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 aalue)
- Accuracy class 0.5 as per International Standard IEC/EN 60 688.
- Auxiliary power supply: 40 V-300 V AC/DC.
  or 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 independent DC current or DC voltage proportional to the measured value.

Product Features

Measuring Input

AC voltage/current input signal, sine wave.

Auxiliary Power Supply

- 40 V-300 V AC/DC

or • 24 V-60 V AC/DC.

Analog Output

Isolated analog output which can be voltage or current.

Accuracy

Ouput signal accuracy class 0.5 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.

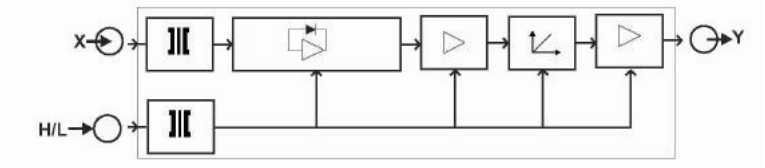
Mode of operation

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.

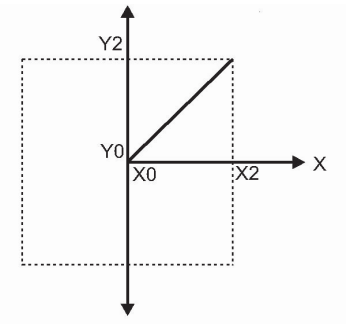
The output amplifiers transforms the measuring signal into an impressed output signal Y.

The circuit is supplied with Auxiliary supply H or L.



Output characteristics:

Example of setting with Linear Characteristics



X0 =	Start value of input	Y0 =	Start value of input
X2 =	End value of input	Y2 =	End value of input

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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		0.5
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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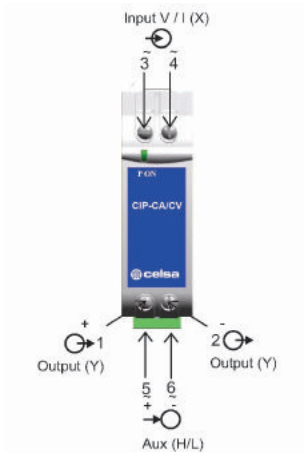
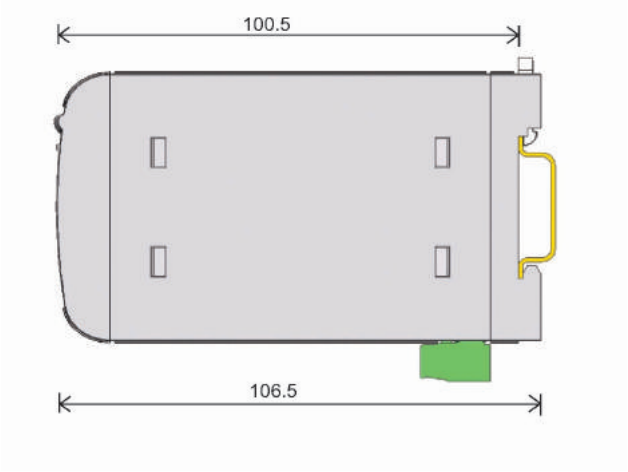
Connection Terminal	
Connection elemet	Convetional screw type terminal with indirect wire pressure
Permissible cross section of the connection lead	≤ 4.0mm² single wire or 2x2.5mm² fine wire
Environmental	
Nominal range of use	0°C...23°C...45°C
Storage temperature	-40 to +70°C
Relative humidity of annual 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	1 octave/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

Electrical Connections:

Connection	Terminal details	
Measuring input	~ ~	3 4
Auxiliary power supply	~, + ~, -	5 6
Measuring output	+ -	1 2



Dimensions:



Type	Description	Output (to indicate)	Auxiliary supply (to indicate)
CIP-CA	Compact 1 output Current	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC
CIP-CV	Compact 1 output Voltage	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC

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CIP-V/I - Transducers of voltage or current

- True RMD Measurement
- Onsite selectable output type (DC current/ DC voltage)
- Accuracy class 0.5 (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
- LCD display
- Fully onsite programmable input range for CIP-V and input current range for CIP-I

Optional

- Available in single or dual output type
- 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 0.5 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 7 segment LCD display with backlit and keypad. For displaying measured parameters and onsite configuration of input/output.

RS485 Communication (Optional)

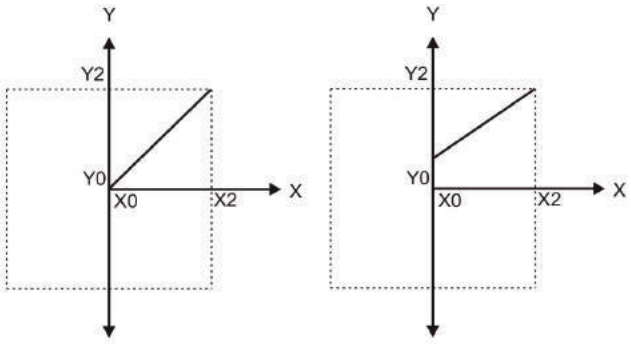
Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

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

Output characteristics:

Example of setting with Linear 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

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 0.5

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

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.

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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
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	1 octave /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

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

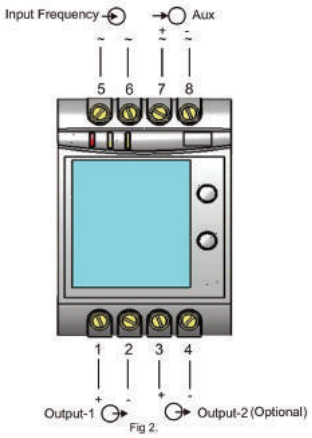
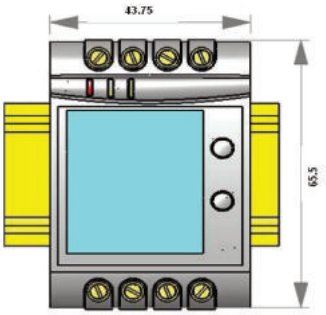
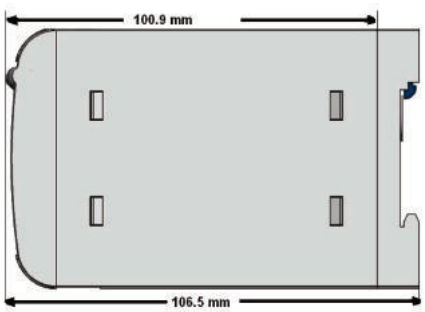


Fig 2.

Dimensions





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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

Type	Description	Output (to indicate)	Auxiliary supply (to indicate)
CIP-CA	Compact 1 output Current	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC
CIP-CV	Compact 1 output Voltage	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC

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CIP-HZ - Transducers of Frequecy

- Onsite selectable output type (DC current/ DC voltage)
- Accuracy class 0.5 (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
- Fully onsite programmable input range
- Seven segment LCD Display

Optional

- Available in single or dual output type
- 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 0.5 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 7 segment LCD display with backlit and keypad. For displaying measured parameters and onsite configuration of input/output.

RS485 Communication (Optional)

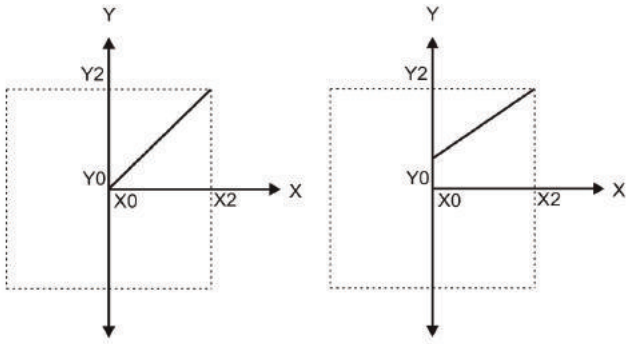
Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

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

Output characteristics:

Example of setting with Linear 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

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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 0.5

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.

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Ambient tests	
EN 60 068-2-6	Vibration
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
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

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

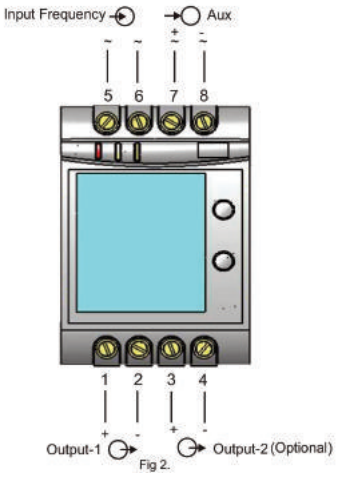
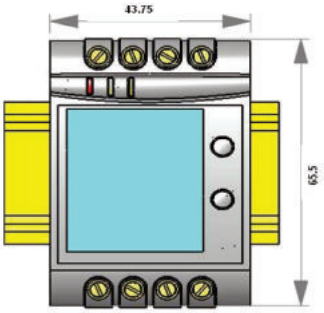
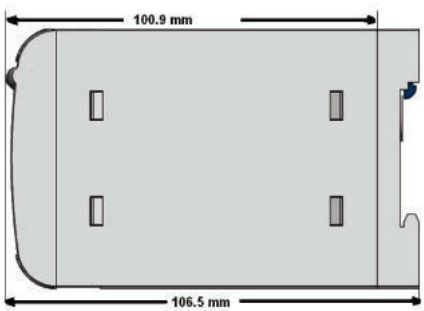


Fig 2.

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

Type	Description	Output (to indicate)	Auxiliary supply (to indicate)
CIP-CA	Compact 1 output Current	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC
CIP-CV	Compact 1 output Voltage	0 - 20 mA 4 - 20 mA 0 - 10V	40 - 300V AC/DC 24 - 60V AC/DC

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CIP- P - Transducers of active / reactive power

- True RMS measurement
- Onsite configurable as active or reactive power
- Accuracy class 0.5 (IEC/EN 60688)
- Wide Auxiliary power supply which can be accept any between 60 - 300V AC/DC or 24V AC/DC
- Output response time < 700ms standard
- Fast and easy installation on DIN RAIL or onto a wall
- Fully onsite programmable input voltage range and input current range
- Seven segment LCD Display

Optional

- Single or dual output type
- Onsite selectable output type (DC current/ DC voltage)
- RS485 (MODBUS) Communication

Application

The CIP-P transducer is used to measure and convert active or reactive power in to 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 0.5 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)

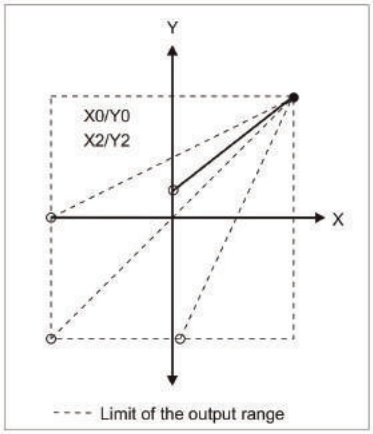
Optional RS485 communication is available. For reading measured parameters and onsite configuration of input/output.

Symbols and their meaning

X	Input	Reactive / Active Power
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	

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.

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
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 power	$0.30 \leq (X2/\text{Rated power}) \geq 1.3 \cdot U_N/\sqrt{3} \cdot I_N$
With 3-phase AC active/ reactive power	$0.30 \leq (X2/\text{Rated power}) \geq 1.3 \cdot \sqrt{3} \cdot U_N \cdot I_N$ (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	$0V \leq R \leq 15V/Y2$
Output burden with DC voltage output signal	$Y2/(2mA) \leq R \leq \infty$
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 0.5
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: $C = \frac{1-(Y0/Y2)}{1-(X0/X2)}$ or C= 1	For $X0 \leq X \leq X1$ Bent characteristics: $C = \frac{(Y1-Y0)}{(X1-X0)} \cdot \frac{X2}{Y2}$ or C=1
	For $X1 \leq X \leq X2$ $C = \frac{1-(Y1/Y2)}{1-(X1/X2)}$ 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

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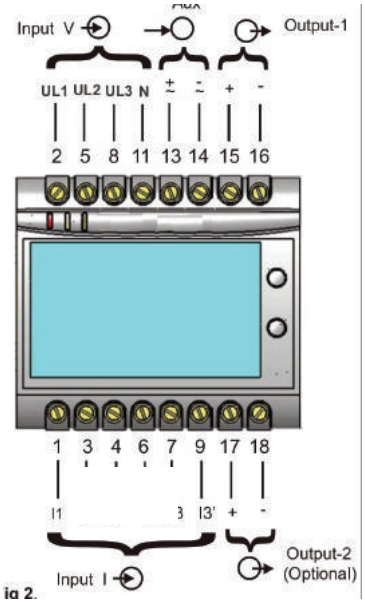
Additional error	
Temperature Influence	± 0.2%/10°C
Influence of Variations	
As per IEC EN 60688 Standard Output Stability	< 30min
Safety	
Protection Class	II (Protection Isolated, EN 61010)
Protection	IP 40, housing according to EN 60 529 IP 20 ,terminal according to EN 60 529
Pollution degree	2
Installation	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

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

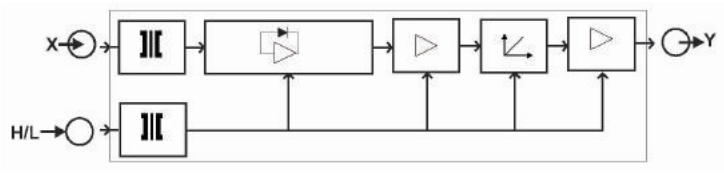


ia 2.

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 networks



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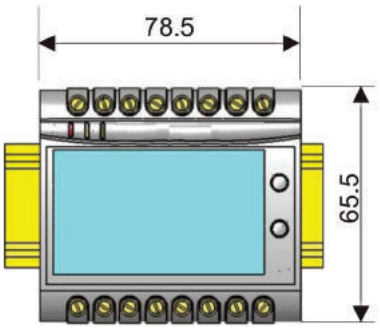
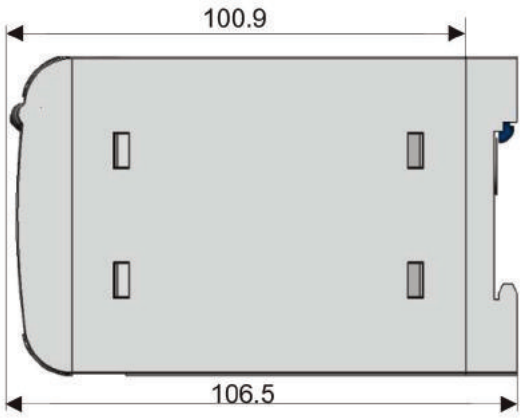
DIP Swicth Setting	Type of output signal
	load-independent current
	load-independent voltage

Dimensions





Type	Description		Output 1 or 2 outputs (to indicate)	Auxiliary supply (to indicate)
Active power	CIP-P/1w CIP-P/1d CIP-P/2 CIP-P/1 CIP-P/3	1-Phase 3-Phases 3 wire balanced 3-Phases 3 wire unbalanced 3-Phases 4 wire balanced 3-Phases 4 wire unbalanced	0 - 20 mA 4 - 20 mA 0 - 10V	60 - 300V AC/DC 24 - 60V AC/DC
Reactive power	CIP-P/1w CIP-P/1d CIP-P/2 CIP-P/1 CIP-P/3	1-Phase 3-Phases 3 wire balanced 3-Phases 3 wire unbalanced 3-Phases 4 wire balanced 3-Phases 4 wire unbalanced	0 - 20 mA 4 - 20 mA 0 - 10V	60 - 300V AC/DC 24 - 60V AC/DC

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CPQT2: 2 Analog outputs / CPQT4: 4 Analog outputs

DIN rail, fully programmable, high accuracy, the multi-transducer, can be used with 50, 60 or 16⅔ Hz rated frequencies with a wide range of AC and DC auxiliary supply. This transducer can measure active and reactive powers, power factors, and all other electrical quantities including voltage and current for any 3-phase system. The CPQT can be easily programmed through its USB micro standard port and ConfigLQT free software.

Technical Data

Input	
Voltage range (Un)	100 – 400 V (L-L) main voltage (nominal)
Measuring range	1 – 520 V TRMS L-L 50/60 Hz 1 - 520 V TRMS L-L 16⅔ Hz
Configurable measuring range	0 - 500 V L-L / 0 - 300 V L-N
Frecuency	50/60 Hz (10...40....70...120 Hz) 16⅔ Hz (10...15....18...120 Hz)
Overload voltage	1.5 x Un – continuously, 2 x Un – 10 s
Consumption	Un x 1 mA / Phase
Current Input (In)	1 – 5 A
Measuring range	5 mA – 10 A TRMS
Configurable measuring range	0 – 10 A
Overload current	2 x In continuously, 10 x In 15 s, 40 x In 1 s
Auxiliary power supply	24 – 230 VDC / 90 – 230 V AC ±10 %
Burden	max 7.2 W / 15 VA
Outputs	
Analog outputs	2 or 4
Programmable range	±20 mA, ±5 mA, ±10 V (settings within the range)
External resistance load	Current output: max 750 Ω (15 V) Voltage output: min 750 Ω
Response time	<100 msec
Digital outputs	2 (Energy pulse output)
Analogue output ripple	≤0.2%
Communication	Modbus RS485 (RTU)
Measured quantities	F, U12, U23, U31, U, I, P, S, IS, LF, PF, QF, PA
Accuracy	0.2 (Ref. temp. 23 °C)
Galvanic isolation	Supply, in- and output are galvanically isolated
Connection terminals/Torque	
Humidity	
USB	95% non-condensing
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
Pollution degree	2
Dimensions (w x h x d)	70 x 132 x 101 mm – DIN-rail
Weight	approx. 300 gr
Protection	IP40 (housing), IP20 (terminals)
Standard	SS-EN 60688: 2021 Transducers SS-EN 601010 -1 Safety EN 61000-6-2 / -6-4 / -6-5

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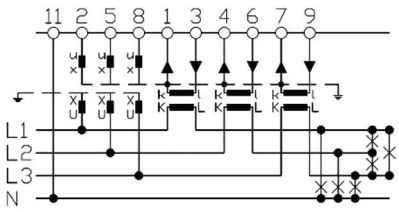
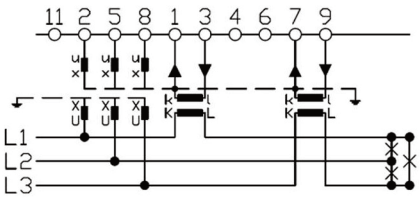
Configurable system connection

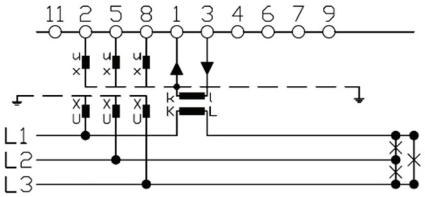
Code	Application	I1	I2	I3	N	U1	U2	U3	U12	U23	U31
00	4 wire, 3 phases symmetric load	x	-	-	x	x	-	-	-	-	-
01	1 wire, 1 phase	x	-	-	x	x	-	-	-	-	-
02	3 wire, 3 phase symmetric load	x	-	-	-	-	-	-	x	-	-
03	3 wire, 3 phase symmetric load	x	-	-	-	-			-	x	-
04	3 wire, 3 phase symmetric load	x	-	-	-	-	-	-	-	-	x
05	3 wire, 3 phase symmetric load	x	-	-	-	x	x	x	x	x	x
09	3 wire, 3 phase asymmetric load	x	-	x	-	x	x	x	x	x	x
11	4 wire, 3 phase asymmetric load	x	x	x	x	x	x	x	x	x	x
11	4 wire, 3 phase asymmetric load	x	x	x	-	x	x	x	x	x	x



Connection -11



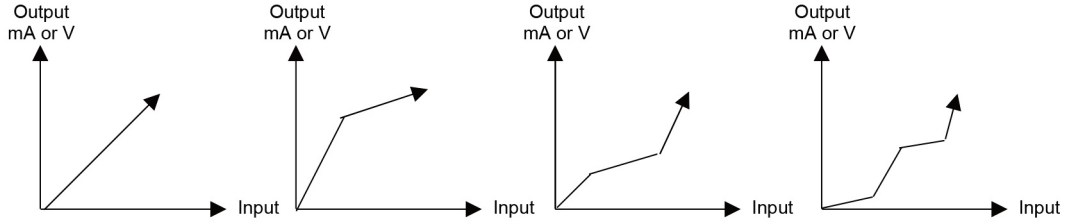
Connection -09



Connection -05

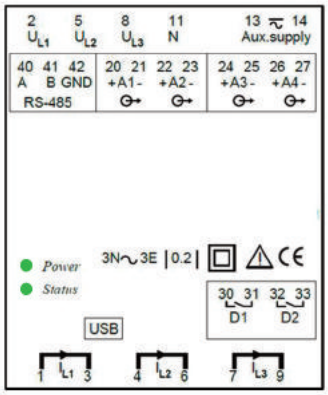
Configurable characteristic point (analog outputs)

Up to setting 5 points

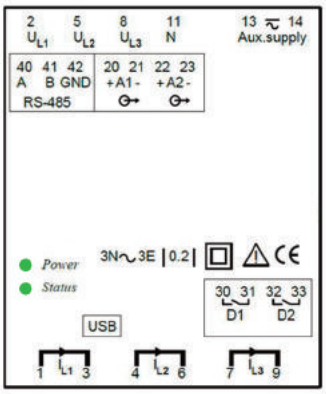


Connections:

CPQT-4



CPQT-2



Dimensions:

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Configurable system connection

Quantity	Unit	Description	Measured	Value
F	Hz	Frequency	System	F
I	A	Current	System	I = (I1+I2+I3)/3
I1	A	Phase current	L1	I1
I2	A	Phase current	L2	I2
I3	A	Phase current	L3	I3
U	V	Voltage	System	U = (U1+U2+U3)/3
U1	V	Phase voltage	L1-N	U1
U2	V	Phase voltage	L2-N	U2
U3	V	Phase voltage	L3-N	U3
U12	V	Phase-phase voltage	L1-L2	U12
U23	V	Phase-phase voltage	L2-L3	U23
U31	V	Phase-phase voltage	L3-L1	U31
P	W	Active power	System	P = (P1+P2+P3)/3
P1	W	Active power	L1	P1
P2	W	Active power	L2	P2
P3	W	Active power	L3	P3
Q	Var	Reactive power	System	Q = (Q1+Q2+Q3)/3
Q1	Var	Reactive power	L1	Q1
Q2	Var	Reactive power	L2	Q2
Q3	Var	Reactive power	L3	Q3
S	VA	Apparent power	System	S = (S1+S2+S3)/36
S1	VA	Apparent power	L1	S1 = U1*I1
S2	VA	Apparent power	L2	S2 = U2*I2
S3	VA	Apparent power	L3	S3 = U3*I3
PF	-	Active power factor (cosϕ)	System	PF = (1+2+3)/3
PF1	-	Active power factor (cosϕ1)	L1	PF1
PF2	-	Active power factor (cosϕ2)	L2	PF2
PF3	-	Active power factor (cosϕ3)	L3	PF3
QF	-	Reactive power factor (sinϕ)	System	QF = (1+2+3)/3
QF1	-	Reactive power factor (sinϕ1)	L1	QF1
QF2	-	Reactive power factor (sinϕ2)	L2	QF2
QF3	-	Reactive power factor (sinϕ3)	L3	QF3
LF	-	LF Factor	System	LF = sign(Q)*(1-(PF))
LF1	-	LF Factor	L1	LF1 = sign(Q1)*(1-(PF1))
LF2	-	LF Factor	L2	LF2 = sign(Q2)*(1-(PF2))
LF3	-	LF Factor	L3	LF3 = sign(Q3)*(1-(PF3))
PA	Deg	Phase angle ϕ	System	PA = (1+2+3)/3
PA1	Deg	Phase angle ϕ1	L1	PA1
PA2	Deg	Phase angle ϕ2	L2	PA2
PA3	Deg	Phase angle ϕ3	L3	PA3
IS	A	Bidirectional current	System	IS = (1+2+3)/3
IS1	A	Bidirectional current	L1	IS1
IS2	A	Bidirectional current	L2	IS2
IS3	A	Bidirectional current	L3	IS3

Order information required:

- number of analog outputs: 2 (CPQT-2) or 4(CPQT-4)
- Range of analog outputs: ±20 mA, ±5 mA or ±10 V
- Frequency: 50/60Hz or 16⅔ Hz

Order example:

- CPQT4 with 4 analog outputs, 2 digital, RS485, ±20 mA, 50/60 Hz with standard configuration
- CPQT2 with 2 analog outputs, 2 digital, RS485, ±10 V, 50/60 Hz with standard configuration
- CPQT2 with 2 analog outputs, 2 digital, RS485, ±20 mA, 16⅔ Hz, with standard configuration

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