

Grundfos Direct Sensors™

Vortex flow sensors



1. Product introduction	3
Vortex principle	3
Construction	3
Material	3
Type Key	4
2. Vortex flow sensor, industry (VFI)	5
VFI general data	5
VFI 0.3 - 6 m3/h (1.3 - 26.4 gpm)	6
VFI 0.6 - 12 m3/h (2.6 - 52.8 gpm)	7
VFI 1.3 - 25 m3/h (5.7 - 110 gpm)	8
VFI 2 - 40 m3/h (8.8 - 176 gpm)	9
VFI 3.2 - 64 m3/h (14 - 282 gpm)	10
VFI 5.2 - 104 m3/h (23 - 458 gpm)	11
VFI 8 - 160 m3/h (35 - 704 gpm)	12
VFI 12 - 240 m3/h (53 - 1057 gpm)	13
3. Vortex flow sensor, standard (VFS)	14
VFS general data	14
VFS 1 - 20 l/min (0.2 - 5.3 gpm)	16
VFS 2 - 40 l/min (0.5 - 10.6 gpm)	17
VFS 5 - 100 l/min (1.3 - 26 gpm)	18
VFS 10 - 200 l/min (2.6 - 53 gpm)	19
VFS 20 - 400 l/min (5.3 - 106 gpm)	20
VFS 1 - 12 QT l/min (0.2 - 3.2 gpm)	21
VFS 1 - 15 QT l/min (0.2 - 3.9 gpm)	22
VFS 2 - 40 QT l/min (0.5 - 10.6 gpm)	23
VFS 5 - 100 QT l/min (1.3 - 26 gpm)	24
VFS 10 - 200 QT l/min (2.6 - 53 gpm)	25
4. Product range	26
VFI sensor	26
VFS sensor	27
5. Accessories	28
Sensor interface - converter unit	28
6. Appendix	29
Minimum flow rate curves	29
Pressure drop curves	30
Installation of VFI sensor	31
7. Grundfos Product Center	32

1. Product introduction

This data booklet comprises an overview of the Grundfos vortex flow sensor range and related products.



Fig. 1 Grundfos vortex flow sensors

The Grundfos vortex flow sensor range comprises flow measurement systems as well as combined flow and temperature measurement systems (two-in-one) designed for harsh aqueous environments.

Vortex principle

The flow measurement is based on the vortex principle. The system elements include a flow pipe with an integrated bluff body and a differential pressure sensor.

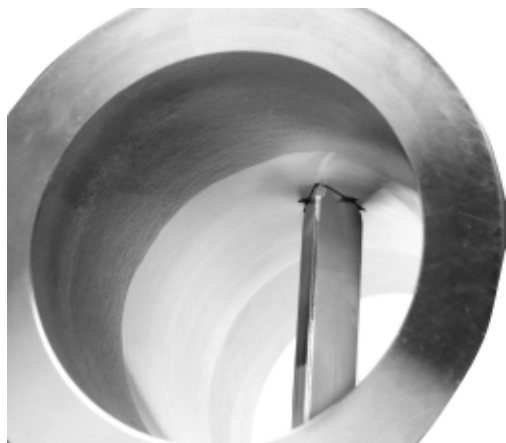


Fig. 2 Bluff body inside a vortex flow sensor

When a bluff body is placed inside a pipe, a series of vortices will be generated on either side of the bluff body. These vortices propagate downstream, giving rise to periodic pressure variations which can be detected by the pressure sensor. The frequency of the pressure variations is proportional to the volume flow through the pipe.

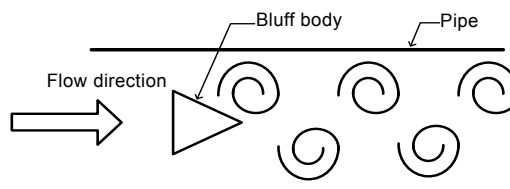


Fig. 3 Operating principle

The bluff body is designed to optimise the pulse strength of the pressure variations at the position of the differential pressure sensor.

Flow ranges are determined by the pipe diameter and the signal processing parameters. The differential pressure sensor key elements are a bulk micromachined silicon chip and a microprocessor-based signal-conditioning circuit, both on the same PCB. The conditioning circuit converts the pressure reading to a signal proportional to the flow.

Construction

The bluff body is either integrated in the injection moulded flow pipe, or supplied as a separate composite or stainless steel part to be inserted in the flow pipe.

The chip has a square membrane, which wraps due to pressure difference. This is registered as a change of resistance in the strain gauges of a Wheatstone bridge. The pressure and temperature sensitive area (the membrane region) is coated on both sides by an extremely corrosion and diffusion resistive thin film (Silicoat®). The coating provides direct environmental robustness of the chip. The media-free zone is sealed by an O-ring.

Material

The Grundfos vortex flow sensors are available in two material variants, suitable for different media:

- EPDM: suitable for water (drinking-water approved).
- FKM: suitable for oily media and for water in heating applications.

Type Key

This type key is common to all Grundfos Direct Sensors™ and thus not only specific to flow sensors.

Type designation	XXX	/ X.X-XXX	X	/ X	/ X	/ X	X.XX	XX	/ XXX	/ XX	/ XX	X	/ XXXX
Product group Pressure sensors: DPD: Differential Pressure sensor Digital DPI: Differential Pressure sensor Industrial DPS: Differential Pressure sensor Standard LPS: Leader Pressure sensor Standard RPD: Relative Pressure sensor Digital RPI: Relative Pressure sensor Industrial RPS: Relative Pressure sensor Standard VFI: Vortex Flow sensor, Industry Pressure components: DPC: Differential Pressure sensor Component RPC: Relative Pressure sensor Component Flow sensors: MFS: Multi Flow sensor Standard VFD: Vortex Flow sensor Digital VFI: Vortex Flow sensor Industrial VFS: Vortex Flow sensor Standard													
Range Unit Pressure: b: bar; p: psi - Flow: m: m ³ /h; g: gallons/min.; l: litres/min.													
Generation 1: 1st generation; 2: 2nd generation; 3: 3rd generation; etc.													
Electrical output type B: 0-10 V; C: 4-20 mA, 2 wires; D: 2 x 0.5 - 3.5 V; E: 2 x 0.5 - 4.5 V; F: 2 x 0-10 V; G: 4-20 mA, 3 wires; H: Genibus protocol / RS485 (UART); I: V-bus protocol / Open-drain; J: LPS protocol / Tx: TTL (UART), Rx: Pulse; K: OEM protocol / TTL (open-drain) (UART); L: 0.5 - 3.5 V; M: Redwolf protocol / TTL (UART); N: SQuba protocol / TTL (UART); P: Passive; Q: Self-configuring Redwolf protocol / TTL (UART) or 2 x 0.5 - 3.5 V													
Sensor connector or cable type and cable connector in sensor end A: Grundfos cover, 4-pin male; B: FCI 90312-004LF/77138-101, unscreened 4 wire cable; C: MPE-Gerry BL12-700, overmoulded, unscreened 4-wire cable; D: FCI 90312-004LF/77138-101, overmoulded, screened 4-wire cable; E: TE snap-on, female, angled, screened 3-wire cable and pig tail. Screen and pig tail connected to GND pin; I: TE snap-on, female, straight, unscreened 4-wire cable; J: TE snap-on, female, straight, screened 4-wire cable. Screen connected to GND pin; L: TE snap-on, female, angled, unscreened 4-wire cable; M: M12x1, female, straight, screened 4-wire cable; N: M12x1, 4-pin male; S: TE snap-on cover, 4-pin male; V: PCB pads													
Cable length Cable length in metres (length below 1 metre is denoted without a "0" before the dot. Example: 105 mm is denoted .105)													
Cable connector opposite sensor B: FCI 90312-004LF/77138-101; C: CKM 42010107/42010326, gold plated; D: AMP 103648-3/104479-9; E: Molex 51004-0400/50011-8000; F: AMP 172167-1/0-170365-1; G: TE Val-U-Lok 794954-4/794958-2, gold plated; H: Phoenix SACC-M 8MS-4CON-M-0.34-SH; J: JST XHP-4/SXH-001T-P0.6; K: JST ZER-04V-S/SZE-002T-P0.3 / EMICO 0420500; L: Lumberg 3510-04 K02; N: Lumberg 3510-04 K03; P: Molex 43025-0400/43030-0005, 43030-001 / Cembre 1910.M16N; Q: Molex 43025-0400/43030-0006; R: Molex 51004-0400/50011-8000 / Cembre 1900.M12; S: Molex 51004-0400/50011-8000 / TE ring terminal 32859-1; T: TE RJ11 2044156-3, gold flash; U: JST PHR-4/SPH-002T-P0.5S; W: JST XAP-04V-1/SXA-001T-P0.6; X: Open ended; Y: 4x TE wire pin 966 066-5; Z: Hirose DF1E-4S-2.5C													
Sealing material and enclosure class 1st character: E: EPDM; M: Both EPDM and FKM included; S: EPDM sealing cap and FKM O-rings; V: FKM; 2nd character: G: Gel-filled 3rd character: 2: IP20; 4: IP44; 5: IP55; 6: IP67													
Material The first character represents the flow pipe or housing for DPS, the second represents the mechanical connection part. B: Brass (lead); C: Composite; G: Cast iron; L: Low lead brass ($\leq 0.25\%$ lead); Q: Stainless steel flow pipe with composite insert (QT); S: Stainless steel													
Dimension of mechanical connection 01: 10 mm; 02: 1/4"; 03: 1/2"; 04: 3/4"; 05: 1"; 06: 6 mm; 07: 1 1/4"; 08: 8 mm; 09: 1 1/2"; 10: 2"; 11: 2 1/2"; 12: 3"; 13: 4"; 14: 14.3 mm; 15: 15 mm; 17: 7/16"; 18: 18 mm; 19: 18.75 mm; 21: 21.5 mm; 24: 1/8"; 30: DIN PN 25/40 DN 18/25/32, ANSI B16.5 Class 300 - 1 1/4"; 31: DIN PN 16/25 DN 40, ANSI B16.5 Class 300 - 2"; 32: DIN PN 16/25 DN 50, ANSI B16.5 Class 300 - 2"; 33: ISO/DIN PN 25/40 DN 65; 34: ANSI B16.5 Class 300 - 2.5"; 35: ISO/DIN PN 25/40 DN 80; 36: ANSI B16.5 Class 300 - 3"; 37: ISO/DIN PN 16 DN 100; 38: ANSI B16.5 Class 300 - 4"; 51: f1" - G 3/4; 52: f1 1/4" - G 1; 63: G 1/2 with ventilation opening; 64: 15.5 mm with ventilation opening													
Mechanical connection type B: BSPT (ISO 7/1); C: Compression; F: Flange; G: Flange and BSPP (ISO 228/1); K: Clip; L: Special clip; M: NPSM; N: NPT; O: Groove for O-ring; P: BSPP (ISO 228/1); Q: For union nut; S: Sweat; T: Tube; U: UNF													
Packaging 1st character: A: Set with preassembled components; M: Miscellaneous set; P: Spare parts set; S: Set; T: Set variant 2; V: Service set 2nd character: B: Plastic bag; C: Cardboard box; D: Blister pack and cardboard box, standard Grundfos; N: Blister pack, neutral white; T: Trays and cardboard box; W: Blister pack, standard Grundfos 3rd - 4th character: -1: 1 piece; 10: Bulk 10; 20: Bulk 20; 25: Bulk 25; 50: Bulk 50; 1H: Bulk 100; 5H: Bulk 500; 1A: Bulk 1081													

2. Vortex flow sensor, industry (VFI)

VFI general data



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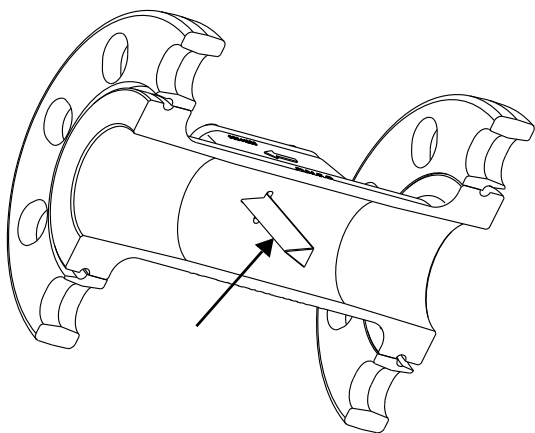
Fig. 4 VFI sensor

Technical overview

The VFI sensor from Grundfos Direct Sensors™ is a flow sensor designed for industrial purposes. It is based on the principle of vortex shedding behind a bluff body. The VFI sensors are fully compatible with wet, aggressive media. They use MEMS sensing technology in combination with the Silicoat® corrosion-resistant coating technology on the sensor chip.

This makes the VFI sensors very robust and ideal for pump integration and monitoring in harsh environments.

The sensor is supplied with a stainless steel flow pipe and has flanges or threaded ends for use with union nuts.



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Fig. 5 Bluff body in a VFI sensor

Applications

- Water treatment and distribution
- water utility
- water monitoring
- HVAC systems
- chiller systems
- HPC and IT cooling systems
- micro CHP
- heat pumps
- solar systems: heating and cooling.

Features

- Wide operating temperature range: -30 - 120 °C (-22 to 248 °F)
- compact design
- MEMS technology.

	m ³ /h	gpm
	0.3 - 6	1.32 - 26.42
	0.6 - 12	2.64 - 52.83
	1.3 - 25	5.72 - 110.07
	2-40	8.81 - 176.11
Flow ranges	3.2 - 64	14.09 - 281.78
	5.2 - 104	22.89 - 457.89
	8-160	35.22 - 704.46
	12-240	52.83 - 1056.69

Benefits

- No moving parts
- compatible with wet, aggressive media
- accurate, linearised and temperature-compensated output signal
- quick temperature response (direct contact with medium)
- cost-effective and robust design
- system solution with Grundfos pumps.

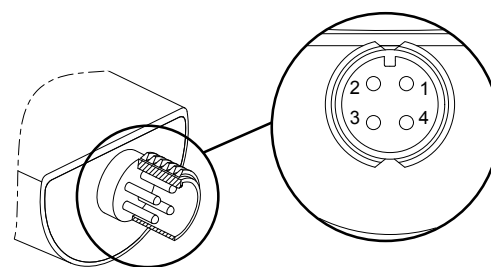
Approvals

- WRAS
- KTW
- ACS.

Certificates

		
CE	C, CSA, US	C-Tick

Electrical connections



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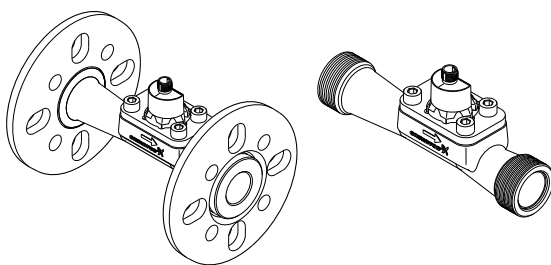
Fig. 6 Electrical connections

Pin	1	2	3	4
Wire colour	Brown	White	Blue	Black
I/O	Power supply	Wire not used	Flow signal 4-20 mA	Wire not used

Power supply: 12.5 - 30 V (screened cable).

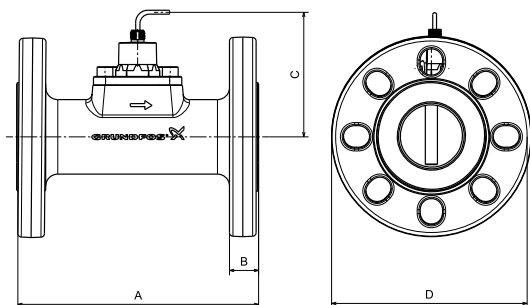
Type: 2-wire (loop-powered).

VFI 0.3 - 6 m³/h (1.3 - 26.4 gpm)



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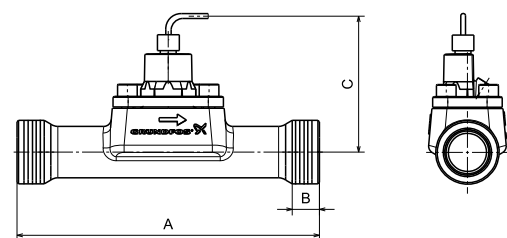
Dimensions



TM04 7154 1610

Fig. 7 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	18	120	140	DN 25/32
in	7.87	0.71	4.72	5.51	ANSI 1 1/4"



TM04 7153 1610

Fig. 8 Dimensions VFI sensor with thread

	A	B	C	Thread size
mm	200	18	120	G1 1/4"
in	7.87	0.71	4.72	

Sensor output signals

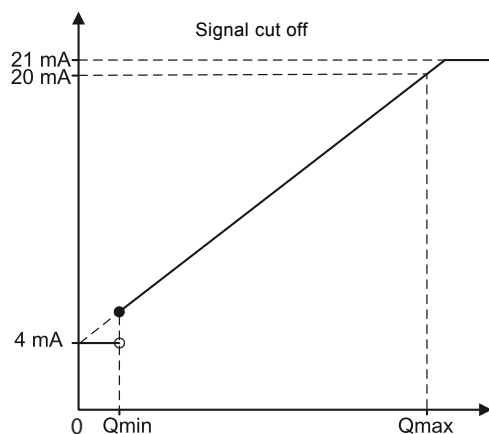


Fig. 9 Flow response

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Specifications

Flow	
Measuring range	0.3 - 6 m ³ /h (1.32 to 26.42 gpm)*
Accuracy (± 1σ) 0-100 °C (32-212 °F)	± 1.5 % FS*
Response time	< 1 s
Resolution	0.0075 m ³ /h (0.03 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC (± 5 %)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)

Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08

Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

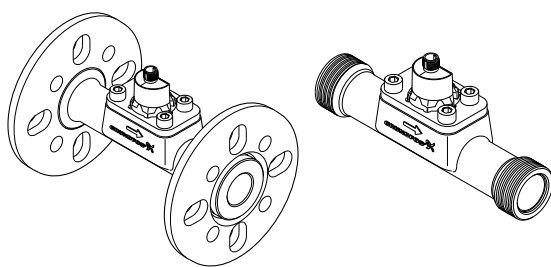
Weight	
With cast iron flanges	4.38 kg (9.66 lbs)
With stainless steel flanges	4.44 kg (9.79 lbs)
Without flange	1.39 kg (3.06 lbs)

* Reference condition

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), ρ = 998 kg/m³ (62.3 lb/ft³), ν = 1 x 10⁻⁶ m²/s (1 cSt).

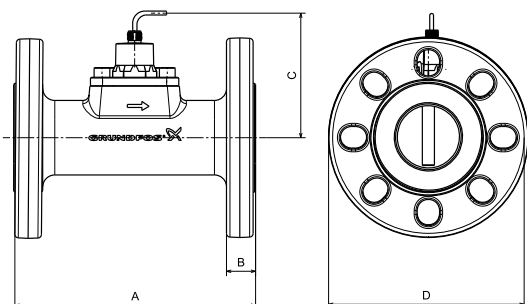
The VFI sensor with threaded ends to be installed by means of union nuts.

VFI 0.6 - 12 m³/h (2.6 - 52.8 gpm)



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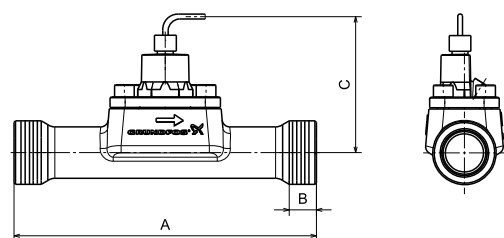
Dimensions



TM04 7154 1610

Fig. 10 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	18	124	140	DN 25/32
in	7.87	0.71	4.88	5.51	ANSI 1 1/4"

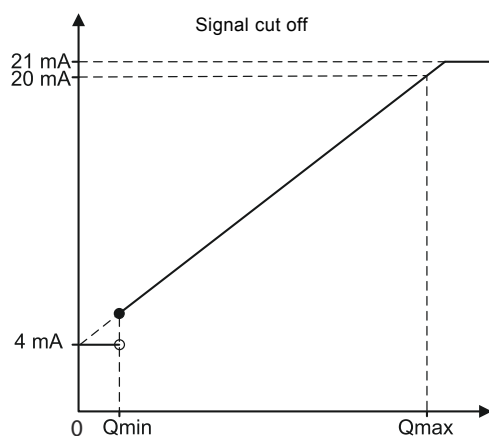


TM04 7153 1610

Fig. 11 Dimensions VFI sensor with thread

	A	B	C	Thread size
mm	200	18	124	G1 1/4"
in	7.87	0.71	4.88	

Sensor output signals



TM06 0951 1314

Fig. 12 Flow response

Specifications

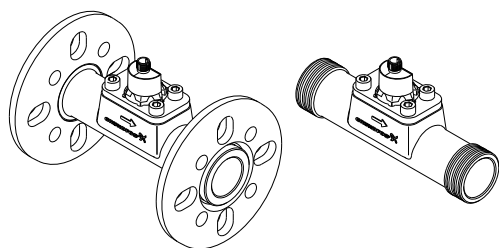
Flow	
Measuring range	0.6 - 12 m ³ /h (2.64 to 52.83 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.015 m ³ /h (0.07 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	4.52 kg (9.96 lbs)
With stainless steel flanges	4.58 kg (10.10 lbs)
Without flange	1.53 kg (3.37 lbs)

* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt)..

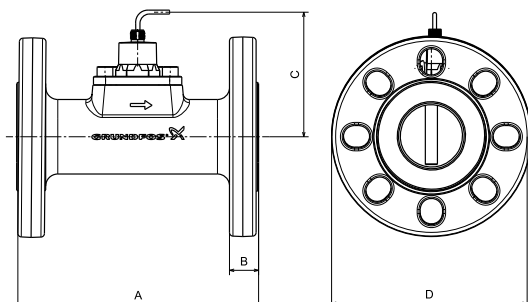
The VFI sensor with threaded ends to be installed by means of union nuts.

VFI 1.3 - 25 m³/h (5.7 - 110 gpm)



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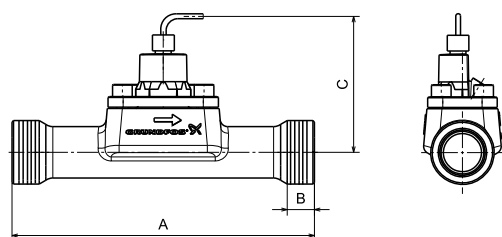
Dimensions



TM04 7154 1610

Fig. 13 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	18	128	140	DN 25/32
in	7.87	0.71	5.04	5.51	ANSI 1 1/4"



TM04 7153 1610

Fig. 14 Dimensions VFI sensor with thread

	A	B	C	Thread size
mm	200	19	128	G1 1/2"
in	7.87	0.75	5.04	

Sensor output signals

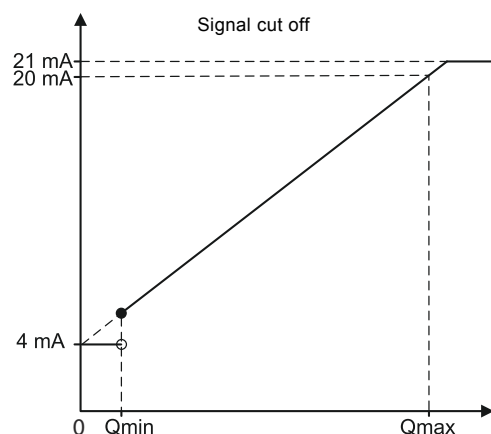


Fig. 15 Flow response

TM06 0951 1314

Specifications

Flow	
Measuring range	1.3 - 25 m ³ /h (5.72 to 110.07 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.031 m ³ /h (0.14 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	4.47 kg (9.85 lbs)
With stainless steel flanges	4.53 kg (9.99 lbs)
Without flange	1.31 kg (2.89 lbs)

* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

The VFI sensor with threaded ends to be installed by means of union nuts.

VFI 2 - 40 m³/h (8.8 - 176 gpm)

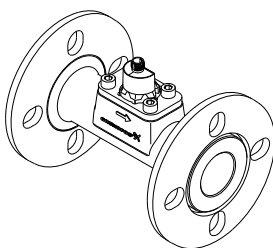


Fig. 16 VFI 2-40 sensor

Dimensions

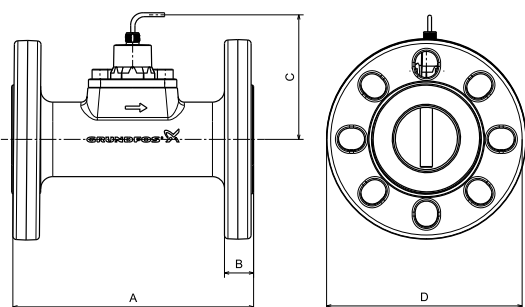


Fig. 17 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	18	131	150	DN 40
in	7.87	0.71	5.16	5.91	ANSI 1 1/2"

Sensor output signals

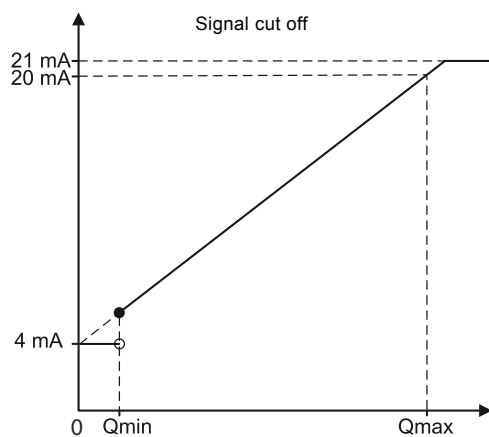


Fig. 18 Flow response

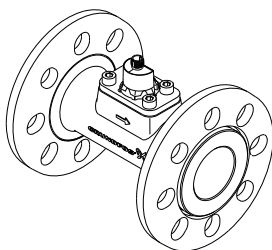
Specifications

Flow	
Measuring range	2-40 m ³ /h (8.81 to 176.11 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.05 m ³ /h (0.22 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	5.58 kg (12.30 lbs)
With stainless steel flanges	6.45 kg (14.22 lbs)

* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

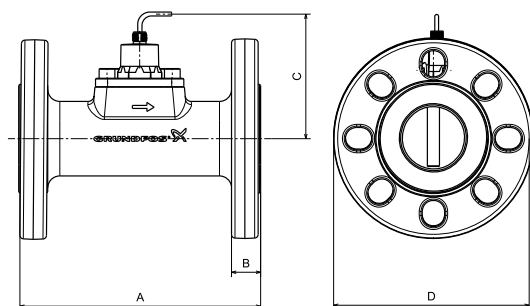
VFI 3.2 - 64 m³/h (14 - 282 gpm)



TM04 7146 1710

Fig. 19 VFI 3.2 - 64 sensor

Dimensions

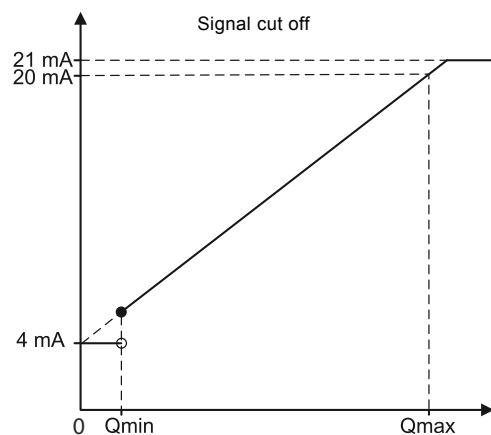


TM04 7154 1610

Fig. 20 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	22	138	165	DN 50
in	7.87	0.87	5.43	6.50	ANSI 2"

Sensor output signals



TM06 0951 1314

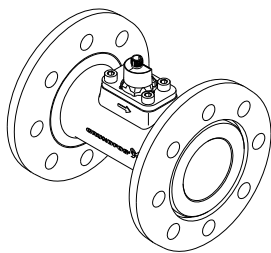
Fig. 21 Flow response

Specifications

Flow	
Measuring range	3.2 - 64 m ³ /h (14.09 to 281.78 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.08 m ³ /h (0.35 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	6.94 kg (15.30 lbs)
With stainless steel flanges	5.94 kg (13.10 lbs)

* Reference condition:

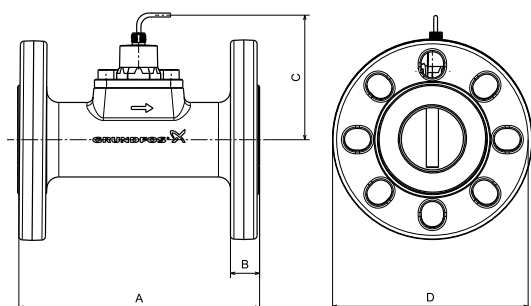
- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

VFI 5.2 - 104 m³/h (23 - 458 gpm)

TM04 7147 1710

Fig. 22 VFI 5.2 - 104 sensor

Dimensions

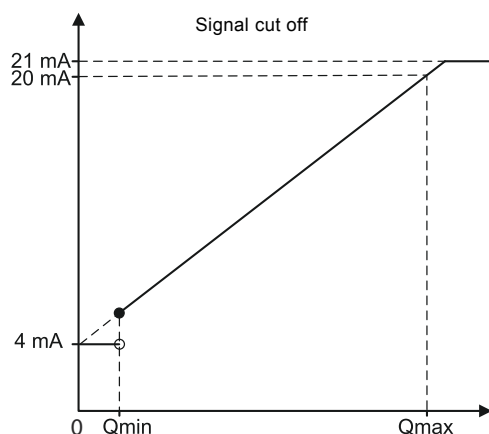


TM04 7154 1610

Fig. 23 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	25	145	185	DN 65
in	7.87	0.98	5.71	7.28	ANSI 2 1/2"

Sensor output signals



TM06 0951 1314

Fig. 24 Flow response

Specifications

Flow	
Measuring range	5.2 - 104 m ³ /h (22.89 to 457.89 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.13 m ³ /h (0.57 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	9.31 kg (20.53 lbs)
With stainless steel flanges	9.90 kg (21.83 lbs)

* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

VFI 8 - 160 m³/h (35 - 704 gpm)

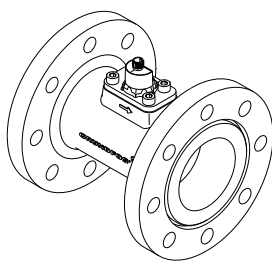


Fig. 25 VFI 8-160 sensor

Dimensions

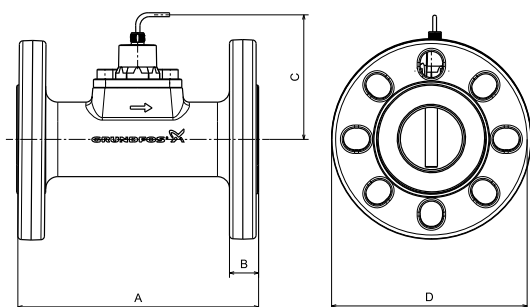


Fig. 26 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	200	25	152	235	DN 80
in	7.87	0.98	5.98	9.25	ANSI 3"

Sensor output signals

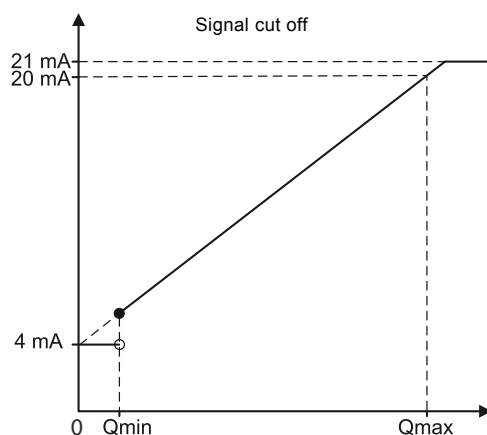


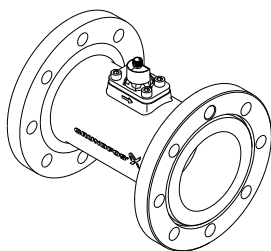
Fig. 27 Flow response

Specifications

Flow	
Measuring range	8-160 m ³ /h (35.22 to 704.46 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.2 m ³ /h (0.88 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	28 bar (406 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	11.51 kg (25.38 lbs)
With stainless steel flanges	16.00 kg (35.27 lbs)

* Reference condition:

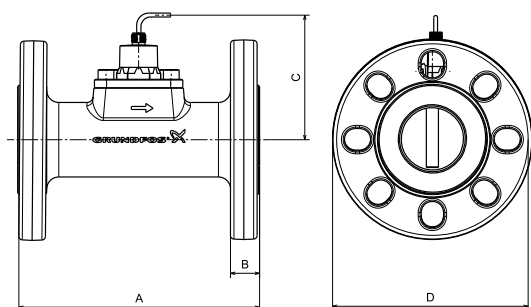
- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

VFI 12 - 240 m³/h (53 - 1057 gpm)

TM04 7149 1710

Fig. 28 VFI 12-240 sensor

Dimensions

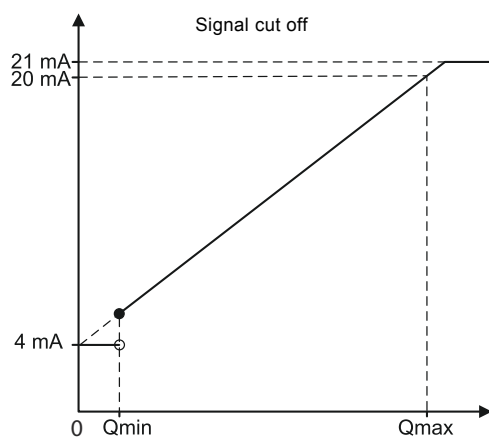


TM04 7154 1610

Fig. 29 Dimensions VFI sensor with flanges

	A	B	C	D	Flange
mm	250	25	163	220	DN 100
in	9.84	0.98	6.42	8.66	ANSI 4"

Sensor output signals



TM06 0951 1314

Fig. 30 Flow response

Specifications

Flow	
Measuring range	12-240 m ³ /h (52.83 to 1056.69 gpm)*
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS*
Response time	< 1 s
Resolution	0.30 m ³ /h (1.32 gpm)
Media and environment	
Medium types	Kinematic viscosity ≤ 10 mm ² /s (cSt) See appendix <i>Minimum flow rate curves</i>
Max. medium pressure	16 bar (232 psi)
Medium temperature (operation)	-30 - 120 °C (-22 - 248 °F), non-freezing
Medium temperature (peak)	-30 - 120 °C (-22 - 248 °F), non-freezing
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 70 °C (-67 - 158 °F)
Storage temperature	-55 - 70 °C (-67 - 158 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	60 bar (870 psi)
Electrical data	
Power supply	12.5 - 30 VDC ($\pm 5\%$)
Output signals	4-20 mA
- Signal cut off	21 mA
Power consumption	Max. 660 mW
Load impedance	Max. 60 Ω at 12.5 VDC Max. 100 Ω at 13.3 VDC Max. 600 Ω at 24 VDC Max. 900 Ω at 30 VDC
Maximum cable length	30 m (98 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
O-ring	EPDM or FKM
Sensor housing	Stainless steel AISI 316 L 1.4404
Flow pipe	Stainless steel AISI 316 1.4408
Flange	Cast iron or stainless steel
Bluff body	Stainless steel AISI 316 L 1.4401
Wetted materials	Corrosion-resistant coating, EPDM or FKM, Stainless steel AISI 316 L 1.4401/04/08
Environmental standards	
Enclosure class	IP67
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1
Weight	
With cast iron flanges	13.56 kg (29.89 lbs)
With stainless steel flanges	14.00 kg (30.86 lbs)

* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998$ kg/m³ (62.3 lb/ft³), $\nu = 1 \times 10^{-6}$ m²/s (1 cSt).

3. Vortex flow sensor, standard (VFS)

VFS general data



TM05 4745 2412

Fig. 31 VFS and VFS QT Sensors

Technical overview

The VFS sensor from Grundfos Direct Sensors™ is a combined flow and temperature sensor (two-in-one solution). It is based on the principle of vortex shedding behind a bluff body.

The VFS sensors are fully compatible with wet, aggressive media. They use MEMS sensing technology in combination with the Silicoat® corrosion-resistant coating technology on the sensor chip.

The sensor is supplied with a flow pipe.

Applications

- Water treatment and distribution
- water utility
- water monitoring
- HVAC systems
- chiller systems
- HPC and IT cooling systems
- micro CHP
- heat pumps
- solar systems: heating and cooling.

Features

- Wide temperature measuring range: 0-100 °C (32-212 °F)
- compact design
- MEMS technology.

	l/min	gpm
Flow ranges	1-12	0.26 - 3.17
	1-15	0.26 - 3.96
	1.3 - 20	0.34 - 5.28
	2-40	0.53 - 10.57
	5-100	1.32 - 26.42
	10-200	2.64 - 52.83
	20-400	5.28 - 105.67

Benefits

- Flow and temperature measurement in one sensor (two-in-one solution)
- no moving parts
- compatible with wet, aggressive media
- accurate, linearised and temperature-compensated output signal
- quick temperature response (direct contact with medium)
- cost-effective and robust design
- system solution with Grundfos pumps.

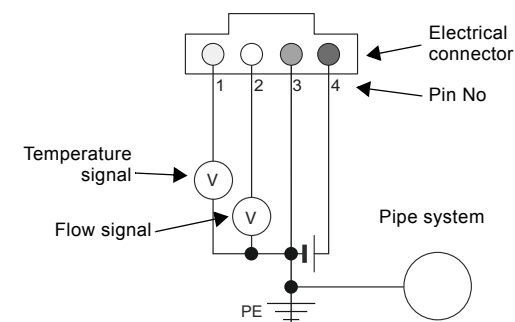
Approvals

- WRAS
- KTW
- ACS.

Certificates



Electrical connections



TM04 7156 1610

Fig. 32 Electrical connections

Pin configuration	Colour
1 Temperature signal (0.5 to 3.5 V relative to pin 3)	Yellow
2 Flow signal (0.5 to 3.5 V relative to pin 3)	White
3 GND (0 V), PELV	Green
4 Power supply (+ 5 VDC)	Brown

Power supply requirements

5 VDC ± 5 %, PELV

- separated from hazardous live circuitry by double or reinforced insulation
- we recommend separate ground for the sensor power supply.

VFS sensors



TM05 4744 2512

Fig. 33 VFS family

The VFS flow sensor consists of a composite flow pipe and a sensor fitted with cable.

The VFS flow sensor is available in 1-20, 2-40, 5-100, 10-200, 20-400 l/min versions.

VFS QT sensors



TM05 4743 2512

Fig. 34 VFS QT family

The VFS QT flow sensor consists of a composite insert, a stainless steel flow pipe and a sensor fitted with cable.

The VFS QT flow sensor is available in 1-12, 1-15, 2-40, 5-100, 10-200 l/min versions.

Snap-on sensor



TM05 4749 2512

Fig. 35 Snap-on sensor

VFS 1 - 20 l/min (0.2 - 5.3 gpm)



Fig. 36 VFS 1-20 sensor

Dimensions

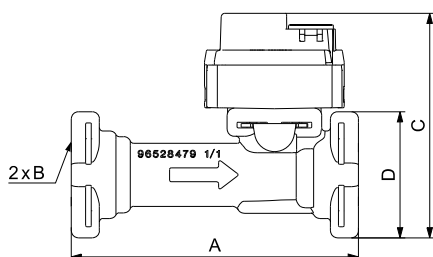


Fig. 37 Dimension without adapter

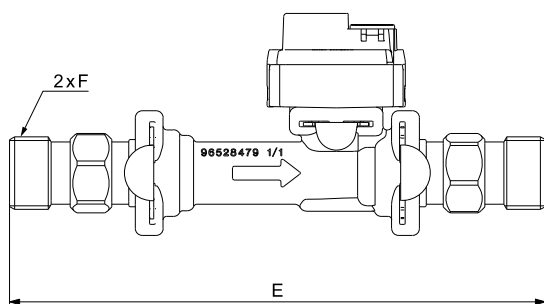


Fig. 38 Dimensions with adapters

	A	B	C	D	E	F
mm	82	Ø 19.8	65	36	153.6	ISO 228 -
in	3.23	Ø 0.78	2.56	1.42	6.05	G 1/2 A

Sensor output signals

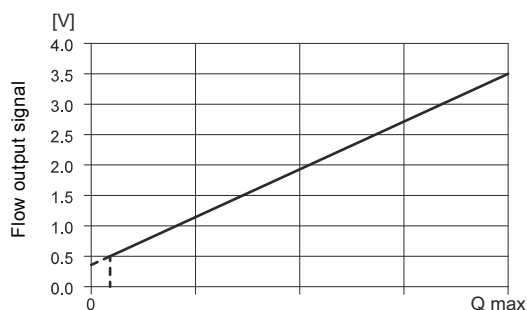


Fig. 39 Flow response

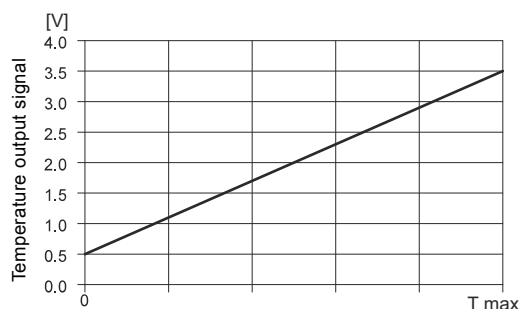


Fig. 40 Temperature response

Specifications

Flow	
Measuring range:	1-20 l/min (0.2 to 5.3 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.1 l/min (0.03 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 to -140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 kΩ
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 2 - 40 l/min (0.5 - 10.6 gpm)



Fig. 41 VFS 2-40 sensor

Dimensions

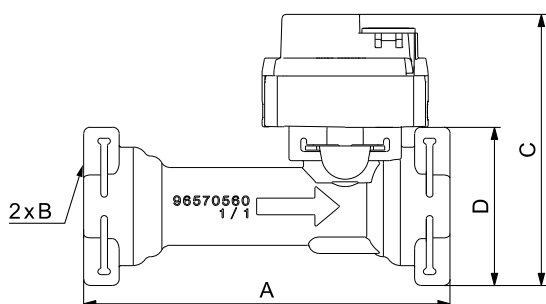


Fig. 42 Dimensions without adapter

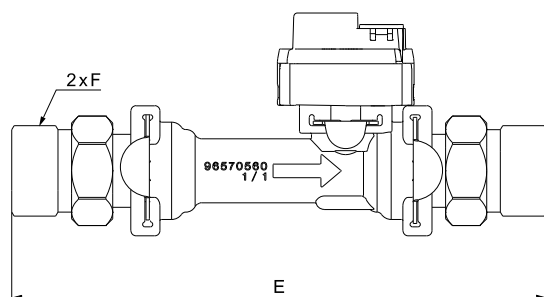


Fig. 43 Dimensions with adapters

	A	B	C	D	E	F
mm	88	Ø 22.8	66	38	157.4	ISO 228/1 -
in	3.46	Ø 0.91	2.60	1.50	6.20	G 3/4 A

Sensor output signals

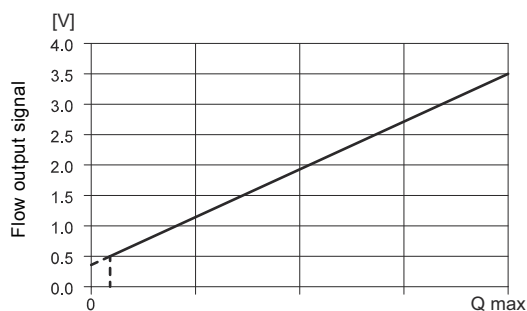


Fig. 44 Flow response

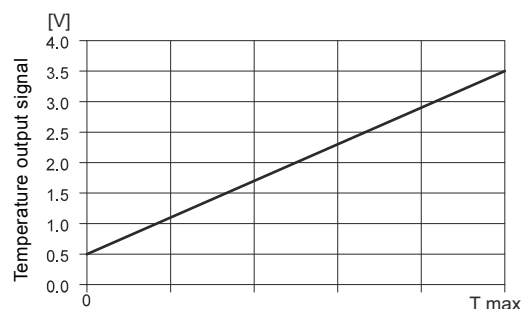


Fig. 45 Temperature response

Specifications

Flow	
Measuring range	2-40 l/min (0.5 to 10.6 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.2 l/min (0.05 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 kΩ
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 5 - 100 l/min (1.3 - 26 gpm)



Fig. 46 VFS 5-100 sensor

TM05 4748 2512

Dimensions

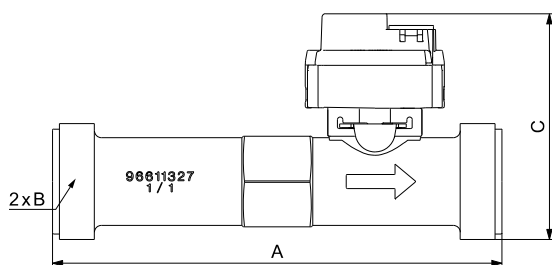


Fig. 47 Dimensions without adapter

TM06 3422 0314

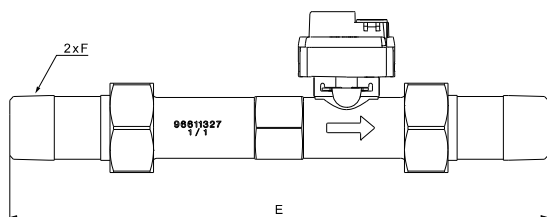


Fig. 48 Dimensions with adapters

TM06 3427 0314

	A	B	C	D	E	F
mm	129	ISO 228/1 -	65	-	223	ISO 7/1-Rc
in	5.08	G 1 A	2.56	-	8.78	3/4

Sensor output signals

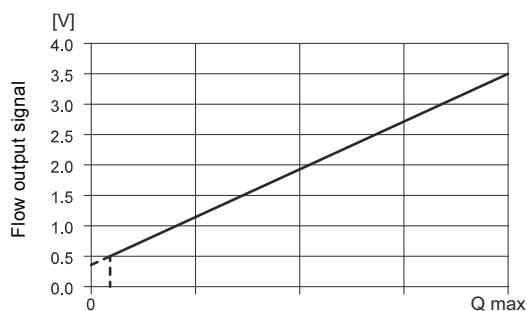


Fig. 49 Flow response

TM06 3355 5214

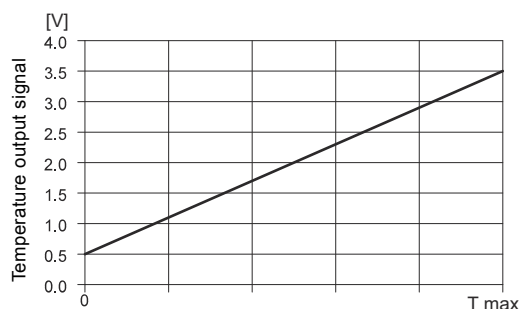


Fig. 50 Temperature response

TM06 3354 5214

Specifications

Flow	
Measuring range	5-100 l/min (1.3 to 26.4 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.5 l/min (0.13 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k Ω
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 10 - 200 l/min (2.6 - 53 gpm)



Fig. 51 VFS 10-200 sensor

Dimensions

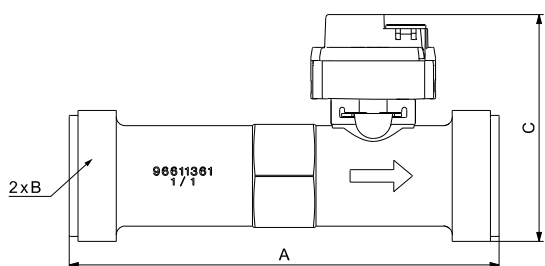


Fig. 52 Dimensions without adapter

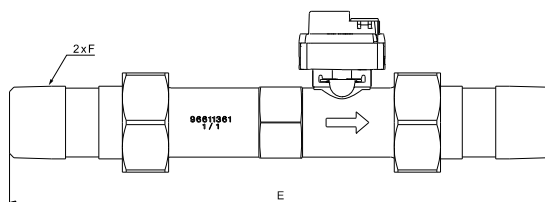


Fig. 53 Dimensions with adapters

	A	B	C	D	E	F
mm	137.5	ISO 228/1 -	73	-	252	ISO 7/1-R 1
in	5.41	G 1 1/4 A	2.87	-	9.92	

Sensor output signals

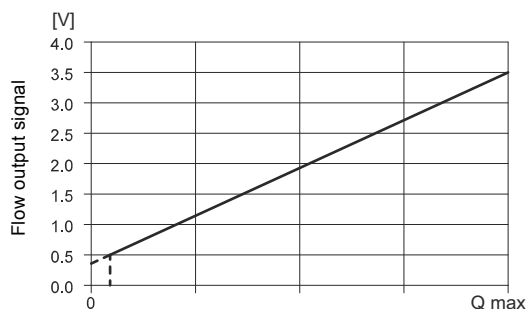


Fig. 54 Flow response

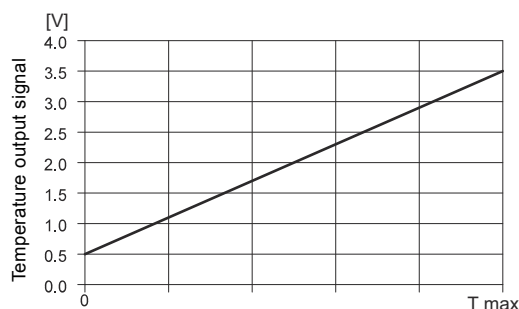


Fig. 55 Temperature response

Specifications

Flow	
Measuring range	10-200 l/min (2.6 to 52.8 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	1.0 l/min (0.26 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 %)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 kΩ
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 20 - 400 l/min (5.3 - 106 gpm)

Fig. 56 VFS 20-400 sensor

TM05 4746 2512

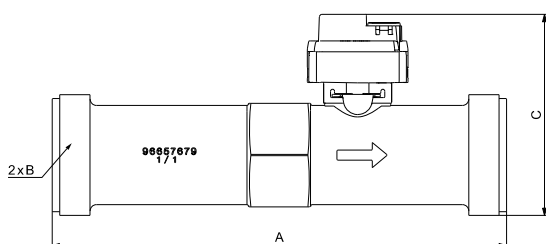
Dimensions

Fig. 57 Dimensions without adapter

TM06 3424 0314

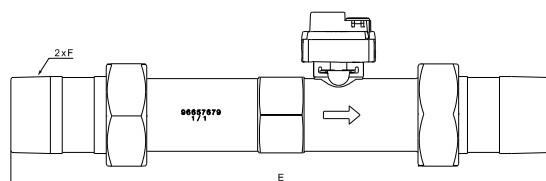


Fig. 58 Dimensions with adapters

TM06 3429 0314

	A	B	C	D	E	F
mm	180	ISO 228/1 -	80	-	293	ISO 7/1- R
in	7.09	G 1 1/2 A	3.15	-	11.54	1 1/4

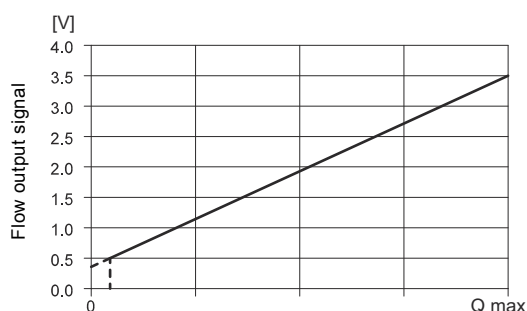
Sensor output signals

Fig. 59 Flow response

TM06 3355 5214

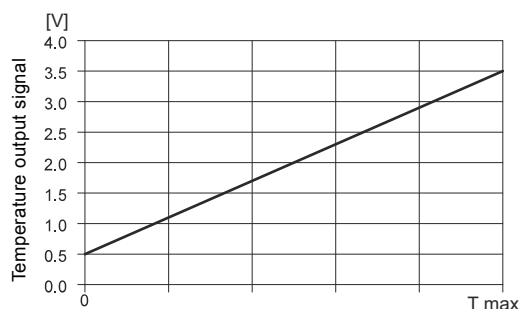


Fig. 60 Temperature response

TM06 3354 5214

Specifications

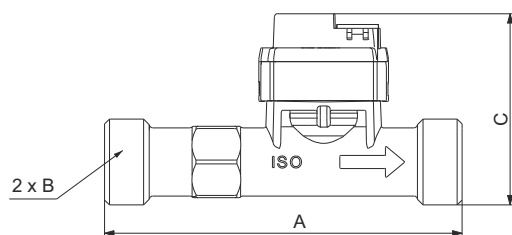
Flow	
Measuring range	20-400 l/min (5.3 to 105.7 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1.0 s
Resolution	2.0 l/min (0.53 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k Ω
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 1 - 12 QT l/min (0.2 - 3.2 gpm)

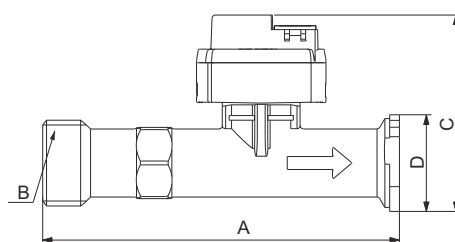


Fig. 61 VFS 1-12 sensor

Dimensions



	A	B	C
mm	110	ISO 228/1 - G3/4 A	58.8
in	4.33	3/4" - 14 NPSM	2.31



	A	B	C	D
mm	110	ISO 228/1 - G3/4 A	60.5	29.8
in	4.33	G3/4 A	2.38	1.17

Sensor output signals

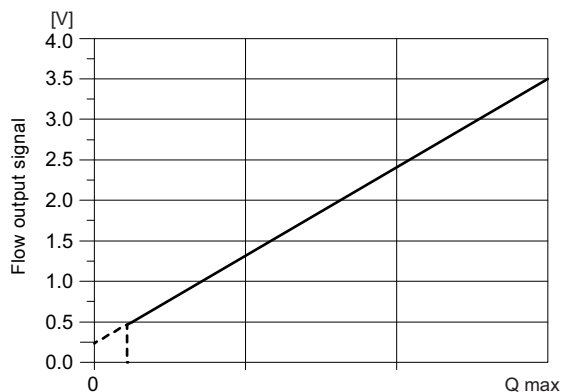


Fig. 62 Flow response

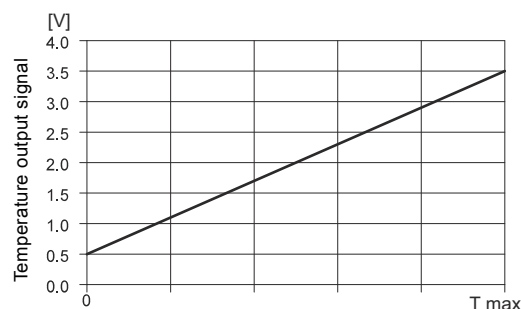


Fig. 63 Temperature response

Specifications

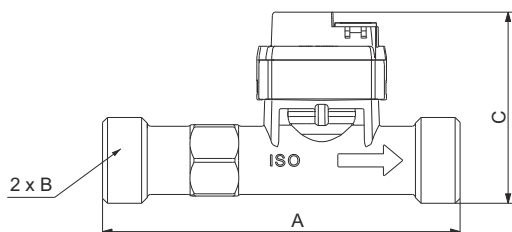
Flow	
Measuring range	1-12 l/min (0.2 to 3.2 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 3 s
Resolution	0.06 l/min (0.016 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 4 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.25 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k Ω
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	1.4408
Insert	PPA 40 GF
Wetted materials	Corrosion-resistant coating EPDM or FKM, PPS, PPA 40-GF, 1.4408
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 1 - 15 QT l/min (0.2 - 3.9 gpm)

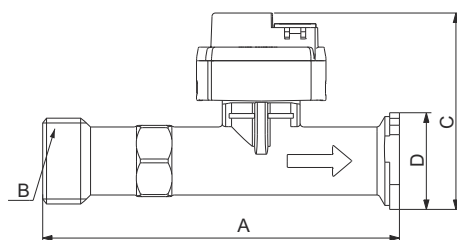


Fig. 64 VFS 1-15 QT sensor

Dimensions



	A	B	C
mm	110	ISO 228/1 - G3/4 A	58.8
in	4.33	3/4" - 14 NPSM	2.31



	A	B	C	D
mm	110	ISO 228/1 - G3/4 A	60.5	29.8
in	4.33	G3/4 A	2.38	1.17

Sensor output signals

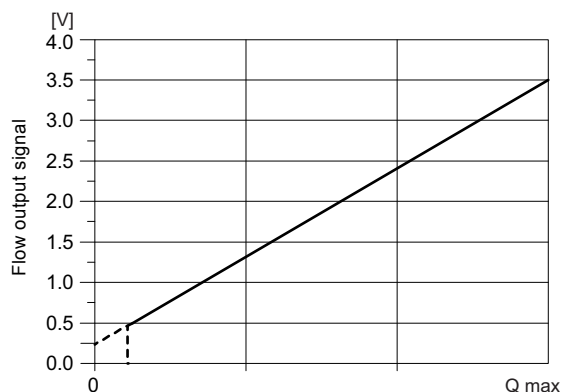


Fig. 65 Flow response

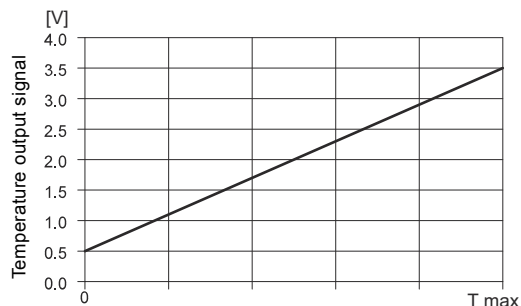


Fig. 66 Temperature response

Specifications

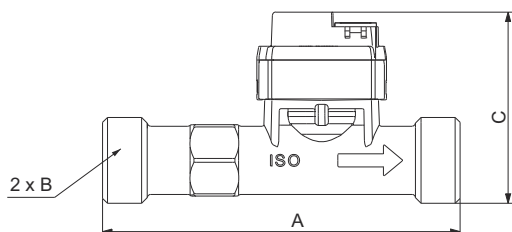
Flow	
Measuring range	1-15 l/min (0.2 to 3.9 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.075 l/min (0.019 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.25 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k Ω
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	1.4408
Insert	PPA 40 GF
Wetted materials	Corrosion-resistant coating EPDM or FKM, PPS, PPA 40-GF, 1.4408
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 2 - 40 QT l/min (0.5 - 10.6 gpm)

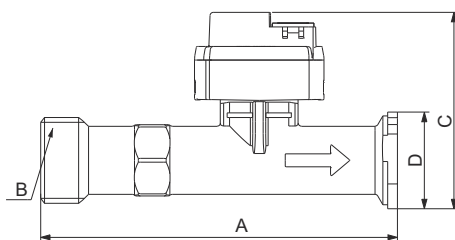


Fig. 67 VFS 2-40 QT sensor

Dimensions



	A	B	C
mm	110	ISO 228/1 - G3/4 A	58.8
in	4.33	3/4" - 14 NPSM	2.31



	A	B	C	D
mm	110	ISO 228/1 -	60.5	29.8
in	4.33	G3/4 A	2.38	1.17

Sensor output signals

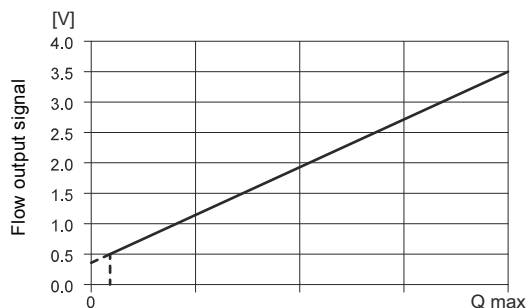


Fig. 68 Flow response

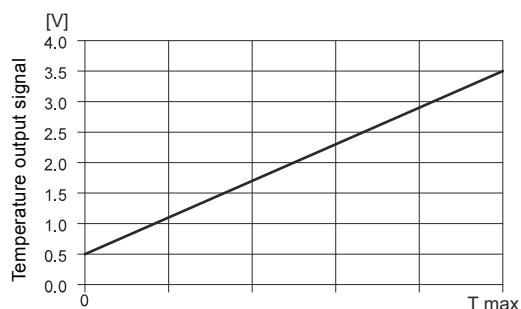


Fig. 69 Temperature response

Specifications

Flow	
Measuring range	2-40 l/min (0.5 to 10.6 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.2 l/min (0.05 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 k Ω
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Housing	Composites (PPS, PA66)
Flow pipe	1.4408
Insert	PPA 40 GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF, 1.4408
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

VFS 5 - 100 QT l/min (1.3 - 26 gpm)

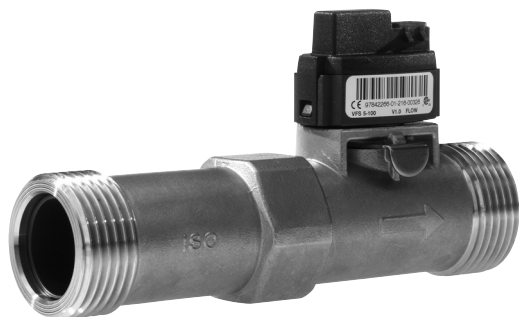
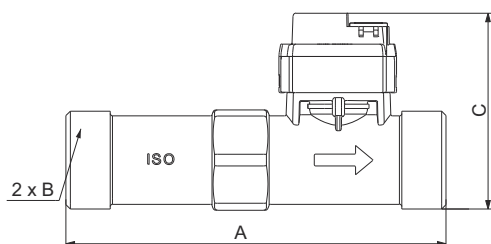


Fig. 70 VFS 5-100 QT sensor

Dimensions



	A	B	C
mm	129	ISO 228/1 - G1A or 1" - 11.5 NPSM	66.5
in	5.08	1" - 11.5 NPSM	2.62

Sensor output signals

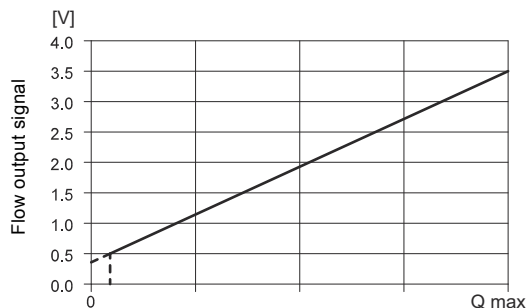


Fig. 71 Flow response

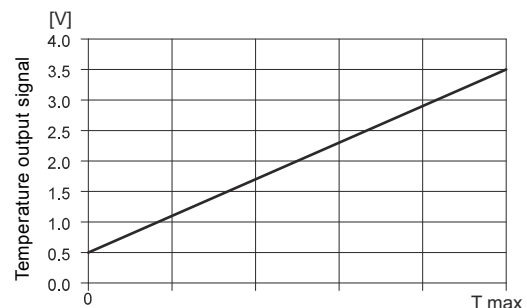
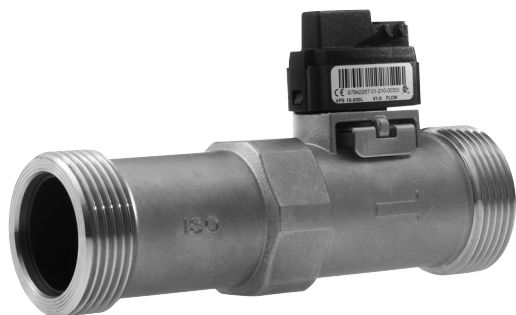


Fig. 72 Temperature response

Specifications

Flow	
Measuring range	5-100 l/min (1.3 to 26.4 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1 s
Resolution	0.5 l/min (0.13 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 kΩ
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Flow pipe	1.4408
Insert	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF, 1.4408
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

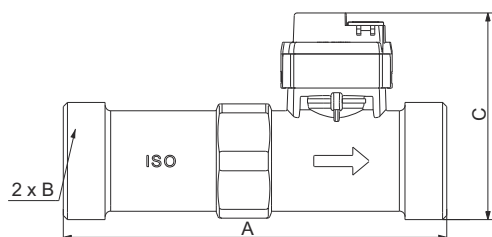
VFS 10 - 200 QT l/min (2.6 - 53 gpm)



TM05 4739 2512

Fig. 73 VFS 10-200 QT sensor

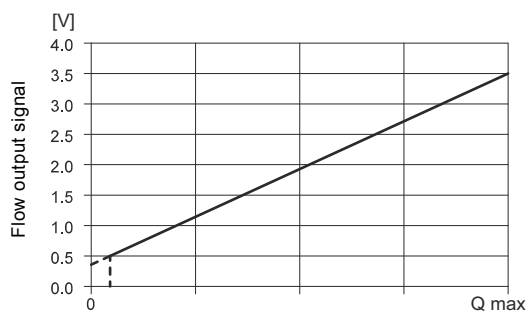
Dimensions



TM05 4673 2512

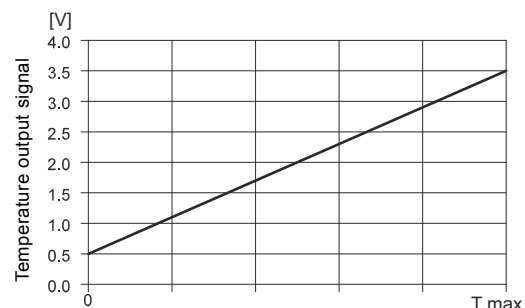
	A	B	C
mm	137.5	ISO 228/1 - G1 1/4 A or	74.1
in	5.41	1 1/4" - 11.5 NPSM	2.92

Sensor output signals



TM06 3355 5214

Fig. 74 Flow response



TM06 3354 5214

Fig. 75 Temperature response

Specifications

Flow	
Measuring range	10-200 l/min (2.6 to 52.8 gpm)
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	$\pm 1.5\%$ FS
Response time (63.2 %)	< 1.0 s
Resolution	1.0 l/min (0.26 gpm)
Temperature	
Measuring range	0-100 °C (32-212 °F)
Accuracy ($\pm 1\sigma$), 25-80 °C (77-176 °F)	± 1 K
Accuracy ($\pm 1\sigma$), 0-100 °C (32-212 °F)	± 2 K
Response time (63.2 % at 50 % FS flow)	250 ms
Resolution	0.35 K
Media and environment	
Medium types	Kinematic viscosity ≤ 2 mm ² /s (cSt)
Medium temperature (operation)	Water: 0-100 °C (32-212 °F)
Medium temperature (peak)	-25 °C (-13 °F), non-freezing 120 °C (-248 °F) for 5 minutes, up to 3 weeks in sensor lifetime
Ambient air temperature (operation)	-25 - 60 °C (-13 - 140 °F)
Ambient air temperature (peak)	-55 - 90 °C (-67 to 194 °F)
Humidity	0-95 % (relative), non-condensing
System burst pressure	> 16 bar (232 psi)
Electrical data	
Power supply	5 VDC ($\pm 5\%$). We recommend grounding of the sensor supply (PELV)
Output signals	Ratiometric
Flow signal	0.5 - 3.5 V (Zero at 0.35 V)
Temperature signal	0.5 - 3.5 V
Power consumption	< 50 mW
Load impedance	> 10 kΩ
Maximum cable length	3 m (9.10 ft)
Materials	
Sensing element	Silicon-based MEMS sensor
Seal (sensor to housing)	EPDM
Flow pipe	1.4408
Insert	PPA 40-GF
Wetted materials	Corrosion-resistant coating, EPDM or FKM, PPS, PPA 40-GF, 1.4408
Environmental standards	
Enclosure class	IP44 (cable connected)
Temperature cycling	IEC 68-2-14
Vibration (non-destructive)	20-2000 Hz, 10G, 4 h
Electromagnetic compatibility	EN 61326-1

4. Product range

VFI sensor

Scope of delivery:

- Flow pipe with sensor
- flanges (only for flange versions)
- fittings and union nuts (for threaded versions)
- 5 m (16.4 ft) cable with free cable end
- quick guide.

Complete product	Flow range	Flange size	O-ring		Connection type			Product number
			EPDM	FKM	Cast iron flange	Stainless steel flange	Thread	
VFI-0.3-6m-1-C-M5.000X-FG6-SG-30F-A-1			•		•			97686127
VFI-0.3-6m-1-C-M5.000X-FG6-SG-30F-A-1				•	•			97686128
VFI-0.3-6m-1-C-M5.000X-EG6-SS-30F-A-1	0.3 - 6 m ³ /h	DN 25/32	•			•		97688293
VFI-0.3-6m-1-C-M5.000X-FG6-SS-30F-A-1	1.32 - 26.4 gpm	ANSI 1 1/4"		•		•		97688294
VFI-0.3-6m-1-C-M5.000X-EG6-SS-07P-A-1			•				•	97688334
VFI-0.3-6m-1-C-M5.000X-FG6-SS-07P-A-1				•			•	97688342
VFI-0.6-12m-1-C-M5.000X-EG6-SG-30F-A-1			•		•			97686129
VFI-0.6-12m-1-C-M5.000X-FG6-SG-30F-A-1				•	•			97686130
VFI-0.6-12m-1-C-M5.000X-EG6-SS-30F-A-1	0.6-12 m ³ /h	DN 25/32	•			•		97688295
VFI-0.6-12m-1-C-M5.000X-FG6-SS-30F-A-1	2.64 - 52.8 gpm	ANSI 1 1/4"		•		•		97688296
VFI-0.6-12m-1-C-M5.000X-EG6-SS-07P-A-1			•				•	97688335
VFI-0.6-12m-1-C-M5.000X-FG6-SS-07P-A-1				•			•	97688343
VFI-1.3-25m-1-C-M5.000X-EG6-SG-30F-A-1			•		•			97686141
VFI-1.3-25m-1-C-M5.000X-FG6-SG-30F-A-1				•	•			97686142
VFI-1.3-25m-1-C-M5.000X-EG6-SS-30F-A-1	1.3 - 25 m ³ /h	DN 25/32	•			•		97688297
VFI-1.3-25m-1-C-M5.000X-FG6-SG-30F-A-1	5.72 - 110.1 gpm	ANSI 1 1/4"		•		•		97688298
VFI-1.3-25m-1-C-M5.000X-EG6-SS-09P-A-1			•				•	97688336
VFI-1.3-25m-1-C-M5.000X-FG6-SS-09P-A-1				•			•	97688344
VFI-2-40m-1-C-M5.000X-EG6-SG-31F-A-1			•		•			97686143
VFI-2-40m-1-C-M5.000X-FG6-SG-31F-A-1	2-40 m ³ /h	DN 40		•	•			97686144
VFI-2-40m-1-C-M5.000X-EG6-SS-31F-A-1	8.81 - 176.1 gpm	ANSI 1 1/2"	•			•		97688299
VFI-2-40m-1-C-M5.000X-FG6-SS-31F-A-1				•		•		97688300
VFI-3.2-64m-1-C-M5.000X-EG6-SG-32F-A-1			•		•			97686145
VFI-3.2-64m-1-C-M5.000X-FG6-SG-32F-A-1	3.2-64 m ³ /h	DN 50		•	•			97686146
VFI-3.2-64m-1-C-M5.000X-EG6-SS-32F-A-1	14.09 - 281.8 gpm	ANSI 2"	•			•		97688301
VFI-3.2-64m-1-C-M5.000X-FG6-SS-32F-A-1				•		•		97688302
VFI-5.2-104m-1-C-M5.000X-EG6-SG-33F-A-1			•		•			97686147
VFI-5.2-104m-1-C-M5.000X-FG6-SG-33F-A-1	5.2 - 104 m ³ /h	DN 65		•	•			97686148
VFI-5.2-104m-1-C-M5.000X-EG6-SS-33F-A-1	22.89 - 457.9 gpm	ANSI 2 1/2"	•			•		97688303
VFI-5.2-104m-1-C-M5.000X-FG6-SS-33F-A-1				•		•		97688304
VFI-8-160m-1-C-M5.000X-EG6-SG-35F-A-1			•		•			97686149
VFI-8-160m-1-C-M5.000X-FG6-SG-35F-A-1	8-160 m ³ /h	DN 80		•	•			97686150
VFI-8-160m-1-C-M5.000X-EG6-SS-35F-A-1	35.22 - 704.5 gpm	ANSI 3"	•			•		97688305
VFI-8-160m-1-C-M5.000X-FG6-SS-35F-A-1				•		•		97688306
VFI-12-240m-1-C-M5.000X-EG6-SG-37F-A-1			•		•			97686151
VFI-12-240m-1-C-M5.00X-FG6-SG-37F-A-1	12-240 m ³ /h	DN 100		•	•			97686152
VFI-12-240m-1-C-M5.000X-EG6-SS-37F-A-1	52.83 - 1057 gpm	ANSI 4"	•			•		97688308
VFI-12-240m-1-C-M5.000X-FG6-SS-37F-A-1				•		•		97688309

VFS sensor

Sensor selection

Grundfos offers a wide range of custom-built VFS sensors.

The VFS sensors can be customized depending on the application. The tables below list all the variants. Be aware that not all combinations are possible.

Therefore, please contact Grundfos Direct Sensors when proceeding to selection.

Example of a type key:

VFS / 20-400 L / 1 / D / C 1.200 E / G4 / CS / 25P / W-1

1	2	3	4	5	6	7	8	9	10
VFS	20-400 L	1	D	C 1.200E	G4	CS	25	P	W-1

1. Product group
2. Product range and units

Product range	Range of unit
20-400	L: litres/min.

3. Generation

Code	Generation
1	1st generation
2	2nd generation
3	3rd generation

4. Electrical output type

Code	Output
B	0-10 V
C	4-20 mA, 2 wires
D	0.5 - 3.5 V
E	0.5 - 4.5 V
F	2 x 0-10 V
G	4-20 mA, 3 wires

5. Cable and connectors:

- Middle letters: 1.200 is cable length in m
- First and last letters: Cable connector

Code	Cable connector description
B	FCI 90312-004LF/77138-101
C	CKM 42010107/42010311, tin plated
D	AMP 103648-3/104479-9
E	Molex 51004-0400/50011-8000
F	AMP 172167-1/0-170365-1
G	Tyco Val-U-Lok 794954-4/794958-2, gold plated
J	JST XHP-4/SXH-001T-P0.6
L	Lumberg 3510-04 K02
N	Lumberg 3510-04 K03
P	Molex 43025-0400/43030-0005, 43030-001/ Cembre 1910M16
Q	Molex 43025-0400/43030-0006
R	Molex 51004-0400/50011-8000/ Cembre 1900M12
X	Open ended

6. O-ring material and enclosure class

Code	Sealing description
E	EPDM (drinking water approved)
F	FKM (for use in oily media)
G	Gel-filled

Code	Enclosure class
4	IP44
5	IP55
6	IP67

7. Material

- the first letter represents the flow pipe
- the second represents the mechanical connection

Code	Material description
B	Brass
C	Composite
G	Cast iron
Q	Stainless steel flow pipe with composite insert (QT)
S	Stainless steel

8. Dimension of mechanical connection

Code	Dimension	Code	Dimension
03	G 1/2"	13	G4"
04	G 3/4"	17	7/16"
05	G1"	19	18.75 mm
06	6 mm	21	21.5 mm
07	G 1 1/4"	24	1/8 - 27
08	8 mm	25	3/4 - 14
09	G 1 1/2"	26	1 - 11.5
10	G 1 1/2"	27	1 1/4 - 11.5
11	G 2 1/2"	51	f1" - G 3/4
12	G 3"	52	f1 1/4" - G 1

9. Mechanical connection type

Code	Description
B	BSPT (ISO 7/1)
C	Compression
F	Flange
G	Flange and BSPP (ISO 228/1)
K	Clips
M	NPSM
N	NPT
P	BSPP (ISO 228/1)
S	Sweat
T	Tube
U	UNF

10. Packaging

Code	Description of packaging
A	Set with pre-assembled components
C	Cardboard box
D	Blister pack and cardboard box, standard Grundfos
P	Spare parts set
S	Set
V	Service set
W	Blister pack, standard Grundfos cardboard
N	Blister pack, neutral white cardboard
1	1 piece
10	Bulk 10
25	Bulk 25
50	Bulk 50
1H	Bulk 100
5H	Bulk 500

5. Accessories

Sensor interface - converter unit

The sensor interface, type SI 010 CNV, from Grundfos Direct Sensors™ is an external power supply, signal amplifier and signal converter for Grundfos sensors, standard variants (VFS, RPS, DPS).

SI 010 CNV has built-in precision resistors enabling the transmitter to give 4-20 mA, 1-5 V and 2-10 V output signals.

SI 010 CNV should be used in applications where sensors from the standard product range are used, but the controller requires a 4-20 mA input signal.



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Fig. 76 Sensor interface, SI 010 CNV

Specification:

- Voltage range: 115-230 VAC $\pm$ 10 % or 24 VDC
- frequency: 50-60 Hz
- power consumption: Max. 2.5 W
- ambient temperature: -20 - 50 °C (-4 to 122 °F)
- enclosure class: IP20.

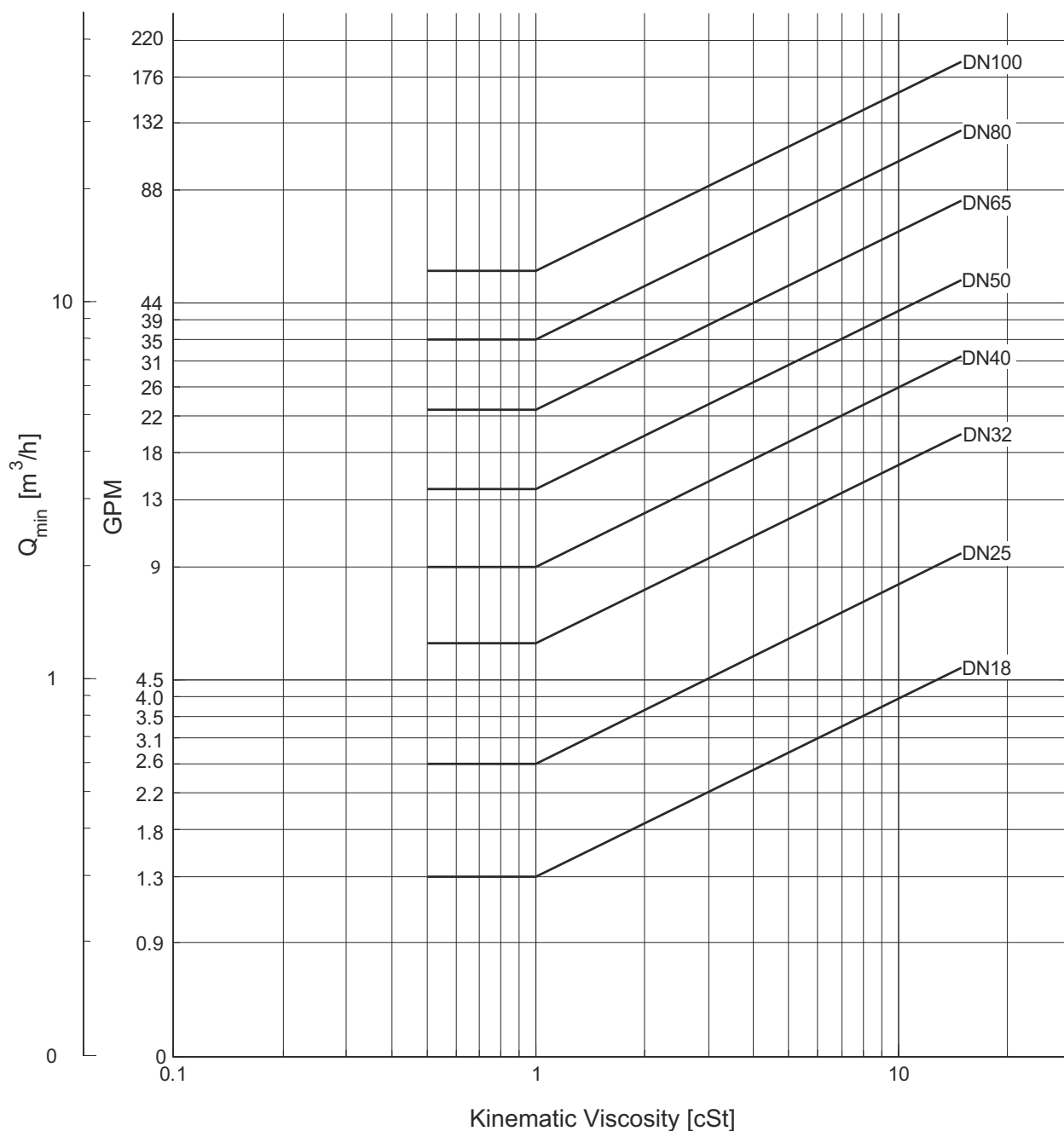
Part	Product Number
Sensor interface, SI 010 CNV, IP20	96983684

6. Appendix

Minimum flow rate curves

Minimum flow rate as a function of the kinematic viscosity

The minimum detectable flow rate ($Q_{\min.}$) for the VFI sensors depends on the kinematic viscosity of the medium. The chart below shows $Q_{\min.}$ as a function of the kinematic viscosity.

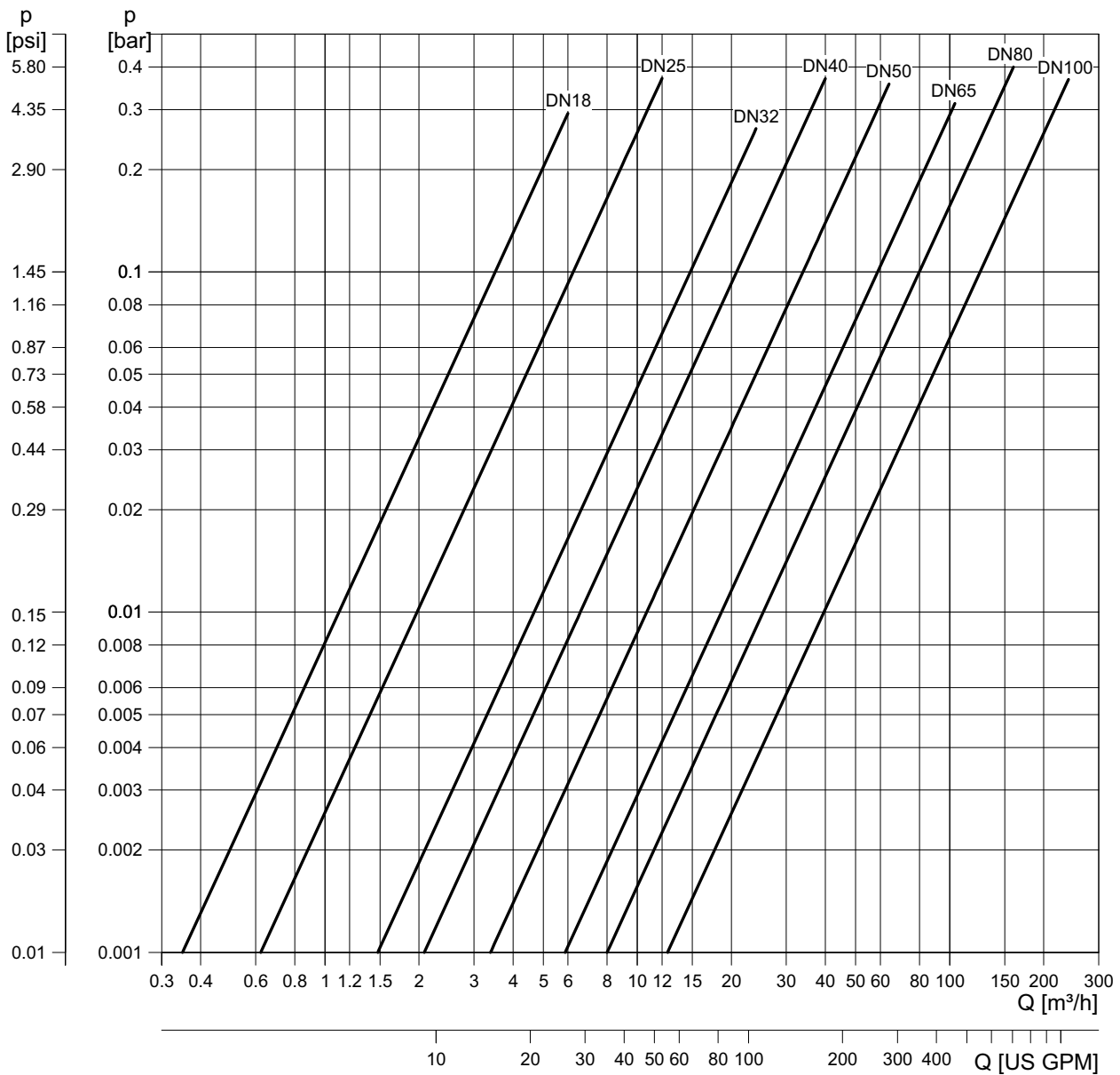


* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998 \text{ kg/m}^3$ (62.3 lb/ft³), $\nu = 1 \times 10^{-6} \text{ m}^2/\text{s}$ (1 cSt).

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Pressure drop curves

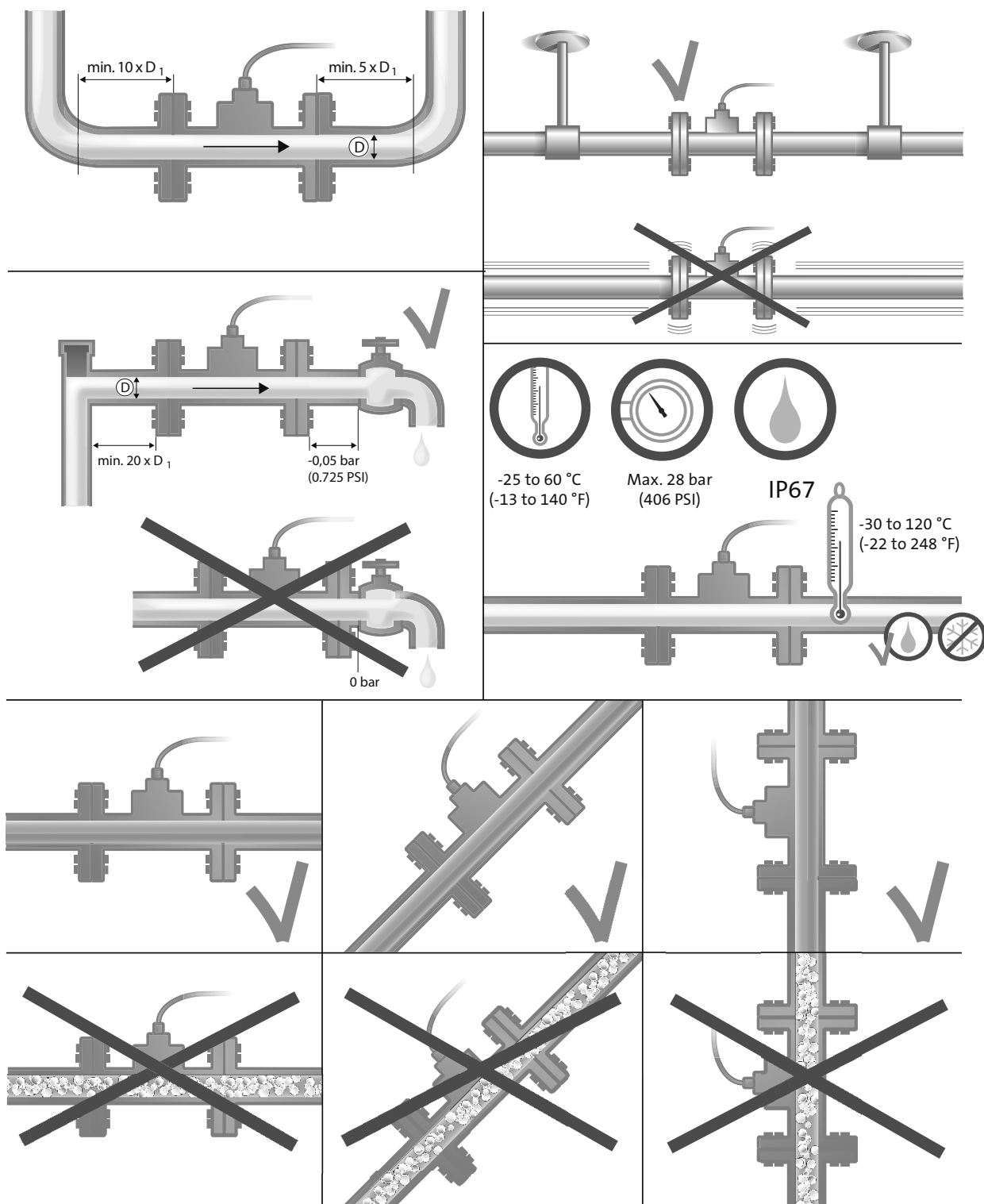


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* Reference condition:

- Media at 20 °C (68 °F), 1013 mbar (1 atmosphere), $\rho = 998 \text{ kg/m}^3$ (62.3 lb/ft³), $\nu = 1 \times 10^{-6} \text{ m}^2/\text{s}$ (1 cSt).

Installation of VFI sensor



TM05 2306 4811

7. Grundfos Product Center

Online search and sizing tool to help you make the right choice.

<http://product-selection.grundfos.com>



SIZING enables you to size a pump based on entered data and selection choices.

REPLACEMENT enables you to find a replacement product. Search results will include information on

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.

The screenshot shows the Grundfos Product Center website. At the top is a navigation bar with the Grundfos logo, 'PRODUCT CENTER', and links for 'HOME', 'FIND PRODUCT', 'COMPARE', 'YOUR PROJECTS', 'SAVED ITEMS', and 'HELP'. A 'Login' button is in the top right. Below the navigation bar is a search bar with the placeholder text 'Input product number or a whole or partial product name' and a 'SEARCH' button. Below the search bar are four main feature tiles: 'SIZING' (Enter pump sizing), 'CATALOGUE' (Products and services), 'REPLACEMENT' (Replace an old pump with a new), and 'LIQUIDS' (Find pump by liquid). Below these tiles is a 'QUICK SIZING' section with input fields for 'Flow (Q)*' (m³/h) and 'Head (H)*' (m), and a 'Select what to size by' section with radio buttons for 'Size by application', 'Size by pump design', and 'Size by pump family'. A 'START SIZING' button is to the right. At the bottom of the 'QUICK SIZING' section is an 'ADVANCED SIZING' section with links for 'Advanced sizing by application' and 'Guided selection'. Callouts point from the text blocks to the 'SIZING', 'CATALOGUE', and 'LIQUIDS' tiles.

CATALOGUE gives you access to the Grundfos product catalogue.

LIQUIDS enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

Subject to alterations.

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ECM: 1155282

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