

Hazardous Location Switches



**Control Products for
Hazardous Location Applications**

Barksdale
CONTROL PRODUCTS
CRANE Barksdale, Inc./Barksdale GmbH
A Subsidiary of Crane Co.

Barksdale Control Products

Barksdale - engineering the future since 1949

Since its founding as a small storefront near downtown Los Angeles in 1949, Barksdale has become a top global solutions provider of quality control products to customers in numerous leading industries. Since day one, Barksdale has partnered closely with its clients to deliver both exceptional service and tailored instrumentation products that excel when used on the most sophisticated and demanding applications. Our penchant for continuous innovation and world-class engineering excellence has served as the cornerstone of our customer-centered business for nearly 60 years. In that time, we have leveraged unparalleled engineering experience along with our global manufacturing, direct sales and customer support resources across North America, Europe and Asia, to deliver control products that meet and exceed unique customer needs.

We are ready to work with you to provide a solution that drives results and gives you a competitive advantage in the marketplace. Call us today at 1-800-835-1060 so that we can help you Control Every Move.

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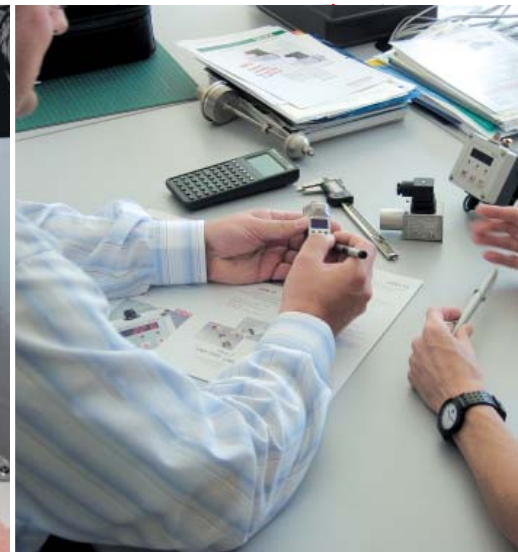
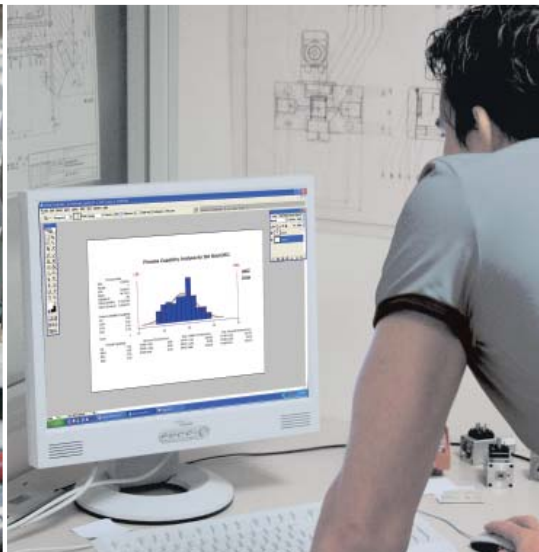
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Barksdale - the total control solutions partner









At Barksdale, our goal is to help our customers “Control Every Move”. For us, this isn’t simply a motto, but rather a vision that guides the way we do business with our valued customers. At every stage in the process from needs assessment, design and manufacturing to customer support, we provide peace of mind by delivering a total controls solution tailored to meet the specific needs of each customer. We accomplish this by leveraging the following:

- ▶ **A Highly Experienced Team** of engineers that work closely with customers to meet, exceed and even anticipate their every control need.
- ▶ **A Diverse Product Portfolio** of quality standard and custom-tailored product solutions that help control Pressure, Temperature, Level and Flow in the most demanding applications in the industry.
- ▶ Our **Global Reach and Support** via our:
 - Worldwide direct sales force of experts
 - Manufacturing facilities in North America and Europe
 - Team of highly capable and friendly customer support staff that make it easy to do business with Barksdale anywhere in the world
- ▶ **Dedicated Tools & Processes**
 - Production Part Approval Process (PPAP) to satisfy the most stringent quality control requirements
 - Compliance with ISO 9001:2000 standards
 - ATEX / IECx compliant facilities
 - 6 Sigma culture / Process Capability



Quick Guide

Mechanical Pressure Switches











	Diaphragm	Bourdon Tube	Dia-Seal Piston	Piston
Pressure Range:	Vacuum to 150 psi (10 bar)	15 psi (1 bar) to 18,000 psi (1,240 bar)	Vacuum to 1,000 psi (70 bar)	Vacuum to 12,000 psi (825 bar)
Typical Life:	1,000,000 cycles	1,000,000 cycles	1,000,000 cycles	2,500,000 cycles
General Advantage:	Lower dead-band: 2%- 7%	Stable & durable during continuous cycling	Less vulnerable to leakage (when compared to piston switches)	Fast response to pressure changes
	Typically higher accuracies	Higher operating pressures	Typically more economical	Typically longer life
Hazardous Location Approvals:	<ul style="list-style-type: none"> ▶ UL & CSA for Div 1 Explosion proof ▶ Class I, Groups B, C & D ▶ Class II, Groups E, F & G ▶ ATEX Certified Flame proof "d" ▶ IP65 	<ul style="list-style-type: none"> ▶ UL & CSA for Div 1 Explosion proof ▶ Class I, Groups B, C & D ▶ Class II, Groups E, F & G ▶ ATEX Certified Flame proof "d" 	<ul style="list-style-type: none"> ▶ UL & CSA for Div 1 Explosion proof ▶ Class I, Groups B*, C & D ▶ Class II, Groups E, F & G ▶ Class III* ▶ ATEX Certified Flame proof "d"* ▶ KGS* ▶ NACE*  <p>* 9671X & 9681X only</p>	<ul style="list-style-type: none"> ▶ UL & CSA for Div 1 Explosion proof ▶ Class I, Groups B, C & D ▶ Class II, Groups E, F & G ▶ Class III ▶ ATEX Certified Flame proof "d" ▶ KGS ▶ NACE 
Applicable Products:	<ul style="list-style-type: none"> ▶ D1X/D2X 	<ul style="list-style-type: none"> ▶ B1X/B2X 	<ul style="list-style-type: none"> ▶ P1X ▶ 9671X ▶ 9681X 	<ul style="list-style-type: none"> ▶ 9692X 
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Customized Solutions

- ▶ Fittings and conduit connections
- ▶ Customer specific electrical connections
- ▶ Multiple listing opportunities
- ▶ Application specific pressure or temperature ranges
- ▶ Precise pressure or temperature set-points
- ▶ Wetted material for 'non-standard' media
- ▶ Industry specific certifications
- ▶ Custom labeling

Quick Guide

Electronic Pressure Control



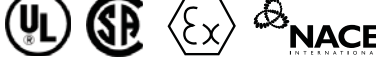



	Intrinsically Safe Solid State Switches	Explosion proof Transducers	Intrinsically Safe Transducers	Nonincendive Transducers
Pressure Range:	0 to 9,000 psi (620 bar)	Vacuum to 10,000 psi (690 bar)	Vacuum to 10,000 psi (690 bar)	Vacuum to 10,000 psi (690 bar)
Typical Life:	100M cycles	100M cycles	100M cycles	100M cycles
General Advantage:	Programmable dead-band	Continuous analog output	Continuous analog output	Continuous analog output
	Longer life and best accuracies	Voltage and current output	Voltage and current output	Voltage and current output
Hazardous Location Approvals:	<ul style="list-style-type: none"> ▶ ATEX Certified ▶ Intrinsically safe "ia" 	<ul style="list-style-type: none"> ▶ cULus Explosion proof ▶ UL Approved ▶ Class I, Groups A, B, C & D ▶ Class II, Groups E, F & G ▶ ATEX Certified Flame proof "d"  	<ul style="list-style-type: none"> ▶ cULus Intrinsically Safe for Div 1 ▶ Class I, Groups A, B, C & D ▶ Class II, Groups E, F & G ▶ ATEX Certified Intrinsically safe "ia"*   <p>*445 only</p>	<ul style="list-style-type: none"> ▶ cULus Nonincendive for Div 2 ▶ Class I, Groups A, B, C & D ▶ Class II, Groups E, F & G 
Applicable Products:	<ul style="list-style-type: none"> ▶ UDS7-EX 	<ul style="list-style-type: none"> ▶ 423X ▶ 425X ▶ 426X 	<ul style="list-style-type: none"> ▶ 443 ▶ 445 ▶ 446 	<ul style="list-style-type: none"> ▶ 433 ▶ 435 ▶ 436 
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Factors in Selecting a Switch

- ▶ Accuracy
- ▶ Adjustable Range
- ▶ Fixed or Adjustable Set point
- ▶ Dead band (Hysteresis or Actuation Value)
- ▶ Wetted Materials
- ▶ Cycle Rate and Life Cycles
- ▶ Proof Pressure / Proof Temperature
- ▶ Number of switch points required
- ▶ Housing type (NEMA or IP ratings required)
- ▶ Approvals Required

Quick Guide

Mechanical Temperature Switches

	Remote Bulb & Capillary and Local Mount	Remote Bulb & Capillary and Local Mount (Heat Trace Specific)	Compact Temperature Switch
Temperature Range:	-50°F (-45°C) to 600°F (315°C)	-50°F (-45°C) to 600°F (315°C)	-50°F (-45°C) to 600°F (315°C)
General Advantage:	Installed on the pipe/vessel or up to 25 feet capillary	Installed on the pipe/vessel or up to 25 feet capillary	Compact size
	Available with thermowell & armor	Available with thermowell & armor	Local and remote mount versions
Hazardous Location Approvals:	<ul style="list-style-type: none"> ▶ UL Approved for Div 1 Explosion proof ▶ Class I, Groups B*, C & D ▶ Class II, Groups E, F & G ▶ CSA Approved for Div 1 Class III ▶ ATEX Certified Flame proof "d"  <p>* UL only</p>	<ul style="list-style-type: none"> ▶ UL, CSA & FM for Div 1 Explosion proof ▶ Class I, Groups B, C & D ▶ Class II, Groups E, F & G ▶ Class III ▶ ATEX Certified Flame proof "d" ▶ NEPSI (China) ▶ GOST (Russia) 	<ul style="list-style-type: none"> ▶ UL & CSA for Div 1 Explosion proof ▶ Class I, Groups A*, B, C & D ▶ ATEX Certified Flame proof "d" ▶ NACE  <p>* UL only</p>
Applicable Products:	<ul style="list-style-type: none"> ▶ T1X/T2X ▶ L1X 	<ul style="list-style-type: none"> ▶ TXR ▶ TXL 	<ul style="list-style-type: none"> ▶ T9692X 
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for Added Protection

Diaphragm Seals

Barksdale offers diaphragm seals (or chemical seals) as a flexible barrier to isolate our pressure products from the adverse effects of hazardous process fluid. These seals protect the sensor from corrosive, abrasive, viscous, crystallizing, or high temperature process media, while protecting the process from contaminants.

- ▶ Threaded Off-line Seals
- ▶ Flush Face Seals
- ▶ Sanitary Seals
- ▶ Mini-seals
- ▶ Other special custom seals



Threaded Off Line Diaphragm Seals

are a popular choice for most applications. The flush port is recommended for applications where there may be a build up of solids and requires a simple means of cleaning. These seals are available in all stainless steel construction, as well as a carbon steel upper flange for a more economical choice.



Mini-Seals

are all-welded, gasketless, threaded off-line seals. The mini-seal is an economical choice for isolation of smaller instruments, or where high sensitivity is not required.



Sanitary Diaphragm Seals

are specially designed to meet the demanding sanitary requirements of food, dairy, beverage, pharmaceutical, and biotech applications.



Flush Face Diaphragm Seals

are useful in applications where a continuous flow of process media across the diaphragm is required to prevent solids buildup.

Pressure

Explosion Proof Diaphragm Switch

D1X, D2X Series

Features

- ▶ Hermetically sealed
- ▶ Explosion proof housing for hazardous location
- ▶ Tamper proof setpoint adjustment
- ▶ Ideal for pressure or vacuum

Applications

- ▶ Pump & compressor monitoring
- ▶ Hydraulic power units
- ▶ Oil & gas
- ▶ Food & beverage
- ▶ Utility & power generation
- ▶ Mining

General Specifications*

Accuracy:	± 0.5% of the adjustable range
Switch:	Single pole double throw (SPDT) Snap Action; single circuit
Type:	
Rating:	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (Class A or H limit switch). Consult sales drawing for ratings of optional limit switches.
Wetted Parts:	303 stainless steel
Process Fitting:	
Diaphragm:	17-7 PH stainless steel
Enclosure:	Die-cast aluminum, anodized and painted
Electrical Connection:	Screw terminals on covered terminal strip via 1/2" NPT (D1X) and 3/4" NPT (D2X) conduit fittings.
Enclosure Ratings:	NEMA 4, 7, 9
Pressure Connection:	1/4" NPT Female
Approvals:	All models are UL approved for use in hazardous locations Class I, Groups B, C, & D; Class II, Groups E, F, & G. UL File No. E37043
UL (standard):	

* See product configurator for additional options.

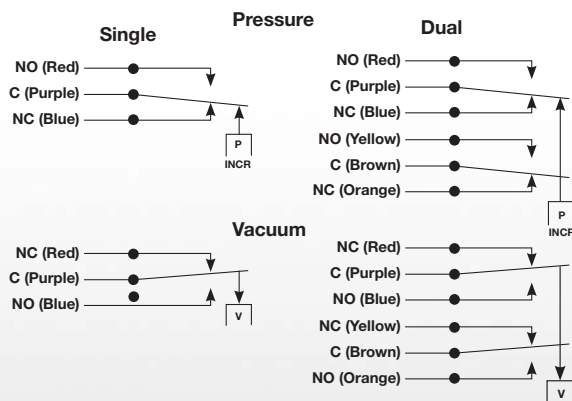


Approvals (cont.):	All models are CSA approved for use in hazardous locations Class I, Groups B, C & D; Class II, Groups E, F, & G. CSA File No. LR22354
CSA (standard):	
ATEX (optional):	Ex models are ATEX certified per ISSEP 03 ATEX 122X & marked as follows: CE 0081 II2 GD EEx d IITC, T6 T85°C
Temperature Range:	-65° to +165°F (-54° to +74°C)
Operating:	
Storage:	-65° to +200°F (-54° to 93°C)
Adjustment Instructions:	Turn adjustment screw counterclockwise to raise actuation point.
Pressure:	
Vacuum:	Turn adjustment screw clockwise to increase setpoint (higher vacuum).
Options:	- Cleaned for oxygen service - Factory pre-set
Shipping Weight:	7.0 lbs. approximate

Wiring Code

Lead	Circuit #1		Circuit #2	
	Pressure	Vacuum	Pressure	Vacuum
Normally Closed	Blue	Red	Orange	Yellow
Common	Purple	Purple	Brown	Brown
Normally Open	Red	Blue	Yellow	Orange

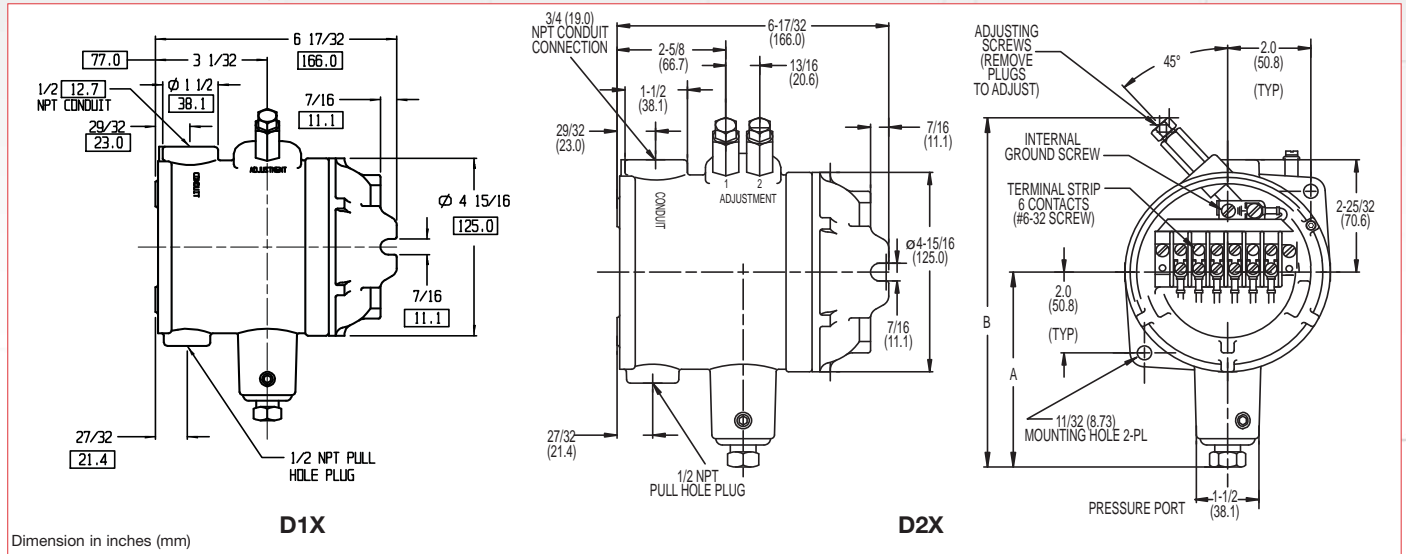
Wiring Diagram



Explosion Proof Diaphragm Switch

D1X, D2X Series

Technical Drawing



Product Configurator

Example	D1X	-A	3SS	-P2	-UL
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H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)

Base Configuration

D1X	Single setpoint housed version
D2X	Single setpoint housed version

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 3SS, 80SS or 150SS)
-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 18SS)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (comes with an elastomer boot)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC; 1 amp @ 24 VDC with Gold Contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC (not available on vacuum models)
-CC	Hermetically sealed; 10 amps @ 125/250 VAC (not available on vacuum models)
-HH	Hermetically sealed; 5 amps @ 125/250 VAC (not available on vacuum models)

Options

-UL	UL & CSA Approval
-EX	ATEX Certified, -EX in place of UL for ATEX only
-Z1	Oxygen cleaned (not available w/ UL)
-Sxxx	Factory pre-set (consult factory)

Pressure Connection

Blank	Std 1/4" NPT female pressure connection
-P2	1/2" NPT female pressure connection

Adjustable Pressure Range

	Adjustable Range (PRESSURE)				Approx. Deadband ² (Actuation Value) psi-(bar)	Proof Pressure psi (bar)
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max		
3SS	.03 (.00)	2.85 (.2)	.18 (.01)	3 (.2)	.07 - .15 (0 - .01)	10 (.7)
18SS	.4 (.03)	17.74 (1.2)	.66 (.04)	18 (1.2)	.12 - .26 (.01 - .02)	60 (4.1)
80SS	.5 (.03)	76.6 (5.2)	3.9 (.3)	80 (5.4)	1.6 - 3.4 (.1 - .2)	160 (10.9)
150SS	1.5 (.10)	144 (9.8)	7.5 (.5)	150 (10.2)	2.3 - 6.0 (.2 - .4)	300 (20.4)

	Adjustable Range (VACUUM)				Approx. Deadband ² (Actuation Value) In. Hg	Proof Pressure In. Hg
	Decreasing - In. Hg		Increasing - In. Hg			
	Min	Max	Min	Max		
3SS	0.06	5.72	0.34	6	.14 - .28	6
18SS	0.8	29.2	1.6	30	.4 - .8	30

NOTES:

¹ Consult Supplemental Guide for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

Pressure

Explosion Proof Bourdon Tube

Series B1X, B2X

Features


- ▶ High accuracy, high proof
- ▶ Explosion-proof housing
- ▶ Hermetically sealed
- ▶ Tamper-proof setpoint adjustment
- ▶ Dual set point capability
- ▶ UL, CSA, ATEX approved
- ▶ NEMA 4, 7, 9 & IP65

Applications

- ▶ Power plants
- ▶ Water pumps
- ▶ Blow out preventers (BOP)
- ▶ Pneumatic devices
- ▶ General industrial applications
- ▶ Oil and gas applications

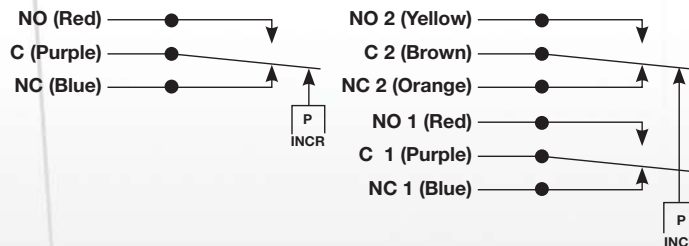


General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements.
Accuracy¹:	± 1% of the adjustable range
Switch: Type:	Single pole double throw (SPDT) snap action; single or dual circuit
Rating:	3 amps @ 480 VAC (standard)
Wetted Parts: Process Fitting & Bourdon Tube:	316 series stainless steel
Enclosure:	Die-cast aluminum
Electrical Connection:	Internal terminal strip via conduit connection (1/2" NPT on B1X models, 3/4" NPT on B2X models)
Enclosure Ratings:	NEMA 4, 7, 9
Pressure Connection:	Models with proof pressures up to 7,200 psi: 1/4" NPT Female; Models with higher pressure ranges: Superpressure Fitting for 1/4" O.D. tube
Approvals: UL/CSA (standard):	UL File No.#E37043; CSA File No. #LR22354 Hazardous Locations, Class I Division I, Groups B, C, & D; Class II Groups E, F, & G
ATEX (optional):	Ex models are ATEX certified per ISSeP 03 ATEX 122XC & marked as follows: CE 0081  II2 GD EEX d IIC T6, T85°C, IP65 -40°C ≤ Tamb ≤ 75°C

Temperature Range: Operating:	-40° to +165°F (-40° to +74°C)
Adjustment Instructions:	Turn adjustment screw clockwise to lower actuation point (remove protective hex cap to remove adjustment screw)
Options:	- Gold contact Limit switch; 1 A @ 125 VAC - 1/2" NPT female process connection - Cleaned for oxygen service – consult factory for details - Adjustable deadband - Temperature compensation and pre-cycle - Hermetically sealed limit switch
Shipping Weight:	8.5 lbs. approximate

Wiring Diagram



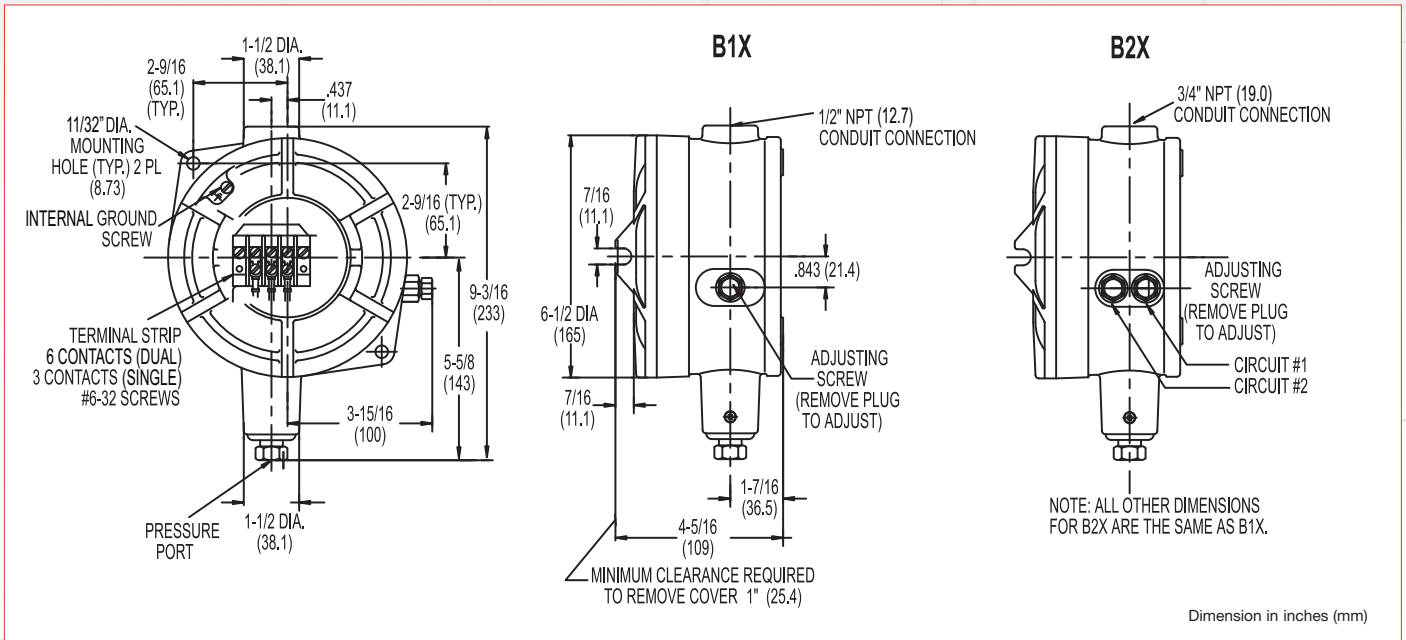
* See product configurator for additional options.

¹ ±1% for 32-110°F; ±2% for > 110°F; -2/+3°F for <32°F

Explosion Proof Bourdon Tube

Series B1X, B2X

Technical Drawing



Product Configurator

Example		B1X	-H	-32	SS	-P2	-UL
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Prefix

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)

Series

B1X Single setpoint
B2X Dual setpoint

Limit Switch¹

-A	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (standard for pressure range 12, 32, 48 and 72)
-B	10 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-C	10 amps @ 125/250/480 VAC; 0.1 amps @ 125VDC; 0.05 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard with pressure range 20)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; (comes with an elastomer boot)
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-S	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (adjustable deadband)
-GH	1 amp @ 125 VAC with gold contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC
-CC	Hermetically sealed; 10 amps @ 125/250 VAC
-GH	Hermetically sealed; 1 amp @ 125 VAC with gold contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Option

-EX ATEX certified, -EX in place of -UL for ATEX only
-UL UL & CSA approval (standard)
-Sxxx Factory preset (consult factory)

Process Connection

Blank 1/4" NPT for 12, 20 & 32 pressure ranges & 1/4" tube for 48 - 72 pressure ranges (standard)
-P2³ 1/2" NPT female pressure fitting

SS Stainless steel bourdon tube

Pressure Range⁴

	Adjustable Range				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
12	50 (3.3)	1173 (78)	77 (5.1)	1200 (80)	11 - 27 (.7 - 1.8)	1800 (120)
20	160 (10.6)	1961 (131)	199 (13)	2000 (133)	16 - 39 (1.1 - 2.6)	4800 (320)
32	240 (16)	3115 (208)	325 (22)	3200 (213)	40 - 85 (2.7 - 5.7)	7200 (480)
48	325 (22.4)	4715 (321)	325 (22)	4800 (327)	40 - 85 (2.7 - 5.7)	7200 (480)
72	600 (40)	6650 (443)	1150 (77)	7200 (480)	275 - 550 (18 - 37)	18000 (1200)

¹ Consult sales drawings for specific deadband values

² Deadband values indicated when used with the "standard" limit switch

³ Consult sales drawings for dimensions

⁴ Pressure range subject to change

Pressure

Explosion Proof Dia-Seal Piston

P1X Series

Features

- ▶ Explosion proof housing
- ▶ High reliability
- ▶ Extremely long life
- ▶ UL & CSA listed
- ▶ Oil & dust tight

Applications

- ▶ Power plants
- ▶ Water pumps
- ▶ Hydraulic power units
- ▶ Pneumatic devices
- ▶ General industrial applicaitons
- ▶ Oil & gas applications



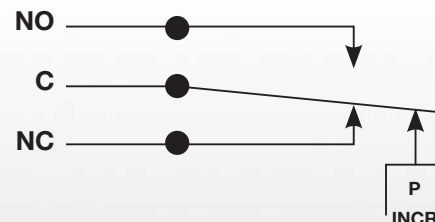
General Specifications*

Electrical Characteristics:	All models incorporate Underwriters Laboratories, Inc. and CSA Listed single pole double throw snap-action switching elements
Accuracy:	± 2% of the adjustable range
Switch:	Single pole double throw (SPDT) snap action; single circuit
Wetted Parts:	
Process Fitting:	Anodized aluminum
Diaphragm:	Buna-N
Enclosure:	Anodized aluminum
Electrical Connection:	Internal screw terminals via 1/2" NPT conduit connector
Enclosure Ratings:	NEMA 7, 9
Pressure Connection:	1/4"-18 NPT female (standard)
Approvals:	
UL:	File No. E37043; approved for hazardous locations, Class I, DIV 2 Groups C&D, Class II Groups E, F, & G; not available on 1600 psi range
CSA:	Class 3238-01, File No. 022354-0-000 (Not approved with hermetically sealed limit switch)
PED (European):	Compliant to PED 97/23/EC

* See product configurator for additional options.

Temperature Range:	
Operating:	-20° to +165 °F (-29° to +74°C)
Storage:	-40° to +200 °F (-40° to +93°C)
Adjustment Instructions:	Loosen setscrew with a #10 allen wrench. With screwdriver, turn adjustment screw clockwise to increase and counterclockwise to decrease the actuation point. Tighten setscrew after desired setting is reached.
Options:	<ul style="list-style-type: none"> - Viton® diaphragm - Teflon diaphragm - NEMA 4X enclosure - Hermetically sealed limit switch - Factory preset - Cleaned for oxygen service - CSA approval
Shipping Weight:	3.75 lbs. approximate

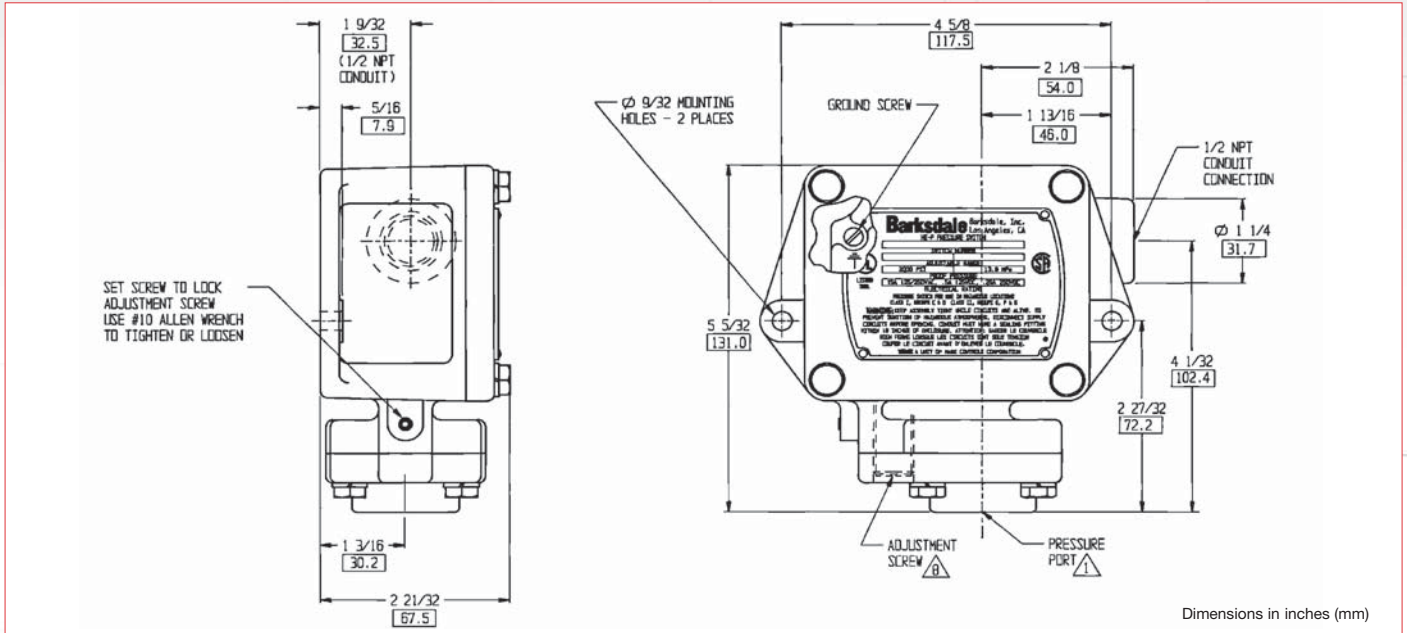
Wiring Diagram



Explosion Proof Dia-Seal Piston

P1X Series

Technical Drawing



Product Configurator

Example		P1X	-H	85	SS		
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H Hermetically sealed limit switch option
- Class I, Division II (requires HH limit switch)

Enclosure
P1X NEMA 7 & NEMA 9 enclosure

Limit Switch¹

-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC (standard for 30, 85, and 340 ranges)
-F	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; 0.2 amps @ 250 VDC
-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard for 600 range)
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC with elastomer boot (standard for 1600 range)
-K	10 amps @ 125/250/480 Vac; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-M	10 amps @ 125/250 VAC; 3 amps @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-GH	1 amp @ 125 VAC gold contacts
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

Options

- P2** 1/2" NPT pressure fitting (available only with stainless steel models)
- FX** NEMA 4X enclosure
- Sxxx** Factory preset (consult factory)

Diaphragm/O-Ring

- Blank** Buna-N diaphragm
- T** Teflon
- V** Viton® diaphragm (not available for 1600 Range)

Pressure Fitting

- Blank** Anodized aluminum, 1/4" NPT female
- SS** Stainless steel, 1/4" NPT female

Pressure Range

	Adjustable Range				Approx. Deadband ² (Actuation Value)	Proof Pressure
	Decreasing - psi (bar)		Increasing - psi (bar)			
	Min	Max	Min	Max	psi-(bar)	psi (bar)
30	.5 (.03)	28.5 (1.9)	1 (.1)	30 (2)	.1 - 1.5 (.07 - .1)	2000 (133)
85	3 (.2)	81.5 (5.4)	4 (.3)	85 (5.7)	.25 - 3.5 (.02 - .23)	2000 (133)
340	6 (.4)	331.5 (22)	7 (.5)	340 (23)	1 - 8.5 (.07 - .6)	2000 (133)
600	25 (1.7)	581 (39)	27 (1.8)	600 (40)	2 - 19 (.13 - 1.3)	2000 (133)
1600	400 (27)	1520 (101)	480 (32)	1600 (107)	20 - 80 (1.3 - 5.3)	2000 (133)

¹ Consult sales drawing for specific deadband values
² Deadband values indicated when used with the "standard" limit switch

Pressure

Explosion Proof Compact Switch

Series 9671X, 9681X, 9692X

Features

- ▶ ATEX approved
- ▶ NEMA 4X, 7 & 9
- ▶ NACE compliant
- ▶ SPDT and DPDT switch
- ▶ Safe to adjust during operation
- ▶ Dia-seal/piston sensor
- ▶ Dual sealed for DIV 1 & DIV 2 applications

Applications

- ▶ BOP closing units
- ▶ Safety panels
- ▶ Pipelines
- ▶ Chemical and petrochemical plants
- ▶ Pulp and paper mills
- ▶ Pump and gas compressors
- ▶ Turbines
- ▶ Oil & gas applications



General Specifications*

Accuracy:	±2% of full scale
Typical Life:	2.5 million cycles
Switch:	SPDT, snap action, Class CC simulated DPDT (optional)
Wetted Parts:	
Process Fitting:	316 stainless steel
Seals:	Viton® Diaphragm (9671X & 9681X) Viton® O-ring and Teflon® backup ring (9692X)
Piston:	Stainless steel (on 9692X)
Enclosure:	316 stainless steel
Electrical Connection:	1/2" NPT male conduit connection, 18 AWG, 18" (300 mm) free leads
Electrical Rating:	11 amps @ 125/250VAC 5 amps @ 30 VDC (CC Class)
Enclosure Ratings:	NEMA 4X, 7 & 9

* See product configurator for additional options.

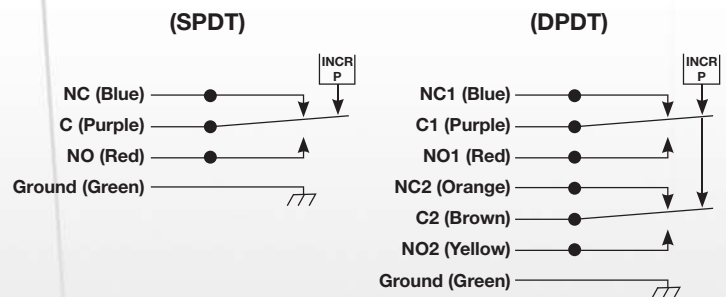
Pressure Connection:	1/4" NPT female
Approvals:	CE 0081, LCIE 08 ATEX 6074X II 2 G, Ex d IIC T6
UL # E37043 CSA # LR22354	UL&CSA Approved for use in hazardous locations Class I, Groups A,B,C,& D; Class II, Groups E,F,& G (Group A, UL Only)
Ambient Temperature:	-20° to +165°F (-29° to +74°C)
EMI/RFI:	EN55011
Vibration:	10g's 10-500 Hz, MIL-STD202F
Shock:	50g's, 11 ms, MIL-S-901C
Adjustment:	Internal adjustment wheel with built in set-screws (#6) ¹
Shipping Weight:	Approximately 1.85 lbs.

¹ Need to loosen set screw (#6) at all times when resetting adjustment.

Wiring Code

Lead	9692X/9681X (Pressure)		9671X (Vacuum)	
	Circuit #1	Circuit #2	Circuit #1	Circuit #2
Normally Open	Red	Yellow	Blue	Orange
Common	Purple	Brown	Purple	Brown
Normally Closed	Blue	Orange	Red	Yellow
Ground	Green		Green	

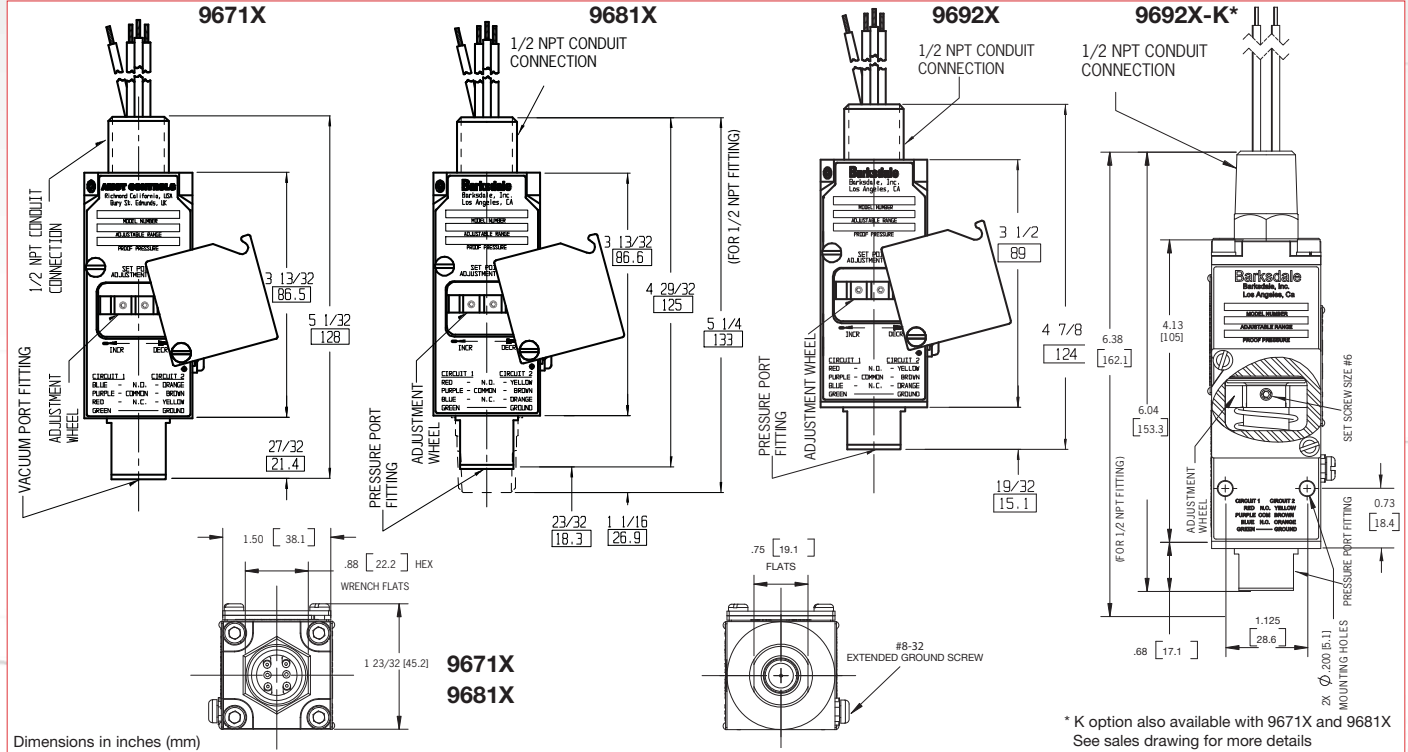
Wiring Diagram



Explosion Proof Compact Switch

Series 9671X, 9681X, 9692X

Technical Drawings



Product Configurator

Example: **9681X -1CC -2 -K -W036**

Base Model

9671X	Vacuum switch, 1 - 30 in. Hg.
9681X	Pressure switch, 2 - 500 psi
9692X	Pressure switch, 100 - 7500 psi

Limit Switch

-1CC	SPDT Switch, 11 amps @ 125/250 VAC; 5 amps @ 30 VDC
-2CC	DPDT Switch, 11 amps @ 125/250 VAC; 5 amps @ 30 VDC
-1GH	SPDT gold contact switch, 1 amp @ 125 VAC
-2GH	DPDT gold contact switch, 1 amp @ 125 VAC

Pressure Ranges for 9681X & Vacuum Ranges for 9671X

		Adjustable Range				Approx. Deadband ¹ (Actuation Value)	Proof Pressure
		Decreasing - psi (bar)		Increasing - psi (bar)			
		Min	Max	Min	Max		
9671X	Blank	1" Hg	21" Hg	5" Hg	30" Hg	4 - 9" Hg	30" Hg
9681X	-1	2 (.1)	12 (.8)	3 (.2)	15 (1)	1 - 3 (.07 - .2)	1000 (69)
	-2	5 (.3)	125 (8.6)	7 (.5)	150 (10.3)	2 - 25 (.1 - 1.7)	1000 (69)
	-3	25 (1.7)	260 (17.9)	32 (2.2)	300 (20.6)	7 - 40 (.5 - 2.8)	1000 (69)
	-4	50 (3.4)	440 (30.3)	65 (4.5)	500 (34.4)	15 - 60 (1 - 4.1)	1000 (69)

NOTES:

- Deadband values indicated when used with the "CC" limit switch
- Contact factory for other possible connection options

Options

- Wxxx Extra wire length (XXX = inches)
- Sxxx Factory preset (consult factory)

-K Mounting holes and conduit wrench flats

-T Wire locking for adjustment cover (no UL, CSA, ATEX)

Process Connection²

- Blank 1/4" NPT Female (standard)
- P1 7/16-20 SAE female process connection

Wetted Material

- Blank Viton® diaphragm/O-rings (standard)
- B Buna-N diaphragm/O-rings
- E EPR diaphragm/O-rings (UL, CSA, and ATEX not available for this option)

Pressure Range for 9692X

9692X		Adjustable Range				Approx. Deadband ¹ (Actuation Value)	Proof Pressure
		Decreasing - psi (bar)		Increasing - psi (bar)			
		Min	Max	Min	Max		
-1	100 (6.9)	600 (41.4)	150 (10.3)	750 (51.7)	50 - 150 (3.4 - 10.3)	15000 (1034)	
-2	150 (10.3)	800 (55.2)	220 (15.2)	1000 (69)	70 - 200 (4.7 - 13.8)	15000 (1034)	
-3	400 (27.6)	2600 (179)	500 (34.5)	3000 (207)	100 - 400 (6.7 - 27.6)	15000 (1034)	
-4	700 (48.2)	4400 (303)	840 (57.9)	5000 (345)	140-600 (9.6 - 41.4)	15000 (1034)	
-5	1000 (69)	6700 (462)	1200 (82.8)	7500 (517)	140-800 (9.6 - 55.2)	15000 (1034)	
-6	150 (10.3)	800 (55.2)	220 (15.2)	3000 (207)	50-1000 (3.4-68.9)	15000 (1034)	

Electr. Dual Pressure Switch

Type UDS 7 - Ex

Electronic pressure switch for pressure control in explosion-proof areas with internal stainless steel diaphragm, digital display, 2 solid state contacts accord. to Namur DIN 19234 and 1 analog output, linearity error 0.5 % f. s.

Features

Intrinsically safe accord. to ATEX, alphanumeric 4-digit LCD display, microprocessor controlled, self monitoring with error display, all parameters are configured by keypad, adjustable keypad lock, various access levels, rugged stainless steel construction

Measuring ranges

0...1 bar 0...10 bar, absolute pressure
-1...0 bar; 0...0.2 bar to 0...600 bar; relative pressure


Applications

Gas compressors, process / chemical technology
test bed and apparatus engineering,
injection moulding machines

Technical Data



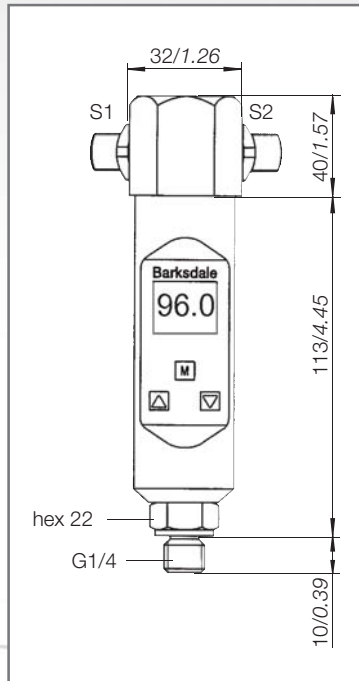
Sensor element:	Piezoresistive silicon measuring cell				
Materials:	Wetted parts: Stainless steel, mat. no. 1.4301 Electronics housing: Stainless steel, mat. no. 1.4571 Seals: FKM (standard), EPDM				
Operating elements:	3 easy-response pushbuttons				
System of protection:	IP65 plug				
Protection class:	---				
Process connection:	G1/4 M				
Dimensions:	32 x 163 mm				
Weight:	approx. 250 g				
Measuring ranges [bar]:	10	50	100	200	400
Proof pressure [bar]:	15	75	150	300	600
Linearity error:	±0.5 % v. f. s. at 25 °C				
A/D converter:	Resolution: 12 bit (4096 steps per measuring span) Scanning rate: 100/s (for peak value memory)				
Electrical connection:	Plug M12 x 1; 4-pin, female / male thread				
Temperature influence:	±0.2 % f. s. /10K (20 °C)				
Compensation range:	-10 °C... +70 °C				
Repeatability:	±0.1 % v. f. s.				
Temperature range:	Medium: 0 °C... +60 °C Operating range: 0 °C... +60 °C Storage: -10 °C... +65 °C				

Max. ambient temperature	-20 °C... +80 °C
Power supply:	18...28 V DC, intrinsically safe acc. to ATEX
On-status display:	4-digit LCD display, digit height 10 mm 5/s 0.0 s ... 9.9 s adjustable on LCD display
Power consumption:	approx. 40 mA at $U_b = 24$ V DC
Analog output:	Current output: Load: Load influence: Adjustment range:
Transistor switching outputs:	Switching function: Adjustment range: Switching frequency: Delay: Status display:
Item designation	 II 1/2 G EEx ia IIC T4 category 1, 2
Certificate no.:	TÜV 02 ATEX 1879X

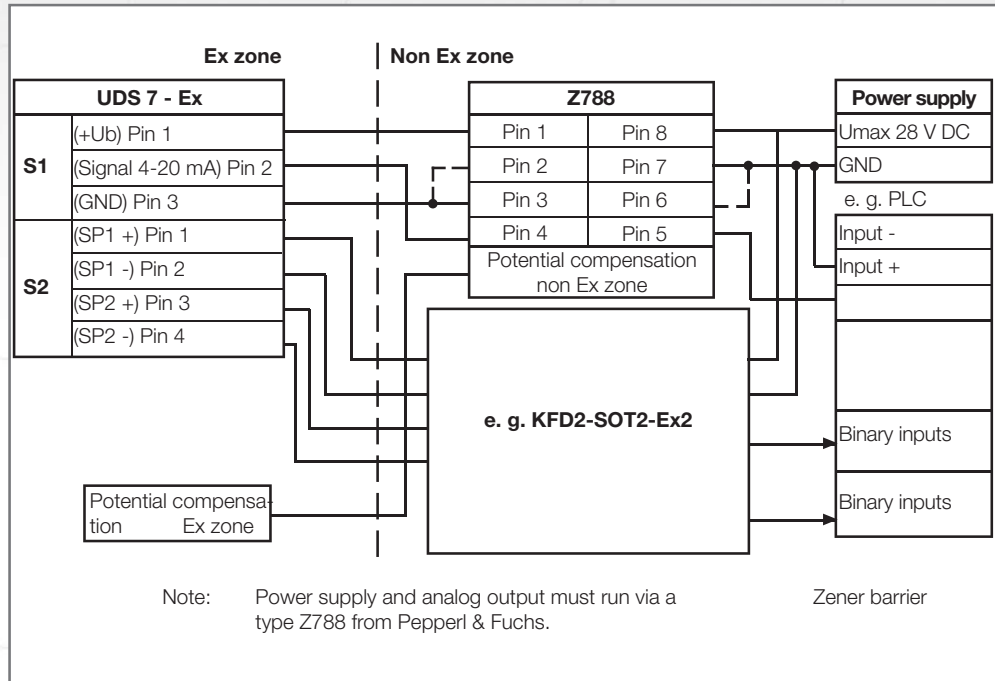
Electr. Dual Pressure Switch

Type UDS 7 - Ex

Dimensions (in mm / inch)



Connection scheme

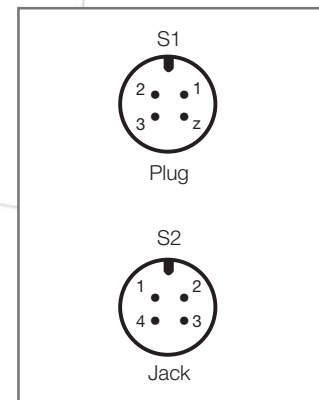


Order Numbers

2 solid state outputs acc. to Namur DIN 19234, analog output 4... 20 mA, plug/load M12x 1, 4-pin		
Measuring ranges	Process connection: G1/4 M	Process connection: G1/2 M
0... 10 bar relative	0427-818	0427-879
0... 50 bar relative	0427-819	0427-880
0... 100 bar relative	0427-820	0427-881
0... 200 bar relative	0427-821	0427-882
0... 400 bar relative	0427-822	0427-883
0... 600 bar relative	0427-866	0427-884

Further measuring ranges on request

Plug



Accessories

Order Number	Description
0499-016	Adapter G1/4 IG - G1/4 male thread for optimum alignment of pressure switch
0499-002	Wall mounting brackets, stainless steel
901-0677	Damping screw with 0.2 mm restriction against quick pressure changes and high pulsation rate
907-0357	S1 plug M12 x 1, 4-pin, female thread, with screw terminals
907-0418	S2 plug M12 x 1, 4-pin, male thread, with screw terminals
909-0482	Zener barrier type Z788 with potential compensation
909-0483	Isolation amplifier type KFD2-SOT2-Ex2

Transducer

Explosion Proof Transducer (Amplified) *Series 423X, 425X, 426X*

Features

- ▶ Diffused silicon sensor for high accuracy
- ▶ Explosion proof enclosure for hazardous locations
- ▶ Superior EMI, ESD and RFI protection
- ▶ Rugged stainless steel construction
- ▶ NEMA 4X, 7 and 9
- ▶ ATEX approved
- ▶ Modular concept
- ▶ Built-in high pressure snubber (2000 psi and above)

Applications

- ▶ Oil & gas pipelines
- ▶ Oil patch
- ▶ Petrochemical plants
- ▶ Refineries
- ▶ Pulp and paper mills
- ▶ Coal and oil fired power plants
- ▶ Cement plants
- ▶ Gas transfers for fuel systems
- ▶ Gas panels
- ▶ Gas mixing systems



General Specifications*

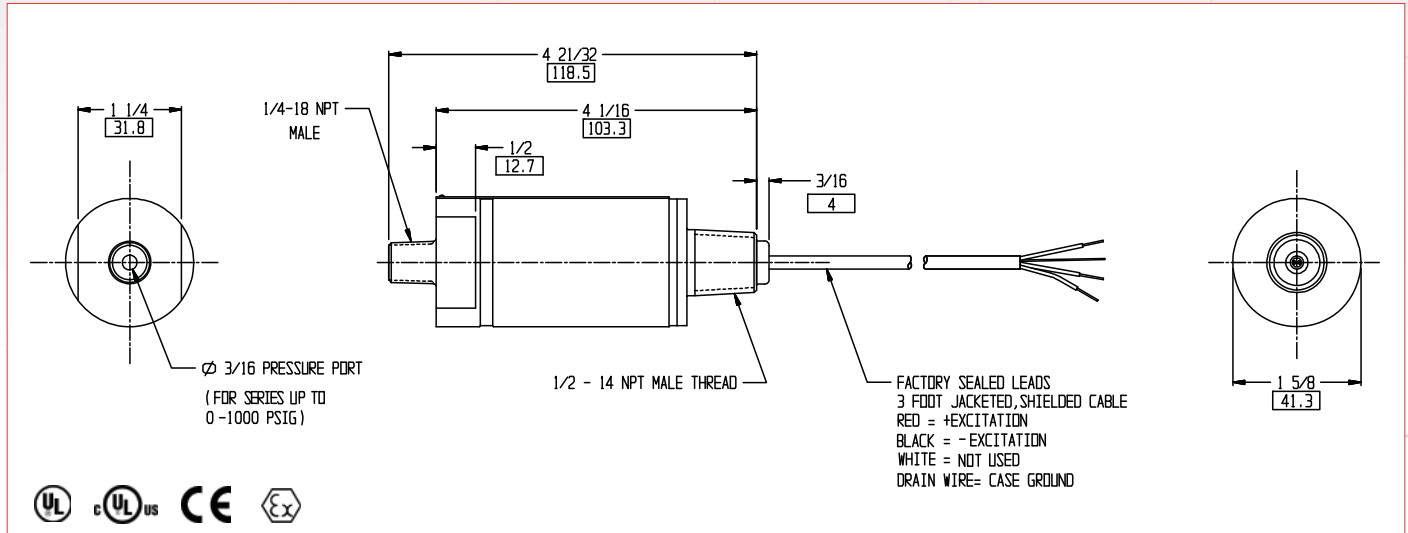
Accuracy (LH & R):	±0.25% FSO
Long Term Stability:	±0.5
Typical Life Cycle:	100 million cycles
Repeatability:	±0.15%
Proof Pressure:	2X rated pressure or 13,000 psi (884 bar), whichever is less
Input:	Excitation voltage: 12 to 28 VDC (see sales drawing)
Supply Current:	15 mA maximum (no load)
Output:	4-20 mA
Wetted Parts:	300 & 17-4 PH series stainless steel
Enclosure:	NEMA 4X, 7 & 9, 300 series stainless steel
Pressure Connection:	1/4-18 NPT male (standard)
Electrical Connection:	1/2-14 NPT male conduit (w/3 conductor, 24 AWG, 3 foot, PVC jacketed & shielded cable).

* See product configurator for additional options.

Temperature Ranges:	
Operating:	-40°F to +185°F (-40°C to +85°C) 0°F to +160°F (-18°C to +71°C)
Compensated:	
Temperature Shift:	±0.0125% per °F over compensated temperature range
Zero and Span:	
Vibration:	15 g's, 10-2000 Hz, MIL-STD 202
Shock:	50 g's, 11 ms, MIL-STD 202 Method 213, Cond. G.
Built-in Protection:	Conducted & radiated RF emissions/ interference to EN 55011 IEC 801-2, -3, -4, -5, and -6 EN/IEC 6100-4-2, -3, -4, -5, -6 Refer to engineering drawing for details.
Weight:	
423X & 426X:	7.4 oz. (221 grams) to 1,000 psi 9.9 oz. (281 grams) 2,000 psi and higher
425X:	7.4 oz. (210 grams) to 1,000 psi 9.4 oz. (266 grams) 2,000 psi and higher
Warranty:	3 years

Explosion Proof Transducer (Amplified) *Series 423X, 425X, 426X*

Technical Drawings



Product Configurator

Example: **425X -04 -A**

Base Model

423X	0.5 - 5.5 VDC analog output
425X	4 - 20 mA analog output
426X	1 - 11 VDC analog output

Pressure Range

-23	0 - 29.9" of Hg
-01	0 - 15 psi (0 - 1 bar) ²
-21	0 - 30 psi (0 - 2.1 bar) ²
-22	0 - 60 psi (0 - 4.1 bar) ²
-03	0 - 50 psi (0 - 3.5 bar) ²
-04	0 - 100 psi (0 - 6.9 bar) ²
-05	0 - 150 psi (0 - 10.3 bar) ²
-06	0 - 200 psi (0 - 12.8 bar) ²
-07	0 - 300 psi (0 - 20.7 bar) ²
-08	0 - 500 psi (0 - 34.5 bar)
-19	0 - 600 psi (0 - 41 bar)
-10	0 - 1,000 psi (0 - 69 bar)
-12	0 - 2,000 psi (0 - 138 bar)
-13	0 - 3,000 psi (0 - 207 bar)
-14	0 - 4,000 psi (0 - 276 bar)
-15	0 - 5,000 psi (0 - 345 bar)
-16	0 - 6,000 psi (0 - 414 bar)
-17	0 - 7,500 psi (0 - 517 bar)
-18	0 - 10,000 psi (0 - 689 bar)

Blank	Gauge pressure (standard)
-A	Absolute pressure range (<300psi)

Process Connection

Blank	1/4-18 NPT male (standard)
-P1	7/16-20 UNF-2B female
-P3	7/16-20 UNF-2B male

Options

-Z10	1 to 5V output (available only on 423X models)
-Z11	1 to 6V output (available only on 423X models)
-Z12	0.5 to 4.5V output (available only on 423X models)
-Z16	2 to 10V output (available only on 426X models)
-Z15	Calibrated in bars
-Z17 ³	For high pressure models with larger orifice
-Z18	Z17 and Z10 options combined
-ZXXY	Special pressure ranges (see note 1)
-WXXX	Additional length of free leads (in inches)

Note 1: Add suffix ZXXY for special pressure range calibration. XX = significant digits. Y = number of trailing zeros. Example: 130 psi calibration: add -Z131

2: Available in absolute range

3: For pressure >10kpsi with a 3/16 diameter pressure port orifice, no surge protector will be offered.

4: Minimum quantities may apply.

Transducer

Intrinsically Safe Transducer

Series 443, 445, 446

Features

- ▶ High accuracy
- ▶ Protection in hazardous environments, Class I, Div 2
- ▶ Superior EMI, ESD and RFI protection
- ▶ Rugged all-welded stainless steel construction
- ▶ NEMA 4X
- ▶ Built-in high pressure snubber (2000 psi and above)
- ▶ cUL, CE approved

Applications

- ▶ Oil & gas pipelines
- ▶ Oil patch
- ▶ Petrochemical plants
- ▶ Refineries
- ▶ Pulp and paper mills
- ▶ Coal and oil fired power plants
- ▶ Cement plants
- ▶ Gas transfers for fuel systems
- ▶ Gas panels
- ▶ Gas mixing systems

General Specifications*



Accuracy (LH & R):	±0.25% BSL
Long Term Stability:	±0.5% FSO of calibration curve
Typical Life Cycle:	100 million cycles
Proof Pressure:	2 times rated pressure or 13,000 psi max. (884 bar), whichever is less
Input:	
443:	Excitation voltage: 9 to 28 VDC
446:	Excitation voltage: 14 to 28 VDC
445:	Excitation voltage: 12 to 28 VDC
Supply Current:	3.0 mA maximum (no load)
Output:	
443:	Output: 0.5 to 5.5 VDC Full scale output: 5.0 VDC ± 0.8% Zero output: 0.5 VDC ± 0.4%
446:	Output: 1 to 11 VDC Full scale output: 10 VDC ± 0.4% Zero output: 1.0 VDC ± 0.2%
445:	Output: 4 to 20 mA Full scale output: 16 mA ± 0.4% Zero output: 4 mA ± 0.2%
Wetted Parts:	17-4 PH & 300 series stainless steel
Enclosure:	NEMA 4, 300 series stainless steel

* See product configurator for additional options.

Wiring Code

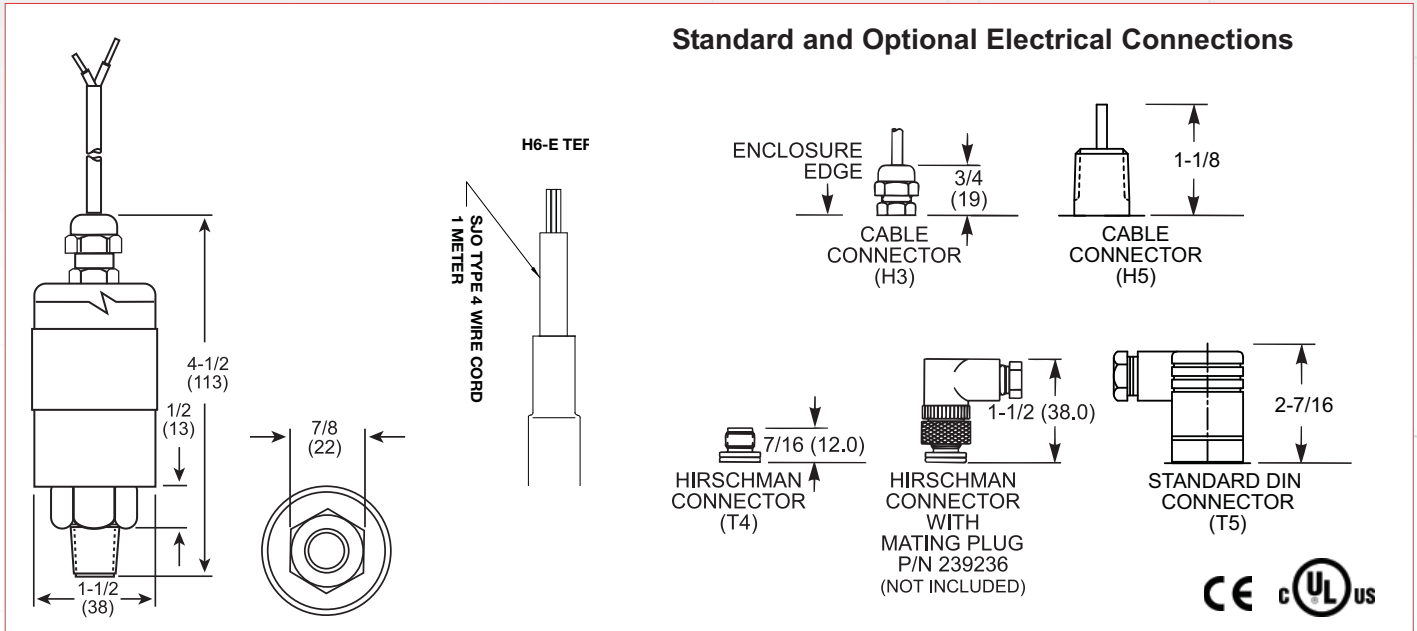
MILLIVOLT SERIES - 443 & 446		
(T4/T5)	(H3/H5)	Signal
1	Red	+ Excitation
3	White	+ Output
2	Black	Common
4	Bare	Drain
MILLIAMPER SERIES - 445		
1	Red	+ Excitation
4	White	- Excitation
3	Black	Drain

Pressure Connection:	1/4"-18 NPT male
Electrical Connection:	3 conductor for voltage series and 2 conductor for current series, 24 awg, PVC jacketed, shielded cable, 3 ft. (1 m) long with integral strain relief and case ground (standard).
Temperature Ranges:	
Operating:	0° to 160°F (-18° to 71)°C
Compensated:	30° to 160°F (-1° to 71)°C
Storage:	-40° to 185°F (-40° to 85)°C
Temperature Shift:	
Zero & Span:	0.0125% per °F over compensated range 75°F reference
Vibration:	15 g's, 10-2000 Hz, MIL-STD 202
Shock:	50 g's, 11 ms, MIL-STD 202 Method 213, Cond. G.
Approvals:	Intrinsically safe pressure transducers are UL cUL approved as telemetering equipment for use in hazardous locations (UL File E146589, WYMV, WYMV7) as follows: Class I, Div. 1, Groups A, B, C & D Class II, Groups E, F & G, when installed in accordance with control drawing 272148. 1/2" NPT male conduit models and 1/2" NPTF conduit/DIN connector models are also UL listed as nonincendive devices, approved for use in Class I, Div. 2, Groups A, B, C, D, Class II, Groups F & G, hazardous locations (without barriers).
Weight:	
443 & 446:	7.4 oz. (221 grams) to 1000 psi 9.9 oz. (281 grams) 2,000 psi and higher
445:	7.4 oz. (210 grams) to 1000 psi 9.4 oz. (266 grams) 2,000 psi and higher
Warranty:	3 year warranty

Intrinsically Safe Transducer

Series 443, 445, 446

Technical Drawings



Product Configurator

Example: **445 H3 -05 A**

Base Model

443	0.5 - 5.5 VDC analog output
445	4 - 20 mA analog output
446	1 - 11VDC analog output

Electrical Connection

H3	Shielded & jacketed #22 AWB cable (1 meter) (standard)
H5	Shielded & jacketed cable with 1/2" male conduit
H6	SJO cable type (1 meter)
T4 ¹	M12 Hirschman connector (ELST 412 PG9)
T5	Standard DIN connector (43650) - mating connector included

Accessories

Order #	Description
239236	Hirschman mating connector (T4 electrical option)
208360	Pressure snubber (1/4-18 NPT female/male)

Pressure Range

-23	0 - 29.9" of Hg
-25	0 - 5 psi (0 - 0.35 bar)
-01	0 - 15 psi (0 - 1 bar) ³
-21	0 - 30 psi (0 - 2 bar) ³
-03	0 - 50 psi (0 - 3.5 bar) ³
-22	0 - 60 psi (0 - 4 bar) ³
-04	0 - 100 psi (0 - 6.9 bar) ³
-05	0 - 150 psi (0 - 10.3 bar) ³
-06	0 - 200 psi (0 - 12.8 bar) ³
-07	0 - 300 psi (0 - 20.7 bar) ³
-08	0 - 500 psi (0 - 34.5 bar)
-19	0 - 600 psi (0 - 41 bar)
-10	0 - 1,000 psi (0 - 69 bar)
-12	0 - 2,000 psi (0 - 138 bar) ⁴
-13	0 - 3,000 psi (0 - 207 bar) ⁴
-14	0 - 4,000 psi (0 - 276 bar) ⁴
-15	0 - 5,000 psi (0 - 345 bar) ⁴
-16	0 - 6,000 psi (0 - 414 bar) ⁴
-17	0 - 7,500 psi (0 - 517 bar) ⁴
-18	0 - 10,000 psi (0 - 689 bar) ⁴

Options

-E	External adjustment - Zero/Span (5pc min)
-Z10	1 to 5V output (available only on 443 models)
-Z11	1 to 6V output (available only on 443 models)
-Z12	0.5 to 4.5V output (available only on 443 models)
Z16	2 to 10V output (available only on 446 models)
-Z15	Calibrated in 'bars'
-Q36	316 SS fitting ⁵
-ZXXY	Special pressure ranges (see note 2)
-WXXX	Additional length of free leads (in inches) (with H3, H5 & H6 connection)

Process Connection

Blank	1/4-18 NPT male (standard)
-P1	7/16-20 UNF-2B female
-P3	7/16-20 UNF-2A male
-P4	1/2" NPT male
-P5	1/2" NPT female
-P6	1/4" NPT female

Blank	Gauge pressure
A	Absolute pressure range (<300psi)

¹ Mating connector: Hirschman # ELWIK 4021 PG7 or equivalent (not included). Order number: 239236

² Add suffix ZXXY for special pressure ranges. XX = significant digits. Y = number of trailing zeros.

Example: for 230psi calibration, add Z231

³ Available in absolute ranges

⁴ Built-in surge protector

⁵ Available with 445 models

Transducer

Non-Incendive Transducer

Series 433, 435, 436

Features

- ▶ High accuracy
- ▶ Protection in hazardous environments, Class I, Div 2
- ▶ No safety barriers required
- ▶ Rugged all-welded stainless steel construction
- ▶ Superior EMI, ESD and RFI protection
- ▶ NEMA 4X
- ▶ Built-in high pressure snubber (2000 psi and above)

Applications

- ▶ Oil & gas pipelines
- ▶ Coal and oil fired power plants
- ▶ Oil patch
- ▶ Cement plants
- ▶ Petrochemical plants
- ▶ Gas transfers for fuel systems
- ▶ Refineries
- ▶ Gas panels
- ▶ Pulp and paper mills
- ▶ Gas mixing systems



General Specifications*

Accuracy (LH & R):	±0.25% BSL
Long Term Stability:	±0.5% FSO of calibration curve
Typical Life Cycle:	100 million cycles
Proof Pressure:	2 times rated pressure or 13,000 psi max. (884 bar), whichever is less
Input:	
433:	Excitation voltage: 9 to 30 VDC
436:	Excitation voltage: 14 to 30 VDC
435:	Excitation voltage: 12 to 28 VDC
Supply Current:	3.0 mA maximum (no load)
Min. Load Resistance:	2K ohms (voltage series)
Output:	
433:	Output: 0.5 to 5.5 VDC Full scale output: 5.0 VDC ± 0.8% Zero output: 0.5 VDC ± 0.4%
436:	Output: 1 to 11 VDC Full scale output: 10 VDC ± 0.4% Zero output: 1.0 VDC ± 0.2%
435:	Output: 4 to 20 mA Full scale output: 16 mA ± 0.4% Zero output: 4 mA ± 0.2%
Wetted Parts:	17-4 PH & 300 series stainless steel
Enclosure:	NEMA 4, 300 series stainless steel
Pressure Connection:	1/4"-18 NPT male

* See product configurator for additional options.

MILLIVOLT SERIES - 433 & 436		
(T4/T5)	(H3/H5)	Signal
1	Red	+ Excitation
3	White	+ Output
2	Black	Common
4	Bare	Drain
MILLIAMPER SERIES - 435		
1	Red	+ Excitation
4	White	- Excitation
3	Black	Drain

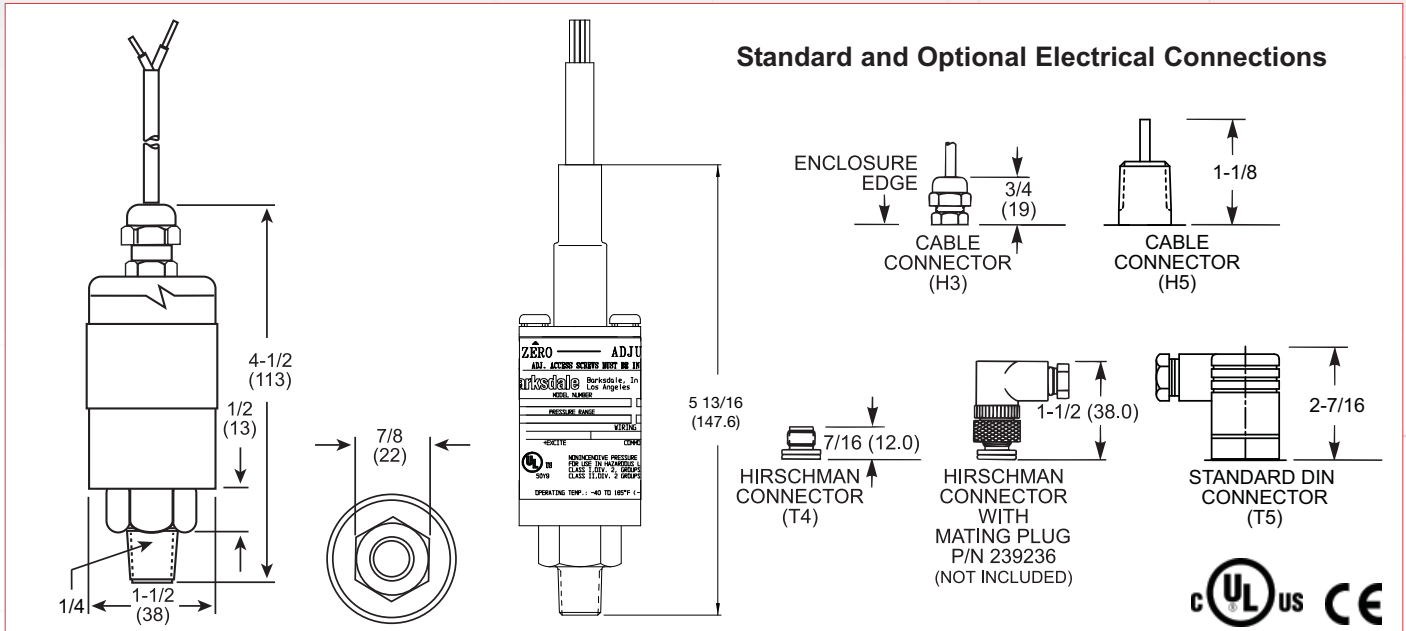
◀ Wiring Code

Electrical Connection:	3 conductor for voltage series and 2 conductor for current series, 24 awg, PVC jacketed, shielded cable, 3 ft. (1 m) long with integral strain relief and case ground (standard).
Temperature Ranges:	
Operating:	0° to 160°F (-18° to 71)°C
Compensated:	30° to 160°F (-1° to 71)°C
Storage:	-40° to 185°F (-40° to 85)°C
Temperature Shift:	
Zero Balance:	±2% FS @ 75F
Span Accuracy:	±1% FS @ 75F
Vibration:	15 g's, 10-2000 Hz, MIL-STD 202
Shock:	50 g's, 11 ms, MIL-STD 202 Method 213, Cond. G.
Approvals:	Nonincendive pressure transmitters are UL cUL approved as telemetering equipment for use in Div. 2 hazardous locations as follows: Class I, Div. 2, Groups A, B, C & D Class II, Div. 2 Groups F & G Agency approval varies by electrical termination type as follows: H5(-E), H6(-E) & (-E) models are cULus listed in UL File E146589, (WYMV, WYMV7). H3(-E), T4(-E) & T5 (-E) models are cURus recognized components in UL File E146589, (WYMV2, WYMV8).
Weight:	
433 & 436:	7.4 oz. (221 grams) to 1,000 psi 9.9 oz. (281 grams) 2,000 psi and higher
435:	7.4 oz. (210 grams) to 1,000 psi 9.4 oz. (266 grams) 2,000 psi and higher
Warranty:	3 year warranty

Non-Incendive Transducer

Series 433, 435, 436

Technical Drawings



Product Configurator

Example: **433 H3 -21**

Base Model

433	0.5 - 5.5 VDC analog output
435	4 - 20 mA analog output
436	1 - 11 VDC analog output

Electrical Connection

H3	Shielded & jacketed #22 AWB cable (1 meter), recognized component (standard)
H5	Shielded & jacketed cable with 1/2" male conduit, UL/CSA
H6	SJO cable type (1 meter). UL/CSA
T4 ¹	M12 Hirschman connector (ELST 412 PG9), recognized component
T5	Standard DIN connector (43650) - mating connector included, UL recognized component

Accessories

Order #	Description
239236	Hirschman mating connector (T4 electrical option)
208360	Pressure snubber (1/4-18 NPT female/male)

Pressure Range

-23	0 - 29.9" of Hg
-25	0 - 5 psi (0 - 0.35 bar)
-01	0 - 15 psi (0 - 1 bar) ³
-21	0 - 30 psi (0 - 2 bar) ³
-03	0 - 50 psi (0 - 3.5 bar) ³
-22	0 - 60 psi (0 - 4 bar) ³
-04	0 - 100 psi (0 - 6.9 bar) ³
-05	0 - 150 psi (0 - 10.3 bar) ³
-06	0 - 200 psi (0 - 12.8 bar) ³
-07	0 - 300 psi (0 - 20.7 bar) ³
-08	0 - 500 psi (0 - 34.5 bar)
-19	0 - 600 psi (0 - 41 bar)
-10	0 - 1,000 psi (0 - 69 bar)
-12	0 - 2,000 psi (0 - 138 bar) ⁵
-13	0 - 3,000 psi (0 - 207 bar) ⁵
-14	0 - 4,000 psi (0 - 276 bar) ⁵
-15	0 - 5,000 psi (0 - 345 bar) ⁵
-16	0 - 6,000 psi (0 - 414 bar) ⁵
-17	0 - 7,500 psi (0 - 517 bar) ⁵
-18	0 - 10,000 psi (0 - 689 bar) ⁵

Options

-E	External adjustment - Zero/Span
-Z10	1 to 5V output (available only on 433 models)
-Z11	1 to 6V output (available only on 433 models)
-Z12	0.5 to 4.5V output (available only on 433 models)
-Z16	2 to 10V output (available only on 436 models)
-Z15	Calibrated in 'bars'
-Z17 ⁴	For high pressure models with larger orifice
-ZXXY	Special pressure ranges (see note 2)
-WXXX	Additional length of free leads (in inches) (H3 & H6 connection)

Process Connection

Blank	1/4-18 NPT male (standard)
-P1	7/16-20 UNF-2B female
-P3	7/16-20 UNF-2A male
-P4	1/2" NPT male
-P5	1/2" NPT female
-P6	1/4" NPT female

Blank	Gauge pressure
-A	Absolute pressure range (<300psi)

¹ Mating connector: Hirschman # ELWIKA 4021 PG7 or equivalent (not included). Order number: 239236

² Add suffix ZXXY for special pressure ranges. XX = significant digits. Y = number of trailing zeros.

Example: for 230psi calibration, add Z231

³ Available in absolute ranges

⁴ For pressure >10kpsi with a 3/16 diameter pressure port orifice, no surge protector is offered.

⁵ Built-in surge protector

Temperature

Explosion Proof Temperature Switches

Series T1X, T2X, L1X

Features

- ▶ Explosion-proof for hazardous locations
- ▶ High accuracy
- ▶ Remote, local or ambient sensing
- ▶ UL, CSA & ATEX approved
- ▶ NEMA 4, 7, 9 & IP65

Applications

- ▶ Oil & gas
- ▶ Heat tracing
- ▶ Printing machinery
- ▶ Compressors
- ▶ Process equipment
- ▶ Machine tools and industrial equipment



General Specifications*

Accuracy:	±1% of mid-60% of full range. At constant ambient +/- 0.5% of full scale.
Switch:	
Single Setting:	One (1) single pole double throw (SPDT) circuit.
Dual Setting:	Two (2) independent single pole double throw (SPDT) circuits.
Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. and CSA listed single pole double throw snap-action switching elements. Switches may be wired normally open or normally closed.
Wetted Parts:	304 stainless steel
Electrical Connection:	Single: 3-pin terminal strip Dual: 6-pin terminal strip
Electrical Ratings:	AC value at 75% power factor —10 amps 125, 250 volts AC, 3 amps 480 volts AC. Automatically reset by snap-action of switch.
Enclosure/Housing:	Designed for hazardous locations: Class I, Division 1 & 2 NEMA 4, 7, 9 & IP65 tamper-proof external adjustment, enclosed terminal strip.

Local Mount:	Immersion length 2-1/16 inches
Bulb & Capillary:	6 and 12 foot length standard.
Approvals:	Underwriters' Laboratories, Inc. and Canadian Standard Assoc. are listed under Temperature indicating and regulating equipment, for use in hazardous locations, Class I, Groups B, C and D; Class II, Groups E, F and G.
UL (standard):	File No. E58658, Guide No. XBDV
CSA (standard):	File No. LR34556, Guide 400-E-O.8. Class 4868.
ATEX (optional):	EX models are ATEX certified per ISSeP 03 ATEX 121 & made as follows: CE 0081 II2 GD EEx d IIC T6 T85° C
Temperature Range:	See product configurator
Adjustment:	Tamper resistant external adjustment. Turn knob clockwise to increase setpoint.
Standard Options/Modifications:	For thermowells, split nuts and union connections, see accessory pages.
Weight:	Single - approximate 3.0 lbs. Dual - approximate 7.0 lbs.

* See Product Configurator for additional options.

Wiring Code

Lead	Circuit #1	Circuit #2
Normally Closed	Blue	Orange
Common	Purple	Brown
Normally Open	Red	Yellow

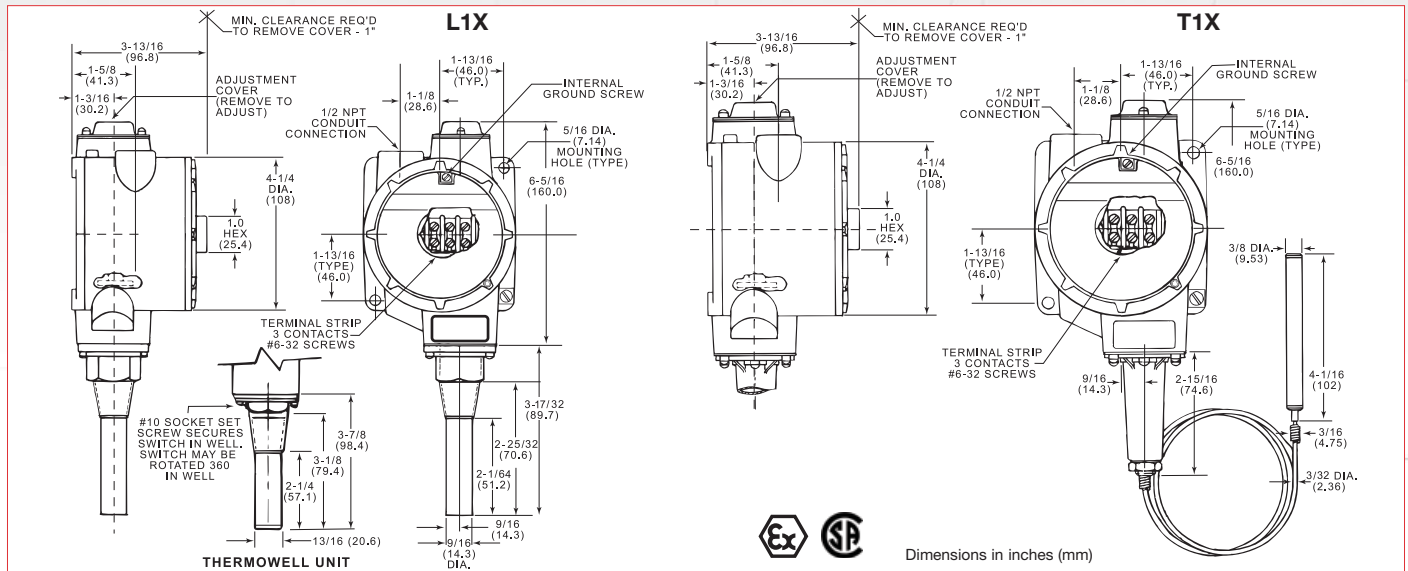
Wiring Diagram



Explosion Proof Temperature Switches

Series T1X, T2X, L1X

Technical Drawing



Product Configurator

Example H T 1 X -HH 251 S -12 -A

Hermetically Sealed

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC or HH limit switch)

Sensing Type

T Remote bulb & capillary
L Local mount

Set Point

1 Single setpoint (SPDT)
2 Dual setpoint (2 SPDT) ¹

Enclosure

X NEMA 4, 7, 9 & IP65 explosion proof enclosure

Limit Switch ²

-H	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (standard)
-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-G	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; MANUAL RESET (only available for T2X) ³
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (with elastomer boot)
-L	15 amps @ 125/250/480 VAC; 0.03 amps @ 125 VDC; 0.02 amps @ 250 VDC
-M	10 amps @ 125/250 VAC; 3 amp @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-S	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; adjustable differential ⁴
-GH	1 amp @ 125VAC; gold contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC
-CC	Hermetically sealed; 10 amps @ 125/250 VAC
-HH	Hermetically sealed; 5 amps @ 125/250 VAC

¹ Not available with local mount version.

² Changing limit switch will effect deadband; See sales drawing

³ When selecting the manual reset option on dual setting switches (T2X), the manual reset limit switch will be on the high circuit. The low circuit limit switch must be specified by the customer. Only available with T2X.

Wetted Material

Blank Brass sensor
S 304 stainless steel (6ft capillary for remote sensing models)

Capillary Length

Blank Blank = 6 foot capillary
-12 12 ft capillary
-25 25 ft stainless steel capillary with armor (use with the "A" options)

Options

-RD Manual reset (must use when selecting "G" limit switch option) ³
Only available on T2X
-EX ATEX certification
-Sxxx Factory pre-set (consult factory)

Thermowell (Local Mount only)

-WS 316 stainless steel thermowell (local mount only)

Armor Option (Bulb & Capillary only)

Blank Blank if not required
-A 302 stainless steel armor

Temperature Range

Range	Adjustable Range				Media Temperature Limit (Proof)				Differential (Approx.) ²	
	Low	High	Low	High	Low	High	Low	High	°F	°C
154	-50°F	+150°F	-45°C	+66°C	-100°F	+200°F	-73°C	+93°C	1° to 2°	.5° to 1.1°
251	+50°F	+250°F	+10°C	+121°C	-100°F	+300°F	-73°C	+149°C	1° to 2°	.5° to 1.1°
351	+150°F	+350°F	+66°C	+177°C	-100°F	+400°F	-73°C	+205°C	1° to 2°	.5° to 1.1°
601	+300°F	+440°F	+149°C	+227°C	0°F	+650°F	-18°C	+343°C	2° to 4°	1.1° to 2.2°
603	+320°F	+600°F	+160°C	+316°C	0°F	+650°F	-18°C	+343°C	2° to 4°	1.1° to 2.2°

Remote sensor ranges

Range	Adjustable Range				Media Temperature Limit (Proof)				Differential (Approx.) ²	
	Low	High	Low	High	Low	High	Low	High	°F	°C
201	-50°F	+75°F	-45°C	+24°C	-100°F	+250°F	-73°C	+121°C	1° to 3°	.5° to 1.6°
202	+15°F	+140°F	+9°C	+60°C	-100°F	+250°F	-73°C	+121°C	1° to 3°	.5° to 1.6°
203	+75°F	+200°F	+24°C	+93°C	-100°F	+250°F	-73°C	+121°C	1° to 3°	.5° to 1.6°
351	+100°F	+225°F	+38°C	+107°C	-100°F	+400°F	-73°C	+205°C	6° to 9°	3.3° to 5.0°
204	-50°F	+200°F	-45°C	+93°C	-100°F	+250°F	-73°C	+121°C	1° to 3°	.5° to 1.6°
354	+100°F	+350°F	+38°C	+177°C	-100°F	+400°F	-73°C	+205°C	6° to 9°	3.3° to 5.0°
454	+150°F	+450°F	+66°C	+232°C	0°F	+500°F	-18°C	+260°C	3° to 6°	1.6° to 3.3°

Local mount sensor ranges

⁴ When selecting the 'S' adjustable differential limit switch option on a dual setting switch (T2X), a standard 'H' switch will be paired with an 'S' switch. Dual 'S' pricing will apply.

Temperature

Explosion Proof Temperature Switch

Series **TXR, TXL**

Features

- ▶ Explosion-proof
- ▶ High accuracy
- ▶ Line or ambient sensing
- ▶ UL, CSA & ATEX approved

Applications

- ▶ Heat tracing
- ▶ Hydraulic power units
- ▶ Combustion engines
- ▶ Compressors
- ▶ Machine tools and industrial equipment
- ▶ Process equipment



General Specifications*

Accuracy:	±1% of full scale
Switch: Type:	Single pole double throw (SPDT), prewired snap action
Rating:	22 amp @ 125/250/480 VAC
Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. and CSA listed single pole double throw snap-action switching elements. Switches may be wired normally open or normally closed.
Electrical Connection:	3/4" NPT female conduit connection. 3 pole terminal block accepts 16-10 AWG wire.
Enclosure Ratings:	NEMA 4, 7, 9, & IP65
Enclosure/Housing:	Anodized aluminum, explosion proof, painted silver
Bulb and Capillary: Material:	316L stainless steel
Bulb:	8" (203mm), 5/16" (8mm) dia.
Capillary Length:	10' (3m), remote mount only
System Pressure (max):	300 psi without thermowell
Fill:	Silicone oil-filled

* See Product Configurator for additional options.

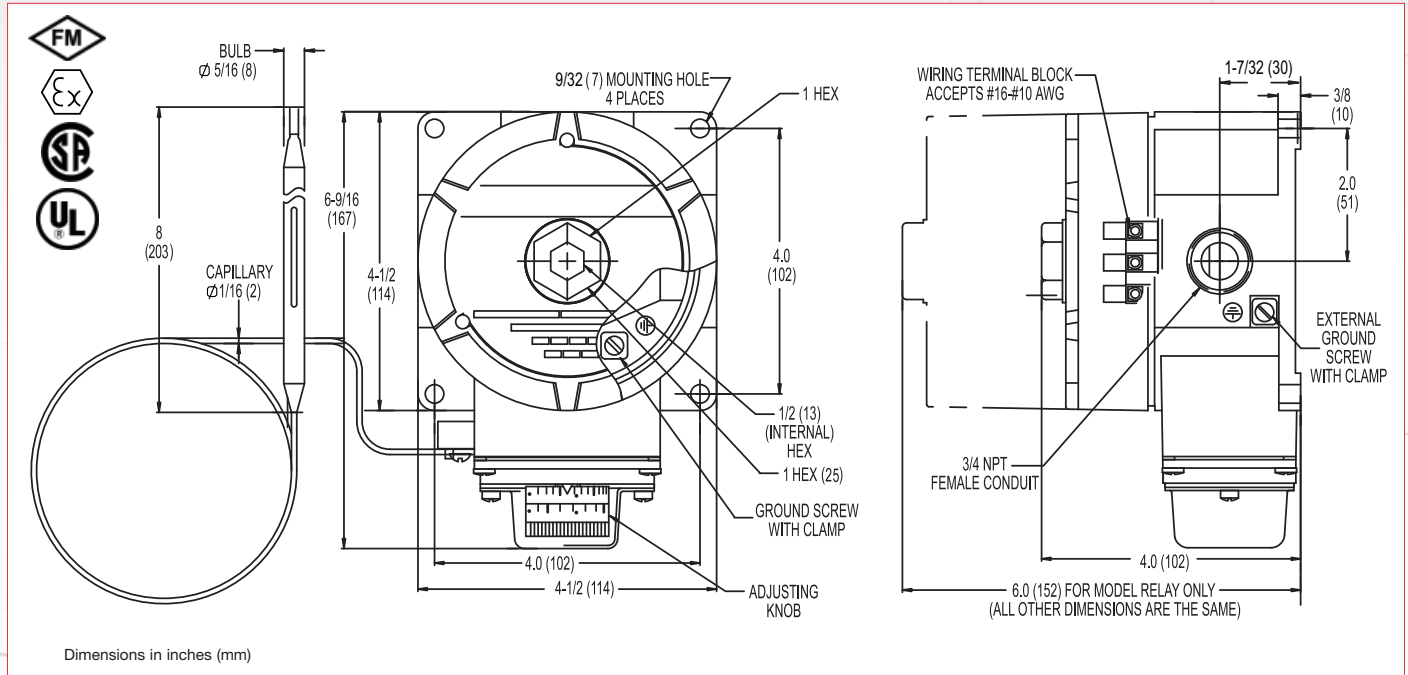
Approvals:	FM, UL file E58658, CSA - file LR 34556 Division 1 and 2, Class I, Group B, C & D Class II, Group E, F & G, Class III. CE 0081, LCIE 07 ATEX 6092X II 2 G D, Ex d IIC T6, Ex tD A21 IP6X T80°C -40°C ≤ Tamb ≤ +60°C (EX NEPSI, GOST-R)
Temperature Range:	-40° to 160°F (-40° to 71°C)
Ambient Temperature:	-40° to 140°F (-40° to 60°C)
Adjustment:	External adjustment knob. Turn knob clockwise to decrease setpoint
ENI/RFI:	to EN 55011
Vibration:	10 g's 10-500 Hz, MIL-STD 202F
Shock:	50 g's, 10 ms, MIL-STD 901C
Standard Options: -R (suffix):	Double pole single throw (DPST) relay 22 amp @ 120/240/277 VAC. Contacts close on falling temperature. Relay Coil: 120 VAC, 4VA. Example: TXR-L2S-10R-Q10
Weight:	3.8 lb (1.7 kg)

Media Temperature Limits	Adjustable Range	Differential (approximate)	Sensing Location	Catalog Number
-40° to 420°F (-40° to 215°C)	25° to 325°F (-4° to 163°C)	10°F (5.6°C)	Line Sensing T-stat	TXR-L2S-10-Q10
-40° to 160°F (-40° to 71°C)	15° to 140°F (-9° to 60°C)	10°F (5.6°C)	Ambient Sensing T-stat	TXL-L1S-Q10

Explosion Proof Temperature Switch

Series TXR, TXL

Technical Drawing



Product Configurator

Example TX R -L 2 S -10 -Q10

Base Configurator

- T Temperature switch
- X NEMA 4, 7, 9 & IP65 explosion proof enclosure

- L¹ Local mount for ambient sensing
- R² Remote bulb & capillary

Limit Switch

- L 22 amp @ 125/250/480 VAC

- Q10 Heat tracing model (standard)

Bulb & Capillary Length & Switch

- For TXL models
- 10 10 ft bulb & capillary for TXR models
- 10R2 22A DPST relay³ with 10 ft bulb & capillary. (For TXR models)

Wetted Material

- S Stainless steel sensor

Temperature Range

Range	Adjustable Range				Media Temperature Limit (Proof)				Differential (Approx.) Liquid	
	°F		°C		°F		°C		°F	°C
	Low	High	Low	High	Low	High	Low	High		
1	+15°	+140°	-9°	+60°	-40°	+160°	-40°	+71°	10°	5.6°
2	+25°	+325°	-4°	+163°	-40°	+420°	-40°	+215°	10°	5.6°

NOTES:

- Use temperature range "1" for local sensing applications
- Use temperature range "2" for remote sensing applications
- DPST switch, 22 amps @ 120/240/277 VAC. Relay Coil: 240 Vac, 4 VA. Contacts close on falling temperature.

Temperature

Compact Explosion Proof Temperature Switch

T9692X

Features

- ▶ Compact design
- ▶ Convenient field adjustability
- ▶ NEMA 4X, 7 & 9
- ▶ SPDT and DPDT switch
- ▶ ATEX approved
- ▶ Class I Div I
- ▶ Direct or remote mount
- ▶ Panel mount capability
- ▶ 316 stainless steel
- ▶ NACE compliant
- ▶ Armored capillary

Applications

- ▶ Offshore platforms
- ▶ Safety panels
- ▶ Chemical plants & refineries
- ▶ Compressor skids
- ▶ Instrument panels
- ▶ Hazardous location applications



General Specifications*

Accuracy:	±3% of full scale
Typical Life:	1 million cycles
Switch:	SPDT, snap action, Class EE, simulated DPDT (optional)
Electrical Ratings:	11 amps @ 125/250 VAC 5 amps @ 30 VDC (EE class)
Materials:	
Bulb, Capillary & Armor:	316 stainless steel
Enclosure:	316 stainless steel
Local Mount Element:	300 series stainless steel
Electrical Connection:	1/2 inch NPT male conduit connection 18 AWG, 18" (300 mm) free leads
Enclosure Ratings:	NEMA 4X, 7 & 9

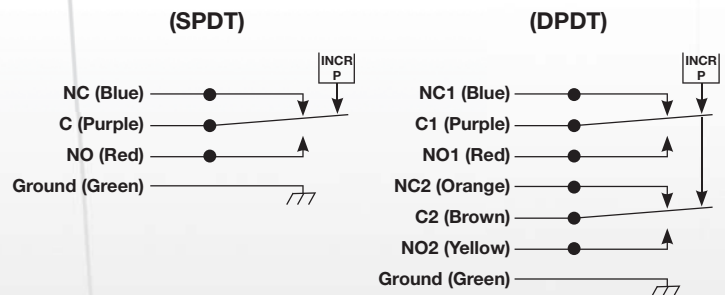
* See Product Configurator for additional options.

Approvals:	
ATEX:	CE 0081, LCIE 08 ATEX 6074X Ⓢ II 2 G, Ex d IIC T6, -40°C ≤ Tamb ≤ 60°C
UL:	Listed 366S, Class: I, Groups: A, B, C, D, -25°C ≤ Tamb ≤ 60°C
CSA:	Class: I, Groups: B, C, D -40°C ≤ Tamb ≤ 60°C
Ambient Operating Temperature:	
CSA & ATEX:	-40°F to 140°F (-40°C to 60°C)
UL:	-13°F to 140°F (-25°C to 60°C)
EMI/RFI:	EN55011
Vibration:	10g's 10-500 Hz, MIL-STD 202°F
Shock:	50g's, 11 ms, MIL-S-901C
Adjustment:	Internal locking adjustment wheel, 1/16 hex set screw
Weight:	3 lbs. maximum

Wiring Code

Lead	Circuit #1	Circuit #2
Normally Closed	Blue	Orange
Common	Purple	Brown
Normally Open	Red	Yellow
Ground	Green	

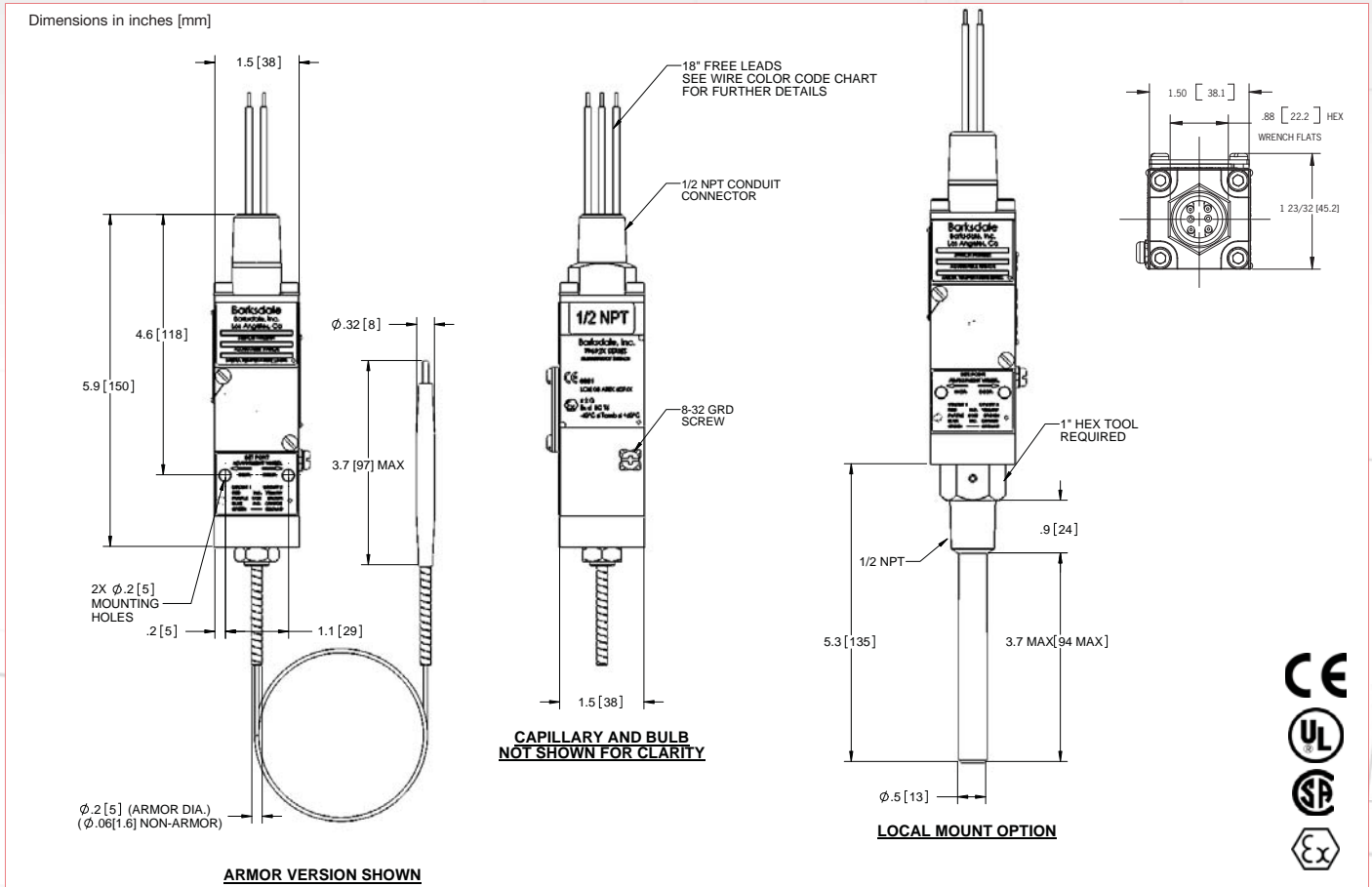
Wiring Diagram



Compact Explosion Proof Temperature Switch

T9692X

Technical Drawing



Product Configurator

Example	T9692X	-1	EE	-1	-072
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Base Configurator

T9692X Temperature switch

Number of Circuits

- 1 SPDT switch
- 2 Simulated DPDT switch (2 SPDTs)

Limit Switch

- EE Silver contacts
11 amps @ 125V/250 VAC;
5 amps @ 30 VDC
- GH Gold contacts
1 amp @ 125/250 VAC

Temperature Ranges

	Adjustable Range	Approx. Deadband ² Actuation Value	Media Temperature Limits	Proof Temperature
-1	-10°F to 110°F (-23°C to 43°C)	5°F to 30°F (2.8°C to 16.7°C)	-40°F to 160°F (-40°C to 71°C)	160°F (71°C)
-2	95°F to 220°F (35°C to 104°C)	5°F to 30°F (2.8°C to 16.7°C)	40°F to 270°F (4°C to 132°C)	270°F (132°C)
-3	180°F to 330°F (82°C to 165°C)	5°F to 30°F (2.8°C to 16.7°C)	70°F to 380°F (21°C to 193°C)	380°F (193°C)

Options

- Blank Standard
- A¹ Stainless steel armor
- SXXX Factory preset
- WXXX Extra wire length (XXX=inches)

Capillary Length

- 072 6 ft (1.8 meters)
- 108 9 ft (2.7 meters)
- 144 12 ft (3.7 meters)
- 001 Local mount

¹ Not available in local mount

² Deadband values indicated when used with the "EE" limit switch

Hazardous Location Classifications

General Information

Hazardous (classified) locations, as defined in the National Electric Code (NEC), are locations where fire or explosion hazards may exist due to the presence of flammable gases, vapors or flammable liquids, combustible dusts, or ignitable fibers or flyings. Protection against explosion in hazardous locations requires that all equipment that could be exposed to the flammable or combustible atmospheres be of a type suitable for installation in such locations. The Classes and Groups for which equipment has been Listed or Classified are shown in the individual Listings and Classifications under the respective categories and are marked on the equipment itself.

Classification Definition

North American Division System	International Zone System
Division 1: Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or some of the time under normal operating conditions.	Zone 0: Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or for long periods of time under normal operating conditions.
	Zone 1: Where ignitable concentrations of flammable gases, vapors or liquids can exist some of the time under normal operating conditions.
Division 2: Where ignitable concentrations of flammable gases, vapors or liquids are not likely to exist under normal operating conditions.	Zone 2: Where ignitable concentrations of flammable gases, vapors, or liquids are not likely to exist under normal operating conditions.

Protection Method Comparison

North American Division System		International / ATEX Zone System	
Area	Division Protection Methods	Area	Zone Protection Methods
Div. 1	Explosion proof Intrinsically safe	Zone 0 Zone 1	Intrinsically safe, 'ia'
		Zone 1	Flame proof, 'd' Any Class I or Zone 0 method Any Class I, Div. 1 method
Div. 2	Hermetically sealed Nonincendive Non-sparking	Zone 2	Hermetically sealed, 'nC' Nonincendive, 'nC' Non-sparking, 'nA'

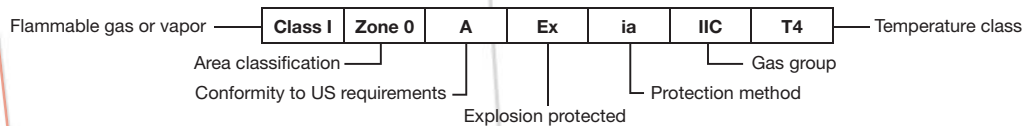
Gas / Dust Group Comparison

Reference Gas / Dust	North American Division System	International Zone System
Acetylene	Class I, Group A	Group IIC
Hydrogen	Class I, Group B	Group IIC
Ethylene	Class I, Group C	Group IIB
Propane	Class I, Group D	Group IIA
Magnesium	Class II, Group E	-
Coal	Class II, Group F	-
Grain	Class II, Group G	-
Cotton	Class III	-
Fibers Group*	Class III	-

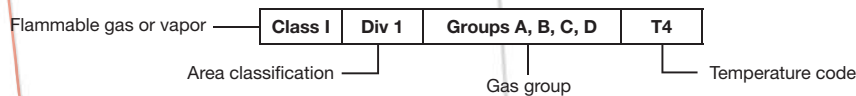
* No equivalent Zone classification

Marking for North America According to NEC/ CEC

Zone System



Division System



Category 1 and 2 Apparatus Gas According to EN/ IEC

Type of Protection	CENELEC Code	CENELEC Standard	IEC Standard	US Division Standards	US Zone Standards	Canadian Div. Standards	Canadian Zone Standards
General requirements	-	EN 50014	60079-0	FM3600	UL60079-0	C22.2 No. 0	E60079-0
Intrinsic safety	EEx ia; ib	EN 50020	60079-11	FM3610/UL913	UL60079-11	C22.2 No. 157	E60079-11
Increased safety	EEx e	EN 50019	60079-7	-	UL60079-7	-	E60079-7
Flameproof/Expl. Proof	EEx d	EN 50018	60079-1	FM3615/UL1203	UL60079-1	C22.2 No. 30	E60079-1
Pressurization	EEx p	EN 50016	60079-2	NFPA496	-	CSA TIL 13A	-
Powder Filling	EEx q	EN 50017	60079-5	-	UL60079-5	-	E60079-5
Encapsulation	EEx m	EN 50028	60079-18	-	UL60079-18	-	E60079-18
Oil immersion	EEx o	EN 50015	60079-6	-	UL60079-6	-	E60079-6
Type n*	EEx n	EN50021	60079-15	FM3611/UL1604	UL60079-15	C22.2 No. 213	E60079-15
Intrinsically safe systems	EEx ia; ib	EN 50039	60079-25	-	-	-	-
Special requirements	-	EN 50284	60079-26	-	-	-	-

For construction, test and marking of electrical apparatus of equipment group II, Cat. 1G

* Enclosed-break device; Non Incendive component; Hermetically sealed device; Sealed device; Encapsulated device; Non sparking

Enclosures

IP Protection Codes

First Numeral Protection Against Solids		Second Numeral Protection Against Water	
0	No protection	0	No protection
1	Greater than 50 mm	1	Vertical dripping
2	Greater than 12.5 mm	2	Angled dripping (15°)
3	Greater than 2.5 mm	3	Spraying
4	Greater than 1 mm	4	Splashing
5	Dust protected	5	Jetting
6	Dust tight	6	Powerful jetting
		7	Temporary immersion
		8	Continuous immersion

NEMA Types / IP Code Correlation

Type	Application	Protection Against	IEC Enclosure Classification
1	Indoor	General purpose	IP 23
2	Indoor	Dripping water, falling dust	IP 30
3	Outdoor	Rain, snow, windblown dust	IP 64
3R			IP 32
3S			IP 54
4, 4X	Indoor/Outdoor	Hose-directed water, corrosion (X)	IP 66
5	Indoor	Angled dripping water, settling dust	IP 52
6	Indoor/Outdoor	Temporary submersion	IP 67
6P	Indoor/Outdoor	Prolonged submersion	
7	Indoor	Hazardous location class I	-
8	Indoor/Outdoor	Hazardous location class I	-
9	Indoor	Hazardous location class II	-
12, 12K	Indoor	Dripping non-corrosive liquid, dust	IP 55
13	Indoor	Water, oil dust, seepage	IP 65

NOTE:

It is not possible to state that an IP rating is equivalent to a NEMA Type Designation. However, it is possible to state that a NEMA Type is equivalent to an IP rating. An IP rating only considers protection against ingress of solid foreign objects and ingress of water. The NEMA Types consider these but also consider other items such as corrosions and construction details.

Marking According to ATEX Directive 94/9/EC

CE	0081	Ex	II	2	G D	Ex ia	IIC	T4	Ex	tD	A21	IP66	T85	LCIE	08	ATEX	6092	X
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CE	European Community Mark Manufactured according to applicable EC Directives.		IIC	Gas Group
0081	Notified Body Number For production surveillance (0081 for LCIE)		T4	Temperature Class
Ex	Marking Specific for equipment to be used in explosive atmospheres		Ex	Explosion Protected
II	Equipment Group I for Mines II different from Mines		tD	Dust Protection by Enclosure
2	Equipment Category		A21	Dust Zone 1
	Mines	Different from Mines ()	IP66	Enclosure Protection
M1 very high protection M2 high protection	1 very high protection 2 high protection 3 normal protection for associated apparatus		T85	Surface Temperature Rating
			LCIE	Notified Body Who has released product certification
G, D	Hazardous Atmospheres G for gas, vapor, mist D for dust		D1	Year of Issuing The last two digits of the year
Ex ia	Mark For the specific types of protection according the applicable standard.		ATEX	ATEX Directive 94/9/EC
			E 042	Certification Number Progressive in the year.
			X	Supplementary Letter X Particular condition of use U Component

NACE

NACE Standard MR0175-2002 has been developed to provide rules for the selection of suitable corrosion resistant materials and processes for use in sour gas environments.

CEC

Canadian Electric Code (2-14-07 Variance) Secondary Seal Rules: 18-092, 18-108, 18-158, J18-108, J18-158, per certification to ANSI/ISA 12.27.01, devices may be marked either "single seal" or "dual seal". Products that do not meet either the dual seal or single seal requirements must use a secondary seal for compliance.

Examples of International Approvals

Nations	Agency	Description
International	IECEx Scheme	Global standards used as basis for many international assessments, often with additional national requirements.
CIS (Commonwealth of Independent States)	GOST	(12 Euro-Asian countries) GOST based requirements with national differences.
Brazil	INMETRO / NCC	National standards developed following IEC requirements.
China	CQST / NEPSI	Certificate in accordance with international Zone standards with some national deviations.
Korea	KGS	Korean Gas Safety Corp. IECEx Scheme, international standards based, with some national deviations.
Japan	TIIS	Technical Institute of Industrial Safety, a government ministry like OSHA for hazardous locations.
Russia	GOST R	Russian Certification based on IEC requirements with Russian deviations.
Saudi Arabia	SASO (Saudi Arabian Standards Organization)	Saudi Arabian Standards Organization, Similar to IEC requirements with National differences due to climate & geographical conditions.
Australia / New Zealand	SAA AS/NZS	Combined national standards generally follow IEC requirements.



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