



**THE DATASHEET OF
SCN-1314SC**



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



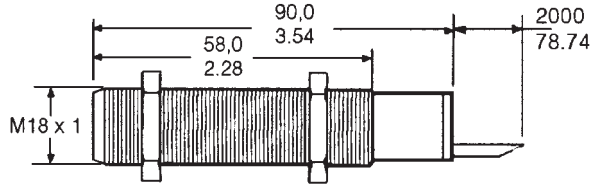
4-pin DC Micro (M12 x 1)

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

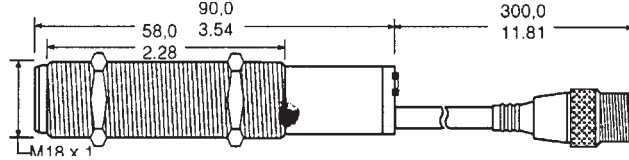
*Normal operation with no connection

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 |

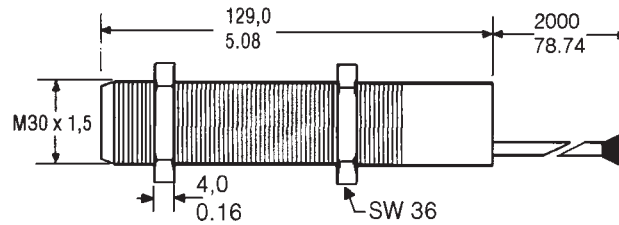
MOUNTING DIMENSIONS (For reference only)

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 | | | |

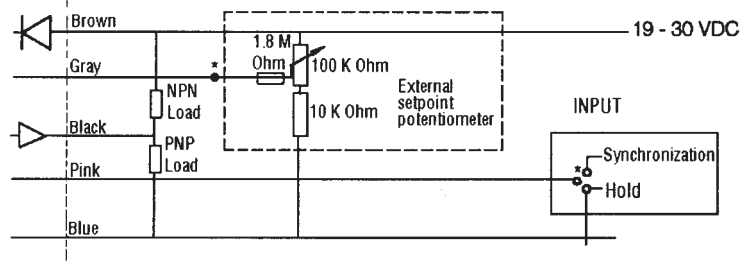
Ultrasonic Sensors

Precision Digital 18 mm Diameter

945 Series

WIRING DIAGRAMS

945-F/N Series



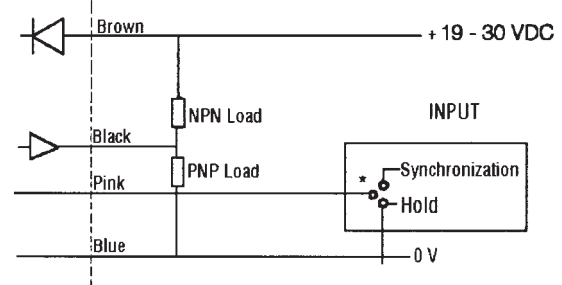
*Normal operation with no connection

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



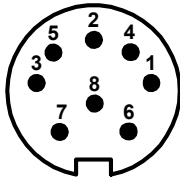
943-O4V-2D-001/002/1C0/1D0-80E,
947-O4V-2D-1C0/1D0-80E



Wiring

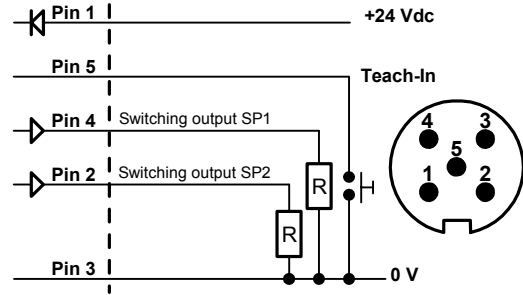
P42-O4N-2D-1A1/1A2-80E

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

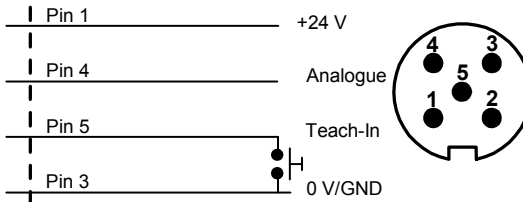
943-O4V-2D-001-80E



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.

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

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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Sensing and Control

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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 |

M18/M30

Termination: Connector M12 x 1
Cable Prelead 2 m

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 |

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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Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

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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 | - | | Teach-In | | - | | Teach-In | |
| 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



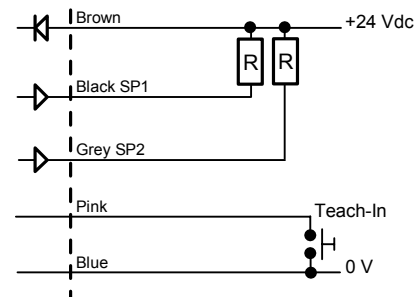
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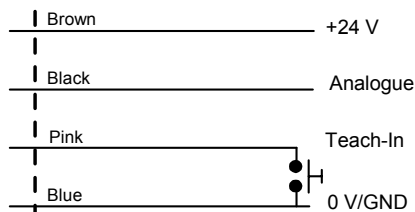
943-F4V-2D-1C0/1D0-360E



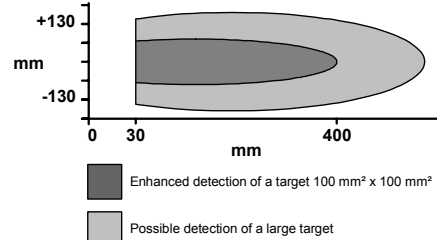
943-F4Y-2D-001/002-360E



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



Detection Range



WARNING

PERSONAL INJURY

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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

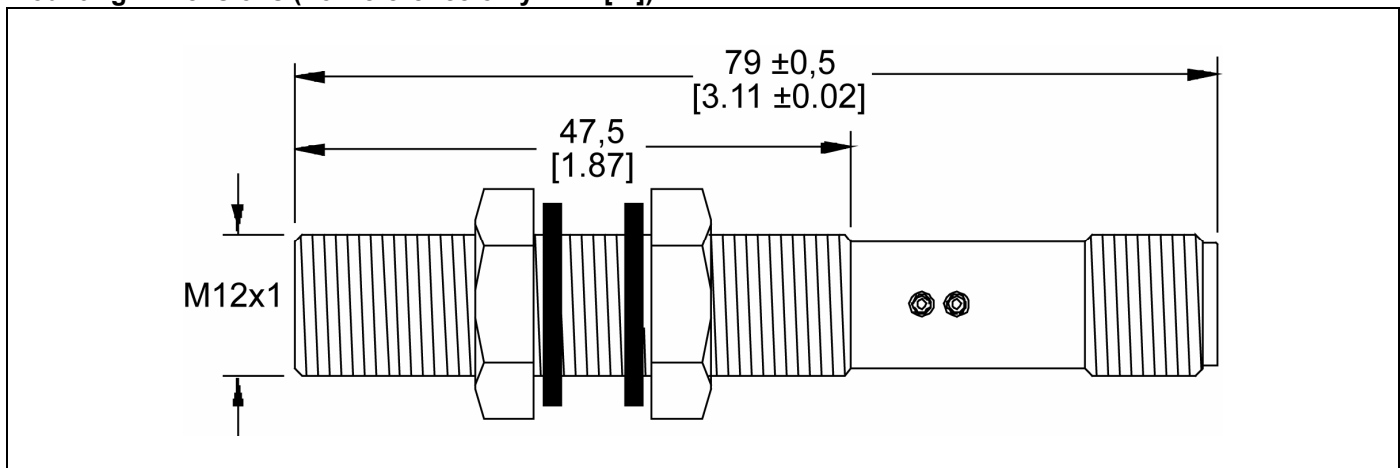
| Parameter | 943-G4V-2G-001-400E | 943-G4V-2G-002-400E |
|------------------------------|-----------------------------------|---------------------|
| Max. sensing distance | 250 mm [9.84 in] | |
| Min. sensing distance | 25 mm [0.98 in] | |
| Switching frequency | 30 Hz | |
| Hysteresis | 1% | |
| Beam 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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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 | | |

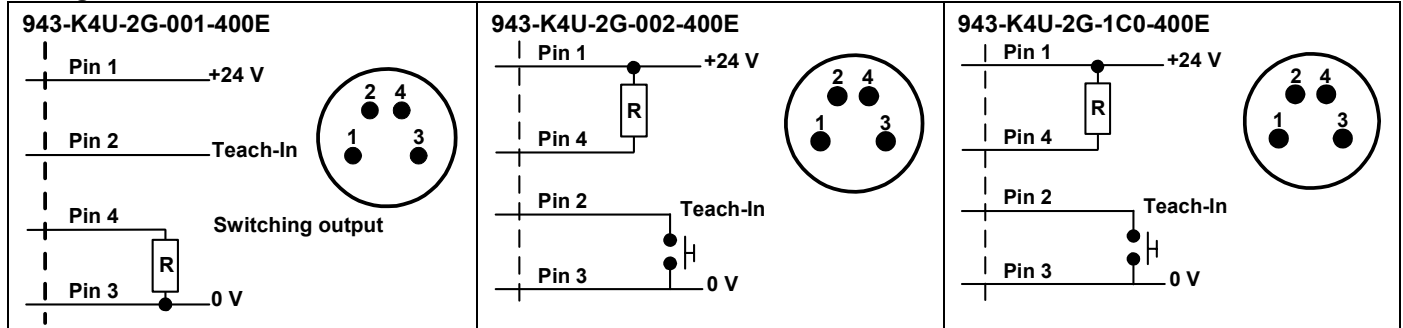
*Attention! Do not expose sensor head to hot water >50 °C or steam vapour.

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

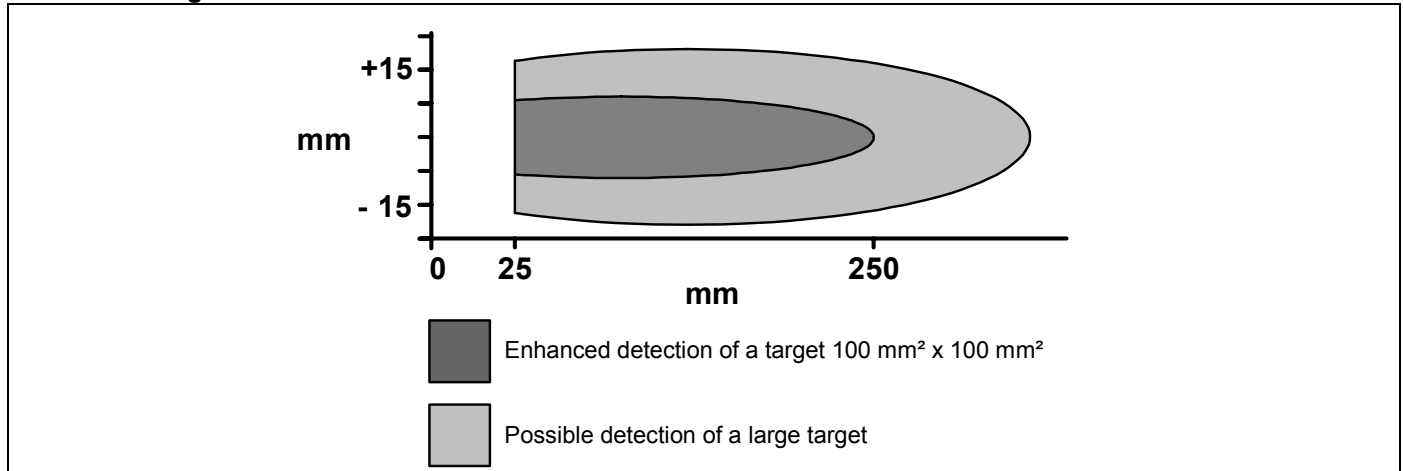


Ultrasonic Distance Sensors

Wiring



Detection Range



WARNING

PERSONAL INJURY

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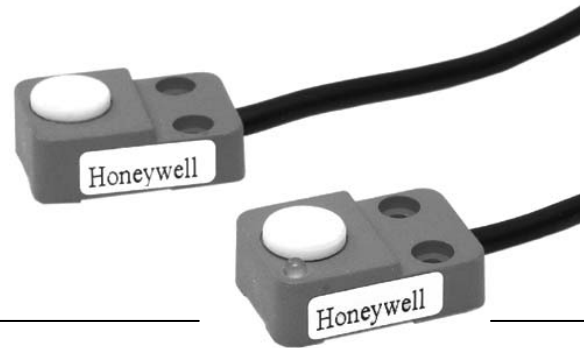
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Honeywell

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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