THERMOMETRICS
A COMMITMENT TO EXCELLENCE

# NTC Type MA

## Biomedical Chip Thermistors

### Applications

A complete line of standard sub-assemblies is available. Continuous research and development efforts within Thermometrics have resulted not only in these field proven designs, but in the development of our Unitherm Thermochip Thermistor, designed exclusively for biomedical applications in the range of 32°F to 122°F (0°C to 50°C) .

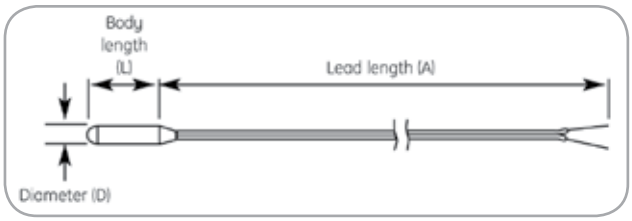
Although low in cost , these highly stable, precision thermochips provide the reliability, tight interchangeable tolerances, geometries, and fast response times that are often required. Thermometrics employs experienced applications engineers who welcome inquiries, whether for assistance, or to help with your design requirements concerning new and existing applications.

Our Biomedical Chip Thermistor assemblies are designed for use in applications involving both intermittent and continuous patient temperature monitoring. Repeatability and fast response are essential not only for the intermittent temperature requirements associated with oral and rectal fever measurements, but also with the continuous monitoring often necessary during induced-hypothermia and general anesthesia, or when employed in the care of infants and premature babies. Intensive care units along with recovery rooms have also adopted patient temperature as part of their vital sign monitoring procedures. Temperature monitoring for skin surface, tympanic, esophageal, foley catheters and biofeedback applications has also improved due to the high stability and tight interchangeable tolerances designed into each Thermometrics' Biomedical assembly.

**Amphenol**
**Advanced Sensors**

# NTC Type MA Specifications

## MA100

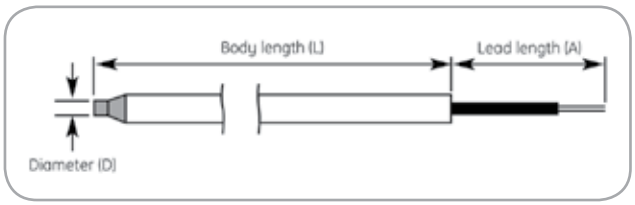



Designed for use in catheter assemblies, these sensors are available with nominal resistance values of 2252, 3000, 5000, and 10,000 Ω at 77°F (25°C). Close monitoring of manufacturing processes allow Thermometrics to maintain tight interchangeability tolerances with volume production. Typical design parameters are represented in Assembly Type table.

0.030 in (0.76 mm) (10 KΩ only) and 0.050 in(1.27mm) diameters available with kapton sleeve only.

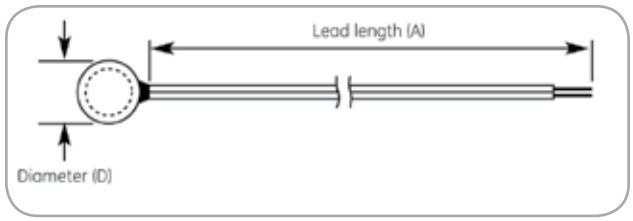
0.070 in (1.78 mm) diameter normally supplied with molded plastic tip.

## MA200




Intermittent body temperature measurements are common practice in all phases of patient care. This assembly is ideally suited for the disposable cover oral and rectal fever thermometers in use today. It features rugged construction with tip sensitive shaft assemblies exhibiting resistance values of 2252, 3000, 5000, and 10,000 Ω at 77°F (25°C). Refer to Assembly Type table for typical design parameters.

## MA300




Routine continuous patient temperature monitoring is now feasible by using the convenience of the patient's skin site as an indicator of body temperature. The stainless steel housing used is suitable for both reusable and disposable applications, while maintaining maximum patient comfort . Nominal resistance values of 2252, 3000, 5000, and 10,000 Ω at 77°F (25°C) are available. Refer to Assembly Type table for typical design parameters.

## Assembly Type

| Assembly Type | MA100 | MA200 | MA300 |
|---|---|---|---|
| Standard Diameters (D) | 0.030 in (0.762 mm)<br>0.050 in (1.27 mm)<br>0.070 in (1.78 mm)<br>0.080 in (2.03 mm) | 0.156 in (3.96 mm) | 0.375 in (9.52 mm) |
| Body Length (L) | 3/8 in (9.52 mm) | 3.75 in (95.25 mm) | N/A |
| Lead Length (A) | 3/8 in (9.52 mm) | 3.75 in (95.25 mm) | N/A |
| Tolerance | See Tolerance Code and Temperature Table | See Tolerance Code and Temperature Table | See Tolerance Code and Temperature Table |
| Wire Gauge | 20, 30, 32, 38, AWG | 30 AWG | 30 AWG |
| Standard Wire Insulation | *Heavy Isomid<br>*Medical Grade PVC<br>*Polyurethane with Nylon Overcoat | PTFE | Medical Grade PVC<br>PTFE |
| Body Material | Molded Plastic or Kapton Sleeve | Lexan Shaft<br>Aluminum Tip | Stainless Steel |
| Nominal R Values @ 77°F (25°C) | | 2252 Ω, 3000 Ω, 5000 Ω, 10,000 Ω (for all three types) | |

## Thermal Response Time (63% Response)

| Series | Still Air | Still Water* |
|---|---|---|
| MA100<br>Catherter Assembly | 15 seconds | 2.0 seconds |
| MA200<br>Oral-Rectal Assembly | 35 seconds | 0.6 seconds |
| MA300<br>Skin Surface Assembly | 45 seconds | 2.0 seconds |

*Response time provided is for assembly plunged from 77°F (25°C) air to 41°F (5°C) water.

# NTC Type MA Specifications

## Tolerance Code and Temperature Range

| | Tolerance Code | | |
|---|---|---|---|
| **Temperature Range °F (°C)** | **A ±°F (±°C)** | **B ±°F (±°C)** | **C ±°F (±°C)** |
| 32 to 68 (0 to 20) | 0.27 (0.15) | 0.36 (0.2) | 0.45 (0.25) |
| 68 to 95 (20 to 35) | 0.18 (0.1) | 0.27 (0.15) | 0.36 (0.2) |
| 95 to 102 (35 to 39) | 0.09 (0.05) | 0.18 (0.1) | 0.27 (0.15) |
| 102 to 107.60 (39 to 42) | 0.14 (0.075 | 0.27 (0.15) | 0.36 (0.2) |
| 107.60 to 113 (42 to 45) | 0.18 (0.1) | 0.27 (0.15) | 0.36 (0.2) |
| 113 to 122 (45 to 50) | 0.27 (0.15) | 0.36 (0.2) | 0.45 (0.25) |

## Data

Our biomedical series thermistor chips and sub-assemblies are designed to be interchangeable over a 32°F to 122°F (0°C to 50°C) range. Best overall stability is maintained when exposure and storage temperatures remain below 158°F (70°C).

## Resistance vs Temperature

| Temperature °F (°C) | 2252 Ω | 3 kΩ | 5 kΩ | 10 kΩ | 103(Y) Ω |
|---|---|---|---|---|---|
| 32.00 (0) | 7373.00 | 9821.93 | 16369.9 | 32739.8 | 29565.8 |
| 33.80 (1) | 7005.80 | 9332.76 | 15554.6 | 31109.2 | 28224.8 |
| 35.60 (2) | 6659.04 | 8870.84 | 14784.7 | 29569.5 | 26951.9 |
| 37.40 (3) | 6331.49 | 8434.49 | 14057.5 | 28115.0 | 25743.3 |
| 39.20 (4) | 6021.97 | 8022.17 | 13370.3 | 26740.6 | 24595.5 |
| 41.00 (5) | 5729.40 | 7632.41 | 12720.7 | 25441.4 | 23505.0 |
| 42.80 (6) | 5452.74 | 7263.87 | 12106.4 | 24212.9 | 22468.7 |
| 44.60 (7) | 5191.06 | 6915.27 | 11525.4 | 23050.9 | 21483.8 |
| 46.40 (8) | 4943.46 | 6585.43 | 10975.7 | 21951.4 | 20547.2 |
| 48.20 (9) | 4709.11 | 6273.23 | 10455.4 | 20910.8 | 19656.6 |
| 50.00 (10) | 4487.22 | 5977.64 | 9962.74 | 19925.5 | 18809.3 |
| 51.80 (11) | 4277.07 | 5697.69 | 9496.15 | 18992.3 | 18003.1 |
| 53.60 (12) | 4077.97 | 5432.47 | 9054.11 | 18108.2 | 17235.7 |
| 55.40 (13) | 3889.29 | 5181.11 | 8635.19 | 17270.4 | 16505.1 |
| 57.20 (14) | 3710.42 | 4942.83 | 8238.05 | 16476.1 | 15809.4 |
| 59.00 (15) | 3540.80 | 4716.88 | 7861.46 | 15722.9 | 15146.7 |
| 60.80 (16) | 3379.91 | 4502.54 | 7504.24 | 15008.5 | 14515.3 |
| 62.60 (17) | 3227.24 | 4299.17 | 7165.28 | 14330.6 | 13913.6 |
| 64.40 (18) | 3082.34 | 4106.14 | 6843.57 | 13687.1 | 13340.0 |
| 66.20 (19) | 2944.77 | 3922.88 | 6538.13 | 13076.3 | 12793.0 |
| 68.00 (20) | 2814.12 | 3748.83 | 6248.05 | 12496.1 | 12271.4 |
| 69.80 (21) | 2690.01 | 3583.49 | 5972.48 | 11945.0 | 11773.8 |
| 71.60 (22) | 2572.07 | 3426.38 | 5710.63 | 11421.3 | 11299.0 |
| 73.40 (23) | 2459.96 | 3277.03 | 5461.72 | 10923.4 | 10845.8 |
| 75.20 (24) | 2353.37 | 3135.04 | 5225.07 | 10450.1 | 10413.1 |
| 77.00 (25) | 2252.00 | 3000.00 | 5000.00 | 10000.0 | 10000.0 |
| 78.80 (26) | 2155.56 | 2871.53 | 4785.88 | 9571.77 | 9605.42 |
| 80.60 (27) | 2063.79 | 2749.28 | 4582.13 | 9164.26 | 9228.45 |
| 82.40 (28) | 1976.44 | 2632.91 | 4388.19 | 8776.38 | 8868.24 |
| 84.20 (29) | 1893.27 | 2522.12 | 4203.54 | 8407.07 | 8523.96 |
| 86.00 (30) | 1814.07 | 2416.61 | 4027.68 | 8055.35 | 8194.82 |
| 87.80 (31) | 1738.61 | 2316.09 | 3860.15 | 7720.30 | 7880.09 |
| 89.60 (32) | 1666.71 | 2220.31 | 3700.51 | 7401.03 | 7579.07 |
| 91.40 (33) | 1598.18 | 2129.02 | 3548.36 | 7096.72 | 7291.10 |
| 93.20 (34) | 1532.85 | 2041.98 | 3403.30 | 6806.60 | 7015.55 |
| 95.00 (35) | 1470.54 | 1958.98 | 3264.97 | 6529.94 | 6751.83 |
| 96.80 (36) | 1411.11 | 1879.81 | 3133.02 | 6266.03 | 6499.37 |
| 98.60 (37) | 1354.41 | 1804.27 | 3007.12 | 6014.23 | 6257.64 |
| 100.40 (38) | 1300.29 | 1732.18 | 2886.96 | 5773.93 | 6026.13 |
| 102.20 (39) | 1248.63 | 1663.36 | 2772.27 | 5544.53 | 5804.36 |
| 104.00 (40) | 1199.30 | 1597.65 | 2662.75 | 5325.50 | 5591.88 |
| 105.80 (41) | 1152.19 | 1534.89 | 2558.15 | 5116.30 | 5388.26 |
| 107.60 (42) | 1107.19 | 1474.94 | 2458.23 | 4916.46 | 5193.09 |
| 109.40 (43) | 1064.18 | 1417.65 | 2362.75 | 4725.49 | 5005.96 |
| 111.20 (44) | 1023.08 | 1362.89 | 2271.49 | 4542.98 | 4826.53 |
| 113.00 (45) | 983.78 | 1310.55 | 2184.24 | 4368.49 | 4654.43 |
| 114.80 (46) | 946.21 | 1260.49 | 2100.82 | 4201.64 | 4489.33 |
| 116.60 (47) | 910.27 | 1212.62 | 2021.03 | 4042.05 | 4330.91 |
| 118.40 (48) | 875.89 | 1166.81 | 1944.69 | 3889.38 | 4178.88 |
| 120.20 (49) | 842.99 | 1122.99 | 1871.65 | 3743.29 | 4032.94 |
| 122.00 (50) | 811.50 | 1081.04 | 1801.73 | 3603.46 | 3892.83 |

# NTC Type MA Specifications

## Ordering Information

The code number to be ordered may be specif ied as follows:

**MA**

| Code | Standard Assemblies |
|---|---|
| 100FA | Series 100, 0.070 in (1.78 mm) diameter molded plastic tip, 30 gauge PVC insulated ribbon cable. |
| 100FD | Series 100, 0.070 in (1.78 mm) diameter molded plastic tip, 32 gauge bifilar heavy isomid insulation. |
| 100DD | Series 100, 0.050 in (1.27 mm) diameter kapton sleeve with 32 gauge bifilar heavy isomid insulation. |
| 100BF | Series 100, 0.030 in (0.768 mm) diameter kapton sleeve with 38 gauge bifilar heavy isomid insulation. |
| 200LC | Series 200, 0.156 in (3.96 mm) diameter aluminum tip, 30 gauge PTFE leads. |
| 300TA | Series 300, 0.375 in (9.52 mm) diameter stainless steel cup, 30 gauge PVC insulated ribbon cable. |
| 300TB | Series 300, 0.375 in (9.52 mm) diameter stainless steel cup, 30 gauge PTFE insulated ribbon cable. |
| 100GG | Series 100, 0.080 in (2.03 mm) diameter molded plastic tip, 28 gauge kynar insulated twisted pair. |

| Code | Resistance Cable* |
|---|---|
| 232 | 2252 Ω |
| 302 | 3000 Ω |
| 502 | 5000 Ω |
| 103 | 10,000 Ω |
| 103 (Y) | 10,000 Ω |

| Code | Tolerance |
|---|---|
| X | Refer to tolerance code and temperature range table |

MA - _____ - _____ - _____ Typical Model Number

*Refer to resistance vs temperature table on previous page.

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