LUMEL

TRANSDUCER of TEMPERATURE and STANDARD SIGNALS

P20 type

USER'S MANUAL

CE

Contents

1. APPLICATION

The P20 programmable transducer is designed to convert temperature, resistance, voltage from a shunt and standard signals into a constant-current or constant-voltage standard signal.

The output signal is galvanicaly isolated from the input signal and supply.

The transducer compensates automatically the resistance of wires in case of resistance value measurements in a three-wire system and automatically compensates the temperature of terminals in case of measurements from thermocouples.

The transducer is fully configurable through the PD14 programmer. By means of this programmer, one can change the input type, the measurement averaging time and rescale the analog output acc. to the individual output characteristic, and also read out the measured value.

2. TRANSDUCER SET

The set of the P20 transducer is composed of:

- P20 transducer 1 pc.
- User's manual 1 pc.
- Guarantee card 1 pc
- Plug with screw terminals 2 pcs.
- Hole 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. OPERATIONAL SAFETY

In the safety service scope, the transducer meets to 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.
- Before switching transducer on, one must check the correctness of connections to the network.
- 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 transducer off.
- 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 programmer socket is only use to connect the PD14 programmer. After the transducer programming, one must insert the hole plug.
- Non-authorized removal of the housing, inappropriate use, incorrect installation or operation, creates the risk of injury to personnel or a transducer damage.

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

4. INSTALLATION

4.1. Fitting way

P20 transducers are designed to be mounted on a 35 mm rail according to EN 60715.

Housing dimensions are: 22.5 x 120 x 100 mm.

On the transducer outside, there are screw or self-locking terminal strips, which make possible the connection of external wires with a 2.5 mm^2 cross-section (supply and output) and up to 1.5 mm^2 (input).

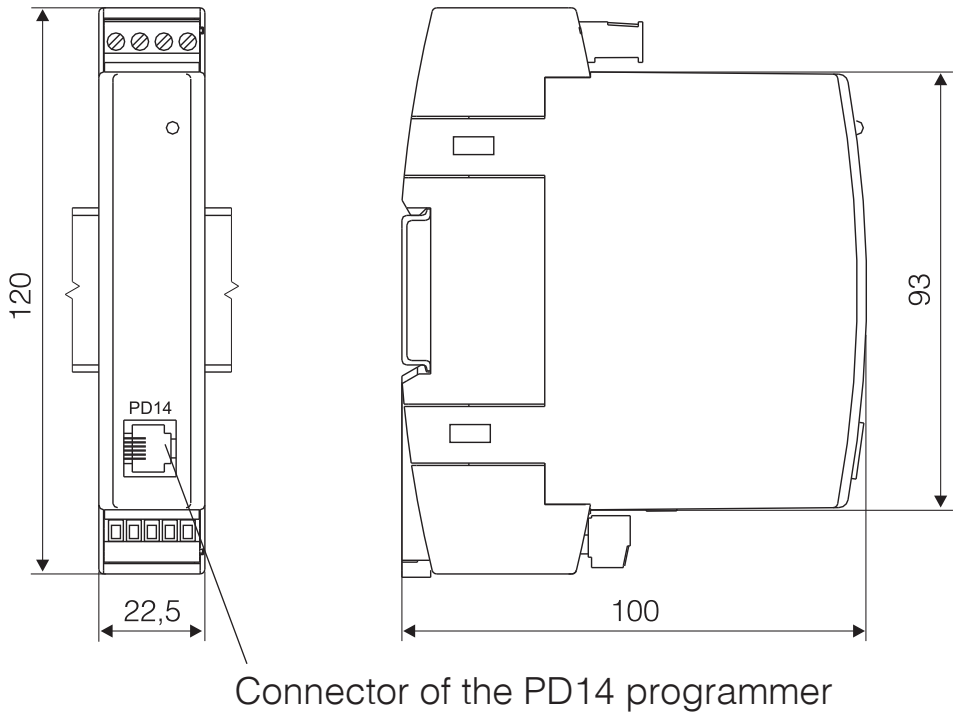


Fig. 1. Overall dimensions and fitting way of the transducer

Transdusers should be mounted on the rail in direct contact with another devices that emit heat (eg transducer P20). You must keep a minimum 5 mm distance between the devices to allow emit heat from the housings to the ambient. Otherwise, the in rated operating temperature of transducer which is in direct contact with the other transducer may exceed the rated operating temperature stated operating conditions.

4.2. External electrical connection diagrams

The transducer has two sockets of terminal strips, which two plugs with terminal screws are connected to. The way to connect external signals is shown on the fig.1

The electrical connection diagram is also situated on the transducer housing. In case of the transducer work in an environment with high interferences, one must apply shielded wires in the transducer input.

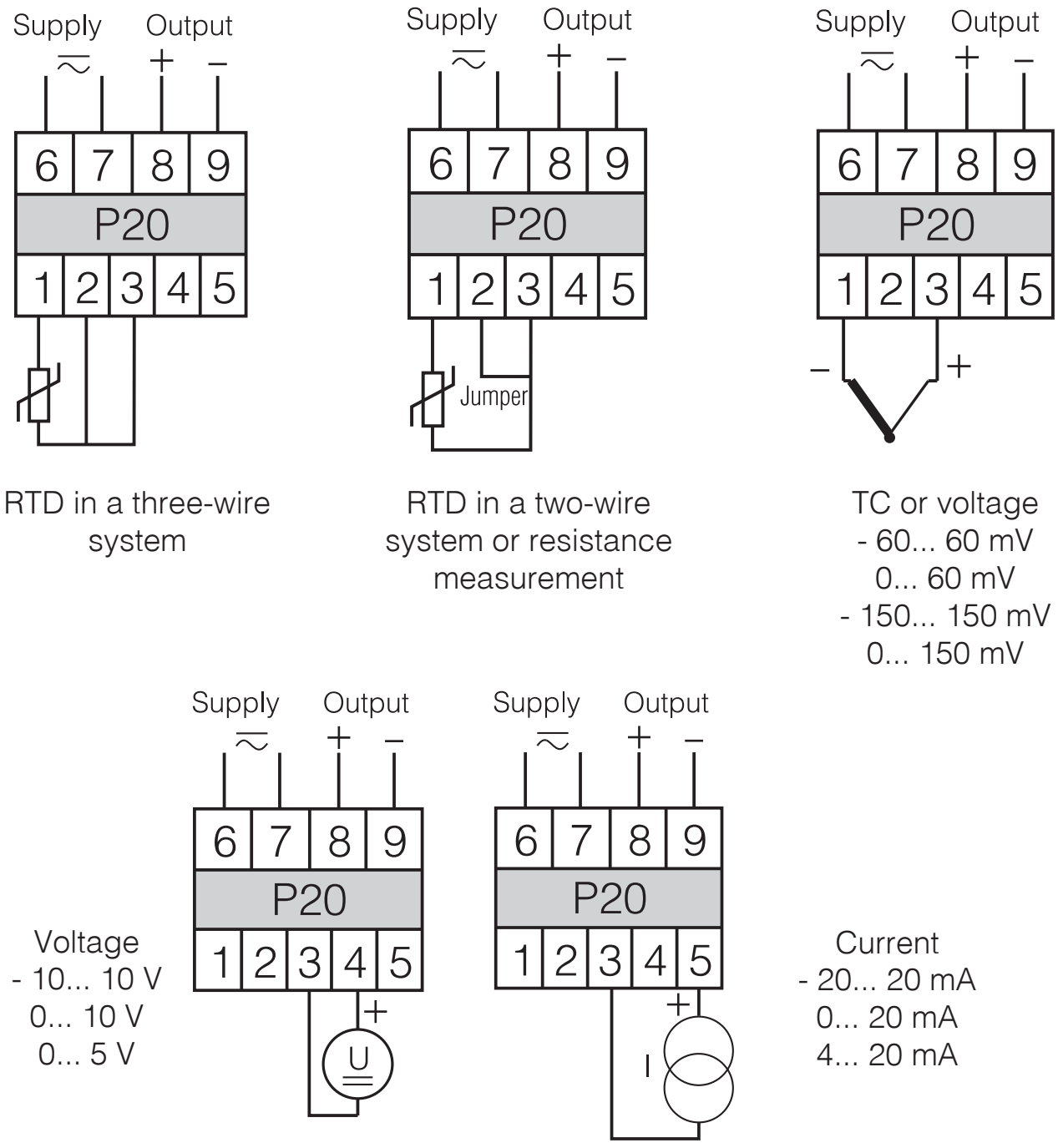
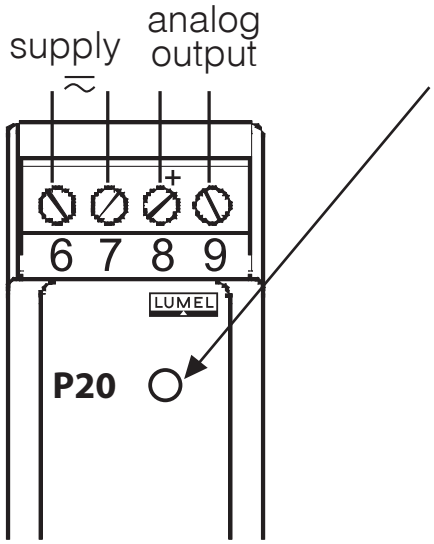


Fig.2. Electrical connection diagrams of the P20 transducer.

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.

Fig. 3. View of the P20 transducer

Confirmation of the separator's communication with PD14 programmer is indicated by the status diode which turns off for short period of time.

5.1. Transducer configuration by means of the LPCon program

The LPCon program is destined for the P20 transducer configuration. One must connect the PC computer through the PD14 programmer and configure the connection choosing ***Option -> Connection configuration*** from the menu (for the P20 transducer, we choose the address 1, baud rate 9600 kb/s, the mode RTU 8N2 and the appropriate port COM under which the controller of the PD14 programmer has been installed).

Fig. 3. Configuration of the connection with the P20 transducer.

After the connection configuration, one must choose ***Device -> Transducers P -> P20*** from the menu, and next click the ***Readout*** icon in order to read out all parameters. One can also read out parameters individually in each group clicking the ***Refresh*** push-button.

5.1.1 Configuration of the transducer input type

Three developable lists are accessible in the parameter group “Input configuration”, by means of which, one can choose the input type, the measuring range and the measurement averaging time. One must confirm changes, clicking the ***Apply*** push-button.

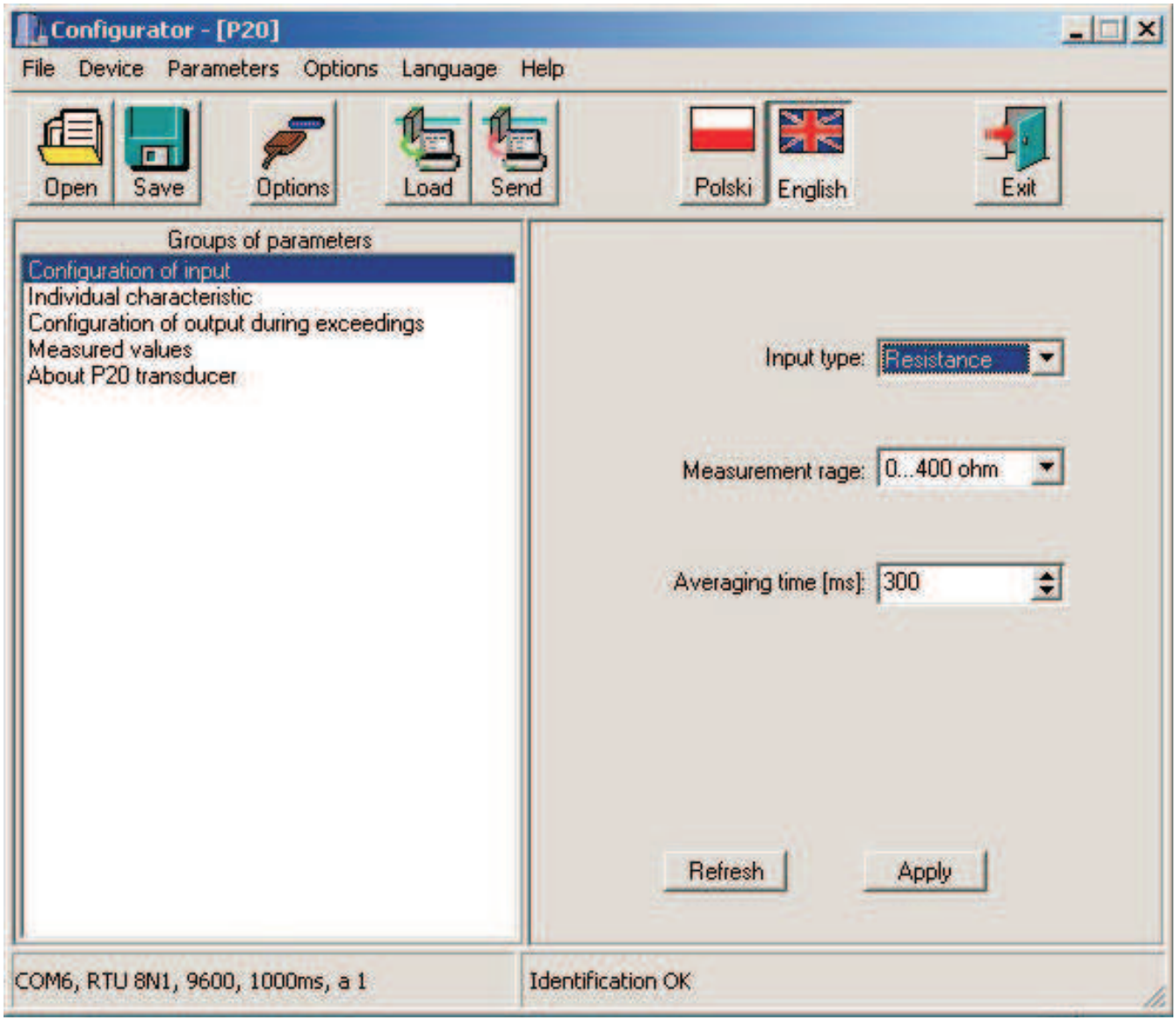


Fig. 4. View of the LPCon program window “Input configuration”

5.1.2. Configuration of the analog output characteristic

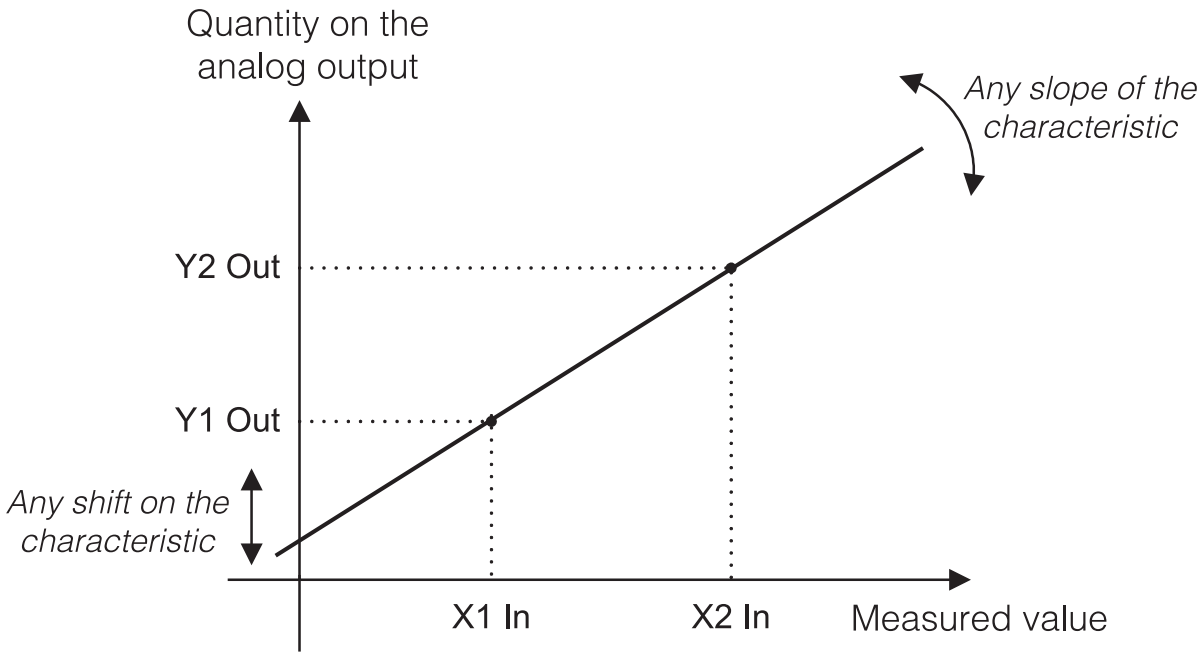
The P20 transducer enables the conversion of measured values into an output signal on the base of the individual linear characteristic of the analog output. On the base of given by the user coordinates of two points, the transducer determines (from the system of equations) coefficients **a** and **b** of the individual characteristic.

$$\begin{cases} Y1\ Out = a \cdot X1\ In + b \\ Y2\ Out = a \cdot X2\ In + b \end{cases}$$

where:

X1 In and X2 In – measured value

Y1 Out and Y2 Out – expected value on the output



The X1 In value on the transducer input
=> Y1 Out value on the analog output

The X2 In value on the transducer input
=> Y2 Out value on the analog output

Other points of the characteristic are calculated

Fig. 5. Individual characteristic of analog outputs

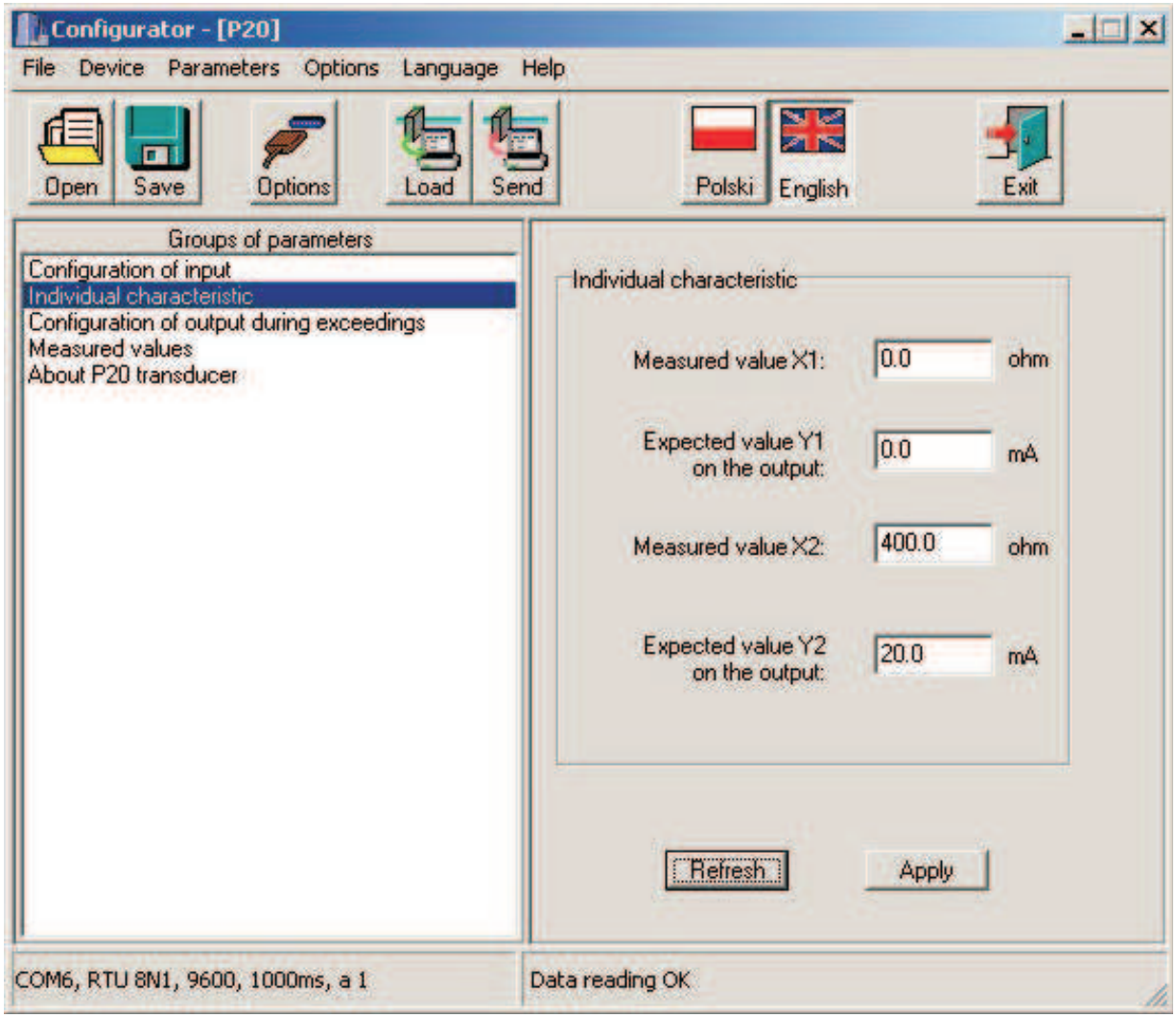


Fig. 6. View of the LPCon program window "Individual characteristic"

5.1.3. Configuration of the analog output at overflows

The user has the additional possibility in the P20 transducer to configure the preservation of the analog output after the signal overflow occurrence on the measuring input. By default, the service of overflows is switched out – then, after the signal overflow on the input, the output is still proportional to the steered up input beyond the basic output range. After switching the overflow service on, the user can define himself by

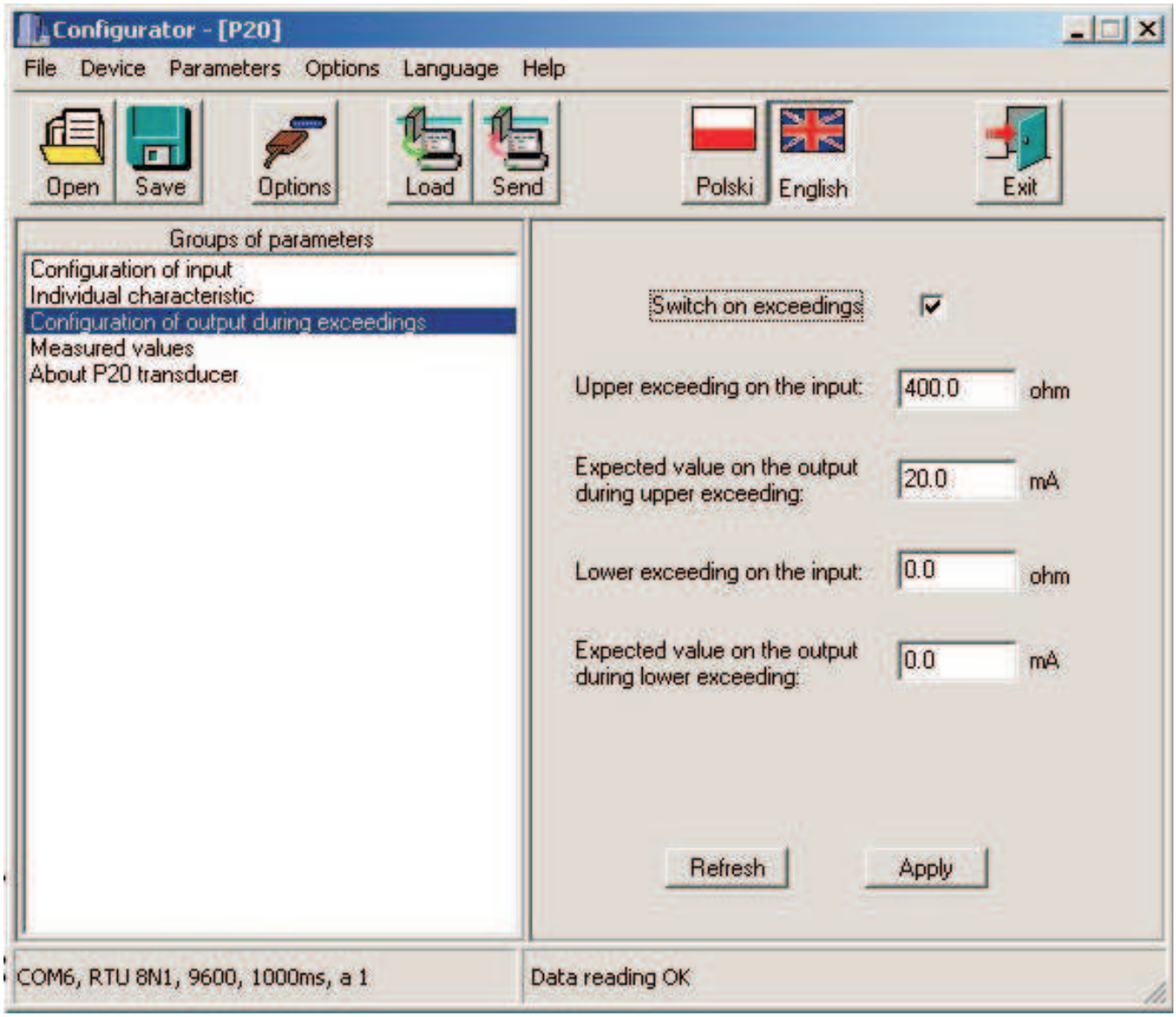


Fig. 7. View of the " Output configuration at overflows" window of the LPCon program.

5.1.4. Readout of the measured value

By means of the LPCon program, one can also read out the actually measured value, check the output type, read out the factory serial number and the programming version. These quantities are located in the ***Measured values*** window.

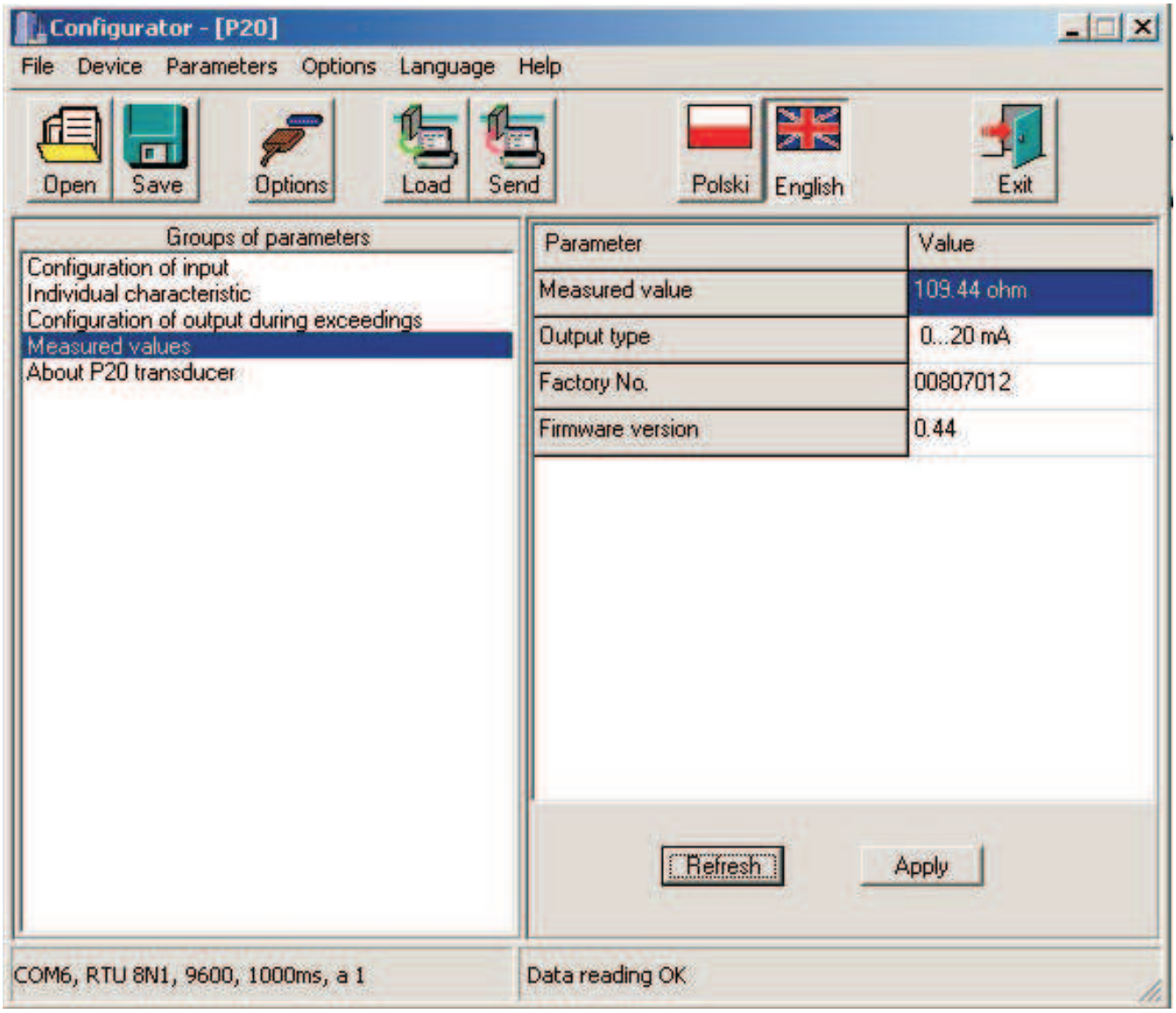


Fig.8. View of the " measured values" window of the LPCon program

6. TECHNICAL DATA

Basic parameters:

- analog output galvanicaly isolated:	
- current	0/4...20 mA
- voltage	0...10 V
- maximal load resistance of the current output	≤ 500 Ω
- minimal load resistance of the voltage output	≥ 500 Ω
- accuracy class[1)]	0.2
- averaging time of the transducer:	
- range: d.c. current [mA], d.c. voltage [V]	≥ 0.1 s
- other ranges	≥ 0.3 s
- consumption	< 2 VA
- preheating time of the transducer	10 min
- transducer response time:	
- range: d.c. current [mA], d.c. voltage [V]	≥ 0.2 s
- other ranges	≥ 0.4 s
- current flowing through RTD	< 0.2 mA
- resistance of wires connecting RTD with the transducer	≤ 10 Ω

Rated operating conditions:

- supply depending on the execution code	85... 253 V a.c./d.c. 20...85 V d.c., 20...65 V a.c.
- frequency of the supply a.c. voltage	45... 65 Hz
- ambient temperature	– 20...23...55°C
- storage temperature	– 25...85°C
- related air humidity	< 95% (condensation inadmissible)
- working position	any

Input parameters:

- resistance of voltage input [V]	> 1 MΩ
- resistance of current input [mA]	12 Ω ±1%

Sustained overload:

- TC and RTD	1.1 X_n
- voltage, current and resistance	1.3 X_n

Short duration overload:

- voltage input	5 U_n
- current input	10 I_n

Ensured protection level acc. to EN 60529:

- housing	IP 40
- from terminal side	IP 20

Dimensions:	22.5 × 100 × 120 mm
Weight:	0.125 kg
Fitting	on a 35 mm DIN rail, acc. to EN 60715

Electromagnetic compatibility:

- noise immunity	EN 61000-6-2
- noise emission	EN 61000-6-4

Safety requirements acc. to EN 61010-1:

- installation category	III
- pollution degree	2
- phase-to-earth working voltage:	
- supply	300 V [2)]
- input	50 V
- output	50 V
- altitude above sea level	< 2000 m

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1) A part of sub-ranges for thermocouples and RTD has a specified individual class – see table 3

2) Execution for supply voltage 230 V.

7. EXECUTION CODES

Execution codes of the P20 transducer

Table 2.

TRANSDUCER P20 -	**X**	**X**	**XX**	**XX**	**X**

Analog outputs:

current 0... 20 mA..... **1**
current 4... 20 mA..... **2**
voltage 0... 10 V **3**

Supply:

85...253 V a.c./d.c. **1**
20 … 85 V d.c., 20...65 V a.c. **2**

Kind of input

see table 3..... **XX**

Execution:

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

Acceptance tests:

without extra quality requirements **8**
with an extra quality inspection certificate..... **7**
acc. to customer's requirements*..... **X**

* after agreeing with the manufacturer

Coding of the P20 transducer input kind *Table 3.*

Type of sensor/input	Range [°C]	Kod
Pt100 RTD	-200...850	01
	0...850	02
	0...600	03
	0...400	04
	0...200	05
	-200...200	06
	-100...100*	07
Pt 250 RTD	-200...850	08
	0...850	09
	0...600	10
	0...400	11
	0...200	12
	-200...200	13
	-100...100	14
Pt 500 RTD	-200...850	15
	0...850	16
	0...600	17
	0...400	18
	0...200	19
	-200...200	20
	-100...100	21
Pt1000 RTD	-200...850	22
	0...850	23
	0...600	24
	0...400	25
	0...200	26
	-200...200	27
	-100...100	28
TC of J type	-200...1200	29
	0...1200	30
	0...1000	31
	0...800	32
	0...600	33
	0...400*	34
	-200...200*	35
TC of K type	-200...1370	36
	0...1200	37
	0...1000	38
	0...800	39
	0...600	40
	0...400*	41
	-200...200*	42
TC of S type	0...1760	43
	0...1600	44
	0...1400*	45
	0...1200*	46
	0...1000*	47
TC of N type	-200...1200	48
	0...1200	49
	0...1000	50
	0...800	51
	0...600*	52
	0...400*	53
	-200...200*	54
d.c. voltage	0...10 V	55
	0...5 V	56
	-10...10 V	57
	-5...5 V	58
	0...60 mV	59
	-60...60 mV	60
	0...150 mV	61
	-150...150 mV	62
d.c. current	0...20 mA	63
	4...20 mA	64
	0...5 mA	65
	-20...20 mA	66
Resistance	0...400 Ω	67
	0...4000 Ω	68
Custom-made execution		XX

* *accuracy class 0,5*

Example of order:

When ordering, please respect successive code numbers.

The code: **P20-1.1.04.00.7** means:

P20 – transducer of temperature and standard signals

1 – with current analog output: 0…20 mA,

1 – voltage supply: 85…253 V a.c./d.c.,

04 – Pt100 input signal, 0…400°C range,

00 – standard execution

7 – with an extra quality inspection certificate

8. MAINTENANCE AND GUARANTEE

The P20 transducer does not require any periodical maintenance.

In case of some incorrect operations:

After the dispatch date and in the period stated in the guarantee card:

One should return the transducer 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 housing causes the cancellation of the granted guarantee.

After the guarantee period:

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

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

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

P20-09B

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