

Data sheet

# Pressure switch

## Type BCP



The BCP type is a series of dedicated pressure switches for safety and pressure monitoring of steam and hot water boilers.

The BCP incorporates a single-pole changeover microswitch where the contact position depends on the pressure in the connection port and the range set value.

For installations, in which operation is particularly critical for safety reason, the use of fail-safe control is recommended.

### Features

- Available as high and low pressure limiters as well as pressure controllers
- Wide pressure range: from low pressure BCP1 with narrow differential to high pressure BCP7
- The fail-safe dual bellows enable premature cut-out when fault occurs
- DIN plug mounted on the top of control for easy electrical wiring
- Single-pole changeover switch (SPDT), switch + alarm
- Direct mounting on pressure connection or wall mounting by means of a bracket
- Versions with automatic and manual resets available
- Screw adjustments made on top of housing
- Manual reset for pressure limiters possible only by means of tools
- Safety Integrity Level: SIL 2 according to IEC 61508:2010

### Approvals

CE-marked in accordance with EN 60947-4/-5  
VdTÜV-Merkblatt „Druck 100“  
TÜV. SDWFS/SDBFS . 15 - 335

CE marked in accordance with 2014/68/EU,  
category IV, safety equipment, testing basis  
pr EN12952-11 and EN12953-9.

## Data sheet | Pressure switch, type BCP

### Materials in contact with media

Bellows: stainless steel X2CrNi19-11,  
1.4306 acc. to EN 10088-2

Pressure connection: nickel plated free cutting steel or stainless steel X5CrNi18-10,  
1.4301 acc. to EN 10088-2

### Technical data

Media		Steam, water, air
Ambient temperature		-20 – 70 °C
Media temperature		Up to 120 °C (Above 120 °C a water-filled loop must be installed).
Enclosure		IP65
Action type acc. to EN 60730		Type BCP - 2B
		Types BCPL/BCPH - 2BDF
Electrical connection Plug		DIN 43650, Pg 11
Switch type		SPDT, snap action microswitch
Contact material		Silver/gold (gold plated silver)
Contact load	Minimum	1mA, 5V
	Maximum <sup>1)</sup>	<sup>2)</sup> AC-1: 6A, 250V
		<sup>3)</sup> AC-15: 1A, 250 V
		<sup>4)</sup> DC 13 10W, 250 V
Expected electrical lifetime		Min. 250 000 cycles under full contact load.

<sup>1)</sup> If used with current higher than 100mA and voltage higher than 30V the gold layer will be burnt away and the unit can't be used at a lower current again.

<sup>2)</sup> AC-1 Ohmic load,  $\cos\phi$  1.

<sup>3)</sup> AC-15 inductive load like coil and contactors with,  $\cos\phi$  0.3.

<sup>4)</sup> DC-13 Direct current load.

### Ordering

#### High pressure limiters

Type	Range [bar]	Fixed Differential avg. [bar]	Reset	Max. operating pressure [bar]	Max. test pressure [bar]	Pressure connection	Code no.
BCP1H	0.1 – 1.1	0.10	Man.	6	7	G ½ A	017B0030
BCP2H	0.0 – 2.5	0.20	Man.	10	11	G ½ A	017B0034
BCP3H	0.0 – 6.0	0.40	Man.	16	18	G ½ A	017B0038
BCP3H	0.0 – 6.0	0.40	Man.	16	18	G ½ A	017B0138 <sup>1)</sup>
BCP4H	1.0 – 10.0	0.45	Man.	25	28	G ½ A	017B0042
BCP5H	2.0 – 16.0	1.20	Man.	32	35	G ½ A	017B0046
BCP6H	5.0 – 25.0	1.50	Man.	40	45	G ½ A	017B0050
BCP7H	10.0 – 40.0	2.30	Man.	63	70	G ½ A	017B0054

#### Low pressure limiters

Type	Range [bar]	Fixed Differential avg. [bar]	Reset	Max. operating pressure [bar]	Max. test pressure [bar]	Pressure connection	Code no.
BCP2L	0.0 – 2.5	0.20	Man.	10	11	G ½ A	017B0058
BCP3L	0.0 – 6.0	0.40	Man.	16	18	G ½ A	017B0062
BCP4L	1.0 – 10.0	0.45	Man.	25	28	G ½ A	017B0066
BCP5L	2.0 – 16.0	1.20	Man.	32	35	G ½ A	017B0070
BCP6L	5.0 – 25.0	1.20	Man.	40	45	G ½ A	017B0074

**Ordering**
*Pressure controllers*

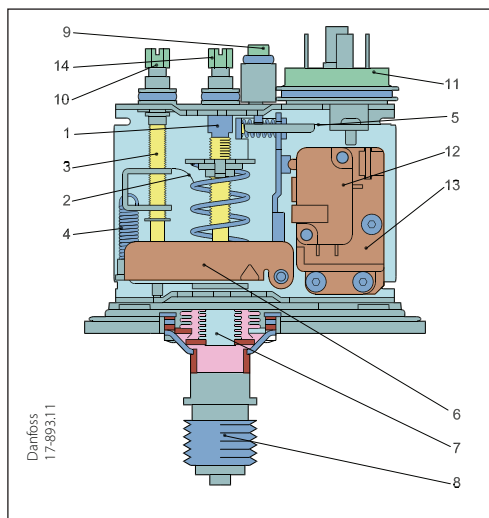
Type	Range [bar]	Differential avg. [bar]	Reset	Max. operating pressure [bar]	Max. test pressure [bar]	Pressure connection	Code no.
BCP1	0.1 – 1.1	0.15 – 0.6	Auto	6	7	G ½A	<b>017B0002</b>
BCP2	0.0 – 2.5	0.4 – 1.0	Auto	10	11	G ½A	<b>017B0006</b>
BCP3	0.0 – 6.0	0.7 – 1.4	Auto	16	18	G ½A	<b>017B0010</b>
BCP3	0.0 – 6.0	0.7 – 1.4	Auto	16	18	G ½A	<b>017B0110<sup>1)</sup></b>
BCP4	1.0 – 10.0	1.0 – 2.5	Auto	25	28	G ½A	<b>017B0014</b>
BCP5	2.0 – 16.0	2.0 – 3.2	Auto	32	35	G ½A	<b>017B0018</b>
BCP6	5.0 – 25.0	2.5 – 4.0	Auto	40	45	G ½A	<b>017B0022</b>
BCP7	10.0 – 40.0	3.0 – 6.0	Auto	63	70	G ½A	<b>017B0026</b>

<sup>1)</sup> Stainless steel pressure connector

**Design and function**

Pressure switch, type BCP

- 1. Main spindle
- 2. Main spring
- 3. Differential spindle
- 4. Differential spring
- 5. Reset spring
- 6. Activating arm
- 7. Bellows
- 8. Pressure connection
- 9. Reset push button
- 10. Differential knob
- 11. DIN plug
- 12. Microswitch
- 13. Microswitch bracket
- 14. Range knob



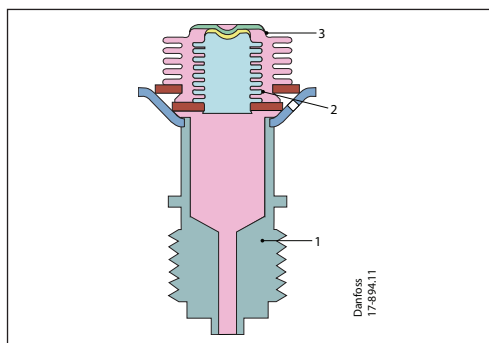
Danfoss  
17-893.11

**Reset**

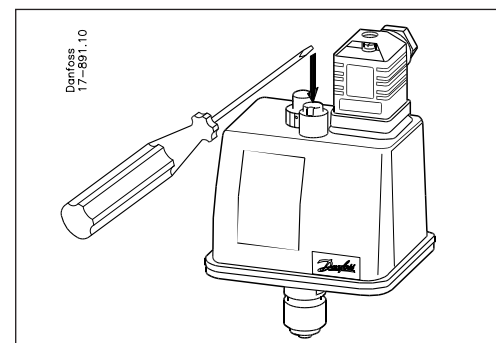
Version with automatic reset cut-in again automatically when the pressure falls to the set point minus differential. Version with manual reset has to be cut in manually by means of tool.

**Fail-safe bellows concept**

BCP 6, BCP 6H, BCP 7, and BCP 7H have a double bellows: an operating bellows (inner) and safety bellows (outer).



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- 1. Pressure connection
- 2. Regulating bellows
- 3. Safety bellows

**Microswitch**

BCP is a microswitch based control with DIN plug. Such design enables easy electrical connection and makes control suitable for operation with modern electronic systems, as PLC.

**Silver/gold plated contacts**

Silver/gold plated contacts are used for low currents and middle range of current, especially in applications with PLC or other corresponding electronic devices. Such contacts have also significantly lower emission of electromagnetic noises produced on contact break. EMC (Electro Magnetic Compatibility) is an important parameter where electronic equipment is used. A gold plated contact has a silver layer under the gold and can therefore also be used in the middle range of load. The gold will disappear at loads above 0,1 A.

**Note:**

Ambient temperature influence

All BCP pressure switches operate independently of changes in ambient temperature around the switch.

Therefore the settings for cut-out pressure and differential stay constant unless the permissible ambient temperature is exceeded.

When system pressure exceeds the set value, the BCP will automatically stop the plant.

A rupture in the inner bellows cause the control cut-out pressure to fall about 3 times less than the preset value, thus the system stops prematurely.

A rupture in the outer bellows cause the control cut-out pressure to fall about 3 bar under the preset value, thus providing a fail-safe function.

In other BCP types with single bellows assembly, fail-safe function is satisfied by proved 2 millions cycles mechanical life time test.

## Setting

### Note:

Cut-in and cut-out pressures of the system should always be checked with accurate pressure gauges.

### Pressure settings for switches (with automatic reset)

Set the cut-out pressure on RANGE scale and differential on DIFF. scale. Restart pressure is equal to cut-out pressure minus pre-set differential value.

### Pressure switches with manual reset

#### High pressure limiters

Set cut-out pressure on the RANGE scale. Pressure limiter can only be manually reset by pressing reset button by means of tools when the pressure is equal to or below the cut-out pressure minus value of the differential.

### Low pressure limiters

Set cut-out pressure on RANGE scale. Limiter can only be reset manually by pressing (with tool) the reset button when pressure rises to cut-out pressure plus differential or above it.

### Note:

Pressure limiters have no differential scale. Fixed differential value is printed on the scale plate.

## Terminology

### Pressure limiters

Limiters are devices that, on reaching a fixed value interrupt and lock out the energy supply.

Manual unlocking is required before restart.

A limiter shall be such that a single fault in any related part shall not lead to a loss of the safety function.

### Note:

If a BCP pressure controller with automatic reset is used as limiter, lockout must be realized externally as a part of safety logic, e.g.: by external contactors and/ or relays according to requirements of standard prEN501156-1 for safety relevant hardware. External closure must be interlocked, while loss of auxiliary energy must lead to closure.

Resetting must not be automated; it has to be performed manually.

Resetting on fault must lead to a repeated closure.

When BCP limits, is for rising or falling applications, the external safety logic must change to fail-safe position.

### Fail-safe control

A control is fail-safe if it has the capability to remain in a safe condition or transition to a safe condition when a fault occurs.

### Note:

If the system pressure exceeds PS/MWP then accuracy of the control settings can be lost.

### Maximum test pressure

The maximum pressure applied in strength or leakage tests on heating systems or components thereof.

### Maximum working pressure

The maximum permissible pressure for safe functioning of the system or any of its components.

### Snap function

A specific contact force is maintained in micro-switch until snap is initiated, therefore, contact bounce cannot occur as a result, for example, of slight vibrations before cut-out.

These design features ensure that the cut-out point of the BCP control remains very accurate and completely independent of the magnitude of the current load.

### Set point

A predetermined value to which a control is adjusted and at which it performs its intended function.

### Differential

The difference between pressure cut-out and pressure cut-in.

### Reset

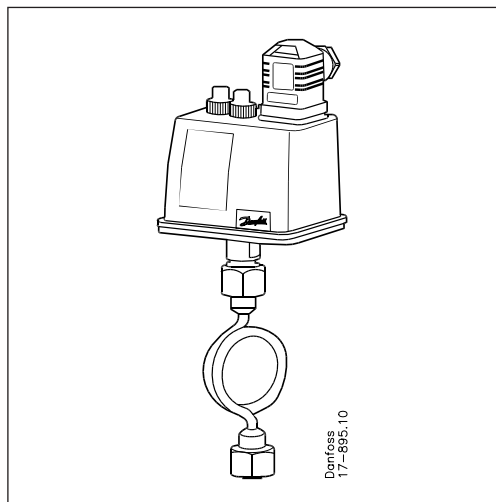
#### 1. Manual reset

A unit with manual reset can only be restored to operational mode by activation of the external reset button.

#### 2. Automatic reset

A unit with automatic reset is restored to operational mode automatically

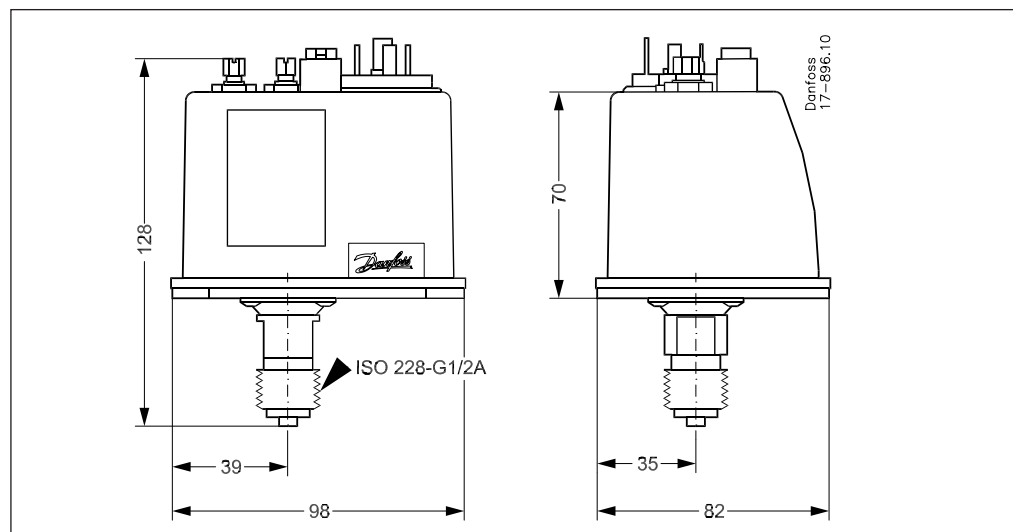
**Installation in steam systems**



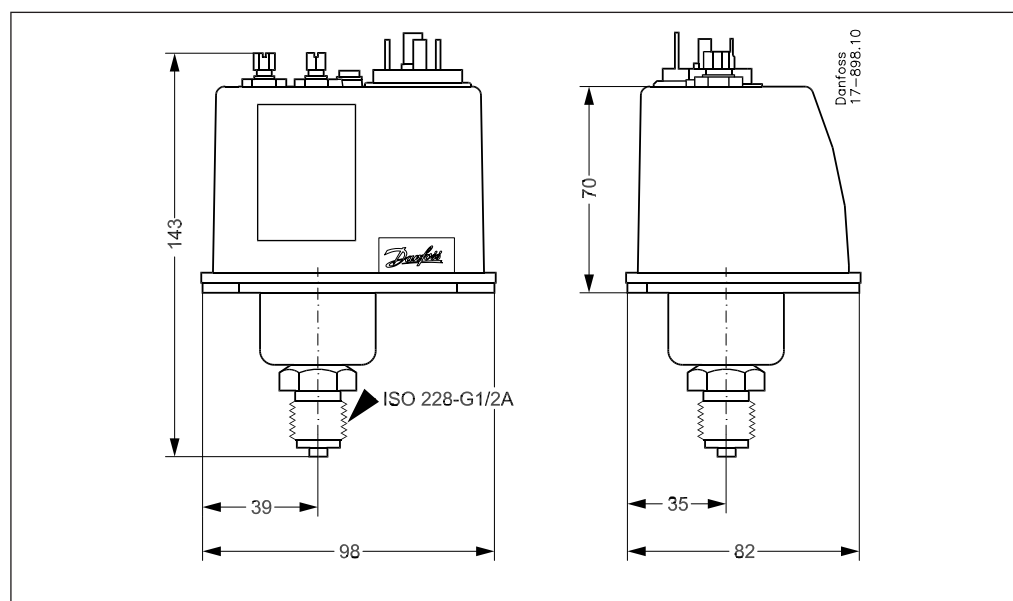
To protect the pressure element against excessive temperature of the media, above allowable 120 °C the insertion of water-filled loop is recommended.

**Dimensions [mm] and weights [kg]**

*BCP types except for BCP 1 and BCP 1H*



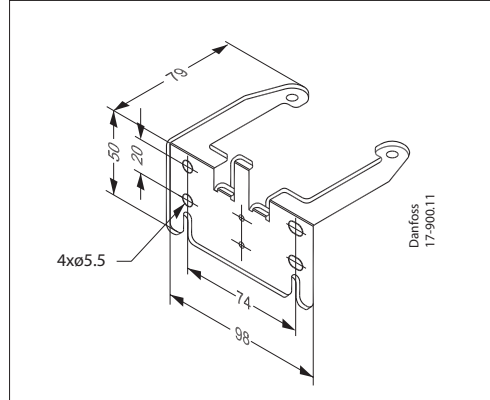
*Types BCP 1 and BCP 1H*



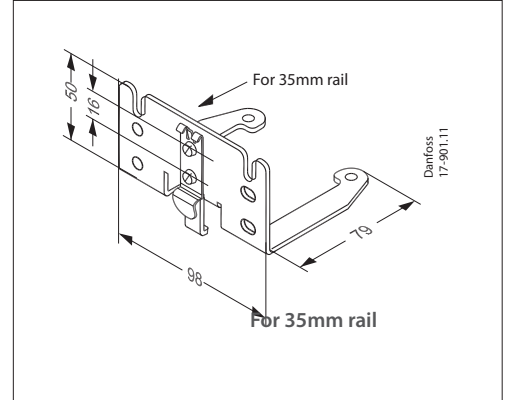
Net weight: 0.5 kg

**Accessories for BCP  
pressure switches**

Mounting bracket, code number 017B1018, for direct mounting on the wall



Mounting bracket for T 35 mm rail, code number 017B1019



Mounting of BCP on the 35 mm rail

