LUMEL

POWER TRANSDUCERS FOR SINGLE-PHASE AND THREE-PHASE NETWORK

P11P, P13P and P13B

ISO 9001 CERTYFIKAT

45 × 120 × 100 mm

SERVICE MANUAL

CE

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1. APPLICATION

The P11P transducer is destined for the conversion of active or reactive a.c. power into a d.c. current or d.c. voltage standard signal. The input, output and supply circuits are galvanically isolated (transformer separation) The conversion frequency range enables the correct measurement of power when currents and voltages are distorted (up to 25 th harmonic).

The pulse feeder ensures the operation in a width range of values and frequency of the supply voltage. The measurement is realised through the analogue multiplier function with the pulse modulation (TDM). These transducers are destined to operate in industrial conditions and can be mounted in optional position. Transducer housings are made of a self-extinguishing plastic and are adapted to be fixed on 35 mm DIN rail (DIN EN 50 022-35).

P11P - transducer destined for active power measurement in a single-phase network.

P13P - transducer destined for active power measurement in a symmetrically loaded 3-phase 3-wire network.

P13B - transducer destined for reactive power measurement in a symmetrically loaded 3-phase 3-wire network.

2. BASIC REQUIREMENTS, OPERATIONAL SAFETY

Symbols located in this service manual mean:

Especially important, one must acquaint with this before connecting the transducer. The non-observance of notices marked by these symbols can occasion the damage of the transducer.

One must take note of this when the transducer is working inconsistently to the expectations.

In the security scope the transducer meets the requirements of the EN 61010-1 standard.

Remarks concerning the operator safety: 

P11P, P13P and P13B transducers are destined to be mounted on 35 mm DIN rails. In the range of operational safety they are in conformity with the EN 61010-1standard requirements.

- The installation and transducer connection should be operated by a qualified personnel.
- One must take into consideration all accessible protection requirements.
- Before switching the instrument on, one must check the correctness of the network lead connection.
- In case of the protection terminal connection with a separate lead one must remember to connect it before the connection of network leads.
- Do not connect the instrument to the network through an auto-transformer.
- Before taking the transducer housing out, one must turn the supply off.
- The removal of the transducer housing during the guarantee contract period may cause its cancellation. The programmer connector is destined only for the PD11 programmer connection. After the transducer programming, one should put the hole plug of the programmer connector.

3. TRANSDUCER SET

The transducer set includes:

- P11P or P13P or P13B transducer	1 pc
- service manual	1 pc
- guarantee card	1 pc

4. TECHNICAL DATA

Basic parameters:

- input current	1 A (X/1 A), 5 A (X/5 A)
- input voltage	10/√3 V, 100 V, 230 V, 400 V, 500 V, 690 V, X/100 V
- output signals	5 mA, 20 mA, 4...20 mA, 10 V
- accuracy class	0.5
- output load resistance:	
- for 5 mA current output	0...2000 Ω
- for 20 mA current output	0...500 Ω
- for 10 V voltage output	≥ 500 Ω
- circuit consumption:	
- voltage measurement	≤ 0.6 VA
- current measurement	≤ 0.3 VA
- supply	≤ 6 VA
- preheating time of the transducer	15 min.
- set-up time of the output signal (0/90%)	≤ 0.5 s
- insulation test voltage	3.25 kV
- limitation of output current	28 mA ± 10%

Nominal reference and operating conditions:

- ambient temperature	-20...23...55°C
- supply voltage	18...40 V or 85...253 V a.c./d.c.
- frequency of the supply voltage	40...400 Hz
- frequency of the input current (voltage)	45...65...1250 Hz
- input voltage	0...0.01...1.2 Un
- power factor (cos fi)	- 1...0...1
- input current	0...0.01...1.2 In
- peak factor of the measured current	≤ 3

- peak factor of the measured voltage ≤ 2
- storage temperature - 25... + 85°C
- air relative humidity (condensation inadmissible) 0... 45...75...85%
- external magnetic field 0...40...400 A/m
- working position any

Additional Errors caused by the influence of:

- frequency of the input quantity < 0.05 k/100 Hz
- ambient temperature < 0.5 k/10°C
- external magnetic field < 0.1 k/100 A/m.

Input overload:

Voltage:

- short duration 2 Un
- long-lasting 1.2 Un

Current:

- short duration 10 In
- long-lasting 1.2 In

Ensured protection degree:

- through the housing IP 50
- from the terminal side IP 20

Dimensions: 45 x 100 x 120 mm

Weight: 210 g

Compliance to standards:

- service security, requirements and tests EN 61010-1
- insulation ensured by the housing double
- insulation between circuits basic
- installation category III
- pollution level 2
- maximal working voltage in relation to earth 600 V

Electromagnetic compatibility:

- immunity	EN 50082-2
- emission	EN 50081-2

5. INSTALLATION

5.1 Fixing

P11P, P13P or P13B transducers are designed to be installed on a 35 mm DIN rail acc. DIN EN 50 022-35. On the external side of the transducer there are screw or self-locking terminal strips enabling the connection of 2.5 mm^2 external leads (supply and output) and up to 1.5 mm^2 leads (input).

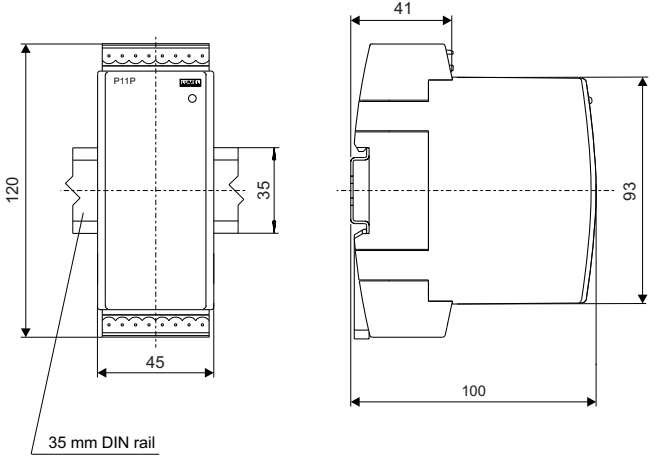
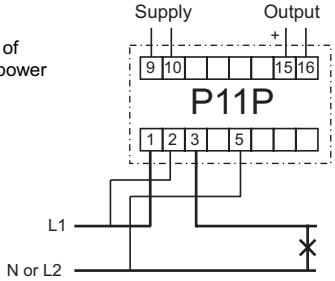


Fig.1 Overall dimensions and fixing way of the transducer

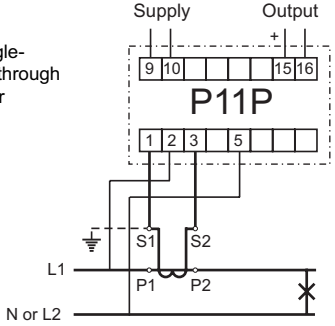
5.2. Connection diagrams

5.2.1. Measurement of active power in a single-phase network by a P11P transducer.

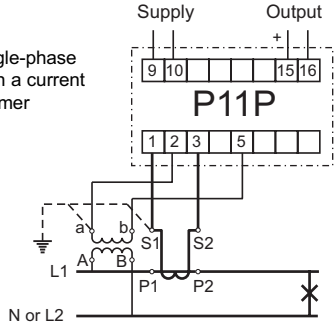
a) Direct measurement of single-phase active power



b) Measurement of single-phase active power through a current transformer

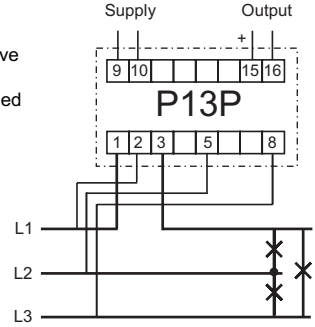


c) Measurement of single-phase active power through a current and voltage transformer

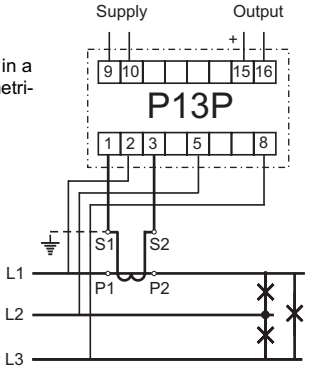


5.2.2. Measurement of active power in a 3-phase 3-wire network by a P13P transducer (Symmetrically loaded)

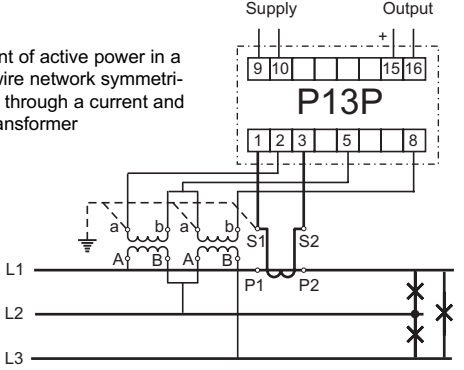
a) Direct measurement of active power in a 3-phase 3-wire network symmetrically loaded



b) Measurement of active power in a 3-phase 3-wire network symmetrically loaded through a current transformer

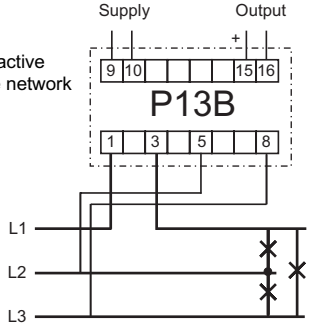


c) Measurement of active power in a 3-phase 3-wire network symmetrically loaded through a current and a voltage transformer

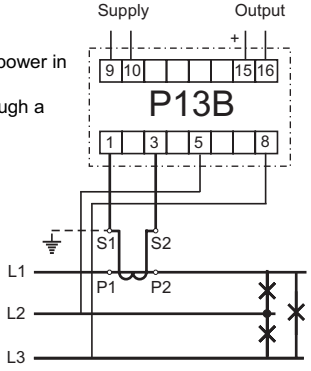


5.2.3. Measurement of reactive power in a 3-phase 3-wire network by a P13P Transducer (Symmetrically loaded)

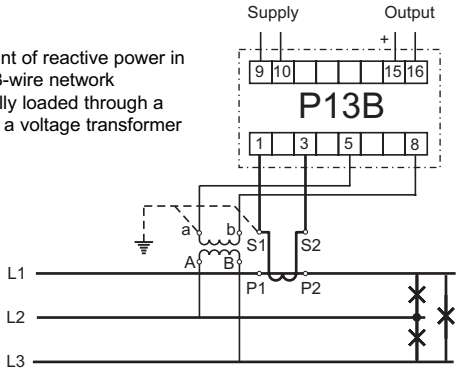
a) Direct measurement of reactive power in a 3-phase 3-wire network symmetrically loaded



b) Measurement of reactive power in a 3-phase 3-wire network symmetrically loaded through a current transformer



c) Measurement of reactive power in a 3-phase 3-wire network symmetrically loaded through a current and a voltage transformer



6. CODING AND ORDERING

Coding example:

The **P11P- A1-C-1-1-1-00-0** code means:
the execution of a transducer for measurement of active power in a single-phase system, input: In = 1 A, Un = 230 V, nominal power: 200 W, permanent fastening screw terminals, standard execution, without an extra quality inspection certificate.

Execution codes of P11P, P13P and P13B transducers — Table 1

POWER TRANSDUCER - P1	XX	XX	X	X	X	X	XX	X

Kind of transducer:

measurement of 1-phase active or reactive power	**1P**
measurement of active power in 3-phase 3-wire systems, symmetric load	**3P**
measurement of reactive power in 3-phase 3-wire systems, symmetric load	**3B**

Input current:
write down the range code (from A1 to Z1 and B5 to Z5) from the table 2:

1 A	**A1**
20 000/1 A	**Z1**
5 A	**B5**
20 000/5 A	**Z5**
on order *	**99**

Input voltage:
write down the range code (from A to V) from the table 2:

100/√3 V	**A**
400 000/100 V	**W**
on order *	**9**

Output range:

0...5 mA, R obc. = 0... 2000 Ω	**1**
0...20 mA, R obc. = 0... 500 Ω	**2**
4...20 mA, R obc. = 0... 500 Ω	**3**
0...10 V, R obc. ≥ 500 Ω	**4**
-5...0...5 mA, R obc. = 0... 2000 Ω	**5**
-20...0...20 mA, R obc. 0... 500 Ω	**6**
-10...0...10 V, R obc. ≥ 500 Ω	**7**
on order *	**9**

Supply:

85...253 V d.c. or a.c. (40...400 Hz)	**1**
18...40 V d.c. or a.c. (40...400 Hz)	**2**
on order *	**9**

Kind of terminals:

permanent fastening screws	**1**
socket - screw plug	**2**
socket - self-locking plug	**3**

Execution:

standard	**00**
custom-made *	**XX**

Acceptance test:

without an extra quality inspection certificate	**0**
with an extra quality inspection certificate	**1**
acc user's agreement **	**X**

* Custom-made execution, one must agree with the producer
** The producer will settle the execution code number

Table 2

Un [V]	Measurement of																					
	single-phase active power	1P	$\frac{100}{\sqrt{3}}$	100	230	400	500															
	3-phase 3-wire active or reactive power in a symmetrically loaded network	3P						400	500	690	$\frac{3\,000}{100}$	$\frac{6\,000}{100}$	$\frac{10\,000}{100}$	$\frac{15\,000}{100}$	$\frac{20\,000}{100}$	$\frac{30\,000}{100}$	$\frac{40\,000}{100}$	$\frac{60\,000}{100}$	$\frac{110\,000}{100}$	$\frac{220\,000}{100}$	$\frac{400\,000}{100}$	
		3B																				

In/x	In code		Power unit	Un code																		
	x=5	x=1		A	B	C	D	E	G	H	I	K	L	M	N	P	R	S	T	U	V	W
1	–	A1	W	50	100	200	400	500	600	800	1	5	10	15	25	30	50	60	100	150	300	600
5; 5/x	B5	B1		250	500	1	2	2.5	3	4	5	25	50	80	120	150	250	300	500	800	1.5	3	
10/x	C5	C1		500	1	2	4	5	6	8	10	50	100	150	250	300	500	600	1	1.5	3	6	
15/x	D5	D1		800	1.5	3	6	7.5	10	12	15	75	150	250	300	500	750	1	1.5	2.5	5	10	
20/x	E5	E1	kW; kvar	1	2	4	7.5	10	12	15	20	100	200	300	500	600	1	1.2	2	3	7.5	12	
30/x	F5	F1		1.5	3	6	12	15	20	25	30	150	300	500	750	1	1.5	2	3	5	10	20	
50/x	G5	G1		2.5	5	10	20	25	30	40	50	250	500	800	1.2	1.5	2.5	3	5	8	15	30	
75/x	H5	H1		4	7.5	15	30	30	50	60	80	300	750	1.2	1.5	2.5	3	5	7.5	12	25	50	
100/x	I5	I1		5	10	20	40	50	60	80	100	500	1	1.5	2.5	3	5	6	10	15	30	60	
150/x	J5	J1		8	15	30	60	75	100	120	150	750	1.5	2.5	3	5	7.5	10	15	25	50	100	
200/x	K5	K1		10	20	40	80	100	120	150	200	1	2	3	5	6	10	12	20	30	75	120	
300/x	L5	L1		15	30	60	120	150	200	250	300	1.5	3	5	7.5	10	15	20	30	50	100	200	
400/x	M5	M1		20	40	80	150	200	250	300	400	2	4	6	10	12	20	25	40	75	150	250	
600/x	N5	N1		30	60	120	200	300	400	500	600	3	6	10	12	20	25	40	60	100	200	400	
800/x	P5	P1		40	80	150	300	400	500	600	800	4	8	12	20	25	40	50	80	150	300	500	
1000/x	R5	R1		50	100	200	400	500	600	800	1	5	10	15	25	30	50	60	100	150	300	600	
1200/x	S5	S1		60	120	250	400	800	800	1	1.2	6	12	20	30	40	60	80	120	200	400	800	
1500/x	T5	T1		80	150	300	600	750	1	1.2	1.5	7.5	15	25	30	50	75	100	150	250	500	1000	
2000/x	U5	U1		100	200	400	800	1	1.2	1.5	2	10	20	30	50	60	100	120	200	300	750		
3000/x	V5	V1		150	300	600	1.2	1.5	2	2.5	3	15	30	50	75	100	150	200	300	300	1000		

4000/x	W5	W1		200	400	800	1.5	2	2.5	3	4	20	40	60	100	120	200	250	400	750
6000/x	X5	X1		300	600	1.2	2	3	4	5	6	30	60	100	150	200	300	400	600	1000
10000/x	Y5	Y1		500	1	2	4	5	6	8	10	50	100	150	200	300	400	600	1000	
20000/x	Z5	Z1	MW; Mvar	1	2	4	8	10	12	15	20	100	200	300	500	600	1000	1200		

7 . MAINTENANCE AND GUARANTEE

The P11P, P13P and P13B transducers do not require any periodical maintenance. In case of some incorrect unit operations:

1. In the 18 months' period from the date of shipment:

One should return the transducer to the LUMEL's Quality Control Dept. If the unit has been used in compliance with the instructions, LUMEL S.A. guarantees to repair it free of charge. The disassembling of the housing causes the cancellation of the granted guarantee.

2. After the guarantee period:

One should turn over the transducer to repair it in a certified service workshop. Spare parts are available for the period of ten years from the date of purchase.

LUMEL S.A. reserves the right to make changes in design and specifications of any products as engineering advances or necessity requires.

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