FLUKE®
Calibration

4180ETRS

Precision Infrared Calibrator

Operators Manual

September 2020
© 2020 Fluke Corporation. All rights reserved. Specifications are subject to change without notice.
All product names are trademarks of their respective companies.

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	Fluke Europe B.V
P.O. Box 9090	Science Park Eindhoven 5110
Everett, WA 98206-9090	5692 EC Son
U.S.A.	The Netherlands

11/99

Table of Contents

Title	Page
Introduction	1
Contact Fluke Calibration	2
Safety Information	2
Burn Hazard	2
Electrical Hazard	3
Service Information	4
Unpack the Product	4
Specifications and Environmental Conditions	5
Specifications	5
Environmental Conditions	6
Forced Air and Convection	6
Quick Start	6
Setup	6
Power on the Product	6
Configure Set Points	7
Parts and Controls	7
Front Panel	8
Display	10
Back Panel	11
Languages	12
Language Selection	12
Reset to English Language	12
Menu Structure	13
Temperature Setup Menu	13
Program Menu	14
System Menu	15
View Temperature Menu	16
Product Operation	16
Main Screen	16
Main Menu	16
TEMP SETUP	17
SETUP	17
IRT	17
CUTOUT	18
PROG MENU	18

SELECT PROG 18
PROG OPTION 19
RUN PROG 20
SYSTEM MENU 20
SYSTEM SETUP 20
PASSWORD 21
CALIBRATE 21
SYSTEM INFO (View Only) 22
VIEW TEMP 23
BLOCK TEMP (View Only) 23
Digital Communication Interface 23
Wiring 23
Setup 23
Serial Operation 24
Command Syntax 24
Commands by Function or Group 25
Serial Commands - Alphabetic Listing 27
Maintenance 39
Troubleshooting 40

Introduction

The Fluke Calibration 4180ETRS Portable IR Calibrator (The Product) is a portable instrument or bench-top temperature calibrator used as an External Temperature Reference Source (ETRS) in a fever-screening system. The Product is small enough to use in the field, and accurate enough to use in the lab.

The Product features:

- Rapid heating and cooling
- RS-232 interface capability

Built in programmable features include:

- Temperature scan rate control
- Eight set-point memory
- Adjustable readout in °C or °F

The temperature is accurately controlled by the digital controller. The controller uses a precision platinum RTD as a sensor and controls the surface temperature with FET-driven Peltier modules.

The display continuously shows the current temperature. The temperature is easily set with the control buttons to any desired temperature within the specified range. The Product's multiple fault protection devices ensure user and Product safety and protection.

With proper use, the Product will provide continued accurate calibration of IR temperature measurement devices. Familiarize yourself with the safety guidelines and operating procedures of the Product. See *Safety Information*.

Contact Fluke Calibration

Fluke Corporation operates worldwide. For local contact information, go to our website:
www.flukecal.com
To register your product, view, print, or download the latest manual or manual supplement, go to our website.
Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090

+1-425-446-5500
info@flukecal.com

Safety Information

General Safety Information is located in the printed Safety Information document that ships with the Product. It can also be found online at www.Flukecal.com. More specific safety information is listed where applicable in this manual.

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.

Burn Hazard

⚠Warning

To prevent personal injury:

- **Do not touch the IR target surface or areas surrounding the target of the Product.**
- **Do not operate the Product in any orientation other than vertical (target face perpendicular to installation surface). Risk of fire or burn hazard may result due to excessive heat buildup.**
- **Take precautions to prevent personal injury or damage to objects.The Product can generate extreme temperatures.**

Electrical Hazard

Follow these guidelines closely to make sure that the safety mechanisms in this Product operate properly. This Product must be plugged into an AC-only outlet according to the *Specifications and Environmental Conditions*. The power cord of the Product has a three-pronged grounding plug for your protection against electrical shock. Plug the power cord directly into a properly grounded three-prong receptacle. The receptacle must be installed in accordance with local codes and ordinances. Consult a qualified electrician.

⚠Warning

To prevent personal injury:

- **Always carry the Product in an upright position. The convenient pull-up handle allows one hand carrying.**
- **Do not operate the Product in excessively wet, oily, dusty, or dirty environments.**
- **Do not operate near flammable materials.**

⚠Caution

To prevent damage to the Product:

- **Do not use an extension cord or adapter plug.**
- **Do not operate the Product without a properly grounded, properly polarized power cord.**
- **Do not connect the Product to a non-grounded outlet.**
- **For installations with polarized outlets, ensure that the polarity of the connection is correct.**
- **HIGH VOLTAGE is used in the operation of this equipment. Contact an Authorized Service Center (see *Contact Fluke Calibration*) for service from a qualified technician. No user serviceable parts.**
- **Always replace the fuse with one of the same rating, voltage, and type.**
- **Always replace the power cord with an approved cord of the correct rating and type.**
- **Protect the target against dirt and damage - scrapes and scratches. A well kept target surface, free from dirt and damage, produces better measurements. Use the target cover whenever the Product is not in use to protect the target. Always use the target cover when transporting the Product, but remember to never transport the Product at high temperatures.**
- **Do not touch the target. Oils and salts from the skin will permanently damage the target surface at high temperatures.**
- **Do not use fluids to clean the target surface.**
- **Do not use shop air to clean the target surface. Oil and contaminants in the shop air could contaminate the surface.**
- **Do not use canned, compressed air (used to clean a computer) to clean the target surface. Chemicals in the air could contaminate the target surface.**

- **Do not force cool the surface. The surface should not be cooled by any method other than natural convection. Forced air can often have oil or water in it. Even water can leave mineral deposits on the surface. Trying to cool the surface too quickly can also cause thermal shock to the emissive surface.**
- **Do not use liquid nitrogen (LN2) to quick cool the target.**
- **Do not plug the Product into 230 V if the fuse holder reads 115 V. This action will cause the fuses to blow and may damage the Product.**
- **Component lifetime can be shortened by continuous high temperature operation.**
- **Do not change the values of the calibration constants from the factory set values. Calibration constants shall only be changed by qualified and authorized personnel. The correct setting of these parameters is important to the safety and proper operation of the Product.**
- **Use a ground fault interrupt device.**
- **Always operate this Product at room temperatures as stated in *Specifications and Environmental Conditions*.**
- **The Product is a precision Product. Handle the Product with care. It is important to keep the calibration well and the IR target surface clean and clear of any foreign matter.**
- **If a main supply power fluctuation occurs, immediately turn off the Product. Wait until the power has stabilized before re-energizing the Product.**

Service Information

Contact an authorized Fluke Calibration Service Center if the Product needs calibration or repair during the warranty period. See *Contact Fluke Calibration*. Please have Product information such as the purchase date and serial number ready when you schedule a repair.

Unpack the Product

Unpack the Product carefully and inspect it for any damage that may have occurred during shipment. If there is shipping damage, notify the carrier immediately.

Verify that these components are present:

- 4180ETRS IR Calibrator Report of Calibration
- *4180ETRS Safety Information*
- Power Cord
- Target Cover
- Serial Cable
- RS232 to USB Converter Cable
- USB Extension Cord

Specifications and Environmental Conditions

The Product specifications describe the Absolute Instrumental Uncertainty of the Product. The Product specifications are provided at a 99 % level of confidence, corresponding to a coverage factor, k=2.58, normally distributed.

Specifications

Product specifications are in Table 1.

Table 1. Specifications

Temperature range (@ 18 °C to 30 °C ambient)	33 °C to 40 °C
Maximum permissible error	±0.2 °C
Stability (3σ, 1 minute)	±0.006 °C
Stability (3σ, 8 hours)	±0.05 °C
Long-term stability (1 year)	±0.05 °C
Heating time	10 min: 23 °C to 40 °C
Cooling time	10 min: 40 °C to 23 °C
Stabilization time	10 minutes
Emissivity[1]	0.928 ± 0.005
Target diameter	152.4 mm (6 in)
Computer interface	RS-232
Power	115 V ac (±10%), 50/60 Hz, 250 W 230 V ac (±10%), 50/60 Hz, 250 W
Fuse(s)	115 V ac 6.3 A, 250 V, T 230 V ac 3.15 A, 250 V, T
Size (HxWxD)	356 x 241 x 216 mm (14 x 9.5 x 8.5 in)
Weight	9.1 kg (20 lb)
Altitude	<2000 m
Operating ambient temperature	5 °C to 35 °C (41 °F to 95 °F)
Operating ambient relative humidity	maximum 80 % for temperature <31 °C, decreasing linearly to 50 % at 40 °C
Mains voltage	mains voltage within ±10 % of nominal
Safety General Heating	 IEC 61010-1: Overvoltage Category II, Pollution Degree 2 IEC 61010-2-010

Table 1. Specifications (cont.)

Electromagnetic Compatibility (EMC)	International..... IEC 61326-1: Basic Electromagnetic Environment CISPR 11: Group 1, Class A *Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself.* *Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances.* *Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.* Korea (KCC)..... Class A Equipment (Industrial, Broadcasting, & Communication Equipment) *Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.* USA (FCC) ..... 47 CFR 15 subpart B. This product is considered an exempt device per clause 15.10
[1] The target has a nominal emissivity of 0.928, however it is radiometrically calibrated to minimize lated uncertainties.	

Environmental Conditions

Although the Product has optimum durability and trouble-free operation, it must be handled with care. The Product should not be operated in an excessively dusty or dirty environment. Only use the Product indoors. Minimize vibrations in the calibration environment. Maintenance and cleaning recommendations can be found in *Maintenance*.

Forced Air and Convection

Since the Product has a large surface area, a major component of the temperature uncertainty is caused by changes in convection. Because of this, keep the Product away from areas with large amounts of air flow or drafts.

Quick Start

Setup

Note

*The Product will not heat, cool, or control until the **SET PT.** parameter is Enabled.*

Place the Product on a flat surface with at least 15 cm (6 in) of free space around the Product. Overhead clearance is required. Do not place under a cabinet or structure.

Plug the power cord of the Product into a mains outlet of the proper voltage, frequency, and current capability (see *Specifications and Environmental Conditions* for power details). Confirm that the nominal voltage corresponds to that indicated on the power entry model at the back of the Product. Remove the target cover.

Power on the Product

Toggle the switch on the power entry module to turn on the power to the Product. After a brief self-test, the controller should begin normal operation. The main screen appears within 30 seconds. If the Product fails to operate, check the power connection. The display shows the target surface temperature, and waits for user input before further operation.

Configure Set Points

Push **SET PT.** and use the arrow buttons to set the desired set-point temperature. Push **ENTER** to save the set-point and enable the Product. After 5 seconds the Product starts to operate normally and heat or cool to the designated set-point.

Parts and Controls

This section describes the exterior features of the Product. All interface buttons are found on the front of the Product (see Table 2). Power and serial connections are on the back of the Product (see Table 4).

Front Panel

Table 2 shows the front panel.

Table 2. Front Panel

1	The **Display** is a 240 x 160 pixel monochrome graphics LCD device with a bright LED backlight. The display shows current control temperature, measurements, status information, operating parameters, and softkey functions.

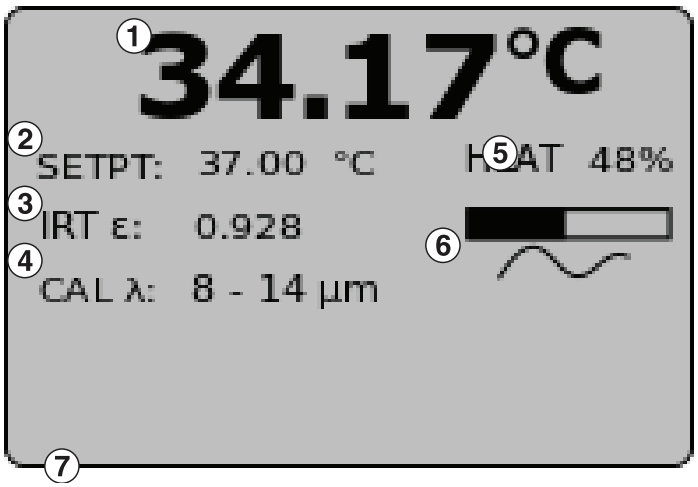
Table 2. Front Panel (cont.)

❷	The **SET PT.** button enables the Product to heat or cool to a desired set-point. Until **SET PT.** is enabled, the Product will not heat or cool. The Product is in a sleep state for safety of the operator and Product.
❸	The **°C/°F** button changes the displayed temperature units from °C to °F and °F to °C.
❹	The **MENU** button accesses all parameter and settings menus. From the main menu, use the softkeys to access submenus and functions.
❺	The **EXIT** button exits menus and cancels newly entered values.
❻	The arrow buttons move the cursor on the display, change the display layout, and adjusts the display contrast.
❼	The **ENTER** button selects menus and accepts new values.
❽	The Softkeys are the four buttons immediately below the display (**F1** to **F4**). The functions of the softkeys are indicated on the display above the buttons. The function of the keys may change depending on the menu or function that is selected.
❾	The block temperature indicator shows when it is safe to install the target cover. The indicator illuminates when the target exceeds approximately 50 °C. The indicator illuminates until the target cools to less than approximately 50 °C. If the Product is disconnected from mains power, the indicator flashes until the target temperature is less than approximately 50 °C.

Display

Table 3 shows the display.

Table 3. The Display



❶	**Process Temperature** - The most recent block temperature measurement is shown in large digits in the box at the top of the screen.
❷	The current **set-point temperature** is displayed just below the Process Temperature.
❸	The current infrared thermometer **emissivity setting (IRT ε)** shown below the current set-point temperature.
❹	The current **calibration wavelength (CAL λ)** selected. The wavelength band at which the Product was calibrated.
❺	**Stability Status** - A graph shows the current status of the stability of the Product.
❻	**Heating/Cooling Status** - A bar graph indicates HEATING, COOLING, or CUT-OUT. This status graph indicates the current level of heating or cooling if the Product is not in cutout mode.
❼	**Softkey Functions** (not shown) - The four sets of text at the bottom of the display indicate the functions of the softkeys (**F1**-**F4**). These functions change with each menu.
❽	During Product setup and use, you are often required to enter or select parameters. **Editing windows** appear on the display to show the values of parameters and allow edits.

Back Panel

Table 4 shows the back panel.

Table 4. Back Panel

❶	The **fan** is located in the center of the back of the Product. Do not obstruct the airflow of the fan. Leave at least 6 inches of air flow around the Product.
❷	The power supply cord attaches to the **power-entry module**. Plug the cord into an ac mains supply appropriate for the voltage displayed on the power entry module and as specified in *Specifications and Environmental Conditions*. The power switch is located on the power-entry module of the Product. The Product fuses are located inside the power-entry module of the Product. If necessary, fuses must be replaced according to *Specifications and Environmental Conditions*.
❸	The **serial (RS-232) interface** can be used to transmit measurements and control the operation of the Product.

Languages

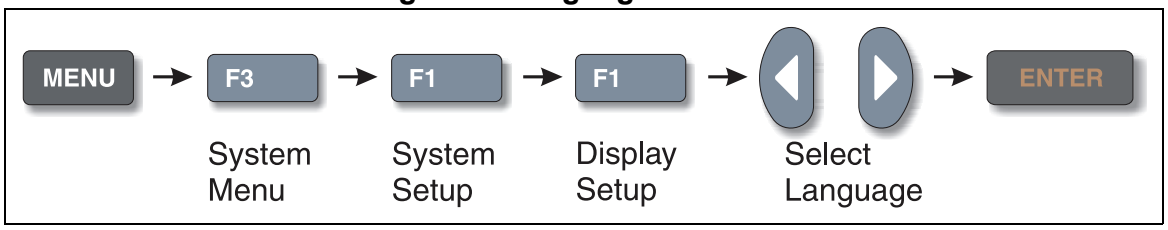
Set the display to different languages depending on the configuration.

- European: English, French, Spanish, Italian, German, Chinese, Japanese
- Russian: Russian, English

Language Selection

The languages in the Menu system under the System Menu/Display Setup. Select the language to be displayed with the left and right arrow buttons (see *SYSTEM MENU*). See Figure 1.

Figure 1. Language Selection



Reset to English Language

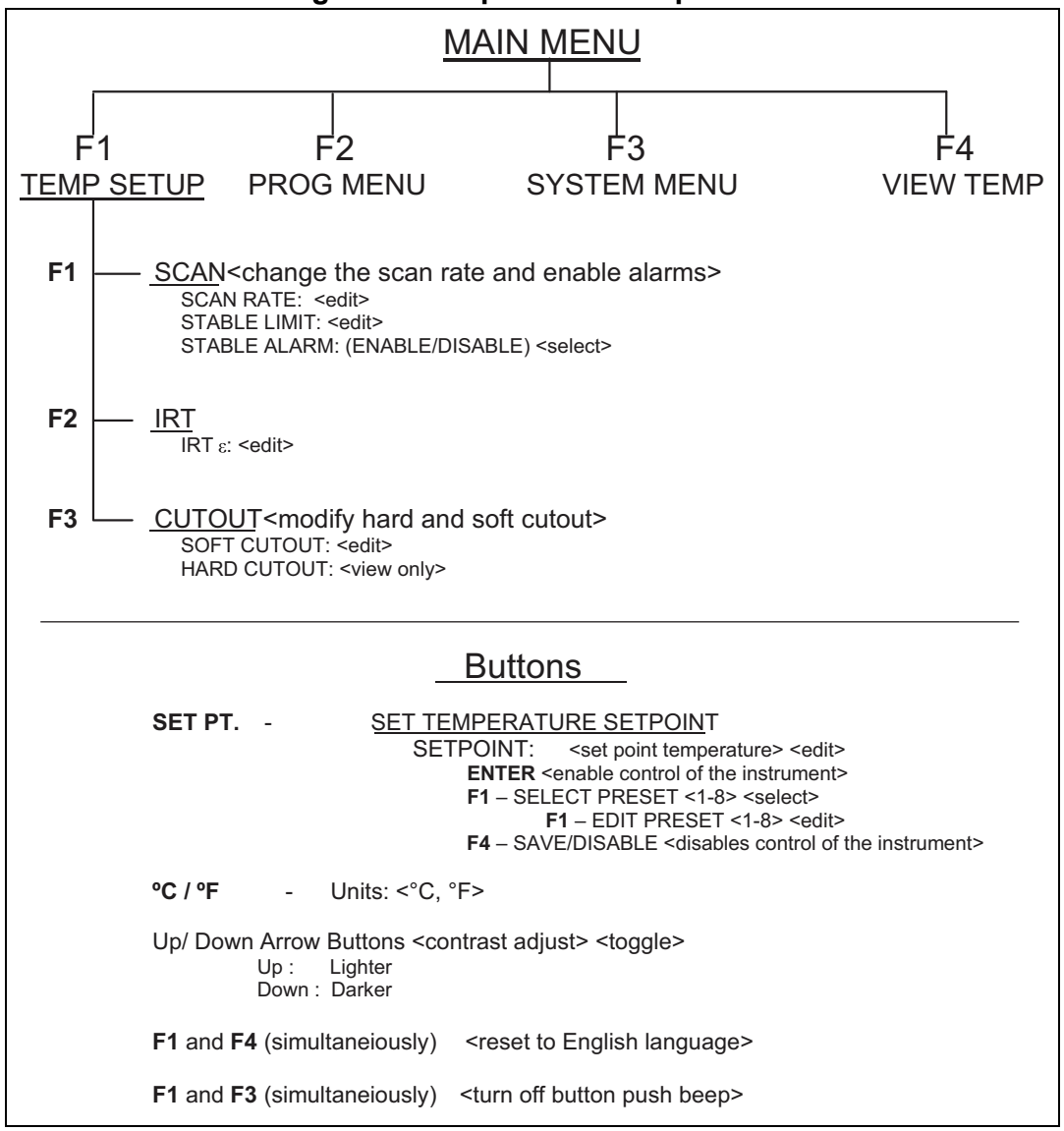
F1 + **F4** temporarily displays English, or returns to the selected language. The selected language resumes after the power is switched off and on. To permanently select English, follow the instructions in *Language Selection*.

Menu Structure

Temperature Setup Menu

The Temperature Setup menu is shown in Figure 2.

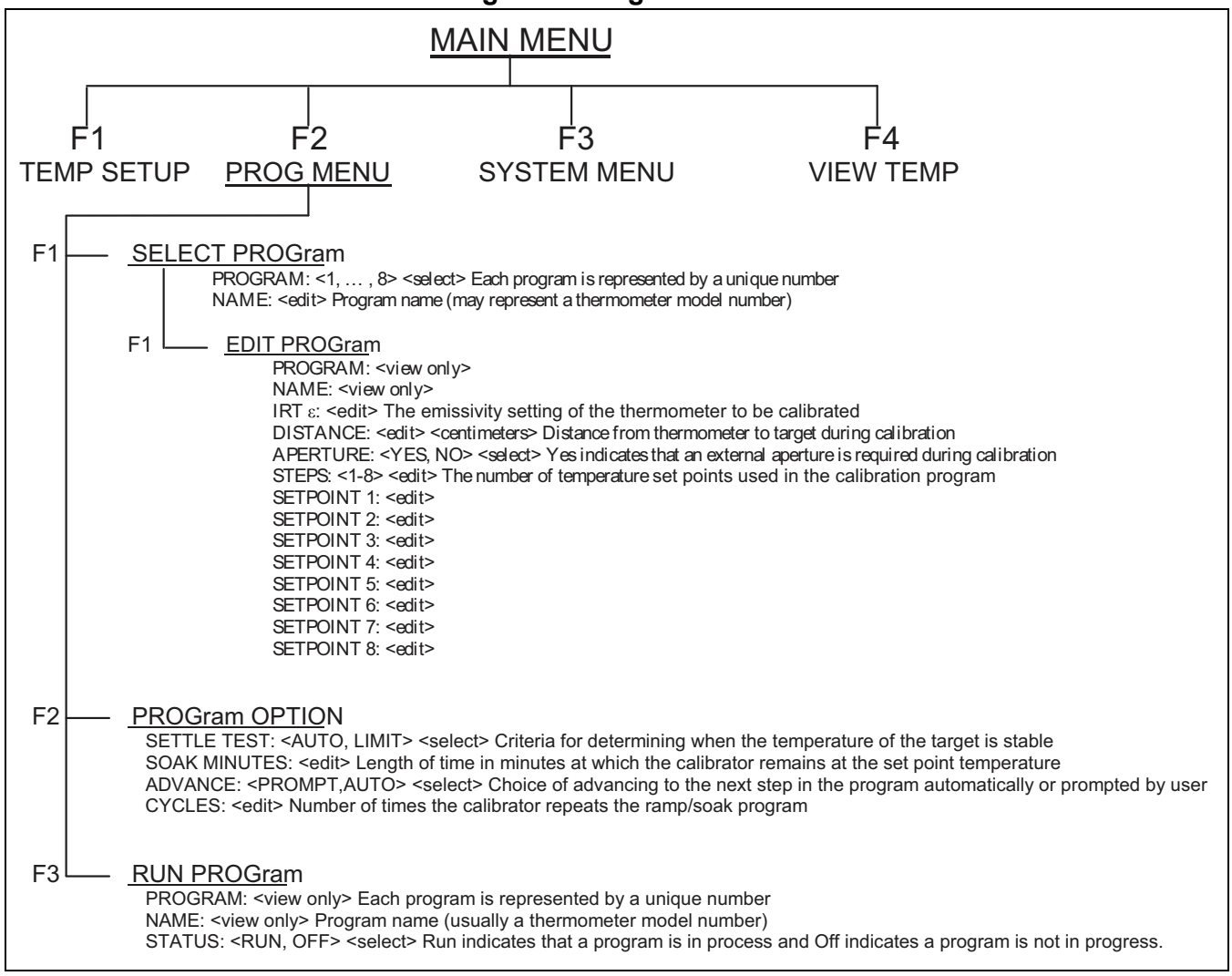
Figure 2. Temperature Setup Menu



Program Menu

The Program menu is shown in Figure 3.

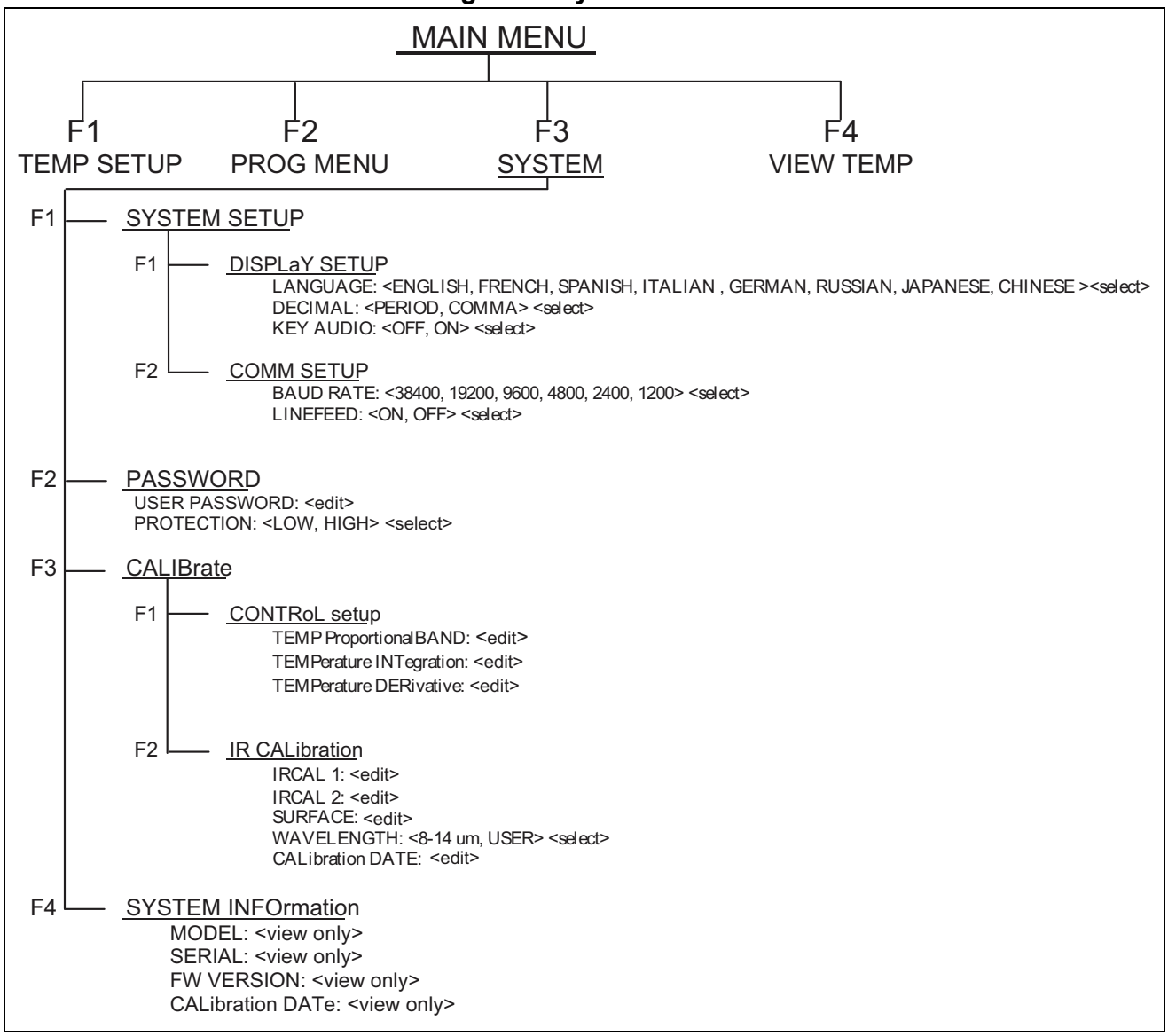
Figure 3. Program Menu



System Menu

The System menu is shown in Figure 4.

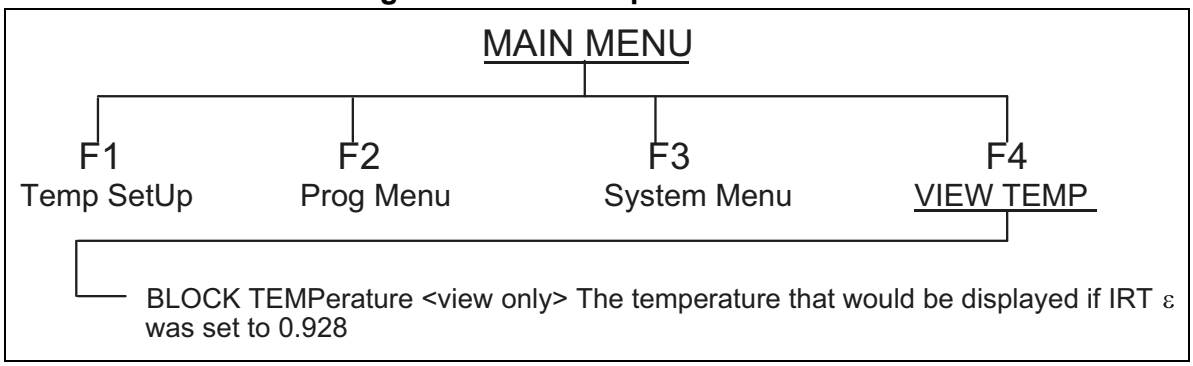
Figure 4. System Menu



View Temperature Menu

The View Temperature menu is shown in Figure 5.

Figure 5. View Temperature Menu



Product Operation

This section discusses how to operate the control panel.

Main Screen

The display shows the control temperature (actual target temperature), heating or cooling power, stability state, current set-point information, and current program information. The temperature is either in °C or °F. Push **C/F** to change temperature units.

APPARENT TEMPERATURE

This is the radiometric temperature of the target surface as calculated from the control sensor temperature. The calculation depends on the emissivity setting. The controller heats or cools the target to force the control temperature equal to the set-point.

SET-POINT (SETPT)

This is the current set-point.

IRT ε

IRT ε is the ETRS nominal emissivity.

CONTROL - HEAT/COOL

Is the relative heating or cooling power (duty cycle) in percent.

HEATING, COOLING, CUTOUT

Is the status of heating or cooling or the cutout when activated. The bar graph indicates the relative heating or cooling power.

STABLE INDICATION (Graphic)

Is the stability of the target. When the stability is within the STABLE LIMIT setting, this line is flat.

Main Menu

Push **MENU** to access the Main Menu and the main submenus. Use the submenus to set up the Product as desired and to change system parameters as needed.

TEMP SETUP

The Temp Setup contains functions related to temperature setup.

SETUP

The SETUP menu contains the parameters that set the stability limit and scan rate for the Product.

SCAN RATE

The Scan Rate parameter can be set such that when the set-point is changed, the Product heats or cools at a specified rate, degrees per minute (°C/min or °F/min), until it reaches the new set-point.

The Scan Rate can be set from 0.1 to 500 °C/min (0.2 to 900 °F/min). However, the maximum scan rate is limited by the natural heating or cooling rate of the Product, which is often much less than 500 °C/min (900 °F/min), especially when cooling.

Use the arrow buttons to adjust the scan rate. Once the scan rate has been set, push **ENTER** to accept the new scan rate.

STABLE LIMIT

Note

The Product should not be expected to operate better than the stability specification set forth in Specifications. The minimum setting of the stability limit should not be less than the stability specification.

The STABLE LIMIT parameter notifies the user when it has achieved the stability limit set in this parameter. There are two notifications: visual and audible. The visual notification is always active. As the Product operates within the stability limit, the stability graph on the main screen remains flat once the Product is within the given specification for 1 minute. Otherwise the graph indicates that the Product is not yet stable. The audible, if enabled, alerts the user once per set-point when the Product achieves the set stability limit. Use the arrow buttons to set the desired stability limit and push **ENTER** to accept the new stability limit. During calibration, the stability limit is 0.01 °C. Always use this setting in the field.

Example

When the Product's stability is within ±0.01 °C for 1 minute, the graph is flat and the audible alarm (if enabled) notifies the user that the Product is operating within ±0.01°C.

STABLE ALARM

To turn on or off the audible alarm described in *STABLE LIMIT*, use the STABLE ALARM parameter. Push the left or right arrow button to select either **Enable** or **Disable** and push **ENTER** to accept the selection.

IRT

The IRT menu contains the nominal emissivity of the ETRS. This parameter cannot be changed.

CUTOUT

The Cutout menu contains the Soft and Hard Cutout functions of the Product. As a protection against software or hardware fault or user error, the Product has an adjustable cutout device that shuts off power to the heat source if the target temperature exceeds a set value. The factory default is 10 degrees above the high limit of the Product. If the cutout is activated because of excessive target temperature, power to the heat source shuts off and the Product cools. The Product remains in cutout mode and active heating and cooling are disabled until the user manually resets the cutout. If the over-temperature cutout is triggered, the Product displays **CUTOUT** above the duty cycle bar graph, which indicates a cutout condition. The Product remains in cutout mode until the temperature is reduced and the cutout is reset. The target temperature must drop a few degrees below the cutout set-point before the cutout can be reset. For safety reasons, the cutout only has one mode - manual reset. Manual reset mode means the cutout must be reset by the operator after the temperature falls below the set-point.

Note

CUTOUT RESET: If the Product exceeds the temperature set in the soft cutout menu or if it exceeds the maximum operating temperature of the Product, a cutout condition occurs. If this happens, the Product enters cutout mode and will not actively heat or cool until the user resets the Product.

To reset the cutout, the Product temperature must cool to lower than the cutout set-point. Once the Product has cooled, push **SET PT.**, then **ENTER,** and then **ENTER** again to reset and engage the Product.

SOFT CUTOUT

The Soft Cutout is user settable. The SOFT CUTOUT parameter can be set to any temperature under the range of the Product. The cutout should be set within 5 ° to 10 ° of the safety limit of the equipment being calibrated or used with the Product.

HARD CUTOUT

The Hard Cutout is not user settable. The HARD CUTOUT parameter is a view-only function and indicates the factory setting for the hard cutout.

PROG MENU

Use the Prog Menu (PROGRAM MENU) to access automated and manual program selections.

SELECT PROG

Use the SELECT PROG menu to select a program, 1 - 8.

PROGRAM

Select the PROGRAM from the listing.

EDIT PROG

Use the EDIT PROG menu edit program parameters.

PROGRAM (view Only)

The PROGRAM parameter indicates the number of the selected program.

NAME (view Only)

Program NAME indicates the program name. To set the program name, see the PROG:[n]NAME serial command. Example: a thermometer model number.

IRT ε

IRT ε is the emissivity setting of the IR thermometer to be calibrated.

DISTANCE

DISTANCE is the distance in centimeters (cm) from the IR target to the DUT.

APERTURE

Select YES or NO. Yes indicates that an external aperture is required during calibration.

NO. SETPOINTS

The NO. SETPOINTS is the number of set-points defined for a given program. The number of set-points for each program can be set from 1 to 8 and vary depending on the needs of the user. Set the maximum number of set-points needed for the program selected. Once the number of set-points is selected, push **ENTER** to accept the new setting.

SETPOINT n:

Use SETPOINT n to set the temperature for each given set-point. n is a number from 1 to No. Set-points.

PROG OPTION

Use the PROG OPTION to set program parameters.

SETTLE TEST

SETTLE TEST is the criteria to determine when the temperature of the surface is stable. The options are: AUTO and LIMIT. AUTO uses a predetermined value for the stability. LIMIT uses the value set by the STABLE LIMIT parameter in the TEMP SETUP|SETUP|STABLE LIMIT window.

SOAK MINUTES

The SOAK MINUTES parameter is the number of minutes that each of the program set-points is maintained. The time starts when the temperature settles to within the specified stability. The stability limit is set in the TEMP SETUP|SETUP|STABLE LIMIT window.

ADVANCE

Use ADVANCE to set the choice to advance to the next step in the program automatically (AUTO) or to be prompted from the screen (PROMPT).

CYCLES

CYCLES is the number of times that the Product repeats the program.

RUN PROG

Use the RUN PROG(RUN PROGRAM) menu to access the program status feature.

PROGRAM (view Only)

The PROGRAM parameter indicates the number of the program that is selected.

NAME (view Only)

Program NAME indicates the program name. To set the program name, see the PROG:[n]NAME serial command. Example: a thermometer model number.

STATUS

The STATUS option controls the state of the program. The user selects RUN to run the program or OFF to turn the program off.

SYSTEM MENU

Use the SYSTEM MENU to set up the display settings, communications protocol, password settings, calibrations settings, and to view system information.

SYSTEM SETUP

The SYSTEM SETUP menu contains the menus for the display and communications parameters.

DISPLY SETUP

The DISPLY SETUP (DISPLAY SETUP) menu contains the language selection, decimal separator, and keypad sound parameters.

LANGUAGE

See *Languages*.

DECIMAL

Use the DECIMAL parameter to determine the decimal separator: a comma or a period. Push the right or left arrow to select the desired decimal separator and then push **ENTER** to accept the selection.

KEY AUDIO

The KEY AUDIO parameter (**F1** and **F3** pushed simultaneously) enables or disables the button push beep.

COMM SETUP

The COMM SETUP (COMMUNICATIONS SETUP) menu contains the serial interface parameters. The parameters in the menu are: BAUD RATE and LINEFEED.

BAUD RATE

The BAUD RATE parameter determines the serial communication transmission rate or baud. BAUD RATE may be programmed to 1200, 2400, 4800, 9600, 19200, or 38400 baud.

LINEFEED

The LINEFEED enables (ON) or disables (OFF) transmission of a line feed character (LF, ASCII 10) after transmission of any carriage return. The LINEFEED default setting is on. The line-feed parameter can be turned on or off as needed.

PASSWORD

Use the PASSWORD (PASSWORD SETUP) menu to set the system password or set the level of protection that conditionally engages or disengages protection of certain groups of parameters.

USER PASSWORD

Use the USER PASSWORD parameter to enter and change the system and conditional password used to access protected menus. The PASSWORD is a number between one and four digits. Each digit of the password can be a number from 0 to 9. The default System Password is *1234*. Use the up, down arrow buttons to enter the new password, and then push **ENTER**.

PROTECTION

Use the PROTECTION parameter to enable (HIGH) or disable (LOW) password protection for the conditional parameters. The password is the same as the system password. You can conditionally password-protect the SOFT CUTOUT and all of the PROGRAM MENU parameters except SELECT PROG and RUN PROG. Select HIGH or LOW with the left and right arrow buttons and push **ENTER** to accept the selection.

CALIBRATE

⚠Caution

Calibration parameters must be correct for the Product to function properly.

Use the CALIB (CALIBRATION) menu to access to the calibration parameters for the Product. Access to the IR target calibration parameters is password protected. Calibration parameters are programmed at the factory when the Product is calibrated. Qualified personnel can adjust these parameters when needed to improve the accuracy of the Product.

⚠Caution

Do not change the calibration values or control parameters from the factory-set values unless recalibrating the Product. The correct setting of these parameters is important to the safe and proper operation of the Product.

The parameters in the CALIB menu are set at the factory and must not be altered unless recalibrating the Product. Recalibration of the Product should be performed by qualified personnel. The correct values are important to the accuracy and safe operation of the Product. Access to these parameters is password protected. In the event that the calibration parameters need to be reentered into the Product, the constants and their settings are listed in the Report of Calibration shipped with the Product.

CONT SETUP

Use the CONT SETUP (CONTROL SETUP) to access the controller parameters.

TEMP PBAND

The TEMP PBAND parameter is the proportional band in °C that the Product's proportional-integral-derivative (PID) controller uses for control.

TEMP INT

The TEMP INT parameter is the integration time in seconds that the Product's PID controller uses for control.

TEMP DER

The TEMP DER parameter is the derivative time in seconds that the Product's PID controller uses for control.

IR CAL

The IR CAL (IR CALIBRATION) menu contains the IR target calibration constants: IR CAL 1, IR CAL 2, and IR CAL 3. Use the arrow buttons to enter the set-point for each calibration point and push **ENTER** to accept the entry. The calibration points should be selected applicable to model with a low, mid-range, and high set-point.

IR CAL 1

The IR CAL 1 parameter is the offset in °C for the IR target accuracy at 30 °C.

IR CAL 2

The TEMP 2 parameter is the offset in °C for the IR target accuracy at 40 °C.

WAVELENGTH

The WAVELENGTH parameter can be set to the default 8 µm to 14 µm or USER selectable. This is to remind the user that the nominal emissivity of the Product pertains to the 8 µm to 14 µm band.

CALDATE

The CALDATE parameter is the calibration date for the IR target. Use the arrow buttons to enter the calibration date in the format yyyy,mm,dd.

SYSTEM INFO (View Only)

The SYSTEM INFO (SYSTEM INFORMATION) menu displays manufacturer information regarding the Product.

MODEL

The MODEL parameter displays the model number of the Product.

SERIAL

The SERIAL (SERIAL NUMBER) parameter displays the serial number of the Product.

FW VERSION

The FW VERSION (FIRMWARE VERSION) parameter displays the firmware version used in the Product.

CAL DATE

The CAL DATE (CALIBRATION DATE) parameter displays the calibration date of the IR target.

VIEW TEMP

Use the VIEW TEMP (VIEW TEMPERATURE) to view the BLOCK TEMPERATURE parameter.

BLOCK TEMP (View Only)

Use the BLOCK TEMP (BLOCK TEMPERATURE) parameter to view the uncompensated control sensor temperature.

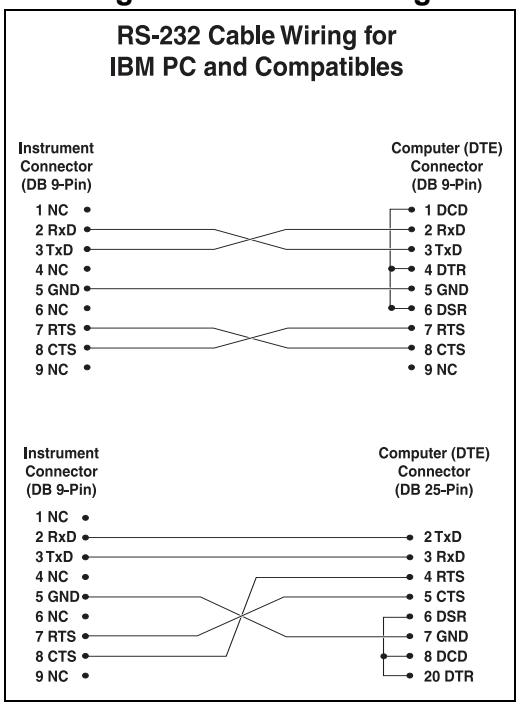
Digital Communication Interface

Wiring

Use a digital interface to connect the Product to a computer or other equipment. A digital interface lets you input the set-point temperature, monitor the temperature, control operating conditions, and access any of the other controller functions. The RS-232 serial interface allows serial digital communications over fairly-long distances. Access any of the functions, parameters, and settings discussed in this section with the serial interface.

The serial communications cable attaches to the Product through the DB-9 connector at the back of the Product. Figure 6 shows the pin-out of this connector and suggested cable wiring. To eliminate noise, the serial cable should be shielded, with low resistance between the connector (DB9) and the shield.

Figure 6. RS-232 Wiring



Setup

Before operation, the serial interface must first be set up by programming the BAUD rate and other configuration parameters. These parameters are programmed within the communications menu. The serial interface parameters can be accessed from the main menu by MENU|SYSTEM SETUP|COMM SETUP|. Refer to *Comm* in *Product Operation* for more information on the serial interface parameters.

Serial Operation

The serial communications uses 8 data bits, one stop bit, and no parity. The set-point and other commands may be sent with the serial interface to set the temperature set-point and view or program the various parameters. The interface commands are discussed in *Digital Communication Interface*.

Command Syntax

Infrared Calibrators accept commands for setting parameters, executing functions, or responding with requested data. These commands are in the form of strings of ASCII-encoded characters. The Product command syntax conforms to SCPI-1994 as closely as possible. One notable exception is that compound commands are not allowed as explained below.

Commands consist of a command header and, if necessary, parameter data. All commands must be terminated with either a carriage return (ASCII 0D hex or 13 decimal) or new line character (ASCII 0A hex or 10 decimal).

Command headers consist of one or more mnemonics separated by colons (:). Mnemonics may use letter characters, the underscore character (_), and possibly numeric digits as well. Commands are not case sensitive. Mnemonics often have alternate forms. Most mnemonics have a long form that is more readable and a short form consisting of three or four characters that is more efficient.

A mnemonic may end with a numeric suffix that specifies one of a set of independent function blocks such as input channel data paths. If a numeric suffix is omitted when a particular block must be specified, an error is generated (*Header suffix out of range*).

Query commands are commands that request data in response. Query commands have a question mark (?) that immediately follow the command header. Responses to query commands are generated immediately and placed in the output buffer. Responses are then transmitted automatically over the RS-232 port. Responses are lost if not read before the next command is received.

Some commands require parameter data to specify values for one or more parameters. The command header is separated from the parameter data by a space (ASCII 20 hex or 32 decimal). Multiple parameters are separated by a comma (,).

The Product does not allow compound commands (multiple commands per line separated with semicolons). All commands are sequential. The execution of each command is completed before subsequent commands are processed.

Commands by Function or Group

In this section, the commands are arranged into the following groups, see Table 5:

- Calibration Commands - commands for the Product calibration parameters.
- Main Screen Commands - commands for parameters displayed on the main screen.
- Program Commands - commands for program setup and status.
- Setup Commands - commands for setting up communication, display, password, measure, and operation parameters.
- System Commands - commands to report and change the status of the Product.
- Temperature Commands - commands for control temperature and cutout functions.

Table 5. Commands by Function or Group

	Screen Parameter	Command	Password Protection Group	Read/Write
Calibration - Controller	TEMP PB	SOUR:LCON:PBAN	Unconditional	R/W
	TEMP INT	SOUR:LCON:INT	Unconditional	R/W
	TEMP DER	SOUR:LCON:DER	Unconditional	R/W
Calibration – IR Target	WAVELENGTH	SOUR:CAL:WAV	Unconditional	R/W
	(none)	SOUR:CAL:EMIS	N/A	R
	IR CAL 1	SOUR:CAL:PAR1	Unconditional	R/W
	IR CAL 2	SOUR:CAL:PAR2	Unconditional	R/W
	CAL DATE	SOUR:CAL:DATE	Unconditional	R/W
Main Screen	(apparent temperature)	SOUR:SENS:DATA [TEMP]	N/A	R
	SETPT	SOUR:SPO	N/A	R/W
	(graphic)	SOUR:STAB:DATA	N/A	R
	(none)	SOUR:STAB:TEST	N/A	R
	HEAT %	OUTP:DATA	N/A	R
	ENABLE	OUTP:STAT	N/A	R/W
	IRT E:	SOUR:EMIS	N/A	R/W
	CAL L	SOUR:CAL:WAV	N/A	R/W
	°C/°F key	UNIT:TEMP	N/A	R/W
	SETPT	SOUR:SPO	N/A	R/W
Setpoint	SETPOINT 1	SOUR:LIST:SPO1	N/A	R/W
	SETPOINT 2	SOUR:LIST:SPO2	N/A	R/W
	SETPOINT 3	SOUR:LIST:SPO3	N/A	R/W
	SETPOINT 4	SOUR:LIST:SPO4	N/A	R/W
	SETPOINT 5	SOUR:LIST:SPO5	N/A	R/W
	SETPOINT 6	SOUR:LIST:SPO6	N/A	R/W
	SETPOINT 7	SOUR:LIST:SPO7	N/A	R/W
	SETPOINT 8	SOUR:LIST:SPO8	N/A	R/W
Program - Select	PROGRAM	PROG:SEL	N/A	R/W
Program - Run	TEST STATUS	PROG:STAT	N/A	R/W
Program - Edit	ADVANCE	PROG:PROM:ADV	N/A	W

Table 5. Commands by Function or Group (cont.)

	Screen Parameter	Command	Password Protection Group	Read/Write
	(none)	PROG:PROM:STAT	N/A	R
	(none)	PROG:PAR:CAT	N/A	R
	SETPOINT 1	PROG[x]:PAR SPO1	Conditional	R/W
	SETPOINT 2	PROG[x]:PAR SPO2	Conditional	R/W
	SETPOINT 3	PROG[x]:PAR SPO3	Conditional	R/W
	SETPOINT 4	PROG[x]:PAR SPO4	Conditional	R/W
	SETPOINT 5	PROG[x]:PAR SPO5	Conditional	R/W
	SETPOINT 6	PROG[x]:PAR SPO6	Conditional	R/W
	SETPOINT 7	PROG[x]:PAR SPO7	Conditional	R/W
	SETPOINT 8	PROG[x]:PAR SPO8	Conditional	R/W
	NO. SETPOINTS	PROG[x]:PAR POIN	Conditional	R/W
	IRT E:	PROG[x]:PAR IRTE	Conditional	R/W
	DISTANCE	PROG[x]:PAR DIST	Conditional	R/W
	APERTURE	PROG[x]:PAR APER	Conditional	R/W
	NAME	PROG1:NAME	Conditional	R/W
	NAME	PROG2:NAME	Conditional	R/W
	NAME	PROG3:NAME	Conditional	R/W
	NAME	PROG4:NAME	Conditional	R/W
	NAME	PROG5:NAME	Conditional	R/W
	NAME	PROG6:NAME	Conditional	R/W
	NAME	PROG7:NAME	Conditional	R/W
	NAME	PROG8:NAME	Conditional	R/W
	SOAK MINUTES	PROG:OPT:SOAK	N/A	R/W
	SETTLE TEST	PROG:OPT:SETT	N/A	R/W
	CYCLE	PROG:OPT:CYCL	N/A	R/W
	ADVANCE	PROG:OPT:ADV	N/A	R/W
Setup - Communication	BAUD RATE	SYST:COMM:SER:BAUD	N/A	R/W
	LINEFEED	SYST:COMM:SER:LIN	N/A	R/W
Setup - Display	LANGUAGE	SYST:LANG	N/A	R/W
	LANGUAGE	SYST:LANG:CAT	N/A	R
	DECIMAL	SYST:DEC:FORM	N/A	R/W
	KEY AUDIO	SYST:BEEP:KEYB	N/A	R/W
Setup - Password	PASSWORD (Disable)	SYST:PASS:CDIS	Unconditional	W
	PASSWORD (Enable)	SYST:PASS:CEN	Unconditional	W
Status	(none)	SYST:PASS:CEN:STAT	N/A	R
	USER PASSWORD	SYST:PASS:NEW	Unconditional	W
	PROTECTION	SYST:PASS:PROT	N/A	R/W
System - Setup	(none)	SYST:KLOC	Conditional	R/W
System - Information	(none)	SYST:ERR	N/A	R

Table 5. Commands by Function or Group (cont.)

	Screen Parameter	Command	Password Protection Group	Read/Write
	(all)	*IDN	N/A	R
	(none)	*CLS	N/A	W
	FW VER	SYST:COD:VERS	N/A	R
	(none)	SYST:BEEP:IMM	N/A	W
Temperature - Setup	SCAN RATE	SOUR:RATE	N/A	R/W
	STABLE LIMIT	SOUR:STAB:LIM	N/A	R/W
	STABLE ALARM	SOUR:STAB:BEEP	N/A	R/W
Temperature – Cutout	HARD CUTOUT	SOUR:PROT:HCUT	N/A	R
	SOFT CUTOUT	SOUR:PROT:SCUT:LEV	Conditional	R/W

Serial Commands - Alphabetic Listing

Each command description provides the structure (long and short format), a description of the command purpose, a command example, an example of what the command returns (as applicable to query commands), and notes specific to the command. The list below applies to each group of commands:

L Numeric data, specified by the mnemonic, <num>, uses ASCII characters to represent numbers. Numbers may contain a plus or minus (+ or -) sign, decimal point (.), and exponent (E or e) with its sign. If a fractional component is received when only an integer is required, the number is rounded to the nearest integer without any resulting error message. The mnemonics DEF, MIN, and MAX are often acceptable for the default, minimum, and maximum value respectively. Unit suffixes, such as V or OHM, can be appended to numeric parameters and are accepted without error but ignored.

- Unrecognized commands or commands with incorrect syntax or invalid parameters generate error messages in the error queue.
- Upper case letters designate syntax that is required when issuing the command.
- Lower case letters are optional and may be omitted.
- < > indicates a required parameter.
- [ ] indicates optional parameters.
- ( ) indicates a group of parameters that must be used together.
- For query commands, specifying the MIN, MAX, or DEF parameter causes the Product to respond with the minimum, maximum, or default setting respectively.
- For set commands, specifying the MIN, MAX, or DEF parameters causes the Product to use the minimum, maximum, or default setting respectively.
- | indicates alternate parameter values.

- <n> indicates a number is required.
- <num> indicates numeric value is required.
- <prog> indicates a program number (SEQ<n> or SWIT<n>) is required.
- <bool> indicates a Boolean value (0 or 1) is required. The mnemonics OFF and ON are also accepted for 0 and 1, respectively.
- <conv> indicates a conversion mnemonic is required.
- <param> indicates a parameter name is required.
- <seri> indicates a serial number is required.
- <unit> indicates a temperature unit is required.
- <temp> indicates a temperature °C/F is required.
- <pass> indicates a password is required.
- <port> indicates a port number is required.
- <label> indicates an eight character label is required.
- <year> indicates a four digit number is required.
- <month> indicates a one or two digit number is required.
- <day> indicates a one or two digit number is required.
- <hour> indicates a one or two digit number is required.
- <minute> indicates a one or two digit number is required.
- <second> indicates a one or two digit number is required. <baud> indicates a valid baud number is required.

***CLS**

Clear the status registers

Example: *CLS

This command has no response.

Clears all status registers (events, operations, etc.).

***IDN?**

Read the product information (Manufacturer, Model Number, Serial Number, and Firmware Version)

Example: *IDN?

Response: FLUKE,4180ETRS,A79002,1.00

OUTP:DATA?

Read the main heat output percent

Example: OUTP1:DATA?

Response: 18.0

This command returns the current main zone heater duty cycle.

OUTP:STAT[?] [0|1]

Read or set the Main Heat output enable, off [0] or on [1]

Read Example: OUTP:STAT?

Response: 0

Set Example: OUTP:STAT 1

This command reads or sets the active heating or cooling output status. 0 is returned if the output status is off, and 1 is returned if the output status is on.

PROG:[n]NAME?

Read or set the program name by identifier by n,1 - 8. Where name consists of 1 to 10

Characters 0 to 9, A to Z and -. If n is omitted, the selected program is assumed.

Read Example: PROG:[1]NAME?

Response: PROG

Set Example: PROG:[1]NAME newprog01A

PROG:OPT:ADV n

Read or set the program advance option, 0 (prompt) or 1 (continue automatically)

Read Example: PROG:OPT:ADV?

Response: 0

Set Example: PROG:OPT:ADV 1

PROG:OPT:CYCL n

Read or set the program cycles, 1 to 999, default 1.

Read Example: PROG:OPT:CYCL?

Response: 123

Set Example: PROG:OPT:CYCL 150

PROG:OPT:SETT n

Read or set the program settle option, 0 (apply default limit) or 1 (apply STABLE LIMIT setting).

Read Example: PROG:OPT:SETT?

Response: 1

Set Example: PROG:OPT:SETT 1

PROG:OPT:SOAK n

Read or set the program soak time, 0 to 500 minutes. Default 1 Read Example: PROG:OPT:SOAK?

Response: 15

Set Example: PROG:OPT:SOAK 350

PROG[n]:PAR? PAR

Read or set a program parameter, for a given program identified by n, n = 1 to 8, where par is the parameter that you want to read. Parameters are SPOi, POIN, IRTE, DIST, and APER.

SPOi = set-points (1-8), where i =the value of one setpoint. POIN = the number of set-points for the indicated program. IRTE= the emissivity ε value, default 0.928.

DIST= the distance from the target to the DUT in cm, 0.1 to 999.9.

APER= yes or no to prompt user for the aperture. 0 = none, 1 = prompt user

Read Example: PROG[1]PAR? DIST?

Response: 100.0

Set Example: PROG[1]:PAR DIST,150

PROG:PAR:CAT?

Read a list of program parameters.

Read Example: PROG:OPT:SOAK?

Response: SPO8, POIN, IRTE, DIST, APER

PROG:PROM:ADV

Advance to the next program step if waiting for user input.

Set Example: PROG:PROM:ADV

PROG:PROM:STAT?

Read the manual program advance prompt state, 0(operating or program off) or 1 (waiting for user input).

Read Example: PROG:STAT? Response: 0

PROG:SEL?

Read or set the program selection, 1 to 8.

Read Example: PROG:SEL?

Response: 3

Set Example: PROG:SEL 2

PROG:STAT?

Read or set the program execution state for the selected program, 0(off) or 1(run).

Read Example: PROG:STAT?

Response: 0

Set Example: PROG:STAT 1

SOUR:CAL:DATE?

Read the Product calibration date in yyyy,mm,dd format.

Read Example: SOUR:CAL:DATE?

Response: 2007,1,18

SOUR:CAL:DATE y,m,d

Note

This command is unconditionally protected, which requires a password to set it.

Set the Product calibration date in yyyy,mm,dd format., year range 2000 to 2999.

Set Example: SOUR:CAL:DATE 2008,12,30

SOUR:CAL:EMIS?

Read the nominal IR calibration emissivity (0.928).

Read Example: SOUR:CAL:EMIS?

Response: 0.928

SOUR:CAL:PARx?

Read a control temperature parameter, where x is a numeric value indicating the parameter, valid values are 1,2, or 3 representing IR CAL 1, IR CAL 2, and IR CAL 3.

Read Example: SOUR:CAL:PAR2?

Response: 0.20

SOUR:CAL:PARx n

Note

This command is unconditionally protected, which requires a password to set it.

Set a control temperature parameter, where x is a numeric value indicating the parameter, valid values are 1,2, or 3 representing IR CAL 1, IR CAL 2, and IR CAL 3. Range = ±99.0; default: 0.0

Set Example: SOUR:CAL:PAR2 0.2

SOUR:CAL:PARx:TEMP?

Read the calibration temperature associated with a calibration parameter, where x is a numeric value indicating the parameter, valid values are 1,2, or 3.

Read Example: SOUR:CAL:PAR1:TEMP?

Response: -15.0

SOUR:CAL:WAV?

Read or set the calibration IR wavelength option, 0(8-14um) or 1(undefined); default 0.

Read Example: SOUR:CAL:WAV?

Response: 0

Set Example: SOUR:CAL:WAV 1

SOUR:EMIS?

Read the IR emissivity setting

Read Example: SOUR:EMIS?

Response: 0.928

SOUR:LCON:DER[?] [n]

Note

This command is unconditionally protected, which requires a password to set it.

Read or set the main control loop derivative time in seconds, Min: 0.0, Max: 99.9

Read Example: SOUR:LCON:DER?

Response: 1.5

Set Example: SOUR:LCON:DER 5

The main zone derivative is the derivative time in seconds that the unit's PID controller uses for main zone control.

SOUR:LCON:INT[?] [n]

Note

This command is unconditionally protected, which requires a password to set it.

Read or set the main control loop integral time in seconds. Range = {10.0-999.9}

Read Example: SOUR:LCON:INT?

Response: 20.0

Set Example: SOUR:LCON:INT 10

The main zone integral is the integration time in seconds that the unit's PID controller uses for main zone control.

SOUR:LCON:PBAN[?] [n]

Note

This command is unconditionally protected and requires a password to set it.

Read or set the main control loop proportional band, °C. Range = {1.0-99.9}

Read Example: SOUR:LCON:PBAN?

Response: 1.5

Set Example: SOUR:LCON:PBAN 7

The main zone proportional band is the gain inverse in °C that the unit's proportional- integral-derivative (PID) controller uses for main zone control.

SOUR:LIST:SPO<i>[?] [n]

Read or set a main temperature preset set-point

Read example: SOUR:LIST:SPO6?

Response: 25.00

Set Example: SOUR:LIST;SPO6 100.00

SOUR:PROT:CLEA

Reset the cutout to enable the system

Example: SOUR:PROT:CLEA

This command has no response.

If the Product exceeds the temperature set in the SOFT CUTOUT menu or if it exceeds the maximum operating temperature of the Product, a cutout condition occurs. If this happens, the unit enters cutout mode and does not actively heat or cool until the user issues this command to clear the cutout or resets the Product using the **SET PT.** button to clear the cutout mode and activate the Product.

SOUR:PROT:HCUT?

Read the hard cutout temperature set-point in °C or °F

Example: SOUR:PROT:HCUT?

Response: 140

Returns the current value of the hard cutout set-point.

SOUR:PROT:SCUT:LEV[?] [n]

Note

This command is conditionally protected and requires a password to set it.

Read or set the soft cutout set-point where n is an integer value from 0 to 700 4180ETRS Range = {0.00 to 70}

Read Example: PROT:SCUT:LEV? Response: 125

Set Example: PROT:SCUT:LEV 450

Read or set the soft cutout set-point. The soft cutout should be set to protect the temperature limits of the DUT.

SOUR:PROT:TRIP?

Read the temperature cutout tripped state. Range = {0, 1}; 0 = No Cutout; 1 = Cutout

Example: SOUR:PROT:TRIP?

Response: 0

A value of 0 is returned if the cutout set point has not been reached. Otherwise a value of 1 is returned and the cutout set point has been reached.

SOUR:RATE[?] [n]

Read or set the control temperature rate of change (Scan Rate), °C or °F per minute. Min: 0.10, Max: 500.00; Default: 100.00

Read Example: SOUR:RATE? Response: 0.531

Set Example: SOUR:RAT 1.26

The response to this command starts out high initially and decreases as the set point is reached.

SOUR:SENS:BLOC?

Reads the target temperature (uncompensated sensor temperature MENU|VIEW TEMP|BLOCK TEMP) in °C or °F.

Read Example: SOUR:SENS:BLOC? Response: 24.091

SOUR:SENS:DATA?

Reads the apparent temperature, in °C or °F.

Read Example: SOUR:SENS:DATA?

Response: 24.091 (current apparent temperature)

SOUR:SPO[?] [n]

Set the control set-point, °C or °F, where "n" is a real value with acceptance limits based on the model.

Parameter	Min	Max	Default
4180ETRS	10	50	25.00

Read Example: SOUR:SPO?

Response: 50.000

Set Example: SOUR:SPO 37.00

SOUR:STAB:BEEP[?] [n]

Read or set the stability alert (beep) enable where "n" is a value 0 or 1. [0] is disable, [1] is enable beep. Default: 1 (Enable Beep)

Read Example: SOUR:STAB:BEEP? Response: 1

Set Example: SOUR:STAB:BEEP 0 Enable or disable the audible stability alert.

SOUR:STAB:DAT?

Read the control temperature stability, °C or °F

Example: SOUR:STAB:DAT?

Response: 0.306

The controller stability is returned.

SOUR:STAB:LIM[?] [n]

Read or set the control temperature stability limit, °C or °F where "n" is a positive real value. Range = {0.01 to 5.0 (°C)}; Default: 0.1 (°C)

Read Example: SOUR:STAB:LIM? Response: 0.1

Set Example: SOUR:STAB:LIM 0.09

SOUR:STAB:TEST?

Read the temperature stability test results. Stable = 1; Unstable = 0

Example: SOUR:STAB:TEST?

Response: 0

A value of 0 is returned if the controller is not stable at the current set-point. Otherwise a value of 1 is returned if the controller is stable at the current set-point.

SYST:BEEP:IMM

Beep the system beeper Example: SYST:BEEP:IMM

The system beeper should make an audible sound in response to this command.

SYST:BEEP:KEYB[?] [n]

Read or set the keyboard beep function, 0=Off, 1=On. Default: 1 Read Example: SYST:BEEP:KEYB?

Response: 1

Set Example: SYST:BEEP:KEYB 1

Turns the keyboard beep function on or off.

SYST:COD:VERS?

Read the main code version

Example: SYST:COD:VERS?

Response: 1.10

Provides the user with the version of the main processor code.

SYST:COMM:SER:BAUD[?] [<baud>]

Read or set serial interface baud rate where "baud" is a standard baud rate value.
Range baud = {1200, 2400, 4800, 9600, 19200, and 38400}; Default: 9600

Read Example: SYST:COMM:SER:BAUD?

Response: 2400

Set Example: SYST:COMM:SER:BAUD 9600

SYST:COMM:SER:LIN[?] [n]

Set serial interface linefeed enable, where n is a value 1 or 0. [0] = LF OFF, [1] = LF ON; Default: 0 (OFF)

Read Example: SYST:COMM:SER:LIN? Response: 0

Set Example: SYST:COMM:SER:LIN 1

This command enables or disables line feed.

SYST:DEC:FORM[?] [n]

Read or set the decimal format, where n is period [0], comma [1]. Default: 0 (Period)

Read Example: SYST:DEC:FORM? Response: 0

Set Example: SYST:DEC:FORM 1

SYST:ERR?

Read the most recent error from the error queue

Example: SYST:ERR?

Response: command protected

This command response reports the errors in the error queue.

SYST:KLOC[?] [n]

Note

This command is unconditionally protected and requires a password to set it.

Read or set the keypad lockout; [0] = unlock, and [1] = lock. Default: 0 (Unlock)

Read Example: SYST:KLOCK?

Response: 1

Set Example: SYST:KLOC 1

This command locks or unlocks the system keypad providing control only through the serial interface (RS-232 port) or the keypad.

SYST:LANG[?] [lang]

Read or set the display language, where lang is ENGL, FREN, SPAN, ITAL, GERM, RUSS, JAP, CHIN; Default: English.

Read Example: SYST:LANG?

Response: ITAL

Set Example: SYST:LANG ENGL

SYST:LANG:CAT?

Read the available display languages,

Read Example: SYST:LANG:CAT?

Response: ENGL, FREN, SPAN, ITAL, GERM, JAP, CHIN

SYST:PASS:CDIS

Disable access to password protected setting commands.

Example: SYST:PASS:CDIS

This command has no response.

This command disables the system password protection.

SYST:PASS:CEN [n]

Enable access to password protected setting commands, where "n" is a four digit pass- word. Range = {0000 - 9999};

Example: SYST:PASS:CEN 1234

This command has no response.

This command enables the system password. This password must be enabled in order to use the conditionally-protected commands. When the power of the Product is cycled, system-password protection is disabled.

SYST:PASS:CEN:STAT?

Read the access state of password protected setting commands.

Example: SYST:PASS:CEN:STAT?

Response: 0

This command reports the current status of the system password.

SYST:PASS:NEW n

Note

This command is unconditionally protected, which requires a password to set it.

Set the password, where n is the new four-digit password. Range = {0000 - 9999}; Default: 1234

Example: SYST:PASS:NEW 1234

This command has no response.

This command allows the user to set the system password.

SYST:PASS:PROT[?] [0|1]

Read or set password protection level., [0] = low, [1] = high

Read Example: SYST:PASS:PROT?

Response: 0

Set Example: SYST:PASS:PROT 1

UNIT:TEMP[?] [n]

Read or set the display temperature units, where "n" is a character "C" or "F". Default: C

Read Example: UNIT:TEMP? Response: C

Depending on units setting, a C (Celsius) or F (Fahrenheit) is returned.

Maintenance

With proper care the Product requires very little maintenance.

If a hazardous material is spilled on or inside the Product, the user is responsible for taking the appropriate decontamination steps as outlined by the National Safety Council with respect to the material.

Before using any cleaning or decontamination method, except those recommended by Fluke Calibration, check with an Authorized Service Center (see *Contact Fluke Calibration*) to be sure that the proposed method does not damage the equipment.

If the Product is used in a manner not in accordance with the equipment design, the operation of the Product may be impaired or safety hazards may arise.

⚠Caution

To prevent damage to the Product:

- **Do not operate the Product in an oily, wet, dirty, or dusty environment.**
- **Do not use harsh chemicals to clean the Product, which may damage the paint. Do not wipe the front plate (target). If the outside of the Product becomes soiled, wipe it clean with a damp cloth and mild detergent.**
- **Always use the target cover when the Product is not in use and during transport.**
- **Handle the Product with care.**
- **Avoid knocking or dropping the Product.**
- **Keep the target surface of the Product clean and clear of any foreign matter.**
- **If the mains supply cord becomes damaged, replace it with a cord with the appropriate gauge wire for the current of the Product. If there are any questions, contact an Authorized Service Center (see *Contact Fluke Calibration*) for more information.**

Calibrate the Product annually to maintain its performance to published specifications. For more information, contact an Authorized Service Center (See *Contact Fluke Calibration*).

Troubleshooting

If the Product appears to function abnormally, this section may help to find and solve the problem, see Table 6. Several possible problem conditions are described along with likely causes and solutions. If a problem arises, please read this section carefully and attempt to understand and solve the problem. If the Product seems faulty or the problem cannot otherwise be solved, contact Fluke Calibration for assistance, see *Contact Fluke Calibration*. Be sure to have the Product model number, serial number, and voltage available.

Table 6. Troubleshooting

Problem	Causes and Solutions
The Product does not power up	**Check the fuses.** If a fuse blows, it may be due to a power surge or a component failure. Replace the fuse once. **⚠ Caution** **Do not replace the fuse with one of a higher current rating. Always replace the fuse with one of the same rating, voltage, and type. If the fuse blows a second time, it is likely caused by failure of a component part.** **Power Cord.** Check that the power cord is plugged in and connected to the Product. **AC Mains Power.** Ensure the circuit the supplies power to the Product is on.
The display is blank. The Product powers up: fan turns on, but the display remains blank	**Contrast.** Check the screen contrast. Push the down arrow key to see if the screen contrast lightens. If the contrast is not the issue, contact an Authorized Customer Service Center. See *Contact Fluke Calibration*.
The Product heats slowly	**Scan Rate.** Check the Scan Rate settings. The Scan Rate may be set with too low of a rate per minute for the current application.
If the display shows an abnormal temperature	The sensor is disconnected, open or shorted. Contact an Authorized Customer Service Center. See *Contact Fluke Calibration*.
If the display shows cutout	**Cutout.** If the Product exceeds the temperature set in the soft cutout menu or if it exceeds the maximum operating temperature of the Product, a cutout condition occurs. If this happens, the Product enters cutout mode and will not actively heat or cool until the user issues the command to clear the cutout or resets the Product using the **SET PT.** button to clear the cutout mode and activate the Product. **Reset.** The software cutout may need to be adjusted for the application. Check and adjust the cutout setting by entering CUTOUT menu: MENU|TEMPSETUP|CUTOUT.
Apparent Temperature is not the displayed temperature OR Incorrect temperature reading	**Operating Parameters.** Ensure that all operating parameters for the Product match the Report of Certification that was sent with the Product. **Electrical Interference.** Look for sources of electrical interference, such as motors, welders, or RF-generating equipment nearby, or ground loops.