# Thermal Sensors

Honeywell

SENSING AND CONTROL

# Product Range Guide

# For innovation that's well apart, there's only Honeywell Sensing and Control.

With more than 50,000 products ranging from snap-action, limit, toggle, and pressure switches to position, speed, pressure, and airflow sensors, Honeywell Sensing and Control (S&C) has one of the broadest sensing and switching portfolios available.

Honeywell sensor, switch, and control components are tailored to exact specifications for stronger performance, longer productivity, and increased safety. Enhanced accuracy and durability are built into every part, improving output and endurance. For our customers, this can reduce expenditures and operational costs. Our global footprint and channels help to competitively price such components for your chosen application and provide immediate technical support.

Our expertise in aerospace and defense, transportation, medical, and industrial industries means we offer products and solutions for a wide range of applications. But, an impressive product line is only one part. We possess unique engineering expertise and value-added capabilities.

While Honeywell's switch and sensor solutions are suitable for a wide array of basic and complex applications, our custom-

engineered solutions offer enhanced precision, repeatability, and ruggedness. We offer domain knowledge and technology resources, along with a close working relationship, to develop and deliver cost-effective, individually tailored solutions. Whether clean-slate development or simple modifications to an existing design are needed, our expertly engineered solutions help to meet the most stringent requirements with worldclass product designs, technology integration, and customer-specific manufacturing.

With a 75-year legacy in the switch and sensor business, Honeywell S&C has earned a reputation for reliability and excellence. Our strong product designs, Six Sigma Plus manufacturing environment, and robust testing facilities help provide quality out of the box, as well as enhanced, sustainable performance down the line.

Global service, sourcing, and manufacturing. Industry-leading engineers. Value-added assemblies and solutions. Construction to required specifications. A one-stop, full-service, globally competitive supplier... Honeywell Sensing and Control.

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# Temperature Sensors
## Packaged Temperature Probes

*Compact, lightweight, with easy installation. Operate with enhanced sensitivity, reliability, and stability under diverse conditions of shock, vibration, humidity, and corrosion. Wide variety of custom packages available for air, liquid, and solid temperature sensing applications. Potential applications include transportation, compressors, HVAC/R, automation control, and aviation.*

| Series | R300 | 500 |
|---|---|---|
| **Temp. sensing type** | immersion | air/gas, immersion, surface, and liquid level |
| **Thermistor type** | RTD | NTC |
| **Nominal resistance at 25 °C [77 °F]** | 100 Ohm | 200 Ohm to 1,000,000 Ohm (inclusive) |
| **Operating temperature range** | -40 °C to 275 °C [-40 °F to 572 °F] continuous, excursion to 300 °C [572 °F] for 10 minutes max. | -40 °C to 300 °C [-40 °F to 572 °F] (inclusive) |
| **Housing material** | stainless steel | plastic, aluminum, stainless steel, epoxy filled, tin- or nickel-plated copper, ceramic or kynar-filled tubing |
| **Electrical and mechanical interface** | overmolded connector with M14 x 1.50 thread | wide variety of connectors, lead types, materials, and insulation |
| **Features** | enhanced response, reliability, and accuracy; stainless steel construction | wide selection of housing, resistance, and termination options |

| Series | ES110 | ES120 | 6655 |
|---|---|---|---|
| **Temp. sensing type** | air/gas | immersion | air/surface |
| **Thermistor type** | NTC | NTC or KTY | NTC |
| **Nominal resistance at 25 °C [77 °F]** | 2000 Ohm | 2000 Ohm | 10,000 Ohm, 12,000 Ohm |
| **Operating temperature range** | -40 °C to 150 °C [-40 °F to 302 °F] | -40 °C to 150 °C [-40 °F to 302 °F] | -20 °C to 110 °C [-4 °F to 230 °F] |
| **Housing material** | brass | brass | phenolic |
| **Electrical and mechanical interface** | overmolded connector with M10 x 1.25 or M12 x 1.50 thread | overmolded connector with M10 x 1.25, M10 x 1.0, M12 x 1.5, M14 x 1.50 thread, or 1/8 PTF | quick connect terminal: (90°, 0.25 in), (0°, 0.25 in), (45°, 0.25 in), (90°, 0.1875 in) |
| **Features** | exposed thermistor; rugged design; brass encapsulation | enclosed thermistor; rugged design; brass encapsulation | low, compact profile; tight interchangeability; enhanced accuracy and response time |

# Temperature Sensors
## Discrete RTD Sensors

*Silicon-based thin film RTDs laser trimmed for accuracy and interchangeability. Offer stable, fast linear outputs with a wide temperature range. Accurate and interchangeable without recalibration. Potential applications include HVAC, electronic assemblies, and process control.*

| Series | HEL-705/707/711/712/716/717 | HEL-775 |
|---|---|---|
| **Sensor type** | 100 Ohm, 1000 Ohm platinum RTD | 100 Ohm, 1000 Ohm platinum RTD |
| **Temperature coefficient** | 0.00385 Ohm/Ohm/°C;<br>0.00375 Ohm/Ohm/°C | 0.00385 Ohm/Ohm/°C;<br>0.00375 Ohm/Ohm/°C |
| **Temperature sensing range** | TFE teflon: -70 °C to 260 °C [-94 °F to 500 °F]<br>fiberglass: -75 °C to 500 °C [-100 °F to 932 °F] | -55 °C to 150 °C [-67 °F to 302 °F] |
| **Packaging type** | alumina tube | ceramic case |
| **Termination** | 28 ga. or 24 ga. lead wire | SIP |
| **Base resistance & interchangeability** | 100 Ohm: ±0.1 % @ 0 °C;<br>100 Ohm: ±0.2 % @ 0 °C;<br>1000 Ohm: ±0.1 % @ 0 °C;<br>1000 Ohm: ±0.2 % @ 0 °C | 100 Ohm: ±0.1 % @ 0 °C;<br>100 Ohm: ±0.2 % @ 0 °C;<br>1000 Ohm: ±0.1 % @ 0 °C;<br>1000 Ohm: ±0.2 % @ 0 °C |
| **Self-heating** | < 15 mW/°C for 0.85 O.D. typ. | < 6.8 mW/°C typ.; 9.7 mW/°C typ. |
| **Termination material** | 24 ga. nickel-coated, stranded copper;<br>28 ga. nickel-coated, stranded copper | phosphor bronze with tin silver plating |
| **Features** | teflon or fiberglass lead wires; wide temperature range; ceramic case material; multiple sizes | enhanced stability; thin film platinum; ceramic SIP; solderable leads |

| Series | HEL-777/776 | 700 |
|---|---|---|
| **Sensor type** | 100 Ohm, 1000 Ohm platinum RTD | 100 Ohm, 1000 Ohm platinum RTD |
| **Temperature coefficient** | 0.00385 Ohm/Ohm/°C;<br>0.00375 Ohm/Ohm/°C | 0.00385 Ohm/Ohm/°C;<br>0.00375 Ohm/Ohm/°C |
| **Temperature sensing range** | -55 °C to 150 °C [-67 °F to 302 °F] | -70 °C to 500 °C [-94 °F to 932 °F]<br>leaded: -50 °C to 130 °C [-58 °F to 266 °F] |
| **Packaging type** | molded plastic | radial chip or surface mount axial flip chip |
| **Termination** | SIP | lead wires or solderpads |
| **Base resistance & interchangeability** | 100 Ohm: ±0.1 % @ 0 °C;<br>100 Ohm: ±0.2 % @ 0 °C;<br>1000 Ohm: ±0.1 % @ 0 °C;<br>1000 Ohm: ±0.2 % @ 0 °C | 100 Ohm: Class A; 100 Ohm: Class B<br>1000 Ohm: Class A; 1000 Ohm: Class B<br>1000 Ohm: Class 2B |
| **Self-heating** | < 15 mW/°C typ. | 0,4 K/mW, 0,6 K/mW, or 0,8 K/mW at 0 °C [32 °F] |
| **Termination material** | copper alloy 194 solder dipped with Sn/Ag | Pt-Clad Ni wire and end termination galvanic tin-plated with Ni barrier layer |
| **Features** | enhanced stability; thin film platinum; molded plastic SIP package; solderable leads | interchangeability; SMD and chip package versions; enhanced stability and time response |

# Temperature Sensors
## Discrete and Packaged RTD Sensors

*Silicon-based thin film RTDs laser trimmed for accuracy and interchangeability. Offer stable, fast linear outputs with a wide temperature range. Accurate and interchangeable. Potential applications include HVAC, electronics assemblies, semiconductors, and process control.*

| Series | HRTS | TD |
|---|---|---|
| **Sensor type** | 100 Ohm, 1000 Ohm platinum RTD | 2000 Ohm silicon resistive element |
| **Temperature coefficient** | 0.00385 Ohm/Ohm/°C;<br>0.00375 Ohm/Ohm/°C | – |
| **Temperature sensing range** | -70 °C to 260 °C [-94 °F to 500 °F] | -40 °C to 150 °C [-40 °F to 302 °F] |
| **Packaging type** | ceramic case | plastic or threaded aluminum case |
| **Termination** | lead wires | SIP or lead wires |
| **Base resistance & interchangeability** | 100 Ohm: ±0.1 % @ 0 °C;<br>100 Ohm: ±0.2 % @ 0 °C;<br>1000 Ohm: ±0.1 % @ 0 °C;<br>1000 Ohm: ±0.2 % @ 0 °C | R2000 Ohm ±5 Ohm at 20 °C |
| **Self-heating** | < 0.3 mW/°C typ. | – |
| **Termination material** | 28 ga. nickel-coated, stranded copper, teflon insulated | TD4A: solderable leads available<br>TD5A: insulated |
| **Features** | resistance interchangeable; accurate; fast; laser-trimmed; wide temperature range | interchangeable without recalibration; thin film; laser trimmed; air or liquid temperature sensing |

# Temperature Sensors
## Discrete Thermistors

*Change resistance with change in temperature. Available in wide range of resistance values and temperature ranges. Variety of packages and sizes from leaded devices to surface mount versions. Potential applications include military, aerospace, appliances, medical, and instrumentation.*

| Series | 111 | 112 | 115 |
|---|---|---|---|
| **Description** | small, hermetically sealed glass bead | large, hermetically sealed glass bead | E-I tested and matched beads on header assembly |
| **Operating temperature range** | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] |
| **Dissipation constant in still air** | 0.1 mW/°C | 0.4 mW/°C | varies with assembly type |
| **Time constant in air** | 0.5 s | 4.0 s | 0.5 s |
| **Nominal resistance at 25 °C [77 °F]** | 1,000 Ohm, 2,000 Ohm, 8,000 Ohm, 10,000 Ohm, 100,000 Ohm | 200 Ohm, 500 Ohm, 1,000 Ohm, 2,000 Ohm, 5,000 Ohm, 10,000 Ohm, 50,000 Ohm, 100,000 Ohm, 500,000 Ohm, 2,000,000 Ohm | 2,000 Ohm, 8,000 Ohm |
| **Maximum diameter** | 0,36 mm [0.014 in] | 1,14 mm [0.045 in] | 0,36 mm [0.014 in] |
| **Termination material** | platinum iridium | platinum iridium | glass to metal header |
| **Lead length** | 9,6 mm [0.375 in] | 9,6 mm [0.375 in] | 31,75 mm [1.25 in] |
| **Features** | enhanced response time and long-term stability; hermetically sealed in glass; micro size; welded platinum iridium leads | enhanced response time; hermetically sealed in glass; small size; enhanced long-term stability | E-I matched in air or helium; interchangeable pairs; extended life; compression-type glass hermetic seal; high pressure solder seal |

| Series | 140/142 | 143 | 173 |
|---|---|---|---|
| **Description** | disc | disc | EIA 0805 surface mount, end-banded |
| **Operating temperature range** | -60 °C to 150 °C [-76 °F to 302 °F] | -60 °C to 150 °C [-76 °F to 302 °F] | -60 °C to 125 °C [-76 °F to 257 °F] |
| **Dissipation constant in still air** | 3.0 mW/°C, 4.0 mW/°C | 5 mW/°C to 7 mW/°C | 3.5 mW/°C |
| **Time constant in air** | 10.0 s | 16.0 s to 20.0 s | 10.0 s |
| **Nominal resistance at 25 °C [77 °F]** | 500 Ohm, 1,000 Ohm, 3,000 Ohm, 5,000 Ohm, 8,000 Ohm, 10,000 Ohm, 25,000 Ohm, 100,000 Ohm | 100 Ohm, 200 Ohm, 1,000 Ohm, 3,000 Ohm, 5,000 Ohm, 30,000 Ohm | 500 Ohm, 5,000 Ohm, 10,000 Ohm, 22,000 Ohm, 33,000 Ohm, 47,000 Ohm, 50,000 Ohm, 100,000 Ohm |
| **Maximum diameter** | 3,81 mm [0.15 in] | 6,35 mm [0.25 in] | EIA 0805 SMD |
| **Termination material** | tinned copper | tinned copper | solder plated NI barrier |
| **Lead length** | 38,1 mm [1.50 in] | 38,1 mm [1.50 in] | – |
| **Features** | pc-board mountable; rugged design; versatile; solderable leads | rugged design; pc-board mountable; solderable leads | surface mount; tape and reel; glass-coated ceramic; 0805 EIA package |

| 120 | 121 | 126 | 128 | 129 | 135 |
|---|---|---|---|---|---|
| mini glass probe | standard glass probe | matched large glass bead | matched mini glass probe | matched large glass probe | glass encapsulated chip, DO-35 type |
| -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] | -60 °C to 300 °C [-76 °F to 572 °F] |
| 0.7 mW/°C, 1.0 mW/°C | 1.0 mW/°C | 0.8 mW/°C | 2.1 mW/°C | 3.0 mW/°C | 2.5 mW/°C |
| 10.0 s | 22.0 s | 4.0 s | 10.0 s | 22.0 s | 4.0 s |
| 1,000 Ohm, 2,000 Ohm, 10,000 Ohm | 2,000 Ohm, 5,000 Ohm, 10,000 Ohm, 50,000 Ohm, 100,000 Ohm, 1,000,000 Ohm | 2,000 Ohm, 100,000 Ohm | 2,000 Ohm, 15,000 Ohm | 2,000 Ohm, 4,000 Ohm | 1,000 Ohm, 2,000 Ohm, 5,000 Ohm, 10,000 Ohm, 20,000 Ohm, 25,000 Ohm, 30,000 Ohm, 47,000 Ohm, 50,000 Ohm, 100,000 Ohm, 200,000 Ohm, 230,000 Ohm, 500,000 Ohm, 1,000,000 Ohm, 5,000,000 Ohm |
| 1,5 mm [0.060 in] | 2,54 mm [0.10 in] | 2,54 mm [0.10 in] | 3,05 mm [0.120 in] | 5,08 mm [0.20 in] | 2,0 mm [0.080 in] |
| dumet | dumet | platinum iridium | dumet | dumet | tinned copper-clad steel |
| 31,8 mm [1.25 in] | 50,8 mm [2.00 in] | 9,6 mm [0.375 in] | 31,8 mm [1.25 in] | 50,8 mm [2.00 in] | 28,6 mm [1.125 in] |
| hermetically sealed in glass; enhanced reliability and stability; weldable/solderable dumet leads | hermetically sealed in glass; enhanced reliability and stability; weldable/solderable dumet leads | hermetically sealed in glass; interchangeability; enhanced sensitivity and reliability; small size | hermetically sealed in glass; interchangeability; enhanced sensitivity and reliability; miniature size | interchangeability; enhanced sensitivity, reliability, and stability; miniature size | enhanced temperature capability; uniform dimensions; tape and reel |

| 175 | 192 | 194 | 197 | ICL |
|---|---|---|---|---|
| EIA 1206 surface mount, end-banded | uni-curve with bare leads and epoxy | uni-curve with insulated leads and epoxy | chip with bare leads and epoxy | in-rush current limiter |
| -60 °C to 125 °C [-76 °F to 257 °F] | -60 °C to 150 °C [-76 °F to 302 °F] | -60 °C to 150 °C [-76 °F to 302 °F] | -60 °C to 125 °C [-76 °F to 257 °F] | -40 °C to 185 °C [-40 °F to 365 °F] |
| 3.5 mW/°C | 0.75 mW/°C | 0.75 mW/°C | 0.75 mW/°C | 12.7 mW/°C to 23 mW/°C |
| 10.0 s | 15.0 s | 15.0 s | 15.0 s | 32 s to 93 s |
| 5,000 Ohm, 10,000 Ohm, 50,000 Ohm, 100,000 Ohm, 440,000 Ohm | 500 Ohm, 1,000 Ohm, 2,252 Ohm, 3,000 Ohm, 5,000 Ohm, 10,000 Ohm, 30,000 Ohm, 50,000 Ohm, 100,000 Ohm | 2,252 Ohm, 3,000 Ohm, 5,000 Ohm, 10,000 Ohm, 30,000 Ohm, 100,000 Ohm, 50,000 Ohm | 300 Ohm, 1,000 Ohm, 3,000 Ohm, 5,000 Ohm, 10,000 Ohm, 50,000 Ohm, 100,000 Ohm | 0.5 Ohm to 220 Ohm ±20 % |
| EIA 1206 SMD | 2,413 mm [0.095 in]* | 2,413 mm [0.095 in]* | 2,413 mm [0.095 in]* | 9.5 mm [0.374 in] to 32 mm [1.26 in] |
| solder plated NI barrier | tinned copper, alloy 180 | solid nickel, Teflon® insulated | tinned copper, alloy 180 | tinned copper |
| – | 38,1 mm [1.50 in] | 38,1 mm [1.50 in] | 38,1 mm [1.50 in] | [25,4 mm] 1 in min. |
| surface mount; tape and reel; glass-coated ceramic; 1206 EIA package | resistance temperature curve interchangeability; enhanced stability and life; epoxy coated | resistance temperature curve interchangeability; enhanced stability and life; epoxy coated; teflon-coated leads | rapid response times; epoxy coated | enhanced reliability; special high-temp protective coating; rugged design; pc-board mountable |

* On a 2252 and 3000 Ohm part, diameter can be up to 3,05 mm [0.120 in] max.

# Thermostats
## Precision Thermostats

*Provides either temperature control or over-temperature protection. Hermetic/non-hermetic devices available. Custom packaged for application flexibility and designed to operate in extreme environmental conditions. Potential applications include computers, medical electronics, power supplies, industrial controls, test equipment, and aerospace.*

| Series | 3000 Custom Packaged | 3100 Hermetic | 3100U REDI TEMP |
|---|---|---|---|
| **Description** | custom packaged | hermetic | UL-approved hermetic |
| **Amperage** | dependent on the internal device | 2.0 A/1.0 A/5.0 A | 3.0 A resistive max. |
| **Housing material** | stainless steel or brass | steel housing hermetically sealed with glass-to-metal seal at terminal junction | steel housing hermetically sealed with glass-to-metal seal at terminal junction |
| **Operating temperature range** | -29 °C to 260 °C [-20 °F to 500 °F] | -29 °C to 260 °C [-20 °F to 500 °F] | -29 °C to 260 °C [-20 °F to 500 °F] |
| **Environmental exposure range** | -62 °C to 288 °C [-80 °F to 550 °F] | -62 °C to 288 °C [-80 °F to 550 °F] | -62 °C to 288 °C [-80 °F to 550 °F] |
| **Dielectric strength** | MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case | MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case | MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case |
| **Insulation resistance** | MIL-STD-202, Method 302; 50 MOhm min. terminal to case | MIL-STD-202, Method 302; Cond. B - 50 MOhm - 500 Vdc applied | MIL-STD-202, Method 302; Cond. B - 50 MOhm - 500 Vdc applied |
| **Contact resistance** | MIL-STD-202, Method 307; 0.050 Ohm | MIL-STD-202, Method 307; 0.050 Ohm | MIL-STD-202, Method 307; 0.050 Ohm max. |
| **Hermetic seal** | MIL-STD-202, Method 112; Cond. A, 1 x $10^{-5}$ atm cc/s | MIL-STD-202, Method 112; Cond. 1 x $10^{-5}$ atm cc/s | MIL-STD-202, Method 112; Cond. 1 x $10^{-5}$ atm cc/s |
| **Moisture resistance** | MIL-STD-202, Method 106 | MIL-STD-202, Method 106 | MIL-STD-202, Method 106 |
| **Shock** | – | – | – |
| **Vibration** | – | – | – |
| **Thermal shock** | – | – | – |
| **Salt spray** | – | – | – |
| **Acceleration** | – | – | – |
| **Approvals** | – | – | UL/CSA |
| **Features** | custom packaging; hermetically sealed; tight tolerances and differentials; hermetic connector or potted construction | hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts | hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts |

| 3106 Low-level Hermetic | 3150 Low Silhouette Hermetic | 3156 Low-level Silhouette Hermetic | 3001/3004 Series Non-Hermetic |
|---|---|---|---|
| low-level hermetic | low silhouette hermetic | low level, silhouette hermetic | low profile silhouette |
| 100 mA/500 mA | 2.0 A/1.0 A | 100 mA/500 mA | 1 A to 3 A (3001, 3001U Series)*<br>2 A to 4 A (3004 Series)* |
| steel housing hermetically sealed with glass-to-metal seal at terminal junction | steel housing hermetically sealed with glass-to-metal seal at terminal junction | steel housing hermetically sealed with glass-to-metal seal at terminal junction | phenolic base with metal closure |
| -29 °C to 204 °C<br>[-20 °F to 400 °F] | -29 °C to 177 °C<br>[-20 °F to 350 °F] | -29 °C to 204 °C<br>[-20 °F to 400 °F] | -18 °C to 168 ° C<br>[0 °F to 335 °F] |
| -62 °C to 260 °C<br>[-80 °F to 500 °F] | -54 °C to 260 °C<br>[-65 °F to 500 °F] | -62 °C to 260 °C<br>[-80 °F to 500 °F] | -18 °C to 177 ° C<br>[0 °F to 350 °F] |
| MIL-STD-202, Method 301;<br>1250 Vac 60 Hz - terminal to case | MIL-STD-202, Method 301;<br>750 Vac 60 Hz - terminal to case | MIL-STD-202, Method 301;<br>1250 Vac 60 Hz - terminal to case | MIL-STD-202, Method 301; 1500 Vac 60 Hz terminal to case (2000 Vac 3004) |
| MIL-STD-202, Method 302;<br>Cond. B - 50 MOhm - 500 Vdc applied | MIL-STD-202, Method 302;<br>Cond. B - 50 MOhm - 500 Vdc applied | MIL-STD-202, Method 302;<br>Cond. B - 500 MOhm - 500 Vdc applied | MIL-STD-202, Method 302; Cond. B<br>500 MΩ, 500 Vdc applied |
| MIL-STD-202, Method 307;<br>0.025 Ohm | MIL-STD-202, Method 307;<br>0.050 Ohm | MIL-STD-202, Method 307;<br>0.050 Ohm | MIL-STD-202, Method 307;<br>50 mΩ |
| MIL-STD-202, Method 112;<br>Cond. 1 x $10^{-5}$ atm cc/s | MIL-STD-202, Method 112;<br>Cond. 1 x $10^{-5}$ atm cc/s | MIL-STD-202, Method 112;<br>Cond. 1 x 10-5 | – |
| MIL-STD-202, Method 106 | MIL-STD-202, Method 106 | MIL-STD-202, Method 106 | – |
| – | – | – | – |
| – | – | – | – |
| – | – | – | – |
| – | – | – | – |
| – | – | – | – |
| – | – | – | UL/CSA |
| gold-alloy contacts; hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts | hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts | gold-alloy contacts; hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts | tight tolerances and differentials; low profile; available to open or close on temperature rise; dust-proof phenolic base; SPST contacts |

# Thermostats
## High Reliability Thermostats

*Provides either temperature control or over-temperature protection. Hermetic/non-hermetic devices available. Manufactured to meet stringent requirements of military and aerospace industries for dielectric strength, moisture, resistance, vibration, and shock. Many potential applications in aerospace and defense applications.*

| Series | 3200 Aerospace | 3153 Low Silhouette Hermetic |
|---|---|---|
| **Description** | aerospace | low silhouette hermetic |
| **Amperage** | 5.0 A resistive | 2.0 A resistive |
| **Housing material** | steel housing hermetically sealed with glass-to-metal seal at terminal junction | steel housing hermetically sealed with glass-to-metal seal at terminal junction |
| **Operating temperature range** | -51 °C to 163 °C [-60 °F to 325 °F] | -29 °C to 177 °C [-20 °F to 350 °F] |
| **Environmental exposure range** | -65 °C to 177 °C [-85 °F to 350 °F] | -65 °C to 260 °C [-85 °F to 500 °F] |
| **Dielectric strength** | MIL-STD-202, Method 301; 1250 Vac | MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case |
| **Insulation resistance** | MIL-STD-202, Method 302; 500 MOhm | MIL-STD-202, Method 302; 500 MOhm |
| **Contact resistance** | MIL-STD-202, Method 307; 0.025 Ohm max. | MIL-STD-202, Method 307; 0.050 Ohm max. |
| **Hermetic seal** | MIL-STD-202, Method 112; Cond. C | MIL-STD-202, Method 112; Cond. C |
| **Moisture resistance** | MIL-STD-202, Method 106 | MIL-STD-202, Method 106 |
| **Shock** | MIL-STD-202, Method 213; 750 G | MIL-STD-202, Method 213; 100 G |
| **Vibration** | MIL-STD-202, Method 204; 30 G; MIL-STD-202, Method 214; 50 G | MIL-STD-202, Method 204; 20 G |
| **Thermal shock** | MIL-STD-202, Method 107; Cond. B | MIL-STD-202, Method 107; Cond. B |
| **Salt spray** | MIL-STD-202, Method 101; Cond. B | MIL-STD-202, Method 101; Cond. B |
| **Acceleration** | MIL-STD-202, Method 212; 20 G | – |
| **Approvals** | MIL-S-24236/NASA S-311-641/01 | MIL-S-24236 |
| **Features** | NASA certified; space qualified; hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts | hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts |

** based on 240 Vac and life-cycle dependent. Call for further details.*

| 3MS1 QPL | 3500 | 3800 Industrial-Grade | 3600/3601 Custom-Packaged |
|---|---|---|---|
| military | military | severe-duty applications | PCB mountable TO-5 |
| 5 A resistive | 5 A resistive | 7 A resistive | 1 A resistive |
| steel housing with glass-to-metal seal at terminal junction | steel housing with glass-to-metal seal at terminal junction | steel housing with glass-to-metal seal at terminal junction | nickel |
| -46 °C to 190 °C [-50 °F to 375 °F] | -51 °C to 204 °C [-60 °F to 400 °F] | -29 °C to 260 °C [-20 °F to 500 °F] | 40° C to 120 °C [104 °F to 248 °F] |
| -65 °C to 260 °C [-85 °F to 500 °F] | -65 °C to 260 °C [-85 °F to 500 °F] | -62 °C to 260 °C [-80 °F to 500 °F] | -50 °C to 150 °C [-58 °F to 302 °F] |
| MIL-STD-202, Method 301; 1250 Vac | MIL-STD-202, Method 301; 1250 Vac | MIL-STD-202, Method 301; 1250 Vac 60 Hz terminal to case | 500 Vac 60 Hz for one second, terminal to case |
| MIL-STD-202, Method 302; 500 MΩ | MIL-STD-202, Method 302; 500 MΩ | MIL-STD-202, Method 302, Cond. B; 50 MΩ min. terminal to case | 20 mΩ at 500 Vdc |
| MIL-STD-202, Method 307; 0.050 Ω max. | MIL-STD-202, Method 307; 0.050 Ω max. | MIL-STD-202, Method 307; 50 mΩ max. | 60 mΩ |
| MIL-STD-202, Method 112; Cond. C | MIL-STD-202, Method 112; Cond. C | MIL-STD-202, Method 112; Cond. A $1x10^{-5}$ atm cc/s | $1x10^{-3}$ atm cc/s |
| MIL-STD-202, Method 106 | MIL-STD-202, Method 106 | MIL-STD-202, Method 106 | – |
| MIL-STD-202, Method 213; 100 G | MIL-STD-202, Method 213; 400 G | MIL-STD-202, Method 213; 400 G | – |
| MIL-STD-202, Method 204; 20 G | MIL-STD-202, Method 204; 20 G | MIL-STD-202, Method 204; 20 G | – |
| MIL-STD-202, Method 107; Cond. B | MIL-STD-202, Method 107; Cond. B | – | – |
| MIL-STD-202, Method 101; Cond. B | MIL-STD-202, Method 101; Cond. B | – | – |
| MIL-STD-202, Method 212; 20 G | MIL-STD-202, Method 212; 20 G | – | – |
| qualified to MIL-S-24236; QPL listed | meets or exceeds the requirements of MIL-S- 24236 | – | – |
| each unit is 100% thermally and mechanically inspected; available to open or close on temperature rise; calibrations preset at factory; SPST contacts | tight tolerances and differentials; hermetically sealed; designed specifically for military and commercial aircraft; each unit is 100% thermally and mechanically inspected | easily customized; used where high levels of vibration and mechanical shock are common | gold contacts; available to open or close on temperature rise; specifically designed for PCBs; flexible circuitry; sophisticated time-based circuits; wave solderable |

# Thermostats
## Commercial Thermostats

*Provides either temperature control or over-temperature protection. Automatic or manual reset options. Phenolic or ceramic housings. Potential applications include HVAC, computers, medical equipment, appliances, automotive, office automation, fireplaces, and water heaters.*

| Series | 2450A | 2450CM | 2450CMG |
|---|---|---|---|
| **Use** | heat detection | high current | low voltage |
| **Reset type** | automatic | manual | manual |
| **Housing material** | phenolic, epoxy seal cap and terminals | ceramic | ceramic |
| **Functional property** | open or close on rise | open on rise | open on rise |
| **Amperage** | 3 A | 15 A/10 A | 0.5 A |
| **Operating temperature range** | 47 °C to 107 °C [117 °F to 225 °F] | 52 °C to 232 °C [125 °F to 450 °F] | 52 °C to 232 °C [125 °F to 450 °F] |
| **Environmental exposure range** | 0 °C to 150 °C [32 °F to 302 °F] | 10 °C to 260 °C [50 °F to 500 °F] | 10 °C to 260 °C [50 °F to 500 °F] |
| **Contacts** | WE-1 gold alloy cross point | silver/nickel alloy | WE-1 gold alloy cross point |
| **Approvals** | UL | UL, CSA, VDE | UL, CSA, VDE |
| **Features** | gold-alloy contacts; epoxy-sealed cap and terminals | rivet sleeve construction | gold-alloy contacts; rivet sleeve construction |

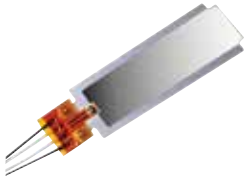
| Series | 2450RG | 2455R | 2455RA |
|---|---|---|---|
| **Use** | low voltage | high current | heat detection |
| **Reset type** | automatic | automatic | automatic |
| **Housing material** | phenolic | phenolic | phenolic, epoxy seal cap and terminals |
| **Functional property** | open or close on rise | open or close on rise | close on rise |
| **Amperage** | 0.5 A | 15 A/10 A | 3 A |
| **Operating temperature range** | 0 °C to 150 °C [32 °F to 302 °F] | 0 °C to 150 °C [32 °F to 302 °F] | 47 °C to 107 °C [117 °F to 225 °F] |
| **Environmental exposure range** | -18 °C to 177 °C [0 °F to 350 °F] | -18 °C to 177 °C [0 °F to 350 °F] | 0 °C to 150 °C [32 °F to 302 °F] |
| **Contacts** | WE-1 gold alloy cross point | silver/nickel alloy | WE-1 gold alloy cross point |
| **Approvals** | UL, CSA | UL, CSA, VDE | UL |
| **Features** | gold-alloy contacts; rivet sleeve construction | rivet sleeve construction; high profile and current | gold-alloy contacts; epoxy-sealed cap |

| 2450HR | 2450HRG | 2450R | 2450RC | 2450RCG |
|---|---|---|---|---|
| high current | low current | high current | high current | low voltage |
| automatic | automatic | automatic | automatic | automatic |
| phenolic | phenolic | phenolic | ceramic | ceramic |
| open or close on rise | open on rise | open or close on rise | open or close on rise | open or close on rise |
| 15 A/10 A | 0.5 A | 15 A/10 A | 15 A/10 A | 0.5 A |
| 0 °C to 150 °C [32 °F to 302 °F] | 0 °C to 150 °C [32 °F to 302 °F] | 0 °C to 150 °C [32 °F to 302 °F] | 0 °C to 260 °C [32 °F to 500 °F] | 0 °C to 260 °C [32 °F to 500 °F] |
| -18 °C to 177 °C [0 °F to 350 °F] | -18 °C to 177 °C [0 °F to 350 °F] | -18 °C to 177 °C [0 °F to 350 °F] | -20 °C to 287 °C [0 °F to 550 °F] | -20 °C to 287 °C [0 °F to 550 °F] |
| silver/nickel alloy | WE-1 gold alloy cross point | silver/nickel alloy | silver/nickel alloy | WE-1 gold alloy cross point |
| UL, CSA | UL, CSA | UL, CSA | UL, CSA, VDE | UL, CSA, VDE |
| rivet sleeve construction; factory calibrated | gold-alloy contacts; rivet sleeve construction; factory calibrated | rivet sleeve construction; low profile | rivet sleeve construction; low profile | gold-alloy contacts; rivet sleeve construction; low profile |

| 2455RVB | 2455RC | 2455RG | 2455RM |
|---|---|---|---|
| high current | high current | low voltage | high current |
| automatic | automatic | automatic | manual |
| ceramic, epoxy overmold | ceramic | phenolic | phenolic |
| open or close on rise | open on rise | open or close on rise | open on rise |
| 15 A/10 A | 15 A/10 A | 0.5 A | 15 A/10 A |
| -12 °C to 105 °C [10 °F to 250 °F] | 0 °C to 260 °C [32 °F to 500 °F] | 0 °C to 150 °C [32 °F to 302 °F] | 0 °C to 150 °C [32 °F to 302 °F] (inclusive) |
| -18 °C to 121 °C [0 °F to 250 °F] | -20 °C to 287 °C [0 °F to 550 °F] | -18 °C to 177 °C [0 °F to 350 °F] | -18 °C to 260 °C [0 °F to 500 °F] |
| silver/nickel alloy | silver/nickel alloy | WE-1 gold alloy cross point | silver/nickel alloy |
| UL, CSA, VDE | UL, CSA, VDE | UL, CSA, VDE | UL, CSA, VDE |
| epoxy overmolded; rivet-sleeve construction; dust-free housing; factory calibrated | rivet sleeve construction; high profile | gold-alloy contacts; rivet sleeve construction; high profile; factory calibrated | rivet sleeve construction; factory calibrated |

# Heaters
## Flexible Heaters

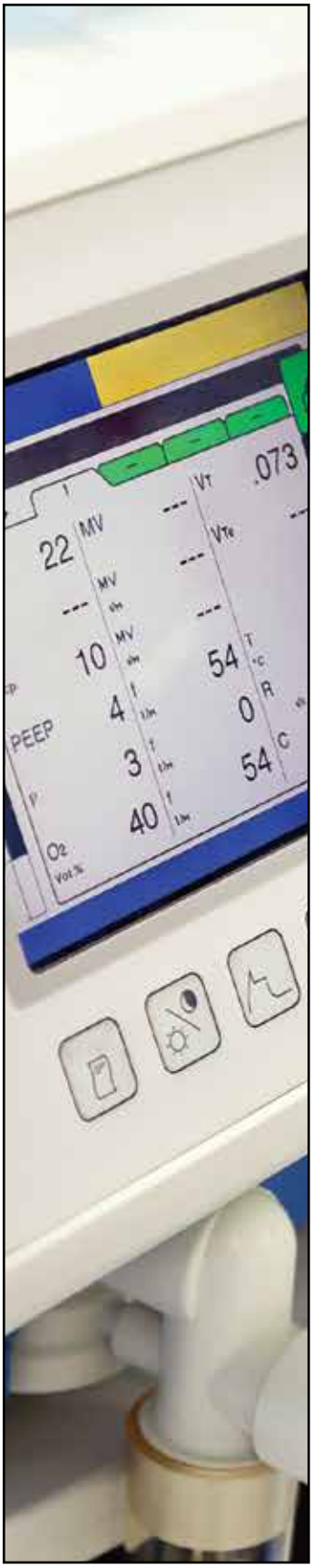
*Flat or custom geometry configurations with single, multiple or variable watt densities to provide stable, uniform and customized heat output for unique application needs. Heaters may be bonded to other system components or combined with thermostats, thermistors, thermocouples, temperature sensors and thermal fuses to form custom-engineered heating systems. Potential applications include medical, HVAC/R, LCD displays, power generation, telecom and food service.*



| Series | 78000 |
|---|---|
| **Description** | transparent |
| **Maximum power** | 0.8 W/cm$^2$ [5 W/in$^2$] |
| **Operating/storage temperature range** | -40 °C to 85 °C [-40 °F to 185 °F] |
| **Size constraints** | 0,60 m x 0,43 m [22 in x 17 in] |
| **Geometry** | specific to customer requirements within size constraints |
| **Heater trace pattern** | continuous layer of ITO (Indium Tin Oxide) across entire surface |
| **Construction** | very thin layer of ITO electrically sputtered on PET polyester film; electrical connection made via silver ink or carbon bus bars laid on top of the ITO; wire connections are made via ring terminals eyeleted to the silver or carbon bus bars or flexible tail/connector |
| **Standard wire** | • UL 1180 Teflon®<br>• gauge per customer request<br>• otherwise selected for max. heater current draw |
| **PSA** | yes |
| **Approvals** | – |
| **Features** | no wires in clear view area; optical grade, thin film polyester; low power consumption |

| 3400 | 3100 | 3200 |
|---|---|---|
| Kapton® insulated or Kapton® insulated high temperature | silicon wire-wound | silicon chemically etched |
| 6.2 W/cm$^2$ [40 W/in$^2$] | 6.2 W/cm$^2$ [40 W/in$^2$] | 6.2 W/cm$^2$ [40 W/in$^2$] |
| Kapton® insulated: 177 °C [350 °F] max. | 250 °C [482 °F] max.<br>200 °C [392 °F] max. (UL) | 250 °C [482 °F] max.<br>200 °C [392 °F] max. (UL) |
| 0,61 m x 0,61 m [24 in x 24 in] | none, virtually any size and shape | 0,61 m x 0,61 m [24 in x 24 in] |
| specific to customer requirements within size constraints | specific to customer requirements | specific to customer requirements within size constraints |
| specific to customer requirements | specific to customer requirements | specific to customer requirements |
| contain etched, resistive foil encased between two layers of Kapton®; Kapton® insulated uses acrylic, thermoset bonding adhesive | contains resistive wire encased between two layers of fiberglass-supported silicone rubber; all bonding adhesives are uncured silicone rubber; cured under pressure and temperature during manufacturing | contains resistive foil traces encased between two layers of fiberglass-supported silicone rubber bonded together using temperature and pressure; heater trace patterns generated similar to processes used in pc-board design and manufacture |
| • UL 1180 Teflon®<br>• gauge per customer request<br>• otherwise selected for max. heater current draw | • UL 1180 Teflon®<br>• gauge per customer request<br>• otherwise selected for max. heater current draw | • UL 1180 Teflon®<br>• gauge per customer request<br>• otherwise selected for max. heater current draw |
| yes | yes | yes |
| UL, CSA | UL, CSA, TUV | UL, CSA, TUV |
| low out gassing; variety of geometries; high dielectric strength with minimal thickness | virtually any size or shape; multi-strand resistance wires | multiple watt densities or varying trace geometries; flat, molded-to-shape, spiral wrap |

# Humidity Sensors
## Honeywell Humidicon™




*Offers a range of accuracies from ±1.7 %RH typ. to ±4.5 %RH typ., wide operating temperature ranges, and low hysteresis. Potential applications include HVAC/R, air compressors, weather stations, telecom cabinets, respiratory therapy, and incubators/microenvironments.*

| Series | Honeywell HumidIcon™ HIH6000 | Honeywell HumidIcon™ HIH6100 |
|---|---|---|
| **Description** | digital output-type relative humidity (RH) and temperature sensor combined in the same package | digital output-type relative humidity (RH) and temperature sensor combined in the same package |
| **Humidity accuracy** | ±4.5 %RH typ. | ±4.0 %RH typ. |
| **Temperature accuracy** | ±1.0 °C typ. | ±1.0 °C max. |
| **Operating temperature range** | -40 °C to 100 °C [-40 °F to 212 °F] | -25 °C to 85 °C [-13 °F to 185 °F] |
| **Hysteresis** | – | – |
| **Output** | I²C or SPI | I²C or SPI |
| **Package type** | SIP 4 Pin or SOIC-8 SMD | SIP 4 Pin or SOIC-8 SMD |
| **Response time** | 6 s typ. in 20 l/min minimum airflow | 6 s typ. in 20 l/min minimum airflow |
| **Long-term stability** | ±1.2 %RH for five years | ±1.2 %RH for five years |
| **Operating humidity range** | 0 %RH to 100 %RH | 0 %RH to 100 %RH |
| **Compensated humidity range** | 20 %RH to 80 %RH | 10 %RH to 90 %RH |
| **Moisture/dust filter** | yes (some listings) | yes (some listings) |
| **Voltage supply** | 3.3 Vdc typ. | 3.3 Vdc typ. |
| **Features** | industry-leading long term stability, reliability, and relative humidity accuracy; lowest total cost solution; energy efficient; available with or without hydrophobic filter and condensation-resistance; optional one or two %RH level alarm outputs | industry-leading long term stability, reliability, and relative humidity accuracy; lowest total cost solution; energy efficient; available with or without hydrophobic filter and condensation-resistance; optional one or two %RH level alarm outputs |

| Honeywell HumidIcon™ HIH7000 | Honeywell HumidIcon™ HIH8000 | Honeywell HumidIcon™ HIH9000 |
|---|---|---|
| digital output-type relative humidity (RH) and temperature sensor combined in the same package | digital output-type relative humidity (RH) and temperature sensor combined in the same package | digital output-type relative humidity (RH) and temperature sensor combined in the same package |
| ±3.0 %RH typ. | ±2.0 %RH typ. | ±1.7 %RH typ. |
| ±1.0 °C typ. | ±0.8 °C typ. | ±0.6 °C typ. |
| -40 °C to 100 °C [-40 °F to 212 °F] | -40 °C to 125 °C [-40 °F to 257 °F] | -40 °C to 125 °C [-40 °F to 257 °F] |
| – | – | ±1.0 %RH |
| $I^2C$ or SPI | $I^2C$ or SPI | $I^2C$ or SPI |
| SIP 4 Pin or SOIC-8 SMD | SIP 4 Pin or SOIC-8 SMD | SIP 4 Pin or SOIC-8 SMD |
| 6 s typ. in 20 l/min minimum airflow | 6 s typ. in 20 l/min minimum airflow | 8 s max., 1/e slow moving air |
| ±1.2 %RH for five years | ±1.2 %RH for five years | ±1.2 %RH for five years |
| 0 %RH to 100 %RH | 0 %RH to 100 %RH | 0 %RH to 100 %RH |
| 20 %RH to 80 %RH | 10 %RH to 90 %RH | 10 %RH to 90 %RH |
| yes (some listings) | yes (some listings) | yes (some listings) |
| 3.3 Vdc typ. | 3.3 Vdc typ. | 3.3 Vdc typ. |
| industry-leading long term stability, reliability, and relative humidity accuracy; lowest total cost solution; energy efficient; available with or without hydrophobic filter and condensation-resistance; optional one or two %RH level alarm outputs | industry-leading long term stability, reliability, and relative humidity accuracy; lowest total cost solution; energy efficient; available with or without hydrophobic filter and condensation-resistance; optional one or two %RH level alarm outputs | industry-leading long term stability, reliability, and relative humidity accuracy; lowest total cost solution; energy efficient; available with or without hydrophobic filter and condensation-resistance; optional one or two %RH level alarm outputs |

*Configured with integrated circuitry to provide on-chip signal conditioning. Potential applications include refrigeration, drying, meteorology, battery-powered systems, OEM assemblies, HVAC, office automation, and medical.*

| Series | HIH-5030/5031 | HIH-4000 |
|---|---|---|
| **Description** | covered, filtered or unfiltered integrated circuit | integrated circuit |
| **Output** | analog voltage | analog voltage |
| **Package type** | surface mount | SIP (2,54 mm [0.100 in] or 1,27 mm [0.050 in] lead pitch) |
| **Response time** | 5 s typ. 1/e in slow moving air | 5 s typ. 1/e in slow moving air |
| **Long-term stability** | ±1.2 %RH for five years; ±0.25 %RH each year | ±1.2 %RH for five years; ±0.25 %RH each year |
| **Operating temperature range** | -40 °C to 85 °C [-40 °F to 185 °F] | -40 °C to 85 °C [-40 °F to 185 °F] |
| **Operating humidity range** | 0 %RH to 100 %RH | 0 %RH to 100 %RH |
| **Moisture/dust filter** | yes (some listings) | no |
| **Cover/case** | yes | no |
| **Calibration and data print out** | no | yes (some listings) |
| **Accuracy** | ±3 %RH | ±3.5 %RH |
| **Voltage supply** | 2.7 Vdc to 5.5 Vdc | 4 Vdc to 5.8 Vdc |
| **Features** | surface mount package; voltage output; near linear voltage output vs. %RH; laser trimmed; molded thermoset plastic housing; chemically resistant; tape and reel | voltage output; near linear voltage output vs. %RH; laser trimmed; molded thermoset plastic housing; chemically resistant |

| HIH-4010/4020/4021 | HIH-4030/4031 | HIH-4602-A, C | HIH-4602-L, L-CP |
|---|---|---|---|
| covered or uncovered, filtered or unfiltered integrated circuit | covered, filtered or unfiltered integrated circuit | monolithic IC with integral thermistor or precision RTD | integrated circuit |
| analog voltage | analog voltage | analog voltage (for humidity), resistance (for temperature) | analog voltage |
| SIP (2,54 mm [0.100 in] or 1,27 mm [0.050 in] lead pitch) | surface mount | TO-5 can | slotted TO-5 can |
| 5 s typ. 1/e in slow moving air | 5 s typ. 1/e in slow moving air | 50 s typ. 1/e in slow moving air | 30 s typ. 1/e in slow moving air |
| ±1.2 %RH for five years; ±0.25 %RH each year | ±1.2 %RH for five years | ±1.2 %RH for five years | ±1.2 %RH for five years |
| -40 °C to 85 °C [-40 °F to 185 °F] | -40 °C to 85 °C [-40 °F to 185 °F] | -40 °C to 85 °C [-40 °F to 185 °F] | -40 °C to 85 °C [-40 °F to 185 °F] |
| 0 %RH to 100 %RH | 0 %RH to 100 %RH | 0 %RH to 100 %RH | 0 %RH to 100 %RH |
| yes (some listings) | yes (some listings) | yes | no |
| yes (some listings) | yes | yes | yes |
| yes (some listings) | yes (some listings) | yes (some listings) | yes (some listings) |
| ±3.5 %RH | ±3.5 %RH | ±3.5 %RH | ±3.5 %RH |
| 4 Vdc to 5.8 Vdc | 4 Vdc to 5.8 Vdc | 4 Vdc to 5.8 Vdc | 4 Vdc to 5.8 Vdc |
| voltage output; near linear voltage output vs. %RH; laser trimmed; molded thermoset plastic housing; chemically resistant | surface mount package; voltage output; near linear voltage output vs. %RH; laser trimmed; molded thermoset plastic housing; chemically resistant; tape and reel | humidity and temperature sensing in one package; near linear voltage output vs. %RH; laser trimmed; chemically resistant; built-in static protection | near linear voltage output vs %RH; laser-trimmed; chemically resistant; enhanced accuracy, fast response |

Honeywell Sensing and Control is a global leader in providing reliable, cost-effective sensing and switching solutions for our customers' applications. We serve thousands of customers in four core industry segments: industrial, medical equipment, transportation, and aerospace/military products.

## Aerospace

Aerospace applications are among the most demanding for any type of product. Rigorous FAA requirements, extreme environments (temperature, shock, vibration, the need for hermetic sealing), and the ability to customize devices are just a few of the parameters often required of sensors and switches in these applications. Aerospace customers typically value speed in prototyping and development, and Honeywell's vertically integrated, AS9100-approved manufacturing locations enhance our ability to produce devices in a wide variety of packages. The precision output of our products helps reduce risk and cost in key applications while also minimizing the need for unscheduled maintenance.

Honeywell's in-depth aerospace engineering experience allows us to work with customers in the design and development of products that best meet the specified requirements of their individual applications. Making products simple to install makes the job easier every step of the way. And, the odds are that Honeywell is already on the list of trusted suppliers for many aerospace companies, underscoring the decades of experience we bring to this field.

Honeywell products for this industry (many of them PMA-certified) include force sensors, load cells, potentiometers, pilot controls, pressure sensors, pressure switches, resolvers, sensor/actuator assemblies for systems ranging from aerostructures to fuel control to flight surfaces, speed sensors, temperature probes, thermostats, torque sensors, y-guides for cargo systems, MICRO SWITCH™ sealed and high-accuracy switches, MICRO SWITCH™ pushbutton switches, and MICRO SWITCH™ rocker and toggle switches.

## Medical

Medical applications typically require sensors and switches that are highly stable and extremely reliable to enhance patient safety and comfort. Stability is often essential to minimize long term drift, reduce the need for recalibration, and improve ease of use for medical equipment operators. Reliability enhances patient safety in life-critical applications, reduces downtime, and improves test throughput in applications such as clinical diagnostics. The product needs to be easy to use and easy to design into a system, so Honeywell's extensive customization and built-in calibration/amplification capabilities are strong benefits. Confidence in Honeywell's product performance, reliability, and availability provide peace of mind for medical equipment manufacturers who choose Honeywell.

Honeywell offerings for this industry include airflow sensors, board mount and stainless steel media isolated pressure sensors, Hall-effect magnetic position sensors, humidity sensors, flexible heaters, force sensors, thermostats, commercial solid state sensors, infrared sensors, oxygen sensors, pressure and vacuum switches, potentiometers and encoders, MICRO SWITCH™ pushbutton, rocker, and toggle switches, and hour meters.

## Industrial

The industrial arena can be a rough one. From high-speed food processing to high-force stamping applications, reliable and cost-effective sensors and switches often help minimize repair costs, maximize system life, and reduce overall system expense. Durability can mean the difference between smooth-running processes and expensive downtime. Accurate, repeatable sensor or switch output can reduce the need for calibration once the device is applied. Because of the wide variety of potential applications, Honeywell's ability to deliver a customized product that can meet virtually any size, weight, and power requirement – as well as any packaging stipulations for tough, harsh environments – often makes it easy to incorporate and use our devices. Safety is another important consideration for industrial users, and our products meet a wide variety of regulatory safety requirements.

Honeywell's industrial product line includes airflow sensors, current sensors, humidity sensors, fiber-optic and liquid-level sensors, linear position sensors, oxygen sensors, pressure sensors, potentiometers and encoders, speed sensors, temperature probes, ultrasonic sensors, wirewound resistors, thermostats, commercial solid state sensors, flex heaters, SMART position sensors, board mount and stainless steel media isolated pressure sensors, force sensors, safety light curtains, push-pull switches, and MICRO SWITCH™ basic switches, hazardous area switches, safety switches, key and rotary switches, limit switches, sealed and high-accuracy switches, pushbutton, rocker, toggle switches, and relays.

## Transportation

Getting from Point A to Point B is often challenging for end-customers of transportation providers – Honeywell aims to make the trip easier with highly reliable, cost-effective switches and sensors. Our products are designed to support rigorous engine requirements, and their efficiency can also help optimize engine performance. Customization is often required to allow a switch or sensor to be mounted in tight or challenging environments including vibration, temperature extremes, and road contamination. The durability of Honeywell products enhances system reliability, which is also boosted by the stable, accurate output of our devices. All of these capabilities allow demanding customers to rely on Honeywell's many years of experience in the transportation industry.

Honeywell products for transportation applications include Hall-effect rotary position sensors, inertial measurement units, infrared sensors, keyless entry sensors, magnetic position sensors, pressure sensors, speed and direction sensors, ultrasonic sensors, thermostats, temperature probes, commercial solid state sensors, SMART position sensors, and MICRO SWITCH™ pushbutton, rocker, and toggle switches.

# Sensing and Control Product Portfolio — Product reliab

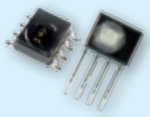
**With more than 50,000 sensing, switching and control products ranging from snap-action, limit, toggle and pressure switches to position, spe**

## SENSORS

**Thermostats:** Commercial and precision snap-action. Automatic or manual reset options, phenolic or ceramic housings.
***May be used in:*** Telecommunications • Battery Heater Controls • Computers • Copy Machines • Fax Machines • Food Service • Food Carts • Small and Major Appliances • Heat and Smoke Detectors • HVAC Equipment

**Pressure transducers – heavy duty:** Provide a complete amplified and compensated pressure measurement solution. Choice of ports, connectors, outputs and pressure ranges, engineered to be resistant to a wide variety of media for use in most harsh environments.
***May be used in:*** Industrial HVAC/R and Air Compressors • General System and Factory Automation Pump, Valve and Fluid Pressure • Transportation (Heavy Equipment and Alternative Fuel Vehicles) System • Pneumatics • Hydraulics

**Pressure sensors – heavy duty:** Small, allowing use on their own in tight packages or as the building block for a complete transducer. Developed for potential use in pressure applications that involve measurement of hostile media in harsh environments compatible with 316 stainless steel.
***May be used in:*** Industrial Controls • Process Control Systems • Industrial Automation



**Humidity sensors:** Digital, analog, and combined humidity/temperature sensing versions. Provide on-chip signal conditioning with accuracy capability to ±1.7 %RH. Stable, reliable, low-drift performance. Standardized, platform-based sensors.
***May be used in:*** Medical • HVAC/R • Weather Stations • Air Compressors • Telecommunications • Grain Storage • Incubators

**Current sensors:** Accurate and fast response. Almost no thermal drift or offset with temperature. Adjustable linear, null balance, digital and linear current sensors. ***May be used in:*** Variable Speed Drives • Overcurrent Protection • Power Supplies • Ground Fault Detectors • Robotics • Industrial Process Control • Wattmeters

**Flexible heaters:** Flat or custom geometry configurations with single, multiple and variable watt densities. Stable, uniform heating. Can be bonded parts or combined in value-added assemblies.
***May be used in:*** Medical • HVAC/R • LCD Displays • Power Generation • Telecommunication

**Pressure sensors – board mount:** Full line of industrial-grade sensors: media-isolating design, multiple ports and outlets, and electrical configurations.
***May be used in:*** Pneumatic Controls • Air Compressors • Process Monitoring • Hydraulic Controls • VAV Controls • Clogged Filter Detection • Presence/Absence of Flow • Transmissions

**Temperature sensors:** Customized probes, thermistors and RTD sensors. Plastic/ceramic, miniaturized, surface-mount housings and printed circuit board terminations.
***May be used in:*** Semi-Conductor Protection • Vending Machines • Power Generation • Hydraulic Systems • Thermal Management • Temperature Compensation

**Magnetic sensors:** Digital and analog Hall-effect position ICs, magnetoresistive position ICs, Hall-effect vane, gear-tooth and magnetic sensors.
***May be used in:*** Speed and RPM Sensing • Motor/Fan Control • Magnetic Encoding • Disc Speed • Tape • Flow-Rate Sensing • Conveyors • Ignitions • Motion Control/Detection • Power/Position • Magnetic Code Reading • Vibration • Weight Sensing

## ELECTROMECHANICAL SWITCHES

**MICRO SWITCH™ basic switches:** Snap-action precision switches. Compact. Lightweight. Designed for repeatability and enhanced life. Basic switches: large, standard, miniature, subminiature, hermetically sealed, water-tight and high-temperature versions.
***May be used in:*** Vending Machines • Communication Equipment • HVAC • Appliances • Automotive • Electronic Gaming Machinery • Valve Controls • Irrigation Systems • Foot Switches • Pressure • Temperature Controls

**MICRO SWITCH™ sealed and high accuracy switches:** Precision "snap action" mechanisms. Wide variety of actuators, terminations, circuitry configurations, electrical ratings, contact materials and operating characteristics.
***May be used in:*** Landing Gear • Flap/Stabilizer Controls • Thrust Reversers • Space Vehicles • Armored Personnel Carriers • De-Icer Controls • Wingfold Actuators • Industrial Environments • Valves • Underwater

**MICRO SWITCH™ hazardous area switches:** Flame path designed to contain and cool escaping hot gases that could cause an explosion. MICRO SWITCH™ EX, BX, CX and LSX Series.
***May be used in:*** Grain Elevators and Conveyors • Off-Shore Drilling • Petrochemical • Waste-Treatment Plants • Control Valves • Paint Booths • Hazardous Waste Handling Facilities

**Key and rotary switches:** Environmentally sealed, 2-3-4 position switches. O-rings help keep dirt and moisture out and prolong life.
***May be used in:*** All-Terrain Vehicles • Golf Carts • Snowmobiles • Scissor Lifts • Telehandlers • Construction and Marine Equipment • Skid Loaders • Agricultural Equipment • Material Handlers

**Pressure and vacuum switches:** Feature setpoints from 3 psi to 4500 psi. Rugged components have enhanced repeatability, flexibility and wide media capability. Uses diaphragm or quad seal/piston.
***May be used in:*** Transmissions • Hydraulics • Brakes • Steering • Generators/Compressors • Dental Air • Embalming Equipment • Oxygen Concentrators • Air Cleaners • Fuel Filters • Pool Water Pressure

**MICRO SWITCH™ toggle switches:** Hermetic and environmentally sealed options. Enhanced reliability. Center pin for ultimate stabilization. Available in many shapes, sizes and configurations.
***May be used in:*** Aerial Lifts • Construction Equipment • Agriculture and Material-Handling Equipment • Factory-Floor Controls • Process Control • Medical Instrumentation • Test Instruments • Military/Commercial Aviation

## LIMITLESS™ WIRELESS SOLUTIONS

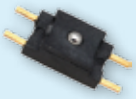
**Limitless™ switches and receivers:** Combines the best of MICRO SWITCH™ limit switches with commercial wireless technology. Beneficial for remote monitoring where wiring/maintenance is not physically possible or economically feasible. Used for position sensing and presence/absence detection.
**Limitless™ Operator Interface:** Adds a human interface device to the product-driven interfaces of Limitless™ switches and receivers. Choose and install a desired operator or utilize one of Honeywell's pushbuttons.
***May be used in:*** Valve Position • Crane Boom/Jib/Skew Position • Lifts • Material Handling • Presses • Construction/Ag Machines • Conveyors • Industrial Environments • Remote/Temporary Equipment • Grain Diverters or Flaps • Door Position

# ility. Industry knowledge. Expertise. Standard with every order.

**eed, pressure and airflow sensors, Honeywell Sensing and Control has one of the broadest sensing and switching portfolios available.**

**Position sensors:** The **SMART position sensor** measures linear, angular or rotary position of a magnet attached to a moving object so that the object's position can be determined or controlled. Its simple, non-contact design eliminates mechanical failure mechanisms, reduces wear and tear, and improves reliability and durability. ***May be used in:*** Valve Position • Material Handling • Plastic Molding • Passenger Bus Level Position • Truck-Mounted Crane Outrigger Position • Aerial Work Lift Platform • Front Loader and Digger/Excavation Boom Position
**Potentiometer sensors:** Measure linear, rotary position or displacement. Honeywell's proprietary conductive plastic delivers extensive temperature range and infinite resolution, and provides precision position measurement. ***May be used in:*** Robotic Motion Control • Marine Steering • In-Tank Level Sensing
**Ultrasonic sensors:** Measure time delays between emitted and echo pulses, often accurately determining the sensor-to-target distance.
***May be used in:*** Level Measurement • Height and Thickness Sensing • Diameter Control

**Infrared sensors:** IREDs, sensors and assemblies for object presence, limit and motion sensing, position encoding and movement encoding. Variety of package styles, materials and terminations.
***May be used in:*** Printers/Copiers • Motion Control Systems • Metering • Data Storage Systems • Scanning • Automated Transaction • Drop Sensors • Non-Invasive Medical Equipment



**Force sensors:** Variety of package styles and various electrical interconnects including pre-wired connectors, printed circuit board mounting and surface mounting for flexibility.
***May be used in:*** Infusion and Syringe Pumps • Blood Pressure Equipment • Pump Pressure • Drug Delivery Systems • Occlusion Detection • Kidney Dialysis Machines

**Proximity sensors:** Designed to meet demanding temperature, vibration, shock and EMI/EMP interference requirements. Number of housing materials and termination styles.
***May be used in:*** Aircraft Landing Gear • Gun Turret Position Control • Door/Hatch Monitoring

**Speed sensors:** Measure speed, position and presence detection utilizing magnetoresistive, variable reluctance, Hall-effect, variable inductance and spiral technologies.
***May be used in:*** Cam and Crankshafts • Transmissions • Fans • Pumps • Mixers • Rollers • Motors

**Airflow sensors:** Advanced microstructure technology. Sensitive and fast response to flow, amount/direction of air or other gas. Analog or digital output. Thin-film, thermally isolated bridge structure consists of a heater and temperature sensing elements.
***May be used in:*** HVAC • Respirators • Process Control • Oxygen Concentrators • Gas Metering • Chromatography • Leak Detection Equipment • Medical/Analytical Instrumentation • Ventilation Equipment

**Rotary position sensors:** Digital and analog Hall-effect, magnetoresistive and potentiometric devices and resolvers for sensing presence of a magnetic field or rotary position. Directly compatible with electronic circuits for application flexibility.
***May be used in:*** Audio and Lighting • Frequency • Temperature • Position • Medical/Instrumentation • Computer Peripherals • Manual Controls • Joysticks • Telecom • Welding • Heating • Aerospace

**MICRO SWITCH™ aerospace-grade pressure switches:** Lightweight, compact pressure switches. Meets military and DO-160 standards. Lower operating force provides application versatility with enhanced precision. Design modularity allows for configuration of the switch, facilitating rapid customization.
***May be used in:*** Aerospace Systems • Engines, Fuel Pressure and Hydraulic Systems • Military Ground Vehicles • Ordnance and Munitions Release Systems • Military Maritime Systems

**MICRO SWITCH™ limit switches:** Broadest and deepest limit switch portfolio. Rugged, dependable position detection solutions. MICRO SWITCH™ heavy-duty limit switches (HDLS), medium-duty and global limit switches. Hermetically and environmentally sealed switches.
***May be used in:*** Machine Tools • Woodworking • Textile • Printing Machinery • Metal Fabrication • Balers/Compactors • Forklifts • Bridges • Robotics • Wind Turbines • Elevators • Moving Stairs • Doors • Dock Locks/Levelers • Aerial Lifts • Cranes • Conveyors • Rail • Shipboards • Dock Side

**MICRO SWITCH™ pushbutton switches:** Lit or unlit. Wide range of electrical and display design, pushbuttons and manual switches. Many shapes, sizes and configurations. Easy to apply, operate and maintain.
***May be used in:*** Control Boards and Panels • Industrial and Test Equipment • Flight Decks • Medical Instrumentation • Process Control

**MICRO SWITCH™ sealed and standard rocker switches:** Wide range of electrical and display design. Many shapes, sizes, buttons and configurations to enhance manual operation.
***May be used in:*** Transportation • Agricultural and Construction Equipment • Test Equipment • Heavy-Duty Machinery • Marine Equipment • Small Appliances • Telecom • Medical Instrumentation • Commercial Aviation

## SAFETY PRODUCTS

**MICRO SWITCH™ safety switches:** For operator point-of-operation protection, access detection, presence sensing, gate monitoring and electrical interfacing. High-quality, dependable, cost-effective solutions.
***May be used in:*** Packaging and Semi-Conductor Equipment • Plastic-Molding Machinery • Machine Tools • Textile Machines • Lifts • Industrial Doors • Bailers • Compactors • Aircraft Bridges • Telescopic Handlers • Refuse Vehicles

**Warranty/Remedy**

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.**

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 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.

**Find out more**

To learn more about Honeywell's sensing and control products, call **+1-815-235-6847**, email inquiries to **info.sc@honeywell.com**, or visit **sensing.honeywell.com**

**Honeywell Sensing and Control**
1985 Douglas Drive North
Golden Valley, MN 55422
honeywell.com

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LifeElectronics
Живое партнерство

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*ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703*

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*С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров*

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- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

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- *Доставку товара в любую точку России и стран СНГ.*
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- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
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