

Product manual

# PSE EX Switch

## CONTENTS

<b>Contents</b> .....	<b>1</b>
<b>1 PRODUCT DESCRIPTION</b> .....	<b>2</b>
1.1 Functional Description: NO Switch .....	2
1.2 Annotation to the Protection type.....	3
<b>2 TECHNICAL DATA AND DIMENSIONAL DRAWINGS</b> .....	<b>4</b>
2.1 Technical Data .....	4
2.2 Component dimensions.....	6
2.3 Design Possibilities for Actuating Area .....	7
2.4 Hole Dimensions .....	8
2.5 Component Parts .....	8
<b>3 Ordernumbers</b> .....	<b>9</b>
3.1 M16 Series .....	9
3.2 Lettering .....	10
<b>4 PACKAGING</b> .....	<b>13</b>
<b>5 QUALIFICATION TESTS</b> .....	<b>14</b>
5.1 IP Protection Class.....	14
5.2 IK Protection Class.....	14
5.3 Salt-Spray Test .....	14
<b>6 APPROVALS</b> .....	<b>15</b>
<b>7 ATEX Approval</b> .....	<b>15</b>
<b>8 ROHS COMPLIANCE</b> .....	<b>15</b>

Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
1 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

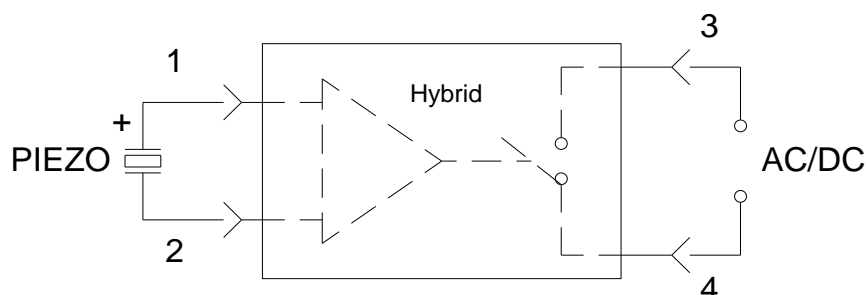
## 1 PRODUCT DESCRIPTION

### 1.1 Functional Description: NO Switch

The piezo switch is based on the functional principle of the piezoelectric crystal. The action of force on the piezo disk causes a voltage to be induced due to a charge transfer. The voltage generated is converted by the electronic connection into a polarity-neutral, electronic switch contact.

During the voltage drop, the electronic switch contact is closed for the specified pulse duration. After this, the electronic switch contact opens again, even if the force is still present. The period that the electronic switch contact remains closed depends on the actuating speed and force as well as on the duration of actuation.

Diagram of an NO switch:



The piezo disk is connected to the terminals 1 and 2. The electric circuit to be switched is connected at the terminals 3 and 4. This can be either direct voltage (DC) or alternating voltage (AC). If a pulse is applied to the piezo disk, terminal 1 becomes positive in relation to terminal 2 due to the voltage generated. The integrated switching element controls the electric circuit to be switched.

In the neutral position of the piezo switching element, the terminals 3 and 4 are non-conductive, and initial contact resistance is greater than 10 MOhm. When the piezo disk is actuated, the initial contact resistance is reduced to less than 20 Ohm.

When actuating the piezo disk, the resistance between terminals 3 and 4 is therefore changed from high resistance → low resistance → high resistance.

This corresponds in principle to the function of a conventional NO pushbutton switch.

Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
2 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## 1.2 Annotation to the Protection type

The explosion protected Piezoswitchelement (further on PSE EX) has the function of a contacts (normally open / NO).

For the electrical characteristics please refer to the label under point 2 “Technical data”.

The permissible voltage and current of explosion protected PSE are limited, so that the PSE EX is according with EN60079-11 and has an intrinsic safety.

The explosion protected PSE EX is according to EN 60079-0 in the device group II in category 2.

The PSE EX is only allowed in areas where the creation of explosive mixture atmospheres by gases, vapours, mists or dust with air is caused occasionally not permanent (Cat. II).

### **Attention:**

- **The maximum operating temperature is -20°C to +60°C.**
- **The approval will cease when the type label is removed**
- **The switch had to be installed and used according to IEC/EN 60079-14 and IEC/EN 60079-25**

Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
3 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## 2 TECHNICAL DATA AND DIMENSIONAL DRAWINGS

### 2.1 Technical Data

<u>Electrical Data</u>			
Switching Voltage max.	$U_I$	(VAC/DC)	24/24
Switching Current max.	$I_I$	(mA)	40
Rated Breaking Capacity	$P_I$	(W)	0.96
Lifetime (at Rated Breaking Capacity)		(Mio.)	20
Insulation Resistance (OFF=not actuated)		(M $\Omega$ )	>10
Initial Contact Resistance (ON=actuated)		( $\Omega$ )	<20
Capacity	$C_I$	(nF)	5
Inductivity	$L_I$ (non-applicable)	(H)	-
NO Pulse Time (depending on the actuating force, time and speed)		(ms)	20-1000
Contact Configuration			polarity-free
Switch Function			NO switch

<u>Mechanical Data</u>		
Actuating Force (at ambient temperature)	(N)	$\leq 3^1$
Actuating Travel	(mm)	0.002
Torque	(Nm)	2.5
IK Protection Class	(IK)	02

<u>Climatic Data</u>		
Operating Temperature	( $^{\circ}$ C)	-20 to +60
Storage Temperature	( $^{\circ}$ C)	-20 to +60
IP Degree of Protection Front Side submerged	(IP)	67
IP Degree of Protection Front Side hose water		69K

<sup>1)</sup> At temperatures lower than -10 $^{\circ}$ C, the actuating force increases 2- to 4-fold.

Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
4 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

<b><u>Material Individual Parts</u></b>	<b><u>Material</u></b>
Housing (depending on type)	Stainless Steel <sup>2)</sup>
	Anodized aluminum
	Polyamide
	Messing chrome-plated

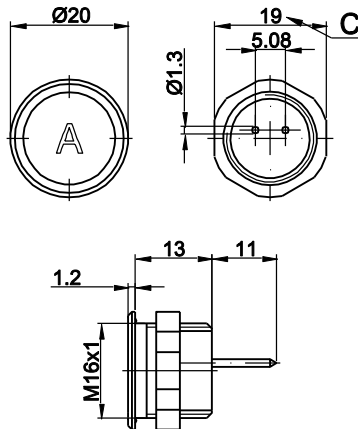
<sup>2)</sup> *When using the switch in a saline or chloric environment, special materials must be used. Items available upon request.*

Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
5 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

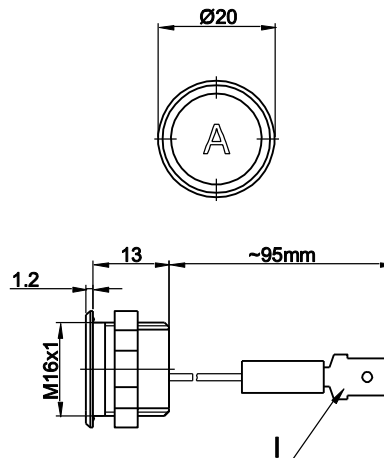
## 2.2 Component dimensions

### 2.2.1 M16 Series with Finger Guidance

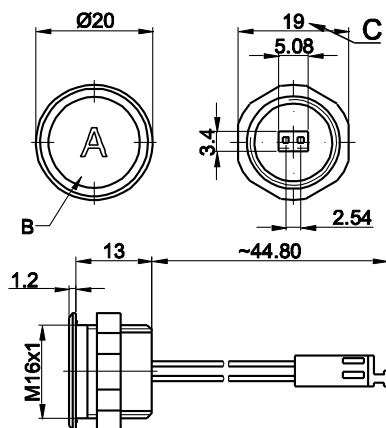
#### with Pins



#### with Quick Connect Terminal



#### with AMP <sup>1)</sup>



#### Legend:

- B = Actuating Area
- C = Width Across Flats
- I = Crimp terminal male 6.3x0.8

#### Lettering:

- either with/without lettering (see Chapter 3.2)
- position of the connections with respect to the position of the lettering is not defined

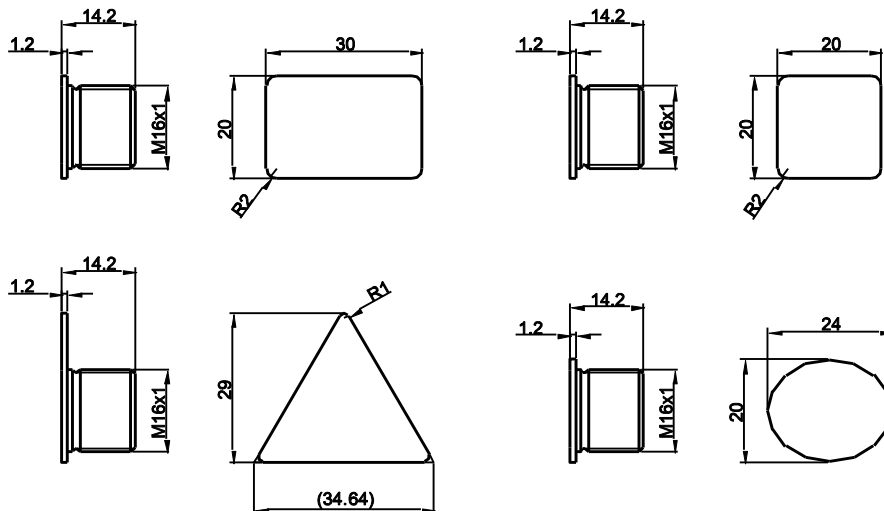
<sup>1)</sup> Version available on request

Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
6 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

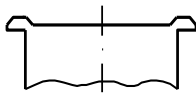
## 2.3 Possible Designs

### 2.3.1 Possible Housing Geometry: M16 (on request)

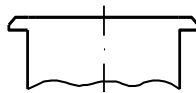


### 2.3.2 Actuation Area

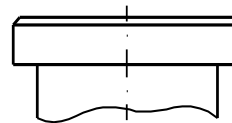
**with finger guidance  
(standard)**



**without finger guidance  
(on request)**



**elevated front design:  
(standard, others on request)**



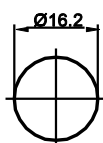
### 2.3.3 Connection variants

- Wire ( Standard: 0,14mm<sup>2</sup> / 200mm wire-length )
- Pins ( with Connection Terminal 0098.9207 )
- Quick Connect Terminal 6,3mmx0,8mm

Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
7 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

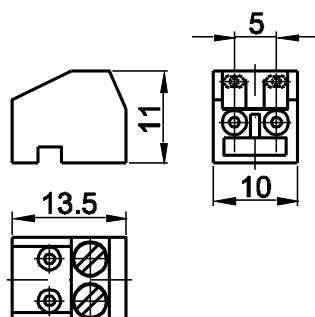
## 2.4 Hole Dimensions M16



## 2.5 Component Parts

### Connection Terminal for Pinsolution

Ordernummer: 0098.9207 (order quantity 10 pieces)



Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
8 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

### 3 ORDERNUMBERS

#### 3.1 M16 Series

<u>Item Number</u>	<u>Function</u>	<u>Connection</u>	<u>Housing Material</u>	<u>Housing Color</u>
1241.2415.1.XXX	EX - NO	Pins	Aluminium	gold
1241.2415.3.XXX	EX - NO	Pins	Aluminium	rot
1241.2415.4.XXX	EX - NO	Pins	Aluminium	blau
1241.2415.5.XXX	EX - NO	Pins	Aluminium	grün
1241.2415.7.XXX	EX - NO	Pins	Aluminium	schwarz
1241.2415.8.XXX	EX - NO	Pins	Aluminium	Alu natur
1241.2435.8.XXX	EX - NO	Quick Connect Terminal	Aluminium	Alu natur
1241.2485.8.XXX	EX - NO	AMP-Connector	Aluminium	Alu natur
1241.2515.XXX	EX - NO	Pins	Messing chromed	
1241.2615.XXX	EX - NO	Pins	Stainless Steel	

*The listed item numbers represent a selection from the range of piezo switches.  
Other mounting diameters, materials, colors and connections are available upon request.*

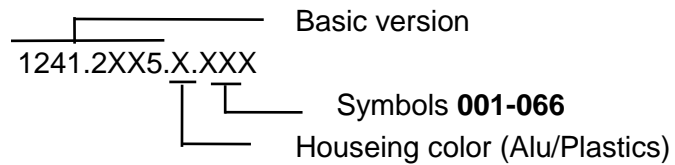
Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
9 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

### 3.2 Lettering

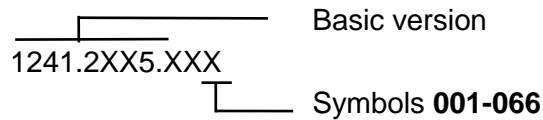
The last three figures of the order number relate to the type of lettering.

001-066                                      Standard Lettering  
101-    Customized Lettering

Example for ordering with lettering - Aluminium / Plastic Material





Example for ordering with lettering - Stainless Steel



Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
10 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## Order Indices for Lettering

001= <b>A</b>	016= <b>P</b>	031= <b>4</b>	046= 	061= <b>EIN</b>
002= <b>B</b>	017= <b>Q</b>	032= <b>5</b>	047= $\rightarrow$	062= <b>AUS</b>
003= <b>C</b>	018= <b>R</b>	033= <b>6</b>	048= $\leftarrow$	063= <b>AUF</b>
004= <b>D</b>	019= <b>S</b>	034= <b>7</b>	049= $\downarrow$	064= <b>AB</b>
005= <b>E</b>	020= <b>T</b>	035= <b>8</b>	050= $\uparrow$	065= <b>ON</b>
006= <b>F</b>	021= <b>U</b>	036= <b>9</b>	051= <b>%</b>	066= <b>OFF</b>
007= <b>G</b>	022= <b>V</b>	037= <b>+</b>	052= $\sqrt{\quad}$	067= <b>UP</b>
008= <b>H</b>	023= <b>W</b>	038= <b>-</b>	053= <b>CTRL</b>	068= <b>DOWN</b>
009= <b>I</b>	024= <b>X</b>	039= <b>.</b>	054= <b>RETURN</b>	069= <b>HIGH</b>
010= <b>J</b>	025= <b>Y</b>	040= <b>x</b>	055= <b>SHIFT</b>	070= <b>LOW</b>
011= <b>K</b>	026= <b>Z</b>	041= <b>÷</b>	056= <b>LOCK</b>	071= <b>ON/OFF</b>
012= <b>L</b>	027= <b>0</b>	042= <b>*</b>	057= <b>STOP</b>	072= <b>START</b>
013= <b>M</b>	028= <b>1</b>	043= <b>=</b>	058= <b>ENTER</b>	073= <b>RESET</b>
014= <b>N</b>	029= <b>2</b>	044= <b>#</b>	059= <b>BACK</b>	074= 
015= <b>O</b>	030= <b>3</b>	045= <b><math>\leftrightarrow</math></b>	060= <b>LINE</b>	

Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
11 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

### 3.2.1 Fontsize

#### PSE M16

Individual characters:	Height: 5 mm; font: Helvetica normal DIN1451-1E
Lettering, max. 3 characters:	Height: 3 mm; font: Helvetica normal DIN1451-1E
Symbols (Indices 037-052):	Height of capital letters: 5 mm; font: True Type, Symbol

### 3.2.2 Standard Colors for Lettering

<b>Stainless Steel:</b>	Black	Filled letters
<b>Aluminum natural:</b>	Gray	Filled letters (only after customer approval)
<b>Anodized Aluminum:</b>	White	Filled letters

Changes that contribute to technical improvement are subject to alternations.							
Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
12 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## 4 PACKAGING

### PSE Switches

M16	air cushion bags 1 Piece	10 pieces per carton
-----	--------------------------	----------------------

Piece separately in ESD-Bag packed with Operationmanual



Nuts with sealing rings (10 Pieces) are packaged separately and are enclosed in the carton.



Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
13 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## 5 QUALIFICATION TESTS

### 5.1 IP Protection Class

IP Protection Class IEC/DIN/EN/60529	Front Side	IP 67
IP Protection Class DIN 40050-9:1993 (High-pressure steam-cleaning test)	Front Side	IP 69K

### 5.2 IK Protection Class

Tested centrally

IK Protection Class DIN EN 50102	IK 02
----------------------------------	-------

### 5.3 Salt-Spray Test

Salt-spray test according to DIN 50021- SS

24h, 48h and 96h test duration

After 8h, the start of corrosion may be discerned; after 96h, this corrosion has spread across large areas of the switch.

This surface corrosion may be removed under running water.

Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
14 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a

## 6 APPROVALS

<u>Description</u>	<u>Standard</u>
Thermal Shock	MIL-STD 202F Method 107G
High Temperature	MIL-STD 810E Method 501.3
Low Temperature	MIL-STD 810E Method 502.3
Humidity	MIL-STD 810E Method 507.3
Vibration	MIL-STD 202F Method 204D
Mechanical Shock	MIL-STD 202F Method 213B
RFI	MIL-STD 416D Method RS103
ESD	EN 61000-4-2
Burst	EN 61000-4-4

## 7 ATEX APPROVAL

<u>Description</u>	<u>Denotation</u>
Model test report	TÜV 08 ATEX 554671X
Marking	II 2 G Ex ib IIB T4

## 8 ROHS COMPLIANCE

All items listed are RoHS-compliant.



Changes that contribute to technical improvement are subject to alternations.

Page	Date of issue	Author:	Date of change:	Changed by:	Change No.	Datasheet No.	Index
15 of 15	29.06.09	FM	31.03.10	SHO	10178	105.9535.200	a