

## Description

Microcontroller operated Flow Meter for gases such as air, compressed air, oxygen, nitrogen, argon, carbon dioxide, methane/natural gas and hydrogen. The FC01-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.

## 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;
  - bargraph status indication of limit contacts, actual flow rate/quantity or medium temperature;
  - directions for parameter assignment, configuration, diagnostics and error correction;
  - base value indication
- Two scalable analogue outputs
- Minimum/maximum memory of flow velocity and temperature
- Two freely selectable limit contacts
- Volume- or mass flow dependent pulse output

## Ordering information

### Type

<b>FC01-CA</b>	Flow Meter with software for mass measurement of gases, rail mounted
<b>FC01-FH-CA</b>	Flow Meter with software for mass measurement of gases, surface mounted
<b>FC01-ST-CA</b>	Flow Meter with software for mass measurement of gases, front panel mounted

### Input voltage

**U1** DC 19...32 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)

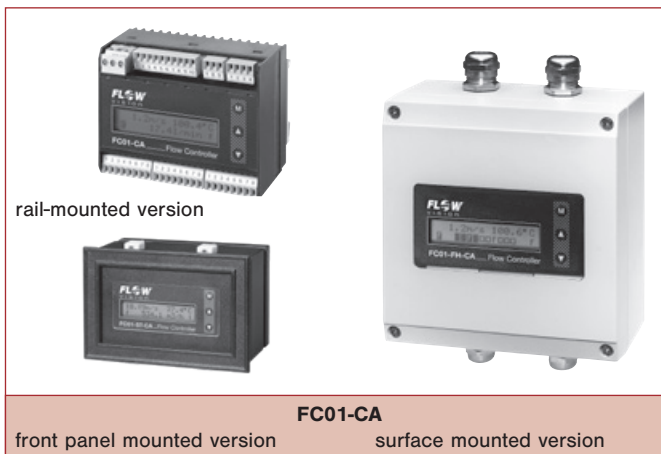
### Analogue outputs

**V1** 0/1-5 Volt

**V2** 0/2-10 Volt

**C1** 0/4-20 mA (self-powered, galvanically isolated)

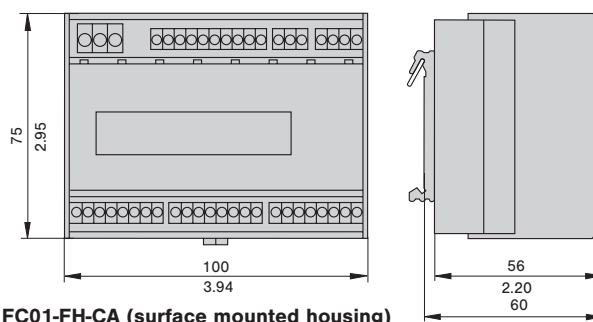
**FC01-CA - U1 R2 V1** ordering example



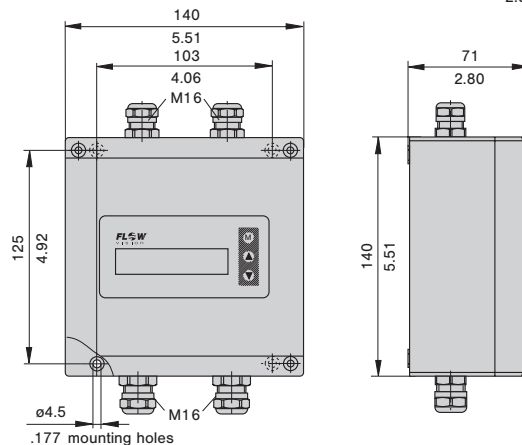
FC01-CA  
front panel mounted version      surface mounted version

## Dimensions

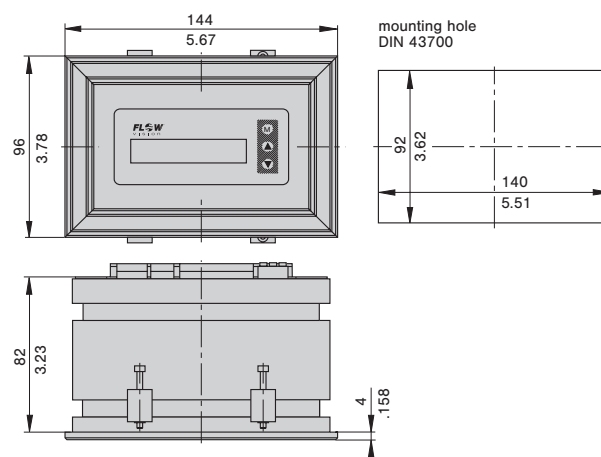
### FC01-CA (rail-mounted housing)



### FC01-FH-CA (surface mounted housing)



### FC01-ST-CA (front panel mounted housing)

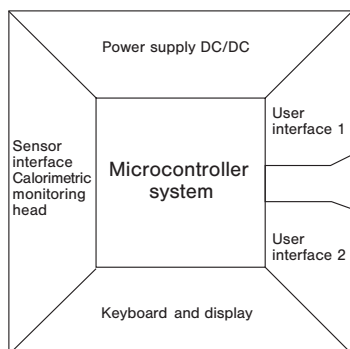


This is a metric design and millimeter dimensions take precedence (mm / inch)

## TECHNICAL DATA

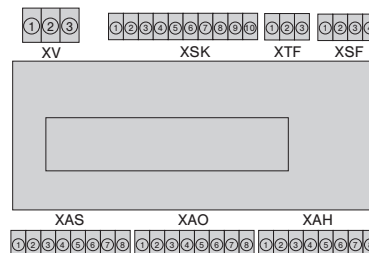
Flow Meter FC01-CA		with CSP monitoring head and sensor adapter TP/ball valve BV	with CST/CSF monitoring head <sup>(2)</sup>
<b>General data</b>			
Monitoring heads applicable in		air, compressed air, oxygen, argon, carbon dioxide, methane/natural gas, nitrogen, hydrogen, other gases on request	
Measuring 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, calibration by:		keypads	
Temperature range (electronic control unit) in circulating air		+10 °C ... +50 °C/+50 °F ... +122 °F *)	
Standard flow velocity (unit = Nm/s) and standard volume flow rate (unit = Nm <sup>3</sup> /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 24 V (19 ... 32 V)	
Power consumption		DC 200 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) valid up to 12 bar abs., > 12 bar abs. upon request  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) Nm <sup>3</sup> /h <sup>(1)</sup>	see table flow measurement range (next page) <sup>(2)</sup>
	in TP-02	0 - 77 (109) Nm <sup>3</sup> /h <sup>(1)</sup>	
	in TP-03	0 - 120 (170) Nm <sup>3</sup> /h <sup>(1)</sup>	
	in TP-04	0 - 197 (280) Nm <sup>3</sup> /h <sup>(1)</sup>	
	in TP-05	0 - 308 (439) Nm <sup>3</sup> /h <sup>(2)</sup>	
	in TP-06	0 - 480 (685) Nm <sup>3</sup> /h <sup>(2)</sup>	
Accuracy <sup>(3)</sup> 3 % ... 50 % of measuring range $\hat{=}$ 2 ... 34 Nm/s	$\pm 3$ % of measured value $\pm 0,1$ % of MRFV		$\pm 5$ % of measured value $\pm 0,5$ % of MRFV
50 % ... 100 % of measuring range $\hat{=}$ 34 ... 68 Nm/s	$\pm 4$ % of measured value $\pm 1$ % of MRFV		$\pm 7$ % of measured value $\pm 1$ % of MRFV
Repeatability (5 % MRFV ... 100 % MRFV) <sup>(3)</sup>		$\pm 1$ % of measured value $\pm 0,5$ % of measuring range final value	
Temperature drift <sup>(4)</sup> (of electronic control unit)		0,05 %/°K/measuring range final value	
Pressure error		$\pm 0,5$ %/bar / $\pm 0,5$ %/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		$\pm 1$ % of measuring range	
<b>Mechanical data (electronic control unit)</b>			
Degree of protection	rail-mounted:	IP20	
	surface mounted:	IP65	
	front panel mounted:	IP65	
Materials	rail-mounted:	acrylic vinyl/ styrene/ polycarbonate; heat sink aluminium	
	surface mounted:	aluminium Acryl	
	front panel mounted:	aluminium, black coated; display polyester foil	
Housing dimension (LxWxH)		see dimension diagram (previous page)	
Mass	rail-mounted:	485 g/1.07 lb	
	surface mounted:	1250 g/2.76 lb	
	front panel mounted:	900 g/1.98 lb	
Cables	voltage supply	3x0,75 mm <sup>2</sup> (AWG 18)	
	to monitoring head	LifYCY 4x2x0,2 mm <sup>2</sup> (AWG 24)	
	analogue outputs	2 x LifYCY 2x0,25 mm <sup>2</sup> (AWG 24)	
	limit value output	2 x LifYCY 3x0,38 mm <sup>2</sup> (AWG 22)	
Max. cable length to monitoring head		200 m/656 ft	
*) with output C1 the max. admissible ambient temperature for the rail-mounted version is limited to +40 °C/+104 °F			
**) with output C1, power consumption may be up to 300 mA $\pm$ 10 %			
(1) measuring ranges for:	methan/natural gas:	argon and carbon dioxide:	hydrogen:
TP-01(1/2 in)	36 Nm <sup>3</sup> /h (54 Nm <sup>3</sup> /h)	3,0 - 50 Nm <sup>3</sup> /h (70 Nm <sup>3</sup> /h)	29,0 Nm <sup>3</sup> /h (62,3 Nm <sup>3</sup> /h)
TP-02 (3/4 in)	56 Nm <sup>3</sup> /h (84 Nm <sup>3</sup> /h)	4,0 - 70 Nm <sup>3</sup> /h (110 Nm <sup>3</sup> /h)	45,2 Nm <sup>3</sup> /h (97,3 Nm <sup>3</sup> /h)
TP-03/BV-03 (1 in)	88 Nm <sup>3</sup> /h (132 Nm <sup>3</sup> /h)	5,0 - 120 Nm <sup>3</sup> /h (176 Nm <sup>3</sup> /h)	70,7 Nm <sup>3</sup> /h (152 Nm <sup>3</sup> /h)
TP-04/BV-04 (1.1/4 in)	144 Nm <sup>3</sup> /h (217 Nm <sup>3</sup> /h)	5,0 - 195 Nm <sup>3</sup> /h (289 Nm <sup>3</sup> /h)	116 Nm <sup>3</sup> /h (249 Nm <sup>3</sup> /h)
TP-05/BV-05 (1.1/2 in)	226 Nm <sup>3</sup> /h (339 Nm <sup>3</sup> /h)		181 Nm <sup>3</sup> /h (389 Nm <sup>3</sup> /h)
TP-06/BV-06 (2 in)	353 Nm <sup>3</sup> /h (530 Nm <sup>3</sup> /h)	TP-01 ... TP-04 only	283 Nm <sup>3</sup> /h (608 Nm <sup>3</sup> /h)
CSF and CST monitoring heads up to	50 Nm <sup>3</sup> /h (75 Nm <sup>3</sup> /s)		40 Nm <sup>3</sup> /s (86 Nm <sup>3</sup> /s)
(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) warm-up time to full accuracy: 15 minutes			
(5) 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			

## Block diagram



- Input voltage:** DC 19 ... 32 V
- Keyboard/display:** keypads  
LC display  
2 x 16 digits
- User interface 1:** relay outputs: 2 limit values  
transistor outputs: 2 limit values +  
1 error indication +  
1 busy or quantity dependent  
pulse output (software selected)
- User interface 2:** analogue outputs  
current or voltage
- Controller system:** signal processing  
I/O - controlling  
monitoring  
parameter memory
- Sensor interfaces:** calorimetric monitoring head

## Connection diagram



- Wire size:** 0.14 mm<sup>2</sup> to 1.5 mm<sup>2</sup> single or finely stranded conductor
- Stripping length:** 6.5 mm
- Clamping screw:** M2 (nickel-plated brass)
- Contact material:** pre-tinned tin bronze
- XV:** current supply
- XSK:** calorimetric monitoring head
- XTF:** keyboard release
- XSF:** not released for user
- XAS:** not released for user
- 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	45239
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

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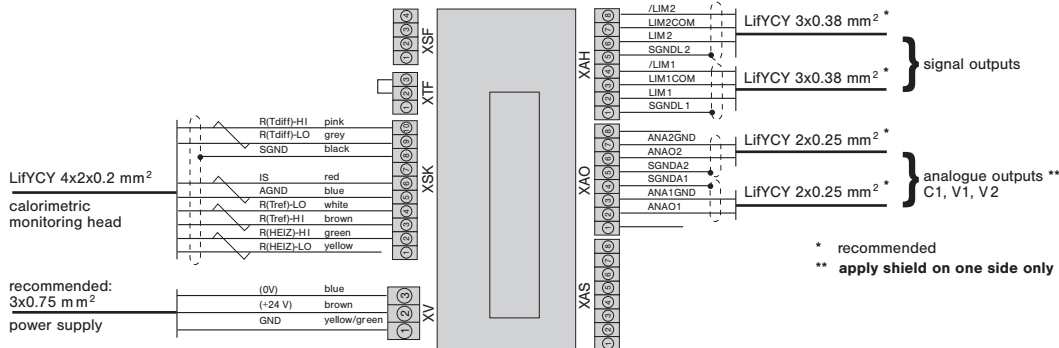
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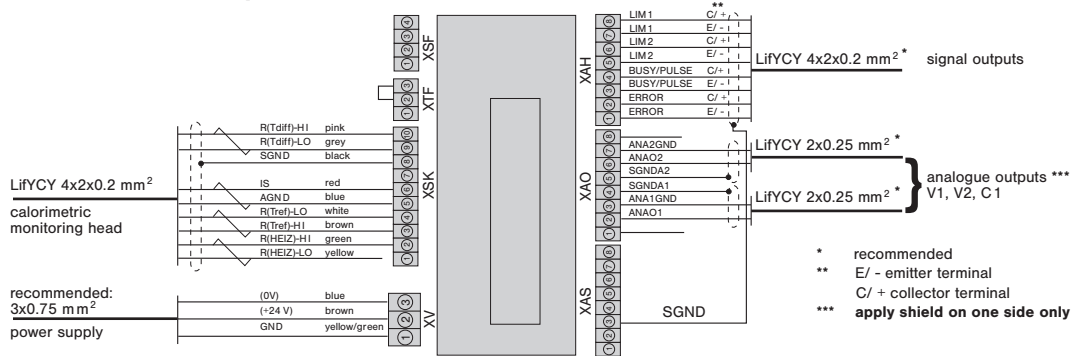
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**Connection diagrams**

**FC01-CA with relay outputs**

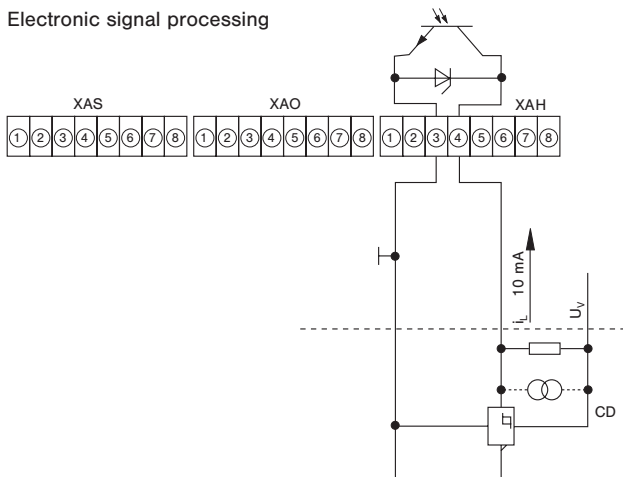


**FC01-CA with transistor outputs**

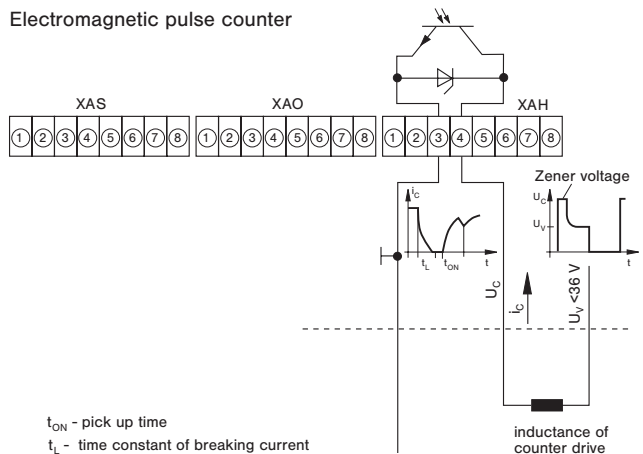


**FC01-CA - Recommended connection of pulse output**

**Electronic signal processing**



**Electromagnetic pulse counter**



All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

**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.

**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>TP</b>	Sensor adapter with internal thread
<b>Process connection/Nominal size</b>	
<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 G 1 internal thread length: 78 mm/3.07 in.
<b>04</b>	DN 32 G 1 1/4 internal thread length: 94 mm/3.70 in.
<b>05</b>	DN 40 G 1 1/2 internal thread length: 110 mm/4.33 in.
<b>06</b>	DN 50 G 2 internal thread length: 138 mm/5.43 in.
<b>Material of the area exposed to medium</b>	
<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

**Ordering information**

Type	
<b>TP</b>	Sensor adapter with welding nipples
<b>Process connection/Nominal size</b>	
<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.
<b>Material of the area exposed to medium</b>	
<b>M1</b>	stainless steel 1.4571/AISI 316Ti
<b>Process connection</b>	
<b>SA</b>	welded connection
<b>TP - 01</b>	<b>M1 - SA</b> ordering example

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



**Ordering information**

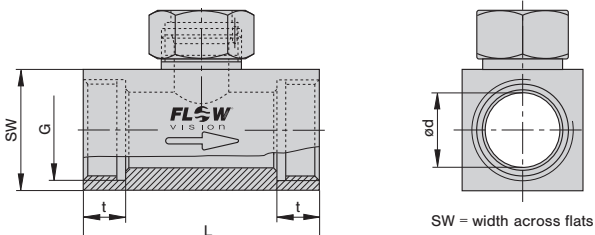
Type	
<b>BV</b>	ball valve with internal thread
<b>Process connection/Nominal size</b>	
<b>03</b>	DN 25 G1 internal thread length: 88 mm/3.46 in.
<b>04</b>	DN 32 G1 1/4 internal thread length: 100 mm/3.94 in.
<b>05</b>	DN 40 G1 1/2 internal thread length: 110 mm/4.33 in.
<b>06</b>	DN 50 G2 internal thread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

**Dimensions**

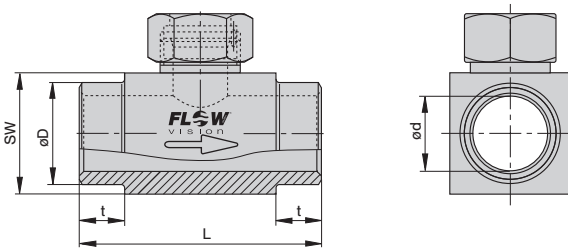
**TP... Sensor adapter with internal thread**



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

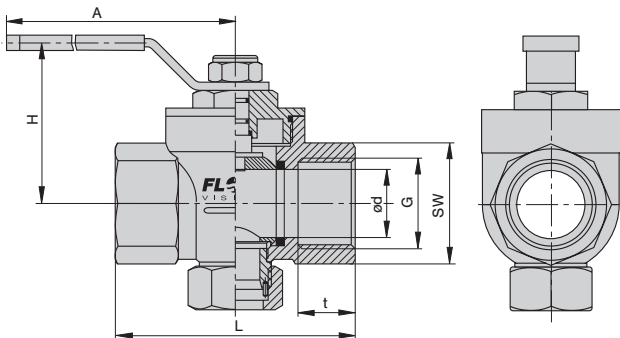
**TP...M1-SA Sensor adapter with welding nipples**



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 ( $\frac{\text{mm}}{\text{inch}}$ )

**Description**

Calorimetric plug-in type monitoring head for sensor adapter TP/BV and flow meter FC01-CA, suitable for compressed-air applications and for measurement of gases.

**Features**

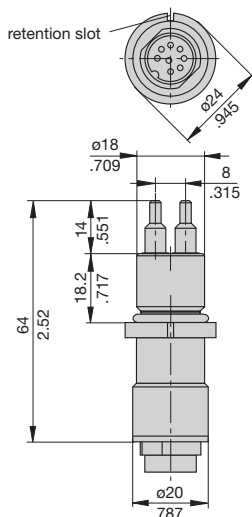
- Ease of installation
- Small physical size
- Medium temperature range: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti
- Sealing: Viton O ring

**Ordering information**

<b>Type No.</b>	
<b>CSP</b>	plug-in type monitoring head with calorimetric sensors
<b>Process connection</b>	
<b>11</b>	plug-in type
<b>Medium</b>	
<b>A</b>	air (standard)
<b>Material of areas exposed to medium</b>	
<b>M1</b>	stainless steel 1.4571/AISI 316 Ti (standard)
<b>Length of shank/thread</b>	
<b>L05</b>	18.2 mm (standard)
<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>CSP - 11 A M1 L05 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 CSP**



CSP-11

**Technical data**

Type of head	plug-in type
Shank diameter	18 mm/.709 in.
Length of shank	18.2 mm/.717 in.
Length of sensor	14 mm/.551 in.
Suitable for	air, compressed air, nitrogen, oxygen, argon, carbon dioxide, methane, hydrogen and other gases (please enquire)
Temperature range *) (of gas)	-40 °C ... +130 °C/-40 °F ... +266 °F
Temperature drift of monitoring head	±< 0.05 %/°K/measuring range (in the range between +20°C ... +80°C/ +68 °F ... +176 °F)
Measuring ranges (air)	in TP01 0 - 50 Nm³/h in TP02 0 - 77 Nm³/h in TP03 0 - 120 Nm³/h in TP04 0 - 197 Nm³/h in TP05 0 - 308 Nm³/h in TP06 0 - 480 Nm³/h
Pressure resistance <sup>(1)</sup>	100 bar/1450 psi
Degree of protection	connector <sup>(2)</sup> : IP67
<b>Material</b>	
housing	stainless steel 1.4571/AISI 316 Ti laser welded
O ring	Viton
Cable to electronic control unit	LiYCY 4x2x0.2 mm² (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

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**Cable types 15/18 with connectors**



**Do + Ka type 15**  
**Do + Ka type 18**

**Do + Ka type 15-ST**  
**Do + Ka type 18-ST**

**Technical data**

**Cable type 15 and 15-ST**

**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 and 18-ST**

**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**

**Typ** between calorimetric monitoring heads **CSP** and **FC01-CA, FC01-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

**Typ** between calorimetric monitoring heads **CSP** and **FC01-ST-CA**

<b>Do + Ka type 15-ST</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-ST</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-ST - 2 m** ordering example

**Description**

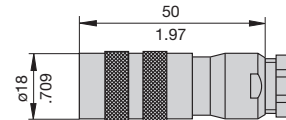
Cable between Flow Meter FC01-xxx and calorimetric monitoring head type CSP.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FC01-xxx by means of 10-pole clamping connector (XSK)

**Accessories**

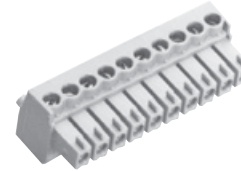
**8-pole round connector**

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



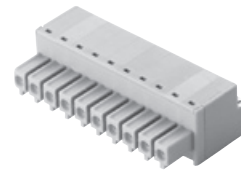
**10-pole clamping connector for cable types 15 and 18**

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



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

(without cable, for individual wiring by customer)  
**OZ112Z000205**



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**

Thread-mounted calorimetric monitoring head for flow Meter FC01-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>	
<b>CST</b>	Thread-mounted monitoring head with calorimetric sensors
	<b>Process connection</b>
<b>11</b>	thread size G1/2A
	<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 (standard)
<b>M2</b>	nickel-based alloy Hastelloy alloy C4/2.4610
	<b>Length of shank/thread</b>
<b>L10</b>	36 mm (standard)
	<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>CST - 11 A M1 L10 E10 T0 - ...</b>	ordering example

\*) for detailed information please see section 0.

**Thread-mounted calorimetric monitoring head**



CST-11

**Technical data**

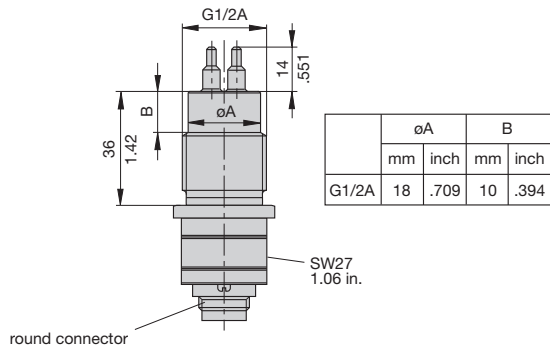
Type of head	thread-mounted
Thread	G1/2A
Length of shank	36 mm/1.42 in.
Length of sensor	14 mm/.551 in.
Suitable for	air, compressed air, nitrogen, oxygen, methane, hydrogen and other gases (please enquire)
Temperature range *) (of gas)	-40 °C ... +130 °C/-40 °F ... +266 °F
Temperature drift of monitoring 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

**Dimensions of round connector**



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

**Cable types 15/18 with connectors**



**Do + Ka type 15**                      **Do + Ka type 15-ST**  
**Do + Ka type 18**                      **Do + Ka type 18-ST**

**Technical data**

**Cable type 15 and 15-ST**

**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 and 18-ST**

**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**

**Typ** between calorimetric monitoring heads **CST** and **FC01-CA, FC01-FH-CA**

<b>Do + Ka type 15</b>	PVC insulated cable, type LiYCY 4x2x0.2 mm <sup>2</sup> (AWG 24) 8-pole round connector + 10-pole clamping connector
<b>Do + Ka type 18</b>	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

**Typ** between calorimetric monitoring heads **CST** and **FC01-ST-CA**

<b>Do + Ka type 15-ST</b>	PVC insulated cable, type LiYCY 4x2x0.2 mm <sup>2</sup> (AWG 24) 8-pole round connector + 10-pole clamping connector
<b>Do + Ka type 18-ST</b>	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-ST - 2 m** ordering example

**Description**

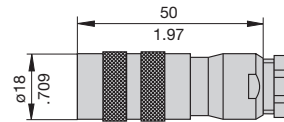
Cable between Flow Meter FC01-xxx and calorimetric monitoring head type CST.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FC01-xxx by means of 10-pole clamping connector (XSK)

**Accessories**

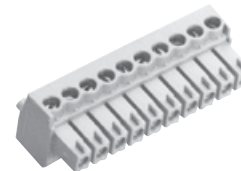
**8-pole round connector**

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



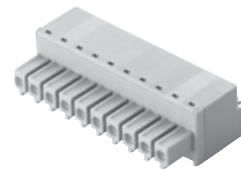
**10-pole clamping connector for cable types 15 and 18**

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



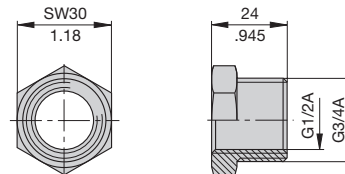
**10-pole clamping connector for cable types 15-ST and 18-ST**

(without cable, for individual wiring by customer)  
**OZ112Z000205**



**Reducing piece**

from G3/4 to G1/2  
Material: stainless steel 1.4571/AISI Ti 316  
**OZ032Z000149**



This is a metric design and millimeter dimensions take precedence ( 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 FC01-CA, suitable for use in pipelines with process connections DN 50 plus.

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

**Features**

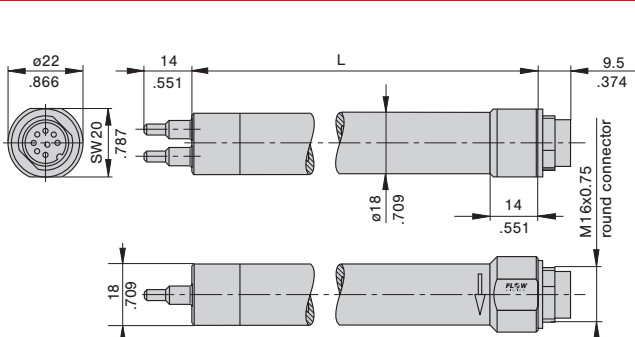
- Medium temperature range  
Stainless steel version: -40 °C ... +130 °C/-40 °F ... +266 °F
- Material: stainless steel 1.4571/AISI 316 Ti
- Not suitable for carbon dioxide and argon!

**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**



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 (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

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**Cable types 15/18 with connectors**



**Do + Ka type 15**                      **Do + Ka type 15-ST**  
**Do + Ka type 18**                      **Do + Ka type 18-ST**

**Technical data**

**Cable type 15 and 15-ST**  
**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 and 18-ST**  
**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 FC01-xxx and calorimetric monitoring head type CSF.

- Connection to monitoring head by means of 8-pole round connector
- Connection to FC01-xxx by means of 10-pole clamping connector (XSK)

**Ordering information**

**Type** between calorimetric monitoring heads **CSF** and **FC01-CA, FC01-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

**Type** between calorimetric monitoring heads **CSF** and **FC01-ST-CA**

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

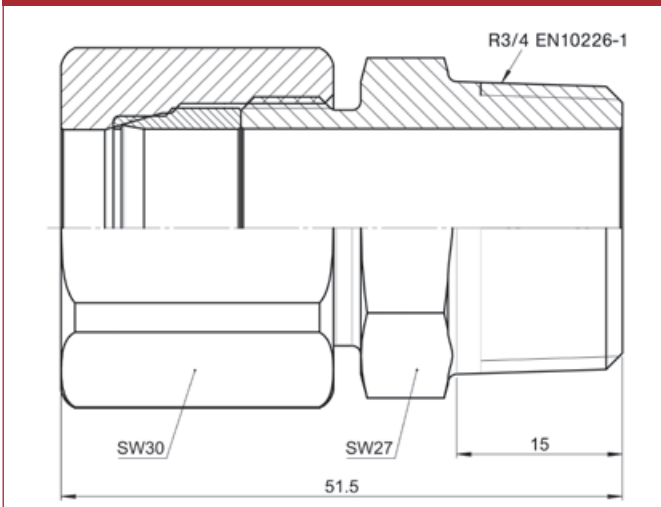
**Do + Ka type 18-ST** **silicone** insulated cable, type 4x2x0.2 mm<sup>2</sup> (AWG 24)  
 8-pole round connector + 10-pole clamping connector

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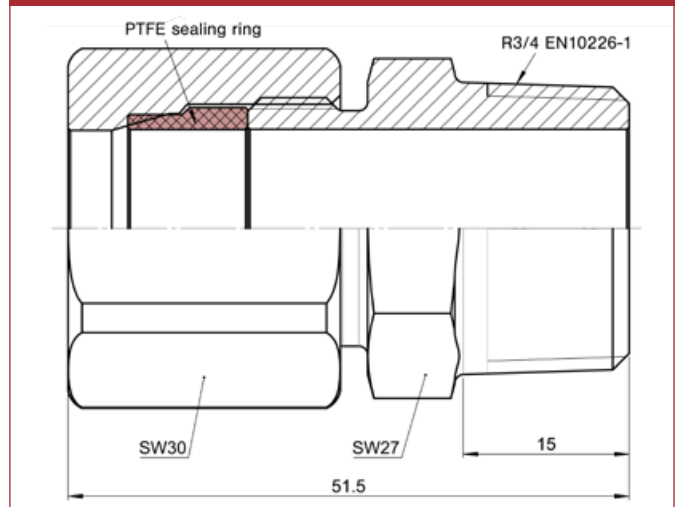
**Do + Ka type 15-ST - 2 m** ordering example

## Threaded installation bush



Suitable up to 25 bar/363 psi abs. if used with push-in sensors.  
Please observe assembly instructions and safety guidelines!  
Metal sealing ring can't be disassembled after assembly.

## PTFE sealing ring for threaded installation bush

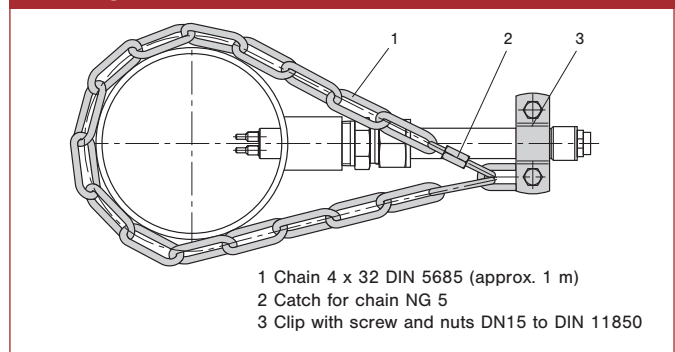


Suitable for threaded installation bush VK-04D8  
Applicable up to 2 bar/29 psi abs. if used with push-in sensors and threaded installation bush VK.  
Ordering no.: Y50005101

## Ordering information – threaded installation bush

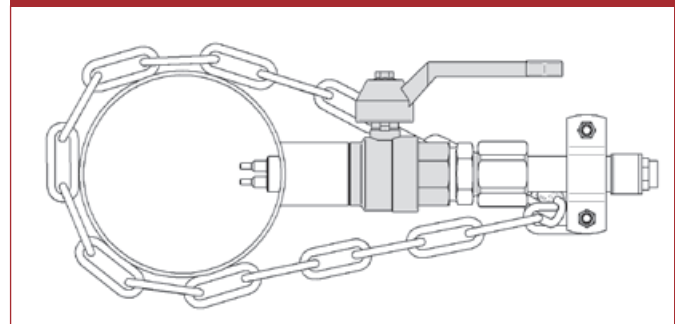
Type			
VK	threaded installation bush		
<b>Process connection</b>			
	04	thread R3/4"	
<b>Bore</b>			
	D8	18 mm	
<b>Material</b>			
	M1	stainless steel 1.4571	
	M3	Hastelloy C22 2.4602	
	M14	tantalum (coating 50±20 µm), base material 1.4571	
	M...	further materials upon request	
VK -	04	D8	M1 ordering example

## Locking set



Locking set for push-in sensors.  
Ordering no.: 0Z122Z000204

## Ball valve for installation under pressure



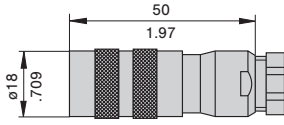
**Material (body, ball):**  
Brass nickel plated  
**Material (ball seal):** PTFE  
**Length:** 65 mm  
**Outside thread:** G3/4", L = 13 mm  
**Inside thread:** G3/4", L = 15 mm  
**Fluid temperature:** -20...120 °C  
**Ambient temperature:** 0...80 °C  
**Pressure:** PN 25 bar (up to 80 °C)  
**Ordering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

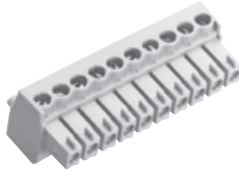
**Further accessories**

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



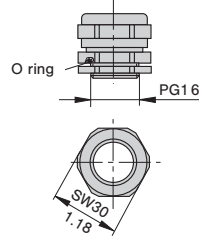
**10-pole clamping connector for cable types 15 and 18**  
(without cable, for individual wiring by customer)  
**OZ112Z000167**



**10-pole clamping connector for cable types 15-ST and 18-ST**  
(without cable, for individual wiring by customer)  
**OZ112Z000205**

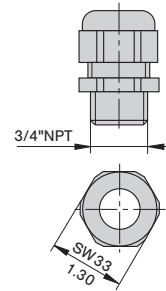


**PG16 nickel-plated brass**  
(standard)  
**OZ122Z000128**



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 ( $\frac{\text{mm}}{\text{inch}}$ )

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

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