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## **Operating Instructions**

### **DP05 / DP06**

*Paddle-bellows flowmeter and switch*

# Operation Manual

Flow-Switch Type DP05  
Flow-Meter Type DP06

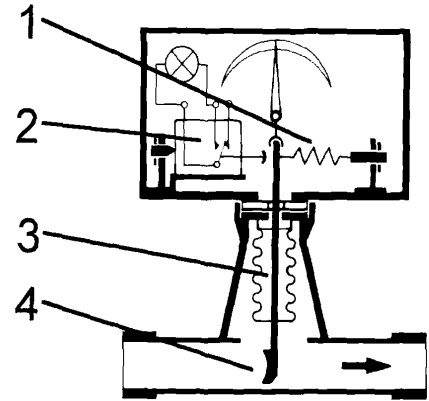
03.01.00  
V0102

## 1. Delivery and packing

All instruments delivered are ready for operation. Avoid rough handling in order to prevent damage to the sensitive built-in measuring and indication mechanism. There is no security fixing for transportation.

## 2. Function

PKP Flow-Switches and Flow-Meters of the described types 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.



## 3. Mounting

### 3.1 Mounting orientation

PKP Flow-Switches and Flow-Meters 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.

### 3.2 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.

### 3.3 Position of mounting

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  $10 \times d$  at input side and  $5 \times d$  at the output side ( $d$ = internal diameter of pipe)

### 3.4 Mounting at the tube

#### 3.4.1 Items with welded socket

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

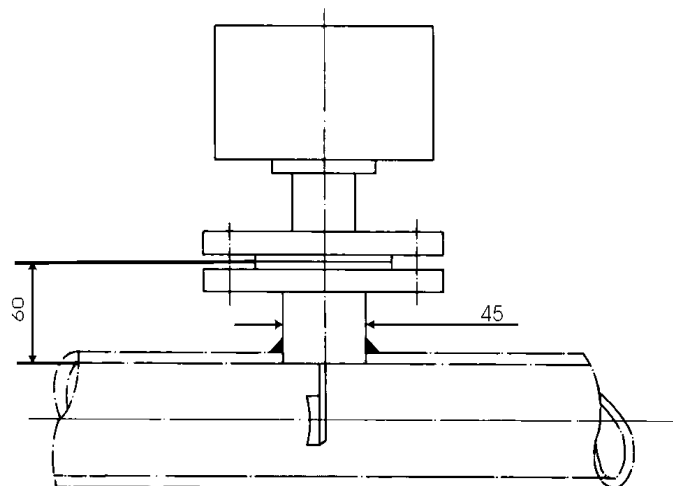
The distance 60mm has to be kept exactly, because this directly affects the calibration of the instrument.

Drill a ridgeless 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.



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Flow-Switch Type DP05  
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## 3.4.2 Items with tread connection

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

## 3.4.3 Items with flange connection

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

## 4. Electrical connection

### 4.2 Connecting Type DP05 and DP06

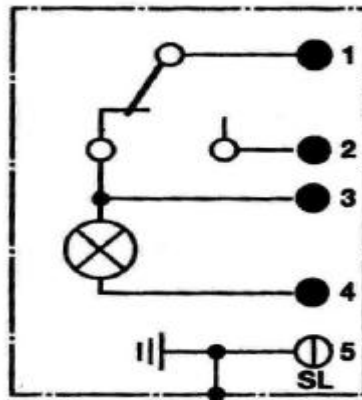
Removing the enclosure to gain access to the four polar connector block.

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 230V/10A AC.

Please connect the device to ground with help of the screw near cable entry .

Circuit diagram type DP05 / DP06

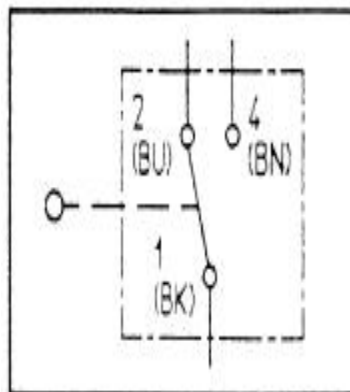


### 4.3 Connecting Type DP05-EX and DP06-EX

The device will be connected at the end of the cable. The connection must be done in a area which is not endangered by explosion (use EX cable gland), or in a special EX connection enclosure.

The max. switching performance is up to 230V/10A AC.

Circuit diagram type DP05-EX / DP06-EX



5. **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.

6. **Switch-point**

Type DP05                      Alternations of the switchpoint can be made by the customer within the limits indicated on the scale.

Type DP06                      Alternations of the switchpoint can be made by the customer within the limits indicated on the scale.  
The actual flow is indicated at front side of the unit.

7. **Maintenance.**

The mentioned PKP instruments 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.

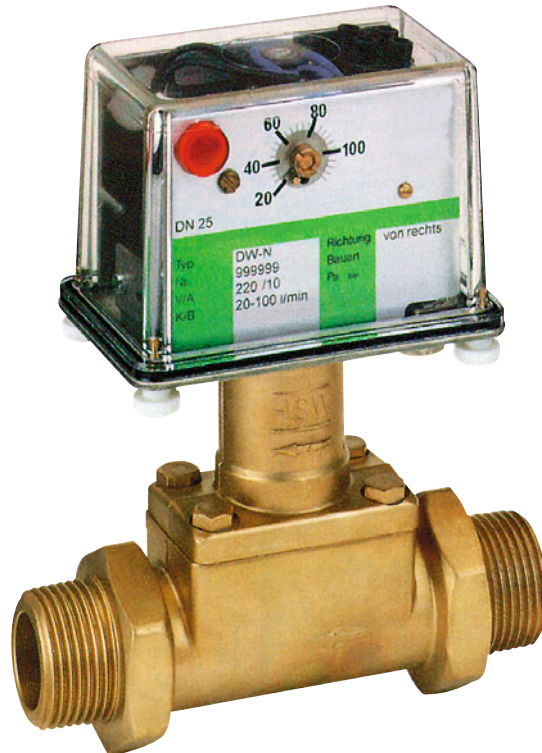
Damaged items should send back to the manufacturer because it is only there possible to do the re-calibration which is necessary.

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

# DP05

## Paddle-bellows flow switch for liquids, with variable switching point

- **Easy switch-point adjustment over the entire switching range**
- **Bellows keeps liquid hermetically separated from the switching element**
- **Insensitive to dirty/contaminated fluids**
- **Very high reliability**
- **High electrical loading capacity through use of 1 or 2 independently adjustable microswitches**
- **Insensitive to electromagnetic fields**
- **Easy installation, for piping up to DN 600**



### Description:

The flow switches model DP05 operate according to 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 an adjustable contact unit. A bellows system hermetically 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.

### Fields of application:

The DP05 paddle-bellows flow switch is suitable for monitoring thin and low-viscosity liquids in average to large flow volumes. For nominal pipe sizes over DN50, installation with a special intermediate mounting flange yields a price/performance ratio of exceptional economy.

## Designs:

Each of the 3 types of DP05 flow switches are available in 3 material combinations:

**DP05.R...** with T fitting and pipe-thread connection from G 3/8 to G 2 male thread

**DP05.F...** with T fitting and DIN flange from DN10 to DN50

**Material combination A:** T fitting of brass  
Pivoting system of brass  
Bellows of 1.4571 stainless steel  
Flange of galvanized steel

**Material combination B:** T fitting of 1.4571 stainless steel  
Pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Flange of 1.4571 stainless steel

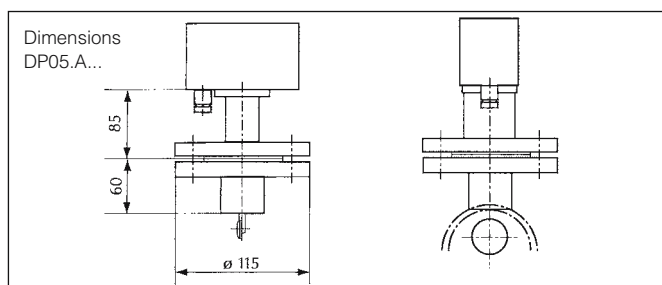
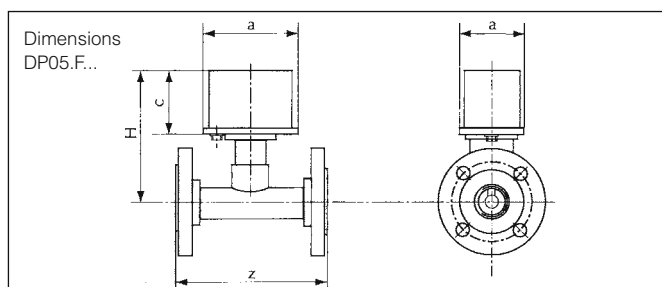
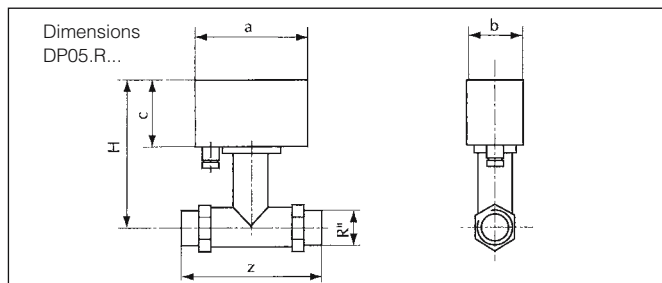
**Material combination C:** T fitting of PVC  
pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Flange of PVC

**DP05.A...** with weld-on flange for nominal pipe size DN65 to DN600

**Material combination A:** Housing of brass  
Pivoting system of brass  
Bellows of 1.4571 stainless steel  
Weld-on flange of carbon steel, painted

**Material combination B:** Housing of 1.4571 stainless steel  
Pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Weld-on flange of 1.4571 stainless steel

## Dimensions:



## Ordering Code:

**Order number:** DP05. R025. B. 1. 20-100

**Paddle-bellows flow switch**

**Process connection (xx=nominal pipe size):**

R0xx = With male thread

(G 3/8 to G2 only)

F0xx = With flange

(DN10 to DN50 only)

Axxx = With weld-on flange

(from DN65 to DN600)

**Material combination:**

A = Brass / stainless steel (galvanized steel)

B = Completely of stainless steel

C = PVC / stainless steel (not for DP05.A..).

**Switching output:**

1 = 1 microswitch (250 V / 10 A)

2 = 2 microswitch (250 V / 5 A)

**Switching range:**

xxxx-xxxx = min. - max. switching point (refer to „Measuring Ranges“ table)

## Additional specifications:

- Liquid density and viscosity (if not water)
- Process pressure and temperature
- Mounting position and direction of flow
- Ratings of electrical connections

## Measuring ranges:

| Process connection<br>DP05.R...<br>DP05.F...                                                                                                                                           | Flow rate (l/min) |      | Flow ratio | Process connection<br>DP05.A... | Flow rate (m³/h) |       | Flow ratio |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|------------|---------------------------------|------------------|-------|------------|
|                                                                                                                                                                                        | min.              | max. |            |                                 | min.             | max.  |            |
| 3/8"/DN10                                                                                                                                                                              | 1                 | 25   | 1:5        | DN 65                           | 4,8              | 60    | 1:4        |
| 1/2"/DN15                                                                                                                                                                              | 1                 | 55   | 1:5        | DN 80                           | 7,2              | 90    | 1:4        |
| 3/4"/DN20                                                                                                                                                                              | 5                 | 100  | 1:5        | DN 100                          | 12               | 144   | 1:4        |
| 1"/DN25                                                                                                                                                                                | 6                 | 150  | 1:5        | DN 125                          | 18               | 255   | 1:4        |
| 1 1/4"/DN32                                                                                                                                                                            | 10                | 250  | 1:5        | DN 150                          | 24               | 330   | 1:4        |
| 1 1/2"/DN40                                                                                                                                                                            | 20                | 400  | 1:5        | DN 200                          | 42               | 600   | 1:4        |
| 2"/DN50                                                                                                                                                                                | 50                | 600  | 1:5        | DN 250                          | 72               | 900   | 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. |                   |      |            | 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        |

| Nominal size | Installation length Z (in mm) |           | Installation clearance H (in mm) |
|--------------|-------------------------------|-----------|----------------------------------|
|              | DP05.R...                     | DP05.F... |                                  |
| 3/8"/DN10    | 135                           | 155       | 145                              |
| 1/2"/DN15    | 135                           | 155       | 145                              |
| 3/4"/DN20    | 135                           | 160       | 145                              |
| 1"/DN25      | 135                           | 160       | 145                              |
| 1 1/4"/DN32  | 170                           | 190       | 150                              |
| 1 1/2"/DN40  | 170                           | 190       | 155                              |
| 2"/DN50      | 170                           | 190       | 160                              |

## Technical specifications:

Max. pressure: 16 bar

Max. temperature: 100 °C

Repeat accuracy: +/- 5% to 20 l/min

+/- 4% from 21 to 200 l/min

+/- 3% > 200 l/min

Switching hysteresis: 10% (to 2 bar)

Contacts: microswitch, 250 V, 10 A or 5 A

Status display: low-voltage lamp or LED

(depends on the voltage rating)

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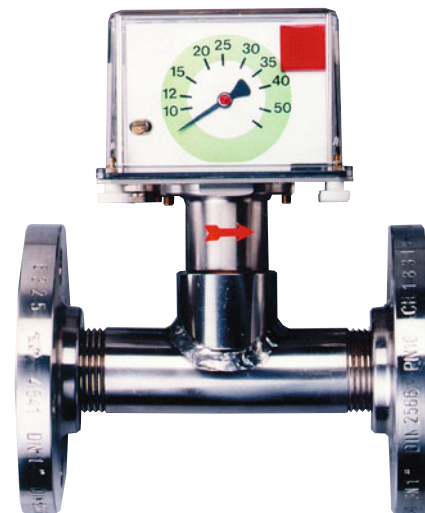
Email: info@pkp.eu · Internet: www.pkp.eu



# DP06

## Paddle-bellows flow meter and switch for liquids

- Large 270° dial gauge display for flow rate
- Simple switch-point adjustment over the entire switching range on a separate small dial
- Bellows keeps liquid hermetically separated from the switching element
- Insensitive to dirty/contaminated fluids
- Very high reliability
- High electrical loading capacity through use of 1 or 2 independently adjustable microswitches
- Insensitive to electromagnetic fields
- Easy installation, for piping up to DN 600



### 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 bellows 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.

### Fields of application:

The DP06 paddle-bellows flow meter and switch is suitable for monitoring thin and low-viscosity liquids in average to large flow volumes. For nominal pipe sizes over DN50, installation with an intermediate mounting flange yields a price/performance ratio of exceptional economy.

## Designs:

Each of the 3 types of DP06 flow meters and switches are available in 3 material combinations:

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

**DP06.F...** with T fitting and DIN flange from DN10 to DN50

**Material combination A:** T fitting of brass  
Pivoting system of brass  
Bellows of 1.4571 stainless steel  
Flange of galvanized carbon steel

**Material combination B:** T fitting of 1.4571 stainless steel  
Pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Flange of 1.4571 stainless steel

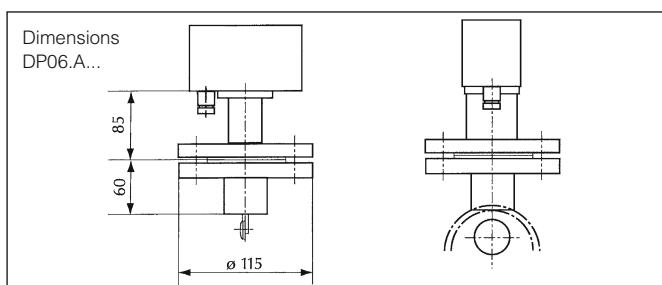
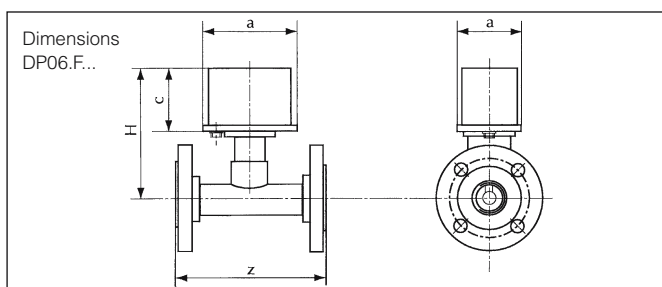
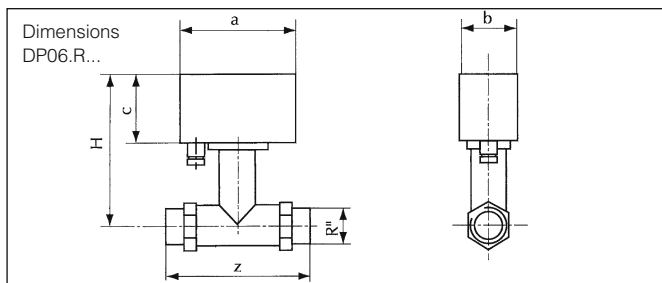
**Material combination C:** T fitting of PVC  
Pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Flange of PVC

**DP06.A...** with weld-on flange for nominal pipe size DN65 to DN600

**Material combination A:** Housing of brass  
Pivoting system of brass  
Bellows of 1.4571 stainless steel  
Weld-on flange of carbon steel, painted

**Material combination B:** Housing of 1.4571 stainless steel  
Pivoting system of 1.4305 stainless steel  
Bellows of 1.4571 stainless steel  
Weld-on flange of 1.4571 stainless steel

## Dimensions:



## Ordering Code:

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

**Paddle-bellows flow meter and switch**

**Process connection (xx=nominal pipe size):**

R0xx = With male thread  
(G 3/8 to G2 only)  
F0xx = With flange  
(DN10 to DN50 only)  
Axxx = With weld-on flange  
(from DN65 to DN600)

**Material combination:**

A = Brass / stainless steel (carbon steel, galvanized)  
B = Completely of stainless steel  
C = PVC / stainless steel (not for DP06.A..)

**Switching output:**

1 = 1 microswitch (250 V / 10 A)  
2 = 2 microswitch (250 V / 5 A)

**Switching range:**

xxxx-xxxx = min. - max. flow rate (refer to „Measuring Ranges“ table)

## Additional specifications:

- Liquid density and viscosity (if not water)
- Process pressure and temperature
- Mounting position and direction of flow
- Ratings of electrical connections

## Measuring ranges:

| Process connection<br>DP06.R...<br>DP06.F...                                                                                                                                            | Flow rate (l/min) |      | Flow ratio | Process connection<br>DP06.A... | Flow rate (m³/h) |       | Flow ratio |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|------------|---------------------------------|------------------|-------|------------|
|                                                                                                                                                                                         | min.              | max. |            |                                 | min.             | max.  |            |
| 3/8"/DN10                                                                                                                                                                               | 1                 | 25   | 1:5        | DN 65                           | 4,8              | 60    | 1:4        |
| 1/2"/DN15                                                                                                                                                                               | 1                 | 55   | 1:5        | DN 80                           | 7,2              | 90    | 1:4        |
| 3/4"/DN20                                                                                                                                                                               | 5                 | 100  | 1:5        | DN 100                          | 12               | 144   | 1:4        |
| 1"/DN25                                                                                                                                                                                 | 6                 | 150  | 1:5        | DN 125                          | 18               | 255   | 1:4        |
| 1 1/4"/DN32                                                                                                                                                                             | 10                | 250  | 1:5        | DN 150                          | 24               | 330   | 1:4        |
| 1 1/2"/DN40                                                                                                                                                                             | 20                | 400  | 1:5        | DN 200                          | 42               | 600   | 1:4        |
| 2"/DN50                                                                                                                                                                                 | 50                | 600  | 1:5        | DN 250                          | 72               | 900   | 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. |                   |      |            | 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        |

| Nominal size | Installation length Z (in mm) |           | Installation clearance H (in mm) |
|--------------|-------------------------------|-----------|----------------------------------|
|              | DP06.R...                     | DP06.F... |                                  |
| 3/8"/DN10    | 135                           | 155       | 145                              |
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| 1 1/4"/DN32  | 170                           | 190       | 150                              |
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## Technical specifications:

Max. pressure: 16 bar  
Max. temperature: 100 °C  
Repeat accuracy: +/- 5% to 20 l/min  
+/- 4% from 21 to 200 l/min  
+/- 3% > 200 l/min

Switching hysteresis: 10% (to 2 bar)  
Contacts: microswitch, 250 V, 10 and, or 5 A  
Status display: low-voltage lamp or LED (depending on the voltage rating)