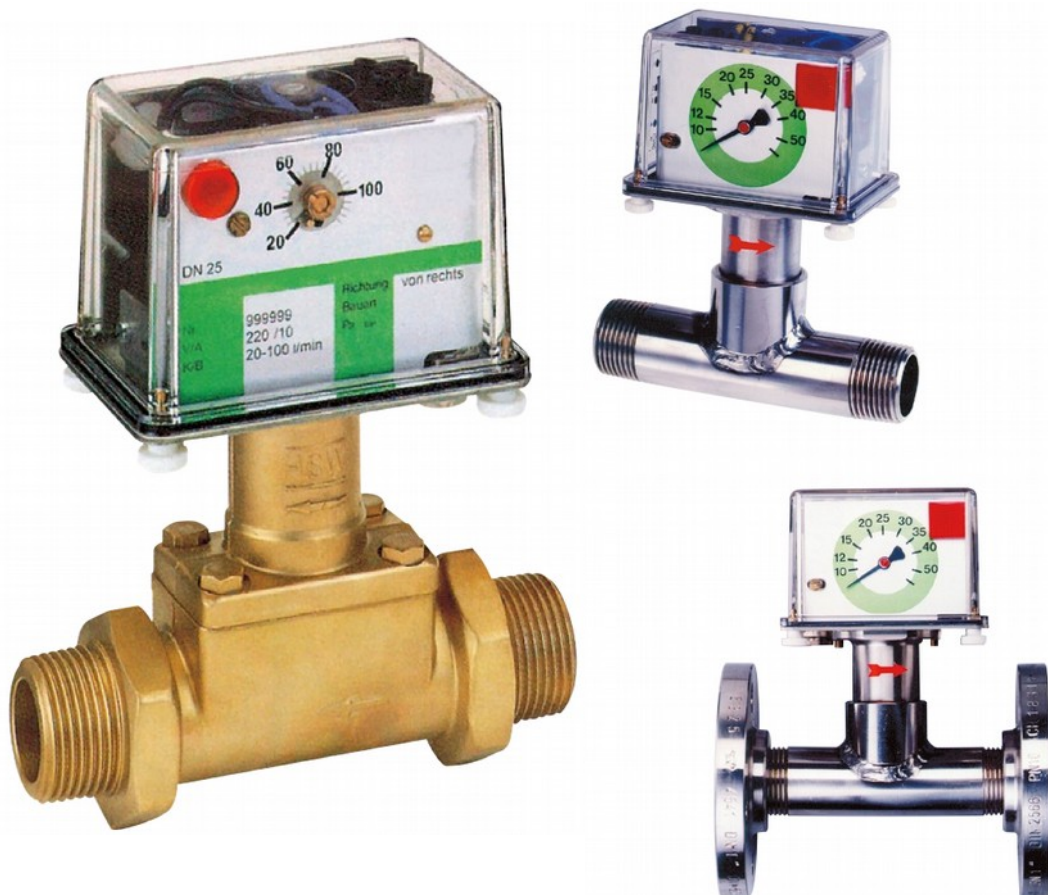




Instruction Manual

DP05 / DP06

Paddle bellows flow switch / meter



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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 work safety instructions in this manual as well as the safety, accident prevention and environmental protection regulations generally valid for the work area must be observed.

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 flow switches / meters DP05 and DP06 are designed to monitor continuous flow rates of liquids which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device.

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 DP05 and DP06 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 DP05 and DP06 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.

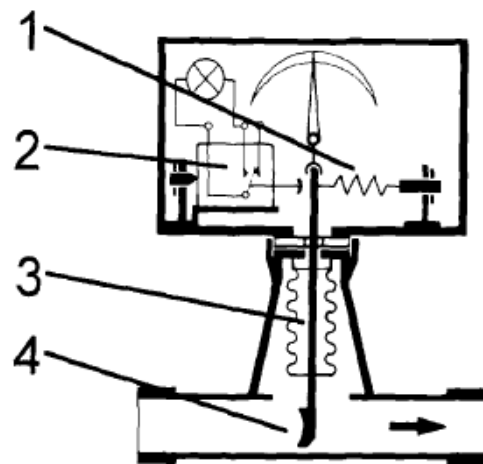
Measuring Principal / Function

The Flow-Switches and Flow-Meters of types DP05 and DP06 work on the principle of dynamic pressure.

The flow medium works against a target plate (4), which causes the system to swing against a tension spring (1).

A bellows system made from stainless steel (3) seals the indicator and switch equipment against the flowing liquid. Connection between the target plate and the evaluating system is made by a lever arm. A microswitch (2) is actuated whenever the preselected low or high flow switch-points are passed.

Depending from type additionally a control-lamp and a indication system for the actual flow will be actuated.



Mounting

Mounting orientation

The Flow-Switches and Flow-Meters DP05 and DP06 are designed to be installed directly in a pipe system. Make sure that the instruments are installed according the information on the type plate. The flow-direction correlates to the direction of the pipe. Inaccuracy of the instrument will result from incorrect mounting.

Flow direction

It is essential that the unit is mounted so that flow is as indicated by the arrow on the body. The unit will not operate unless installed correctly in this way.

Position of mounting

The following points must be observed:

- To avoid damages at the measuring system it is especially important to have the biggest possible distance from magnet valves and ball valves. If it is not possible to have a big distance, the valves have to be installed after the instruments. To avoid pressure shocks it is very important to open the valves slowly.
- It is advantageous to install the unit in a straight piece of pipe and to choose a place of mounting which has the biggest possible distance from elbows, valves etc.
- In order to have an accurate function of the device we recommend a straight length of 10 x d at input side and 5 x d at the output side (d= internal diameter of pipe)

Process connection

Thread connection

We recommend sealing all threads with PTFE sealing tape. Ensure no excess of tape is left protruding into the pipe.

Flange connection

A approved flange seal or gasket must be used. Neither this nor the required fixing bolts are included in the delivery.

Welded socket

The complete flange with screws and sealing is delivered with the instrument.

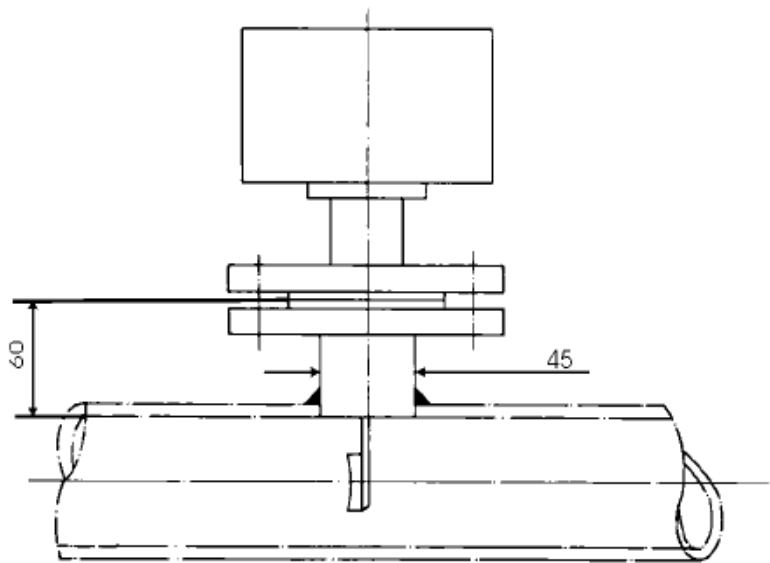
The distance 60 mm has to be kept exactly, because this directly affects the calibration of the instrument.

Drill a ridge less hole in the pipe and weld on the socket.

Use the enclosed sealing.

Please keep the flow direction in consideration during mounting procedure (arrow).

The pipe must be free from pollution.



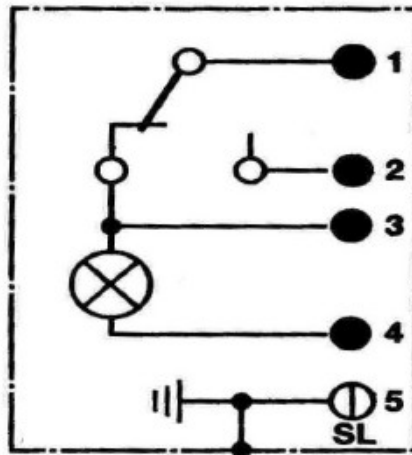
Electrical connection

- Removing the enclosure to gain access to the four polar connector block.
- Additionally to the micro-switch a control lamp is installed. This lamp is for optical control of switch status of the micro-switch.
- The current which is necessary for the lamp is indicated at the label.
- The max. switching performance is up to 230 V / 10 A AC.
- Please connect the device to ground with help of the screw near cable entry .

Cable type to be used

The connection cable to be used must correspond to the required electrical connection power (max 230 V, 10 A AC). In addition, the prevailing stresses (temperature, mechanical stress, chemical influences) must be taken into consideration when selecting the cable.

Circuit diagram



Calibration dates

Calibration dates, type of device and serial number are indicated at the label. Changes of medium, pressure and position of mounting will influence accuracy.

Switch-point

DP05, DP06:

Alternations of the switchpoint can be made by the customer within the limits indicated on the scale.

DP06:

The actual flow is indicated at front side of the unit.

Maintenance

The flow switches and meters DP05 and DP06 are almost maintenance-free. In case of mal-function first of all check the pipe system for calcification or other obstruction.

For cleaning do not use sharp-edged tools. Damaged instruments can only be repaired in our factory, because they have to be re-calibrated.

Damaged items should send back to the manufacturer because it is only there possible to do the recalibration which is necessary.

Unscrewing screws, changing tension spring or bellow system changes calibration and will invalidate the guarantee.

DP06

Paddle-Bellows Flow Meter and Switch

- for liquids
- large 270°-dial gauge display for flow rate
- easy switching-point adjustment with small scale
- bellows keep liquid hermetically separated from the switching element
- insensitive to dirty / contaminated fluids
- 1 or 2 independently adjustable microswitches
- insensitive to electromagnetic fields
- easy installation, for pipes up to DN 600
- measuring ranges: 1...25 l/min up to 420...4500 m³/h
- P_{max}: 16 bar, T_{max}: 250 °C



Description:

The flow meters and switches model DP06 operate according to the paddle-bellows principle. The flowing liquid pushes against the surface area of a paddle mounted at the end of a pivoting arm.

The arm is deflected against the force of a spring. This deflection is mechanically transmitted to a 270° dial-gauge display and a separately adjustable contact unit. A bellow system seals the liquid off from the mechanism. In case of malfunction, the spring returns the paddle plate to the zero position (no flow), which causes the system to automatically signal a fault.

Typical Applications:

The DP06 paddle-bellows flow meter and switch is suitable for monitoring thin and low-viscosity liquids in average to large flow volumes, e.g. for industrial water circuits because they are relatively insensitive to dirty / contaminated fluids.

For nominal pipe sizes over DN 50, installation with an intermediate mounting flange yields a price/ performance ratio of exceptional economy.

Models:

The DP06 flow monitors are available in 3 versions and different material combinations:

DP06.R... with T-fitting and pipe-thread connection from R 3/8 to R 2 male thread

DP06.F... with T-fitting and DIN flange from DN 10 to DN 50

Material-

combination A: T-fitting made of brass
pivoting system made of brass
bellows made of st. steel 1.4571
flange made of galvanized carbon steel

Material-

combination B: T-fitting made of st. steel 1.4571
pivoting system made of st. steel 1.4571
bellows made of st. steel 1.4571
flange made of st. steel 1.4571

DP06.A... with weld on flange for nominal pipe size DN 65 to DN 600

Material-

combination A: housing made of brass
pivoting system made of brass
bellows made of st. steel 1.4571
weld on flange made of carbon steel, painted

Material-

combination B: housing made of st. steel 1.4571
pivoting system made of st. steel 1.4571
bellows made of st. steel 1.4571
weld-on flange made of st. steel 1.4571

Technical Data:

Max. pressure:	16 bar
max. med.-temperature:	130 °C High temperature version: 250 °C
Accuracy:	± 5 % up to 20 l/min ± 4 % from 21...200 l/min ± 3 % > 200 l/min
Switching hysteresis:	10 % (up to 2 bar)
Contacts:	
1 micro switch:	230 V, 10 A, SPDT
2 micro switches:	230 V, 5 A, SPDT
1 gold contact switch:	230 V, 100 mA, SPDT
Status display:	glow lamp or LED (depending on the con. voltage)
Protection class:	IP55 (IP65 on request)

Please specify the connection voltage 24 V or 230 V.

Order Code:

Order number: DP06. R025. B. 1. 20-100. 0

Paddle bellows flow meter and switch

Process connection (xx=nominal pipe size):

R0xx = with male thread (R 3/8 to R 2 only)

F0xx = with flange (DN 10 to DN 50 only)

Axxx = with weld on flange
(from DN 40 to DN 600)

Material combination:

A = brass / st. steel / steel zinc plated

B = completely of st. steel

PVC version (threaded socket, flange etc.) on request

Contact:

1 = 1 microswitch (250 V / 10 A)

2 = 2 microswitches (250 V / 5 A)

3 = 1 microswitch with gold contacts

Switching range:

xxxx-xxxx = min. - max. flow rate (see table „Measuring ranges“)

Options:

0 = without

1 = please specify in plain text

2 = oil dampening

HT = high temperature version (only for material combination B)
up to 250 °C

HTF = high temperature version for flange connection (only for material combination B) up to 250 °C

Additional specifications:

- medium density and viscosity (if different from water)
- process pressure and temperatures
- mounting position and direction of flow
- ratings of electrical connections

Measuring ranges:

Instruments with male thread or flange connection (T-piece)

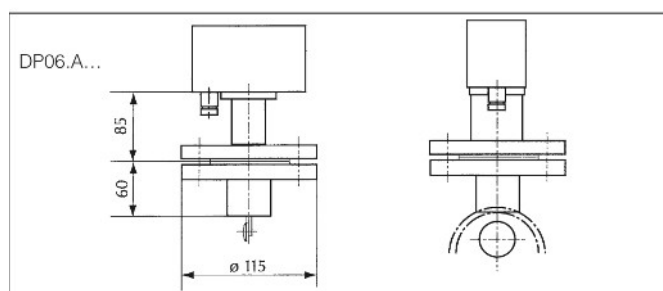
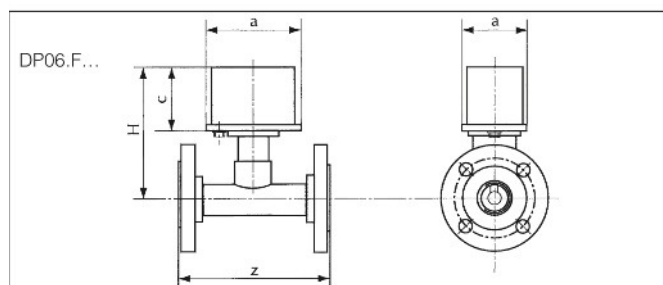
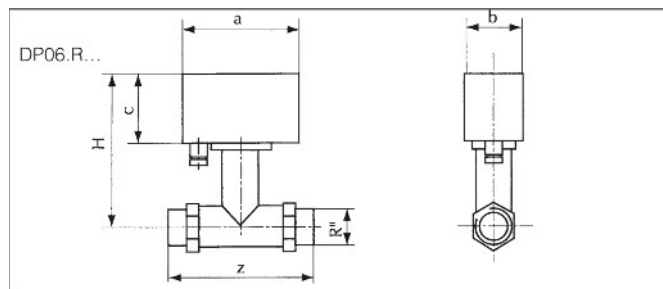
Process connection DP06.R... DP06.F...	Flow rate [l/min]		Flow ratio
	min	max	
3/8"/DN 10	1	25	1:5
1/2"/DN 15	1	55	1:5
3/4"/DN 20	5	100	1:5
1"/DN 25	6	150	1:5
1 1/4"/DN 32	10	250	1:5
1 1/2"/DN 40	20	400	1:5
2"/DN 50	50	600	1:5

Instruments with weld on flange

Process connection DP06.A...	Flow rate [l/min]		Flow ratio
	min	max	
DN 40	1,2	24	1:4
DN 50	3	36	1:4
DN 65	4,8	60	1:4
DN 80	7,2	90	1:4
DN 100	12	144	1:4
DN 125	18	255	1:4
DN 150	24	330	1:4
DN 200	42	600	1:4
DN 250	72	900	1:4
DN 300	102	1.200	1:4
DN 350	150	1.800	1:4
DN 400	180	2.400	1:4
DN 500	300	3.600	1:4
DN 600	420	4.500	1:4

Switching ranges apply to water at 20°C. Within the specified limits, all switching ranges can be achieved, provided that the max./min. ratio for the switching point is not exceeded.
Example in the event of 1/2": 1-5, 2-10 or 11-55 possible.

Dimensions:



Nominal size	Installation length Z [mm]		Installation height H [mm]
	DP06.R...	DP06.F...	
3/8" / DN 10	135	155	145
1/2" / DN 15	135	155	145
3/4" / DN 20	135	160	145
1" / DN 25	135	160	145
1 1/4" / DN 32	170	190	150
1 1/2" / DN 40	170	190	155
2" / DN 50	170	190	160