



Digital instruments and measuring transducers

M.2 - Digital instruments and measuring transducers

Introduction	M2-3
Product selection table	M2-5
DC Series	
Digital indicator for panel mounting	M2-6
DH series	
Digital instruments for panel mounting	M2-9
Royal series	
Digital indicator of various parameters for panel or DIN rail mounting	M2-17
DM45 Series	
Digital instruments	M2-20
CMM 96	
Digital three-phase measurement station for panel mounting	M2-21
Transducers	
Narrow profile	M2-23
High-precision	M2-25
Accessory	M2-34

Digital instruments and measuring transducers

CIRCUTOR offers a wide range of fully programmable digital indicators and instruments that can be used to display electrical parameters or define an alarm system associated to an electrical parameter.

Definition

In digital instruments, the measurement process provides discontinuous information, expressed in a number with various digits. This is the numerical value of the parameter measured; the numerical indication is presented throughout the time scale with a predetermined frequency.

In general, digital instruments have advanced input features when compared to analogue instruments, for example, a higher input impedance in voltage circuits (greater than 2 MW), with a lower consumption of energy and higher accuracy, offering an automatic scale selection and indication of the polarity, which is stored in the instrument and this improves the reliability of the measurement process. **CIRCUTOR** offers three ranges of digital programmable instruments: **DC-B**, **DH-96** and **ROYAL**.

Its general features are as follows:

- Different sizes 48 x 48, 72 x 72, 96 x 96, 96 x 48 mm
- Multi-scale programmable digital instruments.
- Measurement in true root mean square (TRMS) Measurement of voltage and current with the same unit. Voltmeter, ammeter, wattmeter, varmeter, voltammeter, $\cos\phi$ indicator, THD indicator, process indicators, process control, etc.
- Top performance features in the measurement circuit:
 - Accuracy (class 0.1; class 0.2; class 0.5), depending on the type.
 - Resolution up to 16 bits.
 - Visualization capacity (3, 4, 5 digits)
- Wide range of programmable and multi-scale digital instruments to measure AC and DC.
- Module connection options (**DH-96** family):
 - Relays
 - Analogue outputs (0...10 V, 4...20 mA, etc.)
 - Communications with the PC (RS-232, RS-485, with protocols MODBUS RTU, ETHERNET).
- Auxiliary AC and DC power supply
- **PowerStudio** and **PowerStudio SCADA** Software to centralise and record the values measured by the computer (equipment with communications)
- Network connection with other RS-485 instruments (**CVM** power analyzers, etc.)
- Specific instruments for the control of processes (galvanic dips, capacitor bank load analyzers, solar energy, etc.)
- Development in compliance with the current regulations.
- High protection degree (up to IP 65, with accessory)

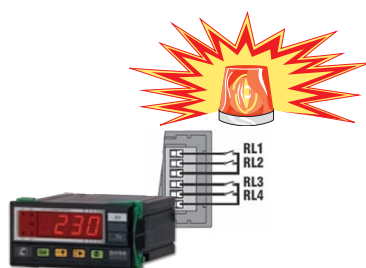


Applications

1.- Display on the screen of the numerical value of one or more electrical parameters of a sub-panel, control process or determined unit.

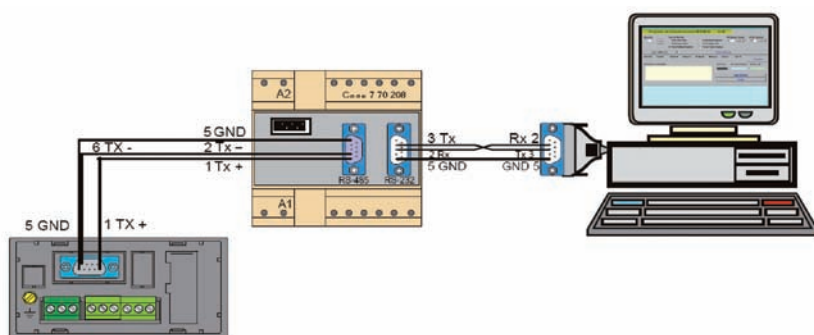


2.- Alarm system: acting on meters, sound and/or light devices, to carry out the protection or notification operations with a relay output .



3.- Control system via software:

- Voltage control
- Current control
- Frequency control
- Temperature control
- Control of any process signal
- Control of harmonics
- Time control



Product selection table

		Measurement	Page
DC-B		Single-phase A.C. or D.C.	6
DH96		Single-phase	9
Royal		Single-phase A.C.	17
DM45		Single-phase A.C.	19
CMM 96		Three-phase A.C.	21
Narrow profile transducers		Single-phase or three-phase according to type	23
High-precision transducers		Three-phase A.C.	25

Digital instruments

DC Series

Digital indicator for panel mounting



Description

- Fully programmable: scale, transformer ratio, etc.
- Measurement of V, A, Hz or °C.
- Measurement in true root mean square (TRMS), ac types. Excellent quality / price ratio
- Measurement of maximum and minimum values
- Optional relay output, depending on the type

Application

- The high luminosity 4-digit digital display indicates the voltage, current, frequency or instantaneous temperature, with the maximum and minimum values of medium and low voltage lines.

Features

Power supply circuit	115 / 230 Vac ($\pm 10\%$)
Frequency	40...70 Hz
Consumption	4 V·A
Measurement circuit	
Resolution	10 bits
Display refresh rate	1s
Accuracy	± 0.5 FE (± 1 digit)
No. of samples per cycle (AC)	32 / cycle
No. of samples per reading (DC)	64 / reading
Display	
Digits	4
Decimal place	Programmable
Range	0...9999 (ac) / -1999...9999 (dc)
Scale excess indicator	"- - -"
Insulation between the input and measurement	
Test voltage	3 kV, 50 Hz, 1 min
Impulse test	4 kV (1.2 / 50 μ s)
Ambient conditions	
Storage temperature	- 40 ... +70 °C
Operating temperature	-10 ... +65 °C
Build features	
Box material	ABS V0, grey anthracite
Degree of protection	Fitted unit (front panel) IP 54 (IP 65 with front panel protection)
	Box and terminals IP 20
Weight	250 g
Standards	
IEC 1010, IEC 348, IEC 664, EN 50081-1, EN 50082-1	

Digital instruments

DC series

Digital indicator for panel mounting



References

DC. Voltmeter

Measurement	Scale	Input	Size	Type	Code
AC	150, 300, 600 V ac	Direct: 600 V Transformer: Programmable	48 x 48	DC 48 B V ac	M20210
			72 x 72	DC 72 B V ac	M20220
			96 x 96	DC 96 B V ac	M20230
DC	10, 50, 200 V dc	Direct: -200 / +200V Process: 0...10 V	48 x 48	DC 48 B V dc	M20213
			72 x 72	DC 72 B V dc	M20223
			96 x 96	DC 96 B V dc	M20233
DC	600 V dc	-600 / 600 V	48 x 48	DC 48 B V dc	M20214
			72 x 72	DC 72 B V dc	M20224
			96 x 96	DC 96 B V dc	M20234
DC	60, 150, 200 mV dc	Direct: -200 mV / +200 mV Shunt: .../60 mV, .../150 mV	48 x 48	DC 48 B mV dc	M20217
			72 x 72	DC 72 B mV dc	M20227
			96 x 96	DC 96 B mV dc	M20237

DC. Ammeter

Measurement	Scale	Input	Size	Type	Code
AC	... / 5 A	Direct: 5 A Transformer: .../5 A	48 x 48	DC 48 B A ac	M20211
			72 x 72	DC 72 B A ac	M20221
			96 x 96	DC 96 B A ac	M20231
AC	... / 5 A	Direct: 5 A Transformer: .../5 A	72 x 72	DC 72 MD A ac (*)	M2022A
			96 x 96	DC 96 MD A ac (*)	M2023A
AC	10 A	Direct: 10 A	48 x 48	DC 48 B A ac	M20212
			72 x 72	DC 72 B A ac	M20222
			96 x 96	DC 96 B A ac	M20232
DC	5, 20, 200 mA	Direct: -200 mV / +200 mV Process: 0 or 4...20 mV	48 x 48	DC 48 B A dc	M20215
			72 x 72	DC 72 B A dc	M20225
			96 x 96	DC 96 B A dc	M20235
DC	10 A	Direct: 10 A	48 x 48	DC 48 B A dc	M20216
			72 x 72	DC 72 B A dc	M20226
			96 x 96	DC 96 B A dc	M20236

(*) Output relay available

DC. Frequency meter

Measurement	Scale	Input	Size	Type	Code
AC	Hz < 100, 2 dec. Hz > 100, 1 dec.	40...600 V	48 x 48	DC 48 B Hz ac	M20218
			72 x 72	DC 72 B Hz ac	M20228
			96 x 96	DC 96 B Hz ac	M20238

Digital instruments

DC series

Digital indicator for panel mounting



References

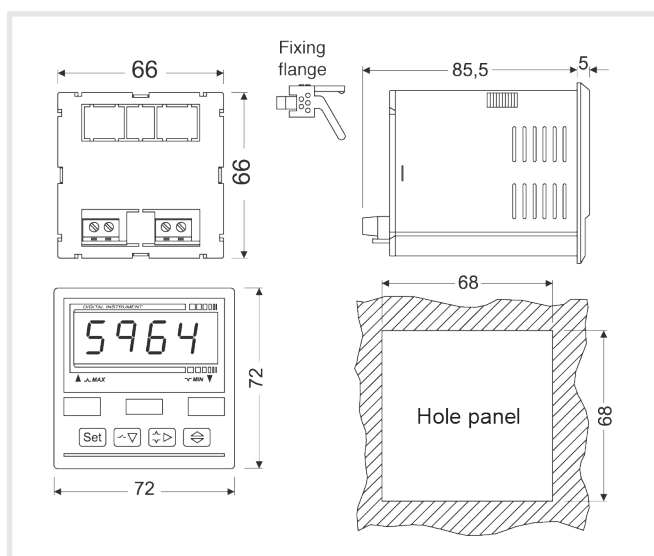
DC. Temperature

Measurement	Relays	Input	Size	Type	Code
°C	-	-200 ... +200 °C	72 x 72	DC 72 TMP22	M20621
	1	-200 ... +200 °C	72 x 72	DC 72 TMP22 - 1R	M20623
	-	-200 ... +800 °C	72 x 72	DC 72 TMP28	M20622
	1	-200 ... +800 °C	72 x 72	DC 72 TMP28 - 1R	M20624

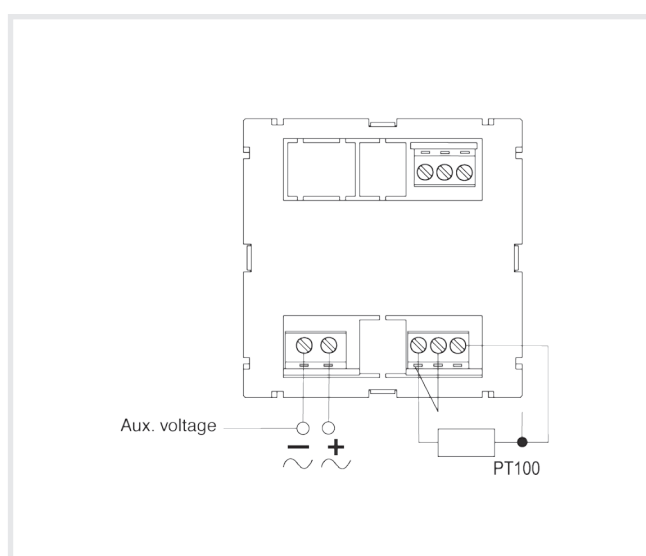
Coding table

M	2	X	X	X	X	0	0	X	X
Code						Internal Code		↑	↑
Auxiliary power supply		Standard (230 V)					0	↑	
		100 ... 120 V ac					1		
		480 ... 500 V ac					4		
		18 ... 36 V dc					7		
Current input		Standard (... / 5 A)					0	↑	
		... / 1 A					1		

Dimensions



Connections



Digital instruments

DH series

Digital instruments for panel mounting



Description

Features

Power supply circuit	230 Vac (-15 ... +20%)
Frequency	4 V·A (without card), 7 V·A (with card)
Consumption	45...65 Hz
Measurement circuit	
Overvoltage (permanent / during 10 s)	$1.2 U_n / 2 U_n$
Overload (permanent / during 10 s)	$1.2 I_n / 5 I_n$
Measurement margin	2 .. 120 %
No. of conversions per cycle	32
Display	Seven 14 mm segments, red
Decimal place	Programmable
Scale excess indicator	"- - -"
Insulation	
Test voltage	3 kV, 50 Hz, 1 min
Impulse test	4 kV (1.2 / 50 s)
Ambient conditions	
Storage temperature	-40 ... +70 °C
Operating temperature	-10 ... +65 °C
Build features	
Box material	ABS V0, grey anthracite
Degree of protection	Box and terminals: IP 20 / Front panel: IP 54
Weight	550 g
Standards	
In A, C, P types: IEC 1010, IEC 348, IEC 664, VDE 0110, VDE 0435	
In other types: IEC 1010, IEC 348, IEC 664, EN 50081-1, EN 50082-1	

Application

○ The high luminosity 4-digit digital display indicates the voltage, current, frequency, etc. and it can be used to define the alarms of the different electrical parameters measured.

References

DH96. Ammeter or Voltmeter

Measurement	Parameters	Range	Scale	Accuracy	Display	Type	Code
DC	A or V	200 Vdc or 200 mA	200 mA or 50,100, 200 V	0.2 % (± 1 dig)	4 digits	DH 96 C	M20411
AC	A or V	600 V ac or ... / 5 A	... / 5 A or 150, 300, 600 V	0.5 % (± 1 dig)	4 digits	DH 96 A	M20412

Digital instruments

DH series

Digital instruments for panel mounting



References

DH96. Ammeter

Measurement	Parameters	Range / Scale	Accuracy	Display	Type	Code
AC	A	...10 A	0.5 % (± 1 dig)	4 digits	DH 96 A (10 A)	M20413
AC	A	... / 5 A (start-up of motors 5 * In during 10)	0.5 % (± 1 dig)	4 digits	DH 96 A (... / 5 A)	M20414

DH96. Ammeter and voltmeter (with shunt .../60 mV)

Measurement	Parameters	Range / Scale	Accuracy	Display	Type	Code
DC	A and V	Programmable: V and A Range of V: 1 to 100 V Range of A: With shunt .../60 mV	0.2 % (± 1 dig)	4 digits	DH 96 A V	M2041C

* Expansion cards are not used

DH96. Earth leakage current indicator

Measurement	Parameters	Range	Scale	Accuracy	Display	Type	Code
AC	mA	10 mA to 3.3 A	Programmable: 300 mA or 3 A	0,5 % (± 1 dig.)	4 digits	DH 96 WG	M2041A

DH96. Measurement station

Measurement	Parameters	Range	Scale	Accuracy	Display	Type	Code
DC	V, A, kW, kW·h	Range of V: up to 800 VVdc Range of A: .../60 mV	Programmable: Selec. V: 100 / 300 / 800 Vdc	0,2 % (± 1 dig.)	4 digits	DH 96 CPM	M20419

DH96. Universal process indicator

Measurement	Parameters	Range Scale	Accuracy	Display	Type	Code
DC	-	± 20 mA, ± 1 mA, ± 120 mV, ± 500 mV, ± 10 V	0,2 % (± 1 dig.)	4 digits	DH 96 P	M20415

DH96. Frequency meter and tachometer

Measurement	Parameters	Range / Scale	Accuracy	Display	Type	Code
-	Hz, r / min	0.1 ... 20000 Hz	-	5 digits	DH 96 FT	M20417

DH96. Chronometer and impulse meter

Measurement	Parameters	Range / Scale	Accuracy	Display	Type	Code
-	S, min, h, No. impulses	Programmable to measure time and impulses	-	5 digits	DH 96 CT	M20418

DH96. Temperature

Measurement	Parameters	Range / Scale	Accuracy	Display	Type	Code
-	°C	RTD sensor and thermocouple	0.2 % (±1 dig)	5 digits	DH 96 TMP	M2041E

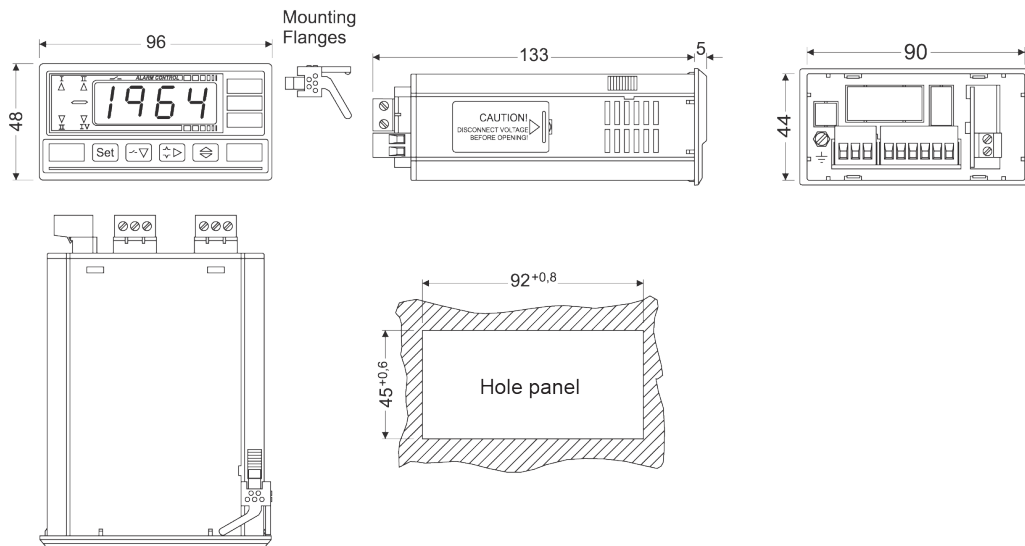
Digital instruments

DH series

Digital instruments for panel mounting

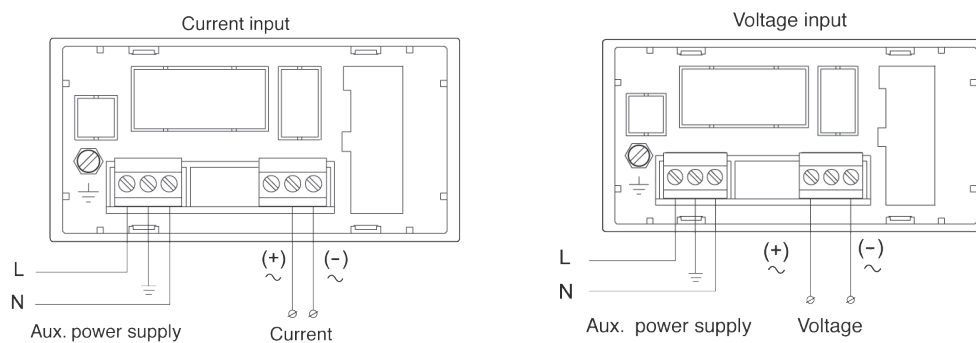


Dimensions

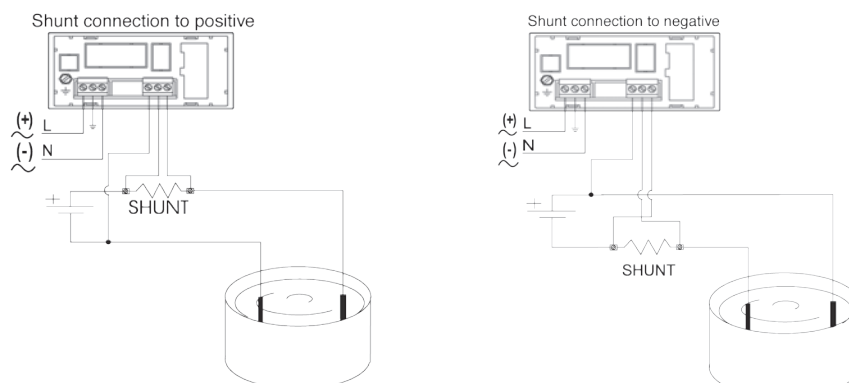


Connections

DH96 - A/C/P



DH96 - AV / CPM



Digital instruments

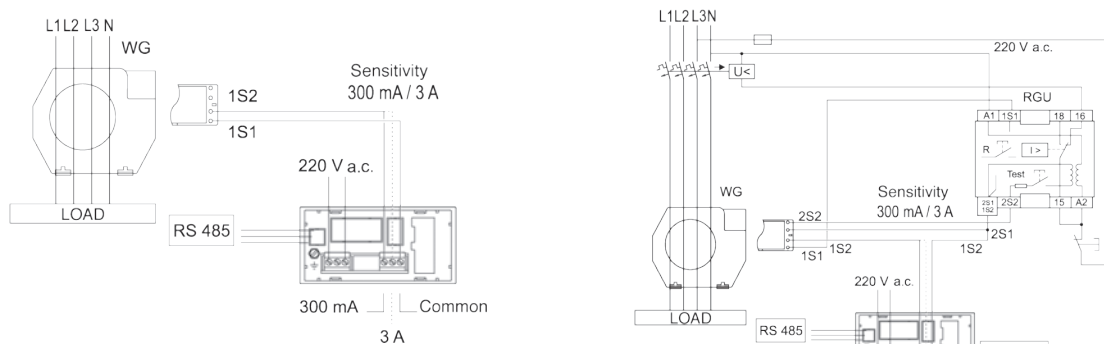
DH series

Digital instruments for panel mounting

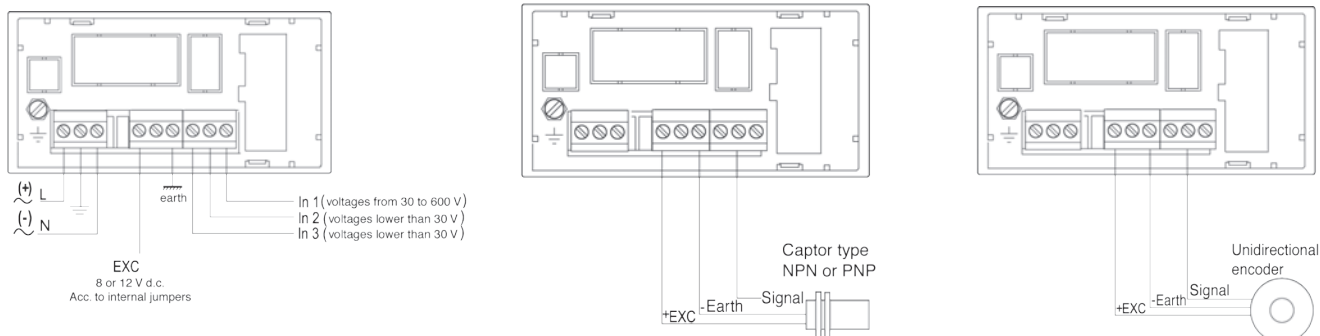


Connections

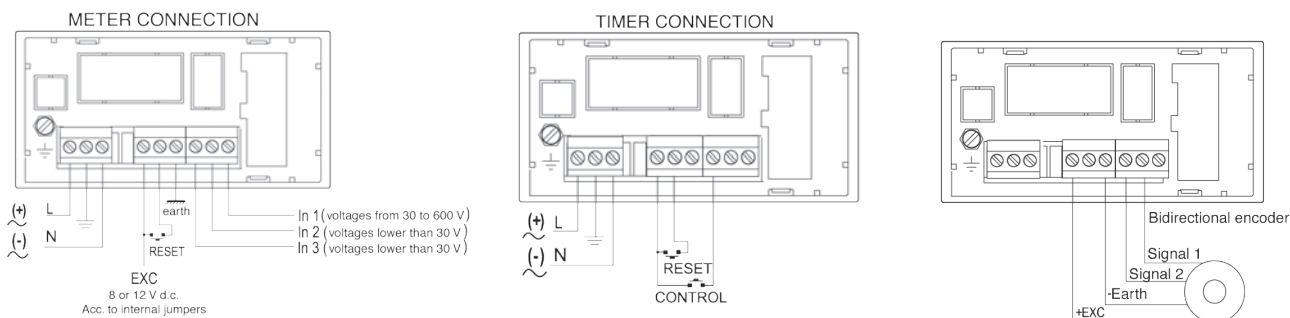
DH96 - WG



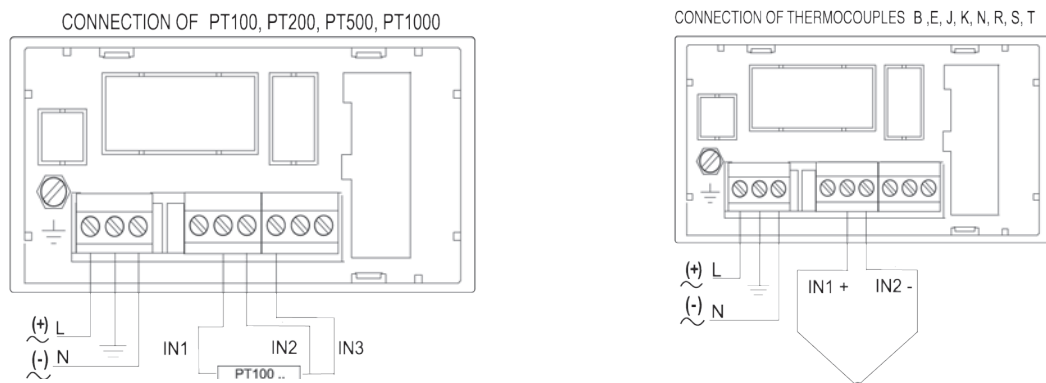
DH96 - FT



DH96 - CT



DH96 - TMP



DIN

DH series

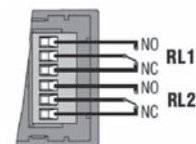
Digital instruments for panel mounting

Types	COMPATIBILITY WITH DH 96 MODULES									Code
	C	A	AV	WG	CPM	P	FT	CT	TPM	
2 relays	*	*	-	*	*	*	*	*	*	M20421
4 relays	*	*	-	*	*	*	*	*	*	M20422
2 relays + RS-485 or RS-232 (Modbus/RTU)	*	*	-	*	*	*	*	*	*	M20423
4 relays + RS-485 or RS-232 (Modbus/RTU)	*	*	-	*	*	*	*	*	*	M20424
Analogue output 0 / 4...20 mA	*	*	-	*	*	*	*	*	*	M20425
Analogue output 0 / 2...10 V	*	*	-	*	*	*	*	*	*	M20426
RS-232 (Modbus/RTU)	*	*	-	*	*	*	*	*	*	M20427
RS-485 (Modbus/RTU)	*	*	-	*	*	*	*	*	*	M20428
Analogue output 0 / 4...20 mA + 2 relays	*	*	-	*	*	*	*	*	-	M20429
Auxiliary power supply (0...10 V) Compatible with all units, except relays + communications	*	*	-	*	*	*	*	*	*	M2042A

Module 2 relays

Description

Features

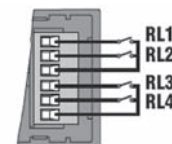
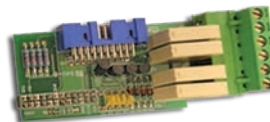


Relay	Switched
Nominal AC Current	8 A
Maximum voltage	250 Vac
Maximum resistive load	2000 V·A
Insulation resistance (at 500 V dc)	>1000 M
Contact - coil insulation	4 kV
Contact - contact insulation	1 kV
Mechanical working life (No. of operations)	>10 ⁷
Electrical working life (8 A; 250 V ac) (No. of operations)	>10 ⁵
Standards	VDE 0435, VDE 0700, VDE 0110, VDE 0106

Module 4 relays

Description

Features



Relay	Simple
Nominal AC Current	5 A
Maximum voltage	250 Vac
Maximum resistive load	750 V·A
Insulation resistance (at 500 V dc)	>1000 MΩ
Contact - coil insulation	2 kV
Contact - contact insulation	750 Vac
Mechanical working life (No. of operations)	>20 x 10 ⁶
Electrical working life (8 A; 250 V ac) (No. of operations)	>30 x 10 ³
Standards	UL 508, C22.2 no. 14, VDE 0435

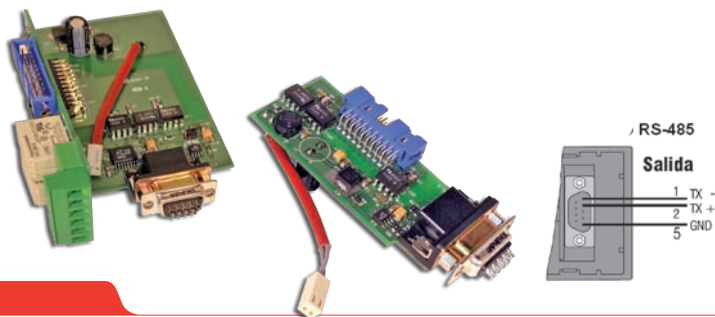
DIN

DH series

Digital instruments for panel mounting

Communications module

Description

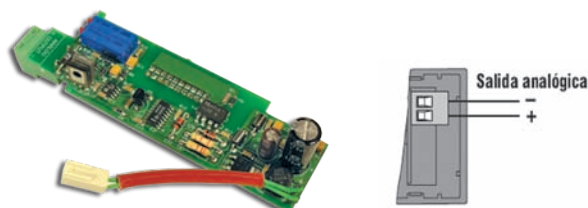


Features

	RS-232 Module	RS-485 Module
EDS Protection	Up to 10 kVac	Up to 2 kVac
Communication lines protected against overloads, short-circuit to earth	30 V without damage	-
Protected against blockages	Yes	-
Communication lines with thermal protection against excessive power dissipation	-	Yes
Connection or disconnection from the active network	-	Yes
Standards	EIA RS-232	EIA RS-485

Analogue output module

Description

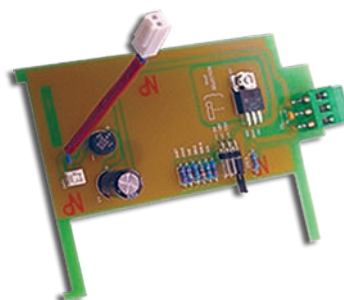


Features

Resolution	14 bits
Maximum load impedance for current outputs	500
Maximum load impedance for voltage outputs	500
Insulation between analogue outputs and the power supply	3 kV
Insulation between analogue and measurement outputs	3 kV
Response time	< 100 ms
Rippling, in TRMS	< 0,5 %
Temperature coefficient	100 ppm / °C
Standards	IEC 1010, IEC 529, IEC 801, EN 50081-2, EN 5002-2

Auxiliary power supply module (DH96P)

Description



DIN

DH series

Digital instruments for panel mounting



Description

COMMUNICATIONS Features

COMMUNICATIONS Features

	RS-232 Module	RS-485 Module
EDS Protection	Up to 10 kV	Up to 2 kV
Communication lines protected against overloads, short-circuit to earth	30 V without damage	-
Communication lines with thermal protection against excessive power dissipation	-	Yes
Connection or disconnection from the active network	-	Yes
Fully protected against blockages	Yes	-
Standards	EIA RS-232	EIA RS-485

RELAYS Features

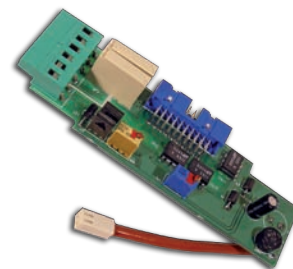
RELAY Features

	2 Relays	4 Relays
Nominal current	8 A	5A
Maximum voltage	250 Vac	
Maximum resistive load	2000 V·A	750 V·A
Insulation resistance (at 500 Vdc)	>1000Ω	Yes
Contact - coil insulation	4 kV	2 kV
Contact - contact insulation: 2/4 relays	1 kV	750 Vac
Mechanical working life (No. of operations)	10 ⁷	20 x 10 ⁶
Electrical working life (8 A and 250 V) (No. of operations)	> 10 ⁵	>30 x 10 ⁴
Standards	VDE 0435, VDE 0700, VDE 0110, VDE 0106	UL 508, C22.2 no. 14, VDE 0435

DIN

DH series

Digital instruments for panel mounting



Communications module + 2 relays

Description

ANALOGUE OUTPUT

Features

- Optional output programming: 0...20 mA or 4...20 mA
- Optional reprogramming of the output margin

ANALOGUE OUTPUT Features

Resolution	14 bits
Maximum load impedance for current outputs	500 Ω
Minimum load impedance for voltage outputs	500 Ω
Insulation between analogue outputs and the power supply	3 kV
Insulation between analogue and measurement outputs	3 kV
Response time	< 100 ms
Rippling, in TRMS	< 0,5 %
Temperature coefficient	100 ppm / °C
Standards	IEC 1010, IEC 529, IEC 801, EN 50081-2, EN 50082-2

RELAYS

Features

- Connection of alarm when maximum or minimum values are reached
- Alarm connection and disconnection delay, programmable between 1 and 9,999 seconds
- Hysteresis can be selected between 9,999 and 9999 points
- Optional alarm interlocking
- Optional fail-safe relay

2 RELAY OUTPUT Features

Maximum voltage	250 Vac
Maximum resistive load	750 V·A
Insulation resistance (at 500 Vdc)	> 1 000 M
Contact - coil insulation	2 kV
Contact - contact insulation	750 Vac
Mechanical working life	20 x 10 ⁶ operations
Electrical working life (8 A and 250 V)	> 30 x 10 ³ operations
Temperature coefficient	> 30 x 10 ³ operations
Standards	UL 508, C22.2, VDE 0435

Coding table

M	2	X	X	X	X	0	0	X	X
Code						Internal Code	↑	↑	
Auxiliary power supply	Standard (230 V)					0			
	100 ... 120 Vac					1			
	380 ... 400 Vac					3			
	480 ... 500 Vac					4			
	18 ... 36 V dc					7			
	36 ... 72 V dc					8			
	40 ... 170 V dc					9			
Current input	Standard (.../ 5 A)					0			
	... / 1 A					1			

Digital indicator

Royal series

Digital indicator of various parameters for panel or DIN rail mounting



Description

- 4 digits, high luminosity
- Measurement in true root mean square (TRMS)
- Measurement in 2 or 4 quadrants (power generated and consumed)
- Valid for single and three-phase systems
- 2 built-in relay outputs
- Measurement of maximum and minimum values
- Fully programmable

Application

- Ideal for industrial environments, thanks to its compact and robust format
- Optional fail-safe operation

Features

	ROYAL A4	ROYAL A4-P	ROYAL A3
Power supply circuit	230 Vac (± 15 %)		
Frequency	40 ... 70 Hz		
Consumption	3 V·A		
Measurement circuit			
Scope	20 ... 500 Vac ... / 5 A		
Accuracy	0.5 % FE		
Overvoltage (permanent / during 10 s)	1.2 U_n / 2 U_n		
Overload (permanent / during 10 s)	1.2 I_n / 5 I_n		
Consumption	0.25 V·A		
Frequency	40 ... 70 Hz		
Display	4 digits		
Scale excess indicator	“ --- ”		
Ambient conditions			
Storage temperature	-25 ... +70 °C		-25 ... +80 °C
Operating temperature	0 ... +50 °C		
Relative humidity	-95% to 40 °C with no condensation		
Build features			
Box material	ABS VO Plastic		
Degree of protection	Box and terminals: IP 20 / Front panel: IP 52		
Weight	170 g		
Standards	IEC 1010, IEC 348, IEC 664, VDE 0435, VDE 0110		

References

Measurement	Parameters	Input	Digital	Size	Fixing	Type	Code
AC	V1n, V2n, V3n or V12, V23, V31	230 V _{p-N} / 400 V _{p-p}	2 relays	6 modules	DIN rail	ROYAL A3	M20332
AC	V, A, Hz, W, V·A, var, cos φ , MD, THD	... / 5 A	2 relays	6 modules	DIN rail	ROYAL A4	M20242
AC	V, A, Hz, W, V·A, var, cos φ , MD, THD	... / 5 A	2 relays	96x48x38	Panel	ROYAL A4-P	M20241

Digital instruments

ROYAL series

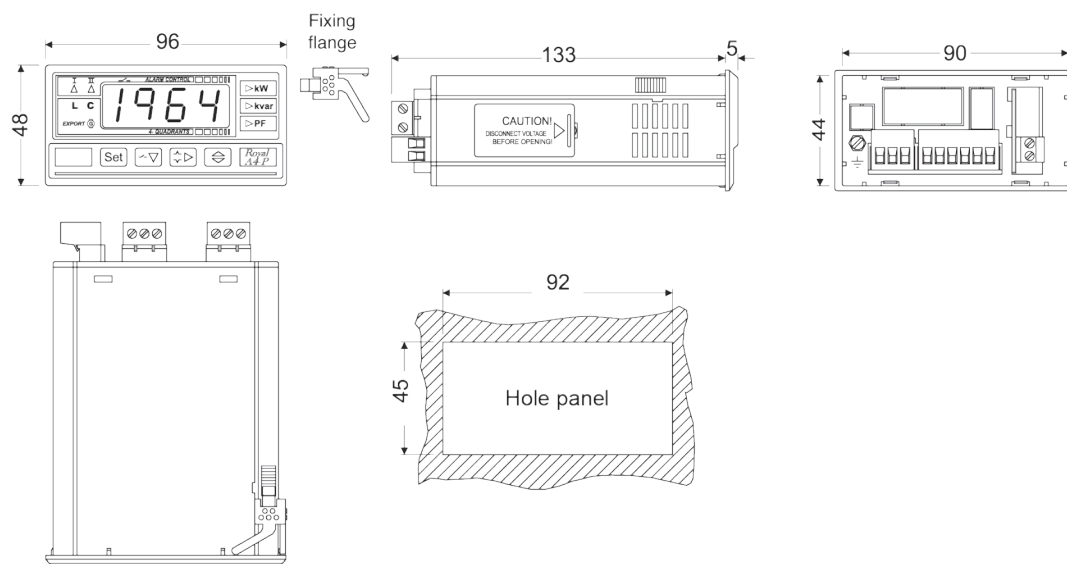
Digital indicator of various parameters for panel or DIN rail mounting



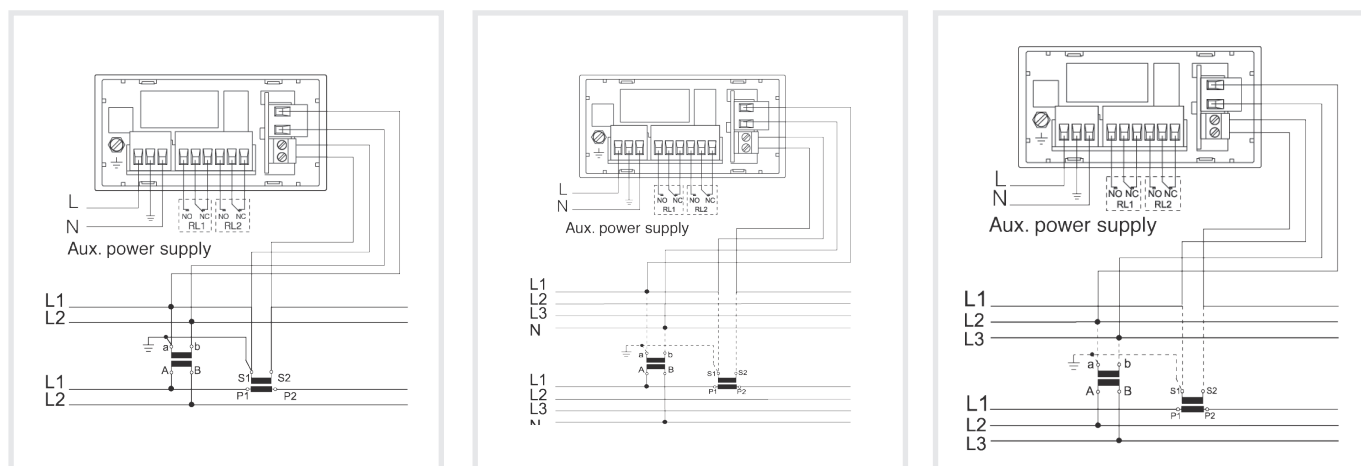
Coding table

M	2	X	X	X	X	0	0	X	X
Code						Internal Code		↑	↑
Auxiliary power supply						Standard (230 V)		0	
						100 ... 120 V ac		1	
						380 ... 400 V ac		3	
						480 ... 500 V ac		4	
						18 ... 36 V dc		7	
						36 ... 72 V dc		8	
						40 ... 170 V dc		9	
Current input						Standard (.../ 5 A)		0	
						... / 1 A		1	

Dimensions



Connections



Digital instruments

DM45 Series

Digital indicator for DIN rail mounting



Description

- Electrical parameter indicator equipment
- Its design enables the installation of the unit on small panels
- It measures voltage, current, frequency and harmonic distortion, depending on the type
- Fully sealed
- Fully programmable alarm relay
- Robust and compact
- Stores maximum and minimum values

Application

- Displays one or various electrical parameters of a sub-panel, control process or determined machine
- Alarm system: the unit's internal relay can act on contactors, sound and/or light devices to carry out a protection or warning operation.

Features

	DM 45 V	DM 45 A	DM 45 AD	DM 45 F
Power supply circuit	230 Vac (± 10 %)			
Frequency	40 ... 70 Hz			
Consumption	5 V·A			
Measurement circuit				
Scope	600 Vac	... / 5 Aac	30 Aac	10... 600 Hz
Accuracy	+/- 0.5 % FE +/- 1 digit			
Overvoltage (permanent)	1.05 U_n	-	-	1.05 U_n
Overload (permanent)	-	1.2 I_n		-
Consumption	0.6 V·A			
Frequency	10...600 Hz			
Display	4 digits with 7 segments, red colour + 4 auxiliary LEDs			
Ambient conditions				
Storage temperature	- 40 ... + 70 °C			
Operating temperature	- 20 ... + 50 °C			
Relative humidity	5 ... 95 % non-condensing			
Build features				
Box material	Self-extinguishing ABS plastic			
Degree of protection	Front panel: IP 54			
Weight	170 g			
Standards	IEC 1010, IEC 664, IEC/EN 62053-31			
Safety standards	IEC61010			

Digital instruments

DM45 series

Digital indicator for DIN rail mounting



References

DM. Voltmeter

Measurement	Parameters	Input	Relay	Type	Code
AC	V	30...0.600 V ac	1	DM 45 V	M20901

DM. Ammeters

Measurement	Parameters	Input	Relay	Type	Code
AC	A	... / 5 A	1	DM 45 A	M20911
AC	A	30 A	1	DM 45 AD	M20921

DM. Frequency-meter

Measurement	Parameters	Input	Relay	Type	Code
AC	Hz	10 ... 600 Hz	1	DM 45 F	M20931

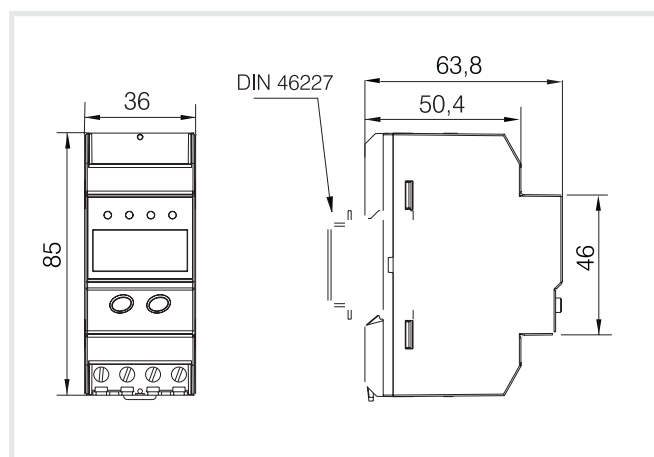
DM. Measurement stations

Measurement	Parameters	Input	Relay	Type	Code
AC	V, A, Hz, THD	600 V / .../5 A / 10...600 Hz	1	DM 45 CM	M20941
AC	V, A, Hz, THD	600 V c / 30 A / 10...600 Hz	1	DM 45 CMD	M20951

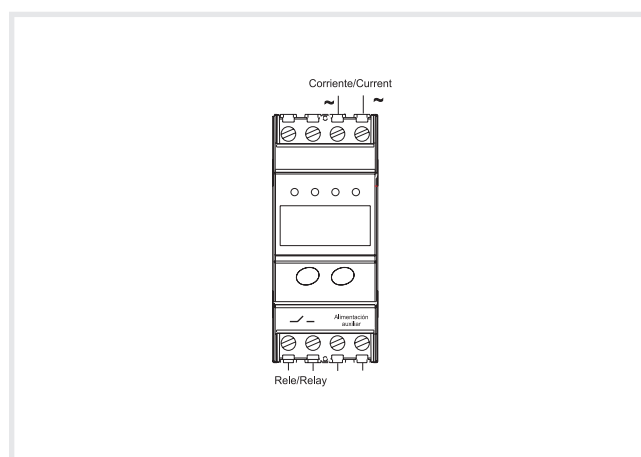
Coding table

M	2	X	X	X	X	0	0	X
Code						Internal Code		↑
Auxiliary power supply		Standard (230 V)					0	
		100 ... 115 V ac					1	
		18 ... 36 V dc					7	

Dimensions



Connections



CMM 96

Digital three-phase measurement station for panel mounting



Description

- Measures V, A, Hz and unbalances per phase
- Measurement in true root mean square (TRMS)
- Optional expansion of its functions with expansion modules:
 - 4 fully programmable relays

Application

- Ideal for unbalanced 3 or 4 wire three-phase networks for the analysis of electrical parameters.
- Time control with the timer function, (type CH)
- Control of the maximum demand, thanks to the maximeters available per phase (type MD)

Features

Power supply circuit	
Power supply	230 Vac (-10 ... +15 %)
Frequency	35 ... 450 Hz
Consumption	5 V·A
Measurement circuit	
Scope	400 V F-N, 565 V P-P ... / 5 A
Accuracy	0.5 % (± 2 dig)
Overload (permanent)	1.2 I_n
Consumption	0.6 V·A
Frequency	35 ... 450 Hz
Display	
Display	Three 4-digit lines
Colour	Red, high efficiency
Display refresh rate	1 s
Ambient conditions	
Storage temperature	- 40 ... +70 °C
Operating temperature	- 10 ... +65 °C
Build features	
Box material	Self-extinguishing ABS
Degree of protection	IP 54 front panel
Size	96 x 96 x 87 mm
Weight	350 g
Standards	
IEC 1010, IEC 348, IEC 664, EN 50081-1, EN 50082-1	

CMM 96

Digital three-phase measurement station for panel mounting



References

Measurement	Parameters	Input	Type	Code
AC	V, A, Hz and MD per phase	400 V _{p-n} / 565 V _{p-p}	CMM96-MD	M20511
AC	V, A, Hz per phase and timer	400 V _{p-n} / 565 V _{p-p}	CMM96-CH	M20512

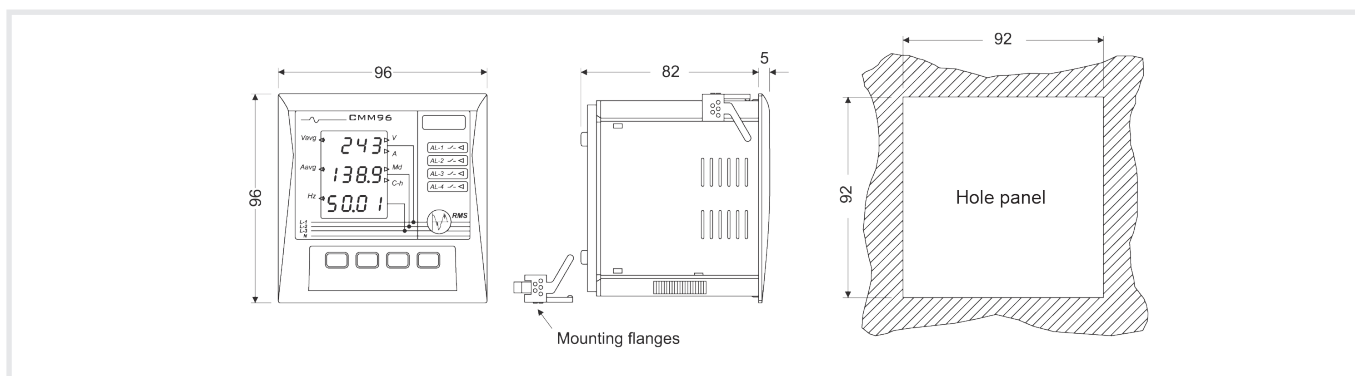
Expansible modules

Inputs	Outputs	Type	Code
-	4 relays	Module with 4 relays CMM 96 -MD	M20522
1 CH input	4 relays	Module with 4 relays CMM 96-CH	M20524

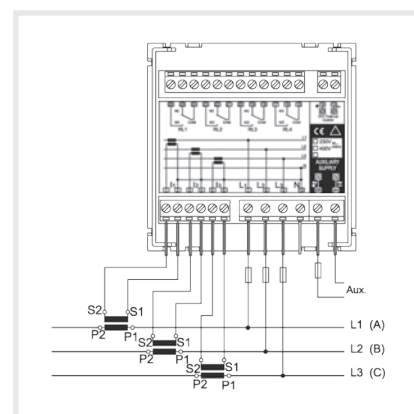
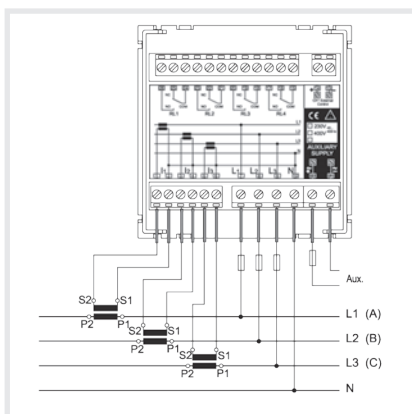
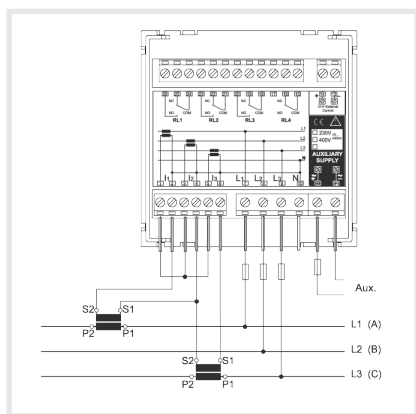
Coding table

M	2	X	X	X	X	0	0	X	X
Code						Internal Code		↑	↑
Auxiliary power supply						Standard (230 V)		0	
						400 V ac		3	
						18 ... 36 V dc		7	
Insulated inputs						Standard (not insulated)		0	
						Insulated - ITF		1	

Dimensions



Connections



Converters

Narrow
profile transducers

Electrical parameter transducer
in a process signal



Description

- Measure voltage, current or frequency in a single-phase system
- Very competitive quality / price ratio
- Ideal for small installations
- Very reliable and robust devices
- Valid for work under demanding conditions

Application

- Systems for the conversion of the electrical parameters of single-phase networks in industrial environments where there are demanding conditions and there is a reduced space.

Features

	CVE-A	CCE	CFE
Power supply circuit	230 V ac (-15 ... +20 %) (*1)		
Frequency	40 ... 90 Hz		
Consumption	2.5 V·A		
Measurement circuit			
Consumption	< 0.2 V·A		
Frequency	45 ... 65 Hz		
Nominal voltage (U_n)	0..0.690 V ac	-	10..0.600 V ac
Nominal current (I_n)	-	5 A ac	-
Measurement range	5-120 % (*2)		
Overload (permanent)	-	300 % I_n	-
Overvoltage	1000 V	-	1000 V
Analogue output circuit			
Voltage load impedance	> 500		
Current load impedance	< 500		
Response time	< 300 ms		
Rippling, in TRMS	< 0,5 %		
Insulation			
Test voltage	3 kV		
Impulse test	4 kV		
Ambient conditions			
Storage temperature	-40 ... +70 °C		
Operating temperature	-10 ... +55 °C		
Build features			
Box material	ABS V0		
Degree of protection	Box: IP 20 / Front panel: IP 54		
Weight (g)	190	250	190
Standards	IEC 529, IEC 688, IEC 801, EN 50081-1, EN 50082-1		

(*1) For other types of power supply, see the coding table

(*2) CVE-A-AP i CFE-AP: Measurement range 70-110 %

Narrow profile transducers

Converter of electrical parameters into process signals



References

Standard auxiliary power supply: 230 Vac, 45...65 Hz (*)

For non-standard purchase orders, please state the following: 1.Code, 2.Input range, 3.Output range, 4.Auxiliary power supply, 5. In **CFE-AP**, state the network voltage. (See coding table)

Application	Measurement	Accuracy	Input (*)	Output (*)	Type	Code
Voltmeter	AC	0.5 % FE	300 V	4...20mA	CVE-A	M25011
Voltmeter (*1)			230 V	0...20mA	CVE-A-AP	M25021
Ammeter			5 A	4...20mA	CCE-A	M25111
Ammeter (*1)				0...20mA	CCE-A-AP	M25121
Frequency-meter			45..0.55 Hz	4...20mA	CFE	M25511
Frequency-meter (Self-powered)				0...20mA	CFE-AP	M25521

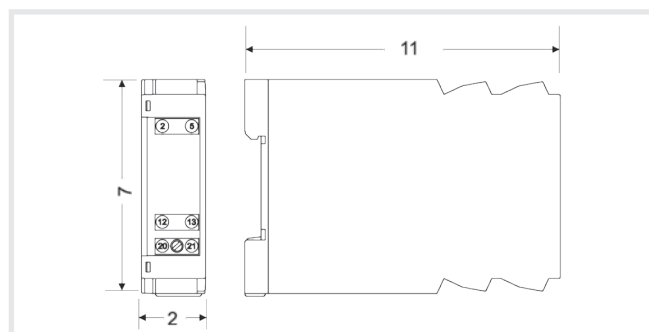
(*1) Self-powered: does not need an auxiliary power supply.

(*) Other inputs, outputs and auxiliary power supplies are offered as an option (See coding table).

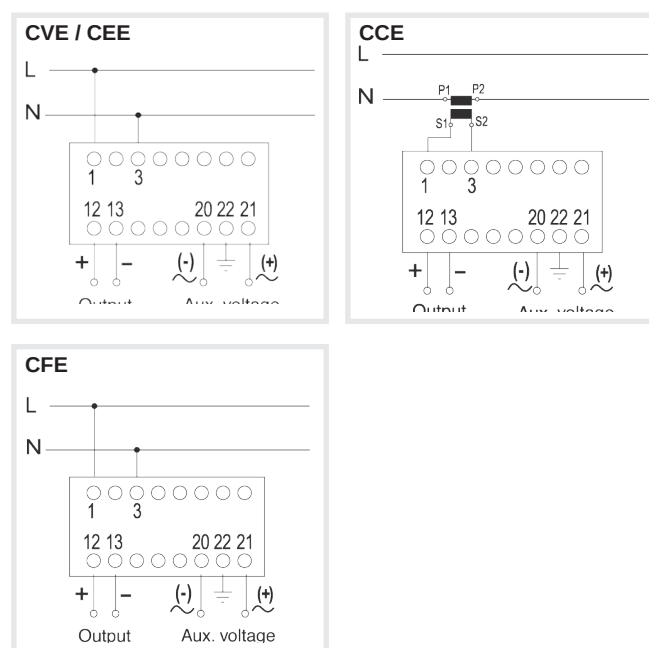
Coding table

	M	2	X	X	X	X	0	0	X	X	X	X	X
1	Code						Internal Code						
2 - INPUTS	CVE-A Voltage	Standard (300 V)					0						
		110 V					1						
		400 V					2						
		500 V					3						
		690 V					4						
	CVE-A-AP Voltage	Standard (230 V)					0						
		110 V					1						
		400 V					2						
	Current	Standard (5 A)					0						
		1 A					1						
		10 A					4						
	Frequency	Standard (45...55 Hz)					0						
		55...65 Hz					1						
		47...53 Hz					2						
		45...65 Hz					3						
		0...0.100 Hz					4						
		380...0.420 Hz					5						
		360...0.440 Hz					6						
		340...0.460 Hz					7						
3 - OUTPUTS	CVE-A, CCE-A, CFE	Standard (4...20 mA)					0						
		0...20 mA					1						
		0...0.10 V					2						
		2...0.10 V					3						
	CVE-A-AP, CCE-A-AP, CFE-AP	Standard (0...20 mA)					0						
		0...0.10 V					1						
4	Auxiliary power supply	Standard (220...240 V)					0						
		380...40 Vac 40/60 Hz					3						
		18...36 Vdc					7						
5	Network voltage (CFE-AP)	Standard (230 V)					0		0				
		110 V					0		1				
		400 V					0		2				

Dimensions



Connections



High-precision

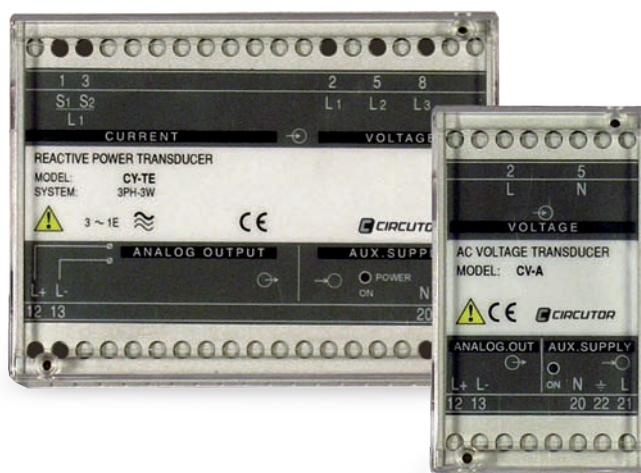
High-precision transducers

Converter of electrical parameters into process signals

Description

- Wide range of models to measure the main parameters of the electrical network.
- Very reliable and robust devices
- Valid for work under demanding conditions

- Systems for the conversion of the electrical parameters of single and three-phase networks in industrial environments where there are demanding conditions



Features

	CV-A	CW / CY	CCOS / CPF / CFD	CC-WG	CC-D	CC-G	CF	CR2	CT-PT	CC-A	CV-D
Power supply circuit	220...240 V ac (*1)										
Frequency	40 ... 90 Hz										
Consumption	2.5 V·A										
Measurement circuit											
Consumption	< 0.2 V·A										
Frequency	45 ... 65 Hz										
Nominal voltage (Un)	0..0.690 Vac			-			40 ... 600 Vac	-			0 mV... 500 V ac
Nominal current (In)	5 A ac			0..0.3 A ac	500 mA ...10 A	0...20 mA				0..0.5 A ac	-
Measurement range	0...150 % U_n			0...150 %	0...120 %		0...20 kHz	0...200 k	-		
Overload (permanent)	300 %				150 %	300 %		-		300 %	150 %
Input impedance	3000 Ω / V			-			180 Ω / V	-			1000 Ω / V
Analogue output circuit											
Voltage load impedance	> 500 Ω										
Current load impedance	< 500 Ω										
Response time	< 300 ms	< 500 ms	< 300 ms	< 100 ms			< 500 ms			< 300 ms	
Rippling (TRMS)	< 0,5 %										
Insulation											
Test voltage	3 kV				2 kV		3 kV				2 kV
Impulse test (1, 2...50 ms)	4 kV				3 kV		4 kV				3 kV
Ambient conditions											
Storage temperature	- 40 ... +70 °C										
Operating temperature	-10 ... +55 °C										

Converters

High-precision
transducers

Converter of electrical parameters
into process signals



	CV-A	CW / CY	CCOS / CPF / CFD	CC-WG	CC-D	CC-G	CF	CR2	CT-PT	CC-A	CV-D
Build features											
Box material	ABS VO										
Weight (g)	310	540	310								
Ambient conditions	IEC 529, IEC 688, IEC 801, EN 50081-1, EN 50082-1										

(*1) For other types of power supply, see the coding table

References

CV-A. AC voltage transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type of measurement	Type	Code
Alternating voltage	AC	± 0.5 % reading	690 Vac	0...20 mA	Measurement in mean values	CV-A-AP (*1)	M25041
		± 0.2 % reading		0...20 mA		CV-A	M25031
		± 0.2 % reading		4...20 mA		CV-A	M25032
		± 0.2 % reading		0...20 mA	Measurement in true root mean square	CV-A-RMS	M25051
		± 0.2 % reading		4...20 mA		CV-A-RMS	M25052
		± 0.2 % reading					

(*1) Self-powered: does not need an auxiliary power supply

CC-A. Alternating current transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Alternating current	AC	± 0.2 % reading	5 A	0...20 mA	CC-A	M25131
		± 0.2 % reading		4...20 mA	CC-A	M25132
		± 0.5 % reading		0...20 mA	CC-A-AP (1)	M25141
		± 0.2 % reading		0...20 mA	CC-A-RMS	M25151
		± 0.2 % reading		4...20 mA	CC-A-RMS	M25152
		± 0.2 % reading				

(*1) Self-powered: does not need an auxiliary power supply

CV-D. DC Voltage transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
DC Voltage	DC	± 0.2 % reading	10 mV ... 500 V	0...20 mA	CV-D	M25061
		± 0.2 % reading		4...20 mA	CV-D	M25062

Converters

High-precision
transducers

Transducer of electrical parameters
into process signals



References

CC-D. Direct current transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
DC Voltage	DC	$\pm 0.2\%$ reading	500 μ A	0...20 mA	CC-D	M25161
		$\pm 0.2\%$ reading	... 10 A	4...20 mA	CC-D	M25162

CC-WG. Leakage current transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Leakage current	AC	$\pm 0.2\%$ reading	0..0.3 Aac	4...20 mA	CC-WG	M25631

C-F. Frequency transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Frequency	AC	$\pm 0.2\%$ reading	40..0.690 V	0...20 mA	CF	M25531
		$\pm 0.2\%$ reading	0...20 kHz	4...20 mA	CF	M25532

CC-G. Galvanic insulation transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Insulation galvanic	-	$\pm 0.2\%$ reading	0...20 mA	0...20 mA	CC-G	M25610

CT-PT100. Temperature transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Temperature	-	$\pm 0.2\%$ reading	Depending on the sensor	0...20 mA	CT-PT100	M25651
		$\pm 0.2\%$ reading		4...20 mA	CT-PT100	M25652

Converters

High-precision
transducers

Transducer of electrical parameters
into process signals



References

CR-2. Resistance transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply (see coding table)

Type of input	Measurement	Accuracy	Input	Digital	Type	Code
Resistance	-	± 0.2 % reading	1...200 kΩ	0...20 mA	CR-2	M25641
		± 0.2 % reading		4...20 mA	CR-2	M25642

CW. Active power transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply, 5. (phase-phase), 6. I_n , 7. f_n (see coding table)

Type of input	Measurement	Accuracy	System	Input	Digital	Type	Code
Active power	AC	± 0.5 % reading	Single-phase	300 V.../5 A	0...20 mA	CW-M	M25211
					4...20 mA	CW-M	M25212
			Balanced three-phase		0...20 mA	CW-TE	M25221
					4...20 mA	CW-TE	M25222
			Unbalanced three-phase ARON (3 wires)		0...20 mA	CW-TA	M25231
					4...20 mA	CW-TA	M25232
			Unbalanced three-phase ARON (4 wires)		0...20 mA	CW-TAN	M25241
					4...20 mA	CW-TAN	M25242

CY. Reactive energy transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply, 5. (phase-phase), 6. I_n , 7. f_n (see coding table)

Type of input	Measurement	Accuracy	System	Input	Digital	Type	Code
Power factor	AC	± 0.5 % reading	Single-phase	300 V.../5 A	0...20 mA	CY-M	M25251
					4...20 mA	CY-M	M25252
			Balanced three-phase		0...20 mA	CY-TE	M25261
					4...20 mA	CY-TE	M25262
			Unbalanced three-phase ARON (3 wires)		0...20 mA	CY-TA	M25271
					4...20 mA	CY-TA	M25272
			Unbalanced three-phase ARON (4 wires)		0...20 mA	CY-TAN	M25281
					4...20 mA	CY-TAN	M25282

Converters

High-precision
transducers

Transducer of electrical parameters
into process signals



References

CPF. Power factor transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply, 5. (phase-phase), 6. I_n , 7. f_n (see coding table)

Type of input	Measurement	Accuracy	System	Input	Digital	Type	Code
Power factor	AC	$\pm 0.5\%$ reading	Single-phase	300 V.../5 A	0...20 mA	CPF-M	M25311
					4...20 mA	CPF-M	M25312
			Unbalanced three-phase ARON (3 wires)		0...20 mA	CPF-TE	M25321
					4...20 mA	CPF-TE	M25322
			Unbalanced three-phase ARON (4 wires)		0...20 mA	CPF-TEN	M25331
					4...20 mA	CPF-TEN	M25332

CCOS. $\cos \varphi$ transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply, 5. (phase-phase), 6. I_n , 7. f_n (see coding table)

Type of input	Measurement	Accuracy	System	Input	Digital	Type	Code
$\cos \varphi$	AC	$\pm 0.5\%$ reading	Single-phase	300 V.../5 A	0...20 mA	CCOS-M	M25341
					4...20 mA	CCOS-M	M25342
			Unbalanced three-phase ARON (3 wires)		0...20 mA	CCOS-TE	M25351
					4...20 mA	CCOS-TE	M25352
			Unbalanced three-phase ARON (4 wires)		0...20 mA	CCOS-TEN	M25361
					4...20 mA	CCOS-TEN	M25362

CFD. Current distortion factor transducer

Standard auxiliary power supply: 230 Vac, 40...90 Hz

For non-standard purchase orders, please state the following:

1. Code, 2. Input range, 3. Output range, 4. Auxiliary power supply, 5. (phase-phase), 6. I_n , 7. f_n (see coding table)

Type of input	Measurement	Accuracy	System	Input	Digital	Type	Code
Distortion factor of I	AC	$\pm 0.2\%$ reading	-	5 A	0...20 mA	CFD-THD	M25411
		$\pm 0.2\%$ reading			4...20 mA	CFD-THD	M25412
		$\pm 0.2\%$ reading			0...20 mA	CFD-D	M25421
		$\pm 0.2\%$ reading			4...20 mA	CFD-D	M25422

Converters

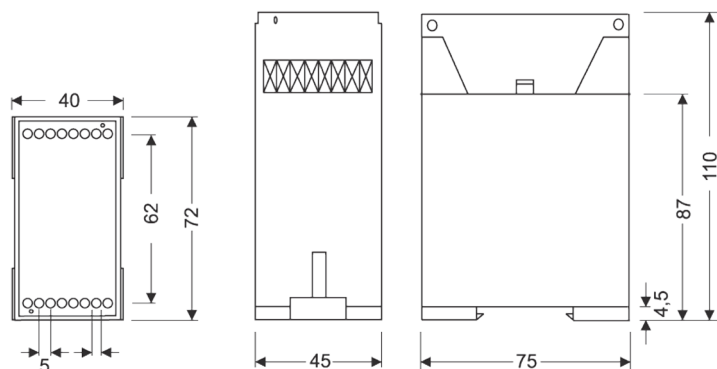
High-precision
transducers

Transducer of electrical parameters
into process signals



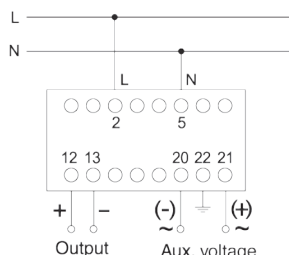
Dimensions

CV-A, CV-D, CC-A, CC-D, CR2

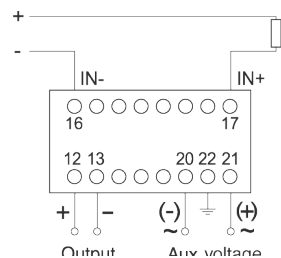


Connections

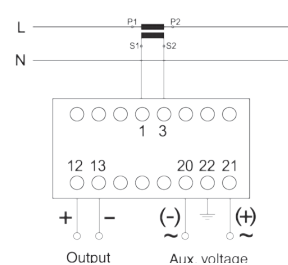
CV-A



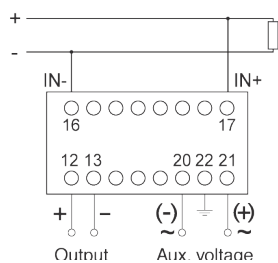
CV-D



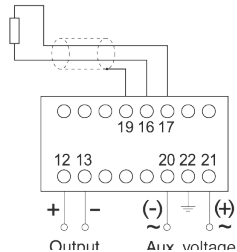
CC-A



CC-D



CR2



Converters

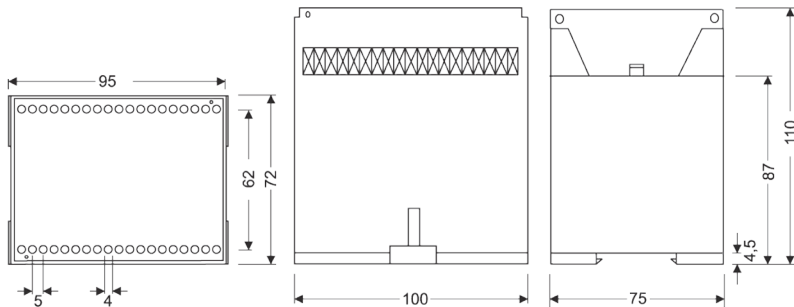
High-precision
transducers

Transducer of electrical parameters
into process signals



Dimensions

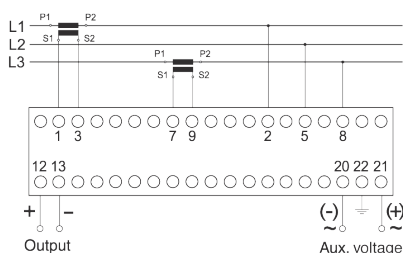
CW, CY, CPF



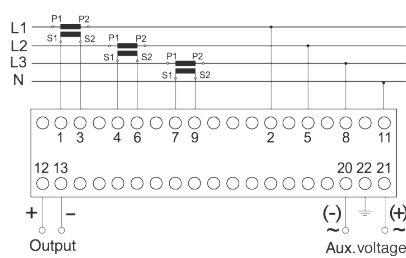
Connections

CW

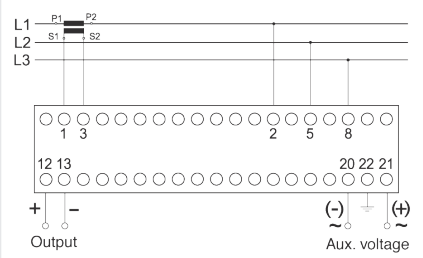
CW-TA



CW-TAN

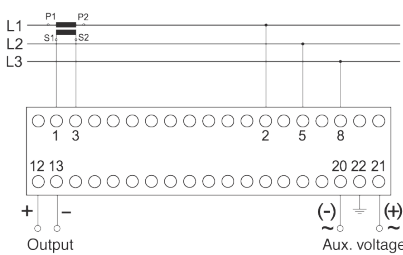


CW-TE

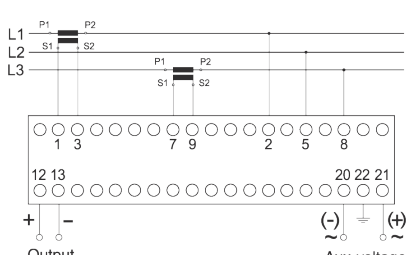


CY

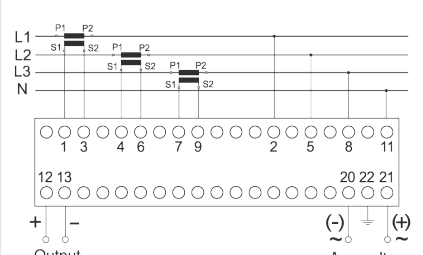
CY-TE



CY-TA

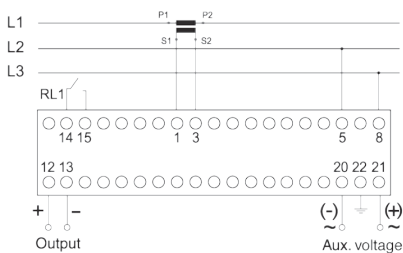


CY-TAN

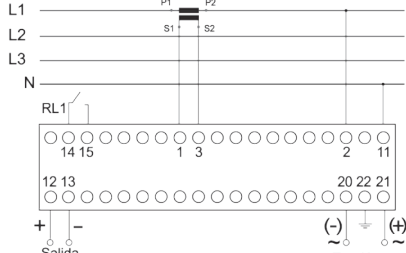


CPF

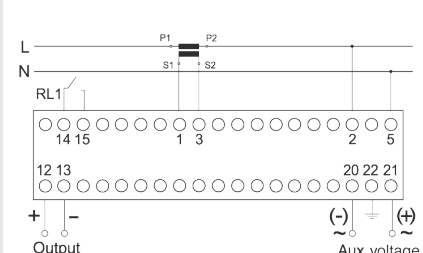
CPF-TE



CPF-TEN



CPF-M



Converters

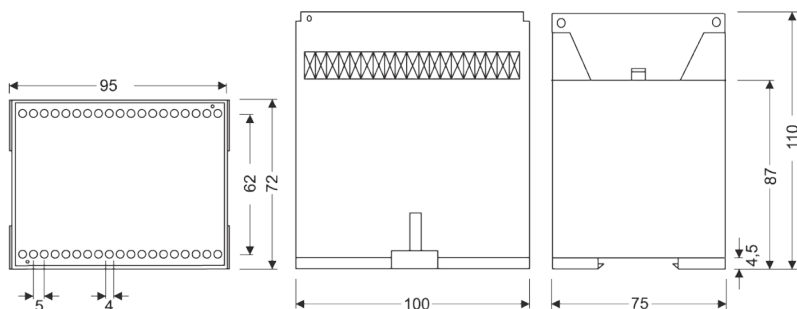
High-precision
transducers

Transducer of electrical parameters
into process signals



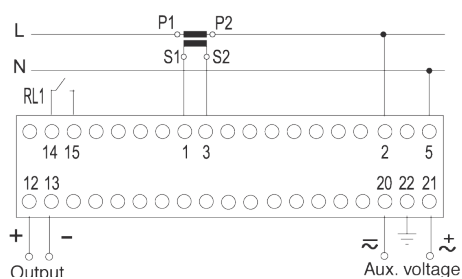
Dimensions

CCOS / CFD

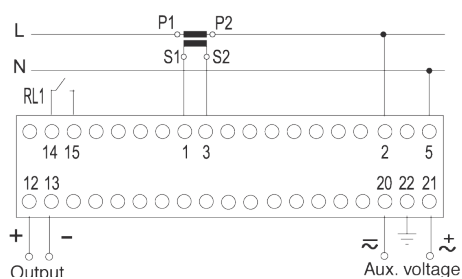


Connections

CCOS

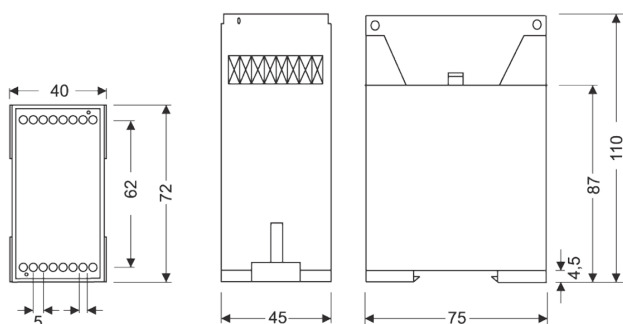


CFD-THD / CFD-D



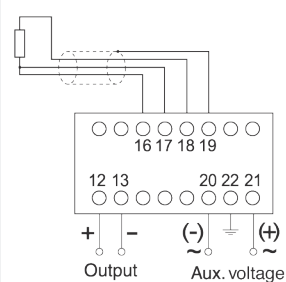
Dimensions

CT-PT100



Connections

CT-PT100



Converters

High-precision
transducers

Transducer of electrical parameters
into process signals



Coding table

		M	2	X	X	X	X	0	0	X	X	X
		Code						Internal Code		↑	↑	↑
INPUTS	Alternating voltage	Standard (300 V)		0								
		110 V		1								
		400 V		2								
		500 V		3								
		690 V		4								
	Alternating current	Standard (5 A)		0								
		1 A		1								
		10 A		4								
	DC Voltage	Standard (10 V)		0								
		60 mV		1								
		1 V		2								
		100 V		3								
		500 V		4								
	Direct current	Standard (20 mA)		0								
		200 mA		1								
		1 A		2								
		10 A		3								
	Power, power factor, cos j (V, A)	Standard (300 V, .../ 5 A)		0								
		110 V, .../5 A		1								
		400 V, .../5 A		2								
		500 V, .../5 A		3								
		600 V, .../5 A		4								
		300 V, .../1 A		5								
		110 V, .../1 A		6								
		400 V, .../1 A		7								
		500 V, .../1 A		8								
		600 V, .../1 A		9								
	Distortion I	Standard (5 A)		0								
		1 A		1								
	Leakage current, Universal process		0									
Resistance	Standard (20 Ω)		0									
	200 Ω		1									
	2 kΩ		2									
	20 kΩ		3									
Temperature	Standard (-200...+200 °C)		0									
	-200 ... +800 °C		1									
Frequency	Standard (45...55 Hz)		0									
	55...65 Hz		1									
	47..0.53 Hz		2									
	57...63 Hz		3									
	0..0.100 Hz		4									
OUTPUTS	Outputs 1, 3	Standard (0...20 mA)		0								
		0..0.1 mA		1								
		0..0.10 mA		2								
		2 V		3								
		5 V		4								
		0..0.10 V		5								
		-20...0...20 mA		6								
		-10...0...10 V		7								
	Outputs 2	-5...0..0.5 V		8								
		Standard (4...20 mA)		0								
		2..0.10 V		2								
Auxiliary power supply	Standard (220...240 V)		0									
	380...40 Vac 40/60 Hz		3									
	18...36 Vdc		7									
	90..0.140 Vdc		9									

accessories

Accessory

PowerStudio

Description

Software.

See M.9 Catalogue

Code M90211



Accessory

PowerStudio Scada

Description

Software.

HASP USB License

See catalogue M.9

Code M90231



Accessory

Front Panel Adaptors

Description

IP 65. Front panel protector 48 x 96 mm

Code M29921



Description

- Front panel adaptor 48 x 48 to 72 x 72 mm
Code M29911
- Front panel adaptor 48 x 48 to 96 x 96 mm
Code M29912



Description

- Front panel adaptor 48 x 96 to 96 x 96 mm
Code M29913

