MPI-D, MPI-DN

Multichannel electronic recorder for RS-485/MODBUS RTU or HART sensors

- 20 measurement channels
- 2 PULS type inputs
- HART port – Master 0/1 type
- RS-485 (1) port – Master (Modbus RTU protocol); RS-485 (2) port – Slave (Modbus RTU, ASCII protocols)
- 16 math channels & functions (+, -, /, *, √)
- User configurable data presentation, the colour TFT display
- USB port on the front panel (IP54)
- Advanced data logging, recording data to the text files, 2 GB internal data memory
- Alarm & control functions, 4 solid state relays (SSR)
- Tracking min., max. and average – for process values
- Ethernet port (Modbus TCP protocol, web server – on-line visualization of process values)
- 4-20mA analogue output (option)
- GSM module (option)
- Dedicated PC software for commissioning and archive data visualization
- Available languages: EN, DE, FR, PL

MPI-D and MPI-DN devices are multichannel microprocessor measuring instruments dedicated for devices and transmitters communicating on the digital bus (Modbus RTU protocol) and in the HART standard (also in the Multidrop mode). Two PULS type inputs can measure flow and state. 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 (2) port (Modbus RTU and ASCII protocols) and can work in distributed control systems.

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

RECORDING MEASUREMENT RESULTS

- Archivization of process values (recording rate from 3 s up to 24 h)
- 2 recording rates, toggled by alarm state for shorting/opening time of selected binary inputs (the option of setting a break in archiving)
- Archivization of max. 15 totalizers (record every 15 min)
- Archivization of events: authorization log file, event log file (recording after the occurrence of the event), settings log
- Checksum secured files – protection against data manipulation
- Recording to internal memory of 2 GB, max. 256 files
- Access to recorded data through the USB port on the front panel or through the Ethernet port

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INPUTS AND CHANNELS TYPES

MPI-D/MPI-DN has: HART port, RS-485 (1) port – Master (18 channels for reading data), 2 PULS type inputs, RS-485 (2) port – Slave and Ethernet port. In addition, 16 math channels are available, which calculate the implemented formula. Up to 16 User's characteristics can be defined.

Input or Channel type	No.	Description
Measurement channel (HART/Modbus RTU)	**18**	reading data from transducers with the **HART** protocol: possible configuration as Primary or Secondary Master; read variables: PV – primary variable, SV – secondary variable, TV – third variable, FV – fourth variable; digital values read from up to 12 transducers/devices connected in parallel to the current loop (Multidrop) reading data from instruments and transducers with the **Modbus RTU** protocol: sensors or instruments connected parallel to one twisted pair of wires (RS-485 (1) port); baud rate in range 1200 .. 115200 bps; available functions: 03 (Read Holding Register) and 04 (Read Input Register); registers in the range 0 .. 65535
PULS	**2**	frequency measurement mode in range 0.001 Hz .. 10 kHz, on/off state tracking
Math channel	**16**	calculation of the formula entered by the user (available mathematical operations: addition, subtraction, multiplication, division, extract the root)

TOTALIZERS

- Totalizers for flow measurements (2 for each channel)
- Calculation of totalizers values by the device or reading of totalizers values by means of the Modbus RTU or HART protocol
- Totalizers can be reset manually or automatically every day, week or month

ALARMS AND CONTROL

- 4 alarm thresholds for each result
- Alarm/control mode
- 4 solid state relays rated at 0.1 A/60 V
- Option of informing about the alarm via SMS (optional GSM module connected to the RS485 (2) port)

DISPLAYING RESULTS

- 6 optional screens for each channel: large digits, trend graph, bar graph, totalizers values, minimum and maximum values (digits), minimum and maximum values (bar graph)
- 6 collective screens with tables (3 or 6 rows in each table) to display current values or totalizers values
- 6 optional additional screens: collective table with channels values; collective bar chart; collective information about exceeded thresholds; status of relay outputs; the current date, tame and day of the week; status of the archiving process, usage indicator, recording interval
- Possibility of screens auto-browse
- Dimmed backlight the screen after a specified time
- Three indicator LEDs on the front panel

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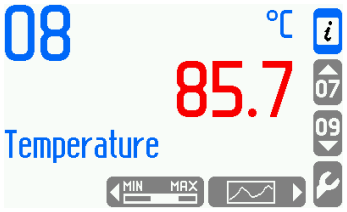
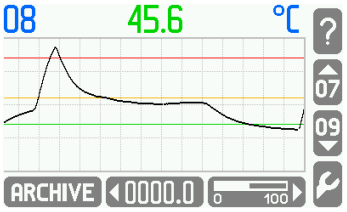
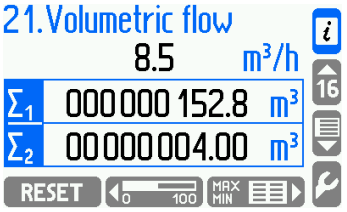
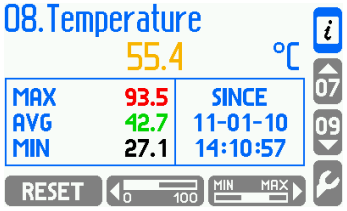
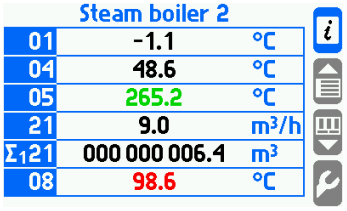
SCREEN EXAMPLES

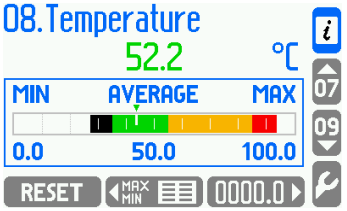


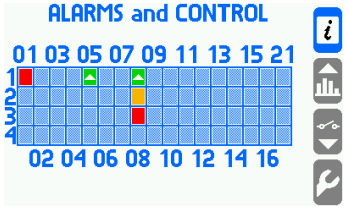


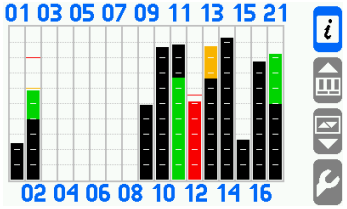




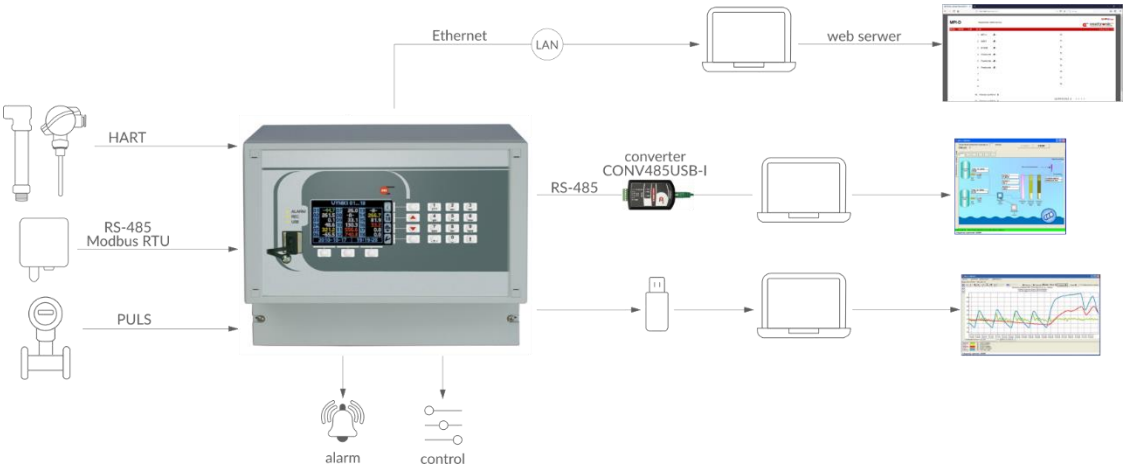








APPLICATION EXAMPLE



AVAILABLE OPTIONS AND ORDERING INFORMATION

MPI-D	(N)	- x	
			panel mount version
	N		wall mount version
		- 0	option without analogue 4-20mA output
		- 1	option with analogue 4-20mA output

For example device in wall mount version, without analogue 4-20mA output has code: **MPI-DN-0**.

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TECHNICAL SPECIFICATIONS

FRONT PANEL	
Display type	LCD TFT colour 272x480 px
Display size	43.8 mm x 77.4 mm
Keyboard	• MPI-D: 7 membrane buttons • MPI-DN: 19 membrane buttons
LED indication	3 LEDs 3-colour, red-orange-green

INPUTS ORGANIZATION		
MPI-D, MPI-DN	Port HART: Port RS-485 (1): 2 x PULS:	IN1 .. IN18 IN19, IN20

RS-485 (1) serial port – Master	
Transmission protocol	Modbus RTU
Data format	Uns. Integer, Integer, Uns. Long, Uns. Long (sw), Long, Long (sw), Float, Float (sw)
Frequency of reading	3 s, 4 s, 5 s, 6 s, 10 s, 12 s, 15 s, 30 s, 1 min
Baud 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 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
Galvanic isolation from supply voltage	400 VAC (functional isolation)

HART port	
Transmission protocol	Master type 0 or 1, rev. 4, rev. 5, rev. 6; FSK
Implemented features	Reading variables PV, SV, TV, FV Retrieve long address (rev. 5, rev. 6) Change of short address
Multidrop mode	Yes, up to 12 devices
Loop power	24 VDC (max 50 mA)
Analog line 4-20mA reading	No
Galvanic isolation from supply voltage	400 VAC (functional isolation)

PULS type inputs (binary/pulse/frequency)	
Number of inputs	2
Maximum input voltage	±28 VDC
Galvanic isolation from supply voltage	400 VAC (functional isolation)
Functions	State detection Pulse counting Frequency measurement
Measuring range	0.001 Hz .. 10 kHz (0.001 Hz .. 1 kHz with filtrating capacitor)

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Minimum impulse width	20 µs 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	1 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

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)

4-20mA analogue output (optional)	
Number of outputs	1
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 bit
Accuracy	0.5%
Current loop supply	External or internal power supply 24 VDC / 22 mA
Galvanic isolation from supply voltage	400 VAC (functional isolation)

RS-485 (2) serial port – Slave	
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	ASCII 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 1.1
Socket protection class	IP54
Recording format	FAT16 (within a limited scope)
Recording indication	red-orange-green LED on the front panel
Internal data memory	
Capacity	2 GB
Estimated recording time for recording speed every 3 s for 16 measuring channels	ca. 400 days
MPI-D power supply	
Supply voltage	24 VAC (+5%/-10%) or 24 VDC (15 .. 30 VDC)
Maximum power consumption	5 VA / 5 W
MPI-DN power supply	
Supply voltage	100 .. 240 VAC 50/60 Hz or 24 VAC (+5%/-10%) or 24 VDC (15 .. 30 VDC)
Maximum power consumption	14 VA / 14 W (for 100 .. 240 VAC power supply) 5 VA / 5 W (for 24 VAC/VDC power supply)
Wire terminals	
Type	• MPI-D: screw type terminal blocks • MPI-DN: spring type terminal block
Conductor cross section	• MPI-D: solid max. 1.5 mm^2 • MPI-DN: stranded 0.2 .. 1.5 mm^2
MPI-D enclosure – dimensions	
Enclosure type	Panel mount, nonflammable plastic material 'Noryl'
Dimensions (width x height x depth)	144 mm x 72 mm x 130 mm
Enclosure depth with terminals	ca. 140 mm
Panel cut-out dimensions (width x height)	$138^{+1.0}$ mm X $68^{+0.7}$ mm
Panel maximum thickness	5 mm
Weight	ca. 0.5 kg
Protection class from the front panel	IP54
Protection class from the rear panel	IP30
MPI-DN 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

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Protection class	IP54
Environmental conditions	
Ambient temperature	• MPI-D: 0 .. +50 °C • MPI-DN: -20 .. +50 °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	• MPI-D: Indoor only • MPI-DN: Indoor or outdoor[2]

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

Data sheet version: 180326EN Device version: 1.31

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