

MPI-C, MPI-CN

Multichannel electronic recorder



- 16 or 8 universal analogue measurement inputs
- 4 or 2 PULS type inputs
- 16 math channels & functions (+, -, /, *, $\sqrt{}$)
- 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, 8 solid state relays (SSR)
- Tracking min., max. and average – for process values
- RS-485 port – Slave (Modbus RTU, ASCII protocols)
- Ethernet port (Modbus TCP protocol, web server – on-line visualization of process values)
- GSM module (option)
- Dedicated PC software for commissioning and archive data visualization
- Available languages: EN, DE, FR, PL

MPI-C and MPI-CN devices are multichannel microprocessor measuring instruments. Data are recorded and can be read locally or periodically using a USB mass storage device.

Sixteen or eight universal measurement inputs can measure process signals in industrial applications and may be used to measure physical values processed into a standard signals, e.g. temperature, humidity, pressure, flow, level, chemical parameters, etc. Four or two PULS type inputs can measure flow and state.

Device can communicate with master system via Ethernet port (Modbus TCP protocol, www server) or via RS-485 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

INPUTS AND CHANNELS TYPES

MPI-C/MPI-CN has: 16 or 8 universal measurement inputs, 4 or 2 PULS type inputs, RS-485 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
Analogue input (RTD/TC/I/U/ /resistance)	16 or 8	for RTD temperature sensors (Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000); TC sensors J, L, M, T, U, E, N, B, R, S; transducers with standard current loop output 0/4-20mA; transmitters with an output resistance in the range 0 .. 5000 Ω or converters with voltage output of -0.8 V ... 0.8 V the inputs are galvanically isolated from each other; digital filter with selectable time constant allows the measurement of noisy signals
PULS type input	4 or 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)
- Totalizers can be reset manually or automatically every day, week or month

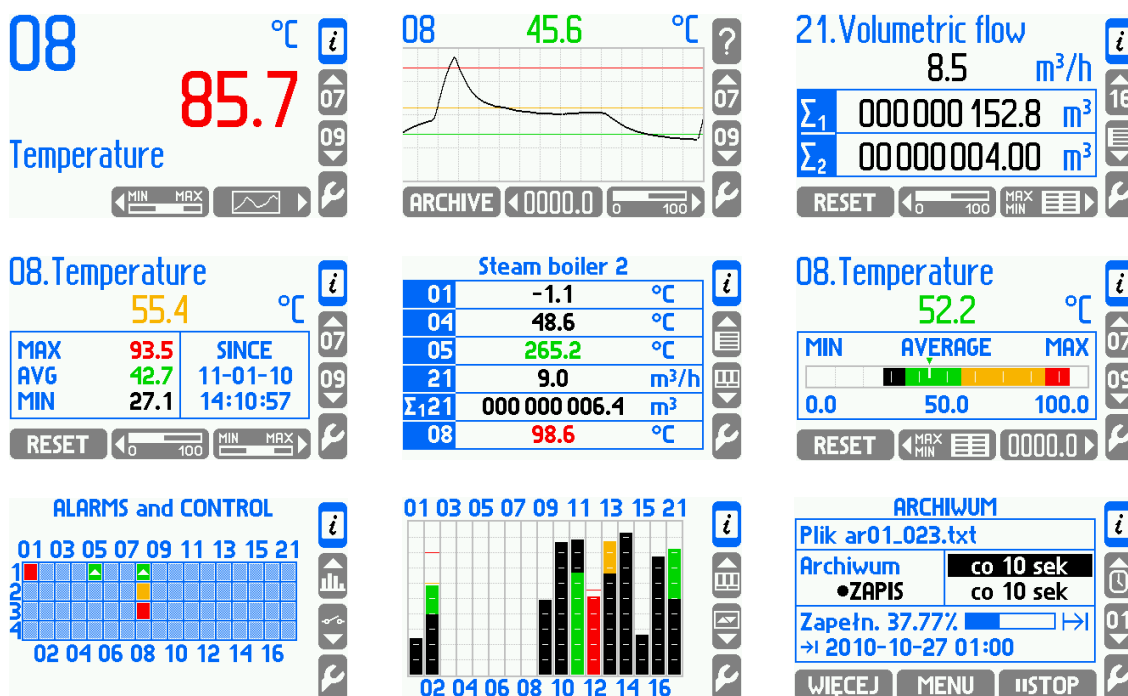
ALARMS AND CONTROL

- 4 alarm thresholds for each result
- Alarm/control mode
- 8 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 port)

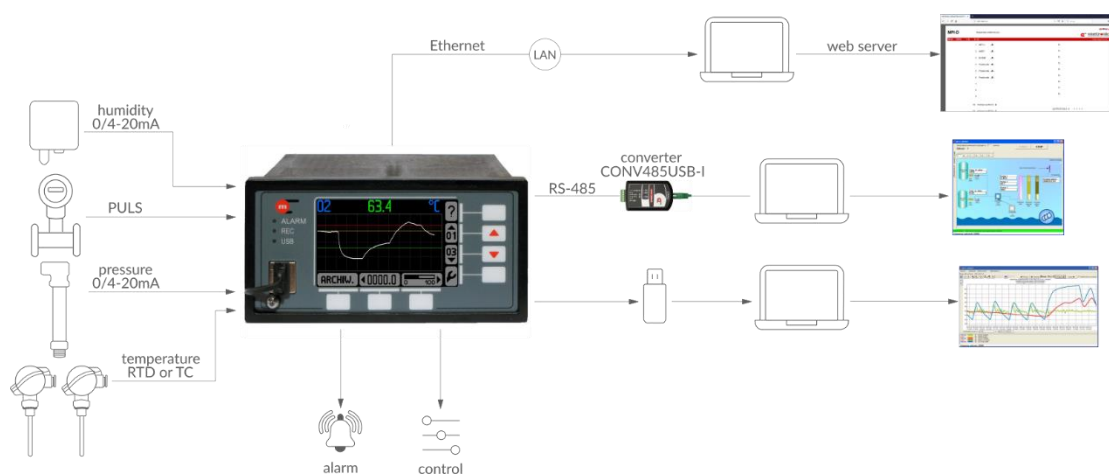
DISPLAYING RESULTS

- 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, time 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

SCREEN EXAMPLES



APPLICATION EXAMPLE



AVAILABLE OPTIONS AND ORDERING INFORMATION

MPI-C	(N)	-x-y	
			panel mount version
	N		wall mount version
		-16-4	option with 16 universal analogue inputs and 4 PULS type inputs
		-8-2	option with 8 universal analogue inputs and 2 PULS type inputs

For example device in wall mount version, with 16 universal analogue inputs and 4 PULS type inputs has code **MPI-CN-16-4**.

TECHNICAL SPECIFICATIONS

FRONT PANEL

Display type	LCD TFT colour 272x480 px
Display size	43.8 mm x 77.4 mm
Keyboard	<ul style="list-style-type: none"> • MPI-C: 7 membrane buttons • MPI-CN: 19 membrane buttons
LED indication	3 LEDs 3-colour, red-orange-green

INPUTS ORGANIZATION

MPI-C-16-4, MPI-CN-16-4	16 analogue inputs: IN1 .. IN16	4 PULS type inputs: IN17 .. IN20
MPI-C-8-2, MPI-CN-8-2	8 analogue inputs: IN1 .. IN8	2 PULS type inputs: IN17 .. IN18

ANALOGUE INPUTS

Number of inputs	16 or 8 multiplexed with signal relays
Galvanic separation between channels	Yes, 100 VDC or 100 V _{p-p}
Galvanic separation from supply voltage	Yes, 500 VDC or 500 V _{p-p}

RTD input

Sensor type	Table below
Current	200 μ A
Connection	3-wire or 2-wire
Wire resistance compensation in the 3-wire connection	Automatic + programmable within the range of -99.99 .. +99.99 Ω
Wire resistance compensation in the 2-wire connection:	Programmable within the range of -99.99 .. +99.99 Ω
Maximum resistance of wires (to the sensor)	50 Ω

Resistance input

Sensor type	Resistance within the range of 0 .. 5000 Ω ⁽¹⁾
Conversion characteristic	Linear / User-defined
Current	200 μ A
Sensor connection type	3-wire or 2-wire
Wire resistance compensation in the 3-wire connection	Automatic + programmable within the range of -99.99 .. +99.99 Ω
Wire resistance compensation in the 2-wire connection	Programmable within the range of -99.99 .. +99.99 Ω
Sensor type	50 Ω

⁽¹⁾The resistance sensor can be set within a sub-range (e.g. 200 - 600 Ω), but it limits the signal processing performance.

TC input

Sensor type	Table below
Cold junction compensation	Any other temperature measuring channel (in °C) or constant value, for thermocouple B – no compensation
Cold junction compensation range	-50.0 .. +99.9 °C
Maximum input voltage	30 VDC or 30 V _{p-p} (between any of +TC and -TC clamps)
Maximum resistance of compensation wires (connected to the TC sensor)	50 Ω

Voltage input

Sensor type	Voltage -0.8 .. +0.8 V ⁽²⁾
Conversion characteristic	Linear / User-defined

Maximum input voltage	30 VDC or 30 V _{p-p}
Input resistance	>10 kΩ
Maximum resistance of wires supplying power to the sensor	50 Ω

⁽²⁾The voltage can be set within a sub-range (e.g. 0 mV - 50 mV), but it limits the signal processing performance.

0/4-20mA inputs

Input resistance	20 Ω +/-10%
Conversion characteristic	Linear / Root-shaped ⁽⁶⁾ / User-defined
Transducers powered from recorder	<ul style="list-style-type: none"> • MPI-C: None • MPI-CN – special version: 24 VDC / 0.4 A common

Measurement error

Measurement accuracy (at ambient temp. of +20 °C)	As specified in the table for the given sensor type
Temperature drift (between 0 °C and +50 °C)	0.025% of the range / 10 °C

PULS type inputs (binary/pulse/frequency)

Number of inputs	<ul style="list-style-type: none"> • 16-channels version: 4 • 8-channels version: 2
Maximum input voltage	30 VDC or 30 V _{p-p}
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)
Minimum impulse width	20 μs 0.5 ms with filtrating capacitor
Accuracy (at T _a = +20 °C)	0.02%

Configuration: OC/contact⁽³⁾

Open circuit voltage	12 V
Short circuit current	12 mA
On/off threshold	2.7 V / 2.4 V

⁽³⁾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	8
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 – 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 $R_0 = 54 \Omega$)
Minimum receiver sensitivity	200 mV / $R_{IN} = 12 k\Omega$
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-C power supply

Supply voltage	24 VAC (+5%/-10%) or 24 VDC (15 .. 30 VDC)
Maximum power consumption	4 VA / 4 W

MPI-CN power supply

Supply voltage	100 .. 240 VAC 50/60 Hz or 24 VAC (+5%/-10%) or 24 VDC (15 .. 30 VDC)
Maximum power consumption	12 VA / 12 W typically, 30 VA max. (for 100 .. 240 VAC power supply) 4 VA / 4 W (for 24 VAC/VDC power supply)

Wire terminals

Type	<ul style="list-style-type: none"> MPI-C: spring type terminal blocks MPI-CN: spring type terminal block
Conductor cross section	<ul style="list-style-type: none"> MPI-C: 0.14 .. 0.5 mm² MPI-CN: stranded 0.2 .. 1.5 mm²

MPI-C 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. 1.1 kg
Protection class from the front panel	IP54
Protection class from the rear panel	IP30

MPI-CN 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

Environmental conditions

Ambient temperature	<ul style="list-style-type: none"> • MPI-C: 0 .. +50 °C • MPI-CN: -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: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • MPI-C: Indoor only • MPI-CN: Indoor or outdoor⁽⁴⁾

⁽⁴⁾If additional protection against atmospheric precipitation is provided (roofing), the device can be installed outdoor.

Table of sensor types

Input type	Range	Pitch	Measurement accuracy	Characteristic
Pt100*K (K=1 .. 11)	-200 .. +850 °C	0.1 °C ⁽⁵⁾	±0.5 °C	IEC751
Ni100*K (K=1 .. 11)	-60 .. +250 °C	0.1 °C ⁽⁵⁾	±0.5 °C	DIN43760
J (Fe - CuNi)	-200 .. +1000 °C	0.1 °C ⁽⁵⁾	±0.5 °C	IEC584
K (NiCr - Ni)	-250 .. +1300 °C	0.1 °C ⁽⁵⁾	±0.5 °C	IEC584
T (Cu - CuNi)	-270 .. +400 °C	0.1 °C ⁽⁵⁾	±0.5 °C	IEC584
E (NiCr - CuNi)	-270 .. +1000 °C	0.1 °C ⁽⁵⁾	±0.5 °C	IEC584
N (NiCrSi - NiSi)	-50 .. +1300 °C	0.1 °C ⁽⁵⁾	±2 °C	IEC584

B (Pt30Rh - Pt6Rh)	+300 .. +1800 °C	0.1 °C ⁽⁵⁾	±2 °C	IEC584
R (Pt13Rh - Pt)	0 .. +1750 °C	0.1 °C ⁽⁵⁾	±2 °C	IEC584
S (Pt10Rh - Pt)	0 .. +1750 °C	0.1 °C ⁽⁵⁾	±2 °C	IEC584
4-20mA / 0-20mA	-9999 .. +9999	0.0001 .. 1	±0.1% scope	Linear / Root-shaped ⁽⁶⁾ / User-defined

⁽⁵⁾Real measurement pitch, the pitch range can be set within the range of 0.0001 – 1.

⁽⁶⁾Root-shaped characteristics within the initial range is carried out according to the following algorithm:
linear characteristics at inclination 1 for the initial value of 0 – 0.01, linear characteristics with inclination
10 within the range of 0.1 – 0.0247, root-shaped characteristics within the range of 0.0247 - 1.

Data sheet version: 180329EN Device version: 1.31