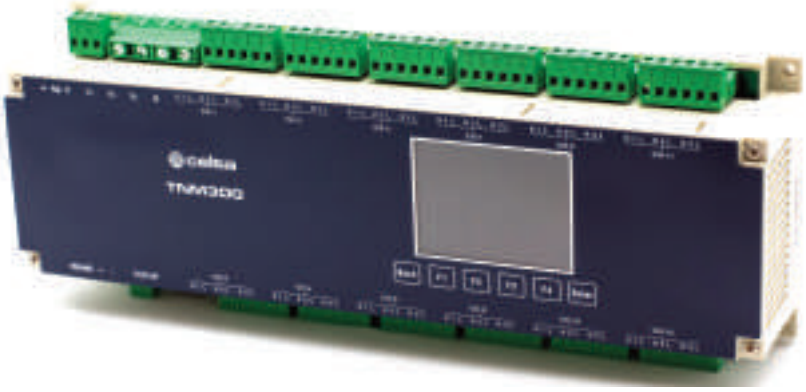

01 Universal Measuring Instruments

UNIVERSAL MEASURING INSTRUMENTS

Universal measuring instruments are applied for measuring, recording and monitoring of electrical values in low and middle voltage networks.

The measurement is rated for 1 and 3 phase systems with or without neutral. These instruments are featuring high accuracy, compact design, and measuring of harmonic currents / voltages for all phases.

Universal measuring instruments replace up to 15 other devices, such as ammeters, voltmeters, voltmeter-switches, power meters (kW, kVA, kvar und cos phi), active / reactive power counters, harmonic analysers, measuring converters, hour counters, etc.

Therefore the costs for the planning, installation, wiring and storage can be significantly reduced in comparison to analogue measuring instruments.

Universal Measuring Instruments

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TNM 96 VAF-O - Multimeter

- True RMS measurement
- On site Programmable
- Limit Switch output
- Low Back Depth
- 3 Line ultra bright LED Display
- Run hours / On hour indication

TNM96 VAF-O measures important electrical parameters in 3 phase 4 Wire, 3 phase 3 Wire and 1 phase Network and replaces the multiple analog panel meters. It measures electrical parameters like AC Voltage, AC Current, Frequency and and many more. The instrument also has an optional limit switch.

Produt Features

True RMS measurement

Measures distorted waveform up to 15th Harmonic.

Onsite programmable

- Onsite Programable System Configuration 3PH4W / 3PH3W and Single phase.
- Onsite Programable CT ratios and PT ratios

Limit Switch (Optional)

Potential free, very fast acting relay contact configurable as limit (alarm) switch. The instrument will trip the relay if the programmed parameter exceeds the programmed Trip Limits.

3 line 3 digits Ultra Bright LED display

Simultaneous display of 3 different parameters.

Run Hour, ON Hour, Number of Interruptions

Run Hour records the number of hours load is connected. ON Hour is the period for which the auxiliary supply is ON. Number of Interruptions indicates the number of times the auxiliary supply was interrupted.

RPM Measurement

The instrument display rotation per minutes for generator applications. Number of poles can be set on site depending upon application requirement.

Storage of Parameters possible

The instrument stores minimum and maximum values for System Voltage, System Current, Run Hour, ON Hour and number of Interrupts. Every 60 sec stored values are updated.

Low Back Depth

The instrument has very low back depth (behind the panel) of less than 55 mm.

Parameter Screen recall

In case of power failure, the instrument memorizes the last displayed screen.

Onsite selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode locally via front panel keys by entering into Programming mode.

Enclosure Protection for dust and water

Conforms to IP 54 (front face) as per IEC60529.

Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2010.

EMC Compatibility

Compliance to International standard IEC 61326.

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Technical Specifications

Input Voltage	
Nominal input voltage (AC RMS)	100 VL-L - 500 VL-L (57.7 VL-N - 290 VL-N)
System PT primary values	100 VLL to 799 kVLL programmable on site.
System PT secondary values	100 VLL to 500 VLL programmable on site.
Max continuous input voltage	120% of Nominal value
Input Current	
Nominal input current	1A / 5A AC RMS
System CT primary values	From 1A up to 799 kA programmable on site.
System CT secondary values	1A / 5A Programmable at site.
Max continuous input current	120% of Nominal value
Auxiliary supply	
External Auxiliary	40 V – 300V AC-DC (± 5 %) or 20 V – 40V AC / 20 V – 60V DC
Aux supply frequency	45 to 65 Hz range
VA Burden	
Nominal input voltage burden	< 0.3 VA approx. per phase
Nominal input current burden	< 0.2 VA approx. per phase
Auxiliary Supply burden	< 4 VA approx
Operating Measuring Ranges	
Current	5... 120% of Nominal value
Voltage	10... 120% of Nominal value
Frequency	45 - 65 Hz
Reference conditions for Accuracy	
Reference Temperature	23°C +/- 2°C
Input Frequency	50/60 Hz ±2%
Current	10... 100% of Nominal value
Voltage	20... 100% of Nominal value
Auxiliary Supply Voltage	Nominal Value ±1%
Auxiliary Supply Frequency	Nominal Value ±1%
Accuracy	
Voltage	±1.0% of Nominal Value
Current	±1.0% of Nominal Value
Frequency	±0.5% of Mid Frequency
Overload withstand	
Voltage	2 x Nominal value for 1 second, repeated 10 times at 10 second intervals
Current	20x Nominal value for 1 second, repeated 5 times at 5 min intervals
Influence of variations	
Temperature coefficient	0.05%/°C
Applicable standards	
EMC	IEC 61326
Immunity	IEC 61000-4-3. 10V/m min – Level 3 industrial Low level
Safety	IEC 61010-1-2010 , Permanently connected use
IP for water and dust	IEC60529
Pollution degree	2
Installation category	III
High Voltage Test	
3510V AC r.m.s,	for 1 minute between Enclosure Vs Power supply + All measuring input Power supply Vs All measuring input
2210V AC r.m.s,	for 1 minute between Input Voltage Vs Input Current Input Current Vs Input Current
Display update rate	
Response time to step up	1 sec approx.
Environmental	
Operating temperature	-10 to +55°C
Storage temperature	-20 to +65°C
Relative humidity	0... 90% non condensing
Warm up time Minimum	3 minute
Shock	15g in 3 planes
Vibration	10... 150 ... 10 Hz, 0.15mm amplitude
Interfaces	
Relay(Optional)	240 VAC ,5 A. Configured as Limit Switch

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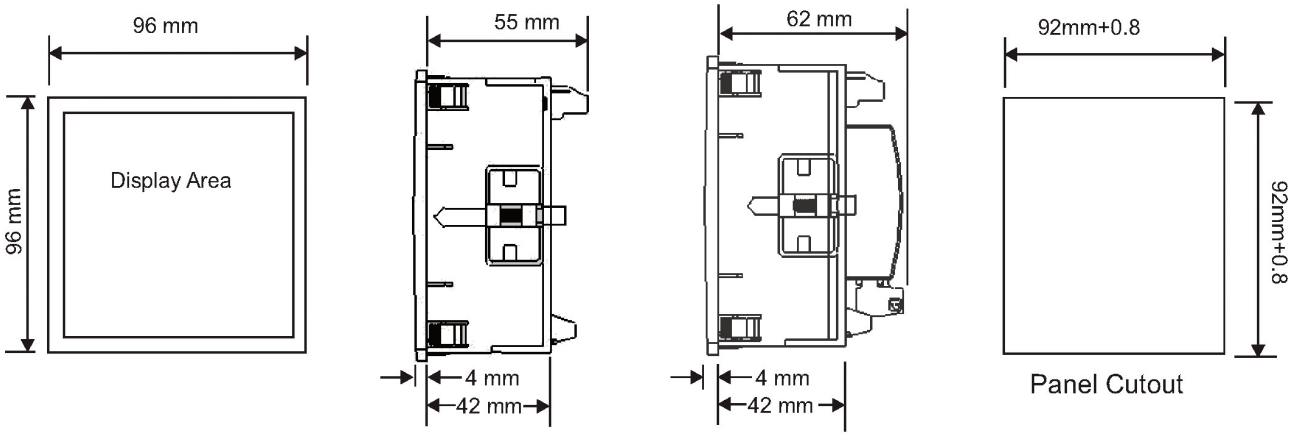
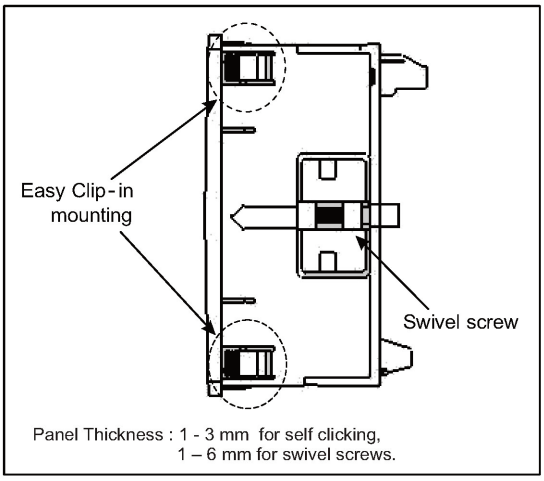
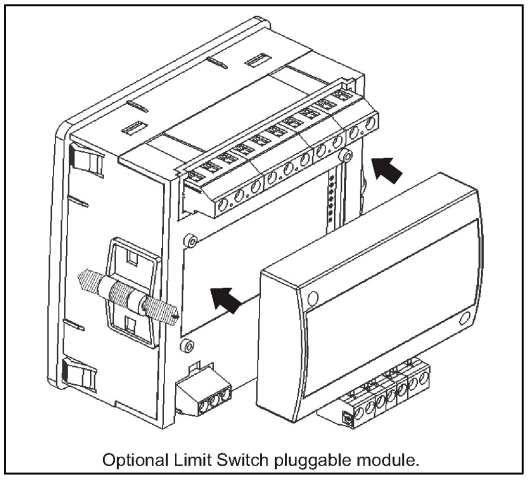
Dimensions:

With optional Limit switch.

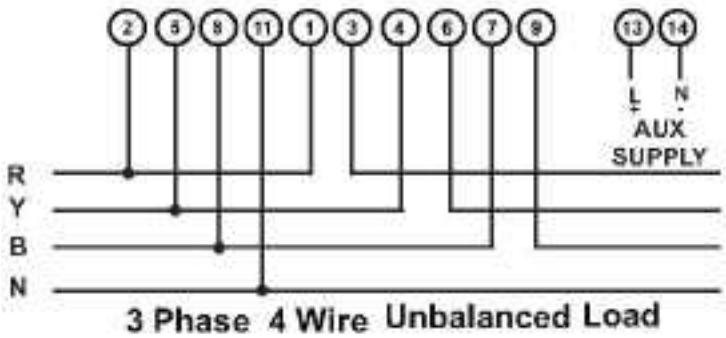


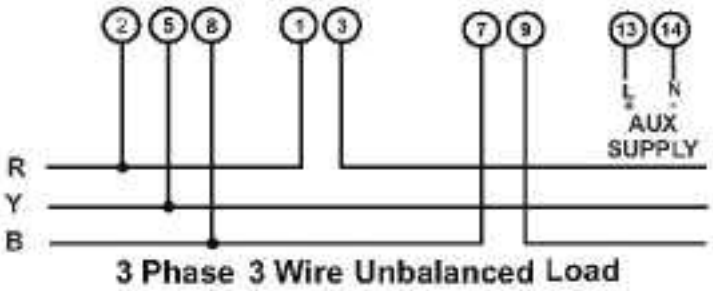
Installation:

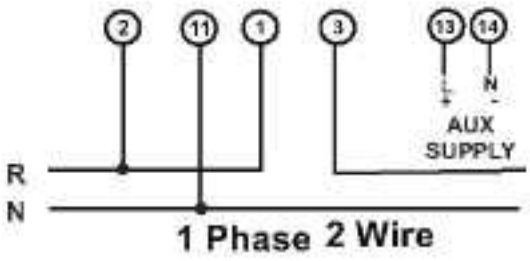




Electrical connections:







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UNIVERSAL MEASURING INSTRUMENTS

No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire	1 Phase 2 Wire
1.	System Voltage	●	●	-
2.	Voltage L1 - N	●	-	●
3.	Voltage L2 - N	●	-	-
4.	Voltage L3 - N	●	-	-
5.	Voltage L1 - L2	●	●	-
6.	Voltage L2 - L3	●	●	-
7.	Voltage L3 - L1	●	●	-
8.	System Current	●	●	-
9.	Current L1	●	●	●
10.	Current L2	●	●	-
11.	Current L3	●	●	-
12.	Frequency	●	●	●
13.	RPM	●	●	●
14.	Max (System Voltage/ System Current)	●	-	●
15.	Min (System Voltage/ System Current)	●	-	●
16.	Hour Run	●	-	●
17.	ON Hour	●	●	●
18.	Number of auxiliary interrupt	●	-	●

●: Available - : Not available

Ordering Information	Ordering Code
	TNM96 VAF-O
System Type (connection network)	
3 Phase (programmable as 4 Wire or 3 Wire on site)	-3
1 Phase	-1
Auxiliary supply voltage	
40 - 300 V AC DC + 5%	-HA
20 - 40 V AC / 20 - 60 V DC	-LA
Optional	
With Limit output	-L
Without Limit output	-NL

Order Code Example:

TNM96 VAF-O -3-HA-L

TNM96 VAF-O, 3Phase 3Wire, external higher aux (40V - 300V AC/DC ± 5%) and with Limit output

TNM 96P - Multimeter

- Fast and Easy Installation on panel with self clicking
- True RMS measurement
- Limit Switch (optional)
- 3 Line 4 Digits ultra bright LED Display (up to 9999)
- On site Programmable CT/PT Ratios
- User selectable CT Secondary 1A/5A
- User selectable PT Secondary from 100 VLL to 500 VLL
- User selectable 3ph3wire / 3ph4wire / single phase Network
- Two auxillary Power Supply available 40V – 300V AC/DC or 12V - 48V DC.
- Storage of MIN / MAX values
- Measurement and Display of RPM, Run hours, On hours, No. of interruption

The TNM96P measures important electrical parameters in 3 phase 4 Wire and 3 phase 3 Wire Network and replaces the multiple analog panel meters. It measures electrical parameters like AC Voltage, AC Current, Frequency, Active, Reactive, Apparent Power and many more.

Product Features

On site programmable PT/CT ratios

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site via front panel keys by entering into Programming mode.

User selectable CT Secondary 5A/1A

The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A using front panel keys.

User selectable PT Secondary

The secondary of external Potential Transformer (PT) can be programmed on site from 100VLL to 500VLL using front panel keys.

Onsite selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode using front panel keys.

Low back depth

The instrument has very low back depth (behind the panel) of less than 55 mm.

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

RPM Measurement

The instrument display Rotation per minutes for generator applications. Number of poles can be set on site depending upon application requirement.

Optional Limit switch (Relay)

The instrument will trip the relay if the programmed parameter exceeds the programmed Trip Limits.

3 line 4 digits LED display

Simultaneous display of 3 Parameters.

User selectable 3 phase 3Wire or 4Wire or Single phase Network

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire or single phase network using front panel keys.

In case of self powered TNM 96P only either 3 Phase 4 wire or single phase network are available.

Storage of parameters possible

The instrument stores minimum and maximum values for System Voltage, System Current, Run Hour, ON Hour and number of Interrupts.
Every 60 sec stored values are updated.

Four function keys

Using the four function key, it is possible to go desired parameter screen instantly.

Enclosure Protection for dust and water

Conforms to IP 50 (for front face) and IP 20 (for back) as per IEC60529.

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EMC Compatibility

Compliance to International standard IEC 61326.

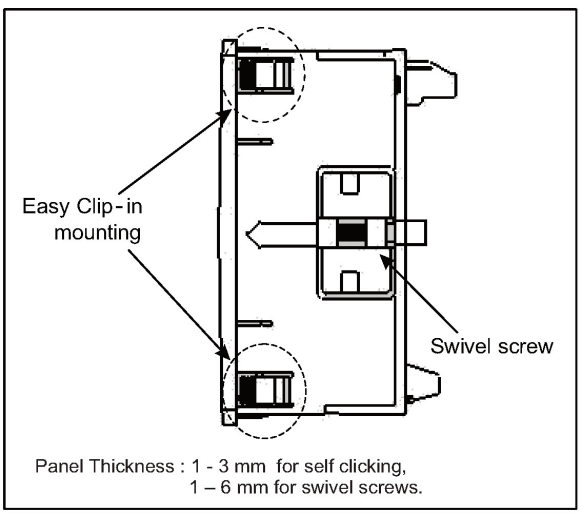
Interference Emission	IEC 61326-1 : 2005, Class A
Interference Immunity	IEC 61326-1 : 2005
Electrostatic discharge (ESD)	IEC 61000-4-2 – 4kV/8kV contact/air.
EM Field	IEC 61000-4-3 – 10 V/m (80 MHz to 1 GHz) – 3 V/m (1.4 GHz to 2 GHz) – 1 V/m (2 GHz to 2.7 GHz)
Burst	IEC 61000-4-4 – 2 kV (5/50 ns, 5 kHz)
Surge	IEC 61000-4-5 – 1 kVLL / 2 kVLN.
Conducted RF	IEC 61000-4-5 – 3 V (150 kHz to 80 MHz)
Rated Power Frequency magnetic Field	IEC 61000-4-8 – 30 A/m
Voltage dip	IEC 61000-4-11 – 0% during 1 cycle. – 40% during 10/12 cycles. – 70% during 25/30 cycles.
Short interruptions	IEC 61000-4-11 – 0% during 25/30 cycles. 25 cycles for 50 Hz test. 30 cycles for 50Hz test.

Technical Specifications

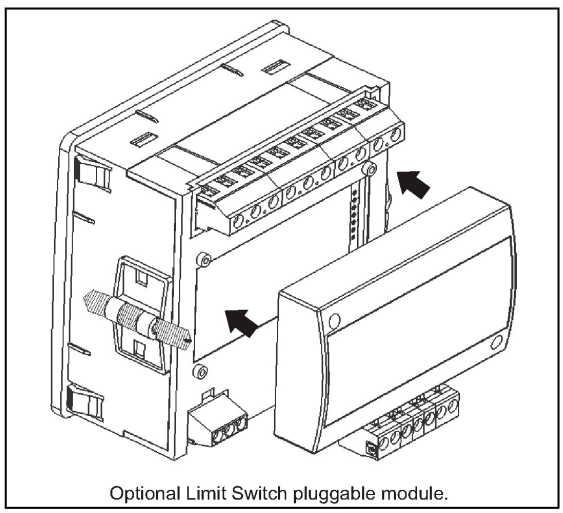
Input Voltage	
Nominal input voltage (AC RMS)	Phase –Neutral 290V L-N , Line-Line 500V L-L
Max continuous input voltage	150% of rated value
Nominal input voltage burden	< 0.3 VA approx. per phase (For external auxiliary meter)
System PT secondary values	100VLL to 500VLL programmable on site.
System PT primary values	100VLL to 692kVLL programmable on site.
Input Current	
Nominal input current	5A AC RMS
System CT secondary values	1A and 5A programmable on site.
System CT primary values	From 1A up to 9999A (for 1 or 5 Amp)
Max continuous input current	150% of rated value
Nominal input current burden	< 0.2 VA approx. per phase
Auxiliary supply	
External Auxiliary	40 V – 300V AC/DC (± 5 %)
DC Auxiliary supply	12V - 48V DC
Self powered	Input voltage range from 80 to 100% of the rated value (Self powered meter is available only in 3Phase 4 Wire and Single Phase network. Auxiliary input is derived from Phase 1 (R phase)
Frequency range	45 to 65 Hz
VA burden	Approx. 3 VA
DC burden	3V
Overload withstand	
Voltage	2 x rated value for 1 second, repeated 10 times at 10 second intervals
Current	20x rated value for 1 second, repeated 5 times at 5 min intervals
Operating Measuring Ranges	
Voltage Range With External Aux	10 ... 120% of rated value
Voltage Range With Self Power	80 ... 120% of rated value
Current Range	10 ... 120% of rated value
Frequency	45... 65 Hz
Power Factor	0.5 Lead ... 1 ... 0.5 Lead
Reference conditions for Accuracy	
Reference temperature	23°C +/- 2°C
Input waveform	Sinusoidal (distortion factor 0.005)
Input frequency	50 or 60 Hz ±2%
Auxiliary supply voltage	Rated Value ±1%
Auxiliary supply frequency	Rated Value ±1%
Voltage Range	20 ... 100% of nominal value
Current Range	10 ... 100% of nominal value
Power	Cos phi = 1 for active power / Sin phi = 1 for reactive power 10... 100% of nominal current and 20... 100% of nominal voltage
Power Factor / Phase Angle	40... 100% of nominal current and 20... 100% of nominal voltage

Accuracy		
Voltage		± 1.0 % of nominal value
Current		± 1.0 % of nominal value
Frequency		0.5% of mid frequency
Active power		± 1.0 % of nominal value
Re-active power		± 1.0 % of nominal value
Apparent power		± 1.0 % of nominal value
Power factor		2.0% of Unity
Phase angle		2.0% of range
Measurment error is normally much less than error specified above. Variation due to influence quantity is less tha twice the error allowed for reference condition.		
Limit switch (relay)		
Switchin voltage and current for relay		240V DC, 5A (1NO + 1NC)
Influence of Variations		
Temperature coefficient (for rated value range of use (0...50°C)		0.025%/°C for Voltage 0.05%/°C for Current
Display update rate		
Response time to step input		1 sec approx.
Applicable Standards		
EMC		IEC 61326-1: 2005
Safety		IEC 61010-1-2001 , Permanently connected use
IP for water and dust		IEC60529
Pollution degree		2
Installation category		III
High Voltage (for 1 minute)	Test 3510V AC r.m.s	Enclosure Vs Power supply + All measuring input Power supply Vs All measuring input
	2210V AC r.m.s,	Input Voltage Vs Input Current Input Current Vs Input Current
Environmental		
Operating temperature		0 +50°C
Storage temperature		-25 to +70°C
Relative humidity		0... 90% non condensing
Warm up time		Minimum 3 minute
Shock		15g in 3 planes
Vibration		10... 55 Hz, 0.15mm amplitude
Enclosure:		
Front		IP50
Back		IP20
Dimensions and Weights:		
Bezel size		96mm x 96mm DIN 43 718
Panel cut-out		92 +0.8mm x 92 +0.8mm
Overall depth		55mm
Panel thickness		1 - 3mm for self clicking, 1 - 6mm for swivel screws
Weight		320gr. approx.

Installation:



Panel Thickness : 1 - 3 mm for self clicking,
1 – 6 mm for swivel screws.


Optional Limit Switch pluggable module.

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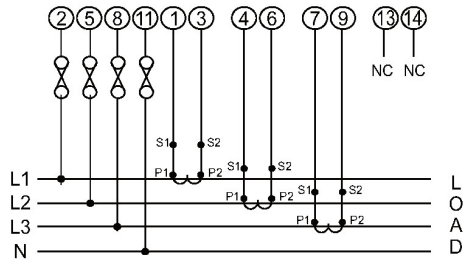
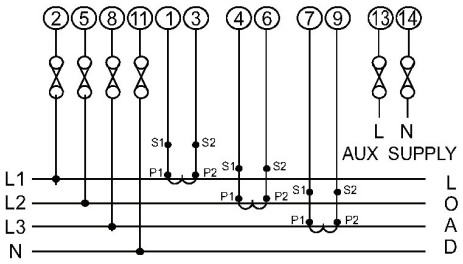
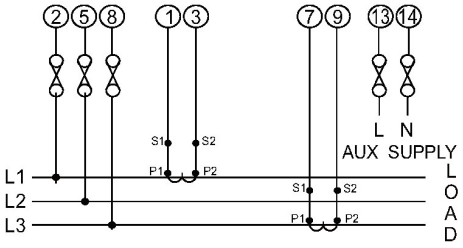
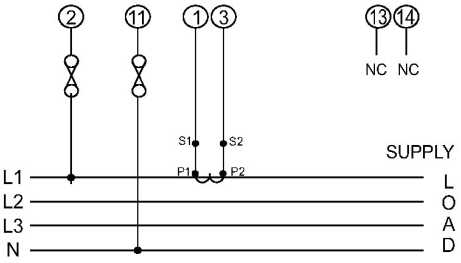
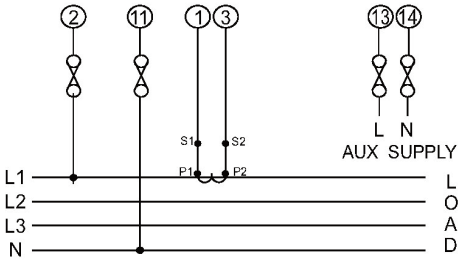
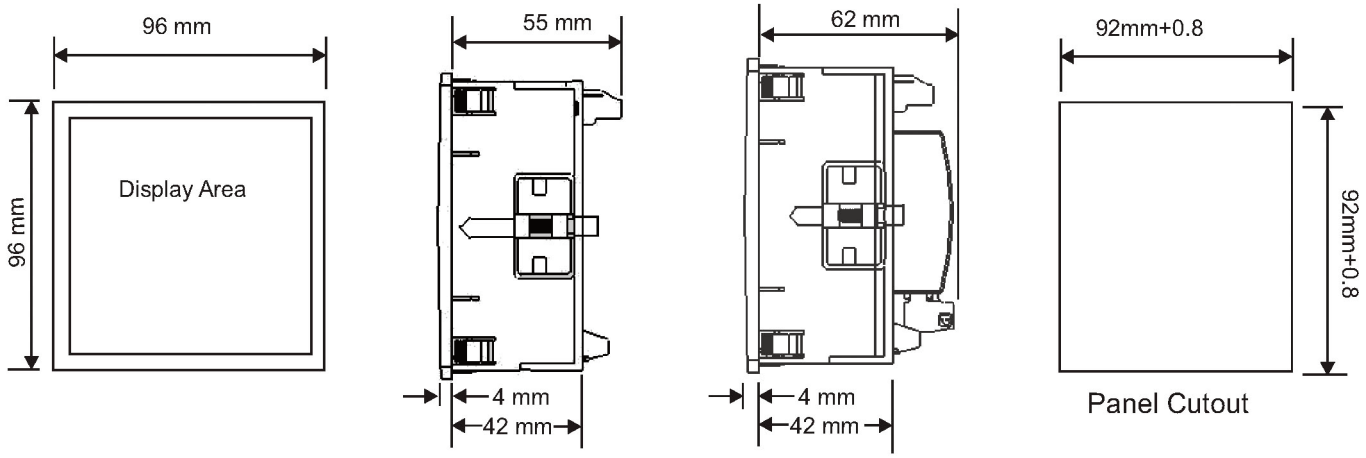
Electrical connections:

	Self Powered Aux	External Powered Aux
3 Phase 4 Wire Unbalanced Load		
3 Phase 3 Wire Unbalanced Load	Not Applicable	
1 Phase 2 Wire		

Dimensions:

With optional Limit switch.



Parameter measurement and display:

No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire	1 Phase 2 Wire
1.	System Voltage	●	●	●
2.	System Current	●	●	●
3.	Voltage L1 - N	●	-	●
4.	Voltage L2 - N	●	-	-
5.	Voltage L3 - N	●	-	-
6.	Voltage L1 - L2	●	●	-
7.	Voltage L2 - L3	●	●	-
8.	Voltage L3 - L1	●	●	-
9.	Current L1	●	●	●
10.	Current L2	●	●	-
11.	Current L3	●	●	-
12.	Frequency	●	●	●
13.	System Active Power (kW)	●	●	●
14.	Active Power L1	●	-	●
15.	Active Power L2	●	-	-
16.	Active Power L3	●	-	-
17.	System Re-active Power (kVar)	●	●	●
18.	Re-active Power L1	●	-	●
19.	Re-active Power L2	●	-	-
20.	Re-active Power L3	●	-	-
21.	System Apparent Power (kVA)	●	●	●
22.	Apparent Power L1	●	-	●
23.	Apparent Power L2	●	-	-
24.	Apparent Power L3	●	-	-
25.	System Phase Angle	●	●	●
26.	System Power Factor	●	●	●
27.	Power Factor L1	●	-	●
28.	Power Factor L2	●	-	-
29.	Power Factor L3	●	-	-
30.	Phase Angle L1	●	-	●
31.	Phase Angle L2	●	-	-
32.	Phase Angle L3	●	-	-
33.	RPM	●	●	●
34.	Max (System Voltage/ System Current)	●	●	●
35.	Min (System Voltage/ System Current)	●	●	●
36.	Hour Run	●	●	●
37.	ON Hour	●	●	●
38.	Number of auxiliary interrupt	●	●	●

●: available - : Not available

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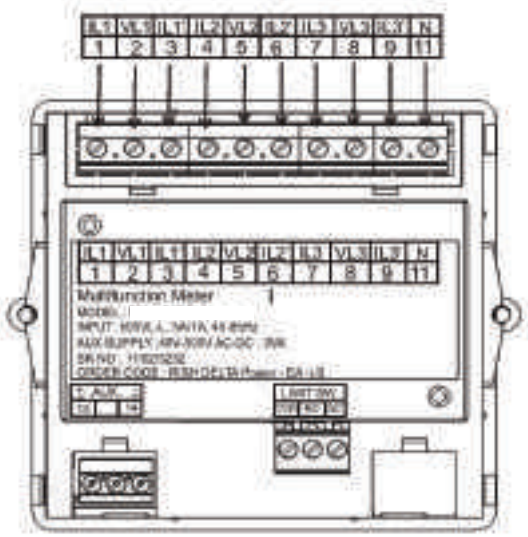
Rear connection:



Ordering Information	Ordering Code
	TNM96P
Auxiliary Supply	
Self Aux*	- SA
Auxiliary supply voltage	
40 V – 300V AC/DC	-EA
12 V – 48V DC	-DC
Optional	
With Limit switch	-LS
Without Limit switch	-Z

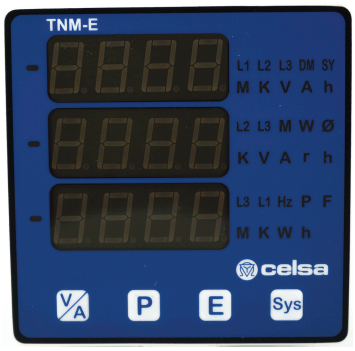
Order Code Example:

TNM96P– EA - LS

TNM96P, external aux (40V – 300V AC/DC), with limit switch.

*NOTE: Self Auxiliary meter is available only in 3Phase 4 Wire and Single Phase network.
Auxiliary input is derived from Phase 1 (R phase).
In case of external auxiliary meter all three networks are available (3Phase 4Wire / 3Phase 3Wire / Single Phase)

TNM 96E - Multimeter



- Fast and Easy Installation on panel with self clicking.
- True RMS measurement.
- MODBUS (RS485) Communication (optional).
- Pulse / Limit Switch output (optional).
- 3 Line 4 Digits ultra bright LED Display (up to 9999).
- On site Programmable CT/PT Ratios.
- User selectable CT Secondary 1A/5A.
- User selectable PT Secondary from 100 VLL to 500 VLL.
- User selectable 3ph3wire / 3ph4wire / single phase Network.
- Programmable Energy format and Energy rollover count
- Wide auxillary Power Supply which can accept any input between 40V – 300V AC/DC or 12V – 48V DC.
- Storage of MIN / MAX values.
- Measurement and Display of RPM, Run hours, On hours, No. of interruption.

TNM96E measures important electrical parameters in 3 phase 4 Wire and 3 phase 3 Wire Network and replaces the multiple analog panel meters. It measures electrical parameters like AC Voltage,AC Current, Frequency, Active, Reactive, Apparent Power, Import and Export Energy and many more.

Products Features

On site programmable PT/CT ratios

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT)on site via front panel keys by entering into Programming mode.

User selectable CT Secondary 5A/1A

The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A using front panel keys.

User selectable PT Secondary

The secondary of external Potential Transformer (PT) can be programmed on site from 100VLL to 500VLL using front panel keys.User can set the display in auto scrolling mode or fixed screen mode using front panel keys.

Low back depth

The instrument has very low back depth (behind the panel) of less than 55 mm(Without output option).

Four function keys

Using the four function key, it is possible to go desired parameter screen instantly.

Demand Measurement

Measures and Displays Current Demand, kVA Demand, kW Import Demand, kW Export Demand. Any of the parameters can be assigned to optional Limit switch.

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

Energy Measurement (Import and Export)

Active Energy (kWh), Reactive Energy (kVArh), Apparent Energy (VAh). Any of the parameters can be assigned to optional Pulse output.

Programmable Energy format and Energy rollover count

Customer can assign the format for energy display on MODBUS (RS485) in terms of W, kW or MW. Additional to this, customer can also set a rollover count from 7 to 14 digits depending on the energy format, after which the energy will roll back to zero.

Optional Pulse Output / Limit switch (Relay output)

The instrument can be programmed as Pulse output or Limit switch.

- **Pulse Output:** The optional pulse output is a potential free,very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.
- **Limit Switch:** The instrument will trip the relay if the programmed parameter exceeds the programmed Trip Limits.

Optional MODBUS (RS485) Output

The optional Modbus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).

Configuration of Instrument via MODBUS

The instrumentsetting can be configured locally via front panel keys by entering into the programming mode or remotely via MODBUS (RS485).

Note: The MODBUS communication parameters can only be set locally via front panel keys in programming mode.

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Storage of parameters possible

The instrument stores minimum and maximum values for System Voltage, System Current, Run Hour, ON Hour and number of Interrupts. Every 60 sec stored values are updated.

3 line 4 digits LED display

Simultaneous display of 3 Parameters.

RPM Measurement

The instrument display Rotation per minutes for generator applications. Number of poles can be set on site depending upon application requirement.

Energy Count Storage

In case of power failure, the instrument memorizes the last energy count. Every 1 min, the instrument updates the energy counter in the non-volatile memory.

User selectable 3 phase 3Wire or 4Wire or Single phase Network

User can program on site the network connection as either 3Phase 3 Wire or 4 Wire or single phase network using front panel keys.

In case of self powered TNM96-E only either 3 Phase 4 wire or single phase network are available.

Onsite selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode using front panel keys.

Enclosure Protection for dust and water

Conforms to IP 50 (for front face) and IP 20 (for back) as per IEC60529.

EMC Compatibility

Compliance to International standard IEC 61326.

Interference Emission :	IEC 61326-1 : 2012
Interference Immunity :	IEC 61326-1 : 2012, Table 2
Electrostatic discharge	
contact/air.(ESD):	IEC 61000-4-2 – 4kV/8kV
EM Field :	IEC 61000-4-3 – 10 V/m (80 MHz to 1 Ghz)
	– 3 V/m (1.4 Ghz to 2 GHz)
	– 1 V/m (2 GHz to 2.7 GHz)
Burst :	IEC 61000-4-4 – 2 kV (5/50 ns, 5 kHz)
Surge :	IEC 61000-4-5 – 1 kVLL / 2 kVLN.
Conducted RF :	IEC 61000-4-5 – 3 V (150 kHz to 80 MHZ
Rated Power Frequency	
magnetic Field :	IEC 61000-4-8 – 30 A/m
Voltage dip :	IEC 61000-4-11
	– 0% during 1 cycle.
	– 40% during 10/12 cycles.
	– 70% during 25/30 cycles.
Short interruptions cycles :	IEC 61000-4-11
	– 0% during 25/30 cycles.
	25 cycles for 50 Hz test.
	30 cycles for 60 Hz test.

Technical Specifications

Input Voltage	
Nominal input voltage (AC RMS)	Phase –Neutral 290V L-N , Line-Line 500V L-L
Max continuous input voltage	120% of rated value
Nominal input voltage burden	< 0.3 VA approx. per phase (For external auxiliary meter)
System PT secondary values	100VLL to 500VLL programmable on site.
System PT primary values	100VLL to 692kVLL programmable on site.
Input Current	
Nominal input current	5A / 1A AC RMS
System CT secondary values	1A and 5A programmable on site.
System CT primary values	From 1A up to 9999A (for 1 or 5 Amp)
Max continuous input current	120% of rated value
Nominal input current burden	< 0.2 VA approx. per phase
Auxiliary supply	
External Aux	40 V – 300V AC-DC (± 5 %)
DC Auxiliary Supply	12V – 48V DC
Self powered	input voltage range from 80% to 100% of Rated value. (Self powered meter is available only in 3Phase 4 Wire and Single Phase network.) Auxiliary input is derived from Phase 1 (R phase)
Frequency range	45 to 65 Hz
VA burden	< 4 VA Approx.
Overload withstand	
Voltage	2 x rated value for 1 second, repeated 10 times at 10 second intervals
Operating measuring ranges	
Voltage Range With External Aux	10... 120% of rated value
Voltage Range With Self Power	80... 120% of rated value
Current Range	10 ... 120% of rated value
Frequency	45...65 Hz.
Power Factor	0.5 Lead ... 1 ... 0.5 Lag.

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Reference conditions for accuracy	
Reference temperature	23°C +/- 2°C
Input waveform	Sinusoidal (distortion factor 0.005)
Input frequency	50 or 60 Hz ±2%
Auxiliary supply voltage	Rated Value ±1%
Auxiliary supply frequency	Rated Value ±1%
Voltage Range	20... 100% of Nominal Value.
Current Range	10... 100% of Nominal Value.
Power	Cos phi / sin phi = 1 for Active / Reactive Power and Energy. 10... 100% of Nominal Current and 20... 100% of Nominal Voltage. Power Factor / Phase Angle 40... 100% of Nominal Current and 20... 100% of Nominal Voltage.
Accuracy	
Voltage	±1.0% of Nominal Value.
Current	±1.0% of Nominal Value.
Frequency	0.5% of mid frequency
Active Power	±1% of Nominal Value.
Re-Active Power	±1% of Nominal Value.
Apparent Power	±1% of Nominal Value.
Active Energy	± 1 %
Reactive Energy	± 1 %
Apparent Energy	± 1 %
Power Factor	2 % of Unity
Phase angle	2 % of range
Measurement error is normally much less than error specified above. Variation due to influence quantity is less than twice the error allowed for reference condition.	
Limit Switch (Relay)	
Switching Voltage and Current for Relay	240 VDC ,5 A (1NO+1NC)
Influence of variations	
Temperature coefficient (for rated value range of use (0...50°C)	0.025%/°C for Voltage 0.05%/°C for Current
Display update rate	
Response time	to step input 1 sec approx.
Applicable Standards	
EMC Immunity	IEC 61326-1: 2012, Table 2
Safety	IEC 61010-1-2001 , Permanently connected use
IP for water and dust	IEC60529
Safety	
Pollution degree	2
Installation category	III
High Voltage Test	4.7 kV DC, 50Hz for 1 minute between Aux. and measuring inputs
Environmental	
Operating temperature	0 to +50°C
Storage temperature	-25°C to +70°C
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	15g in 3 planes
Vibration	10... 55 Hz, 0.15mm amplitude
Enclosure	
Front	IP 50.
Back	IP 20.
Dimensions and Weights	
Bezel size	96 mm x 96 mm DIN 43 718.
Panel cut-out	92 +0.8 mm x 92 + 0.8 mm.
Overall depth	55 mm.(without output option)
Panel Thickness	1 - 3 mm for self clicking, 1 – 6 mm for swivel screws.
Weight	320 gm. Approx.(with output option)

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Pulsed Output Option

Energy (can be programmed for different energy parameters simultaneously):

Relay contact	(1NO+1NC)
Switching Voltage and current for Relay	240 VDC ,5 A

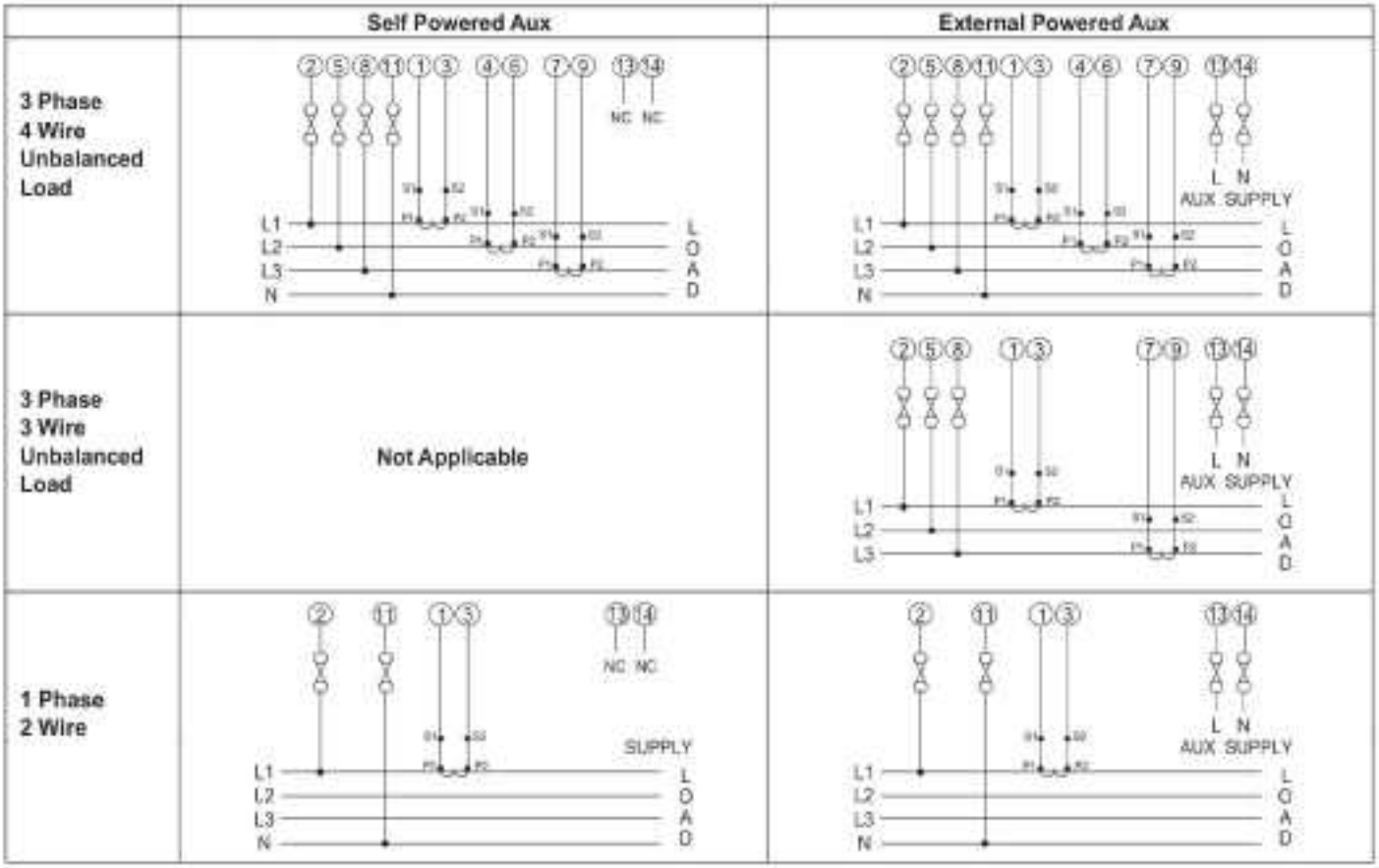
Default pulse rate divisor 1 per Wh (up to 3600W) , 1 per kWh (up to 3600kWh) , 1 per MWh (above 3600kW) ,

Other Pulse rate divisors (applicable only when Energy on RS485 is in W)

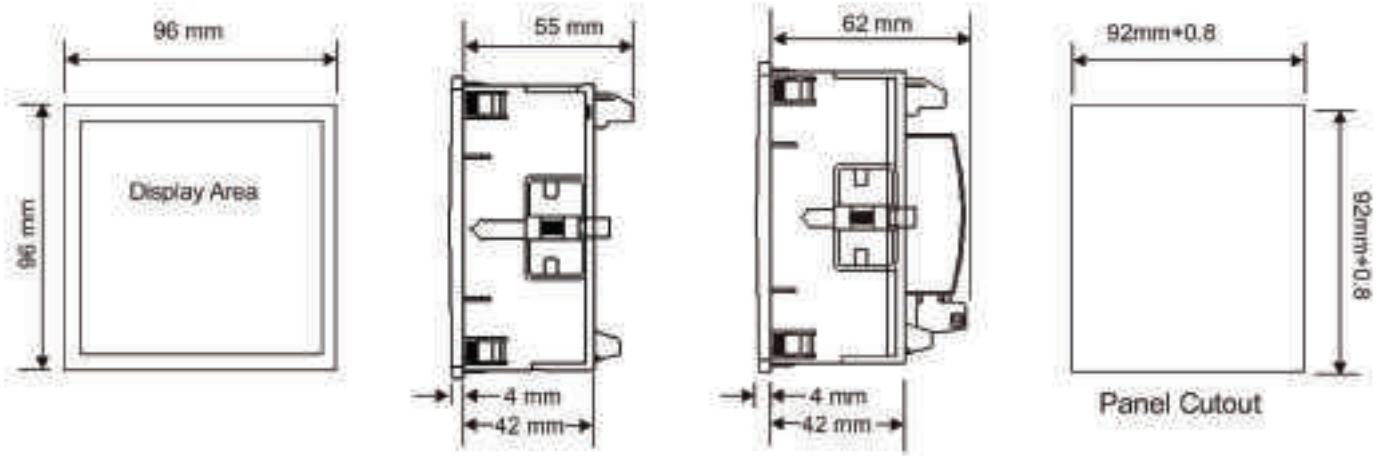
10 1 per 10 Wh (up to 3600W) ,	1 per 10 kWh (up to 3600kWh) ,	1 per 10 MWh (above 3600kW) ,
100 1 per 100 Wh (up to 3600W),	1 per 100 kWh (up to 3600kWh) ,	1 per 100 MWh (above 3600kW) ,
1000 1 per 1000 Wh (up to 3600W) ,	1 per 1000 kWh (up to 3600kWh) ,	1 per 1000 MWh (above 3600kW) ,

Pulse Duration : 60 msec, 100 msec, 200 msec. Above options are also applicable to Apparent and Reactive Energy.

Electrical connections:



Dimensions:



UNIVERSAL MEASURING INSTRUMENTS

No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire	1 Phase 2 Wire
1.	System Voltage	●	●	●
2.	System Current	●	●	●
3.	Voltage L1 - N (Phase voltage for single phase)	●	-	●
4.	Voltage L2 - N	●	-	-
5.	Voltage L3 - N	●	-	-
6.	Voltage L1 - L2	●	●	-
7.	Voltage L2 - L3	●	●	-
8.	Voltage L3 - L1	●	●	-
9.	Current L1 (Phase voltage for single phase)	●	●	●
10.	Current L2	●	●	-
11.	Current L3	●	●	-
12.	Frequency	●	●	●
13.	System Active Power (kW)	●	●	●
14.	Active Power L1 (phase power for single phase)	●	-	●
15.	Active Power L2	●	-	-
16.	Active Power L3	●	-	-
17.	System Re-active Power (kVar)	●	●	●
18.	Re-active Power L1 (phase power for single phase)	●	-	●
19.	Re-active Power L2	●	-	-
20.	Re-active Power L3	●	-	-
21.	System Apparent Power (kVA)	●	●	●
22.	Apparent Power L1 (phase power for single phase)	●	-	●
23.	Apparent Power L2	●	-	-
24.	Apparent Power L3	●	-	-
25.	System Phase Angle	●	●	●
26.	System Power Factor	●	●	●
27.	Power Factor L1	●	-	●
28.	Power Factor L2	●	-	-
29.	Power Factor L3	●	-	-
30.	Phase Angle L1	●	-	●
31.	Phase Angle L2	●	-	-
32.	Phase Angle L3	●	-	-
33.	Active energy Import (kWh)	●	●	●
34.	Active energy Export (kWh)	●	●	●
35.	Reactive energy Import (kVArh)	●	●	●
36.	Reactive energy Export (kVArh)	●	●	●
37.	Apparent energy (kVAh)	●	●	●
38.	RPM	●	●	●
39.	Max (System Voltage/ System Current)	●	●	●
40.	Min (System Voltage/ System Current)	●	●	●
41.	Hour Run	●	●	●
42.	ON Hour	●	●	●
43.	Number of auxiliary interrupt	●	●	●
44.	Current Demand	●	●	●
45.	kVA Demand	●	●	●
46.	kW Demand Import	●	●	●
47.	kW Demand Export	●	●	●
48.	Max Current Demand	●	●	●
49.	Max kVA Demand	●	●	●
50.	Max kW Demand Import	●	●	●
51.	Max kW Demand Export	●	●	●

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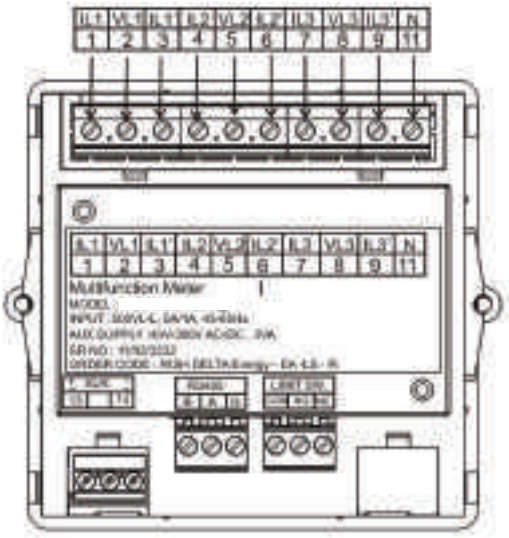
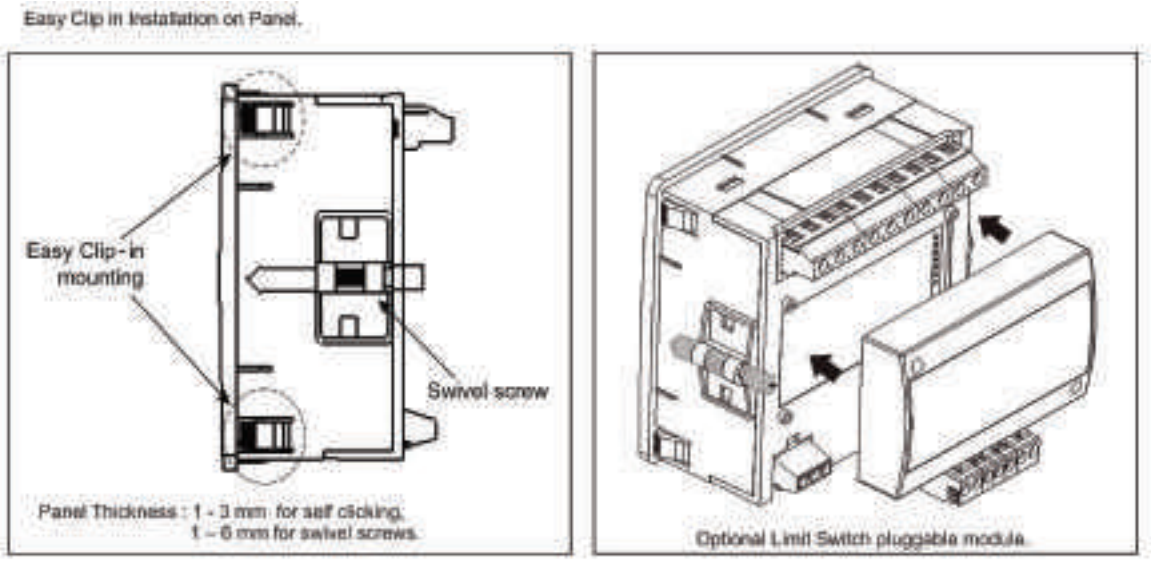
Rear connection:



Installation:



Ordering Information	Ordering Code
	TNM96E
Auxiliary Supply	
Self Aux*	- SA
External Aux	
40 V – 300V AC/DC	-EA
12 V – 48V DC	-DC
Optional	
With Pulse output (Limit switch)	-LS
Without Pulse output (Limit switch)	-Z
Optional	
Output MODBUS (RS485)	-R
Option not used: MODBUS	-Z

Order Code Example:

TNM96E-EA-LS-R

TNM96E, external aux (40V - 300V AC/DC), with limit switch and with MODBUS output.

* Note:
Self auxiliary meter is available only in 3Phase 4Wire and Single Phase network.
Auxiliary input is derived from 1 Phase (R phase).
In case of external auxiliary meter all three networks are available (3Phase 4Wire / 3Phase 3Wire / Single Phase)

TNM 3440

TNM3440 measures important electrical parameters and replaces the multiple analog panel meters. It measures electrical parameters like AC current, Voltage, frequency, active energy import and active energy export, Current Demand, kW Demand, kVA Demand and Max Current Demand, Max kW Demand and Max kVA Demand. The instrument has optional output as one pulse output or two pulse output for energy measurement.

Product Features

On site programmable PT/CT ratios:

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable CT Secondary 5A/1A

The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable PT Secondary

The secondary of external potential Transformer (PT) can be programmed on locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

User selectable 3 phase 3W or 4W

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Low back depth

The instrument has very low back depth (behind the panel) of less than 80 mm in spite of optional features like pulse output

Onsite selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Phase reversal indication

The instrument can detect wrong phase sequence or failure of one of the input voltages and displays “phase” error message.

Energy measurement (Import and Export):

Active energy (kWh), Reactive energy (kVArh), Apparent energy (kVAh) and Ampere Hour (kAh). Any of the parameters can be freely assigned to 2 optional pulse outputs.

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

High brightness 3 line 4 digits LED display

Simultaneous display of 3 Parameters

User selectable Low Current suppression (below 30 mA)

User can suppress the readings below 30 mA in the current measurement by onsite programming if required.

Min Max storage of parameters possible

The instrument stores minimum and maximum values for System Voltage and System Current. Every 40 sec minimum and maximum readings are updated.

Number of parameters measured: more than 46

The instrument measures more than 46 electrical parameters of 3 Phase network.

Parameter Screen recall

In case of power failure, the instrument memorizes the last displayed screen. The displayed screen will get memorized only if user keeps this screen for minimum 40 sec duration before power failure for fixed screen mode.

Total Harmonic Distortion (THD)

The instrument can measures per phase THD of voltage and THD of current.

Energy Count storage

In case of power failure, the instrument memorizes the last energy count.

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Programmable Energy format and Energy rollover count

Customer can assign the format for energy display on MODBUS (RS485) in terms of W, kW or MW. Additional to this, customer can also set a rollover count from 7 to 14 digits (for W), 7 to 12 digits (for kW) and 7 to 9 digits (for MW), after which the energy will roll back to zero. The above settings are applicable for all types of energy.

Hour Run, ON Hour, Number of Interruptions

Hour run records the number of hours load is connected. ON Hour is the period for which the auxiliary supply is ON. Number of Interruptions indicates the number of times the Auxiliary Supply was interrupted.

Optional MODBUS (RS485) Output

The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).

User Assignable Registers for MODBUS

Customer can assign MODBUS register address as per his need for faster response time.

Optional 2 Relay Output (Pulse output / Limit switch)

The instrument can be programmed as Pulse output or Limit Switch.

- **Pulse Output:** The optional pulse output is a potential free, very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.

- **Limit switch:** The instrument will trip the one or two relays if the programmed parameter exceeds the programmed High and Low Limits.

Configuration of the Instrument via MODBUS

The instrument settings can be configured locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Optional Analog Outputs (2 Outputs)

2 Analog outputs can be programmed from a list of input parameters.

Ethernet Interface (Modbus TCP/IP Protocol)

The optional Ethernet Interface output transmit all the measured parameters on Modbus TCP/IP. Also user can configure their instrument via Ethernet Interface.

Enclosure Protection for dust and water

conforms to IP 54 (front face) as per IEC60529

Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2001

EMC Compatibility

Compliance to International standard IEC 61326

Technical Specifications

Input Voltage		
Nominal input voltage (AC RMS)		Phase –Neutral 57.7 - 346 VL-N / Line-Line 100 - 600 VL-L
System PT primary values		100VLL to 692kVLL programmable on site.
System PT secondary values		100VLL to 600VLL programmable on site.
Max continuous input voltage		120% of rated value
Input Current		
Nominal input current		1A / 5A AC RMS.
System CT secondary values		1A and 5A programmable on site.
System CT primary values		From 1A up to 9999A (for 1 or 5 Amp)
Max continuous input current		120% of rated value
Auxiliary supply		
Auxiliary Supply		60 - 300 V AC DC
	or	65 - 300 V AC DC for Ethernet Option
	or	12 - 60 V AC DC
AC Auxiliary supply frequency range		45 to 66 Hz
VA Burden		
Nominal input voltage burden		< 0.35 VA approx. per phase
Nominal input current burden		< 0.3 VA approx. per phase
Auxiliary Supply burden		< 5 VA approx
	or	< 7 VA approx with 4-20mA analog output or Ethernet Option
Overload withstand		
Voltage		2 x rated value for 1 second, repeated 10 times at 10 second intervals
Current		20x for 1 second, repeated 5 times at 5 min
Operating measuring ranges		
Voltage		10... 120% of rated value
Current		5 ... 120% of rated value
Frequency		40...70 Hz
Power Factor		0.5 Lag ... 1... 0.8 Lead

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Reference conditions for accuracy	
Reference temperature	23°C +/- 2°C
Input waveform	Sinusoidal (distortion factor 0.005)
Input frequency	50 or 60 Hz ±2%
Auxiliary supply voltage	Rated Value ±1%
Auxiliary supply frequency	Rated Value ±1%
Voltage Range	50... 100% of Nominal Value. 60... 100% of Nominal Value for THD.
Current Range	10... 100% of Nominal Value. 20... 100% of Nominal Value for THD.
Power	Cos phi / sin phi = 1 for Active / Reactive Power and Energy. 10... 100% of Nominal Current and 50... 100% of Nominal Voltage.
Power Factor / Phase Angle	40... 100% of Nominal Current and 50... 100% of Nominal Voltage.

Accuracy

	Class 1.0 (Standard)	**Class 0.5 (on request)**	**Class 0.2 (on request)**
Voltage	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Current	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Frequency	± 0.15% of mid frequency	± 0.15% of mid frequency	± 0.15% of mid frequency
Active Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Re-Active Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.4% of Nominal value
Apparent Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Active energy (kWh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Re Active energy (kVArh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.5% of Nominal value
Apparent energy (kVAh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Accuracy of Analog Output	1 % of Output end value	1 % of Output end value	1 % of Output end value
Power Factor	±1% of Unity	±1% of Unity	±1.0% of Unity
Angle	±1% of range	±1% of range	±1% of range
Total Harmonic Distortion	±1%	±1%	±1%

Note:- Measurement error is normally much less than the error specified above. Variation due to influence quantity is less than twice the error allowed for reference condition

Influence of variations	
Temperature coefficient : (for rated value range of use (0...50°C))	0.025%/°C for Voltage (50... 120% of rated value) and 0.05%/°C for Current (10... 120% of rated value)
Display update rate	
Response time to step input	1 sec approx.
Applicable standards	
EMC	IEC 61326
Immunity	IEC 61000-4-3. 10V/m min – Level 3 industrial low level
Safety	IEC 61010-1-2001 , Permanently connected use
IP for water and dust	IEC60529
Pollution degree	2
Installation category	III
High Voltage Test	2.2 kV AC, 50Hz for 1 minute between all electrical circuits
Environmental	
Operating temperature	-10 to +55°C
Storage temperature	-20 to +65°C
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	15g in 3 planes
Vibration	10... 55 Hz, 0.15mm amplitude

Energy (can be programmed for different energy parameters simultaneously)

Relay contact		1 NO + 1 NC	
Switching Voltage and Current for Relay		240 VDC ,5 A	
Other Pulse rate divisors (applicable only when Energy on RS485 is in W)			
10	1 per 10 Wh (up to 3600W),	1 per 10kWh (up to 3600kW),	1 per 10MWh (above 3600 kW)
100	1 per 100Wh (up to 3600W),	1 per 100kWh (up to 3600kW),	1 per 100MWh (above 3600 kW)
1000	1 per 1000Wh (up to 3600W),	1 per 1000kWh (up to 3600kW),	1 per 1000MWh (above 3600 kW)
Pulse duration		60 ms, 100 ms or 200 ms	
Above options are also applicable to Apparent and reactive Energy.			

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Ampere hour

Default pulse rate divisoe		CT secondary = 1A Max pulse rate 3600 pulses/Ah *
		CT secondary = 5A Max pulse rate 720 pulses/Ah
Other Pulse rate divisors (applicable only when Energy on RS485 is in W):		
	10	CT secondary = 1A Max pulse rate 3600 pulses/10Ah *
		CT secondary = 5A Max pulse rate 720 pulses/10Ah
	100	CT secondary = 1A Max pulse rate 3600 pulses/100Ah *
		CT secondary = 5A Max pulse rate 720 pulses/100Ah
	1000	CT secondary = 1A Max pulse rate 3600 pulses/1000Ah *
		CT secondary = 5A Max pulse rate 720 pulses/1000Ah
Pulse duration		60 ms, 100 ms or 200 ms

$$\text{*No. of Pulses} = \frac{\text{Maximum Pulses}}{\text{CT Ratio}}$$

Where, CT Ratio = (CT primary/ CT Secondary)

Limit output option

Limit can be assigned to different measured parameters. It can be configured in one of the four modes given below.

1) Hi alarm and Energized Relay
2) Hi alarm and De-energized Relay
3) Lo alarm and Energized Relay
4) Lo alarm and De-energized Relay

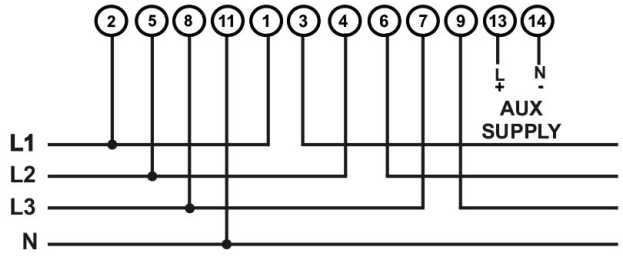
With user selectable Trip point, Hysteresis, Energizing delay and De-energizing delay.

No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire
1.	System Voltage	●	●
2.	System Current	●	●
3.	Voltage L1 - N	●	-
4.	Voltage L2 - N	●	-
5.	Voltage L3 - N	●	-
6.	Voltage L1 - L2	●	●
7.	Voltage L2 - L3	●	●
8.	Voltage L3 - L1	●	●
9.	Current L1	●	●
10.	Current L2	●	●
11.	Current L3	●	●
12.	Neutral current	●	-
13.	Frequency	●	●
14.	System Active Power (kW)	●	●
15.	Active Power L1(kW)	●	-
16.	Active Power L2 (kW)	●	-
17.	Active Power L3 (kW)	●	-
18.	System Re-active Power (kVar)	●	●
19.	Re-active Power L1(kVar)	●	-
20.	Re-active Power L2 (kVar)	●	-
21.	Re-active Power L3 (kVar)	●	-
22.	System Apparent Power (kVA)	●	●
23.	Apparent Power L1(kVA)	●	-
24.	Apparent Power L2 (kVA)	●	-
25.	Apparent Power L3 (kVA)	●	-
26.	System Power Factor	●	●
27.	Power Factor L1	●	-
28.	Power Factor L2	●	-
29.	Power Factor L3	●	-
30.	Phase Angle L1	●	-
31.	Phase Angle L2	●	-
32.	Phase Angle L3	●	-

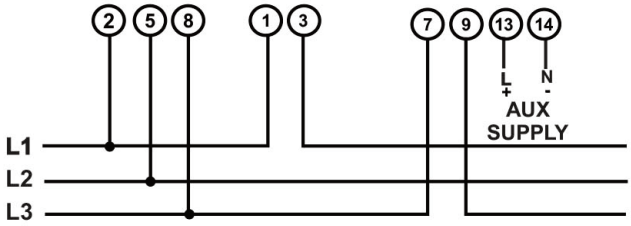
No.	Parameter	3 Phase 4 Wire	3 Phase 3 Wire
33.	Import kWh (8 digit resolution)	●	●
34.	Export kWh (8 digit resolution)	●	●
35.	Import kVArh (8 digit resolution)	●	●
36.	Export kVArh (8 digit resolution)	●	●
37.	KVAh (8 digit resolution)	●	●
38.	KAh (8 digit resolution)	●	●
39.	Current demand	●	●
40.	KVA demand	●	●
41.	KW Import demand	●	●
42.	KW Export demand	●	●
43.	Max Current demand	●	●
44.	Max KVA demand	●	●
45.	Max KW Import demand	●	●
46.	Max KW Export demand	●	●
47.	Run Hour	●	●
48.	On Hour	●	●
49.	Number of interruptions	●	●
50.	Phase reversal indication	●	●
51.	THD Volts L1-N	●	-
52.	THD Volts L2-N	●	-
53.	THD Volts L3-N	●	-
54.	THD Volts L1-L2	-	●
55.	THD Volts L2-L3	-	●
56.	THD Volts L3-L1	-	●
57.	THD Current L1	●	●
58.	THD Current L2	●	●
59.	THD Current L3	●	●
60.	THD Voltage mean	●	●
61.	THD Current mean	●	●

Electrical connections:

For 3 Phase 4 Wire Unbalanced Load



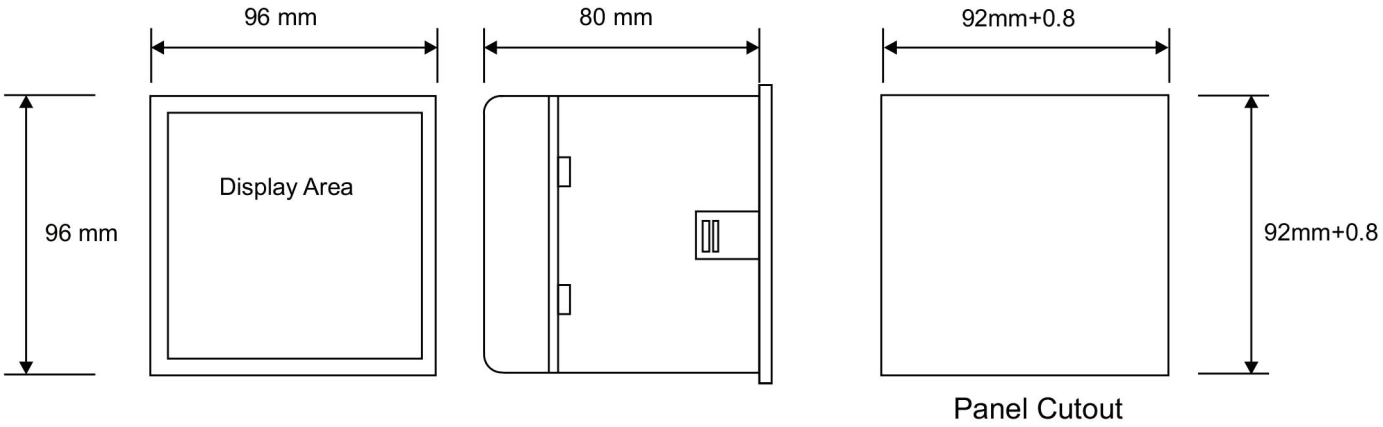
For 3 Phase 3 Wire Unbalanced Load



It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connectionsshould be made with Lugged wires for secure connections. The Maximum diameter of the lug should be 7.0 mm and maximum thickness 3.5 mm.

Permissible cross section of the connection wires: <= 4.0 mm2 single wire or 2 × 2.5 mm2 fine wire.

Dimensions:



Ordering Information	Ordering Code
	TNM3440
Accuracy class	
Acurracy 1.0% (standard)	1.0
Acurracy 0.5% (on request)	0.5
Acurracy 0.2% (on request)	0.2
Auxiliary supply	
60 - 300V AC DC	- H
12 - 60V AC DC	- L
Optional	
RS485 + 2 Pulse output	- 1
RS485 + 1 Pulse output + 2 Analog output	- 2
Ethernet	- 3
Option not used	- Z

Order Code Example:

TNM3440 0.2 – H– 1

TNM3440, Accuracy 0.2%, 60 - 300V AC DC Auxiliary supply, with MODBUS (RS485) and with 2 pulse output.

TNM96-ETL - Energy Powermeter

TNM96-ETL energy powermeter is a compact, multi functional, three-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation for monitoring the parameters of electrical network.

TNM96-ETL includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max and min demand and THD.

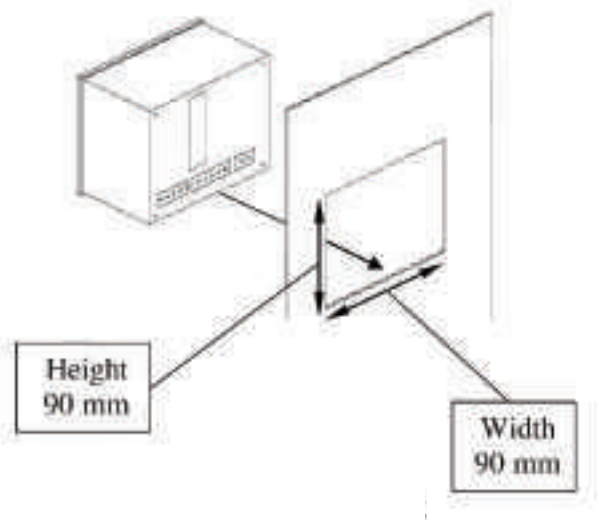
Technical Data

3 phase / 1 phase	yes
Accuracy	0.5% (optional 0.2%)
Sampling rate	1600 sample per cycle
Digital In / out	2 / 1
Harmonic distortion	I-THD, U-THD
Simple operated menus	yes
Multilingual support	yes
Minimum / Maximum	yes
RS485 Communication Port Modbus	yes
LCD graphical display type	High resolution color LCD display
Display resolution	320x240 pixels
Current transformers supported	5A / 1A
Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC
Frequency	50 / 60 Hz
Consumption	8 VA
Mounting	Frontal panel mounting
Dimensions (HxWxD)	96 x 96 x 80 mm
Weight	450 gr.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH%, non condensing
Measurement ranges	Voltage: 0 - 515 VAC Voltage(with transformer): up to 99999 KV Current (with transformer) : up to 99999 KA Maximum Input Voltage : 1000V Maximum Input Current : 6A
Measurement type	True RMS
Standard Approvals	EN62052-11, EN62053-22, EN62053-23, CE,UL61010, EN61000 -3-2, EN61000 -3-3, BTL

Measurement and Display values

Measurement Parameter	Display range
Current	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 99999 KA
Voltage L-N	0.001 - 99999 KV
Voltage L-L	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz
Active power total/phase	0.000 W - 99999 MW
Reactive power total/phase	0.000 VAR - 99999 MVAR
Apparent power total/phase	0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000
Active total/phase	0.001 WH - 99999999 MWH
Reactive total/phase	0.001 VARH - 99999999 MVARH
Apparent total/phase	0.001 VAH - 99999999 MVAH
Harmonic THD V/I	0.000 - 100%
Measurement Parameter	**Measuring in direct connection**
Current	0.001 - 6A
Neutral current (calculated)	0.001 - 6A
Voltage L-N	0.000 - 550V
Voltage L-L	0.000 - 950V
Frequency (Hz)	45.001 - 65.001 Hz
Power factor (cap./ ind)	-1.000 ÷ 1.000

Mechanical mounting:



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TNM96-ETN - Power Quality and Energy Powermeter

TNM96-ETN energy powermeter is a compact, highly accurate 0.2% (0.1% optional), three-phase powermeter, especially designed to meet the needs of power and energy measurement in any electrical installation for monitoring the parameters of electrical network.

TNM96-ETN includes history data logging and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or ethernet TCP/IP communication.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max and min demand, current in neutral line, harmonics up to 64th , periodic energy and very important safety tool - a leakage current.

TNM96ETN-I: RS485

TNM96-ETN-II: TCP/IP and RS485

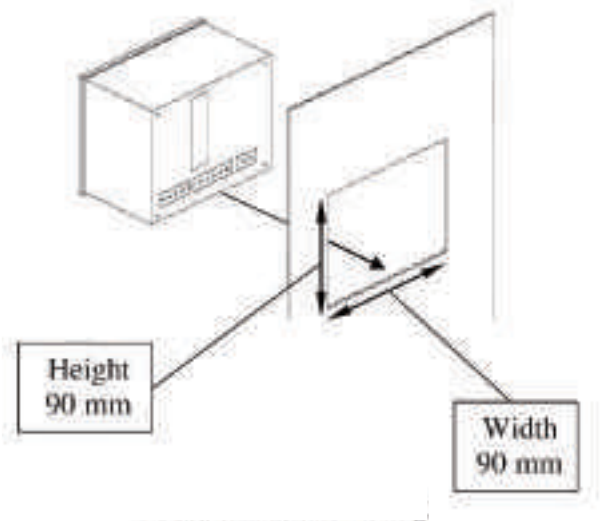
Technical Data

3 phase / 1 phase	yes
Accuracy	0.2% (optional 0.1%)
Sampling rate	1600 sample per cycle
Digital In / out	2 / 1
Harmonic resolution	64
Graphical display of the harmonics measurements	yes
Harmonic distortion	I-THD, U-THD
Waveform	Display only
Leakage (residual) current	yes
Simple operated menus	yes
Multilingual support	yes
Data logging	yes, up to 6 months
Build in T.O.U Energy meter	yes
Alarms	yes
Alarm log	yes
Minimum / Maximum	yes
History log for MIN/MAx values	yes
RS485 Communication Port Modbus	yes
Ethernet (TCP/IP) Modbus and BACnet	only TCP model
BACnet TCP/IP protocol	only TCP model
BACnet MS/TP protocol	yes
Web browser capacibility	only TCP model
LCD graphical display type	High resolution color LCD display
Display resolution	320x240 pixels
Fast trends	yes
Current transformers supported	5A / 1A / 0.333V
Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC
Frequency	50 / 60 Hz
Consumption	8 VA
Mounting	Frontal panel mounting
Dimensions (HxWxD)	96 x 96 x 80 mm
Weight	650 gr.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH% non condensing
Measurement ranges	Voltage: 0 - 515 VAC Voltage(with transformer): up to 99999 KV Current (with transformer) : up to 99999 KA Maximum Input Voltage : 1000V Maximum Input Current : 6A
Measurement type	True RMS
Standard Approvals	EN62052-11, EN62053-22, EN62053-23, CE,UL61010, EN61000 -3-2, EN61000 -3-3, BTL

Measurement and Display values

Measurement Parameter	Display range
Current	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 99999 KA
Voltage L-N	0.001 - 99999 KV
Voltage L-L	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz
Active power total/phase	0.000 W - 99999 MW
Reactive power total/phase	0.000 VAR - 99999 MVAR
Apparent power total/phase	0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000
Active total/phase	0.001 WH - 99999999 MWH
Reactive total/phase	0.001 VARH - 99999999 MVARH
Apparent total/phase	0.001 VAH - 99999999 MVAH
Harmonic THD V/I	0.000 - 100%
Partial Harmonic V/I	0.000 - 100%
Operating hour meter	99999 - HH:MM:SS
Measurement Parameter	**Measuring in direct connection**
Current	0.001 - 6A
Neutral current (calculated)	0.001 - 6A
Voltage L-N	0.000 - 550V
Voltage L-L	0.000 - 950V
Frequency (Hz)	45.001 - 65.001 Hz
Power factor (cap./ ind)	-1.000 ÷ 1.000

Mechanical mounting:



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TNM160 - Energy meter and Electrical powermeter

- Simple installation - DIN Rail mounted

TNM160 energy powermeter is a compact, multi functional, multi channel, three\single-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation up to 1 or 2 sets of three phase energy meters, or up to 6 single phase.

TNM160 includes history data logging up to 6 months and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or Ethernet TCP.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max. and min demand an current in neutral line.

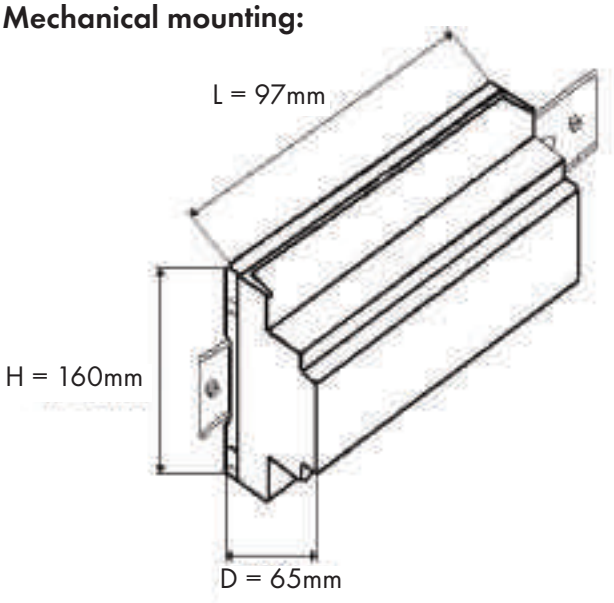
Technical Data

3 phase / 1 phase	up to 1or 2 sets / up to 6
Accuracy	0.2%
Sampling rate	1600 sample per cycle
Digital In / out	- / -
Harmonic resolution	32
Simple operated menus	yes
Multilingual support	yes
Data logging	yes, up to 6 months
Build in T.O.U Energy meter	yes
RS485 Communication Port Modbus	yes
Ethernet (TCP/IP)	yes
BACnet TCP/IP protocol	yes
BACnet MS/TP protocol	yes
Web browser capacibility	yes
LCD graphical display type	color display
Display resolution	320x240 pixels
Display of Waveform and baragph	yes
Current transformers supported	5A / 1A
Power requirements	90 ∾ 250 VAC 110 ∾ 280 VDC
Frequency	50 / 60 Hz
Consumption	6 VA
Mounting	DIN Rail mounting
Dimensions (HxWxD)	160 x 97 x 65 mm
Weight	550 gr.
Environmental	Operation: -20 ∾ 70°C Storage: -20 ∾ 80°C Humidity: 0 ∾ 95 RH% non condensing
Measurement ranges	Voltage: 0 - 550 VAC Voltage(with transformer): up to 999999999 KV Current (with transformer) : up to 99999999 KA Maximum Input Voltage : 1000V Maximum Input Current : 6A Supported current sensors: 1A / 5A
Measurement type	True RMS
Standard Approvals	EN62052-11, EN62053-22, EN62053-23, CE, UL61010, EN61000 -3-2, EN61000 -3-3, BTL

Measurement and Display values

Measurement Parameter	Display range
Current	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 99999 KA
Voltage L-N	0.001 - 99999 KV
Voltage L-L	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz
Active power total/phase	0.000 W - 99999 MW
Reactive power total/phase	0.000 VAR - 99999 MVAR
Apparent power total/phase	0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000
Active total/phase	0.001 WH - 99999999 MWH
Reactive total/phase	0.001 VARH - 99999999 MVARH
Apparent total/phase	0.001 VAH - 99999999 MVAH
Measurement Parameter	**Measuring in direct connection**
Current	0.1 - 6A
Voltage L-N	0.1 - 550V
Voltage L-L	0.1 - 950V
Frequency (Hz)	45 - 65 Hz
Power factor (cap./ ind)	-1.000 ÷ 1.000

Mechanical mounting:



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TNM230 - Energy meter and Electrical powermeter

- Simple installation - DIN Rail mounted

TNM230 energy powermeter is a compact, multi functional, multi channel, three\single-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation up to 8 sets three phase channels or up to 24 single phase engery meters

TNM230 includes history data logging up to 6 months and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or Ethernet TCP.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max. and min demand an current in neutral line.

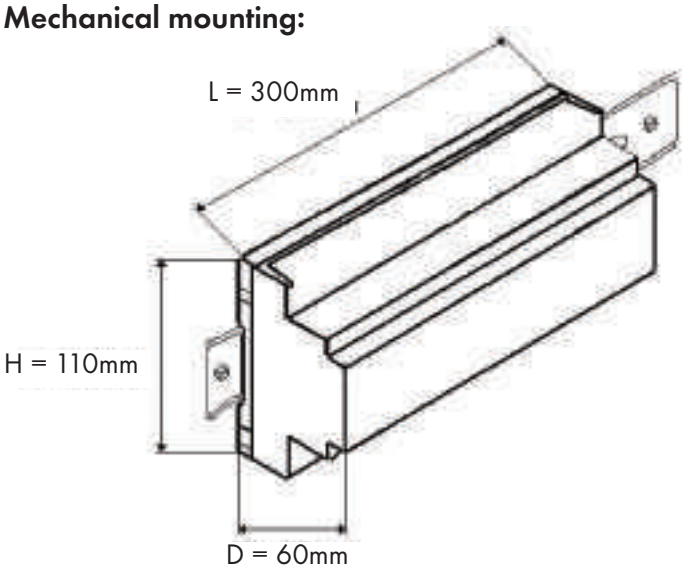
Technical Data

3 phase / 1 phase	up to 8 sets / up to 24
Accuracy	0.2%
Sampling rate	1600 sample per cycle
Digital In / out	- / -
Harmonic resolution	32
Simple operated menus	yes
Multilingual support	yes
Data logging	yes, up to 6 months
Build in T.O.U Energy meter	yes
RS485 Communication Port Modbus	yes
Ethernet (TCP/IP)	yes
BACnet TCP/IP protocol	yes
BACnet MS/TP protocol	yes
Web browser capacibility	yes
LCD graphical display type	color display
Display resolution	320x240 pixels
Display of Waveform and baragph	yes
Current transformers supported	5A / 1A
Power requirements	90 ∾ 250 VAC 110 ∾ 280 VDC
Frequency	50 / 60 Hz
Consumption	11 VA
Mounting	DIN Rail mounting
Dimensions (HxWxD)	110 x 300 x 60 mm
Weight	1.250 gr.
Environmental	Operation: -20 ∾ 70°C Storage: -20 ∾ 80°C Humidity: 0 ∾ 95 RH% non condensing
Measurement ranges	Voltage: 0 - 550 VAC Voltage(with transformer): up to 999999999 KV Current (with transformer) : up to 99999999 KA Maximum Input Voltage : 1000V Maximum Input Current : 6A Supported current sensors: 1A / 5A
Measurement type	True RMS
Standard Approvals	EN62052-11, EN62053-22, EN62053-23, CE, UL61010, EN61000 -3-2, EN61000 -3-3, BTL

Measurement and Display values

Measurement Parameter	Display range
Current	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 99999 KA
Voltage L-N	0.001 - 99999 KV
Voltage L-L	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz
Active power total/phase	0.000 W - 99999 MW
Reactive power total/phase	0.000 VAR - 99999 MVAR
Apparent power total/phase	0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000
Active total/phase	0.001 WH - 99999999 MWH
Reactive total/phase	0.001 VARH - 99999999 MVARH
Apparent total/phase	0.001 VAH - 99999999 MVAH
Measurement Parameter	**Measuring in direct connection**
Current	0.1 - 6A
Voltage L-N	0.1 - 550V
Voltage L-L	0.1 - 950V
Frequency (Hz)	45 - 65 Hz
Power factor (cap./ ind)	-1.000 ÷ 1.000

Mechanical mounting:



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TNM300 - Energy meter and Electrical powermeter

- Simple installation - DIN Rail mounted

TNM300 energy powermeter is a compact, multi functional, multi channel, three\single-phase powermeter, especially designed to meet the stringent needs of power and energy measurement in any electrical installation:

- Up to 12 sets of three phase energy meters or
- Up to 36 singles phaser enger meters or
- Up to 36 digital Inputs

TNM300 includes history data logging up to 4 months and supports standard communication protocols BACnet and Modbus with simple integration into building management systems over RS485 or Ethernet TCP.

An indispensable tool for the building engineer, it aids efficient use of electricity by showing power factor, max. and min demand an current in neutral line.

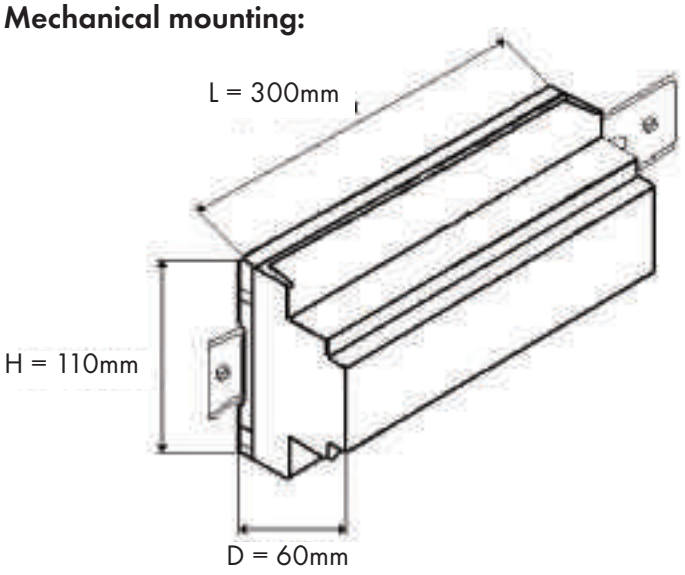
Technical Data

3 phase / 1 phase	12x / 36x
Accuracy	0.2%
Sampling rate	1600 sample per cycle
Digital In / out	- / -
Harmonic resolution	32
Simple operated menus	yes
Multilingual support	yes
Data logging	yes, up to 6 months
Build in T.O.U Energy meter	yes
RS485 Communication Port Modbus	yes
Ethernet (TCP/IP) Modbus and BACnet	yes
BACnet TCP/IP protocol	yes
BACnet MS/TP protocol	yes
Web browser capacibility	yes
LCD graphical display type	text LCD display / color display
Display resolution	4x40 characters / 320x240 pixels
Current transformers supported	5A / 1A / 0.333V
Power requirements	90 ∞ 250 VAC 110 ∞ 280 VDC
Frequency	50 / 60 Hz
Consumption	11 VA
Mounting	DIN Rail mounting
Dimensions (HxWxD)	110 x 300 x 60 mm
Weight	1.250 gr.
Environmental	Operation: -20 ∞ 70°C Storage: -20 ∞ 80°C Humidity: 0 ∞ 95 RH% non condensing
Measurement ranges	Voltage: 0 - 550 VAC Voltage(with transformer): up to 999999999 KV Current (with transformer) : up to 99999999 KA Maximum Input Voltage : 1000V Maximum Input Current : 6A Supported current sensors: 0.333V /1A / 5A / 63A / 0.1A
Measurement type	True RMS
Standard Approvals	EN62052-11, EN62053-22, EN62053-23, CE, UL61010, EN61000 -3-2, EN61000 -3-3,BTL

Measurement and Display values

Measurement Parameter	Display range
Current	0.001 - 99999 KA
Neutral current (calculated)	0.001 - 99999 KA
Voltage L-N	0.001 - 99999 KV
Voltage L-L	0.001 - 99999 KV
Frequency (Hz)	45.001 - 65.001 Hz
Active power total/phase	0.000 W - 99999 MW
Reactive power total/phase	0.000 VAR - 99999 MVAR
Apparent power total/phase	0.000 VA - 99999 MVA
Power factor (cap./ ind)	-1.000 ÷ 1.000
Active total/phase	0.001 WH - 99999999 MWH
Reactive total/phase	0.001 VARH - 99999999 MVARH
Apparent total/phase	0.001 VAH - 99999999 MVAH
Measurement Parameter	**Measuring in direct connection**
Current	0.1 - 6A
Voltage L-N	0.1 - 550V
Voltage L-L	0.1 - 950V
Frequency (Hz)	45 - 65 Hz
Power factor (cap./ ind)	-1.000 ÷ 1.000

Mechanical mounting:



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02 Digital Panel Instruments

Celsa Eine Voltage / Current

The digital panel meter programmable DPM Eine have been designed for industrial applications, which frequently require precise and on-site adjustment of the display range. It can be used in industrial automation and for laboratory uses.

Programmable DPM Eine measures important electrical parameters in 3 phase 4 Wire, 3 phase 3 Wire and single phase network and replaces the multiple analog panel meters.

Salient Features

- Fast & Easy Installation on panel with the help of external swivel screws.
- True RMS measurement.
- 4 Digits ultra bright LED Display.
- User selectable CT/PT Primary.
- User selectable CT/PT Secondary.
- User selectable 3ph3wire or 3ph4wire Network.
- Three auxillary Power Supply available 40V – 300V AC DC, 20-60V DC / 20-40V AC.
- Available in size - 96x96,48x96 mm

Products Features

True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

User selectable CT Primary

The Primary of current transformer can be programmed on site from 1A to 999kA for Current DPM using front panel keys.

User selectable PT Primary

The Primary of Potential transformer can be programmed from on site 100 VLL to 999 kVLL for Voltage DPM (3V) and 57.5 VLN to 999 kVLN for Voltage DPM (V) using front panel keys.

User selectable CT Secondary

The Secondary of current transformer can be programmed on site to 1A or 5A for Current DPM using front panel keys.

User selectable PT Secondary

The Secondary of Potential transformer can be programmed on site from 100 VLL to 500 VLL for Voltage DPM (3V) and 57.5 VLN to 300VLN for Voltage DPM (V) using front panel keys.

4 digits LED display

14mm ultra bright 4 digits LED display.

User selectable 3 phase 3Wire or 4Wire Network(for 3A/3V)

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire network using front panel keys.

Onsite selection of Auto scroll / Fixed Screen(for 3A/3V)

User can set the display in auto scrolling mode or fixed screen mode using front panel keys.

Function keys

Using two function keys it is possible to Display various parameters in Current and Voltage DPM. These function keys are also used for Network selection, CT/PT Primary values, CT/PT Secondary values, Auto Scroll mode selection.

Screen No. storage

In case of power failure, the instrument memorizes the last screen stored. For every 1 min. the instrument stores the screen no. in the non-volatile memory.

Low back depth

The instrument has very low back depth (behind the panel) of less than 40mm.

Enclosure Protection for dust and water

Conforms to IP 50 (for front face) & IP 20 (for back).

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EMC Compatibility

Compliance to International standard IEC 61326.

· Interference Emission :	IEC 61326-1 : 2005, Class A	
· Interference Immunity :	IEC 61326-1 : 2005	
· Electrostatic discharge :	IEC 61000-4-2 – 4kV/8kV contact/air. (ESD)	
· EM Field :	IEC 61000-4-3 – 10 V/m (80 MHz to 1 GHz)	
	– 3 V/m (1.4 Ghz to 2 GHz)	
	– 1 V/m (2 GHz to 2.7 GHz)	
· Burst :	IEC 61000-4-4 – 2 kV (5/50 ns, 5 kHz)	
· Surge :	IEC 61000-4-5 – 1 kVLL / 2 kVLN.	
· Conducted RF :	IEC 61000-4-5 – 3 V (150 kHz to 80 MHZ)	
· Rated Power Frequency magnetic Field :	IEC 61000-4-8 – 30 A/m	
· Voltage dip :	IEC 61000-4-11	– 0% during 1 cycle.
		– 40% during 10/12 cycles.
		– 70% during 25/30 cycles.
· Short interruptions :	IEC 61000-4-11 –	0% during 25/30 cycles.
		25 cycles for 50 Hz test.
		30 cycles for 60 Hz test.

Technical Specifications

Input voltage	Nominal input voltage Ranges (AC RMS) (to be specified while ordering)	Phase –Neutral 57 - 288V L-N , Line-Line 100-500V L-L(For 3V) Phase –Neutral 57.5 - 300V L-N(For V) Phase –Neutral 600VL-N(Only for V(fixed)
	Max continuous input voltage	120% of rated value
	Nominal input voltage burden	< 0.3 VA approx. per phase. < 0.4 VA approx. (For 600VLN(1phase)
	System PT primary values	100VLL to 999kVLL programmable on site for 3 - Phase Voltage (3V). 57.5VLN to 999kVLN programmable on site for 1 - Phase Voltage (V).
Input current	Nominal input current Ranges	1A or 5A AC RMS
	System CT primary values	From 1A up to 999kA (for 1 or 5 A)
	Max continuous input current	120% of rated value (optional 150% of rated value)
	Nominal input current burden	< 0.3 VA approx. per phase
Overload indication	"-oL-" (If input is greater than 125% of secondary value for Voltage and 125% (optional 155%) of secondary value for current)	
Auxiliray supply	AC DC Auxiliary Supply	40-300V AC-DC (±5%) 20-40V AC / 20-60V DC
	Frequency range	45 to 65 Hz
	VA burden	< 3 VA Approx 1 VA approx at 24V AC/DC
Overload withstand	Voltage	2x rated value for 1 second, repeated 10 times at 10 second intervals
	Current	4x rated value for 1 second, repeated 5 times at 5 min intervals
Operating measuring ranges	Voltage Range	10 ... 120% of rated value
	Current Range	10 ... 120% of rated value (optional 10 ... 150% of rated value)
	Frequency	45...65 Hz
Reference conditions of accuracy	Reference temperature	23°C +/- 2°C
	Input waveform	Sinusoidal (distortion factor 0.005)
	Auxiliary supply voltage	Rated Value ±1%
	Auxiliary supply frequency	Rated Value ±1%
	Voltage Range	20...100% of Nominal Value
	Current Range	10...100% of Nominal Value
	Input Frequency	50 Hz / 60 Hz

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Accuracy	Voltage	±1.0% of Nominal value (Optional ±0.5% Available)	
	Current	±1.0% of Nominal value (Optional ±0.5% Available)	
Influence of variations	Temperature coefficient (for rated value range of use (0...50°C)	0.025%/°C for Voltage 0.05%/°C for Current	
Applicable standards	EMC	IEC 61326-1: 2005	
	Safety	IEC 61010-1-2001 , Permanently connected use	
	IP for water and dust	IEC60529	
Safety	Pollution degree	2	
	Installation category	III	
	High Voltage Test	2.2 kV AC, 50Hz for 1 minute.	
Environmental	Operating temperature	0 to +55°C	
	Storage temperature	-25°C to +70°C	
	Relative humidity	0... 90% non condensing	
	Warm up time	Minimum 3 minute	
	Shock	15g in 3 planes	
	Vibration	10... 55 Hz, 0.15mm amplitude	
Enclosure	Front	IP 50(IP 54 on request).	
	Back	IP 20	
Dimensions and weights	a) 96x96 DPM	Bezel size (DIN 43 718)	96 mm x 96 mm.
		Panel cut-out	92 +0.8 mm x 92 + 0.8 mm.
		Overall depth	40 mm.
		Weight	310 gm. Approx.
	b) 48x96 DPM	Bezel size (DIN 43 718)	48 mm x 96 mm.
		Panel cut-out	43.5 + 0.6 mm x 92 + 0.8 mm.
		Overall depth	68 mm.
		Weight	250 gm. Approx.

Parameters measured and displayed

A) DPM Eine 3V

Network type	Displayed Parameter
1) 3 Phase 4 wire	a. Phase –Neutral Voltage VL1 b. Phase –Neutral Voltage VL2 c. Phase –Neutral Voltage VL3 d. Line-Line Voltage VL1L2 e. Line-Line Voltage VL2L3 f. Line-Line Voltage VL3L1 g. System Voltage
2) 3 Phase 3 wire	a. Line-Line Voltage VL1L2 b. Line-Line Voltage VL2L3 c. Line-Line Voltage VL3L1 d. System Voltage

B) DPM Eine 3A

Network type	Displayed Parameter
1) 3 Phase 4 wire and 3 Phase 3 Wire	a. Phase Current IL1 b. Phase Current IL2 c. Phase Current IL3 d. System Current

C) DPM Eine V

Network type	Displayed Parameter
1 Phase 2 wire	Phase –Neutral Voltage VL

D) DPM Eine 3A

Network type	Displayed Parameter
1 Phase 2 wire	Phase Current IL

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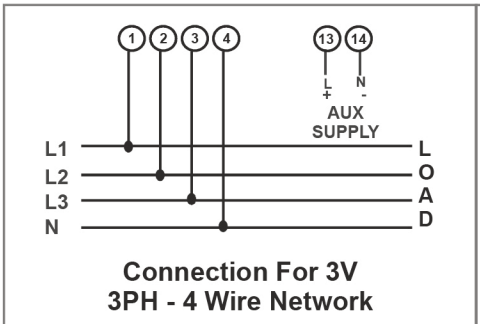
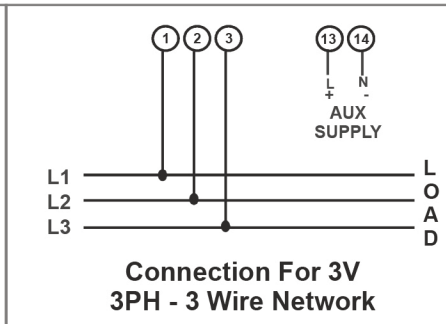
Parameters measured and displayed

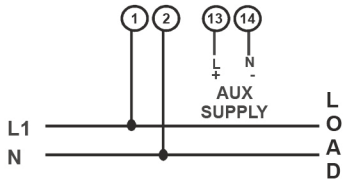
A) For 96x96 DPM



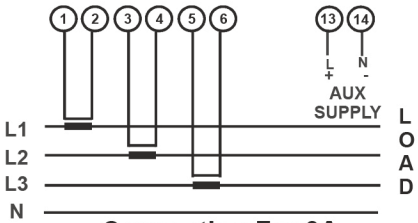
Connection For 3V
3PH - 4 Wire Network



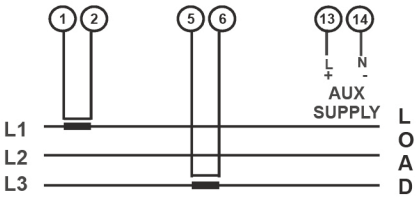
Connection For 3V
3PH - 3 Wire Network



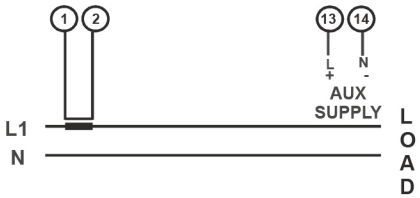
Connection For V
1PH -2 Wire Network



Connection For 3A
3PH - 4 Wire Network

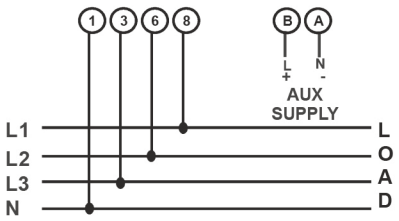


Connection For 3A
3PH - 3 Wire Network

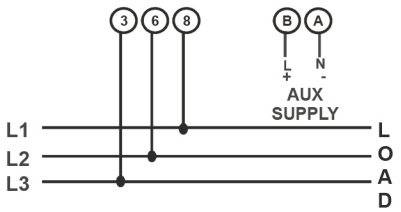


Connection For A
1PH - 2 Wire Network

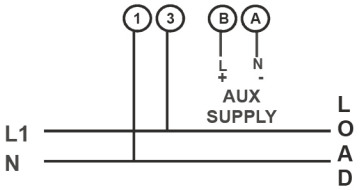
B) For 48x96 DPM



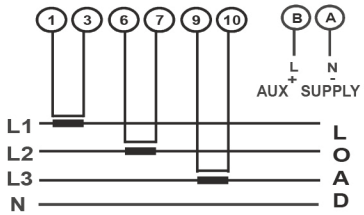
Connection For 3V
3PH - 4 Wire Network



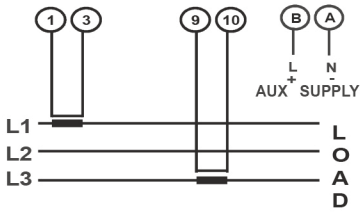
Connection For 3V
3PH - 3 Wire Network



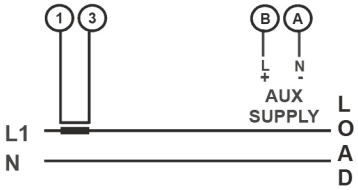
Connection For V
1PH Network



Connection For 3A
3PH - 4 Wire Network



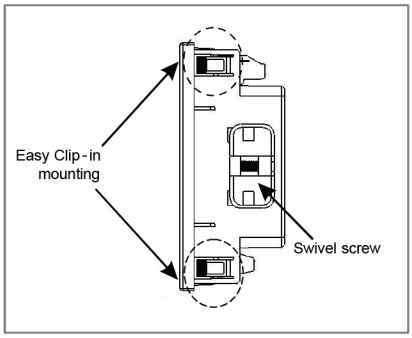
Connection For 3A
3PH - 3 Wire Network



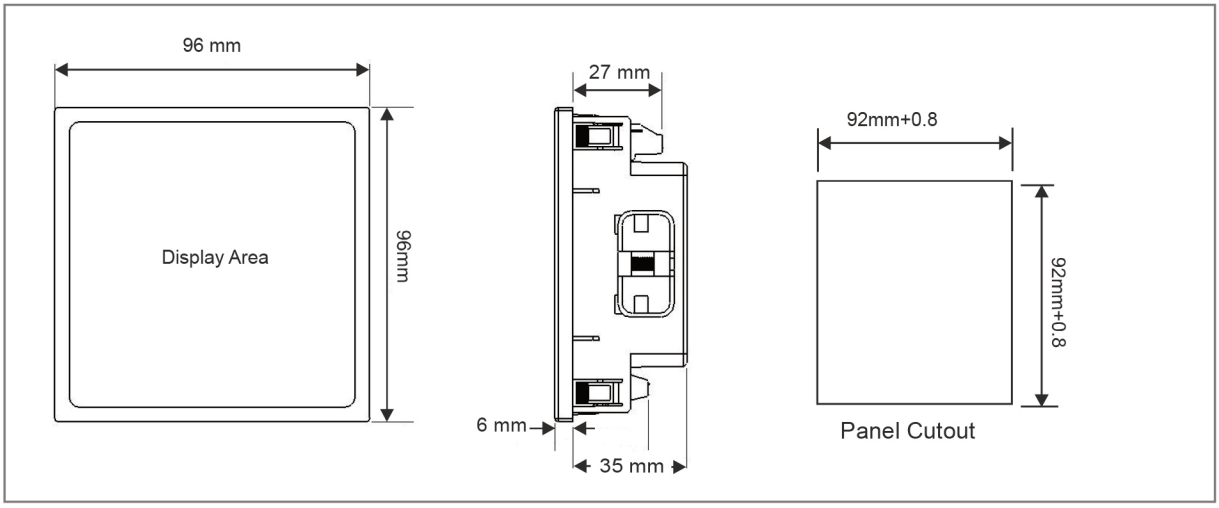
Connection For A
1PH Network

Installation and Dimensions

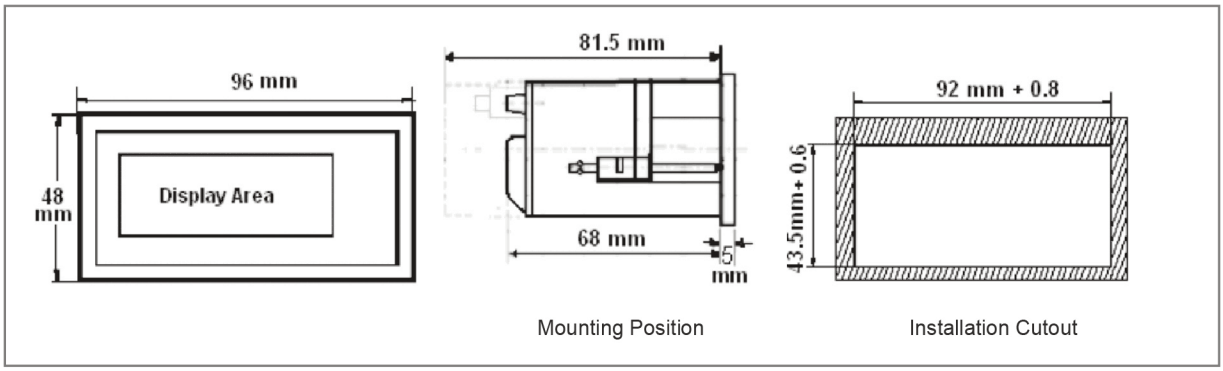
Easy Clip in Installation on Panel for 96x96 DPM:



A) For 96x96 DPM



A) For 48x96 DPM



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Ordering information

Celsa Eine Voltage

A) 3-Phase Voltage (3V)

Ordering Information	Ordering Code
Celsa Eine Voltage - 3V	
System Type 3 Phase Programable as 4 wire or 3 wire on site	**3V**
Auxiliary Voltage 40 - 300V AC - DC (± 5%) 20 - 60V DC / 20-40V AC (± 5%)	**AD** **D**
Size 48x96 96x96	**48** **96**

B) 1-Phase Voltage (V)

Ordering Information	Ordering Code
Celsa Eine Voltage - V	
System Type 1 Phase	**V**
Input Voltage 57.5V L-N to 300V L-N 600V L-N	**300** **600**
Auxiliary Supply 40 - 300V AC - DC (± 5%) 20 - 60V DC / 20-40V AC (± 5%)	**AD** **D**
Size 48x96 96x96	**48** **96**

Order Code Example:

- Celsa Eine Voltage – 3V – AD - 96:

  Celsa Eine Voltage, 3 phases, 40-300V AC auxiliary supply, Dimensions 96x96mm

- Celsa Eine Voltage – V – 300 – AD - 48:

  Celsa Eine Voltage, single phase, 57.5 to 300V L-N input voltage, 40-300V AC auxiliary supply, Dimensions 48x96mm

Celsa Eine Current

Ordering Information	Ordering Code
Celsa Eine Current	
System Type 3 Phase (Programable as 4 wire or 3 wire on site) 1 Phase	**3A** **A**
Auxiliary Voltage 40 - 300V AC - DC (± 5%) 20 - 60V DC / 20-40V AC (± 5%)	**AD** **D**
Size 48x96 96x96	**48** **96**

Order Code example:

- Celsa Eine Current 3A - AD - 96:

  Celsa Eine Current, 3 Phase, 40-300 V AC-DC Auxiliary Supply, Dimensions: 96x96 mm

Celsa Eine + DC Voltage / Current

Celsa Eine + Voltage / Current are specially designed to measure electrical parameters like DC Voltage or DC Current and display it in terms of any parameter or process value.

RISH Eine has been designed for industrial applications, which frequently require precise and on-site adjustment of the display range.

Application

- Distribution and Control Panels
- Electrical load monitoring
- In Laboratories
- In Industrial automation

Product Features

Low Back Depth

The instrument has very low back depth (behind the panel) of less than 40 mm.

Rescalable Display range

The meter is completely programmable and user can easily scale the values as per his requirements onfield.Setting for '-ve' sign and decimal point position is also provided.

Function keys

Using 2 function keys it becomes easy and convenient for user to program the meter without any difficulty.

Bent Characteristics

The meter supports bent characteristics. Hence user can configure the meter as per requirement.

Power Factor Display

The meter can be configured to display power factor also.

Ambient Temperature Indication

The meter gives an accurate indication of the ambient temperature in °C and °F.

Auxillary Supply

The Auxillary supply ranges 40-300V AC-DC and 20-60V DC / 20-40V AC are supported.

4 Full digits Ultra Bright LED display

14mm full range display possible of 4 digits having maximum count - 9999.

Wide Input Range

Wide range of voltages and currents to choose from.

Enclosure Protection for dust and water

Conforms to IP 50 (front face) as per IEC 60529.

Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2010.

EMC Compatibility

Compliance to International standard IEC 61326 Class B.

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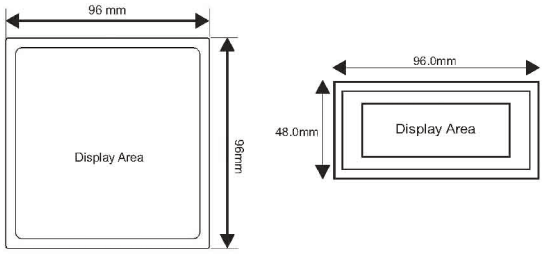
Technical Specifications

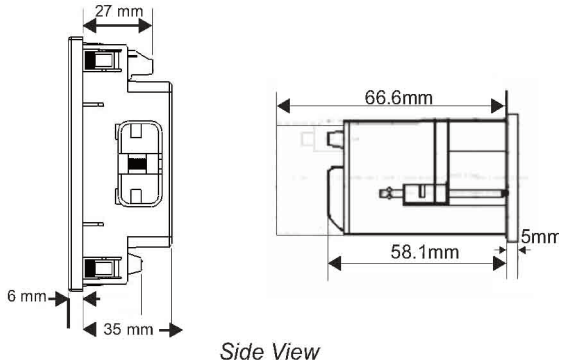
Measuring ranges Celsa Eine + Voltage	Input mV ranges	-75...0...75mV, -150...0...150mV
	Input Voltage range	-5...0...5V, -10...0...10V, 0...500V, 0...1000V
	Max continuous input voltage	120% of Nominal value
Measuring ranges Celsa Eine + Current	Input Current ranges	-10...0...10mA, -20...0...20mA, 4...20mA, -1...0...1A, -5...0...5A
	Max continuous input current	120% of Nominal value
Accuracy	Celsa Eine + Voltage	<0.5% of Display End value ±1 digit (Input current < 300uA) for V/mV
	Celsa Eine + Current	<0.5% of Display End value ±1 digit (Voltage drop < 600mV) for A/mA
	Ambient Temperature	±3 °C
Influence of variations	Temperature coefficient	0.05% / °C, plus
	Zero point drift	0.025% / °C
Display	Type	1 line 4-digit LED display
	Display Count Setting	-9999...-10 or +10...+9999 counts
	Digit Height	14mm
	Decimal point position	Configurable
	Negative Display indication	'-'
	Overload Indication	" - oL - " (above 125% of nominal value)
Auxiliary supply	External Aux	40 - 300V AC - DC 20 - 60V DC / 20-40V AC 80 - 300V AC (for model 96x96)
	Frequency range	45 - 65Hz
	VA burden	< 4.5VA approx. at $240V_{LN}$, 50Hz < 1VA approx. at $24V_{LN}$, 50Hz
Reference conditions for accuracy	Reference Temperature	23°C ±2°C
	Auxiliary Supply Voltage	Rated Value ±1%
	Auxiliary Supply Frequency	Rated Value ±1%
Applicable standards	EMC	IEC 61326-1:2005
	Immunity	IEC 61000-4-1 up to 4. Level 3 industrial Low level
	Safety	IEC 61010-1:2010 , Permanently connected use IP for water & dust IEC60529
	Pollution degree	2
	Installation category	III
	High Voltage Test	2.2 kV AC, 50Hz for 1 minute between all electrical circuits
Environmental	Operating temperature	-10 to +55°C
	Storage temperature	-20 to +70°C
	Relative humidity	0... 90% non condensing
	Warm up time	Minimum 3 minute
	Shock	15g in 3 planes
	Vibration	10... 55 Hz, 0.15mm amplitude
Dimensions and weight	Bezel size	96 mm x 96 mm DIN43718 (for model 96x96) 48 mm x 96 mm DIN43718 (for model 48x96)
	Panel cut-out	92 +0.8mm x 92 + 0.8mm (for model 96x96) 43.5 +0.6mm x 92 + 0.8mm (for model 48x96)
	Overall depth	<40mm (for model 96x96) <75mm (for model 48x96)
	Weight	310 gr. approx. (for model 96x96) 250gr. approx. (for model 48x96)
Factor C (The highest value applies if calculated C is less than 1, then C=1 applies)	Linear characteristics: $C = \frac{1 - (Y0/Y2)}{1 - (X0/X2)}$ or C=1	Bent characteristics: For X0 ≤ X ≤ X1 $C = \frac{Y1 - Y0}{X1 - X0} \cdot \frac{X2}{Y2}$ or C=1 For X1 ≤ X ≤ X2 $C = \frac{1 - (Y1/Y2)}{1 - (X1/X2)}$ or C=1

X0 = Start value of input, Y0 = Start value of display ,
X1 = Elbow value of input ,Y1 = Elbow value of display
X2 = End value of input ,Y2 = End value of display

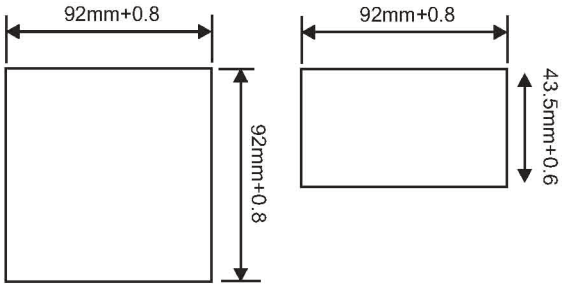
Dimensions:



Front View

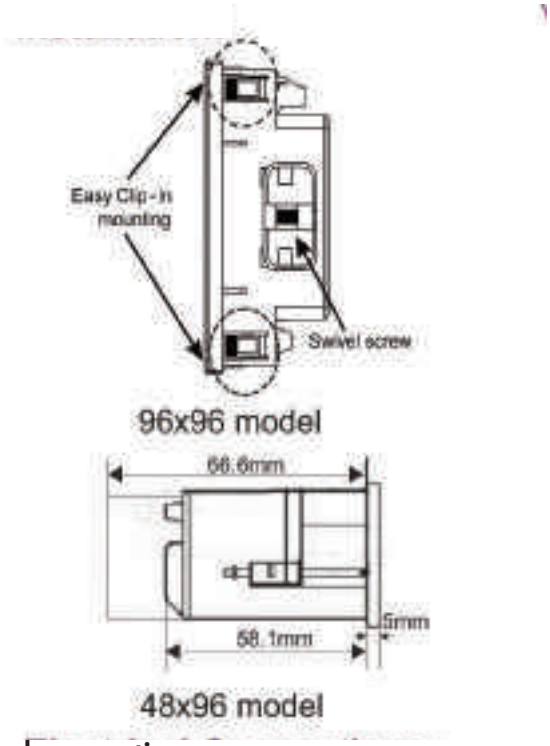


Side View

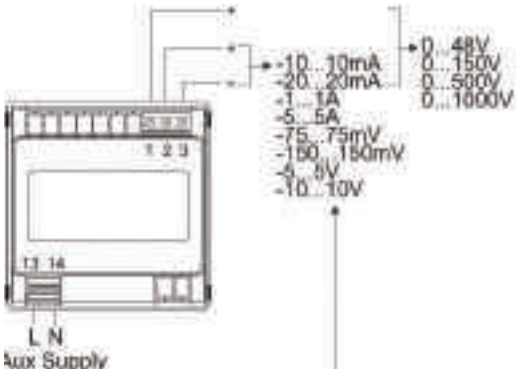


Panel Cutout

Installation:



Electrical connections:



Ordering information for model 96x96:

Ordering Information	Ordering Code
Celsa Eine + Voltage	1
Input Voltage	
75 mV	**75M**
150 mV	**150M**
0 - 5V	**5**
0 - 10V	**10**
0 - 48V	**48**
0 - 150V	**150**
0 - 500V	**500**
0 - 1000V	**1000**
Auxiliary Supply	
40 - 300V AC - DC (± 5%)	**HA**
80 - 300V AC	**LA**
20 - 60V DC / 20-40V AC (± 5%)	**L**

Ordering Information	Ordering Code
Celsa Eine + Current	1
Input Current	
0 - 10 mA	**10M**
0 - 20 mA	**20M**
4 - 20 mA	**20MZ**
0 - 1A	**1A**
0 - 5A	**5A**
Auxiliary Supply	
40-300V AC - DC (± 5%)	**HA**
80-300V AC	**LA**
20-60V DC / 20-40V AC (± 5%)	**L**

Order Code Example:

- Celsa Eine + Voltage – 1 – 500 – L : Celsa Eine + Voltage , VDC, 500 V input voltage, 80-300V AC auxiliary supply
- Celsa Eine + Current – 2 – 20M – HA: Celsa Eine + Current , ADC, 20 mA input current, 40-300 V AC-DC auxiliary supply
- Celsa Eine + Voltage – 1 – 500 – L: Celsa Eine + Voltage, VDC, 500 V input voltage, 20-60V DC / 20-40V AC auxiliary supply
- Celsa Eine + Current – 2 – 20M – L: Celsa Eine + Current , ADC, 20 mA input current, 20-60V DC / 20-40V AC auxiliary supply

Ordering information for model 48x96:

Ordering Information	Ordering Code
Celsa Eine + Voltage	148
Input Voltage	
75 mV	**75M**
150 mV	**150M**
0 - 5V	**5**
0 - 10V	**10**
0 - 48V	**48**
0 - 150V	**150**
0 - 500V	**500**
0 - 1000V	**1000**
Auxiliary Supply	
40 - 300V AC - DC (± 5%)	**HA**
80 - 300V AC	**LA**
20 - 60V DC / 20-40V AC (± 5%)	**L**

Ordering Information	Ordering Code
Celsa Eine + Current	248
Input Current	
0 - 10 mA	**10M**
0 - 20 mA	**20M**
4 - 20 mA	**20MZ**
0 - 1A	**1A**
0 - 5A	**5A**
Auxiliary Supply	
40-300V AC - DC (± 5%)	**HA**
80-300V AC	**LA**
20-60V DC / 20-40V AC (± 5%)	**L**

Order Code Example:

- Celsa Eine + Voltage – 148 – 500 – LA : Celsa Eine + Voltage , VDC, 500 V input voltage, 20-60V DC / 20-40 AC auxiliary supply
- Celsa Eine + Current – 248 – 20M – HA: Celsa Eine + Current , ADC, 20 mA input current, 40-300 V AC-DC auxiliary supply

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03 Hour Counters

BZ48 / BZ72 - HOUR COUNTERS

- Panel mounting or DIN rail housing acc. to DIN EN 50022
- For alternating voltage and direct voltage
- 7 or 8-digit hour meter.
- High shock and impact resistance.
- Without reset, small mounting depth.
- Magnified large figures.
- Protection IP52 (optional IP65), suitable for any mounting position.
- UL-approved.

Technical Data

Electrical connection	screw terminals (tightening torque max. 0.8 Nm) wire entry from behind, for ø 2.5 mm2 [AWG13]
Power consumption	10 ... 30 V DC approx. 500 mW 100 ... 130 V DC approx. 750 mW 20 ... 30 V AC, 50 Hz approx. 0.3 VA 42 ... 48 V AC, 50 Hz approx. 0.25 VA 100 ... 130 V AC, 50 Hz approx. 0.6 VA 187 ... 264 V AC, 50 Hz approx. 1.2 VA 360 ... 440 V AC, 50 Hz approx. 1.65 VA
Rated voltages	AC (50 or 60 Hz) 20 ... 30 V, 42 ... 48 V, 100 ... 130 V, 187 ... 264 V, 360 ... 440 V DC 10 ... 30 V, 36 ... 80 V, 100 ... 130 V
On time	100%
Number of digits	7 at AC 99999.99 h 8 at DC 999999.99 h
Count mode	adding
Height of figures	4 mm (0.16")
Colour of figures	white and red on black
Operating temperature	-15°C ... +50°C [+5°F ... +122°F] (non-condensing)
Storage temperature	-40°C ... +85°C [-40°F ... +185°F]
Relative humidity	< 95 % (non-condensing)
Mounting position	any
Protection	IP52, DIN 40050 (front side)
EMC Standards	EN 55011 class B EN 61000-6-2, EN 61000-6-3
Device safety	designed to EN 61010 part 1 protection class 2 application area pollution level 2
UL Approval	file E128604 the version 360 ... 440 V AC is not UL listed
Housing	plastic PC (Polycarbonate)
Accuracy	AC supply frequency + 30 ms DC < 0.003 % (at 24 h)
Weight	BZ48 approx. 48 g base mount socket no. 48 36 g slip-on bezel 72 13 g
Operating indicator of the running time meter	AC fast rotating wheel with red dashes DC 1/100 h display turns continuously by 1 digit in 36 s
Test voltage	2000 V AC, 50 Hz for AC counters

Versions

Type	Front frame	Mounting	Description
BZ48	48 x 48	clip mounting, on rear	Standard DIN timer
BZ48A	48 x 48	clip mounting, on rear	DIN rail 35mm
BZ72	72 x 72	clip mounting, on rear	Standard DIN timer

Accesories

Type	Front frame	Dimensions in mm
Adapter front bezel	72 x 72	for cut-out 68 x 68 to cut-out 45 x 45 (mating clip must be ordered separately)
	Ø 72	for cut-out Ø 60 to 45 x 45, with clip mounting for counters 48 x 48

Options

Timer BZ72 mounted with adapter front bezel 72 x 72 mm

IP65 version, welded front cover (with IP65, the gaskets is included in the delivery)

Further voltages on request

Order information:

Order example

Product	Voltage	Frequency
BZ48	100 - 130 V AC	60 Hz
BZ72	10 - 30 V DC	-
BZ48/A	20 - 30V AC	50 Hz

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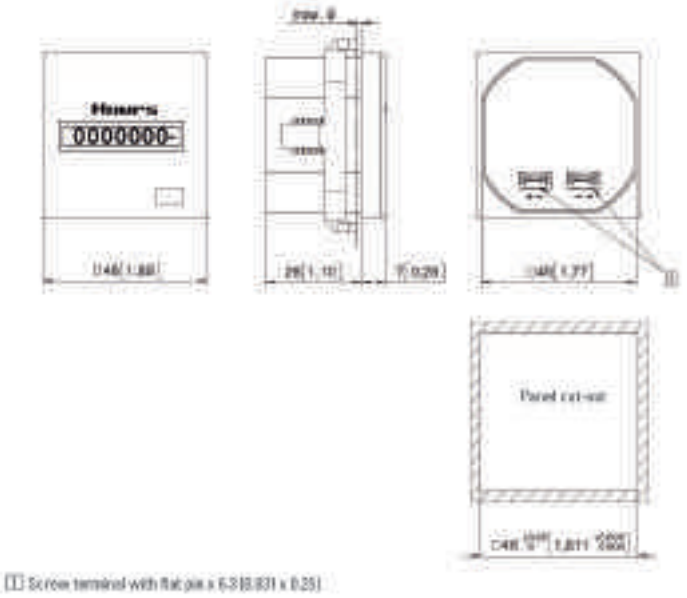
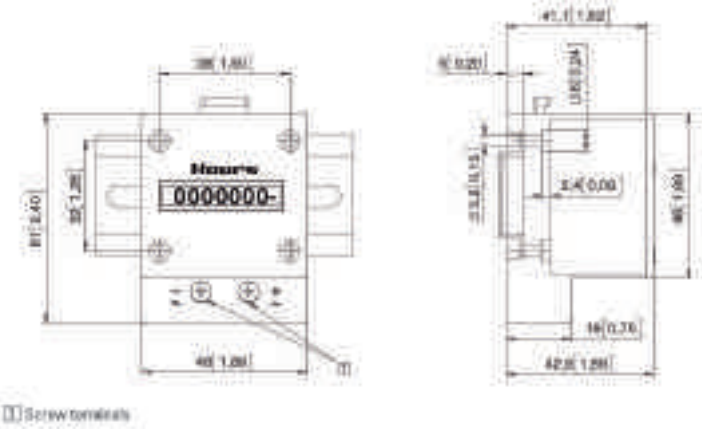
Dimensions (in mm):

BZ48: **Standard DIN timer / clip mounting, on rear**



Dimensions (in mm):

BZ48/A: **DIN rail mounting acc. to DIN EN 50022**



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04 Analogue Measuring Instruments

Analogue instruments register a value to be measured and show it on an analogue display, usually by a pointer on a scale. So the value is displayed in a stepless and continuous way. In opposition to digital displays, instabilities and tendencies of a value can be recognized faster and more intuitively on an analogue display. On the other hand at analogue displays exact numerical values are more difficult to read compared to a digital instrument (reading error).

Analogue instruments are on hand for a broad band of electrical values. They are available in the standardized dimensions 48x48mm, 72x72mm, 96x96mm and 144x144mm, as well as in various rectangle executions.

Technical Features - Square Type

Ambient temperature:	-10 ... +55 °C
Storage temperature:	-25 ... 65 °C
Reference temperature:	+23° C
Relative humidity:	75 % annual average, non-condensing
Climate Class 2:	according to VDE/VDI 3540
External Magnetic field:	0.5 mT
	0.4 kA/m lesser than 6% of the reference value for EQ..n/EQD..n

Accuracy class according to IEC- 60051 and EN- 60051:

Moving iron panel instruments (EQ..n)

- Class	1.5
- Frequency range Voltmeter:	15 ... 100 Hz
- Frequency range Ammeter:	15 ... 400 Hz

Bi-metallic instruments (BIQ..n / BOQ..n):

- Class 3:	for bi-metallic meter movements
- Class 1.5:	for moving iron panel instruments.

Pointer type frequency instruments (FA..n / FAG..n):

- Class	0.5
- Input voltage	+/- 20 %
- Heating period	lesser than 5 minutes

Moving-coil measuring instrument (PQ..n):

- Class 1.5	except for 15, 25, 40 and 60 µA class 2.5

Constructive Features

For vertical front panel mounting:

+/- 5 %

+/- 10 % in EQ/EQD/PR/PQ/PAQ..n

Housing according to DIN IEC 61554:

Housing consists of self-extinguishing plastic according to UL 94-VO .

Fixing

48n- instruments:	2x grip screw
72n- and 96n-instruments:	2x snap closure (plastic clamp)
144n- instruments:	4x grip screw

Front frame according to DIN 43718:

Narrow frame colour black, similar to RAL 9005.

Front panel

The instruments are standard delivered with simple glass. The instruments can be delivered, if possible, with anti reflexing glass on request.

Degree of protection

IP 52	for EQ/PQ/FA housing front
IP 40	for BIQ/BOQ housing front
IP 00	for clamps without electric shock protection
IP 10	for clamps with fixing electric shock protection (except for 48 and EQ/PQ aminstruments higher than 6A)
IP 20	for clamps with electric shock protection

Shaking resistance and mechanical shock resistance

Shaking resistance:	1.5 g at 50 Hz (10-150-10 Hz / 0,15 mm)
Shock resistance:	15 g 11 ms

(Gravitational acceleration 1 g = 9,81 m/s2)

This can be obtained by sprung bearing jewels of the highest quality (which are saved against crushes of jewel storage).

Electrical Features

Overload according to IEC 60051 and EN 60051

Moving iron instruments (EQ..n):

	1,2 x In: continuously
- Voltmeter:	2 x Un (max. 1000 V): 5 seconds
- Ammeter 48:	10 x In: (max. 200 A) 5 seconds0
- Ammeter others:	10 x In: 5 second

Bi-metallic instruments (BIQ..n/BOQ..n):	1,2 x In: continuously
	10 x In: 1 second
Frequency instruments (FA..n/FAG..n):	1,2 x Un: continuously
	2 x Un: 1 second
Moving-coil instruments (PQ..n):	1,2 x In: continuously
- Voltmeter:	2 x Un: 5 seconds
- Ammeter:	10 x In: 5 seconds

Testing voltage according to IEC 61010-1 and EN 61010-1

Meter type Range	Test voltage U_{eff}; 50 Hz	Test voltage class
48n (300 / 600 V)	3,32 / 2,21 k V	CAT III / CAT II
72n-, 96n-, 144n (300/ 600V)	3,32 / 2,21 k V	CAT III / CAT II

Pointers and scales according to DIN 43802

Moving iron panel instruments (EQ..n):

90° scale. From 10 % of the scale practically linear. Coarse-fine division.

Pointer according to DIN 43802 - 3. In case of aminstruments with doubled overload range the overload range corresponds to approximately 20 % of the full scale length.

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Bimetallic-instruments (BIQ..n/BOQ..n):
Bi-metallic meter movements: 90° scale. The final scale value is 1.2 x I
meter movements: see moving iron panel instruments
Coarse-fine division. Knife bar pointer according to DIN 43802 - 3.

Frequency instruments (FA..n, FAG..n):
90° scales (FA..n), 240° scales (FAG..n). Practically linear. Coarse-fine division. Knife bar pointer according to DIN 43802 - 3.

Moving-coil measuring instruments (PQ..n, PAQ..n):
90° scales (PQ..n), 240° scales (PAQ..n). Practically linear. Coarse-fine division. Knife bar pointer according to DIN 43802 - 3.

Scales

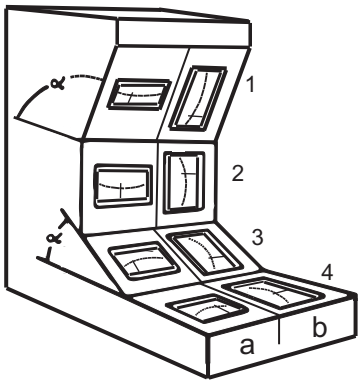
The final scale values are determined according to the following norm line: 1-1,2-1,5-2-2,5-3-4-5-6-7,5-8 and decade multiples.
In case of instruments for current transformer connection this norm line is additionally supplemented with the standard values 1,25-1,6-1,8 and decade multiples.

Special adjustment according to norm line in any measuring size, as for example „%“, „m/s“, „Upm“, „bar“ etc.
Special adjustment beyond the norm line, measuring size in any order.
Special adjustment after equation, curve or table, measuring size in any order.

Position

The instruments are calibrated - if not indicated differently - for vertical purpose (pos.2). Other purposes, horizontal or diagonal, under indication of the angle against the horizontal are considered on demand. The exact storing of the instruments enables installation positions in all angles.

Standard execution: Cross scale, vertical installation



1	∝ > 90°
2	⊥ = 90°
3	∝ < 90°
4	⌐ = 0°

Position sign	Nominal position
⊥	upright position
⌐	across position
∠60°	inclined position (Installation angle indicate to the across position, for example 60°)
∠120°	

Testing voltage for executions with steel plate housing

Test voltage of the measuring range	Test voltage U_{eff}; 50 Hz	Test voltage sign
660 V	2000 V	☆
1000 V	3000 V	☆

Instructions

DIN 43700	Instruments for table installation, nominal and cut-out dimensions and sample size
DIN 43701	Electrical control panel measuring instruments
DIN 43718	Front frame and front plates
DIN 43780	Performance specifications for direct acting indicating instruments and their accessories
DIN 43802	Scales and pointers for electrical measuring instruments
DIN 16257	Nominal positons and position signs for measuring instruments
DIN 57410/VDE 0410	Safety requirements for indicating and writing measuring instruments and their accessories
VDE 0411	Protective measures for electronic measuring instruments
VDE 0110	Determinations for the measurements of the air and leakage path of electrical resources
DIN 40050	Degrees of protection; foreign material and waterproofing for electrical resources
VDE/VDI 3540 sheet 2	Reliability of measuring - control- and regulation instruments climatic classes for instruments and accessories).
DIN 43807	Connections and clamps
DIN 46200/46282	Connecting bolts
UL 94 V-0	According to the UL Burning property class
2006/95/EG	Rule of low tension
2004/108/EG	Rule of EMV

CE certified

Increasing Accuracy

Measuring accuracy on the increase 1 % (as far as possible)

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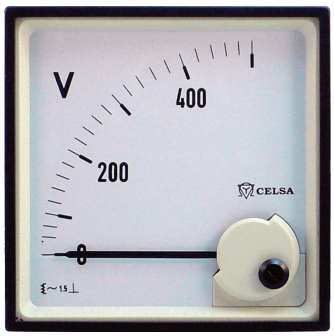
EQ - Moving iron panel instruments



- For alternating current 15 - 100 Hz
- Class 1.5

EQ35p

Type	EQ48n	EQ72n	EQ96n	EQ144n
Front frame (mm)	48x48	72x72	96x96	144x144
Scale length (mm)	41	61	97	146

Description

Moving iron panel instruments are predominantly used in the usual technical frequency range 15...100 Hz for alternating current and alternating voltage measurements in the ordinary technical frequency range 15...100 Hz.

Moving iron instruments practically show independently of the wave form - also at high harmonic content - the effective value of the alternating current.

In order to avoid overloads when starting the engines aminstruments are generally delivered with overload scales 2xIn /=100 % overload). The final scale values correspond in .../5A and in .../ 1A to those of the current transformers.
The scale course of our moving iron instruments is in the beginning a bit compact and almost linear between 10 and 100 % of the final scale value. The length of the overload scale amounts to about 10 % for a scale of 100 % overload referred to the scale length.

The setting time accounts for approximately 1 second.

Consumption of EQ moving iron panel instruments (quadratic)	
Ammeter up to 15 A	0,5 VA
Ammeter exceeding 15 A	0,8 VA
Voltmeter between	1 – 4,5 VA

Moving iron instruments can be connected in any order without observation of polarity (k-l) of the current transformer.

Moving iron instruments

Jewelled. Most modern building class with silicon oil damping. The flexible parts of the movingn iron instruments are stored in springy saphire jewels in order to protect them against crushes.

Interchangeable scales

All plastic executions (n-line) do have intercambiable scales. This scale execution enables the easy exchange or fit of the scale (not during the operating).

Execution for DIN rail mounting (EQ35p)

For measuring current and voltage in panel boards with 35 mm DIN rails according to DIN 50 022.

The instruments of this line are adapted by their dimensions to common installations devices. The installation width of the instruments of 45 mm corresponds to approx. 3 units. They can easyly be mounted on DIN rail bars by snap on mounting.
The terminals are protected against accidental contact.

The moving iron meter is jewelled with silicon oil damping.

Consumption of EQ35p	
Ammeter between	max. 0,5 VA
Ammeter 5 A	max. 0,5 VA
Voltmeter between	max. 2,5 VA
Voltmeter 100 V	max. 2,5 VA
Voltmeter 110 V	max. 2,5 VA

Table for norm-scales of voltmeters for connection to voltage transformer

* Voltmeter for connection to voltage transformer:	sec. 100 V or 110 V	
	Prim.Rated Voltage	Scale
	500 V	0... 600 V
	600 V	0... 720 V
	1 KV	0... 1,2 KV
	3 KV	0... 3,6 KV
The final scale value is 1.2 times the rated voltage, for example:	5 KV	0... 6 KV
	6 KV	0... 7,2 KV
	10 KV	0... 12 KV
for connection to transformer sec. 100 V the measuring range is 0...120 V	10 KV	0... 18 KV
	15 KV	0... 18 KV
	20 KV	0... 24 KV
for connection to transformer sec. 110 V the measuring range is 0...132 V	25 KV	0... 30 KV
	30 KV	0... 36 KV
	33 KV	0... 40 KV
	60 KV	0... 72 KV
Please indicate primary voltage, scale and secondary voltage when ordering..	100 K	0... 120 KV

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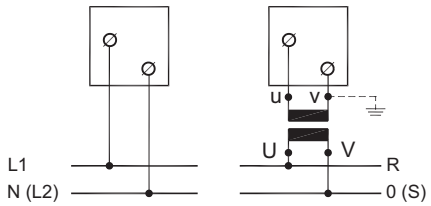
Standard Measuring Ranges

AC Voltages	AC Current
6 V	100 mA
10 V	150 mA
15 V	250 mA
25 V	400 mA
40 V	600 mA
60 V	1 A
100 V	1.5 A
120 V	2.5 A
132 V	4 A
150 V	5 A
250 V	6 A
300 V	10 A
400 V	15 A
500 V	20 A
600 V	25 A
750 V (except EQ48n/EQ35P)	30 A (except EQ35P)
	40 A (except EQ35P)
	50 A (except EQ35P)
	60 A (except EQ35P)
	100 A (except EQ48n/EQ35P)
For connection to voltage transformer	For connection to current transformer
.../100 V secondary	.../1 A secondary
.../110 V secondary	.../5 A secondary

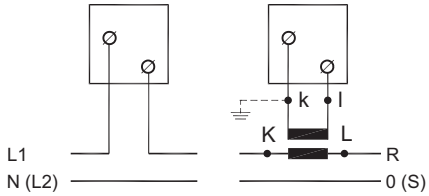
Other measuring ranges on request.

Connection diagrams

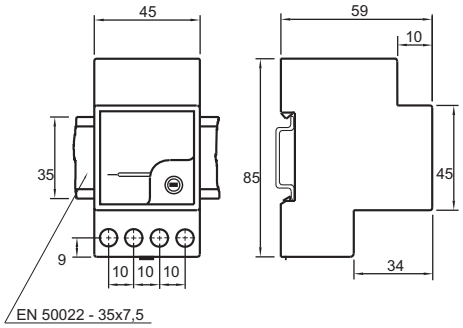
Voltmeter:



Ammeter:



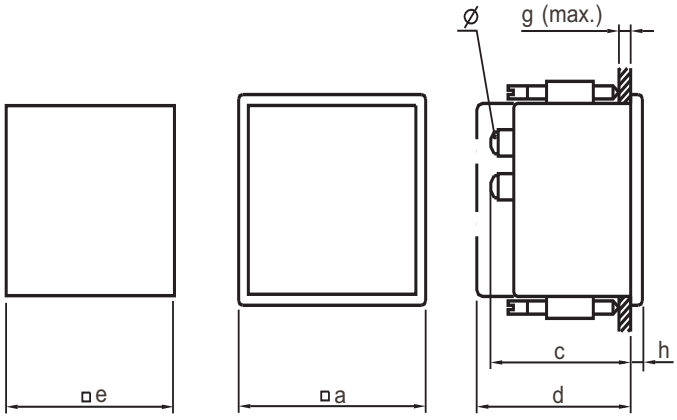
Connection diagrams EQ35p



Housing dimensions of square moving iron instruments

Dimensions in mm / Weight in gramme									
Type	Dimensions	a	c	d	e	g	h	Ø	Weight
EQ 48n	25 - 40 A	48	66	72	45 $^{+0,6}$	28	5	M6	190
	All others	48	55	62	45 $^{+0,6}$	28	5	M4	14
EQ 72n	> 60 A	72	69	77	65 $^{+0,7}$	8[1]	5	M6	23
	25 < 60 A	72	66	74	65 $^{+0,7}$	8[1]	5	M8	280
	All others	72	55	75	65 $^{+0,7}$	8[1]	5	M4	200
EQ 96n	> 60 A	96	69	77	92 $^{+0,8}$	8[1]	5	M6	320
	25 < 60 A	96	66	75	92 $^{+0,8}$	8[1]	5	M8	365
	All others	96	55	75	92 $^{+0,8}$	8[1]	5	M4	280
EQ 144n	> 60 A	144	69	77	138 $^{+1}$	41	8	M6	605
	25 < 60 A	144	66	75	138 $^{+1}$	41	8	M8	665
	All others	144	53	74	138 $^{+1}$	41	8	M4	590

Dimensions



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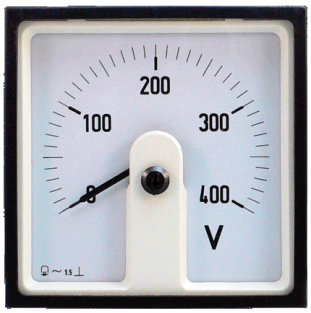
celsa

PR / PAR - Moving coil instruments with rectifier



- For direct measurement of the alternating current and voltage

or

- For connection at the current and voltage transformer
- Class 1.5

PR with 90° scale
PAR with 240° round scale

Description

These instruments do have the same features as the type PQ (see on page 4/29), but are equipped with a rectifier.

Thereby, it can be measured an alternating voltage or current up to 600 mA between 25 and 1000 Hz.

For aminstruments of 1-5 A: Frequency not exceeding 50-60 Hz.
(on request 400 Hz).

These instruments measure effective values at sinusoidal alternating currents and voltages.

Other kind of currents on request.

For measurements and intensity of currents exceeding 5A current transformers are used. (Current transformers see on chapter 5).

The scale course at voltage instruments is practically linear and resembles the moving coil panel instruments.

Overload capacity according to DIN 43780

continuously	1.2 times
Short duration	10 x I_N 5 s at aminstrument
	2 x U_N 5 s at aminstrument

Consumption

Voltmeter:	approx.. 1 mA
Ammeter:	up to 800 mA: 1 up to 1.5 V voltage drop
	from 800 mA: approx. 0.25 VA

Execution with 240° round scale (PAR...n)

These instruments are similar to the PAQ...n but have an installed rectifier to measure the alternating current or voltage.

Other technical features same as PR instruments.

Internal resistance, consumption approx.				
Measuring range	PAR 48n	PAR 72n	PAR 96n	PAR 144n
6 - 60 V	1 mA			
100 - 600 V	1.12 mA			
200 - 600 µA	0.01 - 1.64 m VA			
1 -250 mA	1.6 mVA - 0.76 VA			
400 mA - 5 A	0.38 VA			

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Standard Measuring Ranges

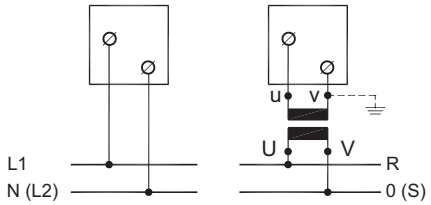
AC Voltages	AC Current PR..n	PAR..n
	60 µA	
	100 µA	100 µA
	150 µA	150 µA
	250 µA	250 µA
6 V	400 µA	400 µA
10 V	600 µA	600 µA
15 V	1 mA	1 mA
25 V	1,5 mA	1,5 mA
40 V	2,5 mA	2,5 mA
60 V	4 mA	4 mA
132 V	6 mA	6 mA
150 V	10 mA	10 mA
250 V	15 mA	15 mA
300 V	25 mA	25 mA
400 V	40 mA	40 mA
500 V	60 mA	60 mA
600 V	100 mA	100 mA
	150 mA	150 mA
	250 mA	250 mA
	400 mA	400 mA
	600 mA	600 mA
	1 A*	1 A*
	1,5 A*	1,5 A*
	2,5 A*	2,5 A*
	4 A*	4 A*
	6 A*	6 A*
	10 A*	10 A*
For connection to voltage transformer .../100 V secondary .../110 V secondary	For connection to current transformer .../1 A secondary .../5 A secondary	

*At PR48n/PAR48n with external transformers

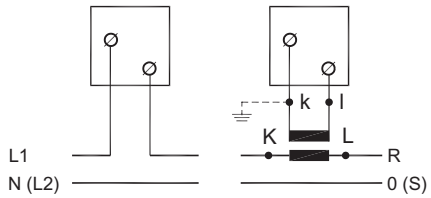
Others measuring ranges on request.

Connection diagrams

Voltmeter:



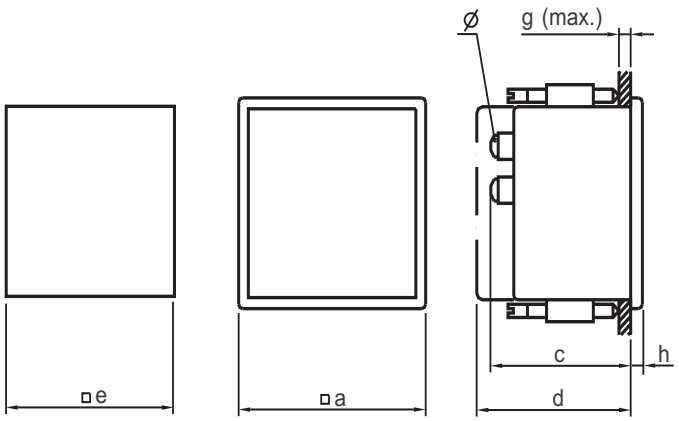
Ammeter:



Housing dimensions of quadratic moving coil instruments with installed rectifier

Dimensions in mm / Weight in gramme							
Type	a	c	d	e	g	h	Weight
PR 48n	48	55	62	45 $^{+0,6}$	28	5	280
PR 72n	72	55	74	68 $^{+0,7}$	8[1]	5	290
PR 96n	96	55	74	92 $^{+0,8}$	8[1]	5	375
PR 144n	144	53	74	138 $^{+1}$	40	5	690
PAR 48n	48	53	64	45 $^{+0,6}$	26	5	235
PAR 72n	72	53	64	68 $^{+0,7}$	40	5	560
PAR 96n	96	53	64	92 $^{+0,8}$	40	5	515
PAR 144n	144	53	64	138 $^{+1}$	40	5	740

[1] 26 mm with fixing screws



EQ..n SWT-3 / EQ..n SWT-6 Moving iron voltinstruments with integrated voltmeter switch

- Class 1.5

Description

These instruments with integrated switch can be used for measurements between phases or phase and zero. Thus only 1 instrument is needed for a 3-phases-grid.

Consumption

3,5 VA max.

Technical Features

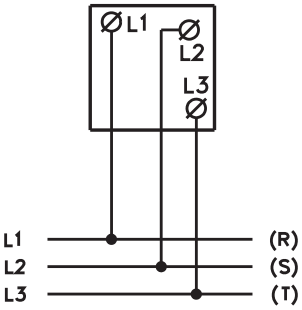
Type			EQ72n SWT-6	EQ96n SWT-6	EQ72n SWT-3	EQ96n SWT-3
Front frame (mm)			72 x 72	96 x 96	72 x 72	96 x 96
Scale length (mm)			91	97	91	97
Weight (g)			190	230	190	230
Panel cut-out (mm)			66 $^{+0,7}$	92 $^{+0,8}$	66 $^{+0,7}$	92 $^{+0,8}$
Installation depth (mm)			55	55	55	55
Switch settings	Measuring range					
6 positions without zero position L3-L1, L2-L3, L1-L2, L1-N, L2-N, L3-N	V=	150 250 300 400 500 600	● ● ● ● ● ●	● ● ● ● ● ●	– – – – – –	– – – – – –
	For connection to voltage transformer	.../100* .../110*	● ●	● ●	– –	– –
Switch settings	Measuring range					
3 position with zero position L1-L3, L2-L3, L1-L2, OFF	V=	150 250 300 400 500 600	– – – – – –	– – – – – –	● ● ● ● ● ●	● ● ● ● ● ●
	For connection to voltage transformer	.../100* .../110*	– –	– –	● ●	● ●
Terminal cover according to VGB 4 included			●	●	●	●

● available ❍ on request

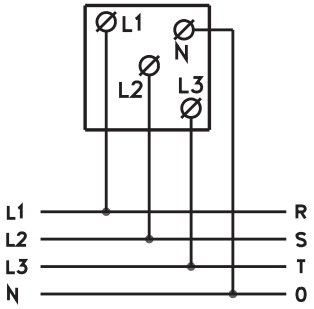
* Please indicate primary voltage and final scale value when ordering

Connection diagrams with switchable voltinstruments

EQ...SWT-3

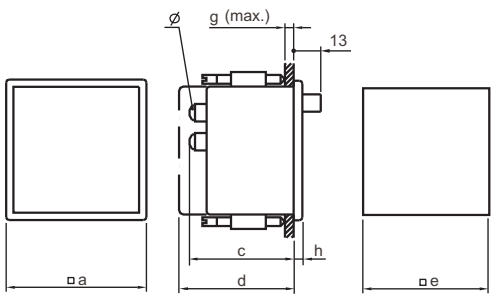


EQ...SWT-6



Housing dimensions of switchable moving iron instruments

Dimensions in mm / Weight in gramme										
Type	a	b	c	d	e	f	g	h	Ø	Weight
EQ72n SWT-3/-6	72	-	53	68	68 $^{+0,7}$	-	40	5	M4	190
EQ96n SWT-3/-6	96	-	53	68	92 $^{+0,8}$		40	5	M4	230



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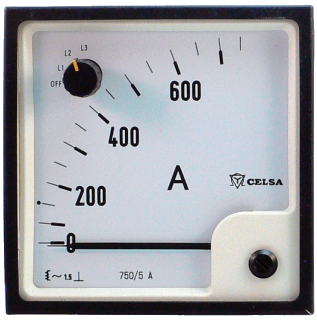
EQ..n SWT - Moving iron voltinstruments with integrated ammeter switch



- Class 1.5

Description

These instruments with integrated switch enable the measurement of current of every single phase. Thus, you only need one instrument to measure the current in a 3-phase grid.

Please indicate on order if instruments are connected directly (max. 10 A), or to a current transformer. (Please indicate ratio of current transformer).

Consumption

1 VA per phase

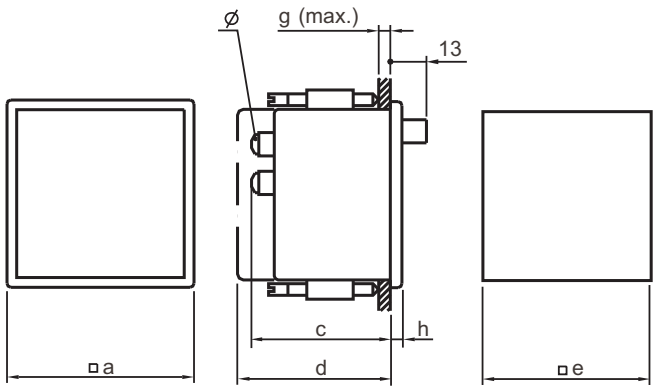
Technical Features

Type			EQ72n SWT	EQ96n SWT
Front frame (mm)			72 x 72	96 x 96
Scale length (mm)			91	97
Weight (g)			190	230
Panel cut-out (mm)			66 $^{+0,7}$	92 $^{+0,8}$
Installation depth (mm)			55	55
Switch settings	Measuring range			
4 positions L1, L2, L3, OFF	mA=	400	❍	❍
		600	❍	❍
	A=	1	❍	❍
		1,5	❍	❍
		2,5	❍	❍
		4	❍	❍
		6	❍	❍
	For connection at	.../5	●	●
	the current	.../1	●	●
Terminal cover according to VGB 4 included			●	●

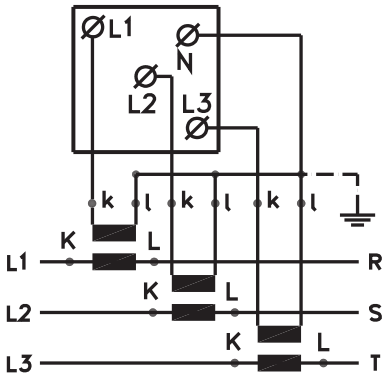
● available ❍ on request

Housing dimensions of switchable moving iron instruments

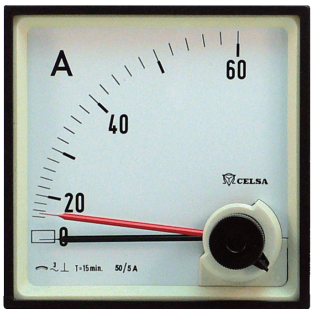
Dimensions in mm / Weight in gramme										
Type	a	b	c	d	e	f	g	h	Ø	Weight
EQ72n SWT	72	-	53	68	68 $^{+0,7}$	-	40	5	M4	190
EQ96n SWT	96	-	53	68	92 $^{+0,8}$		40	5	M4	230



Connection diagram switchable ammeter



BIQ...n - Maximum demand indicator



- Maximum power diameter with drag indicator
- Class 3
- For connection to current transformers
- Secondary 5 A or secondary 1 A
- With interchangeable scale

Description

The system of this instrument consists of 2 bimetallic spirals which are installed working one against each other.

One bimetallic spiral works electricity driven, the other bimetallic spiral compensates by working against the other the ambient temperature which can vary from -10°C up to +55 °C.

A black pointer is coupled at this system which includes a red pointer whereat this red pointer stands still on the respectively reached highest value. The bimetallic instruments are thermically time-declined and indicate the average effective value.

Short-term current peaks don't have any influence on the measuring result. The instrument has a sealable resetting knob with which the red drag indicator can be resetted on the position of the meter's movement pointer.
(Do not turn lower!).

Thermal time delay 15 min.

Maximun demand indicators are especially suited for the supervision of thermal load of cables and transformers.

Overload capacity according to DIN 43780
Continuously 1.2 times
Short duration 10 times 1s

Adjustable scale factor disc for sticking available:
The adjustable scale factor disc extends the scale by the respectively adjusted constant.

Norm-values of scale factor disc:
Type I: 1-2-2,5-3-4-5-6-7-8-9-10

Technical Features

Type		BIQ72	BIQ96n	BIQ144s
Front frame (mm)		72 x 72	96 x 96	144 x 144
Scale length (mm)		91	97	139
Consumption	.../5A	2,5 VA	2,5 VA	2,5 VA
	.../1A	1,6 VA	1,6 VA	1,6 VA
Setting time at transformer 15 min	..../5A	●	●	❍
	.../1A	●	●	❍
Transformer primary current (A) = 100%		final scale value (A) = 120% Primary rated current + 20% overload		
A	5	6	6	6
	10	12	12	12
	15	18	18	18
	20	24	24	24
	25	30	30	30
	30	36	36	36
	40	48	48	48
	50	60	60	60
	60	72	72	72
	75	90	90	90
	100	120	120	120
	125	150	150	150
	150	180	180	180
	200	240	240	240
	250	300	300	300
	300	360	360	360
	400	480	480	480
	500	600	600	600
	600	720	720	720
	750	900	900	900
	800	960	960	960
	1,0 kA	1,2 kA	1,2 kA	1,2 kA
	1,2 kA	1,4 kA	1,4 kA	1,4 kA
	1,5 kA	1,8 kA	1,8 kA	1,8 kA
	2,0 kA	2,4 kA	2,4 kA	2,4 kA
	2,5 kA	3,0 kA	3,0 kA	3,0 kA
	3,0 kA	3,6 kA	3,6 kA	3,6 kA
	4,0 kA	4,8kA	4,8kA	4,8kA
Terminal cover		●	●	●

● available ❍ on request

Backside terminal cover for protection according to VBG 4
(Please indicate when ordering)

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BOQ...n - Maximun demand indicator with additional moving iron ammeter

- Class 3 and 1.5
- For connection to current transformers
- Secondary 5 A or secondary 1 A
- With interchangeable scale

Description

These instruments consist of a bimetallic maximum demand indicator combined with a moving iron system.

The bimetallic meter movement with its drag indicator shows the maximum value, the moving iron meter the present value. They are working smoothly at temperatures between -10°C and +55°C because of their robust assembling.

The instrument has a sealable resetting knob with which the red drag indicator can be resetted on the position of the meter movement's pointer.
(Do not turn lower!).

The instruments can be furnished with a scale factor disc.

The instruments are available in the size 96 x 96 also with an added saturation current transformer.

Overload capacity according to DIN 43780

Continuously	1.2 times
Short duration	10 times 1s

Technical Features

Type		BOQ72	BOQ96n	BOQ144s
Front frame (mm)		72 x 72	96 x 96	144 x 144
Scale length (mm)	Bimetallic	52	71	90
	moving iron	61	90	90
Consumption	.../5A	3,4 VA	3,4 VA	2,7 VA
	.../1A	2,5 VA	2,5 VA	2,5 VA
Setting time at transformer 15 min	..../5A	●	●	●
	.../1A	●	●	●
Transformer primary current (A)		final scale value (A)		
		Bimetallic system	Movin iron system	
= 100%		20% overload = 120%	100% overload = 120%	
A	5	6	10	
	10	12	20	
	15	18	30	
	20	24	40	
	25	30	50	
	30	36	60	
	40	48	80	
	50	60	100	
	60	72	120	
	75	90	150	
	100	120	200	
	125	150	250	
	150	180	300	
	200	240	400	
	250	300	500	
	300	360	600	
	400	480	800	
	500	600	1,0 kA	
	600	720	1,2 kA	
	750	900	1,5 kA	
	800	960	1,6 kA	
	1,0 kA	1,2 kA	2,0 kA	
	1,2 kA	1,4 kA	2,4 kA	
	1,5 kA	1,8 kA	3,0 kA	
	2,0 kA	2,4 kA	4,0 kA	
	2,5 kA	3,0 kA	5,0 kA	
	3,0 kA	3,6 kA	6,0 kA	
	4,0 kA	4,8kA	8,0 kA	
Terminal cover	●	●	–	

● available ❍ on request

Backside terminal cover for protection according to VBG 4

(Please indicate when ordering)

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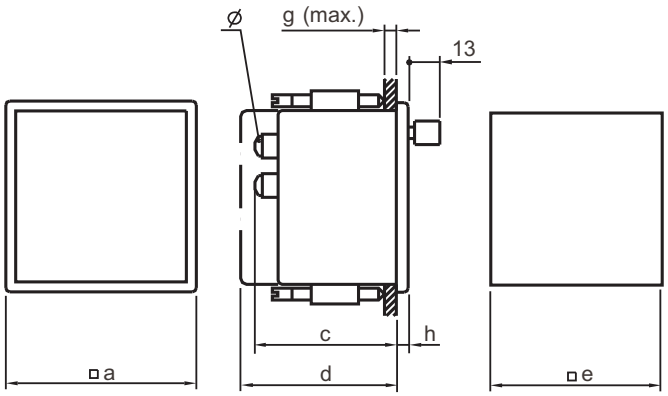
BIQ...n - BOQn

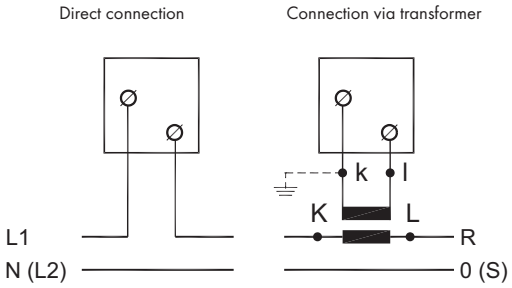
Housing dimensions of bimetallic moving iron panel instruments

Dimensiones in mm / Weight in gramme									
Type	Dimensions	a	c	d	e	g	h	Ø	Weight
BIQ72n	.../5 A	72	55	74	$68^{+0,7}$	8[1]	4,6	M6	190
	.../1 A	72	55	74	$68^{+0,7}$	8[1]	4,6	M4	190
BIQ96n	.../5 A	96	55	74	$92^{+0,8}$	8[1]	5	M6	250
	.../1 A	96	55	74	$92^{+0,8}$	8[1]	5	M8	250
BIQ144s	.../5 A	144	70	-	138^{+1}	10	8	M4	625
	.../1 A	144	70	-	138^{+1}	10	8	M6	750
BOQ72n	.../5 A	72	55	74	$68^{+0,7}$	8[1]	4,6	M8	230
	.../1 A	72	55	74	$68^{+0,7}$	8[1]	4,6	M4	220
BOQ96n	.../5 A	96	55	74	$92^{+0,8}$	8[1]	5	M6	290
	.../1 A	96	55	74	$92^{+0,8}$	8[1]	5	M8	280
BEQ144s	.../5 A	144	70	-	138^{+1}	10	8	M4	680
	.../1 A	144	70	-	138^{+1}	10	8	M4	795

[1] 26 mm with fixing screws



Connection diagrams BIQ / BOQ



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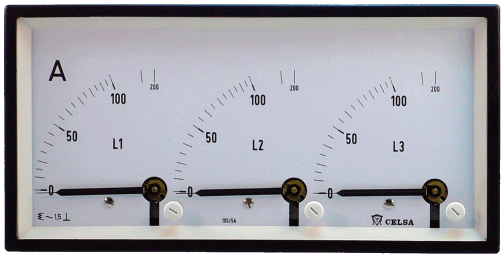
EQ 192 x 96 - Triple instruments



- Triple combination with moving iron movements
- Class 1.5 according to DIN 43780
- Housing by DIN 43700
- In a rectangular housing 192 x 96 mm, positioned side by side, or on top of each other

Description

Standard execution:

3 movements, positioned side-by-side.

These instruments are suited for alternating current 50 ... 100 Hz for simultaneous supervision of 3 phases in a three phase system. All moving iron ammeters have 2 times overload range.

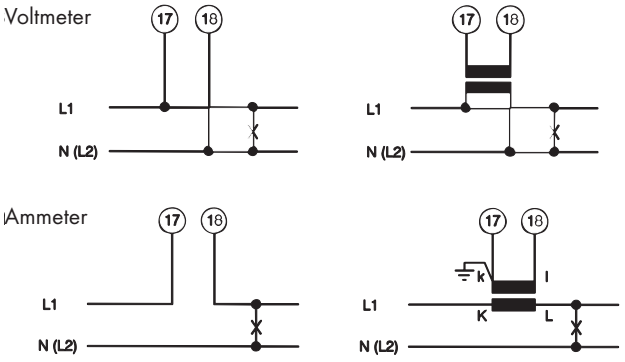
On request:

3 movements positioned on top of each other

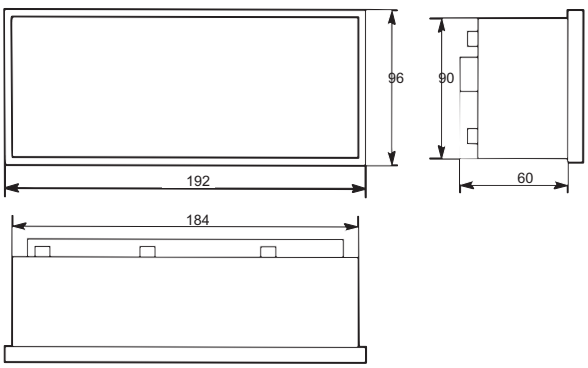
Backside plastic caps as back of hand protection according to VBG 4. (Please indicate when ordering).

If there are no different indications, the standard execution is delivered: movements arranged side by side.

Connection diagrams



Dimensions



Technical Features

Type		EQ 192 x 96 side by side	EQ 192 x 96 on top of each other
Front frame	(mm)	192 x 96	192 x 96
Panel cut-out	(mm)	$186^{+1,1}$ x $92^{+0,8}$	$186^{+1,1}$ x $92^{+0,8}$
Installation depth	(mm)	60	60
Scale length	(mm)	3 x 72	3 x 72
Weight	(Kg)	0,9	0,9
Measuring range mA~	100/ 200	●	●
	150/ 300	●	●
	250/ 500	●	●
	400/ 800	●	●
	600/ 1200	●	●
A~	1/2	●	●
	1,5/3	●	●
	2,5/5	●	●
	4/8	●	●
	6/12	●	●
	10/20	●	●
	15/30	●	●
	25/50	●	●
For transformer connection with 2 times overload capacity			
	.../1 A	●	●
	.../5 A	●	●
V~	6	●	●
	10	●	●
	15	●	●
	25	●	●
	40	●	●
	60	●	●
	100	●	●
	150	●	●
	250	●	●
	400	●	●
	500	●	●
	600	●	●
For transformer connection with 2 times overload capacity			
	.../1 A	●	●
	.../5 A	●	●

● available ❍ on request

Backside terminal cover for protection according to VBG 4

(Please indicate when ordering)

Attention:

Please request the moving coil execution separately.

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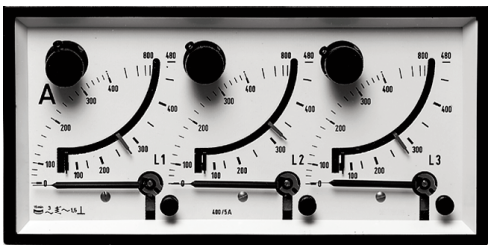
BOQ 192 x 96 - Triple Maximun demand indicators



- Triple combination with bimetallic - or combined bimetallic - moving iron movements
- Class 3 / 1.5 according to DIN 43780
- Housing according to DIN 43700
- In a rectangular housing192 x 96 mm, positioned side by side, or on top of each other

Description

Standard execution:

3 movements, positioned side by side

On request:

3 movements, positioned on top of each other

Class 1.5 (moving iron movement)

Indication error max. ± 3 % (bimetallic, movement) referred to the drag indicator.

Housing according to DIN 43700.

Backside plastic caps as back of hand protection according to VBG 4. (Please indicate when ordering).

Attention:

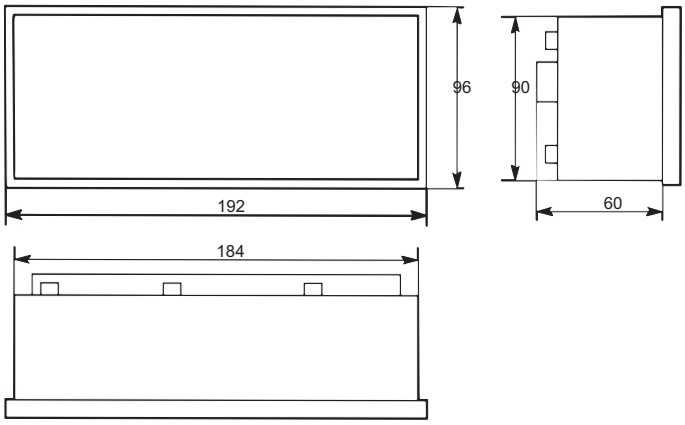
If there are no different indications the standard execution is delivered.

Technical Features BoQ

Maximum ammeter with bimetallic movement		BOQ 192 x 96 side by side	BOQ 192 x 96 on top of each other
Front frame	(mm)	192 x 96	192 x 96
Panel cut-out	(mm)	$186^{+1,1}$ x $92^{+0,8}$	$186^{+1,1}$ x $92^{+0,8}$
Installation depth	(mm)	60	60
Scale length	(mm)	70 74	70 74
Weight	(Kg)	1,0	1,0
3 bimetallic movements			
Setting time	15 min	●	●
on demand	8 min	●	●
Consumption moving iron and bimetallic at 1 A nominal current		3 x 2 VA	3 x 2 VA
Consumption moving iron and bimetallic at 5 A nominal current		3 x 4 VA	3 x 4 VA
Transformer connection	.../1 A	●	●
	.../5 A	●	●
Indicate nominal transformer current Measuring range end value = 1.2 times the nominal transformer current			

● available ❍ on request

Dimension diagrams



Backside terminal cover for protection according to VBG 4

(Please indicate when ordering)

Connection diagrams

Ammeter

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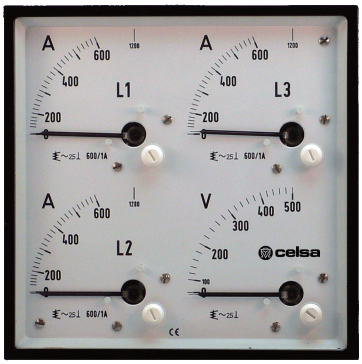
EQ...sK - Quadruple instruments



- Combination as three moving iron ammeter and one moving iron voltmeter
- class 2.5
- Housing 96 x 96 mm or 144 x 144 mm

Description

4 side by side arranged moving instruments. Each with 3 aminstruments for transformer connection .../1 A or .../5 A and a voltmeter in a housing. These instruments are suited to the alternating current 15 ... 50 ... 100 Hz for synchronic supervision of 3 phases and the tension in three phase systems. All moving iron aminstruments have 2 times overload range, voltmeter have 1.2 times overload range.

Moving iron meter

Jewelled. Most modern building class with silicon oil damping. The flexible parts of the moving instruments are stored in springy saphire jewels in order to protect them against crushes.

Please indicate when ordering:

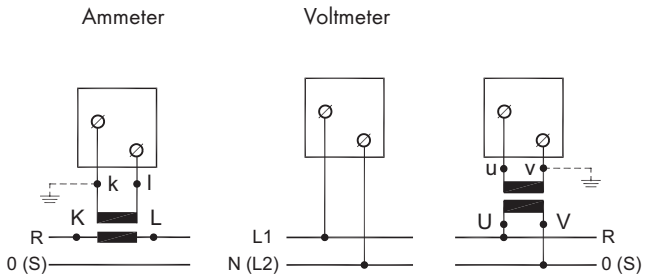
1) Housing size (96 x 96 or 144 x 144)
2) Primary and secondary current for aminstruments
3) Voltage measuring range for voltinstruments

Technical Features

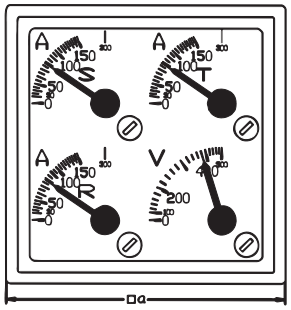
Maximum flowmeter with bimetallic moving meter		EQ 96sK		EQ 144sK	
Front frame	(mm)	96 x 96		144 x 144	
Panel cut-out	(mm)	$92^{+1,1}$ x $92^{+0,8}$		$138^{+1,1}$ x $138^{+0,8}$	
Installation depth	(mm)	76		76	
Scale length	(mm)	4 x 40		4 x 67	
Weight	(Kg)	0,7		0,8	
Measuring range Voltage		Transformer connection		Transformer connection	
		.../1A	.../5A	.../1A	.../5A
V ~	100	●	●	●	●
	150	●	●	●	●
	250	●	●	●	●
	400	●	●	●	●
	500	●	●	●	●
	600	●	●	●	●
For transformer connection with 1.2 times overload range					
	.../100 V	●	●	●	●
	.../110 V	●	●	●	●

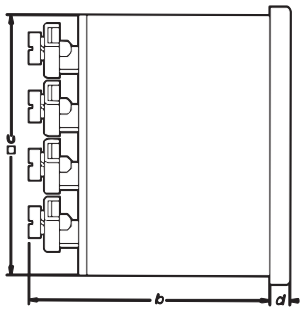
● available ❍ on request

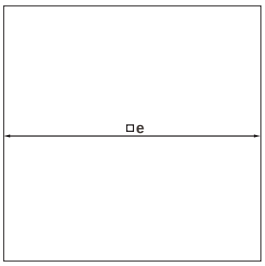
Connection diagrams



Dimensions in mm					
Type	❑ a	b	c	❑ d	e
EQ 96sK	96	76	90	7	$98^{+0,8}$
EQ 144sK	144	76	135	7	138^{+1}







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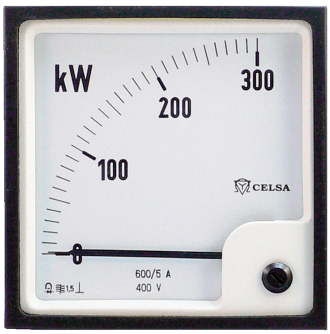
DQ...n - Electronic Active Power Instrument (Wattmeter)



- For alternating current 50-60 Hz
- Class 1.5
- Scale 90°

Description

The system consists of a moving coil meter with installed transducers which measures the active power in a sinusoildal or not sinusoidal current circuit and which transformes it into an analogue signal. This is then passed to the moving coil movement. The standardized scale final values are 1 - 1,2 - 1,5 - 2 - 2,5 - 3 - 4 - 5 - 6 - 8 and respectively the decimal multiples of those. Other values on request.

Consumption

The consumption per current path is < 0.2 VA

The current consumption in the voltage path amounts to: < 3.9 VA

When ordering power instruments please indicate

1. Kind of current as for example an one-phase alternating current or three-phase current with or without zero conductor, equally or unequally loaded.
2. The voltage between phases and between phase and zero conductor.

When using voltage transformers please indicate the operating voltage, ratio and the switching of transformers (At more than 500V voltage transformers are required).

3. The current (max. 5 A directly). When using current transformers also indicate the ratio.
4. Indication of scale end-value at active power:

If not indicated we proceed as follows:

a) for one-phase alternating current net

P (W) = U (V) x I (A)

b) for three-phase net

P (W) = U (V) x I (A) x Ã3 x cos. φ.

If the cos. φ. is unknown, we use the value 1 for our calculations.

Technically realizable scale end-values: : P* 0.5 up to 1.2

Indication of scale end-value at reactive power:

a) for one-phase alternating current net

Q (var) = U (V) x I (A) x sin. φ.

b) for three-phase net

Q (var) = U (V) x I (A) x Ã3 x cos. φ.

If the cos. φ. is unknown, we use the value 1 for our calculations.

Technically realizable scale end-values: Q* 0.5 up to 1.2

If the zero point shouldn't be at the beginning of the scale but within the scale-range (wattmeter for the simultaneous capture of import and export) the required on the left and right of the zero point have to be indicated to.

Active power instruments indicate with the needle's deflection to the right of the zero point the import of active power and on the left of the zero point the export of active power, for example,100-0-100 kW. The same is valid for reactive power instruments.

Overload capacity according to DIN 43780

Current and voltage paths can be continuously overloaded for 20 %.

Technical Features

Front frame (mm)			96 x 96	144 x 144
Scale length (mm)			97	146
Weight (g)			a = 650 b = 650 c = 750 d = 900	a = 900 b = 950 c = 1000 d = 1100
Measuring range	U (V)	I (A)	Type	Type
One phase alternating current			**DQ 96n/1w**	**DQ 144n/1w**
a ~	57,7 - 63,5 100 - 110 - 127	5	●	●
	230 - 400	1	●	●
Three-phase current balanced load			**DQ 96n/1d**	**DQ 144n/1d**
b ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase current unbalanced load			**DQ 96n/2**	**DQ 144n/2**
c ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current balanced load			**DQ 96n/1**	**DQ 144n/1**
d ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current unbalanced load			**DQ 96n/3**	**DQ 144n/3**
e ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●

● available ❍ on request

Connection diagrams see page 4/19.

Dimension diagrams at DQ..n/b. (see page 4/16)

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DQ..n/b - Electronic Reactive Power Instruments (Varmeter)

- For alternating current 50-60 Hz
- Class 1.5
- Scale 90°

Description

The system consists of a moving coil movement with installed transducer which measures the reactive power in a sinusoidal or not sinusoidal current circuit and which transforms it into an analogue signal. This is then passed to the moving coil movement. These instruments have the same system and all technical explanations as our active power meter. (See page 4/21)

The standardized scale end-values are 1-1,2-1,5-2-2,5-3-4-5-6-8 and respectively the decimal multiples of those. Other values on request.

Consumption

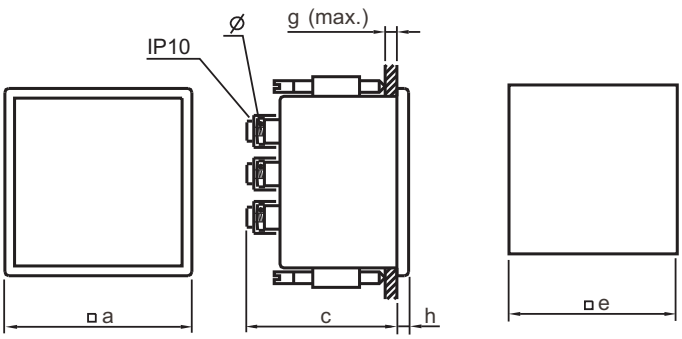
The consumption per current path is < 0,2 VA

The current consumption in the voltage path is < 3,9 VA

Required ordering indications see at DQ..n. (see page 4/15)

Housing dimensions 90° wattmeter/varmeter

Dimensions in mm / Weight in gramme						
Type	a	c	e	g	h	Ø
DQ 96n / DQ 96n/b	96	134	$92^{+0,8}$	40	5,5	M4
DQ 144n / DQ 144n/b	144	134	138^{+1}	40	5,5	M4



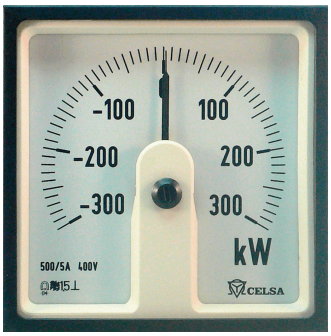
Technical Features

Front frame (mm)			96 x 96	144 x 144
Scale length (mm)			97	146
Weight (g)			a = 460 b = 510 c = 695 d = 725	a = 720 b = 770 c = 960 d = 990
Measuring range	**U (V)**	**I (A)**	**Type**	**Type**
One phase alternating current			**DQ 96n/1wb**	**DQ 144n/1wb**
a ~	57,7 - 63,5 100 - 110 - 127	5	●	●
	230 - 400	1	●	●
Three-phase current balanced load			**DQ 96n/1db**	**DQ 144n/1db**
b ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase current unbalanced load			**DQ 96n/2b**	**DQ 144n/2b**
c ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current balanced load			**DQ 96n/1b**	**DQ 144n/1b**
d ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current unbalanced load			**DQ 96n/3b**	**DQ 144n/3b**
e ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●

● available ❍ on request

Connection diagrams see page 4/19.

DAQ...n - Electronic Active Power Instrument (Wattmeter)



- For alternating current 50-60 Hz
- Class 1.5
- Scale 240°

Description

The system consists of a moving coil movement with installed transducer which measures the reactive power in a sinusoidal or not sinusoidal current circuit and which transformes it into an analogue signal. This is possed to the moving coil movement. These instruments have the same system and all technical explanations as our active power meter.

The standardized scale final values are 1-1,2-1,5-2-2,5-3-4-5-6-8 and respectively the decimal multiples of those. Other values on request.

Consumption

The consumption per current path is < 0,2 VA

The current consumption in the voltage path is < 3,9 VA

When ordering please indicate power meter

1. Kind of current as for example an one-phase alternating current or three-phase with or without zero conductor, equally or unequally loaded.
2. The voltage between phases and between phase and zero conductor.

When using voltage transformers please indicate the operating voltage, ratio and the switching of transformers (At more than 500V voltage transformers are required).

3. The current (max. 5 A directly). When using the current transformers also indicate the ratio.
4. Indication of scale end-value at active power:

If not indicated we proceed as follows:

a) for one-phase alternating current net

P (W) = U (V) x I (A)

b) for three-phase net

P (W) = U (V) x I (A) x Ã3 x cos. φ.

If the cos. φ. is unknown, we use the value 1 for our calculations.

Technically realizable final scale values: : P* 0.5 up to 1.2

Indication of scale end-value at reactive power:

a) for an one-phase alternating current net

Q (var) = U (V) x I (A) x sin. φ.

b) for a three-phase moving current net

Q (var) = U (V) x I (A) x Ã3 x cos. φ.

If the cos. φ is unknown, we use the value 1 for our calculations.

Technically realizable final scale values: Q* 0.5 up to 1.2

If the zero point shouldn't be at the beginning of the scale but within the scale-range (wattmeter for the simultaneous capture of import and export the required ranges on the left and right of the zero point have to be indicated. Active power instruments show with the needle's deflection to the right of the zero point import of active power and on the left of the zero point the export of active power, for example,100-0-100 kW. The same is valid for reactive power instruments.

Overload capacity according to DIN 43780

Current and voltage paths can be continuously overloaded for 20 %.

Technical Features

Front frame (mm)			96 x 96	144 x 144
Scale length (mm)			142	230
Weight (g)			a = 460 b = 510 c = 695 d = 725	a = 900 b = 950 c = 1000 d = 1100
Measuring range	U (V)	I (A)	Type	Type
One phase alternating current			**DAQ 96n/1w**	**DAQ 144n/1w**
a ~	57,7 - 63,5 100 - 110 - 127	5	●	●
	230 - 400	1	●	●
Three-phase current balanced load			**DAQ 96n/1d**	**DAQ 144n/1d**
b ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase current unbalanced load			**DAQ 96n/2**	**DAQ 144n/2**
c ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current balanced load			**DAQ 96n/1**	**DAQ 144n/1**
d ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current unbalanced load			**DAQ 96n/3**	**DAQ 144n/3**
e ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●

● available ❍ on request

Connection diagrams see page 4/19.

Dimension diagrams see at DAQ..n/b.(see page 4/18).

DAQ..n/b - Electronic Reactive Power Instruments (Varmeter)

- For alternating current 50-60 Hz
- Class 1.5
- Scale 240°

Description

The system consists of a moving coil movement with installed transducer which measures the reactive power in a sinusoidal or not sinusoidal current circuit and which transformes it into an analogue signal. This is then passed to the moving coil movement. These instruments have the same system and all technical explanations as our active power meter.
The standardized scale final values are 1-1,2-1,5-2-2,5-3-4-5-6-8 and respectively the 10-,100-, 1000 times etc. Other values on request.

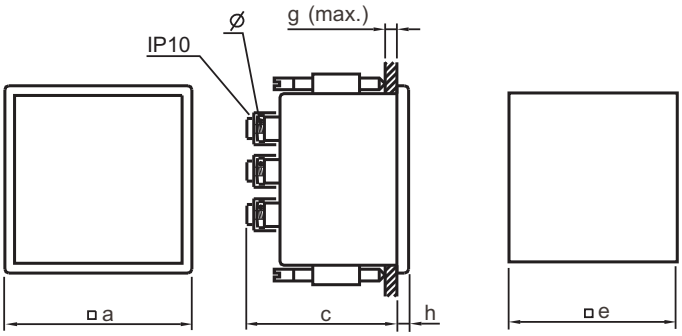
Consumption

The consumption per current path amounts to: < 0,2 VA
The current consumption in the voltage path amounts to: < 3,9 VA

Required ordering indications see at DAQ..n (see page 4/17).

Housing dimensions 240° wattmeter/varmeter

Dimensions in mm / Weight in gramme						
Type	a	c	e	g	h	Ø
DAQ 96n / DAQ 96n/b	96	134	$92^{+0,8}$	40	5,5	M4
DAQ 144n / DAQ 144n/b	144	134	138^{+1}	40	5,5	M4



Technical Features

Front frame (mm)			96 x 96	144 x 144
Scale length (mm)			142	230
Weight (g)			a = 460 b = 510 c = 695 d = 725	a = 720 b = 770 c = 960 d = 990
Measuring range	U (V)	I (A)	Type	Type
One phase alternating current			**DAQ 96n/1wb**	**DAQ 144n/1wb**
a ~	57,7 - 63,5 100 - 110 - 127	5	●	●
	230 - 400	1	●	●
Three-phase current balanced load			**DAQ 96n/1db**	**DAQ 144n/1db**
b ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase current unbalanced load			**DAQ 96n/2b**	**DAQ 144n/2b**
c ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current balanced load			**DAQ 96n/1b**	**DAQ 144n/1b**
d ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●
Three-phase 4-wire current unbalanced load			**DAQ 96n/3b**	**DAQ 144n/3b**
e ≋	100 - 110 - 230 400	5	●	●
	440 - 500	1	●	●

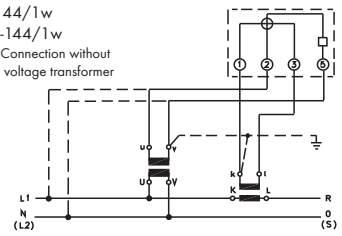
● available ❍ on request

Connection diagrams see page 4/19.

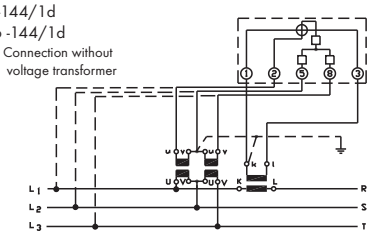
Diagram of connections for power instruments and power factor instruments

Active power instrument

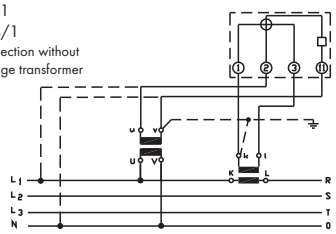
DQ -96 -144/1w
DAQ -96 -144/1w
Connection without voltage transformer



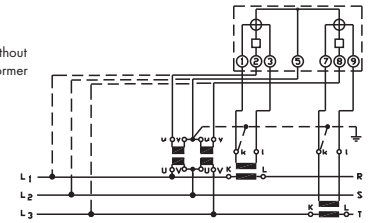
DQ -96 -144/1d
DAQ -96 -144/1d
Connection without voltage transformer



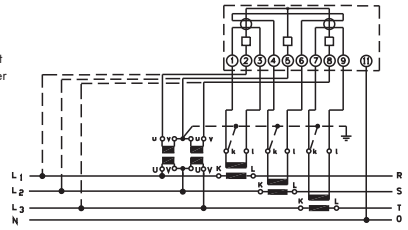
DQ -96 -144/1
DAQ -96 -144/1
Connection without voltage transformer



DQ -96 -144/2
DAQ -96 -144/2
Connection without voltage transformer

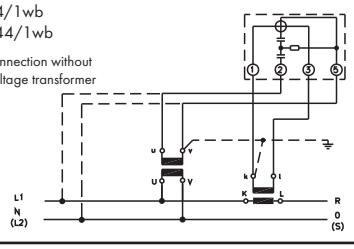


DQ -96 -144/3
DAQ -96 -144/3
Connection without voltage transformer

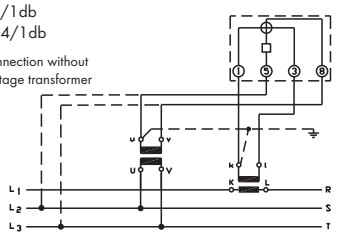


Reactive power instrument

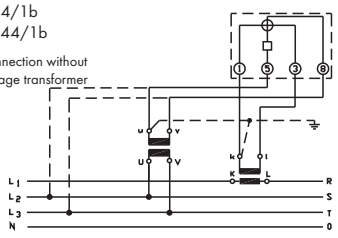
DQ -96 -144/1wb
DAQ -96 -144/1wb
Connection without voltage transformer



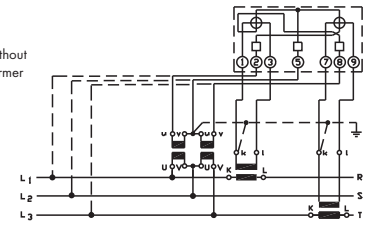
DQ -96 -144/1db
DAQ -96 -144/1db
Connection without voltage transformer



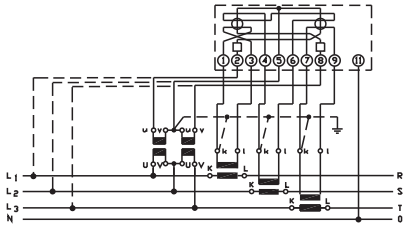
DQ -96 -144/1b
DAQ -96 -144/1b
Connection without voltage transformer



DQ -96 -144/2b
DAQ -96 -144/2b
Connection without voltage transformer

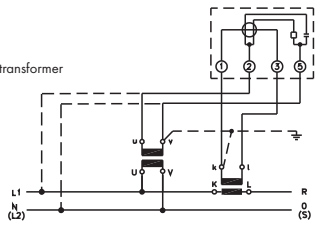


DQ -96 -144/3b
DAQ -96 -144/3b
Connection without voltage transformer

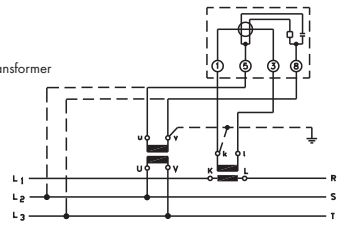


Power factor instrument

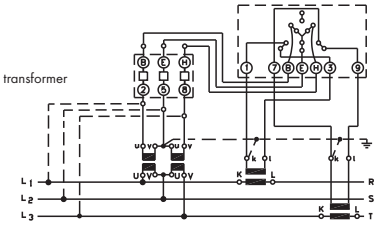
DPQ 72n-96n-144n / 1
EPA 72n-96n-144n / 1
Connection without voltage transformer



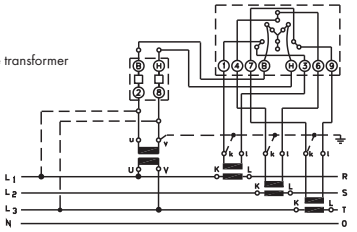
DPQ 72n-96n-144n / 2
EPA 72n-96n-144n / 2
Connection without voltage transformer



DPQ 96n-144n / 3
3-wire connection
Connection without voltage transformer



DPQ 96n-144n / 3
4-wire connection
Connection without voltage transformer



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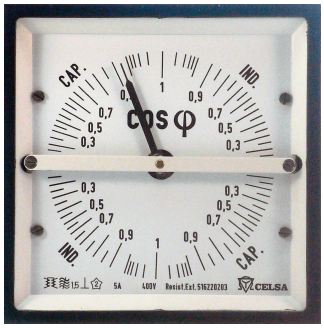
DPQ - Electronic Power Factor Instruments

DPQ/1



DPQ/3

- With moving coil movement or induction quotient movement
- Class 1.5
- For alternating current 50 - 60 Hz

Description DPQ/1/2 with moving coil movement

These instruments measure the cos.φ. value (power factor). Our types DPQ... n/1 and DPQ...n/2 have a moving coil movement with 90° scale.

Standard scale execution:

cap. 0,5-1-0,5 ind.
cap. 0,8-1-0,3 ind.
cap. 0,8-1-0,8 ind.

The type DPQ/1/2 measures the power factor in a three-phase network with balanced load.

Description DPQ/3 with induction quotient movement:

The type DPQ.../3 has an induction quotient movement and is used to measure the power factor in three phase equal or unequal loaded nets with or without zero conductor. The scale is 360° to collect all values of cos.φ capacitive or inductive imported or exported energy.

Minimun: $I_{min}=I_N \times 0.2$

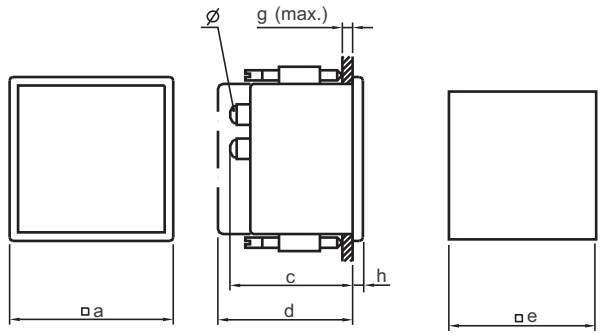
Technical Features DPQ/1/2

Front frame (mm)		72 x 72	96 x 96	144 x 144
Scale length (mm)		61	97	146
Weight (g)		550	600	800
Consumption	Current path 5 A	max. 1 VA	max. 1 VA	max. 1 VA
	Current path 1 A	max. 1 VA	max. 1 VA	max. 1 VA
	Voltage path	max. 3 VA	max. 3 VA	max. 3 VA
Voltage U (V)	Current path I (A)	Type	Type	Type
One phase alternating current	~	**DPQ 72n/1**	**DPQ 96n/1**	**DPQ 144n/1**
57,5 - 100 - 110 - 120 220 - 230 - 240	5	●	●	●
380 - 400 440 - 500	1	●	●	●
Three-phase current balanced load	≋	**DPQ 72n/2**	**DPQ 96n/2**	**DPQ 144n/2**
57,5 - 100 - 110 - 120 220 - 230 - 240	5	●	●	●
380 - 400 440 - 500	1	●	●	●
Terminal cover		●	●	●

● available ❍ on request

Housing dimensions power factor meter

Dimensions in mm / Weight in gramme								
Type		a	c	d	e	g	h	Ø
DPQ 72n/1 -/2	from 240 V	72	55	65	68 $^{+0,7}$	40	4,6	M4
	until 380 V	72	106	132	68 $^{+0,7}$	40	4,6	M4
DPQ 96n/1 -/2	from 240 V	96	55	65	92 $^{+0,8}$	40	5	M4
	until 380 V	96	106	132	92 $^{+0,8}$	40	5	M4
DPQ 144n/1 -/2	from 240 V	144	53	63	138 $^{+1}$	40	5,5	M4
	until 380 V	144	53	63	138 $^{+1}$	40	5,5	M4
DPQ 96s/3		96	125	151	92 $^{+0,8}$	10	5	M4
DPQ 144s/3		144	136	162	138 $^{+1}$	10	5	M4



Technical Features DPQ/3

Front frame (mm)		96 x 96	144 x 144
Scale length (mm)		200	320
Weight (g) (with external shunt)		1450	2400
Consumption		max. 30 mA	max. 3.5 VA
Voltage U (V)	Current path I (A)	Type	Type
Three-phase current balanced load ≋	20 ... 120%	**DPQ 96s/3**	**DPQ 144s/3**
100 - 110 230 ±15	5	●	●
400 440	1	●	●
Terminal cover		❍	❍

● available ❍ on request

Diagrams of connecton see page 4/19.

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EPA...n - Electronic Power Factor Instruments

- For alternating current 50-60 Hz
- Class 1.5
- Scale 240°

Description

These instruments measure the cos φ. value. Our type EPA has a moving coil meter movement that shows by an electronic circuit the phase shift between voltage and current (cos. φ). Scales are available between 90° and 260° phase shift, as well as capacitive and inductive.

Standard scale execution:

cap. 0,5-1-0,5 ind.
cap. 0,8-1-0,3 ind.
cap. 0,8-1-0,8 ind.

Data:

Temperature drift	0,08 % per °C.
Consumption per voltage path	approx. 3 VA
Consumption per current path	approx. 1 VA
Admissible deviation of voltage	$U=U_N \pm 15\%$
Minimal current:	$I_{min}=I_N \times 0,2$

Notice: If I < 0,1 the cos. φ. is outside of the measuring range.

Technical Features

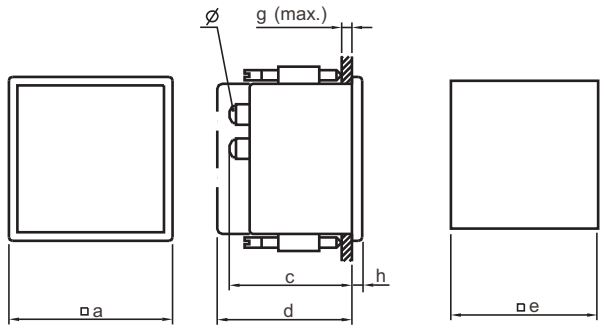
Front frame (mm)		72 x 72	96 x 96	144 x 144
Scale length (mm)		106	142	230
Weight (g)		550	680	800
Voltage U (V)	Current path I (A)	Type	Type	Type
One phase alternating current	~	**EPA 72n/1**	**EPA 96n/1**	**EPA 144n/1**
57,7 - 100 - 110 - 120 220 - 230 240	5	●	●	●
380 - 400 440 - 500	1	●	●	●
Three-phase current balanced load	≋	**EPA 72n/2**	**EPA 96n/2**	**EPA 144n/2**
57,7 - 100 - 110 - 120 220 - 230 240	5	●	●	●
380 - 400 440 - 500	1	●	●	●
Terminal cover		❍	❍	❍

● available ❍ on request

Connection diagrams see page 4/19.

Housing dimensions power factor meter

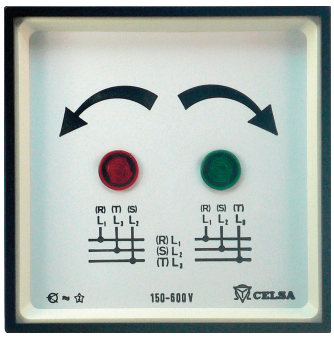
Dimensions in mm							
Type	a	c	d	e	g	h	Ø
EPA 72n/1 -/2	72	106	132	68 $^{+0,7}$	40	4,6	M4
EPA 96n/1 -/2	96	106	132	92 $^{+0,8}$	40	5	M4
EPA 144n/1 -/2	144	53	63	138 $^{+1}$	40	5,5	M4



Backside terminal cover for protection according to VBG 4

(Please indicate when ordering.)

ISE - Phase sequence indicators



- ISE/1 for three-phase current
- ISE/2 for three-phase current with switch contact

Description

These instruments are constructed without any movable parts. Their construction is electronic.Phase sequence indicator serve to determine the phase sequence in 3-phase systems. These instruments 72s/1 and ISE 96s/1 are suited for the permanent connection at voltages between 150 and 600 V. If the phases are connected in accordance with the clamp name the green control lamp flashes. Otherwise the red control lamp flashes.For type ISE 96s/2 the rated voltage has to be indicated. It is an instrument with switch contact. As soon as the red control lamp flashes the control unit is activated. A relay output is available with an isolated switch-over contact.

Technical Features ISE96/2:

Voltage:	110 / 230 / 400 / 440 V
	50 or 60 Hz
Switching range:	U_N +20 % up to -20% U_N
Relay output:	1 isolated change-over contact (changer)
Switching capacity at ohmic load:	1 x10^6.
Maximal switching current:	6 A, 250 V max. 300 W at alternating voltage

Technical Features

Type	ISE 72n/1	ISE 96n/1	ISE 96fs/2
Front frame (mm)	72 x 72	96 x 96	96 x 96
Weight (g)	200	250	600
Consumption	1,5	1,5	1,5
Voltage (V)			
150 - 600 V	●	●	–
110 V	–	–	❍
230 V	–	–	❍
400 V	–	–	●
440 V	–	–	❍
500 V	–	–	❍
Terminal cover	●	●	●

● available ❍ on request

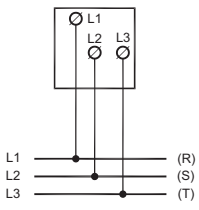
Backside terminal cover for protection according to VBG 4

(Please indicate when ordering.)

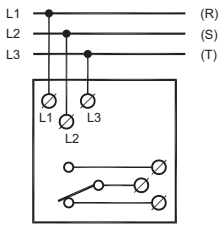
Connection diagrams:

ISE 72n/1

ISE 96n/1

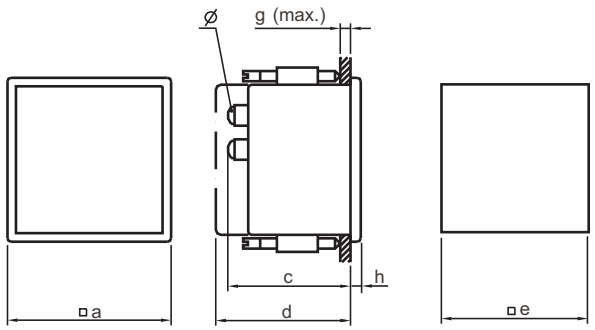


ISE96s/2



Housing dimensions phase sequence indicators

Dimensions in mm							
Type	a	c	d	e	g	h	Ø
ISE 72n/1	72	58	76	68 $^{+0,7}$	40	4,6	M4
ISE 96n/1	96	58	76	92 $^{+0,8}$	40	5	M4
ISE 96fs/2	96	78	95	92 $^{+0,8}$	10	5	M4



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FA...n / FAG...n - Pointer Type Frequency Instruments

FA

FAG

- With moving coil movement and built-in transducer
- FA with 90° scale
- FAG with 240° round scale

Description

These instruments offer a moving coil movement with an electronic transducer.The movements are jewelled and shock-proofed by sprung jewel stoking.The display is mainly independent of curves, form errors and fluctuations of the measurement voltage.

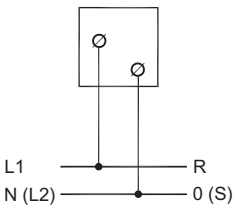
Admissible change in rating voltage: ± 20 %
External magnet field: 0.5 mT

Special feature type FAG:

The large scale length enables a very exact determination of frequency.

The following types are available on request:
FA 48n FAG 48n FAG 144n

Connection diagram

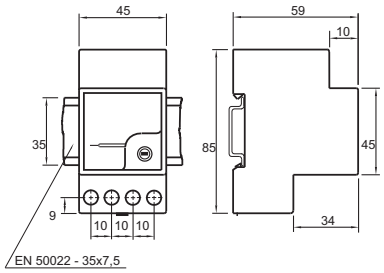


Technical Features

Type		FA 35p	FA 72n	FA 96n	FA 144n	FAG 72n	FAG 96n
Front frame (mm)		45 x 45	72 x 72	96 x 96	144 x 144	72 x 72	96 x 96
Scale length (mm)		40	63	97	146	106	142
Weight		165	210	280	490	210	280
Consumption			< 7VA	< 7VA	< 7VA	< 7VA	< 7VA
Range (Hz)	**U(V)**						
45 - 55	100	●	●	●	●	●	●
45 - 55	110	●	●	●	●	●	●
45 - 55	230	●	●	●	●	●	●
45 - 55	400	●	●	●	●	●	●
45 - 55	440	●	●	●	●	●	●
45 - 55	500	❍	❍	❍	❍	❍	❍
45 - 65	100	●	●	●	●	●	●
45 - 65	110	●	●	●	●	●	●
45 - 65	230	●	●	●	●	●	●
45 - 65	400	●	●	●	●	●	●
45 - 65	440	●	●	●	●	●	●
45 - 65	500	❍	❍	❍	❍	❍	❍
55 - 65	100	●	●	●	●	●	●
55 - 65	110	●	●	●	●	●	●
55 - 65	230	●	●	●	●	●	●
55 - 65	400	●	●	●	●	●	●
55 - 65	440	●	●	●	●	●	●
55 - 65	500	❍	❍	❍	❍	❍	❍
Terminal cover		-	●	●	●	●	●

● available ❍ on request

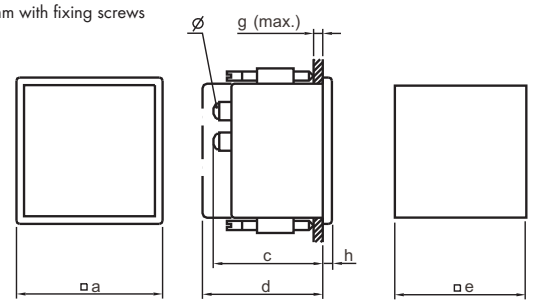
Connection diagram FA35p



Housing dimensions pointer type frequency instruments

Dimensions in mm							
Type	a	c	d	e	g	h	Ø
FA 72n	72	55	75	68 $^{+0,7}$	8[1]	4,6	M4
FA 96n	96	55	75	92 $^{+0,8}$	8[1]	5	M4
FA 144n	144	53	53	138 $^{+1}$	40	5,5	M4
FAG 72n	72	53	53	68 $^{+0,7}$	40	5	M4
FAG 96n	96	53	53	92 $^{+0,8}$	40	5,5	M4

[1] 26 mm with fixing screws



Backside terminal cover for protection according to VBG 4
(Please indicate when ordering.)

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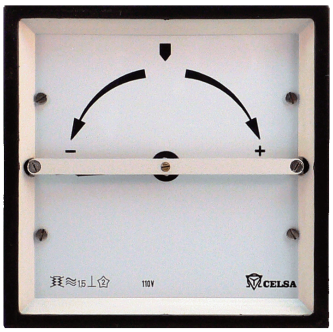
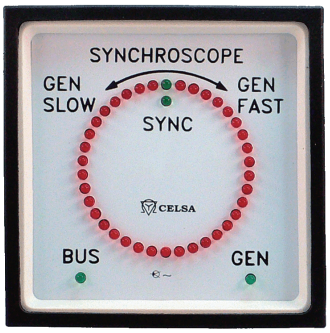
SQ - Synchronoscope



SQ...s



SQ96n

- For alternating current 50-60 Hz
- Analogue execution
- Digital LED execution

Description SQ... analogue

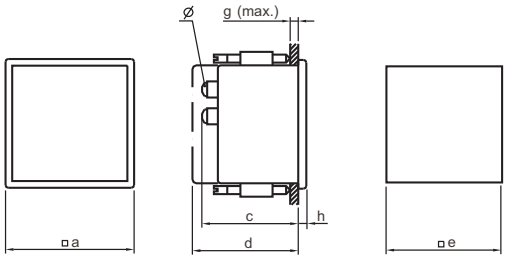
This instrument consists of a ferraris induction movement. The pointer can turn in both rotating directions. If the pointer turns to direction „+" the frequency of generator G2 is higher than the one of G1. The pointer only stands at the top if frequency and phasing of both current circuits are the same. If it stands still outside of the mark, the frequencies are indeed conform but the voltages aren't in phase.

Description SQ... digital

This instrument shows as well the phasing and the frequency of two current circuits to each other. Only if phasing and frequency are the same the green LEDs are flashing in the middle on the top. When there are different phasings or frequencies the red LEDs are flashing, depending on degree of deviation per size of difference more on the left or more on the right.

Housing dimensions synchronoscope

Dimensions in mm							
Type	a	c	d	e	g	h	Ø
SQ 96n/1 -/2	96	107	119	92 $^{+0,8}$	40	5	M4
SQ 96s/1 -/2	96	136	76	92 $^{+0,8}$	10	5	M4
SQ 144s/1 -/2	144	136	95	144^{+1}	1	5,5	M4



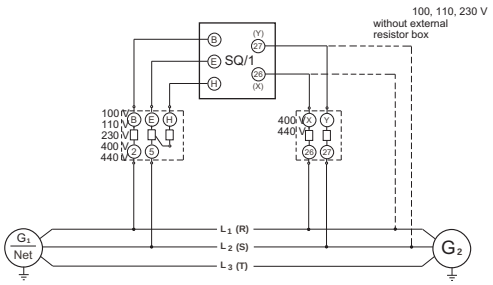
Technical Features

Front frame (mm)	96 x 96	96 x 96	144 x 144
Weight (g)	680	1100	1800
Measuring range U (V)	**Digital type**	**Analogue type**	**Analogue type**
One phase alternating current	**SQ 96n/1**	**SQ 96s/1**	**SQ 144s/1**
Consumption	max.6 VA	5 VA	max.25 mA
100 / Ã3*	❍	❍	❍
100 / Ã3*	❍	❍	❍
100 - 110*	●	●	●
230*	●	●	●
Three-phase 3-wire current	**SQ 96n/2**	**SQ 96s/2**	**SQ 144s/2**
Consumption	max.6 VA	5 VA	max.25 mA
100	●	●	●
110	●	●	●
230	●	●	●
400*	●	●	●
440*	●	●	●
Terminal cover	–	●	–

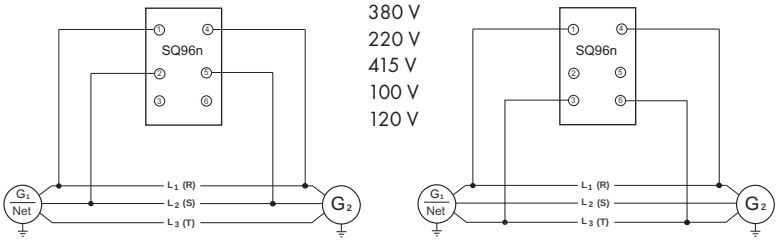
● available ❍ on request

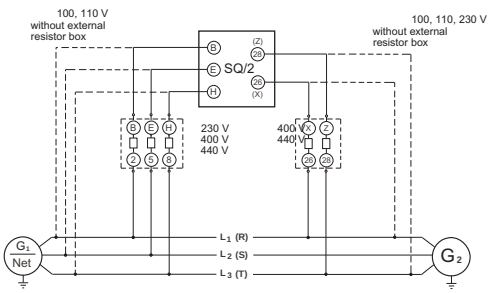
*with separated series resistor (external) / only analogue type

Connection diagrams SQ96s/SQ144s analogue execution



Connection diagrams SQ96n LED execution





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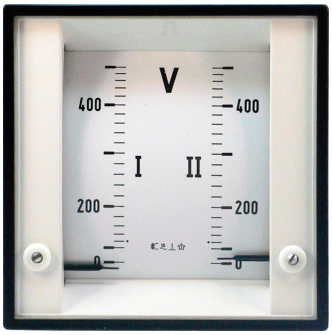
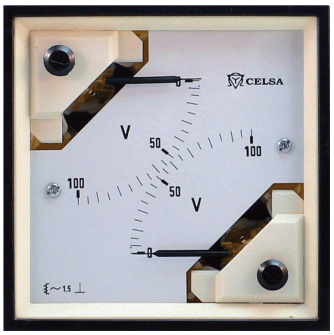
EPD / EQD - Double Voltmeter



EPD



EQD

- Class 1..5
- With 2 moving iron systems on opposite positions
- With 2 parallel vertical scales

Description

The instruments have 2 independent moving iron movements to measure the voltage for example between 2 generators or one generator and the net. The technical features correspond to our type EQ (see page 4/3).

Technical Features

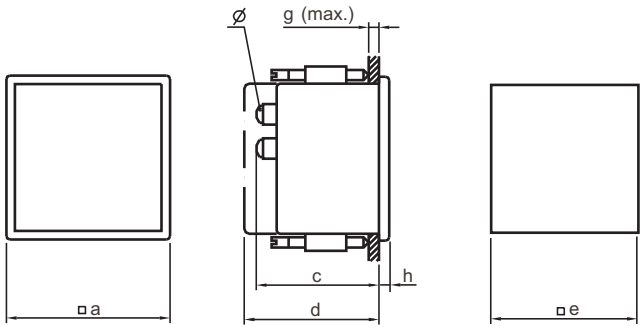
Type	EPD 96s	EPD 144s	EQD 96n	EQD 144s
Front frame (mm)	96 x 96	144 x 144	96 x 96	144 x 144
Scale length (mm)	2 x 62	2 x 103	2 x 54	2 x 90
Weight (g)	700	1200	305	550
Consumption	2 x max.3	2 x max.3	2 x max.4.5	2 x max.3.5
Voltage (V)				
2 x 100[1)]	●	●	●	●
2 x 110[1)]	●	●	●	●
2 x 150	●	●	●	●
2 x 230	●	●	●	●
2 x 250	●	●	●	●
2 x 300	●	●	●	●
2 x 500	●	●	●	●
Terminal cover	–	–	●	❍

● available ❍ on request

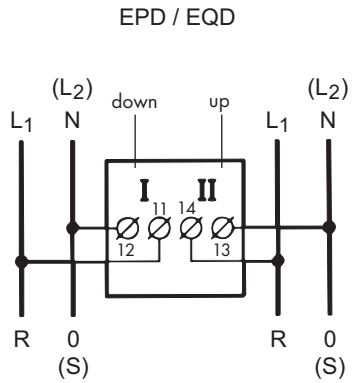
[1)] When connecting to the voltage transformer the indication of the transformer ratio is required.

Housing dimensions double voltmeter

Dimensions in mm							
Type	a	c	d	e	g	h	Ø
EQD 96n	96	53	64	92 $^{+0,8}$	26	5,5	M4
EPD 96s	96	124	135	92 $^{+0,8}$	10	5	M4
EPD 144s	144	170	181	138 $^{+1}$	10	5,5	M4
EQD 96s	96	61	76	92 $^{+0,8}$	10	5	M4
EQD 144s	144	61	76	138 $^{+1}$	10	5,5	M4



Connection diagram



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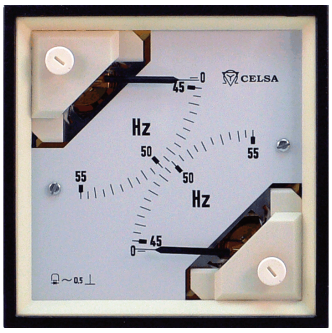
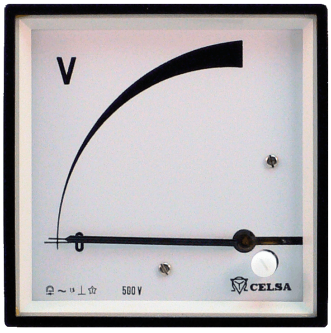
FAD / PRN Double Pointer Type Frequency Meter / Zero Voltage Meter



FAD



PRN

Double Pointer Type Frequency Meter

- Moving coil system with electronic transducer
- For alternating current 50 - 60 Hz

Zero Voltage Meter

- Moving coil system with rectifier
- For alternating current

Description FAD

The instruments have 2 independent moving coil movements to measure the frequency for example between 2 generators or one generator and the net. These instruments are made of a moving coil movement with electronic transducer. The meter movements are jewelled and shock-proofed by sprung storage of jewels.
The indication is mainly independent of curves, form errors and fluctuations of the measuring voltage.

Admissible change in rating voltage:	± 20 %
External magnet field:	0.5 mT

Technical Features

Type	FAD96n	PRN96s	PRN144s
Front frame (mm)	96 x 96	96 x 96	144 x 144
Scale length (mm)	2 x 54	100	140
Weight (g)	260	260	530
Consumption	max 3	max 3	max 3.5
Voltage (V)			
100	●	●	●
110	●	●	●
230	●	●	●
400	●	●	●
500	❍	❍	❍
Terminal cover	●	●	–

● available ❍ on request

Description PRN

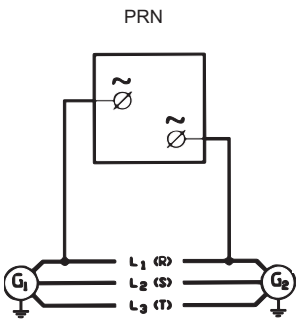
This instrument can be used instead of a synchronoscope. It measures the difference between two sinusoidal voltages. If both voltages are the same and in phase the device indicates zero.

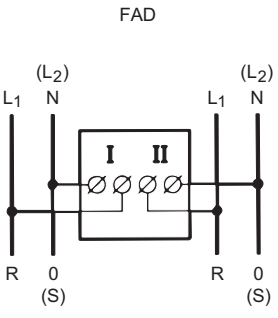
The system is a moving coil system with rectifier. It is very sensitive and offers a extensive protection as it can be permanently charged with the doubl voltage without damage.

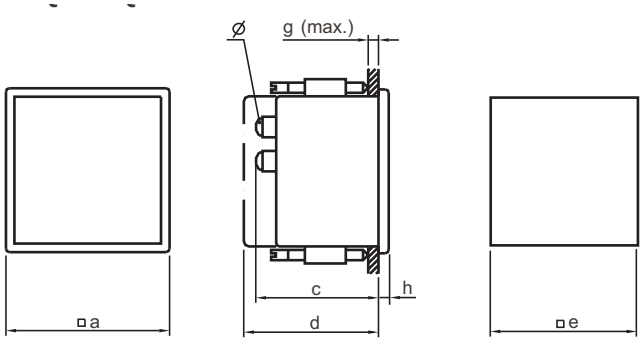
Housing dimensions

Dimensions in mm							
Type	a	c	d	e	g	h	Ø
FAD 96n	96	53	64	92 $^{+0,8}$	26	5,5	M4
PRN 96s	96	60	76	92 $^{+0,8}$	10	5	M4
PRN 144s	144	60	76	144 $^{+1}$	10	5,5	M4

Connection diagrams







SW - Synchronising wall bracket

- Double voltmeter
- Double frequency meter
- Synchronoscope (1 phase or 3 phases)

Description

Synchronisers are used for supervision of voltage, frequency and phasing when paralleling two generators or the net and one generator. If these instruments aren't conform when switching on the generators, heavy disturbance can occur in the entire equipment.

There synchronising instruments are built into a synchronising wall bracket. The synchronising wall bracket is available for the instrument sizes 96 x 96 mm and 144 x 144 mm. Housings are also available for both sizes. The instruments are already installed when ordering completely equipped wall brakkets.

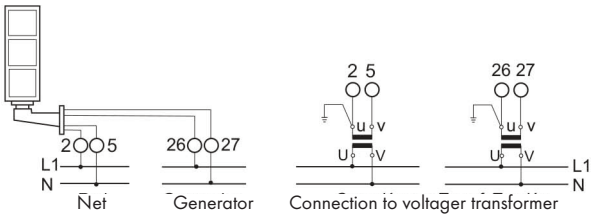
Technical Features

Type	SW96/1s	SW96/2s	SW144/1s	SW144/2s
Weight (Kg)	5,7	5,7	9,0	9,0
Equipment	1 x EQD96s 1 x FD96s 1 x SQ6s/1	1 x EQD96s 1 x FD96s 1 x SQ96s/2	1 x EQD144s 1 x FD144s 1 x SQ96s/1	1 x EQD144s 1 x FD144s 1 x SQ96s/2
	●	●	●	●

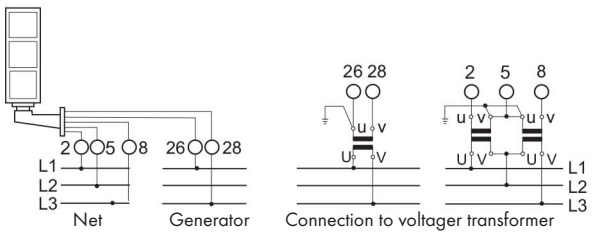
● available ❍ on request

Connection diagrams

1 phase

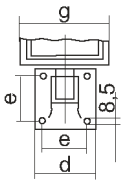


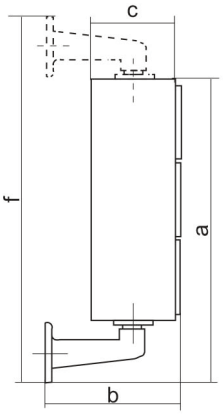
3 phases



Dimension diagrams wall bracket

Dimensions in mm							
Type	a	b	c	d	e	f	g
SW96...	410	223	176	80	60	500	120
SW144...	576	258	176	115	85	692	170





PQ / PAQ - Moving Coil Instruments

PQ35p

- For DC voltage / DC current
- Class 1.5
- PQ scale 90°
- PAQ scale 240°

Description

The system of our instruments is a moving coil movement with sprung toe bearing which is insensitive to external magnetic fields. The movable organs of the movements are stored in sprung jewels in order to protect them against crushes and vibrations. These instruments only measure DC current or DC voltage.

By using core magnets of high quality the moving coil instruments have a almost linear scale course. That's why and due to their low consumption they are especially suited for the application with shunts, impulse transmitters, thermo couples and for the connection to our electronic transducers.
The instruments can be delivered for direct connection up to 100 A with a built-in shunt.

Overload capacity according to DIN 43780 is valid for all moving coil instruments

Continuously	1.2 times
Short duration	10x I_N 5 s for aminstruments
	2xU_N 5 s for voltinstruments

Interchangeable scales

All plastic executions (n-line) have interchangeable scales. This execution enables easy exchange or fit of the changing scale (not during operating).

Execution for DIN rail mounting (PQ35P)

For measuring current and voltage in distribution systems with 35 mm DIN rail according to DIN 50 022.

The instruments of this line are adapted by their dimensions to common installation devices. The installation width of the instruemnts is 45 mm. They can be snapped easily on a 35 mm DIN rail.

The clamps are covered shockproof.

Execution PAQ...n with round scale 240°

The movements are working for the same principle as the PQ devices. The advantage of these devices is the large scale length (better resolution).
These instruments only measure DC current or DC voltage.
These devices also have interchangeable scales.

Internal resistance, consumption approx. in Ohm

Measuring range		PQ35p	PQ ..n	PAQ ...n
µA	25		240 mV	
	40		374 mV	
	60	200 mV	600 mV	
	100	200 mV	400 mV	
	150	200 mV	600 mV	
	250	200 mV	140 mV	810 mV
	400	200 mV	540 mV	900 mV
	600	200 mV	540 mV	900 mV
mA	1	200 mV	37 mV	490 mV
	1,5	200 mV	60 mV	425 mV
	2,5	200 mV	60 mV	760 mV
	4	200 mV	60 mV	950 mV
	6	200 mV	60 mV	60 mV
	4-20	200 mV	1,5 V	1,5 V
	10-800	200 mV	60-70 mV	60-125 mV
A	1-100	to 15A 200 mV	60-100 mV	60 mV
	.../60...150mV	12 Ω	5 mA	67/200Ω/V
mV	15-40	1000 Ω/V	200 Ω/V	67 Ω/V
	15-40	1000 Ω/V	200 Ω/V	67 Ω/V
	60-100	1000 Ω/V	1000 Ω/V	67 Ω/V
	150-600	1000 Ω/V	1000 Ω/V	200 Ω/V
	750	1000 Ω/V	1000 Ω/V	200 Ω/V
V	1	1000 Ω/V	1000 Ω/V	200 Ω/V
	1,5-600	1000 Ω/V	1000 Ω/V	1000 Ω/V

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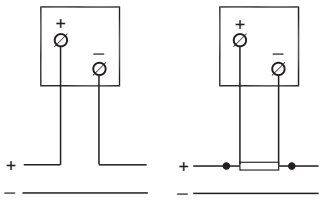
Standard Measuring Ranges

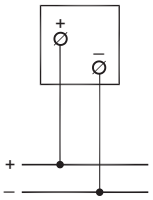
DC Voltages	DC Current
15 mV	15 µA
25 mV	25 µA
40 mV	40 µA
60 mV	60 µA
100 mV	100 µA
150 mV	150 µA
250 mV	250µ A
400 mV	400 µA
600 mV	600 µA
1 V	1 mA
1,5 V	1,5 mA
2,5 V	2,5 mA
4 V	4 mA
6 V	6 mA
10 V	10 mA
15 V	15 mA
25 V	20 mA
40 V	25 mA
60 V	40 mA
100 V	60 mA
150 V	100 mA
250 V	150 mA
300 V	250 mA
400 V	400 mA
500 V	500 mA
600 V	600 mA
	1 A
	1,5 A
	2,5 A
	4 A
	6 A
	10 A
	15 A
	25 A (except PQ35P)
	40 A (except PQ35P)
	60 A (except PQ35P)
	100 A (except PQ48n/PQ35P)
For connection to shunt	Standar signals
.../60 mV secondary	20 mA
.../150 mV secondary	4-20 mA
.../300 mV secondary	1 mA

Connection diagrams

Ammeter

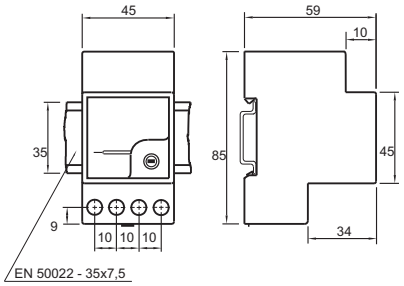


Voltmeter



Housing dimensions

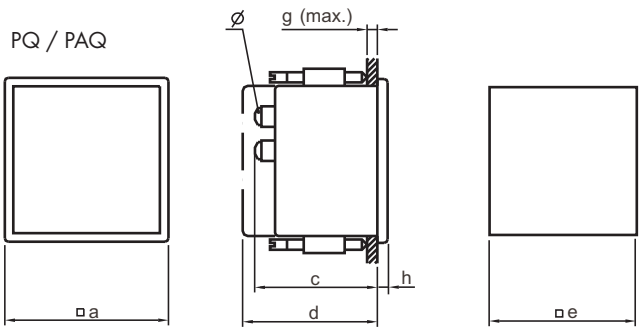
PQ35P



Dimensions in mm / Weight in gramme

Type	Dimensions	a	c	d	e	g	h	Ø	Weight
PQ 48n	< 5... 60 A	48	70	73	45 $^{+0,6}$	28	5	M6	205
	all others	48	55	62	45 $^{+0,6}$	28	5	M4	150
PQ 72n	> 60 A	72	81	-	68 $^{+0,7}$	8^{1}	5	M8	285
	5... < 60 A	72	70	75	68 $^{+0,7}$	8^{1}	5	M6	265
	all others	72	55	75	68 $^{+0,7}$	8^{1}	5	M4	210
PQ 96n	> 60 A	96	81	-	92 $^{+0,8}$	8^{1}	5	M8	350
	5... < 60 A	96	70	75	92 $^{+0,8}$	8^{1}	5	M6	330
	all others	96	55	75	92 $^{+0,8}$	8^{1}	5	M4	275
PQ 144n	> 60 A	144	81	-	138 $^{+1}$	40	8	M8	505
	5... < 60 A	144	70	75	138 $^{+1}$	40	8	M6	485
	all others	144	53	64	138 $^{+1}$	40	8	M4	430
PAQ 48n	10... 40 A	48	70	73	45 $^{+0,6}$	26	5	M6	230
	all others	48	53	64	45 $^{+0,6}$	26	5	M4	210
PAQ 72n	> 60 A	72	78	-	68 $^{+0,7}$	40	5	M8	320
	6... < 60 A	72	68	-	68 $^{+0,7}$	40	5	M6	385
	all others	72	53	64	68 $^{+0,7}$	40	5	M4	290
PAQ 96n	> 60 A	96	78	-	92 $^{+0,8}$	40	5	M8	395
	6... < 60 A	96	68	-	92 $^{+0,8}$	40	5	M6	460
	all others	96	53	64	92 $^{+0,8}$	40	5	M4	370
PAQ 144n	> 60 A	144	78	-	138 $^{+1}$	40	8	M8	680
	6... < 60 A	144	68	-	138 $^{+1}$	40	8	M6	720
	all others	144	53	64	138 $^{+1}$	40	8	M4	650

PQ / PAQ



Technical Features - Rectangular Type

Instructions

DIN 43700	Instruments for table installation, nominal and cut-out dimensions
DIN 43701	Electrical control panel measuring instruments
DIN 43718	Front frame and front plates
DIN 43780	Performance specifications for direct acting indicating instruments and their accessories
DIN 43802	Scales and pointers for electrical measuring instruments
DIN 16257	Nominal positions and position sign for measuring instruments
DIN 57410/VDE 0410	Safety requirements for indicating and writing measuring instruments and their accessories
VDE 0411	Protective measures for electronic measuring instruments
VDE 0110	Determinations for the measurements of the air and leakage path of electrical resources
DIN 40050	Degrees of protection; foreign material and waterproofing for electrical resources
VDE/VDI 3540 sheet 2	Reliability of measuring, -, control- and regulation instruments (climatic classes for instruments and accessories).

Front panel

The instruments can be standard delivered with antiglare glass on demand (non-reflecting glass)as far as available.

Degree of protection

IP 00 for clamps without electric shock protection
IP 20 for clamps with electric shock protection
IP 50 for housing
IP 40 for profile housing

Housing

Housing of plastic, self-extinguishing. exception 72 x 36 mm, 96 x 48 mm and 144 x 72 mm are made of steel plate.

Front frame

All rectangular measuring instruments are delivered with a narrow frame according to DIN 43718, colour black, RAL 9005.
Colour grey, RAL 7037, RAL 7035, RAL 7032 additional charge.

Accuracy class

The accuracy class of the instruments in standard execution lies at 1.5, that means, the indication error +/-1,5 % of the measuring value final range will not be exceeded.
Exceptions are indicated in the data sheets.

Testing voltage

Test voltage of the measuring range	Test voltage U_{eff}; 50 Hz	Test voltage sign
660 V	2000 V	☆
1000 V	3000 V	☆

Shaking resistance and mechanical shock resistance

The bearing jewels are springy mounted from coarse crushes in order to protect the organ of the meter movements. The axis of the meter movement is equipped with interceptors. Thus, the dynamic surface pressure is limited which occurs in case of vibrations and crushes as a result of accelerating force.
These design features guarantee a shock resistance of 15 g and a shaking resistance up to 2.5 g on these instruments and therefore, they completely fulfil the conditions according to VDE 0410.

Climatic suitability

Standard-execution:

Climatic class 2	according to VDE/VDI 3540
Operating temperature range	-25...+40° C according to DIN 43780
Transport and Storage temperature	-25 ... +65° C
Reference temperature	+23° C
Relative humidity	75 % annual averagel, non-condensing

Conditionally tropicalised:

Climatic class 3	according to VDE/VDI 3540
Operating temperature range:	-10 ...+55° C according to VDE/VDI 3540
Transport and Storage temperature:	-25 ...+65° C
Reference temperature	+23° C
Relative humidity	75 % annual average, non-condensing

Scales

The final scale values are determined according to the following norm line: 1-1,2-1,5-2-2,5-3-4-5-6-7,5-8 and decade multiples.

In case of instruments for current transformer connection this norm line is additionally supplemented with the standard values 1, 25-1, 6-1, 8 and decade multiples.

Special adjustment according to the norm line, in any measuring size, as for example „%“, „m/s“, „Upm“, „bar“ etc.
Special adjustment beyond the norm line, measuring size in any order.

Special adjustment after equation, curve or table, measuring size in any order.

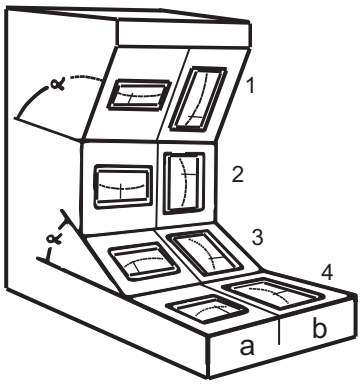
Pointers and scale division

Knife bar pointer

Division of scale: coarse-fine.

Position

The instruments are calibrated - if not indicated differently - for upright position (pos.2). Other positions across or inclined, under indication of the angle against the horizontal are considered on demand. The exact storing of the instruments enables installation positions in all angles.



1	∝ > 90°
2	⊥ = 90°
3	∝ < 90°
4	⌐ = 0°

Position sign	Nominal position
⊥	upright position
⌐	across position
∠60°	inclined position (Installation angle indicate to the across position, for example 60°)

When ordering the installation position and the scale adjustment (Cross scale or horizontal) have to be indicated appropriate to the image above.

Installation inclined (indicate the angle) ∠120°	1a. horizontal scale 1b. vertical scale
⊥	Installation upright 2a. horizontal scale 2b. vertical scale position
Installation inclined (indicate the angle) ∠60°	3a. horizontal scale 3b. vertical scale
⌐	Installation across 4a. horizontal scale 4b. vertical scale

Standard execution: cross-scale, vertical installation.

Moving iron voltinstruments and moving iron aminstruments

Moving iron instruments

Jewelled. State-of-the-art construction with silicon oil damping. The flexible parts of the moving instruments are stored in springy saphire jewels in order to protect them from crushes.

Consumption

Ammeter, voltmeter	0,5...1 VA, 1,5...3 VA
Frequency range	16%...100 Hz

Overload capacity according to DIN 43 780

Continuously	1.2 times
Short duration	10 times 5s at aminstruments
	2 times 5s at voltinstruments

Connection

Hegaxon studs with screws

M3 and wire clamps: Volt and aminstruments up to 3 A

M5 and wire clamps: > 3A to 25 A

Scale course

The division of scale starts at about a fifth of the measuring value final range. In the beginning scale course compact.

Ammeter in standard execution with overload scale for doubled rated current.

Voltmeter for connection at the voltage transformer: the final scale value amounts to a 1.2 times rated voltage, for example:

- for transformer connection sec. 100 V measuring range is 0...120 V.
- for transformer connection sec. 110 V measuring range is 0...132 V.

Scale characteristic

Overload scale doubled

Special executions

Differing measuring range from the norm line

Additional measuring ranges

Measuring range with 3rd clamp	Voltmeter up to 600 V Ammeter from 0.1 A to 25 A
in proportion 1:2 up to1:5	with 2nd figures, however one division with 2nd figures and 2nd division

Further measuring ranges on request

Overload scales

Aminstruments without overload scale

Scale expansion

Ammeter with expanded starting range on request

Voltmeter with scale expansion on request

Special adjustment

Adjustment for a specific frequency between 100 and 1000 Hz (as far as possible)

Suppressed zero point

Suppressed zero point (mech.) up to 30% of the final value, without zero position

Increased accuracy

Measuring accuracy on the increase 1% (as far as possible)

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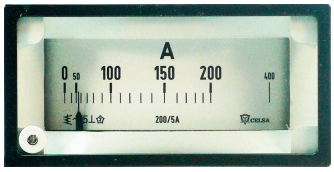
EQP - Moving iron panel instruments



- Profile instruments for alternating current or voltage 15 - 100 Hz
- Class 1.5 according to DIN 43 780
- Upright or across installation

Description

Moving iron panel instruments are predominantly used for alternating current and alternating voltage measurements in the usual technical frequency range of 50 up to 100 Hz, in special calibration up to 1000 Hz.

When measuring direct voltage or current there is on additional errors of approximately 1 %.
Moving iron instruments indicate independently of the wave shape - even at high harmonic content - the effective value of the alternating current.

At extreme wave shapes (for example phase-angle control and frequencies > 100 Hz) you have to consider an exceedance of accuracy class for ammeters and voltmeters. The use for direct current or direct voltage measurements has to be specified explicitly in the order.

The EQP are especially not suited for the connection at shunt resistances or impulse transmitter because of their high consumption.

Moving iron movements

Jewelled. State-of-the-art construction with silicon oil damping. The flexible parts of the moving instruments are stored in springy saphire jewels in order to protect them against crushes.

Consumption of EQP moving iron panel instruments (rectangular)	
Ammeter	0.5 up to 0.7 VA
Voltage meter	1.5 up to 3.5 VA

Overload capacity according to DIN 43780

Continuously	1.2 times
Short duration	10 times 5 s at ammeters
	2 times 5 s at voltmeters

Front panel

Normal glass

Connection

Hexagon studs with screws
M 3 and clamp: Volt- and ammeter up to 3 A
M 5 and clamp: > 3 A up to 25 A

Position

Normal execution at profile instruments: horizontal-scale, upright installation.
When ordering please indicate cross- or horizontal scale.
If no different information is provided the standard execution is delivered: front frame black, scale as the measuring range, upright mounting position, horizontal-scale.

Table for norm-scales of voltmeters for connection to voltage transformers:

* Voltmeter for connection to voltage transformer:	sec. 100 V or 110 V	
	Prim.Rated Voltage	Scale
	500 V	0... 600 V
	600 V	0... 720 V
	1 KV	0... 1,2 KV
	3 KV	0... 3,6 KV
The final scale value is 1.2 times the rated voltage, for example:	5 KV	0... 6 KV
	6 KV	0... 7,2 KV
	10 KV	0... 12 KV
for connection to transformer sec. 100 V the measuring range is 0...120 V	10 KV	0... 18 KV
	15 KV	0... 18 KV
	20 KV	0... 24 KV
for connection to transformer sec. 110 V the measuring range is 0...132 V	25 KV	0... 30 KV
	30 KV	0... 36 KV
	33 KV	0... 40 KV
	60 KV	0... 72 KV
Please indicate primary voltage, scale and secondary voltage when ordering..	100 K	0... 120 KV

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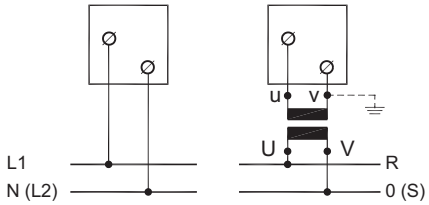
Standard Measuring Ranges	
AC Voltages	**AC Current**
6 V	100 mA
10 V	150 mA
15 V	250 mA
25 V	400 mA
40 V	600 mA
60 V	1 A
100 V	1.5 A
120 V	2.5 A
132 V	4 A
150 V	5 A
250 V	6 A
300 V	10 A
400 V	15 A
500 V	
600 V	
For connection to voltage transformer .../100 V secondary .../110 V secondary	For connection to current transformer .../1 A secondary .../5 A secondary

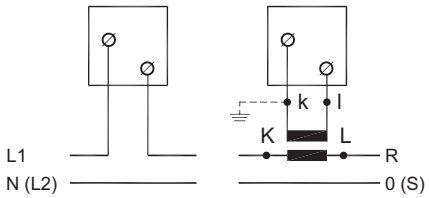
Other measuring ranges on request.

Connection diagram

Voltmeter:

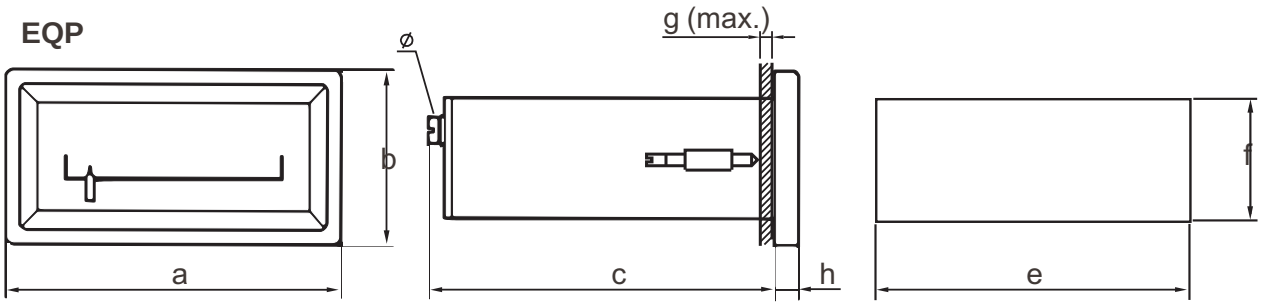


Ammeter:

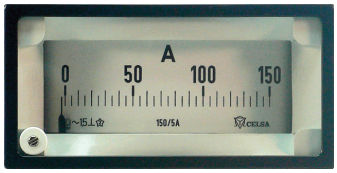


Housing dimension of rectangular moving iron instruments

Dimensions in mm / Weight in gramme										
Type	a	b	c	d	e	f	g	h	Ø	Weight
EQP 72 x 36	72	36	105	-	68 $^{+0,7}$	33 $^{+0,6}$	40	5,5	M6	200
EQP 96 x 48	96	48	125	-	92 $^{+0,8}$	92$^{+0,6}$	40	7	M4	350
EQP 144 x 72	144	72	170	-	138 $^{+1}$	68 $^{+0,7}$	40	8	M6	800



PRP / PRS - Rectangular moving coil instruments with rectifier



PRP96x24q

PRS96x24h

- Profile instruments for a sinusoidal alternating current and voltage
- Class 1.5 according to DIN 43 780
- Upright or across installation

Description

Moving coil instruments with rectifier:
To measure the alternating current and voltage 40...50...10000 Hz.

Moving coil instruments with rectifier measure the arithmetic average value of current. Their scales are designed so that effective values are indicated in case of sinusoidal measuring sizes. The instruments don't have any overload range.

For moving coil instruments with rectifier a shape form is valid as a rated curve form at which the deviation of the sinusoidal form isn't exceeding 1% of the peak value of the fundamental vibration.

Voltmeters with end-values higher than 20 V, have an almost linear scale course.

For voltmeters with end-values up to 20 V the beginning of the scale division is a little compressed.

Overload capacity according to DIN 43780

Continuously:	1.2 times
Short duration:	10 times 5 s at ammeters
	2 times 5 s at voltmeters

Execution profile housing PRP:

Front panel

Normal glass

Connection

Hegaxon studs with screws
M3 and clamps for volt and ammeter

Position

Normal execution at profile instruments: Horizontal scale, upright installation.

Execution narrow profile housing PRS:

Front panel

Normal glass

Connection

Contact pin 6,3 x 0,8 mm

Position

Normal execution at profile instruments: Horizontal scale, upright installation.

Internal resistance, consumption approx.

Measuring range		PRP 72 x 36s PRS 48 x 24p	PRP 96 x 48s PRS 72 x 24p	PRP 144 x 72s PRS 96 x 24p
µA~	10 - 600	-	-	-
mA~	1 - 600	1.2 V	1.2 V	1.2 V
A~	1 1,5 2,5	1.2 VA		
A~	5	0.3VA		
V~	1.5 - 600	1000 Ω/V		

Please indicate vertical or horizontal scale when ordering.
Special executions on request

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Standard Measuring Ranges

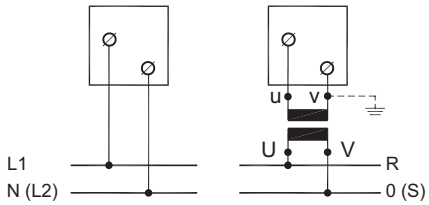
AC Voltages	AC Current
	1 mA
6 V	1,5 mA
10 V	2,5 mA
15 V	4 mA
25 V	6 mA
40 V	10 mA
60 V	15 mA
100 V	25 mA
150 V	40 mA
250 V	60 mA
300 V	100 mA
400 V	150 mA
500 V	250 mA
600 V	400 mA
	600 mA
	1 A*
	1,5 A*
	2,5 A*
	4 A*
	5 A
For connection to voltage transformer	For connection to current transformer
.../100 V secondary	.../1 A secondary
.../110 V secondary	.../5 A secondary

* With external transformers

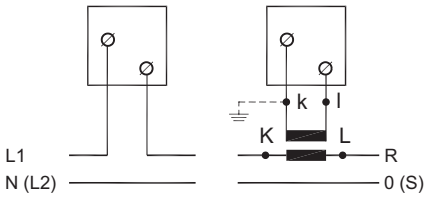
Other measuring ranges on request

Connection diagram

Voltmeter:



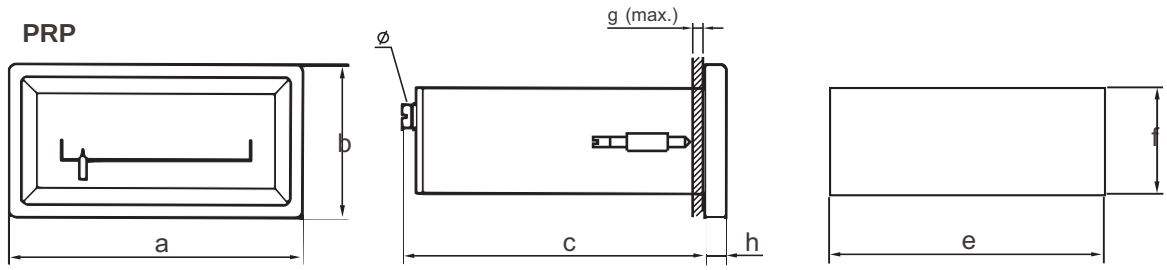
Ammeter:



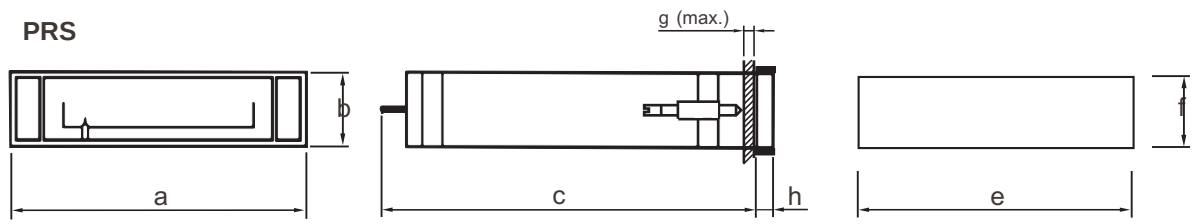
Housing dimensions of rectangular moving coil instruments with installed rectifier:

Dimensions in mm / Weight in gramme										
Type	a	b	c	d	e	f	g	h	Ø	Weight
PRP 72x36	72	36	105	-	68 $^{+0,7}$	33 $^{+0,7}$	40	5,5	M4	200
PRP 96x48	96	48	125	-	92 $^{+0,7}$	44 $^{+0,7}$	40	7	M4	500
PRP 144x72	144	72	170	-	138 $^{+0,7}$	68 $^{+0,7}$	40	8	M4	800
PRP 48x24	48	24	68	-	43,2 $^{+0,3}$	22,2 $^{+0,3}$	40	5,3	-	150
PRP 72x24	72	24	92	-	67 $^{+0,5}$	22,2 $^{+0,3}$	40	5,3	-	200
PRP 96x24	96	24	125	-	91 $^{+0,5}$	22,5 $^{+0,3}$	40	5,3	-	250

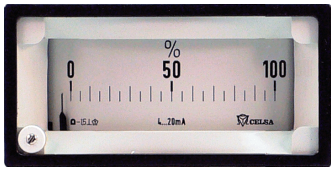
PRP



PRS



PQP / PQS - Rectangular moving coil instruments



PRP96x24q

PRS96x24h

- For DC voltage / DC current
- Class 1.5

Description

Constructive according to the state of the art of movement manufacturing, low consumption and high accuracy. Especially well damping. Response time at full-scale deflection approx. 1 sec., insensitive to external magnetic fields. The movable organs of the meter movements are stored in sprung jewels in order to protect them against crushes.

Consumption

See table; the mentioned inherent resistance values include a tolerance of ± 20 %.

Overload capacity according to DIN 43780

Continuously	1.2 times
Short duration	10 times 5 s for aminstruments
	2 times 5 s for voltinstruments

Isolation group A according to VDE 0110

Front panel: Clear Plexiglas

Connection PQP:

Hexagon studs with screws

M3 and clamping bracket: Volt and ammeter up to 3 A

M5 and clamping bracket: < 3 A up to 30 A

Connection PQS:

Contact pin 6,3 x 0,8 mm

Position

Normal execution for profile devices: horizontal scale, upright installation. If there are no special indications, the standard execution is delivered: front frame black, scale as measuring range, upright installation position, horizontal scale.

When ordering please indicate vertical or horizontal scale.

Internal resistance, consumption approx. in Ohm

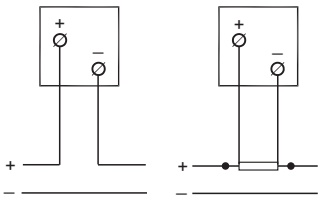
Measuring range		PQP 72 x 36	PQP 96 x 48	PQP 144 x 72	PQS 48 x 24	PQS 72 x 24	PQS 96 x 24	PQS 144 x 36
µA	50	-	-	-	4150 Ω	4800 Ω	5200 Ω	-
	60	-	-	-	3500 Ω	4350 Ω	4700 Ω	-
	100	870 Ω	870 Ω	4000 Ω	2800Ω	3500 Ω	3800 Ω	-
	150	600 Ω	600 Ω	2000 Ω	1190 Ω	1490 Ω	1600 Ω	-
	250	450 Ω	450 Ω	1300 Ω	440 Ω	550 Ω	600 Ω	-
	400	150 Ω	150 Ω	380 Ω	175 Ω	220 Ω	240 Ω	-
	600	75 Ω	75 Ω	170 Ω	76 Ω	95 Ω	100 Ω	-
mA	1	30 Ω	30 Ω	110 Ω	24 Ω	35 Ω	32 Ω	-
	1,5	15 Ω	15 Ω	40 Ω	13,5 Ω	18 Ω	18 Ω	-
	2,5	8 Ω	8 Ω	17 Ω	6,2 Ω	8 Ω	9 Ω	-
	4	3 Ω	3 Ω	10 Ω	4 Ω	4 Ω	4,5 Ω	-
	5	2,5 Ω	2,5 Ω	3,5 Ω	3,5 Ω	3,3 Ω	3,6 Ω	-
	6	2,4 Ω	2,4 Ω	10 Ω	3,3 Ω	2,5 Ω	4 Ω	-
	10	2,2 Ω	2,2 Ω	6 Ω	2,3 Ω	2,5 Ω	3,5 Ω	-
	15	2 Ω	2 Ω	4 Ω	2,1 Ω	2,5 Ω	2,5 Ω	-
	20	2 Ω	2 Ω	1,5Ω	2 Ω	2 Ω	2 Ω	2 Ω
	4... 20	2 Ω	2 Ω	2 Ω	2,2 Ω	2,2 Ω	2,2 Ω	2,2 Ω
	25	2,4Ω	2,4Ω	2,4Ω	2,4Ω	2,4Ω	2,4Ω	2,4 Ω
	40	1,5 Ω	1,5 Ω	1,5 Ω	1,5 Ω	1,5 Ω	1,5 Ω	1,5 Ω
	60	1,0 Ω	1,0 Ω	1,0 Ω	1,0 Ω	1,0 Ω	1,0 Ω	1,0 Ω
	100	0,6 Ω	0,6 Ω	0,6 Ω	0,6 Ω	0,6 Ω	0,6 Ω	0,6 Ω
	150	0,4 Ω	0,4 Ω	0,4 Ω	0,4 Ω	0,4 Ω	0,4 Ω	0,4 Ω
	250	0,24 Ω	0,24 Ω	0,24 Ω	0,24 Ω	0,24 Ω	0,24 Ω	0,24 Ω
	400	0,15 Ω	0,15 Ω	0,15 Ω	0,15 Ω	0,15 Ω	0,15 Ω	0,15 Ω
	600	0,1 Ω	0,1 Ω	0,1 Ω	0,1 Ω	0,1 Ω	0,1 Ω	0,1 Ω
A	1	0,06 Ω	0,06 Ω	0,06 Ω	0,06 Ω	0,06 Ω	0,06 Ω	0,06 Ω
	1,5	0,04 Ω	0,04 Ω	0,04 Ω	0,04 Ω	0,04 Ω	0,04 Ω	0,04 Ω
	2,5	0,024 Ω	0,024 Ω	0,024 Ω	0,024 Ω	0,024 Ω	0,024 Ω	0,024 Ω
	4	0,015 Ω	0,015 Ω	0,015 Ω	0,015 Ω	0,015 Ω	0,015 Ω	0,015 Ω
	6	0,01 Ω	0,01 Ω	0,01 Ω	0,01 Ω	0,01 Ω	0,01 Ω	0,01 Ω
	10	0,006Ω	0,006Ω	0,006Ω	Ω	Ω	0,006Ω	0,006Ω
V	../ 60 V	12 Ω	12 Ω	12 Ω	12 Ω	12 Ω	12 Ω	12 Ω
	./150mV	30 Ω	30 Ω	30 Ω	30 Ω	30 Ω	30 Ω	30 Ω
	./ 300 V	60 Ω	60 Ω	60 Ω	60 Ω	60 Ω	60 Ω	60 Ω
	1V - 600V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V

Standard Measuring Ranges

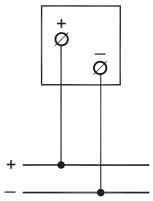
DC Voltages	DC Current
250 mV	50 µA
400 mV	60 µA
600 mV	100 µA
1 V	150 µA
1,5 V	250 µA
2,5 V	400 µA
4 V	600 µA
5 V	1 mA
6 V	1.5 mA
10 V	2.5 mA
15 V	4 mA
25 V	5 mA
40 V	6 mA
60 V	10 mA
100 V	15 mA
150 V	20 mA
250 V	25 mA
400 V	40 mA
500 V	60 mA
600 V	100 mA
	150 mA
	250 mA
	400 mA
	600 mA
	1 A
	1,5 A
	2,5 A
	4 A
	6 A
	10 A
	15 A
	25 A
	40 A
	60 A
	100 A
For connection to shunt	Standar signals
.../60 mV secondary	20 mA
.../150 mV secondary	4-20 mA
.../300 mV secondary	1 mA

Connection diagrams

Ammeter



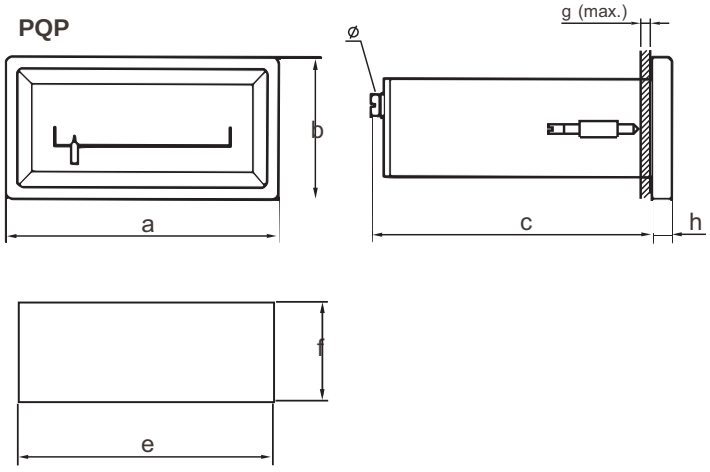
Voltmeter



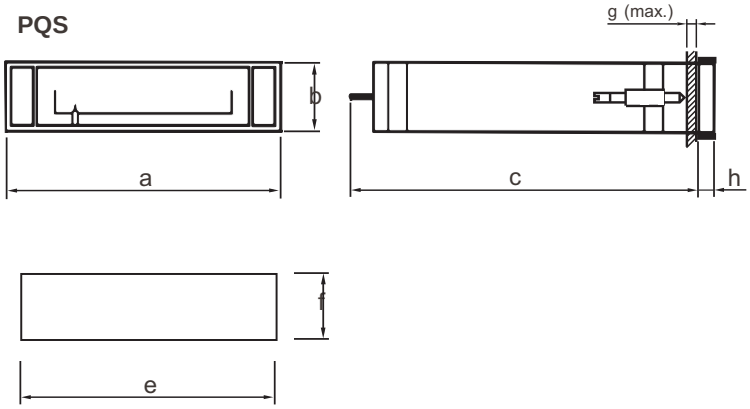
Housing dimensions dimensions of rectangular moving coil instruments

Dimensions in mm / Weight in gramme										
Type	a	b	c	d	e	f	g	h	Ø	Weight
PQP 72x36	72	36	105	-	68 $^{+0,7}$	33 $^{+0,7}$	40	5,5	-	150
PQP 96x48	96	48	125	-	92 $^{+0,8}$	44 $^{+0,7}$	40	7	-	350
PQP 144x72	144	72	170	-	138 $^{+0,7}$	68 $^{+0,7}$	40	8	-	800
PQS 48x24	48	24	59	-	43,2 $^{+0,3}$	22,2 $^{+0,3}$	10	5	-	100
PQS 72x24	72	24	59	-	67 $^{+0,5}$	22,2 $^{+0,3}$	10	5	-	120
PQS 96x24	96	24	57	-	91,5 $^{+0,5}$	22,5 $^{+0,3}$	10	5	-	150
PQS 144x36	144	36	59	-	138 $^{+0,5}$	33 $^{+0,3}$	10	7	-	500

PQP



PQS



Contact instruments with dorsal adjustment

Contact instruments are available in the following executions:
with a moving iron system = EQC
with a moving coil system = PQC

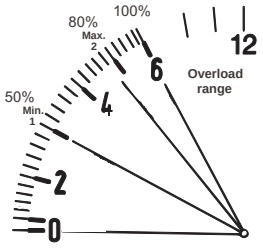
For the non-contact registration of limit values they have: power supply, 2 differential amplifiers, 2 time relays, 2 output relays and – adjustable from outside (on the backside) – 2 potentioinstruments for the adjustment of limit values and the time delay as well as 2 LED lamps on the scale for the control of the switching status.
Contact instruments can be used along with corresponding transducers for the control of current, voltage (alternating and direct), frequency, active power, reactive power, power factor (phase angle), driving speed, temperature and pressure.
Both channels can be adjusted independently of each other on any point of scale by a potentiometer on the backside. Every channel has a 0-30 sec adjustable separated time relay which prevents that peak values activate the contacts. The time relay sets to zero immediately after every peak values and thus prevents a summation of several peak values.
Every channel is equipped with an output relay including change-over contact (changer) - potential-free. The potentioinstruments on the backside of the device are protected by a transparent cover in order to prevent accidental re-adjusting..
2 LEDs on the scale show the switching status.

Contact instruments are deliverable in the following executions:

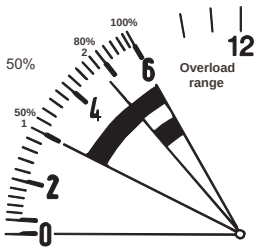
EQC:	EQC 96s/1 EQC 96s/2	1 max. and 1 min. contact 2 max. (or 2 min.) contacts
PQC:	PQC 96s/1 PQC 96s/2	1 max. and 1 min. contact 2 max. (or 2 min.) contacts
ISE/2:	1 contact, switches at wrong phase sequence (ISE 96s/2 see page 4/22)	

Technical features of the electronics	
Auxiliary supply:	230 V~ ± 10 % (40-70 Hz)
Output relays:	1 change-over contact (changer) per channel – potential-free
Switching capacity at: ohmic load:	Alternating current 230V, 5 A max. 300W Alternating current 200V, 5 A max. 100W
Hysteresis:	1 % of final scale value
Producing accuracy:	of final scale value 1 %
Adjustment:	From 0-100 % of the nominal value of scale, tolerance +/- 5%
Duration of life:	1 X 10^7 Switching operations at rated switching power
Temperature:	10 °C up to 30 °C

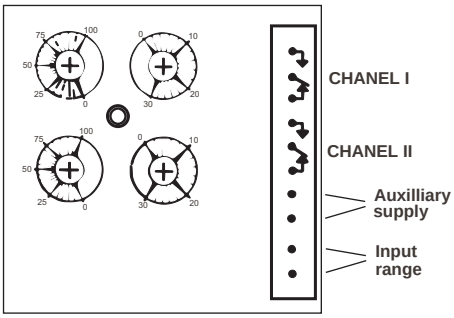
Regulation examples: differential
Differentiated regulation: (.../1)
(Minimum contact at 50 % and maximum contact at 80 %)
As long as the pointer is in the working range, e.g. the measuring value is higher than 50 % and less than 80 % both channels and both illuminating diodes on the scale are inactivated. If the measuring value sinks under 50 % e.g. the pointer is between 0 and 50 % so the channel I is activated, the minimum contact has switched and the illuminating diode on the scale is lighting. If the measuring value is higher than 80 % and 100 % so the channel II is avticated, the maximum contact has switched and the illuminating diode for channel II is lighting while channel I is inactivated again.



Step regulation : (.../2)
(2 maximum contact at 50 % and at 80 %)
The working range is between 0 and 50 % of the scale. If the measuring value is under 50 % both channels and illuminating diodes are inactivated and the first maximum contact was switched on. If the measuring value reaches 80 % or more both channels are activated, e.g. also channel II is switched on and both illuminating diodes are lighting.



Rear view:



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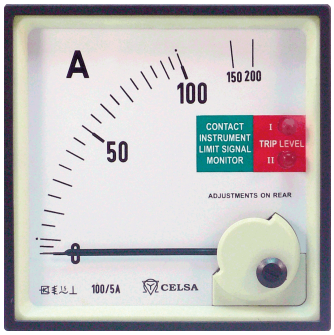
EQC96n - Moving iron instrument with electronic limit control



- With moving iron movement
- For AC current and AC voltage
- Class 1,5

Backside adjustment

Description

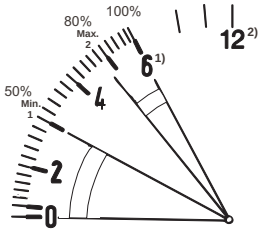
The technical features of the movements are same as the features of the moving iron instruments. Only this has an additionally electronic limit control. (Type EQ see page 4/3)

Electronic:

Auxilliary supply:	230 V ~ ± 10 % (50-60 Hz) other voltages on request
Output relays:	2 changeover relays, potential free
Hysteresis:	2 % of the full scale
Repetibility:	1 % of the full scale
Adjustment with potentiometer:	from 0 to 100 % of the nominal range of scale[1] Tolerance ± 5 %
Time delay:	0 to 20 sec. ± 3 sec.

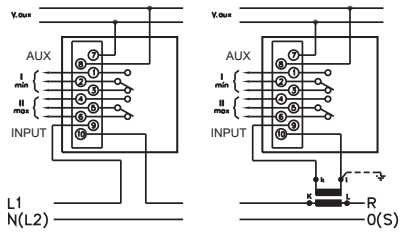
[1] Nominal current input range

[2] Nominal 100 % for voltage inputs or ammeter without overload.

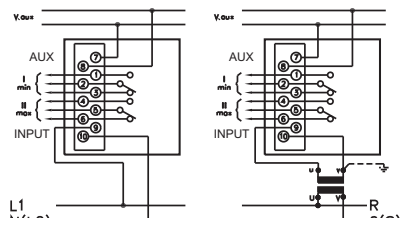


Connection diagrams

Ammeter



Voltmeter



Technical Features

Type		EQC 96n/1	EQC 96n/2 max. EQC 96n/2min.
Front frame	(mm)	96 x 96	96 x 96
Scale length	(mm)	94	94
Weight	(g)	540	540
Relay output		1 max. + 1 min.	2 max. (or 2 min)
Burden auxiliary supply	(VA)	3	3

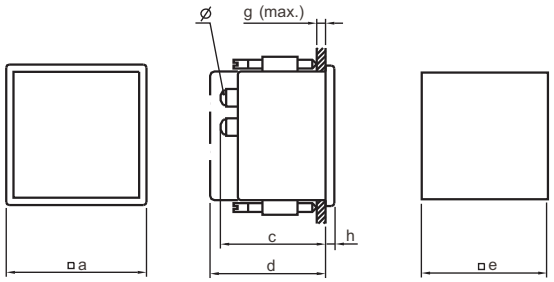
Burden of the movements see EQ-instruments on page 4/3

Standard Measuring Ranges

AC Voltage	AC Current
6 V	
10 V	100 mA
15 V	150 mA
25 V	250 mA
40 V	400 mA
60 V	600 mA
100 V	1 A
150 V	1,5 A
250 V	2,5 A
300 V	4 A
400 V	6 A
500 V	
600 V	
For voltage transformers	For current transformers
.../ 100 V secondary	.../ 1 A
.../ 110 V secondary	.../ 5 A

Dimensions

Dimensions in mm							
Type	a	c	d	e	g	h	Terminals
EQC 96n	96	99	-	92 +0,8	26	5,5	screw terminals



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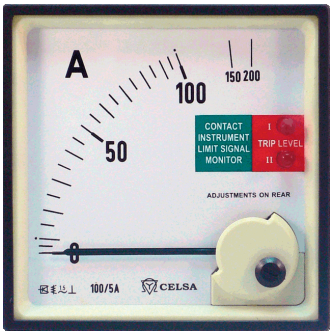
PQC96n - Moving coil instrument with electronic limit control



- With moving iron movement
- For DC current and DC voltage
- Class 1,5

Backside adjustment

Description

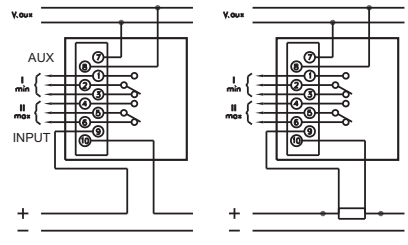
The technical features of the movements are same as the features of the moving coil instruments. Only this has an additionally electronic limit control. (Type PQ see page 4/35)

Electronic:

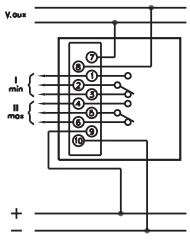
Auxilliary supply:	230 V ~ ± 10 % (50-60 Hz) other voltages on request
Output relays:	2 changeover relays, potential free
Hysteresis:	2 % of the full scale
Repetibility:	1 % of the full scale
Adjustment with potentiometer:	from 0 to 100 % of the nominal range of scale[1]) Tolerance ± 5 %
Time delay:	0 to 30 sec. ± 3 sec. Tolerance ± 5 %

Connection diagrams

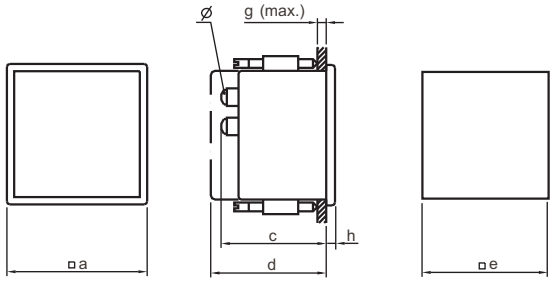
Ammeter



Voltmeter



Dimensions



Technical Features

Type		PQC 96n/1	PQC 96n/2 max. PQC 96n/2min.
Front frame	(mm)	96 x 96	96 x 96
Scale length	(mm)	94	94
Weight	(g)	540	540
Relay output		1 max. + 1 min.	2 max. (or 2 min)
Burden auxiliary supply	(VA)	3	3

Burden of the movements see PQ-instruments on page 4/29

Standard Measuring Ranges

DC Voltage		DC Current	
40 mV	5 V	20 µA	4 mA
50 mV	6 V	25 µA	5 mA
60 mV	10 V	40 µA	6 mA
100 mV	15 V	50 µA	10 mA
150 mV	25 V	60 µA	15 mA
250 mV	40 V	100 µA	20 mA
300 mV	50 V	150 µA	25 mA
400 mV	60 V	200 µA	40 mA
500 mV	100 V	300 µA	50 mA
600 mV	150 V	400 µA	60 mA
800 mV	250 V	500 µA	1 A
1 V	300 V	600 µA	1,5 A
1,5 V	400 V	1 mA	2,5 A
2,5 V	500 V	1,5 mA	4 A
		2,5 mA	5 A
For connection to shunt .../ 60 mV .../ 150 mV		Standard signals 20 mA 4-20 mA 1 mA	

Dimensions

Dimensions in mm							
Type	a	c	d	e	g	h	Terminals
PQC 96n	96	99	-	92 $^{+0,8}$	26	5,5	screw terminals

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05 Current Transformers

Current transformers are electrical equipment, that convert primar currents to proportional secondary currents that are appropriate to the connected measuring instruments.

Current transformers have a primary winding to which the current to be measured is fed. Measuring instruments are connected to a secondary winding.

Current transformers are used for measuring and protecting applications. It is recommended to apply current transformers for currents of 40 A or higher.

Flexible current transformers on request

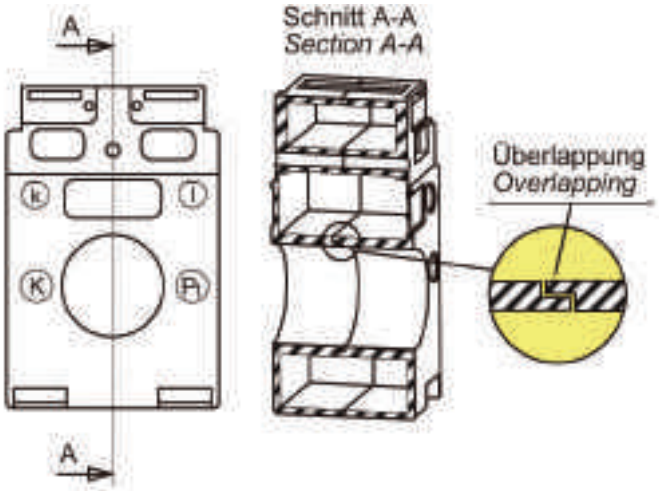
AST - Current transformers line

Technical comments

Modern design, versatility and greater safety are the distinctive features of the new AST-Line. In developing we have moreover retained our reliable CELSA secondary terminal.

Greater safety

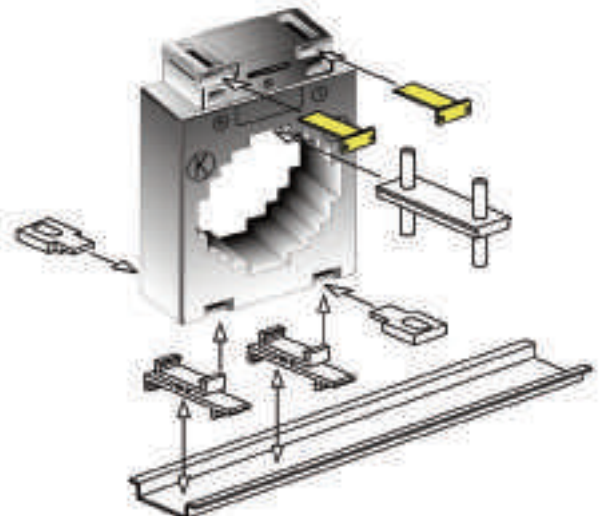
The joining point where the two halves of the housing meet inside the primary bar opening is crucial to safety. Quite in accordance with CELSA´s motto - safety is built into our products - the two halves of the housing are not aligned with a butt joint, instead they are made to overlap in the new AST-Line.



Versatility

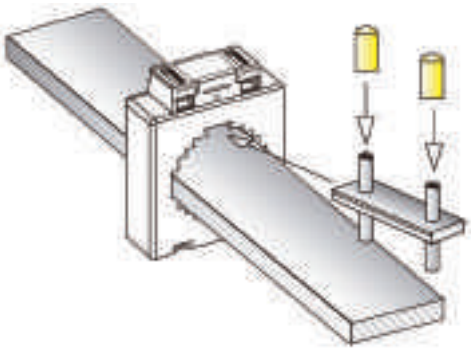
Current transformers are frequently secured with the help of a lug through which a clamping screw fits onto the primary bar. You must have noticed what a nuisance this lug can be, for instance when you want to install the CT behind fuse switch disconnectors, fuse trips or between bar overlaps and exits.

The new current transformer of the CELSA AST-Line have their own solution to this problem. The conventional fixing device has been designed with a form-locking guide so that - if necessary - it can simply be pulled out.



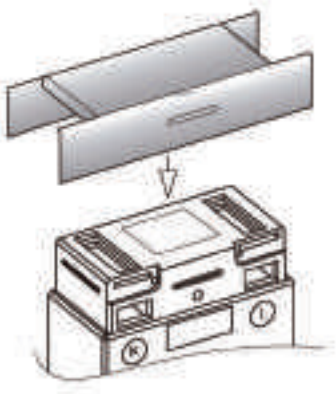
Insulated protective caps for primary fixing bolts

To protect against unintentional contact the bolts of the primary fixing devices can be covered by protective insulation caps. These should be pressed only on the already fastened bolts, not between bolts and bars.



Extended secondary terminal cover

When using the CT as a tube type CT you may wish to increase the air gaps and creepage distances between secondary terminals and primary bars. You can do so by adding protective terminal covers over the CT openings on the front and back as shown.



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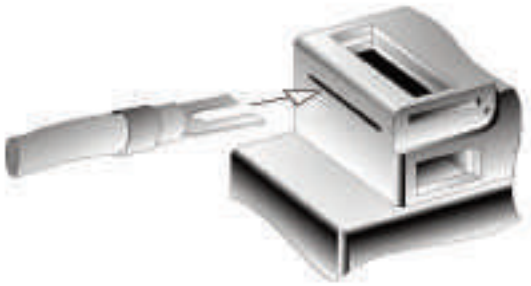
AST - Current transformers line

Secondary terminal openings.
The connection of secondary wire leads to their corresponding terminals is normally done by sliding them into the rectangular openings on the front or the back. If this way of connection is prohibited for instance due to blocking when mounted right behind a line of fuses the secondary wire leads equipped with clamps can also be introduced into the lateral slots for secondary terminal connection as shown

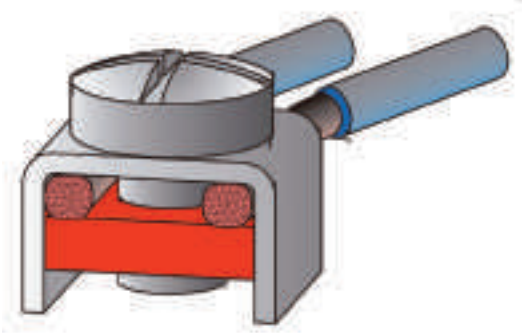


The CELSA Secondary terminal
In this clamping system pressure is transmitted by means of a nut (pad) to the ends of the conductor (lift principle). The conductor is therefore loaded only under pressure and cannot be demaged by rotating components. When opened, there are two clamping spaces of 2.5mm x 4mm each in cross-section.

Thanks to our clamping system the ends of the conductors are clamped over a wide area which ensures lower contact resistance. Pressure forces of several hundret Newtons are reached. In this way conductors even with multiple, fine and extremely fine wires are so well compressed that no harmful gases can penetrate to cause corrosion. It therefore provides an extremely long-lasting connection even in aggressive indu-strial environment.

The plus-minus slot of the M5 (2 Nm) screws allows easy of handling. At the AST-Line both, screws and nuts are designed in such a way to prevent unintentional loosening.

The secondary terminals are made of brass with nickel as a double terminal construction. This double construction permits a very easy short circuit of the current transformer during operation in order to carry out work on the secondary circuit.



General Features

Of course all AST current transformers comply with EN 60044, DIN VDE 0414, VDE 1000, DIN 42600 as well as the regulations VBG 4, VDE 0106 part 100..

General Mechanical Feature
- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features
- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

All CELSA current transformers are dimensioned (exceptionell some marked types) in accordance with VDE 0414 for a rated continuous thermal current of $I_D = 1{,}2 \cdot I_N$.

Included in delivery:
- secondary therminal covers
- primary fixing device
- mounting feet

Accesories:
- cost-effective snap-on mounting brackets out of highly reinforced fibre glass macrolon for snapping on a profile mounting bar according to EN 50022-35 and DIN 46277
- copper tubes in various sizes for using a current transformer as a tube type current transformer
- copper primary bars in various sizes
- insulated protective caps for primary fixing bolts
- protective terminal cover to increase the air gaps and creepage distances if using the CT as tube type CT.

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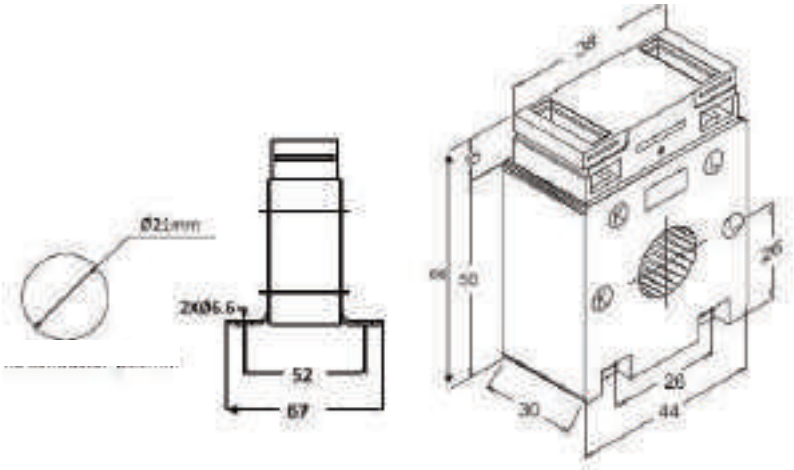
ASTR21 - WINDOW CURRENT TRANSFORMER



Dimensions:	44 x 66 x30	mm
Round conductor:	Ø 21	mm

ASTR21 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50	-	1.25	-	-
60	-	1.25	-	-
75	-	1.25	-	2.5
80	-	2.5	-	2.5
100	1.5	2.5	1.5	5
125	2.5	3.75	2.5	5
150	3.75	5	3.75	-
200	5	5	5	-
250	5	7.5	5	-
300	5	10	5	-
400	3.75	7.5	-	-
500	3.75	7.5	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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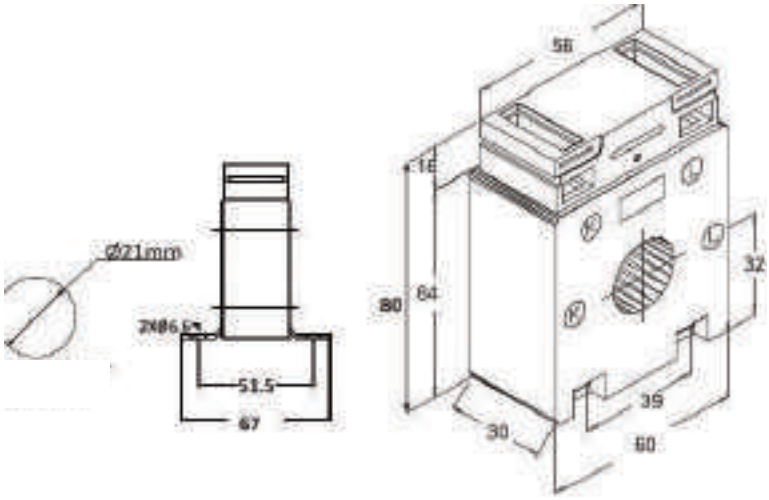
ASTMR21 - WINDOW CURRENT TRANSFORMER



Dimensions:	60 x 80 x 30	mm
Round conductor:	Ø 21	mm

ASTMR21 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50	-	1	-	-
60	-	1.25	-	-
75	2.5	2.5	-	-
80	-	3.75	-	-
100	2.5	5	2.5	5
125	2.5	5	2.5	5
150	3.75	7.5	3.75	7.5
200	5	10	5	10
250	5	10	5	10
300	7.5	10	7.5	-
400	7.5	7.5	7.5	-
500	5	10	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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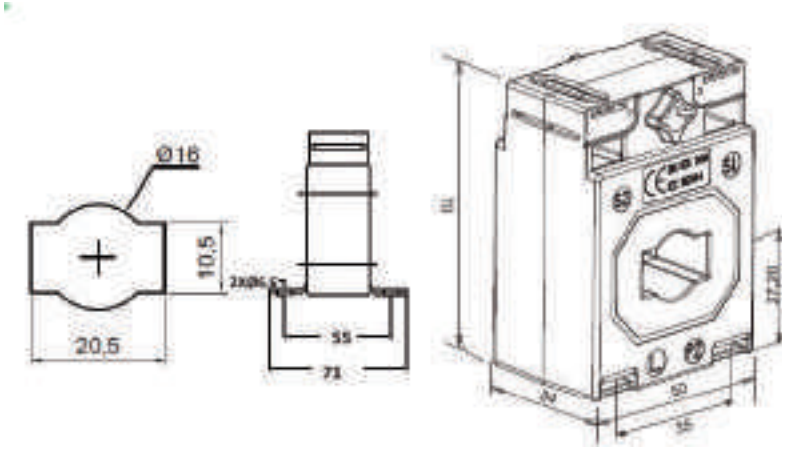
AST210s - WINDOW CURRENT TRANSFORMER



Dimensions:	50 x 70 x34	mm
Primary bar:	20 x 10	mm

AST210S Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA	
	Class 0.5	Class 1
50	1	1.5
60	1.25	1.25
75	1.5	1.5
80	3.75	3.75
100	3.75	5
125	3.75	5
150	3.75	7.5
200	5	7.5
250	5	10
300	5	10

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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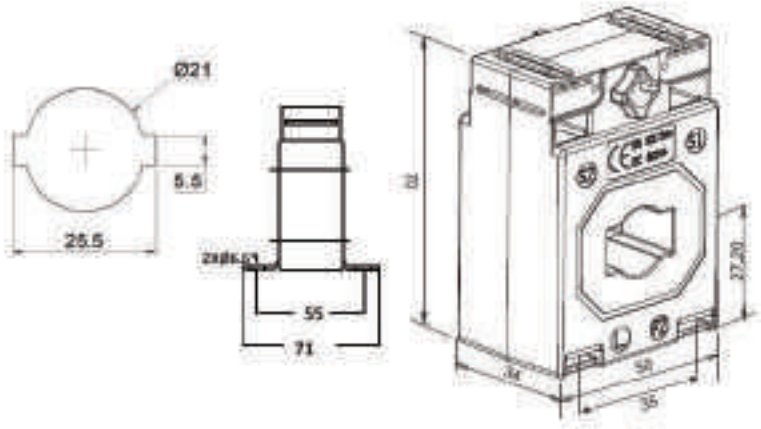
AST255s - WINDOW CURRENT TRANSFORMER



Dimensions:	50 x 70 x 34	mm
Round conductor:	Ø 21	mm
Primary bar:	25 x 5	mm

AST250S Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA
	Class 1
50	1.25*
60	1.25
75	1.5
80	3.75
100	2.5
125	5
150	7.5
200	7.5
250	10
300	10

* Class 3

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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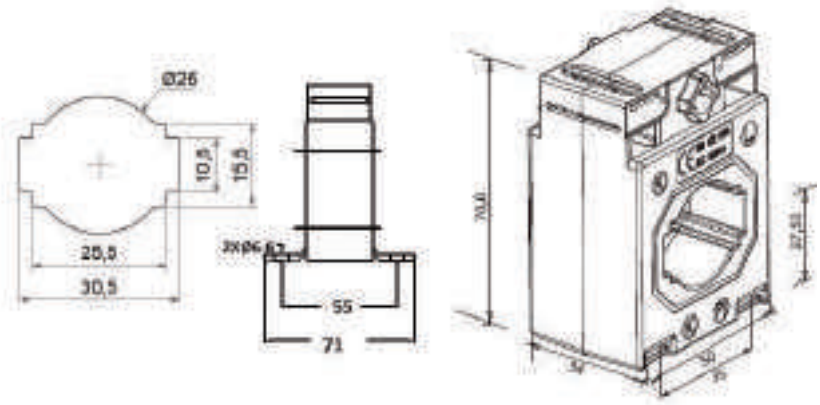
AST310s - WINDOW CURRENT TRANSFORMER

Dimensions:	50 x 70 34 mm
Primary bar:	30 x 10 mm



AST310S Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA			sec. 1 A / Rated burdens VA
	Class 0.5	Class 1	Class 3	Class 1
50	-	-	1.25	-
60	-	-	1.25	-
75	-	1.25	1.25	1.25
80		1.25	2.5	1.25
100	-	2.5	2.5	2.5
125	-	2.5	2.5	2.5
150	-	3.75	3.75	3.75
200	2.5	5	5	5
250	3.75	5	5	5
300	3.75	5	5	5
400	5	5	5	5
500	2.5	3.75	5	3.75
600	5	5	7.5	5

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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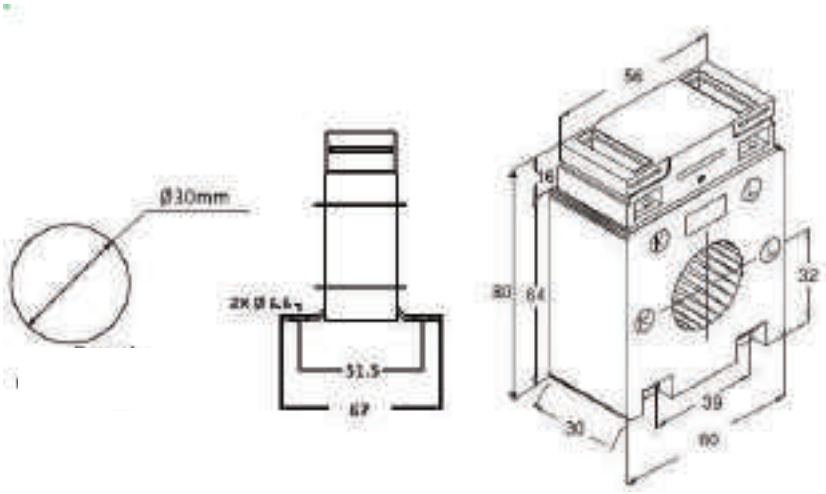
AST3R30 - WINDOW CURRENT TRANSFORMER



Dimensions:	60 x 80 x 30	mm
Round conductor:	Ø 30	mm

AST3R30 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
100	-	2.5	-	2.5
125	-	2.5	-	2.5
150	2.5	5	2.5	5
200	5	7.5	5	5
250	5	10	5	10
300	7.5	10	7.5	10
400	10	10	10	10
500	10	10	10	10
600	7.5	10	-	-
700	-	10	-	-
800	-	10	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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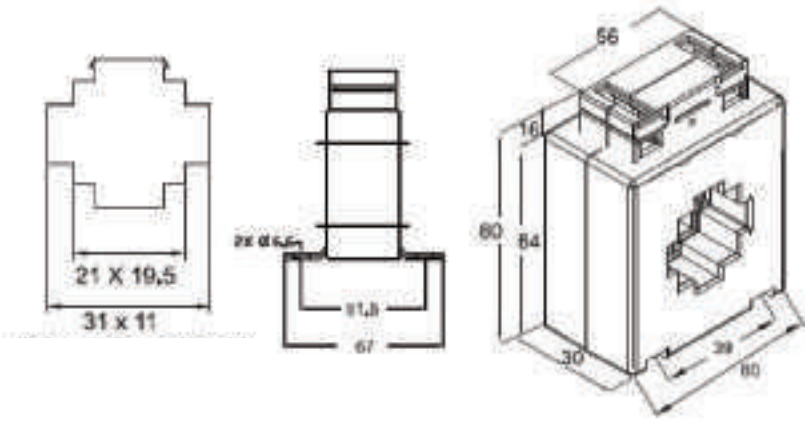
AST310 - WINDOW CURRENT TRANSFORMER



Dimensions:	50 x 70 34	mm
Primary bar:	30 x 10	mm

AST310 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50*	-	-	-	-
100	-	2.5	-	2.5
125	2.5	2.5	2.5	2.5
150	5	5	5	5
200	5	7.5	5	5
250	10	10	10	7.5
300	10	10	10	10
400	10	10	-	10
500	15	15	-	10
600	15	15	-	-
700	10	10	-	-
750	10	10	-	-
800	15	10	-	-

* clase 3 / 1.25VA

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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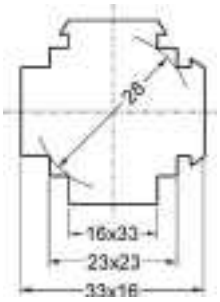
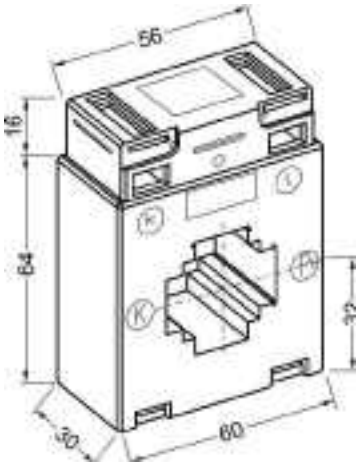
AST315 - WINDOW CURRENT TRANSFORMER





Dimensions:	60 x 80 x 30	mm
Primary bar:	30 x 15	mm

AST315 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50	-	1.25 *	-	-
60	-	1.25	-	-
75	-	1.25	-	2.5
80	-	1.25	-	2.5
100	-	2.5	1.25	2.5
125	-	3.75	1.25	3.75
150	1.25	3.75	2.5	5
200	3.75	3.75	3.75	5
250	5	7.5	5	7.5
300	7.5	7.5	7.5	10
400	7.5	10	10	10
500	7.5	10	10	10
600	10	10	10	15
700	10	10	10	15
750	15	20	15	15

* clase 3

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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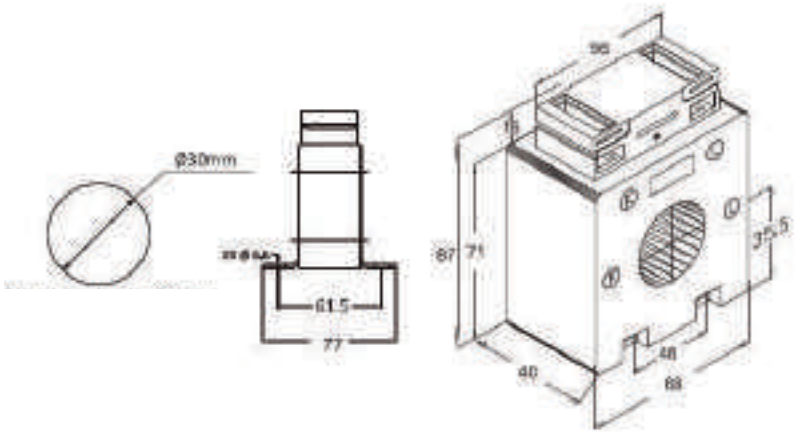
AST4R30 - WINDOW CURRENT TRANSFORMER

Dimensions:	68 x 87 x 40 mm
Round conductor:	Ø 30 mm



AST4R30 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
60	-	1.25	-	-
75	-	2.5	-	1
80	-	2.5	-	2.5
100	2.5	5	-	5
125	3.75	5	-	5
150	3.75	10	5	10
200	5	15	5	10
250	5	15	5	15
300	10	15	10	15
400	10	15	10	15
500	15	15	15	-
600	15	15	15	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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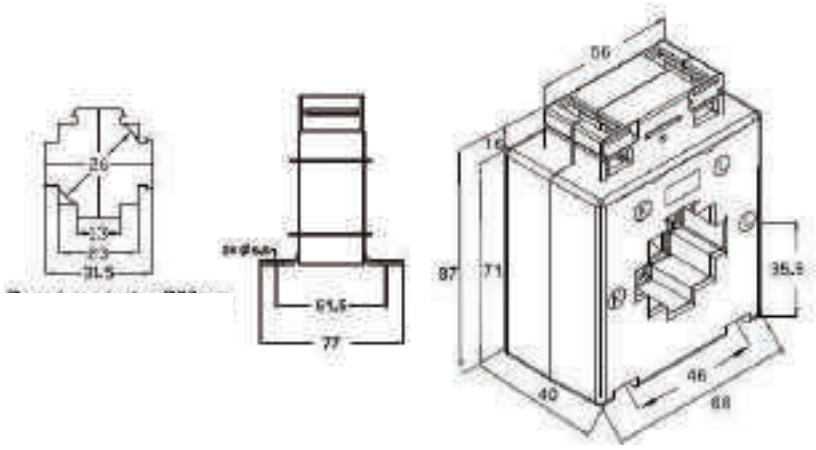
AST4B312 - WINDOW CURRENT TRANSFORMER

Dimensions:	68 x 87 x 34	mm
Round conductor:	Ø 30	mm
Primary bar:	30 x 10	mm



AST4B312 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA			sec. 1 A / Rated burdens VA	
	Class 0.5	Class 0.5	Class 1	Class 0.5	Class 1
60		-	1.25	-	-
75		-	1.5	-	-
80		-	1.5	-	-
100		-	5	-	5
125		-	5	-	5
150		5	10	5	5
200		5	10	5	10
250	2.5	5	15	5	10
300	2.5	10	15	10	15
400	2.5	10	15	10	15
500		15	15	15	-
600		15	15	15	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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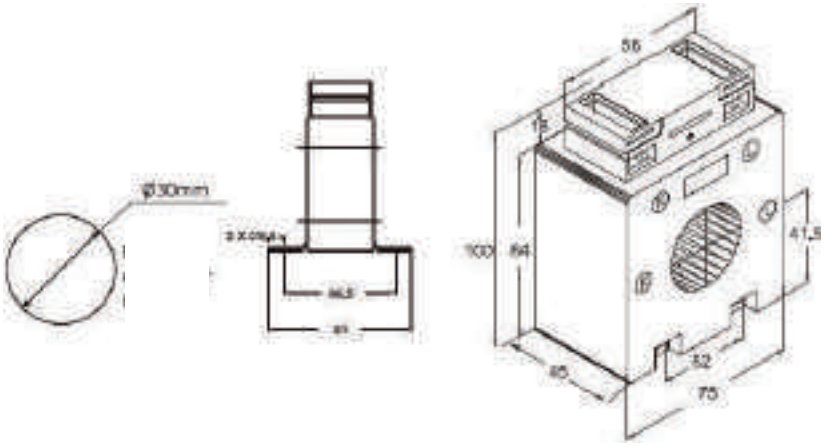
AST5R30 - WINDOW CURRENT TRANSFORMER

Dimensions:	75 x 100 x 45	mm
Round conductor:	Ø 30	mm



AST5R30 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50	-	1	-	-
60	-	1.25	-	-
75	-	2.5	-	-
80	-	2.5	-	-
100	-	2.5	-	2.5
125	3.75	10	3.75	5
150	5	5	5	5
200	7.5	7.5	10	10
250	10	10	10	10
300	10	15	10	15
400	10	15	10	15
500	10	15	10	-
600	10	15	10	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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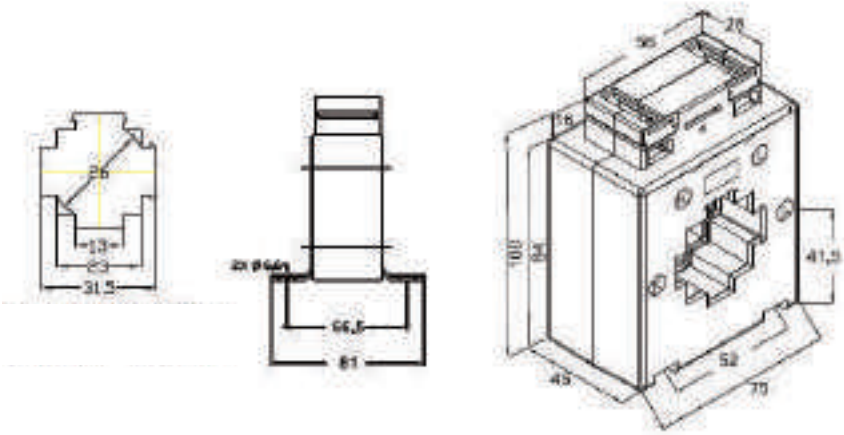
AST5B312 - WINDOW CURRENT TRANSFORMER

Dimensions:	75 x 100 x 45	mm
Round conductor:	Ø 26	mm
Primary bar:	30 x 10	mm



AST5B312 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
50	-	1.25	-	-
60	-	1.5	-	-
75	-	2.5	-	-
80	-	5	-	-
100	3.75	7.5	3.75	3.75
125	5	10	5	5
150	7.5	15	10	10
200	10	15	10	10
250	5	15	5	5
300	10	15	10	10
400	10	15	10	10
500	10	15	10	10
600	10	15	10	10

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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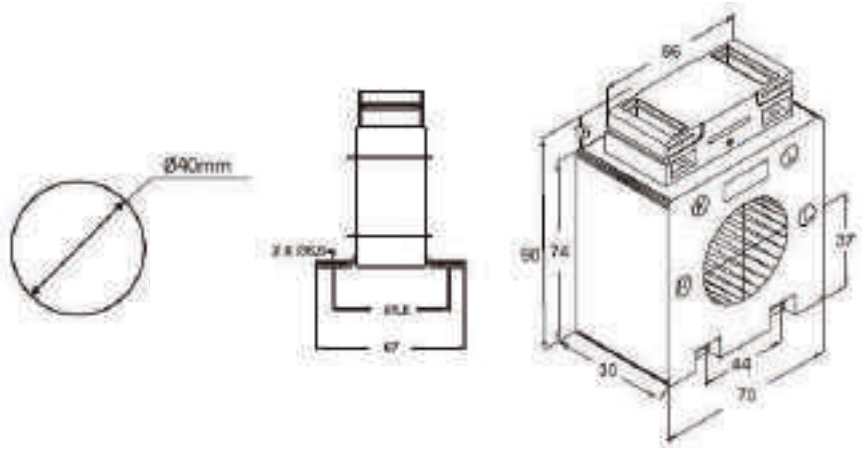
AST4R40 - WINDOW CURRENT TRANSFORMER

Dimensions:	70 x 90 x 30	mm
Round conductor:	Ø 40	mm



AST4R40 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
150	-	1.5	-	1.5
200	1.5	5	1.5	5
250	2.5	7.5	2.5	7.5
300	5	7.5	5	10
400	10	10	10	10
500	10	10	10	10
600	-	10	-	10
750	-	10	-	-
800	-	10	-	-
1000	-	10	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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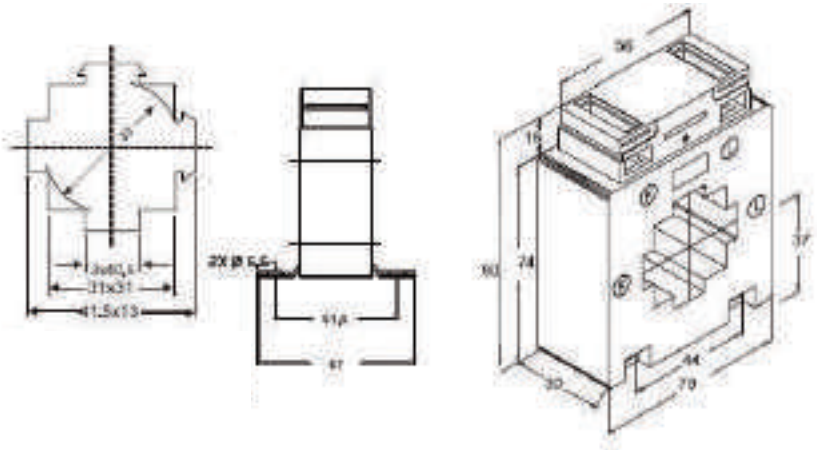
AST412 - WINDOW CURRENT TRANSFORMER



Dimensions:	70 x 90 x 30	mm
Round conductor:	Ø 33	mm
Primary bar:	40x 13	mm
	2 x 30 x 10	mm

AST412 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
125	1.25	1.5	1.25	1.5
150	2.5	5	2.5	5
200	3.75	5	3.75	5
250	5	7.5	5	7.5
300	5	7.5	5	7.5
400	7.5	10	7.5	10
500	7.5	10	7.5	10
600	10	15	10	-
750	10	15	10	-
800	-	15	-	-
1000	-	20	-	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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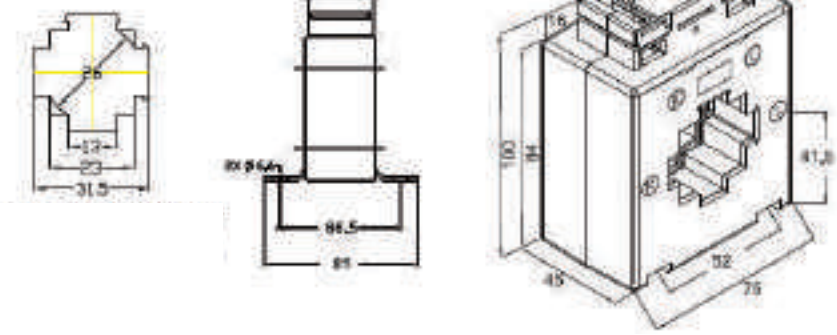
AST5B412 - WINDOW CURRENT TRANSFORMER

Dimensions:	75 x 100 x 45	mm
Round conductor:	Ø 33	mm
Primary bar:	40 x 13	mm
	2 x 30 x 10	mm



AST5B412 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
75	-	1.5	-	-
80	-	1.5	-	-
100	2.5	3.75	-	-
125	2.5	5	2.5	5
150	5	10	5	7.5
200	5	15	5	10
250	10	15	10	10
300	10	15	10	15
400	10	15	10	15
500	10	15	10	15
600	10	15	10	15

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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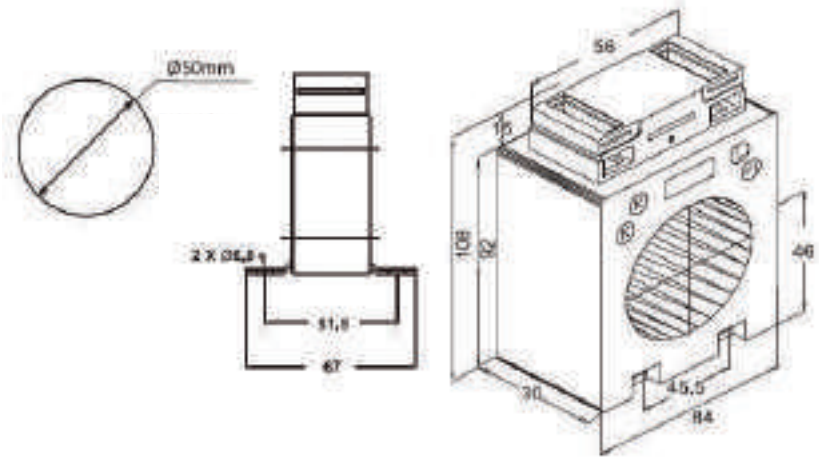
AST5R50 - WINDOW CURRENT TRANSFORMER



Dimensions:	80 x 108 x 30	mm
Round conductor:	Ø 50	mm

AST5R50 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
100	-	1	-	-
125	-	1.25	-	-
150	-	2.5	-	-
200	-	5	-	5
250	2.5	7.5	2.5	5
300	5	15	5	10
400	7.5	15	7.5	10
500	10	15	10	15
600	10	15	10	15
750	15	15	15	15
800	15	15	15	15
1000	15	15	15	15
1250	15	15	15	15
1500	-	15	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

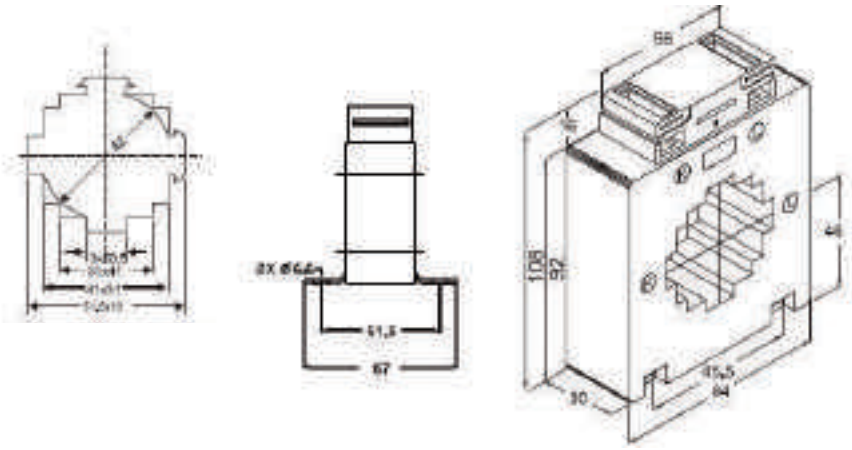
- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

AST512 - WINDOW CURRENT TRANSFORMER

Dimensions:	84 x 108 x 30	mm
Round conductor:	Ø 42	mm
Primary bar:	50 x 13	mm
	2 x 10 x 10	mm



AST512 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
100	-	1.25	-	1.25
125	-	1.25	-	2.5
150	-	1.25	-	2.5
200	-	5	-	5
250	2.5	7.5	2.5	5
300	5	10	5	10
400	7.5	15	7.5	15
500	15	15	15	15
600	15	20	15	15
750	15	10	15	15
800	15	15	15	15
1000	15	20	15	15
1250	15	20	15	-
1500	-	15	-	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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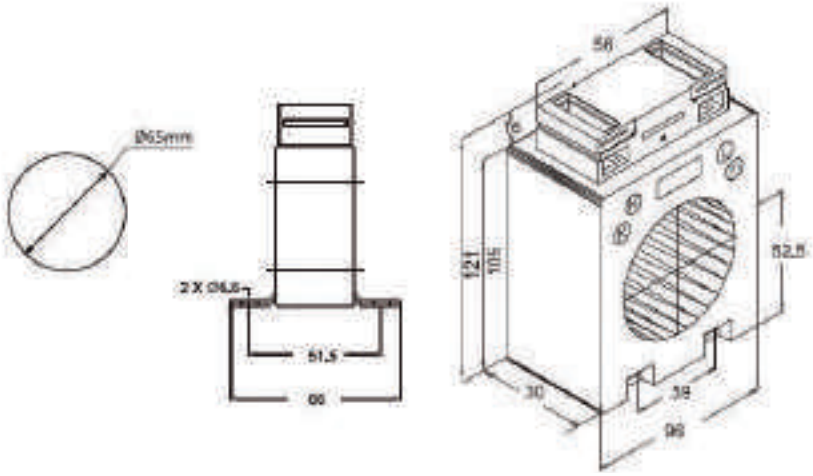
AST6R65 - WINDOW CURRENT TRANSFORMER



Dimensions:	96 x 121 x 30	mm
Round conductor:	Ø 65	mm

AST6R65 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
200	-	2.5	-	2.5
250	-	5	-	5
300	5	5	5	5
400	5	10	5	10
500	10	15	10	15
600	15	15	15	15
750	15	15	15	15
800	15	15	15	15
1000	15	15	15	15
1250	15	15	15	15
1500	15	15	15	15
1600	15	15	15	15
2000	-	15	-	-

Accesories (included):

- Mounting feet (2 pieces)

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

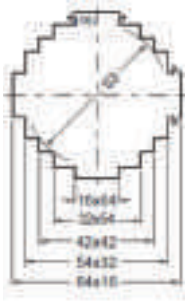
- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

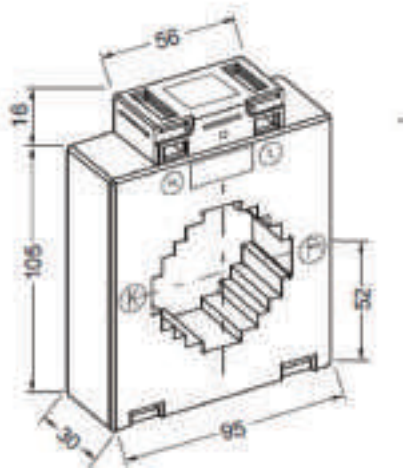
General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

AST615.5 - WINDOW CURRENT TRANSFORMER

Dimensions:	85 x 108 x 30	mm
Round conductor:	Ø 52	mm
Primary bar:	60 x 15	mm
	2 x 50 x 10	mm
	40 x 40	mm





AST615.5 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
200	1.25	3.75		
250	2.5	5		
300	3.75	5	3.75	5
400	5	7.5	5	7.5
500	10	10	10	10
600	10	10	10	10
750	15	15	15	15
800	15	15	15	15
1000	20	20	15	20
1250	20	20	15	20
1500	20	25	-	-
1600	25	30	-	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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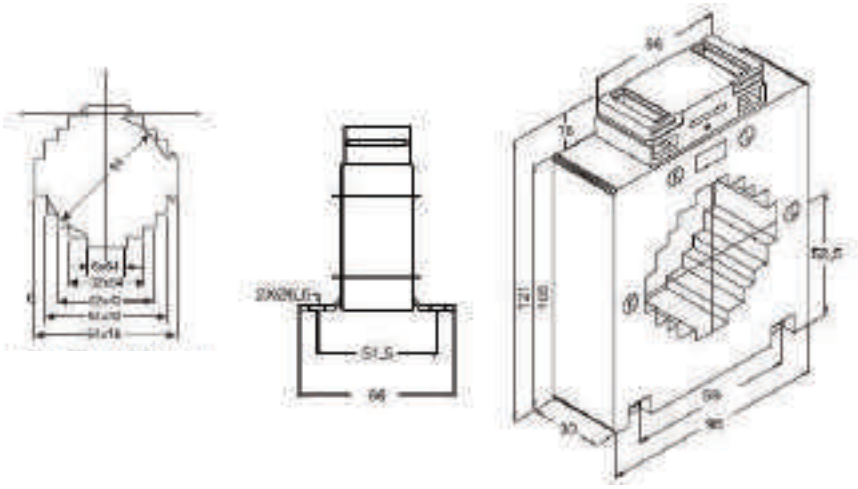
AST615 - WINDOW CURRENT TRANSFORMER



Dimensions:	96 x 121 x 30	mm
Round conductor:	Ø 53	mm
Primary bar:	60 x 15	mm
	2 x 50 x 10	mm
	40 x 40	mm

AST615 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
200	-	2.5	-	2.5
250	2.5	5	2.5	5
300	2.5	5	2.5	5
400	5	10	5	7.5
500	7.5	15	7.5	10
600	10	15	10	15
750	15	15	15	15
800	15	15	15	15
1000	15	15	10	10
1250	15	15	15	-
1500	15	15	15	-
1600	15	20	15	15
2000	30	15	30	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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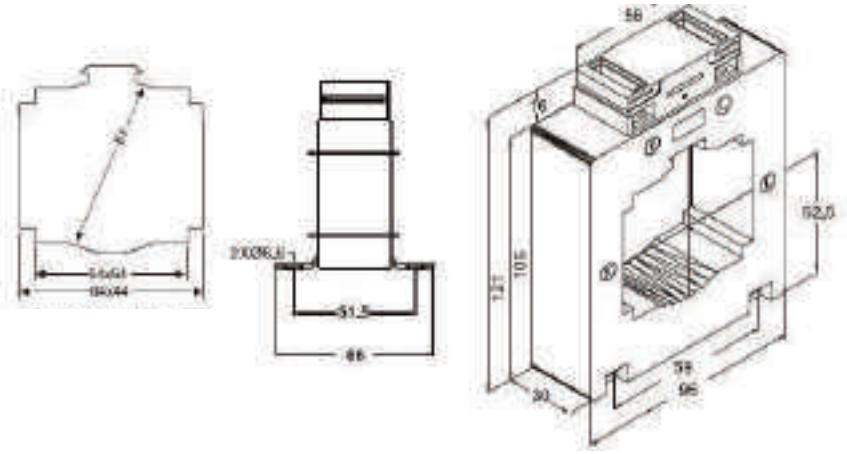
AST640 - WINDOW CURRENT TRANSFORMER

Dimensions:	96 x 121 x 30	mm
Round conductor:	Ø 61	mm
Primary bar:	60 x 40	mm
	3 x 60 x 10	mm
	3 x 50 x 10	mm



AST640 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
200	-	2.5	-	-
250	-	5	-	2.5
300	-	5	-	5
400	3.75	7.5	3.75	5
500	5	10	5	10
600	10	15	10	15
630	10	15	10	15
750	10	15	10	15
800	15	15	15	15
1000	15	15	15	15
1250	15	15	15	-
1500	15	15	15	-
1600	15	20	15	-
2000	-	15	-	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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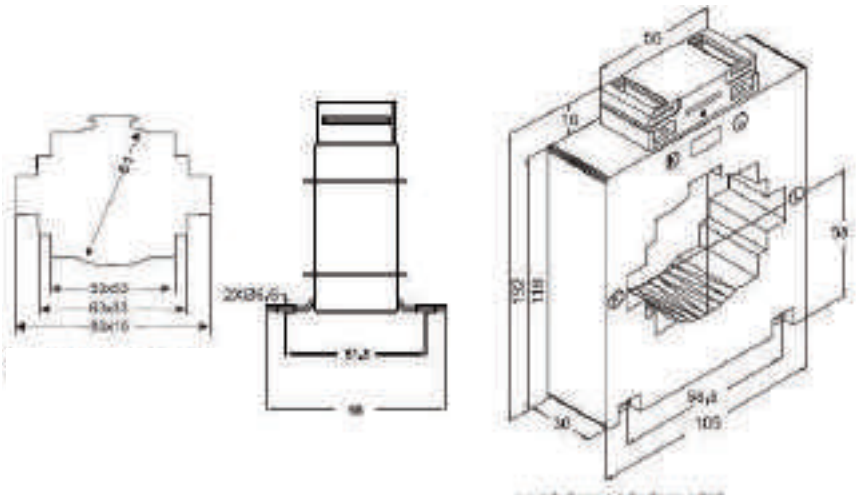
AST815 - WINDOW CURRENT TRANSFORMER

Dimensions:	105 x 132 x30	mm
Round conductor:	Ø 61	mm
Primary bar:	80 x 15	mm
	2 x 60 x 10	mm
	3 x 50 x 10	mm



AST815 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
400	-	5	-	5
500	-	7.5	-	7.5
600	5	10	5	10
630	5	10	-	-
750	5	10	5	10
800	10	10	10	10
1000	20	15	20	10
1250	7.5	15	7.5	10
1500	10	10	10	10
1600	10	15	10	15
2000	10	10	10	15
2500	5	5	5	25

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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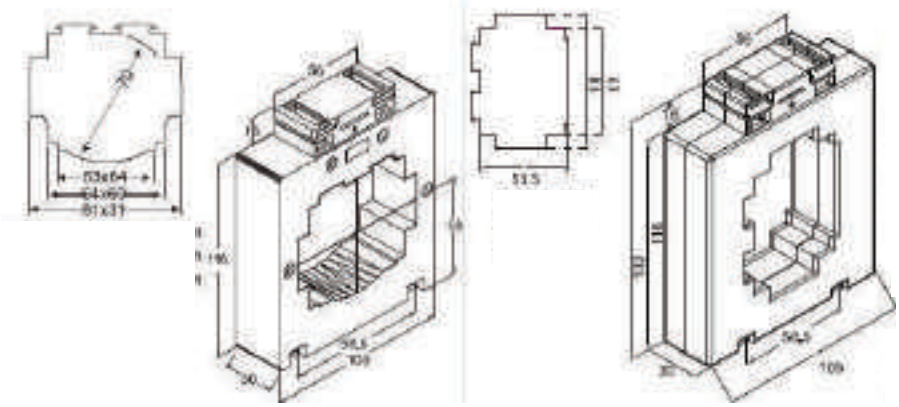
AST830 - WINDOW CURRENT TRANSFORMER

Dimensions:	105 x 132 x30	mm
Round conductor:	Ø 70	mm
Primary bar:	2 x 80 x 10	mm
AST830H	60 x 60	mm
AST830V	60 x 50	mm



AST830H / AST830V Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
400	-	3.75	-	3.75
500	-	7.5	-	7.5
600	5	10	5	10
750	5	10	5	10
800	7.5	7.5	7.5	10
1000	15	15	15	-
1250	15	10	15	-
1500	10	10	10	-
1600	15	15	-	-
2000	10	10	-	-

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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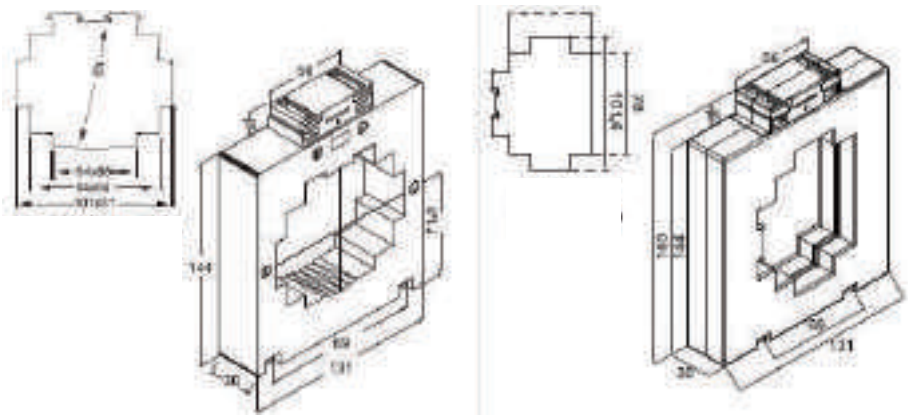
AST1030 - WINDOW CURRENT TRANSFORMER

Dimensions:	131 x 160 x 30	mm
Round conductor:	Ø 85	mm
Primary bar:	2 x 100 x 10	mm
AST1030H	80 x 64	mm
AST1030V	75 x 60	mm



AST1030H / AST1030V Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA			sec. 1 A / Rated burdens VA	
	Class 0.2s	Class 0.5	Class 1	Class 0.5	Class 1
600		-	10	-	7.5
750		5	10	5	10
800		7.5	10	7.5	10
1000		10	15	10	10
1250		15	15	15	10
1500		15	15	15	10
1600		15	15	15	15
2000		15	15	15	15
2500		15	30	20	15
3000		15	15	20	20
3200		15	15	15	15

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

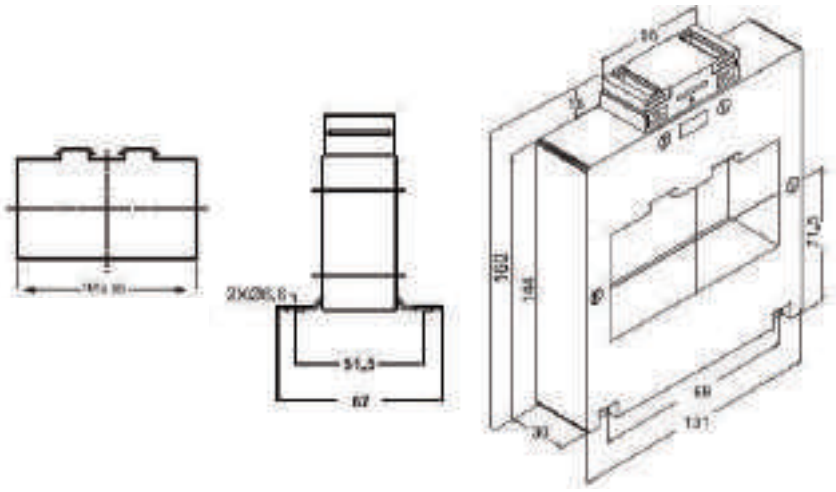
- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

AST1056 - WINDOW CURRENT TRANSFORMER

Dimensions:	131 x 160 x 30 mm
Primary bar:	3 x 60 x 30 mm



AST1056 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
600	-	10	-	-
750	5	10	5	-
800	7.5	10	7.5	-
1000	10	10	10	10
1250	15	15	15	15
1500	15	15	15	15
1600	15	15	15	15
2000	15	25	15	10
2500	20	30	10	10
3000	25	30	15	15
3200	10	30	15	30

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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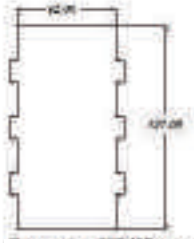
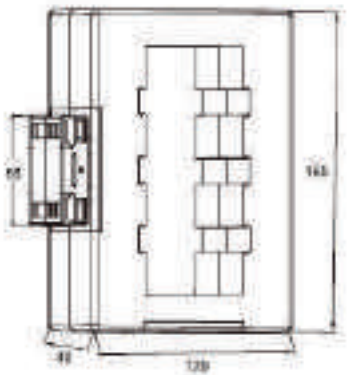
AST1256 - WINDOW CURRENT TRANSFORMER

Dimensions:		
AST1256H	145 x 165 x 40	mm
AST1256V	129 x 181 x 40	mm
Primary bar:	125 x 60	mm





AST1256H / AST1256V Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
600	-	10	-	10
750	5	15	5	15
800	7.5	15	7.5	15
1000	15	15	15	15
1250	15	20	15	15
1500	10	2	15	15
1600	10	20	15	15
2000	15	20	15	20
2500	15	20	15	20
3000	10	20	10	20
3200	15	20	15	20

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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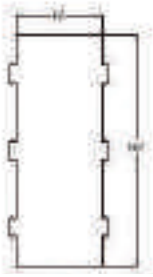
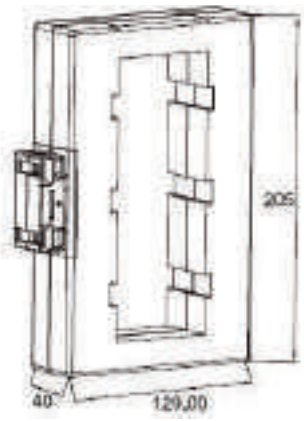
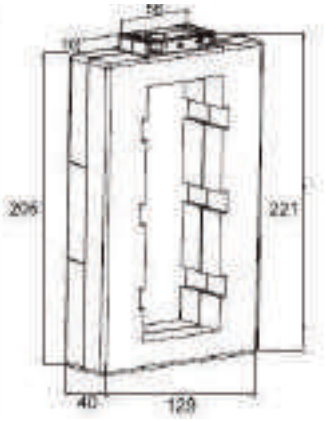
AST1656 - WINDOW CURRENT TRANSFORMER

Dimensions:		
AST1656H	145 x 205 x 40	mm
AST1656V	129 x 221 x 40	mm
Primary bar:	165 x 60	mm







AST1656H / AST1656V Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
600	5	10	-	10
750	-	15	-	15
800	10	15	10	15
1000	15	15	15	20
1250	15	15	15	20
1500	15	15	15	20
1600	15	15	15	20
2000	15	20	15	20
2500	15	20	15	20
3000	15	20	15	20
3200	15	20	15	20
3500	15	20	15	20
4000	15	20	15	20
5000	-	20	-	20

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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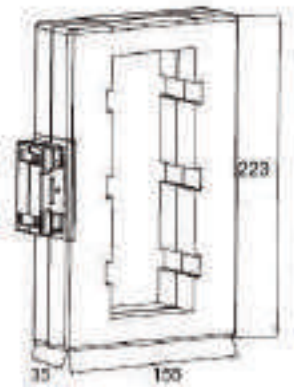
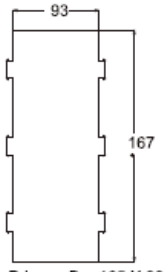
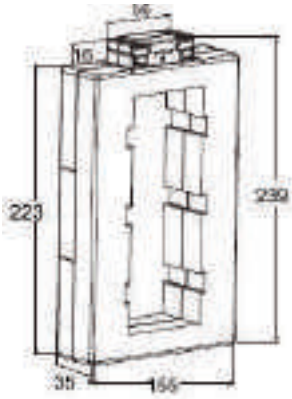
AST1659 - WINDOW CURRENT TRANSFORMER



Dimensions:		
AST1659H	171 x 223 x 35	mm
AST1659V	155 x 281 x 35	mm
Primary bar:	165 x 90	mm





AST1659H / AST1659V Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
800	-	15	-	-
1000	15	15	15	-
1250	15	15	15	20
1500	15	15	15	20
1600	15	20	15	20
2000	15	20	15	20
2500	15	20	15	20
3000	15	20	15	20
3200	15	20	15	20
3500	15	20	15	20
4000	15	20	15	20
5000	15	20	15	20
6000	15	20	15	20

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10.

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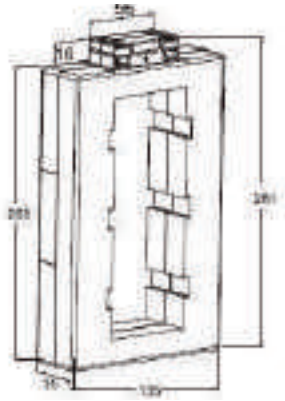
AST2065 - WINDOW CURRENT TRANSFORMER



Dimensions:		
AST2065H	155 x 265 x 35	mm
AST2065V	155 x 239 x 35	mm
Primary bar:	205 x 65	mm

AST2065 Technical Features, Executions

Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0.5	Class 1	Class 0.5	Class 1
800	-	15	-	-
1000	15	15	15	20
1250	15	15	15	20
1500	15	15	15	20
1600	15	15	15	20
2000	15	15	15	20
2500	15	20	15	20
3000	15	20	15	20
3200	15	20	15	20
3500	15	20	15	20
4000	15	20	15	20
5000	15	20	15	20
6000	15	20	15	20

Accesories (included):

- Mounting feet (2 pieces)
- Primary fixing device

Special executions (On request):

- Other ranges, classes or rated burden VA.

General Mechanical Feature

- unbreakable plastic casing, polyamide
- difficult to inflame, according to UL 94 V0 and selfextinguishing
- nickel-plated secondary terminals with plus minus screws (2 Nm)
- integrated secondary terminal caps

General Electrical Features

- rated frequency 50-60Hz (other frequencies on request)
- class of insulation E (other classes on request)
- rated short-time thermal current Ith = 60 . IN
- nominal surge current Idyn = 2.5 . Ith.
- highest voltage for equipment Um = 0,72kV (other voltages on request)
- rated power-frequency withstand voltage 3kV/1min
- instrument security factor FS5 or FS10

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CURRENT TRANSFOMERS

AST3WST - AST4WST - AST4WPL6 - AST5WPL6 - AST5WPL8

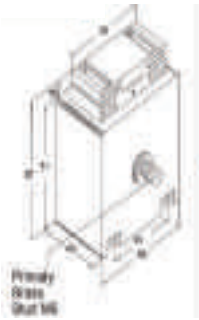
AST3WST

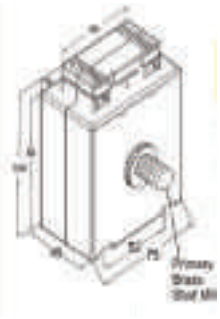
AST4WST

AST4WPL6

AST5WPL6

AST5WPL8





Dimensions:
AST3WST
60 x 80 x 30 mm

AST4WST
60 x 87 x 40 mm

AST4WPL6
68 x 87 x 40 mm

AST5WPL6
75 x 100 x 45 mm

AST5WPL8
75 x 100 x 45 mm

AST3WST / AST4WST Technical Features, Executions

Primary rated current A	AST3WST		AST4WST		
	sec. 5 A / Rated burdens VA	sec. 1 A / Rated burdens VA	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA
	Class 0.5	Class 1	Class 0.5	Class 1	Class 1
5	5	5	10	10	10
6	5	5	10	10	10
7.5	5	5	10	10	10
10	5	5	10	10	10
12.5	5	5	10	10	10
15	5	5	10	10	10
20	5	5	10	10	10
25	5	5	10	10	10
30	5	5	10	10	10

AST4WPL6 / AST5WPL6 Technical Features, Executions

Primary rated current A	AST4WPL6 / Primary bras stud M6			AST5WPL6 / Primary bras stud M6		
	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA
	Class 0.5	Class 1	Class 1	Class 0.5	Class 1	Class 1
5	5	5	5	15	15	15
6	5	5	5	15	15	15
7.5	5	5	5	15	15	15
10	5	5	5	15	15	15
12.5	5	5	5	15	15	15
15	5	5	5	15	15	15
20	5	5	5	15	15	15
25	5	5	5	15	15	15
30	5	5	5	15	15	15

AST5WPL8 Technical Features, Executions

Primary rated current A	AST5WPL8 / Primary bras stud M8		
	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA
	Class 0.5	Class 1	Class 1
50	15	15	15
60	15	15	15
75	15	15	15
80	15	15	15
100	-	-	-

Classic Line - Current transformers

General Characteristics

Application

Current transformers convert an alternating current, usually of high value, into a proportional secondartcurrent of lower value, which is appropriate to be measured by standard instruments of rated currents 5 or 1 A. CELSA transformers are suitable for indoor use in low-voltage networks, and they are built according to IEC 61869-2 and BS 3938. Current transformers are applied for measuring and protection. It is indicated to use current transformers for currents from 40A.

Accucary (according to IECn 61869-2)

CELSA current transformers fulfil the specifications of the accuracy classes 0.5, 1 and 3 for the rated outputs indicated in the tables, in the same instrument.

Constructive Characteristics

Cases of self-extinguishing polycarbonate V0 according to UL 94. Sealable terminal cover included, made of clear polycarbonate, except for the types IBA and IBP.

Double secondary terminals, for short-circuiting the secondary winding before opening the measuring circuit.

The IBO and IBO-50 are wound primary transformers. Other types are bus type transformers.

Electrical Data (according to IEC 61869-2)

Rated secondary current: 5 or 1 A

Frequency range: 50 - 60 Hz

Highest voltage for equipment: 720 V

Rated insulation level: 3 kV, 50 Hz during 1 minute

Rated continuous thermal current: 1.2 times rated current

Rated short-time thermal current (Ith): 60 times rated current

Rated dynamic current (1dyn): 2.5 times Ith

Instrument security factor (FS): less than 5

Thermal class of insulation: according to IEC 60085: E (120°C)

Accuracy class index

According to IEC 60085, VDE-0414 and UNE-21028 the current and the angle error are as follows:

Accuracy

Class	Current error in % at In				Loss angle in min. at In			
	0,05 **In**	0,2 **In**	**In**	1,2 **In**	0,05 **In**	0,2 **In**	**In**	1,2 **In**
0,5	1.5	0,75	0,5	0,5	90	45	30	30
1	3	1,5	1	1	80	90	60	60
3	in 0,5 **In** = 3				in 0,5 **In** = 120			

The accuracy of the current transformers of class 0.5 and 1 varies in any case between 25 % and 100 % of their rated burden for more than 2.5 VA; and between 50 % and 100 % for equal or less than 2.5 VA; however at least 1 VA.

Class 0.5 is used for counters.

Class 1is used for measurement and for internal connected counters.

Class 3 is used for protection and for relays.

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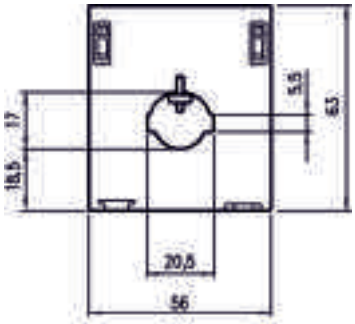
IBA

WINDOW TYPE CURRENT TRANSFORMER

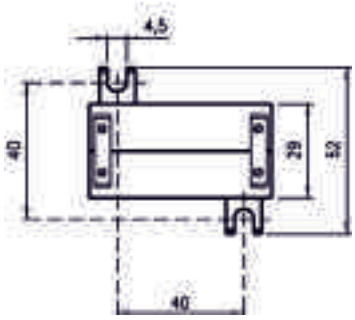
Round conductor:	Ø 16 mm
Primary bar:	20 x 5 mm



IBA Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
40	-	1,25	-	1,25*
50	-	1,25	-	1,25
60	-	1,25	-	1,25
75	-	1,25	-	1,25
100	-	2,5	-	2,5
125	1,25	3,75	1,25	3,75
150	1,25	5	1,25	5
200	2,5	5	2,5	5

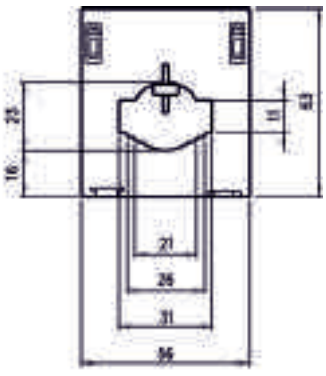
Accesories: mounting feet / snap on mounting bracket EN 50022-35
*class 3



IBP

WINDOW TYPE CURRENT TRANSFORMER

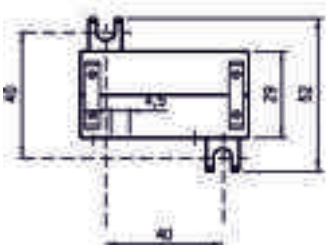
Round conductor:	Ø 22 mm
Primary bar:	30 x 10 mm



IBP Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
100	-	1,25	-	1,25
125	-	2,5	-	2,5
150	-	2,5	-	2,5
200	-	2,5	-	2,5
250	1,25	2,5	1,25	2,5
300	2,5	2,5	2,5	2,5
400	2,5	3,75	2,5	3,75
500	3,75	5	2,5	2,5
600	3,75	5	2,5	3,75

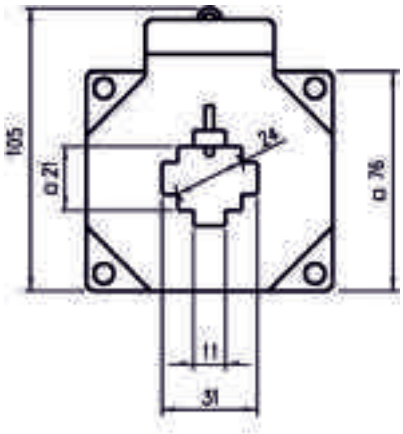
Accesories: mounting feet / snap on mounting bracket EN 50022-35

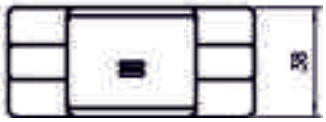


IB

WINDOW TYPE CURRENT TRANSFORMER

Round conductor:	Ø 23 mm
Primary bar:	30 x 10 mm





IB Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
50	–	1,25	–	1,25
60	–	1,25	–	1,25
75	–	2,5	–	2,5
100	–	2,5	–	2,5
125	–	3,75	–	3,75
150	–	3,75	–	3,75
200	1,25	5	1,25	5
250	3,75	5	3,75	5
300	3,75	7,5	3,75	7,5
400	5	10	5	10
500	5	15	5	15
600	7,5	20	7,5	20

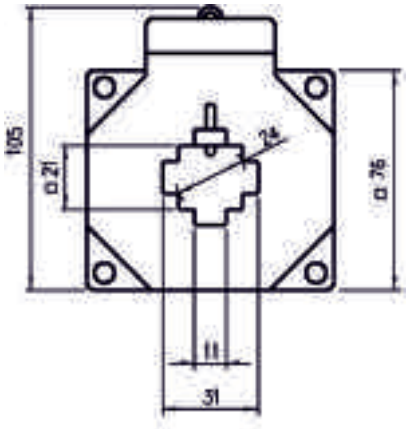
Included in delivery: Primary fixing device
Accesories: mounting feet / snap on mounting bracket EN 50022-35

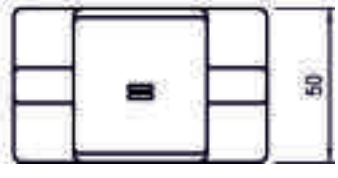
IB-50

WINDOW TYPE CURRENT TRANSFORMER

The rated burden of this type is higher than the type IB.

Round conductor:	Ø 23 mm
Primary bar:	30 x 10 mm





IB-50 Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
100	1,25	3,75	1,25	3,75
125	2,5	5	2,5	5
150	3,75	7,5	3,75	7,5
200	7,5	15	7,5	15
250	10	20	10	20
300	10	20	10	20
400	10	20	10	20
500	10	20	10	20
600	15	30	15	30

Included in delivery: Primary fixing device
Accesories: mounting feet / snap on mounting bracket EN 50022-35

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IBG

IBG

IBG/1

WINDOW TYPE CURRENT TRANSFORMER

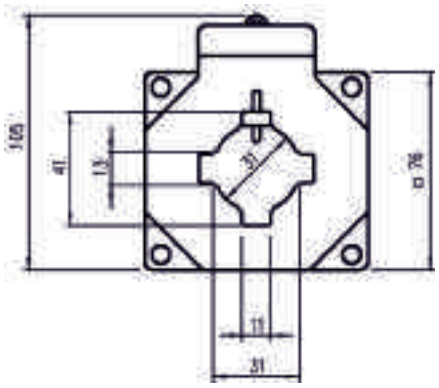
For round conductor Ø 40 mm the type IBG/1 is available.

Round conductor	IBG:	Ø 30 mm
	IBG/1:	Ø 40 mm
Primary bar		40 x 10 mm

IBG Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
150	-	2,5	-	2,5
200	-	5	-	5
250	2,5	5	2,5	5
300	3,75	5	3,75	5
400	3,75	5	3,75	5
500	5	7,5	5	7,5
600	5	7,5	5	7,5
750	5	7,5	5	7,5
800	7,5	7,5	7,5	7,5
1000	10	10	10	10

Included in delivery: Primary fixing device (except IBG/1)
Accesories: Mounting feet / snap on mounting bracket EN 50022-35

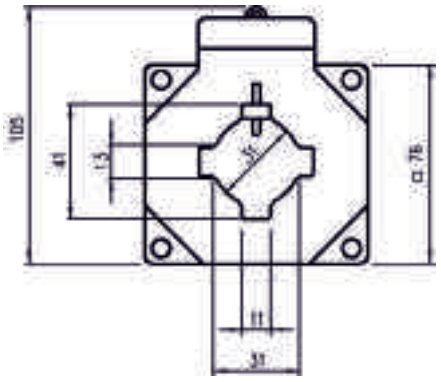


IBG-50

WINDOW TYPE CURRENT TRANSFORMER

The rated burden of this current transformer is higher than the type IBG.

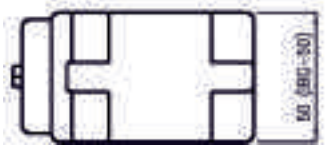
Round conductor:	Ø 30	mm
Primary bar:	40 x 10	mm



IBG-50 Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
150	2,5	5	2,5	5
200	3,75	7,5	3,75	7,5
250	3,75	7,5	3,75	7,5
300	5	7,5	5	7,5
400	10	10	10	10
500	10	15	10	15
600	10	15	10	15
750	10	15	10	15
800	10	15	10	15
1000	15	20	15	20

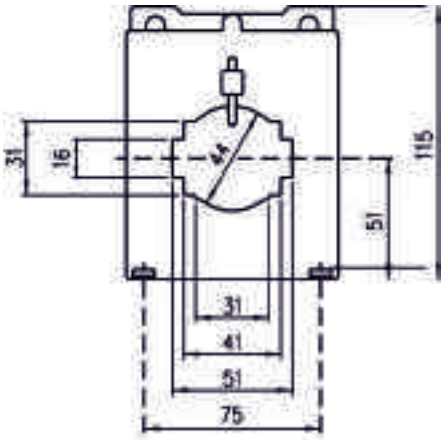
Included in delivery: Primary fixing device
Accesories: Mounting feet / snap on mounting bracket EN 50022-35



IBR

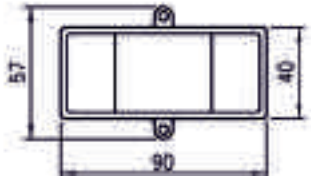
WINDOW TYPE CURRENT TRANSFORMER

Round conductor:	Ø 44 mm
Primary bar:	50 x 15 mm 2 x 40 x 10 mm



IBR Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
400	5	5	5	5
500	7,5	7,5	7,5	7,5
600	10	10	10	10
750	10	15	10	15
800	10	15	10	15
1000	10	15	10	15
1200	10	15	10	15
1500	10	20	10	20
1600	10	20	10	20

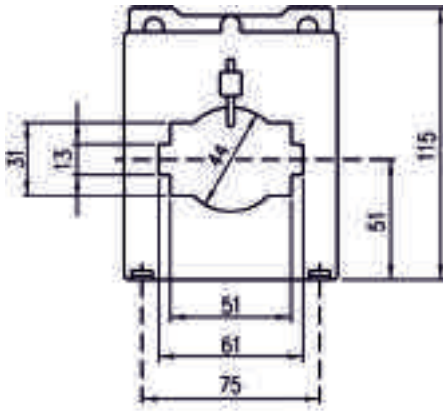


Included in delivery: Primary fixing device
Accesories: mounting feet

IBR/1

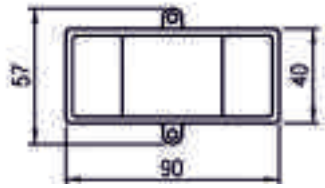
WINDOW TYPE CURRENT TRANSFORMER

Round conductor:	Ø 44 mm
Primary bar:	60 x 12 mm 2 x 50 x 10 mm



IBR/1 Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
400	5	5	5	5
500	7,5	7,5	7,5	7,5
600	10	10	10	10
750	10	15	10	15
800	10	15	10	15
1000	10	15	10	15
1200	10	15	10	15
1500	10	20	10	20
1600	10	20	10	20



Included in delivery: Primary fixing device
Accesories: mounting feet

IER

WINDOW TYPE CURRENT TRANSFORMER

For round conductors Ø 80 mm the type IER/1 is available


IER


IER/1


IER/2

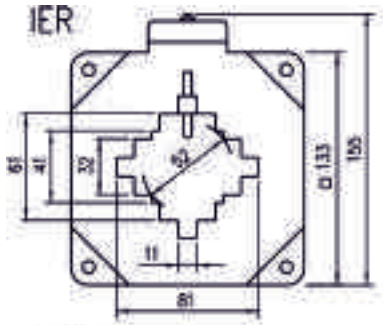

IER/3

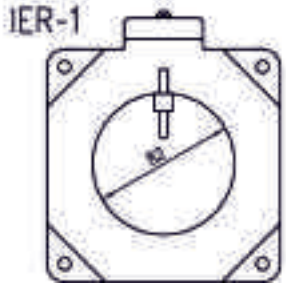
IER Technical Features, Executions

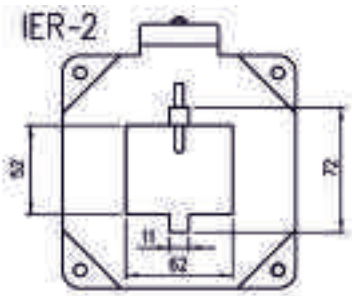
Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0,5	Class 1	Class 0,5	Class 1
250	2,5	5	2,5	2,5
300	5	7.5	5	7.5
400	10	10	10	10
500	10	15	10	15
600	10	15	10	15
750	10	15	10	15
800	10	15	10	15
1000	15	20	15	20
1200	15	20	15	20
1500	20	30	20	30
1600	20	30	20	30
2000	30	45	30	45

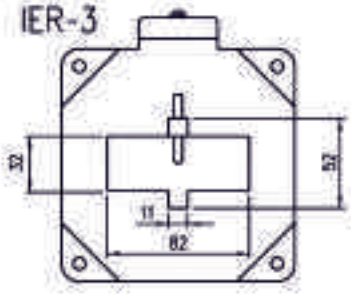
Included in delivery: Primary fixing device (except IER/1)

Round conductor		
IER	⌀ 50	mm
IER/1	⌀ 80	mm
Primary bar		
IER	80 x 10	mm
	2 x 60 x 10	mm
IER/2	3 x 60 x 10	mm
IER/3	2 x 80 x 10	mm









IER/4

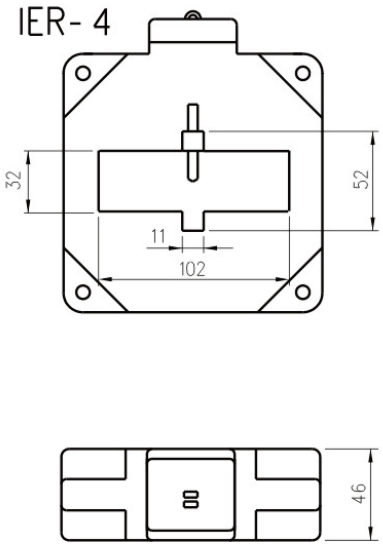
WINDOW TYPE CURRENT TRANSFORMER

Primary bar	2 x 100 x 10 mm

IER/4 Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
250	1,25	3,75	1,25	3,75
400	3,75	7,5	3,75	7,5
500	5	10	5	10
600	10	15	10	15
750	10	15	10	15
800	10	15	10	15
1000	15	20	15	20
1200	15	20	15	20
1500	20	30	20	30
1600	20	30	20	30
2000	30	45	30	45
2500	30	45	30	45

Included in delivery: Primary fixing device
On request

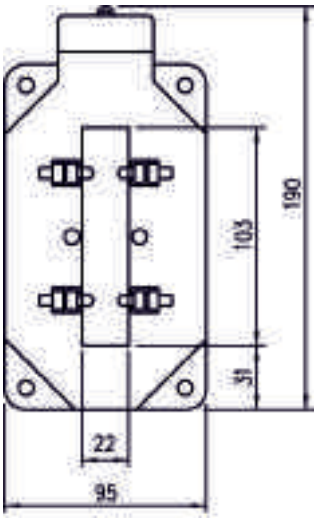


IRP

WINDOW TYPE CURRENT TRANSFORMER

On request: Seconday terminals on the long side of the current transformer

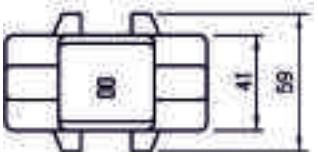
Primary bar	100 x 20 mm



IRP Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
750	10	15	10	15
800	10	15	10	15
1000	15	20	15	20
1200	15	20	15	20
1500	20	35	20	35
2000	30	45	30	45
2500	45	60	45	60

Included in delivery: Primary fixing device



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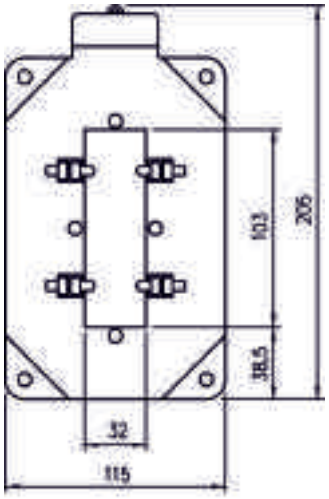
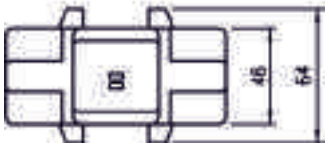
IRM

WINDOW TYPE CURRENT TRANSFORMER

On request: Seconday terminals on the long side of the current transformer

Primary bar	2 x 100 x 10 mm





IRM Technical Features, Executions

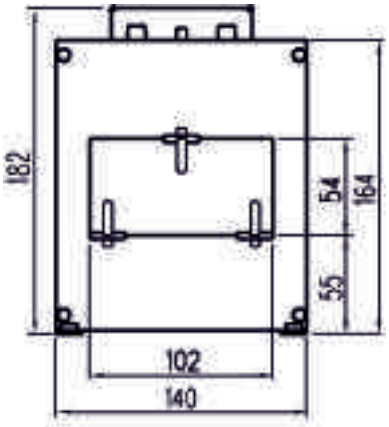
Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0,5	Class 1	Class 0,5	Class 1
1500	20	30	20	30
2000	30	45	30	45
2500	45	60	45	60
3000	45	60	45	60
4000	60	60	60	60

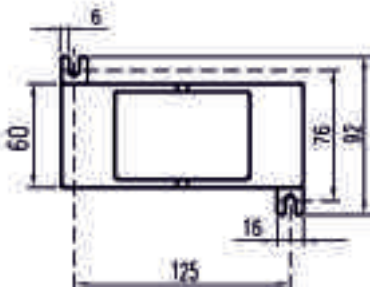
Included in delivery: Primary fixing device

ICM

WINDOW TYPE CURRENT TRANSFORMER

Primary bar:	3 x 100 x 10 mm
	2 x 100 x 20 mm





ICM Technical Features, Executions

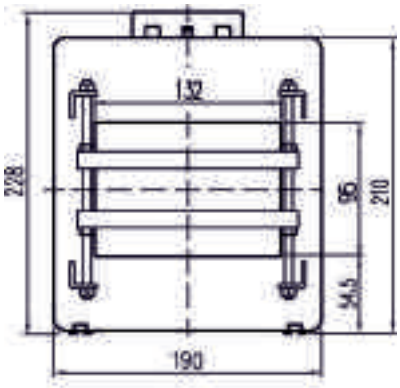
Primary rated current A	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	Class 0,5	Class 1	Class 0,5	Class 1
750	15	20	15	20
800	15	20	15	20
1000	20	30	20	30
1200	30	45	30	45
1500	30	45	30	45
1600	30	45	30	45
2000	45	60	45	60
2500	60	60	60	60
3000	60	60	60	60

Included in delivery: Primary fixing device

ICG

WINDOW TYPE CURRENT TRANSFORMER

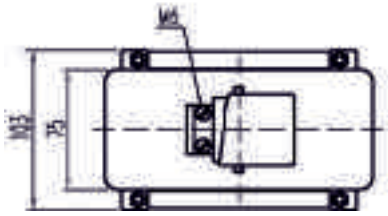
Primary bar	3 x 130 x 20 mm 4 x 130 x 10 mm



ICG Technical Features, Executions

Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
A	Class 0,5	Class 1	Class 0,5	Class 1
3000	60	60	60	60
4000	60	60	60	60
5000	60	60	60	60
6000	60	60	60	60

Included in delivery: Primary fixing device



IBO

WOUND PRIMARY CURRENT TRANSFORMER

Form A

Form B

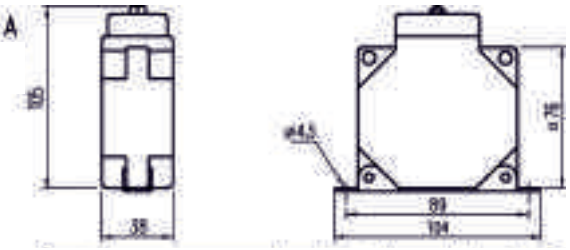
Form	Primary rated current	a	b	c	d	
A	5 A ... 20 A	-	-	-	-	-
B	25 A ... 150 A	38	90	115	3	M8

IBO Technical Features, Executions

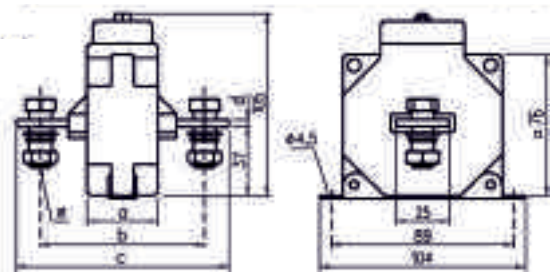
	Primary rated current	sec. 5 A / Rated burdens VA		sec. 1 A / Rated burdens VA	
	A	Class 0,5	Class 1	Class 0,5	Class 1
Form A	5	10	15	10	15
	10	10	15	10	15
	15	10	15	10	15
	20	10	15	10	15
Form B	25	10	15	10	15
	30	10	15	10	15
	40	10	15	10	15
	50	10	15	10	15
	60	10	15	10	15
	75	10	15	10	15
	100	10	15	10	15
	125	10	15	10	15
	150	10	15	10	15

Accesories: Mounting feet / snap on mounting bracket EN 50022-35

IBO < 25 A



IBO > 25 A



Classic Line - Protective Current transformers

While measurement current transformers are used to go into saturation above the nominal current range (shown in the excess current limiting factor FS) to prevent the increasing of the secondary current in case of system fault (e. g. primary short circuit) and to protect the equipments in the secondary circuit, a protective c.t. is used to have a saturation far away from its nominal current range in order to protect the switchgear etc. by using distance relays, overcurrent relays etc.

Rated accuracy classes are 5P and 10P. "P" means "protection". The excess current limiting factor (in %) is given behind the precision class. It means e.g.10P5, if the primary current is five times higher than the nominal current, the negative deviation of the secondary current from the theoretically secondary current calculated by the ratio is not more than 10%.

Application

Protective current transformers convert an alternating current of high value into a lower, proportional one, in order to protect an installation by means of standard relays of rated currents 5 or 1A.
CELSA transformers are suitable for indoor use in low-voltage networks.
They are built according to IEC 61869-2 and BS 3938.

Accuracy (according to IEC 61869-2)

CELSA manufactures protective current transformers of accuracy classes 5 P and 10 P, with an accuracy limit factor of 5 or 10, for the rated outputs indicated in the tables.

Constructive Characteristics

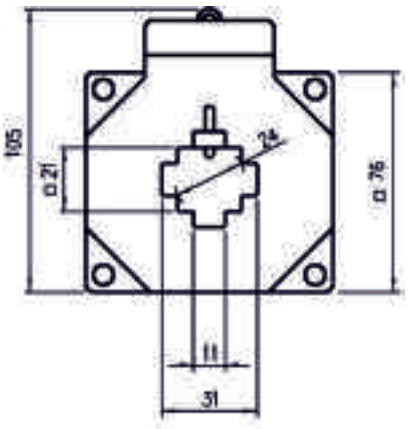
Cases of self-extinguishing polycarbonate V0 according to UL94.
Sealable terminal cover included, made of clear polycarbonate.
Double secondary terminals, for short-circuiting the secondary winding before opening the measuring circuit. All are bus type transformers and they include fixing clamps to the primary bar.

Electrical Data (according to IEC 61869-2)

Rated secondary current: 5 or 1 A
Frequency range: 50-60 Hz
Highest voltage for equipment: 720 V
Rated insulation level: 3 kV, 50Hz during 1 minute
Rated continuous thermal current: 1,2 times rated current
Rated short-time thermal current (I_{th}): 60 times rated current
Rated dynamic current (I_{th}): 2,5 times I_{th}
Accuracy limit factor: 5 or 10
Thermal class of insulation, according to IEC-60085: E (120°C)

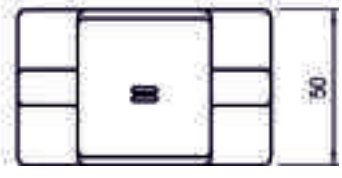
IB-50 Protective current transformers

Round conductor:	Ø 23 mm
Primary bar:	30 x 10 mm



IB-50 Technical Features, Executions

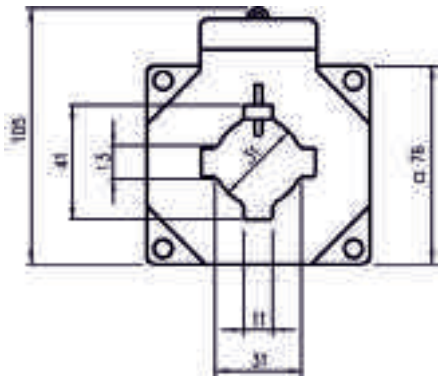
Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)			
	Class 5P10	Class 10P10	Class 5P5	Class 10P5
75	-	-	1,25	1,25
100	-	-	2,5	2,5
125	1,25	1,25	2,5	2,5
150	1,25	1,25	3,75	3,75
200	1,25	1,25	5	5
250	2,5	2,5	7,5	7,5
300	2,5	3,75	7,5	7,5
400	1,25	1,25	5	5
500	1,25	1,25	5	5
600	1,25	1,25	5	5

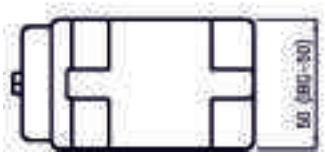


Included in delivery: Primary fixing device
Accesories: Mounting feet / snap on mounting bracket EN 50022-35

IBG-50 Protective current transformers

Round conductor:	Ø 30 mm
Primary bar:	40 x 10 mm





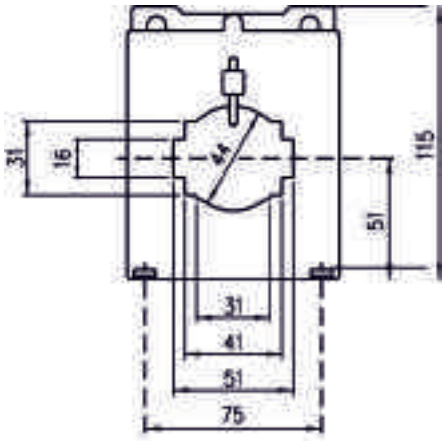
IBG-50 Technical Features, Executions

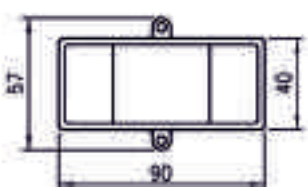
Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)			
	Class 5P10	Class 10P10	Class 5P5	Class 10P5
150	-	-	2,5	2,5
200	1,25	1,25	2,5	2,5
250	-	-	1,25	1,25
300	-	-	1,25	1,25
400	-	-	2,5	2,5
500	-	-	2,5	3,75
600	-	-	2,5	3,75
750	-	-	3,75	5
800	-	-	-	1,25
1000	-	-	-	1,25

Included in delivery: Primary fixing device
Accesories: Mounting feet / snap on mounting bracket EN 50022-35

IBR Protective current transformers

Round conductor:	Ø 44 mm
Primary bar:	50 x 15 mm
	2 x 40 x 10 mm





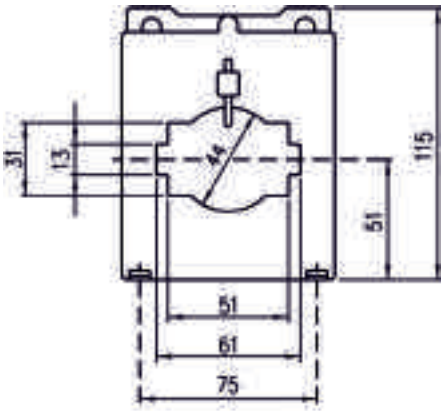
IBR Technical Features, Executions

Primary rated current A	Rated burdens VA (sec. .../5A)		Rated burdens VA (sec. .../1A)	
	Class 5P5	Class 10P5	Class 5P5	Class 10P5
400	1,25	1,25	1,25	1,25
500	1,25	1,25	2,5	2,5
600	2,5	2,5	2,5	2,5
750	2,5	2,5	3,75	3,75
800	2,5	2,5	3,75	3,75
1000	2,5	2,5	5	5
1200	1,25	1,25	3,75	3,75
1500	1,25	1,25	5	5

Included in delivery: Primary fixing device
Accesories: Mounting feet / snap on mounting bracket EN 50022-35

IBR/1 Protective current transformers

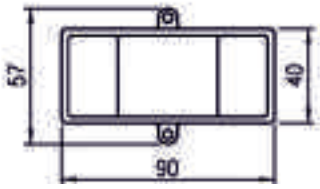
Round conductor:	Ø 44 mm
Primary bar:	60 x 12 mm
	2 x 50 x 10 mm



IBR/1 Technical Features, Executions

Primary rated current A	Rated burdens VA (sec. .../5A)		Rated burdens VA (sec. .../1A)	
	Class 5P5	Class 10P5	Class 5P5	Class 10P5
400	1,25	1,25	1,25	1,25
500	1,25	1,25	2,5	2,5
600	2,5	2,5	2,5	2,5
750	2,5	2,5	3,75	3,75
800	2,5	2,5	3,75	3,75
1000	2,5	2,5	5	5
1200	1,25	1,25	3,75	3,75
1500	1,25	1,25	5	5

Included in delivery: Primary fixing device
Accesories: Mounting feet / snap on mounting bracket EN 50022-35



IER Protective current transformers

IER

IER/2

IER/1

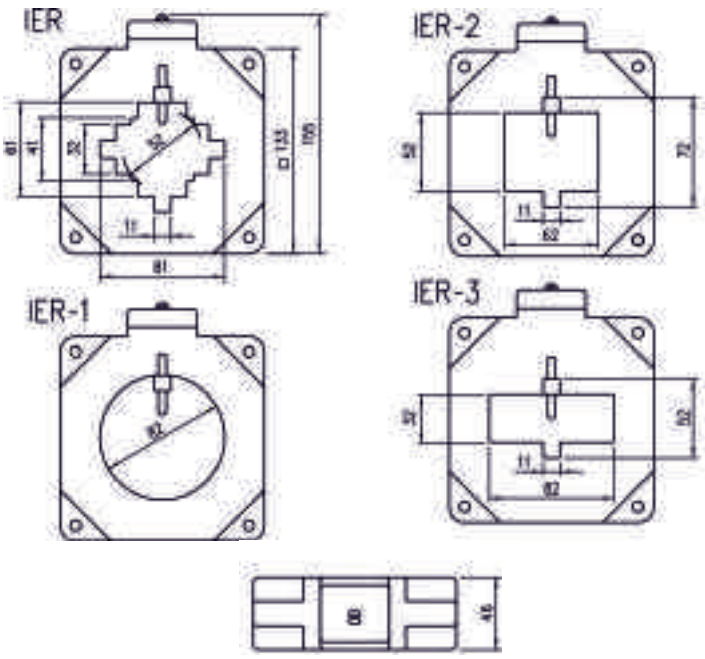
IER/3

Round conductor	
IER	ø 50 mm
IER/1	ø 80 mm
Primary bar	
IER	80 x 10 mm
	2 x 60 x 10 mm
IER/2	3 x 60 x 10 mm
IER/3	2 x 80 x 10 mm

IER-/1-/2-/3 Technical Features, Executions

Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)			
	Class 5P10	Class 10P10	Class 5P5	Class 10P5
250	–	1,25	2,5	2,5
300	1,25	1,25	3,75	3,75
400	1,25	1,25	5	5
500	2,5	2,5	7,5	7,5
600	1,25	1,25	5	5
750	2,5	2,5	7,5	7,5
800	1,25	1,25	7,5	7,5
1000	2,5	2,5	10	10
1200	2,5	3,75	10	10
1500	5	5	15	15
1600	5	5	15	15
2000	5	5	20	20

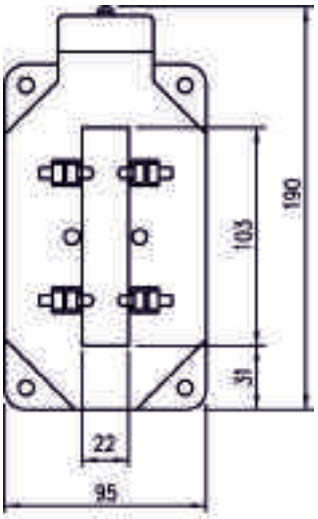
Included in delivery: Primary fixing device (except EIR/1)



IRP Protective current transformers

Primary bar	100 x 20 mm

On request: Seconday terminals on the long side of the current transformer



IRP Technical Features, Executions

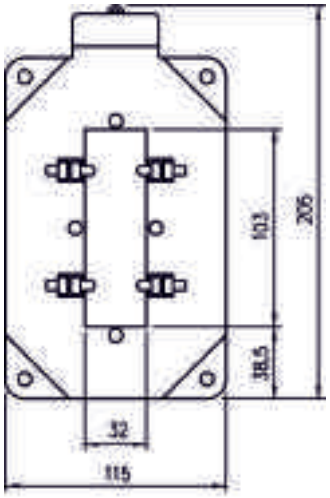
Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)			
	Class 5P10	Class 10P10	Class 5P5	Class 10P5
750	1,25	1,25	7,5	7,5
800	1,25	2,5	7,5	7,5
1000	2,5	2,5	10	10
1200	3,75	3,75	10	10
1500	5	5	15	15
1600	5	5	15	15
2000	5	5	20	20
2500	7,5	7,5	20	20

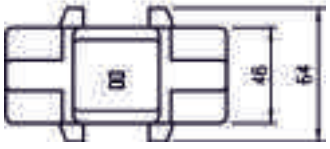
Included in delivery: Primary fixing device

IRM Protective current transformers

Primary bar	2 x 100 x 10 mm

On request: Seconday terminals on the long side of the current transformer





IRM Technical Features, Executions

Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)			
	Class 5P10	Class 10P10	Class 5P5	Class 10P5
1500	3,75	3,75	15	15
1600	5	5	15	15
2000	5	7,5	20	20
2500	7,5	7,5	20	30
3000	10	10	30	30
4000	10	10	30	45

Included in delivery: Primary fixing device

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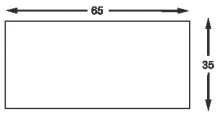
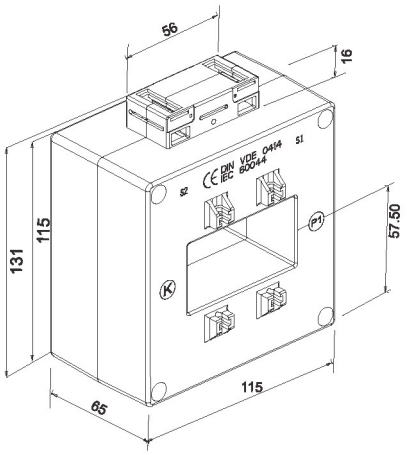
ASTP635H Protective current transformers

Primary bar	60 x 30 mm



ASTP635H Technical Features, Executions

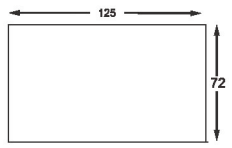
Primary rated current A	Rated burdens VA (sec. .../5A)		
	Class 5P10	Class 5P20	Class 10P20
300	5	-	-
400	7.5	-	-
500	10	-	-
600	10	5	5
700	10	5	5
750	15	5	5
800	15	5	5
1000	15	5	5
1200	15	5	5
1250	15	5	5
1500	15	5	5
1600	15	5	5
2000	15	-	-



Included in delivery: Primary fixing device

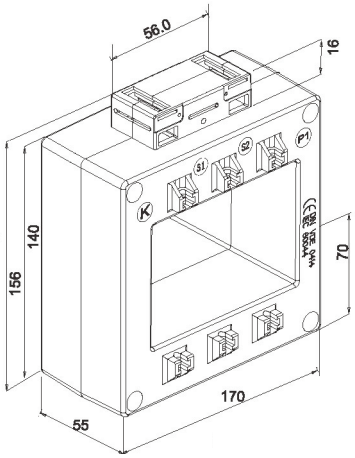
ASTP1257H Protective current transformers

Primary bar	120 x 70 mm



ASTP1257H Technical Features, Executions

Primary rated current A	Rated burdens VA (sec. .../5A)	
	Class 5P10	Class 10P10
800	7.5	7.5
1000	10	10
1200	10	10
1250	10	10
1500	10	10
1600	10	10
2000	10	10
2500	10	10



Included in delivery: Primary fixing device

Split core current Transformers

IACS

Dimensions:	112 x 92.5 x 40 mm
Primary bar:	30 x 20 mm

Application

Split core current transformers convert an alternating current of high value into a proportional, lower one, which is appropiate to be measured by standard instruments (ammeters, wattmeters, varmeters, power factor meters, relays, measuring transducers...) of rated currents 5A (1A on request). Their split core allows their installation in already existing networks without need to cut the conductors. They are suitable for indoor use in low-voltage networks, and they are built according to IEC and EN 61869-2 standards.

Design features

- The current transformers can be opened
- Cases of self-extinguishing polycarbonate UL 94 - V0
- Double secondary terminals, for short circuiting the secondary winding before opening the measuring circuit
- Mounting brackets for the panel mounting and fixing clamps for the fixing to the primary bus bar are included

Accuracy

Our current transformers fulfil the specifications of the accuracy classes 0.5, 1 and 3, for the rated burden indicated in the table (see next page).

IACS Technical Data	
Electrical Features (according to IEC-61869-2)	
Rated secondary current	5 or 1 A
Frecuency range	50 - 60 Hz
Hightest voltage for equipment	720 V
Rated insulation level	3kV, 50Hz 1 min.
Rated continuos thermal current	1.2x I_N
Rated short-time thermal current (I_{th})	60x I_N
Rated dynamic current (I_{dyn})	2.5x I_{th}
Thermal class of insulation, according to IEC-6085	E (120°C)

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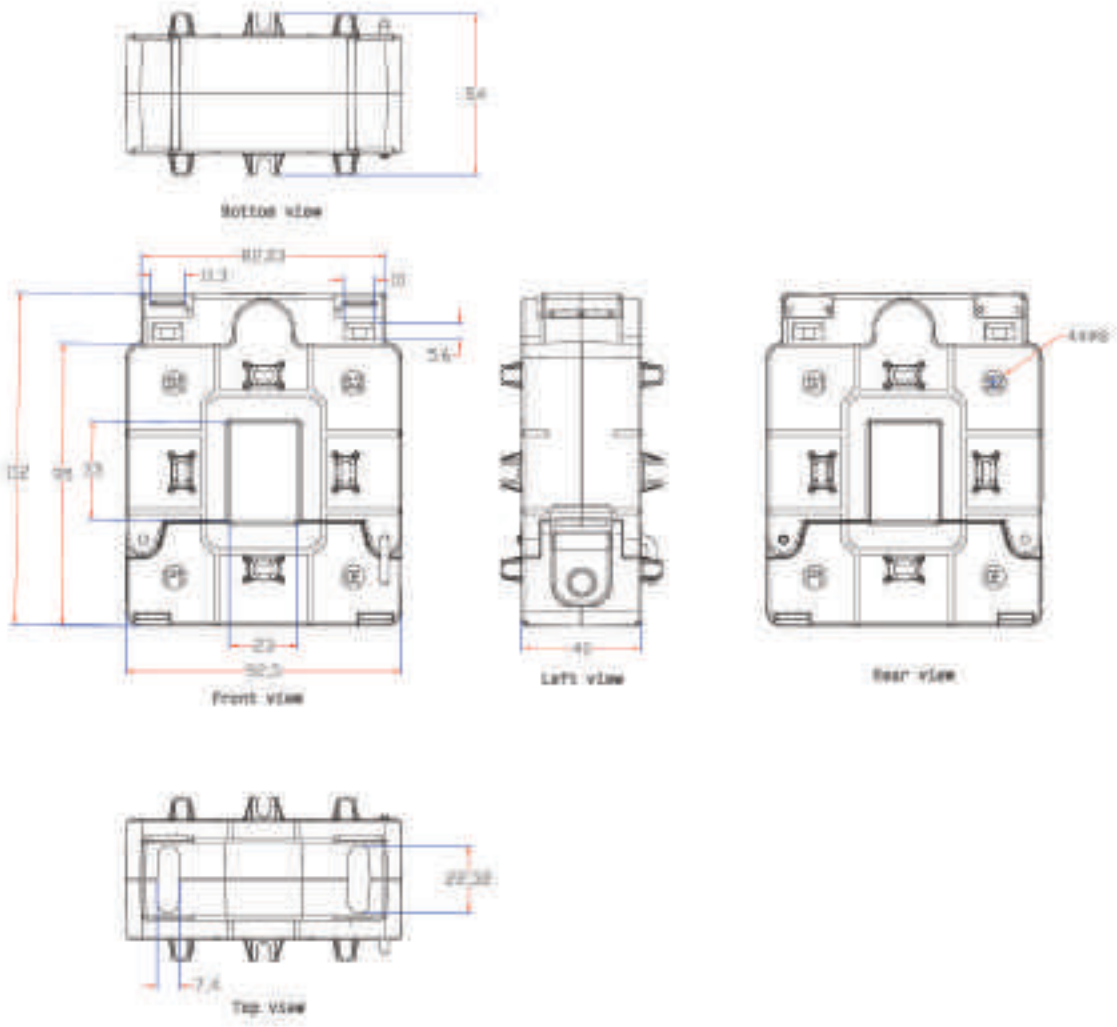
IACS Technical Daten, Executions

Primary rated current A	Rated burdens VA (sec. .../5A)		
	Cl. 0,5	Cl. 1	Cl. 3
50	-	-	1.25
60	-	-	1.25
75	-	-	1.25
100	-	1.25*	2.5
150	-	3.75*	3.75
200	-	2.5	5
250	-	2.5	5
300	-	5	5
400	5	10	15
500	7.5	15	20
600	10	20	30

Remark: These current transformers meet the demands for the classes 0.5, 1 and 3 in the same instrument. / * only ammeters

Dimensions



IAP - IAM - IAG


IAG


IAM


IAP

Application

Split core current transformers convert an alternating current of high value into a proportional, lower one, which is appropiate to be measured by standard instruments (ammeters, wattmeters, varmeters, power factor meters, relays, measuring transducers...) of rated currents 5 or 1 A. Their split core allows their installation in already existing networks without need to cut the conductors. They are suitable for indoor use in low-voltage networks, and they are built according to IEC and EN 61869-2 standards.

Design features

- The current transformers can be opened
- Cases of self-extinguishing polycarbonate UL 94 - V0
- Double secondary terminals, for short circuiting the secondary winding before opening the measuring circuit
- Mounting brackets for the panel mounting and fixing clamps for the fixing to the primary bus bar are included

Accuracy

Our current transformers fulfil the specifications of the accuracy classes 0.5, 1 and 3, for the rated burden indicated in the table (see next page).

IAP, IAM, IAG Technical Data	
Electrical Features (according to IEC-61869-2)	
Rated secondary current	5 or 1 A
Frecuency range	50 - 60 Hz
Hightest voltage for equipment	720 V
Rated insulation level	3kV, 50Hz 1 min.
Rated continuos thermal current	1.2x I_N
Rated short-time thermal current (I_{th})	60x I_N
Rated dynamic current (I_{dyn})	2.5x I_{th}
Thermal class of insulation, according to IEC-6085	E (120°C)

Mechanical Data	
Window:	
IAP	busbar 2x 50x10 mm, 3x 40x10 mm or round conductor Ø 40 mm
IAM	busbar 4x 80x10 mm or round conductor Ø 80 mm
IAG	busbar 4x 125x10 mm or round conductor Ø 80 mm
Weight: (depending on primary current)	
IAP	1040 g ... 1365 g
IAM	1190 g ... 1640 g
IAG	1640 g ... 2495 g

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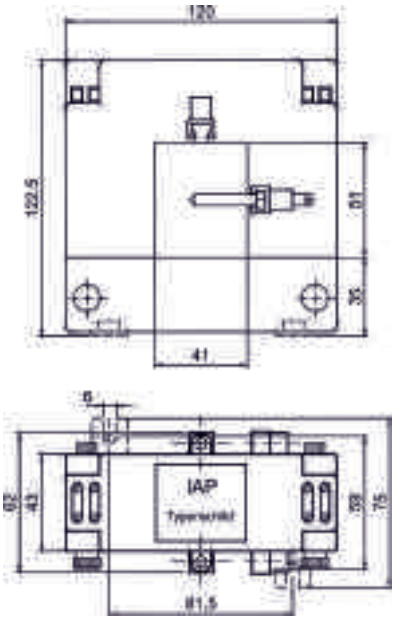
IAP - IAM - IAG Technical Daten, Executions

Primary rated current A	Rated burdens VA (sec. .../5A , .../1A)								
	IAP			IAM			IAG		
	Cl. 0,5	Cl. 1	Cl. 3	Cl. 0,5	Cl. 1	Cl. 3	Cl. 0,5	Cl. 1	Cl. 3
60	-	-	1,25	-	-	-	-	-	-
75	-	-	1,25	-	-	-	-	-	-
100	-	1,25*	2,5	-	-	1,25	-	-	-
125	-	1,25*	3,75	-	-	2,5	-	-	-
150	-	2,5*	3,75	-	-	3,75	-	-	-
200	-	3,75*	3,75	-	1,25*	3,75	-	-	-
250	-	3,75*	7,5	-	2,5*	3,75	-	-	-
300	-	5*	10	-	3,75*	5	-	-	-
400	-	7,5	20	-	5	10	-	-	-
500	5	10	30	1,25	5	15	-	2,5	15
600	10	15	30	2,5	7,5	20	1,25	5	15
750	10	20	45	7,5	15	30	1,25	10	20
800	10	30	60	10	20	30	2,5	10	20
1000	10	45	60	10	20	45	5	15	30
1200	-	-	-	10	30	60	7,5	20	45
1500	-	-	-	10	45	60	10	30	60
1600	-	-	-	-	-	-	15	45	60
2000	-	-	-	-	-	-	15	60	60
2500	-	-	-	-	-	-	20	60	60
3000	-	-	-	-	-	-	20	60	60

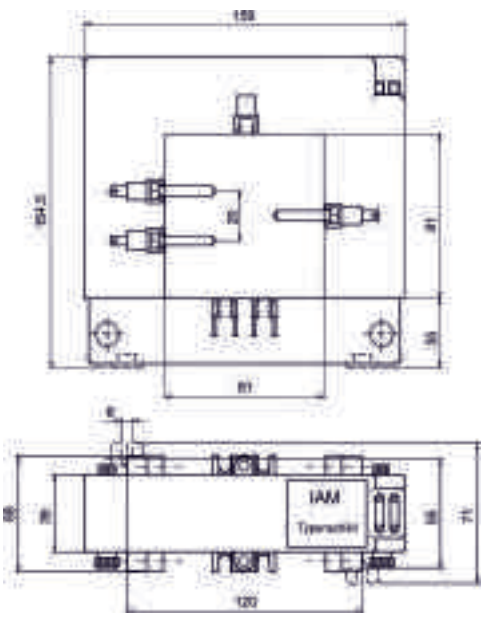
Remark: These current transformers meet the demands for the classes 0.5, 1 and 3 in the same instrument. / * only ammeters

Dimensions

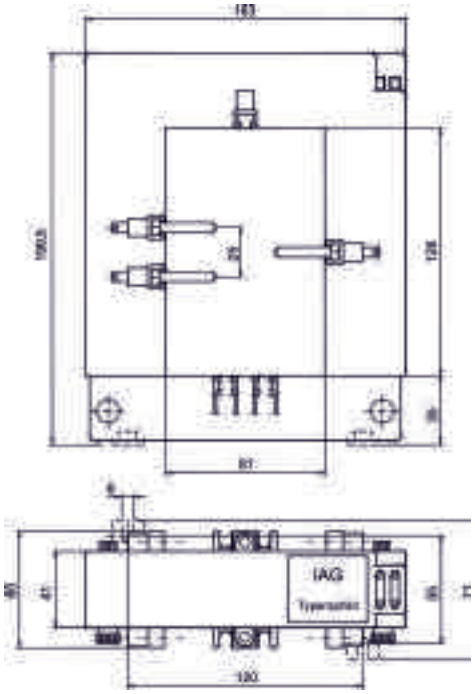
IAP



IAM



IAG



TC - TQ Split core current transformer / sensor

- Very easy mounting is guaranteed
- Fast fixation with two UV-resistant tie wraps
- Also in class 1 available for high accurate kWh measurements
- All TC/TQ.. split core CT's are supplied with colour coded leads

Application

The very compact TQ/ TC are especially designed for connection to digital measurement systems. All TC /TQ are supplied with colour coded leads secondary leads. Correct closing of the current transformer/sensor is guaranteed by a distinct sound of a "click". Two UV-resistant ty-raps are supplied with the current transformer which can be easily mounted around the primary conductor.

TC / TQ Technical Data

Enviromental conditions	
Location	Indoor use
Operating temperature	TQ18-B: -10°C to +55°C TC18: -5°C to +40°C TQ27: -10°C to +55°C TQ42: -10°C to +55°C TQ84: -10°C to +55°C
Relative humidity	5% - 85%, non condensing
Protection degree	IP20
Application conditions	
Standard	IEC 61869-2
Rated short-time thermal current	60 x In/1s
Continuous thermal current (Icth)	100% In
Rated insulation level	0,72/3-kV
Rated frequency	50/60Hz
Class of insulation	E (120°C)
Primary conductor	TQ18-B: max.Ø 18mm TC18: max.Ø 18mm TQ 27: max.Ø 28mm TQ42: max.Ø 42mm TQ84: max. 2x Ø 42mm
Secondary	TQ18-B: 1A: L= 3m cabel 0,5mm2 flexibel 5A: L= 0,5 m cabel 1,5mm2 flexibel TC18: 1A: L= 3m cabel 0,5mm2 flexibel TQ27: 1A: L= 3m cabel 0,5mm2 flexibel 5A: L= 0,5 m cabel 1,5mm2 flexibel TQ42/ TQ84: 1A: L= 5m cabel 0,5mm2 flexibel 5A: L= 3m cabel 1,5mm2 flexibel

TC / TQ Technical Features

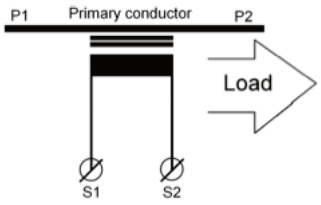
Type	Primary current A	VA Rated burden [1]		
		Cl. 0,5 [2]	Cl.1 [2]	Cl.3
TQ 18-B	100/1A	-	0,2	-
	125/1A	-	0,2	-
	150/1A	-	0,2	-
	200/1A	0,2	-	-
	250/1A	0,2	-	-
	150/5A	-	1	-
	200/5A	-	1	-
	250/5A	-	1	-
TC 18	60/1A	-	-	0,2
	75/1A	-	-	0,2
	100/1A	-	-	0,2
	125/1A	-	-	0,2
	150/1A	-	-	0,2
	200/1A	-	0,2	-
	250/1A	-	0,2	-
TQ 27	200/1A	-	0,2	-
	250/1A	-	0,2	-
	300/1A	-	0,2	-
	400/1A	-	0,2	-
	500/1A	0,2	-	-
	250/5A	-	1	-
	300/5A	-	1	-
	400/5A	-	1	-
	500/5A	-	1	-
TQ 42 TQ84	250/1A	-	0,5	-
	300/1A	-	0,5	-
	400/1A	0,5	-	5
	500/1A	0,5	-	-
	600/1A	0,5	-	5
	750/1A	0,5	-	-
	800/1A	0,5	-	5
	1000/1A [2]	0,5	-	5
	400/5A	-	0,5	5
	500/5A	-	0,5	-
	600/5A	0,5	-	-
	750/5A	0,5	-	-
	800/5A	0,5	-	-
	1000/5A[3]	0,5	-	5

1) Burden specified at the end of the secondary leads / class 3
2) Accuracy conform IEC 61869-2, valid from 5- to 20% In
3) Ambient temperature -10°C ... +40°C

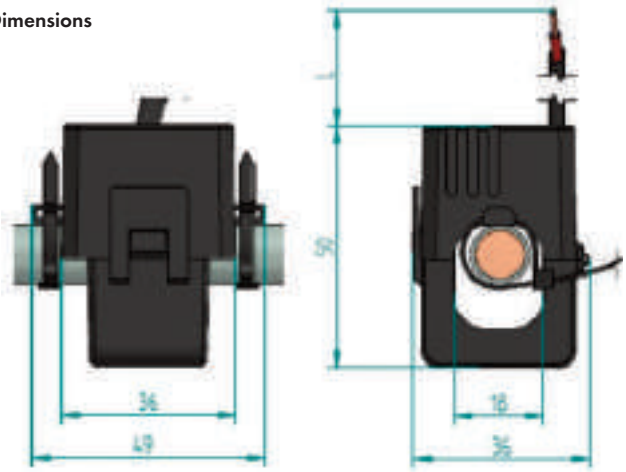
Dimensions / Wiring diagrams

TC18

Wiring diagrams

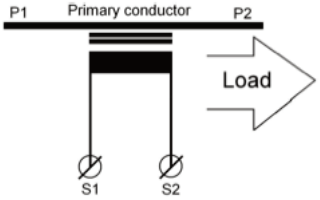


Dimensions

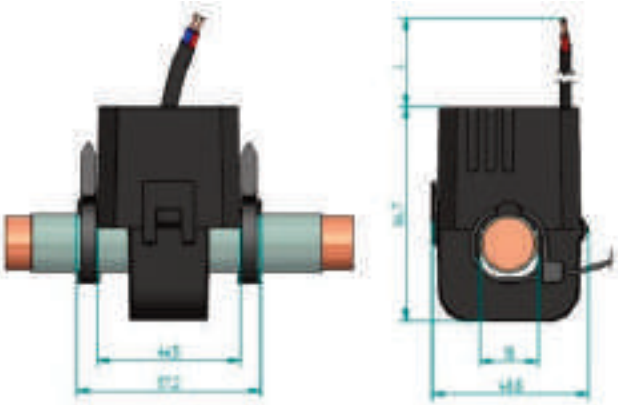


TQ18-B

Wiring diagrams

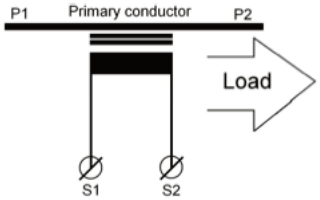


Dimensions

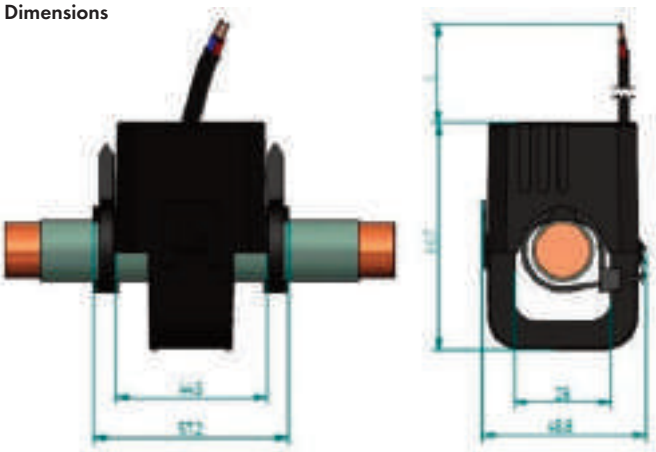


TQ 27

Wiring diagrams

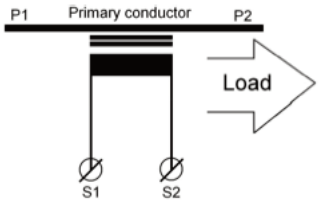


Dimensions

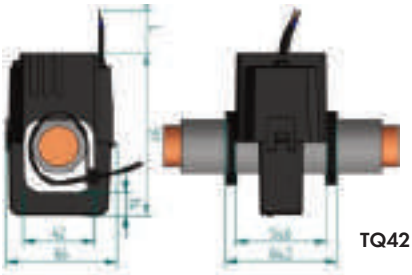


TQ 42 / TQ 84

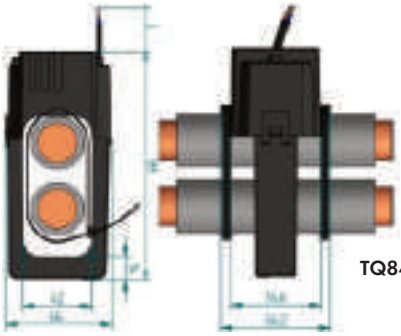
Wiring diagrams



Dimensions



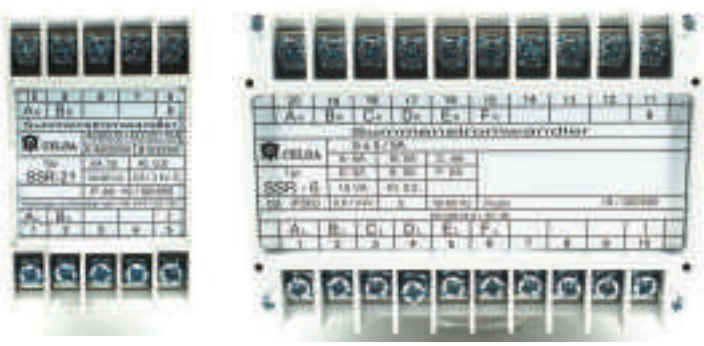
TQ42



TQ84

Summation current transformers

SSR

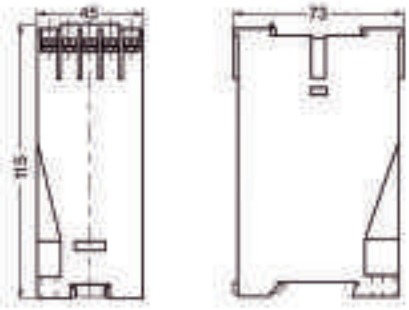


Summation current transformers SSR-2 to SSR-9 are used to summarize secondary currents of several main c.t.`s in order to measure with one instrument only. The output current again constitutes a standardized quantity. That means the primary currents are not only added but also divided by the number of inputs.

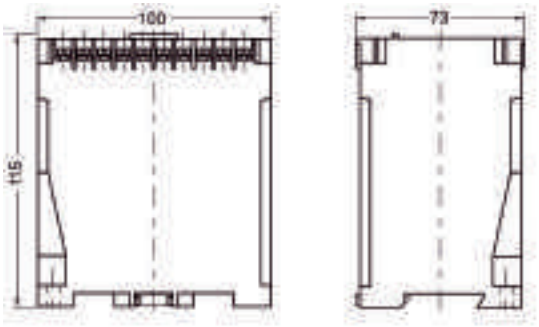
If using unequal main c.t.`s the ratio of the lowest primary current to the highest one should not exceed 1:10. When ordering in case of unequal main c.t.`s the ratio of each of them has to be specified absolutely. Unused primary connections have to be open circuited as opposed to the short circuiting of secondary connections

Dimensions

Housing D10 (SSR-2 to SSR-4)

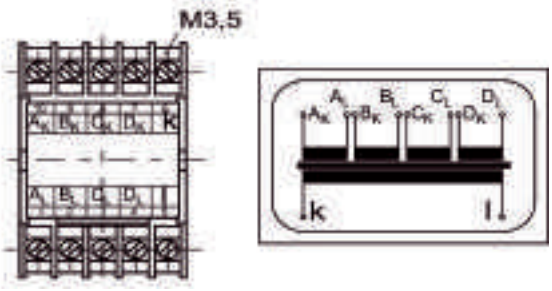


Housing D20 (SSR-5 to SSR-9)

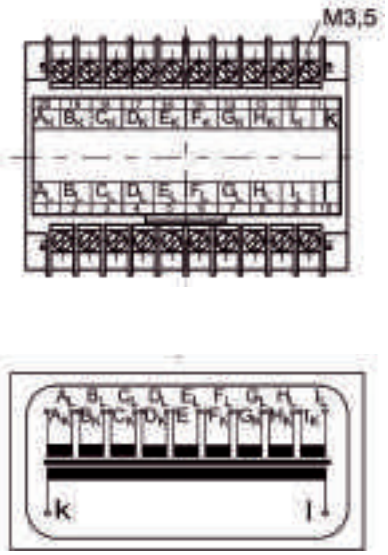


Connections

Housing D10 (SSR-2 to SSR-4)



Housing D20 (SSR-5 to SSR-9)



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SSR Technical Features

Electrical Features	
Hightest voltage equipment:	720 V
Rated insolation leve:	4 kV, 1 min.
Rated shot-time thermal current (I_{th}):	60 x I_N
Rated dynamic current (I_{dyn}):	2.5 x I_{th}
Frecuency range:	50 - 60Hz
Internal consumption:	Max. 4 VA
Thermal class of insulation:	E
Accuracy class index and burden	
Class 0,5	15 VA
Class 1	15 VA
Mechanical Features	
Housings	Of self-extinguishing ABS UL94 V-0
Protection degree	IP40
Fixing	DIN-rail DIN EN50022 or screw fastening
Connection	Nickel plated secondary terminals with plus minus screws
Protection degree of connection	IP10, with secondary terminal cover = IP20 (option)
Weight	D10 = 400g, D20 = 600g
Hightest proportion for different ratios of main c.t`s	1:10
Housing size	SSR-2 until SSR-4 = D10 SSR-5 until SSR-9 = D20

SSR Technical Data, Executions

Article identical ratios of main c.t.'s	Rated burden VA sec. 5A / 1A		Article different ratios of main c.t.'s	Rated burden VA sec. 5A / 1A	
	Class 0.5	Class 1		Class 0.5	Class 1
SSR-2	15	15	**SSR-21**	15	15
SSR-3	15	15	**SSR-31**	15	15
SSR-4	15	15	**SSR-41**	15	15
SSR-5	15	15	**SSR-51**	15	15
SSR-6	15	15	**SSR-61**	15	15
SSR-7	15	15	**SSR-71**	15	15
SSR-8	15	15	**SSR-81**	15	15
SSR-9	15	15	**SSR-91**	15	15

other values on request

SCMU210s

SCMU210s

Current Transformer and transducer in one housing

- from 30 up to 50 A
- Standard analogue output 0 - 20 mA / 0 - 10 V

Application

The measured quantity (i.e. primary current) is galvanically insulated (5kV/1 min), rectified (mean value principle) and converted into a proportional and load-independent DC signal current (or voltage). The passive type SCMU210s does not require auxiliary supply.

Snap-on mounting for DIN- rail, mounting brackets for mounting plates and screws for the busbar fixing are included in delivery.

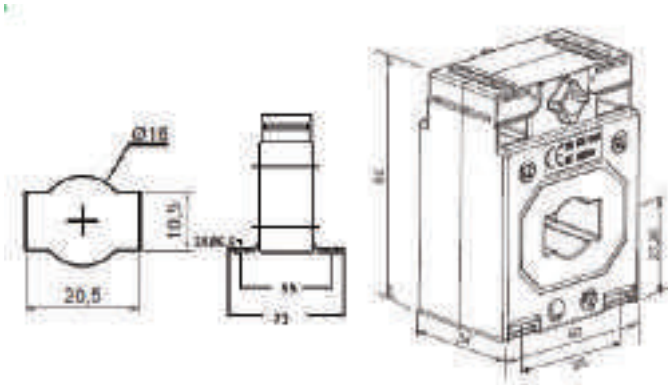
Order expample:

SCMU210s 30 A, 0-20 mA or SCMU210s 40A, 0-10V

SCMU210s - Available metering ranges

Primary current A	Output 0-20mA	Output 0-10V
	without auxiliary supply	
30	●	●
40	●	●
50	●	●

Dimensions



SCMU

SCMU

Current Transformer and transducer in one housing

- from 60 up to 600 A
- Standard analogue output 0 - 20 mA / 0 - 10 V

Application

The measured quantity (i.e. primary current) is galvanically insulated (5kV/1 min), rectified (mean value principle) and converted into a proportional and load-independent DC signal current (or voltage). The passive type SCMU210s does not require auxiliary supply.

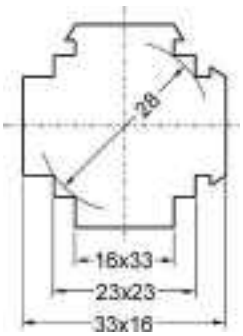
Snap-on mounting for DIN- rail, mounting brackets for mounting plates and screws for the busbar fixing are included in delivery.

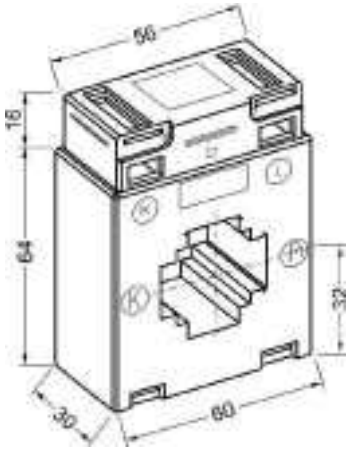
Order expample:
SCMU 60 A, 0-20 mA

SCMU - Available metering ranges

Primary current A	Output 0-20mA	Ouput 0-10V
	without auxiliary supply	
60	●	●
75	●	●
100	●	●
150	●	●
200	●	●
250	●	●
300	●	●
400	●	●
500	●	●
600	●	●

Dimensions





SCMU/I

SCMU/I

Current Transformer and transducer in one housing

- from 10 up to 600 A
- Standard analogue output 4 - 20 mA
- Auxiliary supply: 230 VAC or 24 VDC

Application

The measured quantity (i.e. primary current) is galvanically insulated (5kV/1 min), rectified (mean value principle) and converted into a proportional and load-independent DC signal current (or voltage). The active SCMU/I connects to a auxiliary supply of 230 VAC or 24 VDC. These information have to indicated on the order.

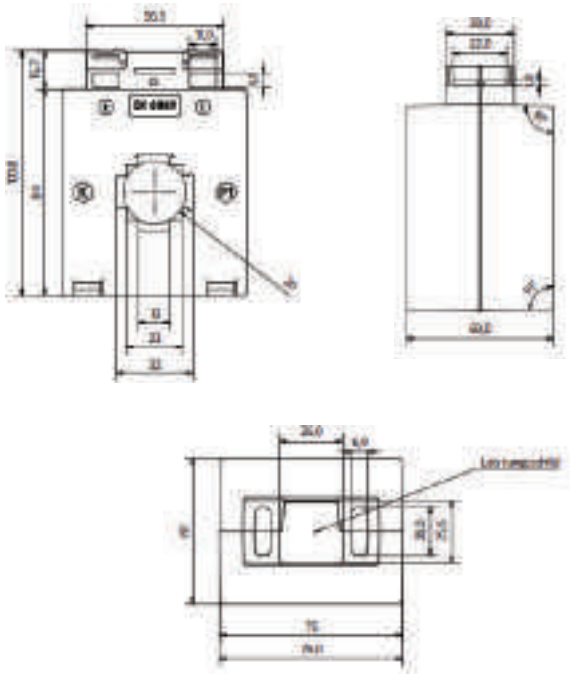
Snap-on mounting for DIN- rail, mounting brackets for mounting plates and screws for the busbar fixing are included in delivery.

Order example:
SCMU/I 15 A, 4-20 mA Aux: 230V AC

SCMU/I - Available metering ranges

Primary current A	Output 4-20mA	
	Auxiliary supply 230V AC	Auxiliary supply 24V DC
10	●	●
15	●	●
20	●	●
25	●	●
30	●	●
40	●	●
50	●	●
60	●	●
75	●	●
100	●	●
150	●	●
200	●	●
250	●	●
300	●	●
400	●	●
500	●	●
600	●	●

Dimensions



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Busbars

CU-cable consumption between the measurement instrument and the current transformer

For secondary primary rated current of 5 A

conductor cross-section mm²	P = consumption in VA (2-wired line)					
	Distance in m					
	1	2	3	4	5	6
1,5	0,58	1,15	2,31	3,46	4,62	5,77
2,5	0,36	0,71	1,43	2,14	2,86	3,57
4	0,22	0,45	0,89	1,34	1,79	2,24
6	0,15	0,30	0,60	0,89	1,19	1,49
10	0,09	0,18	0,36	0,54	0,71	0,89

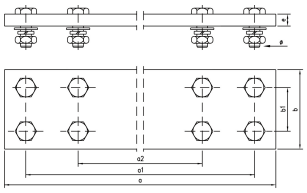
For secondary rated current of 1 A

conductor cross-section mm²	P = consumption in VA (2-wired line)					
	Distance in m					
	10	20	40	60	80	100
1	0,36	0,71	1,43	2,14	2,85	3,57
1,5	0,23	0,46	0,92	1,39	1,85	2,31
2,5	0,14	0,29	0,57	0,86	1,14	1,43
4	0,09	0,18	0,36	0,54	0,71	0,89
6	0,06	0,12	0,24	0,36	0,48	0,60
10	0,04	0,07	0,14	0,21	0,29	0,36

$$P = \frac{I^2 \cdot 2 \times L}{q_{cu} \cdot 56} \text{ VA}$$

L = Distance in m

q_{cu} = Conductor cross-section in mm²



busbars

To pay attention to the selection of current transformers:
1. the primary and secondary ratio of the current transformer;
2. the burden in VA. The burden is calculated of all connected meters and the wires as well.
3. the class accuracy according to VDE 0414 and IEC-determinations. For calculated measurement class 0.5. For internal measuring or protection relays class 1 and 3.

Copper bars' ampacity according to DIN 43671

Ampacity according to DIN 43671

Width x thickness	Cross section	Weight 1)	Continuous current in A / alternating current up to 60 Hz					
			coated			blank		
			numbers of bars			numbers of bars		
mm	mm²	kg/m	1 I	2 II	3 III	1 I	2 II	3 III
12 x 2	23,5	0,209	123	202	228	108	182	216
15 x 2	29,5	0,262	148	240	261	128	212	247
15 x 3	44,5	0,396	187	316	381	162	282	361
20 x 2	39,5	0,351	189	302	313	162	264	298
20 x 3	59,5	0,529	237	394	454	204	348	431
20 x 5	99,1	0,882	319	560	728	274	500	690
20 x 10	199	1,77	497	924	1320	427	825	1180
25 x 3	74,5	0,663	287	470	525	245	412	498
25 x 5	124	1,11	384	662	839	327	586	795
30 x 3	89,5	0,796	337	544	593	285	476	564
30 x 5	149	1,33	447	760	944	379	672	896
30 x 10	299	2,66	676	1200	1670	573	1060	1480
40 x 3	119	1,06	435	692	725	366	600	690
40 x 5	199	1,77	573	952	1140	482	836	1090
40 x 10	399	3,55	850	1470	2000	715	1290	1770
50 x 5	249	2,22	697	1140	1330	583	994	1360
50 x 10	499	4,44	1020	1720	2320	852	1510	2040
60 x 5	299	2,66	826	1330	1510	688	1150	1440
60 x 10	599	5,33	1180	1960	2610	985	1720	2300
80 x 5	399	3,55	1070	1680	1830	885	1450	1750
80 x 10	799	7,11	1500	2410	3170	1240	2110	2790
100 x 5	499	4,44	1300	2010	2150	1080	1730	2050
100 x 10	999	8,89	1810	2850	3720	1490	2480	3260
120 x 10	1200	10,7	2110	3280	4270	1740	2860	3740
160 x 10	1600	14,2	2700	4130	5360	2220	3590	4680
200 x 10	2000	17,8	3290	4970	6430	2690	4310	5610

1) Calculated with density of 8,9 kg/dm3

Material: E-Cu or other materials according to DIN 40 500 Part 3
Preferable used material: Flat bar with rounded edge according to DIN 46 433 Part 3
Continousely currents for bus bars of E-Cu with rectangle cross-section for indoor use at 35 °C air temperatur and 65 °C bus bar temperatur, vertical position of the bus bar width; Bus bar packets with distances between bus bars of one time bus bar width. For AC current and bus bar packets the distances between bus bars should be > 0,8 x centre to centre distance of the main primary conductors.
Integrated short bus bars in current transformers to be connected to main bus bars can be higher loaded than mentioned in the table if the rest of the bus bar system is higher designed than mentioned in the table (DIN 43671).

Primary bars — Design: brass-copper bar (electro-Cu) nickel-plated

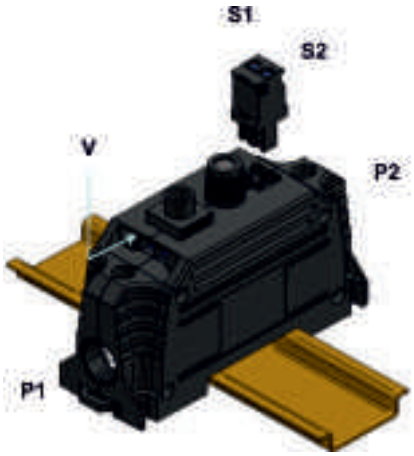
With steal screws M12 x 35 (40) DIN 933 zinc plated and chromatized incl. washer, spring lock washer and hex nut

Width x height x length (mm)	Width x height x length (mm)	Width x height x length (mm)
30x 6x 140 O	50x 10x 180 O	2x 50x 10x 220 O
30x 8x 160 O	50x 10x 220 O	2x 60x 10x 220 O
30x 10x 140 O	60x 10x 180 O	2x 80x 10x 240 O
30x 10x 160 O	60x 10x 240 O	2x100x 10x 240 O
40x 5x 140 O	80x 10x 240 O	
40x 5x 160 O	100x 10x 240 O	Copper tube
40x 10x 140 O		Ø 22.5; length 34 mm
40x 10x 160 O		Ø 22.5;length 36 mm
50x 10x 140 O		

O Delivery period on request

VST - Current Transformer with fused terminal

- Easy mounting on DIN rail
- Three in one - current transformers/Voltage terminal/Busbar terminal
- Available for a three current ranges
- Including two ampere fuse
- Saves space and mounting time



Application

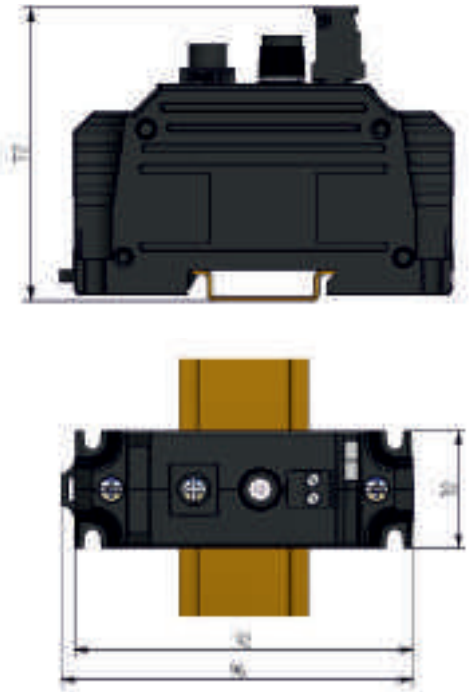
To measure power, voltage and current values are required from each phase. In common cases there is often less space for measurement transformers and voltage terminals. The new CELSA Power Sensor type VST.. solves this problem by combining three functionalities in one product. This is the busbar terminal, the current transformer and the voltage terminal as well.

The fuse is directly mounted on the primary conductor. As result of the short unprotected part of the terminal the reliability is much higher. The CELSA Power Sensor makes it very easy to wire the terminal because of less connections. This reduces mounting costs. Because of reduction of the number of connections the terminal is more reliable than standard terminals. It also decreases mounting space..

VST Technical Data

Rated current	Class	Burden [1]	Type
16/1 A	3	0,1 VA	VST16
35/1 A	1	0,2 VA	VST35
64/1 A	0,5	0,2 VA	VST64

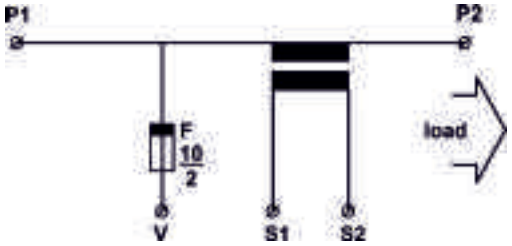
Dimensions



VST General Features

General	
Maximum voltage	690V, Uimp 6kV
Insulation voltage	1890V/50Hz 1min.
Rated current	64A
Max. current (AWG 6)	67A
Max. current (16mm²)	76A
Insulation class	E (max120°)
Protection degree	IP20
Ambient temperature	–5...+40°C
Case	PA 30% glass filled
Suitable for marking	PHOENIX ZBF5
Screw terminal	Philips head DIN 7962-H2
Aprobation	KEMAKEUR
Terminal	
According standard	IEC60947-7-1
Min/Max Wire gauge: Solid wire - Stranded wire / AWG	1,5mm2 - 16mm2 / AWG 16 – 6
Voltage terminal	
Fuse type	5x25mm (with message) Max 2A SIBA DIN41576-2
Short circuit capability	70kA@400V/50Hz
Max. wire gauge	1,5mm2 - 4mm²
Current Transformer	
According standard	IEC61869-2
Frequency	50Hz
Ith	60xIn
Insulation voltage	3kV/50Hz 1min.

Connection diagrams



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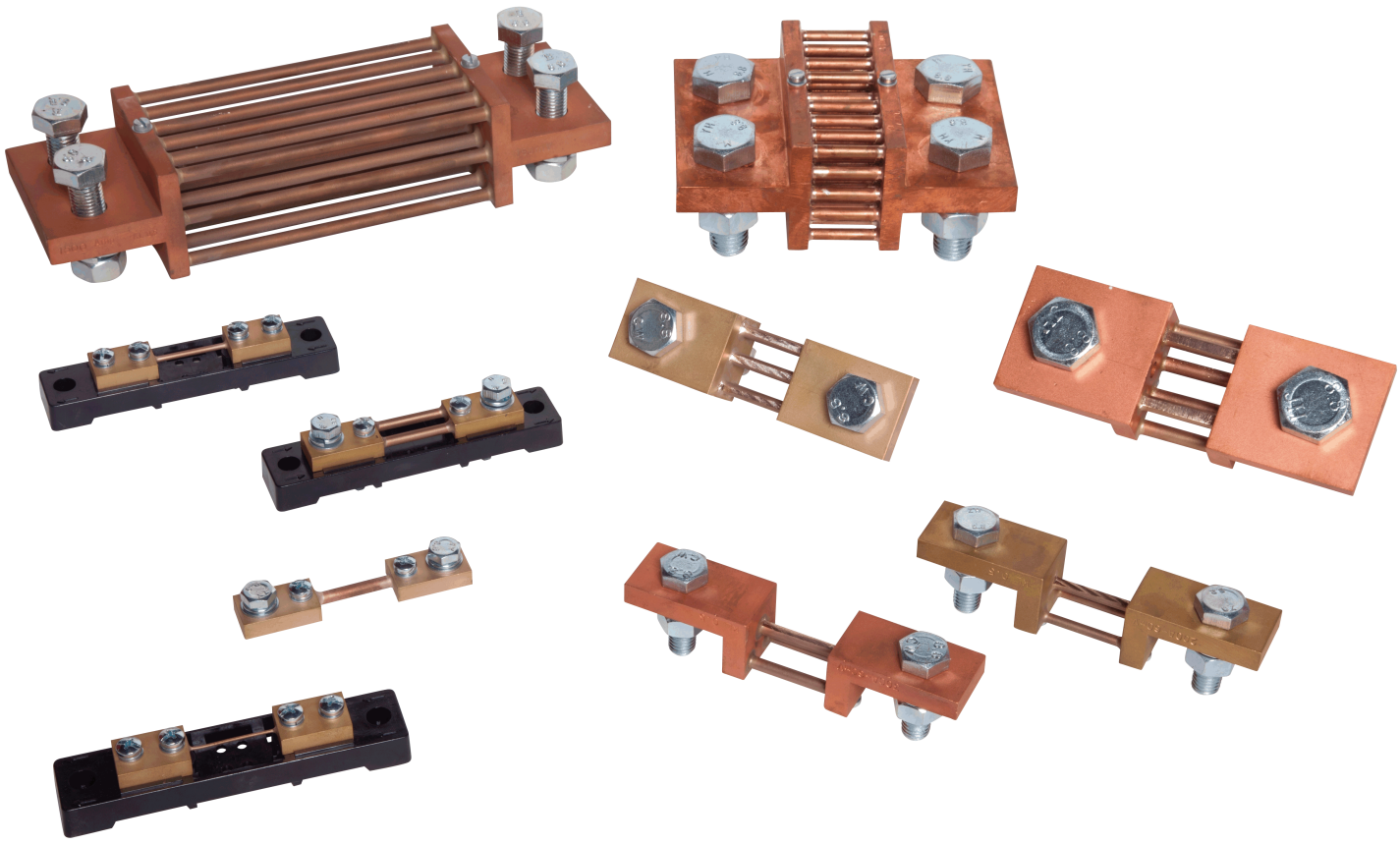


06 Shunts

SHUNTS

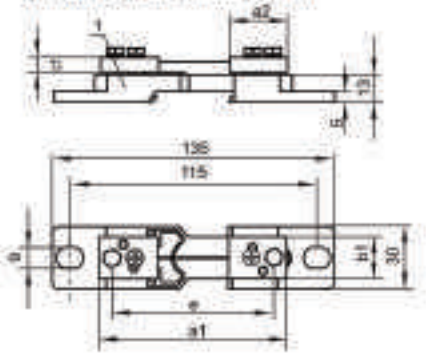
- Accuracy class 0.5 / Special executions class 0.2 on request
- Shunts of 1...25 A ranges (and on request, 60mV 40...150 A) are fixed on an isolating base.
- The isolating base is adapted to be assembled on a 35 mm DIN rail.

Technical Data

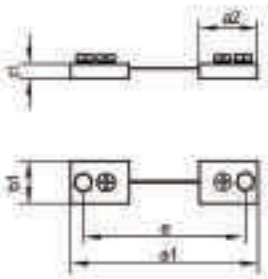
Electromagnetic compatibility	noise immunity noise emissions	acc. to EN 61000-6-2 acc. to EN 61000-6-4
Overload range	continuously 1.2 times rated current 5 s max. ≤ 2,000 A 5 times rated current > 2,000...10,000 A 5 times rated current	acc. to EN 60051-8:2000
Accuracy class	0.5	Special executions class 0.2 on request
Additional error from ambient temperature	0.5 % / 10 °C	
Climatic suitability	climatic class 3	acc. to VDE/VDI 3540
Operating temperature	- 10 ... + 55°C	
Storage temperature	- 25 ... + 65°C	
Relative humidity	≤ 75% annual average, non-condensing	
Shunt calibration	of 1 .. 10 A range Shunts 150 mV of 1 .. 4 A ranges	considering the 10 mA current of the meter measuring element considering the 5 mA current of the meter measuring element
Shunts dimensions	acc. to DIN 43 703 standard	
Testing voltage of shunts with an isolating base	5 kV	
Resistance of a pair of wires connecting the shunt to meter	35mΩ or 75Ω, wires are not delivered with the shunt	
Long-term overload	120%·In	
Short duration overload up to 5 seconds	for range up to 2kA – 5·In for range 2kA <In<10kA – 2·In	

Dimensions / Version:

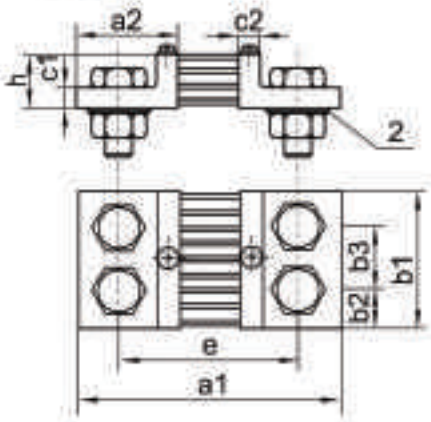
Version A (on an isolating base)



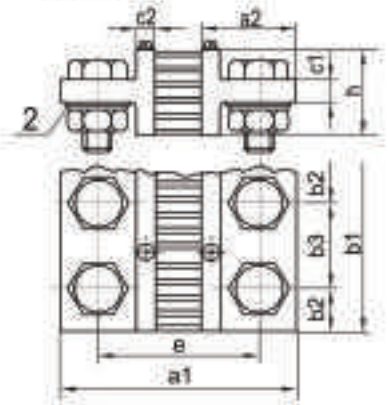
Version D



Version B



Version C



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SHUNTS

Shunts 60 mV												Current terminals			
IN (A)	Version	a1	a2	b1	b2	b3	c1	c2	e	h	Weight (kg)	LZ	Bolt	P	N
1; 1,5; 2,5; 4; 6; 10; 15; 25	A, D	90	28	20	-	-	8	-	78	-	0.13	2 x 1	M5 x 12	5.5	-
40, 60, 100,150	B	100	33	20	-	-	8	-	80	-	0.13	2 x 1	M8 x 16	8.5	-
250	B	145	55	30	15	-	10	10	105	30	0.60	2 x 1	M12 x 40	13	M12
400	B	145	55	40	20	-	10	10	105	30	0.85	2 x 1	M16 x 45	17	M16
600	B	145	55	40	20	-	10	10	105	30	0.85	2 x 1	M16 x 45	17	M16
1000	B	165	65	60	30	-	10	10	115	30	1.45	2 x 1	M20 x 50	21	M20
1500	B	165	65	90	21	48	10	10	115	30	2.00	2 x 2	M16 x 45	17	M16
2500	B	165	65	120	30	60	10	10	115	30	2.90	2 x 2	M20 x 50	21	M20
4000	C	165	65	120	30	60	15	10	115	60	4.30	2 x 2	M20 x 60	21	M20
6000	C	175	70	154	25	52	25	15	125	130	10.50	2 x 3	M20 x 75	21	M20
10000	C	185	75	206	25	52	30	20	135	170	21.00	2 x 4	M20 x 80	21	M20
15000	C	185	75	310	25	52	30	20	135	170	32.00	2 x 6	M20 x 80	21	M20

Shunts 150 mV												Current terminals			
IN (A)	Version	a1	a2	b1	b2	b3	c1	c2	e	h	Weight (kg)	LZ	Bolt	P	N
1; 1,5; 2,5; 4; 6; 10; 15; 25	A	90	28	20	-	-	8	-	78	-	0.14	2 x 1	M5 x 12	5.5	-
40, 60, 100,150	D	225	33	25	-	-	8	-	205	-	0.23	2 x 1	M8 x 16	8.5	-
250	B	270	55	30	15	-	10	50	230	50	0.68	2 x 1	M12 x 40	13	M12
400	B	270	55	40	20	-	10	50	230	50	1.05	2 x 1	M16 x 45	17	M16
600	B	270	55	40	20	-	10	50	230	50	1.16	2 x 1	M16 x 45	17	M16
1000	B	290	65	70	35	-	10	50	240	50	2.15	2 x 1	M20 x 50	21	M20
1500	C	290	65	90	21	48	10	60	240	60	3.10	2 x 2	M16 x 45	17	M16
2500	C	290	65	120	30	60	10	60	240	60	5.20	2 x 2	M20 x 50	21	M20
4000	C	300	70	120	30	60	15	130	250	130	8.30	2 x 2	M20 x 60	21	M20
6000	C	300	70	154	25	52	15	130	250	130	15.00	2 x 3	M20 x 75	21	M20
10000	C	310	75	206	25	52	20	170	260	170	28.00	2 x 4	M20 x 80	21	M20
15000	C	310	75	310	25	52	20	170	260	170	35.00	2 x 6	M20 x 80	21	M20

Shunts 50 mV												Current terminals			
IN (A)	Version	a1	a2	b1	b2	b3	c1	c2	e	h	Weight (kg)	LZ	Bolt	P	N
1; 1,5; 2,5; 4; 6; 10; 15; 25	A	90	28	20	-	-	8	-	78	-	0.13	2 x 1	M5 x 12	5.5	-
40, 60, 100,150	D	93	33	20	-	-	8	-	73	-	0.13	2 x 1	M8 x 16	8.5	-
250	B	138	55	30	15	-	10	10	98	30	0.60	2 x 1	M12 x 40	13	M12
400	B	138	55	40	20	-	10	10	98	30	0.85	2 x 1	M16 x 45	17	M16
600	B	138	55	40	20	-	10	10	98	30	0.85	2 x 1	M16 x 45	17	M16
1000	B	158	65	60	30	-	10	10	108	30	1.45	2 x 1	M20 x 50	21	M20
1500	B	158	65	90	21	48	10	10	108	30	2.00	2 x 2	M16 x 45	17	M16
2500	B	158	65	120	30	60	10	10	108	30	2.90	2 x 2	M20 x 50	21	M20
4000	C	158	65	120	30	60	15	10	108	60	4.30	2 x 2	M20 x 60	21	M20
6000	C	168	70	154	25	52	25	15	118	130	10.50	2 x 3	M20 x 75	21	M20
10000	C	178	75	206	25	52	30	20	128	170	21.00	2 x 4	M20 x 80	21	M20
15000	C	178	75	310	25	52	30	20	128	170	32.00	2 x 6	M20 x 80	21	M20

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SHUNTS

Shunts 75 mV												Current terminals			
IN (A)	Version	a1	a2	b1	b2	b3	c1	c2	e	h	Weight (kg)	LZ	Bolt	P	N
1; 1,5; 2,5; 4; 6; 10; 15; 25	A	90	28	20	-	-	8	-	78	-	0.14	2 x 1	M5 x 12	5.5	-
30, 40, 50, 60, 75, 80, 100, 125, 150, 160	D	115	33	25	-	-	8	-	95	-	0.17	2 x 1	M8 x 16	8.5	-
200, 250, 300	B	160	55	30	15	-	10	10	120	30	0.63	2 x 1	M12 x 40	13	M12
300, 400, 500	B	160	55	40	20	-	10	10	120	30	0.92	2 x 1	M16 x 45	17	M16
500, 600	B	160	55	40	20	-	10	10	120	30	1.00	2 x 1	M16 x 45	17	M16
750, 800, 1000, 1200	B	180	65	60	30	-	10	10	130	30	1.75	2 x 1	M20 x 50	21	M20
1200, 1500, 2000	B	180	65	120	30	60	10	10	130	30	2.30	2 x 2	M16 x 45	17	M16
2000, 2500, 3000	C	180	65	120	30	60	15	10	130	60	3.10	2 x 2	M20 x 60	21	M20
3000, 4000, 5000	C	190	70	120	30	60	25	15	140	130	5.20	2 x 2	M20 x 75	21	M20
5000, 6000, 8000	C	190	70	154	25	52	25	15	140	130	11.20	2 x 3	M20 x 75	21	M20
8000, 10000	C	200	75	206	25	52	30	20	150	170	22.00	2 x 4	M20 x 80	21	M20
15000	C	200	75	310	25	52	30	20	150	170	33.00	2 x 6	M20 x 80	21	M20

Shunts 100 mV												Current terminals			
IN (A)	Version	a1	a2	b1	b2	b3	c1	c2	e	h	Weight (kg)	LZ	Bolt	P	N
1; 1,5; 2,5; 4; 6; 10; 15; 25	A	90	28	20	-	-	8	-	78	-	0.14	2 x 1	M5 x 12	5.5	-
30, 40, 50, 60, 75, 80, 100, 125, 150, 160	D	145	33	25	-	-	8	-	125	-	0.20	2 x 1	M8 x 16	8.5	-
200, 250, 300	B	190	55	30	15	-	10	10	150	30	0.65	2 x 1	M12 x 40	13	M12
300, 400, 500	B	190	55	40	20	-	10	10	150	30	1.00	2 x 1	M16 x 45	17	M16
500, 600	B	190	55	40	20	-	10	10	150	30	1.11	2 x 1	M16 x 45	17	M16
750, 800, 1000, 1200	B	210	65	60	30	-	10	10	160	30	2.00	2 x 1	M20 x 50	21	M20
1200, 1500, 2000	B	210	65	120	30	60	10	10	160	30	2.50	2 x 2	M16 x 45	17	M16
2000, 2500, 3000	C	210	65	120	30	60	15	10	160	60	3.20	2 x 2	M20 x 60	21	M20
3000, 4000, 5000	C	220	70	120	30	60	25	15	170	130	5.80	2 x 2	M20 x 75	21	M20
5000, 6000, 8000	C	220	70	154	25	52	25	15	170	130	12.00	2 x 3	M20 x 75	21	M20
8000, 10000	C	230	75	206	25	52	30	20	180	170	23.00	2 x 4	M20 x 80	21	M20
15000	C	230	75	310	25	52	30	20	180	170	34.00	2 x 6	M20 x 80	21	M20

IN - rated current / LZ - number of terminals / Bolt - hexagon bolt / P – washer / N – nut Voltage terminals

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07 Transducers

TRANSDUCERS

Current and voltage transducers are applied for the measurement of sinusoidal alternating currents (Nominal-input current from 0,05 to 20A) and alternating voltages (Nominal input voltages from 200 to 690 V). For higher currents or voltages transformers have to be connected before. All transducers are able to snap on DIN rails.

CIP-CA/CV - Transducers of Current / Voltage

- Arithmetical mean value measurement: Calibration to RMS with sine waveform (Average Value)
- Accuracy class 0.2 as per International Standard IEC/EN 60 688.
- Auxiliary Power Supply:
  1)40 V-300 V AC/DC.
  or 2)24 V-60 V AC/DC.
- Output Response Time < 250 ms.
- Fast and easy installation on DIN RAIL or onto a wall or in panel using optional screw hole bracket.

Application

The transducer CIP-CA / CIP-CV convert a sinusoidal AC current or AC voltage into load independet DC current or a load independent DC voltage proportional to the measured value.

Product Features

Measuring Input

AC voltage/current input signal, sine wave.

Auxiliary Power Supply

1)40 V-300 V AC/DC
or 2)24 V-60 V AC/DC.

Analog Output

Isolated analog output which can be voltage or current.

Accuracy

Ouput signal accuracy class 0.2 as per International Standard IEC/EN60688.

LED Indication

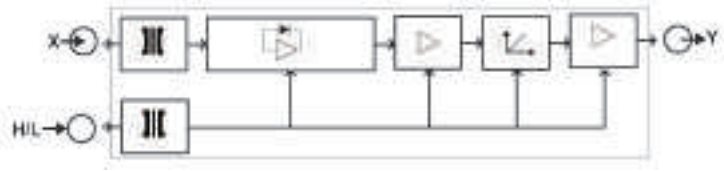
Led indication for power ON

Symbols and their meaning

X	Input AC Voltage / AC Current.
Y	Output DC Voltage / DC Current.
H/L	Power supply.
F_N	Nominal Frequency.
R_N	Rated value of output burden.
U_N	Nominal input voltage.
I_N	Nominal input current.

Mode of operation

Input signal X is separated from the mains network by using a transformer. The signal is rectified and filtered in rectifier unit.
The transformation properties of the measuring transducer are determined in the succeeding characteristics circuit.
The output amplifiers transforms the measuring signal into an impressed output signal Y.
The circuit is supplied with Auxiliary supply H or L.



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Technical Specifications

Measuring Input X: Voltage Transducer CIP-CV		
Final value of Nominal input voltage U_N (X2) AC RMS		63.5V ≤ U_N ≤ 500V
Nominal Frequency F_N		50 or 60Hz
Nominal input voltage burden		< 0.6 VA at U_N
Overload capacity		1.2*U_N continuously 2*U_N for 1 second, repeated 10 times at 10 minute intervals
Measuring Input X: Current Transducer CIP-CA		
Final value of Nominal input voltage I_N (X2) AC RMS		1A, 5A
Nominal Frequency F_N		50 or 60Hz
Nominal input current burden		< 0.2 VA at I_N
Overload capacity		1.2*I_N continuously 10*I_N for 3 second, repeated 5 times at 5 minute intervals 20*I_N for 1 second, repeated 5 times at 5 minute intervals 50*I_N for 1 second
Measuring Output Y		
Output type		Load independent DC voltage or DC current
Load independient DC output (Y2)		Calibration to RMS with sine waveform (Average value) 0...10mA, 0... 20mA, 2... 10mA, 4...20mA, 0... 5V, 0...10V
Output burden with DC current output signal		0V ≤ R ≤ 15V/Y2
Output burden with DC voltage output signal		Y2/(2mA) ≤ R ≤ ∞
Current limit under overload	R=0	≤ 1.6*Y2 with current output ≤ 25mA with voltage output
Voltage limit under	R=∞	≤ 1.6*Y2 with voltage output ≤ 25V with current output
Residual Ripple in output signal		≤ 1% pk-pk
Response time		< 250ms
Auxiliary supply H/L		
Rated operating voltage (for high aux. supply H)		40...300V AC/DC
Rated operating range of frequency (for high aux.Supply H)		45... 50... 60... 65Hz
Power consumption (for high aux. supply H)		< 4 VA
Rated operating voltage (for low aux. supply L)		24... 60V AC ±10%
Rated operating range of frequency (for low aux. supply L)		45... 50... 60... 65Hz
Power consumption(for low Aux. supply L)		< 3 VA
Accuracy: Acc. to IEC/EN 60 688		
Reference Value		Output End Value Y2 (Voltage or Current)
Accuracy class		0.2
Reference conditions for accuracy		
Ambient temperature		23°C +/- 1°C
Pre-conditioning		30min according to IEC EN 60688
Input variable		rated voltage/ rated current range
Input waveform		Sinusoidal
Input signal frequency		50 ... 60Hz
Auxiliary supply voltage		Rated Value ±1%
Auxiliary supply frequency		Rated Value ±1%
Output load		Rn = 7.5V / Y2 ± 1%, with DC current output signal Rn = Y2 / 1mA ± 1%, with DC voltage output signal
Miscellaneous		according to IEC EN 60688
Additional Error		
Temperature influence		± 0.2% / 10°C
Influence of Variations		As per IEC EN 60688 Standard
Safety		
Protection class		II (Protection isolated, EN 61010)
Protection		IP40, housing according to EN 60 529 IP20, terminal according to EN 60 529
Pollution degree		2
Installation category		III
Installation voltage		50Hz,1min. (EN 61 010-1) 5500V, Input versus outer surface. 3700V, Input versus all other circuits. 3700V, Auxiliary supply versus input and output circuits.
Installation data		
Mechanical housing		Lexan 940, polycarbonate Flammability class V-0 according to UL94, self extinguishing, non dripping, free of halogen
Mounting position		Rail mounting/ wall mounting
Weight		approx. 0.2kg

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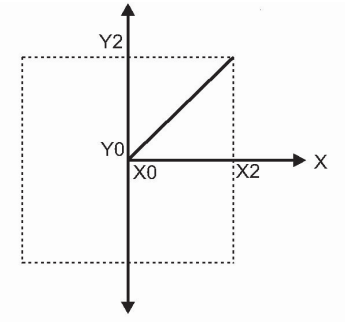
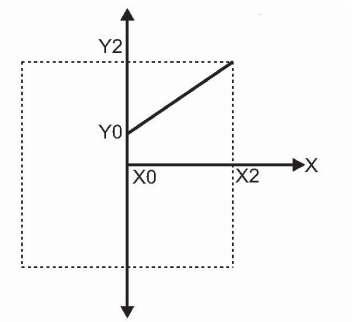
Connection Terminal	
Connection elemet	Convetional screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0mm² single wire or 2x2.5mm² fine wire
Environmental	
Nominal range of use	0°C...23°C...45°C
Storage temperature	-40 to +70°C
Relative humidity of annual mean	≤ 75%
Altitude	up to 2000 m
Ambient tests	
Vibration	EN 60 068-2-6
Acceleration	± 2 g
Frequency range	10...150..10Hz
Rate of frequency sweep	minute
Number of cycles	10, in each of the three axes
Schock	EN 60 068-2-7
Acceleration	3x50g 3 shocks in each direction
Cold, dry, damp heat	EN 60 068-2-1/-2/-3
Electromagnetic compatibility	IEC 61000-4-2/-3/-4/-5/-6 EN 55 011

Output characteristics:

Example of setting with Linear Characteristics



Example of setting with Bent Characteristics



X0 = Start value of input Y0 = Start value of input

X2 = End value of input Y2 = End value of input

Electrical Connections

Connection	Terminal details	
Measuring input	~ ~	3 4
Auxiliary power supply	~, + ~, -	5 6
Measuring output	+ -	1 2

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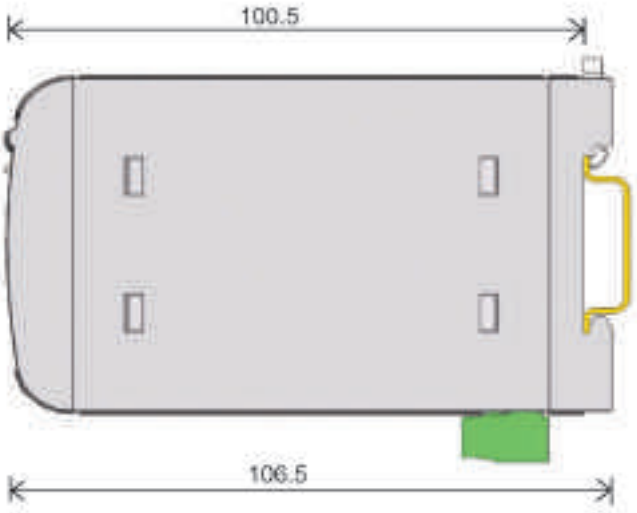
Dimensions



Ordering Information - Optional Versions

Sr.No	Transducer parameter		Ordering Code
1	**Input Signal**	**Voltage** Input range / Standard ranges 0...63.5V 0...100V 0...110V 0...220V 0...230V 0...230V 0...240V 0...250V 0...300V 0...330V 0...415V 0...440V 0...450V 0...500V **Current** Input range / Standard ranges 0...1A 0...5A **Frequency** 50/60 Hz	**CIP-CV** 01 02 03 04 05 06 07 08 09 10 11 12 13 14 **CIP-CA** 01 05 F
2	**Output Signal**	**Voltage** Output range 0...10V 0...5V **Current** Output range 0...20mA 4...20mA 0...10mA 2...10mA	**V** 01 02 **I** 01 02 03 04
3	**Auxiliary supply** 40V...300V AC/DC) 24V...60V AC/DC)		 H L

Example:

CIP - CV - 14 - F - V - 01- H

CIP - CV is Voltage transducer, input range is 0... 500V, output is Voltage with range 0...10V,Power supply is 40...300 V AC/DC.

CIP - CA - 05 - F - I - 02- L

CIP - CA is Current transducer, input range is 0... 5A, output is Current with range 4...20 mA, Power supply is 24...60 V AC/DC.

CIP - CV - 06 - F - I - 01- L

CIP - CV is Voltage transducer, input range is 0... 230V, output is Current with range 0...20mA,Power supply is 24...60 V AC/DC.

CIP-V/I - Transducers of voltage or current

- True RMD Measurement
- Onsite selectable output type (DC current/ DC voltage)
- Accuracy class 0.2 (IEC/EN60688)
- Wide Auxiliary power supply which can be accept any between 60 - 300V AC/DC or 24V - 60V AC/DC
- Output response time < 400ms
- Fast and easy installation on DIN RAIL or onto a wall or in a panel using optional screw hole bracket
- Connection terminal: Conventional screw type
- CIP-V with LCD display

Optional

- Fully onsite programmable input range (for CIP-V) and input current range for CIP-I
- Available in single or dual output type
- Seven segment LCD Display
- RS485 (MODBUS) Communication

Application

The transducers CIP-V / CIP-I are used to measure and convert AC Voltage or Current input into a load independent DC current or voltage output signal. Output signal generated is proportional to the root mean square value of the input Current or Voltage.

Product Features

Measuring Input

AC voltage/current input signal, sine wave or distorted wave form

Analog Output (Single or dual)

Isolated analog output which can be set onsite either to voltage or current output..

Accuracy

Ouput signal accuracy class 0.2 as per International Standard IEC/ EN60688.

Programmable Input/Output

The transducer can be programmed using front key and display or through RS485.

LED Indication

LED Indication for power in and output type.
(Current output: red LED / Voltage output: green LED).

Display Module (Optional)

Optional 7 segment LCD display with backlit and keypad. For displaying measured parameters and onsite configuration of input/output.

RS485 Communication (Optional)

Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

Symbols and their meaning

X	Input AC Voltage / AC Current
X0	Start value of input
X1	Elbow value of input
X2	End value of input
Y	Output DC Voltage / DC Current
Y0	Start value of output DC Voltage / DC Current
Y1	Elbow value of output DC Voltage / DC Current
Y2	End value of output DC Voltage / DC Current
R_N	Rated value of output burden
U_N	Nominal input voltage

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Technical Specifications

Measuring Input X

Voltage Transducer CIP-V

Nominal input voltage U_N (AC RMS) (PT Secondary range)	57 V ≤ U_N ≤ 500 V
PT primary range	57 V to 400 KV
Nominal Frequency F_N	45...66 Hz
Nominal input voltage burden	< 0.6 VA at U_N
Overload capacity	1.2*U_N , continuously 2* for 1 second, repeated 10 times at 10 minute intervals (but maximun 300V with power supply powered from measuring input)

No need of external potentiometer. User can set full scale output for desired input with the help of programmable PT secondary.

Current Transducer CIP-V

Nominal input current I_N (AC RMS) (CT Secondary range)	1 A ≤ I_N ≤ 5 A
CT primary range	1 A to 9999 A
Nominal Frequency F_N	45...66 Hz
Nominal input current burden	< 0.2 VA at I_N
Overload capacity	1.2*U_N , continuously 10* for 3 second, repeated 5 times at 5 minute intervals 50* for 1 second, repeated 1 time at 1 hour interval (max 250A)

No need of external potentiometer. User can set full scale output for desired input with the help of programmable CT secondary.

Measuring Output Y(Single or optional dual)

Output type		Load independent DC voltage or DC current (onsite selectable through DIP switches or programming)
Load independient DC output		0...20mA / 4...20mA or 0...10V
Output burden with DC current Signal		0V ≤ R ≤ 15V/Y2
Output burden with DC voltage Signal		Y2/(2mA) ≤ R ≤ ∞
Current limit under overload	R=0	≤ 1.25*Y2 with current output ≤ 100mA with voltage output
Voltage limit under	R=∞	≤ 1.25*Y2 with voltage output ≤ 30V with current output
Residual Ripple in output signal		≤ 1% pk-pk
Response time		< 400ms

Auxiliary Power Supply

AC/DC auxiliary supply	60V...300V AC/DC ± 5%	or	24V...60V AC/DC ± 105%
AC auxiliary supply frequency range	45 to 65Hz		
Auxiliary supply consumption	60V...300V AC/DC	≤ 8VA for single output	≤ 10VA for dual output
	24V...60V AC/DC	≤ 5VA for single output	≤ 6VA for dual output

Accuracy (According to IEC 60688)

Reference value: Output end value Y2 (voltage or current)

Basic accuracy: class 0.2*C

Factor C (the highest value applies if calculated C is less than 1, then C=1 applies)

Linear characteristics		Bent characteristics		
$C = \frac{1-(Y0/Y2)}{1-(X0/X2)}$	or C=1	For X0≤ X ≤ X1	$C = \frac{(Y1-Y0)}{(X1-X0)} \cdot \frac{X2}{Y2}$	or C=1
		For X1≤ X ≤ X2	$C = \frac{1-(Y1/Y2)}{1-(X1/X2)}$	or C=1

Reference conditions for Accuracy

Ambient temperature	23°C +/- 1°C	
Pre-conditioning	30min according to IEC EN 60688	
Imput variable	Rated voltage / Rated current	
Input waveform	Sinusoidal, form factor 1.1107	
Input signal frequency	50 or 60Hz	
Auxiliary supply voltage	at nominal range	
Output load	Rn = 7.5V / Y2 ± 1%	with DC current output signal
	Rn = Y2 / 1mA ± 1%	with DC voltage output signal
Miscellaneous	according to IEC EN 60688	

Additional Error

Temperature influence: ± 0.2% / 10°C

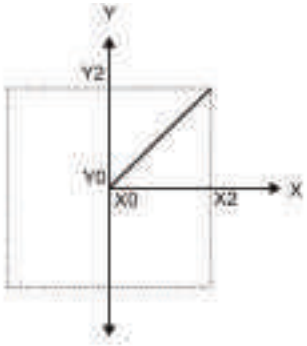
Influence of Variations

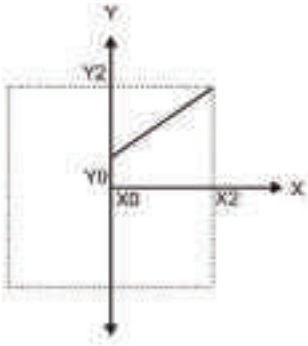
As per IEC EN 60688 Standard — Output Stability: < 30min

Safety	
Protection class	II (Protection isolated, EN 61010)
Protection	IP40, housing according to EN 60 529 IP20, terminal according to EN 60 529
Pollution degree	2
Installation category	III
Installation voltage	50 Hz, 1min (EN 61 010-1) 5500V DC, input versus outer surface 3700V DC, input versus all other circuits 3700V DC, auxiliary supply versus outer surface and output 490V DC, output versus output versus each other versus outer surface
Environmental	
Nominal range of use	0°C...23°C...45°C (usage group II)
Storage temperature	-40 to +70°C
Relative humidity of annual mean	≤ 75%
Altitude	2000m max.
Installation data	
Mechanical housing	Lexan 940, polycarbonate, flammability class V-0 according to UL94, self xtinguishing, non dripping, free of halogen
Mounting position	Rail mounting/ wall mounting
Weight	approx. 0.4kg
Ambient tests	
EN 60 068-2-6	Vibration
Acceleration	± 2 g
Frequency range	10...150..10Hz, rate of frequency sweep: minute
Number of cycles	10, in each of the three axes
EN 60 068-2-7	Schock
Acceleration	3x50g / 3 shocks in each direction
IEC 61000-4-2/-3/-4/-5/-6 EN 55 011	Electromagnetic compatibility

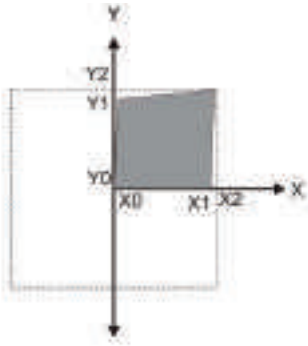
Output characteristics:

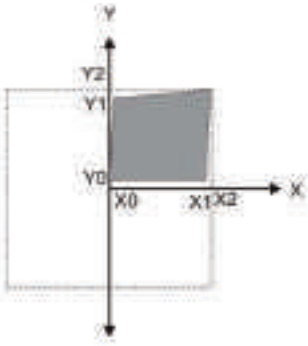
Example of setting with Linear Characteristics





Example of setting with Bent Characteristics





X0 =	Start value of input	Y0 =	Start value of input
X1 =	Elbow value of input	Y1 =	Elbow value of input
X2 =	End value of input	Y2 =	End value of input

Note: End value (Y2) of output cannot be changed onsite

LED Indication

ON LED	Aux. supply healthy condition	Green LED continuous ON
O/P1 LED	Output1 voltage selection	Green LED continuous ON
	Output1 current selection	Red LED continuous ON
O/P2 LED	Output2 voltage selection	Green LED continuous ON
	Output2 current selection	Red LED continuous ON

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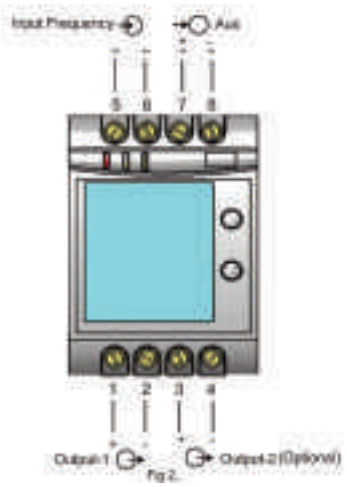
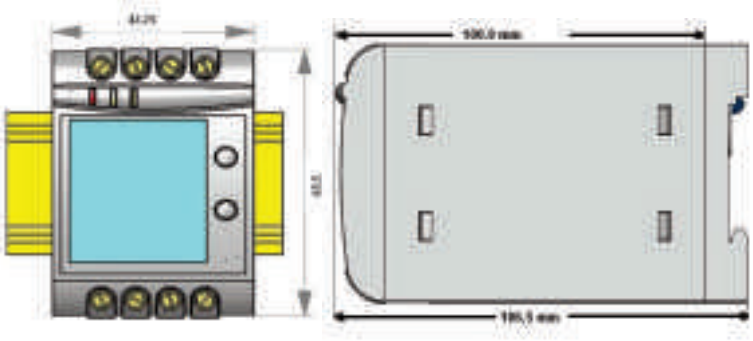
Electrical Connections

Connection	Terminal details	
Measuring input	~ ~	5 6
Auxiliary power supply	~, + ~, -	7 8
Measuring output-1	+ -	1 2
Measuring output-2	+ -	3 4



Dimensions



Programming

Can be done in two ways:

1. Programming via front LCD and two keys
2. Programming via optional RS485 (MODBUS) communication port (Device address,Password,communication parameter,Output Type and simulation mode can be programmed).

Configuration CIP Transducer

To configure CIP Transducers Input/Output one of the two programming methods to be adapted along with mechanical switch setting (DIP switch setting on PCB)

DIP Switch Setting for Output

Type of output (current to voltage signal) has to be set by DIP swicth.For programming of DIP switch the user needs to open the transducer housing and set the DIP switch located on PCB to the desired output type voltage or current output range changing is not possible with DIP switch setting.

The four pole DIP switch is located on the PCB on the CIP Transducers

DIP Swicth Setting	Type of output signal
	load-independent current
	load-independent voltage

Ordering Information - Standard Version

	CIP- X- XX -X -X -X -X	Ordering Code
1	**Product Type** CIP-I CIP-V	 CIP-I CIP-V
2	**Input range** Programmable 1...5A Programmable 57 - 500V	 - 74 - 8E
3	**Power supply** 60-330 V AC/DC 24-60 V AC/DC	 - H - F
4	**Output** 1 O/P 2 O/P	 - 1 - 2
5	**Display module** with display without display	 - D - Z
6	**RS485 module** with RS485 without RS485	 - R - Z

Ordering example:

CIP-I -74-H-1-D-Z

CIP-I, Programmable 1...5A, Aux 60-300 VAC/DC, with display, without RS485

Analog DC output options as below, to be specified while ordering only

Current output	Voltage output	DIP Option
Standard ranges		
0/4...20 mA	0...10 V	Yes
Optional factory set ranges		
0...10 mA	0...5 V	No
0...5 mA	0...2.5 V	No
0...2.5 mA	0...1 V	No
0...1 mA		

Note: End value of output can not be changed onsite.

CIP-HZ - Transducers of Frequecy

- Onsite selectable output type (DC current/ DC voltage)
- Accuracy class 0.2 (IEC/EN60688)
- Wide Auxiliary power supply which can be accept any between 60 - 300V AC/DC or 24V - 60V AC/DC
- Output response time < 400ms
- Fast and easy installation on DIN RAIL or onto a wal or in a panel using optional screw hole bracket
- Connection terminal: Conventional screw type

Optional

- Fully onsite programmable input range
- Available in single or dual output type
- Seven segment LCD Display
- RS485 (MODBUS) Communication

Application

The CIP-Hz transducer is used for frequency measurement. The outpur signal is proportional to measured frequency and is either load independient DC current or load independient DC voltage.

Product Features

Measuring Input

Sine wave or distorted wave form of nominal input voltage with fundamental wave.

Analog Output (Single or dual)

Isolated analog output which can be set onsite either to voltage or current output..

Accuracy

Ouput signal accuracy class 0.2 as per International Standard IEC/ EN60688.

Programmable Input/Output

Onsite transducer can be programmed using front key and display or through RS485.

LED Indication

LED Indication for power in and output type. (Current red LED, voltage green LED).

Display Module (Optional)

Optional 7 segment LCD display with backlit and keypad. For displaying measured parameters and onsite configuration of input/output.

RS485 Communication (Optional)

Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

Symbols and their meaning

X	Input Frequency
X0	Start value of input
X1	Elbow value of input
X2	End value of input
Y	Output DC Voltage / DC Current
Y0	Start value of output DC Voltage / DC Current
Y1	Elbow value of output DC Voltage / DC Current
Y2	End value of output DC Voltage / DC Current
RN	Rated value of output burden
UN	Nominal input voltage

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Technical Specifications

Measuring Input X - Frequency Transducer (CIP-Hz)

Measuring ranges		45Hz to 55Hz	48Hz to 52Hz	55Hz to 65Hz	45Hz to 65Hz	(min span 4Hz)
Nominal input voltage (U_N)		57V ≤ U_N ≤ 500V				
Nominal input voltage burden		< 0.6VA max				
Overload capacity		1.2*U_N , continuously				
		2* for 1 second, repeated 10 times at 10 minute intervals				
		(but maximun 300V with power supply powered from measuring input)				

Measuring Output Y(Single or optional dual)

Output type		Load independent DC voltage or DC current (onsite selectable through DIP switches or programming)
Load independient DC output		0...20mA / 4...20mA or 0...10V
Output burden with DC current Signal		0V ≤ R ≤ 15V/Y2
Output burden with DC voltage Signal		Y2/(2mA) ≤ R ≤ ∞
Current limit under overload	R=0	≤ 1.25*Y2 with current output
		≤ 60mA with voltage output
Voltage limit under	R=∞	≤ 1.25*Y2 with voltage output
		≤ 30V with current output
Residual Ripple in output signal		≤ 1% pk-pk
Response time		< 400ms

Auxiliary Power Supply

AC/DC auxiliary supply	60V...300V AC/DC ± 5%	or	24V...60V AC/DC ± 105%	
AC auxiliary supply frequency range	45 to 65Hz			
Auxiliary supply consumption	60V...300V AC/DC	≤ 8VA for single output		≤ 10VA for dual output
	24V...60V AC/DC	≤ 5VA for single output		≤ 6VA for dual output

Accuracy (According to IEC 60688)

Reference value: Output end value Y2 (voltage or current)

Basic accuracy: class 0.2*C

Factor C (the highest value applies if calculated C is less than 1, then C=1 applies)

Linear characteristics		Bent characteristics		
$C = \frac{1-(Y0/Y2)}{1-(X0/X2)}$	or C=1	For X0≤ X ≤ X1	$C = \frac{(Y1-Y0)}{(X1-X0)} \cdot \frac{X2}{Y2}$	or C=1
		For X1≤ X ≤ X2	$C = \frac{1-(Y1/Y2)}{1-(X1/X2)}$	or C=1

Reference conditions for Accuracy

Ambient temperature	23°C +/- 1°C
Pre-conditioning	30min according to IEC EN 60688
Imput variable	Rated voltage / Rated current
Input waveform	Sinusoidal, form factor 1.1107
Input signal frequency	50..60Hz
Auxiliary supply voltage	at nominal range
Output load	Rn = 7.5V / Y2 ± 1%, with DC current output signal
	Rn = Y2 / 1mA ± 1%, with DC voltage output signal
Miscellaneous	according to IEC EN 60688

Additional Error

Temperature influence: ± 0.2% / 10°C

Influence of Variations

As per IEC EN 60688 Standard — Output Stability: < 30min

Safety

Protection class	II (Protection isolated, EN 61010)
Protection	IP40, housing according to EN 60 529
	IP20, terminal according to EN 60 529
Pollution degree	2
Installation category	III
Installation voltage	1m (EN 61 010-1)
	7700V DC, input versus outer surface
	5200V DC, input versus all other circuits
	5200V DC, auxiliary supply versus outer surface and output
	690V DC, output versus output versus each other versus outer surface

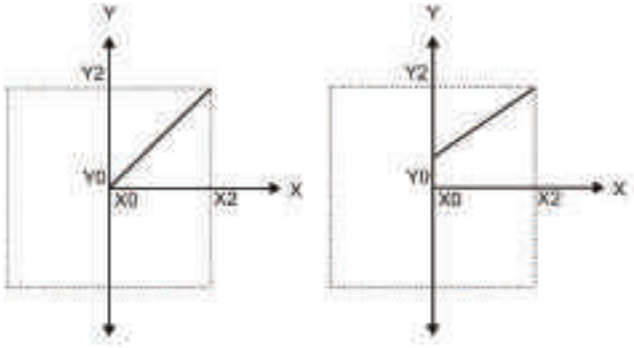
Environmental

Nominal range of use	0°C...23°C...45°C (usage group II)
Storage temperature	-40 to +70°C
Relative humidity of annual mean	≤ 75%
Altitude	2000m max.

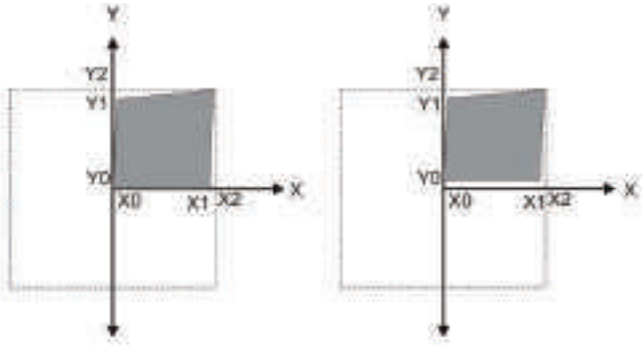
Ambient tests	
EN 60 068-2-6	Vibration
Acceleration	± 2 g
Frequency range	10...150..10Hz, rate of frequency sweep: minute
Number of cycles	10, in each of the three axes
EN 60 068-2-7	Schock
Acceleration	3x50g 3 shocks in each direction
EN 60 068-2-1/-2/-3	Cold, dry, damp heat
IEC 61000-4-2/-3/-4/-5/-6	Electromagnetic compatibility
Installation data	
Mechanical housing	Lexan 940, polycarbonate, flammability class V-0 according to UL94, self xtinguishing, non dripping, free of halogen
Mounting position	Rail mounting/ wall mounting
Weight	approx. 0.4kg
Connection Terminal	
Connection elemet	Convetional screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0mm² single wire or 2x2.5mm² fine wire

Output characteristics:

Example of setting with Linear Characteristics



Example of setting with Bent Characteristics



X0 = Start value of input Y0 = Start value of input

X1 = Elbow value of input Y1 = Elbow value of input

X2 = End value of input Y2 = End value of input

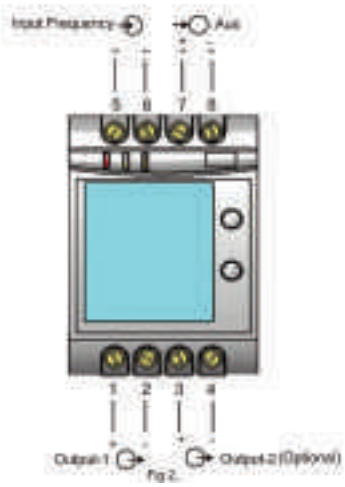
Note: End value (Y2) of output cannot be changed onsite

LED Indication

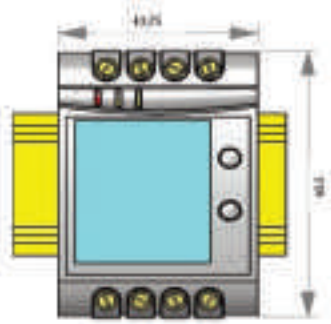
ON LED	Aux. supply healthy condition	Green LED continuous ON
O/P1 LED	Output1 voltage selection	Green LED continuous ON
	Output1 current selection	Red LED continuous ON
O/P2 LED	Output2 voltage selection	Green LED continuous ON
	Output2 current selection	Red LED continuous ON

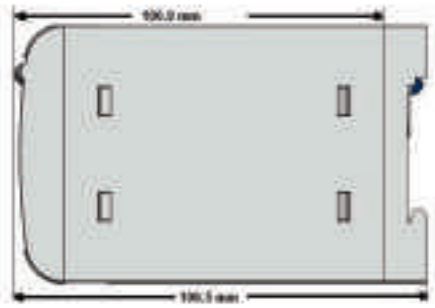
Electrical Connections

Connection	Terminal details	
Measuring input	~ ~	5 6
Auxiliary power supply	~, + ~, -	7 8
Measuring output-1	+ -	1 2
Measuring output-2	+ -	3 4



Dimensions





Programming

Can be done in two ways:

1. Programming via front LCD and two keys
2. Programming via optional RS485 (MODBUS) communication port (Device address,Password,communication parameter,Output Type and simulation mode can be programmed).

Configuration CIP Transducer

To configure CIP Transducers Input/Output one of the two programming methods to be adapted along with mechanical switch setting (DIP switch setting on PCB)

DIP Switch Setting for Output

Type of output (current to voltage signal) has to be set by DIP swicth.For programming of DIP switch the user needs to open the transducer housing and set the DIP switch located on PCB to the desired output type voltage or current output range changing is not possible with DIP switch setting.

The four pole DIP switch is located on the PCB on the CIP Transducers

DIP Swicth Setting	Type of output signal
	load-independent current
	load-independent voltage

Ordering Information - Standard Version programmable

Sr.No	Transducer parameter	Ordering Code
1	**Input signal** Frequency of input 45 - 65Hz Note: Input frequency can be programmed onsite from 45Hz to 65 Hz but minimum span is 4Hz	CIP-Hz F1
2	**Auxiliary supply** High aux (60V...300V AC/DC) Low aux (24V...60V AC/DC)	H L
3	**Output 1Standard range** Current = 0...20mA	O1A1
4	**Output 2** without output 2	0200
5	**Without display**	Z
6	**Without RS485**	Z

Note: End value of output can not be change on site

Example:

Dual Output: **CIP-Hz - F1 - H - O1A1 - 0200 - D - Z**

CIP-Hz is frequency transducer, input signal frequency range 45Hz to 65Hz, High auxiliary supply (60V-300V AC/DC), Output1 current = 0..20mA, without Output2, without LCD display module and without RS485.

Single Output: **CIP-Hz - F1 - L - O1A1 - 0200 - Z - Z**

CIP-Hz is frequency transducer, input signal frequency range 45Hz to 65Hz, Low auxiliary supply (24V-60V AC/DC), Output1 current = 0..20mA, without Output2, without LCD display module and without RS485.

Ordering Information - Basic Optional Versions

Sr.No	Transducer parameter	Ordering Code
1	**Input signal** Frequency of input 45 - 55Hz 55 - 65Hz 48 - 52Hz	CIP-Hz F2 F3 F4
2	**Auxiliary supply** High aux (60V...300V AC/DC) Low aux (24V...60V AC/DC)	H L
3	**Output 1** Current = 0...20mA = O1A1 Current = 4...20mA = O1A2 Voltage = 0...10V = O1V1 **Optional factory set ranges** Current = 0...10mA = O1A3 Current = 0...5mA = O1A4 Current = 0...2.5mA = O1A5 Current = 0...1mA = O1A6 Voltage = 0...5V = O1V2 Voltage = 0...2.5V = O1V3 Voltage = 0...1V = O1V4	O1A1 O1A2 O1V1 O1A3 O1A4 O1A5 O1A6 O1V2 O1V3 O1V4
4	**Output 2** without output 2 Current = 0...20mA = O2A1 Current = 4...20mA = O2A2 Voltage = 0...10V = O2V1 **Optional factory set ranges** Current = 0...10mA = O2A3 Current = 0...5mA = O2A4 Current = 0...2.5mA = O2A5 Current = 0...1mA = O2A6 Voltage = 0...5V = O2V2 Voltage = 0...2.5V = O2V3 Voltage = 0...1V = O2V4	0200 O2A1 O2A2 O2V1 O2A3 O2A4 O2A5 O2A6 O2V2 O2V3 O2V4
5	**LCD Display module** with display without display	D Z
6	**RS485 module** with RS485 without RS485	R Z

Note: End value of output can not be change on site

Example:

CIP-Hz - F21 - H - O1A1 - O1V1 - O2V1 - O2A1 - D - R

CIP-Hz is Frequency transducer, 45.....55Hz nominal input signal, High Aux, Output1 = 0...20mA or 0...10V , Output2= 0...10V or 0...20mA, with LCD display module and RS-485

CIP - Transducers of Power / Phase Angle / Power Factor

Model	Description
CIP-P	Active Power
CIP-Q	Reactive Power
CIP-S	Apparent Power
CIP-PA	Phase Angle
CIP-PF	Power Factor

- True RMS measurement
- Onsite configurable as active/ reactive/ apparent transducer/ phase angle / power factor
- Accuracy class 0.2 (IEC/EN 60688) for power
  Accuracy class 0.5 (IEC/EN 60688) for phase angle/ power factor
- Wide Auxiliary power supply which can be accept any between 60 - 300V AC/DC or 2aV AC/DC
- Output response time < 700ms standard
- Fast and easy installation on DIN RAIL or onto a wall

Optional

- Fully onsite programmable input voltage range and input current range
- Single or dual output type
- Onsite selectable output type (DC current/ DC voltage)
- Seven segment LCD Display
- RS485 (MODBUS) Communication

Application

The CIP-P transducer is used to measure and convert active, reactive and apparent power, phase angle and power factor of a singple-phase or three-phase AC system with balanced or unbalanced load into a proportional load independent DC current or voltage output signal.

Product Features

Measuring Input

AC voltage/current input signal, sine wave or distorted wave form.

Analog Output (Single or dual)

Isolated analog output which can be set to voltage or current output onsite.

Accuracy

Ouput signal accuracy class 2.0 as per International Standard IEC/ EN60688.

Programmable Input/Output

Onsite transducer can be programmed using front key and display or through RS485.

LED Indication

LED Indication for power in and output type. (Current red LED, voltage green LED).

Display Module (Optional)

Optional 7 segment LCD display with backlit and keypad. For displaying measured parameters and onsite configuration of input/output.

RS485 Communication (Optional)

Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

Symbols and their meaning

X	Input	Apparent / Reactive / Active Power Factor / Phase Angle
X0	Start value of input	
X1	Elbow value of input	
X2	End value of input	
Y	Output DC Voltage / DC Current	
Y0	Start value of output DC Voltage / DC Current	
Y1	Elbow value of output DC Voltage / DC Current	
Y2	End value of output DC Voltage / DC Current	
RN	Rated value of output burden	
FN	Nominal frequency	

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Technical Specifications

Measured Parameter

Network Type Supported by Power transducer:	Single Phase / 3 phase 3 wire Unbalanced / 3 phase 4 wire Unbalanced 3 phase 3 wire balanced / 3 phase 4 wire balanced
Network Type Supported by Power Factor & Phase Angle :	Single Phase / (U12 I1) 3 Phase Balanced load (U13 I1) 3 Phase Balanced load / (U23 I1) 3 Phase Balanced load 3 phase 3 wire balanced / 3 Phase 4 wire Balanced load

Nominal voltage Input U_N

Nominal input Voltage (AC RMS) (PT Secondary range)	100 V ≤ UN ≤ 500 VL-L
PT Primary range	100V to 692.8 KVL-L
Nominal Frequency F_N	25 Hz to 65 Hz (Optional - 400Hz)
Nominal input Voltage burden	< 0.6 VA per phase at U_N
Overload Capacity	1.2 * U_N continuously, 2 * U_N for 1 second, repeated 10 times at 10 minute intervals (Un maximum 300V with power supply powered from measuring input).

Nominal current Input I_N

Nominal input Current (AC RMS) (CT Secondary range)	1 A ≤ I_N ≤ 5 A
CT Primary range	1 A to 9999 A
Nominal Frequency F_N	25 Hz to 65 Hz (Optional - 400Hz)
Nominal input Current burden	< 0.2 VA per phase at I_N
Overload Capacity	1.2 * I_N continuously, 10 * I_N for 3 second, repeated 5 times at 5 minute intervals. 50 * I_N for 1 second, repeated 1 times at 1 hour interval (Max 250 A).

Allowed measuring range end values X2 (calibration factor Xc)

With single phase AC active/ reactive/ apparent power	$0.30 \le (X2/\text{Rated power}) \ge 1.3 \cdot U_N/\sqrt{3} \cdot I_N$
With 3-phase AC active/ reactive/ apparent power	$0.30 \le (X2/\text{Rated power}) \ge 1.3 \cdot \sqrt{3} \cdot U_N \cdot I_N$ (For single phase rated power = $U_N/\sqrt{3} \cdot I_N$) (For three phase rated power = $\sqrt{3} \cdot U_N \cdot I_N$)

Phase Angle & Power Factor measuring Range:

Minimum span 20° to Maximum Span 360°

Measuring output / (Single or optional Dual)

Output type Y2		Load independent DC voltage or DC current (onsite selectable through DIP switches)
Load independient DC output		Unipolar 0...20mA / 4...20mA or 0...10V Bipolar -20mA...0...+20mA/ or -10V...0...+10V
Output burden with DC current output signal		0V ≤ R ≤ 15V/Y2
Output burden with DC voltage output signal		Y2/(2mA) ≤ R ≤ ∞
Current limit under overload	R=0	≤ 1.25*Y2 with current output ≤ 100mA with voltage output
Voltage limit under	R=∞	< 1.25*Y2 with voltage output ≤ 30V with current output
Residual Ripple in output signal		≤ 1% pk-pk
Response time		< 7500ms

Auxiliary supply (according to IEC/EN 60688)

Reference value	Output end value Y2 (voltage or current)
Basic accuracy	class 0.2*C
Basic Accuracy for Phase Angle & Power Factor transducer	0.5*C

Factor C (The highest value applies if calculated C is less than 1,then C=1 applies)

Linear characteristics			Bent characteristics		
$C = \frac{1-(Y0/Y2)}{1-(X0/X2)}$	or	C= 1	For X0 ≤ X ≤ X1	$C = \frac{(Y1-Y0)}{(X1-X0)} \cdot \frac{X2}{Y2}$	or C=1
			For X1 ≤ X ≤ X2	$C = \frac{1-(Y1/Y2)}{1-(X1/X2)}$	or C=1

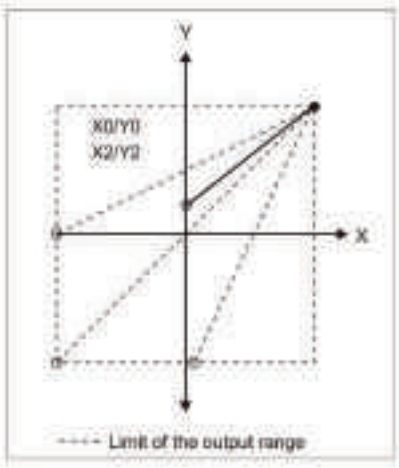
Reference conditions for Accuracy

Ambient temperature	23°C +/- 1°C
Pre-conditioning	30min according to IEC EN 60688
Imput variable	voltage rated/ current rated
Input waveform	Sinusoidal, form factor 1.1107
Input signal frequency	50 or 60Hz
Active/reactive factor	cos = 1 resp. sin = 1
For Phase Angle & Power Factor Transducer	Reference Value For Phase angle = 90° resp. For power factor = 0.5
Auxiliary supply voltage	at nominal range
Output load	Rn = 7.5V / Y2 ± 1%, with DC current output signal Rn = Y2 / 1mA ± 1%, with DC voltage output signal
Miscellaneous	according to IEC EN 60688

Additional error	
Temperature Influence	± 0.2%/10°C
Influence of Variations	
As per IEC EN 60688 Standard Output Stability	< 30min
Safety	
Protection Class	II (Protection Isolated, EN 61010)
Protection	IP 40, housing according to EN 60 529 IP 20 ,terminal according to EN 60 529
Pollution degree	2
Installation	Category III
Insulation Voltage	1min. (EN 61010-1) 7700V DC, Input versus outer surface 5200V DC, Input versus all other circuits 5200V DC, Auxiliary supply versus outer surface and output 690V DC, Output versus output versus each other versus outer surface.
Installation data	
Mechanical Housing	Lexan 940 (polycarbonate) Flammability Class V-0 acc. To UL 94, self extinguishing, non dripping, free of halogen
Mounting position	Rail mounting / wall mounting
Weight	Approx. 0.4kg
Connection terminal	
Connection Element	Conventional Screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0 mm² single wire or 2 x 2.5 mm² fine wire
Environmental	
Operating temperature	0°C...23°C...45°C(usage Group II)
Storage temperature	-40 °C to 70 °C
Relative humidity of annual mean	≤ 75%
Altitude	2000m max
Ambient tests	
Vibration	EN 60 068-2-6
Acceleration	± 2 g
Frequency range	10....150...10Hz,
Rate of frequency sweep	1 octave/minute
Number of cycles	10, in each of the three axes
Shock	EN 60 068-2-7
Acceleration	3 x 50g 3 shocks in each direction
Cold, Dry, Damp heat	EN 60 068-2-1/-2/-3
Electromagnetic compatibility	IEC 1000-4-2/-3/-4/-5/-6 - EN 55 011

Output characteristics:

Example of setting with Linear Characteristics

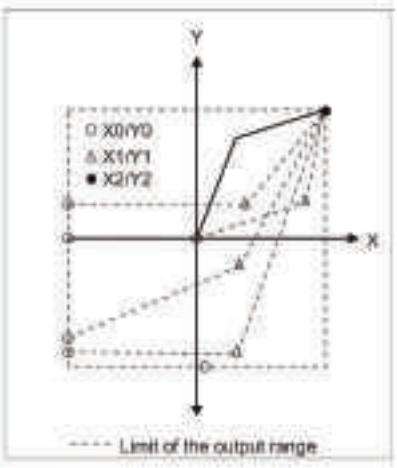


X0 = Start value of input
Y0 = Start value of output
X1 = Elbow value of input

Y1 = Elbow value of output
X2 = End value of input
Y2 = End value of output

Note: End value(Y2) of output cannot be changed onsite.

Example of setting with Bent Characteristics



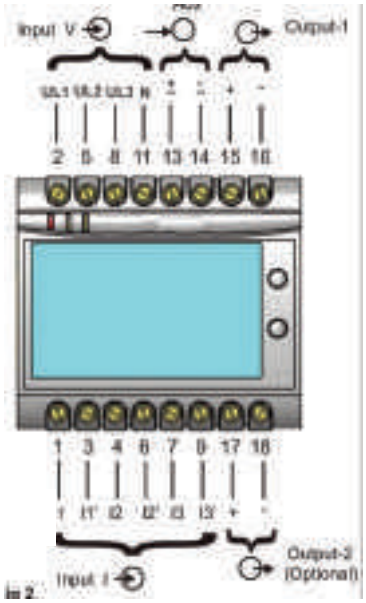
LED Indication

ON LED	Aux. supply healthy condition	Green LED continuous ON
O/P1 LED	Output1 voltage selection	Green LED continuous ON
	Output1 current selection	Red LED continuous ON
O/P2 LED	Output2 voltage selection	Green LED continuous ON
	Output2 current selection	Red LED continuous ON

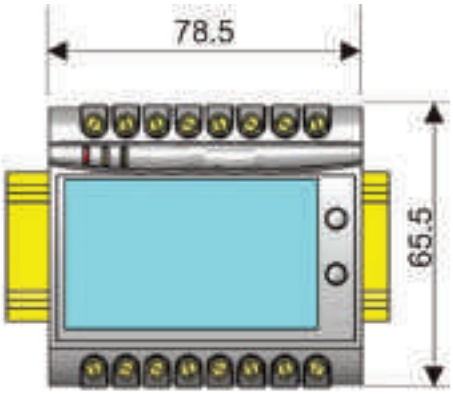
Electrical Connections

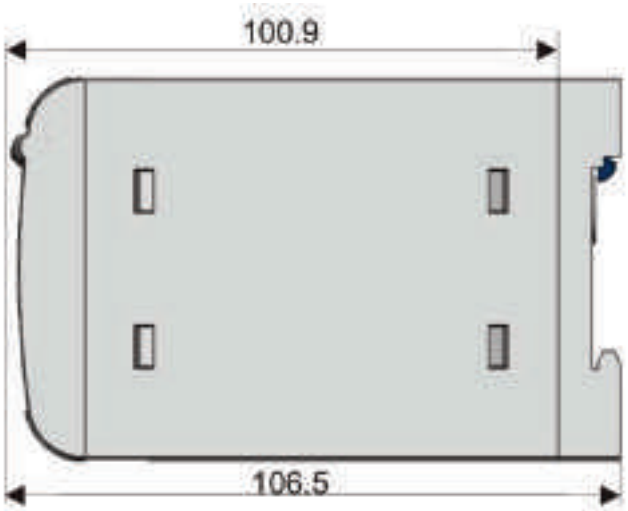
Connection	Terminal details	
Measuring Voltage input	UL1 UL2 UL3 N	2 5 8 11
Auxiliary power supply	~, + ~, -	13 14
Measuring output - 1	+ -	15 16
Measuring Current input	I1 I1′ I2 I2′ I3 I3′	1 3 4 6 7 9
Measuring output - 2	+ -	17 18

Terminal details

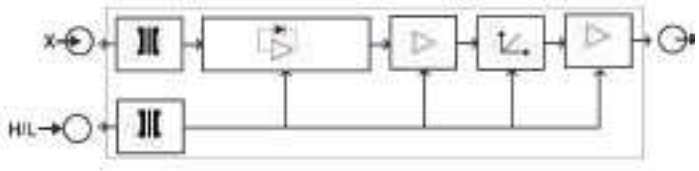


Dimensions





Electrical networks



Programming

Can be done in two ways:

1. Programming via front LCD and two keys
2. Programming via optional RS485 (MODBUS) communication port (Device address,Password,communication parameter,Output Type and simulation mode can be programmed).

Configuration CIP Transducer

To configure CIP Transducers Input/Output one of the two programming methods to be adapted along with mechanical switch setting (DIP switch setting on PCB)

DIP Switch Setting for Output

Type of output (current to voltage signal) has to be set by DIP swicth.For programming of DIP switch the user needs to open the transducer housing and set the DIP switch located on PCB to the desired output type voltage or current output range changing is not possible with DIP switch setting.

The four pole DIP switch is located on the PCB on the CIP Transducers

DIP Swicth Setting	Type of output signal
	load-independent current
	load-independent voltage

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Ordering Information - Standard Version Programmable

Sr.No	Transducer parameter	Ordering Code
1	**Input signal** Active Power * Network supported: 3 phase 4 wire unbalanced load	CIP P 4WUB
2	**Frequency of input (50Hz / 60Hz)**	F
3	**Auxiliary supply** High aux (60V...300V AC/DC) Low aux (24V...60V AC/DC)	 H L
4	**Output 1Standard range** Current = 0...20mA	 O1A1
5	**Output 2** without output 2	 0200
6	**Without display**	Z
7	**Without RS485**	Z

Note: End value of output can not be change on site

*Transducer type and networks supported are onsite programmable

Example:

Dual Output: **CIP-P - 4WUB - F - H - O1A1 - O2V1 - Z - Z**

CIP-P is active power transducer, 3 phase 4 wire unbalanced load, frequency input (50/60Hz), High auxiliary supply (60V-300V AC/DC), Output1 current = 0..20mA, Output2 voltage = 0...10VDC, without LCD display module and without RS485.

Single Output: **CIP-P - 4WUB - F - L - O1A1 - Z - Z**

CIP-P is active power transducer, 3 phase 4 wire unbalanced load, frequency input (50/60Hz), Low auxiliary supply (24V-60V AC/DC), Output1 current = 0..20mA, without LCD display module and without RS485.

Basic Version Example:

CIP - Q - 3WB - F - H - O1A2 - O1V2 - O2V2- O2A2 - D - R

Reactive Power transducer, 3 phase 3 wire balanced network ,50/60 Hz nominal input signal, High Aux, Output1 = 0...20mA or 0...10V , Output2= 0... 10V or 0...20mA, with LCD display module and with RS-485.

Ordering Information - Basic

Sr. No	Transducer parameter	Ordering Code
1	**Input signal**	CIP
	Active Power	P
	Reactive Power	Q
	Apparent Power	S
	* Network supported:	
	Single phase	1P2W
	3 phase 3 wire unbalanced load	3WUB
	3 phase 4 wire unbalanced load	4WUB
	3 phase 4 wire balanced load	4WB
	3 phase 3 wire balanced load	3WB
	Power Factor	PF
	Phase Angle	PA
	* Network supported:	
	Single phase	1P2W
	3 phase 4 wire balanced load	4WB
	3 phase 3 wire balanced load	3WB
	(U12I1) 3 phase balanced load	3WB - U12
	(U13I1) 3 phase balanced load	3WB - U13
	(U23I1) 3 phase balanced load	3WB - U23
2	**Frequency of input (50Hz / 60Hz)**	F
3	**Auxiliary supply**	
	High aux (60V...300V AC/DC)	H
	Low aux (24V...60V AC/DC)	L
4	**Output 1**	
	Current = 0...20mA = O1A1	O1A1
	Current = 4...20mA = O1A2	O1A2
	Voltage = 0...10V = O1V1	O1V1
	Optional factory set ranges	
	Current = 0...10mA = O1A3	O1A3
	Current = 0...5mA = O1A4	O1A4
	Current = 0...2.5mA = O1A5	O1A5
	Current = 0...1mA = O1A6	O1A6
	Voltage = 0...5V = O1V2	O1V2
	Voltage = 0...2.5V = O1V3	O1V3
	Voltage = 0...1V = O1V4	O1V4
5	**Output 2**	
	without output 2	0200
	Current = 0...20mA = O2A1	O2A1
	Current = 4...20mA = O2A2	O2A2
	Voltage = 0...10V = O2V1	O2V1
	Optional factory set ranges	
	Current = 0...10mA = O2A3	O2A3
	Current = 0...5mA = O2A4	O2A4
	Current = 0...2.5mA = O2A5	O2A5
	Current = 0...1mA = O2A6	O2A6
	Voltage = 0...5V = O2V2	O2V2
	Voltage = 0...2.5V = O2V3	O2V3
	Voltage = 0...1V = O2V4	O2V4
6	**LCD Display module**	
	with display	D
	without display	Z
7	**RS485 module**	
	with RS485	R
	without RS485	Z

Note: End value of output can not be changed onsite.

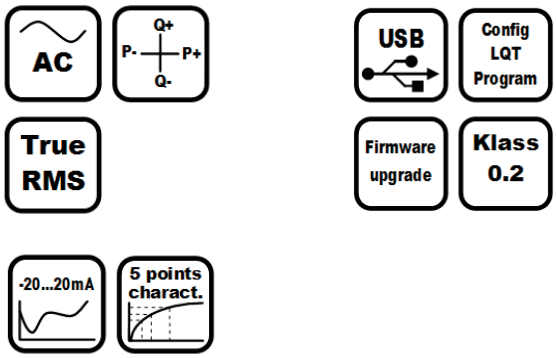
* Transducer type and network supported are onsite programmable.

**For apparent power, -20...0....20mA or ,-10....0....10V is not applicable.

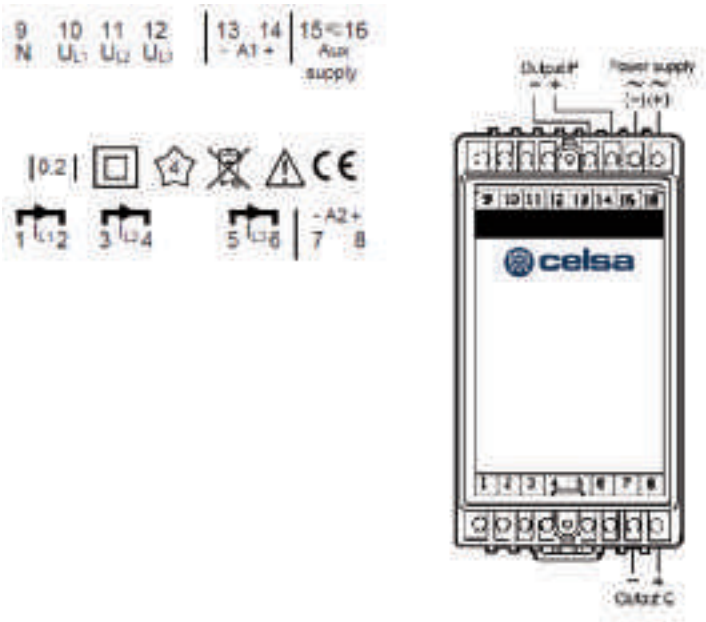
CPQT - Configurable multifunctional transducer / 2 Analog outputs

CPQT is a configurable multi transducer for all electrical networks. Any of the parameters can be linked to the 2 analog outputs.

The configuration is simple with the software "ConfigLQT" through the USB port.



Connections:



Technical Data

Inputs - Voltage	
Input (Un)	100 – 400 V
Overload	1.5 x Un – continuously, 2 x Un – 10 s
Measuring range	0 – 500 V TRMS
Consumption	Un x 1 mA / Phase
Frecuency	10...40....70...120 Hz
Inputs - Current	
Input (Un)	1 – 5 A
overload	2 x In continuously, 10 x In 15 s, 40 x In 1 s
Measuring range	0 – 10 A TRMS
Load	<0.05 VA / Phase
Aux. supply	
Universal current	24 – 250 VDC / 80 – 250 VAC
Consumption	max 8 W
Outputs - Analog	
Analog outputs	2
Range	+/- 20 mA, Option: +/- 10 V
Load	max 750 ohm (15V)
Response time	< 100 ms
General Data	
Accuracy class	0,2
Galvanic isolation	Supply, in- and output are galvanically isolated
USB	1 pc for configuration
Temperature range	Operation: -10 to +55 C° Storage -40 to +70 C°
Temperature coefficient	< 0.1% / 10 C°
Test voltage	4 kV AC / min
Inputs	Overvoltage cat. III
Outputs	Overvoltage cat. II
Dimensions (w x h x d)	70 x 132 x 137 mm – DIN-rail
Weight	approx. 0.5 kg
Standard	SS-EN 60688 SS-EN 601010 EN 61000-6-2 / -6-4 / -6-5

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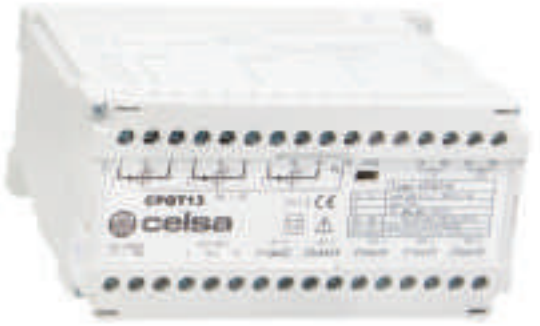
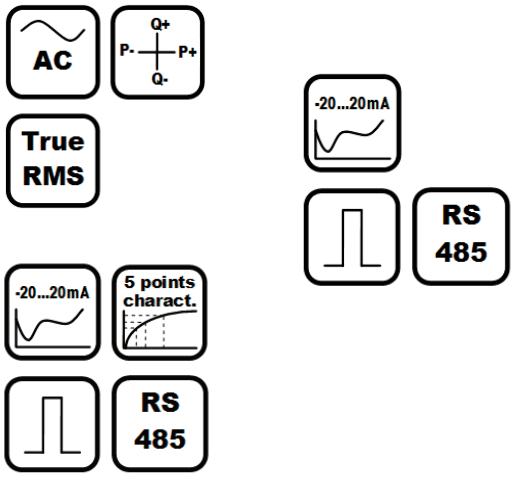
CPQT13 - Configurable multifunctional transducer / 5 Analog outputs

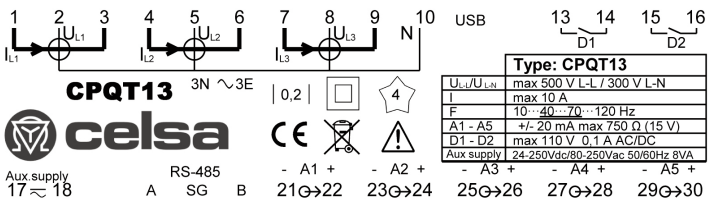


CPQT13 is a configurable multi transducer for all electrical networks. All of the parameters can be linked to the 5 analog outputs.
There are 2 pulse outputs for kWh+ and kWh-.

The configuration is simple with the software "ConfigCPQT" through the USB port.



Connections:



Type: CPQT13	
U_{L-L}/U_{L-N}	max 500 V L-L / 300 V L-N
I	max 10 A
F	10···40···70···120 Hz
A1 - A5	+/- 20 mA max 750 Ω (15 V)
D1 - D2	max 110 V 0,1 A AC/DC
Aux supply	24-250Vdc/80-250Vac 50/60Hz 8VA

Technical Data

Inputs - Voltage	
Input (Un)	100 – 400 V
overload	1.5 x Un – continuously, 2 x Un – 10 s
Measuring range	0 – 500 V TRMS
Consumption	Un x 1 mA / Phase
Frecuency	10...40....70...120 Hz
Inputs - Current	
Input (Un)	1 – 5 A
Overload	2 x In continuously, 10 x In 15 s, 40 x In 1 s
Measuring range	0 – 10 A TRMS
Load	<0.05 VA / Phase
Aux. supply	
Universal current	24 – 250 VDC / 80 – 250 VAC
Consumption	max 8 W
Outputs - Analog	
Number	5
Range	+/- 20 mA, Option: +/- 10 V
Load	max 750 ohm (15V)
Response time	< 100 ms
Outputs - Digital	
Number	2 ,110 V AC/DC, 100 mA
Communication	
Serial	RS485
General Data	
Accuracy class	0,2
Galvanic isolation	Supply, in- and output are galvanically isolated
USB	1 pc for configuration
Temperature range	Operation -10 to +55 C° Storage: -40 to +70 C°
Temperature coefficient	< 0.1% / 10 C°
Test voltage	4 kV AC / min
Inputs	Overvoltage cat. III
Outputs	Overvoltage cat. II
Dimensions (w x h x d)	150 x 70 x 73 mm – DIN-rail
Weight	approx. 0.5 kg
Standard	SS-EN 60688 SS-EN 601010 EN 61000-6-2 / -6-4 / -6-5

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08 Switches - Position Indicators

SWITCHES - POSITION INDICATORS

Voltmeter- and ammeter switches:

Voltmeter- and ammeter switches are applied to select the AC phases to be measured. This way, one single instrument can be used for measurement of current or voltage of different phases, respectively phase-to-phase and phase-to-zero. Some types additionally have a zero-position. Switches are available for panel-mounting or DIN-rail mounting. Panel-mounting-types are 4-hole screw-fixing, or one-hole-central-fixing.

Position indicators:

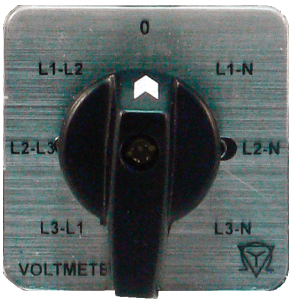
Position indicators display the actual position of circuit-breakers and isolators. They are designed for mounting in instrument-panels or in Mimic panels. The position indicators are available for AC and DC voltages and in different formats and sizes.

VOLT- AND AMMETER SWITCHES

POSITION INDICATORS

Electronic Position Indicators on request.

TP Serie - Volt- and ammeter switches



- Mounting by 4 screws
- For front panel mounting

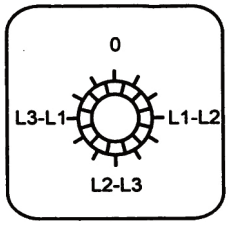
Application

Mounting by 4-hole screw-fixing, degree of protection IP65, rated current In= 16A, rated voltage 690V, frontplate labelled, handle in black color. Switches are completely wired and labelled. Clamps are protected against direct contact according to VDE 0106, chapter 100 and VBG 4 respectively.

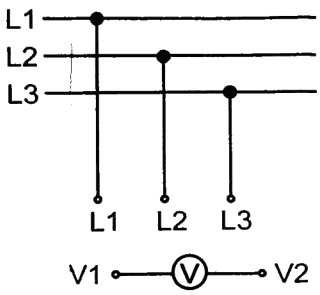
VOLTMETER

Voltmeter switch with "0" position, 3 phase to phase voltages

TP-701



90 Degree

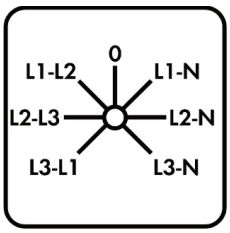


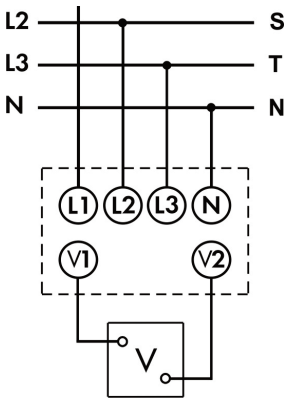
VOLTMETER

Voltmeter switch with "0" position,

3 phase to phase voltages and 3 phases against neutral

TP-705

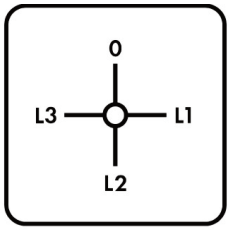


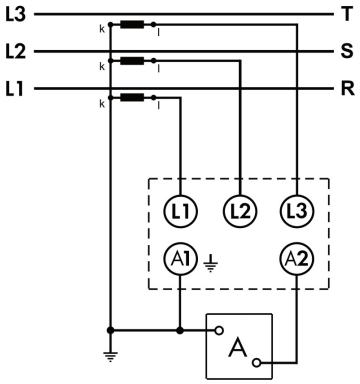


AMMETER

Ammeter switch with "0" position, 1 pole, 3 curren transformers

TP-731





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V Serie - Voltmeter switches

- One hole - central mounting
- For front panel- or for DIN-rail mounting

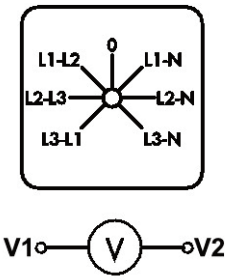
Application

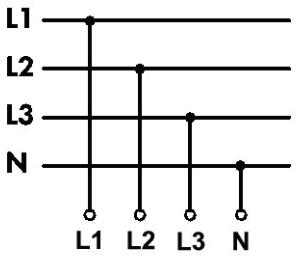
One hole-central mounting, degree of protection IP65, rated current In = 20A (16A for TP-line), rated voltage 690V, frontplate labelled, handle in black color. Switches are completely wired and labelled. Clamps are protected against direct contact according to VDE 0106, chapter 100 and VBG 4 respectively.

Voltmeter switch with 0 position,
3 phase-to-phase and 3 phases against neutral

V 30 - 8 ZM
V 30 - 8 T

One hole - central mounting
Din rail mounting

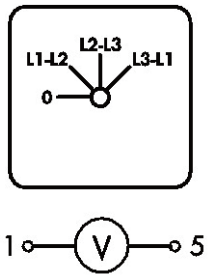


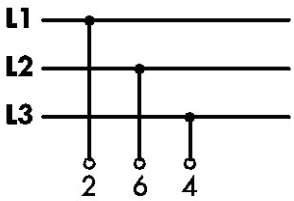


Voltmeter switch with 0 position, 3 phase-to-phase

V 3 - 8 ZM
V 3 - 8 T

One hole - central mounting
Din rail mounting

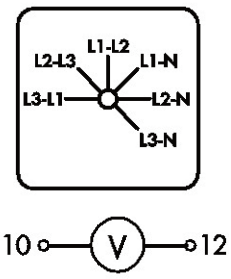


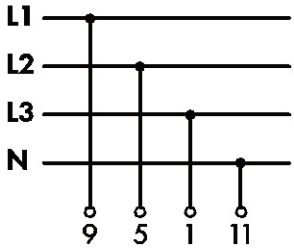


Voltmeter switch without 0 position,
3 phase-to-phase and 3 phases against neutral

VN 30 - 8 ZM
VN 30 - 8 T

One hole - central mounting
Din rail mounting

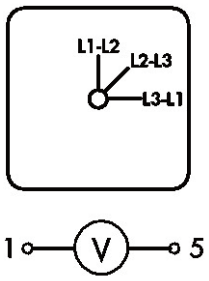


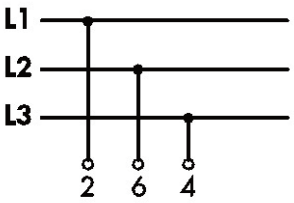


Voltmeter switch without 0 position, 3 phase-to-phase

VN 3 - 8 ZM
VN 3 - 8 T

One hole - central mounting
Din rail mounting

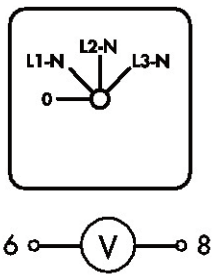


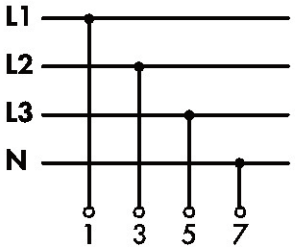


Voltmeter switch with 0 position, 3 phases to neutral voltages

VO - 8 ZM
VO - 8 T

One hole - central mounting
Din rail mounting





More change-over switches on request.

Dimensions page 8/3

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celsa

AU Serie - Ammeter switches

- One hole - central mounting
- For front panel- or for DIN-rail mounting

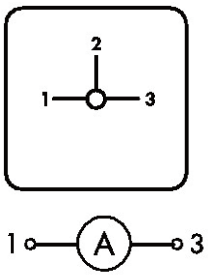
Application

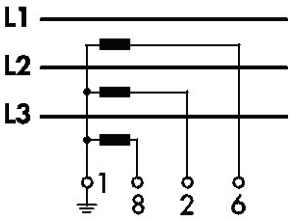
One hole-central mounting, degree of protection IP65, rated current In = 20A (16A for TP-line), rated voltage 690V, frontplate labelled, handle in black color. Switches are completely wired and labelled. Clamps are protected against direct contact according to VDE 0106, chapter 100 and VBG 4 respectively.

Ammeter switch without "0" position, 1 pole, 3 curren transformers

AU 31 - 8 ZM - X 96
AU 31 - 8 T - X 96

One hole - central mounting
Din rail mounting

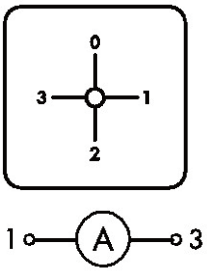


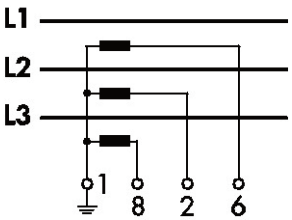


Ammeter switch with "0" position, 1 pole, 3 curren transformers

AU 31 - 8 ZM
AU 31 - 8 T

One hole - central mounting
Din rail mounting

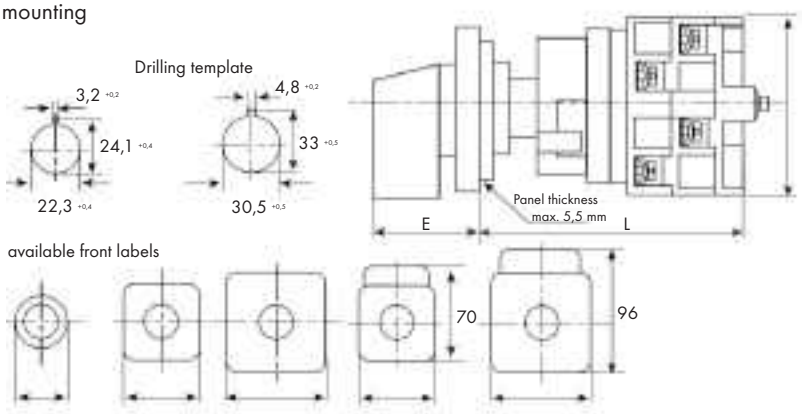




Dimensions

E	31 mm
D	39 x 41 mm
Type	Lenght **L** (in mm)
V 30 - 8 ZM	82
VN 30 - 8 ZM	82
AU 31 - 8 ZM	82
AU 31 - 8 ZM - X 96	82
V 3 - 8 ZM	70
VN 3 - 8 ZM	70
VO -8 ZM	70
TP - 705	55
TP - 731	55

Central mounting



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PI / PIR - Position Indicators

- Easy mounting
- Wide band voltage inputs
- Independent working position

Electronic position indicators on request

DC voltages 24 - 230 V						AC voltages 24 - 230 V				
Type	**PI 24**	**PI 25**	**PI 36**	**PI 29**	**PI 39**	**PIR24**	**PIR25**	**PIR36**	**PIR29**	**PIR39**
Front frame	❑ 24,0	❑ 25,0	❑ 36,0	Ø 29,0	Ø 39,0	❑ 24,0	❑ 25,0	❑ 36,0	Ø 29,0	Ø 39,0
Housing	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8
Installation depth	94	94	94	94	94	94	94	94	94	94
Cut out	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$	Ø $22^{+0,5}$
Front panel thickness	0... 12	0... 12	0... 12	0... 12	0... 12	0... 12	0... 12	0... 12	0... 12	0... 12
Weight approx.	0,1 kg	0,1 kg	0,15 kg	0,12 kg	0,12 kg	0,1 kg	0,1 kg	0,15 kg	0,12 kg	0,12 kg

Mounting dimmension in mm. Options: spacer 121 702 for mimic panels, 24 - 36 mm.

Electrical features

Position indicators for AC and DC voltages between 24 - 90 V and 91 - 230 V available.

PI PIR	Connect to DC voltages Connect to AC voltages
Consumption	0,4 W at 110 V 1,4 W at 230 V
Test voltage	3,7 kV

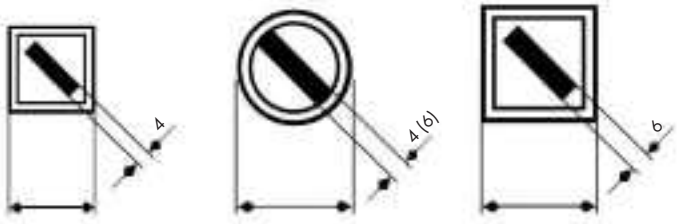
Norms

Our position indicators are manufacture according the following standards:
IEC51, EN50081-1, EN50082-1, EN50081-2, EN50082-2, IEC 473

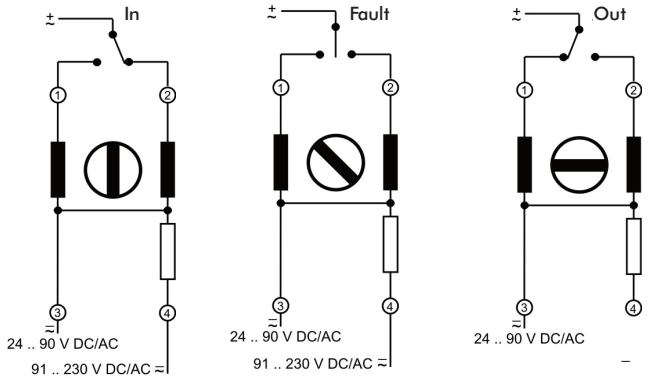
Persons safety	EN 61010-1 Category III, table D12, double insulation
Voltage range	max. 300 V

Mechanical Features

Design	Round plastic case with round or square front frame for panel mounting (PI/PIR 25/29/36) or mimic panels (PI/PIR 24)
Hosusing material	Polycarbonat UL 94 VO
Front frame	Plastic
Front frame color	Black
Working position	Independent
Mounting	Connecting nut
Connecting clamps	Screw clamps till 1,5 mm² with terminal cover
Protection	IP54



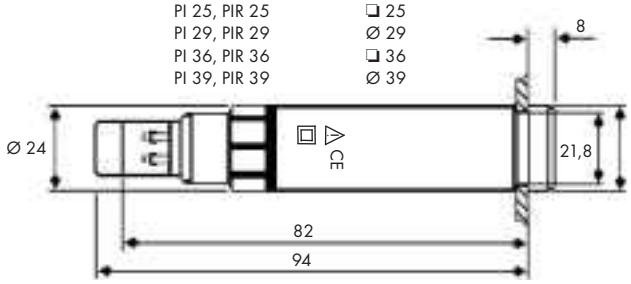
Connecting diagrams:



Dimensions:

(Dimensions in mm)

Type	A
PI 24, PIR 24❑ 24	
PI 25, PIR 25	❑ 25
PI 29, PIR 29	Ø 29
PI 36, PIR 36	❑ 36
PI 39, PIR 39	Ø 39



Cut out

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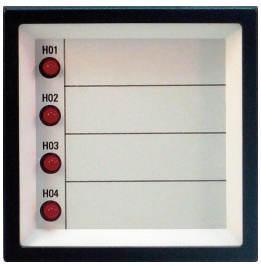
09 LED - Indicator Panels

LED - INDICATOR PANELS

LED-Indicator panels optically indicate the operating- respectively the fault-status of up to 36 channels by colour-LEDs (SM-type available with 3-color-LEDs). Depending on the input-signal its status is directly indicated. Additional connection of optical or acoustical alarms is possible as an option. Labelling of the labelling-plates can be made according to the customers specifications.

LED - INDICATOR PANELS

LM - LED-Indicator panels for operation and malfunction indication



- Standard signal and supply voltage 24V DC or 230V AC
- Control buttons on the front and / or external buttons to be connected
- Labeling plate approx.n be changed from the front, after installation
- Plug-in terminals

Functional description

Type: LM...
The signal panel is a display unit for optical signals by LEDs. As soon as a fault signal is applied to one of the signal inputs, the LED of the appropriate channel lights up. The LED goes out again as soon as the fault has been eliminated (no signal storage). Incoming message signals are decoupled through diodes and fed to the collective signal output. Pressing the lamp test button causes all the LEDs to light up.

Type: LMB...
Identical functions of LM...-Signal panels and in addition all uneven inputs are designed as operating inputs and do not affect colective signal output.

Type: LMT...
he signal panel is a display unit for optical signals by LEDs. As soon as a fault signal is applied to one of the signal inputs, the LED of the appropriate channel lights up. The LED goes out again as soon as the fault has been eliminated (no signal storage). Incoming message signals are decoupled through diodes and fed to the collective signal output. Pressing the lamp test button causes all the LEDs to light up. A lamp test button is included.

Type: LMBT...
Identical functions of LMT...-Signal panels and in addition all uneven inputs are designed as operating inputs and do not affect colective signal output.
A lamp test button is included.

Type: LMS...
The signal panel type is a display unit for optical signals by LEDs with potential-free connection facilities for optical (lamp) and acoustic (horn) collective transmitters by testable and acknowledgeable relay set. As soon as a fault signal is applied to one of the signal inputs, the LED of the appropriate channel lights up and the contacts for the lamp connection is closed. The LED goes out again as soon as the fault has been eliminated (no signal storage). The contacts for the collective transmitters stay closed even if there is no longer a fault signal until the acknowledge button is pressed. If the fault signal should persist after pressing the acknowledge button the contact for the lamp connection stays active as long as a fault signal is available. Pressing the test button has the same effect on the output contacts as a temporary fault with the difference that no LED lights up in this case. Pressing the lamp test button causes all the LEDs to light up.

Type: LMST...
The signal panel type is a display unit for optical signals by LEDs with potential-free connection facilities for optical (lamp) and acoustic (horn) collective transmitters by testable and acknowledgeable relay set. As soon as a fault signal is applied to one of the signal inputs, the LED of the appropriate channel lights up and the contacts for the horn and lamp connection are closed. The LED goes out again as soon as the fault has been eliminated (no signal storage). The contacts for the collec- tive transmitters stay closed even if there is no longer a fault signal until the acknowledge button is pressed. If the fault signal should persist after pressing the acknowledge button, only the contact for the horn is opened, the contact for the lamp connection stays active as long as a fault signal is available. The horn contact cannot be reactivated until all signals have disappeared (no new value signal).
Pressing the test button has the same effect on the output contacts as a temporary fault with the difference that no LED lights up in this case. Pressing the lamp test button causes all the LEDs to light up

Type: LMBS...
Identical functions of LMS...-Signal panels and in addition all uneven inputs are designed as operating inputs and do not affect colective signal output or output relais.

Type: LMBST...
Identical functions of LMST...-Signal panels and in addition all uneven inputs are designed as operating inputs and do not affect colective signal output.
A lamp and test button are included.

Technical Data

Type	LM72 / LM96 / LM144 LMB 72 / LMB96 / LMB144		LMS96 / LMS144 LMBS96 / LMBS144	LMST96 /LMST144 LMBST96 / LMBST144	LMT 96 / LMT144 LMBT96 / LMBT144	
Standard auxiliary supply	none		24V AC/DC	230V AC	24V AC/DC	230V AC
Power absorption	-	-	1 W	5 VA	1 W	5 VA
Signal voltage	24V AC/DC	230V AC	24V AC/DC	230V AC	24V AC/DC	230V AC
Input current	approx.. 5 mA	approx.. 2 mA	max. 55mA	max. 20 mA	approx.. 5 mA	approx.. 2 mA
Contact load capacity	-	-	250V / 2A		-	-
Load capacity "SM"	1 A		1 A		1 A	

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LED - INDICATOR PANELS

Versions 72x72/96x96 LM/LMS - 4/6/8/16/24

LM 72-4.1/..
LM 96-4.1/..
LMS 96-4.1/..

Size of labeling plate
LM 72-4.1/.. - 46,4 x 13,4 mm
LM 96-4.1/.. - 69,6 x 19,6 mm
LMS 96-4.1/.. - 69,6 x 19,6 mm

LM 72-6.1/..
LM 96-6.1/..
LMS 96-6.1/..

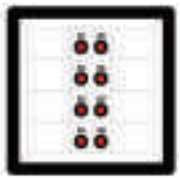
Size of labeling plate
LM 72-6.1/.. - 46,4 x 8,4 mm
LM 96-4.1/.. - 69,6 x 12,6 mm
LMS 96-4.1/.. - 69,6 x 12,6 mm

LM 72-8.1/..
LM 96-8.1/..
LMS 96-8.1/..

Size of labeling plate
LM 72-8.1/.. - 46,4 x 6,4 mm
LM 96-8.1/.. - 69,6 x 9,4 mm
LMS 96-8.1/.. - 69,6 x 9,4 mm

LM 72-8.2/..
LM 96-8.2/..
LMS 96-8.2/..

Size of labeling plate
LM 72-8.2/.. - 18,6 x 13,4 mm
LM 96-8.2/.. - 30,4 x 19,6 mm
LMS 96-8.2/.. - 30,4 x 19,6 mm



LM 72-8.3/..
LM 96-8.3/..
LMS 96-8.3/..

Size of labeling plate
LM 72-8.3/.. - 18,6 x 13,4 mm
LM 96-8.3/.. - 30,4 x 19,6 mm
LMS 96-8.3/.. - 30,4 x 19,6 mm

LM 96-12.1/..
LMS 96-12.1/..

Size of labeling plate
LM 96-12.1/.. - 69,6 x 6,0 mm
LMS 96-12.1/.. - 69,6 x 6,0 mm

LM 72-12.2/..
LM 96-12.2/..
LMS 96-12.2/..

Size of labeling plate
LM 72-12.2/.. - 18,6 x 8,4 mm
LM 96-12.2/.. - 30,4 x 12,6 mm
LMS 96-12.2/.. - 30,4 x 12,6 mm

LM 72-12.3/..
LM 96-12.3/..
LMS 96-12.3/..

Size of labeling plate
LM 72-12.3/.. - 18,6 x 13,4 mm
LM 96-12.3/.. - 30,4 x 12,6 mm
LMS 96-12.3/.. - 30,4 x 12,6 mm

LM 72-16.2/..
LM 96-16.2/..
LMS 96-16.2/..

Size of labeling plate
LM 72-16.2/.. - 18,6 x 6,4 mm
LM 96-16.2/.. - 30,4 x 9,4 mm
LMS 96-16.2/.. - 30,4 x 9,4 mm

LM 72-16.3/..
LM 96-16.3/..
LMS 96-16.3/..

Size of labeling plate
LM 72-12.3/.. - 18,6 x 6,4 mm
LM 96-12.3/.. - 30,4 x 9,4 mm
LMS 96-12.3/.. - 30,4 x 9,4 mm

LM 96-24.2/..
LMS 96-24.2/..

Size of labeling plate
LM 96-24.2/.. - 30,4 x 6,0 mm
LMS 96-24.2/.. - 30,4 x 6,0 mm

LM 96-24.3/..
LMS 96-24.3/..

Size of labeling plate
LM 96-24.3/.. - 30,4 x 6,0 mm
LMS 96-24.3/.. - 30,4 x 6,0 mm

Versions 72x72/96x96 LMB/LMBS - 3/6/8

LMB 72-3.1/..

Size of labeling plate
LM 72-3.1/.. - 46,4 x 17,2 mm

LMB 72-4.1/..
LMB 96-4.1/..
LMBS 96-4.1/..

Size of labeling plate
LMB 72-4.1/.. - 46,4 x 13,4 mm
LMB 96-4.1/.. - 69,6 x 19,6 mm
LMBS 96-4.1/.. - 69,6 x 19,6 mm

LMB 96-6.1/..
LMBS 96-6.1/..

Size of labeling plate
LMB 96-6.1/.. - 69,6 x 12,6 mm
LMBS 96-6.1/.. - 69,6 x 12,6 mm

LMB 72-6.2/..

Size of labeling plate
LMB 72-6.2/.. - 18,6 x 17,2 mm

LMB 72-6.3/..

Size of labeling plate
LMB 72-6.3/.. - 18,6 x 17,2 mm

LMB 72-8.2/..
LMB 96-8.2/..
LMBS 96-8.2/..

Size of labeling plate
LMB 72-8.2/.. - 18,6 x 13,4 mm
LMB 96-8.2/.. - 30,4 x 19,6 mm
LMBS 96-8.2/.. - 30,4 x 19,6 mm

LMB 72-8.3/..
LMB 96-8.3/..
LMBS 96-8.3/..

Size of labeling plate
LMB 72-8.3/.. - 18,6 x 17,2 mm
LMB 96-8.3/.. - 30,4 x 19,6 mm
LMBS 96-8.3/.. - 30,4 x 19,6 mm

LED - INDICATOR PANELS

Versions 144x144 LMT - 18/36

LMT 144-18.3/..

Size of labeling plate
LMT 144-18.3/.. - 51,3 x 12,8 mm

LMT 144-36.2/..

Size of labeling plate
LMT 144-36.2/.. - 51,3 x 6,1 mm

LMT 144-36.3/..

Size of labeling plate
LMT 144-36.3/.. - 51,3 x 6,1 mm

Versions 144x144 LMB/LMBS - 9/18

LMB 144-9.1/..
LMBS 144-9.1/..

Size of labeling plate
LMB 144-9.1/.. - 111,8 x 12,8 mm
LMBS 144-9.1/.. - 111,8 x 12,8 mm

LMB 144-18.2/..
LMBS 144-18.2/..

Size of labeling plate
LMB 144-18.2/.. - 51,3 x 12,8 mm
LMBS 144-18.2/.. - 51,3 x 12,8 mm

LMB 144-18.3/..
LMBS 144-18.3/..

Size of labeling plate
LMB 144-18.3/.. - 51,3 x 12,8 mm
LMBS 144-18.3/.. - 51,3 x 12,8 mm

Versions 144x144 LMST - 9/18/36

LMST 144-9.1/..

Size of labeling plate
LMST 144-9.1/.. - 111,8 x 12,8 mm

LMST 144-18.1/..

Size of labeling plate
LMST 144-18.1/.. - 111,8 x 6,1 mm

LMST 144-18.2/..

Size of labeling plate
LMST 144-18.2/.. - 51,3 x 12,8 mm

LMST 144-18.3/..

Size of labeling plate
LMST 144-18.3/.. - 51,3 x 12,8 mm

LMST 144-36.2/..

Size of labeling plate
LMST 144-36.2/.. - 51,3 x 6,1 mm

LMST 144-36.3/..

Size of labeling plate
LMST 144-36.3/.. - 51,3 x 6,1 mm

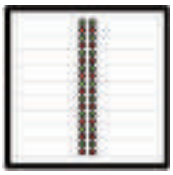
Versions 144x144 LMBT - 9/18

LMBT 144-9.1/..

Size of labeling plate
LMBT 144-9.1/.. - 111,8 x 12,8 mm

LMBT 144-18.2/..

Size of labeling plate
LMBT 144-18.2/.. - 51,3 x 12,8 mm



LMBT 144-18.3/..

Size of labeling plate
LMBT 144-18.3/.. - 51,3 x 12,8 mm

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Versions 144x144 LMBST - 9/18

LMBST 144-9.1/..

Size of labeling plate
LMBST 144-9.1/.. - 111,8 x 12,8 mm

LMBST 144-18.2/..

Size of labeling plate
LMBST 144-18.2/.. - 51,3 x 12,8 mm

LMBST 144-18.3/..

Size of labeling plate
LMBST 144-18.3/.. - 51,3 x 12,8 mm

Description of the clamps

LED-Indicator panels 72 x 72 LM(B) 3/4/8/12/16 : LM / LMB

Input "1 - 16"	Signal inputs, numbers dependening on type
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output

LED-Indicator panels 72 x 72 LM(B)T 3/4/8/12/16 : LMT / LMBT

Input "1 - 16"	Signal inputs, numbers dependening on type
Input "L"	Auxiliary supply input
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output

LED-Indicator panels 96 x 96 LM(S/T) 4/8/16 : LM

Input "1 - 16"	Signal inputs, numbers dependening on type
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output

LED-Indicator panels 96 x 96 LMB(S/T) 4/8 : LMB

Input "1 - 16"	Signal inputs, numbers dependening on type
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output
Input "L"	Auxiliary supply input

LED-Indicator panels 96 x 96 LM(S/B) 6/12/24 : LMT / LMBT

Input "1 - 24"	Signal inputs, numbers dependening on type
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output

Additional clamps
LMS / LMT / LMST / LMBS / LMBST / LMS / LMBS

Input "Qu"	Acknowledging horn-output
Input "Pr"	Testing the relay phrase
Input "L"	Auxiliary supply input
Input "P"	Common connection for horn and lamp
Output "Hu"	Floating no-contact output, horn
Output "La"	Floating no-contact output, lamp

LED-Indicator panels 144 x 144 LM(B/S/T) 9/18/36
LM / LMB

Input "1 - 36"	Signal inputs, numbers dependening on type
Input "N"	Common ground terminal
Input "LP"	Input for lamp test button
Output "SM"	Non-isolated signal output

Additional clamps LMT / LMBT

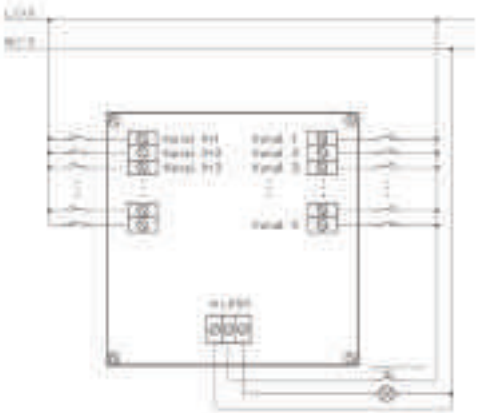
Input "L"	Auxiliary supply input

Additional clamps LMS(T) / LMBS(T)

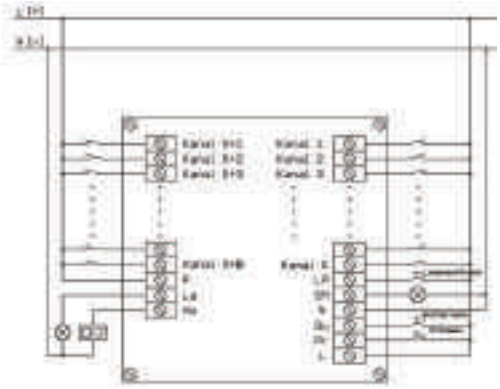
Input "Qu"	Acknowledging horn-output
Input "Pr"	Testing the relay phrase
Input "L"	Auxiliary supply input
Input "P"	Common connection for horn and lamp
Output "Hu"	Floating no-contact output, horn
Output "La"	Floating no-contact output, lamp

Dimensions

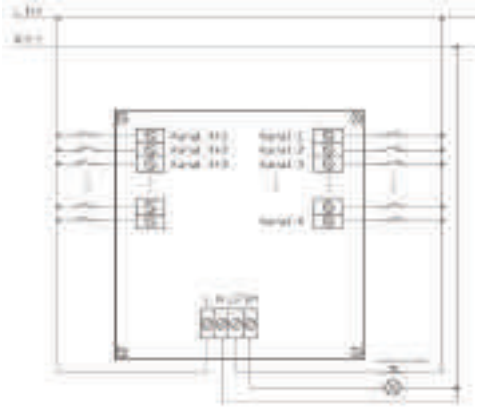
Connections diagrams - 72 x 72 LM(B) 3/4/6/8/12/16



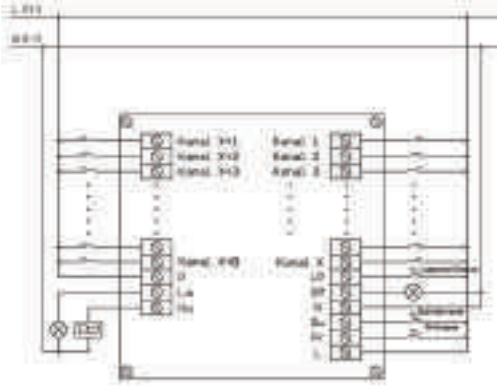
Connections diagrams - 96 x 96 LM(S/T) 4/8/16



Connections diagrams - 72 x 72 LM(B)T 3/4/6/8/12/16



Connections diagrams - 96 x 96 LMB(S/T) 4/8



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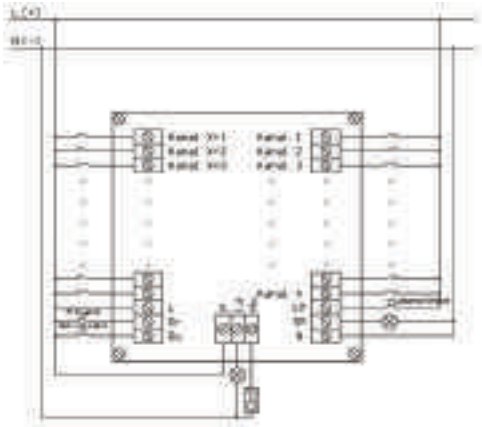
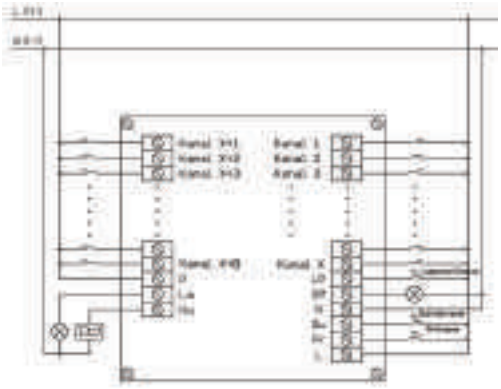
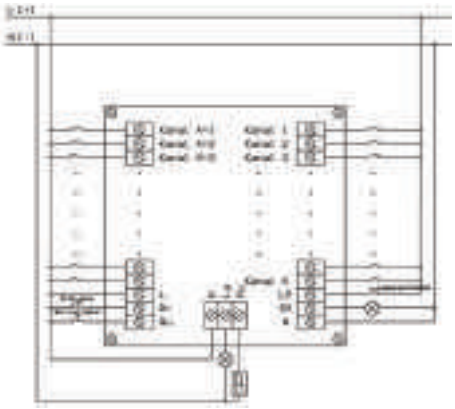
Connections diagrams - 96 x 96 LM(S/B) 6/12/24



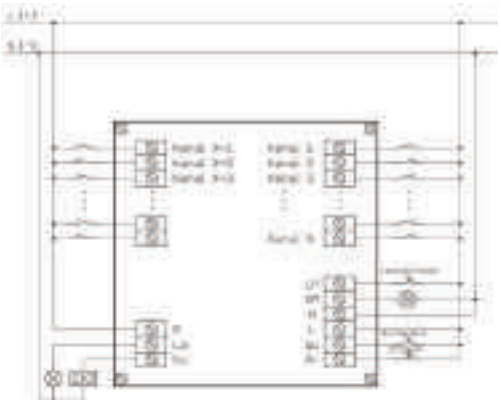
Connections diagrams - 96 x 96 LMB(S/T) 4/8



Connections diagrams - 144 x 144 LM(B/S) 9/18/36



Connections diagrams - 144 x 144 LM(B/S)T 9/18/36

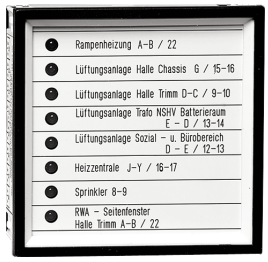


Order examples for Serie LM

Order example		
Product	**Version**	**Supply voltage**
LM72	4.1	230 V AC
LMBT	6.3	24 V AC/DC

LED - INDICATOR PANELS

SM - LED-Indicator panels for operation and malfunction indication



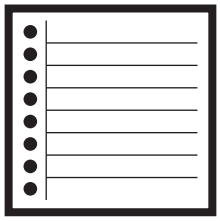
3 colour LED's

Functional description

Type SM:

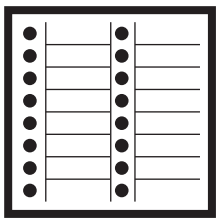
Indicator panel for optical signals. Each LED directly indicates the status of the input signal. The instrument has a collective signal output and an input for lamp-testing. These malfunction indicators are equipped with 5mm Ø and 3 colour LEDs (red, green, orange). The activation is effected with 24V/20mA directly from the SPS. Other voltages on request. All colours of the LEDs can be individually controled via connection terminals. All inputs consist of a common reference point (minus).

Versions 96x96 SM 8 / 16



SM 96-8/24V

Size of labeling plate 9,0 x 65,0 mm



SM 96-16/24V

Size of labeling plate 9,0 x 28,0 mm

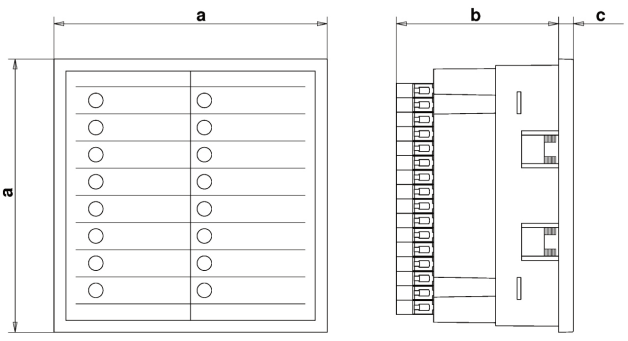
Technical Data

Input	
Input signal	24 VDC (Option: 24 VAC)
Rated input current	6 mA por LED and color (Option AC: 4,5 mA per LED and color)
Input test DC	24 VDC / 95 mA (SM16: 190 mA)
Input test AC (Option)	24 VAC / 73 mA (SM16: 145 mA)
Continiuos overload	max. 30 V
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Foreign field influence	none (to 400 A/m)
Electrical connection	Screw max. 4 mm2 on the back
Test voltage	2,2kV, 50 Hz, 10 sec., Between input and housing 2,2kV, 50 Hz, 10 sec., Between input and relay contacts
Attention!	**The inputs are not isolated from each other!**
Alarm	
Relay contact	1 change
Switching capacity	max. 250 VAC, 1250 VA
Regulations	
EMV	DIN EN 61326
Mechanical	DIN EN 61010 Part 1
Electrical safety	DIN EN 61 010 Part 1, Pollution degree 2, overvoltage category III, at rated voltages up to 300 V (operating voltage to ground)
Protection	DIN EN 60529 Case IP52, Terminals IP10

Dimensions

Type SM.. (Dimensions in mm)

Type:	A	B	C	Cut-out
SM 96..	96	57	5	$92^{+0,8}$ x $92^{+0,8}$



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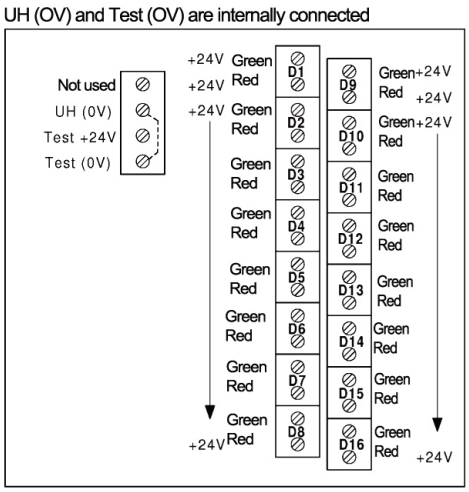
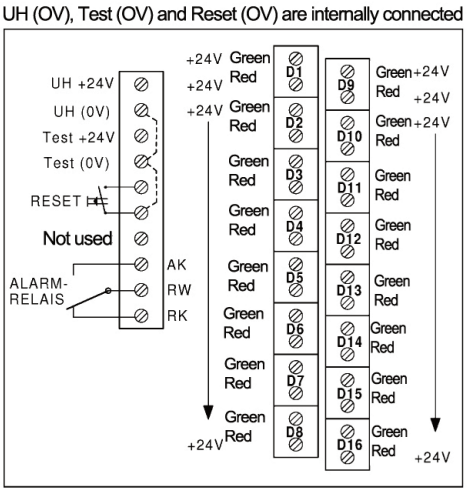
Connections diagrams

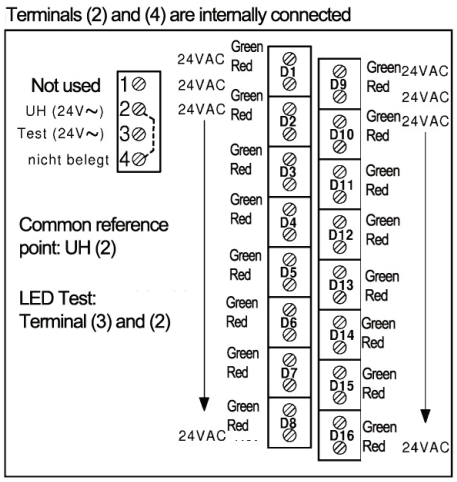
SM8 / SM16 with 24 VDC



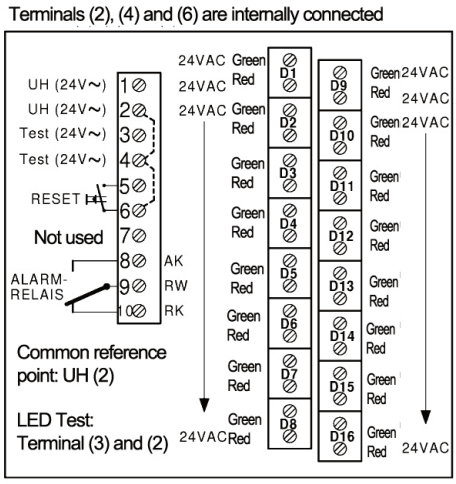
SM8 / SM16 with 24 VDC and General alarm with storage



SM8 / SM16 with 24 VDC



SM8 / SM16 with 24 VDC and General alarm with storage



Order information SM 96

Serie SM	Description
SM 96/8 LED-Indicator panels	3 LED colours (red, green, orange) 5mm diameter.
SM 96/16 LED-Indicator panels	3 LED colours (red, green, orange) 5mm diameter.
SM 96/8 LED-Indicator panels with General alarm and storage	3 LED colours (red, green, orange) 5mm diameter.
SM 96/16 LED-Indicator panels with General alarm and storage	3 LED colours (red, green, orange) 5mm diameter.

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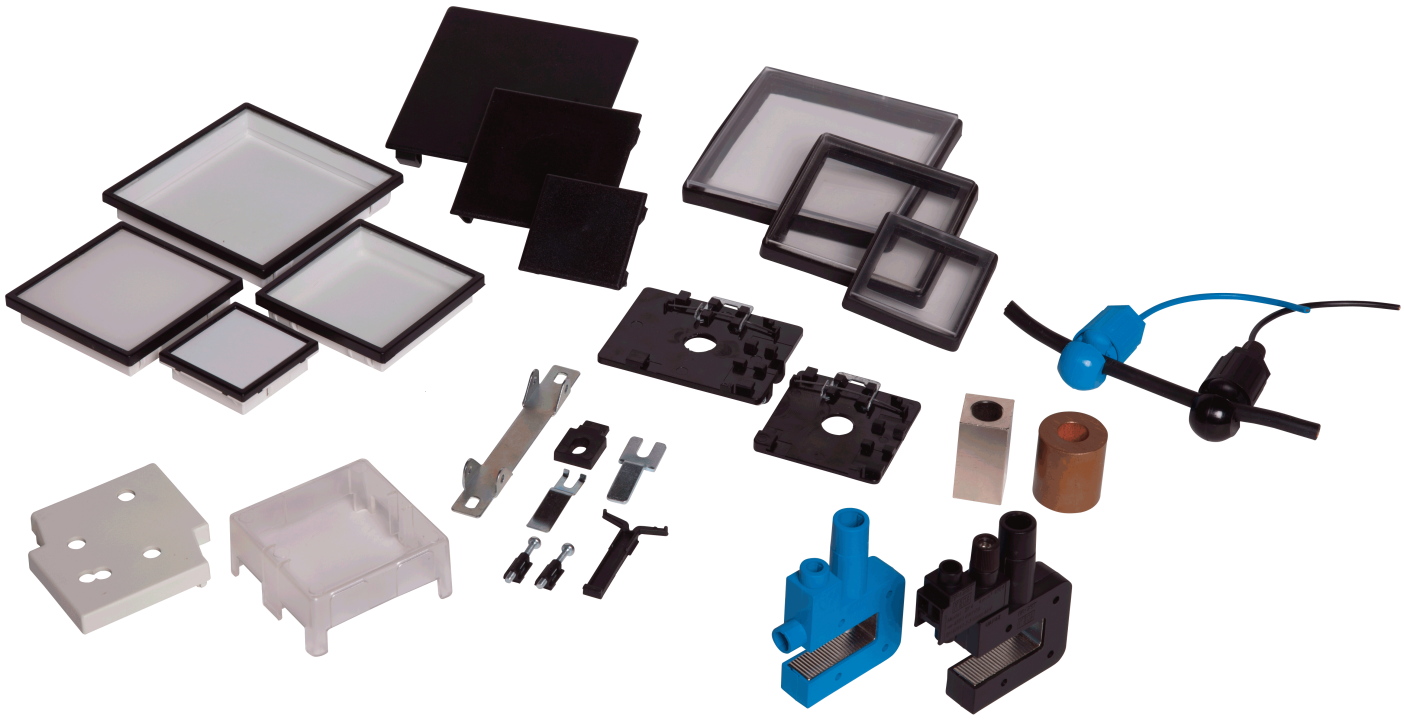
Email: info@celsaspain.com



10 Accesories

ACCESORIES

Accessories for analogue instruments

Accessories for current transformers

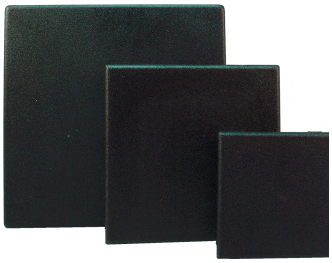
Accessories for switchboards

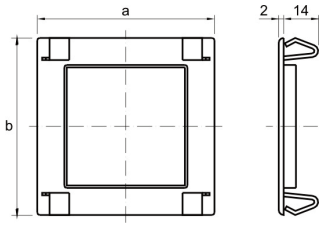
Accessories for voltage taps

ACCESORIES

ACCESORIES FOR ANALOGUE INSTRUMENTS

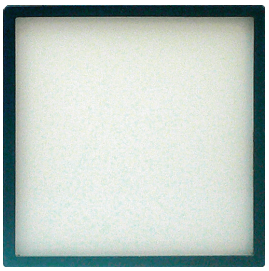
Snap -in covers

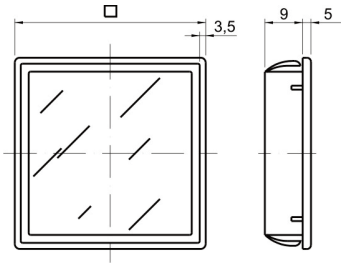




Available sizes (Dimensions in mm)	
Square	
Size	Colour
48 x 48	black
72 x 72	black
96 x 96	black

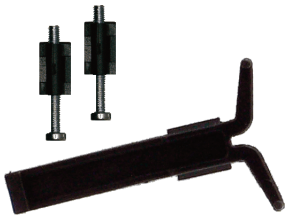
Blind cover with glass

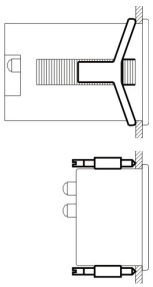




Available sizes (Dimensions in mm)			
Transparent glass		White glass	
Size	Cut - out	Size	Cut - out
48 x 48	45 x 45	48 x 48	45 x 45
72 x 72	68 x 68	72 x 72	68 x 68
96 x 96	92 x 92	96 x 96	92 x 92
144 x 144	140 x 140	144 x 144	140 x 140

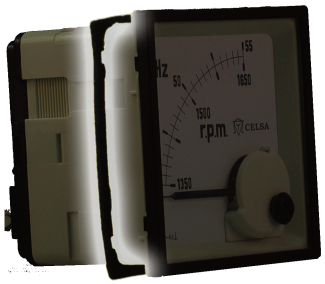
Mounting screws / -Clips

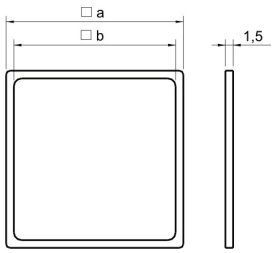




Available
Description
Plastic clips for "n" versions
Screws for "n" versions

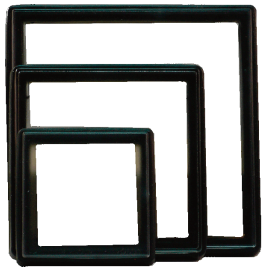
Rubber gaskets

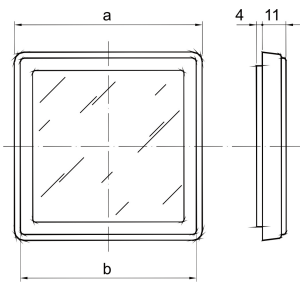




Available sizes (Dimensions in mm)	
For "n" devices (Foam rubber)	
a	b
72x 72	68x 68
96 x 96	92 x 92

IP65 Protection cover





Available sizes (Dimensions in mm)		
Plexiglas with rubber frame		
For standard size	a	b
48 x 48	54 x 54	50 x 50
72 x 72	78 x 78	75 x 75
96 x 96	103 x 103	99 x 99

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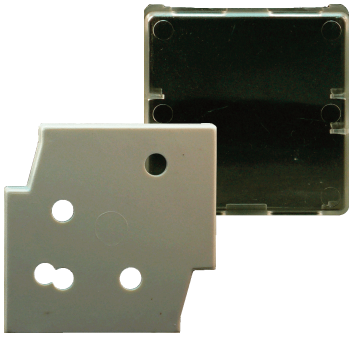
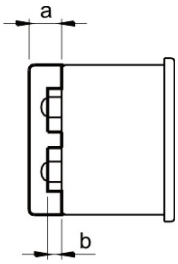
ACCESORIES

ACCESORIES FOR ANALOGUE INSTRUMENTS

Terminal covers





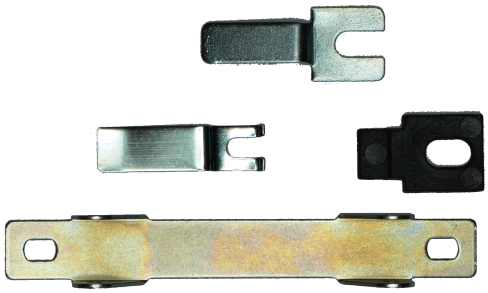
Available sizes (Dimensions in mm)		
Plastic (Clear / White)		
For standard size	a	b
48 x 48	9	-
72 x 72	22	5
96 x 96	22	5
144 x 144	9	-

ACCESORIES FOR CURRENT TRANSFORMERS

Snap on mounting (DIN rail)

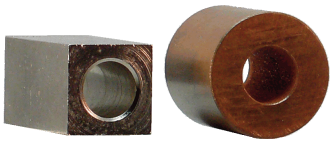
Available for the following CT	
IB - Serie	AST - Serie
IBA, IBP	AST...
IB, IB-50	WST40
IBG, IBG-50	SCMU, SCMU210S
IBO	SCMU/I

Mounting feet



Available for the following CT	
IB - Serie	AST - Serie
IBA, IBP	AST...
IB, IB-50, IBG, IBG-50	WST40
IBR, IBR/1, IAP, IAM, IAG	SCMU, SCMU210S
IBO	SCMU/I

Cooper - tubes



Available for the following CT	
IB - Serie	AST - Serie
IBD-1 –> Width: 60 mm (da = 20x20 mm, di = 12,5 mm)	CU-Hülse –> Width: 32 mm (da = 28 mm, di = 12,5 mm
IBD-2 –> Width: 40 mm (da = 20x20 mm, di = 12,5 mm)	CU-Hülse –> Width: 32 mm (da = 42 mm, di = 12,5 mm)

ACCESORIES FOR SWITCHBOARDS

DIN power sockets

Technical Data / Dimensions in mm		
	For snapp on DIN rail	
Execution	standard	with green LED *
Lenght/Width/Height	87 / 44 / 61	87 / 44 / 61
Rated current	16 A	16 A
Material	PA 6	PA 6
Colour	similar RAL 7035	similar RAL 7009
Weight	97 g	97 g

* on request

Connection diagrams pockets

Available sizes (Dimensions in mm)				
Type	DIN A4-02	DIN A4-05	DIN A4-06	DIN C-07
Width	264	180	140	210
Height	236	240	170	130
Deep	30	33	10	7
Material	Polystyrol	Polystyrol	Polystyrol	Polystyrol
Colour	RAL 7035	clear	clear	clear
Weight	97 g	90 g	154 g	97 g

Connection diagrams pockets

Available sizes				
Dimensions	Creepage resistance 1 min.	Voltage force	Max. torgue	Break force
M6 x 30	10 kV	3,0 kN	15 Nm	2,0 kN
M8 x 30	10 kV	5,0 kN	20 Nm	2,0 kN
M6 x 35	10 kV	5,0 kN	15 Nm	2,0 kN
M8 x 35	10 kV	5,0 kN	20 Nm	2,0 kN
M8 x 40	10 kV	7,5 kN	20 Nm	3,0 kN
M10 x 40	10 kV	7,5 kN	25 Nm	3,0 kN
M10 x 50	10 kV	10,0 kN	25 Nm	3,5 kN
M12 x 50	10 kV	10,0 kN	30 Nm	3,5 kN

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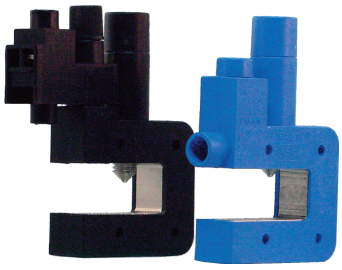
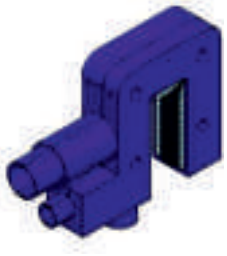
VSP - Voltage taps for busbars



VSPL4

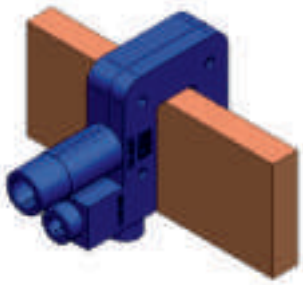
Terminal voltage tap for bus bar with integrated fuse

The VSP of insulated busbar terminals let you connect your instruments to live busbars. A fuse holder is an integrated part of this terminal, proving you with protection at the source. The terminal can be installed directly onto the busbar using an insulated Allen key driver. This makes the installation of this unique product a one handed exercise. The fuse holder is mounted directly on the metal that makes contact with the busbar, thereby providing a secure connection with a high short circuit rating. For connection to the Netural bar, the model VSP provides an unfused connection.



VSPN16

Terminal voltage tap for bus bar without fuse



VSP.. General Features	
General	
Maximum voltage	690 V
Test voltage / spike	3 kV/50 Hz / 6 kV
Max. current	10 A
Isolation class	E (max 120 °C)
Fuse type	5x25 mm (with indicator) 10 A SIBA DIN 41576-2
Short circuit rating	70 kA @ 400 V/50 Hz
IP rating	IP20
Ambient temperature	-5...+40°C [1]
Temperature rise busbar	Max. 75 K [1]
Busbar connection	Via Allen key bolt M8
Allen key size	Number 6
Busbar thickness	Max. 15 mm / min. 4 mm
Housing	Polyamide (PA6.6)
Material terminal	Nickel plated brass

1)Max. temperature of the busbar: 120°
(Sum of the busbar temperature rise and the ambient temperature)

VSPL4

VSPN16

VSP... Executions			
Type	**Description**	**Colour**	**Connection**
VSPL4	Fused phase terminal	black	1,5-4mm²
VSPL16	Phase terminal	black	0-16mm²
VSPN16	Neutral terminal	blue	0-16mm²
Set with 3 x VSPL4 and 1 x VSPN16			

VSR6 - Voltage for round conductors

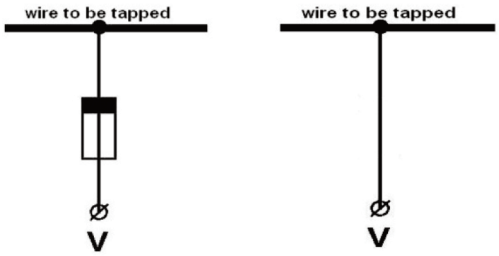
- One-handed and safe tapping of voltage for measurement purposes
- No tools needed
- Safe mounting
- Including 5x25mm, 2A fuse
- For insulated 2.5-6 mm2 conductors, stranded and solid (rigid) and flexible wire

In existing installations there is rarely a fused terminal available for measurement purposes. This unique tapping clamp allows you to tap a fused voltage from an insulated wire for measurement using one hand and without the need for additional tools. The fuse is mounted directly on the primary conductor, which results in an optimum degree of safety. This unique product is a breakthrough for fast and safe measurement in existing installations The VSR..n is available in a fused and non used version.

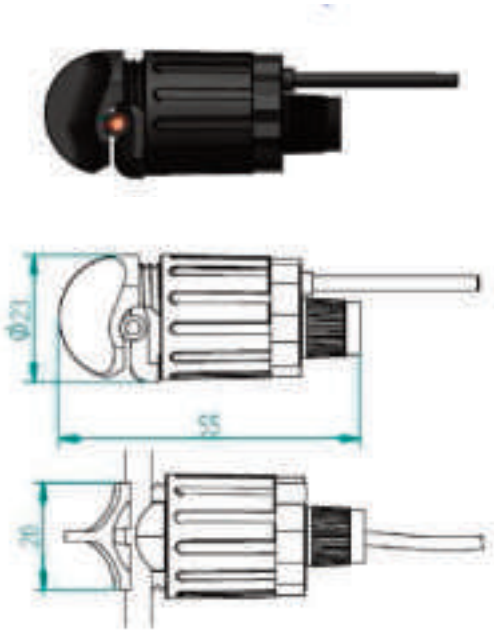
VSR6.. General Features

Safety conditions	
CE directive Standard	Low voltage directive 2006/96/EC IEC 60998 (clamp), IEC 60947 (fuse)
Environmental conditions	
Standard	IEC 60721-3-3: 1996
Class	3K3
Operating temperature	+5°C ...+55°C
Relative humidity	5%..85%, non condensing
Operation height	0... 200m over Nm
Protection degree	IP20, basic insulation
Pollution degree	2
Measurement degree	CAT III
Application conditions (suitable for Conductors with basic insulation)	
Insulation material	PVC or XLPE
Wire diameter	3 - 5mm (2,5 - 6mm²)
VSR6 - R	Rigid wire (solid, stranded)
VSR6 - F	Flexible wire
Umax	400V AC
Test Voltage	
Imax	2 A
Voltage drop	< 500m V AC
Fuse (VSRL6-R)	2A, 450V, F, 70kA, 5x25mm, Keramic (SIBA Part.no. 7008913.2)
Sec. lead	1mmn2 flexible, 50cm, end-sleeve
Use	Multiple use, max. 24 times
Torque	1.5 - 2.0 Nm
Storage	
Temperature	-20°C ...+70°C
Relative humidity	5% ...85%, non condensing
Weight	28gr.
Dimensions	diameter 23mm, height 59mm
Material	PA 6.6, UL94 V2

Wiring diagrams:



Dimensions:



VSR6... Executions

Type	Cable dimension
VSRL6-R	fused, for 2.5-6mm² rigid (solid, stranded) wire
VSRN6-R	Phase terminal, for 2.5-6mm² rigid (solid, stranded) wire
Set with 3 x VSRN6-R and 1 x VSRL6-R	

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