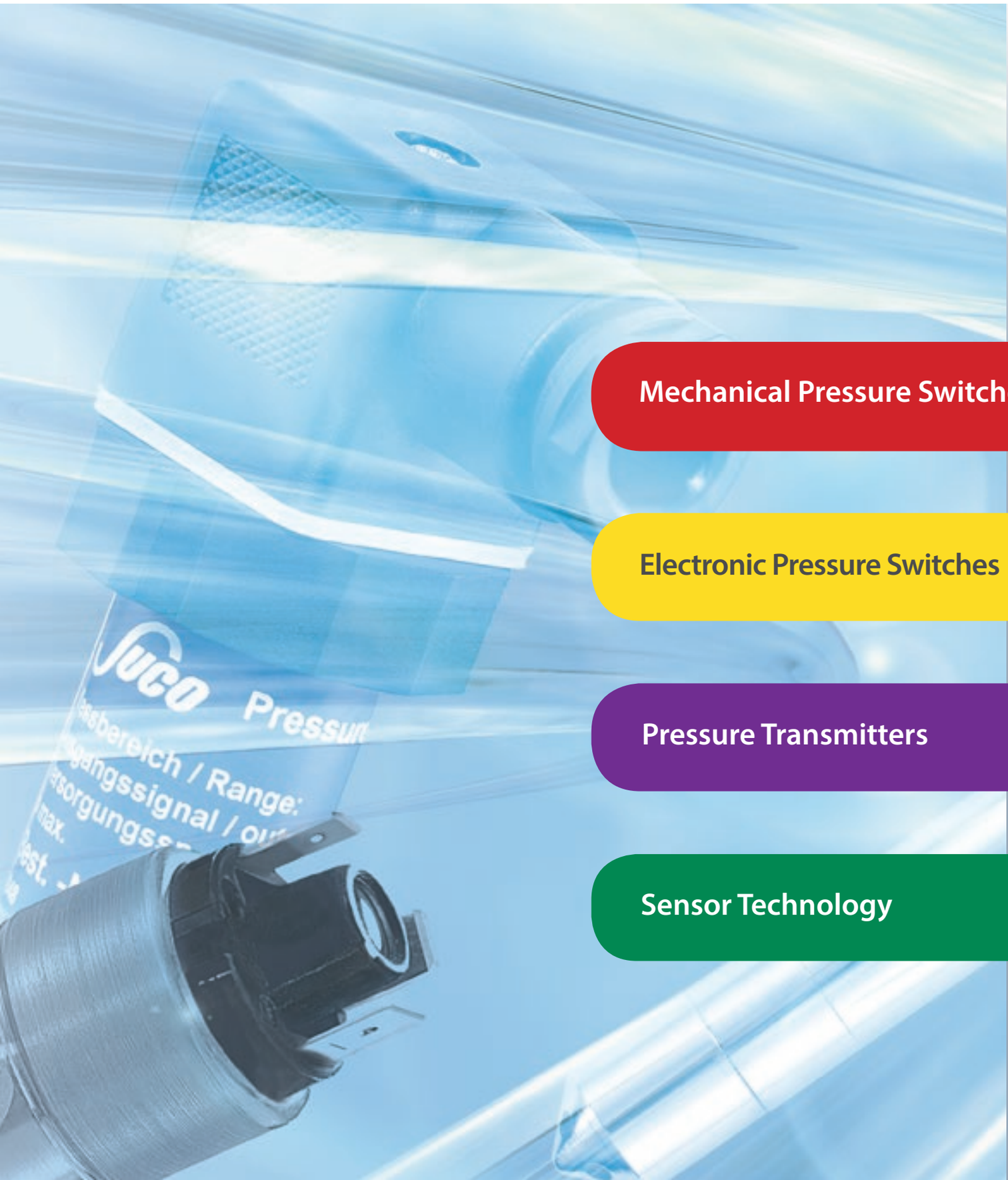
SUCO
Pressure Monitoring



Welcome to SUCO

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SUCO Robert Scheuffele GmbH & Co. KG

A pressure monitoring specialist setting standards on the global stage

SUCO Robert Scheuffele GmbH & Co. KG was founded in 1938 and has established itself across the globe under the trade name SUCO. The two main product groups, pressure monitoring (mechanical pressure switches, vacuum switches, electronic pressure switches and pressure transmitters) and transmission technology (centrifugal clutches and brakes, electromagnetic clutches and brakes), as well as descent devices with centrifugal technology, are developed, designed and manufactured at the Bietigheim-Bissingen site, approximately 20 km north of Stuttgart in Germany.

Peter Stabel, Director

Marcell Kempf, Director

Highest quality in all areas

The development and continual expansion of the company premises are indications of a thriving company.

Work on global presence has been rigorous, and today SUCO is actively represented by distribution companies in France (SUCO VSE France – a 50/50 joint venture with VSE Volumentechnik GmbH) and in the USA (SUCO Technologies Inc.), by associate company ESI Technology Ltd in Wrexham, North Wales, and by more than 50 mostly exclusive sales partners in over 70 countries.

Certified accoring to DIN EN ISO 9001:2015, SUCO has retained its consistently high quality standards for many years, something substantiated by numerous audits by reputable companies from a broad diversity of industry sectors.

This worldwide acknowledged product quality is guaranteed with CNC-controlled machining centres, automated assembly machines, sophisticated test systems and the latest in measuring equipment. Outstanding products, high level of customer service and excellent price/performance ratio guarantee SUCO good market positioning within the product sectors mentioned.

A sophisticated level of personnel qualification, a high identifaction of the employees with the company, process-oriented structures and efficient organisation are guarantees for continued company growth into the future.

Observance of ethical principles and comprehensive environmental awareness are standard at SUCO and guarantee business relationships on the highest level for our customers all over the world.

This catalogue does not only give a clear and structured overview of our capabilities all around our comprehensive range of pressure monitoring products but also offers detailed technical explanations supporting you in many challenges occurring in your specific applications.

Please trust in a company with more than 80 years of experience.

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

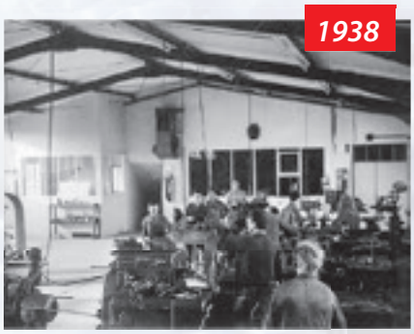
* 16.10.1909 † 20.02.1966 * 15.01.1912 † 04.02.1982

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

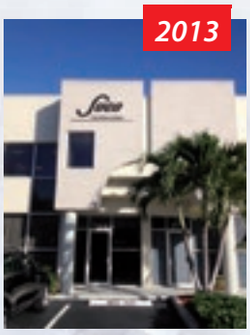
1987
Broadening of the product range to include custom pre-wired pressure switches

1988
Start of sales in the US

1993
Development of pressure dampers for ABS brake systems in the auto-motive 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

2017
Certification to DIN ISO 9001:2015

Tradition and Innovation

The preservation of proven traditions and continuous 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.

Mounting position
For mechanical and electronic pressure switches as well as transmitters there is no limitation due to the mounting position with regard to the accuracy of the pressure measurement.

However, other boundary conditions of the application may require a certain mounting position, e. g. horizontal installation to avoid waterlogging on the electrical connection or vertical installation to prevent debris from accumulating in the bore of the pressure connection.

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, species 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 longterm 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 transmitters.
IP67 / IP6K9K is the recommended protection for mobile hydraulics and any equipment exposed to the outdoor environment.

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 gakets.

If the corresponding thread types do not provide specifications regarding the roughness of the counter sealing surface, we recommend the following values:

- R_{amax} 1,6
- R_{max} 6,3
- R_{mr}(-0,10) > 5 % C_{ref} 5 %

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 transmitters. 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 torgue
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
G 1/4; 9/16 – 18 UNF	max. 40 Nm
NPT 1/4; M 14 x 1.5	max. 40 Nm

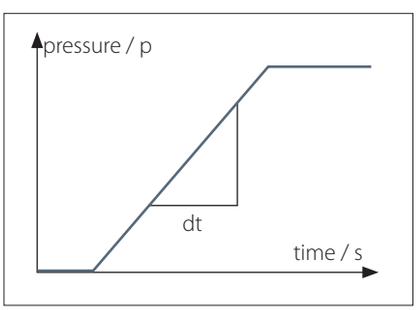
Values 30% lower than in the table above must be used for brass housings.

Gaseous applications
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).

Overpressure protection
The specified overpressure 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 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 ≤ 1 bar/ms for mechanical pressure switches, and at ≤ 5 bar/ms for transmitters.

RoHS-Compliance

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

Suco RoHSII compliant

CE-Mark
= **C**ommunauté **E**uropéenne
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.

Only products which have been tested according to CE directive or corresponding standards may carry 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 afixed.

The current product-specific CE declaration is available on the download area of our homepage:
www.suco.de/en/downloads

CE

Subject to technical changes

M. Mechanical Pressure Switches

M. Overview of mechanical pressure switches

Technical explanations for mechanical pressure switches from page 14

Selection matrix
Help in selecting a suitable pressure switch from page 18

M.1 **Pressure and vacuum switches with integrated connector NC/NO, hex 24** from page 22

- Max. voltage up to 42 V
- Switching points: 0.1 – 150 bar or vacuum
- IP protection up to IP67 (IP6K9K)
- Available connectors:
  Deutsch DT04-2P, AMP Superseal 1.5®, Packard MetriPack 280®,
  Deutsch DT04-3P, AMP Junior Timer®, Bayonet DIN 72585 A1–2.1,
  M12x1 DIN EN 61076-2-D
- Housing materials: zinc-plated steel (CrVI-free), stainless steel or brass
- Types: 0110, 0111, 0112, 0113, 0114, 0115, 0116, 0117, 0118, 0119, 0120, 0121, 0122, 0123, 0124, 0125

M.2 **Pressure switches with integrated connector Changeover contacts, hex 27** from page 32

- Adjustable hysteresis
- Max. voltage up to 250 V
- Switching points: 0.3 – 200 bar
- IP protection up to IP67 (IP6K9K)
- Available connectors:
  TE AMP Superseal 1.5®, M12x1 DIN EN 61076-2-101A,
  Deutsch DT04-3P, DIN connector EN 175301
- Housing material: zinc-plated steel (CrVI-free), others on request
- Types: 0132, 0133, 0134, 0135, 0136, 0137, 0184, 0185, 0194, 0195

M.3 **Pressure switches NC/NO, hex 24** from page 40

- Max. voltage up to 42 V
- Switching points: 0.1 – 150 bar
- IP protection up to IP65 (IP00 terminals)
- Housing materials: zinc-plated steel (CrVI-free), stainless steel or brass
- Types: 0163, 0164, 0166, 0167, 0168, 0169

M.4 **Pressure switches Changeover contacts, hex 27** from page 52

- Adjustable hysteresis (apart from 0140 and 0141)
- Max. voltage up to 250 V
- Switching points: 0.3 – 400 bar
- IP protection up to IP65
- Housing materials: zinc-plated steel (CrVI-free) or stainless steel
- Types: 0140, 0141, 0170, 0171, 0180, 0181, 0183, 0186, 0187, 0190, 0191, 0196, 0197

M.5 **Ready-wired pressure switches, cabled and encapsulated individually to customer requirements** from page 62

- Numerous cable and connector variants
- IP protection up to IP67 (IP6K9K)
- Housing materials: zinc-plated steel (CrVI-free), stainless steel or brass
- Types: 02XX,
  special feature: 0240/0241 – switch point adjustable on site even after assembly
- Technical characteristics for hex 24: see chapter M.3
- Technical characteristics for hex 27: see chapter M.4

M.6 **„PLUS“ – Pressure switches with integrated connector and inteligent supplementary functions, hex 24** from page 66

- Max. voltage dependent on custom function up to 42 V
- Numerous additional safety functions, such as:
- LED for visual check of switching status
- Overvoltage protection (varistor)
- Fail-safe accoring to NAMUR (resistor)
- Types: 04X

M.7 **Pressure switches Changeover contacts, 30 A/F** from page 74

- Square or block style
- Some with adjustable hysteresis
- Max. voltage up to 250 V
- Switching point adjustable 0.1 – 400 bar
- Housing material: aluminium
- Types: 0161, 0162, 0175
  special feature: 0159 with knurled screw for simple adjustment of the switching point

M.8 **Pressure switches ATEX versions** from page 80

- hex 27 for dust protection zone 22
- 30 A/F for gas protection zones 1 and 2
- Housing material: zinc-plated steel (CrVI-free) or aluminium
- Types: 0165, 0340, 0341

M.9 **Vacuum switches NC/NO or Changeover contacts, hex 24 or 30 A/F** from page 86

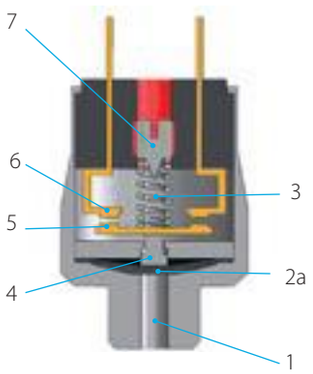
- Max. voltage up to 250 V
- Overpressure protected up to 35 bar
- Housing material: brass or aluminium
- Types: 0150, 0151

M.10 **Accessoires for mechanical pressure switches** from page 90

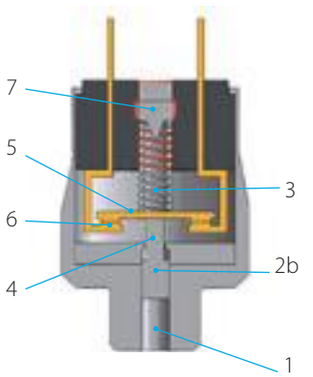
- Protective caps
- Socket devices
- Thread adapters
- Plugs with ready-to-use cables
  (for pressure switches with integrated connector)

Technical explanations for mechanical pressure switches

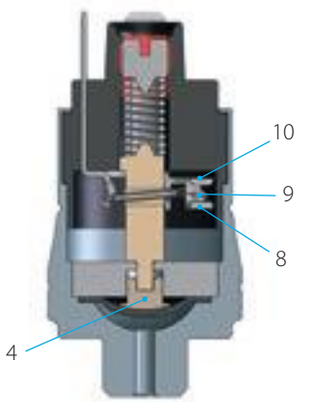
Diaphragm pressure switch
NO



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 0.1 bar to 100 bar, meaning over pressure safety of 35, 100, 300 and 600 bar, depending on the used diaphragm type.

Piston pressure switches
Pressure ranges from 10 bar to 400 bar can bemonitored with SUCO piston pressure switches (dependent on size); an overpressure safety of up to 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 force of the pre-tensioned 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 hysteresis 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 **change-over contact system** (snap-action) offers both, a NC and a 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.

B10d value
According to DIN EN ISO 13849-1, 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.

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	
Change-over contacts	CO, change over (snap action)	SPDT single pole, double throw	C	

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.

If no switching point is specified on order, the pressure switches are adjusted by approximately half the adjustment range at factory.

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 > 1bar/s may have an effect on the switching point for diaphragm pressure switches.

The switching point (forrising pressure) and hysteresis increase, whilst the switch-back point (for falling pressure) sinks. Also, the effect of the maximum (system) pressure on the switchback 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.

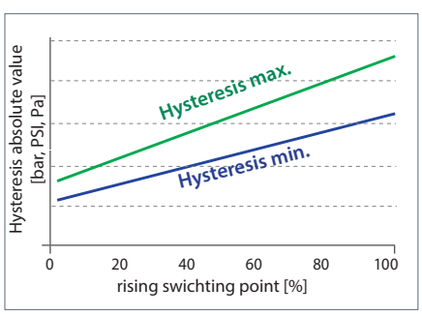
Hysteresis

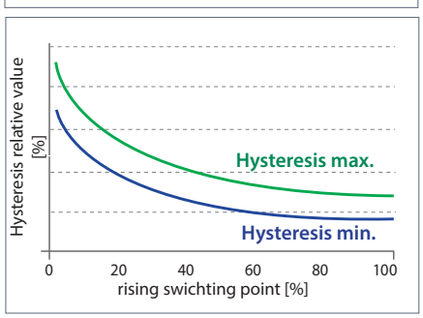
Rising / falling switching point

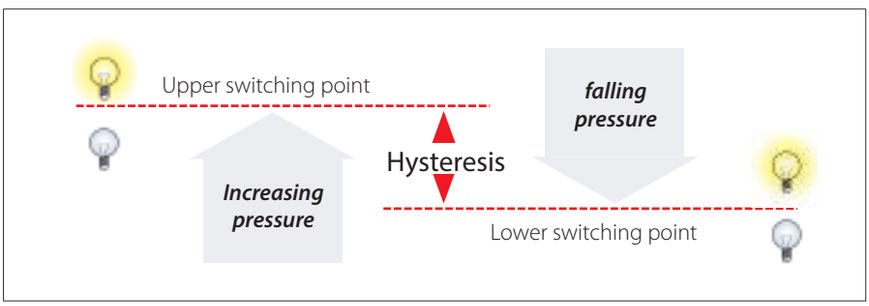
The pressure difference between the rising (upper) and falling (lower) switching points (refer to the figure, e.g. NO) is known as hysteresis (switch-back difference).

Hysteresis has no constant value due to the structural layout of a mechanical pressure switch. In absolute values, the hysteresis is also the smallest with the smallest adjustment range. The hysteresis increases with increasing adjustment range.

Hysteresis over rising switching point







Technical explanations for mechanical pressure switches

Hysteresis 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 hysteresis.

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 hysteresis.

The lowest possible hysteresis 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 switching frequencies 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 exibility so that the sealing properties of the pressure switch are also retained at low temperatures.

NBR is denoted by number „1" in our order 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 order number.

EPDM with drinking water approval
This EPDM material is intended for drinking water applications according to Elastomer Guideline, WRAS (Water Regulation Advisory Scheme), ACS (Attestation de Conformité Sanitaire) and NSF 61 (National Sanitation Foundation) and for use in medical and pharmaceutical 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. Sealing is only available upon request, so please consult us before ordering.

EPDM-TW is denoted by number „5" in our order 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 order number.

FFKM
This diaphragm material is suitable for temperature exposure up to 120°C and can withstand very aggressive conditions such as chemical species including organic or inorganic acids, diluted alkalis, ketones, esters, alcohols, fuels and hot water.

FFKM is denoted by number „6" in our order number.

TPE (Thermoplastic elastomers)
This sealing material is available only for our electronical products of the Performance Series.

TPE offers similar media compatibility like NBR, e.g suitable for mineral oil and hydraulic fluids.
Additionally the material can be used with diluted acids and bases and cold water, too.

TPE is denoted by number „7" in our order 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 order 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 10 bar) with maximum overpressure safety to 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 order 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 order 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 mmHg	Millimetres, mercury column	133.322	0.00133	1	0.01934
1 lbf/in² = 1 PSI	Pound-force per square inch	6 894	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

Water applications
Standard piston switches are not suitable for water applications.
Pressure switches in stainless steel with EPDM seal have a special sealing system and can therefore also be used for water with corrosion protection, water mixtures or emulsions. The use of other fluid mixtures should be clarified with SUCO (e.g. swelling of EPDM sealing could happen by water – oil mixture).

Pressure switches with stainless steel housings with EPDM-TW diaphragm, SUCO type „5" are designed for the use of drinking water.

Gas applications
Our pressure switches are suitable for liquid and gaseous media. Gaseous media place particular demands on leak-tightness how ever. 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).

For gaseous applications below 10 bar (145 PSI) in combination with pressure switches with high IP class, i.e. IP 67 and IP6K9K, in general we recommend to use ventilation. Please consult us; we are able to offer suitable solutions.

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 with steel housings with zinc-nickel coating are, in conjunction with oxygen, only approved to a maximum working pressure of 10 bar.

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

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

Please consult us about gas, water and oxygen applications.

Subject to technical changes.

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 300 mbar (relative).

Overpressure safety of vacuum switches
Our vacuum switches are overpressure safe up to 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 certicate also includes the test of the relevant UL standard.

Checked by an offcial institution and verified with regular company visits by CSA inspectors, this approval guarantees the highest levels of quality and operational reliability for our products.

You can download the current cCSAus certificate in the download area of our homepage: ***http://www.suco.de/en/downloads***

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.

At-a-glance overview of mechanical pressure switches

Function	Overpressure	■								■		■		■								■
	Vacuum																					
[illegible]	NO / NC	■								■		■		■		■						
	[illegible]																	■		■		■
	max. 42 V	■								■		■		■		■						
	[illegible]																	■	■	■	■	■
	max. 250 V																					
	max. 24 V / 50 mA																					
Adjustment range	100 – 950 mbar																					
	200 – 950 mbar																					
	0,1 – 1 bar	■		■		■		■		■		■		■		■						
	0,2 – 2 bar																					
	0,3 – 1,5 bar																	■		■		■
	0,5 – 1 bar																					
	0,5 – 3 bar	■		■		■		■		■		■		■		■						
	0,5 – 5 bar																					
	1,0 – 6 bar																					
	1,0 – 10 bar	■		■		■		■		■		■		■		■		■		■		■
	2,0 – 20 bar																					
	5,0 – 50 bar																					
	10 – 20 bar	■		■		■		■		■		■		■		■						
	10 – 50 bar																	■		■		■
	10 – 100 bar																	■		■		■
	20 – 50 bar	■		■		■		■		■		■		■		■						
	20 – 100 bar																					
	25 – 250 bar																					
	40 – 400 bar																					
	50 – 100 bar																					
	50 – 150 bar		■		■		■		■		■		■		■		■					
	50 – 200 bar																		■		■	
	100 – 300 bar																					
	100 (200) – 400 bar																					
Overpressure savety up to	35 bar																					
	100 bar																					
	200 bar																					
	300 bar	■		■		■		■		■		■		■		■		■		■		■
	600 bar		■		■		■		■		■		■		■		■		■		■	
Size	hex 24	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	hex 27																	■	■	■	■	■
	30 A/F																					
Housing material	Zinc-platted steel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	stainless steel																					
	Brass																					
	Aluminium																					
Custom variant	ATEX																					
	Configurable																					
	additional functions																					
	cCSAus approval	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

		M.1 **hex 24** **with integrated connector**																M.2 **hex 27** **with integrated connector**				
		0110	0111	0112	0113	0114	0115	0116	0117	0118	0119	0120	0121	0122	0123	0124	0125	0132	0133	0134	0135	0136
	Page	26	27	26	27	26	27	26	27	26	27	28	29	26	27	26	27	34	34	34	34	34
Function	Overpressure	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Vacuum																					
	NO / NC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	Changeover contacts																	■	■	■	■	■
Voltage	max. 42 V	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	max. 48 V																	■	■	■	■	■
	max. 250 V																					
	max. 24 V / 50 mA																					
Adjustment range	100 – 950 mbar																					
	200 – 950 mbar																					
	0,1 – 1 bar	■		■		■		■		■		■		■		■						
	0,2 – 2 bar																					
	0,3 – 1,5 bar																	■		■		■
	0,5 – 1 bar																					
	0,5 – 3 bar	■		■		■		■		■		■		■		■						
	0,5 – 5 bar																					
	1,0 – 6 bar																					
	1,0 – 10 bar	■		■		■		■		■		■		■		■		■		■		■
	2,0 – 20 bar																					
	5,0 – 50 bar																					
	10 – 20 bar	■		■		■		■		■		■		■		■						
	10 – 50 bar																	■		■		■
	10 – 100 bar																	■		■		■
	20 – 50 bar	■		■		■		■		■		■		■		■						
	20 – 100 bar																					
	25 – 250 bar																					
	40 – 400 bar																					
	50 – 100 bar																					
	50 – 150 bar		■		■		■		■		■		■		■		■					
	50 – 200 bar																		■		■	
	100 – 300 bar																					
	100 (200) – 400 bar																					
Overpressure savety up to	35 bar																					
	100 bar																					
	200 bar																					
	300 bar	■		■		■		■		■		■		■		■		■		■		■
	600 bar		■		■		■		■		■		■		■		■		■		■	
Size	hex 24	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	hex 27																	■	■	■	■	■
	30 A/F																					
Housing material	Zinc-platted steel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	stainless steel																					
	Brass																					
	Aluminium																					
Custom variant	ATEX																					
	Configurable																					
	additional functions																					
	cCSAus approval	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

					M.3 **hex 24** **NO / NC**						M.4 **hex 27** **CO**										M.5 **hex 27** **Configured**				
0137	0184	0185	0194	0195	0163	0164	0166	0167	0168	0169	0140	0141	0170	0171	0180	0181	0183	0186	0187	0190	0191	0196	0197	0240	0241	
34	36	37	38	39	42	48	44	50	46	47	55	55	56	56	57	57	58	59	59	60	60	61	61	65	65	Page
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Overpressure
																										Vacuum
					■	■	■	■	■	■																NO / NC
■	■	■	■	■							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Changeover contacts
					■	■	■	■	■	■			■	■												max. 42 V
■																										max. 48 V
	■	■									■	■			■	■	■	■	■					■	■	max. 250 V
			■	■																■	■	■	■			max. 24 V / 50 mA
																										100 – 950 mbar
																										200 – 950 mbar
					■	■	■	■	■																	0,1 – 1 bar
																										0,2 – 2 bar
	■		■								■		■		■					■				■		0,3 – 1,5 bar
																										0,5 – 1 bar
					■	■	■	■	■																	0,5 – 3 bar
																		■				■				0,5 – 5 bar
																										1,0 – 6 bar
	■		■		■	■	■	■	■		■		■		■			■		■		■		■		1,0 – 10 bar
																										2,0 – 20 bar
																										5,0 – 50 bar
					■	■	■	■	■		■													■		10 – 20 bar
	■		■										■		■			■		■		■				10 – 50 bar
	■		■										■		■			■		■		■				10 – 100 bar
					■	■	■		■		■													■		20 – 50 bar
																										20 – 100 bar
																										25 – 250 bar
																										40 – 400 bar
																										50 – 100 bar
										■															■	50 – 150 bar
■		■		■										■					■		■		■			50 – 200 bar
																	■									100 – 300 bar
																	■									100 (200) – 400 bar
								■																		35 bar
	■		■										■		■					■						100 bar
																										200 bar
	■		■				■		■		■		■		■			■		■		■		■		300 bar
■		■		■	■	■				■		■		■		■	■		■		■		■		■	600 bar
					■	■	■	■	■	■																hex 24
■	■	■	■	■							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	hex 27
																										30 A/F
■	■	■	■	■	■		■		■	■	■	■	■	■	■	■	■			■	■					Zinc-platted steel
						■												■	■			■	■			stainless steel
								■																		Brass
																										Aluminium
																										ATEX
					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Configurable
																										additional functions
	■	■	■	■	■	■	■	■	■	■			■	■	■	■		■	■	■	■	■	■			cCSAus approval

M.6 Pressure Switches *PLUS* hex 24 with intelligent electronic functions															M.7 hex 30 CO				M.8 ATEX Variant			M.9 Vacuum Switch			
0410	0411	0412	0413	0414	0415	0416	0417	0418	0419	0422	0423	0424	0425	0159	0161	0162	0175	0165	0340	0341	0150	0151		
70	72	70	72	70	72	70	72	70	72	70	72	70	72	76	77	77	78	83	84	84	88	89	Page	
■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			Overpressure	**Function**
																					■	■	Vacuum	
■	■	■	■	■	■	■	■	■	■	■	■	■	■									■	NO / NC	
														■	■	■	■	■	■	■	■		Changeover contacts	
■	■	■	■	■	■	■	■	■	■	■	■	■	■									■	max. 42 V	**Voltage**
																							max. 48 V	
														■	■	■	■	■	■	■	■		max. 250 V	
																							max. 24 V / 50 mA	
																					■		100 – 950 mbar	**Adjustment range**
																						■	200 – 950 mbar	
■		■		■		■		■		■		■					■		■				0,1 – 1 bar	
														■									0,2 – 2 bar	
																							0,3 – 1,5 bar	
															■	■							0,5 – 1 bar	
																							0,5 – 3 bar	
														■	■	■							0,5 – 5 bar	
																		■					1,0 – 6 bar	
■		■		■		■		■		■		■		■	■	■			■				1,0 – 10 bar	
														■									2,0 – 20 bar	
														■				■					5,0 – 50 bar	
■		■		■		■		■		■		■							■				10 – 20 bar	
															■	■							10 – 50 bar	
														■									10 – 100 bar	
■		■		■		■		■		■		■							■				20 – 50 bar	
																							20 – 100 bar	
														■				■					25 – 250 bar	
														■									40 – 400 bar	
															■	■							50 – 100 bar	
	■		■		■		■		■		■		■							■			50 – 150 bar	
																							50 – 200 bar	
																							100 – 300 bar	
															■	■		■					100 (200) – 400 bar	
																	■				(■)	■	35 bar	**Overpressure savety up to**
																							100 bar	
														■	■	■		■					200 bar	
■		■		■		■		■		■		■							■				300 bar	
	■		■		■		■		■		■		■	■	■	■		■		■			600 bar	
■	■	■	■	■	■	■	■	■	■	■	■	■	■									■	hex 24	**Size**
																			■	■			hex 27	
														■	■	■	■	■			■		30 A/F	
■	■	■	■	■	■	■	■	■	■	■	■	■	■						■	■			Zinc-platted steel	**Housing material**
																							stainless steel	
																						■	Brass	
														■	■	■	■	■			■		Aluminium	
																		■	■	■			ATEX	**Custom variant**
																			■	■		■	Configurable	
■	■	■	■	■	■	■	■	■	■	■	■	■	■										additional functions	
																						■	cCSAus approval	

M.1
hex 24 integrated

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
- Vacuum switches with integrated connector available at request

[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

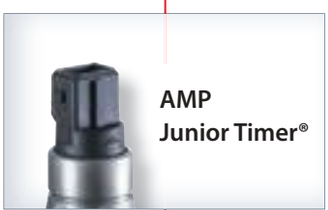
NC or NO, maximum operating voltage up to 42 V

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

M12x1 with 3 codings

Coding: PIN 1+3

Coding: PIN 1+4

Coding: PIN 1+2

Bayonet with 4 codings

Coding A1-2.1

Coding A2-2.1

Coding A3-2.1

Coding A4-2.1

for 6 setting ranges

- 0,1 – 1 bar
- 0,5 – 3 bar
- 1 – 10 bar
- 10 – 20 bar
- 20 – 50 bar
- 50 – 150 bar

with many thread types

- G1/4
- G1/8
- M10x1 cyl.
- M ´10x1 con.
- M12x1.5 cyl.
- NPT 1/8
- NPT 1/4
- 9/16-18 UNF
- 7/16-20 UNF

Suitable for a broad diversity of applications

- NBR: Hydraulic/machine oil, heating oil, air, nitrogen, etc.
- EPDM: Brake uid, hydrogen, oxygen, acetylene, etc.
- FKM: Hydraulic uids (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

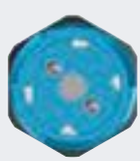
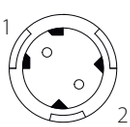
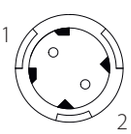
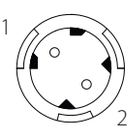
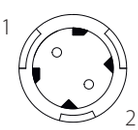
0122 / 0123
M12x1 DIN EN 61076-2-101-A
IP67

0124 / 0125
M12x1 DIN EN 60947-5-2
IP67

Technical details

Rated working voltage:	10 … 42 VAC/DC	
Rated current range (resistive load, DC12 / AC12):	10 mA … 4 A	
Switching power DC12 / AC12:	100 W / 100 VA	
Temperature resistance of sealing materials:	NBR	-40 °C … +100 °C
	EPDM	-30 °C … +120 °C
	FKM (in diaphragm pressure switch)	-5 °C … +120 °C
	FKM (in piston pressure switch)	-15 °C … +120 °C
	Silicone	-40 °C … +120 °C
	HNBR	-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:	≤ 1 bar/ms	
Hysteresis:	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/s²; 14 ms half sine wave; DIN EN 60068-2-27	
Protection class:	Up to IP67 / IP6K9K according to manufacturer's specifications for the respective plug-in system only when plugged in, otherwise IP00	
Weight:	approx. 90 g	

Contact assignment for bayonet connectors

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

0110/0112/0114/0116/0118/0122/0124

Diaphragm pressure switches with integrated connector

- Setting ranges to up to 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 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	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 (PIN 1+3)	0122 - XXX XX - X - XXX	0122 - XXX XX - X - XXX
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0124 - XXX XX - X - XXX	0124 - XXX XX - X - XXX

Adjustment range (Tolerance at room temperature)	Male thread	Order number NO ⟶ |:	Order number NC ⟶ :|

Diaphragm pressure switches with integrated connector

0.1 - 1 (± 0.2) bar	G1/4	XXXX - 403 03 - X - 011	XXXX - 404 03 - X - 015
	G1/8	XXXX - 403 28 - X - 603	XXXX - 404 28 - X - 604
	M10x1 cyl.	XXXX - 403 13 - X - 003	XXXX - 404 13 - X - 004
	M10x1 con.	XXXX - 403 01 - X - 009	XXXX - 404 01 - X - 013
	M12x1.5 cyl.	XXXX - 403 02 - X - 010	XXXX - 404 02 - X - 014
	NPT1/8	XXXX - 403 04 - X - 012	XXXX - 404 04 - X - 016
0.5 - 3 (± 0.3) bar	G1/4	XXXX - 423 03 - X - 070	XXXX - 424 03 - X - 070
	G1/8	XXXX - 423 28 - X - 070	XXXX - 424 28 - X - 070
	M10x1 cyl.	XXXX - 423 13 - X - 070	XXXX - 424 13 - X - 070
	M10x1 con.	XXXX - 423 01 - X - 070	XXXX - 424 01 - X - 070
	M12x1.5 cyl.	XXXX - 423 02 - X - 070	XXXX - 424 02 - X - 070
	NPT1/8	XXXX - 423 04 - X - 070	XXXX - 424 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	XXXX - 407 03 - X - 027	XXXX - 408 03 - X - 031
	G1/8	XXXX - 407 28 - X - 607	XXXX - 408 28 - X - 608
	M10x1 cyl.	XXXX - 407 13 - X - 007	XXXX - 408 13 - X - 008
	M10x1 con.	XXXX - 407 01 - X - 025	XXXX - 408 01 - X - 029
	M12x1.5 cyl.	XXXX - 407 02 - X - 026	XXXX - 408 02 - X - 030
	NPT1/8	XXXX - 407 04 - X - 028	XXXX - 408 04 - X - 032

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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

0110/0112/0114/0116/0118/0122/0124
Diaphragm pressure switches with integrated connector

- Setting ranges up to 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 300 bar[1)]

0122 Coding: PIN 1+3

0124 Coding: PIN 1+4 (NO)

0124 Coding: PIN 1+2 (NC)

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	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 (PIN 1+3)	0122 - XXX XX - X - XXX	0122 - XXX XX - X - XXX
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0124 - XXX XX - X - XXX	0124 - XXX XX - X - XXX

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

Diaphragm pressure switches with integrated connector

10 - 20 (± 1) bar	G1/4	XXXX - 411 03 - X - 043	XXXX - 412 03 - X - 047
	G1/8	XXXX - 411 28 - X - 611	XXXX - 412 28 - X - 612
	M10x1 cyl.	XXXX - 411 13 - X - 011	XXXX - 412 13 - X - 012
	M10x1 con.	XXXX - 411 01 - X - 041	XXXX - 412 01 - X - 045
	M12x1.5 cyl.	XXXX - 411 02 - X - 042	XXXX - 412 02 - X - 046
	NPT1/8	XXXX - 411 04 - X - 044	XXXX - 412 04 - X - 048
20 - 50 (± 2) bar	G1/4	XXXX - 415 03 - X - 059	XXXX - 416 03 - X - 063
	G1/8	XXXX - 415 28 - X - 615	XXXX - 416 28 - X - 616
	M10x1 cyl.	XXXX - 415 13 - X - 015	XXXX - 416 13 - X - 016
	M10x1 con.	XXXX - 415 01 - X - 057	XXXX - 416 01 - X - 061
	M12x1.5 cyl.	XXXX - 415 02 - X - 058	XXXX - 416 02 - X - 062
	NPT1/8	XXXX - 415 04 - X - 060	XXXX - 416 04 - X - 064

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 / 0125

Piston pressure switches with integrated connector

- Setting range up to 150 bar
- NC or NO, maximum operating voltage up to 42 V
- Zinc-plated steel (Cr VI-free)
- Overpressure safety up to 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	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 (PIN 1+3)	0123 - XXX XX - X - XXX	0123 - XXX XX - X - XXX
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0125 - XXX XX - X - XXX	0125 - XXX XX - X - XXX

Piston pressure switches with integrated connector

Adjustment range (tolerance at room temperature)	Male thread	Order number NO —› |:	Order number NC —› :|
50 - 150 (± 5) bar	G1/4	XXXX - 419 03 - X - 011	XXXX - 420 03 - X - 015
	G1/8	XXXX - 419 28 - X - 603	XXXX - 420 28 - X - 604
	M10x1 cyl.	XXXX - 419 13 - X - 003	XXXX - 420 13 - X - 004
	M10x1 con.	XXXX - 419 01 - X - 009	XXXX - 420 01 - X - 013
	M12x1.5 cyl.	XXXX - 419 02 - X - 010	XXXX - 420 02 - X - 014
	NPT1/8	XXXX - 419 04 - X - 012	XXXX - 420 04 - X - 016

Matériau d'étanchéité – Secteurs d'application

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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

0123 Coding: PIN 1+3

0125 Coding: PIN 1+4 (NO)

0125 Coding: PIN 1+2 (NC)

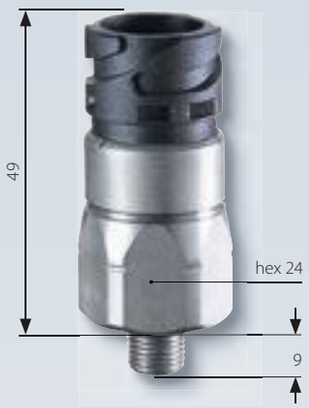
[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

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 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

0.1 - 1 (± 0.2) bar	G1/4	0120 - X03 03 - X - 011	0120 - X04 03 - X - 015
	G1/8	0120 - X03 28 - X - 603	0120 - X04 28 - X - 604
	M10x1 cyl.	0120 - X03 13 - X - 003	0120 - X04 13 - X - 004
	M10x1 con.	0120 - X03 01 - X - 009	0120 - X04 01 - X - 013
	M12x1.5 cyl.	0120 - X03 02 - X - 010	0120 - X04 02 - X - 014
	NPT1/8	0120 - X03 04 - X - 012	0120 - X04 04 - X - 016
0.5 - 3 (± 0.3) bar	G1/4	0120 - X23 03 - X - 070	0120 - X24 03 - X - 070
	G1/8	0120 - X23 28 - X - 070	0120 - X24 28 - X - 070
	M10x1 cyl.	0120 - X23 13 - X - 070	0120 - X24 13 - X - 070
	M10x1 con.	0120 - X23 01 - X - 070	0120 - X24 01 - X - 070
	M12x1.5 cyl.	0120 - X23 02 - X - 070	0120 - X24 02 - X - 070
	NPT1/8	0120 - X23 04 - X - 070	0120 - X24 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0120 - X07 03 - X - 027	0120 - X08 03 - X - 031
	G1/8	0120 - X07 28 - X - 607	0120 - X08 28 - X - 608
	M10x1 cyl.	0120 - X07 13 - X - 007	0120 - X08 13 - X - 008
	M10x1 con.	0120 - X07 01 - X - 025	0120 - X08 01 - X - 029
	M12x1.5 cyl.	0120 - X07 02 - X - 026	0120 - X08 02 - X - 030
	NPT1/8	0120 - X07 04 - X - 028	0120 - X08 04 - X - 032

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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 300 bar[1)] for diaphragm variant
- Overpressure safety up to 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

10 - 20 ((± 1) bar	G1/4	0120 - X11 03 - X - 043	0120 - X12 03 - X - 047
	G1/8	0120 - X11 28 - X - 611	0120 - X12 28 - X - 612
	M10x1 cyl.	0120 - X11 13 - X - 011	0120 - X12 13 - X - 012
	M10x1 con.	0120 - X11 01 - X - 041	0120 - X12 01 - X - 045
	M12x1.5 cyl.	0120 - X11 02 - X - 042	0120 - X12 02 - X - 046
	NPT1/8	0120 - X11 04 - X - 044	0120 - X12 04 - X - 048
20 - 50 ((± 2) bar	G1/4	0120 - X15 03 - X - 059	0120 - X16 03 - X - 063
	G1/8	0120 - X15 28 - X - 615	0120 - X16 28 - X - 616
	M10x1 cyl.	0120 - X15 13 - X - 015	0120 - X16 13 - X - 016
	M10x1 con.	0120 - X15 01 - X - 057	0120 - X16 01 - X - 061
	M12x1.5 cyl.	0120 - X15 02 - X - 058	0120 - X16 02 - X - 062
	NPT1/8	0120 - X15 04 - X - 060	0120 - X16 04 - X - 064

0121 Piston pressure switches with integrated connector

50 - 150 ((± 5) bar	G1/4	0121 - X19 03 - X - 011	0121 - X20 03 - X - 015
	G1/8	0121 - X19 28 - X - 603	0121 - X20 28 - X - 604
	M10x1 cyl.	0121 - X19 13 - X - 003	0121 - X20 13 - X - 004
	M10x1 con.	0121 - X19 01 - X - 009	0121 - X20 01 - X - 013
	M12x1.5 cyl.	0121 - X19 02 - X - 010	0121 - X20 02 - X - 014
	NPT1/8	0121 - X19 04 - X - 012	0121 - X20 04 - X - 016

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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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

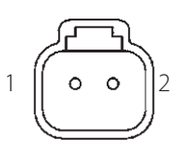
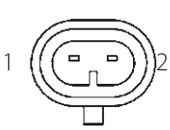
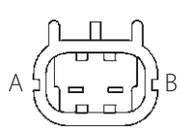
for hex 24 pressure switches with integrated connector

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

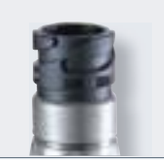
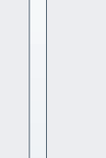
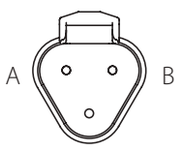
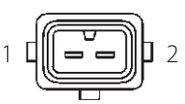
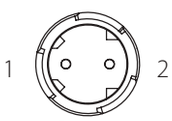
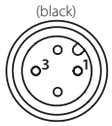
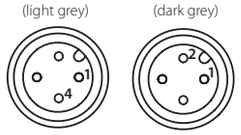
Mating plug accessories

Mating plug type	Deutsch DT04-2P (for DT06-2S)	AMP Superseal 1.5®	Packard MetriPack 280®
Including 2 m cable			
Cable cross-section	2 x 0,5 mm² Radox cables	2 x 0,5 mm² Radox cables	2 x 0,5 mm² Radox cables
Protection class	IP65	IP65	IP65
Order number	**1-1-10-653-118**	**1-1-12-653-113**	**1-1-14-653-114**

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

Model / Type	0110 / 0111	0112 / 0113	0114 / 0115
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			

Deutsch DT04-3P (for 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 PUR cables	2 x 0,5 mm² Radox cables	2 x 0,5 mm² Radox cables	4 x 0.34 mm² PUR cables
IP67	IP65	IP65	IP67
1-1-36-653-160	**1-1-18-653-116**	**1-1-20-653-112**	**1-1-00-653-162**

0116 / 0117	0118 / 0119	0120 / 0121	0122 / 0123	0124 / 0125
				
Deutsch DT04-3P	**AMP Junior Timer®**	**Bayonet DIN 72585/ISO 15170**	**M12x1 DIN EN 61076-2-101-A**	**M12x1 DIN EN 60947-5-2**
IP67, IP6K9K	IP65, IPx4K	IP67, IP6K9K	IP67	IP67
H ≈ 63 mm	H ≈ 54 mm	H ≈ 49 mm	H ≈ 51 mm	H ≈ 51 mm
		 Coding: A1-2.1	 1: brown 3: blue	 1: brown 2: black 4: white

M.2

hex 27 integrated

Pressure switches hex 27 with integrated connector

Changeover switch with silver or gold contacts

- Large selection of electrical plug-in types for quick attachment and reliable connection
- Hysteresis adjustable at factory
- 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[1)]
- Very high overpressure safety
- 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 details

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 / AC12)	10 mA … 4 A	10 mA … 4 A	3 … 50 mA
Temperature resistance of sealing materials:	NBR (Overpressure safety up to 100 bar)		-30 °C … +100 °C
	NBR (Overpressure safety up to 300 bar)		-40 °C … +100 °C
	EPDM		-30 °C … +120 °C
	FKM (in diaphragm pressure switch)		-5 °C … +120 °C
	FKM (in piston pressure switch)		-15 °C … +120 °C
	Silicone		-40 °C … +120 °C
	HNBR		-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:	≤ 1 bar/ms		
Hysteresis: (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. 100 g	approx. 130 g	approx. 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 hysteresis (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

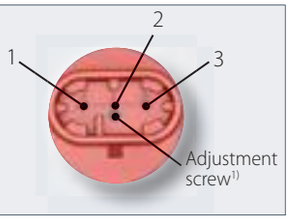
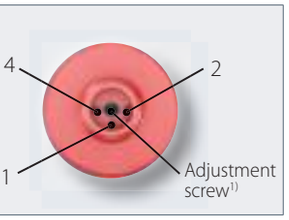
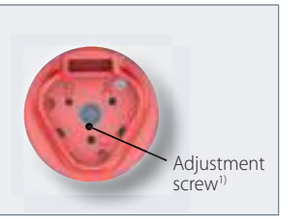
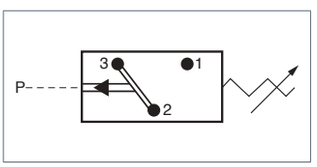
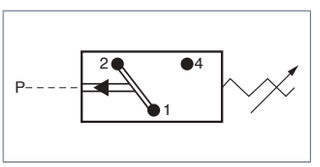
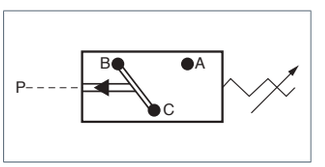
M.2

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 tting with socket wrench (spanner)
- Changeover with silver contacts (gold contacts available as option)
- Hysteresis 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 EN 61076-2-101-A** 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 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**

0132 / 0133 / 0134 / 0135 / 0136 / 0137

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

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Thread	Order number

0132 / 0134 / 0136 Diaphragm pressure switches

100[1)]	0.3 - 1.5	± 0.2	G1/4	013X - 457 03 - X - 003
			M10x1 con.	013X - 457 01 - X - 001
			M12x1.5 cyl.	013X - 457 02 - X - 002
			NPT1/8	013X - 457 04 - X - 318
			NPT1/4	013X - 457 09 - X - 314
			7/16-20 UNF	013X - 457 20 - X - 301
			9/16-18 UNF	013X - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	013X - 458 03 - X - 042
			M10x1 con.	013X - 458 01 - X - 040
			M12x1.5 cyl.	013X - 458 02 - X - 041
			NPT1/8	013X - 458 04 - X - 343
			NPT1/4	013X - 458 09 - X - 340
			7/16-20 UNF	013X - 458 20 - X - 341
			9/16-18 UNF	013X - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	013X - 459 03 - X - 009
			M10x1 con.	013X - 459 01 - X - 007
			M12x1.5 cyl.	013X - 459 02 - X - 008
			NPT1/8	013X - 459 04 - X - 320
			NPT1/4	013X - 459 09 - X - 316
			7/16-20 UNF	013X - 459 20 - X - 305
			9/16-18 UNF	013X - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	013X - 461 03 - X - 012
			M10x1 con.	013X - 461 01 - X - 010
			M12x1.5 cyl.	013X - 461 02 - X - 011
			NPT1/8	013X - 461 04 - X - 321
			NPT1/4	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

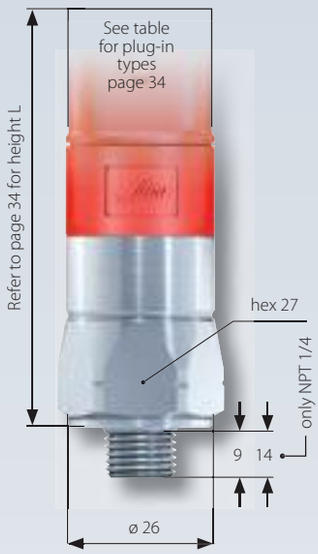
600[1)]	50 - 200	± 5.0	G1/4	013X - 460 03 - X - 003
			M10x1 con.	013X - 460 01 - X - 001
			M12x1.5 cyl.	013X - 460 02 - X - 002
			NPT1/8	013X - 460 04 - X - 304
			NPT1/4	013X - 460 09 - X - 303
			7/16-20 UNF	013X - 460 20 - X - 301
			9/16-18 UNF	013X - 460 21 - X - 302

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 X – 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.2

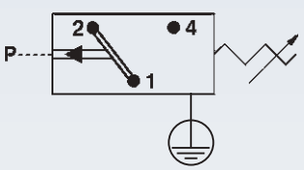
hex 27 integrated

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)
- Changeover with silver contacts
- Overpressure safety up to 100 / 300 bar[1)]
- Hysteresis adjustable at factory

Socket device
included in the delivery



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0184 Diaphragm pressure switches				
100[1)]	0.3 - 1.5	± 0.2	G1/4	0184 - 457 03 - X - 003
			M10x1 con.	0184 - 457 01 - X - 001
			M12x1.5 cyl.	0184 - 457 02 - X - 002
			NPT1/8	0184 - 457 04 - X - 318
			NPT1/4	0184 - 457 09 - X - 314
			7/16-20 UNF	0184 - 457 20 - X - 301
			9/16-18 UNF	0184 - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	0184 - 458 03 - X - 042
			M10x1 con.	0184 - 458 01 - X - 040
			M12x1.5 cyl.	0184 - 458 02 - X - 041
			NPT1/8	0184 - 458 04 - X - 343
			NPT1/4	0184 - 458 09 - X - 340
			7/16-20 UNF	0184 - 458 20 - X - 341
			9/16-18 UNF	0184 - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	0184 - 459 03 - X - 009
			M10x1 con.	0184 - 459 01 - X - 007
			M12x1.5 cyl.	0184 - 459 02 - X - 008
			NPT1/8	0184 - 459 04 - X - 320
			NPT1/4	0184 - 459 09 - X - 311
			7/16-20 UNF	0184 - 459 20 - X - 305
			9/16-18 UNF	0184 - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	0184 - 461 03 - X - 012
			M10x1 con.	0184 - 461 01 - X - 010
			M12x1.5 cyl.	0184 - 461 02 - X - 011
			NPT1/8	0184 - 461 04 - X - 321
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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)
- Changeover with silver contacts
- Overpressure safety up to 600 bar[1)]
- Hysteresis adjustable at factory

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number

0185 Piston pressure switches

600[1)]	50 - 200	± 5.0	G1/4	0185 - 460 03 - X - 003
			M10x1 con.	0185 - 460 01 - X - 001
			M12x1.5 cyl.	0185 - 460 02 - X - 002
			NPT1/8	0185 - 460 04 - X - 304
			NPT1/4	0185 - 460 09 - X - 303
			7/16-20 UNF	0185 - 460 20 - X - 301
			9/16-18 UNF	0185 - 460 21 - X - 302

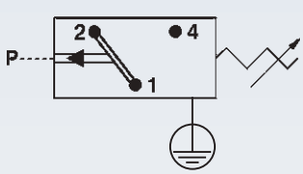
Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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

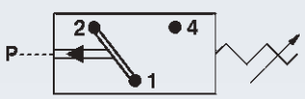
hex 27 integrated

0184

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)
- Changeover with gold contacts
- Overpressure safety up to 100/300 bar[1)]
- Hysteresis adjustable at factory

Socket device
included in the delivery



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0194 Diaphragm pressure switches				
100[1)]	0.3 - 1.5	± 0.2	G1/4	0194 - 457 03 - X - 003
			M10x1 con.	0194 - 457 01 - X - 001
			M12x1.5 cyl.	0194 - 457 02 - X - 002
			NPT1/8	0194 - 457 04 - X - 318
			NPT1/4	0194 - 457 09 - X - 314
			7/16-20 UNF	0194 - 457 20 - X - 301
			9/16-18 UNF	0194 - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	0194 - 458 03 - X - 042
			M10x1 con.	0194 - 458 01 - X - 040
			M12x1.5 cyl.	0194 - 458 02 - X - 041
			NPT1/8	0194 - 458 04 - X - 343
			NPT1/4	0194 - 458 09 - X - 340
			7/16-20 UNF	0194 - 458 20 - X - 341
			9/16-18 UNF	0194 - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	0194 - 459 03 - X - 009
			M10x1 con.	0194 - 459 01 - X - 007
			M12x1.5 cyl.	0194 - 459 02 - X - 008
			NPT1/8	0194 - 459 04 - X - 320
			NPT1/4	0194 - 459 09 - X - 311
			7/16-20 UNF	0194 - 459 20 - X - 305
			9/16-18 UNF	0194 - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	0194 - 461 03 - X - 012
			M10x1 con.	0194 - 461 01 - X - 010
			M12x1.5 cyl.	0194 - 461 02 - X - 011
			NPT1/8	0194 - 461 04 - X - 321
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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)
- Changeover with gold contacts
- Overpressure safety up to 600 bar[1)]
- Hysteresis adjustable at factory

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number

0195 Piston pressure switches

600[1)]	50 - 200	± 5.0	G1/4	0195 - 460 03 - X - 003
			M10x1 con.	0195 - 460 01 - X - 001
			M12x1.5 cyl.	0195 - 460 02 - X - 002
			NPT1/8	0195 - 460 04 - X - 304
			NPT1/4	0195 - 460 09 - X - 303
			7/16-20 UNF	0195 - 460 20 - X - 301
			9/16-18 UNF	0195 - 460 21 - X - 302

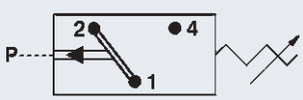
Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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
- For cutomized and ready-wired pressure switches, please refer to chapter M.5, starting at page 62.

[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 details

Rated working voltage:	10 … 42 VAC/DC	
Rated current range (resistive load, DC12 / AC12):	10 mA … 4 A	
Switching power DC12 / AC12:	100 W / 100 VA	
Temperature resistance of sealing materials:	NBR	-40 °C … +100 °C
	EPDM	-30 °C … +120 °C
	EPDM-TW	-20°C . . . +100 °C
	FKM (in diaphragm pressure switch)	-5 °C … +120 °C
	FKM (in piston pressure switch)	-15 °C … +120 °C
	Silicone	-40 °C … +120 °C
	HNBR	-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:	≤ 1 bar/ms	
Hysteresis:	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. 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	●	●				●

RoHSII compliant

0163

Diaphragm pressure switches up to 42 V with spade terminal

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

Adjustment range (Tolerance at room temperature)	Male thread	Order number NO —› |:	Order number NC —› :|

0163 Diaphragm pressure switches with spade terminal

0.1 - 1 (± 0.2) bar	G1/4	0163 - 403 03 - X - 011	0163 - 404 03 - X - 015
	G1/8	0163 - 403 28 - X - 603	0163 - 404 28 - X - 604
	M10x1 cyl.	0163 - 403 13 - X - 003	0163 - 404 13 - X - 004
	M10x1 con.	0163 - 403 01 - X - 009	0163 - 404 01 - X - 013
	M12x1.5 cyl.	0163 - 403 02 - X - 010	0163 - 404 02 - X - 014
	NPT1/8	0163 - 403 04 - X - 012	0163 - 404 04 - X - 016
0.5 - 3 (± 0.3) bar	G1/4	0163 - 423 03 - X - 070	0163 - 424 03 - X - 070
	G1/8	0163 - 423 28 - X - 070	0163 - 424 28 - X - 070
	M10x1 cyl.	0163 - 423 13 - X - 070	0163 - 424 13 - X - 070
	M10x1 con.	0163 - 423 01 - X - 070	0163 - 424 01 - X - 070
	M12x1.5 cyl.	0163 - 423 02 - X - 070	0163 - 424 02 - X - 070
	NPT1/8	0163 - 423 04 - X - 070	0163 - 424 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0163 - 407 03 - X - 027	0163 - 408 03 - X - 031
	G1/8	0163 - 407 28 - X - 607	0163 - 408 28 - X - 608
	M10x1 cyl.	0163 - 407 13 - X - 007	0163 - 408 13 - X - 008
	M10x1 con.	0163 - 407 01 - X - 025	0163 - 408 01 - X - 029
	M12x1.5 cyl.	0163 - 407 02 - X - 026	0163 - 408 02 - X - 030
	NPT1/8	0163 - 407 04 - X - 028	0163 - 408 04 - X - 032
10 - 20 (± 1.0) bar	G1/4	0163 - 411 03 - X - 043	0163 - 412 03 - X - 047
	G1/8	0163 - 411 28 - X - 611	0163 - 412 28 - X - 612
	M10x1 cyl.	0163 - 411 13 - X - 011	0163 - 412 13 - X - 012
	M10x1 con.	0163 - 411 01 - X - 041	0163 - 412 01 - X - 045
	M12x1.5 cyl.	0163 - 411 02 - X - 042	0163 - 412 02 - X - 046
	NPT1/8	0163 - 411 04 - X - 044	0163 - 412 04 - X - 048
20 - 50 (± 2.0) bar	G1/4	0163 - 415 03 - X - 059	0163 - 416 03 - X - 063
	G1/8	0163 - 415 28 - X - 615	0163 - 416 28 - X - 616
	M10x1 cyl.	0163 - 415 13 - X - 015	0163 - 416 13 - X - 016
	M10x1 con.	0163 - 415 01 - X - 057	0163 - 416 01 - X - 061
	M12x1.5 cyl.	0163 - 415 02 - X - 058	0163 - 416 02 - X - 062
	NPT1/8	0163 - 415 04 - X - 060	0163 - 416 04 - X - 064

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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.

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 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			
0.1 - 1 (± 0.2) bar	G1/4	0163 - 401 03 - X - 003	0163 - 402 03 - X - 007
	G1/8	0163 - 401 28 - X - 601	0163 - 402 28 - X - 602
	M10x1 cyl.	0163 - 401 13 - X - 001	0163 - 402 13 - X - 002
	M10x1 con.	0163 - 401 01 - X - 001	0163 - 402 01 - X - 005
	M12x1.5 cyl.	0163 - 401 02 - X - 002	0163 - 402 02 - X - 006
	NPT1/8	0163 - 401 04 - X - 004	0163 - 402 04 - X - 008
0.5 - 3 (± 0.3) bar	G1/4	0163 - 421 03 - X - 070	0163 - 422 03 - X - 070
	G1/8	0163 - 421 28 - X - 070	0163 - 422 28 - X - 070
	M10x1 cyl.	0163 - 421 13 - X - 070	0163 - 422 13 - X - 070
	M10x1 con.	0163 - 421 01 - X - 070	0163 - 422 01 - X - 070
	M12x1.5 cyl.	0163 - 421 02 - X - 070	0163 - 422 02 - X - 070
	NPT1/8	0163 - 421 04 - X - 070	0163 - 422 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0163 - 405 03 - X - 019	0163 - 406 03 - X - 023
	G1/8	0163 - 405 28 - X - 605	0163 - 406 28 - X - 606
	M10x1 cyl.	0163 - 405 13 - X - 005	0163 - 406 13 - X - 006
	M10x1 con.	0163 - 405 01 - X - 017	0163 - 406 01 - X - 021
	M12x1.5 cyl.	0163 - 405 02 - X - 018	0163 - 406 02 - X - 022
	NPT1/8	0163 - 405 04 - X - 020	0163 - 406 04 - X - 024
10 - 20 (± 1.0) bar	G1/4	0163 - 409 03 - X - 035	0163 - 410 03 - X - 039
	G1/8	0163 - 409 28 - X - 609	0163 - 410 28 - X - 610
	M10x1 cyl.	0163 - 409 13 - X - 009	0163 - 410 13 - X - 010
	M10x1 con.	0163 - 409 01 - X - 033	0163 - 410 01 - X - 037
	M12x1.5 cyl.	0163 - 409 02 - X - 034	0163 - 410 02 - X - 038
	NPT1/8	0163 - 409 04 - X - 036	0163 - 410 04 - X - 040
20 - 50 (± 2.0) bar	G1/4	0163 - 413 03 - X - 051	0163 - 414 03 - X - 055
	G1/8	0163 - 413 28 - X - 613	0163 - 414 28 - X - 614
	M10x1 cyl.	0163 - 413 13 - X - 013	0163 - 414 13 - X - 014
	M10x1 con.	0163 - 413 01 - X - 049	0163 - 414 01 - X - 053
	M12x1.5 cyl.	0163 - 413 02 - X - 050	0163 - 414 02 - X - 054
	NPT1/8	0163 - 413 04 - X - 052	0163 - 414 04 - X - 056

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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.

0166

Diaphragm pressure switches up to 42 V with spade terminal

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

0166 Diaphragm pressure switches with spade terminal

Adjustment range (Tolerance at room temperature)	Male thread	Order number NO —› |:	Order number NC —› :|
0.1 - 1 (± 0.2) bar	G1/4	0166 - 403 03 - X - 011	0166 - 404 03 - X - 015
	G1/8	0166 - 403 28 - X - 603	0166 - 404 28 - X - 604
	M10x1 cyl.	0166 - 403 13 - X - 003	0166 - 404 13 - X - 004
	M10x1 con.	0166 - 403 01 - X - 009	0166 - 404 01 - X - 013
	M12x1.5 cyl.	0166 - 403 02 - X - 010	0166 - 404 02 - X - 014
	NPT1/8	0166 - 403 04 - X - 012	0166 - 404 04 - X - 016
0.5 - 3 (± 0.3) bar	G1/4	0166 - 423 03 - X - 070	0166 - 424 03 - X - 070
	G1/8	0166 - 423 28 - X - 070	0166 - 424 28 - X - 070
	M10x1 cyl.	0166 - 423 13 - X - 070	0166 - 424 13 - X - 070
	M10x1 con.	0166 - 423 01 - X - 070	0166 - 424 01 - X - 070
	M12x1.5 cyl.	0166 - 423 02 - X - 070	0166 - 424 02 - X - 070
	NPT1/8	0166 - 423 04 - X - 070	0166 - 424 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0166 - 407 03 - X - 027	0166 - 408 03 - X - 031
	G1/8	0166 - 407 28 - X - 607	0166 - 408 28 - X - 608
	M10x1 cyl.	0166 - 407 13 - X - 007	0166 - 408 13 - X - 008
	M10x1 con.	0166 - 407 01 - X - 025	0166 - 408 01 - X - 029
	M12x1.5 cyl.	0166 - 407 02 - X - 026	0166 - 408 02 - X - 030
	NPT1/8	0166 - 407 04 - X - 028	0166 - 408 04 - X - 032
10 - 20 (± 1.0) bar	G1/4	0166 - 411 03 - X - 043	0166 - 412 03 - X - 047
	G1/8	0166 - 411 28 - X - 611	0166 - 412 28 - X - 612
	M10x1 cyl.	0166 - 411 13 - X - 011	0166 - 412 13 - X - 012
	M10x1 con.	0166 - 411 01 - X - 041	0166 - 412 01 - X - 045
	M12x1.5 cyl.	0166 - 411 02 - X - 042	0166 - 412 02 - X - 046
	NPT1/8	0166 - 411 04 - X - 044	0166 - 412 04 - X - 048
20 - 50 (± 2.0) bar	G1/4	0166 - 415 03 - X - 059	0166 - 416 03 - X - 063
	G1/8	0166 - 415 28 - X - 615	0166 - 416 28 - X - 616
	M10x1 cyl.	0166 - 415 13 - X - 015	0166 - 416 13 - X - 016
	M10x1 con.	0166 - 415 01 - X - 057	0166 - 416 01 - X - 061
	M12x1.5 cyl.	0166 - 415 02 - X - 058	0166 - 416 02 - X - 062
	NPT1/8	0166 - 415 04 - X - 060	0166 - 416 04 - X - 064

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 M3 screw terminal

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

Adjustment range (Tolerance at room temperature)	Male thread	Order number NO —› |:	Order number NC —› :|
0166 Diaphragm pressure switches with M3 screw terminal			
0.1 - 1 (± 0.2) bar	G1/4	0166 - 401 03 - X - 003	0166 - 402 03 - X - 007
	G1/8	0166 - 401 28 - X - 601	0166 - 402 28 - X - 602
	M10x1 cyl.	0166 - 401 13 - X - 001	0166 - 402 13 - X - 002
	M10x1 con.	0166 - 401 01 - X - 001	0166 - 402 01 - X - 005
	M12x1.5 cyl.	0166 - 401 02 - X - 002	0166 - 402 02 - X - 006
	NPT1/8	0166 - 401 04 - X - 004	0166 - 402 04 - X - 008
0.5 - 3 (± 0.3) bar	G1/4	0166 - 421 03 - X - 070	0166 - 422 03 - X - 070
	G1/8	0166 - 421 28 - X - 070	0166 - 422 28 - X - 070
	M10x1 cyl.	0166 - 421 13 - X - 070	0166 - 422 13 - X - 070
	M10x1 con.	0166 - 421 01 - X - 070	0166 - 422 01 - X - 070
	M12x1.5 cyl.	0166 - 421 02 - X - 070	0166 - 422 02 - X - 070
	NPT1/8	0166 - 421 04 - X - 070	0166 - 422 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0166 - 405 03 - X - 019	0166 - 406 03 - X - 023
	G1/8	0166 - 405 28 - X - 605	0166 - 406 28 - X - 606
	M10x1 cyl.	0166 - 405 13 - X - 005	0166 - 406 13 - X - 006
	M10x1 con.	0166 - 405 01 - X - 017	0166 - 406 01 - X - 021
	M12x1.5 cyl.	0166 - 405 02 - X - 018	0166 - 406 02 - X - 022
	NPT1/8	0166 - 405 04 - X - 020	0166 - 406 04 - X - 024
10 - 20 (± 1.0) bar	G1/4	0166 - 409 03 - X - 035	0166 - 410 03 - X - 039
	G1/8	0166 - 409 28 - X - 609	0166 - 410 28 - X - 610
	M10x1 cyl.	0166 - 409 13 - X - 009	0166 - 410 13 - X - 010
	M10x1 con.	0166 - 409 01 - X - 033	0166 - 410 01 - X - 037
	M12x1.5 cyl.	0166 - 409 02 - X - 034	0166 - 410 02 - X - 038
	NPT1/8	0166 - 409 04 - X - 036	0166 - 410 04 - X - 040
20 - 50 (± 2.0) bar	G1/4	0166 - 413 03 - X - 051	0166 - 414 03 - X - 055
	G1/8	0166 - 413 28 - X - 613	0166 - 414 28 - X - 614
	M10x1 cyl.	0166 - 413 13 - X - 013	0166 - 414 13 - X - 014
	M10x1 con.	0166 - 413 01 - X - 049	0166 - 414 01 - X - 053
	M12x1.5 cyl.	0166 - 413 02 - X - 050	0166 - 414 02 - X - 054
	NPT1/8	0166 - 413 04 - X - 052	0166 - 414 04 - X - 056

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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.

M.3

hex 24

0168

Diaphragm pressure switches up to 42 V

- Made of zinc-plated steel (CrVI-free)
- Spade or M3 screw terminal
- Overpressure safety up to 300 bar[1)]
- With female thread with compression-type fitting to DIN EN ISO 8434-1 (former DIN 2353)

AMP 6.3 x 0.8
Galvanically tin-plated

0168 Diaphragm pressure switches with spade terminal

Adjustment range (Tolerance at room temperature)	Female thread	Order number NO —› |:	Order number NC —› :|
0.1 - 1 (± 0.2) bar	M12x1.5 female DIN EN ISO 8434-1	0168 - 403 16 - X - 003	0168 - 404 16 - X - 004
0.5 - 3 (± 0.3) bar		0168 - 423 16 - X - 070	0168 - 424 16 - X - 070
1 - 10 (± 0.5) bar		0168 - 407 16 - X - 007	0168 - 408 16 - X - 008
10 - 20 (± 1) bar		0168 - 411 16 - X - 011	0168 - 412 16 - X - 012
20 - 50 (± 2) bar		0168 - 415 16 - X - 015	0168 - 416 16 - X - 016

0168 Diaphragm pressure switches with M3 screw terminal

0.1 - 1 (± 0.2) bar	M12x1.5 female DIN EN ISO 8434-1	0168 - 401 16 - X - 001	0168 - 402 16 - X - 002
0.5 - 3 (± 0.3) bar		0168 - 421 16 - X - 070	0168 - 422 16 - X - 070
1 - 10 (± 0.5) bar		0168 - 405 16 - X - 005	0168 - 406 16 - X - 006
10 - 20 (± 1) bar		0168 - 409 16 - X - 009	0168 - 410 16 - X - 010
20 - 50 (± 2) bar		0168 - 413 16 - X - 013	0168 - 414 16 - X - 014

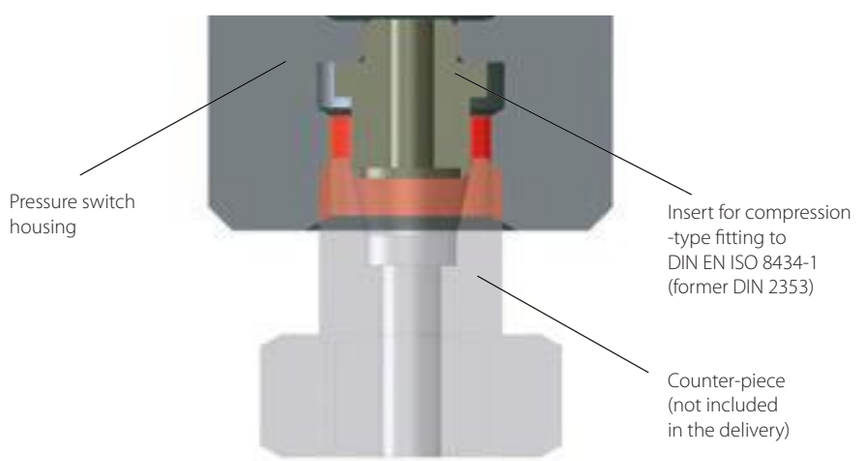
Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 16 – 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

Diaphragm pressure switches up to 42 V

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

0169 Piston pressure switches with spade terminal

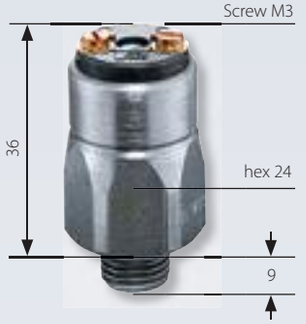
Adjustment range (Tolerance at room temperature)	Male thread	Order number NO ⟶ |:	Order number NC ⟶ :|
50 - 150 (± 5) bar	G1/4	0169 - 419 03 - X - 011	0169 - 420 03 - X - 015
	G1/8	0169 - 419 28 - X - 603	0169 - 420 28 - X - 604
	M10x1 cyl.	0169 - 419 13 - X - 003	0169 - 420 13 - X - 004
	M10x1 con.	0169 - 419 01 - X - 009	0169 - 420 01 - X - 013
	M12x1.5 cyl.	0169 - 419 02 - X - 010	0169 - 420 02 - X - 014
	NPT1/8	0169 - 419 04 - X - 012	0169 - 420 04 - X - 016
100 - 200 (± 5) bar	G1/4	0169 - 493 03 - X - 011	0169 - 494 03 - X - 015
	G1/8	0169 - 493 28 - X - 603	0169 - 494 28 - X - 604
	M10x1 cyl.	0169 - 493 13 - X - 003	0169 - 494 13 - X - 004
	M10x1 con.	0169 - 493 01 - X - 009	0169 - 494 01 - X - 013
	M12x1.5 cyl.	0169 - 493 02 - X - 010	0169 - 494 02 - X - 014
	NPT1/8	0169 - 493 04 - X - 012	0169 - 494 04 - X - 016

AMP 6.3 x 0.8
Galvanically tin-plated

0169 Piston pressure switches with M3 screw terminal

50 - 150 (± 5) bar	G1/4	0169 - 417 03 - X - 003	0169 - 418 03 - X - 007
	G1/8	0169 - 417 28 - X - 601	0169 - 418 28 - X - 602
	M10x1 cyl.	0169 - 417 13 - X - 001	0169 - 418 13 - X - 002
	M10x1 con.	0169 - 417 01 - X - 001	0169 - 418 01 - X - 005
	M12x1.5 cyl.	0169 - 417 02 - X - 002	0169 - 418 02 - X - 006
	NPT1/8	0169 - 417 04 - X - 004	0169 - 418 04 - X - 008
100 - 200 (± 5) bar	G1/4	0169 - 491 03 - X - 003	0169 - 492 03 - X - 007
	G1/8	0169 - 491 28 - X - 601	0169 - 492 28 - X - 602
	M10x1 cyl.	0169 - 491 13 - X - 001	0169 - 492 13 - X - 002
	M10x1 con.	0169 - 491 01 - X - 001	0169 - 492 01 - X - 005
	M12x1.5 cyl.	0169 - 491 02 - X - 002	0169 - 492 02 - X - 006
	NPT1/8	0169 - 491 04 - X - 004	0169 - 492 04 - X - 008

Screw M3



Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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 – 4XX 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 (1.4305 / AISI 303)
- Spade terminal
- Overpressure safety up to 600 bar[1)]
  (EPDM-TW and silicone diaphragm up to 35 bar[2)])

Adjustment range (Tolerance at room temperature)	Male thread	**Order number** NO —› |:	**Order number** NC —› :|
0164 Diaphragm pressure switches with spade terminal			
0.1 - 1 (± 0.2) bar	G1/4-E	0164 - 403 41 - X - 003	0164 - 404 41 - X - 004
	R1/8	0164 - 403 12 - X - 003	0164 - 404 12 - X - 004
	R1/4	0164 - 403 46 - X - 003	0164 - 404 46 - X - 004
	NTP1/8	0164 - 403 04 - X - 003	0164 - 404 04 - X - 004
0.5 - 3 (± 0.3) bar	G1/4-E	0164 - 423 41 - X - 070	0164 - 424 41 - X - 070
	R1/8	0164 - 423 12 - X - 070	0164 - 424 12 - X - 070
	R1/4	0164 - 423 46 - X - 070	0164 - 424 46 - X - 070
	NTP1/8	0164 - 423 04 - X - 070	0164 - 424 04 - X - 070
1 - 10 (± 0.5) bar	G1/4-E	0164 - 407 41 - X - 007	0164 - 408 41 - X - 008
	R1/8	0164 - 407 12 - X - 007	0164 - 408 12 - X - 008
	R1/4	0164 - 407 46 - X - 007	0164 - 408 46 - X - 008
	NTP1/8	0164 - 407 04 - X - 007	0164 - 408 04 - X - 008
10 - 20 (± 1) bar	G1/4-E	0164 - 411 41 - X - 011	0164 - 412 41 - X - 012
	R1/8	0164 - 411 12 - X - 011	0164 - 412 12 - X - 012
	R1/4	0164 - 411 46 - X - 011	0164 - 412 46 - X - 012
	NTP1/8	0164 - 411 04 - X - 011	0164 - 412 04 - X - 012
20 - 50 (± 2) bar	G1/4-E	0164 - 415 41 - X - 015	0164 - 416 41 - X - 016
	R1/8	0164 - 415 12 - X - 015	0164 - 416 12 - X - 016
	R1/4	0164 - 415 46 - X - 015	0164 - 416 46 - X - 016
	NTP1/8	0164 - 415 04 - X - 015	0164 - 416 04 - X - 016

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[3)]	Drinking water ($p_{max} \leq 35$ bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone[4)]	Water, food products, air, etc. ($p_{max} \leq 35$ 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-TW and silicone.
[3)] On demand
[4)] The G1/4-E thread has an EPDM sealing ring if the silicone membrane is selected.

0164

Diaphragm pressure switches up to 42 V with stainless steel housing

- Stainless steel housing (1.4305 / AISI 303)
- M3 screw terminal
- Overpressure safety up to 600 bar[1)]
  (EPDM-TW and silicone diaphragm up to 35 bar[2)])

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

0164 Diaphragm pressure switches with screw terminal M3

0.1 - 1 (± 0.2) bar	G1/4-E	0164 - 401 41 - X - 001	0164 - 402 41 - X - 002
	R1/8	0164 - 401 12 - X - 001	0164 - 402 12 - X - 002
	R1/4	0164 - 401 46 - X - 001	0164 - 402 46 - X - 002
	NTP1/8	0164 - 401 04 - X - 001	0164 - 402 04 - X - 002
0.5 - 3 (± 0.3) bar	G1/4-E	0164 - 421 41 - X - 070	0164 - 422 41 - X - 070
	R1/8	0164 - 421 12 - X - 070	0164 - 422 12 - X - 070
	R1/4	0164 - 421 46 - X - 070	0164 - 422 46 - X - 070
	NTP1/8	0164 - 421 04 - X - 070	0164 - 422 04 - X - 070
1 - 10 (± 0.5) bar	G1/4-E	0164 - 405 41 - X - 005	0164 - 406 41 - X - 006
	R1/8	0164 - 405 12 - X - 005	0164 - 406 12 - X - 006
	R1/4	0164 - 405 46 - X - 005	0164 - 406 46 - X - 006
	NTP1/8	0164 - 405 04 - X - 005	0164 - 406 04 - X - 006
10 - 20 (± 1) bar	G1/4-E	0164 - 409 41 - X - 009	0164 - 410 41 - X - 010
	R1/8	0164 - 409 12 - X - 009	0164 - 410 12 - X - 010
	R1/4	0164 - 409 46 - X - 009	0164 - 410 46 - X - 010
	NTP1/8	0164 - 409 04 - X - 009	0164 - 410 04 - X - 010
20 - 50 (± 2) bar	G1/4-E	0164 - 413 41 - X - 013	0164 - 414 41 - X - 014
	R1/8	0164 - 413 12 - X - 013	0164 - 414 12 - X - 014
	R1/4	0164 - 413 46 - X - 013	0164 - 414 46 - X - 014
	NTP1/8	0164 - 413 04 - X - 013	0164 - 414 04 - X - 014

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[3)]	Drinking water ($p_{max} \leq 35$ bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone[4)]	Water, food products, air, etc. ($p_{max} \leq 35$ 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.

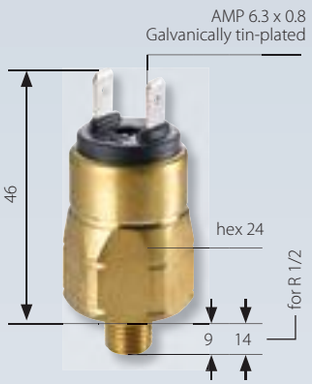
Your order number:	**0164 – XXX XX – X – XXX**

[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-TW and silicone.
[3)] On demand
[4)] The G1/4-E thread has an EPDM sealing ring if the silicone membrane is selected.

0167

Diaphragm pressure switches up to 42 V with brass housing

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



0167 Diaphragm pressure switches with spade terminal

Adjustment range (Tolerance at room temperature)	Male thread	Order number NO —› |:	Order number NC —› :|
0.1 - 1 (± 0.2) bar	G1/4	0167 - 403 03 - X - 039	0167 - 404 03 - X - 040
	G1/8	0167 - 403 28 - X - 003	0167 - 404 28 - X - 004
	R1/8	0167 - 403 12 - X - 008	0167 - 404 12 - X - 011
	R1/2	0167 - 403 07 - X - 009	0167 - 404 07 - X - 012
	M10x1 con.	0167 - 403 01 - X - 007	0167 - 404 01 - X - 010
	NPT1/8	0167 - 403 04 - X - 012	0167 - 404 04 - X - 016
0.5 - 3 (± 0.3) bar	G1/4	0167 - 423 03 - X - 070	0167 - 424 03 - X - 070
	G1/8	0167 - 423 28 - X - 070	0167 - 424 28 - X - 070
	R1/8	0167 - 423 12 - X - 070	0167 - 424 12 - X - 070
	R1/2	0167 - 423 07 - X - 070	0167 - 424 07 - X - 070
	M10x1 con.	0167 - 423 01 - X - 070	0167 - 424 01 - X - 070
	NPT1/8	0167 - 423 04 - X - 070	0167 - 424 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0167 - 407 03 - X - 043	0167 - 408 03 - X - 044
	G1/8	0167 - 407 28 - X - 007	0167 - 408 28 - X - 008
	R1/8	0167 - 407 12 - X - 020	0167 - 408 12 - X - 023
	R1/2	0167 - 407 07 - X - 021	0167 - 408 07 - X - 024
	M10x1 con.	0167 - 407 01 - X - 019	0167 - 408 01 - X - 022
	NPT1/8	0167 - 407 04 - X - 028	0167 - 408 04 - X - 032
10 - 20 (± 1.0) bar	G1/4	0167 - 411 03 - X - 047	0167 - 412 03 - X - 048
	G1/8	0167 - 411 28 - X - 011	0167 - 412 28 - X - 012
	R1/8	0167 - 411 12 - X - 032	0167 - 412 12 - X - 035
	R1/2	0167 - 411 07 - X - 033	0167 - 412 07 - X - 036
	M10x1 con.	0167 - 411 01 - X - 031	0167 - 412 01 - X - 034
	NPT1/8	0167 - 411 04 - X - 044	0167 - 412 04 - X - 048

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[2)]	Drinking water (p_{max} ≤ 35 bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (p_{max} ≤ 35 bar)	8

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)] On demand

0167

Diaphragm pressure switches up to 42 V with brass housing

- Brass housing
- M3 screw terminal
- Overpressure safety up to 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

0.1 - 1 (± 0.2) bar	G1/4	0167 - 401 03 - X - 037	0167 - 402 03 - X - 038
	G1/8	0167 - 401 28 - X - 001	0167 - 402 28 - X - 002
	R1/8	0167 - 401 12 - X - 002	0167 - 402 12 - X - 005
	R1/2	0167 - 401 07 - X - 003	0167 - 402 07 - X - 006
	M10x1 con.	0167 - 401 01 - X - 001	0167 - 402 01 - X - 004
	NPT1/8	0167 - 401 04 - X - 004	0167 - 402 04 - X - 008
0.5 - 3 (± 0.3) bar	G1/4	0167 - 421 03 - X - 070	0167 - 422 03 - X - 070
	G1/8	0167 - 421 28 - X - 070	0167 - 422 28 - X - 070
	R1/8	0167 - 421 12 - X - 070	0167 - 422 12 - X - 070
	R1/2	0167 - 421 07 - X - 070	0167 - 422 07 - X - 070
	M10x1 con.	0167 - 421 01 - X - 070	0167 - 422 01 - X - 070
	NPT1/8	0167 - 421 04 - X - 070	0167 - 422 04 - X - 070
1 - 10 (± 0.5) bar	G1/4	0167 - 405 03 - X - 041	0167 - 406 03 - X - 042
	G1/8	0167 - 405 28 - X - 005	0167 - 406 28 - X - 006
	R1/8	0167 - 405 12 - X - 014	0167 - 406 12 - X - 017
	R1/2	0167 - 405 07 - X - 015	0167 - 406 07 - X - 018
	M10x1 con.	0167 - 405 01 - X - 013	0167 - 406 01 - X - 016
	NPT1/8	0167 - 405 04 - X - 020	0167 - 406 04 - X - 024
10 - 20 (± 1.0) bar	G1/4	0167 - 409 03 - X - 045	0167 - 410 03 - X - 046
	G1/8	0167 - 409 28 - X - 009	0167 - 410 28 - X - 010
	R1/8	0167 - 409 12 - X - 026	0167 - 410 12 - X - 029
	R1/2	0167 - 409 07 - X - 027	0167 - 410 07 - X - 030
	M10x1 con.	0167 - 409 01 - X - 025	0167 - 410 01 - X - 028
	NPT1/8	0167 - 409 04 - X - 036	0167 - 410 04 - X - 040

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[2)]	Drinking water (p_{max} ≤ 35 bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. (p_{max} ≤ 35 bar)	8

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)] On demand

Pressure switches hex 27

Changeover with silver or gold contacts

- Switching point can be adjusted when fitted on site[1)]
- Factory adjustable hysteresis (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 details

Temperature resistance of sealing materials:	NBR (max. overpressure up to 100 bar)	-30 °C … +100 °C
	NBR (max. overpressure up to 300/600 bar)	-40 °C … +100 °C
	EPDM	-30 °C … +120 °C
	EPDM-TW (in diaphragm pressure switch)	-20 °C … +100 °C
	FKM (in diaphragm pressure switch)	-5 °C … +120 °C
	FKM (in piston pressure switch)	-15 °C … +120 °C
	Silicone (in diaphragm pressure switch)	-40 °C … +120 °C
	HNBR	-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:	≤ 1 bar/ms	
Hysteresis (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/s²; 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. 100 g	

Switching performance and materials overview

Type:	0140	0141	0170	0171	0180	0181	0183	0186	0187	0190	0191	0196	0197
5 … 24 V DC										●	●	●	●
10 … 42 V AC/DC			●	●									
10 … 250 V AC/DC	●	●			●	●	●	●	●				
3 … 50 mA										●	●	●	●
10 mA … 2 A	●	●											
10 mA … 4 A			●	●	●	●	●	●	●				
Gold contacts										●	●	●	●
Silver contacts	●	●	●	●	●	●	●	●	●				
Adjustable hysteresis			●	●	●	●	●	●	●	●	●	●	●
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	AC12
24 VDC	2 / 1 A	DC12 / DC13
50 VDC	1 / 0.5 A	DC12 / DC13
75 VDC	0.5 / 0.25 A	DC12 / DC13
125 VDC	0.2 / 0.1 A	DC12 / DC13
250 VDC	0.15 / 0.1 A	DC12 / DC13
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 DIN EN 60529:1991+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	AC12
250 VAC 50 / 60 Hz	1 A	AC14
24 VDC	4 / 2 A	DC12 / DC13
50 VDC	2 / 1 A	DC12 / DC13
75 VDC	1 / 0.5 A	DC12 / DC13
125 VDC	0.3 / 0.2 A	DC12 / DC13
250 VDC	0.25 / 0.2 A	DC12 / DC13
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 class of protection according to DIN EN 60529:1991+A1:1999:	IP65 with socket device, terminals IP00	

[1)] For technical explanations refer to page 9

0140 / 0141

Diaphragm / piston pressure switches 250 V

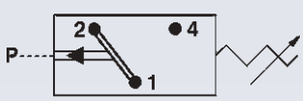
- Protection class 2, protective insulation ⧈
- Zinc-plated steel (CrVI-free)
- Changeover with silver contacts
- Overpressure safety up to 300 / 600 bar[1)]
- Includes polyamide cap, protection class IP65

0140 Diaphragm pressure switches with screw terminals

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
300[1)]	0.3 - 1.5	± 0.2	G1/4	0140 - 457 03 - X - 003
			NPT1/8	0140 - 457 04 - X - 300
			NPT1/4	0140 - 457 09 - X - 305
			7/16-20 UNF	0140 - 457 20 - X - 310
			9/16-18 UNF	0140 - 457 21 - X - 315
	1 - 10	± 0.5	G1/4	0140 - 458 03 - X - 006
			NPT1/8	0140 - 458 04 - X - 301
			NPT1/4	0140 - 458 09 - X - 306
			7/16-20 UNF	0140 - 458 20 - X - 311
			9/16-18 UNF	0140 - 458 21 - X - 316
	10 - 20	± 1.0	G1/4	0140 - 459 03 - X - 009
			NPT1/8	0140 - 459 04 - X - 302
			NPT1/4	0140 - 459 09 - X - 307
			7/16-20 UNF	0140 - 459 20 - X - 312
			9/16-18 UNF	0140 - 459 21 - X - 317
	20 - 50	± 2.0	G1/4	0140 - 461 03 - X - 012
			NPT1/8	0140 - 461 04 - X - 303
			NPT1/4	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

600[1)]	50 - 150	± 5.0	G1/4	0141 - 460 03 - X - 003
			NPT1/8	0141 - 460 04 - X - 304
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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.

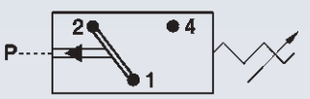
Your order number:	014X – XXX XX – X – XXX

[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)
- Changeover with silver contacts
- Overpressure safety up to 100 / 300 / 600 bar[1)]
- Hysteresis adjustable at factory



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0170 Diaphragm pressure switches with spade terminal				
100[1)]	0.3 - 1.5	± 0.2	G1/4	0170 - 457 03 - X - 003
			M10x1 con.	0170 - 457 01 - X - 001
			M12x1.5 cyl.	0170 - 457 02 - X - 002
			NPT1/8	0170 - 457 04 - X - 318
			NPT1/4	0170 - 457 09 - X - 314
			7/16-20 UNF	0170 - 457 20 - X - 301
			9/16-18 UNF	0170 - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	0170 - 458 03 - X - 042
			M10x1 con.	0170 - 458 01 - X - 040
			M12x1.5 cyl.	0170 - 458 02 - X - 041
			NPT1/8	0170 - 458 04 - X - 343
			NPT1/4	0170 - 458 09 - X - 340
			7/16-20 UNF	0170 - 458 20 - X - 341
			9/16-18 UNF	0170 - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	0170 - 459 03 - X - 009
			M10x1 con.	0170 - 459 01 - X - 007
			M12x1.5 cyl.	0170 - 459 02 - X - 008
			NPT1/8	0170 - 459 04 - X - 320
			NPT1/4	0170 - 459 09 - X - 316
			7/16-20 UNF	0170 - 459 20 - X - 305
			9/16-18 UNF	0170 - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	0170 - 461 03 - X - 012
			M10x1 con.	0170 - 461 01 - X - 010
			M12x1.5 cyl.	0170 - 461 02 - X - 011
			NPT1/8	0170 - 461 04 - X - 321
			NPT1/4	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				
600[1)]	50 - 200	± 5.0	G1/4	0171 - 460 03 - X - 003
			M10x1 con.	0171 - 460 01 - X - 001
			M12x1.5 cyl.	0171 - 460 02 - X - 002
			NPT1/8	0171 - 460 04 - X - 304
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR[2)]	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

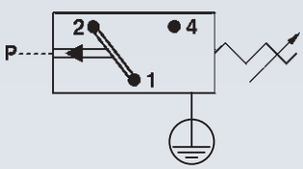
[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.
[2)] Not available for pressure ranges between 0.3 - 5 bar.

0180 / 0181

Diaphragm / piston pressure switches up to 250 V

- Zinc-plated steel (CrVI-free)
- Changeover with silver contacts
- Overpressure safety up to 100 / 300 / 600 bar[1)]
- Hysteresis adjustable at factory

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0180 Diaphragm pressure switches with spade terminal				
100[1)]	0.3 - 1.5	± 0.2	G1/4	0180 - 457 03 - X - 003
			M10x1 con.	0180 - 457 01 - X - 001
			M12x1.5 cyl.	0180 - 457 02 - X - 002
			NPT1/8	0180 - 457 04 - X - 318
			NPT1/4	0180 - 457 09 - X - 314
			7/16-20 UNF	0180 - 457 20 - X - 301
			9/16-18 UNF	0180 - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	0180 - 458 03 - X - 042
			M10x1 con.	0180 - 458 01 - X - 040
			M12x1.5 cyl.	0180 - 458 02 - X - 041
			NPT1/8	0180 - 458 04 - X - 343
			NPT1/4	0180 - 458 09 - X - 340
			7/16-20 UNF	0180 - 458 20 - X - 341
			9/16-18 UNF	0180 - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	0180 - 459 03 - X - 009
			M10x1 con.	0180 - 459 01 - X - 007
			M12x1.5 cyl.	0180 - 459 02 - X - 008
			NPT1/8	0180 - 459 04 - X - 320
			NPT1/4	0180 - 459 09 - X - 311
			7/16-20 UNF	0180 - 459 20 - X - 305
			9/16-18 UNF	0180 - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	0180 - 461 03 - X - 012
			M10x1 con.	0180 - 461 01 - X - 010
			M12x1.5 cyl.	0180 - 461 02 - X - 011
			NPT1/8	0180 - 461 04 - X - 321
			NPT1/4	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				
600[1)]	50 - 200	± 5.0	G1/4	0181 - 460 03 - X - 003
			M10x1 con.	0181 - 460 01 - X - 001
			M12x1.5 cyl.	0181 - 460 02 - X - 002
			NPT1/8	0181 - 460 04 - X - 304
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR[2)]	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.
[2)] Not available for pressure ranges between 0.3 - 5 bar.

M.4

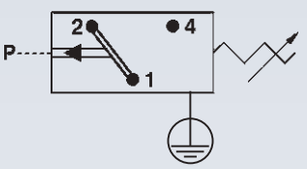
hex 27

0183

Piston pressure switches up to 250 V

- Zinc-plated steel (CrVI-free)
- Changeover with silver contacts
- Overpressure safety up to 600 bar[1)], Hysteresis adjustable at factory
- Adjustment range: 100 – 400 bar
- Height only 51 mm

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



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0183 Piston pressure switches with spade terminal				
600[1)]	100 - 300	± 10.0	M14x1.5 DIN 6149-3	0183 - 462 45 - X - 051
	200 - 400			0183 - 463 45 - X - 061

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, hydrogen, oxygen, acetylene, etc.	2
FKM	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.

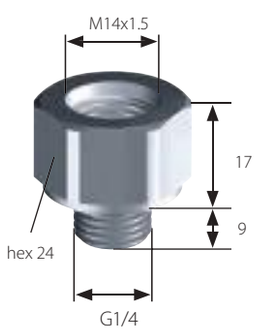
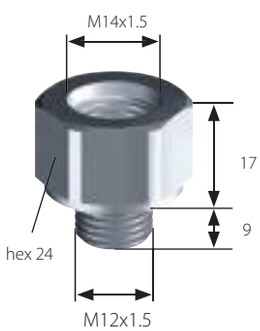
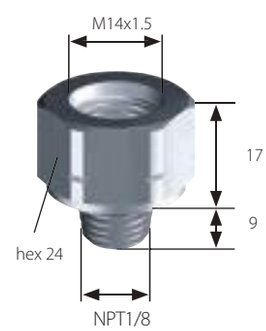
Your order number: **0183 – 46X 45 – X – XXX**

[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 M14 x 1.5		
to **G1/4**	to **M12 x 1.5**	to **NPT1/8**
		
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 (1.4305 / AISI 303)
- Changeover with silver contacts
- Overpressure safety up to 300 / 600 bar[1)]
  (EPDM-TW and silicone diaphragm up to 35 bar[2)])
- Hysteresis adjustable at factory

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number

0186 Diaphragm pressure switches with spade terminal

300[1)2)]	0.5 - 5	± 0.3	G1/4	0186 - 457 03 - X - 003
	1 - 10	± 0.5		0186 - 458 03 - X - 006
	10 - 50	± 3.0		0186 - 459 03 - X - 009
	10 - 100	± 3.0 - 5.0		0186 - 461 03 - X - 012

0187 Piston pressure switches with spade terminal

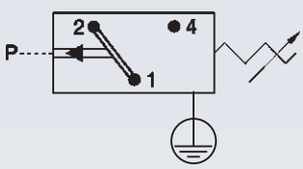
600[1)]	50 - 200	± 5.0	G1/4	0187 - 460 03 - X - 003

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[3)]	Drinking water ($p_{max} \leq 35$ bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. ($p_{max} \leq 35$ 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

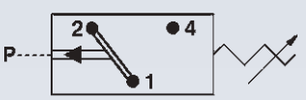


[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.
[2)] Overpressure safety of diaphragm pressure switch up to 600 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-TW and silicone.
[3)] On demand

0190 / 0191

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

- Zinc-plated steel (CrVI-free), with spade terminal
- Changeover with gold contacts
- Overpressure safety up to 100/300/600 bar[1)]
- Hysteresis adjustable at factory



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0190 Diaphragm pressure switches with spade terminal				
100[1)]	0.3 - 1.5	± 0.2	G1/4	0190 - 457 03 - X - 003
			M10x1 con.	0190 - 457 01 - X - 001
			M12x1.5 cyl.	0190 - 457 02 - X - 002
			NPT1/8	0190 - 457 04 - X - 318
			NPT1/4	0190 - 457 09 - X - 314
			7/16-20 UNF	0190 - 457 20 - X - 301
			9/16-18 UNF	0190 - 457 21 - X - 302
300[1)]	1 - 10	± 0.5	G1/4	0190 - 458 03 - X - 042
			M10x1 con.	0190 - 458 01 - X - 040
			M12x1.5 cyl.	0190 - 458 02 - X - 041
			NPT1/8	0190 - 458 04 - X - 343
			NPT1/4	0190 - 458 09 - X - 340
			7/16-20 UNF	0190 - 458 20 - X - 341
			9/16-18 UNF	0190 - 458 21 - X - 342
	10 - 50	± 3.0	G1/4	0190 - 459 03 - X - 009
			M10x1 con.	0190 - 459 01 - X - 007
			M12x1.5 cyl.	0190 - 459 02 - X - 008
			NPT1/8	0190 - 459 04 - X - 320
			NPT1/4	0190 - 459 09 - X - 316
			7/16-20 UNF	0190 - 459 20 - X - 305
			9/16-18 UNF	0190 - 459 21 - X - 306
	10 - 100	± 3.0 - 5.0	G1/4	0190 - 461 03 - X - 012
			M10x1 con.	0190 - 461 01 - X - 010
			M12x1.5 cyl.	0190 - 461 02 - X - 011
			NPT1/8	0190 - 461 04 - X - 321
			NPT1/4	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				
600[1)]	50 - 200	± 5.0	G1/4	0191 - 460 03 - X - 003
			M10x1 con.	0191 - 460 01 - X - 001
			M12x1.5 cyl.	0191 - 460 02 - X - 002
			NPT1/8	0191 - 460 04 - X - 304
			NPT1/4	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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
HNBR[2)]	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.
[2)] Not available for pressure ranges between 0.3 - 5 bar.

RoHS II compliant

0196 / 0197

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

- Stainless steel housing (1.4305 / AISI 303)
- Fitted with changeover contact and gold contacts
- Overpressure safety up to 300 / 600 bar[1)]
  (EPDM-TW and silicone diaphragm up to 35 bar[2)])
- Hysteresis adjustable at factory

0196 Diaphragm pressure switches with spade terminal

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
300[1)2)]	0.5 - 5	± 0.3	G1/4	0196 - 457 03 - X - 003
	1 - 10	± 0.5		0196 - 458 03 - X - 006
	10 - 50	± 3.0		0196 - 459 03 - X - 009
	10 - 100	± 3.0 - 5.0		0196 - 461 03 - X - 012

0197 Piston pressure switches with spade terminal

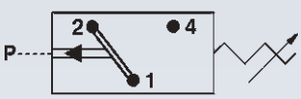
600[1)]	50 - 200	± 5.0	G1/4	0197 - 460 03 - X - 003

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Water, Brake fluid, hydrogen, oxygen, acetylene, etc.	2
EPDM-TW[3)]	Drinking water ($p_{max} \leq 35$ bar)	5
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
Silicone	Water, food products, air, etc. ($p_{max} \leq 35$ 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:	019X – 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 600 bar. Functional reliability only up to 35 bar with diaphragm materials EPDM-TW and silicone.
[3)] On demand

hex 24 / hex 27
Ready-wired pressure switches

Custom designs

- Available with all commercial plug-in types and individual cable length.
- Technical details of ready-wired pressure switch types correspond to those of the same standard pressure switch types[1)]
- High protection classes IP67 or IP6K9K, required in particular in commercial vehicle construction, mobile hydraulics and similarly demanding applications
- With ready-wired pressure switches, the plug connections can be moved in climatically uncritical or low-vibration areas, if required.
- The modular layout also enables the production of lower volumes.
- The switching point is factory-set to a fixed value.[2)]

[1)] Different technical details will be agreed with the customer.
[2)] Exception: The switching point of the 0240/0241 can be adjusted on site even after the sealing process.

Hex 24 / hex 27

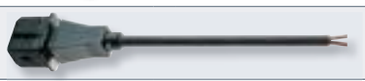
Custom designs

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.

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)	

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.

For gas applications below 10 bar (145 PSI) we generally recommend venting the housing for encapsulated pressure switches.

Please contact us so we can offer you a suitable solution.

0240 / 0241

Diaphragm / piston pressure switches, hex 27

Technical details

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 -	-40 °C … +100 °C
	EPDM	-30 °C … +120 °C
	FKM (in diaphragm pressure switch)	-5 °C … +120 °C
	FKM (in piston pressure switch)	-15 °C … +120 °C
	Silicone	-40 °C … +120 °C
	HNBR	-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:	≤ 1 bar/ms	
Hysteresis:	Average value 10 – 20 % (not adjustable)	
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 60068-2-6	
Materials:	Housing material: zinc-plated steel Protective cap: anodised aluminium	
Protection class: IP67	IP67	
Cable:	Standard length 2 m with wire end sleeves	
Weight:	approx. 120 g	

Options for 0240 / 0241

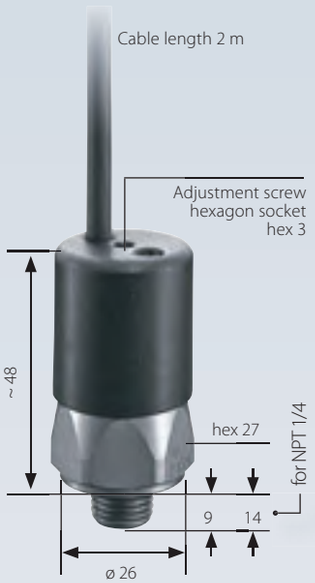
- Other cable lengths and plug-in systems
- Fixed switching point, factory-set, set point embossed on housing
- Alternative housing materials and connection threads
- Other sealing materials, such as silicone for diaphragm pressure switches

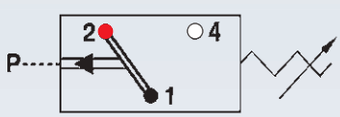
0240 / 0241

Diaphragm / piston pressure switches, hex 27

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

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0240 Diaphragm pressure switches				
300[1)]	0.3 – 1.5	± 0.2	G 1/4	0240 - 457 03 - X - 003
			NPT 1/8	0240 - 457 04 - X - 300
			NPT 1/4	0240 - 457 09 - X - 305
			7/16-20 UNF	0240 - 457 20 - X - 310
			9/16-18 UNF	0240 - 457 21 - X - 315
	1 – 10	± 0.5	G 1/4	0240 - 458 03 - X - 006
			NPT 1/8	0240 - 458 04 - X - 301
			NPT 1/4	0240 - 458 09 - X - 306
			7/16-20 UNF	0240 - 458 20 - X - 311
			9/16-18 UNF	0240 - 458 21 - X - 316
	10 – 20	± 1.0	G 1/4	0240 - 459 03 - X - 009
			NPT 1/8	0240 - 459 04 - X - 302
			NPT 1/4	0240 - 459 09 - X - 307
			7/16-20 UNF	0240 - 459 20 - X - 312
			9/16-18 UNF	0240 - 459 21 - X - 317
	20 – 50	± 2.0	G 1/4	0240 - 461 03 - X - 012
			NPT 1/8	0240 - 461 04 - X - 303
			NPT 1/4	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				
600[1)]	50 – 150	± 5.0	G 1/4	0240 - 460 03 - X - 003
			NPT 1/8	0240 - 460 04 - X - 304
			NPT 1/4	0240 - 460 09 - X - 309
			7/16-20 UNF	0240 - 460 20 - X - 314
			9/16-18 UNF	0240 - 460 21 - X - 319





Contacts assignment:
- ● 1 = black
- ● 2 = red
- ○ 4 = white

Seal material – Application areas[2)]

NBR	Hydraulic/machine oil, heating oil, air, nitrogen[2)], etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene[2)] etc.	2
FKM	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:	0240 – 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)] For gas applications below 10 bar (145 PSI) we generally recommend venting the housing for encapsulated pressure switches. Please contact us so we can offer you a suitable solution.

RoHS II compliant CE

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:

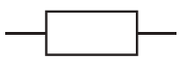
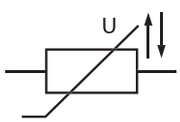
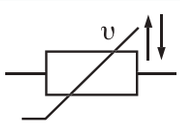
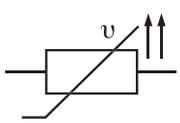
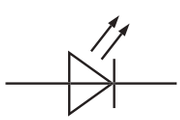
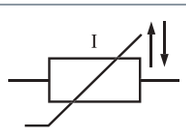
- NAMUR diagnostic function (fail-safe) with short-circuit and cable break detection
- Overvoltage protection for prolonging the contact service life
- Active reduction of EMC emissions
- Temperature-controlled switching function (e.g. cold start, i.e. inactive switching function until a certain temperature is reached)
- In-rush current limitation (overload limitation of the switching contacts when switching load is too high,, e.g. lamp load, motor start-up)
- Display ot the the switching status with LED
- Overload protection with self-resetting electrical fuse
- High protection class up to IP67 and IP6K9K
- Switching point can be set on site with adjusting screw in the connector[1)]

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

Pressure switches *PLUS*

with integrated connector and supplementary functions

Overview of possible supplementary functions

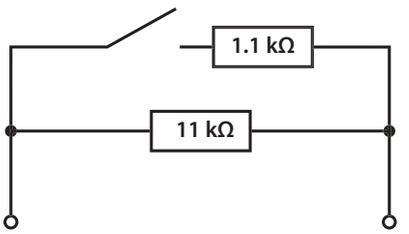
Circuit	Symbole	Function	Application	Code for order number
Resistor Resistor circuit to NAMUR, refer to page 68		• Diagnostic function (fail-safe) with short-circuit and cable break detection	Safety systems such as brake systems, hydrostatic steering systems and fire extinguisher systems	04XX - R
Varistor 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 by an 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	upon request

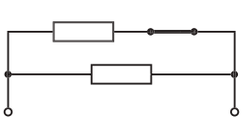
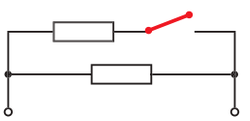
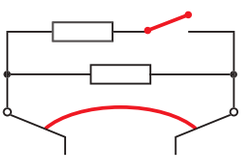
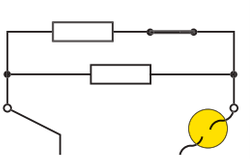
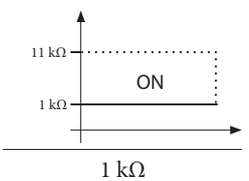
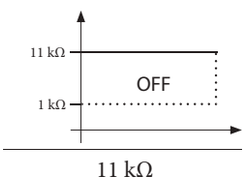
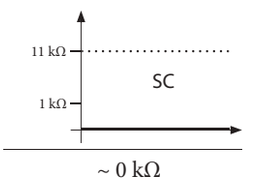
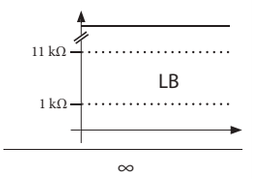
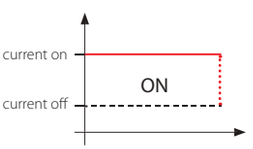
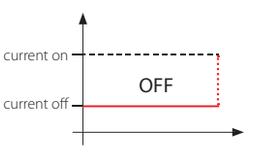
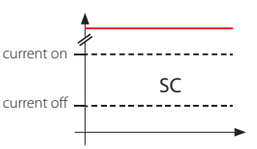
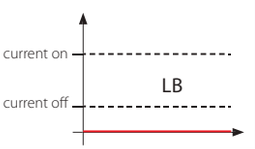
M.6
PS *PLUS*
hex 24

Pressure switches *PLUS*
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 speci cations can be satis ed. An operating voltage of 8.2 VDC must be provided for NAMUR-compliant operation. A resistance of 11 k is present in the circuit when the switch contact is open. The resistance is 1 k 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	 1 kΩ	 11 kΩ	 ~ 0 kΩ	 ∞
Current				
Example: Supply voltage 12 VDC	$I = \frac{Ucc}{1\ k\Omega} = \frac{12\ V}{1\ k\Omega} = 12$ mA	$I = \frac{Ucc}{11\ k\Omega} = \frac{12\ V}{11\ k\Omega} = 1{,}1$ mA	$I >> \frac{Ucc}{1\ k\Omega}$ $I >> \frac{12\ V}{1\ k\Omega}$ $I >> 12$ mA	I = 0 mA

Technical details	
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:	≤ 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
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.

Pressure switches *PLUS*

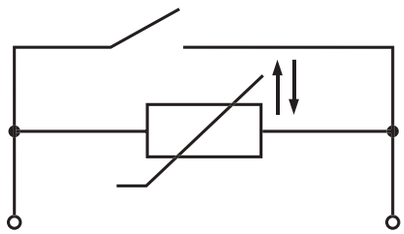
Circuit with varistor for overvoltage limitation (pressure switches with part numbers 04XX-V)

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 details	
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:	≤ 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
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 / 0422 / 0424

Diaphragm pressure switches, up to 42 V with supplementary functions

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

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

0422 / 0423
M12x1 DIN EN 60947-5-2
IP67

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 (PIN 1+3)	0422 – XXX XX – X – 001	0422 – XXX XX – X – 002
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0424 – XXX XX – X – 001	0424 – XXX XX – X – 002

Adjustment range (tolerance at room temperature)	Male thread	Order number NO ⟶ |:	Order number NC ⟶ :|
04XX Diaphragm pressure switches			
0.1 - 1 (± 0.2) bar	G 1/4	04XX – X 03 03 – X – 001	04XX – X 04 03 – X – 002
	G 1/8	04XX – X 03 28 – X – 001	04XX – X 04 28 – X – 002
	M 10x1 cyl.	04XX – X 03 13 – X – 001	04XX – X 04 13 – X – 002
	M 10x1 con.	04XX – X 03 01 – X – 001	04XX – X 04 01 – X – 002
	M 12x1.5	04XX – X 03 02 – X – 001	04XX – X 04 02 – X – 002
	NPT 1/8	04XX – X 03 02 – X – 001	04XX – X 04 02 – X – 002
0.5 - 3 (± 0.3) bar	G 1/4	04XX – X 23 03 – X – 001	04XX – X 24 03 – X – 002
	G 1/8	04XX – X 23 28 – X – 001	04XX – X 24 28 – X – 002
	M 10x1 cyl.	04XX – X 23 13 – X – 001	04XX – X 24 13 – X – 002
	M 10x1 con.	04XX – X 23 01 – X – 001	04XX – X 24 01 – X – 002
	M 12x1.5	04XX – X 23 02 – X – 001	04XX – X 24 02 – X – 002
	NPT 1/8	04XX – X 23 04 – X – 001	04XX – X 24 04 – X – 002
1 - 10 (± 0.5) bar	G 1/4	04XX – X 07 03 – X – 001	04XX – X 08 03 – X – 002
	G 1/8	04XX – X 07 28 – X – 001	04XX – X 08 28 – X – 002
	M 10x1 cyl.	04XX – X 07 13 – X – 001	04XX – X 08 13 – X – 002
	M 10x1 con.	04XX – X 07 01 – X – 001	04XX – X 08 01 – X – 002
	M 12x1.5	04XX – X 07 02 – X – 001	04XX – X 08 02 – X – 002
	NPT 1/8	04XX – X 07 04 – X – 001	04XX – X 08 04 – 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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	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:	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.

RoHSII compliant

0410 / 0412 / 0414 / 0416 / 0418 / 0422 / 0424

Diaphragm pressure switches, up to 42 V with supplementary functions

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 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 (PIN 1+3)	0422 – XXX XX – X – 001	0422 – XXX XX – X – 002
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0424 – XXX XX – X – 001	0424 – XXX XX – X – 002

Adjustment range (tolerance at room temperature)	Male thread	**Order number** NO ⟶ |:	**Order number** NC ⟶ :|

04XX Diaphragm pressure switches

10 - 20 (± 1) bar	G 1/4	04XX – X 11 03 – X – 001	04XX – X 12 03 – X – 002
	G 1/8	04XX – X 11 28 – X – 001	04XX – X 12 28 – X – 002
	M 10x1 cyl.	04XX – X 11 13 – X – 001	04XX – X 12 13 – X – 002
	M 10x1 con.	04XX – X 11 01 – X – 001	04XX – X 12 01 – X – 002
	M 12x1.5	04XX – X 11 02 – X – 001	04XX – X 12 02 – X – 002
	NPT 1/8	04XX – X 11 04 – X – 001	04XX – X 12 04 – X – 002
20 - 50 (± 2) bar	G 1/4	04XX – X 15 03 – X – 001	04XX – X 16 03 – X – 002
	G 1/8	04XX – X 15 28 – X – 001	04XX – X 16 28 – X – 002
	M 10x1 cyl.	04XX – X 15 13 – X – 001	04XX – X 16 13 – X – 002
	M 10x1 con.	04XX – X 15 01 – X – 001	04XX – X 16 01 – X – 002
	M 12x1.5	04XX – X 15 02 – X – 001	04XX – X 16 02 – X – 002
	NPT 1/8	04XX – X 15 04 – X – 001	04XX – X 16 04 – 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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	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:	**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.

M.6

PS ***PLUS***

hex 24

0411 / 0413 / 0415 / 0417 / 0419 / 0423 / 0425

Piston pressure switches, up to 42 V with supplementary functions

- Zinc-plated steel (CrVI-free)
- Overpressure safety up to 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 (PIN 1+3)	0423 – XXX XX – X – 001	0423 – XXX XX – X – 002
M12x1 DIN EN 60947-5-2 (PIN 1+2 / PIN 1+4)	0425 – XXX XX – X – 001	0425 – XXX XX – X – 002

Adjustment range (tolerance at room temperature)	Male thread	**Order number** NO ⟶ |:	**Order number** NC ⟶ :|

04XX Piston pressure switches

50 - 150 (± 5.0) bar	G 1/4	04XX – X 19 03 – X – 001	04XX – X 20 03 – X – 002
	G 1/8	04XX – X 19 28 – X – 001	04XX – X 20 28 – X – 002
	M 10x1 cyl.	04XX – X 19 13 – X – 001	04XX – X 20 13 – X – 002
	M 10x1 con.	04XX – X 19 01 – X – 001	04XX – X 20 01 – X – 002
	M 12x1.5	04XX – X 19 02 – X – 001	04XX – X 20 02 – X – 002
	NPT 1/8	04XX – X 19 04 – X – 001	04XX – X 20 04 – 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	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	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:	**04XX – XXX XX – X – 00X**

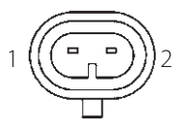
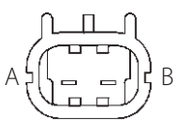
RoHSII compliant

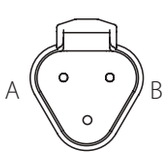
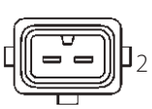
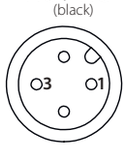
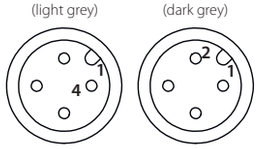
[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.

Pressure Switches *PLUS*

Plug-in types for diaphragm and piston pressure switches

Technical details 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	0422 / 0423	0424 / 0425
Model / type				
Connector	**Deutsch DT04-3P**	**AMP Junior Timer®**	**M12x1 DIN EN 61076-2-101-A**	**M12x1 DIN EN 60947-5-2**
Protection class	IP67, IP6K9K	IP65, IPx4K	IP67	IP67
Overall height	H ≈ 63 mm	H ≈ 54 mm	H ≈ 51 mm	H ≈ 51 mm
Contact assignment		 Not recommended for new applications	NO / NC (black)  1: brown 3: blue	NO (light grey) NC (dark grey)  1: brown 2: black 4: white

RoHSII compliant

Pressure switches 30 A/F

Changeover 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 details

Temperature resistance of sealing materials:	NBR	-40 °C … +100 °C
	EPDM	-30 °C … +120 °C
	FKM (in diaphragm pressure switch)	-5 °C … +120 °C
	FKM (in piston pressure switch)	-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 50 bar)	
Pressure rise rate:	≤ 1 bar/ms	
Hysteresis:	Type 0159:	approx. 10 … 30 % (not adjustable)
	Types 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/s²; 14 ms half sine wave; DIN EN 60068-2-27	
Housing material:	Aluminium	
Protection class:	IP65 with Socket device fitted, otherwise IP00	
Weight	Types 0159, 0161, 0162: approx. 240 g	
	Type 0175:	approx. 310 g

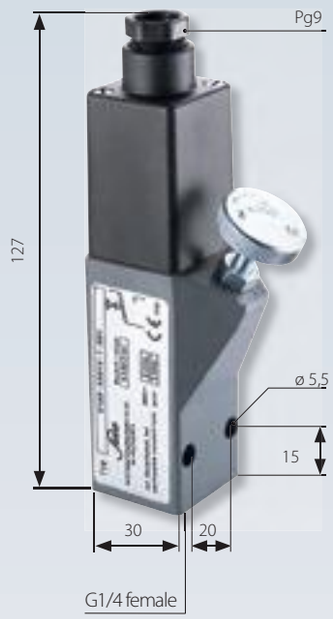
Electrical values	0159	0161 / 0162 / 0175
Rated working voltage U_e:	Rated working current I_e:	
250 V AC 50 / 60 Hz, AC 12	2.5 A	5 A
250 V AC 50 / 60 Hz, AC 14	1 A	1 A
24 V DC, DC 12 / DC 13	2 / 2 A	3.5 / 3.5 A
50 V DC, DC 12 / DC 13	1 / 0.5 A	2 / 1 A
75 V DC, DC 12 / DC 13	0.75 / 0.4 A	1 / 0.5 A
125 V DC, DC 12 / DC 13	0.3 / 0.2 A	0.3 / 0.2 A
250 V DC, 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 mm²	

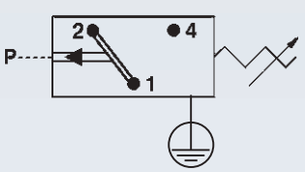
Suco RoHSII compliant CE

0159

Diaphragm / piston pressure switch up to 250 V

- Aluminium housing
- Changeover with silver contacts
- Overpressure safety up to 200 / 600 bar[1)]
- Switching point continuously adjustable by turning knurled screw whilst system in operation





p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Thread	Order number

With female thread

0159 Diaphragm pressure switches

200[1)]	0.2 – 2	± 0.2 – 0.3	G 1/4 female	0159 - 426 14 - X - 001
	0.5 – 5	± 0.2 – 0.5		0159 - 427 14 - X - 001
	1 – 10	± 0.5		0159 - 428 14 - X - 001
	2 – 20	± 1.0		0159 - 429 14 - X - 001
	5 – 50	± 3.0		0159 - 430 14 - X - 001
	10 – 100	± 3.0 – 5.0		0159 - 431 14 - X - 001

0159 Piston pressure switches

600[1)]	10 – 100	± 3.0 – 5.0	G 1/4 female	0159 - 432 14 - X - 001
	25 – 250	± 5.0 – 7.0		0159 - 433 14 - X - 001
	40 – 400	± 5.0 – 9.0		0159 - 434 14 - X - 001

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	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 – 001

RoHSII 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 switch up to 250 V

- Aluminium housing
- Changeover with silver contacts
- Overpressure safety up to 200 / 600 bar[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Hysteresis adjustable at factory

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Dimension A in mm	Order number

With female G 1/4 thread

0161 Diaphragm pressure switches

200[1)]	0.5 – 1	± 0.2		0161 - 436 14 - X - 001
	0.5 – 5	± 0.2 – 0.5		0161 - 437 14 - X - 001
	1 – 10	± 0.5		0161 - 438 14 - X - 001
	10 – 50	± 1.0		0161 - 439 14 - X - 001
	50 – 100	± 3.0 - 5.0		0161 - 440 14 - X - 001

0161 Piston pressure switches

600[1)]	100 - 400	± 5.0 - 9.0		0161 - 441 14 - X - 001

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

0162 Diaphragm pressure switches

200[1)]	0.5 – 1	± 0.2	15	0162 - 436 14 - X - 001
	0.5 – 5	± 0.2 – 0.5		0162 - 437 14 - X - 001
	1 – 10	± 0.5		0162 - 438 14 - X - 001
	10 – 50	± 3.0		0162 - 439 14 - X - 001
	50 – 100	± 3.0 – 5.0		0162 - 440 14 - X - 001

0162 Piston pressure switches

600[1)]	100 - 400	± 5.0 - 9.0	19.5	0162 - 441 14 - X - 001

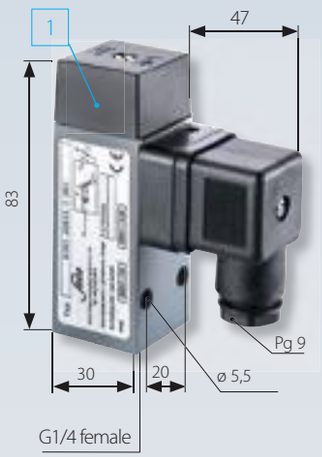
Seal material – Application areas

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

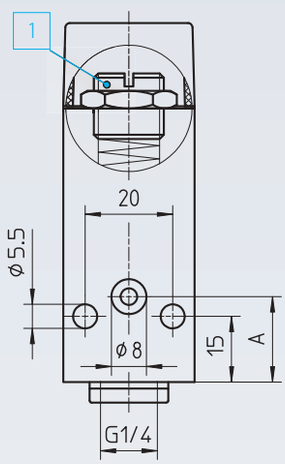
Refer to page 75 for the temperature range and application thresholds of sealing materials.

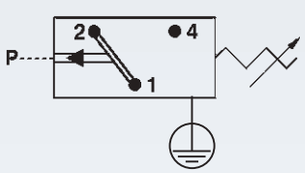
Your order number:	016X – XXX 14 – X – 001

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 M16 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.

M.7

30 A/F

0175

Diaphragm pressure switches up to 250 V

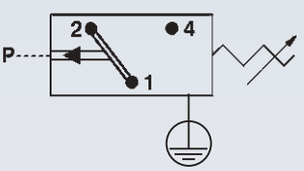
- For low pressure, high accuracy
- Aluminium housing
- Changeover with silver contacts
- Overpressure safety up to 25 bar[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Hysteresis adjustable at factory

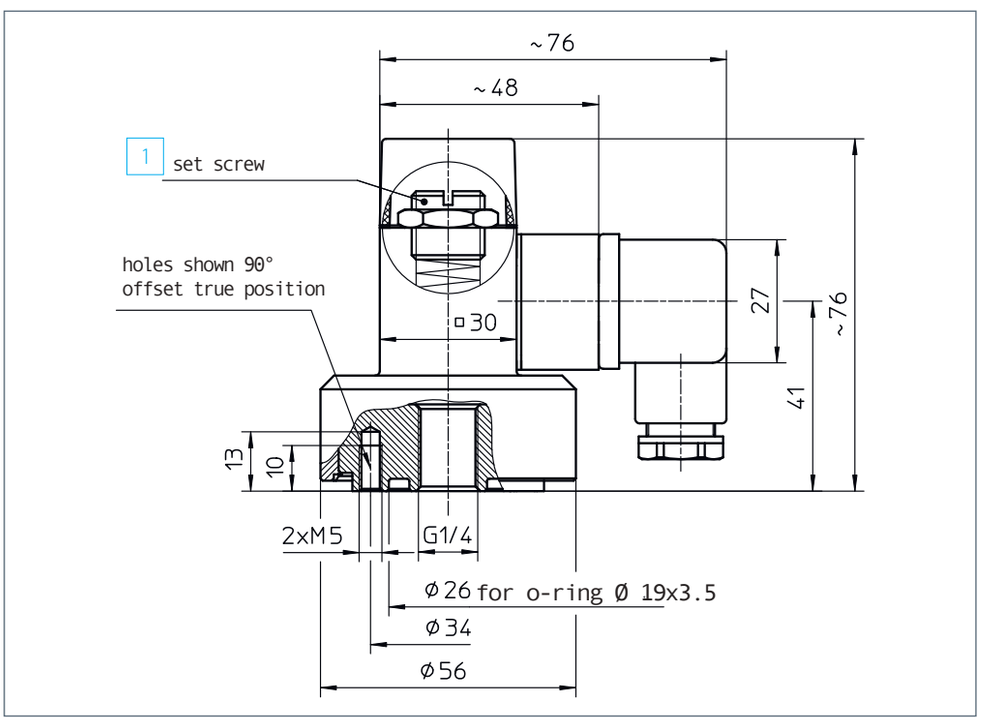
p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Thread	Order number
With female thread				
0175 Diaphragm pressure switches				
25[1)]	0.1 – 1	± 0.1 – 0.2	G 1/4 female	0175 - 435 14 - **1** - 001

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.
	Temperature resistance: -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 M16 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.

M.8

ATEX

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 in operation
- Compact design
- Excellent price/performance ratio

Explosion-protected pressure switches

Technical details

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 details

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		-20 °C … +80 °C
	EPDM		-20 °C … +80 °C
	FKM (in diaphragm pressure switch)		-5 °C … +80 °C
	FKM (in piston pressure switch)		-15 °C … +80 °C
Switching frequency:	200 / min		
Mechanical life expectancy:	1,000,000 cycles		
Pressure rise rate:	≤ 1 bar/ms		
Hysteresis:	0 … 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. 2m with wire end sleeve, also available in lengths of approx. 5m.		
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. 380 g		approx. 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
- Changeover with silver contacts
- Operating voltage up to 250 V
- Overpressure safety up to 200 / 600 bar[1)]

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Thread	Order number

0165 Diaphragm pressure switches

200[1)]	1 – 6	± 0.5	G 1/4 female	0165 - 448 14 - X - 001
	5 – 50	± 3.0		0165 - 449 14 - X - 001

0165 Piston pressure switches

600[1)]	20 – 100	± 3.0 – 5.0	G 1/4 femalle	0165 - 450 14 - X - 001
	25 – 250	± 5.0 – 7.0		0165 - 452 14 - X - 001
	100 – 400	± 5.0 – 9.0		0165 - 451 14 - X - 001

Seal material – Application areas

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

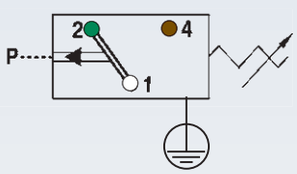
Refer to page 82 for the temperature range and application thresholds of sealing materials.

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.

M.8

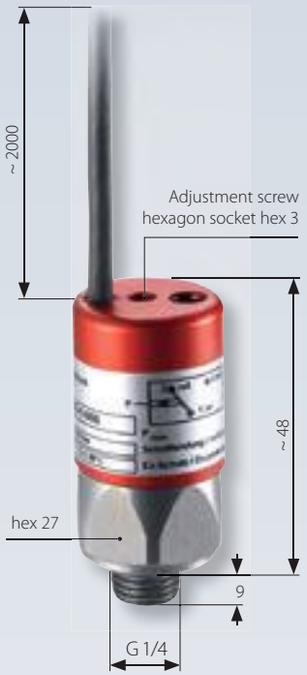
ATEX

0340 / 0341

Diaphragm / piston pressure switches up to 250 V

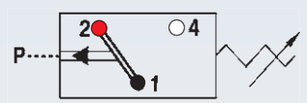
ATEX CE II 3D IP65 T90°C (dust protection zone 22)

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



Contact assignment

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



p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Thread	Order number
0340 Diaphragm pressure switches				
300[1)]	0.3 – 1.5	± 0.2	G 1/4	0340 - 457 03 - X - 003
	1 – 10	± 0.5 – 1.0		0340 - 458 03 - X - 006
	10 – 20	± 1.0		0340 - 459 03 - X - 009
	20 – 50	± 2.0		0340 - 461 03 - X - 012
0341 Piston pressure switches				
600[1)]	50 – 100	± 5.0	G 1/4	0341 - 460 03 - X - 003

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	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

for negative pressure from 950 mbar to 100 mbar

- Switching point can be adjusted when fitted on site[1)]
- High overpressure resistance
- Long service life even under harsh conditions
- 0150 series available as changeover contacts 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 details

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:	-20 °C … +100 °C	-15 °C … +120 °C
Switching frequency:	200 / min	
Mechanical life expectancy:	1,000,000 cycles	
Pressure rise rate:	≤ 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. 270 g	approx. 140 g

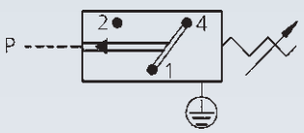
0150 Electrical values (also refer to page 14 for technical explanations)

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 changeover contact

- Aluminium housing
- Operating voltage up to 250 V
- Changeover with silver contacts
- Overpressure safety up to 20 bar[1)]
- Socket device similar to DIN EN 175301 (DIN 43650)
- Hysteresis approx. 50 – 150 mbar (cannot be changed)



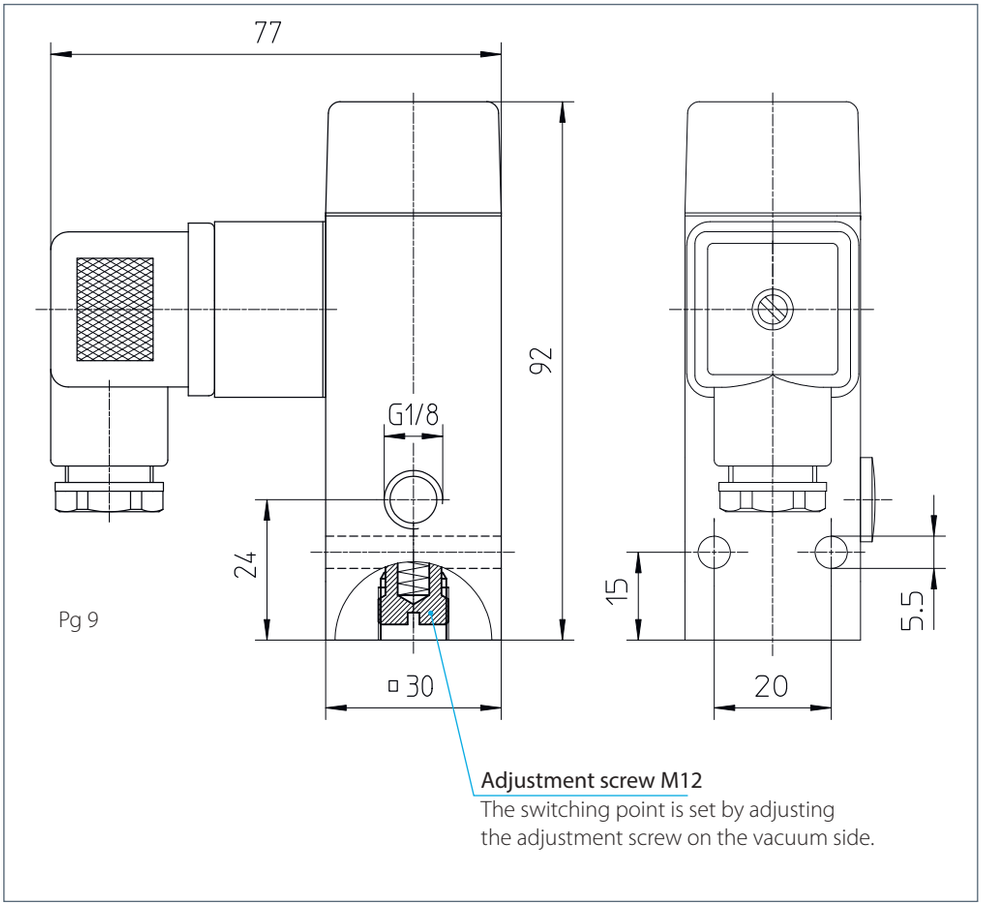
p_{max} in bar	Adjustment range in mbar (relative)	Tolerance at room temperature in mbar	Thread	Order number
0150 Vacuum switch				
20[1)]	100 – 950	± 50	G 1/8 female	0150 - 456 15 - 4 - 001

Seal material – Application areas

ECO	Air, oils, greases, fuel/gasoline	4

Temperature resistance: -20 °C … +100 °C

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



[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 35 bar[1)]

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

Seal material – Application areas

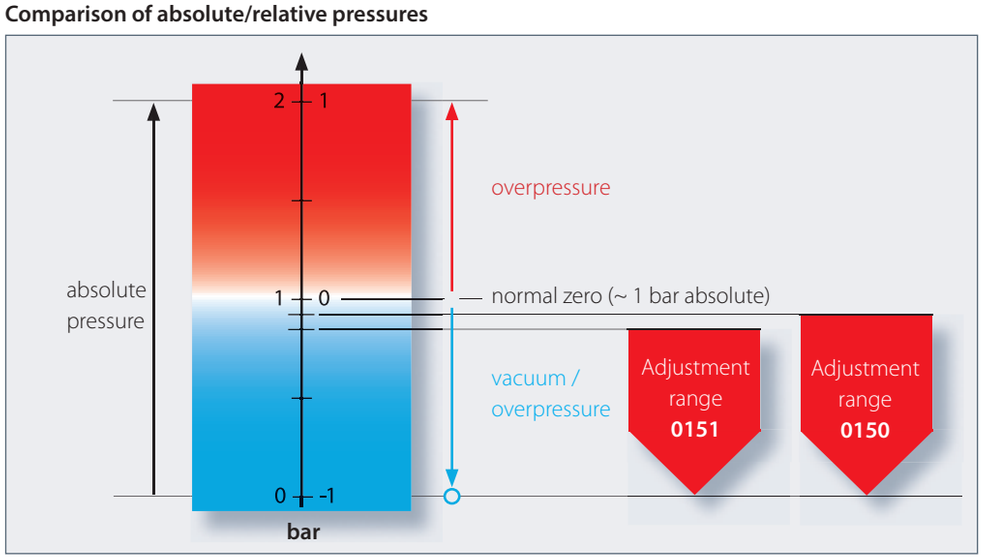
FKM	Air, oils, greases, fuel/gasoline	4

Temperature resistance: -15 °C … +120 °C

Your order number:	0151 – 45X 15 – 3 – 001

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

Comparison of absolute/relative pressures



Note: Required set points in the vacuum range must be specied 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.

M.10

Accessoires

Accessories

Mating plugs, Socket devices and Thread adapters

- 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	Ordner number: **1-1-10-653-118**	
Deutsch DT06-3S (for DT04-3P) 3 x 0,75 mm² PUR cable, IP67	suitable for series 0116 / 0117 / 0136 / 0137 0416 / 0417	Ordner 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	Ordner 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	Ordner 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	Ordner 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	Ordner number: **1-1-14-653-114**	
Baïonnette DIN 72585 A1-2.1 2 x 0,5 mm² Radox cable, IP65	suitable for series 0120 / 0121	Ordner number: **1-1-20-653-112**	
M12 DIN EN 61076-2-101-LF, 4-pin 4 x 0,34 mm² PUR cable, IP65	suitable for series 0122 / 0123 / 0124 / 0125 0134 / 0135 / 0424 / 0425	Ordner number: **1-1-00-653-162**	

All mating plugs with 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

cSCAus approval
Housing: Polyamide
Pg9 screw fitting
(tightening range 6 - 9 mm)

With socket device fitted: IP65

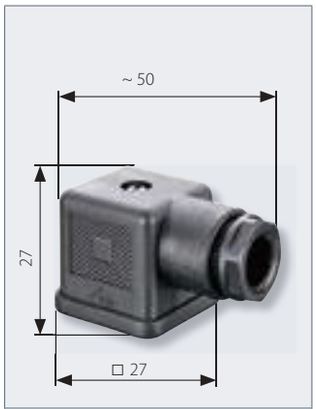
Suitable for voltages up to 250 V

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

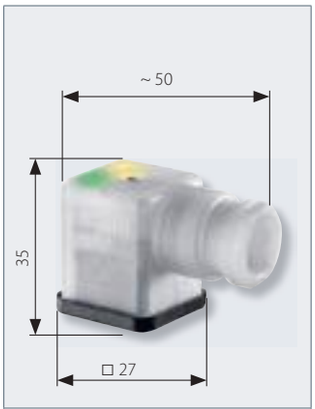
Suitable for voltages up to 250 V

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 voltages up to 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

M12x1
DIN EN 61076-2-101 A
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

M12x1
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

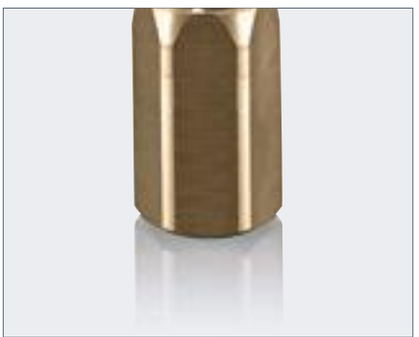
Order number:

1-6-00-652-017

Thread adapters

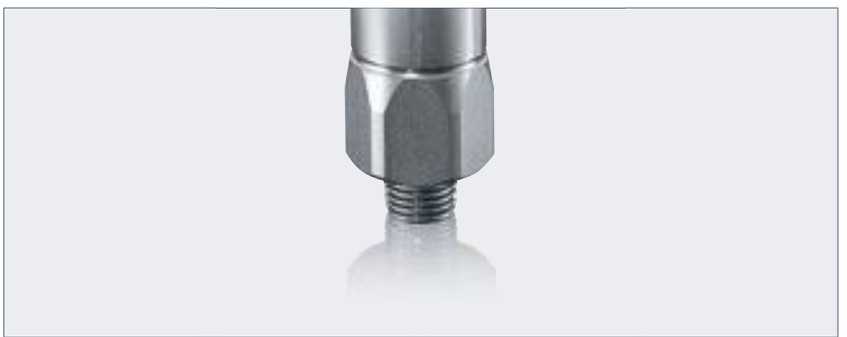
For requirements at short notice and for realising custom solutions

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



For G 1/8 female

Vacuum switch
with SUCO thread code 15



For G1/4 DIN EN ISO 1179-1 (DIN 3852-E)

All pressure switches and transmitters
with SUCO thread code 41

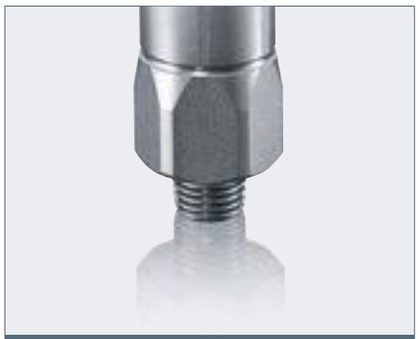
Dual nipple brass

G 1/8 shape E DIN EN ISO 1179-2 includes sealing ring NBR	**G 1/8 shape A** DIN ISO 16030 includes sealing ring stainless steel / NBR
NPT 1/8-27	**NPT 1/4-18**
Order number:	Order number:
1-1-00-420-014	**1-1-00-420-029**

Thread adapters stainless steel (1.4305 / AISI 303)

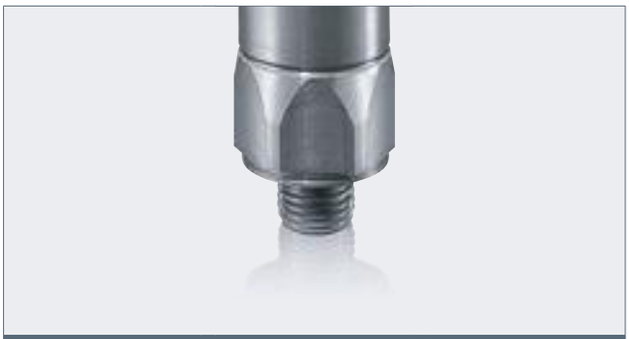
G 1/4
DIN EN ISO 1179-1 (DIN 3852-E)
female thread

M10 x 1 shape A DIN 3852-1	**M14 x 1.5 shape E** DIN 3852-E includes sealing ring FKM	**NPT 1/4-18**	**9/16 -18UNF** includes O-ring FKM
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**



For G1/4

All hex 24 and hex 27 pressure switches with SUCO thread code 03



For M14x1.5 ISO 6149-3

Pressure switch series 0183 with SUCO thread code 45

For G1/4

All hex 24 and hex 27 pressure switches with SUCO thread code 03

Thread adapters zinc-plated steel (CrVI-free)

G 1/4
female thread
includes sealing ring FKM

R 1/4

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

3/8-24 UNF-2A

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

M14 x 1.5
DIN EN ISO 6149-1
female thread

G 1/4

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

G 1/4
female thread
includes copper sealing ring

Flange design
includes
NBR O-ring

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

E. Electronic Pressure Switches

E. Overview of electronic pressure switches

Technical explanations
Electronic pressure — from page 100

Selection matrix
A guide to choosing the correct pressure switch — from page 105

Electronic pressure switches with ceramic measuring cell

E.1 **Electronic pressure switches, Performance series, hex 24, adjustable at factory** — from page 106

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

E.2 **Electronic pressure switches, Performance series, hex 24, adjustable by user** — from page 110

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

E.3 **Electronic pressure switches hex 27 / A/F 30, adjustable by user** — from page 114

Switching point:	0 – 250 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 1, output current: max. 1.4 A
Variant:	PNP
Housing materials:	Zinc-plated steel (CrVI-free)
Sealing materials:	NBR, FKM, EPDM
Thread:	G 1/4 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 – 400 bar
Overpressure protection:	Up to 2 x
Transistor outputs:	Qty: 2, output current: max. 1.4 A
Variant:	PNP
Additional analogue output:	4 – 20 mA
Housing materials:	Anodised aluminium and die-casted zinc
Sealing materials:	NBR, FKM, EPDM
Thread:	Female thread
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 – 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 1.4305 (AISI 303)
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 – 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 1.4305 (AISI 303)
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 device PPD05

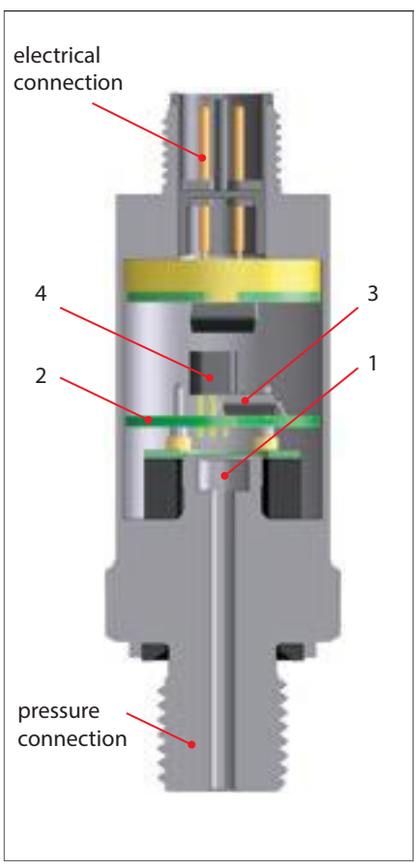
Technical explanations for electronic pressure switches

What is an electronic pressure switch?

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

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

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



How does an electronic pressure switch work?

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

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

SoS technology

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

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

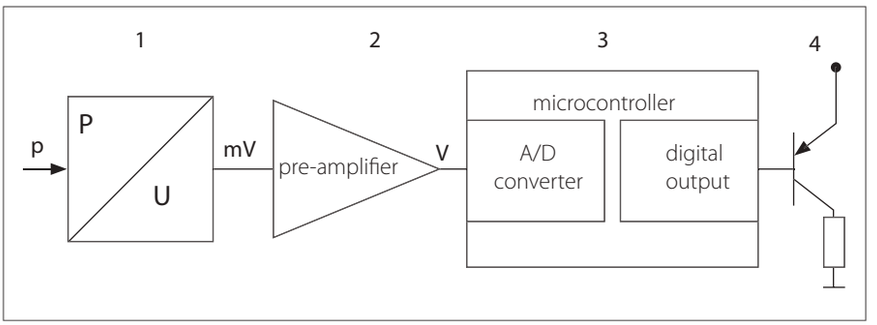
„Oil-filled" stainless steel measuring cell

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

Ceramic measuring cell / thick film technology

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

Block diagram



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

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

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

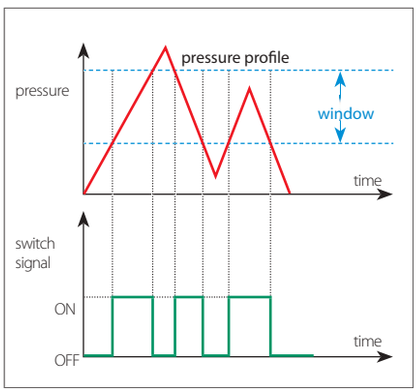
Our electronic pressure switches are a perfect fit to extremely low or high hysteresis.

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

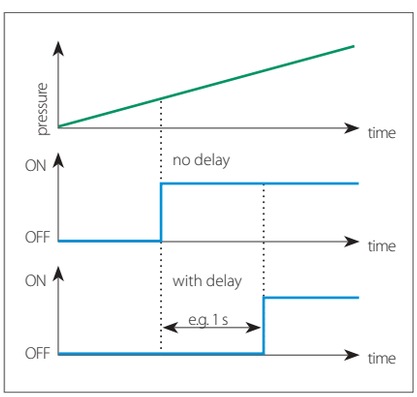
Please ask about the possible setting ranges you may require.

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

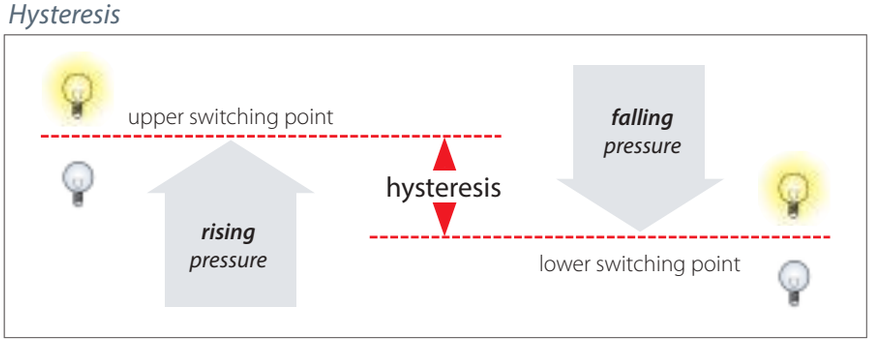
Window function
In the window function, the switch signal is programmed such that it remains ON or OFF between two values. This means a defined pressure range can be monitored. This function is only possible on the 053X series.



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



Hysteresis



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

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

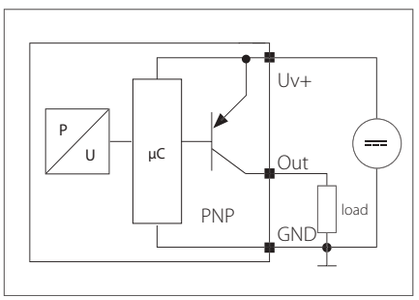
Load
The output transistor is an open collector, i.e. the output must be wired with a load. The load limits the switching current and is selected according to the application.

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

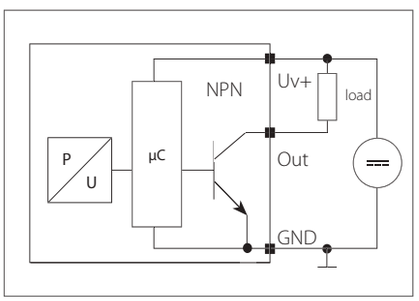
Technical explanations for electronic pressure switches

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

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

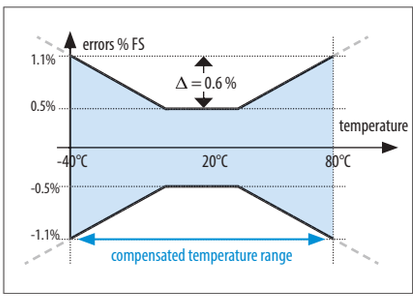


NPN output / low-side / minus-switching
For an NPN output (minus-switching), the load is connected to the switching output and to the positive line of the supply voltage (Uv+ as reference potential).



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

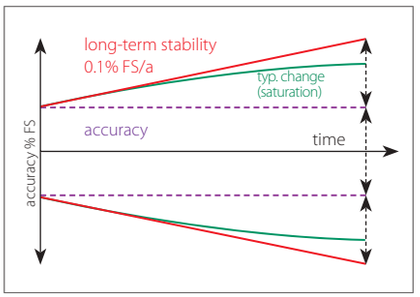
Temperature errors and ranges
The temperature (both of the medium and environment) generally has a signicant influence on the accuracy of an electronic pressure switch. Electronic pressure switches are temperature compensated over a particular range corresponding to the typical application. This means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



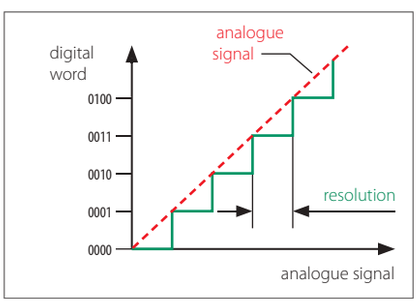
Service life and long-term stability
Service life information pertains to nominal conditions specified in the data sheet, and can vary considerably when a product is operated mechanically or electrically outside the specifications. Service life essentially depends on the used measuring cell technology.

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

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

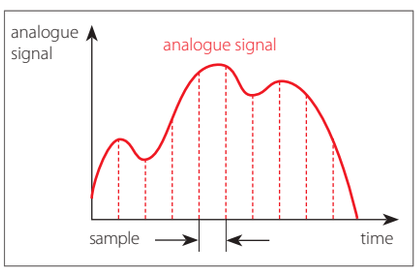


Resolution
The A/D resolution (analogue - digital) of an electronic pressure switch defines the smallest change of the analogue – digital – analogue conversion which takes place by the signal processing of an electronic pressure switch. If for example 13-bit resolution is used for an electronic pressure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



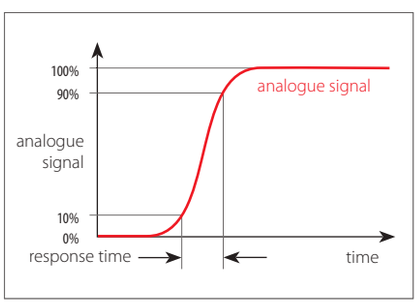
Sampling rate

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



Response time

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



CE mark

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

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

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

Electromagnetic compatibility (EMC)

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

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

Technical explanations for electronic pressure switches

Conversion chart for pressure units

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

Conversion chart for temperature units

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

Insulation strength
According to the latest specifications for immunity to surges and lightning protection, the following must be taken into account when testing insulation strength: With insulation test devices having an inner resistance exceeding 42 Ohm, the insulation strength of electronic pressure switches can be tested up to 500 VDC. All contacts must be tested short-circuited against the housing. For a specific threshold value of test voltage, the protective circuit for surge protection is activated without any defects arising within the circuit. In the process, the current may rise to a point at which an insulation strength fault is indicated. The recommendation therefore is to conduct the insulation test of the electronic pressure switch when it is removed, or independently of the overall system.

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

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

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

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

Oxygen and hydrogen
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.

Selection matrix for electronic pressure switches

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

■ M12x1 DIN EN 61076-2 101 A connector only

Electronic pressure switches, Performance series

hex 24, adjustable at factory or programmable with programming device PPD05

- Very attractively priced electronic pressure switches, particularly for high volume deployment
- High overpressure protection (up to 2 x)
- Small, compact electronic switches
- Broad diversity of electronic and mechanical connection options
- Ceramic sensor in thick film technology
- Monitoring of a pressure range due to window function
- Hysteresis adjustable within a wide range (2 % – 98 %, set at factory)
- Programming of switching points and switching delay time possible via PPD05 (see Chapter E.7, page 133)
- High level of adaptability to your requirements (custom solutions)

Electronic pressure switches, Performance series

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 (≤ 0.2 A at ≥ 50 °C) short-circuit and overvoltage protection						
Idle power consumption:	< 30 mA						
Adjustment range p_{nom}:	0 – 2 bar	0 – 4 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar	0 – 250 bar
Max. overpressure[1]:	4 bar	10 bar	20 bar	40 bar	100 bar	150 bar	375 bar
Burst pressure[1]:	8 bar	20 bar	35 bar	60 bar	140 bar	300 bar	500 bar
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 1 bar/ms at p_{nom}						
Pressure rise:	≤ 1 bar/ms						
Accuracy:	±0.5 % of adjustment range p_{nom} (full scale (FS)) at room temperature						
Switching point adjustment range:	3 … 100 % of adjustment range p_{nom} (FS), set at factory						
Hysteresis[2]:	2 … 98 % FS, programmable at factory (max. tolerance ±1.0% of adjustment range p_{nom})						
Default-Hysteresis without order specification:	2 bar	4 bar	10 bar	16 bar	40 bar	100 bar	250 bar
	0.1 bar	0.2 bar	0.5 bar	0.8 bar	2 bar	5 bar	10 bar
Operating mode:	with hysteresis or window function (see page 101), programmable at factory						
Resolution:	0.2 % of adjustment range p_{nom} (FS)						
Long term stability:	±0.1 % of adjustment range p_{nom} (FS) per year						
Repeatability[3]:	±0.1 % of adjustment range p_{nom} (FS)						
Switching time:	< 4 ms						
Switch-on / -off delay:	Adjustable between 0 and 2 s (please specify when ordering, otherwise default 0 s is set)						
Temperature error[3]:	±0.04 % of adjustment range p_{nom} (FS) / °C						
Compensated temperature range:	0 °C … +70 °C (32 °F …158 °F), total error ≤ 2 %						
Temperature range ambient:	-30 °C … +100 °C (-22 °F … 212 °F)						
Temperature range media:	with TPE seal: -30 °C … +110 °C (-22 °F … +230 °F)						
	with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)						
	with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)						
	with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)						
Wetted parts material – Housing:	Stainless steel (1.4305 / AISI 303)						
Wetted parts material – Messuring cell:	Ceramic						
Wetted parts material – Seal material:	TPE, NBR, EPDM or FKM						
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. 80 g (DIN EN 175301 approx. 110 g)						

[1] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[2] 3 . . . 98 % with programming device PPD05 (see page 133).
[3] Within the compensated temperature range.

E.1

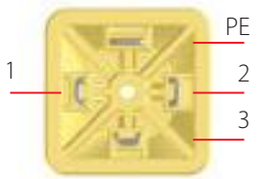
hex 24
Performance
adjustable at factory

0500 / 0501

Electrical connectors and threads

	NO / NC
1	(Uv+)
2	(Gnd)
3	(U_{out})

DIN EN 17530-803-A



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

IP65

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

Order number: 013

M12 – 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 ®

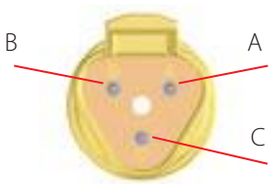
Pin	Assignment
1	U_{out}
2	Gnd
3	Uv+

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

Cable connection

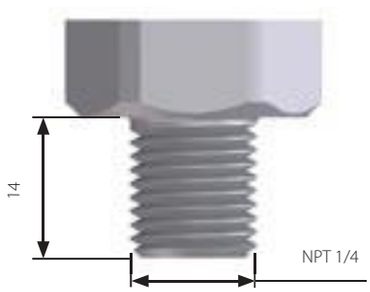
Pin	Assignment
red	Uv+
white	U_{out}
black	Gnd

IP67

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

Order number: 011

Thread code: 41



Thread code: 09

0500 / 0501

Order matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

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

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

Pressure connection

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

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline etc.	3
TPE	Hydraulic/machine oil, air, nitrogen, water, acetylene etc.	7

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	013
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 2 m standard)	011

Order number:	05XX	XXX	XX	X	XXX

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

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

Electronic pressure switches, Performance series

hex 24, adjustable by user

- Very competitively priced electronic pressure switches
- High overpressure protection (up to 2 x)
- Small, compact electronic switches
- Broad diversity of electronic and mechanical connection options
- Ceramic sensor in thick film technology
- Easy adjustment of switching point from the outside using set screw
- Hysteresis adjustable within broad range (2 % – 98 %, set at factory)
- Monitoring of a pressure range due to window function
- High level of adaptability to your requirements (custom solutions)

Electronic pressure switches, Performance series

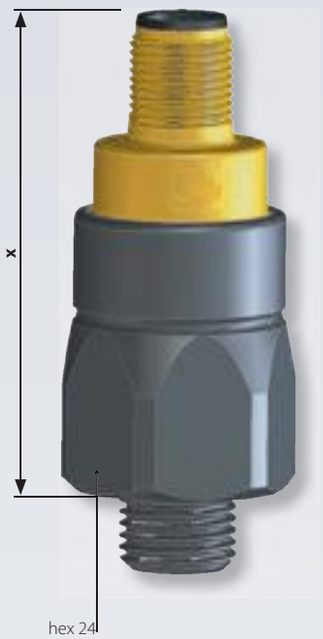
Technical Datails

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						
Adjustment range p_{nom}:	0 – 2 bar	0 – 4 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar	0 – 250 bar
Max. overpressure[1]:	4 bar	10 bar	20 bar	40 bar	100 bar	150 bar	375 bar
Burst pressure[1]:	8 bar	20 bar	35 bar	60 bar	140 bar	300 bar	500 bar
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 1 bar/ms at p_{nom}						
Pressure rise:	≤ 1 bar/ms						
Accuracy:	±0.5 % of adjustment range p_{nom} (full scale (FS)) at room temperature						
Switching point adjustment range:	3 … 100 % of adjustment range p_{nom} (FS), set at factory						
Hysteresis[2]:	2 … 98 % FS, programmable at factory (max. tolerance ±1.0% of adjustment range p_{nom})						
Default-Hysteresis without order specification:	2 bar	4 bar	10 bar	16 bar	40 bar	100 bar	250 bar
	0,1 bar	0,2 bar	0,5 bar	0,8 bar	2 bar	5 bar	10 bar
Operating mode:	With hysteresis or window function (see page 101), programmable at factory						
Resolution:	0.2 % of adjustment range p_{nom} (FS)						
Long term stability:	±0.1 % of adjustment range p_{nom} (FS) per year						
Repeatability[3]:	±0.1 % of adjustment range p_{nom} (FS)						
Switching time:	< 4 ms						
Swith-on / -off delay:	Adjustable between 0 and 2 s (please specify when ordering, otherwise default 0 s is set)						
Temperature error[3]:	±0.04 % of adjustment range pnom (FS) / °C						
Compensated temperature range:	0 °C … +70 °C (32 °F …158 °F), total error ≤ 2 %						
Temperature range ambient:	-30 °C … +100 °C (-22 °F … 212 °F)						
Temperature range media:	with TPE seal: -30 °C … +110 °C (-22 °F … +230 °F)						
	with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)						
	with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)						
	with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)						
Wetted parts material – Housing:	Stainless steel (1.4305 / AISI 303)						
Wetted parts material – Messuring cell:	Ceramic						
Wetted parts material – Seal material:	TPE, NBR, EPDM or FKM						
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. 80 g (DIN EN 175301 approx. 110 g)						

[1] Static pressure, dynamic pressure 30 to 50 % lower. Values refer to the hydraulic or pneumatic part of the electronic pressure switch.
[2] 3 . . . 98 % with programming device PPD05 (see page 133).
[3] Within the compensated temperature range.

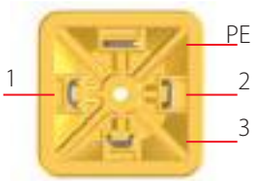
0510 / 0511

Electrical connectors and threads



	NO / NC
1	(Uv+)
2	(Gnd)
3	(U_{out})

DIN EN 17530-803-A



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

IP65

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

Order number: 013

M12 – 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

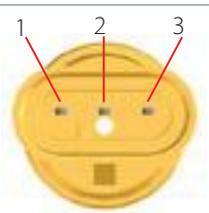
Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
4	nc

IP67, IP6K9K

x ~ 56 mm

Order number: 004

AMP Superseal 1.5 ®



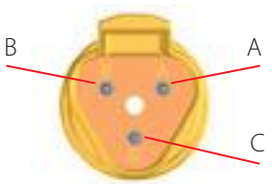
Pin	Assignment
1	U_{out}
2	Gnd
3	Uv+

IP67

x ~ 61 mm

Order number: 007

Deutsch DT04 - 3P

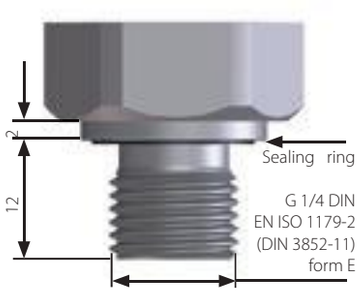


Pin	Assignment
A	Uv+
B	Gnd
C	U_{out}

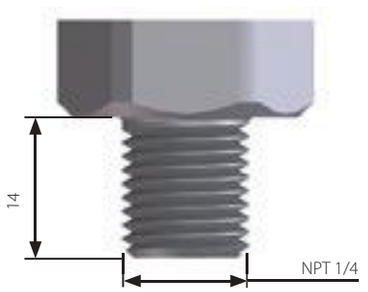
IP67, IP6K9K

x ~ 61 mm

Order number: 010



Thread code: 41



Thread code: 09

RoHS II compliant

CE

0510 / 0511

Ordner matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Seal material	Electrical connection

Type

Normally open (NO), PNP, switching point adjustment by potentiometer[1]	0510
Normally closed (NC), PNP, switching point adjustment by potentiometer[1]	0511

Max. overpressure[2]	Burst pressure	Adjustment range[2]	
4 bar	8 bar	0 – 2 bar (approx. 29 PSI)	200
10 bar	20 bar	0 – 4 bar (approx. 58 PSI)	400
20 bar	35 bar	0 – 10 bar (approx. 145 PSI)	101
40 bar	60 bar	0 – 16 bar (approx. 230 PSI)	161
100 bar	140 bar	0 – 40 bar (approx. 580 PSI)	401
150 bar	300 bar	0 – 100 bar (approx. 1.450 PSI)	102
375 bar	500 bar	0 – 250 bar (approx. 3.625 PSI)	252

Pressure connection

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

Seal material – Application areas

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, acetylene, hydrogen etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline etc.	3
TPE	Hydraulic/machine oil , air, water, acetyle ne,nitrog.en, etc	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
Cable connection (length of cable 2 m standard)	011

Order number:	05XX	XXX	XX	X	XXX

[1] Switching points and hysteresis can also be adjusted at factory.

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

RoHSII konform

CE

Electronic pressure switches

hex 27 and 30 A/F, adjustable by user

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

Electronic pressure switches

Technical details

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	0 – 100 bar	0 – 250 bar
Max. overpressure[1]:		20 bar	150 bar	500 bar
Burst pressure[1]:		25 bar	175 bar	600 bar
Mechanical life expectancy:		5,000,000 switching cycles in adjustment range at p_{nom}		
Pressure rise:		≤ 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		
Hysteresis:		2 … 95 % FS, programmable at factory (max. tolerance ± 1.0 % of adjustment range)		
Standard-Hysteresis without order specification :		approx. 0.5 bar	approx. 5 bar	approx. 10 bar
Resolution:		0.15 % of adjustment range p_{nom} (FS)		
Long term stability:		±0.1 % of adjustment range p_{nom} (FS) per year		
Repeatability[2]:		±0.1 % of adjustment range p_{nom} (FS)		
Switching time:		< 4 ms		
Temperature error[2]:		±0.04 % of adjustment range p_{nom} (FS) / °C		
Compensated temperature range:		0 °C … +70 °C (32 °F …158 °F), total error ≤ ±2 %		
Temperature range ambient:		-30 °C … +80 °C (-22 °F … 178 °F)		
Temperature range media:		with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)		
		with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)		
		with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)		
Wetted parts material:	Housing:	zinc-plated steel		
	Measuring cell:	Ceramic		
	Seal material:	NBR, EPDM or FKM		
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/s^2; 11 ms half sine wave; DIN EN 60068-2-27		
Protection class:		IP65: (DIN EN 175301-803-A); IP67: (M12x1)		
Electromagnetic compatibility:		EMC 2014/30/EU, EN 61000-6-2:2005, EN 61000-6-3:2007		
Weight:		approx. 240 g		

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

[2] Within the compensated temperature range.

E.3

hex 27 / 30 A/F

adjustable by user

0520

Electrical connectors and threads

	NO / NC
1	(Uv+)
2	(Gnd)
3	(U_{out})

DIN EN 175301 - 803 - 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	

M12 – 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

RoHS II compliant

CE

0520

Order matrix for electronic pressure switches

	Type	Adjusment range	Pressure connection	Seal material	Electrical connection

Type

Electronic pressure switch	**0520**

Adjustment range[1] for NO

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

Adjustment range[1] for NC

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

Pressure connection

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

Seal material – Application areas

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

Elektrischer Anschluss

DIN EN 175301-803-A (DIN 43650-A); socket device included	**001**
M12x1 - 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 hysteresis when ordering.

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

E.4
menu-controlled

Menu-controlled electronic pressure switches

with display

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

Menu-controlled electronic pressure switches

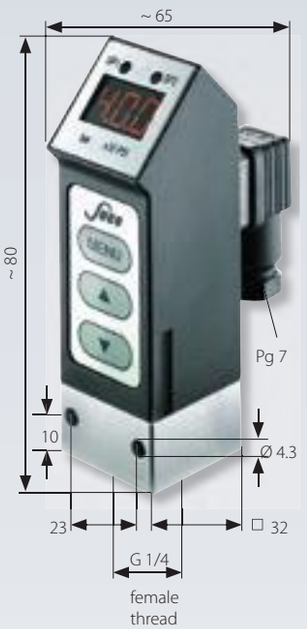
Technical details

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 1 bar/ms at p_{nom}
Pressure rise rate:		≤ 1 bar/ms
Switching time:		< 4 ms
Switching time delay:		Adjustable between 0 and 3.0 s
Hysteresis:		1 – 99 % FS, programmable from keypad
Accuracy:		±0.5 % (FS at room temperature)
Display accuracy:		±0.5 % (FS at room temperature) ±2 digits
Temperature drift::		±0.2 % / 10 °C
Temperature range:		NBR, EPDM, FKM -20 °C … +80 °C
Compensated temperature range:		0 °C … +70 °C (32 °F …158 °F), total error ±2 %
Housing material:		die-casted zinc
Wetted parts material	Housing:	zinc-plated steel
	Measuring cell:	Ceramic
	Seal material:	NBR, EPDM or FKM
Vibration resistance:		10 g at 5 … 2000 Hz sine wave; DIN EN 60068-2-6
Shock resistance:		294 m/s²; 11 ms half sine wave; DIN EN 60068-2-27
Protection class:		IP65
EMV:		acc. to EN 50081-1, EN 50081-2, EN 50082-2
Weight:		approx. 340 g
Access pin:		The switch can be protected with a pin between 1 and 999

0570

Electronic pressure switch

- Anodised aluminium and die-casted zinc
- Ceramic measuring cell in thick-film technology
- Supply voltage 12 … 30 VDC
- Overpressure protection to 20 / 150 / 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 bar	Burst pressure in bar	Adjustment range in bar	Thread	Order number:

0570 Electronic pressure switches

20[1)]	25	0 - 10	G 1/4 female thread	0570 - 467 14 - X - 001
150[1)]	175	0 - 100		0570 - 468 14 - X - 001
600[1)]	700	0 - 400		0570 - 469 14 - X - 001

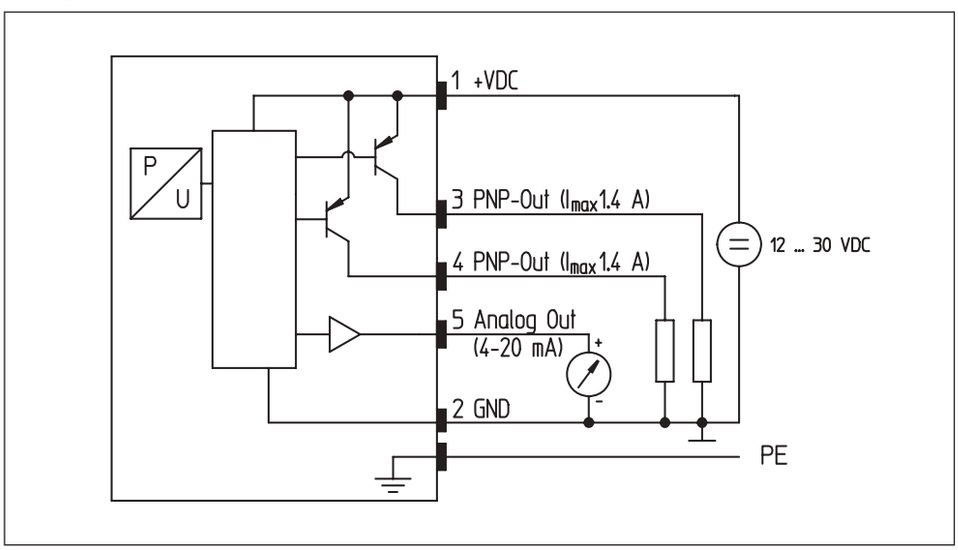
Seal material – Application areas

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

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

Ordner number:	0570 - 46X 14 - X - 001

Wiring chart



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

E.5

hex 22
High Performance
1 switching output

Electronic pressure switches, High-Performance series

hex 22 with one switching output

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

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

Electronic pressure switches, High-Performance series

Technical details

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:	< 15mA				
Standard adjustment range p_{nom}:	0 – 10 bar	0 – 25 bar	0 – 100 bar	0 – 250 bar	0 – 600 bar
Overpressure protection p_u[1]:	40 bar	100 bar	400 bar	1,000 bar	1,650 bar
Burst pressure[1]:	80 bar	200 bar	800 bar	2,000 bar	2,000 bar
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 5 bar/ms p_{nom}				
Permitted pressure change rate:	≤ 5 bar/ms				
Switching point adjustment range:	2 … 100 % of the nominal pressure range (Full Scale, FS), programmable at factory				
Hysteresis:	0.2 … 99.8 % of the nominal pressure range (FS), programmable at factory (set to 5 % 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 hysteresis or window function (see page 101), programmable at factory				
Long term stability:	±0.1 % FS p. a.				
Repeatability[2]:	±0.1 % FS				
Temperature error[2]:	±0.02 % / 1 K FS				
Compensated temperature range:	-20 °C … +80 °C (- 4 °F … +176 °F)				
Temperature range media:	-40 °C … +125 °C (- 40 °F … +257 °F)				
Temperature range ambient:	-40 °C … +100 °C (- 40 °F … +212 °F)				
Wetted parts material:	Stainless steel 1.4305 (AISI 303) and titanium				
Housing material:	Stainless steel 1.4305 (AISI 303)				
Insulation resistance:	> 100 MΩ (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				
Protection against reverse polarity, short-circuit and over voltage surges:	built-in				
Weight:	approx. 80 g (DIN 175301 approx. 110 g, cable version approx. 135 g)				

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

[2] Within the compensated temperature range.

E.5

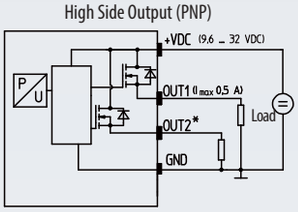
hex 22
High Performance
1 switching output

0530 / 0531 / 0532 / 0533

Electrical connectors and threads

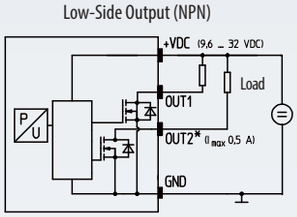
Connection diagrams

High Side Output (PNP)



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

Low-Side Output (NPN)

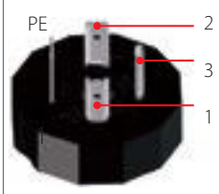


Pin assignment depending on electrical connections
*OUT2 only for series 054x

Technical modifications and errors excepted.

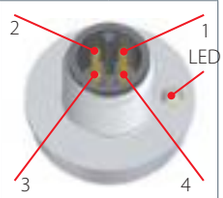
RoHS II compliant

DIN EN 175301- 803 - A



Pin	Assignment
1	Uv+
2	Gnd
3	U_{out}
PE	PE
IP65	
x ~ 60 / 76 mm*	
d ~ Ø 30 mm	
Order number: 013	

M12 – DIN EN 61076-2-101 A

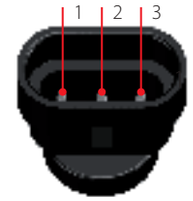


Pin	Assignment
1	Uv+
2	nc
3	Gnd
4	Out
IP67	
x ~ 54 mm	
d ~ Ø 22 mm	
Order number: 002	

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	

AMP Superseal 1.5 ®



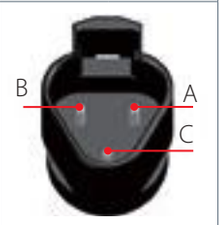
Pin	Assignment
1	Out
2	Gnd
3	Uv+
IP67	
x ~ 73 mm	
d ~ Ø 26 mm	
Order number: 007	

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

Deutsch DT04 - 4P

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

Deutsch DT04 - 3P



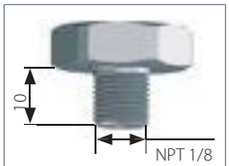
Pin	Assignment
1	Uv+
2	Gnd
3	Out
IP67, IP6K9K	
x ~ 74 mm	
d ~ Ø 23 mm	
Order number: 010	

Cable connection

Pin	Assignment
red	Uv+
white	Out
black	Gnd
IP67	
x ~ 44 mm (+ 20 mm bend relief) cable length ~ 2 m	
d ~ Ø 22 mm	
Order number: 011	

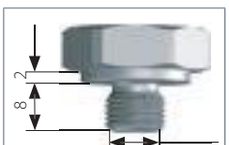
Thread code: 41

Thread code: 03

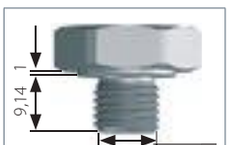


Thread code: 04

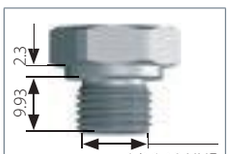
Thread code: 09



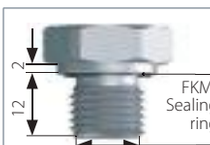
Thread code: 30



Thread code: 20



Thread code: 21



Thread code: 42

0530 / 0531 / 0532 / 0533

Order matrix for electronic pressure switches

	Type	Adjustment range	Pressure connection	Pressure unit	Electrical connection

Type

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

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

Pressure connection

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

Pressure unit

bar	**B**

Electrical connection

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

Ordner number:	053X	XXX	XX	B	XXX

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

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

Electronic pressure switches, High-Performance series

hex 22 with two switching outputs

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

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

Electronic pressure switches, High-Performance series

Technical details

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:	< 15mA				
Standard adjustment range p_{nom}:	0 – 10 bar	0 – 25 bar	0 – 100 bar	0 – 250 bar	0 – 600 bar
Overpressure protection p_u [1]:	40 bar	100 bar	400 bar	1,000 bar	1,650 bar
Burst pressure[1]:	80 bar	200 bar	800 bar	2,000 bar	2,000 bar
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 5 bar/ms p_{nom}				
Permitted pressure change rate:	≤ 5 bar/ms				
Switching point adjustment range:	2 … 100 % of the nominal pressure range (Full Scale, FS), programmable at factory				
Hysteresis:	0.2 … 99.8 % of the nominal pressure range (FS), programmable at factory (set to 5% 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 hysteresis or window function (see page 101), programmable at factory				
Long term stability:	±0.1 % FS p. a.				
Repeatability[2]:	±0.1 % FS				
Temperature error[2]:	±0.02 % / 1 K FS				
Compensated temperature range:	-20 °C … +80 °C (-4 °F … +176 °F)				
Temperature range media:	-40 °C … +125 °C (-40 °F … +257 °F)				
Temperature range ambient:	-40 °C … +100 °C (-40 °F … +212 °F)				
Wetted parts material:	Stainless steel 1.4305 (AISI 303) and titanium				
Housing material:	Stainless steel 1.4305 (AISI 303)				
Insulation resistance:	> 100 MΩ (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. 80 g (DIN 175301 approx. 110 g, cable version approx. 135 g)				

[1] Within the compensated temperature range.

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

E.6

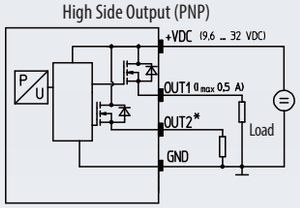
hex 22
High Performance
2 switching outputs

0540 / 0541 / 0542 / 0544 /0545 / 0546

Electrical connectors and threads

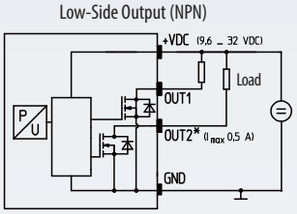
Connection diagrams

High Side Output (PNP)



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

Low-Side Output (NPN)

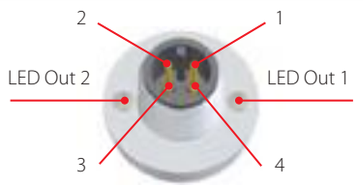


Pin assignment depending on electrical connections
*OUT2 only for 054x

Technical modifications and errors excepted.

RoHS II compliant

M12 – 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	Out 1
4	Out 2
IP67, IP6K9K	
x ~ 65 mm	
d ~ Ø 27 mm	
Order number: 004	

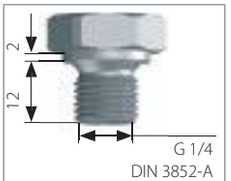
Deutsch DT04 - 4P

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

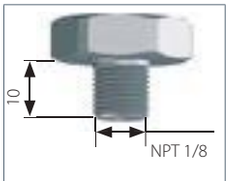
Cable connection

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

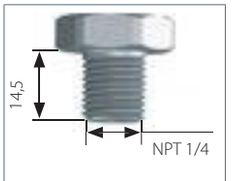
Thread code: 41



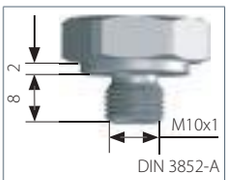
Thread code: 03



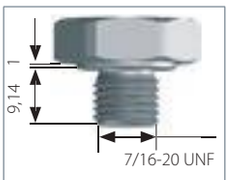
Thread code: 04



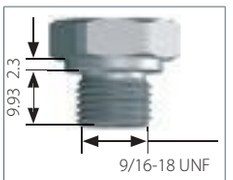
Thread code: 09



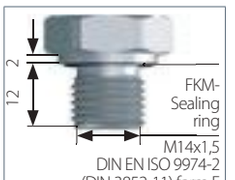
Thread code: 30



Thread code: 20



Thread code: 21



Thread code: 42

0540 / 0541 / 0542 / 0544 /0545 / 0546

Order matrix for electronic pressure switches

	Type	Adjusment range	Pressure connection	Pressure unit	Electrical connection

Type

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

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

Pressure connection

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

Pressure unit

bar	**B**

Electrical connection

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

Order number:	054X	XXX	XX	B	XXX

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

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

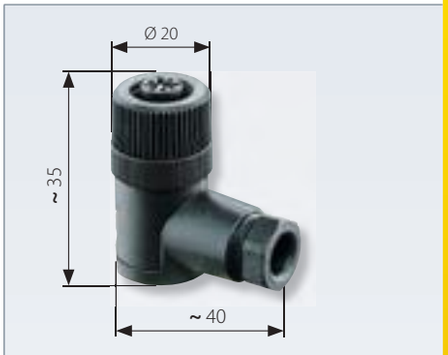
Accessories

Mating plugs, thread adapters and programming devices

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

Mating plugs

For requirements at short notice and realising customized solutions

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

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

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

Stainless steel 1.4305 / AISI 303 thread adapters

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

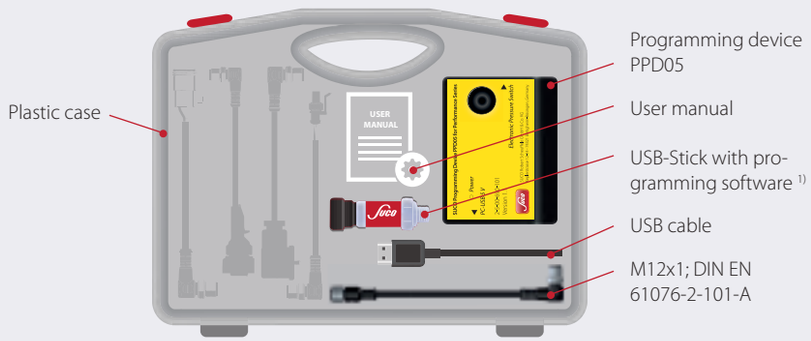
M10 x 1 form A DIN 3852-1	**M14 x 1,5 form E** DIN 3852-E incl. sealing ring FKM	**NPT 1/ 4-18**	**9/16 -18UNF** incl. O-ring FKM
Order number:	Order number:	Order number:	Order number:
1-1-00-420-020	**1-1-00-420-028**	**1-1-00-420-021**	**1-1-00-420-027**

Programming device PPD05

for electronic pressure switches of the SUCO „Performance“ series

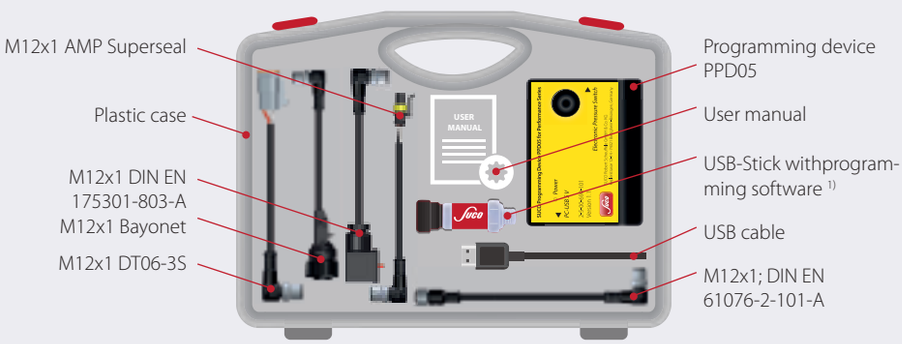
0500 / 0501

- easy and quick adjustment of technical parameters onsite or onfield.
- individual programming of the switching points or the switch delay time (0 ... 2 s)
- choosing between hysteresis and window function



Basic set with M12 connector
Additional connectors can be retrofitted.

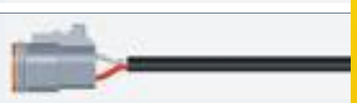
Order number: **2-5-00-690-150**



Complete set with all available connectors

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

1) System requirements: min. Windows Vista OS.

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

T. Pressure Transmitters

T. Overview of pressure transmitters

Technical explanations for pressure transmitters from page 138

Selection matrix
A guide to choosing the correct pressure transmitter from page 143

Pressure Transmitters with ceramic measuring cell

T.1 **Pressure transmitters, Performance series, hex 24** from page 144

Standard pressure ranges:	0 – 2 bar, 0 – 4 bar, 0 – 10 bar, 0 – 16 bar, 0 – 40 bar, 0 – 100 bar, 0 – 250 bar
Overpressure protection:	2 x
Output signal (alternative):	0 – 10 V or 4 – 20 mA
Housing materials:	Stainless steel 1.4305 (AISI 303)
Sealing materials:	NBR, EPDM, FKM
Thread:	G 1/4 E, NPT 1/4
Types:	0601, 0602

Pressure Transmitters with oil-filled measuring cell

T.2 **Robust pressure transmitter, hex 22, stainless steel „303“** from page 148

Standard pressure ranges:	-1 – 0 bar (vacuum), 0 – 1 bar, 0 – 4 bar, 0 – 6 bar, 0 – 10 bar, 0 – 16 bar, 0 – 40 bar, 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 1.4305 (AISI 303)
Sealing materials:	NBR, EPDM, FKM
Thread:	G 1/4 E
Types:	0645, 0650, 0660

T.3 **Robust pressure transmitter, hex 22, stainless steel „316L“** from page 152

Standard pressure ranges:	-1 – 0 bar (vacuum), 0 – 1 bar, 0 – 4 bar, 0 – 6 bar, 0 – 10 bar, 0 – 16 bar, 0 – 40 bar, 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 1.4404 (AISI 316L)
Sealing materials:	NBR, EPDM, FKM
Thread:	G 1/4 E
Types:	0675, 0680, 0690

Pressure Transmitters with SoS technology

T.4 **Pressure transmitters, High-Performance series, hex 22** from page 156

Standard pressure ranges:	0 – 10 bar, 0 – 16 bar, 0 – 25 bar, 0 – 40 bar, 0 – 60 bar, 0 – 100 bar, 0 – 160 bar, 0 – 250 bar, 0 – 400 bar, 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 1.4305 (AISI 303)
Sealing materials:	All welded, without elastomeric seal
Thread:	different male threads
Types:	0705, 0710, 0720

Digital Pressure Transmitters with CAN-Bus interface

T.5 **Digital pressure transmitters, CANopen / J1939-Protocol, hex 22** from page 160

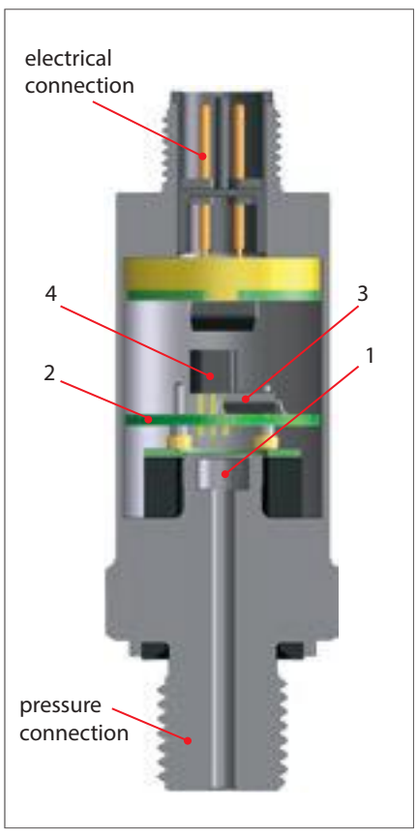
Standard pressure ranges:	0 – 1 bar, 0 – 2,5 bar, 0 – 4 bar, 0 – 6 bar, 0 – 10 bar, 0 – 16 bar, 0 – 25 bar, 0 – 40 bar, 0 – 60 bar, 0 – 100 bar, 0 – 160 bar, 0 – 250 bar, 0 – 400 bar, 0 – 600 bar
Overpressure protection:	Up to 2 x
Output protocol:	CANopen DIN EN 50325-4 SAE J1939
Housing materials:	Stainless steel
Sealing materials:	All welded, without elastomeric seal
Electrical connection:	M12 DIN EN 61076 - 2-101 A, CiA-DR303-1
Thread:	G 1/4 E, NPT 1/4
Types:	0630, 0631

T.6 **Accessoires** from page 164

- Mating plugs
- Thread-Adapters
- Display

Technical explanations for pressure transmitters

What is a pressure transmitter?
A pressure transmitter (also called pressure transducer 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.

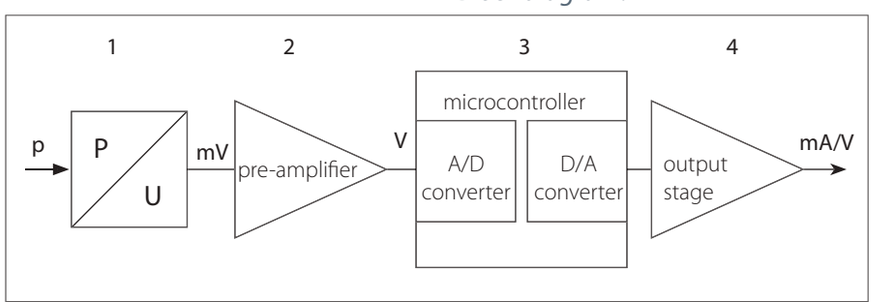


How does a pressure transmitter work?
The pressure measuring cell fitted has a membrane (1) that is exposed to the pressure to be measured. Affixed on this membrane is a bridge circuit consisting of four ohmic resistors in the form of a Wheatstone bridge. The values of these resistors change proportionally 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).

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.

Block diagram:



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.

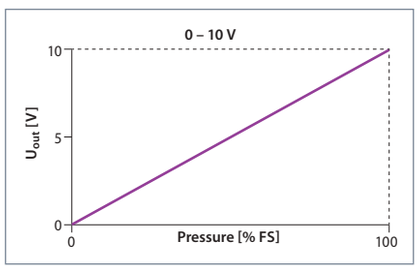
Ceramic measuring cell / thick film technology
Ceramic thick film pressure measuring cells are made up of a sintered ceramic body. The ceramic body sleeve already has the key geometries for the subsequent pressure range. The membrane thickness required and thus, the pressure range required is established 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 transmitters with customer-specific output signals (such as 1 - 5 V).

Voltage output 0 - 10 V

Transmitters 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 bar). The output load must be selected as highly resistive (with typical minimum value 4.7 kΩ). SUCO transmitters with voltage output have a 3-wire design.

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



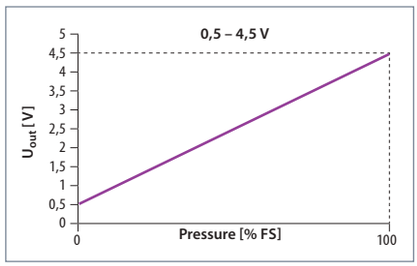
Conversion formula for pressure and voltage:

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

Voltage output
0.5 – 4.5 V ratiometric

SUCO transmitters 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 transmitter 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:

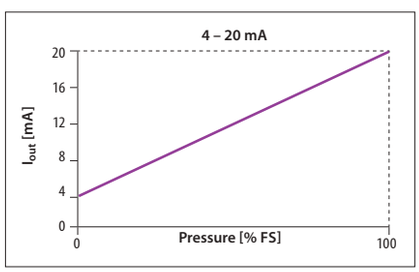
$$U_{out} = 0.1 \text{ x } U_{v+} + \frac{\text{pressure applied}}{\text{pressure range}} \text{ x } 0.8 \text{ V x } U_{v+}$$

with 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 conguration). 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.

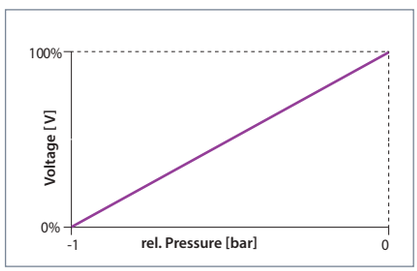


Conversion formula for pressure and voltage:

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

Output for vacuum transmitters

As depicted in the sketch on the upper right the output is at maximum signal at zero pressure. Therefore at maximum vacuum the output signal is at its minimum.



Load / apparent ohmic resistance for pressure transmitters

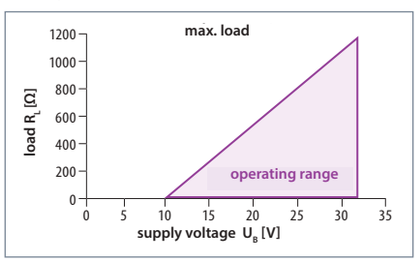
An appropriate ohmic load must be connected to guarantee perfect functioning of a pressure transmitter.

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

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

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

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



Supply / operating voltage UB

All pressure transmitters work with DC voltage and have no galvanic isolation. Within the thresholds specied in the relevant data sheet, the supply voltage may change without inuencing the output signal. (the ratiometic variant is an exception).

To guarantee the functionality of a transmitter, the minimum supply voltage may not fall below. The maximum operating voltage may not be exceeded to avoid damage on the electronics.

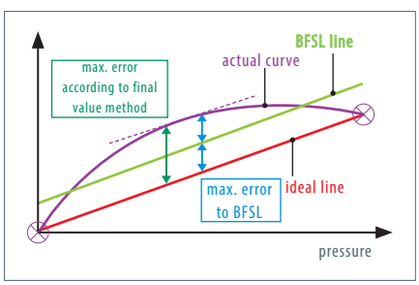
Technical explanations for pressure transmitters

Accuracy (to DIN EN 61298)

The (measuring) accuracy of pressure transmitters is specified by SUCO as ±0.5% or ±1% of the span (also called full scale). Accuracy includes zero point offset, non-linearity, hysteresis 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 BFSL 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)

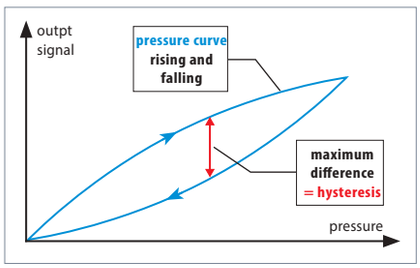
Non-linearity (also linearity) defines the deviation of the actual output curve from the theoretical ideal line. SUCO specifies the maximum error in relation to the overall span or full scale (FS) of the pressure range.



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).

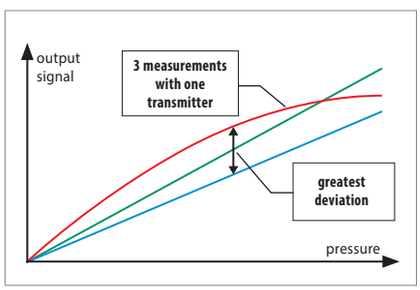
Hysteresis (to DIN EN 61298)

For a pressure transmitter, hysteresis specifies the difference of output signal between a rising and falling pressure, and is typically very low and negligible for SUCO pressure transmitters.



Non-repeatability (to DIN EN 61298)

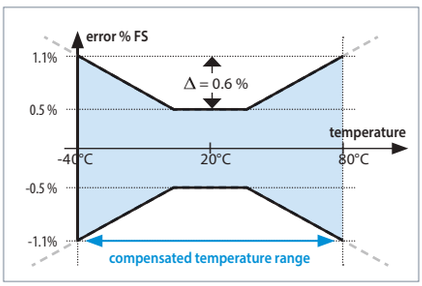
Non-repeatability defines reproducibility of the output signal. The pressure is attained three times for example - the maximum variance between these three values gives the non-repeatability.



Temperature errors and ranges

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

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

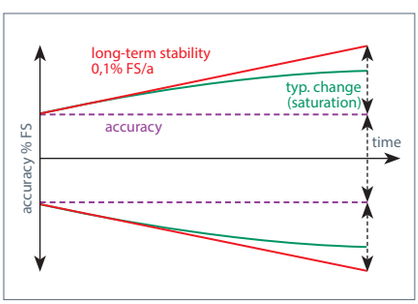


Service life and long-term stability

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.

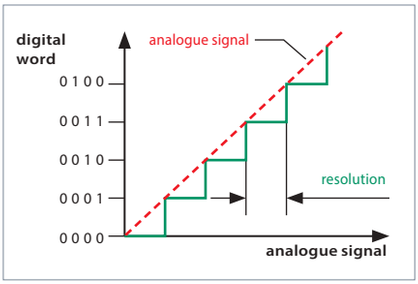
SUCO specifies long-term stability in accordance with DIN 16086 in relation to one year. Typically the influence of aging on the accuracy reduces with increasing operating duration. The information in the data sheet corresponds to the worst case scenario.



Resolution

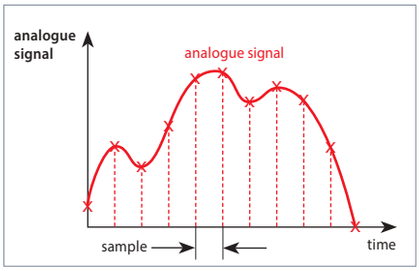
The A/D resolution (analogue - digital) of an pressure transmitter defines the smallest change of the analogue – digital – analogue conversion which takes places by the signal processing of an pressure transmitter.

If for example 13-bit resolution is used for an pressure transmitter with a 100 bar setting range, the smallest signal change is 8192 steps (213). As state of the art a resolution of 12 bits and hence 4096 steps (212) is typical. Therefore pressure changes of 100 bar / 4096 = 0.024 bar can be recorded.



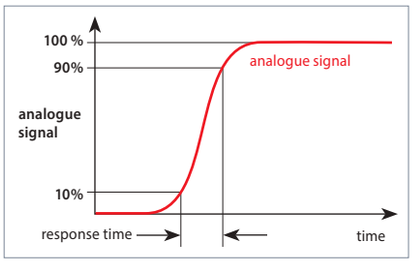
Sampling rate

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 transmitter 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 transmitters from SUCO fall under the 2014/30/EU EMC Directive.

EC declarations of conformity have been issued for the pressure transmitters 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)

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

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

Technical explanations for pressure transmitters

Conversion chart for pressure units

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

Conversion chart for temperature units

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

Insulation strength
According to the latest specifications for immunity to surges and lightning protection, the following must be taken into account when testing insulation strength: With insulation test devices having an inner resistance exceeding 42 Ω, the insulation strength of pressure transmitters 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 transmitter when it is removed, or independently of the overall system.

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

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

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

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

Oxygen and hydrogen
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 transmitters 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 transmitter. Thus a bore diameter of 0.8 mm has been established.

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

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

Subject to technical changes.

Selection matrix for pressure transmitters

Type / series		0601	0602	0645	0650	0660	0675	0680	0690	0705	0710	0720	0630	0631
Page		147	147	151	151	151	155	155	155	159	159	159	163	163
Measuring cell technology	stainless steel, oil-filled, piezo-resistive			■	■	■	■	■	■					
	stainless steel, piezo-resistive												■	■
	ceramic / thick-film	■	■											
	SoS / titanium									■	■	■		
Function	overpressure	■	■	■	■	■	■	■	■	■	■	■	■	■
	vacuum			■	■	■	■	■	■					
Output	0.5 – 4.5 V ratiometric			■			■			■				
	0 – 10 V	■			■			■			■			
	4 – 20 mA		■			■			■			■		
	CAN												■	■
Operating voltage	5 VDC ±10 %			■			■			■				
	(9.6 … 12) – 32 VDC	■	■		■	■		■	■		■	■	■	■
Pressure range	-1 – 0 bar			■	■	■	■	■	■					
	0 – 1 bar			■	■	■	■	■	■				■	■
	0 – 2 bar	■	■											
	0 – 2.5 bar												■	■
	0 – 4 bar	■	■	■	■	■	■	■	■				■	■
	0 – 6 bar			■	■	■	■	■	■				■	■
	0 – 10 bar	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 16 bar	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 25 bar									■	■	■	■	■
	0 – 40 bar	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 60 bar									■	■	■	■	■
	0 – 100 bar	■	■	■	■	■	■	■	■	■	■	■	■	■
	0 – 160 bar									■	■	■	■	■
	0 – 250 bar	■	■							■	■	■	■	■
	0 – 400 bar									■	■	■	■	■
	0 – 600 bar									■	■	■	■	■
Overpressure protection	up to 2 x	■	■	■									■	■
	up to 3 x			■	■	■	■	■	■					
	up to 4 x									■	■	■		
Compensated temperature range	0…+70 °C	■	■											
	-10…+70 °C			■	■	■	■	■	■					
	-20…+85 °C												■	■
	-40…+80 °C									■	■	■		
Size	hex 22			■	■	■	■	■	■	■	■	■	■	■
	hex 24	■	■											
Housing material	stainless steel 1.4301 / AISI 304												■	■
	stainless steel 1.4305 / AISI 303	■	■	■	■	■				■	■	■		
	stainless steel 1.4404 / AISI 316L						■	■						
Option	suitable for oxygen on request			■	■	■								

Pressure transmitters, Performance series

hex 24

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

Pressure transmitters, Performance series

Technical details

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

Type:	**0601 / 0602**						
Standard pressure ranges p_{nom}:	0 – 2 bar	0 – 4 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar	0 – 250 bar
Overpressure protection p_u [1]:	4 bar	10 bar	20 bar	40 bar	100 bar	150 bar	375 bar
Burst pressure[1]:	8 bar	20 bar	35 bar	60 bar	140 bar	300 bar	500 bar
Mechanical life expectancy:	5,000,000 pulsations at rise rates to 1 bar/ms at p_{nom}						
Pressure rise:	≤ 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:	0 °C ... +70 °C (32 °F …158 °F)						
Temperature range ambient:	-30 °C … +100 °C (-22 °F … 212 °F)						
Temperature range media:	with TPE seal: -30 °C … +110 °C (-22 °F … +230 °F)						
	with NBR seal: -30 °C … +100 °C (-22 °F … +212 °F)						
	with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)						
	with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)						
Wetted parts material: Housing:	Stainless steel 1.4305 (AISI 303)						
Measuring cell:	Ceramic						
Seal material:	TPE, NBR, EPDM or FKM						
Insulation resistance:	> 100 MΩ (500 VDC, Ri > 42 Ω)						
Response time10 – 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. 80 g (DIN EN 175301 approx. 110 g)						

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

[2] Within the compensated temperature range

0601 / 0602

Electrical connectors and threads

DIN EN 17530-803-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 without coupler socket

Order number: 013

M12 – 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

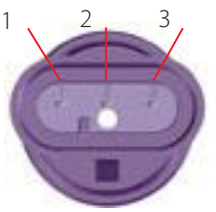
Pin	0601	0602
1	Uv+	Uv+
2	Gnd	I_{out}
3	U_{out}	nc
4	nc	nc

IP67, IP6K9K

x ~ 56 mm

Order number: 015

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

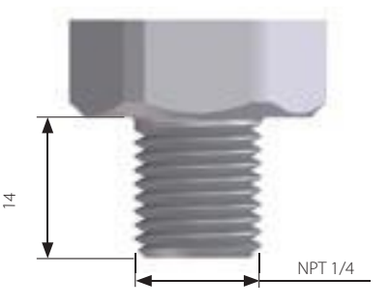
Pin	0601	0602
A	Uv+	Uv+
B	Gnd	I_{out}
C	U_{out}	nc

IP67, IP6K9K

x ~ 61 mm

Order number: 014

Thread code: 41



Thread code: 09

0601 / 0602

Order matrix for pressure transmitters

	Type	Pressure range	Pressure connector	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	8 bar	0 - 2 bar (approx. 29 PSI)	**200**
10 bar	20 bar	0 - 4 bar (approx. 58 PSI)	**400**
20 bar	35 bar	0 - 10 bar (approx. 145 PSI)	**101**
40 bar	60 bar	0 - 16 bar (approx. 230 PSI)	**161**
100 bar	140 bar	0 - 40 bar (approx. 580 PSI)	**401**
150 bar	300 bar	0 - 100 bar (approx. 1.450 PSI)	**102**
375 bar	500 bar	0 - 250 bar (approx. 3.625 PSI)	**252**

Pressure connection ↓

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

Seal material - Application areas ↓

NBR	Hydraulic/machine oil, heating oil, air, nitrogen, etc.	**1**
EPDM	Brake fluid, water, acetylene, hydrogen, etc.	**2**
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	**3**
TPE	Hydraulic/machine oil, water, air, nitrogen, acetylene, etc.	**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)	**015**
AMP Superseal 1.5®	**007**
Deutsch DT04-3P	**014**

	↓	↓	↓	↓	↓
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 transmitter.

T.2

hex 22
stainless steel
1.4305 / AISI 303

Robust pressure transmitters

Stainless steel housing (1.4305 / AISI 303, hex 22)

- Pressure transmitters 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 with a diverse array of media
- Custom variants (e.g. cleaned for oxygen applications) are available on request

Robust pressure transmitters

Technical details

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_{V+}:	5 VDC ±10 % max. 6.5 VDC	12 - 32 VDC	10 - 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≥ 4.7 kΩ	≤ (U_{V+} – 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)	0 – 1 bar	0 – 4 bar	0 – 6 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar
Overpressure protection p_u [1]:		3 bar	3 bar	8 bar	12 bar	20 bar	32 bar	80 bar	200 bar
Burst pressure[1]:		10 bar	10 bar	20 bar	30 bar	35 bar	40 bar	100 bar	250 bar
Mechanical life expectancy:		10,000,000 pulsations at rise rates to 1 bar/ms at p_{nom}							
Permitted pressure change rate:		≤ 1 bar/ms							
Accuracy:		±0.5 % full scale (FS) at room temperature, ±0.25 % BFSL							
Langzeitstabilität:		< ±0.2 % of full scale (FS) per year							
Wiederholgenauigkeit[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:		-10 °C ... +70 °C (14 °F …158 °F)							
Temperature range ambient:		- 40 °C … +100 °C (-40 °F … 212 °F)							
Temperature range media:		with NBR seal: -40 °C … +100 °C (-40 °F … +212 °F)							
		with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)							
		with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)							
Wetted parts material	Housing:	Stainless steel 1.4305 (AISI 303)							
	Measuring cell:	Stainless steel 1.4305 (AISI 303)							
	Seal material:	NBR, EPDM or FKM							
Standard sensor oil:		Fluorine oil (not suitable for food applications)							
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		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. 80 g (DIN EN 175301 approx. 110 g, cable output approx. 135 g)							

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

[2] Within the compensated temperature range.

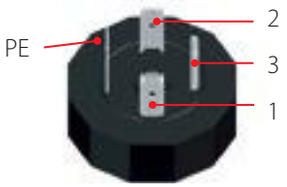
T.2

hex 22
Stainless steel
1.4305 / AISI 303

0645 / 0650 / 0660

Electrical connectors and threads

DIN EN 175301-803-A



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

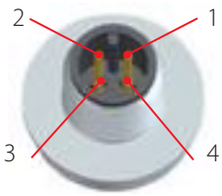
IP65

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

d ~ Ø 30 mm

Order number: 013

M12 – DIN EN 61076-2-101 A



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

IP67

x ~ 54 mm

d ~ Ø 22 mm

Order number: 002

ISO 15170 - A1 - 4.1

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

IP67

x ~ 65 mm

d ~ Ø 27 mm

Order number: 004

Cable connection

1: red
2: white
3: black

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

IP67

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

d ~ Ø 22 mm

Order number: 011

Thread code: 41

RoHSII compliant

0645 / 0650 / 0660

Order matrix for pressure transmitters

	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, approx. -29.6 inHg)	3 bar	**000**
0 - 1 bar (approx. 14.5 PSI)	3 bar	**100**
0 - 4 bar (approx. 58 PSI)	8 bar	**400**
0 - 6 bar (approx. 87 PSI)	12 bar	**600**
0 - 10 bar (approx. 145 PSI)	20 bar	**101**
0 - 16 bar (approx. 232 PSI)	32 bar	**161**
0 - 40 bar (approx. 580 PSI)	80 bar	**401**
0 - 100 bar (approx. 1,450 PSI)	200 bar	**102**

↓

Pressure connection

G1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**

↓

Seal material – Application areas

NBR:	Hydraulic/machine oil, heating oil, air, nitrogen, water, etc.	-40 °C … +100 °C (-40 °F … +212 °F)	**1**
EPDM:	Brake fluid, water, acetylene, hydrogen, etc.	-30 °C … +125 °C (-22 °F … +257 °F)	**2**
FKM:	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	-20 °C … +125 °C (-4 °F … +257 °F)	**3**

↓

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M12x1 - DIN EN 61076-2-101-A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
Cable connection (length of cable 2 m standard)	**011**

	↓	↓	↓	↓	↓
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 transmitter.

RoHSII compliant

T.3

hex 22
Stainless steel
1.4404 / AISI 316L

Robust pressure transmitters

Stainless steel housing 1.4404 / AISI 316L, hex 22

- Pressure transmitters 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 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

Robust pressure transmitters

Technical details

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_{V+}:	5 VDC ±10 % max. 6,5 VDC	12 - 32 VDC	10 - 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≥ 4.7 kΩ	≤ (U_{V+} – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA		< 4 mA

Type:		**0675 / 0680 / 0690**							
Standard pressure ranges p_{nom}:		-1 – 0 bar (vacuum)	0 – 1 bar	0 – 4 bar	0 – 6 bar	0 – 10 bar	0 – 16 bar	0 – 40 bar	0 – 100 bar
Overpressure protection p_u [1]:		3 bar	3 bar	8 bar	12 bar	20 bar	32 bar	80 bar	200 bar
Burst pressure[1]:		10 bar	10 bar	20 bar	30 bar	35 bar	40 bar	100 bar	250 bar
Mechanical life expectancy:		10,000,000 pulsations at rise rates to 1 bar/ms at p_{nom}							
Permitted pressure change rate:		≤ 1 bar/ms							
Accuracy:		±0.5 % full scale (FS) at room temperature, ±0.25 % BFSL							
Langzeitstabilität:		< ±0.2 % of full scale (FS) per year							
Wiederholgenauigkeit[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:		-10 °C ... +70 °C (14 °F …158 °F)							
Temperature range ambient:		- 40 °C … +100 °C (-40 °F … 212 °F)							
Temperature range media:		with NBR seal: -40 °C … +100 °C (-40 °F … +212 °F)							
		with EPDM seal: -30 °C … +125 °C (-22 °F … +257 °F)							
		with FKM seal: -20 °C … +125 °C (-4 °F … +257 °F)							
Wetted parts material	Housing:	Stainless steel 1.4404 (AISI 316L)							
	Measuring cell:	Stainless steel 1.4404 (AISI 316L)							
	Seal material:	NBR, EPDM or FKM							
Standard sensor oil:		Fluorine oil (not suitable for food applications)							
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		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. 80 g (DIN EN 175301 approx. 110 g, cable output approx. 135 g)							

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

[2] Within the compensated temperature range.

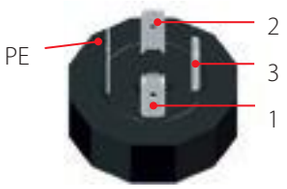
T.3

hex 22
Stainless steel
1.4404 / AISI 316L

0675 / 0680 / 0690

Electrical connectors and threads

DIN EN 175301 - 803 - A



Pin	0675 / 0680	0690
1	Uv+	Uv+
2	Gnd	I_{out}
3	U_{out}	nc
PE	⏚	⏚

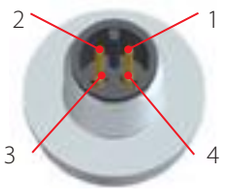
IP65

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

d ~ Ø 30 mm

Order number: 013

M12 – DIN EN 61076 - 2 -101 A



Pin	0675 / 0680	0690
1	Uv+	Uv+
2	U_{out}	nc
3	Gnd	I_{out}
4	nc	nc

IP67

x ~ 54 mm

d ~ Ø 22 mm

Order number: 002

ISO 15170 - A1 - 4.1

Pin	0675 / 0680	0690
1	Uv+	Uv+
2	Gnd	nc
3	U_{out}	I_{out}
4	nc	nc

IP67

x ~ 65 mm

d ~ Ø 27 mm

Order number: 004

Cable connection

1: red
2: white
3: black

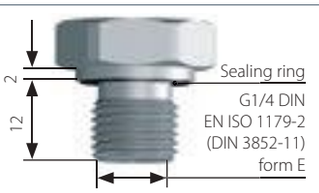
Pin	0675 / 0680	0690
1	Uv+	Uv+
2	U_{out}	nc
3	Gnd	I_{out}

IP67

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

d ~ Ø 22 mm

Order number: 011



Thread code: 41

RoHSII compliant

0675 / 0680 / 0690

Order matrix for pressure transmitters

	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, approx. -29.6 inHg)	3 bar	**000**
0 - 1 bar (approx. 14.5 PSI)	3 bar	**100**
0 - 4 bar (approx. 58 PSI)	8 bar	**400**
0 - 6 bar (approx. 87 PSI)	12 bar	**600**
0 - 10 bar (approx. 145 PSI)	20 bar	**101**
0 - 16 bar (approx. 232 PSI)	32 bar	**161**
0 - 40 bar (approx. 580 PSI)	80 bar	**401**
0 - 100 bar (approx. 1,450 PSI)	200 bar	**102**

Pressure connection

G1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**

Seal material – Application areas

NBR:	Hydraulic/machine oil, heating oil, air, nitrogen, water, etc.	- 40 °C … +100 °C (-40 °F … +212 °F)	**1**
EPDM:	Brake fluid, water, acetylene, hydrogen, etc.	-30 °C … +125 °C (-22 °F … +257 °F)	**2**
FKM:	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	-20 °C … +125 °C (-4 °F … +257 °F)	**3**

Electrical connection

DIN EN 175301-803-A (DIN 43650-A); socket device included	**013**
M12x1 – DIN EN 61076-2-101 A	**002**
Bayonet ISO 15170-A1-4.1 (DIN 72585-A1-4.1)	**004**
Cable connection (length of cable 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 transmitter.

RoHSII compliant

Pressure transmitters High-Performance series

Silicon-on-sapphire sensor technology (SoS), hex 22

- 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

Pressure transmitters
High-Performance series

Technical details

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_{V+}:	5 VDC ±10 % max. 6.5 VDC	12 - 32 VDC	10 - 32 VDC
Permissible loadapparent ohmic resistance:	≥ 4.7 kΩ	≥ 4,7 kΩ	≤ (U_{V+} – 10 V) / 20 mA
Idle power consumption:	approx. 5 mA		< 4 mA

Type:	**0705 / 0710 / 0720**									
Standard pressure ranges p_{nom} in bar:	0 - 10	0 - 16	0 - 25	0 - 40	0 - 60	0 - 100	0 - 160	0 - 250	0 - 400	0 - 600
Overpressure protection p_u [1] in bar:	40	64	100	160	240	400	640	1,000	1,600	1,650
Burst pressure[1] in bar:	80	128	200	320	480	800	1,280	2,000	2,000	2,000
Mechanical life expectancy:	10,000,000 pulsations at rise rates to 5 bar/ms at p_{nom}									
Permitted pressure change rate:	≤ 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 °C … +50 °C (-40 °F …158 °F)									
Temperature range ambient:	-40 °C … +100 °C (-40 °F … 212 °F)									
Temperature range media:	-40 °C … +125 °C (-40 °F … +257 °F)									
Wetted parts material:	stainless steel 1.4305 / SAE Grade 303, 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 M12x1, 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. 80 g (DIN 175301 approx. 110 g, cable outlet approx. 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.

0705 / 0710 / 0720

Electrical connectors and threads

DIN EN 175301- 803 - A

Pin	0705 / 0710	0720
1	U_{out}	nc
2	Gnd	I_{out}
3	Uv+	Uv+
PE	⏚	⏚

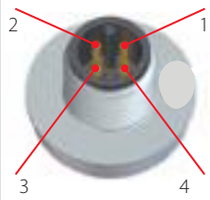
IP65

x ~ 60 / 76 mm*

d ~ Ø 30 mm

Order number: 001

M12 DIN EN 61076 - 2-101 A



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

IP67

x ~ 54 mm

d ~ Ø 22 mm

Order number: 002

ISO 15170 - A1 - 4.1

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

IP67, IP6K9K

x ~ 65 mm

d ~ Ø 27 mm

Order number: 004

AMP Superseal 1.5 ®

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

IP67

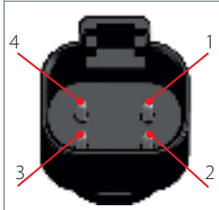
x ~ 73 mm

d ~ Ø 26 mm

Order number: 007

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

Deutsch DT04 - 4P



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

IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Order number: 008

Deutsch DT04 - 3P

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

IP67, IP6K9K

x ~ 74 mm

d ~ Ø 23 mm

Order number: 010

Cable connection

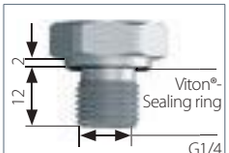
Pin	0705 / 0710	0720
1	Uv+	Uv+
2	U_{out}	nc
3	Gnd	I_{out}

IP67

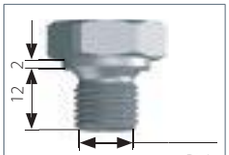
x ~ 44 mm
(+ 20 mm bend relief)
Cable lenght ~ 2m

d ~ Ø 22 mm

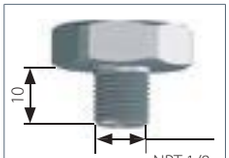
Order number: 011



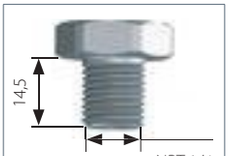
Order number: 41



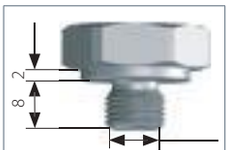
Order number: 03



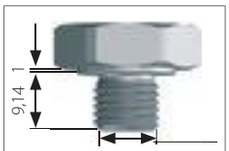
Order number: 04



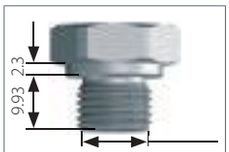
Order number: 09



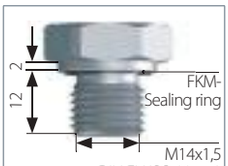
Order number: 30



Order number: 20



Order number: 21



Order number: 42

RoHSII compliant

0705 / 0710 / 0720

Order matrix for pressure transmitters

	Type	Pressure range	Pressure connection	Pressure unit	Electrical connection
	↓	↓	↓	↓	↓

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

Pressure range	Max. overpressure[1)]	
0 - 10 bar (approx. 145 PSI)	40 bar	**101**
0 - 16 bar (approx. 232 PSI)	64 bar	**161**
0 – 25 bar (approx. 362 PSI)	100 bar	**251**
0 – 40 bar (approx. 580 PSI)	160 bar	**401**
0 – 60 bar (approx. 870 PSI)	240 bar	**601**
0 – 100 bar (approx. 1,450 PSI)	400 bar	**102**
0 – 160 bar (approx. 2,320 PSI)	640 bar	**162**
0 – 250 bar (approx. 3,620 PSI)	1,000 bar	**252**
0 – 400 bar (approx. 5,800 PSI)	1,600 bar	**402**
0 – 600 bar (approx. 8,700 PSI)	1,650 bar	**602**

Pressure connection

G1/4 – DIN EN ISO 1179-2 (DIN 3852-11), form E	**41**
G1/4 – 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 EN ISO 9974-2 (DIN 3852-11), form E	**42**

Pressure unit

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

Electrical connection

DIN EN 175301-803-A (DIN 43 650-A) ; socket device included	**013**
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 2 m standard)	**011**

	Type	Pressure range	Pressure connection	Pressure unit	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 transmitter.

T.5

hex 22
stainless steel

Digital Pressure Transmitter with CANopen / CAN J1939 Interface

Hex 22

- Type 0630: CANopen protocol according to CiA DS-301, Device profile according to CiA DS-404
- Type 0631: CAN J1939 protocol according to SAE J1939
- Robust stainless steel construction with high reliability, even in very rough environments
- Completely welded measuring cell made of stainless steel 1.4542 ensures excellent media compatibility
- Measuring ranges from 0 - 1 bar to 0 - 600 bar

Digital Pressure Transmitter with CANopen / CAN J1939 Interface

Technical data

Type:	**0630**	**0631**
Output protocol:	CANopen DIN EN 50325-4 [1) 2)]	SAE J1939 [1)]
Supply voltage U_B:	10 V - 32 VDC	10 V - 32 VDC
Idle power consumption:	< 30 mA	< 30 mA
CAN Interface:	acc. to DIN ISO 11898-2 CAN 2.0 A	acc. to DIN ISO 11898-2 CAN 2.0 B

Type:		**0630 / 0631**						
Standard pressure ranges p_{nom}:		0 - 1 bar	0 - 2,5 bar	0 - 4 bar	0 - 6 bar	0 - 10 bar	0 - 16 bar	0 - 25 bar
Overpressure protection p_u [3)]:		6 bar	6 bar	10 bar	20 bar	20 bar	40 bar	100 bar
Burst pressure [3)]:		9 bar	9 bar	15 bar	30 bar	30 bar	60 bar	150 bar
Standard pressure ranges p_{nom}:		0 - 40 bar	0 - 60 bar	0 - 100 bar	0 - 160 bar	0 - 250 bar	0 - 400 bar	0 - 600 bar
Overpressure protection p_u [3)]:		100 bar	200 bar	200 bar	400 bar	750 bar	750 bar	840 bar
Burst pressure [3)]:		150 bar	300 bar	300 bar	600 bar	1000 bar	1000 bar	1050 bar
Mechanical life expectancy:		10.000.000 pulsations at rise rates to 1 bar/ms at p_{nom}						
Permitted pressure change rate:		≤ 1 bar/ms						
Accuracy:		±0,5 % of full scale (FS) at room temperature [4)], ±0,25 % BFSL						
Long-term stability:		< ±0,1 % of full scale (FS) per year						
Repeatability [5)]:		±0,1 % of full scale (FS)						
Temperature error [5)]:		1,5 % of full scale (FS)						
Compensated temperature range:		-20 °C ... +85 °C						
Temperature range ambient:		-40 °C … +105 °C						
Temperature range media:		-40 °C … +125 °C						
Wetted parts material	Housing:	Stainless steel 1.4301 / AISI 304						
	Measuring cell:	Stainless steel 1.4542						
Electric strength:		50 VDC						
Response time 10 - 90 %:		< 1 ms						
Vibration resistance:		20 g acc. to IEC 68-2-6 and IEC 68-2-36						
Shock resistance:		1000 g acc. to IEC 68-2-32						
Protection class:		IP67 (IP00 without mating plug)						
Electromagnetic compatibility:		EN 61326						
Weight		80 g - 120 g (dependent on version)						

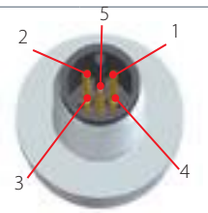
[1)] Further information and the standard setting can be found in the Technical Documentation CANopen (1-6-30-628-058) as well as CAN J1939 (1-6-30-628-059) on our homepage at: https://www.suco.de/en/downloads.
[2)] The EDS (Electronic Data Sheet) of our CANopen device can be downloaded from our homepage at: https://www.suco.de/en/downloads.
[3)] Static pressure. Dynamic value is 30% to 50% lower. Values refer to the hydraulic/pneumatic part of the pressure transmitter.
[4)] Including non-linearity, hysteresis, repeatability, zero error and full scale (FS) according to IEC 61298-2.
[5)] Within the compensated temperature range.

T.5

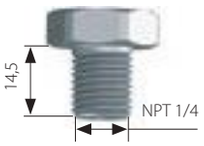
hex 22
Stainless steel

0630 / 0631

Electrical connectors and threads

M12 DIN EN 61076 - 2-101 A CiA-DR303-1

0630 / 0631
1: nc
2: Uv+
3: Gnd
4: CAN-High
5: CAN-Low
x ~ 60 mm
d ~ Ø 22 mm
Order number: 032

Thread code: 41



Thread code: 09

CANopen

RoHSII compliant

CE

0630 / 0631

Order matrix for digital pressure transmitters

	Type	Pressure range	Pressure connection	Pressure unit	Electrical connection
	↓	↓	↓	↓	↓
CANopen, CAN 2.0 A	**0630**				
CAN J1939, CAN 2.0 B	**0631**				

Pressure range [1]	Max. overpressure [2]	
0 - 1.0 bar (approx. 14 PSI)	6 bar	**100**
0 - 2.5 bar (approx. 36 PSI)	6 bar	**250**
0 - 4.0 bar (approx. 58 PSI)	10 bar	**400**
0 - 6.0 bar (approx. 87 PSI)	20 bar	**600**
0 - 10 bar (approx. 145 PSI)	20 bar	**101**
0 - 16 bar (approx. 232 PSI)	40 bar	**161**
0 – 25 bar (approx. 362 PSI)	100 bar	**251**
0 – 40 bar (approx. 580 PSI)	100 bar	**401**
0 – 60 bar (approx. 870 PSI)	200 bar	**601**
0 – 100 bar (approx. 1.450 PSI)	200 bar	**102**
0 – 160 bar (approx. 2.320 PSI)	400 bar	**162**
0 – 250 bar (approx. 3.620 PSI)	750 bar	**252**
0 – 400 bar (approx. 5.800 PSI)	750 bar	**402**
0 – 600 bar (approx. 8.700 PSI)	850 bar	**602**

Pressure connection

G1/4 - (DIN 3852), form E, male thread	**41**
1/4 NPT	**09**

Pressure unit

bar	**B**

Electrical connection

M12x1 - DIN EN 61076-2-101 A, CiA-DR303-1	**032**

	↓	↓	↓	↓	↓
Order number:	**063X**	**XXX**	**XX**	**B**	**032**

[1] The proprietary PGN and SPN of the respective pressure range can be found in the Technical Documentation CAN J1939 (1-6-30-628-059) on our homepage at: https://www.suco.de/en/downloads.
[2] Static pressure. Dynamic value is 30 to 50% lower. Values refer to the hydraulic/pneumatic part of the pressure transmitter.

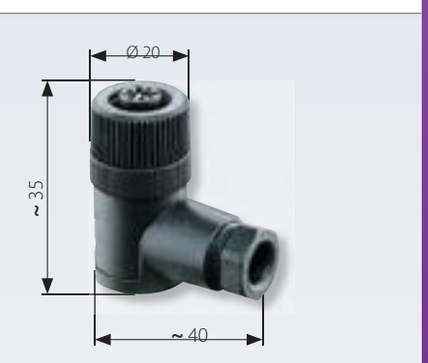
Accessories

Mating plugs, Thread adapters and transmitter display

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

Mating plugs

For requirements at short notice and for realising custom solutions

Deutsch DT06-3S (for DT04-3P) 3 x 0,5 mm² PUR cable (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 (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 (2 m), IP65	Suitable for connector code **002** **M12 DIN EN 61076-2-101 A**	Order number: **1-1-00-653-162**	 Hex thread ring (tightening torque: 0,6 Nm)
M12x1 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 device M12x1 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 G1/4 DIN EN ISO 1179-1 (DIN 3852-E)

SUCO thread code 41, transmitters and electronic pressure switches

Stainless steel (1.4305 / AISI 303) thread adapters

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

M10 x 1 form A DIN 3852-1	**M14 x 1.5 form E** DIN 3852-E incl. FKM sealing ring	**NPT 1/ 4-18**	**9/16 -18UNF** incl. O-ring FKM
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**

SUCO transmitter display STD

- For pressure transmitters 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 … 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 VDC
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
Hysteresis (only for 1-6-20-656-008):	constant value 3 digits of pre-setting
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:	-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:

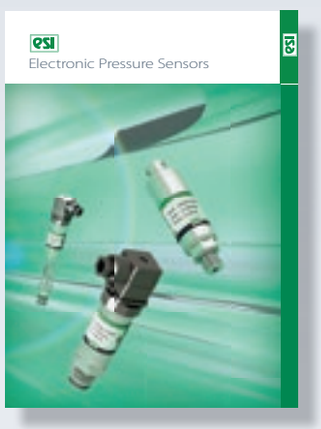
PIN	Display (STD 0)
1	nc
2	I_{out}
3	Uv+
⏚	Gnd

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

Model: HI2200-1500
Range: 0-1500 barg
Output: 0-100 mV
HI2200-1500AB
0-1500 barg
0-100 mV

ESI Technology Ltd

The worldwide specialist for customized high precision electronic pressure sensors



For decades, ESI Technology with headquarters in Wrexham (UK) has served its customers with consistent product development, special engineered solutions and outstanding technical service and sales support.

In 2009 ESI Technology ltd was acquired by SUCO. Since then ESI stands for Electronics, Sensors and Instruments. By forming part of a bigger organisation, yet keeping its own independence, ESI has gained the strength to expand its sales efforts and services worldwide.

ESI Technology has become one of the leading suppliers for specialised pressure sensors by offering bespoke solutions for specific applications.

With a dedicated manufacturing and engi neering facility in Wrexham, ESI serves an extensive range of major industries such as Oil and Gas, Subsea, Aerospace, Process, Test and Calibration.

Being one of the key suppliers to these industries requires high performance not only of its products. From design and sourcing through to shipment and customer service, ESIs' Management System is approved to ISO 9001:2008 and ATEX and IECEx approval is available on a wide range of products.

Throughout the product range, ESI uses a variety of state of the art sensor technologies to make each product a perfect fit to the desired application.

Though, the jewel of ESI's sensor technologies is Silicon-on-Sapphire which has redefined the performance capability of pressure monitoring products.

Additional services, such as tailoring of the existing product range to suit application requirements, product conditioning such as ESS (Environmental Stress Screening) and product documentation packaging, make ESI the perfect partner for customers who need a bespoke service.

With a wide sales network, ESI Technology is able to deliver its' special services globally.

If you can't find the suitable solution on the following pages, please do not hesitate to contact the ESI Technology sales team or one of its partners which is always near to you.

We are looking forward to supporting you!

Pressure Sensors Overview

For full information, please ask for our brochure
ESI - Electronic Pressure Sensors

S.1 High-Pressure Transmitter

Pressure Ranges:	0 – 600 bar; 0 – 1,000 bar; 0 – 1,500 bar; 0 – 2,000 bar; 0 – 3,000 bar; 0 – 4,000 bar; 0 - 5,000 bar (other ranges possible)
Sensor Technology:	Silicon-on-Sapphire (SoS)
Accuracy:	±0.25 % FS typ. max., BFSL
Output Signal:	10 mV/V or 0 – 5 V or 0 – 10 V or 4 – 20 mA
Wetted Parts:	All titanium, machined from a single piece
Process Connection:	Autoclave F250-C female; M16 x 1.5 female
Option:	ATEX/IECEx (available only for 4 – 20mA), includes mining areas (Group I M1)
Types:	HP1000; HP1001; HP1002; HP1003; HP1011; HP1012; HP1100; HP1101; HP1102; HP1103; HP1111; HP1112

S.2 Low-Pressure Transmitter

Pessure Ranges:	0 – 50 mbar; 0 – 100 mbar; 0 – 250 mbar; 0 – 500 mbar (other ranges possible)
Sensor Technology:	Piezoresistive Silicon Sensor
Accuracy:	±0.5 % FS typ. max., BFSL
Output Signal:	10 mV/V (typ.) or 0 – 5 V or 0 – 10 V or 4 – 20 mA
Wetted Parts:	Stainless steel (316) with O-ring
Process Connection:	¼" BSP (G ¼); ½" BSP; ¼" NPT; ½" NPT; (all male) (others on request)
Types:	LP1000; LP1001; LP1002; LP1003; LP1011; LP1012

S.3 High-Precision Pressure Transducer

Pressure Ranges:	0 – 500 mbar to 0 – 1,500 bar
Sensor Technology:	Silicon-on-Sapphire (SoS)
Accuracy:	±0.1 % FS typ. max., BFSL
Temperature Effects:	±1.0 % FS max. thermal error band over -20 °C … +70 °C
Output Signal:	10 mV/V (typ.) or 0 – 5 V or 0 – 10 V or
Wetted Parts:	All Titanium
Process Connection:	¼" BSP (G ¼); ¼" NPT; (all male)
Electrical Connection:	MIL-C-26482 6 pin Bayonet or 1 m PTFE cable
Option:	ATEX/IECEx (available only for mV output)
Types:	HI2000; HI2001; HI2002 HI2010; HI2011; HI2012

Pressure Sensors Overview

S.4 High-Temperature Pressure Transmitter

Temperature Ranges:	Media temperature up to 200 °C
Pressure Ranges:	0 – 1 bar up to 0 – 1,500 bar
Output Signal:	10 mV or 4 – 20 mA
Process Connection:	¼" BSP (G ¼); ¼" NPT; (all male) or ½" BSP flush diaphragm
Electrical Connection:	MIL-C-26482 6 pin Bayonet; 1 m PTFE cable; DIN EN 175301
Option:	ATEX/IECEx
Types:	HI2200; HI2210; HI2300; HI2310; PR3860; PR3861; PR3862

S.5 USB-Transducer

Pressure Ranges:	-1 – 2.5 bar; 0 – 16 bar; 0 – 100 bar; 0 – 400 bar; 0 – 1,500 bar; 0 – 2,000 bar; 0 – 4,000 bar; 0 - 5,000 bar
Sensor Technology:	Silicon-on-Sapphire (SoS)
Accuracy:	±0.15 % of span BFSL
Output Signal:	USB-Interface, power supply and data transfer via USB Mini B
Wetted Parts:	All titanium
Process Connection:	¼" BSP (G ¼); ¼" NPT; (all male) or Autoclave F-250-C female;
Sample Rate:	up to 1,000 Hz
Types:	GS4200-USB; GD4200-USB

S.6 Submersible Depth / Level Pressure Transmitter

Pressure Ranges:	0 – 1 mWG up to 0 – 500 mWG (other pressure ranges available)
Accuracy:	±0.3 % of span BFSL
Output Signal:	4 – 20 mA (other options on request)
Electrical Connection:	Vented Cable
Option:	ATEX/IECEx
Types:	PR3420; PR3441; PR3442

S.7 Flush Diaphragm Pressure Transmitter

Pressure Ranges:	0 – 200 mbar up to 0 – 1,000 bar
Sensor Technology:	Thick Film Ceramic Sensor
Accuracy:	±0.3 % of span BFSL
Output Signal:	4 – 20 mA (other options on request)
Wetted Parts:	Stainless steel 316
Process Connection:	½" BSP; Pipe-clamp; DIN 11851; (other options on request)
Option:	ATEX/IECEx
Types:	PR3800; PR3801; PR3802; PR3820; PR3821; PR3822; PR3850; PR3851; PR3852; PR3860; PR3861; PR3862

S.8 Special and Customised Solutions

Application Specific Design Solutions
Customised Housing Design
Choice of Output Signals and Pressure Ranges
Specialised Process Connections
Various Electrical Connectors
Special Housing Materials

S.9 Oil, Gas and Subsea Solutions

Dual Redundancy (Pressure Sensors and Electronics)
Hyperbaric Testing to 3000 m Depth
Environmental Stress Screening (ESS)
Bespoke Process Connections
Extended Service life
Special Housing Materials
Comprehensive Documentation Package and Certification

S.10 Differential Pressure Transmitter

Pressure Ranges:	0 – 5 mbar up to 0 – 200 bar
Accuracy:	±0.3 % of span BFSL
Output Signal:	4 – 20 mA (other options on request)
Wetted Parts:	Suitable for liquids or gases
Option:	ATEX/IECEx
Types:	PR3200; PR3202; PR3203; PR3204

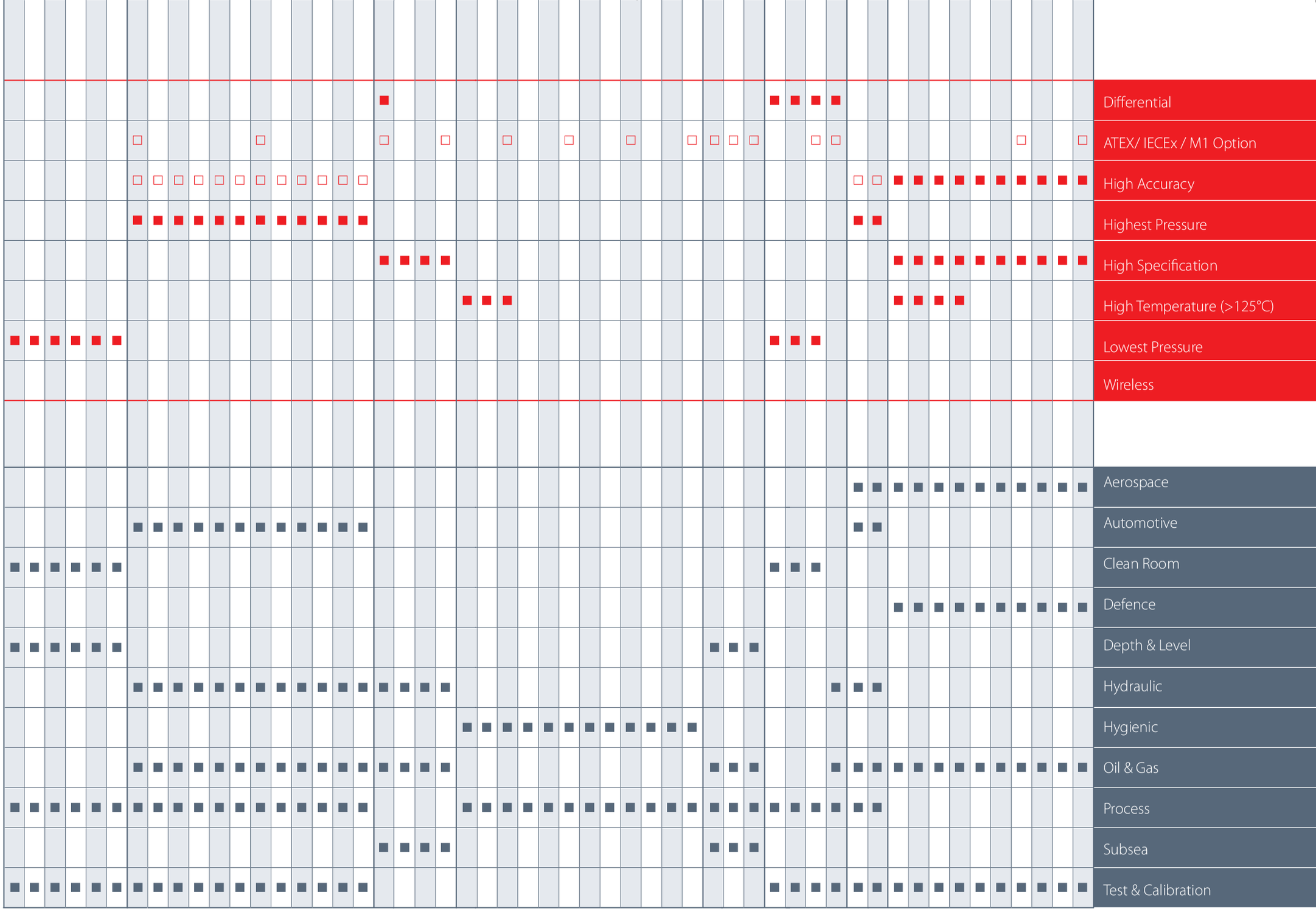
S.11 Accessories

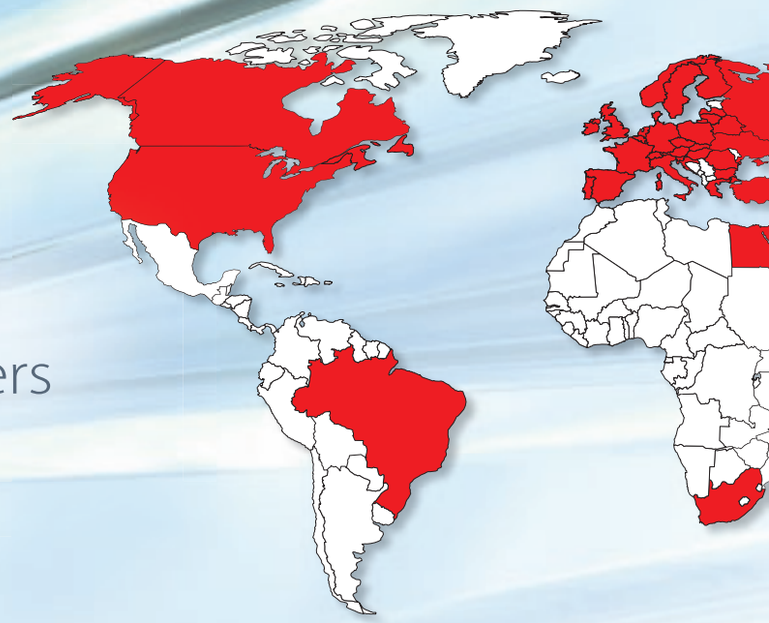
Panel Meter
High Temperature Pressure Adapter
Adapters for Process Connectors

Selection Matrix
Help in selecting a suitable pressure sensor

Selection Matrix

			Silicon-on-Sapphire	Ceramic Thick Film	Isolated Piezoresistive	Piezoresistive Silicon
High Specification High Temperature Pressure Transmitters	**HI2000**	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2001	Silicon-on-Sapphire Pressure Transmitter, 5 V output, 1 m cable	■			
	HI2002	Silicon-on-Sapphire Pressure Transmitter, 10 V output, 1 m cable	■			
	HI2010	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
	HI2011	Silicon-on-Sapphire Pressure Transmitter, 5 V output, MIL-C-26482	■			
	HI2012	Silicon-on-Sapphire Pressure Transmitter, 10 V output, MIL-C-26482	■			
	HI2200	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2210	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
	HI2300	Silicon-on-Sapphire Pressure Transmitter, mV output, 1 m cable	■			
	HI2310	Silicon-on-Sapphire Pressure Transmitter, mV output, MIL-C-26482	■			
Digital USB	**GS4200-USB**	Silicon-on-Sapphire Pressure Transducer, USB connector	■			
	GD4200-USB	Silicon-on-Sapphire Pressure Transducer, USB connector	■			
Differential	**PR3200**	Differential Pressure Transmitter, 4 – 20 mA (2 wire)				■
	PR3202	Air Differential Pressure Transmitter, 4 – 20 mA (2 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
	PR3203	Air Differential Pressure Transmitter, 5 V (3 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
	PR3204	Air Differential Pressure Transmitter, 10 V (3 wire), 0 – 5 up to 0 – 1,000 mbar DP				■
Submersible	**PR3420**	Submersible Pressure Transmitter, sludge platform, 4 – 20 mA (2 wire)			■	
	PR3441	Depth/Level Pressure Transmitter, 25 mm diameter, 4 – 20 mA (2 wire)			■	
	PR3442	Depth/Level Pressure Transmitter, 16.5 mm diameter, 4 – 20 mA (2 wire)			■	
Barrière Étanche/Hygiénique	**PR3800**	Pressure Transmitter, pipe-clamp barrier seal, 4 – 20 mA (2 wire)		■		
	PR3801	Pressure Transmitter, pipe-clamp barrier seal, 0 – 5 V (4 wire)		■		
	PR3802	Pressure Transmitter, pipe-clamp barrier seal, 0 – 10 V (4 wire)		■		
	PR3820	Pressure Transmitter, choice of barrier seal fittings, 4 – 20 mA (2 wire)		■		
	PR3821	Pressure Transmitter, choice of barrier seal fittings, 0 – 5 V (4 wire)		■		
	PR3822	Pressure Transmitter, choice of barrier seal fittings, 0 – 10 V (4 wire)		■		
	PR3850	Pressure Transmitter, flush diaphragm, 4 – 20 mA (2 wire)		■		
	PR3851	Pressure Transmitter, flush diaphragm, 0 – 5 V (4 wire)		■		
	PR3852	Pressure Transmitter, flush diaphragm, 0 – 10 V (4 wire)		■		
	PR3860	High Temperature Pressure Transmitter, flush diaphragm, 4 – 20 mA (2 wire)		■		
	PR3861	High Temperature Pressure Transmitter, flush diaphragm, 0 – 5 V (4 wire)		■		
	PR3862	High Temperature Pressure Transmitter, flush diaphragm, 0 – 10 V (4 wire)		■		
Oil & Gas, Subsea	**PR3913**	Control Valve Pressure Transmitter, 4 – 20 mA output	■			
	PR3914	Subsea Pressure Transmitter, 4 – 20 mA output	■			
	PR3915	Dual Redundant Control Valve Pressure Transmitter, 4 – 20 mA output	■			
	PR3920	DP Control Valve Pressure Transmitter, 4 – 20 mA output	■			
High Pressure	**HP1000**	High Pressure Transducer, mV output, pressures to 2,000 bar	■			
	HP1001	High Pressure Transducer, 5 V (4 wire), pressures to 2,000 bar	■			
	HP1011	High Pressure Transducer, 5 V (3 wire), pressures to 2,000 bar	■			
	HP1002	High Pressure Transducer, 10 V (4 wire), pressures to 2,000 bar	■			
	HP1012	High Pressure Transducer, 10 V (3 wire), pressures to 2,000 bar	■			
	HP1003	High Pressure Transmitter, 4 – 20 mA output, pressures to 2,000 bar	■			
	HP1100	High Pressure Transducer, mV output, pressures to 4,000 bar	■			
	HP1101	High Pressure Transducer, 5 V (4 wire), pressures to 4,000 bar	■			
	HP1111	High Pressure Transducer, 5 V (3 wire), pressures to 4,000 bar	■			
	HP1102	High Pressure Transducer, 10 V (4 wire), pressures to 4,000 bar	■			
	HP1112	High Pressure Transducer, 10 V (3 wire), pressures to 4,000 bar	■			
	HP1103	High Pressure Transmitter, 4 – 20 mA output, pressures to 4,000 bar	■			
Low Pressure	**LP1000**	Air, Low Pressure Transducer, mV output			■	
	LP1001	Air, Low Pressure Transducer, 5 V (4 wire)			■	
	LP1011	Air, Low Pressure Transducer, 5 V (3 wire)			■	
	LP1002	Air, Low Pressure Transducer, 10 V (4 wire)			■	
	LP1012	Air, Low Pressure Transducer, 10 V (3 wire)			■	
	LP1003	Air, Low Pressure Transmitter, 4 – 20 mA output			■	


Differential
ATEX/ IECEx / M1 Option
High Accuracy
Highest Pressure
High Specification
High Temperature (>125°C)
Lowest Pressure
Wireless
Aerospace
Automotive
Clean Room
Defence
Depth & Level
Hydraulic
Hygienic
Oil & Gas
Process
Subsea
Test & Calibration



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Order correctly - it's quite simple

Explanation of SUCO order numbers

p_{max} in bar	Adjustment range in bar	Tolerance at room temperature in bar	Male thread	Order number
0170 Diaphragm pressure switches with spade terminals				
			G 1/4	0170 – 457 03 – X – 003
			M 10x1 con.	0170 – 457 01 – X – 001
			M 12x1.5 cyl.	0170 – 457 02 – X – 002
100[1)]	0.3 – 1.5	± 0.2	NPT 1/8	0170 – 457 04 – X – 318
			NPT 1/4	0170 – 457 09 – X – 314
			7/16-20 UNF	0170 – 457 20 – X – 301
			9/16-18 UNF	0170 – 457 21 – X – 302

Order number: **0170 – 457 04 – X – 318**

The first four digits indicate the type number:
Our example: **Diaphragm pressure switch with spade terminals, type 0170**

By these three digits, the type of construction and the setting range are determined.
Our example: **Overpressure safe up to 100 bar, adjustment range 0.3 – 1.5 bar.**

These two digits provide information about the desired thread. Our example: **NPT 1/8.**

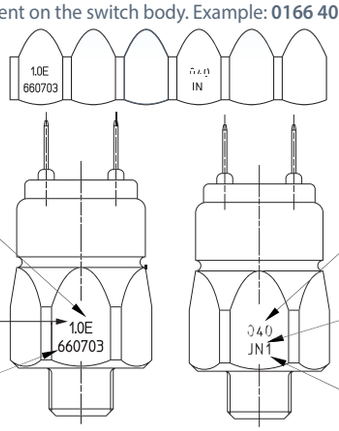
Important - the code for the seal material:

1 for **NBR** (Buna-N): hydraulic fluid, machine oil, heating oil, etc.
2 for **EPDM**: water, brake fluid, ozone, acetylene, etc.
3 for **FKM**: hydraulic fluid, petrol/gasoline, etc.
4 for **ECO** (epichlorhydrin): air, oils, fats, fuels (used only in SUCO vacuum switches).
5 for **EPDM-TW:** drinking water (only in diaphragm, p_{max} <= 35 bar).
6 for **FFKM:** acids, diluted alkalis, ketones, esters, alcohols, fuels and hot water.
7 for **TPE**: hydraulic fluid, water, machine oil, heating oil, etc.
8 for **Silicone**: water, food products, air, etc. (only in diaphragm, p_{max} 35 bar).
9 for **HNBR**: hydraulic / machine oil, ester-based bio-oils.

The last three digits are reserved for further differentiation of the switch.
In our example: **318**

Abbreviated coding explanation is embossed on the hex surface areas of the pressure switches.

Coding or way of short embossment on the switch body. Example: **0166 40703-1-040, adjusted on rising 1.0 bar**



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SUCO Robert Scheuffele GmbH & Co. KG

Publisher SUCO Robert Scheuffele GmbH & Co. KG,
Keplerstraße 12-14,
74321 Bietigheim-Bissingen, Germany

3. Edition, June 2018
No of prints: 750 Ex.
Part No: 1-0-00-999-107

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