

# Standard, High-End and High-End Flush-Mounted Pressure Switches



EU directives: 2014/30/EU (EMC); 2011/65/EU (RoHS II)  
Standards: EN 61000-6-4:2011 (emission), EN 61000-6-2:2006 (interference resistance); EN 50581:2013  
Emission tests: Radio noise emission EN 55011:2016 Group 1, classes A and B

## Validity

These instructions apply to the following pressure switches:

- 234-11145-3; 234-11145-4; 234-11145-5
- 234-11145-9

## Downloading the operating instructions

These operating instructions are also available on the Internet at [www.skf.com/lubrication](http://www.skf.com/lubrication)



## Intended use

The pressure switches were designed to monitor the pressure of lubricants compatible with stainless steel, ceramics and fluoroelastomers (FKM). Depending on the type of device and the mechanical connection the pressure switches are suitable for the most different fields of application.

The pressure switch is installed in a machine or integrated into a system. Proper functioning in accordance with the specifications in the technical data is ensured only when original SKF accessories are used. Using other components will void the warranty.

Modifications to the pressure switch or non-approved use are not admissible and will result in a loss of warranty and void any liability claims against the manufacturer.

## Safety instructions



Carefully read the operating instructions prior to integrating/commissioning the pressure switches.

These pressure switches must not be used in applications in which the safety of persons is dependent on the function of the device (not a safety component according to EC Machinery Directive).

**Installation and start-up** are to be performed only by trained specialists.

The **operator** is responsible for ensuring that local safety regulations are observed.

In particular, the operator must take measures to ensure that a defect in the object detection systems will not result in hazards to persons or equipment.

In case of defects or a failure that cannot be remedied, take the pressure switch out of service and secure it against unauthorized use.

## Installation



### Notice

Operate the pressure switch within the specified technical data only. The pressure switch must not be exposed to high temperatures or rapid pressure increases.

Do not touch the membrane of the flush-mounted sensor: it can tear or become deformed.

- Always depressurize and disconnect pressure switches from the power supply before mounting.
- Observe the following when mounting outdoors or in a damp environment:  
Select a mounting location that allows splash and condensation water to drain away. Fluids must not be allowed to accumulate on sealing surfaces. Connect the device to the power supply immediately after mounting to prevent moisture from entering the connector. Otherwise fit a suitable protective cap to prevent the ingress of moisture. The protection class specified on the data sheet only applies if the device is connected.
- If there is a danger of damage from lightning strikes or overvoltage, mount an overvoltage protection between the power supply unit or switch cabinet and the device.
- In hydraulic systems, position the device in such way that the pressure connection faces upwards (venting).
- Mount the device in a location protected from direct sunlight. Sunlight may affect the functionality of the device or damage it.
- When installing devices with relative reference in the housing (small bore next to the electrical connection), make sure that the relative reference required for the measurement is protected against dirt and moisture. If the device is exposed to fluids, the relative reference blocks the air pressure compensator. Accurate measurements are not possible when this happens. And there may also occur material damage to the device.
- No mechanical tension should be placed on the pressure connection during installation as this may displace the characteristic curve. This applies in particular to extremely small pressure ranges and devices with a plastic pressure connection.

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## Installation

### Important notes for installation of flush-mounted pressure switches



#### Notice

Handle the unprotected membrane with the utmost care: it can be easily damaged.

- Do not remove the packaging and protective cap until shortly before installation, so that the membrane remains undamaged. Retain the protective cap.
- After disassembly, place the protective cap back over the membrane immediately.
- Do not use force when installing the sensor, so as not to cause damage to the device or the system.

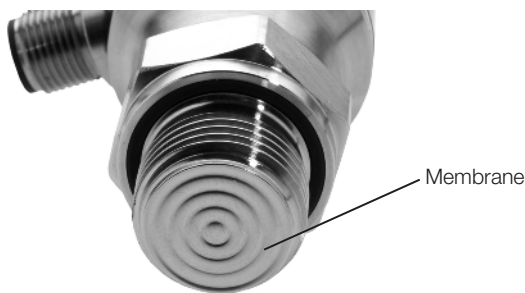


Fig. 1: Unprotected membrane of the flush-mounted sensor

### Installation of connections according to EN 3852

Make sure that:

- the sealing surface on the relevant part is perfectly clean and free of residues,
  - the O-ring seated in the slot provided is undamaged.
1. Screw the device into the mounting thread by hand. Secure devices to the steel pressure connection using a flat spanner SW 27. Observe the following tightening torques:

Tightening torques	Connection according to EN 3852	Connection according to EN 837	Connection NPT
1/4"	approx. 5 Nm	approx. 20 Nm	approx. 30 Nm
1/2"	approx. 10 Nm	approx. 50 Nm	approx. 70 Nm



Fig. 2: Electrical connection and process connection

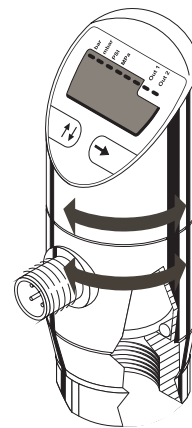


Fig. 3: Display and connection housing rotatable 320°

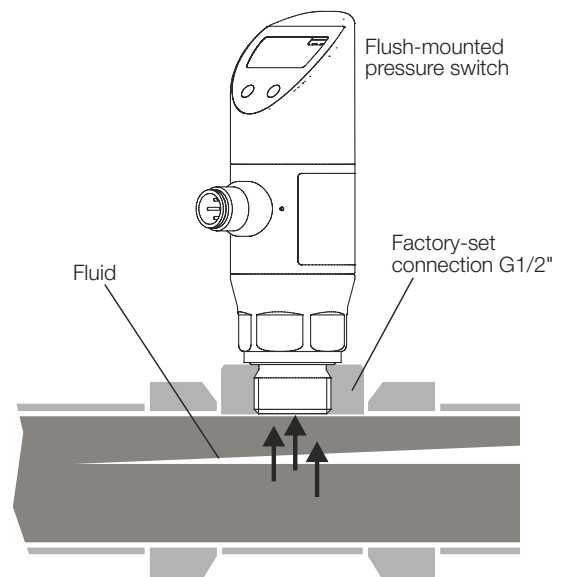


Fig. 4: Process connection for the flush-mounted pressure switch (G1/2" acc. to EN 3852)

## Dimensional drawings

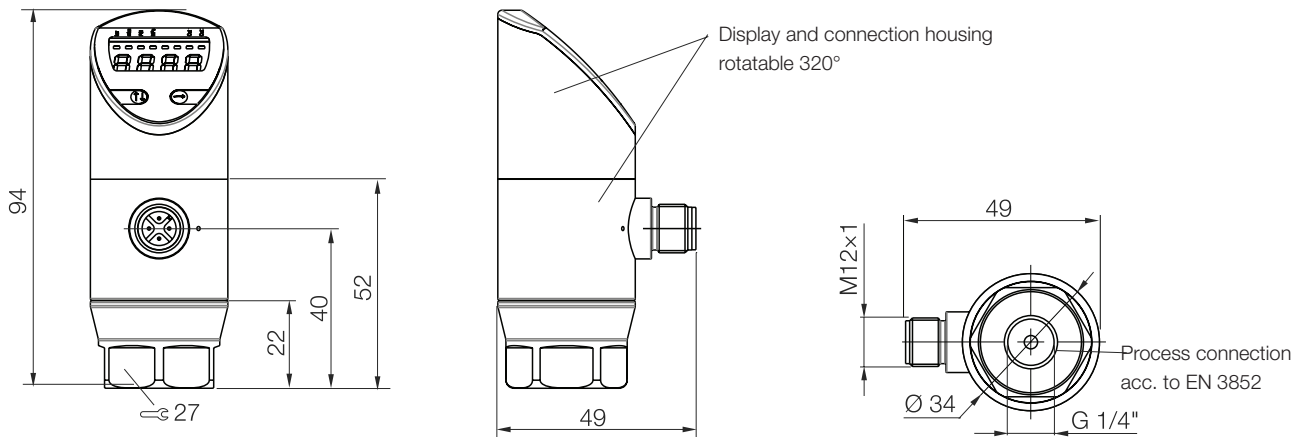
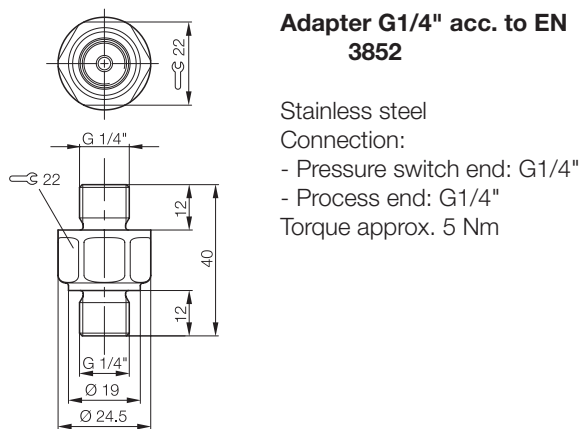


Fig. 5: Dimensional drawing of standard and high-end pressure switches, not flush-mounted (as of 100 bar)

### Adapter for process connection G1/4"

BSP pressure switches can be adapted to different process connections using optional adapters (accessories). The adapters must be ordered separately. Adapters for other process connections are available on request.



### Adapter G1/4" acc. to EN 3852

Stainless steel

Connection:

- Pressure switch end: G1/4"

- Process end: G1/4"

Torque approx. 5 Nm

Fig. 7: Dimensional drawing of flush-mounted pressure switches, 100 bar or higher

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## Electrical connections



### Notice

Always depressurize and disconnect pressure switches from the power supply before establishing an electrical connection.

Establish the electrical connection to device according to the specifications indicated on the type identification plate, the pin assignment table below and the wiring diagram.

Electrical connections	Pressure switches with switching output	Pressure switches with analogous output
Supply +	1	1
Supply -	3	3
Signal +		2
Switching output 1	4	4
Switching output 2	2	
Shield	Connector housing	Connector housing

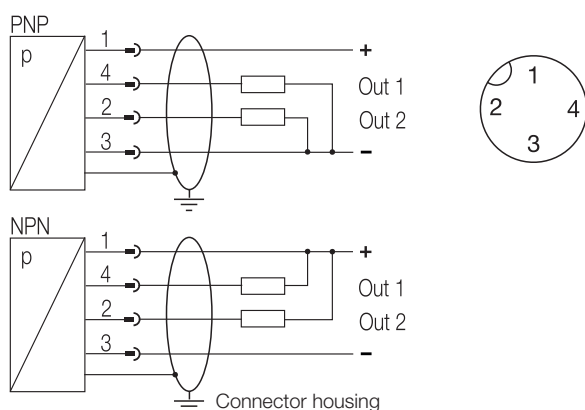


Fig. 8: Pressure switch diagram with 2 switching outputs

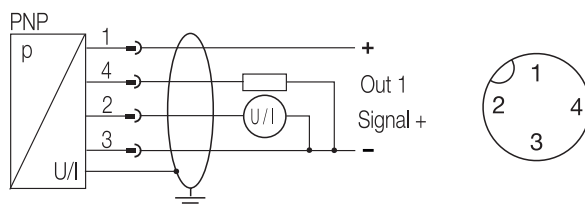
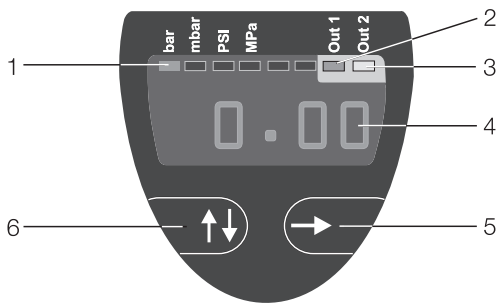


Fig. 9: Pressure switch diagram with analogous output

# Standard, High-End and High-End Flush-Mounted Pressure Switches

## Display and operating elements






1. Four LEDs to display the units
2. Green LED Out 1: Status indicator for switching output 1
3. Yellow LED Out 2: Status indicator for switching output 2
4. Seven-segment display for measured values and parameters
5. Key for navigating within a menu
6. Key for navigating from menu to menu

### LED status in the standard mode

Green LED	on	Switch point 1 reached, active switching output
	off	Switch point not reached
Yellow LED	on	Switch point 2 reached, active switching output
	off	Switch point not reached

### Key functions

	Press briefly	Scroll from menu 1 to menu 5, then return to display
	Press and hold	Count up parameter values quickly
		Select a menu item within a menu
		Accept selected parameter and return to the current menu item
	Press both keys simultaneously	Return to the display

The pressure switch is configured according to VDMA standards.

## Adjustable hysteresis

The difference between the switch point (SP) and return point (RP) is known as hysteresis. On electronic pressure switches, any hysteresis can be selected within the measuring range.

**Hysteresis function** The hysteresis keeps the switching status of the outputs stable, even if the system pressure fluctuates either side of the setpoint value. The output is activated when the system pressure rises and the relevant switch point (SP) is reached. The output is deactivated when the pressure decreases again and the return point (RP) is reached.

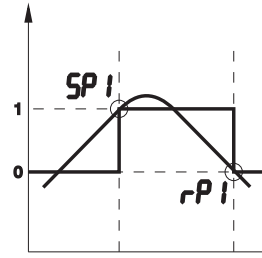


Fig. 10: Hysteresis function

## Adjustable window

The output function is activated when the measured value falls between the preset switch and return point.

**Window function:** The range between a defined lower pressure limit and a defined upper limit is known as a window. A switching operation is initiated as soon as the upper or lower limit of the programmed pressure range is exceeded.

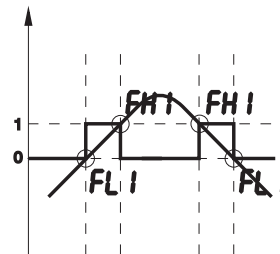


Fig. 11: Window function

## Adjustable delay time

Delay times can reliably filter out undesired pressure peaks that occur momentarily. The status of the switching output does not change immediately after the switching event occurs, but only once a determined preselectable delay time has elapsed (0...50 s). If the switching event no longer exists by the time the delay has elapsed, the switching output does not change either.

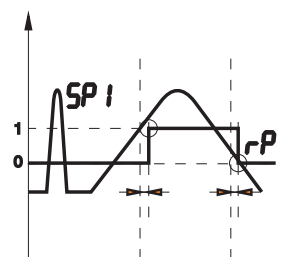
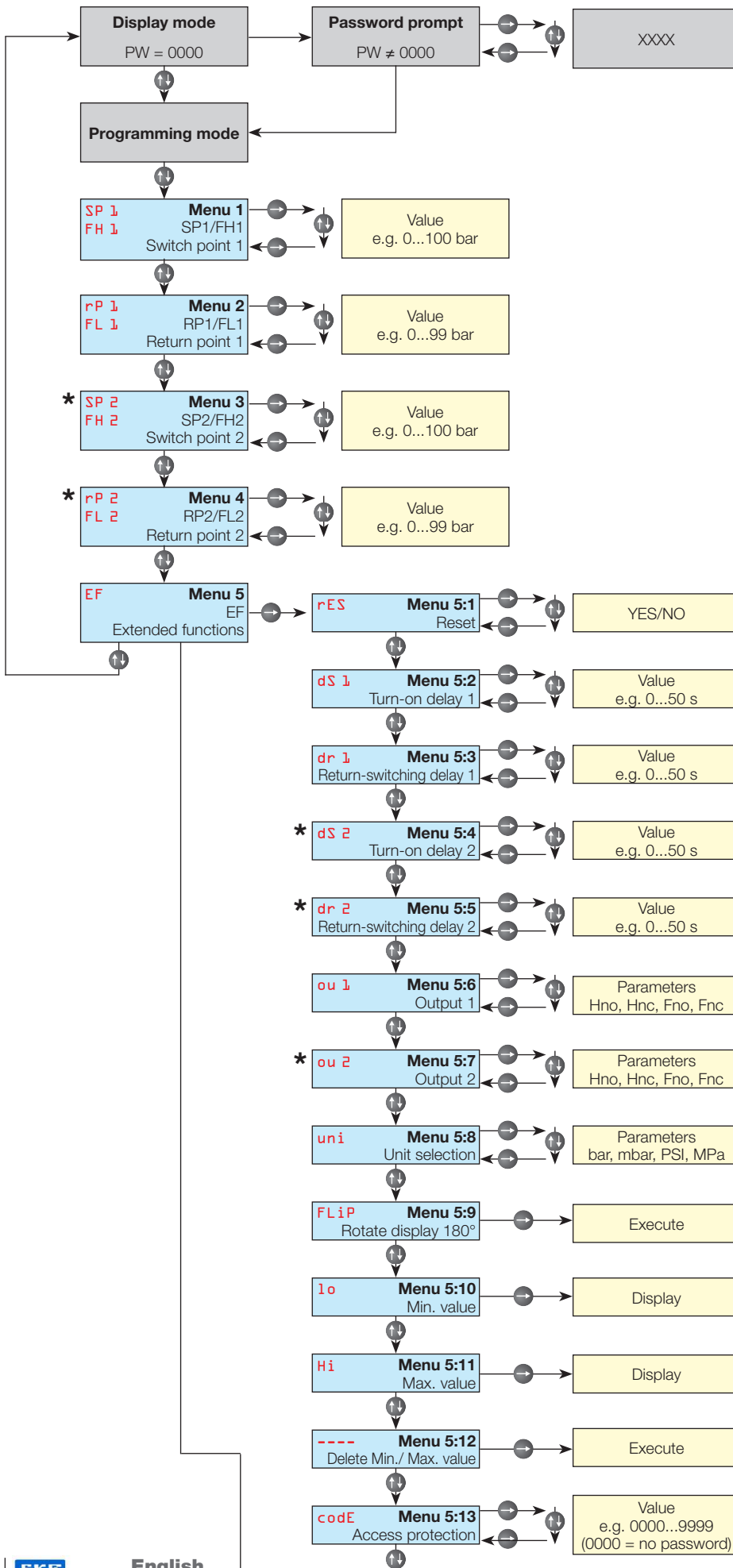


Fig. 12: Delay function

# Standard, High-End and High-End Flush-Mounted Pressure Switches

## Menu



### Operating instructions

1. Open menu 1 by pressing the key.
2. Press the key to display the values for switch point 1. The selected value flashes.
3. Press the key to select a value. Press the key to confirm the selected value and return to menu 1.
4. Press the key to open the next menu and adjust the value as described under points 2 and 3.
5. Open menu 5 by pressing the key.
6. Press the key to open the first submenu 5:1 and adjust the value as described under points 2 and 3.

### Note

If no keys are pressed for 60 seconds, the program returns to the display without saving the modified value.

### Legend

\* Menus marked with an asterisk do not appear if the pressure switch has an analog output.

# Standard, High-End and High-End Flush-Mounted Pressure Switches

## Menu functions for pressure switches with 2 switch points

First menu level	
<b>SP 1</b> <b>FH 1</b>	Menu 1 – Setting for switch point 1, setting for the relevant value from which switch point 1 shall be activated. If the window function in menu 5:6 is activated, the value for switch point 1 represents the upper pressure limit in the window ( <b>FH</b> ).
<b>rP 1</b> <b>FL 1</b>	Menu 2 – Setting for return switch point 1, setting for the relevant value from which return point 1 shall be activated. If the window function in menu 5:6 is activated, the return value for switch point 1 represents the lower pressure limit in the window ( <b>FL</b> ).
<b>SP 2</b> <b>FH 2</b>	Menu 3* – Setting for switch point 2, setting for the relevant value from which switch point 2 shall be activated. If the window function in menu 5:7 is activated, the value for switch point 2 represents the upper pressure limit in the window.
<b>rP 2</b> <b>FL 2</b>	Menu 4 – Setting for return switch point 2, setting for the relevant value from which return switch point 2 shall be activated. If the window function in menu 5:7 is activated, the value for switch point 2 represents the upper pressure limit in the window.
<b>EF</b>	Menu 5 – Extended functions
Second menu level	
<b>rES</b>	Menu 5:1 – Reset Restores all adjustable parameters to their default settings and deletes the Min. and Max. values,
<b>dS 1</b>	Menu 5:2 – Switching delay time 1 Setting for the value of switching delay time 1, which starts after switch point 1 is reached (time range 0...50 seconds)
<b>dr 1</b>	Menu 5:3 – Return switching delay time 1 Setting for the value of return switching delay time 1, which starts after return switch point 1 is reached (time range 0...50 seconds)
<b>dS 2</b>	Menu 5:4* – Switching delay time 2 Setting for the value of switching delay time 2, which starts after switch point 2 is reached (time range 0...50 seconds)
<b>dr 2</b>	Menu 5:5* – Return switching delay time 2 Setting for the value of return switching delay time 2, which starts after return switch point 2 is reached (time range 0...50 seconds)
<b>ou 1</b>	Menu 5:6 – Output 1 Switching function of the switching output: <b>Hno</b> = Hysteresis function, NO contact <b>Hnc</b> = Hysteresis function, NC contact <b>Fno</b> = Window function, NO contact <b>Fnc</b> = Window function, NC contact

## Menu functions (continued)

Second menu level (continued)	
<b>ou 2</b>	Menu 5:7* – Output 2 Switching function of the switching output: <b>Hno</b> = Hysteresis function, NO contact <b>Hnc</b> = Hysteresis function, NC contact <b>Fno</b> = Window function, NO contact <b>Fnc</b> = Window function, NC contact
<b>uni</b>	Menu 5:8 Change units Selection of physical unit of measurement for displayed and preset pressure values: <b>bAr</b> = bar, <b>nnBa</b> = mbar, <b>PSi</b> = PSI, <b>mPA</b> = MPa
<b>FLiP</b>	Menu 5:9 – Rotate display Rotate the display 180°
<b>lo</b>	Menu 5:10 - Min value Display of minimum pressure attained during the measurement (the value is lost when the power supply is interrupted)
<b>Hi</b>	Menu 05:11 - Max value Display of maximum pressure attained during the measurement (the value is lost when the power supply is interrupted)
<b>---</b>	Menu 5:12 – Deletion of Min and Max values The display confirms that the process for deleting the values has started
<b>codE</b>	Menu 5:13 – Access protection Setting the password for protecting access to the menu 0000 = no password 0000...9999 adjustable

### Legend

\* Menus marked with an asterisk do not appear if the pressure switch has an analogous output.

# Standard, High-End and High-End Flush-Mounted Pressure Switches

## Overview of adjustable parameters

Menu item	Description	Factory setting	Own setting
Menu 1 SP1 / FH1	Switch point 1/ FH 1	80 % of the nominal pressure	
Menu 2 rP1 / FL1	Return switch point 1/ FL 1	75 % of the nominal pressure	
Menu 3 SP2 / FH2	Switch point 2/ FH 2	80 % of the nominal pressure	
Menu 4 rP2 / FL2	Return switch point 2/ FL 2	75 % of the nominal pressure	
Menu 5:2 dS1	Switching Delay time 1	0 seconds	
Menu 5:3 dr1	Return switching delay time 1	0 seconds	
Menu 5:4 dS2	Switching delay time 1	0 seconds	
Menu 5:5 dr2	Return switching delay time 1	0 seconds	
Menu 5:6 ou1	Switching function Output 1	Hno	
Menu 5:7 ou2	Switching function Output 2	Hno	
Menu 5:8 uni	Units	bar	
Menu 5:13 code	Password	0000	

### Maintenance



Incorrect cleaning can cause irreparable damage of the measuring cell. Therefore never use pointed objects or compressed air to clean the membrane.

In principle, the device is maintenance free. If required, the housing can be cleaned with a damp cloth and mild cleaning solution provided the device is switched off. The membrane may become covered with deposits and contamination, depending on the measuring material. If a contamination of the material is known, the operator must define appropriate cleaning intervals. When the device is decommissioned correctly, the membrane can be cleaned carefully with a mild cleaning solution and a soft brush or sponge.

### Decommissioning



The measuring material may pose a risk to the operator. Therefore always take appropriate protective measures.

Always depressurize and disconnect the device from the power supply before removing. Before removing check whether material must be drained first.

### Disposal



Residual material on the device may pose a risk to the operator and a danger to the environment. Therefore always take appropriate protective measures and dispose of the device correctly.

The device must be disposed of according to European Directive WEEE 2012/19/EU (Waste Electrical and Electronic Equipment). Waste equipment must be disposed of separately from domestic waste!



# Standard, High-End and High-End Flush-Mounted Pressure Switches

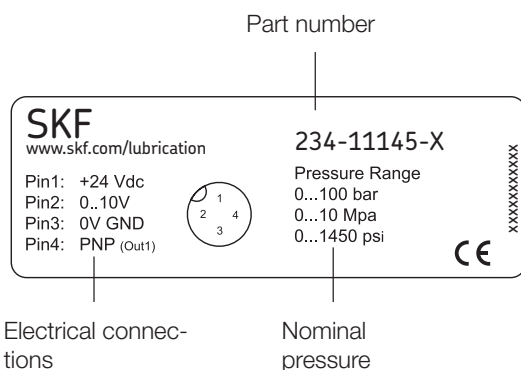
## Technical data

Electrical data	
Operating voltage $U_B$	18...36 V DC
Output current max	500 mA
No-load supply current $I_0$ max	$\leq 50$ mA
Reverse polarity protected	Ja
Short-circuit proof	Ja
Switching frequency $f$	200 Hz
Accuracy according to IEC 60770	$\leq \pm 0,5$ % FSO BFSL
Temperature error Standard, High-End and Flush-mounted 100 bar or higher frontbündig bis 50 bar	$\leq \pm 0,3$ % FSO/10 K $\leq \pm 0,15$ % FSO/10 K
Mechanical data	
Housing material Standard pressure switches High-end pressure switches	PA 6.6, stainless steel Stainless steel
Measuring cell material	Ceramic
Sealing ring material	Fluoroelastomer
Connection of connector	M12, 4-pin
Process connection BSP Standard, High-end BSP High-End Flush-mounted	G1/4", 1/4" NPT G1/2" flush-mounted
Displays	
Function indicators	LEDs
Display	7-segment display
Ambient conditions	
Ambient temperature range Standard pressure switches High-end pressure switches	-25...+85 °C -40...+85 °C
Material temperature Standard pressure switches High-end pressure switches	-25...+125 °C -40...+125 °C
Type of protection as per IEC 60529	IP 67 when connected

### Your type of pressure switch

The type identification plate contains the exact designation and most important technical data so that the device can be identified clearly.

Pressure data		
Pressure switch 0 - 600 bar		
	Not flush-mounted	Flush-mounted
Rel. nominal pressure	600 bar	600 bar
Overload pressure	750 bar	750 bar
Burst pressure	800 bar	1200 bar
Permitted negative pressure	vacuum-proof	
Pressure switch 0 - 400 bar (part no.: 234-11145-5)		
	Not flush-mounted	Flush-mounted
Rel. nominal pressure	400 bar	400 bar
Overload pressure	650 bar	650 bar
Burst pressure	700 bar	1000 bar
Permitted negative pressure	vacuum-proof	



## Standard, High-End and High-End Flush-Mounted Pressure Switches

### Ordering information

Part number / order number	Version
234-11145-3	Standard, incl. adapter G1/4" internal thread to G1/4" external thread with M12 socket 90°
234-11145-4	Standard G1/4" internal thread without socket
234-11145-5	High-end flush-mounted G1/2" external thread without socket
234-11145-9	Standard incl. adapter G1/4" internal thread to G3/8" and M12 socket 90°

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