



## High Precision Turbine Wheel Flow Meter for Liquids



measuring  
•  
monitoring  
•  
analysing

- Measuring ranges:  
0.006- 0.1 to 10-500 L/min water
- Measuring accuracy:  $\pm 1.25\%$  f. s.
- $p_{max}$ : 345 bar,  $t_{max}$ : 135 °C
- Viscosity range: low viscosity, max. 10 mm<sup>2</sup>/s
- Connection:  
R 1/4, R 1/2, hose connector 8 mm /11 mm  
intermediate flange DN 40 to DN 50
- Material: Nylon, stainless steel, PVC, Titanium
- Output: pulses, 4-20 mA, contacts
- Display on site



Model: PEL-LMX



Model: PEL-L...

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Model:  
PEL

**Areas of application**

The sensor principle based on a Pelton water wheel is remarkable for its high reliability – proven over more than ten years of service. This flow meter is to be found in applications in a variety of plants, where not only negligible volumetric flow rates of media such as fuels, distilled water, or hot greases are measured, but also high flow rates normally found in power stations. The sensors satisfy almost all industrial requirements with temperature limits of 135°C and nominal pressures up to 345 bar (higher pressures upon request). Only V4A Supra St.St. (material no. 1.4571) or titanium is used for metallic parts. Swiss precision bearings ensure long service life and reliability. Sensors with solid sapphire bearings and no metal parts have been developed to measure aggressive liquids such as sulphuric acid and hydrochloric acid.

Other critical media such as toluene and vinyl chloride can be measured in hazardous environments. Sensors made of less expensive materials are used for less sophisticated conditions.

**Function Principle**

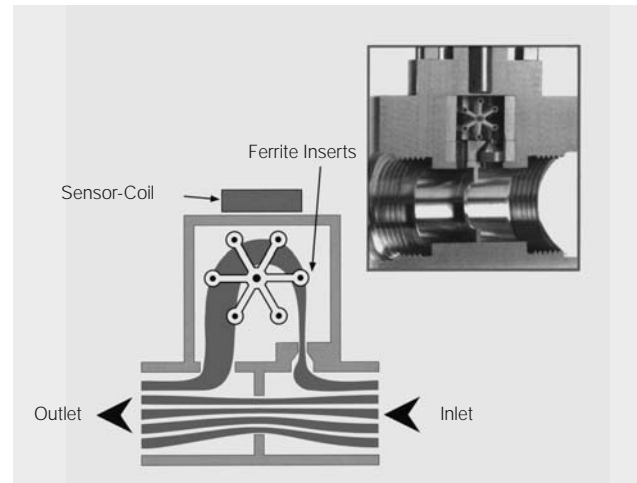
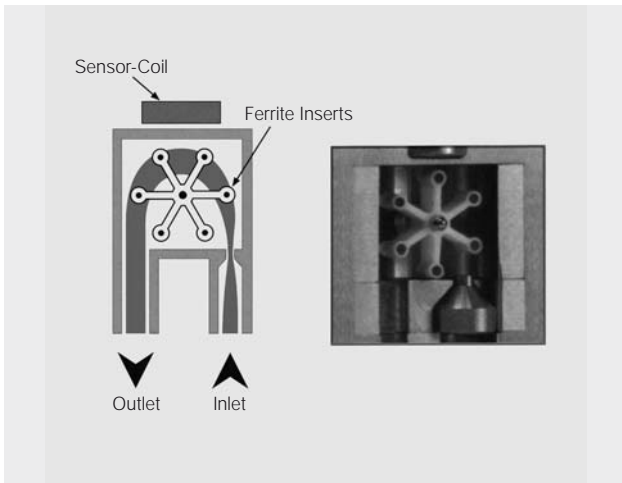
The model PEL flow meter works on the turbine wheel principle. The heart of this device is a Pelton turbine supported by tungsten/sapphire bearings. The Pelton turbine is an impeller with ferrite inserts embedded in the blade tips. When this turbine is brought into rotary motion, the motion is recorded by a coil mounted nearby; the resulting electrical impulses are passed to a control unit for further processing.

**Model PEL-L... for low flow rates**

Linearity:	1% f.s.
Repeatability:	< ±0.25% at 90% of range
Accuracy:	±1.25% f. s. at 10-100% of measuring range
Measuring range:	to 280:1









**Model PEL-M... for higher flow rates**







Linearity:	1% f.s.
Repeatability:	< ±0.25% at 90% of range
Accuracy:	±1.25% f. s. at 10-100% of measuring range
Measuring range:	at least 50:1



Model PEL-L flow meters measure the entire volumetric flow that passes through the instrument. A nozzle guides the flow to the impeller. The resulting turbine rotation is proportional to the flow rate. A small sensing coil signals the approach of the ferrite inserts contained in the impeller. An output signal with constant current is then produced by the electronics.

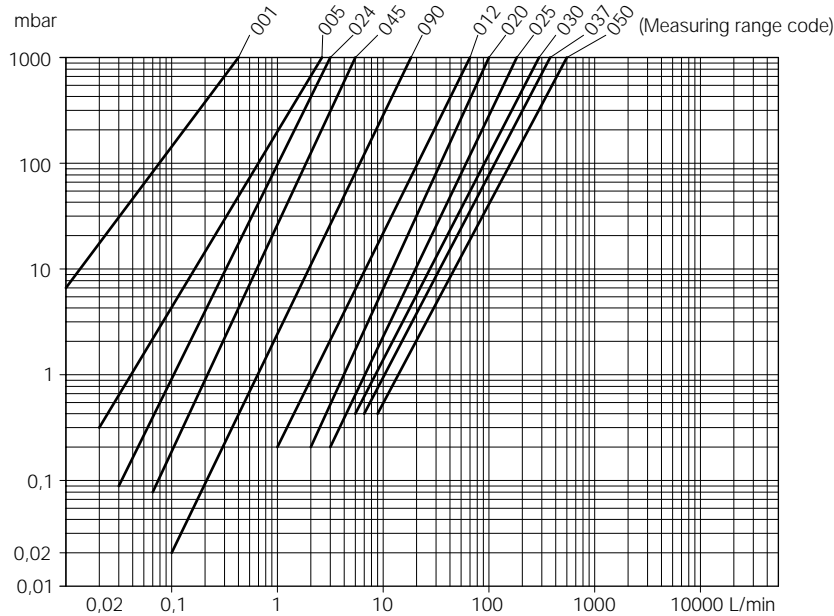
The PEL-M devices comprise a Pelton turbine and screen. A small part of the total volumetric flow is forced through the Pelton turbine by the differential pressure at the screen. The total flow can be determined from the partial flow, as the relationship between partial flow and total flow is always constant. This method is especially suited for high flow rates and is used in lines up to DN 300.

Model	Meas. range [L/min]	Version							
		..GN1..	..LMX..	..SPF..	..S03..	..S10..	..S20..	..S34..	..Ti1..
PEL-L000..	0.006 - 0.1								
PEL-L001..	0.01 - 0.25								
PEL-L005..	0.02 - 1.3								
PEL-L024..	0.03 - 4.3								
PEL-L045..	0.04 - 6.3								
PEL-L090..	0.08 - 15								
PEL-L220..	0.1 - 28								
Process connection	Hose conn. Ø 8 mm/11 mm incl. mounting	R 1/2 AG	R 1/4 AG	R 1/4 AG	R 1/4 AG	R 1/4 AG	R 1/4 AG	R 1/4 AG	R 1/4 AG
Housing	glass/Nylon*	VA	VA	VA	VA	VA	VA	VA	Ti
Electronic housing	VA	Alu	Alu (shaft in VA)						
Turbine ring	VA	VA	VA	VA	VA	VA	VA	VA	Ti
Rotating vane	glass/Nylon	PFA	PFA	PFA	PFA	PFA	PFA	PFA	PFA
Rotating vane bearings	sapphire (mounting VA)								Ti
Rotating vane axle	VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	Ti
O ring	FPM (optional: EPDM, Kalrez, PTFE covered FPM)								
p <sub>max</sub>	5 bar	100 bar	40 bar	30 bar	100 bar	200 bar	345 bar	50 bar	50 bar
t <sub>max</sub>	75 °C	100 °C	70 °C	135 °C	135 °C	135 °C	135 °C	135 °C	135 °C
Version electronic housing	rubber cap	rubber cap	rubber cap	housing IP 65	housing IP 65	housing IP 65	housing IP 65	housing IP 65	housing IP 65

Model	Meas. range [L/min]	Connection size	Version					
			..LMX..**	..SPF..	..S10..	..Ti1..***	..PVC..	
PEL-M012..	1 - 65	R 1/2						
PEL-M020..	2 - 130	R 3/4						
PEL-M025..	3 - 160	R 1						
PEL-M030..	5-220 (p <sub>max</sub> 66 bar)	R 1 1/4						
PEL-M037..	7-350 (p <sub>max</sub> 54 bar)	DN 40						
PEL-M050..	10-500 (p <sub>max</sub> 40 bar)	DN 50						
Connection			Male thread R 1/2	Female thread R 1/2...R 1 1/4 or intermediate flange DN 40/DN 50	Female thread R 1/2...R 1 1/4 or intermediate flange DN 40/DN 50	Female thread R 1/2...R 1 1/4	Glue-in pipe DN 15...DN 50	
Housing			VA	VA	VA	Ti	PVC	
Electronic housing			Alu	Alu (shaft in VA)				PVC
Turbine ring			VA	VA	VA	Ti	PVC	
Rotating vane			PFA	PFA	PFA	PFA	glass/Nylon*	
Rotating vane bearings	sapphire (mounting VA)							
Rotating vane axle			VA/sapphire	VA/sapphire	VA/sapphire	VA/sapphire	Ti	
O ring			FPM	FPM	FPM	FPM	FPM	
p <sub>max</sub>			100 bar	40 bar	100 bar	50 bar	5 bar	
t <sub>max</sub>			100 °C	70 °C	135 °C	135 °C	60 °C	
Version electronic housing			rubber cap	housing IP 65	housing IP 65	housing IP 65	rubber cap	

\* Glass-fibre reinforced Nylon \*\* Version for PEL-M012 only \*\*\* not for PEL-M037 and PEL-M050

**Flow rate pressure loss diagram**



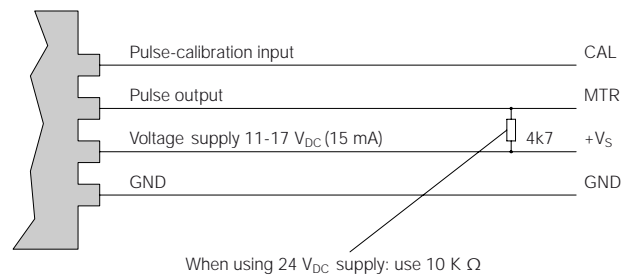
**Technical Details**

**Standard pulse output (Code F)**

Power supply: 11-17 V<sub>DC</sub>, max. 8-15 mA  
 Signal: +2 V upto max. V<sub>S</sub>

**Electrical connection**

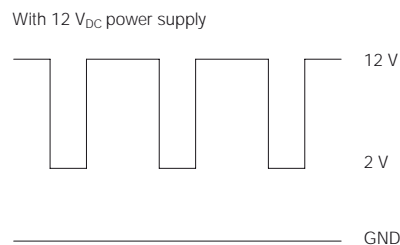
**Standard pulse output**



**Compact Display on site (Code K)**

Power supply: 12-30 V<sub>DC</sub>, typ. 50 mA  
 Display: 2-segment LC display, actual amount 5-position, counter 7-position, changeable  
 Linearisation: 9 points  
 Output signal: 1 x pulse output, passive max. 12-30 V<sub>DC</sub>, max. 50 mA, 1 x analogue output 4-20 mA (passive), max. 12-30 V<sub>DC</sub>  
 Temperature: -30...+80 °C

**Voltage level - pulse output**



**Materials**

Housing: ABS  
 Display window: Polycarbonate  
 Gasket: PE  
 Dimensions: 130 x 114 x 58 mm

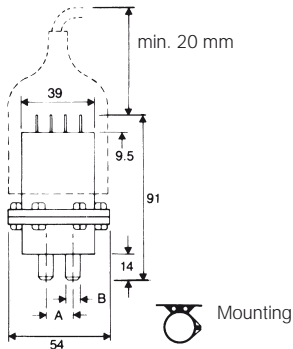


**Order Details** (example: **PEL-L000 GN1 F**)

Measuring range* [L/min]	Model	Version/material	Evaluating electronics
0.006 - 0.1	PEL-L000	..GN1..	..F = standard pulse output 11-17 V <sub>DC</sub> , 8-15 mA
0.01 - 0.25	PEL-L001	..LMX..	
0.02 - 1.3	PEL-L005	..SPF..	
0.03 - 4.3	PEL-L024	..S03..	
0.04 - 6.3	PEL-L045	..S10..	
0.08 - 15	PEL-L090	..S20..	
0.1 - 28	PEL-L220	..S34..	
1 - 65	PEL-M012	..Ti1..	
		..LMX..	
2 - 130	PEL-M020	..SPF..	
		..S10..	
3 - 160	PEL-M025	..Ti1..	
5 - 220	PEL-M030	..PVC..	
7 - 350	PEL-M037	..SPF..	
10 - 500	PEL-M050	..S10..	
		..PVC..	

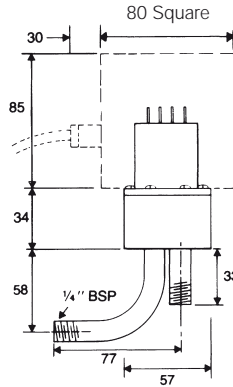
\* Higher measuring ranges upon request

PEL-L...GN1

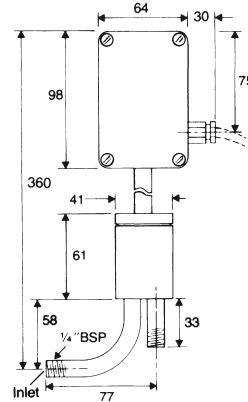


PEL-L	..000 upto ..090	..220
A	14 mm	17 mm
B	8 mm	11 mm

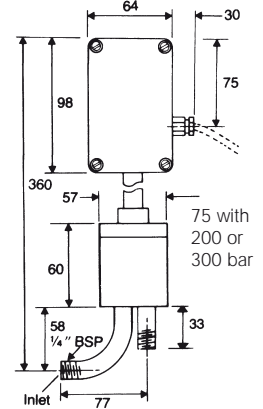
PEL-L...SPF



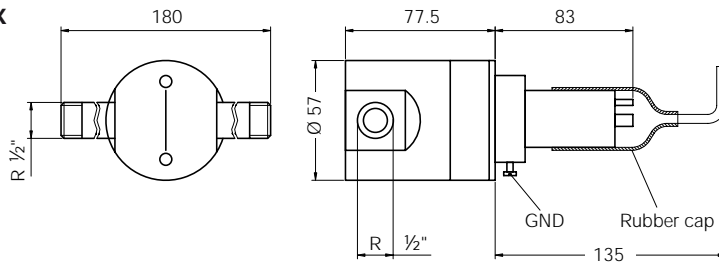
PEL-L...S03 / ...Ti1



PEL-L...S10 / ...S20 / ...S34

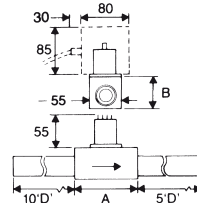


PEL-...LMX



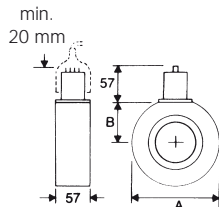
PEL-M...PVC

PEL-M..	..012PVC	..020PVC	..025PVC	..030PVC
A	65 mm	65 mm	85 mm	95 mm
B	45 mm	50 mm	60 mm	65 mm
DN	12.5 mm	20 mm	25 mm	30 mm



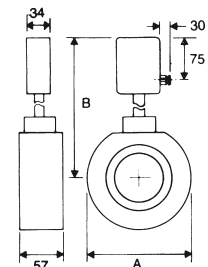
PEL-M037PVC; PEL-M050PVC

PEL-M..	..037PVC	..050PVC
A	89 mm	106 mm
B	36 mm	44 mm
DN	40	50



PEL-M037SPF; PEL-M050SPF; PEL-M037S10; PEL-M050S10

PEL-M..	..037	..050
A	89 mm	106 mm
B	300 mm	308 mm
DN	40	50



PEL-M...SPF; ...S10; ...Ti1

PEL-M..	..012	..020	..025	..030
A	75 mm	75 mm	95 mm	95 mm
B	60 mm	60 mm	75 mm	75 mm
DN	R 1/2	R 3/4	R 1	R 1 1/4

