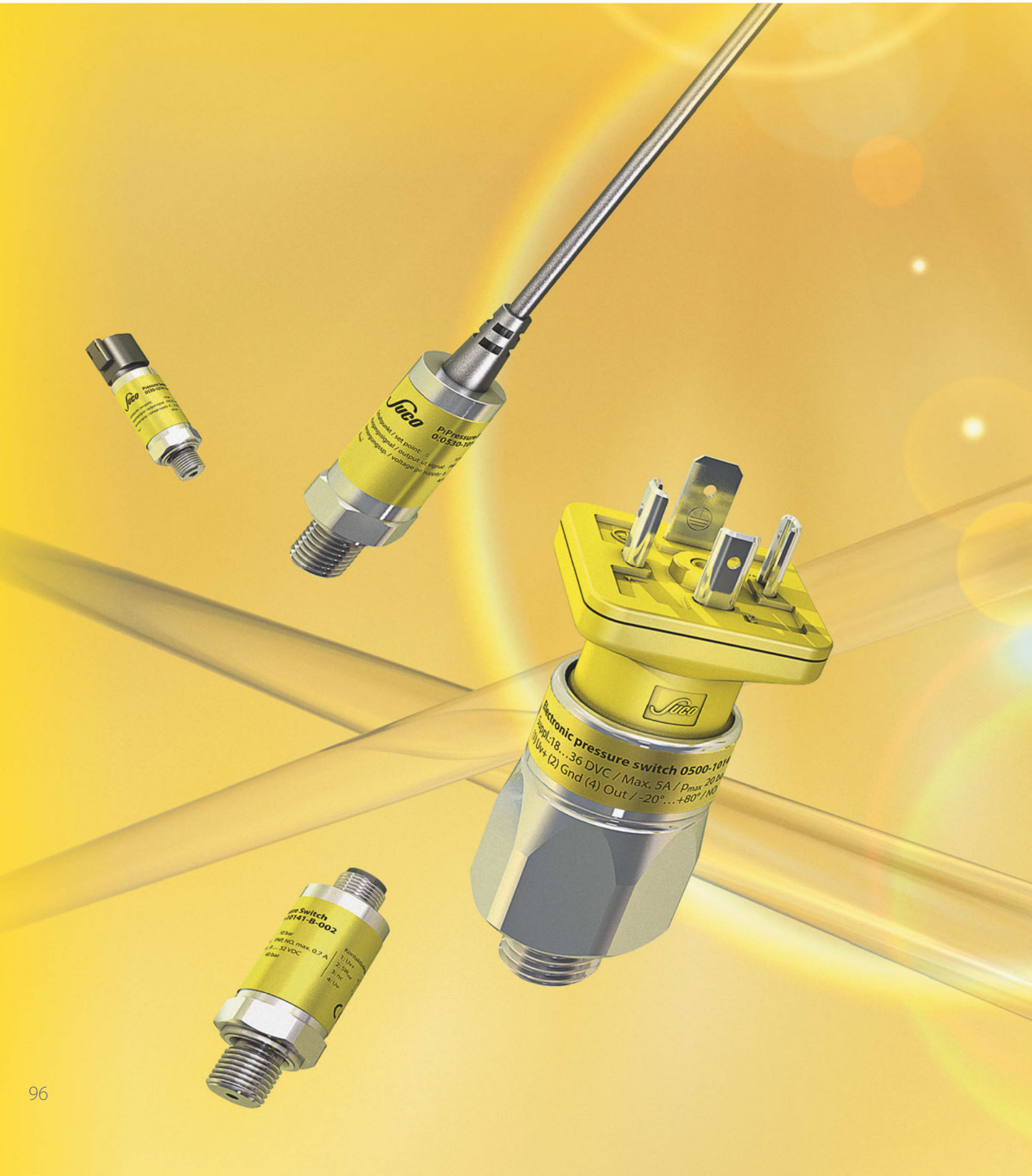
E. Electronic Pressure Switches



E. Overview of electronic pressure switches

Electronic pressure switches with ceramic measuring cell

Switching point:	0 – 250 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, maximum output current 0.5 A
Variant:	PNP
Housing materials:	Stainless steel 1.4305 (AISI 303)
Sealing materials:	NBR, FKM, EPDM
Threads:	G 1/4, NPT 1/4
Types:	0500, 0501, 0502, 0503

Special feature:	Switching status display (LED)
Switching point:	0 – 250 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, output current: max. 0.5 A
Variant:	PNP
Housing materials:	Stainless steel 1.4305 (AISI 303)
Sealing materials:	NBR, FKM, EPDM
Threads:	G 1/4, NPT 1/4
Types:	0510, 0511, 0512, 0513

Switching point:	0 – 250 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, output current: max. 1.4 A
Variant:	PNP
Housing materials:	Zinc-plated steel (CrVI-free)
Sealing materials:	NBR, FKM, EPDM
Threads:	G 1/4 male or female thread
Type:	0520

E.4 Menu-controlled electronic pressure switches with display

from page 118

Special feature:	All functions programmable from menu Switching state LEDs, display, coding, etc.
Switching point:	0 – 400 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 2, output current: max. 1.4 A
Variant:	PNP
Additional analogue output:	4 – 20 mA
Housing materials:	Anodised aluminium and die-casted zinc
Sealing materials:	NBR, FKM, EPDM
Thread:	Female thread
Type:	0570

Electronic pressure switches with SoS technology

E.5 Electronic pressure switches, High-Performance series, hex 22 with 1 switching output

from page 122

Special feature:	Highest accuracy and long-term stability
Switching point:	0 – 600 bar
Overpressure protection:	Up to 4 x
Transistor outputs:	Qty: 1, maximum output current 0.5 A
Variants:	PNP or NPN
Housing materials:	Stainless steel 1.4305 (AISI 303)
Sealing materials:	All welded, without elastomer seal
Threads:	Different male threads
Types:	0530, 0531, 0532, 0533

E.6 Electronic pressure switches, High-Performance series, hex 22 with 2 switching outputs

from page 126

Special feature:	Highest accuracy and long-term stability
Switching point:	0 – 600 bar
Overpressure protection:	Up to 4 x
Transistor outputs:	Qty: 2, maximum output current 0.5 A
Variants:	PNP or NPN
Housing materials:	Stainless steel 1.4305 (AISI 303)
Sealing materials:	All welded, without elastomer seal
Threads:	Different male threads
Types:	0540, 0541, 0542, 0544, 0545, 0546

E.7 Accessories

from page 130

- Mating plugs
- Thread adapters
- Programming device PPD05

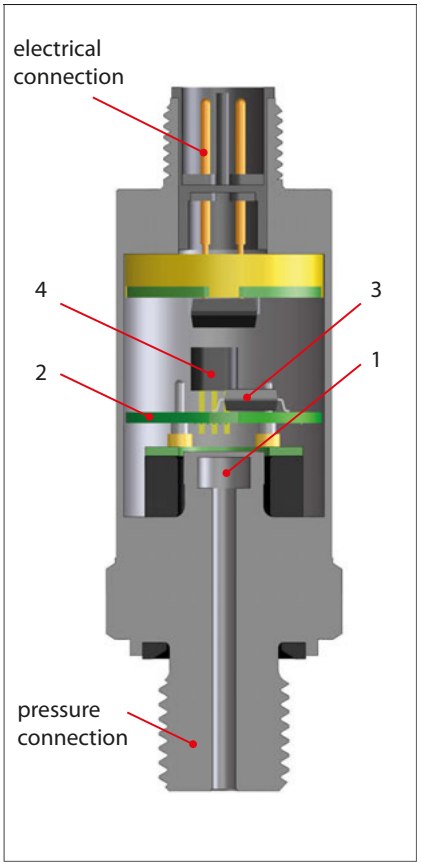
Technical explanations for electronic pressure switches

What is an electronic pressure switch?

An electronic pressure switch converts the medium pressure which is present at the measuring cell into a digital, electrical switch signal (ON / OFF).

An electronic pressure switch is more complex than a mechanical pressure switch, and thus generally more expensive. As an electronic pressure switch has no moving parts (relative to each other), it usually has a much prolonged service life and provides a higher level of precision (depending on application).

The hysteresis can be set over a wide range and virtually independently of the switching point. Electronic pressure switches can also be equiped with additional functions, such as optical displays and menu control.



How does an electronic pressure switch work?

The pressure measuring cell fitted (1) has a membrane that is exposed to the pressure to be measured. Affixed to this membrane is a bridge circuit consisting of four ohmic resistors in the form of a Wheatstone bridge. The values of these resistors change proportionally to the pressure load present at the measuring cell or membrane. The bridge voltage of the measuring cell is amplified in the evaluation electronics (2) and processed digitally by a microcontroller (3).

Once the switching point or switch-back point is reached, the output transistor (4) closes or opens depending on the output function (normally open / closed contact).

SoS technology

In the silicone-on-sapphire technology, the substrate of the thin film measuring cell is synthetic sapphire. This has excellent mechanical and temperature stable properties and prevents undesired parasitic effects, thereby having a positive effect on accuracy and stability. In conjunction with a titanium membrane, this results in virtually unique coaction between the temperature coefficients of sapphire and titanium.

This is because, unlike silicon and stainless steel, they are more closely matched and thus require only a low level of compensation. This also has a favourable effect on longterm stability.

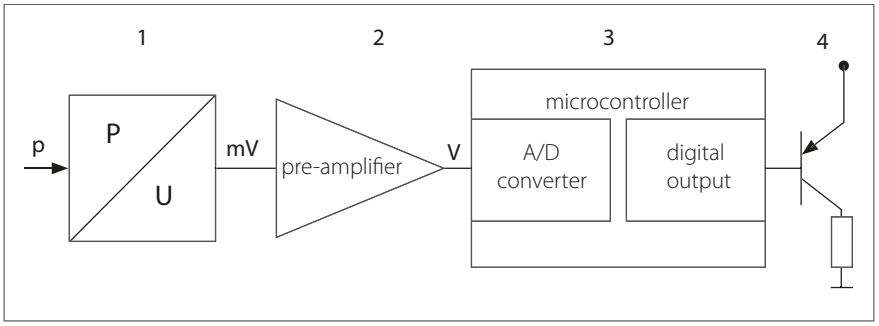
„Oil-filled" stainless steel measuring cell

In this measuring cell technology, the piezo-resistive measuring cell is packaged within a metallic housing filled with fluorine oil. This means the measuring cell is virtually free of external mechanical stress. Fluorine oil has excellent characteristics in regards to temperature and ageing behaviour, and is not flammable and so fits perfectly for oxygen applications. It is not recommended for food applications.

Ceramic measuring cell / thick film technology

Ceramic thick film pressure measuring cells are made up of a sintered ceramic body. The ceramic body sleeve already has the key geometries for the subsequent pressure range. The membrane thickness required and thus, the pressure range required is established with grinding and lapping. The resistors are imprinted with thick film technology and interconnect to form a measuring bridge.

Block diagram



Adjustment range of switching point
The pressure range within which the switching point of an electronic pressure switch can be set is called adjustment range. The switching point corresponds to the pressure value at which the electric circuit of the output is opened or closed.

Switching point accuracy and tolerances
The switching point accuracy of electronic pressure switches is specified by SUCO and relates to the full scale value (FS).
The switching point tolerances specified by us are valid at room temperature (RT) and new state. The values can change as a result of temperature, ageing and application specific conditions. Switching points can either be set at the factory or by the customer on site (depending on model).

Hysteresis
Rising/falling switching point
The difference between the rising (upper) and falling (lower) switching points (refer to the figure) is known as hysteresis (switchback difference).

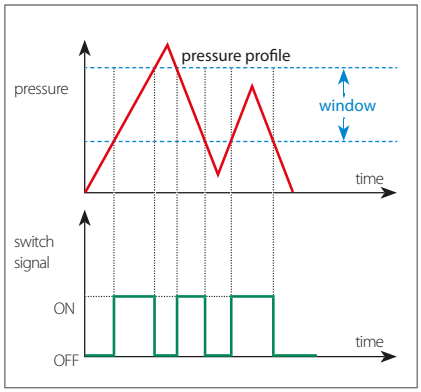
Our electronic pressure switches are a perfect fit to extremely low or high hysteresis.

Hysteresis is either set at the factory or by the customer on site (only the 0570 series). The hysteresis or switch-back point of all pressure switches can be set over almost the entire adjustment range.

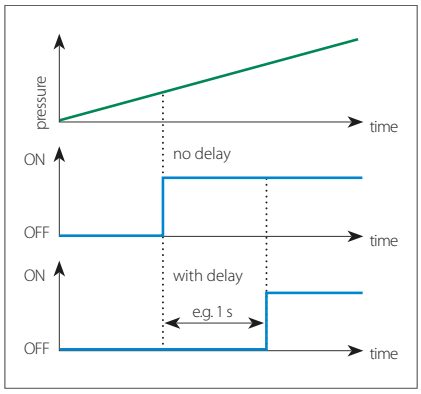
Please ask about the possible setting ranges you may require.

The hysteresis specified in the data sheet is set if nothing is specified in the order.

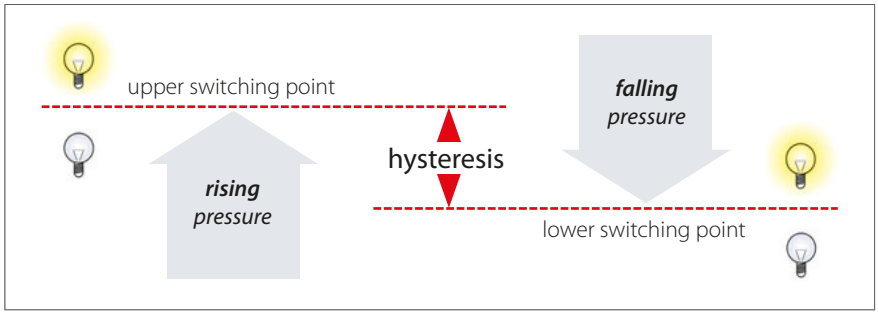
Window function
In the window function, the switch signal is programmed such that it remains ON or OFF between two values. This means a defined pressure range can be monitored. This function is only possible on the 053X series.



Switching delay
Switch outputs can be programmed with a delay separately for switch-on and switch-off (depending on model). Delays of up to several seconds are possible.



Hysteresis



Operating/supply voltage
All electronic pressure switches work with DC voltage and have no galvanic isolation. Within the thresholds specified in the relevant data sheet, the supply voltage may change without influencing the output signal. In order to guarantee the functionality of an electronic pressure switch, the minimum operating voltage must be respected. The maximum operating voltage may not be exceeded to avoid damage on the electronics.

Output current
Depending on the model, electronic pressure switches have a maximum output current of 0.5 A to 1.4 A and therefore are also suitable for applications requiring relatively high control and switching currents.

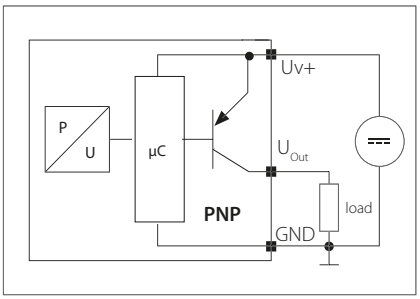
Load
The output transistor is an open collector, i.e. the output must be wired with a load. The load limits the switching current and is selected according to the application.

Electronic pressure switches have protection from voltage peaks at the output, and are short-circuit proof. When inductive loads are switched (relays, motors, etc.), provision may have to be made for an additional electronic snubber to eliminate high voltage peaks. This is realised e.g. with flyback diodes, or even better with suppressor diodes or varistors.

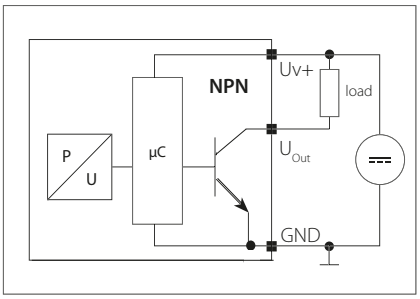
Technical explanations for electronic pressure switches

Connection types and output functions
There are essentially two different ways to connect the load or apparent ohmic resistance to electronic pressure switches:

PNP output / high-side / plus-switching
PNP output (plus-switching) is the most popular variant in Europe. Here the load is connected to the output of the switch and ground (GND as reference potential).

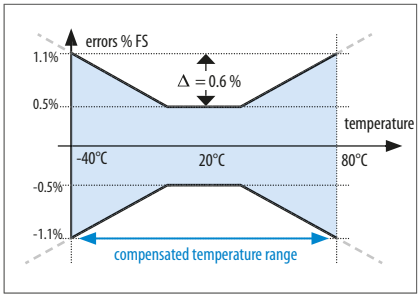


NPN output / low-side / minus-switching
For an NPN output (minus-switching), the load is connected to the switching output and to the positive line of the supply voltage (Uv+ as reference potential).



NO / NC
Electronic pressure switches are available as normally open (NO) or normally closed (NC) versions. Also refer to section M.0, page 14.

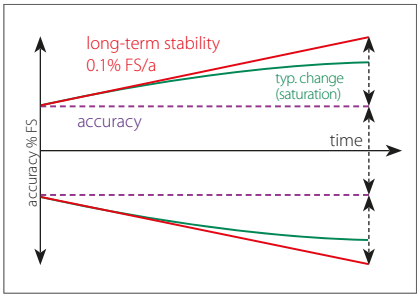
Temperature errors and ranges
The temperature (both of the medium and environment) generally has a signicant influence on the accuracy of an electronic pressure switch. Electronic pressure switches are temperature compensated over a particular range corresponding to the typical application. This means that temperature errors within this temperature range are minimised by means of circuitry design and algorithms.
The temperature error is added to the accuracy, and shown in the total error band of the electronic pressure switch, also called „butterfly graph". Outside the compensated temperature range, the maximum error is not defined, however the electronic pressure switch still functions. To prevent mechanical and electrical damage, electronic pressure switches may not be used beyond the threshold temperature ranges specified in the data sheet.



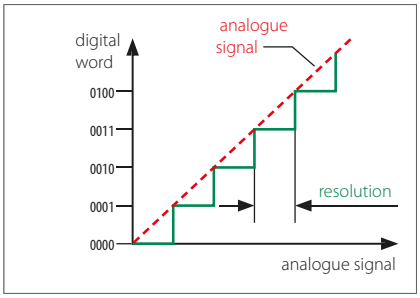
Service life and long-term stability
Service life information pertains to nominal conditions specified in the data sheet, and can vary considerably when a product is operated mechanically or electrically outside the specifications. Service life essentially depends on the used measuring cell technology.

Ageing is accelerated (or slowed) due to different factors - such as temperature, temperature change and reduction of mechanical forces. The occurrence of ageing does effect the total accuracy.

SUCO specifies long-term stability in accordance with DIN 16086 in relation to one year. Typically the influence of aging on the accuracy reduces with increasing operating duration. The information in the data sheet corresponds to the worst case scenario.

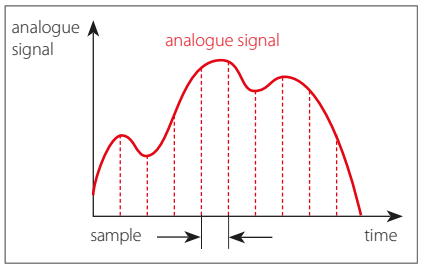


Resolution
The A/D resolution (analogue - digital) of an electronic pressure switch defines the smallest change of the analogue – digital – analogue conversion which takes place by the signal processing of an electronic pressure switch. If for example 13-bit resolution is used for an electronic pressure switch with a 100 bar setting range, the smallest signal change is 8192 steps (2^{13}). As state of the art a resolution of 12 bits and hence 4096 steps (2^{12}) is typical. Therefore pressure changes of 100 bar / 4096 = 0.024 bar can be recorded.



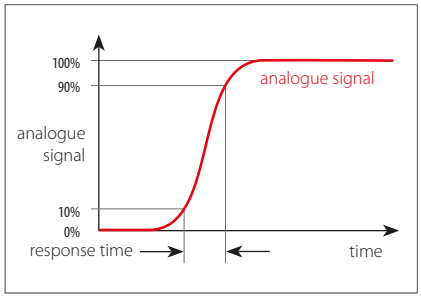
Sampling rate

The sampling rate (or sampling frequency) defines the number of samples per time unit (typically in seconds or milliseconds) taken from an analogue signal and converted to a digital signal. The sampling rate is an indicator of how fast the output signal of an electronic pressure switch responds to the pressure change at the input.



Response time

The response or circuit time is shorter than 2 to 4 milliseconds (depending on model). The sum of A/D and D/A conversions, and the analogue and digital filters in the signal chain from the measuring bridge to the output, make up the response time. Filtering is used to suppress unwanted pressure peaks and electrical interference signals and to ensure good EMC characteristics.



CE mark

Electronic pressure switches from SUCO fall under the 2014/30/EU EMC Directive. EC declarations of conformity have been issued for the electronic pressure switches are available on request or can be downloaded from our website. The relevant devices are denoted by a CE mark in our catalogue.

The Machinery Directive 2006/42/EC is not applicable, because our products are classed as components.

Our products are designed for Group 2 fluids based upon good engineering practise in line with Pressure Equipment Directive 2014/68/EU, meaning neither a declaration of conformation may be issued nor a CE mark affixed.

Electromagnetic compatibility (EMC)

Electronic pressure switches from SUCO do comply to all important industrial EMC standards. The basis for the standards are the stricter thresholds for transient emissions in residential environments (EN 61000-6-3) and immunity for industrial environments (EN 61000-6-2).

Generic standard	Test standard	Parameter(s)
Radio disturbance and immunity	EN 55016-2-1 EN 55016-2-3	60 dBuV
Radiated, high-frequency electromagnetic field immunity test	EN 61000-4-3	10 V/m; 80-1000 MHz, 3 V/m; 1400-2000 MHz, 1 V/m; 2000-2700 MHz
Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	10 V; 0,15-80 MHz
Electrical fast transient / burst immunity test	EN 61000-4-4	±2 kV
Surge immunity test	EN 61000-4-5	±0.5 kV (common) ±0.5 kV (differential)
Electrostatic discharge (ESD) immunity test	EN 61000-4-2	air: 8 kV with contact: 4 kV

Technical explanations for electronic pressure switches

Conversion chart for pressure units

Abbreviation for unit	Name of unit	Pa = N/m²	bar	Torr	lbf/in², PSI
1 Pa = N/m²	Pascal	1	0.00001	0.0075	0.00014
1 bar	Bar	100 000	1	750.062	14.5
1 Torr = 1 mmHg	Millimeters of mercury	133.322	0.00133	1	0.01934
1 lbf/in² = 1 PSI	Pound-force per square inch	6894	0.06894	51.71	1

Conversion chart for temperature units

	K	°C	F
K	1	K - 273.15	9/5 K - 459.67
°C	°C + 273.15	1	9/5 °C + 32
F	5/9 (F + 459.67)	5/9 (F - 32)	1

Insulation strength
According to the latest specifications for immunity to surges and lightning protection, the following must be taken into account when testing insulation strength: With insulation test devices having an inner resistance exceeding 42 Ohm, the insulation strength of electronic pressure switches can be tested up to 500 VDC.

All contacts must be tested short-circuited against the housing. For a specific threshold value of test voltage, the protective circuit for surge protection is activated without any defects arising within the circuit.

In the process, the current may rise to a point at which an insulation strength fault is indicated. The recommendation therefore is to conduct the insulation test of the electronic pressure switch when it is removed, or independently of the overall system.

Medium compatibility
The specifications on medium compatibility in this catalogue pertain to the specific seal and housing materials as well as the used measuring cell technology and so cannot be generalised.

Titanium
Its high levels of mechanical resistance and the wide media compatibility – in particular to corrosive media – do make titanium the ideal material for measuring cells and membranes. It is not recommended for oxygen or hydrogen applications.

Stainless steel (1.4305 / AISI 303)
Stainless steel with broad level of media compatibility. Also suitable for oxygen and hydrogen applications.

Stainless steel (1.4404 / AISI 316L)
Stainless steel with broad level of media compatibility. Also suitable for chemical industry and sea water applications.

Oxygen and hydrogen
It is recommended to use an EPDM seal for the media oxygen / hydrogen to be monitored. The EPDM seal of the „Performance" series (pp. 106-113) was successfully tested at the BAM (Federal Institute for Materials Testing) up to 250 bar by means of an oxygen pressure shock test at 60 °C.

EPDM must not come into contact with oil, as this results in swelling and softening of the material and thus the failure of the electronic pressure switch.

Country-specific safety requirements and application guidelines must be observed if the medium to be monitored is oxygen or hydrogen, such as DGUV accident prevention regulations (DGUV 500, Section 2.32 and BGI 617).

Please specify when ordering „for oxygen, oil and grease-free" or order plasma cleaned and individually packaged electronic pressure switches (see also „Plasma cleaning for oxygen applications / LABS-free (PWIS-free)" on page 9).

Pressure peak dampening
If required, our electronic pressure switches can also be fitted with a pressure snubber (pressure peak orifice) to protect the measuring cell against transient pressure loads such as pressure peaks due to the switching of valves, cavitation effects, etc. which can shorten life expectancy.

For liquid media, the hole of a pressure snubber cannot be chosen to be any small size. At low temperatures the viscosity of the media will increase. In a case of dropping pressure the media might remain in the cavity behind the snubber which might affect the functionality of the electronic pressure switch. Thus a bore diameter of 0.8 mm has been established.

Product information
The technical information in this catalogue is based upon fundamental testing during product development, as well as upon empirical values. The information cannot be used for all application scenarios.

Testing of the suitability of our products for a specific application (e.g. also the checking of material compatibilities) falls under the responsibility of the user. It may be the case that suitability can only be guaranteed with appropriate field testing.

Subject to technical changes.

Selection matrix for electronic pressure switches

Type / series		0500	0501	0510	0511	0520	0570	0530	0531	0532	0533	0540	0541	0542	0544	0545	0546
Page		109	109	113	113	117	120	125	125	125	125	129	129	129	129	129	129
Technology Measuring cell	ceramic / thick-film	■	■	■	■	■	■										
	titanium / SoS							■	■	■	■	■	■	■	■	■	■
Variants	NO	■		■		■	■	■		■		■		■	■		■
	NC		■		■				■		■		■	■		■	■
	1 switching output	■	■	■	■	■		■	■	■	■						
	2 switching outputs						■					■	■	■	■	■	■
	PNP (High Side)	■	■	■	■	■	■	■	■			■	■	■			
	NPN (Low Side)									■	■				■	■	■
	analogue output 4 - 20 mA						■										
Supply voltage	9.6 – 32 V	■	■	■	■			■	■	■	■	■	■	■	■	■	■
	12–30V						■										
	15–36V					■											
Adjustment range	0 – 2 bar	■	■	■	■												
	0 – 4 bar	■	■	■	■												
	0 – 10 bar	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 16 bar	■	■	■	■			■	■	■	■	■	■	■	■	■	■
	0 – 25 bar							■	■	■	■	■	■	■	■	■	■
	0 – 40 bar	■	■	■	■												
	0 – 100 bar	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 250 bar	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■
	0 – 400 bar						■	■	■	■	■	■	■	■	■	■	■
	0 – 600 bar							■	■	■	■	■	■	■	■	■	■
Switch point adjustability	at factory	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	by customer (on site)			■	■	■	■										
Hysteresis adjustability	at factory	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	by customer (on site)						■										
	window mode (settable at factory)	■	■	■	■			■	■	■	■						
Max. over-pressure	up to 2x	■	■	■	■	■	■										
	up to 4x							■	■	■	■	■	■	■	■	■	■
Size	hex 22							■	■	■	■	■	■	■	■	■	■
	hex 24	■	■	■	■												
	A/F 30					■											
	A/F 32						■										
Housing material	zinc-plated steel					■											
	stainless steel 1.4305 / AISI 303	■	■	■	■			■	■	■	■	■	■	■	■	■	■
	aluminium / die-casted zinc						■										
Additional functions	7-segment and menu control						■										
	LED switching state indicator	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■
	Programmable via PPD05	■	■														
Option	suitable for oxygen (on request)	■	■	■	■												

■ M12x1 DIN EN 61076-2 101 A connector only

Electronic pressure switches, Performance series

adjustable at factory or programmable with programming device PPD05

- Very attractively priced electronic pressure switches, particularly for high volume deployment
- High overpressure protection (up to 2 x)
- Small, compact electronic switches with ceramic sensor
- Hysteresis adjustable within a wide range (2 % – 98 %, set at factory)
- Programming of switching points and switching delay time possible via PPD05 (see Chapter E.7, page 133)
- Monitoring of a pressure range due to window function
- High level of adaptability to your requirements (custom solutions)
- Available as ‘plasma cleaned for oxygen applications’[1)]

[1)] For oxygen applications, the EPDM diaphragm can only be used up to 250 bar and a media temperature of max. +60°C.

Electronic pressure switches, Performance series

Technical details

		0500 NO 0501 NC						
Transistor output:		PNP output (High-Side N-channel)						
Supply voltage:		9.6 – 32 VDC with reverse voltage protection						
Output current:		0.5 A with (≤ 0.2 A at ≥ 50 °C) short-circuit and overvoltage protection						
Idle power consumption:		< 30 mA						
Adjustment range p_{nom}:		0 – 2 bar	0 – 4 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar	0 – 250 bar
Max. overpressure[1]:		4 bar	10 bar	20 bar	40 bar	100 bar	150 bar	375 bar
Burst pressure[1]:		8 bar	20 bar	35 bar	60 bar	140 bar	300 bar	500 bar
Mechanical life expectancy:		5,000,000 switching cycles at rise rates to 1,000 bar/s at p_{nom}						
Pressure rise rate:		1,000 bar/s						
Accuracy:		±0.5 % of adjustment range p_{nom} (full scale (FS)) at room temperature						
Switching point adjustment range:		3 … 100 % of adjustment range p_{nom} (FS), set at factory						
Hysteresis[2]:		2 … 98 % FS, programmable at factory (max. tolerance ±1.0 % of adjustment range p_{nom})						
Default-Hysteresis without order specification:		2 bar	4 bar	10 bar	16 bar	40 bar	100 bar	250 bar
		0.1 bar	0.2 bar	0.5 bar	0.8 bar	2 bar	5 bar	10 bar
Operating mode:		with hysteresis or window function (see page 101), programmable at factory						
Resolution:		0.2 % of adjustment range p_{nom} (FS)						
Long term stability:		±0.1 % of adjustment range p_{nom} (FS) per year						
Repeatability[3]:		±0.1 % of adjustment range p_{nom} (FS)						
Switching time:		< 4 ms						
Switch-on / -off delay:		Adjustable between 0 and 2 s (please specify when ordering, otherwise default 0 s is set)						
Temperature error[3]:		± 0.04 % of adjustment range p_{nom} (FS) / °C						
ompensated temperature range:		0 °C … +70 °C (+32 °F …+158 °F), total error ≤ 2 %						
Temperature range ambient:		-30 °C … +100 °C (-22 °F … +212 °F)						
Temperature range media:		with TPE seal: -30 °C … +110 °C (-22 °F … +230 °F)						
		with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)						
		with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)						
		with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)						
Wetted parts material	Housing:	Stainless steel (1.4305 / AISI 303)						
	Messuring cell:	Ceramic						
	Seal material:	TPE, NBR, EPDM or FKM[4]						
Insulation resistance:		> 100 MΩ (35 VDC)						
Vibration resistance:		20 g; at 4…2000 Hz sine wave, DIN EN 60068-2-6						
Shock resistance:		500 m/s², 11 ms half sine wave; DIN EN 60068-2-27						
Protection class:		IP65: DIN EN 175301-803-A IP67: M12x1, AMP-Superseal®, cable connector IP67 and IP6K9K: Bayonet ISO 15170-A1-4.1, Deutsch DT04-3P						
Electromagnetic compatibility:		EMV 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007						
Cable output thread size:		For DIN EN 175301: PG9 (outside diameter of cable 6 to 9 mm)						
Weight:		approx. 80 g (DIN EN 175301 approx. 110 g)						

[1] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[2] 3 … 98 % with programming device PPD05 (see page 133).
[3] Within the compensated temperature range.
[4] FKM sealings are only suitable for pressure ranges up to 0-16 bar.

E.1

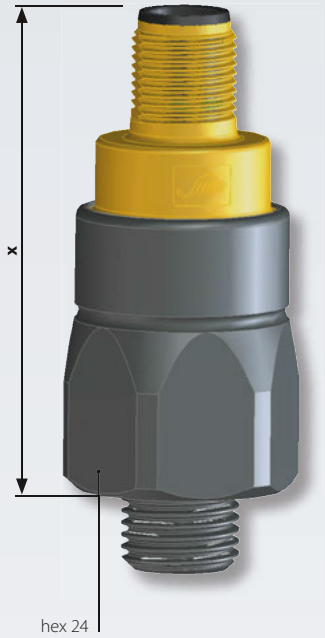
hex 24

Performance

adjustable at factory

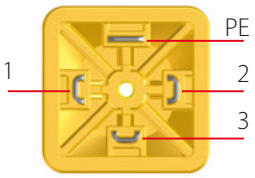
0500 / 0501

Electrical connectors and threads



NO / NC	
(UV+)	
(Gnd)	
(U_{out})	

DIN EN 175301-803-A



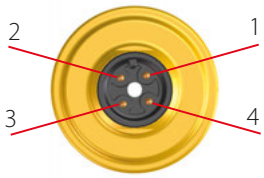
Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{out}
PE	⏚

IP65

x ~ 60 mm without socket device **x** ~ 77 mm with socket device

Connection code: 013

M12 – DIN EN 61076-2-101 A



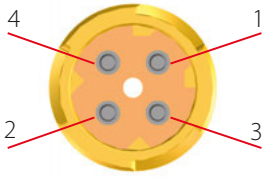
Pin	Assignment
1	U_{V+}
2	nc
3	Gnd
4	U_{out}

IP67

x ~ 54 mm

Connection code: 002

ISO 15170-A1-4.1



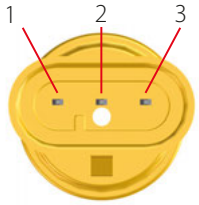
Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{Out}
4	nc

IP67, IP6K9K

x ~ 56 mm

Connection code: 004

AMP Superseal 1.5 ®



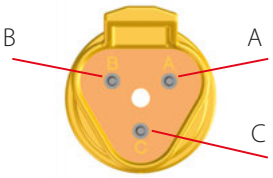
Pin	Assignment
1	U_{out}
2	Gnd
3	U_{V+}

IP67

x ~ 61 mm

Connection code: 007

Deutsch DT04-3P



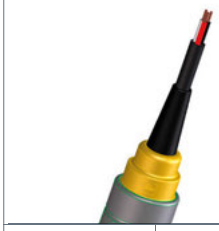
Pin	Assignment
A	U_{V+}
B	Gnd
C	U_{out}

IP67, IP6K9K

x ~ 61 mm

Connection code: 010

Cable connection

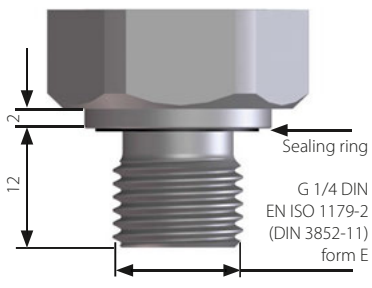


Pin	Assignment
red	U_{V+}
white	U_{out}
black	Gnd

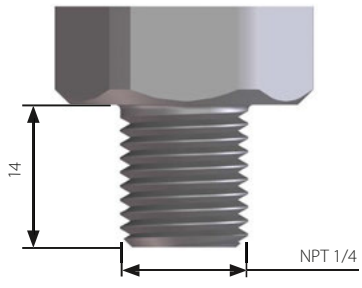
IP67

x ~ 47 mm
(+ 25 mm bend relief)
Cable length ~ 2 m

Connection code: 011



Thread code: 41



Thread code: 09

0500 / 0501

Article matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

Normally open (NO) , PNP, switching points programmed at factory[1]	**0500**
Normally closed (NC), PNP, switching points programmed at factory[1]	**0501**

Max. overpressure[2]	Burst pressure	Adjustment range	
4 bar	8 bar	0 - 2 bar (approx. 29 PSI)	**200**
10 bar	20 bar	0 - 4 bar (approx. 58 PSI)	**400**
20 bar	35 bar	0 - 10 bar (approx. 145 PSI)	**101**
40 bar	60 bar	0 - 16 bar (approx. 230 PSI)	**161**
100 bar	140 bar	0 - 40 bar (approx. 580 PSI)	**401**
150 bar	300 bar	0 - 100 bar (approx. 1,450 PSI)	**102**
375 bar	500 bar	0 - 250 bar (approx. 3,625 PSI)	**252**

Pressure connection

G 1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**
NPT 1/4	**09**

Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	**1**
EPDM	Break fluid, ozone, acetylene, hydrogen, oxygen, etc.	**2**
FKM[3]	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	**3**
TPE	Hydraulic / machine oil, air, nitrogen, water, acetylene, etc.	**7**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M12x1 - DIN EN 61076-2-101-A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
AMP Superseal 1.5	**007**
Deutsch DT04-3P	**010**
Cable connection (standard lenght = 2 m)	**011**

Article number:	050X	XXX	XX	X	XXX

[1] Please state switching point and hysteresis when ordering.
[2] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[3] FKM sealings are only suitable for pressure ranges up to 0-16 bar.

Electronic pressure switches, Performance series

hex 24, adjustable by user

- Very competitively priced electronic pressure switches
- High overpressure protection (up to 2 x)
- Small, compact electronic switches with ceramic sensor
- Easy adjustment of switching point from the outside using set screw
- Hysteresis adjustable within broad range (2 % – 98 %, set at factory)
- High level of adaptability to your requirements (custom solutions)
- Available as 'plasma cleaned for oxygen applications'[1)]

[1)] For oxygen applications, the EPDM diaphragm can only be used up to 250 bar and a media temperature of max. +60°C.

Electronic pressure switches, Performance series

Technical details

		0510 NO **0511 NC**					
Transistor output:		PNP output (High-Side N-channel)					
Supply voltage:		9.6 – 32 VDC with reverse voltage protection					
Output current:		0.5 A with (≤ 0.2 A at ≥ 50 °C) short-circuit and overvoltage protection					
Idle power consumption:		< 30 mA					
Adjustment range p_{nom}:		0 – 2 bar	0 – 4 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar	0 – 250 bar
Max. overpressure[1]:		4 bar	10 bar	20 bar	40 bar	100 bar	150 bar	375 bar
Burst pressure[1]:		8 bar	20 bar	35 bar	60 bar	140 bar	300 bar	500 bar
Mechanical life expectancy:		5,000,000 switching cycles at rise rates to 1,000 bar/s at p_{nom}					
Pressure rise rate:		1,000 bar/s					
Accuracy:		±0.5 % of adjustment range p_{nom} (full scale (FS)) at room temperature					
Switching point adjustment range:		3 … 100 % of adjustment range p_{nom} (FS), set at factory					
Hysteresis[2]:		2 … 98 % FS, programmable at factory (max. tolerance ±1.0 % of adjustment range p_{nom})					
Default-Hysteresis without order specification:		2 bar	4 bar	10 bar	16 bar	40 bar	100 bar	250 bar
		0.1 bar	0.2 bar	0.5 bar	0.8 bar	2 bar	5 bar	10 bar
Resolution:		0.2 % of adjustment range p_{nom} (FS)					
Long term stability:		±0.1 % of adjustment range p_{nom} (FS) per year					
Repeatability[2]:		±0.1 % of adjustment range p_{nom} (FS)					
Switching time:		< 4 ms					
Switch-on / -off delay:		Adjustable between 0 and 2 s (please specify when ordering, otherwise default 0 s is set)					
Temperature error[2]:		± 0.04 % of adjustment range p_{nom} (FS) / °C					
Compensated temperature range:		0 °C … +70 °C (+32 °F …+158 °F), total error ≤ 2 %					
Temperature range ambient:		-30 °C … +100 °C (-22 °F … +212 °F)					
Temperature range media:		with TPE seal: -30 °C … +110 °C (-22 °F … +230 °F)					
		with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)					
		with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)					
		with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)					
Wetted parts material	Housing:	Stainess steel (1.4305 / AISI 303)					
	Messuring cell:	Ceramic					
	Seal material:	TPE, NBR, EPDM or FKM[3]					
Insulation resistance:		> 100 MΩ (35 VDC)					
Vibration resistance:		20 g; at 4…2000 Hz sine wave, DIN EN 60068-2-6					
Shock resistance:		500 m/s², 11 ms half sine wave; DIN EN 60068-2-27					
Protection class:		IP65: DIN EN 175301-803-A IP67: M12x1, AMP-Superseal®, cable connector IP67 and IP6K9K: Bayonet ISO 15170-A1-4.1, Deutsch DT04-3P					
Electromagnetic compatibility:		EMV 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007					
Cable output thread size:		For DIN EN 175301: PG9 (outside diameter of cable 6 to 9 mm)					
Weight:		approx. 80 g (DIN EN 175301 approx. 110 g)					

[1] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[2] Within the compensated temperature range.
[3] FKM sealings are only suitable for pressure ranges up to 0-16 bar.

E.2

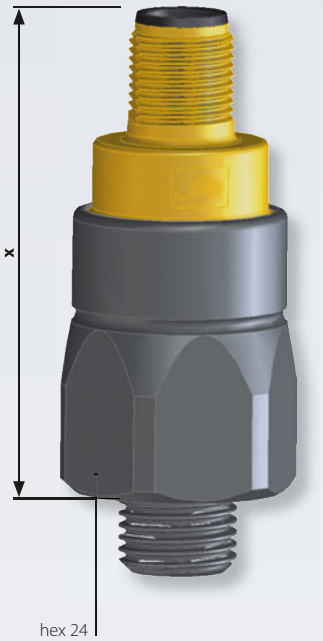
hex 24

Performance

adjusted by user

0510 / 0511

Electrical connectors and threads



NO / NC	
(UV+)	
(Gnd)	
(U_{out})	

DIN EN 175301-803-A

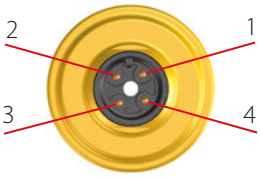
Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{out}
PE	⏚

IP65

x ~ 60 mm without socket device
x ~ 77 mm with socket device

Connection code: 013

M12 – DIN EN 61076-2-101 A



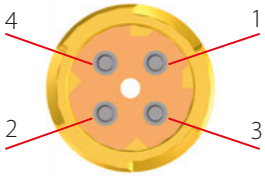
Pin	Assignment
1	U_{V+}
2	nc
3	Gnd
4	U_{out}

IP67

x ~ 54 mm

Connection code: 002

ISO 15170-A1-4.1



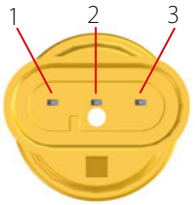
Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{out}
4	nc

IP67, IP6K9K

x ~ 56 mm

Connection code: 004

AMP Superseal 1.5 ®



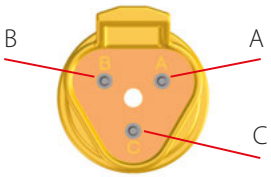
Pin	Assignment
1	U_{out}
2	Gnd
3	U_{V+}

IP67

x ~ 61 mm

Connection code: 007

Deutsch DT04 - 3P

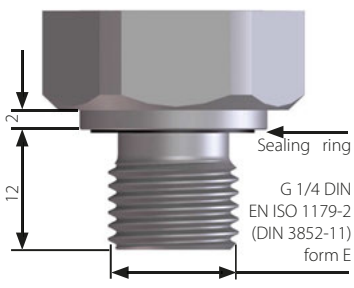


Pin	Assignment
A	U_{V+}
B	Gnd
C	U_{out}

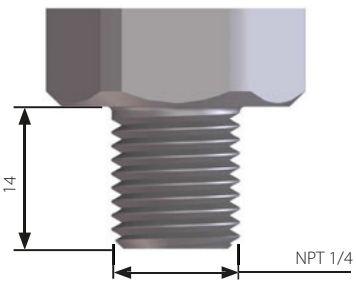
IP67, IP6K9K

x ~ 61 mm

Connection code: 010



Thread code: 41



Thread code: 09

RoHS III 2020 - 205 compliant

CE

0510 / 0511

Article matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

Normally open (NO) , PNP, switching points programmed at factory[1]	**0510**
Normally closed (NC), PNP, switching points programmed at factory[1]	**0511**

Max. overpressure[2]	Burst pressure	Adjustment range	
4 bar	8 bar	0 - 2 bar (approx. 29 PSI)	**200**
10 bar	20 bar	0 - 4 bar (approx. 58 PSI)	**400**
20 bar	35 bar	0 - 10 bar (approx. 145 PSI)	**101**
40 bar	60 bar	0 - 16 bar (approx. 230 PSI)	**161**
100 bar	140 bar	0 - 40 bar (approx. 580 PSI)	**401**
150 bar	300 bar	0 - 100 bar (approx. 1,450 PSI)	**102**
375 bar	500 bar	0 - 250 bar (approx. 3,625 PSI)	**252**

Pressure connection

G 1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**
NPT 1/4	**09**

Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	**1**
EPDM	Break fluid, ozone, acetylene, hydrogen, oxygen, etc.	**2**
FKM[3]	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	**3**
TPE	Hydraulic / machine oil, air, nitrogen, water, acetylene, etc.	**7**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M12x1 - DIN EN 61076-2-101-A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
AMP Superseal 1.5	**007**
Deutsch DT04-3P	**010**

Article number	051X	XXX	XX	X	XXX

[1] Switching points and hysteresis can also be adjusted at factory.
[2] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[3] FKM sealings are only suitable for pressure ranges up to 0-16 bar.

E.3

hex 27 / 30 A/F

adjustable by user

Electronic pressure switches

hex 27 and 30 A/F, adjustable by user

- Ceramic sensor in thick film technology
- High overpressure protection to 500 bar
- Easy adjustment of switching point from the outside using set screw
- Hysteresis available within broad range (2 % – 95 %, set at factory)
- Very high switching currents (to 1.4 A)

Electronic pressure switches

Technical details

		0520 NO / NC		
Transistor output:		PNP output (High-Side N-channel)		
Supply voltage:		15 – 36 VDC		
Output current:		1.4 A transistor output (PNP, DC12) with short-circuit and overvoltage protection		
Idle power consumption:		< 15 mA		
Adjustment range p_{nom}:		0 – 10 bar	0 – 100 bar	0 – 250 bar
Max. overpressure p_u [1]:		20 bar	150 bar	500 bar
Burst pressure[1]:		25 bar	175 bar	600 bar
Mechanical life expectancy:		5,000,000 switching cycles at rise rates to 1,000 bar/s at p_{nom}		
Pressure rise rate:		1,000 bar/s		
Accuracy:		±0.5 % of adjustment range p_{nom} full scale (FS) at room temperature		
Switching point adjustment range:		2 … 100 % of adjustment range p_{nom} (FS), set from outside using set screw		
Hysteresis:		2 … 95 % FS, programmable at factory (max. tolerance ±1.0 % of adjustment range)		
Standard-Hysteresis without order specification:		approx. 0,5 bar	approx. 5 bar	approx. 10 bar
Resolution:		0.15 % of adjustment range p_{nom} (FS)		
Long term stability:		±0.1 % of adjustment range p_{nom} (FS) per year		
Repeatability[2]:		±0.1 % of adjustment range p_{nom} (FS)		
Switching time:		< 4 ms		
Temperature error[2]:		±0.04 % of adjustment range p_{nom} (FS) / °C		
Compensated temperature range:		0 °C … +70 °C (+32 °F …+158 °F), total error ≤ ±2 %		
Temperature range ambient:		-30 °C … +80 °C (-22 °F … +178 °F)		
Temperature range media:		with NBR joint: -30 °C … +100 °C (-22 °F … +212 °F)		
		with EPDM joint: -30 °C … +125 °C (-22 °F … +257 °F)		
		with FKM joint: -20 °C … +125 °C (-4 °F … +257 °F)		
Wetted parts material:	Housing:	zinc-plated steel		
	Measuring cell:	Ceramic		
	Seal material:	NBR, EPDM or FKM		
Insulation resistance:		> 100 MΩ (35 VDC)		
Vibration resistance:		10 g at 4 … 2000 Hz sine wave; DIN EN 60068-2-6		
Shock resistance:		294 m/s²; 11 ms half sine wave; DIN EN 60068-2-27		
Protection class:		IP65: (DIN EN 175301-803-A); IP67: (M12x1)		
Electromagnetic compatibility:		EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007		
Weight:		approx. 240 g		

[1] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.

[2] Within the compensated temperature range.

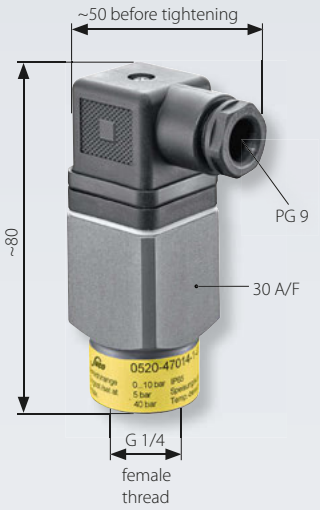
E.3

hex 27 / 30 A/F

adjustable by user

0520

Electrical connectors and threads

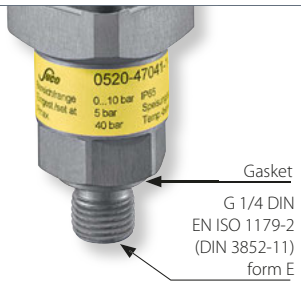


NO / NC	
(UV+)	
(Gnd)	
(U_{out})	

DIN EN 175301 - 803 - A	
	
Pin	**Assignment**
1	U_{V+}
2	Gnd
3	U_{out}
PE	PE
IP65 Cable output PG9 (outside diameter of cable 6 to 9 mm)	
Connection code: 001	

M12 – DIN EN 61076 - 2 - 101 A	
	
Pin	**Assignment**
1	U_{V+}
2	nc
3	Gnd
4	U_{out}
IP67	
Connection code: 002	

Thread code: 14



Thread code: 41

0520

Article matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

Electronic pressure switch	0520

Adjustment range[1] for NO

0 – 10 bar (approx. 145 PSI)	470
0 – 100 bar (approx. 1450 PSI)	472
0 – 250 bar (approx. 3620 PSI)	474

Adjustment range[1] for NC

0 – 10 bar (approx. 145 PSI)	471
0 – 100 bar (approx. 1450 PSI)	473
0 – 250 bar (approx. 3620 PSI)	475

Pressure connection

G 1/4 – female thread	14
G 1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	41

Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	1
EPDM	Break fluid, ozone, acetylene, hydrogen, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	001
M12x1 - DIN EN 61076-2-101-A	002

Article number:	0520	47X	XX	X	XXX

Also available factory adjusted. If you require factory adjustment, please state switching point and hysteresis when ordering.

[1] Static pressure, dynamic pressure 30 to 50% lower. Value refers to the hydraulic or pneumatic part of the electronic pressure switch.

Menu-controlled electronic pressure switches

with display

- Menu-controlled, simple programming of switching functions
- 2 switching outputs and 1 analogue output
- Numerous programming functions, such as
  – switching time delay
  – zero point reset
  – peak value memory
  – switching point counter
- Current pressure value and switching states shown on 3-digit display
- Very high switching currents up to 1.4 A

Menu-controlled electronic pressure switches

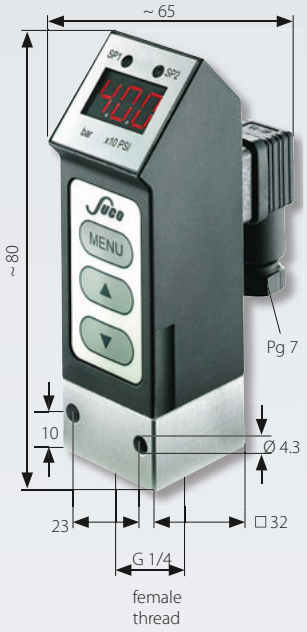
Technical details

		0570 Electronic pressure switches
Switching function:		NC/NO, programmable, 2 switching points, switching time delay, zero point reset, peak value memory (within adjustment range), switching point counter
Settings:		Programmable using keypad on front
Outputs:		2 transistor outputs (each 1.4 A DC12 / PNP) 1 analogue output (4 – 20 mA)
Supply voltage U_B:		12 - 30 VDC
Switching status display:		2 LEDs (yellow)
Pressure display:		Current pressure displayable in bar or PSI on 3-digit LED (red)
Life expectancy:		5,000,000 switching cycles at rise rates to 1,000 bar/s at p_{nom}
Pressure rise rate:		≤ 1,000 bar/s
Switching time:		< 4 ms
Switching time delay:		Adjustable between 0 and 3.0 s
Hysteresis:		1 – 99 % FS, programmable from keypad
Accuracy:		±0.5 % (FS at room temperature)
Display accuracy:		±0.5 % (FS at room temperature) ±2 digits
Temperature drift::		±0.2 % / 10 °C
Temperature range:		NBR, EPDM, FKM -20 °C … +80 °C
Compensated temperature range:		0 °C … +70 °C (32 °F …158 °F), total error ±2 %
Housing material:		die-casted zinc
Wetted parts material	Housing:	anodised aluminium
	Measuring cell:	Ceramic
	Seal material:	NBR, EPDM or FKM
Vibration resistance:		10 g at 5 … 2000 Hz sine wave; DIN EN 60068-2-6
Shock resistance:		294 m/s²; 11 ms half sine wave; DIN EN 60068-2-27
Protection class:		IP65
Electromagnetic compatibility:		acc. to EN 50081-1, EN 50081-2, EN 50082-2
Weight:		approx. 340 g
Access PIN:		The switch can be protected with a pin between 1 and 999

0570

Electronic pressure switch

- Anodised aluminium and die-casted zinc
- Ceramic measuring cell in thick-film technology
- Supply voltage 12 … 30 VDC
- Overpressure protection to 20 / 150 / 500 bar[1)]
- Programmable using keypad on front
- Switching time delay (setting from 0 to 3 s)
- Peak value memory (within the measurement range)
- Pin protection possible to prevent misuse
- Socket device included



p max. in bar	Burst pressure in bar	Adjustment range in bar	Thread	Article number:

0570 Electronic pressure switches

20[1)]	25	0 - 10	G 1/4 female thread	0570 - 467 14 - X - 001
150[1)]	175	0 - 100		0570 - 468 14 - X - 001
500[1)]	650	0 - 400		0570 - 469 14 - X - 001

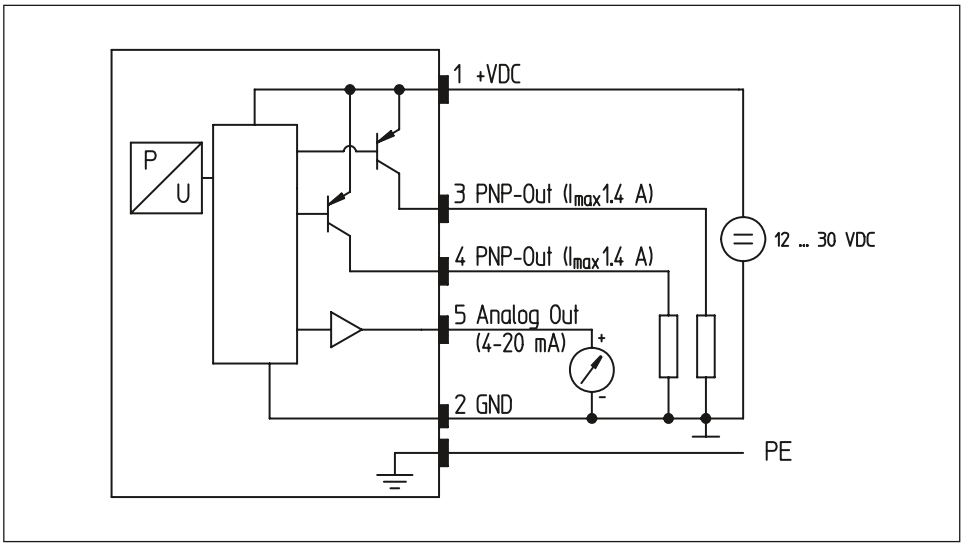
Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	1
EPDM	Break fluid, ozone, acetylene, hydrogen, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

Refer to page 119 for the temperature range and application thresholds of sealing materials

Article number	0570 - 46X 14 - X - 001

Wiring chart



[1)] Static pressure, dynamic pressure 30 to 50% lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.

E.5
hex 22
High Performance
1 switching output

Electronic pressure switches, High-Performance series

hex 22 with one switching output

- Outstanding overpressure protection (up to 4 x)
- Ideal choice for mobile hydraulic applications
- Long service life even under high pressure change rates
- Wetted parts made of stainless steel and titanium ensuring excellent media compatibility
- All welded design, no elastomeric seal
- Silicon-on-sapphire technology (SoS) for highest reliability, accuracy and reliable process monitoring
- Very low temperature error and very good long-term stability
- Adjustment of switching point and hysteresis at factory

For versions with 2 switching outputs, please refer to chapter E.6, page 126

Electronic pressure switches, High-Performance series

Technical details

	0530 NO 0531 NC			0532 NO 0533 NC	
Number of transistor outputs:	1 PNP output (High Side N-channel MOSFET)			1 NPN output (Low Side N-channel MOSFET)	
Supply voltage:	9.6 - 32 VDC				
Idle power consumption:	< 15mA				
Standard adjustment range p_{nom}:	0 – 10 bar	0 – 25 bar	0 – 100 bar	0 – 250 bar	0 – 600 bar
Overpressure protection p_u [1]:	40 bar	100 bar	400 bar	1,000 bar	1,650 bar
Burst pressure[1]:	80 bar	200 bar	800 bar	2,000 bar	2,000 bar
Mechanical life expectancy:	10,000,000 switching cycles at rise rates to 5,000 bar/s at p_{nom}				
Permitted pressure change rate:	≤ 5,000 bar/s				
Switching point adjustment range:	2 … 100 % of the nominal pressure range Full Scale (FS), programmable at factory				
Hysteresis:	0.2 … 99.8 % of the nominal pressure range (FS), programmable at factory (set to 5 % FS as standard)				
Accuracy:	±0.5 % of the nominal pressure range (FS) at room temperature, ±0.25 % BFSL				
Resolution:	0.1 % of the nominal pressure range (FS)				
Switching delay:	ON (0 … 0.5 s) / OFF (0 … 2 s) delay in increments of 1 ms, irrespective of switching point, programmable at factory (specify value when Ordering, otherwise default value of 0 s is set)				
Output:	0.5 A transistor output with short-circuit and overvoltage protection				
Operating mode:	with hysteresis or window function (see page 101), programmable at factory				
Long term stability:	±0.1 % FS p. a.				
Repeatability[2]:	±0.1 % FS				
Temperature error[2]:	±0.02 % / 1 K FS				
Compensated temperature range:	-20 °C … +80 °C (-4 °F … +176 °F)				
Temperature range media:	-40 °C … +125 °C (-40 °F … +257 °F)				
Temperature range ambient:	-40 °C … +100 °C (-40 °F … +212 °F)				
Wetted parts material:	Stainless steel 1.4305 (AISI 303) and titanium				
Housing material:	Stainless steel 1.4305 (AISI 303)				
Insulation resistance:	> 100 MΩ (35 VDC)				
Switching time:	< 2 ms				
Vibration resistance:	20 g at 4 … 2000 Hz sine wave; DIN EN 60068-2-6				
Shock resistance:	half sine wave 500 m/s²; 11 ms; DIN EN 60068-2-27				
Protection class:	Refer to the electrical connections				
EMC:	EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007				
Protection against reverse polarity, short-circuit and over voltage surges:	built-in				
Weight:	approx. 80 g (DIN 175301 approx. 110 g, cable version approx. 135 g)				

[1] Static pressure, dynamic value is 30 to 50 % lower. Values refer to the hydraulic/pneumatic part of the electronic pressure switch.

[2] Within the compensated temperature range.

E.5

hex 22

High Performance

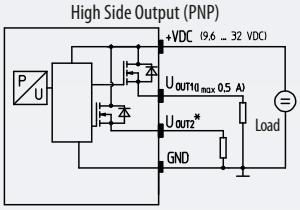
1 switching output

0530 / 0531 / 0532 / 0533

Electrical connectors and threads

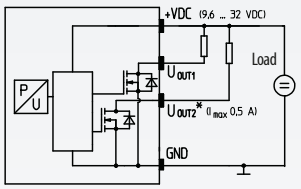
Connection diagrams

High Side Output (PNP)



Pin assignment depending on electrical connections
*U_{OUT2} only for series 054x

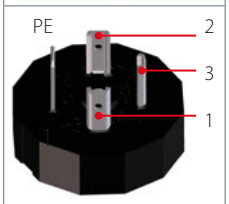
Low-Side Output (NPN)



Pin assignment depending on electrical connections
*U_{OUT2} only for series 054x

Technical modifications and errors excepted.

DIN EN 175301- 803 - A



Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{out}
PE	⏚

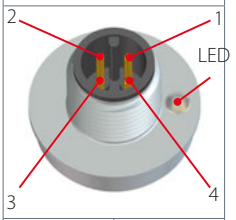
IP65

x ~ 60 / 76 mm*

d ~ Ø 30 mm

Connection code: 013

M12 – DIN EN 61076-2-101 A



Pin	Assignment
1	U_{V+}
2	nc
3	Gnd
4	U_{Out}

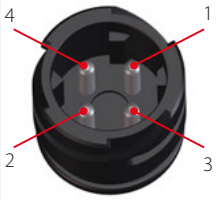
IP67

x ~ 54 mm

d ~ Ø 22 mm

Connection code: 002

ISO 15170 - A1 - 4.1



Pin	Assignment
1	U_{V+}
2	Gnd
3	U_{out}
4	nc

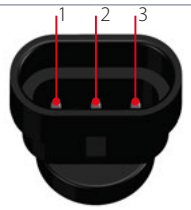
IP67, IP6K9K

x ~ 65 mm

d ~ Ø 27 mm

Connection code: 004

AMP Superseal 1.5 ®



Pin	Assignment
1	U_{Out}
2	Gnd
3	U_{V+}

IP67

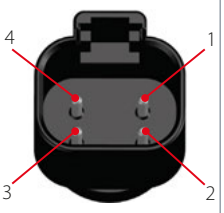
x ~ 73 mm

d ~ Ø 26 mm

Connection code: 007

* x ~ 60 mm without coupler socket, x ~ 76 mm with coupler socket

Deutsch DT04 - 4P



Pin	Assignment
1	Gnd
2	U_{V+}
3	nc
4	U_{Out}

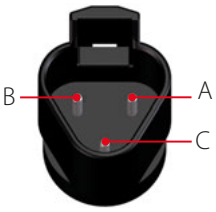
IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Connection code: 008

Deutsch DT04 - 3P



Pin	Assignment
A	U_{V+}
B	Gnd
C	U_{Out}

IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Connection code: 010

Cable connection

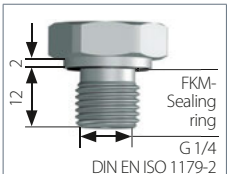
Pin	Assignment
red	U_{V+}
white	U_{Out}
black	Gnd

IP67

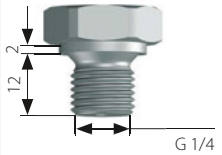
x ~ 44 mm
(+ 20 mm bend relief)
cable length ~ 2 m

d ~ Ø 22 mm

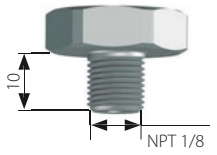
Connection code: 011



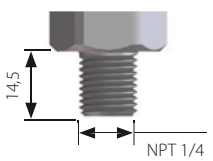
Thread code: 41



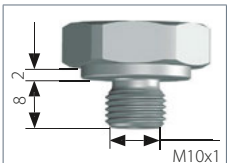
Thread code: 03



Thread code: 04



Thread code: 09



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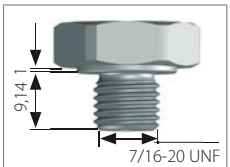

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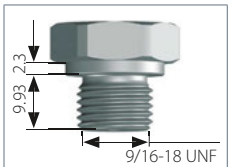
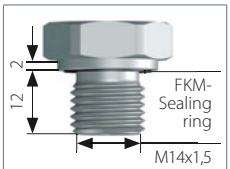


Thread code: 21



Thread code: 42

0530 / 0531 / 0532 / 0533

Article matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Pressure unit	Electrical connection

Type

PNP output (High Side), NO	**0530**
PNP output (High Side), NC	**0531**
NPN output (Low Side), NO	**0532**
NPN output (Low Side), NC	**0533**

Max. Overpressure[2]	Burst pressure	Adjustment range[1]	
40 bar	80 bar	0 - 10 bar (approx. 145 PSI)	**101**
100 bar	200 bar	0 - 25 bar (approx. 362 PSI)	**251**
400 bar	800 bar	0 - 100 bar (approx. 1.450 PSI)	**102**
1,000 bar	2,000 bar	0 - 250 bar (approx.. 3.620 PSI)	**252**
1,650 bar	2,000 bar	0 - 600 bar (approx. 8.700 PSI)	**602**

Pressure connection

G 1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**
G 1/4 – DIN 3852-A	**03**
NPT 1/8 (max. 250 bar)	**04**
NPT 1/4	**09**
M10x1 zyl. DIN 3852-A (max. 250 bar)	**30**
7/16 – 20 UNF (max. 250 bar)	**20**
9/16 – 18 UNF	**21**
M14x1,5 – DIN EN ISO 9974-2 (DIN 3852-11), form E	**42**

Pressure unit

bar	**B**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M12 - DIN EN 61076-2-101-A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
AMP Superseal 1.5®	**007**
Deutsch DT04-4P	**008**
Deutsch DT04-3P	**010**
Cable connection (length of cable 2 m standard)	**011**

Article number	**053X**	**XXX**	**XX**	**B**	**XXX**

[1] Please state switching point and hysteresis when ordering.
[2] Static pressure, dynamic pressure 30 to 50% lower. Value refers to the hydraulic or pneumatic part of the electronic pressure switch.

E.6
hex 22
High Performance
2 switching outputs

Electronic pressure switches, High-Performance series

hex 22 with two switching outputs

- Outstanding overpressure protection (up to 4 x)
- Ideal choice for mobile hydraulic applications
- Long service life even under high pressure change rates
- Wetted parts made of stainless steel and titanium ensuring excellent media compatibility
- All welded design, no elastomeric seal
- Silicon-on-sapphire technology (SoS) for highest reliability, accuracy and reliable process monitoring
- Very low temperature error and very good long-term stability
- Adjustment of switching point and hysteresis at factory

For versions with 1 switching output,
please refer to chapter E.5, page 122

Electronic pressure switches, High-Performance series

Technical details

	0540 NO / NO **0541 NC / NC** **0542 NO / NC**			**0544 NO / NO** **0545 NC / NC** **0546 NO / NC**	
Number of transistor outputs:	2 PNP outputs (High Side N-channel MOSFET)			2 NPN outputs (Low Side N-channel MOSFET)	
Supply voltage:	9.6 - 32 VDC				
Idle power consumption:	< 15mA				
Standard adjustment range p_{nom}:	0 – 10 bar	0 – 25 bar	0 – 100 bar	0 – 250 bar	0 – 600 bar
Overpressure protection p_u[1]:	40 bar	100 bar	400 bar	1,000 bar	1,650 bar
Burst pressure[1]:	80 bar	200 bar	800 bar	2,000 bar	2,000 bar
Mechanical life expectancy:	10,000,000 switching cycles at rise rates to 5,000 bar/s at p_{nom}				
Permitted pressure change rate:	≤ 5,000 bar/s				
Switching point adjustment range:	2 … 100 % of the nominal pressure range (Full Scale, FS), programmable at factory				
Hysteresis:	0.2 … 99.8 % of the nominal pressure range (FS), programmable at factory (set to 5% FS as standard)				
Accuracy:	±0.5 % of the nominal pressure range (FS) at room temperature, ±0.25 % BFSL				
Resolution:	0.1 % of the nominal pressure range (FS)				
Switching delay:	ON (0 … 0.5 s) / OFF (0 … 2 s) delay in increments of 1 ms, irrespective of switching point, programmable at factory (specify value when Ordering, otherwise default value of 0 s is set)				
Output:	0.5 A transistor output with short-circuit and overvoltage protection				
Operating mode:	with hysteresis or window function (see page 101), programmable at factory				
Long term stability:	±0.1 % FS p. a.				
Repeatability[2]:	±0.1 % FS				
Temperature error[2]:	±0.02 % / 1 K FS				
Compensated temperature range:	-20 °C … +80 °C (-4 °F … +176 °F)				
Temperature range media:	-40 °C … +125 °C (-40 °F … +257 °F)				
Temperature range ambient:	-40 °C … +100 °C (-40 °F … +212 °F)				
Wetted parts material:	Stainless steel 1.4305 (AISI 303) and titanium				
Housing material:	Stainless steel 1.4305 (AISI 303)				
Insulation resistance:	> 100 MΩ (35 VDC)				
Switching time:	< 2 ms				
Vibration resistance:	20 g at 4 … 2000 Hz sine wave; DIN EN 60068-2-6				
Shock resistance:	half sine wave 500 m/s²; 11 ms; DIN EN 60068-2-27				
Protection class:	Refer to the electrical connections				
EMC:	EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007				
Protection against reverse polarity, short-circuit and over voltage surges:	built-in				
Weight:	approx. 80 g (DIN 175301 approx. 110 g, cable version approx. 135 g)				

[1] Within the compensated temperature range.

[2] Static pressure, dynamic value is 30 to 50 % lower. Values refer to the hydraulic/pneumatic part of the electronic pressure switch.

E.6

hex 22

High Performance

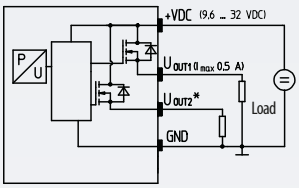
2 switching outputs

0540 / 0541 / 0542 / 0544 /0545 / 0546

Electrical connectors and threads

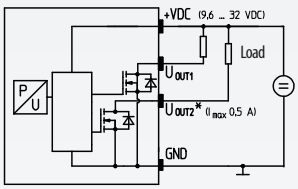
Connection diagrams

High Side Output (PNP)



Pin assignment depending on electrical connections
* U_{OUT2} only for 054x

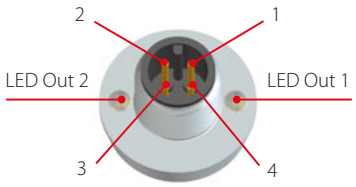
Low-Side Output (NPN)



Pin assignment depending on electrical connections
* U_{OUT2} only for 054x

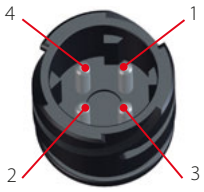
Technical modifications and errors excepted.

M12 – DIN EN 61076 - 2 - 101 A



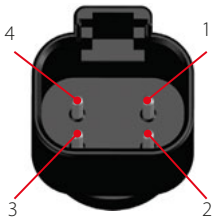
Pin	Assignment
1	U_{V+}
2	$U_{Out\,2}$
3	Gnd
4	$U_{Out\,1}$
IP67	
x ~ 54 mm	
d ~ Ø 22 mm	
Connection code: 002	

ISO 15170 - A1 - 4.1



Pin	Assignment
1	U_{V+}
2	Gnd
3	$U_{Out\,1}$
4	$U_{Out\,2}$
IP67, IP6K9K	
x ~ 65 mm	
d ~ Ø 27 mm	
Connection code: 004	

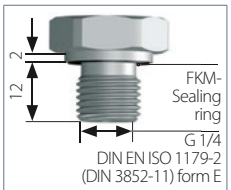
Deutsch DT04 - 4P



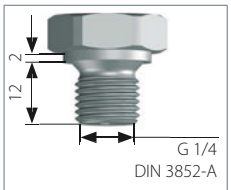
Pin	Assignment
1	Gnd
2	U_{V+}
3	$U_{Out\,2}$
4	$U_{Out\,1}$
IP67, IP6K9K	
x ~ 74 mm	
d ~ Ø 23 mm	
Connection code: 008	

Cable connection

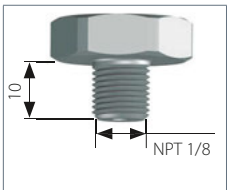
Pin	Assignment
red	U_{V+}
white	$U_{Out\,2}$
black	$U_{Out\,1}$
blue	Gnd
IP67	
x ~ 44 mm (+ 20 mm bend relief) Cable length ~ 2 m	
d ~ Ø 22 mm	
Connection code: 011	



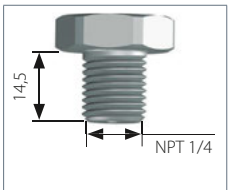
Thread code: 41



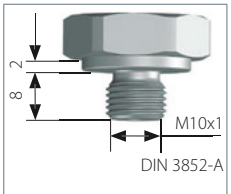
Thread code: 03



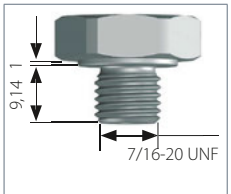
Thread code: 04



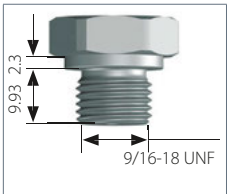
Thread code: 09



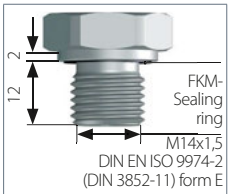
Thread code: 30



Thread code: 20



Thread code: 21



Thread code: 42

0540 / 0541 / 0542 / 0544 /0545 / 0546

Article matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Pressure unit	Electrical connection

Type

PNP output (High Side), NO / NO	0540
PNP output (High Side), NC / NC	0541
PNP output (High Side), NO / NC	0542
NPN output (Low Side), NO / NO	0544
NPN output (Low Side), NC/ NC	0545
NPN output (Low Side), NO / NC	0546

Max. Overpressure[2]	Burst pressure	Adjustment range[1]	
40 bar	80 bar	0 - 10 bar (approx. 145 PSI)	101
100 bar	200 bar	0 - 25 bar (approx. 362 PSI)	251
400 bar	800 bar	0 - 100 bar (approx. 1.450 PSI)	102
1,000 bar	2,000 bar	0 - 250 bar (approx. 3.620 PSI)	252
1,650 bar	2,000 bar	0 - 600 bar (approx. 8.700 PSI)	602

Pressure connection

G 1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	41
G 1/4 – DIN 3852-A	03
NPT 1/8 (max. 250 bar)	04
NPT 1/4	09
M10x1 zyl. DIN 3852-A (max. 250 bar)	30
7/16 – 20 UNF (max. 250 bar)	20
9/16 – 18 UNF	21
M14x1,5 – DIN EN ISO 9974-2 (DIN 3852-11), form E	42

Pressure unit

bar	B

Electrical connection

M12x1 - DIN EN 61076-2-101-A	002
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	004
Deutsch DT04-3P	008
Cable connection (length of cable 2 m standard)	011

Article number	054X	XXX	XX	B	XXX

[1] Please state switching point and hysteresis when ordering.
[2] Static pressure, dynamic pressure 30 to 50% lower. Values refer to the hydraulic or pneumatic part of the electonic pressure switch.

Accessories

Mating plugs, thread adapters and programming devices

- High-quality accessories
- Developed for our products
- Aligned to our products
- Direct from the manufacturer

Mating plugs

For requirements at short notice and realising customized solutions

Deutsch DT06-3S (for DT04-3P) 3 x 0.5 mm² PUR cable (2 m), IP67	Suitable for connection code **010** **Deutsch DT04-3P**	Article number: **1-1-36-653-160**	
TE AMP Superseal 1.5®, 3-pin 3 x 0,5 mm² Radox Kabel (2 m), IP65	Suitable for connection code **007** **AMP Superseal 1.5®**	Article number: **1-1-32-653-158**	
M12x1 DIN EN 61076-2-LF, 4-pin 4 x 0,34 mm² PUR cable (2 m), IP65	Suitable for connection code **002** **M12 DIN EN 61076-2-101 A**	Article number: **1-1-00-653-162**	 Hex thread ring (tightening torque: 0,6 Nm)

For the pin assignment of the wires please refer to chapter M.10 Accessories (page 91)

M12x1 DIN EN 61071-2-101 D straight, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connection code **002** **M12 DIN EN 61076-2-101 A**	Article number: **1-6-00-652-016**	
Coupler socket M12x1 DIN EN 61071-2-101 D angled, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connection code **002** **M12 DIN EN 61076-2-101 A**	Article number: **1-6-00-652-017**	

Thread adapters

For requirements at short notice and realising customized solutions

- The materials and shapes of thread adapters are aligned perfectly to our electronic pressure switches and transmitters
- Thread adapters are provided together with seals to ensure safe and easy installation of our electronic pressure switches and transmitters

For G 1/4 DIN EN ISO 1179-1 (DIN 3852-E)
SUCO thread code 41, transmitters and electronic pressure switches

Stainless steel 1.4305 / AISI 303 thread adapters

G 1/4
DIN EN ISO 1179-1 (DIN 3852-E)
female thread

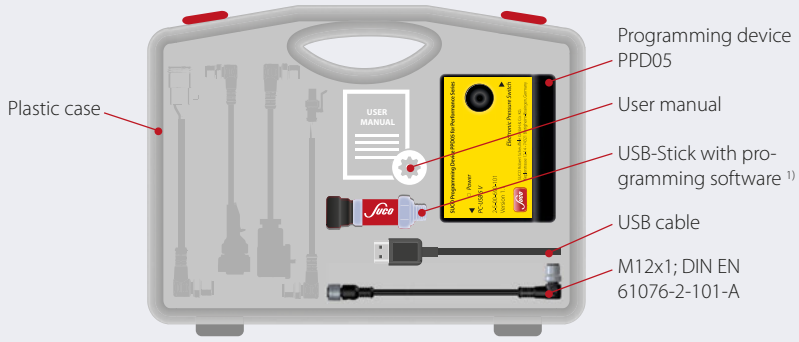
			
M10 x 1 form A DIN 3852-1	**M14 x 1,5 form E** DIN 3852-E incl. sealing ring FKM	**NPT 1/ 4-18**	**9/16 -18UNF** incl. O-ring FKM
hex 22 h = 30,5 mm	hex 22 h = 35 mm	hex 22 h = 35,5 mm	hex 22 h = 33 mm
Article number:	Article number:	Article number:	Article number:
1-1-00-420-020	**1-1-00-420-028**	**1-1-00-420-021**	**1-1-00-420-027**

Programming device PPD05

for electronic pressure switches of the SUCO „Performance“ series

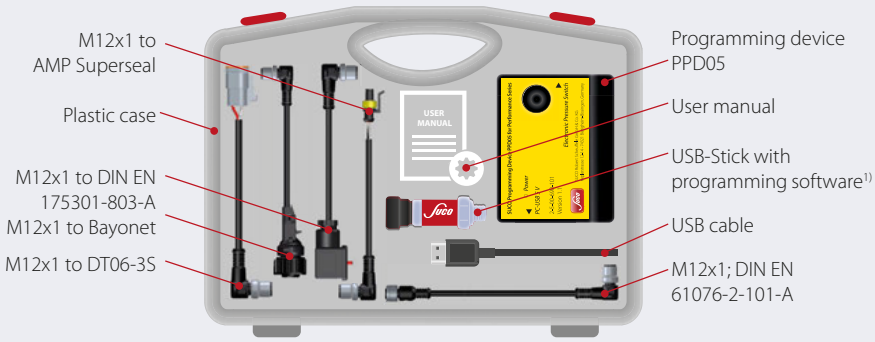
0500 / 0501

- simple connection to the PC / laptop via USB enables an easy and quick adjustment of technical parameters onsite
- individual programming of the switching points and the switch delay time (0 . . . 2 s); readout of max. pressure change rate as well as switching and overpressure cycles



Basic set with M12 connector
Additional connectors can be retrofitted.

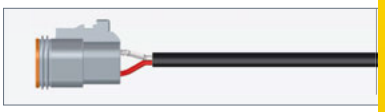
Article number: **2-5-00-690-150**



Complete set with all available connectors

Article number: **2-5-00-690-151**

1) System requirements: min. Windows Vista OS.

M12x1 – DT06-3S (für DT04-3P) Adapter cable, 1 m	Article number: **1–0–00–653–214**	
M12x1 – DIN EN 175301-803-A Adapter cable, 1 m	Article number: **1–0–00–653–210**	
M12x1 – Bajonett (DIN 72585) Adapter cable, 1 m	Article number: **1–0–00–653–212**	
M12x1 – AMP Superseal 1.5® Adapter cable, 1 m	Article number: **1–0–00–653–213**	

For the pin assignment of the wires please refer to chapter M.10 Accessories (page 91)