Platinum Thin Film RTD Elements for OEM Applications

If you’ve been paying too much for RTD elements...

Look at this!
New Lowest Prices!

$0.75 ea
Sold in Packages of 100 Elements

The Most Popular Platinum Thin Film Elements Off the Shelf!

- Available in Class-A, Class-B and 1⁄3 DIN Accuracies
- Temperature Range: -70 to 500°C (-94 to 932°F)
- Available in 100, 500 and 1000 Ω Configurations
- Resistance per IEC/DIN 60751
- Faster Response than Most Wire Wound Elements
- Small Size is Perfect for Use in Tight Places
- Flat Package Allows for Easy Surface Mounting

For Sales and Service, Call TOLL FREE
1-888-82-66342®
1-888-TC-OMEGA
Ask for OEM Extension 3008 or email: OEM@omega.com

OMEGAFAILM®

Glass coating over wire bonds
Connection wires
Connection pad
Ceramic base
Platinum thin film layer with glass coating

Actual Size
2.0 x 2.0 x 0.8 mm

For more information, visit omega.com

Omega's Award-Winning Class 10 Clean Room

Visit omega.com for more information

OEM-RTD4P-0808
Popular Thin-Film Elements

Highest Quality...OEM Prices, You Can’t Buy Them For Less!

- Available in Class-A, Class-B and 1⁄3 DIN Accuracies
- Element Design Has Been Extensively Tested to Ensure Performance
- Other Sizes Available, Call for Details
- Lead Wires and Accessories Also Available
- OEM Pricing When Purchased in Packages of 100 or more (Packaged in Multiples of 100)

Visit omega.com for Complete Ordering Information on All RTD Accessories

**RTD Accessories:**
- **Wire and Connectors (2 or 3-Pin and Multi-Pin)**
  - 2, 3 or 4 #24 or #26 AWG
  - Stranded (7 x 32) Nickel Plated Copper Conductors
  - Fiberglass, PFA or PVC Insulated and Jacketed, Twisted or Parallel, Stainless Steel Overbraid
  - 2 Color Codes Available, Black/Red or Red/White

**F4050**
- Starts at $1.50
- Actual Size 4.0 x 5.0 x 0.8 mm

**F2020**
- Starts at $0.75
- Actual Size 2.0 x 2.0 x 0.8 mm

**F1540**
- Starts at $1.50
- Actual Size 1.5 x 4.0 x 0.8 mm

**F2010**
- Starts at $1.50
- Actual Size 2.0 x 9.5 x 0.8 mm

**F4050-100**, starts at $1.50, shown larger than actual size.

**F2020-100**, starts at $0.75, shown larger than actual size.

**F1540-100**, starts at $1.50, shown larger than actual size.

**F2010-100**, starts at $1.50, shown larger than actual size.

**Actual Size**
- 2.0 x 9.5 x 0.8 mm

**Thin Film RTD Accuracy Classes**
- Deviation
- Degrees, Celsius
- Temperatures, Celsius

**EXTT-3CUI-24S-SB**, RTD extension 3-wire stainless steel overbraid, starts at $54 for a 7.5 M (25') spool.

**OTP-U-M**, 3-pin standard RTD connectors, $3.50 each

**MTP-U-M**, 3-pin miniature RTD connectors, $2.50 each

**EXGG-4CUI-24S**, RTD extension 4-wire, starts at $26 for a 7.5 M (25') spool.

**HPC-AU-P**, uncompensated RTD contact pins, $15 per pkg of 20.
Flat Profile Thin Film Platinum for OEM Applications

- Very Low Cost
- Flat, Small Profile
- Resistance Meets Requirements of IEC60751
- Temperature Range -70 to 500°C (-94 to 932°F)
- Temperature Coefficient $\alpha = 0.00385 \, \Omega/\Omega/{ }^\circ C$
- 100, 500, and 1000 Ω Configurations
- Class A, B, and $\frac{1}{3}$ B DIN Tolerances
- Long-Term Stability—Max R0 Drift 0.4% after 1000 Hours at 500°C (932°F)
- Vibration Resistance at Least 40 g Acceleration at 10 to 2000 Hz
- Shock Resistance at 100 g Acceleration with 8 ms Half Sine Wave
- Insulation Resistance >10 MΩ at 20°C, with 8 ms Half Sine Wave
- Shock Resistance at 100 g Acceleration with 8 ms Half Sine Wave
- Temperature Coefficient $(-94$ to 932°F)
- Temperature Range -70 to 500°C
- Self Heating 0.4 K/mW at 0°C
- Response Time Water Current ($v = 0.4$ m/s)
  t0.5 = 0.2 s, t0.9 = 0.4 s; Air Stream ($v = 1$ m/s)
  t0.5 = 3.0 s, t0.9 = 9.0 s
- Platinum Clad Nickel Wire Leads
  10 L x 0.2 mm D (0.39 x 0.008”)

**F** Series, Sold in Packages of 100 Elements

- Starts at $0.75 per element
- Glass coating over wire bonds pattern
- Connection wires
- Connection pad
- Ceramic base
- Platinum thin film layer
- Made in USA

“F” Series, Sold in Packages of 100 Elements

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Dimensions mm (in)</th>
<th>Size mm (in)</th>
<th>Nominal Resistance (Ω)</th>
<th>Price Per Pack (100/pk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2020-100-B</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>100</td>
<td>$75 (0.75 each)</td>
</tr>
<tr>
<td>F2020-100-A</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>100</td>
<td>$90 (0.90 each)</td>
</tr>
<tr>
<td>F2020-100-1/3B</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>100</td>
<td>$225 (2.25 each)</td>
</tr>
<tr>
<td>F2020-1000-B</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>1000</td>
<td>$90 (0.90 each)</td>
</tr>
<tr>
<td>F2020-1000-A</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>1000</td>
<td>$225 (2.25 each)</td>
</tr>
<tr>
<td>F2020-1000-1/3B</td>
<td>0.8 x 0.8 (0.031 x 0.031)</td>
<td>2.0 x 2.0 x 0.8</td>
<td>1000</td>
<td>$225 (2.25 each)</td>
</tr>
<tr>
<td>F2010-100-B</td>
<td>1.5 x 4.0 (0.059 x 0.157)</td>
<td>1.5 x 4.0 x 0.8</td>
<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
<tr>
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<td>$150 (1.50 each)</td>
</tr>
<tr>
<td>F4050-100-B</td>
<td>4.0 x 5.0 (0.157 x 0.196)</td>
<td>4.0 x 5.0 x 0.8</td>
<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
<tr>
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<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
<tr>
<td>F1540-100-B</td>
<td>1.5 x 2.0 (0.059 x 0.078)</td>
<td>1.5 x 2.0 x 0.8</td>
<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
<tr>
<td>F1540-100-A</td>
<td>1.5 x 2.0 (0.059 x 0.078)</td>
<td>1.5 x 2.0 x 0.8</td>
<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
<tr>
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<td>1.5 x 2.0 x 0.8</td>
<td>100</td>
<td>$150 (1.50 each)</td>
</tr>
</tbody>
</table>

To Order (Specify Model Number)

- Sold in packages of 100 elements. Due to the self heating error by the measuring conditions, the measuring current should be limited to a maximum value. We recommend 100 Ω max 1 mA; 500 Ω max 0.7 mA; 1000 Ω max 0.3 mA.
- Ordering Example: F2020-100-B-100, 100 elements of 2 x 2 x 0.8 mm 100 Ω Class B tolerance thin film RTD element, 100 x $0.75 = $75.
- Note: OEM, original equipment manufacturer.
OMEGAFILM® elements are manufactured to meet the requirements of IEC Standard 60751. This standard uses “Classes” to define the accuracy and interchangeability for the elements, the basic resistance vs. temperature characteristics, temperature ranges and other technical information relating to the OmegaFilm RTD elements. Key portions of these requirements are summarized below.

### Accuracy Classes

There are two accuracy “Classes” defined in IEC60751, they are: “Class A” and “Class B”; there are other “Classes” not specified in IEC60751 that are used in industry, they include 1/3DIN and 1/10DIN. These “Classes” are defined as follows:

Tolerance (°C)

<table>
<thead>
<tr>
<th>Class</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>±(0.15 + 0.002t)</td>
</tr>
<tr>
<td>B</td>
<td>±(0.30 + 0.005t)</td>
</tr>
<tr>
<td>1/3 DIN</td>
<td>±(0.30 + 0.005t)</td>
</tr>
</tbody>
</table>

where:

- \( t \) = Temperature °C

Temperature Range

-200 to 650°C

-200 to 850°C

0 to 200°C

*Note: Since there are no temperature ranges for 1/3DIN and 1/10DIN, typical industry standards have been assigned.

### Equations

Platinum RTD resistance can be calculated using the Callendar-Van Dusen Equation as follows:

For temperatures below 0°C:

\[ R_t = R_0 \left[ 1 + A t + B t^2 + C(t-100)t^3 \right] \]

where:

- \( A = 3.90833 \times 10^{-3} \) (C⁻¹)
- \( B = -5.7753 \times 10^{-7} \) (C⁻²)
- \( C = -4.1833 \times 10^{-12} \) (C⁻³)
- \( R_0 \) = Resistance at 0°C
- \( t \) = Temperature °C

For temperatures above 0°C, this simplifies to:

\[ R_t = R_0 \left( 1 + At + Bt^2 \right) \]

### Maximum Operating Current

The maximum operating current is determined by the amount of electrical current that can be passed through the element without significant self heating occurring. Omega® recommends a maximum operating current of 1 milliamp for all of the 100 ohm elements and sensors we supply. Higher or lower currents may be suitable for other resistances or sensor products, Omega® recommends testing, for self heating effects before use.

### Resistance vs. Temperature Values per IEC60751

<table>
<thead>
<tr>
<th>Temp °C (°F)</th>
<th>Resistance (Ω)</th>
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<th>Temp °C (°F)</th>
<th>Resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-200 (-328)</td>
<td>18.52</td>
<td>150 (302)</td>
<td>157.33</td>
<td>450 (842)</td>
<td>264.18</td>
</tr>
<tr>
<td>-150 (-238)</td>
<td>39.72</td>
<td>200 (392)</td>
<td>175.86</td>
<td>500 (992)</td>
<td>280.98</td>
</tr>
<tr>
<td>-50 (-58)</td>
<td>80.31</td>
<td>250 (482)</td>
<td>194.10</td>
<td>550 (1022)</td>
<td>297.49</td>
</tr>
<tr>
<td>0 (32)</td>
<td>100.00</td>
<td>300 (572)</td>
<td>212.05</td>
<td>600 (1112)</td>
<td>313.71</td>
</tr>
<tr>
<td>50 (122)</td>
<td>119.40</td>
<td>350 (662)</td>
<td>229.72</td>
<td>650 (1202)</td>
<td>329.64</td>
</tr>
<tr>
<td>100 (212)</td>
<td>138.50</td>
<td>400 (752)</td>
<td>247.09</td>
<td>700 (1292)</td>
<td>345.28</td>
</tr>
</tbody>
</table>

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