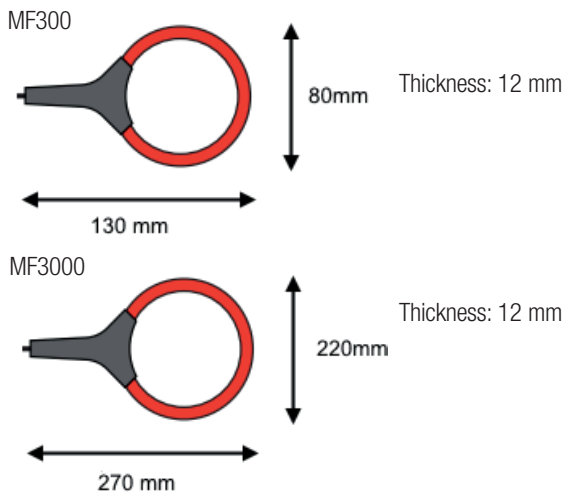
GENERAL SPECIFICATIONS

Measurement range	MF300: 2.4 A to 600 A MF3000: 2.4 A to 3,000 A
Output	39.1 μ V/A
Accuracy (current measurement)	Class 0.5 as per IEC 61557-12 (complete ULYS MCM measurement line and coils)
Output connections	HY-Y type

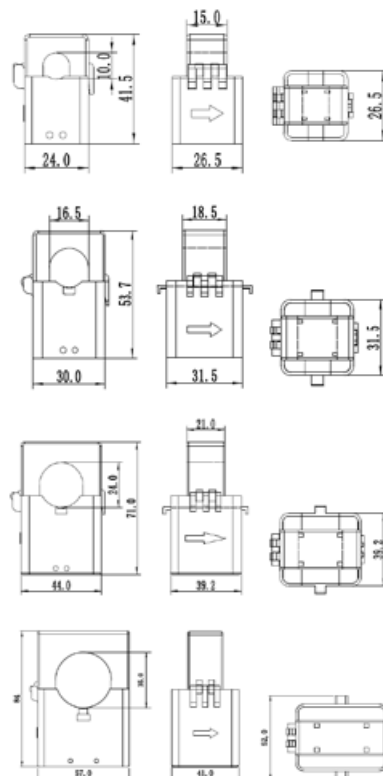
GENERAL SPECIFICATIONS

Nominal current (In)	TCC V 105: 5 A TCC V 161: 100 A TCC V 242: 250 A TCC V 364: 400 A TCC V 366: 600 A
Clamping diameter	TCC V 105: 10 mm TCC V 161: 16 mm TCC V 242: 24 mm TCC V 364: 36 mm TCC V 366: 36 mm
Frequency	50-60 Hz
Output	333 mV
Accuracy (current measurement)	Class 0.5 from 100 to 120 % of In as per IEC 61869-2 Class 1 from 20 to 120 % of In
Output connections	HY-Y type

MECHANICAL SPECIFICATIONS



MECHANICAL SPECIFICATIONS



Clamping diameter	MF300: length = 250 mm; \varnothing = 70 mm MF3000: length = 350 mm; \varnothing = 200 mm
Length of linking cable (between the output connection and the coil)	1.5 meter
Protection provided by the enclosures	IP50 as per IEC 60529
Degré de protection contre les impacts mécaniques	IK04
Weight	MF300: 60 g approx. MF3000: 90 g approx.



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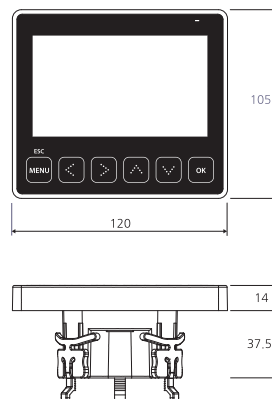


railway

ULYS MCM D REMOTE DISPLAY UNIT



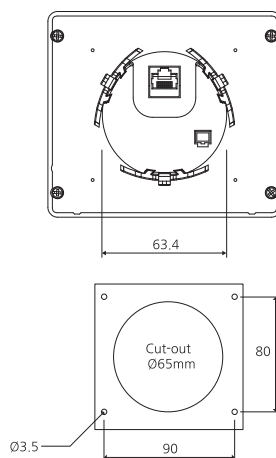
MECHANICAL SPECIFICATIONS



GENERAL SPECIFICATIONS

Feature	Specifications										
Power supply	5 Vdc (self-powered by the ULYS MCM)										
Electrical consumption	1.2 W										
Dimensions (mm)	120 (L) x 105 (H) x 50 (P)										
Weight	196 g										
Mounting	Mounting on electrical cabinet / portable use										
Operating conditions	Operating temperature: -10°C to +55°C Storage temperature: -25°C to +70°C Humidity range: 5 to 80 % without condensation Altitude: ≤ 2,000 m										
Screen	4.3 inch LCD TFT screen (480 (W) x 272 (H) mm)										
ESC/MENU	Back to previous menu or cancel / Access parameters menu										
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LEFT	Move left										
RIGHT	Move right										
UP	Move up										
DOWN	Move down										
OK	Modify the selection or display mode of the channel										

CUT-OUTS



TO ORDER

WHICH SENSORS DO YOU WANT?

(may be different for each feeder, in kits of 3)

	Ratio	Diameter	
P01379616	PACK 3 TCC V 105	5A / 333mV	10mm
P01379618	PACK 3 TCC V 161	100A / 333mV	16mm
P01379620	PACK 3 TCC V 242	250A / 333mV	24mm
P01379622	PACK 3 TCC V 364	400A / 333mV	36mm
P01379624	PACK 3 TCC V 366	600A / 333mV	36mm
P01379631	PACK 3 MF300	600A / 39.1µV	70mm
P01379633	PACK 3 MF3000	3000A / 39.1µV	200mm

DO YOU WANT TO EQUIP YOUR ULYS MCM WITH A DISPLAY?

P01331065	ULYS MCM D	DISPLAY UNIT
P01379640	RJ45M-RJ45M M	Linking cable*

*Cable essential for connection of the display

WHAT WILL THE DISTANCE BE BETWEEN YOUR ULYS MCM AND YOUR SENSORS?

P01379641	RJ12M-RJ12M M	≤ 3 meters
P01379642	RJ12M-RJ12M L	≤ 9 meters



ALTYS

TARIFF METER

4-quadrant tariff meter for MV customers.

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



- 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

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)

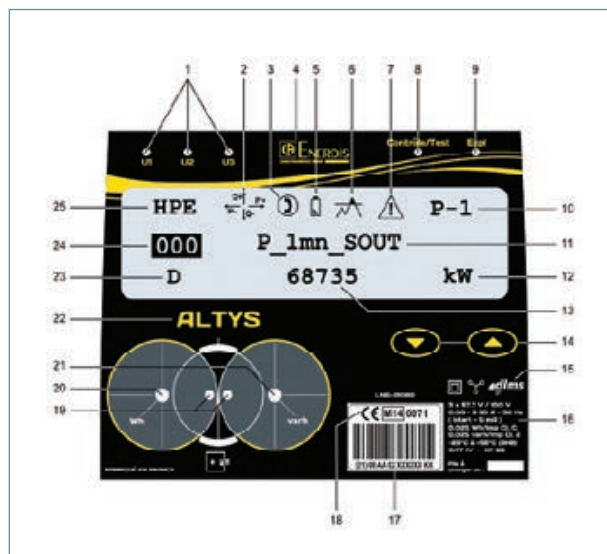
Interfaces

- DLMS Cosmem operator communication
- Tariff change input
- Pulse outputs for active and reactive energy: CM, P+, P-, Q+, Q-
- Time pulse output: TP1- TP2
- DLMS Cosmem 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 (Chauvin Arnoux Energy)
- 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. 1 pulse every 0.025 Wh
Weight	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 mm ² / Max. tightening torque: 0.6 Nm
Input and output terminal strips	Collet capacity: 2.5 mm ² / Max. tightening torque: 0.5 Nm

ENVIRONMENT

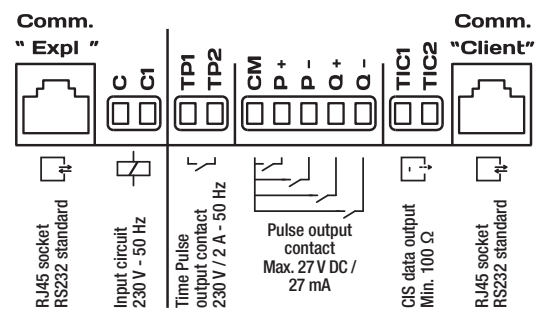
Climatic	
Rated operating temperature	-25°C to +55°C
Storage temperature	-28°C to +70°C
Relative humidity	Max. 80%
Electrical	
Overvoltage category	II

CONNECTIONS

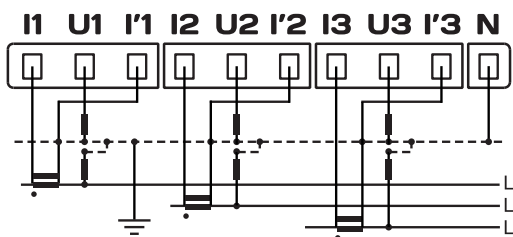
Operator access	
Terminals	Functions
"Expl" communication	Two-way "Operator" interface
C, C1	Input circuit for tariff change

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

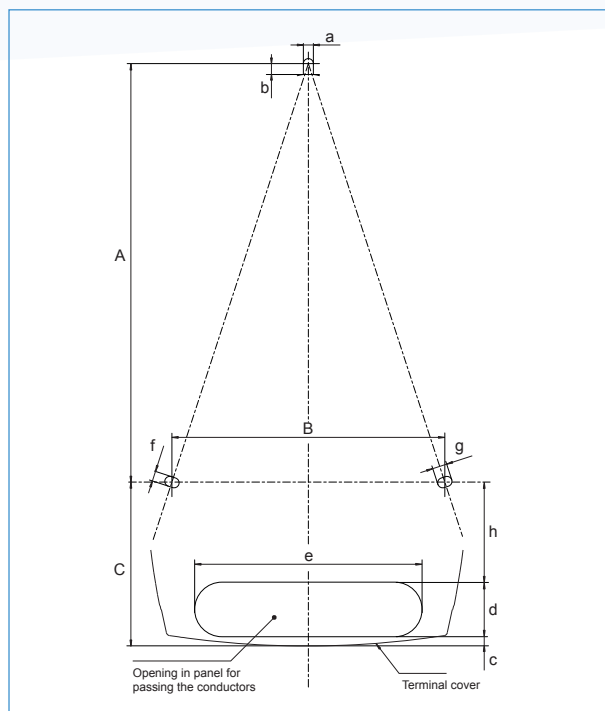
Communication terminal strip



Power terminal strip



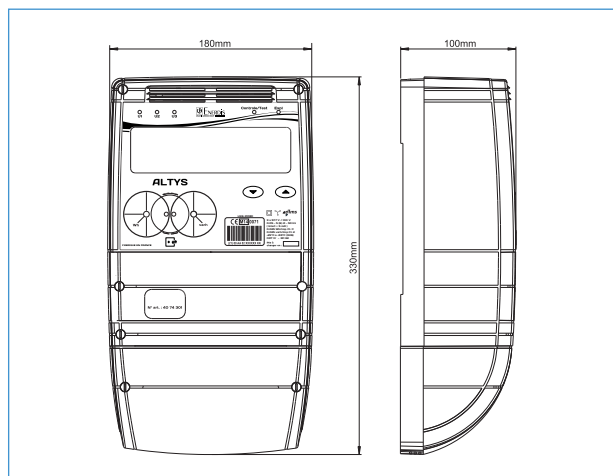
Terminals	Functions
I1	Phase 1 current input
U1	Phase 1 voltage input
I'1	Phase 1 current output
I2	Phase 2 current input
U2	Phase 2 voltage input
I'2	Phase 2 current output
I3	Phase 3 current input
U3	Phase 3 voltage input
I'3	Phase 3 current output
N	Neutral



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



T O O R D E R

Model	Reference
ALTYs meter	P01331051

ASSOCIATED PRODUCTS



Low voltage current measurement transformers for tariff metering
page 111



USB optical head
P01330401



MEMO

RANGE

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

DESCRIPTION

MEMO P200 est une gamme de 2 centrales de mesure simples et performantes apportant une vision claire et immédiate de votre réseau électrique.

- Measurement in all 4 quadrants
- Energy values: Ea, Eq, Es (import, export, cumulated, partial)
- Instantaneous values: V, U, I, THD-V, THD- I, F, crest factor, K factor, PF, P, Q, S
- Average max. values: I, P, Q, S
- Tariff metering: 4 tariffs with configurable tariff ranges (internal RTC clock)
- Relay outputs (on-off): Pulse mode, active energy or reactive energy (adjustable weight)



- Built-in Modbus RS485 communication
- Easy-to-read all-in-one screen
- Management of 4 tariffs
- Only 2 models to cover all your supervision needs

ZOOM



RS485 Modbus port: all the electrical measurements are transmitted in real time to the supervision system



4 tariffs: clear display of the current tariff



3 lines for easy-to-read display of the three-phase network



Total consumption displayed constantly



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

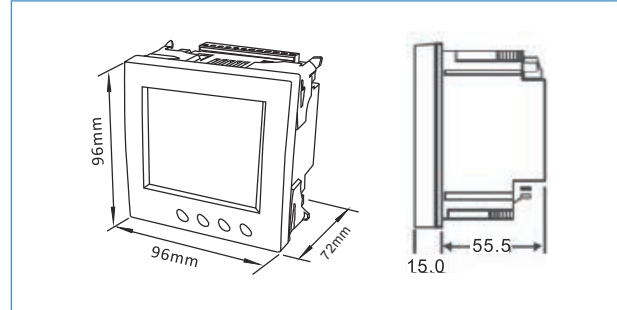
ELECTRICAL SPECIFICATIONS

Voltage inputs	
Primary VT	100 V to 500 kV – Secondary VT: 100 V à 480 V
Measurement range	5...120 % Un - 50/60 Hz (Un = 100/400 V)
Overvoltage	120 % of 400 V (permanent) - 1 kV (0.5 s)
Consumption	< 0.25 VA – Input impedance: 1 MΩ
Connection	3P3W - 3P4W - 1P2W
Current inputs (AC)	
Primary CT	1 A to 10,000 A – Secondary CT: 1 A to 5 A
Measurement range	1 % In...120 % In (In = 5 A)
Transient overload	120 A (0,5 s) – Permanent overload 6 A
Consumption	< 0.1 VA
Measurement accuracy	
Active power and energy	Class 0.5s (IEC 62053-22 & IEC 61557-12)
Reactive power and energy	Class 2 (IEC 62053-23 & IEC 61557-12)
Apparent power	1 % (IEC 61557-12)
Voltage / current	0.5 (IEC 61557-12)
Auxiliary power supply	
MEMO P200 ref. P01330825	85...275 VAC - 120...380VDC (< 2 W) - 50/60 Hz
MEMO P200 ref. P01330826	21...28 VDC (2 W)
RS485 output	
Protocol	Modbus RTU – Slave mode
Speed	2,400...38,400 bauds
On-off output	
Metering output	kWh / kVARh (IEC 62053-31)
Operating voltage	5...27 VDC
Max. current	27 mA

GENERAL SPECIFICATIONS

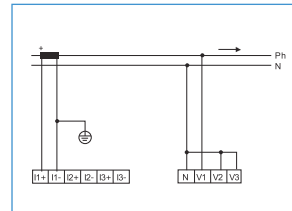
Dimensions L x H x P	96 x 96 x 55 mm
Weight	350 g
Connection	Up to 4 mm ² (measurement inputs) and 2.5 mm ² (others)
Operating temperature	-25 °C to +55 °C (K55)
Altitude	Up to 2,000 m

DIMENSIONS (MM)

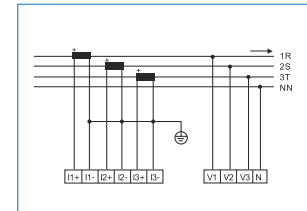


ELECTRICAL CONNECTIONS

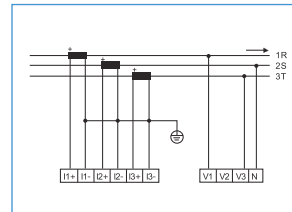
Single-phase



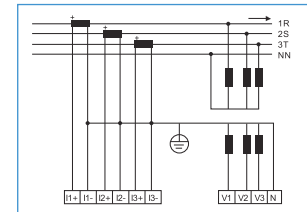
Unbalanced three-phase, 4 wires - 3 CTs



Unbalanced three-phase, 3 wires - 3 CTs



Example of connection to VT



T O O R D E R

	Model	Reference
	MEMO P200 - 230 VAC aux. power supply	P01330825
	MEMO P200 - 24 VDC aux. power supply	P01330826
	DIN rail mounting kit	P01330360

ASSOCIATED PRODUCTS



ELOG DATA LOGGER

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

page 76



Current transformers

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

page 113



ENERMIUM

RANGE

Power monitors ideal for the most critical MV/LV measurements in compliance with the IEC 61557-12 standard.



- 8 load curves
- 16 programmable alarms
- Graphics for easier data analysis
- Harmonic analysis up to the 50th order per phase 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



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.



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

Power monitors

Flush-mounting 96 x 96

Flush-mounting 144 x 144



Enerium 50

Enerium 150

Enerium 100

Enerium 200

Enerium 300

ELECTRICAL ENERGY

MULTI-ENERGY

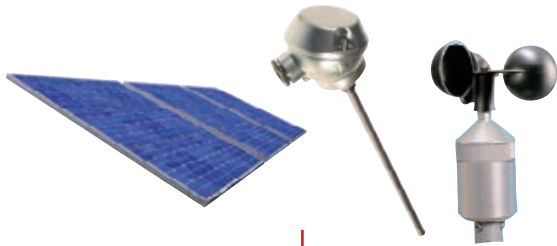
POWER QUALITY

Functional specifications					
Accuracy class (IEC61557-12)	0.5	0.5	0.5	0.5 or 0.2	0.2
Format	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 (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	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	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)	0,1 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 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	■	■	■	■	■
Metrological LED			■	■	■
Other functions					
Programming on front panel	■	■	■	■	■
Programming via software	■	■	■	■	■

* With mounting kit

EXAMPLE OF APPLICATIONS

ANALOG INPUTS



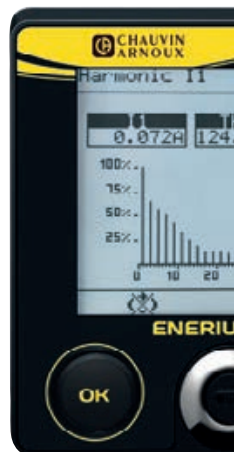
insolation, weather data, temperatures, etc.

METERING INPUTS



water, gas, electricity

CURRENT AND VOLTAGE INPUTS – LV/MV/HV NETWORKS



ANALOG OUTPUTS

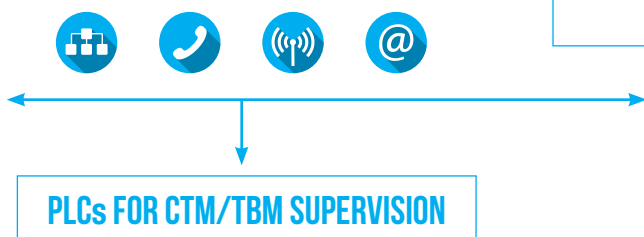
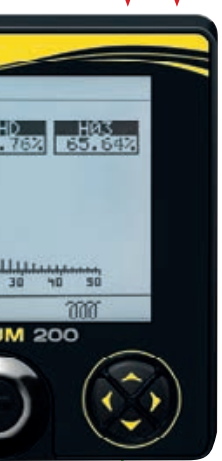


ALARM RELAY OUTPUTS



SYNCHRO PULSE INPUTS

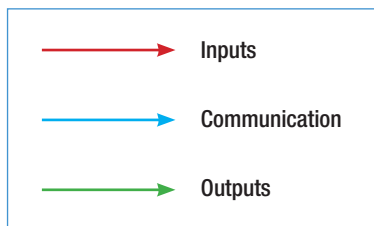
STORAGE OF STATUSES AND ALARMS



PLCs FOR CTM/TBM SUPERVISION



PLC OUTPUTS (ALARM/PULSE)



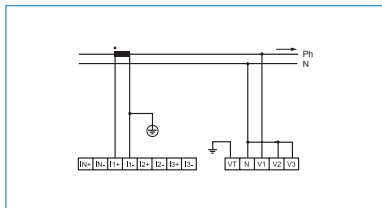
MEASUREMENTS

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

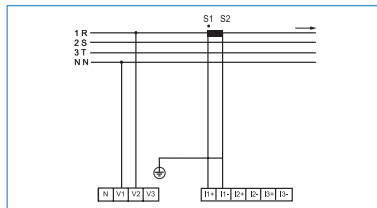
⁽¹⁾ On Enerium 30/50/150, calculated only

CONNECTION DIAGRAMS

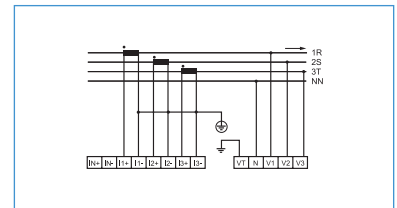
Single-phase



Balanced three-phase, 4 wires - 1 CT



Unbalanced three-phase, 4 wires - 3 CTs



TREND CURVES

(except on Enerium 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 100/200/300 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: Cos ϕ 1, Cos ϕ 2, Cos ϕ 3, Cos ϕ t	■
Rec: Cos ϕ 1, Cos ϕ 2, Cos ϕ 3, Cos ϕ t	■
Tan ϕ t	■
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 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	■
U12, U23, U31	■
I1, I2, I3, In	■
Pt	■
Qt	■
St	■
PFt	■
Cos ϕ t	■
Tan ϕ t	■
Frequency	■
U unbalance	■
THD V, U, I, In	■
3 hour meters: network presence, on-load presence, aux. source	■
Analog inputs (Enerium 100/200 only)	■
AVERAGE VALUES	
Pt Gen, Pt Rec	■
Qt Gen, Qt Rec	■
St	■
Tan ϕ t (except on Enerium 30/50/150)	■
Analog inputs (Enerium 100/200/300 only)	■
ON-OFF INPUTS (Enerium 100/200/300 only)	■

ANALOG OUTPUTS (OPTION)

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	■
Cos ϕ 1, Cos ϕ 2, Cos ϕ 3	■
Cos ϕ t	■
Tan ϕ t	■
Frequency	■

CHARACTERISTICS

	ENERIUM 50/150 Class 0.5s	ENERIUM 100 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)	0.2 % 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 or 400 Hz	50/60 Hz	50/60 Hz or 400 Hz	50/60 Hz
Consumption	< 0.15 VA	< 0.1 VA		
Input impedance	0.44 MΩ	1 MΩ		
Current inputs (AC)				
Measurement range	1 % to 130 % of In for In = 5 A			
Crest factor	3			
Measurement accuracy	0.2 % 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 0.5s		Active energy class 0.2s	Active energy class 0.2s
IEC61557-12 PMD SD/SS	Reactive energy class 0.5s			
	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	0.5 % for 5 % In ≤ I ≤ Imax		0.2 % for 5 % In ≤ I ≤ Imax	
Reactive power and energy	0.5 % for 5 % In ≤ I ≤ Imax			
Apparent power and energy	0.5 % for 5 % In ≤ I ≤ Imax			
Power factor (PF) and cosφ	± 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			

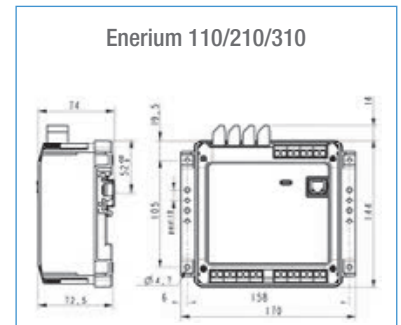
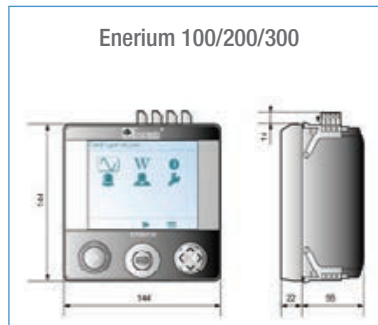
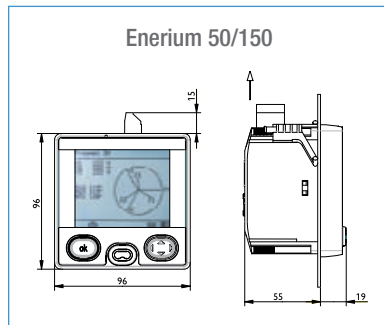
	ENERIUM 50/150 Class 0.5s	ENERIUM 100/200 Class 0.5s	ENERIUM 200 Class 0.2s	ENERIUM 300 Class 0.2s
RS485 output				
Connection	2 wires, half-duplex			
Protocol	ModBus / JBus RTU mode			
Speed (configurable)	2,400 - 4,800 - 9,600 - 19,200 - 34,800 (115,200 on ENERIUM 50/150)			
Parity	Even, odd or none			
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	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	24 to 110 Vdc \pm 20 % 24 to 230 Vac \pm 10 %			
Max. current	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)



TO ORDER

STANDARD PRODUCTS

Model	Frequency	Accuracy class	Power supply	Communication	On-off inputs	On-off outputs	Analog outputs	Reference
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 ENERUM 50/150	P01330403
	Optical head for ENERUM 100/110 - 200/210 - 300/310	P01330401
	DIN-rail mounting kit for ENERUM 30/50/150	P01330830
	DIN-rail mounting kit for ENERUM 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 + Qualitymetry
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

**ELOG DATA LOGGER**

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

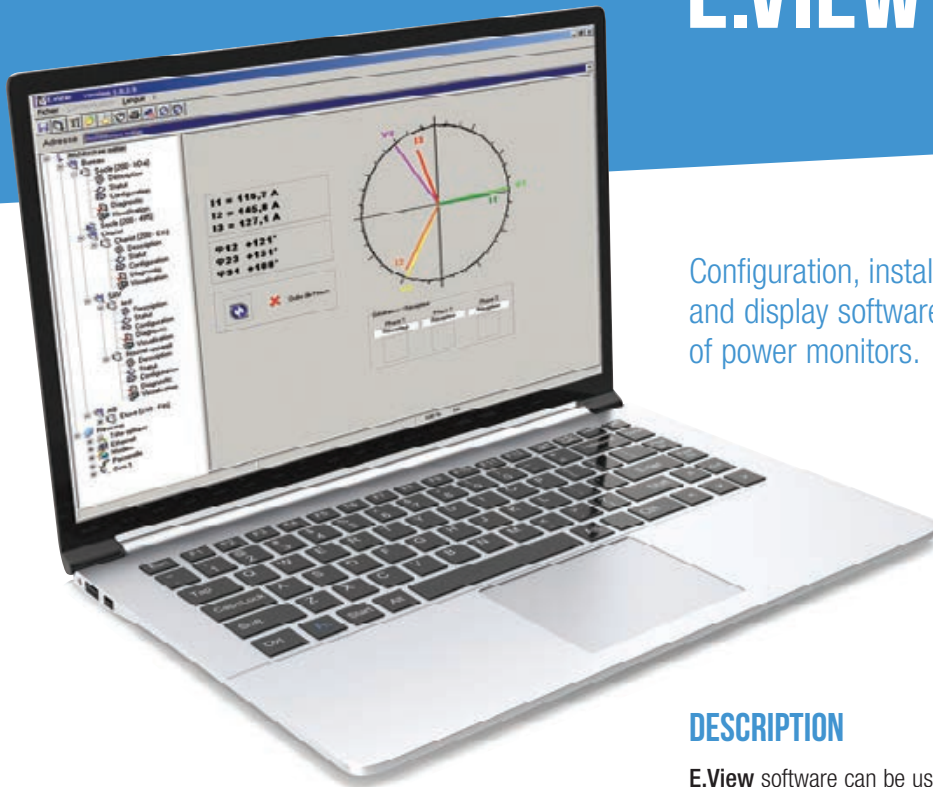
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**Current transformers**

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

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E.VIEW



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

DESCRIPTION

E.View software can be used to configure the power monitors in the ENERIUM range remotely via the RS485 network, Ethernet network or optical head. At any time, it is possible to program the communication parameters of the products (address, speed, parity, etc.) and the configuration parameters (CT ratio, PT ratio, alarm thresholds, etc.).

E.View can be used for remote control of the inputs and outputs on ENERIUM power monitors. **E.View** enables you to view the basic electrical parameters and retrieve recordings of the load curves, trend curves and alarms log in .txt format.



- Configuration of the whole range of ENERIUM power monitors
- Installation diagnostics
- Display of the electrical parameters
- Copies of recordings in .txt format

Functions	E.View
Description	■
Status	■
Configuration	■
Diagnostics	■
Display	■
Graphics	



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industry



energy production



energy transmission & distribution



nuclear

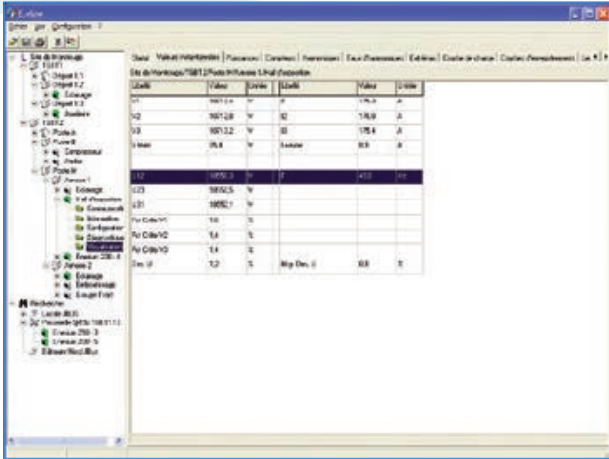


energy efficiency



rail

E.VIEW



DESCRIPTION

- The tabs enable you 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 slots: analog output board, on-off I/O board
- Communication (Ethernet, RS485)

CONFIGURATION OF ENERIUM POWER MONITORS

- Configuration of the communication parameters
- Modification of the date and time
- Configuration of the CTs, PT, alarm status, overrun thresholds, etc.
- Configuration and activation of alarms
- Programming of the analog outputs
- Programming of the inputs/outputs
- Reinitialization of the meters, overruns, log, etc.

NETWORKING ASSISTANCE

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

STATUS

This page can only be used to view the Enerium's status (voltage and current inputs, phase order, time synchro, elementary alarms, global alarms, pulse and analog outputs).

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

BACKUP AND LOADING OF CONFIGURATIONS

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

SCREEN PROGRAMMING

- Programming of the 3 customizable screens

COMMUNICATION

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

ASSOCIATED PRODUCTS



ENERIUM

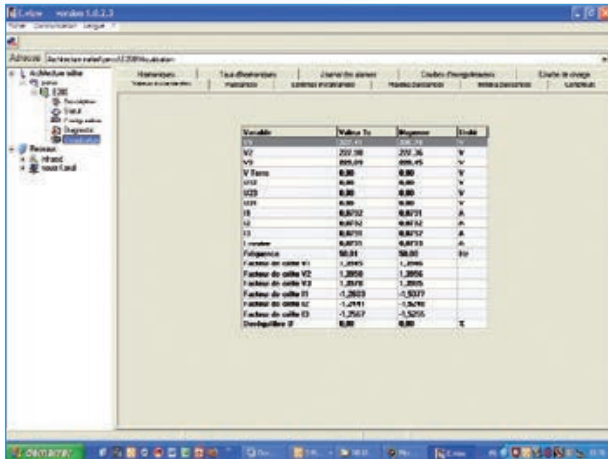
Power monitors for all electrical networks compliant with the IEC 61557-12 standard.

page 58



ENERIUM

Optical head page 58



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.

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ENERIUM

Optical head

page 58



ENERGY METERING PLAN

DATA LOGGERS

- 74 OVERVIEW OF THE RANGE
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DATA LOGGERS

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.

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ENERIUM 110/210

Multi-energy, multi-utility data concentrator

Continuously stores the information from meters or analog sensors.

[page 82](#)



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CHOOSING YOUR DATA LOGGER

Concentrators - Data loggers

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		ELOG DATA LOGGER	ENERIUM 110/210
Electrical energy management	Accuracy		0.2 % for ENERIUM 210 0.5 % for ENERIUM 110
	Measurement of P, Q, S, V, U, I Inst. Min/Max/Avg.		
	Energy generated and consumed		
Multi-energy management	Metering pulse inputs (water, gas, etc.)	5	0, 2, 4, 6 or 8
	0-20 mA / 4-20 mA analog inputs (temp., flow rate, pressure, insolation, etc.)		0, 2, 4, 6 or 8
Installation monitoring	Management of alarms on thresholds		16
	Alarms log (recordings)		64
	Pulse or alarm outputs		0, 2, 4, 6 or 8
	Analog outputs		0, 2, or 4
Power quality	THD / PF / Tan φ		
	Harmonics per order with graphical representation		50
Recording capacity	Number of variables	100	8 load curves - 4 trend curves (only 4 trend curves for ENERIUM 110)
	Recording periodicity	5 s to 60 min	1 s to 60 min
Data export	csv or xml files		
Inputs / Outputs	RS485 - Modbus – Master	2	0
	RS485 - Modbus – Slave	0	1
	Ethernet	web services format JSON	Modbus TCP
	Format (mm)	6 DIN modules	144 x 144



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

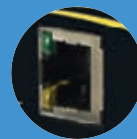
ZOOM



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

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.

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

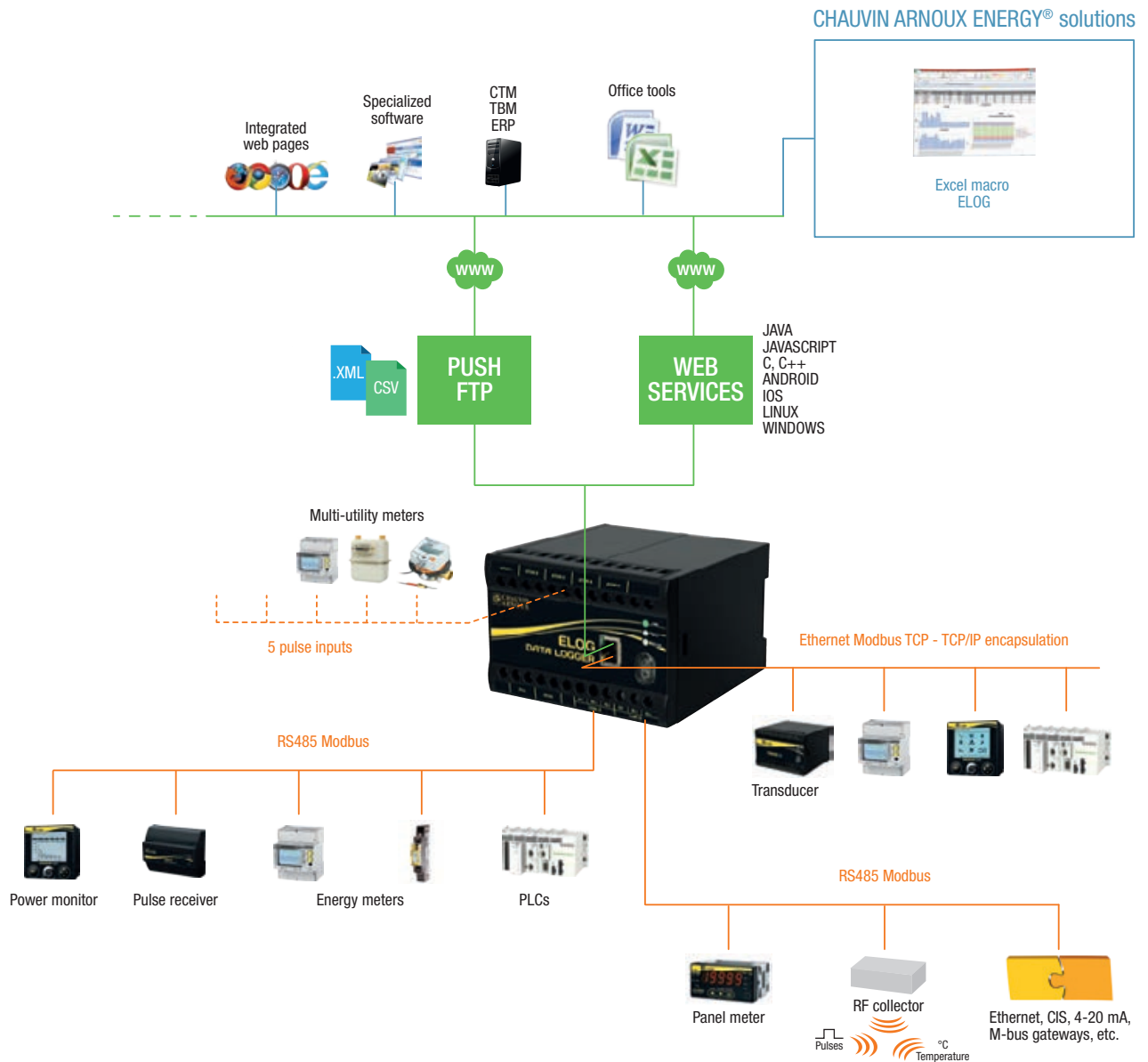
Third-party applications

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.

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 mm ² single-strand - 4 mm ² multi-strand
Tightening torque	0.4 Nm maximum admissible on the terminal

ENVIRONMENTAL CONSTRAINTS

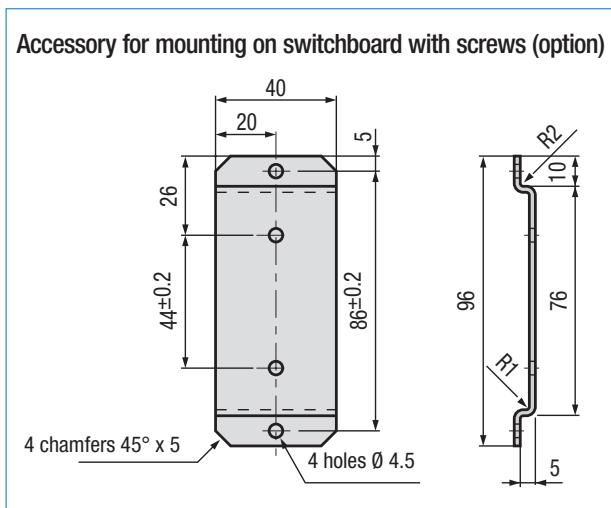
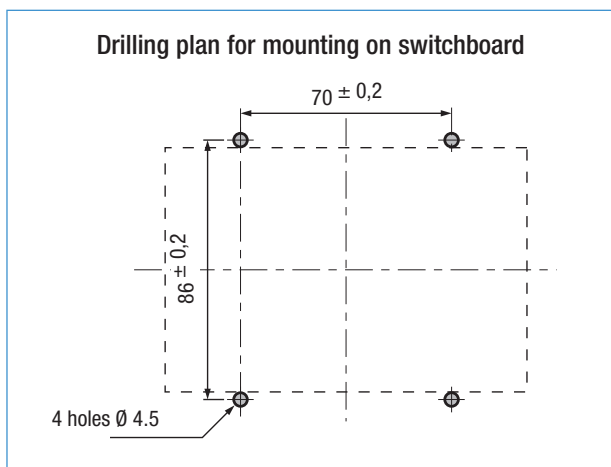
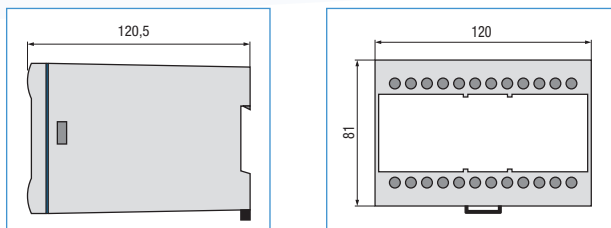
Climatic constraints	
Rated operating temperature	-10 to +55°C
Storage temperature	-25 to +70°C
Relative humidity as per IEC 62052-11 (standard for electrical metering applications)	<75%, annual average 95% for 30 days spread naturally over the year 85% occasionally on other days

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)



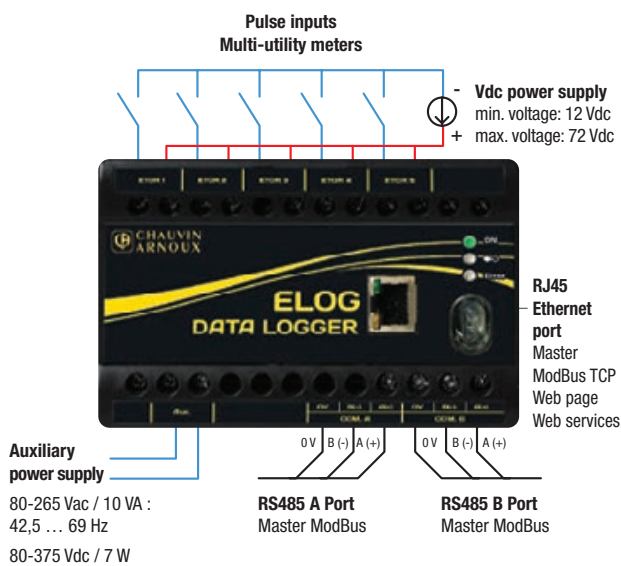
T O O R D E R

Model	Reference
ELOG DATA LOGGER	P01331233

ACCESSORIES

Model	Reference
Switchboard mounting	ACCT 1006
Optical USB cable	P01330403

ELECTRICAL CONNECTIONS



ASSOCIATED PRODUCTS



ULYS THREE-PHASE

Energy meters
Single-phase, three-phase,
direct inputs, CT connection.
page 36



ENERIUM

Power monitors for
all electrical networks
compliant with the IEC
61557-12 standard.
page 58

ENERIUM 110/210



Multi-energy, multi-utility data logger.



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

DESCRIPTION

ENERIUM 110 / 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

ENERIUM 110 / 210:

- Multi-energy indices and consumption curves (water, gas, electricity, etc.)
- Temperature curves
- Trend curves
- **ENERIUM 210:**
recording of 8 load curves / 4 trend curves
- **ENERIUM 110:**
4 trend curves only



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energy production



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nuclear



energy efficiency



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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
RS485 output	
Type	2 wires, half duplex
Protocol	Modbus / Jbus mode RTU
Speed	2400 - 4800 - 9600 - 19200 - 34800 bauds
Parity	Even, odd or none
JBus address	1 to 247

MECHANICAL SPECIFICATIONS

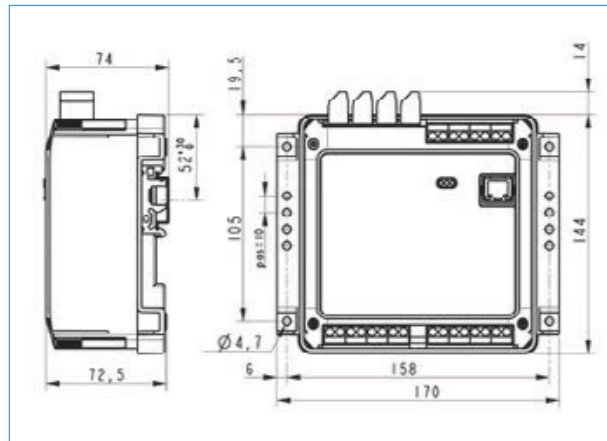
Weight	700 g
Mounting	DIN-rail or plate mounting
Connection	Screw terminal strip

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 address

DIMENSIONS (IN MM)



ELECTRICAL CONNECTIONS

Please see page 34

T O O R D E R	
Model	Reference
Enerium 210 - 50/60 Hz - 80 to 265 Vac / 110 to 375 Vdc - Ethernet - 8 metering inputs	P01330835
Enerium 210 - 50/60 Hz - 80 to 265 Vac / 80 to 265 Vdc - RS485 Modbus - 8 on-off inputs	ENERIUM-210-0-0-0-8-0-0-0-5
Enerium 110 - 50/60 Hz - 80 to 265 Vac / 80 to 265 Vdc - RS485 Modbus - 8 on-off inputs	ENERIUM-110-0-0-0-8-0-0-0-5
Accessory - Model	Reference
Optical head	P01330401

SOFTWARE

Model	Reference
E.view	P01330601

ASSOCIATED PRODUCTS



E.View

Software for configuration and display of the electrical parameters.
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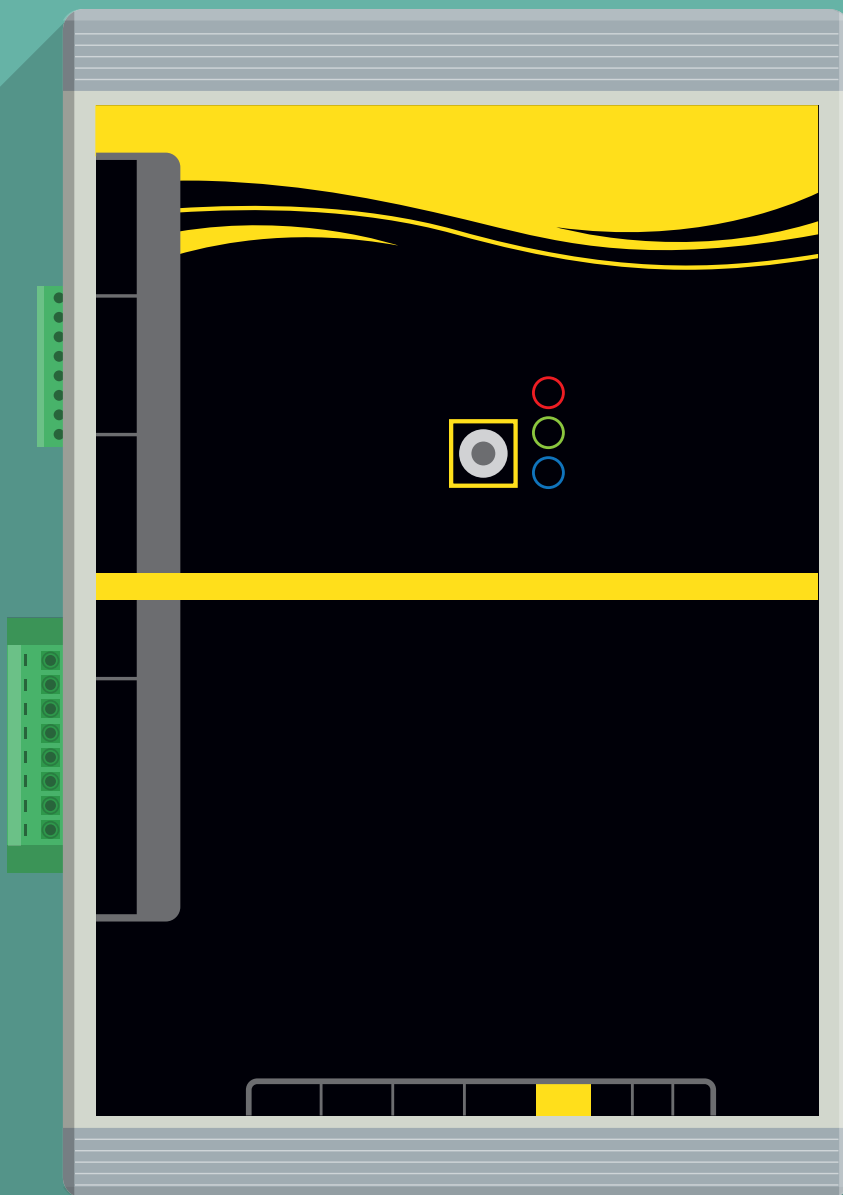


ULYS THREE-PHASE

Energy meters

Single-phase, three-phase, direct inputs, CT connection.

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NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

NETWORK ANALYZERS

- 86** OVERVIEW OF THE RANGE
- 88** SELECTION GUIDE
- 94** NETWORK ANALYZERS
- 104** MANAGEMENT AND ANALYSIS SOFTWARE

METERS AND POWER MONITORS

DATA LOGGERS

NETWORK ANALYZERS

CURRENT TRANSFORMERS AND SHUNTS

TRANSDUCERS

PANEL METERS AND SYNCHROCOUPLER

AUXILIARY RELAYS

SERVICES AND TRAINING

NETWORK ANALYZERS

Electrical network analyzers

Permanent analyzers - MAP range - Class A



MAP 607
Single-phase voltage
quality analyzer
page 95



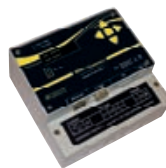
MAP 610
Three-phase voltage
quality analyzer
page 98



MAP 620
Three-phase
voltage/current network
quality analyzer
page 98



MAP 640
Three-phase voltage/
current network quality
analyzer with HF
transient capture
page 98



MAP Compact
Three-phase voltage/
current power and
network quality analyzer
+ Monitoring of EN50160
template
page 96

Power quality monitor



ENERIUM 300
Power monitor
Qualimetry according
to EN50160
page 58

Non-intrusive analyzers - MAP range - Class A



MAP 612-NI
Non-intrusive three-phase
voltage quality analyzer
with quick connection
page 98



MAP 620-NI
Non-intrusive network
analyzer - three-phase
voltage/current
page 98



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efficiency



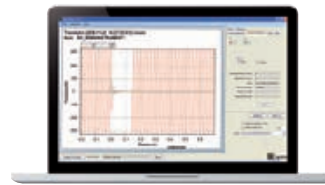
rail

Management and analysis software

For MAP 607



Qual-SRT
Configuration
and display
page 104

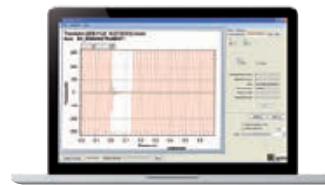


Qual-View
Settings, display
and analysis
page 104

For MAP Compact



Qual-SRTc
Settings
and display
page 104



Qual-View
Settings, display
and analysis
page 104

For MAP 6XX range



E.Qual-Premium
Settings, display
and analysis
page 104



**E.Qual-Premium
Server**
Settings, remote data
retrieval, display,
administration and analysis
page 104

SELECTION GUIDE

BASED ON ITS SPECIFICATIONS

MAP permanent analyzers

MAP non-intrusive analyzers

page 99

page 100



Single-phase

607



610

620

640



612-NI

620-NI

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.			



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

BASED ON ITS FUNCTIONS

MAP permanent analyzers

MAP non-intrusive analyzers

page 99

page 100



Single-phase

607



610

620

Three-phase

640



612-NI

620-NI

Calculated parameters	607	610	620	640	612-NI	620-NI
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..

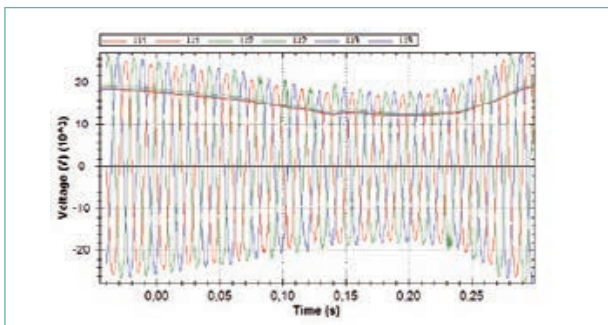
If you choose 0.2s accuracy on your power monitor, it guarantees that you meter energy with the same accuracy as your tariff meter (or higher).

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.

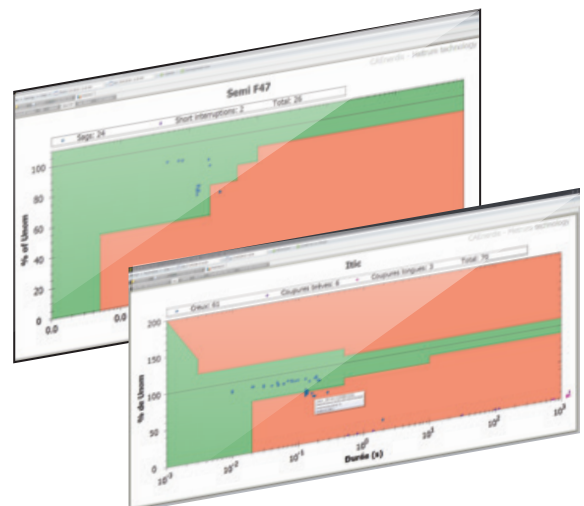
UNDERSTANDING ENERGY QUALITY AND HOW TO IMPROVE IT

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 58)

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

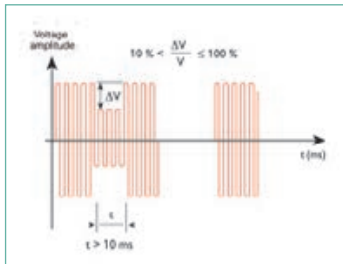


The comprehensive product for transformer station environments

- 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

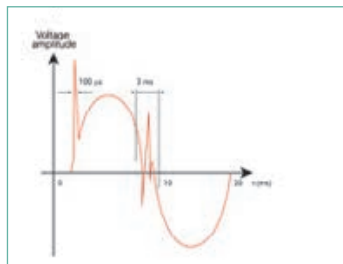


The nominal range of variation of the network voltage is set by the power distributor at $\pm 10\%$ of the phase-to-phase voltage.

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	<ul style="list-style-type: none"> • Voltage surge or dip • Micro-interruptions < 10 ms • Short interruptions < 3 min and long interruptions > 3 min
Causes linked to disturbances due to equipments	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Atmospheric phenomena and accidental short-circuits • Transmission and distribution network management problems
Parameters to be measured	<ul style="list-style-type: none"> • Amplitude and duration of the variation

RAPID VARIATIONS



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

Faults generated	<ul style="list-style-type: none"> • Transient overvoltages (<10 ms)
Causes linked to disturbances due to equipments	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Atmospheric phenomena (lightning)
Parameters to be measured	<ul style="list-style-type: none"> • Maximum amplitude and duration of the transient

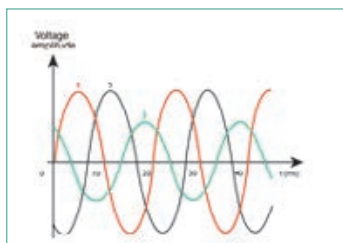
RAPID VOLTAGE VARIATIONS (FLICKER)



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.

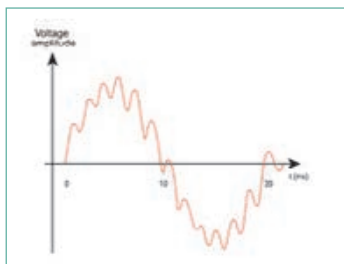
Faults generated	<ul style="list-style-type: none"> • Variation of brightness • Flickering of computer screens
Causes linked to disturbances due to equipments	<ul style="list-style-type: none"> • Arc furnaces • Laser printers • Air-conditioning systems
Causes linked to electrical power supply networks	<ul style="list-style-type: none"> • None
Parameters to be measured	<ul style="list-style-type: none"> • Short-term flicker (Pst) and long-term flicker (PIt)

VOLTAGE UNBALANCE



Faults generated	<ul style="list-style-type: none"> • Current or voltage not phase-shifted by 120° and with different amplitudes
Causes linked to disturbances due to equipments	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Disconnection of one electrical power supply phase
Parameters to be measured	<ul style="list-style-type: none"> • Level of unbalance, direct, inverse and homopolar voltage or current

HARMONICS AND INTERHARMONICS

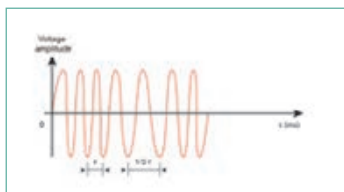


Harmonics: sinusoidal waves whose frequencies are multiples of 50 Hz superimposed on the fundamental wave.
Interharmonics: component of the signal superimposed on the fundamental wave (50 Hz) but which is not a multiple of the fundamental (e.g. 175 Hz).

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	<ul style="list-style-type: none"> Functional synchronization problems, switching Untimely tripping of circuit-breakers Induced heating reducing the life span of rotating machines, capacitors, power transformers and neutral conductors
Causes linked to disturbances due to equipment	<ul style="list-style-type: none"> EQUIPMENT containing power electronics: variable speed drives, uninterruptible power supplies, dimmers, welding units
Causes linked to electrical power supply networks	<ul style="list-style-type: none"> Propagation of harmonic pollution from customers supplied by the same electrical network
Parameters to be measured	<ul style="list-style-type: none"> Global THD Harmonics order by order in % and RMS value

FREQUENCY VARIATIONS

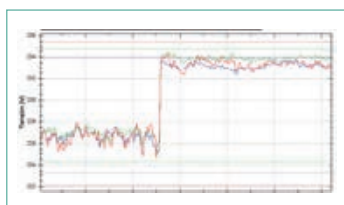


The average value of the fundamental frequency must be 50 Hz \pm 1% in normal operating conditions.

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

Faults generated	<ul style="list-style-type: none"> Process shutdown
Causes linked to disturbances due to equipments	<ul style="list-style-type: none"> Autonomous source control fault
Causes linked to electrical power supply networks	<ul style="list-style-type: none"> After an overload on networks that are not interconnected or on an electrical generator set
Parameters to be measured	<ul style="list-style-type: none"> Frequency F(Hz)

VOLTAGE SURGES



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

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

Faults generated	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Operations: motor startup, activation of a capacitor bank, activation of an inductance, etc.
Causes linked to electrical power supply networks	<ul style="list-style-type: none"> Activation of load adjustment systems Variation of production by independent producers (wind turbines, solar panels, etc.)
Parameters to be measured	<ul style="list-style-type: none"> 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.

GENERAL SPECIFICATIONS

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



- 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: I_{fl} , P_{st} , P_{It}
- Processing of the data according to the EN 50160 standard



Communication port:
local, modem,
built-in Ethernet



Status LED: phase sequence
and template overrun



Communication
couplers: local,
modem, Ethernet

ZOOM



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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 (Lfi, 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 and NRS048 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, PF, Cosφ	Selectable integration
Energy	■	kWh, kVAh	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		

T O O R D E R

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

PERMANENT ANALYZERS - THREE-PHASE



Inputs	Specifications	Voltage		
		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

DATA LOGGERS

NETWORK ANALYZERS

CURRENT TRANSFORMERS AND SHUNTS

TRANSDUCERS

PANEL METERS AND SYNCHROCOUPLER

AUXILIARY RELAYS

SERVICES AND TRAINING



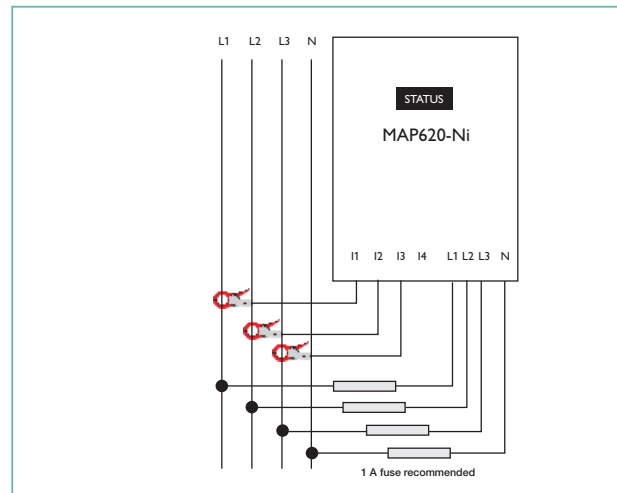
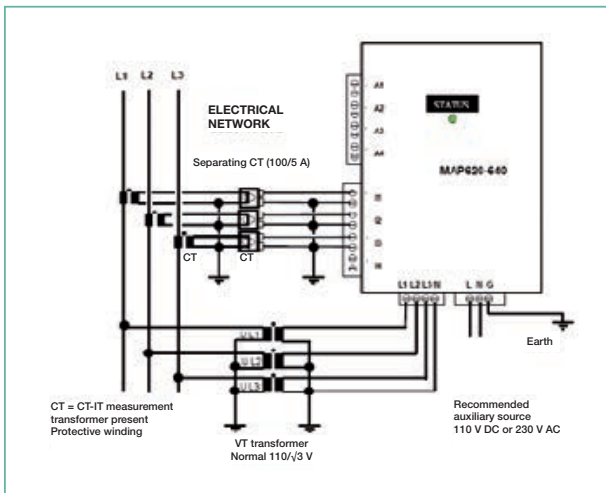
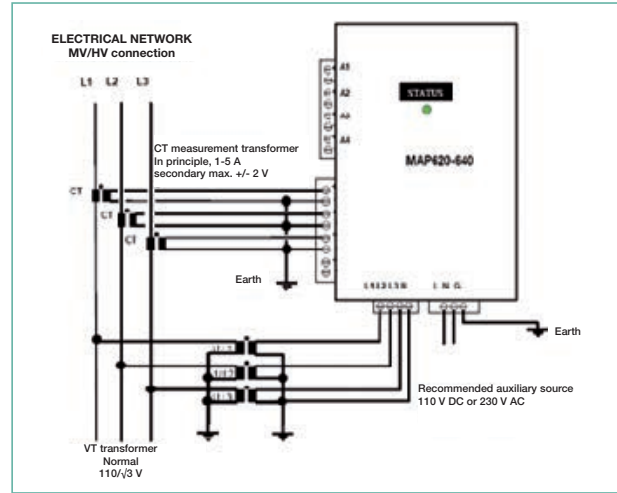
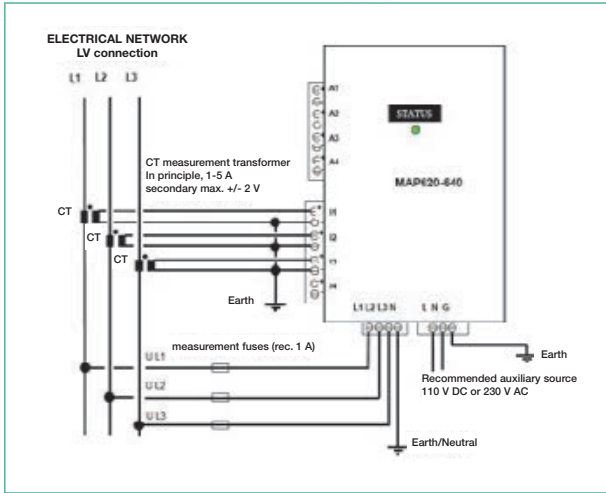
NON-INTRUSIVE ANALYZERS - THREE-PHASE

Inputs	Specifications	Voltage	Voltage / Current
		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		■	■
Lfi, Pst and Pit flicker	Pst 10 min, Pit 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) – Modbus TCP/IP available	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

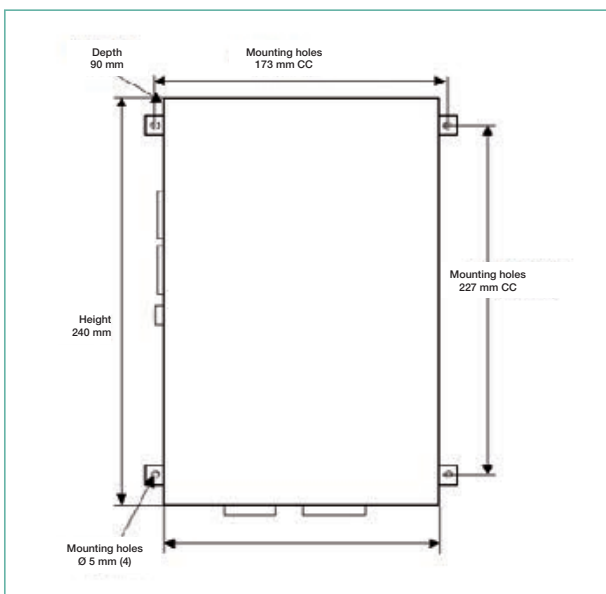
* Accessory for external power supply for flex

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

T O O R D E R

MAP6

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.

DATA LOGGERS

NETWORK ANALYZERS

CURRENT TRANSFORMERS AND SHUNTS

TRANSDUCEURS

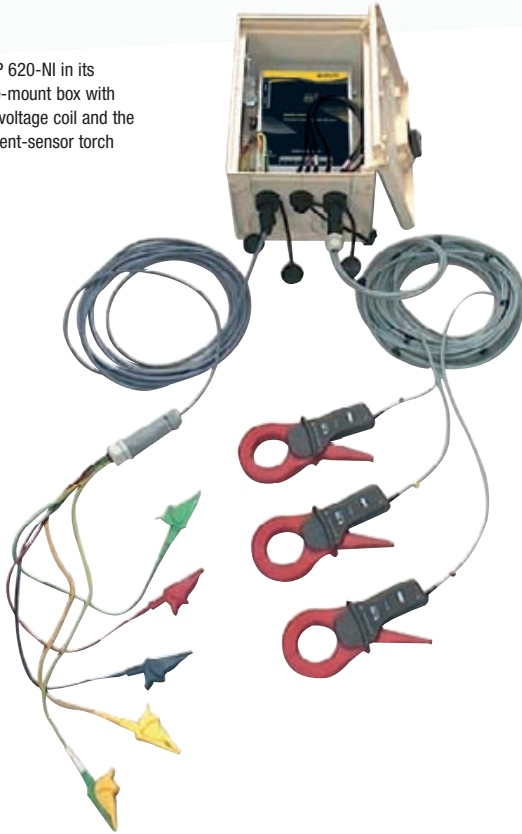
PANEL METERS AND SYNCHROSCOPE

AUXILIARY RELAYS

SERVICES AND TRAINING

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)
- 1.7 kg (MAP 670-NI – excl. accessories)
- 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



MAP SOFTWARE RANGE

Management and analysis software for the MAP range.

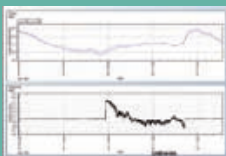
DESCRIPTION

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

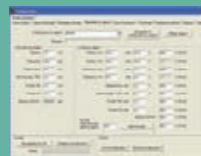
- configuration of the MAP
- creation of call sessions
- display of the electrical parameters (monitoring mode)
- retrieval of recorded data
- analysis of the disturbances and transients
- EN 50160 analysis
- a point-to-point or client/server architecture
- an automatic data retrieval engine
- multi-equipment analysis sessions
- external synchronization by server
- an event viewer module for duty 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



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 \geq 2.0 GHz with dual-core architecture (e.g. Pentium or Intel Core 2 Duo)
- RAM \geq 2 GB
- hard disk \geq 250 GB with 240 MB free
- Ethernet network board

For the Equal-Premium Server version:

additional specifications :

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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

QUAL-SRT

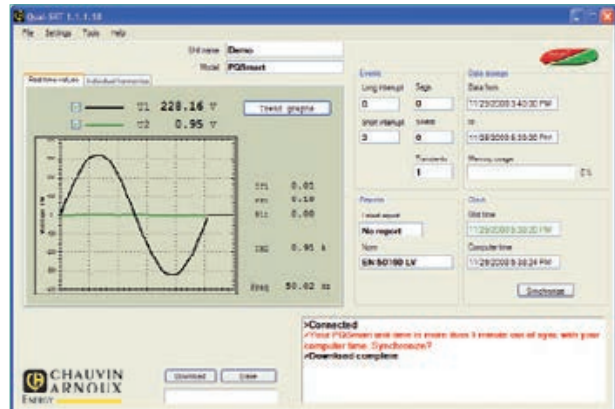
For MAP 607 and MAP Compact

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

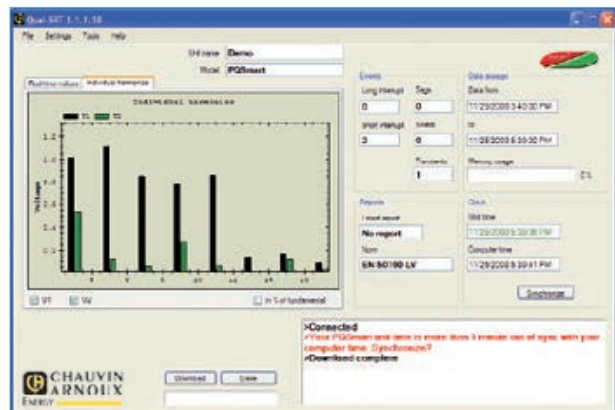
- the measurements
- the number of dips/ voltage surges / long outages / short outages / transients recorded
- the global status of the last EN50160 report
- the memory occupation rate
- the date and time on the equipment

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.



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



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

TO ORDER

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

ASSOCIATED PRODUCTS



MAP 607
Single-phase voltage quality analyzer
page 95



MAP Compact
Compact power and network quality analyzer
page 96

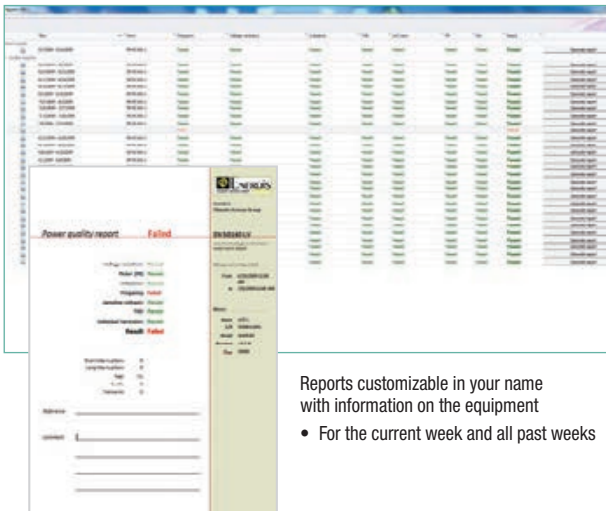
QUAL-VIEW

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.

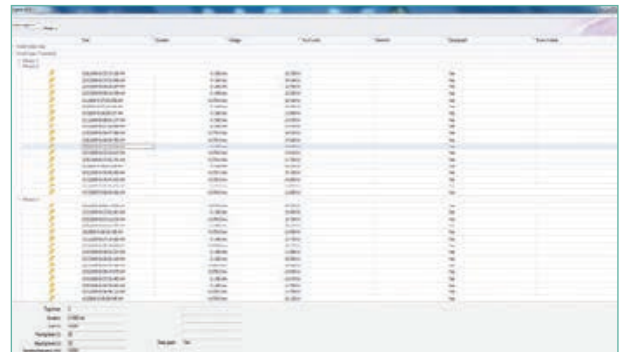
The event-based views such as the event signatures, waveforms and time/date-stamped events log can also be obtained by means of dedicated tabs in the Qual-View software.

- 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



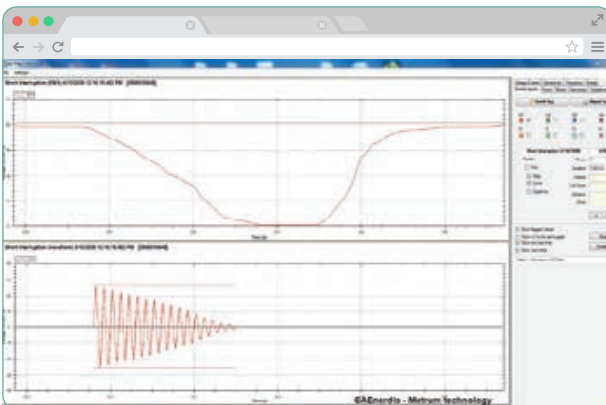
Reports customizable in your name with information on the equipment

- For the current week and all past weeks



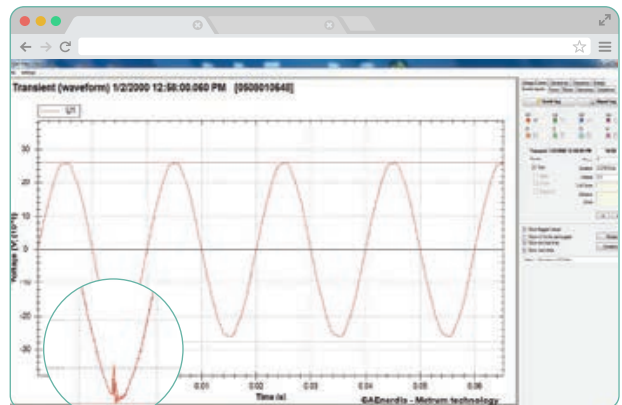
A history of all the events listed according to their type

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



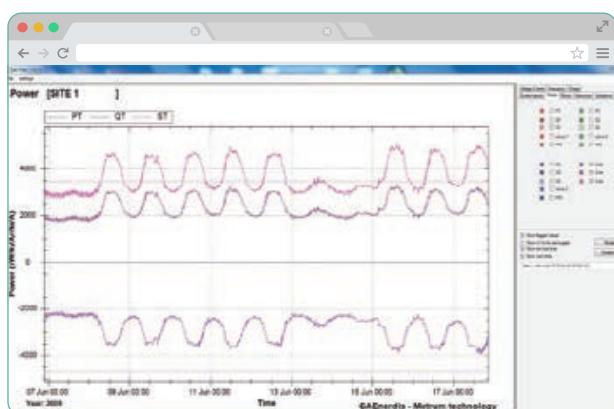
Understand the causes of network outages

- 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 of 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 95



MAP Compact
Compact power
and network
quality analyzer
page 96



MAP range
Three-phase network
quality analyzer
page 94

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 106.

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

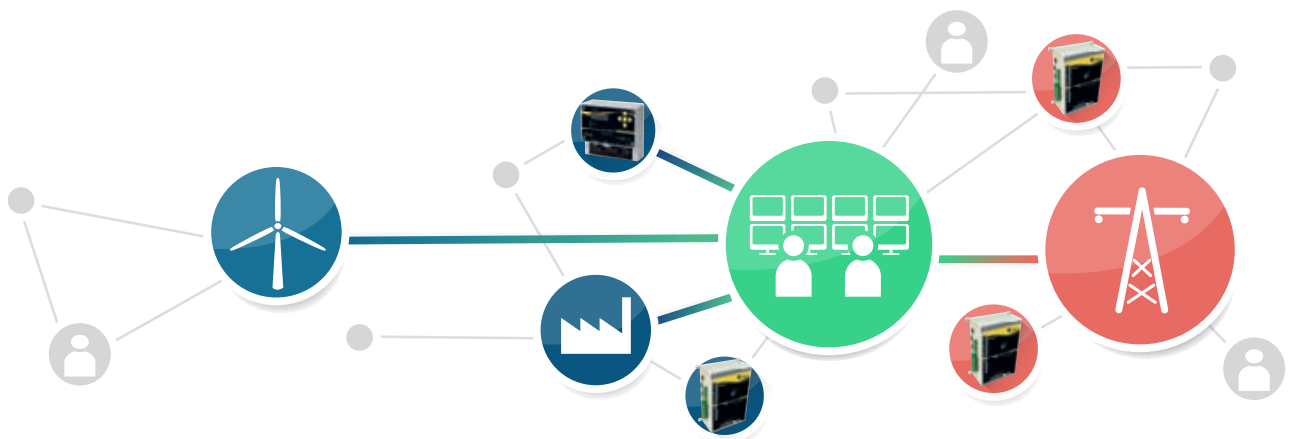
Peace of mind: all the data retrievals are performed automatically by a high-performance remote data-retrieval engine

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

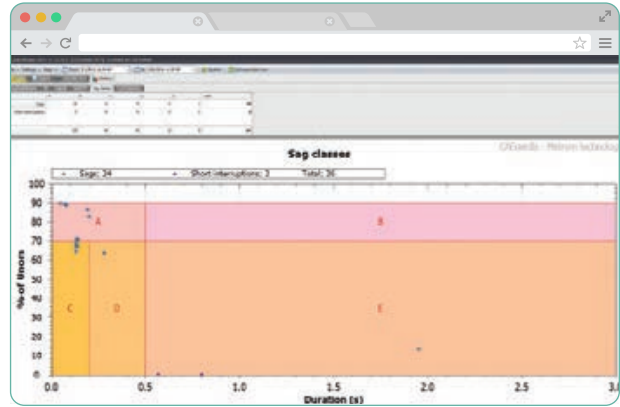
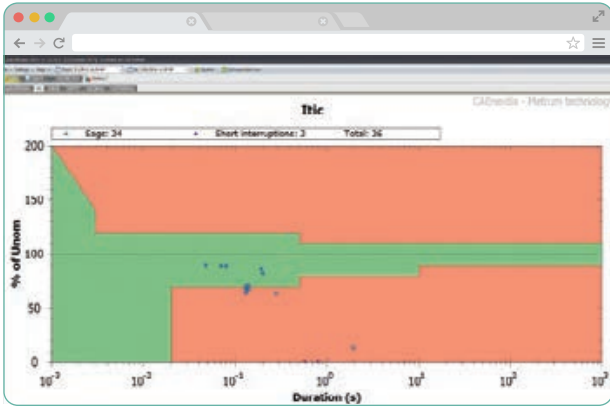
	E.Qual-Premium	E.Qual-Premium Server
Architecture		
Point to point	■	■
Multi-equipment by successive targeting	■	■
Management of measurements in database		■
Multi-site / multi-equipment		■
Client / Server architecture		■
Data transfer		
Manual	■	■
Selective transfer	■	■
Automatic transfer		■
Communication 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		■

T O O R D E R			
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

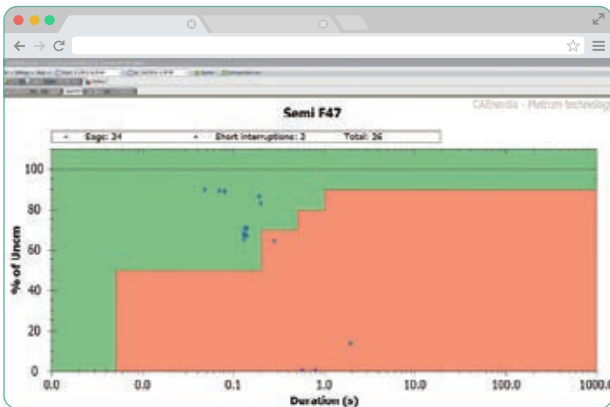


E.QUAL-PREMIUM SERVER

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 PRODUCT



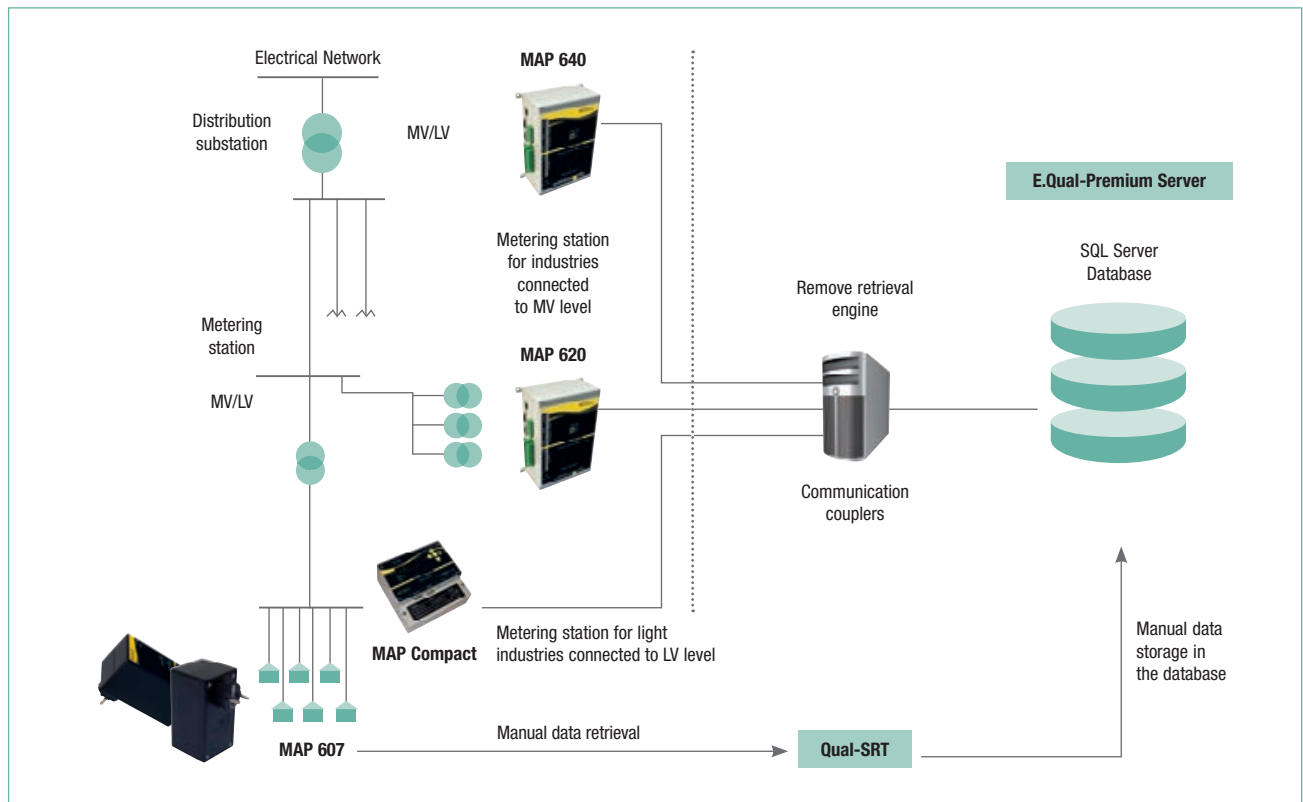
MAP range

Three-phase network quality analyzer

page 94

E.QUAL-PREMIUM SERVER ARCHITECTURE

The E.Qual-Premium Server architecture is ideal for applications where you want to analyze 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.



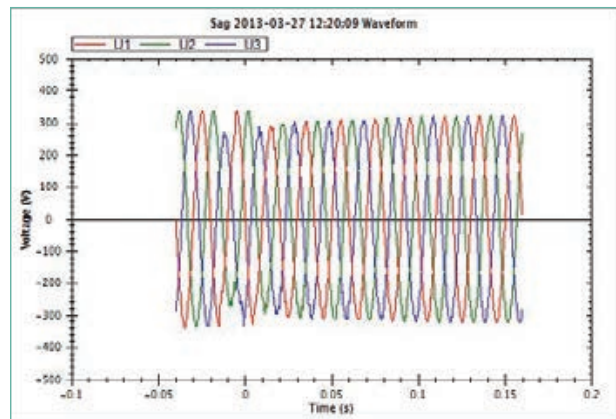
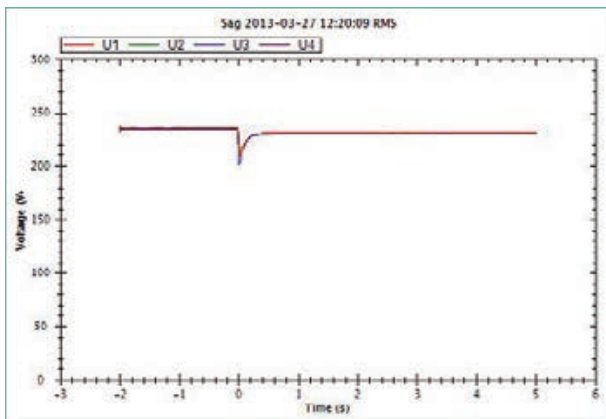
Components of an E.Qual-Premium Server with the network analyzers, the communication links, the database and the analysis and graphic display modules.

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.



CA PQ Web

Time	Phase	Order	Value	Unit	Device	Location	Operator
2013-03-27 12:20:09	U1	1	230.0	V	1000000	1000000	1000000
2013-03-27 12:20:09	U2	2	230.0	V	1000000	1000000	1000000
2013-03-27 12:20:09	U3	3	230.0	V	1000000	1000000	1000000
2013-03-27 12:20:09	U4	4	230.0	V	1000000	1000000	1000000



NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

CURRENT TRANSFORMERS AND SHUNTS

- 114 OVERVIEW OF THE RANGE
- 116 SELECTION GUIDE
- 122 TERTIARY AND INDUSTRIAL
CURRENT TRANSFORMERS
- 136 CURRENT TRANSFORMERS
FOR TARIFF METERING
- 147 CURRENT TOTALIZERS
- 148 CT SHORT-CIRCUITER
- 150 SHUNTS

CURRENT TRANSFORMERS AND SHUNTS

Tertiary and industrial current transformers



TCR
Wound primary
Class 0.5/1/3
page 123



TCR
Cable/busbar primary
Class 0.5/1/3
page 124



TCR
Busbar primary
Class 0.5/1/3
page 127



JVS
Cable/busbar primary
Class 0.2s
page 128



TCRO
Split core
Without conductor opening
page 132



TC CLIP
Split core
Small volume
page 136

Current transformers for tariff metering

Core – Single-phase



JVR86
Wound primary
M8-M10
page 139



JVO 40-100
Cable primary
Ø 42 mm - Class 0.5
page 141



JVO 40-100 S
Cable primary
Ø 40 mm - Class 0.2s
page 142



J3R 80B
Cable primary
Ø 66 mm - Class 0.5
page 139



JVO 90-160S
Cable primary
Ø 90 mm - Class 0.2s
page 143



JVS 38B
Cable/ busbar primary
Ø 63 mm - Class 0.2s
page 130



JVP 1025
Busbar primary
100 x 20 - Class 0.5
page 139



JVP 1045
Busbar primary
100 x 40 - Class 0.5
page 139



JVP 1045B
Busbar primary
100 x 40 - Class 0.5
Two-rating
page 140



JVP 1145S
Busbar primary
100 x 12 - Class 0.2s
page 144



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

Current transformers for tariff metering

Plate-mounting - Three-phase



TRI 500 Single-rating

50 to 240 mm² cable clamp
Class 0.5
page 145

TRI 700 Three-rating

50 to 240 mm² cable clamp
Class 0.5
page 146

TRI 700 S Two-rating

50 to 240 mm² cable clamp
Class 0.5
page 146

Current totalizers



JVM 15

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

page 147

CT short-circuiter



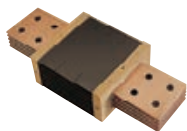
PRTC

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

page 148

Shunts

Class 0.5



76/2 - 77/2 range

1 to 4,000 A
A reference for measurement in demanding applications.

page 152

Class 1



SHMI range

1 to 6,000 A
Vast choice for industrial applications.

page 154



SHEL range

10 to 300 A
At low power, everything you need to facilitate implementation.

page 156



SHMO range

1 to 60 A
DIN-rail mounting.

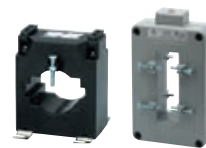
page 156

CHOOSING YOUR TERTIARY AND INDUSTRIAL CURRENT TRANSFORMER

TCR Wound primary	TCR / JVS Cable/busbar primary
----------------------	-----------------------------------

page 123

page 124



	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 mm ²							
Cable primary (mm)			∅ 20	∅ 22	∅ 26	∅ 28	∅ 44	∅ 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	5 A							
	10 A	10 A							
	15 A	15 A							
	20 A	20 A							
	25 A	25 A							
	30 A	30 A							
	40 A	40 A	40 A						
	50 A	50 A	50 A						
	60 A		60 A						
	75 A		75 A						
	100 A		100 A	100 A		100 A			
	125 A		125 A	125 A	125 A	125 A			
	150 A		150 A	150 A	150 A	150 A			
	200 A		200 A	200 A	200 A	200 A			
	250 A		250 A	250 A	250 A	250 A			
	300 A			300 A	300 A	300 A			
	400 A			400 A	400 A	400 A	400 A	400 A	
	500 A			500 A	500 A	500 A	500 A	500 A	
	600 A			600 A	600 A	600 A	600 A	600 A	
	750 A					750 A	750 A	750 A	
	800 A					800 A	800 A	800 A	
	1,000 A						1,000 A	1,000 A	
	1,200 A						1,200 A	1,200 A	
	1,500 A							1,500 A	1,500 A
	2,000 A							2,000 A	2,000 A
	2,500 A							2,500 A	2,500 A
	3,000 A							3,000 A	3,000 A
	4,000 A								4,000 A
	5,000 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

CHOOSING YOUR CURRENT TRANSFORMER FOR TARIFF METERING

Core - single-phase

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page 141

page 142

page 139

page 143

page 130



		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 mm ²)						
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.



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energy efficiency



rail

Core - Single-phase

Plate-mounting - Three-phase

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page 139

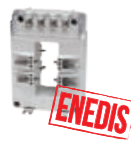
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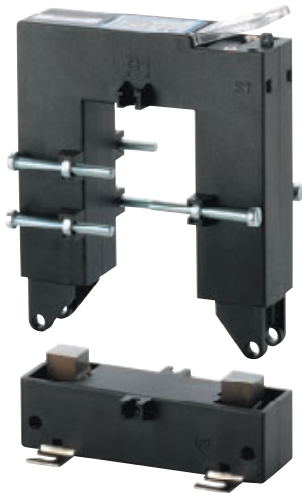
page 146

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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			
0.5	0.5	0.5	0.2s	50 to 240	50 to 240	50 to 240
15 (30 for 1,250 A)	15 (30 for 1,000 A)	7.5 (two-rating) / 15	7.5	0.5	0.5	0.2s
■	■	■		■		
		500 - 1,000 A 1,000 - 2,000 A				50 - 100 A 100 - 200 A 200 - 500 A
			500-1000-2000A		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 $I_p / 5 \text{ A}$);
- 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 meter of line (2 ways)

Copper-wire section (mm ²)	Secondary 5 A	Secondary 1 A
1.5 mm ²	0.61 VA	0.025 VA
2.5 mm ²	0.37 VA	0.015 VA
4 mm ²	0.23 VA	0.009 VA
6 mm ²	0.15 VA	0.006 VA

Enerium 50 Power Monitor	0.15 VA
5 m of double 2.5 mm ² wire	$0.37 \times 5 = 1.85 \text{ VA}$
Measurement line consumption	$0.15 + 1.85 = 2 \text{ VA}$

Primary	Power (VA) on Class		
	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



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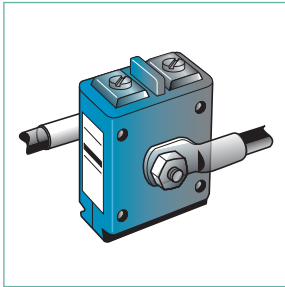
energy efficiency



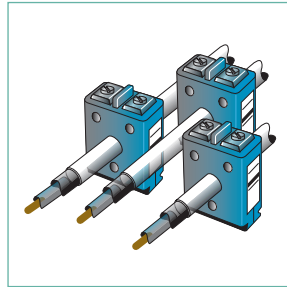
rail

CONNECTING A CURRENT TRANSFORMER

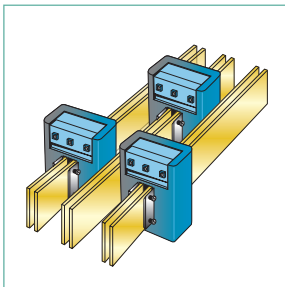
Chauvin Arnoux Energy current transformers offer 4 types of connection:



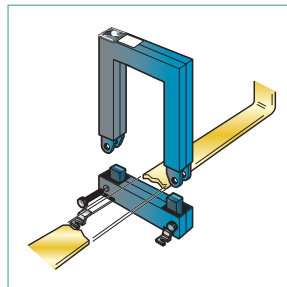
WOUND PRIMARY
for currents less than 200 A



CABLE PRIMARY
for currents between 40 and 2,500 A



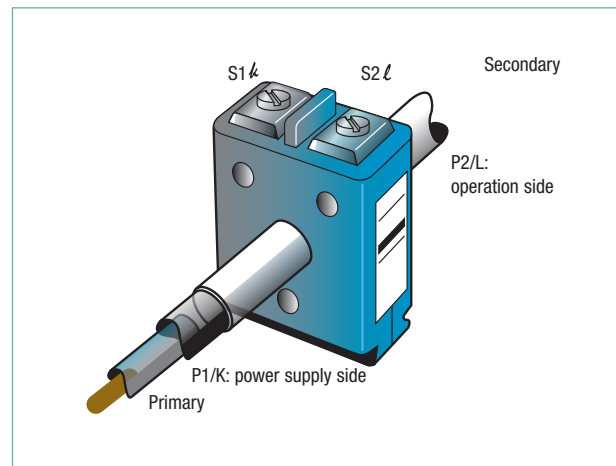
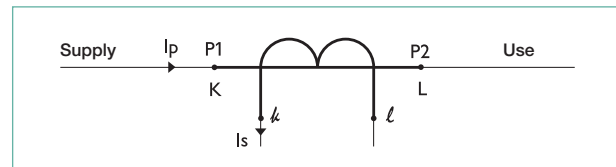
BUSBAR PRIMARY
for currents between 750 and 5,000 A



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 I _n (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 I _n (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 short-circuited.

When a CT is not in use (secondary open) the secondary must be short-circuited before powering up the system. See page 148, PRTC transformer short-circuiter.



TCR RANGE

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

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 (I_{th}): 60 In - 1 second

Dynamic current (I_{dyn}): 2.5 I_{th}

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 94V0)

- +** 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



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

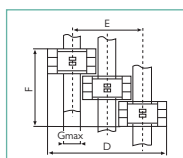
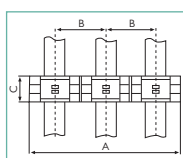


Supplied with bar clamp fitting accessories



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



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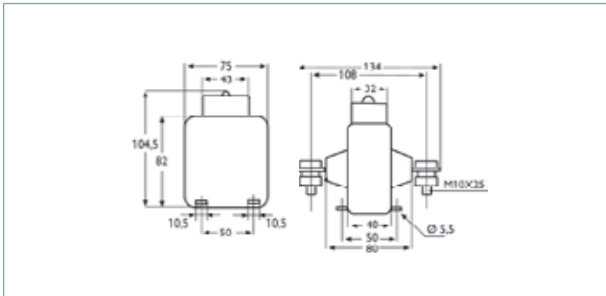


rail

TCR WOUND PRIMARY

TCR 10

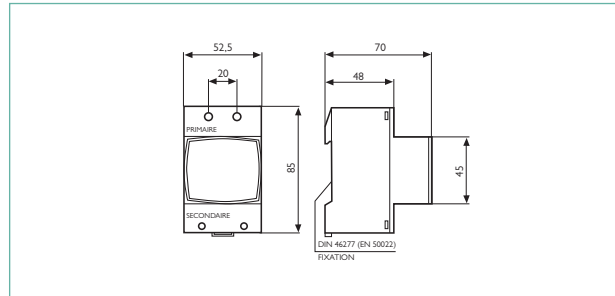
25 x 25 mm aperture



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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			Weight (kg)
	0.5	1	3	
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

T O O R D E R

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.

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PRTC

CT short-circuiter

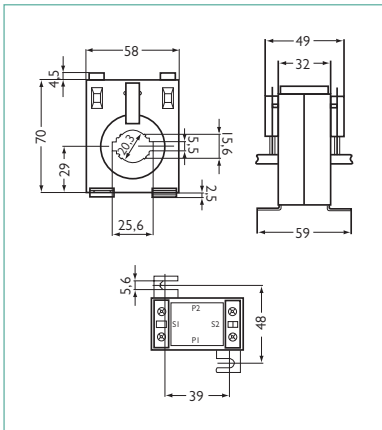
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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CABLE/BUSBAR PRIMARY

TCR 21

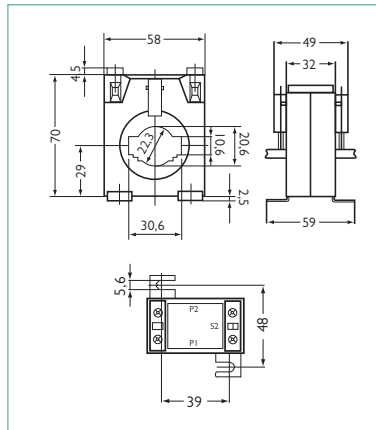
Cable Ø 20 mm
 Bar: 15 x 10 mm
 20 x 10 mm
 25 x 5 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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 31

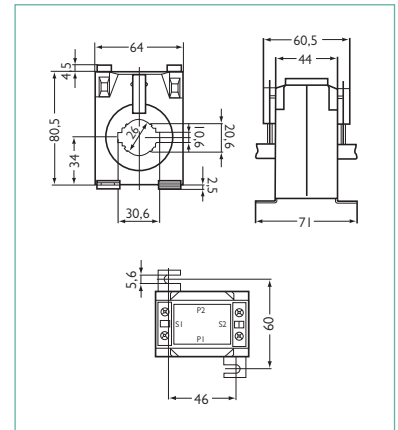
Cable Ø 22 mm
 Bar: 20 x 12 mm
 25 x 11 mm
 30 x 10 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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			Weight (kg)
	0.5	1	3	
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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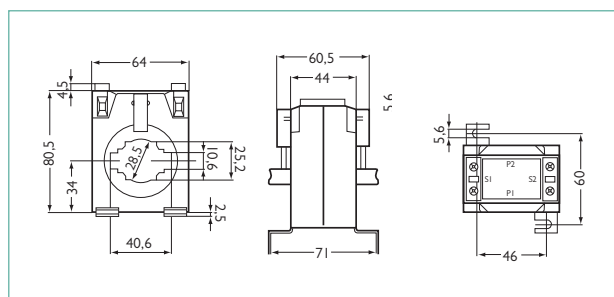
Mounting accessories

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

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TCR 51

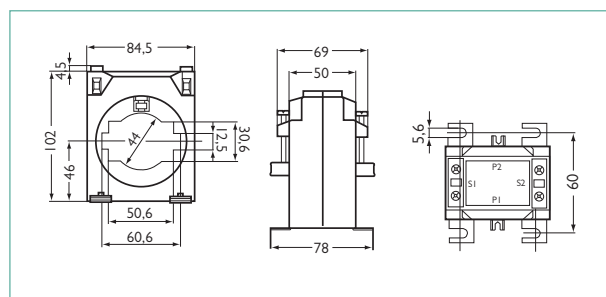
Cable Ø 28 mm
Bar: 20 x 25 mm
30 x 15 mm
40 x 10 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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			Weight (kg)
	0.5	1	3	
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

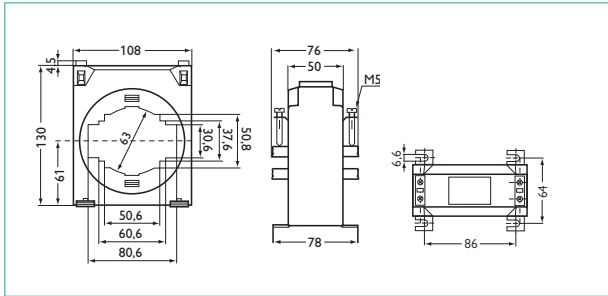
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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CABLE/BUSBAR PRIMARY

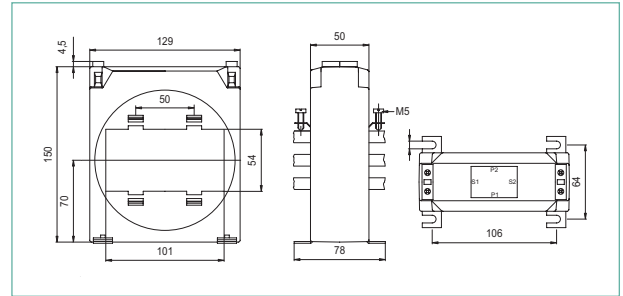
TCR 71

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



TCR 75

Bar: 3 x 100 mm x 10 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

T O O R D E R

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

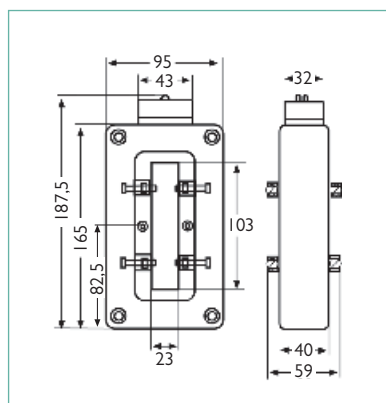
DIN-rail mounting, plate-mounting and sealable terminal cover.

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BUSBAR PRIMARY

TCR 80

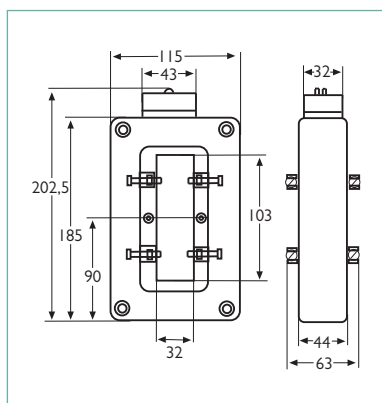
Bar: 100 x 20 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

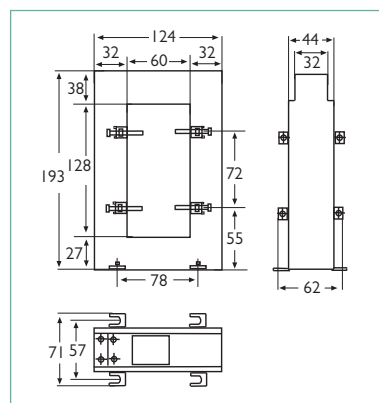
Bar: 100 x 30 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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			Weight (kg)
	0.5	1	3	
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

T O O R D E R

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 measuring 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 (I_{th}):** 60 I_n - 1 second
- Dynamic current (I_{dyn}):** 2.5 I_{th}
- 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 V0)

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



Removable, lead-sealable terminal cover supplied

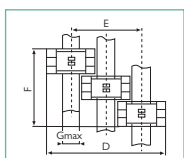
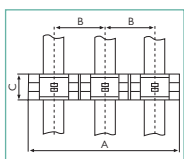


Split output terminals enabling risk-free short-circuiting of the secondary current (M4 or cage for 4 mm² wire)



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



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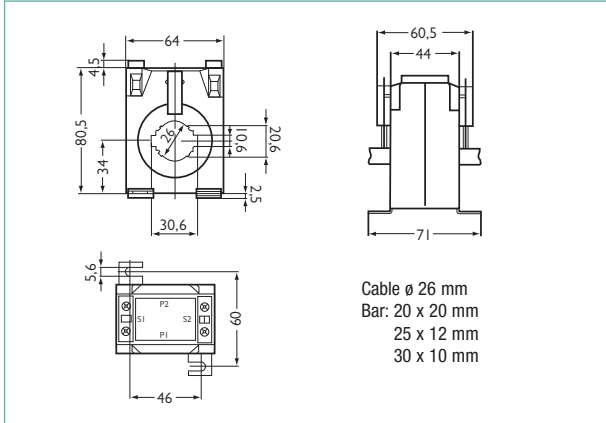
energy efficiency



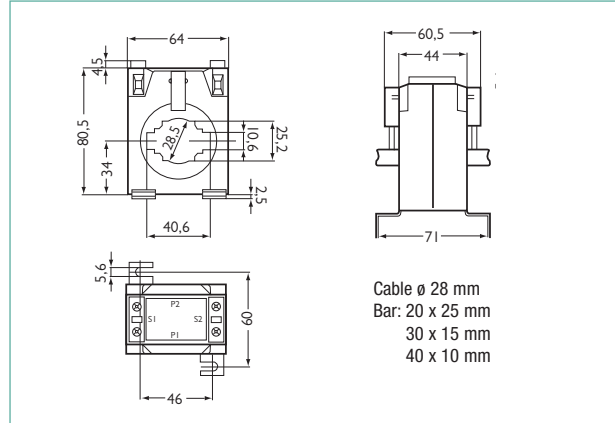
rail

CABLE/BUSBAR PRIMARY

JVS 25B



JVS 26B



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

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

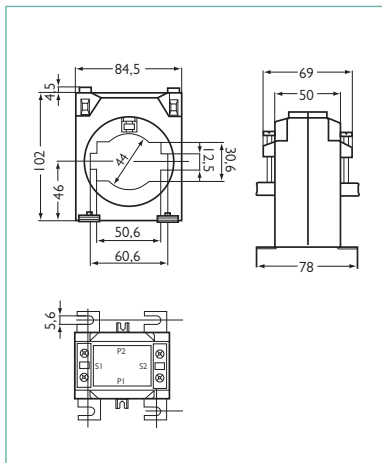
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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CABLE/BUSBAR PRIMARY

JVS 30B

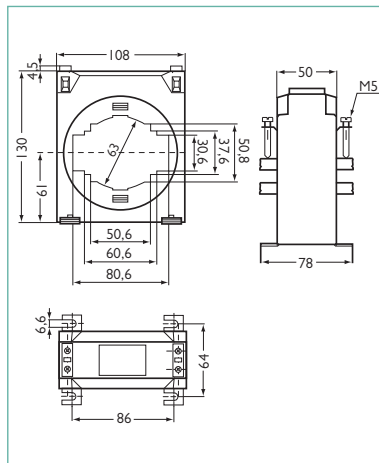
Cable Ø 44 mm
Bar: 50 x 30 mm
60 x 12 mm



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

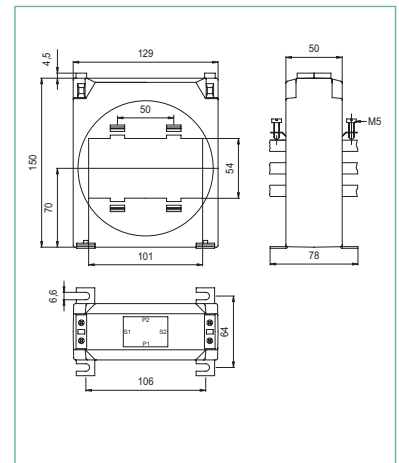
Câble Ø 63 mm
Bar: 50 x 50 mm
60 x 30 mm
80 x 30 mm



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

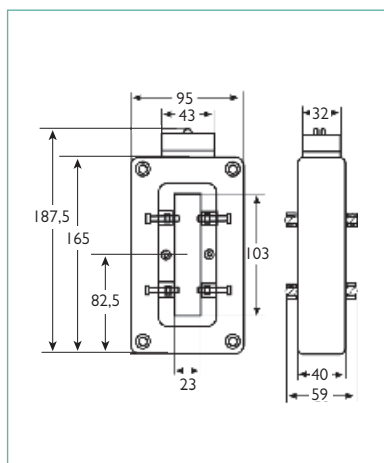
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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BUSBAR PRIMARY

JVS 40

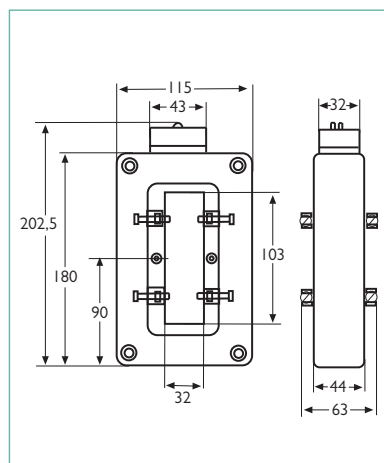
Bar: 100 x 20 mm



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

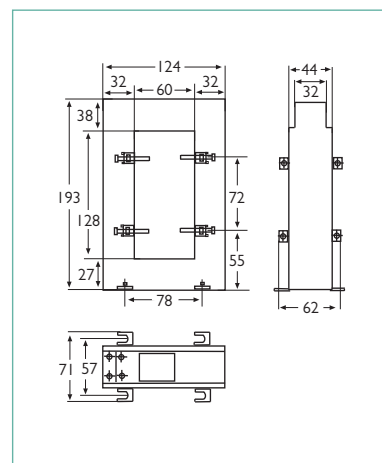
Bar: 100 x 30 mm



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

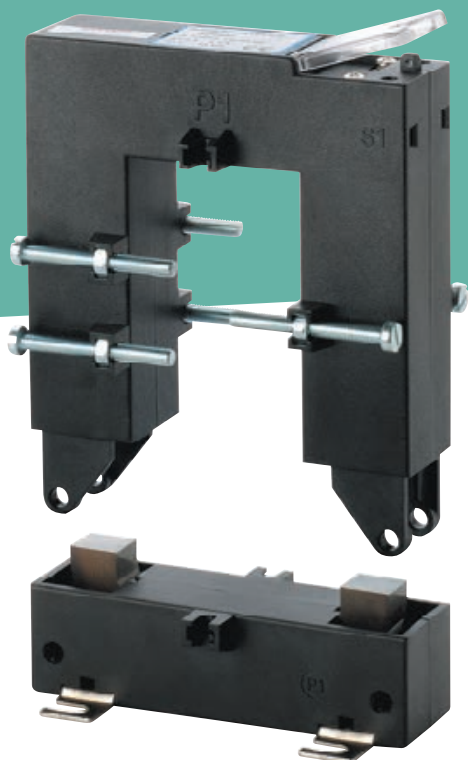


PRTC

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.

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 (I_{th}): 60 I_n - 1 second

Dynamic current (I_{dyn}): 2.5 I_{th}

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)

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



Plate mounting fitting

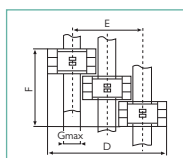
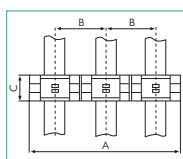


Bar clamp fitting



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

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	■	■



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energy efficiency

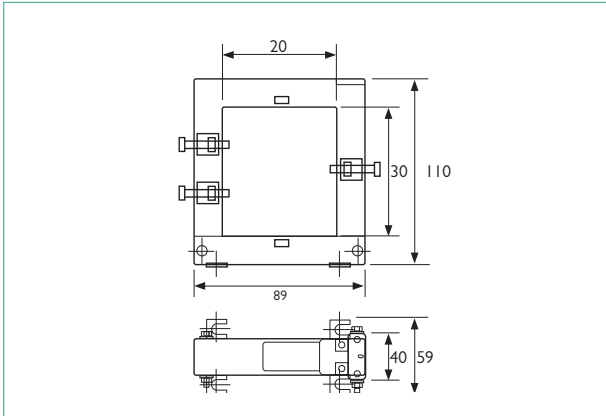


rail

TCRO RANGE

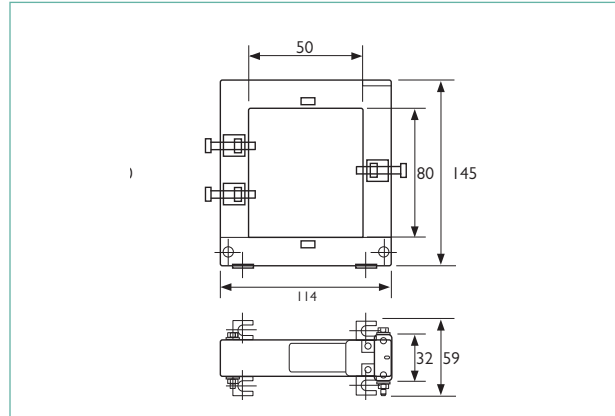
TCRO 2030

Bar: 20 x 30 mm



TCRO 5080

Bar: 50 x 80 mm



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

Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

T O O R D E R

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

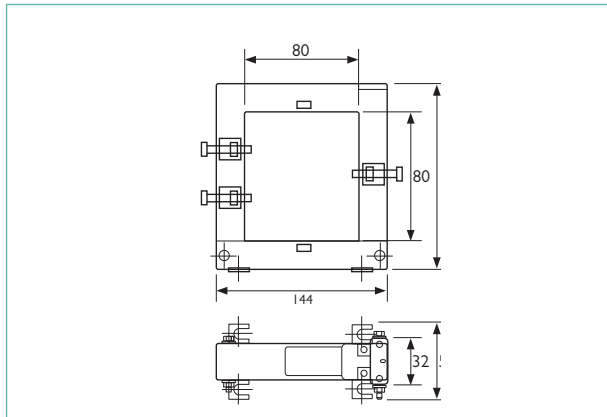
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.

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SPLIT CORE

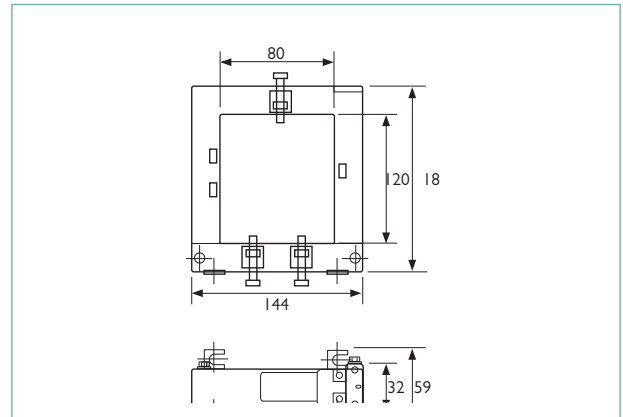
TCRO 8080

Bar: 80 x 80 mm



TCRO 80120

Bar: 80 x 120 mm



Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

Primary	Power (VA) in class			Weight (kg)
	0.5	1	3	
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

T O O R D E R

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

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

1 A secondary on request

ASSOCIATED PRODUCT



PRTC

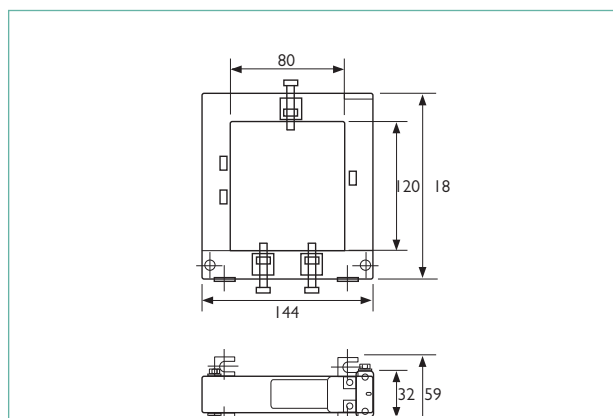
CT short-circuiter

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



Primary	Power (VA) in class			Weight (kg)
	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.

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 Chauvin Arnoux Energy®.



- Quick and easy implementation without cutting off the power
- Built-in shortcircuiting switch
- Reinforced hinge
- Very compact
- Primary from 60 to 600 A

ZOOM



Reinforced hinge



Built-in short-circuiter



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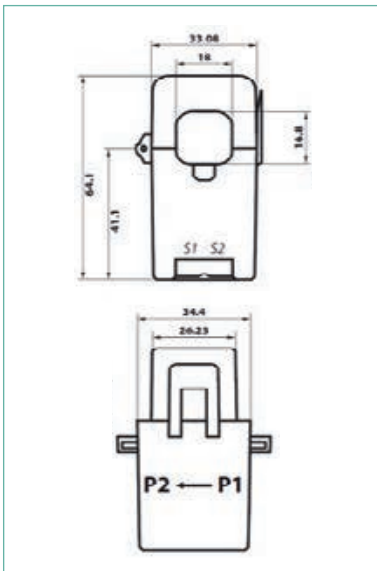
energy efficiency



rail

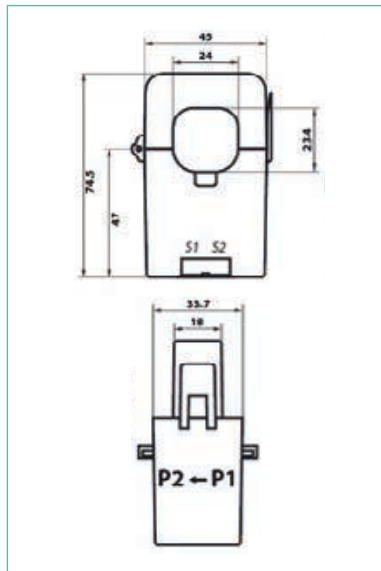
TCC176

Cable Ø 17 mm



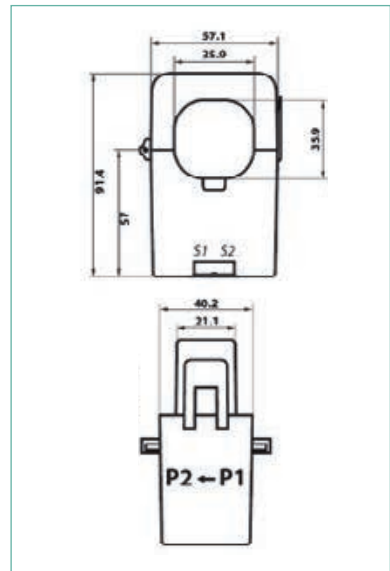
TCC241 / TCC242

Cable Ø 24 mm



TCC364 / TCC366

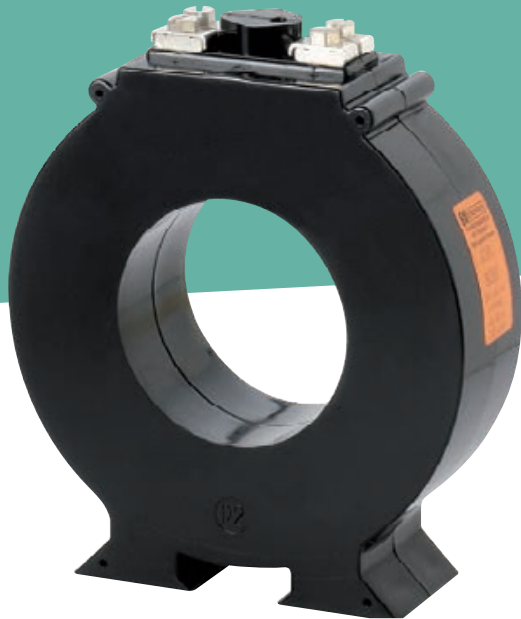
Cable Ø 36 mm



	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

T O O R D E R

Model	Primary / Secondary	Reference	Pack of 3 TC CLIP	Reference
TCC 176	60 A / 1 A	P01379609	Pack of 3 TCC 176	P01379610
TCC 241	100 A / 1 A	P01379601	Pack of 3 TCC 241	P01379605
TCC 242	250 A / 1 A	P01379602	Pack of 3 TCC 242	P01379606
TCC 364	400 A / 1 A	P01379603	Pack of 3 TCC 364	P01379607
TCC 366	600 A / 1 A	P01379604	Pack of 3 TCC 366	P01379608



SINGLE-PHASE CORE CT RANGE

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

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 (I_{th}): JVO, JVP: 80 In
JVR 86: 60 In

Dynamic current (I_{dyn}): 2.5 I_{th}

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 V0)

- + 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 Chauvin Arnoux Energy:

- 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



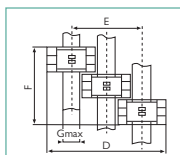
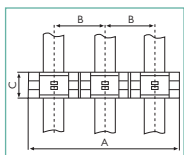
Sealable cover
M5 terminals with 2 grooves for dual connection on secondary



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		



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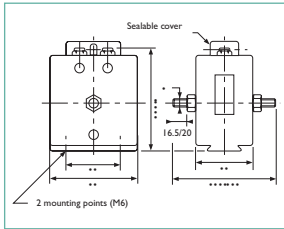
energy efficiency



rail

JVR 86

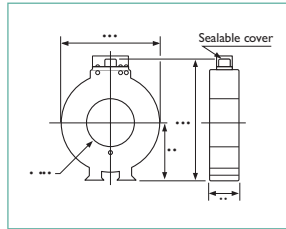
Ø M8/M10 > 75 A
Weight: 1.2 kg



Primary	Power (VA) in class	
	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

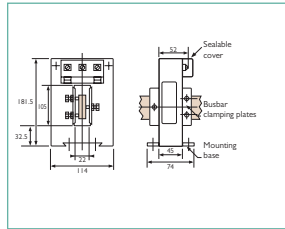
Cable Ø 66 mm
Weight: 1.6 kg



Primary	Power (VA) in class		
	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

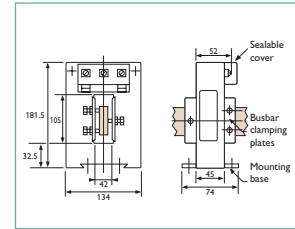
Bar: 100 x 20 mm
Weight: 2 kg



Primary	Power (VA) in class	
	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



Primary	Power (VA) in class	
	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

T O O R D E R

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.
page 138



PRTC

CT short-circuiter
Protection against hazards due to opening of the secondary circuit of a low-voltage measurement CT.
page 148



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 (I_{th}): 80 In

Dynamic current (I_{dyn}): 2.5 I_{th}

Safety factor: 10 in class 0.5
Except * SF = 6.4/10.5 and **SF = 4.7/8.2

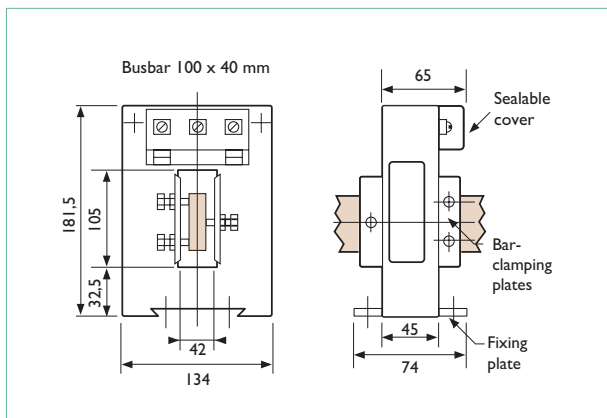
Operating conditions: Temperature: -20°C to +60°C

Relative humidity: 93% at 40°C

Protection: Protection rating: IP 50

Dry winding in self-extinguishing ABS envelope (UL 94 V0)

- 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



T O O R D E R

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 \varnothing 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

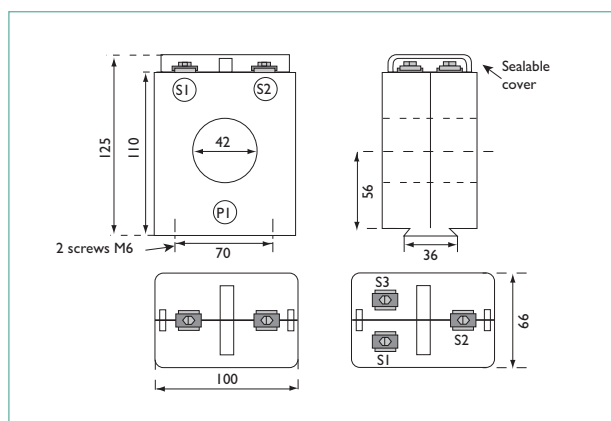
Relative humidity: 93 % at 40 °C

Protection: Protection rating: IP 50

Dry winding in self-extinguishing ABS envelope (UL 94 V0)



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



T O O R D E R

Primary	Power (VA) in class 0.5			Weight (kg)
	15 Secondary 2.5 A	7,5 Secondary 5 A	15 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		



JVO 40-100 S Bi-rating

Cable primary \varnothing 40 mm

GENERAL SPECIFICATIONS

Cable primary: \varnothing 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 (I_{th}): 20 kA for 1 s

Rated dynamic current (I_{dyn}): 2.5 I_{th}

Safety factor: SF = 3 (200/5 A);
SF = 6 (500/5 A)

Rated thermal current: 1.2 I_{pn}

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 μ s

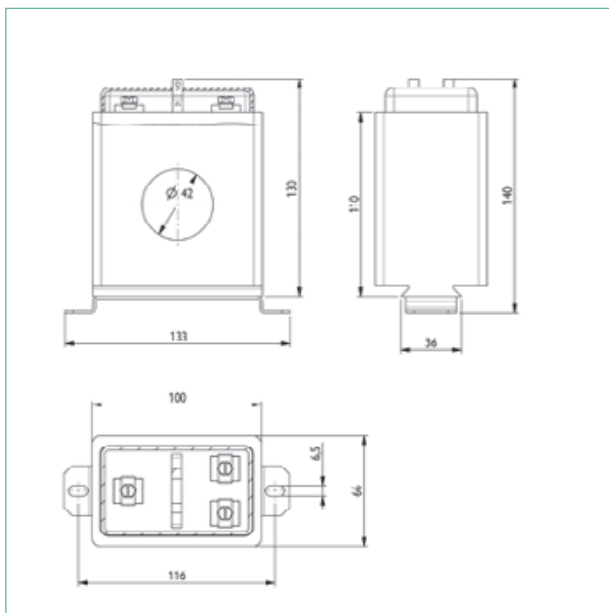
Insulation class: E (heating limit: 75 K)

Weight: 1.1 kg



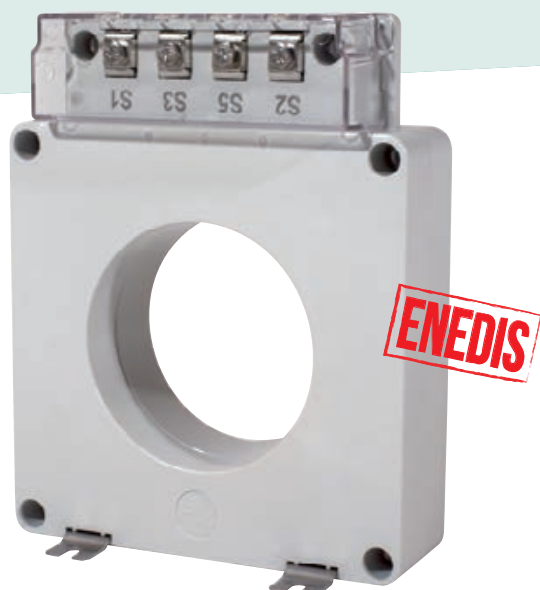
- Class 0.2s according to IEC 60044-1
- Particularly suitable for ENEDIS-qualified bi-rating electronic meters

DIMENSIONS



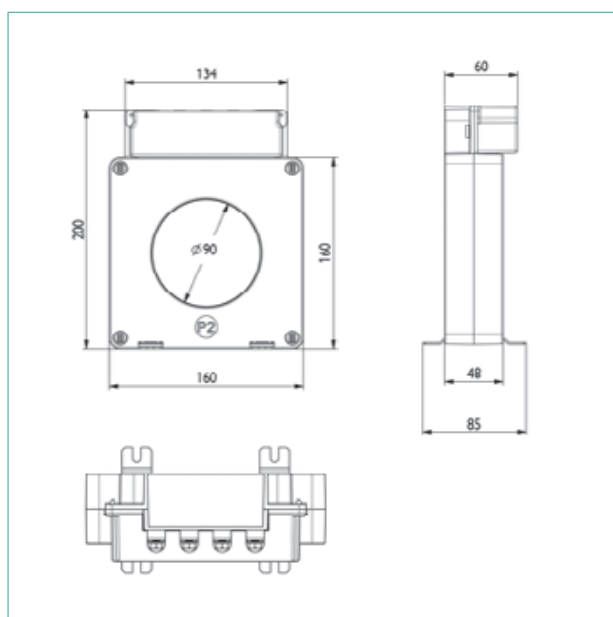
TO ORDER

Model	Reference
JVO 40-100 S bi-rating	P01379512



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

DIMENSIONS



JVO 90-160 S Tri-rating

Cable primary \varnothing 90 mm

GENERAL SPECIFICATIONS

Cable primary: \varnothing 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 (I_{th}): 30 kA for 1 s

Rated dynamic current (I_{dyn}): 2.5 I_n

Safety factor: SF = 4 (500/5 A);
SF = 6 (1 000/5 A);
SF = 9 (2 000/5 A)

Rated thermal current: 1.2 I_{pn}

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:

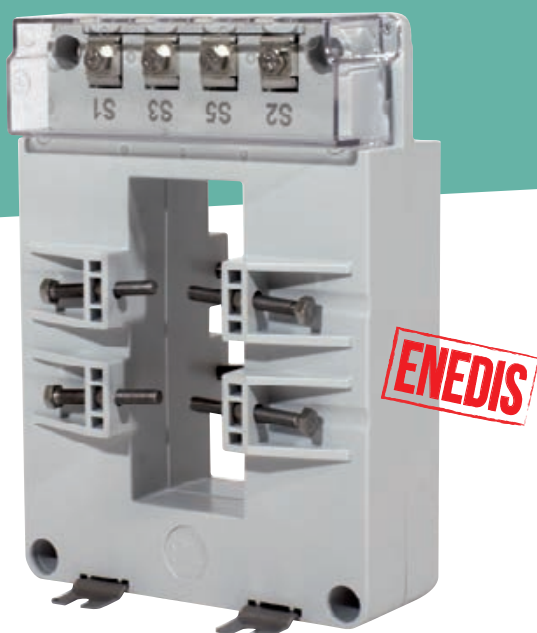
8 kV (peak value) – Wave 1.2/50 μ s

Insulation class: E (heating limit: 75 K)

Weight: 1.9 kg

TO ORDER

Model	Reference
JVO 90-160 S tri-rating	P01379513



JVP 1145 S Tri-rating

Cable/busbar primary

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 (I_{th}): 30 kA for 1 s

Rated dynamic current (I_{dyn}): 2.5 I_{th}

Safety factor: SF = 3 (500/5 A);
SF = 4 (1000/5 A);
SF = 6 (2000/5 A)

Rated thermal current: 1.2 I_{pn}

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

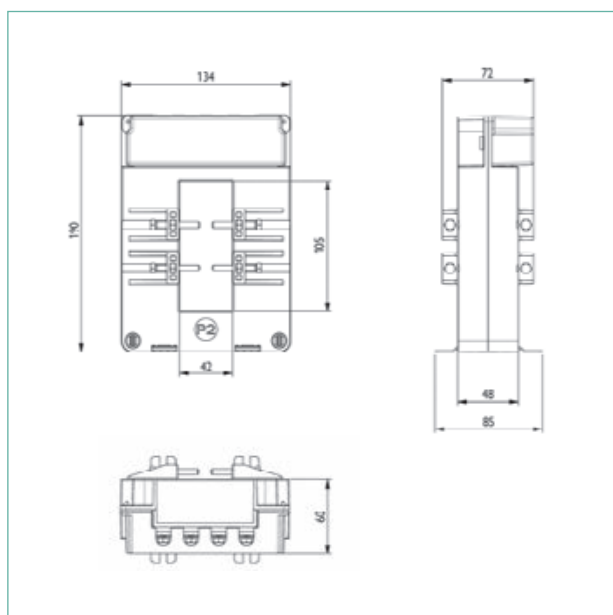
Insulation class: E (heating limit: 75 K)

Weight: 1.7 kg



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

DIMENSIONS



TO ORDER

Model	Reference
JVP 1145 S tri-rating	P01379510



tertiary



industry



energy production



energy transmission & distribution



nuclear

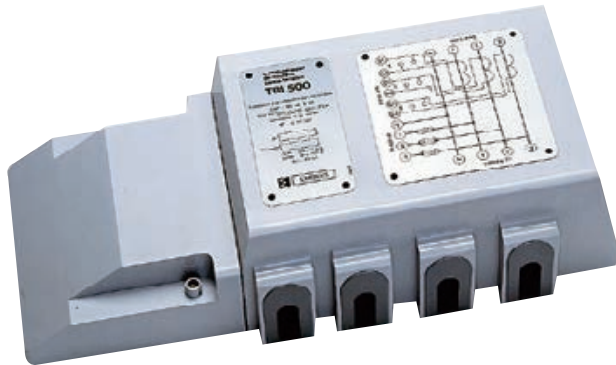


energy efficiency



rail

THREE-PHASE PLATE-MOUNTED CT RANGE



TRI 500

GENERAL SPECIFICATIONS

Maximum network voltage: 500 Vac

Dielectric test voltage: 2 kV - 50 Hz - 1 min

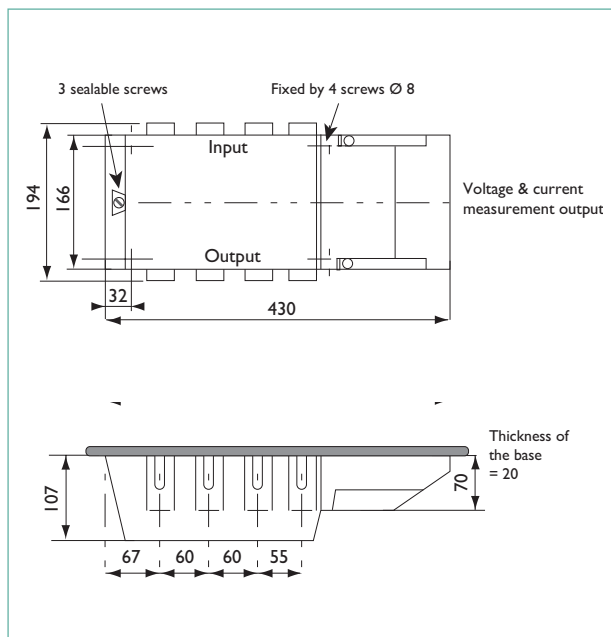
Rated withstand voltage: 8 kV

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)	Weight (kg)
	Class 0.5	
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

T O O R D E R

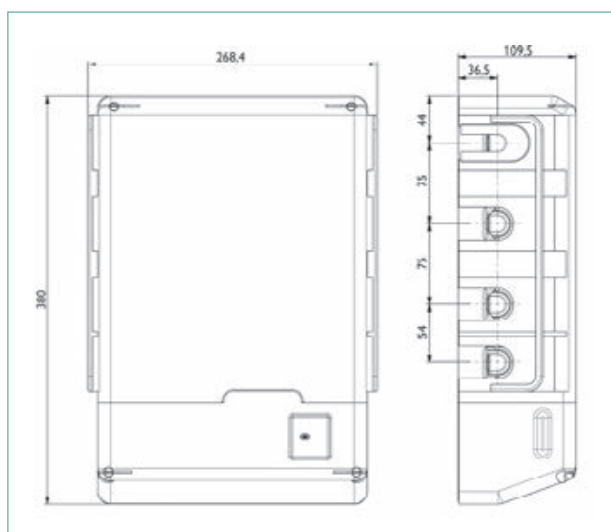
Model	Reference
50 A	TRI5 7823
100 A	TRI5 7825
150 A	TRI5 7826
200 A	TRI5 7827
300 A	TRI5 7828
500 A	TRI5 7831

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



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

DIMENSIONS



T O O R D E R

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

TRI 700

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 (I_{th}):

Bi-rating / tri-rating model: 80 I_{pn} with a maximum of 20 kA for 1 s

Rated dynamic current (I_{dyn}): Bi-rating / tri-rating model: 2.5 I_{th}

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 I_{pn}

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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency

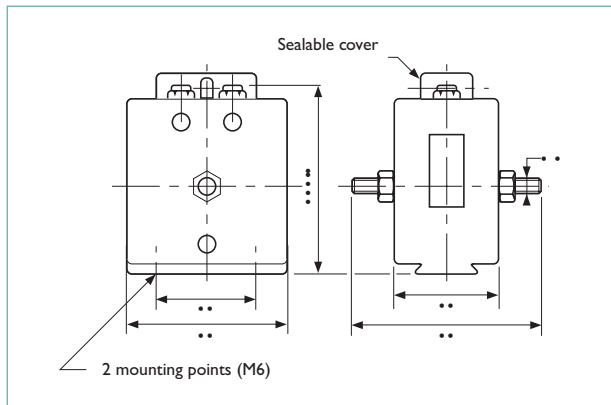


rail

CURRENT SUMMATION: JVM 15



- + Compact design
- + Mounting on plate or rail



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 feeders or feeds.

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 (I_{th}):** 80 In - 1 second
- Dynamic current (I_{dyn}):** 2.5 I_n
- Safety factor:** < 5
- Internal power:** 4 VA
- Operating conditions:** Temperature: -5°C to +60°C
Relative humidity: 93% at 40°C
- Protection:** Protection rating:
IP 40 (module casing) and IP 10 (terminals)
Dry winding with self-extinguishing ABS covering (UL 94 V0)



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



Mounting on plate or symmetrical rail

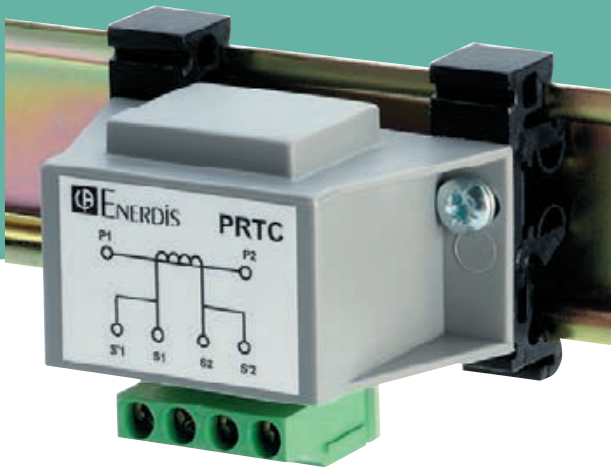
CABINET ACCESSORIES

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

Primary	Power (VA) in class			Weight (kg)
	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 94V0)

Measurement current: 5 A/50 Hz or 1 A/50 Hz

Maximum permitted current: 25 Aac

Peak protection voltage: 22 Vac



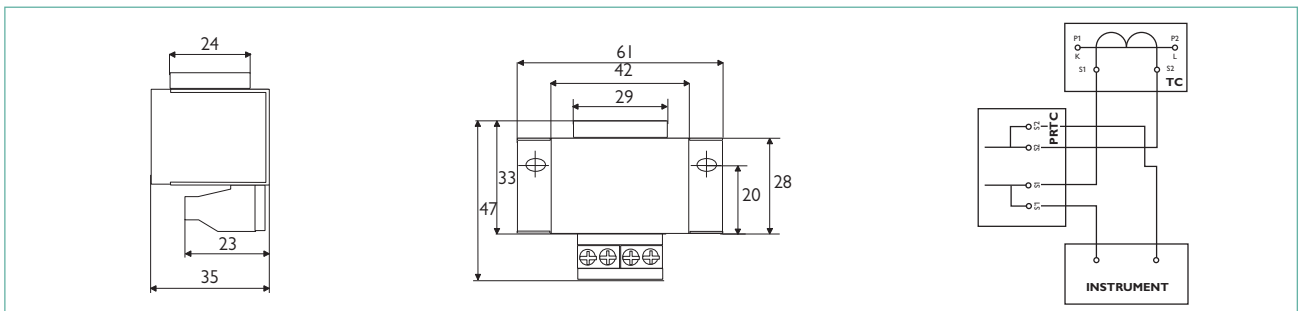
Mounting on DIN rail or plate



Four terminals available for 6 mm² wires



Connection diagram



TO ORDER

Model	Reference
Transformer short-circuit switch	PRTC 1001

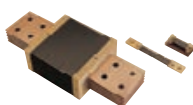
CHOOSING YOUR SHUNTS

76-2 and 77-2

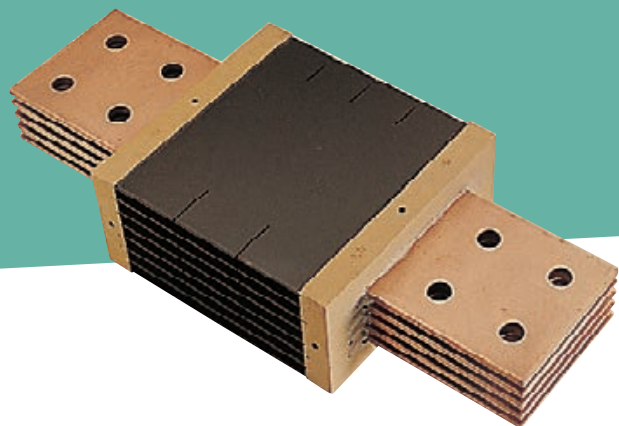
SHMI

page 152

page 154



	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						



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:

$I_n = 1$ 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)



Protection against corrosion
with epoxy-modified acrylic paint



Large-area fittings
to facilitate heat dissipation



tertiary



industry



energy production



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nuclear



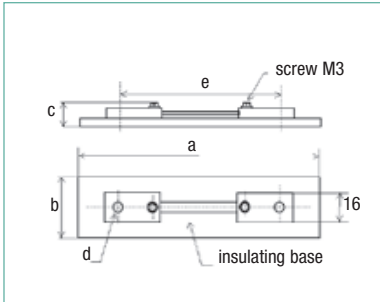
energy efficiency



rail

76-2 Eye connection on base

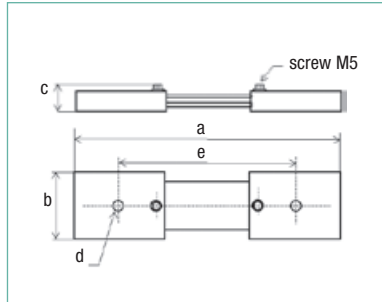
Voltage drop: 100 mV
Class 0.2 and 0.5



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

76-2 Eye connection

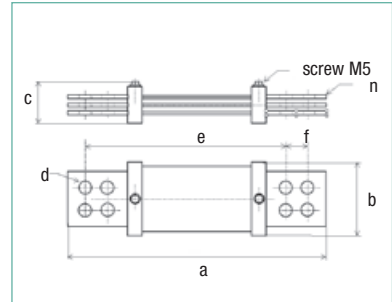
Voltage drop: 100 mV
Class 0.2 and 0.5



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

77-2 Blade connection for bar

Voltage drop: 100 mV
Class 0.2 and 0.5



Current	Dimensions (mm)						
	a	b	c	d	e	f	n
600 A	280	80	35	11	220	25	1
750 A	280	80	35	11	220	25	1
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

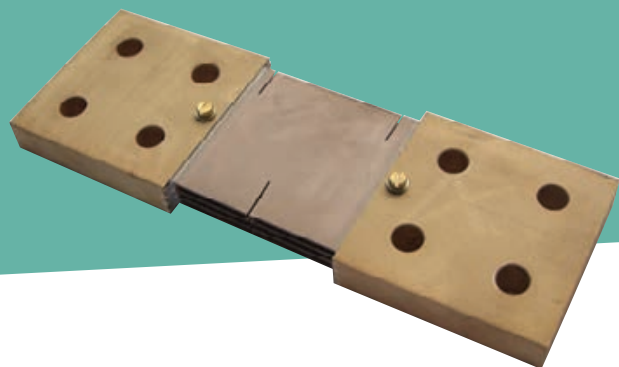
Current	Reference for 100 mV	
	Class 0.2	Class 0.5
1 A	SHUN 1200	SHUN 1300
1.25 A	SHUN 1201	SHUN 1301
1.5 A	SHUN 1202	SHUN 1302
2 A	SHUN 1203	SHUN 1303
2.5 A	SHUN 1204	SHUN 1304
3 A	SHUN 1205	SHUN 1305
4 A	SHUN 1206	SHUN 1306
5 A	SHUN 1207	P01 3042 11
6 A	SHUN 1208	SHUN 1308
7.5 A	SHUN 1209	SHUN 1309

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

Current	Reference for 100 mV	
	Class 0.2	Class 0.5
600 A	SHUN 1227	P01 3042 48
750 A	SHUN 1228	P01 3042 41
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	
Example	76-2	77-2	50 mV	Class 0.2	800 A



SHMI RANGE

Vast choice 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:

$I_n = 1$ 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 (I_n)	2 h	5 s class 0.2	5 s class 0.5 and 1
< 250 A	1.2 I_n	2 I_n	10 I_n
250 to 2,000 A	1.2 I_n	2 I_n	5 I_n
> 2,000 A	1.2 I_n	2 I_n	2 I_n

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



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industry



energy production



energy transmission & distribution



nuclear



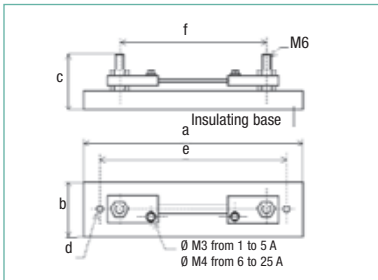
energy efficiency



rail

SHMI 1 A to 25 A Screw connection

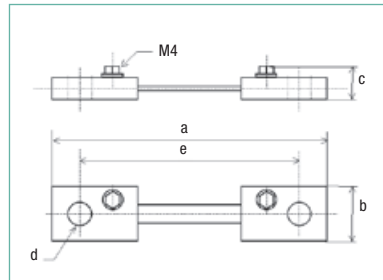
Voltage drop: 100 mV
Class 0.5 and 1



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

SHMI 30 A to 750 A Eye connection

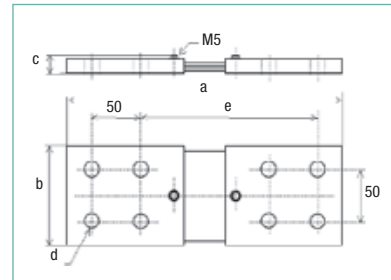
Voltage drop: 100 mV
Class 0.5 and 1



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

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

Voltage drop: 100 mV
Class 0.5 and 1



Current	Dimensions (mm)				
	a	b	c	d	e
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

T O O R D E R

Current	Reference for 100 mV	
	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

Current	Reference for 100 mV	
	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

Current	Reference for 100 mV	
	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

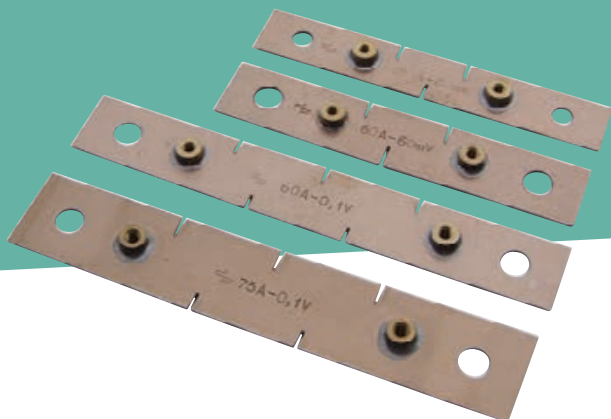
	Model	Voltage drop	Accuracy class	Current
Example	SHMI	50 mV	Class 0.5	3,000 A

ASSOCIATED PRODUCT



Mounting accessories

Screws, bolts and cables
Ratings from 1 to 750 A.
page 154



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:

$I_n = 1$ 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 (I _n)	2 h	5 s
< 250 A	1.2 I _n	10 I _n
> 250 A	1.2 I _n	5 I _n

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)



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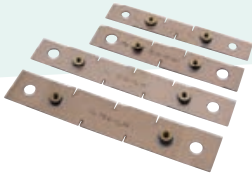


energy efficiency

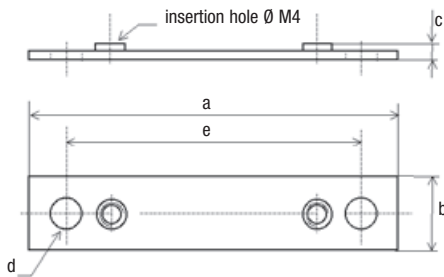


rail

SHEL



Voltage drop: 100 mV Class 1

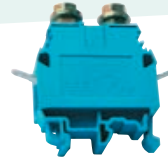


Current	Dimensions (mm)				
	a	b	c	d	e
10 A	150	10	5	6.5	122
15 A	150	12	5	6.5	122
20 A	150	12	5	6.5	122
25 A	150	15	5	6.5	122
30 A	150	15	5	6.5	122
40 A	150	15	5	6.5	122
50 A	150	20	5	6.5	122
60 A	150	25	5	8.5	122
75 A	150	30	5	8.5	122
100 A	150	20	6	8.5	122
125 A	150	25	6	8.5	122
150 A	150	30	6	8.5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

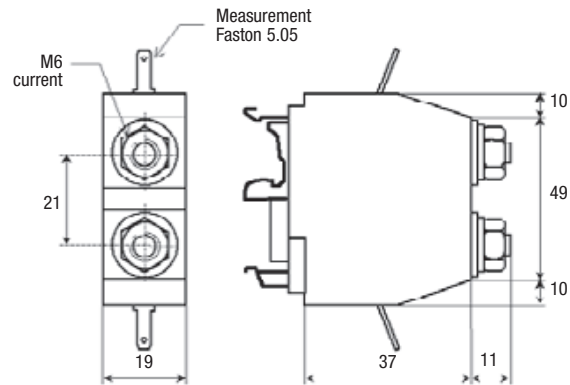
TO ORDER

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

SHMO



Voltage drop: 100 mV Class 1

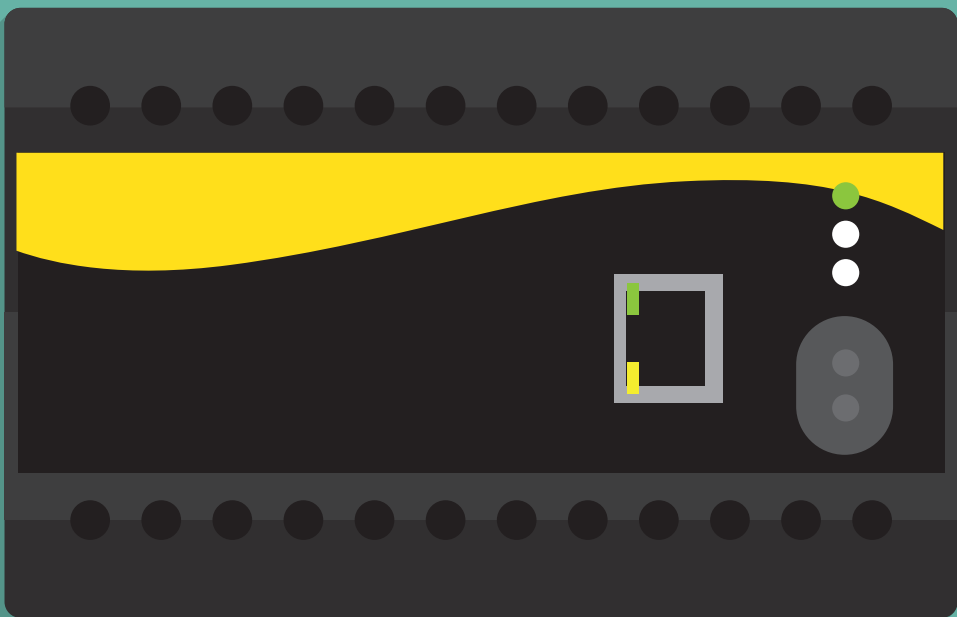


TO ORDER

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

CUSTOMIZED PRODUCT

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



NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

TRANSDUCERS

- 160** OVERVIEW OF THE RANGE
- 165** CHOOSING YOUR TRANSDUCER
- 166** DIGITAL TRANSDUCERS
- 182** ANALOG TRANSDUCERS
- 188** COMMUNICATION SOLUTION

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 166](#)



TRIAD 2

Configurable via TRIADJUST 2
AC quantities

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

[page 166](#)



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industry



energy
production



energy transmission
& distribution



nuclear



energy
efficiency



rail

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 182

Communication solution



ELINK 61850

ModBus /
IEC 61850 gateway

For TRIAD 2 transducers.

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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

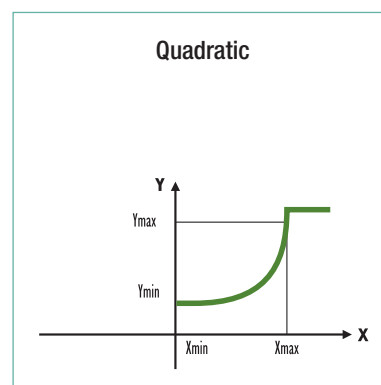
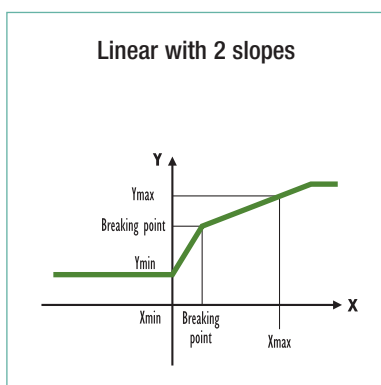
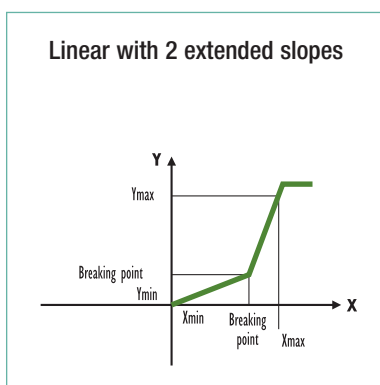
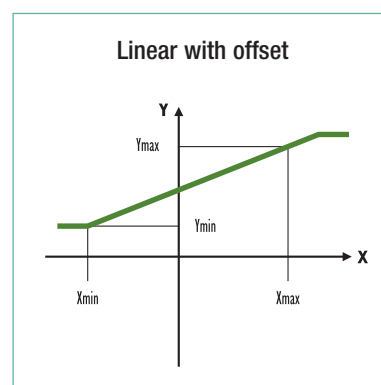
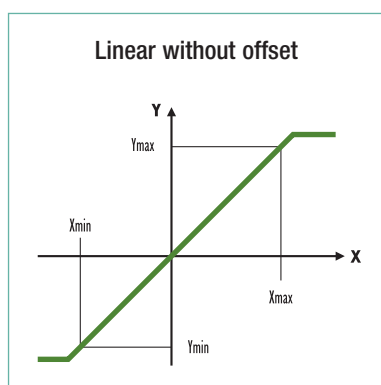
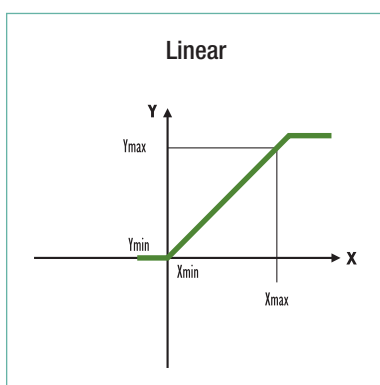
If the specifications of the measurements required are known, a **factory-programmed** transducer can be used.

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?



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 Chauvin Arnoux Energy 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 meters 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.

CHOOSING **YOUR** TRANSDUCER

TRIAD 2

page 166



T82N

page 182



	TRIAD 2	T82N
Mesures		
Iac	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Vac	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Uac	<input checked="" type="checkbox"/>	
Vterre		
Ineutre		
Idc		
Vdc		
P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Q	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S	<input checked="" type="checkbox"/>	
F	<input checked="" type="checkbox"/>	
FP	<input checked="" type="checkbox"/>	
Cosφ	<input checked="" type="checkbox"/>	
Tanφ	<input checked="" type="checkbox"/>	
φ	<input checked="" type="checkbox"/>	
φ (U' - U'')	<input checked="" type="checkbox"/>	
T°		
Ω		
kWh	<input checked="" type="checkbox"/>	
kVAh	<input checked="" type="checkbox"/>	
kVAh	<input checked="" type="checkbox"/>	
Current/voltage unbalance	<input checked="" type="checkbox"/>	
Options		
Number of analog outputs	4	1
RS485	<input checked="" type="checkbox"/>	
Ethernet	<input checked="" type="checkbox"/>	
Pulse output		
Alarm output		
Relay output	<input checked="" type="checkbox"/>	
Programmable	<input checked="" type="checkbox"/>	
Plug-in versions		<input checked="" type="checkbox"/>
Self-powered	(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, $\cos\phi$, ϕ , ϕU , ϕV , $\tan\phi$

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/ $\sqrt{3}$ to 480/ $\sqrt{3}$ V (ph-N)

Transfer curves: linear, 2 slopes or quadratic

Output signals: $\pm 1\text{mA}$, $\pm 5\text{mA}$, $\pm 20\text{mA}$, $\pm 1\text{V}$, $\pm 10\text{V}$

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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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

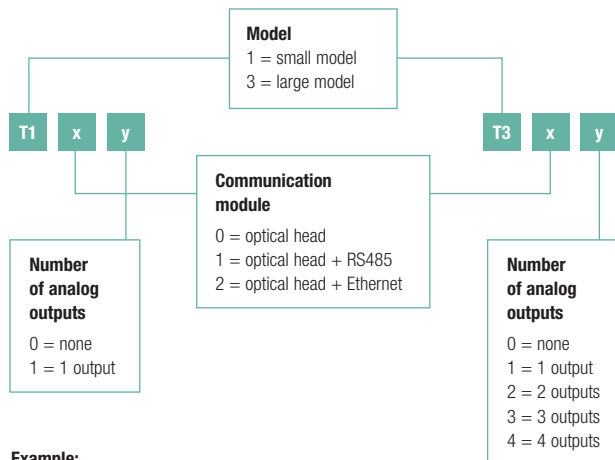
Model	Reference
Plate mounting for T1xy	ACCT 1007
Plate mounting for T3xy	ACCT 1006

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 mm ² conductors or 2 multi-wire 4 mm ² 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	■	■
	Energies*	■	■
Balanced 3-phase, 3 wires	U12, U23, U31	■	■
	I1, I2, I3	■	■
	F	■	■
	Pt	■	■
	Qt	■	■
	St	■	■
	Pft	■	■
	Tanφ	■	■
	Cosφt	■	■
	φt	■	■
	Energies*	■	■
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	■	■
Energies*	■	■	
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)	■	■
	Current unbalance	■	■
Energies*	■	■	
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	■	■
Energies*	■	■	

* Accessible via the product's Modbus communication

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 k Ω	
Current inputs		
Rated value	0 to 10 A max.	
Max. measured current on primary	40,000 A	
Acceptable overload	50 In / 1 s	
Consumption	< 0.15 VA	
Auxiliary power supply		
High level	80 / 265 Vac (50/60 Hz) – 110 to 375 Vdc	
Low level	19 / 58 Vdc	
Consumption	High level T1: 3.3 VA to 8.5 VA max. T3: 9 VA to 20 VA max.	Low level T1: 3.2 W to 5.5 W max. T3: 5.5 W to 11 W max.
Analog outputs		
Rated values	Current $\pm 1\text{mA}, \pm 5\text{mA}, \pm 20\text{mA}$	Tension $\pm 1\text{V}, \pm 10\text{V}$
Acceptable resistive load	15 V / I _o ⁽¹⁾	$\geq 1\text{k}\Omega$
Acceptable capacitive load	0.1 μF	0.1 μF
Overrun	1.2 I _o ⁽¹⁾	1.2 U _o ⁽¹⁾
Peak-peak residual wave	$\pm 0.2\%$ of I _o ⁽¹⁾	$\pm 0.2\%$ of U _o ⁽¹⁾
Programmable response time	50 ms – 100 ms – 200 ms – 500 ms – 1 s	
Transfer curve	Linear, 2 slopes or quadratic	

(1) I_o = output current, U_o = 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, Tan ϕ , Cos ϕ , ϕ , ϕU , ϕV **	$\pm 1\%$	$\pm 0.5\%$	$\pm 0.2\%$	$\pm 0.15\%$	$\pm 0.1\%$

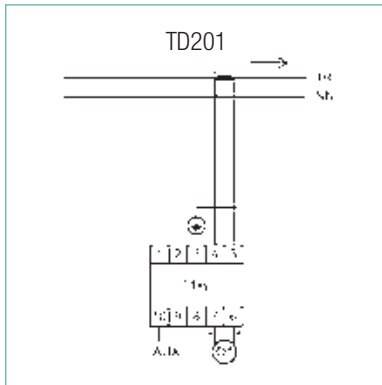
* RT: Response time for F = 50 Hz

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

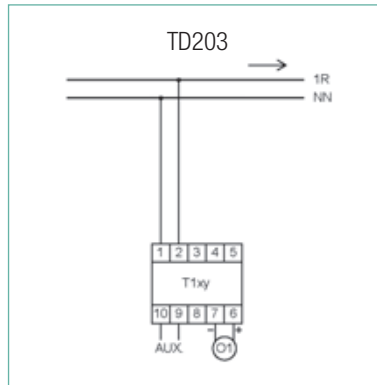
** Phase angle between voltages for ϕU and ϕV

ELECTRICAL CONNECTIONS - SINGLE-PHASE NETWORK

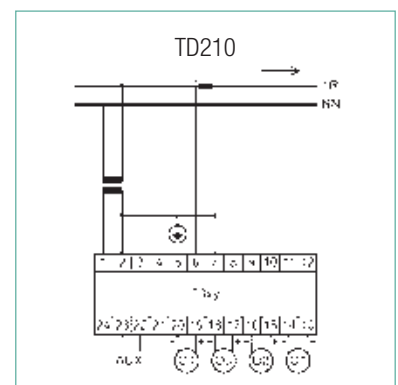
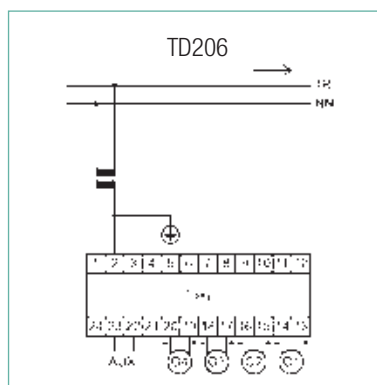
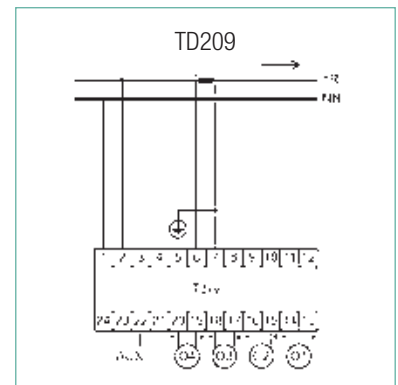
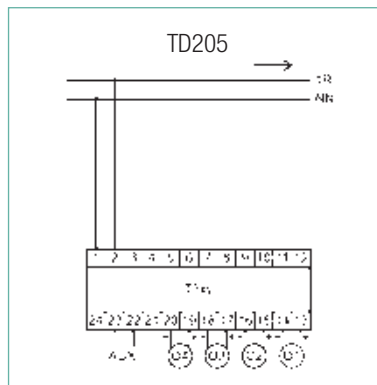
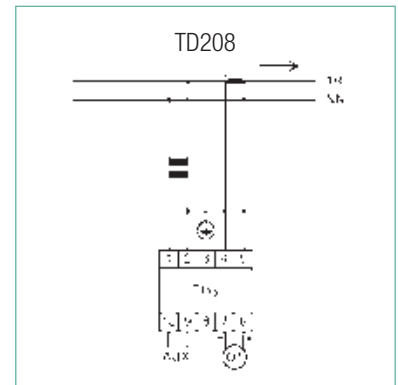
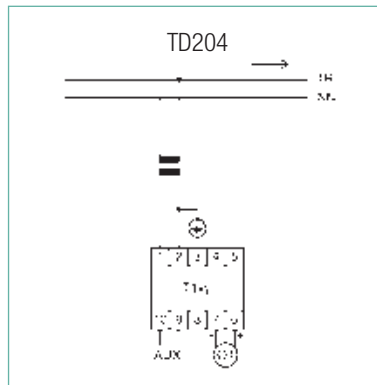
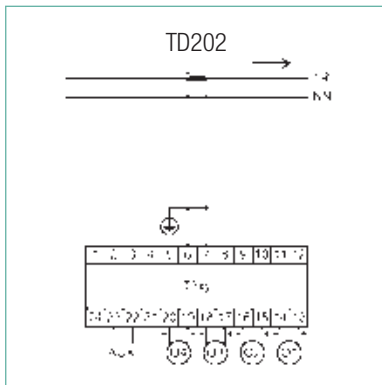
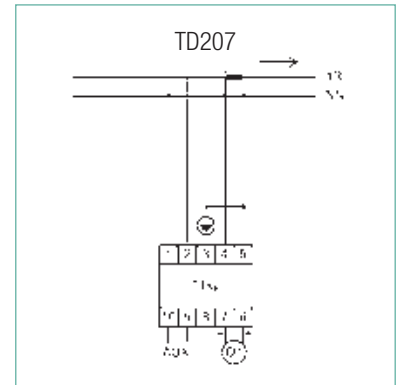
I1, F:



V1, F:

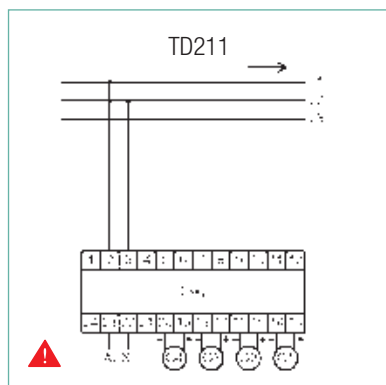


V1, I1, P1, Q1, S1, PF1, F,
TANφ, Cosφ1, φ1:

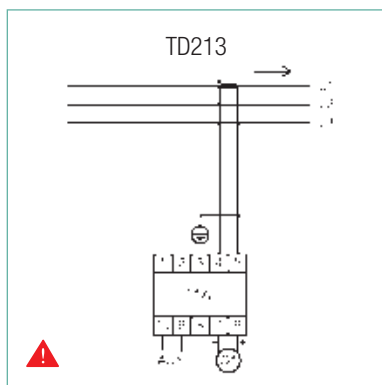


BALANCED 3-PHASE, 3-WIRE NETWORK

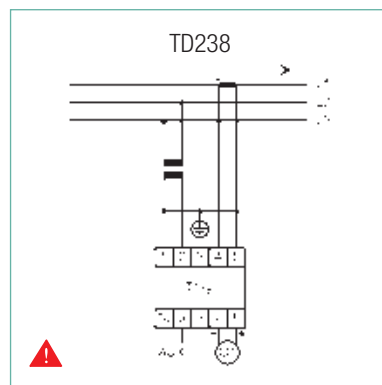
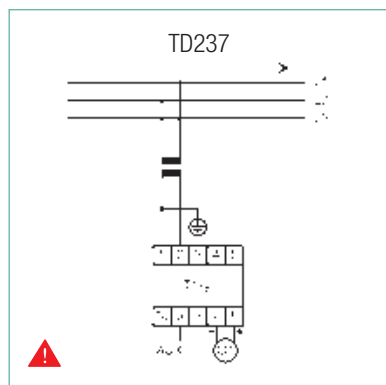
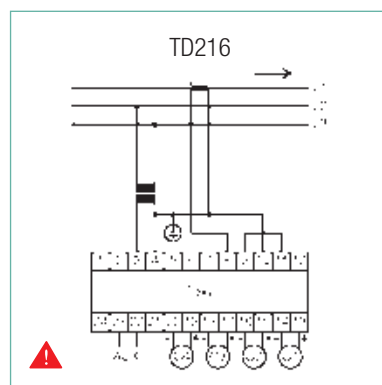
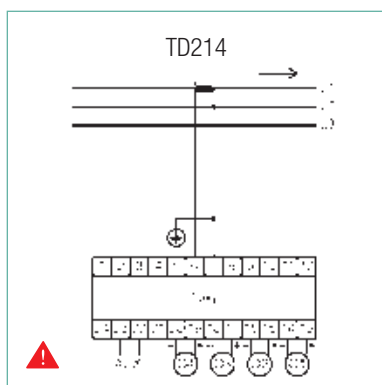
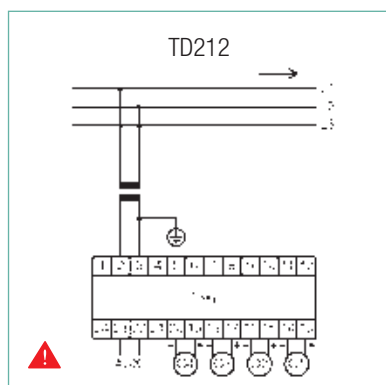
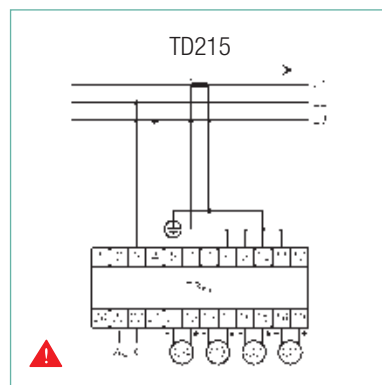
U12, U23, U31, F:



I1, I2, I3, F:



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

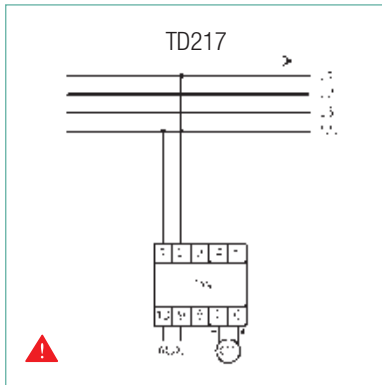


 Phase rotation authorized

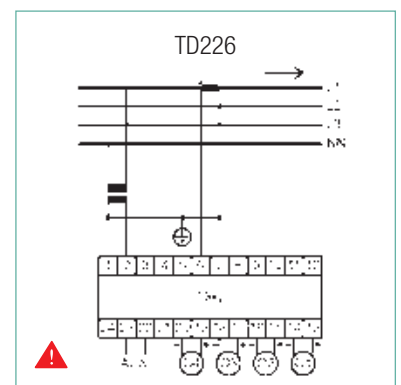
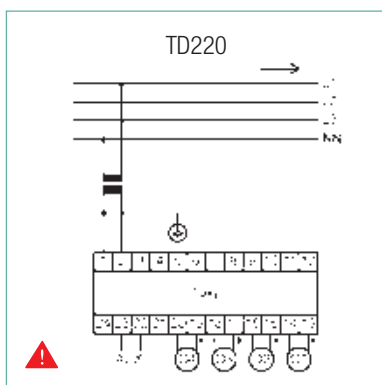
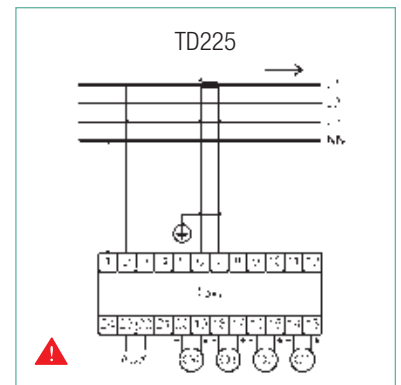
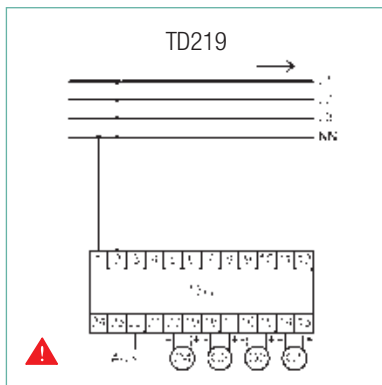
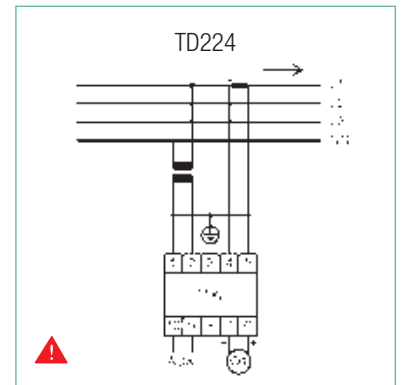
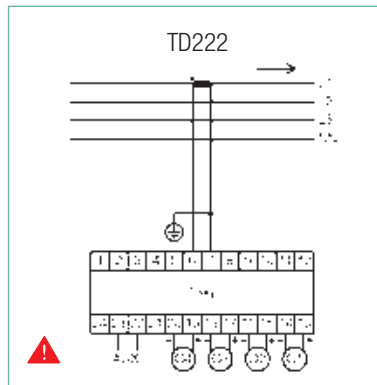
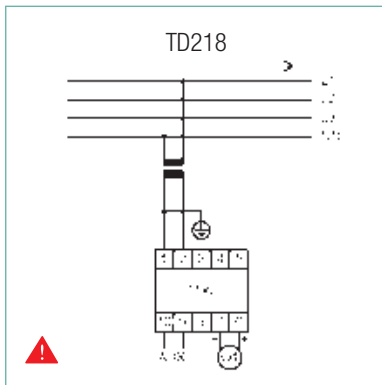
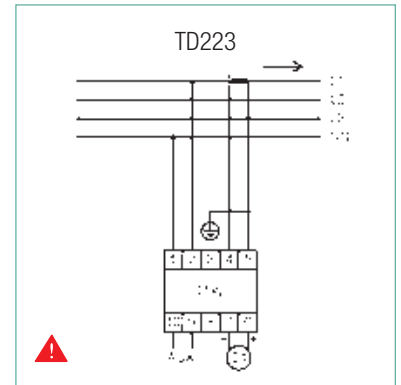
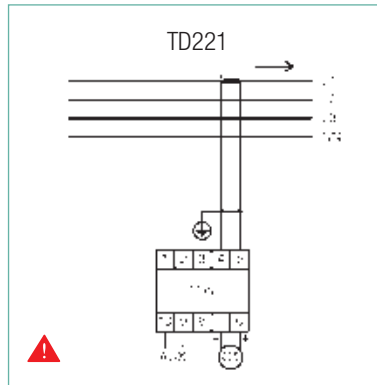
BALANCED 3-PHASE, 4-WIRE NETWORK

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:

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



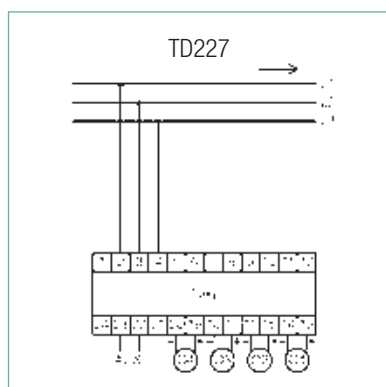
I1, I2, I3, F:



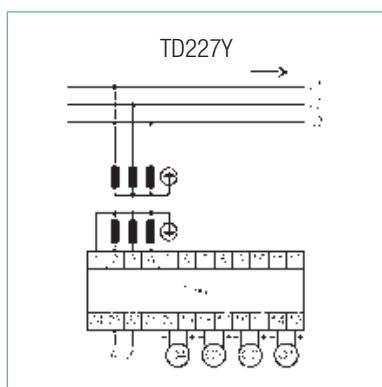
⚠ Phase rotation authorized

UNBALANCED 3-PHASE, 3-WIRE NETWORK

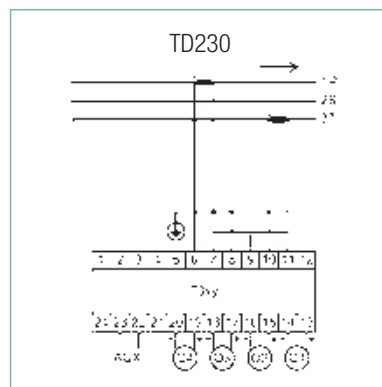
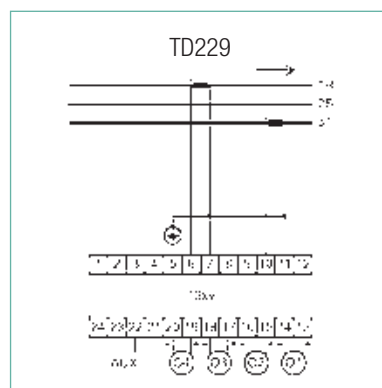
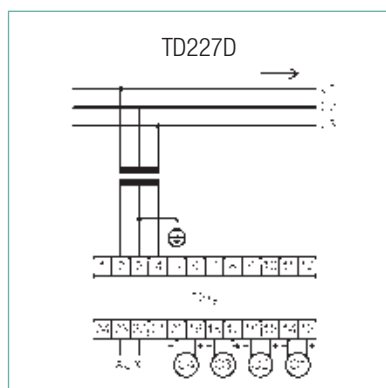
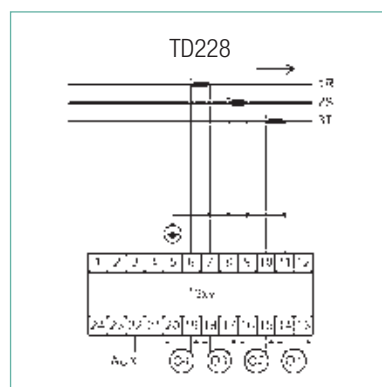
U12, U23, U31, F,
Angle (U12/U23, U23/U31, U31/U12):



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



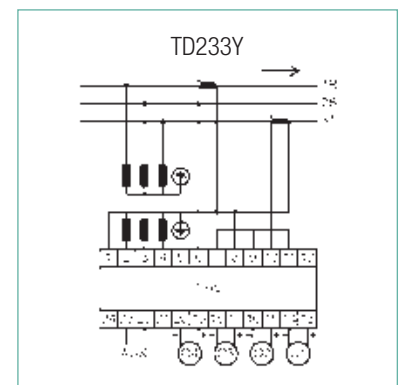
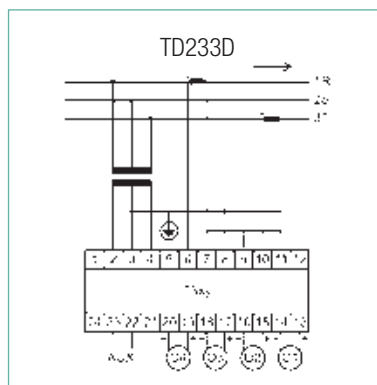
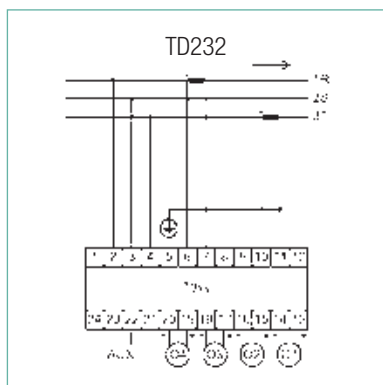
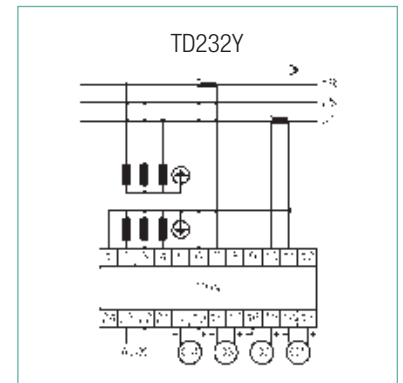
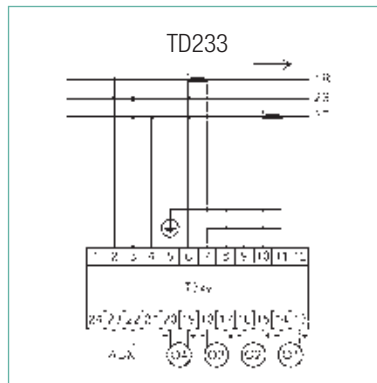
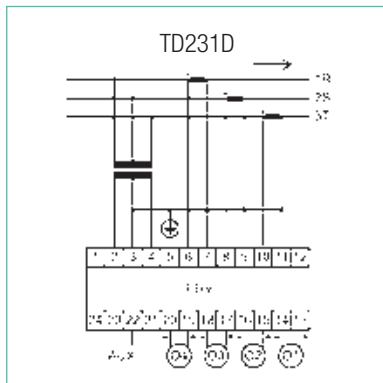
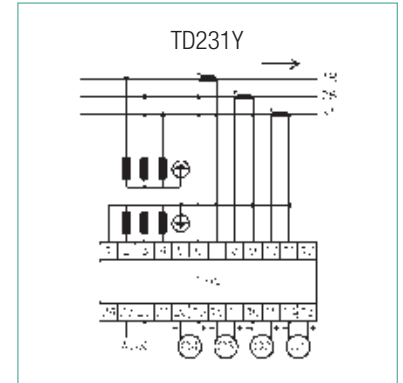
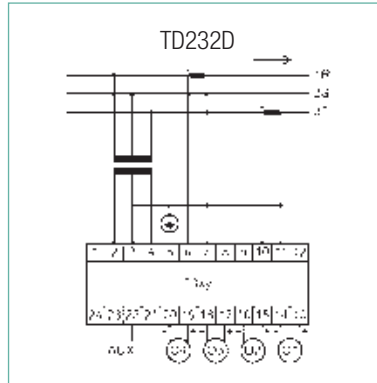
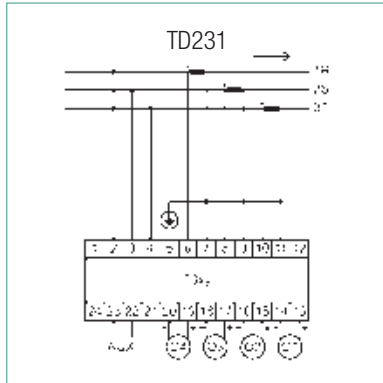
I1, I2, I3, F:



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

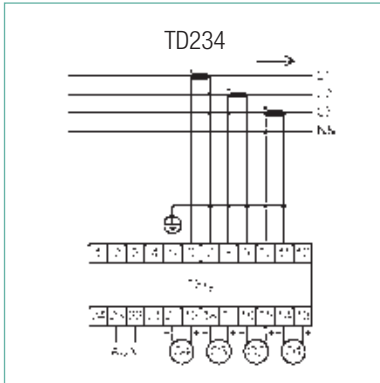
U12, U23, U31, I1, I2, I3, Pt, St, Qt, PFt, F, TANφ, Cosφt, φt,
Angle (U12/U23, U23/U31, U31/U12):

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

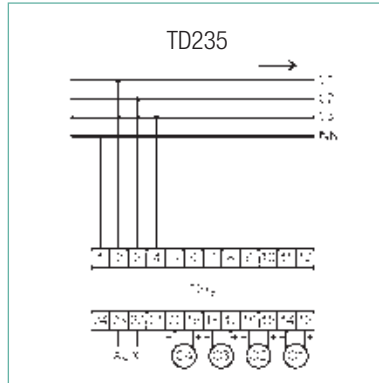


UNBALANCED 3-PHASE, 4-WIRE NETWORK

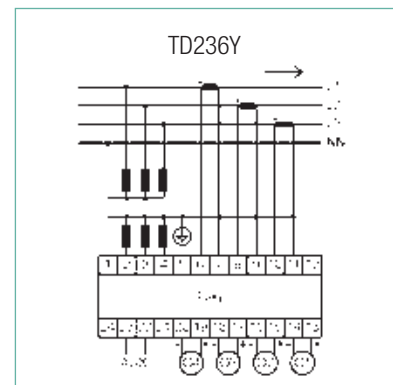
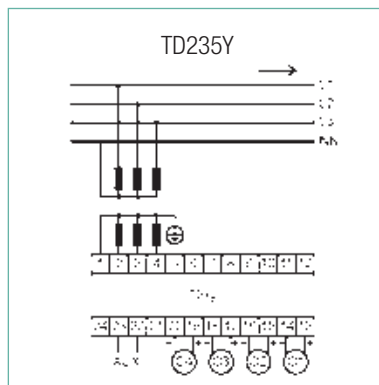
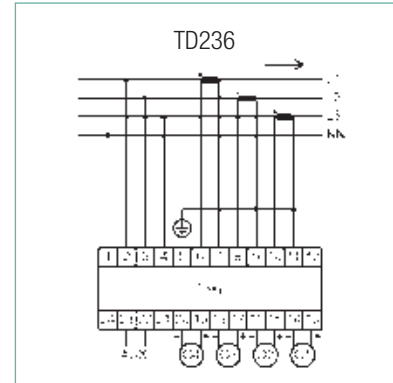
I1, I2, I3, F:



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

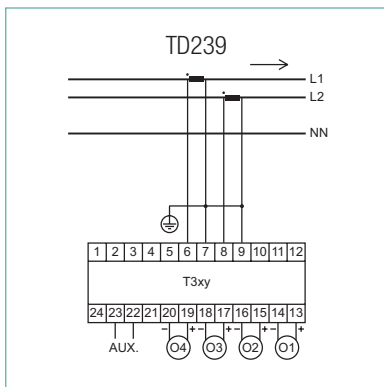


V1, V2, V3, U12, U23, U31, I1, I2, I3, P1,
P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3,
Qt, PF1, PF2, PF3, Pft, F, TANφ, Cosφ1,
Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt
Angle (V1/V2, V2/V3, V3/V1),
Angle (U12/U23, U23/U31, U31/U12):

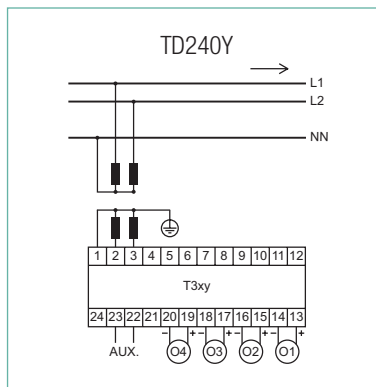


SPLIT-PHASE

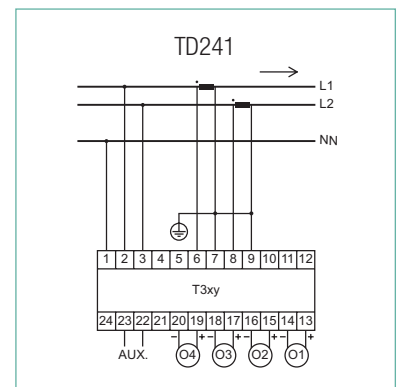
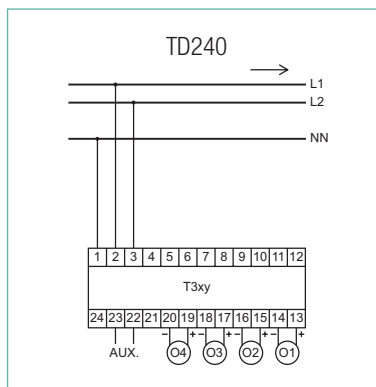
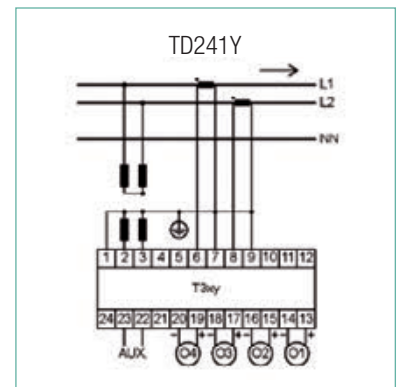
I1, I2, F:



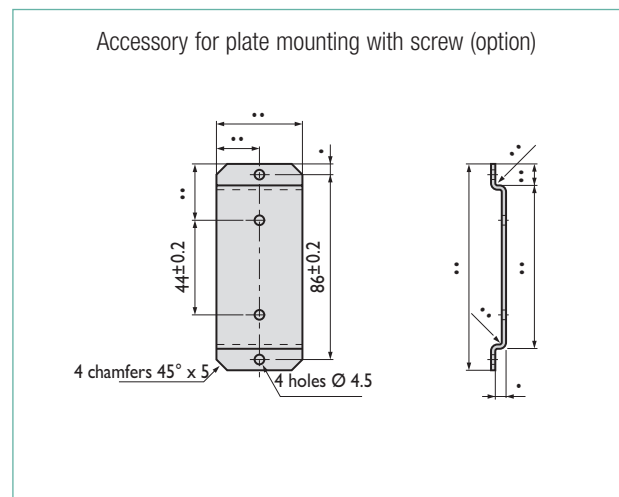
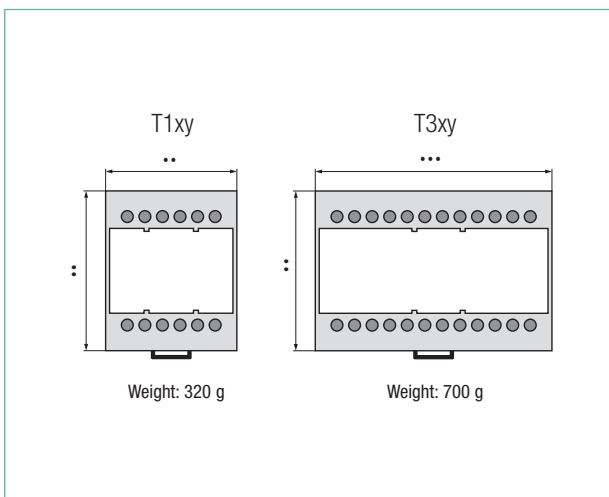
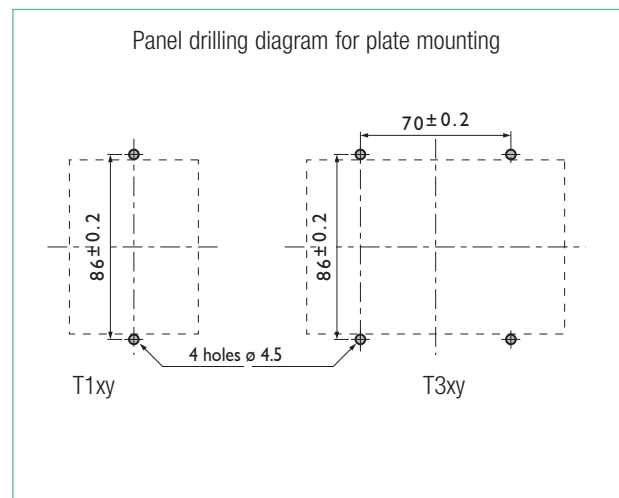
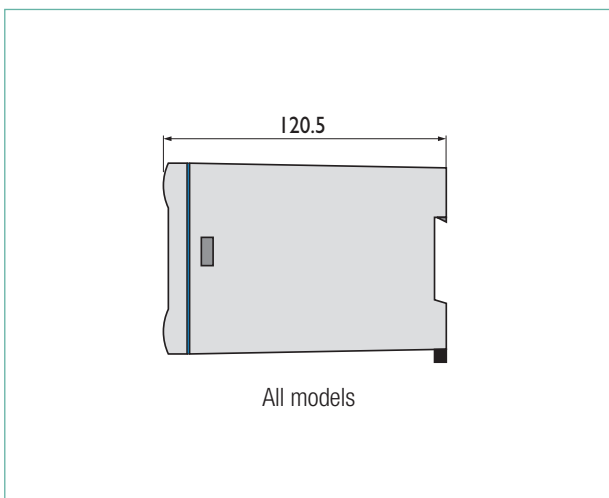
V1, V2, U12, F, Angle (V1/V2) rad,
Angle (V1/V2) deg:



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 Fund. rad,
φ2 Fund. rad, φt Fund. rad, φ1 Fund.
deg, φ2 Fund. deg, φt Fund. deg,
Angle V1/V2 Fund. deg, I1 (signed),
I2 (signed):



DIMENSIONS (IN MM)



TRIAD 2 PROGRAMMABLE VIA TRIADJUST 2

T O O R D E R

Link	Output	Alimentation	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			
			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-	Measurement unit
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 179.

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 / A

Voltage

With voltage transformer or Direct
 Primary Secondary V / V V
 Phase-phase Phase-neutral ($\sqrt{3}$)

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 TAN ϕ COS ϕ 1 COS ϕ 2 COS ϕ 3 COS ϕ t
 ϕ 1 ϕ 2 ϕ 3 ϕ t ϕ U12/23 ϕ U23/31 ϕ U31/12 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
<input type="checkbox"/>	0.1 % 1 s	0.8 s
<input type="checkbox"/>	0.15 % 0.5 s	0.4 s
<input type="checkbox"/>	0.2 % 0.2 s	0.16 s
<input type="checkbox"/>	0.3 % 100 ms	80 ms
<input type="checkbox"/>	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
<input type="checkbox"/>	0.1 % 1 s	0.8 s
<input type="checkbox"/>	0.15 % 0.5 s	0.4 s
<input type="checkbox"/>	0.2 % 0.2 s	0.16 s
<input type="checkbox"/>	0.3 % 100 ms	80 ms
<input type="checkbox"/>	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
<input type="checkbox"/>	0.1 % 1 s	0.8 s
<input type="checkbox"/>	0.15 % 0.5 s	0.4 s
<input type="checkbox"/>	0.2 % 0.2 s	0.16 s
<input type="checkbox"/>	0.3 % 100 ms	80 ms
<input type="checkbox"/>	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
<input type="checkbox"/>	0.1 % 1 s	0.8 s
<input type="checkbox"/>	0.15 % 0.5 s	0.4 s
<input type="checkbox"/>	0.2 % 0.2 s	0.16 s
<input type="checkbox"/>	0.3 % 100 ms	80 ms
<input type="checkbox"/>	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.

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.



- Configuration via optical head, Ethernet or RS485
- Access to all the TRIAD 2 parameters
- Diagnosis of the installation
- Label printing on all types of laser printers



Configuration

- Inputs / Outputs
- Communication
- Connection diagram
- 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



tertiary



industry



energy production



energy transmission & distribution



nuclear

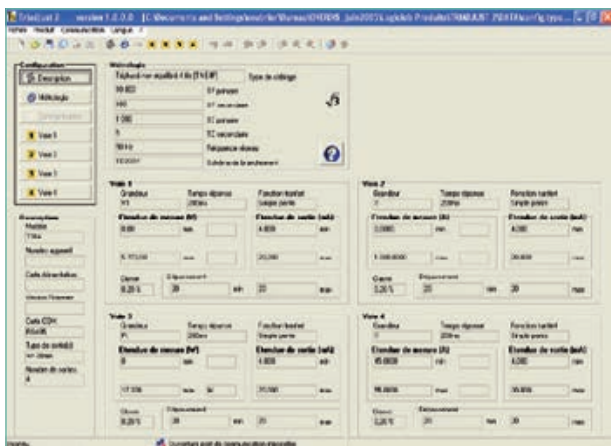


energy efficiency



rail

TRIADJUST 2 KIT



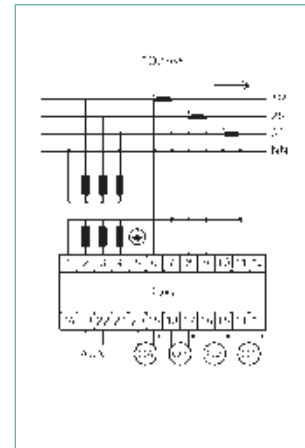
The TRIADJUST 2 configuration kit comprises:

- 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.

T314	
Inputs :	50-60 Hz
10 000 V/√3	100 V/√3
1 000 A	5A
A0 1 : V1	[0,20 200 ms 750 Ω 0 V...5 773,5 V 4 mA...20 mA
A0 2 : I1	[0,20 200 ms 750 Ω 0 A...1 000 A 4 mA...20 mA
A0 3 : Pt	[0,20 200 ms 750 Ω 0 W...17,32 MW 4 mA...20 mA
A0 4 : F1	[0,20 200 ms 750 Ω 45 Hz...55 Hz 4 mA...20 mA
Made in France	
Reference client / Own reference customer	



T O O R D E R

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.chauvin-arnoux-energy.com website

ASSOCIATED PRODUCT



TRIAD 2

Configurable via TRIADJUST 2
Programmable digital transducers, 1 to 4 analog outputs. Configurable accuracy class.

page 166



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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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)

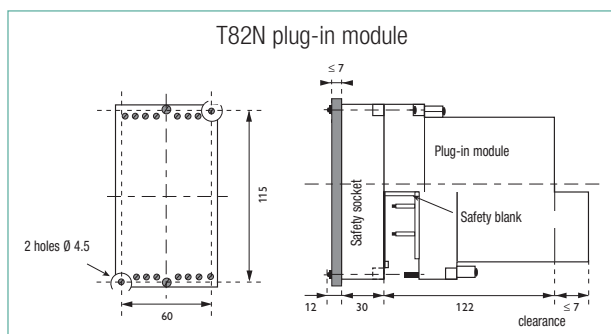
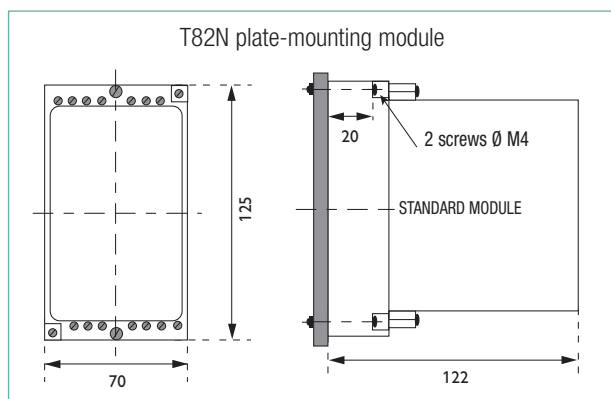
Analog output

- 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/ $\sqrt{3}$ Vac to 440 Vac
 ± 20 % from 24 to 125 Vdc
- Consumption :
 ≤ 3 VA from 100/ $\sqrt{3}$ to 440 Vac
 ≤ 3 W from 24 to 125 Vdc

DIMENSION (IN MM)



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



Model	Socket	
	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.
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Sockets

For plug-in modules
page 183



Mounting on DIN rail

Plate-mounting or plug-in
page 183



lac

RMS AC VOLTAGE

Model	IAR 1210 B					
Transfer curve	Linear					
Module	Fixed / plate-mounting					
		0.7 kg				
Measurement input	Current In	Direct 0.5 to 10 A or on CT 1/5 A				
	Frequency Fn	50 Hz \pm 5 Hz and 60 Hz \pm 5 Hz				
	Measurement range 0...Xmax	0 to In and 0 to 1.3 In if CT present				
	Consumption	\leq 0.2 VA				
Analog output	Current	<table border="1"> <tr> <td>0...Ymax</td> <td>"0/1 mA" "0/2.5 mA" "0/5 mA" "0/10 mA" "0/20 mA"</td> </tr> <tr> <td>Ymin...Ymax</td> <td>"1/5 mA" "2/10 mA" "4/20 mA"</td> </tr> </table>	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"
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	<table border="1"> <tr> <td>0...Ymax</td> <td>"0/1 V" "0/5 V" "0/10 V"</td> </tr> <tr> <td>Ymin...Ymax</td> <td>"1/5 V" "2/10 V"</td> </tr> </table>	0...Ymax	"0/1 V" "0/5 V" "0/10 V"	Ymin...Ymax	"1/5 V" "2/10 V"
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/ $\sqrt{3}$ Vac" "110/ $\sqrt{3}$ Vac" "115/ $\sqrt{3}$ 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	<input checked="" type="checkbox"/>

ASSOCIATED PRODUCTS



Normeurope analog panel meters

Round / square barrel
For viewing an instantaneous and variable quantity.
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Mounting on DIN rail

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page 183



P

ACTIVE POWER

Model		PAR 1232 B
Network + connections		
Balanced three-phase - 3 wires		<input type="checkbox"/>
Unbalanced three-phase - 3 / 4 wires		<input type="checkbox"/>
Transfer curve		
Linear		<input type="checkbox"/>
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) $S_n = \sqrt{x I \times \cos \varphi}$ (single-phase network) $S_n = 3 \times \sqrt{x I \times \cos \varphi}$ (Balanced three-phase, Unbalanced three-phase 4 wires)
 $S_n = \sqrt{3 \times U \times I \times \cos \varphi}$ (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/100V	0...2.77 MW	50 Hz	4...20 mA	220 Vac	IP 20	<input checked="" type="checkbox"/>

ASSOCIATED PRODUCTS



Normeurope analog panel meters

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 For viewing an instantaneous and variable quantity.
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Mounting on DIN rail

Plate-mounting or plug-in
 page 183



Q

REACTIVE POWER

Model		QAR 1232 B
Network + connections		
Unbalanced three-phase - 3 / 4 wires		<input type="checkbox"/>
Transfer curve		
Linear		<input type="checkbox"/>
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		$\pm 1.35 \geq S_n^{(1)} \geq \pm 0.50$
Consumption		I input: ≤ 0.2 VA ; U input: $\geq 500 \Omega/V$
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/ $\sqrt{3}$ Vac" "110/ $\sqrt{3}$ Vac" "115/ $\sqrt{3}$ 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) $S_n = \sqrt{3} \times I \times \cos \varphi$ (single-phase network) $S_n = 3 \times \sqrt{3} \times I \times \cos \varphi$ (Balanced three-phase, Unbalanced three-phase 4 wires)
 $S_n = \sqrt{3} \times U \times I \times \cos \varphi$ (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	<input checked="" type="checkbox"/>

ASSOCIATED PRODUCTS



Normeurope analog panel meters

Round / square barrel
 For viewing an instantaneous and variable quantity.
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Mounting on DIN rail

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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

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 a Chauvin Arnoux Energy 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 Chauvin Arnoux Energy 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 Chauvin Arnoux Energy 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



tertiary



industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

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	Screw terminal block
Cable cross-sections	6 mm ² single-strand wire- 4 mm ² 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.

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ENERIUM

Power meters
Multi-energy,
qualimetry.

page 58



NETWORK SUPERVISION AND PHYSICAL MEASUREMENT

PANEL METERS AND SYNCHROCOUPLER

- 192 DIGITAL PANEL METERS
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- 212 ANALOG PANEL METERS
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- 240 HOUR METERS

DIGITAL PANEL METERS AND SYNCHROCOUPLER

μ DIGI1 and μ DIGI2 ranges



μ DIGI1

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

page 196



μ DIGI2

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

page 200

CA 2150 range



CA 2150

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

page 204

Synchronization unit



Synchrocoupler

Synchronization units for LV networks.

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SELECTION GUIDE

μDIGI1 & μDIGI2 ranges	CA 2150 range
page 196	page 204



		μDIGI1	μDIGI2	CA 2150
Front panel format (mm)		24 x 48	48 x 96	48 x 96
Display range (in counts)		-1,999 / +9,999	-1,999 / +9,999	-19,999 / +19,999
Measurement functions	AC ammeter	μDIGI1 E	μDIGI2 E	CA 2150-E
	AC voltmeter	μDIGI1 E	μDIGI2 E	CA 2150-E
	Frequency meter			CA 2150-D
	DC ammeter	μDIGI1 E	μDIGI2 E	CA 2150-E
	DC voltmeter	μDIGI1 E	μDIGI2 E	CA 2150-E
	Process signals	μDIGI P/LP	μDIGI2 P	CA 2150-M
	Thermocouple thermometer		μDIGI2 P	CA 2150-M
	Pt 100 thermometer		μDIGI2 P	CA 2150-M
	Ohmmeter		μDIGI2 P	
	Tachometer		Chronometer	CA 2150-D
	Meter			CA 2150-D
	Chronometer			CA 2150-D
	Load cell			CA 2150-M
Potentiometer		μDIGI2 P	CA 2150-M	
Special functions	MIN/MAX		μDIGI2 E/P	CA 2150-E/D/M
Output(s)	Analog output			Option
	RS232 output			Option
	RS485 output			Option
	Threshold output(s)		Option	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 $\pm y$ 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 Chauvin Arnoux Energy range of digital panel meters, offers the best display contrast.

A choice of red, green and amber colors also ensures they are easy to read.



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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 39,999). 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

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.

ZOOM



Plug-in connectors for quick and easy connection



Display with 4 levels of brightness



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μDIGI1-LP

4-20mA process signal

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

T O R D E R	
Power supply	Reference
Self-powered (active loop)	P01 330 000

μDIGI1-P

U/I process signal

- **Input:**
 - 10... +10 Vdc
 - 20... +20 Vdc
 - 200... +200 Vdc (1 MΩ)
 - 100... +100 mVdc (100 MΩ)
 - 20... +20 mAdc (12.1 Ω)
- **Display range:** -1,999... 9,999

T O R D E R	
Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 031
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 032

μDIGI1-E

U/I voltage and current

- **Input:**
 - 600 Vac
 - 100 Vac
 - 199.9... +600 Vdc
 - 100... +100 Vdc (3 MΩ)
 - 5 Aac
 - 1 Aac
 - 1.999... +5 Adc
 - 1... +1 Adc (14 mΩ)
 - 40 Hz... 1 KHz
- **Display range:**
 - 1,999... 9,999 (dc)
 - 0... 9,999 (ac)

T O R D E R	
Power supply	Reference
85 - 265 Vac & 100 - 300 Vdc	P01 330 011
22 - 53 Vac & 10.5 - 70 Vdc	P01 330 012

ASSOCIATED PRODUCT



Current transformers & shunts

Tertiary, industrial, tariff
5 to 5,000 A.
page 113

DISPLAY

	μDIGI1-LP	μDIGI1-P	μDIGI1-E
Measurement rate	62/s		
Display range	-1,999... 9,999	-1,999... 9,999	-1,999... 9,999 (dc) 0... 9,999 (ac)
7-segment red LED display			Height 10 mm
Reading	4 digits		
Polarity	Automatic		
Overrun	OVE display		
Decimal position	Programmable using software		

MECHANICAL SPECIFICATIONS

Material	Polycarbonate as per UL94 V-0
Weight	60 g - 40 g (μDIGI1-LP)
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

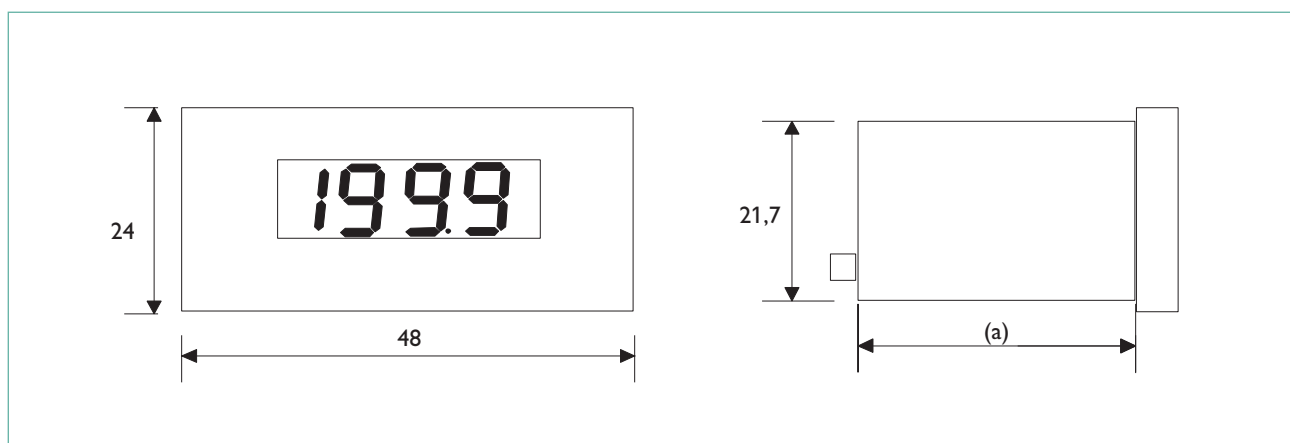
High level	85/265 Vac 50 / 60 Hz - 100/300 Vdc
Low level	22/53 Vac 50 / 60 Hz - 10.5/70 Vdc
Consumption	≤ 2.2 W

STANDARDS

Insulation – dielectric strength: EN 611010-1 (category II installation)

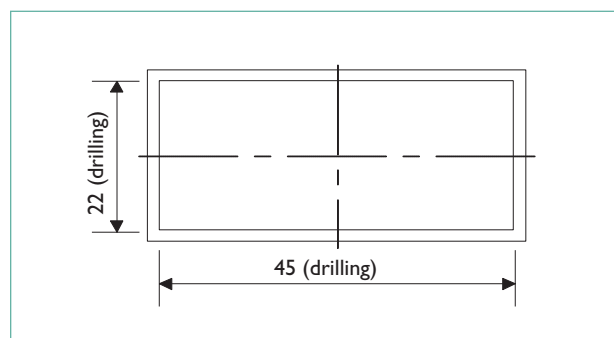
EMC – immunity/emission: EN 61000-4-2, EN 61000-4-3, EN 61000-4-4 / EN 55022
(EN 610000-4-6 for μ DIGI1-LP – EN 61000-4-5)

DIMENSIONS (IN MM)



	μ DIGI1-LP	μ DIGI1-P	μ DIGI1-E
(a)	40 mm	70 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



Easy installation of option boards



Quick connection using plug-in connectors

OPTION BOARD

	Reference
2-relay alarm board	P01 3193 01



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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

T O O R D E R	
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

T O O R D E R	
Supply	Reference
20/265 Vac - 11/265 Vdc	P01 330 080

ASSOCIATED PRODUCTS



Accessories and option boards
Alarm boards
page 200



Current transformers & shunts
Tertiary, industrial, tariff
5 to 5,000 A.
page 113



Tachometric sensor
Please contact us



Thermocouple / probe
See Pyrocontrole Catalog

DISPLAY

Display range	-9,999...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

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

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

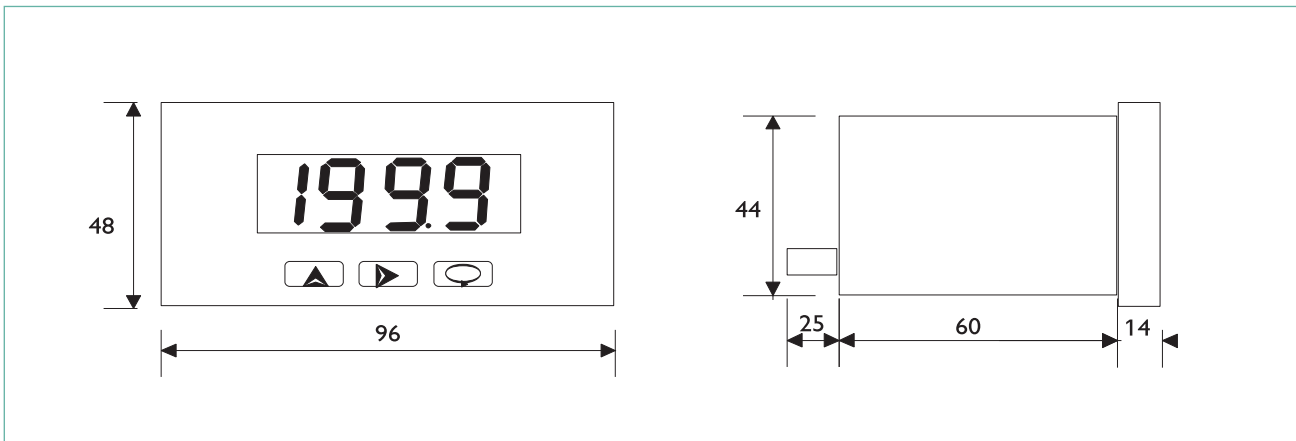
Voltage	20/265 Vac - 50/60 Hz – 11/265 Vdc
Consumption	3 VA/3 W

STANDARD

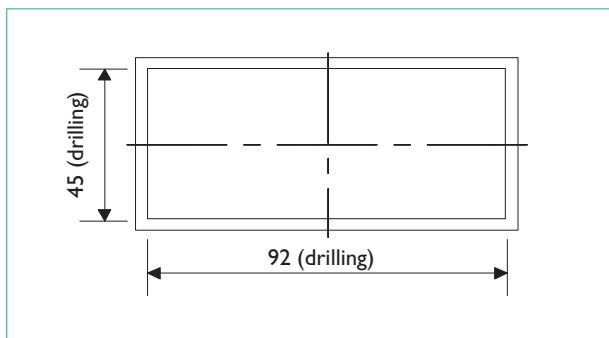
Low voltage directive 73/23/CEE

Insulation - dielectric strength IEC 61010-1

DIMENSIONS (IN MM)



PANEL DRILLING SPECIFICATIONS (IN MM)





CA 2150

RANGE

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



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

DESCRIPTION

The **CA 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 **CA 2150-M** is a 4-in-1 programmable panel meter which can be configured for process, temperature, load cell or potentiometer signals.

The **CA 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.chauvin-arnoux-energy.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.



3 display colors



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

OPTION BOARDS*

Model	Reference
CA 2XXX AL 2-relay board	P01 3193 01
CA 2XXX AL 4-relay board	P01 3193 03
CA 2XXX AL 4 NPN board	P01 3193 04
CA 2XXX COM RS232 board	P01 3193 06
CA 2XXX COM RS485 board	P01 3193 07
CA 2150 0 – 10 V output board	P01 3193 10
CA 2150 4 – 20 mA output board	P01 3193 11

* Extra boards (addition or replacement)



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CA 2150-E

AC input voltage rating (TRMS)

- 2 V with 75 k Ω
- 20 V, 200 V or 600 V with 850 k Ω

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 M Ω

DC input voltage rating

- 2 V 100 k Ω
- 20 V, 200 V or 600 V with 850 k Ω

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 M Ω

CA 2150-M

DC U/I process signals

- **Voltage:** 0... \pm 10 V with 1 m Ω
- **Current:** 0... \pm 20 mA with 15 Ω

Temperature

- **J thermocouple:** Vin > 120 mVeff
- **NAMUR sensor:**
-50...+800 $^{\circ}$ C / -58...+1,472 $^{\circ}$ F
- **K thermocouple:**
-50...+1,200 $^{\circ}$ C / -58...+2,192 $^{\circ}$ F
- **T thermocouple:**
-150...+400 $^{\circ}$ C / -302...+752 $^{\circ}$ F
- **Pt 100:**
-100...+800 $^{\circ}$ C / -148...+1,472 $^{\circ}$ F

Load cells

- 0... \pm 15 mV with 100 m Ω
- 0... \pm 30 mVdc with 100 m Ω
- 0... \pm 150 mV with 100 m Ω

Potentiometer

- 200 Ω ...100 k Ω

CA 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 k Ω
Ion < 1 mAdc
Ioff > 3 mAdc
- **TTL encoder/24 Vdc:**
"0" < 2.4 Vdc / "1" > 2.6 Vdc
Rc = 3.3 k Ω
- **Dry contact:**
Vc = 5 Vdc / Rc = 3.9 k Ω / Fc = 20 Hz

AVAILABLE OPTIONS

Relay boards

	Board with 2 alarms on relays	Board with 4 alarms on relays
Outputs	2 x 1C0 relays	4 x 1C0 relays
Max. voltage	250 Vac or 12 Vdc	250 Vac or 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

Communication board

Type of link	RS232	RS485
Protocol	ISO1745, CA 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 % \pm 1 digit	
Temperature coeff.	0.2 mV per K	0.5 μ A per K
Max. load	> 500 Ω	< 800 Ω

DISPLAY

	CA 2150-E	CA 2150-M			CA 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 color 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	CA 2150-D: 160 g
	CA 2150-E: 135 g
	CA 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 Icd: ± 0.10 % R	± 0.1 % R + 1 digit	TC ± 0.4 % R ± 0.6 °C ± 0.4 % R ± 1 °F	0.005 % R	0.01 % R
			Pt100 ± 0.2 % R ± 0.6 °C ± 0.2 % R ± 1 °F		
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	

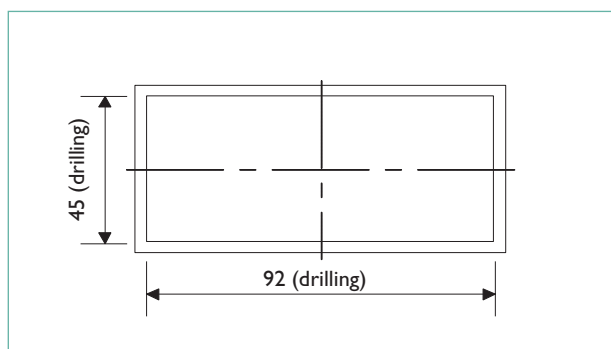
SPECIAL FUNCTIONS

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

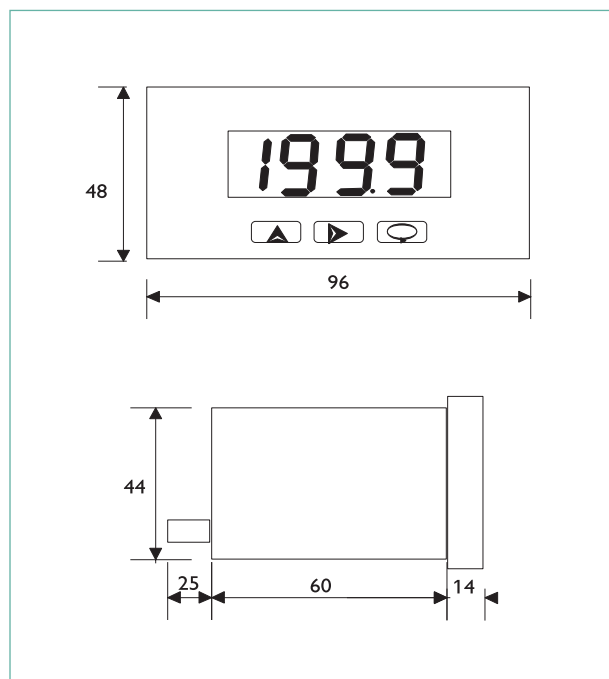
STANDARDS

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)



T O O R D E R

Power supply	CA 2150-E	CA 2150-M	CA 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
 Alarm boards
 page 204



Current transformers & shunts
 Tertiary, industrial, tariff
 5 to 5,000 A.
 page 113



Tachometric sensor
 Please contact us



Thermocouple / probe
 See Pyrocontrole Catalog



SYNCHROCOUPLER RANGE

Synchronization instruments for LV networks.



- Integration in 96 x 96 format
- 1 synchronization command
- 1 control command
- 3 command modes for synchronization
- Control 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



Digital display of 3 measurements: phase, frequency and voltage



User-programmable



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SYNCHROCOUPLER



Display:

- Phase angle variations by 30 LEDs arranged in a circle
- Voltages, frequencies, variations (in %) on 4 digits
- Frequency variations \pm , status of coupler relay, conditions obtained in phase, frequency and voltage

T O O R D E R	
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 standard 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

T O O R D E R	
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		110, 230, 400, 440, 480 Vac (-10 / +15 %)
Frequency		35 Hz...450 Hz
Consumption		10 VA
DC voltage		9-18 Vdc (12 Vdc), 18-36 Vdc (24 Vdc), 36-72 Vdc (48 Vdc)
Consumption		1.5 W

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

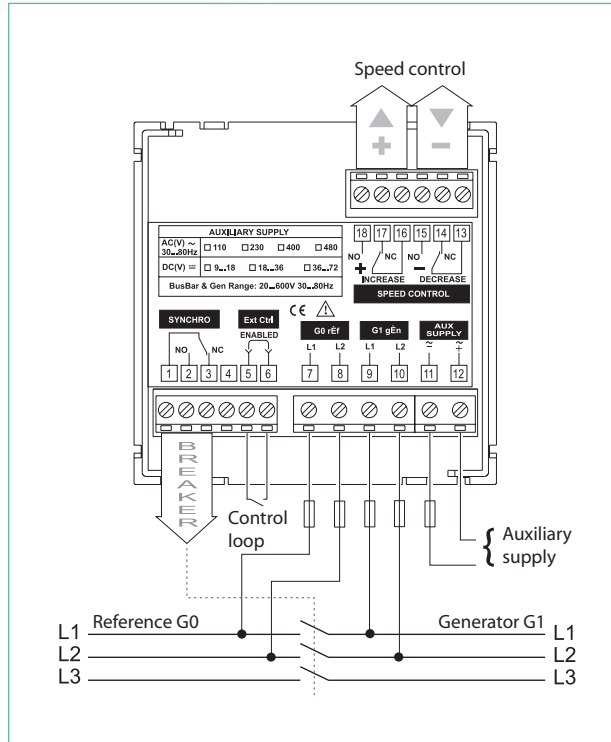
MECHANICAL SPECIFICATIONS

Casing materials		
Casing and flange		Self-extinguishing black ABS
Front panel		Light grey polycarbonate
Protection rating		IP 54 front panel (IP 65 optional)
Weight		505 g
Connection		Holder for 2.5 mm wire
Fitting		Mounting on 8 mm front panel

STANDARDS

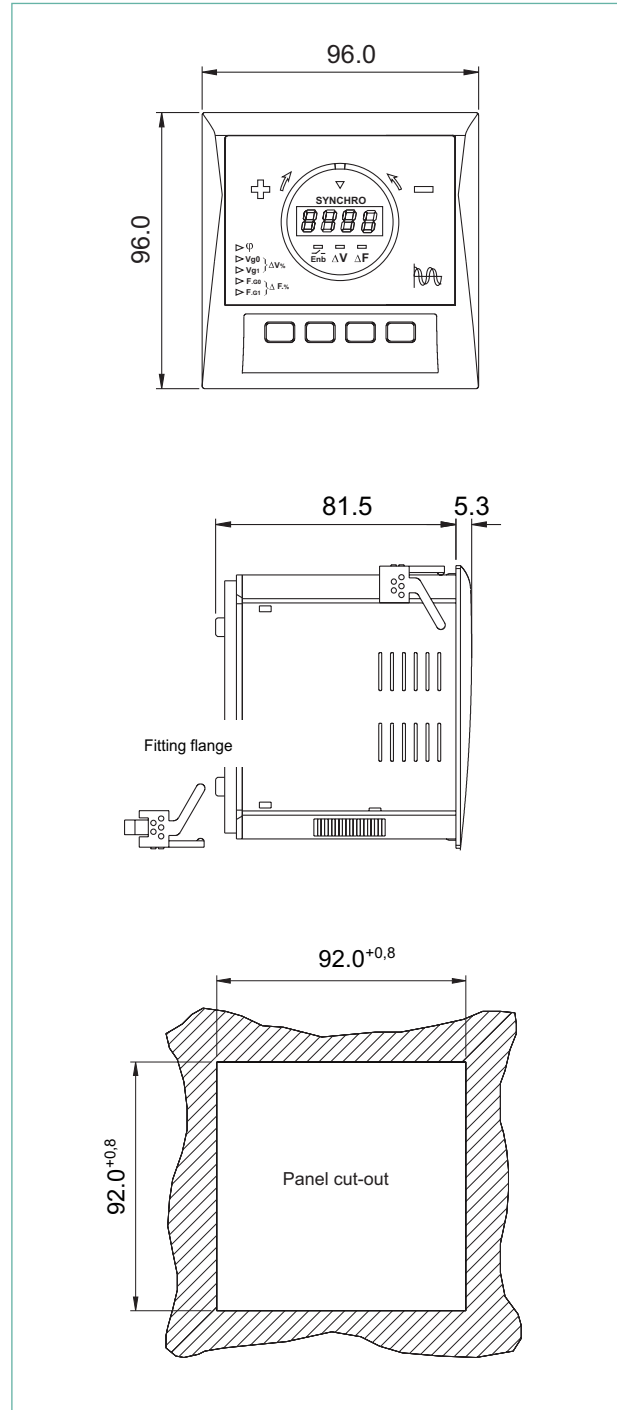
Reference standards		
Safety		IEC 61010-1
Dimensions		DIN 43700
EMC		EN 61326-1
ANSI function		Nos. 25 and 90
Resistance to shock		IEC 60068-2-27
Resistance to vibrations		IEC 60068-2-6
Environment		IEC 60068-1

ELECTRICAL CONNECTIONS



* EC (control loop): Input 5-6 must be closed to authorize closure of the synchro contact in 1-2-3.

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.

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AC voltmeter

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

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Frequency meter

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

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Wattmeter Varmeter

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

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Phasemeter

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

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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.

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Normeurope range

For severe environments



AC ammeter

Analog panel meters with round barrels for severe operating constraints.

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AC voltmeter

Analog panel meters with round barrels for severe operating constraints.

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Frequency meter

Analog panel meters with round barrels for severe operating constraints.

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Wattmeter Varmeter

Analog panel meters with round barrels for severe operating constraints.

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Phasemeter

Analog panel meters with round barrels for severe operating constraints.

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Synchronization units

Analog panel meters with round barrels for severe operating constraints.

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DC ammeter

Analog panel meters with round barrels for severe operating constraints.

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DC voltmeter

Analog panel meters with round barrels for severe operating constraints.

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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 240



LK

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

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CHOOSING AN ANALOG PANEL METER

CLASSIC

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Front panel drilling			
	Round barrel		
	Square barrel		
Front panel			
	Format	48 x 48	72 x 72
			96 x 96
Standard functions			
	AC Ammeter	90°	240°
	AC Voltmeter	90°	240°
	Pointer dial frequency meter		90°
	Vibrating reed frequency meter		
	Wattmeter / Varmeter	90°	240°
	Phasemeter	90°	240°
	DC Ammeter	90°	240°
	DC Voltmeter	90°	240°
	Hour meter		
Synchronization equipment			
	Double vibrating reed frequency meter		
	Differential voltmeter		
Strengths	CLASSIC, the model for day-to-day industrial applications.		



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NORMEUROPE

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COHO / LK

page 240-241



		COHO		LK	
				LK	
48 x 48	72 x 72	96 x 96	48 x 48	48 x 48	
	90°		250°		
	90°		250°		
		90°	250°		
		1 x 9 reeds			
		90°			
	90°		250°		
	90°		250°		
	90°		250°		
		2 x 9 reeds			
		90°	250°		
<p>NORMEUROPE, the industry reference for the generation, transmission and distribution of electrical energy for severe operating constraints.</p>			<p>COHO, the industry reference for severe operating constraints, and LK for standard applications.</p>		

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 control and monitoring points: the switchboard panels of LV distribution networks, motor drive control units or automation device panels.

Functions

Choose the quantity to be displayed in order to monitor and control a known risk. For an electrical line, for example, the voltage is selected as it is crucial for ensuring user safety.

Ergonomics

Choose the instrument size depending on the distance between the operator and the mounting panel. Choose the pointer deflection: a deflection of 240° may be preferred to the usual 90° deflection, to facilitate the reading of extended ranges.

Environmental constraints and standards

It is important to take into account mechanical specifications, environmental restrictions, standards in force, consumption and compatibility with sensors, in order to choose the appropriate dial ranges and calibration scales.

Options and accessories

Panel meters, though robust by nature, are nevertheless sensitive to degraded environments. It is therefore recommended to choose customized solutions for military applications, for onboard rail applications or for explosive atmospheres.

MOVING IRON OR MOVING COIL?

The electric current is read directly by a sensor guiding the pointer movement. The most usual types are:

Moving iron



The moving iron panel meter is composed of a fixed magnet and a mobile magnet, mutually repellant and placed in the field of a coil powered by the current to be measured. For measuring AC signals with a frequency of 50, 60 or 400 Hz. The non-linear scale law is a function of the true root mean square value (TRMS) and the graduation is in TRMS. The measurement is not sensitive to the waveform. 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. For measurement of DC signals, the scale law is linear. 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.

Moving coil with rectifier



This involves a classic moving coil measuring element equipped with a diode bridge to rectify AC signals. For measuring AC signals from 50 to 10,000 Hz. The linear scale law is a function of the mean rectified value of the signal and the graduation is in RMS. The measurement is sensitive to the waveform.



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DEFINITIONS

Damping: Time taken by the needle to stabilize, according to the following requirements:

- **Overrun:** The mechanical overrun must not exceed 20% of the scale length.
- **Response time:** Time necessary for the panel meter to reach and remain within a band centered on the final stable indication when the measured quantity varies suddenly from the value corresponding to unpowered status (zero) on a scale such that the final stable indication is located at a specific point on the scale. The difference between the idle position of the meter and its position after application of a sudden excitation producing a variation of the final indication equal to two third of the scale length must not exceed 1.5 % of the scale length after 4 s.

Mechanism for adjusting the mechanical zero:

Mechanism which can be used to adjust the instrument so that the mechanical zero coincides with the appropriate scale marking.

Dial: Plate mounted on the front panel of the meter and on which the scale and numbering are printed.

Rating: This is the largest measurable value for which the maximum deflection is obtained.

Numbering: All the numbers indicated for the scale markings.

Class index: Also known as the Accuracy Class, this is defined by a value in % and determines the uncertainty of the measurement calculated over the full scale and referred to the measurement. Class 1.5 means that the maximum uncertainty is between + and -1.5% of the full scale, applicable at all points on the scale (e.g. 0-100 A scale: the uncertainty will be $1.5\% \times 100 = \pm 1.5A$. The needle pointing to the 50 A marking really means: $48.5 A >$ actual measurement $> 51.5 A$)

Cover: Covers and protects the dial and needle. It may be openable on certain models, with a removable upper element making dial changes quick and easy to perform.

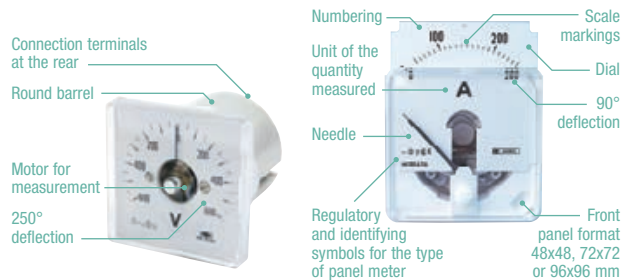
Division: Distance between any two consecutive scale markings.

Scale: All the markings and numbers which, in combination with the position of the index (needle or vibrating reed) enable you to determine the value of the quantity measured.

Repeatability: Property of always showing the same deflection for a given value of the quantity measured.

Graduation: The set formed by the scale+numbering; it complies with the IEC 60051-1 standard.

Markings (on a scale): Markings on the dial whose purpose is to divide the scale into convenient intervals so that the position of the index (needle or vibrating reed) can be determined.



Enclosure ingress protection (IP rating):

Represents a level of protection provided by the instrument's enclosure. The protection rating is stated by means of 2 separate digits.

INGRESS PROTECTION: TWO DIGITS

Rating	1st digit (tens) Protection against solids	2nd digit (units) Protection against water ingress
0	No protection	No protection
1	Protected against solid bodies larger than 50 mm across	Protected against water droplets falling vertically
2	Protected against solid bodies larger than 12.5 mm across	Protected against water droplets falling at up to 15° from the vertical
3	Protected against solid bodies larger than 2.5 mm across	Protected against water spray at up to 60° from the vertical
4	Protected against solid bodies larger than 1 mm across	Protected against water spray from any direction
5	Protected against dust and other microscopic residue	Protected against hose water spray from all directions (nozzle 6.3 mm, distance 2.5 to 3 m, flow rate 12.5 l/mm ± 5%)

MEANINGS OF THE REGULATORY MARKINGS ON DIAL:

	Dielectric voltage test (4 kV)		Moving-coil instrument with built-in rectifier
1.5	Accuracy class 1.5		Vibrating-reed frequency meter
	Vertical position of dial		For connection to 100/5A CT
	Horizontal position of dial		For connection to 380/100V VT
	Inclined position of dial in relation to the horizontal		Usable with direct current
	Standard – IEC 60051-1		Moving-coil instrument
	Usable with direct and alternating current		External shunt with measurement lead, $R = 0.02 \Omega$
	Usable with alternating current		Additional resistance
	Moving-iron device		Caution



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



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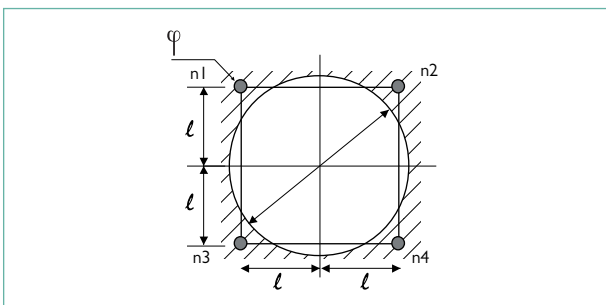
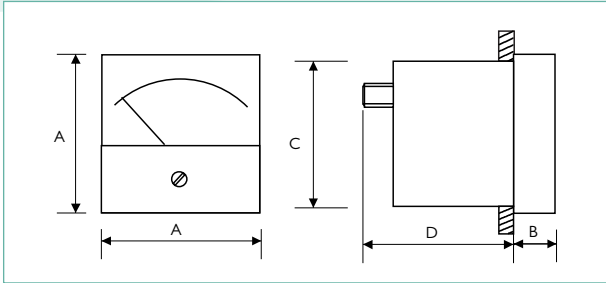


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DIMENSIONS AND DRILLING OF THE PANEL



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°	
	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)	■	■	■	■	■
Color marking	■	■	■	■	■
Color area	■	■	■	■	■
Black background with white markings	■	■	■	■	■
Markings not in standard documentation	■	■	■	■	■
Double scale		■	■	■	■

ACCESSORIES

Deflection	90°			240°	
	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
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 

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 



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 			Deflection 	
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			Deflection 		
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.

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Current transformers

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

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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							
CT ratio		1048 1299	1082 1299	1083 1299					
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							
CT ratio		1048 9597	1082 9597	1083 9597					
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

Examples	Instrument	Deflection	Measuring component	Format	Scale	CT ratio rating	Frequency
	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 VOLTMETER

- Deflection 

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 

Standard-scale model

Accuracy class: 1.5



Measuring component:

rectified moving coil 50 - 10,000 Hz
Linear scale



Consumption: 1 mA





FEASIBILITY LIMITS

Deflection					
	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
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 $100/\sqrt{3}$ V				
moving coil	from $100/\sqrt{3}$ V			from $100/\sqrt{3}$ V	

DIRECT CONNECTION

Format	Rating	Scale Vn					
			48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
	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

Format	VT ratio	Scale					
			48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
Always specify VT ratio when ordering							
	VT/100 $\sqrt{3}$ V	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.

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Current transformers

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

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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	<input checked="" type="checkbox"/>

ASSOCIATED PRODUCTS



Accessories

Seal, ring fastener,
dial, sleeve, etc.

page 219



TRIAD 2

Digital transducers
1 to 4 analog outputs.
Class 0.1.

page 166

WATTMETER VARMETER

PHASEMETER

- Panel meter

Deflection  

Accuracy class: 1.5



Measuring component: moving coil
Linear scale

- Panel meter

See transducers page 159



PANEL METER

		Deflection 		Deflection 		
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 159

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 219



TRIAD 2

Digital transducers
1 to 4 analog outputs.
Class 0.1.

page 166



Current transformers

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

page 113



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

DIRECT CONNECTION

		Deflection 90°			Deflection 240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
	Rating					
	Scale					
	5 A			0-5 A		
	10 A			0-10 A		
	15 A			0-15 A		
	25 A			0-25 A		
	0-20 mA			Process		
	4-20 mA			Process		

Always specify start and end of scale when ordering

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			
	5 A		0-5 A	2961 0307
	10 A		0-10 A	2961 0312
	15 A		0-15 A	2961 0314
	20 A		0-20 A	2961 0315
	25 A		0-25 A	2961 0316
	30 A		0-30 A	2961 0317
	40 A		0-40 A	2961 0318
	50 A		0-50 A	2961 0319
	60 A		0-60 A	2961 0321
	75 A		0-75 A	2961 0323

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


		Deflection 90°			Deflection 240°	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
	Rating					
	Scale					
	50 mV			Gauche		
	60 mV			Gauche		
	100 mV			Gauche		
	50 mV			Central		
	60 mV			Central		
	100 mV			Central		

Always specify the rated current of the shunt

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 

Accuracy class: 1.5

Measuring component: moving coil

Linear scale

Consumption: 1 mA

- Deflection 

Accuracy class: 1.5

Measuring component: moving coil



Linear scale

Consumption: 5 mA for $U_n < 5\text{ V}$



0.5 mA for $U_n \geq 5\text{ V}$





FEASIBILITY LIMITS


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

DIRECT CONNECTION

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

READING OF PROCESS SIGNAL

		Deflection 			Deflection 	
Format		48 x 48	72 x 72	96 x 96	72 x 72	96 x 96
	Rating					
	Scale					
	0-1 V	Process			Process	
	0-10 V	Process			Process	
		2048 0401C			2086 0401C	
		2048 0412C			2086 0412C	

moving iron 

Always specify the start and end of scale when ordering

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 m ³

ASSOCIATED PRODUCTS



Accessories

Seal, ring fastener, dial, sleeve, etc.

page 219



SHUNTS

1 to 6,000 A

Vast choice whatever your application.

page 150



Current transformers

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

page 113



NORMEUROPE RANGE

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



- Customer references: EDF, on-board naval applications, energy generation and distribution
- Designed for demanding applications: nuclear, military, naval
- Long product life span

ZOOM



Compliant with the latest applicable standards



Large choice of functions, formats, ratings, IPs and options



Attractive design and easy to read

REFERENCE STANDARDS

Reference standard: IEC 60051-1, IEC 60051-2, IEC 60051-9

EMC: IEC 61326-1, IEC 61326-2-1, EN 61000-4

Safety rules: IEC 61010-1, IEC 61010-2-030

- Category III

Resistance to vibrations: IEC60051 – IEC 60068-2-6

- 10 to 55 Hz, +/- 15 mm

Resistance to mechanical shocks: IEC 60068-2-27

- 15 g

Degree of protection: IEC 60529

- See table «Mounting mode – Ingress Protection (IP)»

Degree of protection provided by the enclosure: IEC60529

- IK08 on the cover

Climatic withstand: IEC 60051-1, IEC 60051-9

- Calibration temperature: 23°C +/- 2°C
- Rated operating temperature: 23°C +/- 10°C
- Operating temperature limits: -25°C à + 60 °C
- Storage temperature: -25°C to + 70°C
- Relative humidity: 25% to 95%
- Atmospheric pressure: up to 2,000 m – 795 hPa

GENERAL SPECIFICATIONS

Accuracy class: 1.5 (+/- 1.5% of full scale)

Mounting: on front panel by means of studs or ring fastener

- Maximum panel thickness: 8 mm

Materials:

Barrel: self-extinguishing ABS

Front panel: self-extinguishing polycarbonate

Additional casing: Bakelite base, ABS cover

Operating position: calibration for vertical position ($\pm 10^\circ$)

Overloads:

Voltmeter and frequency meter

- 1.2 Un permanent
- 2 Un for 5 s

Ammeter

- 1.3 In permanent
- 10 In for 5 s



tertiary



industry



energy production



energy transmission & distribution



nuclear

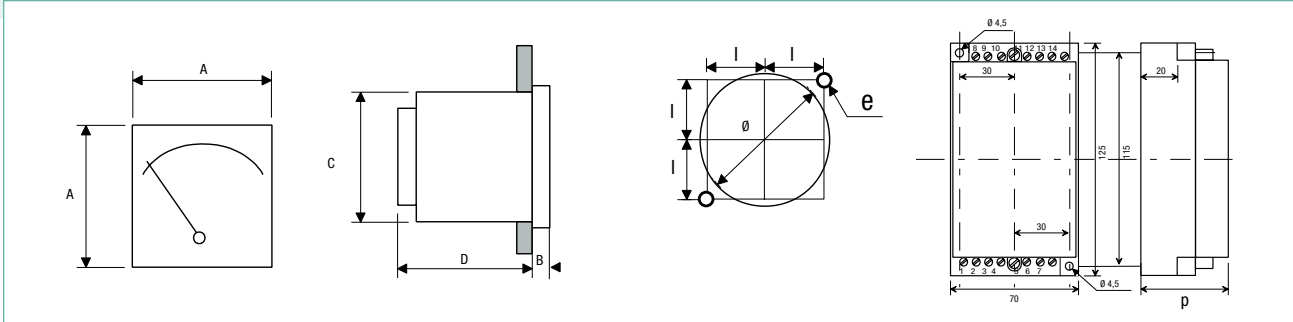


energy efficiency



rail

DIMENSIONS AND PANEL DRILLING SPECIFICATIONS



A x A Format	Panel meter			Additional unit	
	48 x 48	72 x 72	96 x 96	A	B
B (mm)	8	13	14		
C (mm)	diam. 44	diam. 55	diam. 80		
D 90° deflection or blades	46	29 if 20 A max, 39 if 25 A max or more			
D command unit (mm)			93		
Ø (mm)	45	58	88		
l (mm)	20.25	26.5	34		
e (mm)	Ø 3.5	Ø 4.5	Ø 4.5	P = 48	P = 122
Weight (kg)	0.20	0.25	0.30	0.30	0.70
Terminal	M4 and Faston up to 20 A, M6 for higher values			cage for 4 mm ² wire	

MECHANICAL SPECIFICATIONS

Deflection	90°			250°		
	48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
Mounting and front-panel tightness outside standard (1)						
Panel meter standard: IP 40 front panel						
Casing: IP 20						
	2 studs M2,5	2 studs M4	2 studs M4	2 studs M2,5	2 studs M4	2 studs M4
360° panel meters: always 4 studs						
Option Ring fastener IP 40 front panel	drill 48 mm	drill 58 mm	drill 88 mm	drill 48 mm	drill 58 mm	drill 88 mm
Option Reinforced mounting + gasket IP 52 front panel	4 studs M2,5	4 studs M4	4 studs M4	4 studs M2,5	4 studs M4	4 studs M4
Option Watertight (Reset, front panel) + IP54 seal front panel		4 studs M4	4 studs M4	4 studs M2,5	4 studs M4	4 studs M4
Option Watertight (Reset, front/rear panels) + IP55 product		4 studs M4	4 studs M4	4 studs M2,5	4 studs M4	4 studs M4
Non-standard dial options (after agreement on feasibility)						
Dial markings on request	■	■	■	■	■	■
Color markings	■	■	■	■	■	■
Color zones	■	■	■	■	■	■
Black background, white markings	■	■	■	■	■	■
Double scale		■	■	■	■	■

(1) IPXY, where X is the level of protection against penetration by solid bodies and Y is the level of protection against penetration by liquid

ACCESSORIES

Deflection	90°			250°		
	48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
Front-panel sealed gasket	2465 001	2314 375	2314 376	2465 001	2314 375	2314 376
Fitting clip (without seal)	2328 558	2302 348	2307 086	2328 558	2302 348	2307 086
Standard or previous 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°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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 90°			Deflection 250°		
Format			Moving iron, 50 Hz			48 x 48	72 x 72	96 x 96
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.

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Current transformers

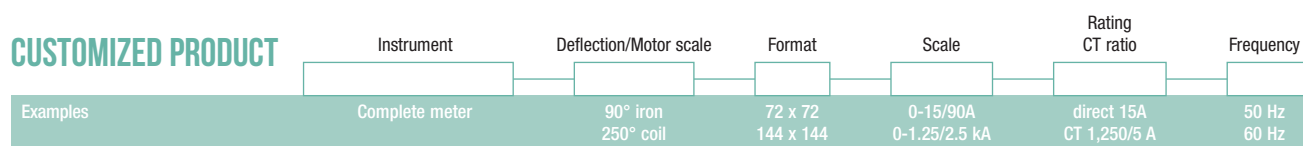
Cable primary, busbar
primary, closed core
or split core, etc.

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CONNECTION ON CT 5 A

Deflection		Moving iron 50 Hz 			Moving iron 50 Hz 						
		Panel meter and dial separate			Complete panel meter			Complete panel meter			
Format	Ratio	Scale	48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
		Panel meter only									
		A90A 0487			A90A 0486			A90A 0485			
		Dial only									
CT		1.3 In									
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							
		Panel meter only									
		A90A 0107			A90A 0106			A90A 0105			
		Dial only									
CT		3 In									
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



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
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 with 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 k Ω /V

Extended-scale model
Accuracy class: 1.5
Measuring component: rectified
 moving coil 50-10,000 Hz
 Linear scale
 Impedance 2 k Ω /V
 With additional "A" unit in 48 x 48
 format with 250° and 90° if value < 100 V

FEASIBILITY LIMITS

		Deflection 90°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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/ $\sqrt{3}$ V			from Un/ 100/ $\sqrt{3}$ V		

DIRECT CONNECTION

		Deflection 90°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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 90°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
VT ratio	Scale						
TT/100 V	0-1.2 Vn	■	■	■	■	■	■
TT/100/ $\sqrt{3}$ 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 229



Current transformers

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

page 113

FREQUENCY METER

Pointer frequency meter

- Deflection 90° 250°

Accuracy class: 0.5 of F_n

Measuring component: moving coil and frequency converter

Linear scale

Operating range: 0.80 U_n to 1.15 U_n

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.

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Current transformers

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

page 113

WATTMETER VARMETER

- Deflection  

Linear scale, measurement range according to client specifications (apparent power kVA, active power kW or reactive power kvar)
 2 mA moving coil analog panel meter (other ratings on request) associated with a T82 or TRIAD measurement transducer (see Transducers chapter)
Accuracy class: 1.5



TRANSDUCERS TO BE USED

The transducer used with the analog panel meter will be selected in the “TRANSDUCERS” chapter of this catalog.



T82N



TRIAD 2

CUSTOMIZED PRODUCT

	Network	Deflection	Format	Frequency	CT ratio	Direct/VT	Voltage or VT ratio	Scale beginning	Scale ending	Transducer model
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	TRIAD T82

ASSOCIATED PRODUCTS



Accessories

Seal, ring fastener, dial, sleeve, etc.

page 229



Current transformers

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

page 113

PHASEMETERS



- Deflection 90° 250°

Scale in $\cos \varphi$

2 mA moving coil analog panel meter (other ratings on request) associated with a T82 or TRIAD measurement transducer (see Transducers chapter)

Accuracy class: 2.5

TRANSDUCERS TO USE

The transducer to use with the analog panel meter will be chosen in the "TRANSDUCERS" chapter of this catalog.



T82N



TRIAD 2

CUSTOMIZED PRODUCT

	Network	Deflection	Format	Frequency	CT secondary	Voltage	Measurement range	Transducer model
Examples	Single Unbalanced three-phase	250° 360°	72 x 72 96 x 96	50 Hz 60 Hz	5 A 1 A	230 V 440 V	0.5 lead /1/0.5 lag -1 / 0 / +1	TRIAD T82

ASSOCIATED PRODUCTS



Accessories

Seal, ring fastener, dial, sleeve, etc.

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Current transformers

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

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SYNCHRONIZERS

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 V²

FEASIBILITY LIMITS

Voltage 57.7 V to 440 V

2 rows of 9 segments			
Format		72 x 72	96 x 96
Frequency	Voltage		
48-52 Hz	100/√3 V	■	■
	100 V		FL12 0677
	230 V	■	FL12 0678
	400 V	■	FL12 0679
58-62 Hz	100/√3 V	■	■
	100 V	■	■
	230 V	■	■
	400 V	■	■

CUSTOMIZED PRODUCT

	Format	Frequency	Voltage
Examples	96 x 96 72 x 72	48-52 Hz 58-62 Hz	100/√3 V 415 V

Differential Voltmeter



Deflection 90° 250°
 Accuracy class: 2.5
 Consumption: 0.5 VA per circuit
 Frequency: 50-60 Hz
 Measurement range: 0.75 to 1.25 Un
 Additional unit "B"

FEASIBILITY LIMITS

Voltage 57.7 V to 440 V, other measurement ranges

Deflection 90°		
Format	72 x 72	96 x 96
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
Voltage Un		
100/√3 V	■	■
100 V	■	■ C250 069
230 V	■	■
400 V	■	■

CUSTOMIZED PRODUCT

	Deflection	Format	Voltage	Measurement range
Examples	90° 250°	72 x 72 96 x 96	100 V 100/√3 V	±25% ±50%

ASSOCIATED PRODUCTS



Accessories

Seal, ring fastener, dial, sleeve, etc.

page 229



Current transformers

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

page 113

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 \geq 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 \geq 10 mA
variable for rating $<$ 10 mA

FEASIBILITY LIMITS

		Deflection 90°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
Direct connection	Zero position, left or central	50 mA to 20 A		50 μ A to 75 A	500 μ A 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°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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°			Deflection 250°		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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 229



SHUNTS

1 to 6,000 A
Vast choice whatever your application.
page 150

DC VOLTMETER

• Deflection

Accuracy class: 1.5

(option class 1 except 48 x 48)

Measuring component: Moving coil

Linear scale

Consumption:

1 mA for $U_n \geq 500$ mV

5 mA for $U_n < 500$ mV

• Deflection

Accuracy class: 1.5

Measuring component: Moving coil

Linear scale

Consumption:



1 mA for $U_n \geq 1$ V

2 mA for $U_n \geq 1$ V (central zero)



5 mA for $U_n < 1$ V



FEASIBILITY LIMITS

		Deflection 			Deflection 		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
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 			Deflection 		
Format		48 x 48	72 x 72	96 x 96	48 x 48	72 x 72	96 x 96
Rating							
	15 V	■	■	■	■	■	■
	30 V	■	■ C90S 1425	■ C90S 1525	■	■	■
	60 V	■	■ C90S 1426	■ C90S 1526	■	■	■
	75 V	■	■	■	■	■	■
	150 V	■	■ C90S 1428	■ C90S 1528	■	■	■ C250 1928
	300 V	■	■	■	■	■	■

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.

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Current transformers

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

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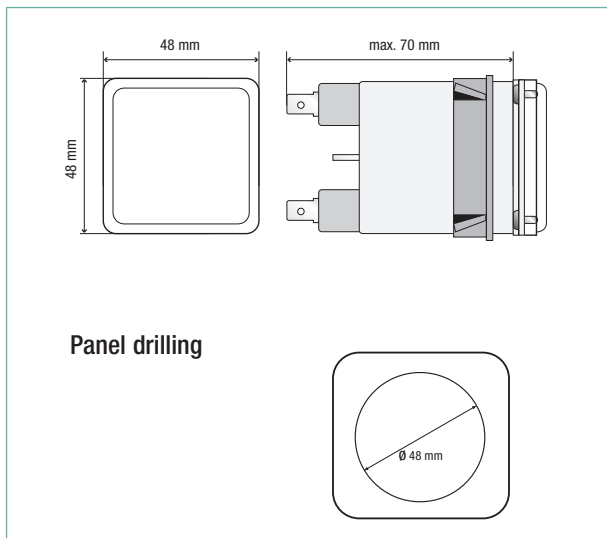
COHO

RANGE

Hour meters for totalling the operating time of machines or equipment for control and maintenance.



- For harsh environments
- High-reliability range



GENERAL SPECIFICATIONS

Reference standard: NFC 42310

Display: without reset function, white on black background, decimals in red

Height of digits: 4 mm

AC and DC capacity: 99,999.99 h

Operating indicator: scrolling 1/100 h every 36 s

Motor in Vac/Vdc: pulse + electronic counter

Consumption:

0.5 VA in 24 Vac/dc,

1.5 VA in 48 Vac/dc,

2 VA in 110/230 Vac,

6 VA in 400 Vac

Operating range:

Voltage Vac: -15% +10%

Frequency: ± 5 Hz

Voltage Vdc: $\pm 20\%$

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

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



tertiary



industry



energy production



energy transmission & distribution



nuclear

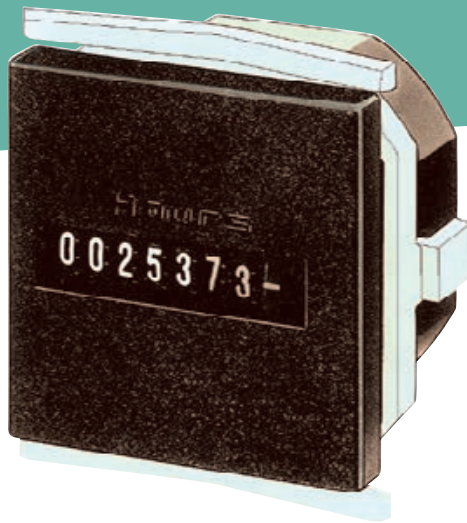


energy efficiency

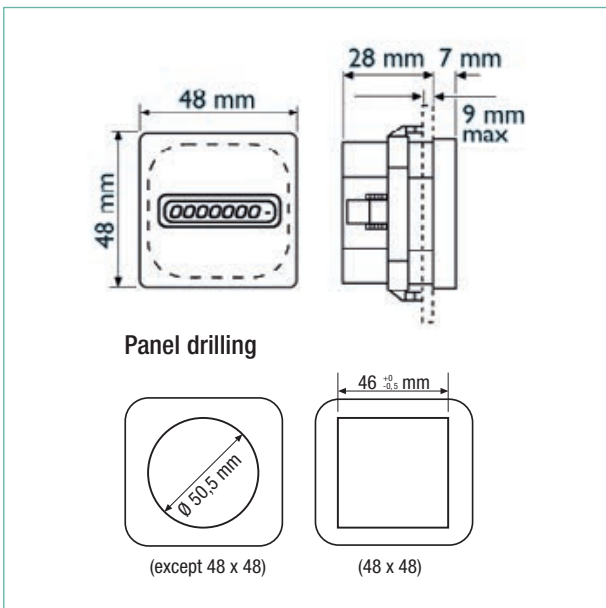


rail

LK RANGE



- + Easy to install
- + Economical



Hour meters (7 or 8 digits) for totalling the operating time of machines or equipment for control and maintenance.

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: $\pm 10\%$

Frequency: $\pm 10\%$

Voltage Vdc: $\pm 10\%$

Environment:

Operating temperature: -15°C to $+50^{\circ}\text{C}$

Relative humidity: $< 95\%$ at $+45^{\circ}\text{C}$

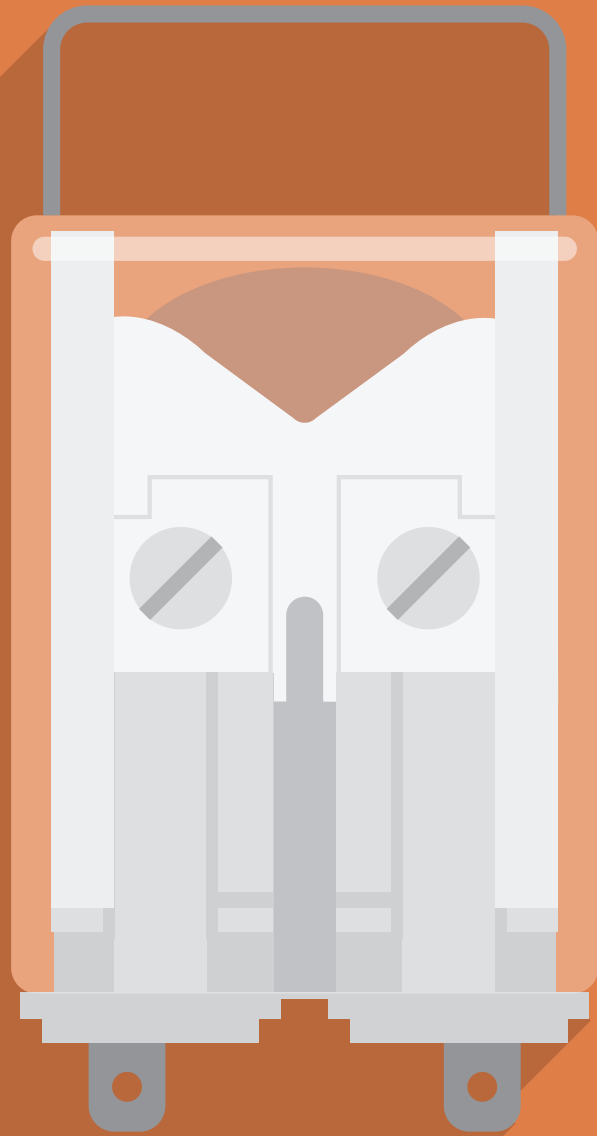
Protection rating on front panel: IP52

Mounting: self-locking flange

Weight: 50 g

Connection: 6.35 lugs or Faston clips

Format		48 x 48	55 x 55	72 x 72
Frequency	Voltage			
50 Hz	24 V	LK4N 001N	LK5N 001N	LK7N 001N
	48 V	LK4N 003N	LK5N 003N	LK7N 003N
	115 V	LK4N 005N	LK5N 005N	LK7N 005N
	230 V	LK4N 007N	LK5N 007N	LK7N 007N
	400 V	LK4N 009N	LK5N 009N	LK7N 009N
60 Hz	24 V	LK4N 002N	LK5N 002N	LK7N 002N
	48 V	LK4N 004N	LK5N 004N	LK7N 004N
	115 V	LK4N 006N	LK5N 006N	LK7N 006N
	230 V	LK4N 008N	LK5N 008N	LK7N 008N
	400 V	LK4N 010N	LK5N 010N	LK7N 010N
DC	10-30 V	LK4N 011N	LK5N 011N	LK7N 011N
	36-80 V	LK4N 012N	LK5N 012N	LK7N 012N
	110-130 V	LK4N 013N	LK5N 013N	LK7N 013N
Front panel only			LK5N 0000	LK7N 0000



CRITICAL AUXILIARY RELAYS

AUXILIARY RELAYS

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METERS AND POWER MONITORS

DATA LOGGERS

NETWORK ANALYZERS

CURRENT TRANSFORMERS AND SHUNTS

TRANSDUCERS

PANEL METERS AND SYNCHROCOUPLER

AUXILIARY RELAYS

SERVICES AND TRAINING

AUXILIARY RELAYS

TO SEE ALL OUR RANGES,
CHECK OUT OUR
RELAYS CATALOG



Instantaneous relays

Monostable

catalog 906130145



Monostable with forcibly guided contacts



Bistable

catalog 906130145



Fast-acting monostable and bistable



Time-delay relays / Logic functions

Time delay on pick-up or drop-out (logic function)



Time-delay with forcibly guided contacts



Measurement relays



Sockets and accessories



Rear connection, front connection, screw connection, Faston connection, blade connection, spring connection: various sockets are available. Chauvin Arnoux Energy® also proposes a complete range of accessories: locking spring, bar-mounting strap, bar for panel mounting, DIN-rail fitting, safety blank, etc.

catalog 906130145



The reference for industrial relays

The French measuring instrument designer and manufacturer **Chauvin Arnoux Group** is acknowledged as a major player in the electrical sector and is consolidating its position on the physical measurement market.

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, **Chauvin Arnoux Energy** 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, Chauvin Arnoux Energy 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, IEC 61810-3 and EN 45545-2, Relays approved by SNCF and RATP: F-OK B, F-OK TBAO, F-OK TBOR

ENERGY

Category K3 (seismic stresses), EDF qualification for use in nuclear power stations. Chauvin Arnoux Energy 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

SELECTION GUIDE

DEPENDING ON PRODUCTS



Depending on products



Depending on products



Model	Monostable instantaneous	Bistable (latching)	Forcibly guided contacts	Fast-acting(*)	Time delay	Contacts	In	Notes	Rolling stock equipment (***)	Nuclear
RCM	■					2 CO	10 A	Compact		
RDM	■					4 CO	10 A	Compact		
RGM	■					4 CO	12 A	High breaking capacity (**)		
RMMX	■					8 CO	10 A	Multi-contact, compact		
RMM	■					8-12-20 CO	12 A	High breaking capacity, multi-contact		
POK-POKS	■					2 CO	5-10 A	Compact		
BIPOK-BIPOKS	■					4 CO	5-10 A	Compact		
TRIPOK-TRIPOKS	■					6 CO	5-10 A	Compact		
QUADRIPOK	■					8 CO	10 A	Compact		
ESAPOK	■					12 CO	10 A	Compact		
OK	■					4-8-12 CO	10 A	High breaking capacity		
OKB184	■					4 CO	10 A	High breaking capacity, K3-qualified		
RE3000	■					4 CO	10 A	K3-qualified		
FOKB	■					4 CO NC-NO	13 A	High breaking capacity, NF F62-002		
RCG	■		■			2 CO	10 A	Forcibly guided contacts, type A, EN61810-3		
RDG	■		■			4 CO	10 A	Forcibly guided contacts, type A, EN61810-3		
RGG Previous name RGMZX	■		■			4 CO	10 A	High breaking capacity, forcibly guided contacts, type A, EN61810-3		
RMGX	■		■			8 CO	10 A	High breaking capacity, forcibly guided contacts, type A, EN61810-3		
RGB		■				3-4 CO	12 A	High breaking capacity		
RMBX		■				7-8 CO	10 A	Multi-contact		
RMB		■				7-11-19 CO	10 A	High breaking capacity, multi-contact, common negative		
OKBA		■				4-8 CO	10 A	High breaking capacity		
RGMVX	■			■		4 CO	10 A	Operating time < 8 ms		
RMMV/X	■			■		8-12 CO	10 A	Operating time < 8 ms for compact models, otherwise < 10 ms		
RGR	■			■		2 CO	2 A	Operating time < 3 ms		



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industry



energy production



energy transmission & distribution



nuclear



energy efficiency



rail

DEPENDING ON PRODUCTS



Depending on products



Depending on products



Model	Monostable instantaneous	Bistable (latching)	Forcibly guided contacts	Fast-acting(*)	Time delay	Contacts	In	Notes	Rolling stock equipment (***)	Nuclear
RGMV	■			■		4 (CO or NC)	10 A	Operating time < 8 ms		
RMMV	■			■		8 (CO or NC)	10 A	Operating time < 6 ms		
RMMZ11/13	■			■		8 CO	10 A	Operating time < 13 ms		
RGBZ10/11		■		■		3-4 CO	12 A	Operating time < 12 ms		
RMBZ30		■		■		7 CO	10 A	Operating time < 18 ms		
RV LV16	■			■		6 (NO or NC)	5 A	Operating time < 6 ms		
RDT					■	4 CO	10 A	Time delay on pick-up or drop-out		
RDL - RGL					■	2 CO	10 A	Flasher		
RDTE15/16					■	4 CO	10 A	Delay on drop-out, adjustable duration, no Vaux		
RGTO					■	1 CO	5 A	Delay on drop-out, adjustable duration, no Vaux		
TMM					■	4 CO	10 A	Multifunction relay, 10 functions	🚂	
TM - TMS Previous names OK-TMF/S					■	4 CO	5-10 A	Time delay on pick-up or drop-out	🚂	
TOK					■	4 CO	10 A	High breaking capacity, time delay on pick-up or drop-out	🚂	🚂
OKR					■	4 CO	5 A	Time delay on pick-up or drop-out	🚂	
OKT					■	4 CO	5 A	Time delay on pick-up or drop-out	🚂	🚂
UTM					■	-	-	Static time delay unit	🚂	
TOK-L					■	4 CO	10 A	High breaking capacity, flasher	🚂	
TOK-FP					■	4 CO	10 A	High breaking capacity, flasher	🚂	
OKRE-L					■	4 CO	5 A	Flasher	🚂	
OKRE-FP					■	4 CO	5 A	Flasher	🚂	
CLE					■	4 CO	5 A	Flasher		
RGK			■		■	4 CO	12 A	Forcibly guided contacts, type A, EN61810-3	🚂	
MOK-V2	■					2 CO	3 A	Measuring relay, voltage	🚂	

* Unless stated otherwise, operating times indicated in the catalog are understood as being inclusive of bounces
 ** Relays with contact specifications guaranteeing efficient break of strongly inductive DC loads, even with 220Vdc voltages
 *** These relays comply with regulations applicable to rolling stock; also suitable for use in other applications.

SELECTION GUIDE

TERMINAL	FRONT Connection			REAR Connection			PCB
	SCREW		SPRING CLAMP	SCREW	DOUBLE FASTON	SPRING CLAMP	
MOUNTING	PLATE-WALL / DIN RAIL	PLATE-WALL	PLATE-WALL / DIN RAIL	FLUSH MOUNTING			SOLDER
RELAY MODEL	SOCKET MODEL						
RCM	PAVC081	-	PAIR085	PRVC081	PRDC081	-	PRCC080
RDM	PAVD161	-	PAIR165	PRVD161	-	-	PRCD161
RGM	PAVG161	-	-	PRVG161	PRDG161	-	-
RMMX	96IP20-I DIN	-	PAIR320	-	ADF4	PRIR320	-
RMM (8 cts)	PAVM321	-	-	PRVM321	PRDM321	-	-
RMM (12 cts)	PAVM481	-	-	PRVM481	PRDM481	-	-
RMM (20 cts)	PAVM801	-	-	PRVM801	PRDM801	-	-
POK-POKS	50IP20-I DIN	50L	PAIR080	53IL	ADF1	PRIR080	65
BIPOK-BIPOKS	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
TRIPOK-TRIPOKS	78BIP20-I DIN	78BL	PAIR240	73IL	ADF3	PRIR240	-
QUADRIPOK	96IP20	96BL	PAIR320	43IL	ADF4	PRIR320	65
ESAPOK	156IP20	78BL	PAIR480	73IL	ADF6	PRIR480	-
OK / OKB184	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	-	65
RE3000	EVV3100	EVL3100*	-	ERV3100	ERL320*	ERL310*	-
FOKB	-	-	-	-	84F*	-	-
RCG	50IP20-I DIN	-	PAIR080	-	ADF1	PRIR080	65
RDG	48BIP20-I DIN	-	PAIR160	-	ADF2-BIPOK	PRIR160	65
RGG	48BIP20-I DIN	-	PAIR160	43IL	ADF2	PRIR160	65
RMGX	96IP20-I DIN	-	PAIR320	-	ADF4-E1	PRIR321	-
RGB	PAVG161	-	-	PRVG161	PRDG161	-	-
RMBX	96IP20-I DIN	-	PAIR320	-	ADF4	PRIR320	-
RMB (7 cts)	PAVM321	-	-	PRVM321	PRDM321	-	-
RMB (11 cts)	PAVM481	-	-	PRVM481	PRDM481	-	-
RMB (19 cts)	PAVM801	-	-	PRVM801	PRDM801	-	-
OKBA	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65

*EVL3100: Faston front connection

*ERL320: double blade

*ERL310: single blade

*84F: Single Faston

OLD SOCKET NAME	NEW SOCKET NAME
50	50IP20-I DIN
48B	48IP20-I DIN
78B	78IP20-I DIN
50BF	50L
48BF	48BL
78BF	78BL
65F	65



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rail

TERMINAL	FRONT Connection			REAR Connection			PCB
	SCREW		SPRING CLAMP	SCREW	DOUBLE FASTON	SPRING CLAMP	
MOUNTING	PLATE-WALL / DIN RAIL	PLATE-WALL	PLATE-WALL / DIN RAIL	FLUSH MOUNTING			SOLDER
RELAY MODEL	SOCKET MODEL						
RGMVX	48BIP20-I DIN	-	PAIR160	-	ADF2	PRIR160	-
RMMVX	96IP20-I DIN	-	PAIR320	-	ADF4	PRIR320	-
RMMVx1/7	PAVM481	-	-	PRVM481	PRDM481	-	-
RGR	PAVG161	-	-	PRVG161	PRDG161	-	-
RGMV	PAVG161	-	-	PRVG161	PRDG161	-	-
RMMV	PAVM321	-	-	PRVM321	PRDM321	-	-
RMMZ11 / 13	PAVM321	-	-	PRVM321	PRDM321	-	-
RGBZ10 / 11	PAVG161	-	-	PRVG161	PRDG161	-	-
RMBZ30	PAVM321	-	-	PRVM321	PRDM321	-	-
RV LV16	78BIP20-I DIN	-	PAIR240	73IL	ADF3	PRIR240	-
RDT	PAVD161	-	PAIR165	PRVD161	-	-	PRCD161
RDL	PAVD161	-	PAIR165	PRVD161	-	-	PRCD161
RGL	PAVG161	-	-	PRVG161	PRDG161	-	-
RDTE15 / 16	PAVD161	-	PAIR165	PRVD161	-	-	PRCD161
RGTO	PAVG161	-	-	PRVG161	PRDG161	-	-
TMM	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
TM - TMS	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
TOK	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
OKR	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
OKT	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
UTM	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
TOK-L	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
TOK-FP	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
OKRE-L	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
OKRE-FP	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
CLE	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65
RGK	48BIP20-I DIN	-	PAIR160	-	ADF2	PRIR160	-
MOK-V2	48BIP20-I DIN	48BL	PAIR160	43IL	ADF2	PRIR160	65

For more details, please see the socket datasheets.



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

Chauvin Arnoux Energy 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.

Chauvin Arnoux Energy 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.

Chauvin Arnoux Energy, 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

Chauvin Arnoux Energy'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, Chauvin Arnoux Energy 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

Manumasure, a company in the Chauvin Arnoux Group, provides after-sales service for the instruments from the Group's brands, with a particular focus on Chauvin Arnoux Energy products. Manumasure'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.

CHAUVIN ARNOUX ENERGY, A CERTIFIED TRAINING ORGANIZATION SINCE 1993 - CERTIFICATION NO. 11.92.16273.92

WE ARE IN THE BEST POSITION TO TRAIN YOU

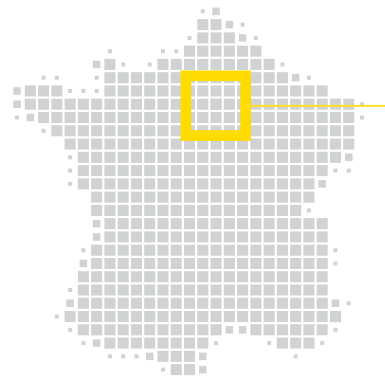


As a manufacturer, we constantly innovate, developing new technologies which we fully master. This know-how guarantees that we possess thorough knowledge of the environments in which our solutions are installed.

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 site in Asnières-sur-Seine

- 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

ABBREVIATIONS

AC OR ac	alternating current	MM	millimeter
CL	class	MS	millisecond
CT	current transformer	MV	medium voltage
DC OR dc	direct current	NC	“normally closed (“break” relay contact)”
E	energy	NO	“normally open (“make” relay contact)”
EACT	active energy	P	active power (W, kW, MW)
EAPP	apparent energy	PC	personal computer
EREACT	reactive energy	PF	power factor
FS	full scale	PID	proportional integral derivative
g	acceleration of gravity (9.81 m/s ²)	PPM	parts per million diameter (in mm)
GB	gigabyte	PR	protection rating (often expressed as IP)
HV	high-voltage	Q	reactive power
I	current (A, kA)	R	reading accuracy (in %)
I/O	input/output	RMS	root mean square
IEC	International Electrotechnical Commission	S	apparent power (in VA, kVA, MVA...)
In	nominal or rated current	s	second
IP	protection level	STN	switched telephone network
IR	infrared	TC	thermocouple
K	Kelvin temperature gradient	THD	total harmonic distortion
kB	kilobyte	TRMS	True RMS
LCD	liquid crystal display	U	phase-phase voltage
LED	light-emitting diode	Un	nominal or rated voltage
LV	low voltage	V	phase-neutral voltage
MB	megabyte	VT (OR PT)	voltage or potential transformer
MIN	minute		

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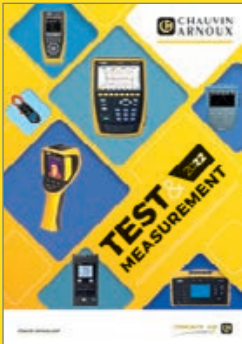
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