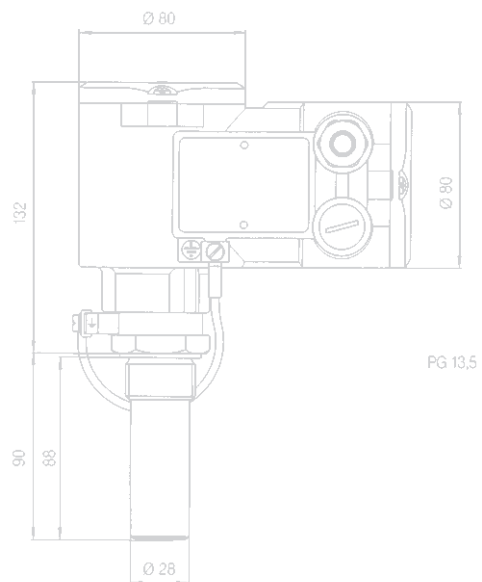
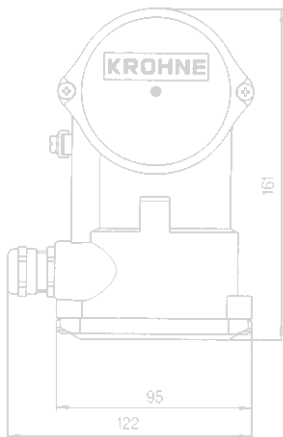
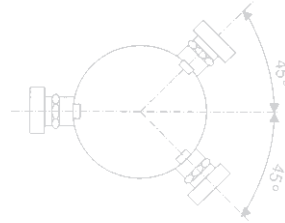


## Electromagnetic flowmeters and switches DWM 1000/2000



Variable area flowmeters

Vortex flowmeters

**Flow controllers**

Electromagnetic flowmeters

Ultrasonic flowmeters

Mass flowmeters

Level measuring instruments

Communications technology

Engineering systems & solutions

# Electromagnetic flowmeters and switches DWM 1000/2000

For measuring and monitoring electrically  
conductive liquids, pastes and slurries

## Measuring principle

If an electrical conductor is caused to move in a magnetic field, such movement induces a voltage **U** in the conductor.

In this case, the conductor is the electrically conductive liquid. Magnetic field **B** is at rightangles to the direction of flow. The induced voltage **U** is directly proportional to the local flow velocity **v**.

$$U = k \times B \times v \times D$$

**k** Instrument constant  
**B** Strength of magnetic field  
**v** Local flow velocity  
**D** Electrode spacing

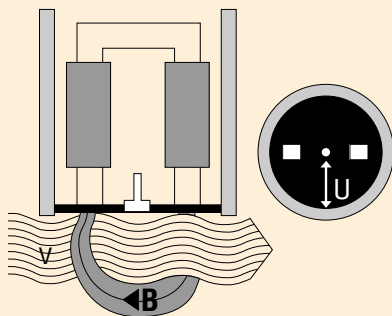
Voltage **U** is tapped off from the electrodes, neutral and ground electrode (socket).

## DWM 1000 flow switch

Voltage **U** converted into a switching signal with adjustable switching point.

## DWM 2000 flowmeter

Voltage **U** converted into a flow-proportional output signal, load-independent current 4-20 mA.



## Versions

- DWM 1000 flow switch, 2-wire system
- DWM 2000 flowmeter, 4-20 mA current output

## Special features

- Rugged design, IP 66 protection, equivalent to NEMA 4 and 4X
- Wetted parts of stainless steel or ceramics
- Process temperature: 150°C or 300°F
- Ambient temperature: -25 to +60°C / -13 to +140°F
- Operating pressure: 25 bar or 360 psig
- No moving parts, maintenance-free
- Electronic unit replaceable at flowing conditions
- Low power consumption
- For pipelines  $\geq$  DN 50 or  $\geq$  2"

## Technical data

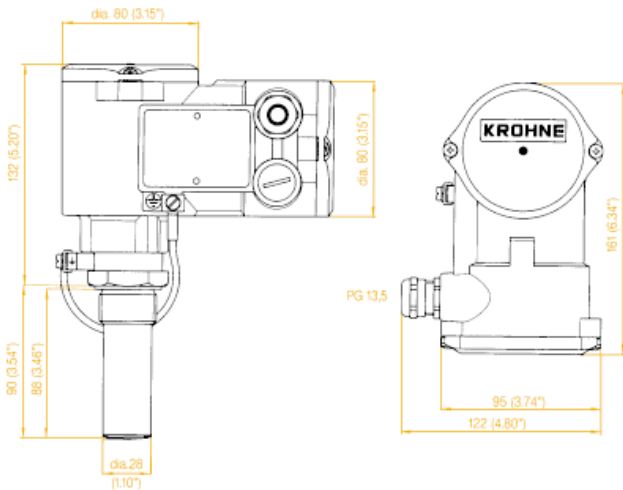
Electromagnetic	... flow switch DWM 1000 2-wire system	... flowmeter DWM 2000 current output 4-20 mA
<b>Supply power and output</b>		
Voltage	48-230 V AC, 50/60 Hz or 48-230 V DC (term. 1/2)	24 V DC ± 20% option: 12 V DC ± 20% (term. 1, 2)
Power consumption	≤ 5 mA	≤ 50 mA (at 24 V DC/max. 20°C/max. 68°F)
Output	break or make contact, switch-selectable (for relay contact limits see page 4)	passive current output, 4-20 mA, (term. 5/6) load: max. 500 ohms (24 V DC)
Functional ground FE (protective ground)	< 10 ohms	< 10 ohms
<b>Full-scale range "v" adjustable</b>	0.1-9.9 m/s <b>or</b> 0.3-32.5 ft/s, reference velocity, hysteresis: - 8% at flow falling	1 / 2 / 3 / 4 / 5 / 6 / 7 or 8 m/s equivalent to 3.3/6.6/9.9/13.1/16.4/19.6/22.9 or 26.2 ft/s
<b>Time constant</b>	5, 8 or 10 seconds, adjustable	5 seconds, fixed
<b>Reproducibility</b>	1% of switching point	1% of measured value
<b>Error limits</b>	<b>SP = switching point</b>	<b>MV = measured value</b>
v > 1 m/s <b>or</b> > 3.3 ft/s	± 5% of setting SP	± 5% of MV (± 2% calibration on side)
v < 1 m/s <b>or</b> < 3.3 ft/s	± (3 cm/s + 2% of setting SP) <b>or</b> ± (1.2 inches/s + 2% of setting SP)	± (3 cm/s + 2% of MV) <b>or</b> ± (1.2 inches/s + 2% of MV)
<b>Operating data</b>		
Liquid product	largely homogeneous liquids, pastes and slurries, also with solids content	
Electrical conductivity	≥ 20 µS/cm (µmho/cm)	
Operating pressure	≤ 25 bar <b>or</b> ≤ 360 psig	
Process temperature	- 25 to + 150°C <b>or</b> - 13 to + 302°F	
Ambient temperature	- 25 to + 60°C <b>or</b> - 13 to + 140°F	
<b>Installation in pipeline</b>		
Nominal size	≥ DN 50 or ≥ 2"	
Connection socket	with thread G1A (R1")	
Inlet/outlet run	10 x DN / 5 x DN, dependent on flow profile (DN = nominal pipe size)	
<b>Protection category</b>		
to EN 60529/IEC 529	IP 66, equivalent to NEMA 4 and 4X	
<b>Electromagnetic compatibility (EMC)</b>		
	to EN 50081-1, 50082-2	
<b>Local display</b>		
	flashing LED (DWM 1000 P only)	
<b>Cable entry</b>		
	PG 13.5	
<b>Power terminals</b>		
	cable cross-section max. 1.5 mm <sup>2</sup> or 16 AWG	
<b>Materials</b>		
<u>Sensor</u>	stainless steel 1.4435 (316 L) with ceramic insulation (zirconium oxide) and Viton gasket	
<u>Housing</u>		
DWM 1000	polycarbonate (option: diecast aluminium with epoxy finish)	
DWM 2000	diecast aluminium with epoxy finish	
<u>Electrode</u>	platinum	
<u>Connection socket</u>	stainless steel 1.4435 (316 L), others on request	
<u>Cable entry</u>		
Polycarbonate housing	polyamide	
Aluminium housing	nickel-plated brass (polyamide on request)	
<u>Gaskets</u>		
Connection	Klingerit (without asbestos)	
Housing cover	buna N	

**Dimensions in mm (inches) and weights**

**Diecast aluminium housing**

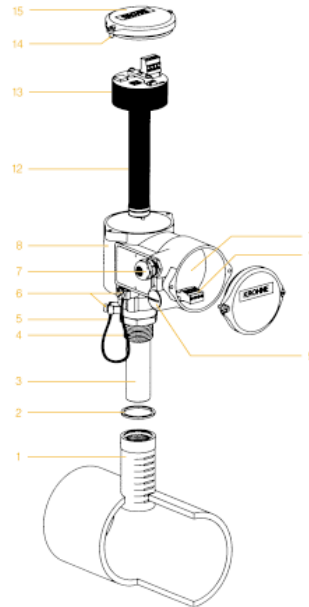
Weight excl. socket: approx. 1.85 kg (4.08 lbs)

**DWM 1000**  
**DWM 2000**



**Component parts**

**DWM 1000 flow switch**  
**DWM 2000 flowmeter**

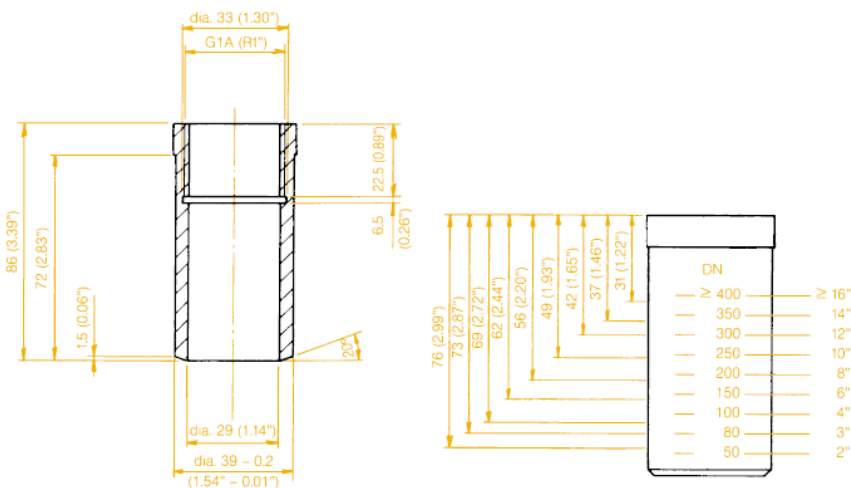


- 1 Connection socket
- 2 Gasket
- 3 Sensor
- 4 Threaded connection
- 5 Grounding cable
- 6 Ground connection
- 7 Cable entry PG 13.5
- 8 Housing
- 9 Blanking plug
- 10 Supply terminals
- 11 Connection housing
- 12 Magnet coils and electrode contacts
- 13 Electronic unit
- 14 Cover screws
- 15 Cover with fitted gasket

**Installation**

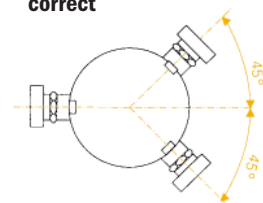
**Installation in the pipeline**

- The electromagnetic DWM flowmeters are installed in the pipeline ( $\geq$  DN 50/ $\geq$  2") with the aid of the supplied connection socket.
- Refer to diagrams for installation location and insertion depth.
- Hole diameter in pipeline: 39 mm or 1.54 inches.
- Straight inlet/outlet run: 10 x DN / 5 x DN (DN = nominal size)
- In keeping with the nominal diameter of the pipeline (see markings), strength weld the connection socket perpendicular to the pipeline axis.
- The position of the sensor is not important when screwing in the flowmeter. The electronic housing can be rotated, refer to "Electrical connection and setting".

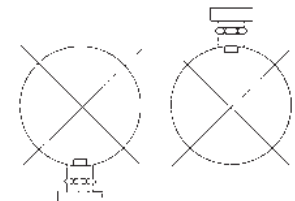


**Installation location**

**correct**



**incorrect**

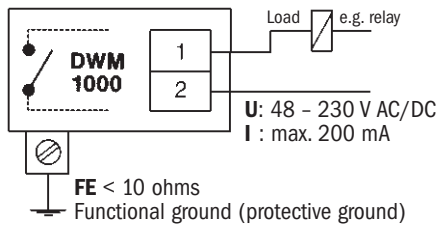


**Electrical connection and setting**



**DWM 1000 flow switch (2-wire system)**

- Terminals 1 and 2 are used for the electrical connection (wire cross-section: max. 1.5 mm<sup>2</sup> or 16 AWG). Polarity is arbitrary.
- The flow switch must **not** be connected to power without an electrical load (e.g. relay)!
- If more than one DWM 1000 is used, make sure they are not connected in parallel. Only one common return is allowed. Provide a separate fuse for each flow switch.

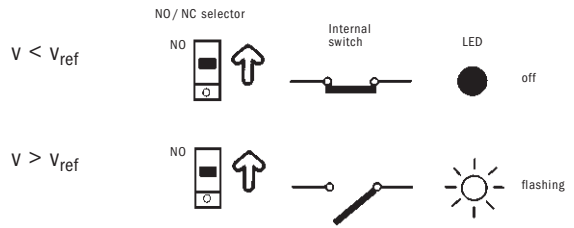


**Relay limits**

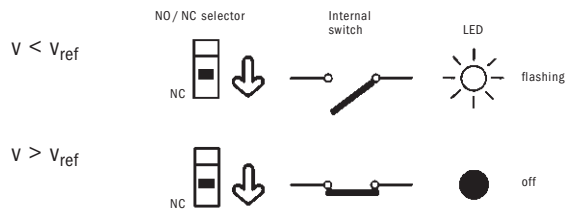
Supply voltage	Min. load current/power for DC	Min. load current/power for AC	Max. load current/power	Peak current/power (max. 40 ms)
48 V	40 mA/1.92 W	30 mA/1.44 VA	400 mA/19.2 VA	3 A/192 VA
110 V	30 mA/3.3 W	20 mA/2.2 VA	400 mA/44 VA	3 A/440 VA
220 V	20 mA/4.4 W	10 mA/2.2 VA	400 mA/88 VA	3 A/880 VA

The holding current of the series-connected relay must be higher than 5 mA, i.e. the relay must drop out when circuit current falls below 5 mA.

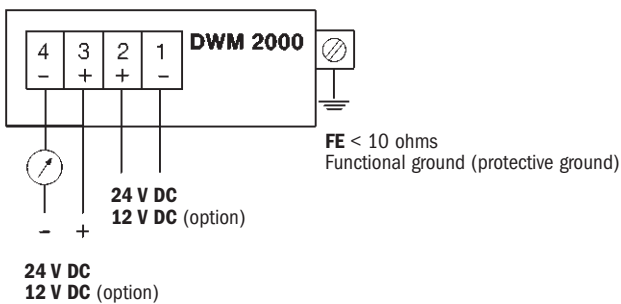
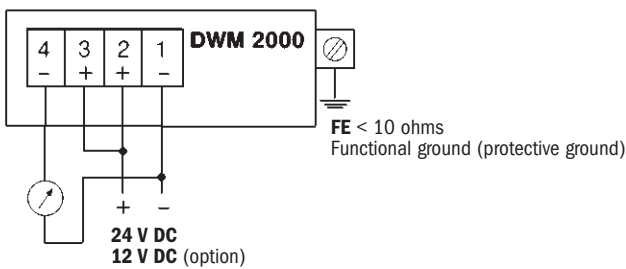
**Make contact (NO) = normally open**



**Break contact (NC) = normally closed**



**DWM 2000 flowmeter (current output)**



- Take note of polarity!
- 4-20 mA current output, load max. 500 ohms!