

Additel 286

Multifunction Reference Thermometer Readout



- Measure and calibrate SPRTs, RTDs, thermistors and thermocouples
- 1 PPM resistance ratio accuracy (channel 1)
- 8 1/2-digit DC multimeter
- Measure up to 82 channels
- Sample rates up to 10 channels per second
- Bluetooth, WIFI, USB & Ethernet (RJ-45) capable
- Auto temperature control of Additel and other manufacture's heat sources
- Built-in automatic temperature control, data collection, and coefficient generation
- Support for creating custom control of heat sources with RS-232
- Auto - zero power feature (self heating compensation)
- 10.1 in. touch screen display
- Supports fully automated temperature calibrations with data collection and report generation (no software required)

OVERVIEW

The Additel 286 Multifunction Reference Thermometer Readout is an industry first! We have combined the capabilities of a high-end reference thermometer with a highly capable data acquisition system and 8.5 digit multimeter. The ADT286 is capable of scanning and recording up to 82 channels at 10 channels per second. Users can easily configure the ADT286 to perform field calibrations and uniformity studies as well as use the unit in the lab as a precision thermometer and 8.5 digit multimeter. Get more for less with this newest game changer from Additel!



ADT 286 Multifunction Reference Thermometer Readout Scanner Modules

If you're in need of a precision reference thermometer for your laboratory, then look no further than the Additel 286. The base unit comes with two precision readout channels that can be used to measure your SPRT. Need to calibrate RTDs, PRTs, thermistors or thermocouples? Add a scanner module and you now have the ability to measure 10 RTDs, PRTs, or thermistors and 20 thermocouples. Expand up to 82 channels with our unique easy to use scanner modules. Each 20 channel module is outfitted with our proprietary universal terminals with an industries best cold junction capability second to none. Utilize the module docked atop the ADT286, or connect remotely with cables to suit nearly any unique setup/configuration. Additel also has a process module specifically designed to measure process instrumentation like transmitters and switches. This scanner will also supply loop power for the transmitters.

Designed to make your job easier, the ADT286 has a large sensor library supporting 15 TC types, both standard and special limits, 18 different thermal resistors, CVD, ITS-90, and a large variety of standard curves for RTDs and thermistors. The ADT286 is loaded with special applications such as probe calibration, SPRT calibration, chamber mapping and more. And we continue to add applications on a regular basis!



Automatic Temperature Control and Probe Calibration

The Additel 286 Multifunction Reference Thermometer Readout has preinstalled drivers to control Additel and other manufacturer's heat sources. Simply connect to one or more heat sources via a communication cable, Ethernet or wireless and now it will automatically control to the set point and desired stability. If your heat source is not on the list, you can easily add the driver yourself so you can run automated calibrations with any heat source.

Now combine the heat source control feature with our probe calibration application and you have a very powerful automatic calibration solution. The probe calibration app allows you to automatically setup and run calibration routines with multiple set points and multiple heat sources, collect data, and develop calibration coefficients — all with one device and without the need of software! Simply place a batch of sensors of any mix and type into your heat source, connect it to the ADT286, run the probe calibration app and come back to a completed test. All that is left to do is generate and export all the calibration data. There's no need to work with complicated software for communication, set up or coefficient generation. There is no reason to have a calibration technician manually monitor the process and record the data. This Multifunction Reference Thermometer Readout will do all the work for you.

ADT286-RS Resistance Standards

Available in 25 & 100 Ohm values, users can enjoy improved resistance ratio performance by easily plugging one of our reference resistors into channel 2 on the new ADT286. Perfect for calibrating your SPRT's and high end PRT's.



FEATURES



| Specification | Display | Application |
|--------------------------------------|---------|-------------|
| Multi-Channel | | |
| Smart Connection | | |
| DAQ Mode | | |
| Temperature Mapping Mode | | |
| Probe Calibration | | |
| Environmental Temperature Field Test | | |

APPLICATIONS

| Specification | Display | Application | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|---|----------------------|-----------------------|----------------------|-----|-------------------|----------|----|------------|---------|------------|------|----------|------------|-----|------------|------|------|------------|----|------------|----------|----|------------|----|------------|--|
| SPRT Mode | <table border="1"> <thead> <tr> <th>Fixed point</th> <th>Resistance ratio W(t)</th> <th>Resistance value (Ω)</th> </tr> </thead> <tbody> <tr> <td>Rtp</td> <td>1mA</td> <td>82.69232</td> </tr> <tr> <td></td> <td>√2mA</td> <td>9.82146</td> </tr> <tr> <td>W(A)</td> <td>R(A)</td> <td>29.44446</td> </tr> <tr> <td></td> <td>Rtp</td> <td>82.69232</td> </tr> <tr> <td>W(Z)</td> <td>R(Z)</td> <td>505.00008</td> </tr> <tr> <td></td> <td>Rtp</td> <td>82.69232</td> </tr> </tbody> </table> | Fixed point | Resistance ratio W(t) | Resistance value (Ω) | Rtp | 1mA | 82.69232 | | √2mA | 9.82146 | W(A) | R(A) | 29.44446 | | Rtp | 82.69232 | W(Z) | R(Z) | 505.00008 | | Rtp | 82.69232 | | | | | |
| Fixed point | Resistance ratio W(t) | Resistance value (Ω) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rtp | 1mA | 82.69232 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | √2mA | 9.82146 | | | | | | | | | | | | | | | | | | | | | | | | | |
| W(A) | R(A) | 29.44446 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rtp | 82.69232 | | | | | | | | | | | | | | | | | | | | | | | | | |
| W(Z) | R(Z) | 505.00008 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rtp | 82.69232 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Switch Testing | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Thermostatic Source Test | <table border="1"> <thead> <tr> <th>Reading Times</th> <th>A</th> <th>MeasuredValue(°C)</th> <th>B</th> <th>MeasuredValue(°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Aa</td> <td>315.148341</td> <td>Bb</td> <td>022.517121</td> </tr> <tr> <td>2</td> <td>Ab</td> <td>315.916839</td> <td>Ba</td> <td>022.420455</td> </tr> <tr> <td>3</td> <td>Aa</td> <td>315.881382</td> <td>Bb</td> <td>022.405473</td> </tr> <tr> <td>4</td> <td>Ab</td> <td>315.814657</td> <td>Ba</td> <td>022.376607</td> </tr> </tbody> </table> | Reading Times | A | MeasuredValue(°C) | B | MeasuredValue(°C) | 1 | Aa | 315.148341 | Bb | 022.517121 | 2 | Ab | 315.916839 | Ba | 022.420455 | 3 | Aa | 315.881382 | Bb | 022.405473 | 4 | Ab | 315.814657 | Ba | 022.376607 | |
| Reading Times | A | MeasuredValue(°C) | B | MeasuredValue(°C) | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Aa | 315.148341 | Bb | 022.517121 | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Ab | 315.916839 | Ba | 022.420455 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Aa | 315.881382 | Bb | 022.405473 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Ab | 315.814657 | Ba | 022.376607 | | | | | | | | | | | | | | | | | | | | | | | |
| DMM | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Heat Source Control | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Snapshot | | | | | | | | | | | | | | | | | | | | | | | | | | | |

SPECIFICATIONS

General Specifications

| Specification | Description |
|---|---|
| Voltage | 100V Setting 90V to 110V 120V Setting 108V to 132V 220V Setting 198V to 242V 240V Setting 216V to 264V |
| Frequency | 47Hz to 440Hz. Automatically sensed at power-on |
| Power Consumption | 40VA peak (30Watt average) |
| Temperature | Operating : 0°C to 50°C Full accuracy : 18°C to 28°C Storage : -20°C to 70°C |
| Warm-up | 90 mins for full uncertainty specifications |
| Relative Humidity (non-condensing) | Operating : 0°C to 28°C < 90% 28°C to 40°C < 75% 40°C to 50°C < 50% Storage : -20°C to 70°C < 95% |
| Altitude | Operating : 2000 m Storage : 12000 m |
| Vibration and Shock | Complies with MIL-28800F Class 3 |
| Input Protection | 50V all functions, ranges and terminals |
| Communication | USB-A , USB-B , RJ45 , WiFi , Bluetooth |
| Memory | 10G - All data stored with time stamps |
| Localization | English , Chinese |
| Display | 10.1 in (256 mm) TFT color display |
| Size (H x W x D) | 9.8 in (250 mm) x 16.5 in (420 mm) x 7.9 in (200 mm) |
| Weight | 18.5 lb (8.39 kg) |
| Other Conformities | CE |

Measurement Specifications

Specification Conditions: 90 mins Warm-Up Time / Environment Temperature (18 - 28) °C.

The following specifications apply for front panel, after at least 90 minutes warm-up.

24-hour specifications are relative to calibration standards and assume a controlled electromagnetic environment per EN 61326.

Resistance Ratio Accuracy (Rx/Rs) using External Rs

| Range | Reference Resistance | Ratio (Rx/Rs) | 1 Year (23 ± 5) °C ppm of Reading |
|-------|----------------------|---------------|--------------------------------------|
| 100 Ω | 25 Ω | 2.00-4.00 | 1.5 |
| | | 1.10-2.00 | 0.85 |
| | | 0.90-1.10 | 0.6 |
| | | 0.50-0.90 | 1.5 |
| | | 0.25-0.50 | 2.5 |
| 400 Ω | 100 Ω | 2.00-4.00 | 2 |
| | | 1.10-2.00 | 0.81 |
| | | 0.90-1.10 | 0.26 |
| | | 0.50-0.90 | 0.95 |
| | | 0.25-0.50 | 1.2 |



SPRT/PRT Measurement Accuracy using External Rs

| SPRT/PRT Type | External Reference Resistance | Temperature (°C) | Resistance Ratio (Rx/Rs) | 1 Year(23 ± 5) °C ppm of reading | Equivalent to Temperature (mK) |
|---------------|-------------------------------|------------------|--------------------------|----------------------------------|--------------------------------|
| PT25 | 25 Ω | -189.3442 | 0.22 | 2.5 | 0.13 |
| | | -38.8344 | 0.84 | 1.5 | 0.32 |
| | | 0.01 | 1 | 0.6 | 0.15 |
| | | 231.928 | 1.89 | 0.85 | 0.44 |
| | | 419.527 | 2.57 | 1.5 | 1.11 |
| | | 660.323 | 3.37 | 1.5 | 1.58 |
| PT100 | 100 Ω | -189.3442 | 0.22 | 1.2 | 0.07 |
| | | -38.8344 | 0.84 | 0.95 | 0.20 |
| | | 0.01 | 1 | 0.26 | 0.07 |
| | | 231.928 | 1.89 | 0.81 | 0.42 |
| | | 419.527 | 2.57 | 2 | 1.47 |
| | | 660.323 | 3.37 | 2 | 2.11 |

[1] The PT25 indicator is based on a nominal resistance of 25 Ω for Rx.

[2] The PT100 indicator is based on a nominal resistance of 100 Ω for Rx.

[3] The uncertainty of external Rs is not included. The user may choose the ADT280-RS-25/100 standard resistor as external Rs, which has an accuracy of 5 ppm at (23±2) °C.

Resistance Accuracy using Internal Rs

| Measurement Range | Scanning Speed | Resolution | 24 Hour (23 ± 1) °C | 90 Days (23 ± 5) °C | 1 year (23 ± 5) °C | Excitation Current | Temperature Coefficient |
|-------------------|----------------|------------|---------------------|---------------------|---------------------|--------------------|-------------------------|
| (0-100) Ω | Slow Speed | 0.01 mΩ | 3 ppm or 0.2 mΩ | 12 ppm or 0.35 mΩ | 15 ppm or 0.35 mΩ | ±1 mA/±12 V | 3 ppm + 0.01 mΩ |
| | Medium Speed | 0.01 mΩ | 3 ppm or 0.55 mΩ | 12 ppm or 0.7 mΩ | 15 ppm or 0.7 mΩ | | |
| | Fast Speed | 0.1 mΩ | 3.6 ppm or 1.7 mΩ | 12.6 ppm or 1.85 mΩ | 15.6 ppm or 1.85 mΩ | | |
| (0-400) Ω | Slow Speed | 0.01 mΩ | 3 ppm or 0.3 mΩ | 12 ppm or 0.4 mΩ | 15 ppm or 0.4 mΩ | ±1 mA/±12 V | 3 ppm + 0.02 mΩ |
| | Medium Speed | 0.01 mΩ | 3 ppm or 0.7 mΩ | 12 ppm or 0.8 mΩ | 15 ppm or 0.8 mΩ | | |
| | Fast Speed | 0.1 mΩ | 3.6 ppm or 1.9 mΩ | 12.6 ppm or 2 mΩ | 15.6 ppm or 2 mΩ | | |
| (0-4000) Ω | Slow Speed | 0.1 mΩ | 3 ppm or 4 mΩ | 12 ppm or 5 mΩ | 15 ppm or 5 mΩ | ±0.1 mA/±12 V | 3 ppm + 0.2 mΩ |
| | Medium Speed | 0.1 mΩ | 3 ppm or 8 mΩ | 12 ppm or 9 mΩ | 15 ppm or 9 mΩ | | |
| | Fast Speed | 1 mΩ | 3.6 ppm or 20 mΩ | 12.6 ppm or 21 mΩ | 15.6 ppm or 21 mΩ | | |

[1] Accuracy Index: ± (ppm of reading or xxmΩ, whichever is greater).

[2] Temperature coefficient index: exceeds (18-28) °C range, increase per degree (ppm reading +xxmΩ).

[3] Specifications are for 4-wire function. For 3-wire, add 0.005 Ω for internal resistance mismatch. For 2-wire, add 0.005 Ω for internal resistance

[4] Automatic current reversal.

PRT Measurement Accuracy using Internal Rs

| Scanning Speed | Temperature | 24 Hour / °C (23 ± 1) °C | 90 Days / °C (23 ± 5) °C | 1 year / °C (23 ± 5) °C | Temperature Coefficient °C/°C |
|----------------|-------------|--------------------------|--------------------------|-------------------------|-------------------------------|
| Slow Speed | -200 °C | 0.0005 | 0.0008 | 0.0008 | 0.0002 |
| | 0 °C | 0.0008 | 0.0031 | 0.0038 | 0.0008 |
| | 300 °C | 0.0018 | 0.0089 | 0.0089 | 0.0018 |
| | 600 °C | 0.0029 | 0.0146 | 0.0146 | 0.0030 |
| Medium Speed | -200 °C | 0.0013 | 0.0016 | 0.0016 | 0.0002 |
| | 0 °C | 0.0014 | 0.0031 | 0.0038 | 0.0008 |
| | 300 °C | 0.0020 | 0.0089 | 0.0089 | 0.0018 |
| | 600 °C | 0.0029 | 0.0146 | 0.0146 | 0.0030 |
| Fast Speed | -200 °C | 0.0039 | 0.0043 | 0.0043 | 0.0006 |
| | 0 °C | 0.0044 | 0.0047 | 0.0047 | 0.0013 |
| | 300 °C | 0.0053 | 0.0093 | 0.0093 | 0.0024 |
| | 600 °C | 0.0059 | 0.0152 | 0.0152 | 0.0036 |

[1] The indicator is based on the electrical accuracy of the 4-wire PT100 PRT and does not include the accuracy of the PRT itself.

[2] Temperature maximum Resolution is 0.0001 °C.

Thermocouple Voltage Accuracy

| Test Range | Scanning Speed | Resolution | 24 hours (23 ±1) °C | 90 days (23 ±5) °C | 1 year (23 ±5) °C | Input Resistance | Temperature Coefficient |
|---------------|----------------|------------|------------------------|-----------------------|----------------------|------------------|-------------------------|
| (-100-100) mV | Slow Speed | 0.01 µV | 5 ppm + 2 ppm | 10 ppm + 4 ppm | 14 ppm + 4 ppm | 10 MΩ or >10 GΩ | 1 ppm + 0.1 µV |
| | Medium Speed | 0.01 µV | 5 ppm + 6 ppm | 10 ppm + 8 ppm | 14 ppm + 8 ppm | | |
| | Fast Speed | 0.1 µV | 5 ppm + 22 ppm | 10 ppm + 24 ppm | 14 ppm + 24 ppm | | |

[1] Accuracy Index: ± (ppm of reading + ppm of FS).

[2] Temperature coefficient index: Exceed the range of (18-28) °C, increase (ppm of reading + xxµV)/°C.

Thermocouple Cold Junction Accuracy

| | |
|---------------------------|--|
| CJC Accuracy | ±0.1 °C , 1 year, 23 °C ± 5 °C |
| Environmental Coefficient | Beyond (18 ~ 28) °C, add 0.02 °C / °C |
| Other | Each signal scanner has 10 cold Junction temperature sensors |

Thermocouple Temperature Accuracy

| Type | Temperature | 24 Hour/°C (23 ±1) °C | | | 90 days/°C (23 ± 5) °C | | | 1 year /°C (23 ±5) °C | | |
|------|-------------|--------------------------|--------------|------------|---------------------------|--------------|------------|--------------------------|--------------|------------|
| | | Fast Speed | Medium Speed | Slow Speed | Fast Speed | Medium Speed | Slow Speed | Fast Speed | Medium Speed | Slow Speed |
| E | -200 | 0.089 | 0.038 | 0.022 | 0.099 | 0.047 | 0.031 | 0.100 | 0.049 | 0.033 |
| | -100 | 0.049 | 0.021 | 0.012 | 0.054 | 0.026 | 0.017 | 0.055 | 0.026 | 0.017 |
| | -40 | 0.041 | 0.017 | 0.009 | 0.045 | 0.021 | 0.013 | 0.045 | 0.021 | 0.014 |
| | 0 | 0.038 | 0.015 | 0.009 | 0.041 | 0.019 | 0.012 | 0.041 | 0.019 | 0.012 |
| | 155 | 0.031 | 0.013 | 0.008 | 0.035 | 0.017 | 0.011 | 0.036 | 0.017 | 0.012 |
| | 350 | 0.029 | 0.013 | 0.008 | 0.033 | 0.017 | 0.012 | 0.035 | 0.018 | 0.013 |
| | 660 | 0.031 | 0.014 | 0.009 | 0.036 | 0.020 | 0.015 | 0.039 | 0.022 | 0.017 |
| J | -200 | 0.102 | 0.043 | 0.025 | 0.113 | 0.054 | 0.036 | 0.115 | 0.055 | 0.037 |
| | -100 | 0.054 | 0.022 | 0.013 | 0.060 | 0.028 | 0.018 | 0.060 | 0.028 | 0.019 |
| | -40 | 0.047 | 0.019 | 0.011 | 0.051 | 0.024 | 0.015 | 0.051 | 0.024 | 0.015 |
| | 0 | 0.044 | 0.018 | 0.010 | 0.048 | 0.022 | 0.014 | 0.048 | 0.022 | 0.014 |
| | 155 | 0.041 | 0.017 | 0.010 | 0.045 | 0.021 | 0.014 | 0.046 | 0.022 | 0.015 |
| | 350 | 0.042 | 0.018 | 0.011 | 0.047 | 0.023 | 0.016 | 0.048 | 0.025 | 0.018 |
| | 660 | 0.039 | 0.018 | 0.011 | 0.046 | 0.024 | 0.018 | 0.048 | 0.027 | 0.020 |
| K | -200 | 0.146 | 0.061 | 0.035 | 0.161 | 0.076 | 0.050 | 0.163 | 0.077 | 0.051 |
| | -100 | 0.073 | 0.030 | 0.017 | 0.080 | 0.037 | 0.024 | 0.080 | 0.038 | 0.025 |
| | -40 | 0.060 | 0.025 | 0.014 | 0.066 | 0.030 | 0.020 | 0.066 | 0.031 | 0.020 |
| | 0 | 0.056 | 0.023 | 0.013 | 0.061 | 0.028 | 0.018 | 0.061 | 0.028 | 0.018 |
| | 155 | 0.056 | 0.023 | 0.013 | 0.061 | 0.029 | 0.019 | 0.062 | 0.030 | 0.020 |
| | 350 | 0.054 | 0.023 | 0.014 | 0.061 | 0.030 | 0.020 | 0.062 | 0.031 | 0.021 |
| | 660 | 0.055 | 0.025 | 0.015 | 0.063 | 0.033 | 0.023 | 0.066 | 0.035 | 0.026 |
| 1372 | 0.073 | 0.035 | 0.023 | 0.087 | 0.049 | 0.037 | 0.093 | 0.055 | 0.043 | |



Thermocouple Temperature Accuracy

| Type | Temperature | 24 Hour/°C (23 ± 1) °C | | | 90 days/°C (23 ± 5) °C | | | 1 year/°C (23 ± 5) °C | | |
|------|-------------|---------------------------|--------------|------------|---------------------------|--------------|------------|--------------------------|--------------|------------|
| | | Fast Speed | Medium Speed | Slow Speed | Fast Speed | Medium Speed | Slow Speed | Fast Speed | Medium Speed | Slow Speed |
| T | -200 | 0.142 | 0.059 | 0.034 | 0.156 | 0.073 | 0.048 | 0.157 | 0.075 | 0.049 |
| | -100 | 0.078 | 0.032 | 0.018 | 0.086 | 0.040 | 0.026 | 0.086 | 0.040 | 0.026 |
| | -40 | 0.063 | 0.026 | 0.015 | 0.069 | 0.032 | 0.020 | 0.069 | 0.032 | 0.021 |
| | 0 | 0.057 | 0.023 | 0.013 | 0.062 | 0.028 | 0.018 | 0.062 | 0.028 | 0.018 |
| | 155 | 0.044 | 0.019 | 0.011 | 0.049 | 0.023 | 0.015 | 0.049 | 0.024 | 0.016 |
| | 350 | 0.038 | 0.016 | 0.010 | 0.043 | 0.021 | 0.015 | 0.044 | 0.022 | 0.016 |
| | 400 | 0.037 | 0.016 | 0.010 | 0.042 | 0.021 | 0.015 | 0.044 | 0.023 | 0.016 |
| R | -40 | 0.543 | 0.222 | 0.124 | 0.593 | 0.272 | 0.173 | 0.593 | 0.272 | 0.173 |
| | 0 | 0.416 | 0.170 | 0.095 | 0.454 | 0.208 | 0.132 | 0.454 | 0.208 | 0.132 |
| | 155 | 0.266 | 0.109 | 0.061 | 0.290 | 0.134 | 0.086 | 0.291 | 0.134 | 0.086 |
| | 350 | 0.220 | 0.091 | 0.051 | 0.241 | 0.112 | 0.072 | 0.242 | 0.113 | 0.073 |
| | 660 | 0.192 | 0.080 | 0.046 | 0.212 | 0.100 | 0.066 | 0.214 | 0.102 | 0.068 |
| | 1768 | 0.188 | 0.082 | 0.049 | 0.213 | 0.107 | 0.074 | 0.219 | 0.114 | 0.081 |
| S | -40 | 0.515 | 0.211 | 0.117 | 0.562 | 0.258 | 0.164 | 0.562 | 0.258 | 0.164 |
| | 0 | 0.407 | 0.167 | 0.093 | 0.444 | 0.204 | 0.130 | 0.444 | 0.204 | 0.130 |
| | 155 | 0.275 | 0.113 | 0.063 | 0.300 | 0.138 | 0.089 | 0.301 | 0.139 | 0.089 |
| | 350 | 0.236 | 0.098 | 0.055 | 0.259 | 0.120 | 0.078 | 0.260 | 0.122 | 0.079 |
| | 660 | 0.214 | 0.089 | 0.051 | 0.236 | 0.111 | 0.073 | 0.239 | 0.114 | 0.075 |
| | 1768 | 0.222 | 0.096 | 0.057 | 0.250 | 0.124 | 0.086 | 0.257 | 0.132 | 0.093 |
| B | 250 | 0.872 | 0.357 | 0.199 | 0.952 | 0.437 | 0.278 | 0.952 | 0.437 | 0.279 |
| | 350 | 0.619 | 0.254 | 0.141 | 0.676 | 0.311 | 0.198 | 0.676 | 0.311 | 0.199 |
| | 660 | 0.342 | 0.141 | 0.079 | 0.374 | 0.173 | 0.111 | 0.375 | 0.175 | 0.113 |
| | 1820 | 0.199 | 0.085 | 0.050 | 0.222 | 0.108 | 0.073 | 0.227 | 0.113 | 0.078 |
| N | -200 | 0.224 | 0.093 | 0.052 | 0.246 | 0.115 | 0.075 | 0.247 | 0.116 | 0.076 |
| | -100 | 0.106 | 0.044 | 0.024 | 0.116 | 0.054 | 0.035 | 0.116 | 0.054 | 0.035 |
| | -40 | 0.089 | 0.036 | 0.020 | 0.097 | 0.045 | 0.029 | 0.097 | 0.045 | 0.029 |
| | 0 | 0.084 | 0.035 | 0.019 | 0.092 | 0.042 | 0.027 | 0.092 | 0.042 | 0.027 |
| | 155 | 0.070 | 0.029 | 0.017 | 0.077 | 0.036 | 0.024 | 0.078 | 0.037 | 0.024 |
| | 350 | 0.062 | 0.026 | 0.015 | 0.069 | 0.033 | 0.022 | 0.070 | 0.035 | 0.024 |
| | 660 | 0.059 | 0.026 | 0.016 | 0.067 | 0.034 | 0.024 | 0.069 | 0.036 | 0.026 |
| | 800 | 0.060 | 0.027 | 0.016 | 0.068 | 0.035 | 0.025 | 0.071 | 0.038 | 0.028 |
| | 1000 | 0.062 | 0.028 | 0.018 | 0.072 | 0.038 | 0.028 | 0.075 | 0.042 | 0.031 |
| | 1200 | 0.065 | 0.030 | 0.019 | 0.076 | 0.041 | 0.031 | 0.081 | 0.046 | 0.035 |
| L | -200 | 0.069 | 0.029 | 0.017 | 0.076 | 0.036 | 0.024 | 0.077 | 0.037 | 0.025 |
| | -100 | 0.053 | 0.022 | 0.013 | 0.059 | 0.028 | 0.018 | 0.059 | 0.028 | 0.018 |
| | -40 | 0.045 | 0.019 | 0.010 | 0.049 | 0.023 | 0.015 | 0.050 | 0.023 | 0.015 |
| | 0 | 0.043 | 0.018 | 0.010 | 0.047 | 0.021 | 0.014 | 0.047 | 0.021 | 0.014 |
| | 155 | 0.040 | 0.017 | 0.010 | 0.044 | 0.021 | 0.014 | 0.045 | 0.022 | 0.015 |
| | 350 | 0.041 | 0.018 | 0.011 | 0.046 | 0.023 | 0.016 | 0.047 | 0.024 | 0.017 |
| | 660 | 0.039 | 0.018 | 0.011 | 0.046 | 0.024 | 0.018 | 0.048 | 0.027 | 0.020 |
| | 900 | 0.035 | 0.017 | 0.011 | 0.042 | 0.023 | 0.017 | 0.045 | 0.026 | 0.021 |
| U | -80 | 0.072 | 0.030 | 0.017 | 0.079 | 0.037 | 0.024 | 0.079 | 0.037 | 0.024 |
| | -40 | 0.062 | 0.026 | 0.014 | 0.068 | 0.031 | 0.020 | 0.068 | 0.032 | 0.020 |
| | 0 | 0.056 | 0.023 | 0.013 | 0.061 | 0.028 | 0.018 | 0.061 | 0.028 | 0.018 |
| | 155 | 0.045 | 0.019 | 0.011 | 0.049 | 0.023 | 0.015 | 0.050 | 0.024 | 0.016 |
| | 350 | 0.037 | 0.016 | 0.010 | 0.042 | 0.021 | 0.014 | 0.043 | 0.022 | 0.016 |
| | 600 | 0.034 | 0.015 | 0.010 | 0.039 | 0.021 | 0.015 | 0.041 | 0.023 | 0.017 |

[1] The index is based on the accuracy of the thermocouple electrical measurement of temperature scanner module, does not include the accuracy of the thermocouple itself and the fixed cold junction compensation at 0 °C.

[2] The highest temperature resolution is 0.0001 °C.

Thermistor Accuracy

| Measurement Range | Scanning Speed | Resolution | 24 Hour (23 ± 1) °C | 90 Days (23 ± 5) °C | 1 year (23 ± 5) °C | Excitation Current | Temperature Coefficient |
|-------------------|----------------|------------|------------------------|------------------------|-----------------------|--------------------|-------------------------|
| (0-12) kΩ | Slow Speed | 1 mΩ | 10 ppm or 60 mΩ | 30 ppm or 80 mΩ | 40 ppm or 80 mΩ | 10 μA | 5 ppm + 10 mΩ |
| | Medium Speed | 1 mΩ | 10 ppm or 110 mΩ | 30 ppm or 130 mΩ | 40 ppm or 130 mΩ | | |
| | Fast Speed | 10 mΩ | 10 ppm or 210 mΩ | 30 ppm or 230 mΩ | 40 ppm or 230 mΩ | | |
| (10-120) kΩ | Slow Speed | 10 mΩ | 10 ppm | 30 ppm | 40 ppm | 10 μA | 5 ppm + 20 mΩ |
| | Medium Speed | 10 mΩ | 10 ppm + 80 mΩ | 30 ppm + 80 mΩ | 40 ppm + 80 mΩ | | |
| | Fast Speed | 100 mΩ | 10.6 ppm + 200 mΩ | 30.6 ppm + 200 mΩ | 40.6 ppm + 200 mΩ | | |
| (100-1000) kΩ | Slow Speed | 0.1 Ω | 50 ppm | 80 ppm | 100 ppm | 1 μA | 5 ppm + 1 Ω |
| | Medium Speed | 0.1 Ω | 50 ppm + 1 Ω | 80 ppm + 1 Ω | 100 ppm + 1 Ω | | |
| | Fast Speed | 1 Ω | 51 ppm + 2 Ω | 81 ppm + 2 Ω | 101 ppm + 2 Ω | | |

[1] Accuracy Index: ± (ppm of reading or xxmΩ, whichever is greater).

[2] Temperature coefficient index: exceeds (18-28) °C range, increase (ppm reading + xxmΩ) / °C.

[3] Specifications are for 4-wire function.

Thermistor Temperature Accuracy

| Type | Scanning Speed | Temperature | 24 Hour / °C (23 ± 1) °C | 90 Days / °C (23 ± 5) °C | 1 year / °C (23 ± 5) °C |
|-------|----------------|-------------|-----------------------------|-----------------------------|----------------------------|
| 10 kΩ | Slow Speed | -40 °C | 0.0007 | 0.0011 | 0.0014 |
| | | 0 °C | 0.0002 | 0.0006 | 0.0008 |
| | | 50 °C | 0.0004 | 0.0008 | 0.0011 |
| | | 100 °C | 0.0030 | 0.0039 | 0.0039 |
| | | 150 °C | 0.0130 | 0.0174 | 0.0174 |
| | Medium Speed | -40 °C | 0.0007 | 0.0011 | 0.0014 |
| | | 0 °C | 0.0002 | 0.0006 | 0.0008 |
| | | 50 °C | 0.0008 | 0.0010 | 0.0011 |
| | | 100 °C | 0.0054 | 0.0064 | 0.0064 |
| | | 150 °C | 0.0239 | 0.0282 | 0.0282 |
| | Fast Speed | -40 °C | 0.0007 | 0.0011 | 0.0014 |
| | | 0 °C | 0.0002 | 0.0006 | 0.0008 |
| | | 50 °C | 0.0016 | 0.0016 | 0.0016 |
| | | 100 °C | 0.0104 | 0.0104 | 0.0104 |
| | | 150 °C | 0.0456 | 0.0456 | 0.0456 |

[1] The indicator is based on the electrical accuracy of the 4-wire thermistor and does not include the accuracy of the thermistor itself.

[2] Temperature maximum Resolution is 0.0001 °C.

DC Voltage Accuracy

| Test Range | Scanning Speed | Resolution | 24 hours (23 ± 1) °C | 90 days (23 ± 5) °C | 1 year (23 ± 5) °C | Input Resistance | Temperature Coefficient |
|---------------|----------------|------------|-------------------------|------------------------|-----------------------|------------------|-------------------------|
| (-100-100) mV | Slow Speed | 0.01 μV | 5 ppm + 2 ppm | 10 ppm + 4 ppm | 14 ppm + 4 ppm | >10 GΩ or 10 MΩ | 1 ppm + 0.1 μV |
| | Medium Speed | 0.01 μV | 5 ppm + 6 ppm | 10 ppm + 8 ppm | 14 ppm + 8 ppm | | |
| | Fast Speed | 0.1 μV | 5 ppm + 22 ppm | 10 ppm + 24 ppm | 14 ppm + 24 ppm | | |
| (-1-1) V | Slow Speed | 0.1 μV | 2 ppm + 0.3 ppm | 8 ppm + 0.6 ppm | 14 ppm + 0.6 ppm | >10 GΩ or 10 MΩ | 1 ppm + 0.2 μV |
| | Medium Speed | 0.1 μV | 2 ppm + 1.3 ppm | 8 ppm + 1.6 ppm | 14 ppm + 1.6 ppm | | |
| | Fast Speed | 1 μV | 2.6 ppm + 3.3 ppm | 8.6 ppm + 3.6 ppm | 14.6 ppm + 3.6 ppm | | |
| (-10-10) V | Slow Speed | 1 μV | 2 ppm + 0.05 ppm | 8 ppm + 0.08 ppm | 14 ppm + 0.08 ppm | >10 GΩ or 10 MΩ | 1 ppm + 0.3 μV |
| | Medium Speed | 1 μV | 2 ppm + 0.35 ppm | 8 ppm + 0.38 ppm | 14 ppm + 0.38 ppm | | |
| | Fast Speed | 10 μV | 2.6 ppm + 1.05 ppm | 8.6 ppm + 1.08 ppm | 14.6 ppm + 1.08 ppm | | |
| (-50-50) V | Slow Speed | 10 μV | 8 ppm + 1 ppm | 32 ppm + 1 ppm | 38 ppm + 1 ppm | 10 MΩ | 5 ppm + 5 μV |
| | Medium Speed | 10 μV | 8 ppm + 2 ppm | 32 ppm + 2 ppm | 38 ppm + 2 ppm | | |
| | Fast Speed | 100 μV | 8.6 ppm + 7 ppm | 32.6 ppm + 7 ppm | 38.6 ppm + 7 ppm | | |

[1] Accuracy Index: ± (ppm of reading + ppm of FS).

[2] Temperature Coefficient index: Exceed the range of (18-28) °C, increase (ppm reading + xxμV) / °C.

[3] Any range, the maximum input voltage is 50 V.

DC Current Accuracy

| Test Range | Scanning Speed | Resolution | 24 hours (23 ±1) °C | 90 days (23 ±5) °C | 1 year (23 ±5) °C | Burden Voltage | Temperature Coefficient |
|---------------|----------------|------------|------------------------|-----------------------|----------------------|----------------|-------------------------|
| (-100-100) µA | Slow Speed | 0.01 nA | 15 ppm + 3 ppm | 50 ppm + 6 ppm | 60 ppm + 6 ppm | <1 mV | 8 ppm + 0.1 nA |
| | Medium Speed | 0.01 nA | 15 ppm + 7 ppm | 50 ppm + 10 ppm | 60 ppm + 10 ppm | | |
| | Fast Speed | 0.1 nA | 15 ppm + 23 ppm | 50 ppm + 26 ppm | 60 ppm + 26 ppm | | |
| (-1-1) mA | Slow Speed | 0.1 nA | 15 ppm + 0.6 ppm | 50 ppm + 1 ppm | 60 ppm + 1 ppm | <1 mV | 8 ppm + 0.5 nA |
| | Medium Speed | 0.1 nA | 15 ppm + 1.6 ppm | 50 ppm + 2 ppm | 60 ppm + 2 ppm | | |
| | Fast Speed | 1 nA | 15.6 ppm + 3.6 ppm | 50.6 ppm + 4 ppm | 60.6 ppm + 4 ppm | | |
| (-10-10) mA | Slow Speed | 1 nA | 30 ppm + 3 ppm | 75 ppm + 6 ppm | 80 ppm + 6 ppm | <1 mV | 8 ppm + 10 nA |
| | Medium Speed | 1 nA | 30 ppm + 7 ppm | 75 ppm + 10 ppm | 80 ppm + 10 ppm | | |
| | Fast Speed | 10 nA | 30 ppm + 23 ppm | 75 ppm + 26 ppm | 80 ppm + 26 ppm | | |
| (-100-100) mA | Slow Speed | 10 nA | 40 ppm + 0.6 ppm | 75 ppm + 1 ppm | 80 ppm + 1 ppm | <1 mV | 8 ppm + 50 nA |
| | Medium Speed | 10 nA | 40 ppm + 1.6 ppm | 75 ppm + 2 ppm | 80 ppm + 2 ppm | | |
| | Fast Speed | 100 nA | 40.6 ppm + 3.6 ppm | 75.6 ppm + 4 ppm | 80.6 ppm + 4 ppm | | |

[1] Accuracy Index: ± (ppm of reading + ppm of FS).

[2] Temperature Coefficient index: Exceed the range of range of (18-28) °C, increase (ppm reading + xxnA)/ °C.

[3] Input Protection 0.3A/600V Resettable PTC.

DC Resistance Accuracy

| Test Range | Scanning Speed | Resolution | 24 hours (23 ±1) °C | 90 days (23 ±5) °C | 1 year (23 ±5) °C | Excitation Current | Temperature Coefficient |
|------------|----------------|------------|------------------------|-----------------------|----------------------|--------------------|-------------------------|
| (0-100) Ω | Slow Speed | 0.01 mΩ | 3 ppm + 1 ppm | 13 ppm + 1.5 ppm | 16 ppm + 1.5 ppm | 1 mA | 3 ppm + 0.01 mΩ |
| | Medium Speed | 0.01 mΩ | 3 ppm + 5 ppm | 13 ppm + 5.5 ppm | 16 ppm + 5.5 ppm | | |
| | Fast Speed | 0.1 mΩ | 3 ppm + 21 ppm | 13 ppm + 21.5 ppm | 16 ppm + 21.5 ppm | | |
| (0-1) kΩ | Slow Speed | 0.1 mΩ | 3 ppm + 0.2 ppm | 12 ppm + 0.3 ppm | 15 ppm + 0.3 ppm | 1 mA | 3 ppm + 0.02 mΩ |
| | Medium Speed | 0.1 mΩ | 3 ppm + 1.2 ppm | 12 ppm + 1.3 ppm | 15 ppm + 1.3 ppm | | |
| | Fast Speed | 1 mΩ | 3.6 ppm + 3.2 ppm | 12.6 ppm + 3.3 ppm | 15.6 ppm + 3.3 ppm | | |
| (0-10) kΩ | Slow Speed | 1 mΩ | 3 ppm + 0.3 ppm | 12 ppm + 0.4 ppm | 15 ppm + 0.4 ppm | 0.1 mA | 3 ppm + 0.2 mΩ |
| | Medium Speed | 1 mΩ | 3 ppm + 1.3 ppm | 12.6 ppm + 1.3 ppm | 15 ppm + 1.3 ppm | | |
| | Fast Speed | 10 mΩ | 3.6 ppm + 3.3 ppm | 12.6 ppm + 3.4 ppm | 15.6 ppm + 3.4 ppm | | |
| (0-100) kΩ | Slow Speed | 10 mΩ | 3 ppm + 0.2 ppm | 12 ppm + 0.3 ppm | 15 ppm + 0.3 ppm | 0.1 mA | 3 ppm + 20 mΩ |
| | Medium Speed | 10 mΩ | 3 ppm + 0.5 ppm | 12 ppm + 0.6 ppm | 15 ppm + 0.6 ppm | | |
| | Fast Speed | 100 mΩ | 3.6 ppm + 1.3 ppm | 12.6 ppm + 1.3 ppm | 30.6 ppm + 1.3 ppm | | |
| (0-1) MΩ | Slow Speed | 0.1 Ω | 10 ppm + 0.6 ppm | 30 ppm + 1 ppm | 40 ppm + 1 ppm | 10 µA | 5 ppm + 0.2 Ω |
| | Medium Speed | 0.1 Ω | 10 ppm + 1.2 ppm | 30 ppm + 0.6 ppm | 40 ppm + 0.6 ppm | | |
| | Fast Speed | 1 Ω | 10 ppm + 2.6 ppm | 30 ppm + 3 ppm | 40 ppm + 3 ppm | | |
| (0-10) MΩ | Slow Speed | 1 Ω | 50 ppm + 0.4 ppm | 80 ppm + 1 ppm | 100 ppm + 1 ppm | 1 µA | 10 ppm + 1 Ω |
| | Medium Speed | 1 Ω | 50 ppm + 1.4 ppm | 80 ppm + 2 ppm | 100 ppm + 2 ppm | | |
| | Fast Speed | 10 Ω | 50 ppm + 4.4 ppm | 80 ppm + 5 ppm | 100 ppm + 5 ppm | | |
| (0-100) MΩ | Slow Speed | 10 Ω | 150 ppm + 1 ppm | 400 ppm + 4 ppm | 500 ppm + 4 ppm | 0.1 µA | 50 ppm + 50 Ω |
| | Medium Speed | 10 Ω | 150 ppm + 6 ppm | 400 ppm + 9 ppm | 500 ppm + 9 ppm | | |
| | Fast Speed | 100 Ω | 150 ppm + 11 ppm | 400 ppm + 14 ppm | 500 ppm + 14 ppm | | |

[1] Accuracy Index: ± (ppm of reading + ppm of FS).

[2] Temperature Coefficient index: Exceed the range of range of (18-28) °C, increase (ppm reading + xx Ω)/ °C.

[3] The above is a 4-wire measurement index.

[4] When the range is less than or equal to 10 kΩ, the default is automatic current reversal.

[5] Max Lead Resistance(4-wire ohms): 10 Ω per lead for 100 Ω & 1 kΩ ranges; 100 Ω per lead for 10 kΩ & 100 kΩ ranges; 1 kΩ per lead on all other ranges.

Ordering Information

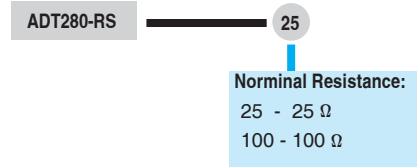
| Model Number | | |
|---------------|---|---------|
| Model | Description | Picture |
| ADT286 | Multifunction Reference Thermometer Readout base unit only | |
| ADT286-TS-PKG | Multifunction Reference Thermometer Readout base unit with (1) Temperature Scanner Module (9051 cable not included) | |
| ADT286-PS-PKG | Multifunction Reference Thermometer Readout base unit with (1) Process Scanner Module (9051 cable not included) | |

Accessories

| Accessories (Included) | | |
|--|----------------|---------|
| Standard Accessories | Quantity | Picture |
| Shorting Block | 1 pc. | |
| USB Cable (UK-415) | 1 pc. | |
| Test leads | 4 sets (8 pcs) | |
| 9026 4-Wire Test Leads (Only w/ ADT286-TS-PKG & ADT286-PS-PKG) | 1 pc. | |
| Fuse (0213.315MXP) | 1 pc. | |
| Calibration Certificate | 1 pc. | |
| CD Manual | 1 pc. | |

| Optional Accessories | | |
|----------------------|---|---------|
| Model | Optional Accessories | Picture |
| 9026 | 4-wire test leads(10-Pack) | |
| 9051-10 | Dsub Comm Cable=10 ft | |
| 9051-33 | Dsub Comm Cable=33 ft | |
| 9916-286 | Carrying Case for ADT286,(2) scanner modules and reference probe w/wheels | |
| ADT286-DOCK | Remote Module Docking Station w/AC Adapter | |
| ADT286-TS | ADT286 Temperature Scanner Module | |
| ADT286-PS | ADT286 Process Scanner Module | |
| ADT280-RS-25 | 25 Ω Standard Reference Resistor | |
| ADT280-RS-100 | 100 Ω Standard Reference Resistor | |

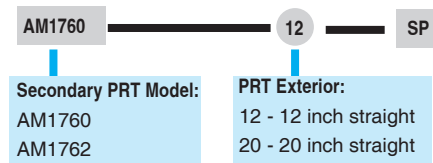
Standard Reference Resistor Ordering Information



ADT280-RS-X

| Resistance Standards | | |
|-------------------------|-----------------------|-----------------------|
| Specification | ADT280-RS-25 | ADT280-RS-100 |
| Nominal Resistance | 25 Ω | 100 Ω |
| Stability | 5 ppm/year | 5 ppm/year |
| Operating Temperature | 23 °C±2 °C | 23 °C±2 °C |
| Temperature Coefficient | 0.5 ppm/°C | 0.5 ppm/°C |
| Size | 57 mm x 57 mm x 45 mm | 57 mm x 57 mm x 45 mm |
| Weight | 0.35 lb (160 g) | 0.35 lb (160 g) |
| Excitation Current | 1 mA | 1 mA |

Secondary Standard PRT Ordering Information



AM17XX-X-SP

■ Secondary Standard PRT Information

| Specification | AM1760 Series | AM1762 Series |
|---|--|--|
| Temperature Range | -200 °C to 670 °C | -200 °C to 670 °C |
| Resistance at 0°C | Nominal 100 Ω | Nominal 25 Ω |
| Temperature Coefficient | 0.003925 Ω / Ω / °C | |
| Accuracy | ±0.007 °C at -196 °C ±0.006 °C at 0.01 °C ±0.015 °C at 420 °C ±0.025 °C at 660 °C | ±0.007 °C at -196 °C ±0.006 °C at 0.01 °C ±0.015 °C at 420 °C ±0.025 °C at 660 °C |
| Drift | ±0.004 °C at TPW after 100 hours at 661 °C | |
| Short Term Stability | ±0.002 °C | |
| Thermal Shock | ±0.002 °C after 10 times thermal cycles from minimum to maximum temperatures | |
| Hysteresis | N/A | |
| Self-heating | 0.0015 °C at 1 mA current | |
| Response Time | 9 seconds for 63% response to step change in water moving at 3 feet per second | |
| Measurement Current | 0.5 mA or 1 mA | |
| Sensor Length | 42 mm | |
| Sensor Location | 5 mm from tip | |
| Insulation Resistance | >1000 MΩ at room temperature | |
| Sheath Material | Inconel™ | |
| Dimension | AM1760-12-SP 0.25 in dia X 12 in (6.35 mm X 305 mm) AM1760-20-SP 0.25 in dia X 20 in (6.35 mm X 500 mm) | AM1762-12-SP 0.25 in dia X 12 in (6.35 mm X 305 mm) AM1762-20-SP 0.25 in dia X 20 in (6.35 mm X 500 mm) |
| External Leads | Teflon™ – insulated copper wire, 4 leads, 2.5 meters | |
| Handle Dimension | 15 mm (OD) x 65 mm (L) | |
| Handle Temperature Range ^[1] | -50 °C to 160 °C | -50 °C to 180 °C |
| Calibration | NIST traceable calibration w/ data included | |

[1] Handle temperatures outside the usable will cause damage to the probe.

* PRT Information from www.accumac.com.