



Pressure and Vacuum Switches for Process Applications

Form 216

SOR Pressure Switches

are rugged field-mounted instruments. The pressure sensing element of the SOR pressure switch is a force-balance, piston-actuated assembly. The sensing element is sealed by a flexible diaphragm and a static o-ring. A wide selection of wetted parts materials for media compatibility and containment are available. A metal diaphragm may be welded to the pressure port for certain applications, thereby eliminating the o-ring.

Application Information

The SOR pressure switches in this catalog are suitable for a variety of process applications. Basic models with standard wetted parts are normally suitable for air, oil, water and non-corrosive processes. See the Quick Selection Guide on page 3. Specific application requirements can normally be met by selecting optional components, such as switching elements, diaphragm systems and pressure ports. See How to Order on page 3. Certain applications may require customized specials. Consult the SOR representative in your area or the factory.

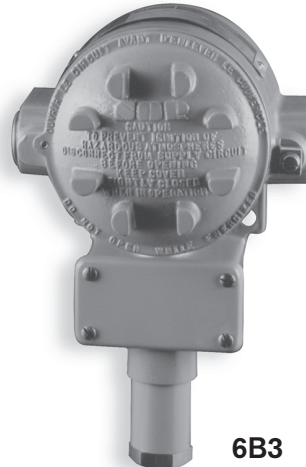
This catalog describes switches that are:

- General Purpose
- Weathertight
- Conventional Explosion Proof

Other specific types of switches available through your SOR representative are:

- Hermetically Sealed (for hazardous locations)
- Pivot Seal (for high shock pressures and cycle rates)
- Differential Pressure
- Temperature (remote and direct mount)
- Electronic and Mechanical Level
- Electronic Pressure

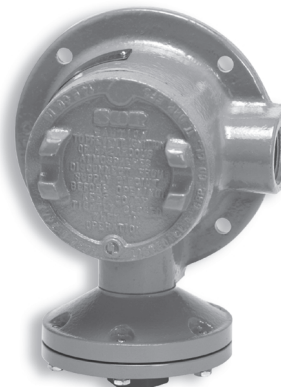
Design and specifications are subject to change without notice.



6B3



6NN



12L

Features and Benefits

Complete Product Line

- Standard models and customized specials cover pressure range from 30 inches Hg VAC to 4000 psi.

Robust Construction

- Rugged, high cycle rate tolerance, long life, not critical to vibration, high overrange and proof pressures, excellent corrosion resistance to hostile environments.

Instrument Quality

- High resolution of Set Points, high repeatability, narrow dead band, negligible temperature effect.

Wetted Parts

- Wide selection materials, process connection configurations and sizes. Optional “fire-safe” pressure sensor.

Snap-Action Electrical Switching

- Wide selection UL Listed and CSA Certified switching elements for AC and DC service. Optional “hermetically sealed” capsule for hazardous and hostile environments.

Field Adjustable

- Self-locking adjustment, no special tools required. No-charge factory calibration.

Cost Effective

- Simple and fast installation without special tools, long service life, no required periodic service or spare parts.

UL Listed, CSA Certified, CENELEC (BASEEFA & NEMKO) Certified, FM, JIS/RIIS Approved Models

- Meets most code and customer requirements.

Built-In Quality

- Rigid quality standards maintained from raw material to finished product.

Service

- Factory sales engineers and area factory representatives provide effective and prompt worldwide service.

Delivery

- Routine shipments 7 to 10 working days. Emergency shipments via same day air.

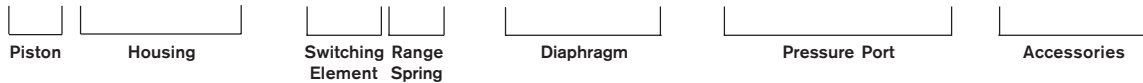
Warranty

- 3 years from date of manufacture.

Note: Re-order items as shown.

Model Number System

6NN-K5-M4-C2A-YY



Quick Selection Guide

Basic SOR pressure switches with standard wetted parts are normally suitable for air, oil, water and non-corrosive processes. The Quick Selection Guide on pages 4 and 5 shows these basic SOR type pressure and vacuum switches. Corrosive service and particular customer requirements may require optional components. Refer to How to Order section below to build a customized model number or the dedicated page to locate optional components, such as switching elements, diaphragm systems, pressure ports and accessories. Each position in the model number, except Accessories, must have a designator.

Applications

SOR pressure switches in this catalog are suitable for a wide variety of continuous pressure applications. Specific application requirements can normally be met by selecting optional components, such as, switching elements, diaphragm systems and pressure ports. Certain applications may require customized specials. Consult the SOR representative in your area or the factory.

How to Order

Information and data in this catalog are formatted to provide a convenient guide to assist instrument engineers, plant engineers and end users in selecting pressure switches for their unique applications.

Steps 1 through 5 are required. Step 6 is optional. Orders must have complete Model Numbers, i.e. each component must have a designator.

Step 1: Select **Piston-Spring** adjustable range/Set Point from Specifications (pages 7 & 8). (Piston/Spring combination determines adjustable range.)

Step 2: Select **Housing** for type of pressure switch and service (page 9).

Step 3: Select electrical **Switching Element** for electrical service (pages 10 & 11).

Step 4: Select **Diaphragm and O-Ring** for process compatibility and containment (pages 12 & 13).





Step 5: Select **Pressure Port** for process compatibility and connection (page 14).

Step 6: Select **Accessories** required for service (page 16).

Pressure and Vacuum Switches

Quick Selection Guide - Pressure

Basic SOR pressure switches with standard wetted parts are normally suitable for air, oil, water and non-corrosive processes. Corrosive service and particular customer requirements may require optional components. Refer to How to Order on page 3 to locate optional components, such as, housing, switching elements, diaphragm systems, pressure ports and accessories. Each position in the model number, except Accessories, must have a designator.

 Weathertight	Weathertight Model Number	Adjustable Range (Increasing pressure) psi (in. wc)	Typical Dead Band psi (in. wc)	Explosion Proof Model Number	 Explosion Proof
	12NN - N66 - N4 - B1A	(0.6 to 2.5)	(0.4)	12L - N66 - N4 - B1A	
	12NN - K614 - N4 - B1A	(2.5 to 45.0)	(0.8)	12L - K614 - N4 - B1A	
	12NN - K2 - N4 - B1A	0.4 to 2.0	0.1	12L - K2 - N4 - B1A	
	12NN - K4 - N4 - B1A	0.5 to 6.0	0.1	12L - K4 - N4 - B1A	
	12NN - K5 - N4 - B1A	0.75 to 12	0.1	12L - K5 - N4 - B1A	
	12NN - K45 - N4 - B1A	1 to 16	0.15	12L - K45 - N4 - B1A	
Piston 12		Overrange 200 (psi)		Proof 400 (psi)	
 Weathertight	Weathertight Model Number	Adjustable Range (Increasing pressure) psi	Typical Dead Band psi	Explosion Proof Model Number	 Explosion Proof
	4NN - K2 - N4 - B1A	2 to 8	0.2	4L - K2 - N4 - B1A	
	4NN - K4 - N4 - B1A	2 to 25	0.3	4L - K4 - N4 - B1A	
	4NN - K5 - N4 - B1A	3 to 50	0.4	4L - K5 - N4 - B1A	
	4NN - K45 - N4 - B1A	4 to 75	0.5	4L - K45 - N4 - B1A	
Piston 4		Overrange 750 (psi)		Proof 1000 (psi)	

Standard Construction

- Housing: NN - aluminum; L - cast iron
- Switching Element: SPDT; N - 10 amps @ 250 VAC; K - 15 amps @ 250 VAC
- Diaphragm & O-ring: N4 - primary (wetted) diaphragm, TCP; o-ring (wetted) Buna-N
- Pressure Port: 1/4" NPT(F); B1A - aluminum; F1A - carbon steel.

Notes

1. See balance of catalog for construction options.
2. Dead band values are expressed as typical expected at mid-range for a particular model number. See dead band considerations on page 8.
3. Design and specifications subject to change without notice.

Pressure and Vacuum Switches

Quick Selection Guide - Pressure



Weathertight

Weathertight Model Number	Adjustable Range (Increasing pressure) psi	Typical Dead Band psi	Explosion Proof Model Number
6NN - K2 - N4 - F1A	7 to 30	0.5	6L - K2 - N4 - F1A
6NN - K3 - N4 - F1A	12 to 100	0.9	6L - K3 - N4 - F1A
6NN - K5 - N4 - F1A	20 to 180	1.4	6L - K5 - N4 - F1A
6NN - K45 - N4 - F1A	25 to 275	1.9	6L - K45 - N4 - F1A
5NN - K3 - N4 - F1A	25 to 240	2.2	5L - K3 - N4 - F1A
5NN - K5 - N4 - F1A	35 to 375	3.1	5L - K5 - N4 - F1A
5NN - K45 - N4 - F1A	45 to 550	3.9	5L - K45 - N4 - F1A
9NN - K4 - N4 - F1A	100 to 500	5.3	9L - K4 - N4 - F1A
9NN - K5 - N4 - F1A	200 to 1000	9.2	9L - K5 - N4 - F1A
9NN - K45 - N4 - F1A	200 to 1750	15	9L - K45 - N4 - F1A
1NN - K45 - N4 - F1A	500 to 4000	98	1L - K45 - N4 - F1A
Piston 6, 5 9 1	Overrange 1500 (psi) 2500 5000		Proof 2500 (psi) 6000 6000



Explosion Proof

Standard Construction

- Housing: NN - aluminum; L - cast iron
- Switching Element: SPDT; K - 15 amps @ 250 VAC
- Diaphragm & O-ring: N4 - primary (wetted) diaphragm, TCP; o-ring (wetted) Buna-N
- Pressure Port: 1/4" NPT(F); B1A - aluminum; F1A - carbon steel.

Notes

1. See balance of catalog for construction options.
2. Dead band values are expressed as typical expected at mid-range for a particular model number. See dead band considerations on page 8.
3. Design and specifications subject to change without notice.

Quick Selection Guide - Vacuum



Weathertight

Weathertight Model Number	Adjustable Range Vacuum-0-pressure in. Hg (in. wc)	Typical Dead Band in. Hg (in. wc)	Explosion Proof Model Number
52NN - K116 - N4 - B1A	(20 - 0 - 20)	(0.9)	52L - K116 - N4 - B1A
52NN - K117 - N4 - B1A	(40 - 0 - 40)	(1.1)	52L - K117 - N4 - B1A
54NN - K117 - N4 - B1A	15 - 0 - 15	0.5	54L - K117 - N4 - B1A
54NN - K118 - N4 - B1A	30 - 0	0.5	54L - K118 - N4 - B1A
56NN - K216 - M2 - F1A	30 - 0 - 20	1.0	56L - K216 - M2 - F1A
56NN - K316 - M2 - F1A	30 - 0 - 160	1.4	56L - K316 - M2 - F1A
Piston 52 54 56	Overrange 200 (psi) 750 1500		Proof 400 (psi) 1000 2500



Explosion Proof

Standard Construction

- Housing: NN - aluminum; L - cast iron
- Switching Element: SPDT; K - 15 amps @ 250 VAC
- Diaphragm & O-ring: N4 - primary (wetted) diaphragm, TCP; o-ring (wetted) Buna-N. Piston 56 primary (wetted) diaphragm, 316SS.
- Pressure Port: 1/4" NPT(F); B1A - aluminum; F1A - carbon steel.

Notes

1. See balance of catalog for construction options.
2. Dead band values are expressed as typical expected at mid-range for a particular model number. See dead band considerations on page 8.
3. Design and specifications subject to change without notice.

SOR recognizes that there is no industry convention with respect to terminology and definitions pertinent to pressure switches. This glossary applies to SOR pressure switches.

Pressure Switch

A bi-stable electromechanical device that actuates/deactuates one or more electrical switching element(s) at a predetermined discrete pressure/vacuum (Set Point) upon rising or falling pressure/vacuum.

Adjustable Range

The span of pressure between upper and lower limits within which the pressure switch can be adjusted to actuate/deactuate. It is expressed for increasing pressure.

Set Point

That discrete pressure at which the pressure switch is adjusted to actuate/deactuate on rising or falling pressure. It must fall within the adjustable range and be called out as increasing or decreasing pressure.

Dead Band

The difference in pressure between the increasing Set Point and the decreasing Set Point. It is expressed as typical, which is an average with the increasing Set Point at mid range for a pressure switch with the standard K switching element. It is normally fixed (non-adjustable).

Fire-Safe

The ability of a welded seal pressure sensor to contain the process at elevated temperatures up to 1200°F at the rated overrange pressure, unsupported by the body of the pressure switch.

Hermetically Sealed

A welded steel capsule with glass-to-metal, factory-sealed electrical leads that isolates the electrical switching element(s) from the environment.

Overrange

The maximum input pressure that can be continuously applied to the pressure switch without causing permanent change of Set Point, leakage or material failure.

Proof Pressure

The maximum input pressure that can be continuously applied to the pressure switch without causing leakage or catastrophic material failure. Permanent change of Set Points may occur, or the device may be rendered inoperative.

Repeatability

The ability of a pressure switch to successively operate at a Set Point that is approached from a starting point in the same direction and returns to the starting point over three consecutive cycles to establish a pressure profile. Repeatability on SOR switches will be smaller than 1% of full scale per ISA/ANSI S51.1.

SPDT Switching Element

Single-Pole, Double Throw (SPDT) has three connections: C – Common, NO – Normally Open and NC – Normally Closed, which allows the switching element to be electrically connected to the circuit in either NO or NC state.

DPDT Switching Element

DPDT is two synchronized SPDT switching elements which actuate together at increasing Set Point and deactuate together at decreasing Set Point. Discrete SPDT switching elements allow two independent circuits to be switched; i.e., one AC and one DC.

The synchronization linkage is factory set, and is not field adjustable. Synchronization is verified by connecting test lamps to the switching elements and observing them go “On” simultaneously at actuation and “Off” simultaneously at deactuation.

Pressure and Vacuum Switches

Step 1: Piston/Spring

6NN-K5-M4-C2A-YY

This table is a listing of piston-spring combinations and the corresponding adjustable ranges, dead bands, overrange and proof pressures. Adjustable range is expressed for increasing pressure; the Set Point must be within the adjustable range. Dead band is expressed as typical. See dead band considerations at the bottom of switching element page 8.

Piston-Spring Designators	Adjustable Range ⁴		Typical Dead Band ¹		Overrange		Proof	
	psi (in. wc)	bar [mbar]	psi (in. wc)	bar [mbar]	psi	bar	psi	bar
12 - 66 ²	(0.6 to 2.5)	[1.5 to 6.2]	(0.4)	[1]	200	14	400	28
12 - 614 ³	(2.5 to 45)	[6.2 to 110]	(0.8)	[2]				
12 - 2	0.4 to 2.0	[30 to 140]	0.1	[7]				
12 - 4	0.5 to 6.0	[35 to 415]	0.1	[7]				
12 - 5	0.75 to 12	[50 to 830]	0.1	[7]				
12 - 45	1 to 16	[70 to 1100]	0.15	[10]	750	50	1000	70
4 - 2	2 to 8	[140 to 550]	0.2	[15]				
4 - 4	2 to 25	0.14 to 1.7	0.3	[20]				
4 - 5	3 to 50	0.2 to 3.5	0.4	[30]				
4 - 45	4 to 75	0.3 to 5	0.5	[35]				
6 - 2	7 to 30	0.5 to 2	0.5	[35]	1500	100	2500	170
6 - 3	12 to 100	0.8 to 7	0.9	[60]				
6 - 5	20 to 180	1.4 to 12	1.4	[95]				
6 - 45	25 to 275	1.7 to 19	1.9	0.1				
5 - 3	25 to 240	1.7 to 16	2.2	0.15				
5 - 5	35 to 375	2.4 to 26	3.1	0.2	2500	170	6000	410
5 - 45	45 to 550	3.1 to 38	3.9	0.25				
9 - 4 ⁶	100 to 500	7 to 35	5.3	0.5				
9 - 5 ⁶	200 to 1000	14 to 70	9.2	0.6	5000	340	6000	410
9 - 45 ⁶	200 to 1750	14 to 120	15	1				
1 - 45 ⁶	500 to 4000	35 to 275	98	7				

- Dead band values are expressed as typical expected at mid-range with the standard K switching element assembly installed. When optional switching elements are specified, corresponding dead band multipliers shown on pages 8 and 10 must be applied.
- The 12/66 piston/spring combination is available with the N switching element only.
- Adjustable range becomes 10 to 45 in. wc whenever switching elements other than K, KA, W or D are used.
- Special ranges may be possible. Consult the factory or the SOR representative in your area.
- Diaphragms may have an additional effect on dead band. See page 12.
- Diaphragm life may be limited by using T or H switching elements with Numbers 1 and 9 pistons.
- Metric bar (mbar) values are practical equivalents of the reference English values; not necessarily exact mathematical conversions. This data appears on the product nameplate when metric engineering units are specified.
- A breather drain (Accessory KK, see page 16) should be specified when low pressure adjustable ranges are used in environments with significant ambient temperature changes.



Mechanical Level Switches

Form 912

SOR® mechanical level switches

are rugged, industrial products specifically designed for versatility of application. This catalog contains application and ordering data for float and displacer-operated level switches. Switches are available with flanged or sealed chambers or as insertion models.

Options available for each type of switch include: switch type and number, housing type, chamber material, process connections, accessories, and more. Units may be customized to suit customers' needs.

Inside this catalog you will find solutions to your level sensing puzzles. SOR mechanical level switches have many configurations available. If you don't see what you need, we will engineer a solution for your application.



Features and Benefits

- Five-year warranty
- ASME Section IX and AWS D2.1 qualified welding system
- Designed to ANSI/ASME B31.1 and B31.3 guidelines
- Hermetically sealed switching mechanisms available
- Stainless steel switching mechanisms
- High-temperature capability
- Wide variety of explosion-proof housings
- Versatile switching mechanisms which retro-fit into other manufacturers' units
- Worldwide listings and certifications
- Quick worldwide delivery
- Only ASTM grade materials with certified mill test reports used

Mechanical Level Switches

