Honeywell

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# Precision and High Reliability Thermostats

***009048***

*Issue 3*

**Datasheet**

## DESCRIPTION

Thermostats can provide either temperature control or over-temperature protection by breaking electrical contact when a specified temperature is reached.

Honeywell manufactures a wide range of thermostats for a variety of potential applications:

- Precision non-hermetic and hermetically-sealed versions designed to serve infotech, transportation, telecom, industrial, aircraft, medical equipment, radar, communications, and electronic control systems needs.
- High reliability military and aerospace versions that meet the unique needs of the military, aerospace and aviation industries.

Honeywell can also integrate these thermostats in higher-value cable assemblies, incorporating wire harness and connectors.

Also available is a selection of pre-configured REDI-TEMP Thermostats.

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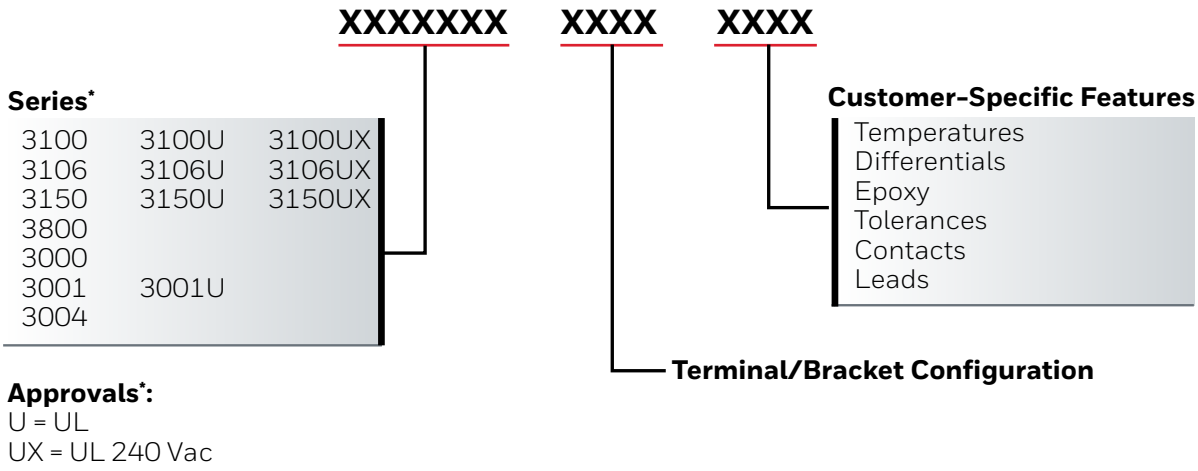
## NOMENCLATURE

The nomenclature given in Figures 1 and 2 is provided for reference only.

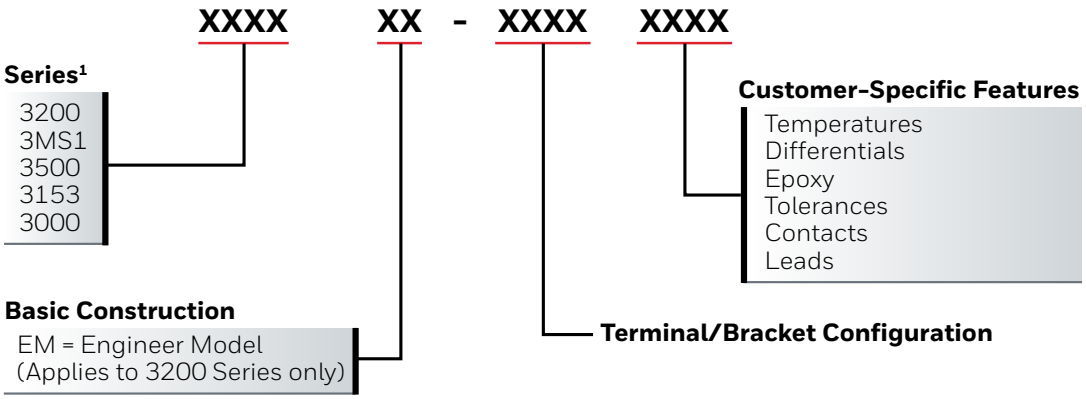
**Figure 1. Precision Thermostat Nomenclature**




**Approvals*:**
U = UL
UX = UL 240 Vac

*Some series may be UL/CSA approved even if there is no separate catalog listing. See series pages for individual product information.

**Figure 2. High Reliability Military and Aerospace Thermostat Nomenclature**

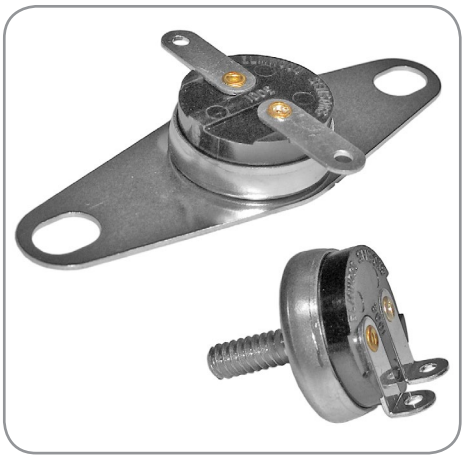


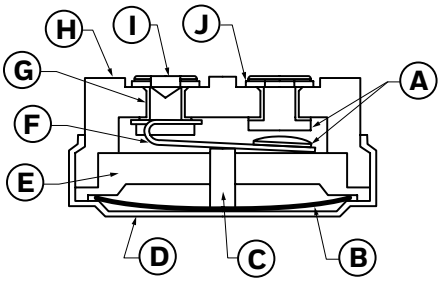
## DEFINITION OF TERMS

- **Automatic Reset:** A type of thermostat that will automatically reset at a specific temperature (i.e. a thermostat operates at 65,5°C [150°F] and resets at 48,89°C [120°F]).
- **Bimetal:** Two dissimilar metals bonded together to form the material for manufacturing thermally-sensitive discs which actuate the thermostat.
- **Close on Rise (COR):** Refers to operation of the contacts. When the temperature rises to its set point, the contacts close or make contact and complete the circuit.
- **Contact Resistance:** The value of resistance measured between the terminals.
- **Dielectric Strength:** The value of insulation between two electrically conducting parts. It may be tested by the application of a predetermined overvoltage for a specified time.
- **Differential:** The temperature difference between the operate and reset set points, also known as operate and reset.
  - **Nominal:** The temperature difference between nominal set points regardless of tolerance.
  - **Maximum:** The temperature difference between the operate and reset points.
  - **Minimum:** Minimum number of degrees between actual open and closing set points.
- **Exposure Temperature:** Thermal environment of a device during application operation.
- **FLA (Full Load Amps):** Current taken from the line by the motor when the motor is yielding the rated hp at the rated voltage and frequency.
- **Life Cycles:** The endurance rating of the thermostat expressed in number of operations with stated electrical load applied. Temperature limit application = open or rise.
- **LRA (Locked Rotor Amps):** The amount of current the motor can be expected to draw under starting conditions when full voltage is applied, also known as starting inrush current.
- **Manual Reset:** A bimetal thermostat with a reset button that must be pressed to reset the contacts.
- **Open on Rise (OOR):** Refers to the operation of contacts. When the temperature rises to its set point the contacts open, terminating the circuit.
- **Overmold:** Encapsulation with an insulating material.
- **Phenolic:** Thermoset plastic used for the insulating body of the thermostat.
- **Set Point:** The nominal temperature at which the thermostat operates.
- **SPST (Single Pole/Single Throw):** A switch with one current path which can be either open or closed.
- **Tolerance:** The allowable range above and below the set point temperature.
- **Operate:** Change of state when the thermostat reaches its set point.
- **Reset:** Change of state when the thermostat returns to its original condition prior to operation.

## NOTES

- **Standard Temperature Characteristics Tables:**
  - **Temperatures:** Please consult applications engineering for temperature ranges, tolerances and differentials not noted. The operating temperature ranges include tolerances.
  - **Tolerances:** The ± tolerances given have been established after review of many thermostat applications. Attempts should be made to establish the widest acceptable tolerance possible.
- **UL and CSA Approvals:** 12,7 mm [0.5 in] thermostats are available with multiple agency approval for incorporation into equipment.
- **Fan control applications:** Require thermostat set points to be derated by 20°C from the equivalent temperature limit application. They also close on rise.






**A** Contacts
**B** Bimetal disc
**C** Ceramic transfer pin
**D** Metal closure
**E** Phenolic insulator
**F** Contact arm
**G** Metal sleeve (3004 only)
**H** Phenolic base
**I** Rivet (3004 only)
**J** Terminal

3001: Not UL/CSA approved.
3001U Vac only: UL/CSA approved.
3004 Vac and hp only: UL/CSA approved.

## Potential applications:

- Computers
- Office equipment
- Blood analyzers

## 3001/3004 Series Non-Hermetic Thermostats

The 3001/3004 Series is a factory pre-set, single-pole, single-throw thermal switch available to open and close on temperature rise. The 3001 has a low-profile that allows it to be used in most applications where a non-hermetic precision thermostat is required for tight tolerances and the 3004 has a metal sleeve rivet construction. A metal closure makes the phenolic base dustproof and also provides thermal and electrical isolation for the silver contacts.

**Table 1. 3001/3004 Series Standard Operating Temperature Characteristics***

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -17,8°C to 0°C [0°F to 31°F] | ±3,9 [±7] | ±5,0 [±9] | 16,7 to 33,3 [30 to 60] | – |
| | ±3,3 [±6] | ±3,9 [±7] | 8,3 to 16,1 [15 to 29] | – |
| 0°C to 26,1°C [32°F to 79°F] | ±3,3 [±6] | ±4,4 [±8] | 16,7 to 33,3 [30 to 60] | – |
| | ±2,8 [±5] | ±3,9 [±7] | 8,3 to 16,1 [15 to 29] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| 26,7°C to 93,3°C [80°F to 200°F] | ±2,8 [±5] | ±3,9 [±7] | 16,7 to 33,3 [30 to 60] | – |
| | ±2,8 [±5] | ±3,3 [±6] | 8,3 to 16,1 [15 to 29] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | - | ±2,2 [±4] | – | 4,4 [8] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±3,9 [±7] | ±4,4 [±8] | 16,7 to 44,4 [30 to 80] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 13,9 to 16,1 [25 to 29] | – |
| | ±3,3 [±6] | ±3,9 [±7] | 11,1 to 13,3 [20 to 24] | – |
| | ±3,9 [±7] | – | – | 8,3 [15] |
| | – | ±3,9 [±7] | – | 8,3 [15] |
| | ±3,3 [±6] | – | – | 6,7 [12] |
| | – | ±3,3 [±6] | – | 6,7 [12] |
| 149,4°C to 168,3°C [301°F to 335°F] | ±5,6 [±10] | ±6,7 [±12] | 22,2 to 44,5 [40 to 80] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 19,5 to 21,7 [35 to 39] | – |
| | ±4,4 [±8] | ±5,6 [±10] | 13,9 to 16,1 [30 to 34] | – |
| | ±5,6 [±10] | – | – | 11,1 [20] |
| | – | ±5,6 [±10] | – | 11,1 [20] |
| | ±4,4 [±8] | – | – | 10,0 [18] |
| | – | ±4,4 [±8] | – | 10,0 [18] |

**Operating temperatures are available in 5°C [8°F] increments between 40°C to 120°C [104°F to 248°F].*

**Table 2. 3001/3004 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | see Tables 3, 4, 5 |
| Voltage | 120 Vac |
| Operating temperature range | -17,8°C to 150°C [0°F to 302°F] |
| Environmental exposure range | -17,8°C to 177°C [0°F to 350°F] |
| Dielectric strength | MIL-STD-202 Method 301<br>3001: 1500 Vac 60 Hz, terminal to case<br>3004: 2000 Vac 60 Hz, terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B – 500 MOhm, 500 Vdc applied |
| Contact resistance | MIL-STD-202 Method 307 – 50 mOhm |
| Material:<br>base<br>contacts<br>terminals<br>closure<br>brackets | <br>phenolic<br>silver alloy<br>plated brass or steel<br>aluminum, stainless steel or brass<br>stainless steel or brass |
| Approvals | UL File E36103, CSA File LR21048 |
| Weight | 4 g [0.14 oz] (brackets and wire leads not included) |

**Table 3. 3001 Contact Ratings**

| Life Cycles | 30 Vac/dc | 120 Vac | 240 Vac |
|---|---|---|---|
| 5,000 | 7 A | 6 A | 3 A |
| 10,000 | 6.5 A | 5 A | 2.5 A |
| 25,000 | 6 A | 4 A | 2 A |
| 50,000 | 5.5 A | 3.3 A | 1.5 A |
| 100,000 | 5 A | 2 A | 1 A |

**Table 4. 3001U Contact Ratings**

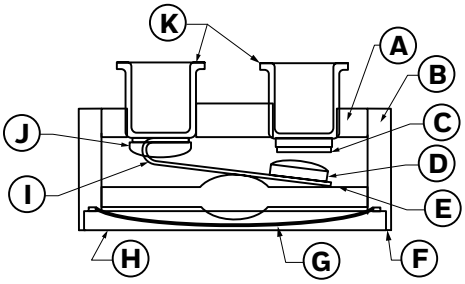
| Life Cycles | 120 Vac | 240 Vac | 250 Vac |
|---|---|---|---|
| 6,000 | 6 A | 1.5 A[1] | 1.5 A[1] |
| 6,000 | 1/10 hp | – | – |
| 100,000 | 3 A | – | – |

[1] *CSA Rating*

**Table 5. 3004 Contact Ratings**

| Life Cycles | 120 Vac | 250 Vac |
|---|---|---|
| 6,000 | 8 A[1,2] | 4.0 A[1,2] |
| 6,000 | 1/10 hp[1] | – |
| 100,000 | 4.0 A[1] | 2 A[1] |

[1] *UL Rating*
[2] *CSA Rating*




**A** Glass header
**B** Housing
**C** Contact
**D** Movable contact
**E** Actuator
**F** Laser weld
**G** Bimetal disc
**H** Cap
**I** Contact arm
**J** Weld cap
**K** Terminals

3150: Not UL approved.
3150U 120 Vac max.: UL/CSA approved.
3150UX 240 Vac max.: UL approved.

## Potential applications:

- Office equipment
- Computers
- Aircraft
- Electronic controls

## 3150 Series Low-Profile Hermetic Thermostats

The 3150 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. The case is laser welded to form a hermetically sealed steel housing, with a glass-to-metal seal at the terminal junction. The low profile and compact design allows it to be used in most applications that require miniaturization. Temperature calibrations are pre-set at the factory, and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise. A variety of mounting brackets and terminals is available.

**Table 6. 3150 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,89°C to -12,2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22,2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,6 [14 to 19] | – |
| -11,7°C to 107,2°C [11°F to 225°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 44,4 [20 to 80] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| | ±1,7 [±3] | – | – | 3,3 [6] |
| | – | ±1,7 [±3] | – | 3,3 [6] |
| 107,8°C to 148,9°C [226°F to 300°F] | ±4,4 [±8] | ±3,3 [±6] | 13,9 to 27,8 [25 to 50] | – |
| | ±5,6 [±7] | ±3,3 [±6] | 8,3 to 13,3 [15 to 34] | – |
| | ±3,3 [±6] | ±3,3 [±6] | 6,7 to 7,8 [12 to 14] | – |
| | ±2,8 [±5] | – | – | 6,7 [12] |
| | – | ±2,8 [±5] | – | 6,7 [12] |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,5 to 27,8 [35 to 50] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 13,9 to 18,9 [25 to 34] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,9 [±7] | – | – | 8,3 [15] |
| | – | ±3,9 [±7] | – | 8,3 [15] |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |

**Table 7. 3150 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | see Tables 8, 9 10 |
| Voltage | 120 Vac |
| Operating temp. range | -28,89°C to 177°C [-20°F to 350°F] |
| Environmental exposure range | -54°C to 260°C [-65°F to 500°F] |
| Dielectric strength | 3150: MIL-STD-202 Method 301 – 750 Vac, 60 Hz terminal to case<br>3150U: MIL-STD-202 Method 301 – 1250 Vac, 60 Hz terminal to case<br>3150UX: MIL-STD-202 Method 301 – 1500 Vac, 60 Hz terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B: 50 MOhm, 500 Vdc applied |
| Contact resistance | MIL-STD-202, Method 307: 50 mOhm |
| Hermetic seal | MIL-STD-202, Method 112 Cond. $1x10^{-5}$ Atm cc/sec |
| Moisture resistance | MIL-STD-202, Method 106 |
| Material:*<br>base<br>contacts<br>terminals<br>closure<br>brackets<br>plating | <br>cold rolled plated steel<br>silver alloy<br>nickel/iron alloy<br>hermetically sealed<br>cold rolled plated steel<br>copper/nickel QQ-N-290 |
| Marking | MIL-STD-1285 |
| Approvals | UL File E36103, CSA File LR21048 |
| Weight | 5,0 g [0.17 oz] (brackets and wire leads not included) |

**Value-added materials such as brackets and wires may affect operating temperature and environmental temperature ranges.*

**Table 8. 3150 Contact Ratings**

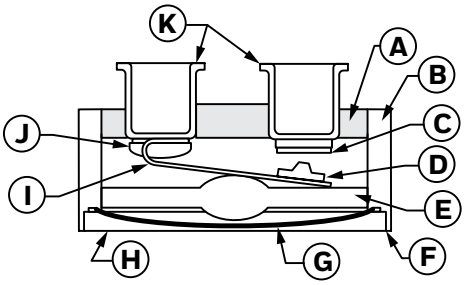
| Life Cycles | 30 Vac/dc | 120 Vac | 240 Vac |
|---|---|---|---|
| 5,000 | 6 A | 6 A | 1.5 A |
| 10,000 | 4 A | 4 A | 1.25 A |
| 25,000 | 3 A | 3 A | 1 A |
| 50,000 | 2 A | 2 A | 1 A |
| 100,000 | 2 A | 2 A | 1 A |

**Table 9. 3150U Contact Ratings**

| Life Cycles | 24 Vdc | 120 Vac |
|---|---|---|
| 6,000 | – | 3 A |
| 6,000 | – | 1/10 hp |
| 100,000 | 0.5 A | – |

**Table 10. 3150UX Contact Ratings**

| Life Cycles | 240 Vac |
|---|---|
| 6,000 | 1.5 A |
| 100,000 | 0.025 A |




**A** Glass header
**B** Housing
**C** Contact
**D** Movable contact
**E** Actuator
**F** Laser weld
**G** Bimetallic disc
**H** Cap
**I** Contact arm
**J** Weld cap
**K** Terminals

3156: Not UL/CSA approved.
3156U: UL/CSA approved.

### Potential applications:

- Dry circuit applications where space is limited

## 3156 Series Low-Level, Low Profile Hermetic Thermostats

The 3156 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. It has WE-1 gold alloy cross point contacts for use in potential low voltage applications The case is laser welded to form a hermetically-sealed steel housing, with glass-to-metal seal at the terminal junction. Its low silhouette and compact design allows use in most applications that require miniaturization. Temperature calibrations are pre-set at the factory and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise. A variety of mounting brackets and terminals is available.

**Table 11. 3156 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,89°C to -12,2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22,2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,6 [14 to 19] | – |
| -11,7°C to 107,2°C [11°F to 225°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 44,4 [20 to 80] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| | ±1,7 [±3] | – | – | 3,3 [6] |
| | – | ±1,7 [±3] | – | 3,3 [6] |
| 107,8°C to 148,9°C [226°F to 300°F] | ±4,4 [±8] | ±3,3 [±6] | 13,9 to 44,4 [25 to 80] | – |
| | ±3,9 [±7] | ±3,3 [±6] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,3 [±6] | ±3,3 [±6] | 6,7 to 7,8 [12 to 14] | – |
| | ±2,8 [±5] | – | – | 6,7 [12] |
| | – | ±2,8 [±5] | – | 6,7 [12] |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,5 to 27,8 [35 to 50] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 13,9 to 18,9 [25 to 34] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,9 [±7] | – | – | 8,3 [15] |
| | – | ±3,9 [±7] | – | 8,3 [15] |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |

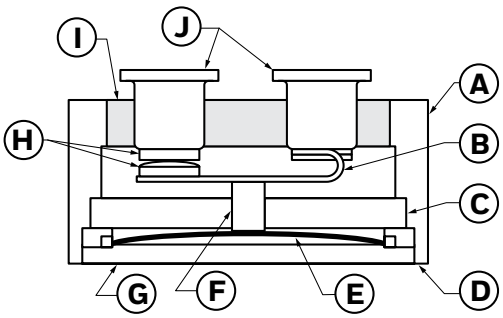
**Table 12. 3156 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 500 mA |
| Voltage | 50 Vdc |
| Operating temperature range | -28,89°C to 177°C [-20°F to 350°F] |
| Environmental exposure range | -54°C to 260°C [-65°F to 500°F] |
| Dielectric strength | 3156: MIL-STD-202 Method 301 – 750 Vac, 60 Hz terminal to case<br>3156U: MIL-STD-202 Method 301 – 1250 Vac, 60 Hz terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B – 50 MOhm, 500 Vdc applied |
| Contact resistance | MIL-STD-202, Method 307 – 50 mOhm |
| Hermetic seal | MIL-STD-202, Method 112 Cond. $1x10^{5}$ Atm cc/sec |
| Moisture resistance | MIL-STD-202, Method 106 |
| Material:*<br>base<br>contacts<br>terminals<br>closure<br>brackets<br>plating | <br>cold rolled plated steel<br>WE-1 gold alloy cross point<br>nickel/iron alloy<br>hermetically sealed<br>cold rolled plated steel<br>copper/nickel QQ-N-290 |
| Marking | MIL-STD-1285 |
| Approvals | UL File E36103, CSA File LR21048 |
| Weight | 5,0 g [0.17 oz] (brackets and wire leads not included) |

**Value-added materials such as brackets and wires may affect operating temperature and environmental temperature ranges.*

**Table 13. 3156 Contact Ratings**

| Life Cycles | 50 Vdc | 120 Vac |
|---|---|---|
| 100,000 | 500 mA | 100 mA |




**A** Housing
**B** Contact arm
**C** Ceramic insulator
**D** Laser weld
**E** Bimetal disc
**F** Ceramic transfer pin
**G** Cap
**H** Contacts
**I** Glass header
**J** Terminals

3100 120 Vac max.: Not UL/CSA approved.
3100U 120 V: UL approved.
3100UX 240 V: UL/CSA approved.

### Potential applications include high-temperature control for:

- Office equipment
- Computers
- Aircraft
- Electronic controls

## 3100 Series Hermetic Thermostats

The 3100 Series is a single-pole, single-throw switch activated by a snap-action bi-metal disc. The case is laser welded to form a hermetically-sealed steel housing, with a glass-to-metal seal at the terminal junction. Temperature calibrations are pre-set at the factory. Each unit is thermally and mechanically inspected and tamperproof. They are available to open or close on temperature rise. A variety of mounting brackets and terminals is available. Preconfigured REDI-TEMP versions are available. See page 31.

**Table 14. 3100 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,89°C to -12,2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22, 2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,6 [14 to 19] | – |
| | ±3,3 [±6] | – | – | 4,4 [8] |
| | – | ±3,3 [±6] | – | 4,4 [8] |
| -11,7°C to 93,3°C [11°F to 200°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 44,4 [20 to 80] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| | ±1,7 [±3] | – | – | 3,3 [6] |
| | – | ±1,7 [±3] | – | 3,3 [6] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±4,4 [±8] | ±3,3, [±6] | 13,9 to 44,4 [25 to 80] | – |
| | ±3,9 [±7] | ±3,3 [±6] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,3 [±6] | ±3,3 [±6] | 6,7 to 7,8 [12 to 14] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,4 to 44,4 [35 to 80] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 13,9 to 18,9 [25 to 34] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 13,3 [16 to 24] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,0 [14 to 18] | – |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |
| 177,2°C to 204,4°C [351°F to 400°F] | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 55,6 [40 to 100] | – |
| | ±8,3 [±15] | ±6,7 [±12] | 16,7 to 21,7 [30 to 39] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 11,1 to 16,1 [20 to 29] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 10,6 [16 to 19] | – |
| | ±3,3 [±6] | – | – | 8,3 [15] |
| | – | ±3,3 [±6] | – | 8,3 [15] |
| 205°C to 232,20°C [401°F to 450°F] | ±11,1 [±20] | ±8,3 [±15] | 22,2 to 55,6 [40 to 100] | – |
| 232,8°C to 260°C [451°F to 500°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 66,7 [60 to 120] | – |

**Table 15. 3100 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | see Tables 16, 17, 18 |
| Voltage | 30 Vac/dc |
| Operating temperature range | -28,89°C to 260°C [-20°F to 500°F] |
| Environmental exposure range | -62°C to 288°C [-80°F to 550°F] |
| Dielectric strength | 3100 and 3100U: MIL-STD-202 Method 301 – 1250 Vac, 60 Hz terminal to case<br>3100UX: MIL-STD-202 Method 301 – 1500 Vac, 60 Hz terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B – 50 MOhm, 500 Vdc applied |
| Contact resistance | MIL-STD-202, Method 307 – 50 mOhm |
| Hermetic seal | MIL-STD-202, Method 112 Cond. $1x10^5$ Atm cc/sec |
| Moisture resistance | MIL-STD-202, Method 106 |
| Material:*<br>base<br>contacts<br>terminals<br>closure<br>brackets<br>plating | <br>cold rolled plated steel<br>silver<br>nickel/iron alloy<br>hermetically sealed<br>cold rolled plated steel<br>copper/nickel QQ-N-290 |
| Marking | MIL-STD-1285 |
| Approvals | 3100U: UL File E36103 |
| Weight | 5,5 g [0.19 oz] (brackets and wire leads not included) |

**Value-added materials such as brackets and wires may affect operating temperature and environmental temperature ranges.*

**Table 16. 3100 Contact Ratings**

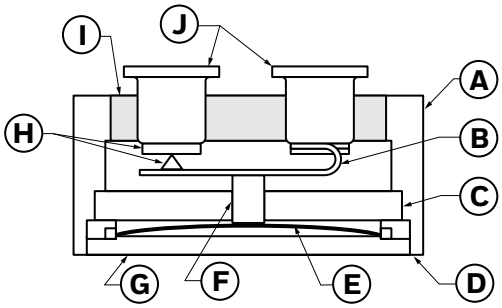
| Life Cycles | 30 Vac/dc | 120 Vac | 240 Vac |
|---|---|---|---|
| 5,000 | 7 A | 6 A | 3 A |
| 10,000 | 6.5 A | 5 A | 2.6 A |
| 25,000 | 6 A | 4 A | 2 A |
| 50,000 | 5.5 A | 3 A | 1.5 A |
| 100,000 | 5 A | 2 A | 1 A |

**Table 17. 3100U Contact Ratings**

| Life Cycles | 120 Vac |
|---|---|
| 6,000 | 6 A |
| 6,000 | 1/10 hp |
| 100,000 | 3 A |
| 30,000 | 3 A |
| 100,000 | 100 mA |

**Table 18. 3100UX Contact Ratings**

| Life Cycles | 240 Vac |
|---|---|
| 6,000 | 1.5 A |
| 6,000 | – |
| 100,000 | 0.025 A |
| 30,000 | – |
| 100,000 | – |




**A** Housing
**B** Contact arm
**C** Ceramic insulator
**D** Laser weld
**E** Bimetal disc
**F** Ceramic transfer pin
**G** Cap
**H** Gold-alloy contacts
**I** Glass header
**J** Terminals

3106: Not UL/CSA approved.
3106U: UL/CSA approved.

## Potential applications:

- Logic level
- Dry circuit applications

## 3106 Series Low-Level Hermetic Thermostats

The 3106 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. The case is laser welded to form a hermetically-sealed steel housing, with a glass-to-metal seal at the terminal junction. WE-1 gold alloy cross point contacts allow use in potential low voltage applications. Temperature calibrations are pre-set at the factory, and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise. A variety of mounting brackets and terminals is available.

**Table 19. 3106 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,89°C to -12,2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22, 2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,6 [14 to 19] | – |
| | ±3,3 [±6] | – | – | 4,4 [8] |
| | – | ±3,3 [±6] | – | 4,4 [8] |
| -11,7°C to 93,3°C [11°F to 200°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 44,4 [20 to 80] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| | ±1,7 [±3] | – | – | 3,3 [6] |
| | – | ±1,7 [±3] | – | 3,3 [6] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±4,4 [±8] | ±3,3 [±6] | 13,9 to 44,4 [25 to 80] | – |
| | ±3,9 [±7] | ±3,3 [±6] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,3 [±6] | ±3,3 [±6] | 6,7 to 7,8 [12 to 14] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,4 to 44,4 [35 to 80] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 13,9 to 18,9 [25 to 34] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 13,3 [16 to 24] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,0 [14 to 18] | – |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |
| 177,2°C to 204,4°C [351°F to 400°F] | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 55,6 [40 to 100] | – |
| | ±8,3 [±15] | ±6,7 [±12] | 16,7 to 21,7 [30 to 39] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 11,1 to 16,1 [20 to 29] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 10,6 [16 to 19] | – |
| | ±3,3 [±6] | – | – | 8,3 [15] |
| | – | ±3,3 [±6] | – | 8,3 [15] |

**Table 20. 3106 Series Specifications**

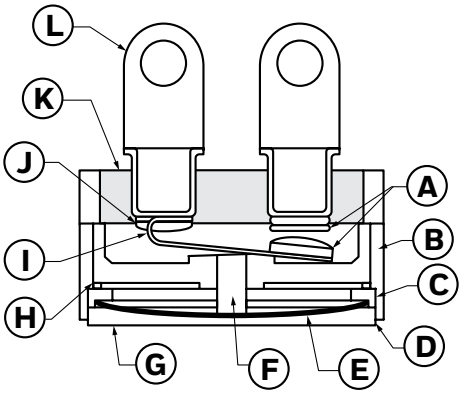
| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 500 mA |
| Voltage | 50 Vdc |
| Operating temperature range | -29°C to 204,4°C [-20°F to 400°F] |
| Environmental exposure range | -62°C to 260°C [80°F to 500°F] |
| Dielectric strength | MIL-STD-202 Method 301 – 1250 Vac 60 Hz, terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B – 50 MOhm, 500 Vdc applied |
| Contact resistance | MIL-STD-202, Method 307 – 25 mOhm |
| Hermetic seal | MIL-STD-202, Method 112 Cond. $1x10^5$ Atm cc/sec |
| Moisture resistance | MIL-STD-202, Method 106 |
| Material:*<br>base<br>contacts<br>terminals<br>closure<br>brackets<br>plating | <br>cold rolled plated steel<br>WE-1 gold alloy cross point<br>nickel/iron alloy<br>hermetically sealed<br>cold rolled plated steel<br>copper/nickel QQ-N-290 |
| Marking | MIL-STD 1285 |
| Approvals | UL File E36103, CSA File LR21048 |
| Weight | 5,5 g [0.19 oz] (brackets and wire leads not included) |

**Value-added materials such as brackets and wires may affect operating temperature and environmental temperature ranges.*

**Table 21. 3106 Contact Ratings**

| Life Cycles | 24 Vac[1] | 50 Vdc | 120 Vac |
|---|---|---|---|
| 100,000 | – | 500 mA | 100 mA |
| 6,000 | 25 Va (P.D.) | – | – |

*1: UL only*




**A** Contacts
**B** Ceramic insulator
**C** Disc retainer
**D** Laser weld
**E** Bimetal disc
**F** Ceramic transfer pin
**G** Cap
**H** Capping washer
**I** Contact arm
**J** Weld cap
**K** Glass header
**L** Terminal

## Potential applications:

- Commercial aircraft
- Industrial
- HVAC

## 3800 Series Industrial-Grade Thermostats for Severe Duty Applications

The 3800 Series uses the same materials and manufacture as Honeywell's military-grade thermostats, allowing them to be used where high levels of vibration and mechanical shock are common but a military device is not required. Originally designed for use in motor protection applications, the 3800 Series is now used in commercial aircraft, such as the Boeing 737, 747, 757, 767 and 777, and other applications where severe duty may be encountered.

**Table 22. 3800 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Standard Mean Differential °C [°F] | Optional Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,9°C to -12.2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22,2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,6 [14 to 19] | – |
| | ±3,3 [±6] | – | – | 4,4 [8] |
| | – | ±3,3 [±6] | – | 4,4 [8] |
| -11.7°C to 93.3°C [11°F to 200°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 44,4 [20 to 80] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| | ±1,7 [±3] | – | – | 3,3 [6] |
| | – | ±1,7 [±3] | – | 3,3 [6] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±4,4 [±8] | ±3,3 [±6] | 13,9 to 44,4 [25 to 80] | – |
| | ±3,9 [±7] | ±3,3 [±6] | 8,3 to 13,3 [15 to 24] | – |
| | ±3,3 [±6] | ±3,3 [±6] | 6,7 to 7,8 [12 to 14] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 7,8 [10 to 14] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,4 to 44,4 [35 to 80] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 13,9 to 18,9 [25 to 34] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 13,3 [16 to 24] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 7,8 to 10,0 [14 to 18] | – |
| | ±2,8 [±5] | – | – | 5,6 [10] |
| | – | ±2,8 [±5] | – | 5,6 [10] |
| 177,2°C to 204,4°C [351°F to 400°F] | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 55,6 [40 to 100] | – |
| | ±8,3 [±15] | ±6,7 [±12] | 16,7 to 21,7 [30 to 39] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 11,1 to 16,1 [20 to 29] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,9 to 10,6 [16 to 19] | – |
| | ±3,3 [±6] | – | – | 6,7 [12] |
| | – | ±3,3 [±6] | – | 6,7 [12] |
| 205°C to 232,2°C [401°F to 450°F] | ±11,1 [±20] | ±8,3 [±15] | 22,2 to 55,6 [40 to 100] | – |
| 232,8°C to 260°C [541°F to 500°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 66,7 [60 to 120] | – |

**Table 23. 3800 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | see Table 24 |
| Voltage | 120 Vac |
| Operating temperature range | -28.9°C to 260°C [-20°F to 500°F] |
| Environmental exposure range | -62°C to 288°C [-80°F to 550°F] |
| Dielectric strength | MIL-STD-202 Method 301, 1250 Vac 60 Hz, terminal to case |
| Insulation resistance | MIL-STD-202 Method 302 Cond. B, 50 MOhm min., 500 Vdc applied |
| Contact resistance | MIL-STD-202 Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112, Cond. $1x10^{-5}$ atm cc/sec |
| Vibration (random) | MIL-STD-202, Method 214, 30 Grms, 20 Hz to 2,000 Hz |
| Vibration (sinusoidal) | MIL-STD-202, Method 204, Cond. D 20 G, 20 Hz to 2,000 Hz |
| Mechanical shock | MIL-STD-202, Method 213, 400 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Acceleration | MIL-STD-202, Method 212, 20 G |
| Moisture resistance | MIL-STD-202, Method 106 |
| Material:* | |
| base | cold plated steel |
| contacts | silver alloy |
| terminals | Ni/Fe alloy |
| closure | hermetically sealed |
| brackets | cold rolled plated steel |
| Marking | MIL-STD-1285 |
| Weight | 7.5 g [0.26 oz] (brackets and wires not included) |

**Value-added materials such as brackets and wires may affect operating temperature and environmental temperature ranges.*

**Table 24. 3800 Contact Ratings**

| Life Cycles | 30 Vac/dc | 120 Vac | 240 Vac |
|---|---|---|---|
| 5,000 | 7 A | 6 A | 3 A |
| 10,000 | 6.5 A | 5 A | 2.5 A |
| 25,000 | 6 A | 4 A | 2 A |
| 50,000 | 5.5 A | 3 A | 1.5 A |
| 100,000 | 5 A | 2 A | 1 A |

## High Reliability Thermostats

Tables 21 and 22 provide overall performance qualifications for the High Reliability Thermostats. Figure 3 indicates potential applications.

**Table 25. Performance Qualifications, Part 1**

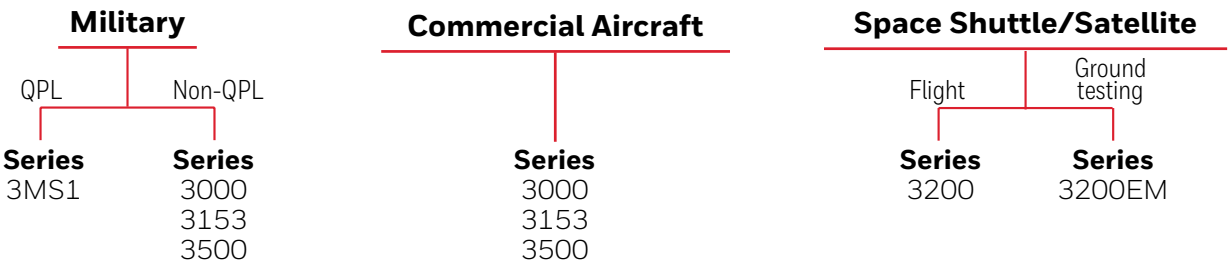
| Series | Shock | Vibration | Acceleration | Thermal Shock | Dielectric Strength |
|---|---|---|---|---|---|
| 3200 | MIL-STD-202 Method 213 – 750 G | MIL-STD-202 Method 204 – 30 G MIL-STD-202 Method 214 – 50 G | MIL-STD-202 Method 212 – 20 G | MIL-STD-202 Method 107 – Cond. B | MIL-STD-202 Method 301 – 1250 Vac |
| 3200EM | | | | | |
| 3MS1 QPL | MIL-STD-202 Method 213 – 100 G | MIL-STD-202 Method 204 – 20 G | | | |
| 3500 | MIL-STD-202 Method 213 – 400 G | | | | |
| 3153 | MIL-STD-202 Method 213 – 100 G | | | | |
| 3000 | | | N/A | | |

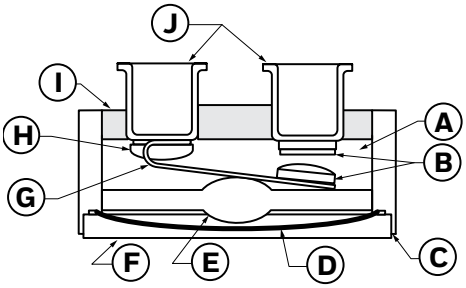
**Table 26. Performance Qualifications, Part 2**

| Series | Insulation Resistance | Contact Resistance | Hermetic Seal | Moisture Resistance | Salt Spray* |
|---|---|---|---|---|---|
| 3200 | MIL-STD-202 Method 302 – 500 MOhm | MIL-STD-202 Method 307 – 0.025 Ohm max. | MIL-STD-202 Method 112 – Cond. C | MIL-STD-202 Method 106 | MIL-STD-202 Method 101 – Cond. B |
| 3MS1 QPL | | MIL-STD-202 Method 307 – 0.050 Ohm max. | | | |
| 3500 | | | | | |
| 3153 | | | | | |
| 3000 | | | MIL-STD-202 Method 112 - Cond. D | | |

**Not applicable to 3153 and 3500 Series with mounting brackets and operating temperatures exceeding 162,8°C [325°F].*

**Figure 3. High Reliability Thermostat Applications**






**A** Backfill dry gas
**B** Contacts
**C** Laser weld
**D** Bimetal disc
**E** Ceramic transfer pin
**F** Cap
**G** Contact arm
**H** Weld cap
**I** Glass header
**J** Terminals

## Potential applications:

- Non-QPL military
- Commercial aircraft
- Aircraft batteries

## 3153 Series Low-Profile Thermostats

The 3153 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. The case is laser welded to form a hermetically-sealed steel housing, with a glass-to-metal seal at the terminal junction. The low profile and compact design allow use in most applications that require miniaturization. Temperature calibrations are pre-set at the factory and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise.

**Table 27. 3153 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Nominal Differential °C [°F] | Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -28,89°C to -12,2°C [-20°F to 10°F] | ±5,6 [±10] | ±4,4 [±8] | 16,7 to 22,2 [30 to 40] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 16,1 [20 to 29] | – |
| | ±3,9 [±7] | ±3,9 [±7] | 11,1 to 16,1 [20 to 29] | – |
| -11,7°C to 9,4°C [11°F to 49°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 22,2 [20 to 40] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 6,1 to 7,8 [11 to 14] | – |
| | **Open or Close Only** | | | |
| | ±2,2 [±4] | ±2,2 [±4] | – | 4,4 [8] |
| 10°C to 107,2°C [50°F to 225°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 22,2 [20 to 40] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 6,1 to 7,8 [11 to 14] | – |
| | **Open or Close Only** | | | |
| | ±2,2 [±4] | ±2,2 [±4] | – | 4,4 [8] |
| 107,8°C to 148,9°C [226°F to 350°F] | ±2,8 [±5] | ±2,8 [±5] | 11,1 to 22,2 [20 to 40] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 10,6 [15 to 19] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 6,1 to 7,8 [11 to 14] | – |
| | **Open or Close Only** | | | |
| | ±2,2 [±4] | ±2,2 [±4] | – | 6,7 [12] |
| 149,4°C to 176,7°C [301°F to 350°F] | ±6,7 [±12] | ±5,6 [±10] | 19,5 to 27,8 [35 to 50] | |
| | ±5,6 [±10] | ±5,6 [±10] | 13,6 to 18,9 [25 to 34] | |
| | ±4,4 [±8] | ±4,4 [±8] | 8,3 to 13,3 [15 to 24] | |
| | **Open or Close Only** | | | |
| | ±3,9 [±7] | ±3,9 [±7] | – | 8,3 [15] |

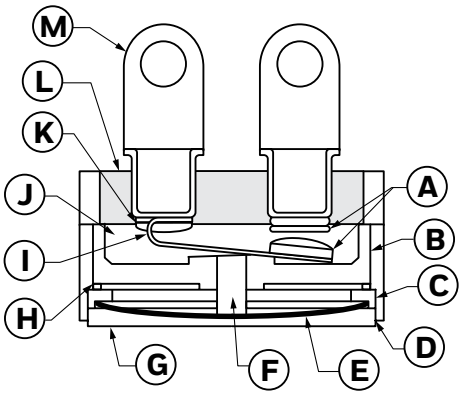
**Table 28. 3153 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 6 A resistive |
| Voltage | 28 Vac/dc |
| Operating temperature range | -29°C to 177°C [-20°F to 350°F] |
| Environmental exposure range | -65°C to 260°C [-85°F to 500°F] |
| Dielectric strength | MIL-STD-202, Method 301, 1250 Vac |
| Insulation resistance | MIL-STD-202, Method 302, 500 MOhm |
| Contact resistance | MIL-STD-202, Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112, Cond. C |
| Moisture resistance | MIL-STD-202, Method 106 |
| Shock | MIL-STD-202, Method 213, 100 G |
| Vibration | MIL-STD-202, Method 204, 20 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Salt spray* | MIL-STD-202, Method 101, Cond. B |
| Housing material | cold rolled plated steel |
| Marking | MIL-STD-1285 |
| Weight | 6 g [0.12 oz] (brackets not included) |
| Approvals | Acceptance testing performed in accordance with MIL-PRF-24236, Table III. |

**Not applicable to thermostats with brackets or those operating at temperatures above 162,8°C [325°F].*

**Table 29. 3153 Contact Ratings**

| Life Cycles | 30 Vac/Vdc | 120 Vac | 240 Vac |
|---|---|---|---|
| 5,000 | 6 A | 4 A | 1.5 A |
| 10,000 | 4 A | 4 A | 1.25 A |
| 25,000 | 3 A | 3 A | 1 A |
| 50,000 | 2 A | 2 A | 1 A |
| 100,000 | 2 A | 2 A | 1 A |




**A** Contacts
**B** Ceramic insulator
**C** Ceramic pin guide
**D** Disc retainer
**E** Laser weld
**F** Bimetal disc
**G** Ceramic transfer pin
**H** Cap
**I** Contact arm
**J** Backfill dry gas
**K** Weld cap
**L** Glass header
**M** Terminals

## Potential applications:

- Military aircraft
- Commercial aircraft
- Military vehicles

## 3500 Series Military Thermostats

The 3500 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. It meets or exceeds the requirements of MIL-PRF-24236 and is designed for potential military and commercial aircraft applications. It is not QPL listed (see the 3MS1 QPL Series). The case is laser welded to form a hermetically sealed steel housing, with a glass-to-metal seal at the terminal junction. Temperature calibrations are pre-set at the factory, and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise.

**Table 30. 3500 Series Standard Operating Temperature Characteristics**

| Operating Temperature Range | Tolerance | | Nominal Differential °C [°F] | Max. Differential °C [°F] |
|---|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | | |
| -45,6°C to 17,8°C [-50°F to 0°F] | ±8,3 [±15] | ±8,3 [±15] | 16,7 to 33,3 [30 to 60] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] | – |
| -17,2°C to 93,3°C [1°F to 200°F] | ±8,3 [±15] | ±8,3 [±15] | 16,7 to 33,3 [30 to 60] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 22,2 [10 to 40] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±8,3 [±15] | ±8,3 [±15] | 16,7 to 33,3 [30 to 60] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] | – |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 22,2 [10 to 40] | – |
| | ±2,2 [±4] | – | – | 4,4 [8] |
| | – | ±2,2 [±4] | – | 4,4 [8] |
| 149,4°C to 176,6°C [301°F to 350°F] | ±8,3 [±15] | ±8,3 [±15] | 16,7 to 33,3 [30 to 60] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] | – |
| | ±2,8 [±5] | – | – | 5,5 [10] |
| | – | 2,8 [±5] | – | 5,5 [10] |
| 177,2°C to 204,4°C [351°F to 400°F] | ±8,3 [±15] | ±8,3 [±15] | 16,7 to 44,4 [30 to 80] | – |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] | – |
| | ±4,4 [±8] | ±4,4 [±8] | 8,3 to 10,6 [15 to 19] | – |
| | ±3,3 [±6] | – | – | 8,3 [15] |
| | – | ±4,4 [±8] | – | 8,3 [15] |

**Table 31. 3500 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 5 A resistive |
| Voltage | 28 Vdc |
| Operating temperature range | -51°C to 204°C [-60°F to 400°F] |
| Environmental exposure range | -65°C to 260°C [-85°F to 500°F] |
| Dielectric strength | MIL-STD-202, Method 301, 1250 Vac |
| Insulation resistance | MIL-STD-202, Method 302, 500 MOhm |
| Contact resistance | MIL-STD-202, Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112, Cond. C |
| Moisture resistance | MIL-STD-202, Method 106 |
| Shock | MIL-STD-202, Method 213, 400 G |
| Vibration | MIL-STD-202, Method 204, 20 G |
| Acceleration | MIL-STD-202, Method 212, 20 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Salt spray* | MIL-STD-202, Method 101, Cond. B |
| Housing material | cold rolled plated steel |
| Marking | MIL-STD-1285 |
| Weight | 7,5 g [0.26 oz] (brackets and lead wire not included) |

**Not applicable to thermostats with brackets or those operating at temperatures above 162,8°C [325°F].*

**Table 32. 3500 Contact Ratings**

| Load Type | Life Cycles | 28 Vac/dc | 115 Vac |
|---|---|---|---|
| Resistive | 100,000 | 5 A | 2 A |
| Inductive | 100,000 | 2.5 A | 1 A |
| Lamp | 100,000 | 1 A | 0.5 A |

## Potential applications:

- HVAC
- Liquid bath control
- Transportation

### 3000 Series Custom Packaged Thermostats

The 3000 Series is customizable. Features include internal and external design options, all-welded, hermetically sealed stainless steel construction, customized probe length up to 152 mm [6 in] and a hermetic connector or potted construction.

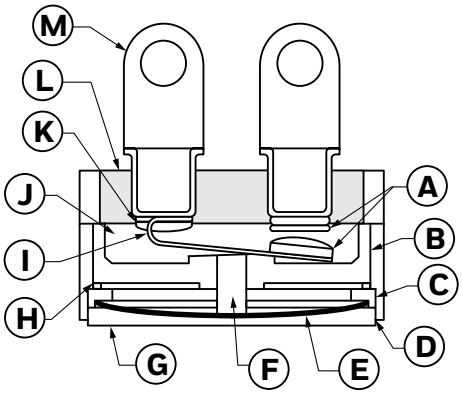
A typical 3000 Series configuration includes:

- 3500 Series or other thermostat
- Termination selection
- Housing selection
- Customized part number

**Table 33. 3000 Series Specifications***

| Characteristic | Parameter |
|---|---|
| Switch type | custom |
| Reset type | Automatic |
| Amperage | custom |
| Voltage | custom |
| Operating temperature range | -40°C to 204°C [-40°F to 400°F] |
| Environmental exposure range | -65°C to 260°C [-85°F to 500°F] |
| Dielectric strength | MIL-STD-202, Method 301, 1250 Vac |
| Insulation resistance | MIL-STD-202, Method 302, 500 MOhm |
| Contact resistance | MIL-STD-202, Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112 Cond. D |
| Moisture resistance | MIL-STD-202, Method 106 |
| Shock | MIL-STD-202, Method 213, 100 G |
| Vibration | MIL-STD-202, Method 204, 20 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Salt spray | MIL-STD-202, Method 101, Cond. B |
| Housing material | stainless steel |
| Weight | 72 g [2.5 oz] |

**Specifications are applicable to the 3500 internal hermetic connector design. Parameters will be affected by internal series and design selected. Please consult Honeywell.*




**A** Contacts
**B** Ceramic insulator
**C** Ceramic pin guide
**D** Disc retainer
**E** Laser weld
**F** Bimetal disc
**G** Ceramic transfer pin
**H** Cap
**I** Contact arm
**J** Backfill dry gas
**K** Weld cap
**L** Glass header
**M** Terminals

## Potential applications:

- Military aircraft
- Military vehicles

## 3MS1 QPL Series Military Thermostats

The 3MS1 QPL Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. It is qualified to MIL-PRF-24236, Type 1, Class 4, and is QPL listed for military applications. The case is laser welded to form a hermetically-sealed steel housing, with a glass-to-metal seal at the terminal junction. Temperature calibrations are pre-set at the factory and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise. Available mounting brackets and terminal configurations are in accordance with the M-24236/1 Military Specification Sheet.

**Table 34. 3MS1 QPL Series Standard Temperature Characteristics**

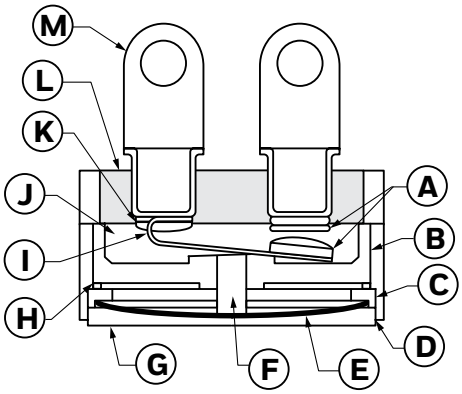
| Temperature Setpoint Range | Tolerance | | Nominal Differential °C [°F] |
|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | |
| -45,6°C to 17,8°C [-50°F to 0°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 55,5 [60 to 100] |
| | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 44,4 [40 to 80] |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] |
| -17,2°C to 93,3°C [1°F to 200°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 55,5 [60 to 100] |
| | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 44,4 [40 to 80] |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] |
| | ±4,4 [±8] | ±4,4 [±8 | 11,1 to 27,8 [20 to 50] |
| | ±2,8 [±5] | ±2,8 [±5 | 5,6 to 22,2 [10 to 40] |
| | ±1,7 [±3] | ±1,7 [±3] | 5,6 to 11,1 [10 to 20] |
| 93,9°C to 148,9°C [201°F to 300°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 55,5 [60 to 100] |
| | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 44,4 [40 to 80] |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] |
| | ±4,4 [±8] | ±4,4 [±8 | 11,1 to 27,8 [20 to 50] |
| | ±2,8 [±5] | ±2,8 [±5] | 5,6 to 22,2 [10 to 40] |
| 149,4°C to 191°C [301°F to 375°F] | ±13,9 [±25] | ±13,9 [±25] | 33,3 to 55,5 [60 to 100] |
| | ±8,3 [±15] | ±8,3 [±15] | 22,2 to 44,4 [40 to 80] |
| | ±5,6 [±10] | ±5,6 [±10] | 16,7 to 33,3 [30 to 60] |
| | ±4,4 [±8] | ±4,4 [±8] | 11,1 to 27,8 [20 to 50] |

**Table 35. 3MS1 QPL Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 5 A resistive |
| Voltage | 28 Vac/dc |
| Operating temperature range | -46°C to 190°C [-50°F to 375°F] |
| Environmental exposure range | -65°C to 260°C [-85°F to 500°F] |
| Dielectric strength | MIL-STD-202, Method 301, 1250 Vac |
| Insulation resistance | MIL-STD-202, Method 302, 500 MOhm |
| Contact resistance | MIL-STD-202, Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112, Cond. C |
| Moisture resistance | MIL-STD-202, Method 106 |
| Shock | MIL-STD-202, Method 213, 100 G |
| Vibration | MIL-STD-202, Method 204, 20 G |
| Acceleration | MIL-STD-202, Method 212, 20 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Salt spray | MIL-STD-202, Method 101, Cond. B |
| Housing material | cold rolled plated steel |
| Marking | MIL-STD-1285 |
| Approvals | QPL MIL-PRF-24236/1 |
| Weight | 7,5 g [0.26 oz] |

**Table 36. 3MS1 QPL Series Contact Ratings**

| Load Type | Life Cycles | 8 Vac/dc | 115 Vac |
|---|---|---|---|
| Resistive | 100,000 | 5 A | 2 A |
| Inductive | 100,000 | 2.5 A | 1 A |
| Lamp | 100,000 | 1 A | 0.5 A |




**A** Contacts
**B** Ceramic insulator
**C** Ceramic pin guide
**D** Disc retainer
**E** Laser weld
**F** Bimetal disc
**G** Ceramic transfer pin
**H** Cap
**I** Contact arm
**J** Backfill dry gas
**K** Weld cap
**L** Glass header
**M** Terminals

## Potential applications:

- Satellites
- Rockets
- Missiles

## 3200 Series High Reliability Aerospace Thermostats

The 3200 Series is a single-pole, single-throw switch activated by a snap-action bimetal disc. It is manufactured and tested to meet or exceed critical military and aerospace specifications for spaceflight use, including temperature stability, shock, vibration and cleanliness. The case is laser welded to form a hermetically-sealed steel housing, with a glass-to-metal seal at the terminal junction. Temperature calibrations are pre-set at the factory and each unit is thermally and mechanically inspected. It is available to open or close on temperature rise.

The 3200EM (Engineering Model) version is produced using the same components as the 3200, but is not subjected to the rigors of extensive flight testing. It is specifically designed for ground and experimental testing.

**Table 37. 3200 Series Standard Temperature Characteristics**

| Temperature Setpoint Range | Tolerance | | Nominal Differential °C [°F] |
|---|---|---|---|
| | Open °C [°F] | Close °C [°F] | |
| -51,1°C to -29,4°C [-60°F to 21°F] | consult factory | | consult factory |
| -28,9°C to 17,8°C [-20°F to 0°F] | ±4,4 [±8] | ±3,9 [±7] | 16,0 to 16,7 [19 to 30] |
| | ±3,9 [±7] | ±3,3 [±6] | 9,4 to 15,0 [17 to 27] |
| | ±3,3 [±6] | ±3,3 [±6] | 8,9 to 14,5 [16 to 26] |
| | ±3,3 [±6] | ±2,8 [±5] | 8,3 to 13,9 [15 to 25] |
| | ±2,8 [±5] | ±2,8 [±5] | 8,3 to 13,9 [15 to 25] |
| 7,2°C to 37,8°C [1°F to 100°F] | ±3,9 [±7] | ±3,3 [±6] | 9,4 to 15,0 [17 to 27] |
| | ±3,3 [±6] | ±3,3 [±6] | 8,9 to 13,9 [16 to 25] |
| | ±3,3 [±6] | ±2,8 [±5] | 8,3 to 13,9 [15 to 25] |
| | ±2,8 [±5] | ±2,8 [±5] | 7,8 to 13,9 [14 to 25] |
| | ±2,8 [±5] | ±2,2 [±4] | 7,2 to 13,9 [13 to 25] |
| | ±2,2 [±4] | ±2,2 [±4] | 6,7 to 13,9 [12 to 25] |
| 38,3°C to 93,3°C [101°F to 200°F] | ±5,0 [±9] | ±4,4 [±8] | 11,7 to 16,7 [21 to 30] |
| | ±3,9 [±7] | ±3,3 [±6] | 9,4 to 16,7 [17 to 30] |
| | ±3,3 [±6] | ±2,8 [±5] | 8,3 to 16,7 [15 to 30] |
| | ±2,8 [±5] | ±2,8 [±5] | 7,8 to 13,9 [14 to 25] |
| 93,9°C to 162,8°C [200°F to 325°F] | ±5,6 [±10] | ±5,0 [±9] | 12,8 to 19,4 [23 to 35] |
| | ±4,4 [±8] | ±3,3 [±6] | 10,0 to 19,4 [18 to 35] |
| | ±3,9 [±7] | ±3,3 [±6] | 9,4 to 19,4 [17 to 35] |
| | ±3,3 [±6] | ±3,3 [±6] | 8,9 to 14,5 [16 to 35] |

**Table 38. 3200 Series Specifications**

| Characteristic | Parameter |
|---|---|
| Switch type | SPST |
| Reset type | automatic |
| Amperage | 5 A resistive |
| Voltage | 28 Vac/dc |
| Operating temperature range | -51°C to 162,8°C [-60°F to 325°F] |
| Environmental exposure range | -65°C to 177°C [-85°F to 350°F] |
| Dielectric strength | MIL-STD-202, Method 301, 1250 Vac |
| Insulation resistance | MIL-STD-202, Method 302, 500 MOhm |
| Contact resistance | MIL-STD-202, Method 307, 50 mOhm max. |
| Hermetic seal | MIL-STD-202, Method 112, Cond. C |
| Moisture resistance | MIL-STD-202, Method 106 |
| Shock | MIL-STD-202, Method 213, 750 G |
| Vibration | MIL-STD-202, Method 204, 30 G; MIL-STD-202, Method 214, 50 G |
| Thermal shock | MIL-STD-202, Method 107, Cond. B |
| Salt spray | MIL-STD-202, Method 101, Cond. B |
| Housing material | cold rolled plated steel |
| Marking | MIL-STD-1285 |
| Weight | 8,5 g [0.30 oz] (brackets and end wires not included) |

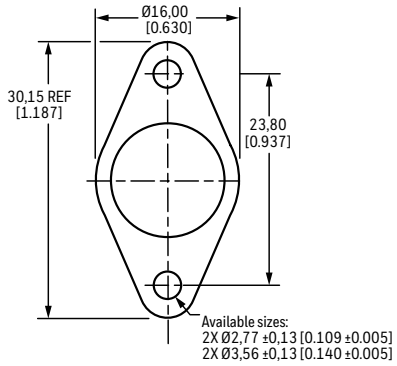
**Table 39. 3200 Series Contact Ratings**

| Load Type | Life Cycles | 28 Vac/dc | 115 Vac |
|---|---|---|---|
| Resistive | 100,000 | 5 A | 2 A |
| Inductive | 100,000 | 2.5 A | 1 A |
| Lamp | 100,000 | 1 A | 0.5 A |

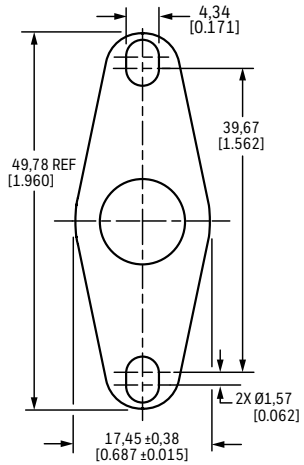
**MOUNTING HARDWARE (All dimensions for reference only: mm/[in])**

**Figure 4: 3001/3004 Series Brackets**

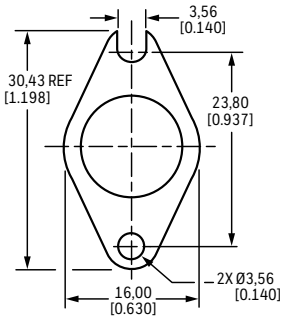
**B-201**




**B-206**




**B-209**

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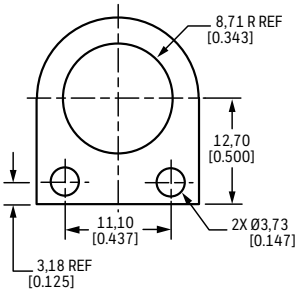
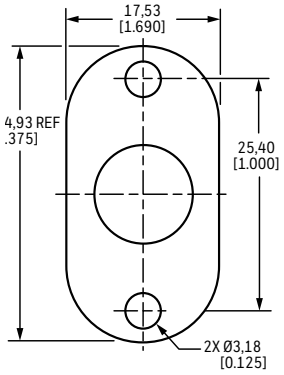



**B-212**




**B-213**

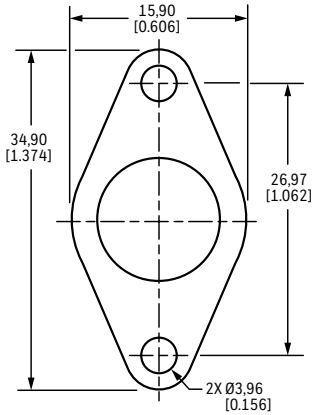
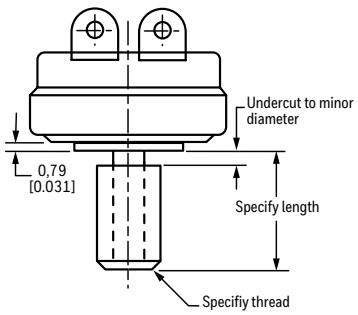



**Figure 5: 3001/3004 Series Cap Studs**

**Round:**

**S334** 4-40 **S343** 10-32
**S337** 6-32 **S346** M3 x 0.5
**S340** 8-32 **S349** M4 x 0.7




**Hex:**

**HS367** 6-32 **HS376** M3 x 0.5
**HS370** 8-32 **HS379** M4 x 0.7
**HS373** 10-32 **HS372** M5 x 0.8

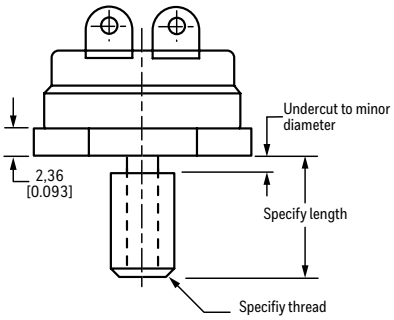



**Figure 6: 3001/3004 Series Radius Cap**

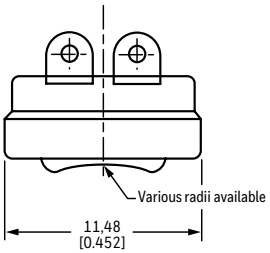
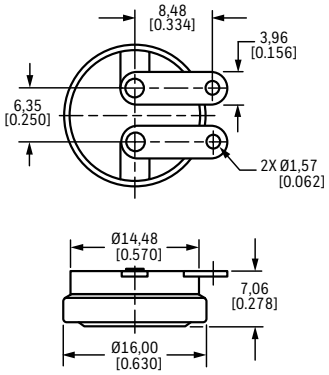
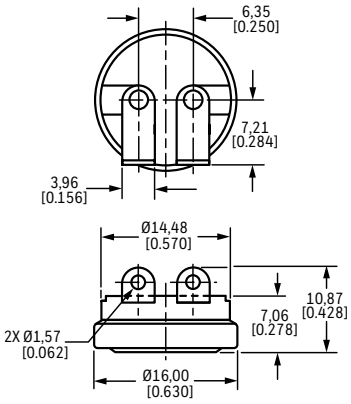


**Figure 7: 3001 Series Terminals**

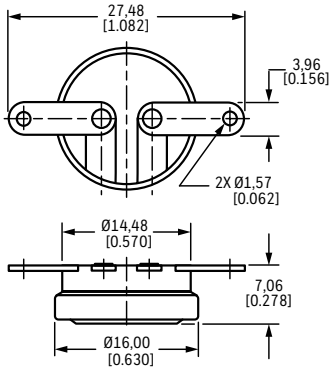
**T123**



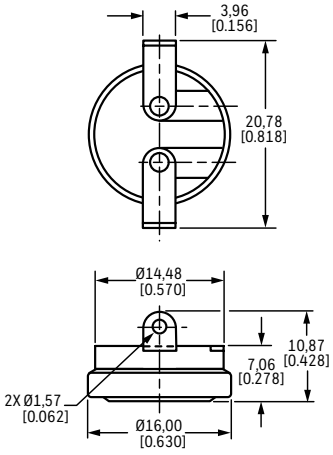

**T124**



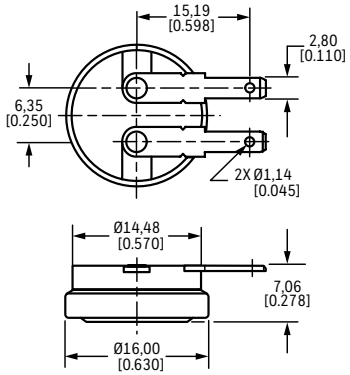

**T125**



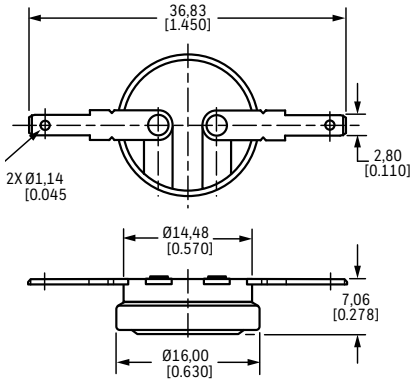

**T126**




**T127**




**T128**




**T177**

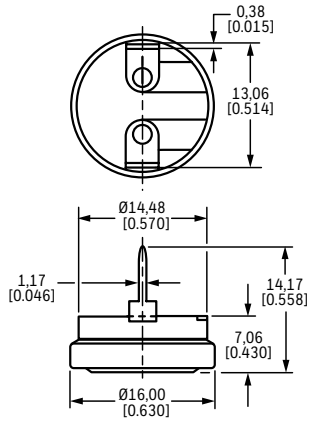
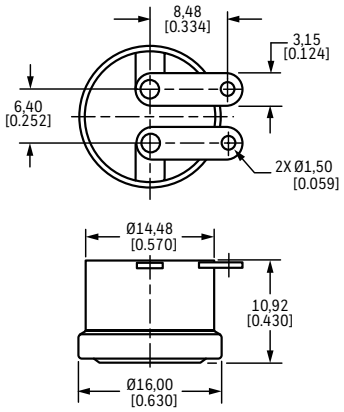
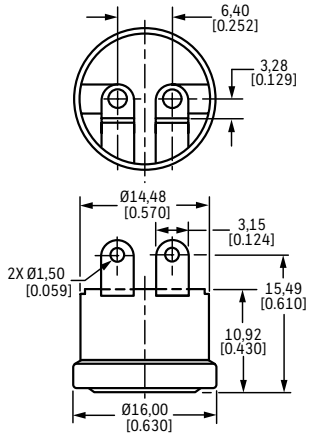


**Figure 8: 3004 Series Terminals**

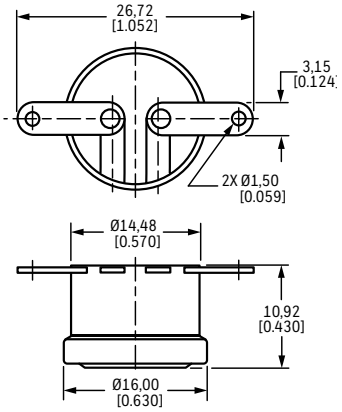
**T123**



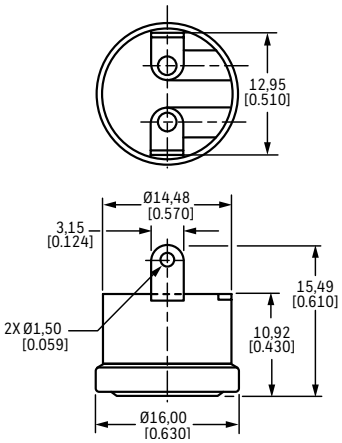

**T124**



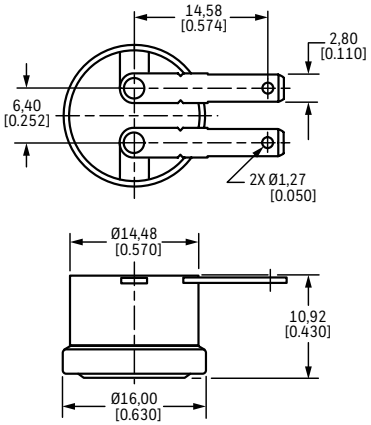

**T125**



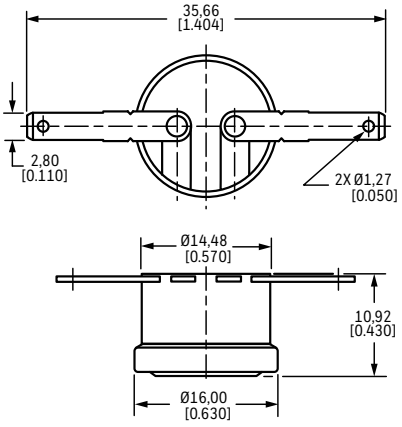

**T126**




**T127**




**T128**




**T177**

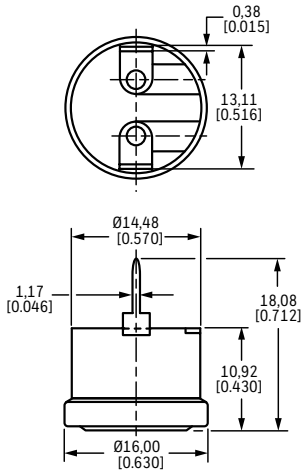
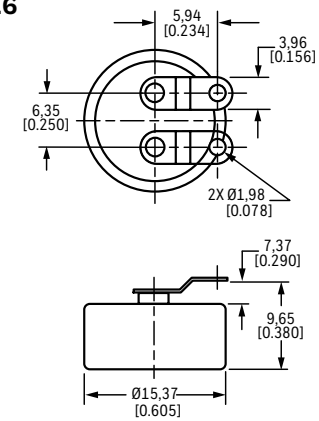
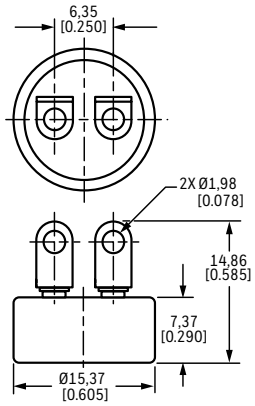


**Figure 9: 3100/3106 Series Terminals**

**T116**




**T117**




**T120**

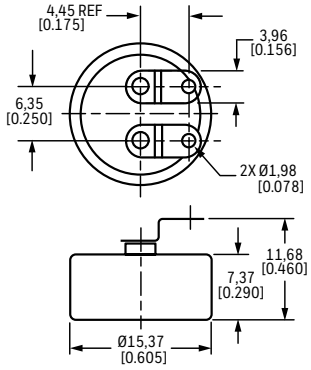
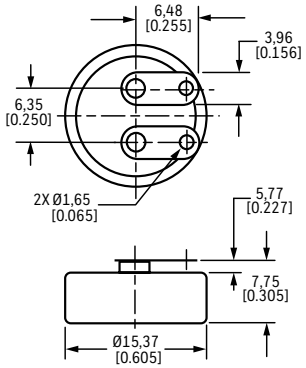
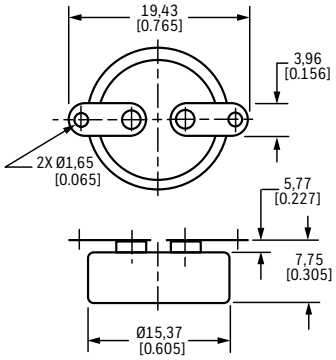



**Figure 10: 3150/3156 Series Terminals**

**T109**




**T110**




**T111**

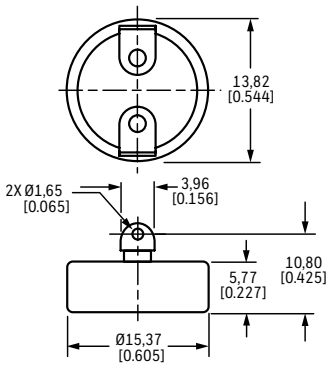
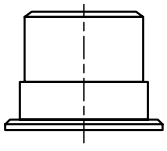
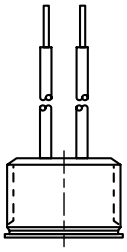



**Figure 11: 3000 Series Terminations**

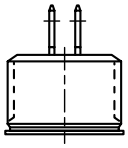
**0**
Hermetic connector, bayonet or threaded



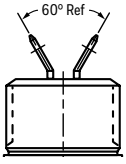
**3**
1/2-1/4 NPT thread, wire leads and lengths as required



**4a**
1/2-1/4 NPT thread, 0.25 in male quick connect terminals

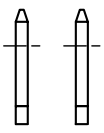


**4b**
1/2-1/4 NPT thread, 0.25 in male quick connect terminals




**1**
Wire leads and lengths as required

**2a**
0.25 in male quick connect terminals



**2b**
0.25 in male quick connect terminals

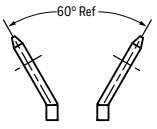
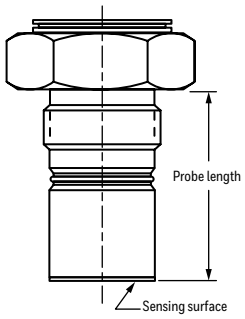


**Figure 12: 3000 Series Housings: Used with Terminations 0, 1, 2a, 2b, 3, 4a, 4b only**

**3000-45X**
3/4–16 UNF-3A thread, 1 in hex




**3000-55X**
1/2-14 NPT thread, 7/8 in hex

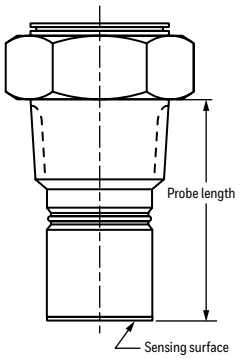
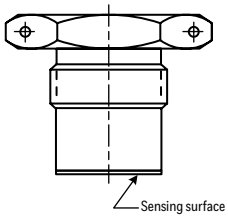



**Figure 13. 3000 Series Housings: Used with Terminations 1, 2a, 2b only**

**3000-141**
3/4–16 UNF-3A thread, 1 in hex




**3000-53X**
1/2-14 NPT thread, 7/8 in hex

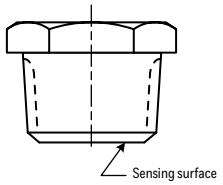



**Figure 14: Overmolds Used on All Series (3100/3106 Shown)**

Overmolds provide electrical isolation. Examples in this figure show the 3100/3106 Series; however, overmolds may be used on other series. Please consult Honeywell.

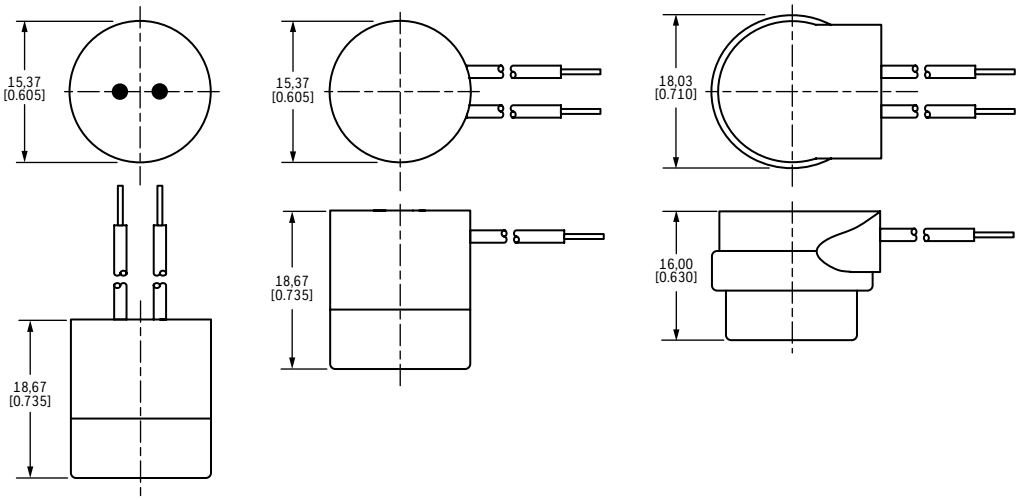
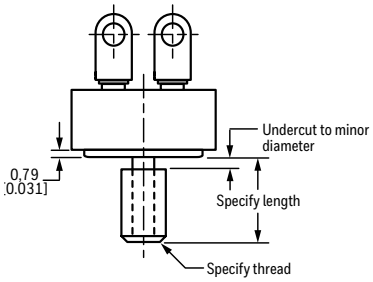
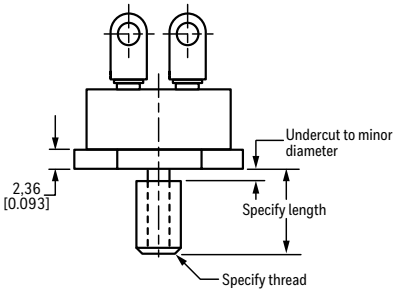



**Figure 15: Cap Studs Used on All Series**

**Round:**
**S303** 4-40
**S306** 6-32
**S330** 6-40
**S309** 8-32
**S312** 10-24
**S315** 10-32
**S324** 1/4-28
**S318** M3 x 0.5
**S321** M4 x 0.7
**S327** M5 x 0.8




**Hex[1]:**
**HS303** 4-40
**HS306** 6-32
**HS330** 6-40
**HS309** 8-32
**HS312** 10-24
**HS315** 10-32
**HS324** 1/4-28
**HS318** M3 x 0.5
**HS321** M4 x 0.7
**HS327** M5 x 0.8




[1]Not available on 3150, 3153, 3156 Series

## 3100U REDI-TEMP Series

See pages 10 and 11 for specifications and applications.

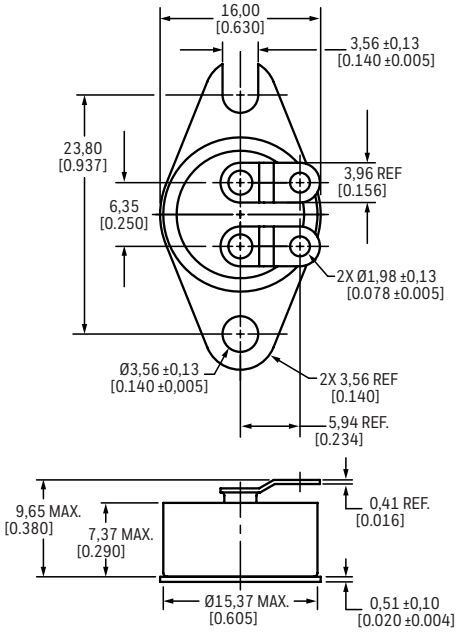
**Table 40. 3100U REDI-TEMP Series Open on Rise**

| Catalog Listing | Open Temp. °C [°F] | Open Tolerance °C [°F] | Close Temp. °C [°F] | Close Tolerance °C [°F] |
|---|---|---|---|---|
| 3100U-3-1431 | 4 [40] | ±3 [±5] | -7 [20] | ±3 [±5] |
| 3100U-3-1432 | 10 [50] | ±3 [±5] | -1 [30] | ±3 [±5] |
| 3100U-3-1433 | 16 [60] | ±3 [±5] | 4 [40] | ±3 [±5] |
| 3100U-3-1434 | 21 [70] | ±3 [±5] | 10 [50] | ±3 [±5] |
| 3100U-3-1435 | 27 [80] | ±3 [±5] | 16 [60] | ±3 [±5] |
| 3100U-3-1436 | 32 [90] | ±3 [±5] | 21 [70] | ±3 [±5] |
| 3100U-3-1437 | 38 [100] | ±3 [±5] | 27 [80] | ±3 [±5] |
| 3100U-3-1438 | 43 [110] | ±3 [±5] | 32 [90] | ±3 [±5] |
| 3100U-3-1439 | 49 [120] | ±3 [±5] | 38 [100] | ±3 [±5] |
| 3100U-3-1440 | 54 [130] | ±3 [±5] | 43 [110] | ±3 [±5] |
| 3100U-3-1441 | 60 [140] | ±3 [±5] | 49 [120] | ±3 [±5] |
| 3100U-3-1442 | 66 [150] | ±3 [±5] | 54 [130] | ±3 [±5] |
| 3100U-3-1443 | 71 [160] | ±3 [±5] | 60 [140] | ±3 [±5] |
| 3100U-3-1444 | 77 [170] | ±3 [±5] | 66 [150] | ±3 [±5] |
| 3100U-3-1445 | 82 [180] | ±3 [±5] | 71 [160] | ±3 [±5] |
| 3100U-3-1446 | 88 [190] | ±3 [±5]] | 77 [170] | ±3 [±5] |
| 3100U-3-1447 | 93 [200] | ±3 [±5] | 82 [180] | ±3 [±5] |
| 3100U-3-1448 | 99 [210] | ±5 [±8] | 85 [185] | ±4 [±6] |
| 3100U-3-1449 | 104 [220] | ±5 [±8] | 91 [195] | ±4 [±6] |
| 3100U-3-1450 | 110 [230] | ±5 [±8] | 96 [205] | ±4 [±6] |
| 3100U-3-1451 | 116 [240] | ±5 ± [8] | 102 [215] | ±4 [±6] |
| 3100U-3-1452 | 121 [250] | ±5 [±8] | 107 [225] | ±4 [±6] |

**Table 41. 3100U REDI-TEMP Series Close on Rise**

| Catalog Listing | Close Temp. °C [°F] | Close Tolerance °C [°F] | Open Temp. °C [°F] | Open Tolerance °C [°F] |
|---|---|---|---|---|
| 3100U-3-1453 | 4 [40] | ±5 [±5] | -7 [20] | ±3 [±5] |
| 3100U-3-1454 | 10 [50] | ±5 [±5] | -1 [30] | ±3 [±5] |
| 3100U-3-1455 | 16 [60] | ±5 [±5] | 4 [40] | ±3 [±5] |
| 3100U-3-1456 | 27 [80] | ±5 [±5] | 16 [60] | ±3 [±5] |
| 3100U-3-1457 | 38 [100] | ±5 [±5] | 27 [80] | ±3 [±5] |
| 3100U-3-1458 | 49 [120] | ±5 [±5] | 38 [100] | ±3 [±5] |
| 3100U-3-1459 | 60 [140] | ±5 [±5] | 49 [120] | ±3 [±5] |
| 3100U-3-1460 | 71 [160] | ±5 [±5] | 60 [140] | ±3 [±5] |
| 3100U-3-1461 | 82 [180] | ±5 [±5] | 71 [160] | ±3 [±5] |
| 3100U-3-1462 | 93 [200] | ±5 [±5] | 82 [180] | ±3 [±5] |
| 3100U-3-1463 | 104 [220] | ±4 [±6] | 91 [195] | ±5 [±8] |

**Figure 16. 3100U REDI-TEMP Series Dimensions (For reference only: mm/[in])**



## ADDITIONAL MATERIALS

The following associated literature is available at sensing.honeywell.com:

- Product range guide
- Application notes

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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.**

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- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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000828-3-EN | 3 | 09/18
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