

# Honeywell Industrial Switches and Sensors



SENSING AND CONTROL

## Product Range Guide

**Honeywell**



# Industrial-Strength Switches, Sensors, and Much More

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## The right products

Sensing and Control brings you one of the broadest switching and sensing portfolios in the world, and the promise of a continually expanding selection. You won't need to compromise when selecting a solution from our variety of technology platforms. They're backed by Honeywell's continual technology development, which has been producing innovative customer solutions for more than 150 years. You'll get products designed to survive in your demanding environments because of our expertise integrating switching and sensing technologies into application-specific packaging.

## The right quality

With more than 65 years in the switch and sensor business, Sensing and Control has earned an excellent reputation for quality and reliability. Our robust product designs, Six Sigma Plus culture and extensive testing facilities ensure that you get quality right out of the box and superior, lasting performance down the line.

## The right support

When you work with Sensing and Control, you have a tremendous range of support at your disposal.

- Customer Response Center available for immediate technical support.
- Direct sales people and representatives who can work with you, learn about your needs and then provide the right solutions for your application.
- Distributors for sales support and product inventory available when you need it, where you need it.
- Interactive catalog on the Sensing and Control Web site for online product specifications, drawings and product selection assistance based on a step-by-step definition of your needs.

## Right where you need it

Honeywell Sensing and Control's global sales force offers sales, application and service support wherever you do business. You get truly global reach – to more than 70 worldwide sales and support locations.

## Try us right now

Pick up the phone, send us a fax or contact us via the Web today at [www.honeywell.com/sensing](http://www.honeywell.com/sensing) to find out how we can put the power of our expertise, experience, global reach, customer focus and quality products to work for you.



# Industrial Switches and Sensors Range Guide

## OEM Pressure Sensors - page 6

Full line of industrial-grade pressure sensors featuring media-isolating design, multiple port and electrical configurations for OEMs and end users.



## Test and Measurement - page 8

Full line of industrial pressure transducers, load cells and electronic sensor instrumentation. Comprehensive range of strain gauge-based, piezoelectric and coil wound transducers. Wide pressure ranges with complete instrumentation available.



## Current Sensors - page 12

Offer accurate and fast response current measurement for many applications. The new magnetoresistive technology has almost no thermal drift or offset with temperature, providing very stable, repeatable measurements.



## Equipment Health Monitoring System - page 12

Provide a simple method to detect a range of machine health parameters if they should drift from 'normal.' These include temperature, flow, mechanical noise, audible noise, tilt angle and vibration.



# Industrial Switches and Sensors Range Guide

## Fiber Optic Products - page 13

Provide solutions for demanding and high-performance applications such as short-haul data communications over plastic fiber, analog and digital interfaces and duplex communication over a single fiber. Meet SERCOS and other standards.



## Position & Speed Sensors - page 14

Include rotary sensing and controls, linear rotary sensors, ultrasonic sensors and non-contact position and speed sensors for presence/absence sensing and precision distance sensing or tracking.



## Resistors - page 20

Designed for a large variety of electrical and power circuit applications. They are available in an assortment of sizes and package styles that include an adjustable series.



## Liquid Level Sensors - page 21

Basic and industrial (designed for harsh industrial environments) liquid level sensors indicate the presence or absence of liquid in a variety of applications.



## Electronic Safety - page 22

Offer solutions for machine guarding applications including operator point-of-operation protection, access detection, presence sensing, gate monitoring and electrical interfacing to the machine circuitry.

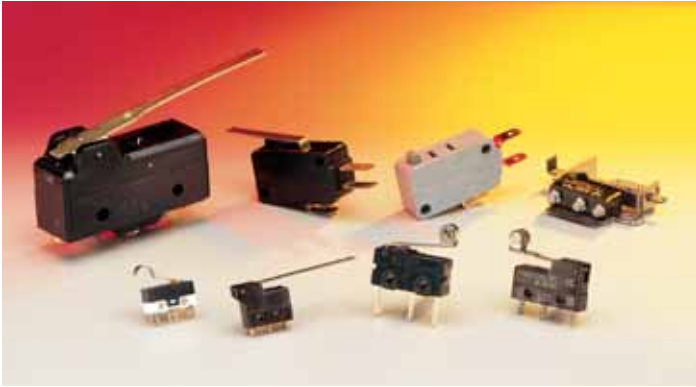




# Industrial Switches and Sensors Range Guide

## Switches - page 26

Include standard size basics, miniature and subminiature switches. Precision snap action mechanisms are available with a variety of actuators and operating characteristics. Ideal for applications requiring compactness, repeatability and long life.



## Safety Switches - page 34

High-quality, dependable and cost-effective solutions for safety hard guarding and perimeter emergency stop applications.



## Limit Switches - page 30

One of the broadest and deepest limit switch portfolios available. Rugged and dependable position detection solutions for industrial equipment, process, material handling and surface and transportation applications.



## Relays - page 35

Designed for applications that require stability and reliability, including power and logic control for factory machines and control panels. Feature small package design, vibration and shock resistance, and high dielectric strength.



# OEM Pressure Sensors

## Media-Isolated Sensors



Product Series	MLH	13/19 mm	SPT	AB/HP
<b>Description</b>	port design	1/8-27 NPT, 1/4-18 NPT 7/16-20 UNF, flush mount cell package	1/8-27 NPT, 1/4 NPT 7/16-20 UNF, 1/4-19 BSP	flush design
<b>Construction</b>	all wetted parts equivalent to 304 SS	wetted parts; 316L SS housing	wetted parts; 316L SS housing	wetted parts; 15-5 PH/316 SS
<b>Pressure Range</b>	0 psi to 50 psi, 0 psi to 8k psi; reference pressures: psig, psis, psia	3 psi to 5k psi	3 psi to 5k psi	5 psig to 20k psig, 6.0 psia to 50 psia
<b>Output Signal</b>	0.25 Vdc to 10.5 Vdc, 0.5 Vdc to 4.5 Vdc, 1.0 Vdc to 6 Vdc, 0 mV to 50 mV, 4 mA to 20 mA	4 mA to 20 mA, 100 mV, 150mV compensated & uncompensated	4 mA to 20 mA, 100 mV, 1 Vdc to 5 Vdc (calibrated)	0 to 100 mV
<b>Accuracy</b>	0.25 %	0.25 %	0.25 %	0.25 %
<b>Temperature Range</b>	compensated -40 °C to 125 °C [-40 °F to 257 °F]	compensated 0 °C to 82 °C [32 °F to 180 °F]	compensated -10 °C to 85 °C [14 °F to 185 °F]	compensated -1 °C to 54 °C [30 °F to 130 °F]
<b>Termination/Connector</b>	multiple connectors	ribbon cable, connectors, pins	cable/8 bayonet	Bendix connector



Product Series	BL	BX	SR	Datamate
<b>Description</b>	flush design	flush design	flush design	port design
<b>Construction</b>	wetted parts; 15-5 PH/316 SS	wetted parts; 304/306 SS housing	wetted parts; 304/306 SS, plastic housing	wetted parts; 304/306 SS housing
<b>Pressure Range</b>	5 psig to 20k psig, 15 psia to 50 psia	15 psig to 300 psig	15 psig to 2k psig	0 psi to 15 psi, 0 psi to 5k psi
<b>Output Signal</b>	4 mA to 20 mA	0 to 50 mV at excitation of 4 mA, 5 Vdc	25 mV/mA at excitation of 4 mA, 5 Vdc	4 mA to 20 mA
<b>Accuracy</b>	1.0 %	1.0 %	1.0 %	1.0 %
<b>Temperature Range</b>	compensated -1 °C to 54 °C [30 °F to 130 °F]	compensated 10 °C to 54 °C [50 °F to 130 °F]	compensated -1 °C to 71 °C [30 °F to 160 °F]	compensated -1 °C to 54 °C [30 °F to 130 °F]
<b>Termination/Connector</b>	Bendix connector	pins	pins	3 lead wires

# OEM Pressure Sensors

## Media-Isolated Sensors



Product Series	EA	Eclipse	MM	PT1
Description	port design	port design	port design	port design
Construction	wetted parts; 304/306 SS housing	wetted parts; 304/306 SS housing	wetted parts; 304/306 SS housing	aluminum housing and threads, plastic connector
Pressure Range	6 psig to 5k psig	0 bar to 6 bar, 0 bar to 500 bar, 0 psi to 15 psi, 0 psi to 7.1k psi	15 psig to 7k psig	0 psi to 150 psi
Output Signal	1 Vdc to 6 Vdc, 1 kHz to 6 kHz	4 mA to 20 mA	1 Vdc to 6 Vdc, 1 kHz to 6 kHz	5 Vdc $\pm$ 0.5 Vdc
Accuracy	1.0 %	0.25 %	0.50 %	$\pm$ 2.5 %
Temperature Range	compensated -1 °C to 85 °C [30 °F to 185 °F]	compensated -40 °C to 105 °C [40 °F to 221 °F]	compensated -1 °C to 82 °C [30 °F to 180 °F]	-40 °C to 135 °C [-40 °F to 275 °F]
Termination/Connector	VALOX® connector	cable, Hirschmann, Packard, DIN	Hirschmann connector, spade pins	plastic connector



Product Series	SA	ST	XPRO	DG
Description	port design	port design	port design	port design
Construction	wetted parts; 304/306 SS housing	wetted parts; SS & silicon plastic housing 304/306 SS	wetted parts; 304/306 SS housing	wetted parts; 304/306 SS housing
Pressure Range	15 psig to 50 psig, 15 psia to 200 psia, 500 psis to 5k psis	5 psig to 250 psig	0 psi to 15 psi, 0 psi to 7k psi	0 psi to 100 ps, 0 psi to 7k psi
Output Signal	1 Vdc to 6 Vdc	0.5 Vdc to 4.5 Vdc 4 mA to 20 mA	4 mA to 20 mA	0.25 Vdc to 4.75 Vdc
Accuracy	1.0 %	1.0 %	1.0 %	1.0 %
Temperature Range	compensated -1 °C to 85 °C [30 °F to 185 °F]	compensated -40 °C to 100 °C [-40 °F to 212 °F]	compensated -1 °C to 54 °C [30 °F to 130 °F]	compensated -40 °C to 125 °C [-40 °F to 257 °F]
Termination/Connector	VALOX® connector	Packard connector	cable	Packard connector

# Test & Measurement

## Accelerometers



**MA11, MA12, MA15, PA, PEL, PEI, JTFS, MA21, MAQ13, MAQ14, MA23, PEC-S, PEC**



**JTF, MA311, MA312, SM-5, MA331, MA332, MA35, MA341, MA342, MAQ36**



**MAQ13, MAQ14, MAQ41, MAV51, MAT53, MA15, MA321, MA322, MAV52, PEC-S**

<b>Product Series</b>	MA11, MA12, MA15, PA, PEL, PEI, JTFS, MA21, MAQ13, MAQ14, MA23, PEC-S, PEC	JTF, MA311, MA312, SM-5, MA331, MA332, MA35, MA341, MA342, MAQ36	MAQ13, MAQ14, MAQ41, MAV51, MAT53, MA15, MA321, MA322, MAV52, PEC-S
<b>Description</b>	general purpose	extended frequency	special applications
<b>Range</b>	2 Hz to 10 kHz	dc 14 kHz	2 Hz to 10 kHz
<b>Sensitivity</b>	20 pC/g, 100 mV/g	5 pC/g, 100 mV/g, 1.6 mA/g	20 pC/g to 1100 pC/g, 20 mV/°C [10 mV/°F], 0.1 mV/in/s, 5mV/g
<b>Powered Input</b>	constant current, 4 mA to 20 mA loop	constant current, 4 mA to 20 mA loop	constant current, 4 mA to 20 mA loop
<b>Output</b>	pC/g, mV/V, mA	pC/g, mV/V, mA	pC/g, mV/V, mA
<b>Diameter/Length</b>	15 mm to 28 mm [0.6 in to 1.1 in]/ 15 mm to 33 mm [0.6 in to 1.3 in]	8 mm to 28 mm [0.3 in to 1.1 in]/ 13 mm to 33 mm [0.5 in to 1.3 in]	10 mm to 28 mm [0.4 in to 1.1 in]/ 25 mm to 38 mm [1.0 in to 1.5 in]
<b>Temperature Range</b>	57 °C to 138 °C [70 °F to 280 °F]	-57 °C to 138 °C [-70 °F to 280 °F]	-57 °C to 249 °C [-70 °F to 480 °F]
<b>Technology</b>	piezoelectric	piezoelectric, piezoresistive	piezoelectric, piezoresistive

## Torque Transducers



**QSFK, QFFH, QWFK, QWLC**



**RTC, 6200**



**9300**

<b>Product Series</b>	QSFK, QFFH, QWFK, QWLC	RTC, 6200	9300
<b>Description</b>	miniature reaction	rotary in-line	rotary clamp-on
<b>Range</b>	0.15 N m to 27,5k N m [1.5 in lb to 24k in lb]	170 N m to 19,25k N m [1.5k in lb to 170k in lb]	consult factory
<b>Linearity, Hysteresis, Repetition</b>	±0.1 % to ±0.03 %	0.25 % to 1 % F.S.	0.25 % to 1 % F.S.
<b>Input (Excitation)</b>	V	160 kHz induction power	160 kHz induction power
<b>Output</b>	mV/V	mV/V, mA	mV/V, mA
<b>Data Bandwidth</b>	—	dc to 1 kHz	dc to 100 Hz
<b>RF Operating Frequency</b>	—	10.7 MHz	10.7 MHz
<b>Temperature Range</b>	-54 °C to 107 °C [-65 °F to 225 °F]	-26 °C to 74 °C [-15 °F to 165 °F]	-26 °C to 74 °C [-15 °F to 165 °F]
<b>Technology</b>	strain gauge	strain gauge	strain gauge



# Test & Measurement

LVDTs



**MVL7, VL7A, MVL7C, JEC, JEC-AG, JEC-C, DLB, DLE, DLF**



**MS3, S3C, M-5P, M-5C**



**LW7S, LW7C, LW7U, DW7S, DW7C, DW7U, MS7A, S7C, SSA, SSD**

## Product Series

<b>Description</b>	long stroke	miniature	submersible
<b>Range</b>	±13 mm to ±470 mm [±0.5 in to ±18.5 in]	±0,6 mm to ±13 mm [± 0.025 in to ±0.5 in]	±13 mm to 102 mm [±0.5 in to 4 in]
<b>Non-Linearity</b>	±0.25 % F.S.	±0.25 % F.S.	±0.25 % F.S.
<b>Input</b>	V	V	V
<b>Output</b>	mV/V, mA	mV/V	mV/V
<b>Diameter/Length</b>	21 mm [0.82 in]/ 127 mm to 1702 mm [5 in to 67 in]	10 mm to 20 mm [0.4 in to 0.8 in]/ 43 mm to 79 mm [1.7 in to 3.1 in]	8 mm to 38 mm [0.3 in to 1.5 in]/ 152 mm to 536 mm [6.0 in to 21.1 in]
<b>Temperature Range</b>	-50 °C to 125 °C [-58 °F to 257 °F]	-50 °C to 125 °C [-58 °F to 257 °F]	-40 °C to 125 °C [-40 °F to 257 °F]
<b>Element Type</b>	ac/ac, dc/dc	ac/ac, dc/dc	ac/ac, dc/dc

## Instrumentation Devices



**GM, DM, HM, GM-A, NK, HH**



**SC2000, SC500**



**DV-05, DA-05, DV-10, DLD-VH, DLD-CH, UV, UV-10, U3W, U2W, CA2, CA3**

## Product Series

<b>Description</b>	single channel	multi-channel	amplifiers
<b>Channels</b>	single	up to 14	—
<b>Display Characters</b>	4.5	up to 16	—
<b>Frequency Response</b>	300 Hz	2 Hz to 800 Hz	dc to 5 kHz
<b>Excitation</b>	V	V	V
<b>Output</b>	mV/V	mV/V	mV/V
<b>Dimensions (L x W x D)</b>	1/8 DIN	3/8 DIN	23 mm x 109 mm x 74 mm [0.9 in x 4.3 in x 2.9 in] to 97 mm x 64 mm x 53 mm [3.8 in x 2.5 in x 2.1 in]
<b>Temperature Range</b>	0 °C to 54 °C [32 °F to 130 °F]	4 °C to 66 °C [40 °F to 150 °F]	-7 °C to 82 °C [20 °F to 180 °F]

# Test & Measurement

## Load Cells



**41, 43, 75, 73, 45, 47**



**MPB, UG, TG, WG**



**11, 13, 31, 34, 53, LFH-7I**



**RM, RG, LP, 81, 82**

Product Series				
<b>Description</b>	pancake	cannister	miniature	in-line
<b>Range</b>	5 lb to 500k lb	100 lb to 3,000k lb	50 gm to 50k lb	5 lb to 200k lb
<b>Accuracy</b>	0.03 % to 0.2 %	0.03 % to 0.1 %	0.7 % to 0.1 %	0.25 % to 0.05 %
<b>Output</b>	mV/V, mA	mV/V, mA	mV/V, mA	mV/V, mA
<b>Diameter/Height</b>	64 mm to 356 mm [2.5 in to 14.0 in]/ 31 mm to 165 mm [1.2 in to 6.5 in]	36 mm to 432 mm [1.4 in to 17.0 in]/ 20 mm to 533 mm [0.8 in to 21.0 in]	10 mm to 30 mm [0.4 in to 1.2 in]/ 5 mm to 51 mm [0.2 in to 2.0 in]	38 mm to 89 mm [1.5 in to 3.5 in]/ 61 mm to 300 mm [2.4 in to 11.8 in]
<b>Temperature Range</b>	-54 °C to 121 °C [-65 °F to 250 °F]	-54 °C to 121 °C [-65 °F to 250 °F]	-54 °C to 121 °C [-65 °F to 250 °F]	-54 °C to 121 °C [-65 °F to 250 °F]
<b>Technology</b>	strain gauge	strain gauge	strain gauge	strain gauge



**TH, D**



**IC48**



**41a, 75a, 45a, 47a, 43a, 73a, RMa, RHa, RFa**

Product Series			
<b>Description</b>	donut	calibration	high output
<b>Range</b>	150 gm to 200k lb	500 lb to 10k lb	50 lb to 200k lb
<b>Accuracy</b>	0.5 % to 0.25 %	0.02 %	0.05 % to 0.2 %
<b>Output</b>	mV/V, mA	mV/V, mA	mV/V, mA
<b>Diameter/Height</b>	13 mm to 89 mm [0.5 in to 3.5 in]/ 5 mm to 89 mm [0.2 in to 3.5 in]	104 mm to 279 mm [4.1 in to 11.0 in]/ 112 mm to 249 mm [4.4 in to 9.8 in]	76 mm to 279 mm [3.0 in to 11.0 in]/ 25 mm to 64 mm [1.0 in to 2.5 in]
<b>Temperature Range</b>	-54 °C to 121 °C [-65 °F to 250 °F]	-54 °C to 93 °C [-65 °F to 200 °F]	-18 °C to 85 °C [0 °F to 185 °F]
<b>Technology</b>	strain gauge	strain gauge	strain gauge

# Test & Measurement

## Pressure Transducers



**TJE, A-5, Z, DS, FPA, FPG, FPB, FPV**



**STJE**



**LM, BDR**



**F, G, S, A-105, A-205**

Product Series	TJE, A-5, Z, DS, FPA, FPG, FPB, FPV	STJE	LM, BDR	F, G, S, A-105, A-205
<b>Description</b>	general purpose	ultra precision	OEM	miniature
<b>Range</b>	vacuum to 60k psi	10 psi to 7.5k psi	1 psig to 15k psig	100 psi to 20k psi
<b>Accuracy</b>	0.1 % to 0.25 %	0.05 %	0.5 % to 0.75 %	1.0 % to 0.5 %
<b>Output</b>	mV/V, mA	mV/V, mA	mV/V, mA	mV/V, mA
<b>Diameter/Length</b>	28 mm to 58 mm [1.1 in to 2.3 in]/ 46 mm to 127 mm [1.8 in to 5.0 in]	41 mm [1.6 in]/ 66 mm to 97 mm [2.6 in to 3.8 in]	28 mm [1.1 in]/ 46 mm to 58 mm [1.8 in to 2.3 in]	8 mm to 15 mm [0.3 in to 0.6 in]/ 13 mm to 46 mm [0.5 in to 1.8 in]
<b>Temperature Range</b>	-74 °C to 163 °C [-100 °F to 325 °F]	-54 °C to 121 °C [-65 °F to 250 °F]	-43 °C to 121 °C [-45 °F to 250 °F]	-54 °C to 149 °C [-65 °F to 300 °F]
<b>Technology</b>	strain gauge, silicon	strain gauge	strain gauge	strain gauge



**TJE, FPG, FPA, FPV, FPB, Z, A-5, 424, 425**



**A-105, A-105a, A-205, G, F, 355, CIP, S**



**FDW, FDD, KZ, Z, A-5, P-30-P, 420DP, HL-Z, TJE**

Product Series	TJE, FPG, FPA, FPV, FPB, Z, A-5, 424, 425	A-105, A-105a, A-205, G, F, 355, CIP, S	FDW, FDD, KZ, Z, A-5, P-30-P, 420DP, HL-Z, TJE
<b>Description</b>	intrinsically safe	flush diaphragm	differential
<b>Range</b>	vacuum to 30k psi	150 psi to 20k psi	2 psid to 10k psid
<b>Accuracy</b>	0.1 % to 0.5 %	1.0 % to 0.1 %	0.1 % to 0.25 %
<b>Output</b>	mA	mV/V, mA	mV/V, mA
<b>Diameter/Length</b>	28 mm to 58 mm [1.1 in to 2.3 in]/ 46 mm to 124 mm [1.8 in to 4.9 in]	8 mm to 38 mm [0.3 in to 1.5 in]/ 13 mm to 127 mm [0.5 in to 5.0 in]	28 mm to 89 mm [1.1 in to 3.5 in]/ 58 mm to 104 mm [2.3 in to 4.1 in]
<b>Temperature Range</b>	-40 °C to 93 °C [-40 °F to 200 °F]	-40 °C to 93 °C [-40 °F to 200 °F]	-18 °C to 82 °C [0 °F to 180 °F]
<b>Technology</b>	strain gauge, silicon	strain gauge	strain gauge, silicon



# Current Sensors

## Industrial Current Sensors



Product Series	CSNX	CSNR	CSNS
Measuring Range	up to 56 A	up to 200 A	up to 600 A
Response Time	< 200 ns	< 500 ns	< 500 ns
Accuracy	better than 0.3 %	better than 0.5 %	better than 0.5 %
Output Stability	better than 10 µA	better than 250 µA	better than 400 µA
Current Type	dc, ac, impulse	dc, ac, impulse	dc, ac, impulse
Primary Connection	integral busbar	through-hole, integral busbar	through-hole
Secondary Connection	PCB	PCB	Molex connector

# Equipment Health Monitoring System

## Detectors



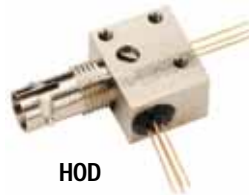
Product Series	Equipment Health Monitoring System Detectors
Description	detect temperature loss or rise, fluid flow or leak, mechanical noise or wear, audible noise, tilt & acute angle, vibration
Power Supply	10 Vdc to 32 Vdc at 20 mA typ.
Temperature Range	-25 °C to 85 °C [-13 °F to 185 °F]
Dimensions (L x W x H)	53 mm x 18 mm x 97 mm [ 2.1 in x 0.7 in x 3.8 in]
Mounting	2 M4 screws or cable ties for pipes
Housing Material	nylon 66 & BS
Output	bi-color red/green LED, isolated volt free contact rated at 48 V max., 100 mA max. ac or dc switching
Approvals	CE compliant to EN610101
Sealing	IP67 when mounted per instructions

# Fiber Optic Products

## Fiber Optic Modules



Product Series	GFD	HFX	HFD
Package/Connector Type	component, SMA, ST	POF DIP	component, SMA, ST, POF DIP
Frequency	660 nm	660 nm	660 nm, 850 nm, 1300 nm
Response Time	6 ns typ.	50 ns typ.	3.5 ns typ.
Bandwidth	—	7 MHz typ. (digital)	—
Sensitivity	-20 dBm min.	—	0.55 A/W typ.
Interface	digital	digital	analog, digital
Optical Budget	—	—	—



Product Series	HFE	HOD
Package/Connector Type	component, SMA, ST, POF DIP	SMA, ST, SC
Frequency	660 nm, 850 nm, 1300 nm	850 nm, 1300 nm
Response Time	—	3.5 ns typ.
Bandwidth	up to 1.25 GHz	up to 1.25 GHz
Sensitivity	—	0.55 A/W typ.
Interface	analog, digital	analog, digital
Optical Budget	—	≤40 dB

# Position & Speed Sensors

## Potentiometers, Industrial Cermet & Wirewound Elements



Product Series	309/409	43/RA20	58/RA30
Description	309: compact, modular housing 409: sealed for board washing	wirewound element & nickel-plated brass shafts; RA20 meets MIL-R-19	rugged construction, wirewound element; RA30 meets MIL-R-19
Rotational Life	25k cycles	10k cycles	25k cycles
Element Type	cermet	wirewound	wirewound
Power Rating	1 W	2 W	4 W
Terminal Type	PC	solder lug	solder lug
Resistance Range	100 $\Omega$ to 5 M $\Omega$	43: 10 $\Omega$ to 50 k $\Omega$ RA20: 50 $\Omega$ to 15 k $\Omega$	58: 50 $\Omega$ to 50 k $\Omega$ RA30: 25 $\Omega$ to 25 k $\Omega$
Bushing Type	standard	standard, locking	standard, locking
Potentiometer Type	industrial	—	—
Electrical Taper	linear	—	—

## Industrial Conductive Plastic Devices



Product Series	308/408	380/53/RV4	381	392/RV6
Description	308: compact, modular housing 408: sealed for board washing	superior dynamic noise & long rotational life; meets MIL-PRF-94 where applicable	metal case & nickel-plated brass shaft & bushings	designed for wave soldering to PC boards; meets MIL-PRF-94 where applicable
Rotational Life	50k cycles	100k cycles, 25k cycles	25k cycles	50k cycles
Element Type	conductive plastic	conductive plastic	conductive plastic	conductive plastic
Power Rating	0.5 W	2 W	1 W	0.5 W
Terminal Type	PC, solder hook	solder lug	solder lug	PC
Resistance Range	100 $\Omega$ to 1 M $\Omega$ , 500 $\Omega$ to 10 k $\Omega$	100 $\Omega$ to 5 M $\Omega$ , 50 $\Omega$ to 5 M $\Omega$	100 $\Omega$ to 5 M $\Omega$	100 $\Omega$ to 5 M $\Omega$
Bushing Type	standard, locking	standard, locking	standard, locking	standard
Potentiometer Type	industrial	industrial	industrial	industrial
Electrical Taper	CW audio, linear	CW audio, linear	CW audio, linear	linear



# Position & Speed Sensors

## Commercial Potentiometers



**574**



**575**



**585**

<b>Product Series</b>	<b>574</b>	<b>575</b>	<b>585</b>
<b>Description</b>	low mounting profile; vertical PC style mounting	smooth feel & robust construction in a thermoplastic panel mount housing	robust, low-cost commercial package; uses carbon elements & metal shaft/bushing
<b>Rotational Life</b>	50k cycles	50k cycles	10k cycles
<b>Element Type</b>	conductive plastic	conductive plastic	carbon
<b>Power Rating</b>	0.5 W	0.5 W	0.05 W
<b>Terminal Type</b>	PC with bracket	PC, solder hook	PC
<b>Resistance Range</b>	1 k $\Omega$ to 100 k $\Omega$	1 k $\Omega$ to 50 k $\Omega$	1 k $\Omega$ to 10 k $\Omega$
<b>Bushing Type</b>	standard	standard	standard
<b>Potentiometer Type</b>	commercial	commercial	commercial
<b>Electrical Taper</b>	linear	linear	CW audio, linear



**586**



**590/591**

<b>Product Series</b>	<b>586</b>	<b>590/591</b>
<b>Description</b>	robust, low-cost commercial package; uses carbon elements & plastic shaft	low electrical noise & smooth feel; multiple sections available on special order
<b>Rotational Life</b>	10k cycles	50k cycles, 25k cycles
<b>Element Type</b>	carbon	conductive plastic, cermet
<b>Power Rating</b>	0.025 W	0.5 W, 1 W
<b>Terminal Type</b>	PC	PC
<b>Resistance Range</b>	1 k $\Omega$ to 10 k $\Omega$	100 $\Omega$ to 1 M $\Omega$ , 500 $\Omega$ to 100 k $\Omega$
<b>Bushing Type</b>	—	standard
<b>Potentiometer Type</b>	commercial	commercial
<b>Electrical Taper</b>	CW audio, linear	linear

# Position & Speed Sensors

## Precision Potentiometers



Product Series	578	73
Description	ruggedly constructed; cost-effective for joy-stick & position sensing devices	wirewound element; linear taper & 10 turn construction
Rotational Life	2.5 M cycles	50k cycles
Element Type	conductive plastic	wirewound
Power Rating	0.5 W	2 W
Terminal Type	PC	solder lug
Resistance Range	1 k $\Omega$ to 10 k $\Omega$	100 $\Omega$ to 100 k $\Omega$
Bushing Type	standard	standard
Potentiometer Type	precision	precision
Electrical Taper	linear	linear

## Encoders



Product Series	388E	510	600
Description	high performance mechanical contact encoder; high resolution precision screened element	provides a 2-bit gray code for relative sensing applications or a 4-bit gray code for absolute sensing applications	optical encoder with 128 quadrature pulses per channel per revolution
Encoder Type	mechanical	mechanical	optical
Pulse Per Revolution	6, 4	16, 9, 6, 4	128
Output	2-bit gray code	2-bit gray code	quadrature square wave
Dome Switch	yes	no	no
Rotational Life	100k cycles	100k cycles	10 million cycles
Operating Speed	30 rpm max.	50 rpm max.	300 rpm max.
Terminals	PCB pins	PCB pins	PCB pins or cable with/without connector

# Position & Speed Sensors

## Rotary Sensing & Control Devices



<b>Product Series</b>	<b>MYSTR</b>
<b>Description</b>	custom linear & rotary elements
<b>Accessory Options</b>	contact wipers & mounting blocks

## Linear Rotary Sensors



**LT**



**MLT**



**AQ**

<b>Product Series</b>	<b>LT</b>	<b>MLT</b>	<b>AQ</b>
<b>Description</b>	13 mm [0.5 in] diameter, plunger-driven wiper	10 mm [0.4 in] diameter; plunger-driven wiper	magnetically-coupled wiper drive for environmental isolation
<b>Measurement Range</b>	25 mm to 254 mm [1 in to 10 in]	13 mm to 152 mm [0.5 in to 6 in]	127 mm to 965 mm [5 in to 38 in]



**Longfellow II**



**Short Longfellow**



**DURASTAR**

<b>Product Series</b>	<b>Longfellow II</b>	<b>Short Longfellow</b>	<b>DURASTAR</b>
<b>Description</b>	vibration-resistant, plunger-driven wiper	short stroke version of the Longfellow II	space-saving side actuator
<b>Measurement Range</b>	152 mm to 1219 mm [6 in to 48 in]	25 mm to 152 mm [1 in to 6 in]	102 mm to 1270 mm [4 in to 50 in]



# Position & Speed Sensors

## Ultrasonic Sensors



Product Series	940-F/947	941-D	942-T
Range Type	from 0.6 m to 3 m [2.0 ft to 10.0 ft]	from 0.4 m to 3.5 m [1.3 ft to 11.5 ft]	from 1.5 m to 3.5 m [4.9 ft to 11.5 ft]
Output Type	analog or switching	analog or switching	analog & switching
Supply Voltage	19 Vdc to 30 Vdc	15 Vdc to 30 Vdc	19 Vdc to 30 Vdc
Housing Style	plastic M18 & M30	plastic square housing	plastic M30
Termination Type	cable or connector	connector	connector
Software Programmable	no	no	yes
Teach In	no	yes	yes
Remote Teach In	no	no	no
Synchronization Output	yes	yes	yes



Product Series	943	944	948
Range Type	from 0.2 m to 3.5 m [0.7 ft to 11.5 ft]	from 0.4 m to 3.5 m [1.2 ft to 11.5 ft]	0.3 m [1.0 ft]
Output Type	analog or switching	analog & switching	switching
Supply Voltage	15 Vdc to 30 Vdc	19 Vdc to 30 Vdc	18 Vdc to 30 Vdc
Housing Style	metal M12, plastic M18 & M30	plastic M18 & M30	2 pieces square plastic
Termination Type	cable or connector	connector	cable
Software Programmable	no	no	no
Teach In	yes	yes	no
Remote Teach In	yes	no	no
Synchronization Output	no	no	no

# Position & Speed Sensors

## Non-Contact Sensors



<b>Product Series</b>	<b>HRS100</b>
<b>Description</b>	Hall effect rotary position sensor with stainless steel shaft & housing
<b>Supply Voltage</b>	5 Vdc $\pm$ 10 %
<b>Output Type</b>	analog voltage
<b>Rotational Life</b>	10 million cycles
<b>Package Style</b>	stainless steel shaft & brass bushing
<b>Temperature Range</b>	-40 °C to 85 °C [-40 °F to 185 °F]
<b>Supply Current</b>	5 mA (max. at 25 °C [77 °F]), exclusive of load



<b>Product Series</b>	<b>Speed Sensors</b>
<b>Air Gap Range</b>	0 mm to 2,0 mm [0 in to 0.08 in]
<b>Technology</b>	single Hall element, rotation insensitive, various technologies available, precise edge sensing, zero speed, 50 % dc
<b>Output Type</b>	single digital output, open collector
<b>Supply Voltage</b>	4.5 Vdc to 26 Vdc
<b>Housing Style</b>	plastic housing & mounting flange with metal mounting bushing; multiple mounting lengths & connector orientations
<b>Connection Type</b>	Packard 150 metric pack, 3,5 mm [0.14 in] terminal centers
<b>Applications</b>	senses ferrous metal targets to provide speed or position information, automotive under the hood packaging integrity, EMI hardened

# Resistors

## Wirewound Resistors



Product Series	CMC	SC	VC	VK
Resistor Type	fixed	fixed	fixed	fixed
Power Rating	5 W, 10 W, 25 W, 50 W	1 W, 3 W, 5 W	3 W, 5 W, 10 W	100 W, 200 W
Resistance Range	0.1 $\Omega$ to 25 k $\Omega$	0.1 $\Omega$ to 25 k $\Omega$	0.1 $\Omega$ to 50 k $\Omega$	1 $\Omega$ to 100 k $\Omega$
Terminal Type	lug	axial	axial	lug
Housing Material	aluminum	silicone	vitreous enamel	vitreous enamel



Product Series	VPR	VP Fixed	VP Adjustable
Resistor Type	fixed	fixed	adjustable
Power Rating	5 W, 10 W, 20 W	25 W, 50 W	10 W, 25 W, 50 W
Resistance Range	1 $\Omega$ to 100 $\Omega$	1 $\Omega$ to 250 k $\Omega$	1 $\Omega$ to 50 k $\Omega$
Terminal Type	axial & lug	lug	lug
Housing Material	vitreous enamel	vitreous enamel	vitreous enamel

# Liquid Level Sensors

## Enhanced Sensors



Product Series	LLE105000	LLE102000	LLE101000
Repeatability	±1 mm [0.039 in]	±1 mm [0.039 in]	±1 mm [0.039 in]
Hysteresis	1 mm [0.039 in]	1 mm [0.039 in]	1 mm [0.039 in]
Response Time	50 µs (rising liquid)	50 µs (rising liquid)	50 µs (rising liquid)
Operating Temperature	-25 °C to 80 °C [-13 °F to 176 °F]	-25 °C to 80 °C [-13 °F to 176 °F]	-25 °C to 80 °C [-13 °F to 176 °F]
Power Supply	5 Vdc to 12 Vdc	5 Vdc to 12 Vdc	5 Vdc to 12 Vdc
Output Connection	3 lead wires	3 lead wires	3 lead wires

## Industrial Sensors



Product Series	LLN
Repeatability	±1 mm [0.039 in]
Hysteresis	1 mm [0.039 in]
Response Time	50 µs (rising liquid)
Operating Temperature	-40 °C to 125 °C [-40 °F to 257 °F]
Power Supply	10 Vdc to 40 Vdc
Output Connection	3 pin Lumberg connector

# Electronic Safety

## Gate Monitoring Devices



Product Series	FF-SD Safety Sensing Edge	FF-SNC Non-Contact Safety Switches
Device Category	approved as Category 4 per EN 954-1; UL, CE	suitable for interfaces up to Category 3 per EN 954-1; UL, CE
Voltage	24 Vdc	24 Vac/Vdc, 110 Vac
Operating Range	sensing edge length: 10 m [32.8 ft]	on: 5 mm to 7 mm [0.2 in to 0.3 in]; off: 8 mm to 12 mm [0.3 in to 0.5 in]
Dimensions (L x W x H) (W)	sensors: Ø 11 mm x 37 mm [Ø 0.45 in x 1.45 in] control unit: 22,5 mm [0.9 in]	sensors: 52 mm x 28 mm x 14 mm [2.0 in x 1.1 in x 0.6 in] control units: 22,5 mm [0.9 in], 75 mm [3.0 in]
Safety Outputs	2 relay outputs	2 relay outputs
Auxiliary Outputs	1 static output	1 relay output
Termination	sensors: pre-wired; control unit: screw terminal	sensors: pre-wired or M8 plug; control unit: screw terminal
Functions	start & restart interlock, external device monitoring	start & restart interlock, external device monitoring, e-stop circuit inputs, cascading

## Control Modules



Product Series	FF-SRL Control Module for Safety Light Curtains
Device Category	suitable for interfaces up to Category 4 per EN 954-1; cRUus, CE
Voltage	24 Vdc
Input Channels	dual
Dimensions (W)	22,5 mm [0.9 in], 45 mm [1.8 in]
Safety Outputs	3 relay outputs
Auxiliary Outputs	1 relay or static output
Termination	screw terminals
Functions	start & restart interlock, external device monitoring, cascading, muting, mutual exclusion, single/double stroke (PSDI)



# Electronic Safety

## Control Modules



Product Series	FF-SRS Emergency Stop Circuit	FF-SR2 Two-Hand Control
Device Category	suitable for interfaces up to Category 2 & 4 per EN 954-1; cRUUs, CE	Type IIIA or Type IIIC per EN 574; cRUUs, CE
Voltage	24 Vdc, 120 Vac, 230 Vac	24 Vdc
Input Channels	single or dual	dual (0.5 s input timing)
Dimensions (W)	22,5 mm [0.9 in], 45 mm [1.8 in], 100 mm [3.9 in]	22,5 mm [0.9 in], 45 mm [1.8 in]
Safety Outputs	2 to 6 relay outputs	2 or 3 relay outputs
Auxiliary Outputs	1 relay output	1 relay output
Termination	screw terminals	screw terminals
Functions	off-delayed relay outputs option, external device monitoring, start & restart interlock	external device monitoring



Product Series	FF-SRO Standstill & Low-Speed Monitor	FF-SRE & FF-SRT Extension Module
Device Category	suitable for interfaces up to Category 1 & 3 per EN 954-1; cRUUs, CE	suitable for interface up to Category 4 or Category 1 per EN 954-1; cRUUs, CE
Voltage	24 Vdc, 120 Vac, 230 Vac	24 Vdc, 120 Vac, 230 Vac
Input Channels	single or dual	single or dual
Dimensions (W)	45 mm [1.8 in]	22,5 mm [0.9 in], 45 mm [1.8 in], 100 mm [3.9 in]
Safety Outputs	2 relay outputs	1 to 7 relay outputs
Auxiliary Outputs	1 or 2 relay output	1 or 2 relay outputs
Termination	screw terminals	screw terminals
Functions	motor back EMF monitoring or rotation frequency monitoring, external device monitoring	off-delayed relay outputs option

# Electronic Safety

## Light Curtains for Point-of-Operation Protection



**FF-SYB Self-Contained & Multi-Purpose Safety Light Curtain**



**FF-SG Simple On/Off Safety Light Curtain**

Product Series	FF-SYB Self-Contained & Multi-Purpose Safety Light Curtain	FF-SG Simple On/Off Safety Light Curtain
Device Category	approved as Type 4 per IEC/EN 61496-1/2; cCSAus, CE	approved as Type 4 per IEC/EN 61496-1/2; cCSAus, CE
Voltage	24 Vdc	24 Vdc
Resolution	FF-SYB14: 14 mm [0.6 in]; FF-SYB30: 30 mm [1.2 in] FF-SYB50: 50 mm [2.0 in]	FF-SG18: 18 mm [0.7 in] FF-SG30: 30 mm [1.2 in]
Scanning Range	FF-SYB14: 6 m [20 ft] FF-SYB30/50: 20 m [65.6 ft]	3,5 m [11.5 ft]
Protection Height	320 mm to 1760 mm [12.6 in to 56.7 in]	FF-SG18: 310 mm to 700 mm [12.2 in to 27.6 in] FF-SG30: 310 mm to 1470 mm [12.2 in to 57.9 in]
Dimensions (Cross Section)	55 mm <sup>2</sup> x 42 mm <sup>2</sup> [2.2 in <sup>2</sup> x 1.7 in <sup>2</sup> ]	55 mm <sup>2</sup> x 42 mm <sup>2</sup> [2.2 in <sup>2</sup> x 1.7 in <sup>2</sup> ]
Functions	selectable start & restart interlock, external device monitoring, test input, floating blanking, muting, e-stop circuit inputs	—



**FF-SLG Simple On/Off Safety Light Curtain**



**FF-SB Self-Contained Safety Light Curtain**

Product Series	FF-SLG Simple On/Off Safety Light Curtain	FF-SB Self-Contained Safety Light Curtain
Device Category	approved as Type 2 per IEC/EN 61496-1/2; cCSAus, CE	approved as Type 4 per pr EN 50100-1/2; cCSAus, CE
Voltage	24 Vdc	120 Vac, 240 Vac, 24 Vdc, 46 Vdc
Resolution	FF-SG18: 18 mm [0.7 in] FF-SG30: 30 mm [1.2 in]	35 mm [1.4 in]
Scanning Range	4 m [13.1 ft]	10 m [32.8 ft], 24 m [78.7 ft] (long range)
Protection Height	FF-SG18: 310 mm to 700 mm [12.2 in to 27.6 in] FF-SG30: 310 mm to 1470 mm [12.2 in to 57.9 in]	400 mm to 1400 mm [15.8 in to 55.2 in]
Dimensions (Cross Section)	55 mm <sup>2</sup> x 42 mm <sup>2</sup> [2.2 in <sup>2</sup> x 1.7 in <sup>2</sup> ]	116 mm <sup>2</sup> x 56 mm <sup>2</sup> [4.6 in <sup>2</sup> to 2.2 in <sup>2</sup> ]
Functions	—	selectable start & restart interlock, external device monitoring, test input

# Electronic Safety

## Multibeam Systems for Access Detection



Product Series	FF-SYB234 Self-Contained & Multi-Purpose Safety Light Curtain	FF-SLG234 Self-Contained & Multi-Purpose Safety Light Curtain
Device Category	approved as Type 4 per IEC/EN 61496-1/2; cCSAus, CE	approved as Type 2 per IEC/EN 61496-1/2; CE
Voltage	24 Vdc	24 Vdc
Resolution	number of beams: 2, 3 or 4 beam pitch: 500 mm (2 beam), 400 mm (3 beam), 300 mm (4 beam)	number of beams: 2, 3 or 4 beam pitch: 500 mm (2 beam), 400 mm (3 beam), 300 mm (4 beam)
Detection Field Size	scanning range: 30 m [98.4 ft] (standard), 80 m [262.5 ft] (long range)	scanning range: 45 m [147.6 ft]
Dimensions (Cross Section)	55 mm <sup>2</sup> x 42 mm <sup>2</sup> [2.2 in <sup>2</sup> to 1.7 in <sup>2</sup> ]	35 mm <sup>2</sup> x 40 mm <sup>2</sup> [1.4 in <sup>2</sup> to 1.6 in <sup>2</sup> ]
Functions	selectable, start & restart, interlock, external device monitoring, test input, floating blanking, muting, e-stop circuit input	selectable start & restart, interlock, test input, muting

## Presence Sensing Devices



Product Series	FF-SM Safety Mat
Device Category	mat: Category 3; control unit: Category 4 per EN 954-1; cCSAus, CE
Voltage	120 Vac, 240 Vac, 24 Vdc
Resolution	≥30 kg [66 lb]
Detection Field Size	max. surface per control unit: 6 m <sup>2</sup> [64.5 ft <sup>2</sup> ]
Dimensions (L x W x H)	control unit: 211 mm x 211 mm x 96 mm [8.3 in x 8.3 in x 3.8 in]
Functions	test input

# Switches

## Subminiature Switches



Product Series	SM	SX	ZM	ZV
<b>Housing Material</b>	high temperature phenolic	high temperature phenolic	polyamide (nylon)	polyamide (nylon)
<b>Dimensions (L x W x H)</b>	12,7 mm x 6,4 mm x 20,3 mm [0.50 in x 0.25 in x 0.80 in]	8,9 mm x 5,1 mm x 12,7 mm [0.35 in x 0.20 in x 0.50 in]	10,6 mm x 6,4 mm x 19,8 mm [0.42 in x 0.25 in x 0.78 in]	10,6 mm x 6,4 mm x 19,8 mm [0.42 in x 0.25 in x 0.78 in]
<b>Circuitry</b>	SPDT snap action	SPDT snap action	SPNO, SPNC, SPDT snap action	SPNO, SPNC, SPDT snap action
<b>Sealing</b>	none	none	none	none
<b>Electrical Data</b>	up to 11 A at 250 Vac	up to 7 A at 250 Vac	up to 10.1 A at 250 Vac	up to 10.1 A at 250 Vac
<b>Approvals</b>	UL, CSA, CE, ENEC	UL, CSA, CE, ENEC, DEMKO	UL, CSA, CE	UL, cUL, CSA, CE, ENEC
<b>Temperature Range</b>	-54 °C to 85 °C [-65 °F to 185 °F]	-54 °C to 85 °C [-65 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]



Product Series	ZW	ZX
<b>Housing Material</b>	PBT polyester	PBT (case)/nylon (cover)
<b>Dimensions (L x W x H)</b>	9,0 mm x 6,4 mm x 19,8 mm [0.36 in x 0.25 in x 0.78 in]	6,5 mm x 5,8 mm x 12,7 mm [0.26 in x 0.23 in x 0.50 in]
<b>Circuitry</b>	SPNO, SPNC, SPDT snap action	SPDT snap action
<b>Sealing</b>	IP50 & IP67 available	none
<b>Electrical Data</b>	up to 6 A at 250 Vac	up to 3 A at 125 Vac
<b>Approvals</b>	UL, cUL, CSA, CE, ENEC	UL, CSA, CE
<b>Temperature Range</b>	-40 °C to 120 °C [-40 °F to 248 °F]	-25 °C to 85 °C [-13 °F to 185 °F]

# Switches

## Miniature Switches



Product Series	V5	V7	TB
Housing Material	thermoplastic	thermoplastic	general purpose phenolic
Dimensions (L x W x H)	15,9 mm x 10,2 mm x 28,8 mm [0.63 in x 0.40 in x 1.14 in]	15,9 mm x 10,2 mm x 28,8 mm [0.63 in x 0.40 in x 1.14 in]	25,4 mm x 17,8 mm x 50,8 mm [1.00 in x 0.70 in x 2.00 in]
Circuitry	SPNC, SPNO, SPDT snap action	SPNC, SPNO, SPDT snap action	two circuit double break (2 CKT DB) snap action
Sealing	none	none	none
Electrical Data	up to 22 A at 250 Vac	up to 25 A at 277 Vac	10 A at 250 Vac
Approvals	UL, CSA, CE, ENEC, BEAB, SEMKO, VDE	UL, CSA, ENEC	UL, CSA
Temperature Range	-55 °C to 150 °C [-67 °F to 302 °F]	-40 °C to 177 °C [-40 °F to 350 °F]	-54 °C to 85 °C [-62 °F to 185 °F]

## Large Switches



Product Series	BZ/BA/BM/BE	DT	MT	MN
Housing Material	general purpose phenolic	general purpose phenolic	arc-resistant phenolic	arc-resistant phenolic
Dimensions (L x W x H)	24,1 mm x 17,5 mm x 49,3 mm [0.95 in x 0.69 in x 1.94 in]	31,5 mm x 43,0 mm x 49,3 mm [1.24 in x 1.70 in x 1.94 in]	22,5 mm x 17,5 mm x 49,3 mm [0.88 in x 0.69 in x 1.94 in]	30,5 mm x 17,3 mm x 63,5 mm [1.20 in x 0.68 in x 2.50 in]
Circuitry	SPNO, SPNC, SPDT snap action	DPDT snap action	SPDT snap action	two circuit double break (2 CKT DB) snap action
Sealing	environmental available	none	none	none
Electrical Data	up to 25 A at 480 Vac	10 A at 250 Vac	10 A at 125 Vac/Vdc	15 A at 600 Vac
Approvals	CE, CSA, UL, DEMKO, ENEC	CSA, UL	UL, CSA	UL, CSA
Temperature Range	-54 °C to 204 °C [-62 °F to 400 °F]	-54 °C to 82 °C [-62 °F to 180 °F]	-54 °C to 82 °C [-62 °F to 180 °F]	-54 °C to 85 °C [-62 °F to 185 °F]



# Switches

## Door Interlock Switches



Product Series	AC	DM/DP
Housing Material	stainless steel & phenolic	polyester
Dimensions (L x W x H)	46,0 mm x 12,7 mm x 50,0 mm [1.81 in x 0.50 in x 1.97 in]	snap-in panel mount: 14,0 mm x 28,4 mm [0.55 in x 1.12 in]
Circuitry	SPST, SPDT snap action	SPNC, SPDT, DPDT, snap action
Sealing	none	none
Electrical Data	up to 15 A at 480 Vac	up to 16 A at 277 Vac
Approvals	UL, CSA (selected listings)	UL, CSA
Temperature Range	-54 °C to 85 °C [-65 °F to 185 °F]	-37 °C to 82 °C [-35 °F to 180 °F]

## Environmentally Sealed Switches



Product Series	SE	XE
Housing Material	aluminum	aluminum
Dimensions (L x W x H)	19,1 mm x 8,6 mm x 20,3 mm [0.75 in x 0.34 in x 0.8 in]	19,1 mm x 8,1 mm x 15,2 mm [0.75 in x 0.32 in x 0.60 in]
Circuitry	SPNC, SPNO, SPDT snap action	SPNO, SPDT snap action
Sealing	environmental	environmental
Electrical Data	7 A at 250 Vac	7 A at 250 Vac
Approvals	CE, UL/CSA (selected listings), watertight seal per MIL-S-8805	UL (selected listings), watertight seal per MIL-S-8805
Temperature Range	-54 °C to 105 °C [-65 °F to 221 °F]	-54 °C to 149 °C [-65 °F to 300 °F]

# Switches

## Hermetically Sealed Switches



Product Series	HS	HM	HT
<b>Housing Material</b>	stainless steel, phenolic, monel	stainless steel, epoxy	ceramic/stainless steel
<b>Dimensions (L x W x H)</b>	25,4 mm x 17,8 mm x 50,8 mm [1.00 in x 0.70 in x 2.00 in]	12,7 mm x 6,35 mm x 20,3 mm [0.50 in x 0.25 in x 0.80 in]	25,4 mm x 17,8 mm x 50,8 mm [1.00 in x 0.70 in x 2.00 in]
<b>Circuitry</b>	SPDT snap action	SPDT snap action	SPDT snap action
<b>Sealing</b>	hermetic	hermetic	none
<b>Electrical Data</b>	up to 25 A at 28 Vdc, 1 A at 115 Vac	up to 4 A at 115 Vac, 400 Hz up to 3A at 28 Vdc	3 A at 250 Vac
<b>Approvals</b>	UL, CSA	hermetically sealed per MIL-S-8805	UL, CSA
<b>Temperature Range</b>	-55 °C to 149 °C [-67 °F to 300 °F]	-65 °C to 260 °C [-85 °F to 500 °F]	up to 538 °C [1000 °F]

## Pushbutton Switches




Product Series	AML	PB
<b>Housing Material</b>	thermoplastic	general purpose phenolic plastic/metal
<b>Dimensions (L x W x H)</b>	35,6 mm x 20,3 mm x 20,3 mm [1.4 in x 0.8 in x 0.8 in]	34,0 mm x 17,3 mm x 19,8 mm [1.34 in x 0.68 in x 0.78 in]
<b>Circuitry</b>	SPDT	SPDT
<b>Sealing</b>	none	hermetic (selected listings)
<b>Electrical Data</b>	up to 15 A at 250 Vac	up to 5 A at 250 Vac or 30 Vdc
<b>Approvals</b>	UL, CSA, CE	UL, CSA
<b>Temperature Range</b>	0 °C to 55 °C [32 °F to 131 °F]	-54 °C to 85 °C [-65 °F to 185 °F]

# Limit Switches

## Global Switches (EN50041/EN50047)



Product Series	EVN2000	GLS MIN-DIN	GLS DIN
<b>Dimensions (L x W x H)</b>	30 mm x 31 mm x 116 mm [1.2 in x 1.2 in x 4.6 in]	30 mm x 31 mm x 77 mm [1.2 in x 1.2 in x 3.0 in]	42 mm x 42 mm x 103 mm [1.7 in x 1.7 in x 4.0 in]
<b>Electrical Data</b>	10 A thermal; AC15 (NEMA A300)	10 A thermal; AC15: SPDT (NEMA A600), DPDT (NEMA A300)	10 A thermal; AC15: SPDT (NEMA A600), DPDT (NEMA A300)
<b>Circuitry</b> 	SPDT snap action	SPDT snap & slow action, DPDT snap action	SPDT snap & slow action, DPDT snap action
<b>Sealing</b>	IP66/67; NEMA 1, 12, 13	IP66; NEMA 1, 3, 4, 12, 13 (metal housing), NEMA 1, 12, 13 (plastic housing)	IP67; NEMA 1, 3, 4, 12, 13 (metal housing), NEMA 1, 12, 13 (plastic housing)
<b>Temperature Range</b>	-25 °C to 85 °C [-13 °F to 185 °F]	-40 °C to 85 °C [-40 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]
<b>Available Actuators</b>	side rotary, top plunger, cross roller plunger, top roller plunger	side rotary, top plunger, top roller level, wobble	side rotary, top plunger, top roller level, wobble
<b>Approvals</b>	UL, CSA, CE	UL, CSA, CE EN50047	UL, CSA, CE EN50041

# Limit Switches

## Compact Switches



Product Series	14CE/914CE/SSCE	SL1	SZL-VL
<b>Dimensions (L x W x H)</b>	41 mm x 15 mm x 53 mm [1.6 in x 0.6 in x 2.1 in]	44 mm x 18 mm x 28 mm [1.73 in x 0.71 in x 1.10 in]	28 mm x 38 mm x 97 mm [1.1 in x 1.5 in x 3.8 in]
<b>Electrical Data</b>	5 A thermal; up to 250 Vac; AC14 D300, DC13 R300	5 A thermal; up to 250 Vac	ac: 5 A res., 125 Vac, 250 Vac dc: 0.4 A res., 125 Vac
<b>Circuitry</b>	SPDT snap action, optional double break	SPDT snap action	SPDT double break
<b>Sealing</b>	IP66/67/68; NEMA 1, 2, 3, 3R, 4, 6, 6P, 12 (with seal boot), 13	IP67; NEMA 3, 4, 13	IP64
<b>Temperature Range</b>	0 °C to 105 °C [32 °F to 221 °F], optional -40 °C [-40 °F]	-10 °C to 70 °C [14 °F to 160 °F]	-20 °C to 60 °C [-4 °F to 140 °F]
<b>Available Actuators</b>	side rotary, top plunger, roller plunger, pushbutton, wobble	top plunger, roller plunger, roller lever	side rotary, top plunger, wobble
<b>Approvals</b>	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE

# Limit Switches

## Medium-Duty Switches



**BF**



**BAF1**



**E6/V6**

Product Series	BF	BAF1	E6/V6
<b>Dimensions (L x W x H)</b>	74 mm x 30 mm x 69 mm [2.9 in x 1.2 in x 2.7 in]	102 mm x 33 mm x 81 mm [4.0 in x 1.3 in x 3.2 in]	76 mm x 25 mm x 69 mm [3.0 in x 1.0 in x 2.7 in]
<b>Electrical Data</b>	5 A, 11 A; 125 Vac	up to 20 A	up to 15 A
<b>Circuitry</b>	SPDT	SPDT, DPDT	SPDT, DPDT
<b>Sealing</b>	NEMA 1, 3, 4, 13	NEMA 1, 3, 4, 13	NEMA 1, 3
<b>Temperature Range</b>	-32 °C to 71 °C [-25 °F to 160 °F]	-32 °C to 71 °C [-25 °F to 160 °F]	-32 °C to 71 °C [-25 °F to 160 °F], optional -40 °C [-40 °F]
<b>Available Actuators</b>	top plunger, lever actuated (rod, roller), wobble	top plunger, roller plunger, maint. with reset, lever, wobble	top plunger, roller plunger, maint. with reset, lever, wobble
<b>Approvals</b>	UL, CSA	UL, CSA	UL, CSA, CE



**LN**



**LS**



**SZL-WL**

Product Series	LN	LS	SZL-WL
<b>Dimensions (L x W x H)</b>	103 mm x 25 mm x 48 mm [4.0 in x 1.0 in x 1.9 in]	41 mm x 58 mm x 94 mm [1.6 in x 2.3 in x 3.7 in]	43 mm x 40 mm x 119 mm [1.7 in x 1.6 in x 4.7 in]
<b>Electrical Data</b>	up to 15 A	10 A thermal; up to 480 Vac	ac: 10 A res., 125 Vac, 250 Vac, 480 Vac dc: 0.8 A res., 125 Vdc, 0.4 A res. 250 Vdc
<b>Circuitry</b>	SPDT snap action & double break	SPDT, DPDT	SPDT double break
<b>Sealing</b>	NEMA 1, 3, 4, 13	NEMA 1, 3, 4, 6, 13	IP67
<b>Temperature Range</b>	-32 °C to 55 °C [-25 °F to 131 °F]	-29 °C to 71 °C [-20 °F to 160 °F]	-10 °C to 80 °C [14 °F to 176 °F]
<b>Available Actuators</b>	top plunger, top roller arm, cross roller arm	side rotary, top plunger, side plunger, wobble	side rotary, top plunger, side plunger, wobble
<b>Approvals</b>	UL, CSA	UL, CSA	UL, CSA, CE, CCC

# Limit Switches

## Heavy-Duty Switches



**HDLS**



**HDLS Fully Potted**



**HDLS Stainless Steel**

Product Series	HDLS	HDLS Fully Potted	HDLS Stainless Steel
<b>Dimensions (L x W x H)</b>	41 mm x 61 mm x 107 mm [1.6 in x 2.4 in x 4.2 in]	41 mm x 61 mm x 107 mm [1.6 in x 2.4 in x 4.2 in]	49 mm x 61 mm x 124 mm [1.9 in x 2.4 in x 4.9 in]
<b>Electrical Data</b>	10 A thermal; SPDT (NEMA A600), DPDT (NEMA B600)	10 A thermal; SPDT (NEMA A600), DPDT (NEMA B600)	10 A thermal; SPDT (NEMA A600), DPDT (NEMA B600)
<b>Circuitry</b>	SPDT double break, DPDT double break	SPDT double break, DPDT double break	SPDT double break, DPDT double break
<b>Sealing</b>	NEMA/UL 1, 3, 4, 4X, 6, 6P, 12, 13	NEMA/UL 1, 3, 4, 6, 6P, 12, 13	NEMA/UL 1, 3, 4, 4X, 6, 6P, 12, 13
<b>Temperature Range</b>	-12 °C to 121 °C [10 °F to 250 °F], optional -40 °C [-40 °F]	-12 °C to 121 °C [10 °F to 250 °F], optional -40 °C [-40 °F]	-12 °C to 121 °C [10 °F to 250 °F], optional -40 °C [-40 °F]
<b>Available Actuators</b>	side rotary, top rotary, top plunger, side plunger, wobble	side rotary, top rotary, top plunger, side plunger, wobble	side rotary, top rotary, top plunger, side plunger, wobble
<b>Approvals</b>	UL, CSA, CE, CCC	UL, CSA, CE, CCC	UL, CSA, CE, CCC



# Limit Switches

## Hazardous Location Switches



**14CE100**



**EX**



**GXS**

Product Series	14CE100	EX	GXS
<b>Dimensions (L x W x H)</b>	41 mm x 15 mm x 53 mm [1.6 in x 0.6 in x 2.1 in]	94 mm x 81 mm x 66 mm [3.7 in x 3.2 in x 2.6 in]	41 mm x 15 mm x 53 mm [1.6 in x 0.6 in x 2.1 in]
<b>Electrical Data</b>	AC14 D300; DC13 R300	up to 20 A; 125 Vac, 250 Vac, 480 Vac	5 A thermal; AC15
<b>Circuitry</b>	SPDT snap action	SPDT, DPDT	SPDT snap action
<b>Sealing</b>	IP65; NEMA 1, 3	NEMA 1, 7, 9	IP66/67
<b>Temperature Range</b>	0 °C to 70 °C [32 °F to 158 °F]	-40 °C to 71 °C [-40 °F to 160 °F]	-20 °C to 75 °C [-4 °F to 167 °F]
<b>Available Actuators</b>	top plunger, roller plunger	side rotary (variety), top plunger, manually actuated	side rotary, top plunger, top roller plunger
<b>Approvals</b>	CE, KEMA 03 ATEX 2514 X	UL, CSA, ATEX (pending)	CE, ATEX II 2 G EExd IIC T6 T85



**LSX/BX**



**CX**

Product Series	LSX/BX	CX
<b>Dimensions (L x W x H)</b>	76 mm x 61 mm x 147 mm [3.0 in x 2.4 in x 5.8 in]	102 mm x 169 mm x 102 mm [4.0 in x 6.6 in x 4.0 in]
<b>Electrical Data</b>	10 A thermal; SPDT (NEMA A600), DPDT (NEMA B600)	up to 20 A; 125 Vac, 250 Vac, 480 Vac
<b>Circuitry</b>	SPDT, SPDT double break, DPDT, DPDT double break	up to 4 switch elements w/SPDT or DPDT; analog optional
<b>Sealing</b>	NEMA/UL 1, 3, 4, 6, 7 (Class 1, Div. 1, Groups B, C, D), 9 (Class 2, Div. 1, Groups E, F, G), 13	NEMA/UL 1, 3, 4, 6, 7 (Class 1, Div.1, Groups B, C, D), 9 (Class 2, Div. 1, Groups E, F, G), 13
<b>Temperature Range</b>	LSX: -12 °C to 121 °C [10 °F to 250 °F], optional -40 °C [-40 °F] BX: -40 °C to 121 °C [-40 °F to 250 °F]	-25 °C to 85 °C [-13 °F to 185 °F]
<b>Available Actuators</b>	side rotary, top rotary, top plunger, side plunger, wobble	side rotary (variety)
<b>Approvals</b>	LSX: UL, CSA, CCC BX: UL (select products), CSA, CE, SIRA 00 ATEX 1037X	UL, CSA, all products; KEMA 01, ATEX 2111X, select products

# Safety Switches

## Cable/Rope Pull Switches



Product Series	1CPS	2CPS	CLSX
<b>Dimensions (L x W x H)</b>	173 mm x 65 mm x 99 mm [6.8 in x 2.6 in x 4.8 in]	326 mm x 93 mm x 152 mm [12.8 in x 3.7 in x 6.0 in]	141 mm x 73 mm x 180 mm [5.5 in x 2.9 in x 7.1 in]
<b>Electrical Rating</b>	AC15 A300; DC13 Q300	AC15 A300; DC13 Q300	AC15 A300; DC13 Q300
<b>Circuitry</b>	1NC/1NO, 2NC/2NO, 3NC/1NO, 4NC	2NC/2NO, 3NC/1NO, 4NC	1NC/1NO BBM slow action, 2NC, 2NC/2NO, 3NC/1NO, 4NC
<b>Sealing</b>	IP67; NEMA 1, 4, 12, 13	IP67; NEMA 1, 4, 12, 13	NEMA/UL 1, 3, 4, 6, 7 (Class 1, Div. 1, Groups B, C, D), 9 (Class 2, Div. 1, Groups E, F, G), 13
<b>Temperature Range</b>	-25 °C to 80 °C [-13 °F to 176 °F]	-40 °C to 80 °C [-40 °F to 176 °F]	-1 °C to 70 °C [-30 °F to 158 °F]
<b>Available Actuators</b>	cable	cable	cable
<b>Approvals</b>	UL, CSA, CE	UL, CSA, CE, BG	UL, CSA, CE

## Key-Operated Switches



Product Series	GK	GKM	GKR/GKL	GKN
<b>Dimensions (L x W x H)</b>	30 mm x 43 mm x 122 mm [1.2 in x 1.7 in x 4.8 in]	16 mm x 34 mm x 39 mm [0.6 in x 0.3 in x 2.7 in]	110 mm x 49 mm x 149 mm [4.3 in x 2.0 in x 5.9 in]	90 mm x 52 mm x 33 mm [3.5 in x 2.0 in x 1.3 in]
<b>Electrical Rating</b>	AC15 A300/A600; DC13 Q300	AC15 B300; DC13 Q300	AC15 A300/A600; DC13 Q300	10 A at 24 Vac/110 Vac, 6 A at 230 Vac/24 Vdc, 2.4 kV max. transient tolerance, NEMA A300 P300
<b>Circuitry</b>	1NC/1NO, 2NC/2NO snap action, 1NC/1NO BBM, 2NC, 2NC/2NO BBM, 3NC/1NO, 4NC slow action	1NC/1NO BBM, 2NC	1NC/1NO, 1NC/1NO BBM slow action, 2NC/2NO BBM, 3NC/1NO BBM slow action, 3NC/1NO BBM, 4NC	1NC/1NO BBM, 1NC/1NO MMB, 2NC/1NO MBB, 1NC/2NO MBB, 2NC
<b>Sealing</b>	IP67; NEMA/UL 1, 4, 12, 13	IP66/67; NEMA/UL 1, 12, 13; EN60529	IP68; NEMA/UL 1, 4, 6P, 12, 13	IP65; NEMA 4
<b>Temperature Range</b>	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 40 °C [-13 °F to 104 °F]	-25 °C to 40 °C [-13 °F to 104 °F]	-30 °C to 80 °C [-22 °F to 176 °F]
<b>Available Actuators</b>	key (straight, flexible)	key (straight, flexible)	key (straight, flexible)	key (straight, flexible)
<b>Approvals</b>	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE, BG

# Safety Switches


## Safety Limit Switches



**GSS**



**24/924CE**

<b>Product Series</b>	<b>GSS</b>	<b>24/924CE</b>
<b>Dimensions (L x W x H)</b>	30 mm x 31 mm x 83 mm [1.2 in x 1.2 in x 3.3 in]	41 mm x 15 mm x 53 mm [1.6 in x 0.6 in x 2.1 in]
<b>Electrical Rating</b>	AC15 A300; DC13 Q300	5 A thermal; up to 250 Vac
<b>Circuitry</b> 	1NC/1NO, 1NC/1NO BBM, 2NC, 2NC/2NO BBM, 2NC/1NO, 3NC/1NO BBM slow action, 4NC	1NC, 1 NC/1NO BBM, 1NC/1NO MBB slow action
<b>Sealing</b>	IP66; NEMA/UL 1, 4, 12, 13	IP66/67/68 (with boot seal); NEMA 1, 2, 3, 3R, 4, 6, 6P, 12 (with boot seal), 13
<b>Temperature Range</b>	-25 °C to 85 °C [-13 °F to 185 °F]	0 °C to 105 °C [32 °F to 221 °F]
<b>Available Actuators</b>	hinge (straight, 90 degree)	side rotary, top plunger, roller plunger, pushbutton, wobble
<b>Approvals</b>	UL, CSA, CE, BG	UL, CSA, CE, BG

# Relays

## Industrial Relays



**SZR-LY**



**SZR-MY**

<b>Product Series</b>	<b>SZR-LY</b>	<b>SZR-MY</b>
<b>Current Rating</b>	10 A	3 A, 5 A
<b>Contact Material</b>	silver	fine silver, gold-plated silver
<b>Contact</b>	4PDT, DPDT	4PDT, DPDT
<b>Terminal Type</b>	PCB, solder/plug-in	PCB, solder/plug-in
<b>Max. Contact Rating</b>	125 Vdc, 250 Vac	125 Vdc, 250 Vac
<b>Coil Input Voltage</b>	6 Vac to 240 Vac, 6 Vdc to 110 Vdc	6 Vac to 240 Vac, 6 Vdc to 110 Vdc
<b>Options</b>	diode protection, LED indicator	diode protection, LED indicator
<b>Approvals</b>	UL, CSA, CE	UL, CSA, CE

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