

PROGRAMMABLE TRANSDUCER OF TEMPERATURE, RESISTANCE D.C. VOLTAGE, D.C. CURRENT WITH RS-485 INTERFACE

P12U



1. APPLICATION

The P12U programmable transducer is intended to the conversion of temperature, resistance, voltage from the shunt, standard signals, d.c. voltage, d.c. current into a d.c. current or d.c. voltage standard signal.

The output signal is galvanically isolated from the input signal and the supply. The read-out field can be an LCD 2 x 8 display (only in P12U-2 execution).

The P12U transducer is programmed by the producer according to the ordered execution code but it is possible to change the parameters by means of the keyboard in the P12U-2 execution, the RS-485 interface or the computer through the PD11 programmer.

The PD11 programmer is a universal device serving to program all the P11 and P12 families and it must be ordered separately.

2. FEATURES

P12U transducers realize following functions:

- conversion of the measured value into any optional output signal on the base of the individual linear characteristic,
- recalculation of the input signal into any optional indication on the base of the individual linear characteristic,
- signalling of the set up alarm value exceedings,
- recording of the input signal in programmed time lengths,
- programming of the indication resolution (only for P12U-2),
- preview of set up parameter values,
- switching the automatic compensation on or off. Possible introduction of a manual correction,

- storage of maximal and minimal values,
- programming of the measurement averaging time,
- display of the unit according to the table 1,
- servicing of the RS-485 interface in the MODBUS protocol, both in ASCII either in RTU mode,
- interlocking of the parameter introduction by means of a password.

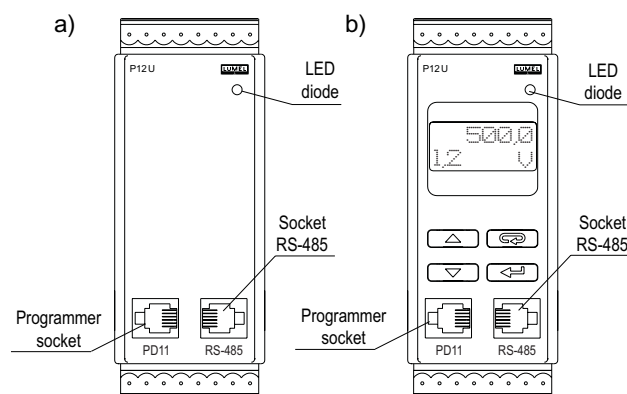


Fig.1 View of the P12U transducer: a) P12U-1, b) P12U-2

3. INSTALLATION

P12U 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 (as ordered) enabling the connection of 2.5 mm² cross-section conductors. Overall dimensions and the fixing way are shown on the fig.2.

The lighted diode situated on the upper front of the transducer signals the connection of this transducer to the mains.

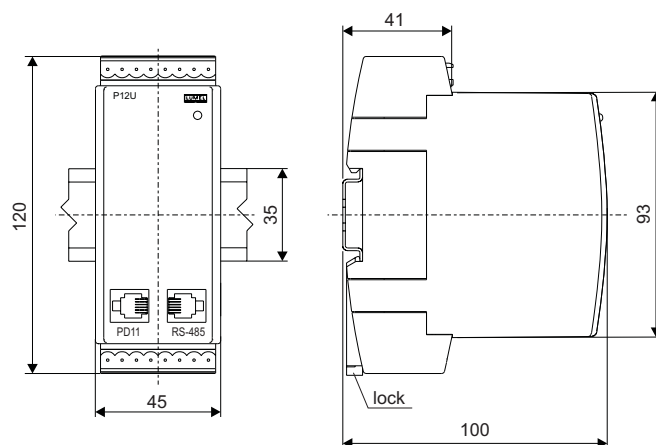


Fig.2. Overall dimensions and fixing way of P12U transducers

4. CONNECTION DIAGRAMS

The P12U transducer has two sockets of terminal strips which two connectors with screw or self-locking terminals are connected to, depending on the order execution code. The fig.3 shows the connection way of external signals. This scheme is also placed on the transducer case.

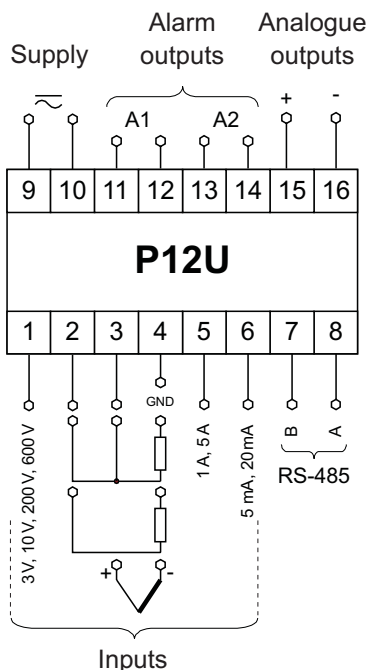
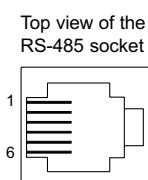


Fig.3. Connection of external signals



No	Description
1	NC
2	B
3	A
4	GND
5	NC
6	NC

Fig.4. Description of terminal strips of the P12U transducer

5. TECHNICAL DATA

■ Input signals:

Pt100	- 200... + 850°C
Pt500	- 200... + 850°C
Pt1000	- 200... + 850°C
Cu100	- 50... + 180°C
Ni100	- 60... + 180°C
J (Fe-CuNi)	- 100... + 1200°C
K (NiCr-NiAl)	- 100... + 1370°C
N (NiCrSi-NiSi)	- 100... + 1300°C
E (NiCr-CuNi)	- 100... + 900°C
R (PtRh13-Pt)	0... + 1760°C
S (PtRh10-Pt)	0... + 1760°C
T (Cu-CuNi)	- 100... + 400°C
Resistance measurement	0... 400 Ω

Resistance measurement	0... 4000 Ω
Voltage measurement	- 10... 70 mV, input resistance > 9 MΩ
Voltage measurement	0...3 V, 0... 10 V, 0... 200 V, 0... 600 V input resistance > 4.2 MΩ
Current measurement	0... 5 mA , input resist. < 4 Ω
Current measurement	0... 20 mA, input resist. < 4 Ω
Current measurement	0... 1 A, 0... 5 A input resist.: 10 mΩ ± 10%

Thermocouple characteristics acc. EN 60584-1

Resistance thermometer characteristics acc. EN 60 751+A2

Passage of current through the resistance thermometer < 200 μA

Resistance of conductors connecting the resistance thermometer to the transducer < 20 Ω /conductor

■ Analogue outputs

galvanically isolated with a range resolution of 0.025%:

- current programmed	0/4...20 mA	load resistance ≤ 500 Ω
- voltage programmed	0...10 V	load resistance ≥ 500 Ω

■ Relay outputs (2 outputs)

- programmable alarm thresholds,	
- three types of alarms ,	
- hysteresis defined by means of the lower and upper alarm threshold,	
- signalling of alarm operation on the LCD display,	
- two relay outputs with dead voltage and make contacts, maximal load:	
- voltage	250 V a.c., 150 V d.c.
- current	5 A, 30 V d.c., 250 V a.c.
- resistance load	1250 VA, 150 W

■ Digital output

- interface	RS-485
- transmission protocol	MODBUS
- ASCII	8N1, 7E1, 7O1
- RTU	8N2, 8E1, 8O1, 8N1
- baud rate	2400, 4800, 9600 bit/s
- max. response time to the query frame	300 ms

■ Communication parameters of the programmer socket:

- interface	RS-232
- data bit	8
- parity	none
- stop bit	1
- baud rate	9600 bit/s
- communication control	none

■ Storage parameters:

- transducer memory (storage)	750 samples
- minimal storage interval	1 s

■ Accuracy class index

0.2
0.3, for Cu100 and Ni100

■ Additional error from ambient temperature changes

± (0.1 % of the range/10 K)
± (0.2% of the range/10 K)
for R, S, T thermocouples

■ Conversion time:

- P12U-1 < 200 ms
- P12U-2 min. 200 ms (min. 100 ms averaging time of measurement + 100 ms output response time)

■ Rated operating conditions:

- supply voltage depending on the execution code 85...230...253 V a.c./d.c.
20...24...40 V a.c./d.c.
- supply voltage frequency 40...50/60...440 Hz
- ambient temperature -25...23...+55°C
- storage temperature -25...+85°C
- air relative humidity < 95% (no condensation)
- preheating time of the transducer 10 min.
- working position any (on a 35 mm DIN rail)

■ Sustained overload:

- thermocouples, resistance thermometers 1%
- measurement of voltage, current and resistance 20%

■ Short duration overload (3 sec.):

- sensors and 70 mV voltage inputs 30 V
- voltage input ≥ 3 V 10 Un (< 1000 V)
- current input: 10 In

■ Display fields (in P12U-2)

LCD 2x8 displays
indication range: - 99999...99999

■ Servicing (in P12U-2 only)



■ Ensured protection degree:

- through the case IP 40

■ Dimensions

45 x 120 x 100 mm

■ Mass

< 300 g

■ Fixing

on a 35 mm DIN rail

■ Power consumption

< 4 VA

■ Current decay immunity

acc. EN 50082-2

■ Electromagnetic compatibility:

- immunity acc. EN 50082-2
- emission acc. EN 50081-2

■ Security requirements acc. EN 61010-1:

- installation category III
- pollution degree 2
- max. working voltage in relation to ground 600 V a.c.

The transducer maintains its class index up to a four-fold decrease of the input signal of the basic range. In the P12U-1 transducer, besides the basic range, one must give the required sub-range.

In case when the given sub-range is lower than the basic range divided by four, one must specify the input signal in the order as XX.

CODING EXAMPLES:

Transducer with a basic range:

P12U 2 16 3 1 0 00 0 code means:

The execution of a P12U transducer with a display, programmed in the factory on the input range: 0...10 V, 4...20 mA analogue current output, 85...253 V a.c./d.c. supply voltage, socket-screw plug terminals, standard execution, without an extra quality inspection certificate.

6. EXECUTION CODES

Execution codes of the P12U transducer

P12U PROGRAMMABLE TRANSDUCER	X	XX	X	X	X	XX	X
Kind of transducer:							
without a display	1						
with a display	2						
Input signal*:							
Pt100	00						
Pt500	01						
Pt1000	02						
Cu100	03						
Ni100	04						
Thermocouple J - (Fe-CuNi)	05						
Thermocouple K - (NiCr-NiAl)	06						
Thermocouple N - NiCrSi-NiSi)	07						
Thermocouple E - NiCr-CuNi)	08						
Thermocouple R - (PtRh13-Pt)	09						
Thermocouple S - (PtRh10-Pt)	10						
Thermocouple T - (Cu-CuNi)	11						
Resistance measurement up to 400 Ω	12						
Resistance measurement up to 4 kΩ	13						
Voltage measurement: - 10 ...70 mV	14						
Voltage measurement: 0...3 V	15						
Voltage measurement: 0...10 V	16						
Current measurement: 0...5 mA	17						
Current measurement: 0...20 mA	18						
Voltage measurement: 0...200 V	19						
Voltage measurement: 0...600 V	20						
Current measurement: 0...1 A	21						
Current measurement: 0...5 A	22						
On order**	XX						
Output signal:							
voltage 0-10 V	1						
current 0-20 mA	2						
current 4-20 mA	3						
current 0-5 mA	4						
on order**	X						
Supply:							
85...253 V a.c./d.c.	1						
20...40 V a.c./d.c.	2						
Kind of terminals:							
socket - screw plug	0						
on order***	X						
Execution:							
standard	00						
custom-made**	XX						
Acceptance tests:							
without an extra quality inspection certificate	0						
with an extra quality inspection certificate	1						
acc user's agreement**	X						

* The transducer has an universal input. When ordering, one must give the output signal code which is to be programmed.

** After agreeing with the producer.

*** Possible execution with self-locking terminal sockets

Transducer with a measuring sub-range:

P12U 1 05 1 1 0 00 0, 0...400°C range code means:

The execution of a P12U transducer without a display, programmed in the factory to co-operate with a J thermocouple of 0...400°C range, 0...10 V analogue voltage output, 85...253 V a.c./d.c. supply voltage, socket-screw plug terminals, standard execution, without an extra quality inspection certificate.