

Interactive Catalog Replaces Catalog Pages

Honeywell Sensing and Control has replaced the PDF product catalog with the new **Interactive Catalog**. The **Interactive Catalog** is a power search tool that makes it easier to find product information. It includes more installation, application, and technical information than ever before.



**Click this icon to try the new
Interactive Catalog.**

Sensing and Control
Honeywell Inc.
11 West Spring Street
Freeport, Illinois 61032



Temperature Sensors

Platinum RTDs

HRTS Series



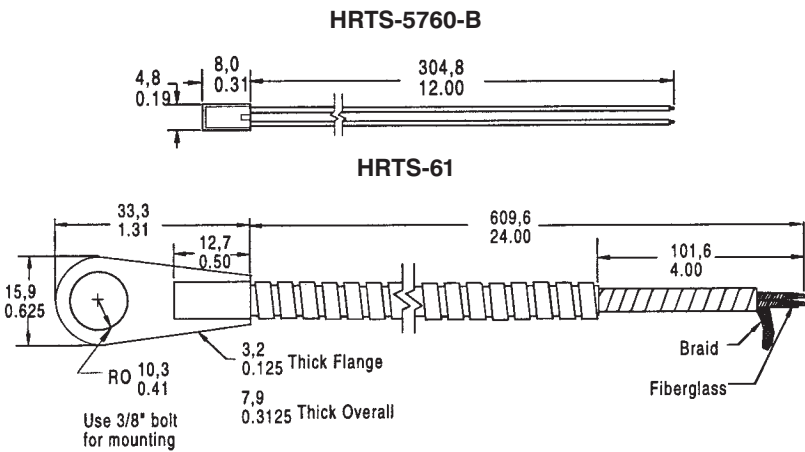
- FEATURES**
- Resistance interchangeable
 - Accurate
 - Linear
 - Fast
 - Laser trimmed
 - Bolt, cement-on or strap-on models

- 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 $+480^{\circ}\text{C}$ (-320° to $+900^{\circ}\text{F}$) 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 $\pm 0.5^{\circ}\text{C}$ accuracy or $\pm 0.1\%$ with $\pm 0.3^{\circ}\text{C}$ 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

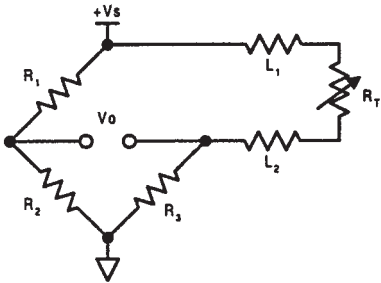


Fig. 2: Linear Output Voltage

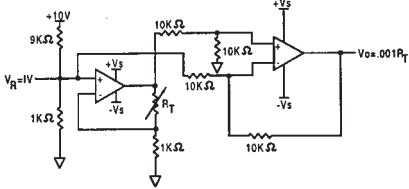
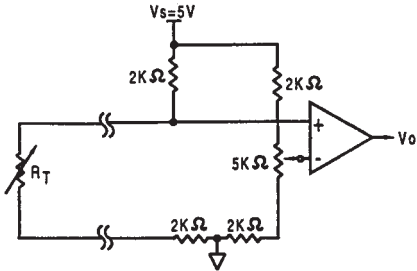


Fig. 3: Adjustable Point (Comparator) Interface



Temperature

Temperature Sensors

HRTS Series

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 $T > 0^{\circ}\text{C}$

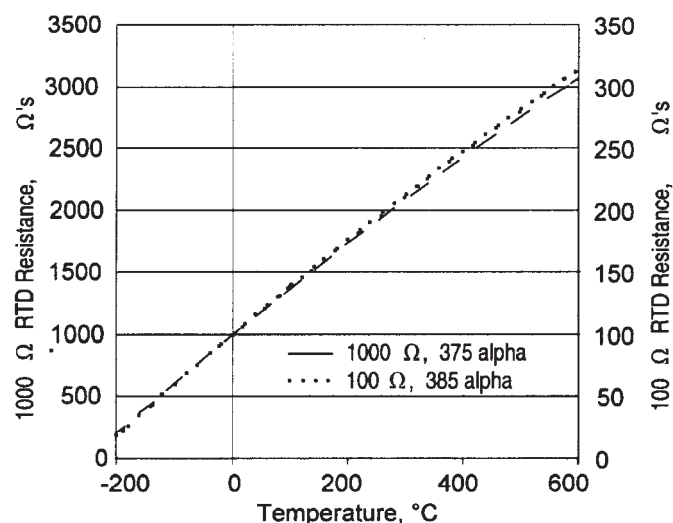
ACCURACY VS TEMPERATURE

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°C ; $\alpha = 0.00375 \Omega/\Omega/^{\circ}\text{C}$ $R_0 = 100 \Omega$ @ 0°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
18 mm dia. Stainless Steel  136 g (4.8 oz.)	70 - 180 (2.76 - 7.09)	Setpoint adjustment within sensing range	PNP, N.O.	945-F4Y-AD-001-300E
	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

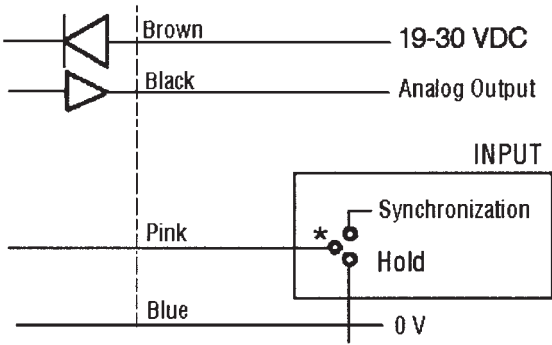
Catalog Listings	945-F4Y-AD-1C0-180E	945-F4Y-AD-1C0-300E	945-L4Y-AD-1C0	945-E3Y-AD-1C0-180E	945-G3Y-AD-1C0-300E
Max. Sensing Distance	600 mm (23.6 in.)	200 mm (7.87 in.)	600 mm (23.6 in.)	600 mm (23.6 in.)	150 mm (5.9 in.)
Min. Sensing Distance	150 mm (5.9 in.)	60 mm (2.36 in.)	100 mm (3.9 in.)	150 mm (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	20Hz
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

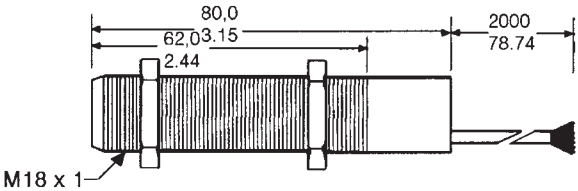
945 Series

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

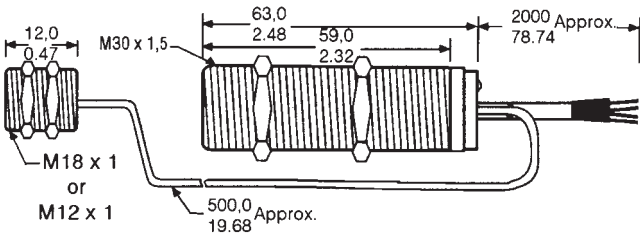


*Normal operation with connection to 19-30 VDC

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%