RTD Resistance Temperature Detectors

The Probe
A probe is an assembly composed of an element, a sheath, a lead wire, and a termination or connection.

The Termination
Probes may be terminated in a connection head, quick disconnect, terminal block, or extension wire. OMEGA’s standard terminations are pictured on product pages. Other termination styles are available upon special request. For something other than standard products, please contact our sales team to submit a full description and/or sketch of your desired version.

The Lead Wire
Lead styles are offered in one of four configurations (see diagrams at the side of this page). Style 2 is OMEGA’s standard. Be sure to select the configuration that is compatible with your instrumentation.

The Sheath
The sheath, a closed end tube, immobilizes the element, protecting it against moisture and the environment to be measured. The sheath also provides protection and stability to the transition lead wires from the fragile element wires. OMEGA’s standard sheaths are 3 mm (¼”) and 6 mm (½”) O.D. 304 stainless steel tubes. Other O.D.’s and materials are available upon request.

The Element
The standard OMEGA® RTD probe is made with a 100 ohm platinum European curve element (α = 0.00385).

Temperature Rating
OMEGA’s “PR” style RTD probe assemblies are rated for use in temperatures up to 600°C (1110°F). The “PRTF” style probes are rated up to 260 or 500°C depending on construction (see product handbook page). Temperature limitations may be placed on termination styles due to the wire insulation used. The maximum temperature rating available on special order is 750°C (1380°F). If the probe is intended for high temperature use, please request a quotation.

OMEGA stocks a broad line of RTD probes for immediate delivery. Many special assembly probes are available for shipment within two weeks of receipt of your order. Please consult Sales Department for further details on your special needs.

Definition of RTD Probe Part Number
Type: Select style PR- or PRTF-10, -11, -12,-13, -14, -15, -16, -17, -18, -19.

Lead Configuration: Specify 1, 2, 3, or 4. Style 2 is standard.

Resistance: 100 Ω is standard. 50, 200, 500, 1000, or 2000 Ω are available, usually with two-week delivery.

Sheath Diameter: 1.5 mm (¼”), 3 mm (½”), 4.5 mm (⅝”) and 6.0 mm (⅞”) are available. 3 mm (⅛”) and 6 mm (⅛”) O.D. probes are stocked for off-the-shelf delivery.

Sheath Length: There is no upper limit on sheath length. The minimum practical length is 2 inches.

Curve: European (E): α = 0.00385 ohms/ohm°C, American (A): α = 0.00392 ohms/ohm°C

Note: The resistance of probe and extension is added to the sensor resistance and will increase the measured value.

Lead Configurations of RTD Probes

STYLE 1

STYLE 2 (STANDARD)

STYLE 3

STYLE 4

LEAD RESISTANCE LOOP

Lead configuration 4 is similar to Lead Configuration 3 except that a separate pair of wires is provided as a loop to provide compensation for lead resistance and ambient temperature changes in lead resistance.
When accuracy over a wide temperature range is a crucial factor in industry, OMEGA's platinum Resistance Temperature Detectors (RTD's) are unequalled in performance. Stability over long periods of continued use makes them unmatched for reliability. Precision materials and workmanship make them highly interchangeable for easy replacement without calibration.

**Definition**
A resistance temperature detector operates on the principle of the change in electrical resistance in wire as a function of temperature.

**Element or Probe?**
A common source of confusion is the distinction between an element and a probe.

**The Element**
An element is the actual temperature sensing unit. OMEGA features two styles of elements: wire wound and thin film.

**Wire Wound**
Wire wound RTD elements used are made of 99.99% pure platinum wire wound about a ceramic or glass core and hermetically sealed within a ceramic or glass capsule. Platinum wire was chosen because it best meets the needs of precision thermometry. It resists contamination and is mechanically and electrically stable. Extension leads are attached by welding at OMEGA or by the end user. These RTD's provide close interchangeability between elements with negligible drift and error with age. On special request, OMEGA can make RTD probes with other wire materials. The probes are available conforming to the following two curves: European (E) or IEC60751 $\alpha = 0.00385$ ohms/ohm/°C or American (A) $\alpha = 0.00392$ ohms/ohm/°C.

**Thin Film**
Made by depositing platinum as a film on a substrate and then encapsulating both. This method allows for the production of small, fast response, accurate sensors. Thin film elements also conform to the IEC60751 curve.

**Recommended Temperature Application Ranges-Platinum RTD Elements**

<table>
<thead>
<tr>
<th>Series</th>
<th>Construction</th>
<th>-200</th>
<th>-100</th>
<th>-60</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
<th>700°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Tight spaces, leads perpendicular</td>
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<td>F</td>
<td>Small, flat response</td>
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<td>FR</td>
<td>Ceramic</td>
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<tr>
<td>KN</td>
<td>Ceramic for temperatures up to 600°C</td>
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<td>G</td>
<td>Glass</td>
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<tr>
<td>GN</td>
<td>Glass with glazed coating</td>
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<tr>
<td>GX</td>
<td>Glass with silicone-glazed coating</td>
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<td>W</td>
<td>Special shapes</td>
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OMEGAFILM® Thin Film RTD Elements

Elements are included as part of a probe assembly here in the OMEGA Complete Temperature Measurement Handbook and Encyclopedia®, or they can be purchased separately online at omega.com.

**Wire Wound Element Numbers**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Example: 2PT100G3550</th>
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<tbody>
<tr>
<td>PT 100</td>
<td>Platinum wire</td>
</tr>
<tr>
<td>G 35</td>
<td>Glass core</td>
</tr>
<tr>
<td>50</td>
<td>Length of element in mm</td>
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</table>

This value divided by 10 gives element diameter in mm.