FLOWSIC900

Custody transfer ultrasonic LNG-Meter

Drives energy diversification and reduces emissions

- Low measurement uncertainty directly at custody transfer point reducing financial risks during LNG-transaction
- Increased transparency during LNG-transaction by dynamic & real-time measurement & diagnostics
- Nearly maintenance-free due to intrinsically safe transducers
- Operational expenditure savings by reduced boil-off gas losses and efficient LNG transfer due to minimized pressure drop
- Capital expenditure savings by simplified meter integration and installation due to compact design and factory pre-insulation
- Easy and fast access during commissioning and regular checks with remote SPU



Endress+Hauser

People for Process Automation

Ultrasonic technology for the custody transfer measurement of liquefied natural gas

LNG has been driving global energy diversification for decades and is becoming increasingly important as a bridge fuel for reducing emissions in the mobility and energy sectors. Although the basic process of liquefaction, transportation, distribution, and regasification have long been established, operators still face technical, operational, and commercial challenges in LNG transactions. FLOWSIC900 is the result of many years of experience in the natural gas industry: a flowmeter specially tailored to the requirements of the LNG industry that solves these challenges. FLOWSIC900 thus offers the necessary custody transfer measurement accuracy for volume flow measurement, which is approved according to metrological standards for the storage and loading of large quantities of LNG. FLOWSIC900 is also the right choice for LNG process measurement and keeps your process under control at all times.

Everything from a single source. Together with the proven FLOWSIC600-XT, FLOWSIC100 Flare-XT and Analyzer solutions, the FLOWSIC900 significantly increases measurement performance and reliability in LNG plants - a complete solution portfolio from a single source.



Why ultrasonic technology?

Flowmeters with ultrasonic technology are ideal for custody transfer flow measurement—both for gases and cryogenic liquids such as LNG:

- Highly accurate measurement according to current metrological standards (OIML R117 / API MPMS Ch. 5.8)
- Real-time measurement of fluid quality fluctuations directly at the billing point
- Real-time measurement of the transferred LNG quantity (volume) directly at the billing point in the pipeline
- Large nominal diameter range (DN200 to DN900)
- High measuring span of ≥ 1:25
- Blockage-free, no pressure loss
- No mechanically moving parts, no pulsation



Comprehensive expertise included

Over 30 years of experience in ultrasonic flow measurement

Our ultrasonic gas meters have been used successfully at over 20,000 measuring points worldwide for more than 30 years. This also includes applications for gases with different hydrogen contents. This knowledge was incorporated into the development of the FLOWSIC900.

Designed and tested to the highest metrological standards

State-of-the-art development methods such as CFD flow simulations are used in the development of the device design. This enables the design and measurement performance to be fine-tuned in the shortest possible development time, even before the first laboratory test. The result: conformity with the highest metrological standards - such as OIML R117 Cl. 0.3 and API MPMS Chapter 5.8.

Easy access and maximum flexibility thanks to remote SPU

An advantage during commissioning or regular tests: Thanks to the remote SPU, the meter body can be installed exactly where the process and safety guidelines require. Depending on requirements, the SPU is mounted up to 5 m away at an easily accessible point on the wall using a 2" pipe. The meter body can therefore be installed flexibly and independently of the SPU – even in hard-to-reach pipe sections.



Tailor-made designed for LNG

No pressure loss by full-bore design and no need for flow conditioner

The constriction-free full-bore design of the FLOWSIC900 and the absence of flow conditioners virtually eliminate the pressure loss in the metering line. This means: less boil-off gas, higher flow velocities, less pump energy and ultimately a more efficient LNG transfer.

Compact design without separate connection units

Flexible system design, simple installation, low space requirement: the intrinsically safe transducer design means that the cabling between the ultrasonic transducer and the SPU is free and without separate connection units. This means that no additional installation space needs to be planned above or below the meter and the meter fits almost seamlessly into the pipework.

Factory thermal pre-insulation

In order to achieve low measurement uncertainty and minimize boil-off gas losses, thermal insulation of the LNG pipelines is essential. The FLOWSIC900 is thermally pre-insulated ex works, and can also be ordered with optional metal jacketing: This reduces the effort required for insulation in the field to a minimum.

Tailor-made designed for LNG



FLOWSIC900 with 4 paths as standard version



FLOWSIC900 Forte with 8 paths for compact installations

No active electronic components within the insulation

In order to reduce the probability of failure and therefore maintenance and service to a minimum, only passive, intrinsically safe components are used in the ultrasonic transducers of the FLOWSIC900. In addition, the cables are pre-routed within the insulation, robustly connected to each other and protected against mechanical influences.

Simple integration, intelligent diagnostics

Bluetooth® or wired: always well connected

In addition to the standardized interfaces for data communication, FLOWSIC900 is equipped with a dedicated commissioning and service interface: Equipped with the Bluetooth®-compatible adapter, wireless connections of up to 30 m are possible with Bluetooth®-enabled end devices. Additional device-specific adapters are not required. Alternatively, a wired adapter with USB-C interface is also available.

Guided commissioning and inspection via FLOWgate™

FLOWgate™ enables on-line or off-line access to the FLOWSIC900 and therefore to all measured value and diagnostic data at any time via computer or mobile devices.
Various assistance functions, such as the guided commissioning wizard, make operating the device much easier. This minimizes the time, complexity, and therefore the effort involved in commissioning the device. The quick status provides immediate information on the current status of the meter and the system.

Everything in view

Depending on the variant, the FLOWSIC900 comes with a fully integrated display for clear indication of the relevant measurement and diagnostic data as well as metrological data for regular maintenance and inspection. If necessary, the display can be easily replaced as it is a separate module.



Process and asset monitoring

Real-time monitoring of process and measurement conditions

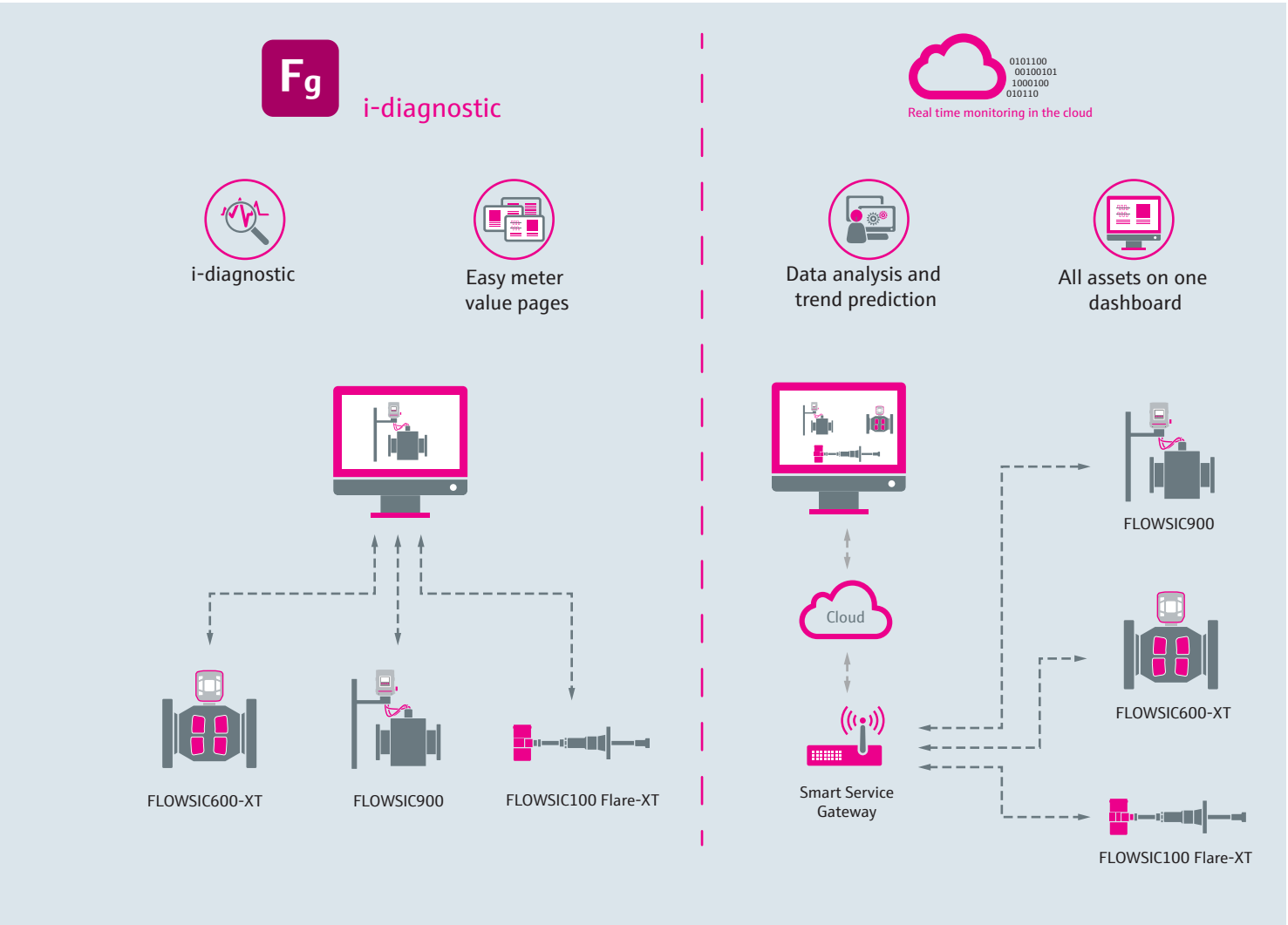
With modern diagnostics features like monitoring fluid quality via speed of sound,plausibility check of individual path values,the indication of process changes as e.g. sudden fluid quality changes or partially closed valves gets possible. That allows switching from time- to event-triggered process interactions like gas sampling or piping inspections. These features help operators to keep their processes under control at all times.

High measurement availability by path compensation

In the unlikely event that process conditions cause malfunction of a single measurement path – FLOWSIC900 keeps running inside uncertainty limits. With the path compensation feature, the measurement availability and therefore process stability are ensured. Inspection of the metering section can wait until the next regular plant maintenance.

Easy Asset Monitoring by FLOWgate™ and Monitoring Box

All relevant measurement data, meter diagnostics, settings, and live sessions can be visualized and stored in standardized Flowgate™ reports and files. Our Monitoring Box offers cloud based Dashboards, which visualize health status and process data from all your measurement tags and assets. This eases monitoring, trend diagnosis and troubleshooting of your asset – from the control room or from any standard web-browser, anywhere and anytime without need for field visit of the meter.



FLOWSIC900
Custody transfer ultrasonic LNG meter



Product description

LNG drives energy diversification and reduces emissions in the mobility and energy sector. Plant operators however still face technical, operational, and commercial challenges during LNG transfer. FLOWSIC900 solves these challenges. It is the result of our many years of experience in natural gas measurement: A flowmeter specially tailored to the needs of the LNG-industry.

FLOWSIC900 offers the required custody transfer accuracy for volume flow measurement and meets highest standards. FLOWSIC900 and the proven products FLOWSIC600-XT and FLOWSIC100 Flare-XT significantly increase measurement performance and reliability in LNG plants - a complete solution portfolio from a single source.

At a glance

- Custody transfer ultrasonic liquid flowmeter
- Conform to OIML R117 Cl. 0.3 and API MPMS Ch. 5.8
- Real time measurement and diagnostics
- Intrinsically safe and reliable ultrasonic transducers
- Full bore design without pressure drop or need for flow conditioner
- Compact meter design without junction boxes
- Factory thermal pre-insulation
- Remote Signal Processing Unit

Your benefits

- Low measurement uncertainty directly at custody transfer point reducing financial risks during LNG-transaction
- Increased transparency during LNG-transaction by dynamic, real-time measurement and diagnostics
- Nearly maintenance-free due to intrinsically safe transducers with over 30 years ultrasonic expertise
- Operational expenditure savings by reduced boil-off gas losses and efficient LNG transfer due to minimized pressure drop
- Capital expenditure savings by simplified meter integration and installation due to compact design and factory pre-insulation
- Easy and fast access during commissioning and regular checks with remote SPU

Fields of application

- Custody transfer measurement of LNG
- On- and offshore applications
- Liquefaction, transport, and storage of LNG
- Process measurement of LNG

More Information online

For more information, enter the link or scan the QR code to get direct access to technical data, operating instructions, software, application examples, and much more.
www.endress.com/flowsic900

Technical data

The exact device specifications and product performance data may vary and are dependent on the respective application and customer specifications.

FLOWSIC900

Measured values	Volume a.c., volumetric flow a.c., velocity of fluid, speed of sound
Measuring principle	Ultrasonic transit time difference measurement
Measuring medium	LNG (Liquified Natural Gas)
Measuring ranges	0.5 m/s ... 13 m/s (1.5 ft/s ... 43 ft/s)
Accuracy [1]	Typical error limits Q_{min} ... Q_{max}
4 path and 8 path design	≤ ±0.2 % of reading After flow calibration with adjustment
Repeatability	≤ ±0.05 % of reading[2]
Nominal pipe diameter	8" ... 36" / DN200 ... DN900 Schedule 40S/STD acc. ASME B36.19 / B36.10 Others on request
Design pressure	0 bar(g) ... 19 bar(g) (0 psi(g) ... 275 psi(g)) Others on request
Design temperature	−196 °C ... +60 °C (−321 °F ... +140 °F)
Operating pressure	0 bar(g) ... 19 bar(g) (0 psi(g) ... 275 psi(g))
Operating temperature	−196 °C ... +60 °C (-321 °F ... +140 °F)
Ambient temperature [3]	
IECEx/ATEX	−40 °C ... +60 °C (-40 °F ... +140 °F)
cCSAus	−30 °C ... +60 °C (-22 °F ... +140 °F)
Storage temperature	
IECEx/ATEX	−40 °C ... +60 °C (-40 °F ... +140 °F)
cCSAus	−30 °C ... +60 °C (-22 °F ... +140 °F)
Flange type	Class 150/300 acc. ASME B16.5/B16.47 PN16/40 acc. EN 1092-1 Raised Face Stock Finish Others on request
Material	
Meter body (wetted)	Stainless steel (316/316L / 1.4401/1.4404) Others on request
Ultrasonic transducers (wetted)	Titanium Grade 5
SPU housing	Aluminum (copper-free)[4] Option: Stainless Steel 316L
Ambient humidity	≤ 100% relative humidity
Direction of flow	Unidirectional Bidirectional
Electrical connection	
Voltage	24 V DC +30% / -20%
Power consumption	≤5 W
Cable entries	4x M25x1,5 or 4x NPT 3/4" [5]
Number of measurement paths	4 / 8 (Forte)
SPU mounting	Mounted remotely from the meter body (5 m cable length / 16 ft cable length)

Coating	
SPU housing	Coating system: C3, option: CX acc. ISO 12944
Meter body	Uncoated Coating on request
Operation	Commissioning and regular checks via FLOWgate™ Visualization of measured values via integrated Display [6] on SPU front cover
I/O	
Process interfaces	2x RS485 Modbus RTU/ASCII 2x digital output 2x frequency / digital output Others on request
Commissioning and service	1x BLE (Bluetooth® Low Energy) or 1x USB via accessory adapter to SPU
Ex approvals	
IECEx	Ex db ia [ia Ga] IIA T4 Gb
NEC/CEC (US/CA)	Ex db ia [ia Ga] IIA T4 Gb Class I, Zone 1, AEx db ia [ia Ga] IIA T4 Gb
NEC (US)	Class I, Division 1, Group D T4
Protection class	IP66/IP67 acc. to EN 60529 Type 4X acc. UL50E
Compliance	
Metrological:	
OIML	R117 Class 0.3
MID [7]	2014/32/EU
Explosion protection:	
IECEx	IEC 60079
cCSA	CSA C22.2 No. 60079, CSA C22.2 No. 61010-1
CSAus	UL60079, UL61010-1, FM3600, FM3610, FM3615
Pressure safety:	
PED	2014/68/EU
ASME	B16.5/B16.47, B36.19/36.10
Others:	
API	MPMS Ch. 5.8
Installation in the pipeline	horizontal, vertical [8]

[1] 1,0 % of reading for process measurement without need for flow calibration
[2] At reference conditions, fulfilling requirements of API MPMS Ch. 5.8, Table B.1 and OIML R 117-1 Cl. 0.3
[3] Additional limitations apply for metrological use. Please refer to the specific type evaluation certificate. The certified max. ambient temperature for use acc. OIML or MID is +55 °C.
[4] Aluminum EN AW-6082 or Aluminum EN AC-44300 with ≤ 0.1 % copper content, copper-free acc. API definition (API Recommended Practice 14FZ)
[5] Depending on the device variant selected
[6] Depending on the device variant selected, this feature is available as an option.
[7] See MID evaluation certificate
[8] See installation instructions in the operating instructions.

Flowrates

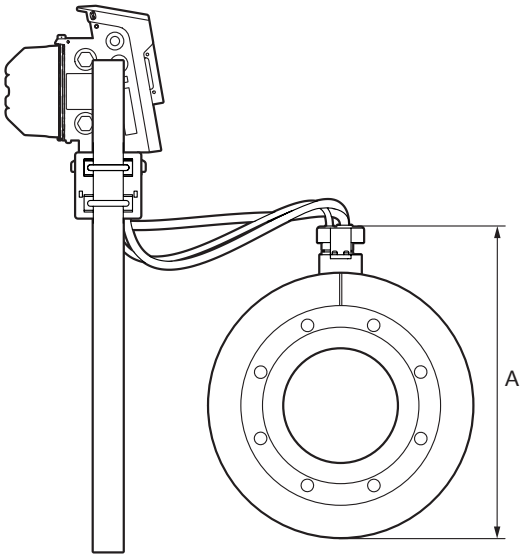
Nominal diameter	Q_{min}		Q_{max}	
	m^3/h	ft^3/h	m^3/h	ft^3/h
8" / DN200	60	2,100	1,500	53,000
10" / DN250	90	3,200	2,300	81,000
12" / DN300	130	4,600	3,300	117,000
14" / DN350	160	5,700	4,100	145,000
16" / DN400	220	7,700	5,500	195,000
18" / DN450	280	9,900	7,000	247,000
20" / DN500	340	12,000	8,800	310,000
24" / DN600	500	17,700	12,800	452,000
26" / DN650	590	21,000	15,200	536,000
28" / DN700	680	24,000	17,600	621,000
30" / DN750	790	28,000	20,200	713,000
32" / DN800	900	32,000	23,000	812,000
36" / DN900	1,140	40,000	29,000	1,020,000

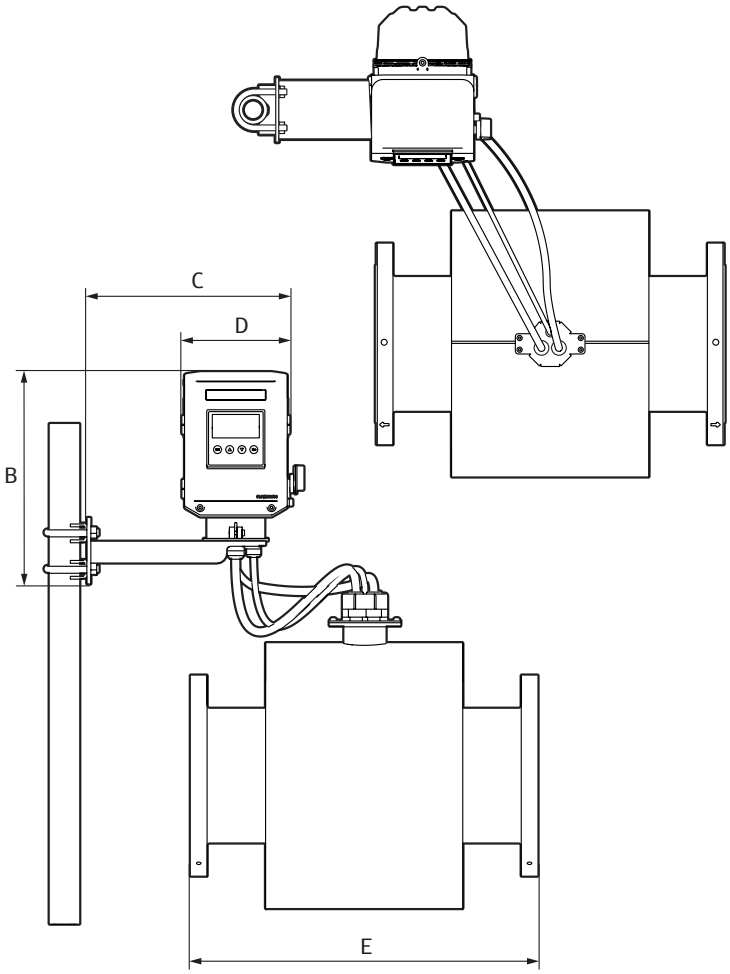
Ordering information

Our regional sales organization will help you to select the optimum device configuration. Product features subject to change. Product availability upon request.

Dimensional drawings

FLOWSIC900 - Remote version





Nominal pipe size	Weight		Dimensions									
			A		B		C		D		E	
	kg	lbs	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
8" / DN200	145	320	550	21.7	364	14.1	369	14.5	228	9.0	600	23.6
10" / DN250	205	450	620	24.5							750	29.5
12" / DN300	395	870	620	24.5							900	35.4
14" / DN350	500	1,100	650	25.6							1050	41.3
16" / DN400	550	1,210	720	28.3							762	29.9
18" / DN450	585	1,290	752	29.5							820	32.2
20" / DN500	705	1,550	800	31.5							902	35.4
24" / DN600	1,000	2,200	910	35.8							991	38.9
26" / DN650	1,135	2,500	960	37.8							1,050	41.3
28" / DN700	1,250	2,760	1,010	39.8							1,100	43.3
30" / DN750	1,350	2,980	1,060	41.7							1,150	45.2
32" / DN800	1,460	3,220	1,100	43.3							1,200	47.2
36" / DN900	1,880	4,140	1,184	46.5							1,250	49.2

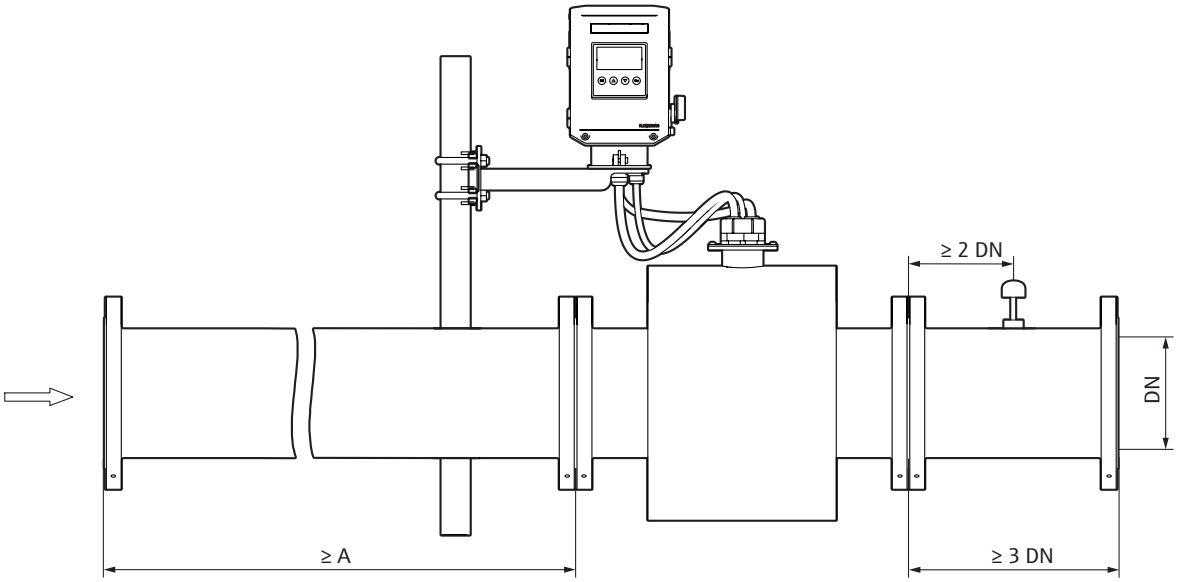
Mounting instructions

Installation of the FLOWSIC900 in the pipeline for unidirectional and bidirectional use (minimum requirements)

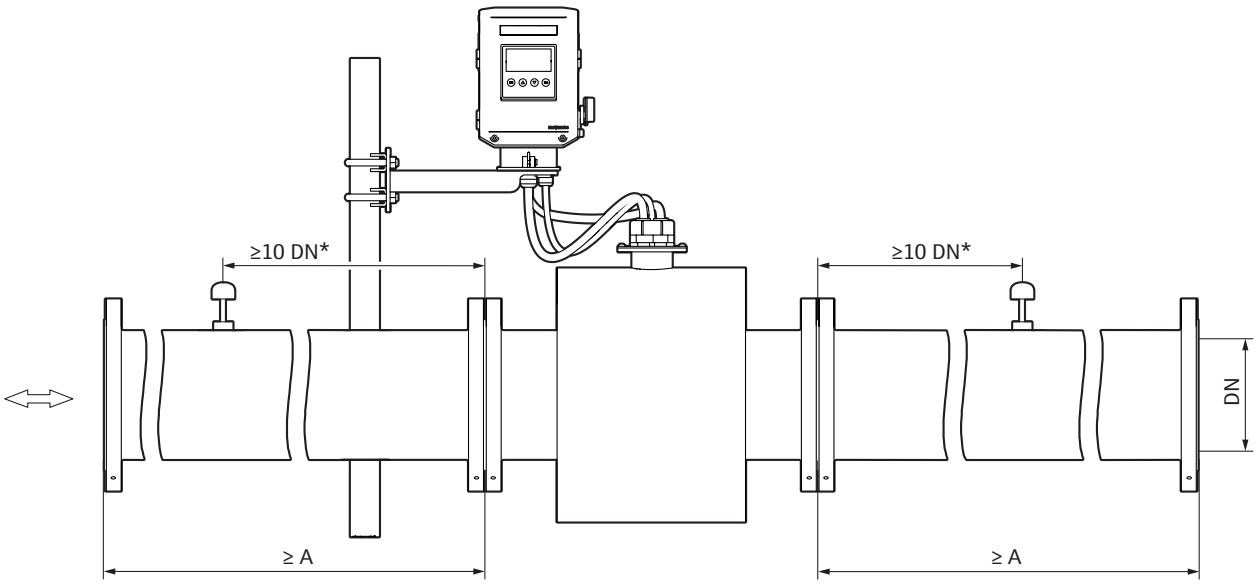
Number of measuring paths	OIML R 117	A
4	Accuracy class 0.3	20 DN
8	Accuracy class 0.3	5 DN

FLOWSIC900 – Remote Version

Unidirectional



Bidirectional



* Thermowell recommended to position downstream of mainly used flow direction

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