Compact Vortex Flowmeter
for Low Viscosity Liquids

measuring • monitoring • analyzing

DVZ

- Measuring Ranges:
  0.13...1.2 GPM to 2.7...26 GPM
- Accuracy: ± 2.5 % of Full Scale
- Vortex Shedding Technology with No Moving Parts
- P_{max}: 290 PSIG; T_{max}: 176 °F
- ¼" NPT ... 1" NPT, G¼ ... G1
- PPS Body with Nickel-plated Brass or 316 Stainless Steel Fittings
- Outputs: Analog, Frequency, Switching, or U-PACE Electronics with Digital Display and Two Configurable Outputs
- Additional for U-PACE: Temperature Meassurement, IO-Link

KOBOLD companies worldwide:

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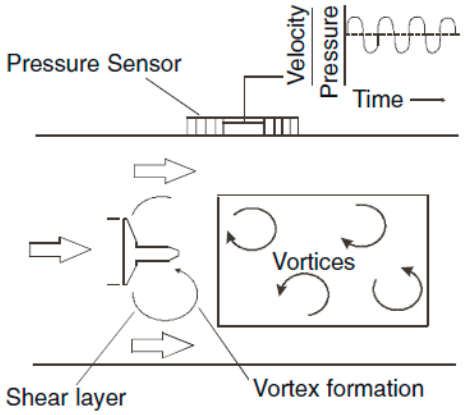
Description

The KOBOLD DVZ series vortex flowmeters are the perfect solution for applications where reliability and low cost are desired. The DVZ senses the flow rate of low viscosity liquids using the vortex shedding principle. A small obstruction called a bluff body is placed in the flow path. As liquid flows across the bluff body, small low-pressure areas called vortices are created just behind the bluff body. The position of the vortices alternate to either side of the bluff body in a uniform pattern. The frequency of the vortex shift is directly proportional to flow rate. This shift in the vortices is detected by a very sensitive pressure sensor and processed as a flow rate signal.



The vortex flowmeter has no moving parts and is very reliable. The DVZ series is available with a PPS body and a choice of either nickel-plated brass or 316 stainless steel fittings. The bluff body is available in either PPS or ceramic, which has excellent long term wear characteristics. The device is available with a switching, a frequency, or an analog output. In addition, the U-PACE electronic (Universal Precision and Control Electronics, order code C3T0) is available and features two outputs that can be configured arbitrarily by the user. The compact electronic offer various diagnositc functions and a wide array of other exceptional features:

- Flow and Temperature Measurement
- Switching, Transmitting, and Batching Functions
- Batching Function with External Control Input
- Colored, Multi-Parameter Configurable TFT-display, rotatable in 90°steps
- Intuitive Setup Menu via 4 Optical Touch Keys
- 2 Configurable Outputs (Pulse/Frequency/Alarm/Analog Output)
- Grand and Resettable Totalizer
- IO-Link Function
- The U-PACE Electronics have CSA approval for ordinary locations (Ordloc)
- International IECEE Certification acc. to CB-Scheme with U-PACE

Areas of Application

- Monitoring the Flow of Low Viscosity Liquids
- Measuring Aggressive, High-purity, or Salty Solutions
- Not Suitable for Abrasive Media or Media Containing a Large Amount of Fibers

Specifications

Available Ranges: 0.13...1.2 to 2.7...26 GPM Water
Accuracy*: ± 2.5% of Full Scale
Repeatability: ± 1% of Full Scale
Response time: ~1 Sec. (at flow changes>10%)
Straight Pipe Requirement: 10x Diameter Upstream, 2x Diameter Downstream
Media Temp. Range: 32...176°F
Ambient Temp. Range: 14...140°F

*Reference conditions: Water, 68-86ºF, 14.5-29 psi, counter pressure according to table

Maximum Media Viscosity**

Measuring Range Code	Measuring Range Start Point (GPM)					Max. Viscosity
	1 cSt	1.5 cSt	2 cSt	4 cSt	7 cSt	
..04.. / ..U1..	0.13	0.4	0.8	-	-	2 cSt
..07.. / ..U2..	0.2	0.4	0.8	-	-	2 cSt
..10.. / ..U3..	0.4	0.4	1.0	-	-	2 cSt
..16.. / ..U4..	0.6	0.6	1.0	-	-	4 cSt
..22.. / ..U5..	0.9	0.9	0.9	1.6	-	4 cSt
..32.. / ..U6..	1.1	1.1	1.1	0.9	3.3	7 cSt
..40.. / ..U7..	1.1	1.1	1.1	2.1	4.0	7 cSt
..50.. / ..U8..	1.3	1.3	1.3	2.4	4.4	7 cSt
..63.. / ..U9..	1.7	1.7	1.7	2.7	4.9	7 cSt
..80.. / ..UA..	2.1	2.1	2.1	2.9	5.4	7 cSt
..99.. / ..UB..	2.7	2.7	2.7	3.0	6.1	7 cSt

**When using viscous media, the decreased Reynolds number causes a displacement of the measuring range start point to a higher value. The measuring range end point values remain unchanged.

Maximum Pressure

DVZ-1.. & DVZ-2..: 145 PSIG Fixed Fittings
DVZ-1.. & DVZ-2..: 290 PSIG Rotatable Fittings
DVZ-3.. & DVZ-4..: 290 PSIG
Max. Pressure Drop: 3.6 PSI at 100% Rated Flow

Wetted Parts

Sensor Housing: PPS, fiberglass reinforced
Sensing Diaphragm: PVDF
Bluff Body: PPS, fiberglass reinforced or Oxide Ceramic
Seals: NBR, EPDM, or FKM
Fittings: Nickel-plated Brass or 316 Stainless Steel
Protection: IP65

No responsibility taken for errors; subject to change without prior notice.

Electrical Specifications

DVZ-..S300, S30D

Display:	DUO-LED for switching condition and when range limit is exceeded
Switching Output	
DVZ-..S300:	Relay SPDT, Max.1 A, 30 V_{DC}
DVZ-..S30D:	PNP 24 V_{DC}, N/C, N/O
Switch Point:	10%...90% of full scale in 10% steps configurable via a rotary switch
Power Supply:	24 V_{DC} ± 20%
Power Consumption:	25 mA
Electrical Connection:	
DVZ-..S300	Micro-DC, 5-pin Male
DVZ-..S30D	Micro-DC, 4-pin Male
Range Overflow:	Flashing of DUO-LED (green/red) from 105% of F.S.

DVZ-..S30x

DVZ-..F300, F390

Output:	PNP Open Collector, 200 mA Max.
Frequency at F.S.	
DVZ-..F300:	500 Hz
DVZ-..F390:	50…1000 Hz (User Specified)
Power Supply:	24 V_{DC} ± 20%
Power Consumption:	5 mA
Electrical Connection:	Micro-DC, 4-pin Male
Range Overflow:	F_{out} approx. 2 kHz from 105% of F.S.

DVZ-..F3x0
DVZ-..L343

DVZ-..L343, L443

Output:	4-20 mA, 3-wire
Max. Load:	500 Ω
Power Supply:	24 V_{DC} ± 20%
Electrical Connection	
L343:	Micro-DC, 4-pin Male
L443:	DIN 43650 Plug
Range Overflow:	I_{out} approx. 20.5 mA from 103% of F.S.

DVZ-..L443

DVZ-..L443 with Optional AUF-3000

Output:	4-20 mA, 3-wire
Max. Load:	250 Ω with AUF-3000
Power Supply:	24 V_{DC} ± 20%
Electrical Connection:	DIN 43650 Plug

DVZ-..L443
with AUF-3000

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DVZ-...C3T0 (U-PACE Electronics)

Supply Voltage	19-30 V_{DC}, internal power consumption max 200 mA
Display:	TFT Display, 128 x 128 Pixels, 1.4" Display, Orientation Adjustable in 90° Increments
Display Repetition Rate:	0.5... 10 s, Adjustable
Pulse Output:	Push-Pull, Freely Scalable, Configurable for Partial and Accumulated Totalizer
Frequency Output:	Push-Pull, Fully Scalable, 2 kHz at Overflow 50... 1000 Hz at Full Scale, User Programmable
Alarm Output:	NPN, PNP, Push-Pull. Configurable Max 30 V_{DC}, Max. 200 mA Short-Circuit Proof
Analog Output:	Active, 3-wire, 4-20 mA, Max. Load 500 Ω or 0-10 V_{DC}, (R_i = 500 Ω) (Factory Calibrated with R_L = 1 MΩ)
Control Input:	Active Signal U_{high} Max. 30 V_{DC}, 0<Low<10 V_{DC}, 15 V_{DC}<High<V_S
Batching Function:	Batching Output OUT2: Push-Pull, High Active Control Input OUT1: START/STOP 0.5s < t_{high} < 4s, RESET t_{high}>5s
Temperature Measurement:	
Sensor:	Digital
Accuracy:	≤±3.6ºF (depending on ambient temperature; flow > 0.66 ft/s)
Measuring Range:	Medium Temperature Range
Electrical Connection:	Plug M12x1, 4-Pin
Shock Resistance:	DIN EN 60068-2-27:2010: 20 g (11 ms)
Vibration Resistance:	DIN EN 60068-2-6:2008: 5 g (10... 2000 Hz)
Environmental Testing:	DIN EN 60068-2-30:2006: Severity Level b
Approval:	cCSAus for Ordinary Locations

When operated under the CSA label, the equipment shall be supplied with an external power supply which fulfills the requirements of Cl. 6.3.1, 6.3.2, 9.4 of IEC/CSA/UL 61010-1 and fulfills the requirements of the national authorities. For example, by the use of a Class 2 Limited Power Source (LPS)

Configuration of Outputs (C3T0)

Output 1 (OUT1, PIN 4)	Output 2 (OUT2, PIN 2)
Analog Output 4-20 mA	Analog Output 4-20 mA
Analog Output 0-20 mA	Analog Output 0-20 mA
Analog Output 0-10 V_{DC}	Analog Output 0-10 V_{DC}
Analog Output 2-10 V_{DC}	Analog Output 2-10 V_{DC}
Switching Output NPN/PNP/PP	Switching Output NPN/PNP/PP
Pulse Output PP	Pulse Output PP
Frequency Output PP	Frequency Output PP
Communication Mode KofiCom	
Communication Mode IO-Link	
Control Input	
Control Input Batching Function	Batching Output

IO-Link Specification

Manufacturer ID:	1105 (Decimal), 0 x 0451 (Hex)
Manufacturer Name:	Kobold Messring GmbH
IO-Link Specification:	V1.1
Bitrate:	COM3
Minimal Cycle Time:	1.1 ms
SIO-Mode:	Yes (OUT1 in Configuration IO-Link)
Block Parameterization:	Yes
Operational Readiness:	10 s
Max. Cable Length:	20 m

DVZ-..C3T0

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Order Details (Example: **DVZ-34U6N5L343 with Accessory 807.037**)

<table>
<tr><th rowspan="2">Housing/Bluff Body</th><th rowspan="2">Fitting/Seals</th><th rowspan="2">Flow Ranges</th><th colspan="2">Connections</th><th rowspan="2">Output</th></tr>
<tr><th>Fixed</th><th>Rotatable</th></tr>
<tr><td rowspan="4">DVZ-1.. = PPS/PPS

DVZ-2.. = PPS/Ceramic

DVZ-3[1].. = PPS/PPS, Reinforced Design

DVZ-4[1].. = PPS/Ceramic, Reinforced Design</td><td rowspan="4">..1.. = Brass/NBR

..2.. = SS/NBR

..4.. = Brass/EPDM

..5.. = SS/EPDM

..7.. = Brass/FKM

..8.. = SS/FKM</td><td>..04.. = 0.5...4.5 LPM
..07.. = 0.8...6.5 LPM
..10.. = 1.3...10 LPM
..U1.. = 0.13...1.2 GPM
..U2.. = 0.2...1.7 GPM
..U3.. = 0.4...2.6 GPM</td><td>..G2.. = G 1/4
..G3.. = G 3/8
..G4.. = G 1/2
..N2.. = 1/4" NPT
..N3.. = 3/8" NPT
..N4.. = 1/2" NPT</td><td>..B2.. = G 1/4
..B3.. = G 3/8
..B4.. = G 1/2
..P2.. = 1/4" NPT
..P3.. = 3/8" NPT
..P4.. = 1/2" NPT</td><td rowspan="4">Switching Output
..S300 = Relay, M12-plug
..S30D = PNP 24 V_{DC}, M12-plug

Frequency Output
..F300 = M12-plug, 500 Hz
..F390[4] = M12-plug, 50...1000 Hz

Analog Output
..L343 = M12-plug, 4-20 mA
..L443 = DIN-plug, 4-20 mA

U-PACE Electronics
..C3T0[2][3] = Compact, TFT display, 2 outputs (current/voltage/ pulse/frequency/alarm output/ IO-Link configurable), M12x1 plug, with cCSAus and IECEE CB Scheme Approval</td></tr>
<tr><td>..16... = 2.0...16 LPM
..U4.. = 0.6...4.2 GPM</td><td>..G3.. = G 3/8
..G4.. = G 1/2
..G5.. = G 3/4
..N3.. = 3/8" NPT
..N4.. = 1/2" NPT
..N5.. = 3/4" NPT</td><td>..B3.. = G 3/8
..B4.. = G 1/2
..B5.. = G 3/4
..P3.. = 3/8" NPT
..P4.. = 1/2" NPT
..P5.. = 3/4" NPT</td></tr>
<tr><td>..22.. = 3.2...22 LPM
..32.. = 4.0...32 LPM
..U5.. = 0.9...5.8 GPM
..U6.. = 1.1...8.5 GPM</td><td>..G4.. = G 1/2
..G5.. = G 3/4
..G6.. = G 1
..N4.. = 1/2" NPT
..N5.. = 3/4" NPT
..N6.. = 1" NPT</td><td>..B4.. = G 1/2
..B5.. = G 3/4
..B6.. = G 1
..P4.. = 1/2" NPT
..P5.. = 3/4" NPT
..P6.. = 1" NPT</td></tr>
<tr><td>..40.. = 4...40 LPM
..50.. = 5...50 LPM
..63.. = 6.5...63 LPM
..80.. = 8...80 LPM
..99.. = 10...100 LPM
..U7.. = 1.1...10.5 GPM
..U8.. = 1.3...13 GPM
..U9.. = 1.7...16.6 GPM
..UA.. = 2.1...21 GPM
..UB.. = 2.7...26 GPM</td><td>..G5.. = G 3/4
..G6.. = G 1
..N5.. = 3/4" NPT
..N6.. = 1" NPT</td><td>..B5.. = G 3/4
..B6.. = G 1
..P5.. = 3/4" NPT
..P6.. = 1" NPT</td></tr>
<tr><td colspan="6">Accessories: 807.037 = Mating 4-Pin Micro-DC Plug with 6 foot Cable for Output F300, F390, S30D , L343, & C3T0
807.007 = Mating 5-pin Micro-DC Plug with 6 foot Cable for Output S300</td></tr>
</table>

[1] Reinforced design only available with fixed connections
[2] Only for DVZ-1.../DVZ-3...
[3] The flow indication can be reduced to a value of 0 GPM by minimizing the parameter "separation" (cutoff) in the U-PACE electronics. However, the accuracy of the measured value below the measuring start range is not guaranteed.
[4] Please specify frequency out at max. flow when ordering

Order Details Accessory AUF

Model	Weight
AUF-3000	Plug-on Display, 4-20 mA, 3-wire

No responsibility taken for errors;
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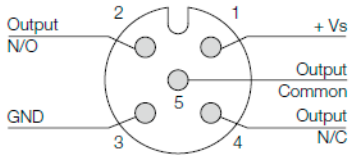
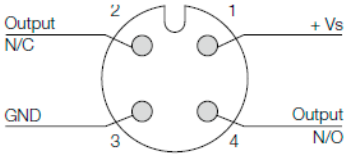
Electrical Connections

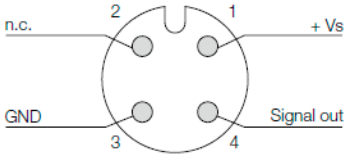
DVZ-..S300



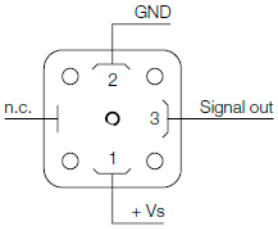
DVZ-..S30D



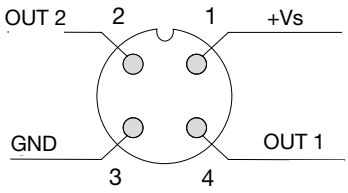
DVZ-..F300, F390, L343



DVZ-..L443



DVZ-..C3T0



Pressure Loss at Range End Value

Model	Flow Range End Value (GPM)	Pressure Loss (PSI)	Minimum Required Backpressure (PSI)*
DVZ-..U1/04	1.2	6.1	-
DVZ-..U2/07	1.7	9.4	-
DVZ-..U3/10	2.6	11.3	-
DVZ-..U4/16	4.2	8.7	-
DVZ-..U5/22	5.8	6.5	-
DVZ-..U6/32	8.5	5.4	-
DVZ-..U7/40	10.5	6.5	7.3
DVZ-..U8/50	13	5.8	7.3
DVZ-..U9/63	16.6	5.5	13.1
DVZ-..UA/80	21	5.8	10.2
DVZ-..UB/99	26	5.1	13.1

* Minimum required backpressure from >80% FS to prevent cavitation

Approximate Sensor Weight

Measuring Range	Size	Fixed Connections	Reinforced Connections	Rotatable Connections
up to 8.5 GPM	1/4", 3/8", 1/2"	1.0 LBS	1.3 LBS	1.8 LBS
up to 8.5 GPM	3/4"	1.3 LBS	1.3 LBS	2.0 LBS
up to 8.5 GPM	1"	2.3 LBS	2.1 LBS	2.1 LBS
10.5...26 GPM	3/4"	2.3 LBS	2.9 LBS	3.0 LBS
10.5...26 GPM	1"	2.0 LBS	2.50 LBS	3.1 LBS

Approximate Electronic Weight

Model	Weight
DVZ-..F3x0 **DVZ-..S30x** **DVZ-..Lxx3**	0.18 LBS
DVZ-..C3T0	0.66 LBS

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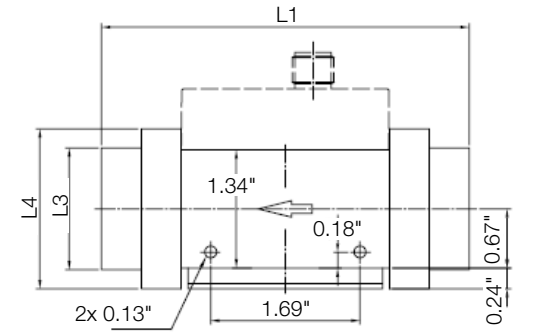
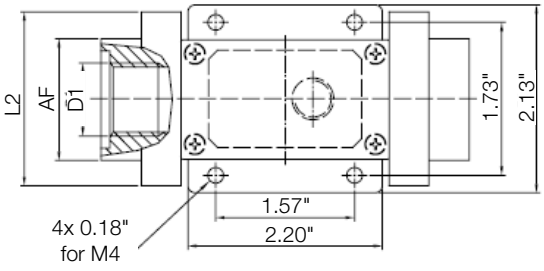
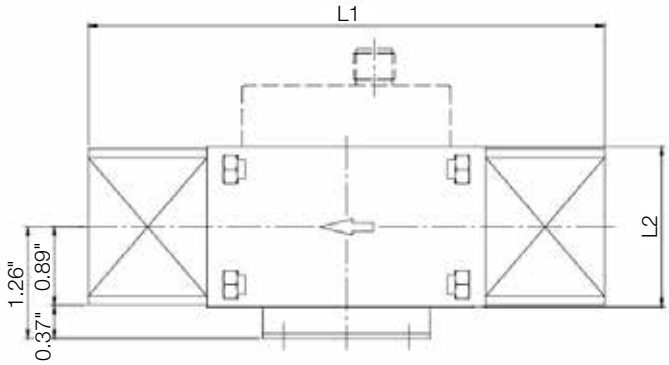
Dimensions

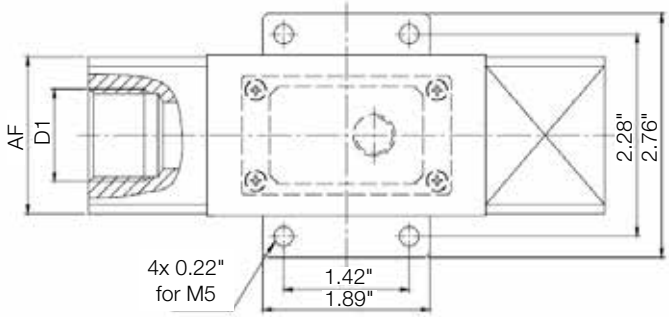
DVZ Flowmeters with Fixed Connections
Flow Range up to 8.5 GPM





DVZ Flowmeters with Fixed Connections
Flow Range from 10.5 GPM





MB	U1/U2/U3/ 04/07/10	U1/U2/U3/U4/ 04/07/10/16	U1/U2/U3/ U4/U5/U6/ 04/07/10/16/22/32	U4/U5/U6/ 16/22/32	U5/U6/ 22/32	U7/U8/U9/UA/UB/ 40/50/63/80/99	U7/U8/U9/UA/UB/ 40/50/63/80/99
D1	1/4"	3/8"	1/2"	3/4"	1"	3/4"	1"
AF	35 mm	35 mm	35 mm	34 mm	-	45 mm	45 mm
L1	3.94"	3.94"	4.17"	4.72"	5.04"	5.83"	5.83"
L2	-	-	-	1.97"	1.97"	1.81"	1.81"
L3	1.38"	1.38"	1.38"	1.34"	-	-	-
L4	-	-	-	-	1.81"	-	-

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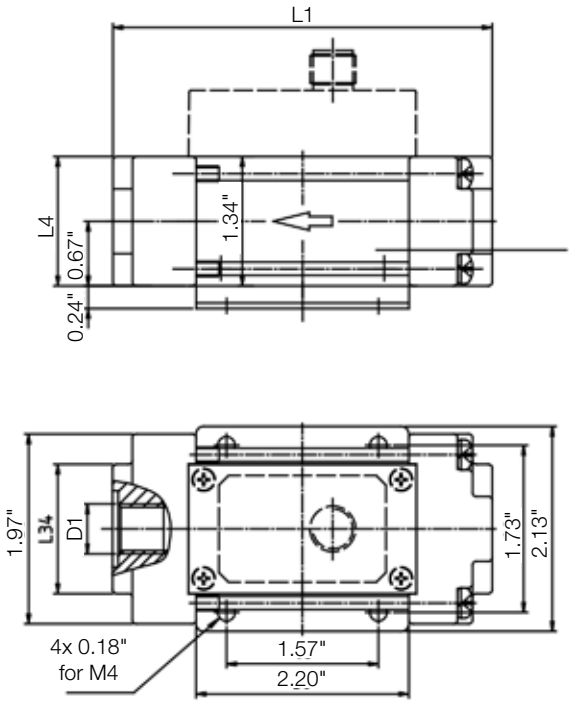
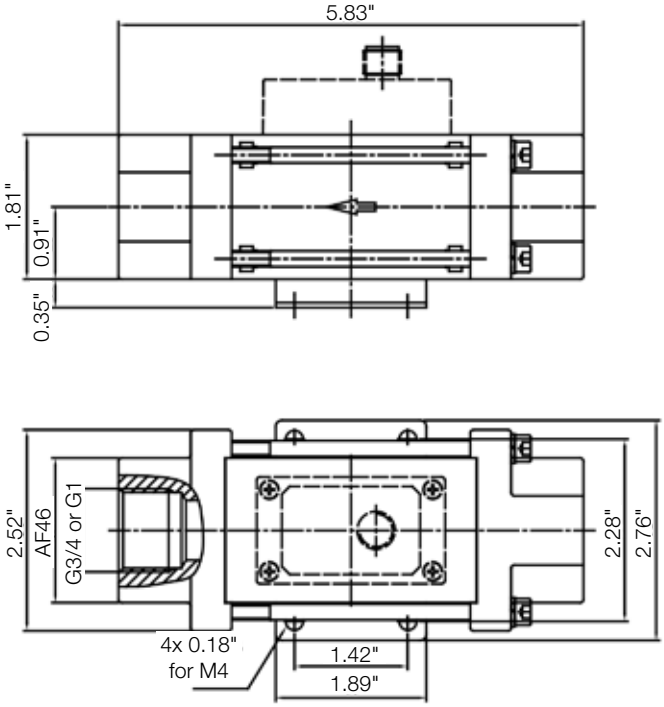
Dimensions

DVZ Flowmeters with Reinforced Connections
Flow Range up to 8.5 GPM



DVZ Flowmeters with Reinforced Connections
Flow Range from 10.5 GPM



MB	U1/U2/U3/ 04/07/10	U1/U2/U3/U4/ 04/07/10/16	U1/U2/U3/U4/U5/U6/ 04/07/10/16/22/32	U4/U5/U6/ 16/22/32	U5/U6/ 22/32
D1	1/4"	3/8"	1/2"	3/4"	1"
AF	34 mm	34 mm	34 mm	34 mm	-
L1	3.94"	3.94"	4.17"	4.72"	5.04"
L4	1.34"	1.34"	1.34"	1.34"	1.81"

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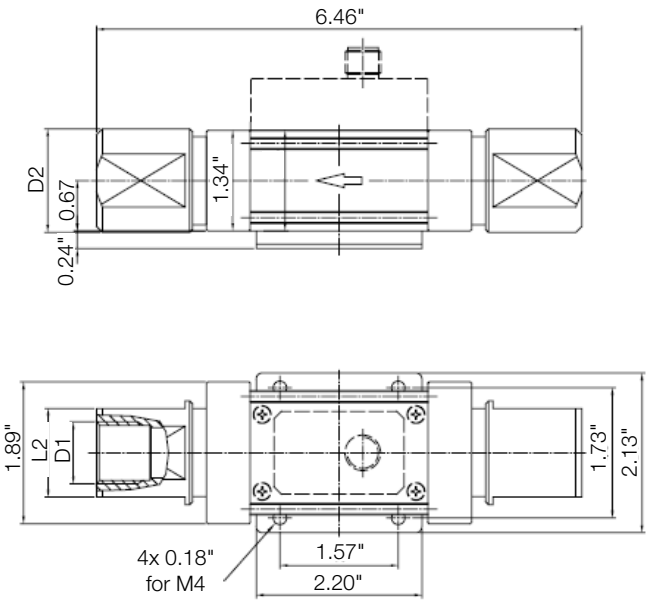
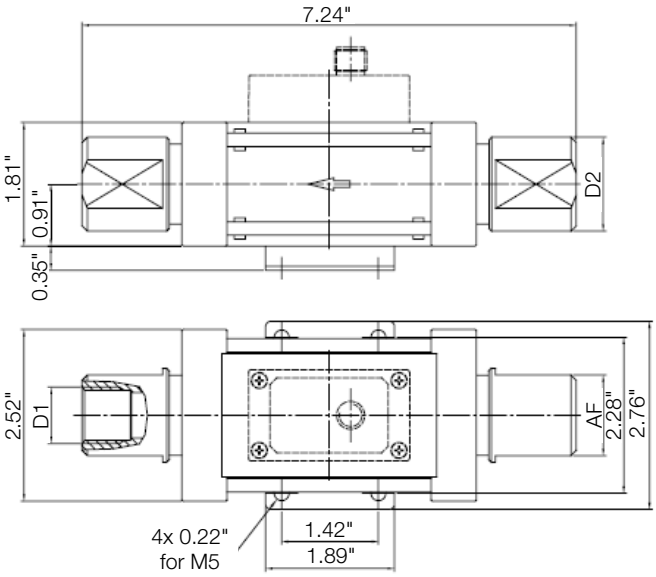
Dimensions

DVZ Flowmeters with Rotatable Connections
Flow Range up to 8.5 GPM



DVZ Flowmeters with Rotatable Connections
Flow Range from 10.5 GPM

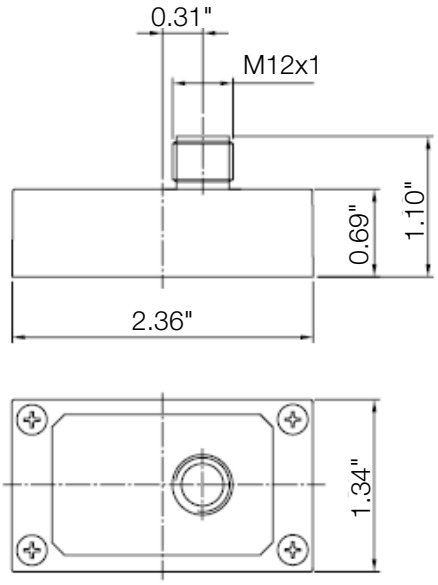


MB	U1/U2/U3/ 04/07/10	U1/U2/U3/U4/ 04/07/10/16	U1/U2/U3/U4/U5/U6/ 04/07/10/16/22/32	U4/U5/U6/ 16/22/32	U5/U6/ 22/32	U7/U8/U9/UA/UB/ 40/50/63/80/99	U7/U8/U9/UA/UB/ 40/50/63/80/99
D1	1/4"	3/8"	1/2"	3/4"	1"	3/4"	1"
D2	0.94"	1.10"	1.38"	1.57"	1.77"	1.57"	1.77"
AF	19 mm	24 mm	30 mm	36 mm	41 mm	36 mm	41 mm

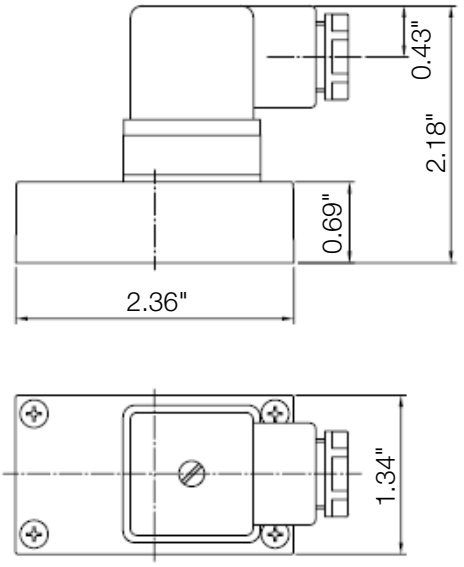
No responsibility taken for errors;
subject to change without prior notice.

Dimensions: Electronics

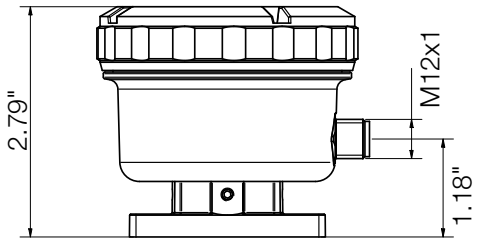
DVZ-..S30x, F3x0, L3x3

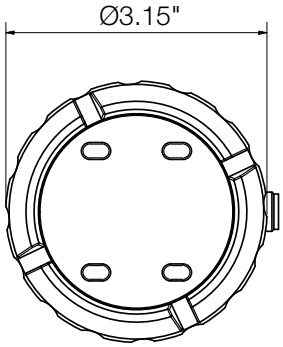


DVZ-..L443



DVZ-..C3T0





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