

# Flow Meter **FC100-CA** (compressed air/gases)

## Description

Microcontroller operated Flow Meter for gases such as air, compressed air, oxygen, nitrogen, argon, carbon dioxide, methane/natural gas and hydrogen. The FC100-CA is particularly suited to consumption measurement and leakage detection in compressed air systems. It is suitable for use with calorimetric monitoring heads.

Please note for use with carbon dioxide and argon that measurement is only possible with adapters TP-01 through TP-04.

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



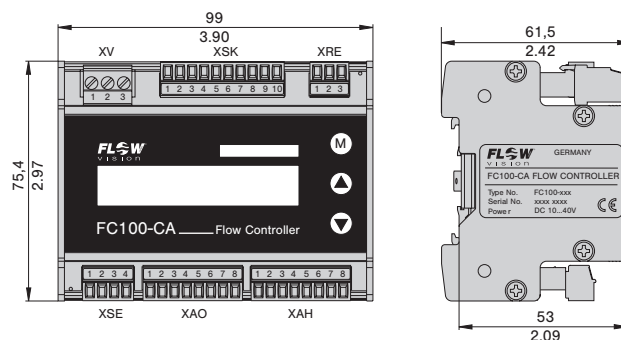
**FC100-CA**  
rail-mounted version      surface mounted version

## Features

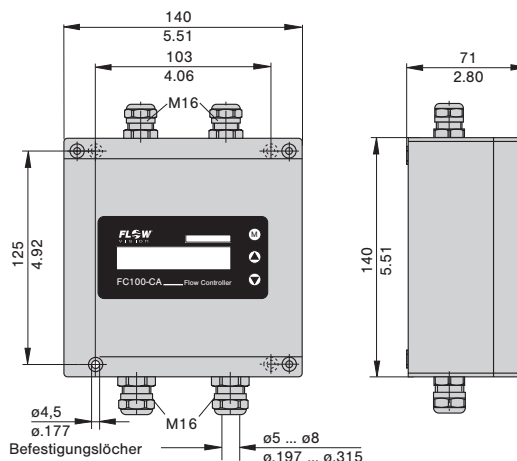
- Menu driven (keypads)
- LC display (2 x 16 digits) can show:
  - actual operating flow velocity/standard flow velocity, operating volume flow/standard volume flow, mass flow, medium temperature;
  - directions for parameter assignment, configuration, diagnostics and error correction;
  - peak value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

## Dimensions

FC100-CA (rail-mounted version)



FC100-FH-CA (surface mounted version)



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

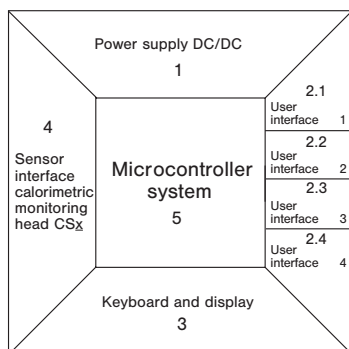
## Ordering information

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

## TECHNICAL DATA

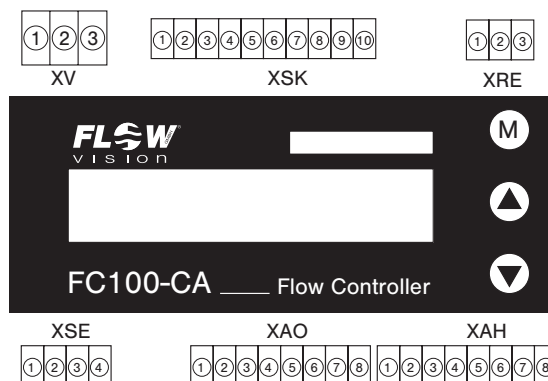
Flow Meter FC100-CA		with CSP monitoring head and sensor adapter TP/ball valve BV	with CST/CSF monitoring head <sup>(2)</sup>																																
<b>General data</b>																																			
Monitoring head applicable in		air, compressed air, oxygen, argon, carbon dioxide, methane/natural gas, nitrogen, hydrogen, other gases on request																																	
Measuring functions		operating/standard flow velocity, operating/standard volume flow rate, mass flow, medium temperature, totalized flow rate																																	
Display		2 x 16 digit LC display																																	
Parameter assignment, configuration by		keypads or PC software																																	
Serial interface		RS232, PC-Software runs on Windows® XP/Windows Vista®/Windows® 7																																	
Temperature range (electronic control unit) in circulating air		+5 °C ... +50 °C/+41 °F ... +122 °F																																	
Standard flow velocity (unit = Nm/s) and standard volume flow rate (unit = Nm³/h) are related to 1013 mbar/14.7 psi and 0 °C/+32 °F Operating flow velocity and operating volume flow rate are related to set pressure and measured temperature																																			
<b>Electrical data</b>																																			
Input voltage		DC 10 V ... 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 limit values + 1 status + 1 pulse output)	open collector outputs DC 36 V / 150 mA / 1,5 W																																	
<b>Flow measurement</b>																																			
Measuring range 0 ... 68 Nm/s (medium air) (display range 0 ... 100 Nm/s) Zero adjustment possible for smallest volume flow quantities Low flow suppression (adjustable, 0 ... 10 % of measuring range final value)	in TP-01	0 - 50 (70) Nm³/h <sup>(1)</sup>	see table flow measurement range (next page) <sup>(2)</sup>																																
	in TP-02	0 - 77 (109) Nm³/h <sup>(1)</sup>																																	
	in TP-03	0 - 120 (170) Nm³/h <sup>(1)</sup>																																	
	in TP-04	0 - 197 (280) Nm³/h <sup>(1)</sup>																																	
	in TP-05	0 - 308 (439) Nm³/h <sup>(2)</sup>																																	
	in TP-06	0 - 480 (685) Nm³/h <sup>(2)</sup>																																	
Accuracy <sup>(4)</sup> 3 % ... 50 % of measuring range $\hat{=}$ 2 ... 34 Nm/s	±3 % of measured value ±0,1 % of MRFV		±5 % of measured value ±0,5 % of MRFV																																
50 % ... 100 % of measuring range $\hat{=}$ 34 ... 68 Nm/s	±4 % of measured value ±1 % of MRFV		±7 % of measured value ±1 % of MRFV																																
Repeatability (5 % MRFV ... 100 % MRFV) <sup>(3)</sup>		±1 % of measured value ±0,5 % of measuring range final value																																	
Temperature drift (of electronic control unit)		0,05 %/°K/measuring range final value																																	
Pressure error		±0,5 %/bar / ±0,5 %/14.5 psi of measured value																																	
Response time (step function)		< 1 s																																	
<b>Temperature measurement</b>																																			
Measuring range		-40 °C ... +130 °C/-40 °F ... +266 °F																																	
Accuracy		±1 % of measuring range																																	
<b>Mechanical data (electronic control unit)</b>																																			
Degree of protection	rail-mounted:	IP20																																	
	surface mounted:	IP65																																	
Materials	rail-mounted:	acrylic vinyl/ styrene/ polycarbonate; heat sink aluminium																																	
	surface mounted:	aluminium Acryl																																	
Housing dimension (LxWxH)		see dimension diagram (previous page)																																	
Mass	rail-mounted:	365 g/0.805 lb																																	
	surface mounted:	1200 g/2.65 lb																																	
Cables	voltage supply	3x0,75 mm² (AWG 18)																																	
	to monitoring head	LifYCY 4x2x0,2 mm² (AWG 24)																																	
	analogue outputs	2 x LifYCY 2x0,25 mm² (AWG 24)																																	
	limit value output	2 x LifYCY 3x0,38 mm² (AWG 22)																																	
Max. cable length to monitoring head		200 m/656 ft																																	
<table border="0"> <tr> <td>(1) measuring ranges for:</td> <td>methane/natural gas:</td> <td>argon and carbon dioxide:</td> <td>hydrogen:</td> </tr> <tr> <td>TP-01 (1/2 in)</td> <td>36 Nm³/h (54 Nm³/h)</td> <td>3,0 - 50 Nm³/h (70 Nm³/h)</td> <td>29,0 Nm³/h (62,3 Nm³/h)</td> </tr> <tr> <td>TP-02 (3/4 in)</td> <td>56 Nm³/h (84 Nm³/h)</td> <td>4,0 - 70 Nm³/h (110 Nm³/h)</td> <td>45,2 Nm³/h (97,3 Nm³/h)</td> </tr> <tr> <td>TP-03/BV-03 (1 in)</td> <td>88 Nm³/h (132 Nm³/h)</td> <td>5,0 - 120 Nm³/h (176 Nm³/h)</td> <td>70,7 Nm³/h (152 Nm³/h)</td> </tr> <tr> <td>TP-04/BV-04 (1.1/4 in)</td> <td>144 Nm³/h (217 Nm³/h)</td> <td>5,0 - 195 Nm³/h (289 Nm³/h)</td> <td>116 Nm³/h (249 Nm³/h)</td> </tr> <tr> <td>TP-05/BV-05 (1.1/2 in)</td> <td>226 Nm³/h (339 Nm³/h)</td> <td></td> <td>181 Nm³/h (389 Nm³/h)</td> </tr> <tr> <td>TP-06/BV-06 (2 in)</td> <td>353 Nm³/h (530 Nm³/h)</td> <td>TP-01 ... TP-04 only</td> <td>283 Nm³/h (608 Nm³/h)</td> </tr> <tr> <td>CSF and CST monitoring heads up to</td> <td>141.343 Nm³/h (212.000 Nm³/h)</td> <td></td> <td>113.112 Nm³/h (243.144 Nm³/h)</td> </tr> </table>				(1) measuring ranges for:	methane/natural gas:	argon and carbon dioxide:	hydrogen:	TP-01 (1/2 in)	36 Nm³/h (54 Nm³/h)	3,0 - 50 Nm³/h (70 Nm³/h)	29,0 Nm³/h (62,3 Nm³/h)	TP-02 (3/4 in)	56 Nm³/h (84 Nm³/h)	4,0 - 70 Nm³/h (110 Nm³/h)	45,2 Nm³/h (97,3 Nm³/h)	TP-03/BV-03 (1 in)	88 Nm³/h (132 Nm³/h)	5,0 - 120 Nm³/h (176 Nm³/h)	70,7 Nm³/h (152 Nm³/h)	TP-04/BV-04 (1.1/4 in)	144 Nm³/h (217 Nm³/h)	5,0 - 195 Nm³/h (289 Nm³/h)	116 Nm³/h (249 Nm³/h)	TP-05/BV-05 (1.1/2 in)	226 Nm³/h (339 Nm³/h)		181 Nm³/h (389 Nm³/h)	TP-06/BV-06 (2 in)	353 Nm³/h (530 Nm³/h)	TP-01 ... TP-04 only	283 Nm³/h (608 Nm³/h)	CSF and CST monitoring heads up to	141.343 Nm³/h (212.000 Nm³/h)		113.112 Nm³/h (243.144 Nm³/h)
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(2) not released for carbon dioxide (CO <sub>2</sub> ) and argon (Ar)																																			
(3) of the set value, at constant temperature and flow conditions and stable thermal conductivity																																			
(4) the accuracy values were determined under ideal conditions: - symmetrical complete flow profile - correct mounting in the pipe - inlets and outlets according to EN ISO 5167-1																																			
MRFV = measuring range final value																																			
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## 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

## Flow measurement range (referring to the medium air)

The flow measurement range is determined by the inner pipe diameter (see table). It can be calculated with the following equation:

$$Q = V_N \times A_R$$

Q (Nm<sup>3</sup>/h) - flow quantity

V<sub>N</sub> (m/h) - average standard velocity

A<sub>R</sub> (m<sup>2</sup>) - inner pipe cross section

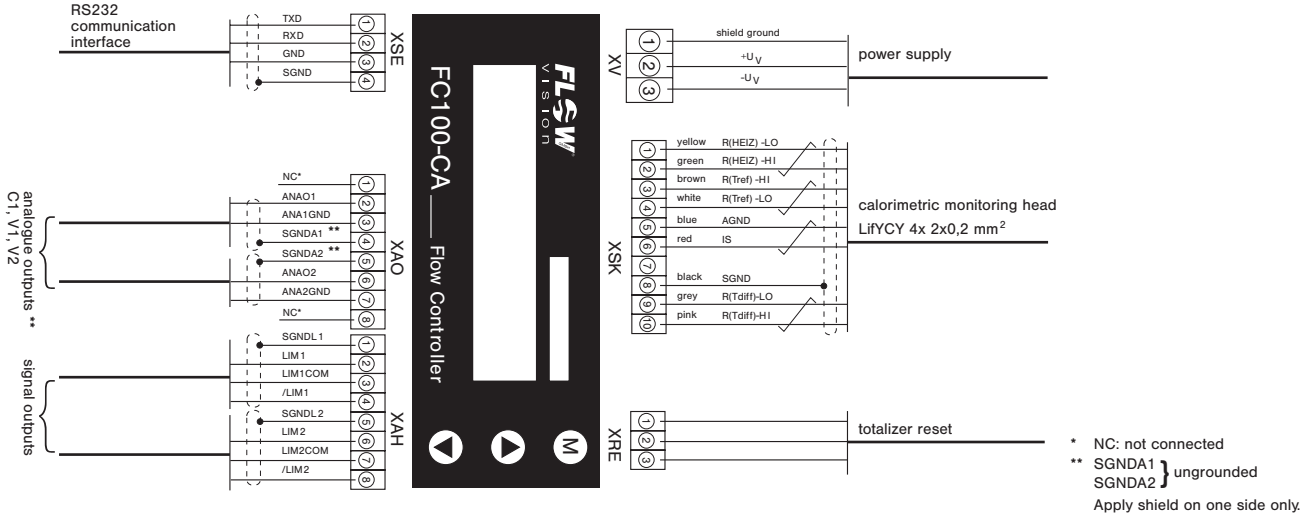
Setting range for inner pipe diameter: 10.0 mm ... 999.9 mm/  
.394 in. ... 39.4 in.

Velocity range: 0 ... 68 Nm/s (100 Nm/s)

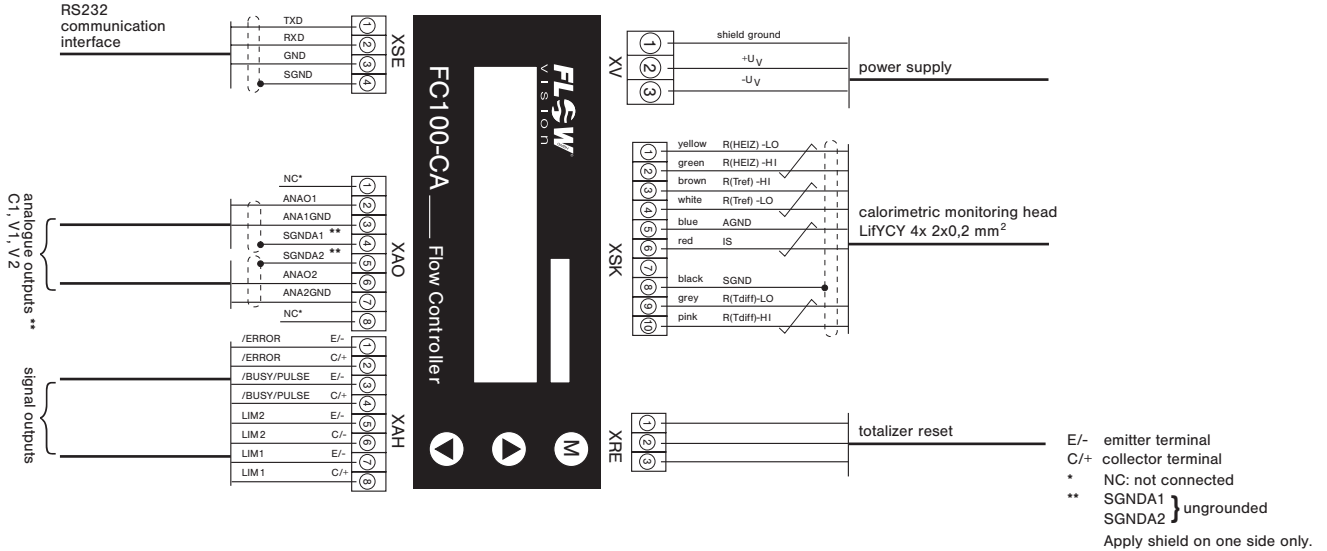
inner pipe diameter D in mm	measuring range in Nm <sup>3</sup> /h	display range in Nm <sup>3</sup> /h	inner pipe diameter D in mm	measuring range in Nm <sup>3</sup> /h	display range in Nm <sup>3</sup> /h
20	76	113	200	7690	11309
30	173	254	250	12016	17671
40	307	452	300	17303	25446
50	480	706	400	30762	4523
60	692	1017	500	48066	70685
70	942	1385	600	69215	101787
80	1230	1809	700	94210	138544
90	1557	2290	800	123049	180955
100	1922	2827	900	155734	229021
150	4325	6361	1000	192265	282743

Connection diagrams

**FC100-CA with relay outputs**

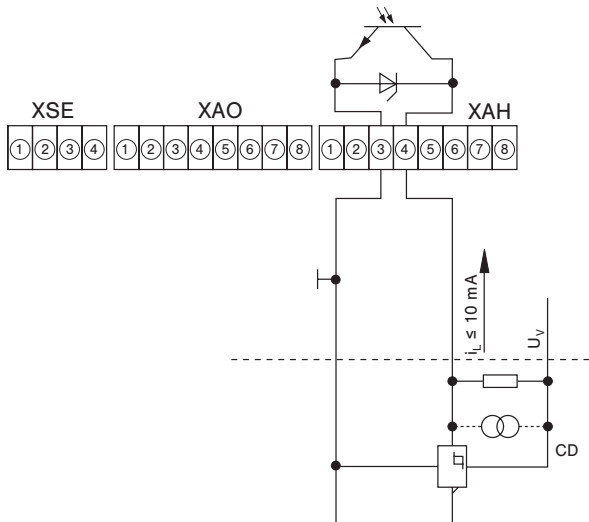


**FC100-CA with transistor outputs**

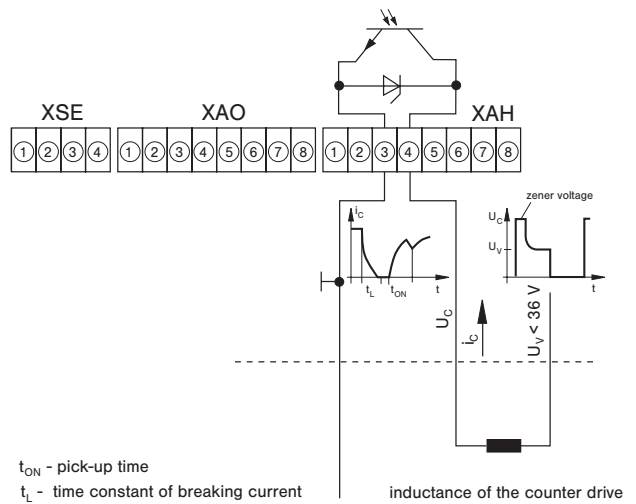


**FC100-CA - Recommended connection of pulse output**

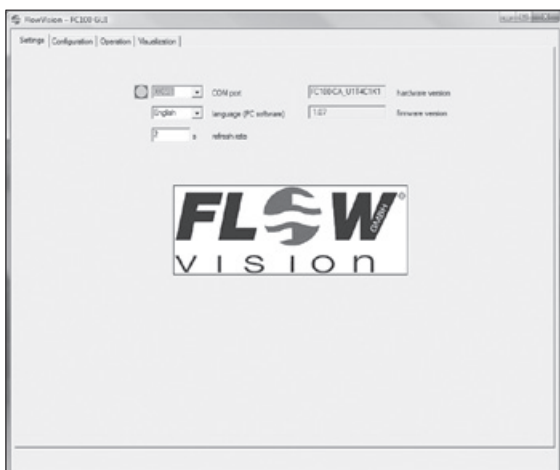
Electronic signal processing



Electromagnetic pulse counter

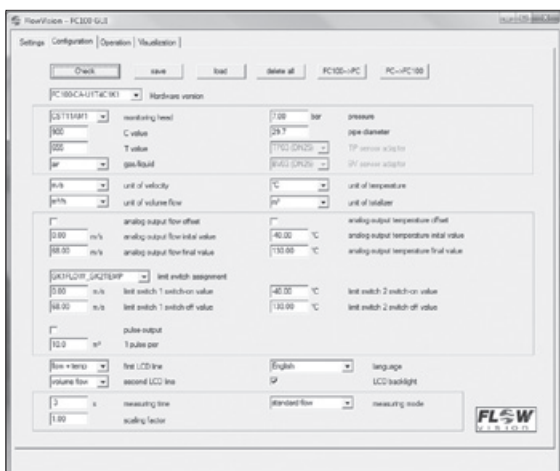


PC-Software



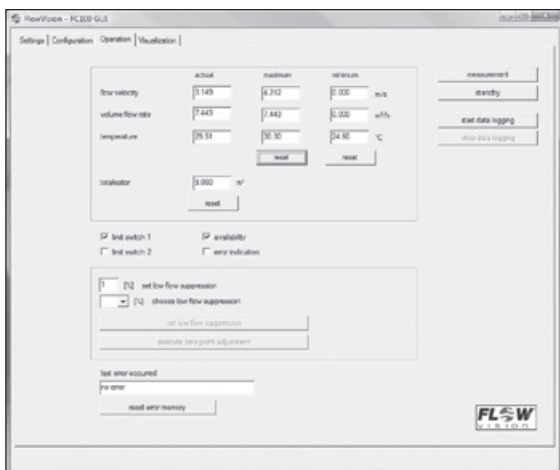
**General Settings:**

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



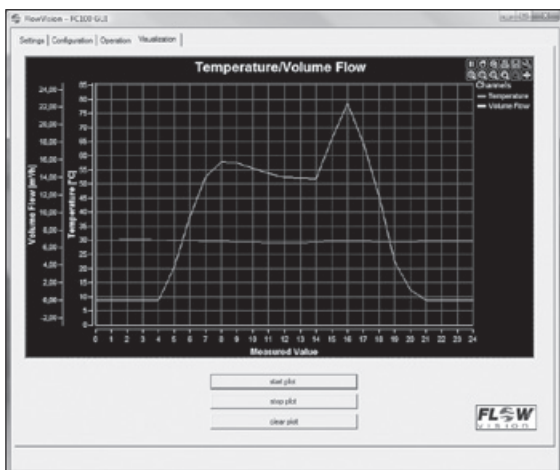
**Configuration of the FC100-CA:**

- 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-CA:**

- Indication of the actual measured values and saved minimum and maximum values
- Indication of the actual condition of the signal outputs
- Setting of the low flow suppression
- 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)

- A
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- B

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**Description**

Sensor adapters TP and BV facilitate correct positioning and exchange of CSP monitoring heads, FC03 or FS10 in pipes with process connection DN 15 ... DN 50.

Ball valve BV enables pressure-free installation and removal of CSP monitoring heads, Flow Meter FC03 and Flow Monitor FS10 simply by closing the input and output pipe. The measuring points are suited to temporary measurements; after completion of the measuring cycle they can be closed by means of blanking plugs.

**Sensor adapter TP... / Ball valve BV...**



TP...

BV...

**Features**

- Correct positioning of the sensor
- Ease of sensor replacement
- Measuring point can be closed if not used
- Sensor adapter available as screw-in or welding type
- Ball valve also serves as a shutoff valve (both input and output)
- Carbon dioxide (CO<sub>2</sub>) and argon (Ar): only approved for TP-01 ... 04

**Ordering information**

Type	
<b>BV</b>	ball valve with internal thread
Process connection/Nominal size	
<b>03</b>	DN 25 G1 internal thread length: 88 mm/3.46 in.
<b>04</b>	DN 32 G1 1/4 internal thread length: 100 mm/3.94 in.
<b>05</b>	DN 40 G1 1/2 internal thread length: 110 mm/4.33 in.
<b>06</b>	DN 50 G2 internal thread length: 131 mm/5.16 in.
Material of the area exposed to medium	
<b>M3</b>	nickel plated brass, Delrin seal
<b>BV - 03</b>	<b>M3</b> ordering example

**Ordering information**

Type	
<b>TP</b>	Sensor adapter with internal thread
Process connection/Nominal size	
<b>01</b>	DN 15 G 1/2 internal thread length: 50 mm/1.97 in.
<b>02</b>	DN 20 G 3/4 internal thread length: 64 mm/2.52 in.
<b>03</b>	DN 25 G1 internal thread length: 78 mm/3.07 in.
<b>04</b>	DN 32 G1 1/4 internal thread length: 94 mm/3.70 in.
<b>05</b>	DN 40 G1 1/2 internal thread length: 110 mm/4.33 in.
<b>06</b>	DN 50 G2 internal thread length: 138 mm/5.43 in.
Material of the area exposed to medium	
<b>M1</b>	stainless steel 1.4571/AISI 316Ti PN 315 bar/4570 psi
<b>M3</b>	brass (not TP-03..) PN 25 bar/363 psi
<b>M5</b>	red brass (only TP-03..) PN 16 bar/232 psi
<b>TP - 01</b>	<b>M3</b> ordering example

**Accessories**

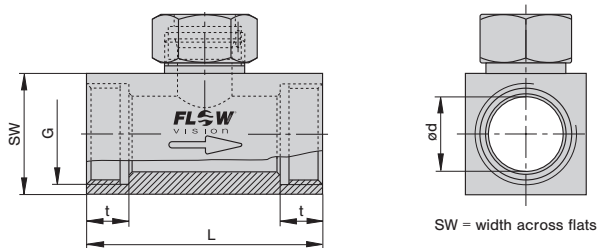
Description	Ref. No.
Blanking plug, brass, with O ring	0Z121Z000186
Union nut, brass	Y 306 901 01
Blanking plug, stainless steel 1.4571/AISI 316 Ti, with viton O ring	0Z121Z000187
Union nut, stainless steel	Y 306 901 03

**Ordering information**

Type	
<b>TP</b>	Sensor adapter with welding nipples
Process connection/Nominal size	
<b>01</b>	DN 15 dia.d: 16 mm/.630 in. length: 80 mm/3.15 in.
<b>02</b>	DN 20 dia.d: 20 mm/.787 in. length: 70 mm/2.76 in.
<b>03</b>	DN 25 dia.d: 25 mm/.984 in. length: 80 mm/3.15 in.
<b>04</b>	DN 32 dia.d: 32 mm/1.26 in. length: 100 mm/3.94 in.
<b>05</b>	DN 40 dia.d: 40 mm/1.57 in. length: 110 mm/4.33 in.
<b>06</b>	DN 50 dia.d: 50 mm/1.97 in. length: 140 mm/5.51 in.
Material of the area exposed to medium	
<b>M1</b>	stainless steel 1.4571/AISI 316Ti
Process connection	
<b>SA</b>	welded connection
<b>TP - 01</b>	<b>M1 - SA</b> ordering example

**Dimensions**

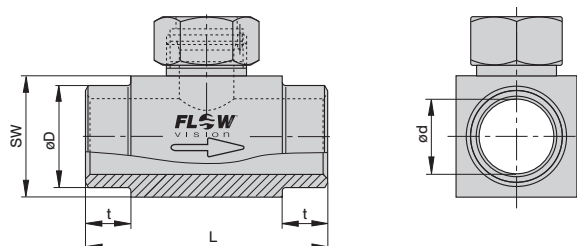
**TP... Sensor adapter with internal thread**



Material stainless steel (-M1): PN 315 bar / 4570 psi  
 Material brass (-M3): PN 25 bar / 363 psi  
 Material red brass (-M5): PN 16 bar / 232 psi

Type	DN		dia. d		G	t		L		SW	
	mm	in.	mm	in.	in.	mm	in.	mm	in.	mm	in.
TP-01 ...	15	.591	16	.630	1/2"	11	.433	50	1.97	27	1.06
TP-02 ...	20	.787	20	.787	3/4"	12	.472	64	2.52	32	1.26
TP-03 ...	25	.984	25	.984	1"	14	.551	78	3.07	40	1.57
TP-04 ...	32	1.26	32	1.26	1 1/4"	15	.591	94	3.70	50	1.97
TP-05 ...	40	1.57	40	1.57	1 1/2"	15	.591	110	4.33	55	2.16
TP-06 ...	50	1.97	50	1.97	2"	19	.748	138	5.43	70	2.76

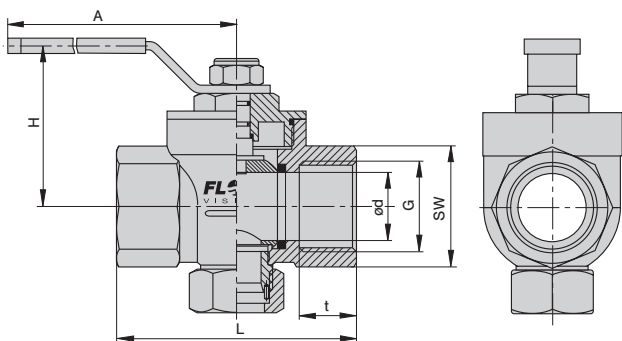
**TP...M1-SA Sensor adapter with welding nipples**



PN 315 bar / 4570 psi

Type	DN		dia. d		dia. D		t		L		SW	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
TP-01M1-S A	15	.591	16	.630	21.3	.839	15	.591	80	3.15	27	1.06
TP-02M1-S A	20	.787	20	.787	26.9	1.06	15	.591	70	2.76	32	1.26
TP-03M1-S A	25	.984	25	.984	33.7	1.33	15	.591	80	3.15	40	1.57
TP-04M1-S A	32	1.26	32	1.26	42.4	1.67	15	.591	100	3.94	50	1.97
TP-05M1-S A	40	1.57	40	1.57	48.3	1.90	15	.591	110	4.33	55	2.16
TP-06M1-S A	50	1.97	50	1.97	60.3	2.37	15	.591	140	5.51	70	2.76

**BV...M3 Ball valve with internal thread**



PN 25 bar / 363 psi

Type	DN		dia. d		G	t		L		SW		H		A	
	mm	in.	mm	in.	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
BV-03M3	25	.984	25	.984	1"	21	.827	88	3.46	41	1.61	59	2.32	115	4.53
BV-04M3	32	1.26	32	1.26	1 1/4"	24	.945	100	3.94	50	1.97	65	2.56	115	4.53
BV-05M3	40	1.57	40	1.57	1 1/2"	24	.945	110	4.33	54	2.13	77	3.03	150	5.91
BV-06M3	50	1.97	50	1.97	2"	28	1.10	131	5.16	70	2.76	85	3.35	150	5.91

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

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**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 **CSP** and **FC100-CA, FC100-FH-CA**

**Do + Ka type 15** **PVC** insulated cable, type LiFYCY 4x2x0.2 mm<sup>2</sup> (AWG 24)  
8-pole round connector + 10-pole clamping connector

**Do + Ka type 18** **silicone** insulated cable, type 4x2x0.2 mm<sup>2</sup> (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 (up to max. 656 ft)

**Do + Ka type 15 - 2 m** ordering example

**Description**

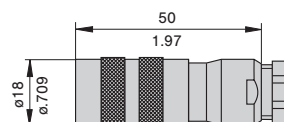
Cable between Flow Meter FC100-xxx and calorimetric monitoring head type CSP.

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

**Accessories**

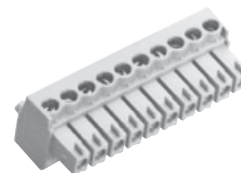
**8-pole round connector**

(without cable, for individual wiring by customer)  
**OZ112Z003124**



**10-pole clamping connector for cable types 15 and 18**

(without cable, for individual wiring by customer)  
**OZ112Z000167**



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

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

**Description**

**A** Thread-mounted calorimetric monitoring head for flow Meter FC100-CA, suitable for compressed air applications.

**Features**

- Suitable for installation in welding sleeves
- Medium temperature: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti, or Hastelloy alloy C4/2.4610
- Not suitable for carbon dioxide and argon!

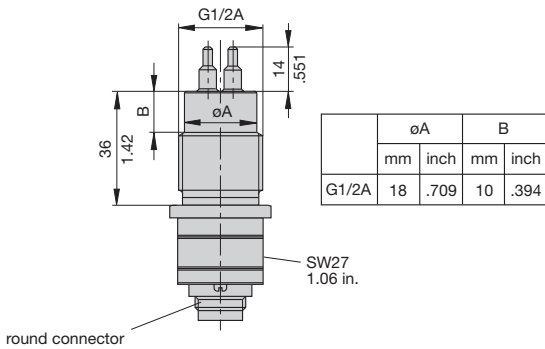
**Ordering information**

<b>Type No.</b>	CST	Thread-mounted monitoring head with calorimetric sensors
<b>Process connection</b>	11	thread size G1/2A
<b>Medium</b>	A	air
<b>Material of areas exposed to medium</b>	M1	stainless steel 1.4571/AISI 316 Ti (standard)
	M2	nickel-based alloy Hastelloy alloy C4/2.4610
<b>Length of shank/thread</b>	L10	36 mm (standard)
<b>Electrical connection</b>	E10	round connector with tinned contacts (plug and cable to order separately)
<b>Certification</b>	T0	without certificate (standard) *
<b>Specification of medium</b>	xxx	

CST - 11 A M1 L10 E10 T0 - ... ordering example

\*) for detailed information please see section 0.

**Dimensions of round connector**



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

**Thread-mounted calorimetric monitoring head**



**CST-11**

**Technical data**

Type of head	thread-mounted
Thread	G1/2A
Length of shank	36 mm/1.42 in.
Length of sensor	14 mm/.551 in.
Suitable for	air, compressed air, nitrogen, oxygen, methane, hydrogen and other gases (please enquire)
Temperature range *)	-40 °C ... +130 °C/-40 °F ... +266 °F (of gas)
Temperature drift of monitoring head	± < 0.05 %/°K/measuring range (in the range between +20 °C ... +80 °C/ +68 °F ... +176 °F)
Measuring ranges:	Average standard flow velocity x pipe cross section
Flow velocity range:	0 - 68 (100) Nm/s
Pressure resistance <sup>(1)</sup>	100 bar / 1450 psi
Degree of protection	connector <sup>(2)</sup> : IP67
Material	stainless steel 1.4571/AISI 316 Ti Hastelloy C4
Cable to electronic control unit	LifYCY 4x2x0.2 mm <sup>2</sup> (AWG 24)

<sup>(1)</sup> Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)

<sup>(2)</sup> with mating connector

<sup>\*)</sup> max. +85 °C/+185 °F in the connector area

**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-CA, FC100-FH-CA**

<b>Do + Ka type 15</b>	<b>PVC</b> insulated cable, type LifYCY 4x2x0.2 mm <sup>2</sup> (AWG 24) 8-pole round connector + 10-pole clamping connector
<b>Do + Ka type 18</b>	<b>silicone</b> insulated cable, type 4x2x0.2 mm <sup>2</sup> (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 (up to max. 656 ft)
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**Do + Ka type 15 - 2 m** ordering example

**Description**

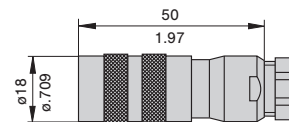
Cable between Flow Meter FC100-xxx and calorimetric monitoring head type CST.

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

**Accessories**

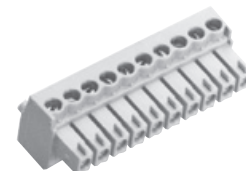
**8-pole round connector**

(without cable, for individual wiring by customer)  
**0Z112Z003124**



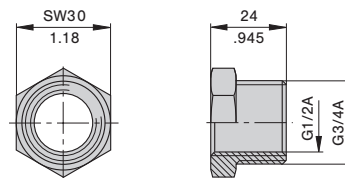
**10-pole clamping connector for cable types 15 and 18**

(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.

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**Description**

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

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

**Features**

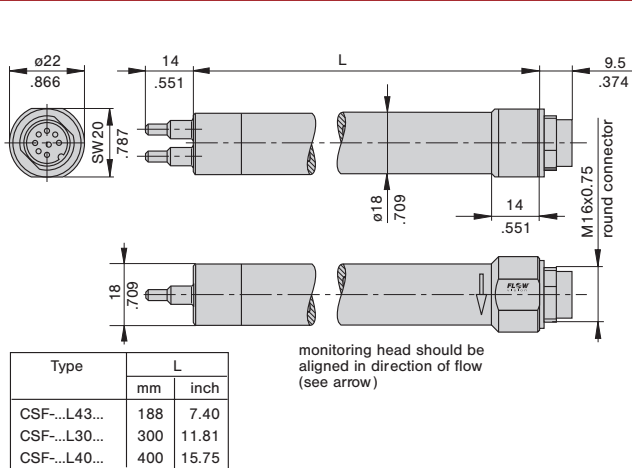
- Medium temperature range  
Stainless steel version: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti
- Not suitable for carbon dioxide and argon!

**Ordering information**

<b>Type</b>	<b>CSF</b>	Extended monitoring head with calorimetric sensors
	<b>Monitoring head design</b>	
	<b>11</b>	Monitoring head with variable immersion depth
	<b>Medium</b>	
	<b>A</b>	air
	<b>Material of areas exposed to medium</b>	
	<b>M1</b>	stainless steel 1.4571/AISI 316 Ti
	<b>M2</b>	nickel-base alloy Hastelloy alloy C4 2.4610
	<b>Process connection</b>	
	<b>00</b>	without flange; see accessories for connections
	<b>Length of shank/thread</b>	
	<b>L43</b>	188 mm (standard) other lengths upon request
	<b>Electrical connection</b>	
	<b>E10</b>	round connector with tinned contacts (plug and cable to order separately)
	<b>Certification</b>	
	<b>T0</b>	without certificate (standard *)
	<b>Specification of medium</b>	
	<b>xxx</b>	
<b>CSF - 11 A M1 00 L43 E10 T0 - ...</b>		ordering example

\*) for detailed information please see section 0

**Dimensions**



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

**Monitoring head CSF**



**CSF-11**  
variable immersion depth

**Technical data**

Type of head	push-in
Shank diameter	18 mm/.709 in. without thread
Length of shank	188 mm/7.40 in.
Length of sensor	14 mm/.551 in.
Suitable for	air, compressed air, nitrogen, oxygen, methane, hydrogen and other gases (please enquire)
Temperature range*) (of gas)	-40 °C ... +130 °C/-40 °F ... +266 °F (stainless steel)
Temperature drift of sensor	± < 0.05 %/°K/measuring range (in the range between +20 °C ... +80 °C/ +68 °F ... +176 °F)
Measuring ranges:	depending on immersion depth;
Flow velocity range:	0 - 68 (100) Nm/s
Pressure resistance <sup>(1)</sup> (sensor)	100 bar/1450 psi (stainless steel)
Pressure resistance <sup>(1)</sup> (installation)	depending on connection (see accessories)
Degree of protection	connector <sup>(2)</sup> : IP67
Material	stainless steel 1.4571/AISI 316 Ti
Cable to electronic unit	LifYCY 4x2x0.2 mm <sup>2</sup> (AWG 24)

<sup>(1)</sup> Admissible operating pressure DIN 2401, measured at max. temperature (= max. medium temperature)

<sup>(2)</sup> with mating connector

<sup>\*)</sup> max. +85 °C/+185 °F in the connector area

**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

**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)

**Ordering information**

**Type** between calorimetric monitoring heads **CSF** and **FC100-CA, FC100-FH-CA**

**Do + Ka type 15** PVC insulated cable, type LiFYCY 4x2x0.2 mm<sup>2</sup> (AWG 24) 8-pole round connector + 10-pole clamping connector

**Do + Ka type 18** silicone insulated cable, type 4x2x0.2 mm<sup>2</sup> (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 (up to max. 656 ft)
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**Do + Ka type 15 - 2 m** ordering example

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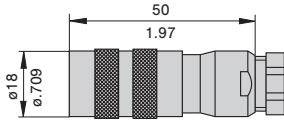
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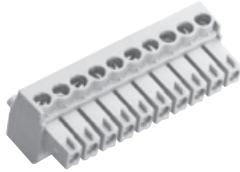
**Accessories**

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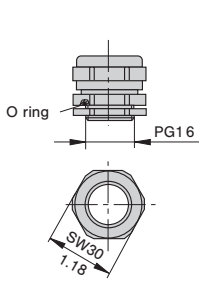
**8-pole round connector**  
(without cable, for individual wiring by customer)  
**OZ112Z003124**



**10-pole clamping connector for cable types 15 and 18**  
(without cable, for individual wiring by customer)  
**OZ112Z000167**

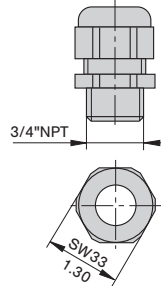


**PG16 nickel-plated brass**  
(standard)  
**OZ122Z000128**



pressure resistant up to 2 bar/29.0 psi

**NPT3/4" moulded, black**  
**OZ122Z000131**

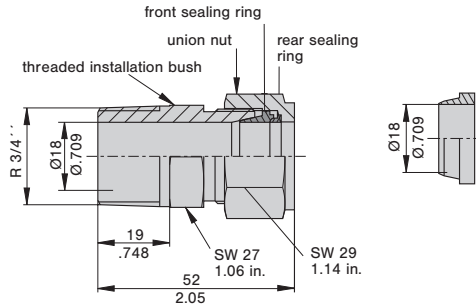


pressure resistant up to 2 bar/29.0 psi

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

**Threaded installation bush**  
**OZ122Z000196**

**Teflon sealing ring**  
**OZ122Z000197**

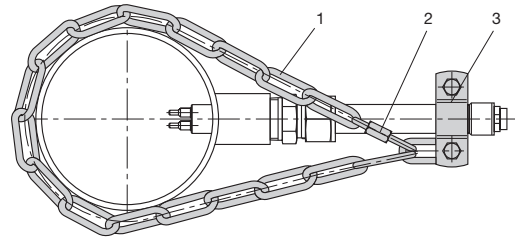


Suitable up to 25 bar/363 psi if used with stainless steel CSF-11 monitoring head. (Observe instructions for installation.)\*\*\*

**Caution:** Stainless steel ring is designed to cut into monitoring head. Pressure resistant to 25 bar/363 psi. Teflon ring can only be used from 0 to 2 bar (29.0 psi).

Please observe user manual !

\*\*\*) **Caution:** The threaded installation bush is not made of Hastelloy alloy C4. The user has to check suitability of the threaded installation bush with regard to chemical resistance. Otherwise he will have to use a suitable moulded installation bush and will then have to observe the applicable pressure and temperature limits.



- 1 chain 4 x 32 DIN 5685 (approx. 1 m/3.28 ft)
- 2 catch for chain NG 5
- 3 clip with screw and nuts DN15 to DIN 11850

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

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