

## Description

Compact flow meter with 4 ... 20 mA analogue output and switching output or pulse output. 10 x LED bar which shows the actual flow rate and the status of the switching point or the pulse output configuration. Suitable for air, compressed air, nitrogen and oxygen. Available as screw-in type, plug-in type for sensor adapter TP/ball valve BV or push-in type.

## Features

- wear-resistant compact design, with stainless steel 1.4571 monitoring head and housing
- 4 ... 20 mA analogue output (4 mA = 0 Nm<sup>3</sup>/h, 20 mA = operating range final value)
- switching output: switch point can be adjusted steplessly or to 10 predefined values regardless of the actual flow speed
- pulse output: adjustable quantity per pulse
- 10 x LED bar (red, green, orange) which shows the actual flow rate and the status of the switching point or the pulse output configuration
- fluid temperature -25 ... 100 °C (screw-in type, plug-in type for sensor adapter TP/ball valve BV) and -25 ... 130 °C (push-in type) respectively
- M12 plug-in electrical connection
- switching output/pulse output with HighSide-FET output
- protected against short circuits and overloads



**FC50-CA**

**Screw-in type  
Push-in type**

**Plug-in type**

## Ordering information

### Flow meter (calorimetric)

**FC50-CA** in compact housing

#### Power supply

**U1** DC 24 V

#### Switching output/pulse output

**MIN** minimum switching point

**MAX** maximum switching point

**PUL** pulse output, only with process connection 11

#### Analogue output

**C11** 4 ... 20 mA (0 Nm<sup>3</sup>/h ... operating range final value)

#### Operating range

**FB2** operating range final value 100 Nm/s

**FB1** operating range final value 25 Nm/s

#### Characteristic curve

**PC1** characteristic curve for TP01, only with process connection 11

**PC2** characteristic curve for TP02, only with process connection 11

**PC3** characteristic curve for TP03/BV03, only with process connection 11

**PC4** characteristic curve for TP04/BV04, only with process connection 11

**PC5** characteristic curve for TP05/BV05, only with process connection 11

**PC6** characteristic curve for TP06/BV06, only with process connection 11

**TC1** characteristic curve for pipes with inside diameter < 26,0 mm, only with process connection 01 and 02

**TC2** characteristic curve for pipes with inside diameter 26,0 ... 32,8 mm, only with process connection 01 and 02

**TC3** characteristic curve for pipes with inside diameter > 32,8 ... 40,3 mm, only with process connection 01 and 02

**TC4** characteristic curve for pipes with inside diameter > 40,3 ... 53,0 mm, only with process connection 01 and 02

**TC5** characteristic curve for pipes with inside diameter > 53,0 mm, only with process connection 01 and 02

**FC1** characteristic curve for pipes with inside diameter > 50,0 ... 67,0 mm, only with process connections 00 and 22

**FC2** characteristic curve for pipes with inside diameter > 67,0 mm, only with process connections 00 and 22

#### Fluid

**A** air, compressed air, oxygen, nitrogen

#### Process connection

**00** push-in type, length 300 mm - without flange, threaded installation bush as accessory

**22** push-in type, length 200 mm - without flange, threaded installation bush as accessory

**01** screw-in type, G1/2A (to DIN 3852-A), length 36 mm

**02** screw-in type, NPT1/2"-14, length 36 mm

**11** plug-in type (following DIN ISO 6149), length 18.2 mm for TP or BV adapters

#### Fitting material

**M1** stainless steel 1.4571 (standard material)

**M2** Hastelloy C4 2.4610

**M6** Titanium G7 3.7235

**M14** Tantalum (coating 50±20 µm), base material 1.4571, only with process connection 01 and 02

**M...** further materials on demand

#### Electrical connection

**E12** M12x1, 4-pole

#### Certification

**T0** without certificate (standard \*)

**FC50-CA - U1 MIN C11 - FB2 PC1 A - 11 M1 E12 - T0** ordering example

\* for detailed information please see section 0.

## TECHNICAL DATA (T<sub>U</sub> = 25 °C, U<sub>B</sub> = DC 24 V)

General data		FC50-CA	
Suitable for		air, compressed air, oxygen, nitrogen	
Temperature range	fluid	-25 ... +100 °C (-13 ... +212 °F) / -25 ... +130 °C (-13 ... +266 °F) <sup>(5)</sup>	
	ambience	-25 ... +65 °C (-13 ... +149 °F)	
Status indication		10 x LED bar (red, green, orange)	
Pulse output		1 pulse per 0,01/0,1/1/10/100 Nm <sup>3</sup> (adjustable, pulse width 50 ms)	
Electrical data			
Operating voltage U <sub>B</sub>		DC 24 V (18 ... 32 V)	
Power consumption (without load)		ca. 75 mA	
Analogue output	flow rate	4 ... 20 mA (12 bit), 4 mA = 0 Nm <sup>3</sup> /h, 20 mA = operating range final value	
Switching output/ pulse output	flow rate	Power FET, high side switch, short circuit proof max. load 500 mA, inductive load max. 100 mA	
Connection to DIN 50044		M12 plug-in connection, 4-pole	
MTTF (SN 29500)		267 years	
Flow measurement <sup>(6)</sup>			
Measuring range (operating range)	plug-in type TP-01	FB1	0...18,10 Nm <sup>3</sup> /h (0...18,10 Nm <sup>3</sup> /h)
		FB2	0...49,22 Nm <sup>3</sup> /h (0...72,38 Nm <sup>3</sup> /h)
	plug-in type TP-02	FB1	0...28,27 Nm <sup>3</sup> /h (0...28,27 Nm <sup>3</sup> /h)
		FB2	0...76,91 Nm <sup>3</sup> /h (0...113,1 Nm <sup>3</sup> /h)
	plug-in type TP-03/BV-03	FB1	0...44,18 Nm <sup>3</sup> /h (0...44,18 Nm <sup>3</sup> /h)
		FB2	0...120,2 Nm <sup>3</sup> /h (0...176,7 Nm <sup>3</sup> /h)
	plug-in type TP-04/BV-04	FB1	0...72,38 Nm <sup>3</sup> /h (0...72,38 Nm <sup>3</sup> /h)
		FB2	0...196,9 Nm <sup>3</sup> /h (0...289,5 Nm <sup>3</sup> /h)
	plug-in type TP-05/BV-05	FB1	0...113,1 Nm <sup>3</sup> /h (0...113,1 Nm <sup>3</sup> /h)
		FB2	0...307,6 Nm <sup>3</sup> /h (0...452,4 Nm <sup>3</sup> /h)
	plug-in type TP-06/BV-06	FB1	0...176,7 Nm <sup>3</sup> /h (0...176,7 Nm <sup>3</sup> /h)
		FB2	0...480,7 Nm <sup>3</sup> /h (0...706,9 Nm <sup>3</sup> /h)
	screw-in type/push-in type	FB1	0...25 Nm/s (0...25 Nm/s) - Nm <sup>3</sup> /h depends on pipe diameter, see table
		FB2	0...68 Nm/s (0...100 Nm/s) - Nm <sup>3</sup> /h depends on pipe diameter, see table
Accuracy <sup>(4)</sup>	plug-in type	3 ... 50% of the measuring range	± 3 % of measured value ± 0,3 % of measuring range final value
		50 ... 100% of the measuring range	± 5 % of measured value ± 1 % of measuring range final value
	screw-in/ push-in type	3 ... 50% of the measuring range	± 4 % of measured value ± 0,75 % of measuring range final value
		50 ... 100% of the measuring range	± 7 % of measured value ± 1 % of measuring range final value
Repeatability <sup>(1)</sup>		± 1 % of measured value ± 0,5 % of measuring range final value	
Response time <sup>(3)</sup>		approx. 2 s	
Temperature drift (+10 ... +70 °C)		± 0,06 % of measuring range final value/°C	
Pressure drift		approx. ± 0,5 % of measured value/bar	
Mechanical data			
Type and size of monitoring head	plug-in type	following DIN ISO 6149	
	screw-in type	G 1/2 A, NPT 1/2"	
	push-in type	shank diameter 18 mm/0.709 in. without thread	
Pressure resistance	monitoring head, all types	100 bar (push-in type: observe pressure resistance of installation)	
Degree of protection		IP67 (when plugged in)	
Material	fitting, sensor	stainless steel 1.4571 (wetted)	
	connection sensor/fitting	laser welded	
	housing	stainless steel 1.4571	
	M12 connector	CuZn, nickel-plated	
	cap	PA	
	O-ring	FKM (wetted, plug-in and push-in type)	
Weight	plug-in type	approx. 300 g	
	screw-in type	approx. 240 g	
	push-in type	approx. 740 g	

<sup>(1)</sup> at constant temperature and flow conditions, and stable thermal conductivity

<sup>(3)</sup> delay with the switch point set to 18 Nm/s and the flow at 20 Nm/s, after a sudden complete stop

<sup>(4)</sup> 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

<sup>(5)</sup> the extended temperature range up to 130 °C/266 °F is only allowed with FC50-CA...00/22... (push-in type) and a minimum distance of 15 cm (5.91 in) between electronic housing and fluid, in this case max. ambient temperature must not exceed 50 °C (122 °F)

<sup>(6)</sup> Sensor calibration is performed at approx. 25 °C and approx. 970 mbar abs. in TP-03, inside pipe diameter 29,7 mm (FC50...01/02) and inside pipe diameter 79,2 mm (FC50...00) respectively. Specifications dependent on the measuring range final value always refer to 68 Nm/s (FB2).

## Operating ranges

The operating/measuring ranges are determined by the inner pipe diameter (see table). They can be calculated with the following equation:

$$Q = V_N \times A_R$$

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

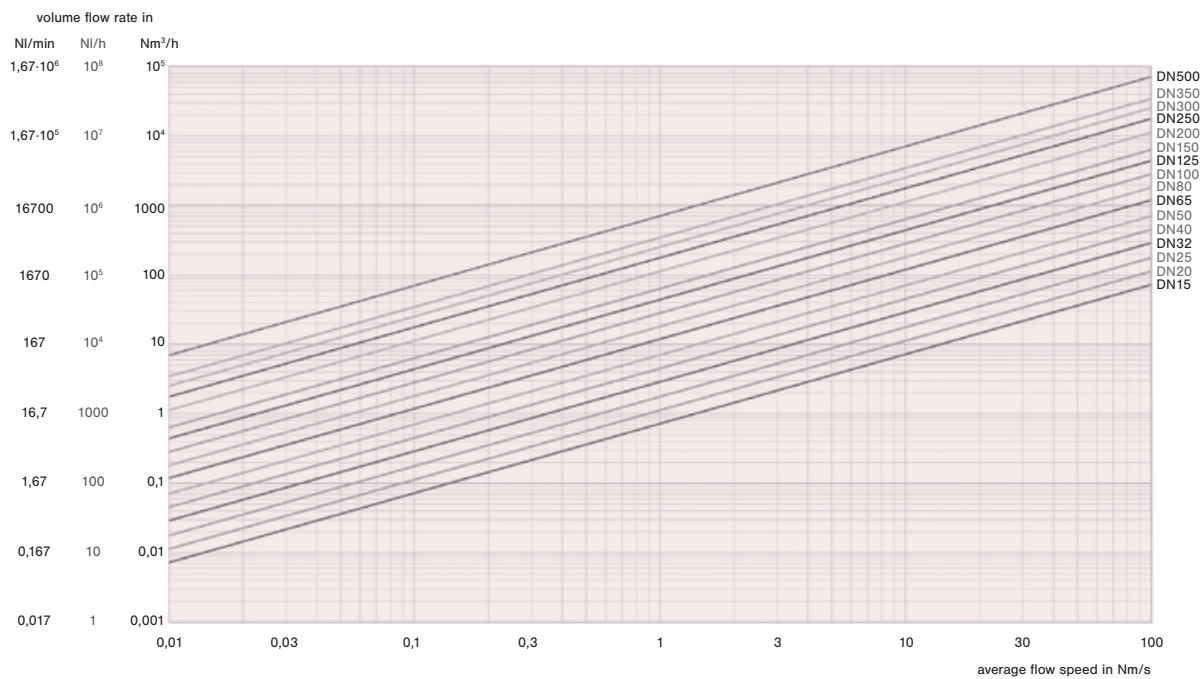
V<sub>N</sub> (Nm/h) - average standard velocity

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

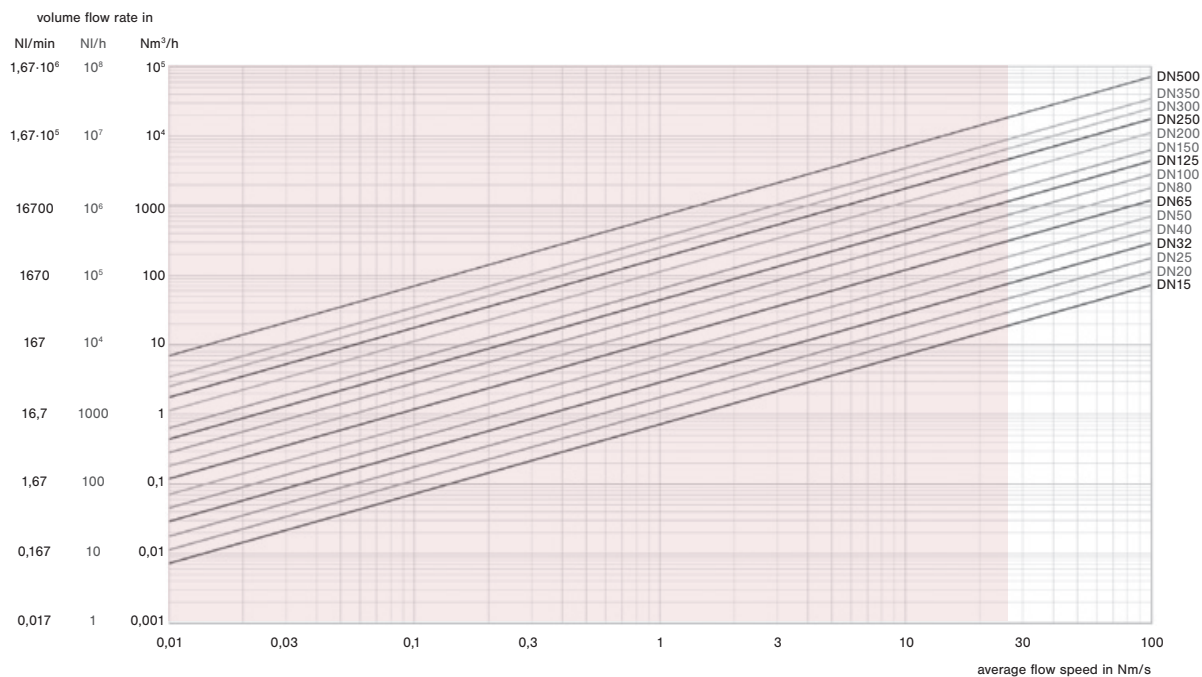
- Standard velocity measuring range (FC50...FB2...): 0 ... 68 Nm/s
- Standard velocity operating range (FC50...FB2...): 0 ... 100 Nm/s
- Standard velocity measuring range (FC50...FB1...): 0 ... 25 Nm/s
- Standard velocity operating range (FC50...FB1...): 0 ... 25 Nm/s

inner pipe diameter D in mm	operating range FB1 in Nm <sup>3</sup> /h	operating range FB2 in Nm <sup>3</sup> /h	inner pipe diameter D in mm	operating range FB1 in Nm <sup>3</sup> /h	operating range FB2 in Nm <sup>3</sup> /h
20	28	113	200	2827	11309
30	63	254	250	4417	17671
40	113	452	300	6361	25446
50	176	706	400	11309	45239
60	254	1017	500	17671	70685
70	346	1385	600	25446	101787
80	452	1809	700	34636	138544
90	572	2290	800	45238	180955
100	706	2827	900	57255	229021
150	1590	6361	1000	70685	282743

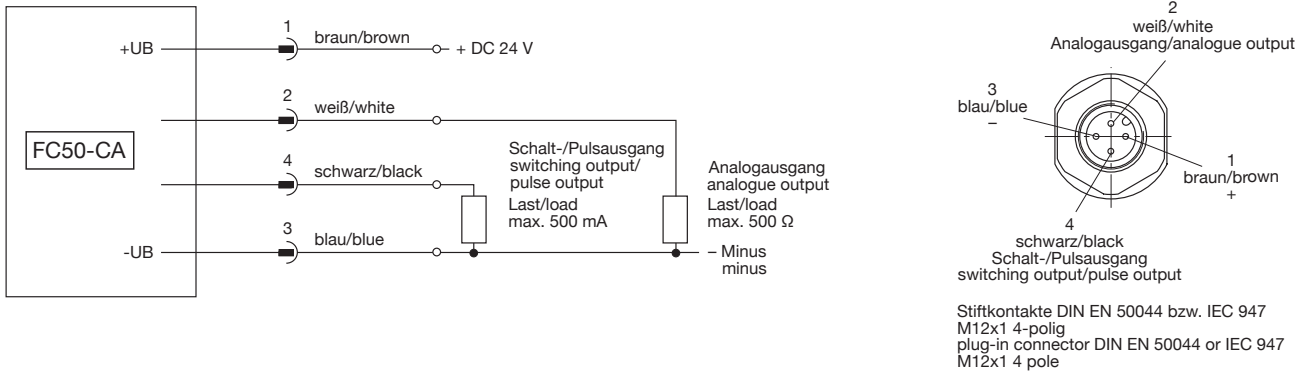
## Operating range FB2



## Operating range FB1

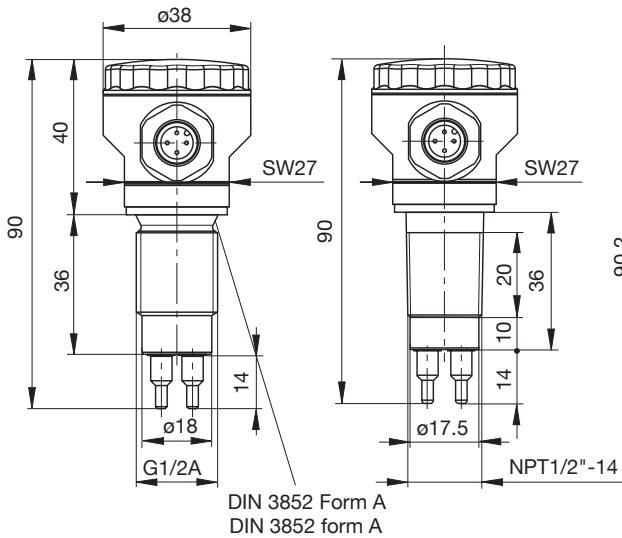


**Electrical connection**

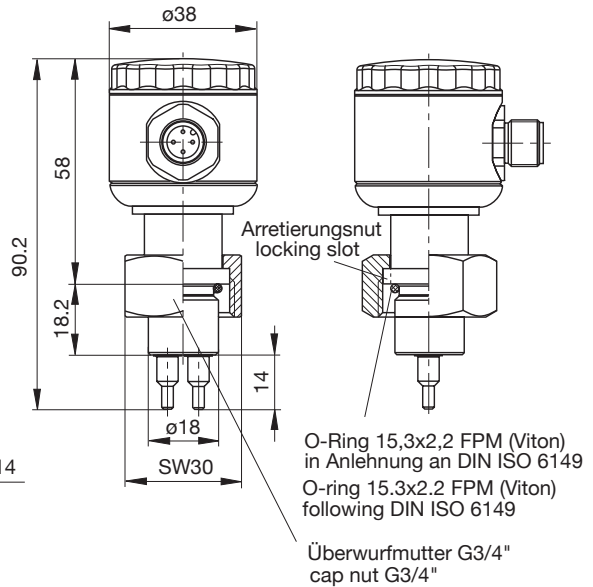


**Dimensions**

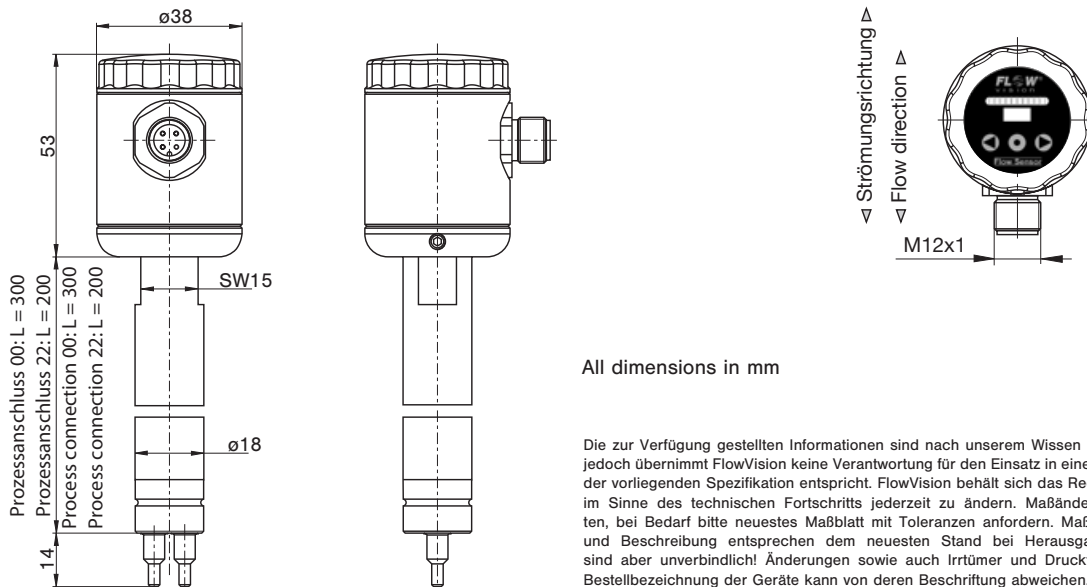
**Gewindeanschluss**  
**Screw-in type process connection**



**Einsteckanschluss**  
**Plug-in type process connection**



**Einschiebeanschluss**  
**Push-in type process connection**



All dimensions in mm

Die zur Verfügung gestellten Informationen sind nach unserem Wissen genau und zuverlässig, jedoch übernimmt FlowVision keine Verantwortung für den Einsatz in einer Anwendung, die nicht der vorliegenden Spezifikation entspricht. FlowVision behält sich das Recht vor, Spezifikationen im Sinne des technischen Fortschritts jederzeit zu ändern. Maßänderungen sind vorbehalten, bei Bedarf bitte neuestes Maßblatt mit Toleranzen anfordern. Maße, Daten, Abbildungen und Beschreibung entsprechen dem neuesten Stand bei Herausgabe dieses Kataloges, sind aber unverbindlich! Änderungen sowie auch Irrtümer und Druckfehler vorbehalten. Die Bestellbezeichnung der Geräte kann von deren Beschriftung abweichen.

## Sensor adapter TP/Ball valve BV



TP...

BV...

### Features

- Correct positioning of 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 out output)

### 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

### Description

Sensor adapters TP and BV facilitate correct positioning and exchange of FC50-CA...11... (plug-in type connection) in pipes with process connection DN 15...DN 50.

Ball valve BV enables pressure-free installation or removal of FC50-CA...11... (plug-in type connection) 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.

### Ordering information – sensor adapter TP/thread

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

### Ordering information – sensor adapter TP/welding

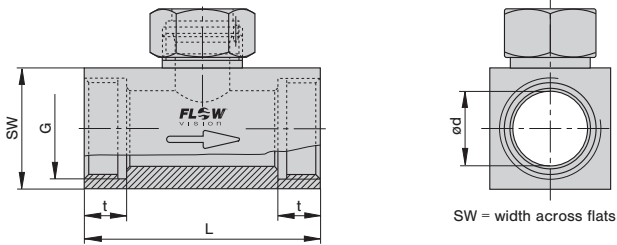
Type	
TP	Sensor adapter with welding nipples
<b>Process connection/Nominal size</b>	
01	DN 15 dia.d: 16 mm/.630 in. length: 80 mm/3.15 in.
02	DN 20 dia.d: 20 mm/.787 in. length: 70 mm/2.76 in.
03	DN 25 dia.d: 25 mm/.984 in. length: 80 mm/3.15 in.
04	DN 32 dia.d: 32 mm/1.26 in. length: 100 mm/3.94 in.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

### Ordering information – ball valve

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

**Dimensions**

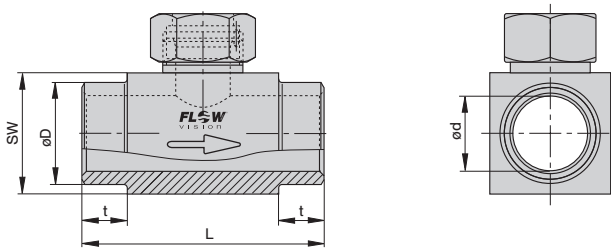
**TP... sensor adapter with internal thread**



Material stainless steel (-M1): PN 315 bar / 4569 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

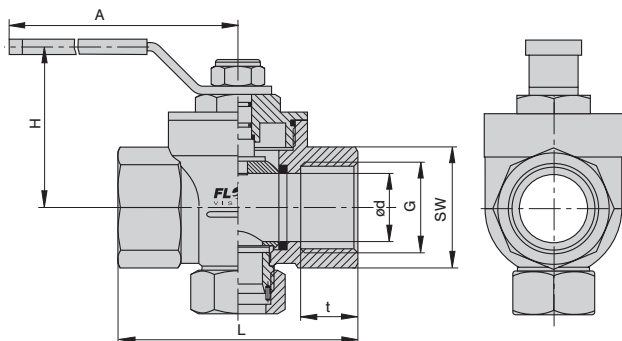
**TP... M1-SA sensor adapter with welding nipples**



PN 315 bar / 4569 psi

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



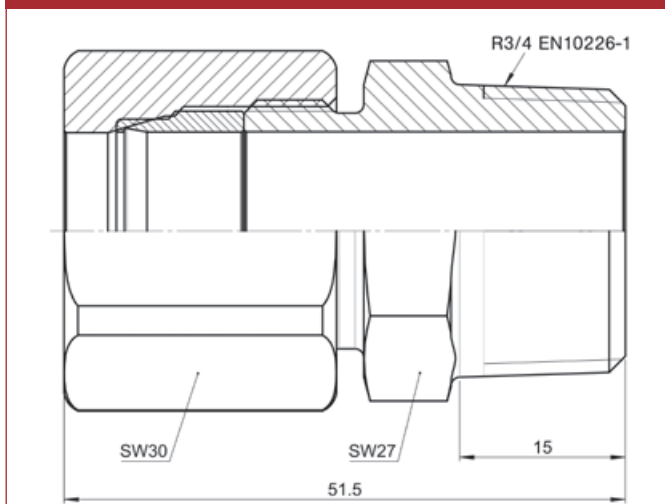
PN 25 bar / 363 psi

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

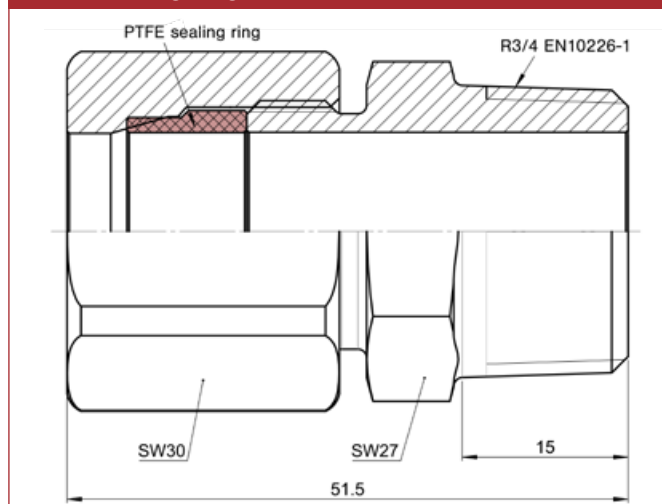


**Threaded installation bush**



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**

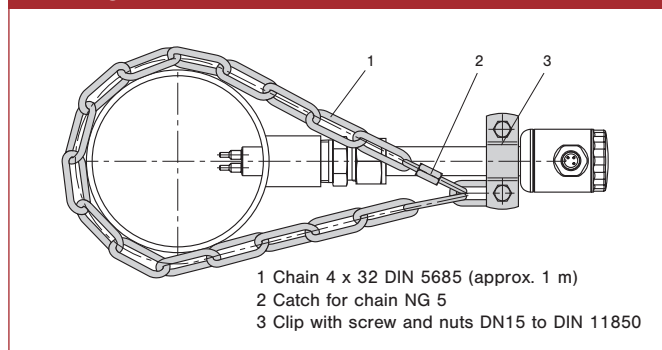


Suitable for threaded installation bush VK-04D8  
Applicable up to 2 bar/29 psi abs. if used with push-in sensors and threaded installation bush VK.  
Ordering no.: Y50005101

**Ordering information – threaded installation bush**

<b>Type</b>				
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

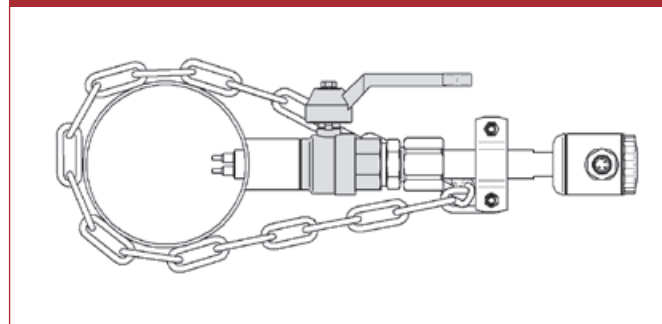
**Locking set**



- 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

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

**Ball valve for installation under pressure**



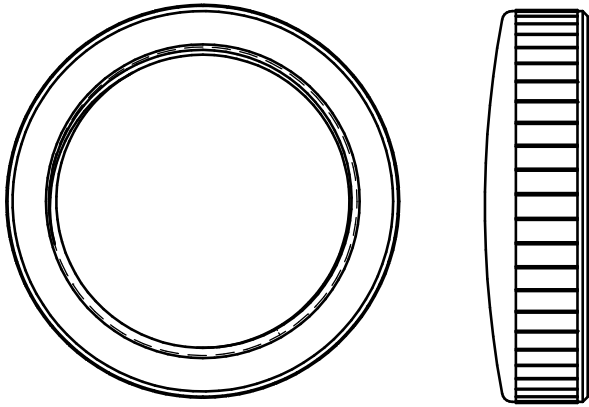
**Material (body, ball):**  
Brass nickel plated  
**Material (ball seal):** PTFE  
**Length:** 65 mm  
**Outside thread:** G3/4", L = 13 mm  
**Inside thread:** G3/4", L = 15 mm  
**Fluid temperature:** -20...120 °C  
**Ambient temperature:** 0...80 °C  
**Pressure:** PN 25 bar (up to 80 °C)  
**Ordering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

**Stainless steel cap**

**Description**

Protective cap, material stainless steel 1.4571  
Ordering no.: Z00025



1



**Cable type 25 with connectors**



**Description**

M12 plug-in electrical connection for connection of supply voltage and switching output.

1

**Technical data**

**Cable type 25**

**Features:** IP67 (only when connector plugged in)  
Resistant to chemicals and oils

Temperature range: -25 °C ... +80 °C

Current carrying capacity: 4 A

Insulation resistance: > 10<sup>9</sup> Ω

Withstand voltage: 1,5 kV/60 s

**Ordering information**

**Typ**

**Do + Ka Typ 25 - 5 m** with connector to IEC60947-5-2, 4-pole, M12 and PUR insulated cable 4x0.34 mm<sup>2</sup> (AWG 22), halogen-free

**Do + Ka Typ 25 - 5 m** ordering example