EUROTEC
TECNOLOGIE IMPIANTISTICHE - AUTOMAZIONE - TELECONTROLLO

LUMEL

PROGRAMMABLE TRANSDUCER OF DC CURRENT AND DC VOLTAGE SIGNALS

P20H TYPE

USER'S MANUAL

CE

Contents:

1. APPLICATION 5

2. TRANSDUCER SET 5

3. OPERATIONAL SAFETY 6

4. INSTALLATION 7

4.1. Fixing Way 7

4.2. External Connection Diagrams 7

5. SERVICE 9

5.1. Transducer Configuration by Means of the LPCon Program 10

5.2. Register Map (in option with RS-485 Interface) 10

5.3. Manufacturer's Parameters 14

6. TECHNICAL DATA 15

7. ORDERING CODES 18

8. MAINTENANCE AND GUARANTEE 19

1. APPLICATION

Transducers of P20H series are applied for the continuous conversion of one quantity: high voltage or high current signal, uni or bipolar signal into a standard d.c. current or d.c. voltage signals, or into a digital form available through the RS-interface.

The transducer is configurable through the PD14 programmer. With the aid of the programmer and the LPCon program, one can reprogram following parameters:

- measurement averaging time,
- conversion characteristic,
- preservation of the output signal at overflows,
- narrowing of the output signal,
- RS485 transmission parameters,

The transducer has a galvanic separation between individual blocks:

- supply
- measuring inputs
- outputs and PD14 programmer

2. TRANSDUCER SET

The transducer set is composed of:

- P20H transducer ..... 1 pc
- user's manual ..... 1 pc
- guarantee card ..... 1 pc
- protection plug of the programmer socket .... 1 pc

When unpacking the transducer, please check whether the type and execution code on the data plate correspond to the order.

3. BASIC REQUIREMENTS, OPERATIONAL SAFETY

In the safety service scope, the transducer meets the requirements of the EN 61010-1 standard.

Observations concerning the operational safety:

- All operations concerning transport, installation, and commissioning as well as maintenance, must be carried out by qualified, skilled personnel, and national regulations for the prevention of accidents must be observed.
- The programming of P20H transducer parameters must be carried out after disconnecting measuring circuits.
- Before switching the transducer on, one must check the correctness of connections to the network.
- Do not connect the transducer to the network through an autotransformer.
- Before removing the transducer housing, one must switch the supply off and disconnect measuring circuits. The removal of the transducer housing during the guarantee contract period may cause its cancellation.
- The transducer is destined to be installed and used in electromagnetic industrial environment conditions.
- When connecting the supply, one must remember that a switch or a circuit-breaker should be installed in the building. This switch should be located near the device, easy accessible by the operator, and suitably marked as an element switching the meter off.
- Non-authorized removal of the housing, inappropriate use, incorrect installation or operation, create the risk of injury to personnel or transducer damage.

For more detailed information, please study the User's Manual.

4. INSTALLATION

4.1. Fixing Way

P20H transducers are destined to be fixed on a 35 mm rail acc. to EN 60715 standard.

Overall dimensions and the fixing way are presented on the fig. 1.

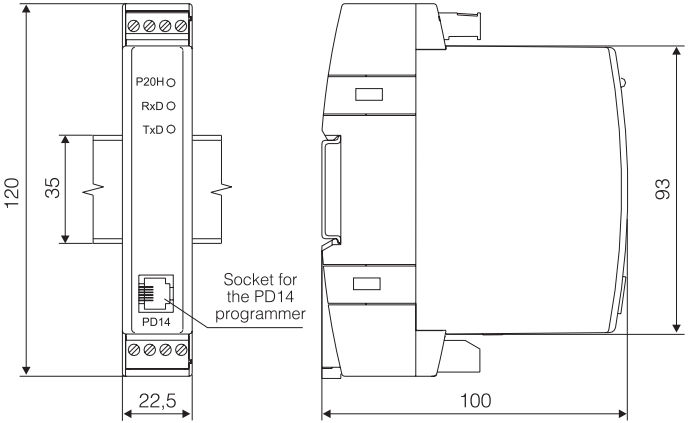


Fig. 1. Overall dimensions and fixing way of the P20H transducer

4.2. External Connection Diagrams

The transducer has a separable strip with screw terminals, which enable the connection of supply and output by 2.5 mm^2 cross-section external wires. The connection of input signals must be carried out

to inseparable screw terminals with wires of maximal 1.5 mm^2 cross-section.

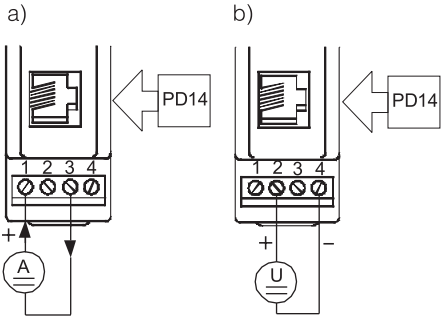


Fig. 2. Electrical connections of P20H transducer inputs.
a) voltage
b) current

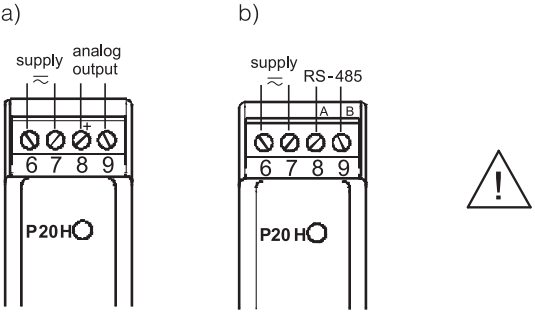
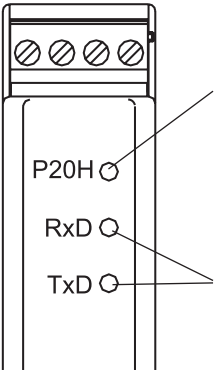


Fig. 3. Electrical connections of the P20U transducer supply and output:
a) with analog output,
b) with RS-485 interface

5. SERVICE

After switching the transducer on, the work state diode should light in red for a moment, next it should light in green.



Diode of the transducer work state:
- the state diode lights in green – normal work,
- the state diode lights in red – improper work parameters; one must configure the transducer again,
- the state diode pulsates in red – lack of calibration or the non-volatile memory is damaged; one must return the transducer to the manufacturer.

Diodes only in the option with RS-485 interface:
- the RxD diode lights – reception of data,
- the TxD diode lights – transmission of data.

Fig. 4. View of the P20H transducer

The write confirmation in registers is signaled by a short extinction of the state diode. Till the time to obtain the required number of correct measurements (acc. to the table 1), the arithmetical mean value of measurements which have been doing so far, is converted. The measurement of values beyond the measuring range causes the overflow setting and begins the counting of correct measurements from the beginning. The measurement is carried out on the mowing window principle. The time is set up on 1 s by the manufacturer.

When the averaging time is less than 10 sec – the single measurement lasts ca 30 ms however, above 10 sec, the measurement lasts ca 0.5 sec.

Table 1

Averaging time	0.2s	0.4s	0.6s	0.8s	1s	3s	5s	10s	15s	20s
Number of averaged measurements	6	13	20	27	34	103	172	20	30	40

In the transducer , one can program the behaviour of the analog output (the recording of the output value in the option with RS-485) at overflows of the set up input measuring range.

Set up values: expected on the output at lower overflow (Out-d) for a value below the lower input overflow (In-d) and the expected value on the output at upper overflow (Out-u) for values above the upper input overflow (In-u) – Values are presented in the table 3.

5.1. Transducer Configuration by Means of the LPCon Program

The free delivered LPCon program, available in our www.lumel.com.pl page, is destined for the P20H transducer configuration. The detailed description of parameter configuration is presented in a separate user's manual for programming *(instruction for transducer configuration by means of the LPCon program)*. In the option with RS-485 interface, the transducer can be configured directly through the interface. When configuring the transducer through the PD14 programmer, one must turn the RS-485 interface off.

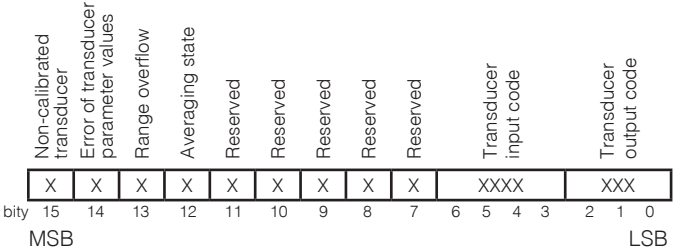
5.2. Register Map (in option with RS-485 Interface)

Table 2

Register address	Operation	Range	Description
4000	RW	0...9	Averaging time: 0 – 0,2 s; 1 – 0,4 s; 2- 0,6 s; 3 – 0,8 s; 4 – 1 s; 5 - 3 s; 6 - 5 s; 7 - 10 s; 8 - 15 s; 9 - 20 s;
4001	RW	0...2	Continuous output: 0 - normaln work, 1 - value from the register 7602, 2- value from the register 7603
4002	RW	0, 1	Continuous output – overflow service: 0 – switched off, 1 – service
4003	RW	1...247	Address in MODBUS network
4004	RW	0...3	Transmission mode: 0->8n2, 1->8e1,2->8o1, 3->8n1

4005	RW	0...2	Baud rate: 0->4800, 1->9600, 2->19200
4006	RW	0, 1	Change parameters of the MODBUS transmission: 1 - change
4007	R	0...65535	Status
4008	R	0	Reserved
4009	R	0...65535	Reserved
4010	R	0...65535	Reserved
4011	R	0...65535	Program version

Opis rejestru status



Bit – 15 Non-calibrated transducer

0 – measuring input of the calibrated transducer

1 – signaling of transducer input calibration lack

Bit – 14 Error of transducer parameter values

0 – correct transducer parameters

1 – signaling of an incorrect transducer parameter readout

Bit – 13 Signaling of an upper range overflow

0 – normal work

1 – range overflow

Bit – 12 Averaging state

0 – a full interval of the measurement averaging time was elapsed

1 – a full interval of the measurement averaging time was not elapsed

Bit - 11 – 7 Reserved

Bit-6 – 3 measuring inputs

Bit 6	Bit 5	Bit 4	Bit 3	Meaning
0	0	0	0	reserved
0	0	0	1	-/+ 100 V d.c.
0	0	1	0	-/+ 250 V d.c.
0	0	1	1	-/+ 400 V d.c.
0	1	0	0	-/+ 1 A d.c.
0	1	0	1	-/+ 5 A d.c.
0	1	1	0	0...100 V d.c.
0	1	1	1	0...250 V d.c.
1	0	0	0	0...400 V d.c.

Bit - 2 – 0 Output

Bit 2	Bit 1	Bit 0	Meaning
0	0	0	reserved
0	0	1	current output 0(4)...20 mA
0	1	0	current output 0(4)...20 mA
0	1	1	voltage output 0...10 V
1	0	0	RS-485

Table 3

Register 2x16 bit address	Register 32 bit address	Opera-tions	Description
7200	7600	RW	Continuous output – lower input value (x1)
7202	7601	RW	Continuous output – upper input value (x2)
7204	7602	RW	Continuous output – lower output value (y1)
7206	7603	RW	Continuous output – upper output value (y2)
7208	7604	RW	Minimal input value
7210	7605	RW	Maximal input value
7212	7606	RW	Expected value on the output at lower overflow Out-d
7214	7607	RW	Expected value on the output at upper overflow Out-u
7216	7608	R	Measured value taking into consideration registers 7604 and 7605 Reg. 7608 = reg. 7604 if reg. 7609 ≤ reg. 7604 Reg. 7608 = reg. 7605 if reg. 7609 ≥ reg. 7605
7218	7609	R	Measured value
7220	7610	R	Output value

5.3. Manufacturer's parameters

Table 4

Parameter description	Range / Value	Manufacturer's value *
Averaging time	0.2 s; 0.4 s; 0.6 s; 0.8 s; 1 s; 3 s; 5 s; 10 s; 15 s; 20 s;	1 s
Continuous output: working mode	Normal work, output minimum, output maximum	Normal work
Continuous output: transition characteristic: (x1, y1) → (x2, y2)	-999999...999999	x1 = 0 or –Un or –In ; x2 = Un or In, y1 = 0 or –Un or –In or 4; y2 = 10 or 20
Continuous output: overflow service	off, on	turned off **
Lower input overflow	-999999...999999	0 or –Un or –In **
Upper input overflow	-999999...999999	Un or In **
Lower output overflow	-999999...999999	0, 3,9 **
Upper output overflow	-999999...999999	11 V or 22 mA
Address in Modus network ***	1...247	1
Transmission mode ***	8n2, 8e1, 8o1, 8n1,	8n2
Baud rate ***	4800, 9600, 19200	9600

* - Depending on option

** - In the 4...20 mA option, the overflow service is switched on, the minimal output value is set on 3.9 mA, the minimal input value is converted according to the transition characteristic.

*** - Only in the option with RS-485 output

6. TECHNICAL DATA

Measuring Ranges

INPUTS:

Measuring range of the unipolar Un voltage:

-0.5...0...100...130 V d.c.
-1...0...250...325 V d.c.
-2...0...400...630 V d.c.

} input resistance > 2 MΩ

Measuring range of the bipolar Un voltage:

-130...-100...100...130 V d.c.
-325...-250...250...325 V d.c.
-630...-400...400...630 V d.c.

} input resistance > 2 MΩ

Measuring range of the bipolar In current:

-1.3...-1.0...1.0...1.3 A d.c.	input resistance 10 mΩ ±10%
-6.3...-5...5...6.3 A d.c.	input resistance 2 mΩ ±10%

Analog output	**current** 0(4)...20...22 mA load resistance ≤ 500 Ω **voltage** 0...10...11 V load resistance ≥ 500 Ω resolution 0.01% of the range output reaction time: 200 ms
Serial interface	**RS-485:** address 1...247 mode: 8N2, 8E1, 8O1, 8N1 baud rate: 4.8, 9.6, 19.2 kbit/s transmission protocol: Modbus RTU response time: 200 ms
Basic conversion error	±0.2% of the range

Additional errors in rated operating conditions:	
- from ambient temperature changes	(50% of the intrinsic error/10 K)
Sustained overload:	150% Un (in. 400 V, ± 400 V), 120% Un (other in.), 120% In
Short duration overload (1 s)	voltage input 2 Un (<1000 V) current input 10 In
Rated operating conditions:	
- supply voltage	85..253 V a.c. 40..400 Hz; 90..300 V d.c. 20..40 V a.c. 40..400 Hz; 20..60 V d.c.
- ambient temperature	-20...23...60°C
- storage temperature	-25...+85°C
- humidity	< 95% (inadmissible vapour condensation)
- work position	any
Averaging time (programmable):	≥ 0,2 s (default 1 s)
Preheating time	15 minutes
Galvanic isolation between:	
- supply – measuring input	3.2 kV d.c.
- supply – output	2 kV d.c.
- measuring input – output	3.2 kV d.c.
Ensured protection grade acc. to EN 60529:	
- casing	IP 40
- from the terminal side	IP 20
Overall dimensions	22.5 x 100 x 120 mm
Weight	0.125 kg

Fixing	on a 35 mm rail acc. EN 60715
Input power	< 3 VA

Electromagnetic compatibility:

– noise immunity	acc. to EN 61000-6-2
– noise emissions	acc. to EN 61000-6-4

Safety requirements acc. to EN 61010 -1 standard**:**

– isolation between circuits: basic
– installation category: III (for the 400 V option – category II)
– pollution grade: 2
– maximal phase-to-earth working voltage:
  - for the supply circuit: 300 V
  - for the measuring input: 600 V - category II, (300 V – cat. III)
  - for the programming input: 50 V
  - for output: 50 V
– altitude above sea level < 2000 m.

7. ORDERING CODES

Table 5.

TRANSDUCER	P20H -	X	X	X	XX	X	X

Input signal:
- +/- 100 V d.c. **1**
- +/- 250 V d.c. **2**
- +/- 400 V d.c. **3**
- +/- 1 A d.c. **4**
- +/- 5 A d.c. **5**
- 0...100 V d.c. **6**
- 0...250 V d.c. **7**
- 0...400 V d.c. **8**

Output:
- 0...20 mA **1**
- 4...20 mA **2**
- 0...10 V **3**
- RS-485 ..... **4**

Supply:
- 85..253 V a.c. 40..400 Hz; 90..300 V d.c. **1**
- 20..40 V a.c. 40..400 Hz; 20..60 V d.c. **2**

Version:
- standard **00**
- non-standard settings ..... **NS**
- custom-made* ..... **XX**

Language:
- Polish ..... **P**
- English ..... **E**
- other* ..... **X**

Acceptance Tests
- without extra quality requirements **0**
- with an extra quality inspection certificate **1**
- acc. to customer's requirements* ..... **X**

* after agreeing with the Manufacturer

Example of Order:

The code: **P20H - 6 1 1 00 E 0** means:

P20H – transducer of d.c. current and d.c. voltage signals,
6 – input signal: 0...100 V d.c.,
1 – output: 0...20 mA,
1 – supply: 85..253 V a.c. 40..400 Hz; 90..300 V d.c.
00 – standard version
E – English language
0 – without extra quality inspection requirements

8. MAINTENANCE AND GUARANTEE

The P20H separator does not require any periodical maintenance.
In case of some incorrect operations:

From the Shipping During the Period Given in the Annexed Guarantee Card:

One should return the separator to the Manufacturer's Quality Inspection Dept.

If the instrument has been used in compliance with the instructions, we guarantee to repair it free of charge.

The disassembling of the casing may cause the cancellation of the granted guarantee.

After the Guarantee Period:

One should turn over the separator to repair it in a certified service workshop.

Spare parts are available for the period of five years from the date of purchase.

Our policy is one of continuous improvement and we reserve the right to make changes in design and specifications of any products as engineering advances or necessity requires and revise the above specifications without notice.

P20H-09A

LUMEL S.A.
ul. Słubicka 1, 65-127 Zielona Góra, Poland

Tel.: (48-68) 45 75 100
Fax: (48-68) 45 75 508
e-mail:lumel@lumel.com.pl
http://www.lumel.com.pl

Export Department:
Tel.: (48-68) 45 75 302
Fax: (48-68) 32 54 091
e-mail: export@lumel.com.pl