

- Flow switches for insertion installation
- Piston type flow switches
- Magnetic inductive flow sensors
- Turbine flow sensors
- Positive displacement flow sensors
- Oval gear flow meters




FLOW MEASUREMENT →

Flow switches for insertion installation

Paddles interchangeable, for marine applications

Type VH500



Technical data	
Switching function	Change over contact
Pressure rating (Test pressure)	Max. 6 bar (10 bar) or max. 10 bar (15 bar)
Temperatures	
Medium	Max. 100 °C
Ambient	Max. 85 °C
Electrical data	
Max. contact rating	24 VDC, 5 A resistive load 4 A inductive load 60 VDC, 1 A resistive load 0.5 A inductive load 250 VAC, 10 A resistive load 10 A inductive load
Degree of protection EN 60529	IP54
Protection class EN 60730-1	Class I
Approvals	
 Germanischer Lloyd, Type Approval Certificate No. 89824-94HH and 94970-10HH	

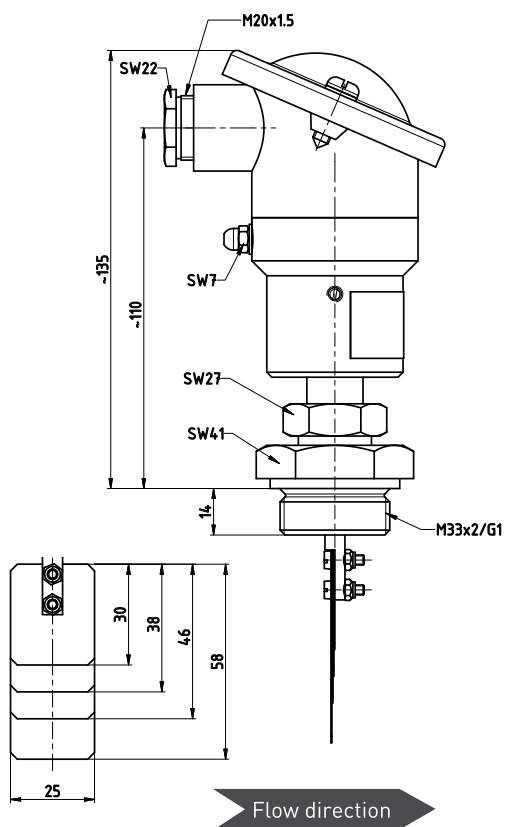
Advantages

- Germanischer Lloyd Type Approval
- Suitable for water, oil, etc.
- Insertion installation into pipes or pipe tees DN 25...DN 50 or bigger
- Easy installation and alignment due to screw in connection
- Four paddles in different sizes included, selection in accordance to the pipe size
- Set point adjustment by paddle size selection and by adjustment screw
- Micro switch with high contact rating
- Robust, vibration-resistant up to 4 g

Size of pipe tee	Paddle to select**	Set point ranges [m³/h]*	
		Increasing flow ON	Decreasing flow OFF
DN 25	25 x 30 mm	1.0...1.25	1.05...1.2
DN 32	25 x 38 mm	1.7...2.05	1.6...1.95
DN 40	25 x 46 mm	2.2...2.55	2.1...2.45
DN 50	25 x 58 mm	3.25...3.85	3.15...3.75

* Water, 20 °C, horizontal pipe, tolerance ±15 %

** Higher set points selectable by use of smaller paddle sizes
Set points for bigger pipe sizes on request



Materials in contact with fluid

Body, process connection	Brass 2.0401
Bellow system	Stainless steel 1.4571
Paddles	Stainless steel 1.4310
Flat gasket	HD 300
O-ring	NBR

Order code	IMPA code	Pressure rating	Process connection
VH500NI3451R41	75 25 38	6 bar	G1
VH500NM3451M41	75 25 44	6 bar	M33 x 2
VH500RI3451R41		10 bar	G1
VH500RM3451M41		10 bar	M33 x 2

Piston type flow switches for marine applications

Series VM100

- Germanischer Lloyd Type Approval
- Inline installation,
DN 15...DN 20 female threaded, DN 25...DN 80 flanged
- Wide set point range
- Various fitting positions
- High repeatability
- Reed contact output
- Special version for oil available (on request)

Type VM100



Technical data

Pressure rating	PN 16
Medium temperature	Max. 100 °C
Change over contact max. contact rating	24 V DC; 230 V AC 0,5 A DC; 1 A AC 25 W; 36 VA
Cable gland	M24 x 1,5 acc.to DIN 89280
Degree of protection EN 60529	IP44
Hysteresis	< 15 % of set point range
Accuracy	< 2 % of set point range

Approvals

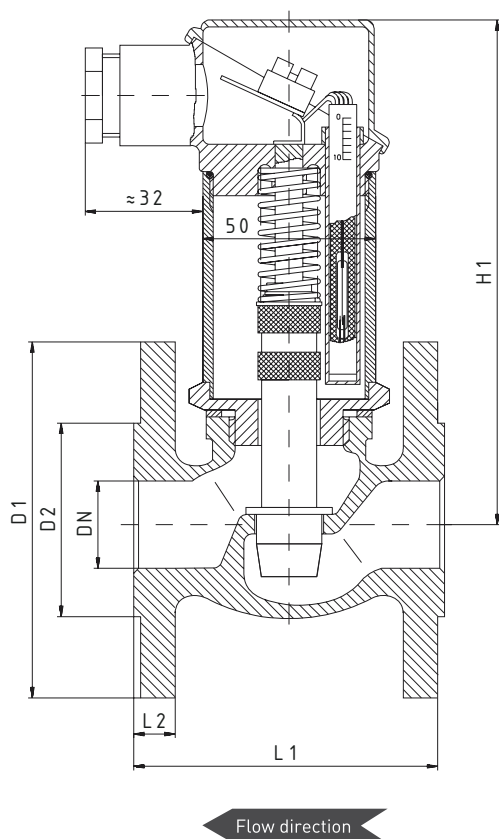


Germanischer Lloyd, Type Approval
Certificate No. 54627-71HH

Order code

Pipe size	Process connection	Set point range [l/min]* Decreasing flow OFF	Dimensions [mm]					SIKA-Code	IMPA-Code
			D1	D2	L1	L2	H1		
DN 15	G½	2...13			81		136	VM115--1351G3R	75 25 51
DN 20	G¾	5...28			80		136	VM120--1351G4R	75 25 52
DN 25	Flange acc. to EN 1092-1	15...75	115	68	90	12	151	VM125--1351G5R	75 25 53
DN 32		20...125	140	78	95	13	161	VM132--1351G6R	75 25 54
DN 40		30...200	150	88	110	14	165	VM140--1351G7R	75 25 55
DN 50		85...280	165	102	125	14	165	VM150--1351G8R	75 25 56
DN 65		65...410	185	122	150	15	179	VM165--1351G9R	75 25 57
DN 80		150...550	200	138	170	16	185	VM180--1351G0R	75 25 58

* Water, 20 °C



Materials in contact with fluid

Pipe section	Gun metal RG5
Body	Brass
Piston	PPN (Hostalen)
Magnet	Hard ferrite



Magnetic inductive flow sensors

Principle of operation

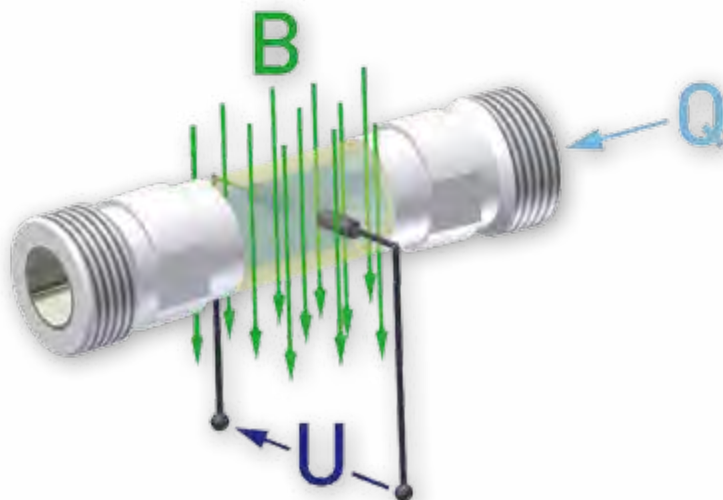
The smart flow sensors of the **induQ®** series operate according to the principle of induction: The measuring pipe is in a magnetic field (**B**). If an electrically conductive medium, with the flow (**Q**) to be measured, flows through the measuring pipe and thereby at a right-angle to the magnetic field, a voltage (**U**) is induced in the medium. This voltage is proportional to the average flow velocity and is picked up by two electrodes.

Regarding flow proportional output signals two versions are available depending on the model:

- Frequency output signal
- Analogue and frequency output signal

The pulse rate can be configured at the factory or on-site.

The **induQ®** sensors enable the flow measurement/volume flow measurement or dosing of electrically conductive liquids without any moving parts. They are the ideal flow sensors when accuracy and reliability are a must.



Advantages induQ®

- No moving parts
- No mechanical wear*
- Free pipe cross-section → no additional pressure drop
- Maintenance-free
- Fast response (< 100 ms)
- Minimum inlet section requirements

* For aqueous media without solid fractions



Magnetic inductive flow sensors

Series induQ® VMM

Advantages

- Rapid signal processing with a 16-bit microcontroller
- Password protection
- Self-test
- Language selection: German, English
- Low-flow suppression
- Empty pipe detection
- Easy menu-driven operation and programming (e.g. measuring range, pulse rate) by the user by means of a two-line alphanumeric display
- Delivery including works calibration certificate

Outputs

- Analogue output (0)4...20 mA
- Frequency or Impulse output
- 2 alarm / status outputs

Displays

- Flow rate, several total flows
- Flow velocity
- Relative flow rate [%]
- Mass and mass flow (enter density)

Units

- Divers, e.g. m³/h, l/s, USG/min, kg/h (density programmed)

Compact type



Separate type



Type	VMM15	VMM25	VMM32	VMM40	VMM50	VMM65	VMM80	VMM100	VMM125	VMM150	VMM200
Characteristics											
Nominal diameter	DN 15	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200
Process connection	Flange connection in accordance with EN 1092-1, JIS B2220 10K or ANSI B16.5										
Flow range											
→ Flow velocity [m/s]	0...10										
→ Volumetric flow [m³/h]	0...6.3	0...17.6	0...28.9	0...45.2	0...70.6	0...119.4	0...180.9	0...282.7	0...441.7	0...636.1	0...1130
Accuracy*											
v = 1...10 m/s	±0.5 % of reading										
v < 1 m/s	±0.4 % of reading ±1 mm/s										
additionally											
Frequency output	±0.05 % per 10 K										
Analogue output	±0.1 % per 10 K										
Repeatability	±0.15 %										
Response time	< 100 ms**										
Signal output starting from	> 0 m/s										
Medium / min. conductivity of medium	Water and other conductive liquids / 50 µS/cm										
Medium temperature											
→ Hard rubber	0...90 °C										
→ PTFE	-20...100 °C at 40 bar -20...150 °C at 25 bar -20...180 °C at 16 bar										
→ Process connections	Min. -10 °C (steel)										
→ Process connections	Min. -20 °C (stainless steel)										
Ambient temperature											
→ Hard rubber	0...80 °C										
→ PTFE	-20...100 °C										
→ Process connections	Min. -10 °C (steel)										
→ Process connections	Min. -20 °C (stainless steel)										
→ Display	-20...50 °C***										
Storage and transport temperature	-20...60 °C										
Pressure rating											
→ EN1092-1	PN 40	PN 40	PN 40	PN 40	PN 40	PN 16**** PN 40	PN 16 PN 40	PN 16 PN 40	PN 16 PN 40	PN 16 PN 40	PN 10 PN 16 PN 25 PN 40
→ JIS B2220 10K	9.8 bar										
→ ANSI B16.5 150 RF	19.6 bar (Process connection, steel) 15.9 bar (Process connection, stainless steel)										
Display	LCD two-line, backlight										
Operation	6 keys, menu-driven										
Degree of protection EN 60529	IP67										

* Reference conditions: Media temperature 10...30 °C; Ambient temperature 20...30 °C; warm-up period 30 min.; straight pipe lengths; inlet 5 x DN, outlet 2 x DN, regularly centered and earthed

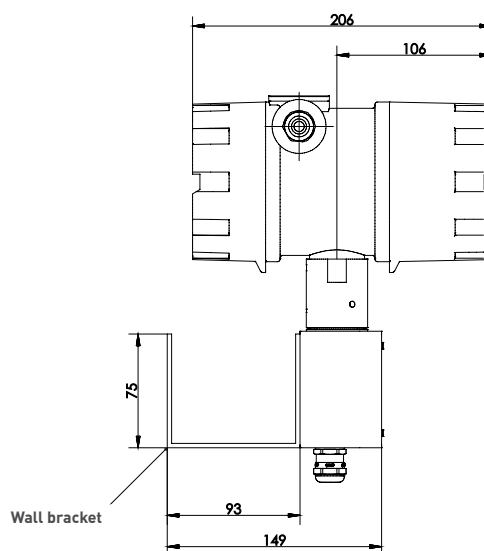
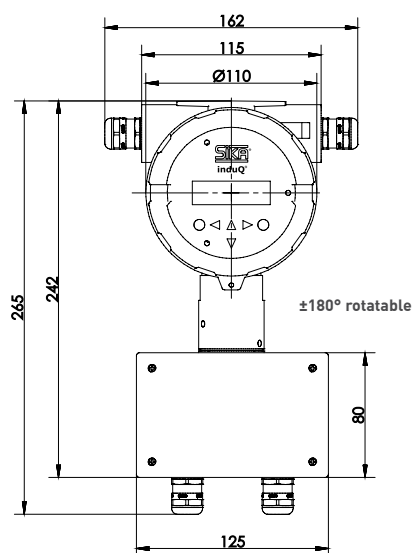
** Depending on the electronics settings

*** The readability of the LCD display is restricted below 0 °C

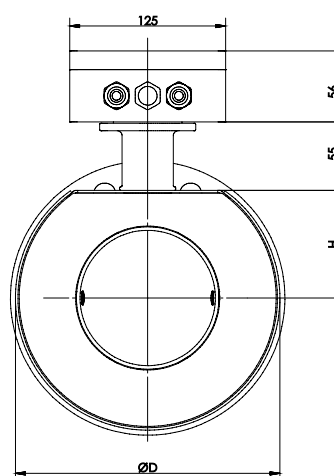
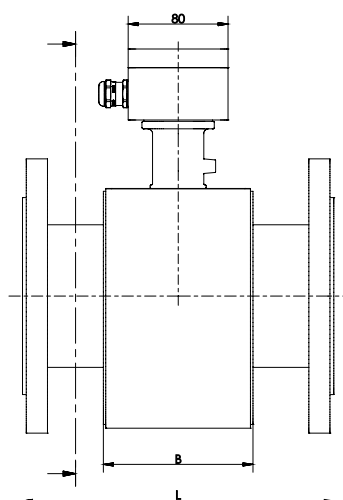
**** 8 bolt flanges

Output signals											
Type	VMM15	VMM25	VMM32	VMM40	VMM50	VMM65	VMM80	VMM100	VMM125	VMM150	VMM200
Pulse / frequency output											
→ Configuration	Pulse signal or frequency signal selectable										
Pulse output											
→ Pulse rate (factory-set) [pulses/m³]	1000	1000	1000	1000	1000	1000	1000	1000	100	100	100
→ Pulses/Time	≤ 1000 Pulses/s										
→ Pulse width	≥ 0.1 ms (max. 2 s), adjustable										
→ Signal shape	Squarewave signal										
Frequency output											
→ Factory-scaled measuring range corresponds to 0...1 kHz [m³/h]	0...3	0...10	0...10	0...10	0...20	0...50	0...50	0...70	0...100	0...150	0...250
→ Frequency	0...1 kHz										
→ Signal shape	Squarewave signal										
Analogue output											
→ Factory-scaled measuring range corresponds to 4...20 mA [m³/h]	0...3	0...10	0...10	0...10	0...20	0...50	0...50	0...70	0...100	0...150	0...250
→ Operating range	0 ... 20 mA / 4 ... 20 mA, selectable										
→ Current limitation	21.6 mA										
→ Max. burden	600 Ω										
→ Short-circuit proof	Permanent										
Alarm output											
→ Quantity	2										
→ Version	Optocoupler										
→ Function	Status output: Preflow, backflow, MIN flow rate, MAX flow rate, alarm (adjustable)										
→ Switching values	U _{max} : 30 V; I _{max} : 60 mA; P _{max} : 1,8 W										
Electrical data											
Electrical connection	Cable gland M20 x 1.5										
Power supply	230 VAC (-15 % / +10 %), 50/60 Hz or 115 VAC (-15 % / +10 %), 50/60 Hz or 19...36 VDC										
Current consumption	15 VA										

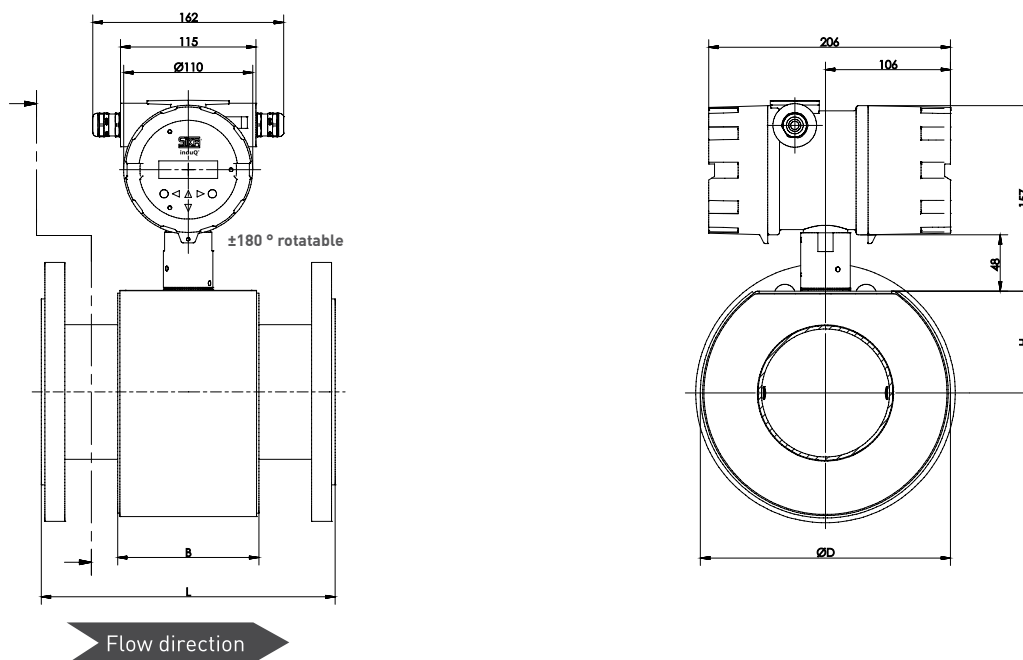
Separate type (Display)



Separate type (Sensor)



Compact type



Dimensions [mm]

Process connection		Installation length L							Weight EN 1092-1 [kg]*	
EN 1092-1 JIS B2220 10K	ANSI B16.5	Hard rubber	PTFE		Tolerance	B	D	H	Sensor	Compact type
			Without protection rings	With protection rings						
DN 15	1/2"	200	200	206	+0 / -3	80	130	53	5	8
DN 25	1"	200	200	206	+0 / -3	80	130	53	6	9
DN 32	1 1/4"	200	200	206	+0 / -3	80	130	53	7	10
DN 40	1 1/2"	200	200	206	+0 / -3	80	130	53	7.5	10
DN 50	2"	200	200	206	+0 / -3	80	140	57	9	12
DN 65	2 1/2"	200	200	206	+0 / -3	80	155	63	10	13
DN 80	3"	200	200	206	+0 / -3	80	170	70	13	16
DN 100	4"	250	250	256	+0 / -3	120	210	86	15	18
DN 125	5"	250	250	256	+0 / -3	120	240	98	19	22
DN 150	6"	300	300	306	+0 / -3	120	285	117	23	26
DN 200	8"	350	350	360	+0 / -3	200	350	143	36	39

* valid for DN 15...DN 50 (PN 40), DN 65...DN 150 (PN 16), DN 200 (PN 10)

Materials

Not in contact with fluid	
Display housing	Casted aluminium
Sensor housing	Steel
Measuring pipe	Stainless steel
Process connection	Steel 1.0460 or stainless steel 1.4404
In contact with fluid	
Electrodes	Stainless steel 1.4571 or Hastelloy C276
Measuring pipe lining	PTFE or Hard rubber

Order code	Example → VMM32	A	1	0	1	0	KAMA	20
Nominal diameter								
DN 15 / ½"	VMM15							
DN 25 / 1"	VMM25							
DN 32 / 1¼"	VMM32							
DN 40 / 1½"	VMM40							
DN 50 / 2"	VMM50							
DN 65 / 2½"	VMM65							
DN 80 / 3"	VMM80							
DN 100 / 4"	VMM1C							
DN 125 / 5"	VMMV3							
DN 150 / 6"	VMM3L							
DN 200 / 8"	VMM2C							
Process connection								
EN 1092-1 PN 10 starting from DN 200	A							
EN 1092-1 PN 16 starting from DN 65	B							
EN 1092-1 PN 25 starting from DN 200	C							
EN 1092-1 PN 40 starting from DN 15	D							
JIS B2220 10K	J							
ANSI B16.5 150 RF	I							
Material process connection								
Steel 1.0460		1						
Stainless steel 1.4571		2						
Lining								
PTFE			0					
Hard rubber			1					
Material electrodes								
Stainless steel 1.4571				1				
Hastelloy C276				2				
Earth electrode								
Without					0			
One					1			
Two					2			
Type								
Compact type with display						KAMA		
Separate type with display						GAMA		
Power supply								
230 VAC, 50/60 Hz								20
115 VAC, 50/60 Hz								40
19...36 VDC								30

Accessories

Earthing ring VMM



Earthing ring

An earthing ring is used for the electrical reference and earthing of the medium being measured. It is necessary if the pipes are not electrically conductive or lined (plastic or concrete pipes, etc.). The earthing ring must be connected to the provided earthing screw of the sensor. Retrofitting is possible. Material stainless steel 1.4571.

Sensor cable set

Sensor cable between sensor and display unit (separate design) consisting of magnetic power cable and electrode cable for configuration of M16 x 1.5 screw connection.

Protection rings VMM



Pair of protection rings

Protection rings protect the inlet and outlet edges of the sensor against mechanical damage, in particular when abrasive media such as gravel, sand, etc. are concerned. At the same time, they also serve as earthing rings. The protection rings are firmly screwed to the sensor. Material stainless steel 1.4571.

Order example		VMMZEW	32	A	1
Type					
Earthing ring	VMMZEW				
Protection rings (pair)	VMMZPR				
Nominal diameter					
DN 15 / ½"		15			
DN 25 / 1"		25			
DN 32 / 1¼"		32			
DN 40 / 1½"		40			
DN 50 / 2"		50			
DN 65 / 2½"		65			
DN 80 / 3"		80			
DN 100 / 4"		1C			
DN 125 / 5"		V3			
DN 150 / 6"		3L			
DN 200 / 8"		2C			
Process connection					
EN 1092-1				E	
JIS B2220 10K				J	
ANSI B16.5 150 RF				A	
Lining					
PTFE					0
Hard rubber					1

Sensor cable set - length of cable	Order code
5 m	VMMZSC000Z0005
10 m	VMMZSC000Z0010

Turbine flow sensors



Series VTR

Turbine flow sensors of the series VTR are used to measure different low viscosity media such as water and coolants. They are long-lasting and provide continuously reliable measuring results because they are made of stainless steel and equipped with a tungsten carbide supported turbine wheel.

During the design of these turbine flow sensors, versatile customisation options for special applications were in the focus of attention. Versions with flanged or threaded connection, a wide range of different sizes and application-specific sensors allow the adaption to a variety of applications. Pick-up sensors are available for example as versions with or without auxiliary energy, for high temperatures or for use with the local display TD32500.

To maintain accurate readings, the characteristic K-factor – the number of measured pulses per litre – is determined for each device in the factory and specified on the type plate. In addition, a five point calibration report for each sensor can be created on request.

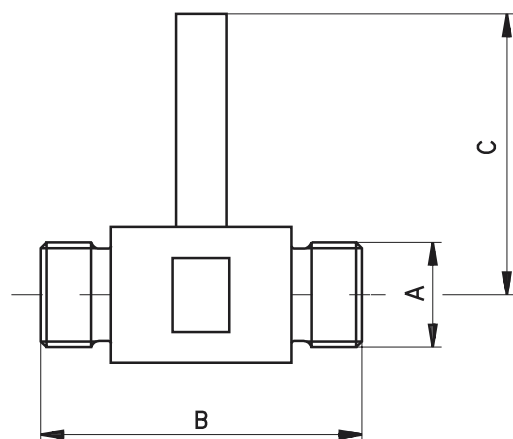
Advantages

- Works calibration certificate 5 point calibration
- Wide measuring ranges (1.8...45090 l/min)
- Always reliable measuring results due to high measuring accuracy, regardless of the mounting position
- High quality tungsten carbide bearings with low wear and long durability
- Robust stainless steel body, even for difficult applications
- For variable use thanks to different pick-up sensors as well as a variety of connections and sizes

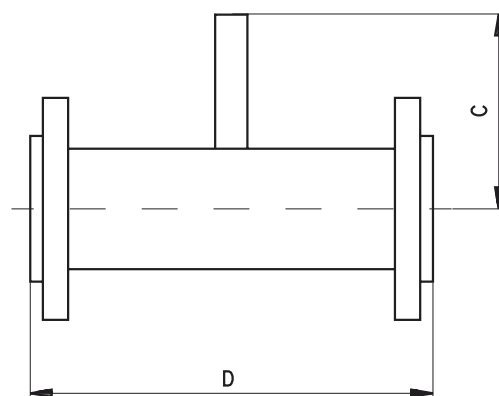


Type	Nominal diameter	Flow range		Dimensions			
	DN	[m³/h]	[l/min]	A	B [mm]	C _{max} [mm]	D [mm]
VTR1010	10	0.11...1.1	1.8...18.3	G½	64	150	127
VTR1015-S	15	0.22...2.2	3.7...36.7	G¾	64	150	127
VTR1015	15	0.4...4	6.7...66.7	G¾	64	150	127
VTR1020	20	0.8...8	13.3...133	G¾	83	150	140
VTR1025	25	1.6...16	26.7...267	G 1	88	200	152
VTR1040	40	3.4...34	56.7...567	G 1½	114	200	178
VTR1050	50	6.8...68	113...1133	G 2	132	200	197
VTR1075	80	13.5...135	225...2250			200	254
VTR1100	100	27...270	450...4500			300	356
VTR1150	150	55...550	917...9167			300	360
VTR1200	200	110...1100	1833...18333			350	457
VTR1250	250	190...1900	3173...31730			350	457
VTR1300	300	270...2700	4509...45090			400	457

Thread connection DN 10...DN 50



Flange connection DN 10...DN 300



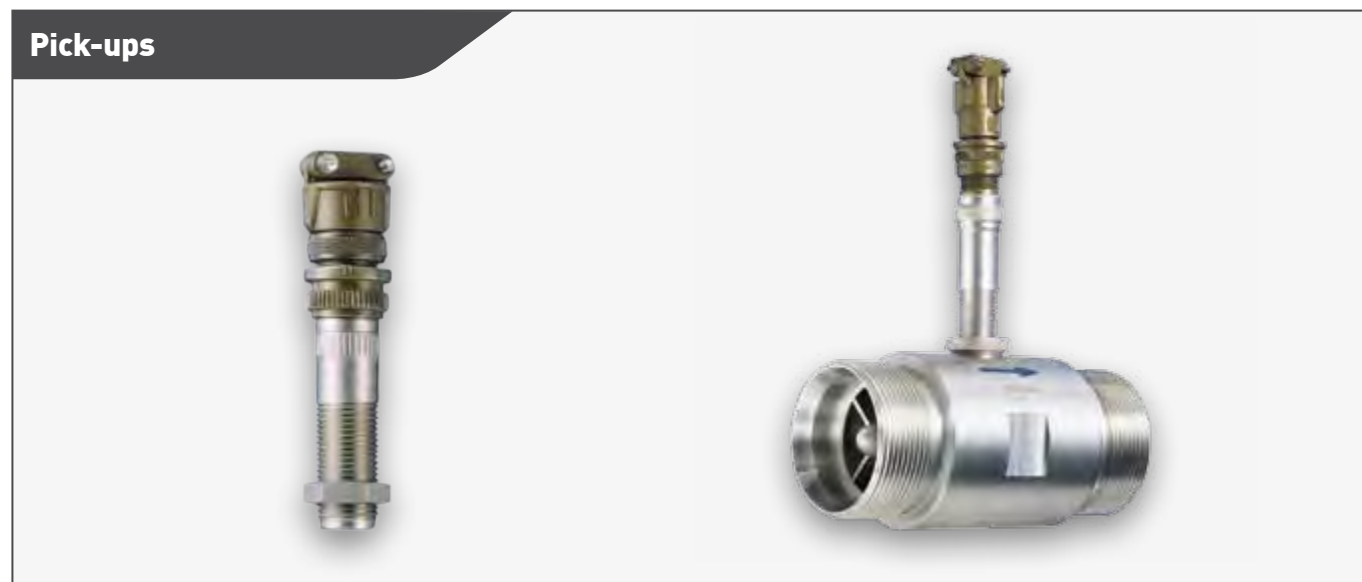
Materials	
Turbine body	Stainless steel ANSI 316
Flange	Stainless steel ANSI 316
Rotor	VTR1010 - VTR1020: Stainless steel (18 % Cr, 2 % Mo) VTR1025 - VTR1300: Stainless steel (20 % Cr, 2 % Mo)
Bearing support	Stainless steel ANSI 316
Rotor bearing	Tungsten carbide sleeve bearing

Order code	Example → VS	1071VA	ISP0	A3
Type				
VTR thread connection male	VS			
Nominal size / flow range	Process connection			
DN 10 / 0.11...1.1 m³/h	male thread G½	1071VA		A3
DN 15 / 0.22...2.2 m³/h	male thread G¾	1572VA		A4
DN 15 / 0.4...4 m³/h	male thread G¾	1573VA		A4
DN 20 / 0.8...8 m³/h	male thread G¾	2074VA		A4
DN 25 / 1.6...16 m³/h	male thread G 1	2575VA		A5
DN 40 / 3.4...34 m³/h	male thread G 1½	4076VA		A7
DN 50 / 6.8...68 m³/h	male thread G 2	5077VA		A8
Sensor				
Inductive pick-up VISPP (included in the scope of delivery)			ISP0	
Optional pick-up according to table on the following page (separate order)			0000	

Order code	Example → VS	1071VA	ISP0	G	1
Type					
VTR flange connection	VS				
Nominal size / flow range					
DN 10 / 0.11...1.1 m³/h		1071VA			
DN 15 / 0.22...2.2 m³/h		1572VA			
DN 15 / 0.4...4 m³/h		1573VA			
DN 20 / 0.8...8 m³/h		2074VA			
DN 25 / 1.6...16 m³/h		2575VA			
DN 40 / 3.4...34 m³/h		4076VA			
DN 50 / 6.8...68 m³/h		5077VA			
DN 80 / 13.5...135 m³/h		7578VA			
DN 100 / 27...270 m³/h		1H79VA			
DN 150 / 55...550 m³/h		HF81VA			
DN 200 / 110...1100 m³/h		2H82VA			
DN 250 / 190...1900 m³/h		ZF83VA			
DN 300 / 270...2700 m³/h		3H84VA			
Sensor					
Inductive pick-up VISPP (included in the scope of delivery)			ISP0		
Optional pick-up according to table on the following page (separate order)			0000		
Process connection					
DIN flange stainless steel				G	
ANSI flange stainless steel				I	
PN 6 / #150					1
PN 16 / #300					2
PN 25 / #400					3
PN 40 / #600					4

Accessories for series VTR

Pick-ups



The local display TD32500 is ordered and configured separately. The specifications can be selected in the subchapter Accessories for series VTR.

Technical data					
Type	VISPP Inexpensive, fitted as standard	VISPP-HT For high medium temperatures	VSAPPS* Square wave signal	VSAPPSHT* Square wave signal, for high medium temperatures	VSANTD For local display TD32500
Output signal	Sinus wave		Square wave NPN or PNP to choose		Square wave NPN
Measuring principle	Inductive		Magnetically biased Hall effect sensor		
Temperature range	-20...120 °C	-20...230 °C**	-20...85 °C	-20...100 °C	-20...85 °C
Power supply			10...30 VDC		Via TD32500
Degree of protection EN 60529	IP54		IP67		IP65
Electrical connection	Amphenol plug connection MS 10 SL 3102		4-pin plug connection M12 x 1		
Cable socket	Inclusive		Accessory		
Material housing	Stainless steel ANSI 314	Stainless steel ANSI 316	Brass nickel-plated		

* Adapter VT1140 sold separately ** Notice the max. medium temperature of measuring turbine (150 °C).

Connection cables	Length	Order code	
Connection cable for turbine flow sensor with cable socket M12 x 1 moulded lead, 4-pin, shielded, sheathing material PUR (T _{max} = 70 °C) UL-approval	3 m 5 m 10 m	XVT2053 XVT2009 XVT2070	
4-pin cable socket M12 x 1 angle type unassembled		VT1331	

Local displays, series TD32500

Description

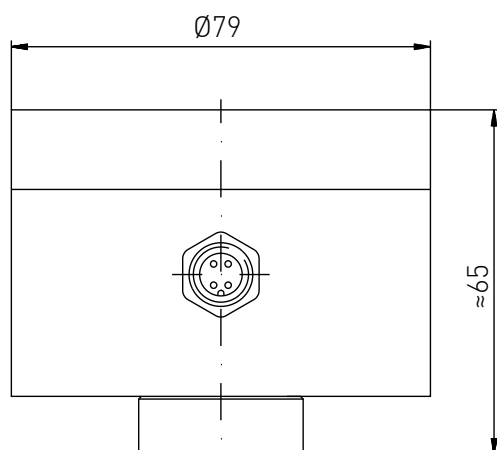
- Supplied fitted directly on SIKA turbine flow sensors, series VTR
- Display can be switched to:
 - flow rate
 - total flow (resettable)
 - total flow (non resettable)
 - optional temperature
- In addition bargraph 0...100 % to display flow rate, total flow (resettable) or optionally temperature
- Menu-driven programming via two light-reflex buttons
- Key lock for unintentional operation
- Robust stainless steel casing, with a closed glass window front
- Rotating case gives improved reading
- Language selection German, English or French
- Fixed connecting cable or plug connector M12 x 1

Type TD32500



Technical data

Signal input	Frequency signal from flow sensor 0.5...2000 Hz, pulse rate programmable
Additional temperature input (optional)	Pt100 / 3-wire, measuring range -10...150 °C
Programming	Menu-driven with two light reflex buttons
Display	2-line LC-display with 16 characters per line, character height: 5 mm
Programmable units	l/min, l/h, m³/h, GPM (US), GPM (UK), l, m³, GAL (US), GA L(UK), °C, °F
Power supply	12...24 VDC
Power supply to sensor	12 VDC
Ambient temperature	-10...60 °C
Temperature of medium through the flow sensor	Depending on type of sensor, not exceeding -20...90 °C
Analogue output (optional)	(0)4...20 mA (max. resistance 800 Ω with 24 VDC) or 0...10 V, adjustable for flow rate, total flow (resettable) or optional temperature
Alarm outputs (optional)	Two fast-switching PNP transistor open collector outputs, programmable for min- or max alarm, hysteresis programmable, allocation of flow rate, total flow (resettable) or optional temperature holding current or working current programmable
Pulse output with frequency divider (optional)	PNP open collector, TTL-level, programmable divider-rate
Casing	Circular stainless steel casing, Ø 80 mm, height 55 mm, 350° rotating
Degree of protection EN 60529	IP65
Electrical supply	PVC-connection cable, 2 m or plug connector M12 x 1



Options

- Additional temperature display, input for resistance thermometer Pt100 / 3-wire
- Analogue output 0(4)... 20 mA or 0...10 V, freely adjustable, allocated to: flow rate, total flow (resettable) or optional temperature
- Two fast-switching alarm outputs, min or max allocation selective: flow rate, total flow (resettable) or optional temperature. A red LED clearly signals alarms
- Pulse output for flow rate, if required with frequency divider (pulse reduction)



The turbine flow sensor is ordered and configured separately. The specifications can be selected in the chapter Turbine flow sensors.

Order code	Example → ED325	6	01000	009	1	0
Type						
TD32500	ED325					
Input						
Flow sensor		6				
Flow sensor and Pt100		7				
Outputs						
None			01000			
Analogue output			A1000			
Pulse + frequency divider			F1000			
Analogue + frequency divider			B1000			
Alarm output						
None				009		
Two, programmable				299		
Electrical connection						
2 m cable					1	
Plug M12 x 1					2	
Number of pins / leads						
Factory preset						[]

Positive displacement flow sensors

Gearwheel type flow sensors record volume flows of liquids with both high and changing viscosities. The high-precision sensors work according to the displacement principle. The high resolution combined with reliable measurement accuracy make the sensors especially useful for applications involving the measurement of small and very small volumes.

In principle, the measurement accuracy is increased for high viscosities. Conversely, the measurement accuracy is lower with a viscosity of less than 10 mm²/s. Due to their construction, gearwheel type flow sensors require a certain lubricity of the fluid being measured. Operation with non-lubricating media, e.g. water, is not possible.

Applications

- Consumption measurement
- Control of filling operations
- Dosage of oils and chemicals
- Flow measurement of paints and varnishes
- Ratio control of polyol and isocyanate

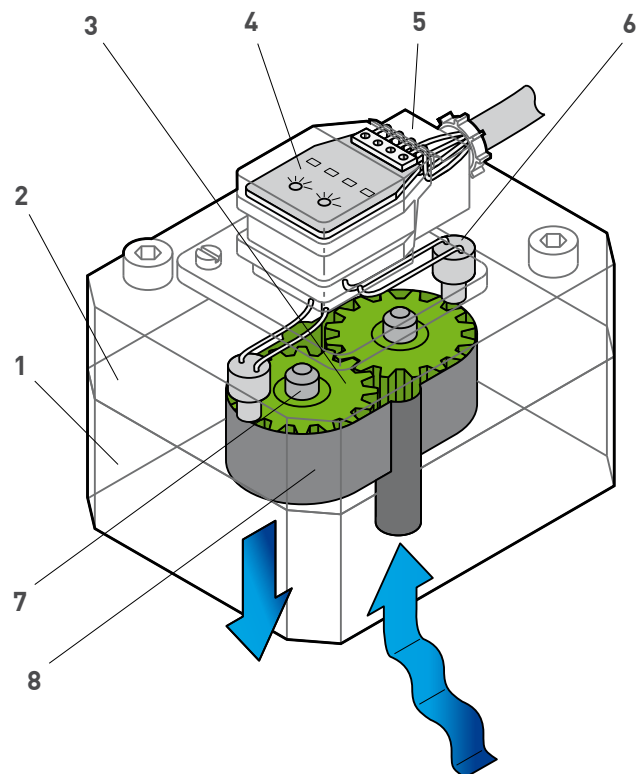
Principle of operation

A very precisely adjusted gear pair within the casing forms the measuring element. The inflowing medium causes the gear pair to rotate. The rotary motion is scanned by contactless sensors. Since each individual tooth generates a pulse, this results in a very high resolution. Consequently, even the smallest volumes can be measured or dosed precisely.

The measurement unit contains two pick-offs that are circumferentially offset by $\frac{1}{4}$ of a tooth pitch to generate a 2 channel flow-proportional frequency signal. Suitable processing of the signal provides an greater resolution and the option to identify the flow direction.

The maximum pressure drop should not exceed 16 bar. This limits the measurement range of high viscosity media (see pressure drop diagrams). Basically, the measurement accuracy increases with increase in viscosity of the media.

- 1 Housing bottom
- 2 Housing cover
- 3 Gear wheels
- 4 Pre-amplifier
- 5 Connection plug
- 6 Pick-offs
- 7 Bearing
- 8 Measurement chamber



Overview of performance features of the VZGG / VZVA / VZAL

	VZGG / VZVA	VZAL
Housing	Ductile iron or stainless steel	Aluminium
Viscosity of medium	1...100 000 mm ² /s	1...4000 mm ² /s (depending on the model)
Temperature of medium	-30...120 °C (standard)	-10...80 °C
Measuring accuracy	±0.3 % of reading	±1... 3 % of reading
Sizes	8	4
Process connection	Via subplate with lateral female thread connection	Direct female thread

Additional performance features of the VZGG / VZVA

- The measuring volume per pulse determines the size, e.g. 0.4 cm³/pulse for VZ 0.4...-S
- HT version for temperatures up to 150 °C with thermally insulated preamplifier (option)
- Intrinsically safe explosion-proof versions available in accordance with ATEX (max. medium temperature 80 °C)
- Variety of casing and sealing materials, meaning they can be universally used for different measurement media
- Standard process connection via connecting plates, so they can be replaced quickly without lengthy interruptions to the process
- Other bearings for special requirements on request

Additional performance features of the VZAL

- Standard process connections
- Output signal: pulse signal

Positive displacement flow sensors

Series VZGG, VZVA

Type VZGG



Type VZVA



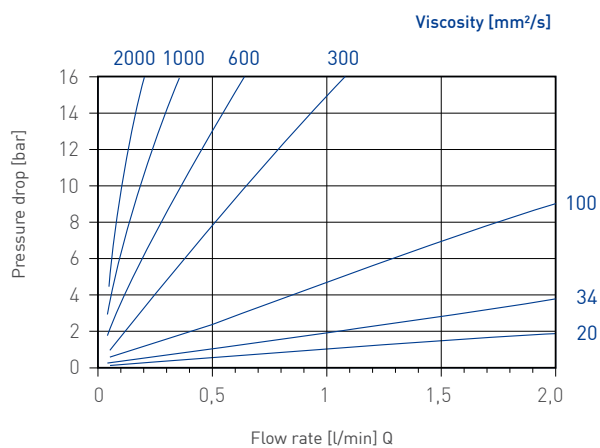
Type	VZ0.025	VZ0.04	VZ0.1	VZ0.2	VZ0.4	VZ1	VZ3	VZ5
Size	0.025	0.04	0.1	0.2	0.4	1	3	5
Start of gear wheel rotation [l/min]	0.001	0.004	0.008	0.01	0.01	0.02	0.03	0.04
Measuring range* [l/min]	0.008...2	0.02...4	0.04...8	0.16...16	0.2...40	0.4...80	0.6...160	1...250
Geometric gear volume [cm³]	0.025	0.04	0.1	0.245	0.4	1.036	3	5.222
Measuring volume [ml/Pulse]	0.025	0.04	0.1	0.245	0.4	1.036	3	5.222
Resolution [Pulse/l]	40 000	25 000	10 000	4081.63	2500	965.25	333.33	191.5

* For media with high viscosity the measuring range is reduced.
The max. pressure drop shouldn't exceeded 16 bar (see pressure drop diagrams).

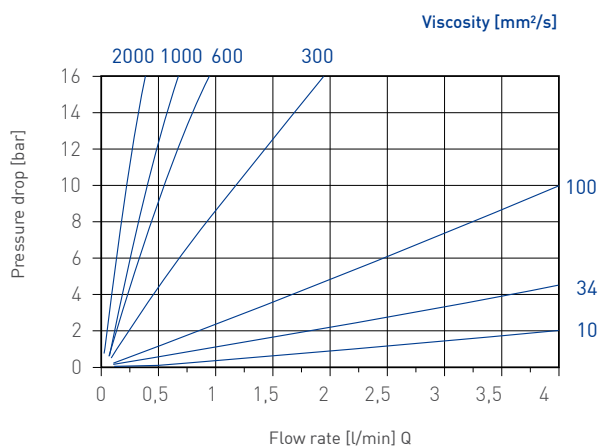
Technical data			
Measuring accuracy	±0.3 % of reading (21 mm ² /s)		
Repeatability	< 0.1 % under same conditions		
Viscosity of medium	1...100 000 mm ² /s		
Pressure rating	→ VZ 0.025... to VZ 1... -max. 400 bar → VZ 3... to VZ 5... -max. 315 bar → Higher pressure rating on request		
Medium temperature range (depends on sealing material)	FKM	FEP	EPDM
→ Standard	-15...120 °C	-30...120 °C	-30...120 °C
→ Without preamplifier (for TD8250)	0...60 °C	0...60 °C	0...60 °C
→ High temperature	-15...150 °C	-30...130 °C	-30...130 °C
→ Ex version	-15...80 °C	-30...80 °C	-30...80 °C
Ambient temperature range (depends on sealing material)	FKM	FEP	EPDM
	-15...80 °C	-30...80 °C	-30...80 °C
Process connection	Via subplate with lateral female thread connection		
Power supply	12...30 VDC / max. 90 mA		
Electrical connection	Via standard socket		
Degree of protection EN 60529	IP65		
Output signal	2-channel, squarewave, pulse duty ratio 1:1, PNP		

Options	
For type	On request
VZVA	→ Direct Process connection

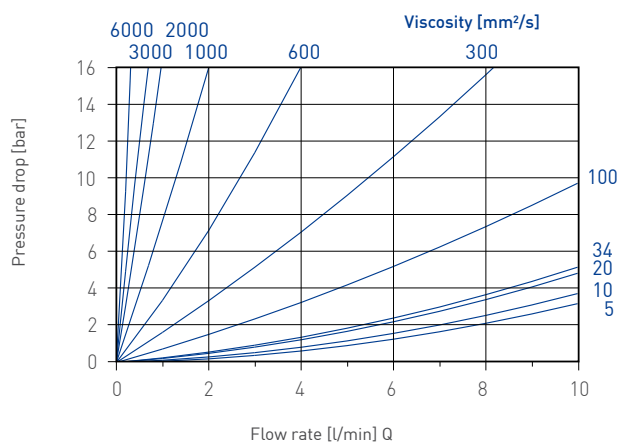
Typical pressure drop VZ0.025



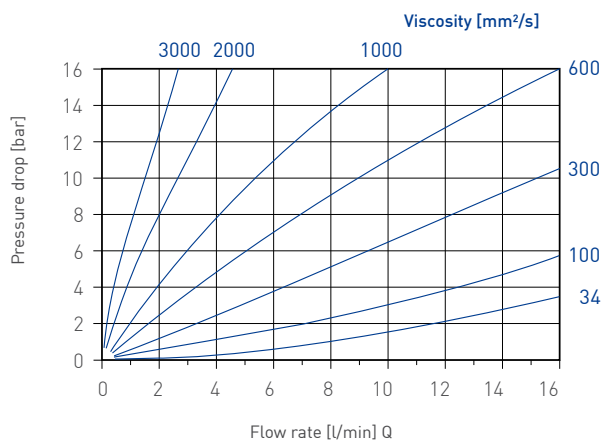
Typical pressure drop VZ0.04



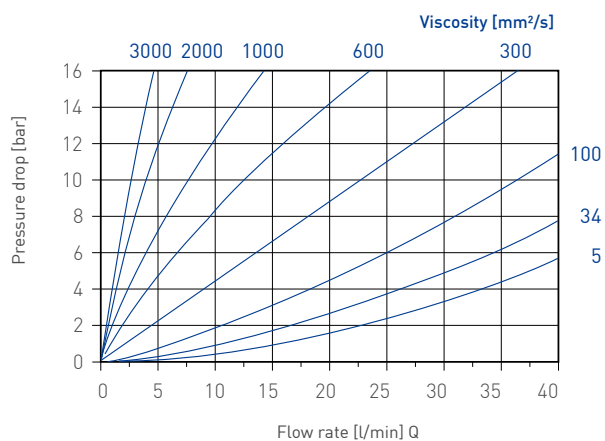
Typical pressure drop VZ0.1



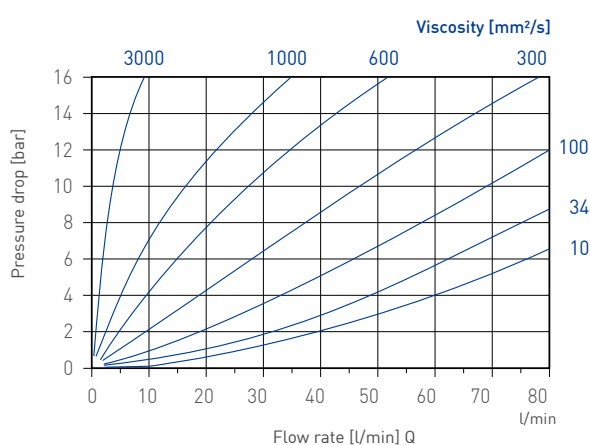
Typical pressure drop VZ0.2



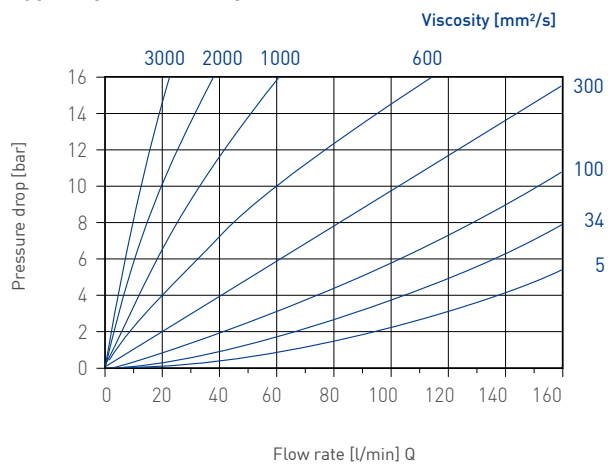
Typical pressure drop VZ0.4



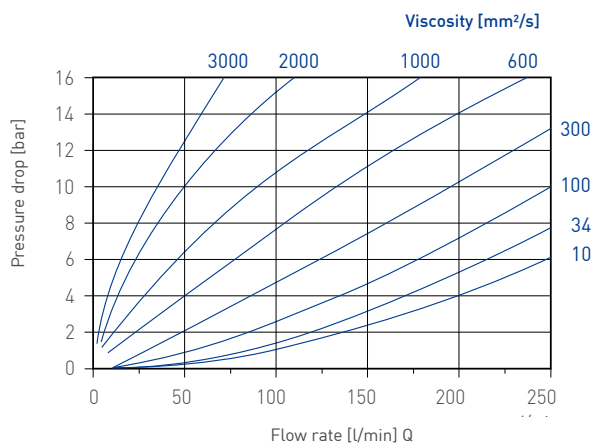
Typical pressure drop VZ1



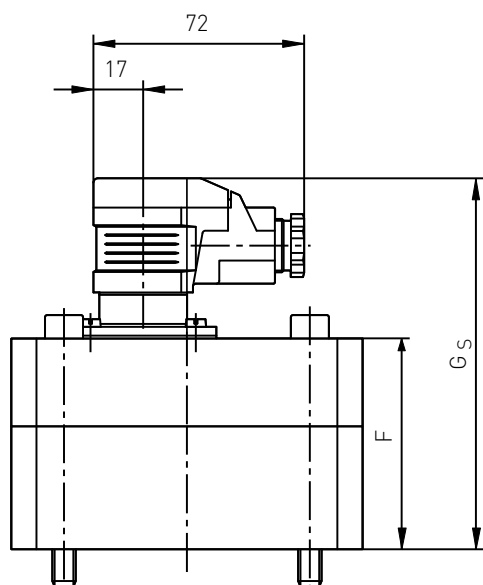
Typical pressure drop VZ3



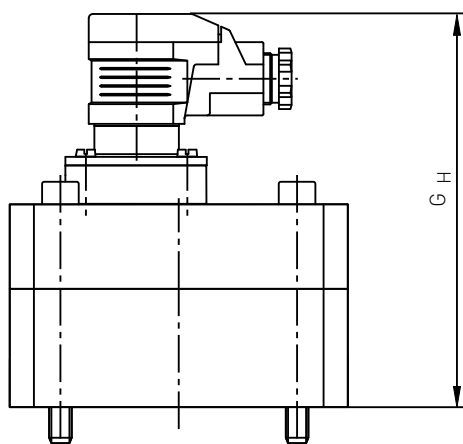
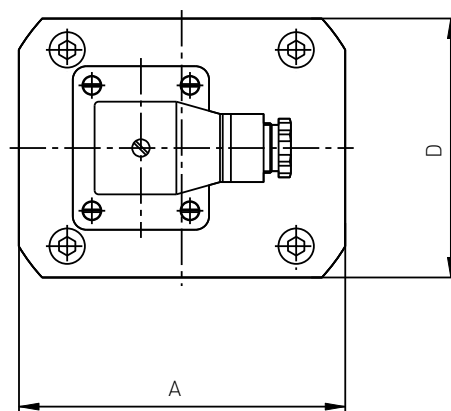
Typical pressure drop VZ5



VZGG



Standard version and Ex version



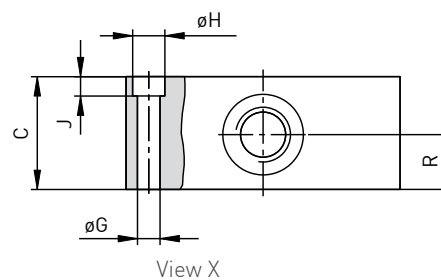
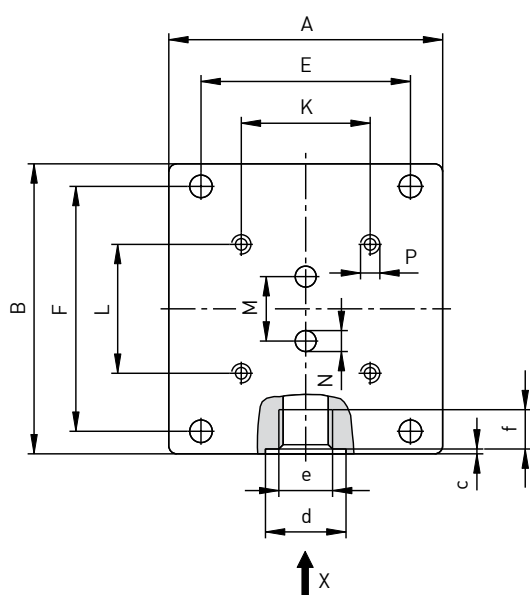
High temperature version

Material	
Housing	Ductile iron EN-GJS-400-15
Gear wheels	Steel 1.7139
Bearings	Ball bearings
Seals	Standard: FKM Option: EPDM, FEP

Type	VZ0.025GG	VZ0.04GG	VZ0.1GG	VZ0.2GG	VZ0.4GG	VZ1GG	VZ3GG	VZ5GG
A [mm]	85	85	85	85	100	120	170	170
D [mm]	60	60	60	60	90	95	120	120
F [mm]	50	56	65	57	63	72	89	105
GS [mm]	101	107	116	108	114	123	140	156
GH [mm]	114	120	129	121	127	136	153	169
Weight [kg]	1.8	2	2.3	2	3.7	5.2	9	13

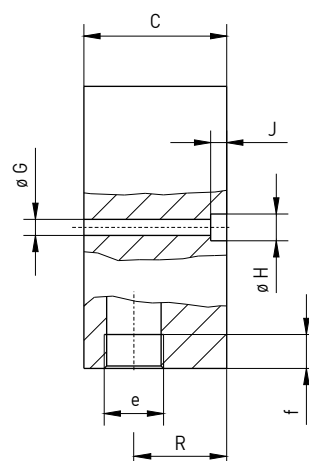
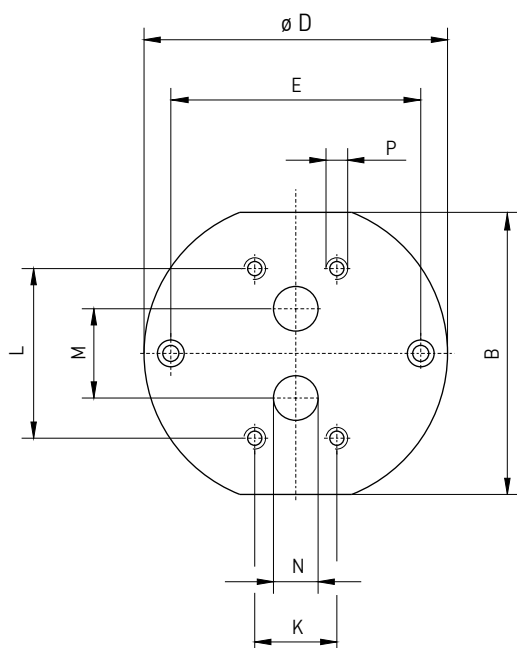
Subplates for VZGG

For type	VZ0.025GG / VZ0.04GG / VZ0.1GG / VZ0.2GG	VZ0.4GG	VZ1GG	VZ3GG / VZ5GG
A [mm]	85	100	100	160
B [mm]	90	110	120	165
C [mm]	35	37	37	80
c [mm]	0.7	0.7	0.7	1
d [mm]	25	29	29	42
E [mm]	65	86	80	140
e	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{1}{2}$	G 1
F [mm]	76	96	106	145
f [mm]	13	15	15	19
G [mm]	7	7	7	9
H [mm]	11	11	11	15
J [mm]	7	7	7	9
K [mm]	70	80	84	46
L [mm]	40	38	72	95
M [mm]	20	34	35	50
N [mm]	6.5	16	12	25
P [mm]	M 6/14t	M 8/18t	M 8/18t	M 12/24t
R [mm]	17	18.5	17.5	28
Weight [kg]	1.8	2.7	2.9	14
Material	Ductile iron EN-GJL-250	Ductile iron EN-GJL-400-15	Ductile iron EN-GJL-250	



Subplates for VZVA

For type	VZ0.025VA / VZ0.04VA / VZ0.1VA / VZ0.2VA	VZ1VA	VZ3VA / VZ5VA
B [mm]	85	116	158
C [mm]	35	37	80
D [mm]	94	124	170
E [mm]	75	100	140
e	G $\frac{3}{8}$	G $\frac{1}{2}$	G1
f [mm]	13	15	19
G [mm]	7	9	9
H [mm]	11	15	15
J [mm]	7	9	9
K [mm]	70	84	46
L [mm]	40	72	95
M [mm]	20	35	50
N [mm]	6.5	12	25
P [mm]	M 6/14t	M 8/18t	M 12/24t
R [mm]	18	19.5	52
Weight [kg]	1.7	3.2	13.9
Material	Stainless steel 1.4404		



Order code		Example → VZ0025	GG	V	3	2	I	00S
Type	Size		GG VA	V	3	2	I	00S
VZ0.025	0.025	VZ0025						
VZ0.04	0.04	VZ004						
VZ0.1	0.1	VZ010						
VZ0.2	0.2	VZ020						
VZ0.4	0.4 (only ductile iron)	VZ040						
VZ1	1	VZ100						
VZ3	3	VZ300						
VZ5	5	VZ500						
Material								
Ductile iron			GG					
Stainless steel			VA					
Seals								
FKM				V				
EPDM				E				
FEP				P				
Power supply								
12...30 VDC					3			
Process connection								
Via subplates						2		
Direct (only for stainless steel)						1		
Preamplifier								
Integrated							I	
Without preamplifier, for TD8250 (not for Ex-version)							K	
Isolated for high temperature version (not for Ex-version)							E	
Version								
Standard								00S
Ex-version								10S

Order code	Example → AP004	GG	0380S
Subplates appropriate to			
VZ0.025 / VZ0.04 / VZ0.1 / VZ0.2	AP004		
VZ0.4 (only ductile iron)	AP040		
VZ1	AP100		
VZ3 / VZ5	AP500		
Material			
Ductile iron		GG	
Stainless steel		VA	

Positive displacement flow sensors

Series VZAL

Type VZ0.2AL



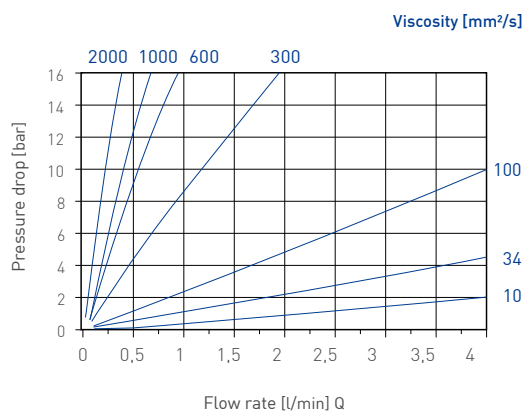
Type VZ2AL



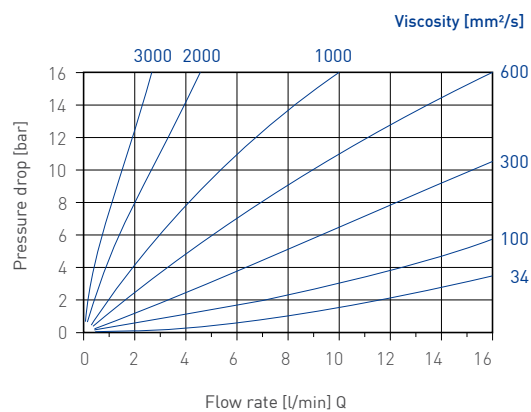
Technical data				
Type	VZ 0.04AL	VZ0.2AL	VZ2AL	VZ5AL
Size	0.04	0.2	2	5
Measuring range*	0.02...4 l/min	0.16...16 l/min	1...65 l/min	1...200 l/min
Viscosity of medium	20...4000 mm ² /s	1...3000 mm ² /s	20...4000 mm ² /s	20...4000 mm ² /s
Measuring accuracy	±2 % of reading	±1 % of reading	±2.5 % of reading	±1 % of reading
Repeatability	Up to 0.5 % under same conditions			
Pressure rating	Max. 200 bar	Max. 160 bar	Max. 160 bar	Max. 80 bar
Pressure peaks	Max. 240 bar	Max. 200 bar	Max. 200 bar	Max. 100 bar
Medium temperature range	-10...80 °C integrated preamplifier 0...60 °C without preamplifier (for TD8250)			
Thread connection	G¼	G½	G¾	G 1
Weight	0.5 kg	0.7 kg	1.9 kg	6 kg
Volume per pulse	0.04 cm ³	0.245 cm ³	2 cm ³	5.222 cm ³
Number of output channels	1	2	1	1
Output signal	→ Signal shape Square wave, pulse signal, PNP, pulse duty ratio 1:1 ±15 % → Pulse rate 25000 pulses/l → Resolution 0.04 ml/pulse			
Indication	Cable socket with one LED for pulse signal	Cable socket with two LED for pulse signal (two channels)	Cable socket with one LED for pulse signal	Cable socket with one LED for pulse signal
Electrical connection	Plug connector incl. cable socket			
Power supply	12...30 V DC reverse polarity protection			
Power input	0.6 W short circuit proof	0.9 W short circuit proof	0.6 W short circuit proof	0.6 W short circuit proof
Degree of protection EN 60529	IP65			

* For media with high viscosity the measuring range is reduced.
The max. pressure drop shouldn't exceeded 16 bar (see pressure drop diagrams).

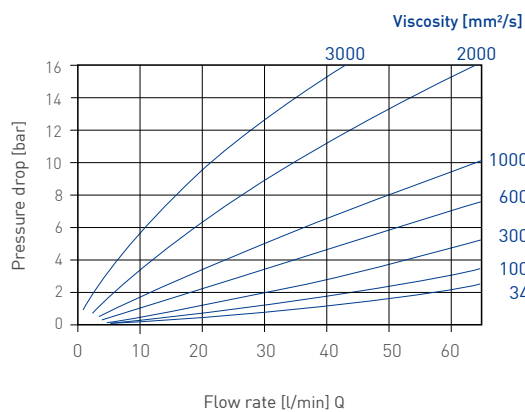
Typical pressure drop VZ0,04AL



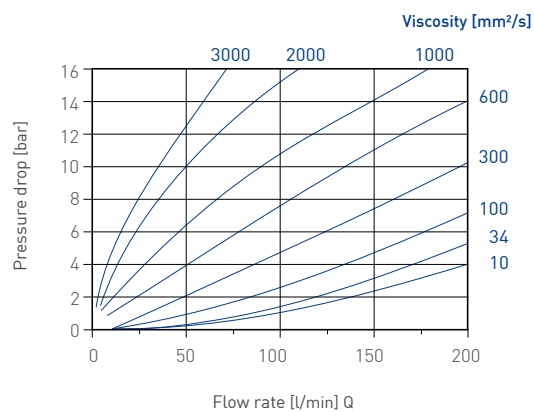
Typical pressure drop VZ0,2AL

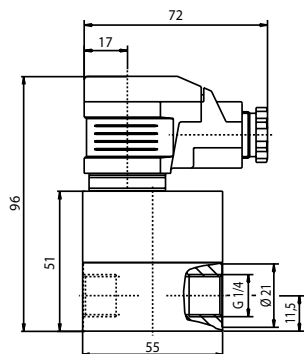
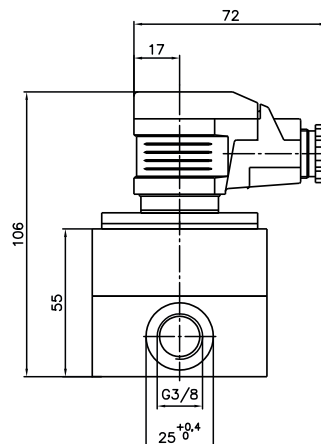
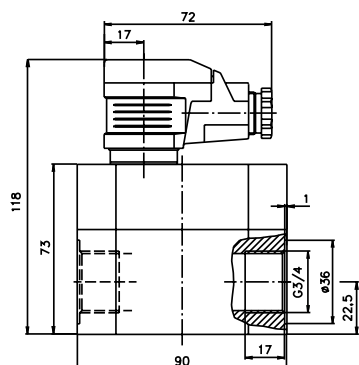
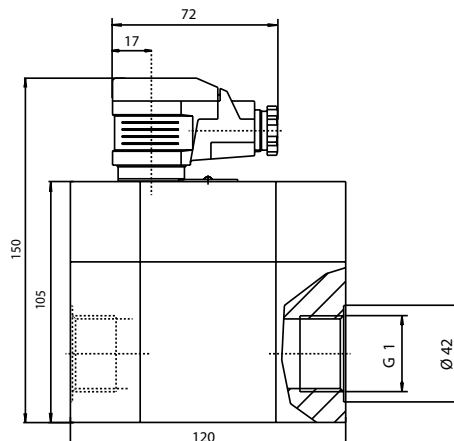


Typical pressure drop VZ2AL



Typical pressure drop VZ5AL



VZ0.04AL

VZ0.2AL

VZ2AL

VZ5AL

Material

Type	VZ0.04AL	VZ0.2AL	VZ2AL	VZ5AL
Housing	Aluminium, gold-colour anodised	Aluminium, gold-colour anodised	Aluminium AlMgSi F30 (hard coated)	Aluminium AlMgSi F30 (hard coated)
Gear wheels	Stainless steel 1.4462	Steel 1.7139	Steel 1.7139	Steel 1.7139
Bearings	Ball bearings	Ball bearings stainless steel	Sleeve bearings (P10)	Ball bearings
Seals	FKM	FKM	FKM	FKM

Order code
Example → VZ004ALV31 I00S

Type	Size		
VZ0.04AL	0,04	VZ004ALV31	
VZ0.2AL	0,2	VZ020ALV31	
VZ2AL	2	VZ200ALV31	
VZ5AL	5	VZ500ALV31	
Preamplifier			
Integrated			I00S
Without preamplifier (for TD8250)			K00S

Accessories

Local displays, series TD8250

The local display TD8250 is simply fitted between the plug connector plug and the cable socket of VZGG, VZVA or VAL positive displacement flow sensors. It is programmable via two buttons which are located behind the front panel. It can be set to display either the actual flow rate or the total volume (counter function), as required. The TD8250 is available in three different output signal versions:

- Pulse output (2-channel, depending on flow sensor)
- Analogue output 0(4)...20 mA
- Two alarm contacts

It is also easy to retrofit onto existing flow sensors. To do this, merely remove the amplifier board from the cable socket.

Technical data	
Signal input	Pulse signal from flow sensor
Programming	Via 2 buttons, data retention on power off
Display	Four-digit LED display, red, 7.6 mm high
Power supply	19...28 VDC, optional 10...19 VDC
Current consumption	Max. 120 mA
Ambient temperature	0...60 °C
Storage temperature	-25...85 °C
Output signals	Pulse output (2-channel, depending on flow sensor) or analogue output 0(4)...20 mA or 2 alarm contacts max. 24 VDC / 1 A
Housing	Aluminium, 60 x 35 x 60 (W x H x D) without plug connector
Weight	Approx. 120 g
Degree of protection EN 60529	IP65
Electrical connection	Plug connector DIN EN 175301-803-A, 4 pin

Type TD8250



Order code	Example → ED825F	60
Output signals		
Pulse output	ED825F	
Analogue output 0(4)...20 mA	ED825A	
Two alarm contacts	ED825R	
Power supply		
19...28 VDC (standard)		60
10...19 VDC (option)		50

Switch amplifier, series K-130

The switch amplifier K-130 serves as an interface between electrical signals of the hazardous areas to the safe areas.

The input signals of positive displacement flow sensors in in Ex-version are transmitted through transistor contacts. The input-, output- and power supply circuits are safe galvanic separated.



This unit is approved as associated apparatus.

Type K-130



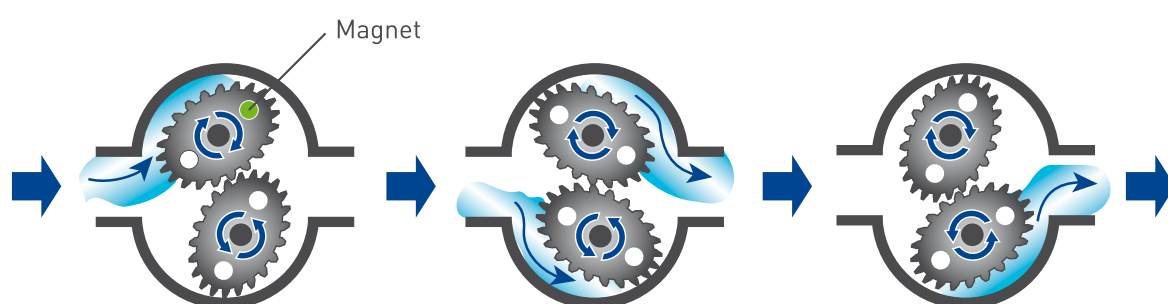
Technical data	
Temperature ranges	
→ Ambient	-25...60 °C
→ Storage	-25...85 °C
Humidity	Max. 75 % RH
Housing	For assembly rail setup DIN EN 50022
Dimensions	114.5 mm x 22.5 mm x 99 mm (H x W x D)
Declaration of conformity	94/9/EG: CE 0158
Field of application	EX II (2) G D, [EEx ia] II C
EC-type examination	PTB 03 ATEX 2094 X
Electrical data	
Signal input	2 channel frequency signal of positive displacement flow sensors in Ex-version
→ Switching points	0 ≤ 9 mA 1 ≥ 12 mA
→ Open circuit voltage	10 V
→ Short circuit current	82 mA
Signal output	2 channel, open collector
Power supply	24 V AC/DC (±20 %)
Power consumption DC	3.6 W
Mode selection	2x switch
Displays	6x LED, each Channel power indication, switch status and wire monitoring
Order code	
	K-130-ATEX



Oval gear flow meters

Principle of operation

Oval gear meters are displacement-type volume meters that transport defined incremental volumes in individual measuring chambers. The measuring element consists of two high precision toothed oval gears, which are driven by the flow of the medium and mesh with each other. In this way, a defined volume is transported for each rotation of the pair of oval gears. The number of rotations is a measure of the amount of fluid that has passed through the meter. The rotations are detected by a sensor element.



Advantages

- Positive displacement meter for volumetric flow rate or total flow measurement
- Applicable for fluids such as lubrication oils, mineral oils, hydraulic oils, fuels, liquified gases and others
- No inlet or outlet section required
- High-quality construction for long service life and high reliability
- Long-term stability
- High measurement accuracy and repeatability
- Easy installation

Oval gear flow meters

Series V0, Sensor

Threaded Version



Flanged Version



Characteristics

- Sensor with pulse output signal, no local display
- Flow rate or total flow indication by local or remote display
- Individual calibration
- Various versions of local displays are available: battery powered (lifetime approx. 3 years) or externally powered version with analogue and pulse output
- Female threaded or flanged process connection
- O-ring material FKM, EPDM or FEP

Type	V0015	V006	V01	V02	V05	V010	V050	V0115
Measuring range [l/min]								
→ Oval gears st. steel (V0...VA)	0.03...1	0.2...5	0.4...10	1...30	2...50	4...100	15...300	35...660
→ Oval gears PEEK (V0...VP / AP)	0.03...1	0.2...7	0.4...14	1...30	2...60	3...120		
Process connection								
→ Thread	G 1/4	G 1/2	G 1/2	G 3/4	G 1	G 1	G 2	G 2
→ Flange (according to DIN EN 1092-1)				DN 15		DN 25	DN 50	DN 50
Nominal puls rate [1/l]	3100	333	166	100	40	20	4	1.7

Type	VO...VA	VO...VP**	VO...AP**
Accuracy*	±0.5 % of reading		
Repeatability*	< 0.05 %		
Pressure rating	PN 40 (PN 25 with FEP O-ring)		
Temperature range			
Standard	-10...70 °C		
High temperature sensor	-10...130 °C		
Materials***			
Housing	Stainless steel	Stainless steel	Aluminium
Oval gears	Stainless steel	PEEK	PEEK
O-ring	FKM (standard) or EPDM (option) or FEP (option)	FKM (standard) or EPDM (option) or FEP (option)	FKM (standard) or EPDM (option) or FEP (option)
Medium			
Allowable Viscosity	0.3...350 mPa s	0.3...50 mPa s	
Max. particle size	25...100 µm		
Electrical data			
Supply voltage → Standard → High temperature sensor	10...30 VDC 18...30 VDC	10...30 VDC	10...30 VDC
Electrical connection (Sensor without display)	M12 x 1 connector		
Signal output			
Standard High temperature sensor	NPN, PNP PNP	NPN, PNP	NPN, PNP
Degree of protection EN 60529	IP67		

* Test conditions:

→ Viscosity >3 mPa s

→ Media temperature 20 °C

** Not available for V050 and V0115

*** Other material combinations on request

Series V0, Display

Display 1

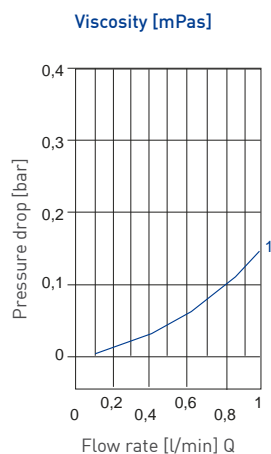


General description – displays

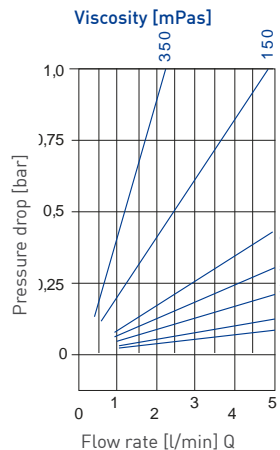
- Choice of three display models
- Actual flow rate indication
- Total flow indication, password protected counter
- Mass indication (temperature-dependent)
- Up to two V0 sensors can be connected; configurable for differential measurement (Display 2 and 3)
- Impulse output (Display 2 and 3)
- Optionally available for wall mounting with bracket (for media temperatures up to 70 °C)

Type	Display 1	Display 2	Display 3
Display	8 digit		
Electrical data			
Power supply	Battery	Battery	10...30 VDC
Power consumption			100 mA, 28 V
Signal outputs		Pulse output NPN open collector	Pulse output NPN open collector Analogue output 4...20 mA / 2-wire
Degree of protection EN 60529	IP65		
Electrical connection		Terminal block / cable gland	
Cable length (remote type / wall mounting)		2000 mm	
Temperature range			
Medium temperature	-10...70 °C		
Ambient temperature	-20...70 °C		
Storage temperature	10...55 °C		
Type			
Local (meter mounted)	✓	✓	✓
Remote (wall mounting)		✓	✓

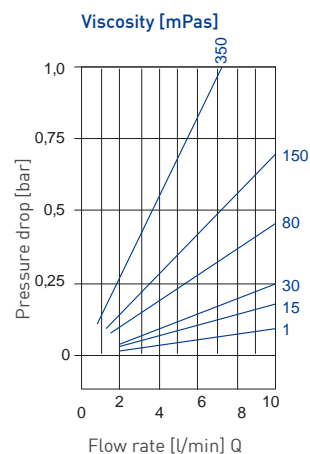
Typical pressure drop V0015



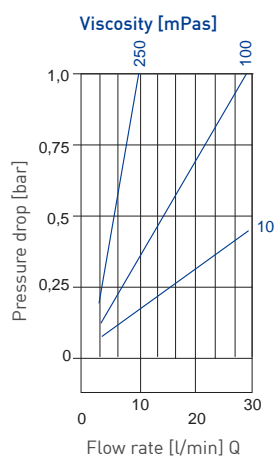
Typical pressure drop V006



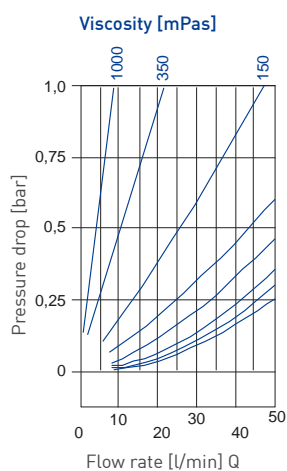
Typical pressure drop V01



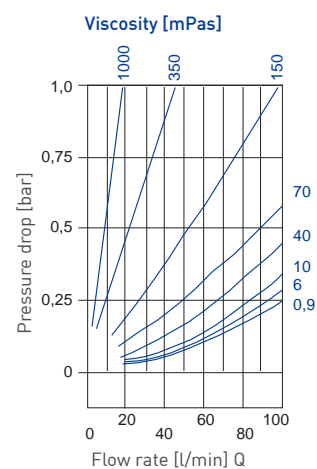
Typical pressure drop V02



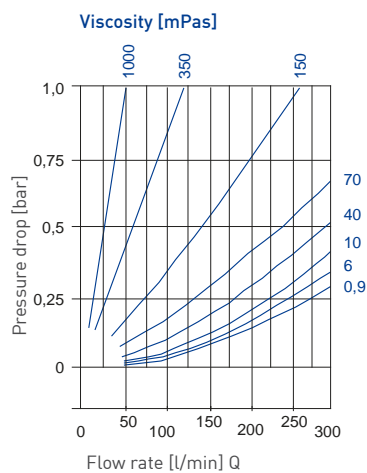
Typical pressure drop V05



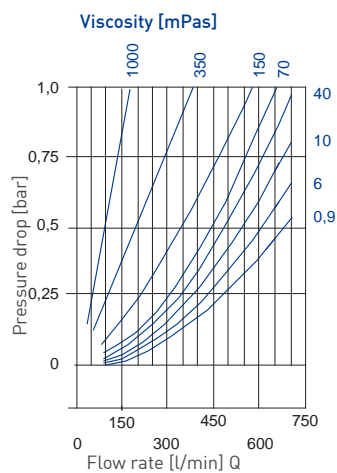
Typical pressure drop V010



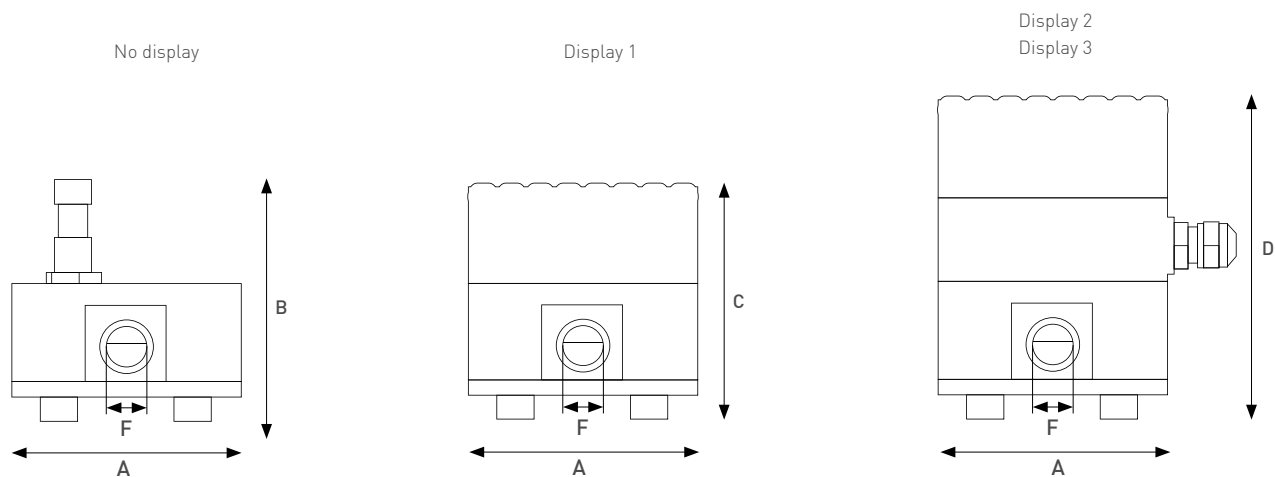
Typical pressure drop V050



Typical pressure drop V0115



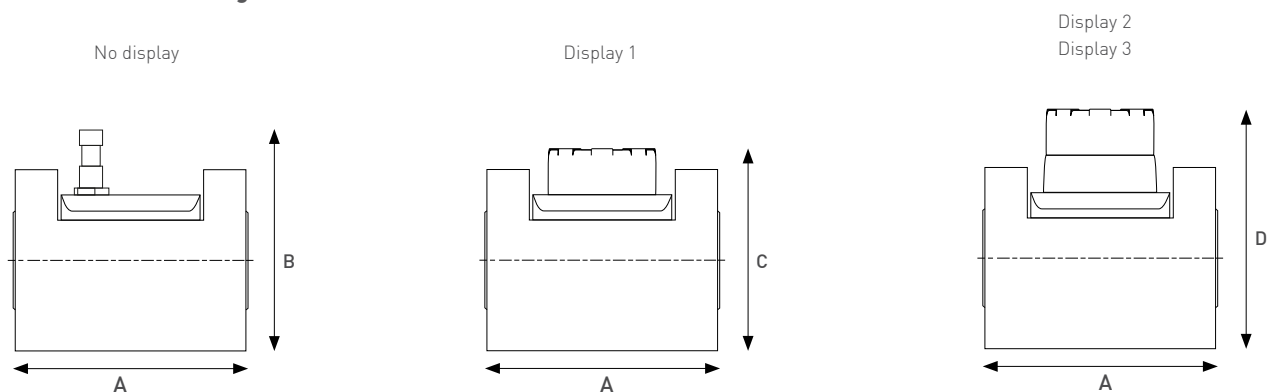
Process connection threaded



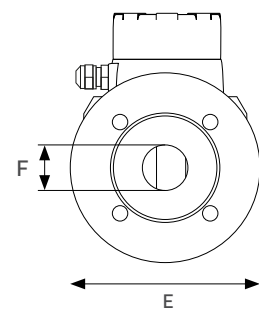
Size	V0015	V006	V01	V02	V05	V010	V050	V0115
A [mm]	78	78	78	99	112	112	220	260
C [mm]	70	75	85	93	98	125	187	245
B _{max} *, D [mm]	96	101	111	120	125	152	213	271
Installation [mm]	73	73	73	90	102	102	184	196
F / Process connection	G 1/4	G 1/2	G 1/2	G 3/4	G 1	G 1	G 2	G 2

* Depends on sensor

Process connection flanged



Size	V0 2	V0 10	V0 50	V0 115
A / Installation [mm]	140	170	184	196
C [mm]	108	153	165	243
B _{max} *, D [mm]	135	180	192	270
E [mm]	95	130	220	260
F / Process connection	DN 15	DN 25	DN 50	DN 50

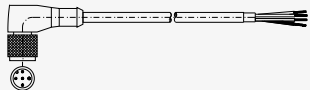



* Depends on sensor

Order code		Example → V0	01	VA	P	N	I1K
Type							
Oval gear meters, series V0		V0					
Size	Process connection						
015	G 1/4 female	01					I1K
06	G 1/2 female	06					I3K
1	G 1/2 female	1A					I3K
2	G 3/4 female	2A					I4K
5	G 1 female	5A					I5K
10	G 1 female	10					I5K
50	G 2 female	50		[VA]*			I8K
115	G 2 female	11		[VA]*			I8K
2	DN 15 flange according to DIN EN 1092-1	2A					F3K
10	DN 25 flange according to DIN EN 1092-1	10					F5K
50	DN 50 flange according to DIN EN 1092-1	50		[VA]*			F8K
115	DN 50 flange according to DIN EN 1092-1	11		[VA]*			F8K
Materials							
Body	Oval gears						
Stainless steel	Stainless steel			VA			
Stainless steel	PEEK			VP			
Aluminium	PEEK			AP			
O-rings							
FKM (standard)					V		
EPDM					E		
FEP					P		
Sensor pulse output without display							
NPN						N	
PNP						P	
PNP (high temperature)						H	
Sensor with display							
Display 1							
Battery powered, local display						D	
Display 2							
Battery powered, local display and pulse output						C	
Battery powered, remote display and pulse output						B	
Display 3							
Local Display, pulse and analogue output (4...20 mA)						T	
Remote display, pulse and analogue output (4...20 mA)						A	

* Preset

Accessories

Accessories	Length	Order code	
Connection cable with 4-pin cable socket M12 x 1, angle type molded lead, sheathing material PUR, shielded, ($T_{max} = 80\text{ °C}$) - UL-approval	3 m 5 m 10 m	XVT2053 XVT2009 XVT2070	
4 pin cable socket M12x1 angle type, unassembled		VT1331	
3.6 V lithium battery for Display 1 and Display 2		VO1036	

