SUCO Technologies
Pressure Monitoring

Mechanical Pressure Switches

Electronic Pressure Switches

Pressure Transmitters

Sensor Technology

www.Suco-Tech.com

Welcome to SUCO

What you'll see on the following pages:

SUCO – A success story

From a mechanical workshop to an industrial company operating on the global stage

1938

Robert Scheuffele starts up a mechanics workshop

1945

Start of the partnership between Robert Scheuffele and Georg Fuhrmann

*16.10.1909 † 20.02.1966 *15.01.1912 † 04.02.1982

1946

Start of production of centrifugal clutches and brakes

1953

Move into the new premises in Bietigheim-Bissingen, Keplerstrasse (still headquarter today)

1956

Registration of trade name SUCO with worldwide trademark protection

1960

Start of production of mechanical pressure switches for the automotive industry

A view into production

Administration building, Bietigheim-Bissingen

Aerial shot of premises, Bietigheim-Bissingen

1997

First DIN ISO 9001 company certification

1998

Start of market penetration in Asia with set-up of a company pool

Broadening of product expertise to electronic pressure monitoring

Start of the "fully automatic pressure switch adjusting" development project with the Fraunhofer Institute

1999

Founding of subsidiary SUCO VSE France

2001

Certification to DIN ISO 9001:2000

2002

Penetration of the markets in South America and Eastern Europe

2004

Start of development of fully automatic assembly systems for pressure switch modules

2005

New company name: SUCO Robert Scheuffele GmbH & Co. KG

Development of the SUCO zero clutch

1969

Start of production of electromagnet clutches and brakes

Set-up of a pan-European sales network

1979

Further development of SUCO pressure switches especially for hydraulic and pneumatic applications

Strategic alignment to the industry

1980

Development of the hex 24 pressure switch series for broad industrial applications

1984

Development of the hex 27 pressure switch series for broad industrial applications

1987

Broadening of the product range to include custom pre-wired pressure switches

1988

Start of sales in the US

1993

Development of pressure dampers for ABS brake systems in the automotive industry

Aerial shot of premises, Bietigheim-Bissingen

ESI Technology, Wrexham, UK

SUCO Technologies Boca Raton, USA

SUCO VSE France Le Mans, France

2006

Development and production start of descenders with centrifugal technology

Enhancement of the laboratory test facility for simulating several million test cycles under different test conditions

Development of the world's smallest pressure switch with adjustable switching point to 400 bar (patented)

2007

Founding of subsidiary SUCO Technologies Inc., USA

2009

Acquisition of ESI Technology Ltd. (UK)

2010

Across-the-board use of enhanced automatic pressure switch adjusters

Development of a transmitter series based on SoS technology

2011

Development of the SUCO thermal brake

2013

75-year company anniversary celebrations

2014

Development of additional inteligent functions integrated in mechanical pressure switches

Tradition and Innovation

The preservation of proven traditions and continuousz efforts in innovation enable visions to become successful reality

Design and development of new products using the latest CAD tools.

Products are subjected to comprehensive testing and measurements to simulate realistic ambient conditions and loads.

Assembly and test of pressure switches on semi and fully automated installations.

Fully automated switching point adjustment with computer-aided documentation of readings.

Ultra-modern production facilities with integrated, fully automated component handling for high efficiency.

Encapsulating system for custom ready-wired pressure switches for strictest requirements of IP protection class.

State of the art measuring and test methods for assembly and alignment of our electronic products.

Product final inspection with ultra-modern computer- aided test systems.

General technical explanations

User information

Our pressure monitoring products may only be installed and started up by authorised specialists. The safety regulations of country-specific authorities must be observed, especially when working with mains voltages and oxygen, and in potentially explosive areas.

Product information

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

Testing of the suitability of our products for a specific application (such as the checking of material compatibilities) remains the responsibility of the user. It may be the case that suitability can only be verified by appropriate field testing.

IP protection class

The IP protection class is a defined protection level code (sealing) of electrical equipment housings in line with IEC 60529 (formerly DIN 40050 - Part 2). Protection of a housing against the following is tested here:

- The penetration of solid extraneous particles, such as dust
- Access of hazardous parts
- Penetration of water

IP protection tests are performed as type tests. The IP protection type code, made up of two digits, specifies the protection of a housing against the penetration of solid extraneous particles and water. The numeric code therefore provides conclusions to be drawn on the level of personal safety as well as the functional protection / mid to long-term functional reliability of electrical equipment.

Protection types IP00, IP65, IP67 and IP6K9K

IP00:

No protection against penetration of solid particles or water, no protection against contact.

IP6X:

Protection against penetration of dust (dust proof). Full contact protection.

IPX5:

A jet of water from a nozzle, aimed at equipment (such as a pressure switch) from all directions, must not have any harmful effect.

IPX7:

Protection from water, when equipment (such as a pressure switch) is immersed in water under defined pressure and time conditions. Water must not penetrate into the equipment in harmful quantities.

IP6K9K:

Devices satisfying these requirements must be dust-proof and be able to withstand loads during the use of high-pressure cleaners and steam jets. The standard stipulates a water pressure from 80 to 100 bar at a temperature of 80°C for testing.

IP6KX:

Dust must not penetrate. Letter K: Specific to the electrical equipment of road vehicles.

IPX9K:

Protection against penetration of water at high pressure / for steam jet cleaning. Water aimed at the housing from every direction at greatly increased pressure may not have any damaging effects.

We are able to offer IP67 / IP6K9K for many of our mechanical and electronic pressure switches (pre-wired or with integrated connector) and for our transducers.

Cylindrical threads

Cylindrical threads are either sealed on the front by underlaying an appropriate sealing ring (such as a copper sealing ring) or by already having integrated O-rings or gaskets.

Conical threads (cone-shaped threads)

Conical threads guarantee tolerance compensation of the two threaded parts. The sealing function is realised with thread flanks which deform permanently and enter into a metallic frictional fit. Conical threads are not screwed in down to the screw-in depth, but fixed with the tightening torque required for the leak tightness. Remember not to exceed the permitted tightening torque of the pressure switch or transmitter presented in the following table (to prevent damaging the threaded pin beforehand, causing it to become untight during operation or to snap off when tightened).

Tightening torques of steel threads

The specifications below are to be understood upper material thresholds for the housing of pressure switches or transducers. Remember during installation that the type and material of the seal, the condition of mating surfaces (e.g. dry or oily) and the material of the counter-piece all have a bearing on the tightening torque.

Thread	Tightening torque
NPT 1/8; M 10 x 1 conical	max. 18 Nm
M 10 x 1 cyl.; G 1/8	max. 20 Nm
M 12 x 1.5; 7/16 – 20 UNF	max. 30 Nm
1/4 BSPP; 9/16 – 18 UN	max. 40 Nm
NPT 1/4; M 14 x 1.5	max. 40 Nm

Values 30% lower than in the table above must be used for brass housings.

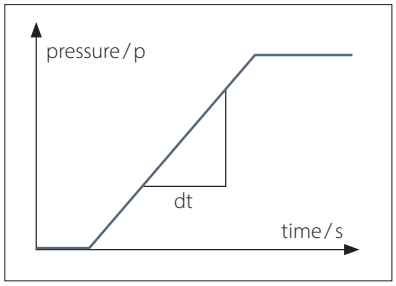
In particular, using additional sealant to attain the required leak tightness may be necessary for gas applications.

Vacuum
The values given in the technical details for the vacuum range are specified in millibars (mbar) below atmospheric pressure.

Pressure change rate (~rise / ~fall)

The pressure change rate denotes the pressure over time for the rising/falling pressure. The pressure change rate is specified in bar/s or bar/ms.

The maximum pressure change rate for SUCO mechanical pressure switches is 1 bar/ms (1,000 bar/s). For SUCO electronic pressure monitoring products the maximum pressure change rate can be up to 5 bar/ms (5,000 bar/s).



Over pressure protection
The specified over pressure protection in the catalogue is based on a static pressure. The values refer to the hydraulic or pneumatic part of the switch.

It is best practice to use 30 - 50% lower values for dynamic pressure compared to static pressure. These empirical values are based on the knowledge that, in pressure systems, unexpected pressure peaks which are higher than the working pressure are generated as a result of activation of valves, sudden falling or rising load or simply the change of cross-sections in the pipes. With conventional measurement techniques (such as manometers), these pressure peaks are hardly measureable. Faster measurement systems must therefore be used for this data acquisition. Attempts are being made to take this into account by using emperical or corrective factors.

If the pressure conditions are known and the pressure change rates are ≤ 1.45 psi/ms (≤ 0.1 bar/ms), our pressure switches and transmitters can be used up to the permitted overpressure protection as per data sheet / catalogue. Only 50% of the specified overpressure protection is permitted when operating at the maximum permitted pressure change rate of ≤ 14.5 psi/ms (≤ 1 bar/ms) for mechanical pressure swtiches, and at ≤ 72.5 psi/ms (≤ 5 bar/ms) for transmitters.

RoHS-Compliance

RoHS
= **R**estriction **o**f **H**azardous **S**ubstances (EC Directive 2011/65/EU (RoHS II)

CE mark
European Parliament and Council directives must be observed when products are launched onto the market. If a directive exists for a product, it must be applied. Only products for which a directive exists may bear the CE mark.

Mechanical pressure switches with a supply voltage above 50 VAC or 75 VDC are covered by the 2014/35/EU Low Voltage Directive. Variants for potentially explosive areas are covered in addition by the 2014/34/EU ATEX Product Directive.

Our electronic products satisfy EMC (Electromagnetic Compatibility) Directive 2014/30/EC.

Mechanical pressure switches do not fall under the EMC Directive.

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

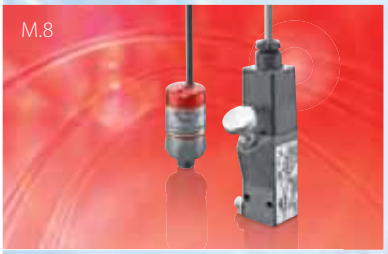
Our product designs are based upon "good engineering practise" in line with Article 4, Paragraph 3 of the Pressure Equipment Directive (2014/68/EU), meaning neither a declaration of conformity may be issued nor a CE mark affixed.

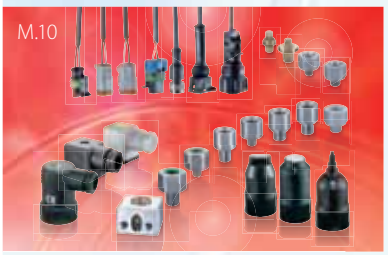
The current product-specific CE declaration is available for download from the download area on our homepage:
www.suco.de/Downloads.htm

CE

Subject to technical changes.

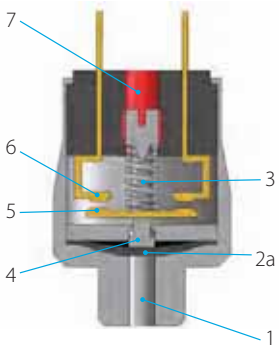
M. Overview of mechanical pressure switches



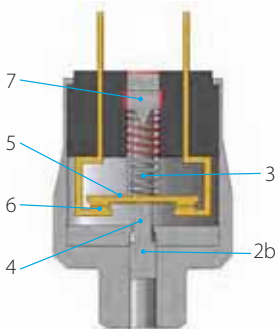


Technical explanations for mechanical pressure switches

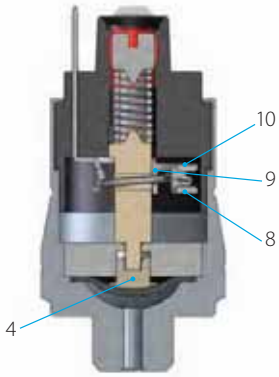
Diaphragm pressure switch
NO



Piston pressure switch
NC



Change over



What is a mechanical pressure switch?
Mechanical pressure switches from SUCO monitor the pressure of liquid or gaseous media, and close or open an electrical circuit on reaching a set threshold.

Diaphragm pressure switches
SUCO diaphragm pressure switches are used in pressure ranges from 1.45 - 1,450 psi (0.1 - 100 bar), meaning over pressure safety of 500, 1,450, 4,350, and 8,700 psi (35, 100, 300 and 600 bar), depending on the used diaphragm type.

Piston pressure switches
Pressure ranges from 145 - 5,800 psi (10 - 400 bar) can be monitored with SUCO piston pressure switches (dependent on size); an over pressure safety of up to 8,700 psi (600 bar) can be attained.

Sizes of pressure switches
Mechanical pressure switches from SUCO can be divided into sizes hex 24, hex 27 and 30 A/F.
Each particular size has specific hydraulic, pneumatic and electric properties (specified on the relevant catalogue page in the technical details).

How does a pressure switch work?
Function description for **normally open (NO)**:
Pressure is applied to the diaphragm (2a) / pistons (2b) through the pressure connector (1).
If the generated pressure force is greater than the pre-tensioned force of the pressure spring (3), the plunger (4) moves towards the counter-contact (6), carrying along the contact disc (5), and closes the circuit. The switch opens again when the pressure is reduced by the differential value.

Function description for **normally closed (NC)**:
Engaging happens in the reverse order.

The adjustment screw (7) enables the switching point to be changed within the adjustment range.

The micro switch of a **snap action system,** offers both, a **NC** and **NO** contact.

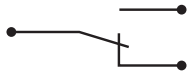
The swivel contact (9) is activated by the plunger (4). The circuit is closed by the NC (8) as long as no pressure is applied. When the applied pressure exceeds the set switching point, the swivel contact changes over and closes the circuit via the NO (10).

Utilisation category
The utilisation category specifies for example voltages and currents, and the type of load, our pressure switches are designed for (to DIN EN 60947-5-1).

AC voltage
AC12: Control of ohmic loads and semiconductor loads in input circuits of optocouplers (such as PLC inputs).
AC14: Control of electromagnetic loads, 72 VA.

DC voltage
DC12: Control of ohmic loads and semiconductor loads in input circuits of optocouplers (such as PLC inputs).
DC13: Control of electromagnets.

Classification of electrical switch functions

			Contact form DIN-EN-60947-5-1	Symbol IEC 60617
NO	NO, normally open	SPST single pole, single throw	X	
NC	NC, normally closed	SPST single pole, single throw	Y	
Snap action	CO, (snap action) change over	SPDT Single pole, double throw	C	

B10d value

The B10d value specifies the anticipated service life (with a 10% probability of failure). The B10d value is therefore directly dependent on the respective application of the pressure switch. For ohmic loads and currents < 1 A, we specify the B10d value as 1 million cycles of electrical life.

The specification of a MTTF time (mean time to failure) is not possible without knowing the specific conditions in the application. However, the MTTF time can be determined easily from the B10d value:

$$MTTF_d = \frac{B_{10d}}{0{,}1\, n_{op}}$$

n_{op}: number of cycles per year

B_{10d}: number of cycles until 10 % of components have failed.

Minimum current / minimum working voltage

The minimum working current and minimum working voltage depend greatly on operating and ambient conditions.
Physically, the build-up of impurity layers on the contact rivets must be countered with mechanical friction and/or electrical erosion. It has proven useful in many applications to deploy our pressure switches with silver contact rivets ensuring that they are fail safe to 10 mA and 10 V. Variants with gold contacts are available in our catalogue for even lower currents and voltages.

Potential-free – galvanically isolated

Mechanical pressure switches from SUCO are potential-free, i.e. no auxiliary energy is required. Also, there is no electrical contact between the individual, live parts and the housing.

Adjustment range of switching point

The pressure range, within which the switching point of a pressure switch can be set, is called adjustment range. The switching point corresponds to the pressure value at which the electric circuit is opened or closed by the pressure applied.

Switching point tolerances

The switching point tolerances specified by us pertain to room temperature (RT) and condition as new. The values can change as a result of temperature, ageing and deployment conditions.

It is not possible to specify generally applicable value for switching point tolerances over temperature as the medium has a significant influence on the sealing materials in the pressure switch. Double the tolerance stated for RT and condition as new can be assumed as a typical magnitude for the tolerance over the entire temperature range.

Based on their design, piston switches may exhibit an increase in switching points due to storage (dry run, stick-slip effect). Following a short start phase, the switching points return to the value set at the factory.

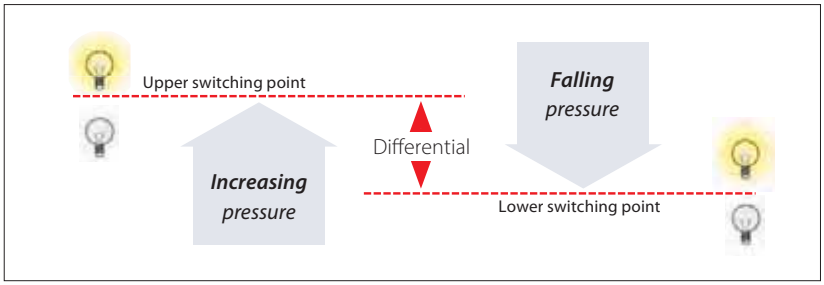
Pressure change rates of > 14.5 psi (>1bar/s) may have an effect on the switching point for diaphragm pressure switches. The switching point (for rising pressure) and differential increase, whilst the switch-back point (for falling pressure) sinks. Also, the effect of the maximum (system) pressure on the switch back point (for falling pressure ramp) must be factored in for tolerance-critical applications. The higher the (system) pressure, the lower the resulting switch-back value.

Differential (dead band / hysteresis) Rising / falling switching point

The pressure difference between the rising (upper) and falling (lower) switching points (refer to the figure) is known as differential (switch-back difference).

Differential is derived from the structural layout of a mechanical pressure switch. It has no constant value within the adjustment range, and is lowest for the lowest adjustment value. It is greatest at the end of the adjustment range.

Differential can be set at SUCO in range from approx. 10% (at end of adjustment range) to 30% or higher (at start of adjustment range), related to the respective switching point for hex 27 and 30 A/F pressure switches with adjustable differential.



Technical explanations for mechanical pressure switches

The specifications in the catalogue only represent typical average values.

Please ask about the possible setting ranges you may require. Our electronic pressure switches are excellently suited to extremely low or high differential.

The lowest possible differential is set if nothing is specified in the order.

Switching frequency
The switching frequency provides information on the possible number of cycles in one minute. The value of 200/minute specified by us is a guideline value. Higher cycle values can be attained depending on switch type and conditions of use.

Sealing materials
The priority in sealing material selection is the chemical resistance. The temperature range only becomes a selection criterion when different sealing materials are suitable for the medium.

NBR (Buna-N)
This is the standard material most commonly used. It is a special SUCO material mix with high level of cold flexibility so that the sealing properties of the pressure switch are also retained at low temperatures.

NBR is denoted by number "1" in our item number.

EPDM
This material is the solution of choice for applications with brake fluids.
It is particularly suitable for applications with (process) water. Approval from the BAM (Federal Institute for Material Testing) is in place for oxygen applications. The safety regulations from country-specific authorities must be observed for oxygen applications.

EPDM may not come into contact with oil because this would entail swelling and softening of the material, and so failure of the pressure switch.

EPDM is denoted by number "2" in our item number.

EPDM with drinking water approval W270
This EPDM material is intended for drinking water applications and for use in medical and pharmaceutical applications. Approval as per code "DVGW Technical Codes, Worksheet W270" is in place for this.

EPDM may not come into contact with oil because this would entail swelling and softening of the material, and so failure of the pressure switch.

EPDM W270 is denoted by number "5" in our item number.

FKM / FPM (Viton®)
This is a diaphragm material suitable for high temperature exposure and exhibits special chemical resistance. It has been tested in the hydraulic sector and has been proven to work successfully with critical oils.

FKM/FPM is denoted by number "3" in our item number.

ECO (epichlorhydrin)
ECO is only used in our vacuum switches. This material has similar properties to NBR in terms of chemical resistance, and can be used in gas applications as well as oil and fuel applications.

ECO is denoted by number "4" in our item number.

Silicone
Silicone is suitable for use within a wide temperature range. The SUCO silicone diaphragm is FDA-approved (Food & Drug Administration) for the food sector.

Silicone is a soft material reserved for sensitive applications in the low pressure range (below 145 psi/10 bar) with maximum overpressure safety to 500 psi (35 bar). Piston switches are therefore not offered with silicone seals. Silicone is also not suitable for oil applications.

Silicone is denoted by number "8" in our item number.

H-NBR
This is a special SUCO material mixture optimised for ester-based bio-oils. The multitude of bio-oils on the market means suitability of the material for the respective oil must be determined. This diaphragm material can also be used for a number of mineral and synthetic oils.

H-NBR is denoted by number "9" in our item number.

Medium compatibility
The specifications on medium compatibility in this catalogue cannot be generalised as they pertain to the sealing materials used in our pressure switches.

Saturated and superheated steam applications
The sealing materials mentioned are not suitable for saturated or superheated steam applications.

Conversion table for pressure units

Unit symbol	Unit name	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 mm Hg	Millimetres, mercury column	133.322	0.00133	1	0.01934
1 lbf/in² = 1 PSI	Pound-force per square inch	6894	0.06894	51.71	1

Conversion table 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

Please consult us about gas, water and oxygen applications.

Water applications

Standard piston switches are not suitable for water applications.
This also applies for stainless steel switches with EPDM seals. The use of water with corrosion protection, water mixtures and emulsions needs to be clarified with SUCO.

Gas applications

Our pressure switches are suitable for liquid and gaseous media. Gaseous media place particular demands on leak-tightness however. The leakage rate is dependent on the respective gaseous medium, the working pressure and the permeability of the seal material used in the pressure switch.

Their lower leakage rates mean diaphragm pressure switches are better suited for gas pressures than piston pressure switches. The latter can also be used however if certain measures are taken (such as venting of the housing).

Oxygen applications

Our mechanical pressure switches are suitable for use with oxygen. We recommend the use of our EPDM diaphragm. The resistance to internal burnout of the diaphragm has been tested by the BAM (Federal Institute for Material Testing).

Pressure switches in steel housings with zinc-nickel coating are, in conjunction with oxygen, only approved to a maximum working pressure of 145 psi (10 bar).

Pressure switches in brass housings are, in conjunction with oxygen, only approved to a maximum working pressure of 500 psi (35 bar).

Pressure switches in stainless steel housings are, in conjunction with oxygen, only approved to a maximum working pressure of 725 psi (50 bar).

DGUV accident prevention regulations (such as DGUV 500, Section 2.32 and BGI 617) must be observed for first operation.

Please specify when ordering "oil and grease-free, for use with oxygen".

Underpressure safety of pressure switches

Our pressure switches are underpressure safe down to 4.35 psi (300 mbar) (relative).

Overpressure safety of vacuum switches

Our vacuum switches are overpressure safe up to 290 or 500 psi (20 or 35 bar) depending on type.

cCSAus approval

Almost all of our mechanical pressure switches (sizes hex 24 and hex 27), and vacuum switch 0151, have cCSAus approval. The CSA mark together with "c" and "us" combines the control stamps for introduction onto the Canadian and American markets. The cCSAus certificate also includes the test of the relevant UL standard.
Checked by an official institution and verified with regular company visits by CSA inspectors, this approval guarantees the highest levels of quality and operational reliability for our products.

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) rests 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.

Pressure switches hex 24 with integrated connector

NC or NO, maximum operating voltage up to 42 V

- Large selection of electrical plug-in types for quick attachment and reliable connection
- High protection class (to IP67 or IP6K9K)
- Compact and rugged design in industrial environments like construction and agricultural machinery or commercial vehicles
- Switching point can be set on site with adjusting screw in the connector[1)]
- High overpressure resistance, compact, small switches, available as normally open or normally closed

[1)] Pressure switches can also be supplied preset at factory.
The switching point is embossed onto pressure switches preset at factory.

The all-rounder with the broad selection of options

NC or NO, maximum operating voltage up to 42 V

Deutsch DT04-2P

AMP Superseal 1.5®

Packard MetriPack 280®

Deutsch DT04-3P

AMP Junior Timer®

M12x1 DIN EN 61076-2-101-A

with 10 plug-in types

Bayonet with 4 codings

Coding A1-2.1

Coding A2-2.1

Coding A3-2.1

Coding A4-2.1

for 6 setting ranges

- 1.45 - 14.5 psi (0.1 - 1 bar)
- 7.25 - 43.5 psi (0.5 - 3 bar)
- 14.5 - 145 psi (1 - 10 bar)
- 145 - 290 psi (10 - 20 bar)
- 290 - 725 psi (20 - 50 bar)
- 725 - 2,175 psi (50 - 150 bar)

with many thread types

- 1/4 BSPP
- 1/8 BSPP
- M 10x1 cyl.
- M 10x1 con.
- M 12x1.5 cyl.
- NPT 1/8
- NPT 1/4
- 9/16-18 UNF
- 7/16-20 UNF

for a broad diversity of applications

- NBR (BunaN): Hydraulic/machine oil, heating oil, air, nitrogen, etc.
- EPDM: Brake fluid, hydrogen, oxygen, acetylene, etc.
- FKM (Viton®): Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.
- HNBR: Hydraulic/machine oil, esterbased bio-oils
- Silicone: Water, food products (FDA approval)

Pressure switches hex 24 with integrated connector

0110/0111
Deutsch DT04-2P
IP67, IP6K9K

0112/0113
AMP Superseal 1.5®
IP67

0114/0115
Packard MetriPack 280®
IP67

0116/0117
Deutsch DT04-3P
IP67, IP6K9K

0118/0119
AMP Junior Timer®
IP65, IPx4K

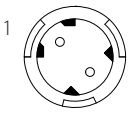
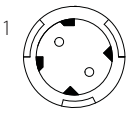
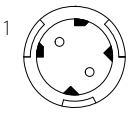
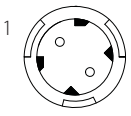
0120/0121
Bayonet DIN 72585
IP67, IP6K9K

0122/0123
M12x1 DIN EN 61076-2-101-A
IP67

Technical data

Rated working voltage:	10 … 42 VAC/DC	
Rated current range (resistive load, DC12 and AC12):	10 mA … 4 A	
Switching power DC12 / AC12:	100 W / 100 VA	
Temperature resistance of sealing materials:	NBR (BunaN)	-40 °F . . . +212 °F (-40 °C … +100 °C)
	EPDM	-22 °F … +248 °F (-30 °C … +120 °C)
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F … +248 °F (-5 °C … +120 °C)
	FKM (Viton®) (in piston pressure switch)	+5 °F … +248 °F (-15 °C … +120 °C)
	Silicone	-40 °F … +248 °F (-40 °C … +120 °C)
	HNBR	-22 °F … +248 °F (-30 °C … +120 °C)
Switching frequency:	200 / min.	
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures to max. 725 psi /50 bar)	
Pressure rise rate:	≤ 14.5 psi/ms (1 bar/ms)	
Differential:	Average value 5…30 % depending on type, not adjustable	
Vibration resistance:	10 g; 5…200 Hz sine wave, DIN EN 60068-2-6	
Shock resistance:	294 m/s^2; 14 ms half sine wave; DIN EN 60068-2-27	
Protection class:	Up to IP67 / IP6K9K according to the manufacturer's specifications for the respective plug-in system only when plugged in, otherwise IP00	
Weight:	approx. 3.17 oz / 90 g	

Contact assignment for bayonet connectors

Coding A1-2.1	Coding A2-2.1	Coding A3-2.1	Coding A4-2.1
			
			

0110 / 0112 / 0114 / 0116 / 0118 / 0122

Diaphragm pressure switches with integrated connector

- Setting ranges to up to 725 psi (50 bar) (higher settings refer to page 26)
- NC or NO, maximum voltage 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1)]

Plug-in types for diaphragm pressure switches

Deutsch DT04-2P	0110 – XXX XX – X – XXX	0110 – XXX XX – X – XXX
AMP Superseal 1.5®	0112 – XXX XX – X – XXX	0112 – XXX XX – X – XXX
Packard MetriPack 280®	0114 – XXX XX – X – XXX	0114 – XXX XX – X – XXX
Deutsch DT04-3P (A+B)	0116 – XXX XX – X – XXX	0116 – XXX XX – X – XXX
AMP Junior Timer®	0118 – XXX XX – X – XXX	0118 – XXX XX – X – XXX
M12x1 DIN EN 61076-2-101-A	0122 – XXX XX – X – XXX	0122 – XXX XX – X – XXX

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|

Diaphragm pressure switches with integrated connector

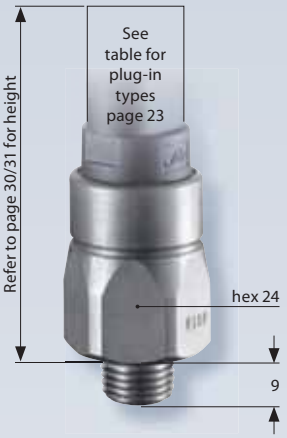
1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	XXXX – 403 01 – X – 009	XXXX – 404 01 – X – 013
	1/4" BSPP	XXXX – 403 03 – X – 011	XXXX – 404 03 – X – 015
	1/8" NPT	XXXX – 403 04 – X – 012	XXXX – 404 04 – X – 016
	1/4" NPT	XXXX – 403 09 – X – 345	XXXX – 404 09 – X – 346
	7/16 - 20 UNF	XXXX – 403 20 – X – 305	XXXX – 404 20 – X – 307
	9/16 - 18 UNF	XXXX – 403 21 – X – 306	XXXX – 404 21 – X – 308
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	XXXX – 423 01 – X – 070	XXXX – 424 01 – X – 070
	1/4" BSPP	XXXX – 423 03 – X – 070	XXXX – 424 03 – X – 070
	1/8" NPT	XXXX – 423 04 – X – 070	XXXX – 424 04 – X – 070
	1/4" NPT	XXXX – 423 09 – X – 070	XXXX – 424 09 – X – 070
	7/16 - 20 UNF	XXXX – 423 20 – X – 070	XXXX – 424 20 – X – 070
	9/16 - 18 UNF	XXXX – 423 21 – X – 070	XXXX – 424 21 – X – 070
14.5 - 145 ±7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	XXXX – 407 01 – X – 025	XXXX – 408 01 – X – 029
	1/4" BSPP	XXXX – 407 03 – X – 027	XXXX – 408 03 – X – 031
	1/8" NPT	XXXX – 407 04 – X – 028	XXXX – 408 04 – X – 032
	1/4" NPT	XXXX – 407 09 – X – 349	XXXX – 408 09 – X – 350
	7/16 - 20 UNF	XXXX – 407 20 – X – 313	XXXX – 408 20 – X – 315
	9/16 - 18 UNF	XXXX – 407 21 – X – 314	XXXX – 408 21 – X – 316

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 24 for the temperature range and application thresholds of sealing materials.

Your order number:	01XX – XXX XX – X – XXX



[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.1

hex 24 integrated

0110 / 0112 / 0114 / 0116 / 0118 / 0122

Diaphragm pressure switches with integrated connector

- Setting ranges up to 725 psi (50 bar) (lower settings refer to page 25)
- NC or NO, maximum operating voltage up to 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1)]

Plug-in types for diaphragm pressure switches

Deutsch DT04-2P	0110 – XXX XX – X – XXX	0110 – XXX XX – X – XXX
AMP Superseal 1.5®	0112 – XXX XX – X – XXX	0112 – XXX XX – X – XXX
Packard MetriPack 280®	0114 – XXX XX – X – XXX	0114 – XXX XX – X – XXX
Deutsch DT04-3P (A+B)	0116 – XXX XX – X – XXX	0116 – XXX XX – X – XXX
AMP Junior Timer®	0118 – XXX XX – X – XXX	0118 – XXX XX – X – XXX
M12x1 DIN EN 61076-2-101-A	0122 – XXX XX – X – XXX	0122 – XXX XX – X – XXX

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
Diaphragm pressure switches with integrated connector			
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	XXXX – 411 01 – X – 041	XXXX – 412 01 – X – 045
	1/4" BSPP	XXXX – 411 03 – X – 043	XXXX – 412 03 – X – 047
	1/8" NPT	XXXX – 411 04 – X – 044	XXXX – 412 04 – X – 048
	1/4" NPT	XXXX – 411 09 – X – 353	XXXX – 412 09 – X – 354
	7/16-20 UNF	XXXX – 411 20 – X – 321	XXXX – 412 20 – X – 323
	9/16-18 UNF	XXXX – 411 21 – X – 322	XXXX – 412 21 – X – 324
290 - 725 ± 29.00 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	XXXX – 415 01 – X – 057	XXXX – 416 01 – X – 061
	1/4" BSPP	XXXX – 415 03 – X – 059	XXXX – 416 03 – X – 063
	1/8" NPT	XXXX – 415 04 – X – 060	XXXX – 416 04 – X – 064
	1/4" NPT	XXXX – 415 09 – X – 357	XXXX – 416 09 – X – 358
	7/16-20 UNF	XXXX – 415 20 – X – 329	XXXX – 416 20 – X – 331
	9/16-18 UNF	XXXX – 415 21 – X – 330	XXXX – 416 21 – X – 332

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 24 for the temperature range and application thresholds of sealing materials.

Your order number:	01XX – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0111 / 0113 / 0115 / 0117 / 0119 / 0123

Piston pressure switches with integrated connector

- Setting range up to 2,175 psi (150 bar)
- NC or NO, maximum operating voltage up to 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 8,700 psi (600 bar)[1)]

Plug-in types for piston pressure switches

Deutsch DT04-2P	0111 – XXX XX – X – XXX	0111 – XXX XX – X – XXX
AMP Superseal 1.5®	0113 – XXX XX – X – XXX	0113 – XXX XX – X – XXX
Packard MetriPack 280®	0115 – XXX XX – X – XXX	0115 – XXX XX – X – XXX
Deutsch DT04-3P (A+B)	0117 – XXX XX – X – XXX	0117 – XXX XX – X – XXX
AMP Junior Timer®	0119 – XXX XX – X – XXX	0119 – XXX XX – X – XXX
M12x1 DIN EN 61076-2-101-A	0123 – XXX XX – X – XXX	0123 – XXX XX – X – XXX

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|

Piston pressure switches with integrated connector

725 - 2,175 ±72.5 psi (50 - 150 ± 5 bar)	M 10x1 taper	XXXX – 419 01 – X – 009	XXXX – 420 01 – X – 013
	1/4" BSPP	XXXX – 419 03 – X – 011	XXXX – 420 03 – X – 015
	1/8" NPT	XXXX – 419 04 – X – 012	XXXX – 420 04 – X – 016
	1/4" NPT	XXXX – 419 09 – X – 311	XXXX – 420 09 – X – 312
	7/16-20 UNF	XXXX – 419 20 – X – 305	XXXX – 420 20 – X – 307
	9/16-18 UNF	XXXX – 419 21 – X – 306	XXXX – 420 21 – X – 308

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 24 for the temperature range and application thresholds of sealing materials.

Your order number:	01XX – XXX XX – X –XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.1

hex 24 integrated

0120

Diaphragm pressure switches with integrated bayonet connector

- NC or NO, maximum operating voltage up to 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1)]

Bayonet ISO 15170 (DIN 72585)

Adjustment range tolerance at room temperature	Male thread	**Order number** NO —› |:	**Order number** NC —› :|
0120 Diaphragm pressure switches with integrated connector			
1.45 - 14.5 ±2.90 psi (0.1 - 1 ±0.2 bar)	M 10x1 taper	0120 – X03 01 – X – 009	0120 – X04 01 – X – 013
	1/4" BSPP	0120 – X03 03 – X – 011	0120 – X04 03 – X – 015
	1/8" NPT	0120 – X03 04 – X – 012	0120 – X04 04 – X – 016
	1/4" NPT	0120 – X03 09 – X – 345	0120 – X04 09 – X – 346
	7/16-20 UNF	0120 – X03 20 – X – 305	0120 – X04 20 – X – 307
	9/16-18 UNF	0120 – X03 21 – X – 306	0120 – X04 21 – X – 308
7.25 - 43.5 ±4.35 psi (0.5 - 3 ±0.3 bar)	M 10x1 taper	0120 – X23 01 – X – 070	0120 – X24 01 – X – 070
	1/4" BSPP	0120 – X23 03 – X – 070	0120 – X24 03 – X – 070
	1/8" NPT	0120 – X23 04 – X – 070	0120 – X24 04 – X – 070
	1/4" NPT	0120 – X23 09 – X – 070	0120 – X24 09 – X – 070
	7/16-20 UNF	0120 – X23 20 – X – 070	0120 – X24 20 – X – 070
	9/16-18 UNF	0120 – X23 21 – X – 070	0120 – X24 21 – X – 070
14.5- 145 ±7.25 psi (1 - 10 ±0.5 bar)	M 10x1 taper	0120 – X07 01 – X – 025	0120 – X08 01 – X – 029
	1/4" BSPP	0120 – X07 03 – X – 027	0120 – X08 03 – X – 031
	1/8" NPT	0120 – X07 04 – X – 028	0120 – X08 04 – X – 032
	1/4" NPT	0120 – X07 09 – X – 349	0120 – X08 09 – X – 350
	7/16-20 UNF	0120 – X07 20 – X – 313	0120 – X08 20 – X – 315
	9/16-18 UNF	0120 – X07 21 – X – 314	0120 – X08 21 – X – 316

Coding

A1-2.1	4XX	4XX
A2-2.1	3XX	3XX
A3-2.1	2XX	2XX
A4-2.1	1XX	1XX

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 24 for the temperature range and application thresholds of sealing materials.

Your order number:	**0120 – XXX XX – X – XXX**

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0120 / 0121

Diaphragm/piston pressure switches with integrated bayonet

- NC or NO, maximum operating voltage up to 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1] for diaphragm variant
  Overpressure safety up to 8,700 psi (600 bar)[1] for piston variant

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
0120 Diaphragm pressure switches with integrated connector			
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	0120 – X11 01 – X – 041	0120 – X12 01 – X – 045
	1/4" BSPP	0120 – X11 03 – X – 043	0120 – X12 03 – X – 047
	1/8" NPT	0120 – X11 04 – X – 044	0120 – X12 04 – X – 048
	1/4" NPT	0120 – X11 09 – X – 353	0120 – X12 09 – X – 354
	7/16-20 UNF	0120 – X11 20 – X – 321	0120 – X12 20 – X – 323
	9/16-18 UNF	0120 – X11 21 – X – 322	0120 – X12 21 – X – 324
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	0120 – X15 01 – X – 057	0120 – X16 01 – X – 061
	1/4" BSPP	0120 – X15 03 – X – 059	0120 – X16 03 – X – 063
	1/8" NPT	0120 – X15 04 – X – 060	0120 – X16 04 – X – 064
	1/4" NPT	0120 – X15 09 – X – 357	0120 – X16 09 – X – 358
	7/16-20 UNF	0120 – X15 20 – X – 329	0120 – X16 20 – X – 331
	9/16-18 UNF	0120 – X15 21 – X – 330	0120 – X16 21 – X – 332
0121 Piston pressure switches with integrated connector			
725 - 2,175 ± 72.5 psi (50 - 150 ± 5.0 bar)	M 10x1 taper	0121 – X19 01 – X – 009	0121 – X20 01 – X – 013
	1/4" BSPP	0121 – X19 03 – X – 011	0121 – X20 03 – X – 015
	1/8" NPT	0121 – X19 04 – X – 012	0121 – X20 04 – X – 016
	1/4" NPT	0121 – X19 09 – X – 311	0121 – X20 09 – X – 312
	7/16-20 UNF	0121 – X19 20 – X – 305	0121 – X20 20 – X – 307
	9/16-18 UNF	0121 – X19 21 – X – 306	0121 – X20 21 – X – 308

Coding

A1-2.1	4XX	4XX
A2-2.1	3XX	3XX
A3-2.1	2XX	2XX
A4-2.1	1XX	1XX

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 24 for the temperature range and application thresholds of sealing materials.

Your order number:	012X – XXX XX – X – XXX

Coding A1-2.1

Coding A2-2.1

Coding A3-2.1

Coding A4-2.1

[1] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Technical details, contact assignment and accessories

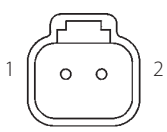
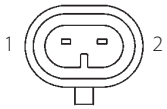
for hex 24 pressure switches with integrated connector

Please note:
Mating plugs are not included in the delivery and can be ordered separately.

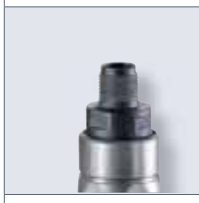
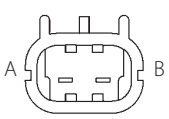
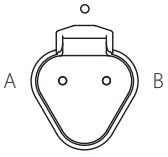
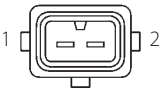
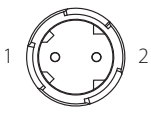
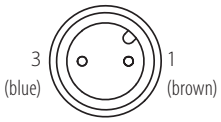
Mating plug accessories

Mating plug type ▶	Deutsch DT06-2S (für DT04-2P)	AMP-Superseal 1.5®
Including 2 m cable ▶		
Cable cross-section ▶	2 x 0.5 mm² Radox cables	2 x 0.5 mm² Radox cables
Protection class ▶	IP65	IP65
Order number ▶	**1-1-10-653-118**	**1-1-12-653-113**

Plug-in types for hex 24 diaphragm and piston pressure switches

Model / type ▶	0110 / 0111	0112 / 0113
		
Connector ▶	Deutsch DT04-2P	AMP Superseal 1.5®
Protection class ▶	IP67, IP6K9K	IP67
Overall height ▶	H ≈ 61 mm	H ≈ 61 mm
Contact assignment ▶		

Packard MetriPack 280®	Deutsch DT06-3S (für DT04-3P)	AMP Junior Timer®	Bayonet DIN 72585 / ISO 15170 A1-2.1	M12x1 DIN EN 61076-2-101-LF
				
2 x 0.5 mm² Radox cables	2 x 0.5 mm² PUR-cables	2 x 0.5 mm² Radox cables	2 x 0.5 mm² Radox cables	4 x 0.34 mm² PUR-cables
IP65	IP67	IP65	IP65	IP67
1-1-14-653-114	**1-1-36-653-160**	**1-1-18-653-116**	**1-1-20-653-112**	**1-1-00-653-162**

0114 / 0115	0116 / 0117	0118 / 0117	0120 / 0121	0122 / 0123
				
Packard MetriPack 280®	**Deutsch DT04-3P**	**AMP Junior Timer®**	**Bayonet DIN 72585/ISO 15170**	**M12x1 DIN EN 61076-2-101-A**
IP67	IP67, IP6K9K	IP65, IPx4K	IP67, IP6K9K	IP67
H ≈ 62 mm	H ≈ 63 mm	H ≈ 54 mm	H ≈ 49 mm	H ≈ 51 mm
			 Coding: A1-2.1	

M.2

hex 27 integrated

Pressure switches hex 27 with integrated connector

Snap action switch with silver or gold contacts

- Large selection of electrical plug-in types for quick attachment and reliable connection
- Differential adjustable at factory
- High protection class (up to IP67 or IP6K9K)
- Compact and rugged design in industrial environments like construction and agricultural machinery or commercial vehicles
- Switching point can be set on site with adjusting screw [1)]
- Very high overpressure safety
- The corresponding mating plugs are available as accessories (please refer to page 34)

[1)] Pressure switches can also be supplied preset at factory.
The switching point is embossed onto pressure switches preset at factory.

Pressure switches hex 27 with integrated connector

Technical data

Types:	0132 – 0137	0184 / 0185	0194 / 0195
Rated working voltage:	10 … 48 VAC/DC	10 … 250 VAC/DC	5 … 24 VDC
Rated current: (resistive load, DC12 and AC12)	10 mA … 4 A	10 mA … 4A	3 … 50 mA
Temperature resistance of sealing materials:	NBR (BunaN) (Overpressure safety up to 1,450 psi /100 bar)		-22 °F… +212 °F (-30 °C … +100 °C)
	NBR (BunaN) (Overpressure safety up to 4,350 psi /300 bar)		-40 °F… +212 °F (-40 °C … +100 °C)
	EPDM		-22 °F… +248 °F (-30 °C … +120 °C)
	FKM (Viton®) (in diaphragm pressure switch)		+23 °F… +248 °F (-5 °C … +120 °C)
	FKM (Viton®) (in piston pressure switch		+5 °F… +248 °F (-15 °C … +120 °C)
	Silicone		-40 °F… +248 °F (-40 °C … +120 °C)
	HNBR		-22 °F… +248 °F (-30 °C … +120 °C)
Switching frequency:	200 / min.		
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures to max. 725 psi (50 bar))		
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)		
Differential: (can only be set at factory)	Adjustable average value 10 … 30 % depending on type		
Vibration resistance:	10 g; 5 … 200 Hz sine wave; DIN EN 60068-2-6		
Shock resistance:	294 m/s²; 14 ms half sine wave; DIN EN 60068-2-27		
Weight:	approx. 3.52 oz (100 g)	approx. 4.58 oz (130 g)	approx. 4.58 oz (130 g)

Overview of maximum working voltage and current and contact materials

Type	0132	0133	0134	0135	0136	0137	0184	0185	0194	0195
5 … 24 VDC									●	●
10 … 48 VAC/DC	●	●	●	●	●	●				
10 … 250 VAC/DC							●	●		
3 … 50 mA									●	●
10 mA … 4 A	●	●	●	●	●	●	●	●		
Gold contacts	○	○	○	○	○	○			●	●
Silver contacts	●	●	●	●	●	●	●	●		
Adjustable differential (can only be set at factory)	●	●	●	●	●	●	●	●	●	●
Connector type	AMP Superseal 1.5®		M12x1 DIN EN 61076-2-101-A		Deutsch DT04-3P		DIN EN 175301			
Protection class	IP67		IP67		IP67, IP6K9K		IP65			

○ Available as an option

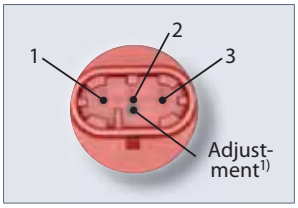
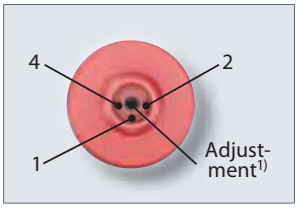
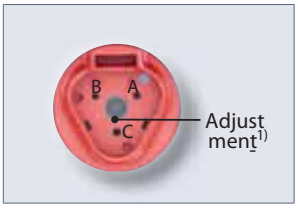
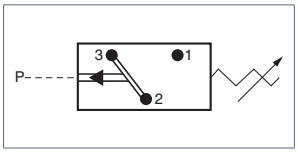
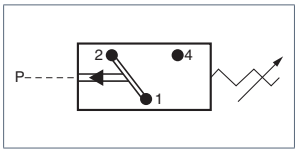
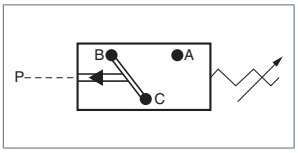
M.2

hex 27 integrated

0132 / 0133 / 0134 / 0135 / 0136 / 0137

Diaphragm/piston pressure switches with integrated connector, maximum operating voltage up to 48 V

- Simple, quick and reliable electrical connection with easy-to-fit connectors
- Quick fitting with socket wrench (spanner)
- Snap action with silver contacts (gold contacts available as option)
- Differential adjustable at factory
- Made of zinc-plated steel (CrVI-free, other housing materials available as option)

Model / type	0132 / 0133	0134 / 0135	0136 / 0137
			
	TE AMP Superseal 1.5® IP67	**M12x1 DIN EN 61076-2-101A** Contact assignment DIN 60947-5-2 IP67	**Deutsch DT04-3P®** IP67, IP6K9K
Height without thread	**L** ~ 73 mm	**L** ~ 65 mm	**L** ~ 71 mm
Contact assignments			
Circuit diagrams			

[1)] Blade of screwdriver max. 2 mm

Accessory

Not included in the delivery.

Please order separately.

Mating plug with 6.5 ft (2 m) cable

	TE AMP Superseal 1.5	M12x1 DIN EN 61076-2-101-LF	Deutsch DT06-3S®
			
Cable cross-section / IP protection	3 x 0.5 mm² Radox cable / IP65	4 x 0.34 mm² PUR cable / IP67	3 x 0.5 mm² PUR cable / IP67
Order number	**1-1-32-653-158**	**1-1-00-653-162**	**1-1-36-653-160**

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0132 / 0134 / 0136 Diaphragm pressure switches

1,450 psi[1] (100 bar)[1]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10x1 taper	013X – 457 01 – X – 001
			1/4" BSPP	013X – 457 03 – X – 003
			1/8" NPT	013X – 457 04 – X – 318
			1/4" NPT	013X – 457 09 – X – 314
			7/16-20 UNF	013X – 457 20 – X – 301
			9/16-18 UNF	013X – 457 21 – X – 302
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	M 10x1 taper	013X – 458 01 – X – 040
			1/4" BSPP	013X – 458 03 – X – 042
			1/8" NPT	013X – 458 04 – X – 343
			1/4" NPT	013X – 458 09 – X – 340
			7/16-20 UNF	013X – 458 20 – X – 341
			9/16-18 UNF	013X – 458 21 – X – 342
4,350 psi[1] (300 bar)[1]	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10x1 taper	013X – 459 01 – X – 007
			1/4" BSPP	013X – 459 03 – X – 009
			1/8" NPT	013X – 459 04 – X – 320
			1/4" NPT	013X – 459 09 – X – 316
			7/16-20 UNF	013X – 459 20 – X – 305
			9/16-18 UNF	013X – 459 21 – X – 306
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10x1 taper	013X – 461 01 – X – 010
			1/4" BSPP	013X – 461 03 – X – 012
			1/8" NPT	013X – 461 04 – X – 321
			1/4" NPT	013X – 461 09 – X – 317
			7/16-20 UNF	013X – 461 20 – X – 307
			9/16-18 UNF	013X – 461 21 – X – 308

0133 / 0135 / 0137 Piston pressure switches

8,700 psi[1] (600 bar)[1]	725 - 2,900 psi (50 - 200 bar)	± 72.5 psi (± 5.0 bar)	M 10x1 taper	013X – 460 01 – X – 001
			1/4" BSPP	013X – 460 03 – X – 003
			1/8" NPT	013X – 460 04 – X – 304
			1/4" NPT	013X – 460 09 – X – 303
			7/16-20 UNF	013X – 460 20 – X – 301
			9/16-18 UNF	013X – 460 21 – X – 302

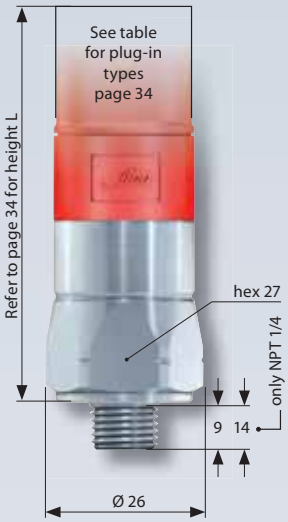
Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 33 for the temperature range and application thresholds of sealing materials.

Your order number:	013 – XXX XX – X – XXX

[1] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.



RoHSII compliant

M.2

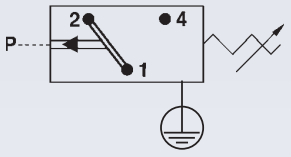
hex 27 integrated

0184

Diaphragm pressure switches up to 250 V

- Made of zinc-plated steel (CrVI-free, other housing materials available as option)
- Socket device similar to DIN EN 175301 (DIN 43650)
- Snap action with silver contacts
- Overpressure safety up to 1,450 / 4,350 psi (100 / 300 bar)[1)]
- Differential adjustable at factory

Socket device
included in the delivery



$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0184 Diaphragm pressure switches

1,450 psi[1)] (100 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10x1 taper	0184 – 457 01 – X – 001
			1/4" BSPP	0184 – 457 03 – X – 003
			1/8" NPT	0184 – 457 04 – X – 318
			1/4" NPT	0184 – 457 09 – X – 314
			7/16-20 UNF	0184 – 457 20 – X – 301
			9/16-18 UNF	0184 – 457 21 – X – 302
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	M 10x1 taper	0184 – 458 01 – X – 040
			1/4" BSPP	0184 – 458 03 – X – 042
			1/8" NPT	0184 – 458 04 – X – 343
			1/4" NPT	0184 – 458 09 – X – 340
			7/16-20 UNF	0184 – 458 20 – X – 341
			9/16-18 UNF	0184 – 458 21 – X – 342
4,350 psi[1)] (300 bar)[1)]	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10x1 taper	0184 – 459 01 – X – 007
			1/4" BSPP	0184 – 459 03 – X – 009
			1/8" NPT	0184 – 459 04 – X – 320
			1/4" NPT	0184 – 459 09 – X – 311
			7/16-20 UNF	0184 – 459 20 – X – 305
			9/16-18 UNF	0184 – 459 21 – X – 306
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10x1 taper	0184 – 461 01 – X – 010
			1/4" BSPP	0184 – 461 03 – X – 012
			1/8" NPT	0184 – 461 04 – X – 321
			1/4" NPT	0184 – 461 09 – X – 312
			7/16-20 UNF	0184 – 461 20 – X – 307
			9/16-18 UNF	0184 – 461 21 – X – 308

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 33 for the temperature range and application thresholds of sealing materials.

Your order number:	0184 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0185

Piston pressure switches up to 250 V

- Made of zinc-plated steel (CrVI-free, other housing materials available as option)
- Socket device similar to DIN EN 175301 (DIN 43650)
- Snap action with silver contacts
- Overpressure safety up to 8,700 psi (600 bar)[1)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0185 Piston pressure switches

8,700 psi[1)] (600 bar)[1)]	725 - 2,900 psi (50 - 200 bar)	± 72.5 psi (± 5.0 bar)	M 10x1 taper	0185 – 460 01 – X – 001
			1/4" BSPP	0185 – 460 03 – X – 003
			1/8" NPT	0185 – 460 04 – X – 304
			1/4" NPT	0185 – 460 09 – X – 303
			7/16-20 UNF	0185 – 460 20 – X – 301
			9/16-18 UNF	0185 – 460 21 – X – 302

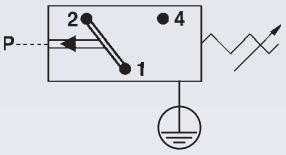
Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 33 for the temperature range and application thresholds of sealing materials.

Your order number:	0185 – 460 XX – X – XXX

Socket device
included in the delivery



[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.2

hex 27 integrated

0194

Diaphragm pressure switches up to 24 V with gold contacts

- Made of zinc-plated steel (CrVI-free)
- Socket device similar to DIN EN 175301 (DIN 43650)
- Snap action with gold contacts
- Overpressure safety up to 1,450 / 4,350 psi (100 / 300 bar)[1)]
- Differential adjustable at factory

Socket device
included in the delivery

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0194 Diaphragm pressure switches

1,450 psi[1)] (100 bar)[1)]	4.35- 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10x1 taper	0194 – 457 01 – X – 001
			1/4" BSPP	0194 – 457 03 – X – 003
			1/8" NPT	0194 – 457 04 – X – 318
			1/4" NPT	0194 – 457 09 – X – 314
			7/16-20 UNF	0194 – 457 20 – X – 301
			9/16-18 UNF	0194 – 457 21 – X – 302
	14.5 - 145 psi (1- 10bar)	± 7.25 psi (± 0.5 bar)	M 10x1 taper	0194 – 458 01 – X – 040
			1/4" BSPP	0194 – 458 03 – X – 042
			1/8" NPT	0194 – 458 04 – X – 343
			1/4" NPT	0194 – 458 09 – X – 340
			7/16-20 UNF	0194 – 458 20 – X – 341
			9/16-18 UNF	0194 – 458 21 – X – 342
4,350 psi[1)] (300 bar)[1)]	145 - 725psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10x1 taper	0194 – 459 01 – X – 007
			1/4" BSPP	0194 – 459 03 – X – 009
			1/8" NPT	0194 – 459 04 – X – 320
			1/4" NPT	0194 – 459 09 – X – 311
			7/16-20 UNF	0194 – 459 20 – X – 305
			9/16-18 UNF	0194 – 459 21 – X – 306
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10x1 taper	0194 – 461 01 – X – 010
			1/4" BSPP	0194 – 461 03 – X – 012
			1/8" NPT	0194 – 461 04 – X – 321
			1/4" NPT	0194 – 461 09 – X – 312
			7/16-20 UNF	0194 – 461 20 – X – 307
			9/16-18 UNF	0194 – 461 21 – X – 308

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 33 for the temperature range and application thresholds of sealing materials.

Your order number:	0194 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0195

Piston pressure switches up to 24 V with gold contacts

- Made of zinc-plated steel (CrVI-free)
- Socket device similar to DIN EN 175301 (DIN 43650)
- Snap action with gold contacts
- Overpressure safety up to 8,700 psi (600 bar)[1)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number
0195 Piston pressure switches				
8,700 psi[1)] (600 bar)[1)]	725 - 2,900 psi (50 - 200 bar)	± 72.5 psi (± 5.0 bar)	M 10x1 taper	0195 – 460 01 – X – 001
			1/4" BSPP	0195 – 460 03 – X – 003
			1/8" NPT	0195 – 460 04 – X – 304
			1/4" NPT	0195 – 460 09 – X – 303
			7/16-20 UNF	0195 – 460 20 – X – 301
			9/16-18 UNF	0195 – 460 21 – X – 302

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 33 for the temperature range and application thresholds of sealing materials.

Your order number:	0195 – 460 XX – X – XXX

Socket device
included in the delivery

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Pressure switches hex 24

NC or NO, maximum voltage 42 V

- Most cost-effective solution for mechanical pressure monitoring
- Stable switching point even after long use and high load
- Switching point can be adjusted when fitted on site [1)]
- High pressure resistance, compact, small switches, available as normally closed (NC) or normally open (NO)
- For solutions with integrated connectors please refer to chapter M.1, starting at page 22

[1)] Pressure switches can also be supplied preset at factory.
Our preset switches are sealed with lacquer paint, set points are embossed on the housing.

Pressure switches hex 24

Technical data

Rated working voltage:	10 … 42 VAC/DC	
Rated current range (resistive load, DC12 and AC12):	10 mA … 4 A	
Switching power DC12 / AC12:	100 W / 100 VA	
Temperature resistance of sealing materials:	NBR (BunaN)	-40 °F … +212 °F (-40 °C … +100 °C)
	EPDM	-22 °F … +248 °F (-30 °C … +120 °C)
	EPDM-W270, diaphragm	-4 °F … +212 °F (-20 °C … +100 °C)
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F … +248 °F (-5 °C … +120 °C)
	FKM (Viton®) (in piston pressure switch)	+14 °F … +248 °F (-10 °C … +120 °C)
	Silicone, diaphragm	-40 °F … +248 °F (-40 °C … +120 °C)
	HNBR	-22 °F … +248 °F (-30 °C … +120 °C)
Switching frequency:	200 / min.	
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures to max. 725 psi / 50 bar)	
Pressure rise rate:	≤ 14.5 psi/ms (1 bar/ms)	
Differential:	Average value 5 – 30 % depending on type, not adjustable	
Vibration resistance:	10 g; 5 – 200 Hz sine wave; DIN EN 60068-2-6	
Shock resistance:	294 m/s^2; 14 ms half sine wave; DIN EN 60068-2-27	
Protection class:	IP65 Terminals IP00	
Weight:	approx. 3.17 oz (90 g)	

Type:		0163	0164	0166	0167	0168	0169
Material:	Zinc-plated steel (CrVI-free)	●		●		●	●
	Stainless steel		●				
	Brass				●		
Overpressure safety up to:	35 bar				●		
	300 bar			●		●	
	600 bar	●	●				●

M.3

hex 24

0163

Diaphragm pressure switches up to 42 V with M3 screw terminal

- Made of zinc-plated steel (CrVI-free)
- M3 screw terminal
- Overpressure safety up to 8,700 psi (600 bar)[1)]

Adjustment range tolerance at room temperature	Male thread	**Order number** NO —› |:	**Order number** NC —› :|
0163 Diaphragm pressure switches with M3 screw terminal			
1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0163 – 401 01 – X – 001	0163 – 402 01 – X – 005
	1/4" BSPP	0163 – 401 03 – X – 003	0163 – 402 03 – X – 007
	1/8" NPT	0163 – 401 04 – X – 004	0163 – 402 04 – X – 008
	1/4" NPT	0163 – 401 09 – X – 343	0163 – 402 09 – X – 344
	7/16-20 UNF	0163 – 401 20 – X – 301	0163 – 402 20 – X – 303
	9/16-20 UNF	0163 – 401 21 – X – 302	0163 – 402 21 – X – 304
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0163 – 421 01 – X – 070	0163 – 422 01 – X – 070
	1/4" BSPP	0163 – 421 03 – X – 070	0163 – 422 03 – X – 070
	1/8" NPT	0163 – 421 04 – X – 070	0163 – 422 04 – X – 070
	1/4" NPT	0163 – 421 09 – X – 070	0163 – 422 09 – X – 070
	7/16-20 UNF	0163 – 421 20 – X – 070	0163 – 422 20 – X – 070
	9/16-20 UNF	0163 – 421 21 – X – 070	0163 – 422 21 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0163 – 405 01 – X – 017	0163 – 406 01 – X – 021
	1/4" BSPP	0163 – 405 03 – X – 019	0163 – 406 03 – X – 023
	1/8" NPT	0163 – 405 04 – X – 020	0163 – 406 04 – X – 024
	1/4" NPT	0163 – 405 09 – X – 347	0163 – 406 09 – X – 348
	7/16-20 UNF	0163 – 405 20 – X – 309	0163 – 406 20 – X – 311
	9/16-20 UNF	0163 – 405 21 – X – 310	0163 – 406 21 – X – 312
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	0163 – 409 01 – X – 033	0163 – 410 01 – X – 037
	1/4" BSPP	0163 – 409 03 – X – 035	0163 – 410 03 – X – 039
	1/8" NPT	0163 – 409 04 – X – 036	0163 – 410 04 – X – 040
	1/4" NPT	0163 – 409 09 – X – 351	0163 – 410 09 – X – 352
	7/16-20 UNF	0163 – 409 20 – X – 317	0163 – 410 20 – X – 319
	9/16-20 UNF	0163 – 409 21 – X – 318	0163 – 410 21 – X – 320
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	0163 – 413 01 – X – 049	0163 – 414 01 – X – 053
	1/4" BSPP	0163 – 413 03 – X – 051	0163 – 414 03 – X – 055
	1/8" NPT	0163 – 413 04 – X – 052	0163 – 414 04 – X – 056
	1/4" NPT	0163 – 413 09 – X – 355	0163 – 414 09 – X – 356
	7/16-20 UNF	0163 – 413 20 – X – 325	0163 – 414 20 – X – 327
	9/16-20 UNF	0163 – 413 21 – X – 326	0163 – 414 21 – X – 328

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	**0163 – XXX XX – X – XXX**

RoHSII compliant

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0163

Diaphragm pressure switches up to 42 V with spade terminal

- Made of zinc-plated steel (CrVI-free)
- Spade terminal
- Overpressure safety up to 8,700 psi (600 bar)[1)]

0163 Diaphragm pressure switches with spade terminal

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0163 – 403 01 – X – 009	0163 – 404 01 – X – 013
	1/4" BSPP	0163 – 403 03 – X – 011	0163 – 404 03 – X – 015
	1/8" NPT	0163 – 403 04 – X – 012	0163 – 404 04 – X – 016
	1/4" NPT	0163 – 403 09 – X – 345	0163 – 404 09 – X – 346
	7/16-20 UNF	0163 – 403 20 – X – 305	0163 – 404 20 – X – 307
	9/16-20 UNF	0163 – 403 21 – X – 306	0163 – 404 21 – X – 308
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0163 – 423 01 – X – 070	0163 – 424 01 – X – 070
	1/4" BSPP	0163 – 423 03 – X – 070	0163 – 424 03 – X – 070
	1/8" NPT	0163 – 423 04 – X – 070	0163 – 424 04 – X – 070
	1/4" NPT	0163 – 423 09 – X – 070	0163 – 424 09 – X – 070
	7/16-20 UNF	0163 – 423 20 – X – 070	0163 – 424 20 – X – 070
	9/16-20 UNF	0163 – 423 21 – X – 070	0163 – 424 21 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0163 – 407 01 – X – 025	0163 – 408 01 – X – 029
	1/4" BSPP	0163 – 407 03 – X – 027	0163 – 408 03 – X – 031
	1/8" NPT	0163 – 407 04 – X – 028	0163 – 408 04 – X – 032
	1/4" NPT	0163 – 407 09 – X – 349	0163 – 408 09 – X – 350
	7/16-20 UNF	0163 – 407 20 – X – 313	0163 – 408 20 – X – 315
	9/16-20 UNF	0163 – 407 21 – X – 314	0163 – 408 21 – X – 316
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	0163 – 411 01 – X – 041	0163 – 412 01 – X – 045
	1/4" BSPP	0163 – 411 03 – X – 043	0163 – 412 03 – X – 047
	1/8" NPT	0163 – 411 04 – X – 044	0163 – 412 04 – X – 048
	1/4" NPT	0163 – 411 09 – X – 353	0163 – 412 09 – X – 354
	7/16-20 UNF	0163 – 411 20 – X – 321	0163 – 412 20 – X – 323
	9/16-20 UNF	0163 – 411 21 – X – 322	0163 – 412 21 – X – 324
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	0163 – 415 01 – X – 057	0163 – 416 01 – X – 061
	1/4" BSPP	0163 – 415 03 – X – 059	0163 – 416 03 – X – 063
	1/8" NPT	0163 – 415 04 – X – 060	0163 – 416 04 – X – 064
	1/4" NPT	0163 – 415 09 – X – 357	0163 – 416 09 – X – 358
	7/16-20 UNF	0163 – 415 20 – X – 329	0163 – 416 20 – X – 331
	9/16-20 UNF	0163 – 415 21 – X – 330	0163 – 416 21 – X – 332

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0163 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.3

hex 24

0166

Diaphragm pressure switches up to 42 V with M3 screw terminal

- Made of zinc-plated steel (CrVI-free)
- M3 screw terminal
- Overpressure safety up to 4,350 psi (300 bar)[1)]

0166 Diaphragm pressure switches with M3 screw terminal

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0166 – 401 01 – X – 001	0166 – 402 01 – X – 005
	1/4" BSPP	0166 – 401 03 – X – 003	0166 – 402 03 – X – 007
	1/8" NPT	0166 – 401 04 – X – 004	0166 – 402 04 – X – 008
	1/4" NPT	0166 – 401 09 – X – 343	0166 – 402 09 – X – 344
	7/16-20 UNF	0166 – 401 20 – X – 301	0166 – 402 20 – X – 303
	9/16-18 UNF	0166 – 401 21 – X – 302	0166 – 402 21 – X – 304
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0166 – 421 01 – X – 070	0166 – 422 01 – X – 070
	1/4" BSPP	0166 – 421 03 – X – 070	0166 – 422 03 – X – 070
	1/8" NPT	0166 – 421 04 – X – 070	0166 – 422 04 – X – 070
	1/4" NPT	0166 – 421 09 – X – 070	0166 – 422 09 – X – 070
	7/16-20 UNF	0166 – 421 20 – X – 070	0166 – 422 20 – X – 070
	9/16-18 UNF	0166 – 421 21 – X – 070	0166 – 422 21 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0166 – 405 01 – X – 017	0166 – 406 01 – X – 021
	1/4" BSPP	0166 – 405 03 – X – 019	0166 – 406 03 – X – 023
	1/8" NPT	0166 – 405 04 – X – 020	0166 – 406 04 – X – 024
	1/4" NPT	0166 – 405 09 – X – 347	0166 – 406 09 – X – 348
	7/16-20 UNF	0166 – 405 20 – X – 309	0166 – 406 20 – X – 311
	9/16-18 UNF	0166 – 405 21 – X – 310	0166 – 406 21 – X – 312
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	0166 – 409 01 – X – 033	0166 – 410 01 – X – 037
	1/4" BSPP	0166 – 409 03 – X – 035	0166 – 410 03 – X – 039
	1/8" NPT	0166 – 409 04 – X – 036	0166 – 410 04 – X – 040
	1/4" NPT	0166 – 409 09 – X – 351	0166 – 410 09 – X – 352
	7/16-20 UNF	0166 – 409 20 – X – 317	0166 – 410 20 – X – 319
	9/16-18 UNF	0166 – 409 21 – X – 318	0166 – 410 21 – X – 320
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	0166 – 413 01 – X – 049	0166 – 414 01 – X – 053
	1/4" BSPP	0166 – 413 03 – X – 051	0166 – 414 03 – X – 055
	1/8" NPT	0166 – 413 04 – X – 052	0166 – 414 04 – X – 056
	1/4" NPT	0166 – 413 09 – X – 355	0166 – 414 09 – X – 356
	7/16-20 UNF	0166 – 413 20 – X – 325	0166 – 414 20 – X – 327
	9/16-18 UNF	0166 – 413 21 – X – 326	0166 – 414 21 – X – 328

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0166 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0166

Diaphragm pressure switches up to 42 V with spade terminal

- Made of zinc-plated steel (CrVI-free)
- Spade terminal
- Overpressure safety up to 4,350 psi (300 bar)[1)]

M.3

hex 24

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
0166 Diaphragm pressure switches with spade terminal			
1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0166 – 403 01 – X – 009	0166 – 404 01 – X – 013
	1/4" BSPP	0166 – 403 03 – X – 011	0166 – 404 03 – X – 015
	1/8" NPT	0166 – 403 04 – X – 012	0166 – 404 04 – X – 016
	1/4" NPT	0166 – 403 09 – X – 345	0166 – 404 09 – X – 346
	7/16-20 UNF	0166 – 403 20 – X – 305	0166 – 404 20 – X – 307
	9/16-18 UNF	0166 – 403 21 – X – 306	0166 – 404 21 – X – 308
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0166 – 423 01 – X – 070	0166 – 424 01 – X – 070
	1/4" BSPP	0166 – 423 03 – X – 070	0166 – 424 03 – X – 070
	1/8" NPT	0166 – 423 04 – X – 070	0166 – 424 04 – X – 070
	1/4" NPT	0166 – 423 09 – X – 070	0166 – 424 09 – X – 070
	7/16-20 UNF	0166 – 423 20 – X – 070	0166 – 424 20 – X – 070
	9/16-18 UNF	0166 – 423 21 – X – 070	0166 – 424 21 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0166 – 407 01 – X – 025	0166 – 408 01 – X – 029
	1/4" BSPP	0166 – 407 03 – X – 027	0166 – 408 03 – X – 031
	1/8" NPT	0166 – 407 04 – X – 028	0166 – 408 04 – X – 032
	1/4" NPT	0166 – 407 09 – X – 349	0166 – 408 09 – X – 350
	7/16-20 UNF	0166 – 407 20 – X – 313	0166 – 408 20 – X – 315
	9/16-18 UNF	0166 – 407 21 – X – 314	0166 – 408 21 – X – 316
145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	0166 – 411 01 – X – 041	0166 – 412 01 – X – 045
	1/4" BSPP	0166 – 411 03 – X – 043	0166 – 412 03 – X – 047
	1/8" NPT	0166 – 411 04 – X – 044	0166 – 412 04 – X – 048
	1/4" NPT	0166 – 411 09 – X – 353	0166 – 412 09 – X – 354
	7/16-20 UNF	0166 – 411 20 – X – 321	0166 – 412 20 – X – 323
	9/16-18 UNF	0166 – 411 21 – X – 322	0166 – 412 21 – X – 324
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	0166 – 415 01 – X – 057	0166 – 416 01 – X – 061
	1/4" BSPP	0166 – 415 03 – X – 059	0166 – 416 03 – X – 063
	1/8" NPT	0166 – 415 04 – X – 060	0166 – 416 04 – X – 064
	1/4" NPT	0166 – 415 09 – X – 357	0166 – 416 09 – X – 358
	7/16-20 UNF	0166 – 415 20 – X – 329	0166 – 416 20 – X – 331
	9/16-18 UNF	0166 – 415 21 – X – 330	0166 – 416 21 – X – 332

AMP 6.3 x 0.8
Galvanically tin-plated

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0166 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0168

Diaphragm pressure switches up to 42 V

- Made of zinc-plated steel (CrVI-free)
- Spade or M3 screw terminal
- Overpressure safety up to 4,350 psi (300 bar)[1)]
- With female thread for compression-type fitting to DIN 2353

Adjustment range tolerance at room temperature	Female thread	Order number NO —› |:	Order number NC —› :|

0168 Diaphragm pressure switches with M3 screw terminal

1.45 – 14.5 ±2.90 psi (0.1 – 1 ±0.2 bar)	M 12x1.5 female DIN 2353	0168 – 401 16 – X – 001	0168 – 402 16 – X – 002
7.25 – 43.5 ±4.35 psi (0.5 – 3 ±0.3 bar)		0168 – 421 16 – X – 070	0168 – 422 16 – X – 070
14.5– 145 ±7.25 psi (1– 10 ±0.5 bar)		0168 – 405 16 – X – 005	0168 – 406 16 – X – 006
145 – 290 ±14.5 psi (10 – 20 ±1.0 bar)		0168 – 409 16 – X – 009	0168 – 410 16 – X – 010
290 – 725 ±29.0 psi (20 – 50 ±2.0 bar)		0168 – 413 16 – X – 013	0168 – 414 16 – X – 014

0168 Diaphragm pressure switches with spade terminal

1.45 – 14.5 ±2.90 psi (0.1 – 1 ±0.2 bar)	M 12x1.5 female DIN 2353	0168 – 403 16 – X – 003	0168 – 404 16 – X – 004
7.25 – 43.5 ±4.35 psi (0.5 – 3 ±0.3 bar)		0168 – 423 16 – X – 070	0168 – 424 16 – X – 070
14.5– 145 ±7.25 psi (1– 10 ±0.5 bar)		0168 – 407 16 – X – 007	0168 – 408 16 – X – 008
145 – 290 ±14.5 psi (10 – 20 ±1.0 bar)		0168 – 411 16 – X – 011	0168 – 412 16 – X – 012
290 – 725 ±29.0 psi (20 – 50 ±2.0 bar)		0168 – 415 16 – X – 015	0168 – 416 16 – X – 016

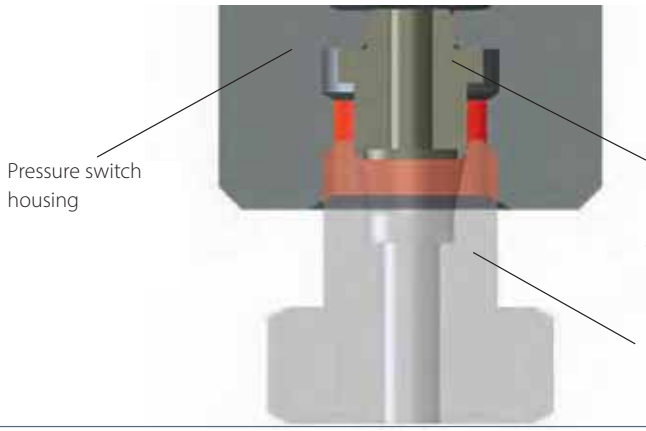
Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0168 – XXX XX – X –XXX

Seal type 0168
Insert with counter-piece



[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0169

Piston pressure switches up to 42 V

- Made of zinc-plated steel (CrVI-free)
- Spade or M3 screw terminal
- Overpressure safety up to 8,700 psi (600 bar)[1)]

Adjustment range tolerance at room temperature	Male thread	**Order number** NO —› |:	**Order number** NC —› :|

0169 Piston pressure switches with M3 screw terminal

725 - 2,175 ± 72.5 psi (50 - 150 ± 5 bar)	M 10x1 taper	0169 – 417 01 – X – 001	0169 – 418 01 – X – 005
	M 12x1.5	0169 – 417 02 – X – 002	0169 – 418 02 – X – 006
	1/4" BSPP	0169 – 417 03 – X – 003	0169 – 418 03 – X – 007
	1/8" NPT	0169 – 417 04 – X – 004	0169 – 418 04 – X – 008
	1/4" NPT	0169 – 417 09 – X – 309	0169 – 418 09 – X – 310
	7/16-20 UNF	0169 – 417 20 – X – 301	0169 – 418 20 – X – 303
	9/16-18 UNF	0169 – 417 21 – X – 302	0169 – 418 21 – X – 304

0169 Piston pressure switches with spade terminal

725 - 2,175 ± 72.5 psi (50 - 150 ± 5 bar)	M 10x1 taper	0169 – 419 01 – X – 009	0169 – 420 01 – X – 013
	M 12x1.5	0169 – 419 02 – X – 010	0169 – 420 02 – X – 014
	1/4" BSPP	0169 – 419 03 – X – 011	0169 – 420 03 – X – 015
	1/8" NPT	0169 – 419 04 – X – 012	0169 – 420 04 – X – 016
	1/4" NPT	0169 – 419 09 – X – 311	0169 – 420 09 – X – 312
	7/16-20 UNF	0169 – 419 20 – X – 305	0169 – 420 20 – X – 307
	9/16-18 UNF	0169 – 419 21 – X – 306	0169 – 420 21 – X – 308

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	**0169 – XXX XX – X – XXX**

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.3

hex 24

0164

Diaphragm pressure switches up to 42 V with stainless steel housing

- Stainless steel housing (AISI 303 / 1.4305)
- Spade or M3 screw terminal
- Overpressure safety up to 8,700 psi (600 bar)[1)]
  (EPDM-W270 and silicone diaphragm up to 500 psi (35 bar))[2)]

0164 Diaphragm pressure switches with M3 screw terminal

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
1.45 - 14.5 ± 2.90 psi (0.1 – 1 ± 0.2 bar)	1/8" BSPPT	0164 – 401 12 – X – 001	0164 – 402 12 – X – 002
	1/4" BSPP-E	0164 – 401 41 – X – 001	0164 – 402 41 – X – 002
	1/4" BSPT	0164 – 401 46 – X – 001	0164 – 402 46 – X – 002
7.25 - 43.5 ± 4.35 psi (0.5 – 3 ± 0.3 bar)	1/8" BSPT	0164 – 421 12 – X – 070	0164 – 422 12 – X – 070
	1/4" BSPP-E	0164 – 421 41 – X – 070	0164 – 422 41 – X – 070
	1/4" BSPT	0164 – 421 46 – X – 070	0164 – 422 46 – X – 070
14.5 - 145 ± 7.25 psi (1 – 10 ± 0.5 bar)	1/8" BSPT	0164 – 405 12 – X – 005	0164 – 406 12 – X – 006
	1/4" BSPP-E	0164 – 405 41 – X – 005	0164 – 406 41 – X – 006
	1/4" BSPT	0164 – 405 46 – X – 005	0164 – 406 46 – X – 006
145 - 290 ± 14.5 psi (10 – 20 ± 1 bar)	1/8" BSPT	0164 – 409 12 – X – 009	0164 – 410 12 – X – 010
	1/4" BSPP-E	0164 – 409 41 – X – 009	0164 – 410 41 – X – 010
	1/4" BSPT	0164 – 409 46 – X – 009	0164 – 410 46 – X – 010
290 - 725 ± 29.0 psi (20 – 50 ± 2 bar)	1/8" BSPT	0164 – 413 12 – X – 013	0164 – 414 12 – X – 014
	1/4" BSPP-E	0164 – 413 41 – X – 013	0164 – 414 41 – X – 014
	1/4" BSPT	0164 – 413 46 – X – 013	0164 – 414 46 – X – 014

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water (p_{max} ≤ 500 psi / 35 bar)	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (p_{max} ≤ 500 psi / 35 bar)	8
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0164 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

[2)] Overpressure safety of pressure switch up to 600 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-W270 and silicone.

RoHS II compliant

0164

Diaphragm pressure switches up to 42 V with stainless steel housing

- Stainless steel housing (AISI 303 / 1.4305)
- Spade or M3 screw terminal
- Overpressure safety up to 8,700 psi (600 bar)[1)]
  (EPDM-W270 and silicone diaphragm up to 500 psi (35 bar))[2)]

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
0164 Diaphragm pressure switches with spade terminal			
1.45 - 14.5 ± 2.90 psi (0.1 – 1 ± 0.2 bar)	1/8" BSPPT	0164 – 403 12 – X – 003	0164 – 404 12 – X – 004
	1/4" BSPP-E	0164 – 403 41 – X – 003	0164 – 404 41 – X – 004
	1/4" BSPT	0164 – 403 46 – X – 003	0164 – 404 46 – X – 004
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	1/8" BSPPT	0164 – 423 12 – X – 070	0164 – 424 12 – X – 070
	1/4" BSPP-E	0164 – 423 41 – X – 070	0164 – 424 41 – X – 070
	1/4" BSPT	0164 – 423 46 – X – 070	0164 – 424 46 – X – 070
14.5 - 145 ± 7.25 psi (1 – 10 ± 0.5 bar)	1/8" BSPPT	0164 – 407 12 – X – 007	0164 – 408 12 – X – 008
	1/4" BSPP-E	0164 – 407 41 – X – 007	0164 – 408 41 – X – 008
	1/4" BSPT	0164 – 407 46 – X – 007	0164 – 408 46 – X – 008
145 - 290 ± 14.5 psi (10 – 20 ± 1 bar)	1/8" BSPPT	0164 – 411 12 – X – 011	0164 – 412 12 – X – 012
	1/4" BSPP-E	0164 – 411 41 – X – 011	0164 – 412 41 – X – 012
	1/4" BSPT	0164 – 411 46 – X – 011	0164 – 412 46 – X – 012
290 - 725 ± 29.0 psi (20 – 50 ± 2 bar)	1/8" BSPPT	0164 – 415 12 – X – 015	0164 – 416 12 – X – 016
	1/4" BSPP-E	0164 – 415 41 – X – 015	0164 – 416 41 – X – 016
	1/4" BSPT	0164 – 415 46 – X – 015	0164 – 416 46 – X – 016

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water (p_{max} ≤ 500 psi / 35 bar)	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (p_{max} ≤ 500 psi / 35 bar)	8
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0164 – XXX XX – X –XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

[2)] Overpressure safety of pressure switch up to 600 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-W270 and silicone.

RoHSII compliant

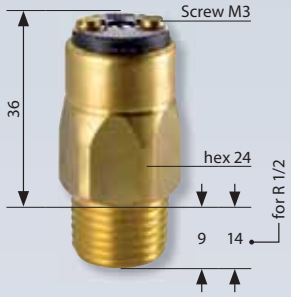
M.3

hex 24

0167

Diaphragm pressure switches up to 42 V with brass housing

- Brass housing
- M3 screw terminal
- Overpressure safety up to 500 psi (35 bar)[1)]



Adjustment range tolerance at room temperature	Male thread	**Order number** NO —› |:	**Order number** NC —› :|

0167 Diaphragm pressure switches with M3 screw terminal

1.45 - 14.5 ± 2.9 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0167 – 401 01 – X – 001	0167 – 402 01 – X – 004
	1/8" BSPT	0167 – 401 12 – X – 002	0167 – 402 12 – X – 005
	1/2" BSPT	0167 – 401 07 – X – 003	0167 – 402 07 – X – 006
	1/4" BSPP	0167 – 401 03 – X – 037	0167 – 402 03 – X – 038
	1/8" BSPP	0167 – 401 28 – X – 001	0167 – 402 28 – X – 002
	1/8" NPT	0167 – 401 04 – X – 004	0167 – 402 04 – X – 008
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0167 – 421 01 – X – 070	0167 – 422 01 – X – 070
	1/8" BSPT	0167 – 421 12 – X – 070	0167 – 422 12 – X – 070
	1/2" BSPT	0167 – 421 07 – X – 070	0167 – 422 07 – X – 070
	1/4" BSPP	0167 – 421 03 – X – 070	0167 – 422 03 – X – 070
	1/8" BSPP	0167 – 421 28 – X – 070	0167 – 422 28 – X – 070
	1/8" NPT	0167 – 421 04 – X – 070	0167 – 422 04 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0167 – 405 01 – X – 013	0167 – 406 01 – X – 016
	1/8" BSPT	0167 – 405 12 – X – 014	0167 – 406 12 – X – 017
	1/2" BSPT	0167 – 405 07 – X – 015	0167 – 406 07 – X – 018
	1/4" BSPP	0167 – 405 03 – X – 041	0167 – 406 03 – X – 042
	1/8" BSPP	0167 – 405 28 – X – 005	0167 – 406 28 – X – 006
	1/8" NPT	0167 – 405 04 – X – 020	0167 – 406 04 – X – 024
145 - 290 ± 14.5 psi (10 - 20 ± 1 bar)	M 10x1 taper	0167 – 409 01 – X – 025	0167 – 410 01 – X – 028
	1/8" BSPT	0167 – 409 12 – X – 026	0167 – 410 12 – X – 029
	1/2" BSPT	0167 – 409 07 – X – 027	0167 – 410 07 – X – 030
	1/4" BSPP	0167 – 409 03 – X – 045	0167 – 410 03 – X – 046
	1/8" BSPP	0167 – 409 28 – X – 009	0167 – 410 28 – X – 010
	1/8" NPT	0167 – 409 04 – X – 036	0167 – 410 04 – X – 040

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc.	8

Refer to page 41 for the temperature range and application thresholds of sealing materials.

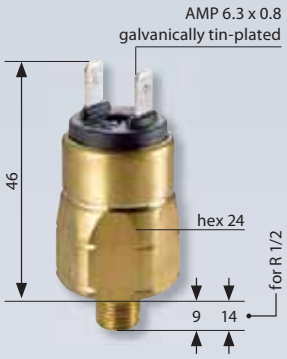
Your order number:	**0167 – XXX XX – X – XXX**

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0167

Diaphragm pressure switches up to 42 V with brass housing

- Brass housing
- Spade terminal
- Overpressure safety up to 500 psi (35 bar)[1)]



0167 Diaphragm pressure switches with spade terminal

Adjustment range tolerance at room temperature	Male thread	Order number NO —› |:	Order number NC —› :|
1.45 - 14.5 ± 2.9 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	0167 – 403 01 – X – 007	0167 – 404 01 – X – 010
	1/8" BSPT	0167 – 403 12 – X – 008	0167 – 404 12 – X – 011
	1/2" BSPT	0167 – 403 07 – X – 009	0167 – 404 07 – X – 012
	1/4" BSPP	0167 – 403 03 – X – 039	0167 – 404 03 – X – 040
	1/8" BSPP	0167 – 403 28 – X – 003	0167 – 404 28 – X – 004
	1/8" NPT	0167 – 403 04 – X – 012	0167 – 404 04 – X – 016
7.25 - 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	0167 – 423 01 – X – 070	0167 – 424 01 – X – 070
	1/8" BSPT	0167 – 423 12 – X – 070	0167 – 424 12 – X – 070
	1/2" BSPT	0167 – 423 07 – X – 070	0167 – 424 07 – X – 070
	1/4" BSPP	0167 – 423 03 – X – 070	0167 – 424 03 – X – 070
	1/8" BSPP	0167 – 423 28 – X – 070	0167 – 424 28 – X – 070
	1/8" NPT	0167 – 423 04 – X – 070	0167 – 424 04 – X – 070
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	0167 – 407 01 – X – 019	0167 – 408 01 – X – 022
	1/8" BSPT	0167 – 407 12 – X – 020	0167 – 408 12 – X – 023
	1/2" BSPT	0167 – 407 07 – X – 021	0167 – 408 07 – X – 024
	1/4" BSPP	0167 – 407 03 – X – 043	0167 – 408 03 – X – 044
	1/8" BSPP	0167 – 407 28 – X – 007	0167 – 408 28 – X – 008
	1/8" NPT	0167 – 407 04 – X – 028	0167 – 408 04 – X – 032
145 - 290 ± 14.5 psi (10 - 20 ± 1 bar)	M 10x1 taper	0167 – 411 01 – X – 031	0167 – 412 01 – X – 034
	1/8" BSPT	0167 – 411 12 – X – 032	0167 – 412 12 – X – 035
	1/2" BSPT	0167 – 411 07 – X – 033	0167 – 412 07 – X – 036
	1/4" BSPP	0167 – 411 03 – X – 047	0167 – 412 03 – X – 048
	1/8" BSPP	0167 – 411 28 – X – 011	0167 – 412 28 – X – 012
	1/8" NPT	0167 – 411 04 – X – 044	0167 – 412 04 – X – 048

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc.	8

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	0167 – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Pressure switches hex 27

Snap action with silver or gold contacts

- Switching point can be adjusted when fitted on site [1)]
- Factory adjustable differential (except types 0140 and 0141)
- High overpressure safety and long service life under harsh conditions
- Operating voltage up to 250 V
- Series 0140 / 0141 with protective insulation ⧈
- For ready-wired customized versions refer to chapter M.5, starting at page 62
- For pressure switches with integrated connectors refer to chapter M.2, starting at page 32

[1)] Pressure switches can also be supplied preset at factory.
Our preset switches are sealed with lacquer paint, set points are embossed on the housing.

Pressure switches hex 27

Technical data

Temperature resistance of sealing materials:	NBR (BunaN) (max. overpressure up to 1,450 psi (100 bar))	-22 °F . . .+212 °F	(-30 °C . . .+100 °C)
	NBR (BunaN) (max. overpressure up to 4,350 psi (300/600 bar))	-40 °F . . .+212 °F	(-40 °C . . .+100 °C)
	EPDM	-22 °F . . .+248 °F	(-30 °C . . .+120 °C)
	EPDM-W270 (in diaphragm pressure switch)	-4 °F . . .+212 °F	(-20 °C . . .+100 °C)
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F . . .248 °F	(-5 °C . . .+120 °C)
	FKM (Viton®) (in piston pressure switch)	+5°F . . .+248 °F	(-15 °C . . .+120 °C)
	Silicone (in diaphragm pressure switch)	-40 °F . . .+248 °F	(-40 °C . . .+120 °C)
	HNBR	-22 °F . . .+248 °F	(-30 °C . . .+120 °C)
Switching frequency:	200 / min.		
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures to max. 50 bar)		
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)		
Differential (only adjustable at factory):	Adjustable average value 10 … 30 % depending on type Types 0140 and 0141 cannot be adjusted		
Vibration resistance:	10 g; 5 … 200 Hz sine wave; DIN EN 60068-2-6		
Shock resistance:	294 m / s ^{2}; 14 ms half sine wave; DIN EN 60068-2-6, DIN EN 60068-2-29		
Protection class:	IP65 with socket device, terminals IP00		
Weight:	approx. 3.5 oz (100 g)		

Switching performance and materials overview

Type	0140	0141	0170	0171	0180	0181	0183	0186	0187	0190	0191	0196	0197
5 … 24 VDC										●	●	●	●
10 … 42 VAC/DC			●	●									
10 … 250 VAC/DC	●	●			●	●	●	●	●				
3 … 50 mA										●	●	●	●
10 mA … 2 A	●	●											
10 mA … 4 A			●	●	●	●	●	●	●				
Gold contacts										●	●	●	●
Silver contacts	●	●	●	●	●	●	●	●	●				
Adjustable differential			●	●	●	●	●	●	●	●	●	●	●
Zinc-plated steel (CrVI-free)	●	●	●	●	●	●	●			●	●		
Stainless steel 1.4305								●	●			●	●

Pressure switches hex 27

Electrical values

0140 / 0141		
Rated working voltage U_e	Rated working current I_e	Usage category[1)]
250 VAC 50 / 60 Hz	2 A	AC 12
24 VDC	2 / 1 A	DC 12 / DC 13
50 VDC	1 / 0.5 A	DC 12 / DC 13
75 VDC	0.5 / 0.25 A	DC 12 / DC 13
125 VDC	0.2 / 0.1 A	DC 12 / DC 13
250 VDC	0.15 / 0.1 A	DC 12 / DC 13
Rated insulation voltage U_i:	300 V	
Rated impulse withstand voltage U_{imp}:	4 kV	
Conventional thermal current I_{the}:	5 A	
Switching overvoltage:	< 2.5 kV	
Rated frequency:	DC and 50 / 60 Hz	
Nominal current of short-circuit mechanism:	to 3.5 A	
Rated short-circuit current:	< 350 A	
IP class of protection according to EN60529:1991+A1:1999:	IP65 with connector	
Tightening torque of terminal screws:	< 0.35 Nm	
Connector cross-section:	0.5 – 1.5 mm^2	

0170 / 0171 / 0180 / 0181 / 0183 / 0186 / 0187 / 0190 / 0191 / 0196 / 0197		
Rated working voltage U_e	Rated working current I_e	Usage category[1)]
250 VAC 50 / 60 Hz	4 A	AC 12
250 VAC 50 / 60 Hz	1 A	AC 14
24 VDC	4 / 2 A	DC 12 / DC 13
50 VDC	2 / 1 A	DC 12 / DC 13
75 VDC	1 / 0.5 A	DC 12 / DC 13
125 VDC	0.3 / 0.2 A	DC 12 / DC 13
250 VDC	0.25 / 0.2 A	DC 12 / DC 13
Rated insulation voltage U_i:	300 V	
Rated impulse withstand voltage U_{imp}:	2.5 kV	
Conventional thermal current I_{the}:	5 A	
Switching overvoltage:	< 2.5 kV	
Rated frequency:	DC and 50 / 60 Hz	
Nominal current of short-circuit mechanism:	to 5 A	
Rated short-circuit current:	< 350 A	
IP-Protection class nach EN60529:1991+A1:1999:	IP65 with connector	

[1)] For technical explanations refer to page 9

0140 / 0141

Diaphragm / piston pressure switches 250 V

- Protection class 2, protective insulation ⧈
- Zinc-plated steel (CrVI-free)
- Snap action with silver contacts
- Overpressure safety up to 4,350 / 8,700 psi (300 / 600 bar)[1)]
- Includes polyamide cap, protection class IP65

$P_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0140 Diaphragm pressure switches with screw terminals

4,350 psi[1)] (300 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	1/4" BSPP	0140 – 457 03 – X – 003
			1/8" NPT	0140 – 457 04 – X – 300
			1/4" NPT	0140 – 457 09 – X – 305
			7/16-20 UNF	0140 – 457 20 – X – 310
			9/16-18 UNF	0140 – 457 21 – X – 315
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	1/4" BSPP	0140 – 458 03 – X – 006
			1/8" NPT	0140 – 458 04 – X – 301
			1/4" NPT	0140 – 458 09 – X – 306
			7/16-20 UNF	0140 – 458 20 – X – 311
			9/16-18 UNF	0140 – 458 21 – X – 316
	145 - 290 psi (10 - 20 bar)	± 14.50 psi (± 1.0 bar)	1/4" BSPP	0140 – 459 03 – X – 009
			1/8" NPT	0140 – 459 04 – X – 302
			1/4" NPT	0140 – 459 09 – X – 307
			7/16-20 UNF	0140 – 459 20 – X – 312
			9/16-18 UNF	0140 – 459 21 – X – 317
	290 - 725 psi (20 - 50 bar)	± 29 psi (± 2.0 bar)	1/4" BSPP	0140 – 461 03 – X – 012
			1/8" NPT	0140 – 461 04 – X – 303
			1/4" NPT	0140 – 461 09 – X – 308
			7/16-20 UNF	0140 – 461 20 – X – 313
			9/16-18 UNF	0140 – 461 21 – X – 318

0141 Piston pressure switches with screw terminals

8,700 psi[1)] (600 bar)[1)]	725 – 2,175 psi (50 - 150 bar)	± 72.5 psi (±5.0 bar)	1/4" BSPP	0141 – 460 03 – X – 003
			NPT 1/8	0141 – 460 04 – X – 304
			NPT 1/4	0141 – 460 09 – X – 309
			7/16-20 UNF	0141 – 460 20 – X – 314
			9/16-18 UNF	0141 – 460 21 – X – 319

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	014X – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0170 / 0171

Diaphragm / piston pressure switches up to 42 V

- Zinc-plated steel (CrVI-free)
- Snap action with silver contacts
- Overpressure safety up to 1,450 / 4,350 / 8,700 psi (100 / 300 / 600 bar)[1)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0170 Diaphragm pressure switches with spade terminal

1,450 psi[1)] (100 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10x1 taper	0170 – 457 01 – X – 001
			1/4" BSPP	0170 – 457 03 – X – 003
			1/8" NPT	0170 – 457 04 – X – 318
			1/4" NPT	0170 – 457 09 – X – 314
			7/16-20 UNF	0170 – 457 20 – X – 301
			9/16-18 UNF	0170 – 457 21 – X – 302
4,350 psi[1)] (300 bar)[1)]	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	M 10x1 taper	0170 – 458 01 – X – 004
			1/4" BSPP	0170 – 458 03 – X – 006
			1/8" NPT	0170 – 458 04 – X – 343
			1/4" NPT	0170 – 458 09 – X – 340
			7/16-20 UNF	0170 – 458 20 – X – 341
			9/16-18 UNF	0170 – 458 21 – X – 342
	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10x1 taper	0170 – 459 01 – X – 007
			1/4" BSPP	0170 – 459 03 – X – 009
			1/8" NPT	0170 – 459 04 – X – 320
			1/4" NPT	0170 – 459 09 – X – 316
			7/16-20 UNF	0170 – 459 20 – X – 305
			9/16-18 UNF	0170 – 459 21 – X – 306
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10x1 taper	0170 – 461 01 – X – 010
			1/4" BSPP	0170 – 461 03 – X – 012
			1/8" NPT	0170 – 461 04 – X – 321
			1/4" NPT	0170 – 461 09 – X – 317
			7/16-20 UNF	0170 – 461 20 – X – 307
			9/16-18 UNF	0170 – 461 21 – X – 308

0171 Piston pressure switches with spade terminal

8,700 psi[1)] (600 bar)[1)]	725 - 2,900 psi (50 - 200 bar)	± 72.5 psi (± 5.0 bar)	M 10x1 taper	0171 – 460 01 – X – 001
			1/4" BSPP	0171 – 460 03 – X – 003
			1/8" NPT	0171 – 460 04 – X – 304
			1/4" NPT	0171 – 460 09 – X – 303
			7/16-20 UNF	0171 – 460 20 – X – 301
			9/16-18 UNF	0171 – 460 21 – X – 302

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	017X – XXX XX – X – XXX

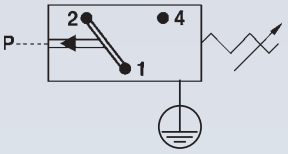
[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0180 / 0181

Diaphragm / piston pressure switches up to 250 V

- Zinc-plated steel (CrVI-free)
- Snap action with silver contacts
- Overpressure safety up to 1,450 / 4,350 / 8,700 psi (100 / 300 / 600 bar)[1)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number
0180 Diaphragm pressure switches with spade terminal				
1,450 psi[1)] (100 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10x1 taper	0180 – 457 01 – X – 001
			1/4" BSPP	0180 – 457 03 – X – 003
			1/8" NPT	0180 – 457 04 – X – 318
			1/4" NPT	0180 – 457 09 – X – 314
			7/16-20 UNF	0180 – 457 20 – X – 301
			9/16-18 UNF	0180 – 457 21 – X – 302
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	M 10x1 taper	0180 – 458 01 – X – 040
			1/4" BSPP	0180 – 458 03 – X – 042
			1/8" NPT	0180 – 458 04 – X – 343
			1/4" NPT	0180 – 458 09 – X – 340
			7/16-20 UNF	0180 – 458 20 – X – 341
			9/16-18 UNF	0180 – 458 21 – X – 342
4,350 psi[1)] (300 bar)[1)]	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10x1 taper	0180 – 459 01 – X – 007
			1/4" BSPP	0180 – 459 03 – X – 009
			1/8" NPT	0180 – 459 04 – X – 320
			1/4" NPT	0180 – 459 09 – X – 311
			7/16-20 UNF	0180 – 459 20 – X – 305
			9/16-18 UNF	0180 – 459 21 – X – 306
	145 - 1,450 psi (10- 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10x1 taper	0180 – 461 01 – X – 010
			1/4" BSPP	0180 – 461 03 – X – 012
			1/8" NPT	0180 – 461 04 – X – 321
			1/4" NPT	0180 – 461 09 – X – 312
			7/16-20 UNF	0180 – 461 20 – X – 307
			9/16-18 UNF	0180 – 461 21 – X – 308
0181 Piston pressure switches with spade terminal				
8,700 psi[1)] (600 bar)[1)]	725 - 2,900 psi (50 - 200 bar)	± 72.5 psi (± 5.0 bar)	M 10x1 taper	0181 – 460 01 – X – 001
			1/4" BSPP	0181 – 460 03 – X – 003
			1/8" NPT	0181 – 460 04 – X – 304
			1/4" NPT	0181 – 460 09 – X – 303
			7/16-20 UNF	0181 – 460 20 – X – 301
			9/16-18 UNF	0181 – 460 21 – X – 302



Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	018X – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

M.4

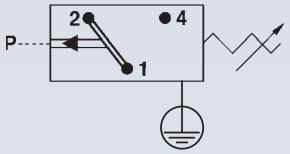
hex 27

0183

Piston pressure switches up to 250 V

- Zinc-plated steel (CrVI-free)
- Snap action with silver contacts
- Overpressure safety up to 8,700 psi (600 bar)[1], Differential adjustable at factory
- Adjustment range: 1,450 - 5,800 psi (100 – 400 bar)
- Height only 51 mm

Thread similar to ISO 6149-3
(including O-ring for sealing)



$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number
0183 Piston pressure switches with spade terminal				
8,700 psi[1] (600 bar)[1]	1,450 - 4,350 psi (100 - 300 bar)	± 145 psi (±10.0 bar)	M 14x1.5	0183 – 462 45 – X – 051
	2,900 - 5,800 psi (200 - 400 bar)			0183 – 463 45 – X – 061

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	0183 – 462 45 – X – XXX

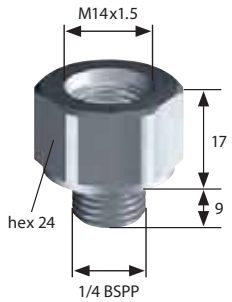
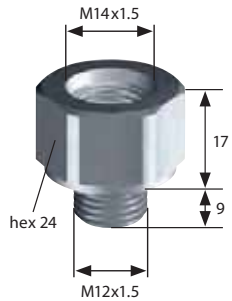
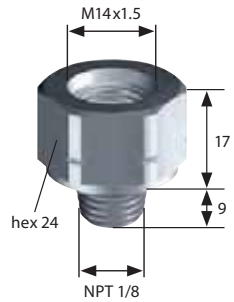
[1] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Accessory

Not included in the delivery.
Please order separately.

Thread adapters

from **M 14 x 1.5**

to **1/4 BSPP**	to **M12 x 1.5**	to **NPT 1/8**
		
Order number	**1-1-83-420-006**	**1-1-83-420-007**	**1-1-83-420-008**

0186 / 0187

Diaphragm / piston pressure switches up to 250 V with stainless steel housing

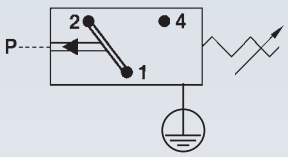
- Stainless steel housing (AISI 303 / 1.4305)
- Snap action with silver contacts
- Overpressure safety up to 4,350 / 8,700 psi (300 / 600 bar)[1)]
  (EPDM-W270 and silicone diaphragm up to 500 psi / 35 bar)[2)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number
0186 Diaphragm pressure switches with spade terminal				
4,350 psi [1)+2)] (300 bar)[1)+2)]	7.25 - 72.5 psi (0.5 - 5 bar)	± 4.35 psi (± 0.3 bar)	1/4 BSPP	0186 – 457 03 – X – 003
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)		0186 – 458 03 – X – 006
	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)		0186 – 459 03 – X – 009
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)		0186 – 461 03 – X – 012
0187 Piston pressure switch with spade terminal				
8,700 psi [1)] (600 bar)[1)]	725- 2,900 psi (50 - 200 bar)	± 7.25 psi (± 0.5 bar)	1/4 BSPP	0187 – 460 03 – X – 003

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water (only in diaphragm, p_{max} ≤ 500 psi / 35 bar)	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (only in diaphragm, p_{max} ≤ 500 psi / 35 bar)	8
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.



Your order number:	018X – XXX 03 – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

[2)] Overpressure safety of diaphragm pressure switch up to 300 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-W270 and silicone.

0190 / 0191

Diaphragm / piston pressure switches up to 24 V with gold contacts

- Zinc-plated steel (CrVI-free), with spade terminal
- Snap action with gold contacts
- Overpressure safety up to 1,450 / 4,350 / 8,700 psi (100 / 300 / 600 bar)[1)]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0190 Diaphragm pressure switches with spade terminal

1,450 psi [1)] (100 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	M 10 x1 taper	0190 – 457 01 – X – 001
			1/4" BSPP	0190 – 457 03 – X – 003
			1/8" NPT	0190 – 457 04 – X – 318
			1/4" NPT	0190 – 457 09 – X – 314
			7/16-20 UNF	0190 – 457 20 – X – 301
			9/16/18 UNF	0190 – 457 21 – X – 302
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)	M 10 x1 taper	0190 – 458 01 – X – 040
			1/4" BSPP	0190 – 458 03 – X – 042
			1/8" NPT	0190 – 458 04 – X – 343
			1/4" NPT	0190 – 458 09 – X – 340
			7/16-20 UNF	0190 – 458 20 – X – 341
			9/16/18 UNF	0190 – 458 21 – X – 342
4,350 psi [1)] (300 bar)[1)]	145- 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)	M 10 x1 taper	0190 – 459 01 – X – 007
			1/4" BSPP	0190 – 459 03 – X – 009
			1/8" NPT	0190 – 459 04 – X – 320
			1/4" NPT	0190 – 459 09 – X – 316
			7/16-20 UNF	0190 – 459 20 – X – 305
			9/16/18 UNF	0190 – 459 21 – X – 306
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	M 10 x1 taper	0190 – 461 01 – X – 010
			1/4" BSPP	0190 – 461 03 – X – 012
			1/8" NPT	0190 – 461 04 – X – 321
			1/4" NPT	0190 – 461 09 – X – 317
			7/16-20 UNF	0190 – 461 20 – X – 307
			9/16/18 UNF	0190 – 461 21 – X – 308

0191 Piston pressure switches with spade terminal

8,700 psi [1)] (600 bar)[1)]	725 - 2,900 psi (50- 200 bar)	± 72.5 psi (± 5.0 bar)	M 10 x1 taper	0191 – 460 01 – X – 001
			1/4" BSPP	0191 – 460 03 – X – 003
			1/8" NPT	0191 – 460 04 – X – 304
			1/4" NPT	0191 – 460 09 – X – 303
			7/16-20 UNF	0191 – 460 20 – X – 301
			9/16/18 UNF	0191 – 460 21 – X – 302

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	019X – XXX XX – X – XXX

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0196 / 0197

Diaphragm / piston pressure switches up to 24 V with stainless steel housing

- Stainless steel housing (AISI 303 / 1.4305)
- Fitted with snap action contact and gold contacts
- Overpressure safety up to 4,350 / 8,700 psi (300 / 600 bar) [1]
  (EPDM-W270 and silicone diaphragm up to 500 psi / 35 bar)[2]
- Differential adjustable at factory

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0196 Diaphragm pressure switches with spade terminal

4,350 psi [1)+2)] (300 bar)[1)+2)]	7.25 - 72.5 psi (0.5 - 5 bar)	± 4.35 psi (± 0.3 bar)	1/4 BSPP	0196 – 457 03 – X – 003
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)		0196 – 458 03 – X – 006
	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)		0196 – 459 03 – X – 009
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)		0196 – 461 03 – X – 012

0197 Piston pressure switch with spade terminal

8,700 psi [1)] (600 bar)[1)]	725- 2,900 psi (50 - 200 bar)	± 7.25 psi (± 0.5 bar)	1/4 BSPP	0197 – 460 03 – X – 003

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-W270	Drinking water (only in diaphragm, p_{max} ≤ 500 psi / 35 bar)	5
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (only in diaphragm, p_{max} ≤ 500 psi / 35 bar)	8
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 53 for the temperature range and application thresholds of sealing materials.

Your order number:	018X – XXX 03 – X – XXX

[1] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

[2] Overpressure safety of diaphragm pressure switch up to 300 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-W270 and silicone.

hex 24 / hex 27
ready-wired pressure switches

Custom designs

- Ready-wired pressure switches hex 24 and hex 27, available with all commercial plug-in types and individual cable length.
- The technical details of ready-wired pressure switch types correspond to those of the same standard pressure switch types. Different technical details will be agreed with the customer.
- Pressure switches usually have protection class IP65.
  Our ready-wired pressure switches attain IP67 or IP6K9K.
  This is a requirement particularly in commercial vehicle construction, mobile hydraulics and similarly demanding applications.
- Ready-wired pressure switches enable plug connectors to be moved in climatically non-critical and low-vibration areas.
- The modular layout also enables the production of lower volumes.
- The switching point for ready-wired pressure switches is factory-set to a fixed value.
  Exception: The switching point of the 0240/0241 can be adjusted on site even after the sealing process.

hex 24 / 27

Custom designs

All hex 24 and hex 27 pressure switches can be individually wired according to customer needs.

Standard types suitable for ready-wiring

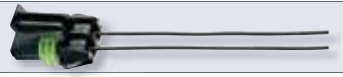
0163 / 0166 0164 0167 0169	0168	0170 / 0171 0180 / 0181 0190 / 0191 0196 / 0197	0140 / 0141
			
Technical details page 41	Technical details page 41	Technical details page 53	Technical details page 53
The switching point is factory preset and cannot be changed subsequently, so please state the switching point when ordering.			The switching point is adjustable even after sealing.

Please note our detailed information on

- CE marking
- protection class
- custom applications

in the general technical explanations on page 14, and the technical explanations on mechanical pressure switches on page 17.

A selection from the wide variety of connectors we can supply

Connector to DIN 72585-A1-4.1	
AMP Junior Timer®	
Cannon connector	
AMP Superseal 1.5®	
Packard connector (Weather Pack® 2-wire)	
Packard connector (Weather Pack® 3-wire)	
Deutsch connector (DT 06 - 2S)	
Deutsch connector (DT 04 - 2P)	
Deutsch connector (DT 04 - 3P)	

0240 / 0241

Diaphragm / piston pressure switches, hex 27

Technical data

Refer to page 54 for electrical values

Rated working voltage:	max. 42 V / 250 V depending on connection		
Rated working current:	max. 2 A		
Protection class:	2, protective insulation ⧈		
Temperature resistance of sealing materials:	NBR (BunaN)	-40 °F...+212 °F	(-40 °C...+100 °C)
	EPDM	-22 °F...+248 °F	(-30 °C...+120 °C)
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F...+248 °F	(-5 °C...+120 °C)
	FKM (Viton®) (in piston pressure switch)	+5 °F...+248 °F	(-15 °C...+120 °C)
	Silicone	-40 °F...+248 °F	(-40 °C...+120 °C)
	HNBR	-22 °F...+248 °F	(-30 °C...+120 °C)
Switching frequency:	200 / min.		
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures to max. 725 psi (50 bar))		
Pressure rise rate:	≤ 14.5 psi/ms (1 bar/ms)		
Differential:	Average value 10 – 20 % (not adjustable)		
Vibration resistance:	10 g / 5 – 200 Hz sine wave, DIN EN 60068-2-6		
Shock resistance:	294 m/s^2; 14 ms half sine wave, DIN EN 60068-2-6		
Materials:	Housing material: zinc-plated steel Protective cap: anodised aluminium		
Protection class:	IP67		
Cable:	Standard length 6.5 ft (2 m) with wire end sleeves		
Weight:	approx. 4.5 oz (120 g)		

Options for 0240 / 0241

- Other cable lengths and plug-in systems
- Fixed switching point, factory-set, set point embossed on housing
- Alternative housing materials and connection threads
- Other sealing materials, such as silicone for diaphragm pressure switches

0240 / 0241

Diaphragm / piston pressure switches, hex 27

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 4,350 / 8,700 psi (300 / 600 bar)[1)]
- Switching point can also be adjusted during use
- Protection class 2, protective insulation ⧈

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Male thread	Order number

0240 Diaphragm pressure switches

4,350 psi[1)] (300 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	1/4" BSPP	0240 – 457 03 – X – 003
			1/8" NPT	0240 – 457 04 – X – 300
			1/4" NPT	0240 – 457 09 – X – 305
			7/16-20 UNF	0240 – 457 20 – X – 310
			9/16-18 UNF	0240 – 457 21 – X – 315
	14.5 - 145 psi (1- 10 bar)	± 7.25 psi (± 0.5 bar)	1/4" BSPP	0240 – 458 03 – X – 006
			1/8" NPT	0240 – 458 04 – X – 301
			1/4" NPT	0240 – 458 09 – X – 306
			7/16-20 UNF	0240 – 458 20 – X – 311
			9/16-18 UNF	0240 – 458 21 – X – 316
	145 - 290 psi (10 - 20 bar)	± 14.5 psi (± 1.0 bar)	1/4" BSPP	0240 – 459 03 – X – 009
			1/8" NPT	0240 – 459 04 – X – 302
			1/4" NPT	0240 – 459 09 – X – 307
			7/16-20 UNF	0240 – 459 20 – X – 312
			9/16-18 UNF	0240 – 459 21 – X – 317
	290 - 725 psi (20 -50 bar)	± 29.0 psi (± 2.0 bar)	1/4" BSPP	0240 – 461 03 – X – 012
			1/8" NPT	0240 – 461 04 – X – 303
			1/4" NPT	0240 – 461 09 – X – 308
			7/16-20 UNF	0240 – 461 20 – X – 313
			9/16-18 UNF	0240 – 461 21 – X – 318

0241 Piston pressure switches

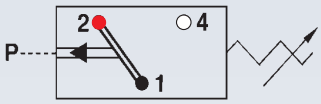
8,700 psi[1)] (600 bar)[1)]	725 - 2,175 psi (50 - 150 bar)	± 72.5 psi (± 5.0 bar)	1/4" BSPP	0241 – 460 03 – X – 003
			1/8" NPT	0241 – 460 04 – X – 304
			1/4" NPT	0241 – 460 09 – X – 309
			7/16-20 UNF	0241 – 460 20 – X – 314
			9/16-18 UNF	0241 – 460 21 – X – 319

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 64 for the temperature range and application thresholds of sealing materials.

Your order number:	024X – XXX XX – X – XXX



Contact assignment:
- 1 = Black
- 2 = Red
- 4 = White

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

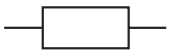
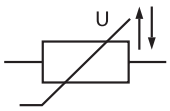
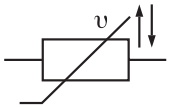
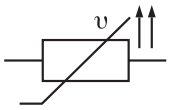
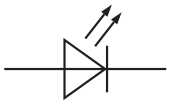
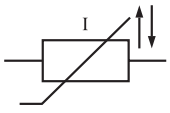
Pressure switches ***PLUS***
with integrated connector and supplementary functions

Hex 24, NC or NO, voltage up to 42 V

Intelligent, supplementary electronic functions broaden the capabilities of mechanical pressure switches by adding numerous features:

- Diagnostic function (fail-safe) with short-circuit and cable break detection
- Overvoltage protection for prolonging the contact service life
- Active reduction of EMC emissions
- Temperature-controlled switching function (e.g. cold start, i.e. switching function does not become active until a certain temperature is reached)
- In-rush current limitation (overload limitation of switching contacts from too high a switch loading, e.g. lamp load, motor start-up)
- Display of the switching status with LED
- Overload protection with self-resetting electrical fuse
- High protection class to IP67 and IP6K9K
- Large selection of electrical plug-in types for quick installation and reliable connection
- Switching point can be set on site with adjusting screw in the connector[1)]

Overview of possible supplementary functions

Circuit	Switch symbol	Function	Application	Code for order number
Resistor Resistor circuit to NAMUR, refer to page 68		• Diagnostic function (fail-safe) with short-circuit and cable break detection	Safety systems such as brake systems, hydrostatic steering systems and fire extinguisher systems	04XX - R
Varistor Circuit with varistor for overvoltage limitation, refer to page 69		• Overvoltage protection for the prolonging of contact service life under conditions of inductive load and long connection length • Active reduction of EMC emissions on switching of the pressure switch	The flyback voltage is effectively limited if the pressure switch interrupts the current in circuits with magnetic valves, relays or motors	04XX - V
NTC thermistor		• Temperature-controlled switch behaviour (e.g. filter monitoring) • In-rush current limitation, e.g. for motors ("soft start") and in PSUs • On-delay (in series) and dropout delay (in parallel) for relays	For a cold start in a mobile hydraulic application, a pressure switch used for filter monitoring may activate due to the high viscosity of the oil at low temperatures, and signals a blocked filter. The NTC thermistor integrated in the pressure switch means the circuit remains interrupted until the pressure switch, and so also the thermistor, have warmed up; not until then does the circuit become low impedance.	04XX - N
PTC thermistor		• Protection against overcurrent • In-rush current limitation, such as for filament lamps and condenser load	E.g. brake light monitoring in mobile hydraulics: The in-rush current can be up to 8 times the nominal current of a filament lamp. This high current is only reduced at the moment of switch-on, thereby protecting the contact system of the pressure switch from overload.	04XX - P
LED		• Displays the switching status of the integrated LED	Direct switching status display for applications in which the controller is physically remote; e.g. in an automation system or permanently installed extinguishing or gas systems.	04XX - L
Multifuse, PPTC		• Protection against overcurrent • Self-resetting: After removing the short-circuit (cooling the MF) the fuse resets	In applications which need to be protected against overcurrent e.g. elektronic applications	04XX - M

[1] Pressure switches can also be supplied preset at factory.
The switching point is embossed onto pressure switches preset at factory.

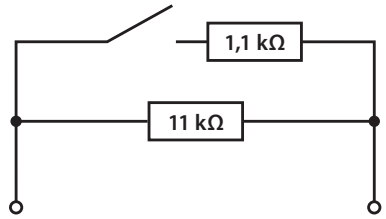
M.6 Pressure switches ***PLUS***

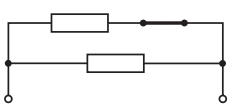
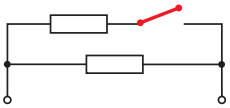
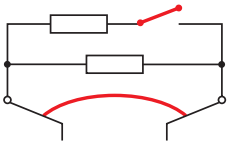
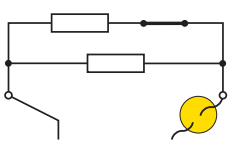
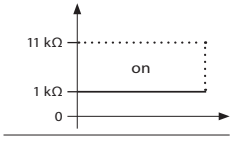
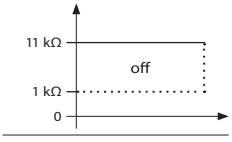
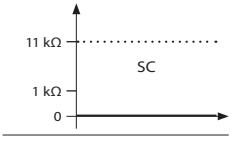
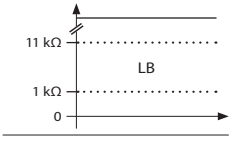
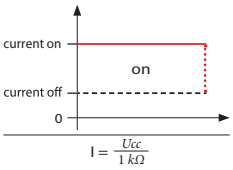
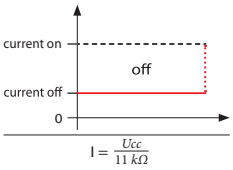
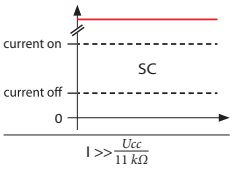
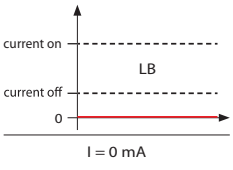
PS ***PLUS*** hex 24

Resistor circuit to NAMUR (pressure switches with part numbers 04XX-R)

The additional circuitry of the switching contact of the pressure switch enables not only the states to be shown enabled and disabled, it also enables interrogation for line breaks (standby current principle) and short-circuits in the electric circuit.

The resistor circuitry is designed such that the NAMUR specifications can be satisfied. An operating voltage of 8.2 V must be provided for NAMUR-compliant operation. A resistance of 11 kΩ is present in the circuit when the switch contact is open. The resistance is 1 kΩ when the switch contact is closed. Other resistance values can also be realised.



Switching status	Closed	Open	Short-circuit SC	Line break LB
Contact				
Resistor				
Current				
Example Supply Voltage is 24VDC	$I = \frac{24\ VDC}{1{,}000\Omega} = 24mA$	$I = \frac{24\ VDC}{11{,}000\Omega} = 2.18mA$	ISC (max. current)	I = 0mA

Technical data	
Rated working voltage Ucc:	8.2 VDC … 30 VDC
Maximum rated operating current:	≤ 30 mA
Switching capacity:	< 1 W
Switching frequency:	200 / min.
Mechanical and electrical service life:	1,000,000 cycles
Permitted pressure rise rate:	≤ 14.5 psi/ ms (≤ 1 bar / ms)
Vibration resistance:	10 g; 5 – 200 Hz sine wave; DIN EN 60068-2-6
Shock resistance:	294 m/s²; 14 ms half sine wave; DIN EN 60068-2-27
Protection class:	Refer to the table on the following pages: According to manufacturer specifications for the respective plug-in system (but only when plugged in), otherwise IP00.

Circuit with varistor for overvoltage limitation (pressure switches with part numbers 04XX-V)

The switching off of inductive consumers such as valves, relays and motors by a mechanical pressure switch generates a high voltage peak. The cause for this is the energy stored in the magnetic field of inductance, which entails an induction voltage when the current is changed.

The induction voltage (or flyback voltage) is defined as follows:

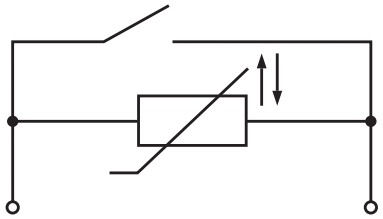
$$U_L = -L \frac{di}{dt}$$

where L inductance
di/dt change of current over time

This induction voltage can result in discharge effects and the occurrence of arcs at the opening contacts. This gives rise to localised, very hot places on the contact surfaces which are able to fuse the contact material. Increasing load damages the contact surface and the contact transition resistance rises. This can result in sporadic interruption, adhesion and welding of the contacts, and so lead to complete failure of the pressure switch.

The effect of induction voltage is countered by means of a varistor – a resistor which reduces its ohmic resistance with increasing connection voltage. The induction voltage is limited to the responding value of the varistor, and the energy is converted to heat in the varistor.

Varistors are suitable for DC and AC in equal measure. In DC circuits, the response voltage of the varistor must be greater than the highest value of the supply voltage. In AC circuits, it must be 1.5 times the peak-peak value of the supply voltage.



Technical data	
Rated operating voltage Ucc:	10 V … 24 … 30 VDC / 10 V … 21 VAC
Rated operating current, ohmic load DC12 / AC12:	10 mA … 4 A
Rated operating current, inductive load DC13 / AC13:	10 mA … 1 A
AC / DC switching capacity:	< 100 W / 100 VA
Switching frequency:	200 / min.
Varistor response voltage:	41 VDC ± 10 % @ 1 mA
Maximum varistor energy:	0.4 J (10/1000 µs); 0.3 J (2 ms)
Maximum varistor peak current:	120 A (8/20 µs, one-off loading), 60 A (8/20 µs, dual loading)
Mechanical service life:	1,000,000 cycles
Permitted pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)
Vibration resistance:	10 g; 5 – 200 Hz sine wave; DIN EN 60068-2-6
Shock resistance:	294 m/s²; 14 ms half sine wave; DIN EN 60068-2-27
Protection class:	Refer to the table on the following pages: According to manufacturer specifications for the respective plug-in system (but only when plugged in), otherwise IP00.

0410 / 0412 / 0414 / 0416 / 0418 / 0424

Diaphragm pressure switches, up to 42 V with supplementary functions

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1] (footnote see next page)

0410/0411
Deutsch DT04-2P
IP67, IP6K9K

0412/0413
AMP Superseal 1.5®
IP67

0414/0415
Packard MetriPack 280®
IP67

0416/0417
Deutsch DT04-3P
IP67, IP6K9K

0418/0419
AMP Junior Timer®
IP65, IPx4K

0424/0425
M12x1 DIN EN 61076-2-101-A
IP67

Plug-in types for diaphragm pressure switches

Deutsch DT04-2P	0410 – XXX XX – X – 001	0410 – XXX XX – X – 002
AMP Superseal 1.5®	0412 – XXX XX – X – 001	0412 – XXX XX – X – 002
Packard MetriPack 280®	0414 – XXX XX – X – 001	0414 – XXX XX – X – 002
Deutsch DT04-3P	0416 – XXX XX – X – 001	0416 – XXX XX – X – 002
AMP Junior Timer®	0418 – XXX XX – X – 001	0418 – XXX XX – X – 002
M12x1 DIN EN 61076-2-101-A	0424 – XXX XX – X – 001	0424 – XXX XX – X – 002

Adjustment range in psi (bar) (tolerance at room temperature)	Male thread	Order number SPST-NO —› |:	Order number SPST-NC —› :|

04XX Diaphragm pressure switches

1.45 - 14.5 ± 2.90 psi (0.1 - 1 ± 0.2 bar)	M 10x1 taper	04XX – X 03 01 – X – 001	04XX – X 04 01 – X – 002
	1/4" BSPP	04XX – X 03 03 – X – 001	04XX – X 04 03 – X – 002
	1/8" NPT	04XX – X 03 04 – X – 001	04XX – X 04 04 – X – 002
	1/4" NPT	04XX – X 03 09 – X – 001	04XX – X 04 09 – X – 002
	7/16-20 UNF	04XX – X 03 20 – X – 001	04XX – X 04 20 – X – 002
	9/16-18 UNF	04XX – X 03 21 – X – 001	04XX – X 04 21 – X – 002
7.25- 43.5 ± 4.35 psi (0.5 - 3 ± 0.3 bar)	M 10x1 taper	04XX – X 23 01 – X – 001	04XX – X 24 01 – X – 002
	1/4" BSPP	04XX – X 23 03 – X – 001	04XX – X 24 03 – X – 002
	1/8" NPT	04XX – X 23 04 – X – 001	04XX – X 24 04 – X – 002
	1/4" NPT	04XX – X 23 09 – X – 001	04XX – X 24 09 – X – 002
	7/16-20 UNF	04XX – X 23 20 – X – 001	04XX – X 24 20 – X – 002
	9/16-18 UNF	04XX – X 23 21 – X – 001	04XX – X 24 21 – X – 002
14.5 - 145 ± 7.25 psi (1 - 10 ± 0.5 bar)	M 10x1 taper	04XX – X 07 01 – X – 001	04XX – X 08 01 – X – 002
	1/4" BSPP	04XX – X 07 03 – X – 001	04XX – X 08 03 – X – 002
	1/8" NPT	04XX – X 07 04 – X – 001	04XX – X 08 04 – X – 002
	1/4" NPT	04XX – X 07 09 – X – 001	04XX – X 08 09 – X – 002
	7/16-20 UNF	04XX – X 07 20 – X – 001	04XX – X 08 20 – X – 002
	9/16-18 UNF	04XX – X 07 21 – X – 001	04XX – X 08 21 – X – 002

Supplementary functions

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX
PTC thermistor	Overcurrent protection	P XX XX
LED	Display	L XX XX
Multifuse, PPTC	Overcurrent protection	M XX XX

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	**04XX – XX XX – X – 00X**

RoHSII compliant

0410 / 0412 / 0414 / 0416 / 0418 / 0424

Diaphragm pressure switches, up to 42 V with supplementary functions

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 4,350 psi (300 bar)[1)]

Plug-in types for diaphragm pressure switches

Deutsch DT04-2P	0410 – XXX XX – X – 001	0410 – XXX XX – X – 002
AMP Superseal 1.5®	0412 – XXX XX – X – 001	0412 – XXX XX – X – 002
Packard MetriPack 280®	0414 – XXX XX – X – 001	0414 – XXX XX – X – 002
Deutsch DT04-3P	0416 – XXX XX – X – 001	0416 – XXX XX – X – 002
AMP Junior Timer®	0418 – XXX XX – X – 001	0418 – XXX XX – X – 002
M12x1 DIN EN 61076-2-101-A	0424 – XXX XX – X – 001	0424 – XXX XX – X – 002

Adjustment range in psi (bar) (tolerance at room temperature)	Male thread	Order number SPST-NO —› |:	Order number SPST-NC —› :|

04XX Diaphragm pressure switches

145 - 290 ± 14.50 psi (10 - 20 ± 1.0 bar)	M 10x1 taper	04XX – X 11 01 – X – 001	04XX – X 12 01 – X – 002
	1/4" BSPP	04XX – X 11 03 – X – 001	04XX – X 12 03 – X – 002
	1/8" NPT	04XX – X 11 04 – X – 001	04XX – X 12 04 – X – 002
	1/4" NPT	04XX – X 11 09 – X – 001	04XX – X 12 09 – X – 002
	7/16-20 UNF	04XX – X 11 20 – X – 001	04XX – X 12 20 – X – 002
	9/16-18 UNF	04XX – X 11 21 – X – 001	04XX – X 12 21 – X – 002
290 - 725 ± 29.0 psi (20 - 50 ± 2.0 bar)	M 10x1 taper	04XX – X 15 01 – X – 001	04XX – X 16 01 – X – 002
	1/4" BSPP	04XX – X 15 03 – X – 001	04XX – X 16 03 – X – 002
	1/8" NPT	04XX – X 15 04 – X – 001	04XX – X 16 04 – X – 002
	1/4" NPT	04XX – X 15 09 – X – 001	04XX – X 16 09 – X – 002
	7/16-20 UNF	04XX – X 15 20 – X – 001	04XX – X 16 20 – X – 002
	9/16-18 UNF	04XX – X 15 21 – X – 001	04XX – X 16 21 – X – 002

Supplementary functions

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX
PTC thermistor	Overcurrent protection	P XX XX
LED	Display	L XX XX
Multifuse, PPTC	Overcurrent protection	M XX XX

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	04XX – XXX XX – X – 00X

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0411 / 0413 / 0415 / 0417 / 0419 / 0425

Piston pressure switches, up to 42 V with supplementary functions

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 8,700 psi (600 bar)[1)]

Plug-in types for piston pressure switches

Deutsch DT04-2P	0411 – XXX XX – X – 001	0411 – XXX XX – X – 002
AMP Superseal 1.5®	0413 – XXX XX – X – 001	0413 – XXX XX – X – 002
Packard MetriPack 280®	0415 – XXX XX – X – 001	0415 – XXX XX – X – 002
Deutsch DT04-3P	0417 – XXX XX – X – 001	0417 – XXX XX – X – 002
AMP Junior Timer®	0419 – XXX XX – X – 001	0419 – XXX XX – X – 002
M12x1 DIN EN 61076-2-101-A	0425 – XXX XX – X – 001	0425 – XXX XX – X – 002

Adjustment range in psi (bar) (tolerance at room temperature)	Male thread	Order number SPST-NO —› |:	Order number SPST-NC —› :|

04XX Piston pressure switches

725 - 2,175 ± 72.5 psi (50 - 150 ± 5 bar)	M 10x1 taper	04XX – X 19 01 – X – 001	04XX – X 20 01 – X – 002
	1/4" BSPP	04XX – X 19 03 – X – 001	04XX – X 20 03 – X – 002
	1/8" NPT	04XX – X 19 04 – X – 001	04XX – X 20 04 – X – 002
	1/4" NPT	04XX – X 19 09 – X – 001	04XX – X 20 09 – X – 002
	7/16-20 UNF	04XX – X 19 20 – X – 001	04XX – X 20 20 – X – 002
	9/16-18 UNF	04XX – X 19 21 – X – 001	04XX – X 20 21 – X – 002

Supplementary functions

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX
PTC thermistor	Overcurrent protection	P XX XX
LED	Display	L XX XX
Multifuse, PPTC	Overcurrent protection	M XX XX

Seal material – Application areas

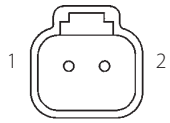
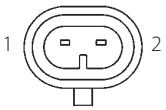
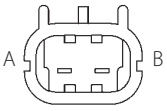
NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

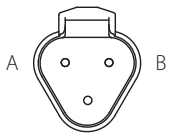
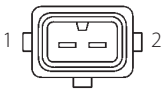
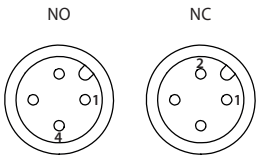
Refer to page 41 for the temperature range and application thresholds of sealing materials.

Your order number:	**04XX – XXX XX – X – 00X**

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Technical data of plug-in types

	0410 / 0411	0412 / 0413	0414 / 0415
Model / type			
Connector	**Deutsch DT04-2P**	**AMP Superseal 1.5®**	**Packard MetriPack 280®**
Protection class	IP67, IP6K9K	IP67	IP67
Overall height	H ≈ 61 mm	H ≈ 61 mm	H ≈ 62 mm
Contact assignment			

	0416 / 0417	0418 / 0419	0424 / 0425
Model / type			
Connector	**Deutsch DT04-3P**	**AMP Junior Timer®**	**M12x1 DIN EN 61076-2-101-A**
Protection class	IP67, IP6K9K	IP65, IPx4K	IP67
Overall height	H ≈ 63 mm	H ≈ 54 mm	H ≈ 51 mm
Contact assignment			

Pressure switches 30 A/F

Snap action with silver contacts

- Attachment options for wall fitting and block style enable clearly structured, accessible, easy-maintenance installation
- Switching pressure can be adjusted easily by user
- High overpressure safety
- Socket devices enable simple installation on the machine

Pressure switches 30 A/F

Technical data

Temperature resistance of sealing materials:	NBR (BunaN)	-40 °F . . +212 °F (-40 °C . . . +100 °C)
	EPDM	-22°F . . . +248 °F (-30 °C . . . +120 °C)
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F. . +248 °F (-5 °C . . . +120 °C)
	FKM (Viton®) (in piston pressure switch)	+5 °F . . . +248 °F (-15 °C . . . +120 °C)
Switching frequency:	200 / min.	
Mechanical life expectancy:	1,000,000 cycles (for diaphragm pressure switches, life expectancy value only applies for switching pressures up to 725 psi / 50 bar)	
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)	
Differential:	Typ 0159:	approx. 10 … 30 % (not adjustable)
	Typ 0161, 0162, 0175:	approx. 10 … 30 % (factory adjustable)
Vibration resistance:	10 g; 5 … 200 Hz sine wave; DIN EN 60068-2-6	
Shock resistance:	294 m/s^2; 14 ms half sine wave; DIN EN 60068-2-27	
Housing material:	Aluminium	
Protection class:	IP65 with Socket device fitted	
Weight:	Typ 0159, 0161, 0162:	approx. 8.5 oz (240 g)
	Typ 0175:	approx. 11 oz (310 g)

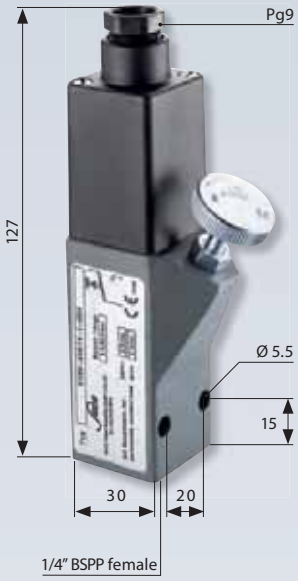
Electrical values	0159	0161 / 0162 / 0175
Rated working voltage U_e	Rated working current I_e	
250 VAC 50 / 60 Hz, AC 12	2.5 A	5 A
250 VAC 50 / 60 Hz, AC 14	1 A	1 A
24 VDC, DC 12 / DC 13	2 / 2 A	3.5 / 3.5 A
50 VDC, DC 12 / DC 13	1 / 0.5 A	2 / 1 A
75 VDC, DC 12 / DC 13	0.75 / 0.4 A	1 / 0.5 A
125 VDC, DC 12 / DC 13	0.3 / 0.2 A	0.3 / 0.2 A
250 VDC, DC 12 / DC 13	0.3 / 0.2 A	0.25 / 0.2 A
Rated insulation voltage U_i:	300 V	
Rated impulse withstand voltage U_{imp}:	2.5 kV	
Conventional thermal current I_{the}:	6 A	
Switching overvoltage:	< 2.5 kV	
Rated frequency:	DC and 50 / 60 Hz	
Nominal current of short-circuit mechanism:	to 2.5 A	to 6.3 A
Conditional short-circuit current:	< 350 A	
Tightening torque of terminal screws:	< 0.35 Nm	
Connector cross-section:	0.5 – 1.5 mm^2	

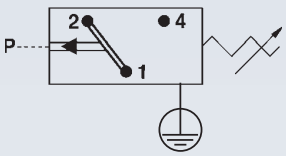
RoHS II compliant

0159

Diaphragm / piston pressure switch up to 250 V

- Aluminium housing
- Snap action with silver contacts
- Overpressure safety up to 2,900 / 8,700 psi (200 / 600 bar)[1)]
- Switching point continuously adjustable by turning knurled screw whilst system in operation





$P_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Thread	Order number:

With female thread

0159 Diaphragm pressure switches

2,900 psi[1)] (200 bar)[1)]	2.90 - 29 psi (0.2 - 2 bar)	± 2.90 - 4.35 psi (± 0.2 – 0.3 bar)	1/4" BSPP female	0159 – 426 14 – X – 001
	7.25 - 72.5 psi (0.5 - 5 bar)	± 2.90 - 7.25 psi (± 0.2 – 0.5 bar)		0159 – 427 14 – X – 001
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)		0159 – 428 14 – X – 001
	29 - 290 psi (2 - 20 bar)	± 14.5 psi (± 1.0 bar)		0159 – 429 14 – X – 001
	72.5 - 725 psi (5 - 50 bar)	± 43.5 psi (± 3.0 bar)		0159 – 430 14 – X – 001
	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)		0159 – 431 14 – X – 001

0159 Piston pressure switches

8,700 psi[1)] (600 bar)[1)]	145 - 1,450 psi (10 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	1/4" BSPP female	0159 – 432 14 – X – 001
	362.5 - 3,625 psi (25 - 250 bar)	± 72.5 - 101.5 psi (± 5.0 - 7.0 bar)		0159 – 433 14 – X – 001
	580 - 5,800 psi (40 - 400 bar)	± 72.5 - 130.5 psi (± 5.0 - 9.0 bar)		0159 – 434 14 – X – 001

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

Refer to page 75 for the temperature range and application thresholds of sealing materials

Your order number:	0159 – XXX 14 – X – XXX

RoHS II compliant

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0161 / 0162

Diaphragm / piston pressure switches up to 250 V

- Aluminium housing
- Snap action with silver contacts
- Overpressure safety up to 2,900 / 8,700 psi (200 / 600 bar)[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Differential adjustable at factory

$P_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Dimension A in mm	Order number:

With female 1/4 BSPP thread

0161 Diaphragm pressure switches

2,900 psi [1)] (200 bar) [1)]	7.25 - 14.5 psi (0.5 - 1 bar)	± 2.90 psi (± 0.2 bar)		0161 – 436 14 – X – 001
	7.25 - 72.5 psi (0.5 - 5 bar)	± 2.90 - 7.25 psi (± 0.2 – 0.5 bar)		0161 – 437 14 – X – 001
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)		0161 – 438 14 – X – 001
	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)		0161 – 439 14 – X – 001
	725 - 1,450 psi (50 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)		0161 – 440 14 – X – 001

0161 Piston pressure switches

8,700 psi [1)] (600 bar) [1)]	1,450 - 5,800 psi (100 - 400 bar)	± 72.5 - 130.5 psi (± 5.0 - 9.0 bar)		0161 – 441 14 – X – 001

Block style (with O-ring NBR 5 x 1.5 mm)

0162 Diaphragm pressure switches

2,900 psi [1)] (200 bar) [1)]	7.25 - 14.5 psi (0.5 - 1 bar)	± 2.90 psi (± 0.2 bar)	15	0162 – 436 14 – X – 001
	7.25 - 72.5 psi (0.5 - 5 bar)	± 2.90 - 7.25 psi (± 0.2 – 0.5 bar)		0162 – 437 14 – X – 001
	14.5 - 145 psi (1 - 10 bar)	± 7.25 psi (± 0.5 bar)		0162 – 438 14 – X – 001
	145 - 725 psi (10 - 50 bar)	± 43.5 psi (± 3.0 bar)		0162 – 439 14 – X – 001
	725 - 1,450 psi (50 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)		0162 – 440 14 – X – 001

0162 Piston pressure switches

8,700 psi [1)] (600 bar) [1)]	1,450 - 5,800 psi (100 - 400 bar)	± 72.5 - 130.5 psi (± 5.0 - 9.0 bar)	19.5	0162 – 441 14 – X – 001

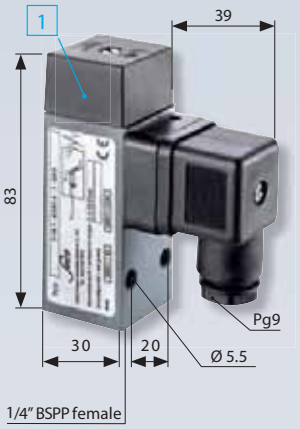
Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

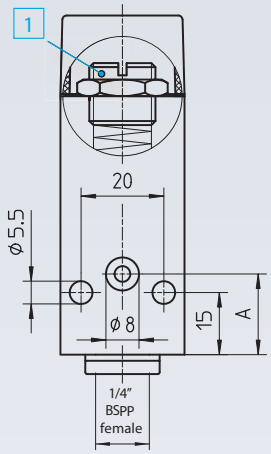
Refer to page 75 for the temperature range and application thresholds of sealing materials

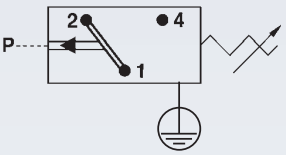
Your order number:	016X – XXX 14 – X – XXX

0161 with female thread



0162 Block style





1 Adjusting the set point

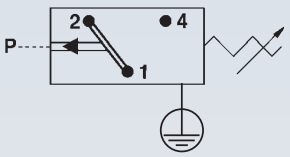
To adjust the set point, undo the locknut and adjust the set screw using a screwdriver. Clockwise screwing increases the switching pressure. After adjusting, tighten the locknut again.

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0175

Diaphragm pressure switches up to 250 V

- For low pressure, high accuracy
- Aluminium housing
- Snap action with silver contacts
- Overpressure safety up to 362.5 psi (25 bar)[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Differential adjustable at factory

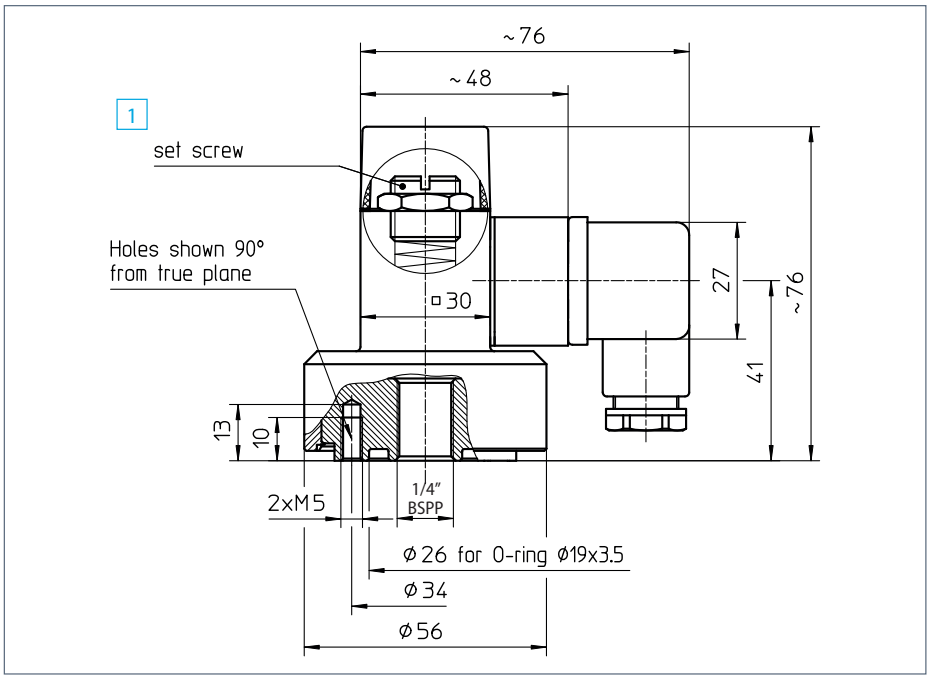


$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Thread	Order number
With female thread				
0175 Diaphragm pressure switches				
362 psi[1)] (25bar)[1)]	1.45 - 14.5 psi (0.1 - 1 bar)	± 1.45 - 2.9 psi (± 0.1 - 0.2 bar)	1/4" BSPP female	0175 – 435 14 – 1 – 001

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.
	Temperature resistance: -22 °F. . . +212 °F (-30 °C . . . +100 °C)

Your order number: 0175 – 435 14 – 1 – 001



1 Adjusting the set point

To adjust the set point, undo the locknut and adjust the set screw using a screwdriver. Clockwise screwing increases the switching pressure. After adjusting, tighten the locknut again.

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Explosion-protected pressure switches

To ATEX standard

- ATEX-certification for use in potentially explosive areas
- Switching point can be easily adjusted by the user whilst system is in operation
- Compact design
- Excellent price/performance ratio

Explosion-protected pressure switches

Technical data

Technical explanations

Explosion-protected pressure switches are classified according to the respective combustible material type. This division is:

Gases and vapours	Dusts	Methane dust
0165	0340 / 0341	not suitable

Our pressure switches are generally designed for use with gases, vapours or dust.

Our explosion-protected pressure switches are not approved for use with methane dust (mining applications).

The table provides an overview of the zone divisions, equipment groups and equipment categories.

Conditions in potentially explosive atmosphere

Combustible materials	Temporary behaviour of combustible materials in potentially explosive area	Categorisation of potentially explosive areas	Marking required on equipment to be used	
			Equipment group	Equipment category
Gases Vapours	are present continually, frequently or for long periods	Zone 0	II	1G
	occur occasionally	Zone 1	II	2G or 1G
	are unlikely to occur, and if so, are then only seldom or for short periods	Zone 2	II	3G or 2G or 1G
Dusts	are present continually, frequently or for long periods	Zone 20	II	1D
	occur occasionally	Zone 21	II	2D or 1D
	occur if accumulated dust is whirled up, and then only seldom or for short periods	Zone 22	II	3D or 2D or 1D
Methane dust	–	Mining industry	I	M1
	–	Mining industry	I	M1 or M2

Explosion-protected pressure switches

Technical data

Type:	**0165**		**0340 / 0341**
ATEX protection zone:	1 and 2		22
Combustible Material:	Gases and vapours		Dusts
Rated working voltage:	10 … 250 VAC	10 … 250 VDC	10 … 250 VAC
Rated working current:	10 mA … 1 A	10 mA … 250 mA	10 mA … 2 A
Temperature resistance:	NBR (BunaN)	-4 °F… +176 °F (-20 °C… +80 °C)	
	EPDM	-4 °F… +176 °F (-20 °C… +80 °C)	
	FKM (Viton®) (in diaphragm pressure switch)	+23 °F… +176 °F (-5 °C… +80 °C)	
	FKM (Viton®) (in piston pressure switch)	+5 °F… +176 °F (-15 °C… +80 °C)	
Switching frequency:	200 / min.		
Mechanical life expectancy:	1,000,000 cycles		
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)		
Differential:	10 … 30 % (depending on type, non-adjustable)		
Vibration resistance:	10 g; 5 … 200 Hz sine wave; DIN EN 60068-2-6		
Shock resistance:	294 m/s^2; 14 ms half sine wave; DIN EN 60068-2-27		
Cable length:	Standard length approx. 6.5 ft (2 m) with wire end sleeve, also available in lengths of approx. 16 ft (5 m).		
Cable cross-section:	3 x 0.75 mm^2		3 x 0.5 mm^2
Housing material:	Aluminium		Zinc-plated steel (CrVI-free) anodised aluminium
Protection class:	IP65		
Weight:	approx. 13.5 oz (380 g)		approx. 8.2 oz (230 g)

0165

Diaphragm / piston pressure switches up to 250 V

ATEX 0102 CE II 2G Ex d II C T6 / T5 X (gas-protected zones 1 and 2)

- Aluminium housing
- Snap action with silver contacts
- Operating voltage up to 250 V
- Overpressure safety up to 2,900 / 8,700 psi (200 / 600 bar) [1]

$p_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Thread	Order number

0165 Diaphragm pressure switches

2,900 psi[1] (200 bar)[1]	14.5 - 87 psi (1 - 6 bar)	± 7.25 psi (± 0.5 bar)	1/4" BSPP female	0165 – 448 14 – 1 – 001
	72.5 - 725 psi (5 - 50 bar)	± 43.5 psi (± 3.0 bar)		0165 – 449 14 – 1 – 001

0165 Piston pressure switches

8,700 psi[1] (600 bar)[1]	290 - 1,450 psi (20 - 100 bar)	± 43.5 - 72.5 psi (± 3.0 - 5.0 bar)	1/4" BSPP female	0165 – 450 14 – X – 001
	362.5 - 3,625 psi (25 - 250 bar)	± 72.5 - 101.5 psi (± 5.0 - 7.0 bar)		0165 – 452 14 – X – 001
	1,450 - 5,800 psi (100 - 400 bar)	± 72.5 - 130.5 psi (± 5.0 - 9.0 bar)		0165 – 451 14 – X – 001

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

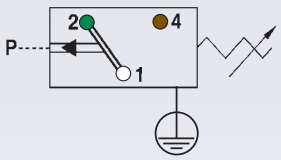
Refer to page 82 for the temperature range and application thresholds of sealing materials

Your order number:	0165 – XXX 14 – X – 001

Piston pressure switches only have limited suitability for use with gases (refer to Page 14 for explanations).

Contact assignment:

- 1 = white
- 2 = green
- 4 = brown



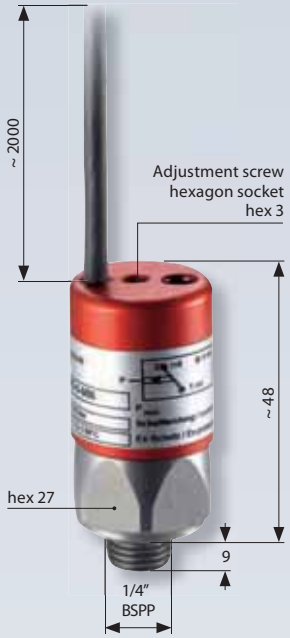
[1] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0340 / 0341

Diaphragm / piston pressure switches up to 250 V

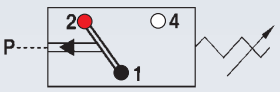
ATEX CE Ex II 3D IP65 T90°C (dust protection zone 22)

- Zinc-plated steel housing (CrVI-free), with anodised aluminium protective cap
- Snap action with silver contacts
- Operation voltage up to 250 V, protection class 2, protective insulation ⧈
- Overpressure safety up to 4,350 / 8,700 psi (300 / 600 bar)[1)]



Contact assignment:

- ● 1 = black
- ● 2 = red
- ○ 4 = white



$P_{max.}$ in psi (bar)	Adjustment range in psi (bar)	Tolerance in psi (bar) at room temperature	Thread	Order number

0340 Diaphragm pressure switches

4,350 psi[1)] (300 bar)[1)]	4.35 - 21.75 psi (0.3 - 1.5 bar)	± 2.90 psi (± 0.2 bar)	1/4" BSPP	0340 – 457 03 – X – 003
	14.5 - 145 psi (1 - 10 bar)	± 7.25 - 14.5 psi (± 0.5 - 1.0 bar)		0340 – 458 03 – X – 006
	145 - 290 psi (10 - 20 bar)	± 14.5 psi (± 1.0 bar)		0340 – 459 03 – X – 009
	290 - 725 psi (20 - 50 bar)	± 29 psi (± 2.0 bar)		0340 – 461 03 – X – 012

0341 Piston pressure switches

8,700 psi[1)] (600 bar)[1)]	725 - 2,175 psi (50 - 150 bar)	± 72.5 psi (± 5.0 bar)	1/4" BSPP	0341 – 460 03 – X – 003

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

Refer to page 82 for the temperature range and application thresholds of sealing materials

Your order number:	034X – XXX 03 – X – XXX

Piston pressure switches only have limited suitability for use with gases (refer to Page 14 for explanations).

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Vacuum switches

- Switching point can be adjusted when fitted on site [1)]
- High overpressure resistance
- Long service life even under harsh conditions
- 0150 series available as a snap action switch, up to 250 V
- 0151 series available as NC or NO up to 42 V

[1)] Pressure switches can also be supplied preset at factory.
Our preset switches are sealed with lacquer paint, set points are embossed on the housing.

Vacuum switches

Technical data

Type:	0150	0151
Operating voltage:	10 … 250 VAC/DC	10 … 42 VAC/DC
Rated current (resistive load):	Refer to electrical values below	10 mA … 4 A
Switching power:	Refer to electrical values below	100 VA
Temperature resistance of sealing materials:	-4 °F . . . +212 °F (-20 °C . . . +100 °C)	+5 °F . . . +248 °F (-15 °C . . . +120 °C)
Switching frequency:	200 / min.	
Mechanical life expectancy:	1,000,000 cycles	
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)	
Vibration resistance:	10 g; 5 … 200 Hz sine wave; DIN EN 60068-2-6	
Shock resistance:	294 m/s^2; 14 ms half sine wave; DIN EN 60068-2-27	
Housing material:	Aluminium	Brass
Protection class:	IP65 with socket device	IP65, terminals IP00
Weight:	approx. 9.5 oz (270 g)	approx. 5 oz (140 g)

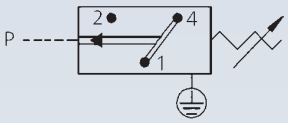
0150 Electrical values (also refer to page 14 for technical explanations)

Rated working voltage U_e	Rated working current I_e (usage category)
250 VAC 50 / 60 Hz	5 A (AC 12)
250 VAC 50 / 60 Hz	1 A (AC 14)
24 VDC	3.5 / 3.5 A (DC 12 / DC 13)
50 VDC	2 / 1 A (DC 12 / DC 13)
75 VDC	1 / 0.5 A (DC 12 / DC 13)
125 VDC	0.3 / 0.2 A (DC 12 / DC 13)
250 VDC	0.25 / 0.2 A (DC 12 / DC 13)
Rated insulation voltage U_i:	300 V
Rated impulse withstand voltage U_{imp}:	2.5 kV
Conventional thermal current I_{the}:	6 A
Switching overvoltage:	< 2.5 kV
Rated frequency:	DC and 50 / 60 Hz
Nominal current of short-circuit mechanism:	up to 6.3 A
Conditional short-circuit current:	< 350 A
Tightening torque of terminal screws:	< 0.35 Nm
Connector cross-section:	0.5 … 1.5 mm^2

0150

Vacuum switch up to 250 V with snap action switch

- Aluminium housing
- Operating voltage up to 250 V
- Snap action with silver contacts
- Overpressure safety up to 290 psi (20 bar)[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Differential approx. 1.5" - 3" HG (50 – 150 mbar)(non-adjustable)



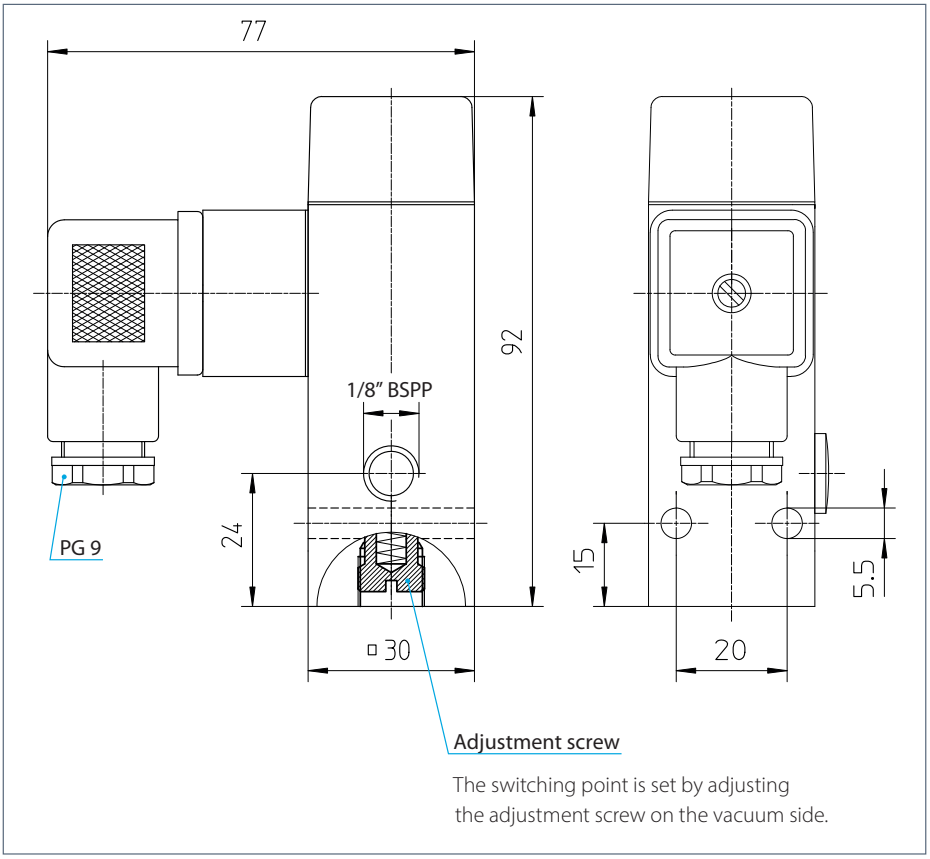
$p_{max.}$ in psi (bar)	Adjustment range in HG (mbar) (relative)	Tolerance in HG (mbar) at room temperature	Thread	Order number
0150 Vacuum switch				
290 psi[1)] (20 bar)[1)]	3" - 29" (100- 950 mbar)	± 1.5" (± 50 mbar)	1/8" BSPP female	0150 – 456 15 – 4 – 001

Seal material – Application areas

ECO	Air, oils, greases, fuel/gasoline	4

Temperature resistance: - 4 °F. . . +212 °F (-20 °C . . . +100 °C)

Your order number:	0150 – 456 15 – 4 – 001



The switching point is set by adjusting the adjustment screw on the vacuum side.

RoHS II compliant

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

0151

Vacuum switch up to 42 V, NO or NC

- Brass housing
- Spade or M3 screw terminal
- Operating voltage up to 42 V
- Overpressure safety up to 500 psi (35 bar)[1)]

$p_{max.}$ in psi (bar)	Adjustment range in HG (mbar) (relative)	Tolerance in HG (mbar) at room temperature	Thread	Order number
0151 Vacuum switches with M3 screw terminal				**NO → |:**
500 psi[1)] (35 bar)[1)]	6" - 29" (200 - 950 mbar)	± 3" (± 100 mbar)	1/8" BSPP female	0151 – 452 15 – 3 – 001
				NC →:|
				0151 – 453 15 – 3 – 001
0151 Vacuum switches with spade terminal				**NO → |:**
500 psi[1)] (35 bar)[1)]	6" - 29" (200 - 950 mbar)	± 3" (± 100 mbar)	1/8" BSPP female	0151 – 454 15 – 3 – 001
				NC →:|
				0151 – 455 15 – 3 – 001

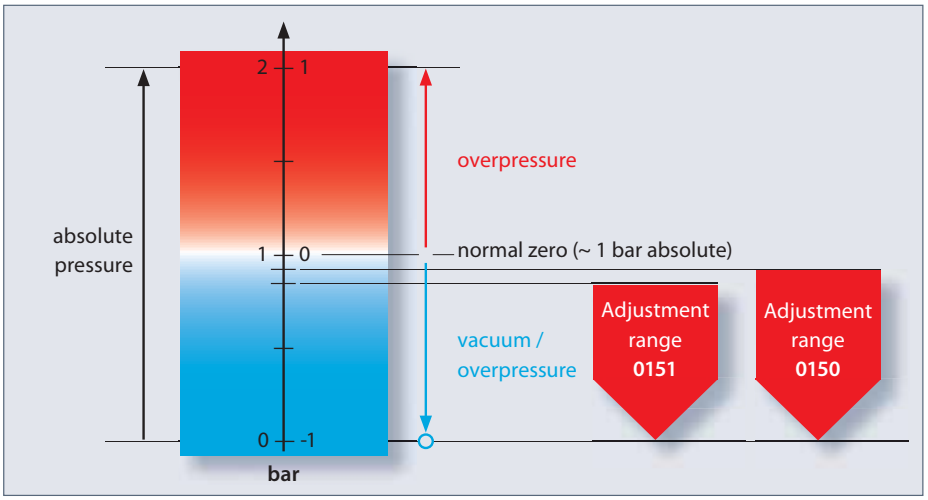
Seal material – Application areas

FKM (Viton®)	Air, oils, greases, fuel/gasoline	3

Temperature resistance: +5 °F. . .+248 °F (-15 °C. . .+120 °C)

Your order number:	0151 – XXX 15 – 3 – 001

Comparison of absolute/relative pressures



Note: Required set points in the vacuum range must be specified relative to atmospheric pressure (normal pressure) in the ordering process.

[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Switches are also available on request with outer thread or integrated connector.

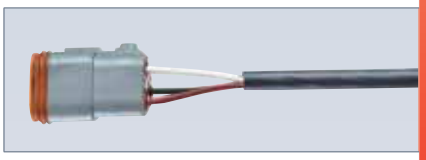
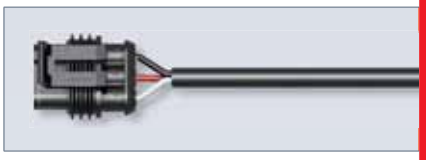
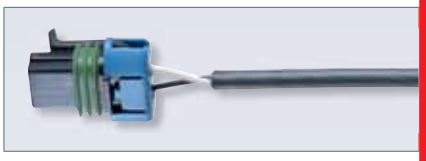
RoHS II compliant

Accessories

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

Mating plugs

For pressure switches with integrated connector

Deutsch DT06-2S (for DT04-2P) 2 x 0.5 mm² Radox cable, IP65	suitable for series **0110 / 0111** **0410 / 0411**	Order number: **1-1-10-653-118**	
Deutsch DT06-3S (for DT04-3P) 3 x 0.5 mm² PUR cable, IP67	suitable for series **0116 / 0117 / 0136 / 0137** **0416 / 0417**	Order number: **1-1-36-653-160**	
TE AMP Superseal 1.5®, 2-pin 2 x 0.5 mm² Radox cable, IP65	suitable for series **0112 / 0113** **0412 / 0413**	Order number: **1-1-12-653-113**	
TE AMP Superseal 1.5®, 3-pin 3 x 0.5 mm² Radox cable, IP65	suitable for series **0132 / 0133**	Order number: **1-1-32-653-158**	
TE AMP Junior Timer, 2-pin 2 x 0.5 mm² Radox cable, IP65	suitable for series **0118 / 0119** **0418 / 0419**	Order number: **1-1-18-653-116**	
Packard MetriPack 280, 2-pin 2 x 0.5 mm² Radox cable, IP65	suitable for series **0114 / 0115** **0414 / 0415**	Order number: **1-1-14-653-114**	
Bayonet DIN 72585 A1-2.1 2 x 0.5 mm² Radox cable, IP65	suitable for series **0120 / 0121**	Order number: **1-1-20-653-112**	
M12 DIN EN 61076-2-LF, 4-pin 4 x 0.34 mm² PUR cable, IP65	suitable for series **0122 / 0123 / 0124 / 0125** **0134 / 0135 / 0424 / 0425**	Order number: **1-1-00-653-162**	

All mating plugs with 6.5 ft (2 m) cable

Socket devices and protective caps

- IP65 socket devices or IP54 rubber protective caps for increased protection
- Simple installation with plug-in socket devices

Rubber protective cap

With central cable feed-through for 1.5 – 5 mm cable diameter

With rubber protective cap fitted: IP54

Suitable for voltages up to 42 V

suitable for series

0151 / 0163 / 0164 / 0166 0167 / 0168 / 0169

Order number:

1-1-66-621-010

Rubber protective cap

With two cable feed-throughs for 1.7 – 2.2 mm cable diameter

With rubber protective cap fitted: IP54

Suitable for voltages up to 42 V

suitable for series

0151 / 0163 / 0164 / 0166 0167 / 0168 / 0169

Order number:

1-1-66-621-003

Rubber protective cap

With two cable feed-throughs for 1.7 – 2.3 mm cable diameter

With rubber protective cap fitted: IP54

Suitable for voltages up to 42 V

suitable for series

0170 / 0171 / 0180* / 0181* 0183* / 0186* / 0187* 0190 / 0191 / 0196 / 0197

(*up to 42 V)

Order number:

1-1-70-621-007

Socket device

PG9 screw fitting (tightening range 6 – 9 mm)

With socket device fitted: IP65

Suitable for voltages up to 250 V

suitable for series

0170 / 0171 / 0180 / 0181 0183 / 0186 / 0187 0190 / 0191 / 0196 / 0197

Order number:

1-1-80-652-002

Socket device

to DIN EN 175301-803-A
(DIN 43650)

PG9 screw fitting
(tightening range 6 – 9 mm)
terminals for wire cross-sections:
0.34 … 1.5 mm²
(AWG 22 … AWG 16),
tightening torque
for terminal screw 0.4 Nm

With socket device fitted: IP65

Suitable for voltages
up to 250 V

suitable for series

0150 / 0161 / 0162 / 0175
0184 / 0185 / 0194 / 0195

Order number:

1-1-84-652-009

Socket device

With indicator lamp to DIN EN
175301-803-A
(DIN 43650)

PG9 screw fitting
(tightening range 6 – 9 mm)
terminals for wire cross-sections:
0.34 … 1.5 mm²
(AWG 22 … AWG 16),
tightening torque
for terminal screw 0.4 Nm

With socket device fitted: IP65

Suitable for voltage
24 or 250 V

suitable for series

0150 / 0161 / 0162 / 0175
0184 / 0185 / 0194 / 0195

Order number:

for 24 VDC: **1-1-84-652-011**

for 250 VAC: **1-1-84-652-010**

Socket device

M 12x1
DIN EN 61071-2-101 D
Straight
4-pin

Terminals for wire cross-section
0.75 mm² (AWG 18),
tightening torque for terminal
screw 0.4 Nm

With socket device fitted: IP65

Suitable for voltages
up to 48 V

suitable for series

0122 / 0123 / 0124 / 0125
0134 / 0135 / 0424 / 0425

and for all transmitters and
electronic pressure switches
with an M12 connector

Order number:

1-6-00-652-016

Socket device

M 12x1
DIN EN 61071-2-101 D
Angled
4-pin

Terminals for wire cross-section
0.75 mm² (AWG 18),
tightening torque for terminal
screw 0.4 Nm

With socket device fitted: IP65

Suitable for voltages
up to 48 V

suitable for series

0122 / 0123 / 0124 / 0125
0134 / 0135 / 0424 / 0425

and for all transmitters and
electronic pressure switches
with an M12 connector

Order number:

1-6-00-652-017

Thread adapters

For requirements at short notice and for realising custom solutions

- The materials and shapes of thread adapters are aligned perfectly to our switches and transmitters
- Thread adapters are supplied with seals

For 1/8 BSPP female
Vacuum switch
with SUCO thread code 15

For 1/4 BSPP DIN EN ISO 1179-1 (DIN 3852-E)
All pressure switches and transmitters
with SUCO thread code 41

Dual nipple brass

1/8 BSPP- E
DIN EN ISO 1179-2
includes
sealing ring NBR
(BunaN)

NPT 1/8-27

Order number:
1-1-00-420-014

1/8 BSPP-A

includes
sealing ring OL-1/8

NPT 1/4-18

Order number:
1-1-00-420-029

Thread adapters stainless steel (1.4305 / AISI 303)

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

M10 x 1 Shape A
DIN 3852-1

Order number:
1-1-00-420-020

M14 x 1.5 Shape E
DIN 3852-E
includes
sealing ring FKM
(Viton®)

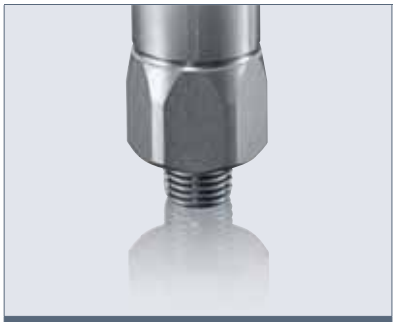
Order number:
1-1-00-420-028

NPT 1/4-18

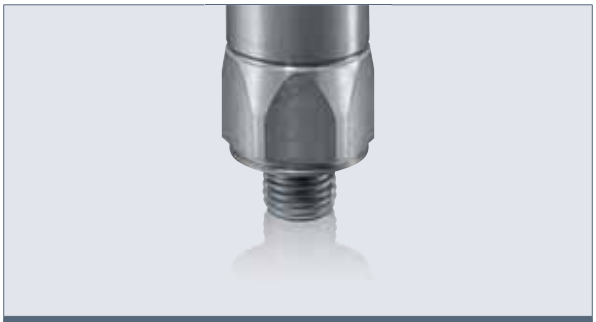
Order number:
1-1-00-420-021

9/16-18UNF
includes
O-ring FKM
(Viton®)

Order number:
1-1-00-420-027



For 1/4 BSPP
All hex 24 and hex 27 pressure switches with SUCO thread code 03



For M14x1.5 DIN ISO 6149-3
Pressure switch series 0183 with SUCO thread code 45

For 1/4 BSPP
All hex 24 and hex 27 pressure switches with SUCO thread code 03

Thread adapters zinc-plated steel (CrVI-free)

1/4 BSPP
female thread
includes sealing ring FKM (Viton®)

1/4 BSPT

Order number: **1-1-00-420-009**

3/8-24 UNF-2A

Order number: **1-1-00-420-013**

M 14 x 1.5
DIN ISO 6149-1
female thread

1/4 BSPP

Order number: **1-1-83-420-006**

M12 x 1.5

Order number: **1-1-83-420-007**

NPT 1/8-27

Order number: **1-1-83-420-008**

Adapter Aluminium

1/4 BSPP
female thread
includes copper sealing ring

Flange design
includes NBR (BunaN) O-ring

Order number: **1-1-00-420-025**

E. Overview of electronic pressure switches

Electronic pressure switches with ceramic measuring cell

Switching point:	0 - 1,450 psi (0 - 100 bar)
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, maximum output current 0.5 A
Variant:	PNP
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	NBR (BunaN), FKM (Viton®)
Thread:	1/4 BSPP, NPT 1/4
Types:	0500, 0501, 0502, 0503

Switching point:	0 – 1,450 psi (0-100 bar)
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, output current: max. 0.5 A
Variant:	PNP
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	NBR (BunaN), FKM (Viton®)
Thread:	1/4 BSPP, NPT 1/4
Special feature:	Switching status display (LED)
Types:	0510, 0511, 0512, 0513

Switching point:	0 – 3,625 psi (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 (BunaN), FKM (Viton®), EPDM
Thread:	1/4 BSPP male or female thread
Types:	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 – 5,800 psi (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 (BunaN), FKM (Viton®), EPDM
Thread:	Female thread
Types:	0570

Electronic pressure switches with SoS technology

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

from page 122

Special feature:	Highest accuracy and long-term stability
Switching point:	0 – 8,700 psi (0 - 600 bar)
Overpressure protection:	Up to 4 x
Transistor outputs:	Qty: 1, maximum output current 0.5 A
Variant:	PNP or NPN
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	All welded, without elastomer seal
Thread:	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 – 8,700 psi (0 - 600 bar)
Overpressure protection:	Up to 4 x
Transistor outputs:	Qty: 2, maximum output current 0.5 A
Variant:	PNP or NPN
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	All welded, without elastomer seal
Thread:	Different male threads
Types:	0540, 0541, 0542, 0544, 0545, 0546

E.7. Accessories

from page 130

- Mating plugs
- Thread adapters
- Programming tools

Technical explanations for electronic pressure switches

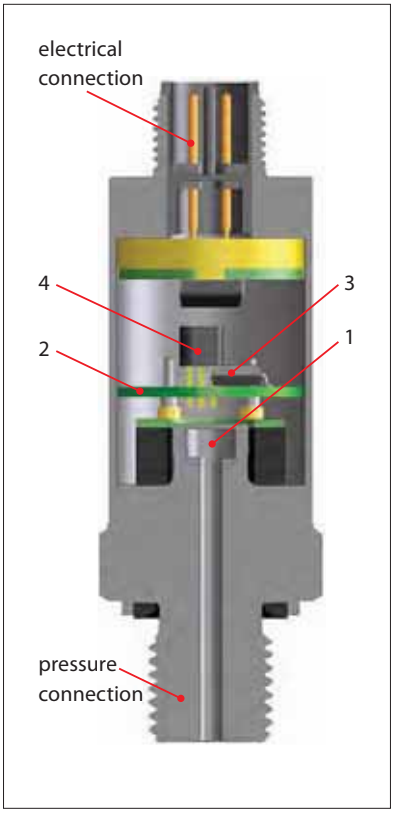
What is an electronic pressure switch?

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 differential 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 long-term stability.

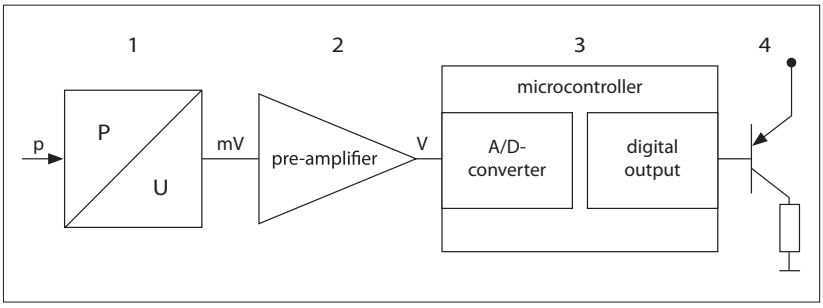
"Oil-filled" stainless steel measuring cell"

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).

Differential
Rising/falling switching point

The difference between the rising (upper) and falling (lower) switching points (refer to the figure) is known as differential (switch-back difference).

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

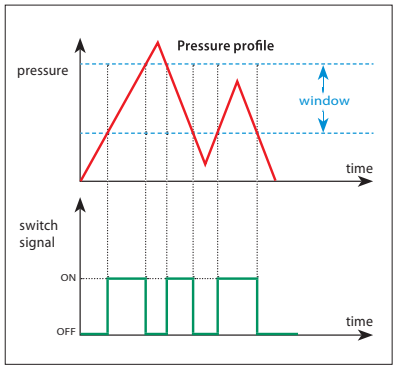
Differential is either set at the factory or by the customer on site (only the 0570 series). The differential or switch-back point of all pressure switches can be set over almost the entire adjustment range.

Please ask about the possible setting ranges you may require.

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

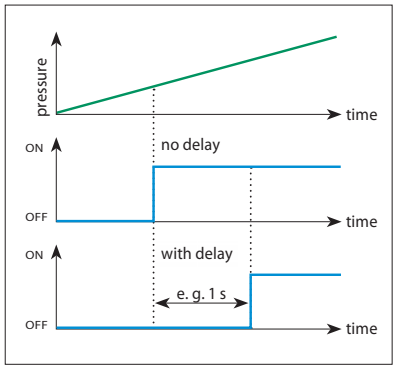
Window function

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.

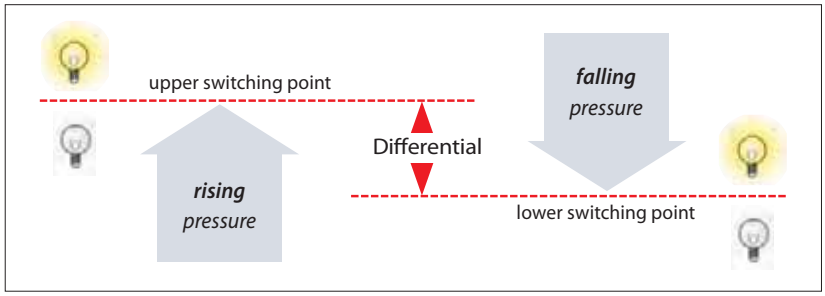


Switching delay

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.



Differential



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.

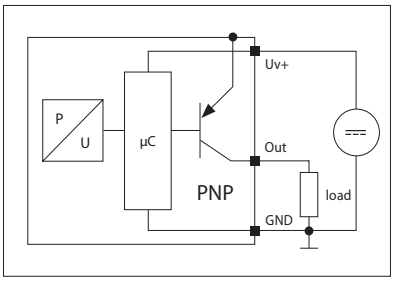
Technical explanations for electronic pressure switches

Connection types and output functions

There are essentially two different ways to connect the load or apparent ohmic resistance to electronic pressure switches:

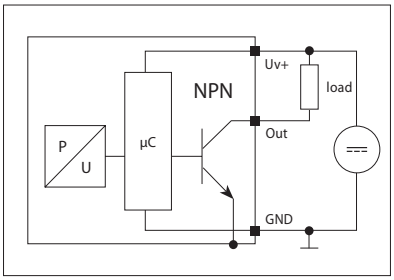
PNP output / high-side / plus-switching

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).

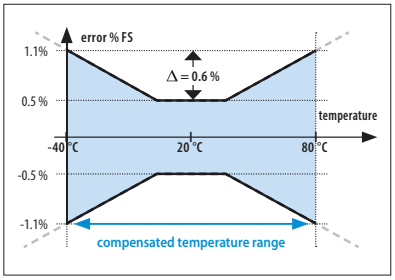


NO/NC

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 significant 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.

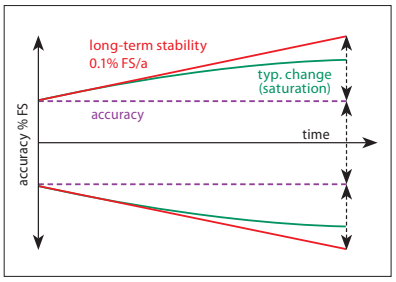


Service life and long-term stability

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.

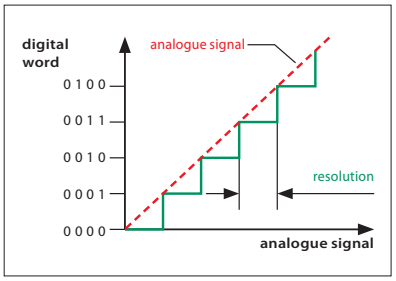
Ageing is accelerated (or slowed) due to different factors - such as temperature, temperature change and reduction of mechanical forces. The occurrence of ageing does effect the total accuracy.

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.



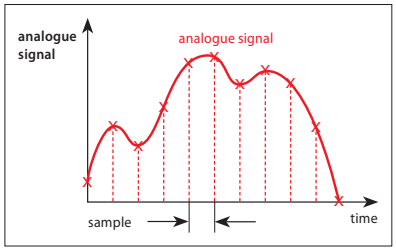
Resolution

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.



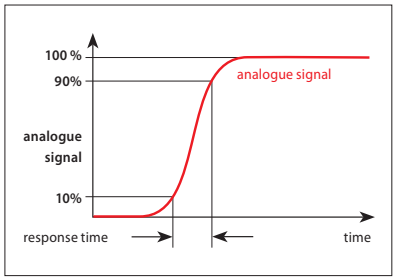
Sampling rate

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 for 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; 80-2700 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/m^2	bar	Torr	lbf/in^2. PSI
1 Pa = N/m^2	Pascal	1	0.00001	0.0075	0.00014
1 bar	Bar	100 000	1	750.062	14.5
1 Torr = 1 mm Hg	Millimeters of mercury	133.322	0.00133	1	0.01934
1 lbf/in^2 = 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 (AISI 303 / 1.4305)

Stainless steel with broad level of media compatibility. Also suitable for oxygen and hydrogen applications.

Stainless steel (AISI 316L / 1.4404)

Stainless steel with broad level of media compatibility. Also suitable for chemical industry and sea water applications.

Oxygen and hydrogen

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".

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.

Electronic pressure switches, Performance series 0500, 0501

hex 24, factory adjustable

- Housing/wetted parts made of stainless steel AISI 303 (1.4305), others on request
- Ceramic sensor in thick film technology
- Very attractively priced electronic pressure switches, particularly for high volume deployment
- High overpressure protection (up to 2x)
- Small, compact electronic switches
- Broad diversity of electronic and mechanical connection options
- High level of adaptability to your requirements (custom solutions)
- Differential (1 % - 98 %) and set point only factory adjustable

Technical details

Type:	**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 short-circuit and overvoltage protection					
Idle power consumption:	< 30 mA					
Standard pressure ranges p_{nom}:	0 – 2 bar (29 psi)	0 – 4 bar (58 psi)	0 – 10 bar (145 psi)	0 – 16 bar (230 psi)	0 – 40 bar (580 psi)	0 – 100 bar (1,450 psi)
Overpressure protection p_u[1]:	4 bar (58 psi)	10 bar (145 psi)	20 bar (290 psi)	40 bar (580 psi)	100 bar (1,450 psi)	150 bar (2,175 psi)
Burst pressure[1]:	8 bar (115 psi)	20 bar (290 psi)	35 bar (500 psi)	60 bar (870 psi)	140 bar (2,000 psi)	300 bar (4,350 psi)
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}					
Pressure rise:	≤ 14.5 psi/ms (≤1 bar/ms)					
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 at factory					
Differential:	1 … 98 % FS, programmable at factory (max. tolerance ±1.0% of adjustment range p_{nom})					
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					
Temperature error[2]:	±0.04 % of adjustment range p_{nom} (FS) / °C					
Compensated temperature range:	+32 °F …+158 °F (0 °C … +70 °C), total error ≤ 2 %					
Temperature range ambient:	-22 °F … +212 °F (-30 °C … +100 °C)					
Temperature range media:	with NBR (BunaN) seal: -22 °F … +212 °F (-30 °C … +100 °C)					
	with EPDM seal: -22 °F … +257 °F (-30 °C … +125 °C)					
	with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)					
	with TPE seal: -22 °F … +230 °F (-30 °C … +110 °C)					
Wetted parts material – Housing:	Stainless steel (AISI 303 / 1.4305)					
Wetted parts material – Messuring cell:	Ceramic					
Wetted parts material – Seal material	NBR (BunaN), EPDM, FKM (Viton®) or TPE[3]					
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)					
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. 2.82 oz / 80 g (DIN EN 175301 approx. 3.88 oz / 110 g)					

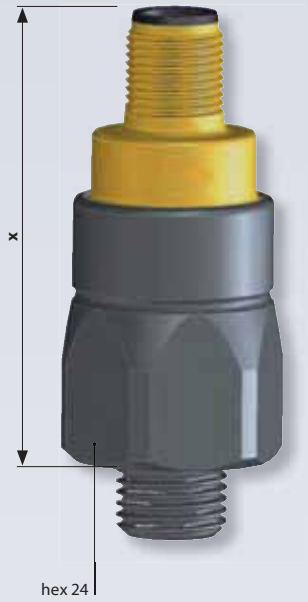
[1] Static pressure, dynamic pressure 30 to 50% lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.

[2] Within the compensated temperature range

[3] Thermoplastic elastomers

0500 / 0501

Factory adjustable
Electrical connectors and threads



	no / nc
○ 1	(+)
○ 2	(GND)
○ 3	(OUT)

DIN EN 175301-803-A

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

IP65

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

Order number: 013

M 12 – DIN EN 61076-2-101 A

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

IP67

x ~ 54 mm

Order number: 002

ISO 15170-A1-4.1

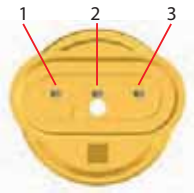
Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
4	nc

IP67, IP6K9K

x ~ 56 mm

Order number: 004

AMP Superseal 1.5®



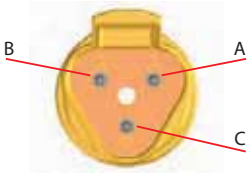
Pin	Assignment
1	U_{out}
2	Gnd
3	Uv+

IP67

x ~ 61 mm

Order number: 007

Deutsch DT04-3P



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

IP67, IP6K9K

x ~ 61 mm

Order number: 010

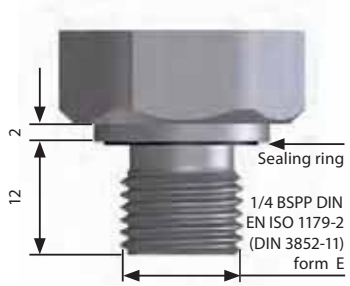
Cabel connection

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

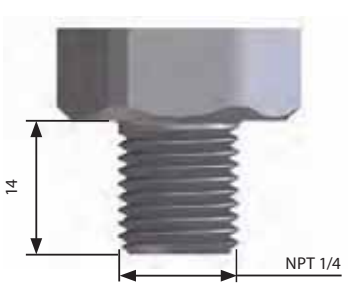
IP67

x ~ 47 mm
(+ 25 mm bend relief)
Cable length ~ 6.5 ft (2 m)

Order number: 011



Thread code: 41



Thread code: 09

RoHSII compliant

0500 / 0501

Order matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

Normally open (NO), PNP, set point - adjustment made by factory[1]	0500
Normally closed (NC), PNP, set point - adjustment made by factory[1]	0501

Max. overpressure[2]	Burst pressure	Pressure range[1]	
4 bar (58 psi)	8 bar (115 psi)	0 - 2 bar (approx. 29 psi)	200
10 bar (145 psi)	20 bar (290 psi)	0 - 4 bar (approx. 58 psi)	400
20 bar (290 psi)	35 bar (500 psi)	0 - 10 bar (approx. 145 psi)	101
40 bar (580 psi)	60 bar (870 psi)	0 - 16 bar (approx. 230 psi)	161
100 bar (1,450 psi)	140 bar (2,000 psi)	0 - 40 bar (approx. 580 psi)	401
150 bar (2,175 psi)	300 bar (4,350 psi)	0 - 100 bar (approx. 1,450 psi)	102

Pressure connection

1/4 BSPP – ISO 1179-2 (DIN 3852), form E, male thread	41
NPT 1/4	09

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
TPE	Mineral oil, HFC, HFD, water, water-salt solutions, methanol	7

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	013
M 12x1 - 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 (length of cable 6.5 ft / 2 m standard)	011

Order number:	05XX	XXX	XX	X	XXX

[1] Please state switching point and differential when ordering.

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

RoHSII compliant

CE

Electronic pressure switches, Performance series 0510, 0511

hex 24, field adjustable

- Housing/wetted parts made of stainless steel AISI 303 (1.4305), others on request
- Ceramic sensor in thick film technology
- Field adjustable with the set screw
- Very competitively priced electronic pressure switches
- High overpressure protection (up to 2 x)
- Small, compact electronic switches
- Broad diversity of electronic and mechanical connection options
- High level of adaptability to your requirements (custom solutions)
- Differential adjustable within broad range (1% - 98%, set at factory)

Technical details

Type:	**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 short-circuit and overvoltage protection					
Idle power consumption:	< 30 mA					
Standard pressure range p_{nom}:	0 – 2 bar (29 psi)	0 – 4 bar (58 psi)	0 – 10 bar (145 psi)	0 – 16 bar (230 psi)	0 – 40 bar (580 psi)	0 – 100 bar (1,450 psi)
Overpressure protection p_u [1]:	4 bar (58 psi)	10 bar (145 psi)	20 bar (290 psi)	40 bar (580 psi)	100 bar (1,450 psi)	150 bar (2,175 psi)
Burst pressure[1]:	8 bar (115 psi)	20 bar (290 psi)	35 bar (500 psi)	60 bar (870 psi)	140 bar (2,000 psi)	300 bar (4,350 psi)
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}					
Pressure rise:	≤ 14.5 psi/ms (≤1 bar/ms)					
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), field adjustable					
Differential:	1 … 98 % FS, programmable at factory (max. tolerance ±1.0 % of adjustment range p_{nom})					
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					
Temperature error[2]:	±0.04 % of adjustment range p_{nom} (FS) / °C					
Compensated temperature range:	+32 °F …+158 °F (0 °C … +70 °C), total error ≤ 2 %					
Temperature range ambient:	-22 °F … +212 °F (-30 °C … +100 °C)					
Temperature range media:	with NBR (BunaN) seal: -22 °F … +212 °F (-30 °C … +100 °C)					
	with EPDM seal: -22 °F … +257 °F (-30 °C … +125 °C)					
	with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)					
	with TPE seal: -22 °F … +230 °F (-30 °C … +110 °C)					
Wetted parts material – Housing:	Stainless steel (AISI 303 /1.4305)					
Wetted parts material – Measuring cell:	Ceramic					
Wetted parts material – Seal material:	NBR (BunaN), EPDM, FKM (Viton®) or TPE[3]					
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)					
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:	EMC 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. 2.82 oz / 80 g (DIN EN 175301 approx. 3.88 oz / 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

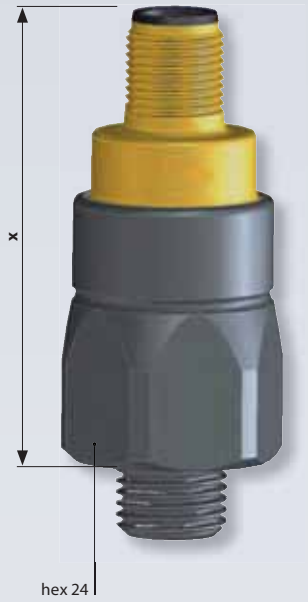
[3] Thermoplastic elastomers

E.2

hex 24
Performance
field adjustable

0510 / 0511

Electrical connectors and threads



	no / nc
1	(+)
2	(GND)
3	(OUT)

DIN EN 175301-803-A

Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
PE	⏚
IP65	
x ~ 60 mm without coupler socket **x** ~ 77 mm with coupler socket	
Order number: 013	

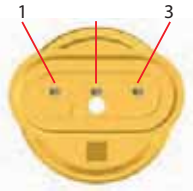
M 12 – DIN EN 61076-2-101 A

Pin	Assignment
1	Uv+
2	nc
3	Gnd
4	U_{out}
IP67	
x ~ 54 mm	
Order number: 002	

ISO 15170-A1-4.1

Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
4	nc
IP67, IP6K9K	
x ~ 56 mm	
Order number: 004	

AMP Superseal 1.5®

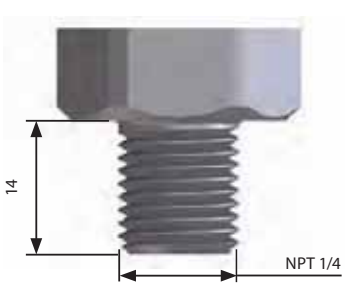


Pin	Assignment
1	U_{out}
2	Gnd
3	Uv+
IP67	
x ~ 61 mm	
Order number: 007	

Deutsch DT04-3P

Pin	Assignment
A	Uv+
B	Gnd
C	U_{out}
IP67, IP6K9K	
x ~ 61 mm	
Order number: 010	

Thread code: 41



Thread code: 09

RoHSII compliant

0510 / 0511

Order matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓

Type

Normally open (NO), PNP, set point - field adjustable	0510
Normally closed (NC), PNP, set point - field adjustable	0511

Max. overpressure[1)]	Burst pressure	Pressure range	
4 bar (58 psi)	8 bar (115 psi)	0 – 2 bar (approx. 29 psi)	200
10 bar (145 psi)	20 bar (290 psi)	0 – 4 bar (approx. 58 psi)	400
20 bar (290 psi)	35 bar (500 psi)	0 – 10 bar (approx. 145 psi)	101
40 bar (580 psi)	60 bar (870 psi)	0 – 16 bar (approx. 230 psi)	161
100 bar (1,450 psi)	140 bar (2,000 psi)	0 – 40 bar (approx. 580 psi)	401
150 bar (2,175 psi)	300 bar (4,350 psi)	0 – 100 bar (approx. 1,450 psi)	102

Pressure connection

1/4 BSPP – ISO 1179-2 (DIN 3852), form E, male thread	41
NPT 1/4	09

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
TPE	Mineral oil, HFC, HFD, water, water-salt solutions, methanol	7

Electrical connection

DIN EN 175301-803-A (DIN 43650-A) coupler socket included in delivery	013
M 12x1 - 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

	↓	↓	↓	↓	↓
Order number:	05XX	XXX	XX	X	XXX

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

RoHSII compliant

Electronic pressure switches

hex 27 and 30 A/F, field adjustable

- Ceramic sensor in thick film technology
- High overpressure protection to 7,250 psi (500 bar)
- Easy adjustment of switching point from the outside using set screw
- Differential available within broad range (2 % – 5 %, set at factory)
- Very high switching currents (to 1.4 A)

Technical details

Type:	**0520 NO or 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 (145 psi)	0 – 100 bar (1,450 psi)	0 – 250 bar (3,625 psi)
Max. overpressure[1]:	20 bar (290 psi)	150 bar (2,175 psi)	500 bar (7,250 psi)
Burst pressure[1]:	25 bar (360 psi)	175 bar (2,540 psi)	600 bar (8,700 psi)
Mechanical life expectancy:	5,000,000 switching cycles in adjustment range at p_{nom}		
Pressure rise:	≤ 14.5 psi/ms (≤ 1 bar/ms)		
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		
Differential:	2 … 95 % FS, programmable at factory (max. tolerance ± 1.0 % of adjustment range)		
Standard differential without order specification:	approx. 7.25 psi (0.5 bar)	approx. 72.5 psi (5 bar)	approx. 145 psi (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:	+32 °F …+158 °F (0 °C … +70 °C), total error ≤ 2 %		
Temperature range ambient:	-22 °F … +176 °F (-30 °C … +80 °C)		
Temperature range media:	with NBR (BunaN) seal: -22 °F … +212 °F (-30 °C … +100 °C)		
	with EPDM seal: -22 °F … +257 °F (-30 °C … +125 °C)		
	with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)		
Wetted parts material – Housing:	zinc-plated steel		
Wetted parts material – Measuring cell:	Ceramic		
Wetted parts material – Seal material:	NBR (BunaN), EPDM or FKM (Viton®)		
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)		
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. 8.5 oz (240 g)		

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

[2] Within the compensated temperature range

E.3

hex 27 / 30 A/F
field adjustable

0520

Electrical connectors and threads

	no / nc
1	(+)
2	(GND)
3	(OUT)

DIN EN 175301-803-A (DIN 43650-A)

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

IP65
Cable output PG9
(outside diameter of cable 6 to 9 mm)

Order number: 001

M 12x1 - DIN EN 61076-2-101-A

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

IP67

Order number: 002

Thread code: 14

Thread code: 41

RoHSII compliant

0520

Order 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 – 145 psi (0 – 10 bar)	470
0 – 1,450 psi (0 – 100 bar)	472
0 – 3,625 psi (0 – 250 bar)	474

Adjustment range[1] for NC

0 – 145 psi (0 – 10 bar)	471
0 – 1,450 psi (0 – 100 bar)	473
0 – 3,625 psi (0 – 250 bar)	475

Pressure connection

1/4 BSPP – female thread	14
1/4 BSPP – ISO 1179-2 (DIN 3852), form E, male thread	41

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

Electrical connection

DIN EN 175301-803-A (DIN 43650-A) ; socket device included	001
M 12x1 - DIN EN 61076-2-101-A	002

Order number:	0520	47X	XX	X	XXX

Also available factory adjusted. If you require factory adjustment, please state switching point and differential 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

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

Technical details

Type:	**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 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}
Pressure rise rate:	≤ 14.5 psi/ms (≤ 1 bar/ms)
Switching time:	< 4 ms
Switching time delay:	Adjustable between 0 and 3.0 s
Differential:	1 – 99 % FS, programmable from keypad
Accuracy:	±0.5 % (FS at room temperature)
Accuracy, display:	±0.5 % (FS at room temperature) ±2 digits
Temperature drift:	±0.2 % / 34°F (1 °C)
Temperature range:	NBR (BunaN), EPDM: - 4 °F … +176 °F (-20 °C … +80 °C)
	FKM (Viton®): +23 °F … +176°F (-5 °C… +80 °C)
Temperature compensation:	-4 °F … +176 °F (-20 °C … +80 °C), error ≤ ±1.5 % overall
Materials:	Wetted parts anodised aluminium, body made of die-casted zinc
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
EMV:	acc. to EN 50081-1, EN 50081-2, EN 50082-2
Weight:	approx. 12 oz (340 g)
Access pin:	The switch can be protected with a pin between 1 and 999

0570

Electronic pressure switches

- Anodised aluminium and die-casted zinc
- Ceramic measuring cell in thick-film technology
- Supply voltage 12 … 30 VDC
- Overpressure protection to 290 / 2,175 / 8,700 psi (20 / 150 / 600 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 psi (bar)	Burst pressure in psi (bar)	Adjustment range in psi (bar)	Thread	Order number:

0570 Electronic switches

290 psi [1)] (20 bar)[1)]	360 psi (25 bar)	0 – 145 psi (0 - 10 bar)	1/4 BSPP female	0570 – 467 14 – X – 001
2,175 psi [1)] (150 bar)[1)]	2,540 psi (175 bar)	0 – 1,450 psi (0 - 100 bar)		0570 – 468 14 – X – 001
8,700 psi [1)] (600 bar)[1)]	10,150 psi (700 bar)	0 – 5,800 psi (0 - 400 bar)		0570 – 469 14 – X – 001

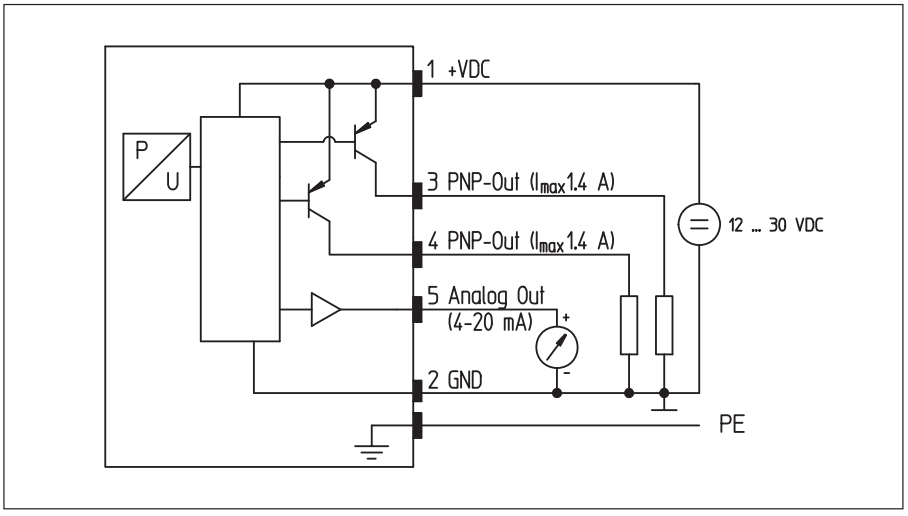
Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	2
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3

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

Order number:	0570 – XXX 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.

RoHS II compliant

E.5

hex 22

Silicon-on-Saphire Sensor with One Switching Function

Electronic pressure switches, High-Performance series

- 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 differential at factory

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

Technical details

Silicon-on-Saphire Sensor with One Switching Function

Type	**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:	< 15 mA				
Standard adjustment range p_{nom}	0 – 10 bar (0 – 145 psi)	0 – 25 bar (0 – 360 psi)	0 – 100 bar (0 – 1,450 psi)	0 – 250 bar (0 – 3,625 psi)	0 – 600 bar (0 – 8,700 psi)
Overpressure protection p_u [1]	40 bar (580 psi)	100 bar (1,450 psi)	400 bar (5,800 psi)	1,000 bar (14,500 psi)	1,650 bar (29,930 psi)
Burst pressure[1]:	80 bar (1,160 psi)	200 bar (2,900 psi)	800 bar (11,600 psi)	2,000 bar (29,000 psi)	2,000 bar (29,000 psi)
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 72.5 psi/ms (5 bar/ms) at p_{nom}				
Permitted pressure change rate:	≤ 72.5 psi/ms (≤ 5 bar / ms)				
Switching point adjustment range:	2 … 100 % of the nominal pressure range (Full Scale, FS), programmable at factory				
Differential:	0.2 … 99.8 % of the nominal pressure range (FS), programmable at factory (set to 5% of the switching point 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 differential or window mode, programmable at factory				
Long term stability:	±0.1 % FS p. a.				
Repeatability[1]:	±0.1 % FS				
Temperature error[1]:	±0.02 % / 1 K FS				
Compensated temperature range:	-4 °F . . . +176 °F (-20 °C . . . +80 °C)				
Temperature range media:	-40 °F . . . +257 °F (-40 °C . . . +125 °C)				
Temperature range ambient:	-40 °F . . . +212 °F (-40 °C . . . +100 °C)				
Wetted parts material:	Stainless steel AISI 303 (1.4305) and titanium				
Housing material:	Stainless steel AISI 303 (1.4305)				
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)				
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/s^2; 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. 2.8 oz / 80 g (DIN 175301 approx. 3.8 oz / 110 g, cable version approx. 4.8 oz / 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.5

hex 22

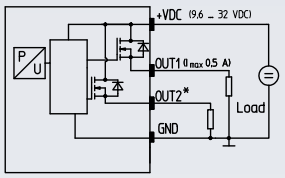
Silicon-on-Saphire Sensor with One Switching Function

0530 / 0531 / 0532 / 0533

Electrical connectors and threads

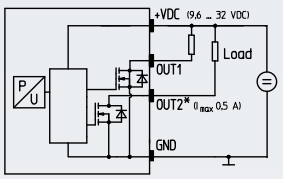
Connection diagrams

High Side Output (PNP)



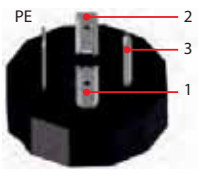
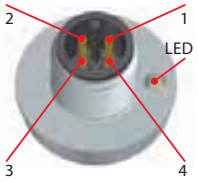
Pin assignment depending on electr. connection
*OUT2 only for 054x

Low Side Output (NPN)

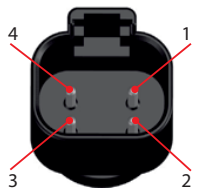


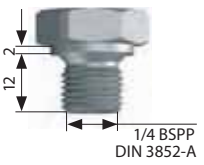
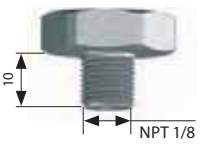
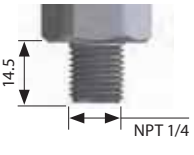
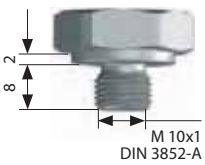
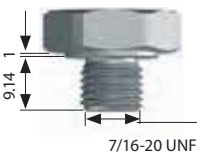
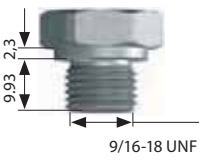
Pin assignment depending on electr. connection
*OUT2 only for 054x

Technical modifications and errors excepted.

DIN EN 175301-803-A	M 12 – DIN EN 61076-2-101 A	ISO 15170-A1-4.1	AMP Superseal
			
Pin / Assignment	Pin / Assignment	Pin / Assignment	Pin / Assignment
1 / Uv+	1 / Uv+	1 / Uv+	1 / Out
2 / Gnd	2 / nc	2 / Gnd	2 / Gnd
3 / U_{out}	3 / Gnd	3 / U_{out}	3 / Uv+
PE / ⏚	4 / Out	4 / nc	
IP65	IP67	IP67, IP6K9K	IP67
x ~ 60 / 76 mm*	**x** ~ 54 mm	**x** ~ 65 mm	**x** ~ 73 mm
d ~ Ø 30 mm	**d** ~ Ø 22 mm	**d** ~ Ø 27 mm	**d** ~ Ø 26 mm
Order number: 001	**Order number: 002**	**Order number: 004**	**Order number: 007**

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

DEUTSCH DT04-4P	DEUTSCH DT04-3P	Cable connection
		
Pin / Assignment	Pin / Assignment	Cable / Assignment
1 / Gnd	A / Uv+	red / Uv+
2 / Uv+	B / Gnd	white / Out
3 / nc	C / Out	black / Gnd
4 / Out		
IP67, IP6K9K	IP67, IP6K9K	IP67
x ~ 74 mm	**x** ~ 74 mm	**x** ~ 44 mm (+ 20 mm bend relief) cable length ~ 6.5 ft (2 m)
d ~ Ø 23 mm	**d** ~ Ø 23 mm	**d** ~ Ø 22 mm
Order number: 008	**Order number: 010**	**Order number: 011**

 FKM-(Viton®) Sealing ring; 1/4 BSPP DIN EN ISO 1179-2 (DIN 3852-11) form E	 1/4 BSPP DIN 3852-A	 NPT 1/8	 NPT 1/4
Thread code: 41	**Thread code: 03**	**Thread code: 04**	**Thread code: 09**
 M 10x1 DIN 3852-A	 7/16-20 UNF	 9/16-18 UNF	 FKM-(Viton®) Sealing ring; M 14x1,5 DIN EN ISO 9974-2 (DIN 3852-11) form E
Thread code: 30	**Thread code: 20**	**Thread code: 21**	**Thread code: 42**

0530 / 0531 / 0532 / 0533

Order matrix for electronic pressure switches

Silicon-on-Saphire Sensor with One Switching Function

	Type	Pressure 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 (580 psi)	80 bar (1,160 psi)	0 – 10 bar (0 - 145 psi)	**101**
100 bar (1,450 psi)	200 bar (2,900 psi)	0 – 25 bar (0 - 362.5 psi)	**251**
400 bar (5,800 psi)	800 bar (11,600 psi)	0 – 100 bar (0 - 1,450 psi)	**102**
1,000 bar (14,500 psi)	2,000 bar (29,000 psi)	0 – 250 bar (0 - 3,625 psi)	**252**
1,650 bar (23,930 psi)	2,000 bar (29,000 psi)	0 – 600 bar (0 - 8,700 psi)	**602**

Pressure connection

1/4 BSPP – DIN EN ISO 1179-2 (DIN 3852-11) form E	**41**
1/4 BSPP – DIN 3852-A	**03**
NPT 1/8	**04**
NPT 1/4	**09**
M 10x1 cyl. DIN 3852-A	**30**
7/16-20 UNF	**20**
9/16-18 UNF	**21**
M 14x1.5 – 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**
M 12 – 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 6.5 ft / 2 m standard)	**011**

Order number:	**05XX**	**XXX**	**XX**	**B**	**XXX**

[1] Please state switching point and differential when ordering.

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

RoHSII compliant

E.6

hex 22

Silicon-on-Saphire Sensor with Two Switching Functions

Electronic pressure switches, High-Performance series

- 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 differential at factory

Technical details

Silicon-on-Saphire Sensor with Two Switching Functions

Type	**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:	< 15 mA				
Standard-Adjustment range p_{nom}:	0 – 10 bar (0 – 145 psi)	0 – 25 bar (0 – 360 psi)	0 – 100 bar (0 – 1,450 psi)	0 – 250 bar (0 – 3,625 psi)	0 – 600 bar (0 – 8,700 psi)
Overpressure protection p_u [1]:	40 bar (580 psi)	100 bar (1,450 psi)	400 bar (5,800 psi)	1,000 bar (14,500 psi)	1,650 bar (23,930 psi)
Burst pressure[1]:	80 bar (1,160 psi)	200 bar (2,900 psi)	800 bar (11,600 psi)	2,000 bar (29,000 psi)	2,000 bar (29,000 psi)
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 72.5 psi/ms (5 bar/ms) at p_{nom}				
Permitted pressure change rate:	≤ 72.5 psi/ms (≤ 5 bar/ms)				
Switching point adjustment range:	2 … 100 % of the nominal pressure range (Full Scale, FS), programmable at factory				
Differential:	0.2 … 99.8 % of the nominal pressure range (Full Scale, FS), programmable at factory (5 % of the switching point is set 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				
Long term stability:	±0.1 % FS p. a.				
Repeatability[1]:	±0.1 % FS				
Temperature error[1]:	±0.02 % / 1 K FS				
Compensated temperature range:	-4 °F . . . +176 °F (-20 °C . . . +80 °C)				
Temperature range media:	-40 °F . . . +257 °F (-40 °C . . . +125 °C)				
Temperature range ambient:	-40 °F . . . +212 °F (-40 °C . . . +100 °C)				
Wetted parts material:	Stainless steel AISI 303 (1.4305) and titanium				
Housing material:	Stainless steel AISI 303 (1.4305)				
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)				
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				
Short-circuit, overvoltage and reverse polarity protection	Built-in				
Weight:	approx. 2.8 oz / 80 g (DIN 175301 approx. 3.8 oz / 110 g, cable version approx. 4.7 oz / 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.

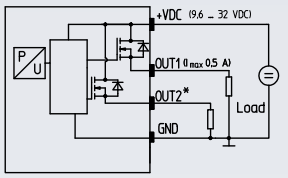
Silicon-on-Saphire Sensor with Two Switching Functions

0540 / 0541 / 0542 / 0544 / 0545 / 0546

Electrical connectors and threads

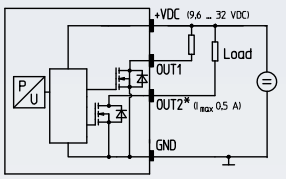
Connection diagrams

High Side Output (PNP)



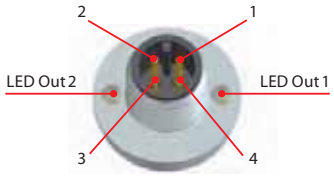
Pin assignment depending on electr. connection
*OUT2 only for 054x

Low Side Output (NPN)

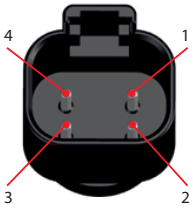


Pin assignment depending on electr. connection
*OUT2 only for 054x

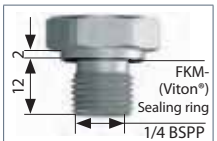
Technical modifications and errors excepted.

M 12 – DIN EN 61076-2-101 A	
	
Pin	Assignment
1	Uv+
2	Out 2
3	Gnd
4	Out 1
IP67	
x ~ 54 mm	
d ~ Ø 22 mm	
Order number: 002	

ISO 15170-A1-4.1	
	
Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
4	nc
IP67, IP6K9K	
x ~ 65 mm	
d ~ Ø 27 mm	
Order number: 004	

DEUTSCH DT04-4P	
	
Pin	Assignment
1	Gnd
2	Uv+
3	Out 2
4	Out 1
IP67, IP6K9K	
x ~ 74 mm	
d ~ Ø 23 mm	
Order number: 008	

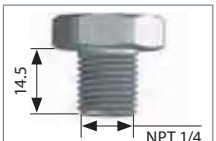
Cable connection	
	
Cable	Assignment
brown	Uv+
white	Out 2
black	Out 1
blue	Gnd
IP67	
x ~ 44 mm (+ 20 mm bend relief) Cable length ~ 6.5 ft (2 m)	
d ~ Ø 22 mm	
Order number: 011	



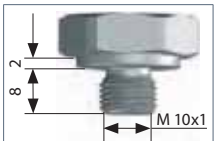
Thread code: 41

Thread code: 03

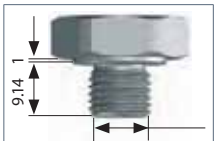
Thread code: 04



Thread code: 09



Thread code: 30



Thread code: 20

Thread code: 21

Thread code: 42

0540 / 0541 / 0542 / 0544 / 0545 / 0546

Order matrix for electronic pressure switches

Silicon-on-Saphire Sensor with Two Switching Functions

	Type	Pressure range	Pressure connection	Pressure unit	Electrical connection

Type

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

Max. overpressure[2]	Burst pressure	Adjustment range[1]	
40 bar (580 psi)	80 bar (1,160 psi)	0 – 10 bar (0 - 145 psi)	101
100 bar (1,450 psi)	200 bar (2,900 psi)	0 – 25 bar (0 - 362.5 psi)	251
400 bar (5,800 psi)	800 bar (11,600 psi)	0 – 100 bar (0 - 1,450 psi)	102
1,000 bar (14,500 psi)	2,000 bar (29,000 psi)	0 – 250 bar (0 - 3,625 psi)	252
1,650 bar (23,930 psi)	2,000 bar (29,000 psi)	0 – 600 bar (0 - 8,700 psi)	602

Pressure connection

1/4 BSPP – DIN EN ISO 1179-2 (DIN 3852-11) form E	41
1/4 BSPP – DIN 3852-A	03
NPT 1/8	04
NPT 1/4	09
M 10x1 cyl. DIN 3852-A	30
7/16-20 UNF	20
9/16-18 UNF	21
M 14x1,5 – DIN EN ISO 9974-2 (DIN 3852-11) form E	42

Pressure unit

bar	B

Electrical connection

M 12 – DIN EN 61076-2-101 A	002
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	004
Deutsch DT04-4P	008
Cable connection (length of cable 6.5 ft / 2 m standard)	011

Order number:	05XX	XXX	XX	B	XXX

[1] Please state switching point and differential when ordering.

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

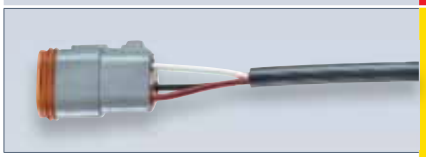
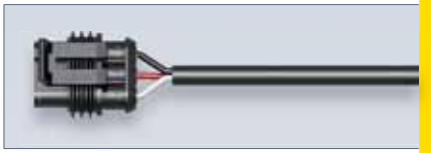
RoHSII compliant

Accessories

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

Accessories

Mating plugs

Deutsch DT06-3S (for DT04-3P) 3 x 0.5 mm² PUR cable 6.5 ft (2 m), IP67	Suitable for connector code **010** **Deutsch DT04-3P**	Order number: **1-1-36-653-160**	
TE AMP Superseal 1.5®, 3-pin 3 x 0.5 mm² Radox cable 6.5 ft (2 m), IP65	Suitable for connector code **007** **AMP Superseal 1.5®**	Order number: **1-1-32-653-158**	
M12 DIN EN 61076-2-LF, 4-pin 4 x 0.34 mm² PUR cable 6.5 ft (2 m), IP65	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-1-00-653-162**	
M 12x1 DIN EN 61071-2-101 D straight, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-6-00-652-016**	
Coupler socket M 12x1 DIN EN 61071-2-101 D Angled, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-6-00-652-017**	

Thread adapters

For requirements at short notice and for realising custom 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 1/4 BSPP DIN EN ISO 1179-1 (DIN 3852-E)
SUCO thread code 41, transmitters and electronic pressure switches

Stainless steel AISI 303 / 1.4305 thread adapters

1/ 4 BSPP
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 (Viton®)	**NPT 1/ 4-18**	**9/16 -18UNF** incl. O-ring FKM (Viton®)
Order number:	Order number:	Order number:	Order number:
1-1-00-420-020	**1-1-00-420-028**	**1-1-00-420-021**	**1-1-00-420-027**

T. Overview of pressure transducers

Pressure transducers with ceramic measuring cell

Standard pressure ranges:	0 – 29 psi (0 - 2 bar), 0 - 58 psi (0 - 4 bar) 0 - 145 psi (0 -10 bar), 0 - 230 psi (0 - 16 bar) 0 – 580 psi (0 - 40 bar), 0 - 1,450 psi (0 - 100 bar)
Overpressure protection:	2 x
Output signal (alternative):	0 – 10 V or 4 – 20 mA
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	NBR (BunaN), EPDM, FKM (Viton®)
Thread:	1/4 BSPP E, NPT 1/4
Types:	0601, 0602

Pressure transducers with oil-filled measuring cell

Standard pressure ranges:	-14.5 – 0 psi (-1 - 0 bar) (vacuum), 0 – 14.5 psi (0 - 1 bar), 0 - 58 psi (0 - 4 bar) 0 – 87 psi (0 - 6 bar), 0 - 145 psi (0 - 10 bar) 0 - 232 psi (0 - 16 bar), 0 - 580 psi (0 - 40 bar) 0 – 1,450 psi (0 - 100 bar)
Overpressure protection:	2 x
Output signal (alternative):	0.5 – 4.5 V ratiometric or 0 – 10 V or 4 – 20 mA
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	NBR (BunaN), FKM (Viton®)
Thread:	1/4 BSPP E
Types:	0645, 0650, 0660

T.3. Robust pressure transducers, hex 22, stainless steel „316 L“

from page 152

Standard pressure ranges:	-14.5 - 0 psi (-1 - 0 bar) (vacuum), 0 – 14.5 psi (0 - 1 bar), 0 - 58 psi (0 - 4 bar) 0 – 87 psi (0 - 6 bar), 0 - 145 psi (0 - 10 bar) 0 - 232 psi (0 - 16 bar), 0 -580 psi (0 - 40 bar) 0 – 1,450 psi (0 - 100 bar)
Overpressure protection:	2 x
Output signal (alternative):	0.5 – 4.5 V ratiometric or 0 – 10 V or 4 – 20 mA
Housing materials:	Stainless steel AISI 316 L (1.4404)
Sealing materials:	NBR (BunaN), FKM (Viton®)
Thread:	1/4 BSPP E
Types:	0675, 0680, 0690

Pressure transducers with SoS technology

T.4. Pressure transducers, High-Performance series, hex 22

from page 156

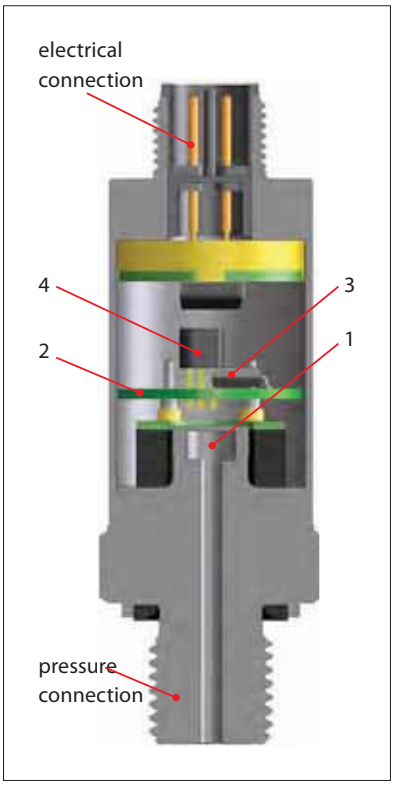
Standard pressure ranges:	0 – 145 psi (0 - 10 bar), 0 - 232 psi (0 - 16 bar) 0 – 362.5 psi (0 - 25 bar), 0 - 580 psi (0 - 40 bar) 0 – 870 psi (0 - 60 bar), 0 - 1,450 psi (0 - 100 bar) 0 – 2,320 psi (0 - 160 bar), 0 - 3,625 psi (0 - 250 bar) 0 – 5,800 psi (0 - 400 bar), 0 - 8,700 psi (0 - 600 bar)
Overpressure protection:	Up to 4 x
Output signal (alternative):	0.5 – 4.5 V ratiometric or 0 – 10 V or 4 – 20 mA
Housing materials:	Stainless steel AISI 303 (1.4305)
Sealing materials:	All welded, without elastomeric seal
Thread:	different male threads
Types:	0705, 0710, 0720

T.5. Accessories

from page 160

- Mating plugs
- Thread-Adapters
- Display

Technical explanations for pressure transducers



What is a pressure transducer?

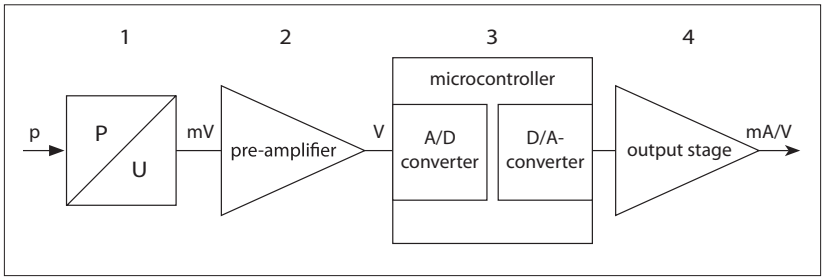
A pressure transducer (also called pressure transmitter or pressure converter) is a component used to convert a pneumatic or hydraulic pressure to an electric (usually analogue and linear) output signal, such as a current or voltage.

How does a pressure transducer work?

The pressure measuring cell fitted has a membrane (1) that is exposed to the pressure to be measured. Affixed on 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).

The downstream output stage (4) converts this signal to the output signal required (such as 4 - 20 mA or 0 - 10 V).

Block diagram:



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 so only require a low level of compensation overhead. This also has a favourable effect on long-term stability.

"Oil-filled" stainless steel measuring cell

In this measuring cell technology, the piezoresistive 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 to 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.

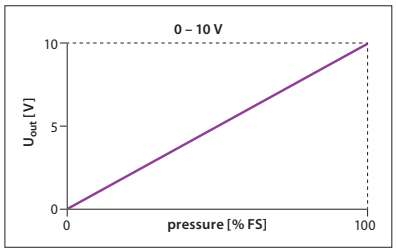
Standard signals

Output signals 4 - 20 mA, 0 - 10 V and 0.5 - 4.5 V ratiometric in particular have established themselves in the industry.
SUCO also offers transducers with customer-specific output signals (such as 1 - 5 V).

Voltage output 0 - 10 V

Transducers with an output signal of 0 to 10 V are a commonly used variant due to their simple initial operation and straightforward scaling of the signal (0 V for 0 psi/ 0 bar). The output load must be selected as highly resistive (with typical minimum value 4.7 kΩ). SUCO transducers with voltage output have a 3-wire design.

The maximum connection length should not exceed 30 m to prevent significant voltage drops in the signal line.



Conversion formula for pressure and voltage:

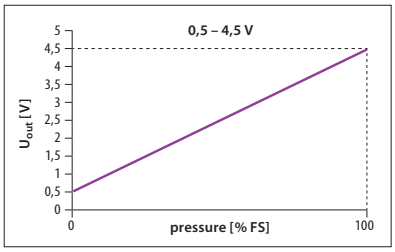
$$U_{out} = \frac{\text{pressure applied}}{\text{pressure range}} \times 10\ V$$

Voltage output
0.5 – 4.5 V ratiometric

SUCO transducers with ratiometric output are operated with a 5 V supply voltage as 3-wire configuration.

The output signal is directly proportional/ dependent to/on the supply voltage; this is known as a ratiometric dependency.
0.5 – 4.5 V is established as an output voltage because many A/D converters work with reference voltage Uv+ of 5 V. The output voltage 0.5 V equals to 10% and 4.5 V corresponds to 90% of the supply voltage. The span is therefore 80% of the supply voltage.

This variant is used for example when a transducer and a downstream A/D converter as an evaluation unit are to be powered with the same reference / operating voltage.



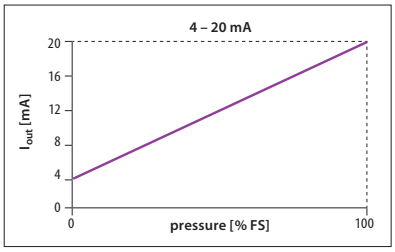
Conversion formula for pressure and voltage:

$$U_{out} = 0{,}1 \times U_{V+} + \frac{\text{pressure applied}}{\text{pressure range}} \times 0{,}8\ V \times U_{V+}$$

where U_{V+} = operating voltage

Current output 4 – 20 mA

The most common analogue output signal of sensors is 4 – 20 mA current output (as 2-wire configuration). The advantage of a 4 – 20 mA output signal is the 4 mA offset which allows the monitoring of potential wire break and short-circuit (life zero signal). The signal can also be transmitted over long distances with no loss in accuracy. This variant is also the least sensitive to EMC factors. 2-wire technology also means wiring overhead is reduced.



Conversion formula for pressure and current:

$$I_{out} = 4\ mA + \frac{\text{pressure applied}}{\text{pressure range}} \times 16\ mA$$

Load / apparent ohmic resistance for pressure transducers

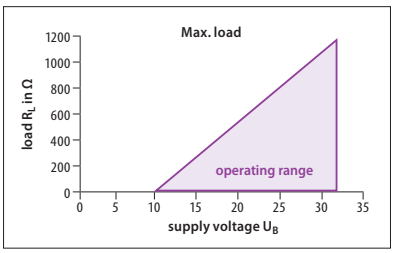
An appropriate ohmic load must be connected to guarantee perfect functioning of a pressure transducer.

For transducers with a voltage output (V), the load should be at least 4.7 kΩ.

For transducers with a current output (4 - 20 mA), the maximum load is calculated using the following formula:

$$R_L = \frac{U_{V+} - U_{V+(min)}}{20\ mA}$$

$U_{V+(min)}$ is the minimum supply voltage - to be taken from the data sheet. $U_{V+(min)}$ = 10 V gives the following operating range for example:



Supply / operating voltage U_B

All pressure transducers 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. (the ratiometic variant is an exception).
To guarantee the functionality of a transducer, the minimum supply voltage may not fall below. The maximum operating voltage may not be exceeded to avoid damage on the electronics.

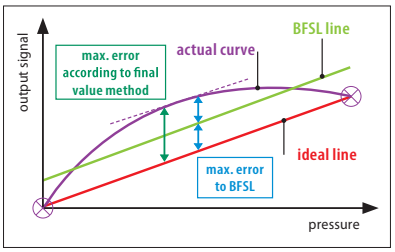
Technical explanations for pressure transducers

Accuracy (to DIN EN 61298)

The (measuring) accuracy of pressure transducers is specified by SUCO as ±0.5% or ±1% of the span (also called full scale). Accuracy includes zero point offset, non-linearity, differential and non-repeatability, and is defined at room temperature and new state. This method defines the maximum deviation from the ideal line (in contrast to the BSFL method in which the average deviation is given). Other factors influencing the total accuracy, such as temperature and ageing, are specified separately.

Non-linearity (to DIN EN 61298)

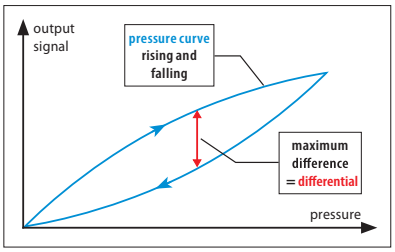
Non-linearity (also linearity) defines the deviation of the actual output curve from the theoretical ideal line. SUCO specifies the maximum error in relation to the overall span or full scale (FS) of the pressure range.



Non-linearity is also shown as BFSL (Best Fit Straight Line) as a reference value in the technical specifications. Non-linearity generally has the biggest influence on the overall error rate. Typically, non-linearity as per BFSL corresponds to half of non-linearity as per the full scale method (1% FS ~ 0.5% BFSL).

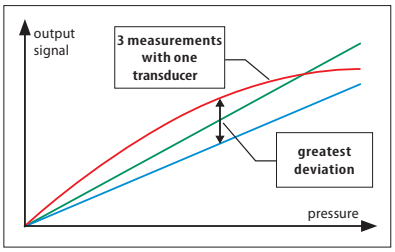
Differential (to DIN EN 61298)

For a pressure transducer, differential specifies the difference of output signal between a rising and falling pressure, and is typically very low and negligible for SUCO pressure transducers.



Non-repeatability (to DIN EN 61298)

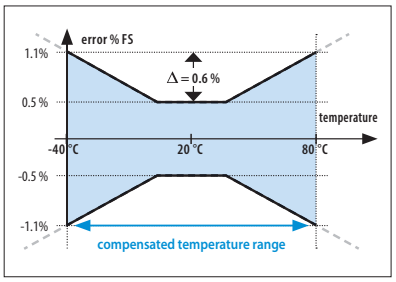
Non-repeatability defines reproducibility of the output signal. The pressure is attained three times for example - the maximum variance between these three values gives the non-repeatability.



Temperature errors and ranges

The temperature (both of the medium and ambience) generally has a significant influence on the accuracy of a pressure transducer. Pressure transducers 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 pressure transducer, also called *butterfly graph*. Outside the compensated temperature range, the maximum error is not defined, however the pressure transducer still functions.

To prevent mechanical and electrical damage, pressure transducers may not be deployed beyond the threshold temperature ranges specified in the data sheet.

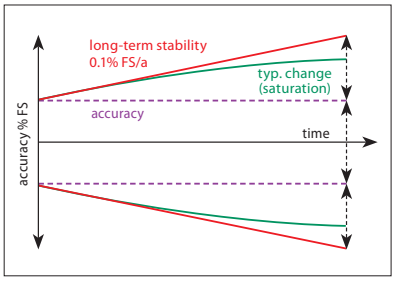


Service life and long-term stability

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.

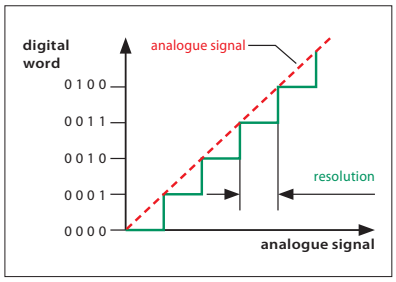
Ageing is accelerated (or slowed) due to different factors - such as temperature, temperature change and reduction of mechanical forces. The occurrence of ageing does effect the total accuracy.

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.



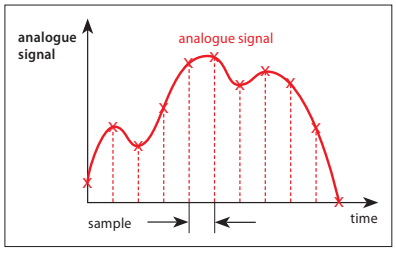
Resolution

The A/D resolution (analogue - digital) of an pressure transducer defines the smallest change of the analogue – digital – analogue conversion which takes places by the signal processing of an pressure transducer. If for example 13-bit resolution is used for an pressure transducer 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.



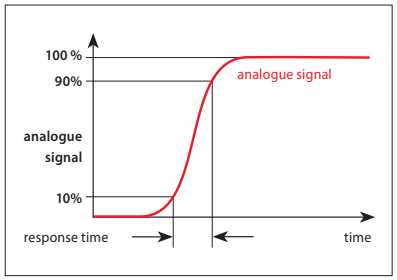
Sampling rate

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 a pressure transducer 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 for good EMC characteristics.



CE mark

Pressure transducers from SUCO fall under the 2014/30/EU EMC Directive.
EC declarations of conformity have been issued for the pressure transducers 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.

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; 80-2700 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

Electromagnetic compatibility (EMC)

Pressure transducers 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).

Technical explanations for pressure transducers

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 mm Hg	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 pressure transducers 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 pressure transducer 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 (AISI 303 / 1.4305)

Stainless steel with broad level of media compatibility. Also suitable for oxygen and hydrogen applications.

Stainless steel (AISI 316L / 1.4404)

Stainless steel with broad level of media compatibility. Also suitable for chemical industry and sea water applications.

Oxygen and hydrogen

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".

Pressure peak dampening

If required, our pressure transducers 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 pressure transducer. 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.

Pressure Transducers, Performance series 0601, 0602

hex 24

- Housing/wetted parts made of stainless steel AISI 303 (1.4305), others on request
- Ceramic sensor in thick film technology
- Very competitively priced electronic pressure transducers
- High overpressure protection (up to 2 x)
- Small, compact electronic transducers
- Broad diversity of electronic and mechanical connection options
- High level of adaptability to your requirements (custom solutions)

Technical details

Type:	**0601**	**0602**
Output signal:	0 – 10 V (3-wire)	4 – 20 mA (2-wire)
Supply voltage U_B:	11 – 32 VDC	9.6 – 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≤ (U_b – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA	< 4 mA

Type:	**0601 / 0602**					
Standard pressure ranges p_{nom}:	0 - 2 bar (0 – 29 psi)	0 - 4 bar (0 – 58 psi)	0 - 10 bar (0 – 145 psi)	0 - 16 bar (0 – 230 psi)	0 - 40 bar (0 – 580 psi)	0 - 100 bar (0 – 1,450 psi)
Overpressure protection p_u[1]:	4 bar (58 psi)	10 bar (145 psi)	20 bar (290 psi)	40 bar (580 psi)	100 bar (1,450 psi)	150 bar (2,175 psi)
Burst pressure[1]:	8 bar (115 psi)	20 bar (290 psi)	35 bar (500 psi)	60 bar (870 psi)	140 bar (2,000 psi)	300 bar (4,350 psi)
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}					
Pressure rise:	≤ 14.5 psi/ma (≤ 1 bar/ms)					
Accuracy:	≤ ±1 % full scale (FS) at room temperature, ±0.5 % BFSL					
Long term stability:	±0.3 % FS p. a.					
Repeatability[2]:	±0.1 % FS					
Temperature error[2]:	≤ ±0.04 % of full scale (FS) / °C					
Compensated temperature range:	32 °F …+158 °F (0 °C … +70 °C)					
Temperature range ambient:	-22 °F … +212 °F (-30 °C … +100 °C)					
Temperature range media:	with NBR (BunaN) seal: -22 °F … +212 °F (30 °C … +100 °C)					
	with EPDM seal: -22 °F … +257 °F (-30 °C … +125 °C)					
	with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)					
	with TPE seal: -22 °F … +230 °F (-30 °C … +110 °C)					
Wetted parts material – Housing:	Stainless steel AISI 303 (1.4305)					
Wetted parts material – Measuring cell:	Ceramic					
Wetted parts material – Seal material:	NBR (BunaN), EPDM, FKM (Viton®) or TPE[3]					
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)					
Response time 10 – 90 %:	≤ 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	IP65: DIN EN 175301-803-A, IP67: M12x1, AMP Superseal 1.5®, cable connector IP67 and IP6K9K: Bayonet ISO 15170-A1-4.1, Deutsch DT04-3P					
Electromagnetic compatibility:	EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007					
Max. length of connection cable:	30 m					
Protection against reverse polarity, short-circuit and overvoltage:	Built-in					
Cable output thread size:	For DIN EN 175301: PG9 (outside diameter of cable 6 to 9 mm)					
Weight:	approx. 2.82 oz / 80 g (DIN EN 175301 approx. 3.88 oz /110 g)					

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

[2] Within the compensated temperature range

[3] Thermoplastic elastomers

0601 / 0602

Electrical connectors and threads

DIN EN 175301-803-A

Pin	0601	0602
1	Uv+	Uv+
2	Gnd	I_{out}
3	U_{out}	nc*

IP65

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

Order number: 013

M 12 – DIN EN 61076-2-101 A

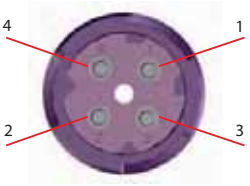
Pin	0601	0602
1	Uv+	Uv+
2	U_{out}	nc*
3	Gnd	I_{out}
4	nc*	nc*

IP67

x ~ 54 mm

Order number: 002

ISO 15170-A1-4.1



Pin	0601	0602
1	Uv+	Uv+
2	Gnd	nc*
3	U_{out}	I_{out}
4	nc*	nc*

IP67, IP6K9K

x ~ 56 mm

Order number: 004

AMP Superseal 1.5®

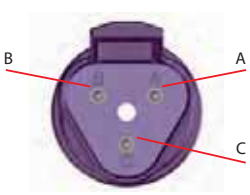
Pin	0601	0602
1	U_{out}	nc*
2	Gnd	I_{out}
3	Uv+	Uv+

IP67

x ~ 61 mm

Order number: 007

Deutsch DT04-3P

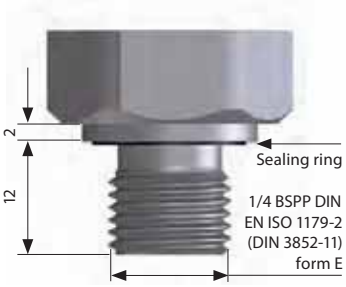


Pin	0601	0602
A	Uv+	Uv+
B	Gnd	nc*
C	U_{out}	I_{out}

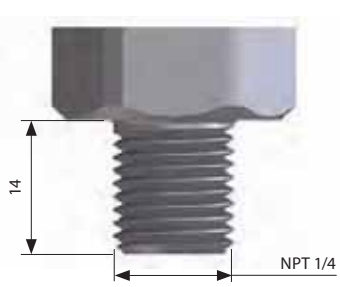
IP67, IP6K9K

x ~ 61 mm

Order number: 010



Thread code: 41



Thread code: 09

RoHSII compliant

0601 / 0602

Order matrix for pressure transducers

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓

0 – 10 V, 3-wire	**0601**
4 – 20 mA, 2-wire	**0602**

Max. overpressure[1]	Burst pressure	Pressure range	
4 bar (58 psi)	8 bar (115 psi)	0 – 2 bar (approx. 29 psi)	**200**
10 bar (145 psi)	20 bar (290 psi)	0 – 4 bar (approx. 58 psi)	**400**
20 bar (290 psi)	35 bar (500 psi)	0 – 10 bar (approx. 145 psi)	**101**
40 bar (580 psi)	60 bar (870 psi)	0 – 16 bar (approx. 232 psi)	**161**
100 bar (1,450 psi)	140 bar (2,000 psi)	0 – 40 bar (approx. 580 psi)	**401**
150 bar (2,175 psi)	300 bar (4,350 psi)	0 – 100 bar (approx. 1,450 psi)	**102**

Pressure connection

1/4 BSPP – (DIN 3852), form E, male thread	**41**
NPT 1/4	**09**

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	**1**
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	**2**
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	**3**
TPE	Mineral oil, HFC, HFD, water, water-salt solutions, methanol	**7**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A) ; socket device included	**013**
M 12x1 - 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**

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓
Order number:	**06XX**	**XXX**	**XX**	**X**	**XXX**

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

RoHSII compliant

T.2

hex 22

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 303

Robust pressure transducers

Stainless steel housing (AISI 303 / 1.4305, SW22)

- Pressure transducers specially for low pressures, including vacuum applications
- High overpressure protection (up to 3 x)
- Long life time even under high pressure change rates
- Housing and wetted parts are made of stainless steel providing excellent media compatibility
- Suitable for hydrogen and oxygen applications
- The highly-sensitive piezo-resistive sensor in the measuring cell filled with oil guarantees high level of accuracy, repeatability and long-term stability
- The availability of different sealing materials enables deployment in a broad temperature range and with a diverse array of media
- Custom variants (e.g. cleaned for oxygen applications) are available on request

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 303

Type:	0645	0650	0660
Output signal:	0.5 – 4.5 V ratiometric	0 – 10 V (3-wire)	4 – 20 mA (2-wire)
Supply voltage U_B:	5 VDC ±10 % max. 6.5 VDC	12 – 32 VDC	10 – 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4,7 kΩ	≥ 4,7 kΩ	≤ (U_b – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA		< 4 mA

Type:	0645 / 0650 / 0660							
Standard pressure ranges p_{nom}:	-1 - 0 bar (vacuum) (-14.5 - 0 psi)	0 - 1 bar (0 - 14.5 psi)	0 - 4 bar (0 - 58 psi)	0 - 6 bar (0 - 87 psi)	0 - 10 bar (0 - 145 psi)	0 - 16 bar (0 - 232 psi)	0 - 40 bar (0 - 580 psi)	0 - 100 bar (0 - 1,450 psi)
Overpressure protection p_u [1]:	3 bar (43 psi)	3 bar (43 psi)	8 bar (116 psi)	12 bar (174 psi)	20 bar (290 psi)	32 bar (464 psi)	80 bar (1,160 psi)	200 bar (2,900 psi)
Burst pressure[1]:	10 bar (145 psi)	10 bar (145 psi)	20 bar (290 psi)	30 bar (435 psi)	35 bar (500 psi)	40 bar (580 psi)	100 bar (1,450 psi)	250 bar (3,625 psi)
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}							
Permitted pressure change rate:	≤ 14.5 psi/ms (≤1 bar/ms)							
Accuracy:	±0.5 % full scale (FS) at room temperature, ±0.25 % BFSL							
Long term stability:	< ±0.2 % of full scale (FS) per year							
Repeatability[2]:	±0.1 % FS							
Temperature error[2]:	±0.02 % of full scale (FS) / °C; -1 … 1 bar ±0.03 % of full scale (FS) / °C							
Compensated temperature range:	+14 °F … +158 °F (-10 °C … +70 °C)							
Temperature range ambient:	-40 °F … +212 °F (-40 °C … +100 °C)							
Temperature range media:	with NBR (BunaN) seal: -40 °F … +212 °F (-40 °C … +100 °C)							
	with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)							
Wetted parts material – Housing:	Stainless steel AISI 303 / 1.4305							
Wetted parts material – Measuring cell:	Stainless steel AISI 316L / 1.4404							
Wetted parts material – Seal material:	NBR (BunaN) or FKM (Viton®)							
Standard sensor oil:	Fluorine oil (not suitable for food applications)							
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42Ω)							
Response time 10 – 90 %:	< 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; 11ms; DIN EN 60068-2-27							
Protection class	Refer to the electrical connections							
Electromagnetic compatibility:	EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007							
Max. length of connection cable:	30 m							
Protection against reverse polarity, short-circuit and overvoltage:	Built-in							
Weight:	approx. 2.82 oz / 80 g (DIN EN 175301 approx. 3.88 oz / 110 g, cable output approx. 4.76 oz / 135 g)							

[1] Static pressure. Dynamic value is 30 to 50% lower. Values refer to the hydraulic/pneumatic part of the pressure transducer.

[2] Within the compensated temperature range.

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 303

0645 / 0650 / 0660

Electrical connectors and threads

DIN EN 175301-803-A

0645 + 0650	0660
1: Uv+	1: Uv+
2: Gnd	2: I_{out}
3: U_{out}	3: nc
PE	⏚

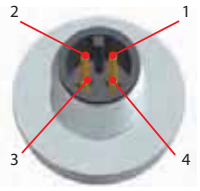
IP65

x ~ 60 mm (without coupler socket)
x ~ 76 mm (with coupler socket)

d ~ Ø 30 mm

Order number: 013

M 12 – DIN EN 61076-2-101 A



0645 + 0650	0660
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}
4: nc	4: nc

IP67

x ~ 54 mm

d ~ Ø 22 mm

Order number: 002

ISO 15170-A1-4.1

0645 + 0650	0660
1: Uv+	1: Uv+
2: Gnd	2: nc
3: U_{out}	3: I_{out}
4: nc	4: nc

IP67

x ~ 65 mm

d ~ Ø 27 mm

Order number: 004

Cable connection

0645 + 0650	0660
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}

IP67

x ~ 44 mm (+ 20 mm Bend relief)
Cable length ~ 6.5 ft (2 m)

d ~ Ø 22 mm

Order number: 011

Thread code: 41

RoHSII compliant

CE

0645 / 0650 / 0660

Order matrix for pressure transducers

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 303

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓

0.5 – 4.5 V, ratiometric	**0645**
0 – 10 V, 3-wire	**0650**
4 – 20 mA, 2-wire	**0660**

Pressure range		Max. overpressure[1)]		
-1 – 0 bar (vacuum)	(-14.5 - 0 psi)	3 bar	(43 psi)	**000**
0 – 1 bar	(0 - 14.5 psi)	3 bar	(43 psi)	**100**
0 – 4 bar	(0 - 58 psi)	8 bar	(116 psi)	**400**
0 – 6 bar	(0 - 87 psi)	12 bar	(174 psi)	**600**
0 – 10 bar	(0 - 145 psi)	20 bar	(290 psi)	**101**
0 – 16 bar	(0 - 232 psi)	32 bar	(464 psi)	**161**
0 – 40 bar	(0 - 580 psi)	80 bar	(1,160 psi)	**401**
0 – 100 bar	(0 - 1,450 psi)	200 bar	(2,900 psi)	**102**

Pressure connection

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

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, water, etc.	- 40 °F … +212 °F (- 40 °C … +100 °C)	**1**
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	- 4 °F … +257 °F (-20 °C … +125 °C)	**3**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M 12x1 – DIN EN 61076-2-101 A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
Cable connection (length of cable 6.5 ft / 2 m standard)	**011**

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓
Order number:	**06XX**	**XXX**	**41**	**X**	**XXX**

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

RoHSII compliant

T.3

hex 22

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 316L

Robust pressure transducers

Stainless steel housing AISI 316L / 1.4404, hex 22

- Pressure transducers specially for low pressures, including vacuum applications
- Long life time even under high pressure change rates
- Housing and wetted parts are made of stainless steel AISI 316L / 1.4404 providing excellent media compatibility when used in seawater, chemical and process technology applications
- The highly-sensitive piezo-resistive sensor in the measuring cell filled with oil guarantees high level of accuracy, repeatability and long-term stability
- The availability of different sealing materials enables deployment in a broad temperature range and with a diverse array of media

Technical details

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 316L

Type:	**0675**	**0680**	**0690**
Output signal:	0.5 – 4.5 V ratiometric	0 – 10 V (3-wire)	4 – 20 mA (2-wire)
Supply voltage U_B:	5 VDC ±10 % max. 6.5 VDC	12 – 32 VDC	10 – 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≥ 4.7 kΩ	≤ (U_b – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA		–

Type:		**0675 / 0680 / 0690**							
Standard pressure ranges p_{nom}:		-1 – 0 bar (vacuum) (-14.5 - 0 psi)	0 - 1 bar (0 - 14.5 psi)	0 - 4 bar (0 - 58 psi)	0 - 6 bar (0 - 87 psi)	0 - 10 bar (0 - 145 psi)	0 - 16 bar (0 - 232 psi)	0 - 40 bar (0 - 580 psi)	0 - 100 bar (0 - 1,450 psi)
Overpressure protection p_u[1]:		3 bar (43 psi)	3 bar (43 psi)	8 bar (116 psi)	12 bar (174 psi)	20 bar (290 psi)	32 bar (464 psi)	80 bar (1,160 psi)	200 bar (2,900 psi)
Burst pressure[1]:		10 bar (145 psi)	10 bar (145 psi)	20 bar (290 psi)	30 bar (435 psi)	35 bar (500 psi)	40 bar (580 psi)	100 bar (1,450 psi)	250 bar (3,625 psi)
Mechanical life expectancy:		10,000,000 pulsations at rise rates to 14.5 psi/ms (1 bar/ms) at p_{nom}							
Permitted pressure change rate:		≤ 14.5 psi/ms (≤ 1 bar/ms)							
Accuracy:		±0.5 % full scale (FS) at room temperature, ±0.25 % BFSL							
Long term stability:		< ±0.2 % of full scale (FS) per year							
Repeatability[2]:		±0.1 % FS							
Temperature error[2]:		±0.02 % of full scale (FS) / °C; -1 … 1 bar ±0.03 % of full scale (FS) / °C							
Compensated temperature range:		+14 °F … +158 °F (-10 °C … +70 °C)							
Temperature range ambient:		-40 °F … +212 °F (-40 °C … +100 °C)							
Temperature range media:		with NBR (BunaN) seal: -40 °F … +212 °F (-40 °C … +100 °C)							
		with FKM (Viton®) seal: -4 °F … +257 °F (-20 °C … +125 °C)							
Wetted parts material	Housing:	Stainless steel AISI 316L / 1.4404							
	Measuring cell:	Stainless steel AISI 316L / 1.4404							
	Seal material:	NBR (BunaN) or FKM (Viton®)							
Standard sensor oil:		Fluorine oil (not suitable for food applications)							
Insulation resistance:		> 100 MΩ (500 VDC, Ri > 42Ω)							
Response time 10 – 90 %:		< 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; 11ms; DIN EN 60068-2-27							
Protection class		Refer to the electrical connections							
Electromagnetic compatibility:		EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007							
Max. length of connection cable:		30 m							
Protection against reverse polarity, short-circuit and overvoltage:		Built-in							
Weight:		approx. 2.82 oz / 80 g (DIN EN 175301 approx. 3.88 oz / 110 g, cable output approx. 4.76 oz /135 g)							

[1] Static pressure. Dynamic value is 30 to 50% lower. Values refer to the hydraulic/pneumatic part of the pressure transducer.

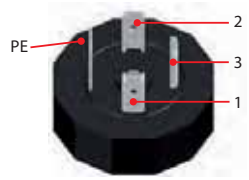
[2] Within the compensated temperature range.

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 316L

0675 / 0680 / 0690

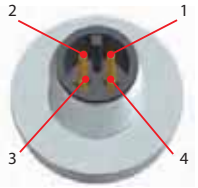
Electrical connectors and threads

DIN EN 175301-803-A



0675 + 0680	0690
1: Uv+	1: Uv+
2: Gnd	2: I_{out}
3: U_{out}	3: nc
PE	⏚
IP65	
x ~ 60 mm (without coupler socket) **x** ~ 76 mm (with coupler socket)	
d ~ Ø 30 mm	
Order number: 013	

M 12 – DIN EN 61076-2-101 A



0675 + 0680	0690
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}
4: nc	4: nc
IP67	
x ~ 54 mm	
d ~ Ø 22 mm	
Order number: 002	

ISO 15170-A1-4.1

0675 + 0680	0690
1: Uv+	1: Uv+
2: Gnd	2: nc
3: U_{out}	3: I_{out}
4: nc	4: nc
IP67	
x ~ 65 mm	
d ~ Ø 27 mm	
Order number: 004	

Cable connection

0675 + 0680	0690
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}
IP67	
x ~ 44 mm (+ 20 mm bend relief) Cable length ~ 6.5 ft (2 m)	
d ~ Ø 22 mm	
Order number: 011	

Thread code: 41

RoHSII compliant

0675 / 0680 / 0690

Order matrix for pressure transmitters

Piezo-Resistive Sensor in Oil-Filled Housing Stainless Steel 316L

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓

0.5 – 4.5 V, ratiometric	**0675**
0 – 10 V, 3-wire	**0680**
4 – 20 mA, 2-wire	**0690**

Pressure range		Max. overpressure[1)]		
-1 – 0 bar (vacuum)	(-14.5 - 0 psi)	3 bar	(43 psi)	**000**
0 – 1 bar	(0 - 14.5 psi)	3 bar	(43 psi)	**100**
0 – 4 bar	(0 - 58 psi)	8 bar	(116 psi)	**400**
0 – 6 bar	(0 - 87 psi)	12 bar	(174 psi)	**600**
0 – 10 bar	(0 - 145 psi)	20 bar	(290 psi)	**101**
0 – 16 bar	(0 - 232 psi)	32 bar	(464 psi)	**161**
0 – 40 bar	(0 - 580 psi)	80 bar	(1,160 psi)	**401**
0 – 100 bar	(0 - 1,450 psi)	200 bar	(2,900 psi)	**102**

Pressure connection

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

Seal material – Application areas

NBR (BunaN)	Hydraulic/machine oil, heating oil, air, nitrogen, water, etc.	-40 °F … +212 °F (-40 °C … +100 °C)	**1**
FKM (Viton®)	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	-4 °F … +257 °F (-20 °C … +125 °C)	**3**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M 12x1 – DIN EN 61076-2-101 A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
Cable connection (length of cable 6.5 ft / 2 m standard)	**011**

	Type	Pressure range	Pressure connection	Seal material	Electrical connection
	↓	↓	↓	↓	↓
Order number:	**06XX**	**XXX**	**41**	**X**	**XXX**

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

RoHSII compliant

Pressure transducers, High-Performance series

hex 22

Silicon-on-Saphire (SoS) Sensor

- 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
- Customer specific solutions available on request

Technical details

Silicon-on-Saphire (SoS) Sensor

Type:	**0705**	**0710**	**0720**
Output signal:	0.5 – 4.5 V ratiometric	0 – 10 V (3-wire)	4 – 20 mA (2-wire)
Supply voltage U_B:	5 VDC ±10 % max. 6.5 VDC	12 – 32 VDC	10 – 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≥ 4.7 kΩ	≤ (U_b – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA		

Type:	**0705 / 0710 / 0720**									
Standard pressure ranges p_{nom} in bar:	0 -10 bar (0-145 psi)	0 -16 bar (0-232 psi)	0 -25 bar (0-362 psi)	0 -40 bar (0-580 psi)	0 -60 bar (0-870 psi)	0 -100 bar (0-1,450 psi)	0 -160 bar (0-2,320 psi)	0 - 250 bar (0-3,625 psi)	0 - 400 bar (0-5,800 psi)	0 - 600 bar (0-8,700 psi)
Overpressure protection p_u[1] in bar:	40 bar (580 psi)	64 bar (928 psi)	100 bar (1,450 psi)	160 bar (2,320 psi)	240 bar (580 psi)	400 bar (5,800 psi)	640 bar (9,280 psi)	1,000 bar (14,500 psi)	1,600 bar (23,200 psi)	1,650 bar (23,925 psi)
Burst pressure[1] in bar:	80 bar (1,160 psi)	128 bar (1,856 psi)	200 bar (2,900 psi)	320 bar (4,640 psi)	480 bar (6,960 psi)	800 bar (11,600 psi)	1,280 bar (18,560 psi)	2,000 bar (29,000 psi)	2,000 bar (29,000 psi)	2,000 bar (29,000 psi)
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 72.5 psi/ms (5 bar/ms) at p_{nom}									
Permitted pressure change rate:	≤ 72.5 psi/ms (≤ 5 bar/ms)									
Accuracy:	±0.5 % full scale (FS) at room temperature, ±0.25 % BFSL									
Long term stability:	±0.1 % FS p. a.									
Repeatability[2]:	±0.1 % FS									
Temperature error[2]:	±0.01 % FS / °C									
Compensated temperature range:	-40 °F … +176 °F (-40 °C … +80 °C)									
Temperature range ambient:	-40 °F … +212 °F (-40 °C … +100 °C)									
Temperature range media:	-40 °F … +257 °F (-40 °C … +125 °C)									
Wetted parts material:	stainless steel SAE Grade 303 / 1.4305, titanium									
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)									
Response time 10 – 90 %:	< 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; 11ms; DIN EN 60068-2-27									
Protection class	IP67 for M 12x1, DIN 72585 (bayonet) and cable connector IP65 for DIN EN 175301-803									
Electromagnetic compatibility:	EMC 2014/30/EU, EN 61000-6-2, EN 61000-6-3									
Max. length of connection cable:	30 m									
Protection against reverse polarity, short-circuit and overvoltage:	Built-in									
Weight:	approx. 2.82 oz / 80 g (DIN 175301 approx. 3.88 oz / 110 g, cable outlet approx. 4.76 oz / 135 g)									

[1] Static value. Dynamic value is 30 to 50% lower. Values refer to the hydraulic/pneumatic part of the pressure transmitter / transducer.

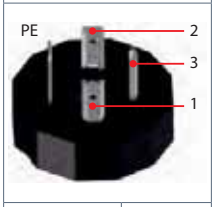
[2] Within the compensated temperature range.

Silicon-on-Saphire (SoS) Sensor

0705 / 0710 / 0720

Electrical connectors and threads

DIN EN 175301-803-A



0705 + 0710	0720
1: U_{out}	1: nc
2: Gnd	2: I_{out}
3: Uv+	3: Uv+

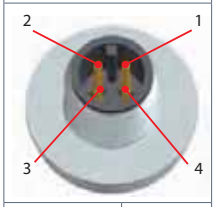
IP65

x ~ 60 / 76 mm*

d ~ Ø 30 mm

Order number: 001

M 12 – DIN EN 61076-2-101 A



0705 + 0710	0720
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}
4: nc	4: nc

IP67

x ~ 54 mm

d ~ Ø 22 mm

Order number: 002

ISO 15170-A1-4.1

0705 + 0710	0720
1: Uv+	1: Uv+
2: Gnd	2: nc
3: U_{out}	3: I_{out}
4: nc	4: nc

IP67, IP6K9K

x ~ 65 mm

d ~ Ø 27 mm

Order number: 004

AMP Superseal

0705 + 0710	0720
1: U_{out}	1: nc
2: Gnd	2: I_{out}
3: Uv+	3: Uv+

IP67

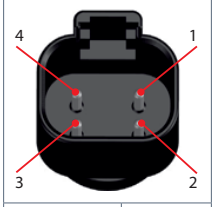
x ~ 73 mm

d ~ Ø 26 mm

Order number: 007

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

DEUTSCH DT04-4P



0705 + 0710	0720
1: GND	1: I_{out}
2: Uv+	2: Uv+
3: nc	3: nc
4:U_{out}	4: nc

IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Order number: 008

DEUTSCH DT04-3P

0705 + 0710	0720
A: Uv+	A: Uv+
B: GND	B: nc
C: U_{out}	C: I_{out}

IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Order number: 010

Cable connection

0705 + 0710	0720
1: Uv+	1: Uv+
2: U_{out}	2: nc
3: Gnd	3: I_{out}

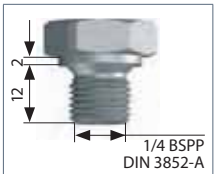
IP67

x ~ 44 mm
(+ 20 mm bend relief)
Cable length ~ 6.5 ft (2 m)

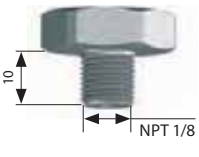
d ~ Ø 22 mm

Order number: 011

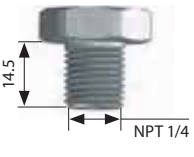
Thread code: 41



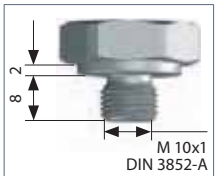
Thread code: 03



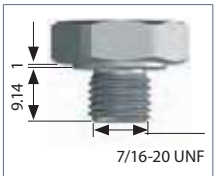
Thread code: 04



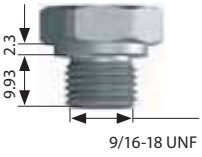
Thread code: 09



Thread code: 30



Thread code: 20



Thread code: 21

Thread code: 42

RoHSII compliant

0705 / 0710 / 0720

Order matrix for pressure transducers

	Type	Pressure range	Pressure connection	Seal material	Electrical connection

0.5 – 4.5 V, ratiometric	**0705**
0 – 10 V, 3-wire	**0710**
4 – 20 mA, 2-wire	**0720**

Pressure range	Code
0 - 150 psi	**152**
0 - 200 psi	**202**
0 - 300 psi	**302**
0 - 600 psi	**602**
0 - 1,000 psi	**103**
0 - 1,500 psi	**153**
0 - 2,500 psi	**253**
0 - 3,000 psi	**303**
0 - 6,000 psi	**603**
0 - 8,700 psi	**873**

Pressure range	Code
0 - 10 bar	**101**
0 - 16 bar	**161**
0 - 25 bar	**251**
0 - 40 bar	**401**
0 - 60 bar	**601**
0 - 100 bar	**102**
0 - 160 bar	**162**
0 - 250 bar	**252**
0 - 400 bar	**402**
0 - 600 bar	**602**

Pressure connection

1/4 BSPP – DIN 3852-E	**41**
1/4 BSPP – DIN 3852-A	**03**
NPT 1/8 (max. to 250 bar)	**04**
NPT 1/4	**09**
M 10 x 1 cyl. DIN 3852-A (max. to 250 bar)	**30**
7 / 16 – 20 UNF (max. to 250 bar)	**20**
9 / 16 – 18 UNF	**21**
M 14 x 1.5 – DIN 3852-E	**42**

Pressure unit

bar	**B**
PSI	**P**

Electrical connection

DIN EN 175301-803-A (DIN 43 650-A) ; socket device included	**001**
M 12 – DIN EN 61071-2-101 D	**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 6.5 ft / 2 m standard)	**011**

Order number:	**07XX**	**XXX**	**XX**	**X**	**XXX**

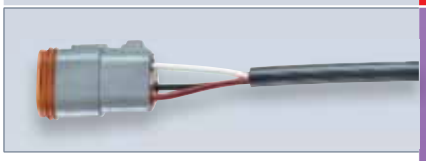
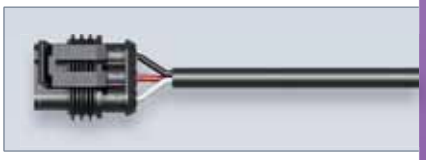
[1] Static pressure, dynamic pressure 30 to 50% lower. Values refer to the hydraulic or pneumatic part of the pressure transducer.

Accessories

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

Accessories

Mating plugs

Deutsch DT06-3S (for DT04-3P) 3 x 0.5 mm² PUR cable 6.5 ft (2 m), IP67	Suitable for connector code **010** **Deutsch DT04-3P**	Order number: **1-1-36-653-160**	
TE AMP Superseal 1.5®, 3-pin 3 x 0.5 mm² Radox cable 6.5 ft (2 m), IP65	Suitable for connector code **007** **AMP Superseal 1.5®**	Order number: **1-1-32-653-158**	
M12 DIN EN 61076-2-LF, 4-pin 4 x 0.34 mm² PUR cable 6.5 ft (2 m), IP65	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-1-00-653-162**	
M 12x1 DIN EN 61071-2-101 D straight, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-6-00-652-016**	
Coupler socket M 12x1 DIN EN 61071-2-101 D Angled, 4-pin Terminals for wire diameter 0.75 mm² (AWG 18)	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-6-00-652-017**	

Thread adapters

For requirements at short notice and for realising custom solutions

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

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

Stainless steel (AISI 303 / 1.4305) thread adapters

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

M10 x 1 shape A
DIN 3852-1

Order number:
1-1-00-420-020

M14 x 1.5 shape E
DIN 3852-E
incl.
sealing ring FKM
Viton®

Order number:
1-1-00-420-028

NPT 1/ 4-18

Order number:
1-1-00-420-021

9/16 -18UNF
incl. O-ring FKM
Viton®

Order number:
1-1-00-420-027

SUCO transducers display STD

- For pressure transducers with 4 – 20 mA current output
- Connection to DIN EN 175301-803-A (DIN 43650)
- No additional voltage supply required
- Simple installation and programming
- Switching output option available

Technical details

Display:	LED, red, 4-digits, rotatable (4x90°)
Display range:	-999 to 9999
Input signal:	4 – 20 mA, 2-wire
Standard display:	4.00 – 20.00 (pre-set at factory)
Accuracy:	0.2 % FS ±1 digit
Supply voltage:	17 – 32 V DC
Max. loop current:	60 mA
Sampling rate:	300 ms – 25.5 s (configurable with filter)
Switching output (only for 1-6-20-656-008):	PNP transistor output 90 mA (P-MOSFET) Embedded overcurrent protection
Programming:	2 programming buttons are located underneath the removable front panel
Programming options: Zero point setting: Range: Decimal points: Average filter: Overrun: Switching point (for 1-6-20-656-008): Switch function (for 1-6-20-656-008): Save settings:	 -999 … 9999 0 … 9999 3 positions or disable 0.3 … 25.5 s On / off -999 … 9999 NO/NC In EEPROM
Error messages:	If the overrun function is selected, "HI" is shown on the display when 20 mA is exceeded. "LO" is displayed when the current drops below 4 mA. When the overrun function is disabled, "ErC6" is displayed as soon as the value is no longer in range -999 … 9999.
Temperature range:	+14 °F … +140 °F (-10 °C … +60 °C)
Housing material:	ABS / acrylic (display window)
Protection class	IP65 when fitted
Electrical connection:	DIN EN 175301-803-A (DIN 43650); suitable for connector assignment with order number -001 (such as the 07xx family)
Attachment screw:	Included in the delivery

Order number:

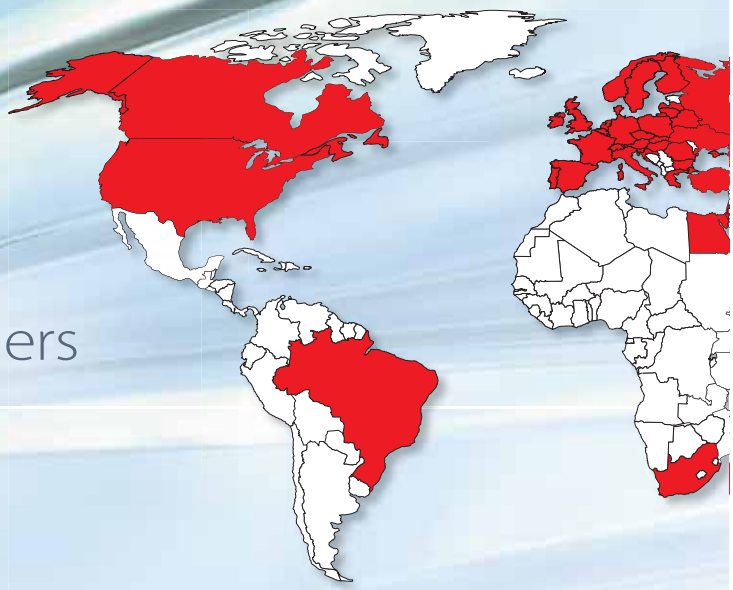
1-6-20-656-007	**Display (STD 0)**
1-6-20-656-008	**Display with switching output (STD 1)**

Contact assignment:

PIN	Display (STD 0):
1	nc
2	I_{out}
3	U_{v+}
⏚	Ground

PIN	Display with switching output (STD 1):
1	PNP
2	I_{out}
3	U_{v+}
⏚	Ground

SUCO worldwide: International sales partners



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