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 4,350 psi (300 bar) [1]
- Burst pressure safety up to 5,800 psi (400 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 61076-2-101-A
IP67

0424 / 0425
M12x1 DIN EN 60947-5-2
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

04XX Diaphragm pressure switches

Adjustment range (tolerance at room temperature)	Male thread	Article number NO ⟶ |:	Article number NC ⟶ :|
1.45 - 14.5 ± 2.90 psi 0.1 - 1 (± 0.2) bar	M 10x1 taper	04XX – X 03 01 – X – 001	04XX – X 04 01 – X – 002
	1/4" BSPP	04XX – X 03 03 – X – 001	04XX – X 04 03 – X – 002
	1/8" NPT	04XX – X 03 04 – X – 001	04XX – X 04 04 – X – 002
	1/4" NPT	04XX – X 03 09 – X – 001	04XX – X 04 09 – X – 002
	7/16-20 UNF	04XX – X 03 20 – X – 001	04XX – X 04 20 – X – 002
	9/16-18 UNF	04XX – X 03 21 – X – 001	04XX – X 04 21 – X – 002
7.25- 43.5 ± 4.35 psi 0.5 - 3 (± 0.3) bar	M 10x1 taper	04XX – X 23-01 – X – 001	04XX – X 24 01 – X – 002
	1/4" BSPP	04XX – X 23 03 – X – 001	04XX – X 24 03 – X – 002
	1/8" NPT	04XX – X 23 04 – X – 001	04XX – X 24 04 – X – 002
	1/4" NPT	04XX – X 23 09 – X – 001	04XX – X 24 09 – X – 002
	7/16-20 UNF	04XX – X 23 20 – X – 001	04XX – X 24 20 – X – 002
	9/16-18 UNF	04XX – X 23 21 – X – 001	04XX – X 24 21 – X – 002
14.5 - 145 ± 7.25 psi 1 - 10 (± 0.5) bar	M 10x1 taper	04XX – X 07 01 – X – 001	04XX – X 08 01 – X – 002
	1/4" BSPP	04XX – X 07 03 – X – 001	04XX – X 08 03 – X – 002
	1/8" NPT	04XX – X 07 04 – X – 001	04XX – X 08 04 – X – 002
	1/4" NPT	04XX – X 07 09 – X – 001	04XX – X 08 09 – X – 002
	7/16-20 UNF	04XX – X 07 20 – X – 001	04XX – X 08 20 – X – 002
	9/16-18 UNF	04XX – X 07 21 – X – 001	04XX – X 08 21 – X – 002

Supplementary functions [2]

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX

Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
FFKM	Hot water, chemical acids, diluted alkalis, ketones, esters, alcohols	6
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

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

Article 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.
[2] Other versions available depending on minimum order quantity (see p. 67)

RoSH III 2020 209 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 4,350 psi (300 bar)[1)]
- Burst pressure safety up to 5,800 psi (400 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	**Article number** NO —› |:	**Article number** NC —› :|

04XX Diaphragm pressure switches

145 - 290 ± 14.50 psi 10 - 20 (± 1) bar	M 10x1 taper	04XX – X 11 01 – X – 001	04XX – X 12 01 – X – 002
	1/4" BSPP	04XX – X 11 03 – X – 001	04XX – X 12 03 – X – 002
	1/8" NPT	04XX – X 11 04 – X – 001	04XX – X 12 04 – X – 002
	1/4" NPT	04XX – X 11 09 – X – 001	04XX – X 12 09 – X – 002
	7/16-20 UNF	04XX – X 11 20 – X – 001	04XX – X 12 20 – X – 002
	9/16-18 UNF	04XX – X 11 21 – X – 001	04XX – X 12 21 – X – 002
290 - 725 ± 29.0 psi 20 - 50 (± 2) bar	M 10x1 taper	04XX – X 15 01 – X – 001	04XX – X 16 01 – X – 002
	1/4" BSPP	04XX – X 15 03 – X – 001	04XX – X 16 03 – X – 002
	1/8" NPT	04XX – X 15 04 – X – 001	04XX – X 16 04 – X – 002
	1/4" NPT	04XX – X 15 09 – X – 001	04XX – X 16 09 – X – 002
	7/16-20 UNF	04XX – X 15 20 – X – 001	04XX – X 16 20 – X – 002
	9/16-18 UNF	04XX – X 15 21 – X – 001	04XX – X 16 21 – X – 002

Supplementary functions[2)]

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX

Seal material – Application areas

NBR	Hydraulic/machine oil, air, nitrogen, etc.	1
EPDM	Brake fluid, water, hydrogen, oxygen, acetylene, etc.	2
FKM	Hydraulic fluids (HFA, HFB, HFD), petrol/gasoline, etc.	3
FFKM	Hot water, chemical acids, diluted alkalis, ketones, esters, alcohols	6
HNBR	Hydraulic/machine oil, ester-based bio-oils	9

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

Article 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.
[2)] Other versions available depending on minimum order quantity (see p. 67)

RoSH III 2020 209 compliant

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 4,350 psi (600 bar)[1)]
- Overpressure safety up to 5,800 psi (700 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	**Article number** NO ⟶ |:	**Article number** NC ⟶ :|

04XX Piston pressure switches

725 - 2,175 ± 72.5 psi 50 - 150 (± 5.0) bar	M 10x1 taper	04XX – X 19 01 – X – 001	04XX – X 20 01 – X – 002
	1/4" BSPP	04XX – X 19 03 – X – 001	04XX – X 20 03 – X – 002
	1/8" NPT	04XX – X 19 04 – X – 001	04XX – X 20 04 – X – 002
	1/4" NPT	04XX – X 19 09 – X – 001	04XX – X 20 09 – X – 002
	7/16-20 UNF	04XX – X 19 20 – X – 001	04XX – X 20 20 – X – 002
	9/16-18 UNF	04XX – X 19 21 – X – 001	04XX – X 20 21 – X – 002

Supplementary functions[2)]

Resistor	Diagnostics function	R XX XX
Varistor	Overvoltage protection	V XX XX
NTC thermistor	Filter monitoring	N XX XX

Seal material – Application areas

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

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

Article number:	**04XX – XXX XX – X – 00X**

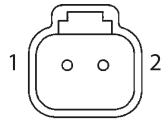
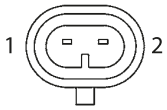
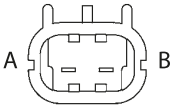
[1)] Static value. Dynamic value is 30-50 % lower. Values pertain to the hydraulic/pneumatic part of the pressure switch.
[2)] Other versions available depending on minimum order quantity (see p. 67)

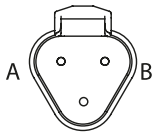
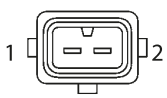
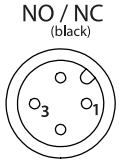
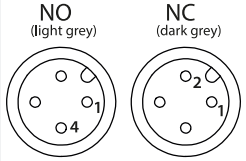
RoHSIII 2020 - 205 compliant

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	 1: brown 3: blue	 1: brown 2: black 4: white

M.6
hex 24
PS ***PLUS***

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:

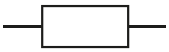
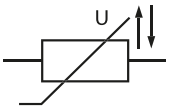
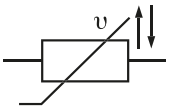
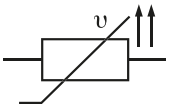
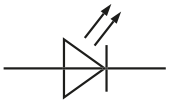
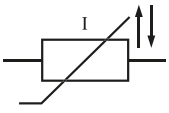
- NAMUR diagnostic function (fail-safe) with short-circuit and cable break detection
- Overvoltage protection for prolonging the contact service life
- Active reduction of EMC emissions
- Temperature-controlled switching function (e.g. cold start, i.e. inactive switching function until a certain temperature 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 of 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.	upon request[1)]
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.	upon request[1)]
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. electronic applications	upon request[1)]

[1)] Available from a minimum order quantity of 2,000 pieces.

M.6

hex 24

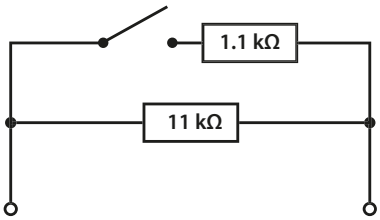
PS ***PLUS***

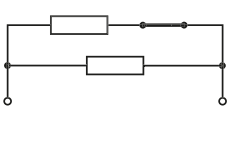
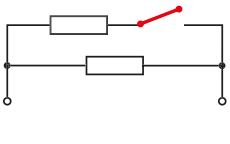
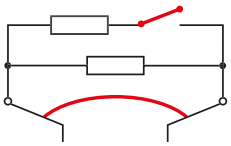
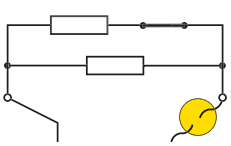
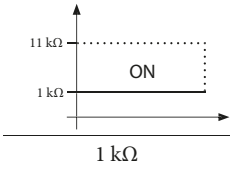
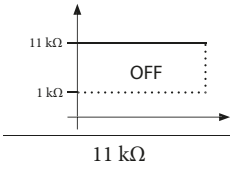
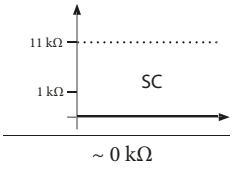
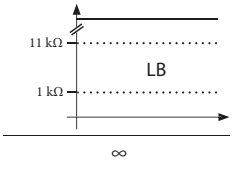
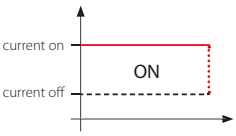
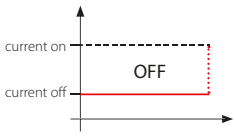
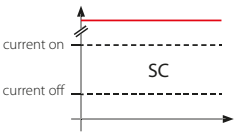
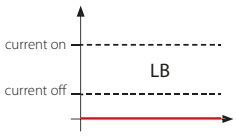
Pressure switches *PLUS*

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

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

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



Switching status	Closed	Open	Short-circuit SC	Line Break LB
Contact				
Resistor				
Current				
Example: Supply voltage 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 (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 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:

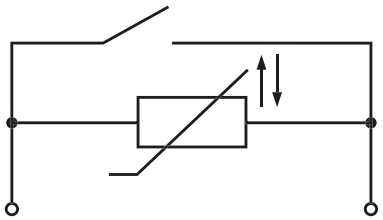
$$U_L = - L \frac{di}{dt}$$

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-to-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 % at 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 (only when plugged in), otherwise IP00.