

Table of Contents



OVERVIEW – Inductive Proximity Sensors

Introduction	4
Operation	5



CYLINDRICAL Inductive Proximity Sensors

Introduction/Operation	8
Selection Guide, DC styles	12
Selection Guide, AC styles	14
Product Specifications.....	16



LIMIT STYLE Inductive Proximity Sensors

Introduction/Operation	68
Selection Guide.....	71
Product Specifications.....	72



BLOCK STYLE Inductive Proximity Sensors

Introduction/Operation	80
Selection Guide.....	82
Product Specifications.....	84



RING STYLE Inductive Proximity Sensors

Introduction/Operation	98
Selection Guide.....	100
Product Specifications.....	102

OTHER INFORMATION

APPENDIX:	
IP Codes	132
NEMA requirements	133
Cross Reference	134
Glossary.....	135
Conversion Charts	137
INDEX	138
TERMS & CONDITIONS	141
WARRANTY	143



ACCESSORIES for Inductive Proximity Sensors

Introduction.....	113
Mounting Brackets	114
Cable Assemblies.....	116
Switching Units.....	122
Motion Detectors	128

All specifications subject to change without notice or obligation



Ring Style Sensors

RING STYLE INDUCTIVE PROXIMITY SENSORS

Altech Ring Sensors are used for variety of applications including punching and stamping operations to detect small metal parts and for the identification of metallic contamination in bulk materials.

The sensitivity of all Altech Ring Sensors is given in terms of a steel metal ball diameter. This is the minimum diameter steel ball that the sensor will detect. Non-ferrous materials will require larger diameter parts for correct sensor detection. See page 4, Figure 1 for rated operating distance correction factors.

OUTPUT CONNECTION

Mini Ring – Normally Open (NO)
 Standard Ring – Complementary
 High Sensitivity – Complementary
 Analog – 1-9 Volt Analog

RING SENSOR MOUNTING

When high sensitivity ring sensors are mounted in or near non-target metal objects, care must be exercised in accordance with the recommendations on the diagram. See **Figure 12**.

Operating Voltages – Ring Style

Mini Ring	10 - 30V DC
Standard Ring	10 - 30V DC
High Sensitivity Ring	20 - 30V DC
Analog Ring	18-30V DC

Operating Current– Ring Style

Mini Ring	200/400 mA
Standard Ring	80 mA
High Sensitivity Ring	50 mA
Analog Ring	5 mA

Sensor Wiring Systems – Ring Style

Mini Ring	3 Wire
Standard Ring	4-Wire
High Sensitivity Ring	4-Wire (must connect to PULSO® 8102-0900 Amplifier)
Analog Ring	3-Wire

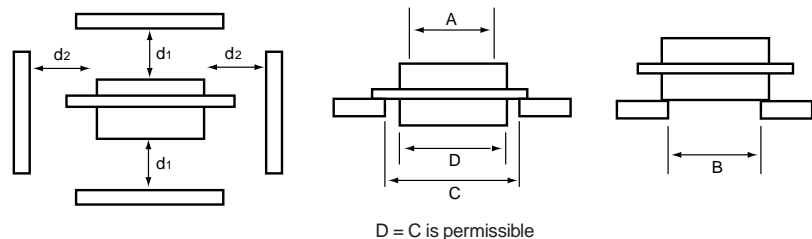
Fig. 12

RING SENSOR INSTALLATION

Ring Sensors installation in Metal Environment (min. permissible values)

SENSOR	Inside diameter SENSOR = A	Metal Plate hole dia. = B*	Side Distances	
			d1	d2
9702-0259	20	30	10	0
9713-0059	35	60	40	0
9701-0259	51	85	60	0
9701-0759	51	85	50	0
9711-0059	71	120	65	0
9700-0159	100	180	100	30
9703-0159	202	260	150	0
9704-0159	294	400	200	0

* Metal plate must not move



DC RING SENSORS – SELECTION GUIDE

Series	Size (mm)	Sensitivity – Minimum Steel Ball Diam. in mm														Function					
		0.5	0.8	1.0	1.1	1.6	2.5	3.0	5.0	6.0	8.0	9.0	12	15	20	30	NPN	PNP	NO	NC	
Mini Ring 10-30V DC, 200 mA • Static Output • Detect unwanted metal • Detect and count parts	Ø12						•											•	•		
	Ø20									•								•	•		
	Ø43											•						•	•		
Normal Sensitivity Standard Series 10-30V DC, 80 mA • Static Output • Large ring diameters • Complementary Output	Ø50						•										•	•	•	•	
	Ø100									•							•	•	•	•	
	Ø100									•							•	•	•	•	
	Ø200													•			•	•	•	•	
	Ø300															•	•	•	•	•	
High Sensitivity Standard Series 20-30V DC, 50 mA • Dynamic Output • Large ring diameters • Complementary Output	Ø20	•															•		•	•	
	Ø35	•															•		•	•	
	Ø50		•														•		•	•	
	Ø50			•													•		•	•	
	Ø70				•												•		•	•	
	Ø100					•											•		•	•	
	Ø200						•										•		•	•	
	Ø300							•									•		•	•	
130 x 130								•								•		•	•		
245 x 290													•			•		•	•		
Analog Ring 18-30V DC, 5 mA • Analog Output proportional to target size	Ø20									•											
	Ø43															•					

	Mounting See Instructions	Connection		No. of Wires	Housing Material	No. of LED's	Page
		Cable	59				
	•	•		3	ABS	1	102
	•	•		3	ABS	1	102
	•	•		3	ABS	1	102
	•		•	4	Aluminum	1	104
	•		•	4	Aluminum	1	104
	•		•	4	Aluminum	1	104
	•		•	4	Aluminum	1	105
	•		•	4	Aluminum	1	105
	•		•	4	Aluminum	1	106
	•		•	4	Aluminum	1	106
	•		•	4	Aluminum	1	107
	•		•	4	Aluminum	1	107
	•		•	4	Aluminum	1	108
	•		•	4	Aluminum	1	108
	•		•	4	Aluminum	1	109
	•		•	4	Aluminum	1	109
	•		•	4	Aluminum	1	110
	•		•	4	Aluminum	1	110
	•	•		3	ABS	0	112
	•	•		3	ABS	0	112

**DC - 3 WIRE
MINI RING SENSORS**
Plastic Housing,
10 - 30V DC 200mA/400mA,
1 LED for Output Energized

- **Applications include detection and counting parts in punching/pressing systems**
- **Detect unwanted metal in grinding operations**
- **Static Output**
- **Carries C mark**

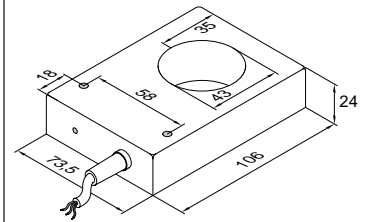
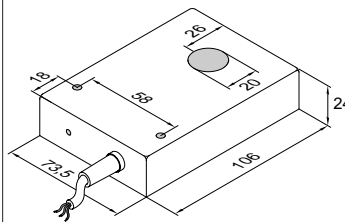
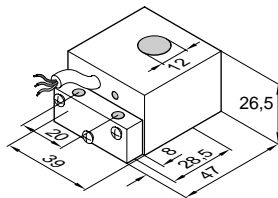
- IEC (529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Short Circuit Protection
- Reverse Polarity Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Ring Diameter	12mm (.47 in.)	20mm (.79 in.)	43mm (1.69 in.)
Sensitivity (min. dia. steel ball)	2.5mm (.1 in.)	6mm (.24 in.)	9mm (.35 in.)
Cable or Connector Style Cat. No.	Cable	Cable	Cable
PNP	Normally Open 	9702-0400	9702-0500
	Normally Closed 		
NPN	Normally Open 		
	Normally Closed 		
Ripple Voltage	≤10%	≤10%	≤10%
Voltage Range	10V-30V	10V - 30V	10V - 30V
Supply Current	≤10 mA	≤10 mA	≤10 mA
Max. Load Current	400 mA	200 mA	200 mA
Voltage Drop Across Sensor	≤2.4V	≤2.4V	≤2.4V
Max. Leakage Current	≤10 μA	≤10 μA	≤10 μA
Switching Frequency	800 Hz	1000 Hz	500 Hz
Housing Material	PBT (GV 30)	ABS	ABS

Note: Sensor dimensions in mm.

Fixed Cable

PVC 2m (6ft. 6in.).
For 5m (16 ft. 5 in.) cable length, change the last two digits of the part number to 02. For other cable lengths and/or PUR cable, please consult Altech.



Metric/in. Conversion Table

8.0 mm = .31 in.	35.0 mm = 1.37 in.
12.0 mm = .47 in.	39.0 mm = 1.53 in.
18.0 mm = .70 in.	43.0 mm = 1.69 in.
20.0 mm = .78 in.	47.0 mm = 1.85 in.
24.0 mm = .94 in.	58.0 mm = 2.32 in.
26.0 mm = 1.02 in.	73.5 mm = 2.89 in.
26.5 mm = 1.04 in.	106.0mm = 4.17 in.
28.5 mm = 1.12 in.	

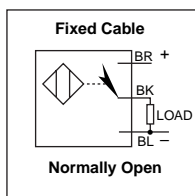
This table converts millimeters to inches in reference to the illustrations included on these pages

Accessories

Wiring Diagrams

Note: Wire colors are applicable on cable purchased from Altech

PNP



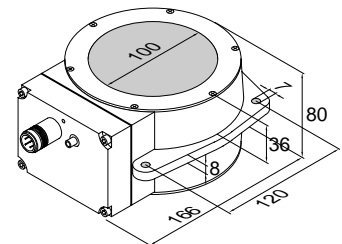
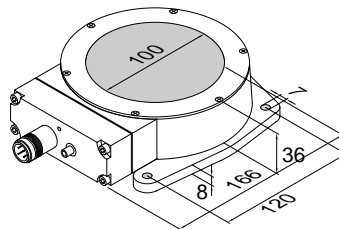
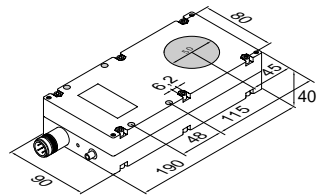
DC - 4 WIRE RING SENSORS
ALUMINUM HOUSING
10-30V DC, 80mA
1 LED for Output Energized

- Applications include the detection and counting of parts in punching/pressing operations
- Detection of unwanted metal in grinding operations
- Complementary outputs available
- Static Output
- Carries $\text{C}\epsilon$ mark

- IEC(529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Ring Diameter	50mm (1.97 in.)	100mm (3.94 in.)	100mm (3.94 in.)
Sensitivity (min. dia. steel ball)	3mm (.12 in.)	8mm (.31 in.)	6mm (.24 in.)
Cable or Connector Style Cat. No.	59	59	59
PNP (Complementary NO/NC)	9705-0659	9708-0559	9708-0659
NPN (Complementary NO/NC)	9705-0259	9708-0059	9708-0159
Ripple Voltage	≤10%	≤10%	≤10%
Voltage Range	10-30V	10-30V	10-30V
Supply Current	≤25 mA	≤25 mA	≤25 mA
Max. Load Current	80 mA	80 mA	80 mA
Voltage Drop Across Sensor	≤0.5V NPN ≤1.5V PNP	≤0.5V NPN ≤1.5V PNP	≤0.5V NPN ≤1.5V PNP
Max. Leakage Current	≤10μA	≤10μA	≤10μA
Switching Frequency	500Hz	500Hz	500Hz

59 Style Connector
 4-pin, Metal, 19mm (.75 in.) device



Metric/in. Conversion Table

6.2 mm = .24 in.	80.0 mm = 3.15 in.	202.0mm = 7.94 in.
7.0 mm = .27 in.	90.0 mm = 3.58 in.	260.0mm = 10.23 in.
8.0 mm = .31 in.	100.0mm = 3.93 in.	290.0mm = 11.41 in.
8.5 mm = .33 in.	115.0mm = 4.52 in.	294.0mm = 11.20 in.
36.0 mm =1.41 in.	120.0mm = 4.72 in.	305.0mm = 12.00 in.
40.0 mm =1.57 in.	160.0mm = 6.29 in.	340.0mm = 13.40 in.
45.0 mm =1.77 in.	162.0mm = 6.37 in.	382.0mm = 15.03 in.
48.0 mm =1.89 in.	166.0 mm= 6.52 in.	397.0mm = 15.62 in.
50.0 mm =1.96 in.	190.0 mm= 7.47 in.	

This table converts millimeters to inches in reference to the illustrations included in this catalog

Accessories

2 meter (6 ft. 6 in.) DC Cable Assemblies for Quick Disconnect Sensors

59 Connector 9512-0200 PVC, Straight

Change last digit of connector number to 2 for 5 meter cable

Refer to pages 116-121 for more cable information

200mm (7.87 in.)

15mm (.59 in.)

59

9706-0659

9706-0159

≤10%

10-30V

≤25 mA

80 mA

≤0.5V NPN

≤1.5V PNP

≤10μA

300Hz

300mm (11.81 in.)

30mm (1.18 in.)

59

9707-0659

9707-0159

≤10%

10-30V

≤25 mA

80 mA

≤0.5V NPN

≤1.5V PNP

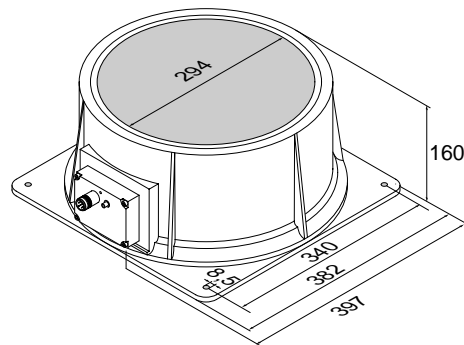
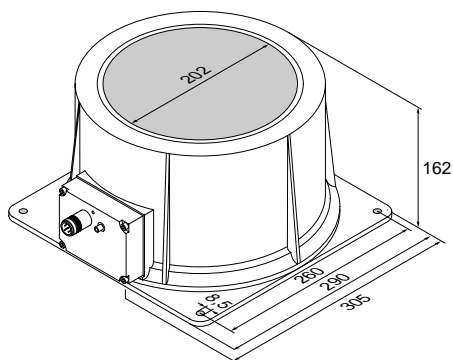
≤10μA

300Hz

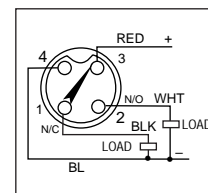
Note: Sensor dimensions in mm.

Wiring Diagrams

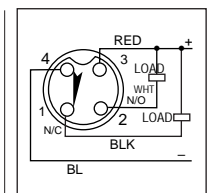
Note: Wire colors are applicable to cable purchased from Altech



PNP



NPN



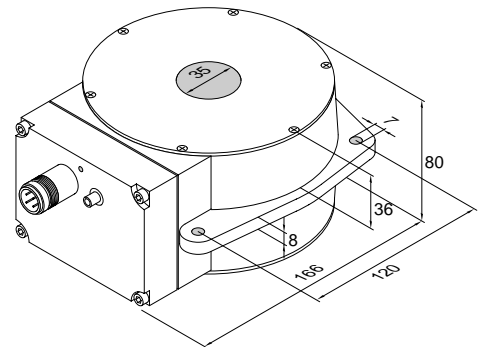
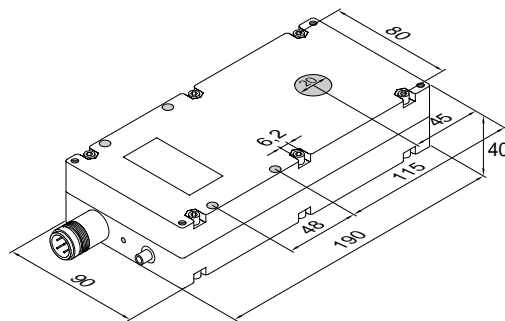
**DC - 4 WIRE HIGH SENSITIVITY
RING SENSORS
ALUMINUM HOUSING
20-30V DC, 50mA
1 LED for Output Energized**

- *Applications include the detection and counting of parts in punching/pressing operations*
- *Detection of unwanted metal in grinding operations*
- *Complementary outputs available*
- *Dynamic output – must be operated with 8102-0900 Unit*
- *Carries C€ mark*

- IEC(529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Short Circuit Protection
- Reverse Polarity Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Ring Diameter	20mm (.79 in.)	35mm (1.38 in.)
Sensitivity (min. dia. stel ball)	.5mm (.02 in.)	.5mm (.02 in.)
Cable or Connector Style Cat. No.	59	59
PNP (Complementary NO/NC)		
NPN (Complementary NO/NC)	9702-0259	9713-0059
Ripple Voltage	≤10%	≤10%
Voltage Range	20-30V	20-30V
Supply Current	≤35 mA	≤35 mA
Max. Load Current	50 mA	50 mA
Voltage Drop Across Sensor	≤1V at 10 mA ≤3.5V at 50 mA	≤1V at 10 mA ≤3.5V at 50 mA
Max. Leakage Current	≤500µA	≤500µA
Switching Frequency	100Hz	100Hz

59 Style Connector
4-pin, Metal, 19mm (.75 in.)
device



Metric/in. Conversion Table

6.2 mm = .24 in.	80.0 mm = 3.15 in.
7.0 mm = .27 in.	90.0 mm = 3.58 in.
8.0 mm = .31 in.	115.0mm = 4.52 in.
35.0 mm = 1.37 in.	120.0mm = 4.72 in.
36.0 mm = 1.41 in.	166.0 mm= 6.52 in.
40.0 mm = 1.57 in.	190.0 mm= 7.47 in.
45.0 mm = 1.77 in.	
48.0 mm = 1.89 in.	
50.0 mm = 1.96 in.	

This table converts millimeters to inches in reference to the illustrations included in this catalog

Accessories

2 meter (6 ft. 6 in.) DC Cable Assemblies for Quick Disconnect Sensors

59 Connector 9512-0200 PVC, Straight

Change last digit of connector number to 2 for 5 meter cable

Refer to pages 116-121 for more cable information

Notes:

High Sensitivity Ring Sensors have a dynamic output – a short output pulse (10 msec) is released during metal detection. The 8102-0900 switching unit must be utilized for proper operation.

50mm (1.97 in.)

.8mm (.03 in.)

59

9701-0759

≤10%

20-30V

≤35 mA

50 mA

≤1V at 10 mA

≤3.5V at 50 mA

≤500μA

100Hz

50mm (1.97 in.)

1.0mm (.04 in.)

59

9701-0259

≤10%

20-30V

≤35 mA

50 mA

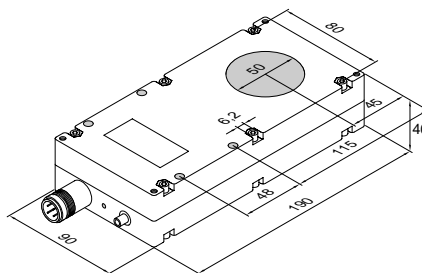
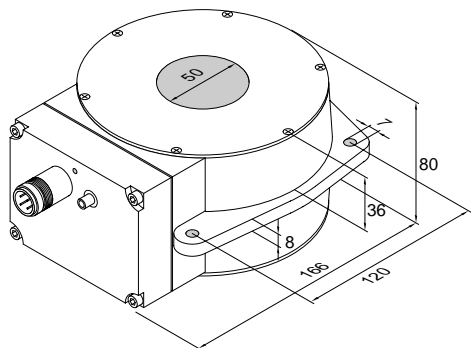
≤1V at 10 mA

≤3.5V at 50 mA

≤500μA

100Hz

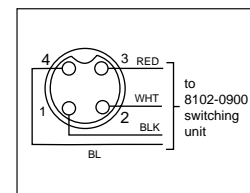
Note: Sensor dimensions in mm.



Wiring Diagrams

Note: Wire colors are applicable on cables purchased from Altech

NPN



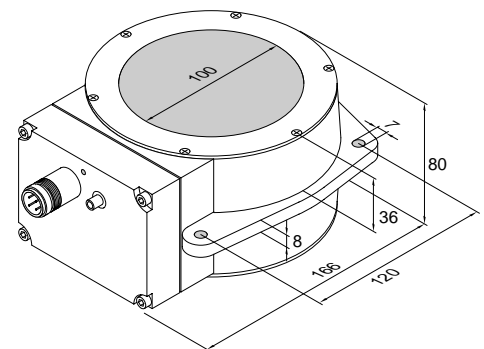
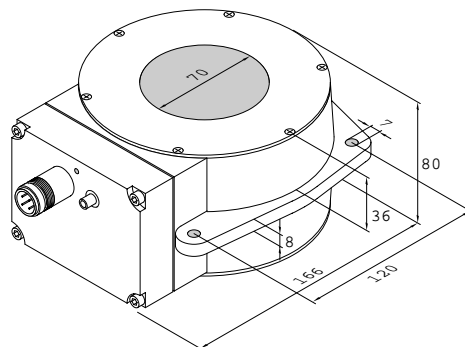
**DC - 4 WIRE HIGH SENSITIVITY
RING SENSORS
ALUMINUM HOUSING
20-30V DC, 50mA
1 LED for Output Energized**

- Applications include the detection and counting of parts in punching/pressing operations
- Detection of unwanted metal in grinding operations
- Complementary outputs available
- Dynamic output – must be operated with 8102-0900 Unit
- Carries (€ mark)

- IEC(529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Short Circuit Protection
- Reverse Polarity Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Ring Diameter	70mm (2.76 in.)	100mm(3.94)
Sensitivity (min. dia. steel ball)	1.1mm (.039 in.)	1.6mm (.059 in.)
Cable or Connector Style Cat. No.	59	59
PNP (Complementary NO/NC)		
NPN (Complementary NO/NC)	9711-0059	9700-0159
Ripple Voltage	≤10%	≤10%
Voltage Range	20-30V	20-30V
Supply Current	≤35 mA	≤35 mA
Max. Load Current	50 mA	50 mA
Voltage Drop Across Sensor	≤1V at 10 mA ≤3.5V at 50 mA	≤1V at 10 mA ≤3.5V at 50 mA
Max. Leakage Current	≤500µA	≤500µA
Switching Frequency	100Hz	100Hz

59 Style Connector
4-pin, Metal, 19mm (.75 in.)
device



Metric/in. Conversion Table

7.0 mm = .27 in.	120.0mm = 5.50 in.	294.0mm = 11.20 in.
8.0 mm = .31 in.	160.0mm = 6.29 in.	305.0mm = 12.00 in.
8.5 mm = .33 in.	162.0mm = 6.37 in.	340.0mm = 13.81 in.
36.0 mm = 1.41 in.	166.0 mm= 6.52 in.	382.0mm = 15.03 in.
70.0 mm = 2.75 in.	202.0mm = 7.94 in.	397.0mm = 15.62 in.
80.0 mm = 3.15 in.	260.0mm = 10.23 in.	
100.0mm = 3.93 in.	290.0mm = 11.41 in.	

This table converts millimeters to inches in reference to the illustrations included in this catalog

Accessories

2 meter (6 ft. 6 in.) DC Cable Assemblies for Quick Disconnect Sensors

59 Connector 9512-0200 PVC, Straight

Change last digit of connector number to 2 for 5 meter cable

Refer to pages 116-121 for more cable information

Notes:

High Sensitivity Ring Sensors have a dynamic output – a short output pulse (10 msec) is released during metal detection. The 8102-0900 switching unit must be utilized for proper operation.

200mm (7.87 in.)

3.0mm (.118 in.)

59

9703-0159

≤10%

20-30V

≤35 mA

50 mA

≤1V at 10 mA

≤3.5V at 50 mA

≤500µA

100Hz

300mm (11.81 in.)

5.0mm (.196 in.)

59

9704-0159

≤10%

20-30V

≤35 mA

50 mA

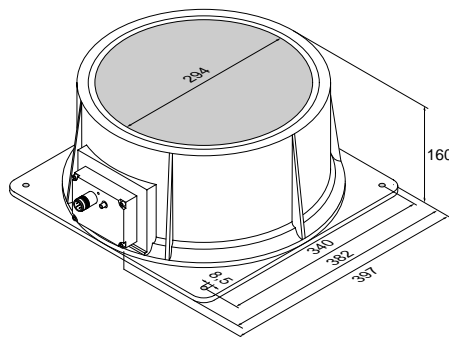
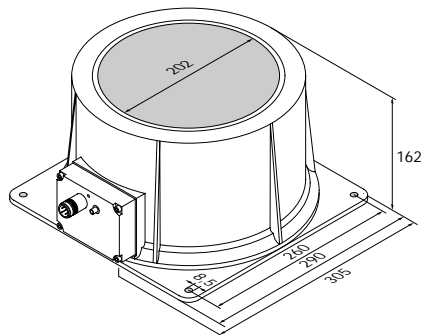
≤1V at 10 mA

≤3.5V at 50 mA

≤500µA

100Hz

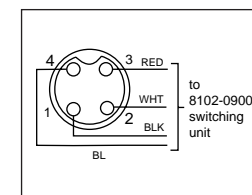
Note: Sensor dimensions in mm.



Wiring Diagrams

Note: Wire colors are applicable on cables purchased from Altech

NPN



**DC - 4 WIRE HIGH SENSITIVITY
RING SENSORS
ALUMINUM HOUSING
20-30V DC, 50mA
1 LED for Output Energized**

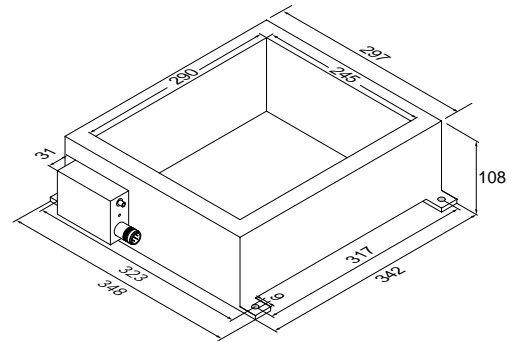
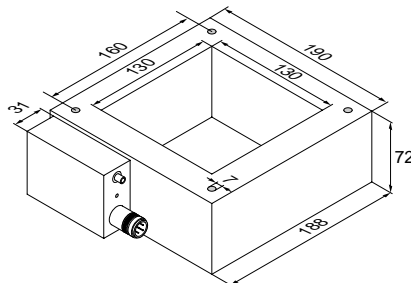
- Applications include the detection and counting of parts in punching/pressing operations
- Detection of unwanted metal in grinding operations
- Complementary outputs available
- Dynamic output – must be operated with 8102-0900 Unit
- Carries (€) mark

- IEC(529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Short Circuit Protection
- Reverse Polarity Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Ring Diameter	130 x 130mm (5.12 in. x 5.12 in.)	245 x 290mm (9.65 x 11.42 in.)
Sensitivity (min. dia. steel ball)	5mm (.196 in.)	12mm (.472 in.)
Cable or Connector Style Cat. No.	59	59
PNP (Complementary NO/NC)		
NPN (Complementary NO/NC)	9709-0359	9709-0259
Ripple Voltage	≤10%	≤10%
Voltage Range	20-30V	20-30V
Supply Current	≤35 mA	≤35 mA
Max. Load Current	50 mA	50 mA
Voltage Drop Across Sensor	≤1V at 10 mA ≤3.5V at 50 mA	≤1V at 10 mA ≤3.5V at 50 mA
Max. Leakage Current	≤500µA	≤500µA
Switching Frequency	100Hz	100Hz

Note: Sensor dimensions in mm.

59 Style Connector
4-pin, Metal, 19mm (.75 in.)
device



Metric/in. Conversion Table

7.0 mm = .27 in.	188.0 mm = 7.39 in.
9.0 mm = .35 in.	190.0 mm = 7.43 in.
31.0 mm = 1.22 in.	245.0mm = 9.63 in.
72.0 mm = 2.83 in.	297.0mm = 11.67 in.
108.0mm = 4.24 in.	317.0mm = 12.45 in.
130.0 mm= 5.11 in.	342.0mm = 13.44 in.
160.0 mm= 6.29 in.	

This table converts millimeters to inches in reference to the illustrations included in this catalog

Notes:

High Sensitivity Ring Sensors have a dynamic output – a short output pulse (10 msec) is released during metal detection. The 8102-0900 switching unit must be utilized for proper operation.

Accessories

2 meter (6 ft. 6 in.) DC Cable Assemblies for Quick Disconnect Sensors

59 Connector 9512-0200 PVC, Straight

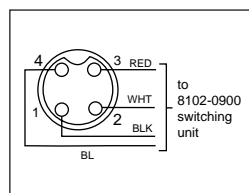
Change last digit of connector number to 2 for 5 meter cable

Refer to pages 116-121 for more cable information

Wiring Diagrams

Note: Wire colors are applicable on cables purchased from Altech

NPN



**DC - 3 WIRE ANALOG
RING SENSORS
18-30V DC, 5mA
1-9 Volt Analog Output**

- **Analog output voltage proportional to metal target size**
- **Carries $\text{C} \in$ mark**
- IEC(529) IP67 (NEMA 1, 3, 4, 6, 12, 13) Protection
- Short Circuit Protection
- Overload Protection
- Temperature Range: -25 to 70°C (-13 to 158°F)

Metric/in. Conversion Table

18.0 mm = .70 in.	43.0 mm = 1.7 in.
20.0 mm = .78 in.	58.0 mm = 2.3 in.
24.0 mm = .94 in.	73.5 mm = 2.9 in.
26.0 mm = 1.02 in.	106.0mm = 4.2 in.
35.0 mm = 1.37 in.	

This table converts millimeters to inches in reference to the illustrations included on these pages

Accessories

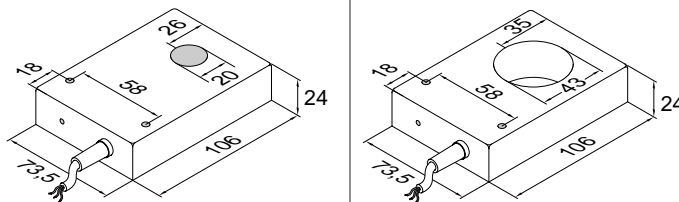
The analog output voltage can be digitized by the 8100-2100 switching unit and 8100-2400/2500 modules.
(Separate Accessory items - refer to pages 125 - 126 for more information.)

Ring Diameter	20mm (.79 in.)	43mm (1.69 in.)
Sensitivity (steel ball dia.)	Ø 0.5mm - Ø6mm	Ø 1mm - Ø20mm
Cable or Connector Style Cat. No.	Cable	Cable
	9714-2000	9714-4300
Voltage Range	18V - 30V DC	18V - 30V DC
Supply Current	≤10 mA	≤10 mA
Maximum Load Current	5mA	5 mA
Switching Frequency	50Hz	50Hz
Temperature Drift	±0.4V	±0.4V
Repeatability	≤1%	≤1%
Housing Material	ABS	ABS
Output Voltage Range	1 - 9V DC	1 - 9V DC

Note: Sensor dimensions in mm.

Fixed Cable

PVC 2m (6ft. 6in.).
For 5m (16 ft. 5 in.)
cable length, change
the last two digits of
the part number to 02.
For other cable
lengths and/or PUR
cable, please consult
Altech.



Wiring Diagrams

Note: Wire colors are applicable to cable purchased from Altech

