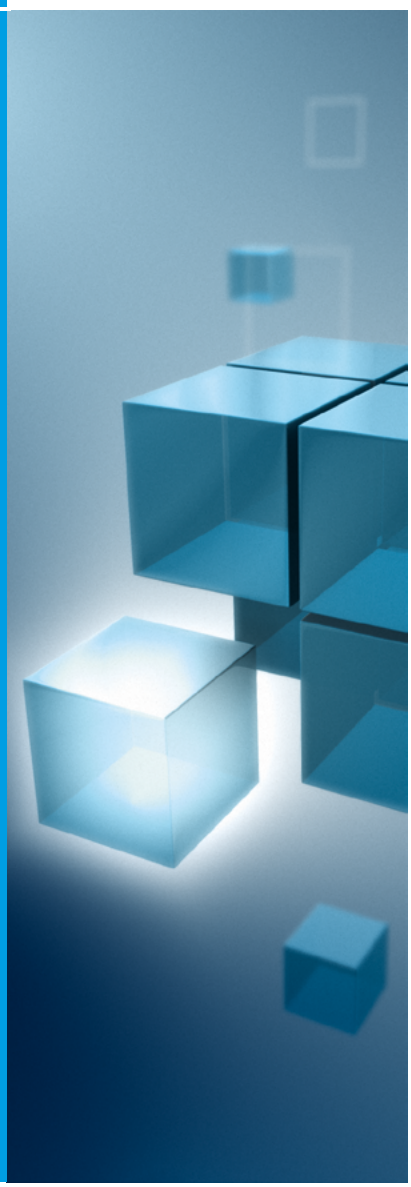
System products and data managers

Solutions for the loop



Endress+Hauser

People for Process Automation

Endress+Hauser — Your partner

Table of contents

Endress+Hauser is a global leader in measurement instrumentation, services and solutions for industrial process engineering

With dedicated sales centers and a strong network of partners, Endress+Hauser guarantees competent worldwide support. Our production centers in twelve countries meet your needs and requirements quickly and effectively. The Group is managed and coordinated by a holding company in Reinach, Switzerland. As a successful family-owned business, Endress+Hauser is set to remain independent and self-reliant.

Endress+Hauser provides sensors, instruments, systems and services for level, flow, pressure and temperature measurement as well as analytics and data acquisition. The company supports you with automation engineering, logistics and IT services and solutions. Our products set standards in quality and technology.

We work closely with the chemical, petrochemical, food and beverage, oil and gas, water and wastewater, power and energy, life science, mining, minerals and metals, renewable energy, pulp and paper and shipbuilding industries. Endress+Hauser helps customers to optimize their processes in terms of reliability, safety, economic efficiency and environmental impact.

To learn more about Endress+Hauser, visit:
www.endress.com

Information on the ISO certification:
Cybersecurity certification for Endress+Hauser

Complete solutions with system products

Everything you need from a single source

Nowadays measuring technology is required to do far more than simply record the measured value. The measuring devices must be powered and protected, the measured value displayed or further processed, limit values must be derived and monitored data must be recorded securely. Endress+Hauser components and data managers are more than capable to run these tasks. These system products not only carry out the basic functionality; they increase your plant availability based on predictive maintenance information, they optimize your process by controlling directly at field level and use sophisticated calculation methods to measure energy consumption. It does not matter in which country or sector the solution is required, Endress+Hauser's system products will always provide the right component with the required functionality and approvals (e.g. SIL or intrinsic safety as per ATEX, FM, CSA, TIIS or NEPSI).

Fast and innovative

Easy installation and fast commissioning are top priorities for both the simple devices such as active barriers and multifunctional devices like the Memograph M. A simple configuration is all that is needed to adapt the various functions to the application requirements. Furthermore a wide range of possible combinations is available thanks to various fieldbuses and interfaces as well as extensive software concepts such as the Field Data Manager software.

Competence center for temperature measurement, Temperature Engineered Solutions and system product

Endress+Hauser Temperature+System Products is one of the leading producers of temperature measurement, Temperature Engineered Solutions and system products worldwide.
The company employs more than 700 associates worldwide. 400 of which are working in our headquarters Nesselwang (Germany), where our products are developed and produced.
Associated Product Centers in Pessano (Italy), Greenwood (USA), Suzhou (China) and Aurangabad (India) guarantee customer proximity with products and services.

Oil & Gas

Fuel for thought

We reduce complexities to help you perform, comply and thrive in the Oil & Gas sector

Maximizing plant availability, safety and the efficiency of operations are the key challenges for today's Oil & Gas industry. Complexity increases in the face of volatile market forces, strict international regulations and your ever-tightening resources. Close, accurate monitoring of key process parameters is critical. Our broad, reliable portfolio of instrumentation, deep industry experience, and our services and solutions make Endress+Hauser the ideal partner for optimal plant performance.

Oil & Gas

Product highlights

Signal conditioning
RN Series - Barriers & power supplies

- Reliable sensor power supply and signal conditioning
- For use in safety instrumented systems up to SIL 2 (SC 3)
- For use in hazardous and extreme environmental conditions, installation in Zone 2, -40 ... + 60 °C (-40 ... 140 °F)
- High packing density thanks to slim housing, 2 channels on 12.5 mm (0.49 inch) width (24V DC)

More information: Page 20

On-site process display
RIA14 & RID14 - Process indicators

- Excellent readable indication of 4 to 20 mA analog or up to 8 process values via fieldbus protocol
- Backlit LC display with bargraph & diagnostic symbols
- No external power supply required
- International Ex and marine approvals

More information: Page 28

Application manager & control
RMA42 - Process control unit

- Dual analog signal handling/processing
- Differential pressure applications
- Integrated loop power supply
- Overfill protection for filling applications e.g. of storage tanks

More information: Page 34

Data manager & monitoring
RSG45 Memograph M - Data Manager

- Unrestricted data exchange between field and control level
- Up to 20 universal (U, I, TC, RTD) or HART inputs
- Easy and fast commissioning via web server
- Ethernet-based fieldbuses, easy system integration
- Application software packages (mathematics, limits)

More information: Page 40

Advantages at a glance

- Mitigating risks by using state of the art technology meeting highest demands with regard to Functional Safety (IEC 61508) integrity
- Minimizing operational costs through efficient proof testing concepts, predictive maintenance and innovative data management
- Increasing plant availability with innovative technologies particularly designed for oil and gas industry applications
- Keeping track of the process with on-site indicators
- Protecting asset investment through overvoltage protection of measuring equipment

Chemicals

Competitive and safe

We help you boost your plant’s safety and performance

Chemicals

Maximizing productivity and profitability whilst meeting toughening safety and sustainability standards is the greatest challenge facing the chemical industry today. Technological innovation brings opportunity, but reliability is vital. Plant modernization is expedient, yet project delivery complex. Our innovatory instrumentation with safety built-in, allied to expert safety and project consulting, enables Endress+Hauser to deliver solutions to safely and reliably attain peak plant performance.

Find a visual overview of the most relevant processes in the chemical industry and the suitable instruments in our portfolio brochure: SO01101

Product highlights

Signal conditioning
RN Series - Barriers & power supplies

- Reliable sensor power supply and signal conditioning
- For use in safety instrumented systems up to SIL 2 (SC 3)
- For use in hazardous and extreme environmental conditions, installation in Zone 2, -40 … +60 °C (-40 … 140 °F)
- High packing density thanks to slim housing, 2 channels on 12.5 mm (0.49 inch) width (24V DC)

More information: Page 20

On-site process display
RIA16 - Process indicator

- Display of 4 to 20 mA measured values
- Good readable on-site — 5 digit display with unit, bargraph & backlight
- International Ex and marine approvals
- Loop powered — no external power supply required

More information: Page 28

Application manager & control
RA33 - Batch controller

- Batch filling with temperature and density compensation
- ASTM D1250-04 standard
- Batch printer interface
- Networking capability via Ethernet TCP/IP protocol

More information: Page 34

Data manager & monitoring
MS20/MS21 - FDM Software

- Secure operation and data integrity
- Automated batch report generation
- Custody transfer
- LDAP domain user management

More information: Page 40

Advantages at a glance

- Using of state of the art technology – functional safety according to IEC 61508
- Internationally accepted hazardous area approvals: ATEX/IECEx, cCSAus, NEPSI, JPN Ex, UK CA
- Custody transfer metering via batch controller
- Batch data visualization and storage via FDM field data manager software
- High plant availability via on-site process value indication
- Reducing risks through overvoltage protection of measuring equipment

Mining, Minerals & Metals

Extracting more from less

In a world of lower ore grades, skill gaps and excavation challenges we can help you hit your target

Never more so than today has the Mining, Minerals & Metals industry had to manage such tension between soaring demand, increased scarcity, lower ore grades, fluctuating prices, and toughening safety and sustainability criteria. Combining our innovative product portfolio with our deep application and industry knowledge enables Endress+Hauser customers to optimize processes, boost productivity, and ensure safety and environmental compliance.

Mining, Minerals & Metals

Product highlights

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RN Series - Barriers & power supplies

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More information: Page 20

On-site process display
RIA45 & RIA46 - Process indicator with control unit

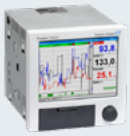
- For panel or field mounting
- Combination of several functions in one device: active barrier, transmitter, control unit with relay
- Can be used in diverse applications thanks to limit value monitoring, easy calculations and linearization
- Easy-to-read, multi-colored display

More information: Page 28

Application manager & control
EngyCal RH33 - Custody transfer heat meter

- Recording and billing heat and cold quantities
- Highest accuracy through calibrated, electronically paired temperature sensors
- Logging of measured values and messages
- Remote readout via Ethernet and fieldbuses

More information: Page 34



Data manager & monitoring
Ecograph T RSG35 - Universal data manager

- Secure data archiving in internal memory and additionally on SD card
- Common interfaces to make it system-compatible
- E-mail notifications in the event of limit value violations, faults and alarms

More information: Page 40

Advantages at a glance

- Extensive product basket for harsh environments
- Advanced diagnostic functionalities to make the process safer and more reliable
- Savings in raw material, water, energy and labor through accurate data of critical and quality relevant points in your process
- Reducing risks through overvoltage protection of measuring equipment

Food & Beverages

Trust in quality

We help you to improve quality while reducing operational costs

Constant demand for consistency in product quality and taste makes Food & Beverage a demanding industry. Complexity increases as ever more stringent hygiene regulations for food safety add cost pressures. Endress+Hauser's industry leading portfolio of reliable instrumentation, expert global consulting and accredited calibration services all combine to enable greater plant availability, resource conservation and high repeatability in processing with traceable compliance.

Food & Beverages

Find a visual overview of the most relevant processes in Food & Beverage production and the suitable instruments in our portfolio brochure: SO01090

Product highlights

Signal conditioning
RN Series - Barriers & power supplies
- Reliable sensor power supply and signal conditioning
- For use in safety instrumented systems up to SIL 2 (SC 3)
- For use in hazardous and extreme environmental conditions, installation in Zone 2, -40 ... +60 °C (-40 ... 140 °F)
- High packing density thanks to slim housing, 2 channels on 12.5 mm (0.49 inch) width (24V DC)

More information: Page 20

On-site process display
RMA42 - Process control unit
- Dual analog signal handling/processing
- Limit value monitoring with 2 relay contact outputs
- SIL for use in safety instrumented systems
- Integrated loop power supply
- Overfill protection for filling applications e.g. of storage tanks

More information: Page 28

Application manager & control
EngyCalRH33 - Custody transfer heat meter
- Recording and billing heat and cold quantities
- Highest accuracy through calibrated, electronically paired temperature sensors
- Logging of measured values and messages
- Remote readout via Ethernet and fieldbuses

More information: Page 34

Data manager & monitoring
RSG45 Memograph M - Advanced data manager
- FDA 21 CFR part 11 user management
- Tamper-proof audit trail
- Data integrity and IT/OT security inside
- FDM Field Data Manager software (on premise)

More information: Page 40

Advantages at a glance

- Food safety and reliability due to instruments designed and manufactured specifically for all requirements in Food & Beverage industry
- Accurate measurement and reliable signal processing
- Data integrity from signal source to database
- 100% legal compliance
- Transparency of all quality parameters

Life Sciences

The pulse of Life Sciences

Trust a reliable partner who helps you achieve operational excellence

Today's thriving biopharmaceutical industry demands high productivity and efficiency balanced with meticulous alignment to GMP standards. From our innovatory ASME-BPE compliant product portfolio enabling standardized production automation, reliable monitoring and predictive maintenance, to our expert consulting in process scale-up and operations optimization, Endress+Hauser offers the full solution. We speed time to market, sustain operational excellence, enhance productivity, and reduce risk.

Life Sciences

Find a visual overview of the most relevant processes in Life Sciences and the suitable instruments in our portfolio brochure: SO01099

Product highlights

Signal conditioning
RN Series - Barriers & power supplies
- Reliable sensor power supply and signal conditioning
- For use in safety instrumented systems up to SIL 2 (SC 3)
- For use in hazardous and extreme environmental conditions, installation in Zone 2, -40 … +60 °C (-40 … 140 °F)
- High packing density thanks to slim housing, 2 channels on 12.5 mm (0.49 inch) width (24V DC)

More information: Page 20

On-site process display
RIA15 - Process indicator
- Display 4 to 20 mA or up to four HART process values
- 7-segment value, bargraph and activatable backlight
- International Ex and marine approvals
- Compact design
- Suitable for functional safety applications (SIL2)

More information: Page 28

Application manager & control
RMA42 - Process control unit
- Processes and transfers up to 2 analog measuring signals
- 2 mathematics channels to calculate the sum, difference, multiplication, mean value and linearization
- Limit value monitoring with 2 relay contact outputs
- SIL for use in safety instrumented systems

More information: Page 34

Data manager & monitoring
RSG45 Memograph M - Advanced data manager
- FDA 21 CFR part 11 user management
- Tamper-proof audit trail
- Data integrity and IT/OT security inside
- FDM Field Data Manager data management software (on premise)

More information: Page 40

Advantages at a glance

- Maximum product safety and reliability through tailored products for life sciences
- Products designed to facilitate verification of compliance with important process parameters
- Accurate measurement and calculations guarantee savings of raw material, water, energy and labor costs

Water & Wastewater

Water is our life

Increase your efficiency and ensure compliance with an experienced and trusted partner

Today more than ever the Water & Wastewater industry must balance the opposing pressures of improving water safety and shrinking budgets. Whether treating for consumption or discharge, process complexity is rising. Endress+Hauser combines a wide portfolio of smart measuring instruments with industry-experienced consulting and expert services to flexibly and efficiently ensure water safety with verifiable regulatory compliance.

Water & Wastewater

Find a visual overview of the most relevant processes in the water / wastewater industry and the suitable instruments in our portfolio brochure: SO01094

Product highlights

Signal conditioning & protection
HAW569/562 - Surge arrester
- Safety protection for expensive sensors, devices and systems against surge damage
- Usable in a variety of applications thanks to international Ex approvals and SIL2 compliance
- Protection of devices with established communication signals and fieldbuses

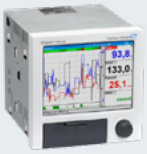
More information: Page 26

On-site process display
RIA15 - Process indicator
- Display 4 to 20 mA or up to four HART process values
- 7-segment value, bargraph and activatable backlight
- International Ex and marine approvals
- Compact design
- Suitable for functional safety applications (SIL2)

More information: Page 28

Application manager & control
RIA452 - Process display with pump control
- Good readable 7-digit LC display with large bargraph
- Alternating pump control for even utilization of up to 8 pumps
- Flow measurement for open channels and weirs
- Different channel types are stored in the device

More information: Page 34



Data manager & monitoring
Ecograph T RSG35 - Universal data manager
- Secure data archiving in internal memory and additionally on SD card
- Common interfaces to make it system-compatible
- E-mail notifications in the event of limit value violations, faults and alarms

More information: Page 40

Advantages at a glance

- Cost-effective product and service portfolio for any application, e.g. for drinking water, wastewater, sewage and desalination
- Meeting internationally recognized standards/ recommendations
- Highest efficiency by easy commissioning, operation and maintenance of instruments
- Protecting asset investment through overvoltage protection of measuring equipment

Power & Energy

Power up your plant

Power plants play a vital role, we help maximize uptime while delivering safety and productivity

Today's Power & Energy industry must strike a complex balance: meeting spiraling demand for affordable and reliable energy while increasing cleaner and renewable sources in the energy mix. As cost and regulatory pressures grow, modernization is essential for efficient, safe resource use. As renewables advance, so does the need for energy storage. With best-fit instrumentation, deep power application expertise, services and solutions, Endress+Hauser brings efficient, reliable productivity.

Power & Energy

Product highlights

Signal conditioning
HAW569/562 - Surge arrester
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On-site process display
RIA15 - Process indicator
- Display 4 to 20 mA or up to four HART process values
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- Suitable for functional safety applications (SIL2)

More information: Page 28

Application manager & control
EngyCalRH33 - Custody transfer heat meter
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- Highest accuracy through calibrated, electronically paired temperature sensors
- Logging of measured values and messages
- Remote readout via Ethernet and fieldbuses

More information: Page 34

Process indicator & control unit
RMA42 - Process control unit
- Dual analog signal handling/processing
- Limit value monitoring with 2 relay contact outputs
- Differential pressure applications
- Integrated loop power supply
- Overfill protection for filling applications e.g. of storage tanks

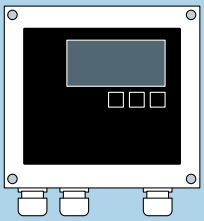
More information: Page 28

Advantages at a glance

- Functional safety according to IEC 61508 certified up to SIL3
- Intelligent instrumentation with advanced diagnostic functions
- Minimized downtime and highest safety through modern instrumentation
- Protect asset investment through over-voltage protection of measuring equipment

Product overview

System components complete the measuring point by offering functionalities around the sensor. They expand the comprehensive portfolio of industrial measurement technology and offer additional added value to the customer, such as increased plant availability, increased efficiency and digitalization.



Data manager & monitoring

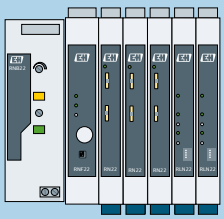
Endress+Hauser data managers are designed for industries with high regulatory requirements. They ensure secure, compliant and convenient access to sensor data and process information at all times. The devices offer comprehensive connectivity and enable seamless integration into system architectures, meeting the highest data security and compliance requirements. State-of-the-art software products for data analysis, archiving and report generation complete the portfolio.

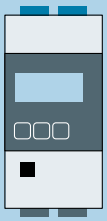
Learn more on pages 40-43

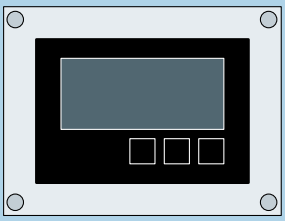
Application manager & control

For linking several measured values of differential applications (pressure, temperature) via linearization and threshold monitoring, application managers also offer complex, highly accurate calculation algorithms. Examples are energy measurements in heating and cooling circuits or filling processes with compensation of ambient conditions. Maximum results are achieved via simple parameterization and operation.

Learn more on pages 34-43







Signal conditioning

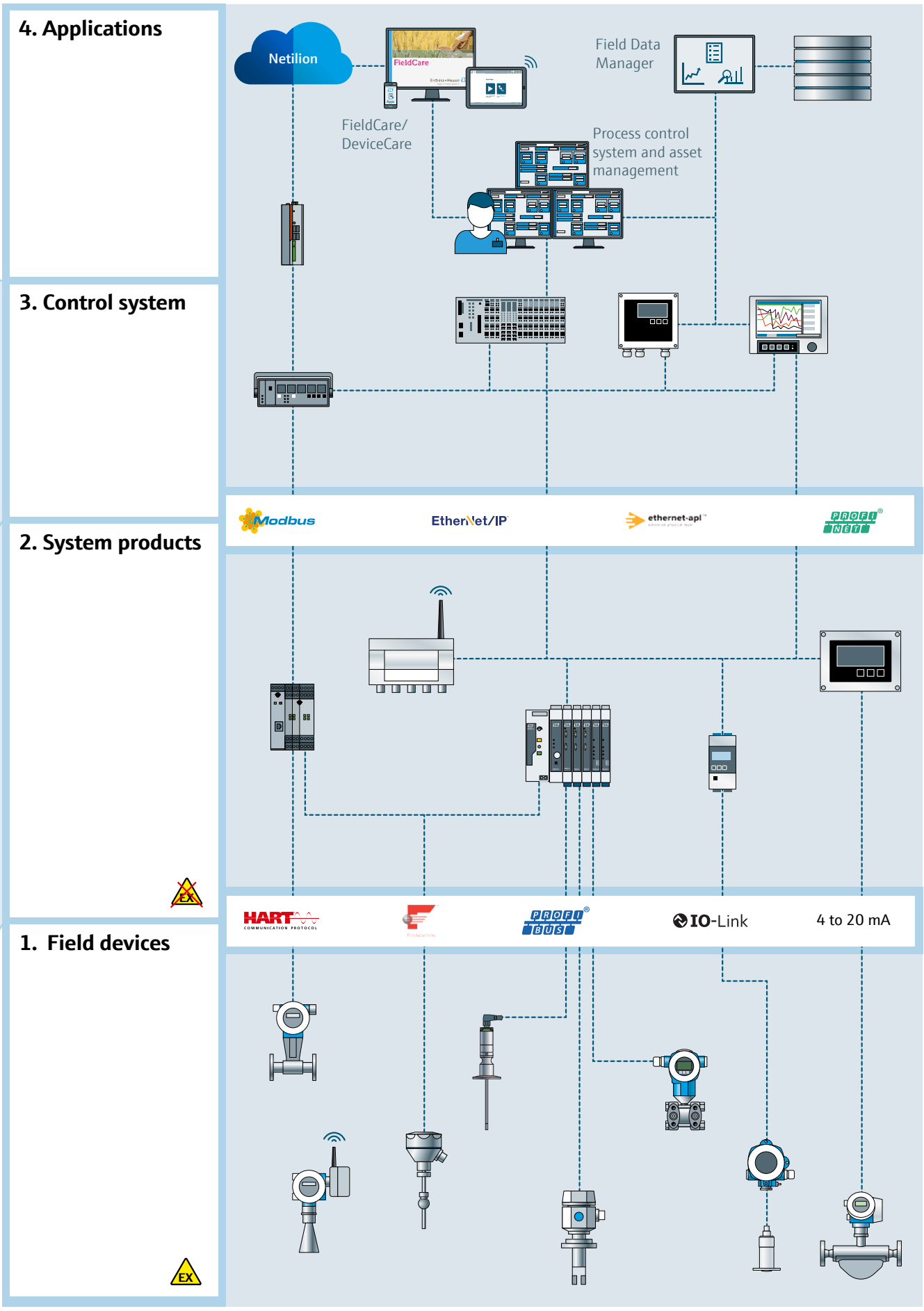
Measuring instrument loops based on an analog signal infrastructure are widespread across industries. Measuring devices need to be powered, protected against overvoltage and signals need to be transmitted safely from hazardous areas into the control cabinet. Endress+Hauser offers a complete portfolio of interface devices and surge arresters from a single source.

Learn more on pages 20-27

On-site process displays

In addition to data visualization in control rooms, measured values and status messages must be displayed on-site, close to the process or in the control cabinet. Hereby the maintenance and operating personnel get a quick and reliable overview of the running processes. The displays of the RIA product family provide perfect transparency even in hazardous areas and harshest environmental conditions.

Learn more on pages 28-33


4. Applications
Netilion
FieldCare
Field Data Manager
FieldCare/ DeviceCare
Process control system and asset management
3. Control system
Modbus
EtherNet/IP
ethernet-apl
PROFINET
2. System products
HART
COMMUNICATION PROTOCOL
FOUNDATION
PROFIBUS
IO-Link
4 to 20 mA
1. Field devices
EX
EX

Signal conditioning

Interface devices for DIN rail

With the interface devices, we pass on our many years of experience in industrial measurement technology to our customers in the form of hardware and software solutions optimally adapted to their respective tasks. The product spectrum ranges from devices that have been optimized precisely for one function, such as sensor power supplies, active or passive signal barriers, NAMUR isolating amplifiers to multifunctional products with logic and calculation functions or limit value monitoring.

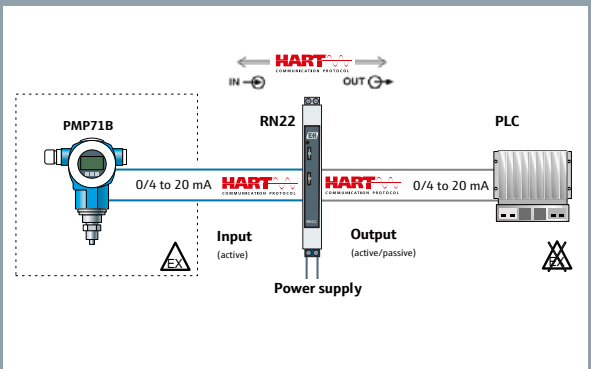
Advantages at a glance:

- High system availability thanks to safety-oriented functionalities and SIL certification
- Global use possible due to international Ex approvals
- Multi-channel applications in the tightest of installation spaces
- HART communication sockets or access taps
- Pluggable screw or push in terminals
- DIN rail bus connectors for fast installation

Safety oriented instrumentation

In the process automation industry, safety-oriented instrumentation is becoming more and more common. This safety orientation is also increasingly required for interface devices.

Endress+Hauser offers interface devices with SIL2 or SIL3 certification according to IEC 61508 as well as international Ex certificates for installations in hazardous areas. The RN Series interface family covers sophisticated functionalities for safe applications as well as cost-effective solutions. The product range is perfectly adapted to our measurement technology to complete your measuring point.



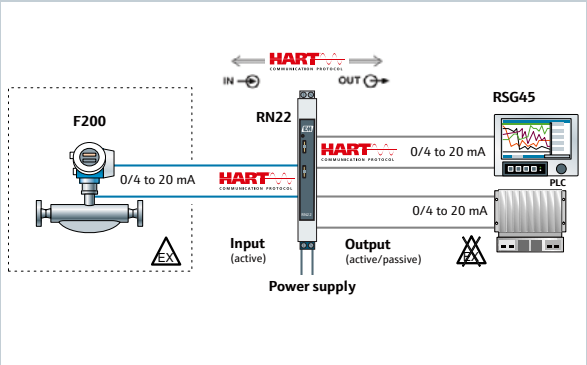
Application examples:
RN22 Sensor supply and signal isolation for a pressure measurement in an explosion-proof area

The PMP71B passive 2-wire sensor supplies a current signal proportional to the pressure to the active input of the RN22 supply isolation amplifier. The RN22 isolation amplifier supplies an active (or passive) current output signal proportional to the input signal to a passive (or active) input of the control unit. The signal path is bidirectional HART transparent.

Versatile use

Due to the extensive equipment, the devices offer a wide range of application possibilities. This goes from the simple power supply of measuring instruments, passive or active barriers for analog 4 to 20 mA or bidirectional HART signals from field instruments to signal doublers for splitting safety-oriented signals and control, visualization or Cloud applications.
With the NAMUR isolating amplifier, binary switching signals can be transmitted safely and the connecting cables are checked for open circuits or short current.

Last but not least, the output isolating amplifier completes the analog signal path for controlling analog actuators or flaps, for example.



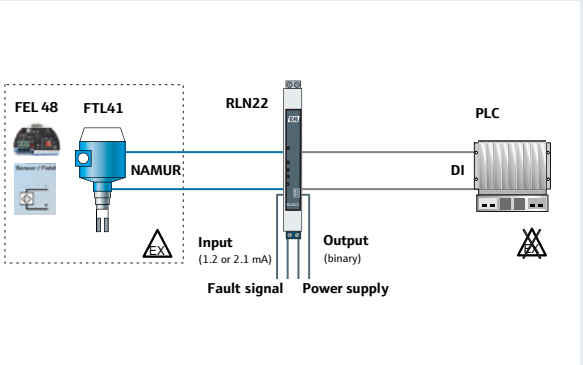
Application examples:
RN22 sensor supply, signal separation and signal doubling

The Prowirl F200 passive 2-wire sensor generates a current signal proportional to the flow to the active input of the isolation amplifier. The RN22 signal doubler transmits the HART signal and an active (or passive) current output signal proportional to the input signal to a passive (or active) input of the RSG45 data manager via its output 1. Via output 2, it generates an active (or passive) current output signal proportional to the input signal to a passive (or active) input of the control unit. The HART signal is filtered in the second output.

Compact design, easy installation

Compact design as well as simple and fast installation are the focus of the DIN rail devices. With up to 2 channels on 12.5 mm width, pluggable screw or push in terminals and the connection of several modules via the DIN rail bus connector for supply as well as for collective error message, this is realized easily and quickly. Compatibility with well-known interface manufacturers facilitates the expansion of existing systems.

If a HART device is connected, the devices offer HART communication sockets / eyelets via which the HART instruments can be parameterized easily without interrupting the measuring loop. This saves time and money.



Application examples:
RLN22 Limit value / level monitoring of a tank and line fault monitoring

The Liquiphant FTL41 passive sensor with FEL48 electronic insert generates a NAMUR signal value of 1.2 mA or 2.1 mA to the active input of the RLN22 NAMUR isolation amplifier. This device evaluates the signal and supplies a binary output signal (relay contact) dependent on the input signal to a digital input of the control unit. Open circuit or short circuit of the 2-wire sensor line are monitored and indicated via LEDs. In addition, an error message is sent to the control unit via the DIN rail bus connector (T-connector), RNF22 feed-in and error message module.

Model	RNB22	RNF22
Keyword	System power supply	Power supply and error message module
Features	24 V DC 2.5 A power supply in compact size, static/ dynamic boost: 3.125 / 5 A, can be connected in parallel for redundancy and power increase, system power supply of the RN Series or for 4-wire devices	With integrated fault evaluation in the event of auxiliary power failure or fuse failure, for redundant supply of 24 V DC to the DIN rail bus connector; collective fault evaluation of connected NAMUR isolating switching amplifier
Design	 www.endress.com/rnb22	 www.endress.com/rnf22
Input		
Input voltage range	100 ... 240 V AC, -15 ... +10 % 110 ... 250 V DC, -20 ... +40 %	19.2 ... 30 V DC
Power consumption (maximum)	0.85 A (100 V AC) / 0.37 A (240 V AC) 0.75 A (110 V DC) / 0.33 A (250 V DC)	3.75 A Fuse 5 A slow blow (replaceable)
Inrush current limitation	typ. 10 A / < 0,1 A^2s	-
Frequency range(fN)	50 ... 60 Hz, -10 ... +10 %	-
Mains failure bypass typ.	54 ms (120 V AC) / 54 ms (230 V AC)	-
Output		
Nominal output tap	24 V DC	24 V DC
Output voltage range	24 ... 28 V DC (setting range, constant power)	U_{IN} - 0.8 V
Nominal output current	2.5 A	3.75 A
Maximum output voltage	3.125 A / 5.0 A (static/ dynamic boost)	3.75 A
Performance data		
Output power	60 W	-
Power dissipation idle / nominal load maximum	< 1 W / < 5 W	-
Number of connectable signal conditioners (depending on type)	typically 35 - 50 channels (see current consumption signal isolator)	typically 35 - 50 channels (see current consumption signal isolator)
Parallel connectivity	yes, redundancy and power increase	yes, redundancy and power increase
Ambient temperature (operating)	-25 °C ... 70 °C (-13 °F ... 158 °F)	-20 °C ... 60 °C (-4 ... 140 °F)
Approvals		
Explosion protection	-	ATEX, IECEx
Electrical security Functional security (SIL)	CE -	CE -
Shipbuilding Protection type	IP20	DNV IP20
General		
Dimensions W x L x H in mm (in)	32 x 99 x 95 (1.26 x 3.90 x 3.74)	17.5 x 116 x 107.5 (0.69 x 4.57 x 4.23)
Connection type Connection cross section	Screw 2.5 mm^2	Screw / push in 0.2 ... 2.5 mm^2

Model	RN22	RLN22
Keyword	Supply isolator, HART transparent	NAMUR Isolation amplifier
Features	1 or 2 channel supply isolator for isolation of 0/4 to 20 mA standard signal circuits, optionally as signal coupler, 24 V DC, HART transparent, input supply or non-supply, output active or passive, with HART tap on the front side	1- or 2-channel NAMUR isolation amplifier 24 V DC with relay signal output, input for proximity sensors according to NAMUR (EN60947-5-6) as well as unswitched or resistance-switched contacts, line fault monitoring input circuits for break and short circuit
Design	 www.endress.com/rn22	 www.endress.com/rln22
Input		
Number of channels	1 / 2 (optional)	1 / 2 (optional)
Signal input	0/4 to 20 mA, feeding or non feeding	NAMUR; < 1.2 mA (blocking), > 2.1 mA (conducting)
Transmitter supply	17.5 V ±1 V at 20 mA	~ 8 V DC
Open circuit voltage	24.5 V ±5 %	-
Output		
Number of outputs	1 / 2 (optional)	1 / 2 (optional)
Output signal	0/4 to 20 mA, active oder passive	Relay, 1 changeover contact (1-channel) 1 NO contact per channel (2-channel)
Open circuit voltage/ External voltage	17.5 V (± 5%) active operation U_{ext} = 12 ... 30 V at passive operation	-
Transmission behavior	1:1 to input signal, HART transparent, bidirectional	-
Maximum load	active: ≤ 500 Ω passive: Rmax = (U_{ext} - 2 V) / 0.022 A	-
Performance data		
Supply voltage	24 V DC	24 V DC
Power consumtion	1-channel: ≤ 1.5 W (20 mA) / 2-channel: ≤ 3 W (20 mA) / signal doubler: ≤ 2.4 W (20 mA)	1-channel: < 0.65 W 2-channel: < 0.8 W
Power dissiaption	1-kanalig: ≤ 1.2 W (20 mA) / 2-kanalig: ≤ 2.4 W (20 mA) / signaldoppler: ≤ 2.1 W (20 mA)	1-channel: < 0.65 W 2-channel: < 1 W
Signal separation / barrier	✓ Ex	✓ Ex
Ambient temperature (operating)	–40 ... 60 °C (–40 ... 140 °F)	–40 ... 60 °C (–40 ... 140 °F)
Approvals		
Explosion protection	ATEX, IECEx, cCSAus Ex, UK Ex, NEPSI, JPN Ex, INMETRO	ATEX, IECEx
Electrical security Functional security (SIL)	CE, UKCA, cULus SIL 2 (SC 3)	CE SIL 2
Shipbuilding Protection type	DNV IP20	DNV IP20
General		
Dimensions W x L x H in mm (in)	12.5 x 116 x 107.5 (0.49 x 4.57 x 4.23)	17.5 x 116 x 107.5 (0.69 x 4.57 x 4.23)
Connection type Connection cross section	Screw / push in 0.2 ... 2.5 mm²	Screw / push-in 0.2 ... 2.5 mm²

Model	RNO22	RB223
Keyword	Output isolating amplifier, HART transparent	Signal isolator
Features	1- or 2-channel output isolating amplifier 24 V DC, HART transparent, transmission and galvanic isolation of analog 0/4 to 20 mA signals for controlling I/P converters, control valves and displays with line fault monitoring	1- or 2-channel, loop-powered passive isolator for safe isolation of 4 to 20 mA standard signal circuits, transmission of signals from non-Ex to Ex areas or optionally from Ex areas to non-Ex areas, with HART tap on the front side
Design	 www.endress.com/rno22	 www.endress.com/rb223
Input		
Number of channels	1 / 2 (opional)	1 / 2 (optional)
Signal input	0/4 to 20 mA	0/4 to 20 mA
Transmitter power supply	-	-
Open circuit voltage	-	-
Output		
Number of outputs	1 / 2 (optional)	1 / 2 (optional)
Output signal	0/4 to 20 mA; active oder passive	0/4 to 20 mA
Open circuit voltage	≤ 27 V	-
Transmission behavior	1:1 to input signal, HART transparent, bidirectional	1:1 to input signal, HART transparent, bidirectional
Maximum load	active: ≤ 700 Ω	active: ≤ 600 Ω
Performance data		
Supply voltage	24 V DC	-
Power consumption	1-channel: ≤ 1.1 W (20 mA) 2-channel: < 2 W (20 mA)	-
Power dissipation	1-channel: ≤ 0.8 W (20 mA) 2-channel: < 1.4 W (20 mA)	≤ 0.3 W (with HART resistance)
Signal separation / barrier	✓ Ex	✓ Ex
Ambient temperature (operating)	–40 … +70 °C (–40 … 158 °F)	–20 … 60 °C (–4 … 140 °F)
Approvals		
Explosion protection	ATEX, IECEx	ATEX, FM, CSA
Electrical security Functional security (SIL)	CE SIL 2 (SC 3)	CE SIL 3
Shipbuilding Protection type	DNV IP20	- IP20
General		
Dimensions W x L x H in mm (in)	12.5 x 116 x 107.5 (0.49 x 4.57 x 4.23)	22.5 x 112 x 110 (0.89 x 4.41 x 4.33)
Connection type Connection cross section	Screw / push in 0.2 … 2.5 mm²	Screw 0.2 … 2.5 mm²

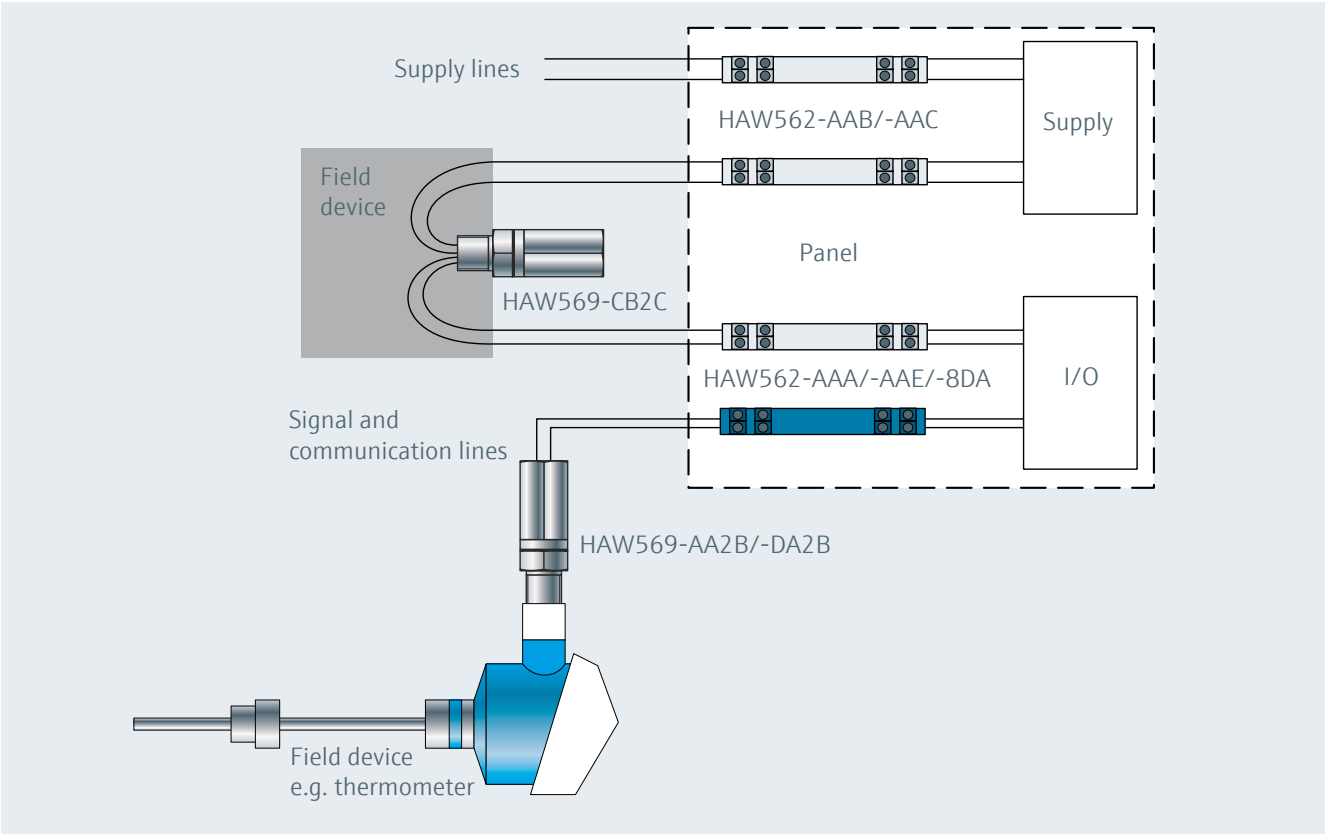
Model	RN42	RLN42
Keyword	Supply isolator, HART transparent	NAMUR Isolation amplifier
Features	1-channel supply isolator with wide range supply AC/DC for safe isolation of 0/4 to 20 mA standard signal circuits, HART transparent wide range supply, input supply or non-supply, output active or passive, option for 180° rotated installation (sensor connection terminals on top or bottom)	2-channel NAMUR isolation amplifier with wide range supply AC/DC and relay signal output, input for proximity sensors according to NAMUR (EN 60947-5-6) as well as unswitched or resistance switched contacts, line fault monitoring input circuits for break and short circuit
Design	 www.endress.com/rn42	 www.endress.com/rln42
Input		
Number of channels	1	2
Signal input	0/4 to 20 mA, feeding or non feeding	NAMUR, < 1.2 mA (blocking), > 2.1 mA (conducting)
Transmitter power supply	17.5 V ±1 V at 20 mA	~ 8 V DC
Open circuit voltage	24.5 V ±5 %	-
Output		
Number of outputs	1	2
Output signal	0/4 to 20 mA, active oder passive	Relay, 1 changeover per channel
Open circuit voltage / external voltage	17.5 V (± 5%) active operation / U_{ext} = 12 ... 30 V at passive operation	-
Transmission behavior	1:1 to input signal, HART transparent, bidirectional	-
Maximum load	active: ≤ 500 Ω passive: $R_{max} = (U_{ext} - 2\ V) / 0.022\ A$	-
Performance data		
Supply voltage	24 ... 230 V AC/DC	24 ... 230 V AC/DC
Power consumption	≤ 4.9 VA / 2.4 W (20 mA)	≤ 1.1 W
Power dissipation	≤ 2 W (20 mA)	≤ 1.3 W
Signal separation / barrier	✓ Ex	✓ Ex
Ambient temperature (operating)	–40 ... 60 °C (–40 ... 140 °F)	–40 ... 60 °C (–40 ... 140 °F)
Approvals		
Explosion protection	ATEX, IECEx, cCSAus Ex, UK Ex, NEPSI, JPN Ex, INMETRO	ATEX, IECEx
Electrical security Functional security (SIL)	CE, cULus SIL 2 (SC 3)	CE SIL 2
Shipbuilding Protection type	DNV IP20	DNV IP20
General		
Dimensions W x L x H in mm (in)	17.5 x 116 x 107.5 (0.69 x 4.57 x 4.23)	17.5 x 116 x 107.5 (0.69 x 4.57 x 4.23)
Connection type Connection cross section	Screw / push in 0.2 ... 2.5 mm²	Screw / push in 0.2 ... 2.5 mm²

Signal conditioning

Surge arresters secure the plant availability

Plant availability is very important as even short failures in production may cause high losses in sales. Therefore respective protection of the devices e.g. surge protection as well as a high availability of plant parts needs to be ensured.
Direct and indirect lightning as well as switching operations within a process can produce voltage overloads into supply lines and communication circuits, such as fieldbus systems. These overloads are rapidly changing impulses, also named transients, which can reach several kilovolts (up to 10 kV) within microseconds.
Even though sensors are tested according to the EMC guidelines (EN 1000-4-5) for these impulses, however, only up to 2 kV on main power lines or 1 kV on signal lines.

This means that overvoltage protection matched to both sensors and process industry requirements is absolutely necessary. The HAW562 and HAW569 devices limit the overloads in both power/supply circuits as well as signal/communication cables to a tolerable value for the sensitive electronics. HAW562 and HAW569 surge arresters have been especially developed for the protection of sensitive measurement electronics and thereby secure plant availability by reducing the excess values in the lightning protection stages and automatic reset after the event.
When installing surge arresters it has to be ensured that both sides of a line are equipped with a surge arrester.
Endress+Hauser offers surge arresters for DIN rail mounting in the panel and for direct mounting in a field housing.



HAW562 – for DIN rail mounting

Version / order code	HAW562-AAB	HAW562-AAC	HAW562-AAA	HAW562-8DA	HAW562-AAD	HAW562-AAE
Construction						
Application	Surge protection for power supplies		Surge protection for signal cables / communication cables, direct and indirect grounding possible			Surge protection for signal cables
Area / signal	10 to 55 V (+/-20 %)	90 to 230 V (+/-10 %)	4 to 20 mA, HART, PFM, PA, FF	4 to 20 mA, HART, PFM, PA, FF	RS485, Modbus, PROFIBUS DP	Protection module Prosonic S
SPD class	Type3 P3		Type1 P1			
Certificates	SIL 2					
Approvals	-	-	-	ATEX/IECEx II2, CSA	-	-
Accessories	Field housing, mounting kit		Field housing, mounting kit, screen grounding clamp			Field housing, mounting kit
Dimensions (WxH) mm (in)	18 x 90 (0.71 x 3.54)	18 x 90 (0.71 x 3.54)	12 x 90 (0.47 x 3.54)	12 x 90 (0.47 x 3.54)	12 x 90 (0.47 x 3.54)	12 x 90 (0.47 x 3.54)

HAW569 – for field mounting

Version / order code	HAW569-AA2B	HAW569-DA2B	HAW569-CB2C
Construction			
Application	Surge protection of signal cables (4 to 20 mA, PFM, HART, FF, PA)		Surge protection of signal cables (4 to 20 mA, PFM, HART, FF, PA) and power supply cables (0 to 66 V & 80 to 230 V)
SPD class	Type2 P1		Type2 P2
Installation	Lead through version (direct and indirect screen grounding). Lead-through of power supply / signals - no extra cable gland	Lead through version (direct screen grounding). Lead-through of power supply / signals - no extra cable gland	Screw-in version Parallel connection – no additional resistor in the circuit
Approvals	Non Ex area	ATEX/IECEx, CSA	ATEX/IECEx, CSA
Certificates	SIL 2		
Accessories	M20 / NPT1/2" adapter Cable gland set Grounding washer	M20 / NPT1/2" adapter Cable gland set Grounding washer	M20 / NPT1/2" adapter
Dimensions	SW 27 x 71 mm (AF 27 mm x 2.8 in)	SW 27 x 71 mm (AF 27 mm x 2.8 in)	SW 27 x 63 mm (AF 27 mm x 2.48 in)

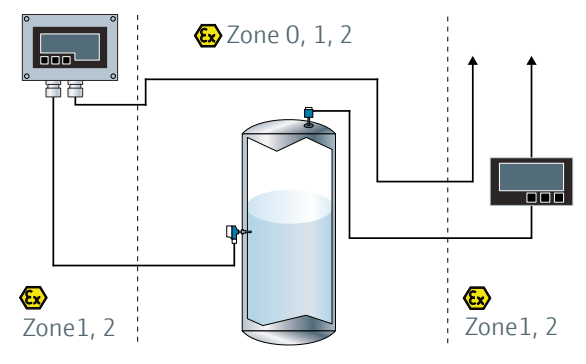
On-site process display

Loop powered indicators (4 to 20mA)

Loop powered indicators require no power supply and can be universally used in 4 to 20 mA current measuring circuits. They can be easily installed in intrinsically safe applications, used where measurement values have to be clearly visible or where the display of the measuring device is hard to read due to the installation conditions.

Due to not requiring a power supply installation, cost savings are made, so that displays that would have been too costly can now be realized. The worldwide certification and various housing versions permit direct installation in Ex-areas.

RIA15 indicators are available for panel mounting as well as in a field housing. Both housing versions have very small dimensions. Thus RIA15 will find room in almost every application and can be used together with all Endress+Hauser measurement principles!



Advantages at a glance:

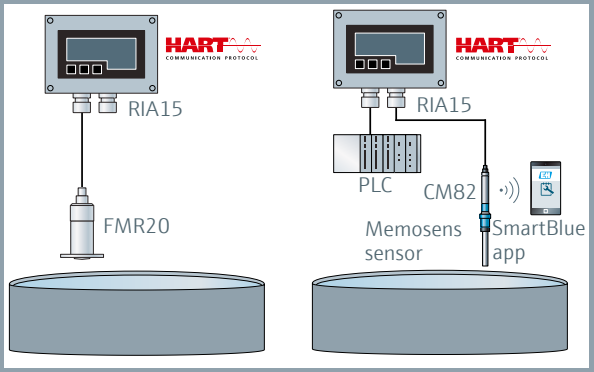
- Loop powered indicator, low voltage drop
- Good readable through high contrast display with backlight
- Fast, simple and comfortable commissioning and operation
- International Ex & marine approval; SIL2
- Excellent price-performance ratio

RIA15 HART process indicator for easy configuration of level & analysis sensors

The RIA15 in the order option HART offers a real added value with the possibility to function as a HART display. The measurement value is displayed highly accurate and there is the possibility to indicate up to 4 values of a measurement device on one RIA15. For this the indicator can be set as primary or secondary HART master and actively inquire the values from the sensor. The small voltage drop of < 1V (< 1.9 V with HART) is a huge advantage especially in Ex-applications, where in most cases only a reduced voltage is permitted.

Used in combination with the Micropilot FMR20 radar level sensor, the Waterpilot FMX21 hydrostatic level sensor, the Gammapilot FMG50 or the Liquiline CM82 compact analytical sensor, the RIA15 can be ordered in Level or Analytic option for easy and fast on-site basic settings of the automatically identified sensors.

The field housing is also available in saltwater-resistant plastic. This makes the indicator suitable for use in shipbuilding and offshore, as well.



Advantages at a glance:

- Indication of up to four HART values (PV, SV, TV, QV)
- Customer or sensor specific presets (Level, Analytic)
- On-site visualization of device status for diagnostics
- Automatic sensor recognition

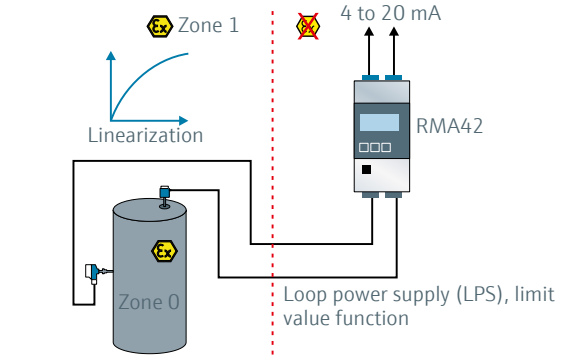
Process indicators with control function

Process indicators with control function combine several functionalities in one device:
- Active barrier
- Transmitter
- Control unit with relay

These features combined with the brilliant displays offer highest comfort and best functionality on-site.

Typical applications are filter monitoring via differential pressure measurement, tank monitoring with linearization of filling level, limit control or temperature monitoring.

The process transmitters with control unit are available as RMA42 DIN rail version, RIA45 for panel mounting in cabinets as well as RIA46 for field mounting in hazardous areas. Operation is easy and intuitive despite the high functionality. The devices can be operated effortlessly by using the operating keys on-site or by using the PC software FieldCare. This enables fast and easy commissioning. Moreover, the devices can be ordered pre-configured.



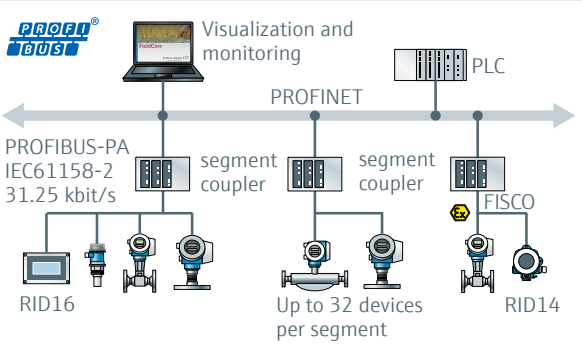
Advantages at a glance:

- Simple calculation of analog measured values
- 2 relay outputs, min/max values saved
- Linearization table with 32 points
- Easy configuration on-site or via interface (DeviceCare)

Process indicators for integration into Fieldbus systems

These indicators support all bus devices and indicate the values communicated on the bus.
The PROFIBUS PA version of the devices acts as a pure listener without an own device address. The FOUNDATION Fieldbus indicators can be operated either in a listener mode or in the standard mode using a function block interconnection.
A simple and fast set-up is possible via e.g. the configuration software FieldCare or DIP switches.
The devices convince by their high contrast backlit display of the respective value. The integrated bargraph with over- and under range indication in the RID14 and RID16 offers a swift value overview. Both devices also offer an integrated 14-segment field for plain text or TAG.

Special features:
Listener mode, on FOUNDATION Fieldbus also function block interconnection:
- Display transducer block
- Advanced diagnostic block
- 2 x input selector
- Arithmetic block
- Integrator block & PID block



Advantages at a glance:

- Large display, easily readable at all ambient conditions
- High plant availability through integrated safety functionalities
- Comfortable and easy integration into bus systems
- Service support through diagnostic functions

Model	RIA14	RIA15
Keyword	Field indicator	Field indicator
Features	Loop powered field indicator with pressure encapsulated metal housing (explosion protected according to Ex d)	Loop powered indicator, panel and field version, field housing made of robust aluminum or salt-waterresistant plastic, display of 4 to 20 mA and HART values, basic settings for Endress+Hauser sensors (z.B. FMR20, FMX21, FMG50, NMS8x, CM82)
Design	 www.endress.com/ria14	 www.endress.com/ria15
Display		
Number of digits Font size (height)	5 20.5 mm (0.81 in)	5 17 mm (0.67 in)
Type	LC display, backlit, bargraph	LC display, bargraph, backlight can be activated
Input		
Analog Digital	1 -	1 1 HART (optional)
Universal (U, I, R, RTD, TC)	-	-
Output		
Display	Analog measured value	Analog measured value Up to 4 HART values (optional)
Analog Digital	- 1 (Open Collector)	- -
Relays	-	-
Performance data		
Power supply Power consumption	Loop powered 4 to 20 mA -	Loop powered 4 to 20 mA -
Loop power supply Signal isolation	- -	- -
Ambient temperature (operating)	-40 … +80 °C (-40 … 176 °F) -20 … +80 °C (-4 … +176 °F) with OC output	–40 … 60 °C (–40 … 140 °F)
Additional features	Limit value function	Display of up to 4 HART values Sensor parametrization (optional)
Approvals		
Explosion protection	ATEX, IECEx, UK, EAC, FM, CSA, TIIS, NEPSI	ATEX, IECEx, UK, EAC, FM, CSA, JPN Ex, NEPSI
Electrical security Functional security (SIL)	CE, UKCA, cURus -	CE, UKCA SIL 2
Shipbuilding Protection type	DNV IP67	DNV Control panel: IP20 /IP65 (front); field: IP66/67
General		
Dimensions WxLxH in mm (in)	199x133x96 (7.83x5.24x3.78)	Control panel: 96x48x41.5 (3.78x1.89x1.69) Field: 131x81.5x55.5 (5.16x3.21x2.19)
Installation location	Field	Control panel, field

Model	RIA16	RIA46
Keyword	Field indicator	Field indicator with control unit
Features	Loop powered field indicator	Field indicator with control unit for monitoring and displaying analog measurement values
Design	 www.endress.com/ria16	 www.endress.com/ria46
Display		
Number of digits Font size (height)	5 26 mm (1.02 in)	5 26 mm (1.02 in)
Type	LC display, backlit, bargraph	LC display, backlit, bargraph, 2-colored
Input		
Analog Digital	1 -	1/2 (optional) -
Universal (U, I, R, RTD, TC)	-	1/2 (optional)
Output		
Display	Analog measured value	Analog measured value, calculated value
Analog Digital	- 1 (Open Collector)	1/2 (optional) 1
Relays	-	0/2 (optional)
Performance data		
Power supply Power consumption	Loop powered 4 to 20 mA -	24 ... 230 V AC/DC 30 mA
Loop power supply Signal isolation	- -	✓ ✓ Ex
Ambient temperature (operating)	-40 ... +80 °C (-40 ... 176 °F) -20 ... +80 °C (-4 ... +176 °F) with OC output	Non-Ex/Ex-devices: –20 ... 60 °C (–4 ... 140 °F) UL-devices: –20 ... 50 °C (–4 ... 122 °F)
Additional features	Limit value function	Linearisation, mathematics function, limit value function, overfill protection
Approvals		
Explosion protection	ATEX, IECEx, UK, EAC, FM, CSA, NEPSI	ATEX, UK, FM, CSA
Electrical security Functional security (SIL)	CE, UKCA, cURus, CSA GP -	CE, UKCA, cURus, WHG SIL 2
Shipbuilding Protection type	DNV IP67	- IP67
General		
Dimensions WxLxH in mm (in)	132x135x106 (5.2x5.31x4.17)	199x160x96 (7.83x6.3x3.78)
Installation location	Field	Field

Model	RIA45	RMA42
Keyword	Process indicator with control unit	Process transmitter with control unit
Features	Process indicator with control unit in panel mounting for monitoring and displaying analog measurement values	Process transmitter with control unit for DIN rail mounting for monitoring and displaying analog measured values
Design	 www.endress.com/ria45	 www.endress.com/rma42
Display		
Number of digits Font size (height)	5 17 mm (0.67 in)	5 7.8 mm (0.31 in)
Type	LC display, backlit, bargraph, 2-colored	LC display, backlit, bargraph, 2-colored
Input		
Analog Digital	1/2 (optional) -	1/2 (optional) -
Universal (U, I, R, RTD, TC)	1/2 (optional)	1/2 (optional)
Output		
Display	analoge measured value calculated value	analoge measured value calculated value
Analog Digital	1/2 (optional) 1	1/2 (optional) 1
Relays	0/2 (optional)	0/2 (optional)
Performance data		
Power supply Power consumption	24 ... 230 V AC/DC 30 mA	24 ... 230 V AC/DC 30 mA
Loop power supply Signal isolation	✔ ✔	✔ ✔
Ambient temperature (operating)	Non-Ex/Ex-devices: –20 ... 60 °C (–4 ... 140 °F) UL-devices: –20 ... 50 °C (–4 ... 122 °F)	Non-Ex/Ex-devices: –20 ... 60 °C (–4 ... 140 °F) UL-devices: –20 ... 50 °C (–4 ... 122 °F)
Additional features	Linearisation, mathematics function, limit value function, overfill protection	Linearisation, mathematics function, limit value function, overfill protection, HART sockets
Approvals		
Explosion protection	ATEX, UK, FM, CSA	ATEX, UK, FM, CSA, NEPSI
Electrical security Functional security (SIL)	CE, UKCA, cURus, WHG SIL 2	CE, UKCA, cURus, WHG SIL 2
Shipbuilding Protection type	DNV IP20 / IP65 (front)	DNV IP20
General		
Dimensions (WxLxH) in mm (in)	96x48x152 (3.78x1.89x5.98)	45x115x118 (1.77x4.53x4.65)
Installation location	Control panel	DIN rail

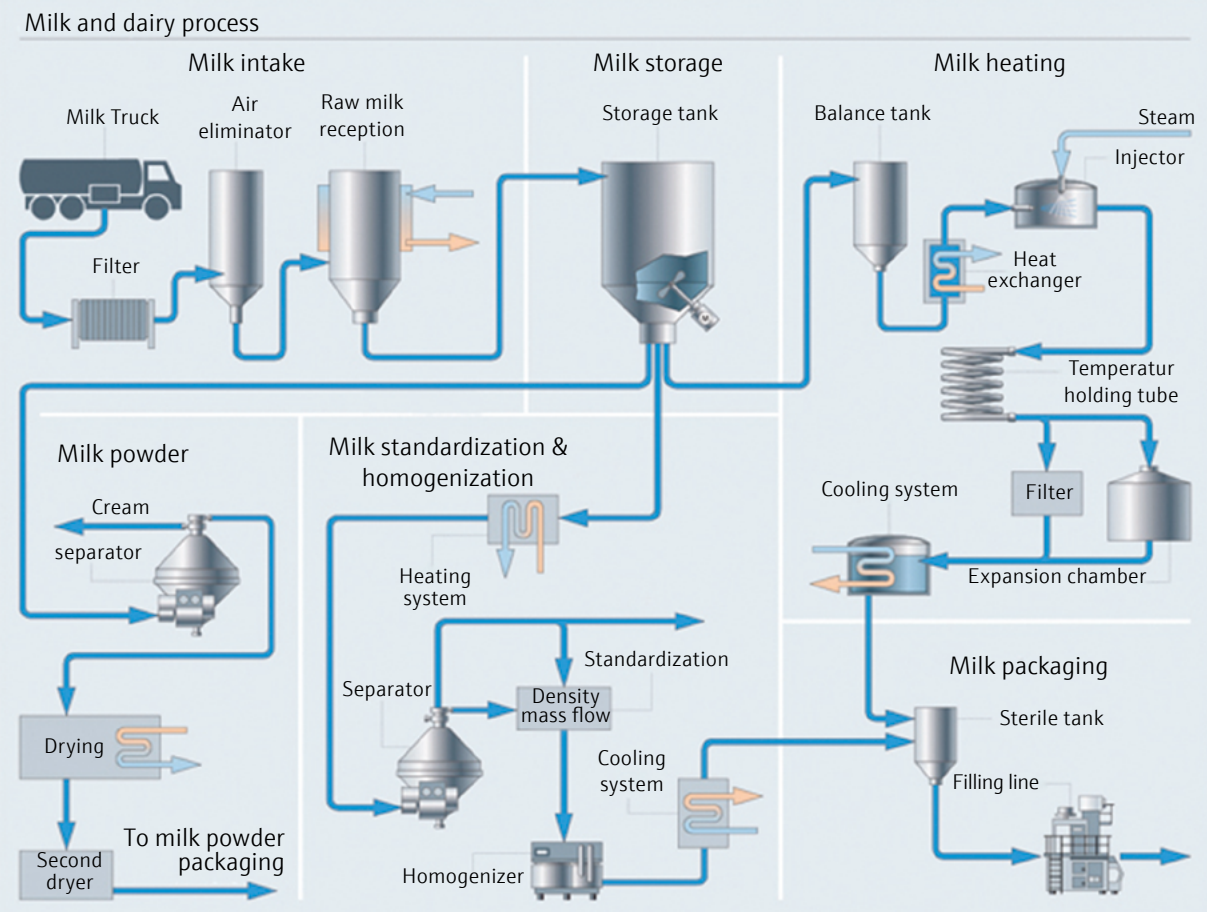
Model	RID14	RID16
Keyword	Field indicator	Field indicator
Features	8-channel field indicator with FOUNDATION Fieldbus or PROFIBUS PA protocol with pressure encapsulated metal housing (explosion protected according to Ex d)	8-channel field indicator with FOUNDATION Fieldbus or PROFIBUS PA protocol
Design	 www.endress.com/rid14	 www.endress.com/rid16
Display		
Number of digits Font size (height)	5 20.5 mm (0.81 in)	5 26 mm (1.02 in)
Type	LC display, backlit, bargraph	LC display, backlit, bargraph
Input		
Analog Digital	- PROFIBUS PA, FOUNDATION Fieldbus	- PROFIBUS PA, FOUNDATION Fieldbus
Universal (U, I, R, RTD, TC)	-	-
Output		
Display	Up to 8 channels	Up to 8 channels
Analog Digital	- -	- -
Relays	-	-
Performance data		
Power supply Power consumption	Via the fieldbus < 11 mA	Via the fieldbus < 11 mA
Loop power supply Signal isolation	- -	- -
Ambient temperature (operating)	-40 … +80 °C (-40 … 176 °F)	–40 … +80 °C (–40 … 176 °F)
Additional features	Listener mode, on FOUNDATION Fieldbus also function block connection	Listener mode, on FOUNDATION Fieldbus also function block connection
Approvals		
Explosion protection	ATEX, IECEx, EAC, FM, CSA	ATEX, EAC, FM, CSA, IECEx
Electrical security Functional security (SIL)	CE, CSA GP -	CE, CSA GP -
Shipbuilding Protection type	- IP67	- IP67
General		
Dimensions (WxLxH) in mm (in)	132x135x106 (5.2x5.31x4.17)	199x158x96 (7.83x6.22x3.78)
Installation location	Field	Field

Energy manager, application manager & control

Parameterizing instead of programming — tested and approved

Application managers are devices that are designed for specific applications in different industries. Predefined functionalities which are tested and only need to be adapted to the customer's requirements via parameters save time and costs during installation, commissioning and in the complete life cycle.

For example, the milk processing industry (see picture below) has recurring process cells (heat exchangers, dryers, filling units, etc.) which can be controlled easily, safely and cost-effectively by decentralized application devices. The integration into the plant control is done via fieldbus or Ethernet based communication protocols.



Energy calculation

Increasing energy costs are one of the biggest challenges in production processes. Monitoring of energy consumption and possible losses is the first step to introduce measures for energy savings.

In dairies for example, the main consumer of heat is the pasteurization process, in which the milk is treated with high temperatures to eliminate pathogens.

Steam at a temperature of 140 to 150 °C is often used as the heating medium. Modern, regenerative hot water systems are also used. Most systems require water at a temperature of around 100 °C for heating. The pressure in the system must be above atmospheric pressure so that the hot water cannot boil.

The RH33 and RS33 energy managers measure consumptions in hot water and steam systems efficiently and with high accuracy. The connected process parameters temperature, pressure and flow are used to calculate and record energy consumption according to standardized algorithms.

Batch control

Batch production is a manufacturing or handling process in which components or goods are produced in groups (batches) and not in a continuous stream. In batch production, various operations are performed on a batch of products, before moving on to the next production stage.

In processing industry (examples see below) it is often required to dose, pump, mix and blend products (e.g. liquids, chemicals, powder, ...). In batch processes, the components/ingredients are dosed and mixed in containers using suitable dosing equipment in order to create a quality product. As a final step products have to be filled in packages, containers or even trucks. Cleaning processes or sterilization are also handled in non-linear (batch) processes.

Food & Beverages

- Milling, granulating, mixing, blending
- Filling & dosing of beverages or solids
- Truck (un)loading e.g. milk, other beverages

Life Sciences

- Centrifugation, crystallization
- Pasteurization, sterilization
- CIP cleaning
- Solvent exchange
- Fed-batch processes, cell culture/fermentation

Chemical

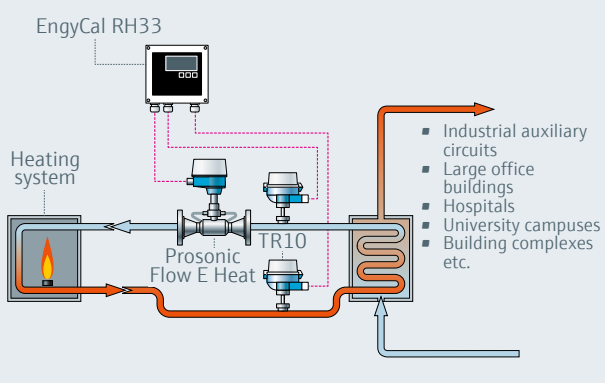
- Chemical reactors — charging and stirring are typical batch processes
- Heating, adding reactants, cooling
- Production of paint, coatings, adhesives, plastic additives, lubricant, truck (un)loading

Energy manager

EngyCal RH33

The BTU meter RH33 is used in applications with liquid energy carriers. It calculates the thermal energy of water acc. to EN1434, glycol/water mixtures or other fluids such as thermal oils. Temperature sensor matching using calibrated temperature sensors is done in the device.
Potential for cost savings can be shown by using the software available as an accessory. The device has a custody transfer approval (MID-004) and allows bi-directional measurement, e.g. charging/discharging of a heat accumulator.

The RH33 measures the energy flow in a heating/cooling circuit of liquids. Standard sensors for which a calibration determines the Callender van Dusen coefficient can be used for measurement. These coefficients are entered into the EngyCal RH33 and the sensors are electronically paired. This enables a highly accurate measurement. If one sensor fails it is not necessary to replace both temperature sensors as it is the case with the classic paired sensors. Only one sensor has to be exchanged. This saves time and costs!



Benefits at a glance:

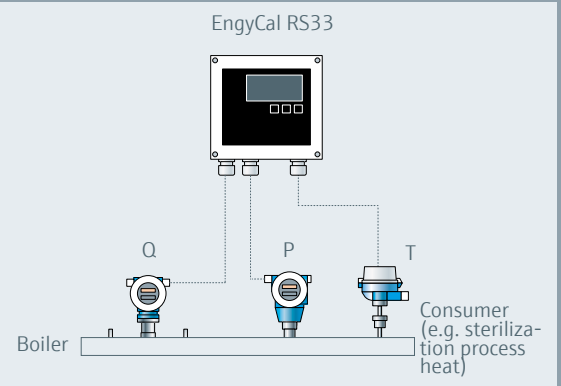
- Save energy costs through transparency and consumption recording
- Calibrated, electronically paired temperature sensors ensure maximum accuracy
- Tariff meter for demand-based billing
- Remote readout via Ethernet and fieldbuses
- MID-004 approval for custody transfer

EngyCal RS33

In many industries, steam, which is generated centrally and distributed to the individual consumers, is still one of the most important energy sources. In addition to the use of these process energies with the lowest possible losses, the billing of different consumers is also a clear requirement.

The steam calculator EngyCal RS33 is used to record steam mass and energy flow of saturated and superheated steam. The calculation is based on the measured process variables volume flow, temperature and/or pressure.

The EngyCal RS33 uses the standard IAPWS IF97 to calculate the mass and energy flow of steam. The density and enthalpy of the steam are calculated from the input variables pressure and temperature.



Benefits at a glance:

- Accurate calculation according to international water steam tables (IAPWS IF97)
- Fully compensation of differential pressure flow calculation
- Detailed data logging of current and counter values
- Deficit counter for transparency in case of error or alarm

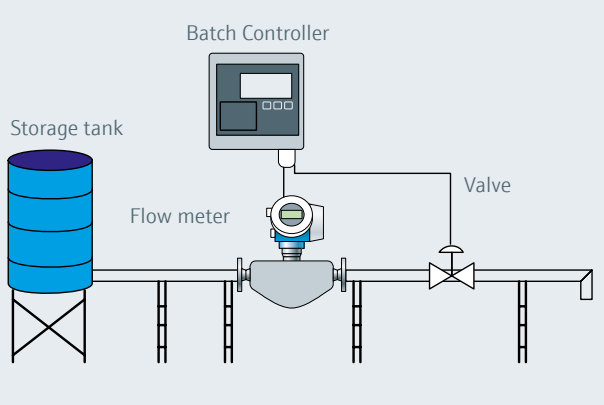
Model	RH33	RS33
Keyword	EngyCal - energy manager water	EngyCal - energy manager steam
Features	Custody transfer BTU meter for recording and measuring energy flow in heating/cooling circuits of water, water/glycol mixtures or other liquids, bidirectional measurement	Steam calculator for recording and measuring the mass and energy flow of saturated or super heated steam, bidirectional measurement
Design	 www.endress.com/rh33	 www.endress.com/rs33
Application		
Software functions	Heat quantity and heat quantity difference	Mass/heat quantity
Number of applications Calculation standards	1 IAPWS-97	1 IAPWS-97
Highly accurate temperature measurementvia Calendar van Dusen	✔	✔
Differential pressure compensation	✔	✔
Media		
Water Water / Glycol	✔ %-Conzentration	- -
Steam Customer specific	- Table	✔ -
Communication		
Interfaces	USB, Ethernet, RS485	USB Ethernet, RS485
Fieldbus protocols	Modbus RTU/TCP, M-Bus	Modbus RTU/TCP, M-Bus
Webserver	Display	Display
Performance data		
Power supply Power consumption	100 ... 230 V AC, 24 V AC/DC 15 VA	100 ... 230 V AC, 24 V AC/DC 15 VA
Loop power supply Data storage	1x 24 V DC, 70 mA ✔	1x 24 V DC, 70 mA ✔
Ambient temperature (operating)	-20 ... 60 °C (-4 ... 140 °F)	-20 ... 60 °C (-4 ... 140 °F)
Approvals		
Electrical security Others	CSA GP, UK CA -	CSA GP, UK CA -
Metrology	PTB type test certificate MI-004-PTB015 (EN 1434; OIML R 75)	-
Ship building Protection type	- IP65	- IP65
General		
Dimensions WxLxH in mm (in)	144x175x138 (5.67x6.89x5.43)	144x175x138 (5.67x6.89x5.43)
Installation location	Field, panel, DIN rail	Field, panel, DIN rail

Application manager

Batch Controller RA33

The Batch Controller RA33 is designed to record flow and control output signals for valves and pumps to ensure the exact dosing of predefined batch quantities. The measured volume can be corrected with the temperature/density compensation function. The filling process can be optimized with an automatic or fixed after-run correction. Mineral oils can be corrected according to the ASTM D1250-04 standard.

The RA33 Batch Controller supports the direct automatic print out of batch protocols. A printer can either be connected directly to the RS232 interface or the Field Data Manager software can be used for the print out of archived batch protocols.



Benefits at a glance:

- Integrated security features like software lock, lead-sealable housing and tamper-proof data storage
- Exact dosing with minimal losses for cost-intensive products
- Preset counter function for filling exact quantities
- Self-learning overrun algorithm
- Temperature and density compensation

Memograph M RSG45

The basic function of the RSG45 is a digital recorder for recording process data. In this way, the customer fulfills his obligation to provide evidence to the legislator, internal quality standards or the specifications of his customers.

With software packages for process applications, the RSG45 is also ideally suited for control and monitoring tasks. With the integrated math functions, additional complex calculations and application algorithms can be implemented.

Application and software packages

- Mathematic functions
- Batch Control, batch reporting
- Tele-alarm notification
- Water/wastewater rain overflow monitoring
- Energy calculation (water & steam)
- TrustSens calibration monitoring

With multiple communication interfaces and protocols, the Memograph M RSG45 can be easily integrated into process control systems to provide measured values as well as calculated information from the applications.

PROFIBUS® PROFINET® OPC SERVER EtherNet/IP Modbus

Benefits at a glance:

- One multi tasking device
- HART sensor inputs with gateway function (sensor to control and asset management)
- Integrated webserver for remote access
- Modular construction with various hardware and software configurations for perfect adaption to process requirements
- FDM essential version free of charge included

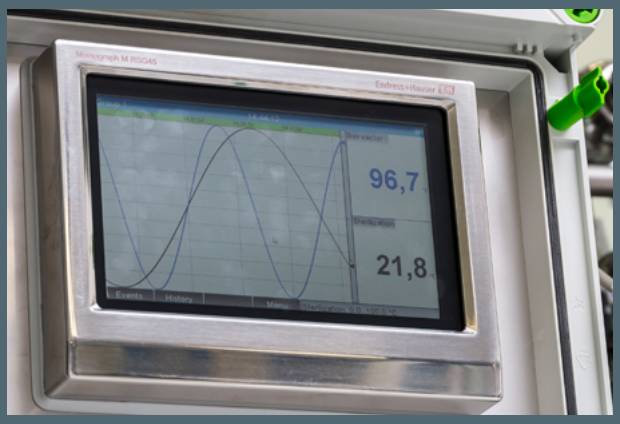
Model	RA33	RSG45
Keyword	Batch Controller	Data manager with energy package
Features	Batch Controller for filling and dosing of any media with automatic correction of overrun quantity	The Memograph M with energy package calculates mass and energy flows in water and steam applications
Design	 www.endress.com/ra33	 www.endress.com/rsg45
Application		
Software functions	Volume calculation, 1- or 2-stage operation, manual and automatic correction of overrun quantity	Mass/heat quantity, heat quantity difference
Number of applications	1	6
Calculation standards	ASTM D1250-04	IAPWS-97
Highly accurate temperature measurementvia Calendar van Dusen	-	-
Differential pressure compensation	-	✔
Media		
Water	-	✔
Water / Glycol	-	✔
Steam	-	✔
Customer specific	✔	-
Communication		
Interfaces	USB, Ethernet, R232	USB, Ethernet, RS232/RS485
Fieldbus protocols	Modbus RTU/TCP	PROFINET, PROFIBUS DP, EtherNet/IP, Modbus RTU/TCP (master/slave), HART master
Webserver	-	Display, diagnostic setup
Performance data		
Power supply	100 … 230 V AC, 24 V AC/DC	90 … 250 V AC, 24 V AC/DC
Power consumption		
Loop power supply	1x 24 V DC, 70 mA	1x24 V, max. 250 mA
Data storage	-	✔
Ambient temperature (operating)	–20 … 60 °C (–4 … 140 °F)	–20 … 60 °C (–4 … 140 °F)
Approvals		
Electrical security	CSA GP, UK CA	UL, UK CA
Others	NTEP	FDA 21 CFR 11
Metrology	-	-
Ship building	-	-
Protection type	IP65	IP65 (front)
General		
Dimensions WxLxH in mm (in)	144 x 144 x 103,1 mm (5.67 x 5.67 x 4.06)	190 x 144 x 158 (7.48 x 5.67 x 6.22)
Installation location	Field, panel, DIN rail	Panel (front, DIN rail)

Data manager & monitoring

Memograph M RSG45 Advanced Data Manger

The Advanced Data Manager is a flexible and powerful system for organizing process values. Thanks to its intuitive operation, Memograph M adapts quickly and easily to any application. The process values are clearly presented on the display and logged safely, limits are monitored and analyzed. Via communication protocols, the measured and calculated values can be easily transferred to higher-level systems and plant modules can be interconnected. Also available as DIN rail version without display.

Memograph M offers a modular hardware+software design for perfect adaption of the device to the customer application needs. Using HART input signals, the signal chain from the sensor to the control system can be set up completely digitally and thus meets the highest requirements for accuracy and reproducibility.



Advantages at a glance:

- High end data recording and visualization
- Direct use of HART signals, HART gateway
- Ethernet based fieldbuses for control connectivity
- FDA21 part 11 compliant user management and audit trail, high degree of data security
- ATEX approval/supply of sensors in the EX area
- Stainless steel front for hygienic applications

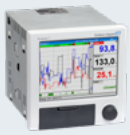
Ecograph T RSG35 Universal Data Manager

The Ecograph T offers a safe and complete recording and visualization of all process sequences. Because every measurement value counts, the Universal Data Manager Ecograph T RSG35 records, visualizes and monitors all analog or digital (binary) input signals. The unit is easy to use and comes with features to save costs and simplify data acquisition. Due to its variety of communication possibilities a simple system integration is possible.

Ecograph T is the perfect entry level device to get started with digital data recording even in price sensitive markets and industries. Up to 12 analog inputs for universal measuring devices can be used in applications with documentation or traceability requirements.

Advantages at a glance:

- Easy installation, setup and operation
- Standard Ethernet interface for IT connectivity
- Reliable data archiving with internal memory and separate SD card
- Modbus RTU/TCP for control connectivity
- E-mail alarm in case of errors or limit violations
- FDM essential version free of charge included

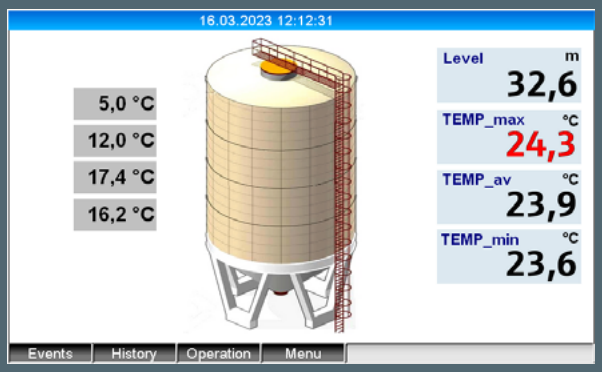
Model	Memograph M - RSG45	Ecograph T- RSG35
Keyword	Advanced Data Manager	Universal Data Manager
Features	Advanced Data Manager with universal use of analog HART and digital signals. Saves, visualizes, analyzes and communicates. Integration of process pictures. Optional with batch function, tele-alert, Wastewater & RÜB Energy packages (water + steam)	Universal Data Manager with up to 12 universal inputs. Display, recording and monitoring device with excellent price/performance ratio.
Design	 www.endress.com/rsg45	 www.endress.com/rsg35
Software function		
Number of channels Number of limit values	max. 40 60	max. 12 30
Number of math functions	12	4
Input		
Universal analog inputs (U, I, TC, RTD, pulse-/frequency) Analog inputs 4 to 20mA /HART	0/4/8/12/16/20 0/4/8/12/16/20	0/4/8/12 -
Fieldbus inputs Digital inputs	max. 40 6/14	- 6
Output		
Analog outputs Relays outputs	2 12	- 6
Communication / operation		
Interfaces	USB, Ethernet, RS232/RS485	USB, Ethernet, RS232/RS485
Fieldbus protocols	Modbus RTU/TCP (master/slave) PROFINET, PROFIBUS DP, EtherNet/IP, HART Master	Modbus RTU/TCP slave
Webserver	Display, diagnostic setup	Display, diagnostic setup
Visualisation	TFT color graphic, 178 mm (7 inch), resolution: 800 x 480 pixels or via Webserver	TFT color graphic, 145 mm (5,7 inch), resolution: 640 x 480 pixels
Operation	Rotary/push wheel, keys / touchscreen / Webserver	Rotary/push wheel, keys, Webserver
Performance data		
Power supply Power consumption	90 ... 250 V AC, 24 V AC/DC	90 ... 250 V AC, 24 V AC/DC
Loop power supply Data storage	1x24 V, max. 250 mA Internal storage, SD card, USB stick	1x24 V, max. 250 mA Internal storage, SD card, USB stick
Ambient temperatue (operating)	–20 ... 60 °C (–4 ... 140 °F)	–10 ... +50 °C (14 ... 122 °F)
Approvals		
Explosion protection Electrical security	ATEX UR, UK CA	- UK CA
Others Protection type	FDA 21 CFR 11 IP65 / NEMA4 (front) / IP20/NEMA1 (DIN rail)	- IP65 / NEMA4 (front)
General		
Dimensions WxLxH in mm (in)	196 x 150 x 159 (7.7 x 5.9 x 6.2) - Front panel installation 181 x 136 x 90 (7.13 x 5.35 x 3.54) - DIN rail	144 x 144 x 158 (5.67 x 5.67 x 6.22)
Installation location	Panel (front, DIN rail)	Panel (front)

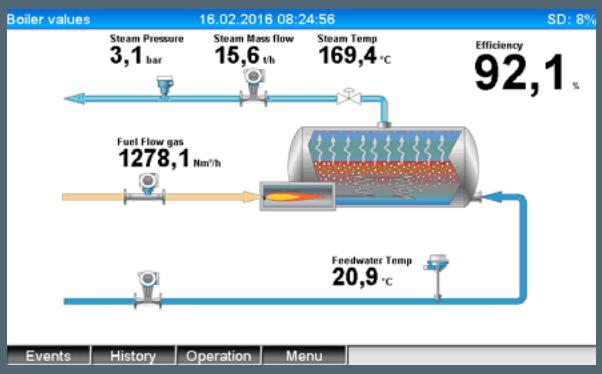
Data manager – highlights

RSG45 process picture integration

Memograph M optimally meets the requirements for application visualization. Measured and calculated values as well as KPIs, failures and status information can be visualized by using a process picture generator tool.

Whether in pumping stations, tanks, coal dumps or milk pasteurizers all needed information can be presented in context to the real process on-site.





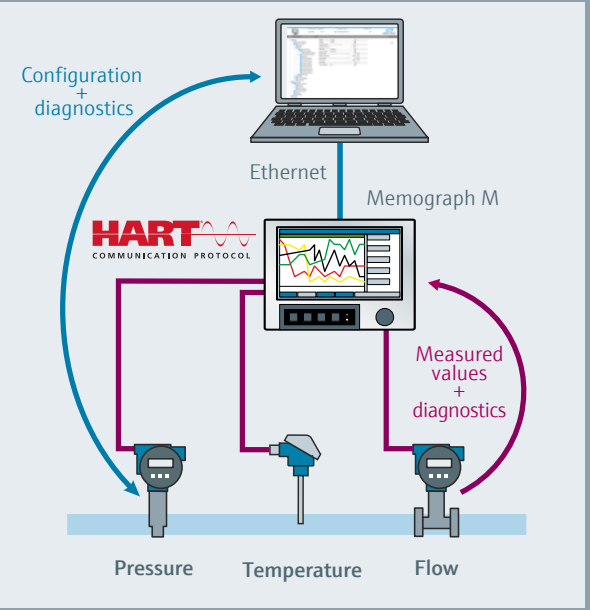
Advantages at a glance:

- Easy to use process picture generating tool
- Visualization of application KPIs
- Up to 8 different process pictures per device
- Easy change to standard views like charts, numeric values, bargraph, etc.

RSG45 HART sensor communication

The Memograph M RSG45 offers a genuinely unique position with HART inputs where both the 4 to 20 mA analog signal and all four HART values of a connected field devices can be used simultaneously. HART multidrop is also possible with up to 5 field devices per channel.

The RSG45 thus helps to obtain more information from the field. It also offers a HART gateway function. This means direct access from the PC configuration software to the field device without the need for an additional modem. Configuration of the field devices is thereby possible from the measuring control room. Furthermore, detailed field device status information is available.



Advantages at a glance:

- Integrated HART modem (gateway)
- Direct access to instrumentation via plant asset management (e.g. FieldCare, DeviceCare)
- Easy and fast download of sensor configuration
- Fast failure detection and remediation

RSG35/RSG45 Remote access via webserver

The integrated webserver allows access to setup parameter, current and historic process data at any time and any place using a conventional web browser. Remote access and remote control of the devices are possible in addition to the display of current values including status and device state.
Furthermore the integrated webserver features a number of excellent, new functions, e.g.:

- Option to print out, save and import device settings
- Firmware update of the RSG35/RSG45 possible
- Protection against unauthorized access through the use of password-protected user levels.
- Online visualization:
  - Trend display
  - Complete device parameter configuration
  - Password-protected access

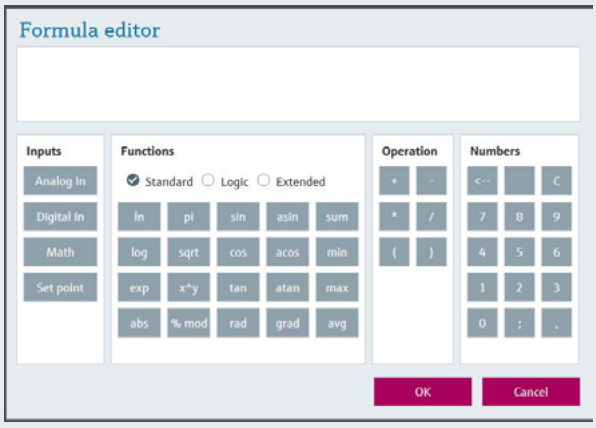
Multifunctional interfaces

RSG35 and RSG45 offer multifunctional interfaces like USB, RS232/RS485 to connect printers, bar code readers or keyboards. Fieldbus protocols like Modbus TCP and RTU allow the connection of devices or data transfer to superior systems. Memograph M RSG45 additionally supports the fieldbuses PROFIBUS DP, PROFINET and EtherNet/IP.

RSG35/RSG45 Mathematic functions

In addition to the instrumentation inputs mathematics channels are available which can be used as independent channels. The formula of the individual mathematics channels can be easily set-up using an easy-to-use editor with predefined functions, similar to MS Excel.

RSG35 comes with a basic arithmetic function set, the RSG45 additionally allows extended calculations (trigonometric, parabolic, linear, logarithms, etc.).



E-mail notification (Telealarm)

With the tele-alarm software in the Memograph M RSG45 and Ecograph T RSG35 it is possible to react even when on the road. The devices create an e-mail message in case of upper and lower limit infringements, sensor failure or on an active digital input.

The RSG45 can even generate SMS messages which will be sent with text that can be individually defined for each incident. The receipt of the message can also be acknowledged by SMS. If the message is not acknowledged, further persons can be alerted. Furthermore, instantaneous values can be easily requested by sending a SMS to the device. Then the RSG45 sends values by SMS. It is also possible to switch relays via SMS so that e.g. pumps can be restarted. This enables full control over the plant without additional tools!

FDM – Field Data Manager software

Visualization & Data management

The FDM software offers various possibilities to display, manage and archive data from the production process. Data is stored in a data base (supported data bases: PostgreSQL, Oracle or Microsoft SQL Server) thus extensive searching and complicated data handling is avoided.

With the help of the tamper-proof data management the requirements of the legislator and company compliance specifications can be easily fulfilled. Flexible display possibilities support the transparent representation and offer a solid basis for process analysis.

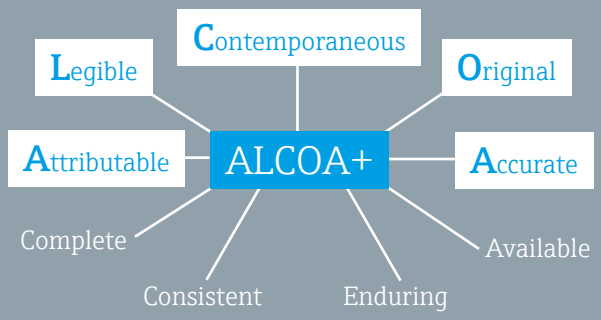
The software can be used with several Endress+Hauser devices:
- Ecograph T RSG35
- Memograph M RSG45
- EngyCal RS33, RH33
- Batch Controller RA33
- Liquiline CM44X
- Liquistation CSFXX
- Liquisystem CA80XX

Product features at a glance:

- Automatic service for report generation, printing reports, read out of data, storing of data, secure export and pdf generation
- Create reports and templates
- Read out measured data via online interface or from mass storage; Export/Import data
- SQL database / manipulation secure data storage
- Online visualization of instantaneous values ("live data")

Data integrity & IT/OT security according ALCOA+ principles

Global regulatory authorities and associations, such as the International Society for Pharmaceutical Engineering (ISPE), the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA) have published guidelines on how to guarantee data integrity.
In combination with Memograph M the FDM software fulfills the requirements regarding data integrity and security according to these ALCOA+ principles.



For more information see the ALCOA+ Whitepaper WP01159R

You find the current software version on the internet:
www.endress.com/ms20
www.endress.com/ms21

Security features at a glance:

- Customizable password rules: adjustable password strength (password length, special characters, autom. password change requirement)
- Blocking of users in case of multiple incorrect entries, which is documented in the audit trail
- Auto-logout of users if there has been no user activity within a defined period of time

OPC UA Server

Visualization, monitoring and control of processes

Today OPC stands for 'Openness, Productivity and Collaboration' and is an interface standard in factory and process automation. Based on Windows technology OPC enables a simple and standardized data exchange between engineering processes and process monitoring and control.

Today higher and higher requirements on the availability, productivity and quality are made in all areas of automation technology. The integration of hundreds of devices from different manufacturers is, in this case, the greatest challenge. The integration of these measurement points into a primary, central visualization and control systems takes a lot of time and money.

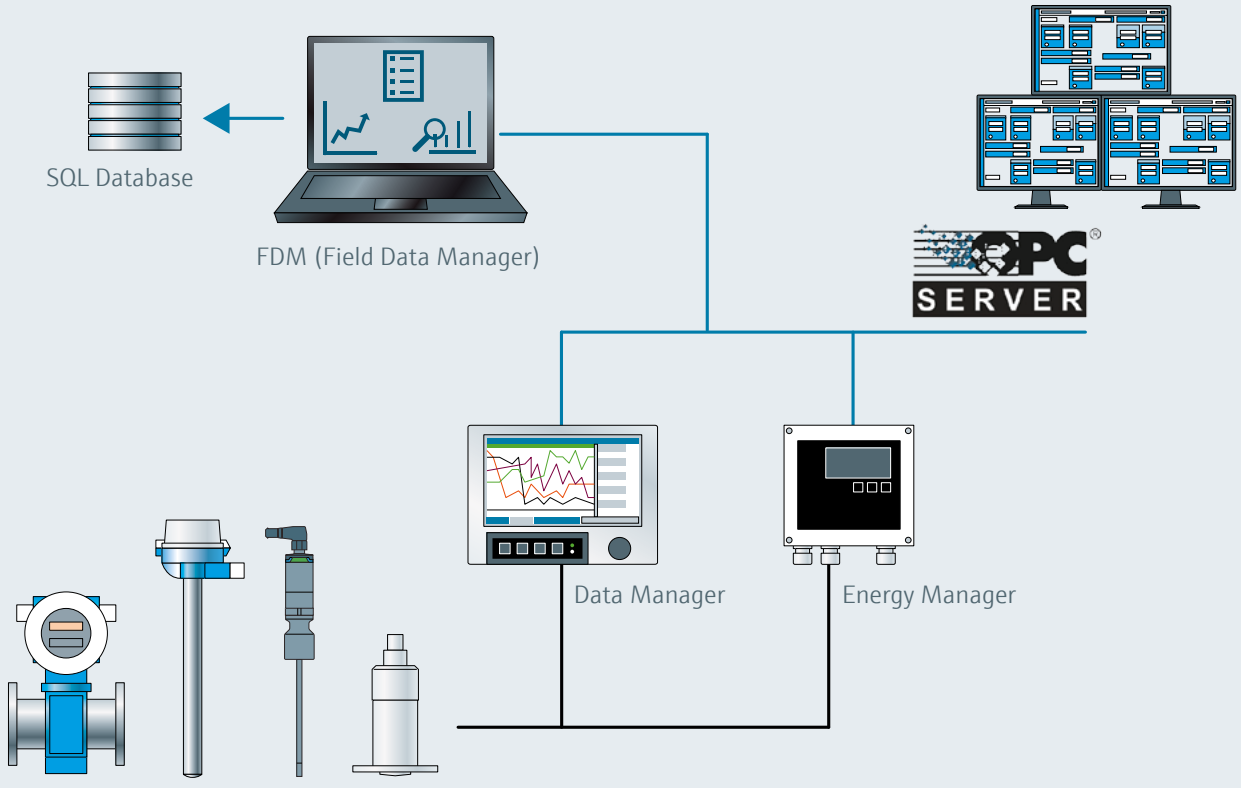
A standardized technology like OPC is used to integrate measuring points and express process data in a simple and fast way. The Endress+Hauser OPC Server is a comprehensive tool for all Endress+Hauser data and energy managers.

Simple data exchange

Depending on the type of device, data access to the following instantaneous values is possible:

- Analog channels
- Digital channels (digital combination)
- Mathematics channels and calculated process values
- Totalizer
- Time synchronization
- Date/time
- Calculated process values
- Quantities and energy

You find the current software version of the OPC server internet:
www.endress.com/rxo20



Netilion – the multi-brand ecosystem

Netilion is a cloud-based IIoT ecosystem, designed for industrial processes. It connects the physical and digital worlds to send valuable information from the field straight to your phone, tablet or other devices. Netilion empowers you to improve efficiency and drive innovation.

Multi-brand ecosystem

You have equipment from various vendors in your installation. An IIoT solution should provide data from as many assets as possible, and Netilion can do that. This multi-brand ecosystem brings transparency into a plant regardless of device type or manufacturer.

Security and privacy

Your facility's information is valuable and needs protection. Netilion allows users to access data digitally because it meets internationally recognized standards of cloud-platform security. It's a safe harbor for your data.

Decentralized processes monitored efficiently

- Reduction of routine checkup tours through comprehensive visualization of essential process variables, e.g. flow quantities, limit values, levels, temperature, pressure or physicochemical quality parameters
- Low operating costs through fast reaction in case of failure

Legal compliance thanks to automation

- Continuous measurement of quantitative and qualitative parameters
- Generation of legally compliant documentation thanks to integrated reporting systems

Data access around the clock

- Complete data access independent of time and place
- Numerous options to analyze and visualize ratios, amounts, thresholds, time series and trends, as well as balances
- Everything at a glance thanks to the web-based visualization of networks with optimized depiction for highly diverse terminal devices

More about Netilion:
www.netilion.endress.com

5. Data fusion and analysis

Algorithms for leakage detection, verification, forecasts, etc.

4. Data management and visualization

Monitoring of networks and decentralized infrastructures

3. Data collection and transmission

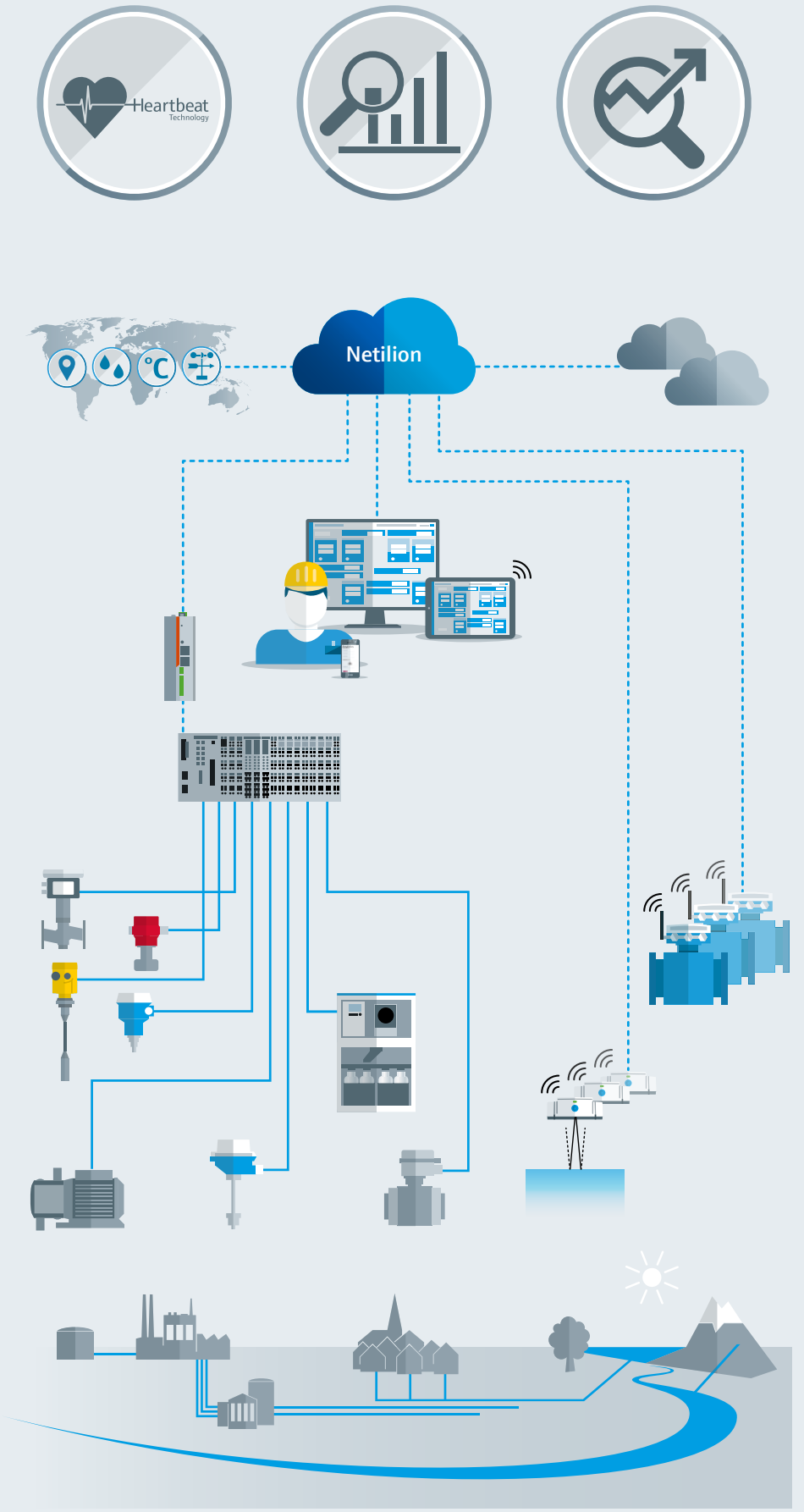
Flexible edge connectivity solutions

2. Data collection and control

Smart field devices and sensors (flow, analysis, pressure, level, temperature, etc.)

1. Physical world

Infrastructure (pipes, pumps, valves, etc.)



Further information:

- Level measurement FA00001F
- Pressure measurement FA00004P
- Flow measurements for liquids, gases and steam FA00005D
- Temperature measurement FA00006T
- pH measuring technology FA00007C
- Analyzers for water and wastewater FA00012C
- Service KOMPAKT FA00018H

Or alternatively as download under:
www.endress.com/download

Have you found "Your" device? We would be pleased to send you further detailed technical information.

www.addresses.endress.com

FA00016K/09/EN/23.23

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People for Process Automation