



Instruction Manual

DR12

Precision Turbine Flowmeter



PKP Prozessmesstechnik GmbH
Borsigstraße 24
D-65205 Wiesbaden-Nordenstadt
Tel.: ++49-(0)6122-7055-0
Fax: ++49-(0)6122-7055-50
Email: info@pkp.de

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Safety Information

General Instructions

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories. Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

The DR12 turbine flowmeters are mainly used for the detection and measurement of low-viscosity media that do not attack the materials used. The materials used, the high pressure resistance and the wide measuring range make it possible to use these instruments in a wide variety of applications in mechanical engineering, chemicals, pharmaceuticals, food technology and much more. Any other use of the instrument is not permitted and outside the field of application

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series DR12 flow meter devices should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The DR12 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.

Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

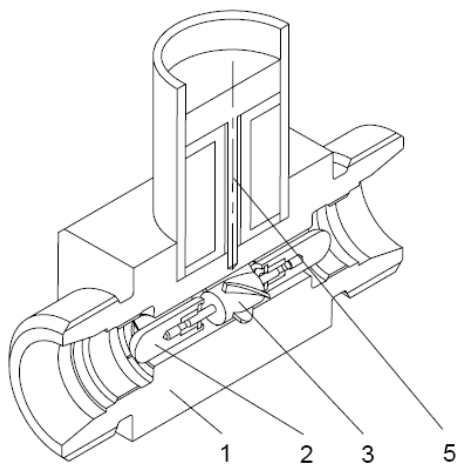
Description / Measuring principle

The flowmeters of the DR12 series are robust measuring turbines for mobile or stationary use. An axial flow turbine wheel rotates proportionally to the average flow velocity in the pipeline.

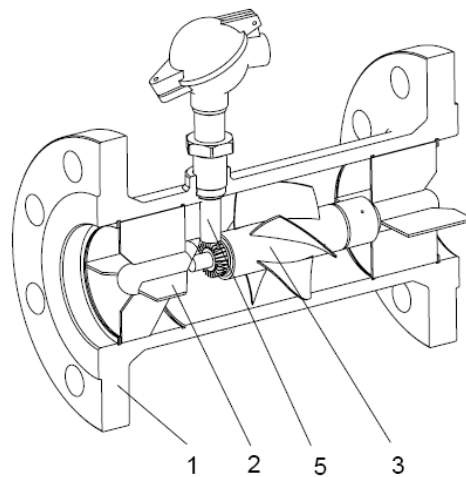
The turbine wheel is scanned by inductive sensors (coil) without contact. The resulting output frequency is a measure of the flow rate.

The turbine body and measuring insert are made of stainless steel, the bearings optionally of tungsten carbide or PTFE. The instruments can be supplied with external thread (up to 2") or flange connection (up to DN 400)

Mechanical construction DN 6 – 75



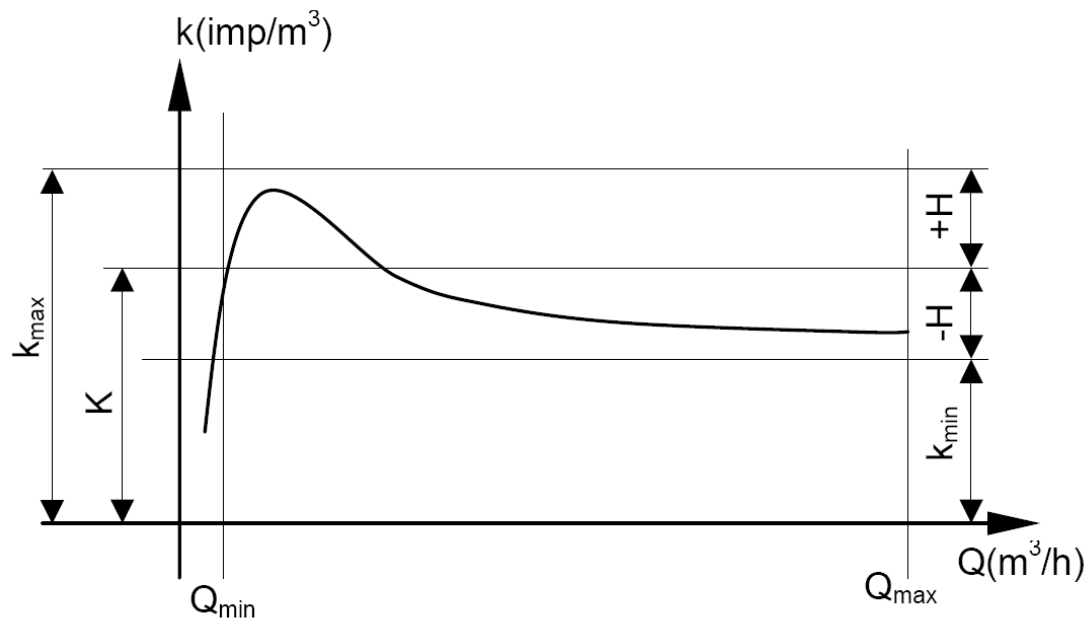
Mechanical construction DN 100 - 400



1-body, 2-stators, 3-rotor, 5-pickup.

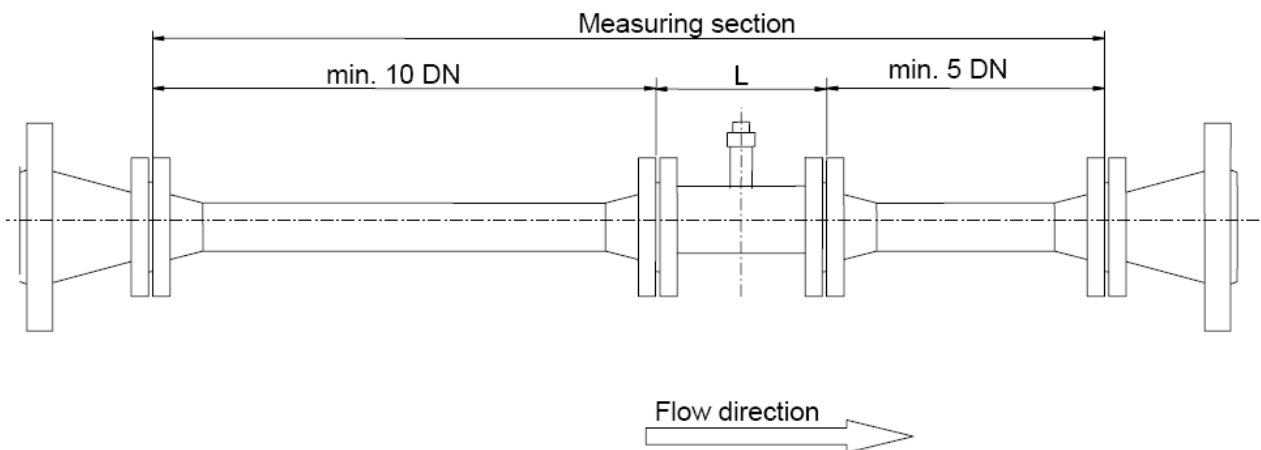
Installation pulse rate

The pulse rate is constant within the error limits over the specified measuring range. Each device is individually calibrated on the test bench and delivered with the K-factor determined there.



Installation and commissioning

- Please remove the transport lock and the protective caps.
- The installation site should be free of strong vibrations.
- The installation site should be at a characteristic point in the process.
- Please observe the required inlet and outlet distances when installing the device:



- If the medium contains sediments, impurities and solids, please use an appropriate filter. The filter must be installed before the inlet section (10 DN).
- After installing the device, check the pipe system for leaks.

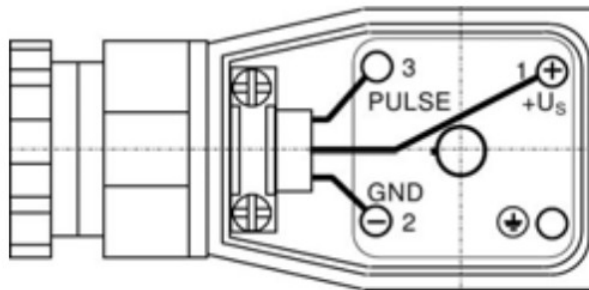
Electrical connection

Attention: Before the electrical connection of the device, it must be ensured that the supply voltage corresponds to the required one and that the supply voltage is switched off.

- The exact pin assignment can be found in the drawings.
- Please use only shielded cables
- The measuring instrument shall be protected from external magnetic fields.
- After installation and electrical connection of the device, make sure that the output signal corresponds to “zero” at “no flow”.
If this is not the case, please remove any possible electrical interference.
- When connecting transmitters, the installation, connection and test specifications of the version to be used must be observed.

Wiring diagram:

Connector plug EN 175301-803, form A, 3-wire with preamplifier



Maintenance and care

The maintenance and care of the turbine flowmeter depends on the process conditions. It is recommended to service and recalibrate the meter annually. Please contact PKP Prozessmesstechnik GmbH for further information. Repairs are only carried out at the manufacturer's work.

DR12

Precision Turbine Flowmeter

- for low viscous media
- wetted parts all stainless steel
- accuracy: $\pm 0,5 \%$ and $\pm 1\%$ of measured value
- for pipe diameters from DN 10 to DN 400 for flow rates up to 4000 m³/h
- available for pressures up to 400 bar and temperatures up to 150 °C
- version with thread or flange connection
- measuring ranges: 0,055...0,275 up to 800...4000 m³/h
- P_{\max} : 400 bar, T_{\max} : 110 °C



Description:

The flowmeters of the DR12 series are robust measuring turbines for mobile or stationary use. An axial flow turbine wheel rotates proportionally to the average flow velocity in the pipeline.

The turbine wheel is scanned by an inductive sensor (coil) without contact. The resulting output frequency is a measure of the flow rate.

The turbine body and measuring insert are made of stainless steel, the bearings optionally of tungsten carbide or PTFE. The instruments can be supplied with external thread (up to 2") or flange connection (up to DN 400).

Typical applications:

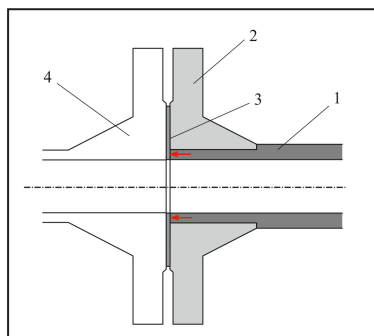
The DR12 turbine flowmeters are mainly used for the detection and measurement of low-viscosity media. The materials used, the high compressive strength and the wide measuring range allow the use of these devices in a wide variety of applications in mechanical engineering, chemicals, pharmaceuticals, food technology and much more.

Models:

The DR12 turbine flowmeters are always supplied with a 1.4541 stainless steel body.

For nominal sizes up to DN 80, the rotor is made of stainless steel 1.4034, for larger nominal sizes of stainless steel 1.4541.

The bearings are made of hard metal (wolfram carbide), PTFE bearings are optionally available.



In the flange version, the flanges are made of 1.1106 steel as standard, stainless steel flanges made of 1.4541 can be supplied as an option, The flanges are welded to the base body in such a way that they do not come into contact with the medium.

- 1 = stainless steel housing DR12
- 2 = steel flange
- 3 = seal
- 4 = counterflange

Sensor Systems:

The following sensor systems are available for the DR12:

- **coil with preamplifier**
output: square wave signal, 3-wire,
PNP open collector, short-circuit proof
supply: 4,5...28 VDC
- **coil with preamplifier according to NAMUR**
output: pulses, 2-wire
supply: 8 VDC

Output Signal:

The DR12s provide an output frequency proportional to the flow rate, which is converted into a typical number of pulse liters for each measuring range (see table “Measuring ranges”).

Due to manufacturing, the final number of pulses per liter can differ by up to 10 % for the same measuring ranges. Each turbine is therefore calibrated before delivery and provided with an individual number of impulses liters.

Application Notes:

When using DR12 turbine flow meters, a number of factors must be taken into account to ensure trouble-free operation:

Chemical resistance:

The DR12 can be used for all liquids that do not attack the stainless steel used or the material of the bearings.

Viscosity:

Turbine flowmeters are generally viscosity dependent. Due to their design, however the DR12 can be used for media with a viscosity of max. 15 cST without any problems. The additional error due to the increased viscosity is less than 0,5 %.

Gas inclusions:

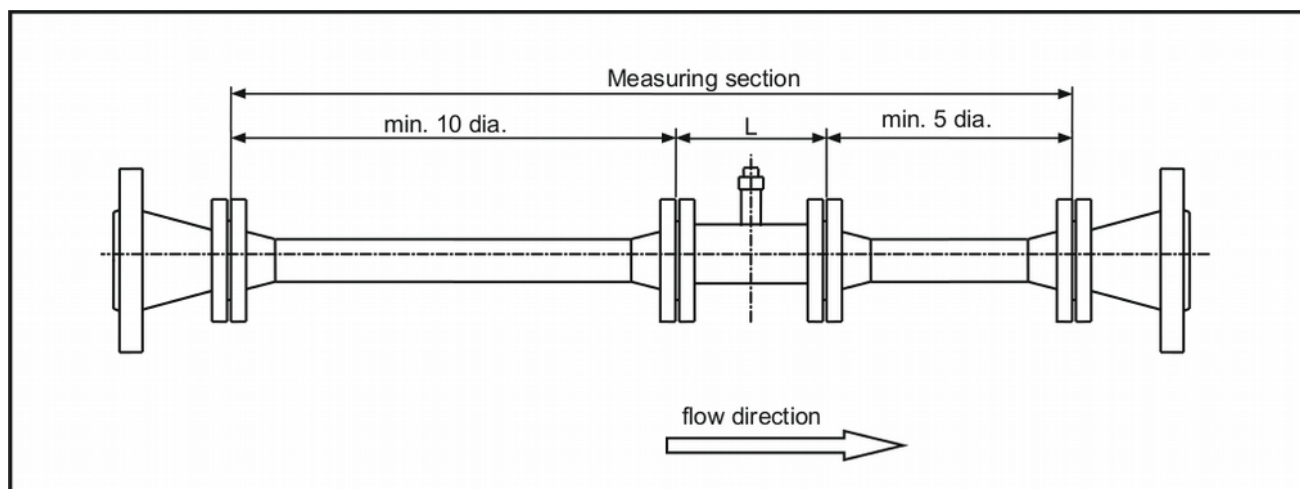
Air bubbles in the medium should be avoided at all costs. You can introduce an additional error into the measurement, which corresponds approximately to the volume of the air bubbles transported by the liquid.

Contamination:

The solids content in the medium can be up to 50 g/m³ without affecting the measuring accuracy or the service life of the system. 80 % of the solids should not exceed a particle size of 50 µm, the remaining 20 % should be less than 500 µm.

Filamentous impurities in the medium must be avoided under all circumstances as they can lead to blockage of the rotor.

Installation Note:



Measuring Ranges:

Code	Measuring range [m³/h] water	Inner diameter [mm]	Pulses per liter	Pressure loss [bar]	Signal level (coil) [mV _{eff}]
01	0,055...0,275	6	17000	0,4	40
02	0,11...0,55	6	8500	0,4	40
03	0,22...1,1	12	4090	0,35	60
04	0,44...2,2	15	1960	0,35	80
05	0,8...4	15	1080	0,35	80
06	1,6...8	18	562	0,35	200
07	3,2...16	25	259	0,3	200
08	6,8...34	37	95,3	0,3	250
09	13,6...68	50	60,88	0,3	300
10	27...135	75	16	0,3	400
11	54...270	100	12	0,25	200
12	110...550	150	5,236	0,25	200
13	220...1100	200	3,109	0,25	200
14	380...1900	250	1,8	0,25	200
15	540...2700	300	1,267	0,25	200
16	800...4000	400	0,9	0,25	200

Process Connections:

inner diameter [mm]	connection type		
	male thread G or NPT	flange connection	
		DIN	ANSI
6	3/8"	DN 10	3/8" RF
12	1/2"	DN 15	1/2" RF
15	5/8"	DN 15	1/2" RF
18	3/4"	DN 20	3/4" RF
25	1"	DN 25	1" RF
37	1 1/2"	DN 40	1 1/2" RF
50	2"	DN 50	2" RF
75	-	DN 80	3" RF
100	-	DN 100	4" RF
150	-	DN 150	6" RF
200	-	DN 200*	8" RF*
250	-	DN 250*	10" RF*
300	-	DN 300*	12" RF*
400	-	DN 400*	16" RF*

* with steel flange only

Pressure Stages:

nominal size	pressure stages		
	thread G or NPT [bar]	DIN flange [PN]	ANSI flange [lbs.]
DN 10 / 3/8" - DN 15 / 5/8"	250 (160 für 5/8")	40 / 160 / 250 150 / 300 320 / 400	150 / 300 600 / 900 1500 / 2500
DN 20 / 3/4"	100	40	150 / 300
DN 25 1" - DN 40 / 1 1/2"	100	40 / 160 250 / 320 / 400	150 / 300 600 / 900 1500 / 2500
DN 50 / 2"	100	40 / 64 100 / 160 / 250 320 / 400	150 / 300 600 / 900 1500 / 2500
DN 80 / 3"	-	10 / 40 64 / 100 / 160 250 / 320 / 400	150 / 300 600 / 900 1500 / 2500
DN 100 / 4"	-	16 / 40 64 / 100 160 / 250	150 / 300 600 / 900 1500 / 2500
DN 150 / 6"	-	16 / 40 64 / 100 160	150 / 300 600 / 900 1500
DN 200 / 8" - DN 400 / 16"	-	16 / 40 64	150 / 300 600 / 900

Order Code:

Order number:	DR12.	V.	09.	050D40.	H.	V.	0
Precision turbine flowmeter							
Models:							
R = stainless steel housing, threaded connection							
S = stainless steel housing, steel flanges							
V = stainless steel housing, stainless steel flanges							
Measuring range:							
01...16 = see table „Measuring ranges“							
Process connection:							
see separate order code „Process connection“							
Bearing:							
H = carbide bearing (not for measuring range 01 + 02)							
P = PTFE bearing							
Sensor system with connector plug EN 175301-803:							
V = coil with preamplifier, 3-wire, 4,5...28 VDC (standard)							
N = coil with preamplifier according to NAMUR, 8 VDC							
Options:							
0 = without							
9 = please specify in plain text							

Order Code Process Connection:

Connection code:	050	D	40.
Nominal size:			
010 = DN 10 / 3/8"			
015 = DN 15 / 1/2"			
018 = DN 15 / 5/8"			
020 = DN 20 / 3/4"			
025 = DN 25 / 1"			
040 = DN 40 / 1 1/2"			
050 = DN 50 / 2"			
080 = DN 80 / 3"			
100 = DN 100 / 4"			
150 = DN 150 / 6"			
200 = DN 200 / 8"			
250 = DN 250 / 10"			
300 = DN 300 / 12"			
400 = DN 400 / 16"			
Connection type (see table „Process connection“):			
G = male thread G			
N = male thread NPT			
D = DIN flange			
A = ANSI flange			
S = special connection			

Pressure stages (see table „Pressure stages“):

10...400 = 10...400 bar
150...2500 = 150...2500 lbs. (for ANSI flanges only)
320 = special version for threads up to 320 bar
(only with metric high pressure fitting „S“
for measuring ranges 01...07)

Technical Data:

Materials:

base body:	stainless steel 1.4571
rotor:	up to DN 80: stainless steel 1.4034 from DN 100: stainless steel 4541
bearings:	tungsten carbide, optional PTFE
flanges:	steel 1.1106, optional stainless steel 1.4541

Max. pressure: according to table „Pressure stages“ and order code

Media temperature: -40...+110 °C with plug acc. to EN 175301-803, form A

Ambient temperature: -40...+60 °C

Accuracy:

DR12.x.01...03:	± 1 % of measured value
DR12.x.04...16:	± 0,5 % of measured value

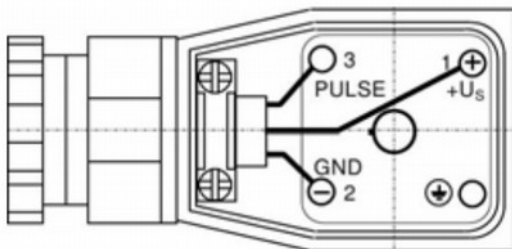
Power supply:

DR12...V:	coil with preamplifier: 4,5...28 VDC
DR12...N:	coil with preamplifier according to NAMUR: 8 VDC

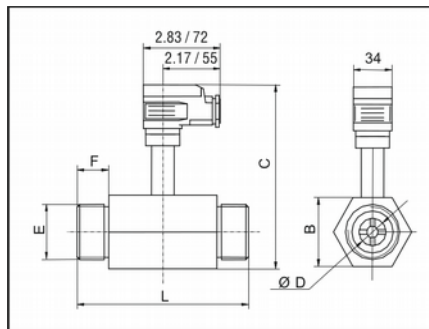
Electrical Connection:

Connector plug EN 175301-803, form A

3-wire with preamplifier



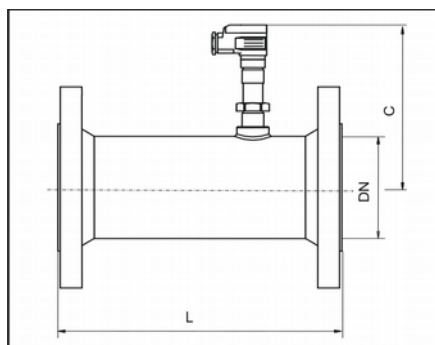
Dimensions:



Threaded connection:

Inner diameter ØD [mm]	B [mm]	C [mm]	L [mm]	E (male thread G or NPT)	F [mm]
6	25	82	50,8	3/8"	12,7
12	25	86	63,5	1/2"	19
15	25	87	63,5	5/8"	19
18	38	89	82,6	3/4"	22
25	38	92	89	1"	23
37	56	99	114	1 1/2"	28
50	70	104	133	2"	29,5

Dimensions for metric high pressure couplings on request



Flange connection

Inner diameter ØD [mm]	C [mm]	L [mm]	Inner diameter ØD [mm]	C [mm]	L [mm]
6	95	114	80	140	228
12	102	127	100	154	355
15	115	127	150	180	368
18	115	141	200	236	458
25	126	153	250	265	458
37	126	179	300	290	458
50	132	198	400	345	610

Dimensions valid for DIN flanges, ANSI flanges on request