

PROGRAMMABLE TRANSDUCER OF FREQUENCY, PULSES, PERIOD, TIME and ROTATIONAL SPEED WITH RS-485 INTERFACE

P120



- counting of pulses, up and down,
- automatic zeroing of counters at the required value,
- possibility of external zeroing, stoppage and start of counters,
- automatic set-up of the decimal point (in P120-2),
- programming digital filter of the input signal (for eliminating the contact vibrations),
- storage of the counter state after the decay of the supply voltage,
- storage of maximal and minimal values,
- programming of the measurement averaging time,
- display of the unit,
- lead-out to supply sensors (24 V d.c.),
- servicing of the RS-485 interface in the MODBUS protocol, both in ASCII either in RTU mode,
- interlocking of the parameter introduction by means of a password.

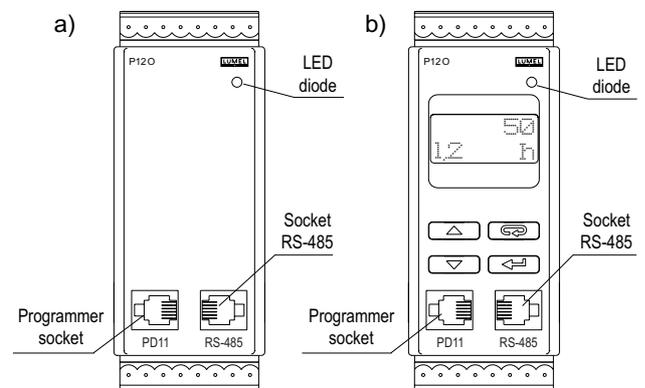


Fig.1 View of the P120 transducer: a) P120-1, b) P120-2

1. APPLICATION

The P120 programmable transducer is intended to the conversion of number of pulses, number of working hours, frequency, period and rotational speed into a d.c. current or d.c. voltage standard signal.

The output signal is galvanically isolated from the input signal and the supply. The read-out field can be an LCD 2 x 8 display (only in P120-2 execution). P120 has an RS-485 interface with MODBUS protocol.

The P120 transducer is programmed by the producer according the ordered execution code but it is possible to change the parameters by means of the keyboard in the P120-2 execution, through the PD11 programmer, or the RS-485 interface.

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

2. FEATURES

P120 transducers also realize following functions:

- conversion of the measured quantity into any optional output signal on the base of the individual linear characteristic,
- recalculation of the input signal into any optional indication on the base of the individual linear characteristic,
- signalling of the set-up alarm value exceedings,
- recording of the input signal in programmed time lengths,
- programming of the indication resolution (only in P120-2),
- preview of set-up parameter values,
- rescaling of the input signal: multiplication and division by the constant,

3. INSTALLATION

P120 transducers are designed to be installed on a 35 mm DIN rail acc. DIN EN 50 022-35.

On the external side of the transducer, there are screw or self-locking terminal strips enabling the connection of 2.5 mm² cross-section conductors. Overall dimensions and the fixing way are shown on the fig.2.

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

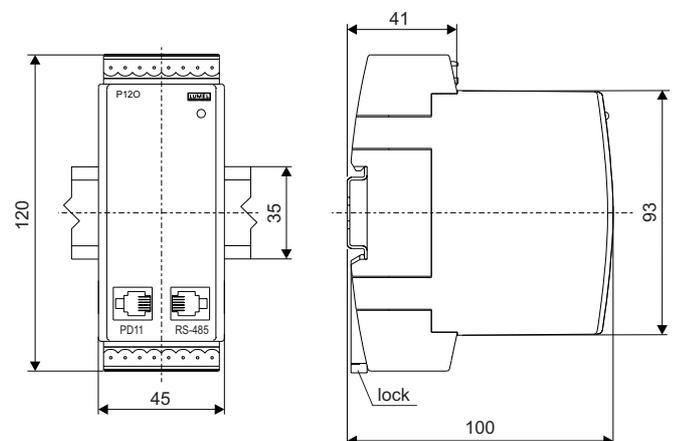


Fig.2. Overall dimensions and fixing way of P120 transducers

4. CONNECTION DIAGRAMS

The P120 transducer has two sockets of terminal strips which two connectors with screw or self-locking terminals are connected to depending on the order execution code. The fig.3 shows the connection way of external signals. This scheme is also placed on the transducer case.

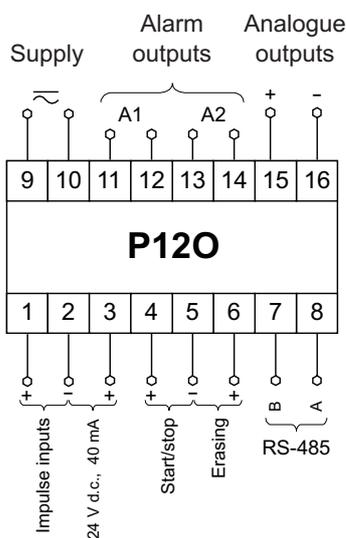


Fig.3. Connection of P120 transducer external signals

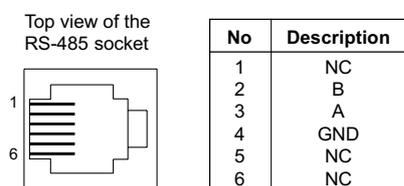


Fig.4. Description of terminal strips of the P120 transducer

5. TECHNICAL DATA

INPUTS:

■ Pulse inputs

Table 1

Kind of input	Indication range	Indication error ³
Number of impulses	0...99999	0.01 % of m.v. ¹
Number of turns	0...99999 turns	0.01 % of m.v.
Worktime counter	0...99999 h	2 sec/24 hours
Frequency	0.05...99.99Hz	0.01 % of m.v.
Frequency	100.0...5000.0 Hz	0.02 % u.l.
Rotational speed	0...10000 t/min	0.02 % of m.v.
Rotational speed	10000...99999 t/min	0.1 % u.l.
Period	0.2...999.99 ms	0.01 % of m.v.
Period	1.0000...9.9999 s	0.02 % of m.v.
Long period > 10 sec	10...99999 s	1 sec

¹) m.v. = measured value

²) u.l. = upper limit of the measuring sub-range

³) concerns P120-2 only

Input galvanically insulated : 50 mV...253 V a.c.

Maximal frequency of counter work: 20 kHz

■ Steerable inputs (start, stop, erasing)

- voltageless, transoptor,
- range of coupled voltages: 5... 24 V d.c.,
- galvanically insulated.

OUTPUTS:

■ Analogue outputs:

- galvanically isolated with a range resolution of 0.025%:
- current programmed 0/4...20 mA load resistance \leq 500 Ω
- voltage programmed 0...10 V load resistance \geq 500 Ω

■ Relay outputs:

- 2 relays, voltageless make contacts,
- maximal load capacity:
 - 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 upper alarm threshold,
- signalling of alarm operation on the LCD display,

■ Digital outputs:

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

■ Communication parameters of the programmer socket:

- interface: RS-232, 8N1 mode
- data bit 8
- parity none
- stop bit 1
- speed 9600 bit/s
- communication control none

■ Memory characteristics:

- transducer memory (recording) 750 samples
- minimal interval of recording 1 sec

■ Accuracy class

0.2

■ Additional error from ambient temperature changes

\pm (0.1% of the range/10 K)

■ Conversion time:

- P120-1 < 200 ms
- P120-2 min. 200 ms (min.100 ms averaging time of measurement + 100 ms output response time)

■ Rated operating conditions:

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

■ Display fields (in P120-2)

LCD 2 \times 8 display
indication range:
- 99999...99999

- **Servicing** (in P12O-2) ← → ▼ ▲
- **Ensured protection degree:**
- through the case IP 40
- **Dimensions** 45 x 120 x 100 mm
- **Mass** < 300 g
- **Fixing** on a 35 mm DIN rail
- **Power consumption** < 5 VA
- **Current decay immunity** acc. EN 50082-2
- **Electromagnetic compatibility:**
- immunity acc. EN 50082-2
- emission acc. EN 50081-2
- **Security requirements acc. EN 61010-1:**
- installation category III
- pollution degree 2
- max. working voltage in relation to ground 600 V a.c.

The transducer maintains its class when decreasing the measuring range to the minimal one given in the table 2. In the P12O-1 transducer, besides the basic range, one must give the required sub-range in the order.
In case when the given sub-range is smaller than the sub-range in the table 2, one must specify the input signal by XX in the order.

Minimal sub-ranges maintaining the class Table 2

Kind of input	Minimal sub-range
Pulse counter	25
Turn counter	25 turns
Worktime counter	25 h
Frequency counter	2 Hz
Rotational speed	120 r.p.m.
Period	20 ms
Long period > 10 s	25 s

6. EXECUTION CODES

Execution codes of the P12O transducer

P12O PROGRAMMABLE TRANSDUCER	X	XX	X	X	X	XX	X
Kind of transducer:							
without a display		1					
with a display		2					
Input signal*:							
number of impulses 0... 99999			00				
frequency 0.05... 5000 Hz				01			
number of turns 0... 99999 t					02		
rotational speed 0... 99999 t/min						03	
period 0.2... 9999.9 ms							04
long period > 10 seconds 0... 99999 s							05
worktime counter 0... 99999 h							06
on order*							XX
Output signal:							
voltage 0... 10 V						1	
current 0... 20 mA							2
current 4... 20 mA							3
current 0... 5 mA							4
on order**							X
Supply:							
85...253 V a.c./d.c.						1	
20...40 V a.c./d.c.							2
Kind of terminals:							
socket - screw plug							0
on order***							1
Execution:							
standard							00
custom-made**							XX
Acceptance tests:							
without an extra quality inspection certificate							0
with an extra quality inspection certificate							1
acc user's agreement**							X

- * The transducer has an universal input. When ordering, one must give the output signal code which is to be programmed.
- ** After agreeing with the producer.
- *** Possible execution with self-locking terminal sockets.

CODING EXAMPLES:

Transducer with a basic range:

P12O 2 04 3 1 0 00 0 code, means:

The execution of a P12O transducer programmed by the producer, with a display, with an input signal for period measurement, with an output signal: 4...20 mA, 85...253 V a.c./d.c. supply voltage, with socket-screw plug terminals, standard execution, without an extra quality inspection certificate.

Transducer with a measuring sub-range:

P12O 1 01 1 1 0 00 0 code, for a 0.05... 100 Hz sub-range, means:

The execution of a P12O transducer programmed by the producer, without a display, for frequency measurement in the range of: 0.05... 100 Hz, with an output signal: 0... 10 V, supply voltage: 85... 253 V a.c./d.c., with socket-screw plug terminals, standard execution, without an extra quality inspection certificate.