



**THE DATASHEET OF
SCN-1392SC**



Ultrasonic Sensors


Compact 18 mm Diameter Digital

940 Series

FEATURES

- Sensing distance up to 1,5 meters
- 18 mm diameter housing
- IP 67 sealing
- High output current
- High power transducer
- Microprocessor controlled

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Digital Output | Termination | Catalog Listing |
|--|------------------------------|----------------|-----------------|---------------------|
| 18 mm dia. PBTB Plastic  | 200 - 1500 (7.87 - 59.05) | PNP, N.O. | Cable | 940-F4Y-2D-001-180E |
| | | NPN, N.O. | Cable | 940-F4Y-2D-002-180E |
| | | PNP, N.O. | Connector cable | 940-F4X-2D-001-180E |
| | | NPN, N.O. | Connector cable | 940-F4X-2D-002-180E |
| | 150 - 700 (5.9 - 27.5) | PNP, N.O. | Cable | 940-F4Y-2D-001-300E |
| | | NPN, N.O. | Cable | 940-F4Y-2D-002-300E |
| | | PNP, N.O. | Connector cable | 940-F4X-2D-001-300E |
| | | NPN, N.O. | Connector cable | 940-F4X-2D-002-300E |

* Standard target is 120 mm square of mild steel perpendicular to ultrasonic beam.

SPECIFICATIONS

| Catalog Listings | 940-F4Y-2D-001-180E 940-F4Y-2D-002-180E 940-F4X-2D-001-180E 940-F4X-2D-002-180E | 940-F4Y-2D-001-300E 940-F4Y-2D-002-300E 940-F4X-2D-001-300E 940-F4X-2D-002-300E |
|-------------------------------|---|--|
| Max. Sensing Distance | 1500 mm (59.05 in.) | 700 mm (27.5 in.) |
| Min. Sensing Distance | 200 mm (7.87 in.) | 150 mm (5.91 in.) |
| Beam Angle | 8° | 8° |
| POWER SUPPLY | | |
| Supply Voltage | 19 - 30 VDC | |
| Supply Current | <25 mA without load | <35 mA without load |
| Circuit Protection | Reverse polarity | |
| OUTPUT CHARACTERISTICS | | |
| Load Current | 0 - 500 mA | |
| Switching Frequency | 8 Hz | 25 Hz |
| Hysteresis | ~ 2% of setpoint | ~ 2.5% of setpoint |
| Repeatability | ± 1 mm | |
| Setpoint Adjustment | 4-turn potentiometer | |
| Circuit Protection | Short circuit | |
| ENVIRONMENTAL | | |
| Operating Temperature | -15 to 70°C (5 to 158°F) | |
| Storage Temperature | -25 to 85°C (-13 to 185°F) | |
| Sealing | IP 67 | |
| SPECIAL FEATURES | | |
| Hold Input | Stops transmission and reception when input is connected to 0 VDC. Last output will be stored until input is disconnected | |
| Synchronization Input | Avoids mutual interference from several sensors by interconnecting the hold input from each sensor. | |
| LED Indicator | Illuminates when sensor detects target | |

Ultrasonic Sensors

940 Series

Compact 18 mm Diameter Digital

WIRING DIAGRAM



940-F4X/Y-20-001/2-300E Versions only



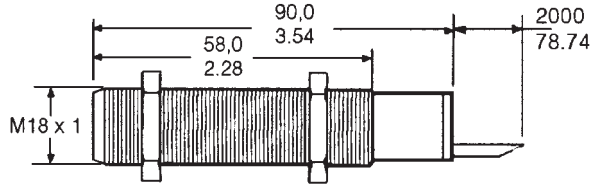
4-pin DC Micro (M12 x 1)

| Pin | Color |
|-----|-------|
| 1 | BRN |
| 2 | PINK |
| 3 | BLU |
| 4 | BLK |

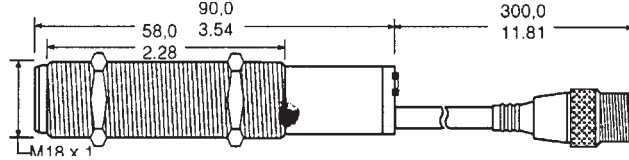
*Normal operation with no connection

MOUNTING DIMENSIONS (For reference only)

940-F4X/Y-20-001/2-180E



940-F4X/Y-2D-001/2-300E



ACCESSORIES

| | Catalog Listing | Feature |
|--|-----------------|---|
| Mounting clamp | 43178389-018 | Allows mounting to a flat surface |
| Beam deflector | 43192871-003 | Allows right angle mounting (Approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-004 | Reduces beam angle by approximately 1/2 (Approx. dim. 35 x 52 mm) |
| Straight connector w/o cable | 66195044-001 | Connector has screw terminals for wiring connection |
| Right angle connector w/o cable | 66195045-001 | Connector has screw terminals for wiring connection |
| 24 VDC Power supply, Relay output, 110 VAC input | FF-MADB24RB | See page B102 for more information |
| 24 VDC Power supply, On/Off delay, 110 VAC input | FF-MADC24RB | See page B102 for more information |

Proximity

Ultrasonic Sensors

30 mm Diameter Analog

940 Series

FEATURES

- Measuring range up to 2000 mm (78.74 in.)
- High repeatability

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Analog Output | Termination | Catalog Listing |
|---|----------------------------|---------------|-------------|---------------------|
|  30 mm dia. Stainless Steel | 300 - 2000 (11.81 - 78.74) | 1.5 - 10 V | Cable | 940-A4Y-AD-1C0-130E |
| | 150 - 1200 (5.90 - 47.24) | 1.25 - 10 V | Cable | 940-A4Y-AD-1C0 |
| | | | Connector | 940-A4V-AD-1C0 |
| | | | | |

* Standard target is 120 mm square of mild steel perpendicular to ultrasonic beam.

SPECIFICATIONS

| Catalog Listings | 940-A4Y-AD-1C0-130E | | 940-A4Y-AD-1C0 940-A4V-AD-1C0 | |
|-------------------------------|--|---------------------|----------------------------------|-------------------|
| | Max. Range | Max. Rate | Max. Range | Max. Rate |
| Max. Sensing Distance | 2000 mm (78.74 in.) | 1000 mm (39.37 in.) | 1200 mm (47.2 in.) | 600 mm (23.6 in.) |
| Min. Sensing Distance | 300 mm (11.8 in.) | | 150 mm (5.91 in.) | |
| Beam Angle | 8° | | 10° | |
| POWER SUPPLY | | | | |
| Supply Voltage | 19 - 30 VDC | | | |
| Supply Current | <20 mA without load | | | |
| Circuit Protection | Reverse polarity | | | |
| OUTPUT CHARACTERISTICS | | | | |
| Load Current | 10 mA max. | | | |
| Switching Frequency | 6 Hz | | 11 Hz | |
| Repeatability | ±2 mm | | ±1 mm | |
| Linearity | <0.2% | | | |
| Output Adjustment | 4 Turn Potentiometer | | | |
| Output Mode | Max. Range or Max. Rate selected by wiring terminal connection | | | |
| Circuit Protection | Short Circuit | | | |
| ENVIRONMENTAL | | | | |
| Operating Temperature | 0 to 50°C (32 to 122°F) | | | |
| Storage Temperature | 0 to 70°C (32 to 158°F) | | | |
| Sealing | IP 65 | | | |
| SPECIAL FEATURES | | | | |
| Hold Input | Stops transmission and reception of sensor when input is connected to 0 VDC. Analog output would be zero. | | | |
| Synchronization Input | Avoids mutual interference from several ultrasonic sensors (external synchronization unit required; see Accessories) | | | |
| LED Indicator | Illuminates when sensor detects a target | | | |

Ultrasonic Sensors

940 Series

30 mm Diameter Analog

WIRING DIAGRAM



*Normal operation with connection +19-30 VDC

CONNECTOR VERSION ONLY



| Pin | Color |
|-----|-------|
| 1 | BRN |
| 2 | WHT |
| 3 | BLU |
| 4 | BLK |
| 5 | GRAY |

MOUNTING DIMENSIONS (For reference only)

940-A4V-AD-1C0



940-A4Y-AD-1C0-130E 940-A4Y-AD-1C0



ACCESSORIES

| | Catalog Listing | Feature |
|--------------------------------------|-----------------|--|
| Mounting clamp, 30 mm sensor | 43178389-030 | Allows mounting to a flat surface |
| Beam deflector | 43192871-001 | Allows right angle mounting (Approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-002 | Reduces beam angle by approximately 1/2 |
| Compact deflector | 66195116-001 | Allows right angle mounting (Approx. dim. 35 x 52 mm) |
| 2 meter cable, Straight connector | RKT5-612/2M | Used for wiring to connector version |
| 5 meter cable, Straight connector | RKT5-612/5M | Used for wiring to connector version |
| 2 meter cable, Right angle connector | RKWT5-612/2M | Used for wiring to connector version |
| 5 meter cable, Right angle connector | RKWT5-612/5M | Used for wiring to connector version |
| Synchronization unit | 55000001 | Controls up to 100 sensors |


Proximity

Compact 30 mm Diameter Analog and Digital, RS232/RS485 Interface

FEATURES

- Programmable
- RS232 or RS485 interface
- 0 - 10 VDC/4 - 20 mA output
- Two N.O. PNP outputs or one N.O. PNP/one N.C. PNP output

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Analog Output | Digital Output | Interface | Catalog Listing |
|--|----------------------------|---------------|----------------|-----------|---------------------|
| 30 mm dia. Stainless Steel  272,1g (9.6 oz) | 300 - 3000 (11.8 - 118) | 0 - 10 V | PNP, N.O./N.C. | RS232 | 942-A4N-2D-1C1-130E |
| | | 4 - 20 mA | PNP, N.O./N.C. | RS232 | 942-A4N-2D-1D1-130E |
| | | 0 - 10 V | PNP, N.O./N.C. | RS485 | 942-A4N-2D-1E1-130E |
| | | 4 - 20 mA | PNP, N.O./N.C. | RS485 | 942-A4N-2D-1F1-130E |
| | 150 - 1500 (5.9 - 59.1) | 0 - 10 V | PNP, N.O./N.C. | RS232 | 942-A4N-2D-1C1-220S |
| | | 4 - 20 mA | PNP, N.O./N.C. | RS232 | 942-A4N-2D-1D1-220S |
| | | 0 - 10 V | PNP, N.O./N.C. | RS485 | 942-A4N-2D-1E1-220S |
| | | 4 - 20 mA | PNP, N.O./N.C. | RS485 | 942-A4N-2D-1F1-220S |
| | 100 - 600 (3.94 - 23.6) | 0 - 10 V | PNP, N.O./N.C. | RS232 | 942-A4N-2D-1C1-300E |

* Standard target is 120 mm square of mild steel perpendicular to ultrasonic beam.

SPECIFICATIONS

| Catalog Listings | 942-A4N-2D-1C1-130E 942-A4N-2D-1D1-130E 942-A4N-2D-1E1-130E 942-A4N-2D-1F1-130E | 942-A4N-2D-1C1-220S 942-A4N-2D-1D1-220S 942-A4N-2D-1E1-220S 942-A4N-2D-1F1-220S | 942-A4N-2D-1C1-300E |
|---|---|--|----------------------|
| Max. Sensing Distance | 3000 mm (118 in.) | 1500 mm (59.1 in.) | 600 mm (23.6 in.) |
| Min. Sensing Distance | 300 mm (11.8 in.) | 150 mm (5.91 in.) | 100 mm (3.94 in.) |
| Beam Angle | 8° | 10° | 8° |
| POWER SUPPLY | | | |
| Supply Voltage | 19 - 30 VDC | | |
| Supply Current | < 30 mA without load | | |
| Circuit Protection | Reverse Polarity | | |
| OUTPUT CHARACTERISTICS (DIGITAL) | | | |
| Load Current | 0 - 100 mA | | |
| Hysteresis | Programmable (0 - 255 mm) | | |
| Switching Frequency | Programmable 5-30 Hz | Programmable 5-30 Hz | Programmable 5-50 Hz |
| Repeatability | ±2 mm or ±0.4% of reading | | |
| Setpoint Adjust | Programmable within sensing range | | |
| Circuit Protection | Short circuit | | |
| OUTPUT CHARACTERISTICS (ANALOG) | | | |
| Switching Frequency | Programmable 5-30 Hz | Programmable 5-30 Hz | Programmable 5-50 Hz |
| Repeatability | ±2 mm or ±0.4% of reading | | |
| Linearity | 3 mm or ±0.5% | | |
| Output Adjust | Programmable | | |
| Circuit Protection | Short circuit | | |
| ENVIRONMENTAL | | | |
| Operating Temperature | -15 to 70°C (5 to 150°F) | | |
| Storage Temperature | -25 to 85°C (-13 to 185°F) | | |
| Sealing | IP 65 | | |
| SPECIAL FEATURES | | | |
| Hold Input | Stops transmission and reception when input is connected to 0 VDC. Analog output would be zero. | | |
| Synchronization input | Avoids mutual interference from several sensors by interconnecting the Hold input from each sensor. | | |
| LED Indicator | Illuminates when sensor detects target | | |
| Programmable Parameters | Analog Output: Span, Offset, Positive or Negative slope Digital Output: Hysteresis, N.O./N.C. | | |

Compact 30 mm Diameter Analog and Digital, RS232/RS485 Interface

WIRING DIAGRAM



*Normal operation with no connection

MOUNTING DIMENSIONS (For reference only)



ACCESSORIES

| | Catalog Listing | Features |
|--|-----------------|--|
| Mounting clamp | 43178389-030 | Allows mounting to flat surface |
| Beam deflector | 43192871-001 | Allows right angle mounting (approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-002 | Reduces beam angle by approximately 50% |
| Compact deflector | 66195116-001 | Allows right angle mounting (approx. dim. 35 x 52 mm) |
| Programming adapter | 55000005-002 | Allows sensor programming via RS232 interface |
| RS232/RS485 converter | 55000003-001 | Converts RS232 interface to RS485 interface |
| 24 VDC Power supply, relay output, 110 VAC input | FF-MADB24RB | See page B102 more information |
| 24 VDC Power supply, On/Off delay, 110 VAC input | FF-MADC24RB | See page B102 more information |
| Software package (disk, manual, cable + 1 sub min D9 connector) | 55195101-101 | Allows programming of sensor |
| Software package (disk, manual, cable + 2 sub min D9 connectors) | 55195101-102 | Allows programming of sensor |
| Straight connector | 66195126-001 | Used for wiring to connector |
| 2 meter cable with straight connector | 55195126-001 | Used for wiring to connector |

2-Piece 30 mm Diameter Precision Switching, Analog, Digital BCD, Hexadecimal Outputs

FEATURES

- **Background suppression**
- Sensor sealed to IP 65
- Amplifier sealed to IP 54
- DIN rail mounting
- Compensated over 0 to 50°C (32 to 120°F)
- Amplifier provides analog, digital switching, BCD or hexadecimal outputs

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Digital Output** | Multiplex Digital Output | Analog Output | Catalog Listing*** |
|--|----------------------------|-------------------------|--------------------------|-------------------------|--|
| 30 mm (1.18 in.) Stainless steel sensor head  272g (9.6 oz) | 150 - 1500 (5.9 - 59.0) | Two PNP N.O. or N.C. | BCD/HEX | 0 - 10 VDC 4 - 20 mA | 942-M3A-2D-1G1-220S *Standard target: 120 mm thick square of mild steel perpendicular to ultrasonic beam. **N.O./N.C. output selectable ***Includes stainless steel sensor head, cable, straight connector and amplifier. |

SPECIFICATIONS

| | |
|---|--|
| Max. Sensing Distance | 1500 mm (59.1 in.) |
| Min. Sensing Distance | 150 mm (5.91 in.) |
| Beam Angle | 10°/5° |
| POWER SUPPLY | |
| Supply Voltage | 19-30 VDC |
| Supply Current | < 130 mA without load |
| Circuit Protection | Reverse polarity |
| OUTPUT CHARACTERISTICS (DIGITAL) | |
| Load Current | 0-100 mA |
| Hysteresis | ±1% of setpoint |
| Switching Frequency | 8 Hz |
| Repeatability | ±1 mm or 0.2% of reading |
| Setpoint Adjustment | Digital switches |
| Output Adjustment | Beam angle 10° w/max. sensitivity or beam angle 5° w/min. sensitivity |
| Circuit Protection | Short circuit |
| OUTPUT CHARACTERISTICS (MULTIPLEX DIGITAL) | |
| Resolution | 1 mm |
| Information Output | Bit Parallel/Word Serial |
| Setpoint Adjustment | Beam angle 10° w/max. sensitivity or beam angle 5° w/min. sensitivity |
| OUTPUT CHARACTERISTICS (ANALOG) | |
| Switching Frequency | 8 Hz |
| Repeatability | ±1 mm or 0.2% of reading |
| Linearity | ±2 mm or 0.3% |
| Output Range Adjustment | Digital switches |
| Output Adjustment | Beam angle 10° w/max. sensitivity or beam angle 5° w/min. sensitivity |
| Min. Load Resistance (VDC) | 1000 Ohms (0-10 VDC output) |
| Max. Load Resistance (mA) | 250 Ohms (4-20 mA output) |
| Slope of Output | Positive or Negative via switch |
| ENVIRONMENTAL | |
| Operating Temperature | Sensor head: 0 to 70°C (32 to 158°F)/Amplifier: 0 to 50°C (32 to 122°F) |
| Storage Temperature | Sensor head/Amplifier: -25 to 85°C (-13 to 185°F) |
| Sealing | Sensor Head: IP 65/Amplifier: IP 54 |
| SPECIAL FEATURES | |
| LED Indicators | RED - Under Range/ RED - Over Range: illumination dependent on analog range chosen and target position with respect to sensor YELLOW - Setpoint: illuminates when target reaches setpoint 1 or setpoint 2 |
| Hold Input | Stops transmission and reception when input is connected to 0 VDC. Last output stored until input is disconnected |
| Synchronization Input | Avoids mutual interference from several sensors by interconnecting the hold input from each sensor |

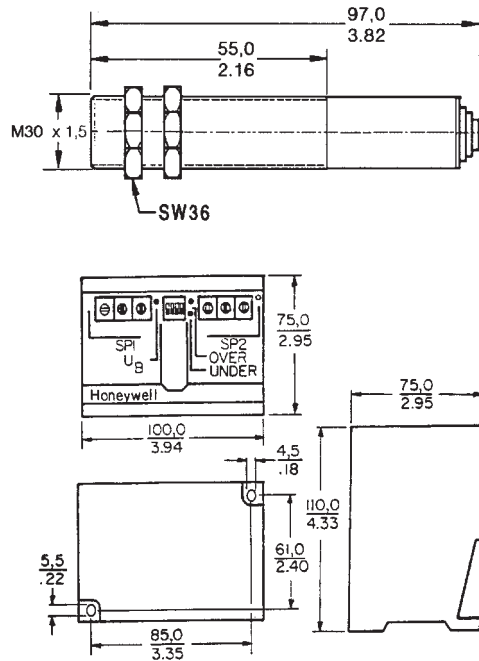
2-Piece 30 mm Diameter

Precision Switching, Analog, Digital BCD, Hexadecimal Outputs

WIRING DIAGRAM



MOUNTING DIMENSIONS (For reference only)



Proximity

ACCESSORIES

| | Catalog Listing | Features |
|-------------------------|-----------------|--|
| Mounting clamp | 43178389-030 | Allows mounting to flat surface |
| Beam deflector | 43192871-001 | Allows right angle mounting (approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-002 | Reduces beam angle by approximately 50% |
| Compact deflector | 66195116-001 | Allows right angle mounting (approx. dim. 35 x 52 mm) |

REPLACEMENT LISTINGS

| | |
|---|---------------------|
| Sensor Head | 942A4M-2D-K220S |
| Amplifier | 942-M0A-2D-1G1-220S |
| Straight Connector (cable not included) | 66195074-001 |

942 SERIES ULTRASONIC CROSS REFERENCE

| Obsolete Listing | Replacement Listing | Comments |
|-----------------------|---------------------|---------------------------------|
| 942-M88 942-M88-LF | 942-M96 | Sensor head, includes connector |
| 942-M3A-2D-1G1 | 942-M0A-2D-1G1-220S | Amplifier |

Temperature Sensors

Platinum RTDs

HRTS Series



FEATURES

- Resistance interchangeable
- Accurate
- Linear
- Fast
- Laser trimmed
- Bolt, cement-on or strap-on models

TYPICAL APPLICATIONS

- HVAC – room, duct and refrigerant equipment
- OEM assemblies
- Electronic assemblies – semiconductor protection, temperature compensation
- Process control – temperature regulation

ORDER GUIDE

| | |
|--------------------|---|
| HRTS-5760-B | Miniature, ceramic body, 28 ga TFE Teflon insulated leads (2-wire only) |
| HRTS-61 | Bolt-on, nickel plated copper alloy body, 24 ga fiberglass insulated leads, SST braid, TFE overwrap, spiral armor |
| -T | 100Ω, 0.00385 Ω/Ω/°C, 3-wire leads, DIN specification |
| -U | 1000Ω, 0.00375 Ω/Ω/°C, 2-wire leads |
| -0 | ±0.2% Resistance Trim (Standard) |
| -1 | ±0.1% Resistance Trim (Optional) |
| -12 | Standard length, HRTS-5760-B |
| -24 | Standard length, HRTS-61 |

MOUNTING DIMENSIONS (for reference only)



The HRTS is designed to measure surface temperatures from -200° to $+480^{\circ}$ C (-320° to $+900^{\circ}$ F) in printed circuit, temperature probe, or other applications.

HRTS surface temperature sensors are fully assembled elements, ready to use, without the need for fragile splices to extension leads.

A thin layer of platinum is deposited on an alumina substrate and laser trimmed to a resistance interchangeability of $\pm 0.2\%$ with $\pm 0.5^{\circ}$ C accuracy or $\pm 0.1\%$ with $\pm 0.3^{\circ}$ C accuracy. The sensor chip is then glassed, wired and potted or ceramic fired to result in a cylindrical alumina package with either Teflon or fiber glass insulated lead wires.

Fig. 1: Wheatstone Bridge 2-Wire Interface



Fig. 2: Linear Output Voltage



Fig. 3: Adjustable Point (Comparator) Interface



Temperature

Platinum RTDs

FUNCTIONAL BEHAVIOR

$$R_T = R_0(1 + AT + BT^2 - 100CT^3 + CT^4)$$

R_T = Resistance (Ω) at temperature T ($^{\circ}\text{C}$)

R_0 = Resistance (Ω) at 0°C

T = Temperature in $^{\circ}\text{C}$

$$A = \alpha + \frac{\alpha \delta}{100} \quad B = \frac{-\alpha \delta}{100^2} \quad C_{T < 0} = \frac{-\alpha \beta}{100^4}$$

CONSTANTS

| | | |
|--|---------------------------|----------------------------|
| Alpha, α ($^{\circ}\text{C}^{-1}$) | 0.00375 ± 0.000029 | 0.003850 ± 0.000010 |
| Delta, δ ($^{\circ}\text{C}$) | 1.605 ± 0.009 | 1.4999 ± 0.007 |
| Beta, β ($^{\circ}\text{C}$) | 0.16 | 0.10863 |
| A ($^{\circ}\text{C}^{-1}$) | 3.81×10^{-3} | 3.908×10^{-3} |
| B ($^{\circ}\text{C}^{-2}$) | -6.02×10^{-7} | -5.775×10^{-7} |
| C ($^{\circ}\text{C}^{-4}$) | -6.0×10^{-12} | -4.183×10^{-12} |

Both $\beta = 0$ and $C = 0$ for $T > 0^{\circ}\text{C}$

ACCURACY VS TEMPERATURE

HRTS platinum RTDs are available in two base resistance trim tolerances: $\pm 0.2\%$ or $\pm 0.1\%$. The corresponding resistance interchangeability and temperature accuracy for these tolerances are:

| Tolerance | Standard $\pm 0.2\%$ | | Optional $\pm 0.1\%$ | | |
|-----------|------------------------------------|-------------------------------|---------------------------------------|-------------------------------|---------------------------------------|
| | Temperature ($^{\circ}\text{C}$) | $\pm \Delta R^*$ (Ω) | $\pm \Delta T$ ($^{\circ}\text{C}$) | $\pm \Delta R^*$ (Ω) | $\pm \Delta T$ ($^{\circ}\text{C}$) |
| | -200 | 6.8 | 1.6 | 5.1 | 1.2 |
| | -100 | 2.9 | 0.8 | 2.4 | 0.6 |
| | 0 | 2.0 | 0.5 | 1.0 | 0.3 |
| | 100 | 2.9 | 0.8 | 2.2 | 0.6 |
| | 200 | 5.6 | 1.6 | 4.3 | 1.2 |
| | 300 | 8.2 | 2.4 | 6.2 | 1.8 |
| | 400 | 11.0 | 3.2 | 8.3 | 2.5 |
| | 500 | 12.5 | 4.0 | 9.6 | 3.0 |
| | 600 | 15.1 | 4.8 | 10.4 | 3.3 |

*1000 Ω RTD. Divide ΔR by 10 for 100 Ω RTD.

RESISTANCE VS TEMPERATURE CURVE



CAUTION

PRODUCT DAMAGE

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take normal ESD precautions when handling this product.

SPECIFICATIONS

| | |
|----------------------|--|
| Sensor Type | Thin film platinum RTD: $R_0 = 1000 \Omega @ 0^{\circ}\text{C}$; $\alpha = 0.00375 \Omega/\Omega/^{\circ}\text{C}$ $R_0 = 100 \Omega @ 0^{\circ}\text{C}$; $\alpha = 0.00385 \Omega/\Omega/^{\circ}\text{C}$ |
| Temperature Range | HRTS-5760-B: -200° to $+260^{\circ}\text{C}$ (-320° to $+500^{\circ}\text{F}$) HRTS-61: -75° to $+425^{\circ}\text{C}$ (-100° to $+800^{\circ}\text{F}$) |
| Temperature Accuracy | $\pm 0.5^{\circ}\text{C}$ or 0.8% of temperature @ 0.2% R_0 Trim $\pm 0.3^{\circ}\text{C}$ or 0.6% of temperature @ 0.1% R_0 Trim Optional |
| Time Constant, 1/e | HRTS-5760-B: Typically 0.6 sec. on metal surfaces HRTS-61: Typically 20 sec. On metal surfaces |
| Operating Current | 2 mA max. for self-heating errors of 1°C 1 mA recommended |
| Self-Heating | 0.3 mW/ $^{\circ}\text{C}$ |
| Lead Material | Nickel coated stranded copper, Teflon or Fiberglass insulated |

Ultrasonic Sensors

Precision Digital 18 mm Diameter

945 Series

FEATURES

- Background suppression
- Sealed to IP 65
- Fixed or adjustable setpoint control
- Temperature compensation over 0 to 50°C (32 to 122°F)
- Inhibit/synchronization input
- Stainless steel or plastic housings

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Setpoint | Output Type | Catalog Listing |
|--|--|--|---------------------|-----------------|
| 18 mm dia. Plastic  90,7 g (3.2 oz.) | 100 - 500 (3.9 - 19.68) | Fixed @ 400 mm (15.75 in.) ± 20 mm** | PNP, N.O. | 945-F4Y-AD-001 |
| | | | NPN, N.O. | 945-F4Y-AD-002 |
| | 100 - 200 (3.9 - 7.87) | Fixed @ 200 mm (7.87 in.) ± 20 mm** | PNP, N.O. | 945-N4Y-AD-001 |
| | | | NPN, N.O. | 945-N4Y-AD-002 |
| 200 - 500 (7.87 - 19.68) | Setpoint adjustment within sensing range | PNP, N.O. | 945-F4Y-AD-001-180E | |
| | | PNP, N.O. | 945-F4Y-AD-001-300E | |
| 18 mm dia. Stainless Steel  136 g (4.8 oz.) | 100 - 500 (3.9 - 19.68) | Setpoint adjustment within sensing range | PNP, N.O. | 945-L4Y-AD-001 |
| | | | NPN, N.O. | 945-L4Y-AD-002 |
| | 100 - 200 (3.9 - 7.87) | Setpoint adjustment within sensing range | PNP, N.O. | 945-S4Y-AD-001 |
| | | | NPN, N.O. | 945-S4Y-AD-002 |
| | | | | |

* Standard target is 120 mm square of mild steel perpendicular to ultrasonic beam.
 **External setpoint adjustment wiring possible.

SPECIFICATIONS

SENSING CHARACTERISTICS

| Catalog Listings | 945-F4Y-AD-001 945-F4Y-AD-002 945-L4Y-AD-001 945-L4Y-AD-002 | 945-N4Y-AD-001 945-N4Y-AD-002 945-S4Y-AD-001 945-S4Y-AD-002 | 945-F4Y-AD-001-180E | 945-F4Y-AD-001-300E |
|-------------------------------|---|--|---------------------|-----------------------------|
| Max. Sensing Distance | 500 mm (19.66 in.) | 200 mm (7.87 in.) | 500 mm (19.66 in.) | 180 mm (7.09 in.) |
| Min. Sensing Distance | 100 mm (3.9 in.) | 100 mm (3.9 in.) | 200 mm (7.87 in.) | 70 mm (2.76 in.) |
| Beam Angle | 10° | 10° | 8° | 8° |
| POWER SUPPLY | | | | |
| Supply Voltage | 19 - 30 VDC | | | |
| Supply Current | <30 mA without load | | <25 mA without load | |
| Circuit Protection | Reverse polarity | | | |
| OUTPUT CHARACTERISTICS | | | | |
| Load Current | 0 - 100 mA | | | |
| Hysteresis | ~ 10 mm | | | |
| Switching Frequency | 30 Hz | 60 Hz | 25 Hz | 60 Hz |
| Repeatability | ± 0.5 mm or 0.3% or reading | | | ± 0.2 mm or 0.2% or reading |
| Setpoint Adjustment | (Fixed or External Circuit) or 4 Turn Potentiometer | | | |
| Circuit Protection | Short Circuit | | | |
| ENVIRONMENTAL | | | | |
| Operating Temperature | 0 to 50°C (32 to 122°F) | | | |
| Storage Temperature | 0 to 70°C (32 to 150°F) | | | |
| Sealing | IP 65 | | | |
| SPECIAL FEATURES | | | | |
| Hold Input | Stops transmission and reception when input is connected to 0 VDC. Last output will be stored until input is disconnected | | | |
| Synchronization Input | Avoids mutual interference from several sensors. (External synchronization unit is required. See Accessories) | | | |
| LED Indicator | Illuminates when sensor detects target | | | |

Ultrasonic Sensors

Precision Digital 18 mm Diameter

945 Series

WIRING DIAGRAMS

945-F/N Series



*Normal operation with no connection

MOUNTING DIMENSIONS (For reference only)

945-F/N Series plastic Housing



945-L/S Series



*Normal operation with no connection

945-L/S Series Stainless Steel Housing



ACCESSORIES

| | Catalog Listing | Features |
|--|-----------------|--|
| 24 VDC Power supply, relay output, 110 VAC input | FF-MADB24RB | See page B102 for more information |
| 24 VDC Power supply, ON/OFF delay, 110 VAC input | FF-MADC24RB | See page B102 for more information |
| Synchronization unit | 55000001 | Controls up to 100 sensors |
| Mounting clamp, 18 mm housing | 43178389-018 | Allows mounting to a flat surface |
| Beam deflector | 43192871-003 | Allows right angle mounting (approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-004 | Reduces beam angle by approximately 50% |

Proximity

Ultrasonic Sensors

Precision Analog 18 mm Diameter

945 Series

FEATURES

- Background suppression
- Sealed to IP 65
- Adjustable sensitivity
- Temperature compensation over 0 to 50°C (32 to 122°F)
- Inhibit/synchronization input
- Stainless steel or plastic housings

ORDER GUIDE

| Sensor Package Style | Sensing Range* mm (in.) | Analog Output | Catalog Listing |
|--|-------------------------|---------------|---|
| 18 mm dia. Plastic  90,7 g (3.2 oz.) | 150 - 600 (5.9 - 23.6) | 1.5 - 6 V | 945-F4Y-AD-1C0-180E |
| | 60 - 200 (2.36 - 7.87) | 1.8 - 6 V | 945-F4Y-AD-1C0-300E |
| 18 mm dia. Stainless Steel  136 g (4.8 oz.) | 100 - 600 (3.9 - 23.6) | 1 - 6 V | 945-L4Y-AD-1C0 |
| 18 mm dia. Plastic with Stainless Steel or Plastic External Head  | 150 - 600 (5.9 - 23.6) | 1.5 - 6 V | 945-E3Y-AD-1C0-180E (M18 x 1 stainless steel sensor head) |
| | 30 - 150 (1.18 - 5.9) | 0.9 - 4.5 V | 945-G3Y-AD-1C0-300E (M12 x 1 plastic sensor head) |

SPECIFICATIONS

| Catalog Listings | 945-F4Y-AD-1C0-180E | 945-F4Y-AD-1C0-300E | 945-L4Y-AD-1C0 | 945-E3Y-AD-1C0-180E | 945-G3Y-AD-1C0-300E |
|-------------------------------|---|---------------------|-------------------|---------------------|---------------------|
| Max. Sensing Distance | 600 mm (23.6 in.) | 200 mm (7.87 in.) | 600 mm (23.6 in.) | 600 mm (23.6 in.) | 150 mm (5.9 in.) |
| Min. Sensing Distance | 150 mm (5.9 in.) | 60 mm (2.36 in.) | 100 mm (3.9 in.) | 150 mm (5.9 in.) | 30 mm (1.18 in.) |
| Beam Angle | 8° | 8° | 10° | 8° | 8° |
| POWER SUPPLY | | | | | |
| Supply Voltage | 19 - 30 VDC | | | | |
| Supply Current | <20 mA without load | | | | |
| Circuit Protection | Reverse polarity | | | | |
| OUTPUT CHARACTERISTICS | | | | | |
| Load Current | 10 mA max. | | | | |
| Switching Frequency | 10 Hz | 20 Hz | 10 Hz | 10 Hz | 20 Hz |
| Repeatability | < ± 0.3% of reading | | | | |
| Linearity | <0.2% | | | | |
| Output Adjustment | 4 turn potentiometer | | | | |
| Circuit Protection | Short Circuit | | | | |
| ENVIRONMENTAL | | | | | |
| Operating Temperature | 0 to 50°C (32 to 122°F) | | | | |
| Storage Temperature | 0 to 70°C (32 to 158°F) | | | | |
| Sealing | IP 65 | | | | |
| SPECIAL FEATURES | | | | | |
| Hold Input | Stops transmission and reception of sensor when input is connected to 0 VDC. Analog output would be zero VDC | | | | |
| Synchronous Input | Avoids mutual interference from several ultrasonic sensors (external synchronization unit is required; see accessories) | | | | |
| LED Indicator | Illuminates when sensor detects a target | | | | |

Ultrasonic Sensors

Precision Analog 18 mm Diameter

945 Series

WIRING DIAGRAMS

945-F/L, 945-E/G Series



*Normal operation with connection to 19-30 VDC

MOUNTING DIMENSIONS (For reference only)

945-F/L Series Housing



945-E/G Series with External Head



Proximity

ACCESSORIES

| | Catalog Listing | Features |
|-------------------------------|-----------------|--|
| Synchronization unit | 55000001 | Controls up to 100 sensors |
| Mounting clamp, 18 mm housing | 43178389-018 | Allows mounting to flat surface |
| Beam deflector | 43192871-003 | Allows right angle mounting (approx. dim. 50 x 170 mm) |
| Focusing beam deflector | 43192871-004 | Reduces beam angle by approximately 50% |

94X Series (942-04N-2D-1A1/1A2-80E, 943-04V-2D-001/002/1C0/1D0-80E, 947-04V-2D-1C0/1D0-80E)

Ultrasonic Distance Sensors



DESCRIPTION

This collection of ultrasonic devices offers enhanced sensing range capability in a square plastic housing. Available sensor types include programmable, Teach-In, and analogue and fixed output versions.

FEATURES

- Non contact distance sensing for use in non invasive measurement
- Reduced sensitivity to light intensity/reflectivity/opacity of target for enhanced flexibility and certainty of measurement
- Detects over much longer distance than other detection methods reducing the need for close proximity to the target
- Extremely long sensing distance (up to 6 m [19.65 ft]) reducing the need for close proximity measurement which can be critical for some applications

POTENTIAL APPLICATIONS

- Level measurement
- Presence/absence detection
- Distance measurement

943 Series (942-04N-2D-1A1/1A2-80E, 943-04V-2D-001/002/1C0/1D0-80E, 947-04V-2D-1C0/1D0-80E)

Specifications

| Parameter | 942-04N-2D-1A1-80E | 942-04N-2D-1A2-80E | 943-04V-2D-001-80E | 943-04V-2D-002-80E | 943-04V-2D-1C0-80E | 943-04V-2D-1D0-80E | 947-04V-2D-1C0-80E | 947-04V-2D-1D0-80E |
|---|---|--------------------|---------------------------|--------------------|-----------------------------|--------------------|-----------------------------|--------------------|
| Max. sensing distance | 6000 mm [236.22 in] | | | | | | 5000 mm [196.85 in] | |
| Min. sensing distance | 600 mm [23.62 in] | | | | | | 500 mm [19.69 in] | |
| Expected response time 90% of final value | 250 ms/prog | | - | | 700 ms | | 400 ms | |
| Beam angle | 8° | | | | | | 10° | |
| Switching frequency | 7 Hz/prog | | 0.5 Hz | | 7 Hz/prog | | | |
| Linearity error | <0.3% | | - | | <0.5 % | | | |
| Hysteresis | prog | | ~1% | | - | | | |
| Repeatability of measured distance | 0.2% | | - | | 0.2% ±2 mm [0.08 in] | | 0.2% | |
| Temperature range | -15 °C to 70 °C [-5 °F to 158 °F] | | | | | | | |
| Temperature compensation | yes | | | | | | - | |
| Operating voltage | 15 Vdc to 30 Vdc | | 12 Vdc to 30 Vdc | | 15 Vdc to 30 Vdc | | 24 Vdc ±20% | |
| Expected current consumption | 100 mA | | <80 mA | | <35 mA | | <40 mA | |
| Analogue output | 0 V to 10 V/4 mA to 20 mA | | - | | 0 V to 10 V 4 mA to 20 mA | | 0 V to 10 V 4 mA to 20 mA | |
| Analogue output selection by load | load >2 kOhm Uout load <500 Ohm Iout | | - | | | | | |
| Switching outputs | 2 PNP NO/NC 2 NPN NO/NC | | 2 PNP NO/NC 2 NPN NO/NC | | - | | | |
| Expected output current | 100 mA max. | | 500 mA max. | | - | | | |
| Adjustment | programming | | | | Teach-In | | | |
| Alignment LED | | | green (1) | | - | | | |
| Status switching output 1 | | | yellow (2) | | - | | | |
| Status switching output 2 | | | yellow (3) | | - | | | |
| Control input | | | - | | | | | |
| Inhibit connect to: | Pin 6 → 0 V | | | | | | | |
| Synchronisation connect to: | Pin 6 ↔ Pin 6 | | | | | | | |
| Enable connect to: | Pin 6 → NC | | | | | | | |
| Interface | RS232 | | - | | | | | |
| Plastic housing | | | | | PBPT | | | |
| Sealing* | | | | | IP65 | | | |
| Connector | 8 pin M16x0.75 | | | | 5 pin M12x1 | | | |

*Attention! Do not expose sensor head to hot water >50 °C or steam vapour.

Accessories: 942-04N-2D-1A1/1A2-80E

| Catalog Listing | Description |
|-----------------|--|
| 66195126-001 | Mating connector straight |
| 55000005-002 | Programming adaptor |
| 55000010-001 | Software programming adaptor and PC connection cable |
| 55000018-001 | Programming cable |

Accessories: 943-04V-2D-001/002-80E, 943-04V-2D-1C0/1D0-80E, 947-04V-2D-1C0/1D0-80E

| Catalog Listing | Description |
|-----------------|---------------------------------|
| 66195044-001 | Mating connector straight |
| 66195045-001 | Mating connector angled |
| 66195214-001 | Straight cable/connector 2 m |
| 66195216-001 | Right-angle cable/connector 2 m |

Ultrasonic Distance Sensors

Mounting Dimensions (For reference only. mm/[in])

942-O4N-2D-1A1/1A2-80E



943-O4V-2D-001/002/1C0/1D0-80E,
947-O4V-2D-1C0/1D0-80E



Wiring

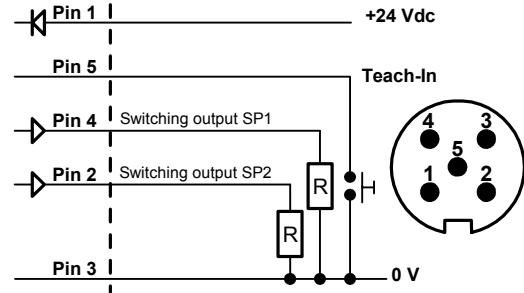
P42-O4N-2D-1A1/1A2-80E

View to solder pins of connector



- Pin 1: + 24 Vdc
- Pin 2: GND
- Pin 3: U/I
- Pin 4: SP1
- Pin 5: SP2
- Pin 6: Hld/Sync
- Pin 7: Rx D
- Pin 8: Tx D

943-O4V-2D-001-80E



943-O4V-2D-002-80E



943-O4V-2D-1C0/1D0-80E



947-O4V-2D-1C0/1D0-80E



947-O4V-2D-1C0-80E



947-O4V-2D-1D0-80E



Detection Range

942-04N-2D-1A1/1A2-80E,
943-04V-2D-001/002/1C0/1D0-80E



Enhanced detection of a target 100 mm² x 100 mm²
Possible detection of a large target

947-04V-2D-1C0/1D0-80E



Enhanced detection of a target 100 mm² x 100 mm²
Possible detection of a large target

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific +65 6355-2828
+65 6445-3033 Fax
Europe +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada +1-800-537-6945
+1-815-235-6847
+1-815-235-6545 Fax

Automation and Control Solutions

Sensing and Control

Honeywell

1985 Douglas Drive North

Minneapolis, MN 55422

www.honeywell.com/sensing

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Honeywell

943 Series Ultrasonic Distance Sensors




The new 943 series industrial sensors are the latest addition to our product range. They have improved scanning ranges, remote teach in of the switching or analog outputs, as well as new advanced features, such as window and hysteresis modes.

OPTIONS AND ORDER GUIDE

2 switching outputs PNP NO and NPN NO

Beam angle: 8°
Supply voltage: 12 to 30 V
Sealing: IP67

Analogue voltage output 0-10 V and 4-20 mA

Beam angle: 8°
Supply voltage: 15 to 30 V
Sealing: IP67

M30

CONNECTOR



CABLE



M30

Housing: M30 x 1,5 mm plastic (PBTB)
Max. sensing distance: 3500 mm
Min. sensing distance: 300 mm
Switching frequency: 1.0 Hz
Repeatability: 0,2 % or 2 mm

| OUTPUT | TERMINATION | REFERENCE |
|--------------|-------------|---------------------|
| PNP, 2 NO/NC | Connector | 943-T4V-2D-001-130E |
| PNP, 2 NO/NC | Cable | 943-T4V-2D-001-130E |
| NPN, 2 NO/NC | Connector | 943-T4V-2D-002-130E |
| NPN, 2 NO/NC | Cable | 943-T4V-2D-002-130E |

M30

Housing: M30 x 1,5 mm plastic (PBTB)
Max. sensing distance: 3500 mm
Min. sensing distance: 300 mm
Response time: 400 ms
Repeatability: 0,2 % or ±2 mm

| OUTPUT | TERMINATION | REFERENCE |
|---------|-------------|---------------------|
| 0-10 V | Connector | 943-T4V-2D-1C0-130E |
| 0-10 V | Cable | 943-T4V-2D-1C0-130E |
| 4-10 mA | Connector | 943-T4V-2D-1D0-130E |
| 4-20 mA | Cable | 943-T4V-2D-1D0-130E |

M18

CONNECTOR



CABLE



M18

Housing: M18 x 1,0 mm plastic (PBTB)
Max. sensing distance: 2000 mm
Min. sensing distance: 200 mm
Switching frequency: 1.2 Hz
Repeatability: 0,2 % or 2 mm

| OUTPUT | TERMINATION | REFERENCE |
|--------------|-------------|---------------------|
| PNP, 2 NO/NC | Connector | 943-F4V-2D-001-180E |
| PNP, 2 NO/NC | Cable | 943-F4V-2D-001-180E |
| NPN, 2 NO/NC | Connector | 943-F4V-2D-002-180E |
| NPN, 2 NO/NC | Cable | 943-F4V-2D-002-180E |

M18

Housing: M18 x 1,0 mm plastic (PBTB)
Max. sensing distance: 2000 mm
Min. sensing distance: 200 mm
Switching frequency: 250 ms
Repeatability: 0,2 % or ±2 mm

| OUTPUT | TERMINATION | REFERENCE |
|---------|-------------|---------------------|
| 0-10 V | Connector | 943-F4V-2D-1C0-180E |
| 0-10 V | Cable | 943-F4V-2D-1C0-180E |
| 4-10 mA | Connector | 943-F4V-2D-1D0-180E |
| 4-20 mA | Cable | 943-F4V-2D-1D0-180E |

Max. sensing distance: 800 mm
Min. sensing distance: 100 mm
Switching frequency: 4.7 Hz
Repeatability: 0,2 % or 1 mm

| OUTPUT | TERMINATION | REFERENCE |
|--------------|-------------|---------------------|
| PNP, 2 NO/NC | Connector | 943-F4V-2D-001-300E |
| PNP, 2 NO/NC | Cable | 943-F4V-2D-001-300E |
| NPN, 2 NO/NC | Connector | 943-F4V-2D-002-300E |
| NPN, 2 NO/NC | Cable | 943-F4V-2D-002-300E |

Max. sensing distance: 800 mm
Min. sensing distance: 100 mm
Switching frequency: 100 ms
Repeatability: 0,2 % or ±1 mm

| OUTPUT | TERMINATION | REFERENCE |
|---------|-------------|---------------------|
| 0-10 V | Connector | 943-F4V-2D-1C0-300E |
| 0-10 V | Cable | 943-F4V-2D-1C0-300E |
| 4-10 mA | Connector | 943-F4V-2D-1D0-300E |
| 4-20 mA | Cable | 943-F4V-2D-1D0-300E |

M18/M30

Termination: Connector M12 x 1
Cable Prelead 2 m

Max. sensing distance: 500 mm
Min. sensing distance: 60 mm
Switching frequency: 4.7 Hz
Repeatability: 0,2 % or 1 mm

| OUTPUT | TERMINATION | REFERENCE |
|--------------|-------------|---------------------|
| PNP, 2 NO/NC | Connector | 943-F4V-2D-001-330E |
| PNP, 2 NO/NC | Cable | 943-F4V-2D-001-330E |
| NPN, 2 NO/NC | Connector | 943-F4V-2D-002-330E |
| NPN, 2 NO/NC | Cable | 943-F4V-2D-002-330E |

Max. sensing distance: 500 mm
Min. sensing distance: 60 mm
Switching frequency: 100 ms
Repeatability: 0,2 % or ±1 mm

| OUTPUT | TERMINATION | REFERENCE |
|---------|-------------|---------------------|
| 0-10 V | Connector | 943-F4V-2D-1C0-330E |
| 0-10 V | Cable | 943-F4V-2D-1C0-330E |
| 4-10 mA | Connector | 943-F4V-2D-1D0-330E |
| 4-20 mA | Cable | 943-F4V-2D-1D0-330E |

WARNING

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WARNING

PERSONAL INJURY

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INTERNET: www.honeywell.com/sensing

E-mail: info.sc@honeywell.com

ASIA PACIFIC

Control Products

Asia Pacific Headquarters

Phone: +(65) 6355-2828
FAX: +(65) 6445-3033

Australia

Honeywell Limited
Phone: +(61) 2-9370-4500
FAX: +(61) 2-9370-4525
Toll Free 1300-36-39-36
Toll Free Fax: 1300-36-04-70

China – PRC - Beijing

Honeywell China Inc.
Phone: +(86-10) 8458-3280
FAX: +(86-10) 8458-3102

China – PRC - Shanghai

Honeywell China Inc.
Phone: +(86-21) 6237-0237
FAX: +(86-21) 6237-1237

China - Hong Kong S.A.R.

Honeywell Ltd.
Phone: +(852) 2953-6412
FAX: +(852) 2953-6767

Indonesia

TATA Honeywell Indonesia Pte Ltd.
Phone: +(62) 21-535-8833
FAX: +(62) 21-5367 1008

India

TATA Honeywell Ltd.
Phone: +(91) 20 6870 445/446
FAX: +(91) 20 681 2243/ 687 5992

Japan

Honeywell Inc
Phone: +(81) 3 5440 1425
FAX: +(81) 3 5440 1368

South Korea

Honeywell Korea Co Ltd
Phone: +(822) 799-6167
FAX: +(822) 792-9013

Malaysia

Honeywell Engineering Sdn Bhd
Phone: +(60-3) 7958-4988
FAX: +(60-3) 7958-8922

New Zealand

Honeywell Limited
Phone: +(64-9) 623-5050
FAX: +(64-9) 623-5060
Toll Free (0800) 202-088

Philippines

Honeywell Systems
(Philippines) Inc.
Phone: +(63-2) 636-1661/1662
FAX: +(63-2) 638-4013

Singapore

Honeywell South East Asia
Phone: +(65) 6355-2828
FAX: +(65) 6445-3033

Thailand

Honeywell Systems (Thailand)
Ltd.
Phone: +(662) 693-3099
FAX: +(662) 693-3085

Taiwan R.O.C.

Honeywell Taiwan Ltd.
Phone: +(886-2) 2245-1000
FAX: +(886-2) 2245-3241

EUROPE

Austria

Honeywell Austria GmbH
Phone: +(43) 1 727 80 366/246
FAX: +(43) 1 727 80 337

Belgium

Honeywell SA/NV
Phone: +(32) 2 728 2522
FAX: +(32) 2 728 2502

Bulgaria

Honeywell EOOD
Phone: +(359) 2 979 00 23
FAX: +(359) 2 979 00 24

Czech Republic

Honeywell spol. s.r.o.
Phone: +(420) 242 442 111
FAX: +(420) 242 442 182

Denmark

Honeywell A/S
Phone: +(45) 39 55 55 55
FAX: +(45) 39 55 55 58

Finland

Honeywell OY
Phone: +(358) 9 3480101
FAX: +(358) 9 34801375

France

Honeywell SA
Phone: +(33) 1 60 19 80 40
FAX: +(33) 1 60 19 81 73

Germany

Honeywell AG
Phone: +(49) 69 8064 444
FAX: +(49) 69 8064 442

Hungary

Honeywell Kft.
Phone: +(361) 451 43 00
FAX: +(361) 451 43 43

Italy

Honeywell S.p.A.
Phone: +(39) 02 92146 450/456
FAX: +(39) 02 92146 490

The Netherlands

Honeywell B.V.
Phone: +(31) 20 565 69 11
FAX: +(31) 20 565 66 00

Norway

Honeywell A/S
Phone: +(47) 66 76 20 00
FAX: +(47) 66 76 20 90

Poland

Honeywell Sp. zo.o
Phone: +(48) 606 09 64
FAX: +(48) 606 09 01

Portugal

Honeywell Portugal Lda
Phone: +(351 21) 424 50 00
FAX: +(351 21) 424 50 99

Romania

Honeywell Bucharest
Phone: +(40) 21 231 64 37/38
FAX: +(40) 21 231 64 39

Commonwealth of Independent States (CIS)

Z.A.O. Honeywell
Phone: +(7 095) 796 98 36
FAX: +(7 095) 797 99 06

Slovak Republic

Honeywell s.r.o.
Phone: +(421 2) 58 247 403
FAX: +(421 2) 58 247 415

South Africa (Republic of)

Honeywell Southern Africa
Honeywell S.A. Pty. Ltd
Phone: +(27) 11 695 8000
FAX +(27) 11 805 1504

Spain

Honeywell S.A.
Phone: +(34) 91 313 6100
FAX: +(34) 91 313 6129

Sweden

Honeywell AB
Phone: +(46) 8 775 55 00
FAX: +(46) 8 775 56 00

Switzerland

Honeywell AG
Phone: +(41) 1 855 24 40
FAX: +(41) 1 855 24 45

Turkey

Honeywell Turkey A.S.
Phone: +(90) 216 5756620
FAX: +(90) 216 5756637

Ukraine

Honeywell
Phone: +(380) 44 201 44 74
FAX: +(380) 44 201 44 75

United Kingdom

Honeywell Control Systems
Ltd
Phone: +(44) 1698 481481
FAX: +(44) 1698 481676

Mediterranean & African Distributors

Honeywell SpA
Phone: +(39) 2 921 46 232
FAX: +(39) 2 921 46 233

Middle East Headquarters

Honeywell Middle East Ltd.
Phone: +(9712) 443 2119
FAX +(9712) 443 2536

NORTH AMERICA

USA/Canada

Honeywell
Sensing and Control
Phone: 1-800-537-6945
1-815-235-6847
FAX: 1-815-235-6545
E-mail:
info.sc@honeywell.com

LATIN AMERICA

Honeywell Latin America Headquarters

Phone: 1-305-805-8188
FAX: 1-305-883-8257

Argentina

Honeywell S.A.I.C.
Phone: +(54-11) 4383-3627
FAX: +(54-11) 4325-6470

Brazil

Honeywell Do Brasil & Cia
Phone: +(55-11) 4166-1900
FAX: +(55-11) 4166-1901

Chile

Honeywell Chile, S.A.
Phone: +(56-2) 425-8400
FAX: +(56-2) 425-8410

Mexico

Honeywell S.A. de C.V.
Phone: +(52) 55 5081-0200
FAX: +(52) 55 5081-0202

Puerto Rico, Caribbean

Honeywell Inc.
Phone: +(787) 792-7075
FAX: +(787) 792-0053

Venezuela

Honeywell C.A.
Phone: +(58-212) 273-0511
FAX: +(58-212) 273-0599

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Honeywell

Sensing and Control

www.honeywell.com/sensing

Honeywell Control Systems Ltd
Newhouse Industrial Estate
Motherwell, Lanarkshire ML1 5SB
Scotland, UK

100464-EN Issue 1 02/04 UK07 GLO

943 Series (943-F4V/F4Y-2D-001/002/1C0/1D0-360E)

Ultrasonic Distance Sensors



DESCRIPTION

The new 943-F4V (connector) and 943-F4Y (cable) Series industrial sensors are the latest additions to our range of ultrasonic distance sensors. They offer improved scanning ranges and remote Teach-In of the switching or analog outputs, in addition to new, advanced features, such as Window and Hysteresis modes. The devices are Teach-In compatible and have an M18 plastic housing.

FEATURES

- Non contact distance sensing for use in non invasive measurement
- Reduced sensitivity to light intensity/reflectivity/opacity of target for enhanced flexibility and certainty of measurement
- Detects over much longer distance than other detection methods reducing the need for close proximity to the target
- Presence absence, tank fill level and diameter measurement provides an extremely robust and flexible measurement method
- Short distance (in ultrasonic terms) for enhanced accuracy, repeatability (material independent) measurement to 30 mm [1.18 in].
-

POTENTIAL APPLICATIONS

- Reel diameter measurement
- Tank level measurement
- Presence/absence of an object
- Loop control
- Product height measurement
- Tire manufacturing

943 Series (943-F4V/F4Y-2D-001/002/1CO/1DO-360E)

Specifications

| Parameter | 943-F4V-2D-001-360E | 943-F4V-2D-002-360E | 943-F4V-2D-1CO-360E | 943-F4V-2D-1DO-360E | 943-F4Y-2D-001-360E | 943-F4Y-2D-002-360E | 943-F4Y-2D-1CO-360E | 943-F4Y-2D-1DO-360E |
|--|-----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Max. sensing distance | 400 mm [15.75 in] | | | | | | | |
| Min. sensing distance | 30 mm [1.18 in] | | | | | | | |
| Expected response time 90% of final value | - | | 60 ms | | - | | 60 ms | |
| Beam angle | 8° | | | | | | | |
| Switching frequency | 15 Hz | | - | | 15 Hz | | - | |
| Linearity error | - | | <0.5% | | - | | <0.5% | |
| Hysteresis | 1% | | - | | 1% | | - | |
| Repeatability of measured distance | ±1 mm [0.039 in] ±0.2% | | | | | | | |
| Temperature range | -15 °C to 70 °C [-5 °F to 158 °F] | | | | | | | |
| Temperature compensation | yes | | | | | | | |
| Operating voltage | 12 Vdc to 30 Vdc | | 15 Vdc to 30 Vdc | | 12 Vdc to 30 Vdc | | 15 Vdc to 30 Vdc | |
| Possible min. supply | - | | 12 Vdc | | - | | 12 Vdc | |
| Expected current consumption | <80 mA | | <40 mA | | <80 mA | | <40 mA | |
| Output | 2X PNP NO/NC | 2X NPN NO/NC | 0 V to 10 V | 4 mA to 20 mA | 2X PNP NO/NC | 2X NPN NO/NC | 0 V to 10 V | 4 mA to 20 mA |
| Expected output current | 500 mA max. | | - | | 500 mA max. | | - | |
| Adjustment set point | Teach-In | | - | | Teach-In | | - | |
| Teach-In input | pin 5 | | | | pink wire | | | |
| Sensitivity | - | | Teach-In | | - | | Teach-In | |
| Teach-In: P1/P2 determines output position | | | | | | | | |
| Plastic housing | PBPT M18x1 | | | | | | | |
| Sealing* | IP65 | | | | | | | |
| Connector | M12x1 | | | | - | | | |
| Cable connection | - | | | | 2 m [6.56 ft] | | | |

*Attention! Do not expose sensor head to hot water >50 °C or steam vapour.

Accessories: 943-F4V-2D-001/002/1CO/1DO-360E

| Catalog Listing | Description |
|-----------------|---------------------------------|
| 66195044-001 | Mating connector straight |
| 66195045-001 | Mating connector angled |
| 66195214-001 | Straight cable/connector 2 m |
| 66195216-001 | Right-angle cable/connector 2 m |
| 43178389-018 | Mounting clamp |
| 43192871-003 | Beam deflector |
| 43192871-004 | Focusing beam deflector |

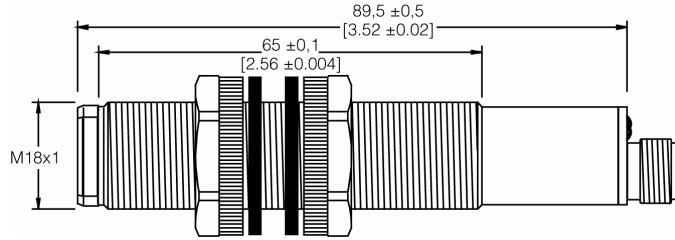
Accessories: 943-F4Y-2D-001/002/1CO/1DO-360E

| Catalog Listing | Description |
|-----------------|-------------------------|
| 43178389-018 | Mounting clamp |
| 43192871-003 | Beam deflector |
| 43192871-004 | Focusing beam deflector |

Ultrasonic Distance Sensors

Mounting Dimensions Continued (For reference only. mm/[in])

943-F4V-2D-001/002/1C0/1D0-360E



943-F4Y-2D-001/002/1C0/1D0-360E



Wiring

943-F4V-2D-001-360E



943-F4V-2D-002-360E



943-F4V-2D-1C0/1D0-360E



943-F4Y-2D-001/002-360E



943-F4Y-2D-1C0/1D0-360E



Detection Range



WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

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WARNING

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Internet: www.honeywell.com/sensing

Phone and Fax:

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| | +65 6445-3033 Fax |
| Europe | +44 (0) 1698 481481 |
| | +44 (0) 1698 481676 Fax |
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| | +1-305-883-8257 Fax |
| USA/Canada | +1-800-537-6945 |
| | +1-815-235-6847 |
| | +1-815-235-6545 Fax |

Automation and Control Solutions

Sensing and Control

Honeywell

1985 Douglas Drive North

Minneapolis, MN 61032

www.honeywell.com/sensing

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Honeywell

943 Series (943-G4V-2G-001/002-400E)

Ultrasonic Distance Sensors



DESCRIPTION

The new 943-G4V series industrial sensors are the latest addition to our range of ultrasonic distance sensors. They offer improved scanning ranges and remote Teach-In of the switching or analogue outputs, in addition to new, advanced features, such as Window and Hysteresis modes. The devices are Teach-In compatible and have an M12 stainless steel housing for the 943 G4V.

FEATURES

- Non contact distance sensing for use in non invasive measurement
- Reduced sensitivity to light intensity/reflectivity/opacity of target for enhanced flexibility and certainty of measurement
- Detects over much longer distance than other detection methods reducing the need for close proximity to the target
- Short distance (in ultrasonic terms) for accuracy, repeatability (material independent) measurement to 25 mm [0.98 in].

POTENTIAL APPLICATIONS

- Reel diameter measurement
- Tank level measurement
- Presence/absence of an object
- Loop control
- Product height measurement
- Tire manufacturing

943 Series (943-G4V-2G-001/002-400E)

Specifications

| Parameter | 943-G4V-2G-001-400E | 943-G4V-2G-002-400E |
|------------------------------|-----------------------------------|---------------------|
| Max. sensing distance | 250 mm [9.84 in] | |
| Min. sensing distance | 25 mm [0.98 in] | |
| Switching frequency | 30 Hz | |
| Hysteresis | 1% | |
| Beam angle | 8° | |
| Repeatability | 0,3 mm [0.012 in] | |
| Temperature range | -20 °C to 70 °C [-4 °F to 158 °F] | |
| Operating voltage | 10 Vdc to 30 Vdc | |
| Expected current consumption | <100 mA | |
| Output | PNP NO/NC | NPN NO/NC |
| Expected output current | 100 mA max. | |
| Adjustment set point | Teach-In | |
| Stainless steel housing | M12x1 | |
| Sealing* | IP65 | |
| Connector | M12x1 | |

*Attention! Do not expose sensor head to hot water >50 °C or water vapour.

Accessories

| Catalog Listing | Description |
|-----------------|---------------------------|
| 66195044-001 | Mating connector straight |
| 66195045-001 | Mating connector angled |

Mounting Dimensions (For reference only. mm/[in])



Ultrasonic Distance Sensors

Wiring



Detection Range



WARNING

PERSONAL INJURY

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Internet: www.honeywell.com/sensing

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| | +1-815-235-6545 Fax |

Automation and Control Solutions

Sensing and Control

Honeywell

1985 Douglas Drive North

Minneapolis, MN 55422

www.honeywell.com/sensing

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Honeywell

943 Series (943-K4U-2G-001/002/1CO-400E) Ultrasonic Distance Sensors



DESCRIPTION

The new 943-K4U series industrial sensors are the latest addition to our range of ultrasonic distance sensors. They offer improved scanning ranges and remote Teach-In of the switching or analogue outputs, in addition to new, advanced features, such as Window and Hysteresis modes. The devices are Teach-In compatible and have a plastic housing.

FEATURES

- Non contact distance sensing for use in non invasive measurement
- Reduced sensitivity to light intensity/reflectivity/opacity of target for enhanced flexibility and certainty of measurement
- Detects over much longer distance than other detection methods reducing the need for close proximity to the target
- Presence absence, tank fill level and diameter measurement provide an extremely robust and flexible measurement method
- Miniature form factor device fits into the smallest mounting positions
- Two mounting methods provide flexibility of mounting options to suit the application

POTENTIAL APPLICATIONS

- Level measurement in small containers/test tubes
- Small object detection in narrow environments
- Presence detection
- Winding/unwinding control
- Height/thickness measurement
- Parts counting

943 Series (943-K4U-2G-001/002/1C0-400E)

Specifications

| Parameter | 943-K4U-2G-001-400E | 943-K4U-2G-002-400E | 943-K4U-2G-1C0-400E |
|------------------------------------|------------------------------------|---------------------|-----------------------------|
| Max. sensing distance | 250 mm [9.84 in] | | |
| Min. sensing distance | 25 mm [0.98 in] | | |
| Switching frequency | 25 Hz | | - |
| Linearity error | - | | <0.3% |
| Hysteresis | 2% | | - |
| Repeatability of measured distance | - | | ±0.2 mm [0.008 in] ±0.2% |
| Beam angle | 8° | | |
| Temperature range | -25 °C to 70 °C [-13 °F to 158 °F] | | |
| Temperature compensation | yes | | |
| Operating voltage | 10 Vdc to 30 Vdc | | 12 Vdc to 30 Vdc |
| Expected current consumption | <100 mA | | |
| Output | PNP NO/NC | NPN NO/NC | 0 V to 10 V |
| Expected output current | 100 mA max. | | - |
| Adjustment set point | Teach-In | | - |
| Adjustment | - | | Teach-In |
| Housing material | plastic | | |
| Sealing* | IP67 | | |
| Connector | M8 | | |

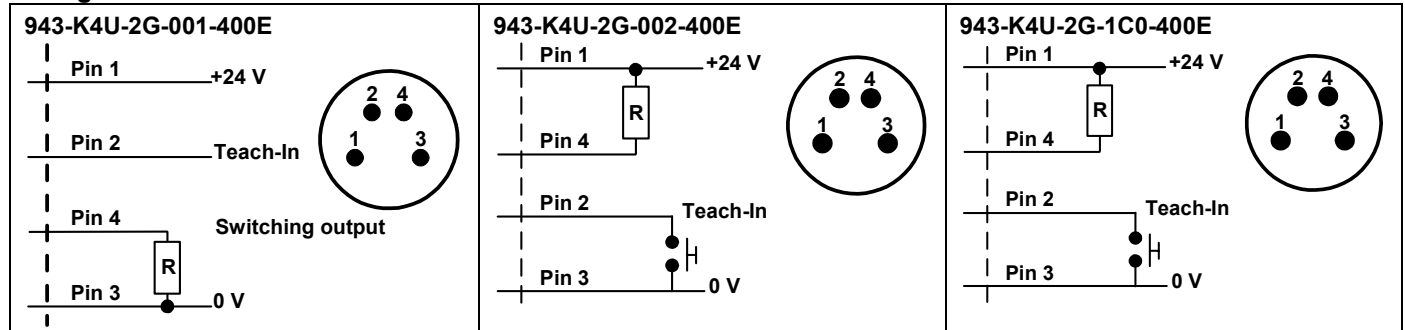
*Attention! Do not expose sensor head to hot water >50 °C or steam vapour.

Mounting Dimensions (For reference only. mm/[in])

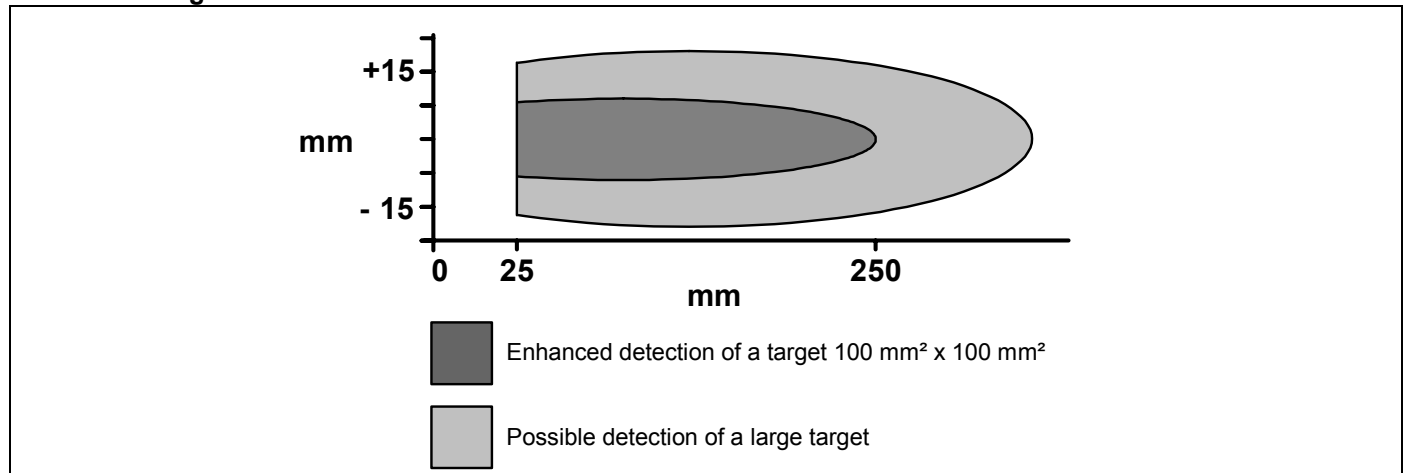


Ultrasonic Distance Sensors

Wiring



Detection Range



WARNING

PERSONAL INJURY

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Honeywell

1985 Douglas Drive North

Minneapolis, MN 55422

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Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific +65 6355-2828

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Europe +44 (0) 1698 481481

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+1-305-883-8257 Fax

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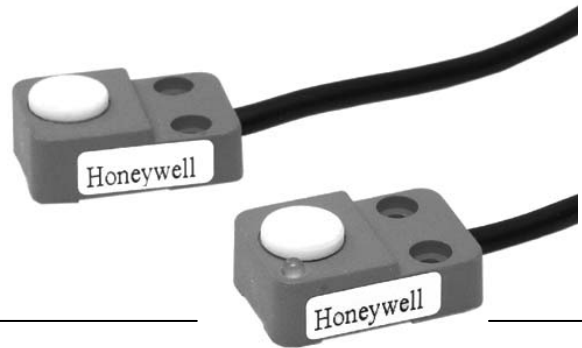
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+1-815-235-6545 Fax

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948 Series (948-ISY-2D-001/002/003/004-180E)

Ultrasonic Distance Sensors



DESCRIPTION

The 948 Series is one of the smallest ultrasonic scan through devices in the world. Its small, rectangular, IP67-rated plastic housing makes it easy to install in limited space applications. The sensor consists of two parts, a transmitter and a receiver. It is especially suited for food and beverage applications, in particular bottle counting.

FEATURES

- Thru-scan detection regardless of the object material for enhanced detection
- Non contact distance sensing for use in non invasive measurement
- Reduced sensitivity to light intensity/reflectivity/opacity of target for enhanced flexibility and certainty of measurement
- Detects over much longer distance than other detection methods reducing the need for close proximity to the target
- Presence absence, tank fill level and diameter measurement provides an extremely robust and flexible measurement method

POTENTIAL APPLICATIONS

- Food and beverage machinery and equipment
- Rapid presence/absence detection: bottle counting
- Loop control

948 Series (948-ISY-2D-001/002/003/004-180E)

Specifications

| Parameter | 948-ISY-2D-001-180E | 948-ISY-2D-002-180E | 948-ISY-2D-003-180E | 948-ISY-2D-004-180E |
|------------------------------|-----------------------------------|---------------------|---------------------|---------------------|
| Sensing distance | 1100 mm [3.61 ft] | | | |
| Response time on/off | 3 ms | | | |
| Beam angle | 15° | | | |
| Output | NO PNP | NO NPN | NC PNP | NC NPN |
| Expected output current | 500 mA | | | |
| Switching frequency | 150 Hz | | | |
| Temperature range | -15 °C to 60 °C [-5 °F to 140 °F] | | | |
| Operating voltage | 18 Vdc to 30 Vdc | | | |
| Expected current consumption | <40 mA | | | |
| Housing | plastic | | | |
| Sealing | IP67 | | | |
| Cable connection | 2 m [6.56 ft] | | | |

Sensor consists of 2 parts: 1 transmitter and 1 receiver.

With flat targets best results may be achieved with an angle 30° object-ultrasonic beam.

Ultrasonic Distance Sensors

Mounting Dimensions (For reference only. mm/[in])

| | |
|---------------------------|--|
| <p>Transmitter</p> | <p>Brown: Vdc Blue: 0 V</p> |
| <p>Receiver</p> | <p>Brown: Vdc Blue: 0 V Black: O/P</p> |

WARNING

PERSONAL INJURY

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WARRANTY/REMEDY

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+65 6445-3033 Fax

Europe +44 (0) 1698 481481

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Latin America +1-305-805-8188

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