

# Series F61

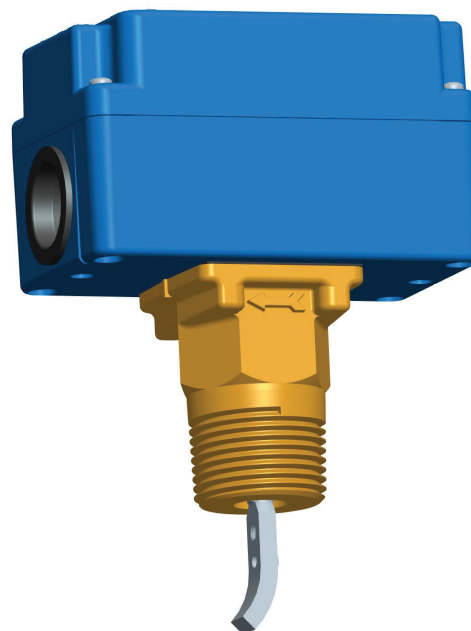
## Liquid Flow Switches

### Product Bulletin

The F61 Liquid Flow Switches can be used in liquid lines carrying water, sea water, swimming pool water, ethylene glycol or other liquids not harmful to the specified materials.

The switches have SPDT contacts and can be wired to energise one device and de-energise another device powered from the same source when liquid flow either exceeds or drops below the set flow rate.

There are two different models available. The pipe insert models and the T-body types for low-flow applications. All materials in contact with the liquid are specified in the part "specifications". At doubt about the liquid used with regards to these materials it is advised to contact the liquid supplier. The IP43 versions can be used for liquid temperatures above dewpoint. Remove the drain plug for applications below dewpoint (IP23). Vapour proof IP67 versions can be used for liquid temperatures of minus 30°C and up or in high moisture environments. Typical applications are to shut down the compressor on liquid chiller systems, to prove flow on electric immersion heaters and to give a signal or alarm when the pump on condenser cooling system shuts down.



- **T-body and Pipe-insert types available**  
For low flow applications (0.04 dm<sup>3</sup>/s) up to flows of 48 dm<sup>3</sup>/s
- **Polycarbonate IP43 enclosure**  
For indoor and outdoor applications.
- **Vapour tight IP67 enclosure**  
For low temperature applications.
- **Stainless steel Pipe-insert type**  
Used for liquids like swimming pool water
- **Large wiring space**  
Makes wiring convenient and easily accessible
- **Range screw easy accessible**  
Easy to adjust in the field

**Note:** These controls are designed for use only as operating controls. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices or systems that protect against, or warn of, control failure.



#### Caution

Do not use with hazardous fluids or in hazardous atmosphere.

## Installation

### Pipe-insert types

To allow the switch to detect changes in the liquid flow, the paddle must not touch the pipe or any other obstacle in the pipe. The Pipe-insert types are mounted on top of the liquid line.

An angle of 120° is allowed (as indicated in Figure 1).

To keep the flow switch close to the pipe and to provide an adequate paddle length in the flow stream the use of a reducing tee for larger pipe sizes is advised.

The arrow on the cover must point in the flow direction. To avoid turbulence it is advised to mount the controller at a distance of minimal 10xD (on each side) away from elbows, valves and other appendages.

The Pipe-insert types can be mounted in a vertical pipe as long as the flow is up-stream. This mounting position affects the adjustment of the controller.

The 6" paddle can be trimmed (as indicated on Page 6). For added stiffness it is advised to mount the smaller paddles behind the largest one.

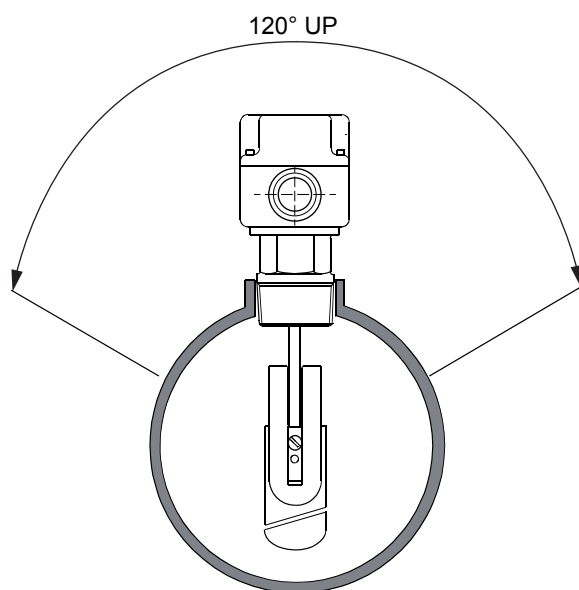


Figure 1: Angle allowed

### T-body types

These types are mounted in the liquid line with the housing at the top. An angle of 120° is allowed (as indicated in Figure 1).

The arrow on the body and cover must point in the flow direction. To avoid turbulences it is advised to mount the controller at a distance of minimal 10xD (on each side) away from elbows, valves and other appendages. The T-body types cannot be mounted in a vertical pipe.

## Wiring

A special vapour proof PG-16 nipple for cable inlet is delivered by the IP67 type controls. This nipple has to be used to keep the control vapour tight.

### Contact Function

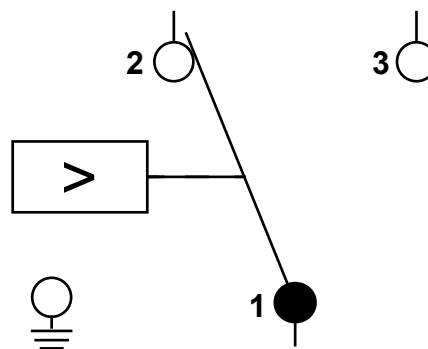


Figure 2: 1-3 closes on flow increase

## Adjustment

The switches are factory set at minimal flow setting. On the application the setting can be adjusted by the range screw under the cover (as indicated in Figure 3). For higher flow rates turn the adjusting screw clockwise.

**Note:** Prevent to adjust the setting below factory setting as this may result in the switch failing to return to “no flow” position.

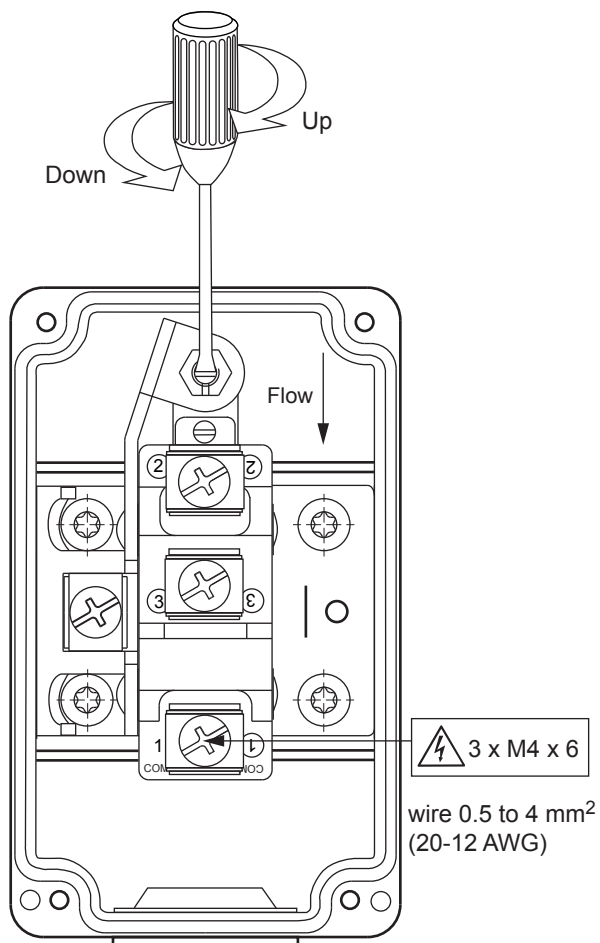


Figure 3: Adjustment

## Flow Rates

**Note:** Please note that these curves are approximate data obtained in a laboratory test by use of water and are not necessarily representative or accurate when compared with various field applications. Values are affected by the liquid used and the mounting position of the controller. Flow rates for pipe sizes 3” and up are calculated values.

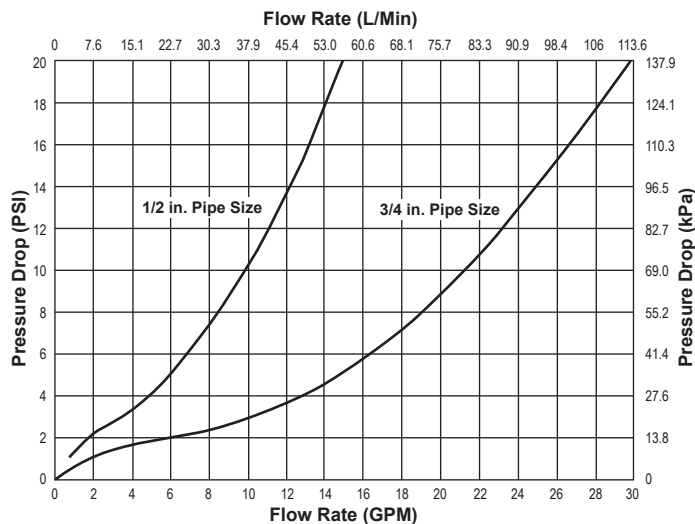


Figure 4: Flow rates T-body Types

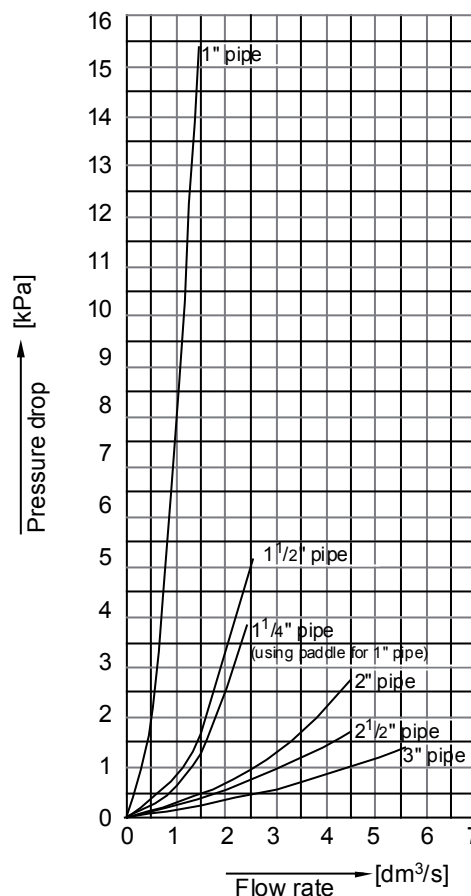


Figure 5: Pressure drop Pipe Insert Types

## Flow Rate Table Pipe Insert Types

|                    |               | Paddle size |                     | Line Pipe Size |       |       |       |       |        |          |                |      |       |
|--------------------|---------------|-------------|---------------------|----------------|-------|-------|-------|-------|--------|----------|----------------|------|-------|
|                    |               |             |                     | 1"             | 1¼"   | 1½"   | 2"    | 2½"   | 3" *   | 4" *     | 5 *            | 6" * | 8" *  |
| Minimum adjustment | Flow increase | 1"-2"-3"    | dm <sup>3</sup> /s  | 0.3            | 0.4   | 0.5   | 0.9   | 1.1   | 1.7    | 4.2      | 7.8            | 12   | 24    |
|                    |               |             | (m <sup>3</sup> /h) | (1.0)          | (1.3) | (1.7) | (3.1) | (4.1) | (6.2)  | (15)     | (28)           | (43) | (85)  |
|                    | 1-3 closes    | 6"          | dm <sup>3</sup> /s  | -              | -     | -     | -     | -     | -      | 2.4 **   | 3.6 **         | 4.8  | 13    |
|                    |               |             | (m <sup>3</sup> /h) | -              | -     | -     | -     | -     | -      | (8.5) ** | (13) **        | (17) | (47)  |
|                    | Flow decrease | 1"-2"-3"    | dm <sup>3</sup> /s  | 0.15           | 0.2   | 0.3   | 0.6   | 0.8   | 1.2    | 3        | 6.4            | 10   | 20    |
|                    |               |             | (m <sup>3</sup> /h) | (0.6)          | (0.8) | (1.1) | (2.2) | (2.8) | (4.3)  | (11)     | (23)           | (36) | (73)  |
|                    | 1-2 closes    | 6"          | dm <sup>3</sup> /s  | -              | -     | -     | -     | -     | -      | 1.7 **   | 2.5 **         | 3.4  | 11    |
|                    |               |             | (m <sup>3</sup> /h) | -              | -     | -     | -     | -     | -      | (6) **   | (9) **         | (12) | (39)  |
| Maximum adjustment | Flow increase | 1"-2"-3"    | dm <sup>3</sup> /s  | 0.6            | 0.9   | 1.2   | 1.8   | 2.2   | 3.4    | 8.1      | 16             | 24   | 48    |
|                    |               |             | (m <sup>3</sup> /h) | (2.0)          | (3.0) | (4.4) | (6.6) | (7.8) | (12)   | (29)     | (56)           | (85) | (173) |
|                    | 1-3 closes    | 6"          | dm <sup>3</sup> /s  | -              | -     | -     | -     | -     | -      | 5.0 **   | 7.6 **         | 9.2  | 26    |
|                    |               |             | (m <sup>3</sup> /h) | -              | -     | -     | -     | -     | -      | (18) **  | (27) **        | (33) | (94)  |
|                    | Flow decrease | 1"-2"-3"    | dm <sup>3</sup> /s  | 0.5            | 0.8   | 1.1   | 1.7   | 2.0   | 3.2    | 7.8      | 1 <sup>5</sup> | 23   | 43    |
|                    |               |             | (m <sup>3</sup> /h) | (1.9)          | (2.8) | (4.1) | (6.1) | (7.3) | (11.4) | (28)     | (53)           | (82) | (116) |
|                    | 1-2 closes    | 6"          | dm <sup>3</sup> /s  | -              | -     | -     | -     | -     | -      | 4.8 **   | 7 **           | 8.7  | 25    |
|                    |               |             | (m <sup>3</sup> /h) | -              | -     | -     | -     | -     | -      | (17) **  | (25) **        | (31) | (91)  |

### Notes:

1 dm<sup>3</sup>/s = 3.6 m<sup>3</sup>/h = 15.6 U.S. gal./min. = 13 U.K. gal./min.

\* Flow rates for these sizes are calculated.

\*\* For 4" and 5" line pipe the 6" paddle is trimmed

### Accessories for Pipe-insert types

|                   |  |
|-------------------|--|
| <b>KIT21A-602</b> | 1", 2", 3" and 6" paddles stainless steel AISI 301 |
| <b>PLT69-11R</b>  | 6" paddle stainless steel AISI 301                 |

### Repair and replacement

Repair is not possible. In case of an improperly functioning control, please check with your nearest supplier. When contacting the supplier for a replacement you should state the type/model number of the control. This number can be found on the data plate or cover label.

## Pipe-insert

|                   | Range<br>dm <sup>3</sup> /sec | Connection | IP class | Paddles<br>st. st AISI 301 | Paddles<br>st. st AISI 316L | Application  |
|-------------------|-------------------------------|------------|----------|----------------------------|-----------------------------|--|
| <b>F61SB-9100</b> | 0.15/46                       | (ISO 7-R1) | IP43     | 1", 2", 3", 6"             | ---                         | Water / Ethylene glycol /<br>Sea water                       |
| <b>F61TB-9100</b> | 0.15/46                       | (ISO 7-R1) | IP67     | 1", 2", 3", 6"             | ---                         | Water / Ethylene glycol /<br>Sea water                       |
| <b>F61TB-9104</b> | 0.15/46                       | (ISO 7-R1) | IP67     | 1", 2", 3", 6"             | ---                         | Water / Ethylene glycol /<br>Sea water<br>Gold flashcontacts |
| <b>F61TB-9200</b> | 0.15/46                       | (ISO 7-R1) | IP67     | ---                        | 1", 2", 3"                  | Water / Chlorinated water /<br>Ethylene glycol               |

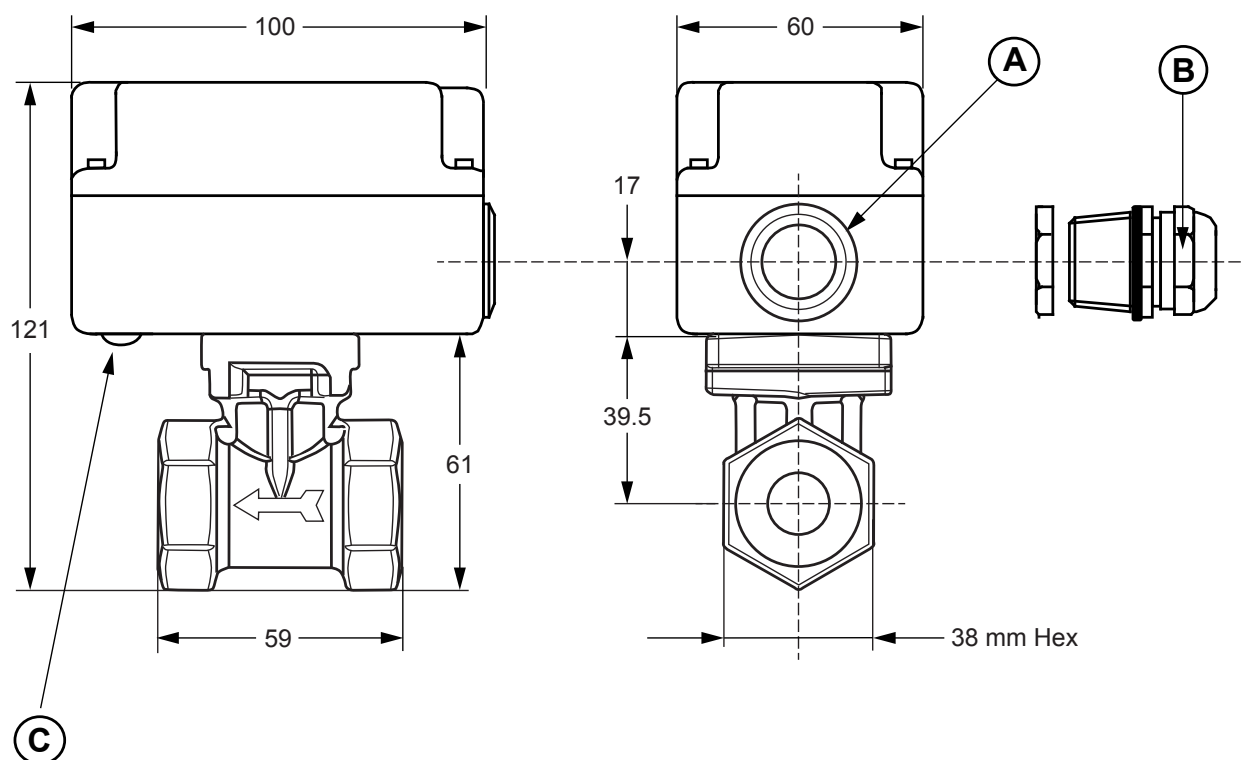
## T-Body

|                   | Range<br>dm <sup>3</sup> /sec | Connection  | IP class | Application           |
|-------------------|-------------------------------|-------------|----------|-----------------------|
| <b>F61SD-9150</b> | 0.04/0.07                     | 1/2-14 NPTF | IP43     | Water/Ethylene glycol |
| <b>F61SD-9175</b> | 0.04/0.07                     | 3/4-14 NPTF | IP43     | Water/Ethylene glycol |
| <b>F61TD-9150</b> | 0.04/0.07                     | 1/2-14 NPTF | IP67     | Water/Ethylene glycol |

### Note:

Paddles not mounted, packed with the control

## Dimensions (in mm)



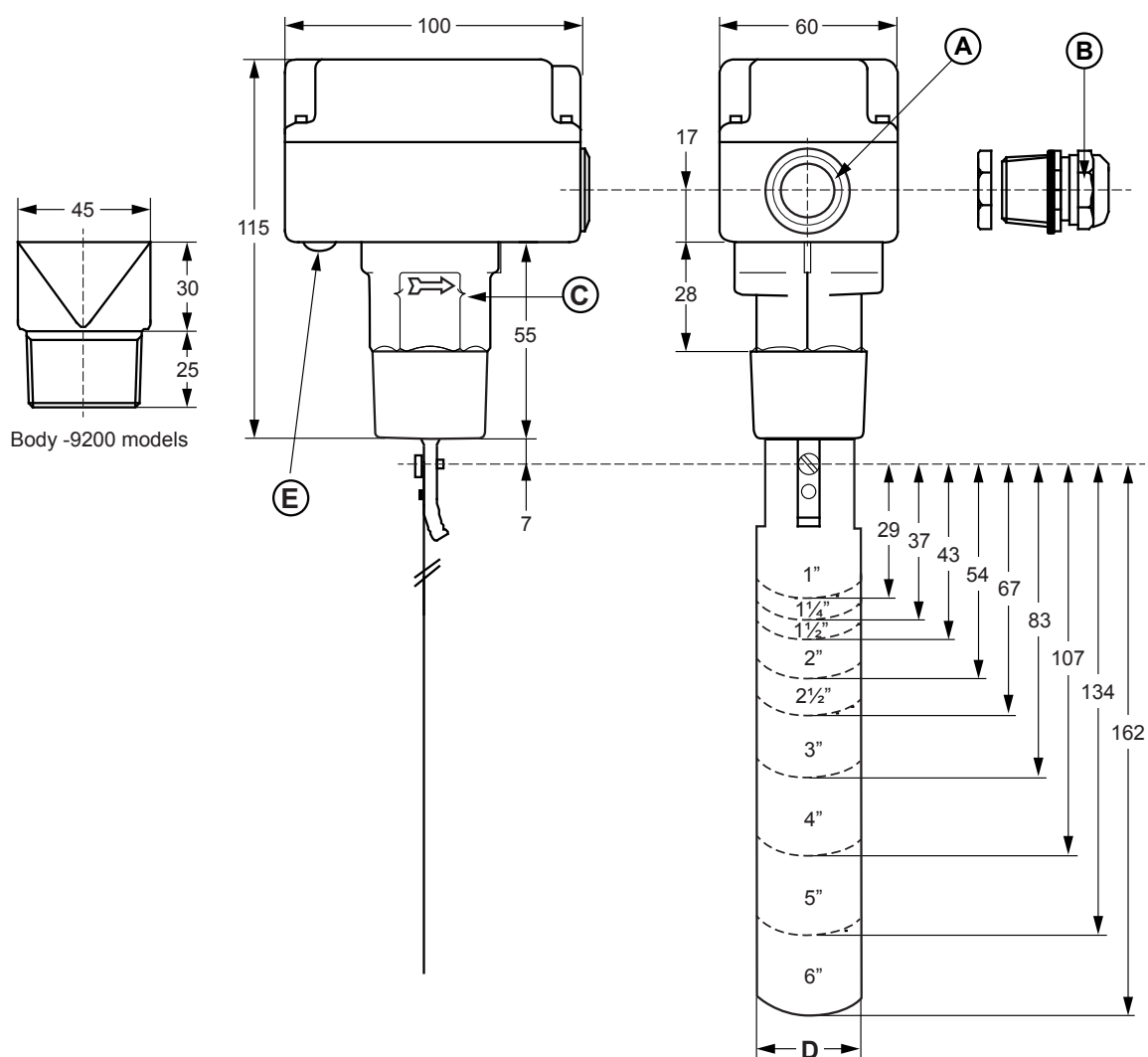
A. Cable inlet hole  $\varnothing$  22.7 mm; Dust cap installed on IP43 types.

B. Vapour proof PG-16 nipple installed on IP67 types

C. Drain hole plug

F61SD/TD Dimensions

## Dimensions (in mm)



**A.** Cable inlet hole  $\varnothing$  22.7 mm; Dust cup is installed on IP43 types.

**B.** Vapour proof PG-nipple installed on IP67 types.

**C.** 33 mm Hex.      F61SB/TB  
45 mm              F61TB-9200

**D.** 1" paddle          D = 25.4 mm  
2", 3", 6" paddle    D = 28.45 mm

**E.** Drain hole plug

**F61SB/TB**

## F61 Wetted Materials

|                             | Pipe Insert Type                    |                                     |   | T-body Type                                 |   |
|-----------------------------|-------------------------------------|-------------------------------------|---|---|---|
|                             | Water / Ethylene Glycol / Seawater  |                                     | Water / Chlorinated Water / Ethylene Glycol | Water / Ethylene Glycol                     |   |
| <b>Bellows</b>              | ---                                 | ---                                 | Stainless Steel<br>AISI 321                 | ---   | ---   |
| <b>Diaphragm</b>            | EPDM                                | EPDM                                | ---   | EPDM  | EPDM  |
| <b>Rod</b>                  | Bronze ASTM<br>B140 Alloy<br>C31600 | Bronze ASTM<br>B140 Alloy<br>C31600 | Stainless Steel<br>AISI 316L                | Bronze ASTM<br>B140 Alloy<br>C31600         | Bronze ASTM<br>B140 Alloy<br>C31600         |
| <b>Body</b>                 | ECO Brass<br>CuZn21Si3P<br>(CW724R) | ECO Brass<br>CuZn21Si3P<br>(CW724R) | Stainless Steel<br>AISI 316L                | Normal Brass<br>CuZn40Pb2<br>(CW617N)       | Normal Brass<br>CuZn40Pb2<br>(CW617N)       |
| <b>Screw Paddle Conn.</b>   | Stainless Steel                     | Stainless Steel                     | Stainless Steel<br>AISI 304                 | Stainless Steel                             | Stainless Steel                             |
| <b>Washer Paddle Conn.</b>  | Phosphor Bronze<br>C51000 HO8       | Phosphor Bronze<br>C51000 HO8       | Stainless Steel<br>AISI 304                 | Phosphor Bronze<br>C51000 HO8               | Phosphor Bronze<br>C51000 HO8               |
| <b>Paddle</b>               | Type 301 SS<br>ASTM A666-96b        | Type 301 SS<br>ASTM A666-96b        | Stainless Steel<br>AISI 316L                | Phosphor Bronze<br>C51000 HO8               | Phosphor Bronze<br>C51000 HO8               |
| <b>Seat</b>                 | ---                                 | ---                                 | ---   | C23000 061<br>85/15 Red Brass<br>(annealed) | C23000 061<br>85/15 Red Brass<br>(annealed) |
| <b>Shipping Weight</b>      | 0.7 kg                              | 0.7 kg                              | 1.0 kg                                      | 1.0 kg                                      | 1.0 kg                                      |
| <b>Representative Model</b> | F61SB-9100                          | F61TB-91xx                          | F61TB-9200                                  | F61SD-91xx                                  | F61TD-9150                                  |

## Technical Specifications

| Type Number                             | Pipe Insert Types  |                      |                      | T-body Types            |                      |
|---|--|----------------------|----------------------|-------------------------|----------------------|
|   | F61SB-9100   | F61TB-91xx           | F61TB-9200           | F61SD-91xx              | F61TD-9150           |
| <b>Max Liquid Pressure</b>              | 20 bar   | 20 bar               | 10 bar               | 20 bar                  | 20 bar               |
| <b>Max. Liquid Temp.*</b>               | 120°C  | 120°C                | 100°C                | 100°C                   | 100°C                |
| <b>Min. Liquid Temp.**</b>              | 0°C  | -30°C                | -30°C                | 0°C                     | -30°C                |
| <b>Max. Ambient Temp.*</b>              | +55°C  | +55°C                | +55°C                | +55°C                   | +55°C                |
| <b>Min. Ambient Temp. **</b>            | -40°C  | -40°C                | -40°C                | -40°C                   | -40°C                |
| <b>Ambient Humidity</b>                 | 10-95%   | 10-95%               | 10-95%               | 10-95%                  | 10-95%               |
| <b>Contact Type</b>                     | SPDT snap-acting switch                                  |                      |                      |                         |                      |
| <b>Electrical Rating</b>                | 15(8) A 230 Vac (except F61TB-9104; max 400 mA / 15 Vdc) |                      |                      |                         |                      |
| <b>Wiring Connections</b>               | Screw terminals 1 up to 2.5 mm <sup>2</sup>              |                      |                      |                         |                      |
| <b>Enclosure</b>                        | IP43<br>(IP23 w/o plug)                                  | IP67<br>Vapour proof | IP67<br>Vapour proof | IP43<br>(IP23 w/o plug) | IP67<br>Vapour proof |
| <b>Materials cover / case</b>           | Polycarbonate  |                      |                      |                         |                      |
| <b>Materials in contact with liquid</b> | See "F61 Wetted Materials" Table                         |                      |                      |                         |                      |

### Notes:

\* The max. liquid temperature of 100°C is at 20°C ambient. At higher ambient temperatures the max. allowed ambient becomes lower. Models F61SB-9100 are tested at 21°C ambient. The max. liquid temp. is 110°C at an ambient temp. of 21°C for ambient temp. <20°C the max. liquid temp. is 120°C. The temperature of the electrical switch inside should not exceed 70°C.

\*\* The low liquid temperature combined with a low ambient temp. should not lead to freezing of the liquid inside the body / diaphragm / bellows. Please observe the liquid freezing point.

*The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office or representative. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.*

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