FLUKE®
Calibration

9190A

Ultra-Cool Drywell

Getting Started

PN 4106657
January 2013

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

Fluke authorized resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Fluke. Warranty support is available only if product is purchased through a Fluke authorized sales outlet or Buyer has paid the applicable international price. Fluke reserves the right to invoice Buyer for importation costs of repair/replacement parts when product purchased in one country is submitted for repair in another country.

Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.

To obtain warranty service, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including overvoltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. FLUKE SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
U.S.A.

Fluke Europe B.V.
P.O. Box 1186
5602 BD Eindhoven
The Netherlands

11/99

To register your product online, visit register.fluke.com

Table of Contents

List of Tables

Getting Started

Introduction

The Fluke Calibration 9190A Ultra-Cool Drywell (the Product or Calibrator) is a bench-top temperature calibrator that can calibrate precision temperature instruments from –95 °C to 140 °C.

This manual includes information on how to set up and turn on the Product for the first time. For instructions on how to operate the Calibrator, see the *9190A Operators Manual* on the CD-ROM.

Contact Fluke Calibration

To contact Fluke Calibration, call one of the following telephone numbers:

- Technical Support USA: 1-877-355-3225
- Calibration/Repair USA: 1-877-355-3225
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31-40-2675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- China: +86-400-810-3435
- Brazil: +55-11-3759-7600
- Anywhere in the world: +1-425-446-6110

To see product information and download the latest manual supplements, visit Fluke Calibration's website at www.flukecal.com.

To register your product, visit http://flukecal.com/register-product.

Safety Information

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury:

- **Read all safety Information before you use the Product.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Use this Product indoors only.**
- **Do not use the Product around explosive gas, vapor, or in damp or wet environments.**
- **Do not use and disable the Product if it is damaged.**
- **Use only the mains power cord and connector approved for the voltage and plug configuration in your country and rated for the Product.**
- **Replace the mains power cord if the insulation is damaged or if the insulation shows signs of wear.**
- **Make sure the ground conductor in the mains power cord is connected to a protective earth ground. Disruption of the protective earth could put voltage on the chassis that could cause death.**
- **Do not put the Product where access to the mains power cord is blocked.**
- **Use caution when you install and remove probes and inserts from the Product. They can be hot.**
- **Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.**
- **Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.**
- **Do not touch the well access surface of the instrument.**
- **Do not turn off the product at block temperatures higher than 100 °C. Select a SETPOINT less than 100 °C and let the instrument to cool before turning it off.**
- **Use the correct terminals, function, and range for measurements.**
- **Do not use test leads if they are damaged. Examine the test leads for damaged insulation, exposed metal, or if the wear indicator shows. Check test lead continuity.**
- **Do not touch the probes to a voltage source when the test leads are connected to the current terminals.**

- **Keep fingers behind the finger guards on the probes.**
- **Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.**

See Table 1 for a list of symbols used in this manual and on the Calibrator.

Table 1. Symbols

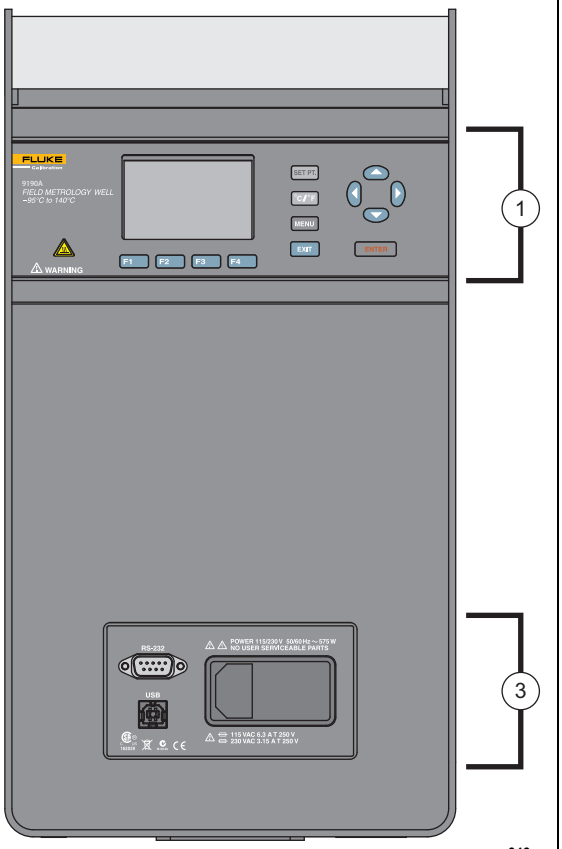
Symbol	Description	Symbol	Description
CE	Conforms to European Union directives	C SP US	Conforms to relevant North American Safety Standards.
⚠	Risk of Danger. Important information. See manual.	N10140	Conforms to relevant Australian EMC requirements
⏚	Earth ground	⚠	Hazardous voltage
	This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.		

Calibrator Features

Table 2 identifies and describes the panels on the front of the Calibrator.

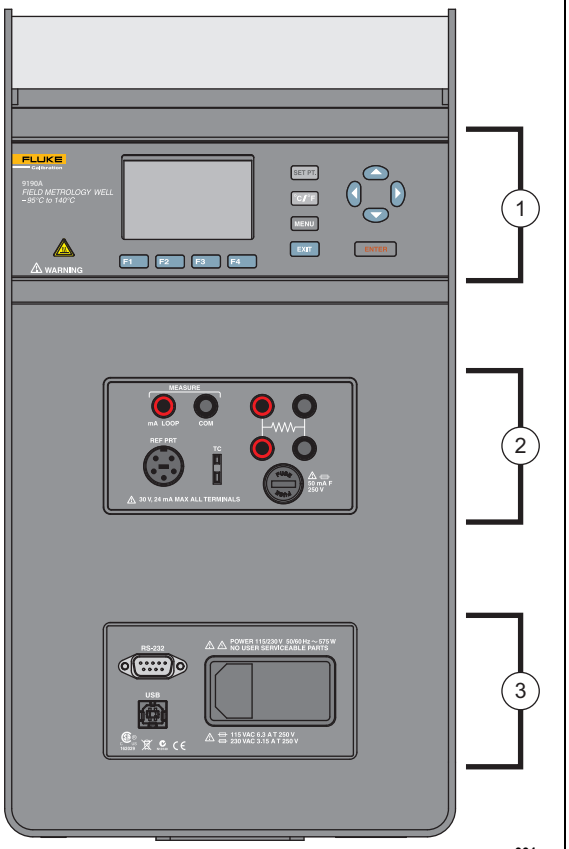
Table 2. Front Panel

9190A Model



gzs046.eps

9190A-P Model



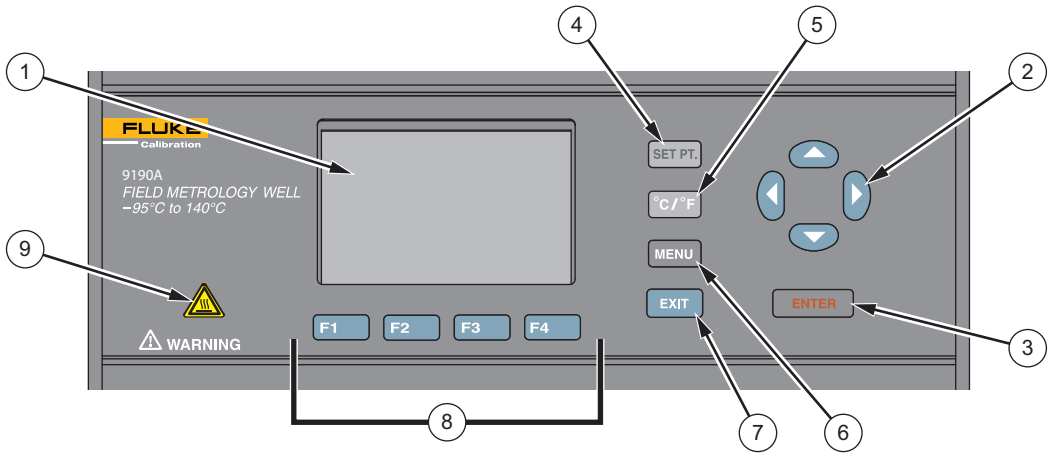
gzs001.eps

Item	Name	Function
①	Display and Control Panel	Control panel and display. See page 5.
②	-P Option Panel (Input Panel)	Input panel used to connect to external sensors and probes. Panel is only available on the “-P” model. See page 6.
③	Power and Remote Interface Panel	Power module and Remote Interface Panel. See page 7.

Display and Control Panel

Table 3 shows and describes the function of each button on the Control Panel.

Table 3. Display and Control Panel

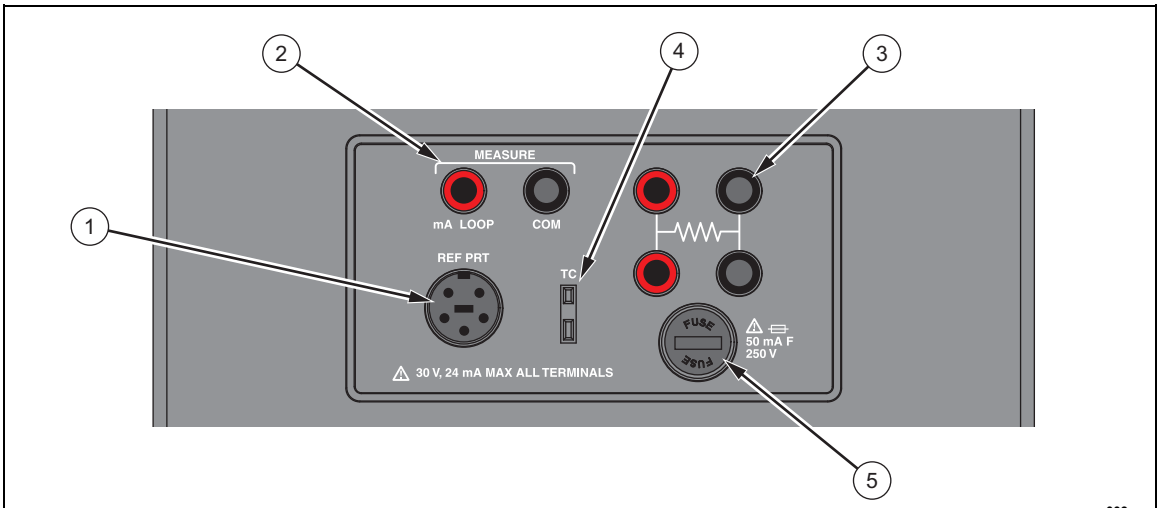


Item	Name	Function
①	Display	Shows block temperature, measurements, status information, operating parameters, and softkey functions. The contrast of the display is adjustable. To adjust the contrast, push ▲ to increase contrast or ▼ to decrease contrast while the Main screen is shown.
②	Arrow Keys ▲▼◄►	Navigates through menu selections, increases or decreases numbers, and scrolls menus up or down.
③	Enter Key ENTER	Selects menus and sets new values.
④	SET Point Key SET PT.	Set a SETPOINT temperature to heat or cool to.
⑤	°C/°F Key °C/°F	Switches the displayed temperature units between °C and °F. Key is enabled only when the Main screen is shown. *Note* *This key is disabled in some regions of the world.*
⑥	Menu Key MENU	Opens the Main menu.
⑦	Exit Key EXIT	Cancels all changes and navigates back to the previous menu.
⑧	Softkeys F1 F2 F3 F4	Navigates the menus on the display. The functions of the softkeys are shown on the display above the buttons.
⑨	Block Temperature Indicator ⚠	Visual safety indicator that illuminates when the block temperature is unsafe and extinguishes when the block temperature is safe. If the block temperature is unsafe and the Calibrator is turned off or the mains power cord is disconnected, the indicator flashes until the block temperature cools to a safe temperature. Do not transport or remove inserts until the indicator is off. **⚠ Warning** **For safe operation and maintenance of the product, do not remove Inserts when the Block Temperature indicator is illuminated.**

-P Option Panel (Input Panel)

Table 4 shows and describes the connectors and ports on the -P Option Panel. The optional process version -P Option Panel is also referred to as the Input Panel.

Table 4. -P Option Panel (Input Panel)

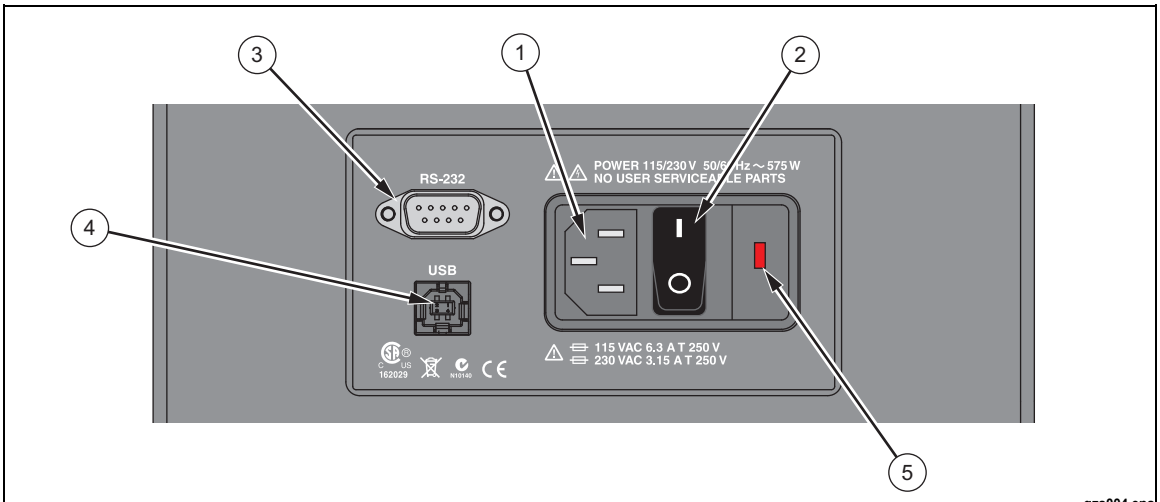


Item	Name	Function
①	Reference Thermometer Input (REF PRT)	Connect a Reference PRT probe to the Calibrator for use with the reference thermometer function. See the *9190A Operators Manual* for more information.
②	4-20 mA Connectors	Connect a 4-20 mA transmitter to the Calibrator. The 4-20 mA Connectors can supply a low voltage (24 V) to power a transmitter.
③	4-Wire PRT/RTD Connector	Connect a 4-wire, 3-wire, and 2-wire PRT/RTDs to the readout to be calibrated.
④	Thermocouple (TC) Connector	Connect a subminiature thermocouple (TC) connector.
⑤	Fuse	Fuse for the 4-20 mA circuit.

Power and Remote Interface Panel

Table 5 shows and describes the connectors and ports on the Power and Remote Interface Panel.

Table 5. Power and Remote Interface Panel



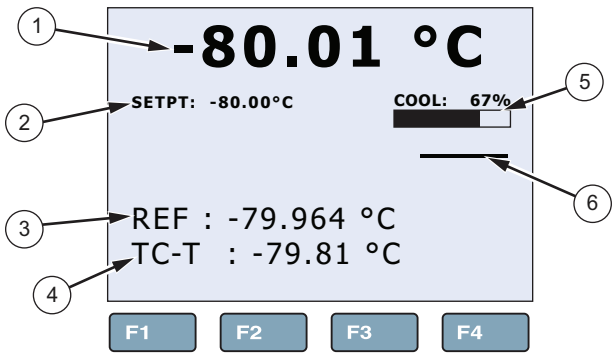
Item	Name	Function
①	Mains Power Cord Receptacle	Receptacle for the mains power cord. Use an AC mains supply appropriate for the voltage range and region of use.
②	Power Switch	Turn on (**I**) and turn off (**O**) the Calibrator.
③	9-pin Subminiature Serial Connector (RS-232)	Transmits measurements and remotely controls the operation of the Calibrator.
④	USB Serial Connector	Transmits measurements and remotely controls the operation of the Calibrator.
⑤	Fuse	Product fuse.

Main Screen

When the Calibrator turns on, the system initializes, does a self-check, then shows a startup screen that shows the model number and firmware version information. If the self-check finds an error, the error is shown on the Startup screen. Contact Fluke Calibration if an error shows on the Startup screen.

After the start-up initialization is complete, the Startup screen disappears and the Main screen shows on the display. Table 6 shows and describes the indicators on the Main screen.

Table 6. Main Screen



Item	Name	Function
①	Block Temperature	Temperature of the internal temperature block.
②	SETPOINT Temperature	Target SETPOINT temperature. A set temperature value is referred to as a “SETPOINT”. The Calibrator uses the SETPOINT value to know what temperature to heat or cool to.
③	Reference Temperature [-P Only]	Shows the most recent reference measurement when a Reference PRT probe is connected and set up.
④	UUT Output [-P Only]	Shows the most recent UUT output measurement of a probe that is connected and setup. The value shown depends on the output type selected in the Input Setup Menu.
⑤	Heating/Cooling Status	Shows the mode the calibrator is in. The modes are: OFF, COOL, HEAT, and CUTOUT. See the *9190A Operators Manual* for more information.
⑥	Stability Status Indicator	Visually shows if the block temperature is stable and within the stability limits. See the *9190A Operators Manual* for more information.

Calibrator Setup

Unpack and Inspect

Unpack the instrument carefully and examine it for any damage that could have occurred during shipment. If there is shipping damage, notify Fluke Calibration and the carrier immediately. Table 7 lists the equipment and the accessories that comes with the Calibrator. Verify that all the equipment and accessories in Table 7 are in the box.

Table 7. Parts and Accessories

Name	Quantity
9190-INSX Insert (X=A, B, C, D, E, or F)	1
6-foot Mains Power Cord	1
USB Cable	1
Getting Started Manual	1
Product CD that contains manuals and remote interface driver files	1
9930 Interface-it Calibration Software and Users Guide	1
Report of Calibration and Calibration Label	1
Well Insulator Cap	1
Insert Removal Tool	1
Clamp-on Ferrites (-P model only)	4
6-pin DIN Connector (-P model only)	1
Test Lead Kit (-P model only)	1

Placement

Put the Calibrator on a clean, flat surface. Make sure the Calibrator is 150 mm (6 inches) away from all objects. For best results, choose a location to set up the Calibrator where room temperature changes are minimum.

⚠ Warning

To prevent possible electrical shock, fire, or personal injury:

- **Do not operate Product in orientations other than upright. A fire hazard can be made if the Product is put on its side.**
- **Do not remove Inserts when the Product shows temperatures more than 50 °C.**
- **Do not operate near flammable materials.**
- **Do not touch the well access surface of the Product.**
- **Do not turn off the Product when the temperature is above 100 °C. Set a SETPOINT temperature below 100 °C and let the Product cool.**

⚠ Caution

For safe operation and maintenance of the Product:

- **Energize the Product for a 2-hour dry-out period before use, if the Product was:**
  - **In transport**
  - **In a humid or semi-humid storage environment**
  - **Not energized for more than 10 days**

  If the product is wet or has been in a wet environment, take necessary measures to remove moisture prior to applying power.
- **Always operate this Product on a flat, level, stable surface.**
- **Do not store the Product at temperatures above 50 °C. The Product has a refrigeration system and contains gasses under pressure.**
- **Do not turn the Product upside down. The inserts will fall out.**
- **To prevent damage to the cooling system, do not tilt the Product on its side or upside down while the Product is operating.**

Connect to Mains Power

Use the 2-meter (6-foot) mains power cord to connect the Product to a 120 V ac or 230 V ac outlet rated for at least 15 amps.

Turn On the Product

1. Push the "**I**" side of the power switch on the front panel of the Calibrator.
2. Monitor the Startup screen for errors while the product turns on. If an error shows, contact Fluke Calibration.

Change Language

To change the display language:

1. Push MENU.
2. Push F3.
3. Push F1.
4. Push F1.
5. Push ◀ or ▶ to highlight a language.
6. Push ENTER to set language.

Note

If the incorrect language is set by accident, push softkeys F1 *and* F4 *at the same time to temporarily switch back to the English language.*

Set Display Contrast

With the Main screen shown in the display, push ▲ to increase or push ▼ to decrease display contrast.

Toggle Key Beep On or Off

With the Main screen shown in the display, push F1 and F3 at the same time to enable or disable key beep.

Security and Password

The Calibrator has two user-level access security levels (Low and High) to protect from undesired changes to the settings (see Table 8). The Calibrator comes from the factory with the security level set to High and a default password of "1234".

If the password is not available, the information can still be viewed. To view the information without the password, push ENTER twice or push EXIT when prompted for the password. The information is then shown on the screen, but cannot be changed.

Note

The Calibrator does not have a password reset function. If the password is lost, contact Fluke Calibration for password reset assistance.

Table 8. Security Levels

Security Level	Definition
Low	Protects the specific metrological information and calibration information settings.
High	Protects all operating parameters. It is intended to minimize user choices, for example, to perform repeated identical calibrations under consistent conditions.

To change the password:

1. Push MENU.
2. Push F3.
3. Push F2.
4. Enter the current 4-digit password to open the password screen (the default factory password is **1234**).
5. Push ◀ and ▶ to highlight a digit then push ▲ to increase the digit or push ▼ to decrease the digit.
6. Push ENTER to save the password.

To change the security level:

1. Push MENU.
2. Push F3.
3. Push F2.
4. Enter the current 4-digit password to open the password screen (the default factory password is **1234**).
5. Push ◀ and ▶ to highlight **HIGH** or **LOW**.
6. Push ENTER to save the selection.

Specifications

Base Unit Specifications

Temperature Range at 23 °C ..... –95 °C to 140 °C (–139 °F to 284 °F)

Display Accuracy ..... ±0.2 °C Full Range

Accuracy with External Reference [3] ..... ±0.05 °C Full Range

Stability ..... ±0.015 °C Full Range

Axial Uniformity at 40 mm (1.6 in) ..... ±0.05 °C Full Range

Radial Gradient ..... ±0.01 °C Full Range

Loading Effect
(with a 6.35 mm reference probe and three 6.35 mm probes) ..... ±0.006 °C Full Range

(versus display with 6.35 mm probes) ..... ±0.25 °C at –95 °C
±0.10 °C at 140 °C

Operating Conditions ..... 0 °C to 35 °C, 0 % to 90 % RH (non-condensing) < 2000 m altitude

Environmental conditions for all specifications except temperature range ..... 13 °C to 33 °C

Immersion (Well) Depth ..... 160 mm (6.3 in)

Well Diameter ..... 30 mm (1.18 in)

Heating Time [1] ..... –95 °C to 140 °C: 40 min

Cooling Time [1] ..... 23 °C to –90 °C: 80 min
23 °C to –95 °C: 90 min
140 °C to 23 °C: 60 min

Stabilization Time [2] ..... 15 min

Resolution ..... 0.01 °

Display ..... LCD, °C or °F user selectable

Size (H x W x D) ..... 480 mm x 205 mm x 380 mm (18.8 in x 8.0 in x 14.9 in)

Weight ..... 16 kg (35 lb)

Power Requirements ..... 100 V to 115 V (±10 %) 50/60 Hz, 575 W
200 V to 230 V (±10 %) 50/60 Hz, 575 W

System Fuse Ratings ..... 115 V: 6.3 A T 250 V
230 V: 3.15 A T 250 V

4–20 mA Fuse (-P model only) ..... 50 mA F 250 V

Computer Interface ..... RS-232, USB Serial, and 9930 Interface-it Temperature Calibration Software included

Safety ..... IEC 61010-1, Installation Category II, Pollution degree 2

Electromagnetic Environment ..... IEC 61326-1: Basic

Refrigerants
R32 (Difluoromethane) ..... < 20 g, ASHRAE Safety Group A2L
R704 (Helium) ..... < 20 g, ASHRAE Safety Group A1

-P Specifications

Built-in Reference Thermometer Readout
Accuracy (4-Wire Reference Probe) [3] ..... ±0.010 °C at –95 °C
±0.013 °C at –25 °C
±0.015 °C at 0 °C
±0.020 °C at 50 °C
±0.025 °C at 140 °C

Reference Resistance Range ..... 0 Ω to 400 Ω

Reference Resistance Accuracy [4] ..... 0 Ω to 42 Ω: ±0.0025 Ω
42 Ω to 400 Ω: ±60 ppm of reading

Reference Characterizations ..... ITS-90, CVD, IEC-751, Resistance

Reference Measurement Capability ..... 4 wire

Reference Probe Connection ..... 6-Pin Din with INFO-CON Technology

Built-in RTD Thermometer Readout Accuracy .. NI-120: ±0.015 °C at 0 °C
PT-100 (385): ±0.02 °C at 0 °C
PT-100 (3926): ±0.02 °C at 0 °C
PT-100 (JIS): ±0.02 °C at 0 °C

RTD Resistance Range ..... 0 Ω to 400 Ω

Resistance Accuracy [4] ..... 0 Ω to 25 Ω: ±0.002 Ω
25 Ω to 400 Ω: ±80 ppm of reading

RTD Characterizations ..... PT-100 (385),(JIS),(3926), NI-120, Resistance

RTD Measurement Capability ..... 2-wire, 3-wire, and 4-wire RTD with Jumpers only

RTD Connection ..... 4-terminal input

Built-in TC Thermometer
Readout Accuracy [5] ..... Type J: ±0.70 °C at 140 °C
Type K: ±0.75 °C at 140 °C
Type T: ±0.60 °C at 140 °C
Type E: ±0.60 °C at 140 °C
Type R: ±1.60 °C at 140 °C
Type S: ±1.60 °C at 140 °C
Type M: ±0.65 °C at 140 °C
Type L: ±0.65 °C at 140 °C
Type U: ±0.70 °C at 140 °C
Type N: ±0.75 °C at 140 °C
Type C: ±1.00 °C at 140 °C

TC Millivolt Range ..... –10 mV to 75 mV

Voltage Accuracy ..... 0.025 % of reading +0.01 mV

Internal Cold Junction
Compensation Accuracy ..... ±0.35 °C (ambient of 13 °C to 33 °C)

TC Connection ..... Miniature Connectors (ASTM E1684)

Built-in mA Readout Accuracy ..... 0.02 % of reading + 0.002 mA

mA Range ..... Cal 4-22 mA, Spec 4-24 mA

mA Connection ..... 2 terminal input

Loop Power Function ..... 24 VDC loop power

Built-in Electronics Temperature Coefficient
(0 °C to 13 °C, 33 °C to 50 °C) ..... ±0.005 % of range per °C

Notes:

[1] – For ambient temperature of 23 °C.

[2] – Time from when the SETPOINT is reached to when the unit is with in Stability specification.

[3] – The temperature range may be limited by the reference probe connected to the readout. The built-in Reference Accuracy does not include the sensor probe accuracy. It does not include the probe uncertainty or probe characterization errors.

[4] – Measurement accuracy specifications apply within the operating range and assume 4 wires for PRTs. With 3-wire RTDs add 0.05 Ω to the measurement accuracy plus the maximum possible difference between the resistances of the lead wires.

[5] – The thermocouple input readout is sensitive to EM fields in the frequency range of 500 MHz to 700 MHz.