FP-3021N
FP-3021

Flow and Energy Computer for Steam, Liquids and Gases with advanced data recording for HART or RS485 / MODBUS RTU sensors

- **Handles up to 2 independent installations**
- **5 channels for HART / Modbus RTU sensors**
- **2 digital channels**
- **Alarm & control functions, 4 output relays**
- **Analog 4-20mA output (option)**
- **Advanced data recording for process values and totalisers**
- **User configurable data presentation on color TFT display**
- **RS485 communication port, ASCII and Modbus RTU protocols**
- **Ethernet port, Modbus TCP and server WWW**
- **GSM module (option)**
- **Software for configuration and recorded data presentation**

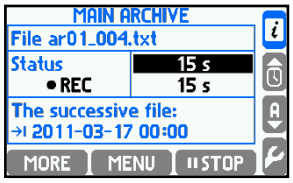
APPLICATION:

- **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 with possibility of local alarming or simple control implementation**
- **Application in distributed control systems with local measurement and data display**
- **Systems with precise data logging for audit trials**

APPLICATIONS FOR STEAM, LIQUIDS AND TECHNICAL GASES

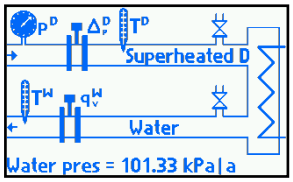
Process values and calculations relevant to a single installation application are grouped in one system named main application. FP-3021 flow computer can handle up to two independent main applications A and B. A configuration wizard helps to setup one of possible applications:

- 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 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 of a gas.



APPLICATION SCOPE FOR STEAM MEASUREMENTS

The flow computer performs flow and heat measurement of superheated or saturated steam or water according to IAPWS-IF97 recommendations in the operating range of temperature 0…800 ºC 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 user – density and enthalpy as function of temperature.



FLOW RATE MEASUREMENT

The flow computer can use:

- mass flowmeters,
- volume flowmeters,
- differential pressure devices with approximation by square root curve,
- differential pressure devices (orifices and nozzles) according to iteration algorithm according to PN-EN ISO 5167 standard (only for water and steam).

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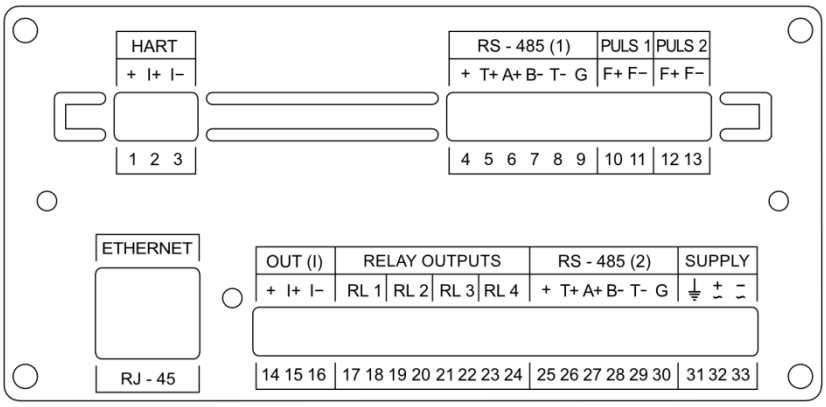
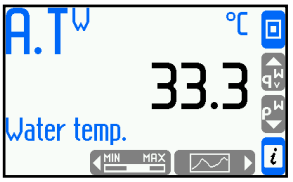
7 CHANNEL FOR MEASURED PROCESS VALUES

- 5 channels designed to read data from sensors and instruments with digital protocol (HART or Modbus RTU).
- 2 digital inputs (PULS) for state, pulse or frequency measurements; OC, voltage or NAMUR configuration.



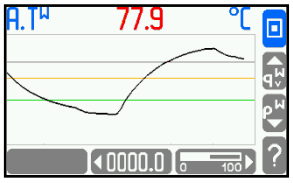
HART

- HART port with power supply for sensors (24 VDC /60 mA), sensors in multidrop configuration.
- Supported rev.4., rev.5., rev.6. Possible configuration as Primary or Secondary Master.
- Read variables: PV - primary variable, SV – secondary variable, TV -third variable, FV - fourth variable.



MODBUS RTU

- Sensors or instruments connected in parallel to one twisted pair of wires.
- Baud rate from 1200 bps to 115200 bps.
- Available functions: 03 (Read Holding Register) and 04 (Read Input Register), registers in the range 0 ... 65535.
- Data format: unsigned integer, integer, unsigned long, unsigned long swapped, long, long swapped, floating point, floating point swapped.



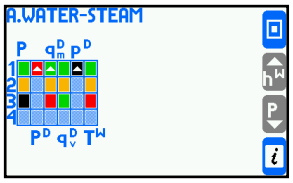
ADDITIONAL MEASUREMENTS AND CALCULATIONS

Additional measured or calculated values can be displayed besides the main application values. Up to 8 auxiliary channels may be set.

ALARMS & CONTROL, OUTPUT RELAYS

The flow computer is equipped with four solid state relay outputs 0,1 A / 60 V. Relays can react to the various events:

- alarm/control threshold over crossing,
- saturation of superheated steam,
- 0/4-20mA transmitter or RTD sensor failure or disconnection,
- close or open of binary input.



DATA RECORDING

2 GB of internal flash memory and extended functions of events and process values recording make it possible to perform analysis of technological processes and emergency conditions.

COMMUNICATION

- **RS485** port (Modbus RTU or ASCII protocol).
- **Ethernet** port (Modbus TCP protocol and server WWW).
- **GSM module** (option), text messages to transfer information about selected alarms, failures, measurement values and totalisers.

VERSIONS

FP-3021	(N)	- x	- y	
				panel mount version
	N			wall mount version
		- 0		basic option with one main application A
		- 1		extended option with A and B applications
			- 0	option without analog 4-20mA output
			- 1	option with analog 4-20mA output

Device version FP-3021 v1.29 / Datasheet version: 2016-07-15

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TECHNICAL DATA

User interface, front panel	
Display type	LCD TFT color, 272 x 480 pixels
Readout field size	43.8 mm x 77.4 mm
LED indication	3 tri-color LEDs, red-orange-green
Keyboard:	FP-3021: 7 membrane buttons FP-3021N: 19 membrane buttons
Inputs organization	
FP-3021, FP-3021N	1 x HART
	1 x RS-485
	2 x PULS
HART	
Transmission protocol:	Master type rev. 4, rev 5, rev.6.; FSK
Implemented features	Reading variables PV, SV, TV, FV Retrieve long address Change of short address
Multidrop mode	Yes, up to 12 devices
Loop power	24 VDC (max 50 mA)
Analog line 4-20mA reading	No
Wire connection	FP-3021: 3-pin screw type terminal blocks, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
RS485 serial port (1)	
Transmission protocol	Modbus RTU
Frequency of reading	3 s, 4 s, 5 s, 6 s, 10 s, 12 s, 15 s, 30 s, 1 min,
Transmission rate	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbps
Address space of transducers	1 … 247
Maximum load	32 receivers / transmitters
Maximum length of line	1200 m
Maximum differential voltage A(+) – B(-)	-8 V … +13 V
Maximum total voltage A(+) – “ground” or B(-) – "ground"	-7 V … +12 V
Minimum output signal of transmitter	1,5 V (przy R_0 = 54 Ω)
Minimum sensitivity of receiver	200 mV / R_{WE} = 12 kΩ
Minimum impedance of data transmission line	27 Ω
Internal terminating resistor	Yes, activated by short-circuit pins on terminal block
Short-circuit / thermal protection	Yes
Lines derived in terminal block	A(+), B(-), GND RS, +5V RS (max 10mA), T(+), T(-)
Galvanic isolation	Isolation from the supply voltage 400V, lack of isolation between inputs
Wire connection	FP-3021: 6-pin screw type terminal blocks, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
PULSE type inputs	
Maximum input voltage:	±28 VDC
Galvanic isolation between inputs:	No, common potential GND for all inputs
Galvanic isolation to supply voltage:	400 VAC
Functions	State detection Pulse counting Frequency measurement
Measuring range	0,001 Hz to 10 kHz (0,001 Hz to 1 kHz with connected filtering capacitor)
Minimum pulse width:	20 μs 0.5 ms, with filtrating capacitor
Accuracy (T_a = 20 °C):	0,02%
Wire connection	FP-3021: two 2-pin screw type terminal blocks, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
Configuration: OC / contact (default)	
Voltage(OC)	12 V
Current (contact)	12 mA
On / off threshold	2,7 V / 2,4 V

Configuration: voltage input	
Input resistance	>10 kΩ
On / off threshold	2,7 V / 2,4 V
Voltage (open)	12 V
Configuration: NAMUR	
High impedance state:	0,4 mA – 1 mA
Low impedance state:	2,2 mA – 6,5 mA
Compensated flow and heat energy measurement	
Accuracy of compensated steam, water, other liquid or technical gas flow:	< 2% (typical < 0,5%)
Frequency of measurement and calculation results	1 s
4-20mA analog output (optional)	
Output signal:	4-20mA
Maximum voltage between I+ and I-:	28 VDC
Loop resistance (for U_{cc} = 24 V):	0 .. 500 Ω
Converter resolution D/A:	16 bits
Accuracy:	0,5%
Current loop supply:	External or from internal unit supply 24 V DC / 22 mA
Galvanic isolation to supply voltage:	400 VAC
Wire connection	FP-3021: 3-pin screw type terminal block, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
Binary outputs	
Number of outputs:	4
Type of outputs	Semiconductor relays
Maximum load current:	100 mA DC/AC
Maximum voltage:	60 V DC/AC
Galvanic isolation:	400 VAC
Wire connection	FP-3021: two 8-pin screw type terminal blocks, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
RS485 SERIAL PORT (2)	
Maximum load:	32 receivers / transmitters
Maximum length of line:	1200 m
Maximum differential voltage A(+) – B(-):	-8 V … +13 V
Maximum total voltage A(+) – “ground” or B(-) – "ground":	-7 .. +12 V
Minimal output signal of transmitter:	1,5 V (przy R_0 = 54 Ω)
Minimum receiver sensitivity	200 mV / R_{WE} = 12 kΩ
Minimum impedance of data transmission line	27 Ω
Internal terminating resistor	Yes, activated by short-circuit pins on terminal block
Short-circuit / thermal protection	Yes
Transmission protocol	ASCII Modbus RTU
Baud rate	1.2, 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, 1stop bit
Galvanic isolation:	No
Wire connection	FP-3021: 6-pin screw type terminal block, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
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 1.1

Socket protection class:	IP-54
Recording format	FAT16 (within a limited scope)
Recording indication	Green-red USB LED on the front panel
Internal data memory	
Capacity:	2 GB
Data format:	Text, FAT16
Recording indication	Green-red LED on the front panel
FP-3021 and FP-3021N power supply	
Supply voltage:	24 VAC (+5% / -10%) or 24 VDC (15 .. 30 VDC)
Maximum power consumption	5 VA / 5 W
Wire connection	FP-3021: 3-pin screw type terminal block, max. cable diameter 1,5 mm^2 FP-3021N: spring type terminal block, cable diameter 0,2 mm^2 – 1,5 mm^2
FP-3021N power supply	
Supply voltage	100-240VAC 50/60 Hz
Maximum power consumption	14 VA
Wire connection	Screw type terminal blocks, cable diameter 0,2 mm^2 – 1,5 mm^2
FP-3021 casing - dimensions	
Casing type	For panel mount, nonflammable plastic material - Noryl
Dimensions (height x width x depth):	72 mm x 144 mm x 130 mm
Housing depth with terminals (without extra space for cables):	ok. 140 mm
Panel cut-out dimensions:	138^{+1} mm X $68^{+0,7}$ mm
Panel maximum thickness:	5 mm
Weight:	ca. 0,5 kg
Protection class from the front panel:	IP-54
Protection class from the rear panel:	IP-30
FP-3021N casing - dimensions	
Casing type	Wall mounting, ABS material
Dimensions (height x width x depth):	217 mm X 257 mm X 125 mm (without cable glands) 247 mm X 257 mm X 125 mm (with cable glands)
Weight:	ca. 2,1 kg
Protection class from the front panel:	IP-54
Climate conditions	
Ambient temperature:	0 .. +50 °C
Relative humidity:	0 .. 75% (without steam condensation)
Storage temperature:	-20 .. +80 °C
Overvoltage category	OVII
Pollution degree	PD2
LVD (safety)	EN 61010-1
EMC	EMC Directive 2014/30/UE EN 61326-1:2013 Tabela 2 (Immunity) EN 55011:2009+A1:2010 Class A (Radiated and conducted emissions)
Installation location	Indoor use only

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