

# PRODUCT CATALOGUE 4



For nearly 20 years, Metronic AKP has specialised in designing and manufacturing devices that measure the compensated flow and consumption of steam and water energy, measure the compensated flow of process gases, record temperature and other physical quantities, and monitor industrial processes.

Today, Metronic AKP meters and recorders are used by industrial plants of all sizes. Metering systems based on our equipment operate in power plants, refineries, food processing plants, steel mills, waterworks and gasworks.

Our production and design processes are compliant with the ISO 9001-2009 quality management system, validated by the appropriate certificate.

# we design, produce and modernise

## CUSTOMERS BENEFIT FROM:

- high quality measuring devices tested in various extreme working conditions
- our engineers and designers' experience
- swift fulfilment of orders
- training in the use and maintenance of our devices
- technical support
- attractive terms

For our full product range, please visit:

[www.metronic.pl](http://www.metronic.pl)

For more information, please contact our office directly.

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## FLOW COMPUTERS FOR CALCULATING COMPENSATED FLOW AND THERMAL ENERGY OF STEAM, WATER AND OTHER LIQUID MEDIA AND COMPENSATED FLOW OF PROCESS GASES WITH ELECTRONICALLY REGISTERED RESULTS

The FP-30x1(N) series of equipment comprises modern, universal computers for:

- measuring and calculating the consumption of steam and water in balancing systems,
- measuring the compensated flow of process gases and other liquid media (glycol, chilled water),
- measuring dispersed points with the option to operate in computer systems,
- measuring with recording of results and local readout of results, or periodic readout of recorded data using a USB mass storage device.



### TYPES OF MEASURING SYSTEMS

- Measuring the flow and thermal energy of liquids.
- Measuring the flow and thermal energy difference of liquids in closed systems – flow measurement at "supply" or "return".
- Measuring the flow and thermal energy difference of liquids with partial return of medium.
- Measuring the flow and thermal energy of steam.
- Measuring the flow and thermal energy of steam for conditions of steam condensation.
- Measuring the flow and thermal energy difference of steam-condensate in a closed system.
- Measuring the flow and thermal energy difference of steam-condensate with partial return of condensate.
- Measuring the flow and difference of thermal energy in steam production systems with water flow measurement.
- Process gas flow measuring system.

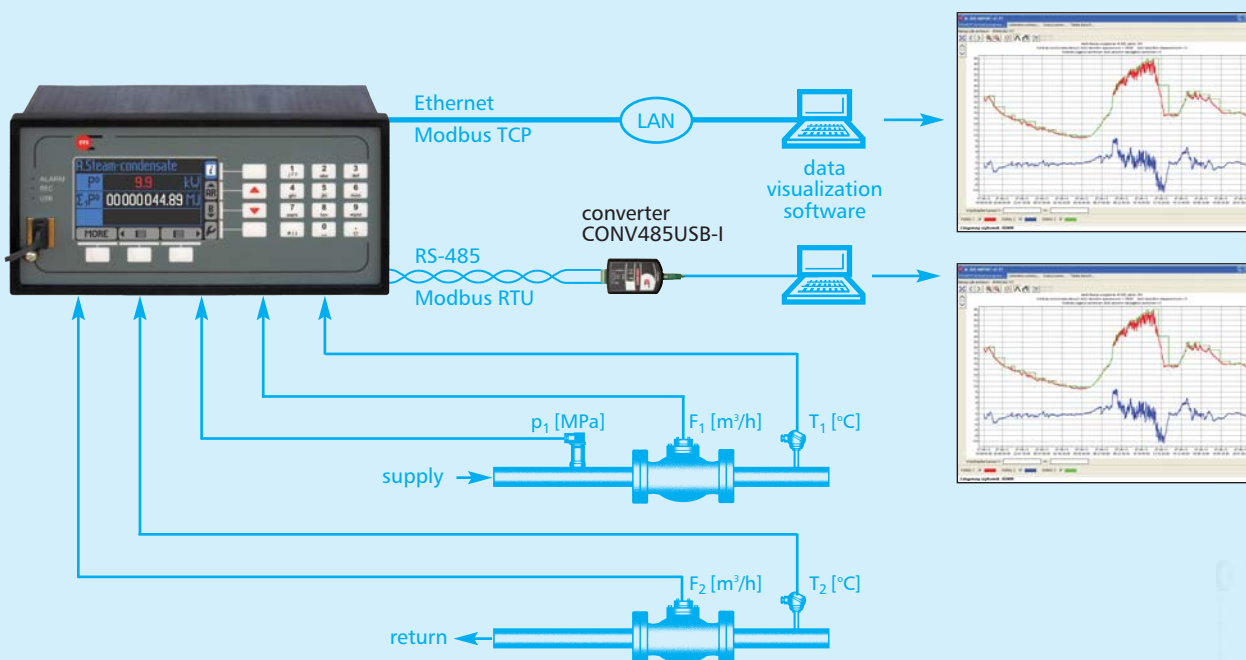
### FLOW MEASURING

The computers can interact with the following types of flowmeters:

- mass flowmeter,
- volumetric flowmeter,
- differential pressure flowmeter with approximation using root characteristic or according to an iterative algorithm, compliant with PN-EN ISO 5167 (only for water and steam).

### COMPENSATION RANGE OF STEAM AND WATER PARAMETERS

The computer enables flow and energy measurement of unsaturated or saturated vapour and water according to IAPWS-IF97 guidelines, within a working temperature range of 0°C to 800°C and an absolute pressure range of 0.05MPa to 16.52MPa. In the case of systems for measuring the flow and energy of other liquids, calculations are made within a range of tabular values entered by the user; both the density and specific enthalpy are functions of temperature.





# FP-3031, FP-3031N

Flow computer for calculating compensated flow and thermal energy of steam, water and other liquid media and compensated flow of process gases with electronically registered results

- Simultaneous consumption calculations in up to three different measurement systems (A, B, C) for separate process lines.
- Flow and energy balancing (X, Y, Z systems).
- 10 measurement inputs.
- Alarm and control functions: 4 alarm and control thresholds for each measurement channel.
- 4 semiconducting output relays: alarm and control functions, operation in pulse output mode with fixed pulse weight.
- 1 or 2 optional 4-20mA analog outputs.
- Advanced recording function allows storage of measurement results in the internal 2GB data memory. USB port for transferring data to and from the computer.
- Colour graphic LCD TFT display.
- Ports: RS-485 (ASCII and Modbus RTU protocols), Ethernet (Modbus TCP protocol, WWW server).
- Two case versions: FP-3031 – panel case and FP-3031N – wall-mounted case.
- Software for visualisation of measurement results.



## INPUTS

The device has ten measurement inputs:

- **3 x RTD/I**, three inputs adapted for connection of resistance temperature sensors (Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000) and transducers with a 0/4-20mA current output,
- **4 x I**, four inputs for interaction with 0/4-20mA transducers only,
- **3 x I/PULS**, three inputs intended for connection of transducers with a 0/4-20mA current output or with a pulse output (range 0.001Hz ... 10kHz).

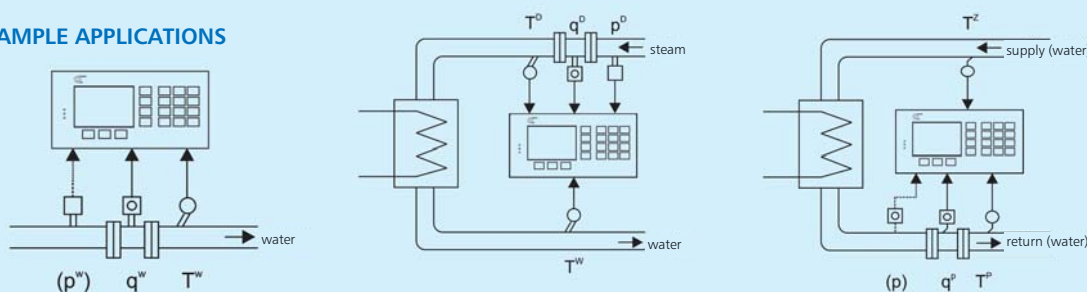
## MEASUREMENTS AND ADDITIONAL CALCULATIONS

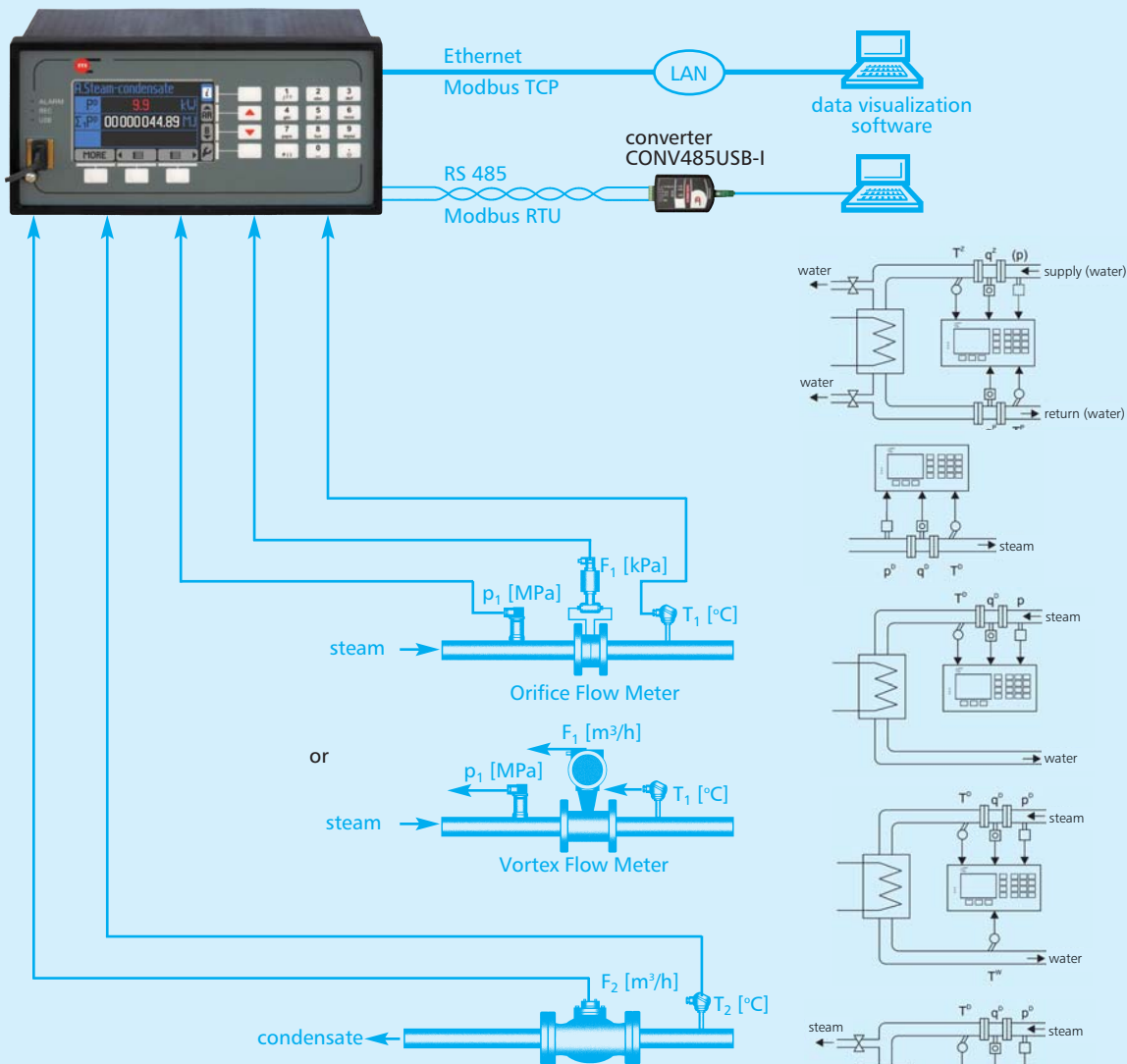
- 8 additional channels: measurement of additional quantities or calculations.
- Additional quantities are omitted when performing calculations related to the flow measurement system.
- Calculated quantities may serve as auxiliary values or be used directly in measurement systems.

## RECORDING MEASUREMENT RESULTS

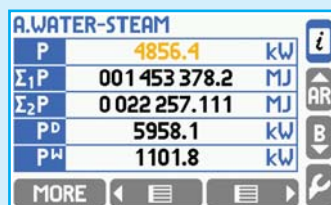
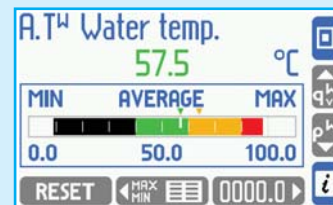
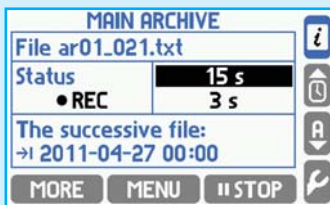
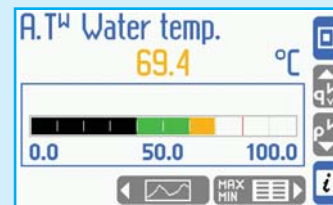
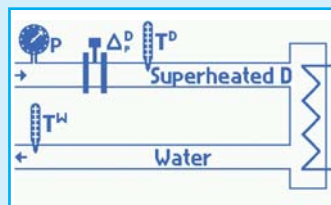
The FP-3031 offers extended functions for recording measured and calculated values. Data are saved in a text file secured with an encrypted checksum and stored in the 2GB internal memory

## EXAMPLE APPLICATIONS





FP-3031 example use in the installation of the heat and flow of steam and condensate



# FP-3011, FP-3011N

Flow computer for calculating compensated flow and thermal energy of steam, water and other liquid media and compensated flow of process gases with electronically registered results

- Simultaneous consumption calculations in up to two different measurement systems (A, B) for separate process lines.
- Balancing flows and energy.
- 5 measurement inputs.
- Alarm and control functions: 4 alarm and control thresholds for each measurement channel.
- 4 semiconducting output relays: alarm and control functions, operation in pulse output mode with fixed pulse weight.
- Optional 420mA analog output.
- Advanced recording function allows storage of measurement results. USB port for transferring data to and from the computer.
- Colour graphic LCD TFT display.
- Ports: RS-485 (ASCII and Modbus RTU protocols), Ethernet (Modbus TCP protocol, WWW server).
- Two case versions: FP-3011 – panel case and FP-3011N – wall-mounted case.
- Software for visualisation of measurement results.



## INPUTS

The device has five measurement inputs:

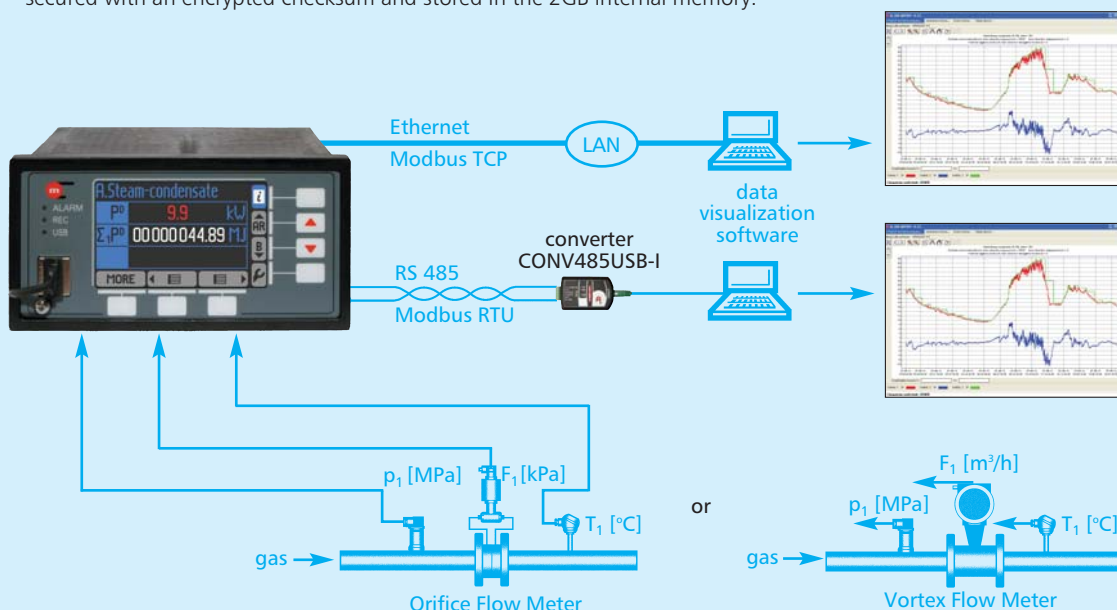
- **2 x RTD/I**, two inputs adapted for connection of resistance temperature sensors (Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000) and transducers with a 0/4-20mA current output,
- **1 x I**, one input for interaction with 0/4-20mA transducers only,
- **2 x I/PULS**, two inputs intended for connection of transducers with a 0/4-20mA current output or with a pulse output (range 0.001Hz ... 10kHz).

## MEASUREMENTS AND ADDITIONAL CALCULATIONS

- 8 additional channels: measurement of additional quantities or calculations.
- Additional quantities are omitted when performing calculations related to the flow measurement system.
- Calculated quantities may serve as auxiliary values or be used directly in measurement systems.

## RECORDING MEASUREMENT RESULTS

The FP-3011 offers extended functions for recording measured and calculated values. Data are saved in a text file secured with an encrypted checksum and stored in the 2GB internal memory.



FP-3011 Example use in gas installation



# FP-3021, FP-3021N

Flow computer for calculating compensated flow and thermal energy of steam, water and other liquid media and compensated flow of process gases with electronically registered results. The computer communicates with RS-485 / Modbus RTU and HART transducers

- Simultaneous consumption calculations in up to two different measurement systems (A, B) for separate process lines.
- Balancing flows – sum, difference, comparison.
- 5 channels for digital data readout.
- 2 PULS-type inputs.
- Alarm and control functions: 4 alarm and control thresholds for each measurement channel.
- 4 semiconducting output relays: alarm and control functions, operation in pulse output mode with fixed pulse weight.
- Optional 4-20mA analog output.
- Advanced recording function allows storage of measurement results. USB port for transferring data from and to the computer.
- Colour graphic LCD TFT display.
- Ports: RS-485 (ASCII and Modbus RTU protocols), Ethernet (Modbus TCP protocol, WWW server).
- Two case versions: FP-3021 – panel case and FP-3021N – wall-mounted case.
- Software for visualisation of measurement results.



## MEASUREMENT CHANNELS

- 5 channels intended for data readout from Modbus RTU protocol devices and transducers and HART protocol transducers.
- Two channels intended for interaction with PULS-type inputs (measurement of frequencies within the range of 0.001Hz ... 10kHz, pulse counting, tracking and recording the shorting / disconnecting binary signal).

## HART

- Readout of digital quantities from transducers/devices connected in parallel to a current loop.
- Operation as Primary Master or Secondary Master.
- Readout of variables: **PV** – primary variable, **SV** – secondary variable, **TV** – third variable, **FV** – fourth variable.

## MODBUS RTU

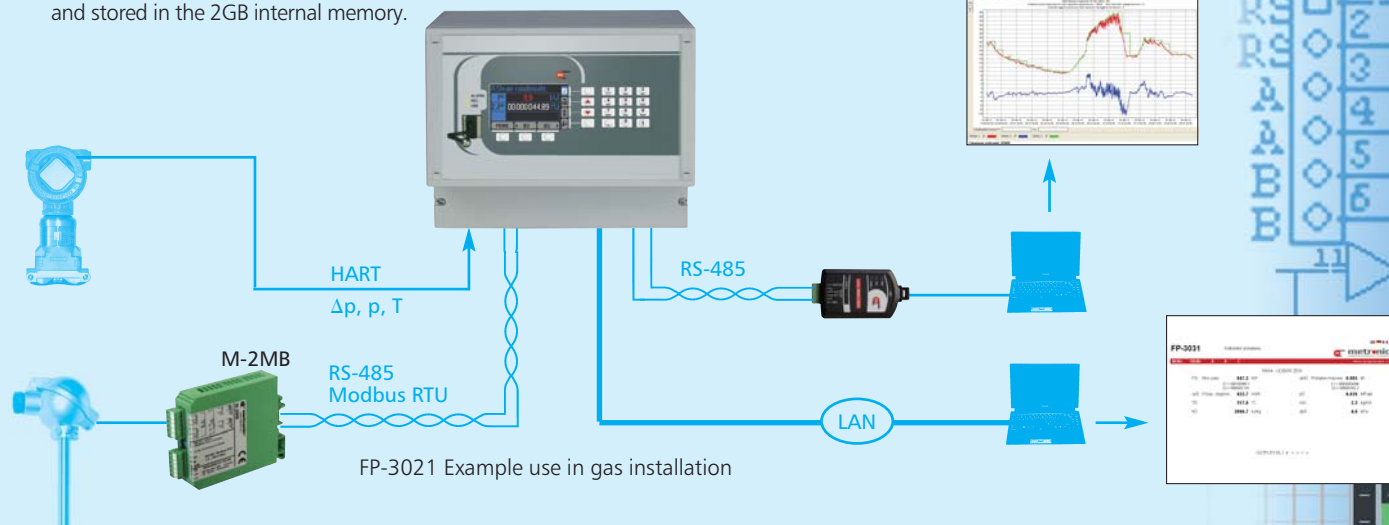
- Devices/transducers connected in parallel to one pair of wires (of an RS-485(1) port).
- Transmission rate between 1200bps and 115,200bps.
- Readout functions: **03** (Read Holding Register) and **04** (Read Input Register).
- Supported formats of variables: Uns. Integer, Integer, Uns. Long, Uns. Long(sw), Long, Long(sw), Float, Float(sw).

## ADDITIONAL MEASUREMENTS AND CALCULATIONS

- 8 additional channels: measurement of additional quantities or calculations.
- Additional quantities are omitted when performing calculations related to the flow measurement system.
- Calculated quantities may serve as auxiliary values or be used directly in measurement systems.

## RECORDING MEASUREMENT RESULTS

The FP-3021 offers extended functions for recording measured and calculated values. Data are saved in a text file, secured with an encrypted checksum and stored in the 2GB internal memory.



# FP-401

Programmable flow totalizer  
with electronic result recording



- 2 analog inputs and 2 PULS-type inputs.
- 2 math channels.
- User defined transducer characteristics for 0/4-20mA, R and U inputs and for mathematics channels.
- Large three-colour LED display and graphic OLED display 16x100 points.
- Results recorded in internal 2GB data memory. Local access to stored data through USB port on face plate.
- Alarm and control functions.
- Optional 4-20mA analog output.
- RS-485 communication port, Modbus RTU protocol.
- Ethernet communication port; Modbus TCP protocol, WWW server.

## INTENDED USE

- Measurement of flow and other quantities, e.g. temperature, humidity, pressure.
- Operation in dispersed measurement systems with local readings of measurement results.

## INPUTS

- 2 analog inputs – for connecting current loop transducers (with optional power supply from device), transducers with 0 ... 5k $\Omega$  resistance output, transducers with -1V ... +1V voltage output and RTD sensors (2-wire only),
- 2 x PULS-type inputs – pulse inputs for connecting transducers with 0.001Hz to 10kHz pulse outputs (frequency measurement or counting pulses); the inputs can also function as binary inputs for controlling result storage or strobing.

## TOTALIZERS

The following totalizers are available for inputs configured for flow measurement:

- L1 flow totalizer without resetting capability,
- L2 flow totalizer with reset button on face plate and operation modes with automatic hourly, daily and monthly reset,
- T1 and T2 time totalizers for counting the operation time of L2 erasable totalizers

## RECORDING MEASUREMENT RESULTS

- Recording data to internal 2GB memory.
- Local access to recorded data through USB port on front panel.
- Data recording rate between 0.2 s and 1 h.
- Totalizers recording rate: 15 min or 1h.
- Two recording frequencies toggled upon exceeding the set alarm thresholds.
- The archive can be controlled by binary input, device's keyboard and remotely.

## ALARM AND CONTROL SYSTEM

- 2 alarm and control thresholds AL1 and AL2 for each measurement channel, LED display colour may change if alarm occurred.
- 4 semiconducting output relays that can be freely assigned to alarm thresholds.

## COMMUNICATION WITH MASTER SYSTEM

- **RS-485 port**, ASCII character-oriented and Modbus RTU protocols.
- **Ethernet port**, Modbus TCP protocol, WWW server (preview current results and downloading an archive from the device using web browser).



# BC-3, BC-3N

## Batch-controller

- Up to 3 batch systems.
- One or two-step batching mode.
- 5 measurement inputs.
- 4 semiconducting output relays rated at 0.1A / 60V.
- 1 or 2 4-20mA analog output (option).
- Valves can be controlled by relay outputs or by 4-20mA analog output.
- 2 totalizers for each input or batcher.
- Results recorded in internal 2GB data memory.
- Local access to stored data through USB port on face plate.
- RS-485 communication port, Modbus RTU protocol.
- Ethernet communication port; Modbus TCP protocol, WWW server.
- Two case versions: panel case and wall-mounted case.



### INPUTS

The device has five measurement inputs:

- 2 x I, two inputs adapted for connection of transducers with a 0/4-20mA current output,
- 3 x I/PULS, three inputs intended for connection of transducers with a 0/4-20mA current output or with a pulse output (range 0.001Hz ... 10kHz).

### FLOW MEASUREMENT

The device cooperate with flowmeters (e.g. ultrasonic, electromagnetic, vortex) with:

- 0/4-20mA output signal proportional to flow,
- impulse output with constant pulse value,
- frequency output proportional to flow.

### BATCH FEATURES

The batching can be:

- one step,
- two steps; to reduce batch overrun, flow rate is limited at the end of the batching process.

Two outputs relays provide control for dual stage batch. At the start of the batch both valves (main and precise one) are open, at the end only the precise one.

If the analog outputs are used for control the valves the two steps of batch are executed by various values of current. BC-3(N) batcher contain "learn algorithm": the device "learn" the amount of batch overrun and then seek to turn the batch off "early" by the average amount of the batch overrun. This feature may be enabled or disabled.

### TOTALIZERS

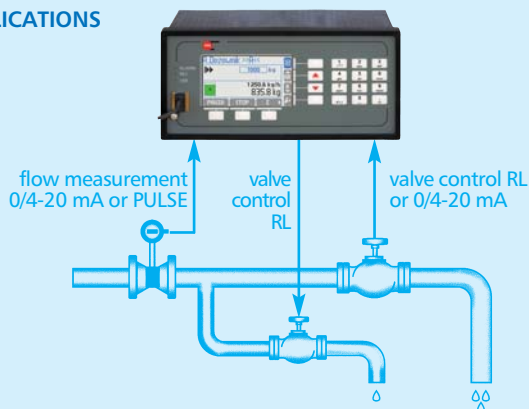
Two totalizers for each input and each of three batchers (A, B, C).

### ALARMS

The alarm situations signalled by the device:

- batch overrun: the amount of fluid is greater than the setpoint which was entered or the flow didn't stop after a set time,
- there is no flow after a specified period of time after opening the valve,
- a flow started although there is no batching.

### EXAMPLE APPLICATIONS



## MULTI-CHANNEL ELECTRONIC RECORDERS

Depending on the version, electronic recorders have between 2 and 20 measurement channels adapted for connecting RTD and TC temperature sensors, resistance and voltage transducers, 0/4-20mA current loop transducers, 0.001Hz to 10kHz pulse transmitters and transducers that share data using the RS-485/Modbus RTU and HART standards (also in multidrop mode).

The devices are available in panel-mounted or wall-mounted cases, as well as portable versions (also with own battery power supply).

The measurement results may be read locally or transmitted to a computer or control system using the RS-485 communication port. Some models have built in Ethernet ports for connectivity to industrial LAN networks.

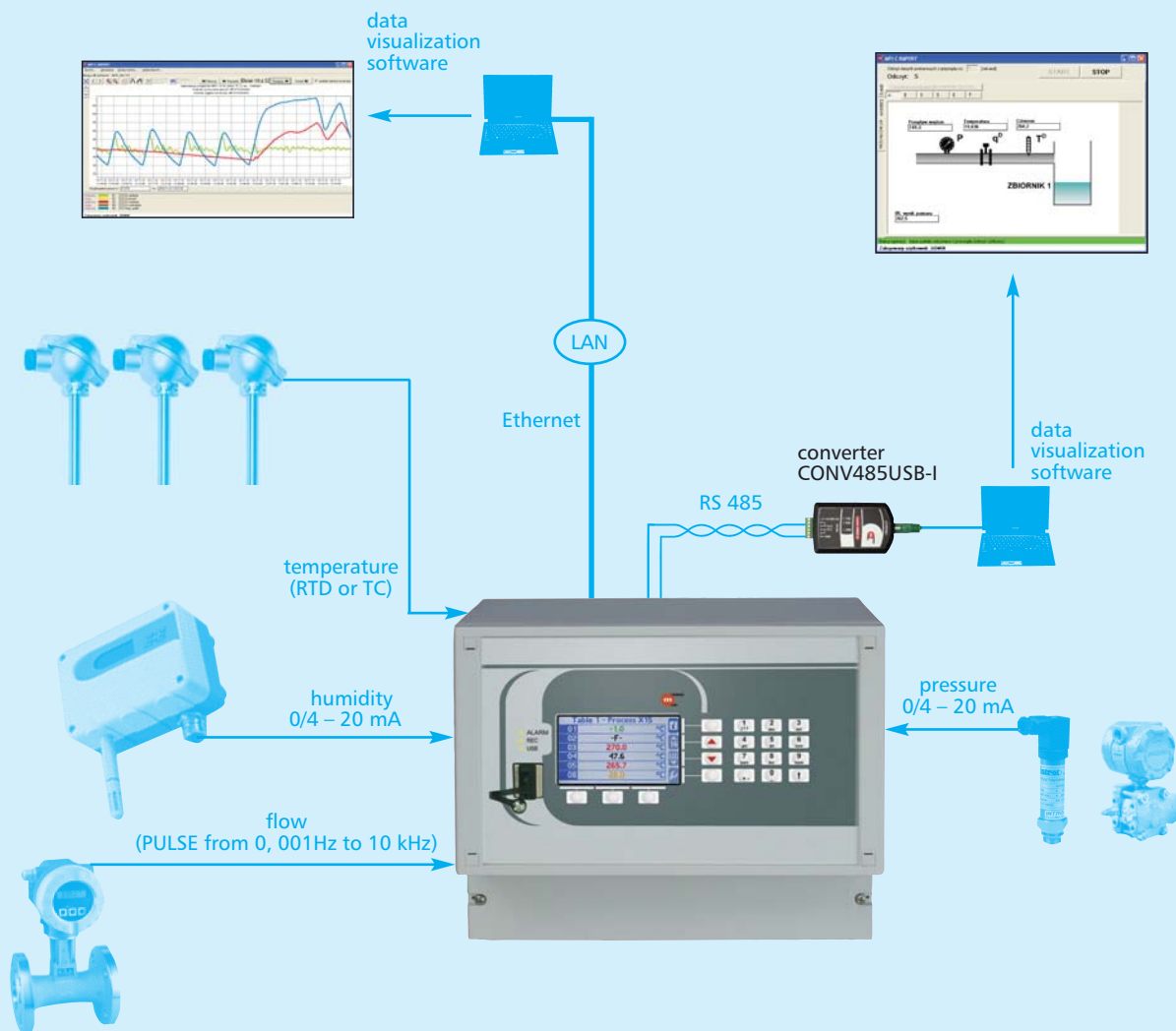
Various additional functions enable basic control and alarming, performing mathematical operations on measurement results, tracking extreme and average values.

The devices offer an extended, yet easy to operate UI for various result representation options - trends in graphical form, bar graphs, bar charts, summary result tables, etc.

The ability to combine different types of measurement inputs in one device allows our products to be customised, making them ideal for many typical and special applications.

### INTENDED USE

- Multi-point measurements of temperature and other physical quantities (e.g. humidity, pressure) with local result readings and data transmission to a master computer or control system.
- Local storage of results with basic control and alarming functionality.
- Operation in dispersed measurement systems with local readings of measurement results.



# MPI-C, MPI-CL, MPI-CN

## Multi-channel electronic recorders

- 16 or 8 universal analog inputs.
- 4 or 2 binary inputs.
- 16 calculation channels.
- 8 relay outputs – alarm and control functions.
- Internal 2GB data memory, advanced data recording.
- Colour graphic LCD TFT display.
- IP54 protected USB port on face plate.
- Ethernet Port: Modbus TCP protocol, WWW server, RS-485 port: ASCII and Modbus RTU protocols.
- Dedicated software for visualisation of measurement results.



### 16 OR 8 UNIVERSAL ANALOG INPUTS

Interaction with:

- **RTD sensors** – type Pt100 and Ni100 and their multiples (e.g. Pt200),
  - **TC sensors** – type J, L, K, T, U, E, N, B, R and S, transducers with **4-20mA** or **0-20mA** current loop output,
  - transducers with **0 Ω... 5000 Ω** resistance output,
  - transducers with **-0,8 V... +0,8 V** voltage output.
- The inputs are **galvanically separated** from one another.  
A **digital filter** with selectable time constant enables measurement of noisy signals.

### 4 OR 2 BINARY INPUTS

- Measurement of frequencies within the **0.001Hz to 10kHz** range.
- Counting pulses.
- Tracking and recording **binary signal** (shorting or disconnection).

### 16 CALCULATED VALUES

- Available functions: addition, subtraction, multiplication, division and extraction of roots.

### RECORDING MEASUREMENT RESULTS

- Recording to internal 2GB memory.
- Checksum secured files – protection against result errors.
- Recording frequency between 5 s and 24 h; define two recording frequencies toggled upon exceeding the set alarm thresholds.

### 8 RELAY OUTPUTS, ALARM AND CONTROL THRESHOLDS

- **8 semiconducting output relays** rated at **0.1A / 60V**.
- Up to **4 alarm thresholds** for each input and each calculated value.

### COMMUNICATION WITH MASTER SYSTEM

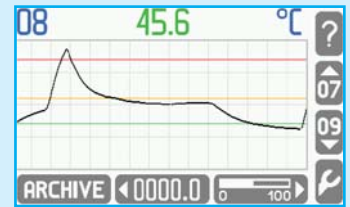
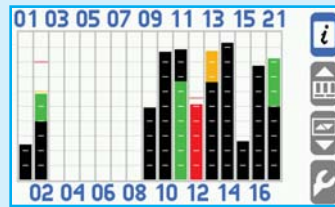
- Galvanically separated **RS-485 port**, ASCII character-oriented and Modbus RTU protocols.
- **Ethernet port**, Modbus TCP protocol, www server.

### OTHER FUNCTIONS

- **USB port** on face plate.
- **Totalizers** – two totalizers per flow value (measured or calculated).
- **Tracking minimum, maximum and average** value of each measured and calculated quantity in the selected time interval.
- Advanced user and password system.
- **Event Log**.
- **Authorised Operations Log**.
- User defined characteristics for inputs linearization.
- Three case versions: MPI-C – panel case, MPI-CL – portable case, MPI-CN – wall-mounted case.





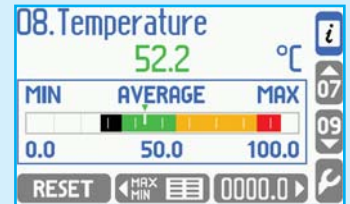


RESULTS 01...21

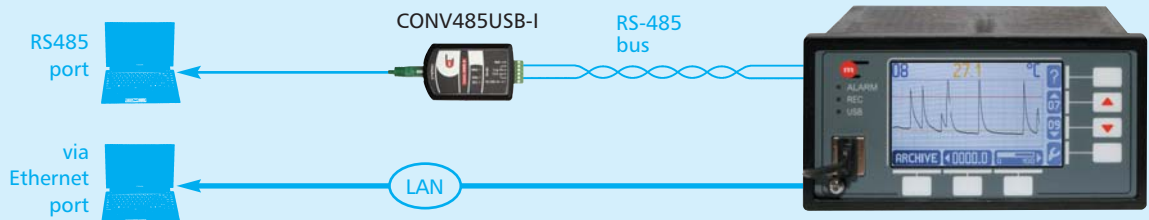
01	-1.1	07	266.7	13	-F-
02	-F-	08	92.6	14	-F-
03	-F-	09	-F-	15	-F-
04	48.7	10	-F-	16	-F-
05	265.3	11	-F-	21	8.6
06	45.2	12	-F-		
2011-01-11 09:19:53					

MAIN ARCHIVE

File ar01_013.txt
Status
• REC
10 secs
10 secs
The successive file:
→ 2011-01-11 00:00
MORE MENU STOP



### EXAMPLE APPLICATIONS



Remote reading devices by two independent systems



Data reading via Internet

# MPI-D, MPI-DN

## Multi-channel electronic recorder

- 20 measuring channels.
- Interaction with RS-485 / Modbus RTU transducers and devices and HART devices (also in multidrop mode).
- 2 PULS-type inputs.
- 16 calculation channels.
- 4 relay outputs – alarm and control functions.
- Internal 2GB data memory, advanced data recording.
- Colour graphic LCD TFT display.
- IP54 protected USB port on face plate.
- Communication with master system: Ethernet port and RS-485 port.
- Dedicated software for visualisation of measurement results.



### MEASUREMENT CHANNELS

- 18 channels intended for data readout from Modbus RTU protocol devices and transducers and HART protocol transducers.
- 2 channels intended for interaction with PULS-type inputs (measurement of frequencies within the range of 0.001Hz ... 10kHz, pulse counting, tracking and recording the shorting / disconnecting binary signal).



### HART

- Readout of digital quantities from transducers/devices connected in parallel to a current loop.
- Operation as Primary Master or Secondary Master.
- Readout of variables: **PV** – primary variable, **SV** – secondary variable, **TV** – third variable, **FV** – fourth variable.

### MODBUS RTU

- Devices/transducers connected in parallel to one pair of wires (of an RS-485(1) port).
- Transmission rate between 1200bps and 115,200bps.
- Readout functions: **03** (Read Holding Register) and **04** (Read Input Register).
- Supported formats of variables: Uns. Integer, Integer, Uns. Long, Long, Long(sw), Float, Float(sw).

### 16 CALCULATED VALUES

- Available functions: addition, subtraction, multiplication, division and extraction of roots.

### RECORDING MEASUREMENT RESULTS

- Recording to internal 2GB memory.
- Checksum secured files - protection against result errors.
- Recording frequency between 5 s and 24 h; define two recording frequencies toggled upon exceeding the set alarm thresholds.

### 4 RELAY OUTPUTS, ALARM AND CONTROL THRESHOLDS

- **4 semiconducting output relays** rated at **0.1A / 60V**.
- Up to **4 alarm thresholds** for each input and each calculated value.

### COMMUNICATION WITH MASTER SYSTEM

- Galvanically separated **RS-485 port**, ASCII character-oriented and Modbus RTU protocols.
- **Ethernet port**, Modbus TCP protocol, WWW server.

### OTHER FUNCTIONS

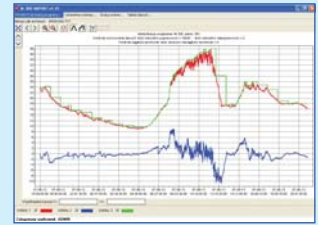
- **USB port** on face plate.
- **Totalizers** – two totalizers per flow value (measured or calculated).
- **Tracking minimum, maximum and average** values.
- Advanced user and password system.
- **Event Log**.
- **Authorised Operations Log**.
- Two case versions: MPI-D - panel case, MPI-DN - wall-mounted case.



# MPI-8, MPI-8/4

eight- or four-channel  
electronic recorder

- 3 device versions: temperature, current, universal (**with galvanically separated channels**).
- 8 or 4 analog inputs.
- Optional 4-20mA analog output.
- 5 relay outputs – alarm and control functions.
- Advanced data recording to removable SD/MMC cards.
- RS-485 port: ASCII and Modbus RTU protocols, optional Ethernet port. Modbus TCP protocol, WWW server.
- Dedicated software for visualisation of measurement data.



## INPUTS

Interaction with:

- **RTD sensors** – type Pt100, Pt1000 and Ni100 (only in universal and temperature versions),
- **TC sensors** – type J, L, K, T, U, E, N, B, R and S (only in universal and temperature versions),
- transducers with **4-20mA** or **0-20mA** current loop output (only in universal and temperature versions; in current version, the loop can be supplied from the device),
- transducers with **0 Ω ... 100 Ω** and **0 Ω ... 1000 Ω** resistance output (only in universal and temperature versions),
- transducers with **0 V ... +2,5 V** voltage output (only in universal version).

## RECORDING MEASUREMENT RESULTS

- Recording results to 2GB removable SD/MMC cards.
- Data saved to text file secured with a checksum.
- Setting data recording rate between 3 s and 24 h.
- Define two recording frequencies toggled upon exceeding the set alarm and control thresholds

## 5 RELAY OUTPUTS, ALARM AND CONTROL THRESHOLDS

- **5 semiconducting output relays** rated at **0,1 A / 60 V**.
- Up to **4 alarm thresholds** for each input and each calculated value.

## COMMUNICATION WITH MASTER SYSTEM

- **RS-485 port**, ASCII character-oriented and Modbus RTU protocols.
- **Ethernet port**, Modbus TCP protocol, WWW server (optional).



# MPI-8E

eight-channel  
electronic recorder



- 8 analog inputs.
- Advanced recording function allows storage of data on an internal 2GB data memory. USB port for transferring recorded data.
- RS-485 port: ASCII and Modbus RTU protocols.
- Graphic LCD display with touch-panel keyboard.
- Dedicated software for visualisation of measurement data.
- High protection rating case cover (IP 67 with closed case) available in yellow or black.
- Power supply from internal rechargeable battery, 230VAC or 12VDC supply network (e.g. car lighter socket).

## INPUTS

Interaction with:

- **RTD sensors** – type Pt100, Pt1000 and Ni100,
- **TC sensors** – type J, L, K, T, U, E, N, B, R and S,
- transducers with **4-20mA** or **0-20mA** current loop output (the loop can be supplied from the device),
- transducers with **0 Ω ... 100 Ω**, and **0 Ω ... 1000 Ω** resistance output,
- transducers with **-1V ... +1V** voltage output.

## RECORDING MEASUREMENT RESULTS

- Recording results to 2GB internal memory.
- Data saved to text file secured with a checksum.
- Setting data recording rate between 3 s and 24 h.
- Define two recording frequencies toggled upon exceeding the set alarm and control thresholds.

## COMMUNICATION WITH MASTER SYSTEM

- **RS-485 port**, ASCII character-oriented and Modbus RTU protocols.

## OPERATION WITH INTERNAL RECHARGEABLE BATTERY

Depending on device configuration and input scanning frequency, the device can function for several hours or over 80 hours using the internal power supply. For longer operation times, you can connect an external higher capacity 12V rechargeable battery.

# M-200

three-channel  
electronic recorder

- 3 measurement inputs.
- 2 relay outputs, alarm and control functions.
- Advanced data recording to internal 2GB memory.
- Local access to recorded data through USB port on face plate.
- Communication with master system: RS-485 port with Modbus RTU protocol and Ethernet port with Modbus TCP protocol and WWW server.
- Dedicated visualisation software.



## ANALOG INPUTS

2 analog inputs, interaction with:

- type Pt100, Pt200, Pt500, Pt1000 RTD sensors (2-, 3- or 4-wire),
  - type J, K, T, E, B, N, R, S TC sensors with internal cold junction compensation,
  - transducers with 4-20mA or 0-20mA current loop output (the possibility of user defined characteristics),
  - transducers with 0  $\Omega$ ... 5 k $\Omega$  resistance output (the possibility of user defined characteristics),
  - transducers with -10V ... +10V voltage output (the possibility of user defined characteristics).
- For 3- or 4-wire connections, only one analog input is available.

## PULS-TYPE INPUT

PULS-type input (measurement of frequencies within the range of 0.001Hz ... 20 kHz, pulse counting, tracking and recording the shorting / disconnecting binary signal).

## RECORDING MEASUREMENT RESULTS

- Recording data to internal 2GB memory.
- Local access to recorded data through USB port on front panel.
- Setting data recording rate between 0.2 s and 1 h.
- Advanced recording functions, two recording frequencies toggled upon exceeding the set alarm thresholds.
- The archive can be controlled by binary input, device's keyboard and remotely.

## 2 RELAY OUTPUTS, ALARM AND CONTROL THRESHOLDS

- 2 alarm and control thresholds for each channel.
- 2 x 60V / 0.1A semiconducting output relays.

## COMMUNICATION WITH MASTER SYSTEM

- **RS-485 port**, Modbus RTU protocol.
- **Ethernet port**, Modbus TCP protocol, WWW server (preview current results and downloading an archive from the device using web browser).

## DISPLAYING THE RESULTS

- 5-position, 3-colour (green, orange, red) LED display.
- 6 indicator diodes.
- Dedicated software for visualisation of measurement results.

## INTERACTION WITH PRINTER

- Communication with printer through RS232/TTL port.
- Printing of measurement data, pressing the button causes start and stop of printing.

## VERSIONS

- M-200-0: device with RS485 communication port.
- M-200-1: device with RS232/TTL port for interaction with printer.

# M-2MB

2-channel input module  
with conversion of analog signals  
to RS-485 / Modbus RTU digital values



## INPUTS

2 analog inputs, interaction with:

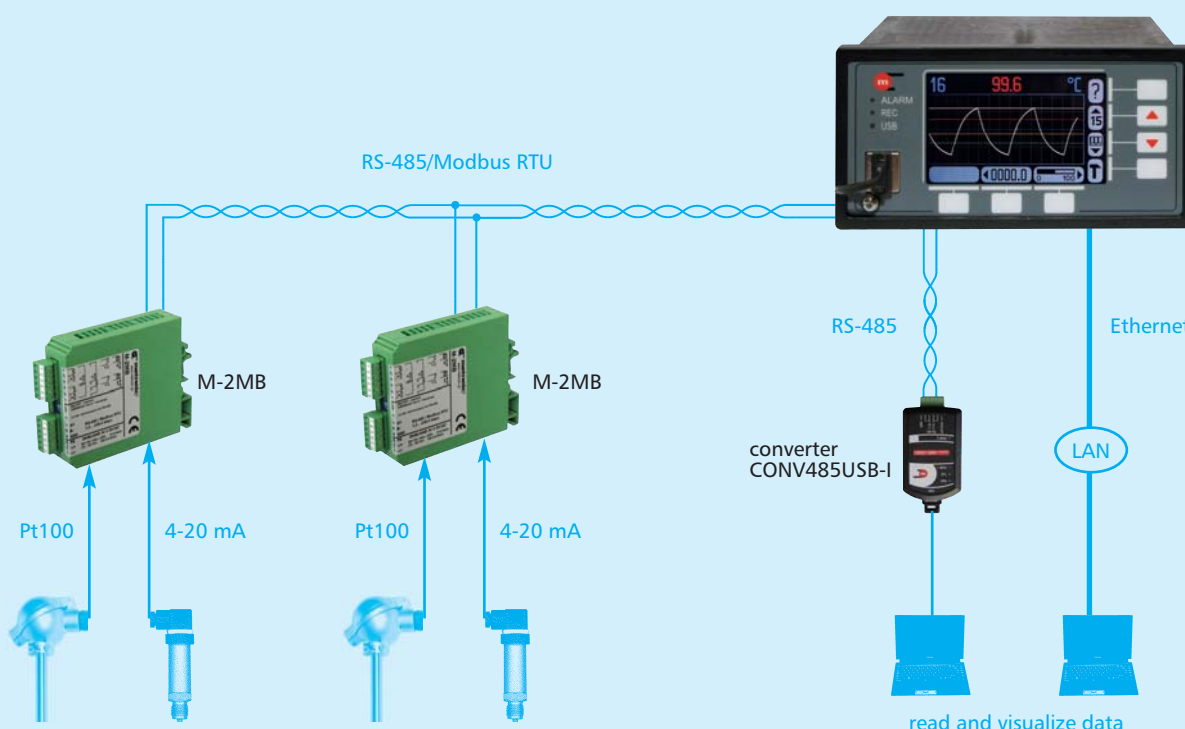
- type Pt100, Pt200, Pt500, Pt1000 RTD sensors (2-, 3- or 4-wire),
- type J, K, T, E, B, N, R, S TC sensors (automatic cold junction temperature compensation),
- transducers with 4-20mA or 0-20mA current loop output,
- transducers with 0 ... 2.5 kΩ linear resistance output,
- transducers with -1V ... +1V linear voltage output.

For 3- or 4-wire connections, only one analog input is available.

The transducer with current output requires an external power supply, usually 24VDC.

## COMMUNICATION WITH MASTER SYSTEM

- Galvanically separated RS-485 port, transmission compliant with Modbus RTU protocol.
- Switch operated internal termination system.
- RS-485 transmission rate: 1200bps to 230,400bps
- 5 Modbus functions: 03, 04, 06, 08, 16.



M-2 MB example use



# M-8D

8-channel binary input module  
with pulse counting function

- 8 binary inputs, interaction with OC type outputs and contact.
- Galvanic separation of inputs in two groups (2 x 4).
- RS-485 Communication Port, Modbus RTU protocol.
- Input, power supply and communication status signalling (9 LEDs).
- 24V AC/DC power supply.



## INTENDED USE

- Tracking the status of binary signals.
- Measuring flow stream; can be connected to eight flowmeters.
- Counting pulses in different industrial automation systems.
- Operation as part of a dispersed measurement system.

## OFFERED FUNCTIONS

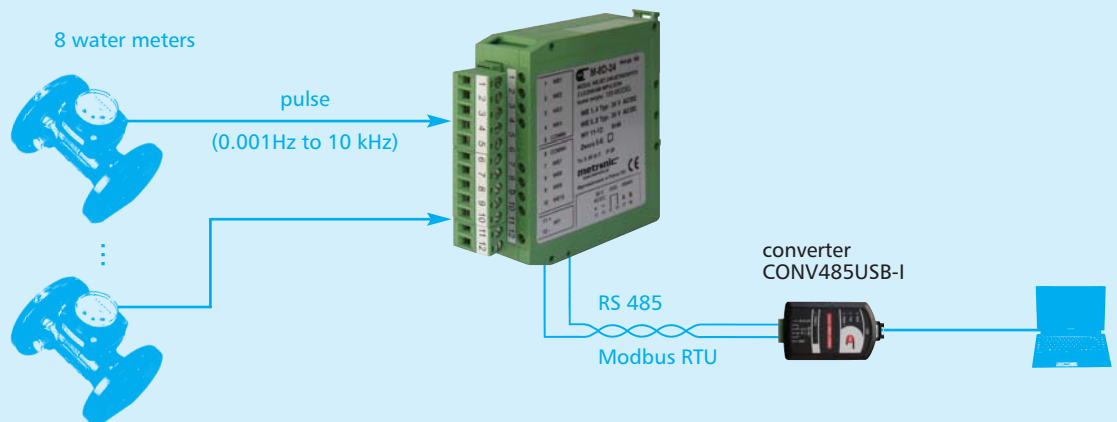
- Tracking the status of inputs.
- Counting pulses with programmed pulse weight (2 totalizers per input).
- Measuring the amount of pulses within a time unit with the inclusion of pulse weight (/s, /min, /h, /day).

## VERSIONS

Depending on the version, inputs are adapted to different voltage levels:

- inputs adapted to interaction with 0/5VDC signals,
  - inputs adapted to interaction with 0/5VDC signals along with 5VDC / 100mA output for supplying input systems,
  - inputs adapted to interaction with 0/24VDC signals.
- Configuration according to special orders is also possible.

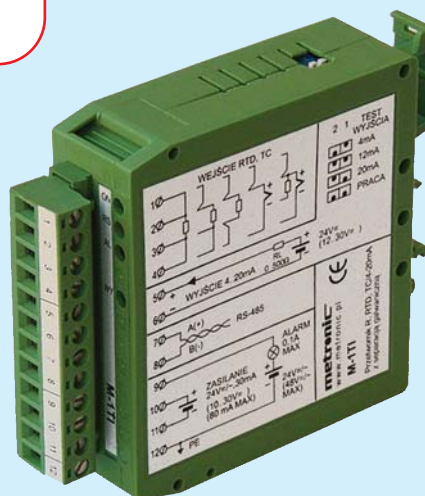
## EXAMPLE APPLICATION



# M-1TI

programmable precise  
RTD, TC, R, U / 4-20mA transducer

- Conversion of temperature (RTD, TC), resistance (R) or voltage (U) sensor signals to 4-20mA current loop signals.
- Choose any processing range. Can work with 20-4mA reversed characteristics.
- Digital low-pass filter with constant time value  $T_O = 0...300$  s (elimination of signal fluctuation).
- Alarm and control relay output with LED signal lamp.
- Test - 4mA, 12mA, 20mA forced current.
- Galvanically separated input, output and power supply circuits.



## RTD, R INPUT

The transducer RTD, R input enables connection of:

- resistance temperature sensors type: Pt-100, Pt-1000, Ni-100, Cu-53 in 2-, 3- or 4-wire configuration,
- linear resistance transducer with a range of 0 to 5000  $\Omega$  (e.g. position transducer).

Additionally:

- Correction of the resistance of power supply wires with a constant value between 0  $\Omega$  and 5  $\Omega$ ,
- using a multiplier (1x to 9x), a system for averaging measurements performed from several measuring points may be achieved. The system consists of sensors connected in parallel. The same method allows for connecting non-standard sensors, e.g. Ni-200 = 2x Ni-100, Pt-500 = 5x Pt-100.

## TC, U INPUT

The transducer TC, U input enables connection of:

- type J, K, T, E, B, N, R, S, L, U thermocouples,
- linear voltage -120mV to +120mV transducer.

Additionally:

- cold junction temperature compensation is achieved through an external Pt-100 temperature sensor,
- in the case of several M-1TI transducers, you can use one Pt-100 sensor and send data to other transducers through the RS-485 communication port.

## 4-20mA OUTPUT

- The measurement result is converted to an analog 4-20mA signal at a resolution of 16 bits.
- Freely programmable processing range.
- Optional reversed operation i.e. an increase in the input signal can cause reduction in the current loop.
- Results are refreshed approx. every 0.5 s.
- First order low-pass passive filter with time constant between 0.1 s and 300 s.
- Test - 4mA, 12mA, 20mA forced current loop.
- The transducer requires an external power supply for the loop, usually 24VDC.

## ALARM AND CONTROL OUTPUT

- Two alarm and control thresholds.
- One semiconducting relay rated at 48V / 0.1A.



# CONV485E

RS-485 ↔ Ethernet TCP/IP converter

- Enables data exchange between devices with RS-485 ports and devices operating in computer LAN networks or industrial Ethernet networks.
- 10BaseT ETHERNET port.
- RS-485 port (2400bps to 115.2kbps).
- 2 modes of operation: Client and Server.
- 2 protocols: "Transparent" and Modbus TCP↔RTU.
- Conversion of Modbus TCP to Modbus RTU.
- Support of up to 6 clients.
- 5 LEDs for converter operation.
- Simple configuration through web browser.
- 3 power supply versions: 24V DC/AC, 5VDC, PoE (Power over Ethernet).
- 2 case versions: plastic and metal.
- Can be mounted on TS-35 busbar.



## CLIENT MODE

The converter enables data exchange between master systems operating in RS-485 networks and devices equipped with an Ethernet port.

## SERVER MODE

The converter enables data exchange between master systems operating in LAN networks with TCP/IP protocol and devices equipped with a RS-485 serial port.

## "TRANSPARENT" PROTOCOL

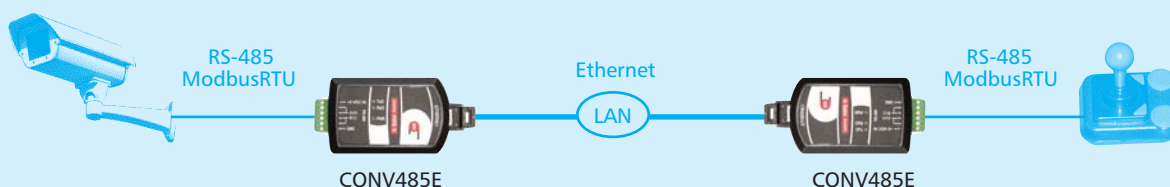
The converter transmits the received string of characters between a LAN network and an RS-485 network.

## MODBUS TCP↔RTU PROTOCOL

Le convertisseur reçoit des données du dispositif fonctionnant avec un protocole Modbus TCP, convertit la trame au protocole Modbus RTU et transfère les données à un réseau RS-485 fonctionnant dans ce standard – et vice versa.

## EXAMPLE USE

CONV485E example use in monitoring camera control



# CONV485USB-I

RS-485 ↔ USB converters

# CONV485USB

- Connecting devices equipped with an RS-485 port to PCs with USB ports.
- RS-485 port.
- USB port, transmission compliant with USB 2.0.
- CONV485USB converter with no galvanised separation. For laboratory use.
- CONV485USB-I converter with galvanised separation. For laboratory and industrial use.
- Software (virtual serial port) enables use of programs that utilise the COM serial port.
- Signalling LEDs.
- CONV485USB-I available also with TS busbar holder.



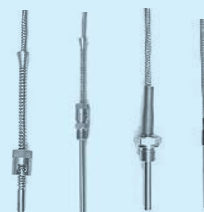
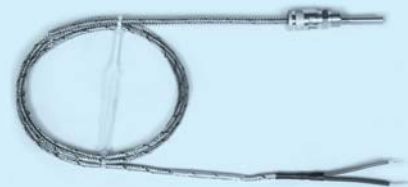


- Dedicated software for individual devices.
- Remote readout of current measurement results - preview.
- Remote readout of data stored in the device.
- Processing and visualisation of data transferred from device to computer hard drive.
- Viewing results in graphical (chart) and tabular form.
- Selecting data, averaging results, searching for minimum and maximum values.
- Verifying measurement results: data encryption and archive continuity control.
- Printed reports.



## TEMPERATURE SENSORS

- Resistance temperature sensors type: Pt100, Pt200, Pt500, Pt1000, Ni100.
- Thermocouples.
- Head-type sensors.
- Cable-type sensors.
- Sensors in cases adapted to wall mounting.
- Versions with 4-20mA transducers.



Type:  
**TOPE 21, TT (J, K) E**

Plug with screw  
**TOPE 363, 364, 365**

Without joins  
**TOP100, TOP230, TOPE41**



With threaded terminal:  
**TOPGB1, TOPGN1**



Without terminal:  
**TOPI6, TOPP1**



Mounts:  
**UG1-6, UG1-8**



Versions with head, connection plug, compensation wire or in wire-form only:  
**PTTK-NA, PTTK-MA, PTTK-W, PTTK-PK, PTTK-BT**



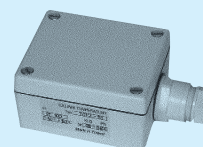
Type: **TOPE 116**



**TOPE 6**



**TOPGE 3**



**TOPZ5** – sensor for ambient temperature measurement





