

# PRESSURE

## Mechanical Pressure Switches



switch

measure

control

**Barksdale**  
Control Products GmbH

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# Introduction

## 1. Applications for Mechanical Pressure Switches

Mechanical pressure switches, also known as hydro-electric pressure monitors, are used to connect or disconnect electric circuits. A pressure switch can serve as a modular unit as well as an optical or acoustic monitor or indicator. Barksdale pressure switches are chiefly used in hydraulic systems for:

- a) monitoring minimum pressures such as protecting pumps from dry operation or as protection for oil lubrication systems.
- b) monitoring maximum pressures such as automatic switch-off function or warning before a relief-valve jet reaches its limit pressure (Fig. 1).

Another application for Barksdale pressure switches is the control of storage loading processes. After the storage capacity is reached ( $P_{max}$ ) the flow is stopped and the pump shuts down. If the storage pressure reaches a certain minimum ( $P_{min}$ ) the flow pump automatically starts up again. The switch hysteresis ( $P_{max} - P_{min}$ ) can be freely selected via two pressure switches and one solenoid valve (Fig. 2).

Within certain pressure ranges the storage process can be controlled with a single pressure switch, the KD1 (compact pressure switch) which Barksdale specifically designed for this application. The pressure set points  $P_{max}$  and  $P_{min}$  are factory set, according to your requirements.

## 2. Mechanical Life Span and Accuracy of Pressure Switches

The life span and accuracy of mechanical pressure switches depends on the frequency and peaks of pressure changes, number of load cycles, and influence of temperature. The highest accuracy is achieved above 30%, the longest life span below 70% of the performance range (Fig. 3).

## 3. Contacts Materials

Barksdale pressure switches have silver contact microswitches. On request, we also supply microswitches with gold-plated contacts. Gold-plated contacts are almost exclusively used on microswitches that are only exposed to low electrical loads. Fig. 4 depicts the standard values of silver or gold-plated contacts. We would gladly assist you in the selection of the material best suited for your application.

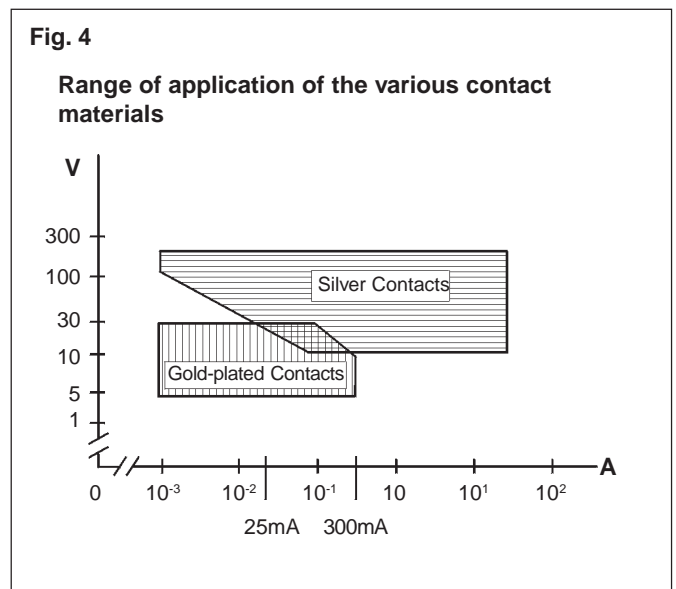
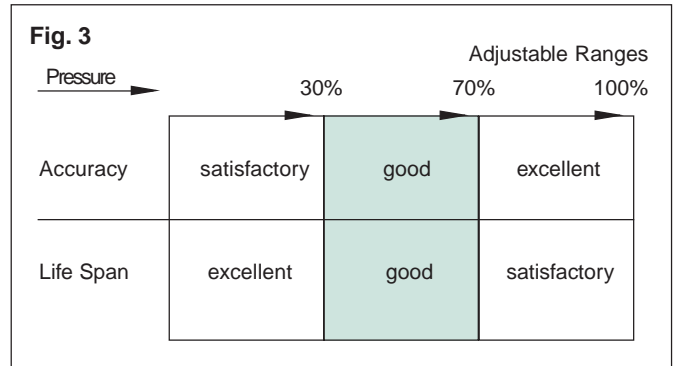
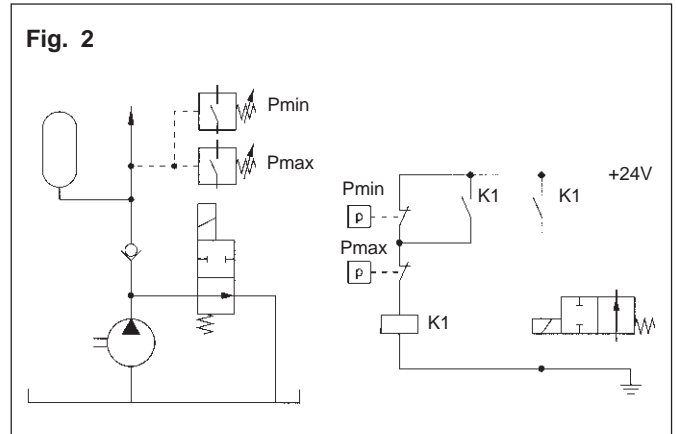
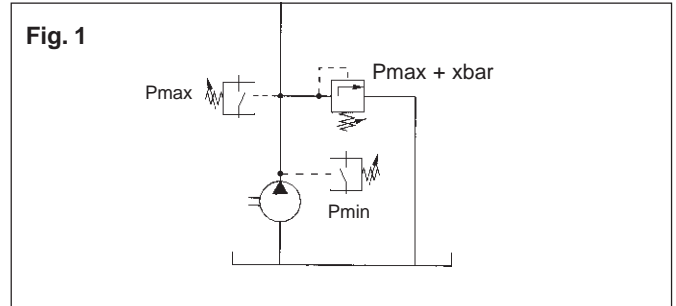
### Summary

Current and voltage should not exceed 0.12 VA. Recommended values: current should range at <400 mA and voltage at <30 V. If operated on alternating current the above values are peak values.

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Barksdale Mechanical Pressure Switches

Subject to technical changes.



# Introduction

## 4. Contact Protection

The microswitches (MS) used are normally suitable for both direct and alternating current operation. Inductive, capacitive and lamp loads may, however, considerably reduce the life expectancy of a microswitch and, under extreme circumstances, even damage the contacts.

### Capacitive Loads and Lamp Loads

Capacitive and lamp loads may be accompanied by very high discharge rates or start-up current rushes 15 times higher than the rated value. Under such circumstances, current limiters (for instance a protective resistance) should be used. (see fig. 5 and 6)

### Inductive Loads

High inductive peak loads may considerably reduce the life span of a microswitch. The electric circuit can be protected by following the wiring diagram in figure 7 and 8. The ratings of the individual elements (diode, varistor etc.) are determined by the corresponding application.

## 5. Pulsation and Vibrations within the system? How to remedy the problem:

Pulsation and vibrations within the system can affect the function of the pressure switch. There are two different types of pressure switches. One type is sufficiently protected against pulsation and vibrations occurring during operation due to its solid design, the others are designed for precision adjustment which, consequently, makes it more sensitive toward such influences. Please refer to page 10 and 15 for compact pressure switch values regarding vibration resistance.

To ensure the proper functioning of the pressure switch, please observe the following recommendations:

### 1. Mechanical Vibrations

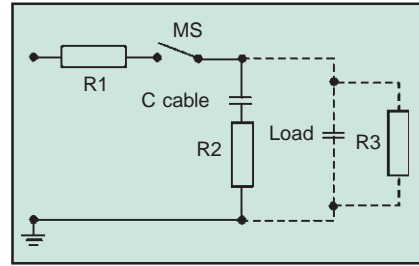
Use rubber buffers between units and wall for wall mounted units.

### 2. Pulsation/Vibration of the Medium

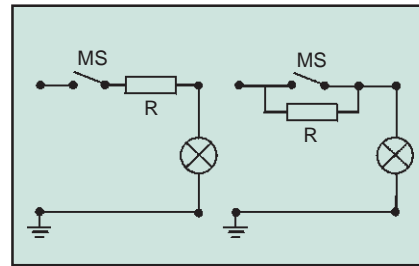
Use flexible hose pipes. If this is technically not possible, place attenuators in front of the pressure switch, for example:

- helical pipes
- commercial pulsation attenuators
- diaphragm accumulators

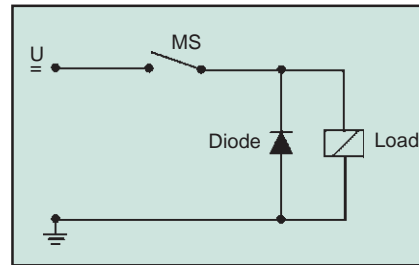
As air pockets enhance vibrations, please ensure that the hydraulic system is properly vented.



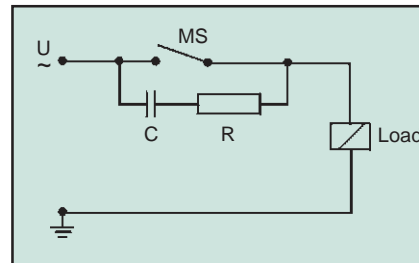
**Fig. 5** Protection in case of capacitive loads. R1 - Protection against start-up current rushes. R2, R3 - Protection against high discharge currents of condensators.



**Fig. 6** Lamp load provided with resistance in parallel or series connection to switch.



**Fig. 7** Protection in case of continuous current and inductive load by recovery diode.



**Fig. 8** Protection in case of alternating current and inductive load by RC-link.

for Pressure, Vacuum and Differential Pressure

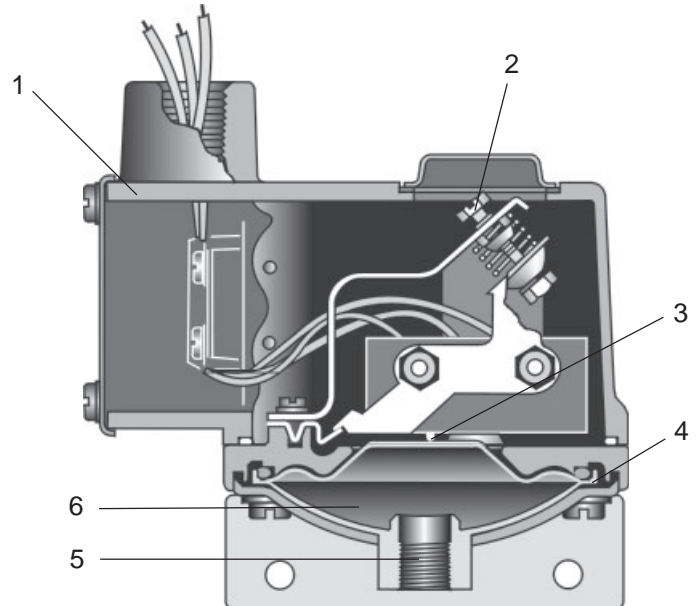
Adjustable Ranges: -1 to 10,5 bar

**Barksdale Metal Diaphragm Pressure Switches with direct acting pressure sensor and the snap-acting microswitch provide very high accuracy and long life span.**

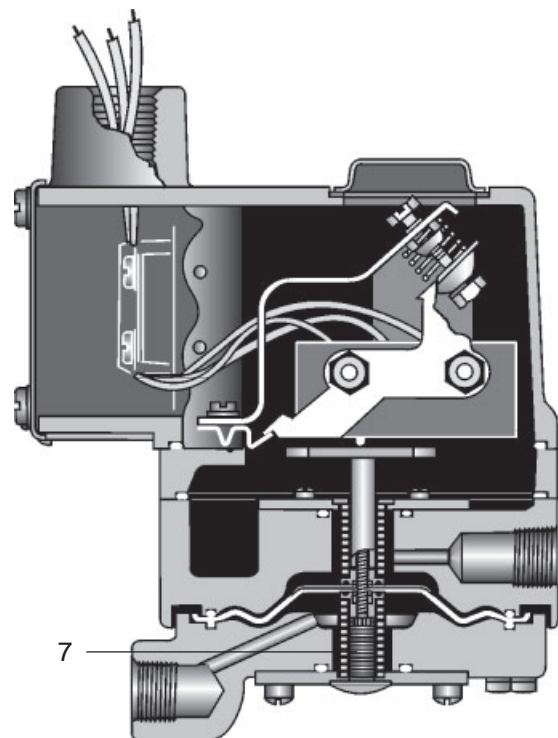
1. Various housing types allow many applications in normal and hazardous installations; also EExi, EExd and UL
2. Fine-pitch screw allows easy set point adjustment
3. Large variety of high accuracy microswitches for user specific requirements
4. Wetted parts:  
Stainless steel V4A  
(~ 1.4542) welded
5. Pressure connections with NPT thread
6. Diaphragms:  
Stainless steel (~ 1.4542)
7. Differential Pressure Switches:  
Two bellows for sealing without friction
8. Extensive approvals allow special applications

For options and approvals, please see general view on the following pages.

**D**



**DPD**



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Barksdale Mechanical Pressure Switches

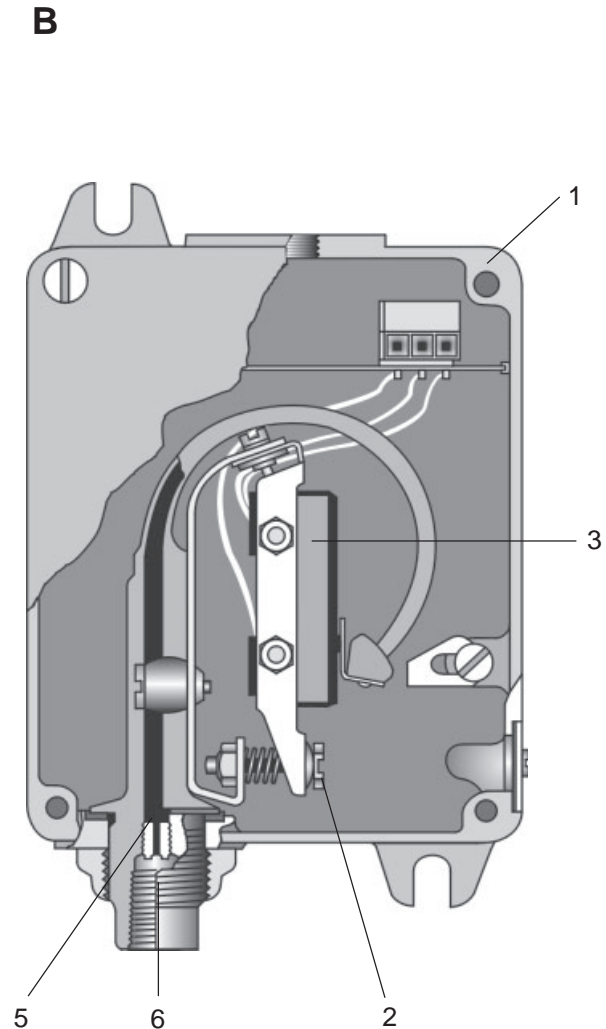
Subject to technical changes.

## Bourdon Tube Pressure Switches

Adjustable Ranges: 5,4 to 1250 bar

**Barksdale Bourdon Tube Pressure Switches with direct acting pressure sensor and the snap-acting microswitch provide very high accuracy and long life span.**

1. Various housing types allow many applications in normal and hazardous installations; also EExi, EExd and UL
2. Fine-pitch screw allows easy set point adjustment
3. Large variety of high accuracy microswitches for user specific requirements
4. Several pressure ranges allow set points between 5,4 and 1250 bar
5. Wetted parts in stainless steel
6. Pressure connections with NPT thread for proof pressure >500 bar: high pressure thread
7. Extensive approvals allow special applications



For options and approvals, please see general view on the following pages.

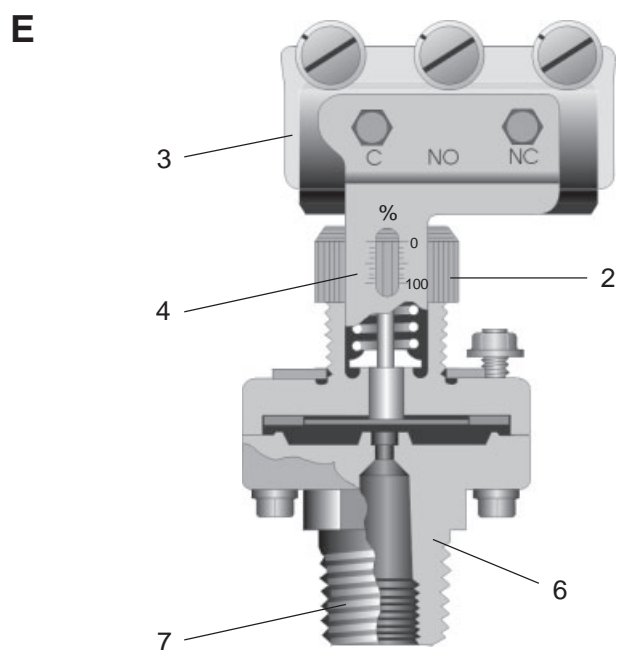
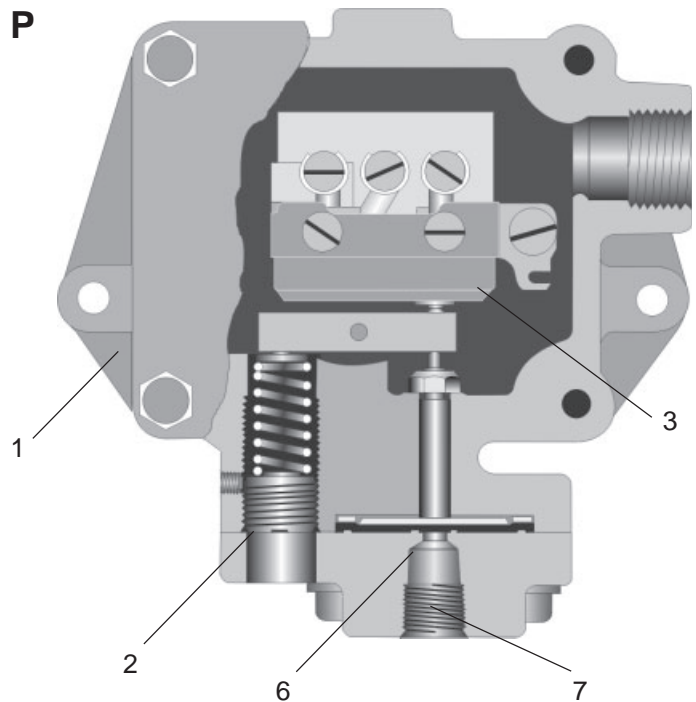


# Diaphragm Seal Piston Pressure Switches

**Adjustable Ranges: -1 to 42 bar**

**Barksdale Diaphragm Seal Piston Pressure Switches with spring loaded pressure sensor provide high accuracy, long life span and high proof pressure.**

1. Various housing types allow many applications in normal and hazardous installations; also EExi and explosion proof housing acc. to CSA and UL
2. Fine-pitch screw allows easy set point adjustment
3. Large variety of high accuracy microswitches for user specific requirements
4. Visual indication of set point for E1S and E1H
5. Several pressure ranges allow following set points:  
 E-series: - 1 to 35 bar  
 P-series: 0,1 to 42 bar  
 MSPS-series: 0,09 to 6,9 bar
6. Material of wetted parts  
 Diaphragm: NBR, Viton or Teflon  
 Fitting: Aluminum, polysulfone, stainless steel or nickel plated aluminum
7. Pressure connections with NPT or G (BSP) thread
8. Type E1H is available with manual reset for alarm functions
9. Extensive approvals allow special applications



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Barksdale Mechanical Pressure Switches

Subject to technical changes.

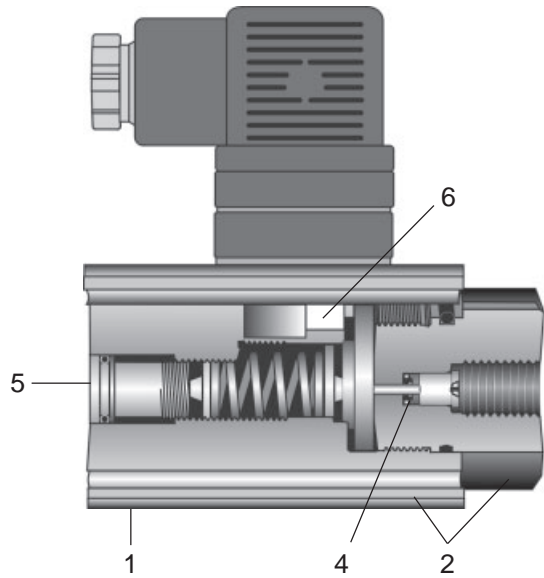
# Compact Pressure Switches

## Adjustable Ranges: 1 to 600 bar

**Compact pressure switches with a diaphragm or a piston, spring loaded pressure element and snap-acting microswitch.**

1. Same housing design for both diaphragm and piston types allow many applications.
2. Housing parts in stainless steel and aluminum (XT-series) or brass/stainless steel (KLK-series) resp. stainless steel (KLM-series).
3. 8 pressure ranges allow precise setting between 1 and 600 bar.
4. Elastomer diaphragm or low friction piston-seal.
5. Setting through hexagon socket (6mm) for the XT-series.  
Option: Factory set individual set points.  
KL-series only available with factory setting, tamper proof.
6. Microswitches with high accuracy.  
Silver and gold plated contacts allow a wide variety of applications.

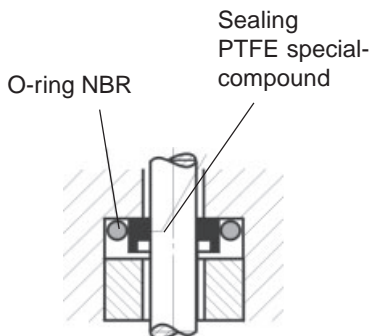
**XTK**



For options and approvals, please see general view on the following pages.

### High quality piston sealing system for hydraulic applications (standard)

For specific requirements (gas etc.), other sealing systems on request.





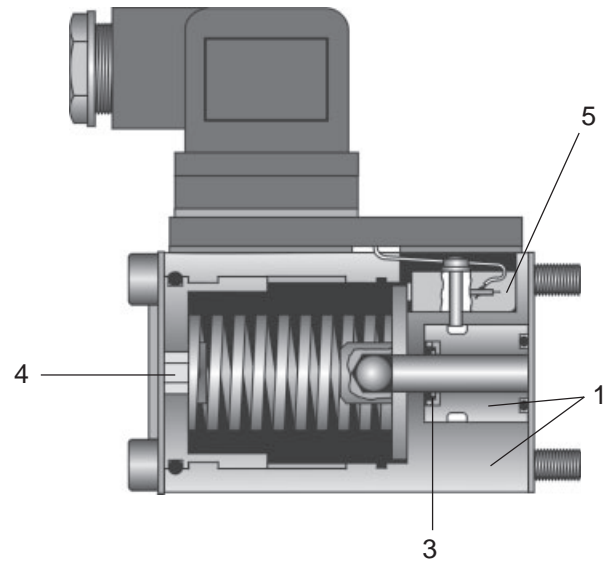
# Compact Pressure Switches

## Adjustable Ranges: 15 to 400 bar

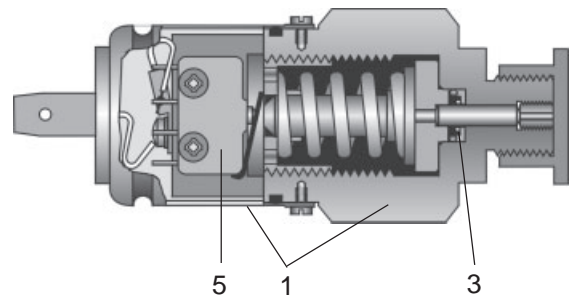
**Compact pressure switch with diaphragm or piston, spring-loaded pressure element and snap-acting microswitch.**

1. Housing parts in stainless steel and aluminum (for X1T-series) or in stainless steel and brass (for KD1-series).
3. Three pressure ranges allow precise setting between 15 and 400 bar.
4. Low friction piston-seal.
5. Setting through hexagon socket (6mm) for the X1T-series.  
Option: Factory set individual set points.  
KD1-series only available with factory setting.  
Silver contacts for KD1-series.
6. X1T-series with small hysteresis and KD1-series with adjustable hysteresis.

### X1T

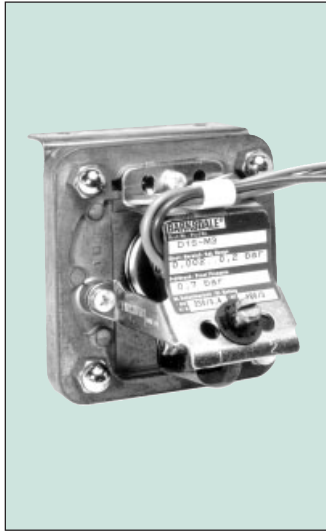


### KD1



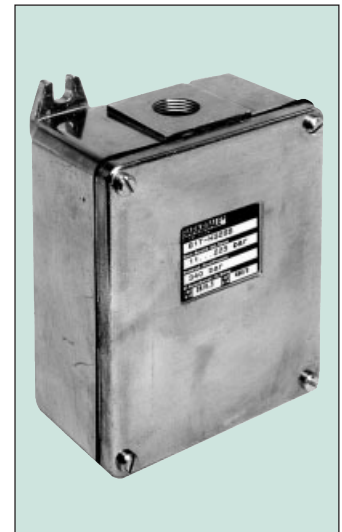
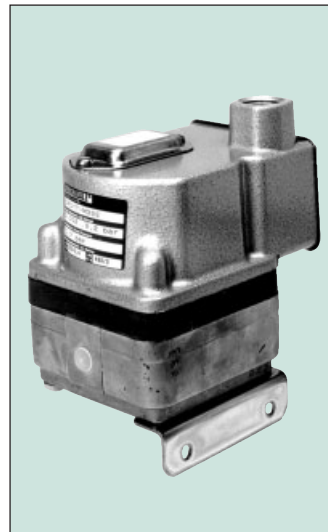
For options and approvals, please see general view on the following pages.

## General View



Type of Pressure Switch	D1S / D2S	D1T / D2T	D1X / D2X
<b>Measuring element</b>	Stainless steel diaphragm	Stainless steel diaphragm	Stainless steel diaphragm
<b>Features</b>	Adjustable switch contacts, for vacuum and overpressure	Adjustable switch contacts, for vacuum and overpressure	Adjustable switch contacts, for vacuum and overpressure
<b>Applications</b>	Machine-tool industry, pump control, retorting, cryogenic fluid control	Machine-tool industry, pump control, retorting, cryogenic fluid control	Petro-chemical industry, process industry
<b>Adjustment ranges</b>	-0,05 bar . . . -1,00 bar up to 0,5 bar . . . 10,5 bar	-0,05 bar . . . -1,00 bar up to 0,5 bar . . . 10,5 bar	-0,05 bar . . . -1,00 bar up to 0,5 bar . . . 10,5 bar
<b>Number of contacts</b>	1 or 2	1 or 2	1 or 2
<b>Max. switch frequency/min</b>	20	20	20
<b>Accuracy in %</b>	±1	±1	±1
<b>Temperature range medium</b>	-40 °C . . . +75 °C	-40 °C . . . +75 °C	-40 °C . . . +75 °C
<b>Vibration tolerance</b>	satisfactory	satisfactory	satisfactory
<b>Process connection (without adaptor)</b>	1/4" NPT female, 1/2" NPT female, stainless steel	1/4" NPT female, 1/2" NPT female, stainless steel	1/4" NPT female, 1/2" NPT female, stainless steel
<b>Electrical connection</b>	Lead wires, PVC 1,5 mm <sup>2</sup>	Cable gland, plug DIN 43650 Form A	Terminal clip
<b>Max. electrical rating</b>	up to 480 V AC / 250 V DC	up to 480 V AC / 250 V DC	acc. to CENELEC
<b>Options</b>	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts, hermetically sealed contacts
<b>Housing</b>	without	Aluminum	Aluminum, pressure proof enclosed
<b>Protection class</b>	IP00	IP65	IP65
<b>Approvals</b>	Exi	Exi	Exi and Exd
<b>Catalog page</b>	16	18	20

# General View



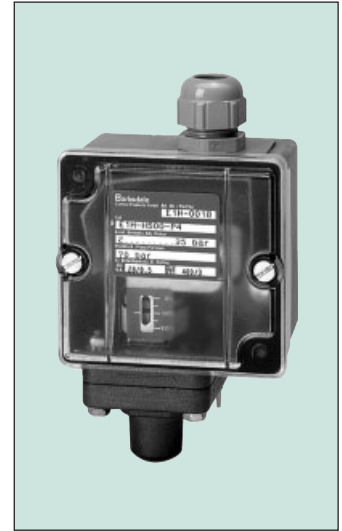
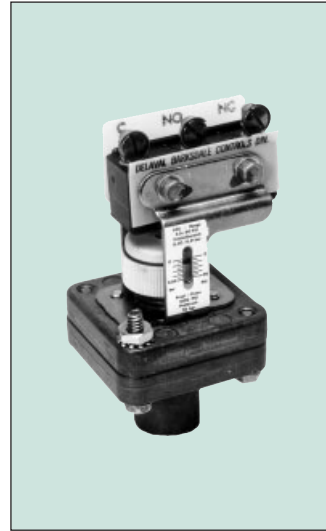
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Barksdale Mechanical Pressure Switches

Subject to technical changes.

Type of Pressure Switch	DPD2T	B1S / B2S	B1T / B2T
<b>Measuring element</b>	Stainless steel diaphragm	Bourdon tube	Bourdon tube
<b>Features</b>	Adjustable switch contacts, für Differenzdruck	Adjustable switch contacts, for high pressure	Adjustable switch contacts, for high pressure
<b>Applications</b>	Filter monitoring, hydraulic power units	Pump control, die-casting machines, press control, power plants	Pump control, die-casting machines, press control, power plants
<b>Adjustment ranges</b>	0,02 bar . . . 0,2 bar up to 0,7 bar . . . 10,3 bar	5,4 bar . . . 85 bar up to 80 bar . . . 1250 bar	5,4 bar . . . 85 bar up to 80 bar . . . 1250 bar
<b>Number of contacts</b>	1 or 2	1 or 2	1 or 2
<b>Max. switch frequency/min</b>	20	20	20
<b>Accuracy in %</b>	±1	±1	±1
<b>Temperature range medium</b>	-40 °C . . . +75 °C	-40 °C . . . +75 °C	-40 °C . . . +75 °C
<b>Vibration tolerance</b>	satisfactory	satisfactory	satisfactory
<b>Process connection (without adaptor)</b>	1/8" NPT female, stainless steel	1/4" NPT female, high pressure G 1/4 female, stainless steel	1/4" NPT female, high pressure G 1/4 female, stainless steel
<b>Electrical connection</b>	Cable gland, plug DIN 43650 Form A	Lead wires, PVC 1,5 mm <sup>2</sup>	Cable gland, plug DIN 43650 Form A
<b>Max. electrical rating</b>	up to 480 V AC / 250 V DC	up to 480 V AC / 250 V DC	up to 480 V AC / 250 V DC
<b>Options</b>	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts, hermetically sealed contacts
<b>Housing</b>	Aluminum	without	Aluminum
<b>Protection class</b>	IP65	IP00	IP65
<b>Approvals</b>	Exi	Exi	Exi
<b>Catalog page</b>	22	24	26

# General View



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Type of Pressure Switch	B1X / B2X	E1S	E1H
<b>Measuring element</b>	Bourdon tube	Plastic-diaphragm / piston	Plastic-diaphragm / piston
<b>Features</b>	Adjustable switch contacts, for high pressure	Adjustable switch contacts, meter dial, for vacuum and overpressure	Adjustable switch contacts, meter dial, for vacuum and overpressure
<b>Applications</b>	Petro-chemical industry, process industry	Machine-tool industry, mechanical engineering, dosing machines, lubrication control	Machine-tool industry, mechanical engineering, dosing machines, sprinkler control
<b>Adjustment ranges</b>	5,4 bar . . . 85 bar up to 80 bar . . . 508 bar	-0,07 bar . . . -1,00 bar up to 2 bar . . . 35 bar	-0,07 bar . . . -1,00 bar up to 2 bar . . . 35 bar
<b>Number of contacts</b>	1 or 2	1	1
<b>Max. switch frequency/min</b>	20	20	20
<b>Accuracy in %</b>	±1	±2	±2
<b>Temperature range medium</b>	-40 °C . . . +75 °C	-30 °C . . . +70 °C	-30 °C . . . +70 °C
<b>Vibration tolerance</b>	good	good	good
<b>Process connection (without adaptor)</b>	High pressure G 1/4 female, stainless steel	1/4" NPT female, 1/8" NPT female, 1/2" NPT male, G 1/4 female, aluminum	1/4" NPT female, 1/8" NPT female, 1/2" NPT male, G 1/4 female, aluminum
<b>Electrical connection</b>	Terminal clip	Screw terminal	Plug DIN 43650 Form A
<b>Max. electrical rating</b>	acc. to CENELEC	up to 480 V AC / 250 V DC	up to 480 V AC / 250 V DC
<b>Options</b>	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts	Gold-plated contacts
<b>Housing</b>	Aluminum, pressure proof enclosed	without	Aluminum, cap polycarbonate or stainless steel
<b>Protection class</b>	IP65	IP00	IP65
<b>Approvals</b>	Exi and Exd	Exi	Exi and Exd
<b>Catalog page</b>	28	30	32

Barksdale Mechanical Pressure Switches

Subject to technical changes.

# General View



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Barksdale Mechanical Pressure Switches

Subject to technical changes.

Type of Pressure Switch	P1H	P1X	MSPS
<b>Measuring element</b>	Plastic-diaphragm / piston	Plastic-diaphragm / piston	Plastic-diaphragm / piston
<b>Features</b>	Adjustable switch contacts	Adjustable switch contacts	Compact construction, adjustable switch contacts, via adjustment screw
<b>Applications</b>	Hydraulic and pneumatic applications, ship building applications	Hydraulic and pneumatic applications, ship building applications	Airconditioning, ventilation control, stema ejectors
<b>Adjustment ranges</b>	0,1 bar . . . 2,1 bar up to 2 bar . . . 42 bar	0,1 bar . . . 2,1 bar up to 2 bar . . . 42 bar	0,09 bar . . . 0,35 bar up to 1,35 bar . . . 6,9 bar
<b>Number of contacts</b>	1	1	1
<b>Max. switch frequency/min</b>	20	20	20
<b>Accuracy in %</b>	±2	±2	±2
<b>Temperature range medium</b>	-30 °C . . . +70 °C	-30 °C . . . +70 °C	-5 °C . . . +70 °C
<b>Vibration tolerance</b>	good	good	good
<b>Process connection (without adaptor)</b>	1/4" NPT female, 1/2" NPT female, aluminum or stainless steel	1/4" NPT female, 1/2" NPT female, aluminum or stainless steel	1/8" NPT male, stainless steel
<b>Electrical connection</b>	Cable gland, plug DIN 43650 Form A	Cable gland	Spade connector
<b>Max. electrical rating</b>	up to 480 V AC / 250 V DC	acc. to CENELEC	up to 250 V AC / 125 V DC
<b>Options</b>	Gold-plated contacts, hermetically sealed contacts	Gold-plated contacts, hermetically sealed contacts	---
<b>Housing</b>	Aluminum	Aluminum	ohne
<b>Protection class</b>	IP65	IP65	IP00
<b>Approvals</b>	Exi	Exi	Exi
<b>Catalog page</b>	34	36	38

# General View



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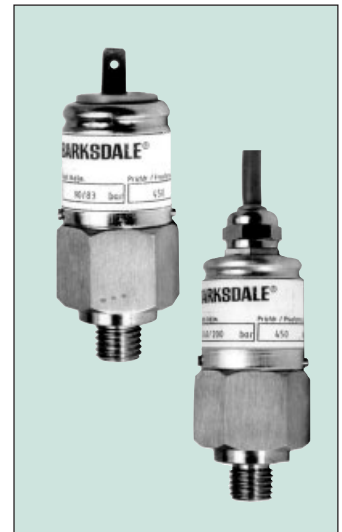
Type of Pressure Switch	XTM	XTK	X1T
<b>Measuring element</b>	Plastic diaphragm	Steel-piston	Steel-piston
<b>Features</b>	Compact construction, adjustable switch contacts	Compact construction, adjustable switch contacts	Compact construction, adjustable switch contacts, small hysteresis
<b>Applications</b>	Machine-tool industry, hydraulic clamping, mobile hydraulics, transfer lines, drilling equipment	Machine-tool industry, hydraulic clamping, mobile hydraulics, transfer lines, drilling equipment	Machine-tool industry, gas accumulator control, press control
<b>Adjustment ranges</b>	1 bar . . . 4 bar up to 10 bar . . . 40 bar	30 bar . . . 100 up to 130 bar . . . 600 bar	15 bar . . . 100 bar up to 30 bar . . . 400 bar
<b>Number of contacts</b>	1	1	1
<b>Max. switch frequency/min</b>	30	60	60
<b>Accuracy in %</b>	±2	±1	±2
<b>Temperature range medium</b>	-20 °C . . . +80 °C	-40 °C . . . +80 °C	-30 °C . . . +80 °C
<b>Vibration tolerance</b>	excellent	excellent	excellent
<b>Process connection (without adaptor)</b>	G 1/4 female, flange connect. C-Top-Norm, stainless steel	G 1/4 female, flange connect. C-Top-Norm, stainless steel	G 1/4 female, flange connect. C-Top-Norm, stainless steel
<b>Electrical connection</b>	Plug DIN 43650 Form A	Plug DIN 43650 Form A	Plug DIN 43650 Form A
<b>Max. electrical rating</b>	up to 250 V AC / 250 V DC	up to 250 V AC / 250 V DC	upt o 250 V AC / 250 V DC
<b>Options</b>	Gold-plated contacts, high pressure version up to 150 bar	Gold-plated contacts, high pressure version up to 900 bar	Gold-plated contacts
<b>Housing</b>	Aluminum	Aluminum	Aluminum
<b>Protection class</b>	IP65	IP65	IP65
<b>Approvals</b>	Exi	Exi	Exi
<b>Catalog page</b>	40	40	42

Barksdale Mechanical Pressure Switches

Subject to technical changes.



# General View



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Barksdale Mechanical Pressure Switches

Subject to technical changes.

Type of Pressure Switch	KLM	KLK	KD1
<b>Measuring element</b>	Plastic diaphragm	Steel-piston	Steel-piston
<b>Features</b>	Compact construction, factory set switch contacts	Compact construction, factory set switch contacts	Compact construction, factory set switch contacts
<b>Applications</b>	Mobile hydraulics, motor control, hydraulic clamping	Mobile hydraulics, motor control, hydraulic clamping	Mobile hydraulics, brake system control, hydraulic accumulator control
<b>Adjustment ranges</b>	1 bar . . . 6 bar up to 10 bar . . . 40 bar	30 bar . . . 100 bar up to 150 bar . . . 400 bar	30 bar . . . 100 up to 60 bar . . . 300 bar
<b>Number of contacts</b>	1	1	1
<b>Max. switch frequency/min</b>	30	60	60
<b>Accuracy in %</b>	±2	±1	±2,5
<b>Temperature range medium</b>	-20 °C . . . +80 °C	-40 °C . . . +80 °C	-40 °C . . . +80 °C
<b>Vibration tolerance</b>	excellent	excellent	excellent
<b>Process connection (without adaptor)</b>	M 12 x 1,5 male, G 1/4 male, stainless steel	M 12 x 1,5 male, G 1/4 male, brass	M 12 x 1,5 male, brass
<b>Electrical connection</b>	PG with cable, plug DIN 43650 Form C	PG with cable, plug DIN 43650 Form C	Spade connector, PG with cable
<b>Max. electrical rating</b>	up to 60 V AC / 60 V DC	up to 60 V AC / 60 V DC	up to 60 V AC / 60 V DC
<b>Options</b>	Gold-plated contacts, high pressure version up to 150 bar	Gold-plated contacts	Gold-plated contacts
<b>Housing</b>	Stainless steel	Stainless steel	Stainless steel
<b>Protection class</b>	Plug: IP65, cable: IP67	Plug: IP65, cable: IP67	Plug: IP65, cable: IP67
<b>Approvals</b>	Exi	Exi	Exi
<b>Catalog page</b>	44	44	46