M-Zert
Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Vortex Flow Meter

for Liquids, Gases and Vapours

KOBOLD

measuring
•
monitoring
•
analysing

- Measuring accuracy: ± 0.75 % of measured value
- Connection: DN 15 ... 300
- p_{max} PN 40, t_{max} 400 °C
- Material: Stainless steel
- Analogue output and frequency output
- Vibration compensated

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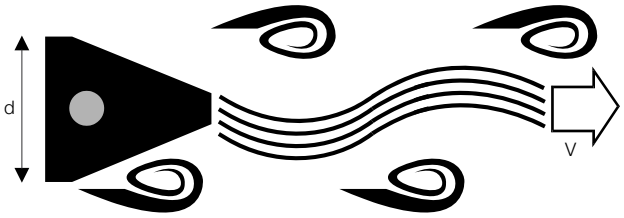
Model:
PWL

1 / 01-2007

Description

The compact KOBOLD Type PWL flow meter works on the Vortex principle. A Karman vortex is created downstream of the sensor body, i.e. the fluid flow causes vortices to be created on both sides, and these are straightened out by the current. This straightening out of the vortex is proportional to the flow velocity of the medium.

Every vortex creates a small negative pressure which is detected by a capacitive pressure pick-up and converted into an electrical pulse. A downline transducer converts the pulse signal into a standard output signal.



The sensor's special design eliminates vibrations in the pipeline (< 1 g to 500 Hz) by means of a primary compensation. This means that it is not necessary to adjust either the device or the zero-point.

The necessary intake and output lengths can be shortened using the separately available flow straighteners.

Fields of application

- Liquids
- Gases
- Superheated steam
- Saturated steam

The PWL measures the volume flow under operating conditions. The flow rate can also be output as a mass or standard volume unit at constant operating pressure and temperature.

With varying process conditions a downstream flow calculator calculates these values from the PWL values and the additional pressure and temperature values to be measured.

Applications

- Mechanical engineering
- Chemical industry
- Petrochemical industry
- Heat supply
- Power engineering

Device design

The complete metering unit consists of the following:

Sensor

- The sensor is supplied for nominal diameters between DN 15 and DN 300 with stainless steel flanges. Installation in pipes with a nominal diameter of DN 15 to DN 150 saves space by using sensors with wafer design. The flange is installed using an installation kit (available as an optional extra) which automatically centres it in the pipe.

Measuring transducer

- The measuring transducer is mounted directly on the measuring transducer. All device functions and parameters can be selected and changed using four push buttons. The individual functions can be selected using the operator's menu and the local indicator. The devices can be remotely controlled using a hand-held terminal (available as an optional extra) via HART protocol.

Technical data

Medium temperature

Standard sensor:	-40...+260 °C
High/low temperature sensor:	-200...+400 °C

Seals

Graphite:	-200...+400 °C
FPM:	-15...+175 °C
Kalrez:	-20...+275 °C
PTFE:	-200...+260 °C
Ambient temperature:	-40...+70 °C (compact version) -40...+85 °C (isolated version)
Process connection:	DN 15 - 300 (PWL-F) DIN flange, PN 16/40 (EN1092-1 B1) Flange ANSI B 16.5, Cl. 150/300 Sch. 40, DN 15-150 (PWL-W)

Parts in contact with media

Measuring tube:	Stainless steel 1.4404
Flange:	Stainless steel 1.4404
Sensor:	Stainless steel 1.4435
Seal:	Graphite, optional FPM, Kalrez, PTFE
Casing support:	Stainless steel 1.4308 (not touched by medium)

Measuring transducer

Casing material:	Varnished die-cast aluminium
Ambient temperature:	-40...+70 °C (compact version)) -40...+80 °C (isolated version)
Power supply:	12...36 V_{DC} (without HART) 18...36 V_{DC} (with HART)
Current output:	4 - 20 mA with HART, 2-wire
Load:	max. 500 Ω at 24 V_{DC}
Output:	Configurable open collector; as pulse output, status, threshold value, vortex frequency (U_{max} = 36 V_{DC} R_i = 500 Ω, I ≤ 15 mA)
Display:	2-line LCD with 16 characters each
Cable entry:	Cable gland M20x1.5 or connection thread ½ NPT, G ½
Resistance to vibration:	1 g, 10...500 Hz
Protection:	IP 67 (NEMA 4X)

Measuring accuracy

Liquids: <0.75 % of meas. value if Re >20 000
<0.75 % of meas. value if Re 4000...20 000

Gas / steam: <1 % of meas. value if Re >20 000
<1 % of meas. value if Re 4000...20000

Measuring range transmission value:
- Liquids $V_{max.}$ = 9 m/s
- Gas / steam $V_{max.}$ = 75 m/s (DN 15 $V_{max.}$ = 46 m/s)

Repeatability: ± 0.25 % of measured value

Current output: Temperature coefficient typically 0.005 % of meas. value / °C

Measuring ranges

The measuring ranges for your operating conditions can be calculated using a special software programme.

Please contact us for advice on measuring ranges, whereby you should have the following data at hand:

Liquids: Nominal diameter, density, kinematic viscosity, flow rate

Steam / gas: Nominal diameter, pressure (relative or absolute), temperature, flow rate

Saturated steam: Nominal diameter, pressure or temperature, flow rate

Flange version order details

(Example: **PWL-F15 F 0 G 0 A W**)

Nominal Diameter	Meas. range Air [m³/h]*	Meas. range Water [m³/h]	Model
DN 15/½"	3...23	0.15...4.92	**PWL-F15...**
DN 25/1"	9...115	0.32...15	**PWL-F25...**
DN 40/1½"	25...280	0.9...36.9	**PWL-F40...**
DN 50/2"	41...475	1.5...61	**PWL-F50...**
DN 80/3"	92...1070	3.5...138	**PWL-F80...**
DN 100/4"	160...1850	6...239	**PWL-F1H...**
DN 150/6"	360...4220	13.5...544	**PWL-F1F...**
DN 200/8"	691...8110	26...1045	**PWL-F2H...**
DN 250/10"	1090...12790	41...1648	**PWL-F2F...**
DN 300/16"	1562...18350	59...2364	**PWL-F3H...**

*Air at 20 °C and 0 bar rel.

Wafer design version

(Example: **PWL-W15 F 0 G 0 A W**)

Nominal Diameter	Meas. range Air [m³/h]*	Meas. range Water [m³/h]	Model
DN 15/½"	4...32	0.15...4.92	**PWL-W15...**
DN 25/1"	11...150	0.32...15	**PWL-W25...**
DN 40/1½"	30...348	0.9...36.9	**PWL-W40...**
DN 50/2"	49...565	1.5...61	**PWL-W50...**
DN 80/3"	109...1270	3.5...138	**PWL-W80...**
DN 100/4"	185...2165	6...239	**PWL-W1H...**
DN 150/6"	413...4855	13.5...544	**PWL-W1F...**

*Air at 20 °C and 0 bar rel.

Order details (flange / wafer design version) continued

Connection form	Sensor	Sealing	Case	Cable gland	Output
F = DIN PN 40 **H** = DIN PN 16* **R** = ANSI Cl. 150 RF Sch. 40 **S** = ANSI Cl. 300 RF Sch. 40	**0** = Standard **5** = High / low temperature	**G** = Graphite **F** = FPM **K** = Kalrez **T** = PTFE	**0** = Compact version **5** = Isolated version with 10 m cable **7** = Isolated version with 30 m cable	**A** = Cable gland M20x1.5 **B** = Thread ½ NPT **C** = Thread G ½	**W** = 4-20 mA **A** = 4-20 mA + pulse

*Not for DN 15...DN 80

Flow straightener order details (Example: **PWL-G15 F**)

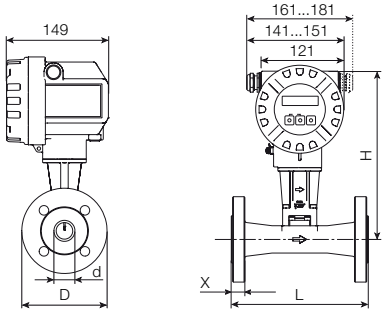
Nominal diameter	Model	Connection form
DN 15/½"	**PWL-G15**	**F** = DIN PN 40 **H** = DIN PN 16 **R** = ANSI Cl. 150 **S** = ANSI Cl. 300
DN 25/1"	**PWL-G25**	
DN 40/1½"	**PWL-G40**	
DN 50/2"	**PWL-G50**	
DN 80/3"	**PWL-G80**	

Nominal diameter	Typ	Connection form
DN 100/4"	**PWL-G1H**	**F** = DIN PN 40 **H** = DIN PN 16 **R** = ANSI Cl. 150 **S** = ANSI Cl. 300
DN 150/6"	**PWL-G1F**	
DN 200/8"	**PWL-G2H**	
DN 250/10"	**PWL-G2F**	
DN 300/16"	**PWL-G3H**	

Dimensions PWL-F acc. to EN 1092-1 (DIN 2501)

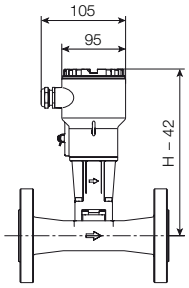
DN	Pressure step	d [mm]	D [mm]	H [mm]	L [mm]	x [mm]	Weight [kg]
15	PN 40	17.3	95.0	248	200	16	5
25	PN 40	28.5	115.0	255	200	18	7
40	PN 40	43.1	150.0	263	200	21	10
50	PN 40	54.5	165.0	270	200	23	12
80	PN 40	82.5	200.0	283	200	29	20
100	PN 16	107.1	220.0	295	250	32	27
100	PN 40	107.1	235.0	295	250	32	27
150	PN 16	159.3	285.0	319	300	37	51
150	PN 40	159.3	300.0	319	300	37	51
200	PN 10	207.3	340.0	348	300	42	63
200	PN 16	207.3	340.0	348	300	42	62
200	PN 25	206.5	360.0	348	300	42	68
200	PN 40	206.5	375.0	348	300	42	72
250	PN 10	260.4	395.0	375	380	48	88
250	PN 16	260.4	405.0	375	380	48	92
250	PN 25	258.8	425.0	375	380	48	100
250	PN 40	258.8	450.0	375	380	48	111
300	PN 10	309.7	445.0	398	450	51	121
300	PN 16	309.7	460.0	398	450	51	129
300	PN 25	307.9	485.0	398	450	51	140
300	PN 40	307.9	515.0	398	450	51	158

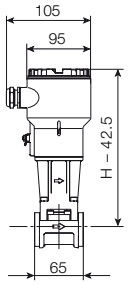
Compact version PWL-F



Isolated version

PWL-F

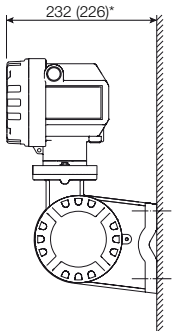


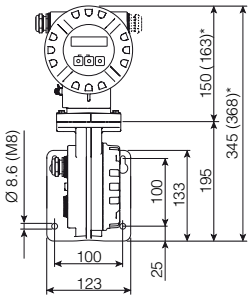


PWL-W

Measuring transducer

Isolated version

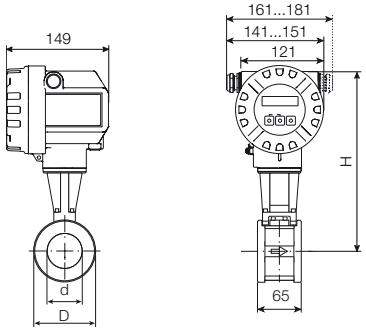




Dimensions PWL-W

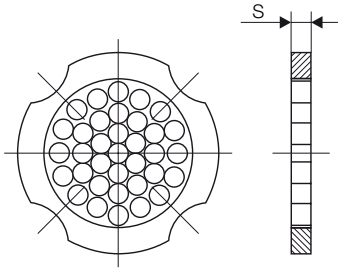
DN DIN/JIS	DN ANSI	d [mm]	D [mm]	H [mm]	Weight [kg]
15	½"	16.50	45.0	247	3.0
25	1"	27.60	64.0	257	3.2
40	1½"	42.00	82.0	265	3.8
50	2"	53.50	92.0	272	4.1
80	3"	80.25	127.0	286	5.5
100	4"	104.75	157.2	299	6.5
150	6"	156.75	215.9	325	9.0

Compact version PWL-W



Flow straightener dimensions acc. to EN (DIN) / ANSI

Flow straightener
acc. to EN (DIN) / ANSI,
Material 1.4435 (316L)



DN		15/ ½"	25/ 1"	40/ 1½"	50/ 2"	80/ 3"	100/ 4"	150/ 6"	200/ 8"	250/ 10"	300/ 12"
s [mm]		2.0	3.5	5.3	6.8	10.1	13.3	20.0	26.3	33.0	39.6
EN (DIN) Weight in [kg]	PN 10	0.04	0.12	0.30	0.50	1.40	2.40	6.30	11.5	25.7	36.4
	PN 16	0.04	0.12	0.30	0.50	1.40	2.40	6.30	12.3	25.7	36.4
	PN 25	0.04	0.12	0.30	0.50	1.40	2.40	7.80	12.3	25.7	36.4
	PN 40	0.04	0.12	0.30	0.50	1.40	2.40	7.80	15.9	27.5	44.7
	PN 64	0.05	0.15	0.40	0.60	1.40	2.40	7.80	15.9	27.5	44.7
ANSI Weight in [kg]	Cl. 150	0.03	0.12	0.30	0.50	1.20	2.70	6.30	12.3	25.7	36.4
	Cl. 300	0.04	0.12	0.30	0.50	1.40	2.70	7.80	15.8	27.5	44.6