Technical Information
EngyCal RS33

Steam calculator for a measuring point with one pulse/analog input for flow and two RTD/analog inputs for temperature/pressure

Reduce energy costs with transparent consumption metering

Applications

The EngyCal RS33 steam calculator is used to record steam mass and energy flow in systems with saturated or superheated steam. The calculation is based on the process values measured for volume flow, temperature and/or pressure. The EngyCal RS33 uses the IAPWS IF97 standard to calculate the mass flow and energy flow of steam. Here, the input variables pressure and temperature are used to calculate the density and enthalpy of steam.

Recording and billing of energy quantities in steam applications (steam heat quantity, steam heat differential). Typical applications include:
- Food industry
- Chemical industry
- Life sciences
- Power plants
- Building automation and plant construction

Your benefits

- Compensation of differential pressure flow measurement
- Calculation in accordance with international steam tables
- Electronic alignment of temperature sensor (sensor-transmitter matching) with the arithmetic unit enables high-accuracy temperature measurement
- Detailed data logging of instantaneous values and counter values and of error messages, limit value violations and changes in operating parameters
- Standard models are suitable for connecting and supplying all common flow transmitters, temperature sensors and pressure sensors.
- Remote readout via Ethernet and fieldbuses
- Deficit counter for transparency in the event of a fault or alarm
- Swift commissioning and easy operation with plain text in language of your choice
- Integrated data logging
- Tariff counter for requirements-based billing
- Industry-compliant compact housing for field or wall mounting, panel mounting or DIN rail mounting

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About this document

Safety symbols

⚠ **DANGER**
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ **WARNING**
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ **CAUTION**
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

Electrical symbols

Direct current

Alternating current

Direct current and alternating current

Ground connection
A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system

Protective earth (PE)
Ground terminals that must be connected to ground prior to establishing any other connections
The ground terminals are located on the interior and exterior of the device
• Inner ground terminal; protective earth is connected to the mains supply
• Outer ground terminal; device is connected to the plant grounding system
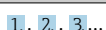
Symbols for certain types of information

Symbol	Meaning
✅	**Permitted** Procedures, processes or actions that are permitted.
✅✅	**Preferred** Procedures, processes or actions that are preferred.
❌	**Forbidden** Procedures, processes or actions that are forbidden.
ℹ	**Tip** Indicates additional information.
📖	Reference to documentation
📄	Reference to page
🖼	Reference to graphic
👁	Visual inspection

Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers	**1** , **2** , **3** ...	Series of steps
A, B, C, ...	Views	**A-A, B-B, C-C, ...**	Sections
🔺EX	Hazardous area	🔺	Safe area (non-hazardous area)

Function and system design

Measuring principle

The EngyCal RS33 steam calculator is used to record steam mass and energy flow in systems with saturated or superheated steam. The calculation is based on the process values measured for volume flow, temperature and/or pressure. Depending on the installation position of the measuring instruments, the heat quantity can be determined using different calculation methods. The standard heat quantity calculation can be used as well as a steam heat difference measurement. For steam temperature-difference measurement, the correct installation position of the measuring instruments must be observed.

The measured and calculated values can be output via Ethernet, fieldbuses or as an analog signal. The counters are 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

Design of different applications such as heat quantity or heat differential with the steam calculator
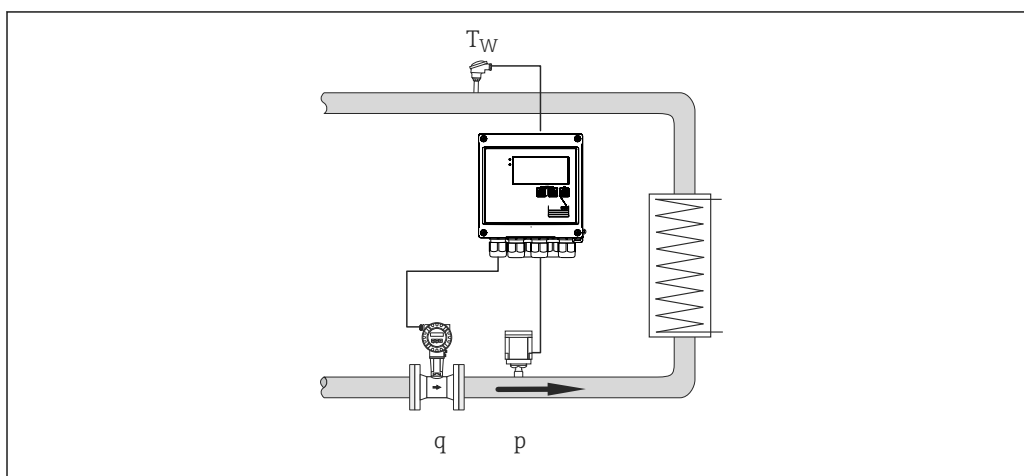
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 1   Heat differential/p

A0022322

 2   Heat differential/T

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⊠ 3   Heat quantity or heat differential/p+T

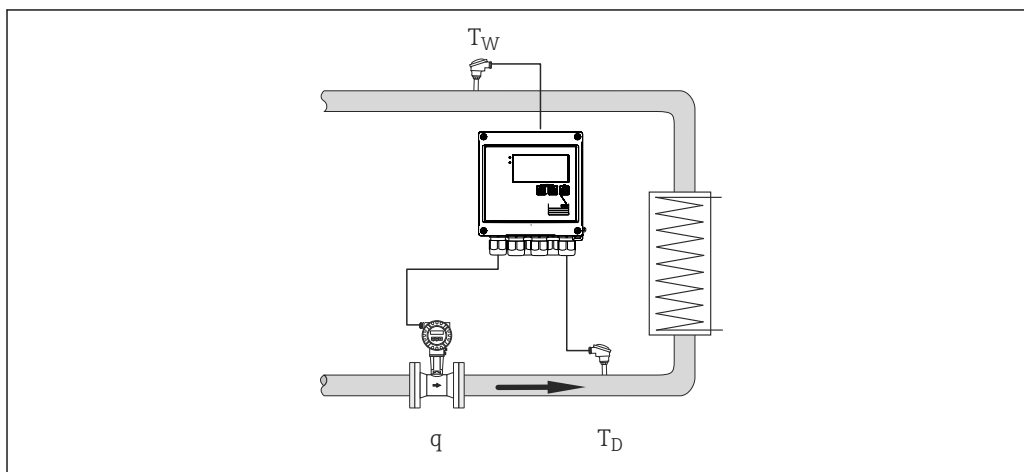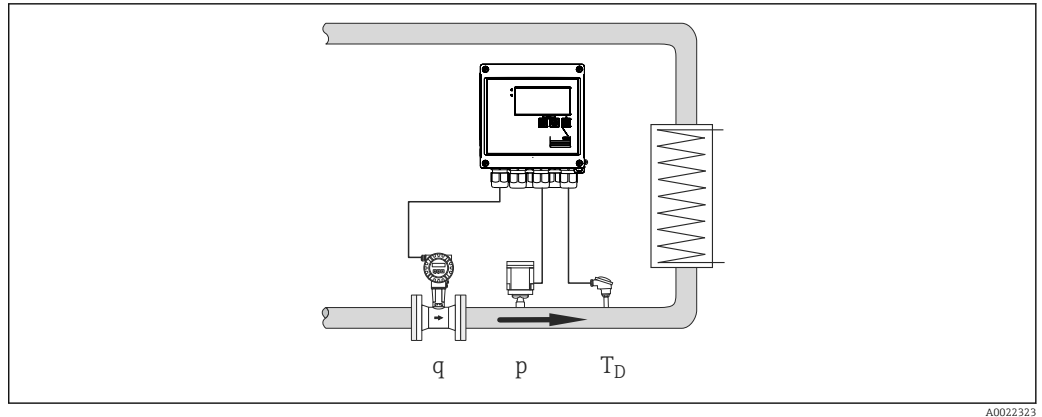|	
Energy calculation	The EngyCal RS33 uses the IAPWS IF97 standard to calculate the mass flow and energy flow of steam. Here, the input variables pressure and temperature are used to calculate the density and enthalpy of steam.
	Calculated values: • Power • Volume • Mass • Density • Enthalpy • DP flow compensation
Counters	Volume, mass, energy, deficit
	Optional: Tariff 1, tariff 2
Failure mode/deficit counter	The EngyCal has a user-definable failure mode (no further calculation or calculation with fallback value). With its defined failure mode and separate deficit counter, the device guarantees transparent energy calculation and billing documentation. If further calculation with a fallback value is selected, the entire calculated energy during the error condition (e.g. line break) is counted 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.
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. Volumes or mass flow rates that are determined using the DP method require 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 logbook:
	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 vales, 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 event text)

Wet steam alarm

If steam condenses, reliable and accurate calculation of the energy quantity is no longer guaranteed. The wet steam alarm indicates the condensation of steam. The aggregate state can be determined on the basis of pressure and temperature. This is required in order to trigger the wet steam alarm.

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.

Tariff counter (optional)

The tariff counters enable the analysis and recording of energy on an additional counter.

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.

Tariff counters enable, for example, invoicing on specific billing dates, consumption-based billing (daytime/nighttime tariff), as well as the analysis of counters when limit values are reached, e.g. depending on power.

Various tariff models are available in the device, e.g. energy, power, time, etc.

The standard counters continue running at the same time, i.e. they are not affected by the activation of the tariff counters.

Real-time clock (RTC)

The device has a real-time clock that can be synchronized via a free digital input or using the Field Data Manager software MS20.

The real-time clock continues to run in the event of a power failure. The device logs power on and power off events. The time switches automatically or manually from summer to winter time.

Display

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.

Analyzing the stored data– Field Data Manager software MS20

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).

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

Connection:	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 to connect the Ethernet interface. A special cable gland is available that allows pre-terminated cables to be routed 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)

RS485

Connection:	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. The Modbus TCP interface is physically 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-level 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-level 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 or as a pulse or frequency input.

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

Cycle time

The cycle time is 250 ms when using the RTD input.

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	Response 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
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 measured value
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) or as RTD inputs (RTD = Resistance Temperature Detector). Here, one input is provided for the temperature signal, the other for the pressure signal.

The two inputs are galvanically connected but galvanically isolated from other inputs and outputs (testing 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 %/℉) 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 ℃ (−328 to +572 ℉)
Pt100_wide:	−200 to +600 ℃ (−328 to +1 112 ℉)
Pt500:	−200 to +300 ℃ (−328 to +572 ℉)
Pt1000:	−200 to +300 ℃ (−328 to +572 ℉)
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 ℉)
Temperature drift:	0.01 %/K (0.0056 %/℉) of measuring range
Delta T measurement (differential measurement between both RTD inputs):	0.03 ℃ (0.054 ℉)
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 Time synchronization Lock device (Block set up)

Input level:

As per IE C61131-2 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 mA current output or as a voltage pulse output.

The output is galvanically isolated (500 V testing 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 upper range value
Temperature drift:	0.01 %/K (0.0056 %/°F) of upper range value
Inductive load:	Max. 10 mH
Capacitance load:	Max. 10 µF
Ripple:	max. 12 mVpp at 600 Ω for frequencies < 50 kHz
D/A converter resolution:	14 bit

Pulse output (active)

Frequency:	Max. 12.5 kHz
Pulse width:	Min. 40 µs
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 normally-open contacts. The output is galvanically isolated (1 500 V testing 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 (testing voltage: 500 V). The digital outputs can be used as status or pulse outputs.

| Frequency:	Max. 1 kHz
Pulse width:	Min. 500 µs
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 testing 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.	

Electrical connection

Terminal assignment	
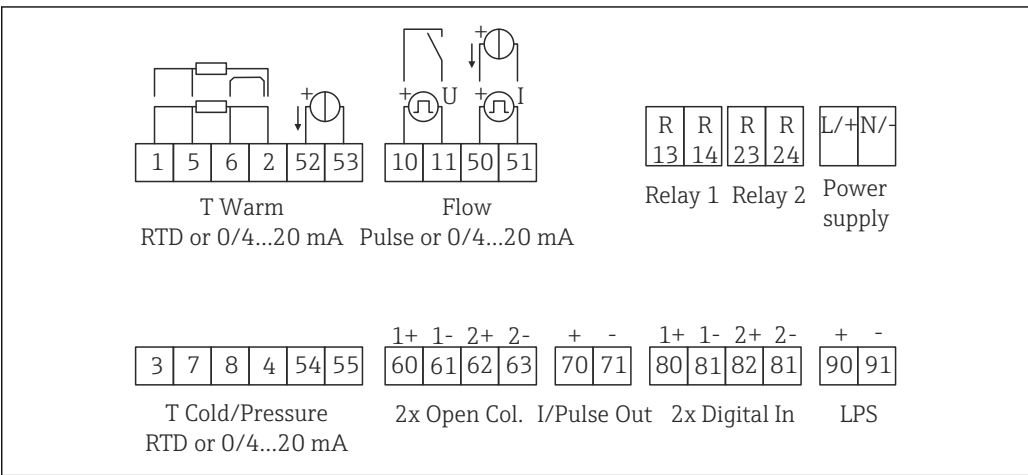
🔲 4   *Terminal assignment of EngyCal*

Supply voltage	• Low-voltage power 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	- Power supply 230 V AC ±10 %; 50 Hz ±0.5 Hz - Warm-up period > 2 h - Ambient temperature 25 ℃ ±5 K (77 ℉ ±9 ℉) - Humidity 39 % ±10 % RH.

Arithmetic unit

Medium	Size	Range
Steam	Temperature measuring range	0 to +800 ℃ (32 to +1 472 ℉)
	Pressure measuring range	0 to 1 000 bar (0 to 14 500 psi)
	Measurement and calculation interval	500 ms

Calculation standard IAPWS IF97

Typical accuracy of steam mass and energy measurement in a complete steam measuring point: approx. 1.5% (e.g. iTHERM ModuLine, Cerabar, Prowirl)

Installation

Installation location	Wall/pipe mounting, panel or DIN rail as per IEC 60715

Orientation	The orientation is determined by the readability of the display.

Environment

Ambient temperature range	−20 to +60 ℃ (−4 to +140 ℉)

Storage temperature	−30 to +70 ℃ (−22 to +158 ℉)

Climate class	As per IEC 60 654-1 Class B2, as per EN 1434 environment class C

Humidity	Maximum relative humidity 80 % for temperatures up to 31 ℃ (87.8 ℉), decreasing linearly to 50 % relative humidity at 40 ℃ (104 ℉).

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

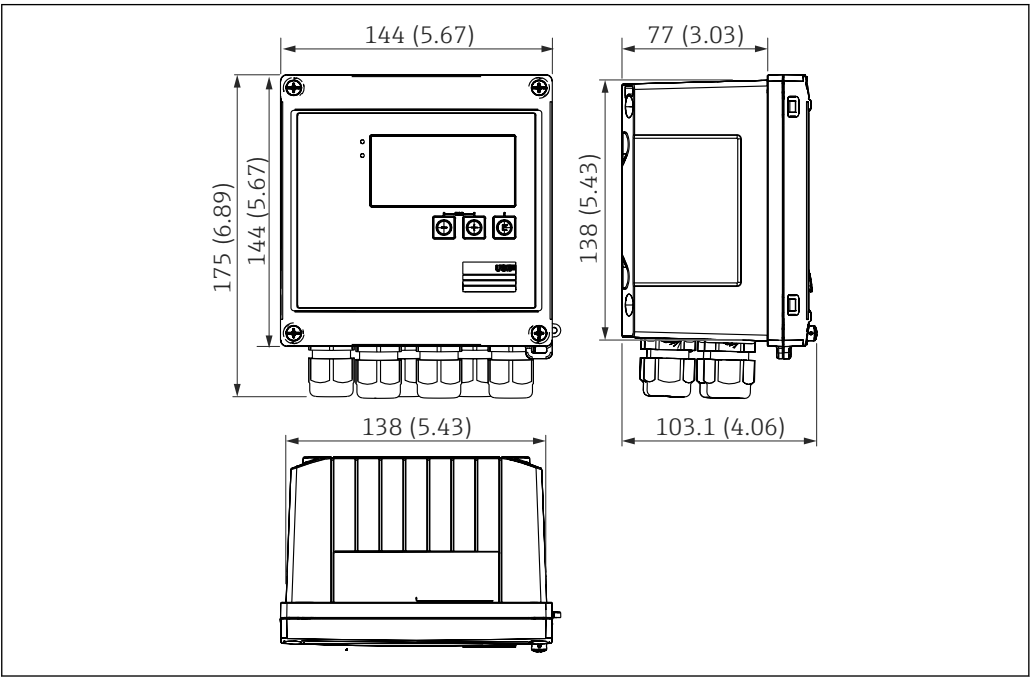| Degree of protection	- Panel mounting: IP65 at front, IP20 at rear - DIN rail: IP20 - Field housing: IP66, NEMA4x (for cable gland with double seal insert: IP65)

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

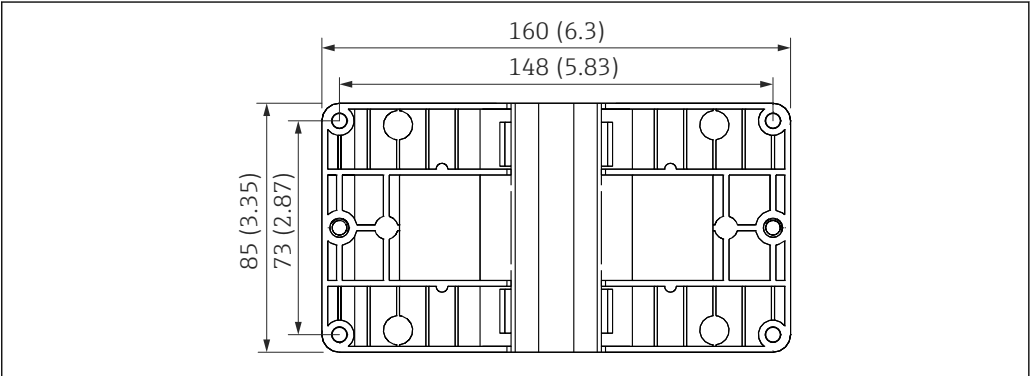# Mechanical construction

Design and dimensions

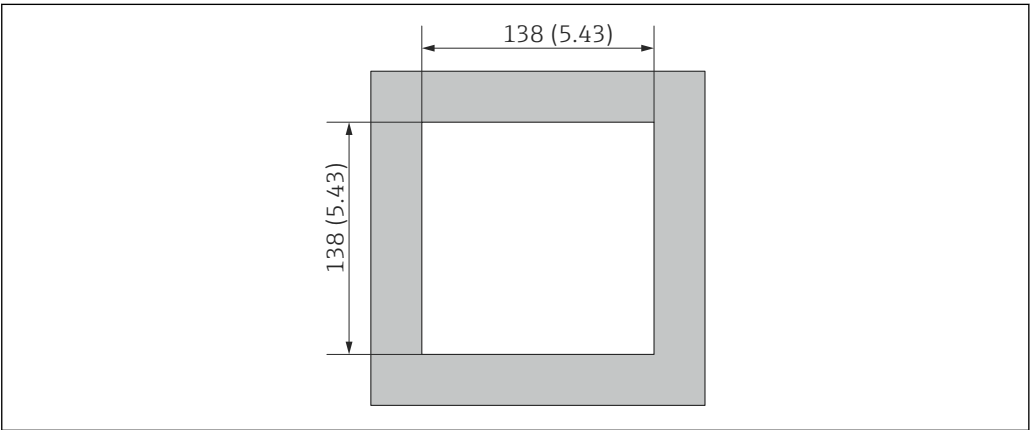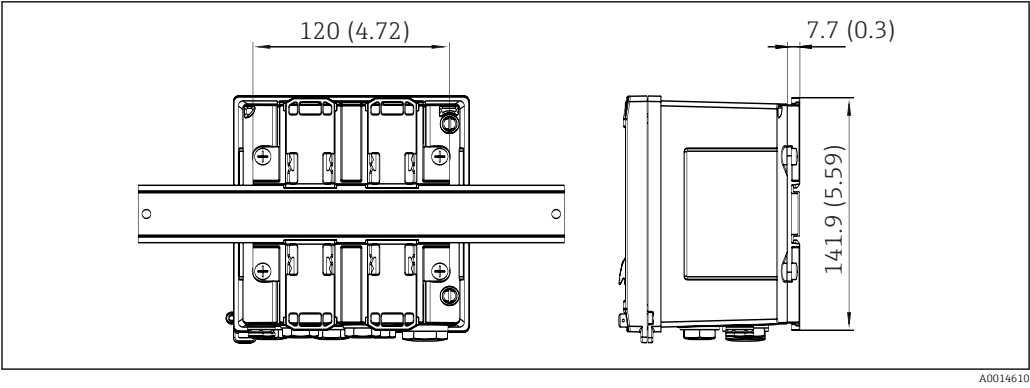*⊞ 5   EngyCal housing; dimensions in mm (in)*

⊞ 6   Mounting plate for wall, pipe and panel mounting; dimensions in mm (in)

⊞ 7   Panel cutout in mm (in)

⊠ *8*   *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 mm² (14 AWG); auxiliary voltage with plug-in screw terminal (30-12 AWG; torque 0.5 to 0.6 Nm) .

User interface

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
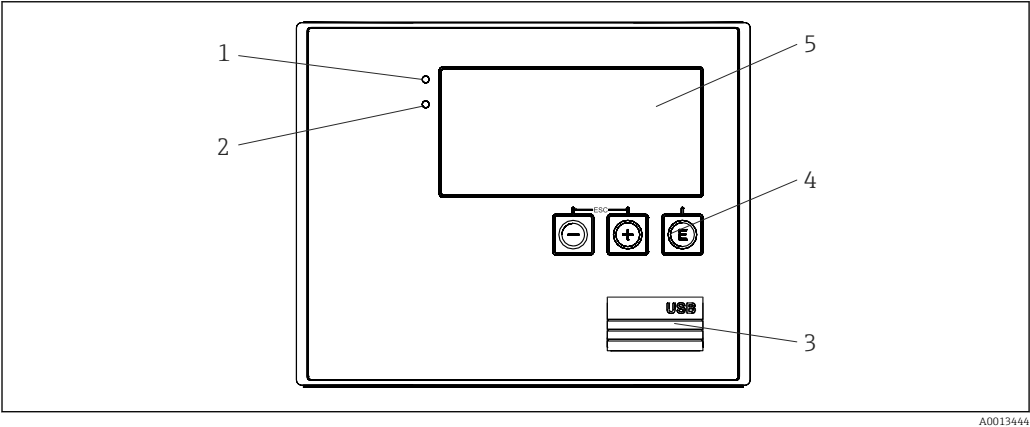
⊠ *9*   *Display and operating elements*

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 delivery with the RXU10-G1 (see "Accessories") or can be downloaded free of charge from www.endress.com/fieldcare .

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Downloads**.

Ordering information

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

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Configuration**.

Product Configurator - the tool for individual product configuration
• Up-to-the-minute configuration data
• Depending on the device: direct input of information specific to the measuring point, such as the 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 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

The accessories currently available for the product can be selected at www.endress.com:

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Spare parts & Accessories**.

Device-specific accessories	**Accessories enclosed**

Accessories	Description
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 the medium. 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

Service-specific accessories	**Commubox FXA291**

Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.

For more information, please refer to: www.endress.com

RXU10-G1

USB cable and FieldCare Device Setup configuration software incl. DTM library

For more information, please refer to: www.endress.com

FieldCare SFE500
FieldCare is a configuration tool for Endress+Hauser and third-party field devices based on DTM technology.
The following communication protocols are supported: HART, WirelessHART, PROFIBUS, FOUNDATION Fieldbus, Modbus, IO-Link, EtherNet/IP, PROFINET and PROFINET APL.

📖 Technical Information TI00028S

www.endress.com/sfe500

Communication-specific accessories	**Field Data Manager (FDM) analysis software MS20, MS21**

- Field Data Manager (FDM) is a software which provides central data management and visualization. This enables the continuous, tamper-free archiving of process data, e.g. measured values and diagnostic events. "Live data" from connected devices is available. FDM saves the data in an SQL database.
- Supported databases: PostgreSQL (included in the delivery), Oracle or Microsoft SQL server.
- MS20 single-user license: Installing the software on a computer.
- MS21 multi-user license: Several simultaneous users, dependent on the number of available licenses.

📖 Technical Information TI01022R

www.endress.com/ms20

www.endress.com/ms21

Online tools	Product information about the entire life cycle of the device is available at: www.endress.com/onlinetools

System components	**Data Manager of the RSG product family**

Data Managers are flexible and powerful systems to organize process values. Up to 20 universal inputs and up to 14 digital inputs for direct connection of sensors, optionally with HART, are available as an option. The measured process values are clearly presented on the display and logged safely, monitored for limit values and analyzed. The values can be forwarded via common communication protocols to higher-level systems and connected to one another via individual plant modules.

For more information, please refer to: www.endress.com

Process indicators from the RIA product family

Easily readable process indicators with various functions: loop-powered indicators for displaying 4-20mA values, display of up to four HART variables, process indicators with control units, limit value monitoring, sensor power supply, and galvanic isolation.

Universal application thanks to international hazardous area approvals, suitable for panel mounting or field installation..

For more information, please refer to: www.endress.com

Surge arrester modules from the HAW product family

Surge arrester modules for DIN rail and field device mounting, for the protection of plants and measuring instruments with power supply and signal/communication lines.

More detailed information: www.endress.com

RN series active barrier

Single- or two-channel active barrier for safe separation of 0/4 to -20 mA standard signal circuits with bidirectional HART transmission. In the signal duplicator option, the input signal is transmitted to two galvanically isolated outputs. The device has one active and one passive current input; the outputs can be operated actively or passively.

For more information, please refer to: www.endress.com

Documentation

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads), depending on the device version:

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid for your device** The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions (KA)	**Guide that takes you quickly to the 1st measured value** The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Your reference document** The Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. These are an integral part of the Operating Instructions. ⓘ The nameplate indicates which Safety Instructions (XA) apply to the device.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is a constituent part of the device documentation.

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