

## FP-401

### FLOW TOTALIZER WITH DATA RECORDING



- 2 analog inputs
- 2 PULSE inputs
- 2 math channels
- 4 solid state relays – alarm and control functions
- 4-20mA analog output (option)
- Internal memory 2 GB
- Large LED display and graphic OLED display
- USB port on front panel
- Ethernet port and RS-485 port

#### INTENDED USE

- Measurement of flow and other quantities, e.g. temperature, humidity, pressure
- Operation in dispersed measurement systems with local readings of measurement results
- Grocery, steel, metallurgical, glass-making industry, warehouse and production line control

#### 2 ANALOG INPUTS:

Independent setup for input sensors::

- transducers with 4-20mA (with optional power supply from device) or 0-20mA current loop output (the possibility of user defined characteristics),
- RTD sensors (Pt100, Pt200, Pt500, Pt1000),
- transducers with **0...2500  $\Omega$**  resistance output (the possibility of user defined characteristics),
- transducers with **-1 V...+1 V** or **-10 V...+10 V** voltage output (the possibility of user defined characteristics).

#### 2 PULSE INPUTS:

- Frequency measurement in range **0,001 Hz ... 10 kHz** (the possibility of user defined characteristics).
- Counting pulses.
- Tracking and recording of **binary signal** (shorting or disconnecting).

#### 2 MATH CHANNELS:

- Available functions: addition, subtraction, multiplication, division, user characteristics.

#### ANALOG OUTPUT (OPTION):

- Retransmission of one of the channels as a 4-20mA current loop output signal.

## TOTALIZERS:

- The following totalizers are available for inputs configured for flow measurement: L1 (non- resettable) and L2 (resettable)
- L2 flow totalizer can be reset with a button on face plate or automatically: hourly, daily and monthly.
- Totalizers T1 (counting total operating time) and T2 (counting the operations time of L2 resettable totalizers).
- Totalizers recording rate: 15 min or 1h.

## ALARM AND CONTROL SYSTEM:

- **4 solid state relays** 0,1 A / 60 V.
- **2 alarm and control thresholds** for each channel.

## RECORDING MEASUREMENT RESULT:

- Recording data to internal 2GB memory, local access to recorded data through **USB port** on the front panel.
- Data recording rate between 0.2 s and 1 h; two recording frequencies toggled upon exceeding the set alarm thresholds.

## COMMUNICATION WITH MASTER SYSTEM:

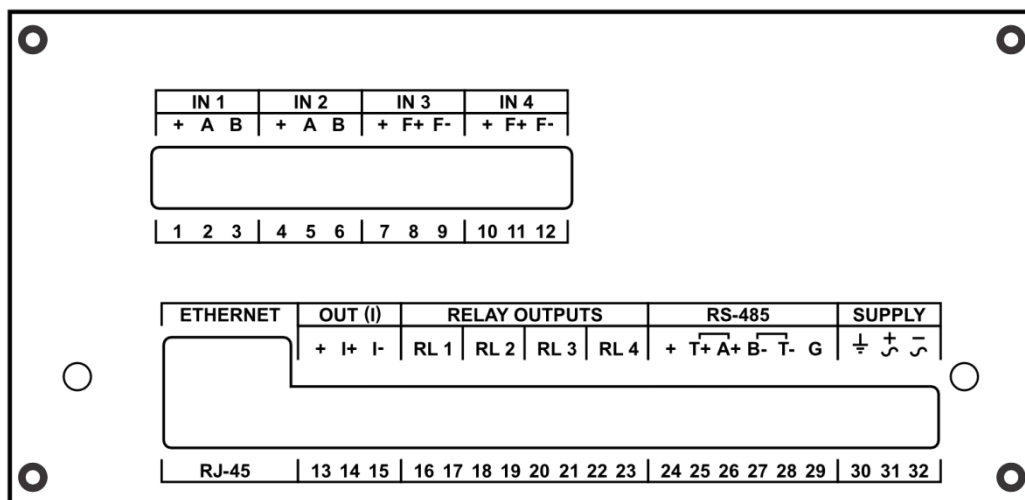
- RS-485 port, Modbus RTU protocol.
- Ethernet port, Modbus TCP protocol, web server.

## DISPLAYING THE RESULTS:

- Three-colour LED display.
- Graphic OLED display.
- 3 indicator diodes.
- The exceedance of alarm thresholds can change the colour of displaying the results..

## VERSIONS:

FP-401	- x	
	- 0	version without 4-20mA analog output
	- 1	version with 4-20mA analog output



Device version FP-401 v1.00 / Data sheet version: 2013-04-23

## TECHNICAL DATA

FRONT PANEL	
Type of display:	LED: 7-segment, 3-colour (green, orange, red), height of digits 14,2 mm OLED: graphic 100 x 16 px, yellow
Indication:	3 two-colour LEDs (red and green) „ALARM”, „REC”, „USB”
Keyboard:	4 buttons
USB port:	USB type A compliant
REAR PLATE	
Wire connection:	Screw-type terminal blocks, max wire section 1.5mm <sup>2</sup> six 3-position terminal blocks one 6-position terminal blocks one 8-position terminal blocks
ETHERNET port:	RJ-45
INPUTS	
Number of inputs:	2 analog 0/4-20mA / RTD / U (set input type using jumpers inside device) 2 PULSE type
Frequency measurement / comb filter:	0,2 sec / 19.6 Hz ; 1 sec / 4.17 Hz
Digital low-pass filter:	Programmed time constant in the range of 0 to 60 s
Galvanic separation between inputs:	None
Galvanic separation from other circuits:	Functional, 250 VAC
Maximum input voltage:	±30VDC between A(I+) and B(I-) terminals
0/4-20mA input	
Measurement range:	0 ÷ 22 mA
Input resistance:	92 Ω±10%
Measurement accuracy (T <sub>a</sub> = 25 °C)	±0,1% of range (typically ±0,05% of range)
Conversion characteristic:	Linear or user defined up to 50 points with linear interpolation between the points
Transducers powered from recorder:	24 VDC (+10/-20%), 24 mA (current-limited polymer fuse)
RTD/R input	
Sensor type:	Pt100, Pt200, Pt500, Pt1000, resistance
Connection:	2-wire
Current:	210µA
Wire resistance compensation in the 2-wire connection:	Constant within the range of -9,99 ohm to 9,99 ohm
Resistance of wires (to the sensor):	max 50 ohm
Transducer resistance range:	0 ... 2500 ohm
Measurement accuracy (T <sub>a</sub> = 25 °C)	± 0,1% of range
Conversion characteristic for R:	Linear or user defined up to 50 points with linear interpolation between the points
Range for Pt sensors / measurement accuracy	-200° C ... +850° C -50° C ... +250° C (for Pt+) (charakterystyka wg normy PN-EN 60751:2009)
Measurement accuracy (T <sub>a</sub> = 25 °C)	± 0,5 °C (typically ± 0,3° C) ± 0,3 °C (for Pt+)
U (±1 V / ±10 V) input	
Input type:	Voltage
Transducer voltage range::	- 1 V ... +1 V or -10 V ... +10V



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Input resistance:	>10 k $\Omega$
Conversion characteristic:	Linear or user defined up to 50 points with linear interpolation between the points
Measurement accuracy ( $T_a = 25\text{ }^{\circ}\text{C}$ )	$\pm 0,5\%$ of range
<b>PULSE type inputs</b>	
Measurement range:	0,001Hz ÷ 10kHz (0,001Hz ÷ 1kHz, if filtrating condenser is connected)
Minimum pulse width:	50 $\mu\text{s}$ (0,5ms, if filtrating condenser is connected)
Maximum input voltage:	$\pm 30\text{ VDC}$
<b>Frequency measurement</b>	
Conversion characteristic:	Linear or user defined up to 50 points with linear interpolation between the points
Measurement accuracy ( $T_a = 20\text{ }^{\circ}\text{C}$ )	0,02%
<b>Pulse counting</b>	
Conversion characteristic::	Linear, direct counting of pulses in totalizers multiplied by the weight of the pulse
<b>Configuration: OC / contact</b>	
(default, filtrating condenser disconnected)	
Open contact voltage:	ca. 4,3V
Short circuit current:	ca. 4,3 mA
Switch on / off threshold:	ca. 2,4 V / 2,7 V
Maximum short circuit resistance:	100 $\Omega$
<b>Configuration: NAMUR</b>	
Input resistance:	1,5 k $\Omega$
Switch on / off threshold:	ca. 1,6mA / 1,8mA
<b>Configuration: current input EH</b>	
Input resistance:	200 $\Omega$
Switch on / off threshold:	ca. 12 mA / 13,5 mA
<b>Configuration: voltage input</b>	
Input resistance:	>10k $\Omega$
Switch on / off threshold:	ca. 2,4 V / 2,7 V
Maximum input voltage:	$\pm 30\text{ VDC}$
<b>RELAY OUTPUTS</b>	
Number of outputs:	4
Outputs type:	Solid state relays
Maximum voltage:	60 V AC/DC
Maximum load current:	0,1 A
<b>ANALOG OUTPUT 4-20mA (option)</b>	
Output signal:	4-20 mA
Maximum voltage between I+ and I-:	28 VDC
Loop resistance (for $U_{cc} = 24\text{ V}$ ):	0 .. 500 $\Omega$
Current loop supply:	External or from internal unit supply 24 V DC / 22 mA
Galvanic isolation to supply voltage:	Functional, 250 VAC
<b>RS-485 PORT</b>	
Signals output on terminal block:	A(+), B(-), T(+), T(-), +5 VDC, GND
Galvanic isolation:	None
Maximum load:	32 receivers / transmitters
Transmission protocol:	Modbus RTU





Maximum length of line:	1200 m
Transmission rate:	1.2, 2.4, 9.6, 19.2, 115.2, 230.4 kbps
Parity control:	Even, Odd, None
Frame:	1 start bit, 8 data bits, 1 stop bit (1 or 2 stop bits for None)
Minimum timeout:	0 ÷ 7,000ms – programmable
Maximum differential voltage A(+) – B(-):	±14 V
Minimum output signal of transmitter:	1,5V (at R <sub>0</sub> =27Ω)
Minimum sensitivity of receiver:	200mV / R <sub>WE</sub> =12kΩ
Minimum impedance of data transmission line:	27Ω
Short-circuit / thermal protection:	Yes
Internal terminating resistor:	Yes
<b>ETHERNET PORT</b>	
Transmission protocol:	Modbus TCP, ICMP (ping), DHCP Server, http server
Interface:	100BaseT Ethernet
Number of connections opened simultaneously:	4
<b>USB PORT</b>	
Version:	USB 2.0
Function:	Record archive data, saving the settings, loading settings, upgrade firmware
Data format:	FAT16
<b>INTERNAL DATA MEMORY (RECORDING)</b>	
Capacity:	2 GB, Flash
<b>POWER SUPPLY</b>	
Supply voltage:	24 V AC (+10% / -20%) 20 ... 30V DC
Power consumption:	Max 6 W (typically 4 W)
<b>WORKING CONDITIONS</b>	
Working temperature:	0° C do +55° C
Relative humidity during operation:	5 do 95% (without condensation)
Storage temperature:	-30° C ÷ +70° C
Protection class from the front panel:	IP54
Protection class from the rare panel:	IP30
<b>MECHANICAL DIMENSIONS – HOUSING</b>	
Housing type:	For panel surface, nonflammable plastic material „Noryl”
Dimensions (height x width x depth)	72mm X 144mm X 127mm
Dimensions of panel cut-out:	138 <sup>+1</sup> mm X 68 <sup>+0,7</sup> mm
Panel maximum thickness	5 mm
Weight:	ok. 0,5 kg

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