Description

Microcontroller operated Flow Meter to monitor and display flow rates and temperature. Once correctly adjusted it can also be used for mass flow measurements. Factory preset for air and water.

The RS232 interface allows configuration, operation and data logging by means of a PC software.

FC100

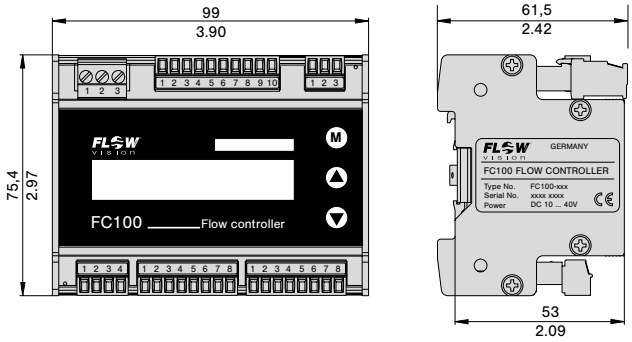
rail mounted housing surface mounted housing

Features

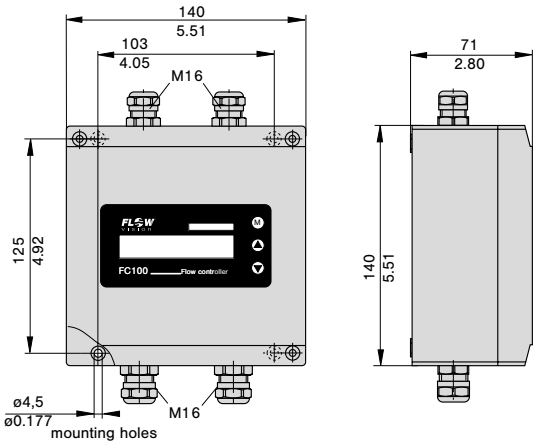
- Menu driven (keypads)
- LC display (2 x 16 digits) can show:
  - actual flow velocity, volume flow rate, temperature
  - directions for parameter assignment, configuration, diagnostics and error correction;
  - peak values indication
- Two scalable analogue outputs
- Minimum/maximum memory of flow velocity and temperature
- Two freely selectable limit contacts
- Volume flow dependent pulse output
- Totalizer (with external reset), power fail-safe
- display illumination
- RS232 interface allows configuration, operation and data logging by means of a PC software

Dimensions

FC100 (rail mounted housing)



FC100-FH (surface mounted housing)



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Ordering information

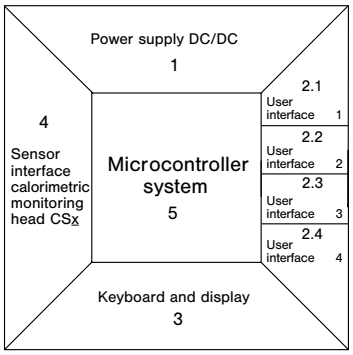
Type						
FC100						Flow Meter in rail mounted housing
FC100-FH						Flow Meter in surface mounted housing
		Input voltage				
		U1				DC 10 ... 40 V
			Signal outputs			
			R2			2 relay outputs (2 limit values)
			T4			4 transistor outputs (2 limit values + 2 status or 2 limit values + 1 status + 1 pulse output)
				Analogue outputs		
				V1		0/1-5 Volt
				V2		0/2-10 Volt
				C1		0/4-20 mA (self-powered, galvanically isolated)
					Serial interface	
					K1	RS232 (with PC-Software)
FC100	-	**U1**	**R2**	**V1**	**K1**	ordering example

TECHNICAL DATA

Flow Meter FC100			with CST/CSF calorimetric monitoring heads
General data			
Suitable for			gases, liquids (oil etc.)
Measuring functions			flow velocity, volume flow rate, temperature
Display			2 x 16-digit LC display (illuminated)
Configuration by			keypads or PC software
Serial interface			RS232, PC-Software runs on Windows® XP/Windows Vista®/Windows® 7
Ambient temperature range (electronic control unit)			+5 °C ... +50 °C/+41 °F ... +122 °F
Electrical data			
Supply voltage			DC 10 ... 40 V
Power consumption			DC 10 V: 650 mA; DC 24 V: 240 mA; DC 40 V: 150 mA
Analogue outputs	flow and temperature		0/4-20 mA or 0/2-10 V or 0/1-5 V
Signal outputs	2 relay outputs (2 limit values)		2 SPDT contacts AC/DC 50 V/1 A/50 W
	4 transistor outputs (2 limit values + 2 status, or 2 limits values + 1 status + 1 pulse output)		open collector outputs DC 36 V/150 mA/1,5 W
MTTF (SN 29500)			54 ... 79 years, depends on device type, for details see MTTF-certificate
Flow measurement			
Measuring range (display range)		water	0,05 ... 3 m/s (0 ... 4 m/s)
		air	0,1 ... 20 m/s (0 ... 100 m/s) standard flow speed referred to 20 °C and 1,01325 bar
Accuracy		water	see failure diagram
		air	see failure diagram
Repeatability [1]		water	≤1 % of measured value (5% ... 100% of measuring range final value)
		air	≤1 % of measured value (5% ... 100% of measuring range final value)
Temperature drift		water	± 0,05 %/°C of measuring range final value/ ± 0,09 %/°F of measuring range final value
		air	± 0,05 %/°C of measuring range final value/ ± 0,09 %/°F of measuring range final value
Response delay		water [2]	2,5 s
		air [3]	3 s
Temperature measurement		measuring range	-40 °C ... +130 °C/-40 °F ... +266 °F
		accuracy	± 1 % of measuring range
Mechanical data (electronic control unit)			
Degree of protection	rail mounted		IP20
	surface mounted		IP66
Materials	rail mounted		Aluminium, display: polyester foil
	surface mounted		Aluminium/acrylic
Housing dimensions (LxWxH)			see dimensions (previous page)
Weight	rail mounted		365 g/0.805 lb
	surface mounted		1200 g/2.65 lb
Cables	voltage supply		3x0,75 mm^2/3x1.16·10^{-3} $in.^2$ (AWG 18)
	to monitoring head		LifYCY 4x2x0,2 mm^2/4x2x0.31·10^{-3} $in.^2$ (AWG 24)
	analogue outputs		2 x LifYCY 2x0,25 mm^2/2x0.388·10^{-3} $in.^2$ (AWG 24)
	limit value outputs		2 x LifYCY 3x0,38 mm^2/3x0.589·10^{-3} $in.^2$ (AWG 22)
	Max. cable length to monitoring head		200 m/656 ft

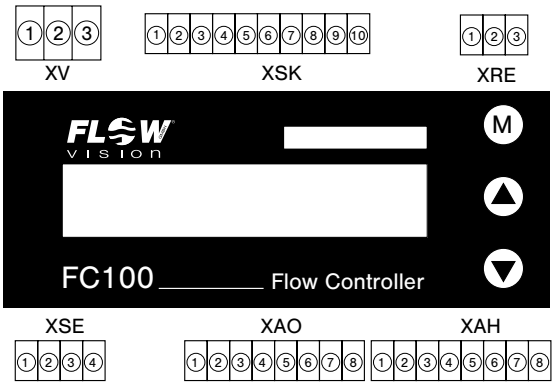
[1] Of the set value, at constant temperature and flow conditions, and stable thermal conductivity.
[2] Delay with the switch point set to 1 m/s / 3.28 fps and the flow at 2 m/s / 6.56 fps, after a sudden complete stop.
[3] Delay with the switch point set to 10 m/s / 32.8 fps and the flow at 20 m/s / 65.6 fps, after a sudden complete stop.

Block diagram



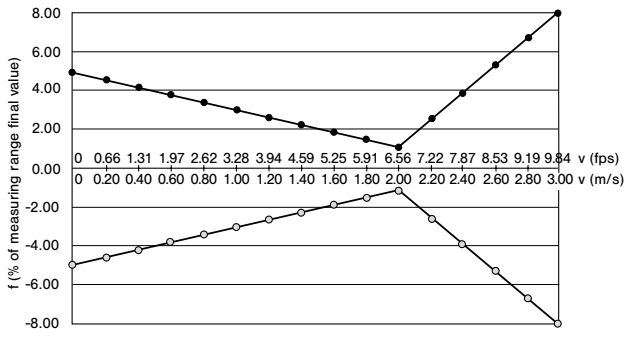
1	Input voltage:	DC 10 ... 40 V	
2.1	User interface 1:	relay outputs:	2 limit values
		transistor outputs:	2 limit values + 1 error indication + 1 busy signal or pulse output (software selected)
2.2	User interface 2:	analogue outputs:	temperature and flow current or voltage
2.3	User interface 3:	RS232 interface	
2.4	User interface 4:	totalizer reset:	edge controlled potential free, normally open contact or voltage pulse DC10 ... 40 V
3	Keyboard/Display:	keypads LC display 2 x 16 digits backlight (can be switched off)	
4	Sensor interface:	calorimetric monitoring head type CSx	
5	Controller system:	signal processing I/O - controlling monitoring parameter memory communication	

Connection diagram



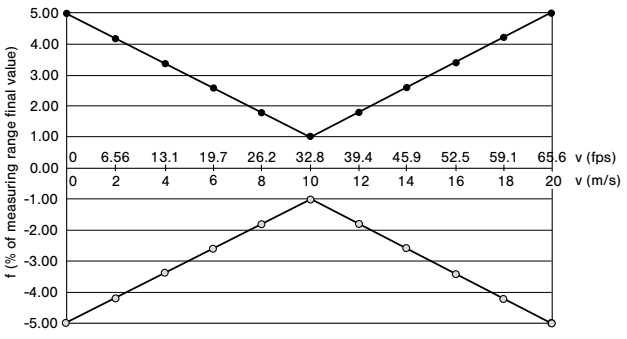
XV - power supply
XSK - calorimetric monitoring head
XRE - totalizer reset
XSE - RS232 communication interface
XAO - analogue outputs
XAH - signal outputs

Failure diagram for water



adjustment point at 2 m/s / 6.56 fps:
±1% of measuring range final value.
Other accuracy values or adjustment points upon request (see type FC01-CC).

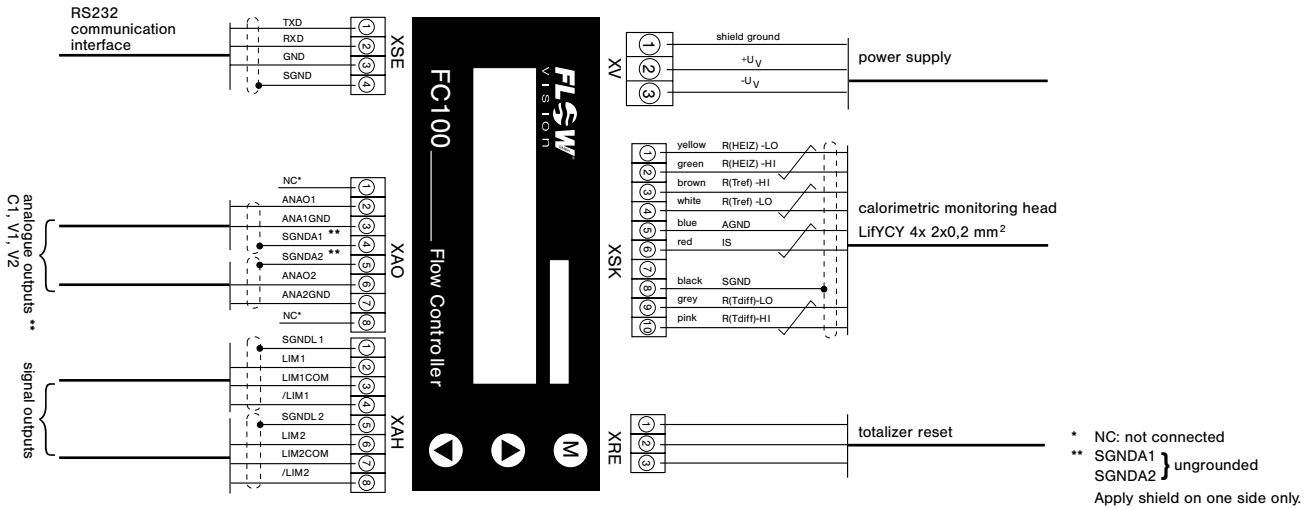
Failure diagram for air



adjustment point at 10 m/s / 32.8 fps:
±1% of measuring range final value
Other accuracy values or adjustment points upon request (see type FC01-CC).

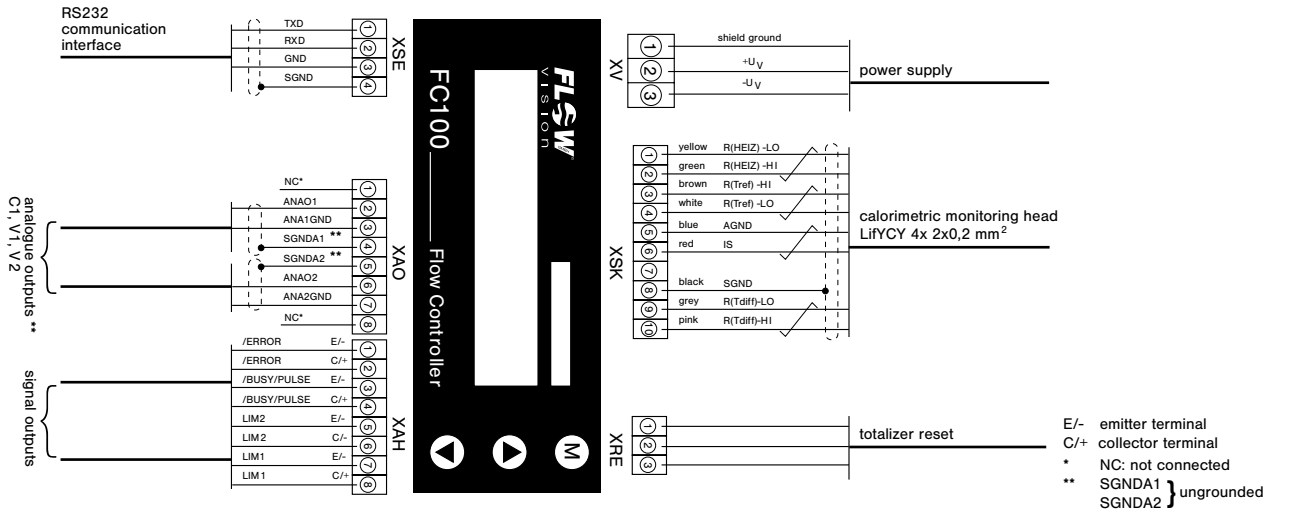
Connection diagrams

FC100 with relay outputs



* NC: not connected
** SGNDA1, SGNDA2 } ungrounded
Apply shield on one side only.

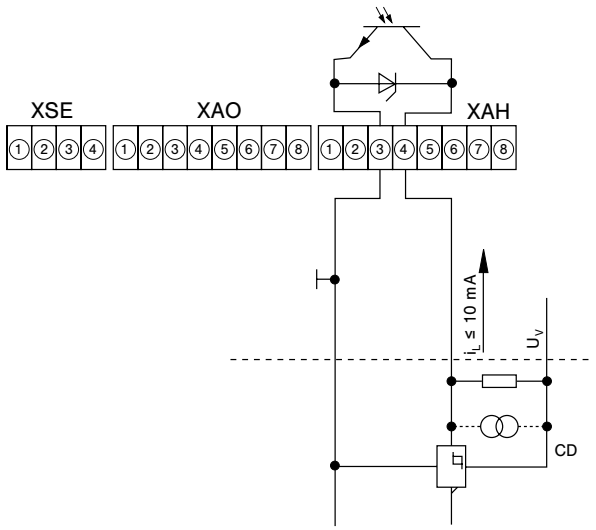
FC100 with transistor outputs



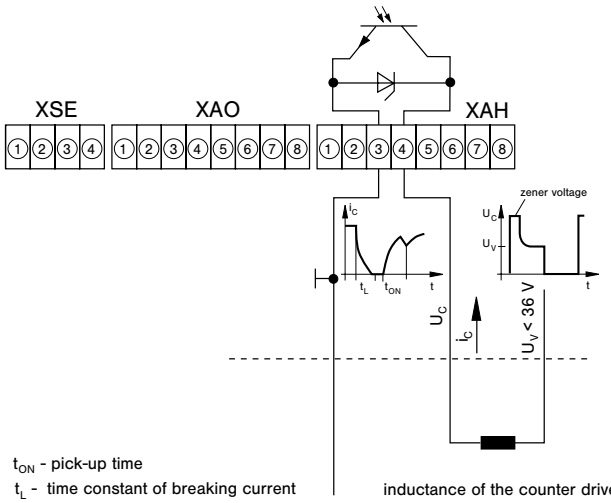
E/- emitter terminal
C/+ collector terminal
* NC: not connected
** SGNDA1, SGNDA2 } ungrounded
Apply shield on one side only.

FC100-CA - Recommended connection of pulse output

Electronic signal processing



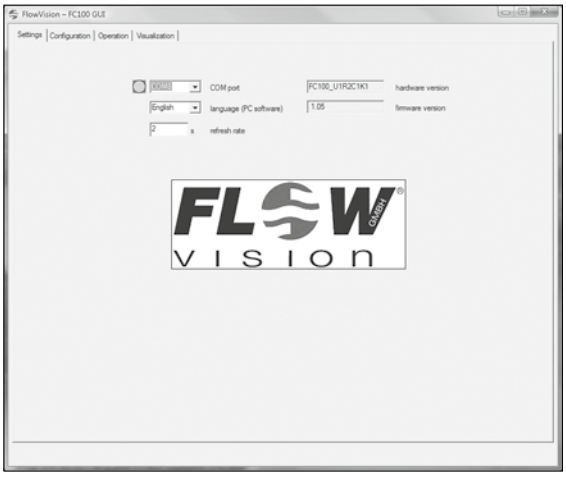
Electromagnetic pulse counter



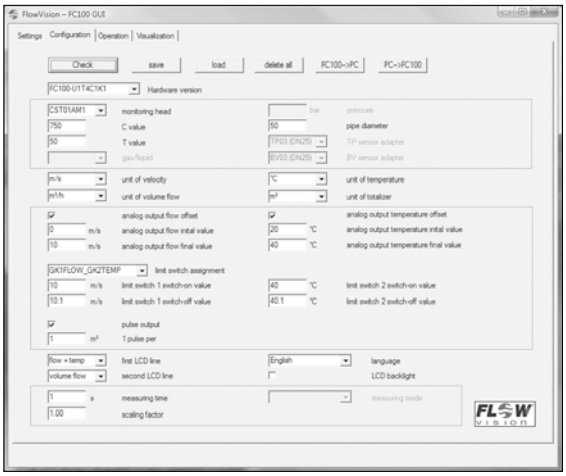
t_{ON} - pick-up time
t_L - time constant of breaking current

inductance of the counter drive

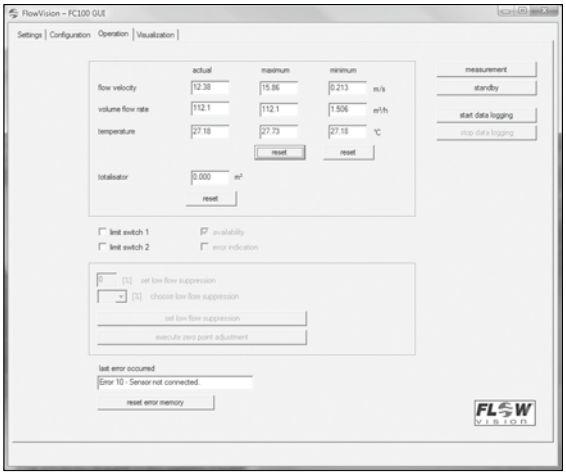
PC-Software



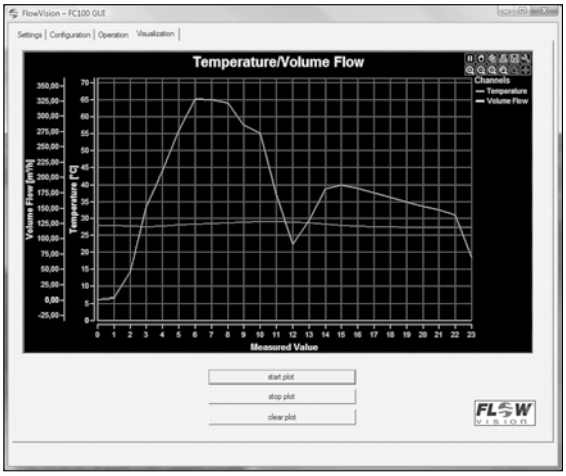
General Settings:
- Selection of the language of the PC software
- Definition how often measuring values are read from the FC100
- Indication of hardware and firmware version



Configuration of the FC100:
- Basic settings (e.g. type of measuring head, pipe size)
- Selection of the units of all measured values
- Configuration of the analogue and signal outputs and the pulse output
- Settings of the display and further configuration possibilities



Operation of the FC100:
- Indication of the actual measured values and saved minimum and maximum values
- Indication of the actual condition of the signal outputs
- Logging of all measured values - export to Microsoft® Excel®



Visualization of the measured values:
- Plot of the measured values (volume flow and temperature)
- Flexible indication of the measured values (e.g. scale, zoom, scroll)

Description

Thread-mounted calorimetric monitoring head for flow Meter FC100, suitable for general industry applications.

Features

- Suitable for installation in welding bushes
- Medium temperature: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti,
  Hastelloy alloy C4 2.4610 or titanium G7 3.7235

Thread-mounted calorimetric monitoring head

CST-01

Ordering information

Type No.							
CST	Thread-mounted monitoring head with calorimetric sensors						
	Process connection						
	01 thread size G1/2A						
	03 thread size NPT 1/2“						
		Medium					
		A air					
		W water					
			Material of areas exposed to medium				
			M1 stainless steel 1.4571/AISI 316 Ti (standard)				
			M2 nickel-based alloy Hastelloy alloy C4 2.4610				
			M6 titanium G7 3.7235				
				Length of shank/thread			
				L10 36 mm/1.42 in. (standard)			
					Electrical connection		
					E10 round connector with tinned contacts (plug and cable to order separately)		
						Certification	
						T0 without certificate (standard) *)	
							Specification of medium
							xxx
CST -	**01**	**A**	**M1**	**L10**	**E10**	**T0 -**	**...** ordering example

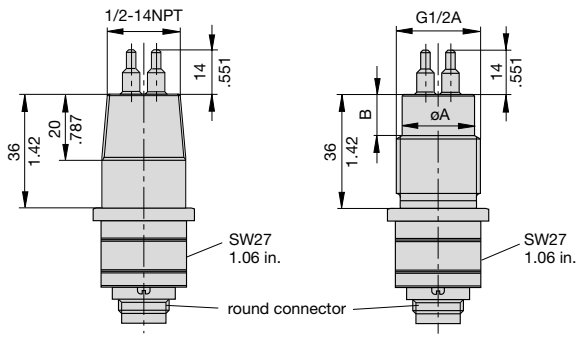
*) for detailed information please see section 0.

Technical data

Type of head	thread-mounted
Thread	G1/2A (standard), NPT 1/2“
Length of shank	36 mm/1.42 in.
Length of sensor	14 mm/.551 in.
Suitable for	air, water
Temperature range *) (of gas/water)	-40 °C ... +130 °C/-40 °F ... +266 °F
Temperature drift of monitoring head	± < 0.05 %/°C/measuring range / ± < 0.09 %/°F/measuring range (T = +20 °C ... +80 °C/+68 °F ... +176 °F)
Measuring ranges air: water:	 0 ... 20 m/s / 0 ... 65.6 fps 0 ... 3 m/s / 0 ... 9.84 fps
Pressure resistance (1)	100 bar/1450 psi
Degree of protection (2)	IP67
Material	stainless steel 1.4571/AISI 316 Ti Hastelloy C4 2.4610 titanium G7 3.7235
Cable to electronic control unit	LifYCY 4x2x0.2 mm²/4x2x0.31·10⁻³ in.² (AWG 24)

(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C/+185 °F in the connector area

Dimensions



	øA		B	
	mm	inch	mm	inch
G1/2A	18	.709	10	.394

This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

Technical data

Cable type 15	
Features:	highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	92 Ω/km
Insulation resistance:	20 MΩ x km
Operating voltage:	250 V
Withstand voltage:	500 V
Max. load:	2 A
Temperature range:	-10 °C ... +80 °C/+14 ° F ... +176 °F (processing and operation) -30 °C ... +80 °C/-22 ° F ... +176 °F (transport and storage)
Cable type 18	
Features:	non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	80 Ω/km
Insulation resistance:	1200 MΩ x km
Operating voltage:	300 V
Withstand voltage:	1500 V
Max. load:	3 A
Temperature range:	-50 °C ... +180 °C/-58 °F ... +356 °F

Ordering information

Type between calorimetric monitoring heads **CST** and **FC100, FC100-FH**

Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector
	Available cable lengths
	...m 2 m/6.56 ft, 3 m, 5 m/16.4 ft, 8 m, 10 m/32.8 ft, 15 m, 20 m/65.6 ft, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m/656 ft, (up to max 656 ft)
Do + Ka type 15 -	**2 m** ordering example

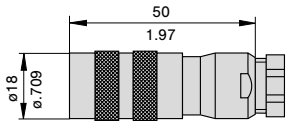
Description

Cable between Flow Meter FC100-xxx and calorimetric monitoring head type CST.

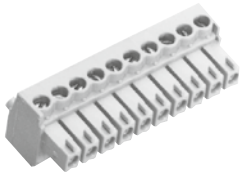
- Connection to monitoring head by means of 8-pole round connector
- Connection to FC100-xxx by means of 10-pole clamping connector (XSK)

Accessories

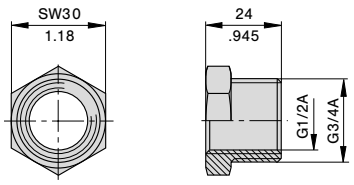
8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124



10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
0Z112Z000167



Reducing piece
from G3/4 to G1/2
Material: stainless steel 1.4571/AISI Ti 316
0Z032Z000149



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Standard warranty cover will be invalidated if the correct FlowVision monitoring head/control unit connecting cable is not used.

Description

Extended calorimetric monitoring head with variable immersion depth for Flow Meter FC100, suitable for use in pipelines with process connections DN 50 plus.

Caution: Fix with locking set 01 (see accessories).

Features

- Medium temperature range: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti

Monitoring head CSF

CSF-01
variable immersion depth

Ordering information

Type									
CSF	Extended monitoring head with calorimetric sensors								
	Monitoring head design								
	01	Monitoring head with variable immersion depth							
		Medium							
		A	air						
			Material of areas exposed to medium						
			M1	stainless steel 1.4571/AISI 316 Ti					
				Process connection					
				00	without flange; see accessories for connections				
					Length of shank/thread				
					L43	188 mm/7.40 in. (standard) other lengths upon request			
						Electrical connection			
						E10	round connector with tinned contacts (plug and cable to order separately)		
							Certification		
							T0	without certificate (standard) *)	
								Specification of medium	
								xxx	
CSF	**-** **01**	**A**	**M1**	**00**	**L43**	**E10**	**T0**	**-** **...**	ordering example

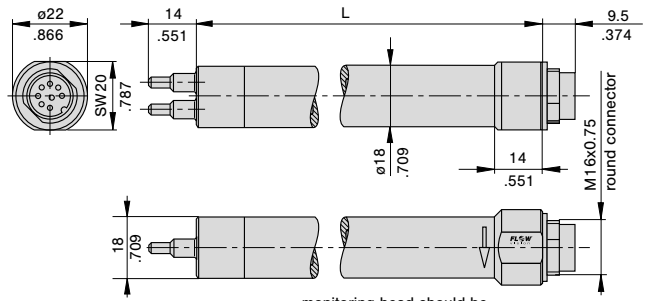
*) for detailed information please see section 0

Technical data

Type of head	push-in
Shank diameter	18 mm/.709 in.
Length of shank	188 mm/7.40 in.
Length of sensor	14 mm/.551 in.
Suitable for	air
Temperature range*) (of gas)	-40 °C ... +130 °C/-40 °F ... +266 °F
Temperature drift of sensor	± < 0.05 %/°C/measuring range ± < 0.09 %/°F/measuring range (T = +20 °C ... +80 °C/+68 °F ... +176 °F)
Measuring range (air)	0 ... 20 m/s / 0 ... 65.6 fps (atm. press.)
Pressure resistance (1) (sensor)	100 bar/1450 psi
Pressure resistance (1) (installation)	depending on connection (see accessories)
Degree of protection (2)	IP67
Material	stainless steel 1.4571/AISI 316 Ti
Cable to electronic unit	LifYCY 4x2x0.2 mm^2/4x2x0.31·10^{-3} $in.^2$ (AWG 24)

(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C/+185 °F in the connector area

Dimensions



Type	L	
	mm	inch
CSF-...L43...	188	7.40
CSF-...L30...	300	11.81
CSF-...L40...	400	15.75

monitoring head should be aligned in direction of flow (see arrow)

Only CSF-...L30... and CSF-...L40...:
Additional wetted o-ring (FKM)

This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

Description

Cable between Flow Meter FC100-xxx and calorimetric monitoring head type CSF.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FC100-xxx by means of 10-pole clamping connector (XSK)

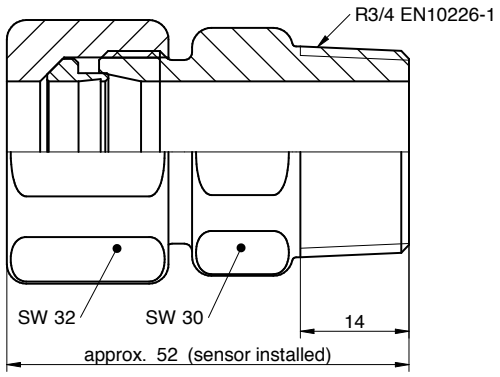
Technical data

Cable type 15	
Features:	highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	92 Ω/km
Insulation resistance:	20 MΩ x km
Operating voltage:	250 V
Withstand voltage:	500 V
Max. load:	2 A
Temperature range:	-10 °C ... +80 °C/+14 ° F ... +176 °F (processing and operation) -30 °C ... +80 °C/-22 ° F ... +176 °F (transport and storage)
Cable type 18	
Features:	non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	80 Ω/km
Insulation resistance:	1200 MΩ x km
Operating voltage:	300 V
Withstand voltage:	1500 V
Max. load:	3 A
Temperature range:	-50 °C ... +180 °C/-58 °F ... +356 °F

Ordering information

Type between calorimetric monitoring heads **CSF** and **FC100, FC100-FH**		
Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector	
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector	
	Available cable lengths	
	...m	2 m, 3 m, 5 m, 8 m, 10 m, 15 m, 20 m, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m/656 ft (up to max 656 ft)
Do + Ka type 15 -	**2 m**	ordering example

Compression fitting

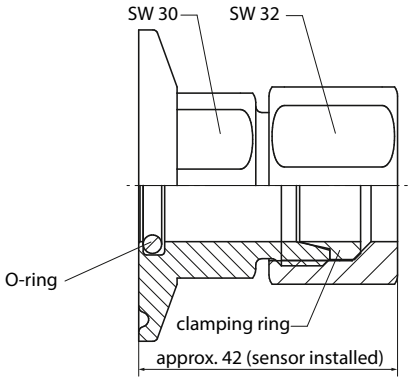


Description and ordering information

Compression fitting for push-in sensors with R3/4 thread

Compression fitting for push-in sensors			
EEF	Compression fitting		
	Process connection		
	04	Thread R3/4	
		Material double nipple and cap nut	
		M1	Stainless steel 1.4571
		M2	Hastelloy C4 2.4610
			Material clamping ring
			CR1 Stainless steel 1.4571 PN 25 bar abs.
			CR2 PTFE PN 5 bar abs.
			CR3 Hastelloy C4 2.4610 PN 25 bar abs.
EEF -	**04 -**	**M1 -**	**CR1** ordering example

Hygiene flange

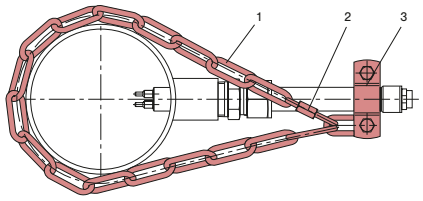


Description and ordering information

Hygiene flange for push-in sensors with front-flush o-ring with FDA approval

Hygiene flange for push-in sensors				
HEF	Hygiene flange			
	Process connection			
	TF1	Triclamp DIN 32676		
		Material flange and cap nut		
		M1	Stainless steel 1.4571	
		M2	Hastelloy C4 2.4610	
			O-ring	
			R1	VMQ (Silicone) blue FDA (standard)
			R2	VMQ (Silicone) white FDA
				Material clamping ring
				CR1 Stainless steel 1.4571 PN 25 bar abs.
				CR2 PTFE PN 5 bar abs.
				CR3 Hastelloy C4 2.4610 PN 25 bar abs.
HEF -	**TF1 -**	**M1 -**	**R1 -**	**CR1** ordering example

Locking set



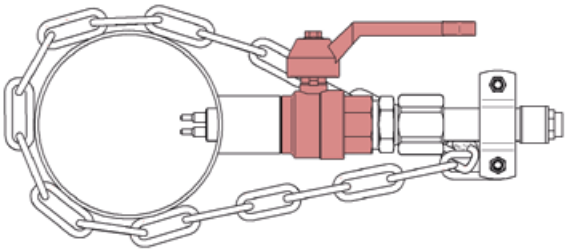
Description and ordering information

Locking set for push-in sensors.

1 Chain 4 x 32 DIN 5685 (approx. 1 m)
2 Catch for chain NG 5
3 Clip with screw and nuts DN15 to DIN 11850

Ordering no.: 0Z122Z000204

Ball valve for installation under pressure



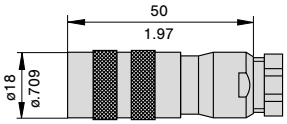
Description and ordering information

Material (body, ball):
Brass nickel plated
Material (ball seal): PTFE
Length: 65 mm
Outside thread: G3/4“, L = 13 mm
Inside thread: G3/4“, L = 15 mm
Fluid temperature: -20...120 °C
Ambient temperature: 0...80 °C
Pressure: PN 25 bar (up to 80 °C)
Ordering number: BV-02M3-PI

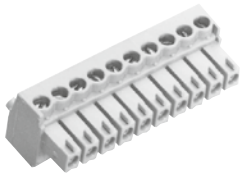
Material (body, ball):
Stainless steel 1.4408, 1.4401
Material (ball seal): PTFE
Length: 78 mm
Outside thread: R3/4“, L = 17 mm
Inside thread: Rp3/4“, L = 13 mm
Fluid temperature: -30...180 °C
Ambient temperature: 0...80 °C
Pressure: PN 64 bar (up to 80 °C)
Ordering number: BV-02M15-PI

Further accessories

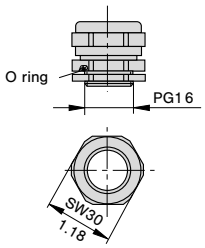
8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124



10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
Z00020

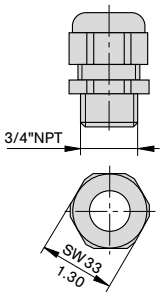


PG16 nickel-plated brass
(standard)
0Z122Z000128



pressure resistant up to 2 bar/29.0 psi

NPT3/4" moulded, black
0Z122Z000131



pressure resistant up to 2 bar/29.0 psi

This is a metric design and millimeter dimensions take precedence (mm / inch)

Caution: Standard warranty cover will be invalidated if the correct FlowVision monitoring head/control unit connecting cable is not used.

Flange-mounted calorimetric monitoring head

CSF-03
Tri-Clamp

Description

Flange-mounted calorimetric monitoring head for Flow Meter FC100. Recommended for food-processing (Tri-Clamp®).

Features

- Medium temperature range: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti

Technical data

Type of head	flange-mounted monitoring head
Process connection	DIN 32676 Tri-Clamp® DN 1
Shank dia.	18 mm/0.709 in.
Length of shank	15 mm/0.591 in.
Length of sensor	14 mm/0.551 in.
Suitable for	water
Temperature range *) (of water)	-40 °C...+130 °C/-40 °F ... +266 °F
Temperature drift range of monitoring head	± < 0.05 %/°C/measuring ± < 0.09 %/°F/measuring range (T = +20 ... +80 °C/+68 ... +176 °F)
Measuring range	0 ... 3 m/s / 0 ... 9.84 fps
Pressure resistance (1)	40 bar/580 psi
Degree of protection (2)	IP67
Material	stainless steel 1.4571/AISI 316 Ti
Cable to electronic control unit	LifYCY 4x2x0.2 mm²/4x2x0.31·10⁻³ in.² (AWG 24)

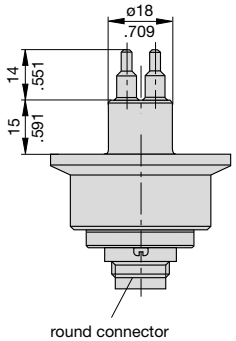
(1) Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)
(2) with mating connector
*) max. +85 °C/+185 °F in the connector area

Ordering information

Type									
CSF	flange-mounted monitoring head with calorimetric sensors								
	Monitoring head design								
	03 monitoring head with flange DIN 32676								
		Medium							
		W water							
			Material of areas exposed to medium						
			M1 stainless steel 1.4571/AISI 316 Ti						
				Process connection					
				91 flange DIN 32676-Tri-Clamp® DN1					
					Length of shank/thread				
					L90 15 mm/0.591 in. (standard)				
						Electrical connection			
						E10 round connector with tinned contacts (plug and cable to separate order)			
							Certification		
							T0 without certificate (standard) *)		
								Specification of medium	
								xxx	
CSF	**-** **03**	**W**	**M1**	**91**	**L90**	**E10**	**T0 - ...**	ordering example	

*) for detailed information please see section 0.

Dimensions



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Cable types 15/18 with connectors

Do + Ka type 15
Do + Ka type 18

Description

Cable between Flow Meter FC100-xxx and calorimetric monitoring head type CSF-03 (Tri-Clamp®).

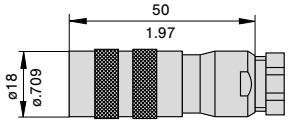
- Connection to monitoring head by means of 8-pole round connector
- Connection to FC100-xxx by means of 10-pole clamping connector (XSK)

Technical data

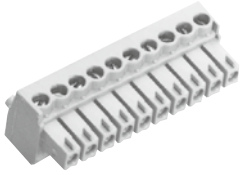
Cable type 15	
Features:	highly flexible, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	92 Ω/km
Insulation resistance:	20 MΩ x km
Operating voltage:	250 V
Withstand voltage:	500 V
Max. load:	2 A
Temperature range:	-10 °C ... +80 °C/+14 ° F ... +176 °F (processing and operation) -30 °C ... +80 °C/-22 ° F ... +176 °F (transport and storage)
Cable type 18	
Features:	non-halogenous, highly flexible, cold- and heat resistant, paired, fully shielded, electrical and thermal properties at +20 °C/+68 °F
Conductor resistance:	80 Ω/km
Insulation resistance:	1200 MΩ x km
Operating voltage:	300 V
Withstand voltage:	1500 V
Max. load:	3 A
Temperature range:	-50 °C ... +180 °C/-58 °F ... +356 °F

Accessories

8-pole round connector
(without cable, for individual wiring by customer)
0Z112Z003124



10-pole clamping connector for cable types 15 and 18
(without cable, for individual wiring by customer)
0Z112Z000167



This is a metric design and millimeter dimensions take precedence ($\frac{mm}{inch}$)

Standard warranty cover will be invalidated if the correct FlowVision monitoring head/control unit connecting cable is not used.

Ordering information

Type between calorimetric monitoring heads **CSF** and **FC100, FC100-FH**		
Do + Ka type 15	**PVC** insulated cable, type LifYCY 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector	
Do + Ka type 18	**silicone** insulated cable, type 4x2x0.2 mm² (AWG 24) 8-pole round connector + 10-pole clamping connector	
	Available cable lengths	
	...m	2 m/6.56 ft, 3 m, 5 m/16.4 ft, 8 m, 10 m/32.8 ft, 15 m, 20 m/65.6 ft, 25 m, 30 m, 40 m, 50 m, 60 m, 70 m, 80 m, 90 m, 100 m, 110 m, 120 m, 130 m, 140 m, 150 m, 160 m, 170 m, 180 m, 190 m, 200 m/656 ft, (up to max 656 ft)
Do + Ka type 15 -	**2 m**	ordering example