Product Catalogue 2017/2018

Endress+Hauser
People for Process Automation

Product Catalogue 2017/2018

Process control and automation solutions

Endress+Hauser

People for Process Automation

Welcome to the world of Endress+Hauser

Wherever you are, look around you and you'll find something made by Endress+Hauser. Drink a glass of water, eat a sandwich, open the newspaper or take a pain killer – process engineering is always in the background, ensuring things run smoothly. As the People for Process Automation, more than 100,000 customers worldwide trust us to make their processes safe, efficient and environmentally-friendly.

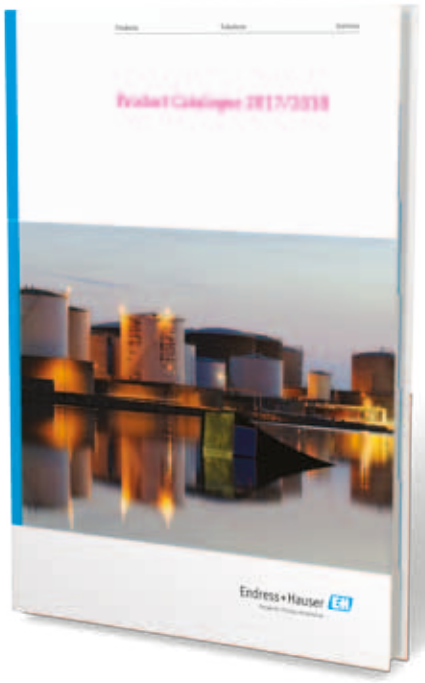
Founded in 1953 by Georg H Endress and Ludwig Hauser, Endress+Hauser has developed from being a specialist in level measurement to a provider of complete solutions for industrial measuring technology and automation, with expansion into new territories and markets. With almost 13,000 employees worldwide, the Group generates annual net sales of more than €2.1 billion.

As a trusted automation partner across the process industries, Endress+Hauser provides a full portfolio of measurement solutions in level, pressure, flow, temperature, analytics and data acquisition. We also support our customers with automation engineering, logistics and IT services and solutions.

Endress+Hauser in the UK

Established in Manchester in 1968, Endress+Hauser Ltd is today a thriving sales, service and solutions organisation employing a workforce of around 200 people. Our facilities in Manchester boast a temperature manufacturing assembly centre supplying tailor-made solutions from specialists in the design and manufacture of industrial temperature sensors and bespoke engineered solutions.
Our primary objective is to provide a seamless level of customer service, from sales enquiry to order placement and into full after-sales support. Whatever your request, our dedicated technical and customer care teams ensure you receive a fast response.
For more complex applications and with in-depth knowledge of their particular field, our product application consultants and industry specialists are always on hand.

Product Catalogue 2017/2018



This product catalogue contains a selection of our most popular products, services and solutions. In order to help you make a more informed selection, we have also included more detailed information, including applications, technical specifications, selection tables and connection examples.

The 2017/2018 catalogue covers the areas of level, pressure, flow, temperature, analytics, recording and system components, services and solutions. And, should you want to go wireless, the majority of our devices can be easily transformed into WirelessHART devices via the use of our SWA70 WirelessHART Adapter – look out for the WirelessHART logo or see page 256 for more information!

Please note:

This catalogue features only a selection of our full range of products, services and solutions. Should you not find what you are looking for, please search online at www.uk.endress.com or call us on 0161 286 5000. We'll be happy to help with further information and documentation, specific application advice or even send a sales engineer to visit you, should you require it.

Get your free Endress+Hauser ‘Operations’ and ‘DC Values’ apps!

Operations app

Based on our tried and trusted online Device Viewer tool, our mobile Operations app offers fast access to a wealth of device-specific information on the go. No matter where you are, you’ll have access to a wealth of device information in the palm of your hand! Simply input your device’s serial number or quickly scan the device QR code for immediate access to information such as technical information, operating manuals, order code, availability, spare parts and even replacement products. Better still, once searched, your instruments appear in a Device List – all ready for future use at a touch. You even have the option to email device details to your colleagues, so you’ll always have the information you need in a flash!

Benefit from:

- Detailed device-specific information.
- Device List: a list of all devices found from previous searches.
- Documentation downloads: technical information, operating manuals and certificates.
- Spare part information.
- Share your information with your colleagues via email.
- Recommend the app via Facebook, Twitter or email!

DC Values app

Our DC Values app is the fast and convenient way to access thousands of dielectric constant values for all kinds of different media types in the field of process automation. Simply search by the name or the chemical formula to quickly discover the DC value. Better still, its in-built autocomplete functionality helps you even if you don’t know the exact spelling!

Benefit from:

- Fast access to thousands of DC values.
- Autocomplete functionality to help with your search.

Available for both iOS and Android devices, our apps are free, handy and quick to download – try them now from your App Store or Google Play!

Contents

Level measurement

For further information, visit our website at: www.uk.endress.com

Level switch selection table

	Conductivity level switches	Liquiphant level switches	Soliphant level switches	Capacitive level switches	Rotary paddle level switches
Solids			■	■	■
Liquid, conductive	■	■		■	
Liquid, non-conductive		■		■	
Solid particles > 10mm				■	■
Solid particles 5-10mm			■	■	■
Solid particles < 5mm			■	■	■
Pressure: 0 - 16 bar	■	■	■	■	
Pressure: 0 - 40 bar	■	■		■	
Pressure: 0 - 64 bar	■	■		■	
Temperature: -20...+80°C	■	■	■	■	■
Temperature: -20...+150°C	■	■	■	■	
Temperature: -20...+200°C		280°C	280°C	■	
Teflon/Halar coating		■		■	
Viscosity > 100mm²/sec	■	■		■	
Viscosity > 10,000mm²/sec	■			■	

Applicable	■
Applicable with restrictions	
Not applicable	

Continuous level selection table

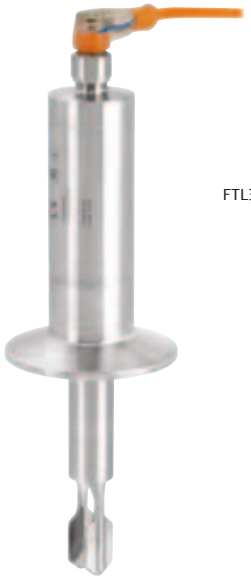
	Hydrostatic level measurement	Capacitive level measurement	Ultrasonic level measurement	Radar level measurement	Guided wave radar level measurement
Vacuum (< 0.5 bar absolute)	■	■		■	■
Pressure: 0.5 - 3.5 bar	■	■	■	■	■
Pressure: 0 - 64 bar	■	■		■	■
Pressure: > 64 bar (on request)	■	■		160 bar	400 bar
Temperature: -20...+80°C	■	■	■	■	■
Temperature: -20...+200°C	■	■	< 150 °C	■	■
Temperature > 250°C	■	■		450 °C	450 °C
Teflon/PVDF coating		■	■	■	■
Other materials possible	Hastelloy C stainless steel/Ti/Ta	PFA	Stainless steel/PP	Various	■
Tank with agitator mechanism	■		■	■	
Top installation	■	■	■	■	■
Bottom installation	■	■			
Liquids	■	■	■	■	■
Viscosity > 4,000mm²/sec	■	■	■	■	
Solids		■	■	■	■
Powders		■	■	■	■
Large particles			■	■	

Applicable	■
Applicable with restrictions	■
Not applicable	

Liquiphant FTL31/33

Compact level limit switch for liquids.

FTL31



FTL33

- Smallest vibronic sensor on the market
- Robust stainless steel design
- Plug & play: no adjustment necessary
- Continuous self-monitoring
- External function test with test magnet

The Liquiphant FTL31 liquid level switch is designed for industrial applications across all industries. It is ideal for overfill prevention or pump dry-run protection in cleaning and filter systems as well as in cooling and lubrication vessels.

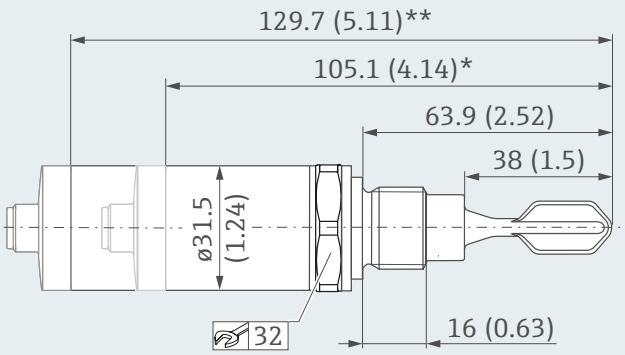
3-A and EHEDG certified, the Liquiphant FTL33 is especially designed for hygienic applications in the food & beverage industry. It is perfect for overfill prevention or pump dry-run protection in storage tanks, mixing vessels and pipes. Better still, it offers CIP and SIP cleaning as standard and IP69K protection as an option.

Technical data

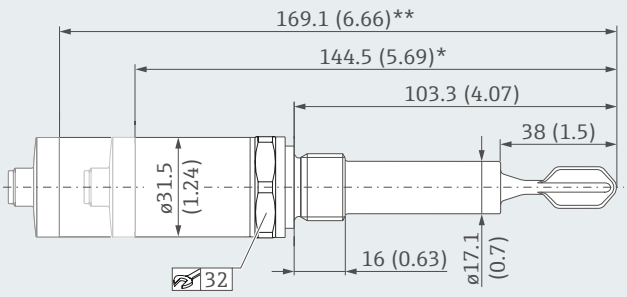
	FTL31	FTL33
Version	: Process	Hygienic (3-A and EHEDG compliant)
Surface roughness	: Ra ≤3.2µm	Ra ≤1.5µm (EHEDG), Ra ≤0.76µm (EHEDG, 3-A)
Temperature	: -1 to +40 bar	-1 to +40 bar
Min denisty of medium	: > 0.7g/cm³ (> 0.5g/cm³ optional)	> 0.7g/cm³ (> 0.5g/cm³ optional)
Solids content	: ø < 5mm	ø < 5mm
Switch point	: 13mm ±1mm	13mm ±1mm
Process connections	: Threads	Threads, hygienic

Dimensions (mm)

FTL31/33 compact version



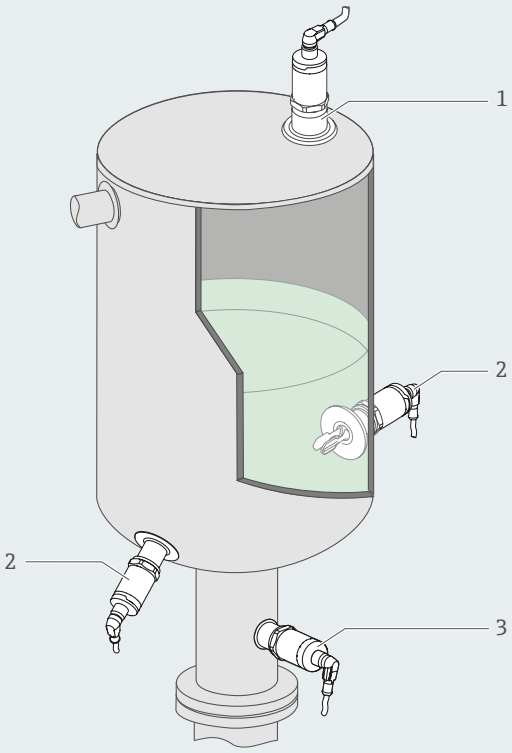
FTL31/33 short tube version



Installation

Installation options:

1. Overfill prevention or upper level detection
2. Lower level detection
3. Dry run protection for pump



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- For product selection help, try our online Application tool: www.uk.endress.com/applicator

Liquiphant M FTL50/51/51C

Vibrating liquid level switch. Suitable for use in hazardous areas.

Liquiphant M FTL50 with plastic housing and G¾" process connection.

FTL51C ECTFE coated fork, extension and flange. Aluminium housing.

- **Functional safety up to SIL3 (IEC61508/IEC61511)**
- **¾" process connection for use in small spaces**
- **Maintenance-free – no moving parts**
- **Unique fork corrosion monitoring system**

Applications

The Liquiphant M is a level switch for use with all types of liquid:

- Temperatures between -40°C and +150°C
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm²/s
- Density of 0.5g/cm³ and above

Operation is not affected by flow, turbulence, air bubbles, foam, vibration, solid constituents or build-up. The Liquiphant is therefore the ideal replacement for float switches.

Hastelloy C, ECTE, PFA and enamelled versions are available for use with very corrosive liquids. EEx ia and EEx d(e) protection allow use in hazardous areas.

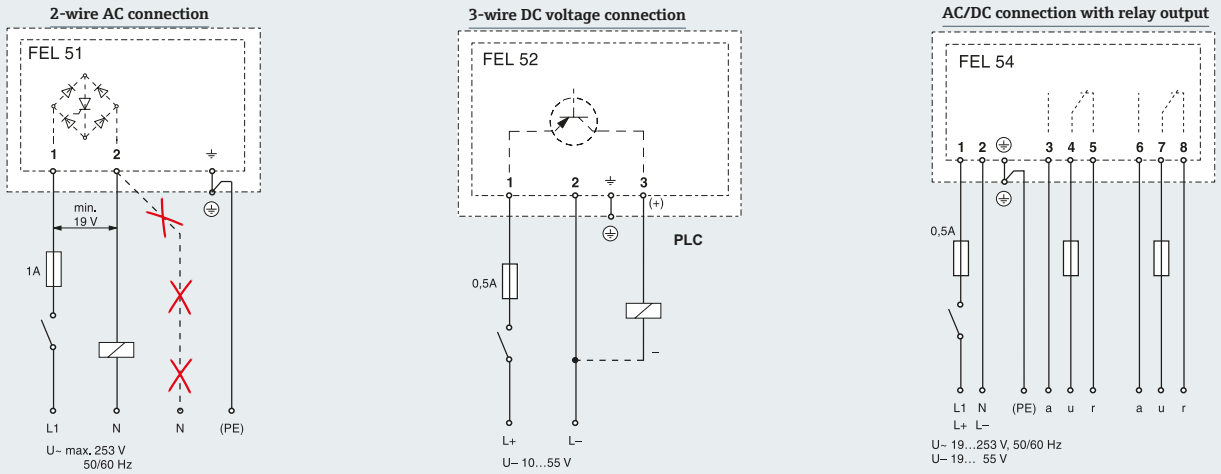
Technical data

Process temperature	: Between -40°C...+150°C
Process pressure	: -1 bar...100 bar
Product density	: > 0.5g/cm³
Viscosity	: < 10,000mm²/s (cSt)
Power supply/output	: See options
Sensor material	: Stainless steel 316L (1.4435), optional: Hastelloy C22
Process connections	: G¾", G1" thread or DIN/ANSI flanges from DN25/1" (other process connections optional)
Housing material	: PBT-FR polyester, epoxy coated aluminium (EEx d version without cable entry but with ¾" tapped hole)
Degree of protection	: IP66/IP67
Certificates	: WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA

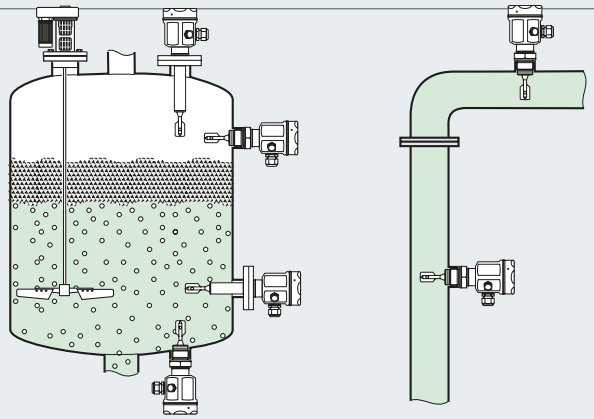
Important features

- Large choice of process connections for universal use.
- Process connections starting at ¾" and the small vibrating fork allow use in tight spaces.
- Large selection of electrical outputs, e.g. 8...16mA, NAMUR, relay, thyristor and PFM signal outputs: a suitable signal for any process control.
- No adjustment: rapid and economical commissioning.
- No mechanical moving parts: maintenance-free, no wear and tear.
- Sensor has function monitoring to check for damage: safe and reliable.
- ATEX II certified.
- Gastight sensor cable feed-through available as an option.

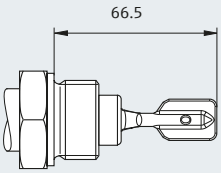
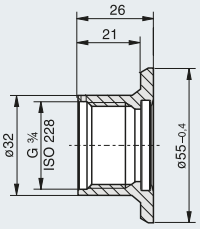
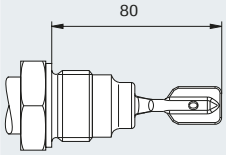
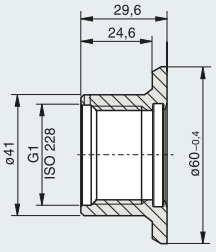
Electrical connection



Installation examples



Process connections and welding sleeves for FTL50 and FTL51

process connection	dimensions	welding sleeve	dimensions
BSP ¾" GQ2		For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001052	
G1" GW2		For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001051, 60mm dia. version 129855-0000, 65mm dia. version (standard)	

Other process connections possible.

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Liquiphant M FTL50H/51H

For universal application with food and pharmaceutical products. Suitable for hazardous areas.

Liquiphant M FTL50H with stainless steel housing and Triclamp.

Liquiphant M FTL50H with plastic housing and G¾" process connection.

- **Vibrating fork length 40mm, connection from ¾" or DN25 flange**
- **New electronics variants, 8...16mA for a 4...20mA loop or a NAMUR switching signal in accordance with EN 50227**
- **Active function safety device in line with quiescent current principle (min/max failsafe adjustable)**

Applications

The Liquiphant M is a level switch for use with all types of liquid:

- Temperatures between - 40°C and +150°C
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm²/s
- Density of 0.5g/cm³ and above.

Operation is not affected by flow, turbulence, air bubbles, foam, vibration, solid constituents or build-up. The Liquiphant is therefore the ideal replacement for float switches.

A version in highly durable Hastelloy C is available for use with very corrosive liquids. EEx ia and EEx d protection allow use in hazardous areas.

Important features

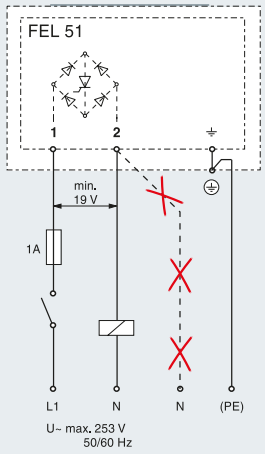
- Wide range of process connections.
- Wet components made entirely in 316L, including the weld seam.
- EHEDG and 3-A certified.
- Process connections starting at ¾" and the small vibrating fork allow use in tight spaces.
- Large selection of electrical outputs, e.g. 8...16mA, NAMUR, relay, thyristor and PFM signal outputs: a suitable signal to any process control.
- No adjustment: rapid and economical commissioning.
- No mechanical moving parts: maintenance free, no wear and tear.
- Sensor has function monitoring to check for damage: safe and reliable.

Technical data

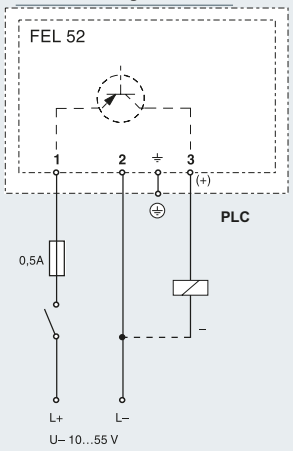
Process temperature	:	Between -40°C...+150°C
Process pressure	:	-1 bar...100 bar
Product density	:	> 0.5g/cm³
Viscosity	:	< 10,000mm²/s (cSt)
Power supply/output	:	See options
Sensor material	:	Stainless steel 316L (1.4435), optional: Hastelloy C22
Process connections	:	G¾" , G 1" thread or DIN/ANSI flanges from DN25/1" (other process connections optional)
Housing material	:	PBT-FR polyester, stainless steel 316L (1.4435)
Degree of protection	:	IP66/IP67
Certificates	:	WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA, EHEDG, 3-A

Electrical connection

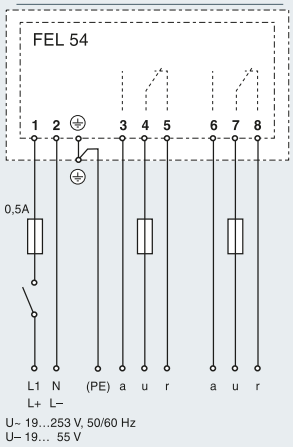
2-wire AC connection



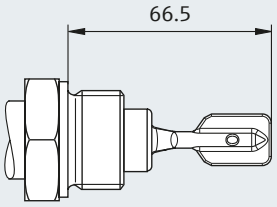
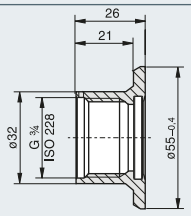
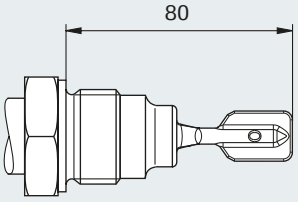
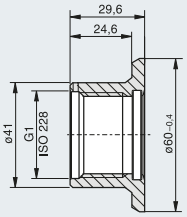
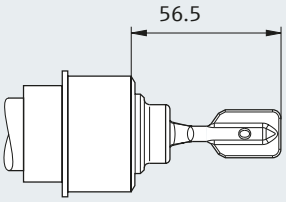
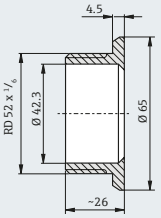
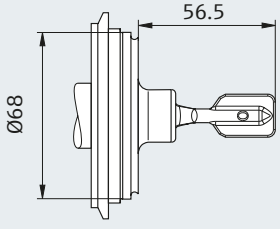
3-wire DC voltage connection



AC/DC connection with relay output



Process connections

process connection	dimensions	welding sleeve	dimensions
BSP ¾" GQ2		For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001052	
G1 GW2		For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001051, 60 mm dia. version 129855-0000, 65mm dia. version (standard)	
Flush mounted EE2		For high-grade sanitary installation. Fork can be aligned. Material: stainless steel 316L (1.4435) Seal: silicone O-ring (included). Part no. 52001047	
Varivent WE2			

Other sanitary process connections such as Tri-Clamp, DIN11851 dairy and aseptic couplings are also available.

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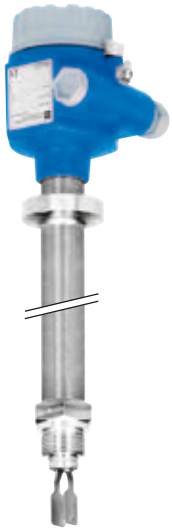
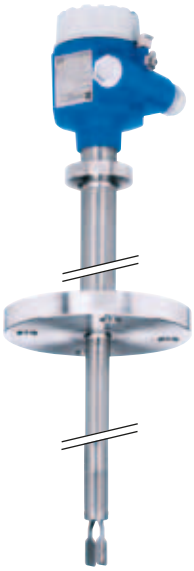
Liquiphant S FTL70/71

For universal use in liquids in temperatures up to 280 °C. Suitable for hazardous areas.



FTL70 with G1" process connection



FTL71 with DN50 process connection

- Vibrating fork length 40mm, connection from ¾" or DN25 flange
- For use in SIL2/3 certified applications
- Active function safety device in line with quiescent current principle (min/max failsafe adjustable)
- Not susceptible to temperature shocks

Applications

The Liquiphant S is a level switch for use in all types of liquid:

- Temperatures between -40°C and +280°C
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm²/s
- Density of 0.5g/cm³ and above

Operation is not affected by flow, turbulence, air bubbles, foam, vibration, solid constituents or build-up. The Liquiphant is therefore the ideal replacement for float switches. A Hastelloy C version is available for use with very corrosive liquids. EEx ia and EEx d(e) protection allow use in hazardous areas. For use as a SIL2/3 certified level switch.

Technical data

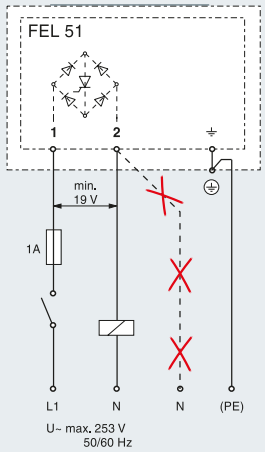
Process temperature	: Between -40°C...+280°C
Process pressure	: -1 bar...100 bar
Product density	: > 0.5g/cm³
Viscosity	: < 10,000mm²/s (cSt)
Power supply/output	: See options
Sensor material	: Stainless steel 31803 (1.4462), optional : Hastelloy C22
Process connections	: G¾", G1" thread or DIN/ANSI flanges from DN25/1" (other process connections optional)
Housing material	: PBT FR polyester, epoxy coated aluminium (EEx d version without cable entry but with ¾" tapped hole)
Protection	: IP66/IP67
Certificates	: WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA

Important features

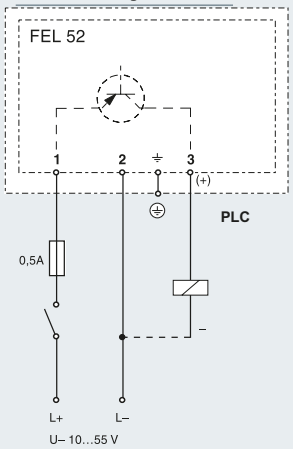
- Wide range of process connections.
- Process connections starting at ¾" and the small vibrating fork allow use in tight spaces.
- Large selection of output options, e.g. 8...16mA, NAMUR, relay, thyristor and PFM signal outputs: a suitable signal for any process control.
- No adjustment: rapid and economical commissioning.
- No mechanical moving parts: maintenance-free, no wear and tear.
- Sensor has function monitoring to check for damage: safe and reliable.
- Second gas-tight sensor cable feed-through provided as standard.

Electrical connection

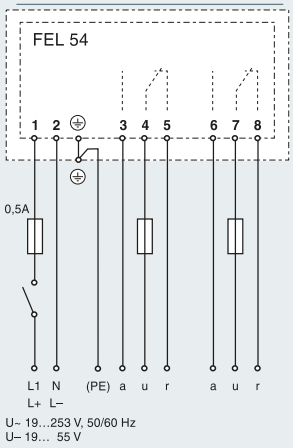
2-wire AC connection



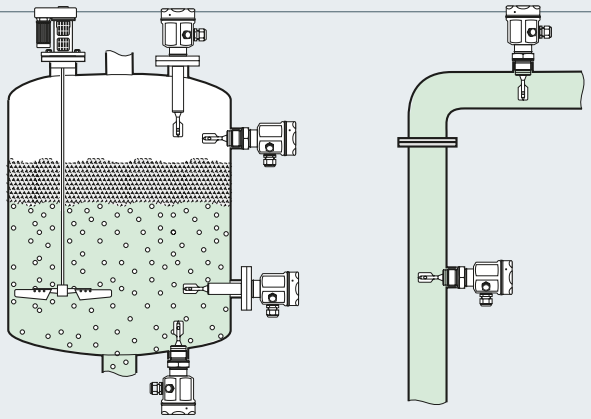
3-wire DC voltage connection



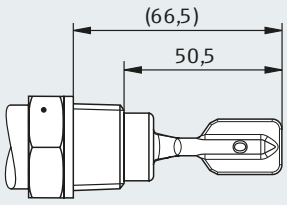
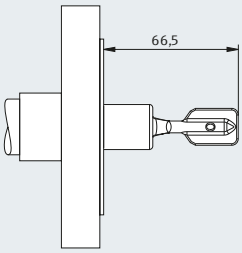
AC/DC connection with relay output



Installation examples



FTL70 and FTL71 process connections

process connection	dimensions	pressure and temperature
¾" NPT GM2		max. 64 bar max. 280°C
Flange ANSI A ## CIN2525 B ###		max. 64 bar max. 280°C

Other process connections available.

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Liquiphant FailSafe FTL80/81/85/825

For functional safety applications requiring a high degree of failure safety and availability.


FTL80


FTL81


FTL85


FTL825

- Min/max safety applications up to SIL3
- Permanent live signal monitors function safety
- Proof testing according to IEC 61508/IEC 61511
- Slave devices tested at the touch of a button

The Liquiphant FailSafe point level switch offers Safety Integrity Levels up to SIL3 with a single instrument, making it ideal for functional safety applications requiring a high degree of failure safety and availability. The high SIL rating is achieved by dual redundancy and permanent self-monitoring of the instrument. In addition, a constant live signal monitors vital functions.

Another benefit is the significantly simplified proof test according to IEC 61508/IEC 61511 functional safety requirements. This allows the proof test interval to be extended by up to 12 years. Downstream devices in the safety loop such as valves are checked by simply pressing a button at the sensor or switching unit – saving both time and money.

Liquiphant FailSafe FTL80, FTL81 and FTL85 are available with a variety of coatings to cope with even highly corrosive media. Additional options provide a special design and materials to allow the sensor to resist process temperatures of up to 280°C. All of the relevant international explosion protection certificates are also available. Liquiphant FailSafe can either be directly integrated into a (safety) PLC via a 4-20mA interface or can be installed with the Nivotester FailSafe FTL825.

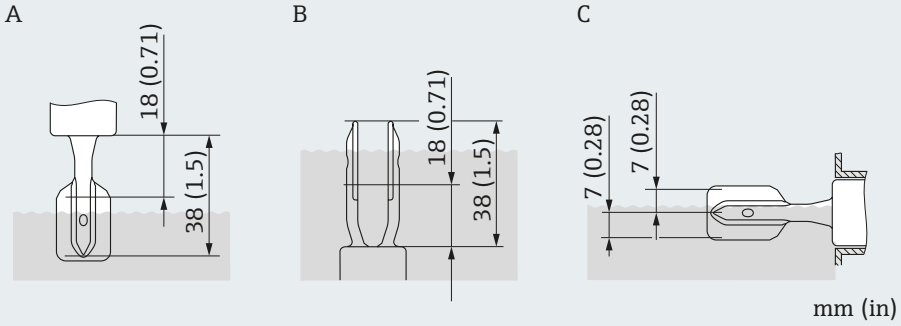
All of the general advantages of the vibration measuring principle apply: measurements are unaffected by the physical properties of the medium such as conductivity, dielectric constant or density changes, foam and turbulence do not influence the measurement and there is no need to calibrate for the respective medium.

Technical data

Process temperature	: -60°C...+280°C
Process pressure	: Up to 100 bar
Product density	: From 0.4 g/cm³
Viscosity	: Up to 10000 mPa·s
Sensor material	: Stainless steel, Hastelloy or coated
Process connections	: Thread or flange
Housing material	: Polyester, stainless steel or aluminium
Degree of protection	: IP66, IP67, IP68/NEMA 4X/6P (depending on housing)
Certificates	: ATEX, IEC Ex, FM, NEPSI

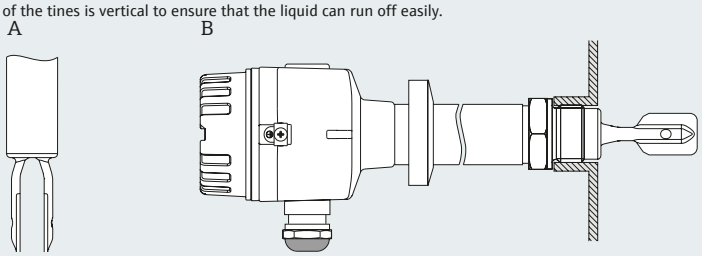
Installation

Switch points on the sensor depend on the mounting position (outside reference conditions).
A: Mounting from above
B: Mounting from below
C: Mounting from the side



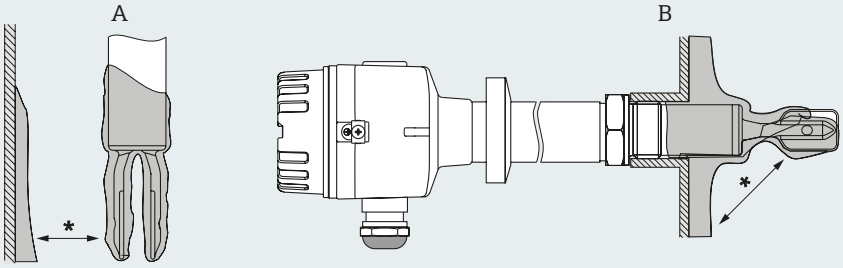
Optimum mounting

Position the fork so that the narrow edge of the tines is vertical to ensure that the liquid can run off easily.
A: Vertical from above
B: Flush-mounted from the side



Mounting with build-up on the tank walls

Ensure that there is sufficient distance between the buildup expected on the tank wall and the fork.
A: Vertical from above
B: Protruding into the tank from the side



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Nivotester FTL325P/375P

Level limit switches with intrinsically safe signal circuit for connection to Liquiphant and Soliphant.

FTL325P, single channel

FTL325P, 3-channel

- Intrinsically safe signal circuits [EEx ia] for problem-free use in hazardous areas
- Highest functional SIL safety – fault-free PFM technology, line monitoring through to sensor, corrosion monitoring of tuning fork (Liquiphant)
- Compact housing for simple series installation on standard rails in switch cabinet
- Functional safety up to SIL3

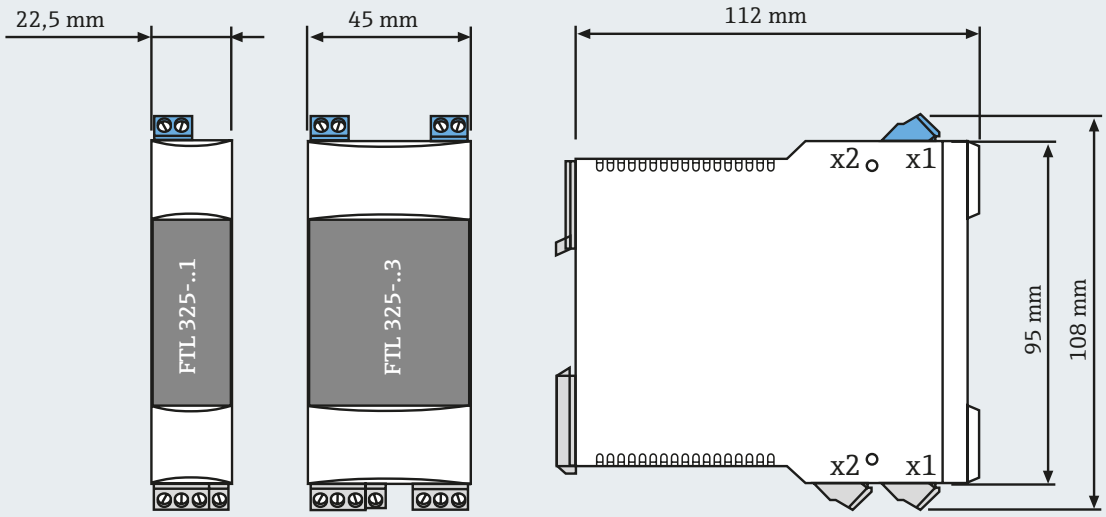
Applications

Both the Nivotester FTL325P and FTL375P are ideal for level limit detection in tanks (liquids) and silos (bulk solids) and are ATEX certified for hazardous area use. They offer liquid level detection in pipes for dry-run protection of pumps, overspill protection in tanks with combustible/non-combustible liquids harmful to water and offer two-point control and level limit detection using only one switching instrument.

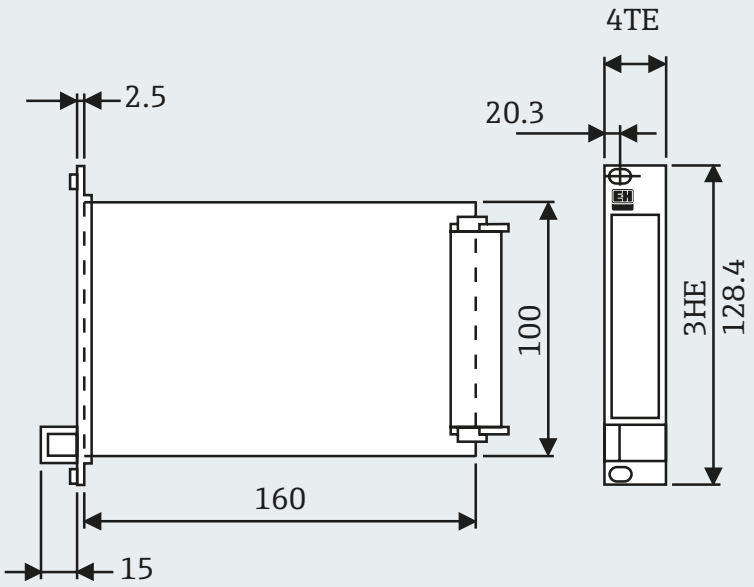
Technical data

	FTL325P	FTL375P
Construction	DIN rail mounting	Eurocard or Monorack
Certification	ATEX II (1) GD (EEx ia) IIC	ATEX II (1) GD (EEx ia) IIC
Input	PFM, 1, 2 and 3-channel	PFM, 1, 2 and 3-channel
Output	Relay for alarm and fault	Relay and transistor

Dimensions (mm)



FTL375N/P



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Nivotester FTL325N

Level limit switch with isolating amplifier with NAMUR input for connection to any NAMUR sensor.

FTL325N

FTL325N, 3-channel

- Intrinsically safe signal circuits [EEx ia] for problem-free use in hazardous areas
- Highest functional SIL safety – line monitoring through to sensor, corrosion monitoring of tuning fork (Liquiphant)
- Compact housing for simple series installation
- Functional safety up to SIL2

Applications

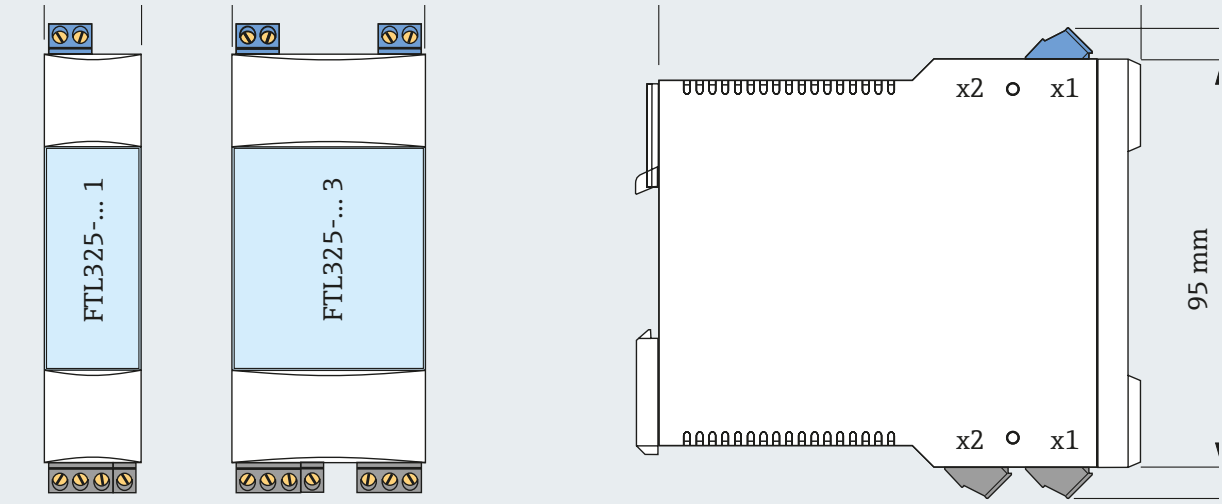
The Nivotester FTL325N is ideal for level limit detection in tanks (liquids) and is ATEX certified for hazardous area use. It offers liquid level detection in pipes for dry-run protection of pumps, overspill protection in tanks with combustible/non-combustible liquids harmful to water and offers two-point control and level limit detection using only one switching instrument.

Technical data

	FTL325N
Construction	DIN rail mounting
Certification	ATEX II (1) GD (EEx ia) IIC
Input	NAMUR, 1, 2 and 3-channel
Output	Relay for alarm fault

Dimensions (mm)

FTL325N



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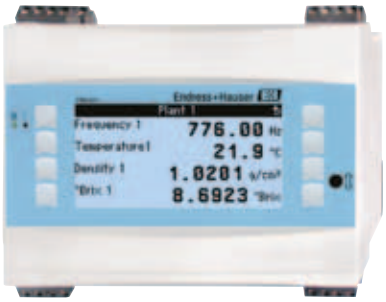
Liquiphant density system

Density and concentration measurement system.

Liquiphant M



FML621

- Maintenance-free, no moving parts
- Pump protection can be provided with the same process connection
- ATEX certification
- EHEDG and 3-A approvals

Dosing preliminary, interim and final products; determining exact density or concentration; monitoring quality and controlling processes: all these activities rely on accurate and reliable density measurement. Endress+Hauser's Liquiphant density system offers outstanding product quality data, helping you to streamline your process, improve yield and save money!

Endress+Hauser makes use of the tried and trusted vibronic principle to provide reliable data on density and quality just as reliable as it does level limits. As soon as the density or the concentration of the medium changes, the resonant frequency changes too. The tines of Liquiphant sense this change in frequency and the FML621 density calculator displays this information in measurements you understand, be it °Brix, °Baume or indeed any units specific to your application.

In the chemical and food & beverage industries, concentration is an important process variable. In order to determine concentration levels, extensive offline procedures and expensive laboratory analysis are often required. Liquiphant M, in combination with a temperature probe and FML621 density controller offers a cost-effective alternative. They provide reliable online density measurement at a glance, increasing plant availability, improving process control and reducing product wastage.

Technical data

Span (measuring range)	:	0.3...2.0g/cm³
Temperature sensor measured error	:	< 1°C
Max viscosity	:	350mPa (exception: max 50mPa*s for FTL51C)
Max flow velocity	:	2m/s
Fluid temperature	:	0...+80°C (validity of accuracy data)
Power supply	:	In accordance with specification FML621
Standard calibration	:	±0.02g/cm³ (±1.2% of the span, under general measuring conditions)
Special calibration	:	±0.005g/cm³ (±0.3% of the span, under reference conditions)
Field calibration	:	±0.002g/cm³ (in operating point)

More than just a density controller

The Liquiphant M density measurement system can be used

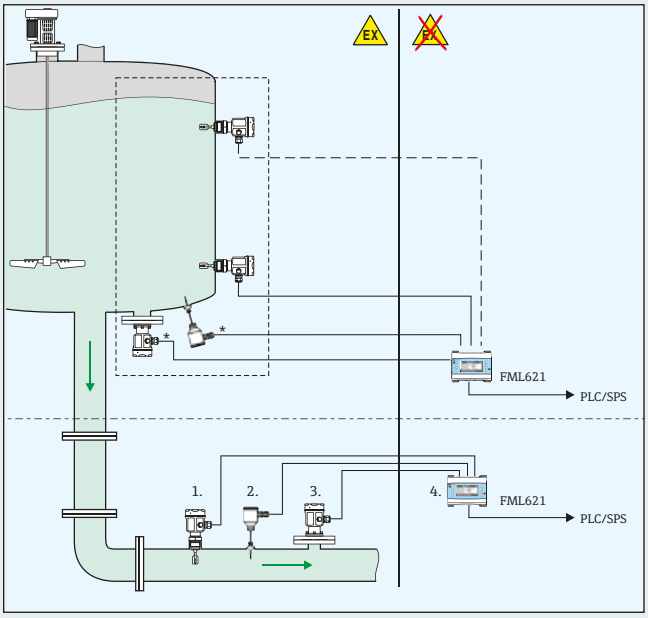
across the process industries for concentration measurement, quality statements and purity indications or even as a basic variable in calculations and simulations. What's more, Liquiphant M can simultaneously provide dry-run protection and can be combined with other measuring instruments (e.g. flowmeters or radar devices) to provide additional values such as mass or mass flow information.

Application

* Pressure and temperature information required depending on the application.
1. Liquiphant M sensor with electronic insert FEL50D (pulse output)
2. Temperature sensor (e.g. 4...20mA output)
3. Pressure transmitter (4...20mA output)
4. Liquiphant density and concentration computer FML621 with display and operating unit

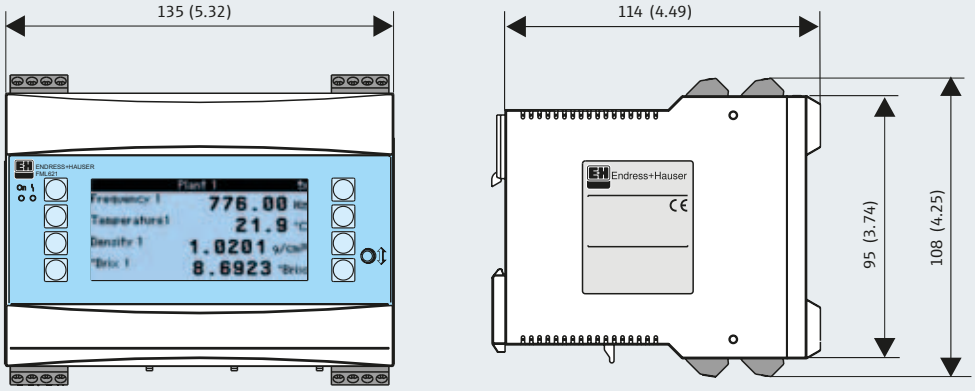
Please note

Measurement can be affected by:
- Air bubbles at the sensor
- Unit not fully covered by medium
- Solid media build-up on sensor
- High fluid velocity in pipes



Dimensions (mm)

Housing for top-hat rail as per IEC 60715



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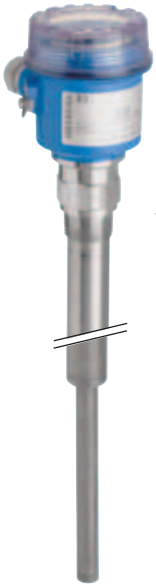
Soliphant T FTM20/21

Vibrating level switch for fine-grained or course-grained solids.

FTM20
compact version



FTM21
with extention

- Insensitive to external vibrations and build-up: maintenance-free operation
- Simple commissioning: no calibration necessary
- Maintenance-free: no mechanically moving parts
- ATEX II 1/3 D, FM or CSA approval

Soliphant T is a robust level limit switch for use in silos with fine-grained or coarse-grained, non-fluidised bulk solids. The various designs means the device has a wide range of applications. Certificates are available for use in dust incendive hazardous areas.

FTM20: compact design (250mm) vibrating rod for installation in any direction.
FTM21: vibrating rod with extension pipe (500mm, 1000mm, 1500mm) for installation in any direction.

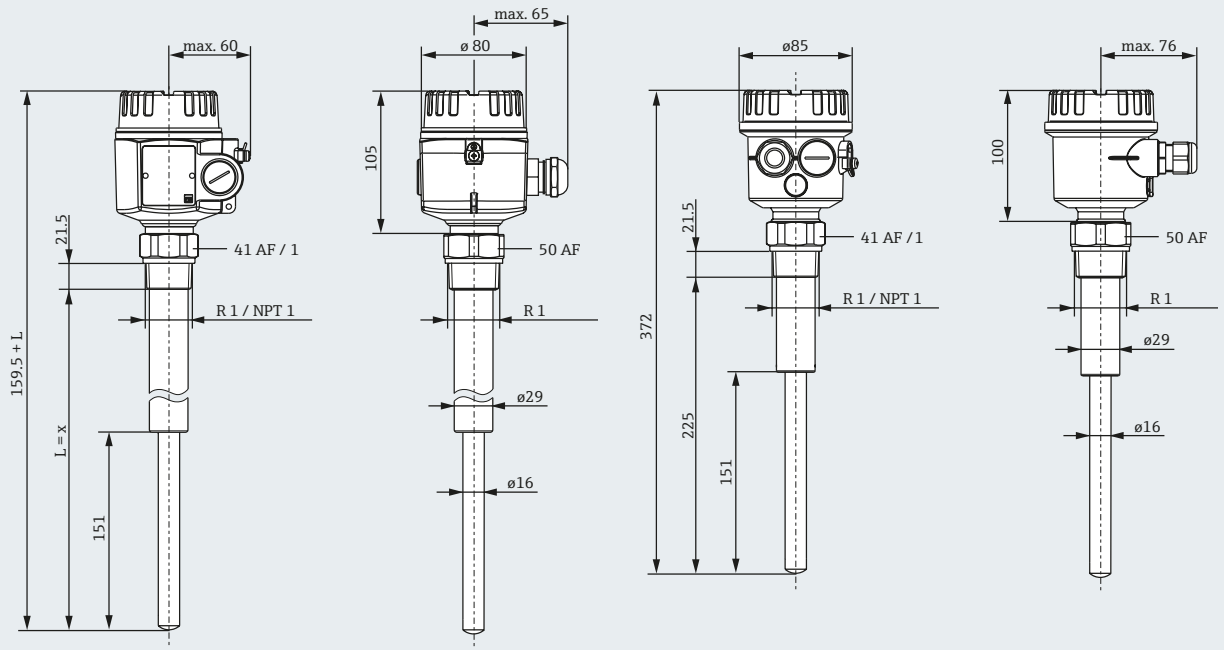
Applications

Typical applications include cereals, coffee beans, sugar, animal feed, rice, detergents, dye powder, chalk, gypsum, cement, sand and plastic granules.

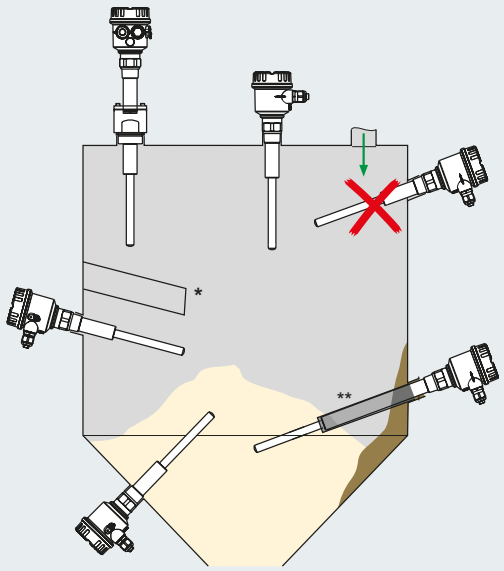
Technical data

Switching delay	:	0.5s when sensor is covered, 1s when sensor exposed
Measuring frequency	:	700...800Hz
Max measured error	:	≤ 5mm
Repeatability	:	< 1mm
Protection	:	IP66/67 (F16/F18 housing)
Thermal shock resistance	:	120K
Pressure range	:	-1...25 bar
Density	:	Bulk solids weight: ≥ 200g/l (not fluidised)
Grain size	:	≤ 25mm

Dimensions (mm)



Installation



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Soliphant M FTM50/51/52

Vibrating level switch for fine-grained solids. Suitable for hazardous area use.

FTM50

FTM51

FTM52

- Insensitive to external vibrations and build-up: maintenance-free operation
- Short fork version (100mm): fits into processes where space is limited
- Integrated self-checking function: reduces time spent on manual checking
- Maintenance-free: no mechanically moving parts
- ATEX, FM or CSA approvals

Soliphant M level limit switch for fine-grained or powdery solids offers outstanding performance, even in hazardous areas (ATEX and SIL2 certified). Available as a compact, extension tube or cable version, Soliphant M provides reliable level measurement from 145mm to 20m in solids applications from cement, mortar and dye powders to powdered milk, sugar and animal feed.

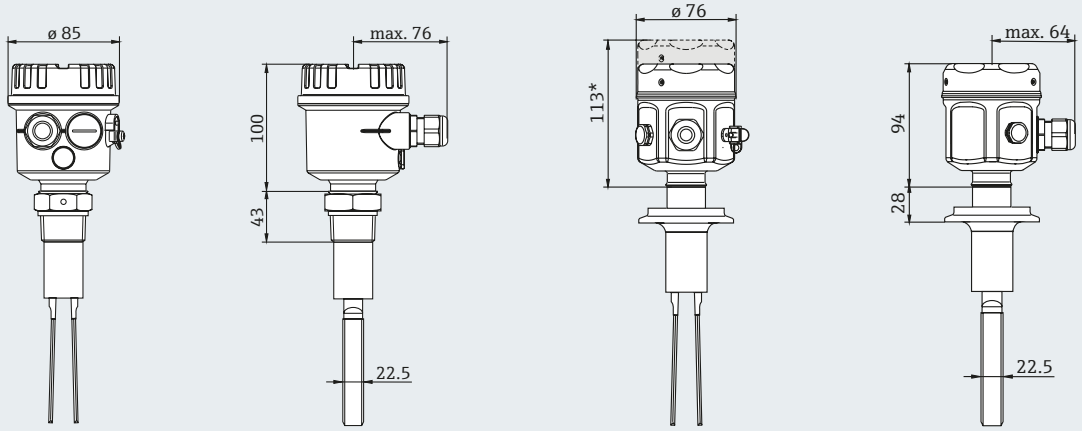
Applications

Soliphant M is perfect for a variety of applications. It can even be used to detect solids levels underwater - the probe recognises the difference between liquid and solid and only switches if covered by sand or sludge.

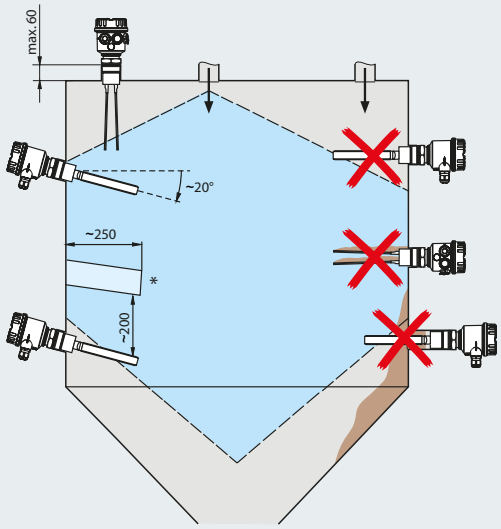
Technical data

Switching delay	:	0.5s when sensor is covered, 1.5s when sensor exposed, 1s for short fork
Measuring frequency	:	Standard fork approx 140Hz
	:	Short fork approx 350Hz
Protection	:	IP66/NEMA4X (F15, F16, F17 housing) IP66/IP68 NEMA4X/6P (F13, T13 housing)
Process temperature	:	Up to 150°C
Thermal shock resistance	:	120K
Pressure range	:	-1...25 bar
Bulk density	:	Standard fork ≥ 10g/l
	:	Short fork ≥ 50g/l
Grain size	:	≤ 10mm

Dimensions (mm)



Installation



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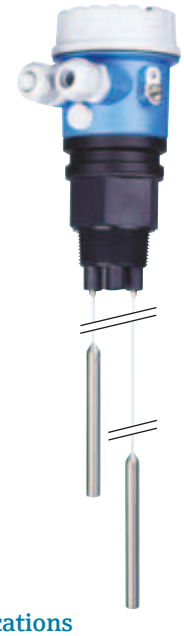
Liquipoint FTW31/32/33

Cost-effective level limit switches for multiple point detection in conductive liquids.

FTW31
Rod version



FTW32
Rope version

FTW33

- Detect up to five point levels with one probe (FTW31/32)
- Two-point control and additional min/max detection (FTW31/32)
- Rod or rope version (FTW31/32)
- CIP/SIP cleaning (FTW33)
- 3-A and EHEDG approvals (FTW33)

Applications

Liquipoint T sensors are used in conductive liquids (as of 10µS/cm) for determining level limits. Depending on the number of measuring points (up to 5 rods or ropes), measuring tasks such as overspill protection, dry-run protection, two-point control of pumps or multiple point detection can be implemented for an existing process connection.

Liquipoint T sensors feature a built-in electronic insert with either a transistor or relay output for 2 or 3 rod/rope probes. With no moving parts in the tank, they offer reliable operation and a long service life.

Specially designed for hygienic applications, the FTW33 meets all international hygiene requirements. It is particularly suited to applications where flush mounting is necessary and can be used in processes up to 100°C with no limits and in cleaning and sterilization processes to 150°C for 60 minutes. And, with build-up compensation, reliable switching is guaranteed time after time.

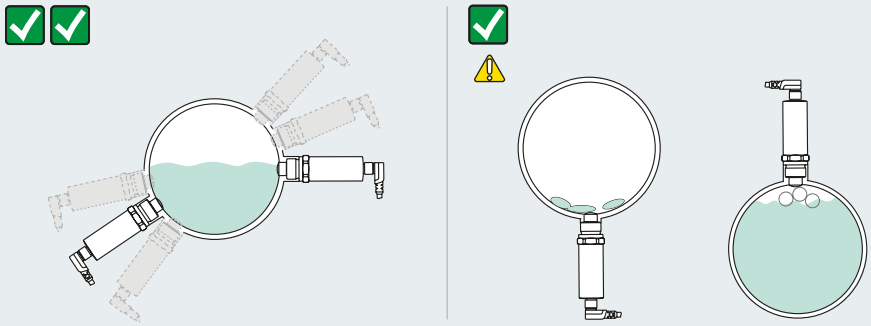
Technical data

		FTW31/32	FTW33
Rod/rope	:	2, 3, 5	-
Switching delay	:	0s, 2s	0.5s (covered), 1s (free)
Pressure	:	-1 bar...+10 bar	-1 bar...+25 bar
Temperature	:	-20°C...+100°C	-20°C...+100°C
Detection range	:	100kΩ	-
Process connection	:	G1½" thread	Full range of hygienic connections
Length	:	4m (rod), 15m (rope)	-
Protection	:	IP66	IP65 to 1P69K (depending on options selected)

Installation (FTW33)

Caution:

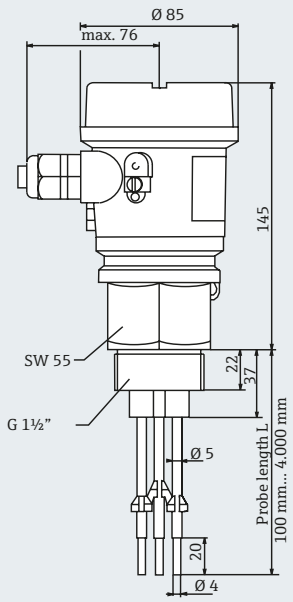
Vertical orientation can affect the measurement. It can be influenced by the fact that the sensor is not completely covered with liquid or by air bubbles at the sensor. Ideally, the device should be fitted horizontally or diagonally in a tank or pipe



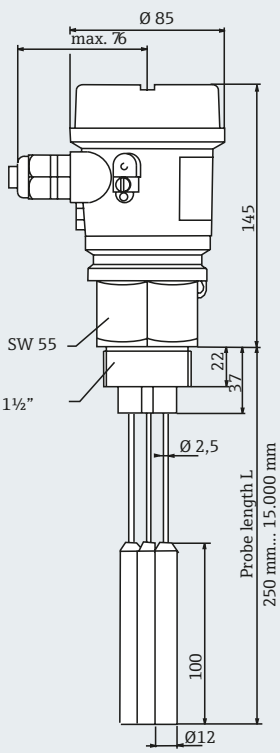
Dimensions (mm)

Rod and version with G1½" (compact version with electronic insert)

FTW31 (rod)

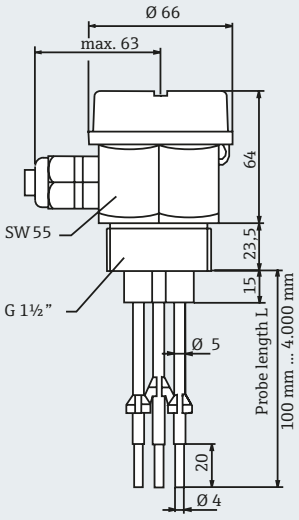


FTW32 (rope)

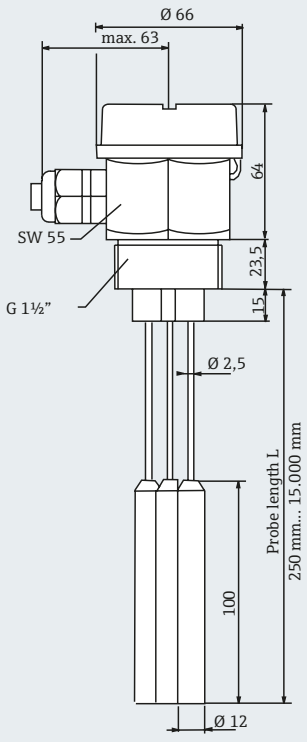


Rod and version with G1½" (remote version without electronic insert)

FTW31 (rod)



FTW32 (rope)



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Liquicap M FMI51/52

Capacitance transmitters for continuous level measurement. Suitable for hazardous area use.

WirelessHART

- Suitable for interface measurement
- ATEX, SIL2 and EHEDG certified
- Electronics can be switched for media prone to build-up
- No calibration required for conductive media

Available as both a rope and rod version, Liquicap M accurately measures level up to 10m. It offers a variety of housings, process connections (starting from ½"), certification and approvals, so that you get exactly what you need. Liquicap M offers outstanding performance in storage, buffer and process tanks.

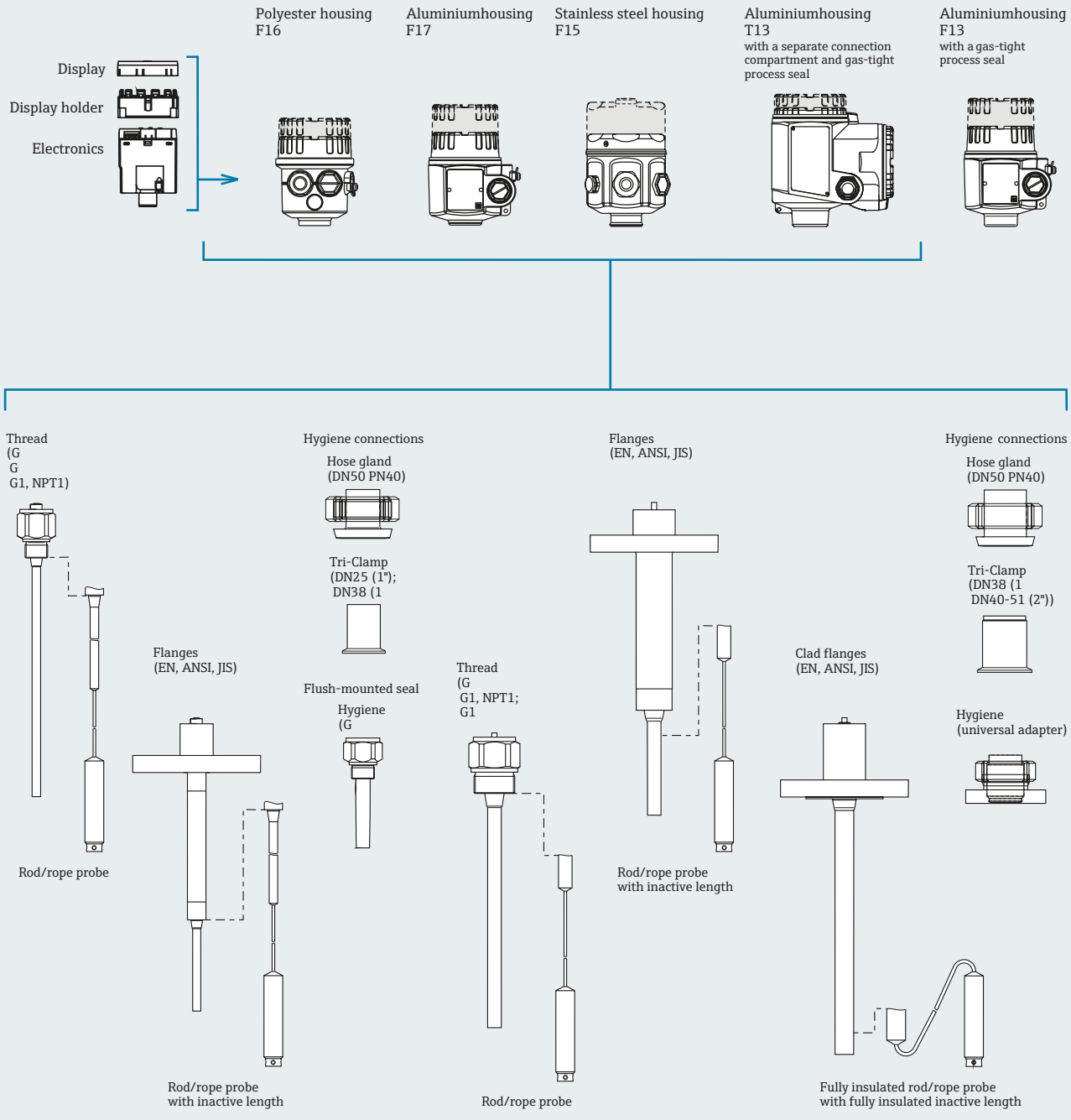
Ideal for the food industry, Liquicap M is suitable for both CIP and SIP systems, has a wide range of hygienic process connections and comes with FDA and EHEDG approvals. In applications with strong build-up, Liquicap M has cutting edge algorithms to safeguard stable measured values. And, its short response time means it is particularly suitable for use in small tanks where rapid level changes occur and the measurement range must cover the entire content of the tank.

Also ideal for the chemical industry, Liquicap M offers a SIL2 rating according to IEC61508 for both low and high demand mode and is ATEX certified to EEx ia and EEx d for hazardous area use. It features a gas-tight feedthrough for protection against aggressive or toxic media, often found in solvent or hydrocarbon applications. Best of all, the device continuously monitors the probe insulation, so that any rod breakage or damage to insulation is immediately detected to minimise measurement errors and plant downtime.

Technical data

Process temperature	:	-80...+200°C
Process pressure	:	Up to 100 bar
Output	:	2-wire 4...20mA HART, PFM, PROFIBUS PA or FOUNDATION Fieldbus
Certification	:	ATEX II ½ GD EEx ia, ATEX II 1/2G EEx d, ATEX 3GD EEx nA

Connections



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Liquicap M FTI51/52

Capacitance limit switches for liquids. Suitable for hazardous area use.

- Active build-up compensation for highly viscous products
- Corrosion-resistant material and FDA-listed materials for wetted parts
- Two-stage overvoltage protection against electrostatic discharge
- Automatic monitoring of electronics

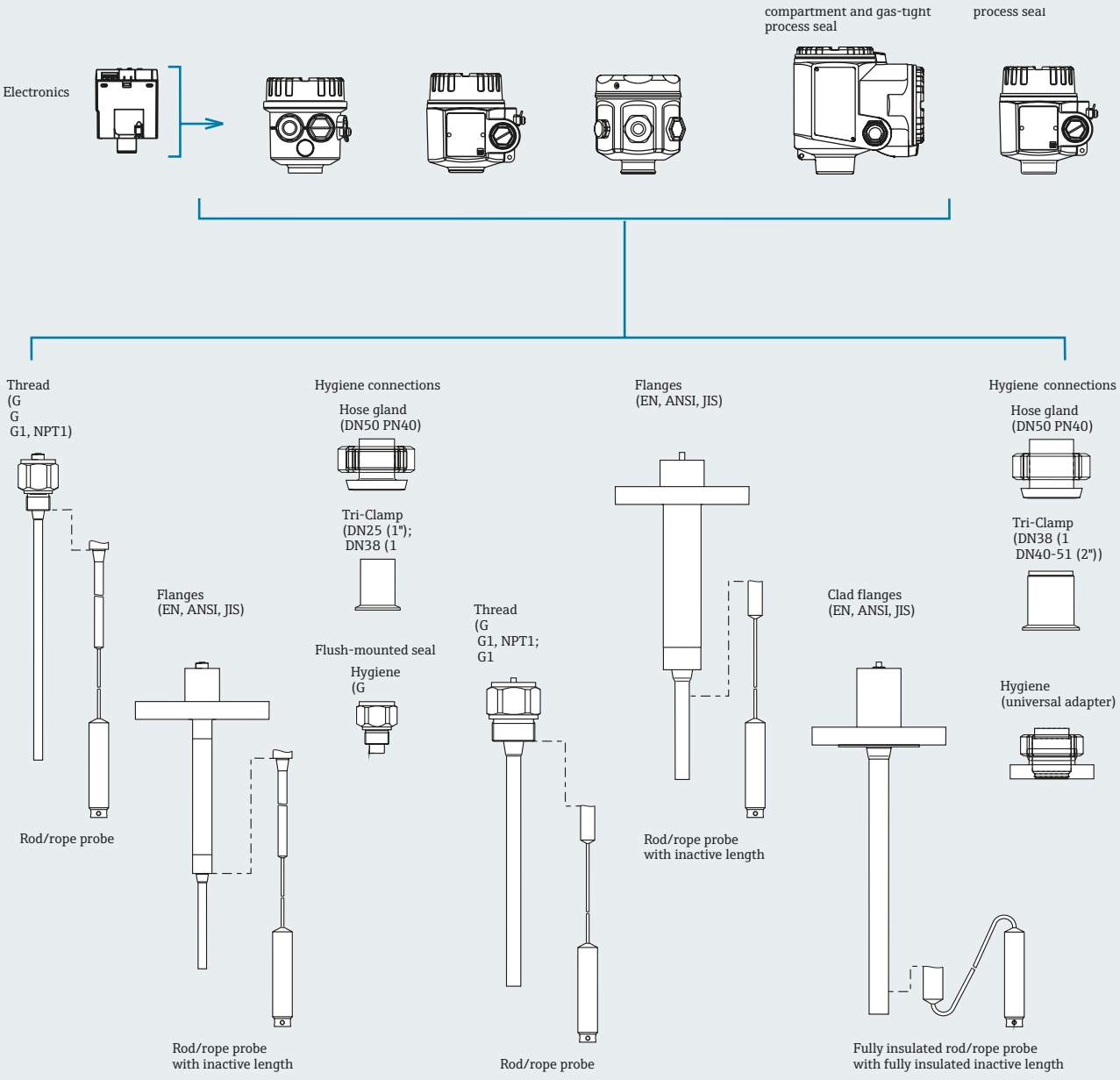
Available as both a rope and rod version, Liquicap M offers accurate and reliable level limit detection. It offers a variety of housings, process connections (starting from ½"), certification and approvals, so that you get exactly what you need. Liquicap M offers outstanding performance in storage, buffer and process tanks.

Thanks to its robust and tried-and-tested construction (self-sealing cone), the probe can be used both in vacuums and in overpressure up to 100 bar. The sealing and insulation materials used allow operation in temperatures from -80°C up to 200°C.

Technical data

Temperature	:	Up to 200°C
Pressure	:	Up to 100 bar
Output	:	Relay, PNP, 2-wire PFM (FTC325/625)
Ambient temperature (housing)	:	-50°C...+70°C
Protection	:	IP66, IP67, NEMA4X (F15, F16, F17 housing) IP66, IP68, NEMA4X (F13, T13 and remote housing)
Certification	:	ATEX, CSA, TIIS
Electrodes	:	Cable or rod
Reproducibility	:	0.1%

Connections



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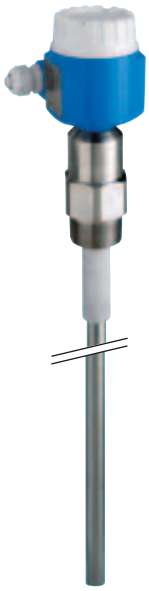
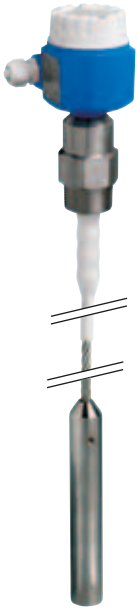
Solicap M FTI55/56

Capacitance limit switch for bulk solids.



FTI55



FTI56

- Active build-up compensation
- Automatic monitoring of electronics
- Two-stage overvoltage protection
- Simple commissioning

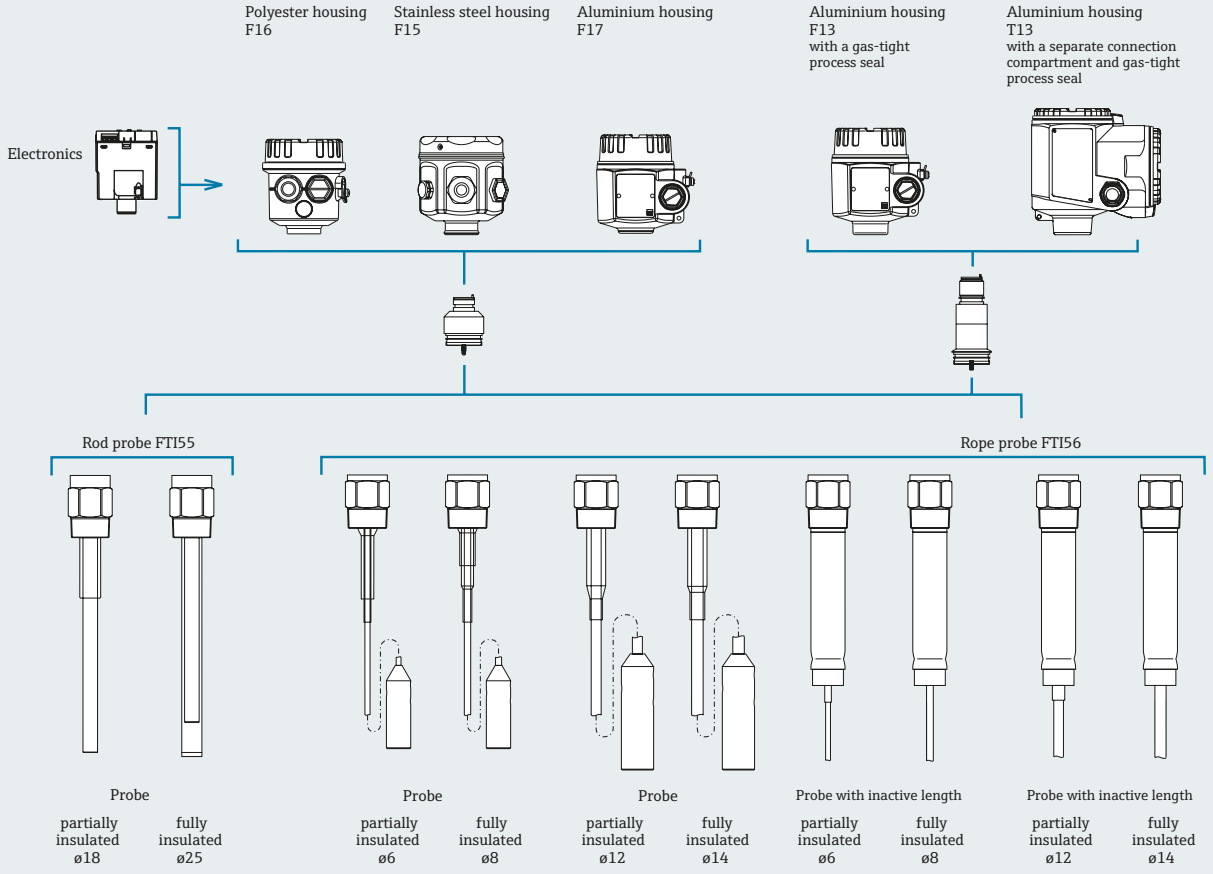
The Solicap M compact transmitter offers reliable level limit detection in bulk solids. Available as a rod (FTI55) or rope (FTI56) version, it can be operated in minimum or maximum failsafe mode and is used for level limit detection in storage, buffer and process tanks and for two-point control. Due to its robust construction, it can also be used to provide accurate measurement in applications with very high tensile loads (up to 60kN for rope version) or lateral loads (up to 300Nm for rod version). In addition, the gastight probe seal prevents the effects of aggressive and toxic media and rough ambient conditions, such as strong vibration and increased temperatures, are overcome by separate electronics (up to 6m).

Solicap M is easily and quickly calibrated on site by simply pressing a button, facilitating quick and simple commissioning. An intelligent electronic memory (EEprom) saves instrument and calibration parameters so that all of the data is automatically transferred to the new electronics in case of an exchange. Time-consuming manual instrument calibration is unnecessary so downtime is kept to a minimum.

Technical data

Measured variable	: Capacitance change between probe and vessel wall
Min capacitance change	: ≥ 5pF
Process temperature	: -50...+180°C
Measuring frequency	: 500kHz
Probe capacitance	: Rod: approx 1.3pF/100mm in air rope: approx 1.0pF/100mm in air
Housing	: Aluminium, polyester or stainless steel
Input signal	: Probe covered: high capacitance probe uncovered: low capacitance
Cable entry	: M20, G½, NPT½, NPT¾
Reproducibility	: 0.1% (related to probe length)
Certification	: ATEX, CSA, FM and TIIS

Connections



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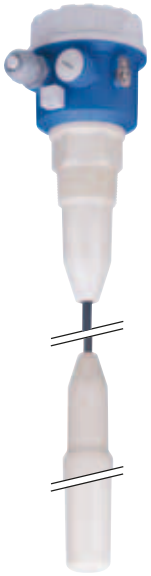
Minicap FTC260/262

Compact limit switch with active build-up compensation.

FTC260



FTC262

- Easy installation and no calibration on start-up
- Maintenance-free – no moving parts
- Compact unit consisting of probe and electronic insert
- Version available for dust explosion areas

Applications

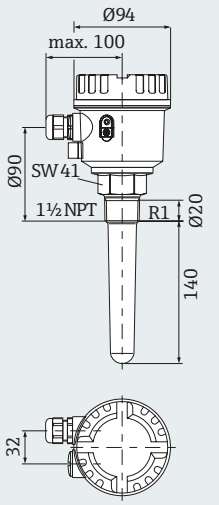
Simple to install and maintain, Minicap is designed for limit detection of light bulk solids, such as grain products, flour, milk powder, animal feed, cement, chalk and gypsum. It offers high operational safety, providing an accurate switch point and uses active build-up compensation to ensure reliability even with heavy build-up.

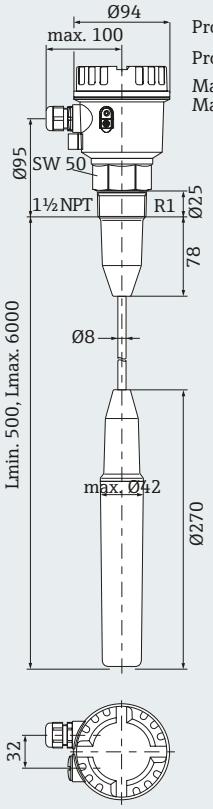
Technical data

Electronic output	: DC PNP transistor (11...45V DC), AC/DC relay output (20...253V AC or 20...55V DC)
Product	: Grain size max 30mm, min dielectric constant 1.6
Protection	: IP66
Operating temperature	: -40°C...+130°C
Process connection	: 1" BSP thread (FTC260), 1½" BSP thread (FTC262)
Probe material	: PPS
Probe length	: 140mm (FTC260), 500mm...6000mm (FTC262)

Dimensions (mm)

FTC260

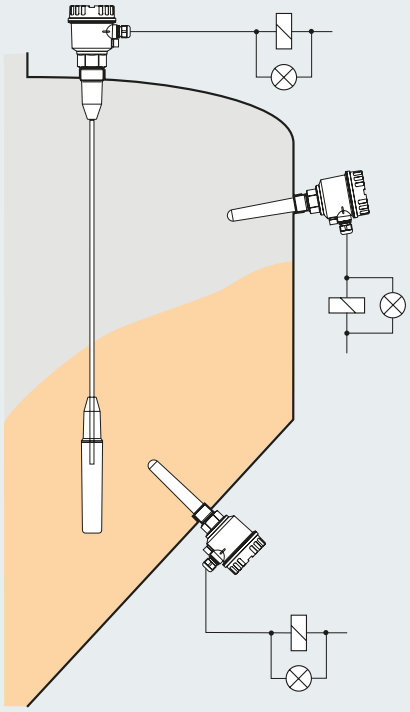




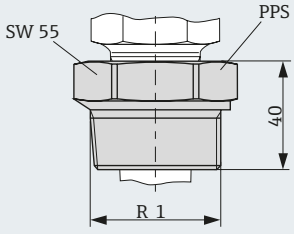
Probe length tolerances:

Probe length L	Tolerance
Max 1000mm	+0, -10mm
Max 3000mm	+0, -20mm

Limit detection in silos



Adapter



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Nivector FTC968

Capacitive level switch for solids.

FTC968 with Protector

- No moving parts (no maintenance)
- For lightweight products
- Simple installation

Applications

This capacitive level switch has been designed primarily to detect solids (powders, pellets, granulates etc.). They are used mostly for high and/ or low level detection or as a start/ stop control for a conveyor or mixer. These level switches differ from one another in size and installation facilities. They are not suitable for abrasive and heavy products such as sand, gravel and limestone. Please contact Endress+Hauser for information about alternatives for these applications.

Function

The sensor forms a capacitor with its internal earth screen. Capacitance is determined by the difference in the dielectric constant of air in relation to the product to be detected. As the sensor is covered or uncovered by the product, this value will either fall short of or exceed switching capacitance, thus activating the switch.

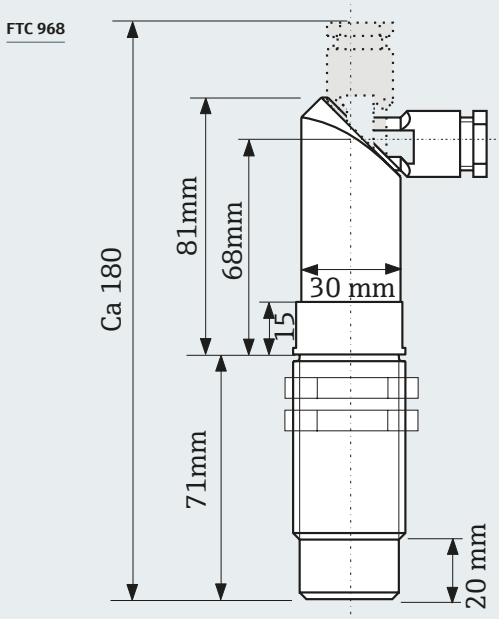
Installation guidelines

The Nivector FTC 968 is installed in the side of a silo or vessel and preferably in a special holder, thus enabling periodic inspection. In addition, this holder protects the Nivector against wear.

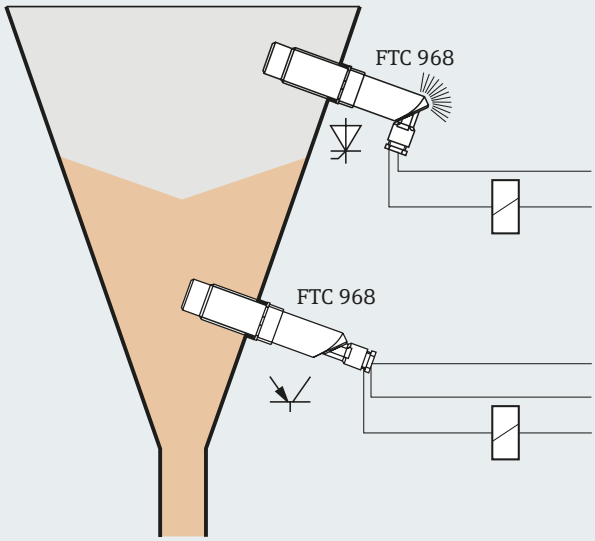
Technical data

Output(s)	:	Choice of direct thyristor switching, twin-wire 21...250V 50Hz, or PNP/NPN output, 10...55V DC.
Degree of protection	:	IP55 of IP66 (optional)
Process connection	:	Nivector FTC 968 1"BSP (with Protector 1½"BSP)
Sensor material	:	Polycarbonate (protector in fibreglass-reinforced polyester)

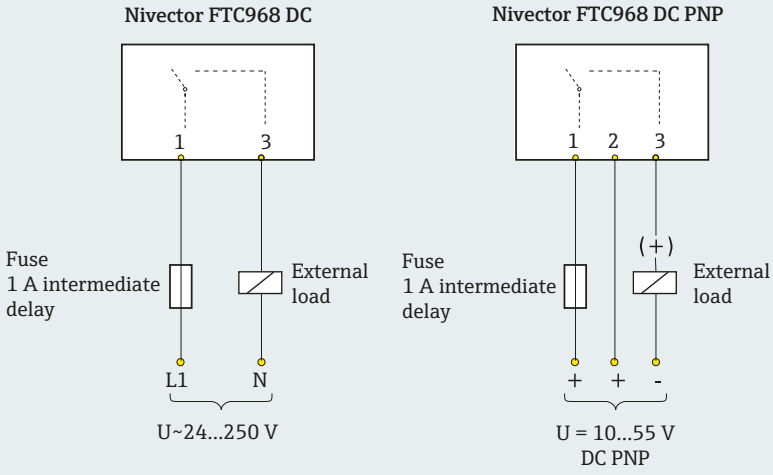
Dimensions



Installation



Connections



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Waterpilot FMX21

Hydrostatic cable-mounted level sensor for clean water, wastewater and saltwater applications.

Clean water

Saltwater

Wastewater

WirelessHART

- High overload resistance
- Climate-proof sensor: potted electronics
- Robust ceramic cell for long-term stability
- Integrated temperature measurement (Pt100 optional)
- Accessories for complete measuring point solution

Waterpilot FMX21 is a robust 2-wire hydrostatic level sensor that comes in three versions to suit a wide range of applications which include the measurement of groundwater, wastewater and saltwater. It is also available with an integrated temperature transmitter as an additional measurement point. Waterpilot offers a variety of measuring ranges, configurable using HART protocol, and its potted electronics and double breather tube filters make it highly resistant to environmental conditions for reliable results, time after time.

With marine and drinking water approvals, Waterpilot is available with three diameter versions:

- 42mm heavy duty version for use in wastewater and sewage treatment plants
- 29mm anti-corrosion version for use in saltwater applications
- 22mm for use in rivers, reservoirs, wet wells and boreholes, for e.g. groundwater level measurement

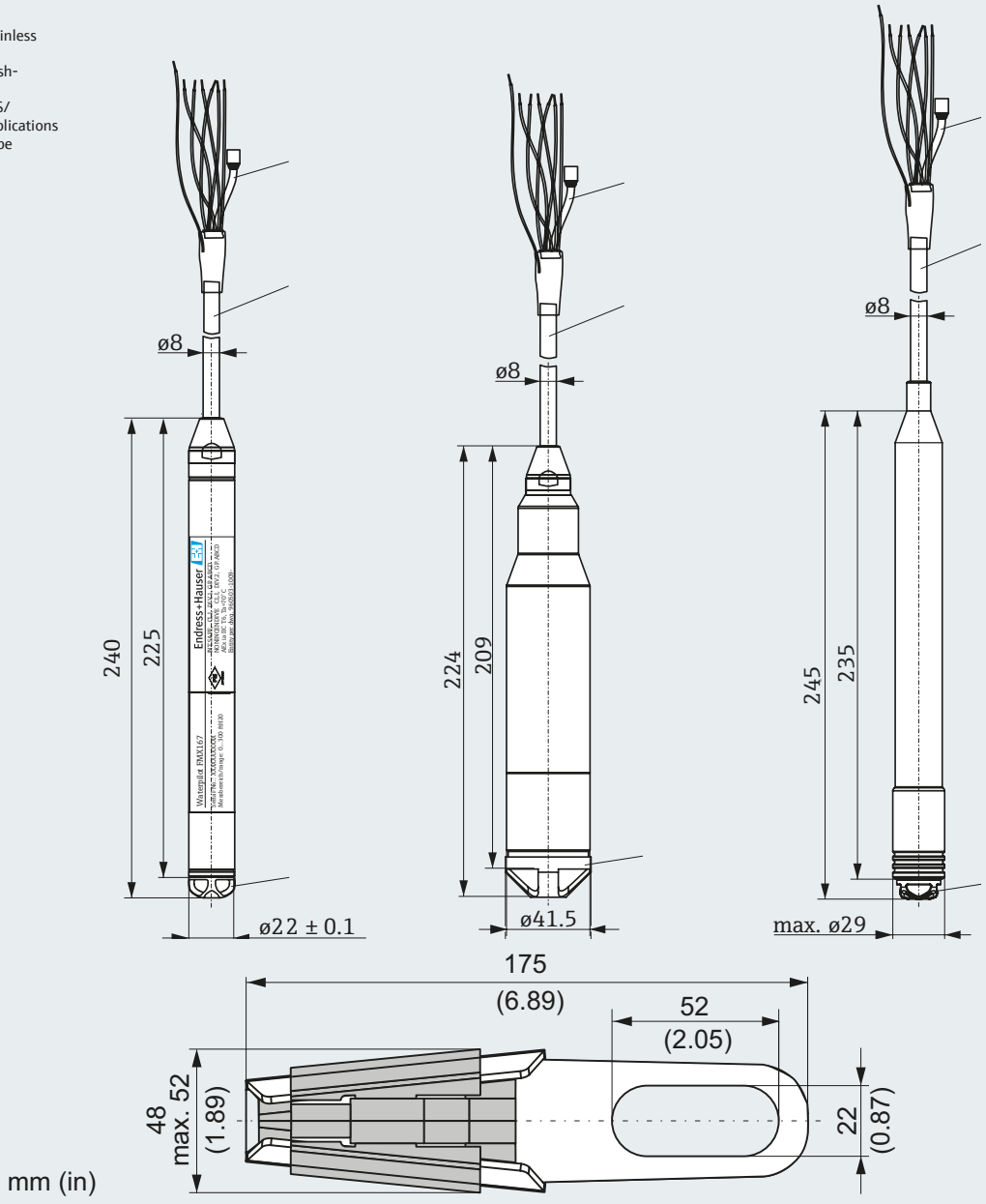
Technical data

Measuring range	:	0...0.1 bar to 0...20 bar
Reference accuracy	:	Standard accuracy ±0.2% (platinum ±0.1% optional)
Long-term stability	:	≤0.1% of upper range limit / year; ≤0.25% of upper range limit / 5 years
Temperature range	:	-10...+70°C
Output(s)	:	4...20mA HART (Pt100 optional)
Power supply	:	10.5...30V DC
Protection	:	Sensor IP68, terminal box IP66/67
Sensor housing	:	Stainless steel (PPS coating for seawater optional)

Dimensions (mm)

FMX21 versions

1 = 22mm outer diameter, stainless steel
2 = 42mm outer diameter, flush-mounted, stainless steel
3 = 29mm, stainless steel, PPS/ polyolefin for saltwater applications
4 = Pressure compensation tube
5 = Extension cable
6 = Protection cap



Suspension clamp: stainless steel and fibreglass reinforced polyamide

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Deltapilot M FMB50/51/52/53

Cost-effective hydrostatic level measurement.


FMB50


FMB51


FMB52


FMB53

WirelessHART

- SIL2 to IEC61508
- 0.2% accuracy (0.1% optional)
- 100:1 turndown
- IP69K rated sensor

Recognising that our customers need a hydrostatic level measurement option for more basic applications, the Deltapilot M range has a more compact design without compromising on accuracy or reliability. Proven-in-use in thousands of applications, all the benefits of the hermetically sealed CONTITE cell are retained in the Deltapilot

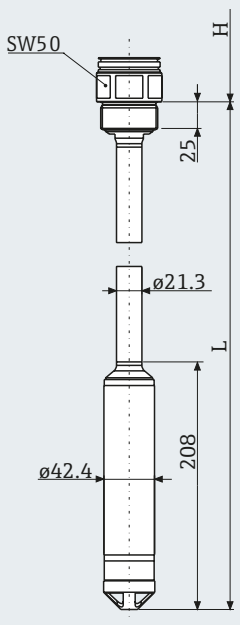
Technical data

	FMB50	FMB51	FMB52	FMB53
Sensor design	Compact	Rod	Rope	Rope and suspension clamp
Measuring ranges	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar
Process connections	Thread, flange or hygienic	Thread or flange	Thread or flange	Suspension clamp
Reference accuracy	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%
Turndown	100:1	100:1	100:1	100:1
Over-pressure limit (OPL)	Up to 40 bar	Up to 40 bar	Up to 40 bar	Up to 40 bar
Supply voltage	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC
Output	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus

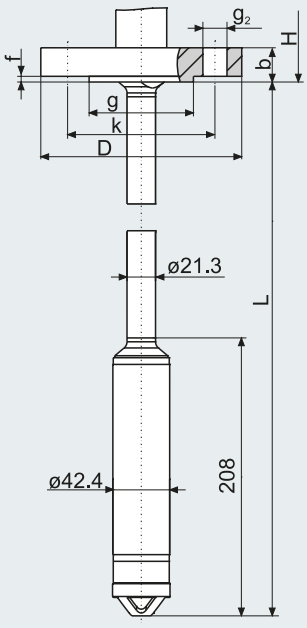
M device, offering the condensate-resistance that is vital to reliable level measurement in cold liquids.
With an accuracy of 0.2% (0.1% optional) and a turndown of 100:1, Deltapilot M instruments are available with the same range of process connections, materials of construction and housings as their predecessors and can be retrofitted directly in place of the old unit, so there is no disruption to your process on commissioning.
Difficult to access areas on plant that require a hydrostatic level measurement can be a problem. By using Endress+Hauser's Deltapilot M with remote housing, commissioning, adjustment and viewing can be carried out at a potentially safer place of work. The remote housing option is also a bonus in applications with high plant vibration as the transmitter and display can be protected from potential damage. Better still, with an IP69K rated sensor, you can be sure that your device will still perform even after high temperature and high pressure washdowns.

Dimensions (mm)

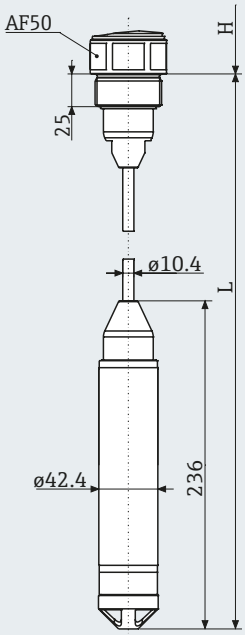
FMB51:
rod version with thread G1½ or 1½NPT
L = probe length 0.4 to 4m
H = installation height



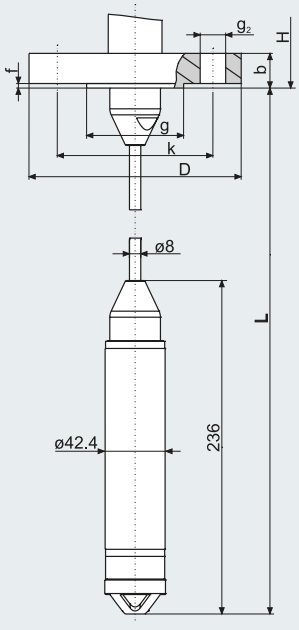
FMB51:
rod version with flange
L = probe length 0.4 to 4m
H = installation heigh



FMB52:
cable version with thread G1½ or 1½NPT
L = probe length 0.5 to 400m
H = installation height



FMB52:
cable version with flange
L = probe length 0.5 to 400m
H = installation height



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Deltapilot S FMB70

Hydrostatic level transmitter with hermetically-sealed CONTITE measuring cell.

FMB70 with stainless steel housing

FMB70 with aluminium housing

WirelessHART

- High reproducibility and long-term stability
- Extensive diagnostic functions
- Simple commissioning via Quick Setup menu
- ATEX and SIL3 certification
- HART, PROFIBUS and FOUNDATION Fieldbus compatible

The Deltapilot S FMB70 is specially designed for hydrostatic level measurement of liquids and pastes and is suitable for use across the process industries, particularly in hygienic applications as it is suitable for CIP/SIP cleaning and has a wide range of hygienic process connections. It also offers additional volume and mass measurements in liquid media.

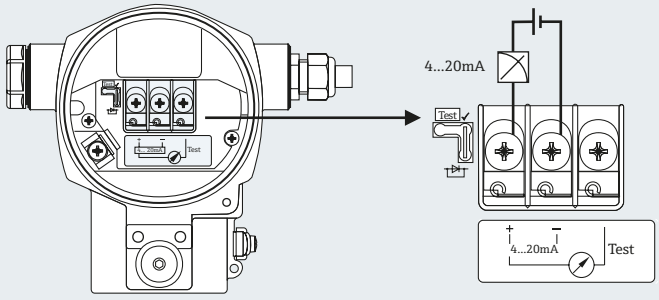
The heart of the device is the CONTITE measuring cell, which is fully encapsulated to resist and prevent the ingress of liquids that can be triggered by plant maintenance or condensate for continuous measurement integrity.

As an option, Deltapilot S FMB70 features an integrated HistoROM/ M-DAT memory chip for simple acquisition, back-up and display of key process data. It also offers diagnostic functions, additional process information, simulation and analysis for improved process control.

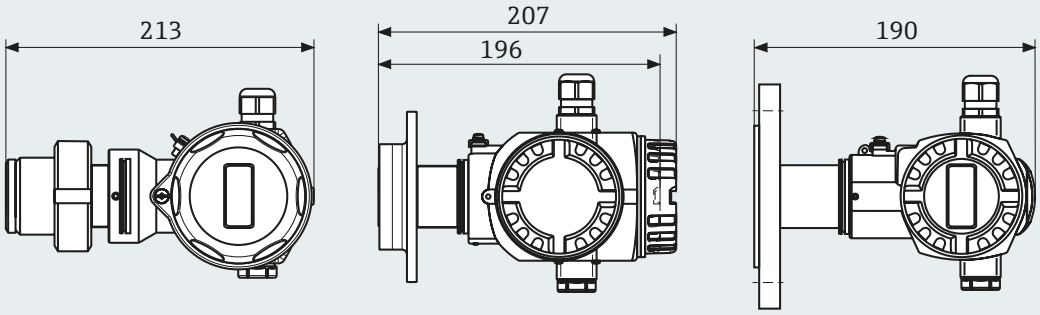
Technical data

Measuring ranges	:	100 mbar...10 bar
Process connections	:	Thread, flange or flush-mounted hygienic connections
Reference accuracy	:	±0.1% (0.075% optional)
Overpressure limit (OPL)	:	40 bar
Supply voltage	:	4...20mA HART: 10.5...45VDC, EEx ia: 10.5...30VDC PROFIBUS PA: 9...32VDC FOUNDATION Fieldbus: 9...32VDC
Output	:	4...20mA with overlaid HART protocol, PROFIBUS PA or FOUNDATION Fieldbus

Connections



Dimensions (mm)



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Prosonic M FMU40/41/42/43/44

Non-contact ultrasonic level measurement for liquids and solids using the Time of Flight principle.

WirelessHART

- Simple menu-guided operation with 4-line plain text display
- Envelope curves on display - you see what the instrument sees
- Maintenance-free
- Free Fieldcare Device Setup software

Applications

Prosonic M is both compact and reliable, providing continuous, non-contact level measurement in both liquids and bulk solids. For liquid level measurement, Prosonic is ideal for continuous monitoring of water and waste levels, with the whole instrument tested to IP68/ NEMA 6P standards. In bulk solids applications, Prosonic provides reliable measurement in controlled monitoring of silo levels, conveyer transfer stations and hoppers.

Prosonic M is robust, cost-effective and versatile. It can be used for flow measurement in open channels and weirs and in conjunction with our RMA42 display (see Recorders & System Components section), Prosonic M is a cost-effective solution for both screen and pump control.

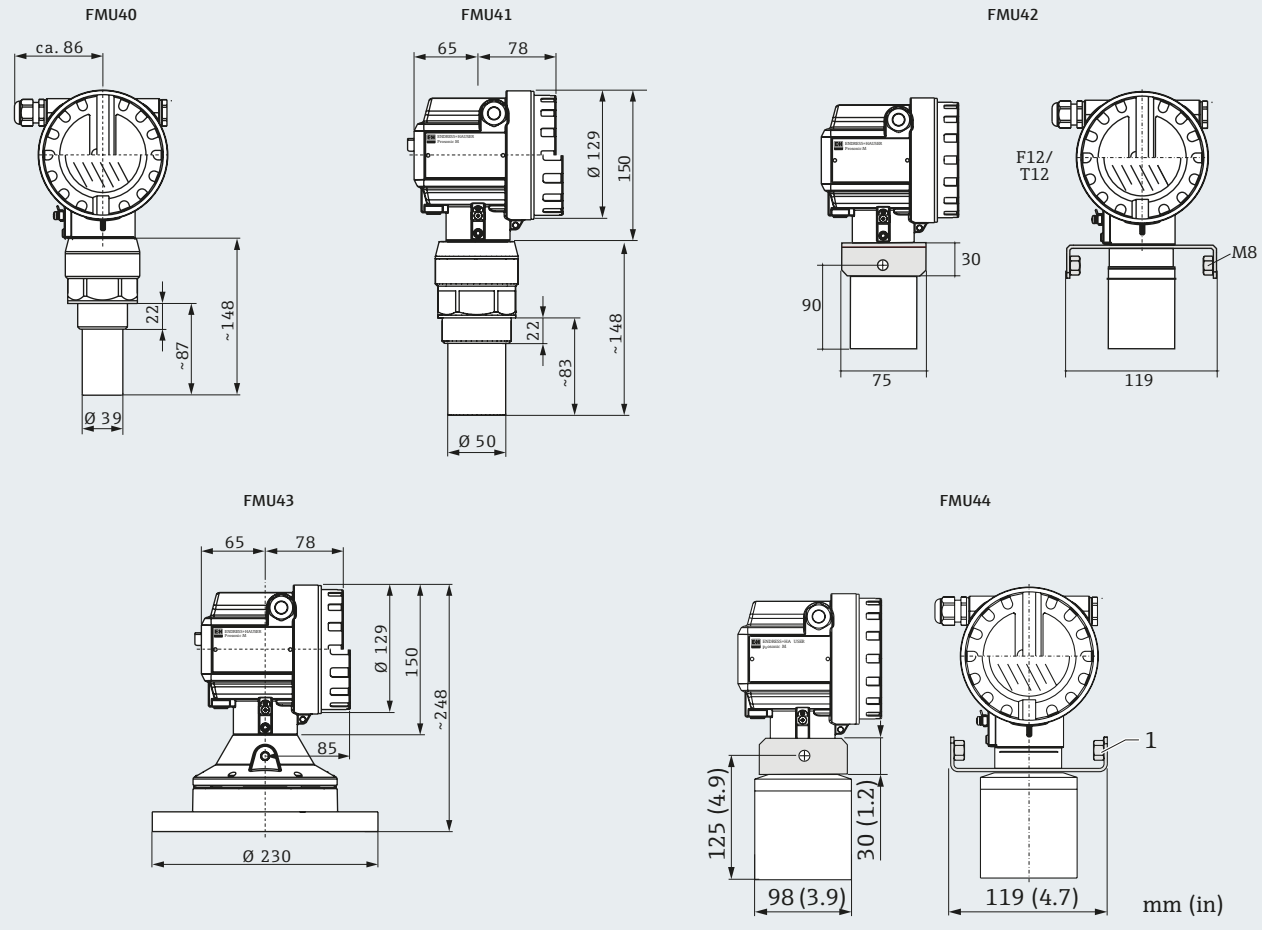
Available in both 2 and 4-wire versions, Prosonic M features an integrated temperature sensor for Time of Flight correction so that measurement is accurate, even with temperature changes. Prosonic M has a 4-line menu-driven display and comes with free Fieldcare Device Setup software for simple commissioning, maintenance, diagnosis and documentation of the measuring point.

Technical data

Process temperature	: -40°C...+80°C
Protection	: Closed housing: IP68, NEMA 6P (24h at 1.83m under water surface)
Process pressure	: 3 bar abs (FMU40/41) 2.5 bar abs (FMU42/43)
Certification	: ATEX II 1/2 G and ATEX II 1/3 D
Process connection	: G1½" BSP thread (FMU40) G2" BSP thread (FMU41) DN80/DN100 universal slip-on flange (FMU42/43) + DN150 (FMU44)
Wetted parts	: PVDF/EPDM (FMU40/41) UP and VA stainless steel 316Ti (FMU43)
Power supply	: 2-wire 4...20mA loop powered, 4-wire AC/DC, PROFIBUS PA, FOUNDATION Fieldbus
Measuring range	: 5m in liquids/2m in solids (FMU40) 8m in liquids/3.5m in solids (FMU41) 10m in liquids/5m in solids (FMU42) 15m in liquids/7m in solids (FMU43) 20m in liquids/10m in solids (FMU44)

Prosonic M is easily integrated into existing process control systems such as HART®, PROFIBUS PA and FOUNDATION Fieldbus, and comes with both EEx ia and EEx d approvals for hazardous area use.

Dimensions (mm)



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Prosonic S FMU90/95 with FDU9x sensors

Ultrasonic transmitter and FDU9x range of sensors.

- Simple menu-guided operation via 6-line display
- Linearisation (up to 32 points)
- Backwards compatible with FDU8x sensor range
- HART and PROFIBUS DP compatible

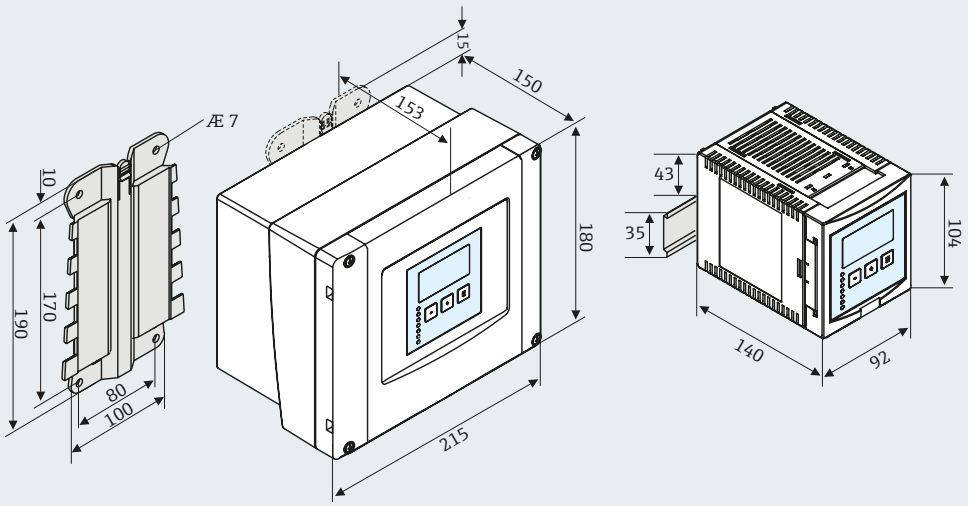
The Prosonic S ultrasonic transmitter cleverly combines level measurement, flowmetering and pump control - all in one single device! Choose from the top-hat rail version for space-saving installation or a robust, weather-resistant (IP66/NEMA4X) field housing for outdoor use. With a measuring range of up to 70m, Prosonic S offers continuous, non-contact level measurement of not only fluids, pastes and sludge but also powdery and coarse grained bulk solids. What's more, calculations can be displayed as average, difference or sum to get the most out of your available measurement data. Prosonic S is also an effective flowmeter, providing accurate measurement in open channels and weirs. It also allows the simultaneous measurement of level and flow in stormwater overflow basins for maximum functionality. The integral linearisation tables provide the most common flumes and weirs and allow the online calculation of flume and weir flow via integrated flow curves.

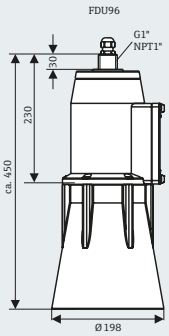
Prosonic S features simple, menu-guided operation via its 6-line plain text display. With no codes to decipher, you can concentrate on getting the job done! What's more, the envelope curves on the display allow you to see exactly what the instrument sees and operation couldn't be easier with the free of charge operating software for reliable commissioning, maintenance and documentation of the measuring point.

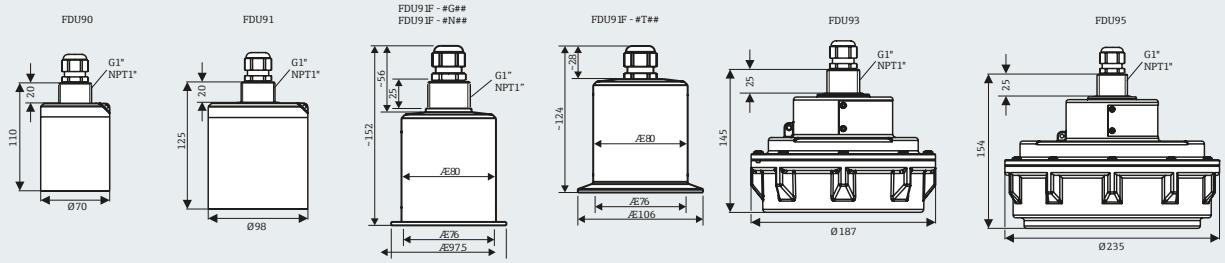
Technical data

Measuring range	:	up to 70m (depending on sensor)
Output	:	4...20mA HART or PROFIBUS DP
Protection	:	IP68 (sensor), IP66/NEMA4X (field housing)
Cable	:	5m standard, up to 300m

Dimensions (mm)







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Micropilot FMR10/20

Compact and cost-effective non-contact radar level devices.

- Best price-performance ratio on the market
- Bluetooth commissioning, operation and maintenance via free SmartBlue app
- Unique radar chip design is perfect for applications with limited space
- Fully encapsulated electronics

Our Micropilot FMR10/20 radar level transmitters offer genuine state-of-the-art technology with the cleverly designed radar chip that allows it to be small enough to install in difficult-to-access applications with limited space. They also feature Bluetooth communication for simple commissioning via any smartphone or tablet via the free SmartBlue app.

Technical data		FMR10	FMR20
Measuring range	:	Up to 8m	Up to 20m
Process connections	:	Thread	Thread or flange
Accuracy	:	±5mm	±2mm
Temperature	:	-40°C...+60°C	-40°C...+80°C
Pressure	:	-1 to +3 bar	-1 to +3 bar
Output	:	2-wire (4...20mA)	4...20mA HART
Communication	:	Bluetooth	Bluetooth
Measuring frequency	:	26GHz	26GHz
Certification	:	CSA C/US	ATEX, CSA C/US, IEC Ex

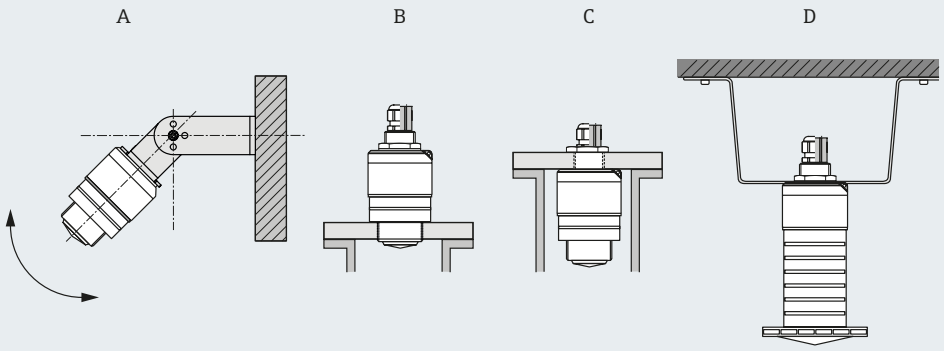
FMR10/20 Installation

Wall, ceiling or nozzle installation:

A. Wall or ceiling mount, adjustable
B. Mounted at front thread
C. Mounted at rear thread
D. Ceiling installation with counter nut (included)

Please note:

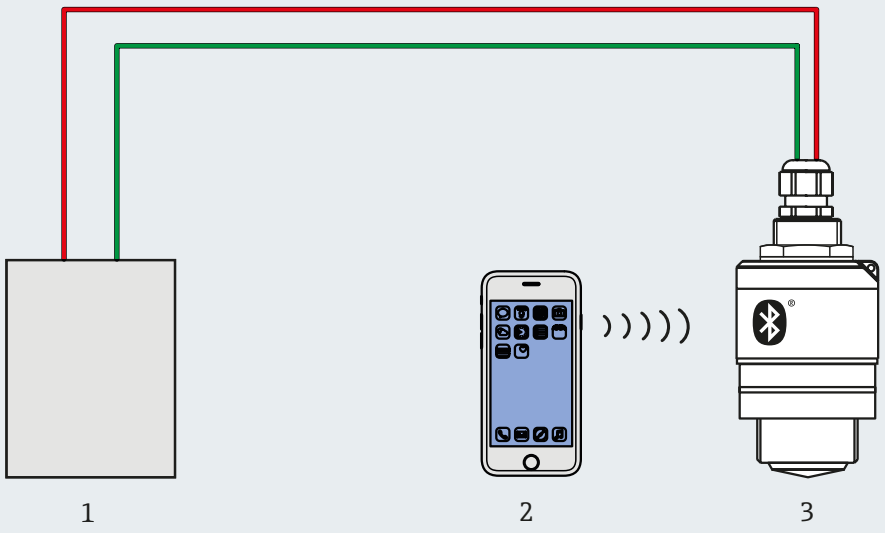
The sensor cable is not designed as supporting cable - do not use as a suspension wire.



FMR10/20 'Bluetooth operation

Possibilities for remote operation via Bluetooth:

1. Transmitter power supply unit
2. Smartphone/tablet with SmartBlue app
3. Transmitter with Bluetooth wireless technology.



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Micropilot FMR50/51/52/53/54

Non-contact radar level measurement using the Time of Flight principle.

- Dual compartment housing for increased safety
- Dual 4...20mA outputs
- SIL2/SIL3 certification
- 4...20mA, HART, PROFIBUS PA, FOUNDATION Fieldbus

The Micropilot range of free space radar transmitters offers outstanding non-contact continuous level measurement in liquids, pastes and slurries. Available with rod, horn or planar antenna and a range of process connections (including hygienic) to suit your process, Micropilot radar devices offer reliable measurement as they are unaffected by pressure, temperature, gas layers or condensation.

Technical data

	FMR50	FMR51	FMR52	FMR53	FMR54
Measuring range	30m, enhanced dynamics 40m	40m, enhanced dynamics 70m	40m, enhanced dynamics 60m	Up to 20m	Up to 20m
Antenna	Horn	Horn	Flush-mounted horn	Rod	Horn or parabolic
Process connection	1½" thread or flange mounting	1½" thread or flange mounting	Flange mounting	1½" thread or flange mounting	Flange mounting
Output	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus
Accuracy	±2mm	±2mm	±2mm	±6mm	±6mm
Temperature	-40°C...+130°C	-196°C...+450°C	-40°C...+200°C	-40°C...+150°C	-60°C...+400°C
Pressure	-1 bar..+3 bar	-1 bar..+160 bar	-1 bar..+16 bar	-1 bar..+40 bar	-1 bar..+160 bar
Certification	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS
Degree of protection	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)

Multi-echo tracking

Developed to allow for a more reliable measurement by utilising multiple echoes to track obstacles accurately within a vessel, the software combines increased echo rate and analysis with the automatic suppression of interfering echoes. Dynamic, continuously adapting evaluation algorithms guarantee precise measurement results.

The 4-line plain text display provides step-by-step menu-driven commissioning and troubleshooting as standard and features either simple pushbutton operation or external touch control. With the added functionality of data backup, data comparison and data transfer, Micropilot level gauges offer outstanding functionality at an attractive price.

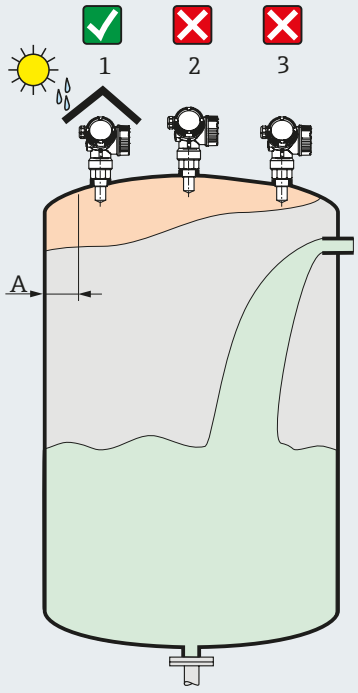
- **FMR50**: For basic supply and storage applications and utility processes.
- **FMR51**: Reliable measurement even under extreme process conditions (up to +450°C and 160 bar).
- **FMR52**: Meets the highest hygienic requirements (ASME BPE, USP Class VI).
- **FMR53**: For small process connections and aggressive media.
- **FMR54**: For measurement in bypass and stilling wells.

Benefit from devices with Heartbeat Technology

The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.

Installation

Mounting position for the measurement of liquids

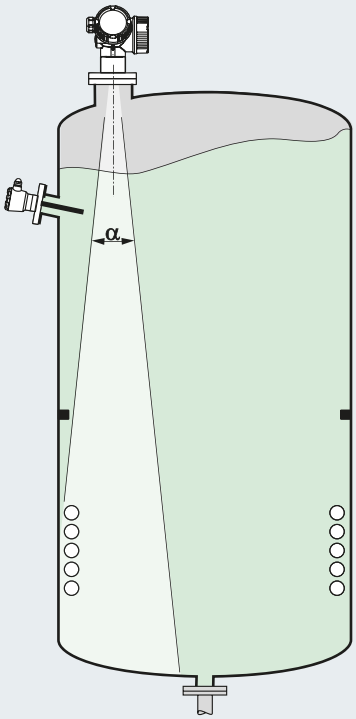


A. Distance from wall to outer edge of the nozzle
1. Weather protection cover
2. No mounting in the centre
3. No mounting above a fill stream

- Recommended distance (A) from wall to outer edge of nozzle: ~ 1/6 of tank diameter. However, the device should not be installed closer than 15cm to the tank wall.
- Not in the centre (2), as interference can cause signal loss.
- Not above the fill stream (3).
- It is recommended to use a weather protection cover (1) in order to protect the device from direct sun or rain.

Vessel installations

Avoid any installations (limit switches, temperature sensors, braces, vacuum rings, heating coils, baffles, etc) inside the signal beam. Take the beam angle into account.



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Micropilot FMR56/57

Non-contact radar level measurement for solids.

FMR56

FMR57

WirelessHART

- **Dual compartment housing for increased safety**
- **Dual 4...20mA outputs**
- **SIL2/SIL3 certification**
- **4...20mA, HART, PROFIBUS PA, FOUNDATION Fieldbus**

The Micropilot range of free space radar transmitters offers outstanding non-contact continuous level measurement in powdery to granular bulk solids. Available with horn or parabolic antenna and a range of process connections to suit your process, Micropilot radar devices offer reliable measurement as they are unaffected by pressure, temperature, gas layers or condensation.

The 4-line plain text display provides step-by-step menu-driven commissioning and troubleshooting as standard and features either simple pushbutton operation or external touch control. With the added functionality of data backup, data comparison and data transfer, Micropilot level gauges offer outstanding functionality at an attractive price.

- **FMR56**: For standard bulk solids applications e.g. bulk cargo silos and storage tanks.
- **FMR57**: For demanding solids applications e.g. measurements in high silos, bunkers and stockpiles. With integrated air purge as standard.

Technical data

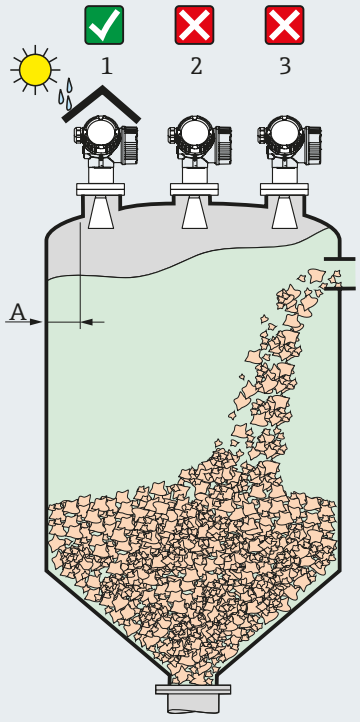
	FMR56	FMR57
Measuring range	Up to 30m	Up to 70m
Antenna	Horn	Horn or parabolic
Process connection	Flange mounting	1½" thread or flange mounting
Output	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus
Accuracy	±3mm	±3mm
Temperature	-40°C...+80°C	-40°C...+400°C
Pressure	-1 bar...+3 bar	-1 bar...+16 bar
Certification	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS
Degree of protection	IP66/NEMA4X-IP68/ NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/ NEMA6P (dependent on housing)

Benefit from devices with Heartbeat Technology

The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.

Installation

Mounting position for the measurement of solids.

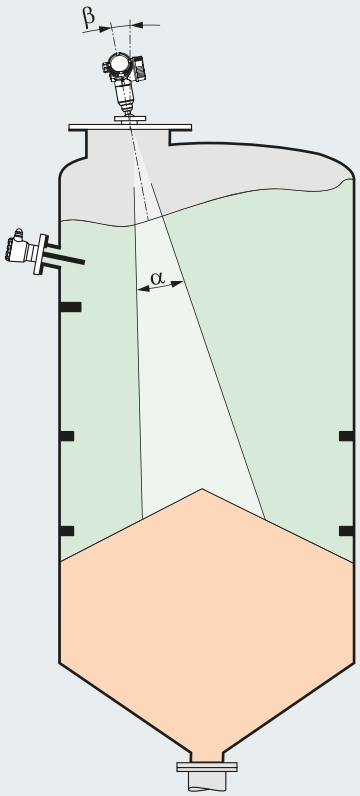


A. Distance from wall to outer edge of the nozzle
1. Weather protection cover
2. No mounting in the centre
3. No mounting above a fill stream

- Recommended distance (A) from wall to outer edge of nozzle: ~ 1/6 of vessel diameter.
  However, the device should not be installed closer than 20cm to the vessel wall. If the wall of the vessel is not smooth, (corrugated metal, welding seams, irregularities, etc.) the distance from the wall should be kept as large as possible. If necessary, use an alignment device to prevent interference reflections from the wall.
- Not in the centre (2), as interference can cause signal loss.
- Not above the fill stream (3).
- It is recommended to use a weather protection cover (1) in order to protect the device from direct sun or rain.
- In extremely dusty applications, the integrated air purge connection can prevent clogging of the antenna.

Vessel installations

Avoid any installations (limit switches, temperature sensors, braces, etc.) inside the signal beam. Take into account the beam angle.



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Micropilot NMR81/84

Non-contact radar for high accuracy custody transfer applications.

NMR81

NMR84

WirelessHART

- Maximum reliability with accuracy up to ±0.5mm
- Developed according to international metrology recommendations such as OIML R85 and API MPMS
- Hardware and software developed according to IEC 61508 up to SIL3 (in homogeneous redundancy) for a high level of safety
- 79GHz technology for narrow beam angle for sharper focus, without interference from tank wall and obstructions
- All relevant certification for custody transfer applications

The Micropilot NMR81/NMR84 intelligent tank gauges are designed for high accuracy liquid level measurement in storage and process applications. They fulfil the exacting demands of tank inventory management, inventory control, custody transfer, loss control, total cost saving and safe operation. Micropilot NMR81 and NMR84 are used for custody transfer and inventory control applications with NMi and PTB approvals and meet the requirements according to OIML R85 and API 3.1B.

Micropilot NMR81 is particularly suited for free space applications up to 70m. The drip-off lens antenna with 80GHz transmitting frequency produces a sharply focused beam angle of 3° and avoids obstacles even close to tank wall.

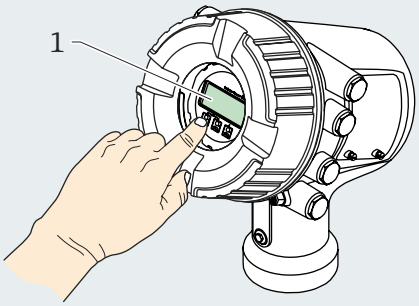
Micropilot NMR84 free space radar with drip-off planar antenna is specifically suited for stilling well applications. The superior drip-off antenna design with proven track record eliminates problems caused by condensation.

Technical data		NMR81	NMR84
Measuring range	:	Up to 70m	Up to 40m
Process connections	:	Flange	Flange
Accuracy	:	±0.5mm	±0.5mm
Temperature	:	-40°C...+200°C	-40°C...+150°C
Pressure	:	-1 to +16 bar	-1 to +25 bar
Measuring frequency	:	79GHz	6GHz
Hazardous area approvals	:	ATEX	ATEX

Local operation

Local operation of the Micropilot NMR81/NMR84

1. Display and operating module
   - 4-line display
   - White background lighting: switches to red in event of device errors
   - Format for displaying measured variables and status variables can be individually configured
   - Permitted ambient temperature for the display: –20 to +70°C (readability of the display may be impaired at temperatures outside this range)



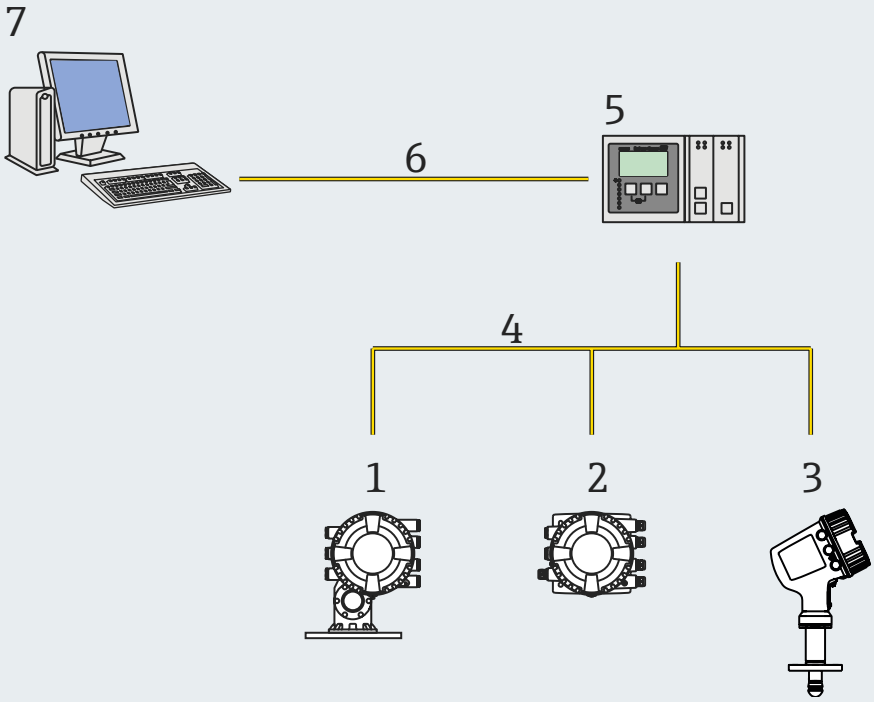
Operating elements

- External operation via touch control: 3 optical keys
- Operating elements also accessible in various hazardous areas

Remote operation

Remote operation of tank gauging devices:

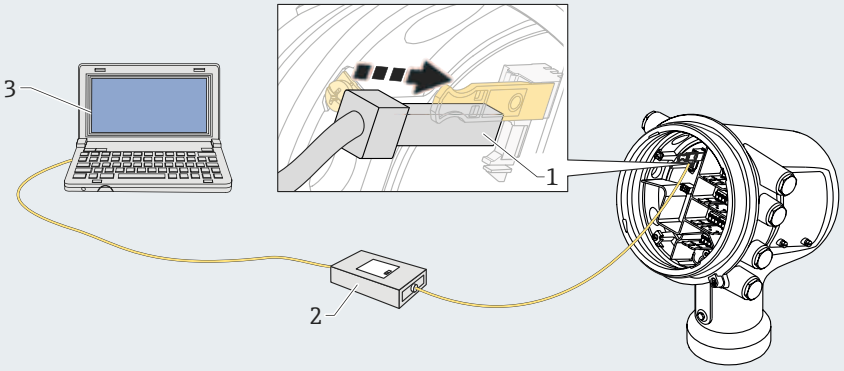
1. Proservo NMS8x
2. Tankside Monitor NRF81
3. Micropilot NMR8x
4. Field protocol (e.g. Modbus, V1)
5. Tankvision Tank Scanner NXA820
6. Ethernet
7. Computer with operating tool (e.g. FieldCare)



Service interface operation

Operation via service interface:

1. Service interface (CDI = Endress+Hauser Common Data Interface)
2. Commubox FXA291
3. Computer with FieldCare operating tool and CDI Communication FXA291 COM DTM



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Levelflex FMP50/51/52/53/54/55/56/57

Guided wave radar level measurement in liquids and solids.

- **Ideal for difficult applications e.g. interface measurement with emulsions**
- **Multi-echo tracking – no signal loss**
- **Developed to SIL IEC 61508**
- **Documented ±2mm accuracy as standard**

For use across industry

With a choice of sensors (rod, coaxial or rope) covering liquids, solids, pastes, liquefied gases or bulk solids, exactly the right model can be selected for a variety of industrial applications including chemical, cement, food, life science and hydrocarbon processing. Severe conditions are not a problem as the sensors handle low/high pressures (vacuum up to 400 bar), low/high temperatures (-200°C up to +450°C) and corrosive or abrasive materials.

Multi-echo tracking

Developed to allow for a more reliable measurement by utilising

Technical data

	FMP50	FMP51	FMP52	FMP53	FMP54	FMP55	FMP56	FMP57
Process media :	Liquids	Liquids	Liquids	Liquids	Liquids	Interface	Solids	Solids
Measuring range :	Up to 12m	Up to 45m	Up to 45m	Up to 6m	Up to 45m	Up to 10m	Up to 12m	Up to 45m
Output :	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch
Power supply :	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC
Temperature :	-20...+80°C	-40...+200°C	-50...+200°C	-20...+150°C	-196...+450°C	-50...+200°C	-40...+120°C	-40...+150°C
Pressure :	-1...+6 bar	-1...+40 bar	-1...+40 bar	-1...+16 bar	-1...+400 bar	-1...+40 bar	-1...+16 bar	-1...+16 bar
Certification :	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex
Protection :	IP68	IP68	IP68	IP68	IP68	IP68	IP68	IP68

multiple echoes to track obstacles accurately within a vessel, the software combines increased echo rate and analysis with the automatic suppression of interfering echoes. Dynamic, continuously adapting evaluation algorithms guarantee precise measurement results.

Better by design

Fully modular with a modern product design, the new Levelflex series is based on a standard housing, display (angled for better readability), power supply and software, allowing simple cost-effective operation and maintenance regimes. With the option of a second analogue or switch output and the advanced process diagnostic capabilities, it is possible to control processes such as antenna cleaning or foam reduction locally.

Menu-guided setup reduces installation time and effort, which can be completed in six simple steps. Maintenance is reduced as the sensors have no moving parts and the device's configuration settings are stored in the innovative HistoROM® data memory module. This allows for easy system restoration and multi-point commissioning without the need for specialised technical knowledge. It's a real bonus for tank farms or any multi-vessel processes as data can simply be transferred from one device to the next, significantly simplifying commissioning and maintenance procedures.

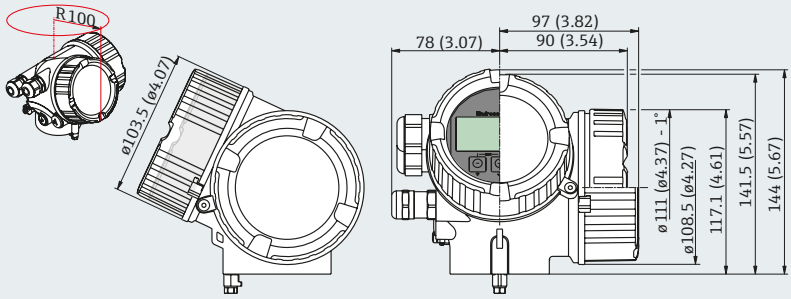
Levelflex FMP55 with SensorFusion technology cleverly combines capacitance and guided radar measurement in one device. The instrument guarantees safe measured value acquisition even in emulsion layers and issues level and interface layer signals simultaneously.

Benefit from devices with Heartbeat Technology

The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.

Dimensions (mm)

Housing dimensions



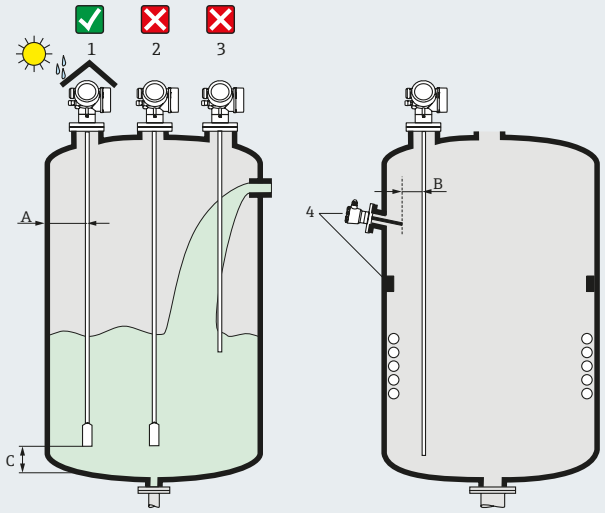
Installation

Mounting distances

- Distance (A) between wall and rod or rope probe:
  - for smooth metallic walls: >50mm
  - for plastic walls: >300mm to metallic parts outside the vessel
  - for concrete walls: >500mm (or measuring range may be reduced)
- Distance (B) between rod or rope probe and internal fittings in the vessel: >300mm
- Distance (C) from end of probe to bottom of the vessel: >10mm

Additional conditions

- When mounting in the open, use a weather protection cover (1).
- In metallic vessels, do not mount the probe in the centre of the vessel (2).
- Do not mount the probe in the filling curtain (3).
- Avoid buckling the rope probe during installation or operation (e.g. through product movement against silo wall) by selecting a suitable mounting location.



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Pressure measurement

For further information, visit our website at: www.uk.endress.com

Deltabar M PMD55

Differential pressure transmitter with metal sensor.

WirelessHART

- IEC61508 up to SIL2
- High accuracy: up to ±0.1% (±0.075% for platinum)
- 100:1 turndown
- Compact transmitter design

The Deltabar M PMD55 differential pressure transmitter has been designed for arduous environments while combining cost-effectiveness with quality. It's the lowest cost device of its class currently on the market, offering the best value for money.

Reliable and robust, the new Deltabar M is ideal for hazardous applications. It comes with an epoxy-coated aluminium housing offering excellent process safety in harsh environments. With measuring accuracy of up to 0.075% and a pressure measuring range of 10 mbar... 40 bar, it offers outstanding performance in demanding process conditions. ATEX certified (Ex ia, Ex d, Ex na, IEC Ex) for hazardous area use, it guarantees measurement safety and integrity.

Combining accuracy, safety and reliability with a lightweight and compact design, Deltabar M offers maximum application flexibility, making it ideal for OEM applications. Its robustness and high turndown of 100:1 also makes it an excellent choice for utilities applications including compressed air, steam, water generation and distribution systems, nitrogen metering as well as heating and cooling systems.

Deltabar M benefits from highly modular electronics that enable quick and simple set-up and commissioning. Its user-friendly software featuring a full graphic display allows the selection of application-specific parameters for maximum flexibility. Be it level, flow or differential pressure, you can adjust Deltabar M to your own application requirements.

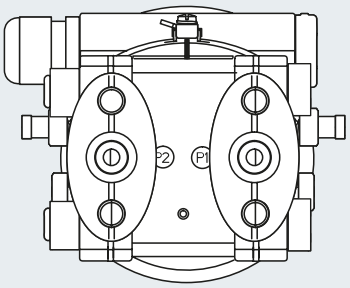
Technical data

Measuring range	:	0...10 mbar to 0...40 bar
Output	:	4...20mA HART, PROFIBUS PA, FOUNDATION Fieldbus
Ambient temperature	:	-40...+85°C
Process temperature	:	-40...+85°C
Power supply	:	11.5...45V DC safe area; 11.5...30V DC intrinsically safe
Accuracy	:	Standard ±0.1%, platinum ±0.075%
Housing	:	Powder-coated die-cast aluminium
Process connection	:	In contact with process: AISI 316L or C22.8
Process membrane	:	Stainless steel 316L or Hastelloy C
Protection	:	IP66/67/68

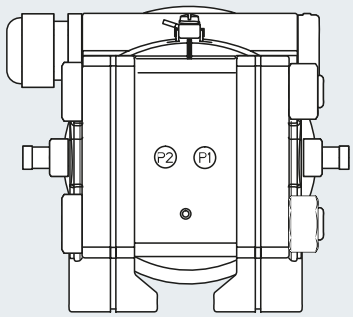
Process connections

Oval flange, ¼-18 NPT connection IEC61518
Designation of the process connections 'P1' and 'P2'
P1 = high pressure side (+)
P2 = low pressure side (-)

PMD55, H1



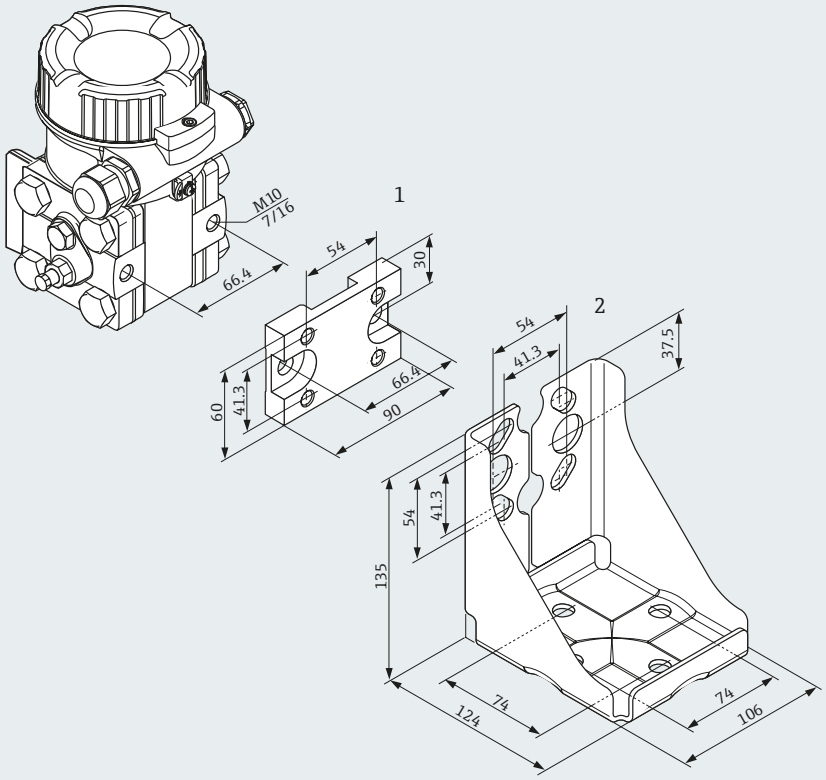
PMD55, V1



Mounting

Mounting bracket for wall and pipe mounting

1 = Adapter plate (+ six screws and six washers)
2 = Mounting bracket (+ bracket for pipe mounting and two nuts)



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Deltabar S PMD75

Differential pressure transmitter for flow, level and filter applications.

WirelessHART

- **Robust metal measuring cell**
- **Self-diagnosis and process monitoring functions**
- **Standard 0.05% accuracy (0.035% optional)**
- **IEC61508 up to SIL3**

The robust metallic sensor offers outstanding performance at low measuring ranges even at high static pressures in gas, liquid and vapour applications.

Applications

- Highly accurate transmitters for flow measurement (volume or mass-based) across orifice plates and pitot tubes in gas and liquid.
- Level, content or volume measurement in liquid
- Differential pressure measurement of filters and pumps

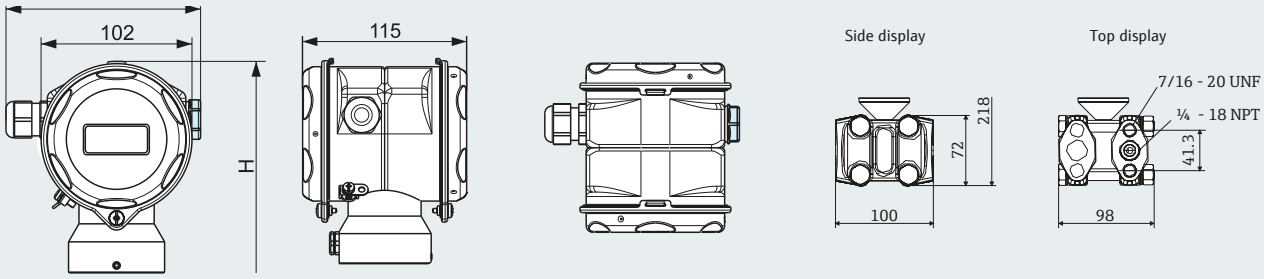
Advantages

- Modular transmitter consisting of only three modules: electronic, sensor and housing
- Fast commissioning via Quick Setup menu
- Long-term stability <0.05% per 5 years minimises recalibration
- HART, PROFIBUS and FOUNDATION Fieldbus compatible
- Menu-guided display with plain text - no error codes to decipher
- No software or handheld communicators required

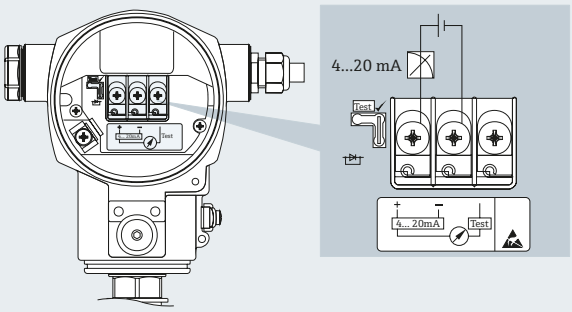
Technical data

Measuring range	: 10 mbar... 40 bar/TD 100:1 (larger TD on request)
Process temp	: -40°C...85°C
Ambient temp	: -40°C...85°C
Protection	: IP66/67/68
Power supply	: 10.5...45V DC standard, 10.5...30V DC for EExi, 9... 32V DC for PA and FF
Cable connection	: Gland M20 x1.5, ½" NPT, 7/8" FF connector, M12
Accuracy	: 0.05% standard (0.035% optional)
Housing	: Cast aluminium with polyester based coating, (stainless steel 316L optional)
Process connection	: Standard DP connection out of 1.4435 (316L), Alloy C276, Carbon steel (C22.8)
Process membrane	: Hastelloy C276, 1.4435 (SS316L), monel, tantalum, rhodium/gold
Process seal	: PTFE, Viton, NBR or copper

T14 housing dimensions (mm)



Electrical connection



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Deltabar FMD71/72

Electronic differential pressure transmitter for level measurement.

WirelessHART

- Robust ceramic or metal measuring cell
- Unaffected by ambient temperature: no measurement drift
- No impulse lines: no condensation, freezing or leakage problems
- For process pressures up to 10 bar (up to 700 bar on request)

Deltabar FMD71/72 is ideal for measuring the level, volume or mass of liquids in pressurised tanks. The system compromises two sensor modules and one transmitter: one sensor module measures the hydrostatic pressure (high pressure) and the other one the head pressure (low pressure). The level (electronic differential pressure) is calculated in the transmitter using these two digital values. It eliminates issues of traditional differential pressure measurements using impulse lines or capillaries such as connection leaks and impulse line condensation and offers outstanding multivariable level measurement.

Deltabar FMD71/72 not only offers a superior response rate (up to 10 times faster than conventional DP transmitters), it also eliminates up to 95% of drift caused by ambient temperature changes. What's more, as the sensors are separate to the transmitter, you can locate the transmitter in areas safe and convenient for personnel, offering improved safety and better access.

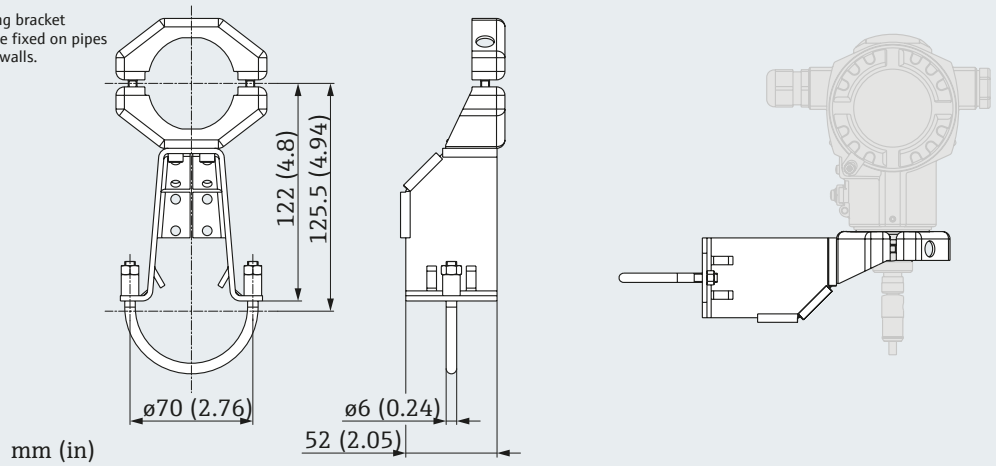
Installation and maintenance

Deltabar FMD71/72 is cost-effective due to the reduction in time required for installation and maintenance and it has the added bonus of a simplified spares concept. The system also benefits from built-in diagnostics for continuous health indication via HART.

Technical data	FMD71	FMD72
Measuring range (DP)	: From -100...+100 mbar to -1...+40 bar	From -400...+400 mbar to -1...+40 bar
Output	: 4...20mA HART	4...20mA HART
Process temperature	: -25°C...+150°C	-40°C...+125°C (higher on request)
Ambient temperature	: -40°C...+80°C	-40°C...+80°C
Protection	: IP66/68 NEMA4X/6P	IP66/68 NEMA4X/6P
Power supply	: 12...45V DC	12...45V DC
Accuracy	: Depends on measuring cell and sensor	Depends on measuring cell and sensor
Housing	: Aluminium, stainless steel	Aluminium, stainless steel
Process connection	: Threads, flanges and hygienic fittings	Threads, flanges and hygienic fittings

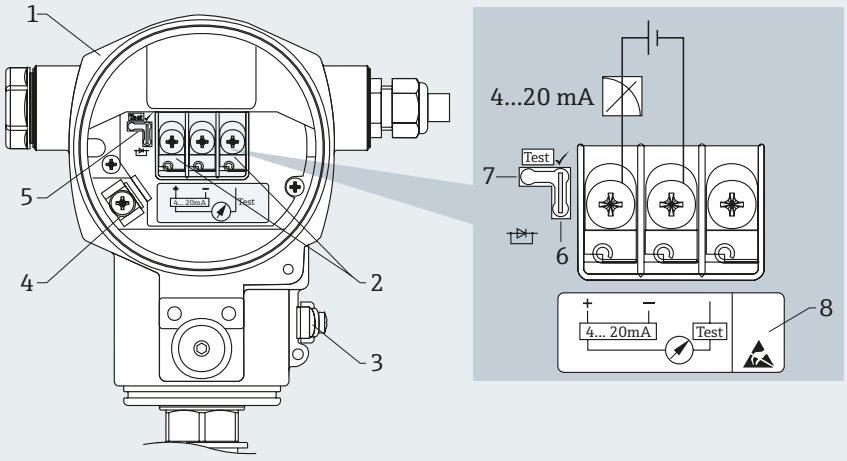
Installation

Install the transmitter with the mounting bracket (supplied). The mounting bracket can be fixed on pipes with a diameter between 1¼"-2" or on walls.



Electrical connection

1. Housing
2. 4...20mA test signal between positive and test terminal
3. External ground terminal
4. Internal ground terminal
5. Jumper for 4...20mA test signal
6. Minimum supply voltage = 12 V DC (jumper is set as illustrated in the diagram)
7. Minimum supply voltage = 13 V DC (jumper is set in 'test' position)
8. Devices with integrated overvoltage protection are labelled 'OVP'



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Deltabar S FMD77

Differential pressure transmitter for level applications.

WirelessHART

- **For process temperatures up to 400°C**
- **Self-diagnosis and process monitoring functions**
- **Standard 0.075% linearity and chemical seal error**
- **IEC61508 up to SIL3**

The metallic sensor provides outstanding long-term stability and single-sided overpressure resistance. It can be supplied with a wide range of process connections and fill fluids.

Technical data

Measuring range	: 10 mbar...16 bar / TD 100:1 (larger TD on request)
Output	: 4...20mA HART, PROFIBUS PA or FOUNDATION Fieldbus
Process temp	: -70°C...400°C
Ambient temp	: -40°C...85°C
Protection	: IP66/67/68
Power supply	: 10.5...45V DC standard, 10.5...30V DC for EExi 9... 32V DC for PA and FOUNDATION Fieldbus
Cable connection	: Gland M20x1.5, Harting connector, ½" NPT, 7/8" FOUNDATION Fieldbus connector, M12
Accuracy (including hysteresis and reproducibility up to TD 15:1)	: 0.075% (transmitter) + chemical seal error
Housing	: Cast aluminium with polyester based coating, (stainless steel 316L optional)
Process connection	: ANSI/DIN flanges out of 1.4435 (316L), Alloy C276, Monel, tantalum etc. Compensation side: Standard DP connection out of 316L. Other materials on request.
Process membrane	: 1.4435 (316L), Alloy C276, Monel, Tantalum, PTFE foil etc. Fill fluids (chemical seal) Silicon oil, vegetable oil (FDA), high temperature oil, inert oil fillings

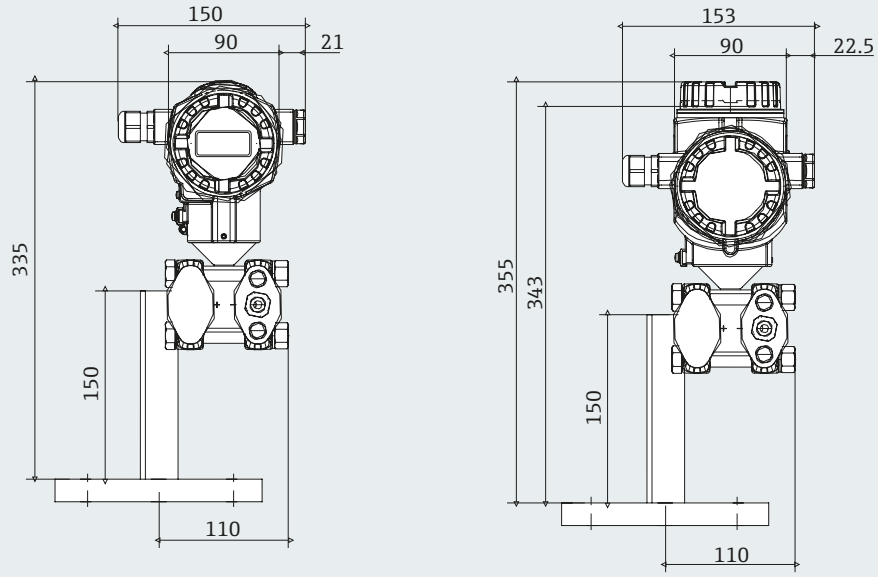
Application

- Level, content or volume measurement in pressurised vessels or vessels under vacuum

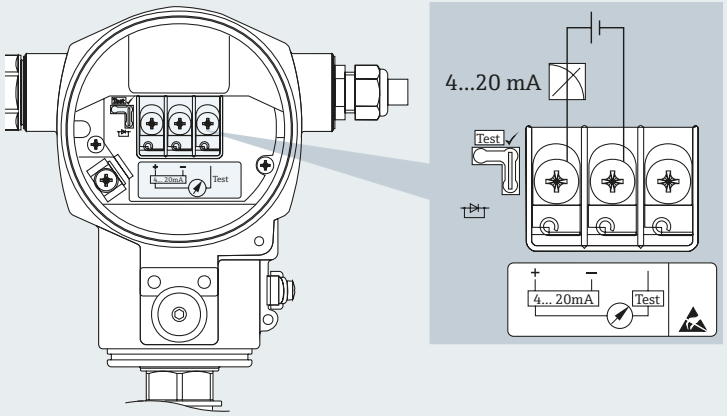
Advantages

- Long term stability <0.05% per 5 years minimises recalibration
- Integrated linearisation of vessels (horizontal or vertical)
- HART, PROFIBUS and FOUNDATION Fieldbus compatible
- Menu-guided display with plain text - no error codes to decipher
- No software or handheld communicators required

Dimensions (mm)



Electrical connection



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Deltabar S FMD78

Differential pressure transmitter for level applications.

WirelessHART

- **For process temperatures up to 400°C**
- **Self-diagnosis and process monitoring functions**
- **Standard 0.075% linearity and chemical seals and capillaries error**
- **IEC61508 up to SIL3**

Pressure device for measuring differential pressure in industrial and non-industrial environments. The metallic sensor provides outstanding long-term stability and single-sided overpressure resistance. It can be supplied with a wide range of process connections and fill fluids.

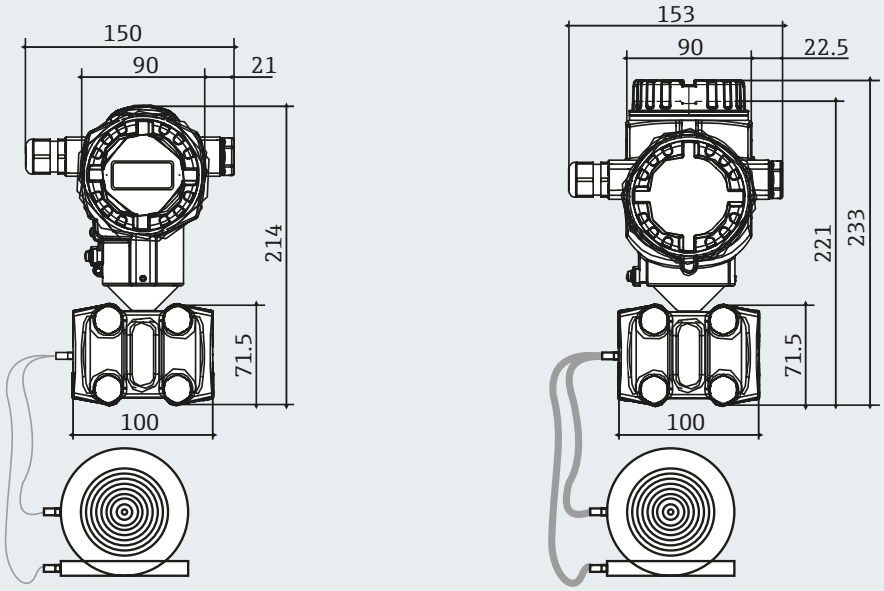
- Level, content or volume measurement in pressurised vessels or vessels under vacuum
- Differential pressure measurement of hazardous and harmful products
- Long term stability <0.05% per 5 years minimises recalibration
- Integrated linearisation of vessels (horizontal or vertical)
- HART, PROFIBUS and FOUNDATION Fieldbus compatible
- Menu-guided display with plain text - no error codes to decipher
- No software or handheld communicators required
- Available with TempC membrane for improved accuracy and process safety in difficult pressure and DP applications

Technical data

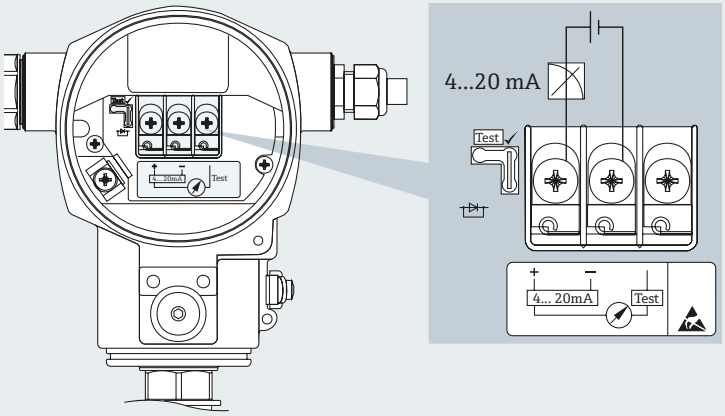
Measuring range	: 100 mbar...40 bar/TD 100:1 (larger TD on request)
Process temp	: -70°C...400°C
Ambient temp	: -40°C...85°C
Protection	: IP66/67/68
Power supply	: 10.5...45V DC standard, 10.5...30V DC for EEx-i 9...32V DC for PA and FOUNDATION Fieldbus
Cable connection	: Gland M20x1.5, ½" NPT, 7/8" FOUNDATION Fieldbus connector, M12
Accuracy	: 0.075% (transmitter) + chemical seal and capillaries error.
Housing	: Cast aluminium with polyester based coating, (stainless steel 316L optional)
Process connection	: All common process connections ANSI/DIN flanges, hygienic couplings e.g. Tri-Clamp etc.
Process membrane	: 1.4435 (316L), Alloy C276, Monel, Tantalum, TempC etc.
Capillary	: Armoured (316L) variable length up to 10 metres
Seal and capillary	: Silicon oil, vegetable oil (FDA), high temperature oil, Inert oil fillings

* The position of the transmitter can be of importance in vacuum applications. Please contact your local Endress+Hauser office for advice.

Dimensions (mm)



Electrical connection



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Cerabar S PMC71/PMP71

High accuracy pressure transmitter with high temperature option up to 150°C.

PMC71

PMP71

WirelessHART

- **Robust ceramic or metallic measuring cell**
- **Self-diagnosis and process monitoring functions**
- **Standard 0.05% linearity (0.025% optional)**
- **IEC61508 up to SIL3**

The measuring sensor is either ceramic or metallic, offering outstanding performance in vacuum applications and fast-changing temperature conditions in gas, liquid and vapour applications.

Technical data

		PMC71	PMP71
Measuring range (larger TD on request)	:	1 mbar...40 bar gauge or absolute /TD 100:1	10 mbar...700 bar gauge or absolute /TD 100:1
Process temp	:	-25°C...125°C (optional 150°C)	-40°C...125°C
Ambient temp	:	-40°C...85°C	-40°C...85°C
Power supply	:	10.5...45V DC standard 10.5...30V DC for EExi 9... 32DC for PA and FF	10.5...45V DC standard 10.5...30V DC for EExi 9... 32V DC for PA and FF
Cable connection	:	Gland M20x1.5 ½" NPT, 7/8" FF connector, M12	
Housing	:	Cast aluminium with polyester based coating, (stainless steel 316L optional).	
Process connection	:	Threads, flanges and hygienic fittings	Threads and flanges
Wetted parts	:	1.4435 (316L), Alloy C276, PVDF etc	1.4435 (316L), Alloy C276, etc
Process seal	:	Viton, EPDM, Chemraz, Kalrez etc.	Welded construction.
Process membrane	:	Ceramic Al_2O_3 99.9% pure, Ceraphire®	SS316L (1.4435) or Alloy C276

Applications

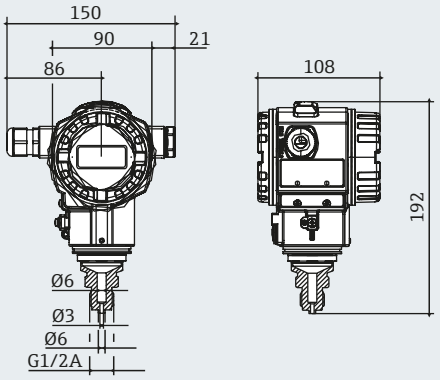
The sensors are able to withstand high process temperatures and are either made from metal (PMP71) or from a corrosion-resistant ceramic (PMC71). The ceramic sensor has the additional benefit of withstanding high pressure peaks and high vacuums.

Advantages

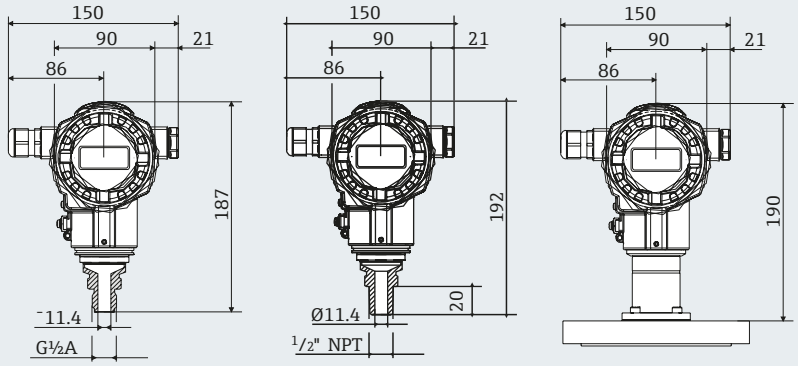
- Measuring sensor capable of withstanding process temperatures up to 150°C at the membrane
- Long-term stability <0.05% per 5 years minimises recalibration
- Secondary containment and venting chamber
- HART, PROFIBUS and FOUNDATION Fieldbus compatible
- IP67 protection (IP68 optional)
- Menu-guided display with plain text - no error codes to decipher
- No software or handheld communicators required

Dimensions (mm)

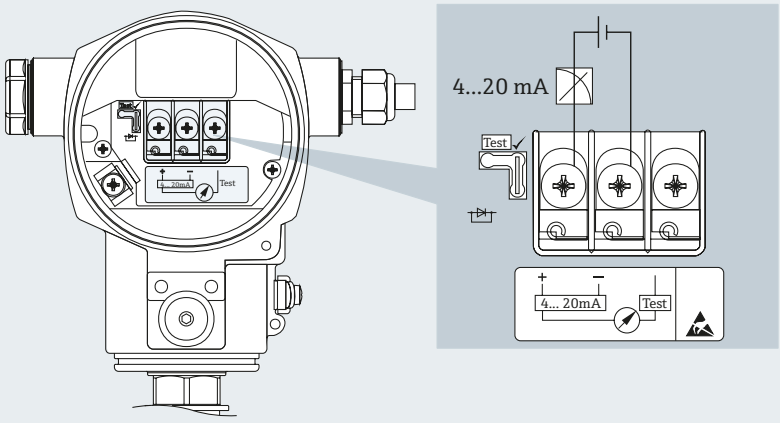
PMP71/PMC71



PMC71



Electrical connection



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Cerabar S PMP75

Pressure transmitter with chemical seal for high temperature or hygienic applications.

WirelessHART

- **Temperatures up to 400°C**
- **Self-diagnosis and process monitoring functions**
- **Standard 0.05% linearity and chemical seal error**
- **IEC61508 up to SIL3**

Pressure device for measuring pressure in industrial and non-industrial environments in process temperatures up to 400°C. The sensor element has an optimised mechanical construction to reduce the temperature effect of the chemical seal.

Technical data

Measuring range	: 100 mbar...400 bar gauge or absolute/TD 100:1 (larger TD on request)
Process temp	: -70°C...400°C
Ambient temp	: -40°C...85°C
Protection class	: IP67 (IP68 optional)
Power supply	: 10.5...45V DC standard, 10.5...30V DC for EExi 9...32V DC for PA and FF
Cable connection	: Gland M20x1.5, ½" NPT, ⅞" FOUNDATION Fieldbus connector, M12
Accuracy	: 0.05% (transmitter) + chemical seal error
Housing cast	: Aluminium with polyester based coating, (stainless steel 316L optional)
Process connection	: All standard DIN/ANSI pressure and hygienic process connections.
Process seal	: Welded construction with secondary containment.
Process membrane	: 316L (1.4435), Alloy C276, Monel, Tantalum, PTFE foil, TempC, etc. Fill fluid silicon oil, vegetable oil (FDA), inert oil, high temperature oil etc.

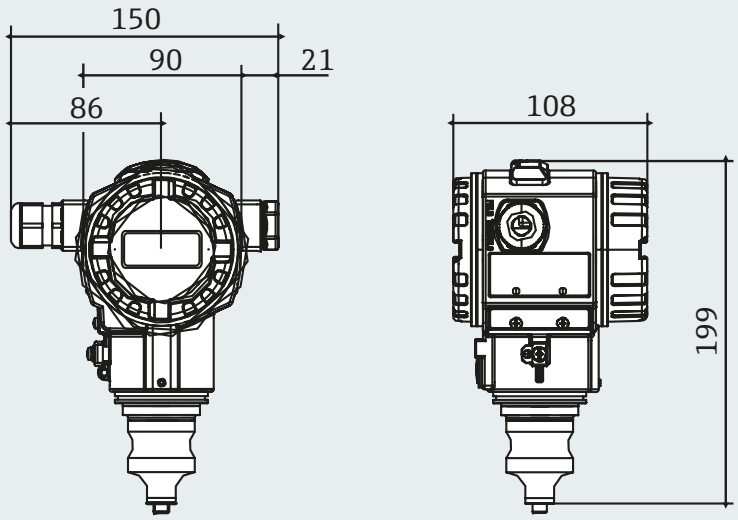
Applications

The PMP75 is ideal for the oil & gas, chemical, food and pharmaceutical industries. The chemical seal is filled with oil that is either FDA listed, silicon or suitable to be used in oxygen applications, for example.

Advantages

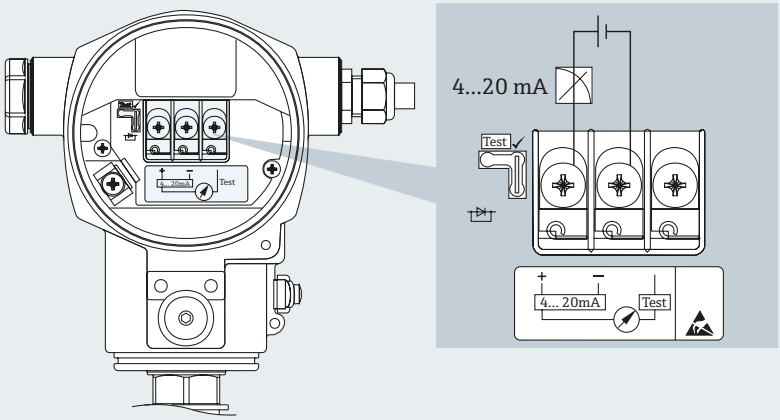
- Optimised for chemical seal mounting
- Long-term stability <0.05% per year minimises recalibration
- HART, PROFIBUS and FOUNDATION Fieldbus compatible
- Menu-guided display with plain text - no error codes to decipher
- No software or handheld communicators required
- Available with TempC membrane for improved accuracy and process safety in difficult pressure and DP applications

Dimensions (mm)



PMP75
flange size depends on chosen seal

Electrical connection



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Cerabar M PMC51/PMP51/PMP55

Overload-resistant pressure transmitter with ceramic or metallic sensors.

PMC51

PMP51

WirelessHART

PMP55

- IEC61508 up to SIL2
- High reference accuracy: up to ±0.15% (±0.075% for platinum)
- 100:1 turndown
- Separate housing version: IP69K rating

Cerabar M pressure transmitters measure relative or absolute pressure in gas, vapour, liquid and dust and are suitable for almost all applications in the engineering and process industries. The high degree of protection and the stainless steel housing make the transmitter ideal for applications where cleaning takes place frequently. And with HART, PROFIBUS or FOUNDATION Fieldbus, Cerabar M can be easily incorporated into existing systems.

Technical data

	PMC51	PMP51	PMP55
Measuring range	-100/0...100 mbar to -1/0...40 bar	-400/0...400 mbar to -1/0...400 bar	-400/0...400 mbar to -1/0...400 bar
Output	4...20mA analogue, 4...20mA HART, PROFIBUS or FOUNDATION Fieldbus	4...20mA analogue, 4...20mA HART, PROFIBUS or FOUNDATION Fieldbus	4...20mA analogue, 4...20mA HART, PROFIBUS or FOUNDATION Fieldbus
Accuracy	Standard ±0.15%, platinum ±0.075%	Standard ±0.15%, platinum ±0.075%	Standard ±0.15%
Long-term drift	±0.4% over 10 years	±0.4% over 10 years	±0.4% over 10 years
Turndown	Up to 100:1	Up to 100:1	Up to 100:1
Ambient temperature	+40...+85°C	+40...+85°C	+40...+85°C
Product temperatrure	-20...+130°C	-40...+130°C	-70...+400°C
Power supply	11.5...45V DC (versions with plug-in connection 35V DC); for intrinsically safe versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC); for intrinsically safe versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC); for intrinsically safe versions: 11.5...30V DC
Housing (coated)	Stainless steel or aluminium	Stainless steel or aluminium	Stainless steel or aluminium
Protection	IP66/67/68/69K	IP66/67/68/69K	IP66/67/68/69K

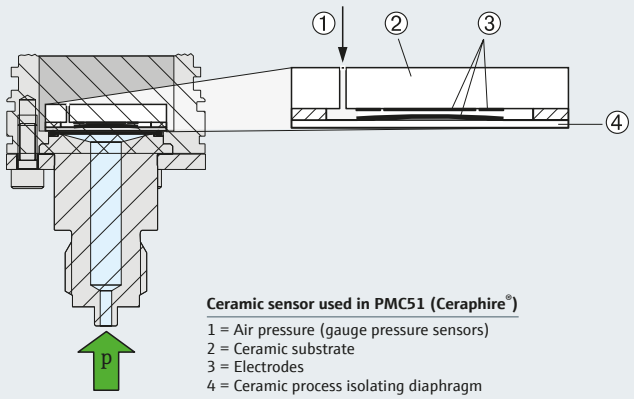
PMC51: Ceraphire® ceramic sensor
Cerabar M PMC51 features a 99.9% pure ceramic measuring cell that offers high chemical stability and overload resistance up to 40 times the nominal pressure.

PMP51: metal on process sensor
Cerabar M PMP51 features a piezoresistive metallic measuring cell for high long-term measurement stability in process pressures up to 400 bar.

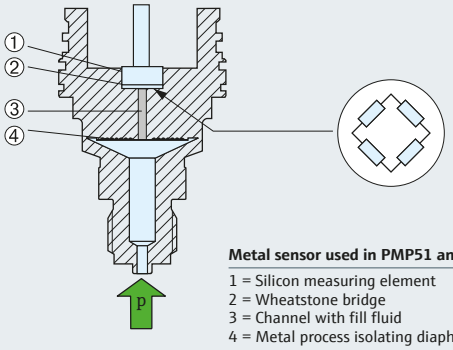
PMP55: diaphragm seals
Cerabar M PMP55 is the high temperature and high pressure version offering measurement stability in temperatures up to 400°C and pressures up to 400 bar. With a range of hygienic process connections, it is perfect for use in hygienic applications and it offers ASME BPE conformity and electropolished versions as an option.

It is also available with the TempC membrane for improved accuracy and process safety in difficult pressure and DP applications.

Ceramic and metallic sensors

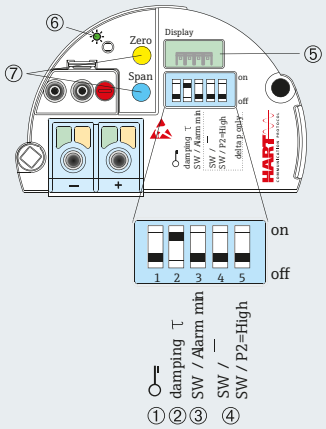


Ceramic sensor used in PMC51 (Ceraphire®)
1 = Air pressure (gauge pressure sensors)
2 = Ceramic substrate
3 = Electrodes
4 = Ceramic process isolating diaphragm

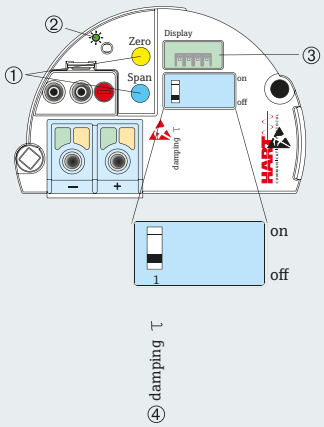


Metal sensor used in PMP51 and PMP55
1 = Silicon measuring element
2 = Wheatstone bridge
3 = Channel with fill fluid
4 = Metal process isolating diaphragm

Operation



HART electronic insert
1 = DIP switch for locking/unlocking parameters relevant to the measured value
2 = DIP switch for switching damping on/off
3 = DIP switch for alarm current SW/alarm min (3.6mA)
4 = DIP switch only for Deltabar M
5 = Slot for optional local display
6 = Green LED to indicate successful operation
7 = Operating keys for lower range value (zero) and upper range value (span)



Analogue electronic insert
1 = Operating keys for lower range value (zero) and upper range value (span)
2 = Green LED to indicate successful operation
3 = Slot for optional local display
4 = DIP switch for switching damping on/off

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Cerabar T PMC11/21, PMP11/21

Pressure transmitters for simple applications.


PMC11


PMP11


PMC21


PMP21

- **Cost-effective and simple to use**
- **High reproducibility**
- **Long-term stability**
- **Overload resistant**
- **Housing and process isolating diaphragm made of 316L**

In standard applications in the process industries, it's all about choosing an instrument that gets the job done! It must work reliably, be easy to install and should meet budget requirements. Our series of compact pressure devices for liquid, gas, vapour and dust applications offer quality and performance at an affordable price.

Many applications in both process automation and utilities monitoring require small products that are easy to install and are flexible in their use. A robust design and high product quality ensure reliable operation. We also know that smooth ordering and fast delivery is important. These were the focal points for the development of the new generation of Cerabar gauge and absolute pressure transmitters.

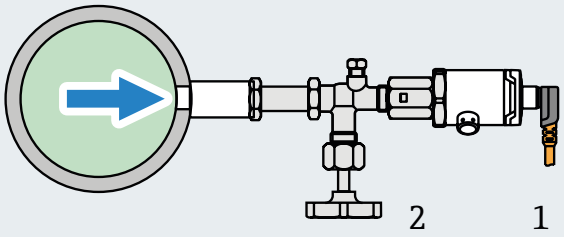
Technical data		PMC11	PMC21	PMP11	PMP21
		Gauge	Absolute and gauge	Gauge	Absolute and gauge
Sensor	:	Ceramic	Ceramic	Metallic	Metallic
Process connections	:	Threads	Threads	Threads	Threads
Accuracy	:	±0.5%	±0.3%	±0.5%	±0.3%
Process temperature	:	-25°C...+85°C	-40°C...+100°C	-25°C...+85°C	-40°C...+100°C
Pressure	:	400 mbar...40 bar	400 mbar...400 bar	400 mbar...40 bar	400 mbar...400 bar
Max overpressure	:	160 bar	600 bar	160 bar	600 bar
Certification	:	ATEX, FM, CSA, IEC Ex, NEPSI, EAC		ATEX, FM, CSA, IEC Ex, NEPSI, EAC	

Mounting location

Pressure measurement in liquids

Mount the device with a shutoff device at the same height as the tapping point.

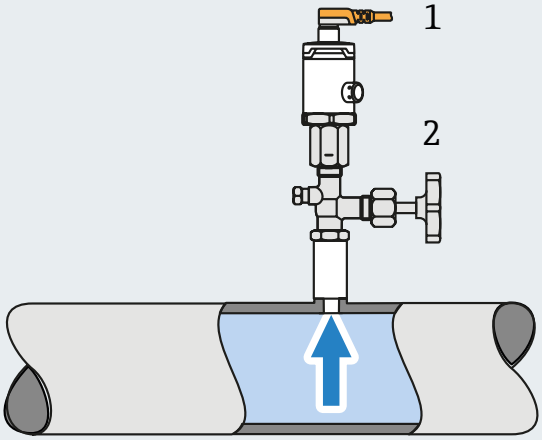
1. Device
2. Shutoff device



Pressure measurement in gases

Mount the device with shutoff device above the tapping point so that any condensate can flow into the process.

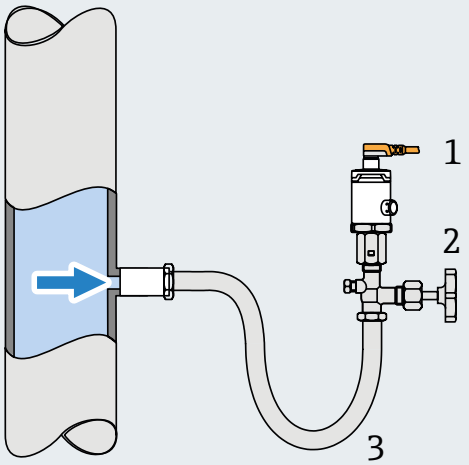
1. Device
2. Shutoff device



Pressure measurement in vapours

Use a siphon for pressure measurement in vapours as it reduces the temperature to almost ambient temperature. Mount the device with a shutoff device at the same height as the tapping point.
Note the maximum permitted ambient temperature of the transmitter!

1. Device
2. Shutoff device
3. Siphon



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Cerabar T PMP23

Pressure transmitter with fully welded design for the food & beverage industry.

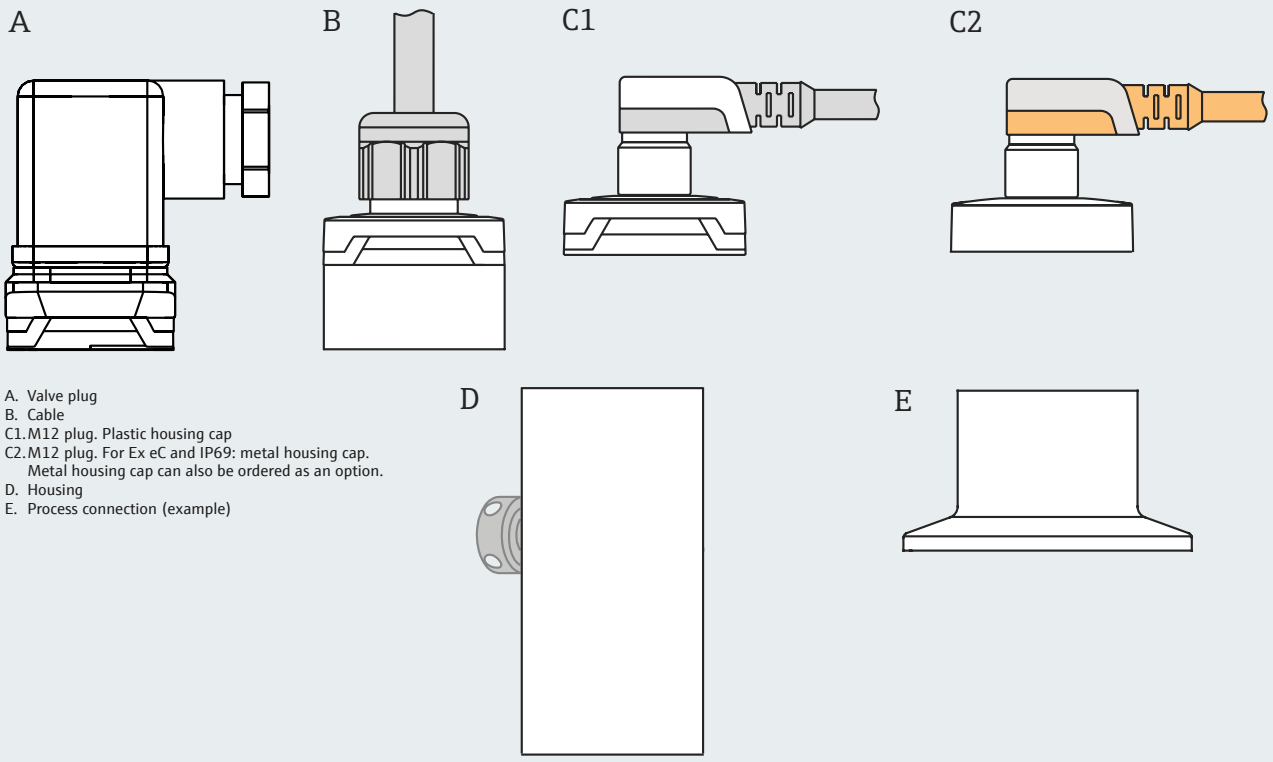
- Cost-effective and simple to use
- High reproducibility
- Long-term stability
- Overload resistant
- Suitable for CIP/SIP cleaning
- IP69 protection

In standard applications in the process and food industries, it's all about choosing an instrument that gets the job done! It must work reliably, be easy to install and should meet budget requirements. Our hygienic compact pressure device for liquid, gas, vapour and powder applications offers high quality at an affordable price.

Cerabar PMP23 is a cost-effective absolute or gauge pressure transmitter featuring a compact, fully-welded construction for maximum performance. The piezo-resistive measuring cell with flush-mounted 316L diaphragm has been specifically designed for applications in the hygienic industries. It offers various EHEDG and 3-A certified hygienic process connections, build materials with FDA conformity, EG 1935/2004 conformity, IP69 protection class as well as hazardous area certificates. The device can be delivered with customised measuring ranges up to 40 bar.

Technical data		PMP23
Measuring principle	:	Absolute and gauge
Sensor	:	Metallic
Process connections	:	Flush-mounted hygienic, flush-mounted thread
Accuracy	:	±0.3%
Process temperature	:	-10°C...+100°C
Pressure	:	400 mbar...40 bar
Max overpressure	:	160 bar
Certification	:	3-A, EHEDG, EG 1935/2004

Product design



A. Valve plug
B. Cable
C1. M12 plug. Plastic housing cap
C2. M12 plug. For Ex eC and IP69: metal housing cap.
Metal housing cap can also be ordered as an option.
D. Housing
E. Process connection (example)

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TempC membrane

Pressure transmitter membrane offering improved accuracy and safety in challenging applications.

- For use with Cerabar PMP55/ PMP75 and Deltabar FMD78 pressure transmitters.
- Covers our range of hygienic process connections for the food & beverage and life sciences industries.
- Laser welded in place for smooth finish and easy cleaning.
- Complements the existing range of pressure measuring cell technologies available: the Ceraphire ceramic cell, condensation-tight CONTITE cell, metallic measuring cell and the electronic DP solution.

The TempC membrane offers improved accuracy and process safety in challenging pressure and DP applications. It utilises a completely new technology to dramatically reduce the influence of process and ambient temperature fluctuations.

In applications with process temperatures from -40°C to 250°C, it offers a very short recovery time after temperature shock, for example at the end of a CIP/SIP cleaning cycle, when compared to conventional diaphragm seals.

Better than conventional membranes

Pressure and differential pressure transmitters are employed across all industries for many different applications such as process pressure measurement, hydrostatic level, differential pressure and even flow measurement, across filters, packing, heat exchangers and many others. Sometimes the application determines that the instrument requires a diaphragm seal design, typically due to extremes of process temperatures, corrosive media, plant vibration, viscous media or hygienic requirements.

Whilst diaphragm seals are very useful in solving some challenging applications they can suffer from poor performance due to changes in both process and ambient temperature. Changes in temperature will cause the oil fill in the system to expand or contract. Conventional membranes can have a high degree of stiffness so the oil expansion or contraction has little effect on the membrane but instead acts upon the measuring cell thus causing errors in measurement.

Reducing measurement errors by up to 90%!

With this in mind, the innovative TempC (temperature compensatory) membrane has been designed to be much more flexible, thus absorbing any oil expansion or contraction. This can typically reduce these measurement errors by up to 90%, therefore providing much improved measurement stability, reliability and potentially greater process safety.

TempC membrane for use with the Cerabar PMP55, PMP75 and Deltabar FMD78

Cerabar PMP55

Cerabar PMP75

Deltabar FMD78

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Ceraphant PTC31B, PTP31B/33B

Pressure switches for safe measurement and monitoring of absolute and gauge pressure.

PTC31B

PTP31B

PTP33B

- **Cost-effective and simple to use**
- **High reproducibility**
- **Long-term stability**
- **Fully-welded sensor**
- **Housing and process isolating diaphragm made of 316L**

Ceraphant pressure switches offer outstanding price-performance ratios for the measurement of absolute and gauge pressure in gases, vapours, liquids and dust, offering good application versatility due to a wide range of approvals and process connections. They are particularly suited to measuring tasks such as pump control and filling machines and in process control applications with head pressure in tanks.

Technical data		PTC31B	PTP31B	PTP33B
Measured variable	:	Gauge and absolute pressure	Gauge and absolute pressure	Gauge and absolute pressure
Sensor	:	Ceramic	Metallic	Metallic
Process connections	:	Threads	Threads	Threads and hygienic
Accuracy	:	Standard: 0.5%, Platinum: 0.3%	Standard: 0.5%, Platinum: 0.3%	Standard: 0.5%, Platinum: 0.3%
Process temperature	:	-25°C...+100°C	-40°C...+100°C	-10°C...+100°C
Pressure	:	100 mbar...40 bar	400 mbar...40 bar	400 mbar...40 bar
Max overpressure	:	60 bar	600 bar	160 bar
Protection	:	IP65/67	IP65/67	IP65/67 or IP69
Surface roughness	:	x	x	Ra<0.76µm
Hygiene approvals	:	x	x	3-A, EHEDG, FDA compliant, EG 1935/2004

PTC31B
Ceraphant PTC31B pressure switch features a ceramic sensor that is both corrosion and abrasion-resistant and offers long-term stability.

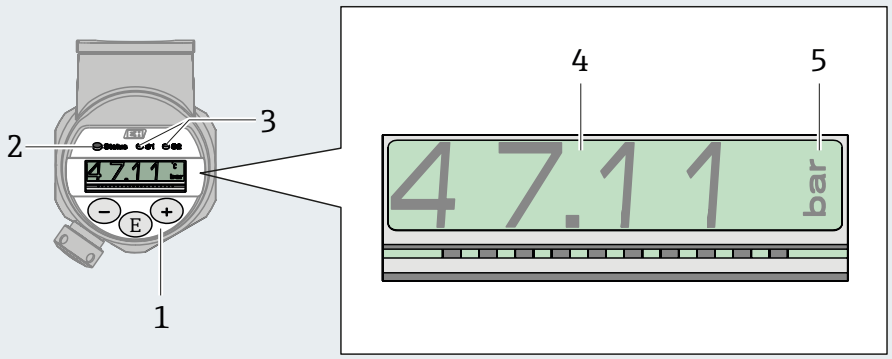
PTP31B
Ceraphant PTP31B pressure switch features a metallic sensor for use in a wide range of applications across the process industries.

PTP33B
Ceraphant PTP33B hygienic pressure switch is specially designed for use in the food & beverage sector and comes with all relevant hygiene approvals.

Operation

The local liquid crystal display shows measured values, fault messages and information messages and supports you through each operating step. During operation, the display shows measured values, fault messages and notice messages. In addition, it is possible to switch to menu mode via the operating keys.
1. Operating keys
2. Status LED
3. Switch output LEDs
4. Measured value
5. Unit

Functions:
- 4-digit measured value display and decimal point
- Simple and complete menu guidance due to breakdown of parameters into several levels and groups
- Possibility to configure the display in accordance with individual wishes and requirements
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators, etc.)
- Quick and safe commissioning
- The device also signals the status via LEDs



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Flow measurement

For further information, visit our website at: www.uk.endress.com

Flowphant T DTT31/35

Flow switch for the measurement and monitoring of mass flow.

DTT31

DTT35

- Negligible pressure loss
- Wide turndown
- CIP compliant up to 130°C
- Optional second switch output for temperature monitoring
- Hygienic with 3-A approval (DTT35)
- Non-hazardous areas only

The Flowphant T liquid flow switch measures the mass flow of liquid. Using the thermal principle, it measures liquid flow rates in the range of 0.03 and 3m/s with exceptional accuracy. Complete with a robust stainless steel housing, Flowphant is suitable for even the most harsh environments. In addition, the legend plate is laser printed directly on the device, making the important information such as the serial number, order code and tag number easily accessed and secure. The rotatable housing and illuminated display ensures data is simple to view and monitor and in the event of an error, the display changes colour from white to red, so you can immediately recognise switch-point errors.

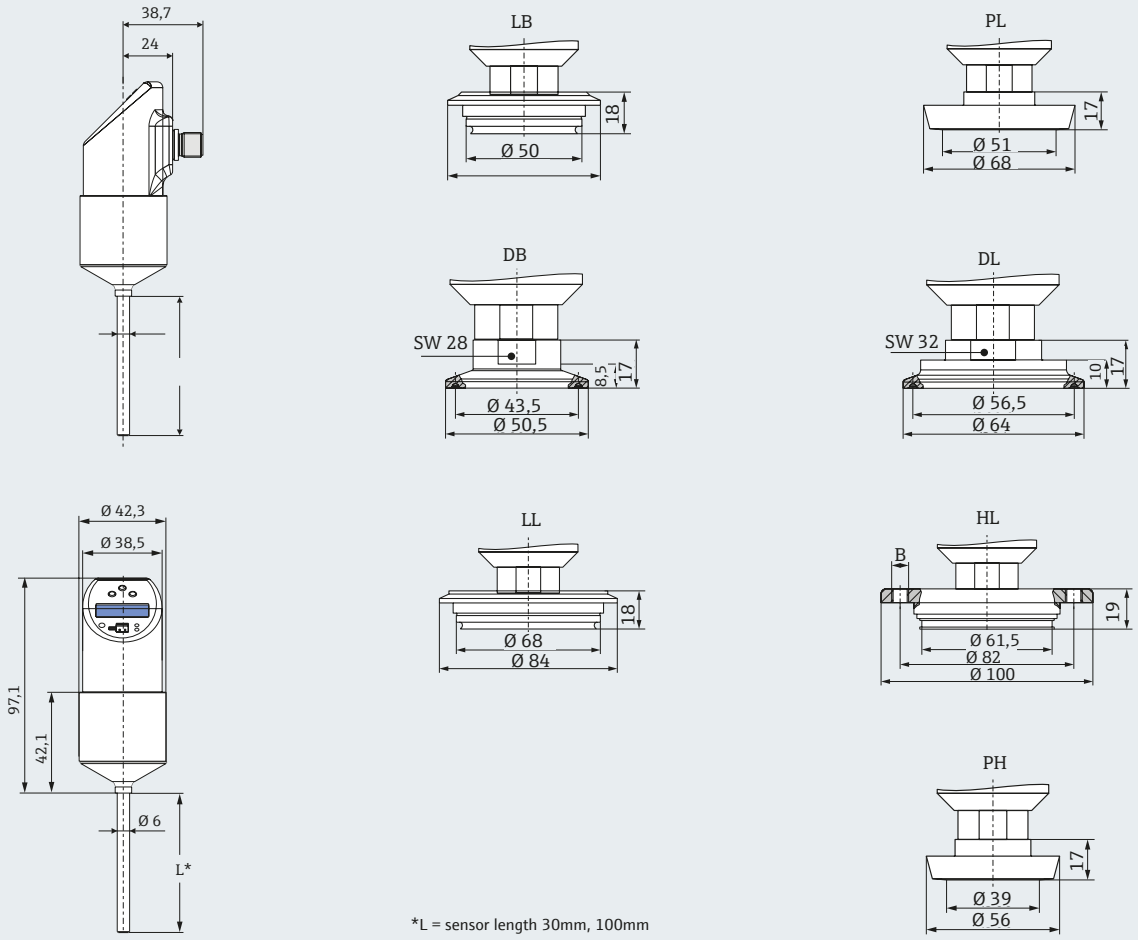
Applications

- Monitoring cooling water circulation systems
- Dry run protection
- Leak monitoring
- Monitoring and display in chemical dosing
- Monitoring CIP cleaning processes
- Filter monitoring

Technical data

Measuring range	:	Flow: 0.03m/s to 3m/s temperature : 20°C to +85°C
Output	:	1 x PNP switch output (flow) 2 x PNP switch outputs (flow or temperature, adjustable)
Supply voltage	:	18...30VDC (reverse polarity protection)
Sensor reaction time	:	6...12s
Switch response time	:	100ms
Process connection	:	DTT31: compression fitting, thread G¼, ½ DTT35: Triclamp connections
Approvals	:	3-A (DTT35)

Dimensions (mm)



*L = sensor length 30mm, 100mm

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Promag 100

Ultra-compact electromagnetic flowmeter for measurement of conductive liquids.

Promag H 100

Promag P 100

WirelessHART

- **Ideal for modular skid-mounted process facilities**
- **Space-saving, multivariable measuring technology in compact or ultra-compact design**
- **IP69K protection (optional)**

Electromagnetic flowmeters can be used to measure electrically conductive liquids with a minimum conductivity of 5µS/cm or higher. The combination of a robust compact design and tried-and-tested measurement technology guarantees a high degree of operational safety.

Designed for applications where space is a premium, it delivers maximum performance with the minimum footprint and is the ideal choice for system integrators, skid builders and equipment manufacturers.

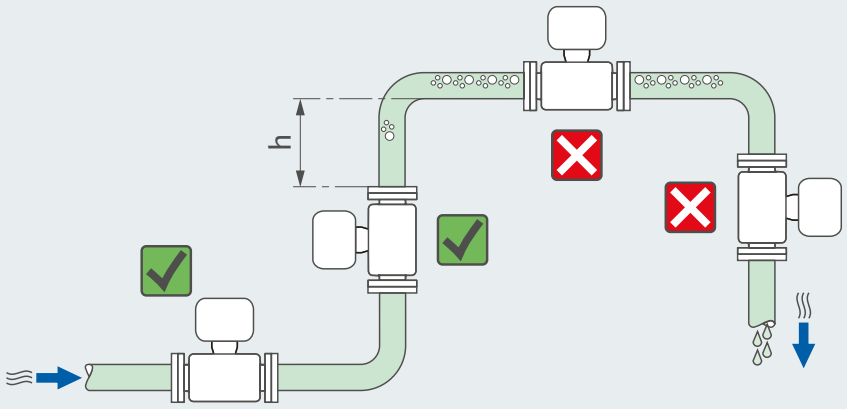
Technical data		Promag H 100	Promag P 100
Version	:	Hygienic (3-A and EHEDG compliant)	Process
Measured variables	:	Volume flow, temperature, conductivity, mass flow, corrected volume flow, corrected conductivity	Volume flow, conductivity, mass flow, corrected volume flow, corrected conductivity
Nominal diameter	:	DN2…150	DN15…600
Liner	:	PFA (-20°C…+150°C)	PFA (-20°C…+180°C), PTFE (-40°C…+130°C)
Output	:	4…20mA HART (active), pulse/frequency/switch output (passive)	4…20mA HART (active), pulse/frequency/switch output (passive)
Pressure	:	Up to PN40	Up to PN40
Protection	:	IP66/67, type 4X enclosure (IP69K optional)	IP66/67, type 4X enclosure
Communication	:	HART, PROFIBUS DP, MODBUS RS485, Ethernet/IP	HART, PROFIBUS DP, MODBUS RS485, Ethernet/IP
Hazardous area	:	ATEX, IECEx, cCSAus	ATEX, IECEx, cCSAus

Promag H 100 is 3-A and EHEDG compliant and is fully SIP and CIP cleanable. It is the preferred sensor for applications with highest requirements in the food & beverage and life science industries.

Promag P 100 is specially designed for chemical and process applications with corrosive liquids and high medium temperatures.

Installation

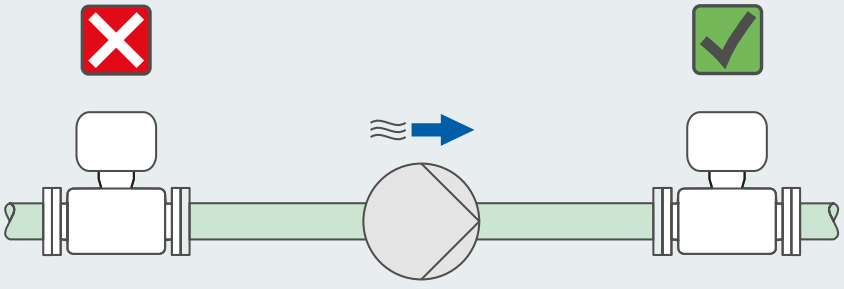
Ideally, install the sensor in a vertical pipe and ensure a sufficient distance to the next pipe elbow:
h ≥ 2 x DN



To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a downpipe.

System pressure

- Never install the sensor on the pump suction side in order to avoid the risk of low pressure and damage to the liner.
- Install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.



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Promag 200

2-wire loop-powered (4...20mA) electromagnetic flowmeter for measurement of conductive liquids.

Promag H 200

Promag P 200

WirelessHART

- **Proven technology**
- **Negligible pressure loss**
- **Immune to plant vibration**
- **Reduced wiring and installation costs**

Electromagnetic flowmeters can be used to measure electrically conductive liquids with a minimum conductivity of 20µS/cm or higher. The combination of a robust compact design and tried-and-tested measurement technology guarantees a high degree of operational safety. Promag 200 offers genuine, industry-compliant two-wire technology, enabling the device to be seamlessly integrated into existing infrastructures and control systems. Additional advantages are high operational safety in hazardous areas thanks to an intrinsically safe design (Ex ia) and a familiar installation procedure.

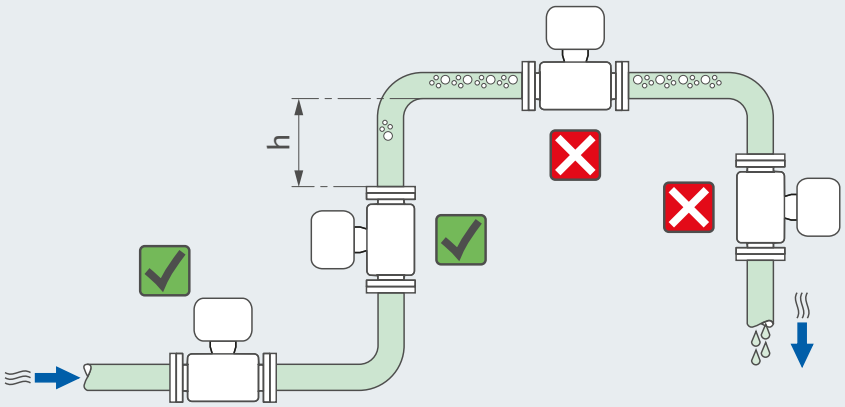
Technical data		Promag H 200	Promag P 200
Version	:	Hygienic (3-A and EHEDG complaint)	Process
Measured variables	:	Volume flow (proportional to induced voltage), mass flow (calculated)	Volume flow (proportional to induced voltage), mass flow (calculated)
Measuring range	:	0...18m³/h	0...1100m³/h
Display	:	4-line display with Touch Control	4-line display with Touch Control
Nominal diameter	:	DN2...25	DN15...200
Liner	:	PFA (-20°C...+150°C)	PFA (-20°C...+150°C), PTFE (-40°C...+130°C)
Output	:	4...20mA + pulse/frequency/status (configurable)	4...20mA + pulse/frequency/status (configurable)
Pressure	:	PN16...40	PN10...40
Protection	:	IP67 (NEMA 4x)	IP67 (NEMA 4x)
Communication	:	HART	HART
Hazardous area	:	ATEX, IECEx, cCSAu	ATEX, IECEx, cCSAu

Promag H 200 is 3-A and EHEDG compliant and is fully SIP and CIP cleanable. It is the preferred sensor for applications with highest requirements in the food & beverage and life science industries.

Promag P 200 is specially designed for chemical and process applications with corrosive liquids and high process temperatures. It is also suitable for applications with low flow rates.

Installation

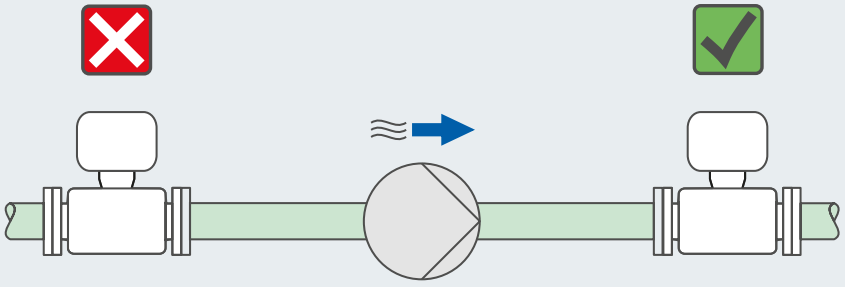
Ideally, install the sensor in a vertical pipe and ensure a sufficient distance to the next pipe elbow:
h ≥ 2 x DN



To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a downpipe.

System pressure

- Never install the sensor on the pump suction side in order to avoid the risk of low pressure and damage to the liner.
- Install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.



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Promag 300/500

Electromagnetic flowmeters with unsurpassed measuring performance under real process conditions.


Promag P 300


Promag H 300


Promag P 500


Promag 500 remote transmitter

- Wide range of wetted materials
- No pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Freely configurable I/O functionality
- Integrated verification with Heartbeat Technology

Promag 300 (compact housing) and Promag 500 (remote housing) make no compromise in measuring performance and accuracy. Digital signal processing starts right at the intelligent sensor and is the base for a truly multi-parameter measuring device. Process values such as mass flow, volume flow and conductivity can be measured with one single sensor. Offering a large variety of digital communication protocols including EtherNet/IP, Modbus RS485, PROFIBUS DP/PA, ProfiNet, FOUNDATION Fieldbus, HART and WirelessHART as well as fully freely configurable analogue outputs Promag 300/500 fulfils all expectation for a seamless system integration.

Technical data	H sensor	P sensor
Version	For the smallest flow quantities and demanding hygienic applications	Meets the highest requirements for the process industry
Measured variables	Direct: volume flow, electrical conductivity, temperature (DN15…150). Calculated: mass flow, corrected volume flow, corrected electrical conductivity.	Direct: volume flow, electrical conductivity. Calculated: mass flow, corrected volume flow.
Nominal diameter	DN2…150	DN15…600
Liner	PFA (USP Class VI, FDA 21 CFR 177.1550, 3-A)	PFA, PTFE
Housing	Stainless steel 1.4301	Coated aluminium or stainless steel
Process connection	Hygienic clamp, thread. Standard thread, flange.	Flange
Medium temperature	-20…+150°C	-40…+180°C
Hazardous area	ATEX, IECEx, cCSAu	ATEX, IECEx, cCSAu
Protection	IP68	IP66/67, type 4X enclosure
Approvals	3-A approval and EHEDG-certified with FDA-compliant seals (excludes Kalrez)	x

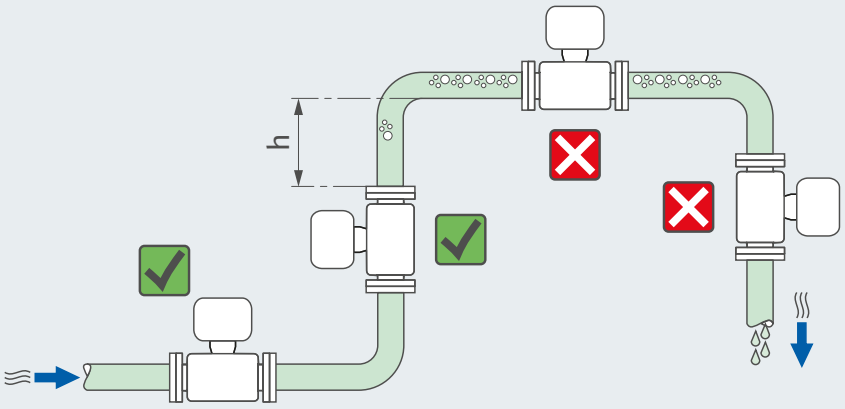
Additional features such as the on-board diagnostics and Heartbeat Technology verification tool ensure product and process safety. The complete device can be verified by the push of a button even from the control room without interrupting the process. In the case of a sensor or electronic problem, real text remedy instructions are provided for a fast and safe troubleshooting. A smart data handling system (HistoROM) makes the exchange of spare parts easy and reduces the downtime significantly. Calibration data and transmitter parameters are stored and automatically reloaded after a maintenance event.

Technical data — W sensor

Version	: For demanding applications in the water & wastewater industry
Measured variables	: Direct: volume flow, electrical conductivity. Calculated: mass flow.
Nominal diameter	: DN25...2000
Liner	: Polyurethane, hard rubber
Housing	: Coated aluminium or plastic
Process connection	: Flange
Medium temperature	: -20...+80°C
Hazardous area	: ATEX, IECEx, cCSAu
Protection	: IP66/67, type 4X enclosure
Approvals	: WRAS BS6920 drinking water

Installation

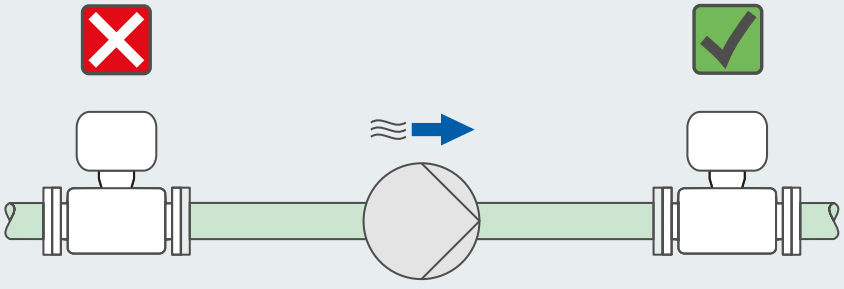
Ideally, install the sensor in a vertical pipe and ensure a sufficient distance to the next pipe elbow:
h ≥ 2 x DN



To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a downpipe.

System pressure

- Never install the sensor on the pump suction side in order to avoid the risk of low pressure and damage to the liner.
- Install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.



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Promag 400

Remote electromagnetic flowmeter for water and wastewater applications.

WirelessHART

- **Simultaneous measurement: volume flow and conductivity**
- **Immune to process influences**
- **Automatic data restore via HistoROM**

Unaffected by pressure and temperature, the Promag 400 electromagnetic flowmeter range offers accurate bidirectional measurement of liquids with a minimum conductivity of ≥5µS/cm in water and wastewater applications.

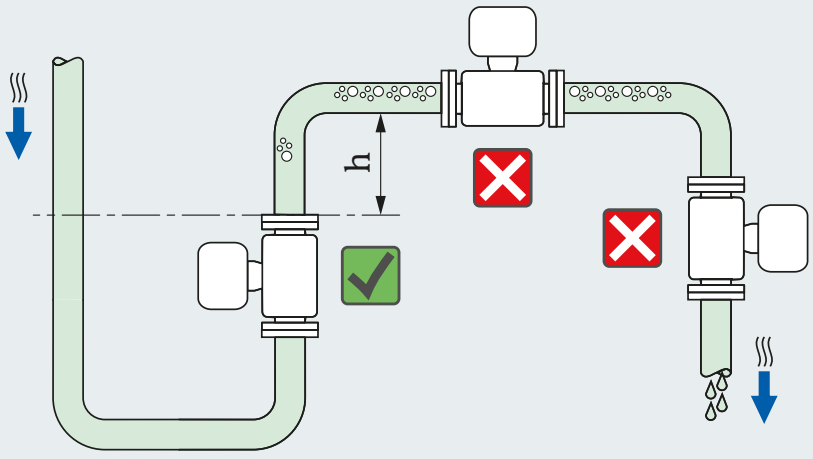
Technicdata	Proal mag D	Promag L	Promag W
Liner	: Polyamide	Hard rubber, polyurethane or PTFE	Hard rubber or polyurethane
Nominal diameter	: DN25...100	DN50...2400	DN50...2000 (rubber liner), DN25...1200 (polyurethane liner)
Conductivity	: ≥5µS/cm for liquids, ≥20µS/cm for demineralised water	≥5µS/cm for liquids, ≥20µS/cm for demineralised water	≥5µS/cm for liquids, ≥20µS/cm for demineralised water
Housing	: Polycarbonate	Polycarbonate	Polycarbonate
Process connection	: Wafer	Flange (lap joint)	Flange
Process temperature	: 0°C...+60°C	0°C...+80°C for hard rubber (DN350...2400), -20°C...+50°C for polyurethane (DN50...1200), -20°C...+90°C for PTFE (DN50...300)	0°C...+80°C for hard rubber (DN50...2000), -20°C...+50°C for polyurethane (DN25...1200)
Pressure	: Up to 16 bar	Up to 16 bar	Up to 40 bar
Communication	: 4...20mA HART, PROFIBUS DP, Ethernet/IP, MODBUS RS485	4...20mA HART, PROFIBUS DP, Ethernet/IP, MODBUS RS485	4...20mA HART, PROFIBUS DP, Ethernet/IP, MODBUS RS485
Certification	: KTW, WRAS, NSF, ACS	KTW, WRAS, NSF, ACS	KTW, WRAS, NSF, ACS
Protection	: IP66/67, type 4X enclosure	IP66/67, type 4X enclosure	IP66/67, type 4X enclosure (IP68, type 6P enclosure as an option)

Promag D: compact wafer device
- Space-saving compact design for use where space is at a minimum.
- Short installation length and lightweight.
- Customised and fast centring due to innovative housing construction.

Promag L: standard device
- Lap-joint flange concept (DN≤300) for flexible installation, independent of the orientation of the pipe flange pitch diameter.
- Lightweight with short installation lengths in accordance with ISO and DVGW norms.
- Compact design without limiting accuracy, repeatability etc.

Promag W: specialist device
- Approved for water custody transfer according to MI-001 and OIML R49.
- With certified corrosion protection and IP68 (type 6P enclosure) protection type for continuous underwater use, for corrosive environment (fulfils C5-M according to EN ISO 12944) and for direct underground installation (fulfils Im3 according to EN ISO 12944).

Installation



No special measures such as supports are necessary. External forces are absorbed by the construction of the device. It is preferable to install the sensor in a vertical pipe with upward flow.

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Dosimag H

Electromagnetic flowmeter for accurate and reliable batching and filling in conductive liquids.

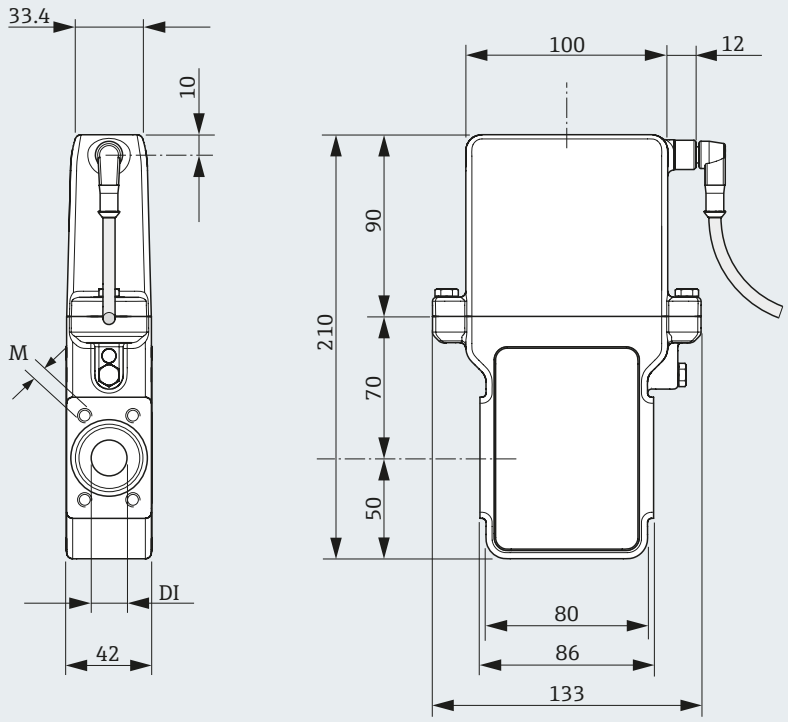
- Automatic function monitoring
- Easy cleaning
- Suitable for corrosive products
- Batch volume changing without process interruption
- 3-A and EHEDG approvals

Dosimag provides accurate and reliable batching and filling in conductive liquids. Its compact design means that it is ideal for installation on rotary and linear filling machines where space is at a premium. Offering 3-A and EHEDG approvals, it is ideal for the food and pharmaceutical industries or any process that includes CIP/SIP cleaning. Dosimag ensures the highest accuracy and repeatability for guaranteed process quality.

Technical data

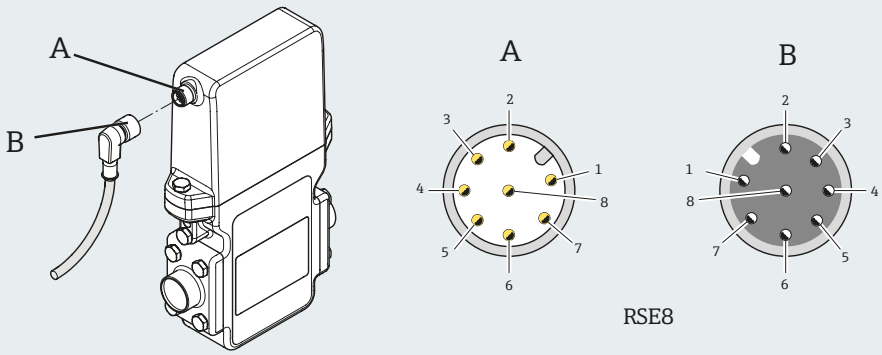
Nominal diameters	: DN2, 4, 8, 15
Lining	: PFA
Power supply	: 20...30V DC (pulsed output)
Protection	: IP67/NEMA 4X
Fluid conductivity	: >5µS/cm
Reproducibility	: ±0.1% o.r.

Dimensions (mm)



Electrical connections

A. Socket
B. Cable connector
1. (+) power supply 24V DC nominal voltage (20..30V DC, max 6W)
2. (-) power supply 24V DC nominal voltage (20..30V DC, max 6W)
3. (+) pulse, status output (max 30V)
4. (-) pulse output (max 100mA)
5. (+) status output (max 100mA)
6. Service interface
7. Service interface
8. Service interface



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Prowirl 200

Vortex flowmeter for volumetric and mass measurement of gas, steam and liquid.

WirelessHART

- **Tried-and-tested maintenance-free sensors: installed in over 300,000 applications worldwide.**
- **Robust sensors for high resistance to vibration, temperature shocks and water hammer.**
- **High process reliability: devices developed to IEC 61508 for SIL2/3.**
- **High repeatability (±0.2%).**

Whether it is reliable control at high pressures and temperatures or reliable measured values during continuous operation, Prowirl 200 has been designed to meet your needs. The fields of application in the chemical, petrochemical, life sciences, power engineering and food industries, for example, involve a wide variety of fluids:

- Wet steam, saturated steam, superheated steam
- Compressed air, nitrogen, oxygen, natural gas
- Liquefied gases, cryogenic liquids
- Demineralized water, boiler feedwater, condensates
- Solvents, coolants, heat transfer oils, etc.

Technical data	Prowirl D 200	Prowirl F 200
Version	: Wafer	Flange
Measured variables	: Volume flow, mass flow, corrected volume flow, energy flow, heat flow difference, temperature	Volume flow, mass flow, corrected volume flow, energy flow, heat flow difference, temperature
Nominal diameter	: DN15...150	DN15...300
Display	: 4-line backlit display with touch control	4-line backlit display with touch control
Output	: 4...20mA, 4...20mA HART, pulse/frequency/switch	4...20mA, 4...20mA HART, pulse/frequency/switch
Input	: 4...20mA	4...20mA
Pressure	: Up to PN40	Up to PN40
Temperature	: -40°C...+260°C (standard), -200°C...+450° (request)	-40°C...+260°C (standard), -200°C...+450° (request)
Protection	: IP66/67, type 4X enclosure	IP66/67, type 4X enclosure
Communication	: HART, PROFIBUS PA, FOUNDATION Fieldbus	HART, PROFIBUS PA, FOUNDATION Fieldbus
Hazardous area	: ATEX, IECEx, cCSAus	ATEX, IECEx, cCSAus

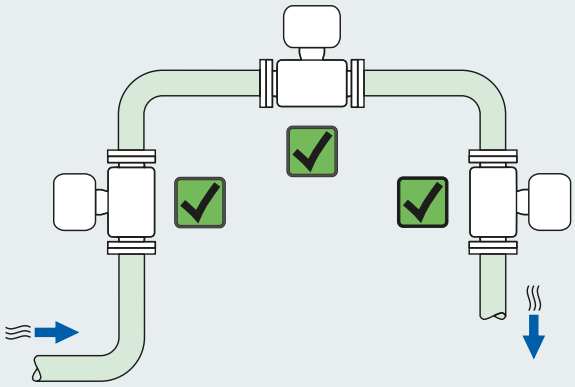
In addition, Prowirl 200 has several functions that are unique worldwide, thus ensuring maximum flexibility for plant design and highest reliability in operation:

- Wet steam alarm for reliable and efficient steam plant operation
- Inlet-run correction function for exact mea¬surements even when installation space is at a minimum
- Heartbeat Technology for continuous self-diagnosis and simple device verification at one's fingertips without process interruption
- Gas mixtures can be freely defined with up to eight components
- Steam and gas data in accordance with interna¬tional standards: IAPWS-IF97, AGA8, AGA5, SGERG, ISO 6976, etc.

Technical data	Prowirl O 200	Prowirl R 200
Version	: High pressure	Reducer
Measured variables	: Volume flow, mass flow, corrected volume flow, energy flow, heat flow difference, temperature	Volume flow, mass flow, corrected volume flow, energy flow, heat flow difference, temperature
Nominal diameter	: DN15...150	DN25...250
Display	: 4-line backlit display with touch control	4-line backlit display with touch control
Output	: 4...20mA, 4...20mA HART, pulse/frequency/ switch	4...20mA, 4...20mA HART, pulse/frequency/ switch
Input	: 4...20mA	4...20mA
Pressure	: Up to PN250	Up to PN40
Temperature	: -40°C...+260°C (standard), -200°C...+450° (request)	-40°C...+260°C (standard), -200°C...+450° (request)
Protection	: IP66/67, type 4X enclosure	IP66/67, type 4X enclosure
Communication	: HART, PROFIBUS PA, FOUNDATION Fieldbus	HART, PROFIBUS PA, FOUNDATION Fieldbus
Hazardous area	: ATEX, IECEx, cCSAus	ATEX, IECEx, cCSAus

Installation

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping). Vortex meters require a fully developed flow profile as a prerequisite for correct volume flow measurement. At all times, please apply good engineering practice.

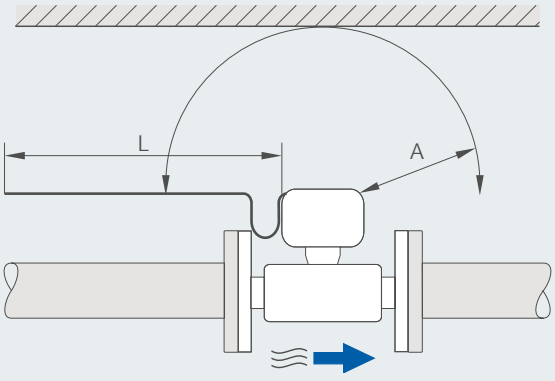


Spacing

Minimum spacing and cable length

A = Minimum spacing in all directions
L = Required cable length

The following dimensions must be observed to guarantee problem-free access to the device for service purposes:
- A = 100mm
- L = L + 150mm



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t-mass 65F/65I

Thermal mass flowmeter for the direct mass flow measurement of gas.

t-mass 65F

t-mass 65I

WirelessHART

- **Negligible pressure loss**
- **Wide turndown (100:1)**
- **ATEX, FM and CSA certified**
- **Wide range of pipe sizes (DN15...1500)**
- **Integrated 'gas engine'**
- **Wet gas installation dependent**

Proven in a wide range of gas flow applications, the t-mass 65 thermal mass flowmeter is the ideal solution for direct mass flow measurement of compressed air, biogas and other utility gas applications. With a turndown of typically 100:1 and a negligible pressure loss, t-mass 65 is capable of accurate measurement of both low flow rates and leakage, which allows users to optimise plant performances.

With its integrated 'gas engine', users can select from a list of 20 pure gases such as air, nitrogen, oxygen etc and you can even customise a specific gas mixture which is ideal for the measurement of biogas. This allows you to select and programme the pure gas or gas mixture directly on the device, reducing the reliance on factory pre-sets and allowing the user to configure t-mass to suit the requirements of the individual application. t-mass 65, with its online diagnostics, field replaceable sensors, integrated gas tables and Quick Setup operating menu, offers a maintenance-friendly and time-saving direct gas mass flow measurement.

- Compressed air generation and distribution
- Natural gas flow to boilers/dryers
- Biogas
- Oxygen and nitrogen metering
- Aeration air
- Leak detection

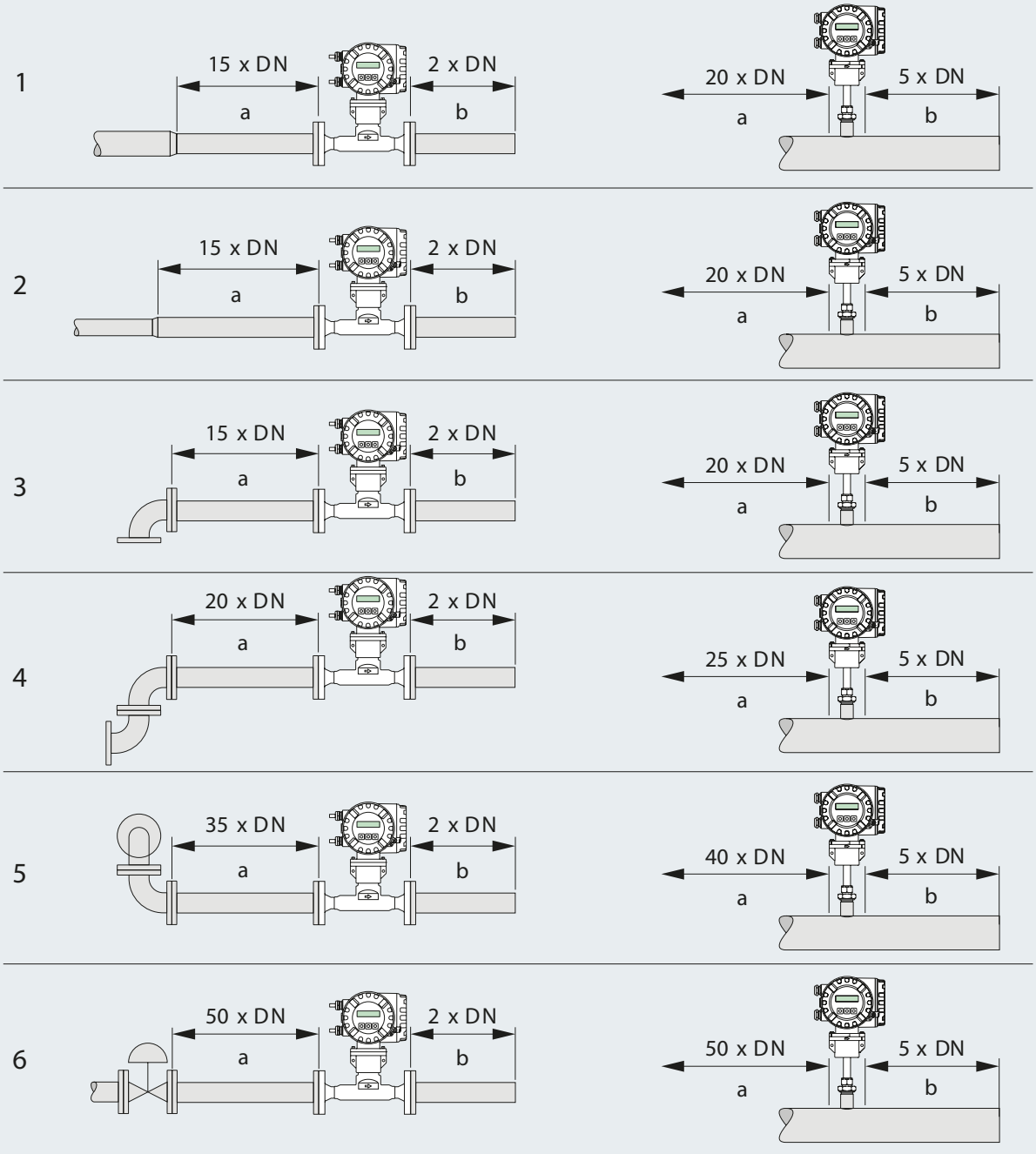
Technical data

Transmitter	: 2-line LCD display, pushbutton configuration
Size	: DN15...100 (65F), DN80...1500 (65I)
Supply voltage	: 5...260VAC, 20...55VAC, 16...62VDC
Output	: Current output: active 0/4...20mA passive 4...20mA, 18...30VDC pulse / frequency output: active 24VDC, 25mA passive 30VDC
Measuring range	: 0.5...720,000kg/h

Installation

The minimum recommended inlet and outlet runs expressed in multiples of the pipe diameter.

1 = reduction
2 = extension
3 = 90° elbow or T-piece
4 = 2 x 90° elbow
5 = 2 x 90° elbow, 3-dimensional
6 = control valve (where possible a modulating control valve should be mounted downstream of a flowmeter)
a = inlet run
b = outlet run



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t-mass A 150/B 150

Thermal mass flowmeter for the measurement of utility gases such as air, nitrogen, carbon dioxide and argon.

t-mass A 150

t-mass B 150

WirelessHART

- **Negligible pressure loss**
- **Multivariable: mass flow, corrected volume flow, FAD volume flow and temperature**
- **Integrated 'gas engine'**

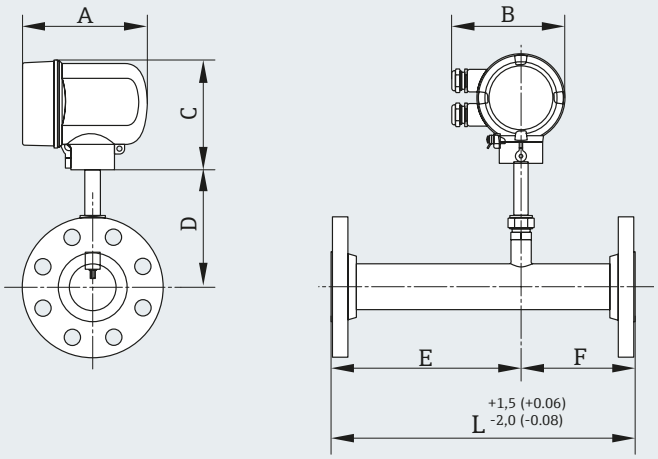
Whether for monitoring and controlling compressed air networks, cost allocation, leak detection or use in energy management systems, the t-mass 150, with its high turndown of up to 100:1, can reliably measure the smallest gas quantities even with very low operating pressures.

As a multivariable flowmeter, the t-mass 150 measures not only the mass flow but also corrected volume flow, process fluid temperature and free air delivery (FAD). Due to the thermal measuring principle, no pressure or temperature compensation is required. Thanks to the device's integrated 'gas engine', the t-mass 150 offers outstanding flexibility as it is possible to change between one utility gas and another without the need for recalibration.

Technical data		A 150 (inline)	B 150 (insertion)
Direct measured variables	:	Mass flow, gas temperature	Mass flow, gas temperature
Calculated measured variables	:	Corrected volume flow, FAD volume flow	Corrected volume flow, FAD volume flow
Version	:	Inline	Insertion
Nominal diameter	:	DN15...50	DN80...1500
Process connection	:	Threaded, flanged	Threaded, flanged
Process temperature	:	-40°C...+100°C	-40°C...+100°C
Pressure	:	Up to 40 bar	Up to 20 bar
Repeatability	:	±0.5% of value for velocities > 1.0m/s	±0.5% of value for velocities > 1.0m/s
Communication	:	4...20mA HART (pulsed frequency)	4...20mA HART (pulsed frequency)
Certification	:	Non-hazardous areas	Non-hazardous areas
Protection	:	IP66/67, type 4X enclosure	IP66/67, type 4X enclosure

With a wide variety of process connections (threaded, flanged or lap-joints), t-mass 150 is suitable for installation in rectangular ducts or pipes (DN15...1500) with both inline (A 150) and insertion (B 150) versions available. Better still, t-mass 150 offers maintenance-free operation with negligible pressure loss.

Dimensions (mm)



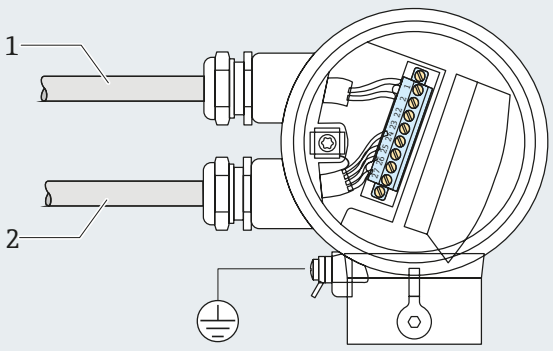
Dimensions in SI units

DN (mm)	A[1] (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	L (mm)
15	146	133	129	109	153	92	245
25	146	133	129	1115	153	92	245
40	146	133	129	110	200	120	320
550	146	133	129	116	250	150	400

1) For version without local display : values - 7 mm

Electrical connection

1. Cable entry for supply voltage
2. Cable entry for signal transmission



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t-mass T 150

Thermal mass flowmeter for measurement of liquid.

WirelessHART

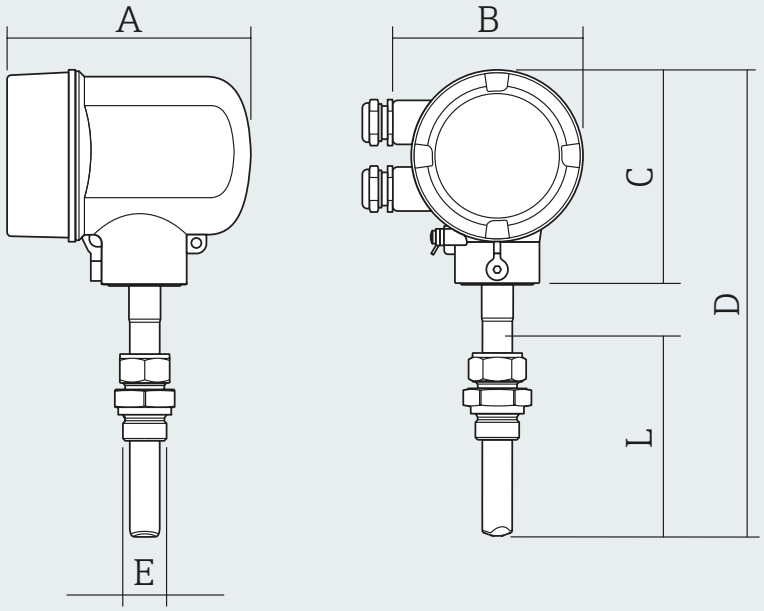
- Negligible pressure loss
- Suitable for SIP up to 130°C
- Standard and hygienic process connections
- Multivariable: reliable flow trending

Designed chiefly for water applications, the t-mass T 150 measures independently of the electrical conductivity of a fluid and can be used in a variety of water-based and non-water-based liquids for the purpose of monitoring and trending. Customer-specific settings are saved on the display and can be easily transferred from one device to another.

t-mass T 150 offers high process safety with high repeatability and linearity due to integrated temperature compensation and measurement is cost-effective with easy installation, negligible pressure loss and virtually no maintenance required! Better still, with 3-A and EHEDG approvals, t-mass T 150 is suitable for hygienic applications with SIP cleaning up to 130°C.

Technical data	T 150 (insertion)
Direct measured variables	: Conductive and non-conductive liquids
Calculated measured variables	: Mass flow, temperature
Version	: Insertion
Nominal diameter	: DN40...1000
Process connection	: Threaded, hygienic
Process temperature	: -20°C...+100°C (SIP: up to +130°C for 1 hour)
Pressure	: Up to 40 bar
Repeatability	: ±0.5% of value for velocities > 0.2m/s
Communication	: 4...20mA HART (pulsed frequency)
Certification	: ATEX, IECEx, CSA, 3-A, EHEDG
Protection	: IP66/67, type 4X enclosure

Dimensions (mm)



Dimensions in SI units

Order code for 'Insertion Length'	L [mm]	A[1)] [mm]	B [mm]	C [mm]	D [mm]	E [mm]
L5	110	146	115	129	280	2)
L6	330	146	115	129	500	2)

1) For version without local display : values -7 mm
2) Dependent on respective process connection

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Promass 40E

Coriolis mass flowmeter for liquid and gas – the mechanical meter replacement.

WirelessHART

- No moving parts – maintenance-free
- Suitable for SIP/CIP cleaning
- Compact design for simple and flexible installation
- Measurement is independent of fluid properties

Applications

For straightforward, less demanding applications, Promass 40E offers amazing value for money. As no regular maintenance of the instrument is required, Promass 40E offers significant cost savings over traditional mechanical meters.

Promass 40E provides cost-effective mass or volume flow measurement for:

- Additives
- Oils & greases
- Acids & alkalis
- Lacquers & paints
- Suspensions
- Gases

Technical data

Transmitter

Measuring range	: 100kg/h...180 ton/h Current output active, 0/4...20mA, max 700Ω (HART) passive, 4...20mA, max 150Ω, max 30V DC Impulse/frequency output open collector (passive), Umax 30V DC, Imax 250mA
Frequency output	: 2...1000Hz on/off ratio 1:1, pulse length max 10 sec
Impulse output	: Impulse length 0.05...2 sec
Input signal	: Umax 3...30V DC, Ri=5kΩ, galvanically isolated. Configurable for totaliser reset, measured value suppression, error message reset, start zero point.
Programming	: via HART or FieldTool software
Power supply	: 85...260V/45...65Hz or 20...55V/45...65Hz or 16...62V DC

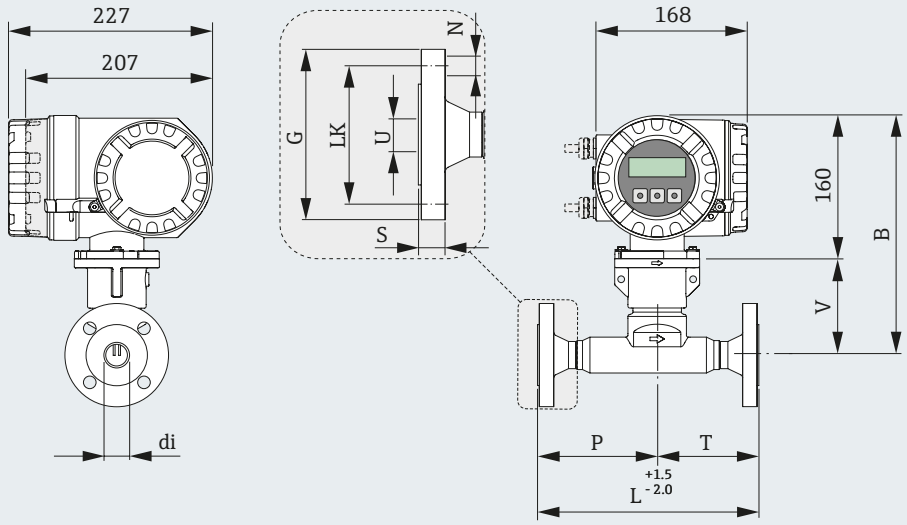
Sensor

Diameters	: DN8, 15, 25, 40, 50, 80
Tube material	: Stainless steel 1.4539 (904L)
Process connection	: Stainless steel
Temperature range	: -40...+125°C
Maximum pressure	: PN100 (dependent on process connection)

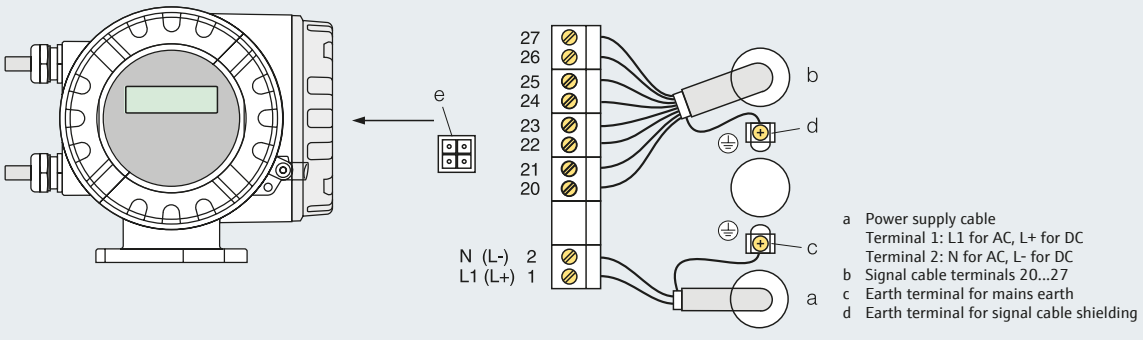
The Promass 40E sensor has been expertly designed for measurement of mass and volume flow in gases and liquids and is a superior alternative to conventional volumetric flowmeters. Its high turndown ensures accurate results over a large flow range.

Promass 40E is compact and flexible in its installation. Measurement is independent of fluid properties and hence is not sensitive to changes in viscosity, temperature and pressure in the process, guaranteeing intelligent, reliable and safe measurement over a long lifetime. Promass 40E is available with hazardous area and hygienic approvals (3-A) for use throughout industry. It offers IP67 protection.

Dimensions (mm)



Electrical connections



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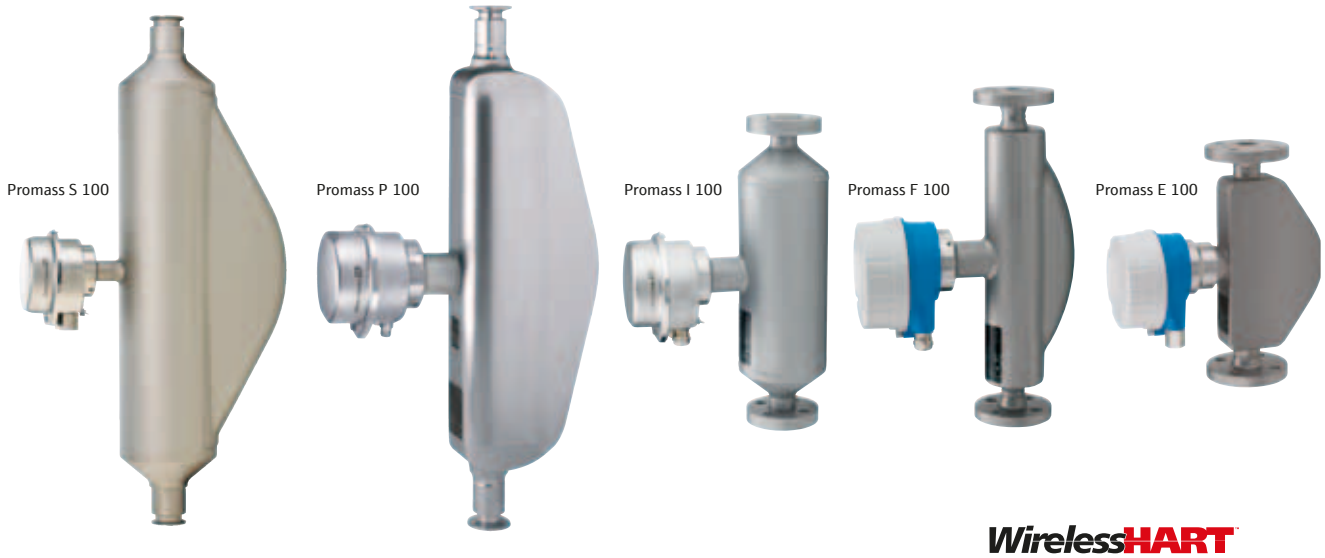
Promass 100

Ultra compact Coriolis mass flowmeter.



WirelessHART

- Excellent price/performance ratio
- Compact space-saving design
- Seamless integration into process control and asset management systems
- No data loss: automatic data storage and restoration via HistoROM

Small in size but big in performance, the Promass 100 Coriolis mass flowmeter range is the first stop for reliable mass flow measurement for system integrators, skid builders and equipment manufacturers. Process values such as mass flow, volume flow, density and temperature can be measured with a single sensor and it offers a variety of digital communication protocols including Ethernet/IP, Modbus RS485, PROFIBUS DP and HART.

Additional features such as the on-board diagnostics and 'Heartbeat technology' verification tool ensure product and process safety. The

Technical data

Transmitter

Measuring range	:	2,220 ton/h
Communication	:	4...20mA HART, pulse/frequency/switch, Modbus RS485, Ethernet/IP (PROFIBUS DP in preparation)
Operation	:	FieldCare, web browser

Sensor		Promass E 100	Promass F 100	Promass I 100
Sensor type	:	Curved-tube	Curved-tube	Straight-tube
Size	:	DN8...80	DN8...250	DN8...80
Process temperature	:	-40°C...+140°C	-50°C...+150°C (-50°C...+200°C optional)	-50°C...+150°C
Wetted parts	:	Stainless steel 1.4539/904L	Stainless steel 1.4539/904L, 1.4404/316L, Alloy C-22 2.4602/N 06022	Titanium, Ti Grade 9
Process connection	:	Stainless steel 1.4539/904L	Stainless steel 1.4404/316L, Alloy C-22 2.4602/N 06022	Titanium, Ti Grade 2, stainless steel 1.4301/304
Protection	:	IP66/67, type 4X enclosure (IP69K optional)	IP66/67, type 4X enclosure (IP69K optional)	IP66/67, type 4X enclosure (IP69K optional)
Surface quality	:	N/A	N/A	N/A
Certification	:	ATEX, IECEx, cCSAus, NEPSI	ATEX, IECEx, cCSAus, NEPSI	ATEX, IECEx, cCSAus, NEPSI
Hygienic approvals	:	3-A	3-A, EHEDG	3-A, EHEDG

complete sensor including measuring tubes and electronics can be verified at the push of a button (as an option). An additional monitoring system is continuously online and guarantees that the process is safe by ensuring that the meter is in good operating condition. In the case of a sensor or electronic problem, plain text remedy instructions are provided for fast troubleshooting. A smart data handling system (HistoROM) makes the exchange of spare parts easy and reduces the downtime significantly. Calibration data and transmitter parameters are stored and automatically reloaded after a maintenance event.

Promass 100 can be commissioned either from the control room via fieldbus or locally with the webserver. The webserver allows the user to connect with the device with a standard laptop computer without any additional tools, software or communication boxes. All that is required is a laptop with a standard web-browser, a LAN network cable and a laptop with a RJ45 network plug. Webserver functionality includes full parameter access, up/download of parameter settings, troubleshooting and device diagnostics.

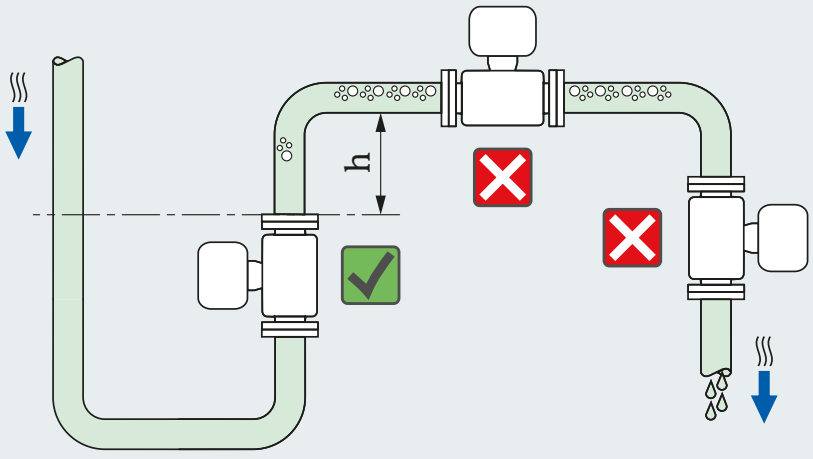
Technical data

Transmitter

Measuring range	: 2,220 ton/h
Communication	: 4...20mA HART, pulse/frequency/switch, Modbus RS485, Ethernet/IP (PROFIBUS DP in preparation)
Operation	: FieldCare, web browser

Sensor	Promass P 100	Promass S 100
Sensor type	: Hygienic: life sciences	Hygienic: food & beverage
Size	: DN8...50	DN8...50
Process temperature	: -50°C...+150°C (-50°C...+200°C optional)	-50°C...+150°C
Wetted parts	: Stainless steel 1.4435/316L	Stainless steel 1.4539 /904L
Process connection	: Stainless steel 1.4435/316L, stainless steel 1.4404/316/316L	Stainless steel 1.4435/316L, stainless steel 1.4404/316/316L
Protection	: IP66/67, type 4X enclosure (IP69K optional)	IP66/67, type 4X enclosure (IP69K optional)
Surface quality	: Ramax 0.76µm (mechanically polished), Ramax 0.38µm (electropolished)	N/A
Certification	: ATEX, IECEx, cCSAus, NEPSI	ATEX, IECEx, cCSAus, NEPSI
Hygienic approvals	: 3-A, EHEDG	3-A, EHEDG

Installation



No special measures such as supports are necessary. External forces are absorbed by the construction of the device. It is preferable to install the sensor in a vertical pipe with upward flow.

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Promass 200

Coriolis mass flowmeter with true 2-wire technology (4...20mA).

Promass E 200

Promass F 200

WirelessHART

- Reduced installation and wiring costs
- Maintenance-free
- Simultaneous measurement of mass, density, volume and temperature
- Immune to pipe vibrations

By using state-of-the-art low power electronic components, Endress+Hauser succeeded in combining the accuracy and repeatability attributed to Coriolis technology with the cost and safety benefits of 2-wire devices. With line sizes in DN8 to DN50, Promass 200 simultaneously measures the mass flow, fluid density and temperature across a range of liquids and gases offering outstanding accuracy and repeatability for improved process control.

Meeting all industry requirements

In the chemical and petrochemical industries, 2-wire measuring devices are in high demand, as intrinsic safety is extremely important especially in hazardous areas. Promass 200 meets all the relevant standards in the

Technical data

Transmitter

Measuring range	:	70,000kg/h
Communication	:	4...20mA HART, pulse/frequency/switch, PROFIBUS PA
Operation	:	Pushbuttons or Touch Control
Power supply	:	2-wire integration (18...30V DC), Imax 22mA

Sensor		Promass E 200	Promass F 200
Size	:	DN8...50	DN8...50
Process temperature	:	-40°C...+140°C	-50°C...+150°C (-50°C...+200°C as an option)
Wetted parts	:	1.4539/904L stainless steel tubes	1.4539/904L stainless steel tubes, Alloy C-22 tubes
Process connection	:	Stainless steel 1.4404/316L (except flanges as per JIS B2220), SUS 316L (only for flanges as per JIS B2220)	Stainless steel 1.4404/316L (except flanges as per JIS B2220), SUS 316L (only for flanges as per JIS B2220)
Protection	:	IP66/67 (NEMA4X)	IP66/67 (NEMA4X)
Certification	:	ATEX, IECEx, cCSAus	ATEX, IECEx, cCSAus
SIL rating	:	Up to SIL2	Up to SIL2
Hygienic approvals	:	3-A	3-A, EHEDG

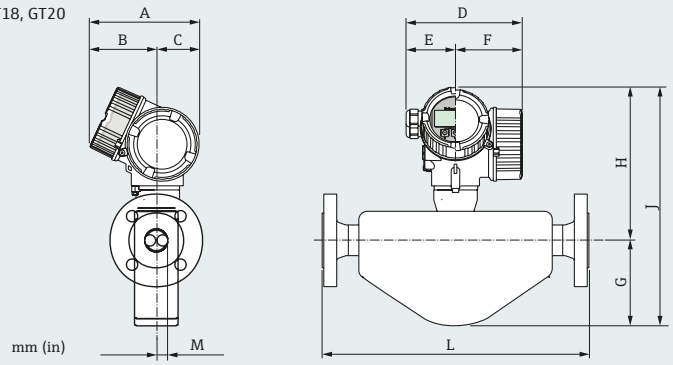
process industry such as NAMUR, HART and SIL. For example, both self-monitoring and error diagnostics are strictly in accordance with the specifications of NE107 (NAMUR), guaranteeing a high degree of operational safety and maximum system availability.

Sophisticated technology, simple operation

Another outstanding feature of the Promass 200 is its innovative, user-specific and task-orientated operating concept - operator, maintenance and expert menus can be called up immediately at the touch of a button. Intuitive menu-guided operation incorporating simple wizards leads users through the configuration process, with handy 'tool tips' to provide additional resource where needed. In the event of an error, remedy information is immediately displayed.

Dimensions (mm) - Promass E 200

Compact version with transmitter housings GT18, GT20

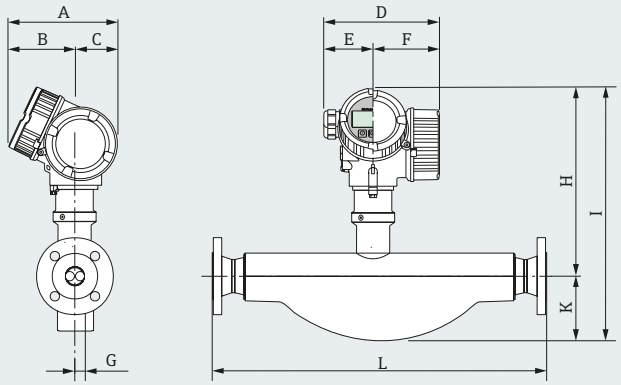


Dimensions in SI units for version without overvoltage protection

DN	A	B [1]	C	D	E	F	G	H [2]	J [2]	L	M
8	162	102	60	165	75	90	93	211	304	[3]	5.35
15	162	102	60	165	75	90	105	213	318	[3]	8.3
25	162	102	60	165	75	90	106	218	324	[3]	12
40	162	102	60	165	75	90	121	224	345	[3]	17.6
50	162	102	60	165	75	90	169.5	240	409.5	[3]	26

1 = For version without local display: values - 7mm
2 = For version without local display: values - 10mm
3 = Dependent on respective process connection

Dimensions (mm) - Promass F 200



Dimensions in SI units

DN	A	B [1]	C	D [2]	E	F [2]	G	H [3]	I [3]	K	L
8	162	102	60	165	75	90	5.35	268	343	75	[4]
15	162	102	60	165	75	90	8.30	268	343	75	[4]
25	162	102	60	165	75	90	12.0	268	343	75	[4]
40	162	102	60	165	75	90	17.6	273	378	105	[4]
50	162	102	60	165	75	90	26.0	283	424	141	[4]

1) = For version without local display: values - 7 mm
2) = For version without overvoltage protection (OVP): values + 8 mm
3) = For version without local display: values - 10 mm
4) = Dependent on respective process connection

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Promass 300/500

Coriolis mass flowmeters for use across the process industries.

- Immune to fluctuating and harsh environments
- Multivariable measurement (flow, density, temperature)
- Space-saving installation – no inlet/outlet runs needed
- Freely configurable I/O functionality
- Integrated verification with Heartbeat Technology

Promass 300/500 Coriolis mass flowmeters make no compromise in measuring performance and accuracy, offering a truly multi-parameter measuring device. With a large variety of digital communication protocols and freely configurable analogue outputs, Promag 300/500 fulfils all expectation for seamless system integration.
Additional features such as the on-board diagnostics and Heartbeat Technology verification tool ensure product and process safety. The complete device can be verified by the push of a button even from the control room without interrupting the process. In the case of a sensor or electronic problem, real text remedy instructions are provided for a fast and safe troubleshooting. A smart data handling system (HistoROM) makes the exchange of spare parts easy and reduces the downtime significantly. Calibration data and transmitter parameters are stored and automatically reloaded after a maintenance event.

Technical data		300 transmitter	500 transmitter
Type	:	Compact	Remote/digital remote
Sensor	:	A, E, F, H, I, O, P, Q, S, X	A, E, F, H, I, O, P, Q, S, X
Measured variables	:	Mass flow, density, temperature, viscosity (Promass I)	Mass flow, density, temperature, viscosity (Promass I)
Calculated variables	:	Volume flow, corrected volume flow, reference density, concentration	Volume flow, corrected volume flow, reference density, concentration
Outputs	:	Up to 3 I/O	Up to 4 I/O (digital remote)
Communication	:	Analogue, HART, WirelessHART, PROFIBUS PA, PROFIBUS DP, PROFINET, FOUNDATION Fieldbus, EtherNet/IP, Modbus RS485	Analogue, HART, WirelessHART, PROFIBUS PA, PROFIBUS DP, PROFINET, FOUNDATION Fieldbus, EtherNet/IP, Modbus RS485
Approvals	:	ATEX, IECEx, CSA, EAC, INMETRO, NEPSI	ATEX, IECEx, CSA, EAC, INMETRO, NEPSI
Ingress protection	:	IP66/67	IP66/67, optional IP69K

Technical data	A sensor	E sensor	F sensor
Version	Accurate measurement of small quantities of liquids and gases	Small dual-tube sensor	Premium dual tube sensor for demanding applications
Transmitter	Compact (300) and remote (500)	Compact (300) and remote (500)	Compact (300) and remote (500)
Measuring range	Up to 450kg/h	Up to 180,000kg/h	Up to 2,200,000kg/h
Nominal diameter	DN 1 to 4	DN 8 to 80	DN 8 to 250
Process connection	Cajon 4-VCO-4, Tri-clamp, Adaptors for flanged & threaded connections	Flange (DIN/ANSI/JIS), Hygienic (Tri-clamp, DIN, SMS)	Flange (DIN/ANSI/JIS), Hygienic (Tri-clamp, DIN, SMS)
Medium temp.	Up to 205°C	Up to 150°C	Up to 350°C
Process pressure	Up to 400 bar	Up to 100 bar	Up to 100 bar
Wetted parts	904L & 316L, Alloy C	904L & 316L	904L & 316L, Alloy C
Approvals	Ex, SIL, 3-A, EHEDG, CRN	Ex, SIL, PED, 3-A, EHEDG, CRN	Ex, SIL, PED, 3-A,EHEDG, NACE, CRN, Marine (ABS, LR, BV, DNV GL)

Technical data	H sensor	P sensor	Q sensor
Version	Single-tube sensor for aggressive chemical applications	Hygienic drainable sensor for the life sciences industry	Specialist sensor for challenging applications with gas entrainment
Transmitter	Compact (300) and remote (500)	Compact (300) and remote (500)	Compact (300) and remote (500)
Measuring range	Up to 70,000kg/h	Up to 70,000kg/h	Up to 550,000kg/h
Nominal diameter	DN 8 to 50	DN 8 to 50	DN 25 to 100
Process connection	Flange (DIN/ANSI/JIS)	Flange (DIN/ANSI/JIS), Hygienic (Tri-clamp, DIN, SMS)	Flange (DIN/ANSI/JIS), Hygienic (Tri-clamp, DIN, SMS)
Medium temp.	Up to 205°C	Up to 205°C	Up to 205°C
Process pressure	Up to 40bar	Up to 40 bar	Up to 100 bar
Wetted parts	Zirconium 702, Tantalum	316L	316/316L
Approvals	Ex, SIL, PED, CRN	Ex, SIL, PED, 3-A, EHEDG, CRN, CoC-ASME BPE	Ex, SIL, PED, 3-A, EHEDG, CRN, NACE (MR 0175, MR0103)

Technical data	S sensor	X sensor
Version	Single-tube flowmeter for food & beverage applications	High capacity four-tube flowmeter for the oil & gas industry
Transmitter	Compact (300) and remote (500)	Compact (300) and remote (500)
Measuring range	Up to 70,000kg/h	Up to 4,100,000kg/h
Nominal diameter	DN 8 to 50	DN 300 to 400
Process connection	Flange (DIN/ANSI/JIS), Hygienic (Tri-clamp, DIN, SMS), thread	Flange (DIN/ANSI)
Medium temp.	Up to 150°C	Up to 180°C
Process pressure	Up to 40 bar	Up to 100 bar
Wetted parts	316L	316/316L
Approvals	Ex, SIL, PED, 3-A, EHEDG, CRN	Ex, SIL, PED, NACE (MR0175, MR0103), CRN, Custody transfer (NTEP, MC, MI-002, MI-005, PTB, OIML R137, OIML R117 NTEP)

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Dosimass H

Coriolis mass flowmeter for batching and filling applications.

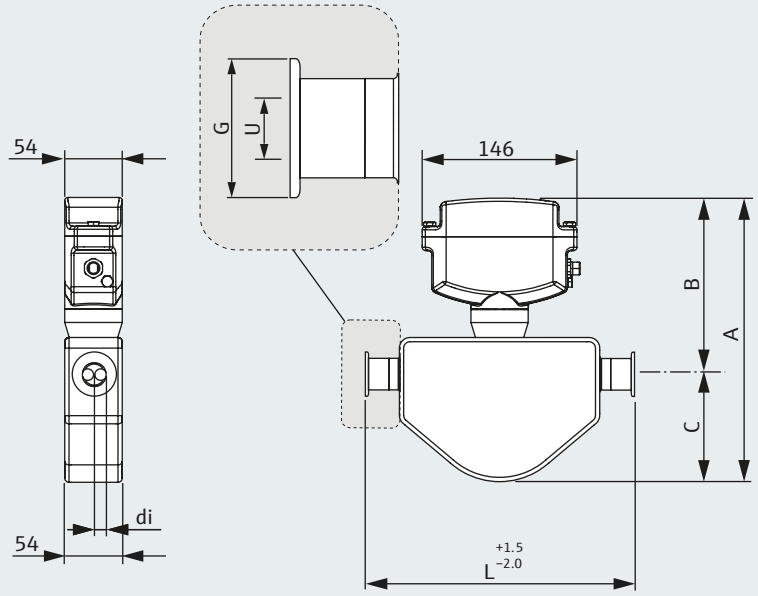
- Highly accurate
- Suitable for CIP/SIP cleaning
- Suitable for corrosive products
- 3-A approval
- ATEX, FM, CSA

With space at a premium in many line and rotary filling machines, Dosimass is lightweight and compact, designed specially for use in filling and bottling applications. Even in demanding process conditions with short filling intervals or small quantities, it provides reliable, repeatable results. Maintenance-free and 3-A and EHEDG certified, Dosimass is the perfect replacement for conventional piston-type bottlers. It is ideal for hygienic applications as it is suitable for both CIP and SIP cleaning. Dosimass measures mass flow or volume flow to suit your requirements and with built-in temperature and density compensation, maximum repeatability is maintained at all times. What's more, Dosimass features self-monitoring and diagnosis functions to recognise and overcome problems immediately and to keep your plant running at optimum.

Technical data

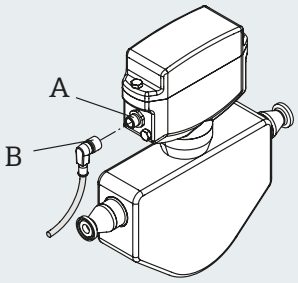
Nominal diameters	: DN8, 15, 25
Power supply	: 20...30V DC (pulsed)
Protection	: IP67/NEMA 4X
Reproducibility	: ±0.1% o.r.

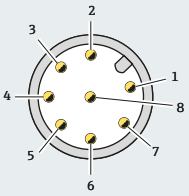
Dimensions (mm)



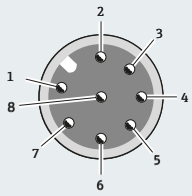
Electrical connections

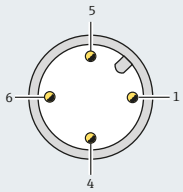
A. Socket
B. Cable connector
1. (+) power supply 24V DC nominal voltage (20..30V DC, 4.3W)
2. (-) power supply 24V DC nominal voltage (20..30V DC, 4.3W)
3. (+) pulse, status output (max 30V)
4. (-) pulse output (max 250mA)
5. (+) status output (max 250mA)
6. Service interface
7. Service interface
8. Service interface



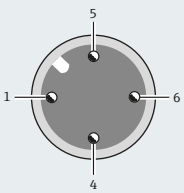


RSE8





RSE4



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Prosonic Flow 91W

Clamp-on ultrasonic flowmeter.

WirelessHART

- Low cost clamp-on technology
- No process interruption
- No pressure loss
- Simple installation and commissioning, even retrofitting

Endress+Hauser's Prosonic Flow 91W clamp-on ultrasonic flowmeter offers outstanding performance at an attractive price. Because of its non-invasive clamp-on installation, Prosonic Flow 91W performs well irrespective of internal pipe pressure, under process temperatures -20 to 130°C and has a measuring range of 0 to 15m/s.

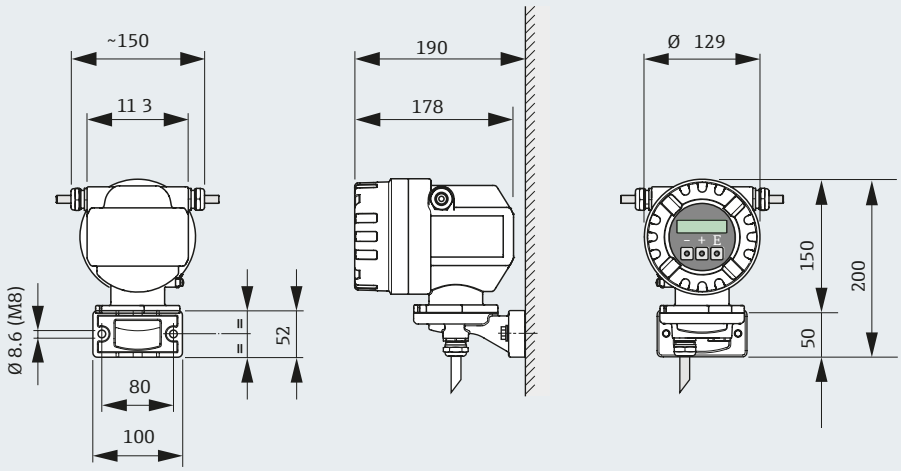
Prosonic Flow 91W is designed for both hot and cold water applications and is suitable for use on the wide variety of materials used for water service pipe systems, from PVC to stainless steel. Prosonic Flow 91W also benefits from a wide pipe diameter range of DN50...4000, making it the most cost-effective flowmeter on the market. Whilst conventional flowmeters increase in cost as pipe diameter increases, Prosonic Flow 91W is the same price irrespective of diameter - making it the ideal solution for pipes from DN200! The compact design of the transmitter, along with the inclusive tooling package, supports safe and simple use from planning and installation to commissioning and maintenance.

Technical data

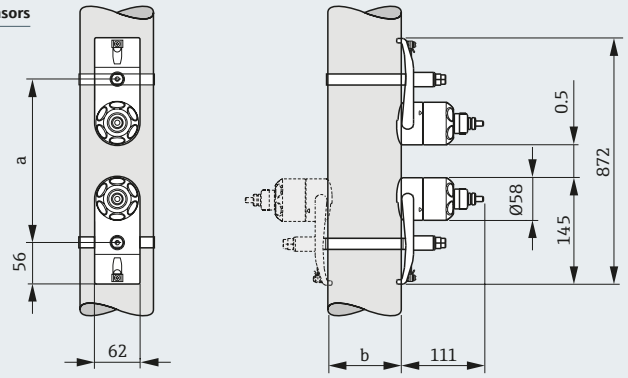
Size	:	DN50...4000
Transmitter	:	2-line LCD display, pushbutton configuration
Current output	:	Active 4...20mA (HART)
Pulse / status output	:	Passive: 30VDC / 250mA
Measuring range	:	0...15m/s
Protection	:	Transmitter IP67, sensor IP68
Power supply	:	85...250VAC, 20...28VAC / 11...40VDC
Process temperature	:	-20...80°C, 0...130°C

Dimensions (mm)

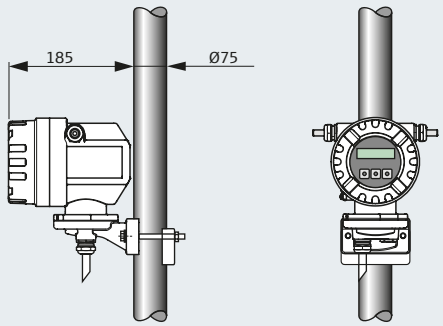
Field housing



W sensors



Pipe mounting



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Prosonic Flow 93P

Non-invasive ‘clamp-on’ ultrasonic flow measurement system.

WirelessHART

- Quick Setup menu for simple commissioning
- Simple, cost-effective mounting
- Compatible with HART, PROFIBUS and FOUNDATION Fieldbus
- IP67 (NEMA4X) protection

Going against the flow requires more power and more time than going with the flow – ultrasonic flow measurement is based on this fact. Two sensors mounted on the pipe send and receive ultrasonic pulses simultaneously. At zero flow, both sensors receive the ultrasonic signals sent in the same time, i.e. without a transit-time difference.

With low flowing fluid, the ultrasonic waves require different lengths of time (flow-dependent) to reach the corresponding sensor. This transit-time difference, measured by Prosonic Flow 93P, is directly proportional to the flow velocity.

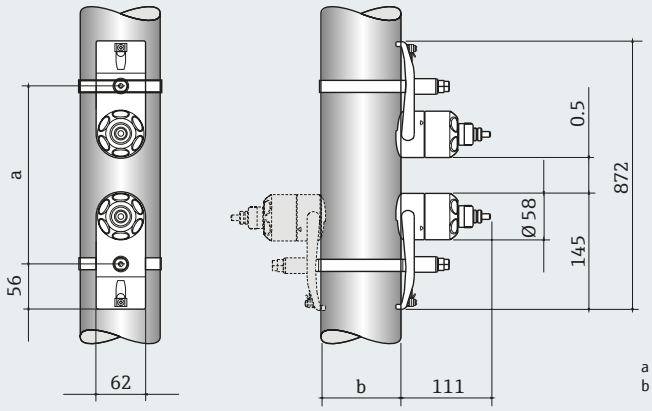
The P sensor is ideal for:

- Simple retrofitting without interrupting the process
- Easy, low-cost mounting

Technical data

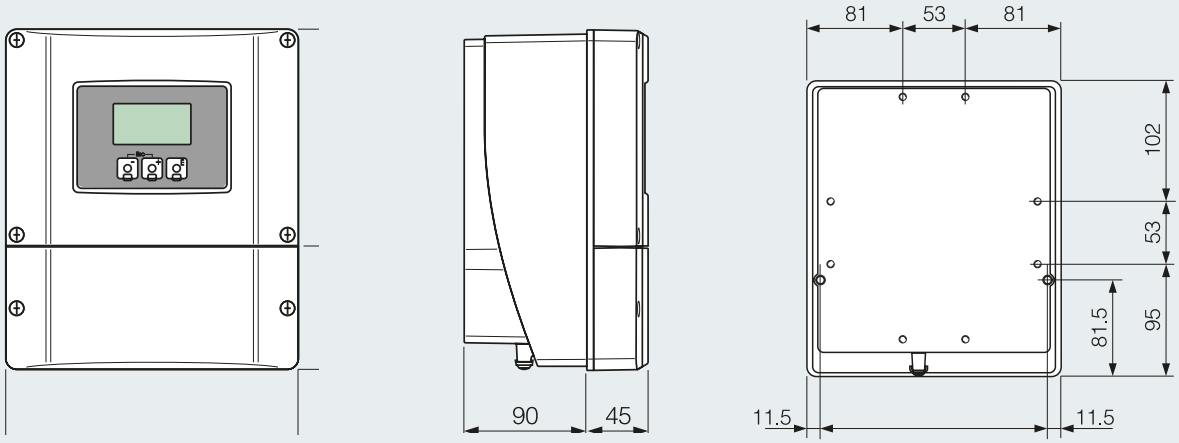
Size	:	DN50...4000
Transmitter	:	4-line LC display Touch Control Dual channel measurement (optional)
Input:	:	Measured variable Flow velocity (transit time difference proportional to flow velocity)
Input	:	Measuring range Typically v = 0...15m/s
Input	:	Operable flow range Over 150:1
Current output	:	Active: 0/4...20mA, RL < 700Ω (for HART : RL > 250Ω) Passive: 4...20mA, max 30V DC, Ri < 150Ω
Repeatability	:	± 0.3% for flow velocities > 0.3m/s

P sensor dimensions (mm)

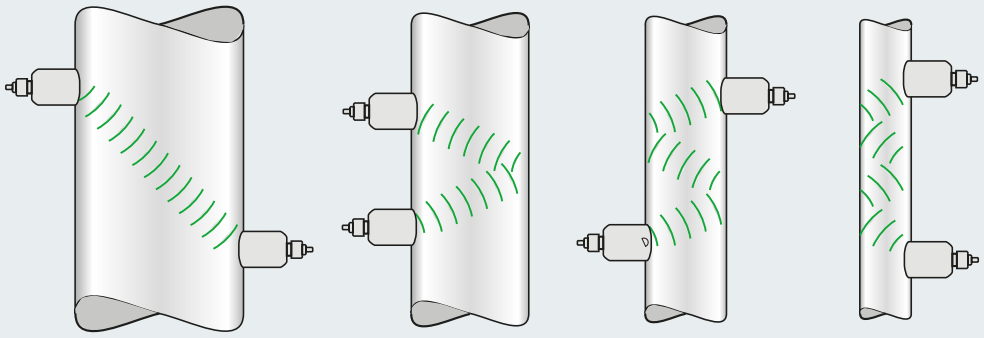


a = Sensor distance can be determined using Quick Setup
b = Pipe outer diameter (defined by applicaton)

Transmitter dimensions (mm)



Sensor arrangement



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Prosonic Flow 92F

2-wire loop-powered ultrasonic inline flowmeter.

WirelessHART

- Fluid temperatures up to 150°C
- Accuracy up to ±0.3%
- HART and PROFIBUS PA compatible
- ATEX, FM and CSA certified

The Prosonic Flow 92F is the world's first 2-wire loop-powered inline ultrasonic flowmeter. It combines a 2-wire loop-powered transmitter and multi-beam ultrasonic inline sensor for simple installation, even in applications where space is at a premium.

Suitable for both conductive and non-conductive liquids, it is suitable for both HART and PROFIBUS PA systems. System integration is supported through a Device Type Management (DTM) program and Field Device Tool (FDT) technology. The transmitter requires virtually no programming during the initial setup: only the actual flow range has to be defined. The HISTOROM T-Dat placed in the front of the transmitter offers software independent data management where the transmitter setup and the sensor calibration data can be stored as a backup.

Prosonic Flow 92F offers high accuracy (better than 0.5% optional 0.3%) and cost effective flow measurement. The measurement requires no mechanical interaction with the flow, making it virtually maintenance-free and without additional pressure drop.

Technical data

Measured variable	:	Flow velocity (transit time difference proportional to flow velocity)
Measuring range	:	Typically v = -10...10m/s with the specified accuracy
Current output	:	4...20mA with HART, full scale value and time constant (0...100s) can be set
Low flow cut-off	:	Switch points for low flow cut-off can be selected as required
Repeatability	:	±0.2% of reading
Fluid temperature range	:	Sensor : -40...+150°C (up to +200°C optional)
Pressure loss	:	Negligible if sensor is installed in a pipe of same nominal diameter
Construction material	:	Compact transmitter: powder coated die-cast aluminium sensor : stainless steel
Protection	:	Transmitter : IP67/NEMA4X sensor : IP67/NEMA4X option : IP68/NEMA6P

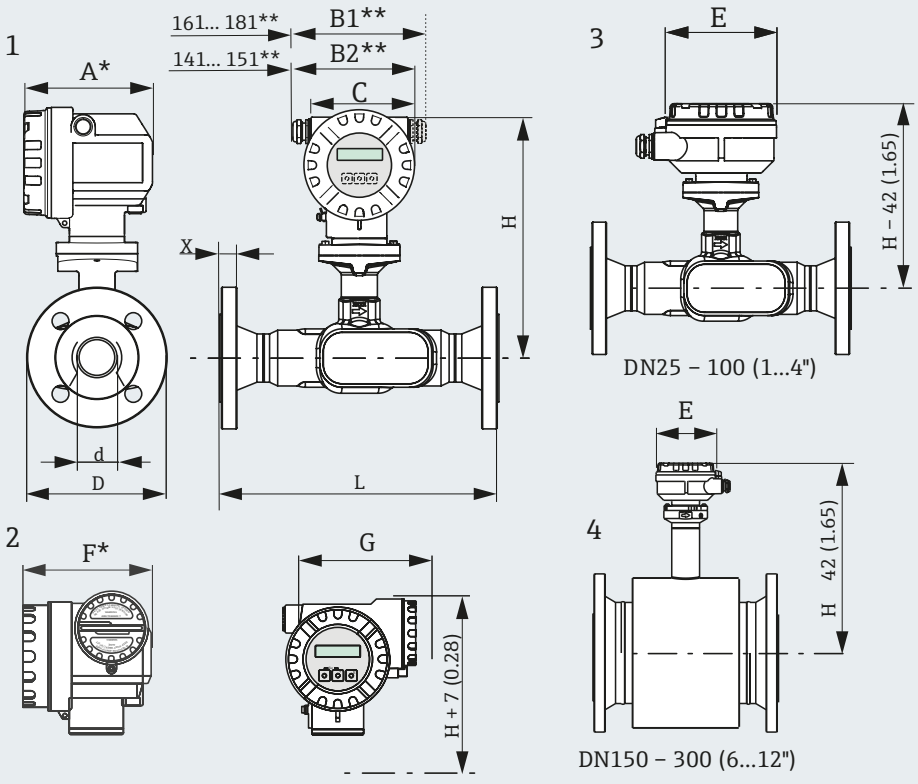
Dimensions (mm)

Flanged version to:

- EN 1092-1 (DIN 2501), Ra = 6.3 to 12.5 µm

Raised face to: EN 1092-1 Form B1 (DIN 2526 Form C), PN 10 to 40, Ra = 6.3 to 12.5 µm

- ASME B16.5, Class 150 to 300, Ra = 125 to 250 µin
- AARH/Ra = 125 to 250 µin
- JIS B2220, 10 to 40K, Ra = 125 to 250 µin



1. Standard and Ex -i version
2. Ex d version (transmitter)
3. Remote version DN25...100
4. Remote version DN150...300

Dimensions of Prosonic Flow 92F

	A	B1**	B2**	C	E	F*	G
mm	149	-	-	121	105	151	161
inch	5.87	6.34...7.13	5.55...5.94	4.76	4.12	5.94	6.34

* The following dimensions change as follows in the blind version (without local operation):
- Standard and Ex i version: the dimension 149 mm (5.87 inch) changes to 142 mm (5.60 inch) in the blind version..
- Ex d version: the dimension 151 mm (5.94 inch) changes to 144 mm (5.67 inch) in the blind version.

** The dimension depends on the cable gland used.

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Prosonic Flow 93T

Portable ‘clamp-on’ ultrasonic flowmeter.

Prosonic Flow 93T

Sensors

- **Non-invasive flowmeter**
- **Pipe sizes: DN15...4000**
- **For safe area use**
- **Menu-guided sensor mounting**
- **Integrated data logger**

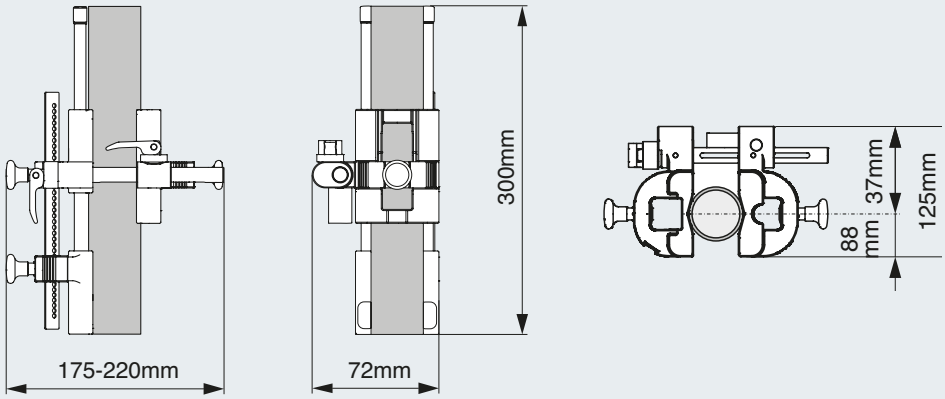
Prosonic Flow 93T’s non-invasive ultrasonic clamp-on system allows accurate and cost-effective bidirectional flow measurement without the need to interrupt the process. It is the ideal solution for all applications with sound-conducting liquids, e.g. water, wastewater, oils, solvents, acids, hydrocarbons and chemicals and is particularly suitable for retrofitting, monitoring and verifying measuring points in a wealth of applications.

Technical data

Size	:	DN15...4000
Power supply	:	100...240V AC, 47 to 63Hz to power adapter (12V DC, 2.5A)
Transmitter	:	LC display: Touch Control
Ambient temperature	:	0...+60°C
Process temperature	:	-40...+170°C
Input	:	1 x 0/4...20mA input
Repeatability	:	±0.3% for flow velocities >0.3m/s
Protection	:	IP40

Dimensions (mm)

Prosonic Flow P sensor (DN15...65)

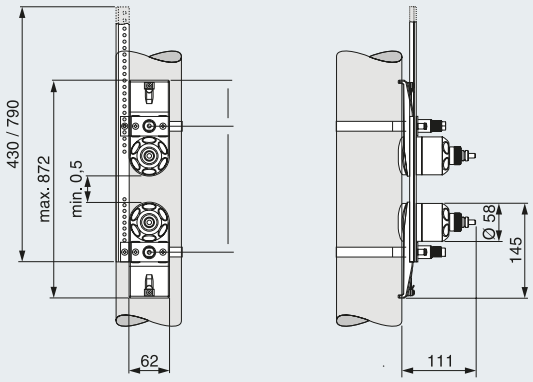


A	B	C	D	E	F
300	72	175/220	88	37	125

All dimensions in [mm]

Mounting arrangement

Mounting arrangement using two traverses



A	B	C	D	E	F	G
56	62	145	111	Ø58	max 872	min 0.5
		H			I	
Depends on the measuring point conditions (pipe, fluid, etc) Dimension 'H' can be determined: ▪ Via the sensor when mounting ▪ Online via Applicator					Pipe outer diameter	

All dimensions in [mm]

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Prosonic Flow B 200

Ultrasonic flowmeter for accurate biogas measurement and methane monitoring.

WirelessHART

- High accuracy (±1.5%) and negligible pressure loss
- Wide operable flow range of 30:1
- For gas temperatures up to +80°C and pressures as low as 0.8 bar absolute
- Available as either an Ex d or an intrinsically safe two-wire flowmeter (Ex ia)

Using tried and trusted ultrasonic flow technology, Prosonic Flow B 200 has been specially designed for accurate volumetric biogas measurement and is available in diameters from DN50 to DN200. All the usual issues such as moisture, dirt, low pressures, low velocities and changing gas composition no longer pose a problem as ultrasonic technology remains unaffected by these external conditions.

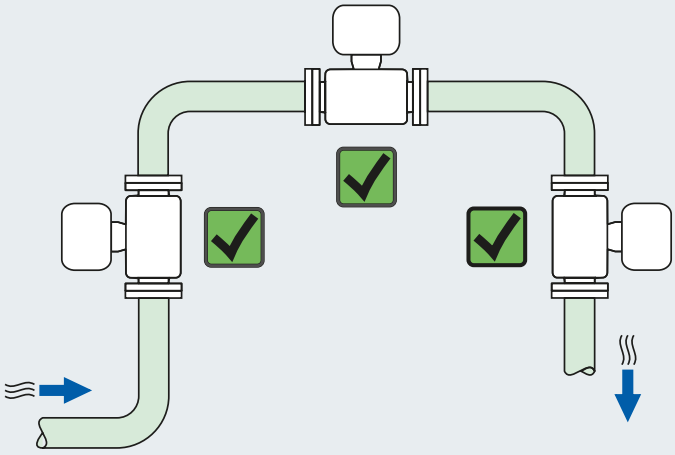
Varying methane content in biogas is often an issue and ideally this should be constantly monitored. Thanks to ultra-precise sound velocity measurement and integrated temperature sensor, Prosonic Flow B 200 measures the methane content of a gas as the flow measurement is made, offering an early indication of problems with the biogas production process and information for the protection and efficient running of the CHP engine.

Technical data

Direct measured variables	: Volume flow
Calculated measured variables	: Corrected volume flow, mass flow
Optional measured variables	: Corrected methane volume flow, energy flow, methane fraction, gross calorific value, Wobbe index, temperature
Nominal diameter	: DN50...200
Process temperature	: 0°C...+80°C
Pressure	: Up to 10 bar
Accuracy	: Volume flow: ±1.5%, methane: ±2%
Communication	: 4...20mA HART
Certification	: ATEX, IECEx, CSA, NEPSI

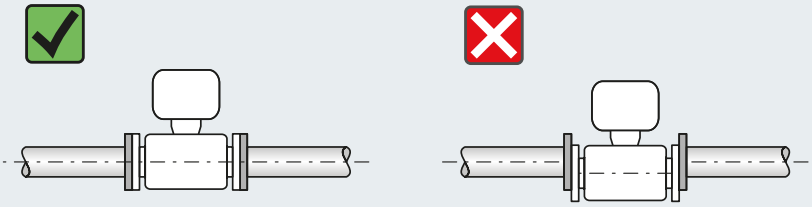
Installation

No special measures such as supports are necessary. External forces are absorbed by the construction of the device.



Orientation

The direction of the arrow on the sensor helps you to install the sensor according to the flow direction (direction of medium flow through the piping).
- Install the measuring device in a parallel plane free of external mechanical stress.
- The internal diameter of the pipe must match the internal diameter of the sensor.



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Temperature measurement

For further information, visit our website at: www.endress.com

Easytemp TMR31/35

Compact thermometers for a wide range of applications.


TMR31


TMR35

- Small, compact design
- Variable insertion lengths
- Simple installation and commissioning
- Breakdown information in event of short-circuit
- 3-A approval (TMR35)

Easytemp TMR31/35 are the latest in Endress+Hauser's range of cost-effective compact thermometers. Characterised by simplicity and compact construction, both TMR31 and TMR35 are quick and easy to install and operate, offering good accuracy and response times.

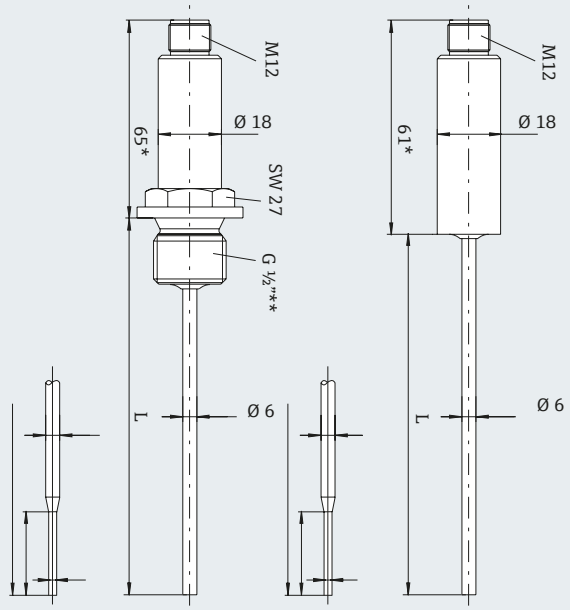
With a temperature capability range of -50...200°C, the Easytemp range is suitable for a wide range of applications. The TMR31 has been designed for all general applications across the process industries, whilst the TMR35 has been specially designed for hygienic applications, offering 3-A certification and a choice of hygienic process connections.

Technical data

Input	:	Pt100: -50...150°C without neck, -50...200°C with neck
Output	:	Standard: Pt100, class A, 4-wire as option: 4...20mA or 20...4mA
Operation	:	PC-programmable (PCP) if electronics option is available
Supply voltage	:	10...35VDC
Product temperature	:	-40°C...+200°C
Process connections	:	TMR31: compression fitting, G¼", G½" TMR35: various Triclamp

Easytemp TMR31

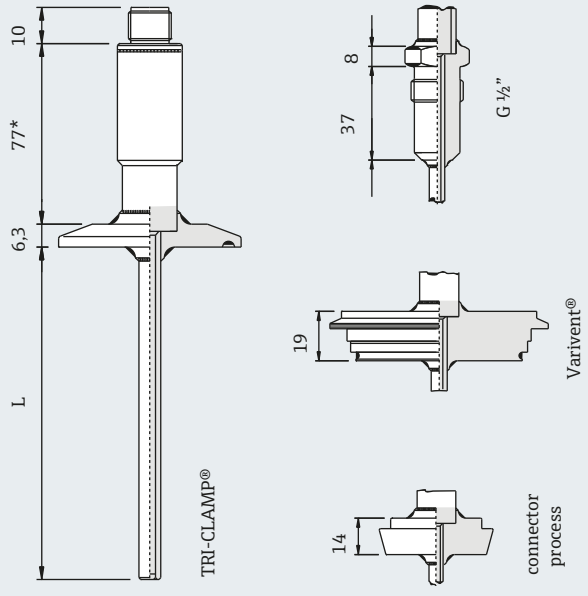
Dimensions (mm)



L = Choice of length from 30 to 300 mm
* neck extention version plus 35 mm
** Available process connections: ¼"-½"G of NPT, M14×1,5; M18×1,5

Easytemp TMR35

Dimensions (mm)



L = Choice of length from 30 to 300 mm
* neck extention version plus 35 mm

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Thermophant T TTR31/35

Cost-effective temperature switches for process and hygienic applications.

TTR31

TTR35

- Complete stainless steel housing
- With display
- Simple pushbutton programming
- High reproducibility and long-term stability
- Maintenance-free

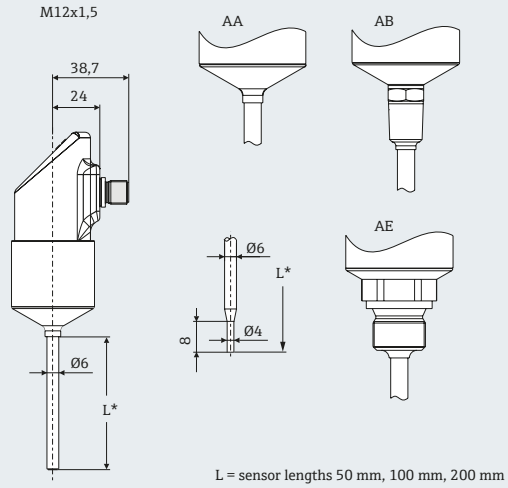
The Thermophant T temperature switch offers accurate monitoring, display and control of process temperatures from -50...+150°C in liquid, gas, steam and dust. Its stainless steel housing offers significant protection against chemical corrosion and mechanical abrasion for increased longevity and performance. What's more, the housing can be rotated 340°C and can be easily adjusted on-site for maximum versatility. The user-friendly Thermophant T offers pushbutton operation and a backlit digital display for easy reading at all times.

Thermophant T is ideal for use in a wide range of applications, from the control of pumps and compressors to bottling plants and filling machines, as it has a fast response time and hygienic process connections are available for food and pharmaceutical processes (TTR35). DESINA compliance comes as standard.

Technical data

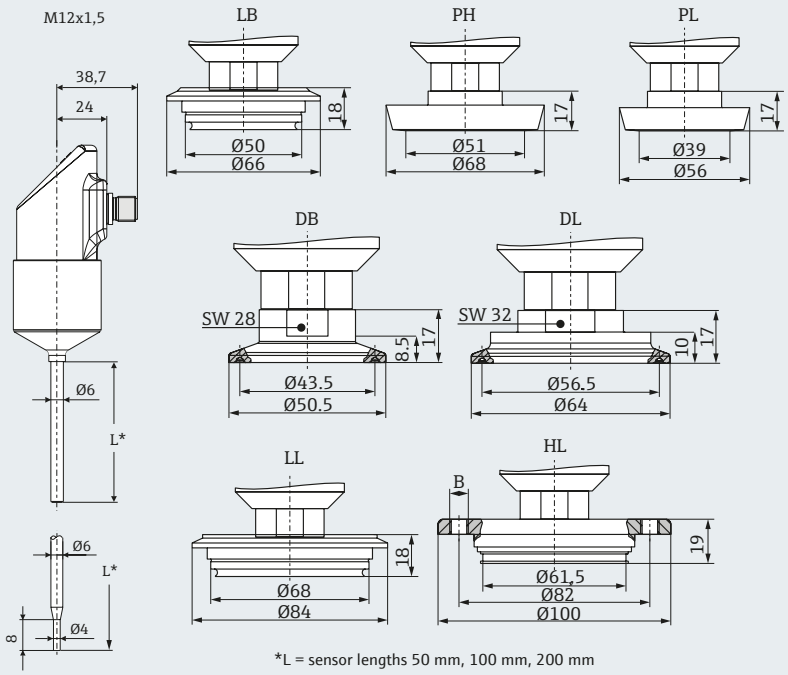
Supply voltage	: 12...30V DC
Maximum load	: <250mA
Voltage drop	: <2V
Ambient temperature	: -40°C...+85°C
Product temperature	: -50°C...+150°C
Operating pressure	: -1 bar...+16 bar
Material	: Stainless steel 316L
Response time	: t_{50} = 10s
Protection	: IP65

Thermophant T TTR31 dimensions (mm)



L = sensor lengths 50 mm, 100 mm, 200 mm

Thermophant T TTR35 dimensions (mm)



*L = sensor lengths 50 mm, 100 mm, 200 mm

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Omnigrad M TR10/11/12/13/15

Resistance temperature sensors for general industrial applications.

WirelessHART

- Customised immersion length
- Replaceable mineral insulated insert
- Double Pt100 for redundancy

The Omnigrad M TR10...15 range of temperature sensors are resistance thermometers designed for use in the fine chemicals industry, but are also suitable for general applications and are ATEX certified for hazardous area use. They are made up of a measurement probe with a protection well and a housing, which may contain the transmitter for conversion of the variable measured.

Due to its modular configuration and the structure defined by the DIN 43772 standard (form 2G/3G), the Omnigrad M range is suitable for most industrial processes.

Applications

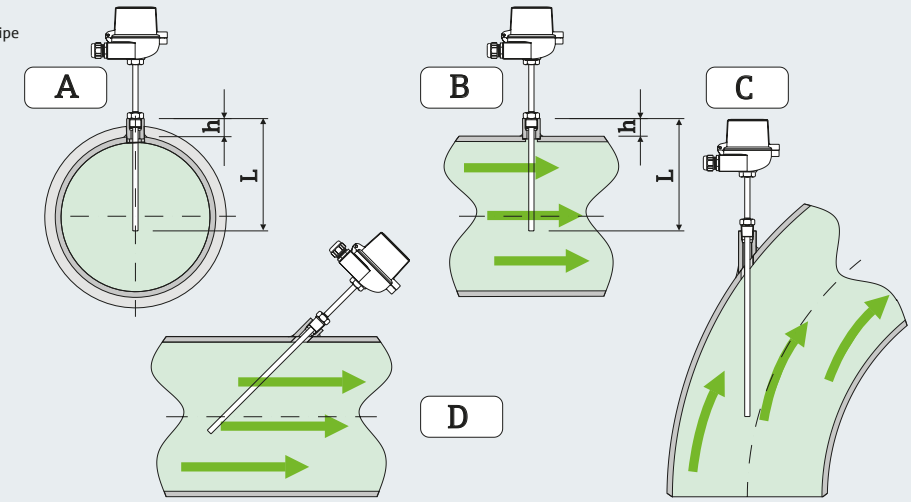
- Fine chemicals industry
- Light energy industry
- General industrial services

Technical data

	TR10	TR11	TR12	TR13	TR15
Version	With neck in accordance with DIN	Without neck	Without neck	With neck (flanged) in accordance with EN1092	With neck
Thermowell diameter	9, 11, 12mm	9, 11, 12mm	9, 11, 12mm	9, 11, 12mm	24mm
Thermowell material	316Ti, 316L, Hastelloy C	316Ti, 316L	316Ti, 316L	316Ti, 316L, Hastelloy C	316Ti

Installation

A and B: In small nominal bore pipes, the tip should reach or extend slightly past the centre line of the pipe (= L).
C and D: Angled installation.



Response times

Response times for TR10-13

Test in water at 0.4m/s according to IEC 60751; 10 K temperature step change. Measuring probe Pt100, TF/WW.
Protection tube

Diameter	Response time	Reduced tip: Ø 5.3mm	Tapered tip: Ø 6.6mm or Ø 9mm	Straight tip
9 x 1mm	t_{50}	7.5s	11s	18s
	t_{90}	21s	37s	55s
11 x 2mm	t_{50}	7.5s	not available	18s
	t_{90}	21s	not available	55s
12 x 2.5mm	t_{50}	not available	11s	38s
	t_{90}	not available	37s	125s

Response times for TR15

Test in water at 0.4m/s according to IEC 60751; 10 K temperature step change. Measuring probe Pt100, TF/WW.
Thermowell, U = length of tapered tip

Outer-Ø	Response time	U = 65/73mm	U = 125/133mm	U = 275mm	Outer-Ø (tapered tip)
18mm	t_{50}	22s	22s	-	9mm
	t_{90}	60s	60s	-	
24mm	t_{50}	31s	31s	31s	12.5mm
	t_{90}	96s	96s	96s	

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Omnigrad T TR24/25

Fast-response resistance thermometers for all process applications.

TR24

TR25

WirelessHART

- Stainless steel wetted parts
- Reduced diameter probe end for fast response
- ATEX certification

Omnigrad T TR24 and TR25 temperature sensors are resistance thermometers suitable for almost all industrial processes and generic applications thanks to their modular structure. They are simple sensors without thermowells.

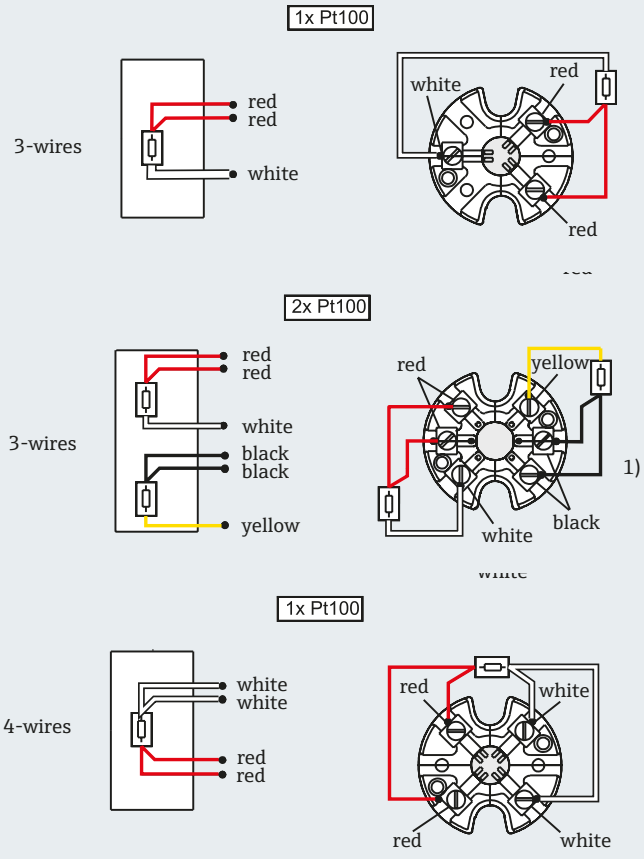
Applications

- Fine chemicals
- Power industry
- Environmental industry
- General processes

Technical data

	TR24	TR25
Measuring range	: Thin film: -50...+400°C wire wound: -200...+600°C	Thin film: -50...+400°C wire wound: -200...+600°C
Insulation	: Insulation resistance between terminals and probe sheath: more than 100MΩ at 25°C (according to DIN EN 60751, test voltage 250V) more than 10MΩ at 300°C	Insulation resistance between terminals and probe sheath: more than 100MΩ at 25°C (according to DIN EN 60751, test voltage 250V) more than 10MΩ at 300°C
Protection	: IP65-67 (dependent on housing)	IP65-67 (dependent on housing)
Mounting	: Via compression fitting	Direct mounting

Electrical connection



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iTHERM TM401/411

Modular resistance thermometers for hygienic applications.


TM401


TM411

WirelessHART

- iTHERM QuickSens: fast response time (T_{90}: 1.5s)
- iTHERM StrongSens: unrivalled vibration resistance (>60g)
- iTHERM QuickNeck: fast recalibration
- Wide range of hygienic process connections
- IP69K protection

The innovative iTHERM hygienic range of thermometers has been designed to meet the requirements of the food & beverage and life sciences industries and comply with highest quality standards and relevant international approvals such as 3-A, EHEDG, FDA, ASME BPE and TSE.

For standard temperature measurement applications, the TM401 devices offer an excellent price-performance ratio but for tougher tasks, the TM411 devices offer the best solution.

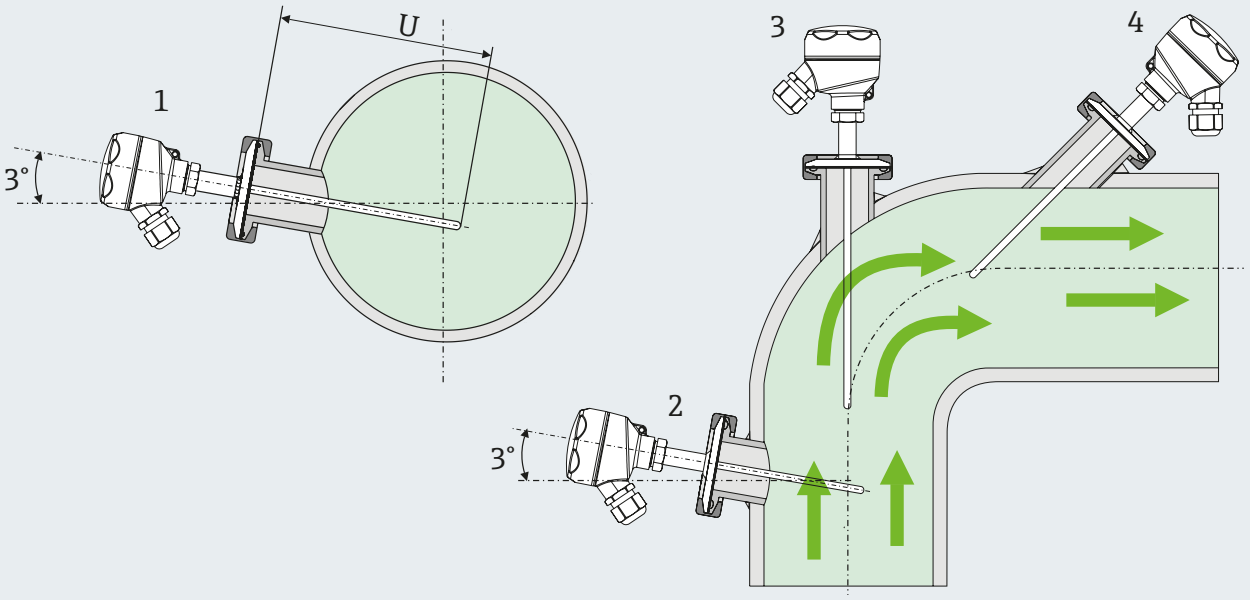
Furthermore, the TM411 device is available with our iTHERM QuickSens, StrongSens and Quickneck features.

- The iTHERM QuickSens offers our fastest response time of t90 in 1.5s to ensure optimum reponses times.
- The iTHERM StrongSens provides unsurpassed vibration resistance up to 60g, for ultimate plant safety
- The iTHERM Quickneck feature allows for removal of the measuring element in a quarter turn of the head without the need to unwire the instrument vastly reducing calibration downtime on plant.

Technical data

	TM401
Type	: Metric/imperial: basic technology
Measurement accuracy	: Class A
Response time	: T_{90}: 7s
Protection	: IP69K
Temperature	: -50°C...+200°C
Pressure	: Up to 40 bar
Replacable insert (thermowell)	: No
Sensor	: Standard thin film: 1 x Pt100
Sensor connection	: 3-wire or 4-wire
Extension neck	: Yes
Display	: No
Connection	: Flying leads, cermic block or 1-channel iTEMP transmitter (4...20mA, HART)
Hygienic approvals	: 3-A, EHEDG, FDA, ASME BPE, TSE
Communication	: 4...20mA analogue, HART
Certification	: Safe area only

Installation



Technical data

	TM411
Type	: Metric/imperial: advanced technology
Measurement accuracy	: Class A or AA
Response time	: T_{90}: 1.5s
Protection	: IP69K
Temperature	: -200°C...+600°C
Pressure	: Up to 40 bar
Replacable insert (thermowell)	: Yes
Sensor	: Standard thin film: 1 x Pt100, wire wound: 1x/2x Pt100, iTHERM QuickSens: 1 x Pt100, iTHERM StrongSens: 1 x Pt100
Sensor connection	: 3-wire or 4-wire
Extension neck	: Yes (iTHERM QuickNeck optional)
Display	: Head transmitter with TID10 plug-on display
Connection	: Flying leads, cermic block or 1-channel iTEMP transmitter (4...20mA, HART) or 2-channel iTEMP transmitter (HART, PROFIBUS, FOUNDATION Fieldbus)
Hygienic approvals	: 3-A, EHEDG, FDA, ASME BPE, TSE
Communication	: 4...20mA analogue, HART, PROFIBUS PA, FOUNDATIION Fieldbus
Certification	: ATEX, FM, CSA, IEC Ex, NEPSI

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Omnigrad S TR61/62/63/65/66

Resistance temperature sensor. Suitable for hazardous area use.

WirelessHART

- Universal concept for all applications
- Measurement range -200°C...600°C
- EEx d or EEx ia certification

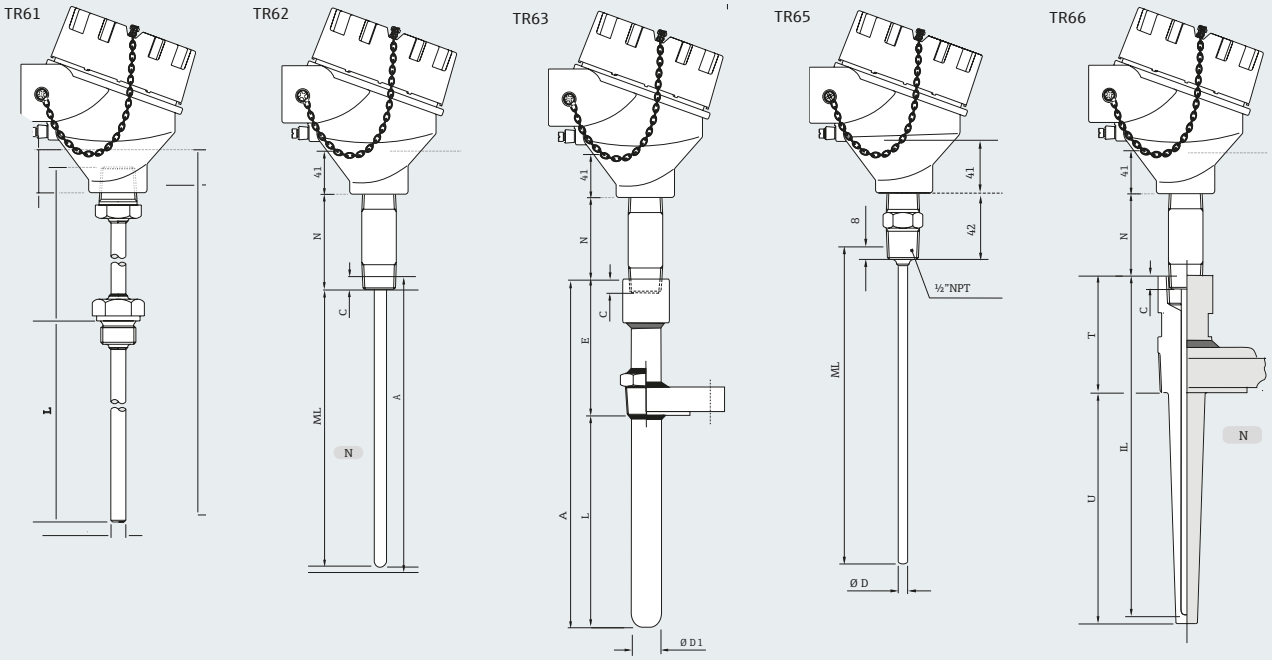
The Omnigrad S is an industrial RTD thermometer with a (Pt100) inset and thermowell. It complies with EN 50014/18/20 (ATEX certification) and is therefore suitable for use in hazardous areas. Omnigrad S RTDs are available with PCP, HART, PROFIBUS PA or FOUNDATION Fieldbus electronics and a variety of connections including threaded, flanged and compression fittings.

The thermometers can be used in process industries such as:
- Chemical industry
- Energy industry
- Gas processing industry
- Petrochemical industry
- General industrial services

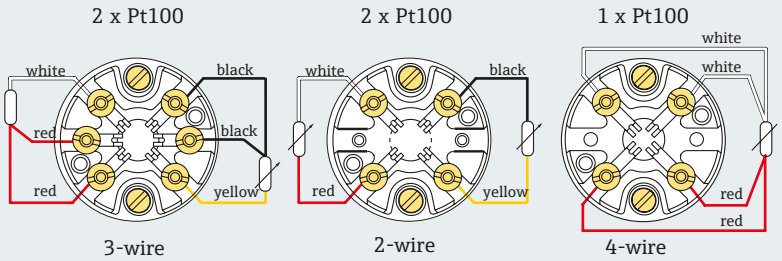
Technical data

Version	TR61	TR62	TR63	TR65	TR66
Certification	: ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d
Process connections	: Compression fitting, thread (NPT/G) or flange (ANSI/DIN)	Thermowell thread: ½"NPT	Compression fitting, thread (NPT/G) or flange (ANSI/DIN)	Thread (NPT) flange (ANSI)	Thread (NPT) flange (ANSI)
Sensor element diameter	: 3mm, 6mm	6mm	3mm, 6mm	3mm, 4.5mm, 6mm, 8mm	3mm, 6mm
Response times (straight tip):	6mm t_{50} = 18s t_{90} = 55s	6mm t_{50} = 3.5s t_{90} = 8s	6mm t_{50} = 3.5s t_{90} = 8s	6mm t_{50} = 3.5s t_{90} = 8s	6mm t_{50} = 3.5s t_{90} = 8s
Maximum process pressure at 400°C	: 100 bar	dependent on thermowell	100 bar	80 bar	480 bar

Dimensions (mm)



Electrical connection



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Omnigrad M TC10/12/13 and Omnigrad S TC15

Thermocouple sensors for general industrial applications.

WirelessHART

- Customised immersion length
- Replaceable mineral insulated insert

The Omnigrad TC10...15 range of temperature sensors are thermocouples designed for use in the fine chemicals industry, but are also suitable for general applications and are ATEX certified for hazardous area use. They are made up of a measurement probe with a protection well and a housing, which may contain the transmitter for conversion of the variable measured. Due to its modular configuration and the structure defined by the DIN 43772 standard (form 2G/3G), the Omnigrad range is suitable for most industrial processes.

Applications

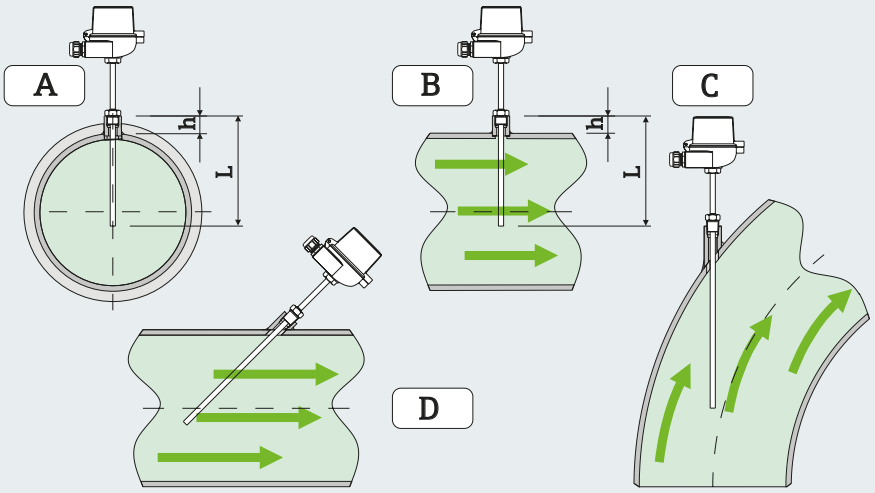
- Fine chemicals industry
- Light energy industry
- General industrial services

Technical data

	TC10	TC12	TC13	TC15
Neck length	: 80, 145mm	-	80, 145mm	155, 165mm
Thermowell diameter	: 9, 11, 12mm	9, 11, 12mm	9, 11, 12mm	18, 24mm
Wetted parts	: 316Ti, 316L, Hastelloy C276, Inconel 600	316Ti, 316L, Hastelloy C276, Inconel 600	316Ti, 316L, Hastelloy C276, Inconel 600	316Ti, 13 CrMo 4-5
Tip	: Straight, reduced/tapered	Straight, reduced/ tapered	Straight, reduced/ tapered	Tapered
Max pressure	: 100 bar	40/100 bar	100 bar	800 bar
Process connection	: Threaded	Compression fitting	Flanged	Weld-in, flanged

Installation

A and B: In small nominal bore pipes, the tip should reach or extend slightly past the centre line of the pipe (= L).
C and D: Angled installation.



Response times

Response times for TC10-13

Test in water at 0.4m/s according to IEC 60751; temperature variation from 23 to 33°C.

Diameter	Type of TC	Response time	Grounded			Ungrounded		
			Reduced tip	Tapered tip	Straight tip	Reduced tip	Tapered tip	Straight tip
9mm	J, K	t_{50} t_{90}	5.5s 13s	9s 31s	15s 46s	6s 14s	9.5s 33s	16s 49s
11mm	J, K	t_{50} t_{90}	5.5s 13s	not available not available	15s 46s	6s 14s	not available not available	16s 49s
12mm	J, K	t_{50} t_{90}	not available not available	8.5s 20s	32s 106s	not available not available	9s 22s	34s 110s

Response times for TC15

Test in water at 0.4m/s according to IEC 60751; temperature variation from 23 to 33°C.

Diameter	Type of TC	Response time	Grounded			Ungrounded		
			Tapering on 65/73mm (U)	Tapering on 125/133mm (U)	Tapering on 275mm (U)	Tapering on 65/73mm (U)	Tapering on 125/133mm (U)	Tapering on 275mm (U)
18mm	J, K	t_{50} t_{90}	7s 18s	7s 18s	not available not available	7.5s 19s	7.5s 19s	not available not available
24mm	J, K	t_{50} t_{90}	17s 47s	15s 43s	15s 43s	18s 50s	16s 46s	16s 46s

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Omnigrad S TC61/62/63/65/66

Thermocouple temperature sensor. Suitable for hazardous area use.

WirelessHART

- Measuring range: type J -40... 750°C, type K -200...1100°C
- Universal concept for all applications
- Customised immersion length

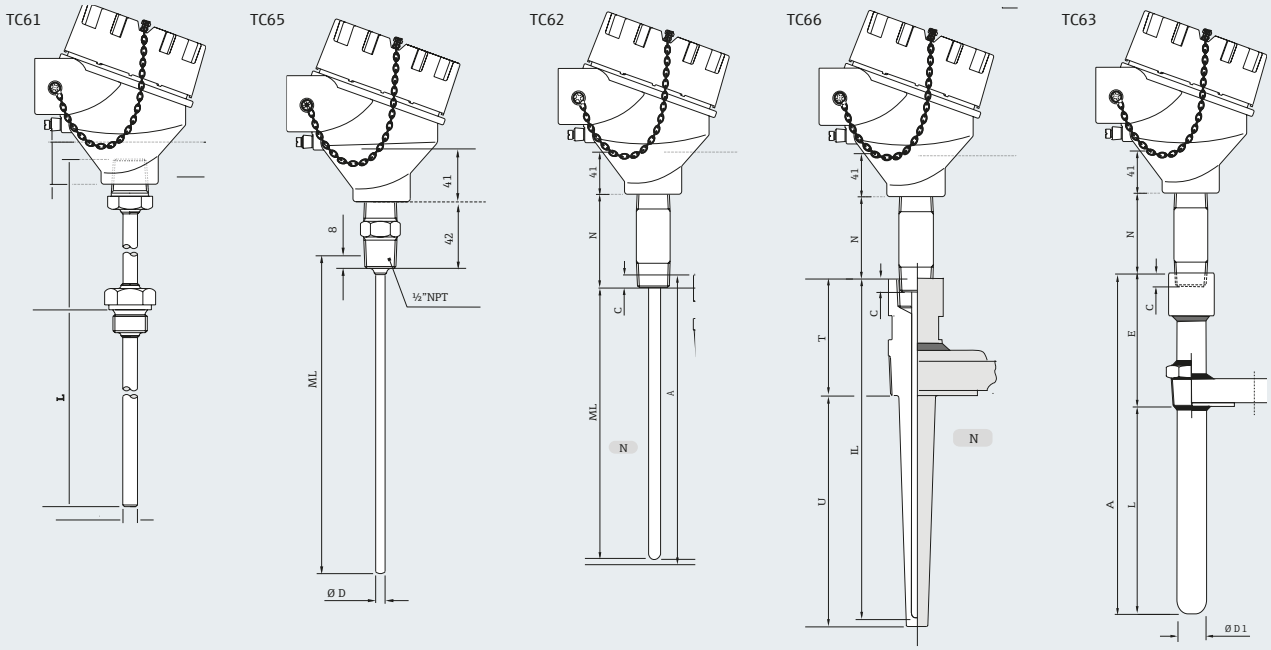
What about harsh environments, corrosive substances and safety requirements? Our response is Omnigrad S temperature sensors which are specifically designed for these challenging applications. If bar stock thermowells, special materials and self-diagnosis field transmitters are considered the norm and you require a customised design or thermowell strength verification, then there is much to choose from within the Omnigrad S range.

The thermometers can be used in process industries such as:
- Chemical industry
- Energy industry
- Gas processing industry
- Petrochemical industry
- General industrial services

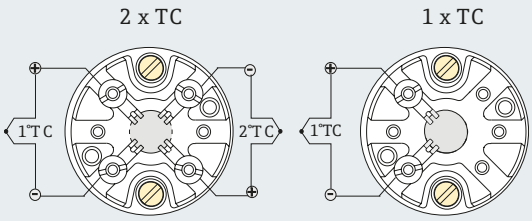
Technical data

		TC61	TC62	TC63	TC65	TC66
Certification	:	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d	ATEX EEx ia ATEX EEx d
Process connections	:	Compression fitting, thread (NPT/G) or flange (ANSI/DIN)	Thermowell thread: ½" NPT	Compression fitting, thread (NPT/G) or flange (ANSI/DIN)	Thread (NPT) flange (ANSI)	Thread (NPT) flange (ANSI)
Sensor element diameter	:	3mm, 6mm	3mm, 6mm	3mm, 6mm	3mm, 6mm	3mm, 6mm
Response time	:	t_{50} = 2.5s t_{90} = 7s	t_{50} = 2.5s t_{90} = 7s	t_{50} = 2.5s t_{90} = 7s	t_{50} = 2.5s t_{90} = 7s	t_{50} = 2.5s t_{90} = 7s
Maximum process pressure at 400°C	:	100 bar	Dependent on thermowell	100 bar	80 bar	480 bar

Dimensions (mm)



Electrical connections



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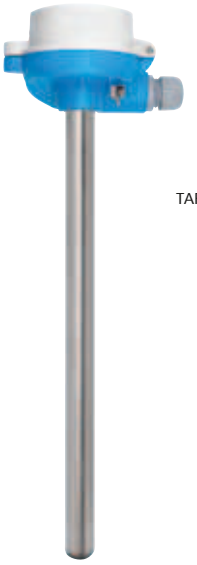
Omnigrad S TAF11/12x/16

High temperature thermocouples.

TAF11

TAF12D



TAF16

- Adjustable process connections
- Replaceable spare parts
- Long-term stability due to sensor protection with non-porous materials
- Metallic or ceramic thermowells

The Omnigrad S TAF series high temperature assemblies are manufactured according to international DIN EN 50446 standards and consist of a measuring insert, a thermowell, a metal sleeve (TAF11/12x only) and a terminal head containing a transmitter or terminal block as electrical connection. They offer excellent performance in the field in terms of reliable measurement and device longevity as they have easily replaceable parts and are suitable for use in applications where temperatures may reach up to 1700°C such as furnaces, glass smelters and flue gas applications.

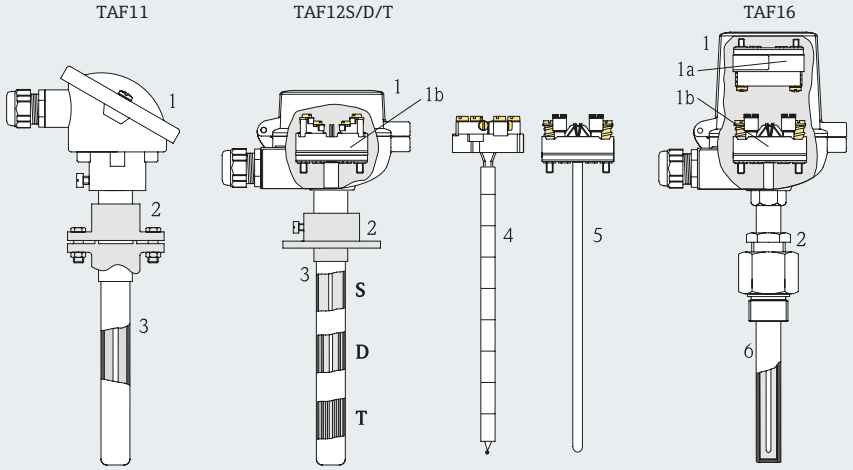
TAF11: For steel treatment (annealing), concrete furnaces and primaries. It contains a single or double TC insert and a ceramic thermowell.
TAF12x: Versions S/D/T include single/double/triple ceramic thermowells and are designed for applications such as ceramic baking ovens, brickworks, porcelain production and glass industries. They contain a single or double TC insert in ceramic insulators.
TAF16: For cement production, steel treatment, incinerators and fluidised bed furnaces. It contains a single or double TC insert and a metallic or ceramic thermowell.

Technical data

	TAF11	TAF12x	TAF16
Process temperature	Up to +1600°C	Up to +1700°C	Up to +1700°C
Process connections	Stop flange according to DIN EN 50446, adjustable flange or gas-tight compression fitting	Stop flange according to DIN EN 50446, adjustable flange or gas-tight compression fitting	Stop flange according to DIN EN 50446, adjustable flange or gas-tight compression fitting
Thermowell	Ceramic	Ceramic	Ceramic or metallic

Equipment architecture

1. Terminal head DIN A (left) or DIN B (right) available with following available electrical connections:
   – Terminal block DIN B with head transmitter (only in high cover terminal head)
   – Terminal block (DIN B) or flying leads (only with MgO insulated insert)
2. Available process connections: stop flange according to DIN EN 50446, adjustable flange or gas-tight compression fitting.
3. Ceramic thermowell (external sheath for TAF11)
   S: Single ceramic thermowell external sheath for TAF12
   D: Double ceramic thermowell external and middle sheath for TAF12
   T: Triple ceramic thermowell external, middle and internal sheath for TAF12
4. Measuring insert TPC200 with ceramic isolation
5. Measuring insert TPC100 with MgO insulation and metallic sheath, selectable for TAF11 and TAF16
6. Metallic or ceramic thermowell for TAF16



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iTEMP TMT121/181

PC-programmable temperature transmitter for head and DIN rail mounting.

TMT121

TMT181

- Universally adjustable with PC
- Galvanic isolation as standard
- ATEX certification

Description

The iTEMP TMT181 and TMT121 are programmable 2-wire temperature transmitters suitable for resistance elements (RTDs) in 2, 3 or 4-wire technology and for 12 different thermocouples. The configuration can be carried out quickly and simply online with the aid of a PC using the ReadWin 2000 operating software that includes a signal interface. This interface (TMT181A) can be connected to head transmitter TMT181 or to the front of the TMT121.

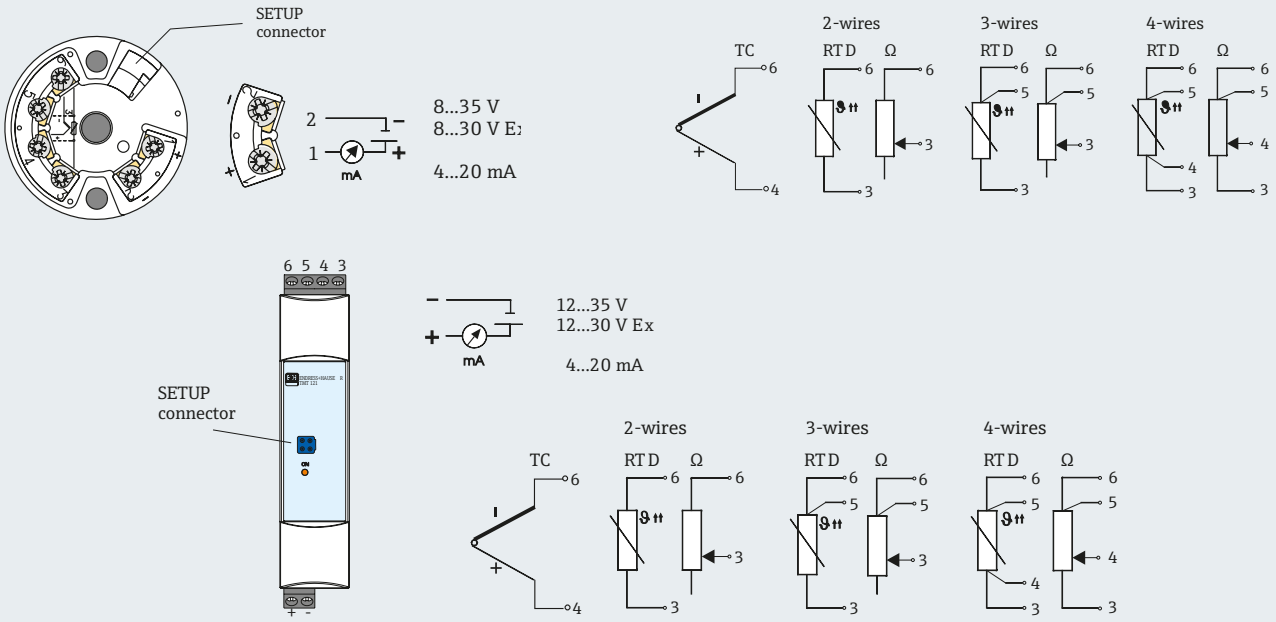
The TMT181 is a compact and completely enclosed head transmitter, suitable for installation in all common types of connection heads. Suitable for DIN rail mounting, the TMT121 is equipped with large connection terminals (up to 2.5mm^2) and requires no auxiliary voltage during configuration.

Both are galvanically isolated as standard, have sensor monitoring in accordance with NAMUR NE43, EMC in accordance with NAMUR NE21, output simulation and the possibility of sensor-specific linearisation. Intrinsically-safe and 3G (for zone 2) versions are available with ATEX certificate as an Ex version.

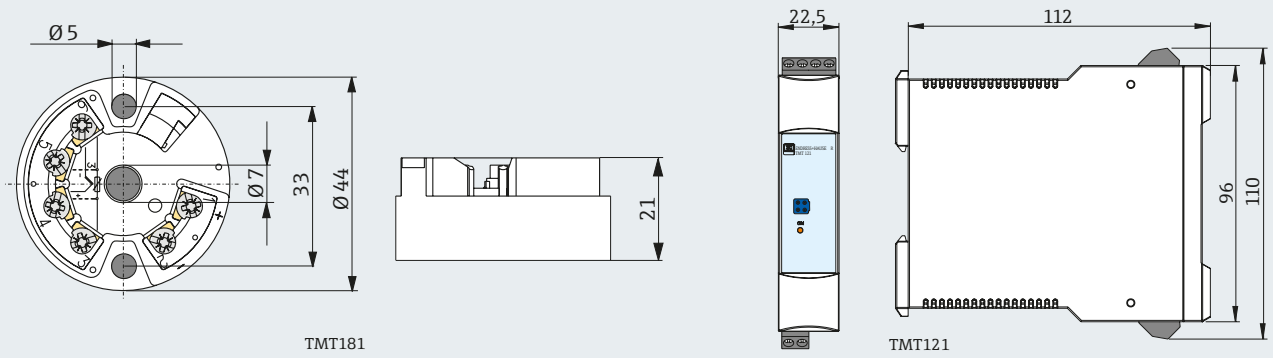
Technical data

	TMT181	TMT121
Input	: RTD Pt/Ni100, 500, 1000, 2, 3, 4-wire	
Thermocouple types	: B, C, D, E, F, G, J, K, L, N, R, S, T and U 10...400Ω, 10...2000Ω, 10...100mV	
Measuring range and zero point	: Freely adjustable	
Output	: 4...20mA or 20...4mA	
Inaccuracy*	: RTDs typically approx. 0.2 K. TCs typically 0.5 K	
Power supply (protected against pole reversal)	: 8...36 V DC	12...35 V DC
Galvanic isolation	: 3.75kV AC	2.0kV AC
Ambient temperature	: 40...85°C	-40...85°C
Protection	: Terminals IP00	IP20
Certification	: ATEX II 1G EEx ia IIC T4/5/6 or ATEX II 3G EEx nL IIC T4/5/6/ (zone 2)	ATEX II 2(1) G EEx ia IIC T4/5/6

Connections



Dimensions (mm)



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iTEMP TMT122/182

Temperature transmitters for head and DIN rail mounting with HART protocol.

TMT122

TMT182

- For head and DIN rail mounting
- With HART protocol for configuration and maintenance
- Galvanic isolation as standard

Description

iTEMP TMT182 and the TMT122 are universal 2-wire temperature transmitters suitable for resistance elements (RTDs) in 2, 3 or 4-wire technology and for 12 different thermocouples. The HART is used to configure these transmitters, and for diagnosis for maintenance or fault detection. The configuration and diagnosis takes place via a PC using the Endress+Hauser Commuwin software package, for example, or using a suitable handheld HART configurator.

The TMT182 is a compact, completely enclosed head transmitter, suitable for mounting in all standard connection heads. The TMT122 is a 22.5mm wide temperature transmitter suitable for DIN rail mounting.
The TMT122 is equipped with large connection clamps (up to 2.5mm^2).

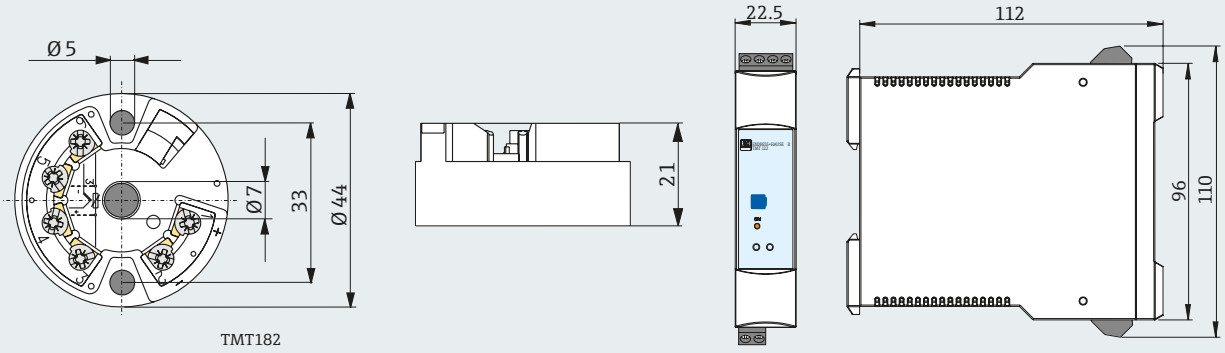
Both are galvanically isolated as standard, have sensor monitoring in accordance with NAMUR NE43, EMC in accordance with NAMUR NE21, output simulation and the possibility of sensor-specific linearisation. Intrinsically-safe and 3G (for zone 2) versions are available with ATEX certificate as an Ex version. This provides flexibility and an additional guarantee of good reliability in practice.

- Optional ATEX intrinsic safety
- Optional ATEX 3G (zone 2)

Technical data

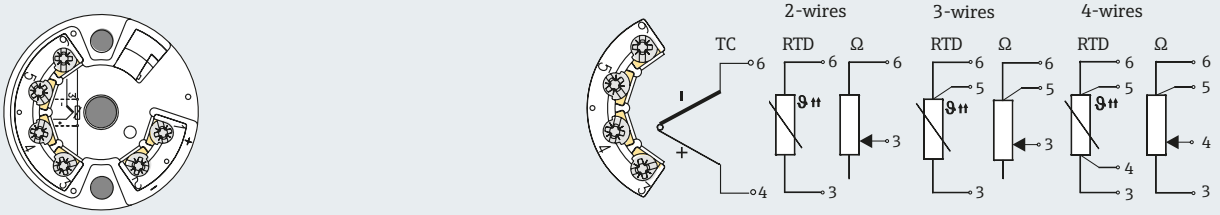
	TMT182	TMT122
Input	: RTD Pt/Ni100, 500, 1000, 2, 3, 4-wire thermocouple types B, C, D, E, F, G, J, K,, L, N, R, S, T and U 10...400Ω, 10...2000Ω, 10...100mV	
Measuring range and zero point	: Freely adjustable	
Output	: 4...20mA or 20...4mA	4...20mA or 20...4mA
Accuracy	: RTDs typically approximately 0.2K TCs typically 0.5K	
Power supply (protected against pole reversal)	: 10...35V DC	12...35V DC
Galvanic isolation	: 2kV AC	
Ambient temperature	: 40...85°C	-40...85°C
Protection	: Terminals IP00	IP20
Certification	: ATEX II 1G EEx ia IIC T4/5/6 or ATEX II 3G EEx nL IIC T4/5/6/ (Zone 2)	ATEX II 2(1) G EEx ia IIC T4/5/6

Dimensions (mm)

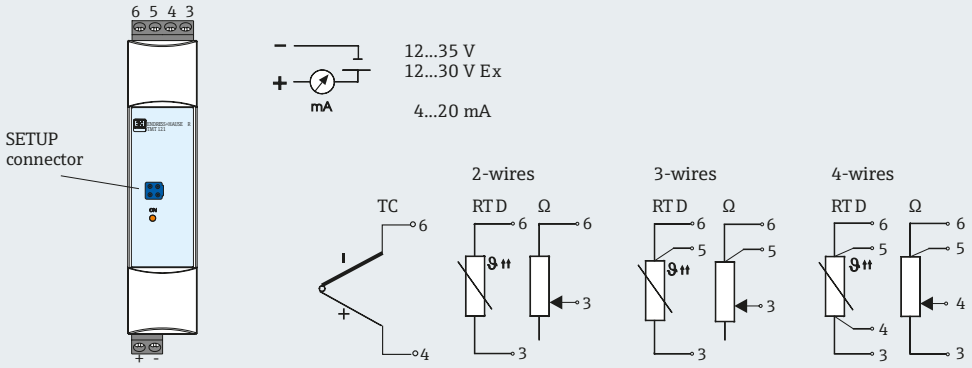


TMT182

Connections



TMT182



TMT122

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iTEMP TMT127/187

Temperature transmitters for resistance thermometers.

TMT127

TMT187

- Fixed measuring range for Pt100
- Two-wire technology, 4...20mA analogue output
- Galvanic isolation

Features and benefits

- High accuracy in complete ambient range
- Failure information when sensor breaks or short-circuits as per NAMUR NE 43
- EMC as per NAMUR NE 21, CE
- ATEX, CSA or FM certification

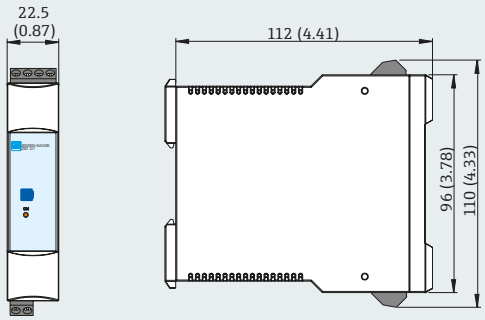
Application

Fixed range temperature head transmitter for converting Pt100 input signals into a scalable 4...20mA analogue output signal.

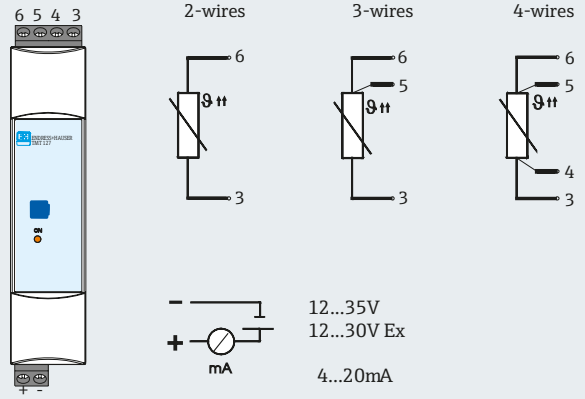
Technical data

	TMT127	TMT187
Input	: 2, 3 or 4-wire connection	2, 3 or 4-wire connection
Output signal	: 4...20mA analogue	4...20mA
Ex-certification	: ATEX, CSA, FM.	ATEX II 2 (1) G, ATEX II 1 G
Ambient temperature limits	: -40...+85°C	-40...+85°C
Storage temperature	: -40...+100°C	-40...+100°C
Climate class	: As per EN 60 654-1, class C	As per EN 60 654-1, class C
Ingress protection	: IP20	IP20
Shock resistance	: 4g/2 to 150 Hz as per IEC 60 068 2-6	4g/2 to 150Hz as per IEC 60 068 2-6
Weight	: Approx. 90g	Approx. 40g
Materials	: Housing: PC/ABS, UL 94V0	Housing: PC
Terminals	: Pluggable screw terminal, max. 2.5mm^2, solid or strand with wire end sleeve.	Cable up to max. 1.75mm2 (secure screws)

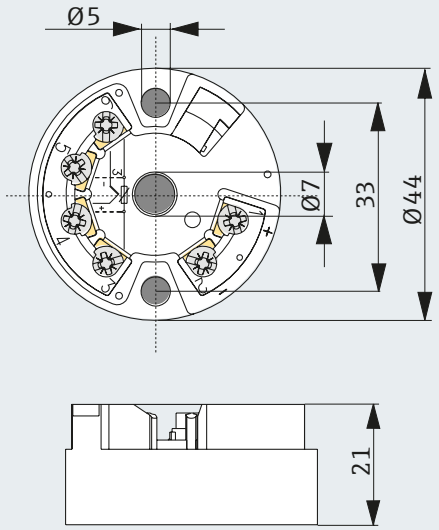
Dimensions (mm) for TMT127



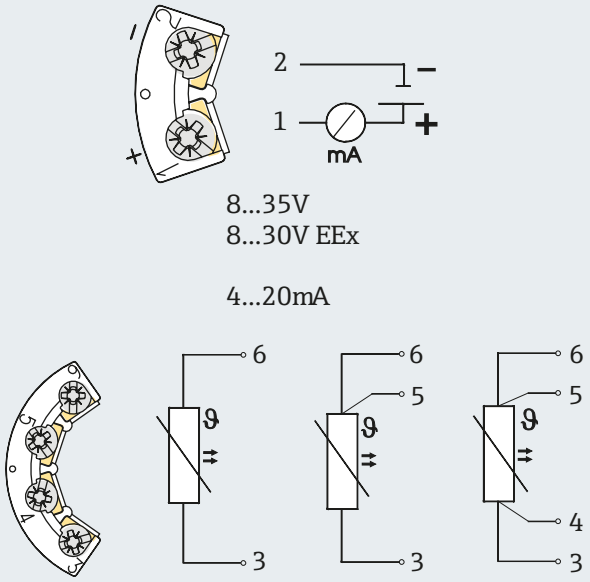
Connections for TMT127



Dimensions (mm) for TMT187



Connections for TMT187



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iTEMP TMT128/188

Temperature transmitters for thermocouples.

TMT128

TMT188

- Fixed measuring range for thermocouples
- Two-wire technology, 4...20mA analogue output
- Galvanic isolation

Features and benefits

- High accuracy in complete ambient range
- Failure information when sensor breaks or short-circuits as per NAMUR NE 43
- EMC as per NAMUR NE 21, CE
- ATEX, CSA or FM certification

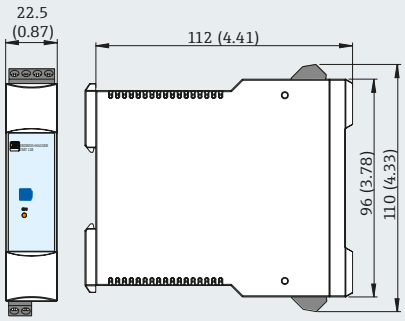
Application

Fixed range temperature head transmitter for converting thermocouple input signals into a scalable 4...20mA analogue output signal.

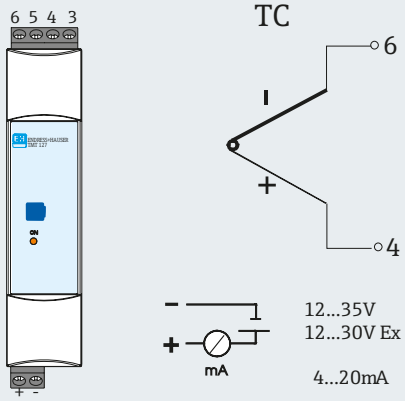
Technical data

	TMT128	TMT188
Output signal	: 4...20mA analogue	4...20mA
Ex certification	: ATEX, CSA, FM.	ATEX II 2 (1) G ATEX II 1 G
Ambient temperature limits	: -40...+85°C	-40...+85°C
Storage temperature	: -40...+100°C	-40...+100°C
Climate class	: As per EN 60 654-1, class C	As per EN 60 654-1, class C
Ingress protection	: IP20	IP20
Shock resistance	: 4g/2 to 150Hz as per IEC 60 068 2-6	4g/2 to 150Hz as per IEC 60 068 2-6
Weight	: Approx. 90g	Approx. 40g
Materials	: Housing: PC/ABS, UL 94V0	Housing: PC potting: PUR
Terminals	: Pluggable screw terminal, max. 2.5mm2, solid or strand with wire end sleeve.	Cable up to max. 1.75mm2 (secure screws)

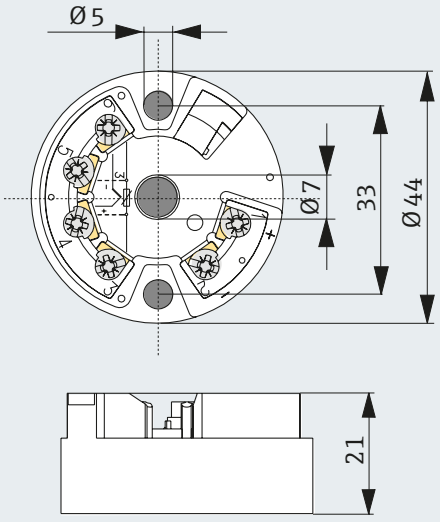
Dimensions (mm) for TMT128



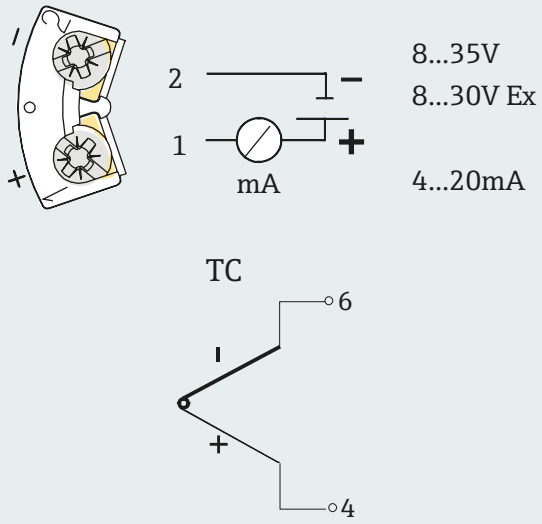
Connections for TMT128



Dimensions (mm) for TMT188



Connections for TMT188



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iTEMP TMT82/84/85

Temperature transmitters for head mounting.

TMT82 with TID10 display

TMT84

TMT85

- **Dual sensor input**
- **Advanced diagnostics**
- **Screw or spring terminals**
- **High accuracy ±0.1K**
- **Optional TID10 display**

The iTEMP range of temperature head transmitters feature two input channels and a choice of HART (TMT82), PROFIBUS (TMT84) or FOUNDATION Fieldbus (TMT85) protocols for the conversion of different input signals into digital output signals. Resistance thermometers, thermocouples, resistance transmitters and voltage transmitters can all be fed through these compact devices and, for maximum versatility, they are suitable for use with 2-, 3- and 4-wire technology!

The iTEMP head transmitters also offer sensor diagnostics: sensor failure, cable corrosion, wiring error and device hardware error are all monitored for improved plant optimisation. Better still, with galvanic isolation between fieldbus and sensor inputs and ATEX, FM, CSA, IECEx and NEPSI certification for hazardous area use, you can be sure of accurate and reliable temperature data in all eventualities!

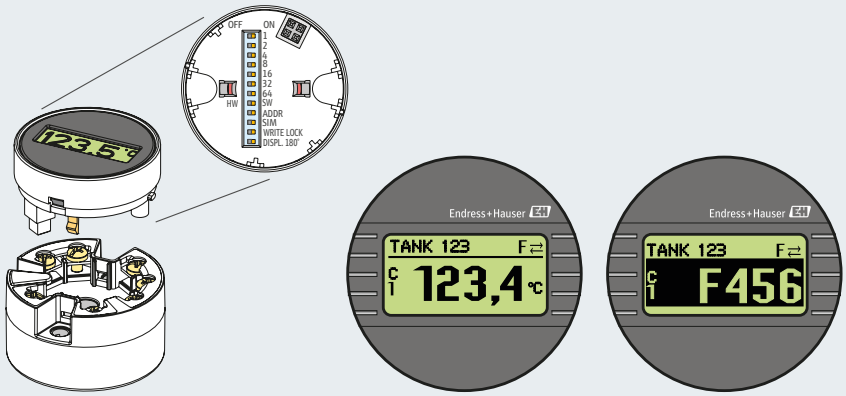
Technical data

	TMT82	TMT84	TMT85
Communication protocol	HART	PROFIBUS	FOUNDATION Fieldbus
Measured variable	Temperature, resistance and voltage	Temperature, resistance and voltage	Temperature, resistance and voltage
Input type	Two independent sensors	Two independent sensors	Two independent sensors
Linearisation	Temperature linear, resistance linear, voltage linear	Temperature linear, resistance linear, voltage linear	Temperature linear, resistance linear, voltage linear
Galvanic isolation	U = 2kV AC (input/output)	U = 2kV AC (input/output)	U = 2kV AC (input/output)
Current consumption	≤23mA	≤11mA	≤11mA
Switch-on delay	10s	8s	8s
Ambient temperature	–40°C...+85°C (safe areas)	–40°C...+85°C (safe areas)	–40°C...+85°C (safe areas)
Certification	ATEX, FM, CSA, IEC Ex, NEPSI	ATEX, FM, CSA, IEC Ex, NEPSI	ATEX, FM, CSA, IEC Ex, NEPSI

Dimensions (mm)

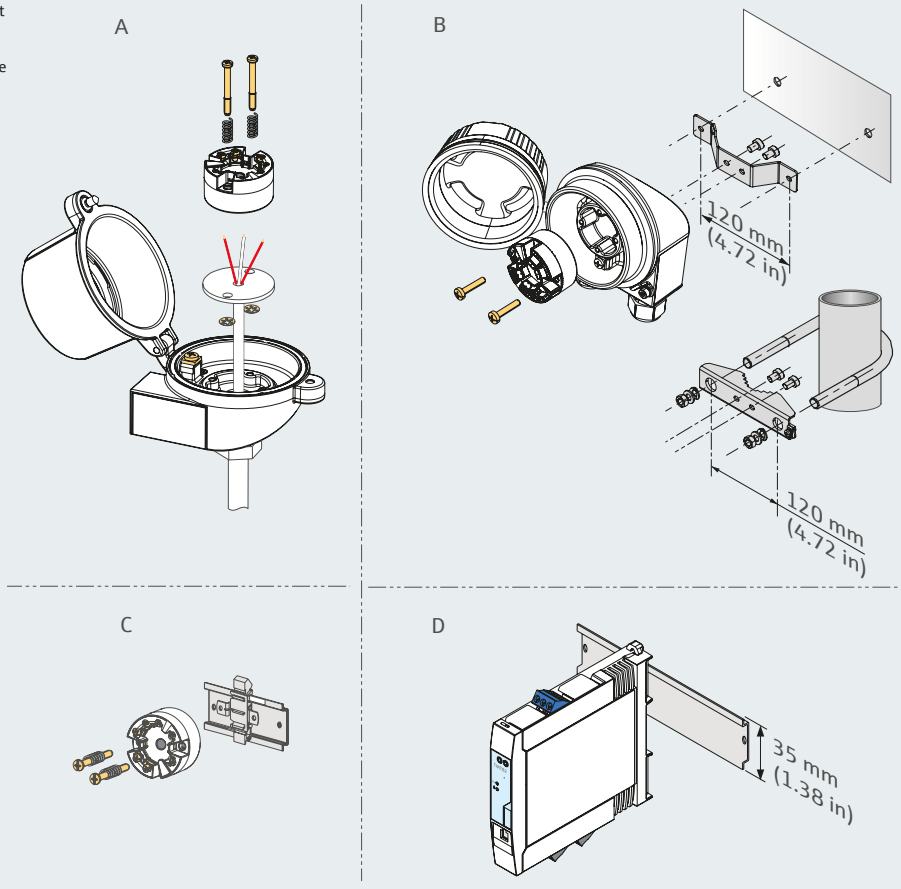
TID10 pluggable display

Whilst there are no display or operating elements present on the head transmitters, the TID10 plug-on display can be used as an option. It will display information regarding the actual measured value and the measurement point identification. In the event of a fault in the measurement chain, this will be displayed in inverse colour showing the channel ident and diagnostics code. DIP switches can be found on the rear of the display, enabling the hardware set-up such as the device address.



Installation

A. terminal head, flat face as per DIN EN 50446, direct installation onto insert with cable entry (middle hole 7mm)
B. Separated from process in field housing, wall or pipe mounting
C. With clip on DIN rail as per IEC 60715 (TH35)
D. DIN rail device for mounting on a TH35 mounting rail as per EN 60715



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iTEMP TMT142

Universal HART temperature transmitter for use in the field.

- ATEX EEx ia, EEx d, FM and CSA certification
- Rotatable rear-illuminated display
- Undervoltage detection
- 2-wire technology

Applications

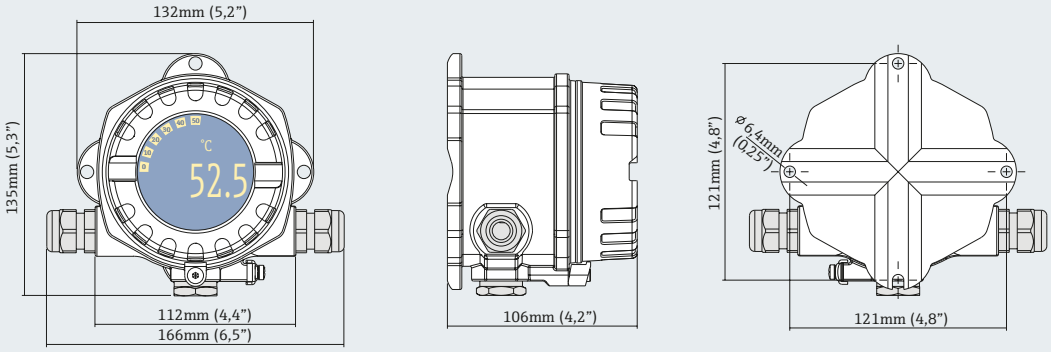
Tough, inhospitable conditions? Endress+Hauser's iTEMP TMT142 HART temperature field transmitter has been purpose-designed to perform where the job demands. Industries such as chemical, petrochemical and mining pose their own set of challenges. That's why the TMT142 offers a robust housing with IP65 protection and full ATEX approval.

The TMT142 is also universally programmable with HART protocol for resistance thermometers, thermocouples and voltage transmitters. The large rotatable rear-illuminated display shows the actual measured value, not only as a digital indicator but also as a 10% step trend bar graph for maximum operability. What's more, the TMT142 fulfils NAMUR requirements: EMC to NE21, failure conditioning in the event of sensor breakdown to NE43 and corrosion detection to NE89. Operation, visualisation and maintenance are carried out via a PC, using FieldCare or ReadWin 2000 operating software.

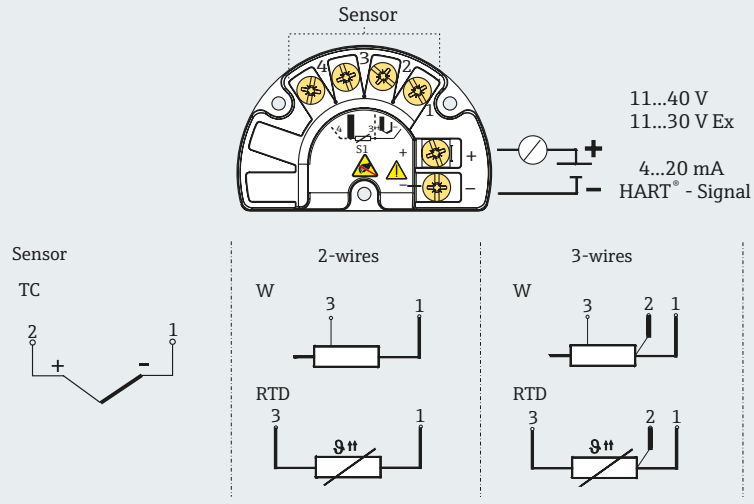
Technical data

Input	:	RTD, TC, Ω, mV
Output	:	4...20mA
Supply voltage	:	11...40VDC (standard) 11...30VDC (Ex-version)
Operation	:	HART
Certificates	:	ATEX, FM, CSA, CSA GP

Dimensions (mm)



Electrical connection



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iTEMP TMT162

Universal temperature transmitter with HART, PROFIBUS or FOUNDATION Fieldbus protocol.

- **Universally programmable**
- **Two-wire technology, analogue output to 4...20mA output**
- **Sensor monitoring**
- **ATEX, FM or CSA certification**
- **Galvanic isolation**

Features and benefits

- Illuminated rotatable display
- Operation, visualisation and maintenance with PC e.g. Fieldcare or ReadWin 2000 operating software
- Breakdown information in event of sensor break or sensor short-circuit, adjustable to NAMUR NE43
- EMC to NAMUR NE21, CE
- Output simulation
- Min/max. process value recorded
- Customised measuring range setup or expanded SETUP
- Optional two input channels, e.g. for 2 x Pt100, 3-wire connection.

Application

Temperature field transmitter for converting various input signals to an analogue, scalable 4...20mA output signal.
Input:

- Resistance thermometer (RTD)
- Thermocouples (TC)
- Resistance transmitter (W)
- Voltage transmitter (mV)
- HART, PROFIBUS or FOUNDATION Fieldbus protocol.

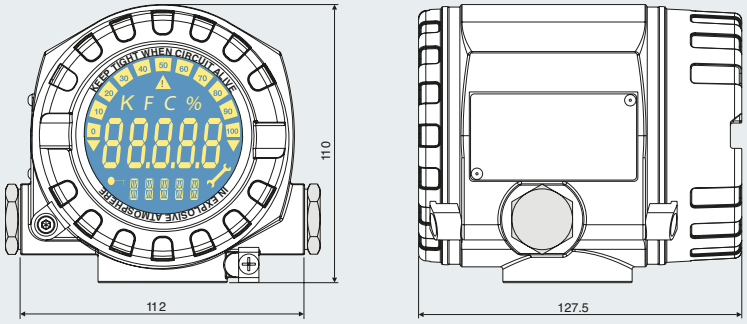
The TMT162 is a two-wire transmitter with analogue output, two (optional) measuring inputs for resistance thermometers and resistance transmitters in 2-wire, 3-wire or 4-wire connection, thermocouples and voltage transmitters. The LCD display shows the current measured value digitally and as a bar graph with an indicator for limit value violation, The TMT162 (HART) can be operated using a handheld terminal (DXR375) or PC.

Technical data

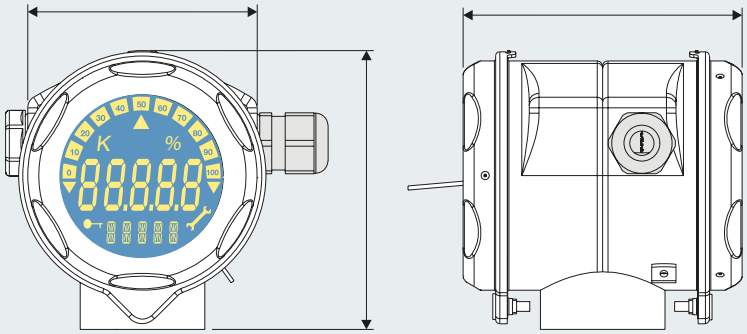
Output signal	:	4...20mA analogue
Galvanic isolation	:	U = 2kV AC (input/output)
Ambient temperature	:	Without display: -40...+ 85°C With display: -30...+70°C
Climate class	:	As per EN 60 654-1, Class C
Degree of protection	:	IP67
Shock and vibration		
Resistance	:	3g/2 to 150Hz as per IEC 60 068-2-6
Weight	:	Approx. 1.4kg, (aluminium housing)
ITK	:	Version 4.61

Dimensions (mm)

Stainless steel/aluminium housing



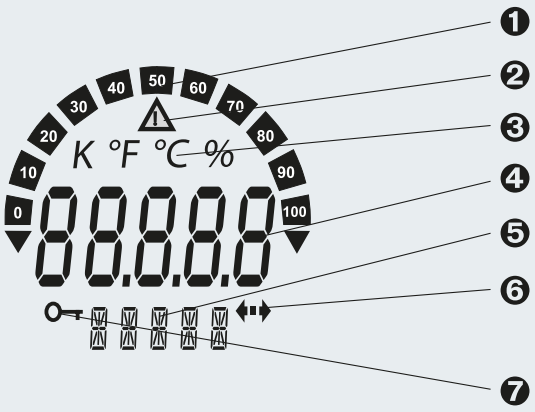
Optional T17 stainless steel housing



Display elements

Field transmitter display (illuminated, rotatable in 90° stages)

1. Bar graph display in 10% stages with indicators for over-ranging/under-ranging
2. Caution display
3. Unit display K, °F, °C or %
4. Measured value display
5. Status and information display
6. Communication display
7. Programming disabled display



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Omniset TPR100

Mineral insulated insert.

- Mineral insulated cable sheathed in stainless steel
- 3 or 6mm diameter stem or tapered
- ATEX certification

The TPR100 is a thermoresistance RTD insert and is used as a replaceable measuring element in thermometers. Constructed in compliance with DIN EN 60751, it consists of a mineral insulated cable and a Pt100 sensing element. It can be connected to the conversion electronics by means of flying leads or alternatively with a ceramic terminal block. Options include various configurations of Pt100 sensors, stems and certification. Sensors are either wire wound or thin film for different operating ranges -50...400°C and -200...600°C.

Technical data

Material	: Stem: stainless steel 316L terminal block: ceramic
Measuring range	: Wire wound Pt100: -200...+600°C thin film Pt100: -50...+400°C
Maximum process pressure	: 2Mpa (20 bar) at 20°C
Shock & vibration resistance	: According to DIN EN 60751 2.8g peak / 10...500Hz
Insulation	: Insulation resistance between terminals and probe sheath: more than 100MΩ at 25°C (according to DIN EN 60751, test voltage 250V) more than 10MΩ at 300°C

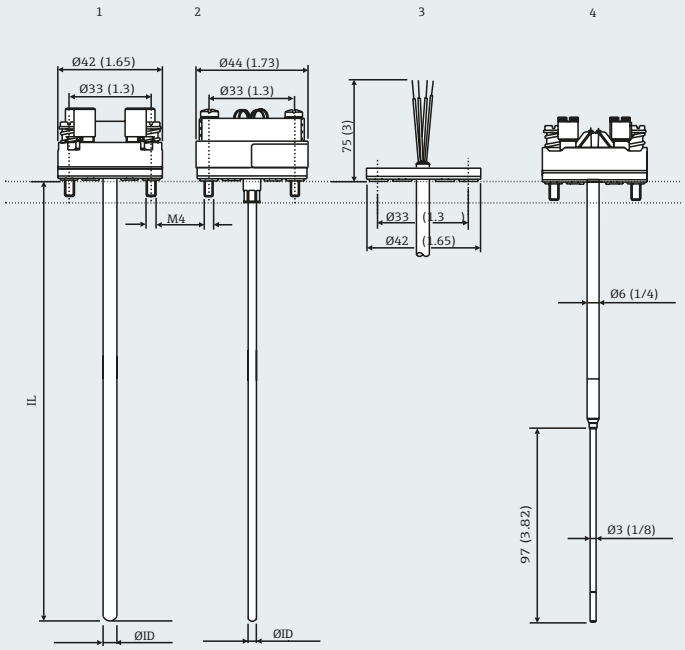
Applications

- Fine chemicals
- Power industry
- Food industry
- Environmental industry
- General processes

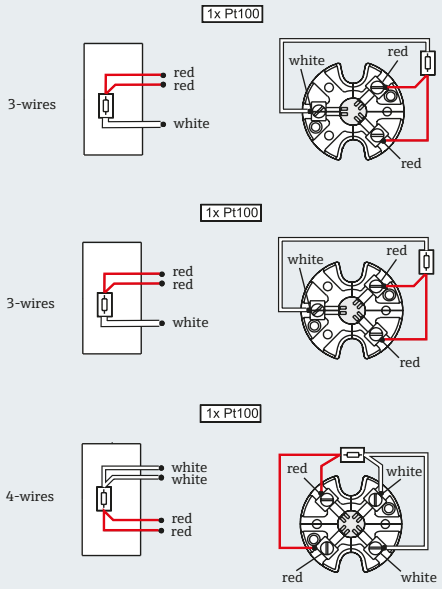
Features and benefits

- Mineral insulated cable sheathed in stainless steel 316L
- 3 or 6mm diameter stem
- Customised immersion length
- Different kinds of Pt100 and classes of tolerance (DIN EN 60751): wire wound type, class A or class AA, single or double; thin film type, class A or class AA
- 4-wire connection for single Pt100, 3-wire connection for double Pt100
- Electronics included in the ordering structure: PCP (4...20mA also with enhanced accuracy), HART and PROFIBUS PA 2-wire transmitters
- Factory calibration certificate
- ATEX I GD EEx ia certification

Dimensions (mm)



Electrical connection



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Analytical measurement

Liquiline CM14

Single-channel analytical transmitter for pH, conductivity or amperometric dissolved oxygen.

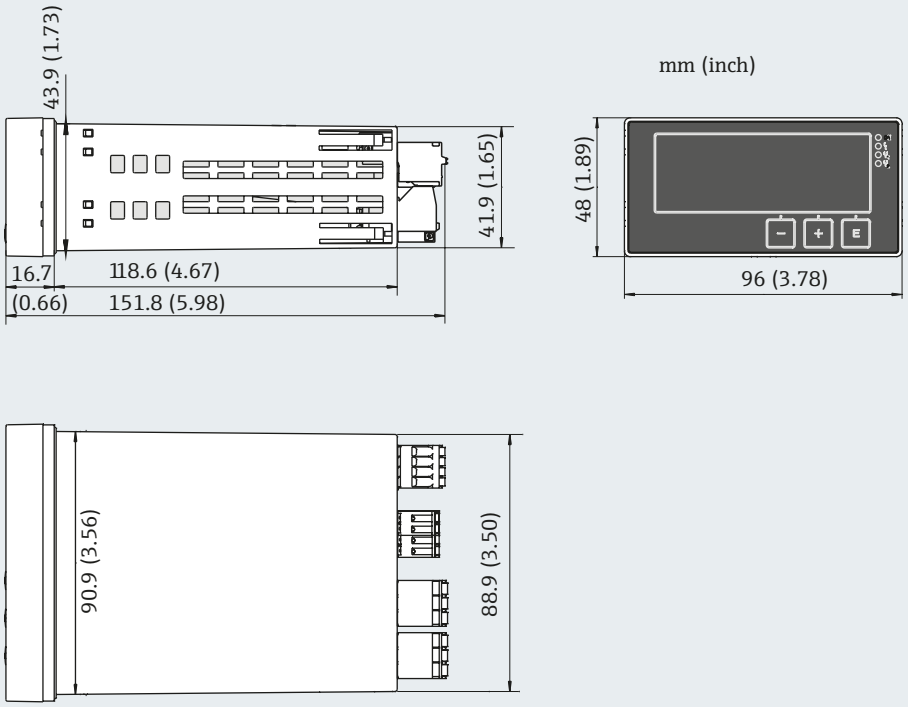
- Memosens digital technology
- Easy to operate
- Two contacts for limit contactor
- Second current output for temperature
- Compact panel-mounted design

The Liquiline CM14 single-channel, panel-mounted transmitter simplifies pH, conductivity or dissolved oxygen monitoring by allowing advanced Memosens digital sensor technology to be incorporated into straightforward applications. Available as a complete system, including sensors and cables, this great value digital transmitter is the perfect solution for OEM applications and simple monitoring solutions.

Technical data

Measured variables	: pH, conductivity, amperometric dissolved oxgen
Sensors	: Digital
Housing	: Panel mounted
Housing body	: Polycarbonate
Front membrane	: Polyester (UV resistant)
Reference temperature	: 25°C
Protection	: Front: IP65/NEMA 4X
Communication	: 2 x 0/4...20mA active

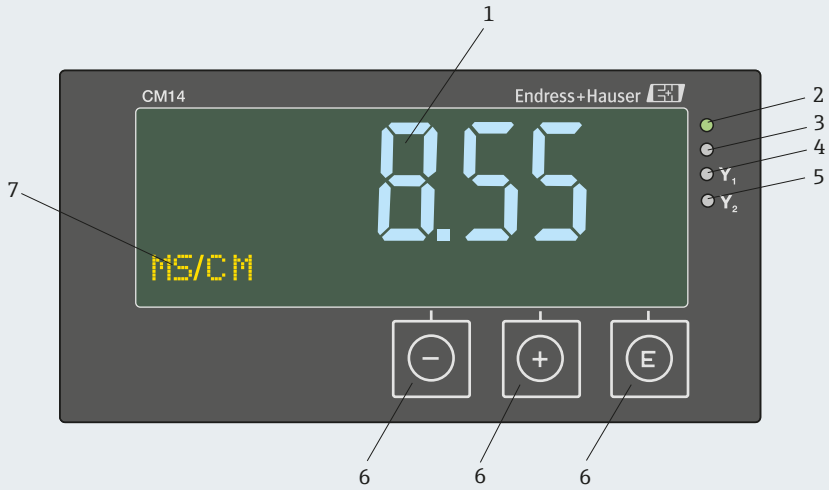
Dimensions



Display and operating elements

Display and operating elements

1. LC display for measuring values and configuration data
2. Status LED power connected
3. Status LED alarm function
4. Status LED limit contactor relay 1
5. Status LED limit contactor relay 2
6. Dot matrix display for measuring units and menu positions
7. Operating keys



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Liquiline M CM42

Transmitters for pH/redox, conductivity and dissolved oxygen.

WirelessHART

- For all types of sensor, digital or analogue
- ATEX, FM, CSA and NEPSI certified
- Predictive maintenance system detects when sensors must be cleaned, calibrated or replaced
- HART, PROFIBUS and FOUNDATION Fieldbus compatible

Liquiline CM42 is easy to use and features a large plain text display showing the measured value in figures 28mm high for easy reading. With step by step menu-driven operation, user error is virtually eliminated. Operation is simplified with the 'navigator' button – a twisting dial with an integrated 'enter' key. Parameter setting, servicing, diagnosis and predictive maintenance are in plain text format – no bulky manuals required!

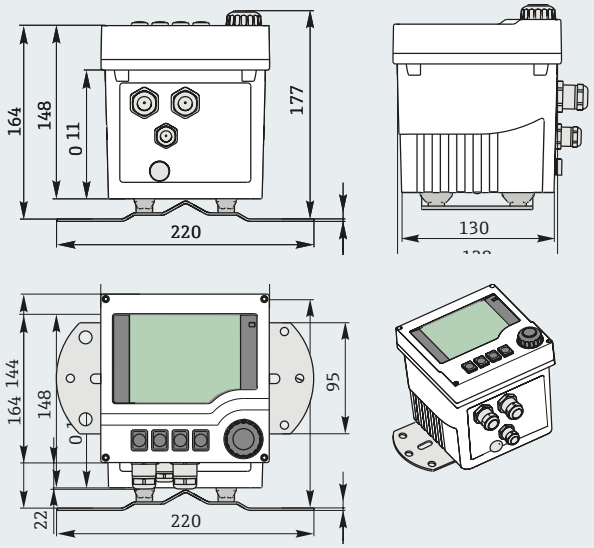
Available with either a corrosion-resistant robust plastic housing or stainless steel housing, Liquiline CM42 is suitable for both plant use and for integration into panels, in both safe and hazardous areas. Better still, it is developed in accordance with IEC 61508 and the international safety standard SIL2 for simple integration into safety instrumented systems.

Technical data

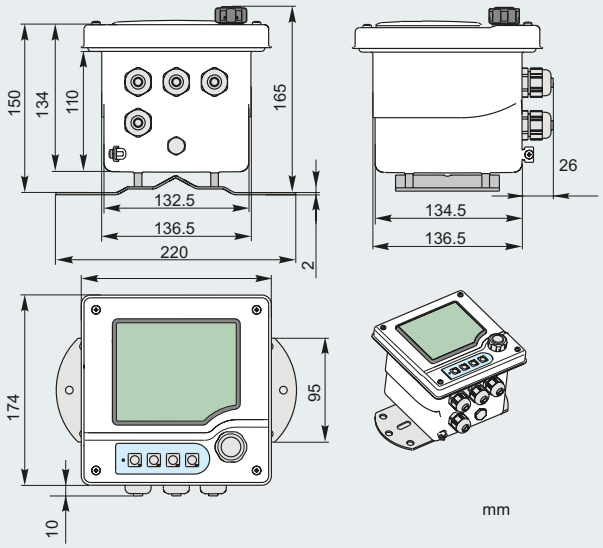
Measured variable	:	pH/redox, conductivity, concentration, resistivity, dissolved oxygen, temperature
Sensors	:	Analogue or digital: glass, ISFET and Pfaudler
Housing	:	Plastic or stainless steel
Temperature sensors	:	Pt100, Pt1000, NTC 30K
Reference temperature	:	25°C
Repeatability	:	< 0.01
Signal on alarm	:	≥ 21.5mA or ≤ 3.6mA
Protection	:	IP67 (NEMA 4X)
Communication	:	HART, PROFIBUS or FOUNDATION Fieldbus

Dimensions (mm)

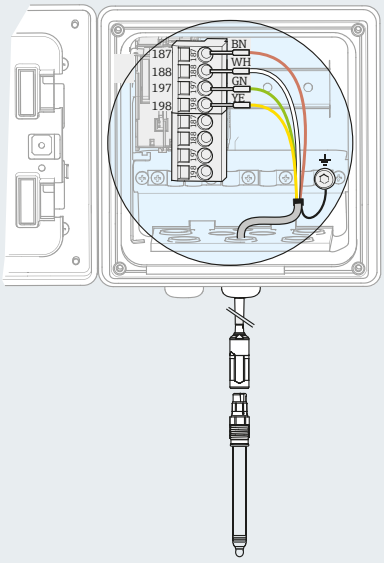
Plastic housing

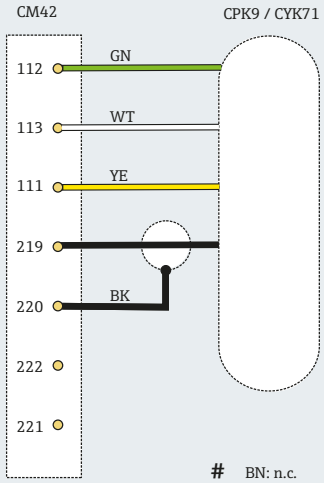


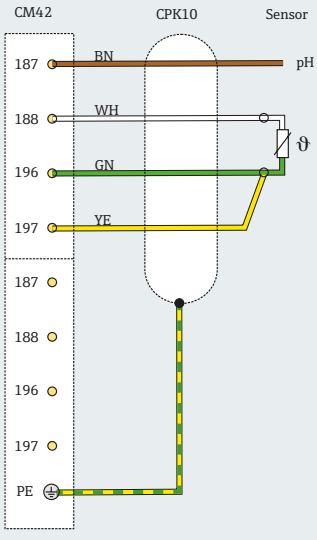
Stainless steel housing



Electrical connections







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Liquiline CM44x

Multi-parameter analytical transmitter for use with Memosens digital sensors.

WirelessHART

- For safe area use
- Quick and easy commissioning
- Standardised intuitive operation
- Easily expandable
- Full diagnostic capability
- Datalogger
- Expandable up to 8 channels

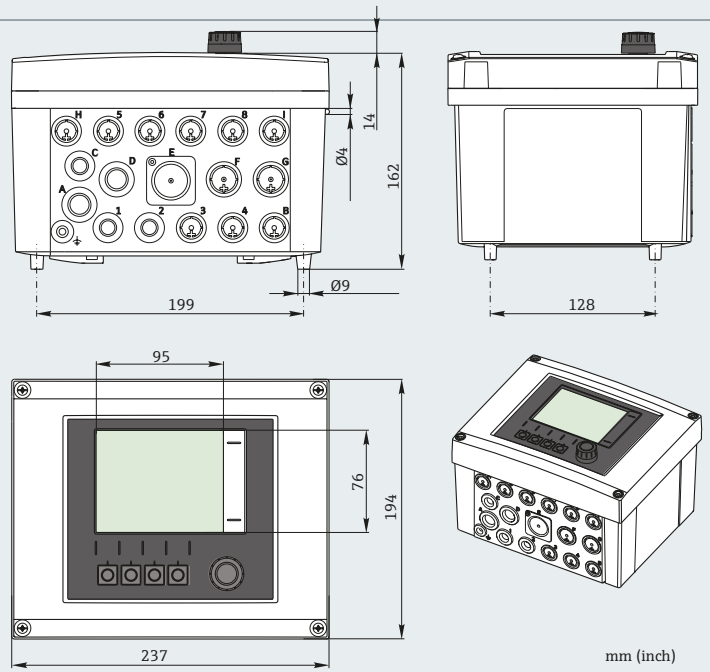
Liquiline CM44x is suitable for use with pH, ORP, conductivity, DO, turbidity, nitrate and chlorine sensors. Available in its most basic form as a single sensor input, single alarm relay safe area solution, you can easily expand the system with additional inputs and alarms to something much more powerful. Choose as little or as much functionality as you need – it's that simple.

All sensors use the same Memosens-Liquiline standardised protocol for total data and mechanical interface compatibility and increased process safety. When used together, any combination of different types of digital sensors, cables, holders and assemblies results in a measurement solution perfectly tailored to your requirements. This modular concept means that our devices are easily adapted to different applications and requirements, giving you more flexibility across your plant.

Technical data

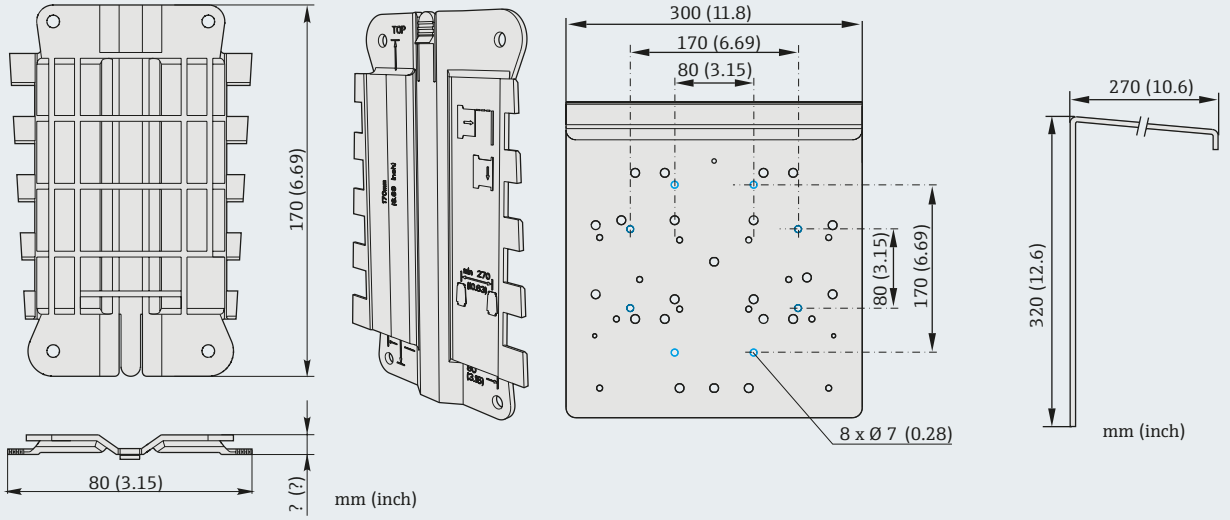
Measured variable	:	pH/ORP, conductivity, oxygen, turbidity, nitrate, chlorine, sludge blanket, SAC
Sensors	:	Digital
Protection	:	IP66/67 (NEMA 4X)
Communication	:	HART, PROFIBUS, Modbus RS485/TCP, Ethernet IP
Output	:	0/4...20mA, HART
Response	:	t_{90} = max 500ms for 0...20mA increase
Ambient temperature	:	-20...+60°C
Housing	:	Plastic

Dimensions (mm)



mm (inch)

Installation



mm (inch)

Mounting plate

Weather protection cover

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Memobase Plus CYZ71D

Measure, calibrate and document Memosens sensors with one single tool.

- Calibrate and measure up to four sensors simultaneously
- Fully traceable and documented
- Simple identification of sensor deterioration
- Fully FDA 21 CFR Part 11 compliant (optional)

Memobase Plus is a unique software tool that allows simultaneous measurement and calibration of multiple pH/ORP, conductivity, dissolved oxygen and chlorine sensors in a controlled environment using your laptop or PC. This results in a simplified and optimised maintenance and calibration effort which is fully traceable and documented.

Calibrate and measure up to four sensors simultaneously

Memobase Plus effectively turns your computer into a calibration and measuring station by connecting the sensors to your PC via USB. Up to four sensors can be managed simultaneously in any combination.

Operation is simple and intuitive, as the user is guided through calibration and maintenance procedures and the software automatically identifies the sensors.

Full traceability and documentation ensures you will comply with quality assurance procedures. Slope and calibration history is included in the calibration document, enabling simple identification of any sensor deterioration. Finally a real answer can be had for the old question of, “How long will my sensor last?” By tracking your sensors via the Memobase Plus database, the calibration history will quickly show you in graphical format whether the slope and zero points are still within acceptable limits that you can set.

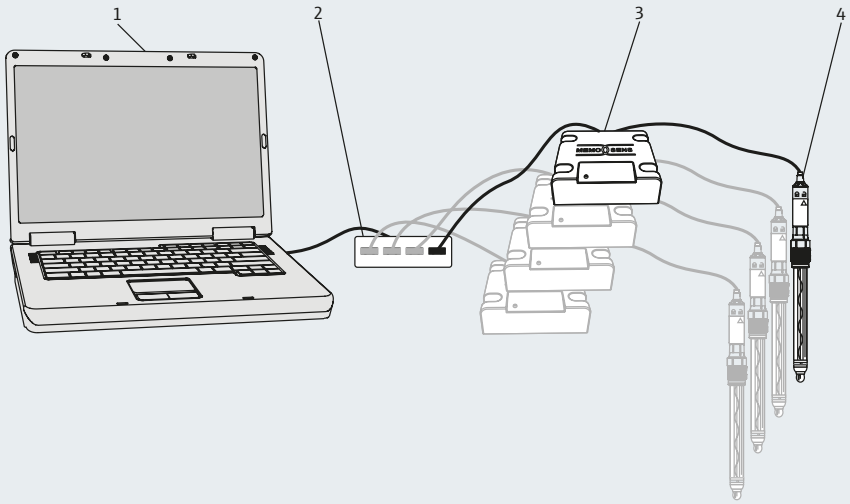
Technical data

Measured variables : pH/ORP, conductivity, dissolved oxygen, chlorine
Software functions : Measure, calibrate, sensors, reports

Fully FDA 21 CFR Part 11 compliant, Memobase Plus is even ideal for use in the highly controlled and regulated life sciences industry. User administration levels with password protection ensure the integrity of the calibration. 'As found - as left' measurement is also possible, to look at the difference in measuring quality before and after calibration. This can be carried out easily and documented as an optional part of all calibration procedures. All the information is stored in a local or central database, making it easy to share.

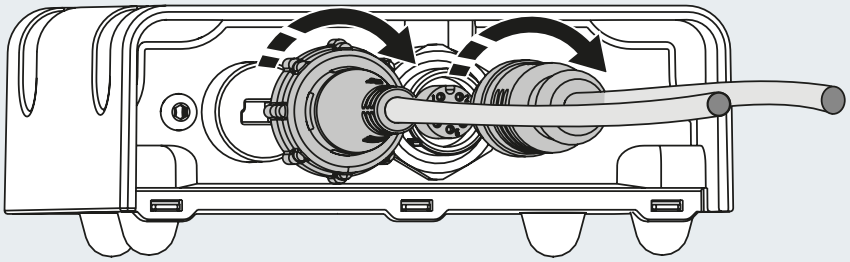
Measuring system

1. PC (not supplied)
2. USB hub (optional, not supplied)
3. 1 to 4 USB cables
4. 1 to 4 Memolink boxes
5. 1 to 4 CYK20 Memosens cables or CYK10 Memosens process cables
6. 1 to 4 Memosens sensors



Memobase Plus connection diagram

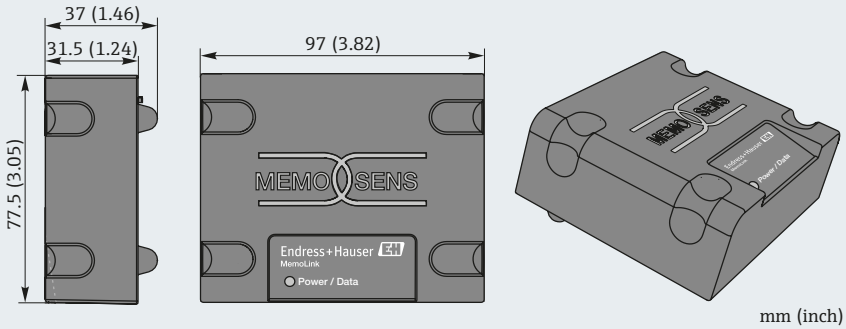
1. Cable with mini USB plug
2. Cable with M12 plug



Memobase Plus dimensions (mm)

Dimensions of Memolink boxes (mm)

The Memolink boxes can be stacked on top of one another with the 'Power/Data' LED still easily visible.



mm (inch)

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Smartec CLD18

Hygienic conductivity measurement system for food & beverage applications.

- Compact design allows installation in small pipes
- Made from highly durable PEEK
- Suitable for CIP
- IP69K protection
- 3-A and FDA compliant

Designed for use in the food & beverage industry, Endress+Hauser's Smartec CLD18 conductivity measurement system offers real value for money. With 3-A approval and a range of hygienic process connections, the CLD18 has been cleverly designed in compliance with FDA regulations to provide reliable, cost-effective conductivity measurement in various food & beverage applications including product monitoring, phase separation and simple CIP applications.

IP69K protection

Compact yet robust, the new Smartec offers a simple solution to straightforward conductivity measurement. It features IP69K protection for high temperature and high pressure washdowns and can also withstand process temperatures from -10°C up to +130°C. It's great for smaller pipe diameters making it the most cost-effective choice for a range of food & beverage applications such as bottling plants, dairies and breweries.

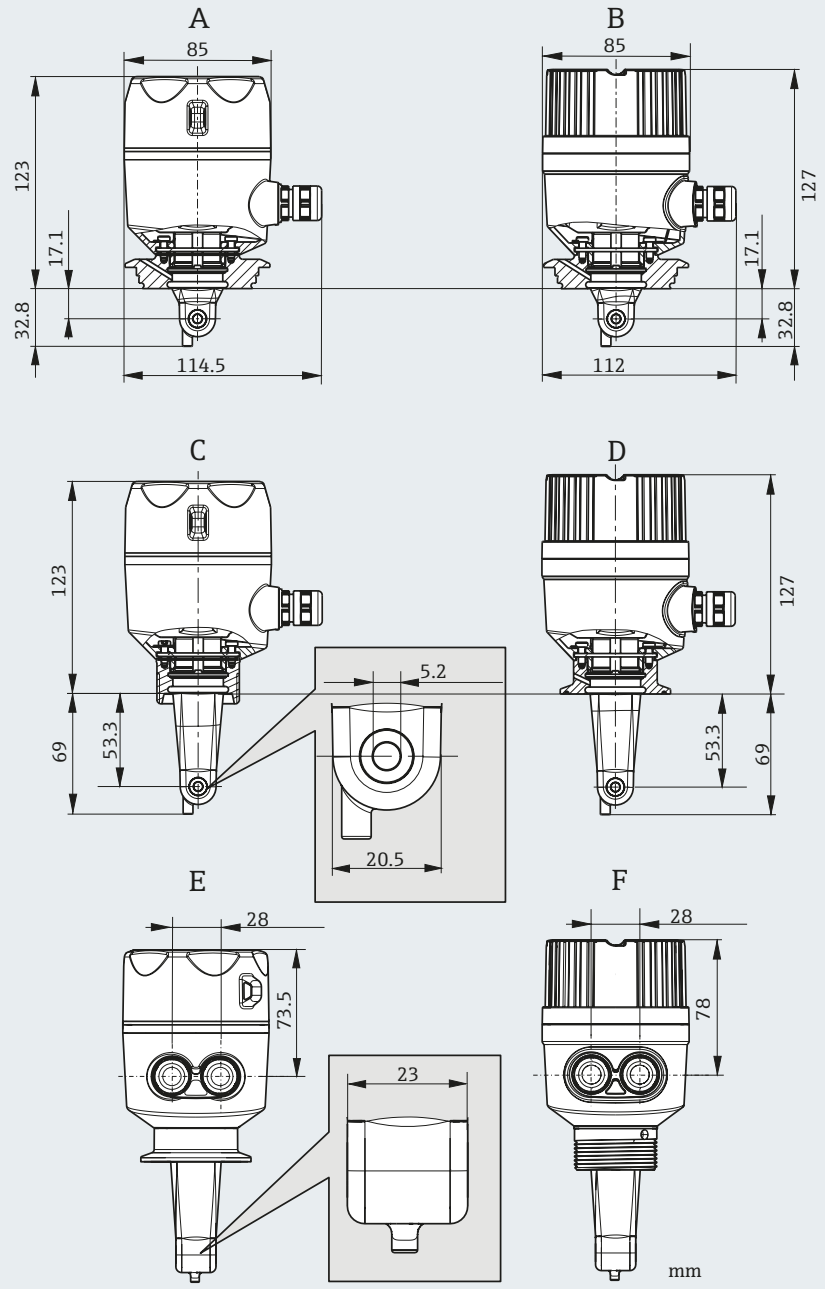
Compact and cost-effective

Whilst the Smartec CLD18 has been designed to be compact and cost-effective, there's been no skimping on features and functionality. Set-up couldn't be easier as it is factory calibrated; there's also a choice of plastic or stainless steel housings to suit your particular requirements. Two outputs, for conductivity and temperature, come as standard. Best of all, Smartec CLD18 has surface mount technology for immunity against plant vibration – so even if your application is susceptible to vibrations, your CLD18 will continue giving clear, reliable readings throughout.

Technical data

Measured variables	: Conductivity, temperature
Conductivity range	: 200µS/cm...1000mS/cm (uncompensated)
Temperature	: −10°C...+130°C
Temperature measurement	: Pt1000
Output signal	: 0/4...20mA (galvanically isolated)
Response time	: Conductivity: t95 < 1.5s, temperature: t90 < 50s
Repeatability	: Max 0.5% of measured value ± 5µS/cm ± 2 digits
Housing	: Plastic or stainless steel
Sensor	: PEEK
Process connections	: Stainless steel (316L) or PVC-U
Seal	: EPDM
Protection	: IP69K

Dimensions (mm)



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Smartec S CLD134

Inductive conductivity measurement with compact or separate transmitter for the food industry.

WirelessHART

- Fast response time enabling safe and efficient phase separations
- Hygienic stainless steel housing
- Designed according to ASME BPE guidelines
- Food-grade virgin PEEK body
- HART and PROFIBUS compatible

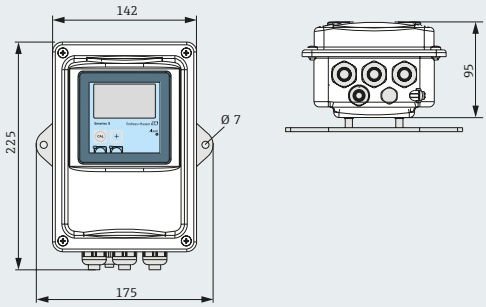
The Smartec S CLD134 transmitter including the CLS54 sensor conforms to EHEDG and 3-A requirements, offering the highest level of sanitary safety. For maximum versatility, the Smartec S transmitter is available with both compact and remote housings for simple installation. Since cleanliness is key, its robust stainless steel housing is easy to clean. It will even slot into your existing hardware: the conductivity system is compatible with HART and PROFIBUS for simple integration.

Technical data

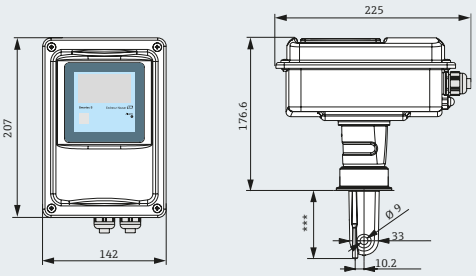
Measured variable	: Conductivity, concentration, temperature
Conductivity measuring	
Range (recommended)	: 100µS/cm...2000mS/cm (uncompensated)
Concentration measuring range	: NaOH: 0...15% HNO_3: 0...25% H_2SO_4: 0...30% H_3PO_4: 0...15% User 1 (to 4): 4 tables available with remote parameter set switching
Temperature measuring range	: -10...+125°C (sterilisation at 150°C, 60 mins maximum)
Temperature sensors	: Pt1000 switchable to Pt100
Output signal range	: 0/4...20mA, galvanically isolated
Temperature response time	: $t_{90} \leq 26s$

Dimensions (mm)

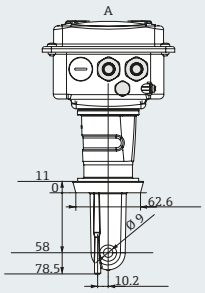
CLD134
Remote version

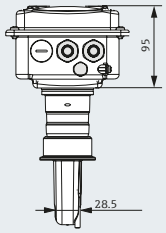


CLD134
Compact version

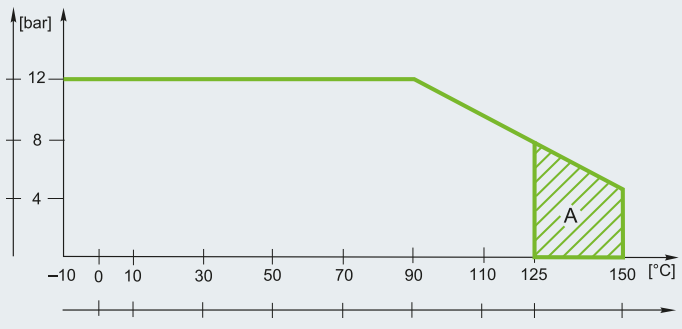


CLD134, dairy pipe fitting DIN11851, DN50





Pressure-temperature load curve



A = sterilisation time (max 60 min)

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Flexdip CYA112 and CYH112

Assembly and holder system for sensors in open basins, channels and tanks.

CYA12

CYH12

- Optimum configuration of any measuring point
- Easy to install and maintain
- Stainless steel or PVC versions

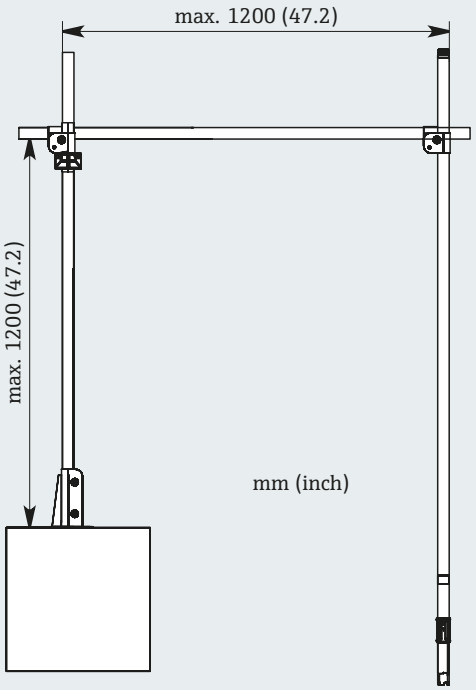
The Flexdip CYA112 assembly and CYH112 holder forms a modular holding system for sensors used in open basins, channels and tanks. For in-situ measurement in water and wastewater plants, the assembly and associated sensor are directly immersed in the medium. The flexible CYH112 holder is suitable for fixing on the floor, wall or directly on a rail.

In addition to the standard G1 sensor connection thread, adapters can be used to match to other, different sensor threads and designs. A quick screw connector allows sensors to be assembled without the need for cable twisting meaning that sensors with an inductive Memosens plug-in head can be easily installed and replaced.

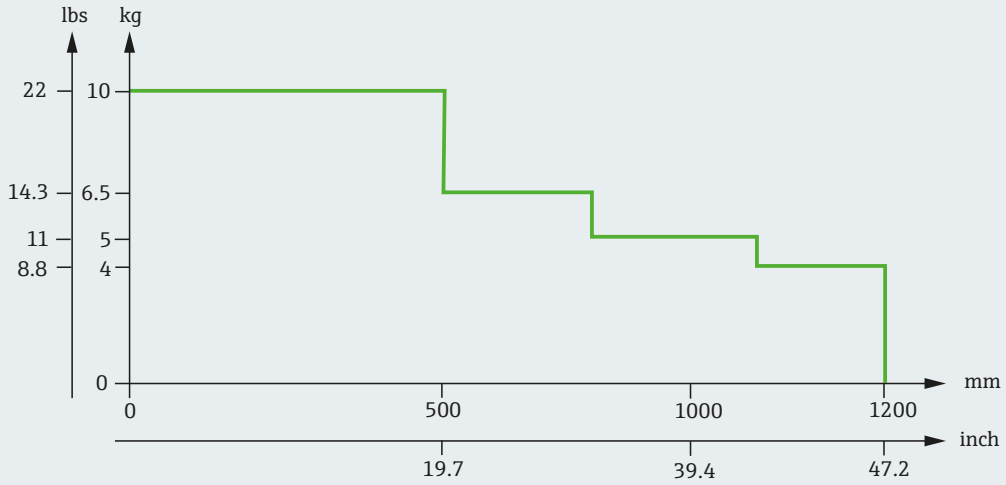
Technical data

		CYA112 assembly
Material	:	Stainless steel or PVC
Connection angle	:	0, 45°, 90°
Temperature	:	-20...+60°C
Pressure	:	Unpressurised
Length	:	600...3600mm (in 600mm steps)
Sensor connection	:	NPT¾", G1", Pg 13.5, G¾", G1½"
Immersion pipe	:	Standard, chain or floater
		CYH112 holder
Material	:	Stainless steel or plastic
Installation	:	Floor, wall or rail
Length	:	500, 1000 and 1800mm
Immersion pipe connection	:	Chain (plastic), chain (stainless steel), cross clamp, pendulum holder

Installation



Maximum extension



The given values are valid for floor, wall and rail mounting. The maximum extension depends on the load (weight of immersion pipe, assembly and cable).

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Flowfit CPA240/250

pH/redox flow-through assemblies with a maximum of three electrode locations.

CPA240-2

CPA240-3

CPA250-A

- **Bypass installation**
- **Direct installation in pipes**
- **Calibration without removing electrodes from holder**
- **Various process connections**
- **Vertical inflow option prevents sedimentation of medium**

Flow-through assemblies CPA240 and CPA250 are intended for direct mounting in/between process pipelines. The assemblies can be used for a wide range of temperatures and applications. Vertical inflow prevents solids from being deposited in the assembly. They are used in many applications, such as:

- water treatment plants
- artificial fertiliser production
- sugar industry
- gas scrubbers
- petrochemical plants

Benefits at a glance

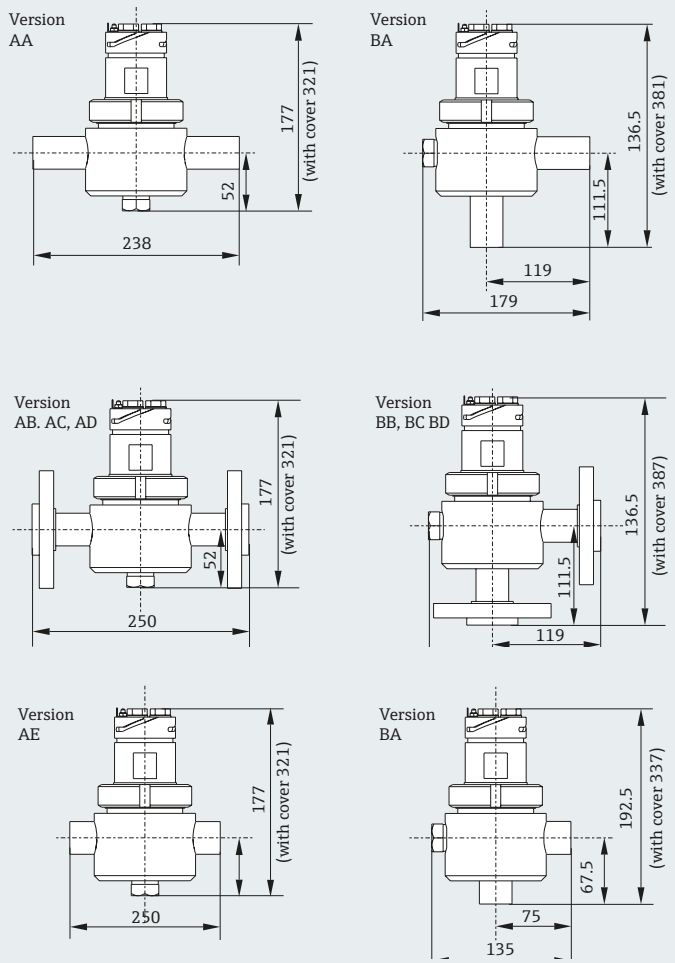
- Simple installation and removal of electrode holder
- Three electrode locations for electrodes and cleaning
- Integrated potential matching pin in Hastelloy C4 or tantalum (analogue only)
- Flexible process connections
- Usable at high pressures and temperatures (up to 10 bar and 150°C max.)
- Drain screw for sampling
- Electrode connection area protected by a cover
- Chemical cleaning may also be retrofitted

Technical data

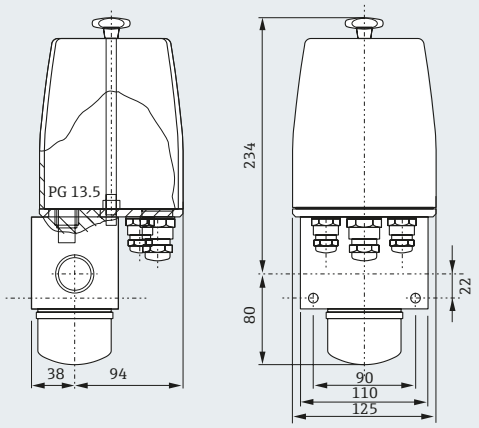
	CPA240-2x	CPA240-3x	CPA250-A
Material	: PVDF	Stainless steel 1.4404	PP
Wet sections (PM)	: HC4 or tantalum	HC4 or tantalum	1.4539
O-rings	: EPDM, Viton Chemraz or Fluoraz	EPDM, Viton Chemraz or Fluoraz	EPDM
Temperature	: 0...120°C	-15...150°C	Unpressurised/80°C
Pressure	: 8 bar/50°C	10 bar/150°C	6 bar/20°C
Electrode length	: 120mm	120mm	120mm

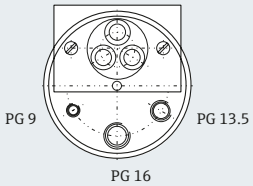
Dimensions (mm)

CPA240 (-2 or -3)



CPA250-A





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Flowfit CYA251

Flow assembly for nitrate/SAC, turbidity and oxygen sensors.

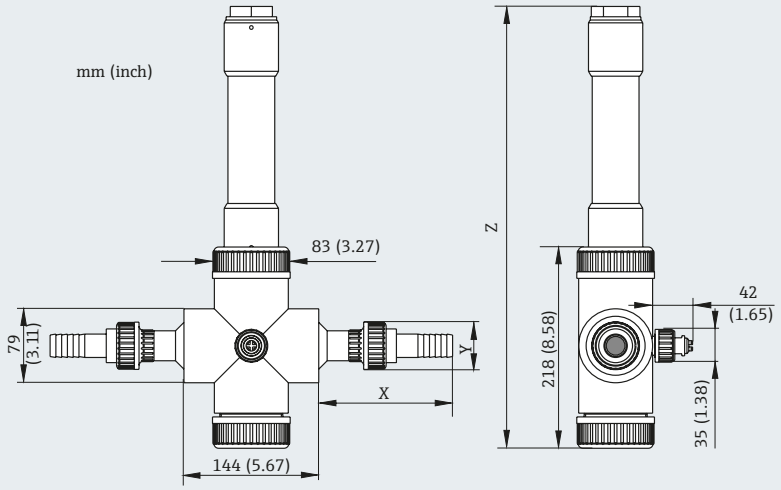
- Simple pipe or wall mounting
- Easy adaptation to your process: process connections for almost all pipe diameters available
- Short sensor response times thanks to low assembly volume
- Automatic or manual cleaning

Flowfit CYA251 is a flow assembly for nitrate/SAC, turbidity and oxygen sensors with a diameter of 40mm. It allows optimum adaption to your piping system thanks to numerous available process connections. The ruggedized material withstands even aggressive media and harsh environmental conditions and a back-pressure valve protects your process from blowing out and increases operational safety. Better still, with the automatic cleaning nozzle, you'll benefit from extended maintenance intervals.

Technical data

Compatible sensors	:	CAS51D (SAC/nitrate); COS31, COS41, COS51D, COS61(D) (oxygen); CUS31, CUS41, CUS51D (turbidity)
Temperature	:	0°C...+50°C
Pressure	:	Max 6 bar at 20°C, 4 bar at 50°C
Typical flow values	:	200l/h (oxygen), 100l/h (turbidity/UV)
Seal	:	EPDM
Weight	:	1.5kg or 1.8kg (depends on version)

Dimensions (mm)

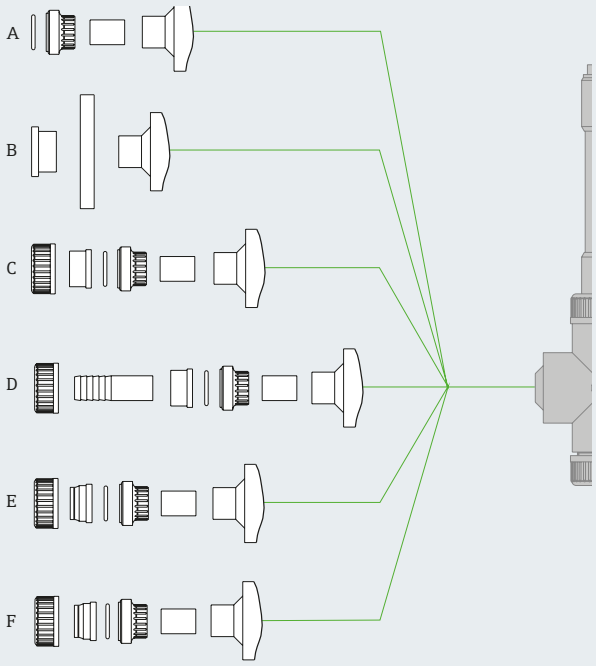


Sensor	CAS51D 2 mm	CAS51D 8 mm	CAS51D 40 mm	COS51D COS41	COS61D COS61 COS31	CUS31 CUS41	CUS51D
Z mm (inch)	468 (18.43)	471 (18.54)	477 (18.78)	284 (11.18)	326 (12.83)	625 (12.80)	332 (13.07)

Connections	NPT ¾"	Rp ¾	DN 25	ANSI 1"	Hose D20	G1¼
X mm (inch)	83 (3.27)	83 (3.27)	83 (3.27)	50.5 (1.97)	137 (5.39)	61 (2.40)
Y mm (inch)	50.5 (1.99	50.5 (1.99)	50.5 (1.99)	115 (4.53)	50.5 (1.99	44.5 (1.75)

Process connections

A. External thread G1¼, PVC
B. Flange ANSI 1", PVC
C. Glue-in port DN 25, PVC
D. Hose D20, PVC
E. Internal thread Rp ¾", PVC
F. Internal thread NPT ¾", PVC



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Cleanfit CPA450

Retractable assembly with ball valve for use with pH/ORP and DO sensors.

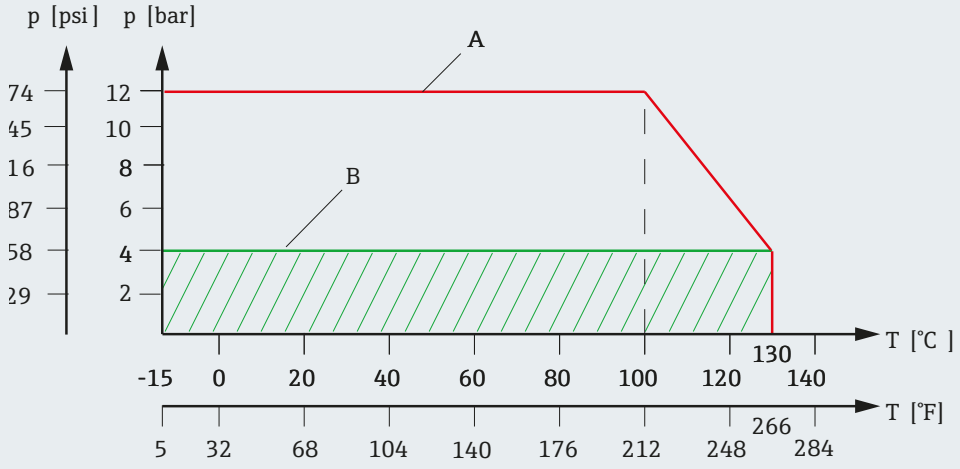
- No process downtime
- Simplified maintenance and calibration
- Integrated rinse and calibration connections

Perfect for use across industry, the Cleanfit CPA450 retractable assembly simplifies maintenance procedures by allowing the replacement of pH/ORP or oxygen sensors while the tank is full or under process conditions. Sensor cleaning and calibration can take place without any process interruption!

Technical data

Immersion depths	: Max 100mm, 250mm, 700mm (depending on process connection)
Process connection	: Full range including threaded and flanged connections
Process pressure	: Max 12 bar at 100°C (max 2 bar for manual retraction, max 6 bar at 130°C)
Process temperature	: -15...130°C
Weight	: 2-10kg depending on the version
Immersion tube	: Stainless steel
Rinse connection plugs	: PVDF
O-rings	: EPDM, Viton, Kalrez
Ball valve	: Stainless steel
Ball valve sealings	: PTFE

Pressure-temperature load curve



Pressure-temperature load curve

A. Maximum process operating pressure (static), only for completely installed assembly
B. Advised upper insertion/retraction pressure (functional)

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Cleanfit CPA871

Retractable assembly for pH/ORP, oxygen and NIR sensors.

- **Clean, sterilise or calibrate/ adjust the sensors without interrupting the process.**
- **Optional immersion chamber eliminates problems due to sticky media.**
- **Wide variety of process connections and wetted materials, even for corrosive media or hazardous areas.**

The Cleanfit CPA871 retractable assembly provides reliable pH/ ORP, oxygen and NIR measurement in sensors with a 12mm diameter and 225/360mm length. Manual or pneumatic, the assembly is easily installed in both vessels and pipes and you can remove, clean, sterilise or calibrate/adjust the sensors without interrupting the process.
Cleanfit CPA871 guarantees the highest operational safety in both standard and demanding applications.

Its intelligent functions prevent any leakage of medium during operation, cleaning or calibration, offering optimum protection of the process and operating personnel. The retractable assembly flexibly adapts to your application. Be it long immersion depths in sticky media, aggressive environments or hazardous areas, you choose the right material and specification to suit your application.

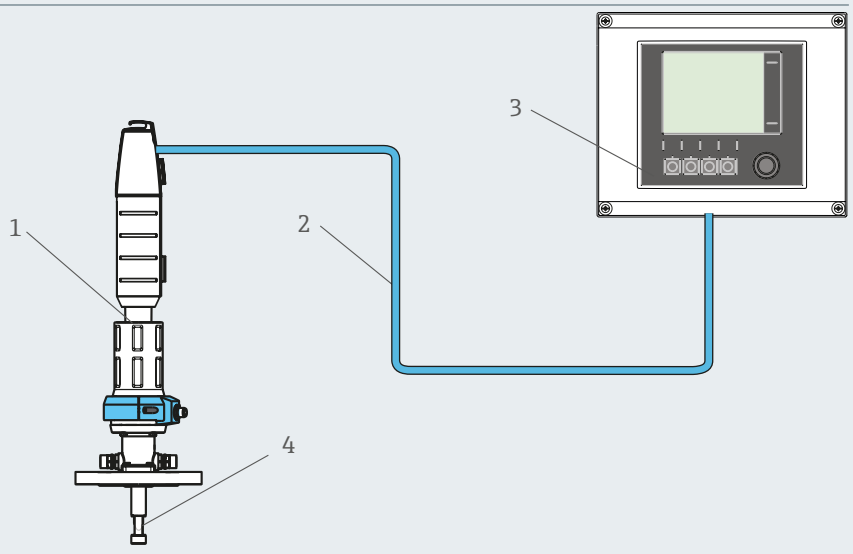
Technical data

Parameters	: pH/ORP, oxygen, NIR
Sensors	: Gel, ISFET, KCl
Version	: Standard or immersion
Drive	: Manual or pneumatic
Housing	: Stainless steel
Temperature	: -10°C...+140°C (for all materials except PVDF and conductive PVDF)
Pressure	: Manual: 8 bar up to 140°C, pnuematic: 16 bar up to 140°C

Measuring system

Measuring system (example)

1. Cleanfit CPA871 assembly
2. Measuring cable
3. Liquiline CM44x transmitter
4. Sensor



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Cleanfit CPA875

Retractable assembly to keep your process 100% sterile.

- **Dynamic sealing prevents contamination.**
- **Remove, sterilize and calibrate the sensor while process is running.**
- **EHEDG-certified assembly: process connection and service chamber.**

Designed to meet the food & beverage and life science industry standards, the Cleanfit CPA875 retractable assembly provides reliable pH/ORP, oxygen and NIR measurement in sensors with a diameter of 12mm and 225/360mm in length. Manual or pneumatic, the assembly is easily installed in both vessels and pipes and you can remove, clean, sterilise or calibrate/adjust the sensors without interrupting the process. Fully certified (EHEDG and ASME BPE) and made of FDA-recommended materials, the CPA875 is the right choice where hygiene counts!

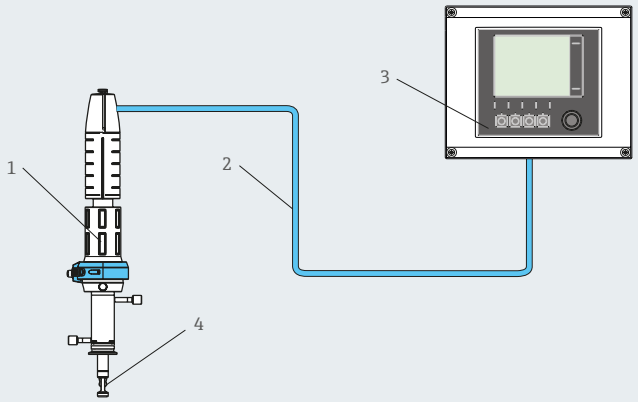
Technical data

Parameters	: pH/ORP, oxygen, NIR
Sensors	: Gel, ISFET, KCl
Chamber	: Single or double
Drive	: Manual or pneumatic
Housing	: Stainless steel
Surface roughness	: Ra < 0.76µm or Ra < 0.38µm (optional)
Temperature	: -10°C...+140°C
Pressure	: Manual: 8 bar up to 140°C, pneumatic: 16 bar up to 140°C
Certification	: Pharmaceutics CoC, EHEDG, ASME BPE, FDA, USP Class VI (optional)

Measuring system

Single chamber measuring system

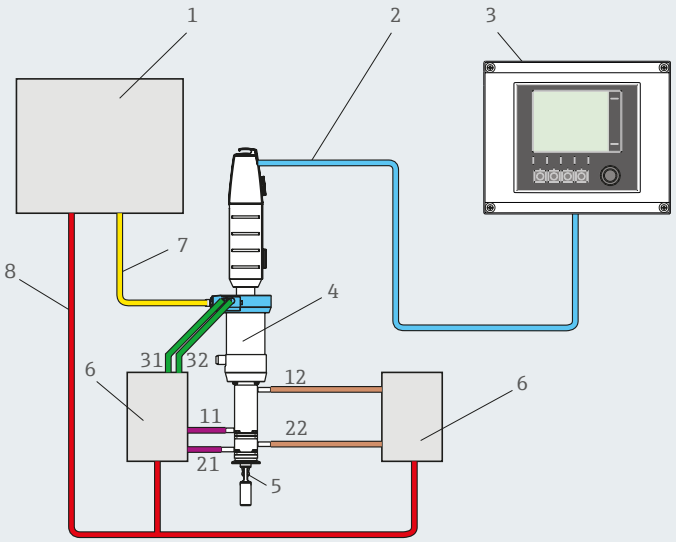
1. Cleanfit CPA875 assembly
2. Measuring cable
3. Liquiline CM44x transmitter
4. Sensor



Double chamber measuring system

1. Control unit
2. Measuring cable
3. Liquiline CM44x transmitter
4. Cleanfit CPA875 assembly
5. Sensor
6. Valve manifold
7. Limit position switch relay signal
8. Control signals (electric/pneumatic)

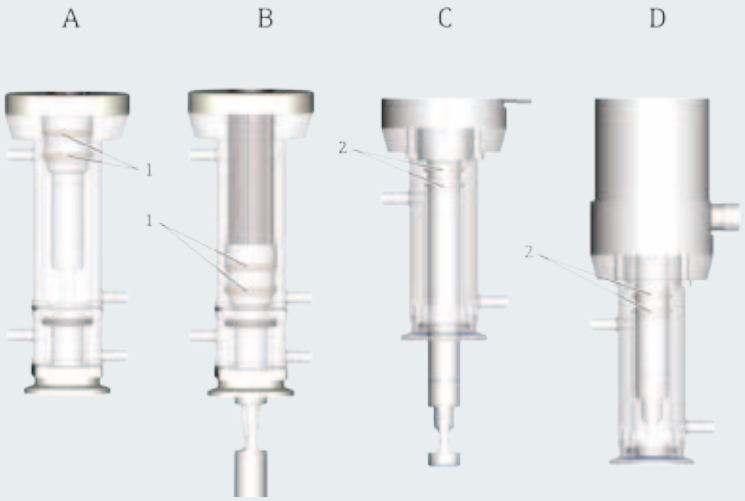
11/12. Inlet/outlet of inner service chamber
21/22. Inlet/outlet of front service chamber
31/32. Drive control



Sealing principle

Sealing principle

A. Double chamber in service position
B. Double chamber in measuring position
C. Single chamber in measuring position
D. Single chamber in service position
1. 'Moving' seals in the double chamber
2. 'Fixed' seals in the single chamber



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Topcal CPC310

Fully automatic pH/ORP measuring, cleaning and calibration system. Suitable for hazardous area use.

WirelessHART

- Low maintenance, even with heavily soiled or aggressive media
- In-process cleaning and calibration: no need to remove electrode
- High accuracy and reproducibility
- System status messages with feedback to control room
- HART and PROFIBUS compatible

Endress+Hauser's Topcal S measuring, cleaning and calibration system makes fully automatic, economical pH and ORP measurement possible even in aggressive process environments. With the CPC310, there is a significant reduction in the use of cleaning agents and buffers as these are pumped through individual pipes to the new rinsing block. In this way, all media is present front end, directly at the retractable assembly. The additional activation of two external valves for steam sterilisation or for using a spray flange at the assembly, is now available as standard, with the multi-hoses easily connectable to the retractable assembly. However, the real cost-saving bonus is the fully automatic inline cleaning and calibration without the need for electrode removal so that minimal maintenance is required.

Technical data

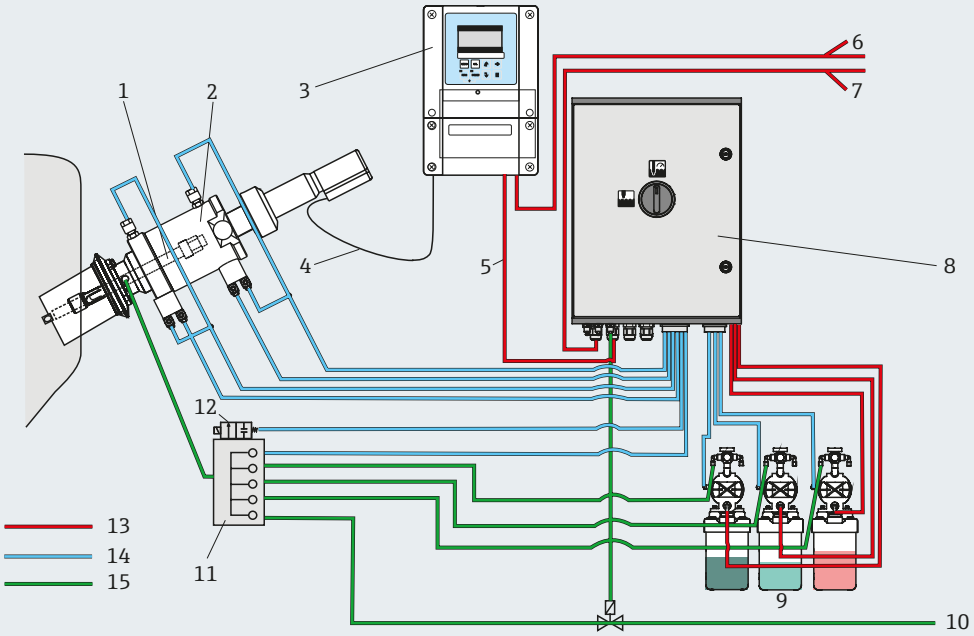
Measuring system	: CPG310 control unit, Mycom S CPM153 transmitter, rinse block, membrane pumps
Cleaning and calibration Programs	: Clean, clean sterilise, clean calibrate, clean sterilise calibrate
Measured variables	: pH (analogue or digital), ORP (analogue or digital), temperature
Measuring range	: pH: -2...16pH, ORP: -1500...+1500mV/-300...+300%, temperature: -50...+200°C
Current output	: 0/4...20mA, max load 600Ω
Repeatability	: 0.1% of measuring range

Topcal S comes complete with both fixed and user-definable programmes for process optimisation. Early warning functions guarantee reliability and system performance, even in hazardous areas, thanks to the predictive maintenance sensor condition check and medium monitoring functions.

Three independent, industry-tested double-membrane pumps replace the revolver pump from the previous generation, increasing the unit's performance particularly for heavy-duty applications and where aggressive cleaning agents are used, e.g. concentrated acids and alkalis.

Automatic cleaning and calibration functions eliminate the problem of glass breakage and contamination, whilst the high reproducibility of the calibration increases product quality. The hygienic condition of the system is maintained, as the system remains closed during calibration and sterilisation.

Connections



Complete measuring system (non-Ex)
1. pH/ORP sensor
2. Cleanfit assembly
3. Mycom S CPM153 transmitter
4. Special pH measuring cable
5. Power supply/control cable
6. Power supply for Mycom S CPM153
7. Power supply for CPG310 control unit
8. CPG310 control unit
9. Membrane pumps with cleaner and buffer bottles
10. Superheated steam, water, cleaner (optional)
11. Rinse block
12. Valve for rinse water control
13. Electrical wiring
14. Compressed air
15. Media (cleaner, buffer, superheated steam etc)

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Glass pH/redox electrodes

A wide range of digital and analogue pH, redox, reference and temperature electrodes.

Digital electrode CPS11D

Digital electrode CPS41D

Compact electrode CPF81(D)

CPS71D

CPS16D

- Memosens digital pH sensor saves process data directly in the sensor
- pH combination electrodes with integrated Pt100/Pt1000/NTC make assembly and calibration simple
- A wide range of electrodes ensures the right choice for each application

The pH or redox electrode and the reference electrode are at the heart of every pH or redox measurement. The right choice is therefore very important in achieving reliable measurement with acceptable operating time and minimum maintenance. Information is provided to help you to select the right electrode. If in doubt, we would advise you to seek advice from us when making the selection. Endress+Hauser electrodes are equipped with Memosens digital technology with inductive hermetically-sealed connectors (TOP68 also available). The benefit of this connector is that it is watertight so that failures due to moisture no longer occur. In order to simplify installation (wiring), maintenance and calibration as much as possible, we would recommend in almost every case that you use a combination electrode (pH or redox electrode and reference electrode combined). Temperature compensation is necessary for pH measurement in order to guarantee accuracy. This is why we have taken a further step towards increasing ease of use, by offering a range of combination electrodes with integrated Pt100, Pt1000 or NTC.

Application

Our range of electrodes covers virtually every pH application. There are applications in all industries; from pH measurements in yoghurt, to wastewater from flue gas scrubbing, from demin water to extremely acid or alkaline products with high conductivity. There is a pressure limit (15 bar max) and temperature limit (135°C max). A complete set-up consists of a pH/redox electrode, (usually) a temperature sensor, pH measuring cable, assembly and a measurement transmitter. Depending on the application, it is worth considering an automatic cleaning system.

Installation guidelines

In order to prevent the presence of air in front of the glass diaphragm of a pH electrode, it is necessary for the electrode to be built in with the small glass sphere at the bottom, at a minimum angle of 15° relative to the horizon (in most cases). Inflow velocity should preferably

be a maximum of approximately 0.5m/s. Higher velocities can result in discrepancies, particularly at low conductivities or with contaminated electrodes. (Process) assemblies are required for simple and correct installation.
Electrodes must always remain 'wet'. 'Standing dry' can lead to a (temporary) loss of function.
Calibration is carried out using buffers. Calibration frequency varies depending on the application and the desired accuracy. The same installation guidelines apply to redox electrodes as apply to pH electrodes.

Memosens

The Memosens digital pH sensors break new ground by enabling important process data to be saved directly in the sensor. The inductive, two-way data transfer between sensor and transmitter guarantees interference-free measuring signals and a dramatic simplification of process technology. Memosens is the first to treat the problems of plug-in systems - not just the symptoms. It successfully eliminates issues such as moisture ingress, leakages, corrosion, salt bridges, ground loops and handling via an inductive non-contact plug-in connection that offers complete galvanic isolation.

The Memosens integrated circuit board also offers a wealth of possibilities. For example, manufacturing data, current sensor properties and sensor history can all be recorded and used as the basis for predictive maintenance. Calibration data is stored, along with other key information such as overall time in operation, and minimum/maximum pH value and temperature.
Memosens sensors can be pre-calibrated under laboratory conditions and then quickly replaced at the measuring point – thus eliminating the problems of measuring points that are difficult to access. The sensors identify themselves within the application; each measuring point recognises its individual sensor, which significantly reduces downtime. Memosens also offers a longer life because sensors can be checked and regenerated by cleaning in the laboratory. The pre-calibration also means that calibration under soiled or moist conditions is unnecessary and cuts work in hazardous areas to a minimum.

Glass electrode	Pg13.5	NPT ¾"	pH	Redox	Combined	rH
CPS11D	X		X			
CPS12D	X			X		
CPS16D	X				X	X
CPS41D	X		X			
CPS42D	X			X		
CPS71D	X		X			
CPS72D	X			X		
CPS76D	X				X	X
CPS91D	X		X			
CPS92D	X			X		
CPS96D	X				X	X
CPF81D		X	X			
CPF82D		X		X		

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Tophit CPS441D/471D/491D

Glass-free IsFET pH electrodes.


CPS441


CPS471D


CPS491

- Long-term, stable pH measurement
- ATEX and FM approval
- EHEDG certified
- PEEK sensor body
- With liquid KCl reference electrode
- Available with Memosens digital technology

Following the success of Endress+Hauser's Tophit glass-free IsFET pH sensor in a wealth of applications, the range has been extended to include sensors specially optimised for extreme processes (CPS441), hygienic applications (CPS471) and for applications that are prone to build-up (CPS491).

Endress+Hauser's Tophit simplifies inline pH measurement and achieves cost savings due to its high stability and consistently fast response times, even low temperatures. Unlike most glass electrodes, Tophit with its robust PEEK design can be installed horizontally, allowing flush fitting with the vessel wall for easy cleaning. All versions feature an integrated temperature sensor providing effective temperature compensation and Tophit is even suitable for use in hazardous areas (ATEX and FM approval).

The new CPS441 electrode features a liquid KCl reference, so it is ideal for use in extreme processes e.g. products that have a high content of organic solvent and/or low conductivity applications.

The CPS471 is fully sterilisable. It is ideal for CIP processes when combined with a Cleanfit retractable assembly, offering a long service life. It conforms to 3-A, EHEDG and FDA standards and is fully autoclavable - it withstands process conditions from -15°C to 135°C, for the maximum in hygienic performance.

For media that is prone to build-up, the CPS491(D) is the ideal choice. As the first IsFET sensor on the market with an open aperture reference junction, it is perfect for water purification and wastewater

Technical data

Measuring range	: 0...14 pH, -15°C...100°C (sterilisable 135°C for 1 hour)
Pressure	: 10 bar at 100°C 3 bar at 135°C
Sensor shaft	: PEEK, FDA approved
Seals	: EPDM or perfluoro elastomer
Diaphragm	: ceramic
Process connection	: Pg 13.5
Temperature sensor	: Pt1000
Surface roughness	: Ra < 0.8µm

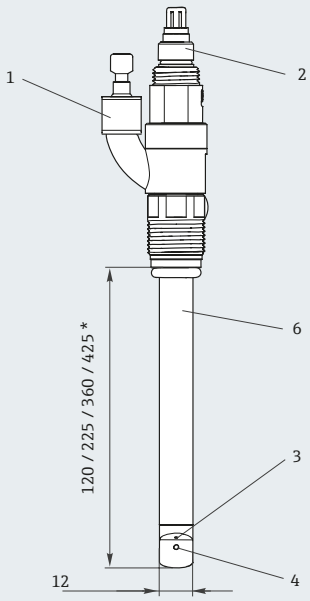
applications or in processes with quickly changing pH values and/ or alternating temperatures and pressures.

The Memosens digital pH sensors break new ground by enabling important process data to be saved directly in the sensor. The inductive, two-way data transfer between sensor and transmitter guarantees interference-free measuring signals and a dramatic simplification of process technology. Memosens is the first to treat the problems of plug-in systems - not just the symptoms. It successfully eliminates issues such as moisture ingress, leakages, corrosion, salt bridges, ground loops and handling via an inductive non-contact plug-in connection that offers complete galvanic isolation. The Memosens integrated circuit board also offers a wealth of possibilities. For example, manufacturing data, current sensor properties and sensor history can all be recorded and used as the basis for predictive maintenance. Calibration data is stored, along with other key information such as overall time in operation, and minimum/maximum pH value and temperature.

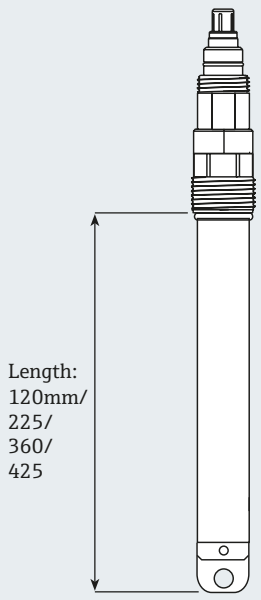
Memosens sensors can be pre-calibrated under laboratory conditions and then quickly replaced at the measuring point – thus eliminating the problems of measuring points that are difficult to access. The sensors identify themselves within the application; each measuring point recognises its individual sensor, which significantly reduces downtime. Memosens also offers a longer life because sensors can be checked and regenerated by cleaning in the laboratory. The pre-calibration also means that calibration under soiled or moist conditions is unnecessary and cuts work in hazardous areas to a minimum.

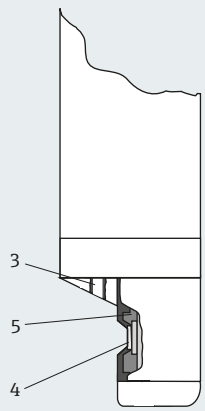
Dimensions (mm)

Tophit CPS441



Tophit CPS471/491
pH combination electrode
connects to CPK12 cable





Sensor head

1 KCl electrolyte connection
2 TOP 68 plug-in head
3 Reference electrode
4 IsFET chip
5 Seal (EPDM or perfluoro elastomer)
6 Sensor shaft

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Ceramax CPS341D

Memosens digital sensor with pH-sensitive enamel.

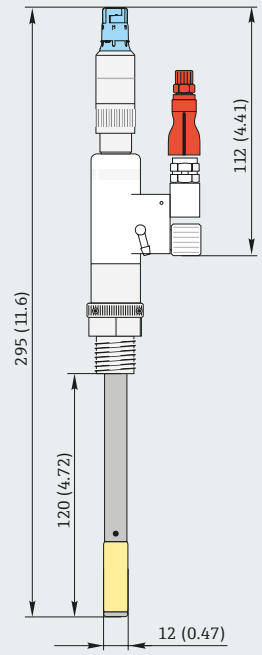
- Direct installation in container nozzles or piping
- Self-cleaning via the flowing medium
- Long-term stability
- High corrosion resistance for harsh applications

Designed for use in the food & beverage and life science sectors, the Ceramax CPS341D digital pH sensor meets highest demands of measuring accuracy, pressure, temperature, sterility and durability. Offering continuous online measurement, it can withstand the rigours of inline CIP and SIP processes. What's more, its steel substrate means it is ideal in applications with solids or agitator turbulence and the protective enamel coating offers corrosion protection – even in acids.

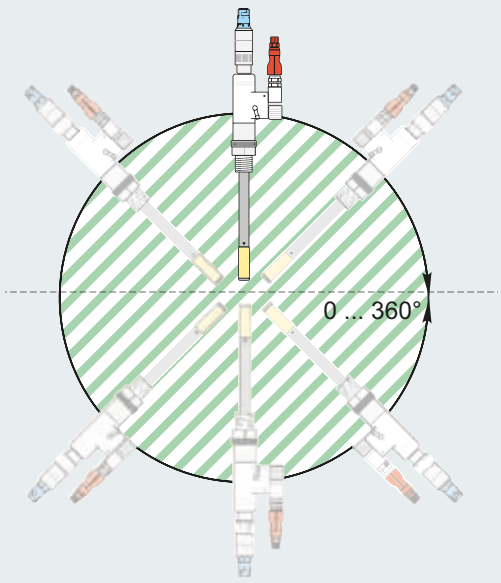
Technical data

pH range	:	-2...+14 pH (depending on application)
Minimum conductivity	:	50µs/cm
Process temperature	:	0...140°C
Temperature sensor	:	NTC 30KΩ
Process pressure	:	0...6 bar
Sensor shaft	:	Porcelain enamel metal substrate (PEMS), chemically resistant and shock resistant
Other materials	:	Stainless steel
Process connection	:	Wide range including Triclamp and dairy fittings
Protection	:	IP68

Dimensions (mm)



Installation



CPS341D can be installed in any position.

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Condumax CLS15D/16D/21D

Digital twin-electrode conductivity sensors.

CLS15D

CLS16D

CLS21D

- Hygienic process connections for installation in pipes or flow chambers
- Available with plug-in head or fixed cable
- Easy-to-clean electropolished surfaces

Condumax conductivity sensors are the ideal solution for conductivity measurement in both water and wastewater applications.

CLS15D sensors are specially designed for the measurement of pure and ultrapure water e.g. monitoring ion exchangers, reverse osmosis, chip cleaning, electro-deionising, WFI (water for injection) and distillation.

CLS16D has been specially designed for hygienic applications (particularly the life science sector) offering 3-A, EHEDG, FDA and ASME BPE approvals.

CLS21D features two coaxial electrodes made of graphite offering a large measuring range. The graphite guarantees high chemical stability and low polarisation.

All Condumax sensors are designed for use with our Liquiline CM14, CM42 and CM44x.transmitters.

Memosens digital technology

All sensors feature Memosens digital technology for improved measurement integrity and efficiency. The inductive non-contact measured value transmission of Memosens guarantees maximum process safety. An automatic error message is generated if the sensor fails or the connection between sensor and transmitter is interrupted. As a direct result, the availability of the measuring point is dramatically increased.

Technical data

	CLS15D	CLS16D	CLS21D
Measured variables	Conductivity, temperature	Conductivity, temperature	Conductivity, temperature
Measuring range	k = 0.01cm^{-1}: 0.04...20µS/cm, k = 0.1cm^{-1}: 0.1...200µS/cm	k = 0.1cm^{-1}: 0.04...500µS/cm	k = 1cm^{-1}: 10µS/cm...20mS/cm
Temperature sensor	Pt100 (CLS15), NTC (CLS15D)	Pt100 or Pt1000 (CLS16), NTC (CLS16D)	Pt100 (CLS21), NTC (CLS21D)
Temperature	-20...+100°C (CLS15, fixed cable), -20...120°C (CLS15, clamp and CLS15D)	-5°C...+120°C	-20°C...+135°C
Pressure	12 bar at 20°C	12 bar at 20°C	16 bar at 20°C
Process connection	NPT ¾" thread and clamp 1½" (CLS15, fixed cable), NPT ½" thread and clamp 1½" (CLS15, plug-in), NPT ¾" and ½" thread and clamp 1½" (CLS15D)	Clamp 1", 1½", 2" according to ISO 2852 (also suitable for TriClamp, DIN 32676), Tuchenhagen Varivent N DN50...125, Neumo BioControl D50	G1 or NPT 1" thread, DIN 11851, SMS, clamp 2"
Material	Stainless steel	Stainless steel	Graphite
Surface roughness	Ra ≤ 0.8µm (Ra ≤ 0.4µm optional)	Ra ≤ 0.8µm (Ra ≤ 0.4µm optional)	Not stated
Protection	IP67 (CLS15), IP68 (CLS15D)	IP67 (CLS16, fixed cable), IP68 (CLS16, plug-in and CLS16D)	IP65 (CLS21, 4-pole plug-in), IP67 (CLS21, fixed cable), IP68 (CLS21D)
Certification	ATEX, FM, CSA	ATEX, FM, CSA	ATEX, FM
Hygienic approvals	None	3-A, EHEDG, FDA, ASME BPE	None

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Indumax CLS50D/54D

Digital conductivity sensors for the chemical, food and life science industries.

CLS50D

CLS54D

- Non-contact: insensitive to electrode soiling and polarisation
- Fast response time for efficient phase separation
- CLS50D for high temperatures
- CLS54D for hygienic applications
- ATEX, FM, CSA and TIIS certified

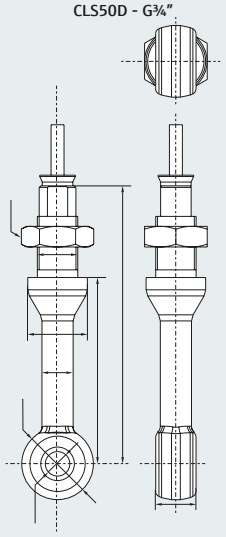
CLS50D: The chemical resistance of the PEEK or PFA sensor material means that the sensor can be used in virtually any chemical process up to 180°C, e.g. concentration measurement of acids and alkalis, product quality monitoring and phase separation applications.
CLS54D: The CLS54D conductivity sensor is specifically intended for use in hygienic applications in the food, pharmaceutical and biotechnology industries. Thanks to its food-grade virgin PEEK body, seamless design and hygienic certificates, it meets the exacting demands of these industries. The CLS54D is especially suitable for phase separation of product/water and product/product mixtures in pipe systems, control of CIP (cleaning in place) processes in the return channel, concentration control in remaking of CIP cleaning agents, product monitoring in pipes and bottling plants and, leakage detection.

Technical data

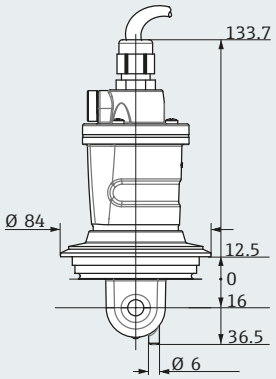
	CLS50D
Measuring range	: 2µS/cm...2000mS/cm
Temperature	: -20...180°C (CLS50), -20...+125°C (CLS50D)
Pressure	: 20 bar max (20°C)
Temperature sensor	: Pt100, class A
Min pipe diameter	: Minimum DN80
Material	: PFA or PEEK
Protection	: IP67/NEMA6 (installed with original sealing)
	CLS54D
Measuring range (recommended)	: 100µS/cm...2000mS/cm (uncompensated)
Temperature	: -10...150°C
Pressure	: 12 bar max (up to 90°C)
Temperature sensor	: Pt1000, class A complies with IEC 60751
Temperature response time	: $t_{90} \leq 26s$
Min pipe diameter	: minimum DN80
Material	: virgin PEEK
Surface finish	: Ra ≤ 0.8µm
Protection	: IP68/NEMA6P

Dimensions (mm)

CLS50D - G¾"

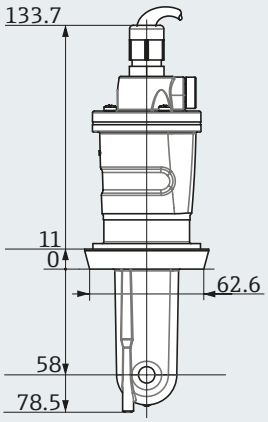


CLS54D



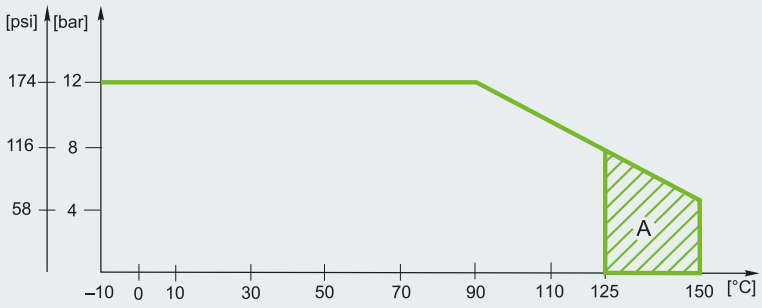
Varivent N
DN40-125

CLS54D



Dairy pipe fitting
DIN118851, DN50

CLS54D: pressure-temperature load curve



A = sterilisation time (max 60 mins)

Chemical durability

Medium	Concentration	PEEK	PFA	Chemraz	Viton
Sodium hydroxide solution NaOH	0 to 50%	20 to 100°C	20 to 80°C	0 to 150°C	Not suitable
Nitric acid HNO_3	0 to 5%	20 to 60°C	20 to 60°C	0 to 150°C	0 to 120°C
	0 to 40%	20°C	20 to 60°C	0 to 150°C	0 to 120°C
Phosphoric acid H_3PO_4	0 to 50%	20 to 60°C	20 to 60°C	0 to 150°C	0 to 120°C
Sulphuric acid H_2SO_4	0 to 2.5%	20 to 80°C	20 to 100°C	0 to 150°C	0 to 120°C
	0 to 30%	20	20 to 100°C	0 to 150°C	0 to 120°C
Hydrochloric acid HCl	0 to 5%	20 to 100°C	20 to 50°C	0 to 150°C	0 to 120°C
	0 to 10%	20 to 100°C	20°C	0 to 150°C	0 to 120°C

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Memosens CLS82D

Digital four-electrode conductivity sensor for hygienic applications.

- Wide measurement range
- EHEDG-qualified aseptic hygienic design, FDA-approved materials, certified in accordance with 3-A.
- Fully sterilizable and autoclavable
- ATEX certified for hazardous area use
- Logging of sensor-specific data for easy traceability and predictive maintenance

Memosens CLS82D is a hygienic, digital sensor for applications with widely varying conductivity values such as phase separation, chromatography, CIP monitoring in small pipes, fermentation and ultrafiltration. Its wide range of process connections and a small compact design ensures the perfect fit to your process. With Memosens digital technology, CLS82D combines maximum process and data integrity with simple operation. It resists corrosion and moisture, enables lab calibration and facilitates predictive maintenance.

Technical data

Measured variables	:	Conductivity, temperature
Conductivity range	:	1µS/cm...500,000µS/cm
Temperature	:	−5°C...+120°C
Sterilization (max 45 min)	:	Max 140°C at 6 bar
Pressure	:	17 bar at 20°C, 9 bar at 120°C
Surface roughness	:	Ra < 0.38µm
Repeatability	:	0.2% of reading
Sensor	:	Platinum and ceramic
Process connections	:	Stainless steel 1.4435 (AISI 316L)
Seal	:	EDPM
Protection	:	IP68/NEMA 6P (connector)

Ideal for life sciences

Particularly in the life sciences industry, conductivity must be measured over a wide range; from average to high values in the process to low values in rinsing processes with ultrapure water. Memosens CLS82D four-electrode conductivity sensor allows you to perform these measurements reliably with a single sensor. With its certified aseptic design, this sensor boasts exceptional reliability and precision and is also suitable for installation positions where space is restricted.

Reliable products and processes

A unique feature of the sensor is its innovative sensor element made from ceramic with platinum electrodes. The advantage of these materials is their similar temperature expansion behaviour. Even during extreme temperature changes the material bond stays tight so that no gaps occur at any time.

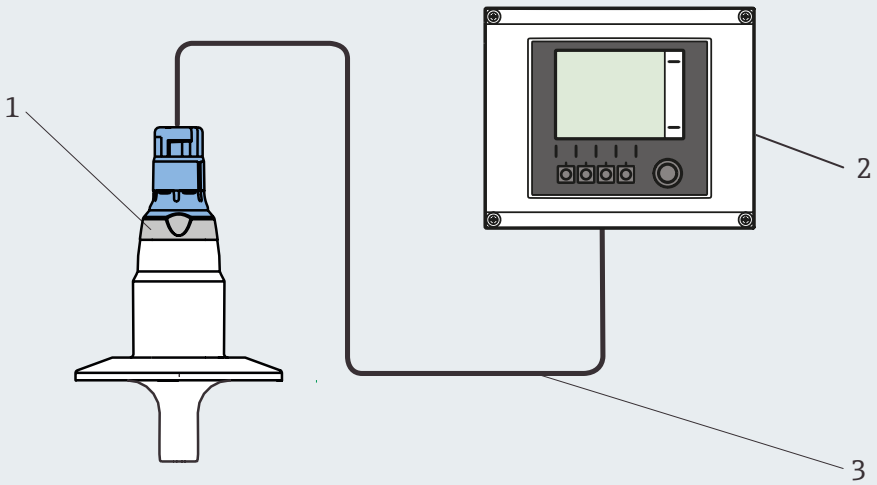
Increased plant availability

The sensor's plug & play capability means that you can integrate the Memosens CLS82D in your process in the shortest possible time, simplifying commissioning and maintenance. In conjunction with the Memobase Plus software, you can calibrate your sensors in the laboratory under ideal conditions for improved sensor and quality management

Measuring system

A complete measuring system consists of the following components:

1. Memosens CLS82D conductivity sensor
2. Liquiline CM44x transmitter
3. Memosens CYK10 measuring cable



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Turbimax CUS51D/52D

Turbidity sensors for the measurement of drinking water, process water and wastewater.

CUS51D

CUS52D

- Simple installation
- Factory calibrated

Turbimax turbidity sensors are the ideal solution for accurate and reliable turbidity measurement in both water and wastewater applications.

Using the 90° scattered light method, the CUS31 is used mainly for drinking water and process water applications.

Thanks to the large measuring range, however, the sensor can also be used in wastewater flow. It is installed using an immersion assembly, a flow-through assembly or directly in the pipe using an inline retractable assembly and can be used effectively in applications such as checking filters in drinking water

Technical data

	CUS51D	CUS52D
Measuring principle	90° nephelometric; 135° back scattered light; four beam pulsed	Nephelometric turbidity sensor (90° scattering) according to ISO7027
Measuring range	0...4000 FNU/0...150g/l	0.000...4000 FNU/NTU
Wavelength	860 ± 30nm	860nm
Optical compensation	Using reference photodiodes	Using reference photodiodes
Accuracy	<2% of the measured value or 0.1 FNU	< 0.5% of measured value (measuring range: 0 to 10 FNU)
Temperature/pressure	-5...50°C (max 80°C short term) / 0.5 to 10 bar	-20...85°C/0.5 to 10 bar
Process connection	G1" / NPT ¾"	G1" and NPT ¾"; 2" clamp (depends on sensor version)/DIN 32676
Material	Stainless steel	Stainless steel
Protection	IP68	IP68

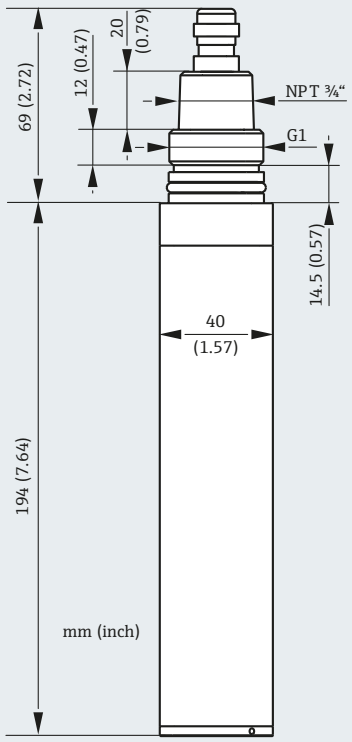
production, effluent and sediment checking in physicochemical purification processes (e.g. flocculation), filter, cooling and surface water monitoring etc.

The CUS51D is used mainly for wastewater and sludge applications such as active sludge tank, sludge return from district and industrial wastewater purification, effluent and sediment checking in physicochemical purification processes and sludge concentration measuring etc.

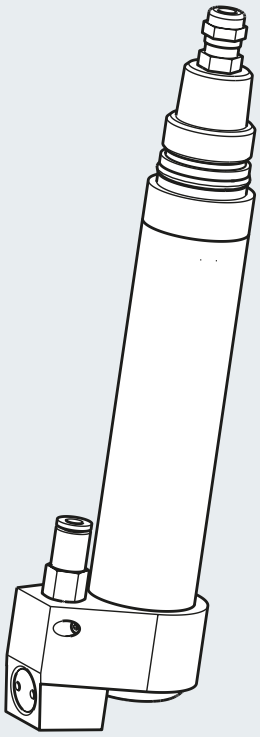
The sensor is insensitive to medium colour and daylight, thanks to the modulating IR light sources. Intelligent signal processing compensates for contamination on the windows and reduces the effect of air bubbles and coarse particles.

The CUS52D is a smart sensor with lab accuracy that allows unattended operation in all measuring points of your water production. Thanks to its hygienic, self-cleaning design, you can mount it directly into your pipeline. This way you will save on extensive bypass installations and avoid product loss. With Memosens digital technology, the CUS52D combines maximum process and data integrity with simple operation. It enables lab calibration and simplifies predictive maintenance.

Dimensions CUS51D (mm)



Cleaning system: CUS51D



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Turbimax CUS71D

Ultrasonic immersion sensor for interface measurement.

- **Three different sensor models allow optimal adaption to the measurement task.**
- **Simple commissioning thanks to predefined calculation models.**
- **Intelligent sensor: all characteristics and calibration values are stored in the sensor.**

In many instances in process engineering, suspensions are separated into their solid and liquid components via sedimentation. To do this economically and efficiently, it is necessary to continuously monitor the separation and transition zones of the clarification and settling phases.

Turbimax CUS71D is a sensor for many applications of the interface measurement:

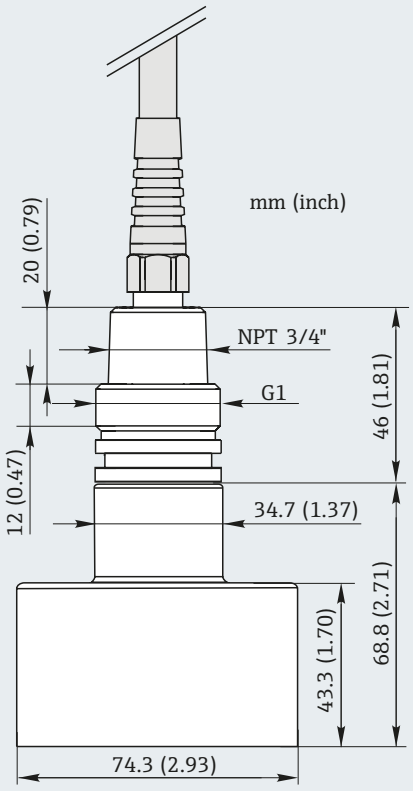
- Wastewater treatment: primary clarifier, sludge thickener, secondary clarifier
- Water purification: settling basin after flocculant dosage, sludge height in contact sludge process
- Chemical industry: static separation process

Technical data

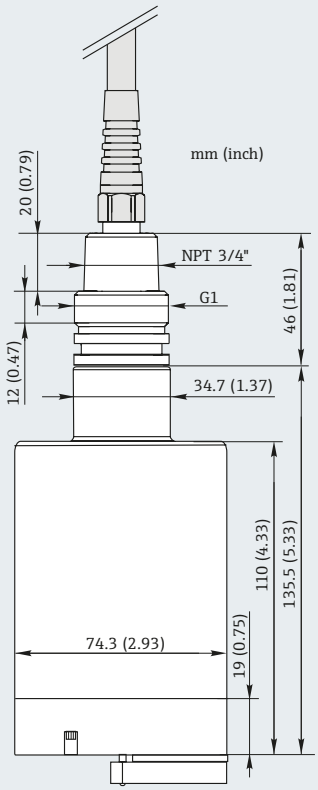
Measured variable	: Interface (turbidity optional)
Measuring range	: 0.3...10m (turbidity: 0...50 (200) NTU)
Max measured error	: 35mm at 3m (turbidity: 1% of the measuring range at 50 NTU)
Temperature	: +1°C...+50°C
Pressure	: 0...6 bar abs
Protection	: IP68
Sensor material	: ABS and epoxy plastic
Wiper material	: Rubber
Optical window	: Sapphire

Dimensions (mm)

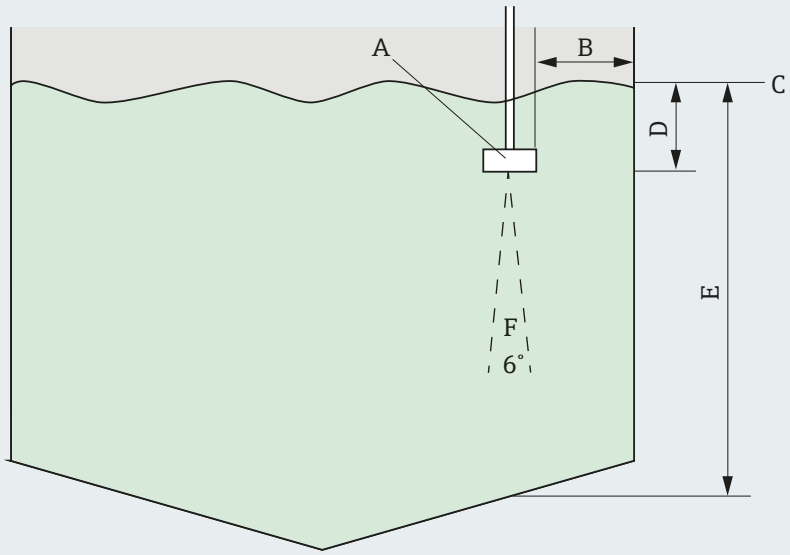
Standard sensor



Sensor with wiper



Installation



Basin configuration

A. Sensor
B. Minimum distance of sensor to basin wall: 45cm
C. Reference point e.g. water surface
D. Zero point
E. Basin depth
F. Opening angle of ultrasonic cone: 6°

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Oxymax COS22D

Digital amperometric oxygen sensor for standard, hygienic and sterile applications.

COS22D

- Maximum process safety through non-contact inductive signal transmission
- Easy handling thanks to storage of sensor-specific data
- Predictive maintenance possible thanks to registration of sensor load data

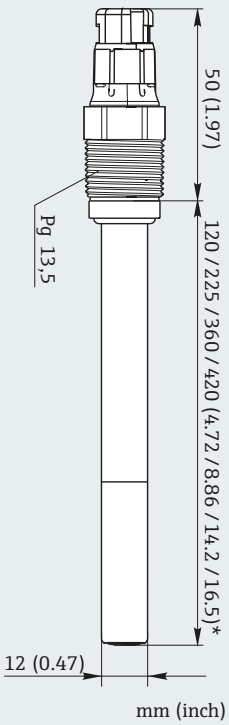
Oxymax COS22D digital sensor is specially designed for the requirements of dissolved oxygen measurement, offering long-term stability and excellent repeatability. It is robust enough to withstand frequent sterilisation and autoclaving so is ideal for use in the food & beverage and life science industries in addition to general process applications. The COS22D also has application-specific versions e.g. carbon dioxide compatible trace sensor for the beverage industry and a trace sensor for the power industry.

Technical data

Measured variable	:	Dissolved oxygen, temperature
Response time	:	t_{90} < 30s, t_{98} < 60s
Repeatability	:	±1%
Process temperature	:	-5°C...+135°C
Process pressure	:	0...12 bar
Min flow rate	:	0.02m/s (COS22D-*1), 0.10m/s (COS22D-*3)
Sensor shaft	:	Stainless steel, titanium, C22 Alloy
Electrode	:	silver/platinum
Sealing ring	:	Fluorelastomer (FDA), perfluorelastomer (USP)
Membrane	:	Silicone, PTFE
Process connection	:	Pg 13.5
Protection	:	IP68
Certification	:	ATEX, FM and CSA

Dimensions (mm)

COS22D



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Oxymax COS51D/61D

Digital oxygen sensors for water, wastewater and utilities.

COS51D

COS61D

- **Maximum process safety through non-contact inductive signal transmission**
- **Easy handling thanks to storage of sensor-specific data**
- **Predictive maintenance possible thanks to registration of sensor load data**

The Oxymax range of dissolved oxygen sensors provide continuous measurement of the concentration of dissolved oxygen in water to maintain quality and ensure effective process control.

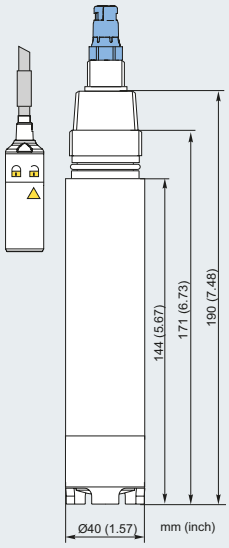
Oxymax COS51D/61D are reliable and highly accurate oxygen sensors for all kinds of water & wastewater applications (including hazardous areas). Designed to be low-maintenance with a long operating life, the sensors offer outstanding value for money. Thanks to Memosens digital technology, Oxymax COS51D/61D combine maximum process and data integrity with simple operation. They resist corrosion and moisture, enable lab calibration and facilitate predictive maintenance.

Technical data

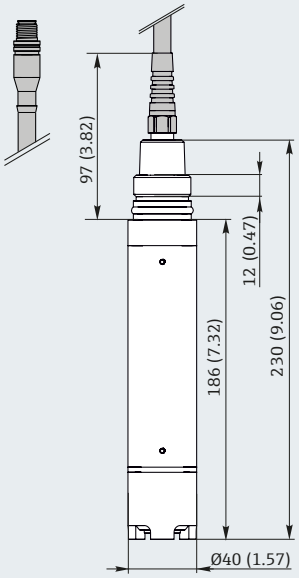
	COS51D	COS61D
Measuring principle	Amperometric sensor	Fluorescence quenching optical sensor
Measured variable	Dissolved oxygen (mg/l, µg/l, ppm, ppb, % SAT, hPa)	Dissolved oxygen (mg/l, % SAT, hPa), temperature
Measuring range	0.01...100mg/l, 0.00...1000 %SAT, 0...2000hPa	0...20mg/l (0...20ppm), 0...200 %SAT, 0...400hPa
Repeatability	±1%	±5%
Response time	t90 < 3 minutes, t98 < 8 minutes (normal response), t90 < 30s, t98 < 90s (fast response)	t90: 60s
Process temperature	-5...50°C	-5...60°C
Process pressure	Up to 10 bar	Up to 10 bar
Process connection	G1 and NPT¾"	G1 and NPT¾"
Protection	IP68	IP68
Certification	ATEX, FM and CSA	Safe area only

Dimensions (mm)

COS51D

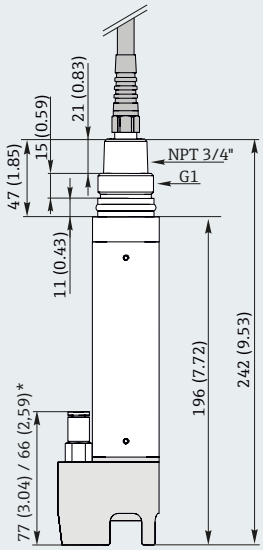


COS61D dimensions with optional M12 plug



COS61D dimensions with optional cleaning unit

* depending on cleaning unit version



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Liquiline System CA80xx

Colourimetric analysers for online monitoring in water applications.

- Easy upgrade to measuring station with up to four digital Memosens sensors.
- Advanced diagnostics with remote access for increased process safety.
- Reduced operating costs through automatic, configurable calibration and cleaning
- Long reagent shelf life with optional cooling module.
- Digital communication for remote access.

The Liquiline System CA80 range of analysers offers high-precision measurement in all critical control points. As member of the Liquiline platform, it enables plug & play and easy upgrade to a measuring station - minimising the installation effort. Automatic calibration and cleaning as well as the low consumption of reagents save on operating and maintenance costs. Advanced diagnostics with remote access ensure process safety and support you in providing process documentation to the authorities.

Technical data

Input	:	1 or 2 measuring channels, 1-4 digital sensor inputs for sensors with Memosens protocol (optional)
Output	:	2 x 0/4...20mA, MODBUS RS485/TCP (optional), Ethernet (optional), alarm relay
Process temperature	:	4...40°C
Process pressure	:	< 0.2 bar absolute
Sample requirement	:	22ml/measurement
Sample temperature	:	4...40°C
Sample flowrate	:	Min 5ml/min
Sample consistency	:	Low solid content : TS < 50mg/l (ppm)
Sample supply	:	Unpressurised
Sample pH value	:	5...9

Liquiline System CA80xx range includes:

- Liquiline System CA80AM ammonium analyser
- Liquiline System CA80PH orthophosphate analyser
- Liquiline System CA80NO nitrate analyser
- Liquiline System CA80CR chromate analyser
- Liquiline System CA80FE iron analyser
- Liquiline System CA80TP total phosphate analyser
- Liquiline System CA80COD COD analyser

Highly precise measurement at all critical control points demands suitable sample preparation. The Liquiline System CAT810, CAT820 and CAT860 are perfectly adapted to the respective sampling spots.

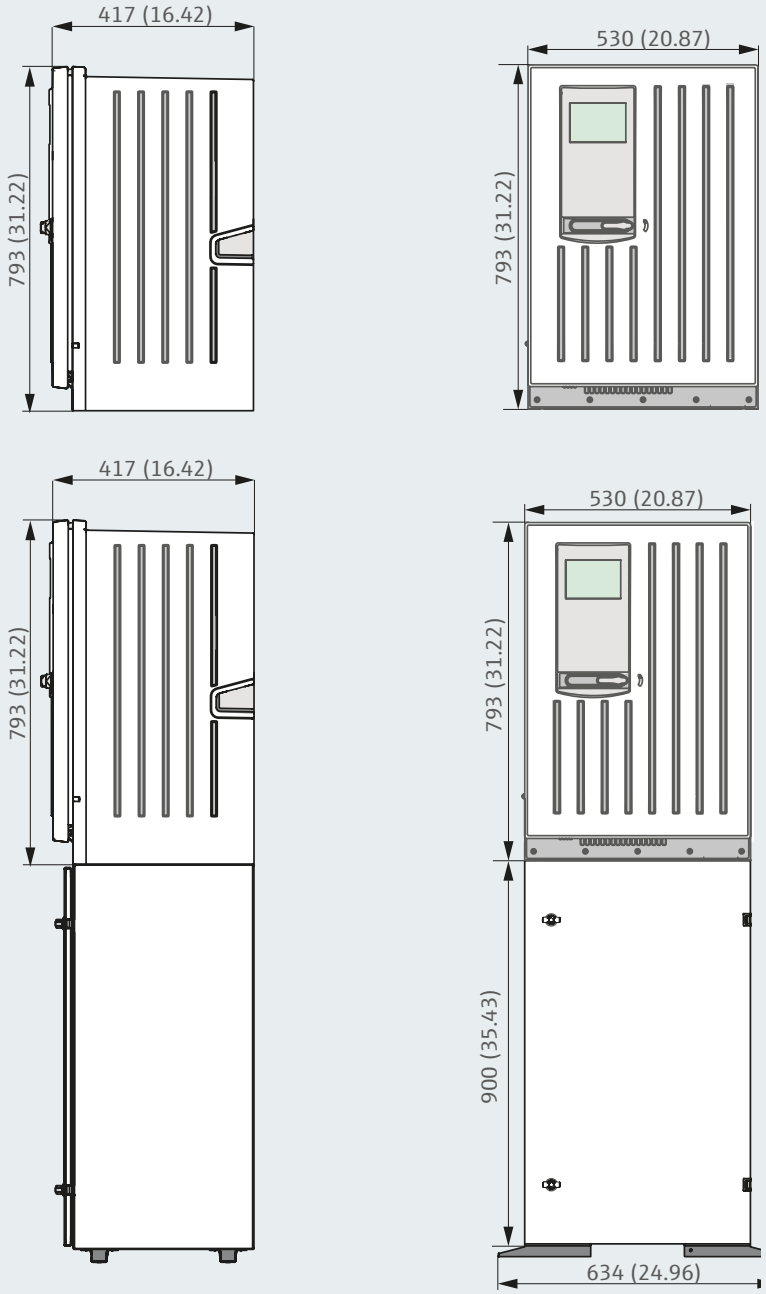
Liquiline System CAT860 is the perfect choice for demanding conditions in the inlet. Its automatic backflush function with cleaning solution and automatic air cleaning clean off fat and proteins and prevent blocking of the ceramic filter.

Liquiline System CAT820 is the flexible solution for bacteria-free sample preparation in the aeration basin or the outlet. It can be equipped with various filters and cleaning options to tailor it to the sampling situation.

Liquiline System CAT810 prepares samples in the outlet or from pressurized pipes. Thanks to its low dead volume, it reflects process changes promptly and shortens the response time of your downstream measuring devices. The system is equipped with a cross-flow filter to avoid blocking.

All sample preparations are fully controlled by the Liquiline System CA80AM analyser to guarantee a perfect synchronization of the measuring point. The filters of Liquiline System CAT860 and CAT820 can be combined with the Flexdip CYH112 holder system to fit them into any installation situation.

Dimensions (mm)



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TOCII CA72TOC

Online TOC analyser using thermal catalytic combustion.

WirelessHART

- Exchangeable furnace
- Externally triggered self-testing
- Heatable salt trap for increased service life
- pH-controlled acid dosing
- Double-batch operation

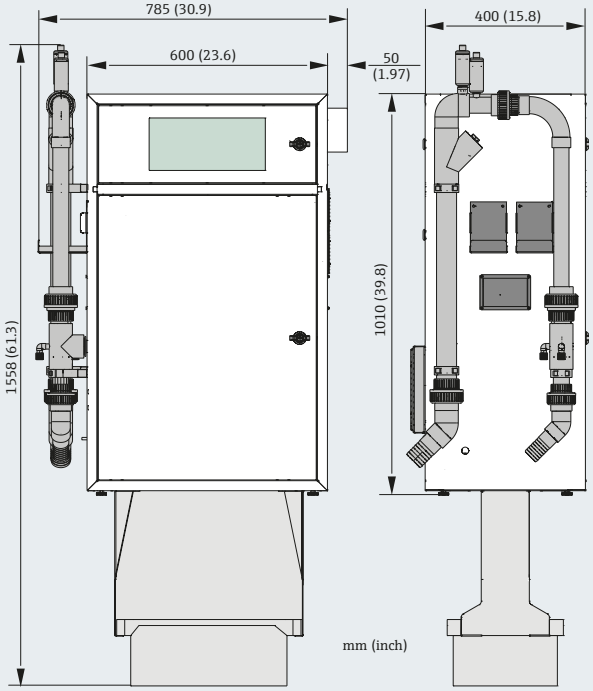
The TOCII analyser determines the TOC (total organic carbon) content of an aqueous sample. It uses thermal catalytic combustion with subsequent NDIR (non-dispersive infrared) detection of the produced carbon dioxide. As TOC indicates the total organic load of water, it is used to assess the water quality and can serve as a basis for the calculation of wastewater charges.

The heatable salt trap simplifies maintenance in applications with high salt loads. When samples with high salt loads are combusted, deposits form on the catalyst and the furnace that lead to inaccurate measurements and can result in congestion. With the heatable salt trap, salts can be removed from the furnace quickly and efficiently, significantly increasing the availability of the measuring point. It also reduces operating costs thanks to longer maintenance intervals and easy handling of the salt trap.

Technical data

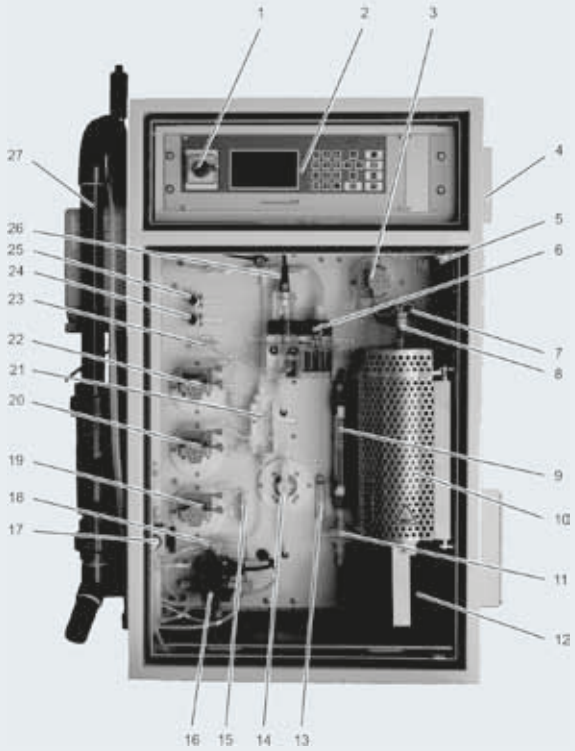
Measuring range	: 0.25...600mg TOC/l, 1...2400mg TOC/l, 2.5...6000mg TOC/l, 5...12000mg TOC/l (depending on version)
Signal inputs	: 8 signal inputs 24 V DC, active, load max. 500 Ω
Output signals	: 0/4...20mA, galvanically separated
Inorganic carbon removal	: > 95% using a pH controlled TIC scrubber
Sample temperature	: 0...40°C
Sample flow rate	: 20ml/min
Sample volume	: 90ml
Sample consistency	: Aqueous (flammable substances not allowed in ignitable concentrations - a sample preparation is required)
Protection	: IP54
Accuracy	: 0.4% for 20% of full scale, 2.4% for 80% of full scale
Repeatability	: 0.4% for 20% of full scale, 1.6% for 80% of ful scale

Dimensions (mm)



Operation

1 = Main switch
2 = Computer
3 = Pump P2 sample analysis
4 = Junction box
5 = Compressor switch
6 = Separation chamber
7 = Dosing valve
8 = Injection unit
9 = Acid filter
10 = Tube furnace with catalyst
11 = Combined filter
12 = Heated salt trap (optional)
13 = Circuit gas flowmeter
14 = Dilution water pump (optional)
15 = Acid hose connector
16 = MV4 calibration standard changeover C1/C2
17 = Valve for online sample/manual sample
18 = MV1 wastewater/calibration standard changeover
19 = Pump P3, acid dosing
20 = Pump P4, sample – dilution (optional)
21 = Mixing chamber (optional)
22 = Pump P1, sample – strip chamber/condensate extraction
23 = Condensate hose connector
24 = Stripping gas dosing valve
25 = Carrier gas dosing valve
26 = Strip chamber with pH electrode



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Liquistation CSF48

Automatic stationary sampler for liquid media.

WirelessHART

- Easily modified into a measuring station
- Integrated data logger
- Two bottle trays for simple transportation
- Can connect one or two Memosens digital sensors
- MCERTS certified
- Flow assembly option for sampling from pressurised pipes

Liquistation CSF48 stationary sampler offers the maximum in simple sampling. Based on the Liquiline-Memosens platform, the Liquistation goes above and beyond the call of duty with the option to be used as a complete measuring station - without the need for additional transmitters.

Thanks to the flexible electronics and expansion slots, inputs for digital sensors with Memosens protocol can be quickly connected – with automatic detection software, they can be operated with immediate effect.

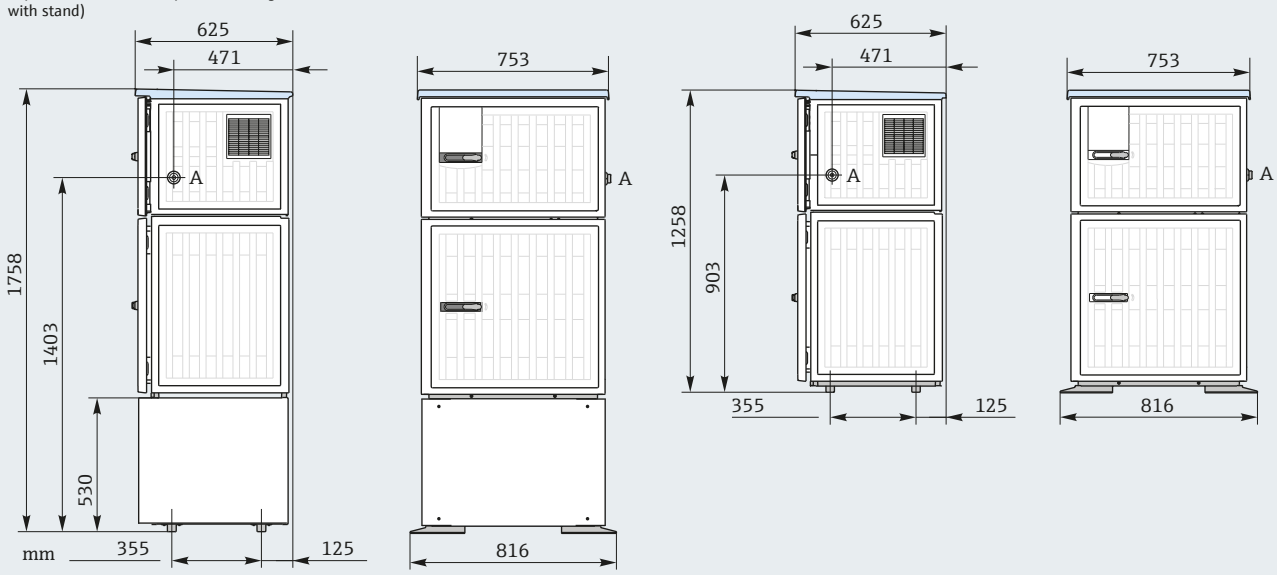
The modular housing consists of two parts with separately lockable doors to ensure that samples are always stored securely and the innovative power supply and cooling system ensure that the samples are not exposed to any fluctuations in temperature. Further protection is provided by the clever design - with no screws on the outside of the housing, once locked the sampler cannot be broken open.

Technical data

Housing	:	Plastic and stainless steel
Repeatability	:	Vacuum pump: 5%, peristaltic pump: 5%
Communication	:	One service interface accessible via front panel connection (optional); Commubox FXA291 (accessory) required for communication with the PC
Certification	:	MCERTS
Inputs	:	2 x analogue; 2 x binary; 2 x optional Memosens digital inputs
Outputs	:	2 x binary outputs; 2 x 4...20mA optional; 2 x relay (optional)
Power supply	:	100...240V AC ±10%, 50/60Hz
Datalogging capability	:	SD card
Protection	:	IP68
Suction height	:	6m or 8m
Sample detection	:	Conductive or capacitance (for heavily fouling media)

Dimensions (mm)

Liquistation CSF48 with plastic housing (without and with stand)

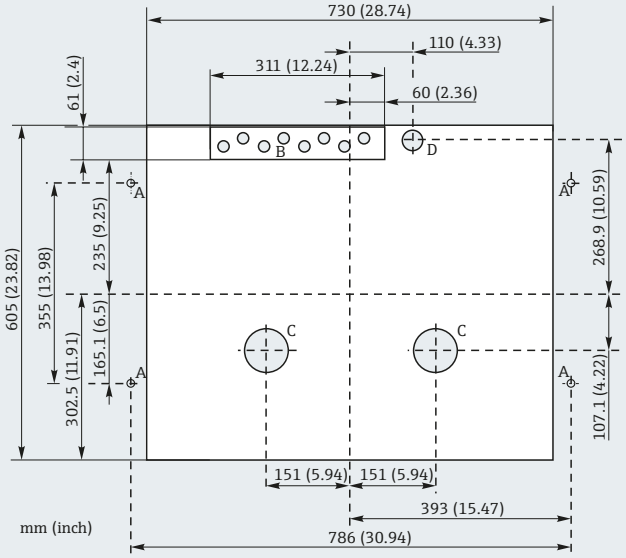


Installation

Foundation plan

A = Fasteners (4 x M10)
B = Cable inlet
C = Outlet for condensate and overflow > DN50
D = Sample supply from below > DN80

Dotted line = Dimensions of Liquistation



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Liquiport 2010 CSP44

Portable sampler for fully automatic sampling and distribution of liquid media.

WirelessHART

- **Flexible programming: time or event-controlled**
- **Uniform operation: same interface as Liquiline transmitters**
- **Lockable sample base to prevent sample manipulation**
- **Integrated data logger for recording measured values**
- **Simple cleaning and maintenance**

Liquiport 2010 CSP44 portable water sampler offers fully automated sampling and defined distribution of liquid media and is ideal the following applications:

- Municipal and industrial sewage treatment plants:
  - Self-monitoring
  - Process monitoring
  - Monitoring of indirect dischargers
  - Manhole monitoring
- Authorities and water conservation boards:
  - Water protection and water quality
  - Monitoring of indirect/direct dischargers
  - Labs and hydrological institutes

Depending on the version ordered, one or two Memosens digital sensors can be connected to the CSP44. Furthermore, two 0/4...20mA analogue outputs are available, as well as a cleaning function and an alarm relay.

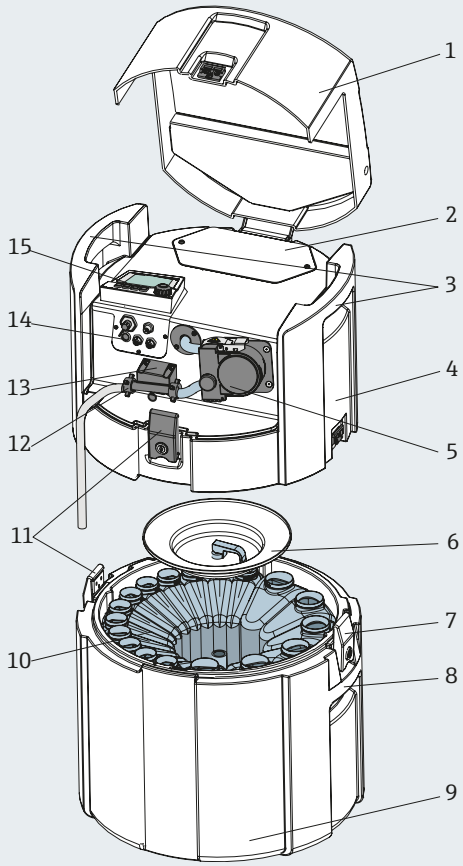
Technical data

Sampling methods	:	Event sampling, single and multiple samples, sampling table, time proportional sampling (CTCV), flow proportional sampling (VTCV), flow proportional sampling/time override (CTVV)
Input types	:	Up to 2 analogue inputs, up to 2 binary inputs, 1 or 2 digital inputs for Memosens sensors
Dosing volume	:	10ml...10000ml
Dosing accuracy	:	±5ml or 5% of the set volume
Repeatability	:	5%
Process temperature	:	+2°C...+50°C
Process pressure	:	Unpressurised
Protection	:	Entire device with closed cover: IP54, controller: IP65
Interface	:	Back-lit LCD with menu-guided operation

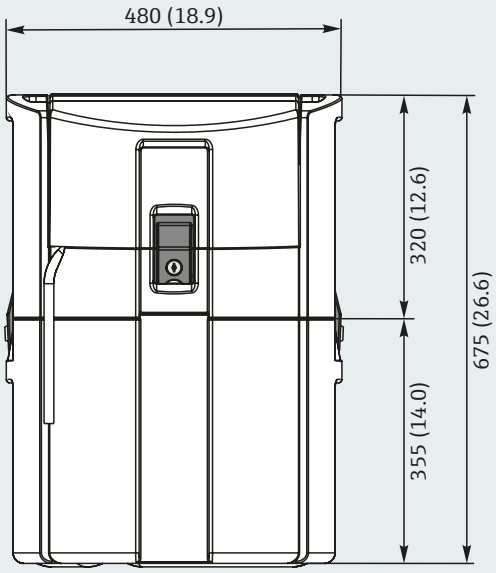
System design

System design

1. Controller cover
2. Cover of battery compartment
3. Upper carrying handles
4. Unit upper compartment
5. Peristaltic pump with pump tubing
6. Bottle retaining cover
7. Lockable latches
8. Lower carrying handles
9. Unit lower compartment
10. Bottle distribution
11. Lockable latches
12. Suction line connection
13. Medium detection
14. Electrical connections
15. Controller



Dimensions (mm)



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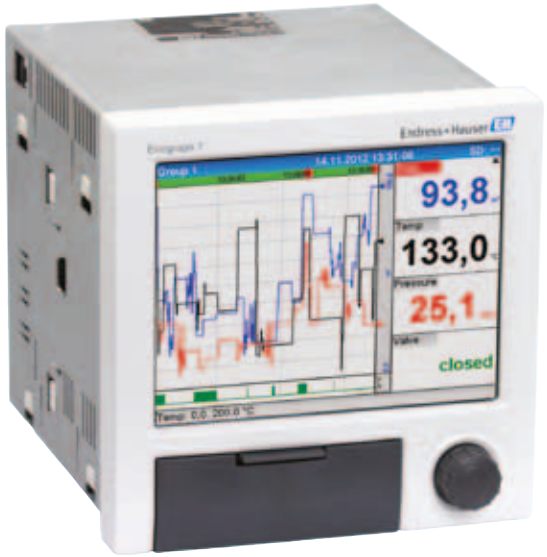
Ecograph T RSG35

Cost-effective multichannel electronic recorder.



- Intuitive operation and handling via easy-to-use 'Navigator' button
- 0, 4, 8, 12 universal inputs
- Four virtual maths channels for universal calculations and flexibility
- Integrated email function
- Simple configuration via FieldCare software

The Ecograph T RSG35 electronic reorder is the cost-effective alternative to paper chart recorders. Whilst traditional recorders require continual replenishment of paper and pens, Ecograph T records process data electronically, consigning paper and pen stocks to history.

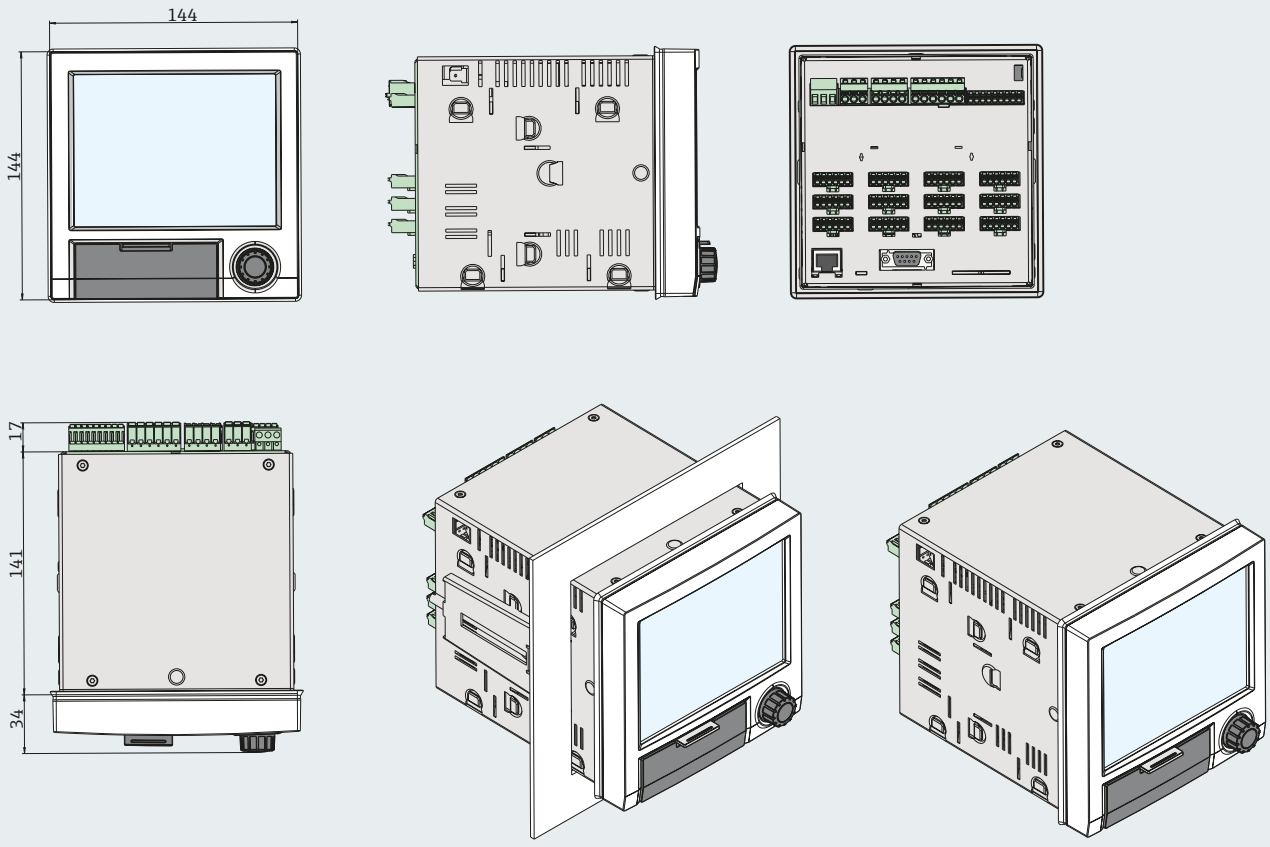
With up to 12 universal inputs, Ecograph T offers reliable data archiving by means of a mechanically-locked SD card – so there's no information loss, even in the event of a power failure. And, with direct access to archived data using MS Excel or the Field Data Manager (FDM) software, Ecograph T couldn't be easier to use! All information is clearly shown in the large full colour digital display in either numeric, bargraph, waterfall or curve format – you choose.

Ecograph T is ideal in a multitude of applications: from quality and quantity monitoring in the water industry to cold storage and transportation monitoring in the food industry. Its compact space-saving design also makes it suitable for use in applications where space is at a premium and with its loop power, no separate power supply is needed! However, Ecograph's real prowess lies in its data transmission features. System-enabled, it is perfect for network integration and remote data transmission via Ethernet, RS232/RS485 (modem), USB and optional Modbus RTU/TCP slave function. Ecograph T data is available worldwide via the integrated web server function for remote monitoring and fast information access wherever you may be!

Technical data

Input function	: Voltage, current, resistance thermometer, thermocouples, pulse input, frequency input
Number of inputs	: 0, 4, 8, 12
Digital inputs	: 6
Loop power supply	: Approx 24V, max 28V (250mA)
Relays	: 6 relays: 1 x alarm relay with changeover contact, 5 x normally open contacts
Display	: Colour LCD: 145mm
Protection	: Front panel: IP54, rear panel: IP20

Dimensions (mm)



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Memograph M RSG45

Advanced data manager.

Stainless steel front with touchscreen

- Tamper-proof data storage and personal access authorisation with electronic signature (FDA 21 CFR 11)
- Supports common fieldbuses (Modbus, PROFIBUS DP, PROFINET, EtherNet/IP) for fast integration into diverse systems
- Integrated web server

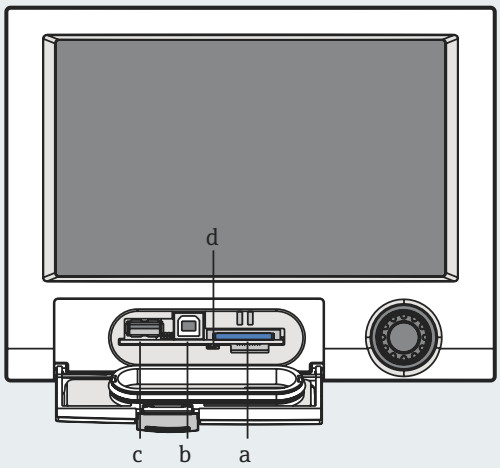
The RSG45 advanced data manager is a flexible and powerful system for organising process values. Thanks to its intuitive operation, it adapts quickly and easily to every application. The measured process values are clearly presented on the display and logged safely and limits are monitored and analysed. Measured and calculated values can be easily communicated to higher-level systems and individual plant modules can be interconnected. Wherever recording, visualisation, analysis and communication of process parameters is required, Memograph RSG45 fits the bill.

Technical data		RSG45
Analogue inputs	:	Standard version without universal inputs. Optional multifunction cards (slot 1-5) with 4 universal inputs (4/8/12/16/20) each
Input function	:	Voltage, current, resistance thernometer, thermocouple, pulse input or frequency input
Digital inputs	:	Standard: 6 digital inputs. Optional digital card (slot 5): 8 additional digital inputs, 6 additional relays and 2 analogue outputs.
Scan rate	:	Current/voltage/pulse/frequency input: 100ms per channel. Thermocouples and resistance temperature detector: 1s per channel.
Totalisation	:	Interim, daily, weekly, monthly, annual and overall value (13-digit, 64 bit).
Memory cycle	:	Off / 100ms / 1s / 2s / 3s / 4s / 5s / 10s / 15s / 20s / 30s / 1min / 2min / 3min / 4min / 5min / 10min / 15min / 30min / 1h
Communication	:	Standard: USB, Ethernet, RS232/485. Optional: Modbus, PROFIBUS DP or PROFINET I/O or EtherNet/IP.
Visual display	:	178mm (7") widescreen TFT full colour graphic display
Display modes	:	Curve, waterfall, bargraph, digital, instrument display, circular chart
Housing	:	Panel, desktop or field housings
Application packages	:	12 maths channels, telealarm, batch softaware, wastewater and rain overflow basins, energy software

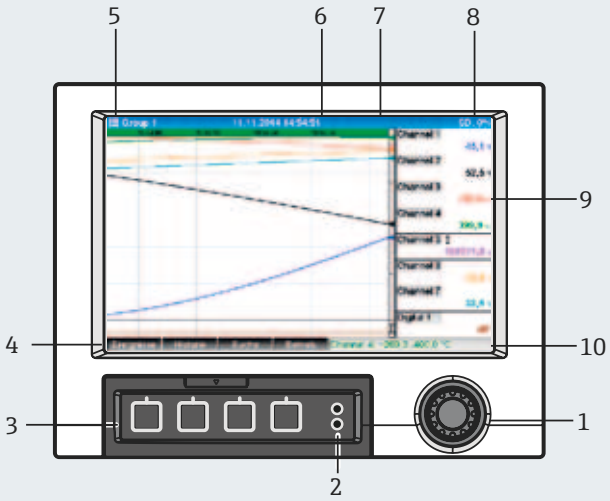
Dimensions (mm)

a. Slot for SD card
b. USB B socket 'Function' - connect to PC or laptop
c. USB A socket 'Host' - for USB memory stick, external keyboard, barcode reader or printer
d. LED at SD slot. Yellow LED lit or flashing when the device writes to the SD card or reads it.

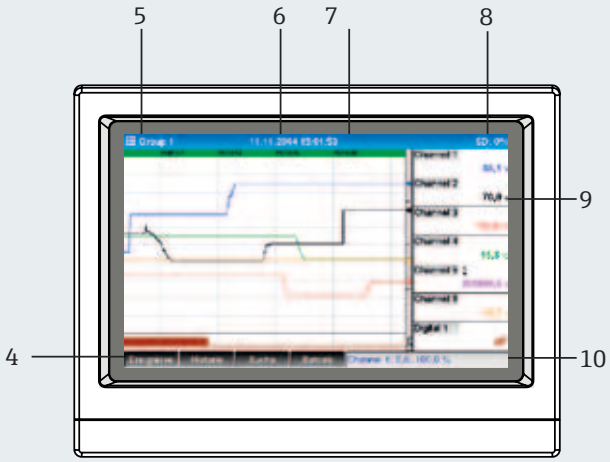
Do not remove the SD card if the LED is lit or flashing as there is risk of data loss!



RSG45 with navigator and front interfaces



RSG45 with stainless steel front and touchscreen



1. Navigator jog shuttle button for operating with additional press/hold function.
2. LED indicators (according to NAMUR NE44)
   - Green LED (top) lit: power supply OK
   - Red LED (bottom) flashing: maintenance required
3. Variable soft keys, keys 1 to 4 (from left to right)
4. Function indicator for the soft keys
5. Display mode: current group name, type of analysis. Setup mode: name of the current operating item.
6. Display mode: displays current date/time.
7. Display mode: user ID (if function is active)
8. Display mode: alternating display indicating space used on the SD card or USB stick. Setup mode: current 'direct access' operating code.
9. Display mode: window for measured value display (e.g. curve display). Setup mode: operating menu.
10. Display mode: alternating status display (e.g. set zoom range) of the analogue or digital inputs. Setup mode: information depends on the display type.

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RIA14/15/16

Loop-powered field indicator.


RIA14


RIA15


RIA16

- Clear back-lit display
- Bar graph, diagnostics symbols and plain text fields
- Digital limit switch
- Suitable for hazardous areas
- Voltage drop ≤1V (RIA15)

The RIA14/RIA16 indicator records an analogue measuring signal and shows this on the display. The display shows the current measured value digitally and as a bar graph with limit value violation signalling. Better still, the 2-wire indicator is loop-powered so no additional power source is required.

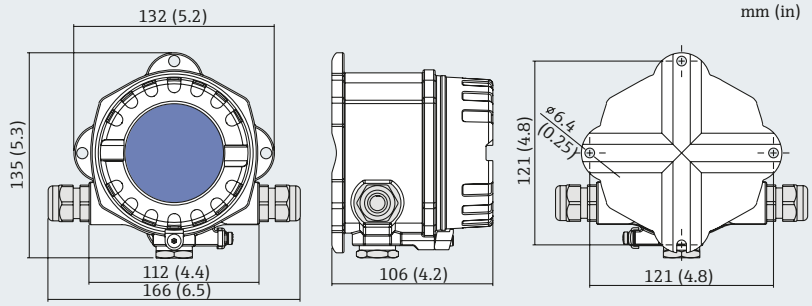
Technical data

	RIA14	RIA15	RIA16
Display	: 5-digit LCD (rotatable in 90°)	5-digit LCD	5-digit LCD
Display range	: -19999...+99999	-19999...+99999	-19999...+99999
Measured variable	: Current	Current	Current
Measuring range	: 4...20mA (reverse polarity protection)	4...20mA (scalable, reverse polarity protection)	4...20mA (reverse polarity protection)
Limit value violation	: Lower/upper limit value exceeded	Lower/upper limit value exceeded	Lower/upper limit value exceeded
Max measured error	: < 0.1% of scaled display range	± 0.1%	< 0.1% of scaled display range
Housing	: Die-cast aluminium (stainless steel as an option)	Panel or field	GRP (aluminium as an option)
Mounting location	: Wall or pipe	Wall or pipe	Wall or pipe
Operation	: 3 push-buttons (open housing)	3 push-buttons on front	3 push-buttons (open housing)
Ambient temperature	: -40...+80°C	-40°C...+60°C	-40...+80°C
Protection	: IP67 (NEMA4X)	Panel: front IP65, rear IP20; field: IP66/NEMA4x	IP67 (NEMA4X)
Certification	: ATEX, FM, CSA	ATEX, FM, CSA	ATEX, FM, CSA

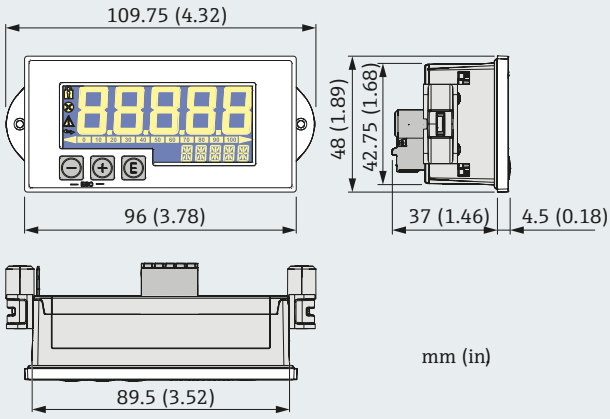
The measuring range, decimal point and offset of the indicator can be quickly and easily configured via the three keys when the housing open or using a PC with FieldCare software. It features configurable device parameters such as measuring dimension, measuring ranges (linear/square), setup block using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

Dimensions (mm)

mm (in)

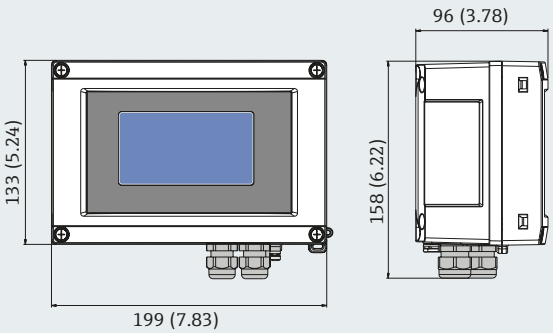


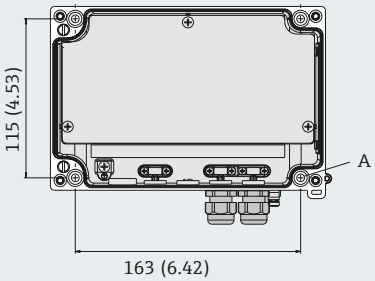
RIA14 with explosion-proof enclosure



mm (in)

RIA15 with field housing





mm (inch)

RIA16 with GRP housing

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RID14/16

8-channel field indicator with FOUNDATION Fieldbus.

RID14

RID16

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

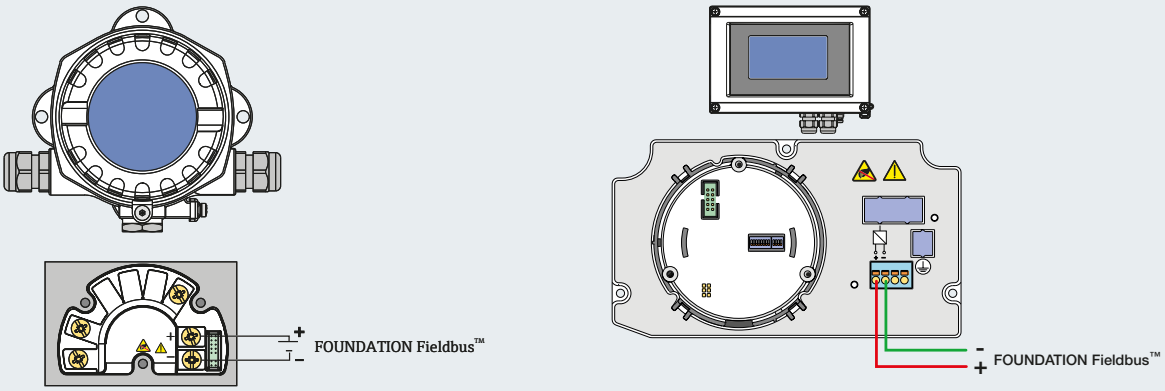
As an 8-channel digital indicator, the RIA 14/15/16 displays the measured values, calculated values and status information of the fieldbus users in a FOUNDATION Fieldbus network. In the listener mode, the device listens to the set fieldbus addresses and displays their specific values. Furthermore, values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

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

Technical data

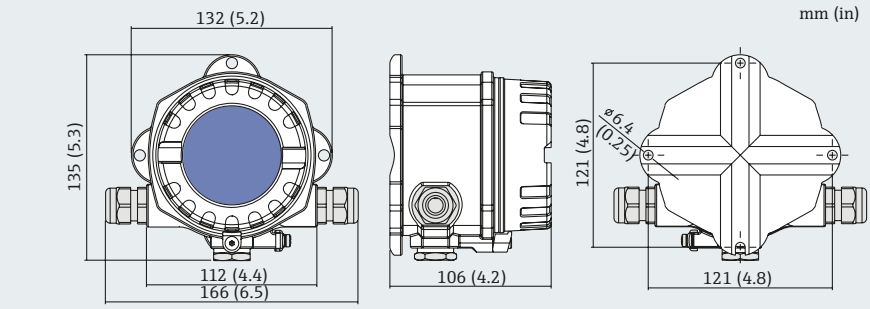
	RID14	RID16
Display	: 5-digit LCD (rotatable in 90°)	5-digit LCD
Display range	: -19999...+99999	-19999...+99999
Measured variable	: Up to 8 variables	Up to 8 variables
Measuring range	: FOUNDATION Fieldbus	FOUNDATION Fieldbus
Limit value violation	: Lower/upper limit value exceeded	Lower/upper limit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

Electrical connection

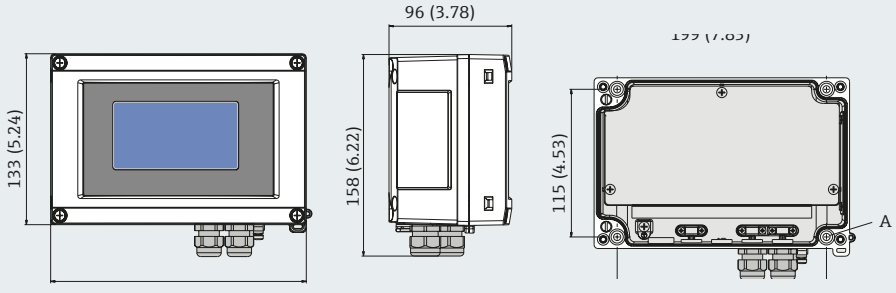


RID16 : Terminal assignment of the field display unit

Dimensions (mm)



RID14 with explosion-proof enclosure



RID16 with GRP housing

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RIA45/46

Digital process display and control unit.

RIA45

RIA46

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

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

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

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

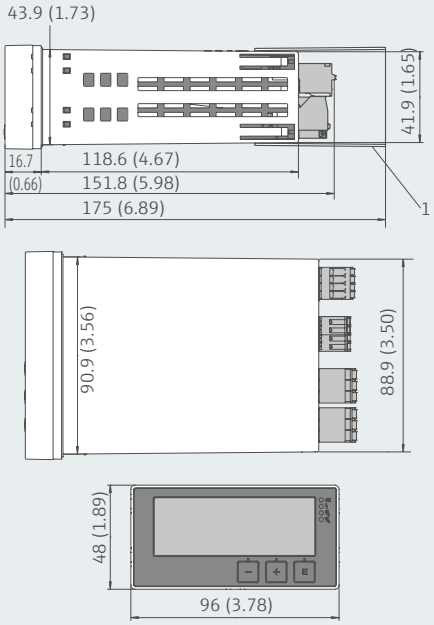
Technical data

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

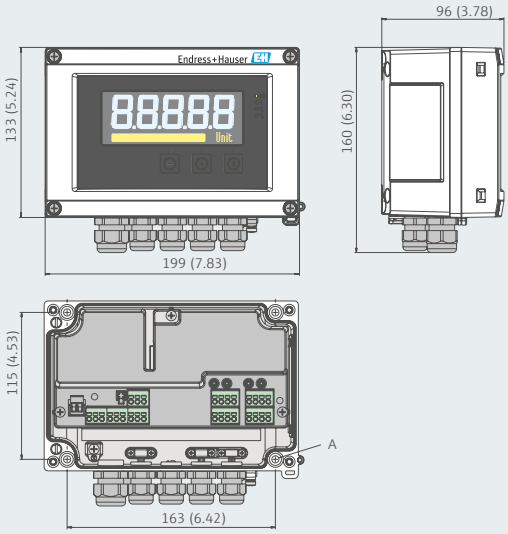
Linearisation function

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

RIA45 dimensions



RIA46 dimensions



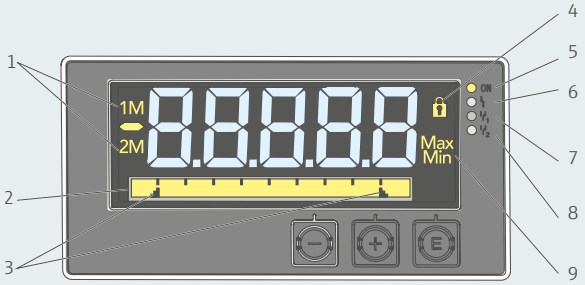
Dimensions of the field display unit

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

RIA45 display

Display elements

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



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RIA452

Multifunctional digital display.

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

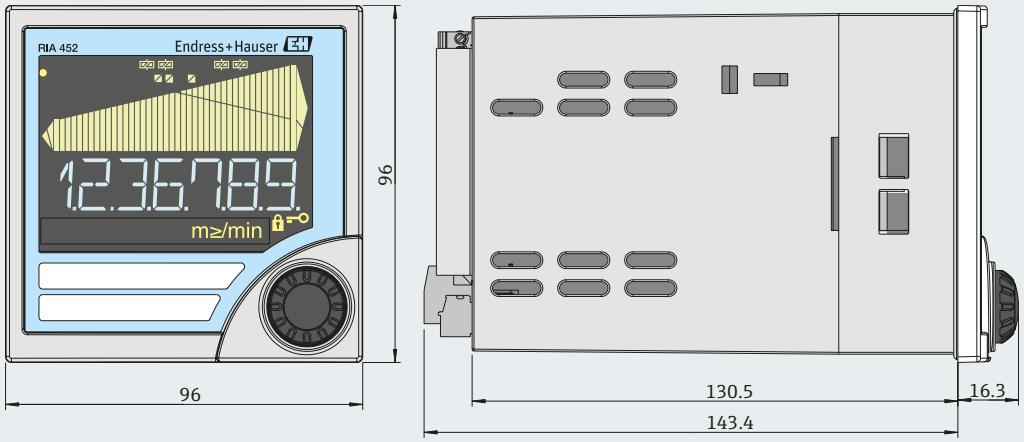
The RIA452 single-channel process display unit monitors and displays analogue measured values. Pumps and valves etc can be monitored with the digital status inputs. The measured value is displayed using the 7-digit 14-segment LC display. Numbers and engineering units are displayed in white, the bargraph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

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

Technical data

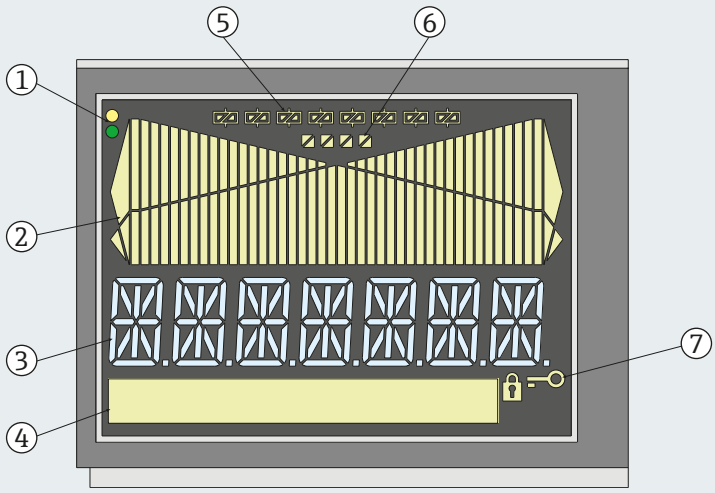
Current input	:	0/4...20mA +10% over-range
Voltage	:	±40mV, ±150mV, ±600mV, ±2.5V, 0...10V, ±10V
Resistance Thermometer	:	Pt100/500/1000, Cu50/100, Pt50 in 3/4-wire technology
Thermocouple types	:	J, K, T, N, B, S, R as per IEC581-1
Digital input	:	Voltage level -3...5V low, 12...30V high
Output signal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

Dimensions (mm)



Display

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



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RMA42

Universal process transmitter with control unit.

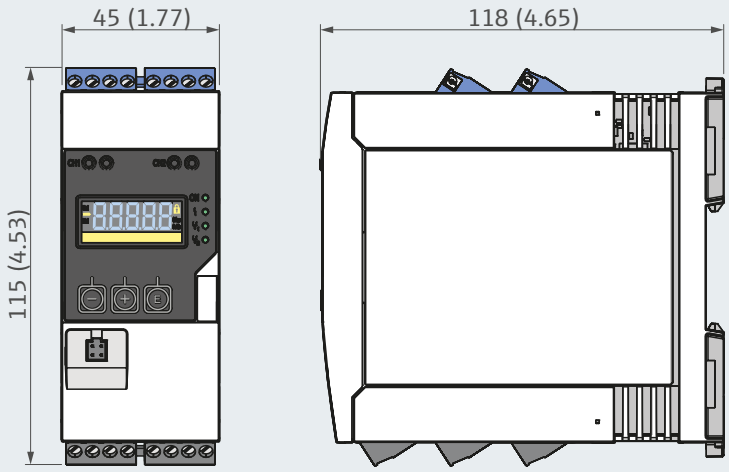
- 5-digit, 7-segment LC back-lit display
- 1 or 2 calculated values and linearization table
- Min/max value saved
- SIL 2 approval (optional)
- Suitable for hazardous areas

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

Technical data

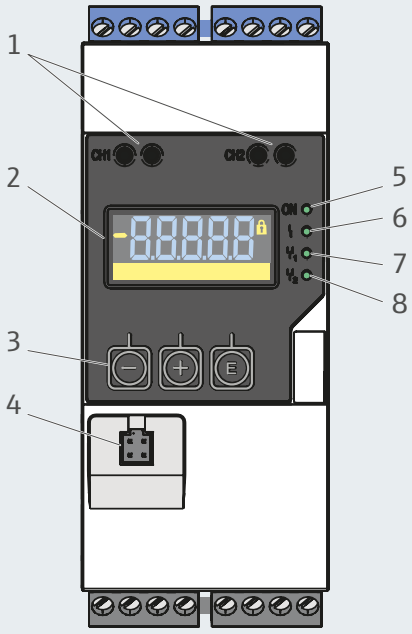
Display	: 5-digit, 7-segment backlit LCD
Display range	: -99999 to +99999
Input	: 2 x universal (current, voltage, R, RTD, TC, resistance)
Output	: 2 x analogue (current, voltage)
Relay output	: 2 x relay, 1 x open collector
Power suppy	: 24V intrinsically safe loop power
Dimensions	: 45 x 115 x 118mm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

Dimensions (mm)



Display elements

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



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RTA421

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

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

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

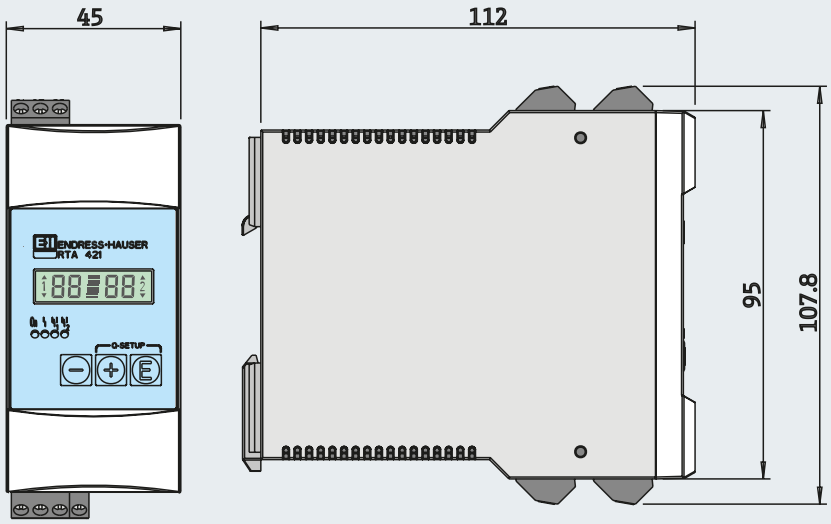
Applications

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

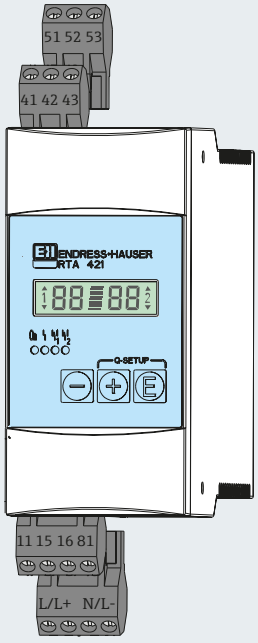
Technical data

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

Dimensions (mm)



Electrical connection



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RN221N and RB223 active barriers

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

RN221N

RB223

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

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

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

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

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

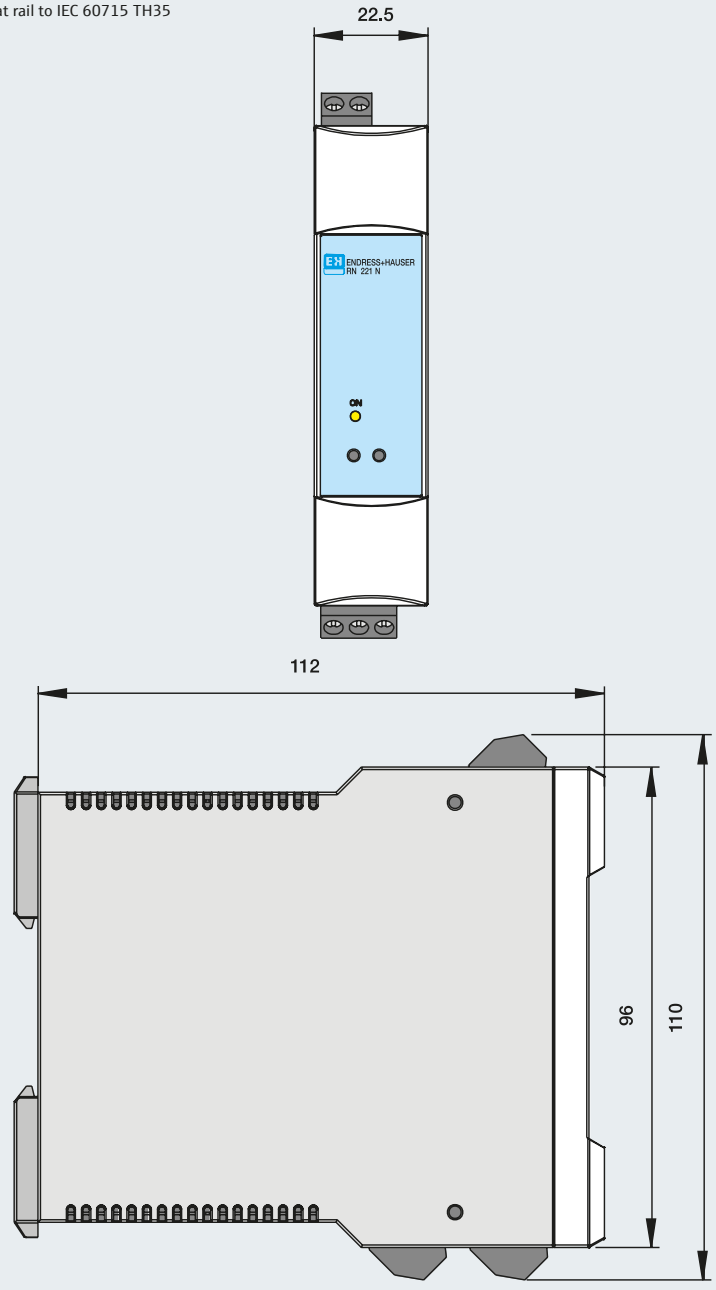
- Transmission from non-Ex to Ex areas e.g. for active adjusters, controllers or indicators
- Transmission from Ex to non-Ex areas for connection of active, intrinsically safe circuits to the PLC
- Transmission from Ex to non-Ex areas for supply of intrinsically safe transmitters with non-intrinsically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

Technical data

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

Dimensions (mm)

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



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RNS221

Power supply for two 2-wire sensors or transmitters.

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

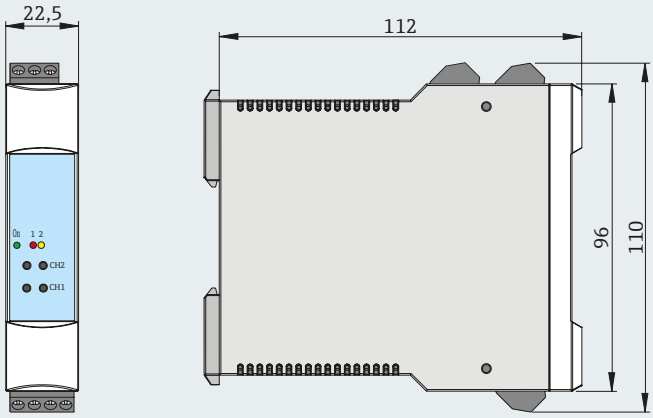
Application areas

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

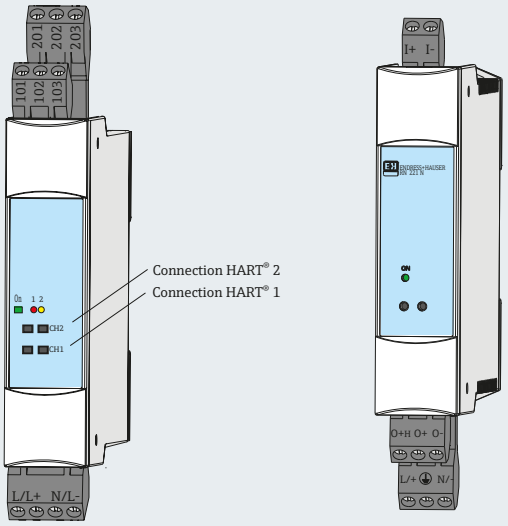
Technical data

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

Dimensions (mm)



Electrical connection



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RMC621

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

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

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

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

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

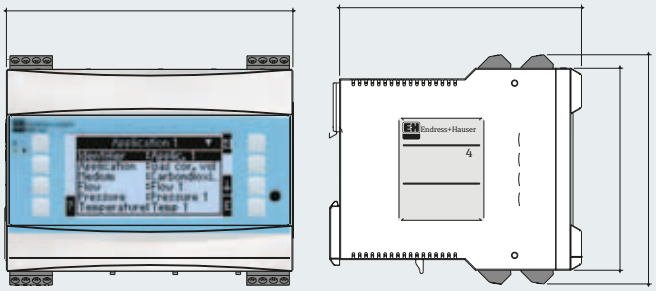
Technical data

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

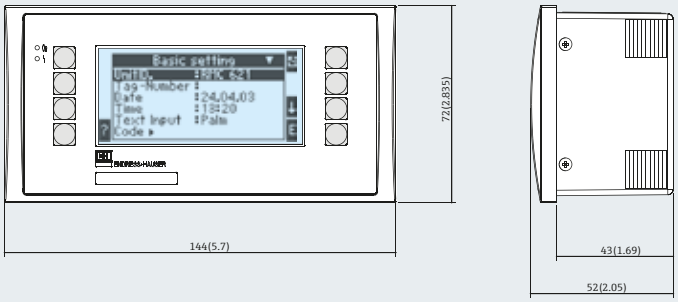
Applications

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

Dimensions (mm)

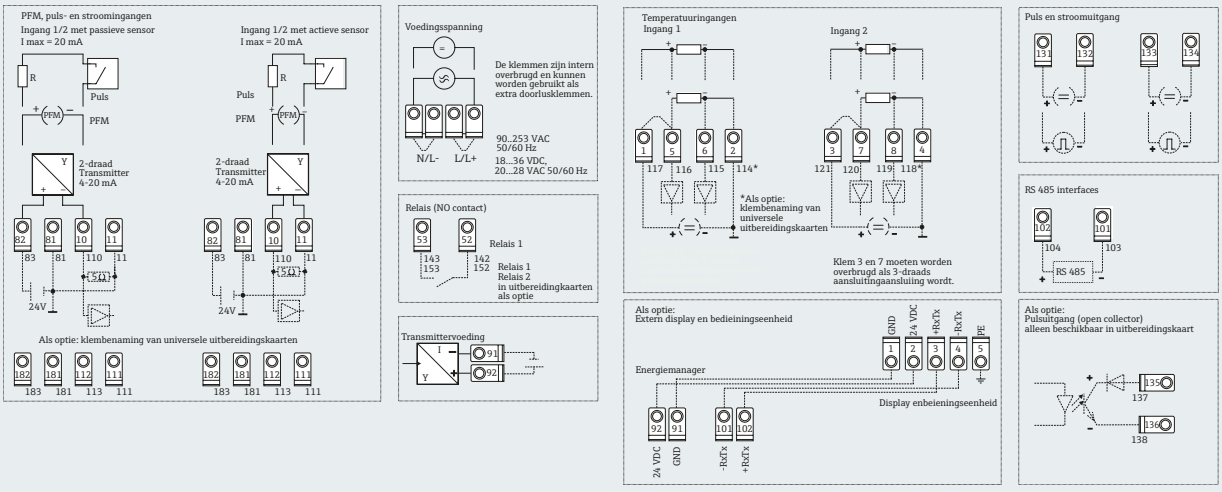


DIN rail housing



External display operating unit

Electrical connection



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RMS621

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

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

Applications

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

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

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

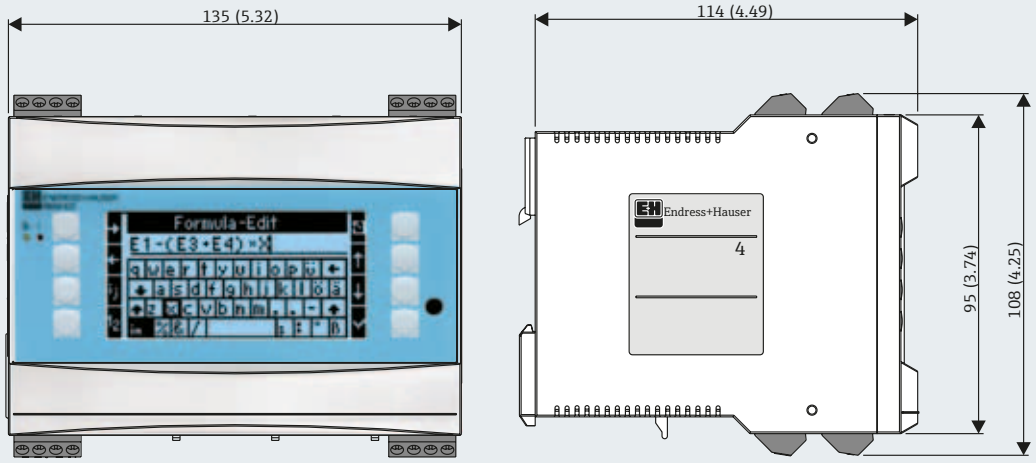
RMS621 features a large back-lit LCD display that changes colour (from blue to red) to alert you to faults and a logbook function for fault messages. It provides complete data security, even on power failure, so measurement integrity is guaranteed. The RMS621 is easy to use with simple pushbutton operation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

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

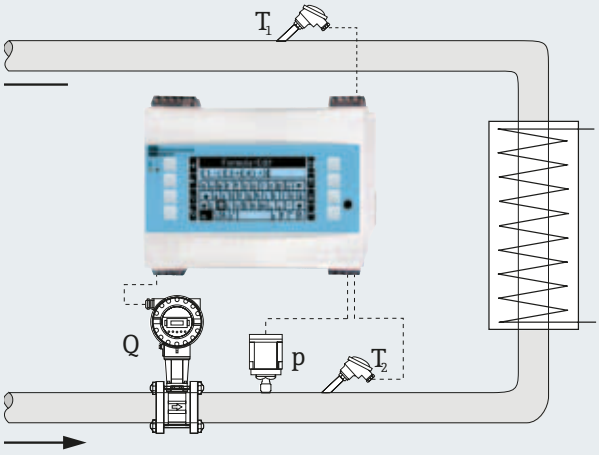
Technical data

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

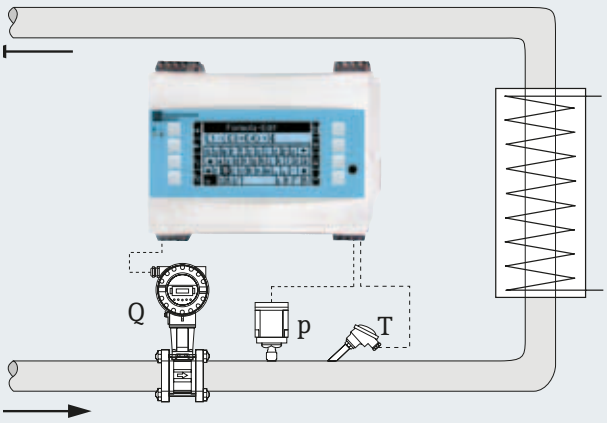
Dimensions (mm)



Calculation of steam-heat differential and net steam quantity



Calculation of steam mass flow and steam heat quantity



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Batch Controller RA33

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

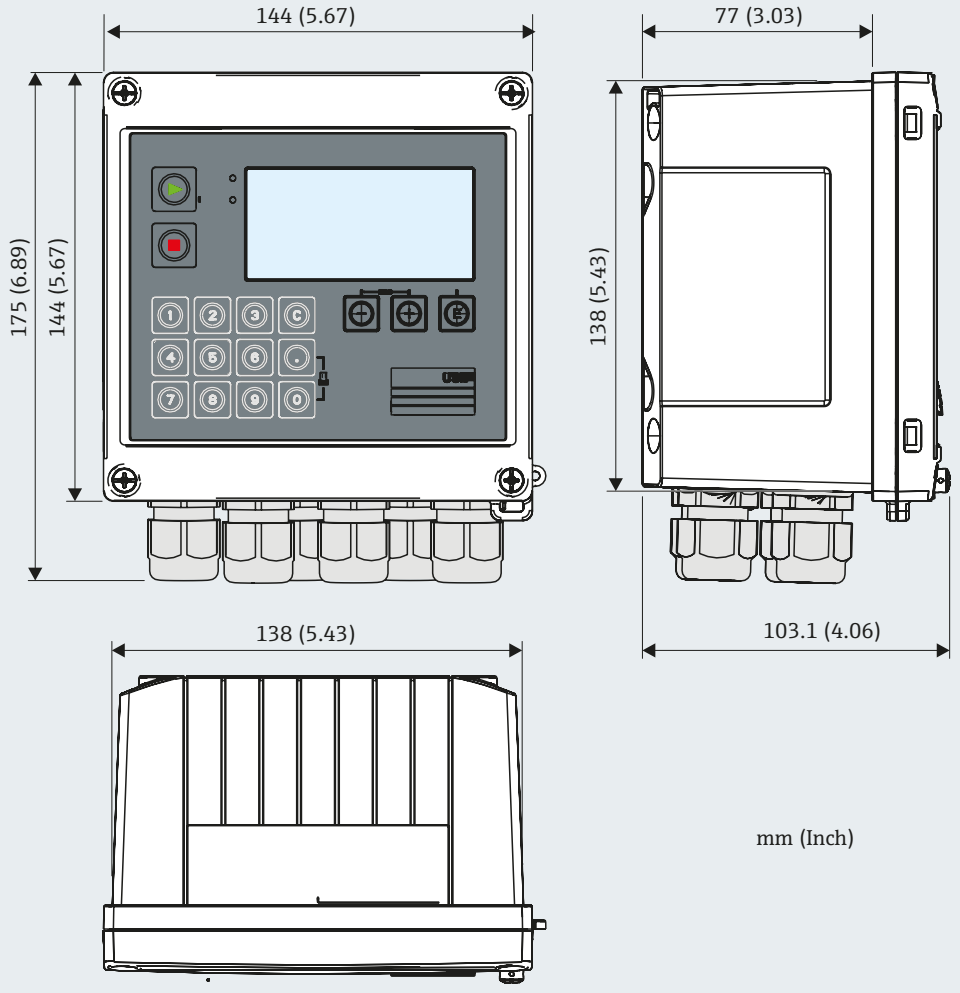
- Valve control for single-stage and two-stage batching
- Detailed logging of batch reports and error messages
- Advanced error diagnostics for leakage, fill deviation and 'no flow'
- Fast commissioning and simple operation

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

Technical data

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

Dimensions (mm)



mm (Inch)

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EngyCal RH33/RS33

Custody transfer BTU meter and steam calculator.

EngyCal RH33

EngyCal RS33

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

EngyCal RH33 BTU meter

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

EngyCal RS33 steam calculator

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

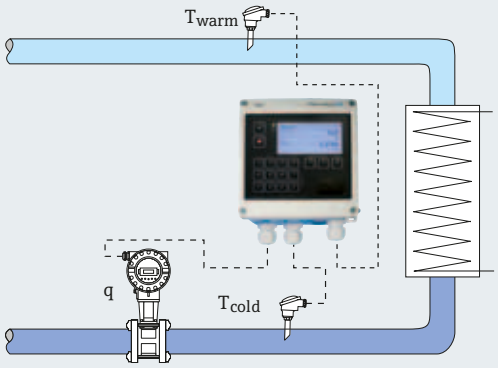
Technical data

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

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

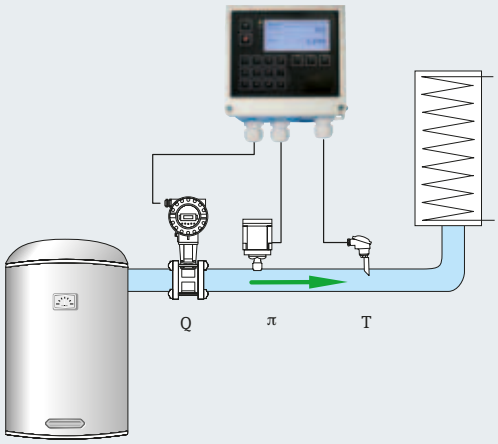
System design

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



System design

EngyCal RS33: measurement of flow, temperature and pressure.



Technical data

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

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EngyVolt RV12/15

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

RV12

RV15

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

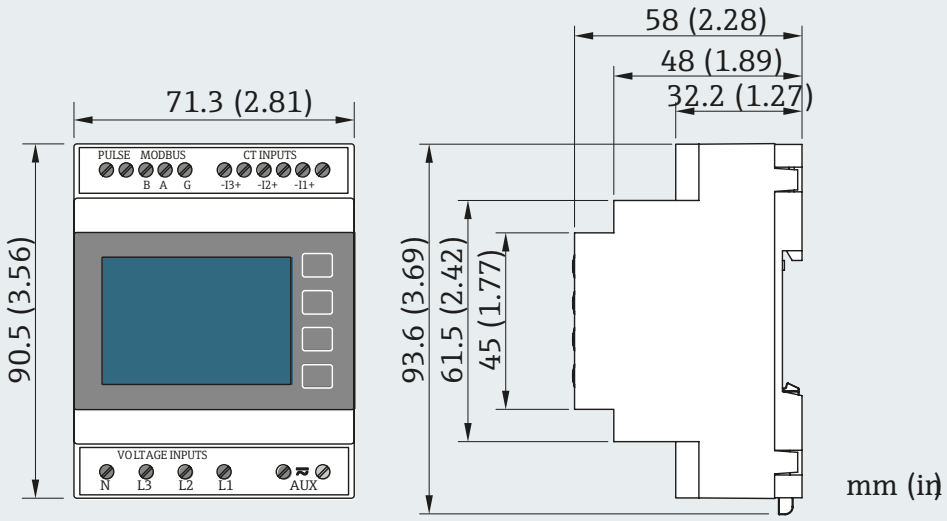
The EngyVolt RV12 and RV15 multifunction electrical energy meters are designed to record, display and transmit electrical measured values in low-voltage systems with a maximum nominal voltage of 500 V L-L (289 V L/N), current connected via low voltage current converter x/5 A at a nominal frequency of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

Technical data

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

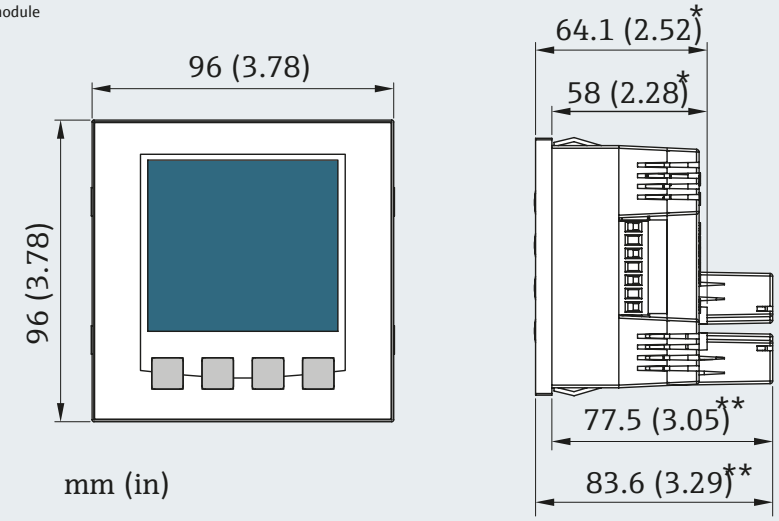
Dimensions (mm)

EngyVolt RV12: top-hat rail



Dimensions (mm)

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



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Fieldgate FXA320/520 and SFG500

Gateways for remote monitoring, diagnosis and process control instrumentation.

FXA320

FXA520

SFG500

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

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

Fieldgate Ethernet

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

Fieldgate Analogue Modem

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

Fieldgate GSM

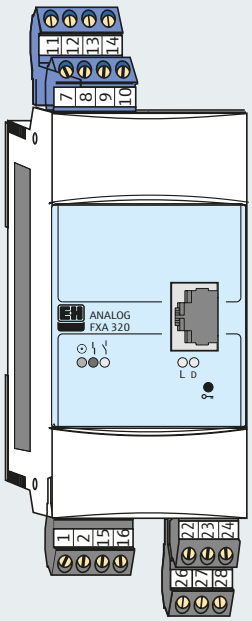
Fieldgate GSM can be connected wirelessly to a mobile network provider. This allows for the collection of data and set up of devices via PSTN or Internet. Another option is to use GSM with GPRS to directly connect to the Internet.

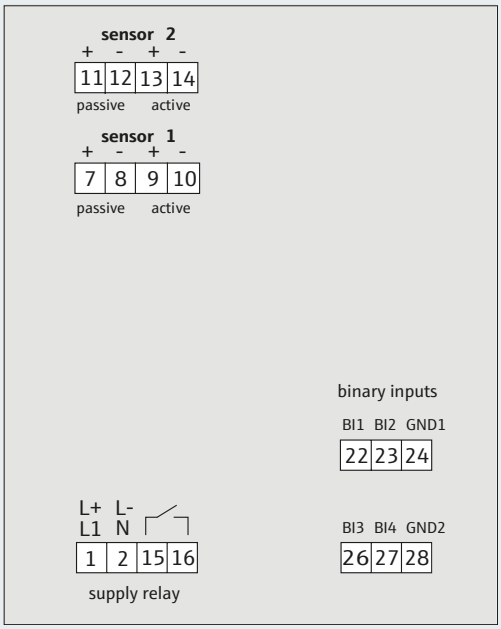
SFG500

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

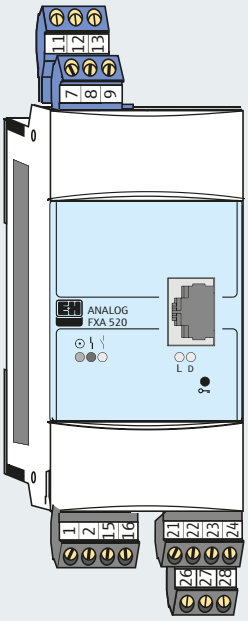
Electrical connections

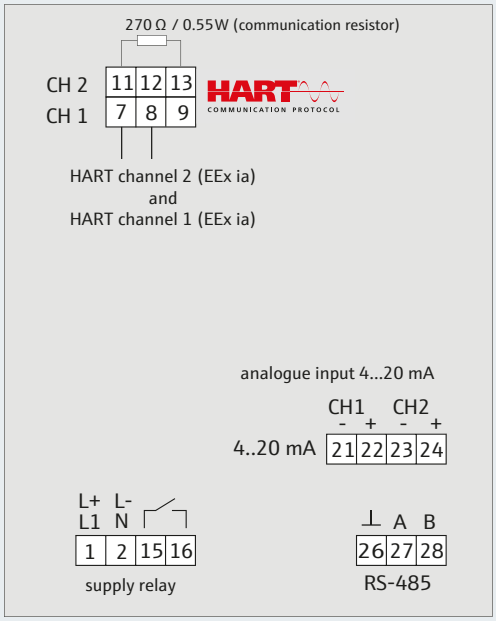
FXA320





FXA520





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WirelessHART Adapter SWA70 and WirelessHART Fieldgate SWG70

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

SWA70

SWG70

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

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

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

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

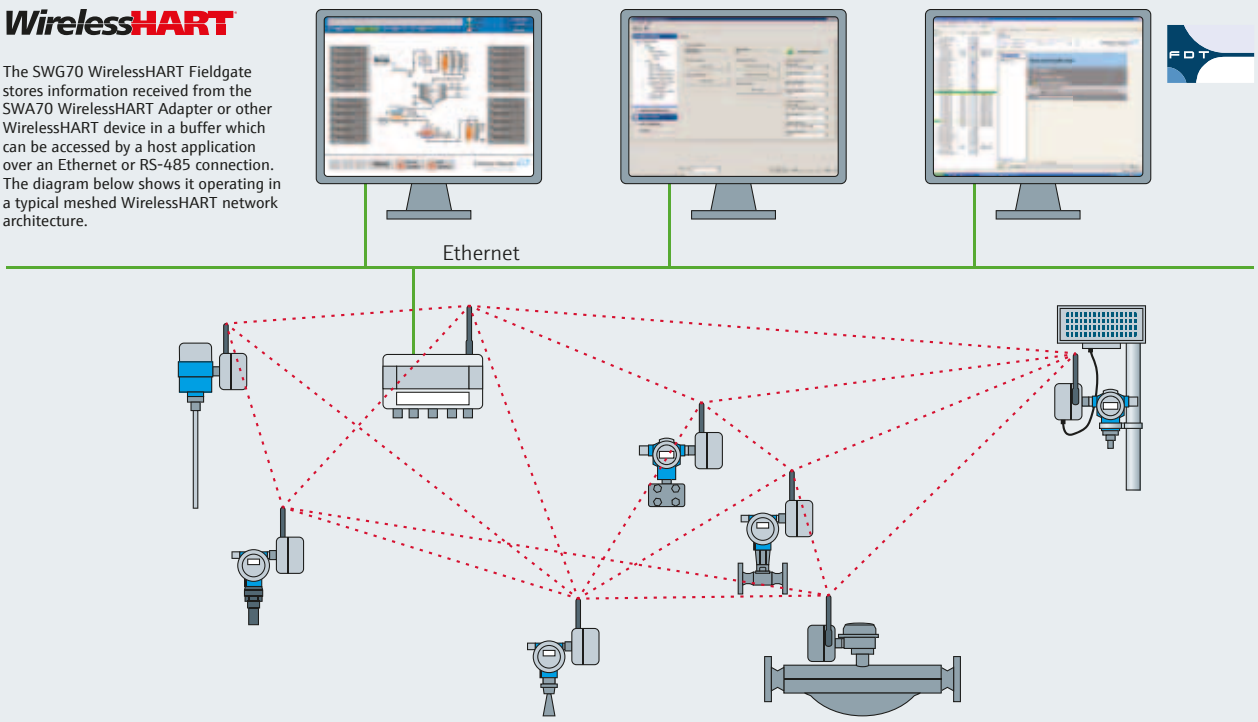
Technical data

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

System design

WirelessHART

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



Technical data

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

- For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
- To download technical documentation, please visit our website: www.uk.endress.com
- For product selection help, try our online Application tool: www.uk.endress.com/applicator

Services & Solutions

For further information, visit our website at: www.uk.endress.com

Start-Up with Endress+Hauser

Avoid false starts!

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

You're in safe hands

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

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

Start-Up gives you:

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

Terms and conditions

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

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

Calibration services

Competent, cost-effective, compliant.

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

Flow

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

Pressure

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

Temperature

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

Test and measuring equipment

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

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

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

Service Agreements

Made-to-measure to suit your requirements.

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

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

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

Unique solutions for unique customers

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

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

Get in touch

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

Engineering services

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

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

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

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

Project management

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

Design services

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

Electrical and mechanical installation

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

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

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

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

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

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

Plant Asset Management

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

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

Reduce capital and operating expenditures

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

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

Benefit from:

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

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

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

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

Inventory Management Solutions

Reduce cost and increase productivity with complete inventory visibility.

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

From the inventory measurement through to your ERP system

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

Benefit from:

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

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

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

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

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

Energy management solutions

The power to reduce your energy usage.

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

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

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

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

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

Evaluate energy data to highlight savings potential

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

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

Analytical solutions

Complete turnkey solutions for your analytical measuring requirements.

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

Customised solutions to meet your needs

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

Analytical monitoring stations

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

Analytical monitoring panels

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

Aeration control

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

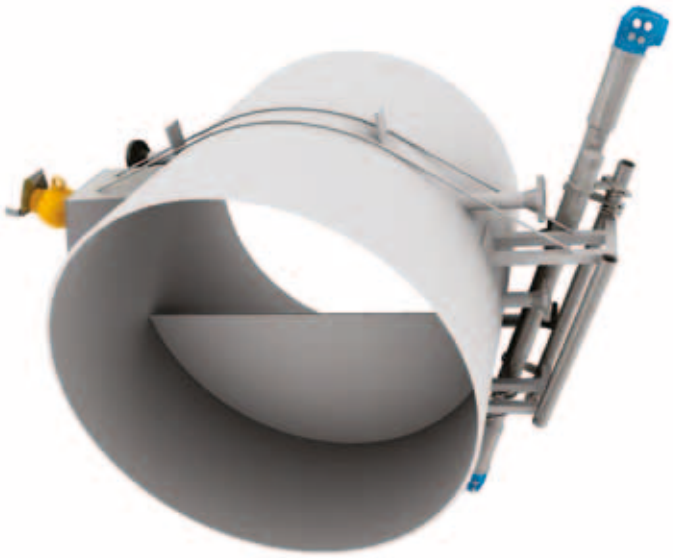
Gamma measurement solutions

Tailor-made for tough applications.

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

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

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



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

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

Bespoke engineering

Custom-made solutions to suit your requirements.

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

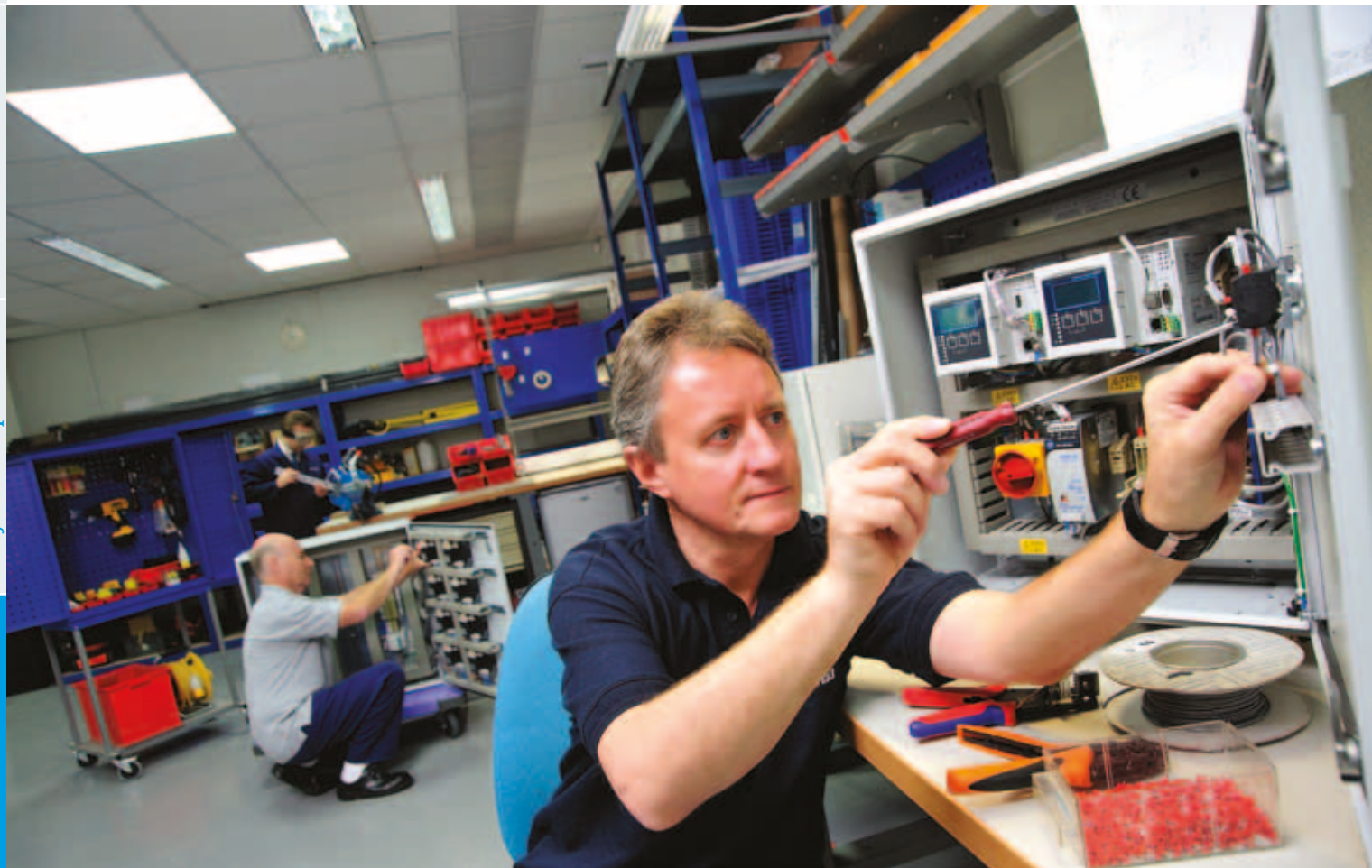
Temperature engineering

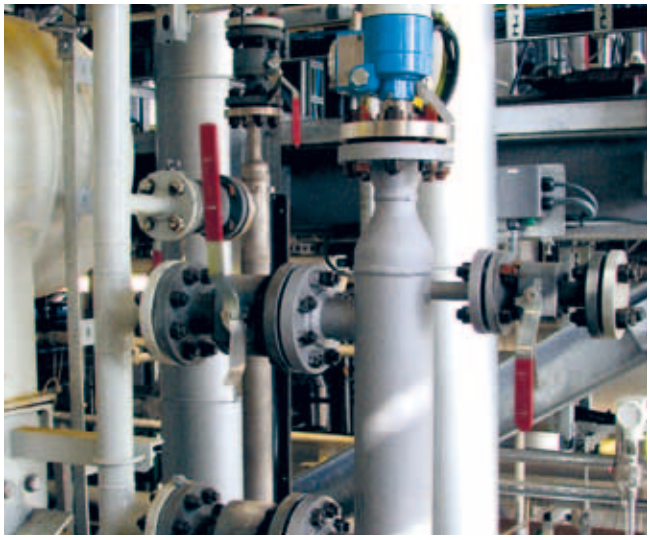
For processes involving high temperatures, pressures and flows in combination with aggressive and corrosive media, we offer tailor-made solutions. Our speciality lies in the fact that we are well-versed in the design and manufacture of highly complex bespoke engineered temperature solutions and our expertise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

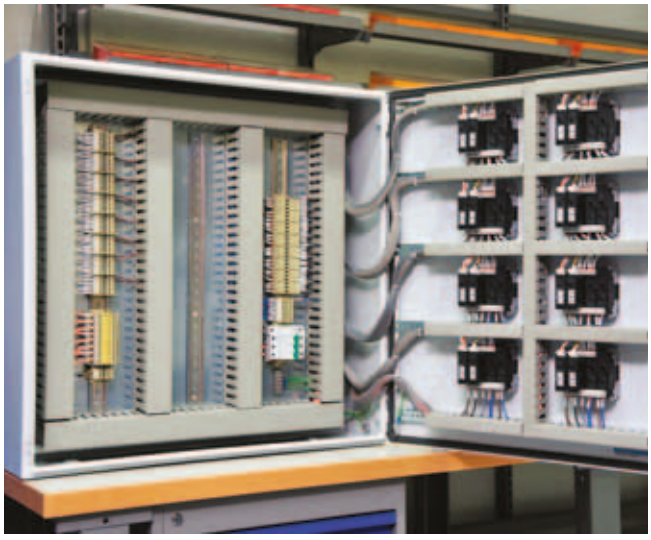
- Semi-flexible coaxial multipoint
- 3D vessel profile multipoint

Flow engineering

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







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

Level solutions

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

- Bridles
- Stilling wells
- Dry wells
- Bypass chambers

all in accordance with PED and piping requirements.

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

Panel solutions

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

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Endress+Hauser

People for Process Automation