

Technical Information

EngyCal RH33

Custody transfer BTU meter for recording and billing heat and cold quantities of water, water/glycol mixtures or other fluids



Reduce energy costs with transparent consumption metering

Applications

Recording and billing of heat and cold in:

- Heating circuits
- Cooling circuits
- Combined heating and cooling circuits

Typical areas of application include industry, district heating networks and building automation.

Your benefits

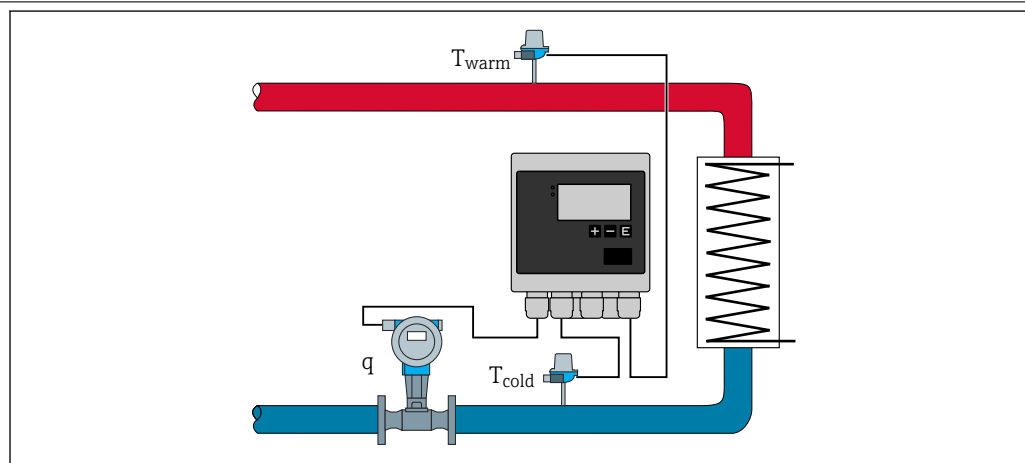
- Tested and certified reliability and accuracy
- Suitable by default for connecting to and supplying all commonly used volume flow transmitters and temperature measuring points
- Detailed data storage of instantaneous values and meter values and of error messages, limit value violations and changes to the operating parameters
- Compact housing suitable for industrial use, for field mounting or wall mounting, for panel mounting and DIN rail mounting
- Deficit counter for transparency in the event of an error or alarm
- Calibration logbook enables flexible device configuration in the field
- Tariff counter for consumption-based billing
- Calibrated, electronically paired temperature sensors ensure maximum accuracy and enable individual temperature sensors to be replaced, even in the case of calibrated devices in the field (no recalibration required!)
- Remote readout via Ethernet and fieldbuses

Function and system design

Measuring principle

The EngyCal RH33 BTU meter is used to measure heat and cold in systems with liquid heat carriers. It is easy to install and read. Thanks to its proven longterm stability and high-precision measurements, the device helps to optimize processes and control costs within the process. Comprehensive data analysis options in the Field Data Manager software MS20 (see accessories) identify potential areas for cost reduction.

Measuring system



1 Measuring system with EngyCal RH33, 2x paired temperature sensors and flow sensor

Energy calculation

The EngyCal RH33 calculates the thermal energy of water, glycol/water mixtures or other liquids such as thermal oils, in accordance with EN1434.

Basis for calculation: IAWPS-IF97

Calculated values:

- Power
- Volume
- Density
- Enthalpy and enthalpy differential
- DP flow compensation
- Mass
- Temperature differential

Counters

Volume, mass, energy, deficit

Optional: Tariff1, Tariff2 or separate heat energy, cold energy, resulting energy balance

Fault mode / deficit counter

The EngyCal has a user-definable fault mode (no further calculation or calculation with error value). With its defined fault mode and separate deficit counter, the device guarantees transparent energy calculation and billing documentation. If calculation continues with an error value, the total energy calculated during the error condition (e.g. cable open circuit) is recorded on a deficit counter.

In this case, the output continues to supply the calculated energy value. If values are communicated via buses, they are assigned the value "invalid". An alarm relay can be switched if desired.

User-defined heat carriers

Heat carriers in refrigerating circuits usually consist of glycol/water mixtures. Mixtures for the following glycols are already predefined in the EngyCal:

- Ethylene-glycol
- Antifrogen N
- Glycosol N
- Propylene glycol

For these glycol-water mixtures it is possible to enter the glycol concentration for accurate calculations.

If other heat carriers (e.g. thermal oils, refrigerants) are used, the liquid data have to be stored in the device. For this purpose, tables are available for entering the density and heat capacity (max. 10 support points). For devices with the "DP flow measurement" option, another table is available with two support points for entering the viscosity data.

The values between or outside of the support points are determined by interpolation or extrapolation.

Temperature-sensor-matching in the device

The pairing of temperature sensors takes place internally in the EngyCal by using Callendar-van-Dusen coefficients to store the sensor characteristics. The Callendar-van-Dusen coefficients are determined by calibrating the temperature sensor.

Internal adjustment enables the use of non-paired sensors and also allows one sensor to be replaced independently of the second sensor, while maintaining or increasing accuracy (compared to using paired sensors).

Compensation of differential pressure flow measurement

The calculation of flow based on the differential pressure method is a special form of flow measurement. Volume or mass flow values measured according to the DP method require a specific correction. By iteratively solving the equations listed there, the best possible accuracies (approx. 0.6 – 1 %) for DP flow measurements can be achieved.

Compensation of flow measurement for throttle methods (orifice plate, nozzle).

The measurement (orifice plate, nozzle, Venturi pipe) is performed in accordance with ISO5167. Flow measurement based on the dynamic pressure method uses the interrelation between differential pressure and flow.

Data logging and logbook

Event log:

The EngyCal RH33 BTU meter has a logbook for measured values and a logbook for events.

All parameter changes, limit value violations, alarms and other events are recorded with a timestamp in the event logbook in such a way that they are tamper-proof. At minimum, the last 1600 events are stored in non-volatile memory.

The measured value memory enables process values and calculated values, as well as counters, to be saved at freely definable intervals. Predefined analyses (day month, year, billing dates) support the transparency of the process flow and ensure a quick overview of consumption values.

All entries in the event logbook, along with the data in the measured value memory, can be read out automatically using the visualization software (Field Data Manager software) and backed up in an SQL database in such a way that they are tamper-proof.

For fast and easy analysis in case of service, an internal diagnostic memory is also available with the error messages that have occurred.

Analysis	No. of analyses
Interval	Approx. 875
Day	260 days
Month/year/billing date	17 years
Events	≥ 1600 (depending on the length of the message text)

Custody transfer approval and custody transfer logbook

The device is equipped with a custody transfer switch. This disables the parts of the configuration that relate to custody transfer.

The custody transfer switch is located inside the device. The housing is lead-sealed. If a custody transfer approval is ordered, the switch is activated prior to delivery. The parameters of the relevant device settings can then be reconfigured three times. All parameter changes are documented with a timestamp in the custody transfer logbook.

The switch can be reset by the manufacturer only.

End-to-end documentation enables flexible commissioning and configuration of the computer in the field (without loss of custody transfer approval).

Limit value monitoring

Three limit values can be freely assigned to the following measured and calculated values: volume flow, temperature, pressure, mass flow, power (heat flow), density, enthalpy, operating volume as well as heat and tariff 1, tariff 2

If the defined limit values are violated, an entry is made in the event logbook. In addition, relays can be switched, and the limit value violation can be indicated on the display. Limit values are also available via the integrated web server.

Bidirectional measurement (optional)	<p>The EngyCal RH33 enables bidirectional measurement, i.e. the combined measurement of cold and heat, for example when charging / discharging a heat accumulator, incl. calculation of heat quantities. Bidirectional measurement can be flow-dependent or temperature-dependent. This option cannot be combined with the tariff function.</p> <p>A digital input can be used to detect the direction of flow.</p>
Tariff counter (optional)	<p>The tariff counters enable the analysis and recording of energy on an additional counter.</p> <p>There are two tariff counters available. A specified tariff can be activated via an event or via the digital inputs. If the specified event occurs, the energy calculated is counted at this tariff.</p> <p>Tariff counters enable, for example, invoicing on specific billing dates (due date invoicing), requirements-based billing (daytime/nighttime tariff), as well as the analysis of counters when limit values are reached.</p> <p>Various tariff models are available for selection in the device, e.g. energy, power, time...</p> <p>The standard counters continue running at the same time, i.e. they are not affected by the activation of the tariff counters.</p> <p>This option cannot be combined with the bidirectional measurement option.</p>
Real time clock (RTC)	<p>The device has a real-time clock, which can be synchronized via a free digital input or using the Field Data Manager software MS20.</p> <p>The real-time clock continues running even in the event of a power outage; the device documents power on and off; the clock switches either automatically or manually from daylight saving to standard time.</p>
Display	<p>To display measured values, counters and calculated values, six groups are available. Each group can be assigned up to 3 values or counter readings as desired.</p>
Analyzing the stored data– Field Data Manager software MS20	<p>The Field Data Manager software allows the saved measured values, alarms and events, as well as the device configuration to be read out from the device (automatically) and backed up securely in an SQL database in such a way that they are tamper-proof. The software offers centralized data management with a variety of visualization functions. Using an integrated system service, analyses and reports can be compiled, printed and saved fully automatically. Security is guaranteed by the FDA-compliant audit trail of the software and by the extensive user management functionality. Simultaneous access to and analysis of data from different workstations or different users is supported (client-server architecture).</p>

Communication interfaces

A USB interface (with CDI protocol) and optional Ethernet, are used to configure the device and read out the values. ModBus and M-Bus are optionally available as communication interfaces.

None of the interfaces has a modifying effect on the device in accordance with PTB Requirement PTBA 50.1.

USB device	Terminal:	Type B socket
	Specification:	USB 2.0
	Speed:	"Full Speed" (max. 12 MBit/sec)
	Max. cable length:	3 m (9.8 ft)

Ethernet TCP/IP

The Ethernet interface is optional and cannot be combined with other optional interfaces. It is galvanically isolated (testing voltage: 500 V). A standard patch cable (e.g. CAT5E) can be used for the connection. A special cable gland is available for this purpose, which allows users to guide pre-

terminated cables through the housing. Via the Ethernet interface, the device can be connected to office equipment using a hub or a switch.

standard:	10/100 Base-T/TX (IEEE 802.3)
Socket:	RJ-45
Max. cable length:	100 m (328 ft)

Web server

If the device is connected via Ethernet, it is possible to export the display values via the internet using a web server.

Data can be exported via the web server to HTML or XML format.

RS485	Terminal:	3-pin plug-in terminal
	Transmission protocol:	RTU
	Transmission rate:	2400/4800/9600/19200/38400
	Parity:	choose from none, even, odd

Modbus TCP The Modbus TCP interface is optional and cannot be ordered with other optional interfaces. It is used to connect the device to higher-order systems to transmit all measured values and process values. Form a physical point of view, the Modbus TCP interface is identical to the Ethernet interface.

Modbus RTU The Modbus RTU (RS-485) interface is optional, and cannot be ordered with other optional interfaces.
It is galvanically isolated (testing voltage: 500 V) and is used to connect to higher-order systems to transmit all measured values and process values. It is connected via a 3-pin plug-in terminal.

M-Bus The M-bus (meter bus) interface is optional and cannot be ordered with other optional interfaces. It is galvanically isolated (testing voltage: 500 V) and is used to connect to higher-order systems to transmit all measured values and process values. It is connected via a 3-pin plug-in terminal.

Input

Current/pulse input This input can be used either as a current input for 0/4 to 20 mA signals (not if the Custody Transfer option was selected) or as a pulse or frequency input.

The input is galvanically isolated (500 V test voltage towards all other inputs and outputs).

Cycle time

The cycle time is 250 ms or 500 ms when using one or both RTD inputs.

Response time

In the case of analog signals, the response time is the time between the change at the input and the time when the output signal is equivalent to 90 % of the full scale value. The response time increases by 250 ms if an RTD with 3-wire measurement is connected.

Input	Output	Reaction time [ms]
Current	Current	≤ 600
Current	Relay/digital output	≤ 600
RTD	Current/ relay/digital output	≤ 600
Cable open circuit detection	Current/ relay/digital output	≤ 600

Input	Output	Reaction time [ms]
Cable open circuit detection, RTD	Current/ relay/digital output	≤ 1100
Pulse input	Pulse output	≤ 600

Current input

Measuring range:	0/4 to 20 mA + 10 % overrange
Accuracy:	0.1 % of full scale value
Temperature drift:	0.01 %/K (0.0056 %/°F) of full scale value
Loading capacity:	Max. 50 mA, max. 2.5 V
Input impedance (load):	50 Ω
HART® signals	Not affected
A/D converter resolution:	20 bit

Pulse/frequency input

The pulse/frequency input can be configured for different frequency ranges:

- Pulses and frequencies up to 12.5 kHz
- Pulses and frequencies up to 25 Hz (filters bounce contacts, max. bounce time: 5 ms)

Minimum pulse width:	
Range up to 12.5 kHz	40 μs
Range up to 25 Hz	20 ms
Maximum permissible contact bounce time:	
Range up to 25 Hz	5 ms
Pulse input for active voltage pulses and contact sensors as per EN 1434-2, Class IB and IC:	
Non-conductive state	≤ 1 V
Conductive state	≥ 2 V
No-load supply voltage:	3 to 6 V
Current limiting resistance in the power supply (pull-up at input):	50 to 2 000 kΩ
Maximum permissible input voltage:	30 V (for active voltage pulses)
Pulse input for contact sensors as per EN 1434-2, Class ID and IE:	
Low-level	≤ 1.2 mA
High-level	≥ 2.1 mA
No-load supply voltage:	7 to 9 V
Current limiting resistance in the power supply (pull-up at input):	562 to 1 000 Ω
Not suitable for active input voltages	
Current/pulse input:	
Low-level	≤ 8 mA
High-level	≥ 13 mA
Loading capacity:	Max. 50 mA, max. 2.5 V
Input impedance (load):	50 Ω
Accuracy during frequency measurement:	
Basic accuracy:	0.01 % of reading
Temperature drift:	0.01 % of measured value over entire temperature range

2 x current/RTD input

These inputs can be used either as current inputs (0/4 to 20 mA; not if the "Custody transfer approval" option has been selected) or RTD inputs (RTD = Resistance Temperature Detector). It is also possible to configure one input as a current input and the other as an RTD input.

The two inputs are galvanically connected but galvanically isolated from other inputs and outputs (test voltage: 500 V).

Current input

Measuring range:	0/4 to 20 mA + 10 % overrange
Accuracy:	0.1 % of full scale value
Temperature drift:	0.01 %/K (0.0056 %/°F) of full scale value
Loading capacity:	Max. 50 mA, max. 2.5 V
Input impedance (load):	50 Ω
A/D converter resolution:	24 bit
HART® signals are not affected.	

RTD input

Pt100, Pt500 and Pt1000 resistance temperature detectors can be connected to this input.

Measuring ranges:	
Pt100_exact:	-200 to 300 °C (-328 to 572 °F)
Pt100_wide:	-200 to 600 °C (-328 to 1112 °F)
Pt500:	-200 to 300 °C (-328 to 572 °F)
Pt1000:	-200 to 300 °C (-328 to 572 °F)
Connection method:	2-, 3- or 4-wire connection
Accuracy:	4-wire: 0.06 % of measuring range 3-wire: 0.06 % of measuring range + 0.8 K (1.44 °F)
Temperature drift:	0.01 %/K (0.0056 %/°F)
Delta T measurement (differential measurement between both RTD inputs):	0.03 °C (0.054 °F)
Characteristic curves:	DIN EN 60751:2008 IPTS-90
Max. cable resistance:	40 Ω
Cable open circuit detection:	Outside the measuring range

Digital inputs

Two digital inputs are available for switching the following functions.

Digital input 1	Digital input 2
Activate tariff counter 1 Time synchronization Lock device (Block set up)	Activate tariff counter 2 Change flow direction Time synchronization Lock device (Block set up)

Input level:

As per IEC 61131-2 Type 3:

Logical "0" (corresponds to -3 to +5 V), activation with logical "1" (corresponds to +11 to +30 V)

Input current:

Max. 3.2 mA

Input voltage:

Max. 30 V (steady-state, without destroying input)

Output

Current/pulse output (option)

This output can be used either as a 0/4 to 20 current output or as a voltage pulse output.

The output is galvanically isolated (500 V test voltage towards all other inputs and outputs).

Current output (active)

Output range:	0/4 to 20 mA + 10 % overrange
Load:	0 to 600 Ω (as per IEC 61131-2)
Accuracy:	0.1 % of full scale value
Temperature drift:	0.01 %/K (0.0056 %/°F) of full scale value
Inductive load:	Max. 10 mH
Capacitance load:	Max. 10 μ F
Ripple:	Max. 12 mVpp on 600 Ω for frequencies < 50 kHz
D/A converter resolution:	14 bit

Pulse output (active)

Frequency:	Max. 12.5 kHz
Pulse width:	Min. 40 μ s
Voltage level:	Low: 0 to 2 V High: 15 to 20 V
Maximum output current:	22 mA
Short-circuit proof	

2 x relay output


The relays are designed as NO contacts. The output is galvanically isolated (1 500 V test voltage towards all other inputs and outputs).

Max. relay switching capacity:	AC: 250 V, 3 A DC: 30 V, 3 A
Minimum contact load:	10 V, 1 mA
Min. switching cycles:	>10 ⁵

2 x digital output, open collector (option)

The two digital outputs are galvanically isolated from one another and from all other inputs and outputs (test voltage: 500 V). The digital outputs can be used as status or pulse outputs.

Frequency:	Max. 1 kHz
Pulse width:	Min. 500 μ s
Current:	Max. 120 mA
Voltage:	Max. 30 V

Voltage drop:	Max. 2 V in conductive state
Maximum load resistance:	10 kΩ  For higher values, the switching edges are flattened.

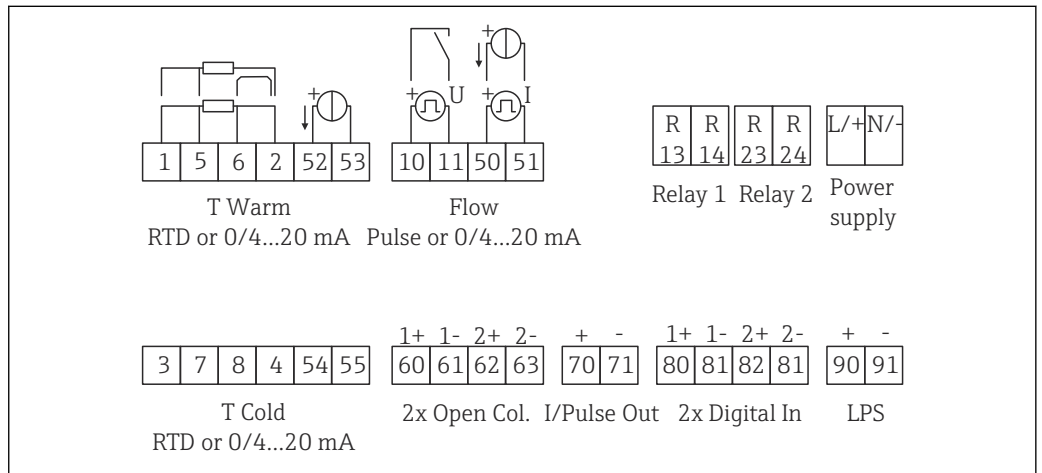
Auxiliary voltage output (transmitter power supply)


The auxiliary voltage output can be used to power the transmitter or control the digital inputs. The auxiliary voltage is short-circuit proof and galvanically isolated (500 V test voltage towards all other inputs and outputs).

Output voltage:	24 V DC ±15 % (not stabilized)
Output current:	Max. 70 mA
HART® signals are not affected.	

Power supply

Terminal assignment



 2 Terminal assignment of EngyCal

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Supply voltage

- Low voltage power supply unit: 100 to 230 V AC(-15 % / +10 %) ⁵⁰/₆₀ Hz
- Extra-low voltage power unit:
 24 V DC (-50 % / +75 %)
 24 V AC (±50 %) ⁵⁰/₆₀ Hz

An overload protection element (rated current ≤ 10 A) is required for the power cable.

Power consumption

15 VA

Performance characteristics

Reference operating conditions	<ul style="list-style-type: none"> ■ Power supply 230 V AC $\pm 10\%$; 50 Hz ± 0.5 Hz ■ Warm-up period > 2 h ■ Ambient temperature 25 °C ± 5 K (77 °F ± 9 °F) ■ Humidity 39 % ± 10 % RH.
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Arithmetic unit	Medium	Variable	Range
	Water		Temperature measuring range
		Temperature differential range ΔT	0 to 350 K (0 to 630 °F)
		Measuring range approved for custody transfer	0 to 300 °C (32 to 572 °F) ΔT : 3 to 297 K (5.4 to 534.6 °F)
		Accuracy	3 to 20 K (5.4 to 36 °F): < 0.7 % of reading 20 to 300 K (36 to 540 °F): < 0.2 % of reading
		Accuracy as per EN1434/OIML75	$\pm (0.5 + \Delta\theta_{\min} / \Delta\theta)$ %
Water/glycol		Glycol concentration	0 to 60 %
		Temperature measuring range	-40 to 350 °C (-40 to 662 °F)
		Maximum temperature differential range ΔT	0 to 390 °C (0 to 702 °F)
		Accuracy (0 to 40 % glycol share)	3 to 20 K (5.4 to 36 °F): < 0.9 % of reading 20 to 300 K (36 to 540 °F): < 0.4 % of reading
Liquids		Temperature measuring range	-200 to 600 °C (-328 to 1 112 °F)
		Maximum temperature differential range ΔT	0 to 390 °C (0 to 702 °F)
		Error limit for ΔT	See water
Measurement and calculation interval			500 ms

Installation

Mounting location	Wall/pipe mounting, panel or DIN rail as per IEC 60715
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Installation position	The only factor determining the orientation is the legibility of the display.
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Environment

Ambient temperature range	-20 to +60 °C (-4 to +140 °F)
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Storage temperature	-30 to +70 °C (-22 to +158 °F)
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Climate class	As per IEC 60 654-1 Class B2, as per EN 1434 environment class C
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Humidity	Maximum relative humidity 80 % for temperatures up to 31 °C (87.8 °F), decreasing linearly to 50 % relative humidity at 40 °C (104 °F).
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Electrical safety

- As per IEC 61010-1 and CAN C22.2 No 1010-1.
- Class II equipment
 - Overvoltage category II
 - Pollution level 2
 - Overcurrent protection ≤ 10 A
 - Operating altitude: up to 2 000 m (6 560 ft.) above MSL

Degree of protection

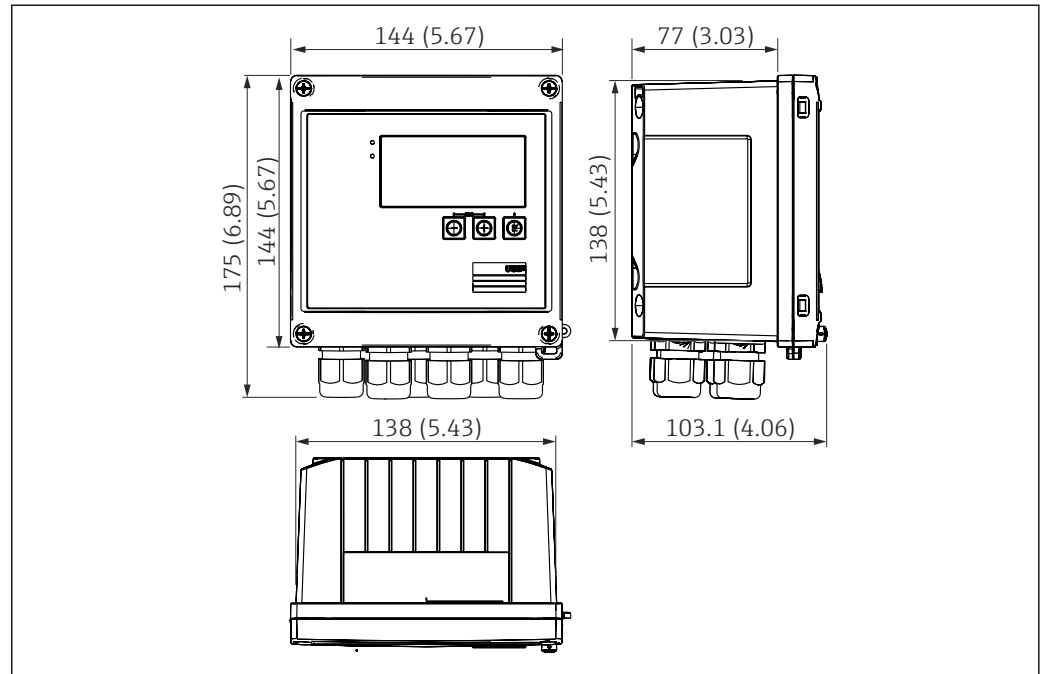
- Panel mounting: IP65 at front, IP20 at rear
- DIN rail: IP20
- Field housing: IP66, NEMA4x (for cable gland with double seal insert: IP65)

Electromagnetic compatibility

As per EN 1434-4, EN 61326 and NAMUR NE21

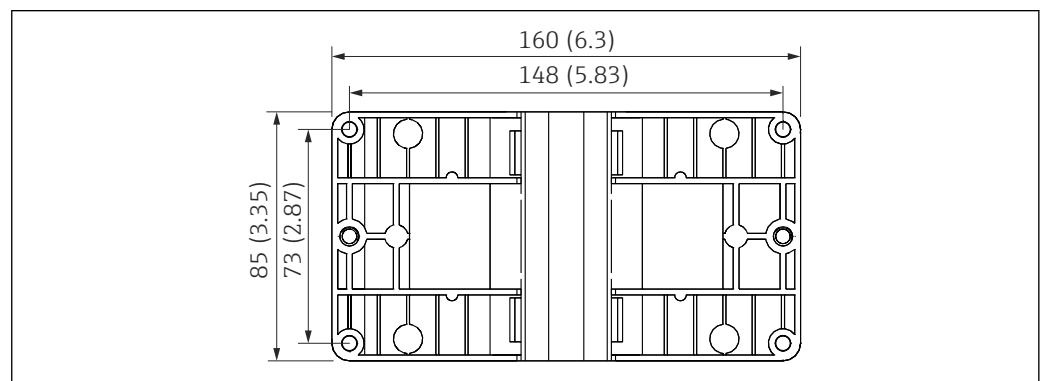
Mechanical construction

Design, dimensions



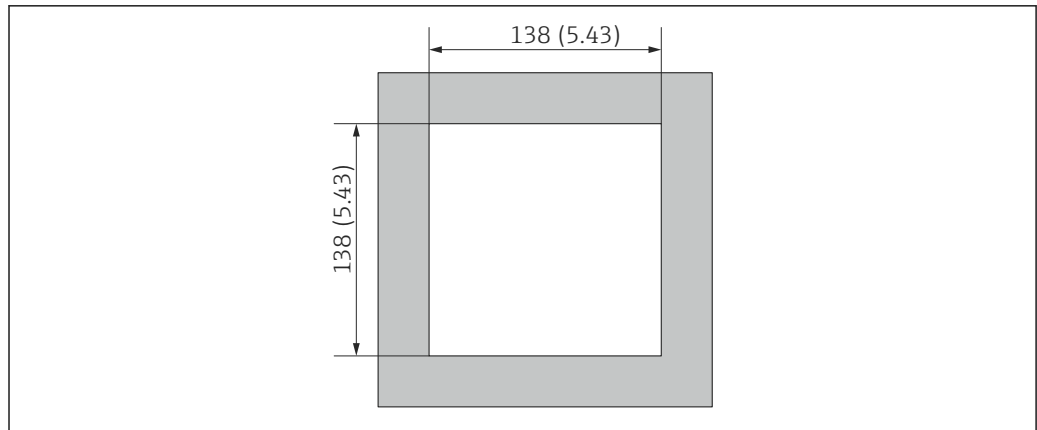
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3 EngyCal housing; dimensions in mm (in)



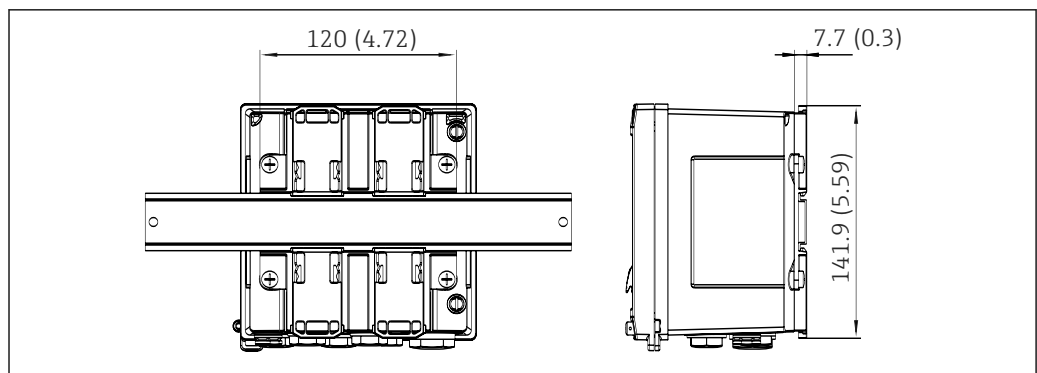
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4 Mounting plate for wall, pipe and panel mounting; dimensions in mm (in)



A0014171

5 Panel cutout in mm (in)

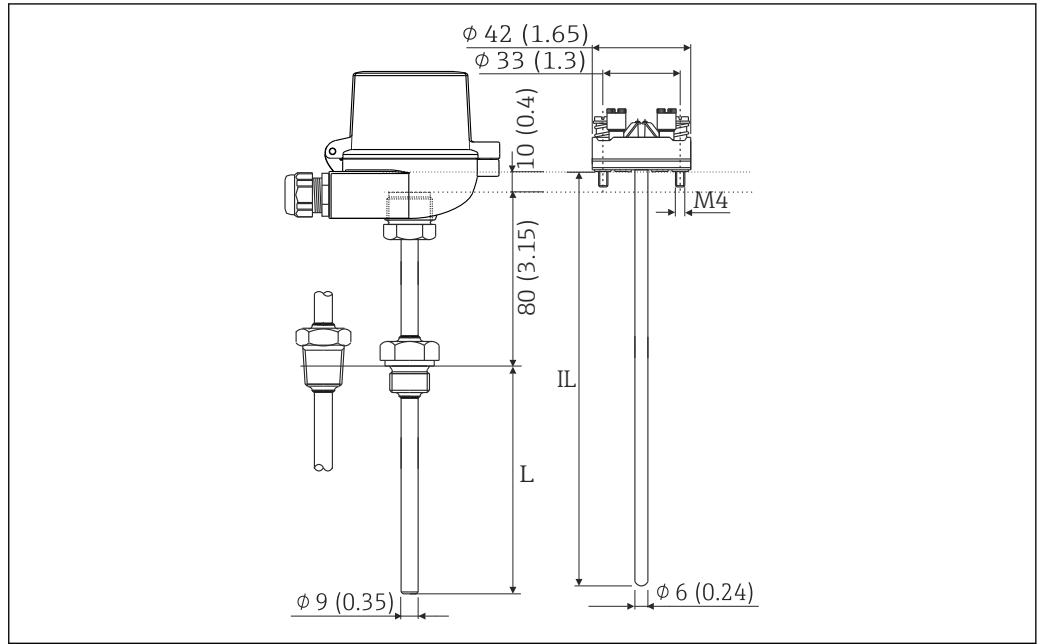


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6 Dimensions of DIN rail adapter in mm (in)

Weight	Approx. 700 g (1.5 lbs)
Materials	Housing: fiber-glass reinforced plastic, Valox 553
Terminals	Spring terminals, 2.5 mm ² (14 AWG); auxiliary voltage with plug-in screw terminal (30-12 AWG; torque 0.5 to 0.6 Nm) .

RTD assembly (option)



A0015313

7 Optional RTD assembly; dimensions in mm (in)

IL Insertion length
L Immersion length

More technical data for the RTD assembly can be found in the Technical Information for the device. This document is available for download at www.de.endress.com/download.

RTD assembly process connection (option)

Process connection		Version		Thread length TL
Cylindrical	Conical	G	G1/2"	15 mm (0.6 in)
		NPT	NPT1/2"	8 mm (0.32 in)

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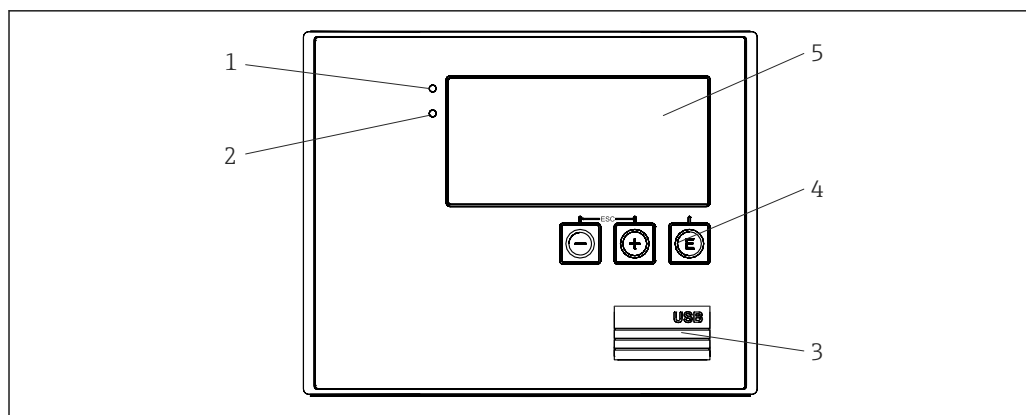
Operability

Languages

You can choose from one of the following operating languages on the device: English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Czech

Display elements

- Display:
160 x 80 dot-matrix LCD with white backlighting, color changes to red in the event of an alarm, active display area 70 x 34 mm (2.76" x 1.34")
- LED status display:
Operation: 1 x green
Fault message: 1 x red



A0013444

8 Display and operating elements

- 1 Green LED, "Operation"
- 2 Red LED, "Fault message"
- 3 USB connection for configuration
- 4 Operating keys: -, +, E
- 5 160x80 dot-matrix display

Local operation

3 keys, "-", "+", "E".

Configuration interface

USB interface at front, optional Ethernet: configuration via PC with FieldCare Device Setup configuration software.

Data logging

Real-time clock

- Deviation: 15 min per year
- Power reserve: 1 week

Software

- **Field Data Manager software MS20:** visualization software and database for analyzing and evaluating the measured data and calculated values as well as tamper-proof data logging.
- **FieldCare Device Setup:** The device can be configured with the FieldCare PC software. FieldCare Device Setup is included in the scope of delivery for RXU10-G1 (see "Accessories") or can be downloaded free of charge from www.produkte.endress.com/fieldcare.

Certificates and approvals

Approval for custody transfer

as per MID 2014/32/EU (L 96/149), EN1434 (water/liquids) and OIML R75

CE mark

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.

Other standards and guidelines

- IEC 60529:
Degrees of protection provided by enclosures (IP code)
- IEC 61010-1: 2001 cor 2003
Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures
- IEC 61326 series:
Electromagnetic compatibility (EMC requirements)
- NAMUR NE21, NE43:
Association for Standards for Control and Regulation in the Chemical Industry
- IAPWS-IF 97:
Internationally applicable and recognized calculation standard (since 1997) for steam and water. Issued by the International Association for the Properties of Water and Steam (IAPWS).

- OIML R75:
International design and test recommendation for heat meters for water applications issued by the International Organization of Legal Metrology.
- EN 1434
- EN ISO 5167
Measurement of fluid flow by means of pressure differential devices

CSA GPCAN/CSA-C22.2 No. 61010-1, 2nd edition

Ordering information

Detailed ordering information is available for your nearest sales organization www.addresses.endress.com or in the Product Configurator under www.endress.com :

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

The Configuration button to the right of the product image opens the Product Configurator.



Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Scope of delivery

The scope of delivery comprises:


- EngyCal (field housing)
- Wall mounting plate
- Hard copy of Brief Operating Instructions
- Optional RTD assembly
- Optional 3 pc. connecting terminal (each 5-pin)
- Optional interface cable in a set with "FieldCare Device Setup" parameterization software
- Optional Field Data Manager software MS20
- Optional mounting hardware for DIN rail, panel mounting, pipe mounting
- Optional overvoltage protection

Accessories


Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Device-specific accessories








For the transmitter

Accessories	Description
Weather protection cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight or extreme cold in winter.  For details, see Installation Instructions SD00333F
Pipe mounting set	Mounting plate for pipe mounting
DIN rail mounting set	DIN rail adapter for DIN rail mounting
Panel mounting set	Mounting plate for panel mounting


For the sensor

Accessories	Description
Heating jacket	Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids. If using oil as a heating medium, please consult with Endress+Hauser. Heating jackets cannot be used with sensors fitted with a rupture disk.  For details, see Operating Instructions BA00099D






Communication-specific accessories

FDM software	Visualization software and SQL-based database "Field Data Manager software (FDM)" MS20  For details, see "Technical Information" TI01022R
RXU10-G1	USB cable and FieldCare Device Setup configuration software incl. DTM library
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface.  For details, see "Technical Information" TI00404F
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.  For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
Wireless HART adapter SWA70	Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity.  For details, see Operating Instructions BA061S
Fieldgate FXA320	Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser.  For details, see "Technical Information" TI00025S and Operating Instructions BA00051S
Field Xpert SFX100	Compact, flexible and robust industry handheld terminal for remote configuration and for obtaining measured values via the HART current output (4-20 mA).  For details, see Operating Instructions BA00060S

Service-specific accessories

Accessories	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, accuracy or process connections. Graphic illustration of the calculation results <p>Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.</p> <p>Applicator is available:</p> <ul style="list-style-type: none"> Via the Internet: https://wapps.endress.com/applicator On CD-ROM for local PC installation.
W@M	<p>Life cycle management for your plant</p> <p>W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle.</p> <p>The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records.</p> <p>W@M is available:</p> <ul style="list-style-type: none"> Via the Internet: www.endress.com/lifecyclemanagement On CD-ROM for local PC installation.
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser.</p> <p>It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p> <p> For details, see Operating Instructions BA00027S and BA00059S</p>

System components

Accessories	Description
Memograph M graphic data manager	<p>The Memograph M graphic data manager provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.</p> <p> For details, see "Technical Information" TI00133R and Operating Instructions BA00247R</p>
Overvoltage protection HAW562 DIN rail	<p>To protect against overvoltage in the power supply and signal/communication cables, Endress+Hauser provides a surge arrester HAW562 for DIN rail mounting.</p> <p> For details, see "Technical Information" TI01012K</p>
Overvoltage protection HAW569 field housing	<p>To protect against overvoltage in the power supply and signal/communication cables, Endress+Hauser provides a surge arrester HAW562 for field mounting.</p> <p> For details, see "Technical Information" TI01013K</p>
RN221N	<p>Active barrier with power supply for safe separation of 4-20 mA standard signal circuits. Offers bidirectional HART transmission.</p> <p> For details, see "Technical Information" TI00073R and Operating Instructions BA00202R</p>
RNS221	<p>Supply unit for powering two 2-wire measuring devices solely in the non-Ex area. Bidirectional communication is possible via the HART communication jacks.</p> <p> For details, see "Technical Information" TI00081R and Brief Operating Instructions KA00110R</p>

Supplementary documentation

- Operating Instructions EngyCal RH33 BTU meter (BA00290K)
- Brief Operating Instructions "EngyCal RH33 BTU meter" (KA00289K)
- Technical Information "Overvoltage protection HAW562" (TI01012K)
- Technical Information "Overvoltage protection HAW569" (TI01013K)
- Brief Operating Instructions "Field Data Manager software" (KA00466C)
- "System Products and Data Managers: Solutions for the loop" brochure (FA00016K)



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