LUMEL

PROGRAMMABLE TRANSDUCER OF FREQUENCY, PULSES, PERIOD, WORKTIME AND ROTATIONAL SPEED WITH RS-485 INTERFACE

P120

45 × 120 × 100 mm

USER'S MANUAL

CE

CONTENTS

1. APPLICATION

The P12O programmable transducer is designed to convert number of pulses, number of turns, number of working hours, frequency, period and rotational speed into a standard d.c. current or d.c. voltage signal.
The output is galvanically isolated from the input and supply.
The P12O-2 transducer has an LCD 2 x 8 read-out field.
The P12O transducer is programmed in the factory according the ordered execution code. The parameter modification is possible with the user through the PD14 programmer, the RS-485 interface or from the keyboard (in case of P12O-2 option).
The PD14 programmer (must be ordered separately), serves to program the P11 and P12 transducer families.

The P12O transducer realizes the 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 indication on the base of the individual linear characteristic,
- signalling of the set alarm value exceeding,
- recording of the input signal in programmed time periods,
- programming of the indication resolution (only for P12O-2 option),
- preview of set parameter values,
- re-calibration of the input signal: multiplication, division by a constant,
- counting of pulses, down and up,
- automatic reset of counters at the required value,
- possibility of external reset, stoppage and start of counters,
- automatic set-up of the decimal point, (in P12O-2 execution),
- programmable digital filter of the input signal (e.g. to eliminate the effect of contacts oscillation)
- storage of counters state in case of the decay of the supply voltage,
- storage of maximal and minimal values,
- programming of the measurement averaging time,
- display of the unit according the table 1,
- lead-out to supply sensors (24 V d.c.),
- service of the RS-485 interface in the MODBUS protocol, both in ASCII either in RTU mode,
- data protection by means of a password.

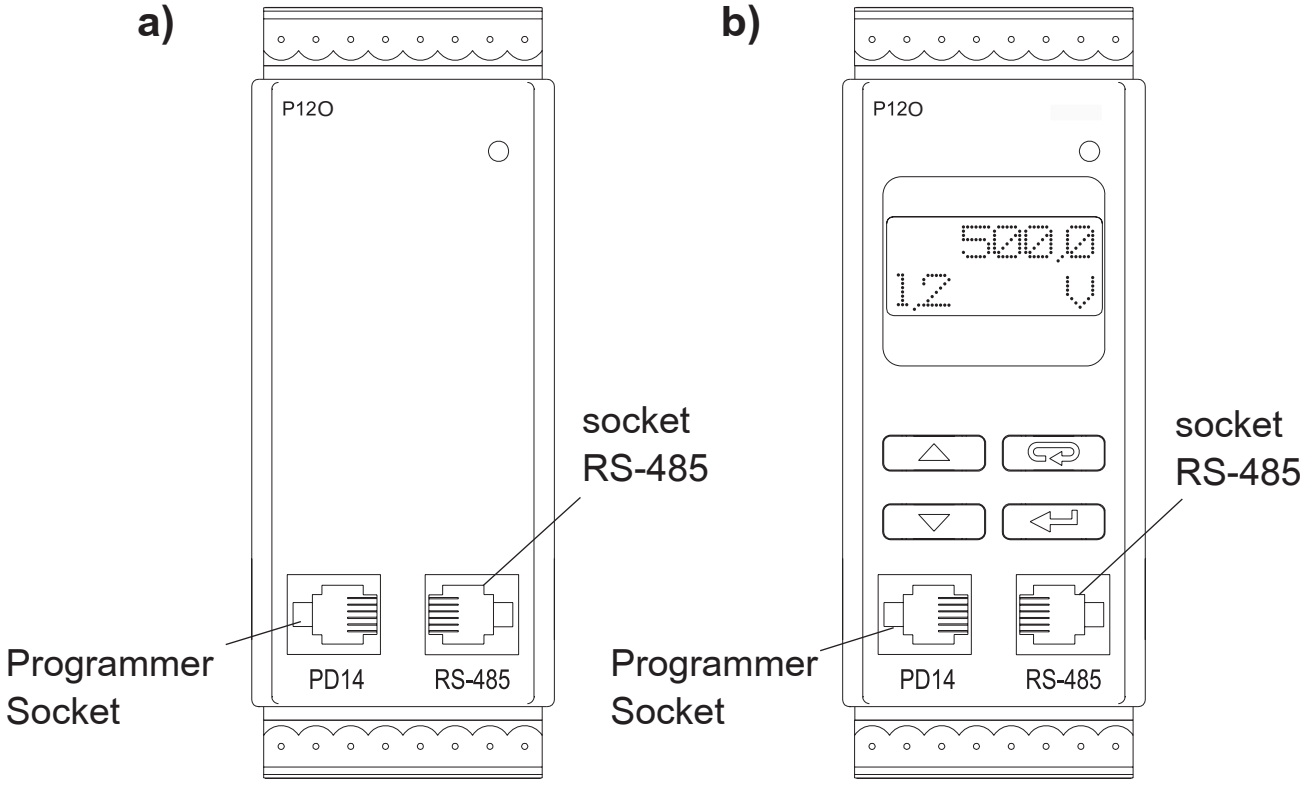


Fig.1 View of the P12O transducer: a) P12O-1, b) P12O-2

2. SET OF THE P12O TRANSDUCER

The set is composed of:

- P12O transducer	1 pc
- service manual	1 pc
- guarantee card	1 pc
- plug with screw or self-locking terminals (on request)	4 pcs
- hole plug of the programmer socket	2 pcs

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

3. BASIC REQUIREMENTS AND 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 pay attention when the transducer is working contrary to the expectations.

In the range of operational safety the transducers are in conformity with the EN 61010-1 standard requirements.

Remarks concerning the operator safety 

- A qualified personnel should operate the installation and transducer connection.
  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 socket is designed for connection the PD14 or PD11 programmer only.
- The RS-485 socket is designed for connection devices working with the MODBUS protocol only.
- Place hole plugs into the unused transducer sockets (of the programmer and RS-485).

4. INSTALLATION

4.1 Fitting of the P12O transducer

P12O transducers are designed to be installed on a 35 mm DIN rail acc. DIN EN 60715:2002. The housing is made of a self-extinguishing thermoplastics. The housing dimensions are: 45 x 120 x 100 mm. On the external side of the transducer, there are screw or self-locking (on order) terminal strips enabling the connection of 2.5 mm2 cross-section conductors.

Overall dimensions and the fixing way are shown on the fig.2.

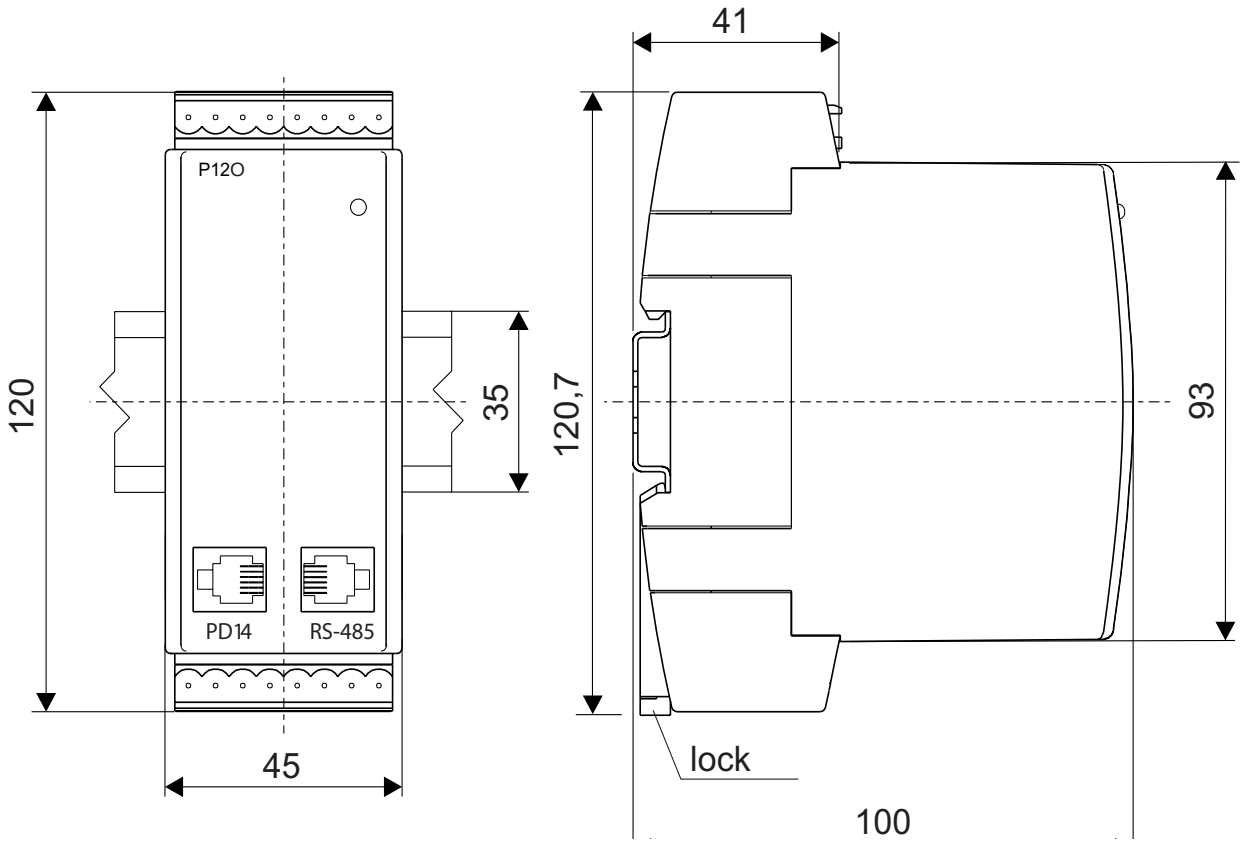
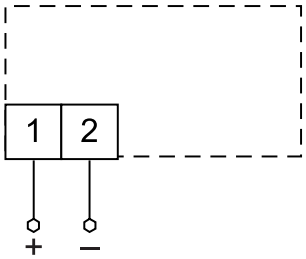


Fig.2. Overall dimensions and fixing way of P12O transducers

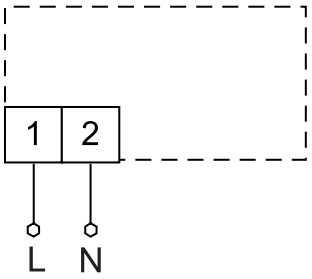
4.2 External connection diagrams

External connections must be done according Fig.3. Input signals must be connected acc. Fig.3a. Connection in system with computer is shown on Fig.3b.

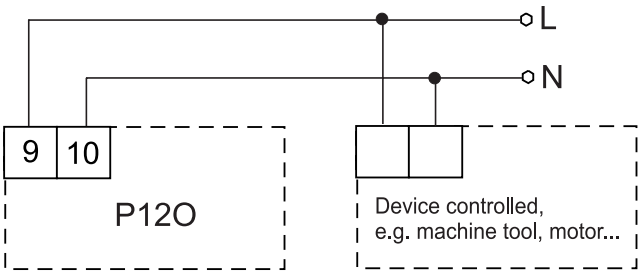
a) Description of terminal strip and connection way of input signals with exemplary applications



Voltage sensor (e.g. generator).

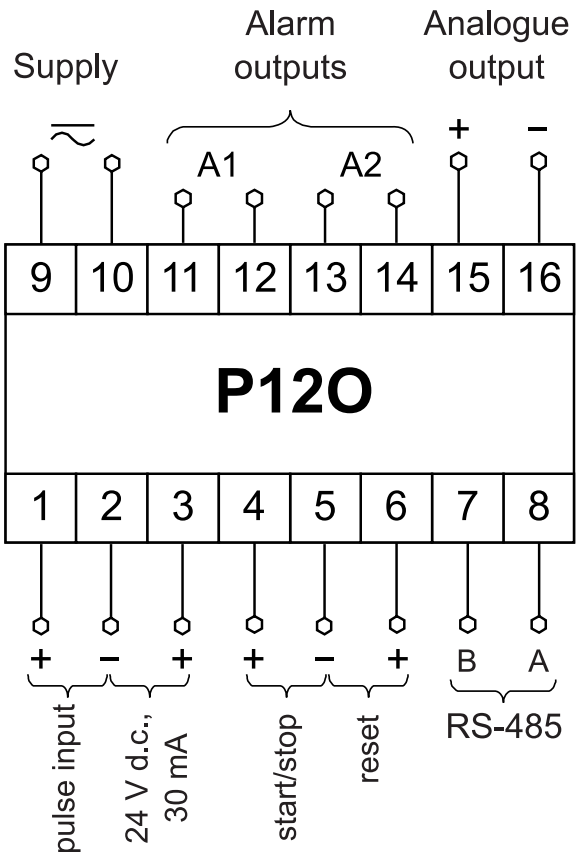


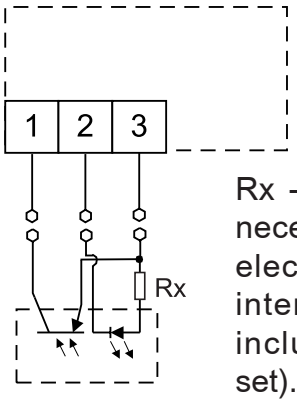
Measurement of frequency from the network.



Connect the supply only.

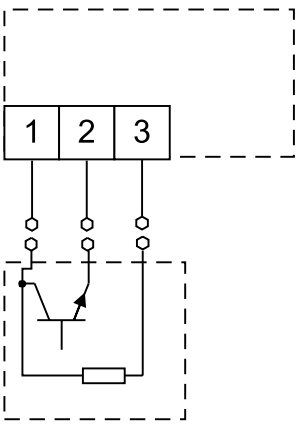
Working hour counter.





Rx - settle the diode current necessary in case of photo-electric sensors without an internal resistor (Rx is not included in the transducer set).

Photo-electric sensor, e.g. CN1.



Inductive sensor, e.g. PCID.

b) Conection way of the RS-485 interface

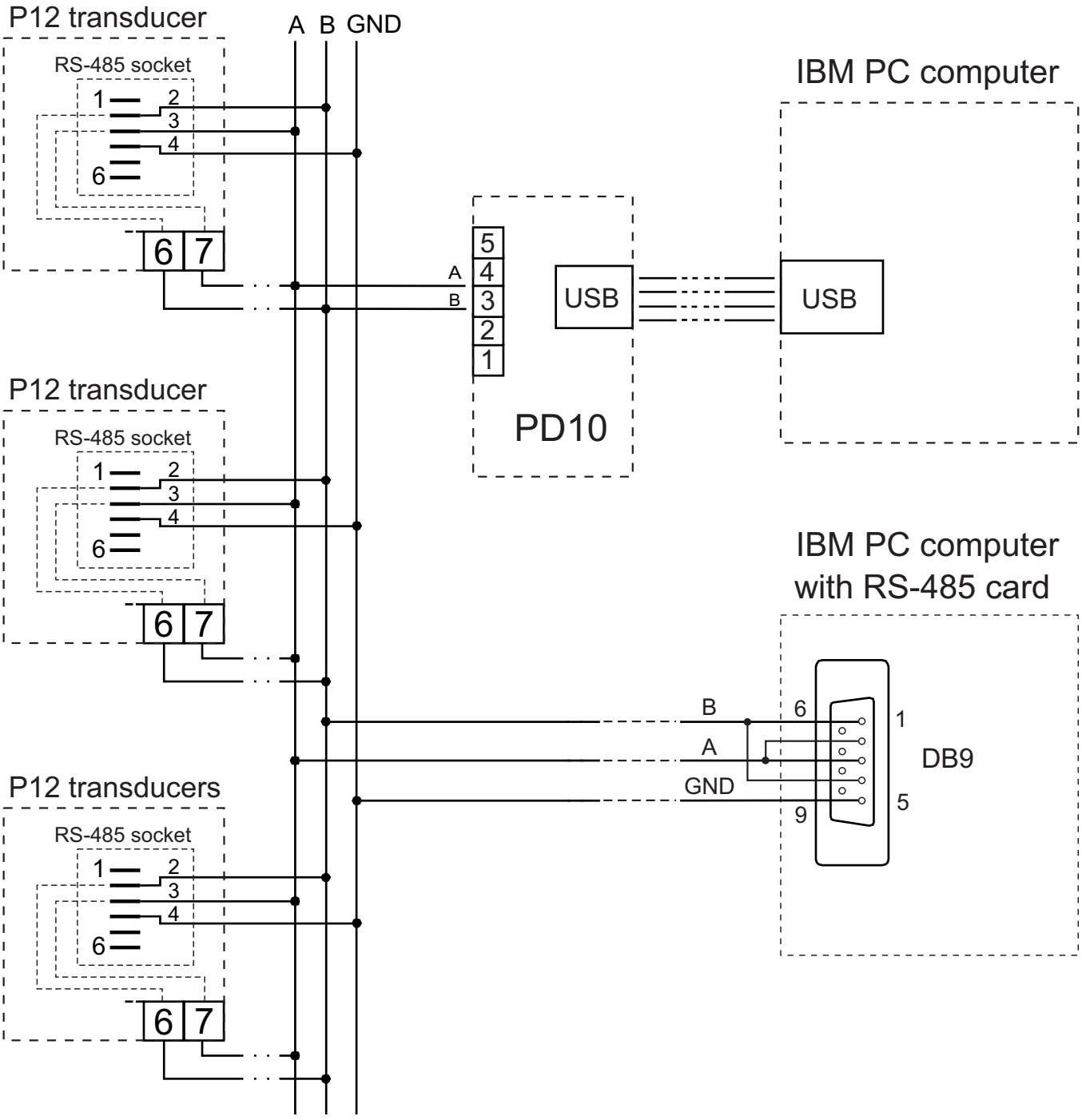
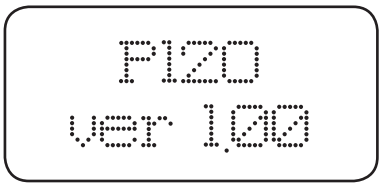


Fig. 3. External connections of the P12O transducer

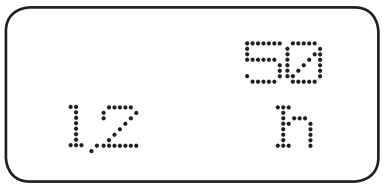
Due to the electromagnetic interference, screen conductors are recommended, to connect signals of the analogue output. Power supply should be connected by a 2-wire conductor with the proper diameters for ensuring its protection by means of an installation cut-out.

5. SERVICING

After connecting external signals and power supply, what is indicated by a LED on, the transducer displays the type and the current version of the program.
After ca 3s, the transducer automatically transits into the working mode, in which



it realizes the measurement and conversion into an analogue output signal. It displays the measured value, the unit of the measured or set value by the user and markers of connected alarms.
The transducer automatically blanks void zeros. The start of the recording is



indicated on the display (the mark „M" means the recording is starting, the mark „E" means the empty memory, however the mark „F" means a full memory). After filling the memory, the transducer automatically switches the recording off.

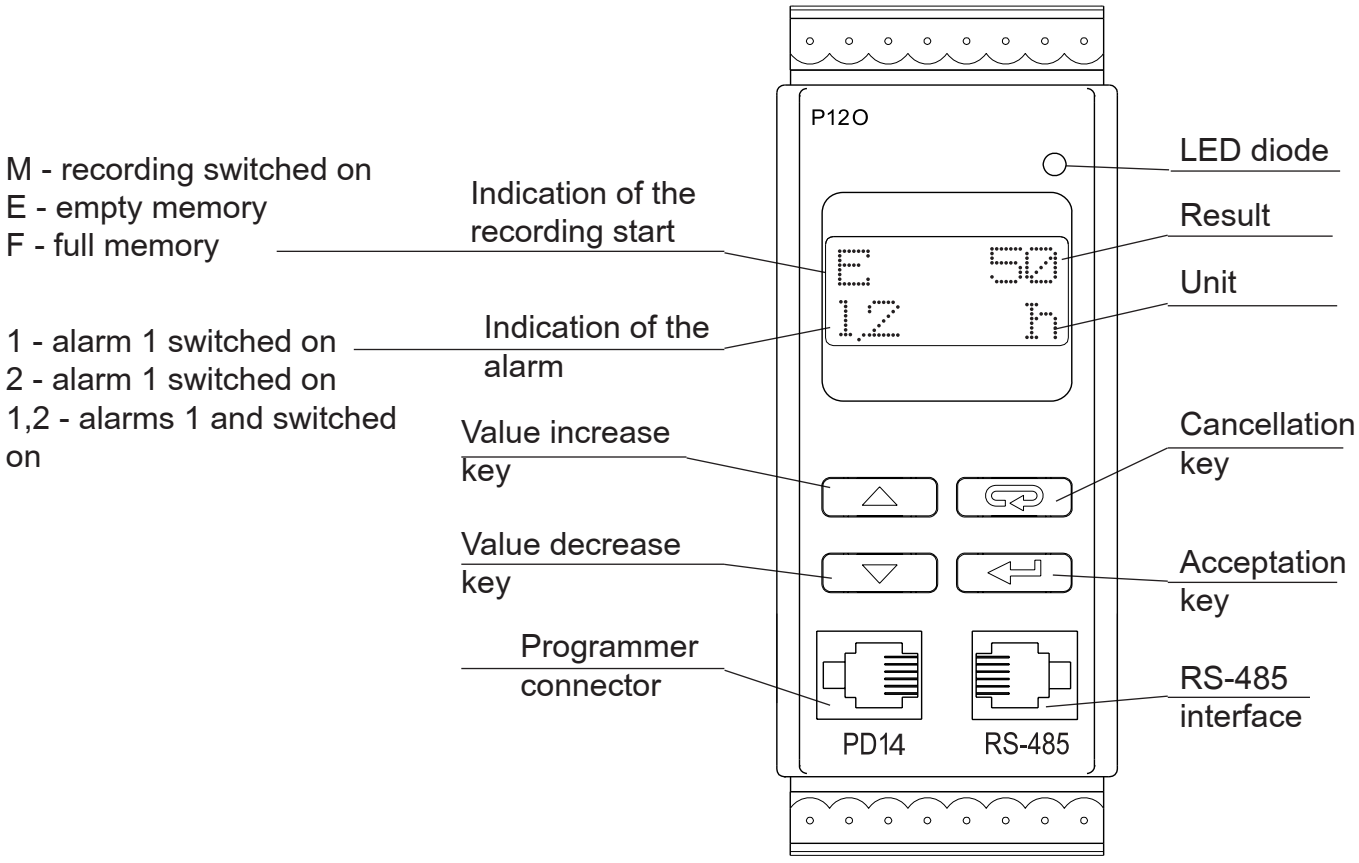


Fig. 4. Description of the P12O transducer frontal plate.

Key functions:

 - acceptation key

- entry into the programming mode (hold down ca 3 s),
- entry into the change of the parameter value mode,
- acceptation of the modified parameter value.

 - value increase key

- display of the maximal value,
- the counter start (if the **Exter In="OFF"**)
- moving along the preview menu or on the programming matrix,
- modification of the chosen parameter value - value increasing.

 - value decrease key

- display of the minimal value,
- the counter stoppage (if the **Exter In="OFF"**)
- moving along the preview menu or on the programming matrix,
- modification of the chosen parameter value - value decreasing.

 - cancellation key

- entry into the menu of parameter preview (hold down ca 3 s),
- exit from the preview menu or programming matrix.
- cancellation of the parameter change.

Pressing the keys  and holding down within ca 3 s causes the erasing of the alarm indication and/or alarm outputs. This operation works exclusively when the support function is switched on.

Pressing the keys  causes:

- the erasing of the minimal value, in case of the measurement of period, frequency or rotational speed,
- counters reset and stoppage, in case of the measurement of pulse number, turns number or in case of the work time counter, when **Exter In="OFF"**

Pressing the keys  causes:

- the erasing of the maximal value, in case of the measurement of period, frequency or rotational speed,
- counters reset and start, in case of the measurement of pulse number, turns number or in case of the work time counter, when **Exter In="OFF"**.

Pressing the key [▲] causes:

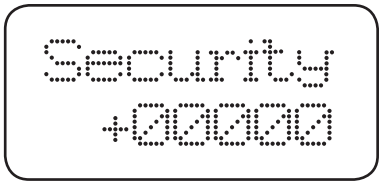
- displaying of the maximal value in case of the measurement of period, frequency or rotational speed,
- in other causes, the counter start, when **Exter In="OFF"**.

Pressing the key [▼] causes:

- displaying of the minimal value in case of the measurement of period, frequency or rotational speed,
- in other causes, the counter stoppage, when **Exter In="OFF"**.

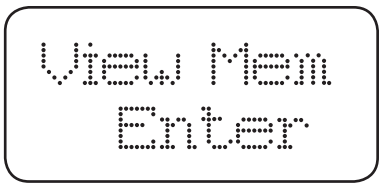
Releasing the key causes the return to the currently displayed measuring parameter.

Pressing and holding the [↵] key within ca 3 s causes the entry into the programming mode. The programming mode is secured by a security code.

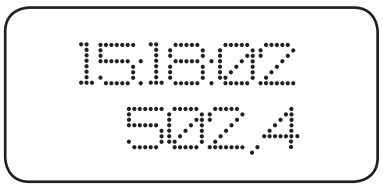


Pressing and holding down of the [↩] key within ca 3 s cause the entry into the preview menu. One must move on the preview menu by means of [▼] and [▲] keys. In this menu, all transsducer programmable parameters are accessible only for readout, with the exception of servicing parameters.

The exit from the preview menu is carried out by means of the [↩] key. It is possible to review recorded values in the preview menu.

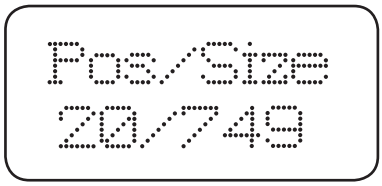


Pressing the [↵] key causes the entry into the review menu of recorded value.



The upper line informs about the sample recording time, whereas the value of the recorded sample is shown on the lower line. Stepping between recorded values happens by [▼] and [▲] keys.

Holding down one of these keys for more than 2 s will speed the reviewing. Pressing [↵] key causes displaying **Pos**/**Size** inscription, number of sample and total memory used.



The exit from the review of recorded values happens by [↩] key.

The algorythm of the transducer servicing is shown on the Fig.5.

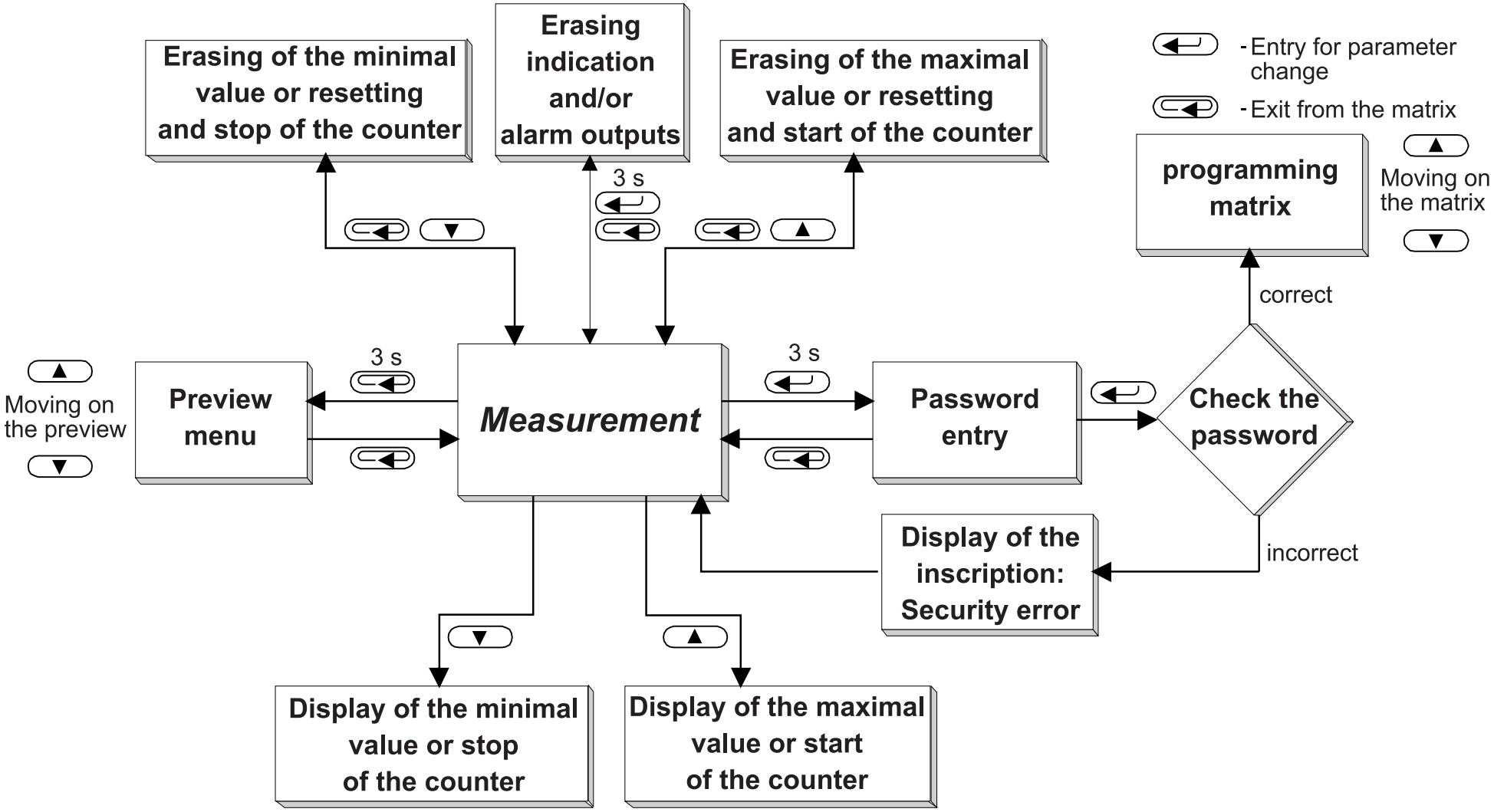


Fig. 5. Algorythm of the P12O transducer.

In case of external functions are on **Exter In=”On”** start, stop and counters reset is conducted from external lead-outs 4,5,6 (see drawing 3a). Introduce the signal of voltage range 5...24 V d.c. to „start, stop” terminators, stops the counter. Signal disconnection starts the counter. Introduce the signal of voltage range 5...24 V d.c. to „reset” terminator, resets the counter.

The appearance of mentioned below symbols and inscriptions on the display means:

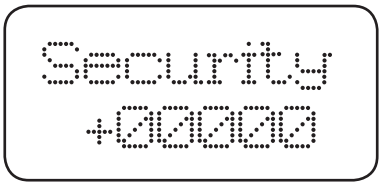
Security Error	Incorrectly introduced security code.
Over Hi 12 V	Overrunning of the higher measuring range.
Over Lo 12 V	Overrunning of the lower measuring range.
NO SIGNAL	This message in displayed till the moment of the input signal appearing and its averaging by the time given in the parameter Cnt. If there is a lack of signal more than 15 s, the transducer displays the value 0.

The change of transducer parameters is possible:

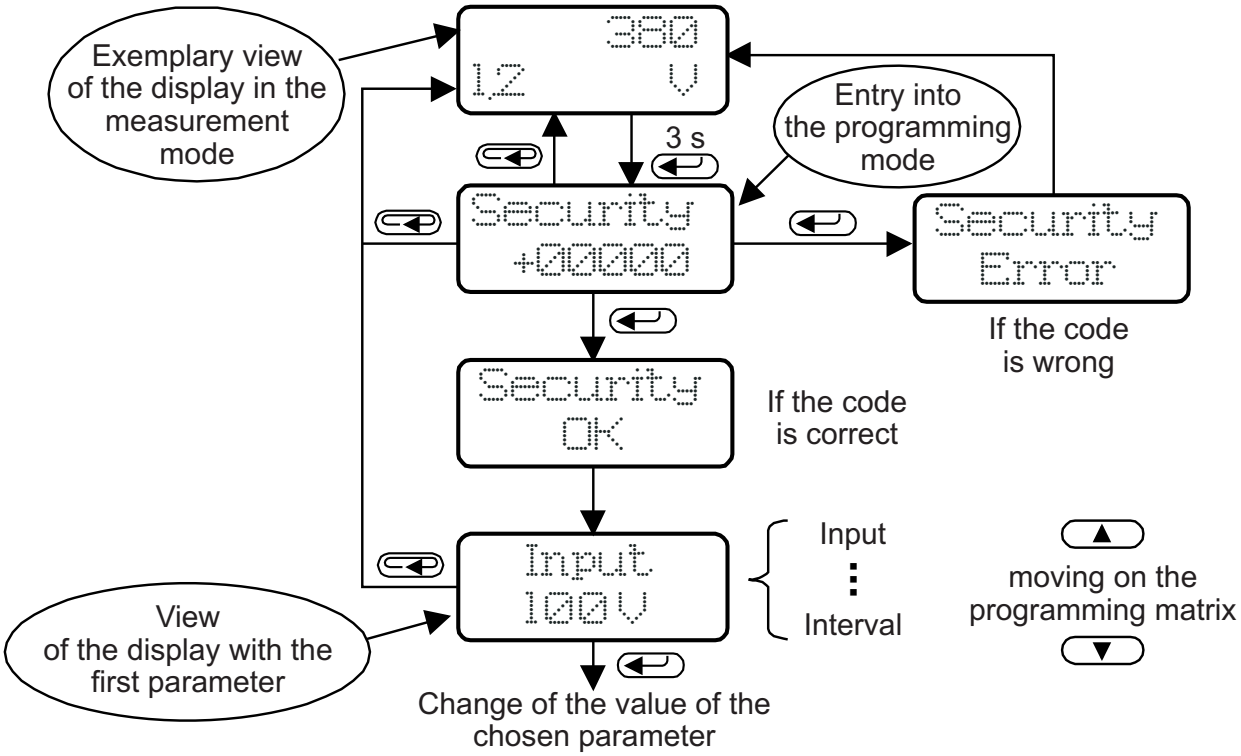
- from the transducer keyboard (in P12O-2) - p 5.1.
- through the PD14 programmer and PC computer - p 5.2.
- through RS-485 - p 6.5.

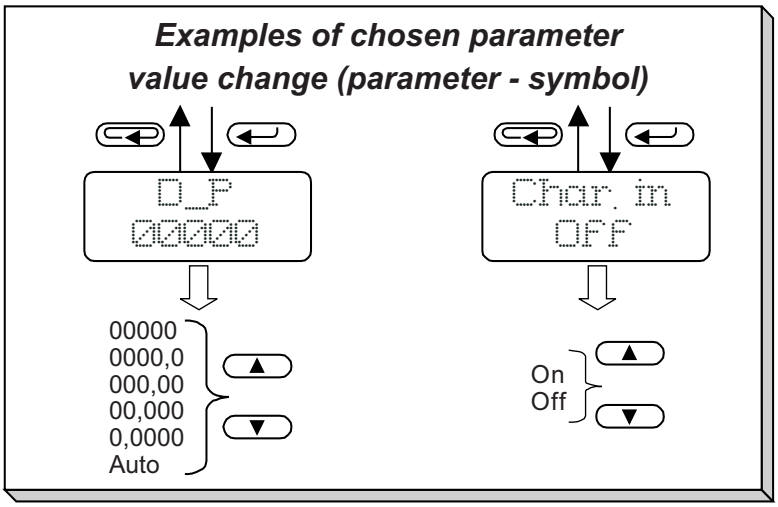
5.1. Change of P12O transducer parameters from the keyboard

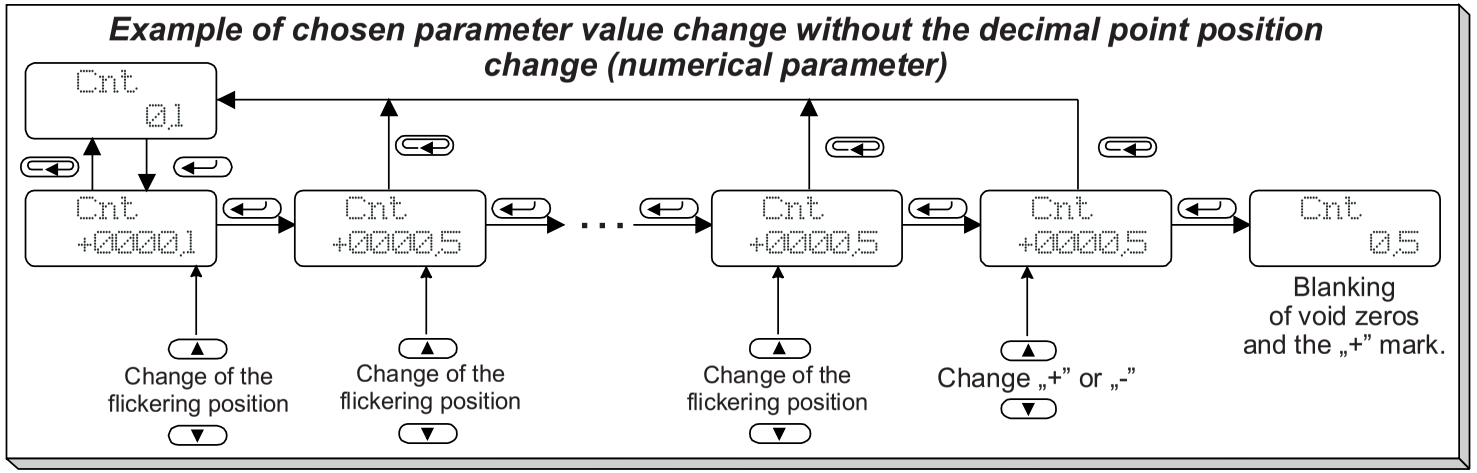
Pressing the ↵ key for ca 3 s causes the display of the inscription:



Input of the correct code in causes the entry into the programming mode.
The programming way is shown below:







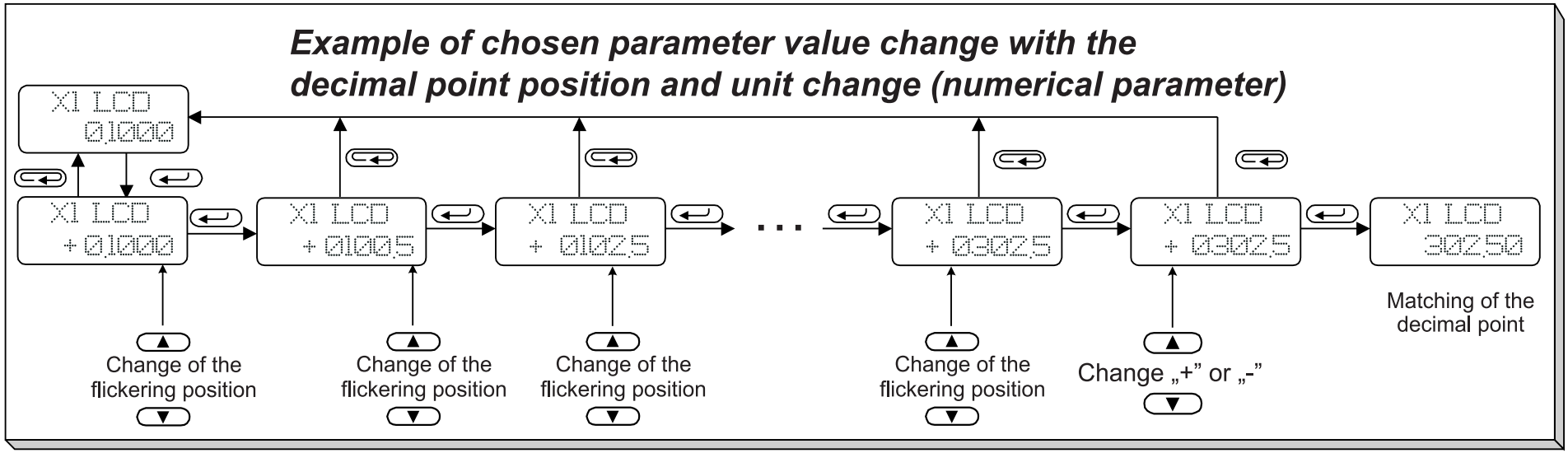


Fig. 6. Transition matrix in the programming mode

5.2. Change of P12O transducer parameters through the PD14 programmer

The way of connection of the P12O transducer through the PD14 programmer to the PC computer is shown on the Fig.7. The programmer is connected from one side to the USB port of the PC computer, and from the other one, through a plug of RJ12 type to the P12O transducer.

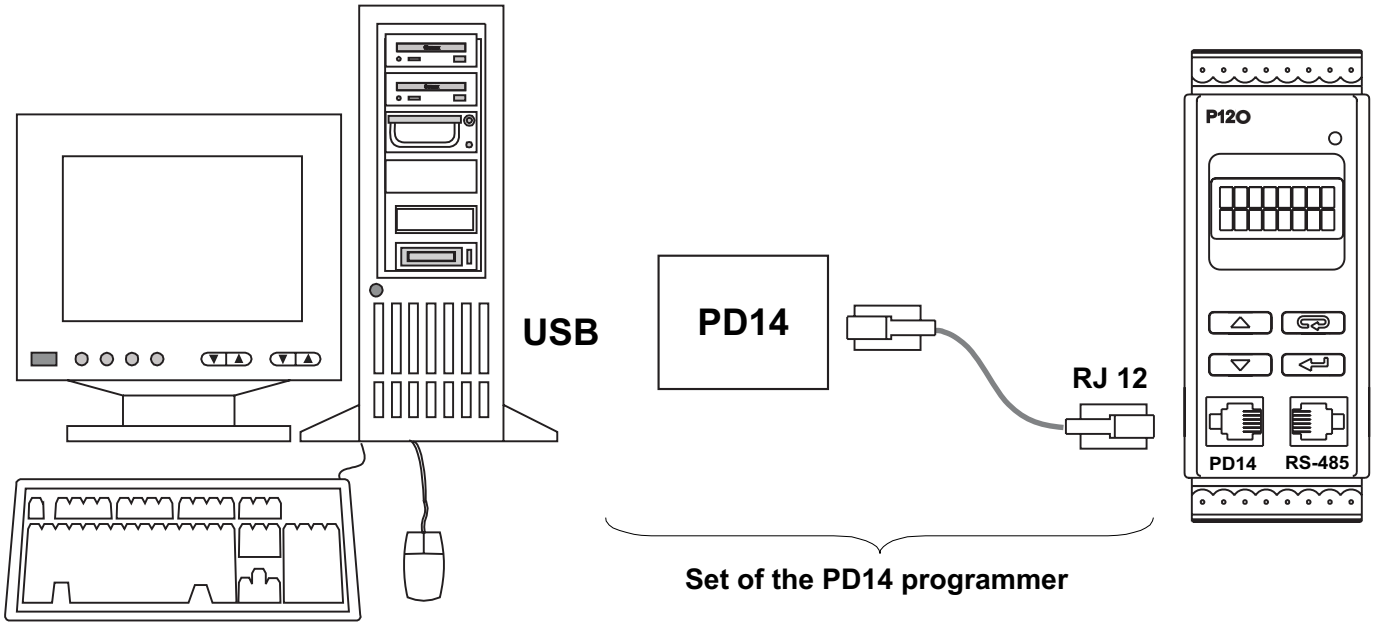


Fig. 7. Connection way of the P12O transducer to the PC computer through the PD14 programmer

Programmable transducer parameters are specified in the table 1.
The programming of the parameters is possible just after the password entry.

Programmable parameters of the P12O transducer Table 1

	Symbol on the display	Description of parameters	Range of changes
Input parameters	Input Counter	**Input type**	**Counter** - pulse counter **Frequen.** - frequency **Rotary** - turns cponter **Tachomet** - rotational speed **Period** - period **Period H** - long period >10 s **TimeMet.** - work time counter
	Filter 100	**Input filter** The parameter is designed to filter interferences on the input, e.g. of the contact oscillation. The transducer ignores pulses, shorter than the programmed time of the filter (Fig.10). The value of the input filter must be lower, than the measured signal frequency.	Possible settings: **0...99999 ms**
	TypeScal And	**Selection of the re-calibration type of the input quantity**. The measured quantity is multiplied or devided by the introduced value(**Cons In** parameter). In case of the input type selection, as a counter of pulses, turns or worktime and multiplication function, each pulse causes an increase of the displayed quantity by the **Cons In** value. In case of the input type selection, as a counter of pulses, turns or worktime and division function, each pulse increases by the 1/Cons In value In case of the left input types, the measured signal is multiplicated or devided by the introduced value (**Cons In** parameter).	**And** - multiplication by constant **Div** - division by constant
	Cons In 10	**Constant re-calibrating the input quantity**. The negative value introduction, in case of counting pulses, number of turns and worktime, causes the counting down.	Possible settings: -99999...99999

Table 1 (continuation)

Input parameters	Exter In On	**Permission for external functions**: start, stop, delay	**Off** - external functions are switched off **On** - external functions are switched on
	Auto 100	**Automatic resetting of the counters**. The counter is automatically reset by the introduced number. In case of frequency, rotational speed and period measurement, this parameter is not taken into consideration.	Possible settings **0...99999**
	D_P 0000.0	**Setting of the decimal point.** The setting operates either when the individual characteristic is switched off or on. The introduction of the decimal point, which makes impossible the display of 7 characters („+" or „-", 5 characters for the result, the decimal point character) on the display, will cause the display of the low or upper exceeding.	Possible settings: **Auto** - automatic selection of the decimal point **00000** **0000.0** **000.00** **00.000** **0.0000**
	Cnt 0.1	**Time of the measurement averaging.**	**0.0...9999.9 s** The write of 0 causes the measurement switching off and the stoppage of the transducer work (the LED is switched on). The current time is displayed on the display.
	Unit V	**Selection of the unit**	Possible settings: V, A, µV, mV, kV, MV, µA, mA, kA, MA, mW, W, kW, MW, var, kvar, Mvar, VA, kVA, MVA, °C, °F, K, Hz, kHz, MHz, mAh, Ah, kAh, Wh, kWh, MWh, m/s, (µm, mm, cm, m, km, m^2, m^3, m^2/s, m^2/min, m^2/h, m^3/s, m^3/min, m^3/h, l, l/s, l/min, l/h, l/m^2, l/m^3, kg/s, kg/min, kg/h, ms, s, h, mN, N, kN, Pa, hPa, kPa, MPa, mmHg, bar, rad, mΩ , Ω , kΩ , MΩ , GΩ , %, o, turns, rps, rpm, rph, m/h, km/h, GW, Gvar, GVA, GWh,Varh, kVarh, MVarh, GVarh, VAh, kVAh, MVAh, GVAh, pulse, pulse/s, pulse/m, pulse/h.

Table 1 (continuation)

	Symbol on the display	*Description of parameters*	*Range of changes*
Input parameters	Char. In On	The switching off or on the user's individual linear characteristic - **(„individual characteristic of the display")**	On - characteristic switched on, Off - characteristic switched off.
	X1 In 0.0000 Y1 LCD 0.0000 X2 In 0.0000 Y2 LCD 0.0000	**Parameters of the individual characteristic of the display.** Based on user defined coordinates of two points, the transducer determines (from the system of equations) coefficients **a** and **b** of the individual characteristic: Y1LCD = a · X1In + b Y2LCD = a · X2In + b where: X1 In and X2 In - measured value Y1 LCD and Y2 LCD - expected value on the display. Fig.9. presents the operation way of the individual characteristic.	Possible settings: -99999...99999 Accesible when the individual characteristic is switched on
Alarm 1 and alarm 2 parameters	Low AL1 0.0 Low AL2 200.0	**Alarming lower threshold**	**-99999...99999**
	High AL1 20.0 High AL2 300.0	**Alarming upper threshold**	**-99999...99999**

Table 1 (continuation)

	Symbol on the display	*Description of parameters*	*Range of changes*
Alarm 1 and alarm 2 parameters (continuation)	Type A11 Normal Type A12 On	**Type of alarm** Fig.8. presents types of alarms.	**Normal** - normal, **On** - switched on, **Off** - switched off. **Hand on** - switched on manually; up to the time of changing the alarm type remains switched on for good. **Hand off** - Switched off manually; up to the time of changing the alarm type remains switched off for good.
	DelayA11 0.0 DelayA11 5.0	**Delay of alarm operation** The parameter is defined in seconds, ie one must give after how many seconds from its occurrence, the alarm operation will follow. The alarm operation occurs after the measurement averaging. The alarm switching-off follows without delay.	**0.0...9999.9** The introduction of **0.0** causes the operation at the moment of the alarm occurrence.
	Hold A11 OFF Hold A12 Relay	**The maintenance of the alarm indication**. In the situation when the maintenance function is switched on after the withdrawal of the alarm, state on the display and/or the contact state does not change. It signals the alarm state till the moment of its termination by means of the key combination [↵] and [↵].	**Off** - Maintenance switched off, **LCD** - Maintenance of the alarm signalling on the display, **Relay** - maintenance of the alarm relay, **LCD+Rel** - maintenance of the alarm indication on the display and the alarm relay.
Output parameters	CharOut. OFF	The switching on or off of the user's individual linear characteristic - **(„ the individual characteristic of the analogue output")**.	**On** - characteristic switched on, **Off** - characteristic switched off When the characteristic is switched off, the transducer operates in maximal range depended on kind of the output and input.

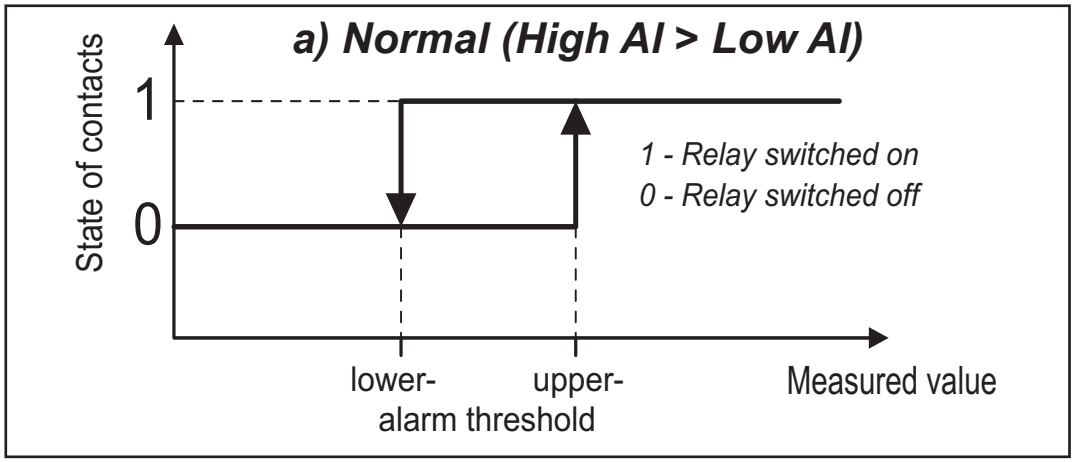
Output parameters (continuation)	X1 LCD 0.0 Y1 Out. 0.0 X2 LCD 0.0 Y2 Out. 0.0	**Parameters of the individual characteristic of the analogue output.** Based on user defined coordinates of two points, the transducer determines (from the system of equations) coefficients **a** and **b** of the individual characteristic. $\begin{cases} Y1\ Out = a \cdot X1\ LCD + b \\ Y2\ Out = a \cdot X2\ LCD + b \end{cases}$ where: X1 LCD and X2 LCD - displayed value, Y1 Out and Y2 Out - expected value on the analogue output. Fig. 9. presents the operation way of the individual charac-	Possibilities of settings: **-99999...99999** Accesible when the individual characteristic is switched on
	Baud. 9600 b/s	**Baude rate of the RS-485 interface**	**2400 b/s** **4800 b/s** **9600 b/s**
	Mode RTU 8N2	**Kind of transmission through the RS-485 interface**	**Off** - interface switched off **ASCII 8N1** **ASCII 7E1** **ASCII 7O1** **RTU 8N2** **RTU 8E1** **RTU 8O1** **RTU 8N1**
	Address 1	**Device address**	**0...247**

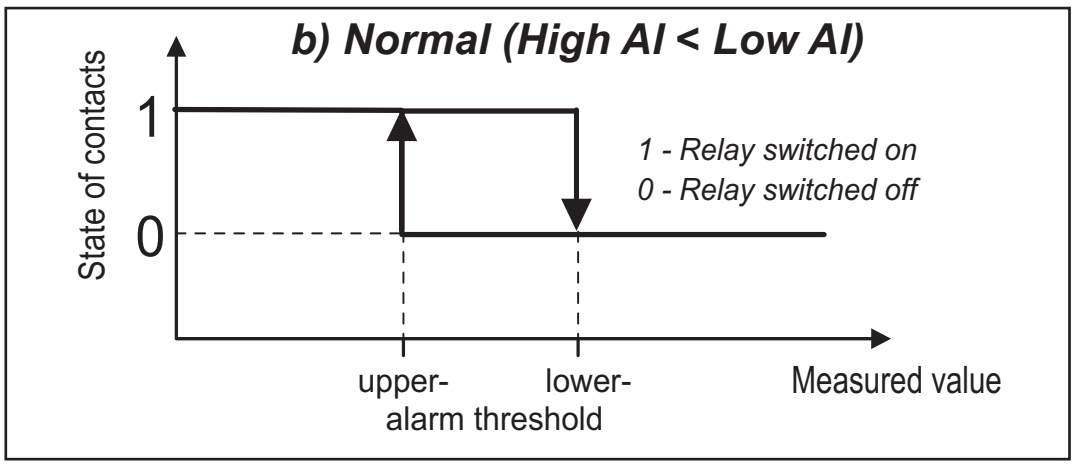
Table 1 (continuation)

	Symbol on the display	*Description of parameters*	*Range of changes*
Servicing parameters	ParFact Enter	**Factory parameters** Factory parameters are presented in the table 2.	Pressing [↵] key causes the registration of factory parameters.
	Security 0	**Introduction of a new password**	**-99999...99999**
	Test LCD	**Display test** The display test is expressed by lighting of the first line LCD segments, and next the whole line. The same test is carried out for the second line.	Pressing [↵] key causes the test switching on. Pressing [↩] key ends the test.
	Time 17:18:00	**Setting of the current time.** Time format: hh:mm:ss	**00:00:00 ... 23:59:59**
Recording parameters	Memory OFF	**Switching the recording on or off.** At the moment of the recording switching on, the transducer erases the previous memorised values after exiting from the programming matrix. Erasing Wait. . .	**On** - recording switched on **Off** - recording switched off
	StartMem 15:18:23	**Recording start time.** Time format: hh:mm:ss	**00:00:00 ... 23:59:59**

Table 1 (continuation)

Recording parameters (continuation)	DateMem 22.05.01	**Recording start date.** Date format: yy.mm.dd It is an informative parameter. Not used to set a date, from which the recording is to start, but only informs, when the recording started.	**00.00.00 ... 99.12.31**
	Interval 01:00:00	**Recording time interval.** Defines time period, how often the result should be saved. Writing format: hh:mm:ss	**00:00:00 ... 99:59:59**





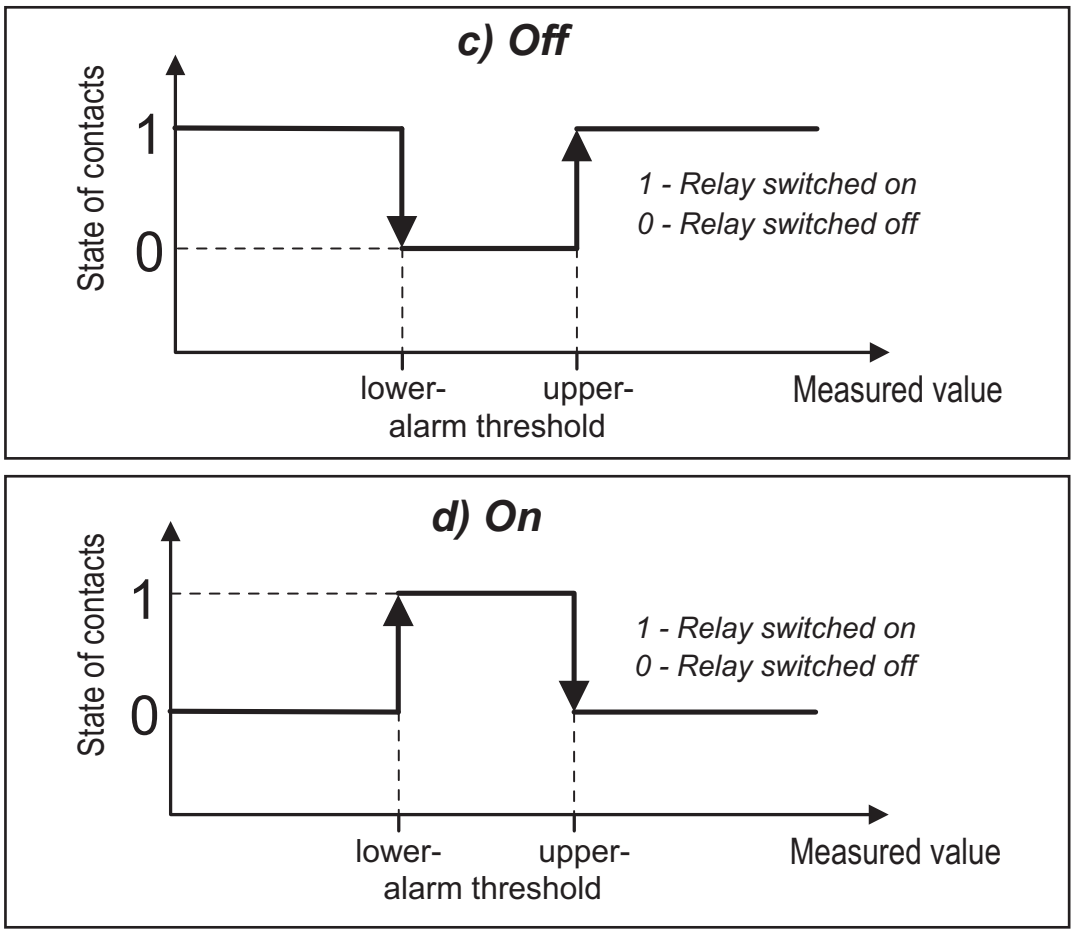
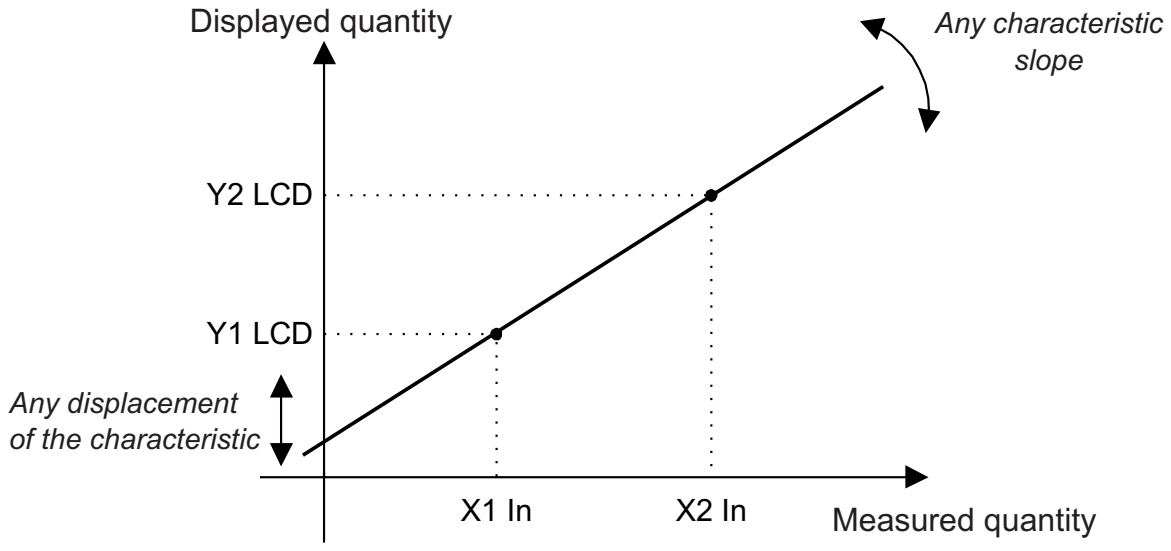


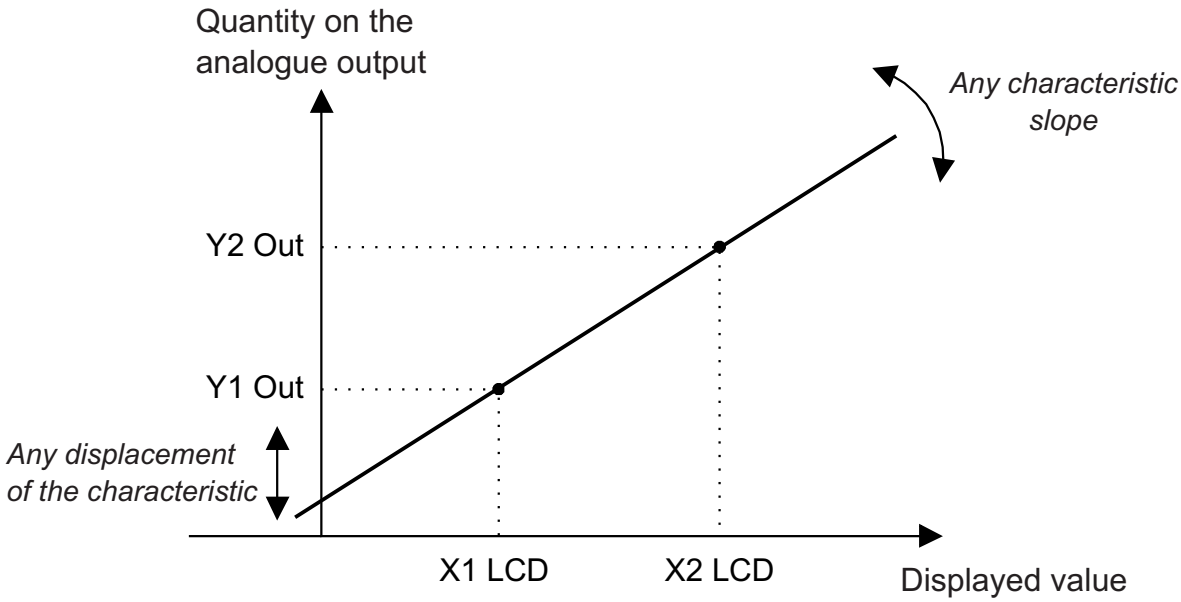
Fig. 8. Alarm types: a), b) normal c) switched off d) switched on.

a)



X1 In value on the transducer input => Y1 LCD value on the display
X2 In value on the transducer input => Y2 LCD value on the display
The other points of the characteristic are calculated.

b)



X1 LCD value on the display => Y1 out value on the analogue output
X2 LCD value on the display => Y2 out value on the analogue output
The other points of the characteristic are calculated.

Fig .9. Individual characteristic: a) of the display, b) of the analogue output.

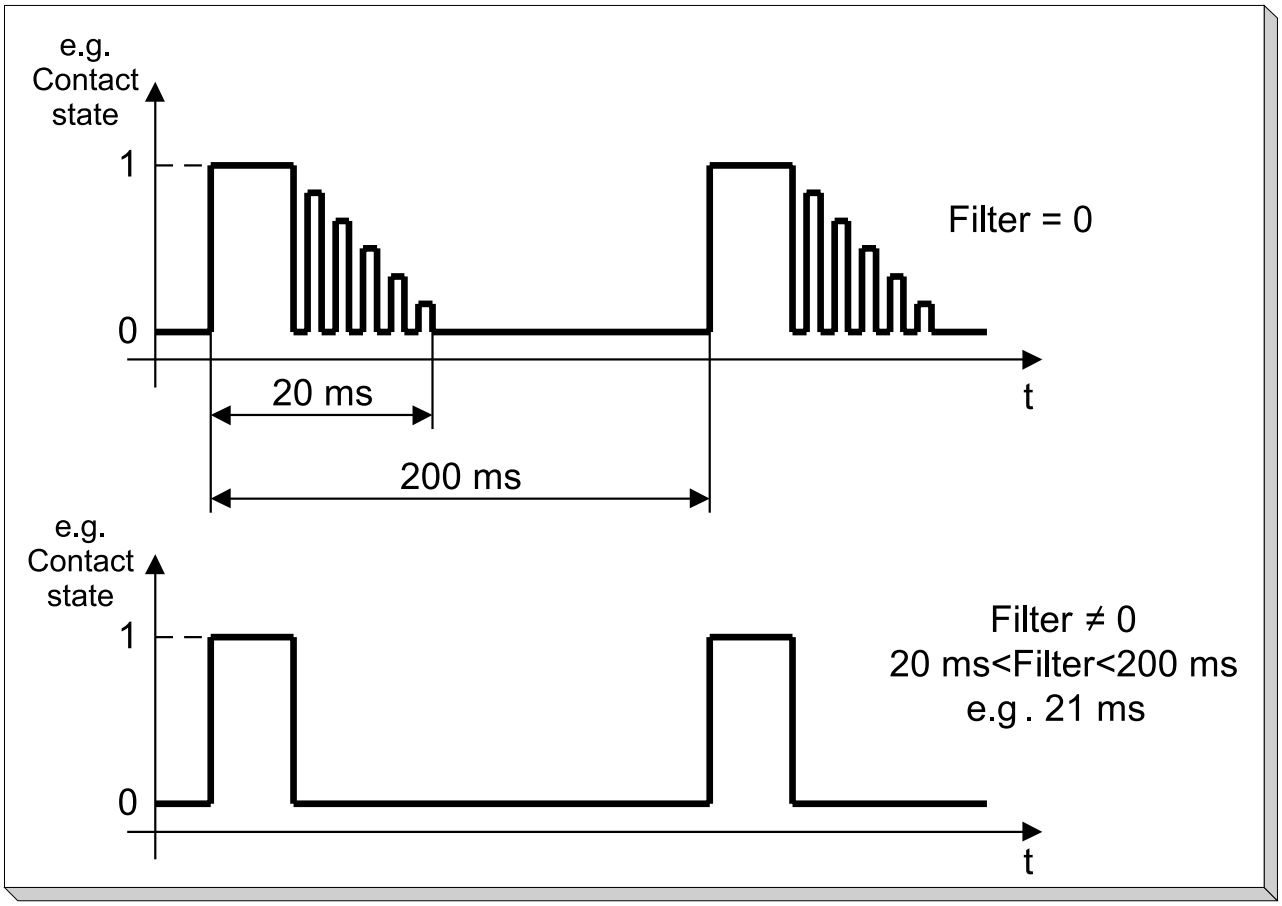


Fig .10. Input filter.

Caution!

- In case of the display individual characteristic connection, the result on the display is linearly converted according to the introduced **X1 In, X2 In, Y1 LCD** and **Y2 LCD** parameters.
- In case of the analogue output individual characteristic connection, the measurement result is linearly converted according to the introduced **X1 LCD, X2 LCD, Y1 Out** and **Y2 Out** parameters.
- The transducer constantly checks the value of the currently introduced parameter. In case when the introduced value overruns the upper or lower range of changes given on the table 1, the transducer will not carry out the parameter recording.
- In case of the **Input Type** change, a simultaneous change of the unit and decimal point follows, optimally to the given input.
- After the supply decay, the current time is reset.
- The recording switching off occurs in the following cases: switching off the recording from the programming matrix, change of the input type, change of StartMem, change of Interval, Cnt=0 setting and at the renewed connection of the transducer to the mains.
- Values max and min are erased in case of changing: input type, constant or kind of input rescaling, individual characteristic (on, off), writing of standard parameters.

Standard parameters of the P12O transducer Table 2

Parameter description	***Standard value***
Input	Tachomet
Filter	0
TypeScal	Div
Cons In	1
Exter In	Off
Auto	99999
D_P	Auto
Cnt	1.0
Char. In	Off
Unit	rpm
X1 In,Y1 LCD,X2 In,Y2 LCD	0

Table 2 (continuation)

Parameter description	*Standard value*
Low Al1, Low Al2	0
High Al1, High Al2	99999
Type Al1, Type Al2	Off
DelayAl1, DelayAl2	0
Hold Al1, Hold Al2	Off
Char. Out	Off
X1 LCD, Y1 Out, X2 LCD, Y2 Out	0
Baud	9600
Mode	RTU 8N2
Address	1
Security	0
Time	00:00:00
Memory	Off
StartMem	00:00:00
DateMem	70.01.01
Interval	00:15:00

6. RS-485 INTERFACE

P12 programmable digital transducers have a serial link in the RS-485 standard for the communication in computer systems and with other devices fulfilling the Master function. An asynchronous character MODBUS communication protocol has been implemented on the serial link. The transmission protocol describes the manners of information exchange between devices through the serial link.

6.1. Serial interface connection

The RS-485 standard allows the direct connection up to 32 devices on a 1200 m long single serial link. In order to connect a greater number of devices it is necessary to use additional intermediary-separating systems.
The leading out of the interface line is given in the transducer service manual. To obtain a correct transmission it is necessary to connect the lines **A** and **B**

in parallel to their equivalents in other devices. The connection must be carried out by means of shielded conductors. The shield must be connected to the protective terminal in a single point. The **GND** line serves to the extra protection of the interface line in case of long connections. One must connect it to the protective terminal (this is not necessary for a correct interface operation).
To obtain the connection with IBM PC class computer, a converter USB into RS-485 of PD10 type (produced by LUMEL S.A.) or an RS-485 interface card is essential.
The connection way of P12 transducer through a PD10 converter is presented on Fig.3.
The identification of transmission lines for the card in the PC computer depends on the card producer.

6.2. Description of the MODBUS implementation

The implemented protocol is in compliance with the specification PI-MODBUS-300 Rev G of the Modicon Company.

List of parameters of the transducer serial link in the MODBUS protocol:

- transducer address - 1...247
- baud rate - 2400, 4800, 9600 bit/s
- information unit - ASCII, RTU
- working mode - ASCII: 8N1, 7E1, 7O1
  - RTU: 8N2, 8E1, 8O1, 8N1
- maximal response time - 300 ms

The parameter configuration of the serial link is described in the futher part of the service manual. This configuration consists on the settlement of the baud rate (**Baud** parameter), device address (**Address** parameter) and the type of the information unit (**Mode** parameter).

Note: Each transducer connected to the communication network must have:

- a unique address , different from the other devices connected to the network.
- the same baud rate and type of the information unit.

6.3 Description of the MODBUS protocol functions

In the P12 transducer series the following MODBUS protocol functions are implemented:

Function description Table 3

Code	*Meaning*
03 (03 h)	Read-out of n-registers
06 (06 h)	Recording of a single register
16 (10 h)	Recording of n-registers
17 (11 h)	Identification of the slave device

Read-out of n-registers (code 03 h)

The function is inaccessible in the publication mode.

Example: read-out of 2 registers starting from the register which the address is 1DBDh (7613) in RTU mode.

Request:

Device address	Function	Register address Hi	Register address Lo	Number of registers Hi	Number of registers Lo	Control total CRC
01	03	1D	BD	00	02	52 43

Response:

Device address	Function	Number of bytes	Register value 1DBD (7613)				Register value 1DBE (7614)				Control total CRC
01	03	08	3F	80	00	00	40	00	00	00	42 8B

Recording of values into the register (code 06h)

The function is accessible in the publication mode.

Example: recording of the register which address is 1DBDh (7613) in RTU mode.

Request:

Device address	Function	Register address Hi	Register address Lo	Register value 1DBD (7613)				Control total CRC
01	06	1D	BD	3F	80	00	00	85 AD

Response:

Device address	Function	Register address Hi	Register address Lo	Register value 1DBD (7613)				Control total CRC
01	06	1D	BD	3F	80	00	00	85 AD

Recording into n-registers (code 10h)

The function is accessible in the publication mode

Example: recording of 2 registers starting from the register which address is 1DBDh (7613) in RTU mode.

Request:

Device address	Function	Register address		Number of registers		Number of bytes	Value for the register 1DBD (7613)				Value for the register 1DBE (7614)				Control total CRC
		Hi	Lo	Hi	Lo										
01	10	1D	BD	00	02	08	3F	80	00	00	40	00	00	00	03 09

Response:

Device address	Function	Register address Hi	Register address Lo	Number of registers Hi	Number of registers Lo	Control total (CRC)
01	10	1D	BD	00	02	D7 80

Report identifying devices (code 11h) in RTU mode.

Request:

Device address	Function	Control total (CRC)
01	11	C0 2C

Response:

Device address	Function	Number of bytes	Device identifier	Device state	Field depending on the type of device	Control total
01	11	08	73	FF	4FXXXXX	

Device address - depending on set value

Function - function number 0x11

Number of bytes - 0x08

Device identifier
- 0x71 - P12H
- 0x72 - P12S
- 0x74 - P12U
- 0x73 - P12O
- 0x79 - P12P

Device state	- 0xFF
Field depending on the device type	- XXXXXX
Device name	- transmitted as a ASCII character and defines the type of transducer H - 0x48, 48 X X X X X S - 0x53, 53 X X X X X U- 0x55, 55 X X X X X O - 0x4F, 4F X X X X X P - 0x50, 50 X X X X X
Analogue output	- field depending on the type of the analogue output - 0x00 - voltage analogue output, X 00 X X X X - 0x01 - current analogue output, X 01 X X X X
No. of the software version	- software version implemented into the transducer - X X_ _ _ _4-byte variable of the floating type
Control total	- 2 bytes in case of work in RTU mode - 1 byte in case of work in ASCII mode

Example:
Work in **RTU** mode, e.g.: **Mode = RTU 8N2** (value 0x02 in read/recording case through the interface).
P12O transducer
Execution with a voltage analogue output: **00**,
No. of the software version: **1.00**,
Device address set on: **Address = 0x01**,

For such a type of transducer the frame has the following form:

Device address	Function	Number of bytes	Device identifier	Device state	Field depending of the device type	Control total (CRC)
01	11	08	73	FF	4F 00 3F 80 00 00	7E 75

6.4. P12 transducers register map

P12 transducers register map Table 4

Address range	*Type of value*	*Description*
7000-7200	Float (32 bits)	The value is placed in two successive 16-bit registers. Registers enclose the same data as 32-bit registers from the 7500 area. Registers are only for read-out.
7200-7400	Float (32 bits)	The value is placed in two successive 16-bit registers. Registers enclose the same data as 32-bit registers from the 7600 area. Registers can be read out and recorded.
7500-7600	Float (32 bits)	The value is placed in a 32-bit register. Registers are only for read-out.
7600-7700	Float (32 bits)	The value is placed in a 32-bit register. Registers can be read out and recorded.

6.5. Registers for recording and read-out

P12O transducer

Table 5

The value is placed in two successive 16-bit registers. Registers enclose the same data as 32-bit registers from the 7600 area.	The value is placed in a 32-bit register.	Symbol	Writing (w)/ Read-out (r)	Range	Description
7200	7600	**Identifier**	r	-	Device identifier
					Value / 0x73h: Identifier
7202	7601	**Input**	w/r	0... 6	Input type
					Value: 0 Pulse number; 1 Frequency; 2 Turns number; 3 Rotational speed; 4 Period; 5 Long period > 10s; 6 Work time counter
7204	7602	Filter	w/r	0...99999	Input filter
7206	7603		No occurs[1)]		
7208	7604		No occurs[1)]		
7210	7605		No occurs[1)]		
7212	7606		No occurs[1)]		
7214	7607		No occurs[1)]		
7216	7608		No occurs[1)]		
7218	7609	Type Scal	w/r	0...1	Re-calibration type
					Value: 0 Division by constant; 1 Multiplication by constant

7220	7610	**Cons In**	w/r	-99999...99999	Re-calibration type	
7222	7611	**Exter In**	w/r	0...1	Premission for an external function: Start, Stop	
					Value	
					0	External functions switched off
					1	External functions switched on
7224	7612	**Auto**	w/r	0...99999	Automatic reset of the counters	
7226	7613	**D_P**	w/r	0... 5	Decimal point	
					Value	
					0	00000
					1	0000.0
					2	000.00
					3	00.000
					4	0.0000
					5	automatic selection of the decimal point
7228	7614	**Cnt**	w/r	0... 9999.9	Measurement time	
7230	7615	**Char.In**	w/r	0... 1	Individual characteristic	
					Value	
					0	Charac. switched off
					1	Charac. switched on
7232	7616	**X1 In**	w/r	- 99999... 99999		Parameters of ind. charac.
7234	7617	**Y1 LCD**	w/r	- 99999... 99999		Parameters of ind. charac.
7236	7618	**X2 In**	w/r	- 99999... 99999		Parameters of ind. charac.
7238	7619	**Y2 LCD**	w/r	- 99999... 99999		Parameters of ind. charac.
7240	7620	No occurs[1)]				
7242	7621	**Low AL1**	w/r	- 99999... 99999		Lower threshold of alarm 1
7244	7622	**High AL1**	w/r	- 99999... 99999		Upper threshold of alarm 1
7246	7623	**Type AL1**	w/r	0... 4		Alarm 1 type
					Value	
					0	Normal
					1	Switched on
					2	Switched off
					3	Manually switched on
					4	Manually switched off

7248	7624	**Delay AL1**	w/r	0... 9999.9	Delay of alarm 1
7250	7625	**Delay AL1**	w/r	0... 3	Holding of the alarm 1 signalling
					Value |
					0 | Holding switched off
					1 | Signalling on LCD
					2 | Relay holding
					3 | Signalling on LCD and relay holding
					To erase the alarm holding, one must switch the holding off (0 value) and then return to the previously set value.
7252	7626	No occurs[1)]			
7254	7627	**Low AL2**	w/r	- 99999... 99999	Lower threshold of alarm 2
7256	7628	**High AL2**	w/r	- 99999... 99999	Upper threshold of alarm 2
7258	7629	**Type AL2**	w/r	0... 4	Alarm 2 type
					Value |
					0 | Normal
					1 | Switched on
					2 | Switched off
					3 | Manually switched on
					4 | Manually switched off
7260	7630	**Delay AL2**	w/r	0... 9999.9	Delay of the alarm 2
7262	7631	**Hold AL2**	w/r	0... 3	Holding of the alarm 2 signalling
					Value |
					0 | Holding switched off
					1 | Signalling on LCD
					2 | Relay holding
					3 | Signalling on LCD and relay holding
					To erase the alarm holding, one must switch the holding off (0 value) and then return to the previously set value.
7264	7632	No occurs[1)]			
7266	7633	No occurs[1)]			
7268	7634	No occurs[1)]			

7270	7635	**Char.Out**	w/r	0... 1	Characterisic of the analogue output
					Value
					0 Characterisic switched off
					1 Characterisic switched off
7272	7636		w/r	-99999... 99999	Displayed lower value
7274	7637	**Y1 Out**	w/r	-99999... 99999	Lower value of analogue output
7276	7638	**X2 LCD**	w/r	-99999... 99999	Displayed upper value
7278	7639	**Y2 Out**	w/r	-99999... 99999	Upper value of analogue output
7280	7640	**Time**	w/r	0... 23.5959	Current time
					This parameter occurs with four places after the decimal point, in the format gg,mmss, where: gg - means hours, mm - means minutes, ss - means seconds. In case of a wrong time introduction, the transducer will not correct automatically the new value.
7282	7641	**Unit**	w/r	0... 97[2)]	Unit choice
7284	7642	**Mem. type**	w/r	0... 1	Measuring quantity recording
					Value
					0 Recording switched off
					1 Recording switched on
7286	7643	**Interval**	w/r	0... 99,5959	Time period of the recording
7288	7644	**Year**	w/r	1970... 2038	Year of the recording start
7290	7645	**Month**	w/r	1... 12	Month of the recording start
7292	7646	**Day**	w/r	1... 31	Day of the recording start
					The parameters: Year, Month, Day are only informative parameters. Not used to set a date, from which recording is to start, but only inform when the recording started.
7294	7647	**Mem.start**	w/r	0... 23.5959	Time of the recording start
					This parameter occurs with four places after the decimal point in the format gg, mmss, where: gg - means hours, mm - means minutes, ss - means seconds. In case of a wrong time introduction, the transducer will correct it automatically.

7296	7648	**Del.Min**	w/r	0... 1	Erasing of the minimal value
					Value
					0 — No operation
					1 — Erasing of the minimal value
7298	7649	**Del.Max**	w/r	0... 1	Erasing of the maximal value
					Value
					0 — No operation
					1 — Erasing of the maximal value
7300	7650	**Start/Stop/ Resetting**	w/r	0... 3	Start, stop, resetting of: pulse counter, turns counter, work time counter
					Value
					0 — Start
					1 — Stop
					2 — Resetting and stoppage
					3 — Resetting and start
7302... 7310	7651... 7655	No occurs[1)]			
7320	7660	Year of the stored value	w/r	1970... 2038	Year of the stored value in the memory
7322	7661	Month of the stored value	w/r	1... 12	Month of the stored value in the memory
7324	7662	Day of the stored value	w/r	1... 31	Day of the stored value in the memory
7326	7663	Time of the stored value	w/r	0... 23.5959	Time of the stored value in the memory
					This parameter occurs with four places after the decimal point in the format gg, mmss, where: gg - means hours, mm - means minutes, ss - means seconds. In case of a wrong time introduction, the transducer will correct it automatically.
7328	7664	Index of the stored value	w/r	1... 750	Number of the stored value in the memory

7330	7665	Status	w/r	0... 7	Status of the operation in the buffer	
					Value	
					0	No operation
					1	Search acc. the date and time (registers 7660...7663 and 7320...7326)
					2	Search acc. the time (registers 7663 and 7326)
					3	Search acc. the index (registers 7664 and 7328)
					4	Load next values into the buffer (registers 7672...7691 and 7344...7382)
					5	Load previous values into the buffer (registers 7672...7691 and 7344...7382)
					6	Go to the first stored value in the memory
					7	Go to the last stored value in the memory
7332	7666	Number of the stored value	r	0... 750	Number of the stored value into the memory, placed in the first buffer register	
					Value	
					0	The memory is empty
					1... 750	Number of the stored value
7334	7667	Number of recorded register	r	0... 750	Number of the recorded buffer register	
					Value	
					0	The buffer is empty
					1... 750	Number of recorded registers

7336	7668	Year	r	1970... 2038	Year of the value in the first register
7338	7669	Month	r	1... 12	Month of the value in the first register
7340	7670	Day	r	1... 31	Day of the value in the first register
7342	7671	Time	r	0... 23.5959	Time of the value in the first register
					This parameter occurs with four places after the decimal point in the format gg, mmss, where: gg - means hours, mm - means minutes, ss - means seconds.
7344...7382	7672... 7691	Buffer	r	–	Stored value, read-out from the memory
					20 registers, containing 20 stored values

[1] In case of registers no occurring in the given transducer series, their values is 1E+20

[2] Unit values

Table 6

Code	Unit	Code	Unit	Code	Unit	Code	Unit
0	V	25	MHz	50	l/m^2	75	turns
1	A	26	mAh	51	l/m^3	76	rps
2	µV	27	Ah	52	kg/s	77	rpm
3	mV	28	kAh	53	kg/min	78	rph
4	KV	29	Wh	54	kg/h	79	m/h
5	MV	30	kWh	55	ms	80	km/h
6	µA	31	MWh	56	s	81	GW
7	mA	32	m/s	57	h	82	GVar
8	kA	33	µm	58	mN	83	GVA
9	MA	34	mm	59	N	84	GWh
10	mW	35	cm	60	kN	85	
11	W	36	m	61	Pa	86	Varh
12	kW	37	km	62	hPa	87	karh
13	MW	38	m^2	63	kPa	88	MVarh
14	var	39	m^3	64	MPa	89	GVarh
15	kvar	40	m^2/s	65	mmHg	90	VAh
16	Mvar	41	m^2/min	66	bar	91	kVAh
17	VA	42	m^2/h	67	rad	92	MVAh
18	kVA	43	m^3/s	68	mOhm	93	GVAh
19	MVA	44	m^3/min	69	Ohm	94	pulse
20	°C	45	m^3/h	70	kOhm	95	pulse/s
21	°F	46	l	71	MOhm	96	pulse/m
22	K	47	l/s	72	GOhm	97	pulse/h
23	Hz	48	l/min	73	%		
24	kHz	49	l/h	74	°		

6.6. Registers only for read-out

P12O transducer

Table 7

The value is placed in two successive 16-bit registers. Registers enclose the same data as 32-bit registers from the 7500 area	The value is placed in 32-bit registers	Name	Writing (w) /read -out (r)	Unit	Name of the quantity
7000	7500	**Identifier**	r	-	Constant identifying the device
					0x73 - P12O
7002	7501	**Status**	r	-	Status is the register describing the transducer current state
7004	7502	**Steering**	r	%	It is the register describing the steering of the analogue output
7006	7503	**Min**	r	-	Minimal value of the currently measured value
7008	7504	**Max**	r	-	Maximal value of the currently measured value
7010	7505	**Measured value**	r	-	Currently measured value on the transducer
7012	7506	No occurs[1)]			
7014	7507	**Hour**	r	gg, mmss	Current time
7016	7508	No occurs[1)]			
7018... 7096	7509... 7548	No occurs[1)]			

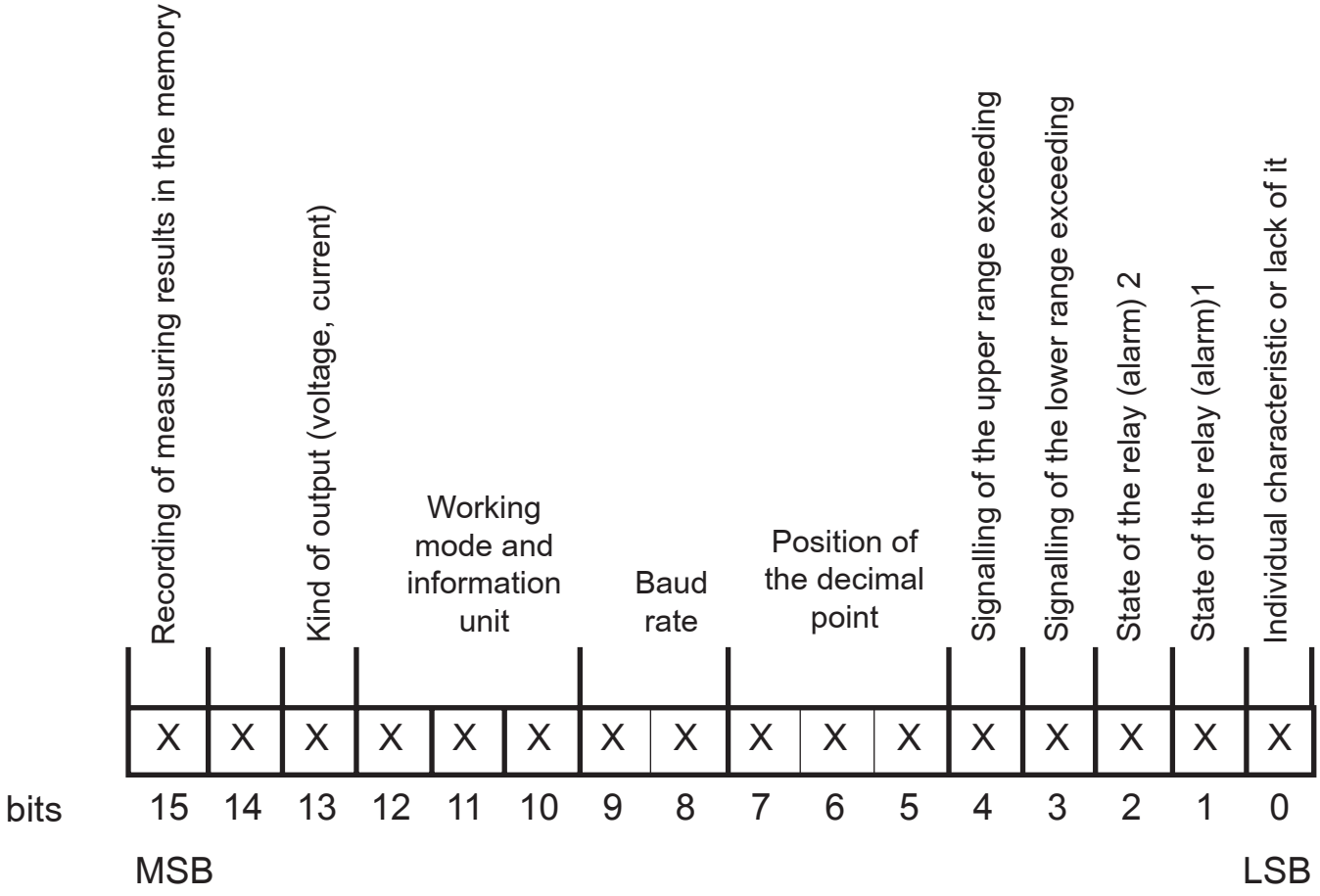
[1)] In case of registers no occurring in the given transducer series, their values is 1E+20

Caution!

While exceeding the upper or the lower range, „ displayed value", „minimum", „maximum" parameters are set on the 1E+20 value.

For the **Cnt=0** parameter (measurement switching off and display blanking), the „minimum", „ maximum" and „displayed value" are set on the 1E +20 value.

Status register describing



Bit-15 Recording of the measurement results in the memory

0 - recording switched off

1 - recording switched on

Bit-14 No used

Bit-13 Kind of output (voltage, current)

0 - voltage

1 - current

Bit-12...10 Working mode and information unit

000 - interface switched off
001 - 8N1 - ASCII
010 - 7E1 - ASCII
011 - 701 - ASCII
100 - 8N2 - RTU
101 - 8E1 - RTU
110 - 8O1 - RTU
111 - 8N1 - RTU

Bit-8...9 Baud rate

00 - 2400 bit/s
01 - 4800 bit/s
10 - 9600 bit/s

Bit-5...7 Position of the decimal point

000 - lack
001 - 0.0
010 - 0.00
011 - 0.000
100 - 0.0000
101 - Auto

Bit-4 Signalling of the upper overrunning of the range

0 - normal work
1 - range overrunning

Bit-3 Signalling of the lower overrunning of the range

0 - normal work
1 - range overrunning

Bit-2 Relay (alarm) 2 state

0 - switched off
1 - switched on

Bit-1 Relay (alarm)1 state

0 - switched off
1 - switched on

Bit-0 Individual characteristic

0 - individual characteristic switched off
1 - individual characteristic switched on

7. TECHNICAL DATA

PULSE INPUT:

Kind of input	Measuring range	Indication error[2]
Pulse counter	0...99999	0.01 % ul[1]
Turns counter	0...99999 turns	0.01 % ul
Worktime counter	0...99999 h	2 s / 24 hours
Frequency	0.1... 99.99 Hz	0.01 % ul
Frequency	100.0...3000,0 Hz	0.02 % mv
Rotational speed	0...10000 rpm	0.02 % ul
Rotational speed	10000...99999 rpm	0.1 % mv
Period	0.3...999.99 ms	0.01 % ul
Period	1.0000...9.9999 s	0.02 % ul
Long period > 10 sec	0.5...99999 s	0.0001 % ul

Amplitude	1 V...253 V
Inactive state	0 V...0.8 V
Transient state	0.8 V...1V
Maximal frequency of the signal	3 kHz
Minimal time of pulse duration	150 μs
Input resistance	> 200 kΩ

STEERING INPUTS (start, stop, reset):

- transoptor voltageless
- range of connected voltages 5...24 V d.c.
- galvanically insulated

OUTPUTS:

■ **Analogue outputs,** galvanically insulated with a resolution 0.025% of the range:

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

■ **Relay outputs:**

– 2 relays; voltageless 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,
– programmable alarm thresholds,
– three types of alarms,
– hysteresis defined by means of the lower and higher alarm threshold,
– signalling of the alarm operation on the LCD display.

1) mv - measured value
ul - upper limit of the measuring sub-range
2) concerns the result in numerical form

■ **Digital outputs:**

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

■ **Sensor supply** (maximal load 30 mA)

■ **Communication parameters of the programmer socket:**

– interface	UART
- data bits	8
- even parity	none
- stop bit	1
– rate	9600 bit/s
– flow control	none

■ **Storage parameters:**

– transducer memory (recording)	750 samples
– minimal recording interval	1 s

■ **Accuracy class** 0.2

Minimal subrange preserving the class.
Table 5.

Kind of input	Minimal subrange preserving the clas
Impulse counter	25
Turn counter	25 turns
Working hour counter	25 h
Frequency	2 Hz
Rotational speed	120 rpm
Period	20 ms

■ **Additional error from ambient temperature changes** ± (0.1% of the range /10K)

■ **Conversion time:** min 200 ms (measurement averaging time min 100 ms

+ output response time = 100 ms)

■ **Rated operating conditions:**

– supply voltage depending on the option code: 85...230...253 V a.c./d.c.; 20...24...50 V a.c./d.c.

– supply voltage frequency, a.c.: 40...50...440 Hz

– ambient temperature: - 20...23...55°C

– storage temperature: - 25...+85°C

– air relative humidity: < 95% (no condensation)

– preheating time of the transducer: 10 min

– working position: any

■ **Display field** (in P12O-2) LCD 2 x 8 display
indication range: - 99999... 99999

■ **Servicie** (in P12O-2) four keys:

■ **Ensured protection degree through the case** IP 40

■ **Ensured protection degree from terminal side** IP 20

■ **Dimensions** 45 x 100 x 120 mm

■ **Mass** < 0.3 kg

■ **Fixing** on a 35 mm DIN rail

■ **Power consumption** < 5 VA

■ **Supply decay immunity** acc. EN 50082-2

■ **Electromagnetic compatibility:**

– noise immunity acc. EN 61000-6-2

– noise emission acc. EN 61000-6-4

■ **Security requirements** **acc. EN 61010-1 standard:**

– installation category III

– pollution level 2

– phase-to-earth maximal working voltage 600 V a.c.

8. BEFORE A DAMAGE WILL BE SUBMITTED

In case of incorrect symptoms, please to acquaint with the below table.

SYMPTOMS	PROCEDURE
1. The transducer diode does not light. Lack of any indications.	Check the connection of the mains cable. Connect the transducer to the mains again.
2. The time (eg. **12:34:43**) and the „**TIME**" inscriptions are alternately displayed with the „**P12O**" inscription on the display.	The number of measurements **Cnt=0** has been introduced. The transducer is working in the **SLEEP**
3. Inscriptions **Over.Hi** or **Over. Lo** are displayed on the display.	Check the correctness of the input signal connection. See the service manual. Check also the setting of **D_P** and **Char.In** parameters.
4. A signal inconsistent with our expectations occurs on the transducer output.	One must check whether the load resistance of the analogue output is compatible with the technical data. Check whether the individual characteristic is not switched on. In case of necessity make the change of the individual characteristic parameters or introduce factory parameters: **Par.fact.**
5. Lack of possibility to enter into the programming mode. The inscription **Security Error** is displayed.	The programming mode is secured by the password. In case when the user will forget which password had been introduced, he should phone the nearest service workshop.
6. Lack of certainty if all character fields of the display are efficient.	Enter into the programming matrix and switch the display test on. The character fields are successively lighted in the first line till the lighting of the last field. Then, the whole line is lighted. This operation is repeated for the second line. If otherwise, submit the fault to the nearest service workshop.

7. During the moving along the programming mode, there are values occurring on the display, not conforming to the range of changes given in the table 1.	Check whether the individual characteristic is not switched on. In case of needs, enter into the programming matrix and accept the **Par. fact.** parameter.
8. A result inconsistent with our expectations appears on the display.	Check whether the individual characteristic is not switched on. Check also if the introduced input filter value is correct (**filter** parameter). Introduction of longer time, than time between pulses on input, will cause, that pulses will be considered as interferences and will not be counted. In case of needs, enter into the programming matrix and accept the **Par. fact.** parameter. The transducer will introduce parameters acc. The table 2.
9. Symbols of **X1 In** , **X2 In**, **Y1 LCD**, and **Y2 LCD** parameters are not displayed in the programming mode.	In case of switched individual characteristic off, the mentioned symbols are avoided.
10. Despite the alarm threshold overrunning, the alarm does not switch on and lack of signalling on the display.	Check the introduced into transducer delay of the alarm operation. If possible correct **Delay Al1**, **Delay Al2** parameters.
11. Despite the relay switching off, the alarm occurrence is still signalled on the display. Despite the alarm signalling on the display is over, the relay is still switched on.	Check whether the support of the alarm signalling or the relay is switched on. **Hold Al1**, **Hold Al2** parameters. In case of necessity switched it off.
12. Lack of possibility to erase the signalling from the display or switch the relay off by means of combination of keys when the parameter of the alarm signalling support is switched on.	The alarm is still operating. The erased alarm signalling from the display is immediately displayed again. The erased relay is switched on again, at once.

13. Despite the alarm lasts, the erased alarm signalling from the display is not displayed again or/and the relay remains switched off.	Check whether a delay of alarm operation was not introduced. **Delay Al1**, **Delay Al2** parameters.
14. Instead of displaying the measuring result, the transducer displays the parameter symbol and its value.	The transducer works in the preview mode or the programming matrix. Press the erase key.
15. A delay of the alarm operation was introduced, e.g. 30 s, but the alarm, after this time did not operate.	The persisting alarm state was shorter than the programmed one, i.e. a state of the alarm retract occurred during the alarm operation. In that case, the transducer begins to deduct the time from the beginning.
16. The transducer does not communicate with the computer through the RS-485 interface.	Check if the interface conductors were correctly connected (**A**, **B**, **GND**). Then, check the setting of the interface in the programming matrix (**Mode**, **Baud**, **Address**). These parameters must be the same as in the used software.
17. The transducer does not communicate with the computer through the PD14 programmer.	Check whether the PD14 programmer was correctly connected. Check if in the used software the proper communication port was chosen. The programmer works only with one transducer socket.

9. EXAMPLES OF P12O TRANSDUCER PROGRAMMINGS

Example 1 - Programming of the individual characteristic of the display

We want to program in order to the 0.00 value on the display will correspond to the 10 Hz value, whereas the 100.00 value will correspond to the 100 Hz value. One must:

- enter into the programming mode and choose the **D_P** parameter responsible for the decimal point. Set the decimal point on **000.00**
- choose the **Char. In.** parameter and switch the individual characteristic **On**
- choose the **X1 IN** parameter and introduce the value 10
- transit on the **Y1 LCD** parameter and introduce the value 0.00
- transit on the **X2 IN** parameter and introduce the value 100
- transit on the **Y2 LCD** parameter and introduce the value 100.00

Example 2 - Programming of the inverse individual characteristic

If we want to program in order to the 120.5 value on the display will correspond to the 0 s value, whereas the 10.80 value will correspond to the 100 s value. One must:

- enter into the programming mode and choose the **D_P** parameter responsible for the decimal point. Set the decimal point on **0000.0**
- choose the **Char. In.** parameter and switched the individual characteristic **On**
- choose the **X1 IN** parameter and introduce the value 0
- transit on the **Y1 LCD** parameter and introduce the value 120.5
- transit on the **X2 IN** parameter and introduce the value 100
- transit on the **Y2 LCD** parameter and introduce the value 10.8

Example 3 - Alarm programming with hysteresis

If we want to program the alarm 1 in order to at the 1500 rpm value the alarm was switched on, whereas it was switched off at the 30 rpm, and the alarm 2 operation in order to at the 0 rpm it was switched off and switched on at the 320 rpm value. One must:

- enter into the programming mode and choose the **Low Al1** parameter and introduce 1500
- transit on **High Al1** parameter and introduce the value 30
- transit on the **Type Al1** parameter and choose the function marked as Normal
- choose the **Low Al2** parameter and introduce 0
- transit on the **High Al2** parameter and introduce the value 320
- transit on the **Type Al2** parameter and choose the **Normal** function

Example 4 - Alarm programming in the set interval with delay

If we want that the alarm 1 was switched on, whereas it was switched on in the interval from 1000 to 3000 and operated only after 10 seconds, one must:

- enter into the programming mode and choose the **Low Al1** parameter and introduce 1000
- transit on **High Al1** parameter and introduce the 3000 value
- transit on the **Type Al1** parameter and choose the **On** function
- transit on the **Delay Al1** parameter and introduce the value 10.0

In case of continuation of the alarm state for more than 10.0 seconds,the transducer will switch the alarm relay on or/and indicate this on the display.

Example 5 - Programming of the analogue output

If we want to program in order to the 4.00 mA value on the analogue output will correspond to the 50 Hz value on the display, whereas the 20.00 mA value will correspond to the 100 Hz value. One must:

- enter into the programming mode and choose the **Char.Out** parameter and switched on the **On** individual characteristic
- transit on **Char. Out** parameter and switched on the **On** individual characteristic
- choose the **X1 LCD** parameter and introduce the 50 value
- transit on **Y1 Out** parameter and introduce the 4.00 value
- transit on the **X2 LCD** parameter and introduce 100 value
- transit on the **Y2 Out** parameter and introduce the value 20.00

Example 6 - Programming of the transducer for rotational speed conversion.

The transducer works with the sensor by 60 pulse/turn constant.

- choose the **Tachomet** as input type
- transit on the **Type Scal** parameter and set **Div**
- transit on the **Cons In** parameter and set 60 value
- exit from the programming mode

The transducer starts rotational speed processing.

Example 7 - Programming of the pulse counter to count down and after overrunning 0, again will start the counting from the value 12546.

- choose the **Counter** as input type
- transit on the **Cons In** parameter and set -1 value
- transit on the **Auto** parameter and set 12546 value
- exit from the programming mode

The transducer starts the pulse counting from 12456...0 and after overrunning 0, again will start the counting from 12546...0.

Example 8 - Programming of the input filter to consider all pulses, between which the distance is shorter than 100 ms, as interferences.

- transit on the **filter** parameter and set 100 value

The transducer starts the counting only pulses, between which the distance is longer than 100 ms.
The other pulses will consider as interferences.

Example 9 - Programming of the recording every 20 s, from 12:30.

- enter into the programing mode and chose the **StartMem** parameter and introduce the value 12:30
- transit on the **Interval** parameter and introduce the value 00:00:20
- Choose the **Memory** parameter and switch the rekording **On**

After exiting from the programming mode, the memory will erased and begin to record results from 12:30, every 20 s.
After filling the memory, the recording will be switched off.

10. OPTION CODES

Option codes of the P12O transducer — Table 8 .

P12O PROGRAMMABLE TRANSDUCER	X	XX	X	X	X	XX	X

Kind of transducer:
without a display **1**
with a display **2**

Input signal*:
pulse counter 0...99999 ..... **00**
frequency 0.1...3000 Hz **01**
turns counter 0...99999 turns **02**
rotational speed 0...99999 rpm **03**
period 0.3...9999.9 ms **04**
long period > 10 sec 0...99999 s **05**
worktime counter 0...99999 h **06**

Output signal:
voltage 0... 10 V **1**
current 0... 20 mA **2**
current 4... 20 mA **3**
current 0... 5 mA **4**

Supply:
85... 253 V a.c./d.c. **1**
20... 50 V a.c./d.c. **2**

Kind of terminals:
socket - screw plug **0**
on order*** ..... **X**

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

Acceptance tests:
without extra quality requirements **8**
with an extra quality inspection certificate **7**
acc user's arequirements** ..... **X**

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

** The option must be agreed with the producer.

*** The option with self-locking terminals is available.

The transducer maintains its class when decreasing the measuring range to the minimal range given in the table 5.
In the P12O-1 transducer, beside the basic range, one must give the required subrange.
In case when the given subrange is lower than in the table 5, one must precise the input signal in the order (XX).

Coding and ordering example:

The **P12O - 2 - 04 - 3 - 1 - 0 - 00 - 8** code means:

2 - the execution of a P12O transducer programmed by the producer, with a display
04 - with an input signal for period measurement,
3 - with an output signal : 4...20 mA ,
1 - supply voltage: 85...253 V a.c./d.c.,
0 - with a socket-screw plug,
00 - standard execution,
8 - without extra quality requirements.

The **P12O - 1 - 01 - 1 - 1 - 0 - 00 - 8**, for a 0.1...100 Hz sub-range code means:

1 - the execution of a P12O transducer programmed by the producer, without a display
01 - with an input signal for frequency measurement, in the range 0.1...3000 Hz
1 - with an output signal : 0...10 V,
1 - supply voltage: 85...253 V a.c./d.c.,
0 - with a socket-screw plug,
00 - standard execution,
8 - without extra quality requirements.

11. MAINTENANCE AND GUARANTEE

The P12O transducer does not require any periodical maintenance.
In case of some incorrect unit operations:

1.From the shipping date, during the period given in the annexed guarantee card:

One should take the transducer down from the installation and return it to the Manufacturer's Quality Control Dept.
If the unit has been used in compliance with the instructions, the manufacturer guarantees to repair it free of charge.

2. After the guarantee period:

One should turn over the transducer to repair in a certified service workshop.
The disassembling of the housing causes the cancellation of the granted guarantee.

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

The Manufacturer's 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 specification without notice.

P12O-09B

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