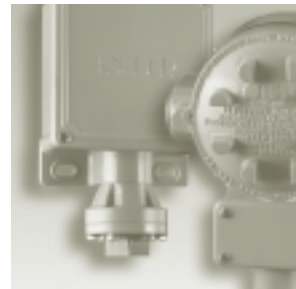
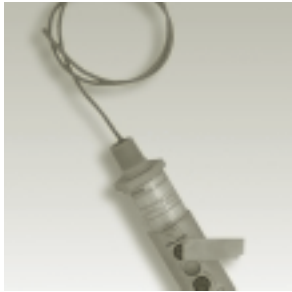




Process Instrumentation

Product Guide



Registered Quality System to ISO 9001

SOR is committed to and understands the demanding requirements of the process industry. We design, develop and manufacture the highest quality, most reliable electronic and electromechanical level, pressure, temperature and flow instruments available.

We earn our customers' trust by maintaining our commitment to the fundamentals we've upheld for more than 50 years: quality, service and delivery. **Doing it right every time.**

We provide dynamic application support and excellent customer service through a network of global offices staffed with well trained representatives who share SOR values. We deliver the best products on time, when and where they're needed, anywhere in the world.

With our complete line of instruments, SOR can solve your application challenges. While this guide will help you make initial instrumentation choices, our representatives and service support staff have been thoroughly trained and understand what you need.

Call us. We're ready to help from our headquarters in Lenexa, Kansas, or from right in your back yard.

Level

Temperature

Pressure

Flow

Product Applications

SOR Product Oil & Gas Petrochemical Power Chemical & Other Nuclear Qualified

Differential Pressure Switches

Weatherproof (Single Diaphragm)			X	X
Weatherproof Terminal Block (Single Diaphragm)			X	X
Explosion Proof (Single Diaphragm)	X	X		X
Explosion Proof UL/CSA/GENELEC (Single Diaphragm)	X	X		X
Big Hermet Explosion Proof, Hermetically Sealed (Single Diaphragm)	X	X		X
Mini-Hermet Explosion Proof, Hermetically Sealed (Single Diaphragm)	X	X		X
Weatherproof (Dual Opposed Diaphragm)			X	X
Explosion Proof (Dual Opposed Diaphragm)	X	X		X
Weatherproof (High Static Operation)			X	X
Explosion Proof Hermetically Sealed (High Static Operation)	X	X		X
Weatherproof (Low Range)			X	X
Explosion Proof Hermetically Sealed (Low Range)	X	X		X

Flow Switches

Thermal Differential	X	X	X	X
Vane Operated	X	X	X	X

Temperature Transmitters

Mini-Hermet Explosion Proof, Adjustable	X			
--------------------------------------------	---	--	--	--

Temperature Switches

Weatherproof (Direct or Remote Mount)			X	X
Weatherproof Terminal Block Connections (Direct or Remote Mount)			X	X
Explosion Proof (Direct or Remote Mount)	X	X		X
Explosion Proof UL/CSA/GENELEC (Direct or Remote Mount)	X	X		X
Big Hermet Explosion Proof, Hermetically Sealed (Direct or Remote Mount)	X	X		X
Mini-Hermet Explosion Proof, Hermetically Sealed (Direct or Remote Mount)	X	X		X

Nuclear

Pressure Switch				X
Vacuum Switch				X
Temperature Switch (Direct or Remote Mount)				X
Differential Pressure Switch				X



Applications

Oil & Gas

- Well head pressure
- Flow line monitoring
- Separator levels
- Compressor pressure monitoring

Petrochemical

- Catalytic cracker
- Distillation
- Fractionation
- Hydrotreater/Reformer
- Coker
- Flare knockout tank

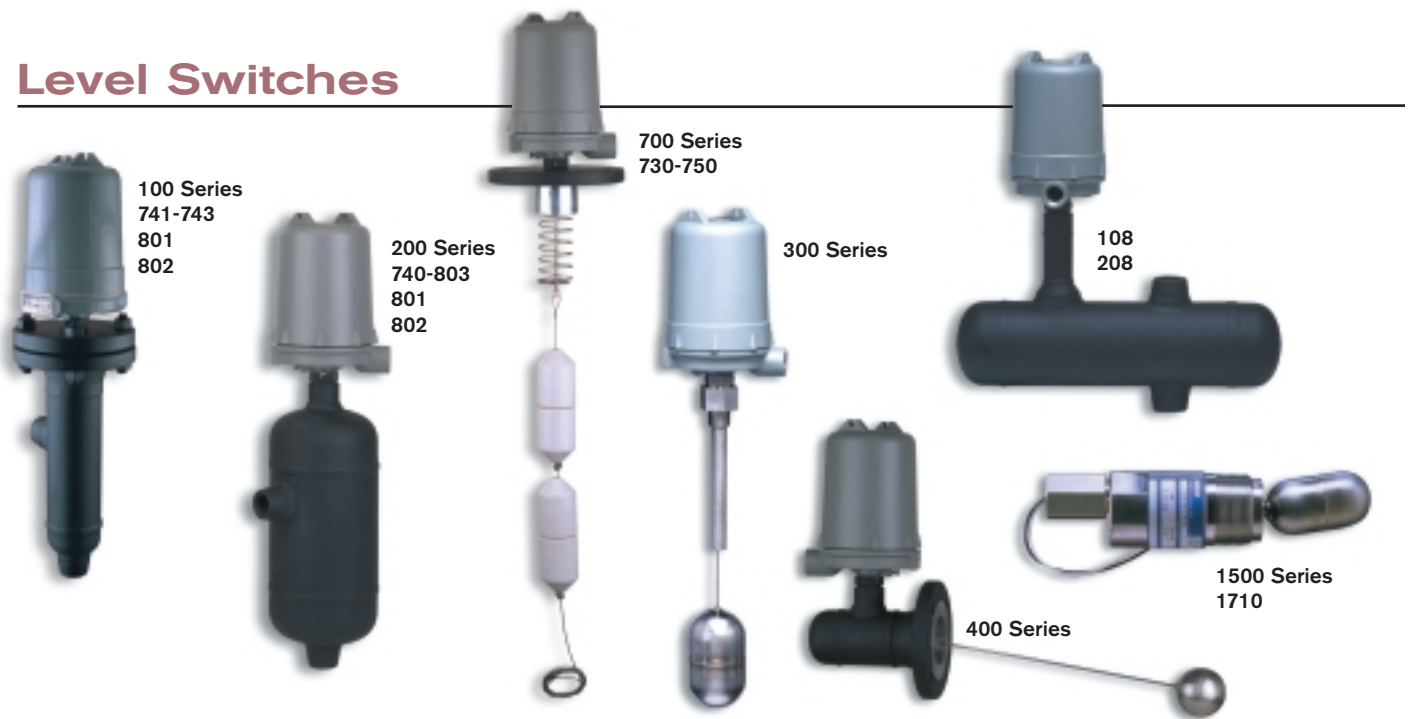
Power

- Fuel storage and handling
- Steam turbine drip legs
- Hotwell condenser
- Feed water heaters
- Demineralization
- Ash precipitator/scrubber
- Steam drum level

Chemical & Other

- Storage & batch tank level
- High level alarm safety shutdown
- Solvent extraction
- Rupture disc integrity
- Filter integrity
- Water/wastewater treatment
- Pulp processing
- Rotating equipment lube systems
- Sump control

Level Switches



Product	Model #	Ranges	Certifications and Standards	Features
Flanged Chamber	100 Series, 741-743, 801, 802	vac - 300+ psi vac - 21 bar -65° - 1000°F -54° - 538°C	UL, CSA, CENELEC, SAA ANSI/ASME ASTM materials	<ul style="list-style-type: none"> • Serviceable flanged chamber • Stainless steel switching mechanism for harsh atmospheres
Sealed Chamber	200 Series, 740 - 803, 801, 802	vac - 300+ psi vac - 21 bar -65° - 1000°F -54° - 538°C	UL, CSA, CENELEC, SAA ANSI/ASME ASTM materials	<ul style="list-style-type: none"> • Low-cost sealed chamber • Stainless steel switching mechanism for harsh atmospheres
Top Mounted Displacer	700 Series, 730 - 750	vac - 1000 psi vac - 69 bar -65° - 450°F -54° - 232°C	UL, CSA, CENELEC, SAA ASTM materials	<ul style="list-style-type: none"> • Available in 1 or 2 stage switching • Narrow and wide differential • Stainless steel switching mechanism for harsh atmospheres
Top Mounted Float	300 Series	vac - 750 psi vac - 51 bar -65° - 450°F -54° - 232°C	UL, CSA, CENELEC, SAA ASTM materials	<ul style="list-style-type: none"> • Available in 1 or 2 stage switching • Stainless steel switching mechanism for harsh atmospheres
Side Mounted	400 Series	vac - 1250 psi vac - 95 bar -65° - 450°F -54° - 232°C	UL, CSA, CENELEC, SAA ASTM materials	<ul style="list-style-type: none"> • Serviceable flanged chamber • Stainless steel switching mechanism for harsh atmospheres
Steam Trap	108, 208	vac - 2248 psi vac - 135 bar -65° - 1000°F -54° - 538°C	UL, CSA, CENELEC, SAA ANSI/ASME ASTM materials	<ul style="list-style-type: none"> • Serviceable flanged or sealed chamber • Stainless steel switching mechanism for harsh atmospheres
OEM Level	1500 Series, 1710	vac - 1500 psi vac - 100 bar -40° - 400°F -40° - 204°C	CSA ASTM materials	<ul style="list-style-type: none"> • Economical side and top mounted versions available

Level Switches



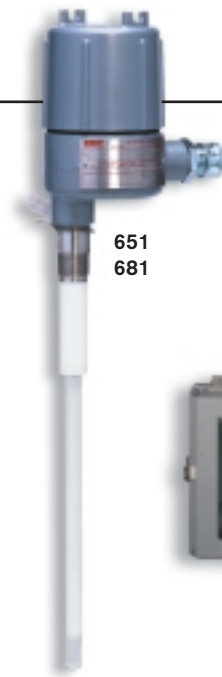
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721



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651
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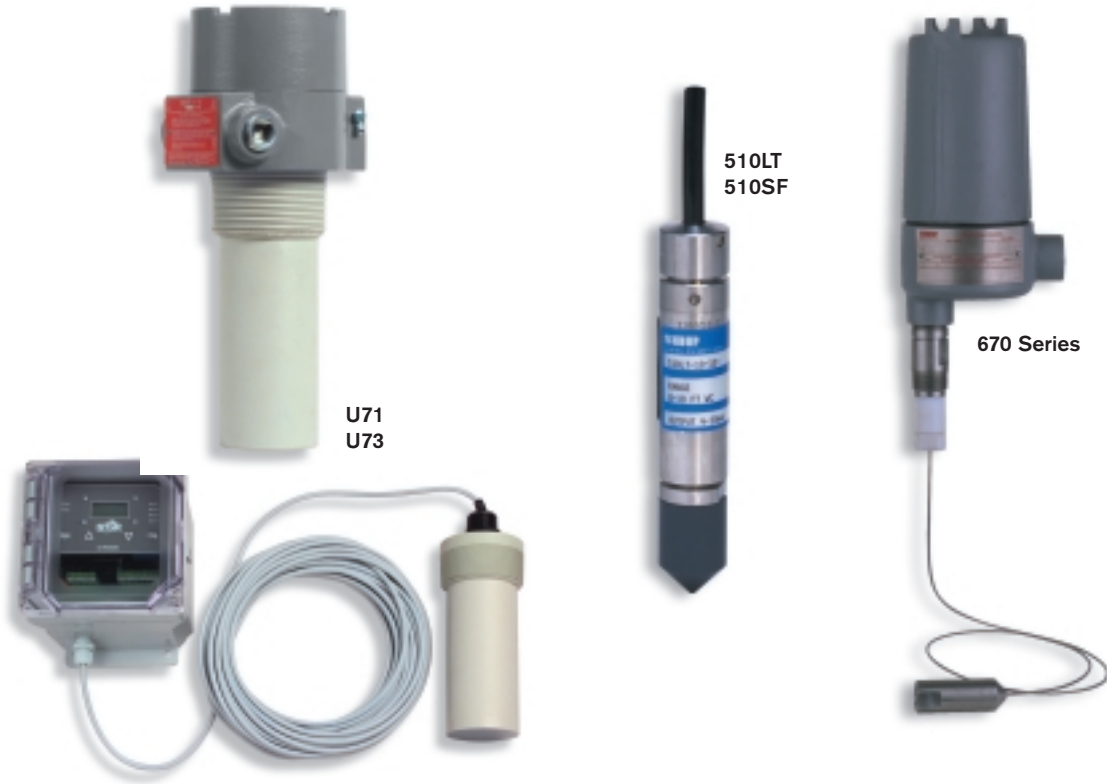


660 Series



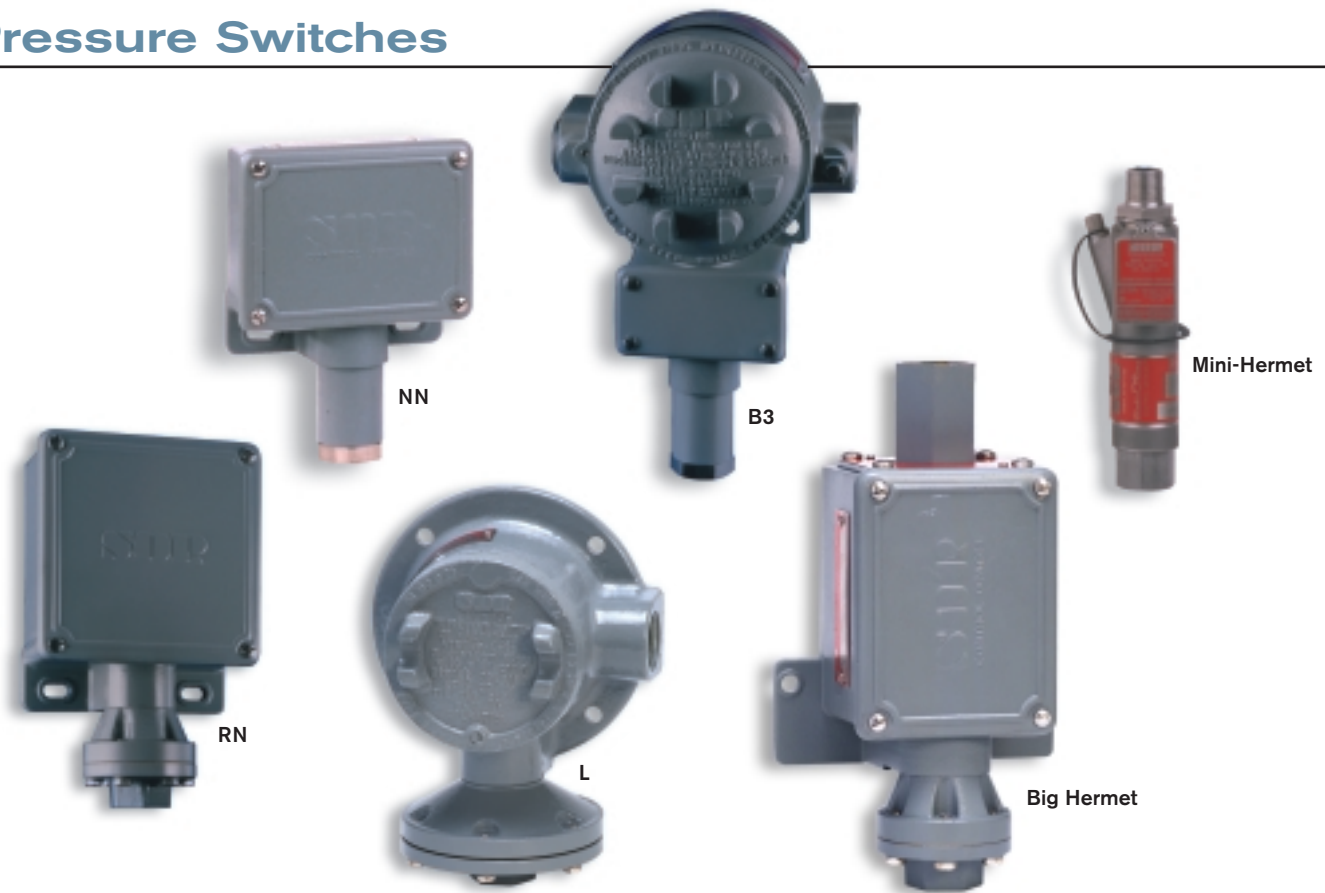
Product	Model #	Ranges	Certifications and Standards	Features
Single Point Ultrasonic	701	0 - 2000 psi 0 - 135 bar -40° - 250°F -40° - 121°C	FM, CSA, CENELEC,	<ul style="list-style-type: none"> • Low cost • No calibration required • Relay and current shift (8/16mA) output available • 316SS sensor
Single Point Ultrasonic with Self Test	721	0 - 2000 psi 0 - 135 bar -40° - 250°F -40° - 121°C	FM, CSA, CENELEC	<ul style="list-style-type: none"> • No calibration required • Relay and current shift (8/16mA) output available • 316SS sensor
Dual Point Ultrasonic with Self Test	722	0 - 2000 psi 0 - 135 bar -40° - 250°F -40° - 121°C	FM, CSA,	<ul style="list-style-type: none"> • No calibration required • Set points can be linked to provide "pump logic" • Relay and current shift (8/16mA) output available • 316SS, Alloy 20, Hastelloy-C Sensors
Single Point RF	651	vac - 4000 psi vac - 275 bar -40° - 1000°F -40° - 538°C	FM, CSA, CENELEC	<ul style="list-style-type: none"> • Low cost • Single point switch for alarm applications • Relay and current shift (8/16mA) output available • A variety of probe configurations meet most application conditions
Single Point RF with Self Test	681	vac - 1500 psi vac - 100 bar -40° - 350°F -40° - 177°C		<ul style="list-style-type: none"> • Adjustable differential feature provides for pump control • Relay and current shift (8/16mA) output available • A variety of probe configurations meet most application conditions
Multipoint RF	660 Series	vac - 4000 psi vac - 275 bar -40° - 350°F -40° - 177°C	FM, CSA	<ul style="list-style-type: none"> • Up to four points level indication for pump control • Adjustable differential feature provides for pump control • A variety of probe configurations meet most application conditions

Level Transmitters



Product	Model #	Ranges	Certifications	Features
Ultrasonic	U71, U73	18 in. 0.45m to 260 ft. 80m	CSA	<ul style="list-style-type: none"> • Powerful transmitted pulse for greater penetration and flexibility • Automatically adjusted gain continually adapts to process conditions • Echo recognition allows automated false echo handling • Superior application flexibility – dust, foam, condensation, angle of repose are automatically compensated
Submersible Hydrostatic Pressure	510LT 510SF	10 - 463 ftwc 3 - 140m	CENELEC EEx ia IIC T4	<ul style="list-style-type: none"> • Nose cone with NPT(M) connection or flush sensor design • Unspliced cable lengths up to 3,000 ft. • Ranges from 10 to 463 ftwc • Compact, 316SS housing
RF	670 Series	Up to 150 ft. 45m	FM, CSA, CENELEC	<ul style="list-style-type: none"> • Continuous level measurement transmitter • Measurement range up to 150 ft. • Loop-powered, intrinsically-safe 4-20mA output • A variety of probe configurations meet most application conditions

Pressure Switches



Product	Model #	Ranges	Certifications	Features
Weatherproof (Pressure/Vacuum/Compound)	NN	30 inHg vac - 7000 psi 1 bar vac - 480 bar	CSA, CE	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Weatherproof, Terminal Block Connections (Pressure/Vacuum/Compound)	RN	30 inHg vac - 7000 psi 1 bar vac - 480 bar	CSA, CE	<ul style="list-style-type: none"> • Set point adjustment with calibrated scale
Explosion Proof (Pressure/Vacuum/Compound)	L	30 inHg vac - 7000 psi 1 bar vac - 480 bar	UL: Class I, Group C, Div. 1 (as an outlet box)	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Explosion Proof, UL/CSA/CENELEC (Pressure/Vacuum/Compound)	B3	30 inHg vac - 7000 psi 1 bar vac - 480 bar	UL/CSA: Class I, Group B, Div. 1; BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> • Terminal block connections • Set point adjustment with calibrated scale • Set point adjustment without declassification of hazardous area
Big Hermet - Explosion Proof, Hermetically Sealed (Pressure/Vacuum/Compound)	Big Hermet	30 inHg vac - 7000 psi 1 bar vac - 480 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area
Mini-Hermet - Explosion Proof, Hermetically Sealed (Pressure/Compound)	Mini-Hermet	30 inHg vac - 7000 psi 1 bar vac - 480 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6 or BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area

Pressure Switches



Product	Model #	Ranges	Certifications	Features
Dual Hi-Lo - Weatherproof (Pressure/Vacuum/Compound)	V1	30 inHg vac - 4000 psi 1 bar vac - 275 bar	CSA, CE	<ul style="list-style-type: none"> • Dual set points • Set point adjustment with calibrated scale
Dual Hi-Lo - Explosion Proof Hermetically Sealed (Pressure/Vacuum/Compound)	V2	30 inHg vac - 4000 psi 1 bar vac - 275 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Dual set points • Hermetically sealed snap switches • Set point adjustment with calibrated scale • Set point adjustment without declassification of hazardous area
Omni - Weatherproof (Pressure)	Omni	7 - 7000 psi 0.5 - 480 bar snap switches		<ul style="list-style-type: none"> • Environmentally sealed snap switches
Sub Mini-Hermet - Explosion Proof, Hermetically Sealed (Pressure)	Sub Mini-Hermet	8 - 200 psi 0.5 - 14 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area

Pressure Transmitters



SGT*



503FR



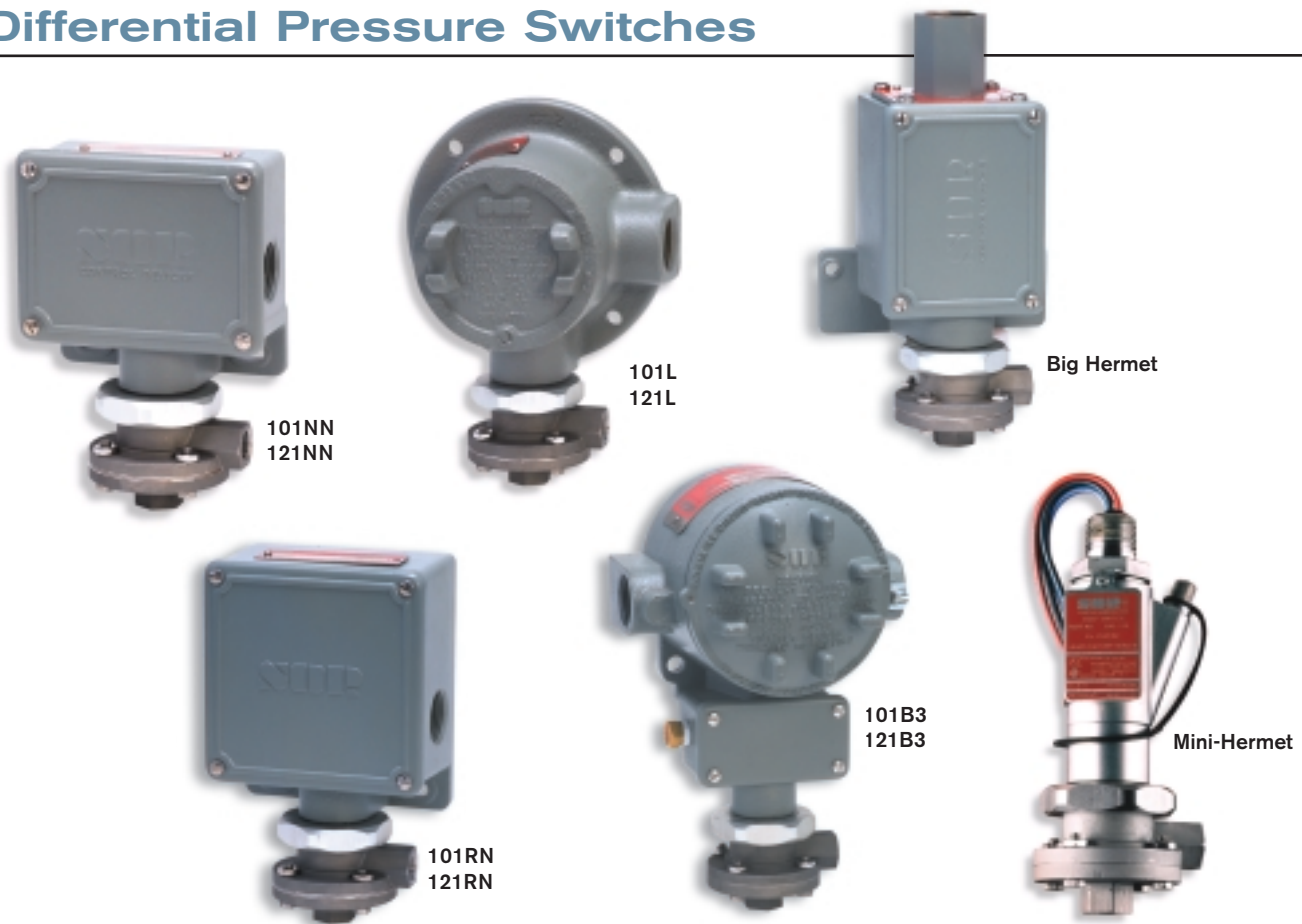
510IM



534CR
534HS
536CR
536HS

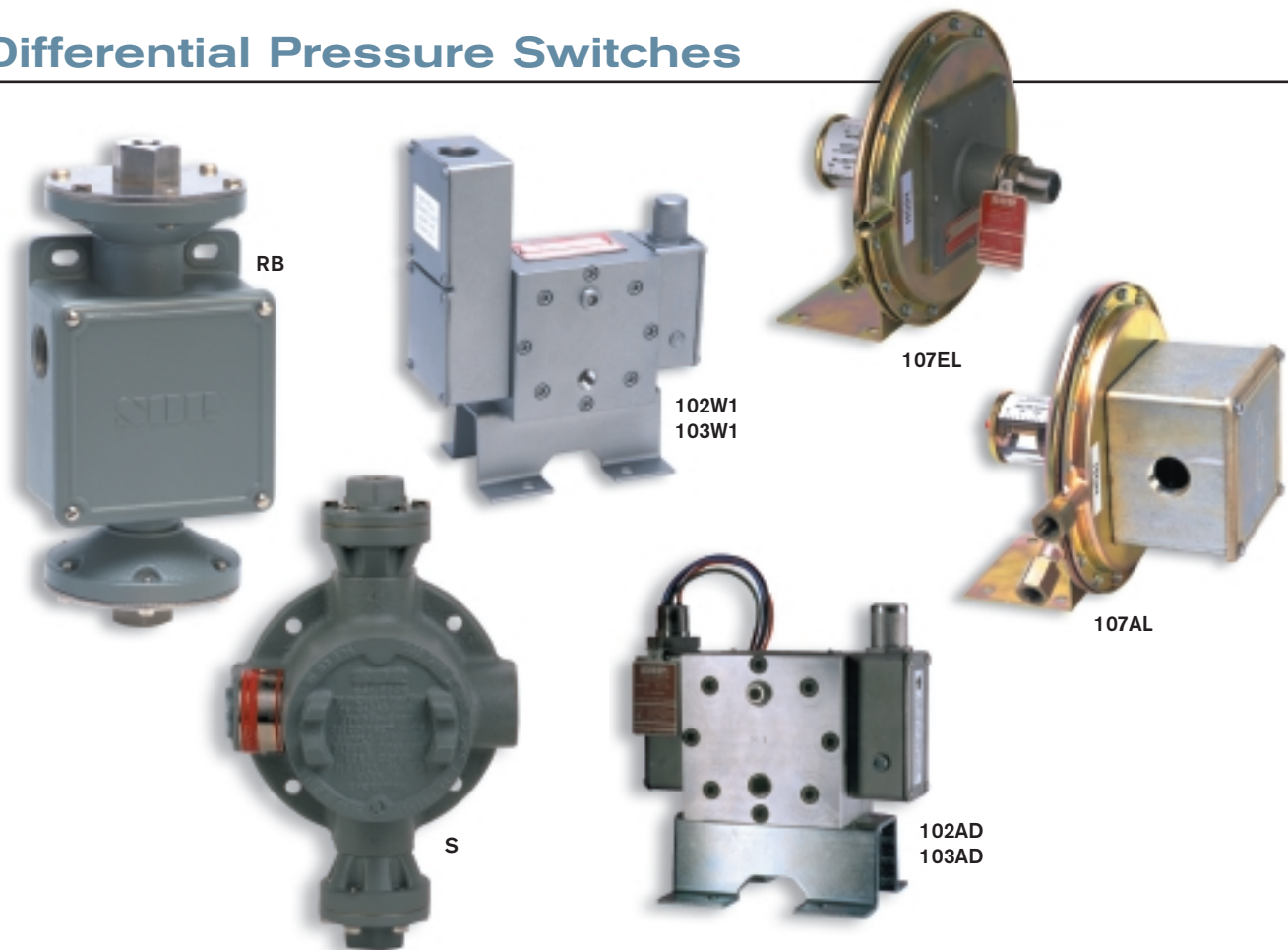
Product	Model #	Ranges	Certifications	Features
Electronic Pressure Instrument	SGT*	30 inHg vac - 2000 psig -1.0 - 135 bar 10 - 2000 psia 0.7 - 135 bar abs.	UL/cUL: Class I, Group A, Div. 2 ATEX: Ex II 3 G/D	<ul style="list-style-type: none"> • Dual set points with programmable dead bands • 150% URL Gage indication with programmable engineering units • 4-20mA, loop-powered output with programmable 5:1 turndown • Self diagnostics with manual circuit tests • Local programming without declassification or hazardous area
Weatherproof, Fixed Range	503FR	5 - 2000 psi .34 - 135 bar	CENELEC: EEx ia IIC T4	<ul style="list-style-type: none"> • Low cost • Environmentally sealed electrical connection
Immersible, Fixed Range	510IM	5 - 2000 psi .34 - 135 bar	CENELEC: EEx ia IIC T4	<ul style="list-style-type: none"> • Suitable for continuous liquid immersion • Compact, 316SS housing
Mini-Hermet - Explosion Proof, Adjustable	534CR, 534HS, 536CR, 536HS	10 - 15,000 psi .69 - 1000 bar	FM/CSA: Class I, Group A, Div. 1, EXPL/IS; CENELEC: EEx d IIC T4, EEx ia IIC T4	<ul style="list-style-type: none"> • 4-20mA, loop powered or 1-5Vdc, low power outputs • Calibration without declassification of hazardous area • Hermetically sealed electrical connection and zero/span adjustments • 5:1 turndown

Differential Pressure Switches



Product	Model #	Ranges	Classifications and Certifications	Features
Weatherproof (Single diaphragm)	101NN, 121NN	3 - 500 psid .2 - 35 bar	CSA, CE	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Weatherproof, Terminal Block (Single diaphragm)	101RN, 121RN	3 - 500 psid .2 - 35 bar	CSA, CE	<ul style="list-style-type: none"> • Set point adjustment with calibrated scale
Explosion Proof (Single diaphragm)	101L, 121L	3 - 500 psid .2 - 35 bar	UL: Class I, Group C, Div. 1 (as an outlet box)	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Explosion Proof, UL/CSA/CENELEC (Single diaphragm)	101B3, 121B3	3 - 500 psid .2 - 35 bar	UL/CSA: Class I, Group B, Div. 1; BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> • Terminal block connections • Set point adjustment with calibrated scale • Set point adjustment without declassification of hazardous area
Big Hermet - Explosion Proof, Hermetically Sealed (Single diaphragm)	Big Hermet	3 - 500 psid .2 - 35 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area
Mini-Hermet - Explosion Proof, Hermetically Sealed (Single diaphragm)	Mini-Hermet	3 - 500 psid .2 - 35 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area

Differential Pressure Switches



Product	Model #	Ranges	Classifications and Certifications	Features
Weatherproof (Dual, opposed diaphragm)	RB	0.5 - 1000 psid 35 mbar - 70 bar	CSA, CE	<ul style="list-style-type: none"> Terminal block connections Set point adjustment with calibrated scale
Explosion Proof (Dual, opposed diaphragm)	S	0.5 - 500 psid 35 mbar - 70 bar	UL: Class I, Group C, Div. 1 (as an outlet box)	<ul style="list-style-type: none"> Set point adjustment with calibrated scale
Weatherproof (High static operation)	102W1 103W1	7 inwc - 2500 psid 18 mbar - 175 bar	CSA, CE	<ul style="list-style-type: none"> Negligible temperature and/or static influence
Explosion Proof, Hermetically Sealed (High static operation)	102AD, 103AD	7 inwc - 2500 psid 18 mbar - 175 bar	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> Negligible temperature and/or static influence Hermetically sealed snap switch(es) Set point adjustment without declassification of hazardous area
Weatherproof (Low range)	107AL	0.25 - 40 inwd 6.4 - 1000 mmwc	FM, CSA, CE	<ul style="list-style-type: none"> Set point adjustment with calibrated scale
Explosion Proof, Hermetically Sealed (Low range)	107EL	0.3 - 40 inwd 7.5 - 1000 mmwc	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II	<ul style="list-style-type: none"> Hermetically sealed snap switch(es) Set point adjustment without declassification of hazardous area

Flow Switches



Product	Model #	Features
Thermal Differential	T21	<ul style="list-style-type: none"> • Wide operating process temperature range of -100°F to +392°F • Removable, plug-in electronics board • Self-heating sensor design
Vane Operated	900 Series	<ul style="list-style-type: none"> • Stainless steel switching mechanism for harsh atmospheres • All ASTM materials construction • Flow monitoring for a wide range of pipe sizes and specific gravities

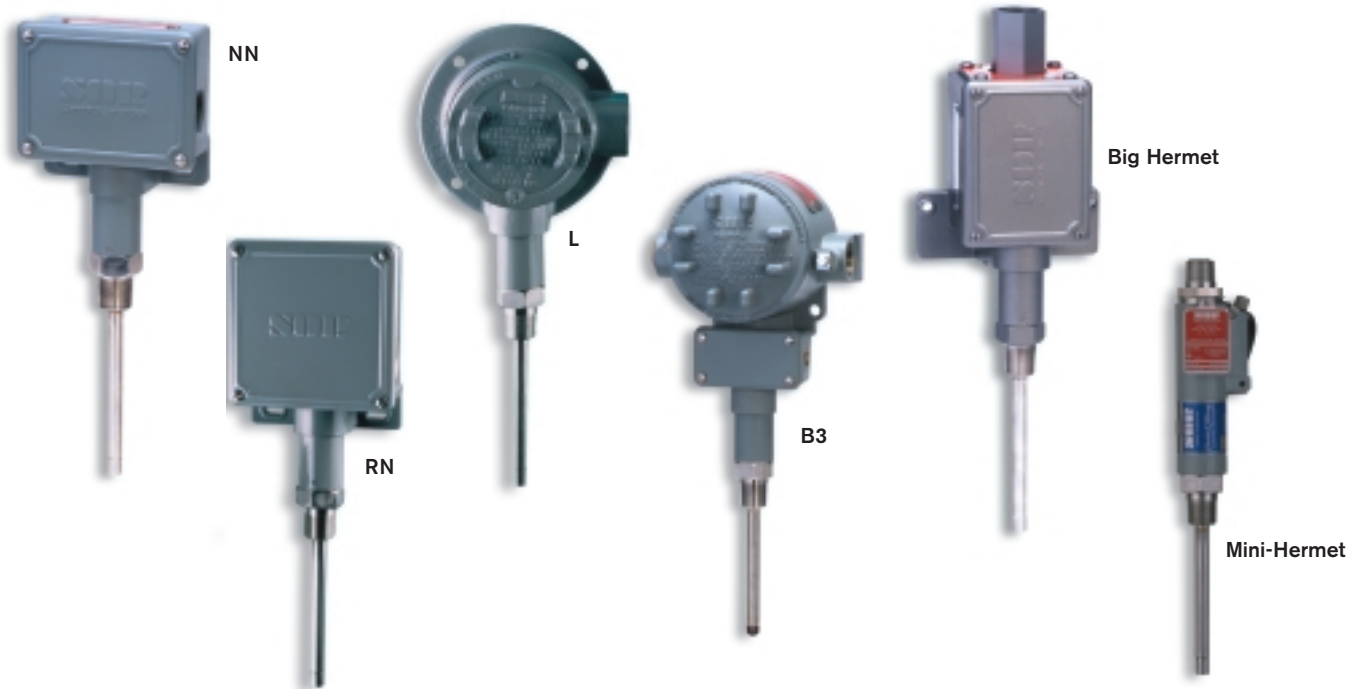
Temperature Transmitters

Product	Model #	Ranges
Mini-Hermet - Explosion Proof, Adjustable	534MT	-328° - 1000°F -200° - 538°C

Features
<ul style="list-style-type: none"> • Direct or remote mounted RTD designs • Calibration without declassification of hazardous area • Hermetically sealed electrical connection and zero/span adjustments



Temperature Switches



Product	Model #	Ranges	Certifications	Features
Weatherproof (Direct or remote mount)	NN	-50° - 1000°F -45° - 540°C	CSA, CE	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Weatherproof, Terminal Block Connections (Direct or remote mount)	RN	-50° - 1000°F -45° - 540°C	CSA, CE	<ul style="list-style-type: none"> • Terminal block connections • Set point adjustment with calibrated scale
Explosion Proof (Direct or remote mount)	L	-50° - 1000°F -45° - 540°C	UL: Class I, Group C, Div. 1 (as an outlet box)	<ul style="list-style-type: none"> • Low cost • Set point adjustment with calibrated scale
Explosion Proof, UL/CSA/CENELEC (Direct or remote mount)	B3	-50° - 1000°F -45° - 540°C	UL/CSA: Class I, Group B, Div. 1; BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> • Terminal block connections • Set point adjustment with calibrated scale • Set point adjustment without declassification of hazardous area
Big Hermet - Explosion Proof, Hermetically Sealed (Direct or remote mount)	Big Hermet	-50° - 1000°F -45° - 540°C	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment with calibrated scale • Set point adjustment without declassification of hazardous area
Mini-Hermet - Explosion Proof, Hermetically Sealed (Direct or remote mount)	Mini-Hermet	-50° - 1000°F -45° - 540°C	UL/CSA: Class I, Group A, Div. 1; DEMKO: EEx m II; SAA: Ex s IIC T6 or BASEEFA: EEx d IIC T6	<ul style="list-style-type: none"> • Hermetically sealed snap switch(es) • Set point adjustment without declassification of hazardous area

Approval Agencies

SOR products satisfy the requirements of approval agencies worldwide. Often, a common design is capable of multiple approvals. In other cases, modified construction techniques are necessary to meet specific agency requirements.

	Underwriters Laboratories
	Factory Mutual
	Canadian Standards Association
	CENELEC (BASEEFA, NEMKO, PTB, DEMKO)
	CE Marked: EMC Directive 89/3367/EEC
	Heavy Industrial (Self Certified)
JIS/RIIS	Japanese Industrial Standards
SAA	Australia Standards Association

Hazardous Area Classification

Hazardous Areas are locations where the potential for fire or explosion exist because of gases, dust or easily ignitable fibers or flyings in the atmosphere.

In North America, hazardous areas are separated by classes, divisions, and groups to define the level of safety required for equipment installed in these locations. Classes define the general form of the flammable materials in the atmosphere. Divisions define the probability of the presence of flammable materials. Groups classify the exact flammable nature of the material.

In Europe and countries outside of North America, classification of hazardous areas is accomplished differently. Zones are used to define the probability of presence of flammable materials. **Protection Types** denote the level of safety for the device. Groups classify the exact flammable nature of the material. These groups are separated differently than North American Groups.

Temperature Identifications convey the maximum surface temperature of the apparatus based on 104°F (40°C) ambient. These temperature codes are selected carefully so as not to exceed the ignition temperature of the specific gas or vapor to be encountered in the application.

Environmental Protection

Similar to hazardous location classifications, environmental protection ratings are slightly different within and outside of North America. National Electrical Manufacturers Association (NEMA) and Ingress Protection (IP) Codes provide similar information regarding protection against specified environmental conditions.

NEMA 4	Indoor or outdoor use. Protection against wind-blown dust and rain, splashing water, hose-directed water and damage from external ice formation.
NEMA 4X	NEMA 4, plus protection against corrosion.
IP 65	Dust-tight and protected against water jets.
IP 68	Dust-tight and suitable for indefinite immersion.

Some classifications are not shown here. For further detailed information, see specific standards published by approval organizations.

Classifications Outside North America

- Zone 0** Area in which an explosive gas-air mixture is continuously present or present for long periods.
- Zone 1** Area in which an explosive gas-air mixture is likely to occur in normal operation.
- Zone 2** Area in which an explosive gas-air mixture is not likely to occur, and if it occurs it will only exist for a short time.

(Zones 0 and 1 are similar to North American Div. 1 classification. Zone 2 is similar to North American Div. 2 classification.)

Protection Types	Specific to Zone
d Flameproof (Explosion proof) Enclosure	1, 2
e Increased Safety	1, 2
ia Intrinsic Safety	0, 1, 2
ib Intrinsic Safety	1, 2
o Oil Immersion	2
p Pressurized (Purged) Apparatus	1, 2
q Powder Filling (Sand Filling)	2
m Encapsulation	1, 2
n Normally Nonsparking and/or Nonincendive Circuits	2
Group I For application in below-ground installations (mines) where methane (firedamp) and coal dust may be present.	
Group IIA For application in above-ground installations where hazards due to propane may exist. (This group most closely matches the North American Group D.)	
Group IIB For application in above-ground installations where hazards due to ethylene may exist. (This group most closely matches the North American Group C.)	
Group IIC For application in above-ground installations where hazards due to hydrogen or acetylene may exist. (This group most closely matches the North American Groups A and B.)	

Temperature Codes

T1	842°F	450°C
T2	572°F	300°C
T3	392°F	200°C
T4	275°F	135°C
T5	212°F	100°C
T6	185°F	85°C

Classifications Inside North America

- Class I** Flammable gases or vapors are present in the air in quantities sufficient to produce explosive or ignitable mixture.
- Class II** Combustible or conductive dusts are present.
- Class III** Ignitable fibers or flyings are present but not likely to be in suspension in sufficient quantities to produce ignitable mixtures. (Group classifications are not applied to this class.)
- Division 1** The substance referred to by class is present during normal conditions.
- Division 2** The substance referred to by class is present only in abnormal conditions, such as a container failure or system breakdown.
- Group A** Acetylene
- Group B** Hydrogen (or gases of equivalent hazard)
- Group C** Ethylene (or gases of equivalent hazard)
- Group D** Gasoline (or gases of equivalent hazard)
- Group E** Metal Dust
- Group F** Coal Dust
- Group G** Grain Dust

This brochure is intended to provide suggestions for the general application of certain types of instruments. Since each application has unique characteristics, it is recommended that you consult SOR to discuss the specific details of your application to ensure the correct instrument is selected.





Level

Temperature

Pressure

Flow

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Registered Quality System to ISO 9001

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