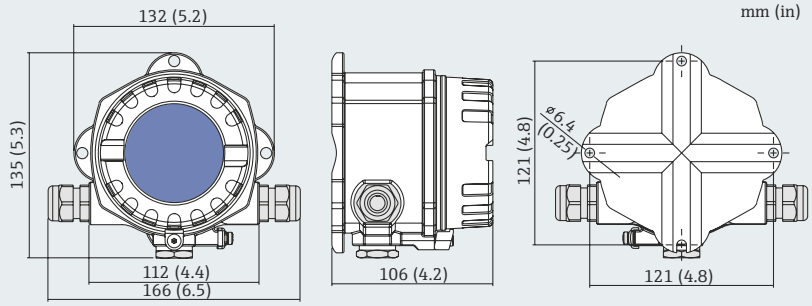
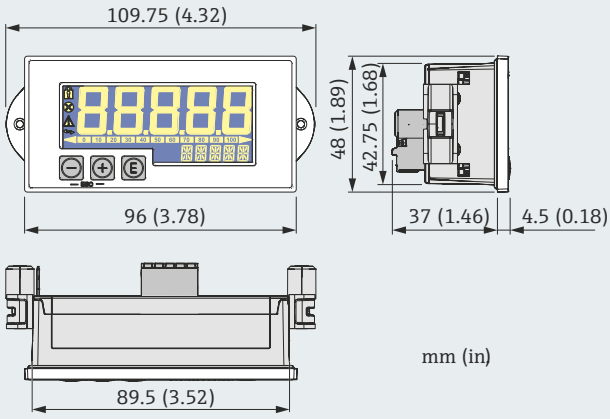
The measuring range, decimal point and offset of the indicator can be quickly and easily configured via the three keys when the housing open or using a PC with FieldCare software. It features configurable device parameters such as measuring dimension, measuring ranges (linear/square), setup block using user code, failsafe mode, digital filter (damping), offset, limit value (min/max/alarm) and freely adjustable alarm limit values.

Dimensions (mm)

mm (in)

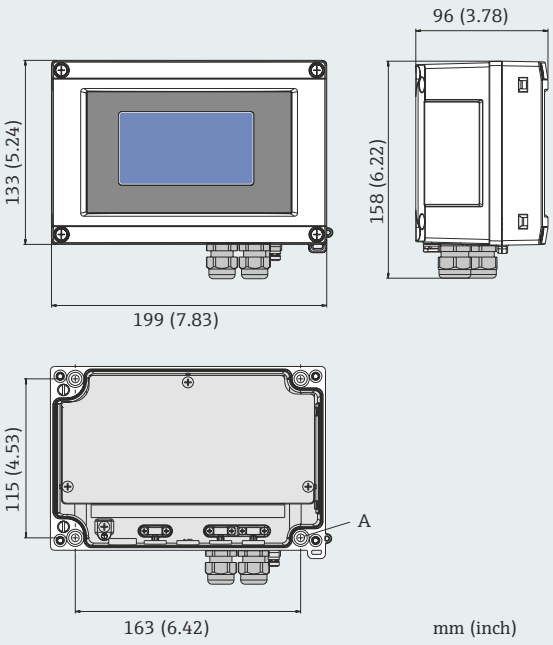


RIA14 with explosion-proof enclosure



mm (in)

RIA15 with field housing



mm (inch)

RIA16 with GRP housing

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RID14/16

8-channel field indicator with FOUNDATION Fieldbus.

RID14

RID16

- Clear back-lit display
- Bar graph, diagnostics symbols and plain text fields
- Listener mode for up to 8 channels or digital statuses
- Suitable for hazardous areas
- Voltage drop ≤1V (RIA15)

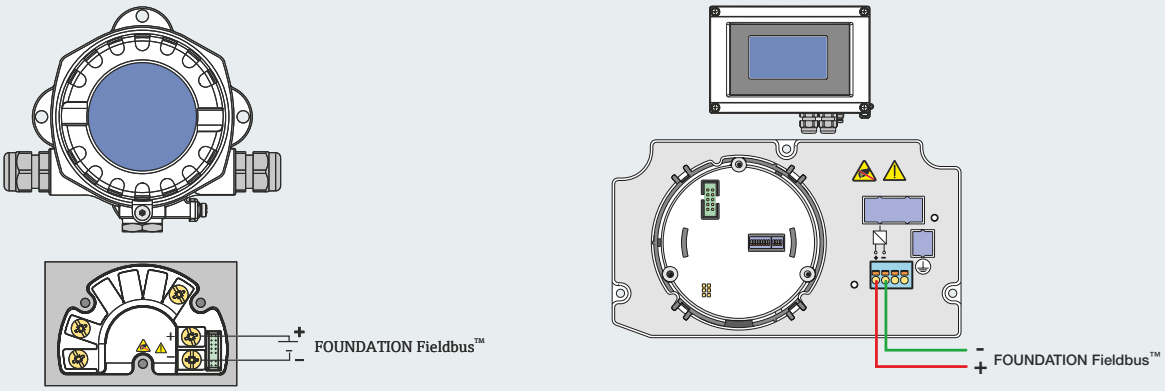
As an 8-channel digital indicator, the RIA 14/15/16 displays the measured values, calculated values and status information of the fieldbus users in a FOUNDATION Fieldbus network. In the listener mode, the device listens to the set fieldbus addresses and displays their specific values. Furthermore, values available on the bus can be displayed via function block interconnection.

Individual configurations can be set for each channel. Analogue values from the bus user are displayed as a 5-digit number while digital values are displayed as plain text e.g. on/off, open/close and numerical values etc. The process value status is indicated by icons or as plain text on the measured value display, making it possible to display alphanumeric character combinations e.g. the TAG.

Technical data

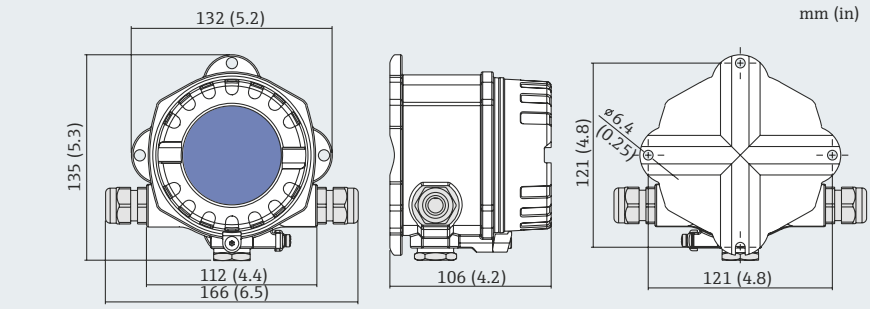
	RID14	RID16
Display	: 5-digit LCD (rotatable in 90°)	5-digit LCD
Display range	: -19999...+99999	-19999...+99999
Measured variable	: Up to 8 variables	Up to 8 variables
Measuring range	: FOUNDATION Fieldbus	FOUNDATION Fieldbus
Limit value violation	: Lower/upper limit value exceeded	Lower/upper limit value exceeded
Max measured error	: < 0.1% of scaled display range	< 0.1% of scaled display range
Housing	: Die-cast aluminium (stainless steel as an option)	GRP (aluminium as an option)
Mounting location	: Wall or pipe	Wall or pipe
Operation	: 3 push-buttons (open housing)	3 push-buttons (open housing)
Ambient temperature	: -40...+80°C	-40...+80°C
Protection	: IP67 (NEMA4X)	IP67 (NEMA4X)
Certification	: ATEX, FM, CSA	ATEX, FM, CSA

Electrical connection

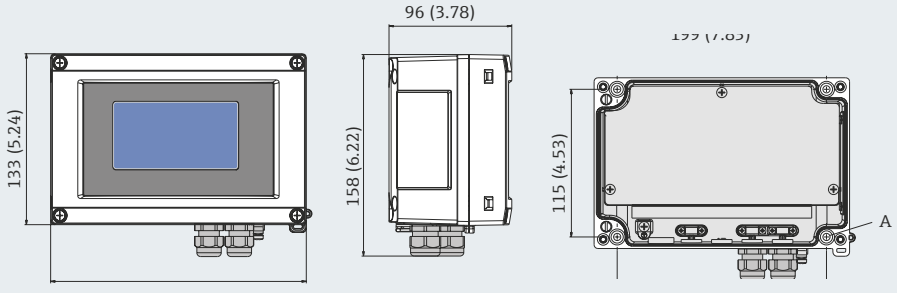


RID16 : Terminal assignment of the field display unit

Dimensions (mm)



RID14 with explosion-proof enclosure



RID16 with GRP housing

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RIA45/46

Digital process display and control unit.

RIA45

RIA46

- 5-digit rear-illuminated display
- User-configurable dot matrix display range for bar graph, units and tag name
- 1 or 2 universal inputs
- 32-point linearisation table

The RIA45 and RIA46 process displays power the transmitter and process analogue signals from transmitters, particularly process instrumentation. These signals are monitored, evaluated, calculated, saved, separated, linked, converted and displayed. The signals, intermediate values and the results of calculations and analysis are transmitted by digital or analogue means.

The RIA45 and RIA46 are process transmitters controlled by a microcontroller and exhibit a display, analogue inputs for process and status signals, analogue and digital outputs and an interface for configuration. Connected sensors (e.g. temperature, pressure) can be powered by the integrated transmitter power supply system. The signals to be measured are converted from analogue to digital signals, processed digitally in the device and then converted from digital to analogue signals and made available to the various outputs. All measured values, and any calculated values, are available as a signal source for the display, all outputs, relays and the interface. It is possible to make multiple use of the signals and results (e.g. a signal source as an analogue output signal and limit value for a relay).

The following maths functions are available: sum, difference, mean and linearisation.

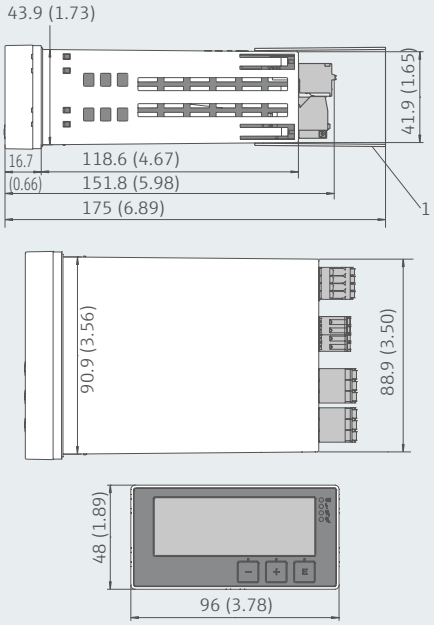
Technical data

Display type	:	Panel mounted (RIA45), field housing (RIA46)
Display	:	5-digit, 7-segment backlit LC display (dot matrix for text/bar graph)
Display range	:	-99999 to +99999 for measured values
Signalling	:	Setup security locking (lock), measuring range overshoot/undershoot, 2 x status relay (only if relay option was selected)
Measured variable	:	Current, voltage, resistance, resistance thermometer, thermocouples
Inputs	:	One or two universal inputs
Output signal	:	One or two analogue outputs, galvanically isolated
Power supply	:	Wide-area power supply unit 24 to 230 V AC/DC (-20% / +10%) 50/60Hz
Power consumption	:	Max 12 VA
Power consumption	:	ATEX, CSA, FM, TIIS, NEPSI

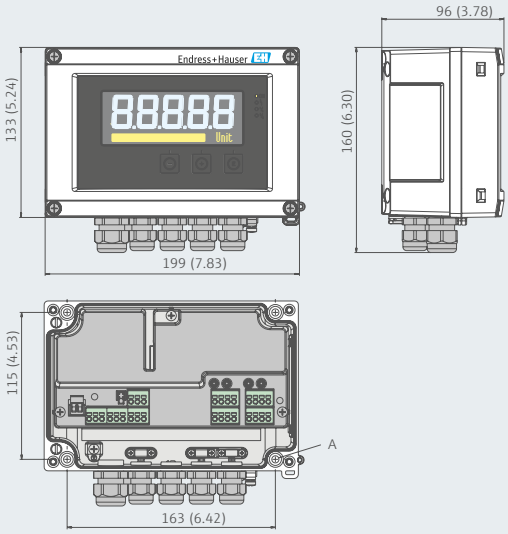
Linearisation function

Up to 32 user-definable points are available in the device per calculated value to linearise the input, e.g. for tank linearisation. In the case of the two-channel device (option), mathematics channel M2 can be used to linearise mathematics channel M1. Linearisation is also available in the FieldCare configuration software.

RIA45 dimensions



RIA46 dimensions



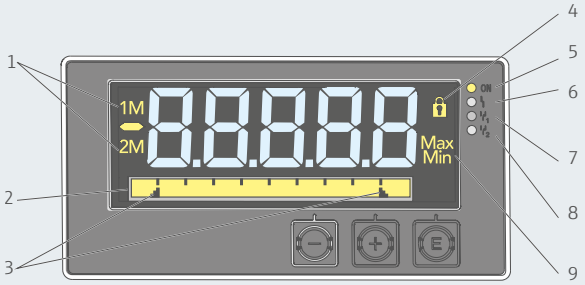
Dimensions of the field display unit

H = 160mm for plastic housing, 161mm for aluminium housing
A = Drill-hole for direct wall mounting or on optional mounting plate with 4 screws Ø5mm

RIA45 display

Display elements

1. Channel display: 1= analogue input 1, 2 = analogue input 2, 1M = calculated value 1, 2M = calculated value 2
2. Dot matrix display for TAG, bar graph and unit
3. Limit value indicators in the bar graph
4. 'Operation locked' indicator
5. Green LED, measuring device operational
6. Red LED, error/alarm
7. Yellow LED, status of relay
8. Yellow LED, status of relay
9. Minimum/maximum value indicator



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RIA452

Multifunctional digital display.

- 7-digit LC colour display
- Graphic display with bargraph and relay indication
- Scalable current or voltage analogue output
- ATEX certification

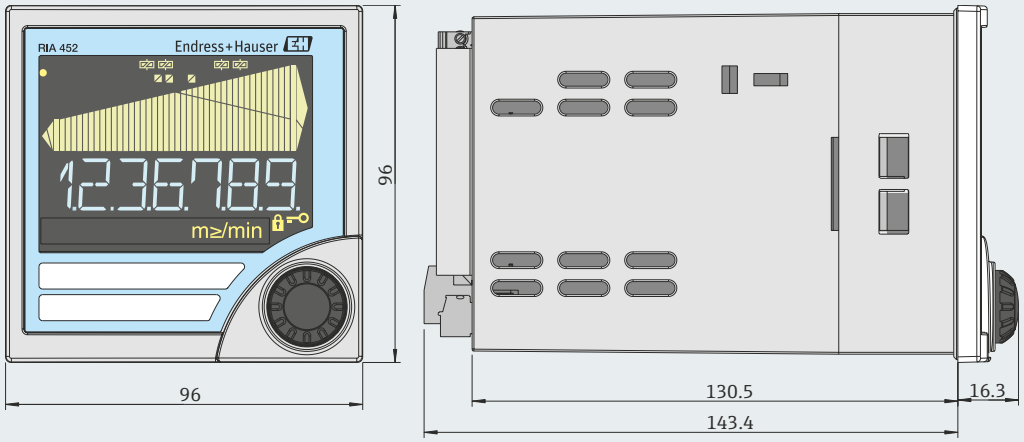
The RIA452 single-channel process display unit monitors and displays analogue measured values. Pumps and valves etc can be monitored with the digital status inputs. The measured value is displayed using the 7-digit 14-segment LC display. Numbers and engineering units are displayed in white, the bargraph in yellow, over-range and under-range in red and the limit value flags and digital status inputs in green and yellow. The RIA452 can provide power directly to 2-wire transmitters. You have the option of selecting the input and the transmitter power supply as intrinsically safe for hazardous area applications. Up to eight freely programmable relays monitor the measured value for limit value violation. Other operating modes for the relays include sensor or device malfunction, batch and pump control functions (e.g. alternating pump control).

The scalable analogue output offers many different ways of forwarding the input signal such as zoom function, linearisation, offset, inversion and signal conversion (input/output conversion). The optional pulse output gives the user the option of transmitting integrated process values.

Technical data

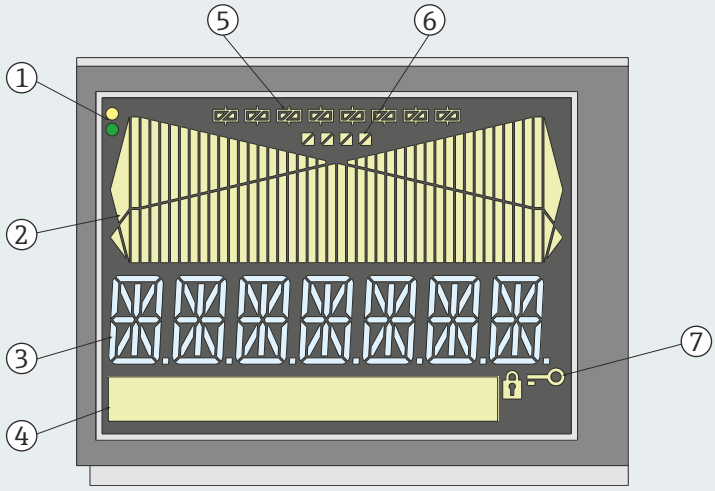
Current input	:	0/4...20mA +10% over-range
Voltage	:	±40mV, ±150mV, ±600mV, ±2.5V, 0...10V, ±10V
Resistance Thermometer	:	Pt100/500/1000, Cu50/100, Pt50 in 3/4-wire technology
Thermocouple types	:	J, K, T, N, B, S, R as per IEC581-1
Digital input	:	Voltage level -3...5V low, 12...30V high
Output signal	:	Relay, transmitter power supply (standard) current, voltage, pulse, intrinsically safe power supply (option)
Display range	:	-19999...+99999
Approvals	:	ATEX, FM, CSA

Dimensions (mm)



Display

1. Device status LEDs: green = ready, red = malfunction
2. Bargraph showing over-reach and under-reach
3. 7-digit 14-segment display
4. Unit and text field 9x77 dot matrix
5. Limit value flags 1...8
6. Status display, digital inputs
7. Symbol for 'device operation blocked'



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RMA42

Universal process transmitter with control unit.

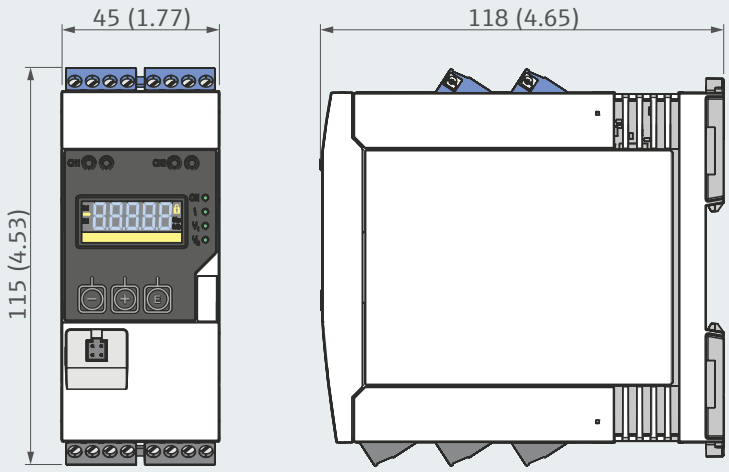
- 5-digit, 7-segment LC back-lit display
- 1 or 2 calculated values and linearization table
- Min/max value saved
- SIL 2 approval (optional)
- Suitable for hazardous areas

The RMA42 cleverly combines a universal transmitter, loop power supply, barrier and a limit switch all in one device! Analogue measured values are indicated, evaluated and calculated by the process transmitter. With the integrated loop power supply two-wire sensors can be powered. The universal inputs enable the connection of current, voltage, RTDs and TCs. Limit values can be monitored and relays can be switched. Via analogue outputs, process signals can be forwarded. In addition, the integrated 'differential pressure' application package allows quick and easy commissioning for differential pressure applications.

Technical data

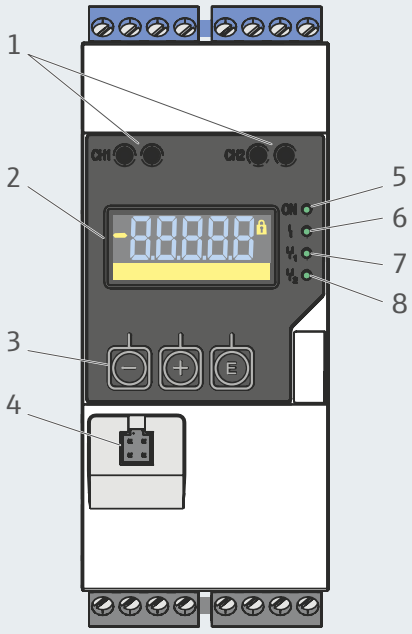
Display	: 5-digit, 7-segment backlit LCD
Display range	: -99999 to +99999
Input	: 2 x universal (current, voltage, R, RTD, TC, resistance)
Output	: 2 x analogue (current, voltage)
Relay output	: 2 x relay, 1 x open collector
Power suppy	: 24V intrinsically safe loop power
Dimensions	: 45 x 115 x 118mm
Software	: Internal software for calculations, linearization, limit monitoring; monitoring of sensor wires according NAMUR NE43; application package differential pressure measurement
Operation	: 3 push-buttons on front, PC configuration via FieldCare
Operating voltage	: 20...250V AC/DC
Certification	: ATEX, FM, NEPSI, CSA, CSA GP, UL, GL, KTA, German WHG overfill protection

Dimensions (mm)



Display elements

Display and operating elements of the process transmitter
1. HART connection sockets
2. Display
3. Operating keys
4. PC interface connection port
5. Green LED: on = supply voltage applied
6. Red LED: on = error/alarm
7. Yellow LED: on = relay 1 energized
8. Yellow LED: on = relay 2 energized



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RTA421

Contactor with loop power supply for monitoring current or voltage signal.

- 2 relays for set point monitoring (with changeable contacts)
- Loop power supply for connected sensors
- LCD display for alarm set points and bar graph
- Compact housing
- Front-end set-up using 3 pushbuttons

The RTA421 contactor monitors industrial processes for safe operation. The unit analyses current (0/4...20mA) and voltage signals (0/2...10V) and switches two independent output relays if the values either exceed or undercut the preset alarm set points. Applications include pump control in the wastewater industry and level measurement in silos.

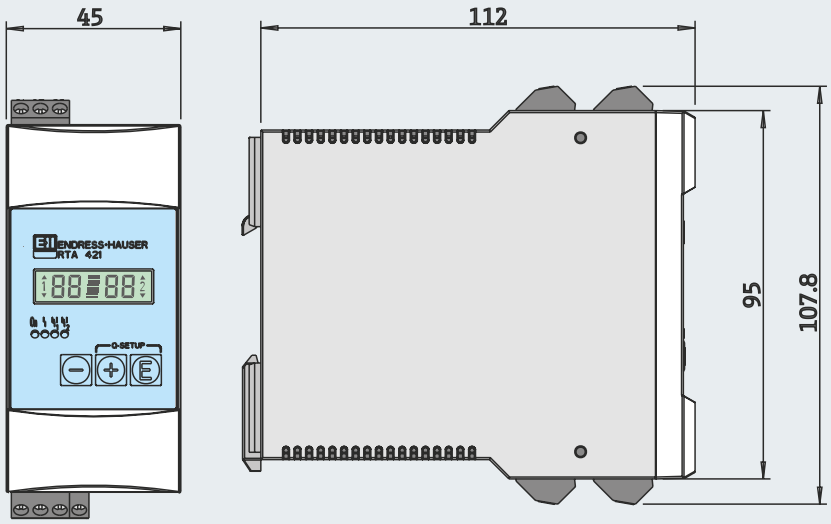
Applications

- Plant and machine construction
- Panel builders
- Process monitoring
- Process control

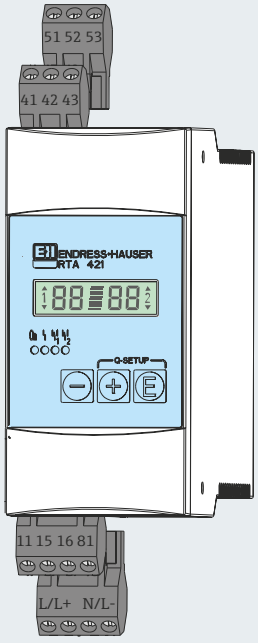
Technical data

Certification	: Non-Ex
Power supply	: 196...253V AC, 50/60Hz with loop power supply
Number of inputs	: 1
Type	: Voltage and current
Number of outputs	: 1
Number of relay outputs	: 2
Protection	: IP20

Dimensions (mm)



Electrical connection



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RN221N and RB223 active barriers

Active barriers for the safe separation of 4...20mA standard signal circuits.

RN221N

RB223

- Compact side-by-side housing
- Space-saving one-channel and two-channel version
- No power supply necessary
- ATEX, FM, CSA, TIIS and NEPSI approvals
- Up to SIL3
- Bidirectional HART transmission

The RN221N and RB223 active barriers provide separation of active 0/4...20mA signals from transmitters, valves and adjusters.

RN221N: The RN221N power supply is used for the galvanic isolation of 4...20mA signal current circuits and can also be applied for the intrinsically safe operation of 2-wire transmitters and to remove earth loops. The unit offers a sensor monitoring function as an option which monitors the HART signal or the current loop for faults. The status of the measuring point is reported over an alarm relay.

The RN221N active barrier supplies sensors with auxiliary energy and transmits the measuring signal to the output. The optional, intrinsically safe input circuit, conforms to the requirements for ignition classification ATEX II (1) GD.

RB223: The RB223 active barrier has one analogue input and one intrinsically safe analogue output or one output and one intrinsically safe input. A two-channel version of the device is also available as an option. Power is supplied to the device from the current loop - it does not have its own power supply. It is ideal for:

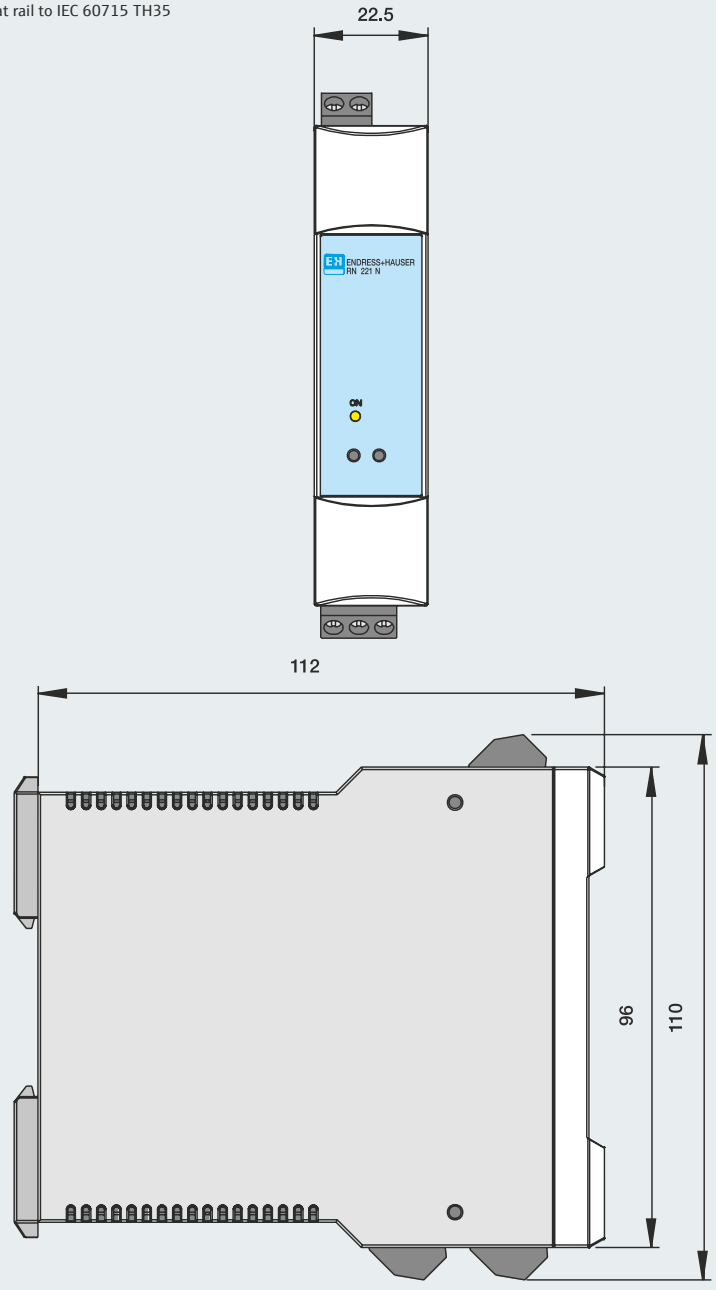
- Transmission from non-Ex to Ex areas e.g. for active adjusters, controllers or indicators
- Transmission from Ex to non-Ex areas for connection of active, intrinsically safe circuits to the PLC
- Transmission from Ex to non-Ex areas for supply of intrinsically safe transmitters with non-intrinsically safe transmitter power supply

Technical data

	RN221N	RB223
Power supply	: Integrated: 20...235V DC/AC, 50/60Hz	Requires power supply
Number of inputs	: 1	2
Number of outputs	: 1	2
Ambient temperature	: -20°C...+50°C	-20°C...+60°C
Certification	: ATEX, FM, CSA, TIIS	ATEX, FM, CSA, TIIS

Dimensions (mm)

RN221N and RB223: Housing for top-hat rail to IEC 60715 TH35



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RNS221

Power supply for two 2-wire sensors or transmitters.

- Galvanic isolation between all circuits
- Sockets and integrated 250Ω resistor for HART communication
- Wide ranging power supply
- Top hat rail mounted housing to EN 50 022-35

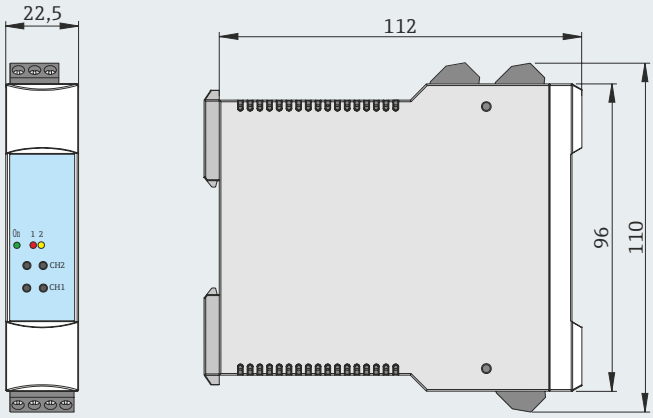
Application areas

The unit supplies two 2-wire sensors or transmitters or galvanically isolated. This is only valid for non-Ex areas. A built-in communication resistance (R=250Ω) enables bi-directional HART communication with Smart sensors and transmitters.

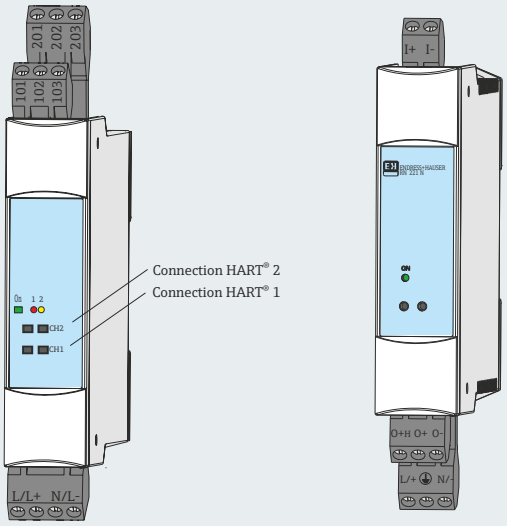
Technical data

Certification	:	Non-Ex
Power supply	:	20...253V DC/AC, 50/60Hz
Power consumption	:	P< 5W
Ambient temperature range	:	-20°C...+ 60°C
Ingress protection	:	IP20
EMC/immunity	:	To EN 61 010-1, Category II, installation protection fuse <10A
Weight	:	Approx. 140g

Dimensions (mm)



Electrical connection



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RMC621

Universal flow and energy manager for liquid, gas and steam.

- **Large backlit display that changes colour in event of an error**
- **Can be used with all common flowmeters**
- **Modular expansion of inputs and outputs**

Endress+Hauser's powerful RMC621 flow computer combines universal versatility with simple operation and clear information.

It is suitable for quantity calculation of gas, liquid, steam and water and can perform three different calculations simultaneously, even if different fluids are used. For flammable liquids and gases, it is even possible to calculate the heat energy from combustion! Density, enthalpy and compressibility calculations are based on equations or tables with specific material data. The quantity calculations are made with the standard calculations IAPWS-IF 97, SGERG88, AGA8, ISO 5167, gas comparisons and tables. The RMC621 can be used with all standard quantity measurements - vortex, turbine, orifice plate, Pitot tube and split range differential pressure transmitters.

The RMC621 features an integrated (optional intrinsically safe) power supply for all connected transmitters, so cost savings are achieved as separate power supplies are unnecessary. Its backlit display changes colour from blue to red in the event of an error and it features pushbutton operation for simple configuration. The free of charge ReadWin2000® software allows for remote configuration, diagnosis and storage of measurement values.

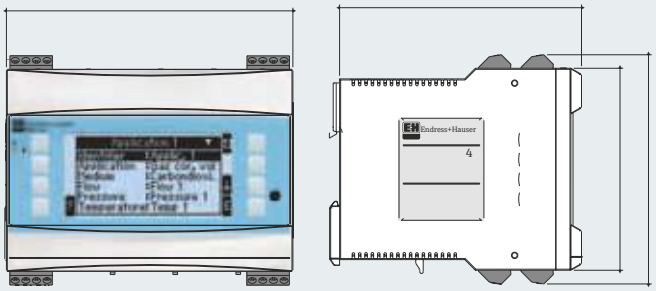
Technical data

Measured variable	: Current, PFM, pulse, temperature
Input signals	: Flow, differential pressure, pressure, density
Output signals	: Current, pulse, transmitter power supply and switching output
Supply voltage	: 90...250V AC 50/60Hz 20...36V DC or 20...28V AC 50/60Hz
Ambient temperature	: -20...+60°C
Protection	: Basic device: IP20
External display	: IP65
Calculation standards	: IAPWS-IF 97, NX 19, SGERG88, AGA8, real gas equations (SRK, RK), ISO 5167, ASTM 1250, API 2540, OIML R63, tables
Interface	: RS232/RS485 (additional RS485 optional)
Operation	: 8 pushbuttons on front of device

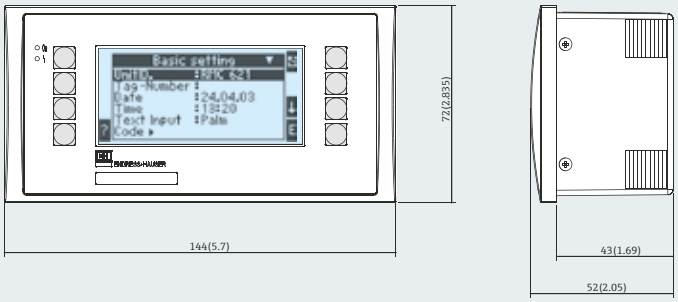
Applications

- Energy management
- Chemical industry
- Heating and air conditioning
- Pharmaceutical industry
- Food & beverage industry
- Plant and panel manufacture
- Oil & petrochemicals

Dimensions (mm)

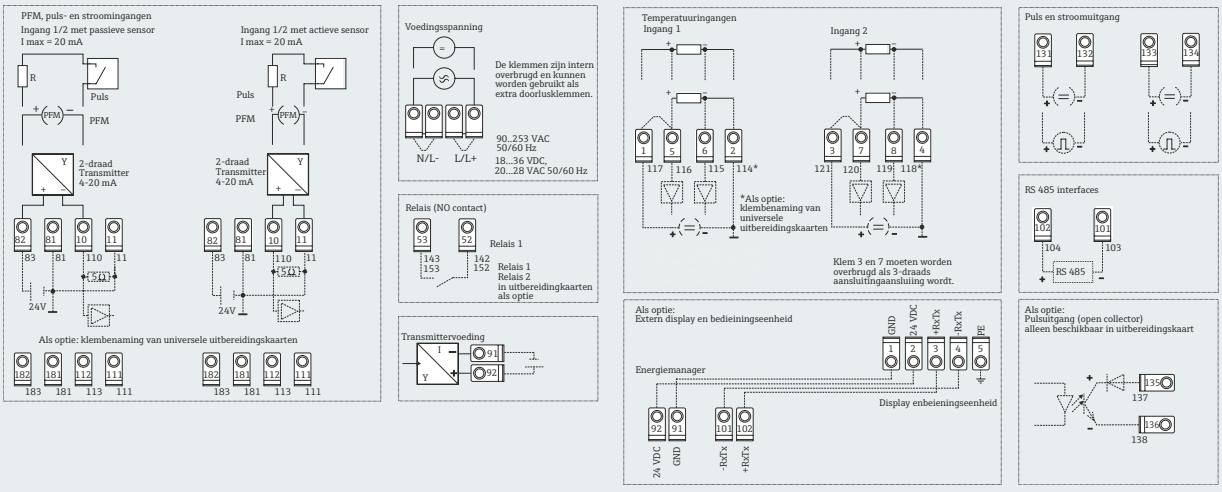


DIN rail housing



External display operating unit

Electrical connection



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RMS621

Steam and heat computer for industrial energy calculation of steam and water.

- Simultaneous calculation of up to 3 applications per device
- Modular expansion using plug-in cards
- Quick and safe commissioning with application-guided operation (Quick Setup)
- Calculation as per IAPWS-IF 97

Applications

- Energy management
- Chemical industry
- Heating and air conditioning
- Pharmaceutical industry
- Food and beverage industry
- Plant and panel manufacture

The RMS621 energy manager provides reliable calculation of steam and water for the process industries in accordance with the IAPWS-IF97 international standard. Typical applications include:

- Steam mass
- Steam heat quantity
- Net steam heat calculation
- Steam heat differential
- Water heat calculation
- Water heat differential

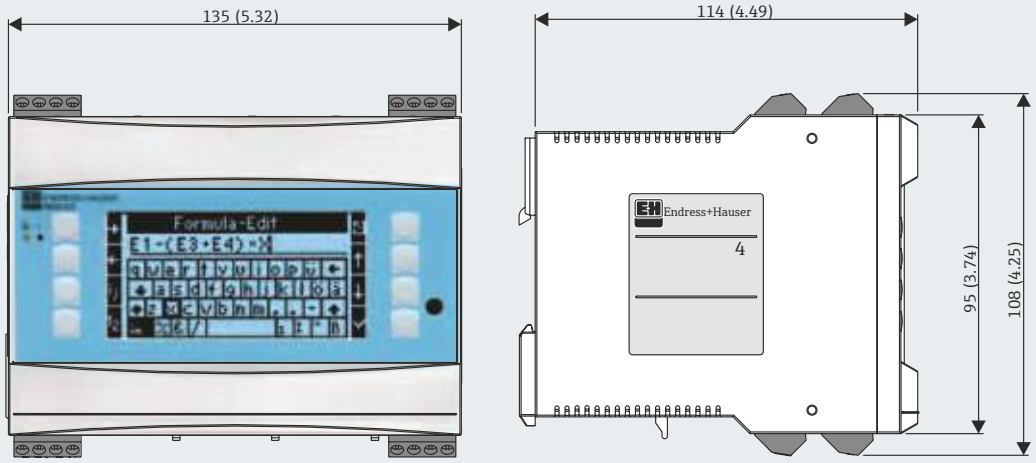
RMS621 features a large back-lit LCD display that changes colour (from blue to red) to alert you to faults and a logbook function for fault messages. It provides complete data security, even on power failure, so measurement integrity is guaranteed. The RMS621 is easy to use with simple pushbutton operation for straightforward commissioning and maintenance and has a selectable online help function. The unit also provides for simple commissioning via the RS232 serial interface and operating software.

Each RMS621 unit can calculate up to 3 applications and with the option of up to three additional extension cards, it will even supply 24V to each individual instrument.

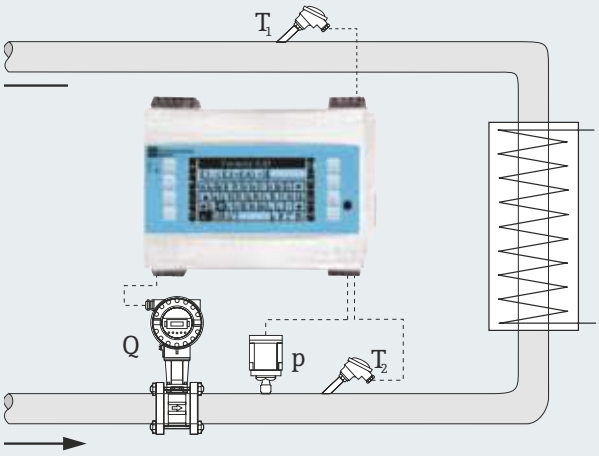
Technical data

Inputs	:	Current, PFM, pulse, temperature
Outputs	:	Current, pulse, transmitter power supply, switching-output
Power supply	:	90...253V AC, 50/60Hz
Display	:	Front display with 8 operating keys
Communication	:	RS232, RS485
Weight	:	500g (at maximum capacity)
Preset application	:	None
Calibration	:	Not required

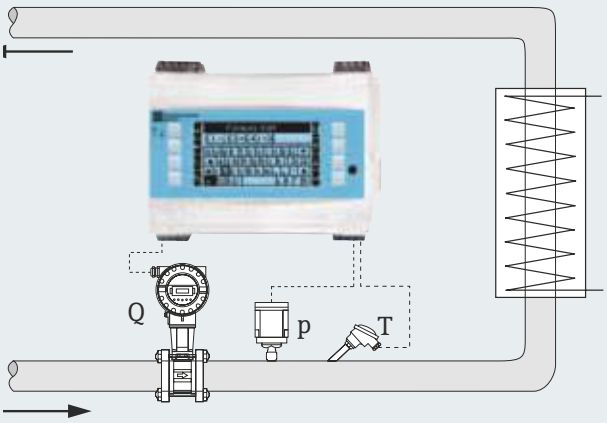
Dimensions (mm)



Calculation of steam-heat differential and net steam quantity



Calculation of steam mass flow and steam heat quantity



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Batch Controller RA33

Batch controller for the batching and dosing of mass and volume.

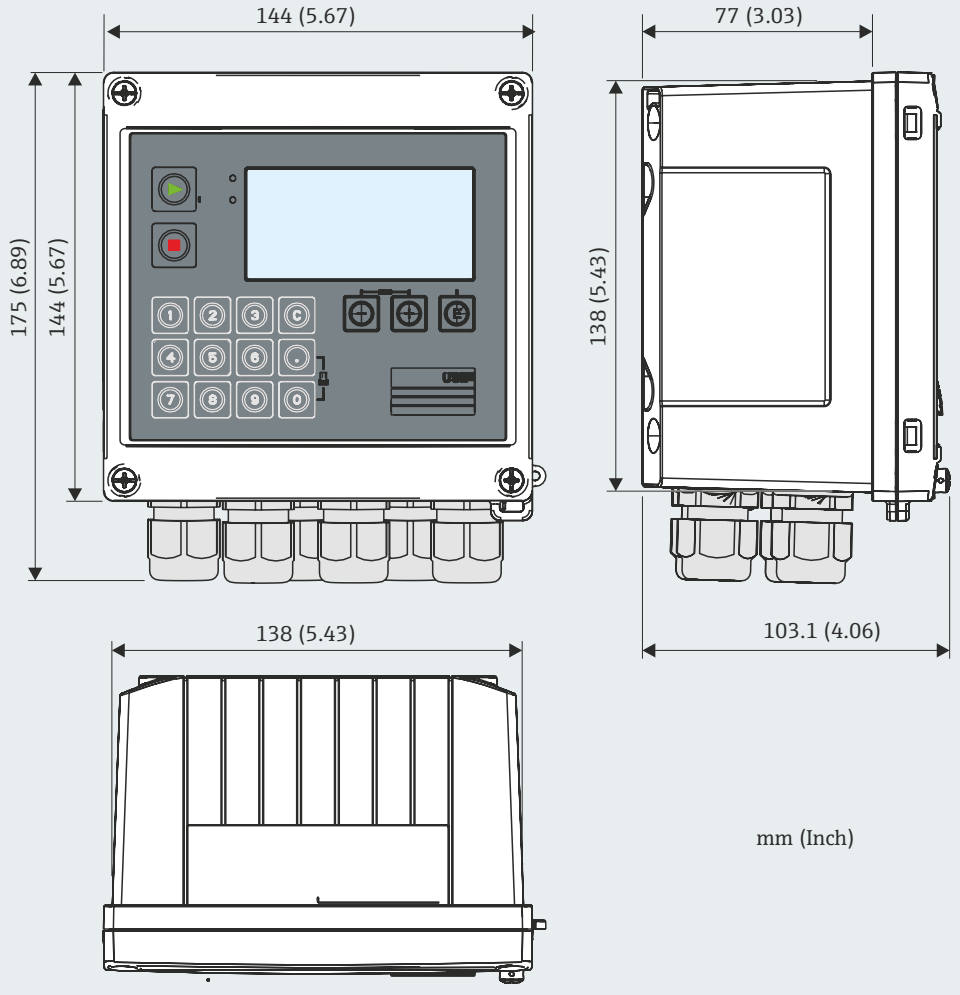
- Valve control for single-stage and two-stage batching
- Detailed logging of batch reports and error messages
- Advanced error diagnostics for leakage, fill deviation and 'no flow'
- Fast commissioning and simple operation

The Batch Controller RA33 is designed to record flow and control output signals for valves and pumps to ensure the exact dosing of predefined batch quantities. The calculation is based on measuring the current rate of flow and then totalising or recording the quantity using pulses. The measured volume can be corrected with the temperature/density compensation function. Here, mineral oils can be corrected according to the ASTM D1250-04 standard. The volumes of other media can be corrected using expansion coefficients or the volume can be converted to mass by measuring the density. Comprehensive data analysis options in the Field Data Manager software identify potential areas for cost reduction.

Technical data

Current/pulse input	: Can be used either as a current input for 0/4...20mA signals or as a pulse or frequency input
Cycle time	: 125ms
Temperature input	: Can be used either as current inputs (0/4...20mA) or as RTD inputs (or one of each)
Cycle time	: 500ms
RTD input	: Pt100, Pt500 and Pt1000
Communication interface	: USB interface (with CDI protocol), Ethernet or Modbus
Ambient temperature	: -20°C...+60°C
Protection	: Panel mounting: IP65 front panel, IP20 rear panel; top-hat rail: IP20; field housing: IP66, NEMA4x (for cable gland with double seal insert: IP65)

Dimensions (mm)



mm (Inch)

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EngyCal RH33/RS33

Custody transfer BTU meter and steam calculator.

EngyCal RH33

EngyCal RS33

- Monitoring and billing of liquid or steam heat and cooling quantities
- Custody transfer approval per MID and EN 1434
- Bi-directional measurement in heating and cooling systems
- Remote display via Ethernet and fieldbus interface
- Electronic pairing of temperature sensors by means of individual sensor characteristic curves stored in the device

EngyCal RH33 BTU meter

EngyCal RH33 is a custody transfer BTU meter for recording and billing the heat/cold quantity given off by water, water/glycol mixtures or other liquids. It is used to measure the heat and cold in systems with liquid heat transfer fluids and is easy to install and read. Thanks to its verified long-term stability and high-precision measurements, the device helps optimise processes and control costs in the process. Comprehensive data analysis options in the Field Data Manager software identify potential areas for cost reduction.

EngyCal RS33 steam calculator

EngyCal RS33 is a steam calculator for recording and billing steam mass and energy flow for applications with saturated or superheated steam. The calculation is based on the measured process values for volume flow, temperature and/or pressure. The measured and calculated values can

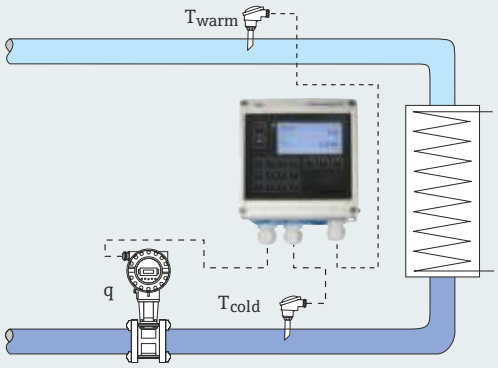
Technical data

		RH33
Measured variable	:	Custody transfer BTU meter
Energy calculation	:	Thermal energy of water, glycol/water mixtures or other liquids such as thermal oils in accordance with EN1434 using the IAPWS IF97 standard
Calculated values	:	Power, volume, density, enthalpy & enthalpy differential, DP flow compensation, mass, temperature differential
Counters	:	Volume, mass, energy, deficit (optional: tariff1, tariff2 or separate heat/cold energy, balance energy)
Data logging	:	Measured values, events
Current/pulse input	:	Current input for 0/4...20mA signals (not if the approval for custody transfer option has been selected) or a pulse/frequency input (galvanically isolated)
Current/pulse output	:	0/4...20mA current output or a voltage pulse output (galvanically isolated)
Communication interfaces	:	USB, Ethernet, RS485, Modbus TCP/RTU, M-Bus
Ambient temperature	:	-20°C...+60°C

be output via Ethernet, fieldbuses or as an analogue signal. The meters are easy to install and read. Thanks to its verified long-term stability and high-precision measurements, the device helps optimize processes and control costs in the process. Comprehensive data analysis options in the Field Data Manager software identify potential areas for cost reduction.

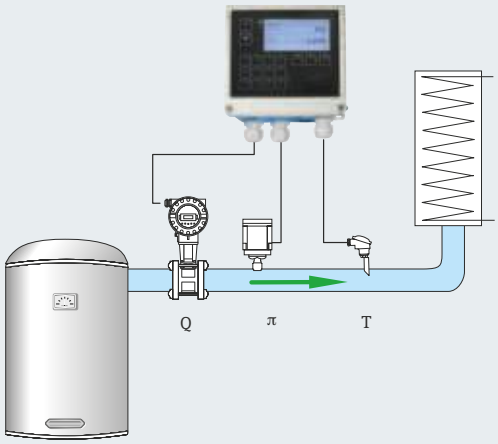
System design

EngyCal RH33: 2 x paired temperature sensors and flow sensor.



System design

EngyCal RS33: measurement of flow, temperature and pressure.



Technical data

	RS33
Measured variable	: Steam calculator
Energy calculation	: Mass and energy flow of steam using the IAPWS IF97 standard
Calculated values	: Power, volume, density, enthalpy, DP flow
Counters	: Volume, mass, energy, deficit (optional: tariff1, tariff2 or separate heat/cold energy, balance energy)
Data logging	: Measured values, events
Current/pulse input	: Current input for 0/4...20mA signals or a pulse/frequency input (galvanically isolated)
Current/pulse output	: 0/4...20mA current output or a voltage pulse output (galvanically isolated)
Communication interfaces	: USB, Ethernet, RS485, Modbus TCP/RTU, M-Bus
Ambient temperature	: -20°C...+60°C

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EngyVolt RV12/15

Multifunctional electrical energy meters for top-hat rail or panel mounting.

RV12

RV15

- Can be used in single phase as well as three-phase systems with 3 or 4 wires
- Displays 17 different parameters, including %THD
- Rear illuminated LC display
- Easy push-button operation

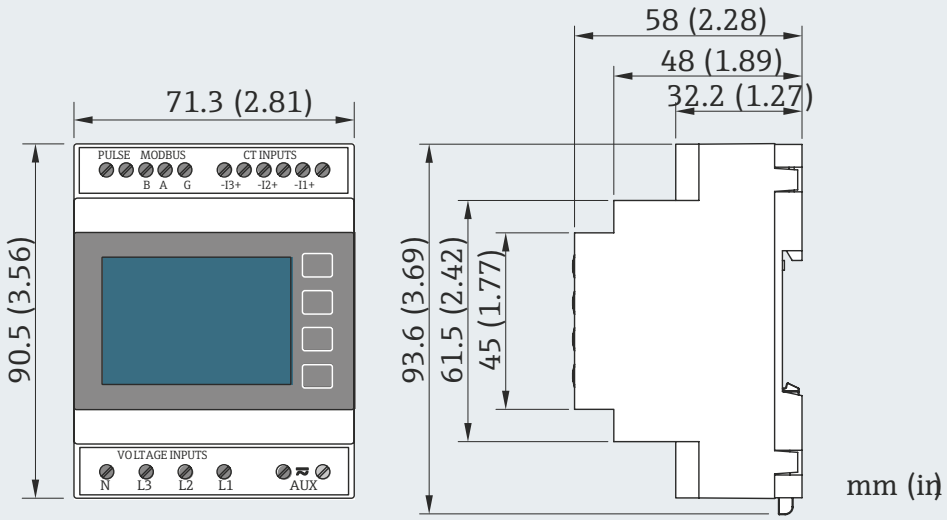
The EngyVolt RV12 and RV15 multifunction electrical energy meters are designed to record, display and transmit electrical measured values in low-voltage systems with a maximum nominal voltage of 500 V L-L (289 V L/N), current connected via low voltage current converter x/5 A at a nominal frequency of 45 to 66Hz. They are suitable for use in single-phase power systems, and in three-phase power systems with three or four wires. Among other values, the multifunction electrical energy meters measure the voltage, frequency, current, power, power factor, total harmonic distortion (THD) as well as active power and reactive power. The EngyVolt RV12 with housing according to DIN 43880 is designed for mounting on a top-hat rail, while the EngyVolt RV15 is designed for installation in a panel.

Technical data

	RV12	RV15
Measured variables	: Current, voltage, frequency in low voltage systems	Current, voltage, frequency in low voltage systems
Calculated variables	: Active, reactive and apparent power, power factor (Cos-Phi), imported and exported active and reactive energy, total harmonic distortion (current, voltage), neutral current, max current, max active power	Active, reactive and apparent power, total harmonic distortion (current, voltage), active and reactive energy, neutral current, max current, max active power
Mounting	: Top-hat rail	Panel
Energy counter	: 0 to 9 999 999.9 Wh, kWh, MWh/varh, kvarh, Mvarh	1 to 9 999 999.9 Wh, kWh, MWh/varh, kvarh, Mvarh
Number of pulse outputs	: 1	2 max (optional, via extension modules)
Display repetition rate	: 1s typically up to > 99% of the full scale value	1s typically up to > 99% of the full scale value
Measurement and calculation interval	: Max 300ms (maximum with %THD measurement)	Max 300ms (maximum with %THD measurement)
Ambient temperature	: -10°C...+55°C	-10°C...+55°C
Protection	: IP30	Front: IP52, rear: IP30

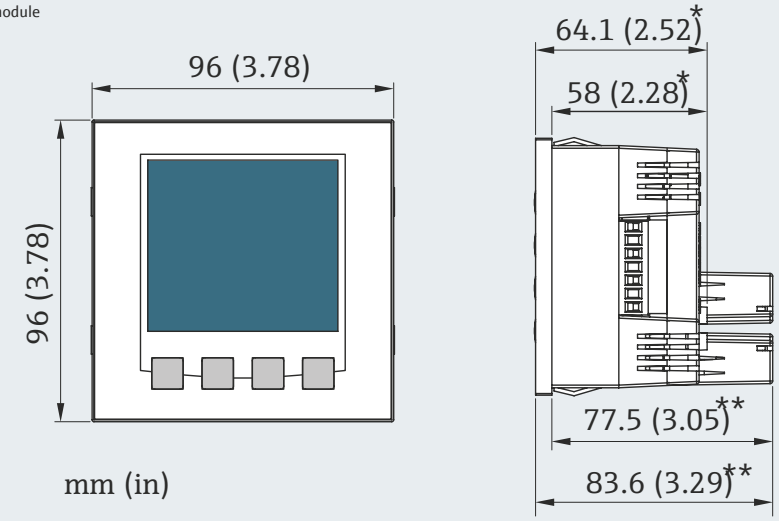
Dimensions (mm)

EngyVolt RV12: top-hat rail



Dimensions (mm)

EngyVolt RV15: panel mounting
* Basic device
** Basic device with extension module



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Fieldgate FXA320/520 and SFG500

Gateways for remote monitoring, diagnosis and process control instrumentation.

FXA320

FXA520

SFG500

- Secure worldwide access to field instrumentation data
- Easy implementation via open protocols
- First step towards inventory control
- Enables predictive maintenance

Fieldgates provide worldwide remote monitoring, diagnosis and configuration of HART® and PROFIBUS sensors via Ethernet TCP/IP, telephone lines (analogue) or mobile communications (GSM) by using a standard web browser without the need for additional software.

Fieldgate Ethernet

Fieldgate Ethernet can be connected directly to a Local Area Network (LAN) or using a legacy wireless LAN (WLAN) components. This allows for the collection of measured data and set-up of connected devices conveniently with any PC in the LAN and on the company's Intranet.

Fieldgate Analogue Modem

Fieldgate Analogue Modem can be connected directly to a phone line. This allows for the collection of measured data and set up of connected devices using any PC with a modem via the Public Switched Telephone Network (PSTN). Alternatively, Fieldgate can be configured to dial into the Internet via an ISP for email alarms.

Fieldgate GSM

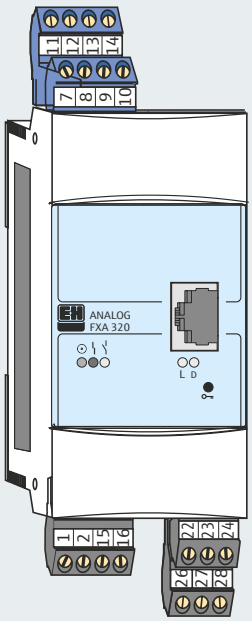
Fieldgate GSM can be connected wirelessly to a mobile network provider. This allows for the collection of data and set up of devices via PSTN or Internet. Another option is to use GSM with GPRS to directly connect to the Internet.

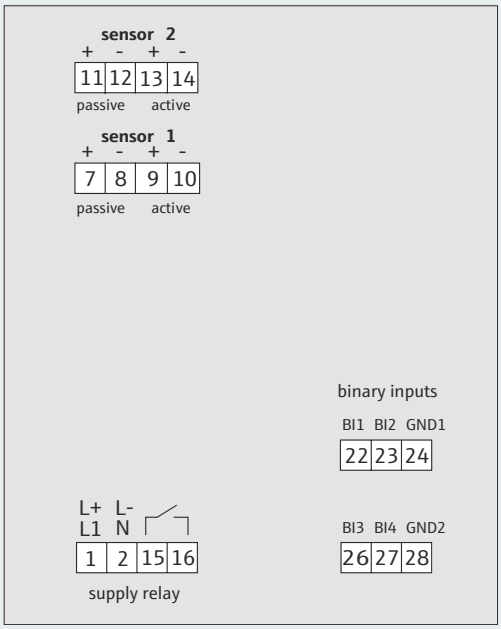
SFG500

Fieldgate SFG500 provides an independent access route to a PROFIBUS network. It may be used in a variety of applications that are supported by specific operating modes. The Fieldgate SFG500 operates as an Ethernet gateway with adaptive PROFIBUS Master Class 2 capabilities to support FDT-based plant asset management host applications, e.g. FieldCare.

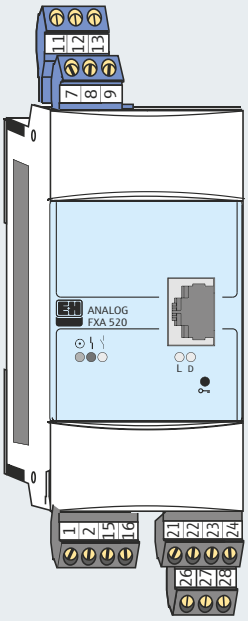
Electrical connections

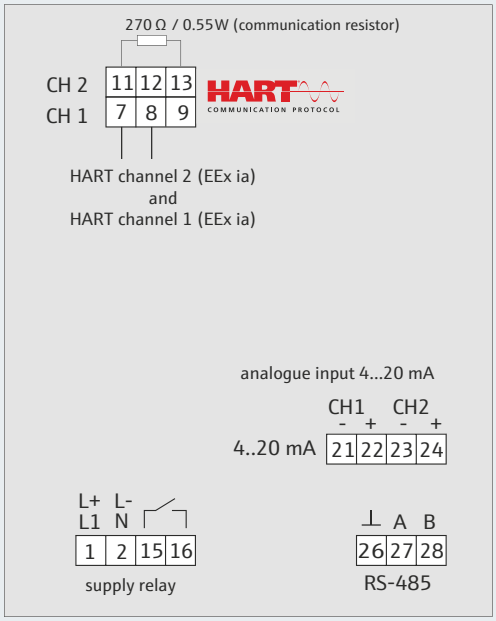
FXA320





FXA520





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WirelessHART Adapter SWA70 and WirelessHART Fieldgate SWG70

Ideal for process monitoring of important yet previously unmonitored process variables.

SWA70

SWG70

- Compatible with all HART or 4...20mA devices
- More information for less cost
- Built-in safeguards to ensure reliable, secure communication
- Supports asset management solutions

Wireless devices are the ideal solution for monitoring important process variables that are uneconomical to measure by conventional methods. WirelessHART makes it possible to acquire measurements from dense plant areas, remote locations and even moving vessels. What's more, wireless instruments support advanced asset management solutions, allowing information to be exchanged with the measurement sensor to aid proactive maintenance strategies across an entire plant.

Endress+Hauser's battery-powered SWA70 WirelessHART Adapter adds wireless capabilities to any HART instrument or any instrument equipped with a 4-20mA output. By using the SWA70 WirelessHART Adapter, it is possible for wireless devices to be added at other points in the plant, not normally connected to the control room, due to accessibility or wiring costs.

The SWG70 WirelessHART Fieldgate collects the measured values at regular intervals and transmits the data, along with the device and battery status, to the plant network. The result is a cost-effective process measurement that includes signal status and device health information.

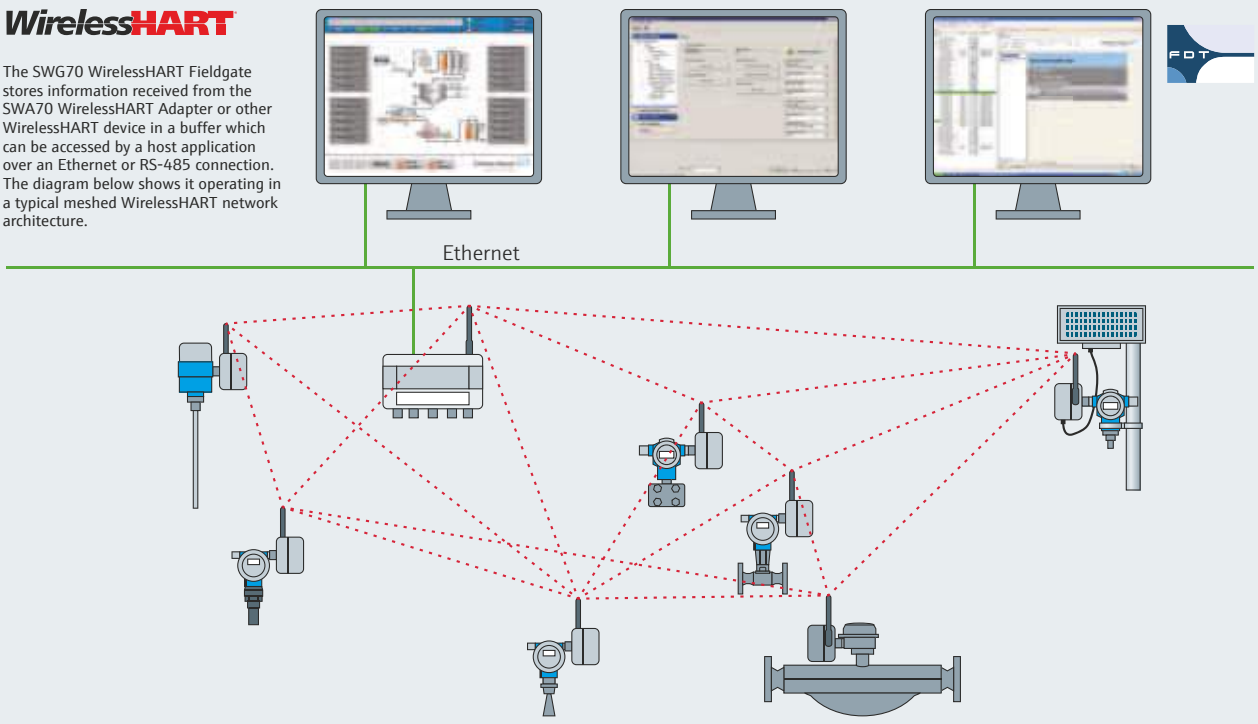
Technical data

		SWA70
Wired interface (input)	:	One device input channel for: one point-to-point with a HART device, one point-to-point connection with a 4...20mA device, up to four HART devices operating in multidrop mode
Communication type	:	HART communication in multidrop mode, 4...20mA current signal in point-to-point mode
Protocol version	:	HART Version 7.0 (backwards compatible with previous HART versions)
Wired interface (output)	:	WirelessHART communication interface (IEC 62591)
Transmission rate	:	Nominal 250 kBits/s
Power supply	:	Long-life lithium thionylchloride battery
Battery life	:	5-7 years (depending on update rate of process variables, instrument type and environmental conditions)
Housing	:	PBT FR or aluminium
Protection	:	IP65, IP66/NEMA Type 4

System design

WirelessHART

The SWG70 WirelessHART Fieldgate stores information received from the SWA70 WirelessHART Adapter or other WirelessHART device in a buffer which can be accessed by a host application over an Ethernet or RS-485 connection. The diagram below shows it operating in a typical meshed WirelessHART network architecture.



Technical data

		SWG70
Wired interface (input)	:	WirelessHART communication interface
Transmission rate	:	Nominal 250 kbits/s
Operating frequency	:	2.4 GHz (ISM band)
Transmission range	:	Under reference conditions: outdoor 250m, indoor 50m
Input variables	:	Process variables according to HART standard sent in burst mode by devices in network
Protocol (output)	:	Ethernet (10 BASE-T/10 BASE TX): configurable for HART IP and MODBUS TCP communication, RS-485 serial interface: configurable for HART Version 7.0 or MODBUS RTU communication
Transmission rate	:	Ethernet (10 BASE-T/10 BASE TX): 100 Mbit/s (max cable length 100m at 25°C ambient temperature), RS-485 serial interface: hardware or software configurable between 1200 bit/s to 115200 bit/s
Power supply	:	20 VDC to 30 VDC

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Services & Solutions

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Start-Up with Endress+Hauser

Avoid false starts!

Our customers choose Endress+Hauser Start-Up safe in the knowledge that their devices are protected with an additional year's warranty that includes 6 months' on-site warranty support! With demands on your engineering and maintenance personnel higher than ever, relying on Endress+Hauser service engineers makes sense. We're experts in delivering a thorough job in the minimum possible time.

You're in safe hands

Extended warranty is provided from the moment you receive your device so you can rest easy, knowing your product is protected. As part of the Start-Up, you can also have your device commissioned by a qualified Endress+Hauser engineer at no additional cost, if required.

If you choose to commission yourself, we offer a device integrity check within the first six months to ensure everything is running correctly. You'll also receive a certificate detailing those instruments benefiting from the additional warranty so you're in no doubt that any necessary work will be completed with minimum fuss.

Start-Up gives you:

- 12 months' warranty with 6 months' on-site warranty support for all new device purchases.
- Guaranteed peace of mind.
- Cost-effective use of expertise and resources.
- Free commissioning or device integrity check as required.

Terms and conditions

- Our Start-Up must be selected at the time of placing your order for new Endress+Hauser devices.
- Start-Up will be invoiced together with the new device sale and is party to similar payment conditions.
- If an engineer is dispatched to a customer site within the first 6 months and the issue is deemed to be unrelated to warranty, the visit will be classified as a standard reactive visit and charged as such.
- When commissioning of the new device is required, it is the customer's responsibility to supply us with a commissioning date so that the visit can be planned in advance.

To discuss your requirements in more detail, call us on
0161 286 5050

Calibration services

Competent, cost-effective, compliant.

Endress+Hauser performs and advises on all aspects of calibration from in-situ testing through to fully accredited factory calibration. We see our calibration service as part of your maintenance planning and will support you from the initial audit of your installed base through to repairs and replacements.

Flow

Flowmeters from 8–100mm are calibrated against Endress+Hauser Promass Coriolis twin reference meters. Calibration of your flowmeter can be carried out in volume or mass, with a calibration uncertainty of ±0.08%. Our flow calibration rig is suitable for any meter with DIN/ANSI flanges, screwed threads or hygienic process connections and flow ranges from 0.1m³/hr to 90m³/hr (100 to 90,000kg/hr). Our in-house water flow calibration rig incorporates the very latest developments in Endress+Hauser flow technology to provide high quality, water-based flow calibrations.

Pressure

Our experienced technicians will calibrate your pressure device to your own metrological specifications in our state-of-the-art laboratory. We can calibrate device ranges from 25 mbar up to 250 bar to a certified uncertainty of ±0.015 mbar in the range of 0 to 10 bar or ±0.05 bar in the range 0 to 250 bar. Our computerised systems mean that our work is both rapid and flexible.

Temperature

Temperature measurement is a vital factor in the quality control of your final product. In our in-house laboratory we will calibrate your temperature device to your specific requirements (from -15°C up to 600°C).

Test and measuring equipment

Endress+Hauser's in-house calibration facilities can also test and calibrate engineers' test and measuring devices such as frequency counters, multimeters and resistance boxes.

Endress+Hauser calibrates a range of instruments covering a variety of measuring principles:

Parameter	Equipment type	Calibration location
Temperature	▪ Resistance thermometer ▪ Probe and temperature transmitter ▪ Probe and display ▪ Thermocouples	On-site In the laboratory DAkkS
Pressure	▪ Manometer ▪ Pressure sensors ▪ Pressure transmitters	On-site In the laboratory DAkkS
Flow	▪ Electromagnetic flowmeters ▪ Vortex flowmeters ▪ Coriolis flowmeters ▪ Ultrasomic flowmeters ▪ Thermal flowmeters ▪ Mechanical flowmeters	On-site In the laboratory SWISS CALIBRATION
Level/distance	Radar level gauge	In the laboratory NMi PTB
Conductivity	Conductivity measuring chain including cell, transmitter and cable	On-site
pH	pH measuring chain including cell, tranmitter and cable	On-site
Other parameters	Vat calibration (strapping table) plus calibration of existing level devices if required	

Service Agreements

Made-to-measure to suit your requirements.

Our made-to-measure Service Agreements should not only be viewed as an insurance package but also as a means to achieving maximum value from your measurement devices. We'll conduct a free on-site survey with you that enables us to determine a precise equipment list, as well as tooling and access requirements.

How will you benefit from an Endress+Hauser Service Agreement?

1. Increase production uptime/plant availability
2. Ensure the quality of your measurement
3. Increase the longevity of your devices
4. Meet legislative requirements

Unique solutions for unique customers

Our customers' requirements are incredibly varied and this diversity is reflected in the Service Agreement packages we offer. Unlike a simple warranty, a Service Agreement can offer far more than the repair of a failed device. In addition to regular, planned checks, we also offer an on-going support option which would, for example, cover costs in the event of an unexpected breakdown and keep upheaval to a minimum.

Support can also be delivered remotely, with our technical support line available 24/7 for Service Agreement holders. As new devices are added, we can ensure that they're integrated into the existing agreement and given a single renewal date, removing unnecessary administration. Crucially, Service Agreements allow us to plan in advance, ensuring we allocate the necessary resources and can offer price incentives, for example a 10% reduction for an up-front three-year Service Agreement.

Get in touch

Our dedicated Service Agreements team ensures that you speak to the people who can best advise you on your service requirements, year-round. With Endress+Hauser as your trusted partner, you can be confident that we will look after your measurement assets, allowing you to stick to what you do best!

Engineering services

Ensure your automation projects are delivered efficiently by engaging the Endress+Hauser engineering services team.

Throughout the delivery phase of any automation related project, consideration must be given to the type of engineering services required. When correctly implemented, projects will be delivered on time, on budget and with low risk.

The engineering services team includes project managers and engineers, panel design and build services and software-related services such as PLC programming and SCADA development. The engineering services follow audited procedures ensuring each project is delivered in an efficient and structured way.

With over 60 years of experience in the process automation industry Endress+Hauser can provide a wide range of project related services including:

Project management

With a team of experienced project managers to call upon you can be sure that your project will be delivered efficiently and safely. By following our global delivery standard risk is reduced to a minimum and deadlines met.

Design services

During the design phase, experienced project engineers will engage not only with you, the customer, but also involve our product and industry specialists to ensure we deliver a solution which meets you expectations. Design can include industrial plant networks, panels and enclosures and control systems and associated SCADA.

Electrical and mechanical installation

If installation services are required we will engage one of our approved partners to carry out site related work under the supervision of our project manager. All partners are audited to ensure they meet the highest standard for health and safety, competence, quality and environmental requirements.

Test and verification
Following successful design and installation of any plant network, procedures dictate that each network are comprehensively tested and documented. Using industry standard tools, all industrial networks will be tested and verified to ensure stability and reliability.

Integration services
With a team of experienced software and systems engineers on hand, assistance can be given to ensure smooth integration into many types of control systems.

Project commissioning
Under the guidance of the project manager, all aspects of the project will be commissioned by experienced project and service engineers.

Training
Once completed the associated project documentation will be issued and training carried out to ensure the end user is fully conversant with the project. This can include not only instrument related training but also any system which has been implemented.

Some or all of the engineering service listed can be supplied as part of each overall project. Other engineered solutions such as Energy Management or Inventory Management will include these services to ensure Endress+Hauser becomes a complete solution provider and meets the high standards expected by industry.

Plant Asset Management

We understand field devices - and how to manage them over their life cycle.

Do you have all relevant information at your fingertips to optimise your maintenance? Can you react quickly to device malfunctions and failures? These are just two questions related to plant operation where the Endress+Hauser Plant Asset Management Solution and services bring you significant improvements. Every field device has to be configured, calibrated, maintained and its information managed over its entire life cycle.

Reduce capital and operating expenditures

Our Plant Asset Management offering supports you in optimising the management of your field devices from the engineering to the operation phase. We provide valuable asset information over the entire life cycle: from the technology and solutions to access and manage information to integrate it into your business processes and IT infrastructure. Endress+Hauser supports you with your field devices from engineering to maintenance optimisation.

Our solution combines the fields of asset information management, device configuration management and calibration management. Our Plant Asset Management offering supports you in optimising industrial workflows and business processes related to plant assets in the commissioning and operation phase.

Benefit from:

- Bringing plant assets quickly into operation and keeping them fit during the operation phase to maintain/improve plant performance.
- Reduced maintenance costs, e.g. by enabling efficient, paperless workflows.
- Increased plant availability and reliability, e.g. through diagnostics and optimisation of scheduled events (such as calibrations).
- Supporting compliance with standards and regulations (e.g. for quality management).

Asset information management
Whether you need to find information to improve spare part management, trace instrument history records of key events or monitor criticality, up-to-date asset information is always available quickly. Web-based tools allow you to manage operational information at any time or place. Combined with plant asset management software and customised services, these tools enable you to optimise your daily maintenance tasks.

Device configuration management
Endress+Hauser can handle your device configuration via a point-to-point connection using mobile clients or digital communication based on open communication standards and device integration technology. Our solutions work in parallel to controllers, separating the process control and asset management tasks. All this in conjunction with our installed base analysis ensures maximum availability of your plant asset information – even for third party devices.

Calibration management
Manage all your calibration activities and documentation within a single system. Always be ready for audits with paperless procedures and benefit from valuable key performance indicators (KPIs) to help you to optimise your calibration schedules. Our calibration services range from calibration management contracts and training through to the complete planning, installation and commissioning of calibration systems according to good manufacturing practices e.g. GAMP.

Inventory Management Solutions

Reduce cost and increase productivity with complete inventory visibility.

The business world is at the threshold of the fourth industrial revolution. Linking the real and virtual world facilitates better monitoring and faster decision-making processes. This makes it possible to control and optimise companies and entire value added networks almost in real time. We can support you integrating your supply chain. Apart from all relevant measuring and system technologies, we also offer appropriate software to monitor and optimise your inventories and supply chain.

From the inventory measurement through to your ERP system

From easy monitoring of tanks and silos to highly accurate custody transfer tank gauging throughout your tank farm or terminal, we offer scalable software packages to monitor your inventories in addition to all the relevant measuring technologies. With inventory management solutions we also support you in the optimisation of your supply chain with individual software solutions for your inventory management.

Benefit from:

- Increased customer satisfaction by improving delivery performance and avoiding product run-outs or emergency deliveries.
- Fast and efficient reaction to supply chain volatilities thanks to the optimisation of your supply and value chain.
- Lower inventory management costs by integrating data in your systems to facilitate fast and effective data exchange with your partners and systems.
- Increased productivity with higher accuracy of your inventory monitoring and enhanced planning capabilities.

We provide design, production, installation and servicing of instrumentation, data acquisition, visualisation and control systems for tank farms, terminals and depots. Our range of level measurement instruments is comprehensive, with a solution to suit every tank environment and required accuracy. However, we also appreciate that in order to reach standard volume or easily compare mass values, it is necessary to consider temperature, expansion functions and other variables. An Endress+Hauser tank monitoring or gauging system includes all the elements to allow you to accurately and safely manage and optimise your inventory.

From simple tank or depot monitoring through to high accuracy tank gauging, SCADA and inventory management, Endress+Hauser is a single source of:

- Project planning and delivery
- Overall project responsibility
- Installation, commissioning, maintenance and calibration
- State-of-the-art technology

We have the people and proven processes to design and deliver the solution you need, ensuring that this is easily scalable to suit your changing needs. We work to ensure the efficiency and safety of your plant and personnel. Our projects are delivered on-time and on-budget, and they meet all appropriate standards and guidelines.

Energy management solutions

The power to reduce your energy usage.

In its simplest format, energy management starts with the installation of appropriate instrumentation to measure the usage of utilities within a process. The next step is to introduce a means of automatically collecting that data at regular time intervals. The final phase is to relay this information into data analysis software that highlights patterns of energy usage, allowing you to set energy efficiency targets and identify areas of energy wastage.

Endress+Hauser can help you save money by enhancing the performance of key on-site installations such as boilers, compressors, pasteurisers, ovens, chillers, sterilisers, kilns and furnaces. Our packaged energy management solutions are fully scalable and upgradable, allowing you to expand your system in line with your changing needs.

Advances in affordable remote automatic data collection devices and web-enabled software solutions have made it easier than ever to implement an energy monitoring and targeting programme. With the opportunity to reduce energy costs by up to 15%, most installations see a return on investment within just two years.

Endress+Hauser will provide you with a ready-made energy management solution that is ideal for your plant. We offer you a complete cost effective solution, all from one source:

- Reliable measuring points
- Intelligent devices for data recording and data transfer
- Made-to-measure software packages for analysing and evaluating measured energy data
- Audits and surveys to help you make the most of the energy data

Evaluate energy data to highlight savings potential

In order to obtain maximum benefit from your measurement and data collection efforts, you need to be able to visualise it and evaluate it. Our web-based energy monitoring software gives access to the entire monitoring system in your plant from any PC or laptop via an intranet or internet connection. In addition, the software will analyse the measurement data and create energy reports to highlight where energy savings can be made.

- Fully web-based software solution
- Worldwide or local usage via intranet or internet
- Simple operation
- Easy-to-use interface with drop-down menus
- Automatic data import from data loggers, SCADA systems, production systems or building management systems
- Modular software design that is easily customised
- Highly scalable systems available with any number of channels, from 25 up to several thousand

Analytical solutions

Complete turnkey solutions for your analytical measuring requirements.

Depending on your measuring task, we develop customised analytical solutions such as monitoring panels, monitoring cabinets, monitoring stations and aeration control systems for wastewater treatment plants. We support you from conceptual design to realisation and commissioning. Better still, with our global support network, Endress+Hauser is your reliable partner during the entire life cycle of your solution.

Customised solutions to meet your needs

With years of application know-how behind us, we're well placed to find the ideal solution for you - we tailor turnkey analytical solutions according to your requirements. Benefit from our experience in developing solutions across thousands of measuring tasks, helping to ensure compliance to environmental requirements or improving process efficiency.

Analytical monitoring stations

We provide you with analytical monitoring stations in containers and cabinets that are engineered for the highest operational safety and functionality. They come complete with state-of-the-art technology that facilitates quick, simple and cost-effective installation on site. What's more, you'll also benefit from comprehensive documentation that is created according to your specifications.

Analytical monitoring panels

Our analytical monitoring panels simplify analytical measuring tasks throughout a range of industries including power, chemical, oil & gas, water & wastewater. They are easy to customise to your requirements and offer improved plant safety, quality and efficiency. With or without sample conditioning, our panel solutions are modular, scalable and suitable for all kinds of applications.

Aeration control

Our Liquicontrol CDC80 provides dynamic load-based aeration control and runs the aeration exactly as required for optimum ammonium cracking. It optimises the process technology in your biological stage, minimises energy consumption and reduces operating costs - offering accurate and reliable outlet values at all times. In addition, our solution is also extremely flexible to your needs in terms of time, staffing and materials.

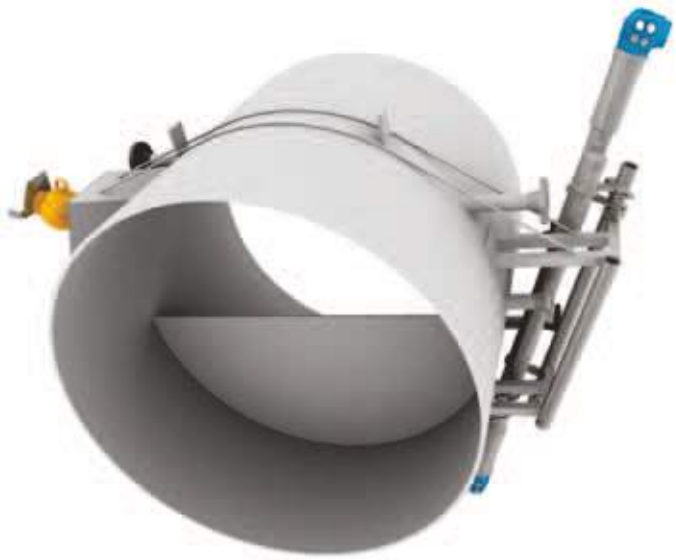
Gamma measurement solutions

Tailor-made for tough applications.

Measurement based on gamma radiation has a reputation for being difficult to design, build, install and operate. Yet, nearly 60 years after the technique was first introduced, there are still measurement challenges in industries ranging from oil and gas production to food manufacturing that can only be reliably solved by the use of a radiation based solution. With over five decades of involvement with nucleonic devices coupled with extensive application experience Endress+Hauser can design, manufacture, supply and commission a complete measurement solution to make the implementation of radiation based measurements as simple as possible.

During the design phase we will first look at the feasibility of the measurement and then arrive at some provisional designs. At this stage it is important that as well as the measurement accuracy the mechanical installation is considered to ensure the ease of commissioning and compliance with country or site regulations. When replacing legacy radiometric measurements either from Endress+Hauser or other manufacturers, we use our experience to design adapted mountings to utilise existing fittings, supply suitable signal interfaces, advise on wiring reuse to ensure a project can be completed as cost effectively as possible. Drawings will then be created for approval and a detailed discussion can take place.
We have many years of experience supplying and arranging the shipping of radioactive sources to onshore and offshore locations around the world and are happy to advise on licensing requirements to ensure a trouble-free delivery regardless of location.

A recent project where Endress+Hauser designed and supplied the gamma source, source holder and detector. In addition, the end user also required that all mechanical parts were supplied to allow installation without a process shutdown. A system to allow external attachment to the vessel was therefore designed and manufactured by Endress+Hauser.



Endress+Hauser will manufacture all the mechanical parts required for the installation, these will usually be a mixture of bespoke and generic items to ensure simple installation. All pressure retaining parts, for example drywells, used where it is necessary to insert a gamma source inside a vessel can be supplied with documentation to meet any testing or inspection requirements.

For complex systems such as multi-stage density profiling we will carry out all the design work including the field networking through to cabinet and HMI, providing a complete hardware and software package for seamless integration into the existing control network.

Bespoke engineering

Custom-made solutions to suit your requirements.

Our UK Centre of Competence in Manchester offers a wealth of knowledge in the engineering design, procurement of materials, project management, manufacture and inspection of equipment destined for high-end applications found in the oil & gas industry. With extensive experience of major projects around the globe, all delivered successfully from our Centre of Competence, Endress+Hauser brings together complete solutions borne from 'best fit' products, unrivalled support and expertly executed bespoke engineering.

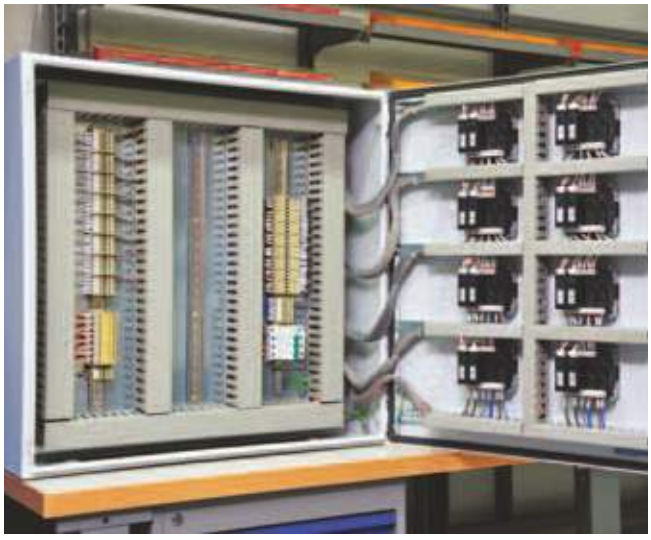
Temperature engineering

For processes involving high temperatures, pressures and flows in combination with aggressive and corrosive media, we offer tailor-made solutions. Our speciality lies in the fact that we are well-versed in the design and manufacture of highly complex bespoke engineered temperature solutions and our expertise has been widely used for multipoint temperature measurement devices including:

- Semi-flexible coaxial multipoint
- 3D vessel profile multipoint

Flow engineering

Complementing our existing flow portfolio of electromagnetic, Coriolis, vortex and thermal meters, Endress+Hauser offers a range of primary devices from orifice plates and orifice carriers to flow nozzles and Venturi tubes – all designed and manufactured in accordance with



BS EN ISO 5167. Further to these standardised primary devices, we also offer averaging pitot tubes.

Level solutions

We offer a bespoke design service using standard or exotic materials to manufacture level accessories such as:

- Bridles
- Stilling wells
- Dry wells
- Bypass chambers

all in accordance with PED and piping requirements.

Many of our level devices are designed in accordance with IEC 61508/IEC61511-1 for installation and integration into safety systems, conforming to SIL2/3. We also offer CAD design drawings in 2D and 3D.

Panel solutions

From the most simple yet vital indicator panels through to complete tank farm control panels and fully serviced, stand-alone analyser kiosks, Endress+Hauser has the capability to provide panels and enclosures that are designed to complement your project architecture perfectly.

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