

60 years  
of Know-How

CATALOG 1



**OFFER**  
of measuring instruments  
and Electronics Manufacturing Services

# GUARANTEE

- OF THE HIGHEST QUALITY OF PRODUCTION AND SERVICES

To meet the expectation of our customers **we continuously take care of improving the quality management system.** It takes place at every activity level, from the identification of the customer's needs, through the production process, to the research of the recipients satisfaction.

**To guarantee the highest quality** we continuously supervise the production processes, we aim at the permanent parameter improving and we use the materials from the suppliers, who meet the highest global standards.

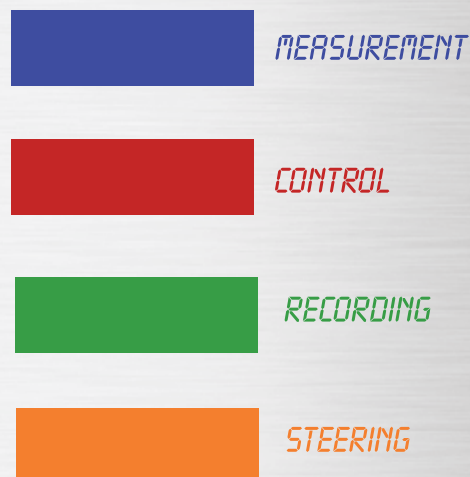
### We work in accordance with:

- Certificate **ISO 9001:2008**,
- Certificate **ISO 14001:2004**,
- Technical specification **ISO/TS 16949:2009**.

We fulfill all requirements of 2002/95/EC Directive about limiting Hazardous Substances in our products.

All our products fulfill requirements

- **Electromagnetic compatibility acc. to:**
  - immunity against electromagnetic interference EN 61000-6-2
  - emission of electromagnetic interference EN 61000-6-4
- **Safety acc. to:** EN61010-1.




## WELCOME TO CO-OPERATION!


### ICON'S LEGEND:

	- TC and RTD input		- voltage-free transistor output (OC)		- logic input
	- resistance signal measurement		- thermoresistance input		- Real Time Clock
	- DC signal input		- relay output		- internal memory
	- AC signal input (1- or 3-phase network parameters)		- temperature and humidity measurement		- USB port
	- 0...10 V analog input/output		- temperature input		- RS-485 interface
	- 4...20 mA analog input/output		- pulse counting input		- RS-232 interface
	- analog output (0...10 V, 0/4...20 mA)		- relative humidity measurement		- Modbus protocol

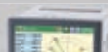
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# DIGITAL METERS



## APPLICATION:

- power industry (substations, generators, turbines)
- heat engineering (heat and power plants, boiler plants)
- food industry (dairies, bakeries, food storage)
- pharmaceutical industry (drug storage)
- plastics processing industry
- wood industry (furnaces, drying plants)
- chemical industry
- pumping stations and sewage plants (visualization of flow, pressure and level in tanks)
- breweries, distilleries
- mimic panels

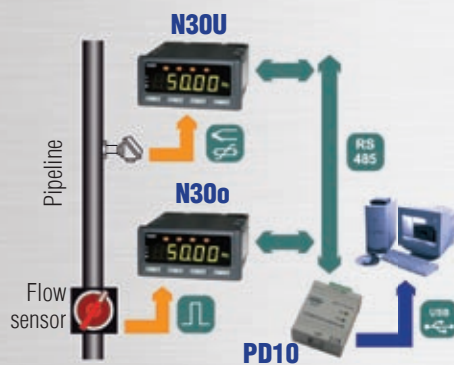


## SELECTED FEATURES:

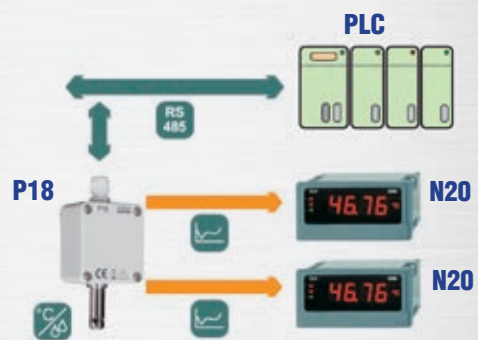
- **programmable measuring inputs** – simple service and universality
- **IP65 Protection rating frontal side** – dustproof and waterproof front panel, ensuring reliable operation and safe service under severe conditions
- **wide supplying voltage range** – applied in both dc and ac supplying systems
- **supplying output** – for external object transducers
- **3-colour display** – intuitive readings, display color programmable separately for three subranges of measured value
- **retransmission outputs** – analog signal for recording and further processing of measured values
- **alarm outputs** – two-state outputs operating in several modes for diagnostics and alarming
- **digital output** – RS-485 interface for communication with HMI panels, PLC controllers and SCADA software

## APPLICATION EXAMPLES

### Temperature and flow measurement in a pipeline



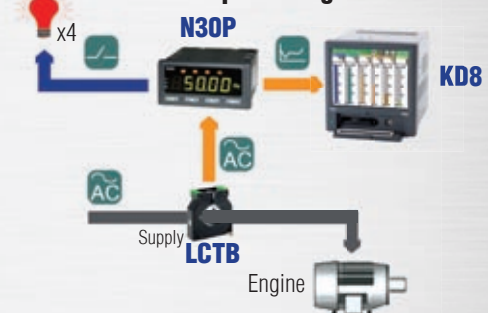
### Air temperature and humidity measurement



### Current measurement in an electroplating plant



### Measurement, alarming and logging of load current for a 1-phase engine



Type	N30 series				
Parameters	N30U	N30H	N30o	N30P	
<b>Input</b>	programmable: Pt100/500/1000 J, K, N, E, R, S ± 20 mA 0...10 V, -10...60 mV 400, 4000 Ω	programmable: 1/5 A d.c., 100/500 V d.c.	pulse input (pulses, frequency, rotational speed, period, operating time counter, encoder)	1-phase power network parameters, programmable: 0...1/5A 0...100/400V a.c.	
<b>Output</b>	4 x relay (2 NO + 2 NOC (optionally)), 1 x analog (option), 1 x pulse (option) in N30P meter, supplying output (24 V/ 30 mA) in N30U (option) and N30O (for supply 85...253 V)				
<b>Interface</b>	1 x RS-485 with MODBUS slave (option)				
<b>Galvanic isolation</b>	supply/input/output/RS-485				
<b>Display</b>	3-colour programmable LED 5 digits (14 mm)				
<b>Supply voltage</b>	85...253 V a.c./d.c. or 20...40 V a.c./d.c.				
<b>Protection rating frontal/rear side</b>	IP65/IP10				
<b>Ambient temp.</b>	-25...23...55 °C				
<b>External dimensions</b>	96 x 48 x 93 mm				
<b>Panel cut-out</b>	92 <sup>+0.6</sup> x 45 <sup>+0.6</sup> mm				
<b>Programming</b>	free LPCon software (using RS-485) or using buttons				
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>· Conversion of any measured value into a current or voltage analog signal.</li> <li>· Storage of minimal and maximal values for all measured quantities.</li> <li>· 21-point rescaling for the measured value (does not apply to N30P)</li> <li>· Password protection.</li> </ul>				



N24



N25



N20 AND N20Z



N17Z

Type	N30 series				
Parameters	N30U	N30H	N30o	N30P	
<b>Input</b>	programmable: Pt100/500/1000 J, K, N, E, R, S ± 20 mA 0...10 V, -10...60 mV 400, 4000 Ω	programmable: 1/5 A d.c., 100/500 V d.c.	pulse input (pulses, frequency, rotational speed, period, operating time counter, encoder)	1-phase power network parameters, programmable: 0...1/5A 0...100/400V a.c.	
<b>Output</b>	4 x relay (2 NO + 2 NOC (optionally)), 1 x analog (option), 1 x pulse (option) in N30P meter, supplying output (24 V/ 30 mA) in N30U (option) and N30O (for supply 85...253 V)				
<b>Interface</b>	1 x RS-485 with MODBUS slave (option)				
<b>Galvanic isolation</b>	supply/input/output/RS-485				
<b>Display</b>	3-colour programmable LED 5 digits (14 mm)				
<b>Supply voltage</b>	85...253 V a.c./d.c. or 20...40 V a.c./d.c.				
<b>Protection rating frontal/rear side</b>	IP65/IP10				
<b>Ambient temp.</b>	-25...23...55 °C				
<b>External dimensions</b>	96 x 48 x 93 mm				
<b>Panel cut-out</b>	92 <sup>+0.6</sup> x 45 <sup>+0.6</sup> mm				
<b>Programming</b>	free LPCon software (using RS-485) or using buttons				
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>· Conversion of any measured value into a current or voltage analog signal.</li> <li>· Storage of minimal and maximal values for all measured quantities.</li> <li>· 21-point rescaling for the measured value (does not apply to N30P)</li> <li>· Password protection.</li> </ul>				



N30 SERIES



NA3



NA5 AND NA6

Type Parameters	NA meters with bargraph indicators		
	NA3	NA5	NA6
<b>Input</b>	programmable: Pt100/500/1000, J, K, N, E, R, S 0...5/20 mA d.c., 0...2/5 A d.c., 0...60 mV d.c., 0...10/600 V d.c., 0...4 k $\Omega$ (NA3)		programmable: Pt100/500/1000, J, K, N, E, R, S $\pm$ 40 mA d.c., $\pm$ 5 A d.c., $\pm$ 300 mV d.c., $\pm$ 0...600 V d.c., 0...10 k $\Omega$
<b>Output</b>	1 x relay or 2 x OC (option) 1 x analog (option)		4 x relay or 8 x OC (option) 1 x analog (option)
<b>Interface</b>	1 x RS-485 MODBUS slave (option)		
<b>Bargraph</b>	3 or 7-colour programmable horizontal	3 or 7-colour programmable vertical	2 x 3 or 7-colour programmable vertical
<b>Galvanic isolation</b>	supply/input/output/RS-485		
<b>Display</b>	LED 4 digits (7 mm)	LED 4 digits (7 mm)	2 x LED 4 digits (7 mm)
<b>Supply voltage</b>	95...253 V a.c./d.c., 20...40 V a.c./d.c.		
<b>Protection rating frontal/rear side</b>	IP40/IP20	IP50/IP20	
<b>Ambient temperature</b>	-10...23...55 °C		
<b>External dimensions</b>	96 x 24 x 125 mm	48 x 144 x 100 mm	
<b>Panel cut-out</b>	92 <sup>+0.5</sup> x 22.2 <sup>+0.5</sup> mm	44 <sup>+0.5</sup> x 137.5 <sup>+0.5</sup> mm	
<b>Programming</b>	free LPCon software (using RS-485) or using buttons		
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>· 2-point rescaling</li> <li>· arithmetical functions <math>\times 2</math>, <math>\sqrt{x}</math>, (+, -, *, / - only in NA6)</li> <li>· logging of the measured signal in programmed time intervals (750 samples)</li> <li>· memory of minimal and maximal values for all measured quantities</li> <li>· password protection</li> <li>· conversion of any measured value into a current or voltage analog signal</li> </ul>		

**N24**

Fig. 1. Electrical connections of N24S meters

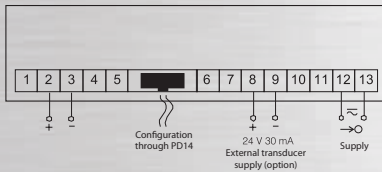
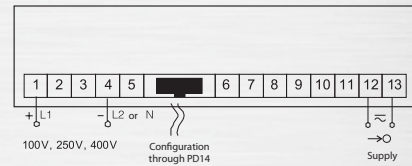


Fig. 2. Electrical connections of N24Z and N24H meters for the measurement of voltage (and frequency only in N24Z)



**N24T**

Fig. 5. Electrical connections of N24Z and N24H meters for the current measurement

Fig. 3. Electrical connections of N24T meters

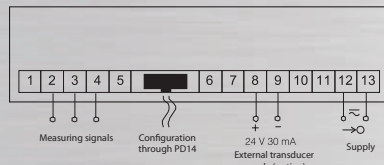
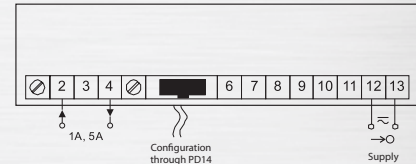
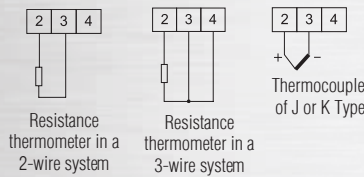


Fig. 4. Connections of N24T measuring inputs



**N25**

Fig. 6. Electrical connections of N25S meters

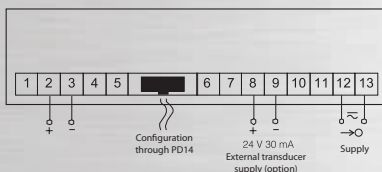
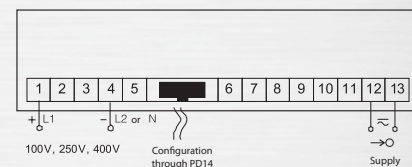


Fig. 7. Electrical connections of N25Z and N25H meters for the measurement of voltage (and frequency only in N25Z)



**N25T**

Fig. 10. Electrical connections of N25Z and N25H meters for the current measurement

Fig. 8. Electrical connections of N25T meters

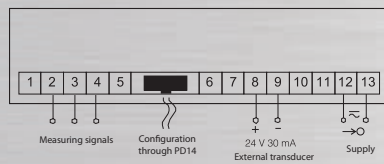
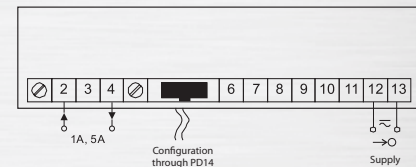
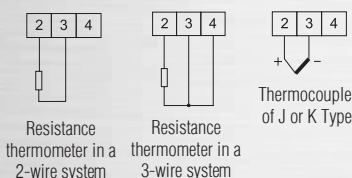


Fig. 9. Connections of N25T measuring inputs



**N20**

Fig. 11. Electrical connections of N20 meters

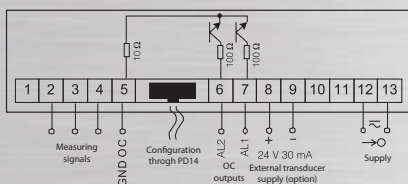
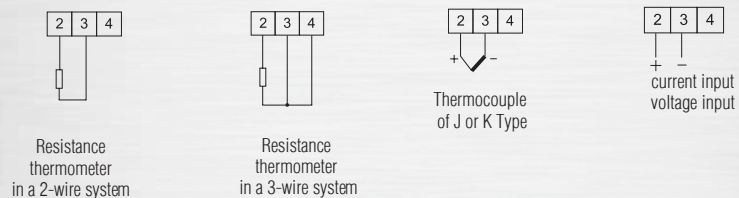


Fig. 12. Connections of measuring inputs



**N20Z**

Fig. 13. Electrical connections of N20Z meters

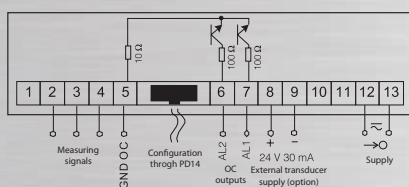


Fig. 14. Electrical connections of N20Z meter for the measurement of voltage and frequency

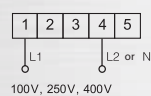
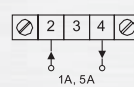
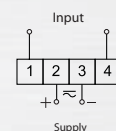


Fig. 15. Electrical connections of N20Z meter for the current measurement



**N17Z**

Fig. 16. Electrical connections of N17Z meter



## N30U

Fig. 17. Electrical connections of N30U meter

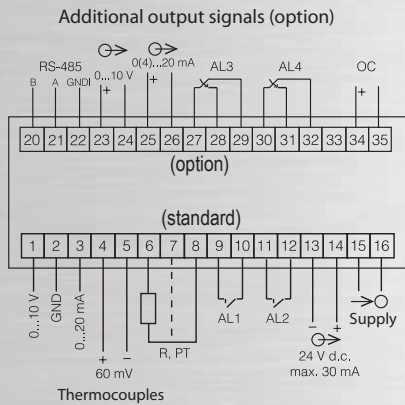
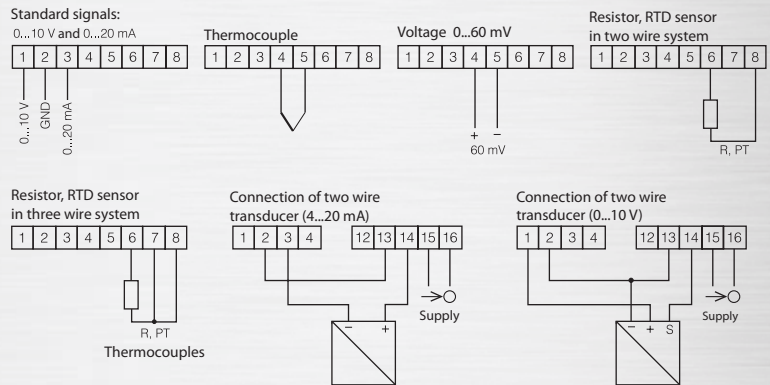


Fig. 18. Connections of measuring input



## N30H

Fig. 19. Electrical connections of N30H meter

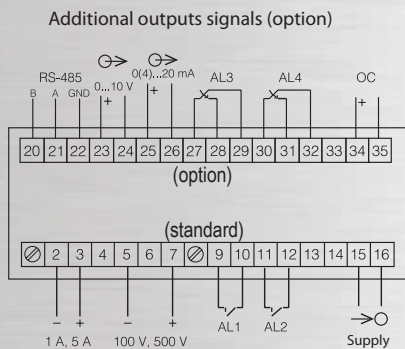


Fig. 20. Electrical connection for the current measurement

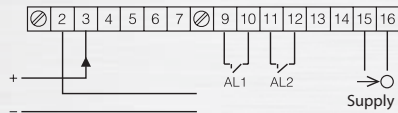
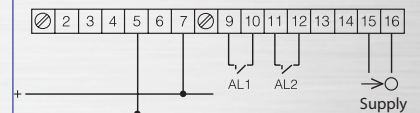


Fig. 21. Electrical connection for the voltage measurement



## N30o

Fig. 22 Electrical connections N30o.

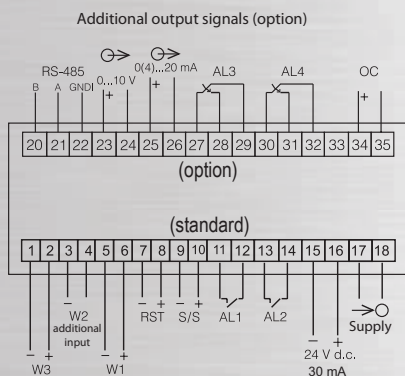


Fig. 23 Connections of the transducer with the OC output of NPN type

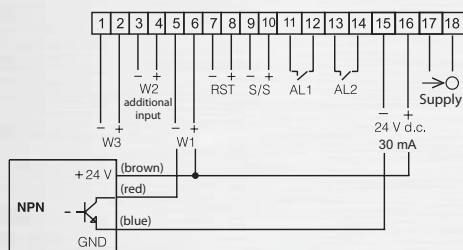
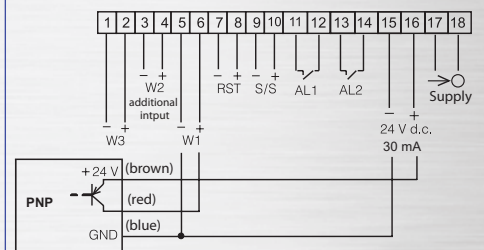


Fig. 24 Connections of the transducer with the OC output of PNP type



## N30P

Fig. 25 Electrical connections of N30P meter

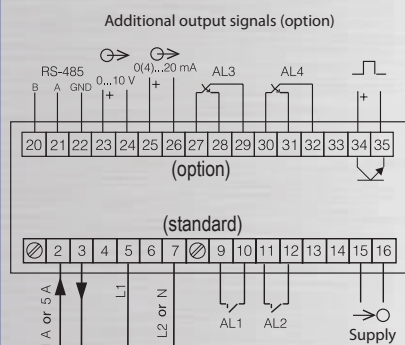


Fig. 26 Electrical connections of N30P meter for direct measurement

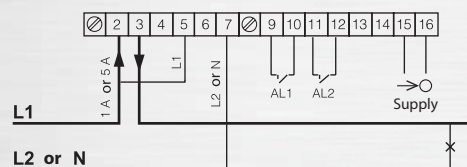
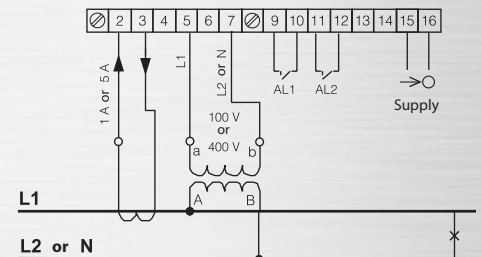


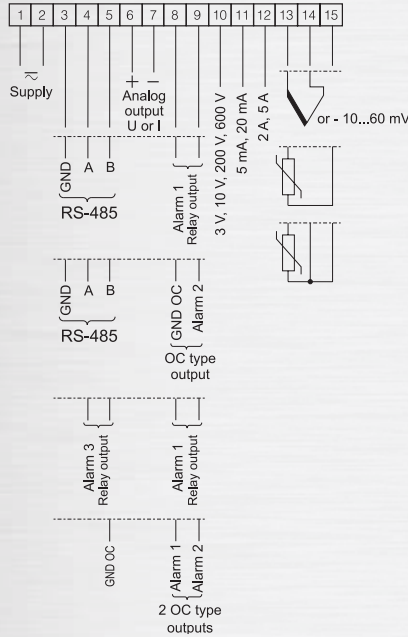
Fig. 27 Electrical connections of N30P meter for indirect measurement





NA3

Fig. 28 Electrical connections of NA3 meter



NA5

Fig. 29 Electrical connections of NA5 meter

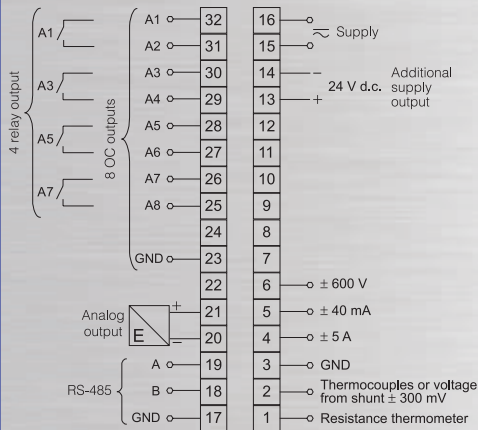
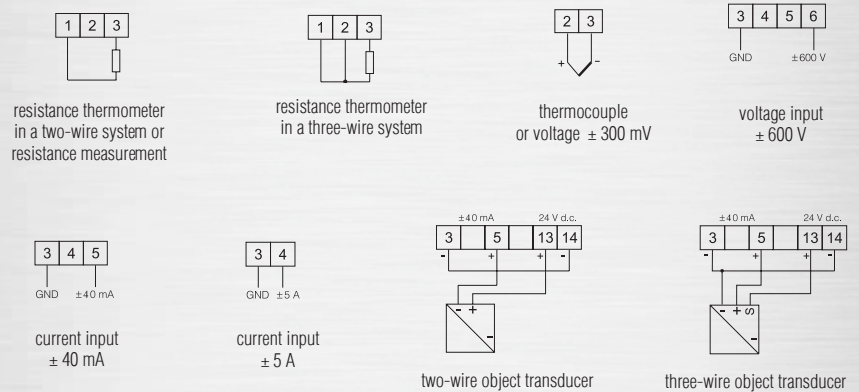


Fig. 30 Connections of measuring inputs



NA6

Fig. 31 Electrical connections of NA6 meter

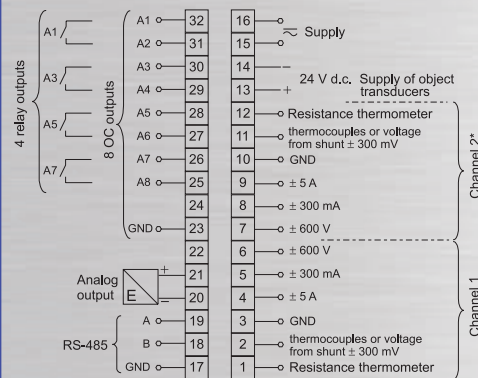
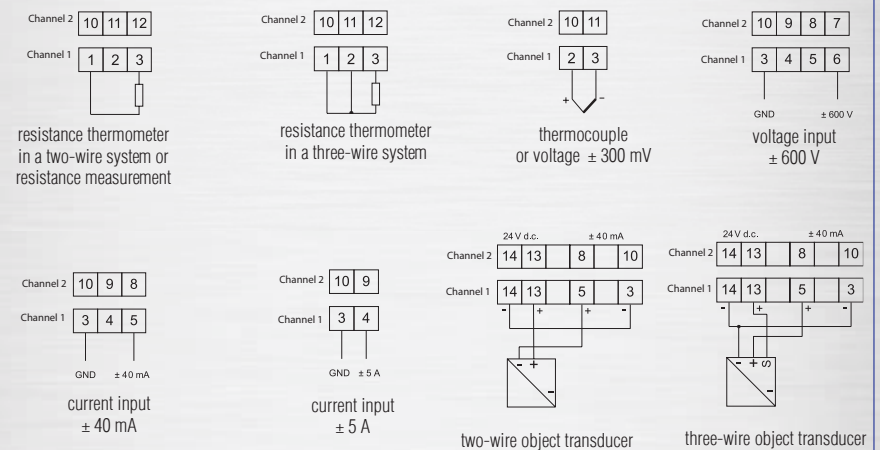


Fig. 32 Connections of measuring inputs







# MEASURING TRANSDUCERS, SEPARATORS



## APPLICATION:

- power engineering (substation telemechanics)
- power plants
- food industry
- storage of food, drugs, etc.
- mines
- automotive industry
- drying plants
- boiler plants, heat plants
- monitoring systems (SCADA)
- object data gathering

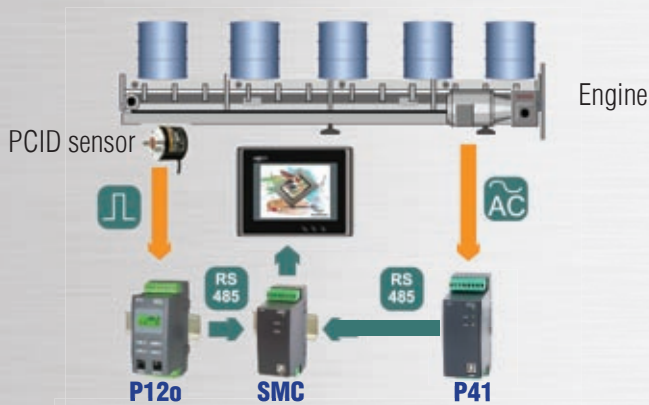


## SELECTED FEATURES:

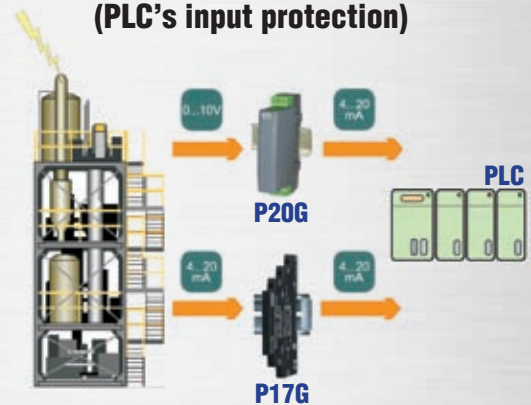
- signals standardization in automation systems
- galvanic isolation between input and output
- signal conversion with rescaling – linear (2-point) or multi-point
- programmability
- alarming (relay outputs)
- RS-485 Modbus communication, **Ethernet**
- measured values logging
- 15 minute power logging

## APPLICATION EXAMPLES

### Measurement of conveyor belt speed and engine load



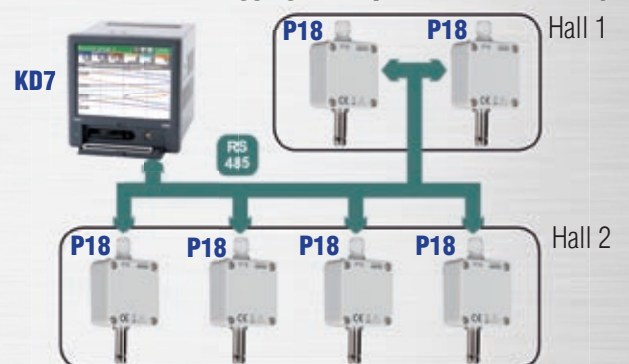
### Galvanic insulation (PLC's input protection)



### Measurement of 3-phase network parameters



### Measurement and logging of temperature and humidity



Type Parameters	P20 and P17 transducers				Separators	
	P20	P20Z	P20H	P17	P20G	P17G
<b>Input</b>	programmable Pt100/250/500/1000, J, K, S, N 0/4...20, ±20 mA 0...5/10, ±5, ±10 V ±60, ±150 mV 0...400/4000 Ω	fixed 0..60/100/150 /250/400/500/ /600 V a.c. 0..1/5 A a.c.	fixed 100, 250, 400 V d.c. ±100, ±250, ±400 V d.c. ±1, ±5 A d.c.	fixed Pt100 J, K, N, E, 0...10 V 0...60 mV 0...150/250 Ω	programmable 0/4...20 mA ±20 mA 0...5/10 V ±5V, ±10 V ±60 mV	0/4...20mA
<b>Output</b>	0/4...20 mA or 0...10 V		0/4...20 mA or 0...10 V	0/4...20 mA	programmable -20...20 mA -10...10 V	active output 0/4...20 mA
<b>Galvanic isolation</b>	supply/output/input			input/output	supply/output/input	input/output
<b>Interface</b>	-	-	RS485 Modbus Slave	-	-	-
<b>Supply voltage</b>	85...253 V a.c./d.c. or 20...85 V d.c., 20...65 V a.c.			supplied from a current loop	85...253 V a.c./d.c. or 20...85 V d.c., 20...65 V a.c.	supply not required
<b>Protection rating frontal/rear side</b>	IP40/IP20			IP50/IP20	IP40/IP20	IP50/IP20
<b>Ambient temp.</b>	-20...23...55 °C					
<b>External dim.</b>	22.5 x 120 x 100 mm			6.2 x 77.5 x 100 mm		
<b>Additional functions</b>	free LCon software (using PD14 pro- grammer)	-	free LCon software (using PD14 pro- grammer)	-	free LCon software (using PD14 programmer)	-



P20Z



P20, P20H AND P20G



P17, P17G

Type Parameters	P30 and P12 transducers				
	P30U	P30o <i>New!</i>	P12H	P120	P12P
<b>Input</b>	programmable Pt100/250/500/1000, Cu100, Ni100, Ni1000 J, K, N, E, R, S, T, B 0...4/20, ±20 mA -5...20, ±75, ±200 mV, 400, 2000, 5500 Ω, RS485 Master or Slave	2 programmable inputs: pulse counter, frequency, rotational speed, period, operating time counter, pulse differential counter on inputs or encoder	programmable ±1 A ±5 A ±100 V ±600 V	programmable pulse input (pulses, frequency, rotational speed, period, operating time counter)	1-phase power network parameters fixed 1A (X/1A) 5A (X/5A) 100 V(x/100 V) 400 V
<b>Output</b>	2 x relays (1 x NO + 1 x NO) 0/4...20 mA, 0...10 V		2 x relays NO 0/4...20 mA, 0...10 V		
	supplying output (24 V/ 30 mA – optionally) - P30U, P120				
<b>Interface</b>	RS-485 Modbus <b>Ethernet</b> 10/100 Base-T (option)		RS-485 Modbus		
<b>Galvanic isolation</b>	supply/output/input/RS-485				
<b>Display</b>	display LCD 2x8 characters backlighted		version without display or display LCD 2x8 characters		
<b>Supply voltage</b>	85...253 V a.c./d.c., 20...40 V a.c., 20...50 V d.c.		85...253 V a.c./d.c. or 20...40 V a.c./d.c.		
<b>Protection rating frontal/rear side</b>	IP40/IP10				
<b>Ambient temp.</b>	-20...23...55 °C				
<b>External dim.</b>	45 x 120 x 100 mm (on a rail)				
<b>Programming</b>	using buttons or RS485 Modbus, <b>HTTP (option)</b>		using buttons or RS485		
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>rescaling (up to 21 points) (P30o - independent for both inputs) (P12P – 2-points linear)</li> <li>alarms indicated on the display</li> <li>internal memory 534336 samples (P30U, P30o), 750 samples (P12)</li> </ul>				
	<ul style="list-style-type: none"> <li>mathematic functions (P30o-independent for both inputs)</li> <li>WWW server, FTP, Modbus TCP/IP Slave</li> <li>memory of min. and max. values (P30o - for both inputs)</li> <li>filtration of periodic signals</li> <li>data logging in internal memory in SD card (P30U, P30o optionally)</li> </ul>				



P30U



P30o



P12 SERIES

# MEASURING TRANSDUCERS, TECHNICAL DATA SEPARATORS

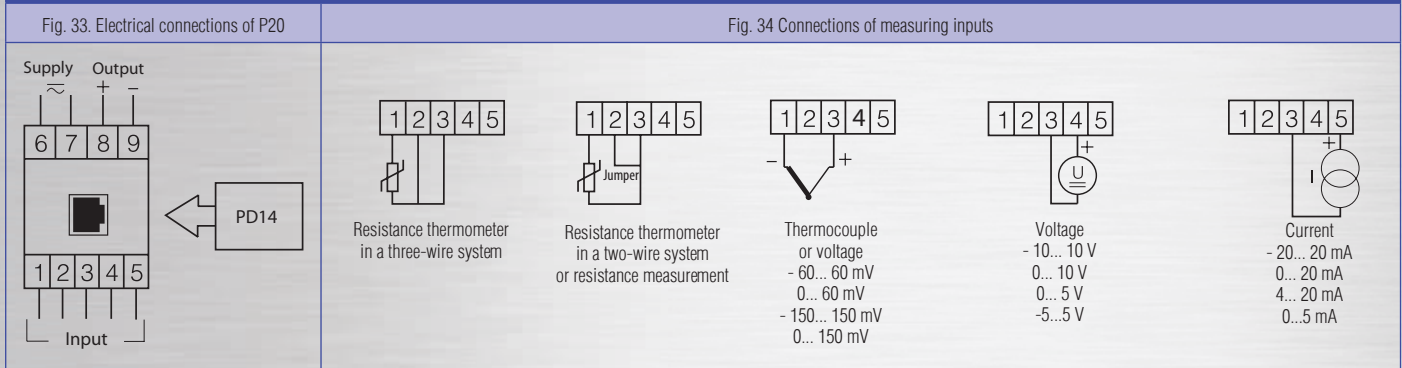


Type	Transducers of network parameters		
Parameters	P41	P12P	P43
<b>Input</b>	1-phase power network parameters programmable 1, 5 A 100, 400 V	1-phase power network parameters fixed 1A (X/1A) 5A (X/5A) 100 V(x/100 V) 400 V	3-phase power network parameters fixed 1 A or 5 A, 3 x 57,7/100 V or 3 x 230/400 V
<b>Output</b>	±20 mA (analog programmable)	2 x relays NO analog 0/4...20 mA, 0...10 V	4 relays or 2 relays + 2 analog programmable ±20mA or 4 analog programmable ±20mA
<b>Interface</b>	RS-485 Modbus		
<b>Galvanic isolation</b>	supply/output/input/RS-485		
<b>Display</b>	-	version without display or display LCD 2x8 characters	-
<b>Supply voltage</b>	85...253 V a.c. 40...400 Hz; 90...300 V d.c. or 20...40 V a.c. 40...400 Hz; 20...60 V d.c.	85...253 V a.c./d.c. or 20...40 V a.c./d.c.	85...253 V a.c. 40...400 Hz; 90...300 V d.c. or 20...40 V a.c. 40...400 Hz; 20...60 V d.c.
<b>Protection rating frontal/rear side</b>	IP40/IP10		
<b>Ambient temperature</b>	-10...23...55 °C		
<b>External dimensions</b>	45 x 120 x 100 mm (on a rail)		90 x 120 x 100 mm (on a rail)
<b>Programming</b>	free LPCon software	using buttons or RS485	free LPCon software
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>memory for selected measured value - 9 000 samples</li> <li>memory of minimal and maximal values</li> <li>programmable current and voltage transformer ratios</li> </ul>	<ul style="list-style-type: none"> <li>2-points linear rescaling</li> <li>alarms indicated on the display</li> <li>internal memory 750 samples</li> </ul>	<ul style="list-style-type: none"> <li>memory for average power – 9 000 samples</li> <li>memory of minimal and maximal values</li> <li>programmable current and voltage transformer ratios</li> <li>pulse output</li> </ul>

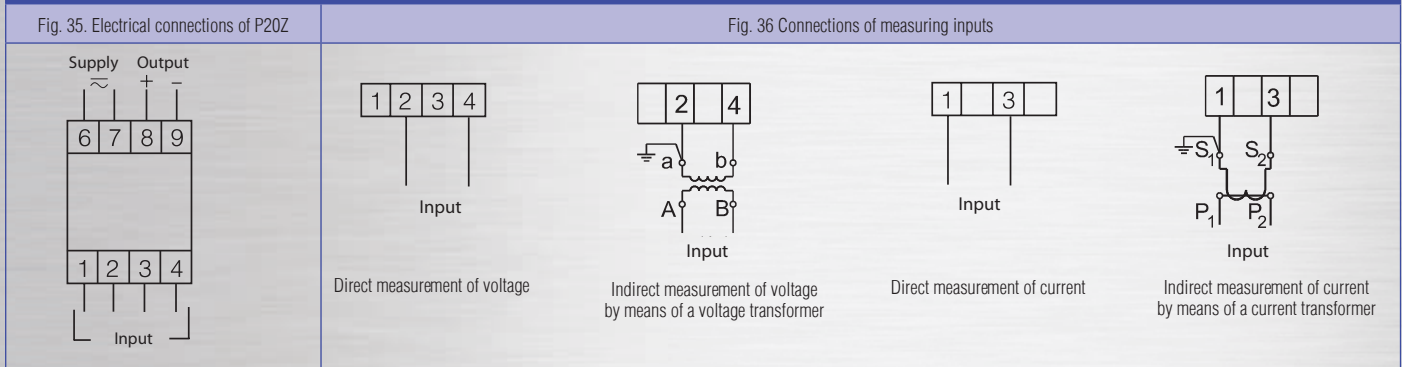


Type	P18 and P18L temperature and humidity transducers		
Parameters	P18	P18D New!	P18L
<b>Input</b>	-30 ... -20 ... 60 ... 85°C 0...100% RH		-30 ... -20 ... 60 ... 85°C or 0...100% RH
<b>Output</b>	2 x 4...20 mA or 0...10 V (option)		4...20 mA
<b>Interface</b>	RS-485 Modbus		-
<b>Supply voltage</b>	9 ... 24 V d.c./a.c		19...30 V d.c. (supplied by a current loop)
<b>Protection rating frontal/rear side</b>	IP65		
<b>Ambient temperature</b>	-20...23...60 °C		
<b>External dimensions</b>	38 x 58 x 118 mm		
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>data presentation on a LCD display</li> <li>calculation of other quantities (dew-point temp.; absolute humidity)</li> <li>memory of measured and calculated min. and max. values</li> </ul>		-

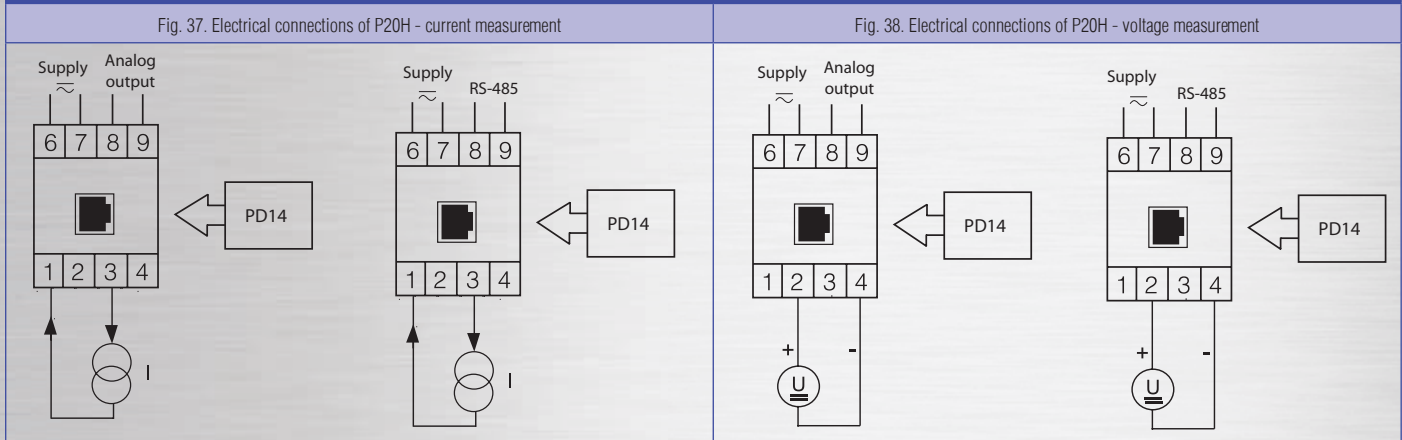
P20



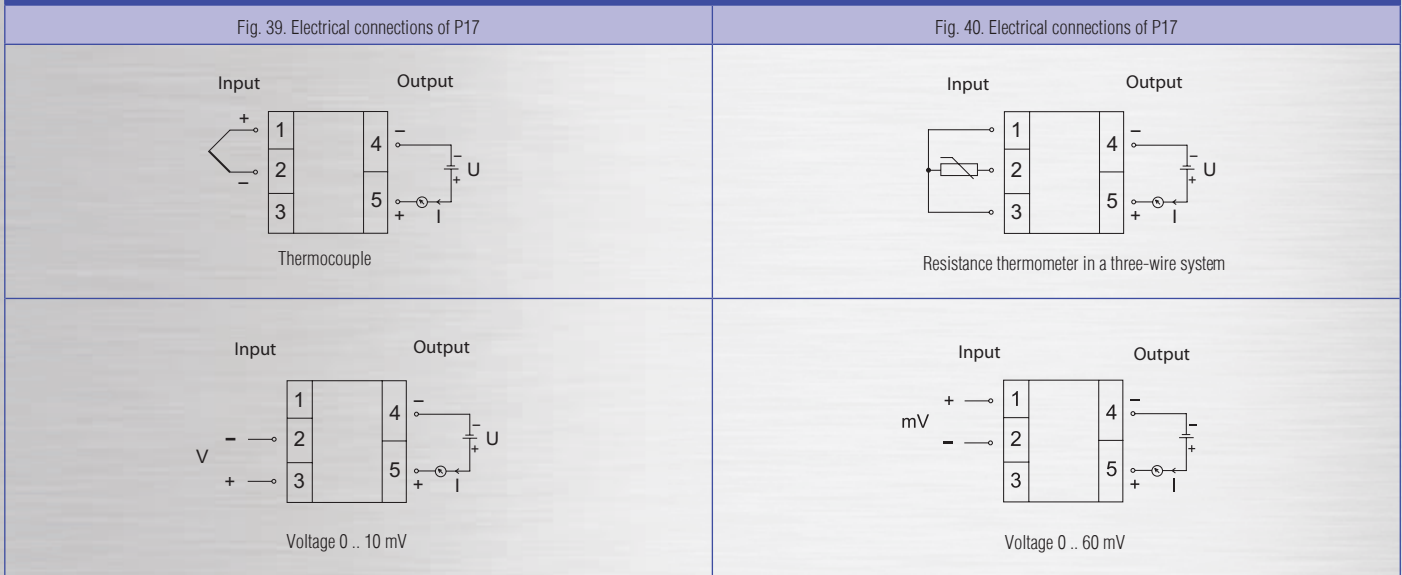
P20Z

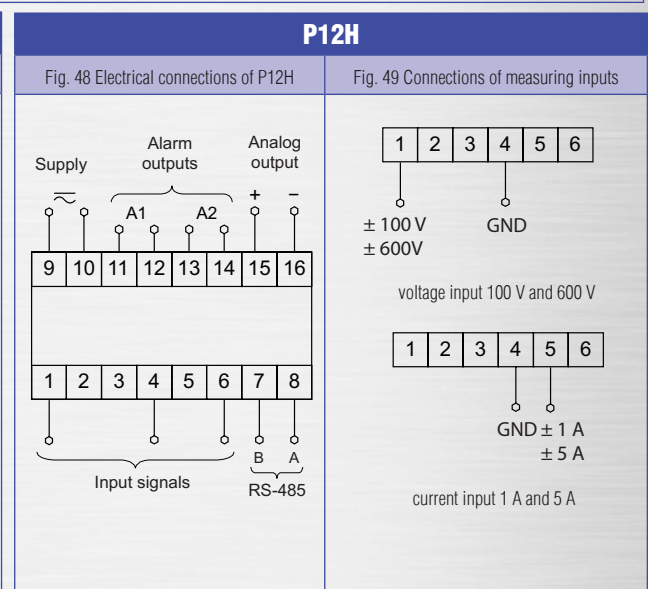
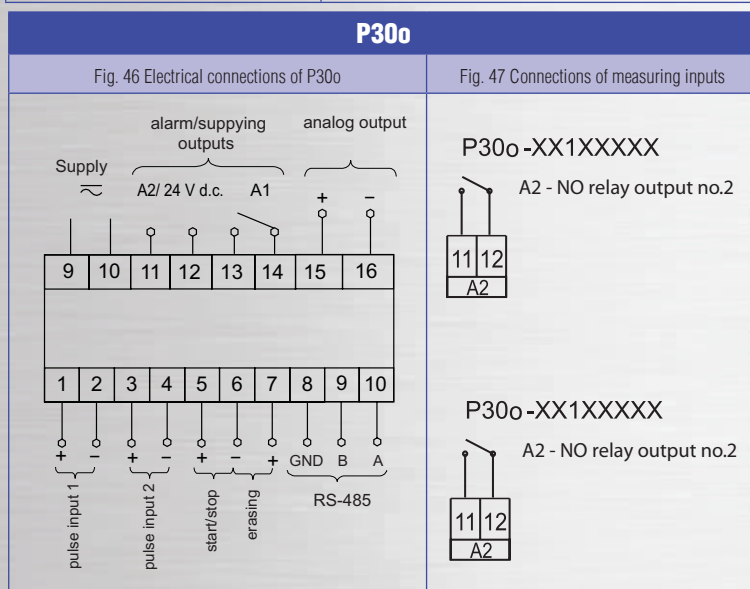
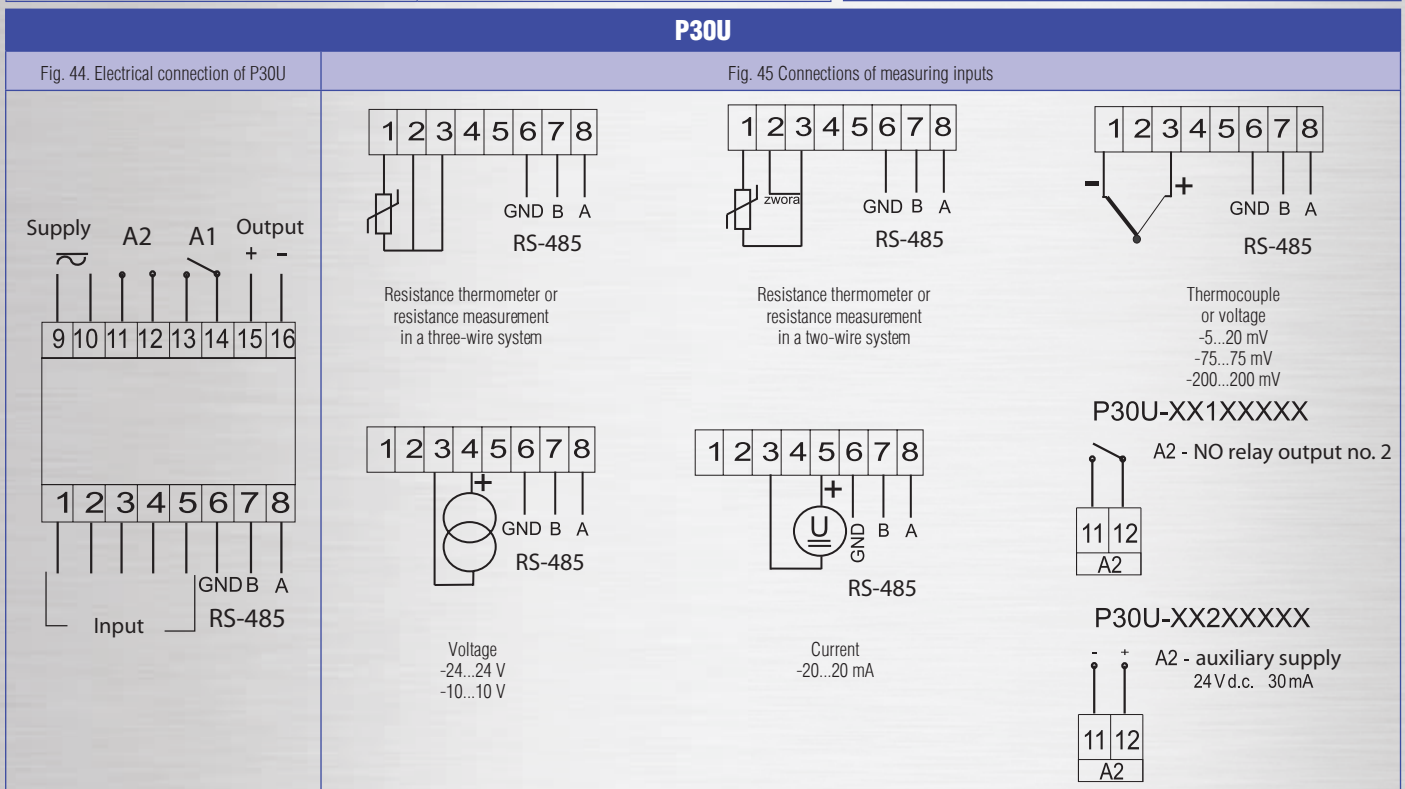
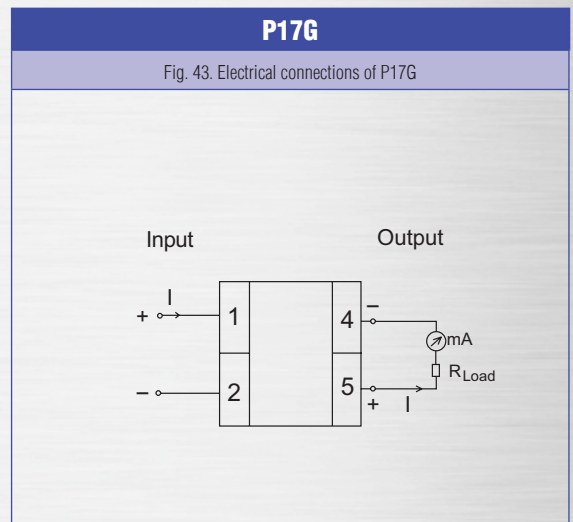
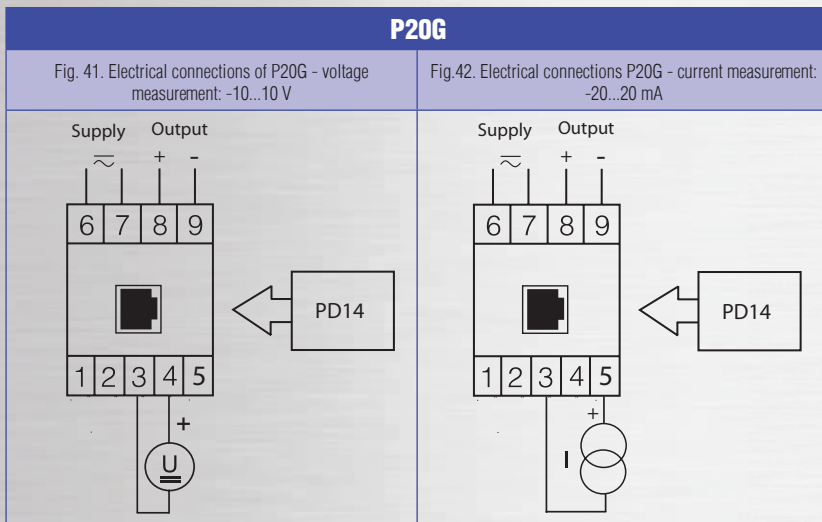


P20H

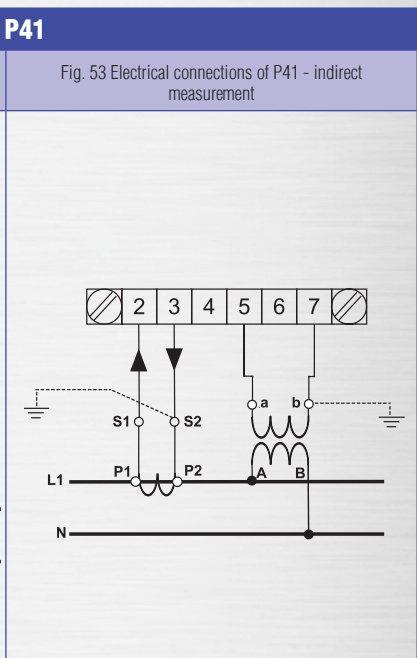
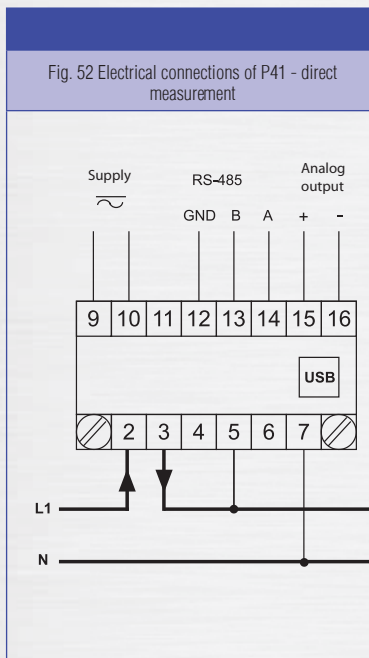
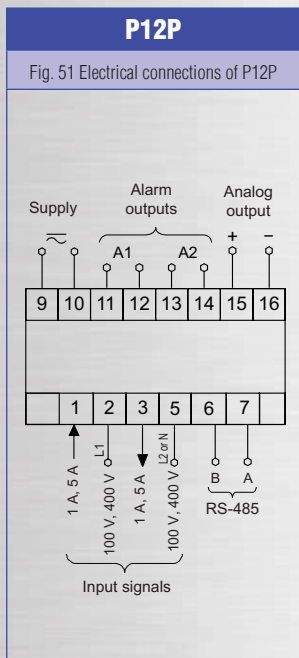
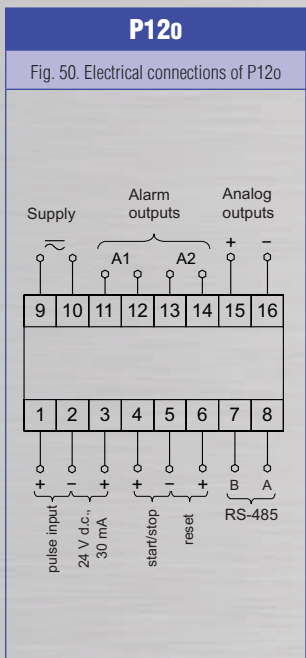


P17

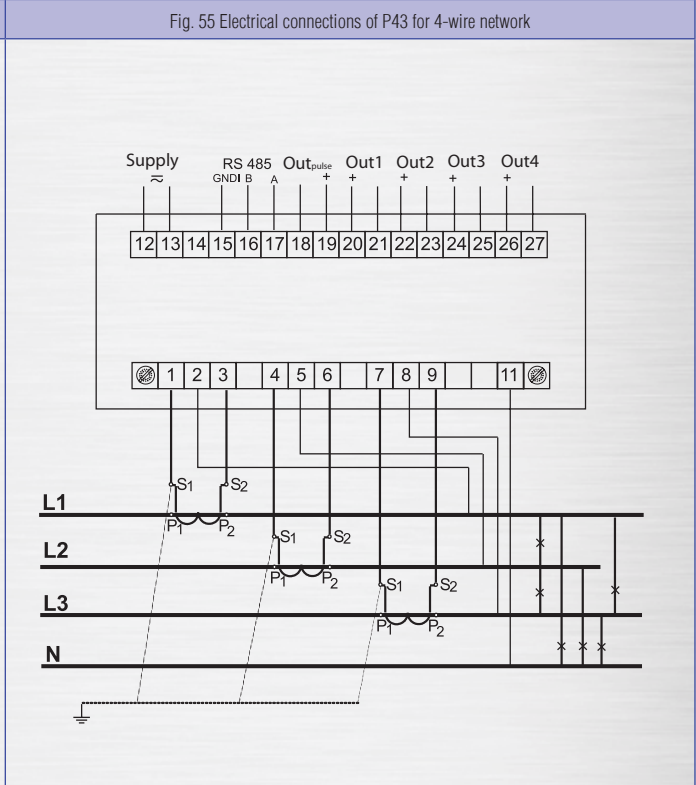
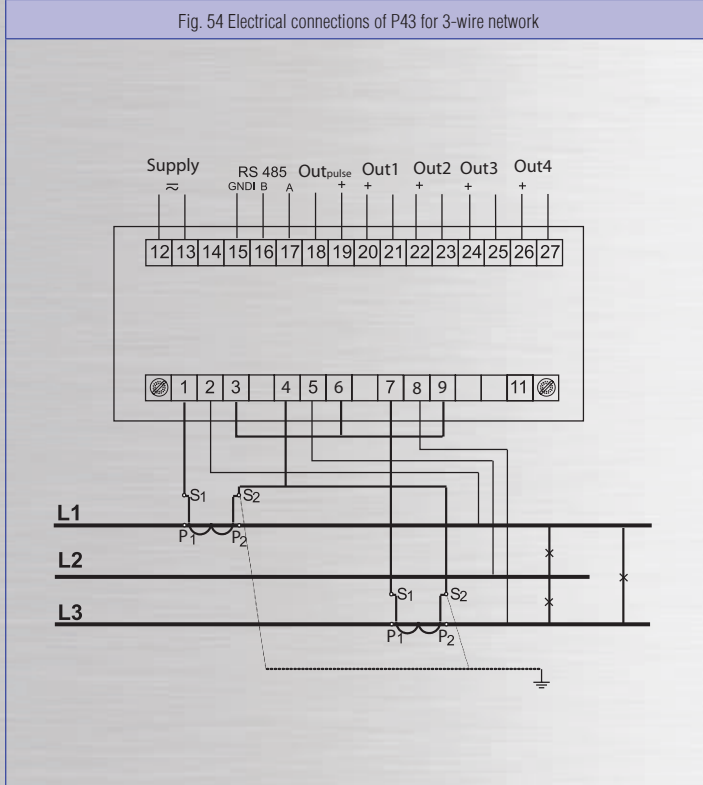




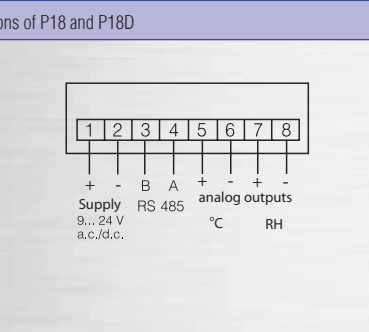
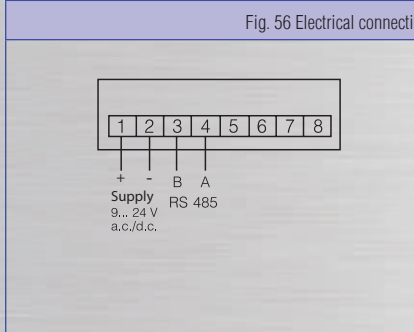




**P43**



**P18, P18D AND P18L**



# MEASURING TRANSDUCERS, ORDERING CODES SEPARATORS

## P20 AND P17 TRANSDUCER SERIES

**TABLE 16. P20 ORDERING CODE:**

P20 -	X	X	XX	XX	X
<b>Analog output:</b>					
current 0...20 mA	1				
current 4...20 mA	2				
voltage 0...10 V	3				
<b>Supply:</b>					
85...253 V a.c./d.c.	1				
20...85 V d.c., 20...65 V a.c.	2				
<b>Kind of input:</b>					
write the code from table 17			XX		
<b>Version:</b>					
standard				00	
custom-made*				XX	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

**TABLE 19. P20H ORDERING CODE:**

P20H -	X	X	X	XX	X
<b>Input signal:</b>					
+/- 100 V	1				
+/- 250 V	2				
+/- 400 V	3				
+/- 1 A	4				
+/- 5 A	5				
0...100 V	6				
0...250 V	7				
0...400 V	8				
<b>Output:</b>					
0...20 mA	1				
4...20 mA	2				
0...10 V	3				
RS-485	4				
<b>Supply voltage:</b>					
85...253 V a.c./d.c.	1				
20...85 V d.c., 20...65 V a.c.	2				
<b>Version:</b>					
standard				00	
non-standard settings				NS	
custom-made*				XX	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

\* - after agreeing with the manufacturer

**TABLE 17. INPUT SIGNALS P20**

Type of sensor/input [Unit]	Range	Code	Type of sensor/input [Unit]	Range	Code
Pt100 [°C]	-200...850	01	TC of K type [°C]	-200...1370	36
	0...850	02		0...1200	37
	0...600	03		0...1000	38
	0...400	04		0...800	39
	0...200	05		0...600	40
	-200...200	06		0...400 <sup>1</sup>	41
	-100...100 <sup>1</sup>	07		-200...200 <sup>1</sup>	42
Pt250 [°C]	-200...850	08	TC of S type [°C]	0...1760	43
	0...850	09		0...1600	44
	0...600	10		0...1400 <sup>1</sup>	45
	0...400	11		0...1200 <sup>1</sup>	46
	0...200	12		0...1000 <sup>1</sup>	47
	-200...200	13		-200...1200	48
	-100...100	14		0...1200	49
Pt500 [°C]	-200...850	15	TC of N type [°C]	0...1000	50
	0...850	16		0...800	51
	0...600	17		0...600 <sup>1</sup>	52
	0...400	18		0...400 <sup>1</sup>	53
	0...200	19		-200...200 <sup>1</sup>	54
	-200...200	20		0...10	55
	-100...100	21		0...5	56
Pt1000 [°C]	-200...850	22	Voltage d.c. [V]	-10...10	57
	0...850	23		-5...5	58
	0...600	24		0...60	59
	0...400	25		-60...60	60
	0...200	26		0...150	61
	-200...200	27		-150...150	62
	-100...100	28		0...20	63
TC of J type [°C]	-200...1200	29	Current d.c. [mA]	4...20	64
	0...1200	30		0...5	65
	0...1000	31		-20...20	66
	0...800	32		0...400	67
	0...600	33		0...4000	68
	0...400 <sup>1</sup>	34		Custom-made	XX
	-200...200 <sup>1</sup>	35			

<sup>1</sup> Accuracy class 0.5

**TABLE 18. P20Z ORDERING CODE:**

P20Z -	XX	X	X	X	XX	X
<b>Input range:</b>						
0...60 V	01					
0...100 V	02					
0...150 V	03					
0...250 V	04					
0...400 V	05					
0...500 V	06					
0...600 V	07					
0...1 A	08					
0...5 A	09					
<b>Output range:</b>						
0...5 mA	1					
0...20 mA	2					
4...20 mA	3					
0...10 V	4					
<b>Supply voltage:</b>						
85...253 V a.c./d.c.	1					
20...40 V a.c./d.c.	2					
<b>Kind of terminals:</b>						
inseparable screws				1		
screwed plug-in sockets				2		
<b>Version:</b>						
standard					00	
custom-made*					XX	
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

**TABLE 20. P17 ORDERING CODE:**

P17 -	XX	XX	X
<b>Input signal:</b>			
voltage (0...10 V)	00		
thermocouple J (-100...1200°C)	01		
thermocouple K (-100...1370°C)	02		
thermocouple N (-100...1300°C)	03		
thermocouple E (-100...900°C)	04		
Pt100 (-50...100°C)	05		
Pt100 (-50...400°C)	06		
voltage (0...60 mV)	09		
<b>Version:</b>			
standard			00
on order*			XX
<b>Acceptance tests:</b>			
without extra requirements			0
with an extra quality inspection certificate			1
acc. to customer's request*			X

## P20G AND P17G TRANSDUCER SERIES

**TABLE 21. P20G ORDERING CODE:**

P20G -	XX	XX	X	XX	X	X
<b>Input:</b>						
input code acc. to the table 22	XX					
<b>Output:</b>						
output code acc. to the table 22	XX					
<b>Supply voltage:</b>						
85...253 V a.c./d.c.	1					
20...40 V a.c./d.c.	2					
<b>Version:</b>						
standard					00	
non-standard settings					NS	
custom-made*					XX	
<b>Language:</b>						
Polish						P
English						E
other*						X
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

**TABLE 22. CODING OF THE P20G SEPARATOR KIND OF INPUT AND OUTPUT**

Range	Input code	Output code
0...1 V	01	01**
0...5 V	02	02
0...10 V	03	03
±1 V	04	04**
±5 V	05	05
±10 V	06	06
0...5 mA	07	07**
0...20 mA	08	08
±5 mA	09	09**
±20 mA	10	10
4...20 mA	11	11
custom-made version*	XX	XX

\* - after agreeing with the manufacturer

\*\* - conversion class > 0.2

**TABLE 23. P17G ORDERING CODE:**

P17G -	XX	X
<b>Version:</b>		
standard	00	
on order*	XX	
<b>Acceptance tests:</b>		
without extra requirements		0
with an extra quality inspection certificate		1
acc. to customer's request*		X



# METERS AND ANALYZERS OF POWER NETWORK PARAMETERS



## APPLICATION:

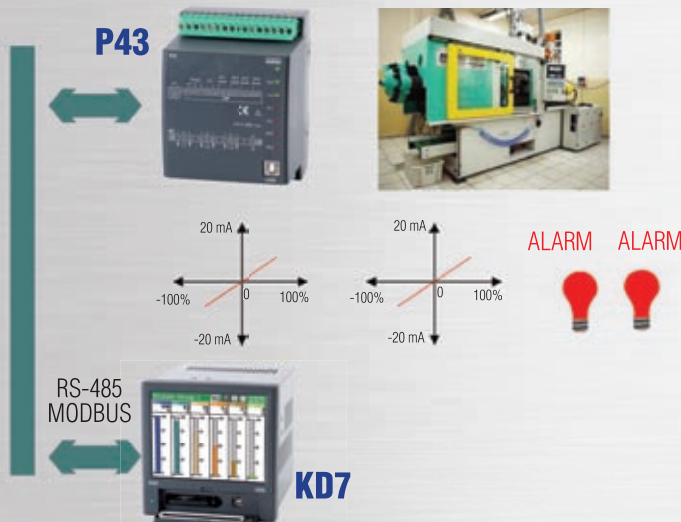
- supply systems in industry
- power industry (substations, generators, turbines)
- heat engineering (heat and power plants, boiler plants)
- monitoring of power network parameters
- monitoring of power quality and consumption

## SELECTED FEATURES:

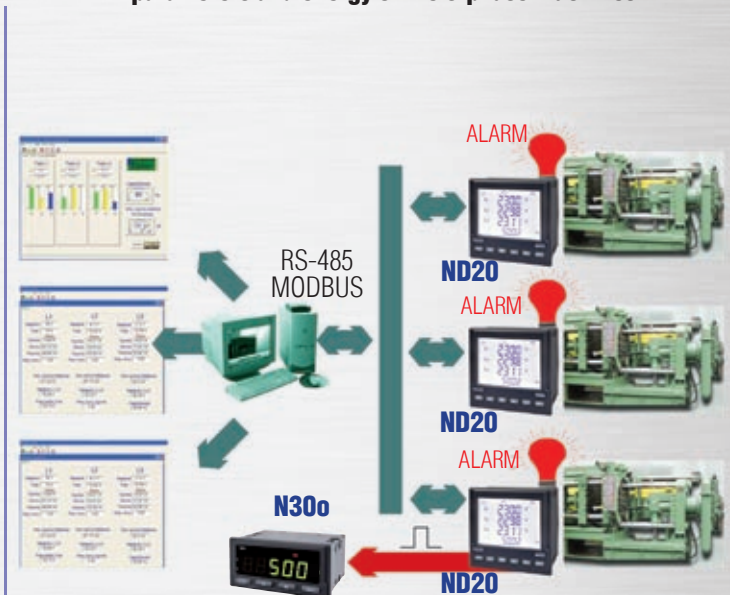
- 4-quadrant power and energy measurement
- measurement of THD and harmonics
- software for configuration of meters for free - LPConfig
- LCD or LED displays
- configurable sequence of displayed measurements
- RS-485 Modbus communication, **Ethernet**
- co-operation with current transformers (CT) and voltage transformers (VT)
- alarming based on selected parameters
- pulse output for energy retransmission

## APPLICATION EXAMPLES

Measurement and monitoring of the power consumption of the machine and archiving by KD7 paperless recorder



Measurement and displaying of the network parameters and energy of the 3-phase machines



Type Parameters	N14	ND10	ND20	N10/N10A	ND1
<b>Measurement</b>	voltage: phase, mean 3-phase, phase-to-phase, mean phase-to-phase current: phase, mean 3-phase, in neutral wire power: active, reactive, apparent 3-phase power, power factor, angle, tg φ, frequency, 15-min. active power <b>4-quadrants power and energy measurement</b>				
	3-phase active and reactive energy			3-phase active, reactive and apparent energy	
	-	-	-	-	energy tariffs (4)
	-	THD U, I	THD U, I	THD U, I	THD U, I
	-	-	harmonics up to 21st	harmonics up to 25th	harmonics up to 51st
	-	-	-	-	voltage dips and swells
					voltage asymmetry
<b>Input</b>	1 A or 5 A 57,7/100 V, 230/400 V or 400/690 V	1 A or 5 A 57,7/100 V or 230/400 V 290/500 V	1 A or 5 A 57,7/100 V or 230/400 V	1 A or 5 A 57,7/100 V or 230/400 V pulse (N10)	1 A or 5 A 57,7/100 V, 230/400 V or 400/690 V 12 x logic
<b>Output</b>	1 x relay 1 x pulse	2 x relays 1 x pulse	1 x 0/4...20 mA (option) 1 x relay 1 x pulse	N10: 1 x 0/4...20 mA 3 x relay 1 x pulse  N10A: 3 x -5...+5 mA 1 x relay	4 x 0/4...20 mA 6 x relay 2 x supplying outputs
<b>Interface</b>	RS-485 Modbus Slave - standard	RS-485 Modbus Slave option	RS-485 Modbus Slave - standard	RS-485 Modbus Slave - option	RS-485 Modbus 1 x Master, 1 x Slave <b>Ethernet</b> (HTTP, NTP, FTP, Modbus TCP), USB
<b>Galvanic isolation</b>	input/output/supply/RS-485				
<b>Display</b>	LED 3 x 3 digits (14 mm)	3.5" LCD 3 x 4 digits (16 mm)	3.5" LCD 3 x 4 (11 mm) + 1 x 5 digits (9 mm)	LED 4 x 5 digits (14 mm)	5.7" TFT touch screen, 320x240 pixel 256 colours, backlighted
<b>Supply voltage</b>	85..253 V a.c./d.c.	supplied from measuring circuit	85.. 253 V a.c./d.c. or 20..40 V a.c./d.c.	85..253 V a.c./d.c.	
<b>Protection rating frontal/rear side</b>	IP40/IP10	IP65/IP20		IP40/IP10	IP65/IP20
<b>Ambient temperature</b>	-20...23...55 °C			0...23...55 °C	
<b>External dimensions</b>	96 x 96 x 70,5 mm	96 x 96 x 77 mm		144 x 144 x 77 mm	144 x 144 x 155 mm
<b>Panel cut-out</b>	91 <sup>+0.5</sup> x 91 <sup>+0.5</sup> mm	92 <sup>+0.6</sup> x 92 <sup>+0.6</sup> mm		138 <sup>+0.5</sup> x 138 <sup>+0.5</sup> mm	138 <sup>+0.1</sup> x 138 <sup>+0.1</sup> mm
<b>Programming</b>	free LPCon software (using RS-485) or using buttons				NDSetup program (using USB or CF card) or using touch screen
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>galvanic isolation of current inputs</li> </ul>	<ul style="list-style-type: none"> <li>memory 9000 samples for mean power</li> <li>galvanic isolation of current inputs</li> </ul>	<ul style="list-style-type: none"> <li>selection of displayed quantities on each of the 20 programmable pages</li> <li>galvanic isolation of current and voltage inputs</li> </ul>	<ul style="list-style-type: none"> <li>measurement and logging of energy quality acc. to EN50160</li> <li>memory - CF card 4GB</li> <li>oscilloscope</li> <li>galvanic isolation of current and voltage inputs</li> </ul>	



N14



ND10



ND20



N10/N10A



ND1



KS3.1

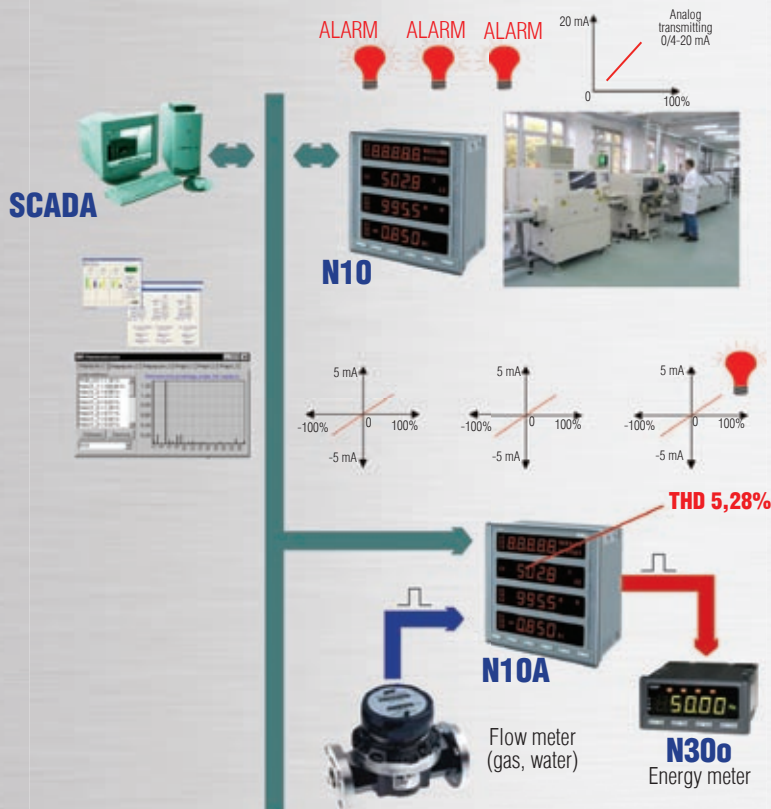


KS3.2

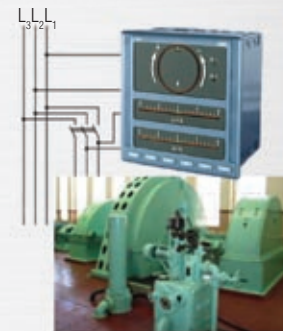
Type Parameters	KS3 synchronizing units	
	KS3.1	KS3.2
<b>Input</b>	100.0 V (Ku=1) 110.0 V (Ku=1) 240.0 V (Ku=1) 400.0 V (Ku=1)	
<b>Output</b>	2 x relays	
<b>Interface</b>	RS-485 Modbus - option	
<b>Galvanic isolation</b>	input/output/supply/RS-485	
<b>Display</b>	4 x 5 digits LED (14 mm), red colour	synchronoscope: circle with 72 diodes; differential voltage and frequency: bargraph with zero in the middle (68 diodes)
<b>Supply voltage</b>	85...253 V AC/DC or 20...40 V AC/DC	
<b>Protection rating frontal/rear side</b>	IP40/IP20	
<b>Ambient temperature</b>	0...23...55 °C	
<b>External dimensions</b>	144 x 144 x 77 mm	
<b>Panel cut-out</b>	138 <sup>+0.5</sup> x 138 <sup>+0.5</sup> mm	
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>• signalling of synchronizing condition (AL1)</li> <li>• programmable parameters</li> <li>• signalling of any network voltage range exceeding beyond 80-120% of the rated value (AL2)</li> <li>• measurement of min. and max. values of voltage and frequency</li> </ul>	

## APPLICATION EXAMPLES

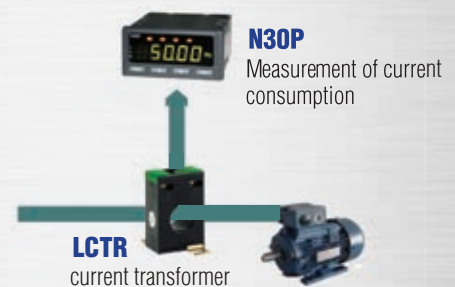
### Measurement and displaying of the network parameters and energy of the 3-phase machines



### Automatic synchronization, while connecting a generator to the main power network

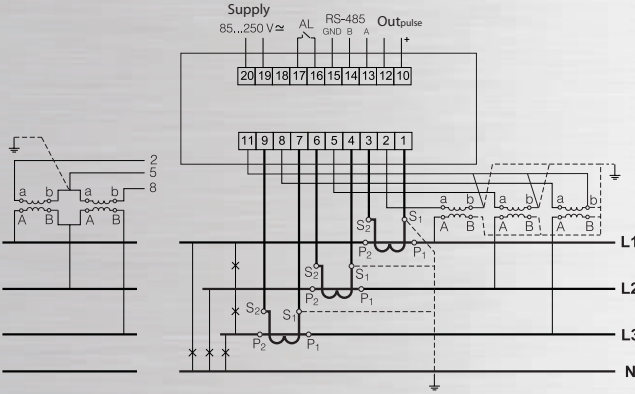


### Measurement of a.c. current of 1-phase engine



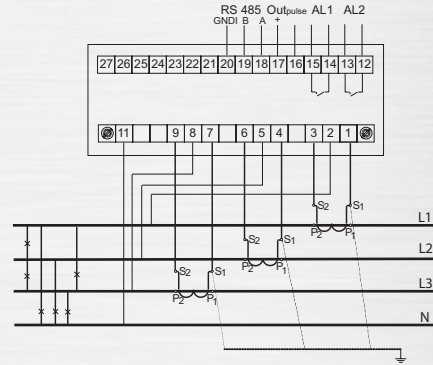
### N14

Fig. 58 Electrical connections of N14



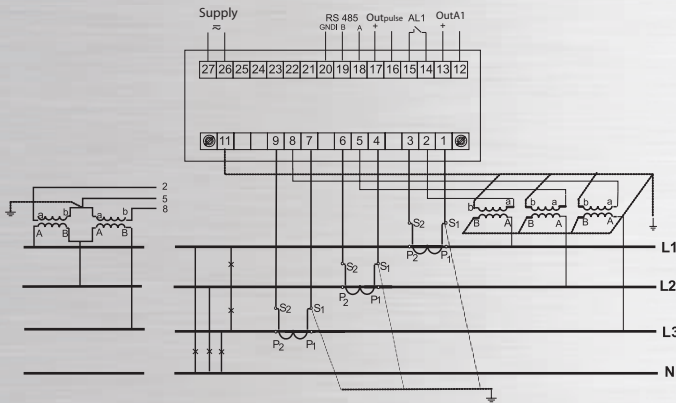
### ND10

Fig. 59 Electrical connections of ND10



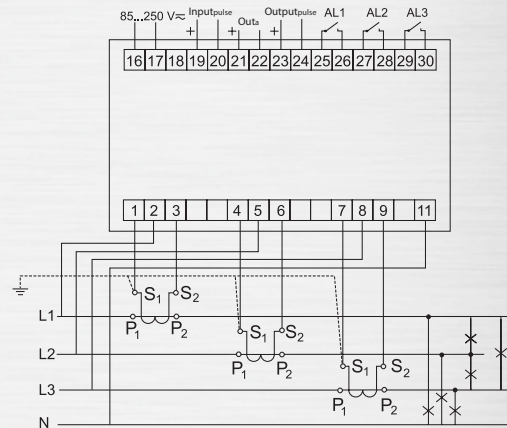
### ND20

Fig. 60 Electrical connections of ND20



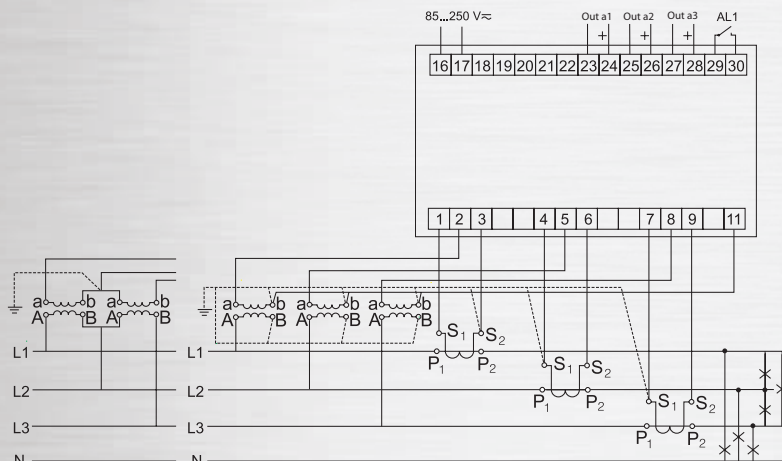
### N10

Fig. 61 Electrical connections of N10



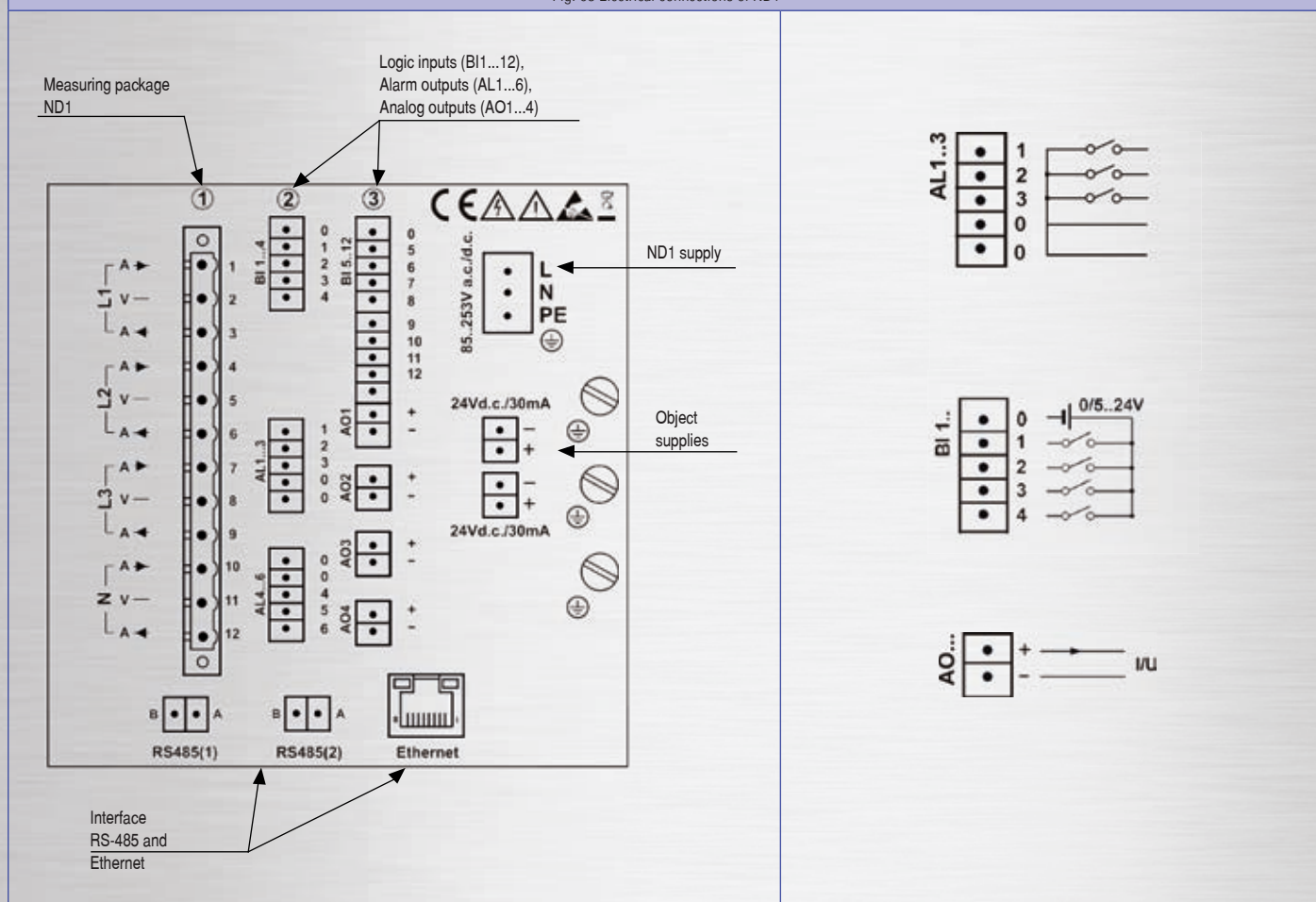
### N10A

Fig. 62 Electrical connections of N10A



### ND1

Fig. 63 Electrical connections of ND1

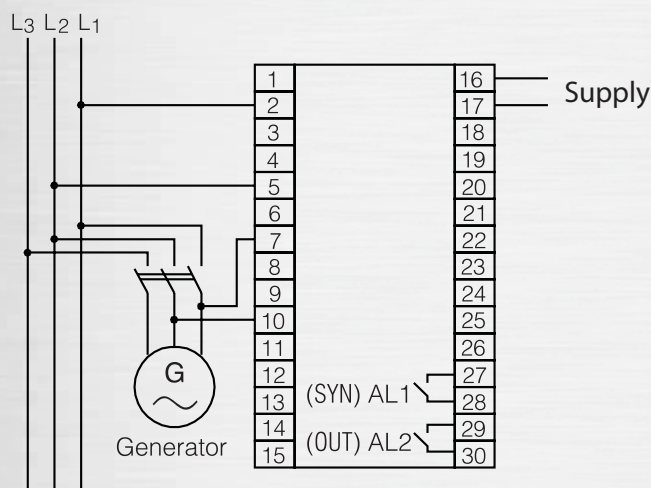


# SYNCHRONIZING UNITS

## CONNECTION DIAGRAMS

### KS3.1 AND KS3.2

Fig.64 Electrical connections of KS3





METERS AND ANALYSERS OF POWER NETWORK PARAMETERS

**TABLE 34. N14 ORDERING CODE:**

N14 -	X	X	XX	X
<b>Current input In:</b>				
1 A (X/1)	1			
5 A (X/5)	2			
<b>Voltage input (phase/phase-to-phase) Un:</b>				
3 x 57.7/100 V	1			
3 x 230/400 V	2			
3 x 400/690 V**	3			
<b>Version:</b>				
standard			00	
input voltage 3 x 110/ 190 V			01	
custom-made*			XX	
<b>Acceptance tests:</b>				
without extra requirements				0
with an extra quality inspection certificate				1
acc. to customer's request*				X

\*\* - version only for direct measurement  
\* - after agreeing with the manufacturer

**TABLE 35. ND10 ORDERING CODE:**

ND10 -	X	X	X	XX	X	X
<b>Current input In:</b>						
1 A (X/1)	1					
5 A (X/5)	2					
<b>Voltage input (phase/phase-to-phase) Un:</b>						
3 x 57.7/100 V	1					
3 x 230/400 V	2					
3 x 290/500 V	3					
<b>Digital output:</b>						
without RS-485 interface				0		
with RS-485 interface				1		
<b>Version:</b>						
standard				00		
custom-made*				XX		
<b>Language:</b>						
Polish					P	
English					E	
other*					X	
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

**TABLE 36. ND20 ORDERING CODE:**

ND20 -	X	X	X	X	XX	X	X
<b>Current input In:</b>							
1 A	1						
5 A	2						
<b>Voltage input (phase/phase-to-phase) Un:</b>							
3 x 57.7/100 V	1						
3 x 230/400 V	2						
<b>Analog current output:</b>							
without analog output						0	
with programmable output 0(4)..20 mA						1	
<b>Supply voltage:</b>							
85..253 V a.c./d.c. (40..400 Hz)						1	
20..40 V a.c./d.c. (40..400 Hz)						2	
<b>Version:</b>							
standard						00	
custom-made*						XX	
<b>Language:</b>							
Polish							P
English							E
other*							X
<b>Acceptance tests:</b>							
without extra requirements							0
with an extra quality inspection certificate							1
acc. to customer's request*							X

**TABLE 37. N10/N10A ORDERING CODE:**

N10/N10A -	X	X	X	X	X	XX	X
<b>Current input In:</b>							
1 A (X/1)	1						
5 A (X/5)	2						
on order*	X						
<b>Input phase voltage Un:</b>							
100 V	1						
400 V	2						
custom-made*	X						
<b>Digital output:</b>							
without interface						0	
with RS-485 interface						1	
<b>Display:</b>							
red						1	
green						2	
<b>Supply voltage:</b>							
85..250 V d.c., a.c. 40..400 Hz						0	
custom-made*						X	
<b>Version:</b>							
standard						00	
custom-made*						XX	
<b>Acceptance tests:</b>							
without extra requirements							0
with an extra quality inspection certificate							1
acc. to customer's request*							X

**TABLE 38. ND1 ORDERING CODE:**

ND1 -	X	X	XX	X	X
<b>Input current:</b>					
1 A	1				
5 A	2				
<b>Input voltage:</b>					
57.7/100 V		1			
230/400 V		2			
400/690 V		3			
<b>Version:</b>					
standard				00	
in a portable case, without RJ45 socket				PO	
in a portable case, with RJ45 socket				PE	
<b>Language:</b>					
Polish					P
English					E
other*					X
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

\* - after agreeing with the manufacturer

**Note!**  
Each ND1 analyser is equipped with 6 alarms (electro-mechanic relays), 4 analog outputs, 12 logic inputs and Ethernet interface.

SYNCHRONIZING UNITS

**TABLE 39. KS3 ORDERING CODE:**

KS3	X	XX	X	X	XX	X
<b>Kind of display:</b>						
digital display	1					
bargraphs (diode lines)	2					
<b>Voltage input:</b>						
100 V		01				
110 V		02				
240 V		03				
400 V		04				
<b>Digital output:</b>						
without interface				0		
with RS-485 interface				1		
<b>Supply voltage:</b>						
85 ... 250 V d.c./a.c.					0	
24 V d.c./a.c.					1	
<b>Version:</b>						
standard					00	
custom-made					XX	
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

\* - after agreeing with the manufacturer

# CONTROLLERS



## APPLICATION:

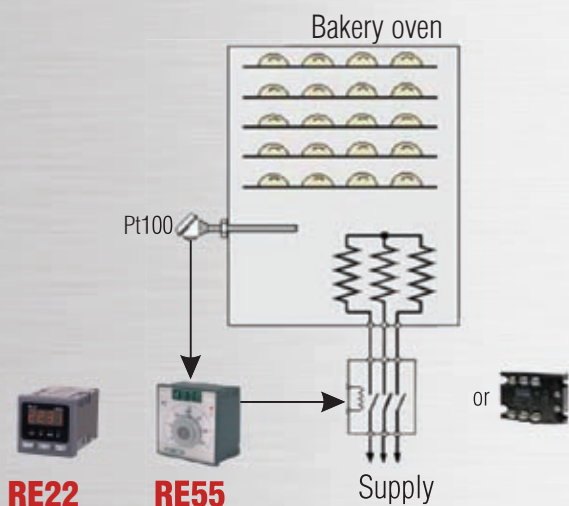
- plastics processing industry (injection moulding machines)
- food industry
- bakery ovens
- drying chambers
- industrial ovens (blast furnaces, kilns, etc.)
- packaging appliances
- to control other measuring quantities converted into standard signals

## SELECTED FEATURES:

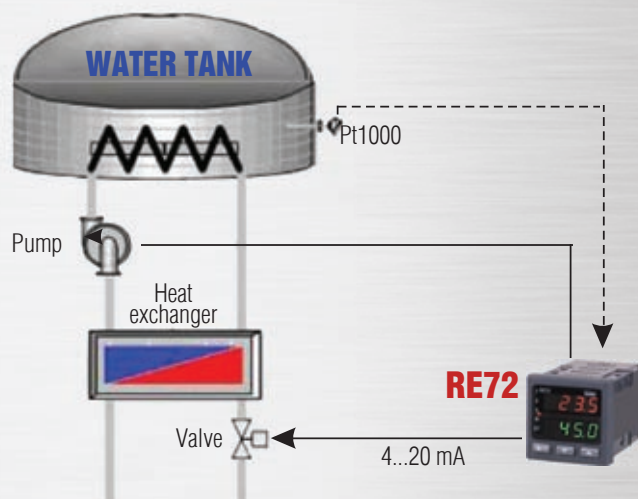
- universal/programmable measuring inputs allow implementing in diverse applications
- easy installation thanks to the function of automatic selection of PID parameters
- smaller overshoot thanks to the setpoint soft start function
- program following control option useful for instance in drying chambers, hardening furnaces and kilns
- bumpless transfer between manual and automatic control
- an installation is protected through the function of switching off the control output in case of measuring sensor damage
- remote control using RS-485 Modbus digital interface, **Ethernet**

## APPLICATION EXAMPLES

### Bakery oven control



### Temperature measurement and control in a water tank



Type Parameters	Industrial process controllers							
	RE22	RE70 New!	RE71	RE81	RE72	RE82	RE92 New!	RE19
Number of channels	1	1	1	1	1	1	2	2
Input	programmable Pt100/1000 J, T, K, S, R, B, E, N, L 0(4)...20 mA 0...5/10 V	programmable Pt100/1000 J, T, K, S, R, B, N	fixed Pt100 J, K, S		programmable Pt100/1000 J, T, K, S, R, B, E, N, L 0(4)...20 mA 0...5/10 V		programmable 2x Pt100/500/1000, Ni100, Cu100 J, T, K, S, R, B, E, N, L 0(4)...20 mA 0...(5)10 V	programmable 2x Pt100/500/1000, Ni100, Cu100 J, T, K, S, R, B, E, N, L 0(4)...20 mA 0...(5)10 V
Additional input	-	-	-	-	logic/ current transformer input/ 0(4)...20 mA (option)	2 x logic/ current transformer input/ 0(4)...20 mA	3x logic and 0(4)...20 mA / 0...(5)10 V / potentiometer (100)1000 Ω (option)	2x logic and 0...(5)10 V / 0(4)...20 mA / potentiometer (100)1000 Ω (option)
Output	relay or OC 0/5 V	relay	relays or 0/6 V	max. 2x relays / 1x OC 0/6 V (option)	2 x relays / OC 0/5 V / analog 0(4)...20 mA / 0...10 V / supplying output 24 V d.c. 30 mA (option)	2x relays and 2x relays / OC 0/5 V / analog 0(4)...20 mA / 0...10 V (option) supplying output 24 V d.c. 30 mA (option)	max. 6x relays / 2x OC 0/5 V / 2x analog 0(4)...20 mA / 0...10 V (option) supplying output 24 V d.c. 30 mA (option)	max. 4x relays / 4x OC / 2x binary 0/15 V / 2x analog 0(4)...20 mA, 0...10 V (option)
Interface	-	RS-485 Modbus (for configuration only)	-	-	RS-485 Modbus	RS-485 Modbus	RS-485 Modbus, Ethernet (optionally)	RS-485 Modbus (optionally)
Galvanic isolation	input/output/supply		input/output/supply/PD14		input/output/supply/RS-485			
Alarm	-	-	-	1	max. 2	max. 3	max. 6	max. 3
Control	on/off or PID heating or cooling	on/off or SMART PID, heating or cooling	on/off / SMART PID heating or cooling	on/off or SMART PID, heating/cooling/step-by-step	programmed on/off SMART PID heating/cooling/step-by-step		programmed on/off SMART PID heating/cooling/step-by-step	programmed on/off, PID heating/cooling/step-by-step
Display	red LED 4 digits (9,2 mm)		red LED 4 digits (7,6 mm)	red and green LED 2 x 4 digits (7,6 mm)	red and green LED 2 x 4 digits (7,6 mm) + 2 bargraphs	LCD 3.5" TFT 320 x 240 pixels colour	red and green LED 2 x 5 digits (10mm) + LCD 2 x 16 characters	
Supply voltage	230; 110; 24 V a.c.	230 V a.c.			85...253 V a.c./ d.c. 20...40 V a.c./d.c.		85...253 V a.c./d.c.	85...253 V a.c./d.c. 18...23 V d.c.
Protect. rating frontal/rear side	IP65/IP20							IP40/IP20
Ambient temp.	0...23...50 °C						0...23...40 °C	
External dimensions	48 x 48 x 93 mm			48 x 96 x 93 mm	48 x 48 x 93 mm	48 x 96 x 93 mm	96 x 96 x 99 mm	96 x 96 x 81 mm
Panel cut-out	45 <sup>+0.6</sup> x 45 <sup>+0.6</sup> mm			45 <sup>+0.6</sup> x 92 <sup>+0.6</sup> mm	45 <sup>+0.6</sup> x 45 <sup>+0.6</sup> mm	45 <sup>+0.6</sup> x 92 <sup>+0.6</sup> mm	92 <sup>+0.5</sup> x 92 <sup>+0.5</sup> mm	
Additional functions	• soft start	-	-	-	<ul style="list-style-type: none"> <li>• soft start</li> <li>• 6 types of alarms</li> <li>• alarm LATCH function</li> </ul>		<ul style="list-style-type: none"> <li>• programmed control (15 programs with 15 segments in each)</li> </ul>	<ul style="list-style-type: none"> <li>• programmed control (20 programs with 15 segments in each)</li> </ul>
							<ul style="list-style-type: none"> <li>• programmed control (15 programs with 15 segments in each)</li> </ul>	



RE22



RE70



RE71



RE72



RE81



RE82



RE92



RE19



RE55

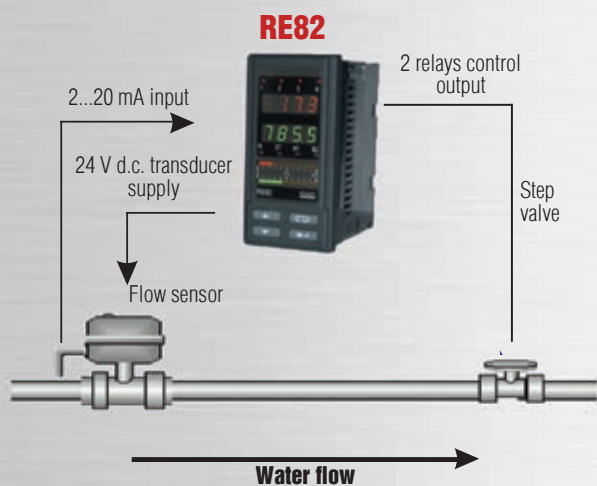


RE60

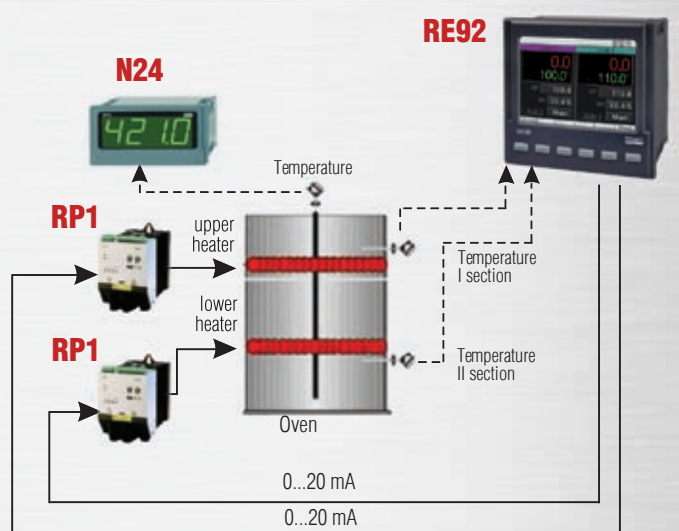
Type	Industrial process controllers	
Parameters	RE55	RE60
Number of channels	1	1
Input	fixed: Pt100 J, K, S	
Additional input	-	
Output	max. 2x relays / 1x logic 0/5 V (option)	max. 3x relays / 1x logic 0/5 V (option)
Alarm	1	max 2
Control	on/off, PID, heating or cooling	
Galvanic isolation	input/output/supply	
Display	green LED 4 digits (10 mm)	LCD (2 x 8 characters)
Supply voltage	85 .. 253 V a.c./d.c.	24, 110, 230 V a.c. 18...72 V d.c.
Protection rating frontal/rear side	IP40/IP20	IP40/IP20
Ambient temperature	0...23...50 °C	
External dimensions	96 x 96 x 65 mm	45 x 100 x 120 mm
Panel cut-out	91 <sup>+0.6</sup> x 91 <sup>+0.6</sup> mm	assembly on a rail

## APPLICATION EXAMPLES

**Water flow measurement and 3-stage valve control**



**Batch temperature measurement with stepless control of heaters power in a hardening furnace**



## RE22

Fig. 65 View of RE22 controller connection strips

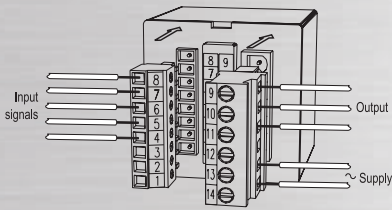


Fig.66 Connection of input signals

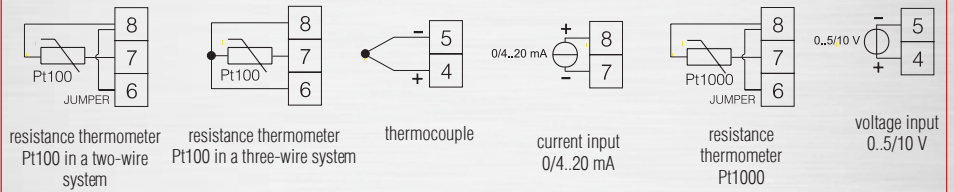
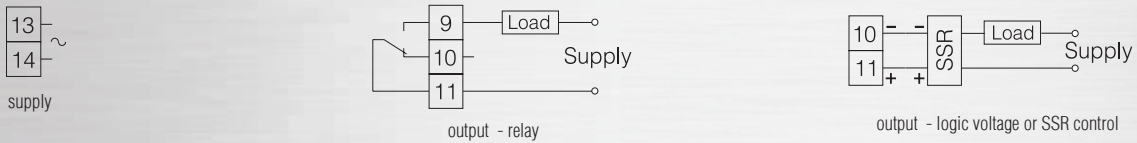


Fig. 67 Connection of supply and load circuit



## RE70

Fig. 68 View of RE70 controller connection strips

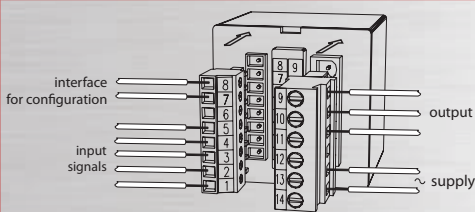


Fig.69 Connection of input signals

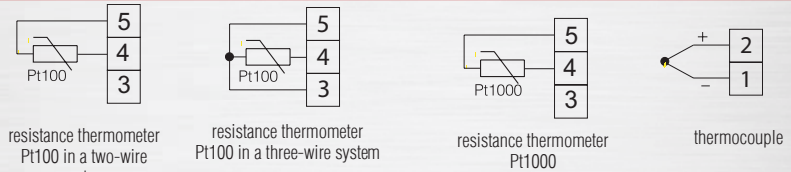


Fig. 70 Connection of supply and load circuit

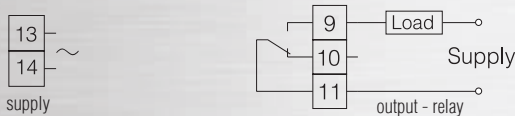


Fig. 71 Interface RS-485 (only for configuration)



## RE71

Fig. 72 View of RE71 controller connection strips

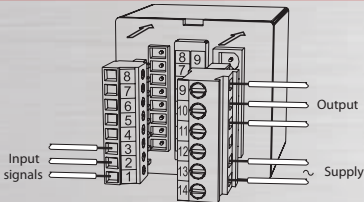


Fig.73 Connections of input signals

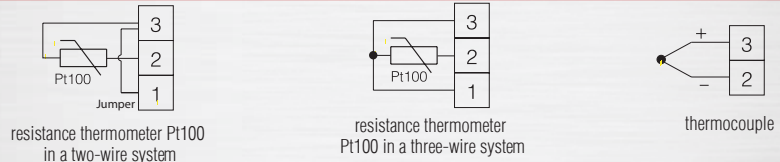
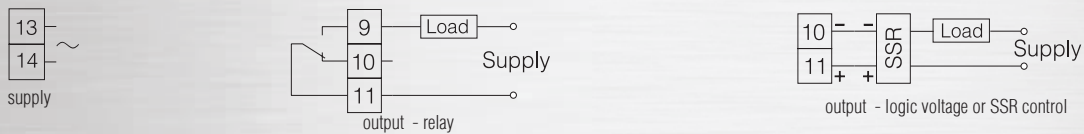


Fig.74 Connection of supply and load circuit



## RE81

Fig. 75 View of RE81 controller connection strips

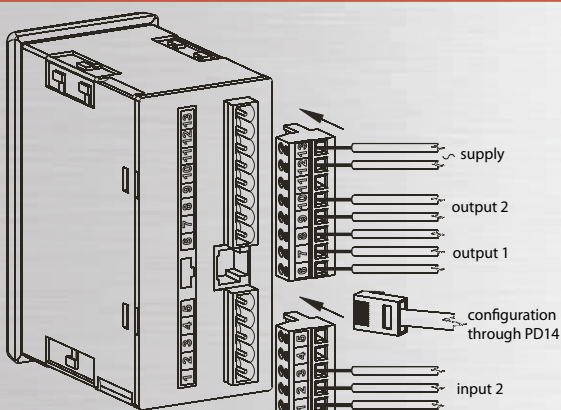


Fig.76 Connections of input signals

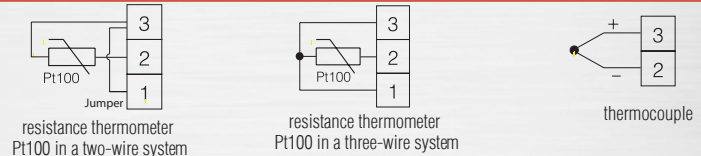


Fig.77 Connection of supply and load circuit



## RE72

Fig. 78 View of RE72 controller connection strips

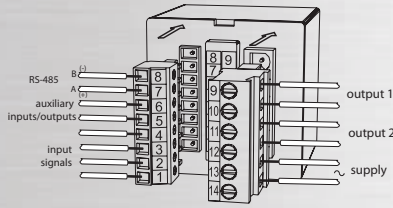


Fig.79 Connection of input signals

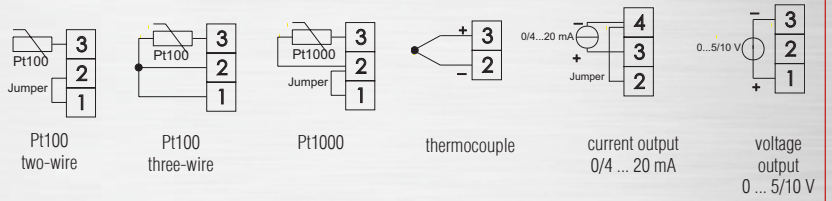


Fig.80 Optional connections

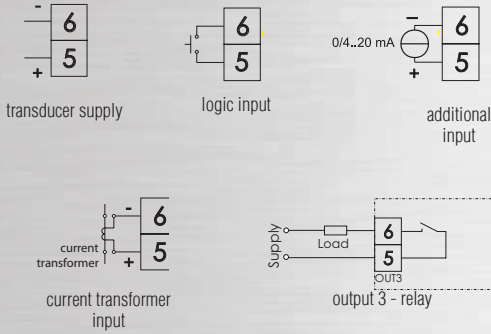
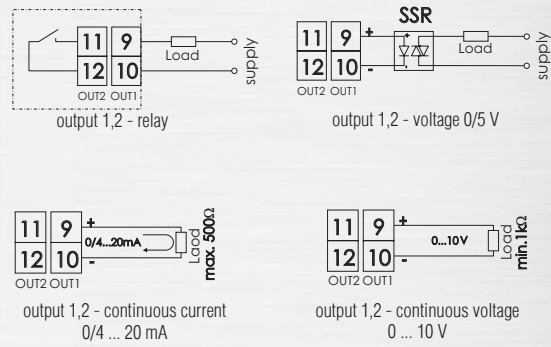


Fig.81 Connection of load circuit



## RE82

Fig. 82 View of RE82 controller connection strips

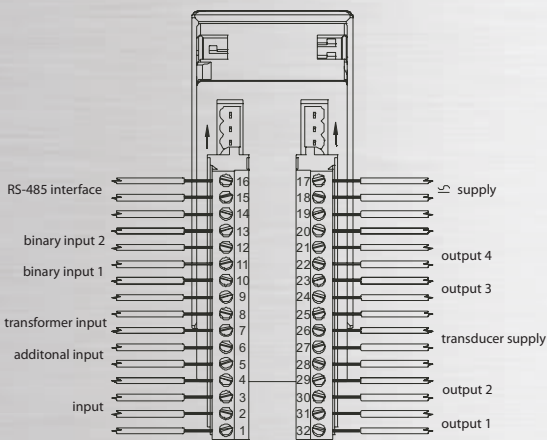


Fig.83 Connection of input signals

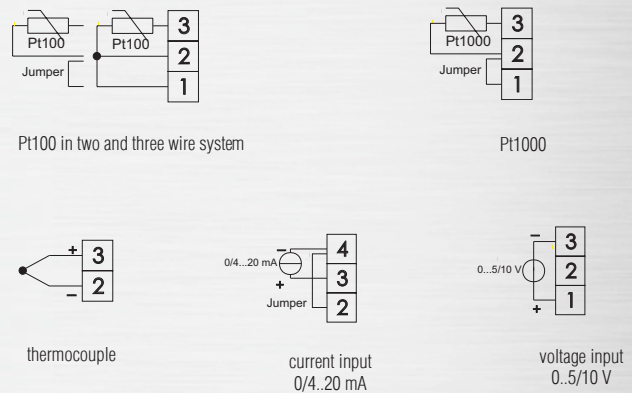


Fig.84 Remaining connections

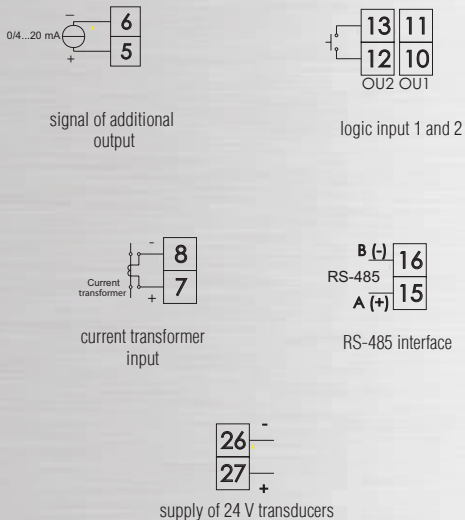
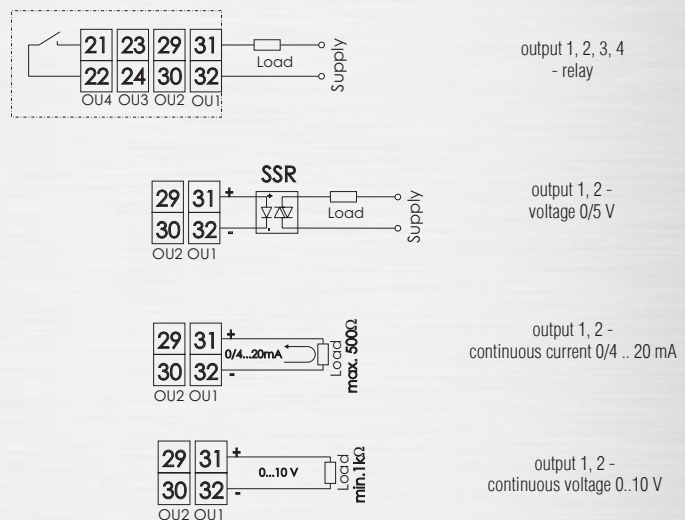
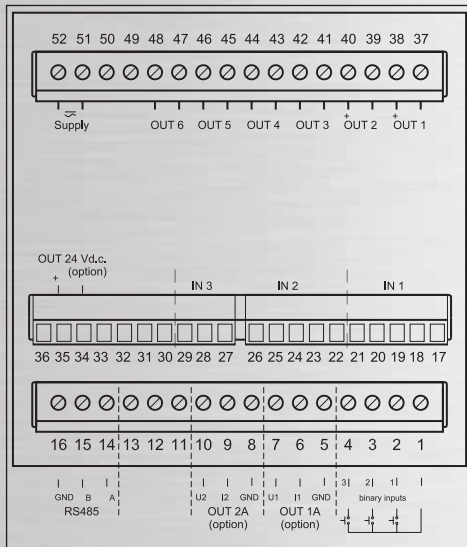


Fig.85 Connection of load circuit



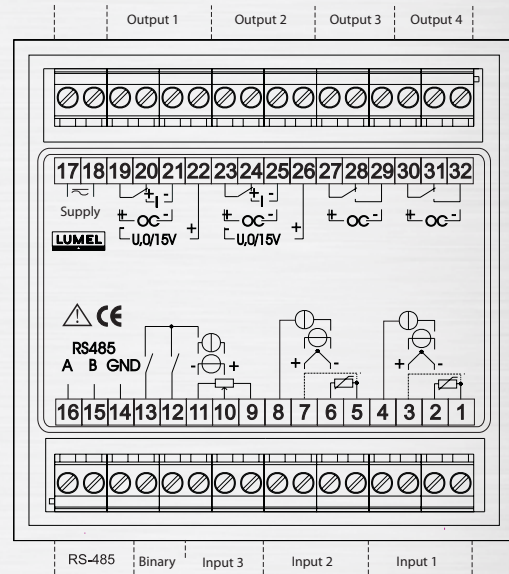
## RE92

Fig. 86 View of RE92 controller connection strips



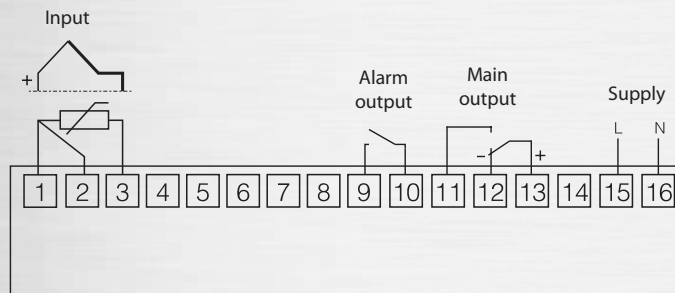
## RE19

Fig. 87 View of RE19 controller connection strips



## RE55

Fig. 88 View of RE55 controller connection strips



## RE60

Fig. 89 View of RE60 controller connection strips

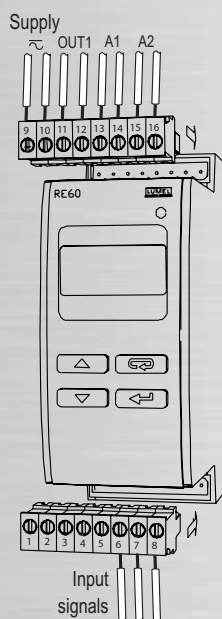


Fig.90 Connection of input signals

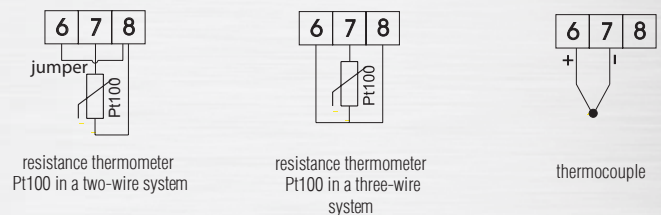
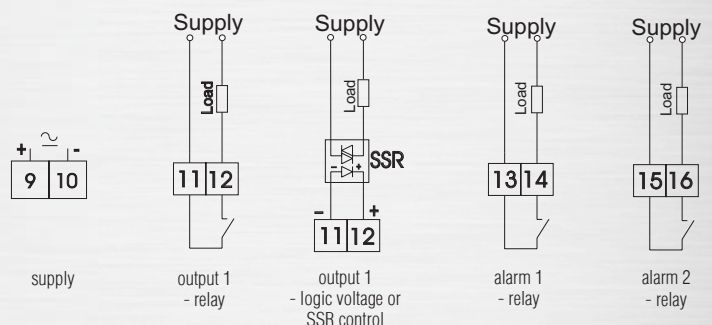


Fig.91 Connection of supply and load circuit



## INDUSTRIAL PROCESS CONTROLLERS

TABLE 40. RE22 ORDERING CODE:

	RE22 -	X	X	X	XX	X
<b>Input:</b>						
universal for RTD and TC sensors	1					
universal linear:						
- current: 0/4..20 mA	2					
- voltage: 0..5/10V						
on order*	X					
<b>Output:</b>						
relay	1					
logic 0/5 V for SSR control	2					
on order*	X					
<b>Supply:</b>						
230 V 50/60 Hz	1					
110 V 50/60 Hz	2					
24 V 50/60 Hz	3					
on order*	X					
<b>Version:</b>						
standard						00
custom-made*						XX
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

TABLE 41. RE71 ORDERING CODE:

	RE71 -	XX	X	X	X	X
<b>Input:</b>						
Pt100 (-50..100 °C)	01					
Pt100 (0..250 °C)	02					
Pt100 (0..600 °C)	03					
thermocouple J (Fe-CuNi)(0...250°C)	04					
thermocouple J (Fe-CuNi)(0...600°C)	05					
thermocouple J (Fe-CuNi)(0...900°C)	06					
thermocouple K (NiCr-NiAl)(0...600°C)	07					
thermocouple K (NiCr-NiAl)(0...900°C)	08					
thermocouple K (NiCr-NiAl)(0...1300°C)	09					
thermocouple S (PtRh10-Pt)(0...1600°C)	10					
<b>Output:</b>						
relay	1					
logic 0/6 V to SSR control	2					
<b>Version:</b>						
standard						00
custom-made*						XX
<b>Language:</b>						
Polish						P
English						E
other*						X
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

TABLE 42. RE81 ORDERING CODE:

	RE81 -	XX	X	X	X	X
<b>Input:</b>						
Pt100 (-50..100 °C)	01					
Pt100 (0..250 °C)	02					
Pt100 (0..600 °C)	03					
thermocouple J (Fe-CuNi)(0...250°C)	04					
thermocouple J (Fe-CuNi)(0...600°C)	05					
thermocouple J (Fe-CuNi)(0...900°C)	06					
thermocouple K (NiCr-NiAl)(0...600°C)	07					
thermocouple K (NiCr-NiAl)(0...900°C)	08					
thermocouple K (NiCr-NiAl)(0...1300°C)	09					
thermocouple S (PtRh10-Pt)(0...1600°C)	10					
<b>Output 1**:</b>						
relay	1					
logic 0/6 V to SSR control	2					
<b>Version:</b>						
standard						00
custom-made*						XX
<b>Language:</b>						
Polish						P
English						E
other*						X
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

\*\* - output 2: relay

TABLE 43. RE70 ORDERING CODE:

	RE70 -	X	X
<b>Language:</b>			
Polish			P
English			E
other*			X
<b>Acceptance tests:</b>			
without extra requirements			0
with an extra quality inspection certificate			1
acc. to customer's request*			X

\* - after agreeing with the manufacturer

TABLE 44. RE72 ORDERING CODE:

	RE72 -	X	X	X	X	X	X	X
<b>Output 1:</b>								
relay	1							
voltage 0/5 V	2							
continuous current 0/4 ... 20 mA	3							
continuous voltage 0 ... 10 V	4							
<b>Output 2:</b>								
relay <sup>1)</sup>	1							
voltage 0/5 V	2							
continuous current 0/4 ... 20 mA	3							
continuous voltage 0 ... 10 V	4							
<b>Options:</b>								
none	0							
output 3 - relay	1							
logic input	2							
current transformer input <sup>1)</sup>	3							
additional current input 0/4 ... 20 mA	4							
transducer supply 24 V d.c. 1 W	5							
<b>Supply:</b>								
85 ... 253 V a.c./ d.c.	1							
20 ... 40 V a.c./ d.c.	2							
<b>Version:</b>								
standard								00
custom-made <sup>2)</sup>								XX
<b>Language:</b>								
Polish								P
English								E
other <sup>2)</sup>								X
<b>Acceptance tests:</b>								
without extra requirements								0
with an extra quality inspection certificate								1
acc. to customer's request <sup>2)</sup>								X

1) - only, when a relay or voltage output 0/5 V is also selecteds  
2) - after agreeing with the manufacturer

TABLE 45. RE82 ORDERING CODE:

	RE82 -	X	X	X	X	X	X	X
<b>Output 1:</b>								
relay	1							
voltage 0/5 V	2							
continuous current 0/4 ... 20 mA	3							
continuous voltage 0 ... 10 V	4							
<b>Output 2:</b>								
relay <sup>1)</sup>	1							
voltage 0/5 V	2							
continuous current 0/4 ... 20 mA	3							
continuous voltage 0 ... 10 V	4							
<b>Transducer supply:</b>								
none	0							
supply of relays 24 V d.c. 1 W	1							
<b>Supply:</b>								
85 ... 253 V a.c./ d.c.	1							
20 ... 40 V a.c./ d.c.	2							
<b>Version:</b>								
standard								00
custom-made <sup>2)</sup>								XX
<b>Language:</b>								
Polish								P
English								E
other <sup>2)</sup>								X
<b>Acceptance tests:</b>								
without extra requirements								0
with an extra quality inspection certificate								1
acc. to customer's request <sup>2)</sup>								X

1) only, when on the output 1, a relay or voltage 0/5 V is also selected  
2) after agreeing with the manufacturer



**TABLE 46. RE92 ORDERING CODE:**

RE92 -	X	X	X	X	X	XX	X	X
<b>Additional input:</b>								
lack	0							
current: 0/4..20 mA	1							
voltage: 0..10 V	2							
potentiometric transmitter: 1000 Ω	3							
<b>Output 1 and 2:</b>								
2 relays	1							
2 logic outputs 0/5 V	2							
<b>Analog output:</b>								
lack	0							
2 continuous 0/4..20 mA and 0..10 V	1							
<b>Ethernet/SD card:</b>								
lack	0							
with Ethernet/SD card	1							
<b>Transducer supply:</b>								
lack						0		
24 V d.c.						1		
<b>Version:</b>								
standard								00
custom-made*								XX
<b>Language:</b>								
Polish								P
English								E
other*								X
<b>Acceptance tests:</b>								
without extra requirements								0
with an extra quality inspection certificate								1
acc. to customer's request*								X

\* - after agreeing with the manufacturer

in standard version: 2 universal inputs, 3 logic inputs, 6 relay outputs, RS-485 Modbus Slave

**TABLE 47. RE19 ORDERING CODE:**

RE19 -	X	X	X	X	X	X
<b>Version:</b>						
constant-valued control	S					
step-by-step control	V					
programmable control	P					
on order*	X					
<b>Additional input:</b>						
without input	0					
current: 0/4..20 mA	1					
voltage: 0..10 V, 0..5 V, 1..5 V						
potentiometric transmitter: 100 Ω	2					
potentiometric transmitter: 1000 Ω						
on order*	X					
<b>Outputs:</b>						
4 relays						1
4 OC transistors						2
1 transistor 0/15 V + 3 relays						3
2 transistors 0/15 V + 2 relays						4
1 continuous + 3 relays						5
1 continuous + 3 OC transistors						6
2 continuous + 2 relays						7
2 continuous + 2 OC transistors						8
1 continuous + 1 transistor 0/15 V + 2 relays						9
on order*	X					
<b>Interface RS-485:</b>						
without Interface						0
with MODBUS protocol						1
<b>Supply voltage:</b>						
85..253 V a.c./d.c.						1
18..30 V d.c.						2
<b>Acceptance tests:</b>						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

**TABLE 48. RE55 ORDERING CODE:**

RE55 -	XX	X	X	XX	X
<b>Input:</b>					
Pt100 (-50..100 °C)	01				
Pt100 (0..100 °C)	02				
Pt100 (0..150 °C)	03				
Pt100 (0..250 °C)	04				
Pt100 (0..400 °C)	05				
Pt100 (0..600 °C)	06				
thermocouple J - Fe-CuNi (0..250 °C)	07				
thermocouple J - Fe-CuNi (0..400 °C)	08				
thermocouple J - Fe-CuNi (0..600 °C)	09				
thermocouple J - Fe-CuNi (0..900 °C)	10				
thermocouple K - NiCr-NiAl (0..600 °C)	11				
thermocouple K - NiCr-NiAl (0..900 °C)	12				
thermocouple K - NiCr-NiAl (0..1300 °C)	13				
thermocouple S - PtRh10-Pr (0..1600 °C)	14				
on order*	99				
<b>Version:</b>					
on-off controller		1			
PID controller		2			
PID controller configurable by buttons and with alarm output		3			
<b>Control output:</b>					
relay			1		
voltage 0/5 V			2		
<b>Version:</b>					
standard					00
custom-made*					XX
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

**TABLE 49. RE60 ORDERING CODE:**

RE60 -	XX	X	X	X	X
<b>Input:</b>					
Pt100 (-50..100 °C)	01				
Pt100 (0..250 °C)	02				
Pt100 (0..600 °C)	03				
thermocouple J - Fe-CuNi (0..250 °C)	04				
thermocouple J - Fe-CuNi (0..600 °C)	05				
thermocouple J - Fe-CuNi (0..900 °C)	06				
thermocouple K - NiCr-NiAl (0..600 °C)	07				
thermocouple K - NiCr-NiAl (0..900 °C)	08				
thermocouple K - NiCr-NiAl (0..1300 °C)	09				
thermocouple S - PtRh10-Pr (0..1600 °C)	10				
on order	XX				
<b>Main output:</b>					
relay		1			
logic 0/5 V to SSR control		2			
on order		X			
<b>Alarm outputs:</b>					
without outputs			0		
1 relay			1		
2 relays			2		
on order			X		
<b>Supply:</b>					
230 V a.c. 50/60 Hz				1	
110 V a.c. 50/60 Hz				2	
24 V a.c. 50/60 Hz				3	
18..27 V d.c.				4	
on order				X	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

\* - after agreeing with the manufacturer

# CONTROLLER FOR INJECTION MOULDS



## APPLICATION:

- temperature control in injection mould with heated channels (SR11)

## SELECTED FEATURES

- Fuzzy Logic algorithm ensures a high accuracy temperature control and optimal energy consumption
- soft-start function and leakage current monitoring ensure prolonged heaters reliability and operation safety for users
- during a break in system operation, a decreased temperature is maintained, what ensures a fast restart of the system
- damage detection:
  - too high heater leakage current,
  - damage of the load circuit,
  - short-circuit, break or inverse polarization in the sensor circuit.

## APPLICATION EXAMPLES

### Temperature control in a injection mould



**SR11 system**



Injection machine

Type	System for injection moulds with heated channels
Parameters	SR11
Number of channels	1...8
Input	fixed Fe-CuNi (J) logic 24 V d.c.
Output	1 output per control zone (15 A)
Control	Fuzzy Logic, PID with self-tuning
Interface	RS-485 with MODBUS protocol (option)
Display	LED 14 mm 2 x 3 digits
Supply voltage	230 V a.c. (for system with 1 control zone) 3 x 230/ 400 V a.c. (for system with 2...8 control zones)
Protection rating	IP30
Ambient temperature	0...40 °C
External dimensions	77.5 x 200 x 355mm (1 control zone) 215 x 197 x 355mm (2 or 3 control zones) 365 x 197 x 355mm (4, 5 or 6 control zones) 465 x 197 x 355 (7 or 8 control zones)
Additional functions	<ul style="list-style-type: none"> <li>Fuzzy Logic algorithm ensures a high accuracy temperature control and optimal energy consumption</li> <li>soft-start function and leakage current monitoring ensure prolonged heaters reliability and operation safety for users</li> <li>during a break in system operation, a decreased temperature is maintained, what ensures a fast restart of the system</li> <li>damage detection:                             <ul style="list-style-type: none"> <li>- too high heater leakage current,</li> <li>- damage of the load circuit,</li> <li>- short-circuit, break or inverse polarization in the sensor circuit.</li> </ul> </li> </ul>



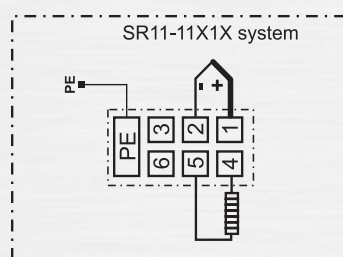
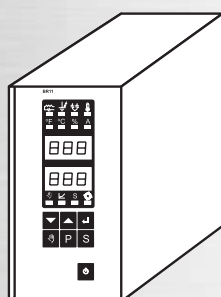
SR11

CONNECTION DIAGRAMS

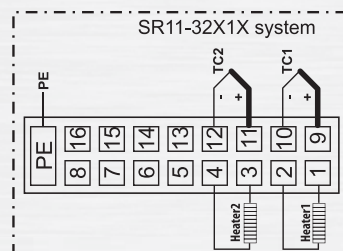
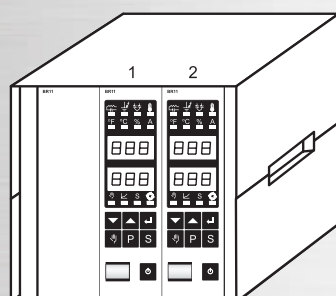
SR11

Fig. 85 View of individual versions of the SR11 system

SR11-11X1X

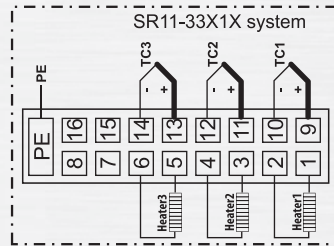
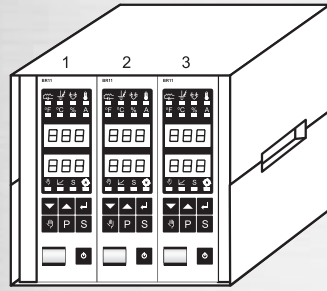


SR11-32X1X

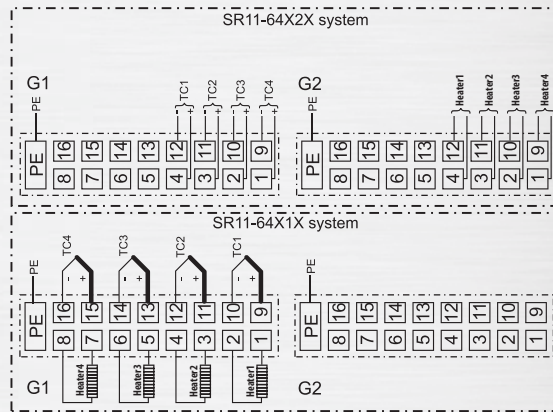
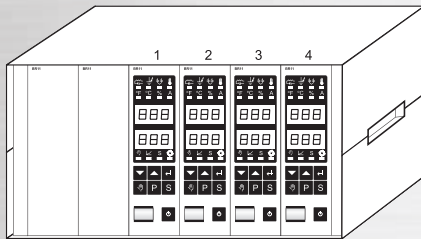


## SR11

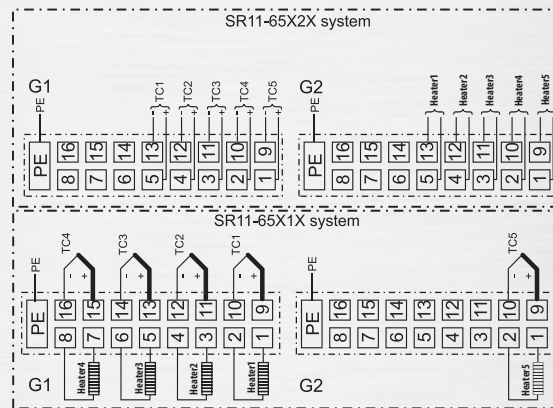
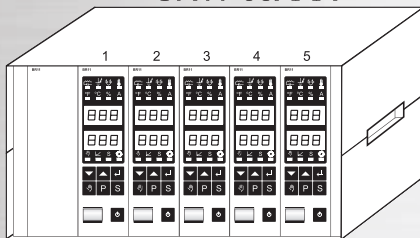
### SR11-33X1X



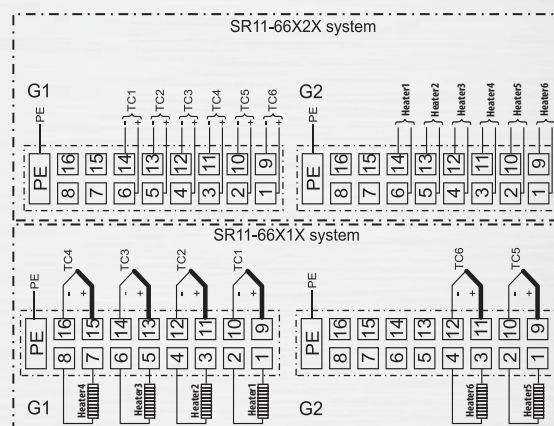
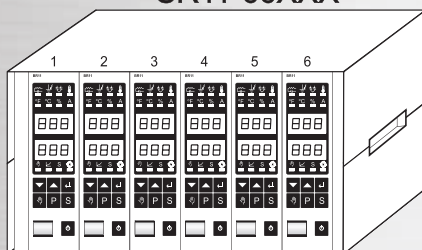
### SR11-64XXX



### SR11-65XXX

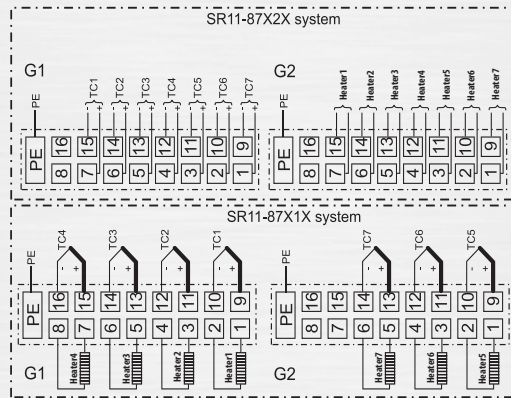
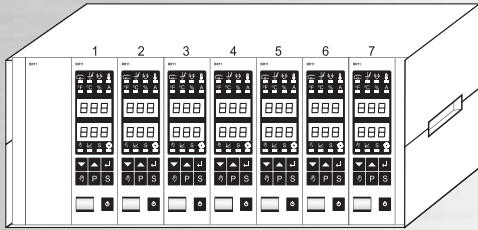


### SR11-66XXX



SR11

SR11-87XXX



SR11-88XXX

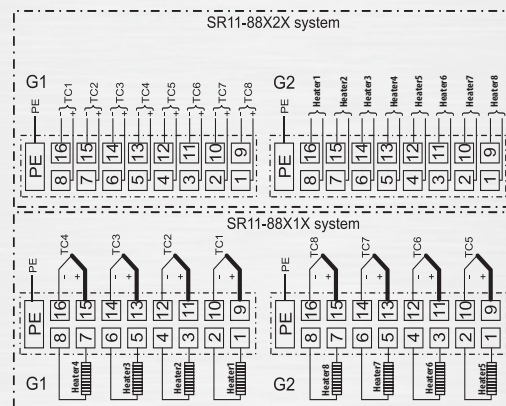
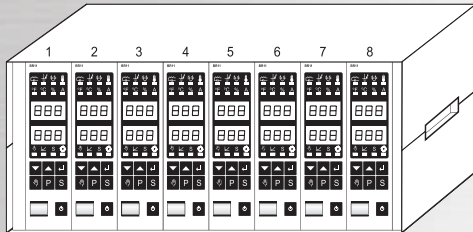
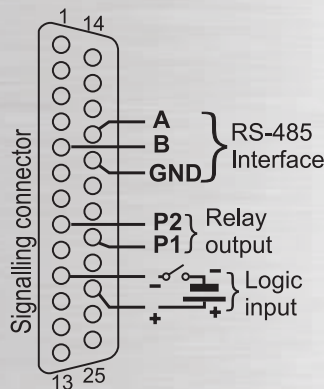


Fig. 92 Way of SR11 system external connections



ORDERING CODES

SYSTEM FOR INJECTION MOULDS WITH HEATED CHANNELS

TABLE 50. SR11 ORDERING CODE:

	SR11 -	X	X	X	X
<b>Housing dimensions:</b>					
housing width: 77.5 mm					
number of controllers: 1	1				
housing width: 215 mm					
number of controllers: 2, 3	3				
housing width: 365 mm					
number of controllers: 4, 5, 6	6				
housing width: 465 mm					
number of controllers: 7, 8	8				
<b>Number of controllers:</b>					
1 controller		1			
2 controllers		2			
3 controllers		3			
4 controllers		4			
5 controllers		5			
6 controllers		6			
7 controllers		7			
8 controllers		8			
<b>Interface RS-485:</b>					
without interface			0		
with interface			1		
<b>Mould connectors:</b>					
common connectors for thermocouples and heaters				1	
separate connectors for thermocouples and heaters <sup>1)</sup>				2	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request <sup>2)</sup>					X

<sup>1)</sup> concerns only versions with 365 mm and 465 mm housing width

<sup>2)</sup> after agreeing with the manufacturer



## APPLICATION:

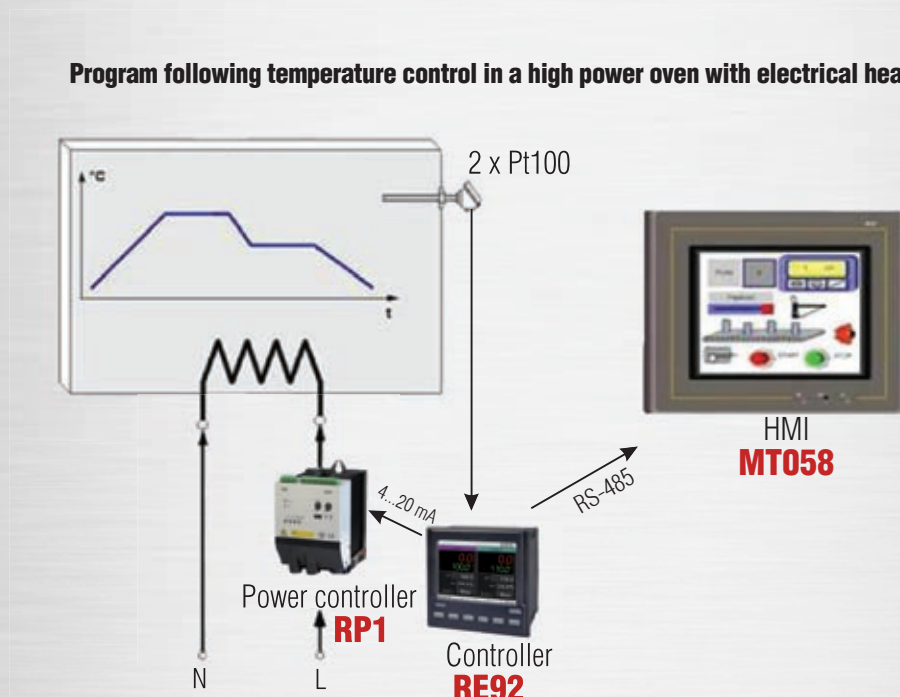
- smooth power control in single-phase networks
- destined for three-phase actuators in control systems and for automatic temperature control of electrothermal devices

## SELECTED FEATURES:

- on-off or pulse control
- phase control
- switching on at zero voltage or in any time
- many additional functions:
  - limitation of the load current,
  - release time-lag of soft-start type,
  - control of the input circuit amplification,
  - stoppage of the triggering by an external signal,
  - checking and signalling of the current in the circuit,
  - checking of the radiator temperature,
  - signalling of the fuse damage,
  - signalling of overload,
  - relay outputs.

## APPLICATION EXAMPLES

### Program following temperature control in a high power oven with electrical heaters



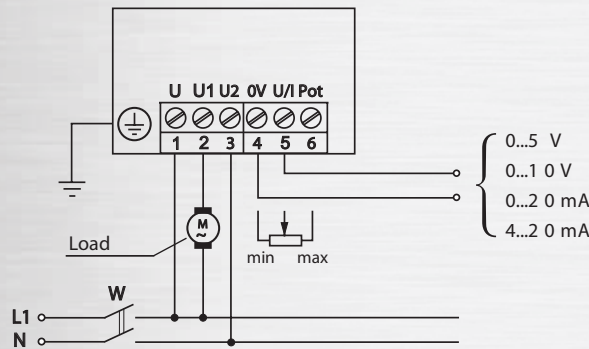
Type	RP7	RP1	RPL1	RP3
Parameters				
Version	1-phase			3-phase
Control	phase	phase, pulse, on/off		
Input signal	0..5/10V, 0/4..20mA potentiometer			
Output	-	voltage (1) – Master/Slave (for co-operation with second power controller) relays (2)		
Galvanic isolation	input/output/supply			
Max. output current	15A	125A		3 x 450A
Load supply voltage	230 V	230 V, 400 V a.c.	230, 400, 500 V a.c.	400 V a.c.
Load configuration	2-wire	2 or 3-wire		3, 4 or 6-wire
Protection rating frontal/rear side	IP20/IP10			IP20/IP00
Ambient temperature	-5...20...50 °C	0...40 °C		
External dimensions	50 x 105 x 105 mm	135 x 201 x 199 mm 135 x 231 x 199 mm	135 x 201 x 199 mm 135 x 231 x 199 mm - RPL1-x4xx (version with fan)	212 x 318 x 177 mm (40, 70, 125 A versions) 383 x 433 x 281 mm (200, 300, 450 A versions)



CONNECTION DIAGRAMS

RP7

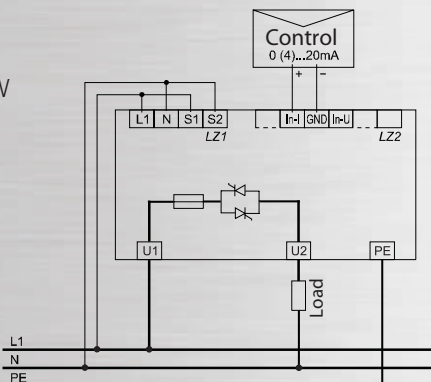
Fig. 93 Electrical connections of RP7



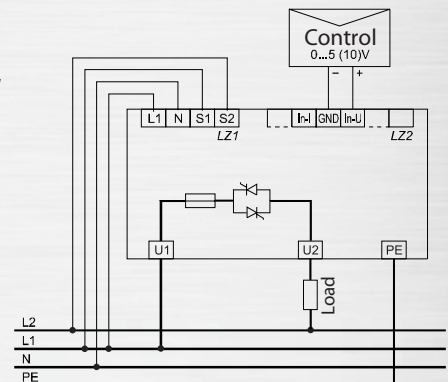
RP1

Fig.94 Connection of load in a single-phase system

a) load supply  
 $U_{LOAD} = 230 V$ ,  
 supply  $U_{GTS} = 230 V$



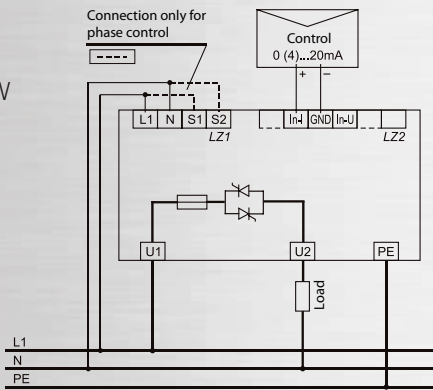
b) load supply  
 $U_{LOAD} = 400 V$ ,  
 Supply  $U_{GTS} = 230 V$



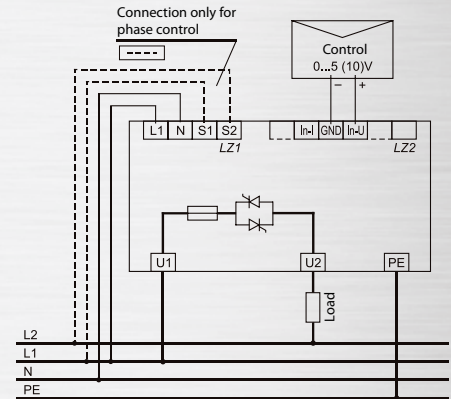
## RPL1

Fig.95 Connection of load in a single-phase system

a) load supply  
 $U_{LOAD} = 230\text{ V}$ ,  
 supply  $U_{GTS} = 230\text{ V}$



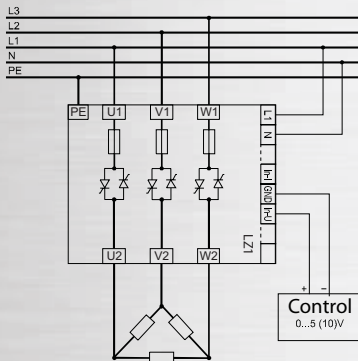
b) load supply  
 $U_{LOAD} = 400\text{ V}$ ,  
 supply  $U_{GTS} = 230\text{ V}$



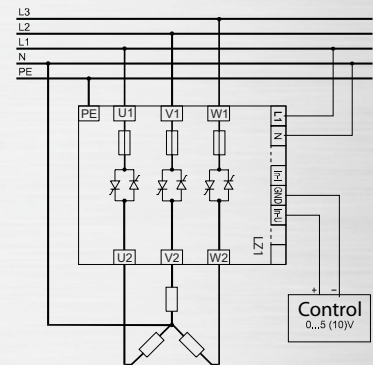
## RP3

Fig. 96 Connection of load in a 3- and 4-wire system

a) three-wire load



b) four-wire load



## ORDERING CODES

### POWER CONTROLLERS

TABLE 55. RP7 ORDERING CODE:

RP7 -	X	X
Maximal current output:		
5 A	1	
10 A	2	
15 A	3	
Acceptance tests:		
without extra requirements	0	
with an extra quality inspection certificate	1	
acc. to customer's request*	X	

TABLE 58. RP3 ORDERING CODE:

RP3 -	X	X
Maximal current output:		
40 A	1	
70 A	2	
125 A	3	
200 A	4	
300 A	5	
450 A	6	
Acceptance tests:		
without extra requirements	0	
with an extra quality inspection certificate	1	
acc. to customer's request*	X	

TABLE 56. RP1 ORDERING CODE:

RP1 -	X	X	X
Maximal current output:			
25 A	1		
40 A	2		
70 A	3		
125 A	4		
load voltage:			
24...400 V a.c. 50/60 Hz		1	
Gate triggering system (GTS):			
supply voltage 85...115...135 V a.c.			1
supply voltage 195...230...253 V a.c.			2
Acceptance tests:			
without extra requirements			0
with an extra quality inspection certificate			1
acc. to customer's request			X

TABLE 57. RPL1 ORDERING CODE:

RPL1 -	X	X	X	XX	X	X
Control:						
phase	1					
pulse/ on/off	2					
Current range:						
maximal current output 25 A			1			
maximal current output 40 A			2			
maximal current output 70 A			3			
maximal current output 125 A*			4			
Load voltage:						
supply voltage - 195...230...253 V a.c.			1			
supply voltage - 340...400...440 V a.c.			2			
supply voltage - 425...500...550 V a.c.			3			
Version:						
standard					00	
custom-made**					XX	
Language:						
Polish						P
English						E
other**						X
Acceptance tests:						
without extra requirements						0
with an extra quality inspection certificate						1
acc. to customer's request*						X

\* the version RPL1- x4xx has a fixed fan

\*\* after agreeing with the manufacturer





## APPLICATION:

Measuring, visualization, logging and control of technological processes in different industries, like

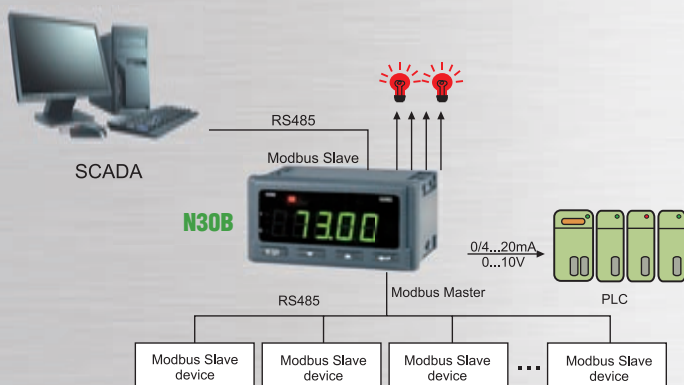
- pharmaceutical,
- food,
- chemical,
- paper.

## SELECTED FEATURES:

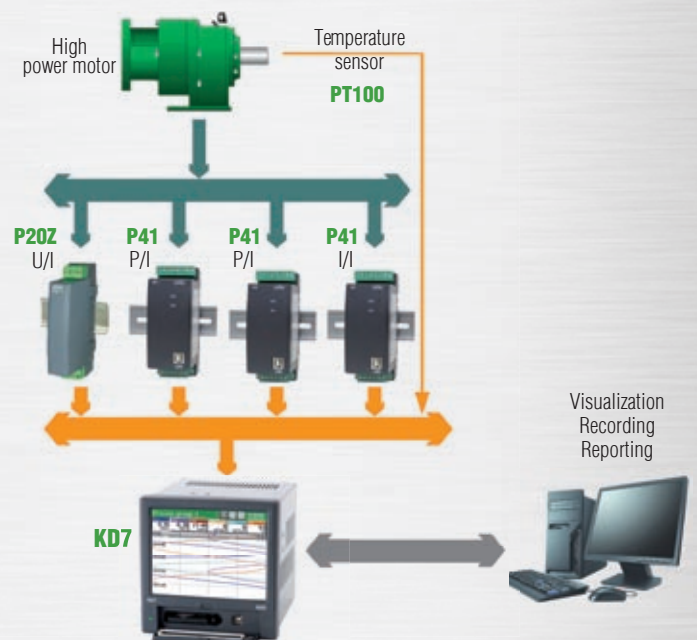
- data visualization on a touchscreen 5.7", 320 x 240 pixels
- data logging on a Compact Flash card, capacity up to 4GB
- universal measuring inputs (option)
- interfaces: USB, RS-485 Modbus Slave, USB Modbus Master (KD7), **Ethernet** (KD7)
- intuitive user interface based on Windows CE (available in 8 languages)
- operator messages functionality
- compatible with FDA CFR21 standard, part 11 (for electronic records)
- mathematical functions on measuring data (KD7)
- **Ethernet**: WWW server, FTP server, NTP client (time synchronization), Modbus TCP/IP (only KD7)

## APPLICATION EXAMPLES

### Data presentation and logging from automation devices



### Measurement and visualization of motor working parameters (temperature and motor load)





N30B



KD7



KD8



PD22



SM61

Type	N30B	KD7	KD8	PD22	SM61 New!
<b>Parameters</b>					
<b>Number of channels</b>	up to 100 digital channels	up to 12 analog channels 24 digital channels	up to 6 analog channels	up to 1000 digital channels	up to 2500 digital channels
<b>Input</b>	Modbus RTU Master 10 groups 10 registers each	programmable (3, 6, 9 or 12 inputs) Pt100/500/1000, Ni100, Cu100, J, K, N, E, R, S, T, B, L, ± 20mA ± 9999mV 50...2000 Ω 0...2000 Ω logic input 0/5...24 V d.c. (8 or 16 pcs.) Modbus RTU Master (24 registers)	programmable (3 or 6 inputs) Pt100/500/1000 Ni100, Cu100, J, K, N, E, R, S, T, B, L, ± 20mA ± 9999mV 50...2000 Ω 0...2000 Ω logic 0/5...24 V d.c. (4 or 8 pcs.)	Port I: Modbus RTU Master (50 groups 20 registers each)	Port II: Modbus RTU Master, (100 groups 25 registers each) 2 x logic (option)
<b>Output</b>	4 x relays (2 NO + optionally 2 changeover), 1 x analog (option)	relays (8 or 16) relays OptoMOS (8 or 16) analog (4 or 8) 0...5, 0/4...20 mA 0... 5 V, 1...5 V, 0...10 V supplying output (2 x 24 V d.c. 30 mA)	relays (6 or 12)	Port II: Modbus RTU Slave	Port I: Modbus RTU/TCP Slave, 2 x relays (option)
<b>Interface</b>	max 2 x RS-485 Modbus Master and Slave (option)	2 x RS-485 (Modbus Slave and Master) 1 x RS232 (Modbus Slave) USB Device 1.1. <b>Ethernet</b> 10 Base-T	RS-485 (Modbus Slave) USB Device 1.1.	3 x RS-485 (Modbus Slave and Master) 1 x RS-232 (Modbus Slave) USB Device 1.1.	2 x RS-485 (Modbus Slave and Master) 1 x RS-232 (Modbus Slave) USB Device 1.1. <b>Ethernet</b> 10/100 Base-T
<b>Memory</b>	internal - 308000 samples external - MMC/SD card up to 4 GB	internal - up to 6 MB external - CF card up to 4 GB		512 kB, 390.000 samples 44.000 events	1 GB
<b>Galvanic isolation</b>	input/output/supply/RS-485				input/output/supply
<b>Display</b>	3-colour LED 5 digits (14 mm)	LCD 5,7" TFT type 320 x 240 pixels with touch panel		-	
<b>Supply voltage</b>	85...253 V a.c. (40...400 Hz); 90...320 V d.c., 20...40 V a.c. (40...400 Hz); 20...60 V d.c.	90...253 V a.c. or 18...30 V d.c.		20...50 V a.c./d.c. 85...230...253 V a.c./d.c.	20...24...50 V a.c./d.c. 85...230...253 V a.c./d.c.
<b>Protection rating frontal/rear side</b>	IP65/IP10	IP65/IP20		IP40/IP20	
<b>Ambient temperature</b>	-25...23...55 °C	0...23...55 °C			
<b>External dimensions</b>	96 x 48 x 93 mm	144 x 144 x 171 mm	144 x 144 x 171 mm	45 x 120 x 100 mm	
<b>Panel cut-out</b>	92 <sup>+0.6</sup> x 45 <sup>+0.6</sup> mm	138 <sup>+0.1</sup> x 138 <sup>+0.1</sup> mm		assembly on a rail	
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>21-point rescaling</li> <li>free software for data analysis</li> <li>data logging on PC in MySQL database</li> </ul>	<ul style="list-style-type: none"> <li>many forms of data presentation: linear, bargraph, chart, digital and analog indicators,</li> <li>WWW and FTP Server (KD7)</li> <li>Windows® CE operating system</li> <li>PC software KD SETUP, KD CHECK, KD CONNECT, KD ARCHIVE</li> <li>user access rights</li> <li>menu available in 8 language versions.</li> </ul>		<ul style="list-style-type: none"> <li>RTC</li> </ul>	<ul style="list-style-type: none"> <li>HTTP (WEB server -visualization in format of synoptic maps),</li> <li>DHCP</li> <li>ftp server,</li> <li>RTC</li> </ul>

KD7

Fig. 97 Electrical connections of KD7

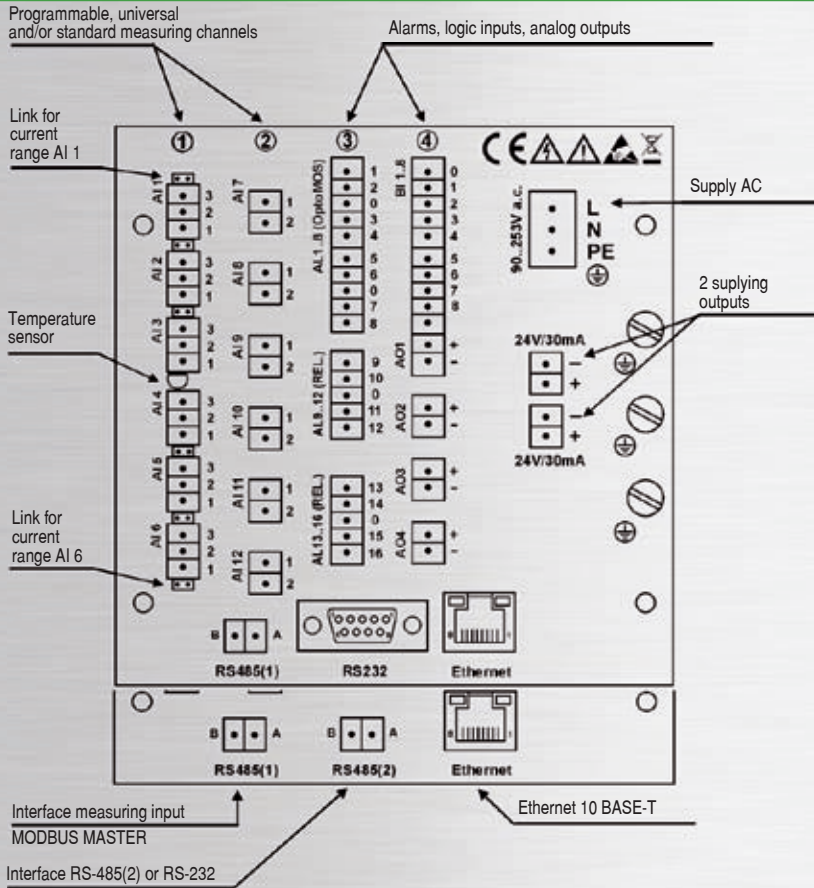
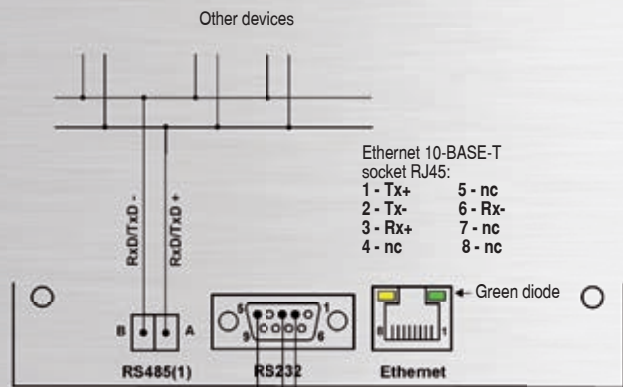


Fig. 102 Interface RS-485(1), RS-485(2), RS-232, Ethernet 10-BASE-T



Description of diodes of Ethernet socket:

**Yellow diode:** is alight when the recorder is connected to the Ethernet network and is go out when the recorder is disconnected from the network

**Green diode:** Tx/Rx, when the recorder uploads and downloads data, it is alight irregularly, and it is a light continuously when data are not transmitted

- To PC: cable with a 25 Sub-D plug
- 3 - TxD
- 2 - TxD
- 7 - GND
- To PC: cable with a 9 Sub-D plug
- 2 - TxD
- 3 - TxD
- 5 - GND

Fig. 98 Standard measuring inputs AI 1...2

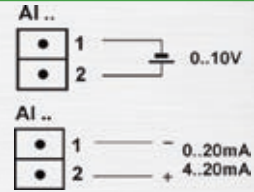
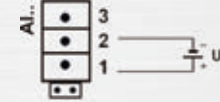
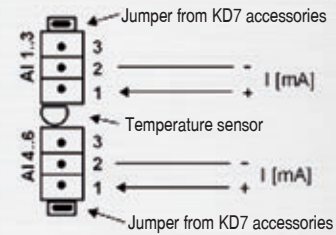


Fig. 99 Programmable measuring inputs AI 1...12

Connection of voltage source



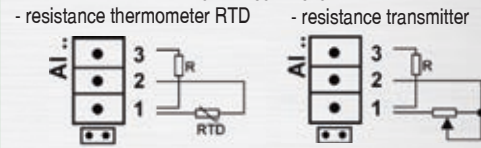
Connection of current source



Connection of thermocouple TC



Two-wire connection:



Three-wire connection:

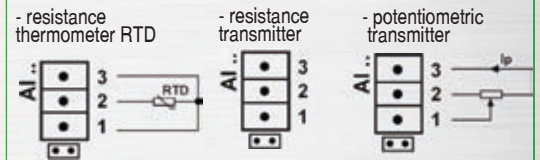


Fig. 100 Analog output systems AO 1...8

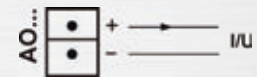
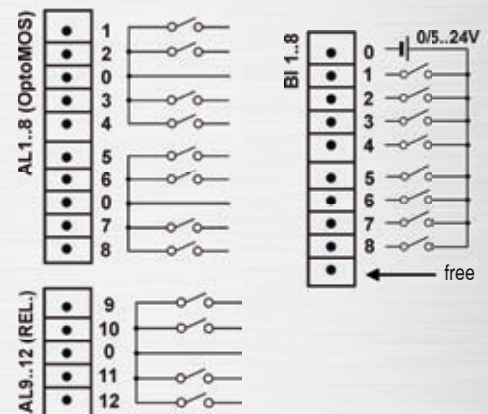


Fig. 101 Alarm systems AL 1...32 and logic inputs BI 1...16



## KD8

Fig. 103 Electrical connections of KD8

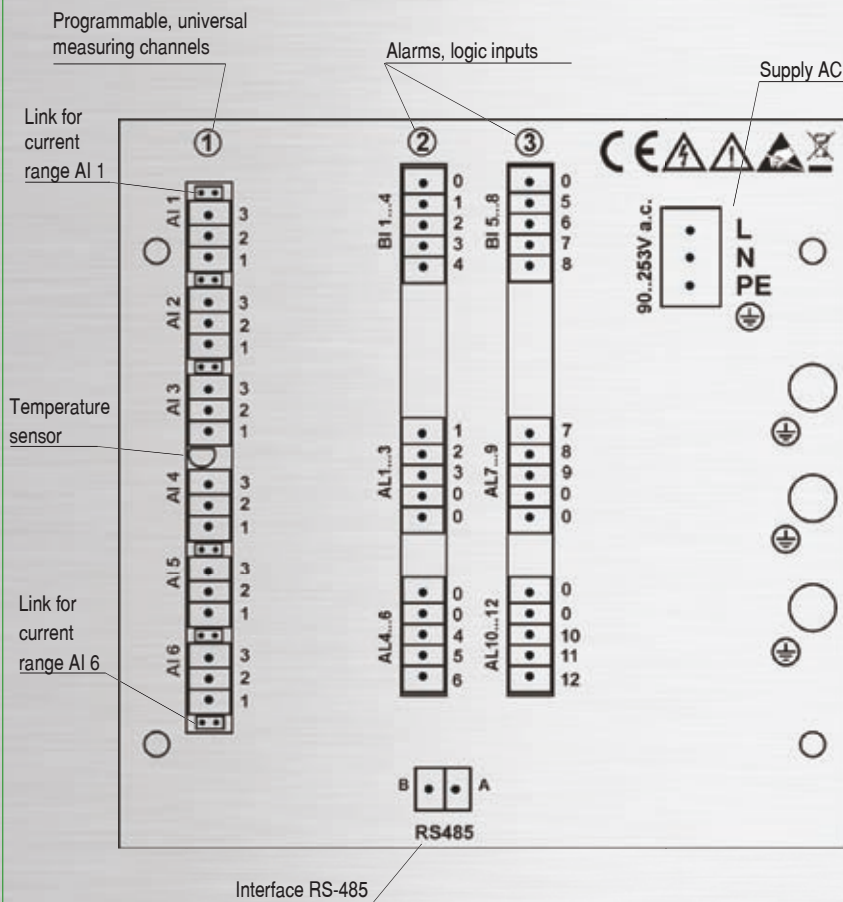
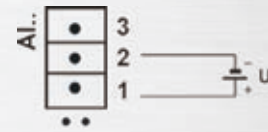
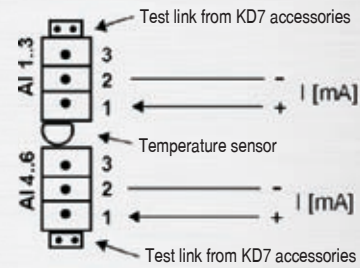


Fig. 104 Programmable measuring inputs AI1...AI2

Connection of voltage source



Connection of current source



Connection of thermocouple TC

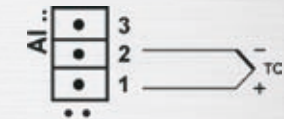
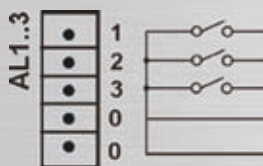


Fig. 105 Alarms AL 1... 12 and logic inputs BI 1... 8

- connection to terminals of the alarm system with electromechanical relays AL1...12



- connection to the control signal to terminals of the logic input system BI 1...8

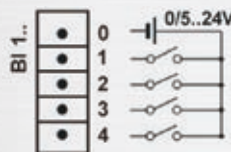
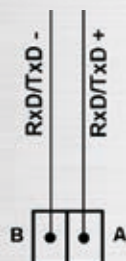


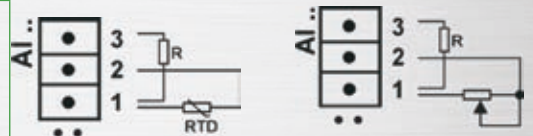
Fig. 106 Interface RS-485 (Modbus Slave)



Two-wire connection:

- resistance thermometer RTD

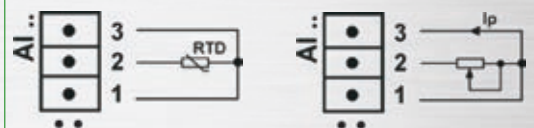
- resistance transmitter



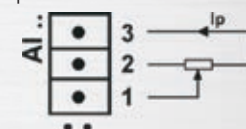
Three-wire connection:

- resistance thermometer RTD

- resistance transmitter

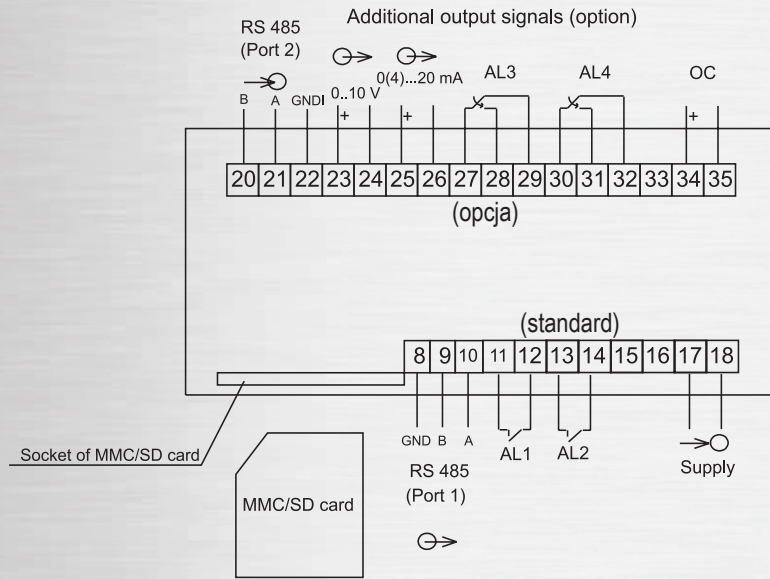


- potentiometric transmitter



N30B

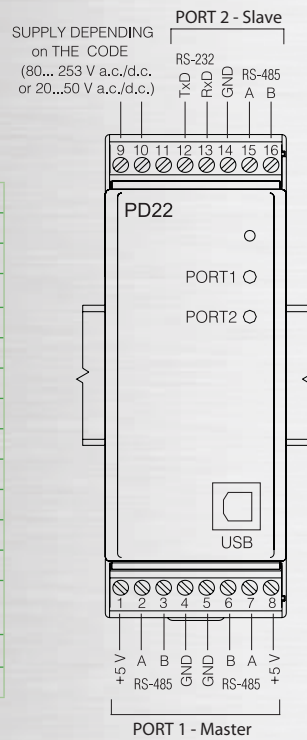
Fig. 107 Electrical connections of N30B



PD22

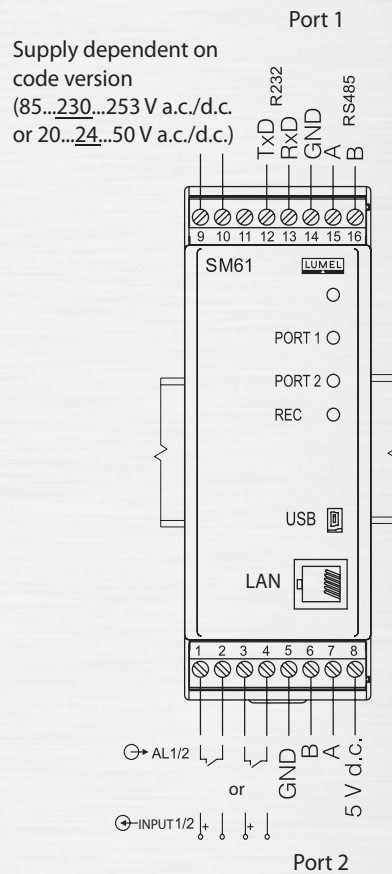
Fig. 108 Electrical connections of PD22

Terminal	Terminal description
1	Output +5 V (for bus polarisation)
2	Line A of the first RS-485 interface of Port 1
3	Line B of the first RS-485 interface of Port 1
4	Line GND of RS-485 interface of Port 1
5	Line GND of RS-485 interface of Port 1
6	Line B second RS-485 interface of Port 1
7	Line A second RS-485 interface of Port 1
8	Output +5 V (for bus polarisation)
9, 10	Concentrator supply lines
11	Not used
12	Output TxD of the RS-232 interface of Port 2
13	Input RxD of the RS-232 interface of Port 2
14	Line GND of the RS-232 and RS-485 interface of Port 2
15	Line A of the RS-485 interface of Port 2
16	Line B of the RS-485 interface of Port 2



SM61

Fig. 109 Electrical connections of SM61



## RECORDERS

**TABLE 59. N30B ORDERING CODE:**

N30B -		X	X	XX	XX	X	X
<b>Supply voltage:</b>							
85...253 V a.c. (40 ... 400 Hz); 90 ... 320 V d.c.	1						
20...40 V a.c. (40 ... 400 Hz); 20 ... 60 V d.c.	2						
<b>Additional outputs:</b>							
lack	0						
OC output, RS-485 (port 2), analog output	1						
OC output, RS-485 (port 2), analog output switched-over relay outputs	2						
<b>Unit:</b>							
unit code acc. to the table 61		XX					
<b>Version:</b>							
standard					00		
custom-made*					XX		
<b>Language:</b>							
Polish						P	
English						E	
other*						X	
<b>Acceptance tests:</b>							
without extra requirements							0
with an extra quality inspection certificate							1

**TABLE 61. CODES OF HIGHLIGHTED UNIT:**

Code	Unit	Code	Unit	Code	Unit
00	without unit	20	kVAh	40	sz
01	V	21	MVAh	41	imp
02	A	22	Hz	42	rps
03	mV	23	kHz	43	m/s
04	kV	24	Ω	44	l/s
05	mA	25	kΩ	45	obr/min
06	kA	26	°C	46	rpm
07	W	27	°F	47	mm/min
08	kW	28	K	48	m/min
09	MW	29	%	49	l/min
10	var	30	%RH	50	m <sup>3</sup> /min
11	kvar	31	pH	51	sz/h
12	Mvar	32	kg	52	m/h
13	VA	33	bar	53	km/h
14	kVA	34	m	54	m <sup>3</sup> /h
15	MVA	35	l	55	kg/h
16	kWh	36	s	56	l/h
17	MWh	37	h		
18	kvarh	38	m <sup>3</sup>	XX	on order*
19	Mvarh	39	obr		

\* after agreeing with the manufacturer

**TABLE 62. KD8 ORDERING CODE:**

KD8 -		X	X	X	X	XX	X
<b>Measuring inputs:</b>							
3 programmable measuring inputs	1						
6 programmable measuring inputs	2						
<b>Alarms and logic inputs:</b>							
without alarms and logic inputs	0						
alarms (NO relays) + logic inputs <sup>1)</sup>	1						
<b>Supply:</b>							
90...253 V a.c.							1
<b>Softwares servicing the recorder from PC:</b>							
KD Connect, KD Check						1	
KD Connect, KD Check, KD Archive, KD8 Setup						2	
<b>Version:</b>							
standard						00	
custom-made <sup>2)</sup>						XX	
<b>Acceptance tests:</b>							
without extra quality inspection requirements							0
with an extra quality inspection certificate							1
acc. to customer's request							X

1) for each 3 measuring inputs a package with 6 alarms and 4 logic inputs is installed  
2) after agreeing with the manufacturer

**TABLE 60. KD7 ORDERING CODE:**

KD7 -		X	X	X	X	X	X	X	X	X	X	X	X
<b>Measuring input (slot 1):</b>													
without measuring inputs	0												
6 programmable measuring inputs	1												
6 standard measuring inputs: 0...10 V	2												
6 standard measuring inputs: 0...20 mA	3												
6 standard measuring inputs: 4...20 mA	4												
6 standard measuring inputs: 3 x 0..10 V + 3 x 0..20 mA	5												
6 standard measuring inputs: 3 x 0..10 V + 3 x 4..20 mA	6												
3 programmable measuring inputs	7												
<b>Measuring inputs (slot 2):</b>													
without measuring inputs	0												
6 programmable measuring inputs	1												
6 standard measuring inputs <sup>1)</sup>	2..6												
3 programmable measuring inputs	7												
<b>Interface input:</b>													
RS-485 for measuring inputs													1
<b>Digital signals/analog outputs (slot 3):</b>													
without digital signals and analog outputs	0												
8 alarms (NO relays) + 8 alarms (OptoMos)	1												
8 alarms (NC relays) + 8 alarms (OptoMos)	2												
8 digital inputs + 4 analog outputs: 0...5 mA	3												
8 digital inputs + 4 analog outputs: 0...20 mA	4												
8 digital inputs + 4 analog outputs: 4...20 mA	5												
8 digital inputs + 4 analog outputs: 0...5 V	6												
8 digital inputs + 4 analog outputs: 0...10 V	7												
<b>Digital signals/analog outputs (slot 4):</b>													
without digital signals and analog outputs	0												
8 alarms (NO relays) + 8 alarms (OptoMos)	1												
8 alarms (NC relays) + 8 alarms (OptoMos)	2												
8 digital inputs + 4 analog output <sup>2)</sup>	3..7												
<b>Interface:</b>													
USB													1
USB + Ethernet + RS-485 (2)													2
USB + Ethernet + RS-232													3
<b>Memory for measuring data:</b>													
with a 4 GB CF card <sup>3)</sup>													1
as per order <sup>4)</sup>													X
<b>Supply:</b>													
90...253 V a.c.													1
<b>Recorder firmware:</b>													
without mathematical functions <sup>5)</sup>													0
with mathematical functions													1
<b>Softwares servicing the recorder from PC:</b>													
KD Connect, KD Check													1
KD Connect, KD Check, KD Archive, KD7 Setup													2
<b>Acceptance tests:</b>													
without extra quality inspection requirements													0
with an extra quality inspection certificate													1
acc. to customer's request <sup>6)</sup>													X

- 1) - write the range code from the item 2...6 as above: (Slot 1)
- 2) - write the range code from the item 3...7 as above: (Slot 3)
- 3) - CF card with the lowest capacity from currently accessible cards on the market
- 4) - after agreeing with the manufacturer (it is recommended to use a 4 GB CompactFlash card from ScanDisk company)
- 5) - a key for the activation of mathematical functions can be ordered separately
- 6) - after agreeing with the manufacturer

**TABLE 63. PD22 ORDERING CODE:**

PD22 -	XX	X
<b>Version:</b>		
standard	00	
custom-made*	XX	
<b>Acceptance tests:</b>		
without extra requirements		0
with an extra quality inspection certificate		1
acc. to customer's request*		X

\* - after agreeing with the manufacturer

**TABLE 64. SM61 ORDERING CODE:**

SM61 -	X	X	XX	X	X
<b>Supply voltage:</b>					
85...253 V a.c./d.c.		1			
20...50 V a.c./d.c.		2			
<b>Input/output:</b>					
2 relays			1		
2 logic inputs			2		
<b>Version:</b>					
standard				00	
custom-made*				XX	
<b>Language:</b>					
Polish					P
English					E
other*					X
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

\* - after agreeing with the manufacturer

## KD7 AND KD8 ASSISTING SOFTWARE

### KD CONNECT

Software destined for the communication between the recorder and the PC computer through the USB interface in order to download archive data and record/erase on the CF card.

The KD Connect program enables to carry out following operations:

- copying of files from the CompactFlash card, directly from the recorder into the PC computer (e.g. data files, screen dumps),
- uploading of files from the PC computer into the CompactFlash card in the recorder (e.g. file with the updated KD7 software)
- delation of stored files in the recorder CompactFlash,
- sampling of current systemic information of the KD7 recorder (among others, system version, current configuration, degree of the Compact Flash filling).

### KD7 SETUP

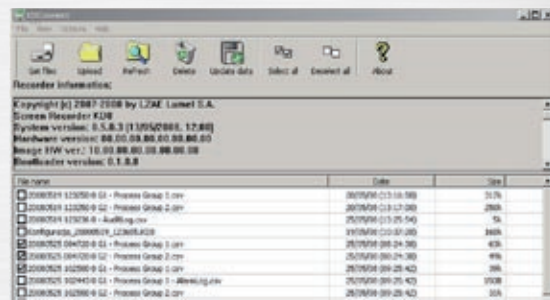
Software destined to configure recorder settings by means of a PC computer. After recopying the configuration on the CF memory card, it can be used for reprogramming of settings in the given KD7 recorder.

### KD ARCHIVE

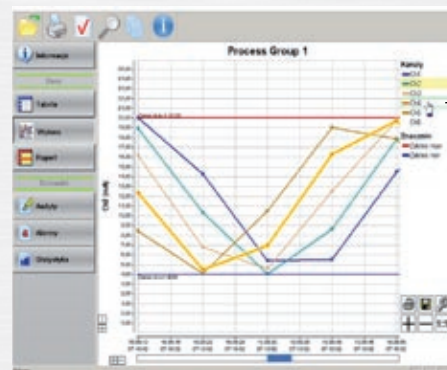
Software destined to review and analyse archive data from the recorder on a PC computer, stored in a logic format with digital signature. The software installation is typical for application destined for the MS Windows environment (MS Windows XP or a newest one).

### KD CHECK

Software destined to verify the digital signature in archive data stored in text format. The program installation is typical for application destined for the MS Windows environment.

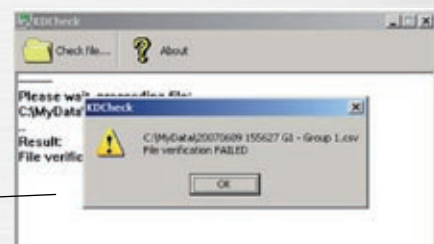


Downloading and erasing of archive data by means of the PC computer - KD CONNECT.



Backlighting of the selected measuring channel diagram.

KD7 configuration through the PC computer -KD SETUP.



Checking result: incorrect file verification

Verification of the digital signature of text data - KD CHECK.

# I/O MODULES

## COMMUNICATION MODULES



### APPLICATION:

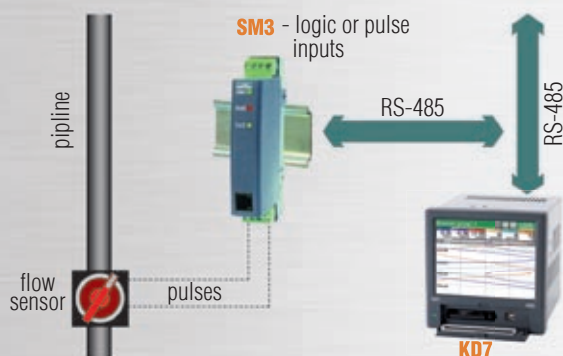
- measurements monitoring systems,
- inputs and outputs for PLC controllers,
- radio and serial transmission in automation systems,
- conversion between communication interfaces
- using Ethernet for industrial communication

### SELECTED FEATURES:

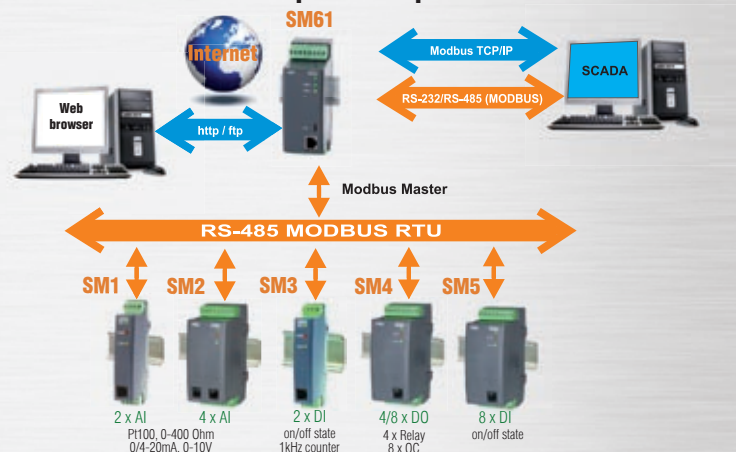
- integration of different transmission media (RS-232, RS-485, USB, **Ethernet**, radio)
- I/O modules configuration using LPConfig software

## APPLICATION EXAMPLES

### Measurement and visualization flow in a pipeline



### Visualization of production process



**Radio transmission with MR03 radio modules.**  
 Modules can realize transmission in a 1.5 km distance in open area. The transmitted data are archived in the KD7 recorder.



### Archiving of 3-phase network parameters from ND20 meter.





Type Parameters	Input/Output modules				
	SM1	SM2	SM3	SM5	SM4
Number of channels	2	4	2	8	4 or 8
Inputs/outputs	inputs: Pt100(-200...850°C) 0/4...20 mA 0...10 V 0...400 Ω		inputs: logic on/off or pulse counter up to 1 kHz 0...4 294 967 295 pulses	inputs: logic on/off	outputs: 4 x relays or 8 x OC
Interface	RS-485 Modbus (ASCII i RTU), RS232 for configuration				
Galvanic isolation	input/output/supply/RS-485				
Baud rate	2400; 4800; 9600; 19.2 k; 38.4 k; 57.6 k; 115 k bit/s				
Supply voltage	85...253 V a.c./d.c.; 20...50 V a.c./d.c.				
Protection rating frontal/rear side	IP40/IP20				
Ambient temperature	-10...23...55 °C				
External dimensions	22.5 x 120 x 100 mm	45x120x100mm	22.5 x 120 x 100 mm	45 x 120 x 100 mm	45 x 120 x 100 mm



Typ Parameters	Data logger	
	PD22	SM61 New!
Number of channels	up to 1000 digital channels	up 2500 digital channels
Input	Port I: Modbus RTU Master (50 groups 20 register each)	Port II: Modbus RTU Master (100 groups 25 registers each), 2 x logic
Output	Port II: Modbus RTU Slave	Port I: Modbus RTU/TCP Slave, 2 x relay
Interface	3 x RS-485 (Modbus Slave and Master) 1 x RS232 (Modbus Slave) USB Device 1.1.	2 x RS-485 (Modbus Slave and Master) 1 x RS232 (Modbus Slave) USB Device 1.1. <b>Ethernet</b> 10/100 Base-T
Memory	512 kB, 390.000 samples, 44.000 events	1 GB
Galvanic isolation		input/output/supply
Supply voltage	20... 50 V a.c./d.c. 85...230...253 V a.c./d.c.	20...24...50 V a.c./d.c. 85...230...253 V a.c./d.c.
Protection rating frontal/rear side	IP40/ IP20	
External dimensions	45 x 120 x 100 mm	
Mounting	on a rail	
Additional functions	<ul style="list-style-type: none"> <li>• RTC</li> </ul>	<ul style="list-style-type: none"> <li>• HTTP (web server - visualization in format of synoptic maps),</li> <li>• DHCP,</li> <li>• FTP server,</li> <li>• RTC</li> </ul>



Typ Parameters	Power supplier
	SM9
Galvanic isolation	input/output
Supply voltage	105...250 V a.c.
Protection rating frontal/rear side	IP20/IP20
External dimensions	45 x 120 x 100 mm
Additional functions	<ul style="list-style-type: none"> <li>• power supplier 24 V d.c.,</li> <li>• max current output: 1 A d.c.</li> </ul>





PD51



PD8



PD8W



PD10



SM7



MR03

Typ	Interface/protocol converters				Radio transmission modules	
	PD51	PD8	PD8W New!	PD10	SM7	MR03
<b>Interface 1</b>	RS-232	RS-485, RS-232		RS-485	RS-232 or RS-485	RS-232 RS-485
<b>Interface 2</b>	RS-485	Ethernet RJ45	Ethernet Wi-Fi	USB	radio frequency 433/869 MHz	radio frequency 869.4 – 869.65 MHz
<b>Interface 3</b>	-	USB*		-	-	-
<b>Galvanic isolation</b>	supply/RS-485/RS-232	supply/RS-485/Ethernet		USB/RS-485	RS-485/RS-232/supply	
<b>Power output</b>	-	-		-	10 mW (-20 do 10 dBm)	500 mW
<b>Baud rate</b>	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 [bit/s]	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 56000 bit/s (RS485) 10, 100 Mbit/s (Ethernet)		do 1 Mb/s	serial interface: 4800...115200 bit/s  radio band: 4800, 9600, 19200, 38400, 76800 bit/s	Port 1 - RS-232 1200...115200 bit/s  Port 2 - RS-485 1200...115200 bit/s  radio band 4800 bit/s
<b>Distance</b>	-	-		-	up to 300m	up to 1.5 km
<b>Supply voltage</b>	7...35 V d.c. or 20...24...40 V a.c./d.c. or 85...230...253 V a.c./d.c.	85...230...253 V a.c./d.c. 20...24...50 V a.c./d.c.		supplied from USB port	85...230...253 V a.c./d.c. or 20...24...50 V a.c./d.c. 7...35 V d.c.	8...30 V a.c./d.c.
<b>Protection rating frontal/rear side</b>	IP40/IP20				IP20/IP20	IP54/IP54
<b>Ambient temperature</b>	0...23...55°C	-23...23...45°C		0...55°C	0...23...45°C	0...23...50°C
<b>External dimensions</b>	22,5 x 120 x 100 mm	45 x 120x 100 mm		52 x 44 x 24 mm	45x120x100mm	115 x 65 x 40 mm
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>converter/repeater</li> <li>galvanic isolation</li> </ul>	<ul style="list-style-type: none"> <li>galvanic isolation</li> <li>Digi RealPort®, TCP/IP, HTTP, ICMP, DHCP, ARP</li> </ul>		<ul style="list-style-type: none"> <li>galvanic isolation</li> </ul>	-	-

\* for PD8 available from second mid-her 2013

SM1

Fig. 110 Electrical connections of SM1

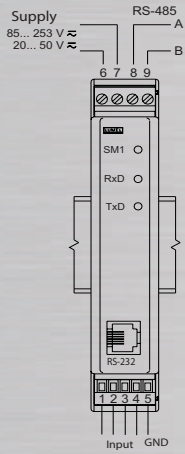


Fig. 111 Connection of input signals

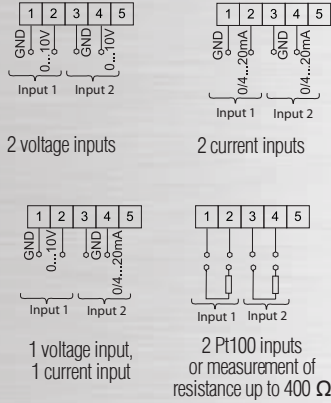


Fig. 112 Connection of RS-485 interface

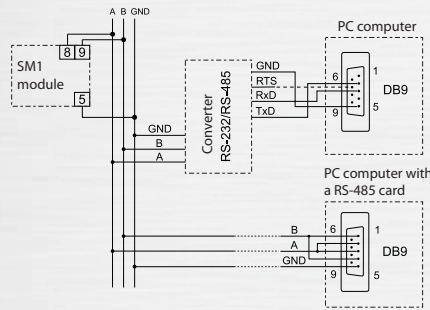
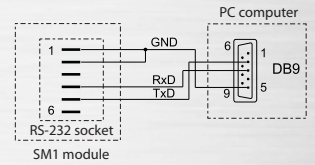


Fig. 113 Connection of RS-232 interface



SM2

Fig. 114 Electrical connections of SM2

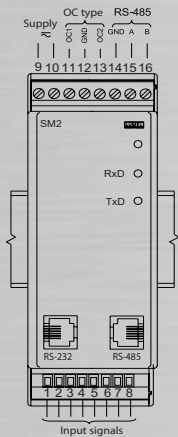


Fig. 115 Connection of input signals

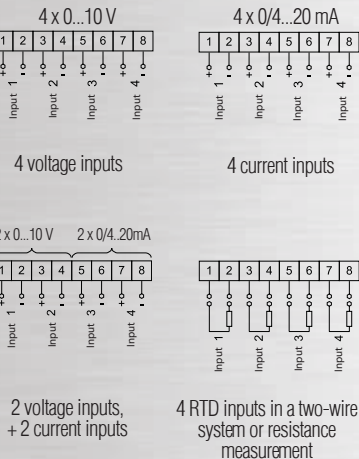


Fig. 116 Connection of RS-485 interface

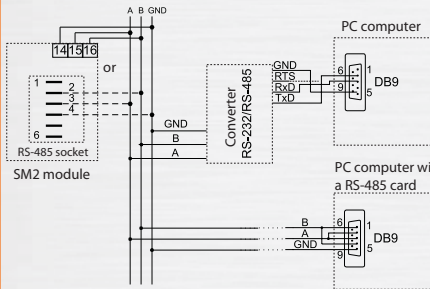
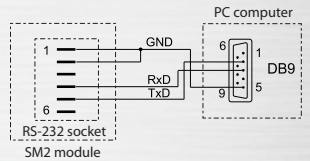


Fig. 117 Connection of RS-232 interface



SM3

Fig. 118 Electrical connections of SM3

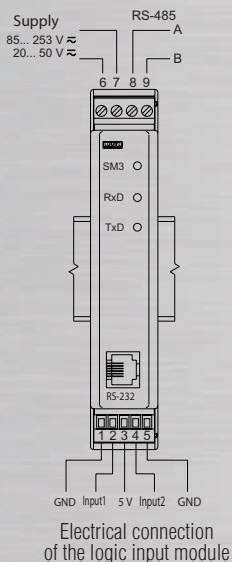


Fig. 119 Connection of RS-485 interface

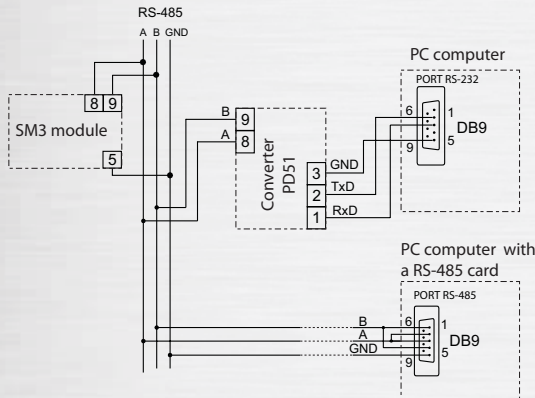
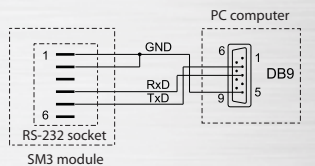


Fig. 120 Connection of RS-232 interface



### SM5

Fig. 121 Electrical connections of SM5

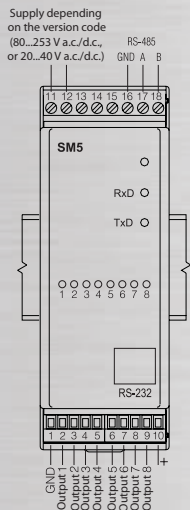


Fig. 122 Connection of RS-485 interface

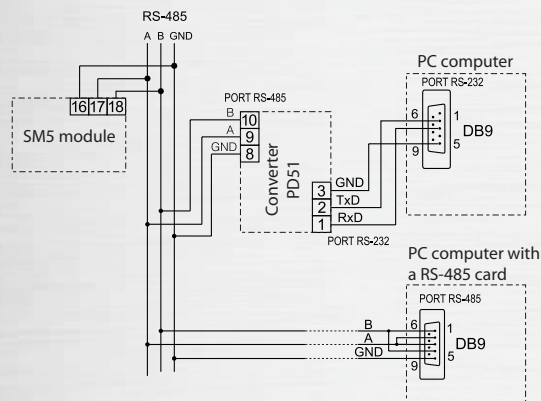
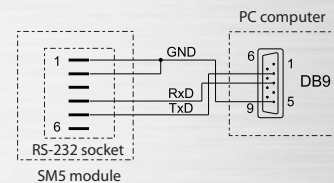
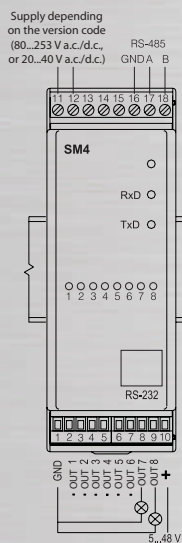


Fig. 123 Connection of RS-232 interface



### SM4

Fig. 124 Electrical connections of SM4



Description of logic output module leads - version with 4 relay outputs

Terminal No	Terminal description
1	GND line
2,3	Relay output no 1
4,5	Relay output no 2
6,7	Relay output no 3
8,9	Relay output no 4
10	5 V d.c. line
11,12	Module supply lines
13...15	No used
16	GND line of RS-485 interface with optoisolation
17	Line A of RS-485 interface with optoisolation
18	Line B of RS-485 interface with optoisolation

Description of logic output module leads - version with 8 OC output types

Terminal No	Terminal description
1	GND line of logic outputs
2	Output 1 line - output no 1
3	Output 2 line - output no 2
4	Output 3 line - output no 3
5	Output 4 line - output no 4
6	Output 5 line - output no 5
7	Output 6 line - output no 6
8	Output 7 line - output no 7
9	Output 8 line - output no 8
10	+ line - supply voltage of outputs
11,12	Lines of module supply
13...15	Not used
16	Mass of RS-485 interface with optoisolation
17	Line A of RS-485 interface with optoisolation
18	Line B of RS-485 interface with optoisolation

Fig. 125 Connection of RS-485 interface

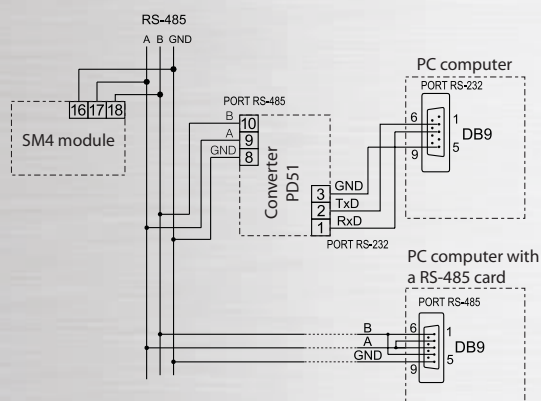
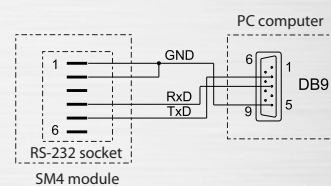
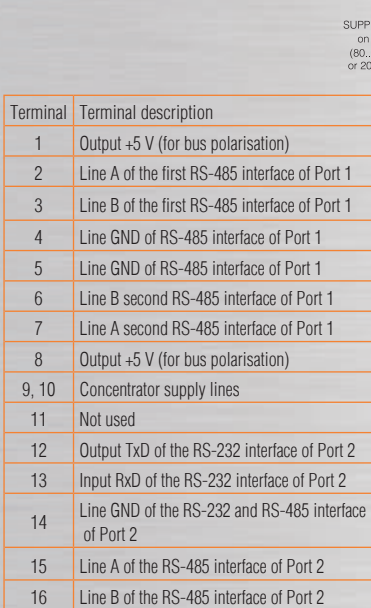


Fig. 126 Connection of RS-232 interface



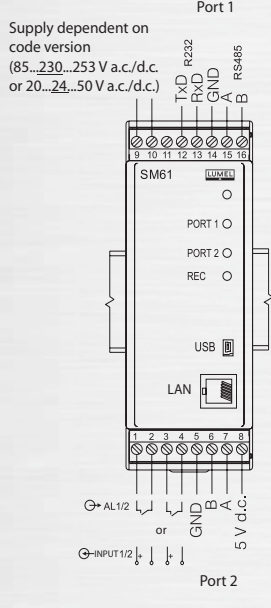
**PD22**

Fig. 127 Electrical connections of PD22



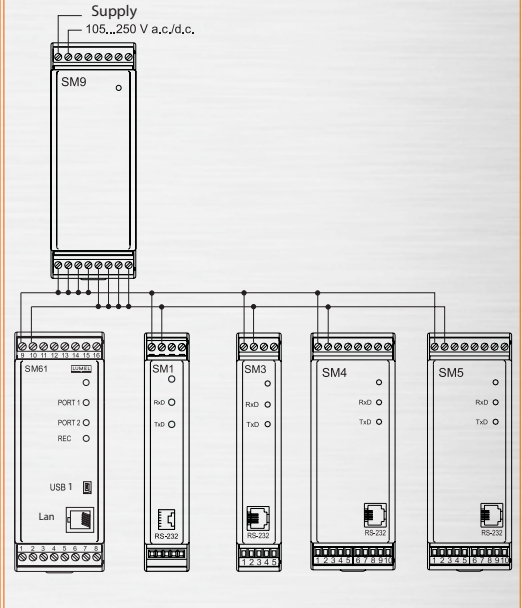
**SM61**

Fig. 128 Electrical connections of SM61



**SM9**

Fig. 129 Example of SM series module connection with the SM9 feeder module



**PD51**

Fig. 130 Electrical connections of PD51 version A1 and A2

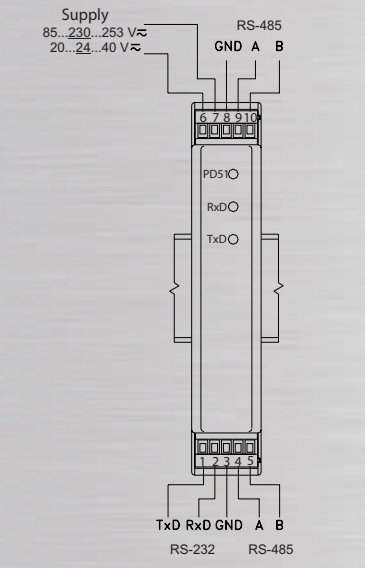


Fig. 131 Electrical connections of PD51 version A3

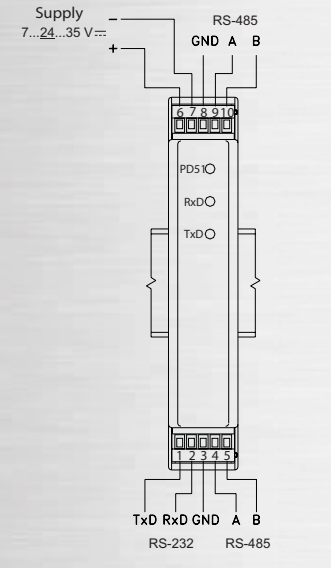
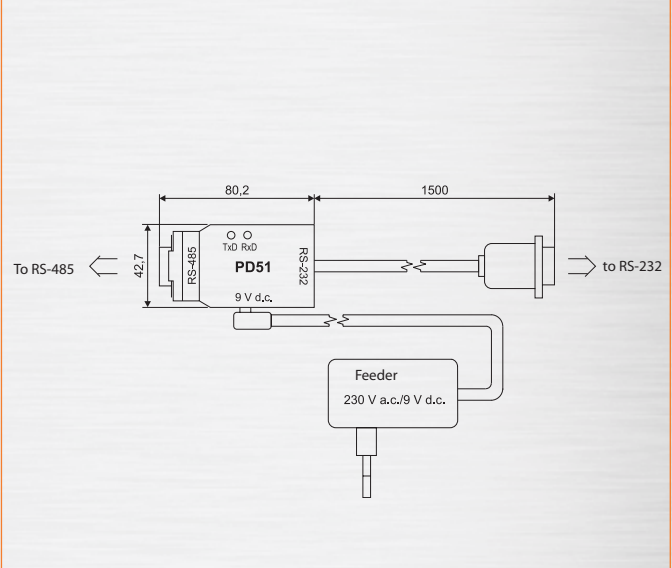


Fig. 132 Electrical connections of PD51 version B1



**PD8**

Fig. 133 External connections PD8

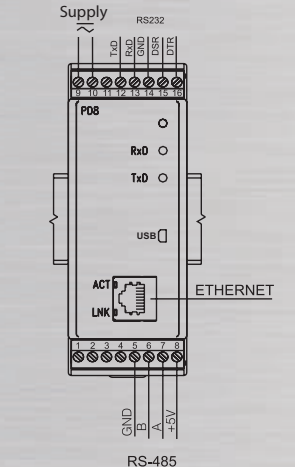
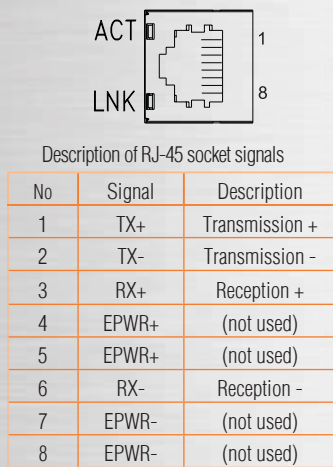
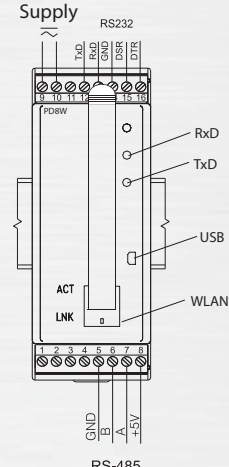


Fig. 134 Frontal view of the Ethernet interface RJ-45 socket



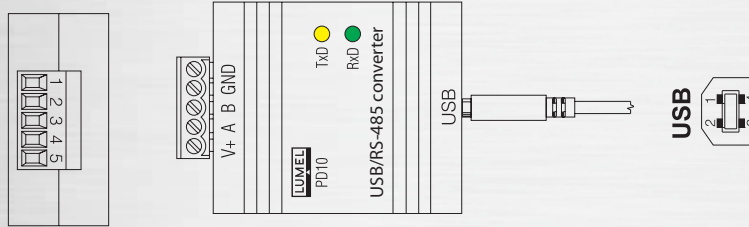
**PD8W**

Fig. 135 External connections PD8W



### PD10

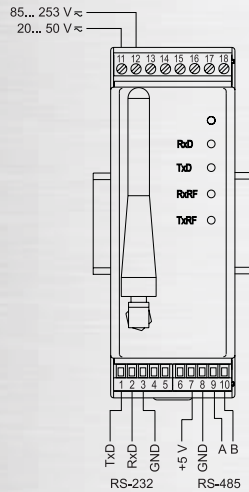
Fig. 136 Connection of PD10



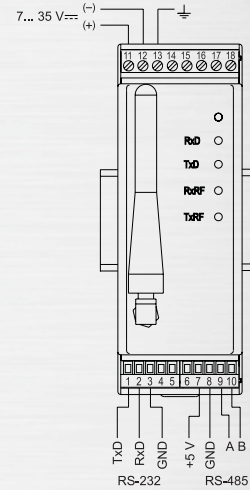
### SM7

Fig. 137 Electrical connections of SM7

a) for supply 85...253 V a.c./d.c. and 20...50 V a.c./d.c.



b) for supply 7...35 V d.c.



### MR03

Fig. 138 Electrical connections of MR03

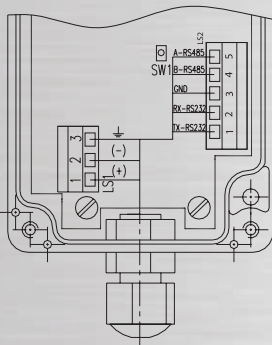


Fig. 139 Connection of RS-485 interface

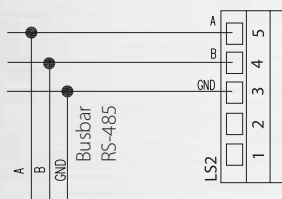
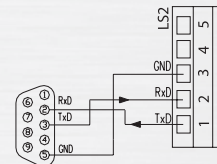


Fig. 140 Connection of RS-232 interface



Terminal	Terminal description
LS1_1	Tightening line (+ to supply by d.c. current)
LS1_2	Tightening line (+ to supply by d.c. current)
LS1_3	Functional earthing line (supply by d.c. current)
LS2_1	TxD line for RS-232 interface
LS2_2	RxD line for RS-232 interface
LS2_3	GND line of RS-232/RS-485 interface
LS2_4	B line of RS-485 interface
LS2_5	A line of RS-485 interface

## INPUT/OUTPUT MODULES

**TABLE 65. SM1 ORDERING CODE:**

SM1 -	XX	X	X
<b>Input:</b>			
2 voltage inputs: 0..10V	00		
2 current inputs: 0/4..20mA	01		
1 voltage input + 1 current input: 0..10 V + 0/4..20 mA	02		
2 resistance 0..400 Ω or Pt100 inputs custom-made*	03 XX		
<b>Supply:</b>			
85..253 V a.c./d.c.	1		
20..50 V a.c./d.c.	2		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

**TABLE 66. SM2 ORDERING CODE:**

SM2 -	XX	X	X
<b>Input:</b>			
4 voltage inputs: 0..10V	00		
4 current inputs: 0/4..20mA	01		
2 voltage inputs + 2 current inputs: 0..10 V + 0/4..20 mA	02		
4 resistance 0..400 Ω or Pt100 inputs custom-made*	03 XX		
<b>Supply:</b>			
85..253 V a.c./d.c.	1		
20..50 V a.c./d.c.	2		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

**TABLE 67. SM3 ORDERING CODE:**

SM3 -	X	XX	X
<b>Supply voltage:</b>			
85..253 V a.c./d.c.	1		
20..50 V a.c./d.c.	2		
<b>Version:</b>			
standard	00		
custom-made*	XX		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

**TABLE 68. SM4 ORDERING CODE:**

SM4 -	X	X	XX	X
<b>Supply:</b>				
85..253 V a.c./d.c.	1			
20..50 V a.c./d.c.	2			
<b>Outputs:</b>				
8 outputs of OC type	1			
4 relays	2			
<b>Version:</b>				
standard	00			
custom-made*	XX			
<b>Acceptance tests:</b>				
without extra requirements	0			
with an extra quality inspection certificate	1			
acc. to customer's request*	X			

**TABLE 69. SM5 ORDERING CODE:**

SM5 -	X	XX	X
<b>Supply:</b>			
85..230...253 V a.c./d.c.	1		
20..24...50 V a.c./d.c.	2		
<b>Version:</b>			
standard	00		
custom-made*	XX		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

\* - after agreeing with the manufacturer

## DATA LOGGER

**TABLE 70. SM61 ORDERING CODE:**

SM61 -	X	X	XX	X	X
<b>Supply:</b>					
85..253 V a.c./d.c.	1				
20..50 V a.c./d.c.	2				
<b>Input/output:</b>					
2 relays	1				
2 logic inputs	2				
<b>Version:</b>					
standard	00				
custom-made*	XX				
<b>Language:</b>					
Polish	P				
English	E				
other*	X				
<b>Acceptance tests:</b>					
without extra requirements	0				
with an extra quality inspection certificate	1				
acc. to customer's request*	X				

**TABLE 71. PD22 ORDERING CODE:**

PD22 -	XX	X
<b>Version:</b>		
standard	00	
custom-made*	XX	
<b>Acceptance tests:</b>		
without extra requirements	0	
with an extra quality inspection certificate	1	
acc. to customer's request*	X	

\* - after agreeing with the manufacturer

## INTERFACE/PROTOCOL CONVERTERS

**TABLE 72. PD51 ORDERING CODE:**

PD51	XX	XX	X
<b>Supply voltage:</b>			
on-rail version:			
85..230...253 V a.c./d.c.	A1		
20..24...40 V a.c./d.c.	A2		
7..24...35 V d.c.	A3		
portable version 9 V d.c.	B1		
<b>Version:</b>			
standard	00		
custom-made *	XX		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request *	X		

**TABLE 73. PD8 ORDERING CODE:**

PD8 -	X	X	X
<b>Supply voltage:</b>			
85..230...253 V a.c./d.c.	1		
20..24...50 V a.c./d.c.	2		
<b>Version:</b>			
standard	0		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

**TABLE 74. PD8W ORDERING CODE:**

PD8W -	X	X	X	X
<b>Supply voltage:</b>				
85..253 V a.c./d.c.	1			
20..50 V a.c./d.c.	2			
<b>Version:</b>				
standard	1			
custom-made	x			
<b>Language:</b>				
Polish	P			
English	E			
other*	X			
<b>Acceptance tests:</b>				
without extra requirements	0			
with an extra quality inspection certificate	1			
acc. to customer's request*	X			

\* - after agreeing with the manufacturer

## POWER SUPPLIER

**TABLE 76. SM9 ORDERING CODE:**

SM9 -	XX	X
<b>Version:</b>		
standard	00	
custom-made*	XX	
<b>Acceptance tests:</b>		
without extra requirements	0	
with an extra quality inspection certificate	1	
acc. to customer's request*	X	

## RADIO TRANSMISSION MODULES

**TABLE 77. SM7 ORDERING CODE:**

SM7 -	X	X	X
<b>Supply:</b>			
85..230...253 V a.c./d.c.	1		
20..24...50 V a.c./d.c.	2		
7..35 V d.c.	3		
<b>Radio carrier frequency:</b>			
433 MHz	1		
868 MHz	2		
<b>Acceptance tests:</b>			
without extra requirements	0		
with an extra quality inspection certificate	1		
acc. to customer's request*	X		

**TABLE 78. MR03 ORDERING CODE:**

MR03 -	XX	X
<b>Version:</b>		
standard	00	
custom-made*	XX	
<b>Acceptance tests:</b>		
without extra requirements	0	
with an extra quality inspection certificate	1	
acc. to customer's request*	X	



## APPLICATION:

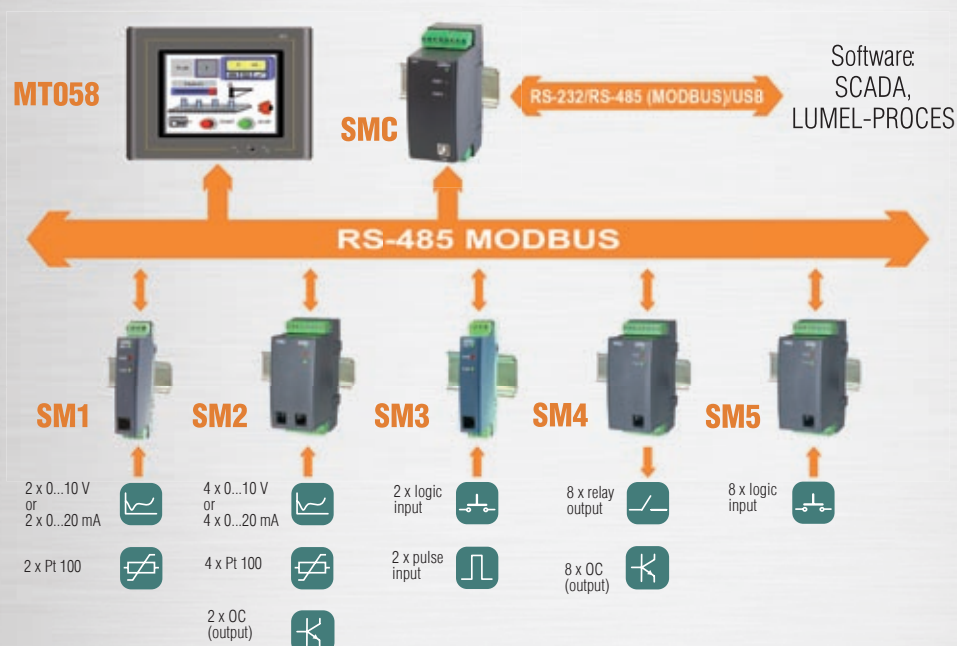
- automation of production process (SMC)
- preparing non-standard functionality for control systems

## SELECTED FEATURES:

- programming in ST language acc. to the IEC61131-3 standard using CPDev package,
- libraries of functional blocks: standard (IEC61131) and dedicated (Basic Blocks, Complex Blocks)
- communication with I/O modules and other measuring and control instruments (like power network analyzers and other) through RS-485 interface with Modbus protocol
- applications for processes which use
  - sequential logic control,
  - real time clock (RTC),
  - multi-channel PID control,
- easy algorithm creation using rich functional libraries, including user created libraries
- configurable functionality for any application

## APPLICATION EXAMPLES

### Control of production process



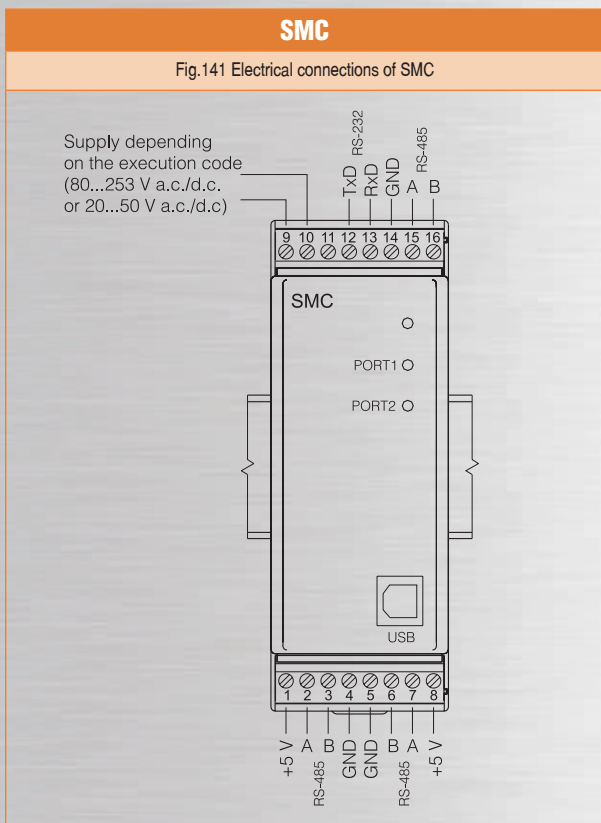


Type	PLC controller
Parameters	SMC
<b>Interface</b>	Port 1: RS-485, RS-232, USB 1.1 Modbus Slave (for communication with PC or HMI); Port 2: 2 x RS-485 Modbus Master (for communication with I/O modules)
<b>Baud rate</b>	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bits/s
<b>Supply voltage</b>	20...24...50 V a.c./d.c. or 85...230...253 V a.c./d.c.
<b>Protection rating frontal/rear side</b>	IP40
<b>Ambient temperature</b>	0...23...55 °C
<b>External dimensions</b>	45 x 120 x 100 mm
<b>Additional functions</b>	<ul style="list-style-type: none"> <li>• programming in ST, FBD, LD, IL languages acc. to the IEC61131-3 (CPDev software)</li> <li>• on-line and off-line simulation of created algorithms (CPDev software)</li> <li>• communication with input / output modules and other control and measurement devices through RS-485 interface with MODBUS protocol</li> <li>• rich libraries of functional blocks (incl. PID) with possibility to create a user's library</li> <li>• real time clock (RTC).</li> </ul>



CONNECTION DIAGRAMS

ORDERING CODES



**TABLE 79. SMC ORDERING CODE:**

	SMC -	X	XX	X	X
<b>Supply:</b>					
85...253 V a.c./d.c.		1			
20...50 V a.c./d.c.		2			
<b>Version:</b>					
standard			00		
non-standard settings			NS		
custom-made*			XX		
<b>Language:</b>					
Polish				P	
English				E	
other*				X	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

\* - after agreeing with the manufacturer

## SMC CONTROLLER SOFTWARE

### CPDev Module:

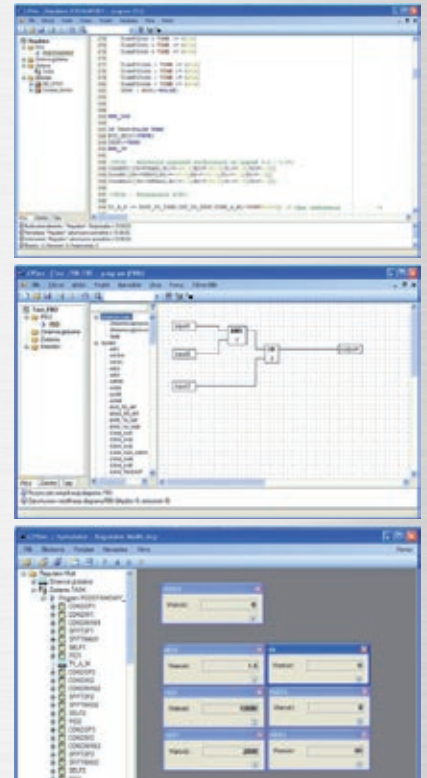
- Programming of algorithms in ST language (structured Text) in compliance with IEC 61131-3 standard.
- Available logic, comparative, arithmetical operators and mathematical functions.
- Constructions: IF...THEN, CASE...OF, FOR...DO, WHILE...DO, REPEAT...UNTIL.
- Access to the RTC clock of the SMC controller.
- Available libraries of IEC-61131 standard functional modules and Basic Blocs, and also specialized Complex Blocs.
- Possible creation of own functional libraries.

### CPSim Module:

- Simulation of off-line algorithms (without a controller) and on-line (with a controller).
- Read-in of process data for simulation from a text file.
- Write of simulation results in the text file.

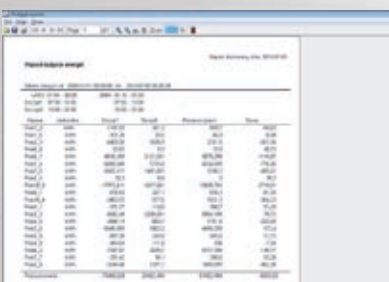
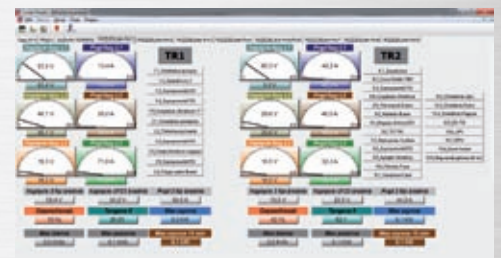
### CPCon Module:

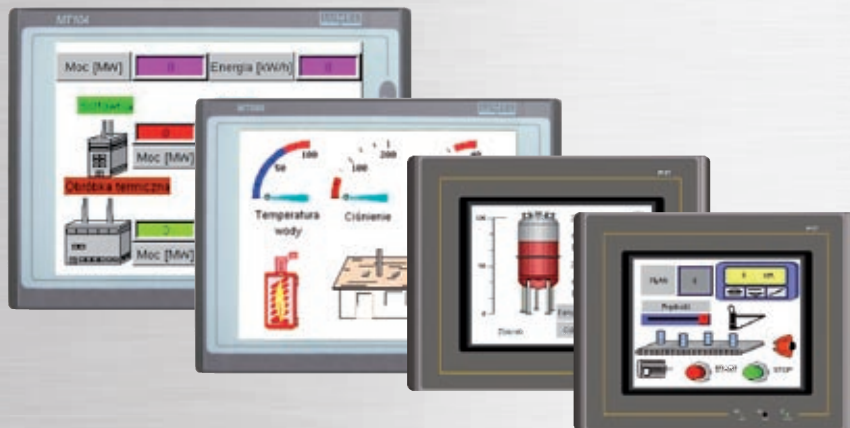
- Configuration of communication parameters of the controller and modules I/O of SM series.
- Configuration of communication tasks with modules I/O (by means of the creator or manually).
- Transmission of the project to the controller.



## LUMEL-PROCES SOFTWARE

- modern integration and data presentation system,
- control and measurement applications for industrial installations, intelligent buildings, heat engineering, gas engineering, power engineering and laboratories,
- for systems built with the application of LUMEL's instruments, compatible with devices from other manufacturers,
- data exchange using Modbus transmission protocol,
- visualization of process parameters in form of mimic maps, tables, bargraphs and trends,
- remote configuration and control of devices,
- data logging,
- recording of alarm events in the system,
- data sharing with other applications using DDE data exchange protocol (client DDE),
- sharing data with other computers with a LUMEL Proces program in the local computer network with the TCP/IP protocol,
- report templates,
- report monitoring on the base of archived data,
- report printing and export to pdf, txt, html formats,
- **view of synoptic map via web broser - NEW FUNCTION!**





## APPLICATION:

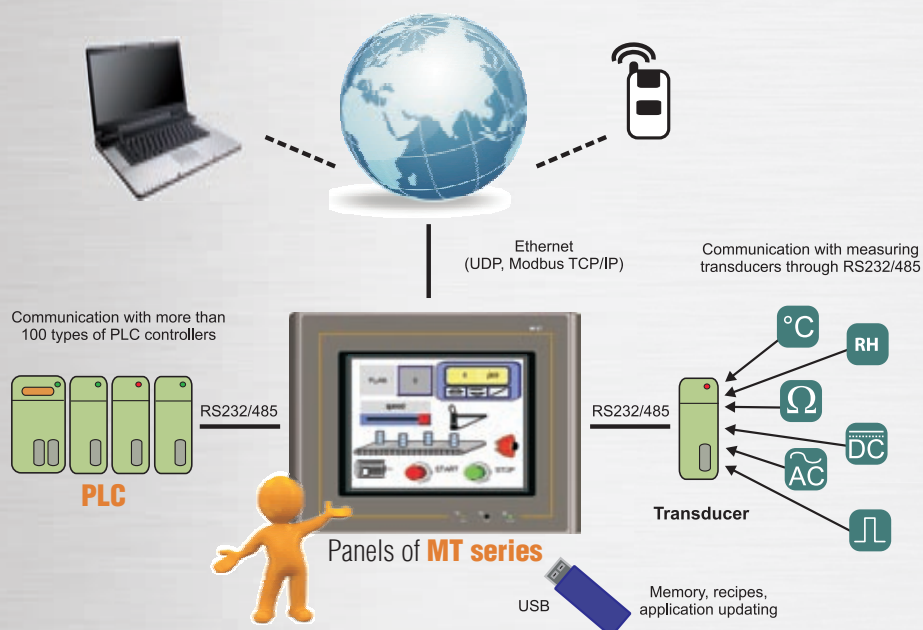
- technological process visualization
- remote control of many automation components from one place
- integration of automation devices working with different communication protocols
- data logging for technological processes

## SELECTED FEATURES:

- rich library of graphic elements
- large communication possibilities (service of over 200 communication drivers, at least 2 serial ports, USB connectors and Ethernet)
- transparent communication (access to PLC from SCADA software through HMI)
- multi-language applications (up to 10 languages)
- storage of data, alarms and events (battery operated memory)
- alarms, recipes, reports, macros (simple control)
- operation in tough conditions (IP65 from front side)
- high security level (8 access levels for applications)
- free Panel Master tool software

## APPLICATION EXAMPLES

### Communication possibilities of HMI panels





MT035



MT058



MT080



MT104

Type	HMI panels				
	Parameters	MT035	MT058	MT080	MT104
External features	Screen	3.5" TFT	5.7" TFT	8.0" TFT	10.4" TFT
	Colour	256	256	65535	65535
	Resolution	320 x 240	320 x 240	800 x 600	640 x 480
	Net weight	0.3 kg	0.85 kg	0.9 kg	1.4 kg
	External dimensions l x h x d [mm]	130 x 106.2 x 36	186.5 x 145.4 x 42	232.5 x 175.8 x 49	315 x 241 x 60
	Panel cut-out l x h [mm]	118.5 x 92.5	174.5 x 132.5	221.5 x 164	303 x 226
Communication protocols	COM1	RS232/422/485			
	COM2	RS422/485	RS232/422/485		
	COM3	-		RS232/422/485	
	Ethernet	-		+	
	USB Host 2.0	-		2x	3x
Memory resources	Flash memory	4 MB		16 MB	
	System memory	1 MB	2 MB	64 MB	
	Battery operated memory	128kB - 1MB			
	CPU	RISC ARM 32-bit			
	Supply voltage	20...24...28 V d.c.			
	Power consumption	6 W	10 W	20 W	
	Protection rating frontal/rear side	IP65/IP20			
Ambient temperature	0...50°C				

## MT

Fig. 142 Connectors of MT035 panel

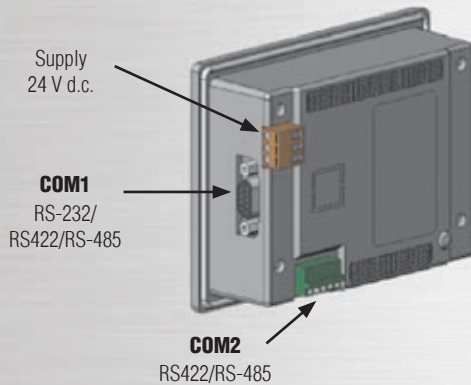


Fig. 143 Serial ports

**COM1** serial port in the panel - DB9-9P female connector.

Pin definition:

Pin	Function	Pin	Function
1	RS422 TX+ and RS-485 +(A)	6	RS422 TX- and RS-485 -(B)
2	RS-232 RXD	7	RS-232 RTS
3	RS-232 TXD	8	RS-232 CTS
4	RS422 RX+	9	RS422 RX-
5	GND		

**COM2** serial port in the panel – connector 5 pins (RS-422 and RS-485)

422	TX+	RX+	RX-	TX-	SG
485	+(A)		-(B)		

**COM2** serial port in the panel - DB9-9P male connector

**(MT058, MT080 and MT104)**

Pin definition:

Pin	Function	Pin	Function
1	RS-485 +(A)	6	RS-485 -(B)
2	RS-232 RXD	7	RS-232 RTS
3	RS-232 TXD	8	RS-232 CTS
4		9	
5	GND		

**COM3** serial port in the panel – connector 6 pins (RS-232) (only MT080 and MT104)

5V	CTS	RTS	TXD	RXD	SG
----	-----	-----	-----	-----	----

Fig. 144 Connectors of MT058 panel

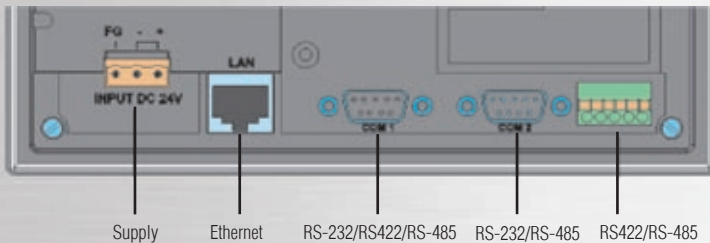


Fig. 145 Connectors of MT080 and MT104 panels



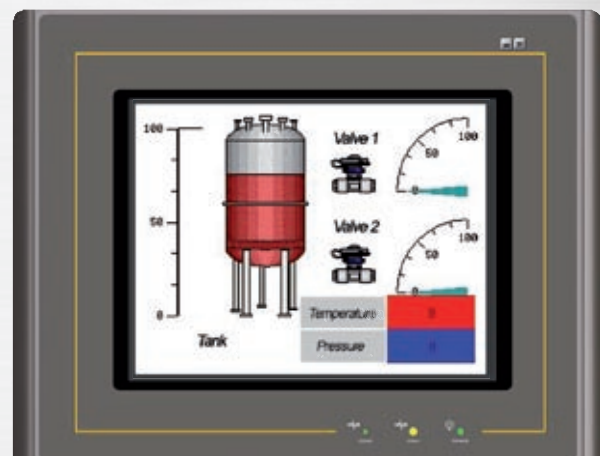
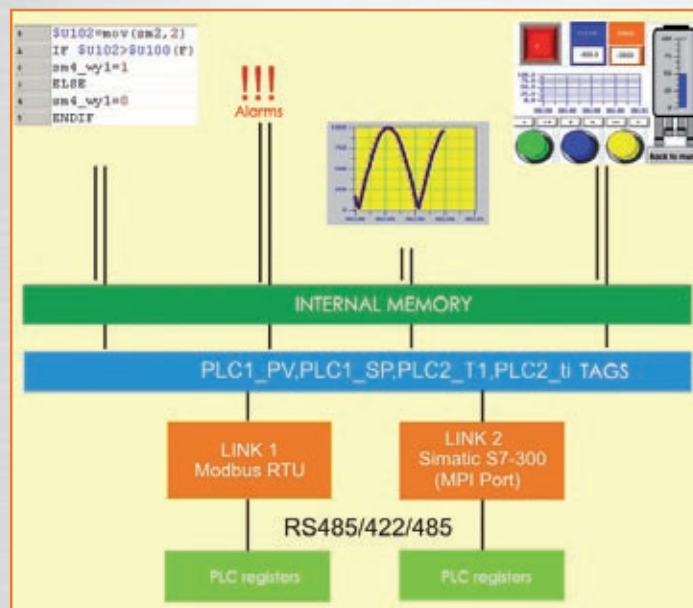
## ORDERING CODES

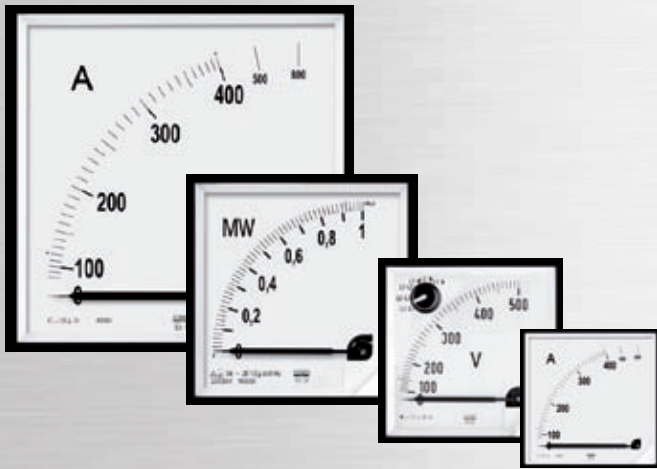
TABLE 80. MT ORDERING CODE:

HMI panel MT -	XXX-XXX	XX	X
<b>Type:</b>			
3.5"	035-TST		
5.7"	058-TST		
5.7" Ethernet	058-TNT		
8.0" Ethernet	080-TNT		
10.4" Ethernet	104-TNT		
<b>Version:</b>			
standard		00	
<b>Acceptance tests:</b>			
without extra requirements			0
with an extra quality inspection certificate			1
acc. to customer's request*			X

\* after agreeing with the manufacturer

- Graphical visualization of processes (available rich library of graphical elements), possible import of own graphics in gif, bmp, jpg formats.
- Communication with devices of over 100 manufacturers (among others: Modbus ASCII/RTU Master and Slave, Siemens: S5, S7-200, S7-300, Profibus DP, GE: 90 Series CCM, 90 Series SNP, Allen Bradley: Micrologix 1000/1500, DH-485, SLC 5/03, 5/04, Saia, Omron and others).
- Mode of transparent communication (access from SCADA application to registers of PLC controllers through the operator's panel).
- Multilanguage applications (up to 10 languages, Unicode coding).
- Data storage in internal memory.
- Alarm storage.
- Event log.
- Review of archived data on trends and tables.
- Recipes.
- Macros (set of instructions for algorithm realization).
- Simulation in off-line (without panel and controllers) and on-line mode (with controllers connected to PC computer ports.)





## APPLICATION:

- industrial supply systems
- power engineering (switching stations, generators, turbines)
- heat engineering (thermal-electric power stations, boiler rooms)
- shipyard industry (supply systems on ships)
- mimic panels (visualization of physical quantities converted into an analog signal)

## SELECTED FEATURES:

- **protection grade IP65 (optional)** – dustproof and waterproof front frame ensuring the meter reliability and safety of service in rugged operation conditions
- **direct and indirect measurements** – co-operation with current and voltage transformers, and shunts
- **overload scales** – extension of ammeter indication ranges (twice or six-times)
- **interchangeable scales** – simple change of indication ranges in meters for indirect measurements
- **extra red pointer** – possible setting on the scale in any position, makes it easier to read measuring results (optional)
- **red division on the scale** – makes it easier to read measuring results (optional)
- **memory of maximal value** – the “memory” pointer remains in maximal position and enables the readout of the maximal load current without a continuous meter observation, possible return of the pointer to the value 0 (BA and BE meters)
- **various working positions** – meters are graduated considering individual working position (optional)
- **front window material** – glass

# TECHNICAL DATA

EB16



EA12



Type	Moving-iron meters				
	EB16	EA16	EA17	EA19	EA12
<b>Measuring ranges:</b> - current: · direct · through a transformer (on request, with twice or six-times overload) - voltage: · direct · through a transformer	100 mA ... 25 A xA x/5 A; xA/1 A  6 V ... 600 V xV/100 V; xV/110 V		100 mA ... 100 A xA x/5 A; xA x/1 A  6 V ... 1000 V xV/ 100 V; xV/110 V		
<b>Frequency of measured value</b>	40...45...65...72 Hz				
<b>Protection rating frontal/rear side</b>	IP52/IP20	IP50/IP20 on request: IP65/IP20			on request: IP54/IP20
<b>Ambient temperature</b>	5...23...50 °C				
<b>Climate version</b>	normal or tropical		normal, tropical or similar to marine		
<b>External dimensions</b>	53 x 90 mm	48 x 48 mm	72 x 72 mm	96 x 96 mm	144 x 144 mm
<b>Panel cut-out [mm]</b>	on a rail	45 <sup>+0.6</sup> x 45 <sup>+0.6</sup>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	138 <sup>+1.0</sup> x 138 <sup>+1.0</sup>
<b>Panel cut-out [mm] - for version with IP65</b>	on a rail	47 <sup>+0.6</sup> x 47 <sup>+0.6</sup>	70.2 <sup>+0.7</sup> x 70.2 <sup>+0.7</sup>	94.2 <sup>+0.8</sup> x 94.2 <sup>+0.8</sup>	-

EV96



EV72



Type	Moving-iron meters	
	EV72	EV96
<b>Measuring ranges:</b> - current: · through a transformer (with twice times overload) - voltage: · direct	x/2x x/5 A  500 V	
<b>Frequency of measured value</b>	45...65 Hz	
<b>Protection rating frontal/rear side</b>	IP52	
<b>External dimensions</b>	72 x 72 mm	96 x 96 mm

MA12



EP29



Type	Moving-coil meters with rectifiers		
	MA17P	MA19P	MA12P
<b>Measuring ranges (direct):</b> - current:  - voltage:	400 mA...1 A (30...1000...10000 Hz) 1 A...6 A (49...50...51 Hz)  6mV...1,5 V (49...50...51 Hz) 2,5 V...600 V (30...1000...10 000 Hz)		400 mA...1 A (30...1000...10 000 Hz)  2,5 V...600 V (30...1000...10 000 Hz)
<b>Protection rating frontal/rear side</b>	IP50/IP20 (on request: IP65/IP20)		IP50/IP20 (on request: IP54/IP20)
<b>Ambient temperature</b>	5...23...55 °C		
<b>Climate version</b>	normal, tropical or similar to marine		
<b>External dimensions</b>	72 x 72 mm	96 x 96 mm	144 x 144 mm
<b>Panel cut-out [mm]</b>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	138 <sup>+1.0</sup> x 138 <sup>+1.0</sup>
<b>Panel cut-out [mm] - for version with IP65</b>	70.2 <sup>+0.7</sup> x 70.2 <sup>+0.7</sup>	94.2 <sup>+0.8</sup> x 94.2 <sup>+0.8</sup>	-

PA39



Type	3-phase voltmeters	
	EP27	EP29
<b>Voltage measuring ranges:</b> - direct phase-to-phase  - through a transformer:	500 V  xV/100 V; xV/110 V	
<b>Frequency</b>	40...45...65...72 Hz	
<b>Protection rating frontal/rear side</b>	IP50/IP20	
<b>Climate version</b>	normal, tropical or similar to marine	
<b>External dimensions</b>	72 x 72 mm	96 x 96 mm
<b>Panel cut-out [mm]</b>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>

Type	Power meters
	PA39
<b>Power measuring ranges:</b>	50W...1000 MW or 50 var...1000 Mvar
<b>Frequency</b>	50 Hz, 60 Hz or 400 Hz
<b>Protection rating frontal/rear side</b>	IP50/IP20 (on request: IP65/IP20)
<b>Ambient temperature</b>	5...23...40 °C
<b>Climate version:</b>	normal, tropical or similar to marine
<b>External dimensions</b>	96 x 96 mm
<b>Panel cut-out [mm]</b>	94.2 <sup>+0.6</sup> x 94.2 <sup>+0.6</sup>



Type	Moving-coil meters				
	MB16	MA16	MA17	MA19	MA12
<b>Measuring ranges:</b> - current: · direct measurement · indirect measurement (through the shunt) - voltage: · direct	40 mA...25 A 1 A...15 kA		100 mA...25 A 1 A...15 kA		
<b>Protection rating frontal/rear side</b>	IP52/IP20	IP50/IP20 on request: IP65/IP20			on request: IP54/IP20
<b>Ambient temperature</b>	5...23...55 °C				
<b>Climate version:</b>	normal or tropical		normal, tropical or similar to marine		
<b>External dimensions [mm]</b>	53 x 90	48 x 48	72 x 72	96 x 96	144 x 144
<b>Panel cut-out [mm]</b>	on a rail	45 <sup>+0.6</sup> x 45 <sup>+0.6</sup>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	138 <sup>+1.0</sup> x 138 <sup>+1.0</sup>
<b>Panel cut-out [mm] - in version with IP65</b>	on a rail	47.2 <sup>+0.6</sup> x 47.2 <sup>+0.6</sup>	70.2 <sup>+0.7</sup> x 70.2 <sup>+0.7</sup>	94.2 <sup>+0.8</sup> x 94.2 <sup>+0.8</sup>	-



Type	Max demand ammeters - Bimetallic or Bimetallic and moving-iron			
	BA27	BA39	BE27	BE39
<b>Measuring ranges:</b> - bimetallic element: · direct measurement · indirect measurement (through a transformers) - moving-iron element: · direct measurement · indirect (through a transformer)	0...1,2 A or 0...6 A 0...1,2(x) A x/1 A or 0...1,2(x) A x/5 A		0...1,2 A or 0...6 A 1,2(x) A x/1 A or 1,2(x) A x/5 A	
<b>Protection rating frontal/rear</b>	IP50/IP20			
<b>Ambient temperature</b>	-25...40 °C			
<b>Climate version:</b>	normal, tropical or similar to marine			
<b>External dimensions</b>	72 x 72 mm	96 x 96 mm	72 x 72 mm	96 x 96 mm
<b>Panel cut-out [mm]</b>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>



Type	Power factor and frequency meters				
	FA39	FA32	CA37	CA39	CA32
<b>Measuring ranges:</b>	0,5 <sub>Cap</sub> ...1...0,5 <sub>IND</sub> . 0,8 <sub>Cap</sub> ...1...0,2 <sub>IND</sub> . 0,85 <sub>Cap</sub> ...1...0,85 <sub>IND</sub> . 0 <sub>IND</sub> ...1		Class 0,5: 45...55 Hz; 45...65 Hz; 55...65 Hz; 360...440 Hz; Class 0,2: 48...52 Hz; 58...62 Hz; 140...160 Hz; 180...220 Hz; 380...420 Hz		
<b>Frequency</b>	45...50...60...65 Hz		-		
<b>Protection rating frontal/rear side</b>	IP52/IP20 (on request IP65/IP20)	IP50/IP20 (on request IP54/IP20)	IP50/IP20 (on request IP65/IP20)	IP50/IP20 (on request IP54/IP20)	
<b>Ambient temperature</b>	5...23...40 °C		5...23...40 °C 5...35...55 °C (tropical version)		
<b>Climate version:</b>	normal, tropical or similar to marine				
<b>External dimensions</b>	96 x 96 mm	144 x 144 mm	72 x 72 mm	96 x 96 mm	144 x 144 mm
<b>Panel cut-out [mm]</b>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	138 <sup>+1.0</sup> x 138 <sup>+1.0</sup>	68 <sup>+0.7</sup> x 68 <sup>+0.7</sup>	92 <sup>+0.8</sup> x 92 <sup>+0.8</sup>	138 <sup>+1.0</sup> x 138 <sup>+1.0</sup>
<b>Panel cut-out [mm] - in version with IP65</b>	94.2 <sup>+0.8</sup> x 94.2 <sup>+0.8</sup>	-	70.2 <sup>+0.7</sup> x 70.2 <sup>+0.7</sup>	94.2 <sup>+0.8</sup> x 94.2 <sup>+0.8</sup>	-



## EV048, EV072, EV96 AND EV144

Fig. 146 Voltage AC

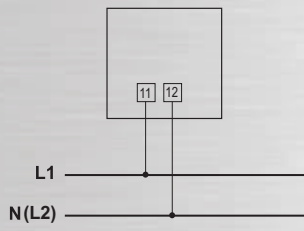


Fig. 147 Current AC, direct connection

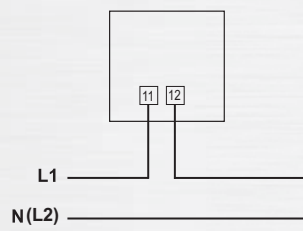
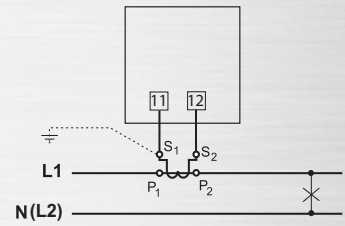


Fig. 148 Current AC, indirect connection



## EP27

Fig. 149 Direct connection

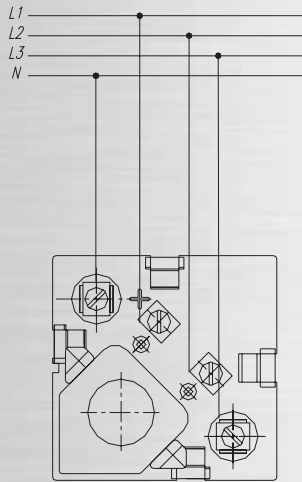
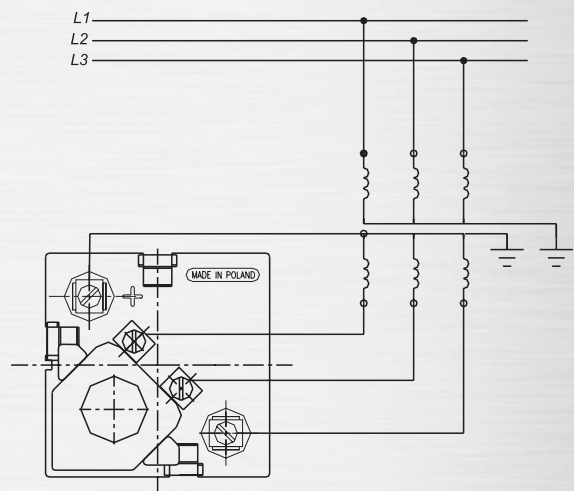


Fig. 150 Connection with voltage transformers



## EP29

Fig. 151 Direct connection

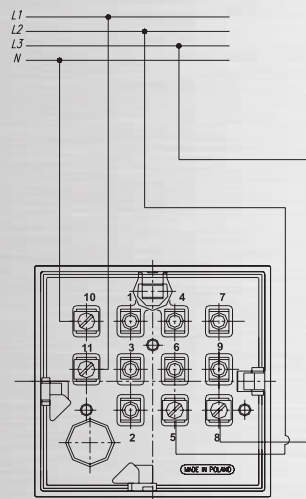
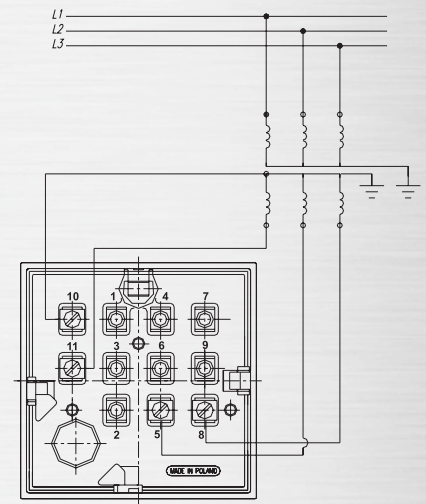


Fig. 152 Connection with voltage transformers



PA39

Fig. 153 Measurement of active power in a single-phase network

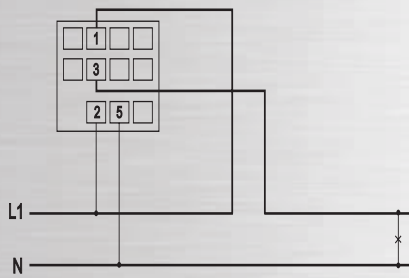


Fig. 154 Measurement of active power in a three-phase three-wire symmetrically loaded network

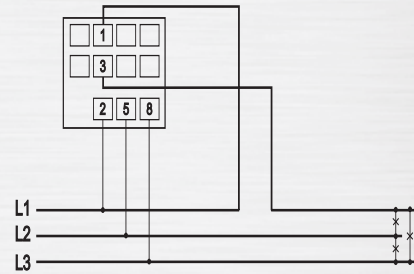


Fig. 155 Measurement of active power in a three-phase three-wire asymmetrically loaded network

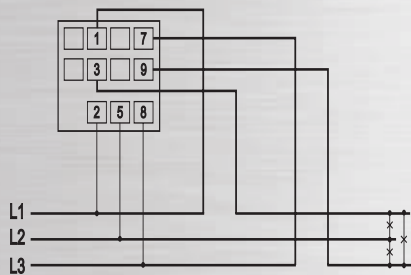


Fig. 156 Measurement of active power in a three-phase four-wire symmetrically loaded network

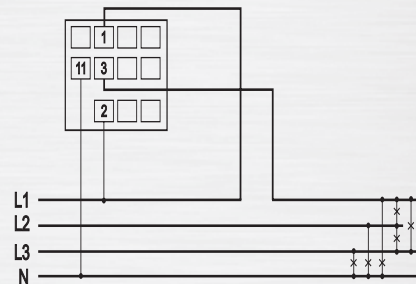


Fig. 157 Measurement of active power in a three-phase four-wire asymmetrically loaded network

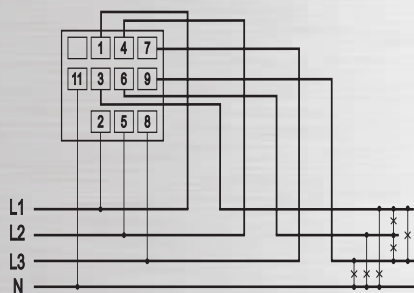


Fig. 158 Measurement of reactive power in a three-phase three-wire symmetrically loaded network

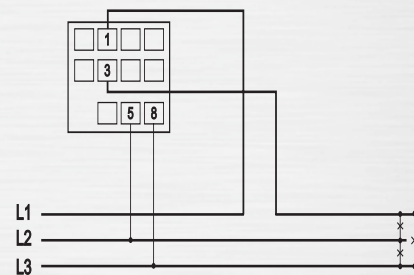


Fig. 159 Measurement of active power in a three-phase three-wire asymmetrically loaded network

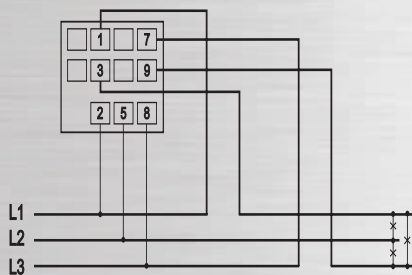


Fig. 160 Measurement of reactive power in a three-phase four-wire symmetrically loaded network

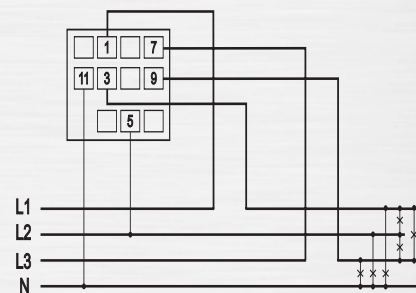
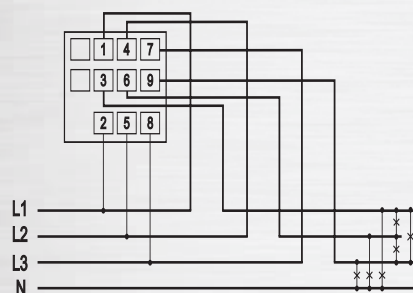


Fig. 161 Measurement of active power in a three-phase four-wire asymmetrically loaded network



## FA39

Fig. 162 Power factor meter connected directly to a single-phase network.

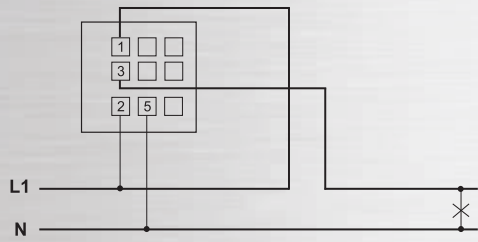


Fig. 163 Power factor meter connected directly to a three-phase symmetrically loaded network.

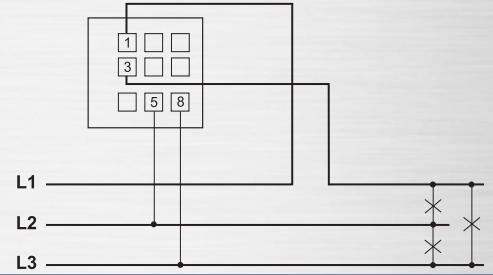


Fig. 164 Power factor meter connected through a current transformer to a single-phase network

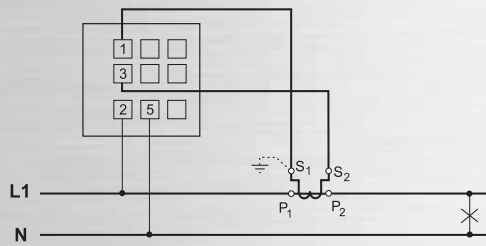


Fig. 165 Power factor meter connected through a current transformer to a three-phase symmetrically loaded network.

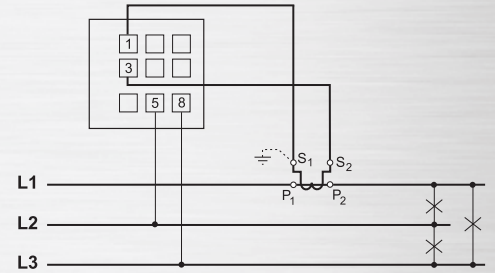


Fig. 166 Power factor meter connected through a current and voltage transformers to a single-phase network

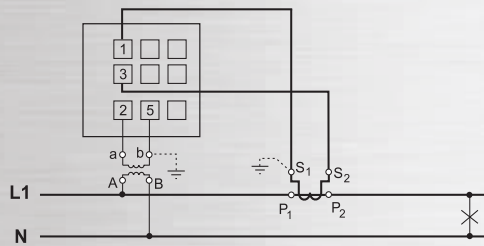
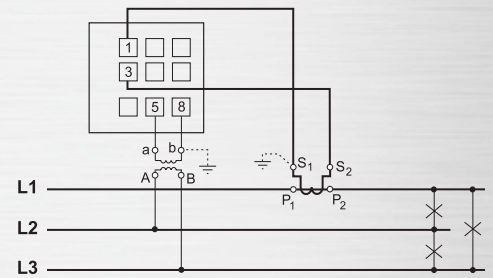


Fig. 167 Power factor meter connected through a current and voltage transformers to a three-phase symmetrically loaded network



## FA32

Fig. 168 Power factor meter connected directly to a single-phase network

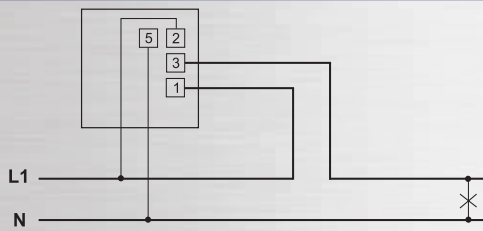


Fig. 169 Power factor meter connected directly to a three-phase symmetrically loaded network

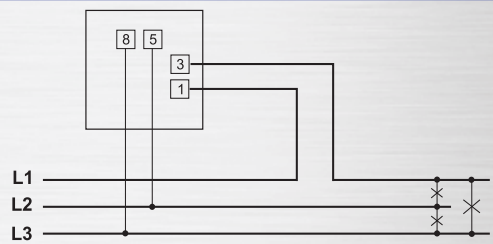


Fig. 170 Power factor meter connected through a current transformer to a single-phase network

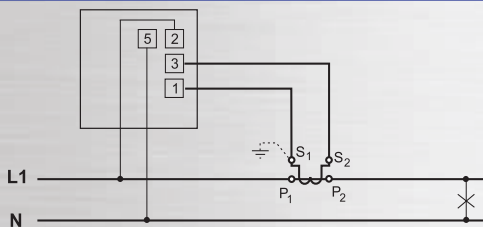


Fig. 171 Power factor meter connected through a current transformer to a three-phase symmetrically loaded network

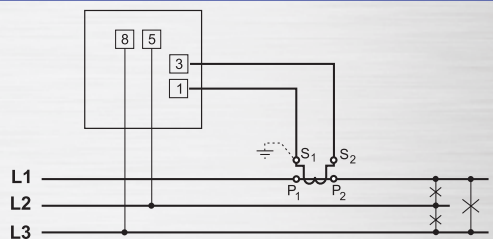


Fig. 172 Power factor meter connected through a current and voltage transformers to a single-phase network

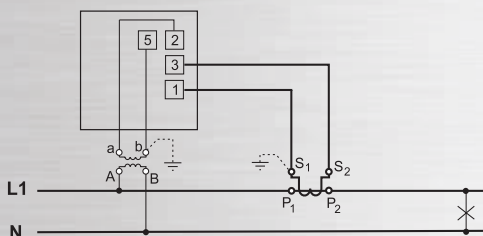
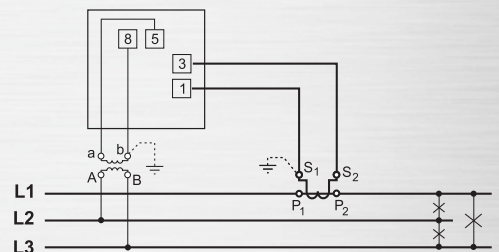


Fig. 173 Power factor meter connected through a current and voltage transformers to a three-phase symmetrically loaded network



## D.C. AMMETERS AND D.C. VOLTMETERS EA AND EB

Please, specify in the order:

- name and meter type
- measuring range
- overload value – only for current ranges
- data of measuring transformers – if the meter is foreseen to co-operate with transformers
- working position
- meter climate version - only for tropical versions or similar to marine
- extra requirements if necessary

**Ordering example:** voltmeter of EA17 type, 500 V range, direct measurement, vertical 90° working position, scale consistent to the range, without extra requirements.

## D.C. AND A.C. AMMETERS AND VOLTMETERS MA AND MB

Please, specify in the order:

- name and meter type
- measuring range
- data of the shunt – if the meter is foreseen to co-operate with an interchangeable shunt
- working position
- meter climate version - only for tropical versions or similar to marine
- extra requirements if necessary

One must order the shunt separately.

When ordering meters for a.c. current or voltage, add „with rectifier” to the meter name.

**Ordering example:** ammeter of MA16 type, 40 A range, to co-operate with shunt of B2 40 A/60 mV type, vertical 90° working position, scale consistent to the range, without extra requirements. If the shunt has to be delivered with the meter, one must place it in the order as a separate item, e.g. shunt B2 40 A/60 mV.

## A.C. VOLTMETERS EP

Please, specify in the order:

- name and meter type
- measuring range
- data of measuring transformers – if the meter is foreseen to co-operate with transformers
- working position
- meter climate version - only for tropical versions or similar to marine
- extra requirements if necessary

**Ordering example:** voltmeter of EP27 type, 500 V range, direct measurement, vertical 90° working position, scale according to the range, without extra requirements.

## DEFAULT PARAMETERS

- climate version: normal
- protection grade: IP50 (IP52 for EB16/MB16)
- working position: 90°
- scale according to the measuring range
- without an inspection certificate and extra requirements



MAX DEMAND AMMETERS BA AND BE

TABLE 86. BIMETALLIC METERS BA27, BE27, BA39, BE39							
BA27, BE27, BA39, BE39 -	X	X	XXXX	X	X	X	X
<b>Version:</b>							
standard, to fix in a panel	1						
direct fixing on the transformer (only BA27)	2						
custom-made version <sup>1)</sup>	X						
<b>Climatic categories:</b>							
standard version	N						
tropical version	T						
custom-made version <sup>2)</sup>	X						
<b>Ranges:</b>							
acc. to the table 87 (write the code, e.g.: F205)	XXXX						
<b>Setting time of the bimetallic element:</b>							
15 minutes	0						
8 minutes	2						
<b>Working position:</b>							
acc. to the table 88						X	
<b>Signs on the dial and markings:</b>							
dial with a standard scale (consistent to the range)	0						
dial with the scale in %	1						
dial execution acc. to the order <sup>3)</sup>	X						
<b>Acceptance tests:</b>							
without extra requirements	0						
with an extra quality inspection certificate	1						
other requirements <sup>3)</sup>	X						

1) - the code number is established by the manufacturer  
 2), 3) - all extra requirements must be agreed with the manufacturer

Work position	Code			
	EB16	MB16	MA16 EA16	other meters
c3. $\alpha = 90^\circ$	A	A	A	0
c1. $\alpha = 0^\circ$		B	B	A
c2. $\alpha = 15^\circ$			C	B
c2. $\alpha = 30^\circ$			D	C
c2. $\alpha = 45^\circ$			E	D
c2. $\alpha = 60^\circ$			F	E
c2. $\alpha = 75^\circ$			G	F
c4. $\alpha = 105^\circ$			H	H
c4. $\alpha = 120^\circ$			I	I

TABLE 87			
Code Range	Range description (measuring range)	Code range	Range description (measuring range)
F201	1.2 A	F366	1920 A 1.6k/1
F205	6 A	F4	1.2 XA X/5
F3	1.2X A X/1	F405	6 A 5/5
F301	1.2 A 1/1	F406	7.2 A 6/5
F305	6 A 5/1	F407	12 A 10/5
F306	7.2 A 6/1	F408	18 A 15/5
F307	12 A 10/1	F409	24 A 20/5
F308	18 A 15/1	F411	36 A 30/5
F309	24 A 20/1	F412	48 A 40/5
F311	36 A 30/1	F413	60 A 50/5
F312	48 A 40/1	F414	72 A 60/5
F313	60 A 50/1	F415	96 A 80/5
F314	72 A 60/1	F416	120 A 100/5
F315	96 A 80/1	F417	180 A 150/5
F316	120 A 100/1	F418	240 A 200/5
F317	180 A 150/1	F420	360 A 300/5
F318	240 A 200/1	F421	480 A 400/5
F320	360 A 300/1	F422	600 A 500/5
F321	480 A 400/1	F423	720 A 600/5
F322	600 A 500/1	F424	960 A 800/5
F323	720 A 600/1	F450	1200 A 1k/5
F324	960 A 800/1	F451	1800 A 1.5k/5
F350	1200 A 1k/1	F452	2400 A 2k/5
F351	1800 A 1.5k/1	F454	3600 A 3k/5
F352	2400 A 2k/1	F455	4800 A 4k/5
F354	3600 A 3k/1	F456	6000 A 5k/5
F355	4800 A 4k/1	F457	7200 A 6k/5
F356	6000 A 5k/1	F459	12000 A 10k/5
F357	7200 A 6k/1	F465	1440 A 1.2k/5
F359	12000 A 10k/1	F466	1920 A 1.6k/5
F365	1440 A 1.2k/1		

POWER FACTOR METERS FA

TABLE 89. POWER FACTOR METERS FA39 AND FA32							
FA39 and FA32 -	X	X	X	XX	X	XX	X
<b>Measurement of power factor in:</b>							
1-phase system	1						
3-phase system, in a 3-phase balanced network	3						
<b>Measuring range:</b>							
0.5 cap...1...0.5 ind	A						
0.8 cap ...1...0.2 ind	B						
0.85 cap ...1...0.85 ind	C						
0 <sub>cap</sub> ...1	D						
<b>Input current:</b>							
1 A	1						
5 A	5						
<b>Input voltage:</b>							
60 V (only for measurement in a 1-phase system)	01						
100 V	02						
110 V	03						
230 V	04						
400 V	05						
415 V (only for measurement in a 3-phase system)	06						
440 V (only for measurement in a 3-phase system)	07						
500 V (only for measurement in a 3-phase system)	08						
on request - after agreeing with the manufacturer	XX						
<b>Working position:</b>							
acc. to the table 88						X	
<b>Version:</b>							
standard	00						
custom-made*	XX						
<b>Acceptance tests:</b>							
without extra requirements	0						
with an extra quality inspection certificate	1						
other requirements*	X						

\* - after agreeing with the manufacturer

FREQUENCY METERS CA

TABLE 90. FREQUENCY METERS CA32, CA37, CA39					
CA32, CA37, CA39 -	X	X	X	XX	X
<b>Frequency range:</b>					
45...55 Hz	1				
45...65 Hz	2				
48...52 Hz	3				
55...65 Hz	4				
58...62 Hz	5				
140...160 Hz	6				
180...220 Hz	7				
360...440 Hz	8				
380...420 Hz	9				
<b>Range voltage:</b>					
60 V	1				
100 V	2				
110 V	3				
230 V	4				
400 V	5				
415 V	6				
440 V	7				
500 V	8				
690 V	9				
<b>Working position:</b>					
acc. to the table 88					X
<b>Version:</b>					
standard	00				
custom-made*	XX				
<b>Acceptance tests:</b>					
without extra requirements	0				
with an extra quality inspection certificate	1				
other requirements*	X				

\* - after agreeing with the manufacturer

# SHUNTS



Type Parameters	Shunts				
	B2	B3	B4	B5	B6
<b>Voltage drop</b>	60 mV	150 mV	50 mV	75 mV	100 mV
<b>Rated current</b>	1 A...15 kA (1; 1.5; 2.5; 4; 6 and their decimal multiples)				
<b>Accuracy class</b>	0.5				
<ul style="list-style-type: none"> <li>all shunts from 1...25 A are fixed on insulating basis with the possibility to be mounted on a DIN rail</li> <li>shunts of other ranges are fixed directly on the DC rail or cable</li> <li>dimensions acc. DIN 43703</li> </ul>					

# CURRENT TRANSFORMERS



LCTA SERIE

Type Parameters	LCTM current transformers with a primary winding	
	LCTM 62/W (40)	LCTM 74W (45)
<b>Primary current [A]</b>	1...25	1...60
<b>External dimensions</b>	40 x 62 mm	45 x 74 mm
<b>Accuracy class</b>	0.2; 0.5; 1	0.2; 0.5; 1



LCTR SERIE

Type Parameters	LCTR current transformers for a round conductor			
	LCTR 45/14(40)	LCTR 50/14 (30)	LCTR 50/14 (50)	LCTR 62/R
<b>Primary current[A]</b>	30...300	40...300	30...300	50...600
<b>Hole diameter</b>	φ14	φ14	φ14	φ22
<b>Accuracy class</b>	0.5; 1	0.5; 1	0.5; 1	0.2; 0.5; 1



LCTB 45

LCTB 62

Type Parameters	LCTB current transformers for a busbar					
	LCTB 45/21(40)	LCTB 50/21 (30)	LCTB 50/21 (50)	LCTB 62/20 (40)	LCTB 74/20 (45)	LCTB 50/30 (30)
<b>Primary current [A]</b>	5...400	50...400	50...400	50...400		75...600
<b>Hole diameter</b>	φ20	φ21	φ21	-	φ20	φ36
<b>Busbar (mm)</b>	20 x 10	20 x 10	30 x 10; 20x15 20x20; 2x20x10	20 x 12 2 x 15 x 6	20 x 10	30x10; 20x15 20x20 2x20x10
<b>Accuracy class</b>	0.5; 1	0.5; 1	0.5; 1	0.2S; 0.2; 0.5; 1	0.2S; 0.2; 0.5; 1	0.5; 1



LCTB 74

LCTB 85

Type Parameters	LCTB current transformers for a busbar					
	LCTB 50/30 (50)	LCTB 62/30 (40)	LCTB 62/30 (50)	LCTB 74/30 (45)	LCTB 62/40 (40)	LCTB 86/40 (45)
<b>Primary current [A]</b>	75...600	50...800	40...800	30...800	100...800	50...1000
<b>Hole diameter</b>	φ26	φ30,5	φ28	φ26	φ31	φ36
<b>Busbar [mm]</b>	30x10; 20x15; 20x20; 2x20x10	30x10 2x25x10	30x10 2x25x10	30x15 2x20x10	40x10 2x30x10	40x10 2x30x15
<b>Accuracy class</b>	0.5; 1					
	0.2S; 0.2; 0.5; 1					



Type Parameters	LCTB current transformers for a busbar					
	LCTB 74/40 (45)	LCTB 74/50 (45)	LCTB 86/50 (45)	LCTB 86/60 (45)	LCTB 104/60 (45)	LCTB 104/80 (45)
Primary current [A]	40...1000	100...1000	100...1250	100...1600	100...1600	200...2000
Hole diameter	φ35	φ41	φ45	φ51	φ54	φ65
Busbar [mm]	40x12 2x30x15	50x12 2x40x10	50x12 2x40x15	60x12 2x50x15	60x12 2x50x15 2x40x20	80x12 2x60x15 2x50x25
Accuracy class	0.2S; 0.2; 0.5; 1					



Type Parameters	LCTB current transformers for a busbar			
	LCTB 140/80 (45)	LCTB 140/100H (45)	LCTB 225/125 (50)	LCTB 225/167 (50)
Primary current [A]	200...2000	200...4000	600...6000	1000...7500
Hole diameter	73	86	-	-
Busbar [mm]	80x30 2x60x25	100x30 2x80x25 2x70x30	124x92	166x65
Accuracy class	0.2S; 0.2; 0.5; 1	0.2S; 0.2; 0.5; 1	0.2S; 0.2; 0.5; 1	0.2S; 0.2; 0.5; 1



Type Parameters	LCTB current transformers for a busbar			
	LCTB 100/100V (45)	LCTB 140/100V (45)	LCTB 100/130V (45)	LCTB 140/130V (45)
Primary current [A]	400...2500	200...3000	400...3200	400...5000
Hole diameter	-	-	-	-
Busbar [mm]	41 x 103	100x30 2x80x25 2x70x30	38 x 128	70 x 130
Accuracy class	0.2S; 0.2; 0.5; 1		0.2; 0.5; 1	0.2S; 0.2; 0.5; 1



Type Parameters	LCTS split core current transformers			
	LCTS 93/30SC (40)	LCTS 125/50SC (40)	LCTS 155/80SC (40)	LCTS 195/80SC (64)
Primary current [A]	100...400	250...1000	250...3000	500...5000
Hole dimensions (depth x width)	23 x 33 mm	82 x 52 mm	82 x 122 mm	82 x 162 mm
Accuracy class	0.5; 1	0.5; 1	0.5; 1	0.5; 1



**We offer:** On customers request we offer transformer calibration certificates.

## ORDERING

### ORDERING WAY

**Please, specify in the order:** transformer type / primary current / secondary current / power / accuracy class

Order example: LCTM 62/W (40) 25/5A, 5VA, cl. 1



## APPLICATION:

- visualization of essential technological process' parameters (DN, DL)
- displaying text messages (DA1)

## SELECTED FEATURES:

- different digit sizes (100, 200 and 300 mm) for showing information from different distances
- analog input for direct connection with a measuring transducers (DNL)
- RS-485 interface with Modbus Master protocol to connect external information source
- RS-485 interface with Modbus Slave protocol for sharing displayed values with master systems (SCADA, PLC)

## APPLICATION EXAMPLES



Type	Outdoor or indoor displays
Parameters	DN1, DN2, DN3
Display	numerical
Digit height	100/200/300 mm
Number of rows	1 or 2
Characters per row	3,4 or 5
Display colour	red, yellow or green
Displayed values	value measured by external device, transmitted through RS-485 interface
Interface (Master)	RS-485 for value download
Programming	during the production process
Protection rating frontal/rear side	IP54 (IP65 option)
Additional functions	<ul style="list-style-type: none"> <li>• good visibility in range up to 120m</li> <li>• brightness sensor installed (display brightness changes depending on outside conditions)</li> </ul>

Type	Indoor displays				
Parameters	DL11, DL12, DL13	DL21	DLZ	DA1	DNL
Display	numerical			alphanumeric	numerical
Digit height	100 mm			60 mm	230 mm (DNL2), 305 mm (DNL3)
Number of rows	1, 2 or 3	1	1	2 or 3	1 or 2
Characters per row	3	3	7	20 or 24 for text version	4
Display colour	red, yellow or green	red/orange/green (programmable)	red	red, yellow or green	red, yellow
Displayed values	value measured by external device, transmitted through RS-485 interface		current time, humidity and temperature (version with P18 transducer)	value measured by external device, transmitted through RS-485 interface, programmed texts, current time	value measured by external device, transmitted through RS-485 interface
Interface (Master)	Modbus RTU RS-485 for value transmission				
Interface (Slave)	RS-485 for configuration			RS-485 or RS-232 for configuration	RS-485 for configuration
Programming	using dedicated software	using LPCon software		using dedicated software	using LPCon software
Additional functions	<ul style="list-style-type: none"> <li>• unit field can be printed in each row</li> <li>• 15 V d.c. supply for P18 transducer</li> </ul>	<ul style="list-style-type: none"> <li>• 3-colour, display colour changes on value change. Ranges of colour changes can be programmed</li> </ul>	<ul style="list-style-type: none"> <li>• digits brightness can change depending on day time</li> </ul>	-	<ul style="list-style-type: none"> <li>• visibility up to 120m</li> <li>• brightness sensor (digital brightness changes depending on outside conditions)</li> <li>• analog input 4...20 mA</li> </ul>

## DN1, DN2, DN3

Fig.174 Electrical connections of DN1, DN2, DN3

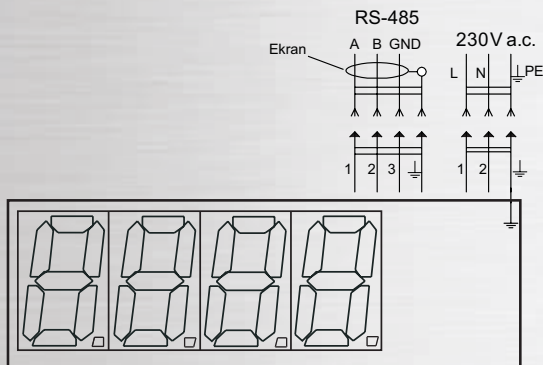
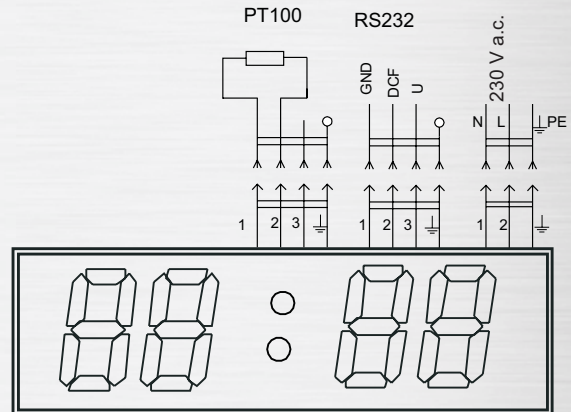
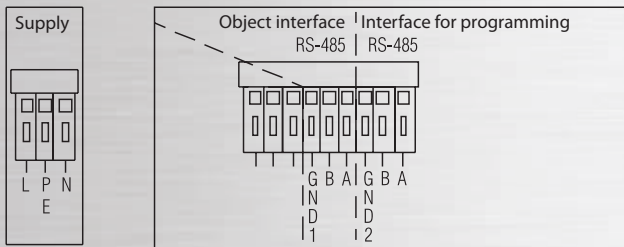


Fig.175 Electrical connections of DN3-8xxxxxx (temperature + time)



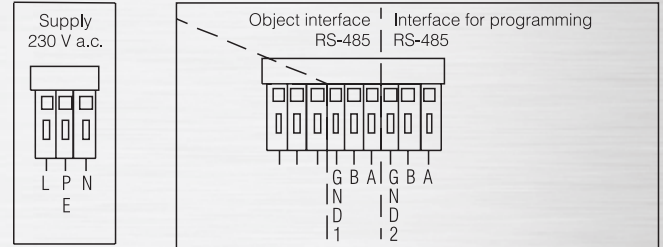
## DL11, DL12, DL13

Fig. 176 Electrical connections of DL11, DL12, DL13



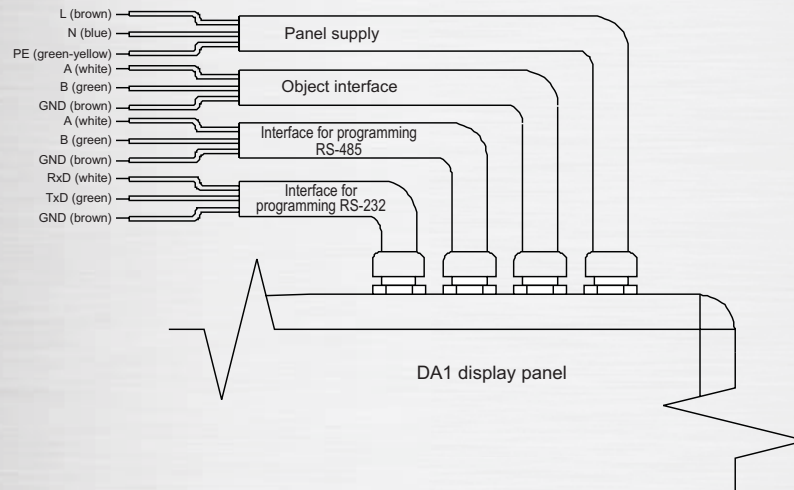
## DL21

Fig. 177 Electrical connections of DL21



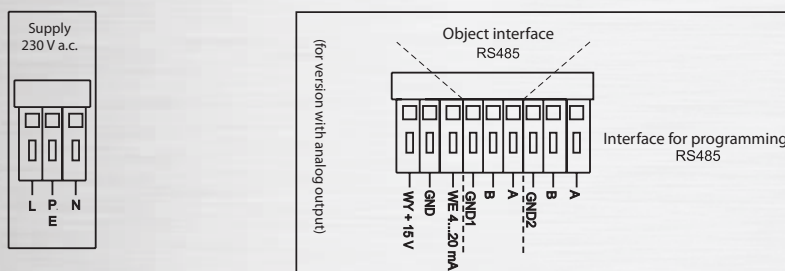
## DA1

Fig. 178 Electrical connections of DA1



## DNL

Fig.179 Electrical connections of DNL



### OUTDOOR DISPLAY

**TABLE 91. DN1, DN2, DN3 ORDERING CODE:**

DN -	X	X	X	X	X	XX	XX	X	XX	X
<b>Digit height:</b>										
100 mm	1									
200 mm	2									
300 mm	3									
<b>Kind of display:</b>										
Code acc to the table 92 (version 8 concerns DN3)	X									
on order*	9									
<b>Digit colour of the first display field:</b>										
red		R								
yellow		Y								
green		G								
blue** (concerns version 1...4 and 6 acc. to the tab.92)			B							
<b>Digit colour of the second display field:</b>										
lack of second field			0							
red			R							
yellow			Y							
green			G							
<b>Way of fixing:</b>										
on the wall				1						
suspended				2						
on order*				9						
<b>Unit of the first display field:</b>										
code number of the unit acc. to the table 93						XX				
on order*						99				
<b>Unit of the second display field:</b>										
code number of the unit acc. to the table 93							XX			
on order*							99			
<b>Quantity displayed and measuring device:</b>										
acc. to the table 94								X		
on order*								9		
<b>Version:</b>										
standard									00	
custom-made*									XX	
<b>Acceptance tests:</b>										
without extra quality requirements										0
with an extra quality inspection certificate										1
acc. to customer's request*										X

\* after agreeing with the manufacturer  
\*\* concerns DN1

**TABLE 92.**

Code	Kind of display	Number of digits	Display overall dimensions [mm]			Assembly dimensions [mm]		
			DN1	DN2	DN3	DN1	DN2	DN3
1		2 digits	a = 415 b = 77 h = 160	a = 560 b = 77 h = 264	a = 820 b = 100 h = 370	c = 220 d = 50 L = 250	c = 320 d = 75 L = 350	c = 450 d = 80 L = 450
2		3 digits	a = 415 b = 77 h = 160	a = 560 b = 77 h = 264	a = 820 b = 100 h = 370	c = 220 d = 50 L = 250	c = 320 d = 75 L = 350	c = 450 d = 80 L = 450
3		4 digits	a = 593 b = 77 h = 160	a = 810 b = 77 h = 264	a = 1200 b = 100 h = 370	c = 320 d = 50 L = 420	c = 430 d = 75 L = 480	c = 850 d = 80 L = 710
4		5 digits	a = 593 b = 77 h = 160	a = 810 b = 77 h = 264	a = 1200 b = 100 h = 370	c = 320 d = 50 L = 420	c = 430 d = 75 L = 480	c = 850 d = 80 L = 710
5		2x 2 digits	a = 593 b = 77 h = 160	a = 810 b = 77 h = 264	a = 1200 b = 100 h = 370	c = 320 d = 50 L = 420	c = 430 d = 75 L = 480	c = 850 d = 80 L = 710
6		clock	a = 415 b = 77 h = 160	a = 810 b = 77 h = 264	a = 1200 b = 100 h = 370	c = 320 d = 50 L = 420	c = 430 d = 75 L = 480	c = 850 d = 80 L = 710
7		2x 3 digits 2 rows	a = 415 b = 77 h = 270	a = 560 b = 77 h = 478	a = 820 b = 100 h = 680	c = 320 d = 50 L = 250	c = 320 d = 75 L = 350	c = 450 d = 80 L = 450
8*	 <b>Uwaga:</b> Alternate display every 10 sec. Clock synchronized by DCF signal.	clock + temperature						
						A = 1200 B = 100 H = 370		C = 850 D = 80 L = 450

\* concerns DN3

**TABLE 93. CODES OF HIGHLIGHTED UNIT:**

Code	Unit	Code	Unit	Code	Unit
00	without unit	22	°F	44	m³/h
01	mV	23	K	45	obr
02	V	24	% H <sub>2</sub> O	46	obr/min
03	kV	25	mbar	47	rad
04	mA	26	Bar	48	szł.
05	A	27	mmH <sub>2</sub> O	49	szł./h
06	kA	28	mmHg	50	O <sub>2</sub>
07	kW	29	Pa	51	CO
08	MW	30	hPa	52	CO <sub>2</sub>
09	var	31	kPa	53	l
10	kvar	32	MPa	54	l/min
11	Mvar	33	pH	55	l/h
12	kWh	34	s	56	mg
13	Ω	35	min	57	kg
14	k Ω	36	h	58	Mg
15	μ S	37	mm	59	k/h
16	mS	38	cm	60	Mg/h
17	Hz	39	m	61	N
18	kHz	40	m³	62	kN
19	MHz	41	m/s	63	mg/l
20	%	42	m/h		
21	°C	43	km/h		

**TABLE 94. CODE OF BACKLIGHTED UNIT AND MEASURING DEVICES**

Displayed quantities	Code
Without measuring quantity	0
Temperature measurement * Measuring range	1
Humidity measurement * Measuring range	2
Temperature and humidity measurement * Measuring range	3
Pressure measurement * Measuring range	4
Measurement of the real time * Measuring range	5
Measurement of pulses, revolutions, working time * Measuring range	6
Measurement of power network parameters * Measuring range	7
measurement of current and voltage standard signals * Measuring range	8

## INDOOR DISPLAYS

**TABLE 95. DL11 ORDERING CODE:**

DL11 -	X	XX	X
<b>Colour of display field:</b>			
red	R		
yellow	Y		
green	G		
<b>Version:</b>			
standard		00	
custom-made*		XX	
<b>Acceptance tests:</b>			
without extra requirements			0
with an extra quality inspection certificate			1
acc. to customer's request*			X

**TABLE 96. DL12 ORDERING CODE:**

DL12 -	X	X	XX	X
<b>Colour of first display field:</b>				
200 mm		2		
300 mm		3		
<b>Colour of second display field:</b>				
red		R		
yellow		Y		
green		G		
<b>Version:</b>				
standard			00	
custom-made*			XX	
<b>Acceptance tests:</b>				
without extra requirements				0
with an extra quality inspection certificate				1
acc. to customer's request*				X

**TABLE 97. DL13 ORDERING CODE:**

DL13 -	X	X	X	XX	X
<b>Colour of first display field:</b>					
200 mm		2			
300 mm		3			
<b>Colour of second display field:</b>					
red		R			
yellow		Y			
green		G			
<b>Colour of third display field:</b>					
red			R		
yellow			Y		
green			G		
<b>Version:</b>					
standard				00	
custom-made*				XX	
<b>Acceptance tests:</b>					
without extra requirements					0
with an extra quality inspection certificate					1
acc. to customer's request*					X

**TABLE 98. DL21 ORDERING CODE:**

DL21 -	XX	X
<b>Version:</b>		
standard	00	
custom-made*	XX	
<b>Acceptance tests:</b>		
without extra requirements		0
with an extra quality inspection certificate		1
acc. to customer's request*		X

**TABLE 99. DA1 ORDERING CODE:**

DA1 -	XX	X	X	X
<b>Display type:</b>				
with text 2x20 characters (character height h=60 mm)	01			
with text 3x24 characters (character height h=60 mm)	02			
graphical 16x120 points	03			
graphical 32x144 points	04			
on order	XX			
<b>Colour:</b>				
red			R	
yellow			Y	
green			G	
<b>Interface for programming:</b>				
RS-232				0
RS-485				1
RS-232 + RS-485				2
Ethernet				3
Profibus DP				4
CAN				5
<b>Acceptance tests:</b>				
without extra requirements				0
with an extra quality inspection certificate				1
acc. to customer's request*				X

**TABLE 100. DNL ORDERING CODE:**

DNL -	X	X	XX	X	XX	XX	X	X
<b>Digit height:</b>								
230 mm (9")			2					
305 mm (12")			3					
<b>Colour of digits in first row:</b>								
red			R					
yellow			Y					
<b>Unit of the first row:</b>								
lack				00				
acc. to the table 101				XX				
<b>Colour of digits in the second row:</b>								
lack of row					0			
red					R			
yellow					Y			
<b>Unit of the second row:</b>								
lack						00		
acc. to the table 101						XX		
<b>Version:</b>								
standard							00	
first row with input 4...20 mA and output +15 V							01	
custom-made*							XX	
<b>Language:</b>								
Polish								P
English								E
other*								X
<b>Acceptance tests:</b>								
without extra requirements								0
with an extra quality inspection certificate								1
acc. to customer's requirements*								X

**TABLE 101. CODES OF HIGHLIGHTED UNIT:**

Code	Unit
00	lack
01	%
02	°C
03	szt.
04	imp.
05	kg
06	m/s
07	szt./h
08	m³
09	obr
XX	on order

\* after agreeing with the manufacturer

## Clamp meters NC10 **NEW!**

- Unique design of rotating clamp jaws facilitate the measurement at positions difficult to access.
- Large Jaw Opening:
  - Clamp meter NC10 1000A: Jaw opening of 55 mm for standard wire diameter of 50 mm
  - Clamp meter NC10 300A: Jaw opening of 44 mm for standard wire diameter of 40 mm
- Current measurement up to 300 and 1000 A.
- Temperature measurement from -200 to 800 °C using Pt 100 and Pt 1000 sensors.
- Backlit digital display with analog indicator.
- Auto Power Off - battery saving function.
- DATA Hold Function.
- MIN, MAX function - recording function of min. and max. values.
- NULL ZERO Correction for Resistance - for low ohm measurement, the lead resistance can be compensated by pressing the shift key (Yellow Key).
- NULL ZERO Correction for Capacitance. For nF range, stray capacitance can be compensated by shift key (Yellow Key).
- AUTO and MANUAL ranging modes.
- Diode Measurement - for testing diode and transistors, diode measurement function is available.
- Protection rate IP20.
- Applicable International Safety standards - 600 V CAT IV/1000V CAT III as per International Safety standard IEC 61010-1- 2001.



**TABLE 102. NC10 ORDERING CODE:**

NC10 -	X	XX	X	X
<b>Maximum current measuring range AC:</b>				
300 A	1			
1000 A	2			
<b>Version:</b>				
standard		00		
custom-made*		XX		
<b>Language:</b>				
Polish			P	
English			E	
other*			X	
<b>Acceptance tests:</b>				
without extra requirements				0
with an extra quality inspection certificate				1
acc. to customer's request*				X

\* after agreeing with the manufacturer

## LPCON FREE SOFTWARE FOR CONFIGURATION OF LUMEL S.A. PRODUCTS

- PD14 - PROGRAMMER TO CONFIGURE NON RS-485 DEVICES USING LPCON
- PD10 - RS-485 TO USB CONVERTER THAT CAN BE USED TO CONFIGURE USING LPCON A DEVICE EQUIPPED WITH RS485

- Easy configuration of Lumel products
- Upload / download full configuration of a device connected to a PC computer using RS485 or PD14 programmer (USB)
- Full device configuration can be saved to a file and stored on a PC computer for later use
- A device template can be created for a RS485 Modbus device not listed in LPCon
- Firmware update for Lumel products



programmer PD14

# PRODUCTION OF PLASTIC PARTS

In the scope of plastic parts production, we offer complex services, from the design of moulds and tools, through the production, machining and assembling, to the delivery of ready products.

We can execute any large-series of parts using entrusted tools or ordered with us. We specialize in the production of plastics moulded pieces for electronics, automotive industries and also for household equipment.

In the scope of production and machining of plastic parts **we offer:**

- designing and manufacturing of moulds,
- execution of parts in all shapes,
- ultrasonic welding,
- gluing,
- silk-screen printing,
- varnish processing,
- anti-electrostatic protection.

We are currently using following plastics: ABS, PA, PC, PE, PMMA, POM, PPE, PPS, PVC, SAN, SB, TPU, in 30 grades and colours.

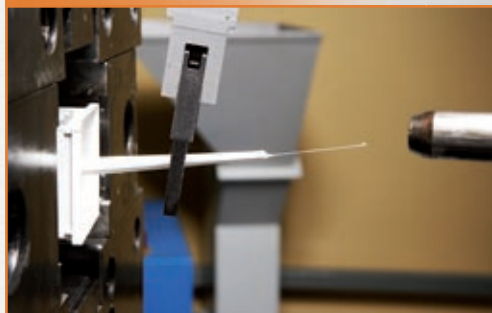
## Machine park:

- injection moulding press Arburg 470C
  - injection weight: 210 g,
  - closing force: 1500 kN,
  - overall mould dimensions: up to 470 x 470 mm
- injection moulding press Arburg 420C
  - injection weight: 166 g,
  - closing force: 800 kN,
  - overall mould dimensions: up to 420 x 420 mm
- injection moulding press Arburg 170U
  - injection weight: 21 g,
  - closing force: 150 kN,
  - overall mould dimensions: up to 170 x 170 mm
- driers, feeding devices, slow-speed mills - from MOTAN company.

All injection moulding presses are equipped with a robot collecting gating systems.

production of  
plastic parts

production of plastic parts



mould for plastic parts



Arburg - mould for plastic parts





## We offer:

- one-sided and double-sided assembling of SMD elements in the technology of reflow soldering, in accordance with European Directive for RoHS,
- assembly of THT elements by flow soldering,
- complementary assembly of THT elements and mechanical parts,
- mixed assembly,
- optical inspection of assembled PCB.

Assembly can be carried out on the base of own or committed elements.

Taking advantage of the acquired experience in design and testing of our apparatus we also offer:

- design of PCB;
- completion of elements to assembly, ensuring PCB and templates for coating with soldering paste or glue in compliance with the transmitted documentation
- testing of assembled systems acc. to the customer's instructions,
- testing in the climatic chamber;
- testing of vibration resistance.

## Our machine park

The assembly line is composed of:

- automatic silkscreen printer JUKI Type KS-1710
- placement machine JUKI KE-2060
- reflow oven ERSA Hotflow 2/14
- magazine loader and line unloader JOT
- soldering aggregate Kirsten
- optical control stand
- stand for thread assembly with Weller soldering stations.

# Electronic Manufacturing Services

All stands and devices are equipped with the protection against static electricity in compliance with EN 61340 5-1 and 5-2 standards.

SMT line



wave soldering line



quality control



quality control



tester



# OFFER OF HIGH PRESSURE DIE-CASTING AND CNC MACHINING

**LUMEL S.A.** We are one of the european leading manufacturers of high pressure aluminium die-castings.

## Our offer includes:

- technical consulting,
- design of moulds and appropriate tools,
- execution of moulds and tools,
- precise die casting,
- CNC machining,
- precise surface treatment,
- varnishing and powdering process, assembly.

We fulfill all requirements of 2002/95/EC Directive about limiting Hazardous Substances in our products.

More technical details you can find in our web in our catalog CUSTOMIZED SOLUTIONS and in our web [www.odlewy.lumel.com.pl](http://www.odlewy.lumel.com.pl).

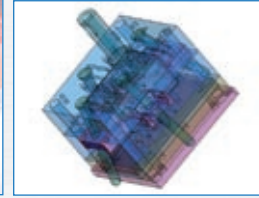


high pressure  
die - casting

Quality **precision!**

**DESIGN**  
OF MOULDS AND TOOLS

on the basis of drawing and 3D documentation  
CAD/CAM software: SolidWorks, EdgeCAM, AlphaCAM, MAGMA (for simulation of filling the mould chamber)



**EXECUTION**  
OF MOULDS AND TOOLS

forming elements (mould cavities, punches, sliders)  
trimming devices, CNC fixtures  
gauges, measurement fixtures  
tools for plastic working, bending dies, punching dies



**PRECISE**  
DIE - CASTING

aluminium alloys 43400, 44200, 46000, 46100 47000  
acc. to EN 1706  
castings up to 4 kg  
closing force of die-casting machines up 750 tones  
vacuum systems and injection cooling  
quality inspection: spectrometer, rotostative, X-ray



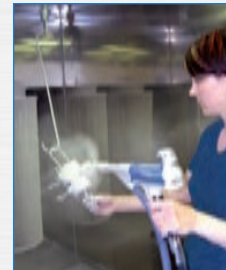
**CNC**  
MACHINING

more than 42 CNC machines  
milling and lathe CNC machines  
machining in 4 programmables axes  
turned parts - by using bar feeder  $\varnothing 77$  mm, by using fixture  $\varnothing 280$  mm



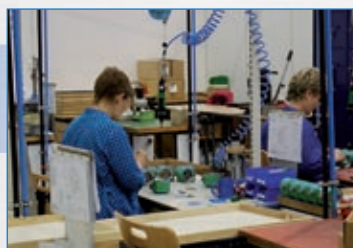
**SURFACE**  
TREATMENT

shot blasting and tumbling  
washing  
chromate (trivalent chromium)  
powder coating, coating by epoxy and varnishes  
screen printing process



**ASSEMBLY**  
SMT & THT

assembling of standardized and customized elements as well as elements executed in our factory  
SMT & THT assembly  
acc. to EX requirements



**LUMEL S.A.** – we are one of leading European manufacturers of electrical devices for automation and high pressure aluminium castings. We have been on the market since 1953. We have achieved our high position on the market due to continuous development policy, competence of our employees and modern equipment for research, design and production.

The activity of LUMEL S.A. is focused on 4 main branches:

- production of automatic devices for measurement, conversion, control and recording, transmission and visualization of various industrial processes;
- production and machining of high pressure castings and manufacturing of moulds and tools;
- design and manufacturing of control and measuring systems,
- SMT assembly, precision engineering and production of plastics parts.

We provide comprehensive solutions for various branches of industry: power industry, chemical industry, metallurgy, food industry, light industry, automotive industry, white industry and mining. We have been working according to: ISO 9001:2008, ISO 14001:2004 and ISO/TS 16949.

# Welcome to co-operation!



**„LUMEL” S.A.**

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**Please contact with our distributor:**