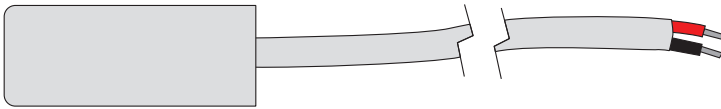




Installation & Operation Manual

Introduction

The Universal Sensor 078 is a temperature sensor with a stiff jacketed cable, making it a perfect choice for easy installation into conduit or domestic hot water tank temperature wells. The sensor can also be strapped to a pipe to measure supply or return temperatures.



Installation

Step One - Check the Contents

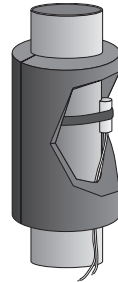
Check the contents of this package. If any of the contents listed are missing or damaged, please refer to the Limited Warranty and Product Return Procedure on the back of this brochure and contact your wholesaler or tekmar sales representative for assistance.

Type 078 includes • One Universal Sensor 078 • One Installation and Operation Manual 078_D.

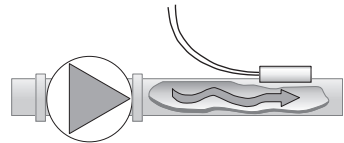
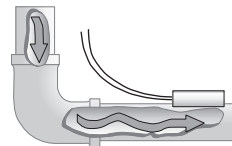
Step Two - Mounting the Sensor

The sensor is designed to mount on a pipe, in a temperature immersion well, or in a domestic hot water tank well.

The Universal Sensor can be strapped directly to the pipe using the cable tie provided. Insulation should be placed around the sensor to reduce the effect of air currents on the sensor measurement.



The Universal Sensor should be placed downstream of a pump or after an elbow or similar fitting. This is especially important if large diameter pipes are used as the thermal stratification within the pipe can result in erroneous sensor readings. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor.



Temperature Sensor Testing Instructions

A good quality test meter capable of measuring up to 5,000 k Ω (1 k Ω = 1000 Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with either a good quality digital thermometer, or if a thermometer is not available, a second sensor can be placed alongside the one to be tested and the readings compared.

First measure the temperature using the thermometer. Disconnect the Sen and Com wires from the control. Using an electrical meter, measure the resistance of the Sen and Com wires at the control location. Using the temperature versus resistance table, estimate the temperature measured by the sensor. The sensor measurement and thermometer readings should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location. Once the test has been completed, reconnect the Sen and Com wires to the control.

Do not apply voltage to the temperature sensor terminals at any time as damage to the sensor may result.

Temperature vs. Resistance Table

| Temperature | | Resistance | Temperature | | Resistance |
|-------------|-----|------------|-------------|-----|------------|
| °F | °C | Ω | °F | °C | Ω |
| -50 | -46 | 490,813 | 90 | 32 | 7,334 |
| -45 | -43 | 405,710 | 95 | 35 | 6,532 |
| -40 | -40 | 336,606 | 100 | 38 | 5,828 |
| -35 | -37 | 280,279 | 105 | 41 | 5,210 |
| -30 | -34 | 234,196 | 110 | 43 | 4,665 |
| -25 | -32 | 196,358 | 115 | 46 | 4,184 |
| -20 | -29 | 165,180 | 120 | 49 | 3,760 |
| -15 | -26 | 139,402 | 125 | 52 | 3,383 |
| -10 | -23 | 118,018 | 130 | 54 | 3,050 |
| -5 | -21 | 100,221 | 135 | 57 | 2,754 |
| 0 | -18 | 85,362 | 140 | 60 | 2,490 |
| 5 | -15 | 72,918 | 145 | 63 | 2,255 |
| 10 | -12 | 62,465 | 150 | 66 | 2,045 |
| 15 | -9 | 53,658 | 155 | 68 | 1,857 |
| 20 | -7 | 46,218 | 160 | 71 | 1,689 |
| 25 | -4 | 39,913 | 165 | 74 | 1,538 |
| 30 | -1 | 34,558 | 170 | 77 | 1,403 |
| 35 | 2 | 29,996 | 175 | 79 | 1,281 |
| 40 | 4 | 26,099 | 180 | 82 | 1,172 |
| 45 | 7 | 22,763 | 185 | 85 | 1,073 |
| 50 | 10 | 19,900 | 190 | 88 | 983 |
| 55 | 13 | 17,436 | 195 | 91 | 903 |
| 60 | 16 | 15,311 | 200 | 93 | 829 |
| 65 | 18 | 13,474 | 205 | 96 | 763 |
| 70 | 21 | 11,883 | 210 | 99 | 703 |
| 75 | 24 | 10,501 | 215 | 102 | 648 |
| 80 | 27 | 9,299 | 220 | 104 | 598 |
| 85 | 29 | 8,250 | 225 | 107 | 553 |

Technical Data

Universal Sensor 078

| | |
|-----------------|--|
| Literature | 078_C, 078_D |
| Packaged weight | 0.35 lbs (160 g) |
| Dimensions | 3/8" OD x 3/4" (9.5 OD x 19 mm) |
| Sensor material | Brass sleeve, 15' (4.6 m) 18 AWG, HDPE jacket, 300 V cable |
| Operating range | -40 to 221°F (-40 to 105°C) |
| Sensor | NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β = 3892 |

Limited Warranty and Product Return Procedure

Limited Warranty *The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product ("Product"), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.*

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer's pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar's instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar's sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and / or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser's agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser's sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar's instructions and / or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar's instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

Product Warranty Return Procedure All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser's customers, regarding a potential warranty claim, tekmar's sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.



Product design, software and literature are Copyright ©2015 by tekmar Control Systems Ltd., A Watts Water Technologies Company. Head Office: 5100 Silver Star Road, Vernon, B.C. Canada V1B 3K4, 250-545-7749, Fax. 250-984-0815 Web Site: tekmarControls.com

