Instruction Manual

Single-Input Thermistor Thermometer

(Model 91428-05)

DIGI-SENSE.

68X001349 Rev0 0717

1065DGMAN_91428-05

TABLE OF CONTENTS

1. QUICK-START GUIDE

To ensure best results please read the complete manual.

1. Connect probe.

2. Press the ***on/off*** key.
   Press again to turn on backlight.

3. Select °C or °F display using ***°C/°F*** key.

4. Insert probe in sample.
   Allow adequate time for reading to stabilize.
   Response time will vary depending on probe.

5. Take reading.
   *Press **hold** key to freeze display.*
   *Press **min/max** to display minimum or maximum temperature.*

6. Press and hold the ***on/off*** key for three seconds to turn meter off.

2. INTRODUCTION

Thank you for choosing the Single-Input Thermistor Thermometer. This sturdy handheld thermometer provides highly accurate temperature measurements using thermistor probes. The instrument is easy to use and includes the following features:

- Operator selection of Celsius or Fahrenheit scale
- Resolution of 0.1° C/F
- Large backlit LCD with two lines of four-digit display
- Hold feature for temporarily retaining a reading
- Min and max readings display
- Field calibration capability
- Auto power off with Enable/Disable function
- Low-battery warning
- Standard ¼ inch (6.3mm) phone jack connector input
- Operates with a wide selection of probes

3. SAFETY PRECAUTIONS

⚠ DANGER

Voltages present at the thermistors may also be present at the battery terminals. Always disconnect the thermistor when changing batteries.

⚠ WARNING

This instrument is designed to accept low level signals supplied by standard 400 series thermistors. Under no circumstances should the input voltage exceed the specified 10 v rms.

⚠ CAUTION

1. Do not use or store this instrument in microwave ovens or any abnormally hot or cold areas.
2. Weak batteries should not be left in the instrument. Dead batteries can leak and cause damage to unit.

4. SPECIFICATIONS

Range	–40 to 150°C (–40.0 to 302.0°F)
Resolution	0.1°C (0.1°F)
Accuracy	±0.2°C (±0.4°F) from –40 to 125°C (-40 to 257°F) ±0.5°C (±0.9°F) from 125 to 150°C (257 to 302°F)
LCD display	4+4 digit, 58 x 40mm dual-line display with backlight
Out-of-range display	"Ur" or "OPEN"
Display update rate	0.5 sec per update
Input	One probe with ¼ inch (6.3mm) phone jack connector
Input protection	10 v rms
Battery	Three AA, 1.5V alkaline
Battery life	700 hours continuous, typical
Auto shutoff	17 minutes after last key press
Stability criteria	"STABLE" will display upon 5 seconds of stability
Stated accuracy	18 to 28°C (64 to 82°F)
Useful range	0 to 40°C (32 to 104°F)
Storage	–40 to 65°C (–40 to 149°F)
Humidity	10% to 90% RH (noncondensing)
Dimensions (L x W x H)	**Without armor:** 175mm x 97mm x 42mm **With armor:** 180mm x 102mm x 52mm
Weight with batteries	**Without armor**: 267g **With armor**: 362g
Ingress protection	Meets IEC-529 IP-54 for dust and water-resistant enclosures
Compliance (for CE mark)	EN61326-1/A1: 1998 (EU EMC Directive)

5. BATTERY INSTALLATION AND REPLACEMENT

⚠ DANGER

Voltages present at the thermistors may also be present at the battery terminals. Always disconnect the thermistor when changing batteries.

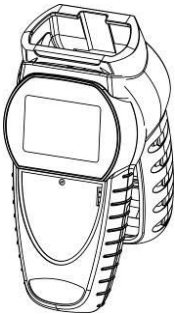
⚠ CAUTION

Weak batteries should not be left in the instrument. Dead batteries can leak and cause damage to unit.

The typical battery life is about 700 hours. Selected settings are stored in memory and will remain in memory even after power is turned off, or while batteries are being replaced.

1. Before changing battery, turn instrument off and disconnect probe.
2. Loosen screw and lift battery cover off the back of case.
3. Remove the three AA batteries.
4. Insert three new batteries observing polarity.
5. Install cover and tighten screw.

6. INSERTING AND REMOVING OPTIONAL RUBBER ARMOR



1. To insert thermometer into the optional rubber armor, slide in from the top of meter before pushing the bottom edges of meter down to set it into position. Lift up the stand at the back of meter for benchtop applications if necessary.

2. To remove thermometer from armor, push out from the bottom edges of meter until it is completely out of boot.

7. ASSEMBLING OPTIONAL HANDS-FREE ACCESORIES

You can use the optional magnets and strap in the Hands-Free Kit accessories for hands-free operations.

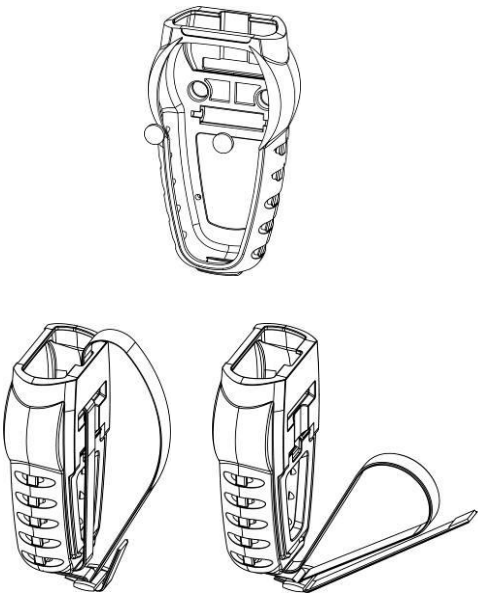


Figure 1: Hands-Free Kit

8. CONNECTING A THERMISTOR

Use the correct thermistor (series 400) for your instrument. Using an incorrect probe will result in erroneous readings. (Series 500 thermistor probes may be used along with the supplied correction chart to convert meter readings to actual readings to actual temperature).

Insert the ¼ inch plug into the mating connector on top of the instrument:

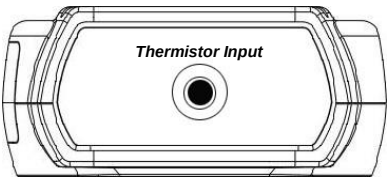


Figure 2: Thermistor Input

9. KEY FUNCTIONS

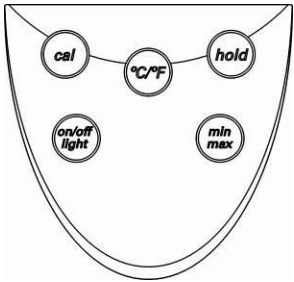


Figure 3: Keypad

°C/°F	Toggle between Celsius or Fahrenheit.
cal	Activates Calibration mode for 0°C offset calibration (after field calibration enabled). Press and hold this key for 3 seconds to enter Calibration mode if field calibration is unprotected.
hold	Activates/deactivates freezing of the measured reading while in measurement mode.
min max	Activates/deactivates display of the minimum and maximum readings (Min and Max readings are calculated from the ***min/max*** keypress). Press and hold key for 3 seconds to clear the MIN/MAX reading stored.
on/off light	Powers on and shuts off the thermometer by holding it for 3 sec. Press this key to activate/deactivate the backlight display. Backlight will automatically turn off within 30 seconds of activation.

10. DISPLAY OVERVIEW

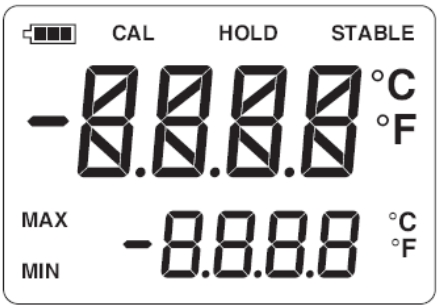


Figure 4: Meter Display

°C/°F	Celsius or Fahrenheit indicator.
MIN	Minimum reading annunciator.
MAX	Maximum reading annunciator.
	3 Bars: 700 – 550 hours 2 Bars: 350 – 550 hours 1 Bar: 150 – 350 hours Blinking: <150 hours
CAL	Blinks during calibration mode. Remains in display indicating field calibration is active.
HOLD	Remain in display during hold mode.
STABLE	Displayed upon recognizing final value.
Err CAL	Error indicator on main digit display Indicates calibration error due to out of tolerance value.

11. MEASUREMENT MODE

Press the ***on/off*** key. The meter performs a self-test and all display digits and indicators should remain on for approximately 2 seconds before the meter enters measurement mode.

If a probe is not connected or if the probe is defective, the display will indicate “OPEN”.

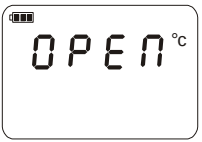


Figure 5: Display when no probe is detected

For optimum instrument accuracy, allow one minute for ambient temperature stabilization. If the unit has been stored at an extreme ambient condition, more time will be needed.

A **STABLE** indicator appears at the top right corner of the display when reading is continuously stable for 5 seconds.

To freeze reading, press ***hold***. Press ***hold*** key again to release the reading and resume normal operation.

Figure 6: HOLD and STABLE function

The display will show “Ur” (under range) or “Or” (over range) if the temperature reading is out of range of the instrument.

12. SELECTING TEMPERATURE SCALE

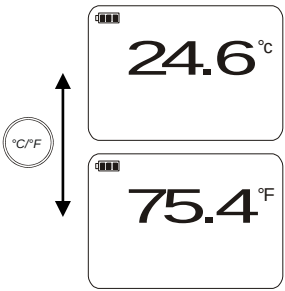


Figure 7: Press *°C/°F* key to toggle between °C and °F

Select °C or °F by pressing the ***°C/°F*** key. Each time the key is pressed, the temperature scale will switch. Switching between °C and °F can be done at any time during operation.

Each time you turn the instrument on, it will power up with the same settings that were set when the unit was last turned off.

13. MIN AND MAX FUNCTION

Press the ***min/max*** key to toggle between the minimum and maximum readings. The minimum and maximum reading function is ideal for monitoring unattended operations while continually displaying every temperature change that occurs. The minimum and maximum values are sensed and automatically stored. To exit and clear the MIN/MAX reading stored, press and hold the ***min/max*** key for 3 seconds.

14. AUTO OFF FUNCTION

The thermometer has a default auto off function of 17.5 minutes.

To deactivate this function, press both the ***min/max*** key and the ***on/off*** key at the same time when turning on the thermometer. “A.OFF no” flashes to show indicate that the auto off function has been disabled for that session.

Figure 8: Disabling the auto off function

15. CALIBRATION

The CAL function allows single-point calibration of meter at 0°C (32°F) to compensate for probe offset error. Use the field calibration feature to improve thermometer/probe accuracy.

The thermometer comes with a calibration lock function to prevent accidental changes to calibration settings. A field calibration can only be performed when the function has been unlocked. To unlock field calibration, follow steps 1 through 4 in **FIELD CALIBRATION UNLOCK** section.

To calibrate:

1. Pack sensing end of probe in a container tightly packed with crushed ice and filled with distilled water. Allow temperature to stabilize.

2. Press and release the ***cal*** key for 3 seconds to enter the calibration mode. The CAL indicator starts blinking. Release the ***cal*** key.
3. If the measured temperature is from –5°C to 5°C (23 to 41°F) when the temperature reading is stable, press the ***cal*** key.

NOTE: Press any key (except the ***cal*** key) while in calibration mode to abort calibration.

The CAL indicator will stop blinking, and the reading will be set to 0°C (32°F). The CAL indicator will remain in display, indicating that field calibration is now active.

If “Err” is displayed, the displayed reading is outside the above limits.

16. CLEAR FIELD CALIBRATION

To clear user calibration:

1. Turn the thermometer off.
2. Hold the ***cal*** key down while pressing the ***on/off*** key.
3. The measurement mode window appears without the CAL indicator to indicate that the user calibration has been successfully cleared.

17. FIELD CALIBRATION UNLOCK

The calibration unlock feature enables field calibration operation. To unlock field calibration:

1. Turn the thermometer off.
2. Hold the ***cal*** key and ***hold*** key down simultaneously, then press the ***on/off*** key.
3. The “CAL” indicator appears momentarily with the version-model window to indicate that the user-calibration function has been unlocked successfully (Figure 9).

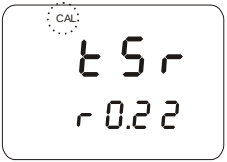


Figure 9: Successful field calibration unlock

4. When the keys are released, the unit will go to measurement mode (Figure 10).

Figure 10: Unit goes to measurement mode

18. FIELD CALIBRATION LOCKOUT

The calibration lockout feature prevents any field calibration changes. The lockout remains in effect until an unlock has been performed. To lock the field calibration operation:

1. Turn the thermometer off.
2. Hold the ***cal*** key and ***°C/°F*** key simultaneously, then press the ***on/off*** key.
3. If field calibration lockout is successful, the version-model window appears without the CAL indicator (Figure 11).

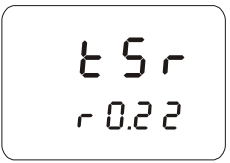


Figure 11: Successful field calibration lockout

4. When the ***cal*** key is released, the unit will go to measurement mode (Figure 12).

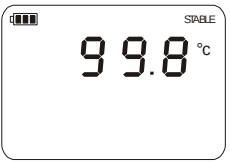


Figure 12: Unit goes to measurement mode

19. MAINTENANCE

Properly used, the meter should maintain calibration indefinitely and not require service other than occasional cleaning of the housing and changing of the batteries. Do not clean with abrasives or solvents. Use mild detergents; never immerse nor use excessive fluid.

20. CLEANING

WARNING:
TO PREVENT IGNITION OF A HAZARDOUS ATMOSPHERE BY ELECTROSTATIC DISCHARGE, CLEAN WITH DAMP CLOTH.

Do not clean with abrasives or solvents. Use mild detergents, never immerse nor use excessive fluid.

21. BATTERIES

If there is no display when the thermometer is turned on, check condition of the three AA batteries. Also check that the battery terminals are clean and batteries are properly installed. If replacement is necessary, refer to the BATTERY INSTALLATION AND REPLACEMENT section for replacement procedure.

22. TROUBLESHOOTING

The following chart lists the most probable faults. There are no internal adjustments or user-replaceable parts.

Problem	Solution
No display	Check condition of batteries. Check that batteries are inserted properly.
Display shows "Ur"	Measurement under range (–40°C / –40°F)
Display shows "Or"	Measurement over range (150°C / 302°F)
Display shows "OPEN"	No thermistor probe connected in the connector.
Display shows "Err"	If display shows this message other than during the field calibration mode, please return the instrument for servicing.

23. ACCESSORIES

Replacement Meter and Meter Accessories

Item	Catalog number
Single-input thermistor thermometer	91428-05
Rubber armor with stand	35427-80
Hands-free kit (two magnets and a strap)	35427-85
General-purpose 400 Series probe, SS 316, 5 ft cable, 10" (L) x 0.188" (dia), 4-second time constant.	93824-00
PTFE-coated general-purpose probe, 10" (L) x 0.2" (dia), 7-second time constant.	93824-12
Penetration probe, 4" (L) x 0.188" (dia), sharp tip, 6-second time constant.	93824-30
Surface probe, 1.0" x 0.81" x 0.25" aluminium substrate with 0.25" (dia) hole for screw mount, 8-second time constant.	93823-01
Air/gas probe, 3.75" (L) x 0.25" (dia), 316 SS radiant heat shield, 2-second time constant.	93823-05

24. WARRANTY

The Manufacturer warrants this product to be free from significant deviations from published specifications for a period of **three years**. If repair or adjustment is necessary within the warranty period, the problem will be corrected at no charge if it is not due to misuse or abuse on your part as determined by the Manufacturer. Repair costs outside the warranty period, or those resulting from product misuse or abuse, may be invoiced to you.

25. PRODUCT RETURN

To limit charges and delays, contact the seller or Manufacturer for authorization and shipping instructions before returning the product, either within or outside of the warranty period. When returning the product, please state the reason for the return. For your protection, pack the carefully and insure it against possible damage or loss. The Manufacturer will not be responsible for damage resulting from careless or insufficient packing.

26. INNOCAL® CALIBRATION AND REPAIR SERVICES (NORTH AMERICA)

Optimum performance of your temperature-measuring instrument is not a timeless condition. To ensure quality measurements, have your instrument calibrated regularly. Trust InnoCal to satisfy your calibration and equipment repair needs. With over a decade of service, we've helped thousands of customers meet ISO, FDA, EPA, GLPs/cGMPs and other quality standards.

Conformity*
ISO/IEC 17025:2005 accredited
NIST Handbook 150, 2000 Edition
ANSI/NCSL Z540-2-1997
NIST Technical Note 1297
ISO 9000:2000

Fast Service

Our substantial inventory of replacement parts ensures a fast turnaround and prevents costly downtime. Most instruments serviced in five business days!

Excellent Value

Get quality at a fair price. Our InnoCal NIST-traceable certificates offer extensive test data on a broad range of measurement parameters without breaking the bank!

Reliable Support

Trust in our free diagnostic support and troubleshooting advice. Our factory-trained metrologists and technicians are armed with years of experience and extensive technical data.

Convenient Reminders

It's so easy to keep your instruments functioning properly. Based on your requirements, InnoCal will send you a reminder when it's time to recertify or service your instrument.

We provide you with the documentation you need to meet your most stringent quality requirements for the control of inspection, measuring, and test equipment.

Certification includes certificate of calibration with test data, including:

- Description and identification of the item certified
- Condition of the item
- Issue date
- Identification of calibration procedure
- Calibration date
- As found/as left test data (where applicable)
- Signature of technician
- Statement of estimated uncertainty
- List of equipment used to perform calibration (including their calibration dates)

With today's high quality standards such as ISO 9000, certification is becoming increasingly important. Traceability is not a timeless condition. It must be verified and maintained over the life of the calibration to ensure the highest accuracy possible. When you have your calibration done by InnoCal, we will send you an automatic reminder when it is time to recalibrate your instrument.

Are your calibration certificates good enough?

InnoCal surpasses the competition by providing the most complete certificates as required by NIST. All of our certificates include measured data and point-by-point measurement uncertainty, and by request, we'll provide test accuracy and test uncertainty ratios at no extra cost. Call us today and see why InnoCal is The Choice of Quality.

*See our Scope of Accreditation for any limitations.

Calibration test points against NIST-traceable standards	Meter only	Probe only	System (meter + probe)*
Four test points across range of instrument.	17000-06	17001-06	17002-06

InnoCal—The Choice of Quality
866-INNOCAL (866-466-6225)
InnoCalSolutions.com

For calibration services outside of North America, please contact your Local Distributors or Local Certification Body.

TECHNICAL ASSISTANCE

If you have any questions about the use of this product, please contact the Manufacturer or authorized seller.