



APPENDIX



R&I
MANUFACTURING CO.

DURA-PRODUCTS
MAGNETIC SENSORS

CS - Cylinder Clamp Sensors

HOW TO ORDER

SENSOR STYLE

TYPE

CS

K

-

KIT

KIT OPTION *

K - Includes (2) Sensors, (2) Cylinder Clamps, and (2) 5 meter Cables (SENCAB-5)

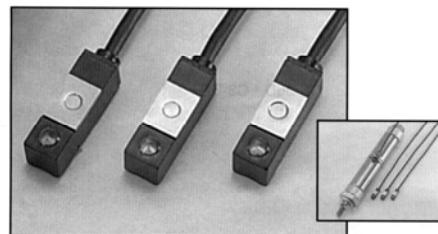
TYPE

R- REED

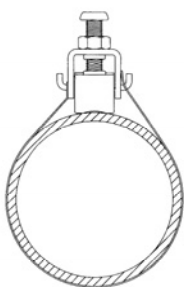
N- NPN

P- PNP

* If KIT OPTION is not requested Includes (1) Sensor and (1) Clamp

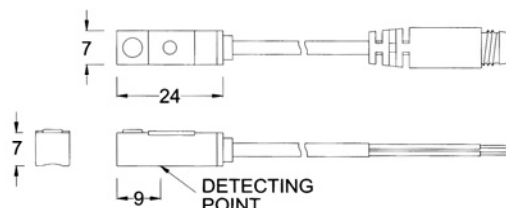


MOUNTING

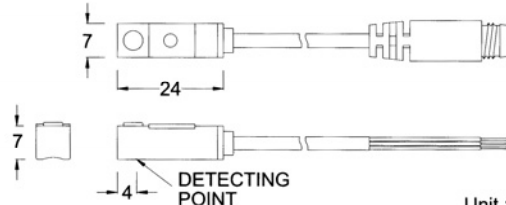


DIMENSIONS

CS-R



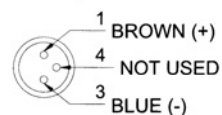
CS-P / CS-N



Unit : mm

PIN DIAGRAM

2-wire QD pinout



3-wire QD pinout

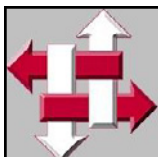


SPECIFICATIONS

Part Number	CS-R		CS-P		CS-N	
Schematic						
Sensor Type	Reed Switch		Solid State Output			
Switching Logic	SPST Normally Open		Normally Open			
Output	-----		PNP Current Sourcing		NPN Current Sinking	
Operating Voltage	5~240V DC/AC 50/60 Hz		5~28 VDC			
Switching Current	100mA max. (Resistive)		200 mA max.			
Power Rating*	10 Watts		6 Watts			
Voltage Drop	3 V max.		0.5 V @ 200 mA max.			
Current Consumption	-----		20 mA @ 24 VDC max.		20 mA @ 24 VDC max.	
Leakage Current	-----		0.01 mA max.			
LED Indicator	Red		Green		Red	
Cable	Robotic grade,abrasion resistant polyurethane (PUR) jacket,PVC insulation					
Operating Frequency	200 Hz		1000 Hz			
Temperature Range	14 to 158°F (-10 to +70°C)					
Mangnet Requirement**	60 Gauss parallel					
Shock / Vibration	30G/9G		50G/9G			
Enclosure Classification			IEC 529 IP67 (NEMA 6)			
Protection Circuit	None		Reverse Polarity,Surge Suppression			
Set Screw Max. Torque			3.3 in-lbs (15 N-m)			

*WARNING : Never exceed rating (Watt=Voltage x Amperage). Permanent damage to sensor will occur.

**MEASURING STANDARD TARGET : $\phi 15.5 \times \phi 8 \times 5t$ (Anisotropy rubber magnet).



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DURA-PRODUCTS
MAGNETIC SENSORS

RS - Round Track Sensors

HOW TO ORDER

SENSOR STYLE

TYPE

KIT OPTION *

K - Includes (2) Sensors and (2) 5 meter Cables (SENCAB-5)

RS

K

-

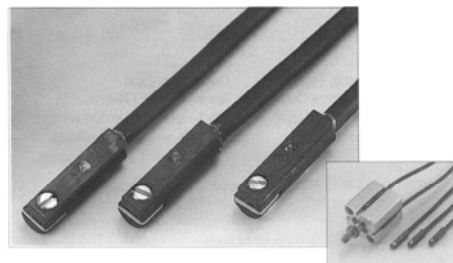
KIT

TYPE

N- NPN

P- PNP

* If KIT OPTION is not requested
Includes (1) Sensor



MOUNTING	DIMENSIONS	PIN DIAGRAM
Unit : mm	RS-P / RS-N Unit : mm	3-wire QD pinout
SPECIFICATIONS		
Part Number		
Schematic	RS-P RS-N	
Sensor Type	Solid State Output	
Switching Logic	Normally Open	
Output	PNP Current Sourcing	NPN Current Sinking
Operating Voltage	4.5~28 VDC	
Switching Current	50 mA max.	
Power Rating*	1.5 Watts	
Voltage Drop	0.5 V @ 50 mA max.	
Current Consumption	10 mA @ 24 VDC max.	
Leakage Current	0.01 mA max.	
LED Indicator	Red	
Cable	Robotic grade,abrasion resistant PVC jacket, PE insulation	
Operating Frequency	1000 Hz	
Magnet Requirement**	40 Gauss parallel	
Temperature Range	32 to 140°F (0 to +60°C)	
Shock / Vibration	50G/9G	
Enclosure Classification	IEC 529 IP67 (NEMA 6)	
Protection Circuit	Reverse Polarity, Surge Suppression	
Set Screw Max. Torque	1.77 in-lbs (0.2 N-m)	

*WARNING : Never exceed rating (Watt=Voltage x Amperage).Permanent damage to sensor will occur.

**MEASURING STANDARD TARGET $\phi 15.5 \times \phi 8 \times 5t$ (Anisotropy rubber magnet).



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DURA-PRODUCTS
MAGNETIC SENSORS

DS - Dovetail Sensors

HOW TO ORDER

SENSOR STYLE

DS

TYPE

KIT

KIT OPTION *

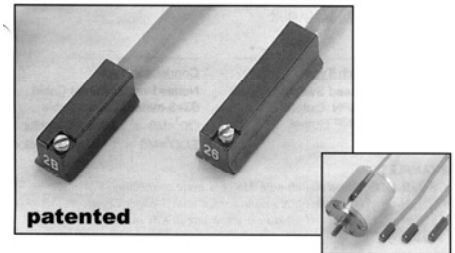
K - Includes (2) Sensors and (2) 5 meter Cables (SENCAB-5)

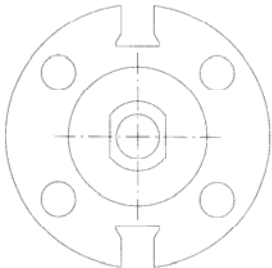
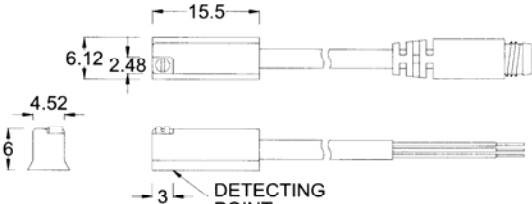
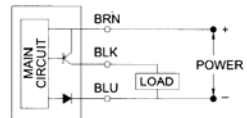
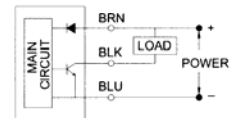
TYPE

N- NPN

P- PNP

* If KIT OPTION is not requested
Includes (1) Sensor



MOUNTING		DIMENSIONS	PIN DIAGRAM
 Unit : mm		DS-P / DS-N  Unit : mm	3-wire QD pinout 
SPECIFICATIONS			
Part Number		DS-P	DS-N
Schematic			
Sensor Type		Solid State Output	
Switching Logic		Normally Open	
Output		PNP Current Sourcing	NPN Current Sinking
Operating Voltage		5~30 VDC	
Switching Current		200 mA max.	
Power Rating*		6 Watts	
Voltage Drop		0.5 V max.	
Current Consumption		20 mA @ 24 VDC max.	
Leakage Current	0.01 mA max.		
LED Indicator	Red		
Cable	Robotic grade,oil resistant polyurethane(PUR) jacket, PVC insulation		
Operating Frequency		1000 Hz	
Magnet Requirement**		40 Gauss parallel	
Temperature Range		14 to 158°F (-10 to +70°C)	
Shock / Vibration		50G/9G	
Enclosure Classification		IEC 529 IP67 (NEMA 6)	
Protection Circuit		Reverse Polarity, Surge Suppression	
Set Screw Max. Torque		1.77 in-lbs (0.2 N-m)	

*WARNING : Never exceed rating (Watt=Voltage x Amperage).Permanent damage to sensor will occur.

**MEASURING STANDARD TARGET $\phi 15.5 \times \phi 8 \times 5t$ (Anisotropy rubber magnet).

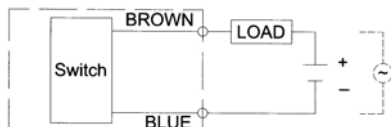


ADDITIONAL CONNECTION METHODS

2 WIRE CONNECTIONS

REED
CS-R

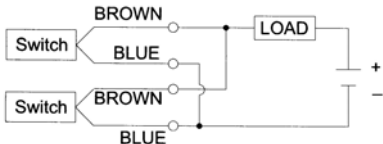
- General connection



- Series connection (And)



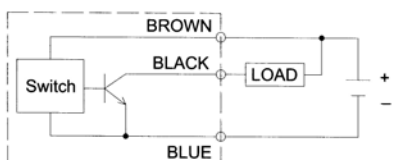
- Parallel connection(OR)



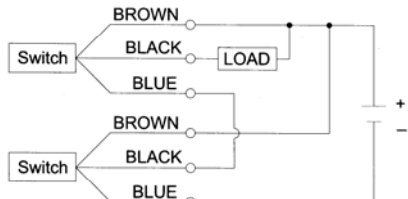
3 WIRE CONNECTIONS

NPN
RS-N
DS-N
CS-N

- General connection



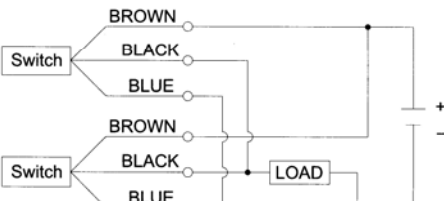
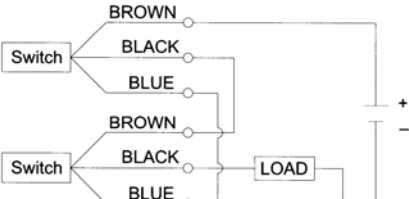
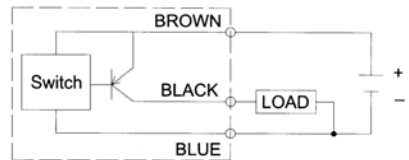
- Series connection (And)

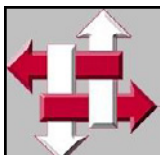


- Parallel connection(OR)



PNP
RS-P
DS-P
CS-P





IS-M8 - 8mm 3-Wire DC Inductive Proximity Sensors

HOW TO ORDER

SENSOR STYLE

TYPE

KIT OPTION *

K - Includes (2) Sensors and (2) 5 meter Cables (SENCAB-5)

IS **K** -M8

KIT

TYPE

N- NPN

P- PNP

* If KIT OPTION is not requested
Includes (1) Sensor



SPECIFICATIONS

Item		IS-M8
Size		M8
Type		Shielded
Sensing distance		2 mm $\pm 10\%$
Setting distance		0 to 1.6 mm
Hysteresis		10% max. of sensing distance
Target		Ferrous metal
Standard target (mild steel ST37)		8 x 8 x 1 mm
Response frequency (See note 1.)		1,500 Hz
Power supply voltage (operating voltage range)		12 to 24 VDC. Ripple (p-p): 10% max. (10 to 32 VDC)
Current consumption (DC 3-wire)		10 mA max.
Control output	Load current (See note 2.)	200 mA max. (32 VDC max.)
	Residual voltage	2 V max. (under load current of 200 mA with cable length of 2 m)
Indicator		Operation indicator (Yellow LED)
Operation mode (with sensing object approaching)		NO
Protection circuit		Power source circuit reverse polarity protection, Surge suppressor, Short-circuit protection
Ambient air temperature		Operating: -40°C to 70°C, Storage: -40°C to 85°C (with no icing or condensation)
Temperature influence (See note 2.)		$\pm 10\%$ max. of sensing distance at 23°C within temperature range of -25°C to 70°C $\pm 15\%$ max. of sensing distance at 23°C within temperature range of -40°C to 70°C
Ambient humidity		Operating: 35% to 95%, Storage: 35% to 95%
Voltage influence		$\pm 1\%$ max. of sensing distance in rated voltage range $\pm 15\%$
Insulation resistance		50 M Ω min. (at 500 VDC) between current carry parts and case
Dielectric strength		1,000 VAC at 50/60 Hz for 1 min between current carry parts and case
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y and Z directions
Shock resistance		500 m/s ² , 10 times each in X, Y and Z directions
Standards and listings		IEC60529: IP67, Degree of protection EN60947-5-2: EMC UL (CSA) [E196555] (See note 3.)
Material	Case	Stainless steel or brass-nickel plated
	Sensing surface	PBT
	Cable	PVC
	Clamping nut	Brass-nickel plated

Note 1. The response frequency is an average value. Measurement conditions are as follows: standard target, a distance of twice the standard target distance between targets, and a setting distance of half the sensing distance.

2. When using any model at an ambient temperature between -40°C and -25°C and a power voltage between 30 and 32 VDC, use a load current of 100 mA max.

3. UL (CSA) [E196555]: Use class 2 circuit only.

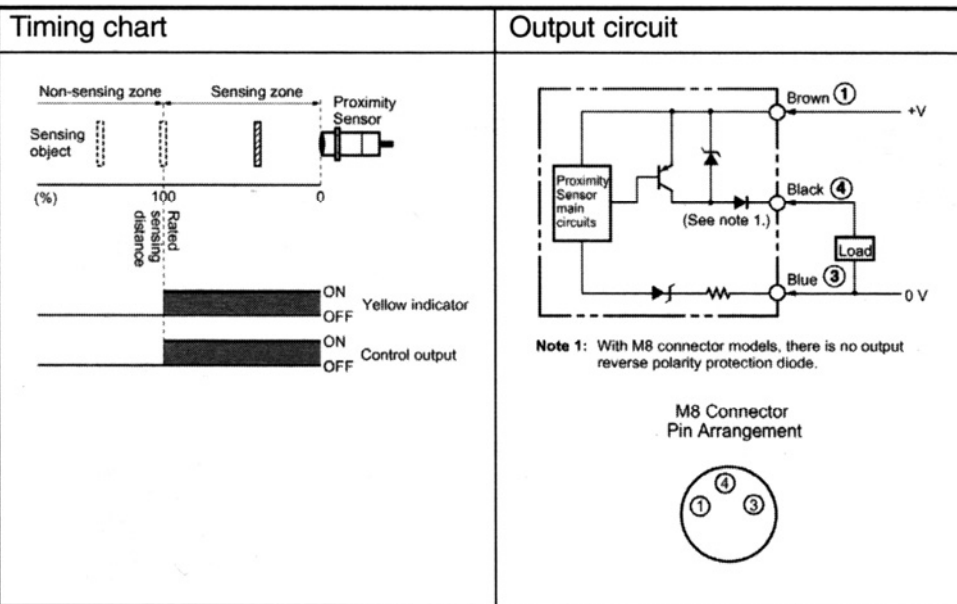


IS-M8 - 8mm 3-wire DC Inductive Proximity Sensors

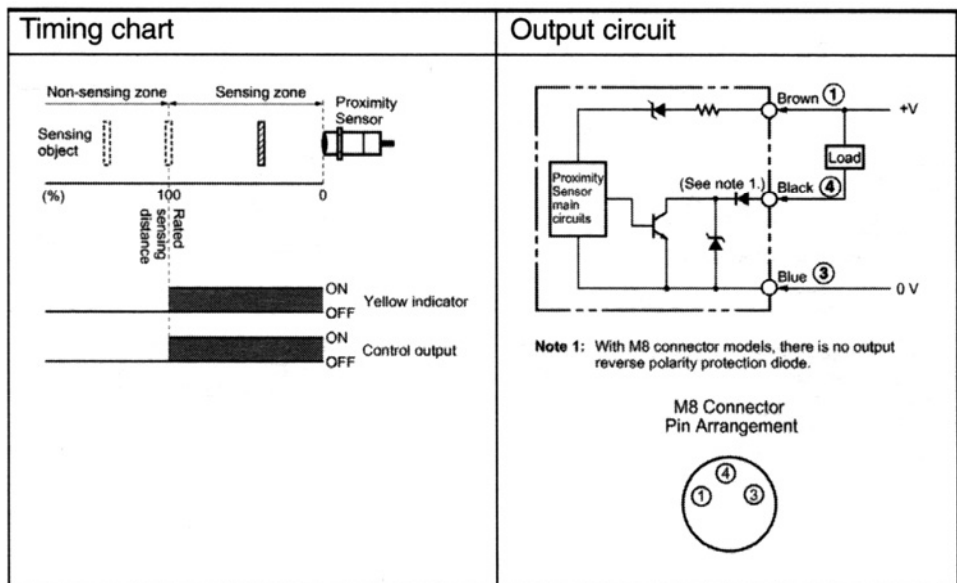
ADDITIONAL SPECIFICATIONS



PNP OUTPUT



NPN OUTPUT





IS-M5 - 5mm 3-Wire DC Inductive Proximity Sensors



HOW TO ORDER

SENSOR STYLE

IS **K** -M5

KIT

TYPE



KIT OPTION *

K - Includes (2) Sensors and (2) 5 meter Cables (SENCAB-5)

TYPE

N- NPN

P- PNP

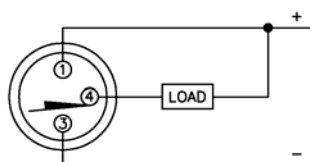
* If KIT OPTION is not requested
Includes (1) Sensor

SPECIFICATIONS

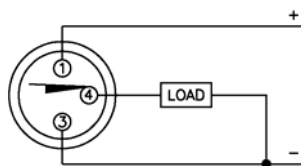
Ripple	≤10%
Differential Travel (Hysteresis)	3-15% (5% typical)
Voltage Drop Across Conducting Sensor	≤1.8 V
Trigger Current for Overload Protection	≥220 mA on 200 mA Load Current ≥170 mA on 150 mA Load Current ≥120 mA on 100 mA Load Current
Off-State (Leakage) Current	<100 µA
No-Load Current	<10 mA (Uprox ≤15 mA)
Time Delay Before Availability	≤8 ms
Power-On Effect	Per IEC 947-5-2
Reverse Polarity Protection	Incorporated
Wire-Break Protection	Incorporated
Transient Protection	Per EN 60947-5-2
Shock	30 g, 11 ms
Vibration	55 Hz, 1 mm Amplitude in all 3 Planes
Repeatability	≤2% of Rated Operating Distance

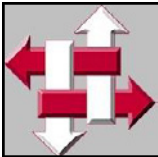
WIRING DIAGRAM

NPN OUTPUT



PNP OUTPUT





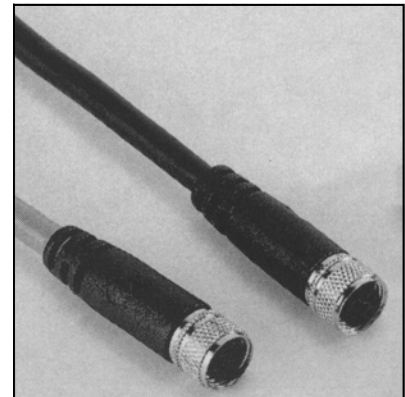
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DURA-PRODUCTS
SENSOR CABLE

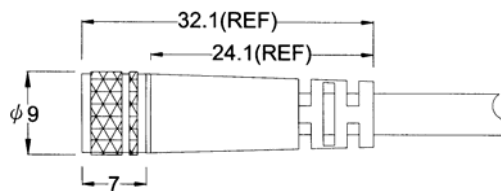
SENCAB-5 - 5m Quick Disconnect Sensor Cable

HOW TO ORDER

SENCAB-5



DIMENSIONS



Unit : mm

Length : 16.4 ft [5 Meters]

SPECIFICATION

Part Number	SENCAB-5
Female Pinout	
Conductor Colors	1=BROWN 3=BLUE 4=BLACK
Cable Type	PUR
Jacky Color	Black
Characteristics	Oil And Abrasion Resistance, Robotic Grade
Connector	Oil resistant polypropylene (PP) body, nylon contact carrier, spacing to VDE 0110 Group C
Contacts	Gold Plated Brass
Locking Nut	Brass, Nickel-plated
Electrical Rating	120V AC/DC 3Amp. max.
Conductors	24 AWG. /0.22 ² mm, high flex Stranding, Self-Extinguishing PVC Insulation, 300V
Temperature	-40° F ~ +176° F (-20° C ~ +80° C)
Protection	IEC 529 IP 67 / NEMA 6 (Only In Fully Locked Position)



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TECH NOTES