Operating Instructions

for

Compact Vortex Flow Meter

Model: DVZ

1. Contents

Manufactured and sold by:

Kobold Messring GmbH
Nordring 22-24
D-65719 Hofheim
Tel.: +49(0)6192-2990
Fax: +49(0)6192-23398
E-Mail: info.de@kobold.com
Internet: www.kobold.com

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

as per PED 97/23/EG
In acc. with Article 3 Paragraph (3), "Sound Engineering Practice", of the PED 97/23/EC no CE mark.

Diagram 8, Pipelines, Group 1, dangerous fluids

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:

- Compact Vortex Flow Meter model: DVZ
- Operating Instructions

4. Regulation Use

Any use of the Compact Vortex Flowmeter, model: DVZ, which exceeds the manufacturer's specifications, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The compact KOBOLD Vortex flow meter, model DVZ, is used for measuring and monitoring smaller and medium-sized flow of low viscosity, water-like fluids in pipes.
The device works using the vortex process, making it virtually maintenance-free. This involves the installation of a sharp-edged object (the vortex generator) in the flow duct. A vortex is created behind the object whose frequency is proportional to the flow velocity of the fluid.
The flow volume can be determined with a very great degree of accuracy by measuring the vortex frequency. This achieves a very high linearity across the whole measuring range.
The device can be fitted with switching, frequency or analogue outputs. There is also an optional compact electronics package that includes a digital display, and both a switching and analogue output.

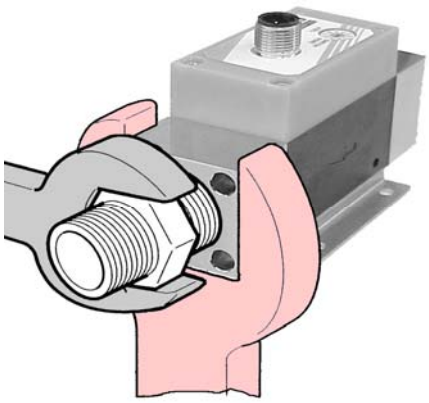
6. Mechanical Connection

6.1 Check operating conditions:

- Flow rate
- max. operating pressure
- max. operating temperature

6.2 Installation

- Remove all packing materials and transport retainers and ensure that no such materials remain in the device.
- Install with flow in direction of arrow (universal mounting)
- Avoid pressure and radial tension
- Fasten the pipe at up stream and down stream at a distance of 50 mm from the connections



Attention! Retransfer the unit on the metal bolting (not on the plastic housing!) Mount switches using the proper tightening torque according the following table!.

Nominal size of threads	Proper tightening torque
3/8”	22 to 24 Nm
1/2”	28 to 30 Nm
3/4”	28 to 30 Nm
1”	Nm

Note! The switch may be damaged if it is tightened above the tightening torque range. Also, if it is tightened below the tightening torque range, the connecting thread section may loosen.

- Ensure inlet and outlet section of 10xDN (e.g. 10x nominal pipe diameter)
- Avoid valves or large reduction on the inlet section (this increases the inaccuracy of measurements)
- Check the seals of the connections

Attention! When used with an open output side, there is a danger of cavitation.

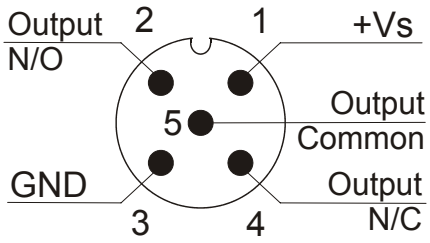
7. Electrical Connection

7.1 General

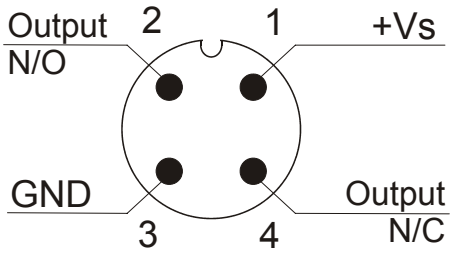
Attention! Make sure that the voltage values of your system correspond with the voltage values of the measuring unit.

- Make sure that the supply wires are de-energised.
- Plug in the system according to the connecting diagrams.
- We recommend the use of wires with cross sectional area of min. 0,25 mm²

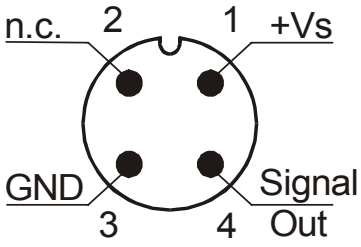
7.2 DVZ-...S300



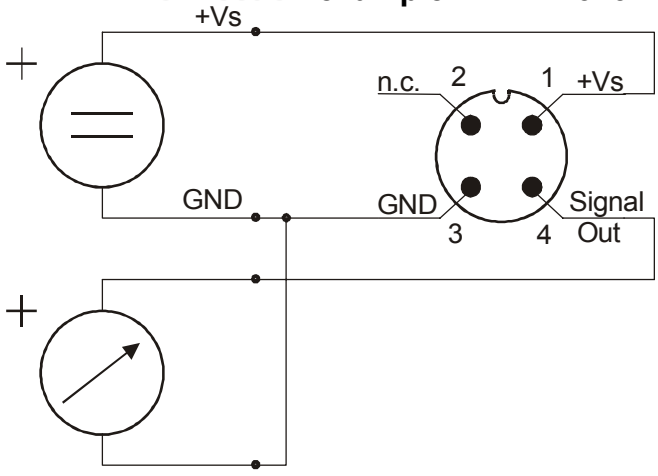
7.3 DVZ-...S30D



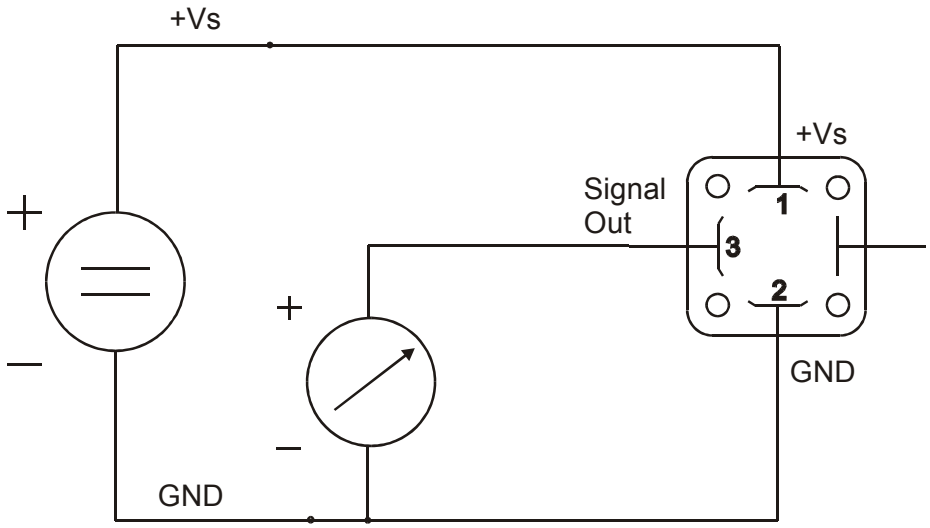
7.4 DVZ-...F300; DVZ-...L3x3



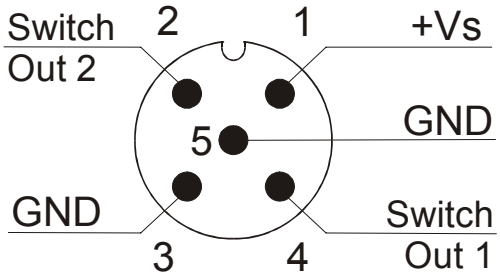
Connection example DVZ-...L3x3



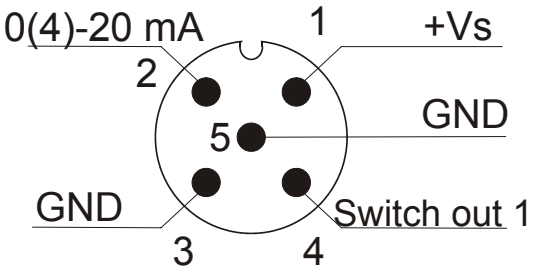
7.5 DVZ-...L443



7.6 DVZ-...C30*



7.7 DVZ-...C34*



8. Operation

The units are preset and after electrical connection ready for operation.

Switch point setting DVZ-...S300

Switch setting	Switch point
0	Switch function deactivated
1	Start of measuring range
2	20% of FS
3	30% of FS
4	40% of FS
5	50% of FS
6	60% of FS
7	70% of FS
8	80% of FS
9	90% of FS

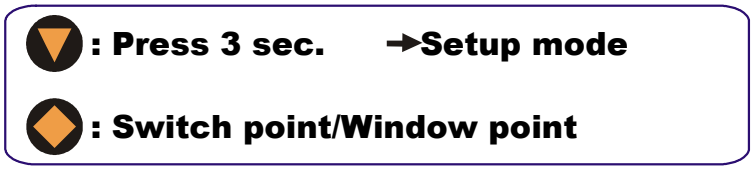
Flow above switch point: DUO-LED green
Flow below switch point: DUO-LED red

9. Adjustments – Compact Electronic DVZ-...C3..

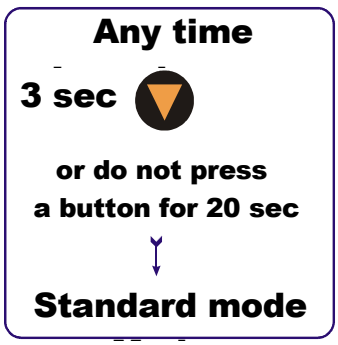
Connect the compact electronic according to previous connection diagram. After power on, the measuring range (end current) will be shown for 3 seconds.

9.1 Button function

In the normal mode (measuring mode)



In the set-up mode



9.2 Settings

The following values can be changed at the temperature transmitter:

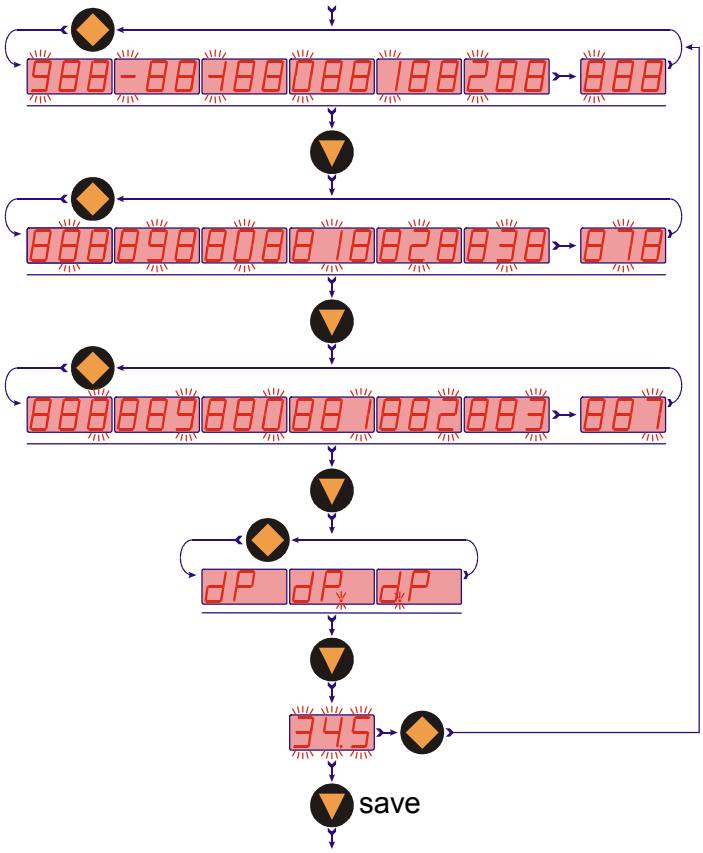
	Scale range	Factory setting
Switch point (**SPo, SP1**, **SP2**)	0...999	0,00
Hysteresis (**HYS**)	-199...0	-0,00
Window point (duo point) (**duo**)	Switch point ...999	--- (inactive)
contact-type (**Con**, **Co1, Co2**)	N/O, N/C or Frequency (**Fr**)**	**no**
Start current (**S-C**)*	000...999	000
End current (**E-C**)*	000...999	FS
Start current selection (**SCS**)	0-- (0 mA), 4-- (4 mA)	4 mA
Change Code (**CCo**)	000...999	000

** Start- and End value of flow relating to 0/4-20 mA.*
*** Only for sensors with pulse output (i.e. DPE)*

9.3 Value setting

From the main menu item (for example: switch point, "**SPo**"), press the "◆" button to set the value. The flow chart below illustrates the universal routine for changing individual parameters.

[From the main menu item]



1. Adjust position

2. Adjust position

3. Adjust position

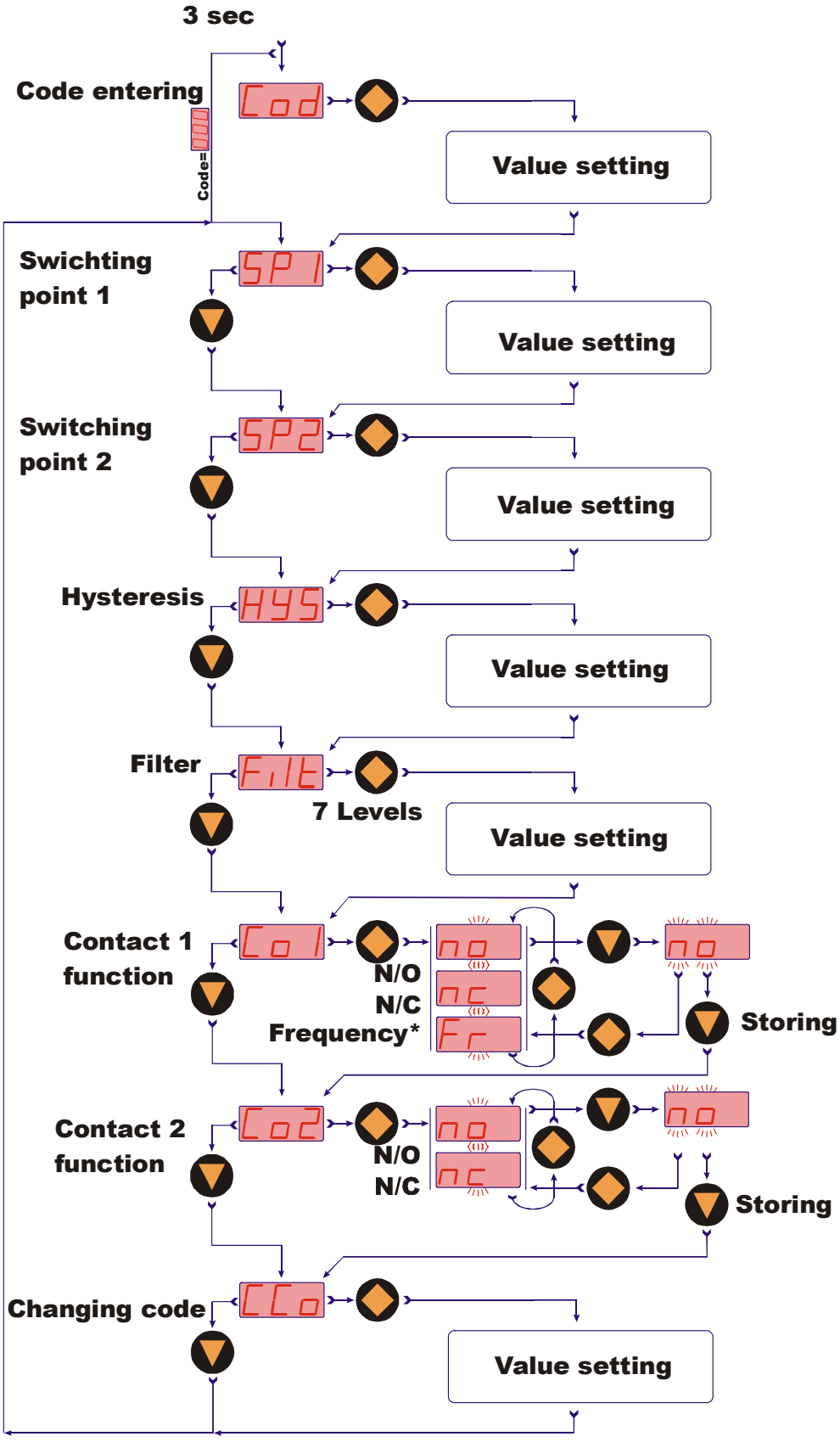
Adjust decimal point

Save selected value or enter new value.

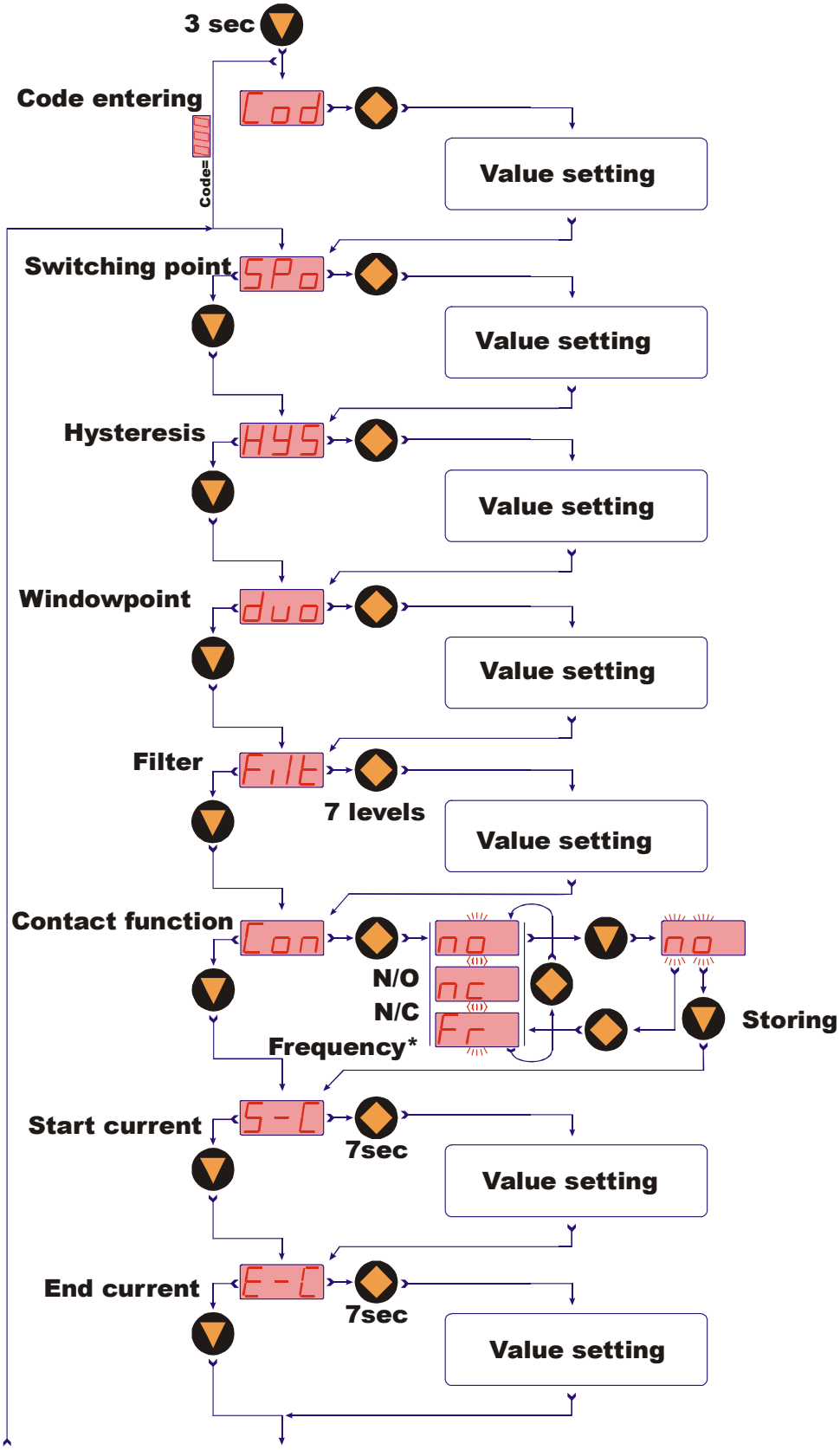
[To the next main menu item]

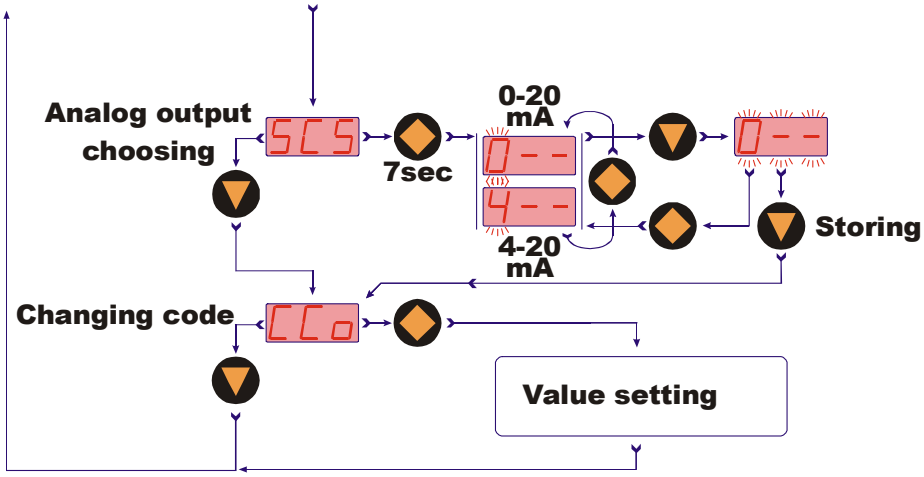
9.4 Set-up mode

Compact electronic DVZ-...C30..



Compact electronic DVZ-...C34





9.5 Main menu items

9.5.1 Switching point

The switching point is entered in the menu item "**Spo, SP1, SP2**". A setting value between 000 and 999 can be selected. This value can also include a decimal point. The decimal point can be set at two points (e.g. 10.0 or 1.00). If the display value exceeds the set switch point, the electronic is activated and is signalised by a lightning LED.
If the hysteresis is equal to zero and the window point is de-activated, the electronic switches back whenever the indicated value falls below the switching point.

9.5.2 Hysteresis

After the setting of the switching point, the hysteresis can be entered as a negative value in the "**HYS**" menu. The standard hysteresis value is zero. In operation condition this can lead to ambiguous switching behaviour, if the reading fluctuates around the switching point or window point. In this case, increasing the hysteresis can put things right. The hysteresis relates to the switching point and the window point (switching point minus hysteresis; window point plus hysteresis).

Example: Switching point 100 l/min; Hysteresis: -2.5 l/min
The electronic switches when 100 l/min is exceeded and switches back when the reading drops below 97.5 l/min.

9.5.3 Window point (duo-point)

As well as the switching point, it is also to define a "**duo**" (duo-point), the window point. This must be higher than the switching point. By using the window point and the switching point it is possible to monitor the measurement value in a certain range. The switching point limits the measurement range to smaller values and the window point to larger values.

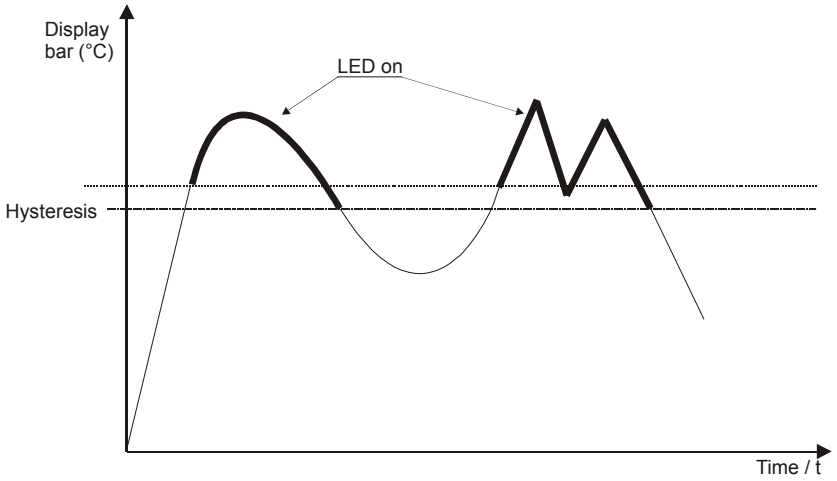
If the window point (duo-point) is less than or equal to the switching point, an error report (Er4) will be indicated on the display and its value is deleted and its function is invalid (in the case that the window point and switching point out of adjustment).

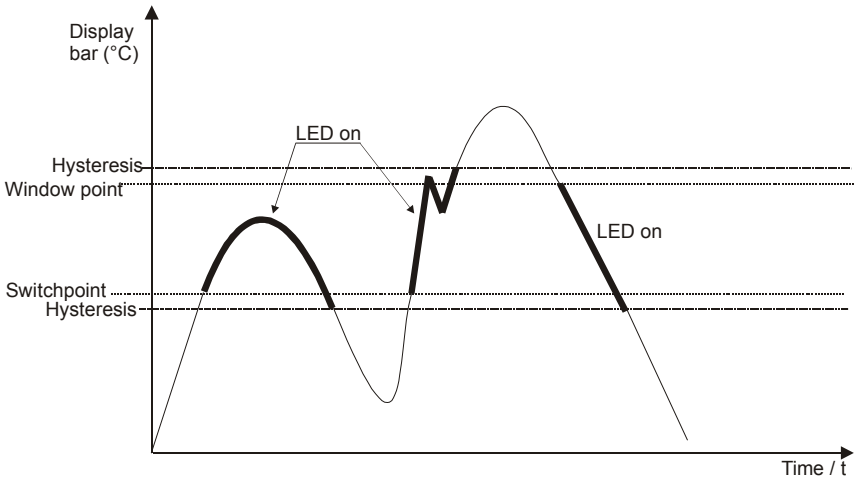
The value is set in the same way as the switching point.
The window point is needed for process, in which monitoring of a certain temperature range is necessary.

Example: Switching point: 100 l/min window point: 150 l/min; hysteresis: -1 l/min
The electronic switches when 100 l/min is exceeded.
If the switching value remains between 99 l/min (100-1) and 151 l/min (150+1), the contact will also remain in active switching condition (LED on). If it exceeds 151 l/min or is below 99 l/min the electronic switches back.

Switching behaviour

The following diagram clarifies the switching behaviour of the electronic switch. The contact closes (contact type: no) when it drops below the switching point or the window point. It only opens again if the window point plus hysteresis is exceeded or if it drops below the switching point minus hysteresis. An **LED** indicates the switching condition of the switching point.





9.5.4 Contact type

The function of the transistor switching output is set in menu item "**Con, Co1 or Co2**". The switching function switches from

no - N/O contact to
nc - N/C to
Fr – frequency (only Con and Co1)
and back.

N/O contact: contact closes when switching point is exceeded
N/C contact: contact opens when switching point is exceeded
Frequency: frequency output synchronised with the vane frequency

9.5.5 Current output

The current output is selected in menu items

"**S-C**" Start current indicated value < > 0(4) mA
"**E-C**" End current indicated value < > 20 mA
"**SCS**" Start current selection (0-20 mA or 4-20 mA).

The indicated value at which 0(4) mA flow is entered in menu item Start current.
The indicated value at which 20 mA flow is entered in menu item End current.

9.5.6 Change Code

The change code option "**CCo**" secures the unit against unauthorised tampering. If the code is different from 000, the user must input the code immediately after entering the adjustment mode.

10. Maintenance

The measurement device requires no maintenance if the measurement medium does not cause deposits or include fiber parts, which wrap around the sensor or the gate. In order to avoid problems, we recommend the installation of a filter, such as the magnetic filter, type MFR.
If it is necessary to clean the sensor, the sensor can be rinsed with a suitable liquid. Fiber parts or large particles can be carefully removed with tweezers, etc.

Ensure that the sensor is not damaged.

Work on the electronics can only be performed by the factory, or the warranty is otherwise voided.

11. Technical Information

Measurement process:	Vortex principle
Mounting position:	any, flow in direction of arrow
Accuracy:	±2.5% of F.S.
Repeat accuracy:	±1% of F.S.
Inlet / outlet runs:	10xDN
Operating temperature:	0...80 °C
Max. pressure:	10 bar
Max. pressure loss:	0.25 bar at F.S.
Wetted parts	
Sensor housing:	PPS, fibreglass-reinforced
Sensor:	PVDF
Connections:	brass, nickel plated or stainless steel 1.4404
Bluff body:	PPS, fibreglass-reinforced or oxide ceramic (non-wear version)
Seal:	NBR, EPDM or FPM
Response time:	1 s
Protection:	IP 65
Weight:	varies for each version

Model	Weight fixed connect.	Weight rotatable connect.
DVT-...S300 **DVZ-...F300** **DVZ-...L3*3** **DVZ-...L443**	approx. 0.50 kg	approx. 0.90 kg
DVZ-...C3	approx. 0.65 kg	approx. 1.10 kg

DVZ-...S300

Display:	duo-LED for switching condition and when range limit is exceeded
Switching output:	relay changeover, max. 1 A/30 V_{DC}
Switch point:	10...100% FS in 10%-steps that can be configured by the customer using a rotary switch
Power supply:	24 V_{DC} ± 20%
Power consumption:	12 mA
Electrical connection:	plug M12x1.5 pole

DVZ-...F300

Impulse output:	PNP, Open Collector, max. 200 mA
Power supply:	24 V_{DC} ± 20%
Power consumption:	5 mA
Electrical connection:	plug M12x1
Measuring range overflow:	F_{out} approx. 2 kHz up to 105% of Fs

DVZ-...L303; DVZ-...L343

Output:	0(4)-20 mA, 3-wire
Max. load:	500 Ohm
Power supply:	24 V_{DC} ± 20%
Electrical connection:	plug M12x1
Measuring range overflow:	I_{out} approx. 21 mA up to 105% of Fs

DVZ-...L443 (usage with AUF-3000)

Output:	4-20 mA, 3-wire
Max. load:	500 Ohm
Power supply:	24 V_{DC} ± 20%
Electrical connection:	plug DIN 43650
Measuring range overflow:	I_{out} approx. 21 mA up to 105% of Fs

DVZ-...C30* (compact electronics)

Display:	3-digit LED
Switching output:	2 Open Collector PNP or NPN, factory programmed
Contact function:	N/C, N/O, frequency, programmable
Programming:	with 2 keys
Power supply:	24 V_{DC} ± 20%, 3-wire
Power consumption:	approx. 100 mA
Electrical connection:	plug M12x1
Measuring range overflow:	display “OF” up to 105% of Fs

DVZ-...C34* (compact electronics)

Display:	3-digit LED
Analogue output:	(0)4...20 mA adjustable
Switching output:	1 Open Collector PNP or NPN, factory programmed
Contact function:	N/C, N/O, frequency, programmable
Programming:	with 2 keys
Power supply:	24 V_{DC} ± 20%, 3-wire
Power consumption:	approx. 100 mA
Electrical connection:	plug M12x1
Measuring range overflow:	display “OF up to 105% of Fs

12. Order Codes

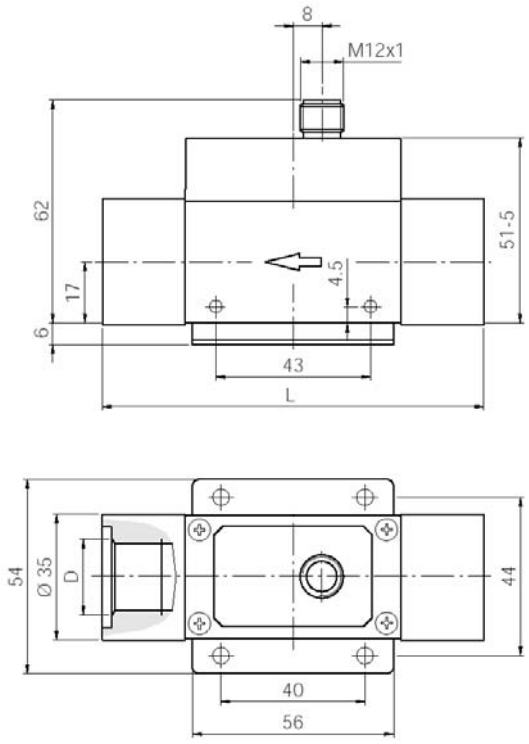
Order details (Example: **DVZ-1 1 04 G2 S300**)

Bluff body	Connection/ Seal	Measuring range	Connections		Electronics
			fixed	axially rotatable	
DVZ-1.. = PPS **DVZ-2..** = Ceramic	**..1..** = Brass/ NBR **..2..** = St. steel/ NBR **..4..** = Brass/ EPDM **..5..** = St. steel/ EPDM **..7..** = Brass/ FPM **..8..** = St. steel/ FPM	**..04..** = 0.5 - 4.5 L/min **..07..** = 0.8 - 7.0 L/min **..10..** = 1.3 - 10.0 L/min	**..G2..** = G 1/4 **..G3..** = G 3/8 **..G4..** = G 1/2 **..N2..** = 1/4 NPT **..N3..** = 3/8 NPT **..N4..** = 1/2 NPT	**..B2..** = G 1/4 **..B3..** = G 3/8 **..B4..** = G 1/2 **..P2..** = 1/4 NPT **..P3..** = 3/8 NPT **..P4..** = 1/2 NPT	**..S300** = Switching output, M12-Plug, Relay output **..F300** = Frequency output, M12-Plug **..L303** = Analogue output, M12-Plug, 0 - 20 mA **..L343** = Analogue output, M12-Plug, 4 - 20 mA **..L443** = Analogue output, DIN-Plug, 4 - 20 mA **..C30R** = Compact electron., 2x Open Coll., PNP **..C30M** = Compact electron., 2x Open Coll., NPN **..C34P** = Compact electron., 4 - 20 mA, 1x Open Coll., PNP **..C34N** = Compact electron., 4 - 20 mA, 1x Open Coll., NPN
		..16.. = 2.0 - 16.0 L/min	**..G3..** = G 3/8 **..G4..** = G 1/2 **..G5..** = G 3/4 **..N3..** = 3/8 NPT **..N4..**= 1/2 NPT **..N5..** = 3/4 NPT	**..B3..** = G 3/8 **..B4..** = G 1/2 **..B5..** = G 3/4 **..P3..** = 3/8 NPT **..P4..** = 1/2 NPT **..P5..** = 3/4 NPT	
		..22.. = 3.2 - 22.0 L/min **..32..** = 4.0 - 32.0 L/min	**..G4..** = G 1/2 **..G5..** = G 3/4 **..G6..** = G 1 **..N4..** = 1/2 NPT **..N5..** = 3/4 NPT **..N6..** = 1 NPT	**..B4..** = G 1/2 **..B5..** = G 3/4 **..B6..** = G 1 **..P4..** = 1/2 NPT **..P5..** = 3/4 NPT **..P6..** = 1 NPT	
		..63*.. = 5.0 - 63.0 L/min **..99*..** = 10.0 - 100 L/min	**..G5..** = G 3/4 **..G6..** = G 1 **..N5..** = 3/4 NPT **..N6..** = 1 NPT	**..B5..** = G 3/4 **..B6..** = G 1 **..P5..** = 3/4 NPT **..P6..** = 1 NPT	

* Measuring ranges in preparation

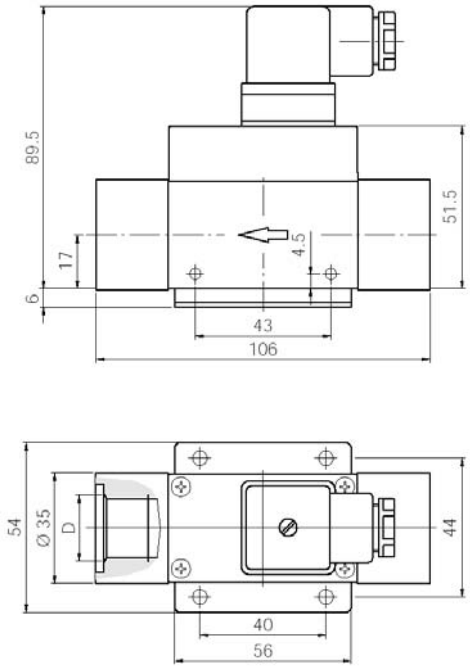
13. Dimensions

DVZ-...S300; DVZ-... F300; DVZ-...L3...
with fixed connection

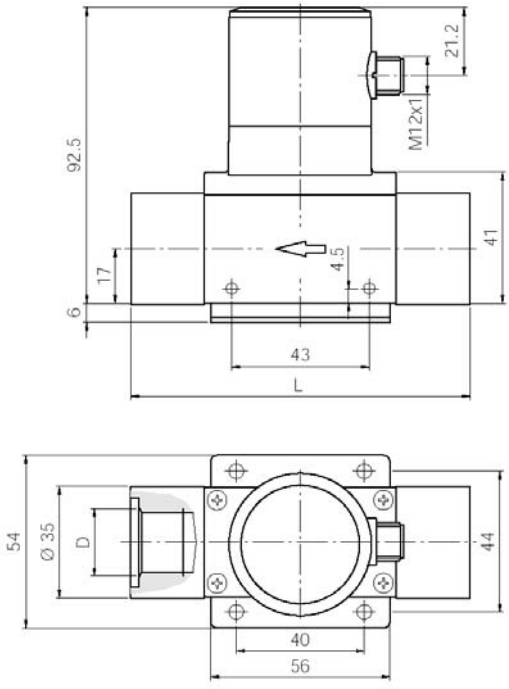


	1/4“	3/8“	1/2“	3/4“	1“
L 1	100	100	106	120	128
L 2	35	35	35	34	--
L 3	--	--	--	50	50
L 4	35	35	35	34	--
L 5	--	--	--	--	46

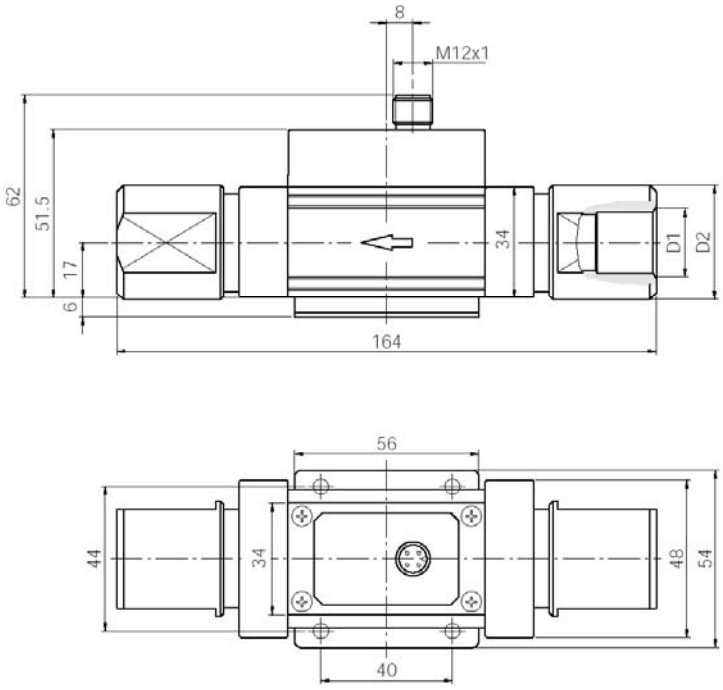
DVZ-...L443
with fixed connection



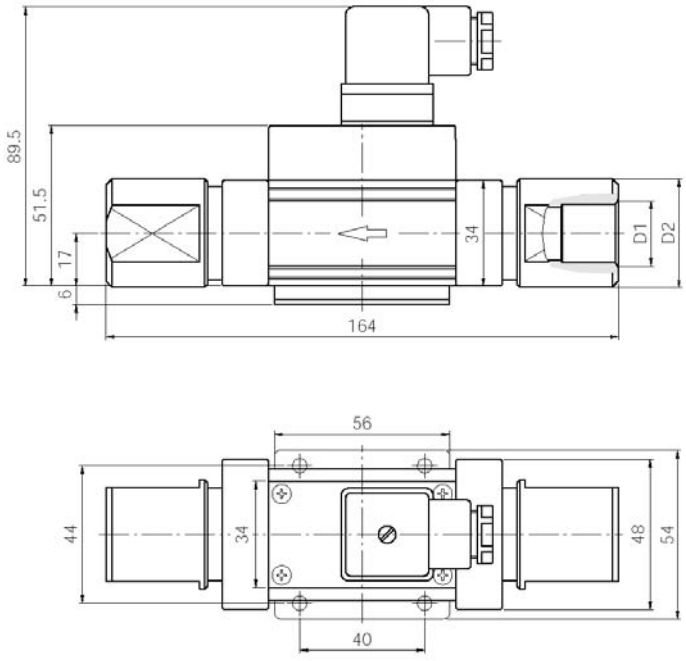
DVZ-...C3...
with fixed connection



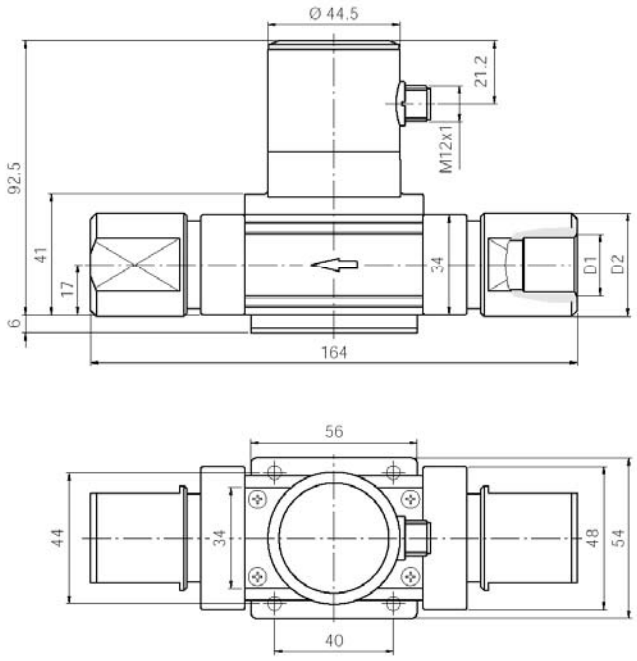
DVZ-...S300; DVZ-...F300; DVZ-...L3...
with rotatable connection



DVZ-...L443
with rotatable connection



DVZ-...C3...
with rotatable connection



14. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Compact Vortex Flow meter Model: DVZ

to which this declaration relates is in conformity with the standards noted below:

EN 61326/A1 2004-05
Electrical equipment for control and instrumentation technology and laboratory use – EMC-requirements (industrial area)

DIN EN 61010-1 1994-03
Safety requirements for electrical measuring-, control- and laboratory instruments.

EN 60529, DIN VDE 0470-1 1992-11
Protection type housing (IP-Code)

Also the following EWG guidelines are fulfilled:
89/336 EEC EMC Directive

Hofheim, 17. October 2005

H. Peters
General Manager

M. Wenzel
Proxy Holder