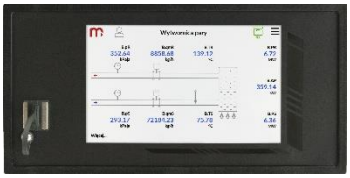
FP70P, FP70W

Flow computer for calculating compensated flow and thermal energy of steam, water and other liquid media



- Up to 2 independent installations (A, B)
- Flows and energy balance calculations (systems X)
- 10 measurement inputs
- Math channels & functions (+, -, /, *, √)
- Alarm & control functions, 4 solid state relays (SSR)
- 4-20mA analogue output – one or two (option)
- Advanced data logging, recording data to the text files, 2 GB internal data memory
- User configurable data presentation, the colour TFT display
- RS-485 port (Modbus RTU)
- Ethernet port (Modbus TCP, www server)
- USB port on the front panel
- Dedicated PC software for commissioning and archive data visualization
- Available languages: EN, DE, ES, FR, IT, PL, PT

FP70P and FP70W are versatile and precise flow totalizers used for measurement of steam and water in various industrial installations, measurements of industrial gases and typical or special liquids (like glycol, supercooled water, oils) in heat exchange systems. There is possibility of local alarming or simple control implementation. Data are recorded and can be read locally or periodically using a USB mass storage device.

Device can communicate with master system via Ethernet port (Modbus TCP protocol, www server) or via RS-485 port (Modbus RTU protocol) and can work in distributed control systems.

Device may be configured by the user from the front panel or using commissioning software on PC.

APPLICATIONS FOR STEAM, LIQUIDS AND TECHNICAL GASES

- For A, B main application setup one of possible applications using a configuration wizard:
  - the flow and heat of a liquid medium
  - the flow and delta heat of a liquid medium in a closed supply-return installation
  - the flow and delta heat of a liquid medium in an installation with different supply and return flow rates
  - the flow and heat of a steam
  - the flow and heat of steam for steam-condensate conditions
  - the flow and delta heat in a closed steam-condensate installation
  - the flow and delta heat in a steam-condensate installation with different steam and condensate flow rates
  - the flow and delta heat in a steam-generating installation with the supplied water flow rate measured
  - the flow and heat of a technical gases

FLOW RATE MEASUREMENT

- The flow computer can work with:
  - mass flowmeters
  - volume flowmeters
  - differential pressure devices with approximation by square root curve or differential pressure devices (orifices and nozzles) according to iteration algorithm according to PN-EN ISO 5167 standard (only for water and steam)

Manufacturer:
Metronic AKP s. c.
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INPUTS AND CHANNELS TYPES

FP70P/FP70W has: 10 analogue inputs, Ethernet port and RS-485 port. In addition, 24 auxiliary channels are available, which can be used as measuring channels or as a math channels. The device enables supplying the current loop for 4-20mA transducers. Up to 10 User's characteristics can be defined.

Input or Channel type:	No.	Description
RTD	**2**	for RTD temperature sensors Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni1000, Cu50, Cu53, Cu100, KTY81, KTY83, KTY 84
I	**6**	for transducers with standard current loop output 0/4-20mA
PULS	**2**	for transducers with pulse output in range 0.02 Hz.. 12,5 kHz
Auxiliary channel	**24**	measurement of additional quantities or calculation of the formula entered by the user (available mathematical operations: addition, subtraction, multiplication, division, extract the root)

THE SCOPE OF MEASUREMENT OF STEAM, WATER PARAMETERS AND OTHER MEDIA

- The flow and heat measurement of superheated or saturated steam or water are according to IAPWS-IF97 recommendations in the operating range of temperature 0 .. 800 °C and absolute pressure 0.05 .. 16.52 MPa
- Flow and energy measurements of liquids other than water are performed in the range of tabular values entered by the user – density and enthalpy as function of temperature
- Measurement of technical gas flow according to the ideal gas equation

TOTALIZERS

- Totalizers for energy and flow measurements (2 for each channel)
- Totalizers can be reset manually or automatically every day, week or month
- Over and under counters to be realized in additional channels X

ALARMS AND CONTROL

- 2 alarm thresholds for each result
- Alarm or control mode, signaling failure of sensors connected to analogue inputs
- 4 solid state relays rated at 0.1 A/60 V
- E-mail messages about alarm states and cyclical reports with counter values (max. 5 recipients)

RECORDING MEASUREMENT RESULTS

- Archive files: process values (recording rate from 3 s up to 24 h), totalizers and min/average/max values (record every 1 h and every 24 h)
- Event files: authorization log file, event log file, settings log file (recording after the occurrence of the event)
- 2 recording rates, toggled by alarm state for shorting/opening time of selected binary inputs
- Access to recorded data through USB port on the front panel or through Ethernet port
- Checksum secured files – protection against data manipulation

SCREEN EXAMPLES

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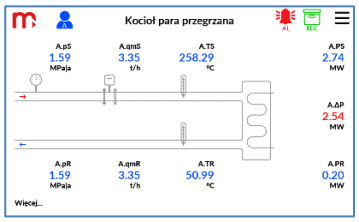
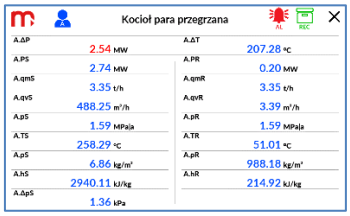
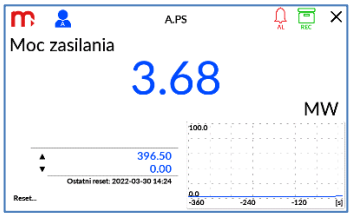
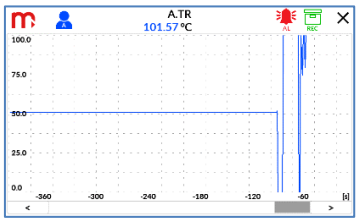
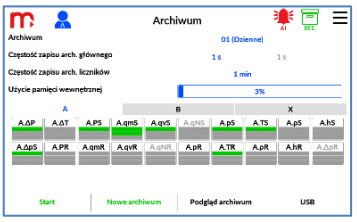
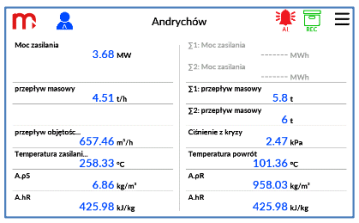


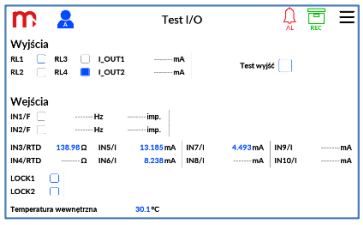




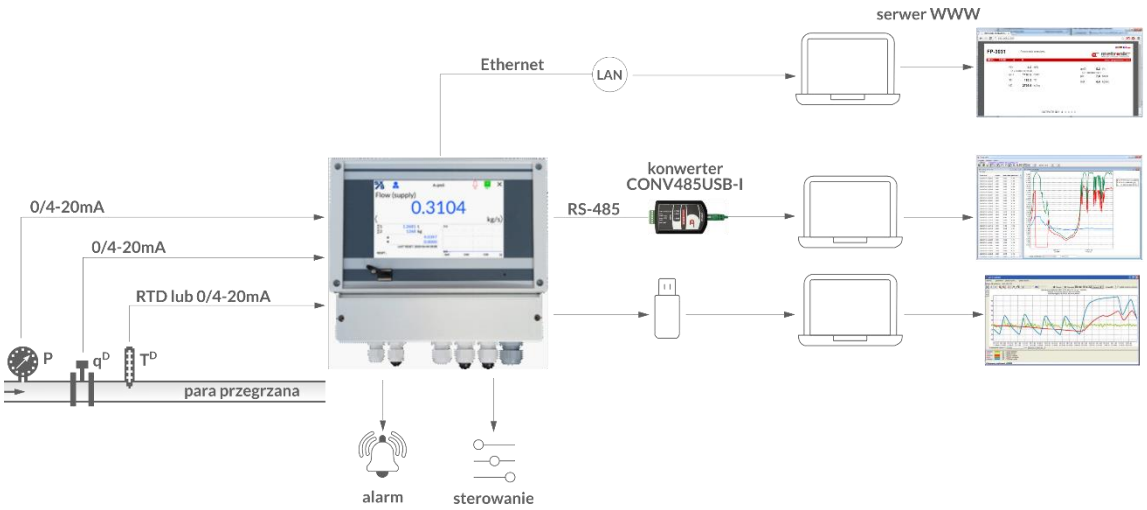








APPLICATION EXAMPLE



AVAILABLE OPTIONS AND ORDERING INFORMATION

FP70			
	P		panel mount version
	W		wall mount version
		- 0	option without analogue 4-20mA output
		- 1	option with one analogue 4-20mA output
		- 2	option with two analogue 4-20mA output

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TECHNICAL SPECIFICATIONS

COMPENSATED FLOW AND HEAT ENERGY MEASUREMENT	
Accuracy of compensated steam, water, other liquid or technical gas flow	<2% (typowo <0,5%)
Frequency of measurement and calculation results	0,5 s

FRONT PANEL	
Display type FP-70P	5" LCD TFT colour 800x480px
Display type FP-70W	7" LCD TFT colour 800x480px
Display size	152mm x 91mm
LED indication	3 colour LEDs

INPUTS ORGANIZATION	
FP70P, FP70W	2 x PULS: IN1, IN2 2 x RTD: IN3, IN4 6 x I: IN5 – IN10

RTD type analogue inputs	
Sensor type	Resistance (according to the table)
Measuring range	-200 .. +850 °C dla Pt100 -60 .. +150 °C dla Ni100 -180 ..+200 °C dla Cu100
Sensor connection	2, 3, or 4-wire
Wire resistance compensation	Manual, in range -99.99 .. +99.99 Ω
Maximum resistance of connecting wires	20 Ω
A/D converter resolution	24 bit
Accuracy (at T_a = +20 °C)	± 0,5 °C (typowo ± 0,3 °C)
Temperature drift	Max ± 0,02 °C / °C
Galvanic isolation between inputs	No, common potential GND for all inputs
Galvanic isolation from supply voltage	400 VAC (functional isolation)

0/4-20mA type analogue inputs	
Signal type	0-20mA lub 4-20mA
Transmitter connection	Passive (supplied from measuring loop) or active converter)
Input resistance	12 Ω ±10% ?
Transmitters supply	24 VDC / max 22 mA
A/D converter resolution	24 bit
Accuracy (at T_a = +20 °C)	±0.1% of the range (typically ±0.05% of the range)
Temperature drift	Max ±50 ppm / °C
Galvanic isolation between inputs	No, common potential GND for all inputs
Galvanic isolation from supply voltage	400 VAC (functional isolation)

PULS type inputs (binary/pulse/frequency)	
Maximum input voltage	±28 VDC
Galvanic isolation between inputs	No, common potential GND for all inputs
Galvanic isolation from supply voltage	400 VAC (functional isolation)
Functions	State detection Pulse counting Frequency measurement
Measuring range	0,02 Hz do 12,5 kHz
Minimum impulse width	20 μs

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	0.5 ms with filtrating capacitor
Accuracy (at T_a = +20 °C)	0.02%
Configuration: OC/contact[1]	
Open circuit voltage	12 V
Short circuit current	12 mA
On/off threshold	2.7 V / 2.4 V
[1]The default setting.	
Configuration: voltage input	
Input resistance	>10 kΩ
On/off threshold	2.7 V / 2.4 V
Open circuit voltage	12 V
Configuration: Namur	
High impedance state	0.4 .. 1 mA
Low impedance state	2.2 .. 6.5 mA

4-20mA analogue output (optional)	
Number of outputs	1 or 2
Output signal	4-20mA (3.6–22 mA)
Maximum voltage between I+ and I-	28 VDC
Loop resistance (at U_{cc} = 24 V)	0 .. 500 Ω
Converter resolution D/A	16 bits
Accuracy	0.5%
Current loop supply	External or internal power supply 24 VDC / 22 mA
Galvanic isolation between outputs	400 VAC (functional isolation)
Galvanic isolation from supply voltage	400 VAC (functional isolation)

Binary outputs (Solid State Relays)	
Number of outputs	4
Type of outputs	Solid State Relays
Maximum load current	100 mA DC/AC
Maximum voltage	60 V DC/AC
Galvanic isolation between outputs	400 VAC (functional isolation)
Galvanic isolation from supply voltage	400 VAC (functional isolation)

RS-485 serial port	
Maximum load	32 receivers/transmitters
Maximum line length	1200 m
Maximum differential voltage A(+) – B(-)	-7 .. +12 V
Maximum total voltage A(+) – 'ground' or B(-) – 'ground'	-7 .. +12 V
Minimal output signal from transmitter	1.5 V (for R_0 = 54 Ω)
Minimum receiver sensitivity	200 mV / R_{IN} = 12 kΩ
Minimum impedance of data transmission line	54 Ω
Internal terminating resistor	Yes, activated by short-circuit pins on terminal block
Short-circuit/thermal protection	Yes/Yes
Transmission protocol	Modbus RTU
Baud rate	2.4, 4.8, 9.6 ,19.2, 38.4, 57.6, 115.2 kbps
Parity control	Even, Odd, None
Frame	1 start bit, 8 data bits, 1 stop bit
Galvanic isolation	No

Ethernet port	
Transmission protocol	Modbus TCP, ICMP (ping), DHCP server, http server
Interface	10BaseT Ethernet
Data buffer	300 B
Number of opened connections (simultaneously)	4
Connector type	RJ-45
LED signaling	2, build in RJ-45 socked

USB port	
Socket type	A type, according to USB standard
Version	USB 2.0
Socket protection class	IP54
Recording format	FAT16 (within a limited scope)
Recording indication	red-orange-green LED on the front panel

FP70P power supply	
Supply voltage	24 VDC (15 .. 30 VDC)
Maximum power consumption	14 VA / 14 W

FP70W power supply	
Supply voltage	100 .. 240 VAC 50/60 Hz 24 VDC (15 .. 30 VDC)
Maximum power consumption	28 VA / 28 W (for 100 .. 240 VAC power supply) 14 VA / 14 W (for 24 VAC/VDC power supply)

Wire terminals	
Type	• FP70P: screw type terminal blocks • FP70W: spring type terminal block
Conductor cross section	• FP70P: solid max. 1.5 mm^2 • FP70W: stranded 0.2 .. 1.5 mm^2

FP70P enclosure – dimensions	
Enclosure type	Panel mount, nonflammable plastic material 'Noryl'
Dimensions (width x height x depth)	192 mm x 96 mm x 63.5 mm
Enclosure depth with terminals	ca. 72 mm
Panel cut-out dimensions (width x height)	$186^{+1.1}$ mm x $92^{+0.6}$ mm
Panel maximum thickness	5 mm
Weight	ca. 0.7 kg
Protection class from the front panel	IP54
Protection class from the rear panel	IP30

FP70W enclosure – dimensions	
Enclosure type	Wall mount, PC material
Dimensions (width x height x depth)	257 mm x 217 mm x 125 mm (without cable glands) 257 mm x 247 mm x 125 mm (with cable glands)
Weight	ca. 2.1 kg
Protection class	IP54

FP70P environmental conditions	
Ambient temperature	0 .. +40 °C
Relative humidity	0 .. 75% (without steam condensation)
Storage temperature	-20 .. +80 °C
Overvoltage category	OV II
Pollution degree	PD 2

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LVD (safety)	EN 61010-1
EMC	Directive 2014/30/EU: • immunity for industrial environments according to EN 61326-1:2013 (Table 2) • conductive and radiated emissions Class A equipment according to EN 61326-1:2013
RoHS	Directive 2011/65/EU
Installation location	Indoor only

FP70W environmental conditions

Ambient temperature	-20 .. +40 °C
Relative humidity	0 .. 75% (without steam condensation)
Storage temperature	-20 .. +80 °C
Overvoltage category	OV II
Pollution degree	PD 2
LVD (safety)	EN 61010-1
EMC	Directive 2014/30/EU: • immunity for industrial environments according to EN 61326-1:2013 (Table 2) • conductive and radiated emissions Class A equipment according to EN 61326-1:2013
RoHS	Directive 2011/65/EU
Installation location	Indoor or outdoor[(2)]

[(2)] If additional protection against atmospheric precipitation is provided (roofing), the device can be installed outdoor.

Data sheet version: 240425 EN Device version: 2.2

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