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Technical Information
Ecograph T RSG35

Data manager



Graphic data manager with up to 12 analog and 6 digital inputs

Field of application

Safe and complete data recording and visualization of all process sequences. Demands on process monitoring and data recording are becoming more and more complex. The Ecograph T RSG35 data manager records, visualizes and monitors all analog or digital input signals. The device is easy to use and simplifies data archiving. Due to its variety of communication options, system integration is easy.

The Ecograph T is the right solution for a wide range of applications such as:
- Quality and quantity monitoring in the water and wastewater industry
- Monitoring of processes in power stations
- Displaying and recording of critical process parameters
- Tank and level monitoring
- Temperature monitoring in metal working

Benefits

- Versatile: up to 12 universal inputs record a wide range of measuring signals
- Clear layout: 5.7" TFT screen for displaying measured values in a maximum of four groups, with digital, bar graph and curve display
- Safe: reliable data archiving with internal memory and separate SD card
- Easy: intuitive operation via the navigator (jog/shuttle dial) on site, or user-friendly operation at the PC via the integrated web server
- Compact: low installation depth, saves space and money
- System-enabled: common interfaces such as Ethernet, RS232/485, USB and optional slave function for Modbus RTU/TCP
- Informative: e-mail notification in event of alarms and limit violation

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People for Process Automation

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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.
	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
	Hazardous area		Safe area (non-hazardous area)

Function and system design

Measuring principle

Electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digital input signals.

The device is intended for installation in a panel or cabinet. Operation in a desktop/field housing is possible as an option.

Measuring system

Multichannel data recording system with multicolored TFT display (145 mm (5.7 in) screen size), galvanically isolated universal inputs (U, I, TC, RTD, pulse, frequency), digital inputs, transmitter power supply, limit relays, communication interfaces (USB, Ethernet, optionally RS232/485), optionally with Modbus protocol, 128 MB internal memory, external SD card and USB stick. A free version of the PostgreTMSQL database can be enabled when FDM is installed.

The number of inputs available in the basic device can be individually increased using a maximum of 3 plug-in cards. The device supplies power directly to connected two-wire transmitters. The device is configured and operated via the navigator (jog/shuttle dial), via the integrated web server and a PC, or via an external keyboard. Online help facilitates local operation.

Reliability

Reliable function

Depending on the device version, the MTBF is between 52 years and 24 years (calculated based on SN29500 standard at 40 °C)

Maintainability

Battery-backed time and data memory. Have the backup battery replaced by a service technician after 10 years.

Real-time clock

- Configurable summer/normal time changeover
- Battery buffer. Have the backup battery replaced by a service technician after 10 years.
- Drift: <10 min./year
- Time synchronization possible via SNTP or via digital input

Standard diagnostic functions as per NAMUR NE 107

The diagnostic code consists of the status signal as per Namur NE 107 and the event number.

- Cable open circuit, short-circuit
- Incorrect wiring
- Internal device errors
- Overrange/underrange detection
- Ambient temperature out-of-range detection

Device error/alarm relay

One relay can be used as an alarm relay. The selected output/relay switches if the device detects a system error (e.g., hardware defect) or a malfunction (e.g., cable open circuit).

This "alarm relay" switches if "F"-type errors occur (F = failure), i.e. "M"-type errors (M= Maintenance required) do not switch the alarm relay.

Safety

The tamper-proof recorded data are saved and can be transferred to an external SQL database for archiving in a way that prevents subsequent manipulation.

IT security

The manufacturer only provides a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

Input

Measured variable

Number of analog universal inputs

Standard version without universal inputs. Optional input cards (slot 1-3) with 4 universal inputs (4/8/12) each.

Number of digital inputs

6 digital inputs

Number of mathematics channels

4 mathematics channels (optional). Mathematics functions can be freely edited via a formula editor.

Integration of calculated values e.g. for totalization.

Number of limit values

30 limit values (individual channel assignment)

Function of analog universal inputs

You are free to choose between the following measured variables for each universal input: U, I, RTD, TC, pulse input or frequency input.

Integration of input variable for totalization e.g. flow rate (m^3/h) into volume (m^3).

Calculated process variables

The values of the universal inputs can be used to perform calculations in the mathematics channels.

Measuring range of analog universal inputs

According to IEC 60873-1: An additional display error of ±1 digit is permitted for every measured value.

User-definable measuring ranges per universal input of the multifunction card:

Measured variable	Measuring range	Maximum measurement error of measuring range (oMR), temperature drift	Input resistance
Current (I)	0 to 20 mA, 0 to 20 mA squared 0 to 5 mA 4 to 20 mA, 4 to 20 mA squared ±20 mA Overrange: up to 22 mA or −22 mA	±0.1% oMR Temperature drift: ±0.01%/K oMR	Load: 50 Ω ±1 Ω
Voltage (U) > 1 V	0 to 10 V, 0 to 10 V squared 0 to 5 V 1 to 5 V, 1 to 5 V squared ±10 V ±30 V	±0.1% oMR Temperature drift: ±0.01%/K oMR	≥ 1 MΩ
Voltage (U) ≤ 1 V	0 to 1 V; 0 to 1 V squared ±1 V ±150 mV	±0.1% oMR Temperature drift: ±0.01%/K oMR	≥ 2.5 MΩ
Resistance thermometers (RTD)	Pt100: −200 to 850 °C (−328 to 1 562 °F) (IEC 60751:2008, α=0.00385) Pt100: −200 to 510 °C (−328 to 950 °F) (JIS C 1604:1984, α=0.003916) Pt100: −200 to 850 °C (−328 to 1 562 °F) (GOST 6651-94, α=0.00391) Pt500: −200 to 850 °C (−328 to 1 562 °F) (IEC 60751:2008, α=0.00385) Pt500: −200 to 510 °C (−328 to 950 °F) (JIS C 1604:1984, α=0.003916) Pt1000: −200 to 600 °C (−328 to 1 112 °F) (IEC 60751:2008, α=0.00385) Pt1000: −200 to 510 °C (−328 to 950 °F) (JIS C 1604:1984, α=0.003916)	4-wire: ±0.1% oMR 3-wire: ±(0.1% oMR + 0.8 K) 2-wire: ±(0.1% oMR + 1.5 K) Temperature drift: ±0.01%/K oMR	
	Cu50: −50 to 200 °C (−58 to 392 °F) (GOST 6651-94, α=4260) Cu50: −200 to 200 °C (−328 to 392 °F) (GOST 6651-94, α=4280) Pt50: −200 to 1 100 °C (−328 to 2 012 °F) (GOST 6651-94, α=0.00391) Cu100: −200 to 200 °C (−328 to 392 °F) (GOST 6651-94, α=4280)	4-wire: ±0.2% oMR 3-wire: ±(0.2% oMR + 0.8 K) 2-wire: ±(0.2% oMR + 1.5 K) Temperature drift: ±0.02%/K oMR	

Measured variable	Measuring range	Maximum measurement error of measuring range (oMR), temperature drift	Input resistance
	Pt46: −200 to 1 100 °C (−328 to 2 012 °F) (GOST 6651-94, α=0.00391) Cu53: −200 to 200 °C (−328 to 392 °F) (GOST 6651-94, α=4280)	4-wire: ±0.3% oMR 3-wire: ±(0.3% oMR + 0.8 K) 2-wire: ±(0.3% oMR + 1.5 K) Temperature drift: ±0.02%/K oMR	
Thermocouples (TC)	Type J (Fe-CuNi): −210 to 1 200 °C (−346 to 2 192 °F) (IEC 60584:2013) Type K (NiCr-Ni): −270 to 1 300 °C (−454 to 2 372 °F) (IEC 60584:2013) Type L (NiCr-CuNi): −200 to 800 °C (−328 to 1 472 °F) (GOST R8.585:2001) Type L (Fe-CuNi): −200 to 900 °C (−328 to 1 652 °F) (DIN 43710-1985) Type N (NiCrSi-NiSi): −270 to 1 300 °C (−454 to 2 372 °F) (IEC 60584:2013) Type T (Cu-CuNi): −270 to 400 °C (−454 to 752 °F) (IEC 60584:2013)	±0.1% oMR from −100 °C (−148 °F) ±0.1 % oMR from −130 °C (−202 °F) ±0.1 % oMR from −100 °C (−148 °F) ±0.1 % oMR from −100 °C (−148 °F) ±0.1 % oMR from −100 °C (−148 °F) ±0.1 % oMR from −200 °C (−328 °F) Temperature drift: ±0.01%/K oMR	≥ 1 MΩ
	Type A (W5Re-W20Re): 0 to 2 500 °C (32 to 4 532 °F) (ASTME 988-96) Type B (Pt30Rh-Pt6Rh): 42 to 1 820 °C (107.6 to 3 308 °F) (IEC 60584:2013) Type C (W5Re-W26Re): 0 to 2 315 °C (32 to 4 199 °F) (ASTME 988-96) Type D (W3Re-W25Re): 0 to 2 315 °C (32 to 4 199 °F) (ASTME 988-96) Type R (Pt13Rh-Pt): −50 to 1 768 °C (−58 to 3 214 °F) (IEC 60584:2013) Type S (Pt10Rh-Pt): −50 to 1 768 °C (−58 to 3 214 °F) (IEC 60584:2013)	±0.15 % oMR from 500 °C (932 °F) ±0.15 % oMR from 600 °C (1 112 °F) ±0.15 % oMR from 500 °C (932 °F) ±0.15 % oMR from 500 °C (932 °F) ±0.15 % oMR from 100 °C (212 °F) ±0.15 % oMR from 100 °C (212 °F) Temperature drift: ±0.01%/K oMR	≥ 1 MΩ
Pulse input (I) [1]	Min. pulse length 40 µs Max. 12.5 kHz 0 to 7 mA = LOW 13 to 20 mA = HIGH		Load: 50 Ω ±1 Ω
Frequency input (I) [1]	0 to 10 kHz Overrange: up to 12.5 kHz 0 to 7 mA = LOW 13 to 20 mA = HIGH	±0.02% @ f < 100 Hz of reading ±0.01% @ F ≥ 100 Hz of reading Temperature drift: 0.01% of measured value over the entire temperature range	

1) If a universal input is used as a frequency or pulse input, a series resistor must be used in series connection with the voltage source. Example: 1.2 Ω series resistor at 24 V

Maximum load of inputs

Limit values for input voltage and current as well as cable open circuit detection/line influence/temperature compensation:

Measured variable	Limit values (steady-state, without destroying input)	Cable open circuit detection/line influence/temperature compensation
Current (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	4 to 20 mA range with disengageable cable open circuit monitoring to NAMUR NE 43. The following error ranges apply when NE 43 is switched on: ≤ 3.8 mA: underrange ≥ 20.5 mA: overrange ≤ 3.6 mA or ≥ 21.0 mA: cable open circuit (display shows: - - - -)
Pulse, frequency (I)	Maximum permitted input voltage: 2.5 V Maximum permitted input current: 50 mA	No cable open circuit monitoring
Voltage (U) > 1 V	Maximum permitted input voltage: 35 V	1 to 5 V range with disengageable cable open circuit monitoring: < 0.8 V or > 5.2 V: cable open circuit (display shows: - - - -)
Voltage (U) ≤ 1 V	Maximum permitted input voltage: 24 V	
Resistance thermometers (RTD)	Measuring current: ≤ 1 mA	Maximum barrier resistance (or line resistance): 4-wire: max. 200 Ω; 3-wire: max. 40 Ω Maximum influence of barrier resistance (or line resistance) for Pt100, Pt500 and Pt1000: 4-wire: 2 ppm/Ω, 3-wire: 20 ppm/Ω Maximum influence of barrier resistance (or line resistance) for Pt46, Pt50, Cu50, Cu53, Cu100 and Cu500: 4-wire: 6 ppm/Ω, 3-wire: 60 ppm/Ω Cable open circuit monitoring if any connection is interrupted.
Thermocouples (TC)	Maximum permitted input voltage: 24 V	Influence of cable resistance: <0.001%/Ω Internal temperature compensation error: ≤2 K

Scan rate

Current/voltage/pulse/frequency input: 100 ms per channel

Thermocouples and resistance thermometer: 1 s per channel

Data storage/save cycle

Selectable save cycle. Choose from: 1s / 2s / 3s / 4s / 5s / 10s / 15s / 20s / 30s / 1min / 2min / 3min / 4min / 5min / 10min / 15min / 30min / 1h

Typical logging duration

Prerequisites for following tables:
- No limit value violation / integration
- Digital input not used
- Signal analysis 1: off, 2: day, 3: month, 4: year
- No active mathematics channels

Frequent entries in the event logbook reduce the memory availability.

128 MB internal memory:

Analog inputs	Channels in groups	Storage cycle (weeks, days, hours)				
		5 min	1 min	30 s	10 s	1 s
1	1/0/0/0	668, 4, 14	135, 0, 5	67, 4, 4	22, 3, 20	2, 1, 18
4	4/0/0/0	491, 0, 10	99, 4, 17	49, 6, 12	16, 4, 15	1, 4, 16
8	4/4/0/0	246, 1, 14	49, 6, 1	24, 6, 19	8, 2, 7	0, 5, 20
12	4/4/4/0	164, 2, 4	33, 1, 18	16, 4, 13	5, 3, 21	0, 3, 21

External memory, 1 GB SD card:

Analog inputs	Channels in groups	Storage cycle (weeks, days, hours)				
		5 min	1 min	30 s	10 s	1 s
1	1/0/0/0	12825, 5, 20	2580, 4, 18	1291, 2, 5	430, 4, 14	43, 0, 12
4	4/0/0/0	8672, 5, 12	1749, 6, 13	875, 6, 13	292, 1, 8	29, 1, 14
8	4/4/0/0	4343, 1, 1	875, 1, 17	438, 0, 6	146, 0, 17	14, 4, 7
12	4/4/4/0	2896, 6, 13	583, 3, 21	292, 0, 6	97, 2, 20	9, 5, 4

Converter resolution

24 bit

Totalization

The interim, daily, monthly and yearly value and the total value can be determined (15-digit, 64 bit).

Analysis

Recording of quantity/operating time (standard function), also a min/max/median analysis within the set time frame.

Digital inputs

Input level	According to IEC 61131-2, logical "0" (corresponds to −3 to 5 V), activation with logical "1" (corresponds to 12 to 30 V)
Input frequency	Max. 25 Hz
Pulse length	Min. 20 ms (pulse counter)
Pulse length	Min. 100 ms (control input, messages, operating time)
Input current	Max. 2 mA
Input voltage	Max. 30 V

Selectable functions

- Functions of the digital input: control input, on/off event, pulse counter (15-digit, 64 bit), operating time, event + operating time, quantity from time, Modbus slave.
- Functions of the control input: start recording, screensaver on, lock setup, time synchronization, set point monitoring on/off, block keyboard/navigator, start/stop analysis.

Output

Auxiliary voltage output

The auxiliary voltage output can be used for loop power supply or to control the digital inputs. The auxiliary voltage is short-circuit proof and galvanically isolated.

Output voltage	24 V_{DC} ±15%
Output current	Max. 250 mA

Relay output

A mix of low voltage (230 V) and safety extra low voltage (SELV circuits) is not permitted at the connections of the relay contacts.

Alarm relay

1 alarm relay with changeover contact

Standard relay

5 relays with NO contact, e.g. for limit value messages (can be configured as NC contact)

Switching capacity

- Max. switching capacity: 3 A @ 30 V_{DC}
- Max. switching capacity: 3 A @ 250 V_{AC}
- Min. switching load: 300 mW

Switching cycles

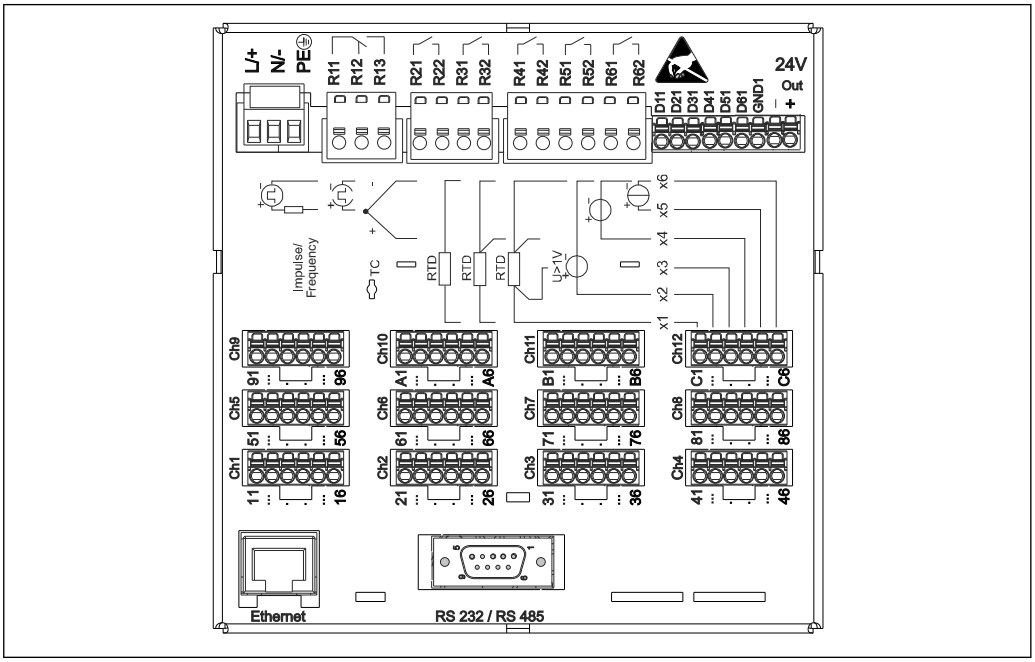
$>10^5$

Galvanic isolation

The following connections are galvanically isolated from one another:
- Power supply
- Relay outputs
- Digital inputs (isolated from other connections but not from each other)
- Analog inputs
- Analog outputs
- Ethernet
- RS232/RS485
- USB
- Auxiliary voltage output

Electrical connection

Terminal assignment



1 Terminals on back of device

Available device plugs

- Panel-mounted device: connected to mains via plug-in screw terminals with reverse polarity protection
- Desktop version (option): connected to mains via IEC connector

Supply voltage

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

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

Power consumption

- 100 to 230 V: max. 35 VA
- 24 V: max. 24 VA

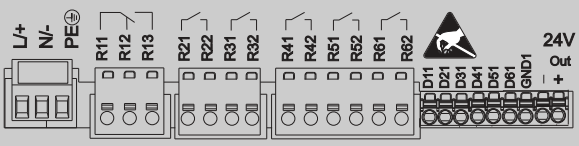
The power actually consumed depends on the individual operating state and the device version (LPS, USB, brightness of screen, number of channels, etc.). The active power here is approx. 3 to 20 W.

Power supply failure

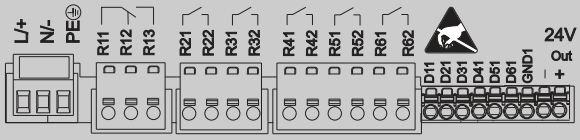
Battery-backed time and data memory. The device starts automatically following a power failure.

Electrical connection

Supply voltage

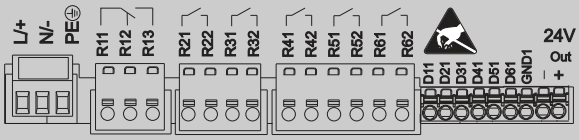
Power unit type	Terminal		
	 A0019103		
100-230 VAC	**L+**	**N-**	**PE**
	Phase L	Zero conductor N	Ground
24 V AC/DC	**L+**	**N-**	**PE**
	Phase L or +	Zero conductor N or -	Ground

Relay

Type	Terminal (max. 250 V, 3 A)				
	 A0019103				
Alarm relay 1	**R11**	**R12**	**R13**		
	Change-over contact	Normally closed contact (NC) [1]	Normally open contact (NO) [2]		
Relay 2 to 6				**Rx1**	**Rx2**
				Switching contact	Normally open contact (NO [2])

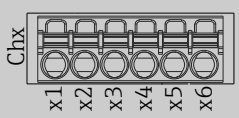
1) NC = normally closed (breaker)
2) NO = normally open (maker)

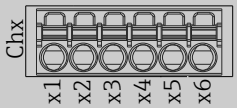
Digital inputs; auxiliary voltage output

Type	Terminal			
	 A0019103			
Digital input 1 to 6	**D11 to D61**	**GND1**		
	Digital input 1 to 6 (+)	Ground (-) for digital inputs 1 to 6		
Auxiliary voltage output, not stabilized, max. 250 mA			**24 V Out -**	**24 V Out +**
			- Ground	+ 24 V (±15%)

Analog inputs

The first digit (x) of the two-digit terminal number corresponds to the associated channel:

Type	Terminal					
	 A0019303					
	x1	**x2**	**x3**	**x4**	**x5**	**x6**
Current/pulse/frequency input [1]					(+)	(-)
Voltage >1 V		(+)				(-)
Voltage ≤ 1 V				(+)		(-)
Resistance thermometer RTD (2-wire)	(A)					(B)

Type	Terminal  A0019303					
Resistance thermometer RTD (3-wire)	(A)			b (sense)		(B)
Resistance thermometer RTD (4-wire)	(A)		a (sense)	b (sense)		(B)
Thermocouples TC				(+)		(-)

1) If a universal input is used as a frequency or pulse input and the voltage is >2.5 V, a series resistor must be used in series connection with the voltage source. Example: 1.2 kΩ series resistor at 24 V

Cable specifications

Cable specification, spring terminals

All connections on the rear of the device are designed as pluggable screw or spring terminal blocks with reverse polarity protection. The spring terminals are unlocked with a slotted screwdriver (size 0).

Note the following when connecting:
- Wire cross-section, auxiliary voltage output, digital I/O and analog I/O: max. 1.5 mm² (14 AWG) (spring terminals)
- Wire cross-section, mains: max. 2.5 mm² (13 AWG) (screw terminals)
- Wire cross-section, relays: max. 2.5 mm²(13 AWG) (spring terminals)
- Stripping length: 10 mm (0.39 in)

No ferrules must be used when connecting flexible wires to spring terminals.

Shielding and grounding

Optimum electromagnetic compatibility (EMC) can only be guaranteed if the system components and the cables - both sensor and communication cables - are shielded and the shielding forms as complete a cover as possible. A shielded cable must be used for sensor cables that are longer than 30 m (100 ft). A shield coverage of 90% is ideal. Make sure that the communication cables and sensor cables do not cross when routing them. Connect the shielding as often as possible to the reference ground to ensure optimum EMC protection for the different communication protocols and the connected sensors.

To comply with requirements, three different types of shielding are possible:
- Shielding at both ends
- Shielding at one end on the supply side with capacitance termination at the device
- Shielding at one end on the feed side

The best results are achieved in installations with shielding at one end on the supply side (without capacitance termination at the device). Appropriate internal device wiring measures must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

Observe national installation requirements and guidelines during installation. Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground.

If the shielding of the cable is grounded at more than one point in systems without potential matching, mains frequency equalizing currents can occur. These can damage the signal cable and significantly impact signal transmission. In such cases, the shield of the signal cable should be grounded on one side only and must not be connected to the ground terminal of the housing. The unconnected shield must be insulated.

Overvoltage protection

To avoid high-energy transients on long signal cables, connect a suitable surge arrester upstream (e.g. HAW562).

Connection data interface, communication

USB ports (standard):

1 x USB port type A (host)

A USB 2.0 port is available on a shielded USB-A socket at the front of the device. A USB stick, for example, can be connected to this interface as a storage medium. An external keyboard or USB hub may also be connected.

1 x USB port type B (function)

A USB 2.0 port is available on a shielded USB-B socket at the front of the device. This can be used to connect the device to a laptop for communication, for example.

Ethernet interface (standard):

Ethernet interface on back, 10/100 Base-T, plug type RJ45. Connect the device to a PC network (TCP/IP Ethernet) via the Ethernet interface using a hub or switch. Use a standard patch cable (e.g., CAT5E) for the connection. Using DHCP, the device can be fully integrated into an existing network without the need for additional configuration. The device can be accessed from every PC in the network. Normally only the automatic assignment of the IP address must be configured at the client. When the device is started, it can automatically retrieve the IP address, subnet mask and gateway from a DHCP server. Depending on the network to which the device is connected, the settings must be configured directly on the device without using DHCP. Two Ethernet function LEDs are located on the rear of the device.

The following functions are implemented:
- Data communication with PC software (analysis software, configuration software, OPC server)
- Web server
- WebDAV (Web-based Distributed Authoring and Versioning) is an open standard for the provisioning of files via the HTTP protocol. Read the data saved on the device's SD card using a PC. A web browser or a WebDAV client can be selected as the network drive for this on the PC side.

Serial RS232/RS485 interface (option):

A combined RS232/RS485 connection is available on a shielded SUB D9 socket at the rear of the device. This can be used for data transfer and to connect a modem. For communication via modem, we recommend an industrial modem with a watchdog function.

- The following baud rates are supported: 9600, 19200, 38400, 57600, 115200
- Max. cable length with shielded cable: 2 m (6.6 ft)(RS232), 1 000 m (3 281 ft)(RS485)

Only one interface can be used at any one time (RS232 or RS485).

Performance characteristics

Response time

Input	Output	Time [ms]
Current, voltage, pulse	Relay	≤ 550
RTD	Relay	≤ 1150
TC [1)]	Relay	≤ 1550
Cable open circuit detection, current input	Relay	≤ 1150
Sensor error RTD, TC	Relay	≤ 5000
Digital input	Relay	≤ 350

1) If internal measuring point temperature compensation is used, otherwise values as for voltage

Reference operating conditions

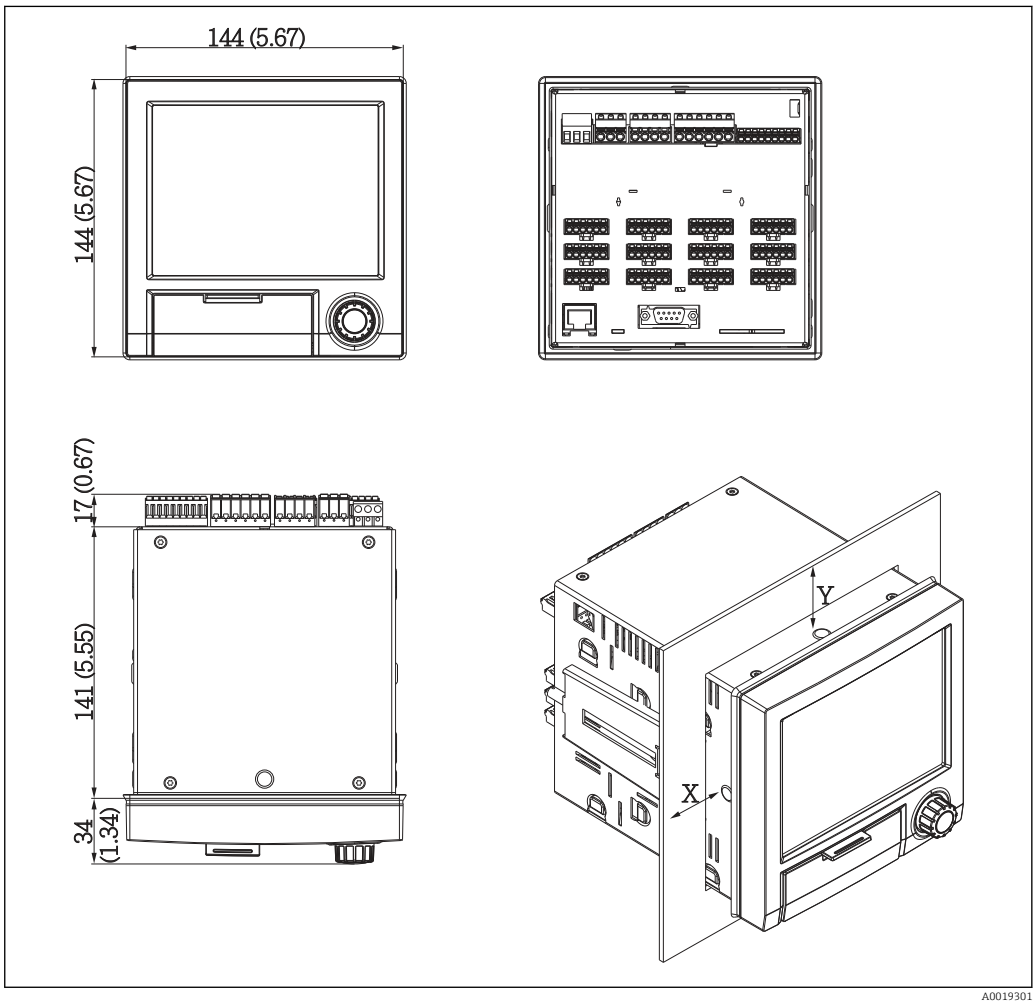
Reference temperature	25 °C (77 °F) ±5 K
Warm-up period	120 min.
Humidity	20 to 60 % rel. humidity

Hysteresis	Can be configured for limit values in the setup
Long-term drift	As per IEC 61298-2: max. ±0.1%/year (of measuring range)

Installation

Mounting location and installation dimensions

The device is designed for use in a panel in non-hazardous areas.



2 *Panel mounting and dimensions in mm (in)*

Observe the installation depth of approx. 158 mm (6.22 in) for the device incl. terminals and fastening clips.

- Panel cutout: 138 to 139 mm (5.43 to 5.47 in) x 138 to 139 mm (5.43 to 5.47 in)
- Panel thickness: 2 to 40 mm (0.08 to 1.58 in)
- Angle of vision: from the midpoint axis of the display, 75° to the left and right, 65° above and below.
- A minimum distance of 15 mm (0.59 in) between the devices must be observed if aligning the devices in the Y direction (vertically above one another). A minimum distance of 10 mm (0.39 in) between the devices must be observed if aligning the devices in the X direction (horizontally beside one another).
- Securing to DIN 43 834

Field housing assembly and design (optional)

As an option, the device can be ordered ready-mounted in a field housing with IP65.

Dimensions (B x H x D) approx.: 320 mm (12.6 in) x 320 mm (12.6 in) x 254 mm (10 in)

Desktop housing assembly and design (optional)

As an option, the device can be ordered ready-mounted in a desktop housing.

Dimensions (W x H x D) approx.: 293 mm (11.5 in) x 188 mm (7.4 in) x 211 mm (8.3 in) (dimensions with bracket, feet and installed device)

Environment

Ambient temperature range

−10 to +50 °C (14 to 122 °F)

Storage temperature

−20 to +60 °C (−4 to +140 °F)

Relative humidity

5 to 85 %, non-condensing

Operating altitude

< 2 000 m (6 561 ft) above MSL

Climate class

To IEC 60654-1: Class B2

Electrical safety

Class I equipment, overvoltage category II

Pollution degree 2

Degree of protection

Degree of protection:
Panel-mounted device:
Front: IP65, NEMA Type 4 encl.
Rear: IP20

Electromagnetic compatibility

EMC in accordance with all relevant requirements of the IEC/EN 61326 series and NAMUR NE 21. For details, refer to the Declaration of Conformity.

- Interference immunity: as per IEC/EN 61326 series (industrial environment)/NAMUR NE 21 Maximum measurement error <1% of measuring range
- Interference emissions: as per IEC 61326-1 Class A

Mechanical construction

Design and dimensions

Information about design and dimensions→ 13

Weight

- Panel-mounted device with maximum configuration: approx. 2.2 kg (4.85 lbs)
- Desktop housing (excluding device): approx. 2.3 kg (5 lbs)
- Field housing (excluding device): approx. 4 kg (8.8 lbs)

Materials

Front frame	Zinc die cast GD-Z410, powder-coated
Sight glass	Transparent Makrolon plastic (FR clear 099) UL94-V2
Flap; jog/shuttle dial	Plastic ABS UL94-V2
Mounting guide rail for PCBs; motherboard fixing unit; display retainer plate	Plastic PA6-GF15 UL94-V2
Seal to panel wall; seal to display; seal in flap; seal to navigator	Rubber EPDM 70 Shore A
Casing; rear panel	Galvanized sheet steel St 12 ZE

All materials are silicone-free.

Materials of desktop housing

- Housing half-panels: sheet steel, electrolytically plated (powder-coated)
- Side sections: aluminum extruded section (powder-coated)
- Section ends: colored polyamide

Display and operating elements

Operating concept

The device can be operated directly on site, or via remote configuration with the PC via interfaces and operating tools (web server, configuration software).

Web server
A web server is integrated into the device. The web server offers the following range of functions:
- Easy configuration without additional installed software
- Instantaneous value display and diagnostics information
- Display of current measured value curves via web browser (remote control)
- Display of historical measured data in numerical format or as a curve
- Display of events and logbook entries
- Loading/saving of device configuration
- Device firmware update
- Printout of device configuration

Integrated Operating Instructions
Thanks to the device's simple operating concept, it is possible to commission the device for many applications without a hard copy of the Operating Instructions. The device has an integrated help function and displays operating instructions directly on screen if the navigator (jog/shuttle dial) is pressed for longer than 3 seconds.

Languages

The following languages can be selected in the operating menu: German, English, Spanish, French, Italian, Dutch, Swedish, Polish, Portuguese, Czech, Russian, Japanese, Chinese (Traditional), Chinese (Simplified)

Local operation

Display elements

Type

TFT color display

Size (diagonal screen measurement)

145 mm (5.7 in)

Resolution

VGA 307,200 pixels (640 x 480 pixels)

Backlight

70,000 h half-life (= half brightness)

Number of colors

262,000 viewable colors, 256 colors used

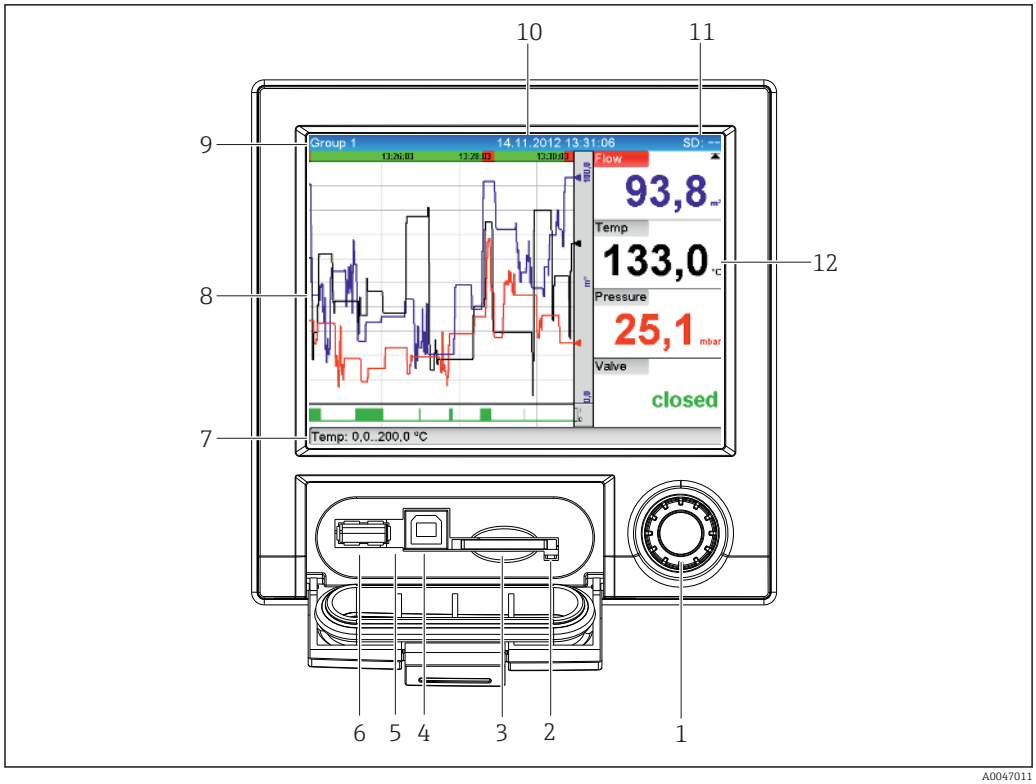
Viewing angle

Viewing angle: 130° vertical, 150° horizontal

Screen displays

- Background color white
- Active channels can be assigned to up to 4 groups. To clearly identify these groups, they can be assigned a name, such as "Temp. boiler 1" or "daily averages".
- Linear scaling
- Measured value history: Quick retrieval of historic data with zoom function
- Preformatted screen displays such as horizontal or vertical curve presentation, bar graph display or digital display.

Operating elements



3 Front of device with open flap

Item no.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
1	"Navigator": Jog/shuttle dial for operating with additional press/hold function. In display mode: turn the dial to switch between the various signal groups. Press the dial to display the main menu. In setup mode or in a selection menu: Turn the dial anticlockwise to move the bar or the cursor up or to the left, changes the parameter. Turning clockwise moves the bar or cursor down or to the right, changes the parameter.
2	LED at SD slot. Orange LED lit or flashing when the device is accessing the SD card. **Do not remove the SD card if the LED is lit or flashing! Risk of data loss!**
3	Slot for SD card
4	USB-B socket "Function", e.g., to connect to a PC or laptop
5	Green LED lit: power supply present
6	USB-A socket "Host", e.g., for USB memory stick or external keyboard
7	In display mode: alternating status display (e.g., set zoom range) of the analog or digital inputs in the appropriate color of the channel. In setup mode: different information can be displayed here depending on the display type.
8	In display mode: window for measured value display (e.g., curve display). In setup mode: display of operating menu
9	In display mode: current group name, evaluation type In setup mode: name of the current operating item (dialog title)
10	In display mode: displays current date/time In setup mode: --

Item no.	Operating function (display mode = display of measured values) (Setup mode = operation in the Setup menu)
11	In display mode: alternating display indicating the percentage space on the SD card or USB stick that has already been used. Status symbols are also displayed in alternation with the memory information. In setup mode: the current "direct access" operating code is displayed
12	In display mode: display of current measured values and the status in the event of an error/alarm condition. In the case of counters, the type of counter is displayed as a symbol. If a measuring point has limit value status, the corresponding channel identifier is highlighted in red (quick detection of limit value violations). During a limit value violation and device operation, the acquisition of measured values continues uninterrupted.

Remote operation

Device access via operating tools

Device configuration and measured value retrieval can also be done via interfaces. The following operating tools are available for this purpose:

Operating tool	Functions	Access via
Field Data Manager (FDM) analysis software, SQL database support	▪ Export of saved data (measured values, analyses, event logbook) ▪ Visualization and processing of saved data (measured values, analyses, event logbook) ▪ Safe archiving of exported data in an SQL database	RS232/RS485, USB, Ethernet
Web server (integrated into the device; access via browser)	▪ Display of current and historical data and measured value curves via the web browser ▪ Easy configuration without additional installed software ▪ Remote access to device and diagnostic information	Ethernet, or Ethernet over USB
OPC server (optional)	The following instantaneous values can be provided: ▪ Analog channels ▪ Digital channels ▪ Mathematics ▪ Totalizer	RS232/RS485, USB, Ethernet
"FieldCare/ DeviceCare" configuration software	▪ Device configuration ▪ Loading and saving of instrument data (upload/download) ▪ Documentation of the measuring point	USB, Ethernet

System integration

The device has (optional) fieldbus interfaces for exporting process values. Measured values and statuses can also be transmitted to the device via fieldbus. Depending on the bus system, alarms and faults occurring during data transmission are displayed (e.g., status byte). The process values are transmitted in the same units that are used to display the values on the device.

Ethernet

The following functions are implemented:
- Data communication with PC software (analysis software, configuration software, OPC server)
- Web server

Modbus RTU/TCP slave

The device can be connected to a Modbus system via RS485 or Ethernet interface. Up to 12 analog inputs and 6 digital inputs can be transmitted via Modbus and stored in the device.

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**.

Scope of delivery

The scope of delivery of the device comprises:
- Device (with terminals, according to order)
- Panel-mounted device: 2 screw fastening clips
- USB cable
- Optional: industrial grade SD card (card is located in the SD slot behind the flap on the front of the device)
- "Field Data Manager (FDM)" analysis software (Essential, Demo or Professional version, depending on order)
- Delivery note
- Multilingual Brief Operating Instructions as hard copy

Accessories

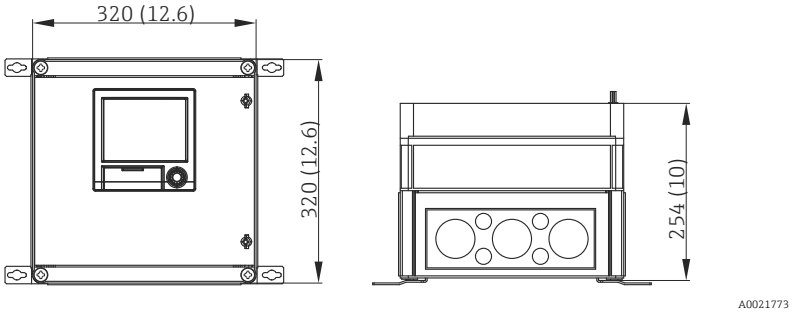
The accessories currently available for the product can be selected at www.endress.com:

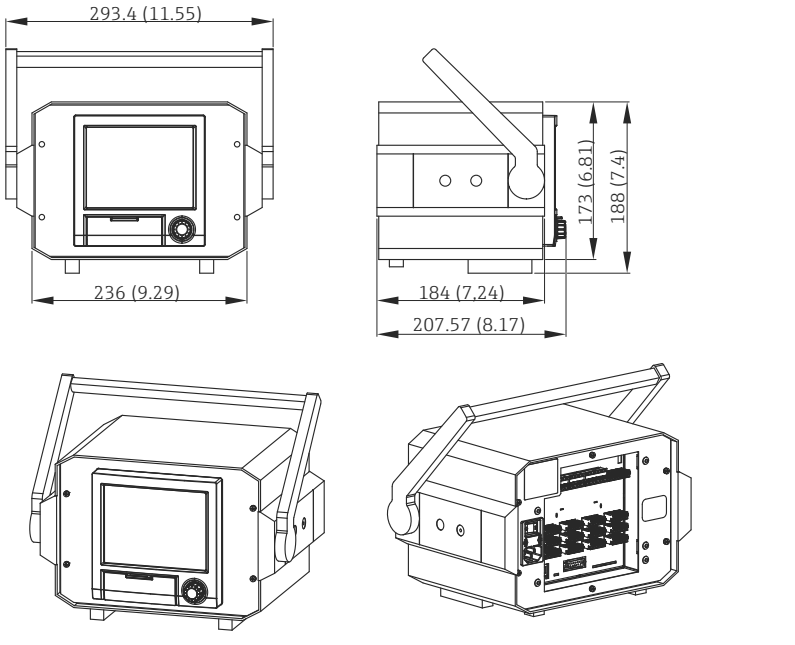
1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Spare parts & Accessories**.

Device-specific accessories

Description	Order no.
"Industrial Grade" SD card, industry standard, 1GB	71213190
Field Data Manager analysis software with SQL database support (1 x workstation license, Professional version on DVD)	MS20-A5
OPC server software (full version on CD)	RXO20-11

Description	Order no.
Accessories for RXU10 data manager	RXU10- _ _
Designation: Cable set RS232 for connection to PC or modem USB - RS232 converter Cable USB-A - USB-B, 1.8 m (5.9 ft) Configuration software "FieldCare Device Setup" + USB cable	 RXU10-B _ RXU10-E _ RXU10-F _ RXU10-G _

Description	Order no.
Field housing IP65 (for panel-mounted device)  4 *Dimensions in mm (in)*	RXU10-H _

Description	Order no.
Desktop housing (for panel-mounted device), cable with Schuko plug Desktop housing (for panel-mounted device), cable with US plug Desktop housing (for panel-mounted device), cable with Swiss plug	RXU10-I _ RXU10-J _ RXU10-K _
 *5 Dimensions in mm (in)*	
Version: Standard Neutral	 RXU10- _ 1 RXU10- _ 2

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

OPC DA server RXO20

The OPC DA server transmits process data such as instantaneous values or totalizers from connected Endress+Hauser field devices and provides them to the OPC clients in real time. These data can be visualized with OPC client software. Communication takes place via an RS232/RS485 interface or a TCP/IP connection. OPC is used in systems of various sizes in factory and process automation.

Technical Information TI00122R

www.endress.com/rxo20

Service-specific accessories

Software

DeviceCare SFE100

DeviceCare is an Endress+Hauser configuration tool for field devices using the following communication protocols: HART, PROFIBUS DP/PA, FOUNDATION Fieldbus, IO/Link, Modbus, CDI and Endress+Hauser Common Data Interfaces.

Technical Information TI01134S

www.endress.com/sfe100

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

Netilion
With the Netilion IIoT ecosystem, Endress+Hauser enables the optimization of plant performance, digitization of workflows, sharing of knowledge and improved collaboration. Drawing upon decades of experience in process automation, Endress+Hauser offers the process industry an IIoT ecosystem designed to effortlessly extract insights from data. These insights allow process optimization, leading to increased plant availability, efficiency, reliability and ultimately a more profitable plant.

www.netilion.endress.com

Field Xpert SMT50
Universal, high-performance tablet PC for device configuration.

Technical Information TI01555S

www.endress.com/smt50

Field Xpert SMT77 via WLAN
Universal, high-performance tablet PC for device configuration in Ex Zone 1 areas.

Technical Information TI01418S

www.endress.com/smt77

Online tools

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

System components

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

Process indicators from the RIA product family

Easily readable process indicators with various functions: loop-powered indicators for displaying 4-20 mA 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

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

Instructions for enabling a software option

Various device options can be enabled via an activation code. Available options can be ordered as an accessory and can be ordered separately.→ 19. Once you place your order, you will receive instructions on how to activate the option and a code which must be entered under **"Main menu -> Expert -> System -> Device options -> Activation code"**.

Documentation

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

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid** This document contains all the technical data on the product and provides an overview of everything that can be ordered with the product.
Brief Operating Instructions (KA)	**Quick guide to obtaining the first measured value** The Operating Instructions contain all the essential information about the product from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Reference** The Operating Instructions contain the information that is required in the various phases of the life cycle of the product: 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 parameters** The document contains detailed explanations of readable or configurable parameters in the product. The description is aimed at those who work with the product over its entire life cycle and perform specific configurations.
Safety Instructions (XA)	Safety Instructions for electrical equipment in hazardous areas are supplied with the product depending on the approval. These are an integral part of the Operating Instructions. The nameplate indicates the Safety Instructions (XA) that are relevant to the product.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the product documentation.



www.addresses.endress.com

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