

1551A Ex/1552A Ex

Stik Thermometer

Users Manual

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Introduction

The Stik Thermometer (the Product or the Probe) is a precision digital thermometer that can be used as an alternative to mercury liquid-in-glass (LIG) thermometers. It can also be used as a reference standard for other types of digital or analog thermometers. Because of its intrinsically safe certification, it can be used in many of the same hazardous locations as analog thermometers.

When you receive the Product, check that it is intact. The batteries are factory installed. Keep the shipping materials until you have made sure that there is no concealed damage.

Features

This section tells you about the features of the Product.

- The 1551A Ex Probe contains a fast-responding thin-film sensor that makes accurate measurements quickly and with minimal immersion depth. The Probe is available in three versions:
 - 4.8 mm x 229 mm (3/16 in. x 9 in.)
 - 6.35 mm x 305 mm (1/4 in. x 12 in.)
 - 6.35 mm x 508 mm (1/4 in. x 20 in.)
- The 1552A Ex Probe contains a stable, wire-wound platinum sensor with a 6.35 mm x 305 mm (1/4 in. x 12 in.) length sheath.

A rotatable probe mount lets the display module be turned horizontally or vertically.

A unique feature of the Product is the trend indication arrows. You can configure the arrows to show when the measurements are adequately stable to record a result.

The auto-off feature gives extended battery life of 300 hours maximum. The typical user may only have to change the batteries a few times a year.

Added features let you tailor the Product for specific applications.

These features include:

- ± 0.05 °C accuracy over full range
- Intrinsically safe
- Display temperature in °C or °F
- Temperature trend indicator
- User-selectable resolution (0.1, 0.01, 0.001)
- Large LCD with backlight
- 300 hour battery life
- Percent battery life and low-battery indicator
- NVLAP accredited calibration (NIST traceable)

How to Contact Fluke

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

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- China: +86-400-921-0835
- Brazil: +55-11-3530-8901
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit <http://register.fluke.com>.

To see, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

Safety Information

A **Warning** identifies conditions and actions that pose hazard(s) to the user. A **Caution** identifies conditions and procedures that could cause Product damage, equipment under test damage, or permanent loss of data.

General Safety Information is in the printed Safety Information document that ships with the Product and at www.Fluke.com. More specific safety information is listed where applicable.

If the Product overheats or is exposed to sudden physical shock, examine it for damage that can cause a safety risk. If possible, compare the displayed temperature to a known reference before Product use. If not sure, send the Product to Fluke Corporation. Refer to “How to Contact Fluke”.

Substitution of components will impair suitability for hazardous locations.

Ex Safety Information

This manual contains data and safety regulations that must be followed for safe, reliable use of the Product in hazardous areas under the detailed conditions. If you do not follow these instructions, personal injury or Product damage can occur. Violation of applicable legislation can also occur. Read the full manual before you use the Product. To make sure of safe Product operation, fully follow all instructions and warnings in the manual. If you are not sure (due to translation and/or printing errors), refer to the English manual.

An “Ex-hazardous area,” as used in this manual, refers to an area made hazardous by the possible presence of flammable or explosive vapors. These areas are also referred to as “hazardous locations.”



II 2 G

Ex ib IIB T4 Gb (−10 °C ≤ Ta ≤ +50 °C)

ITS19ATEX204844X

IECEX ETL 19.0023X



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Manufactured by Fluke Corporation,
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Operation

Immersion Depth and Usage

Caution

To prevent possible damage to the Product or to equipment under test, do not immerse the Probe beyond the maximum immersion depth. This may damage its internal electronics.

The Product must be adequately immersed in the medium to make an accurate temperature measurement.

Allow enough time for the Probe to stabilize before recording measurements. Use the Stability Display to determine when the Probe has stabilized.

Probe sensor length is shown in Figure 1.

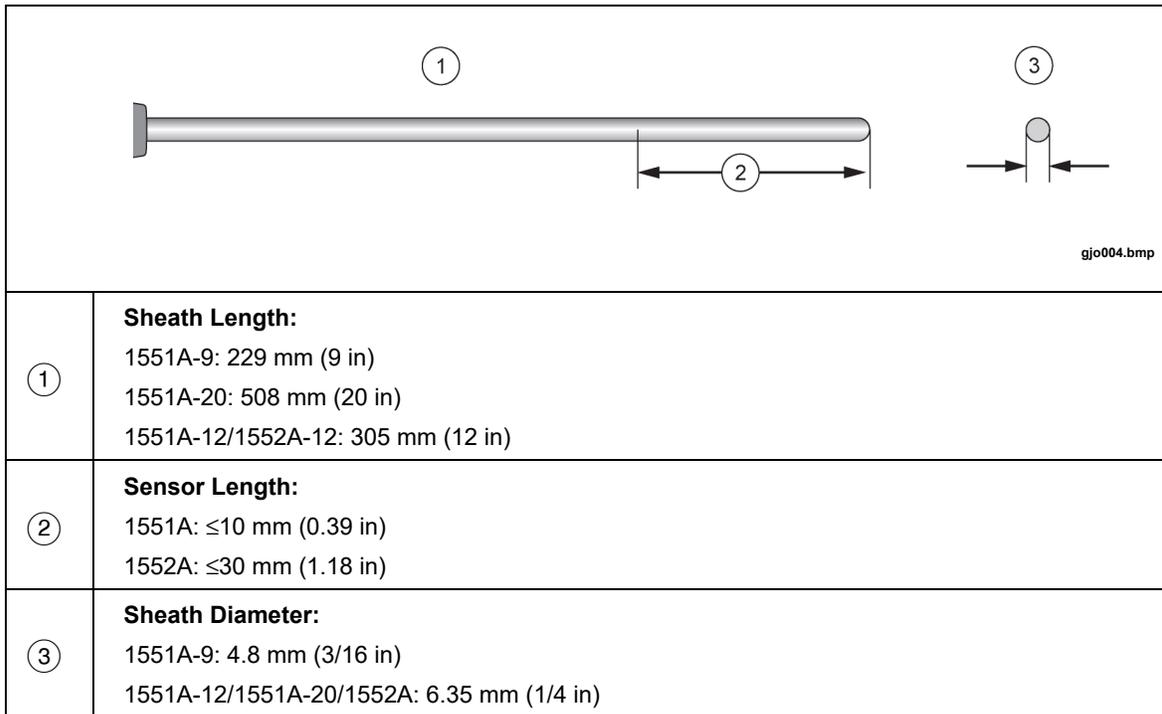


Figure 1. Probe Measurements

- The minimum required immersion depth depends on the type of medium (wet or dry) as shown in Table 1. These figures should result in immersion errors of <0.005 °C in most cases. Actual results depend on the type and form of the surrounding materials.

Table 1. Minimum Immersion Depth

Medium	Minimum Immersion Depth
Wet (liquid bath, thermowell with thermal compound)	70 mm (2.8 in.)
Dry (dry-well, thermowell without thermal compound)	120 mm (4.8 in.)

- The maximum immersion depth for the 1551A Ex is 50 mm (2 in) less than the total length. Make sure the last 50 mm of Probe, nearest to the internal electronics of the device, are not put into the heat source.
- The maximum immersion depth for the 1552A Ex is 75 mm (3 in) less than the total length. Make sure the last 75 mm of the Probe, nearest to the internal electronics of the device, are not put into the heat source.

See Figure 2.

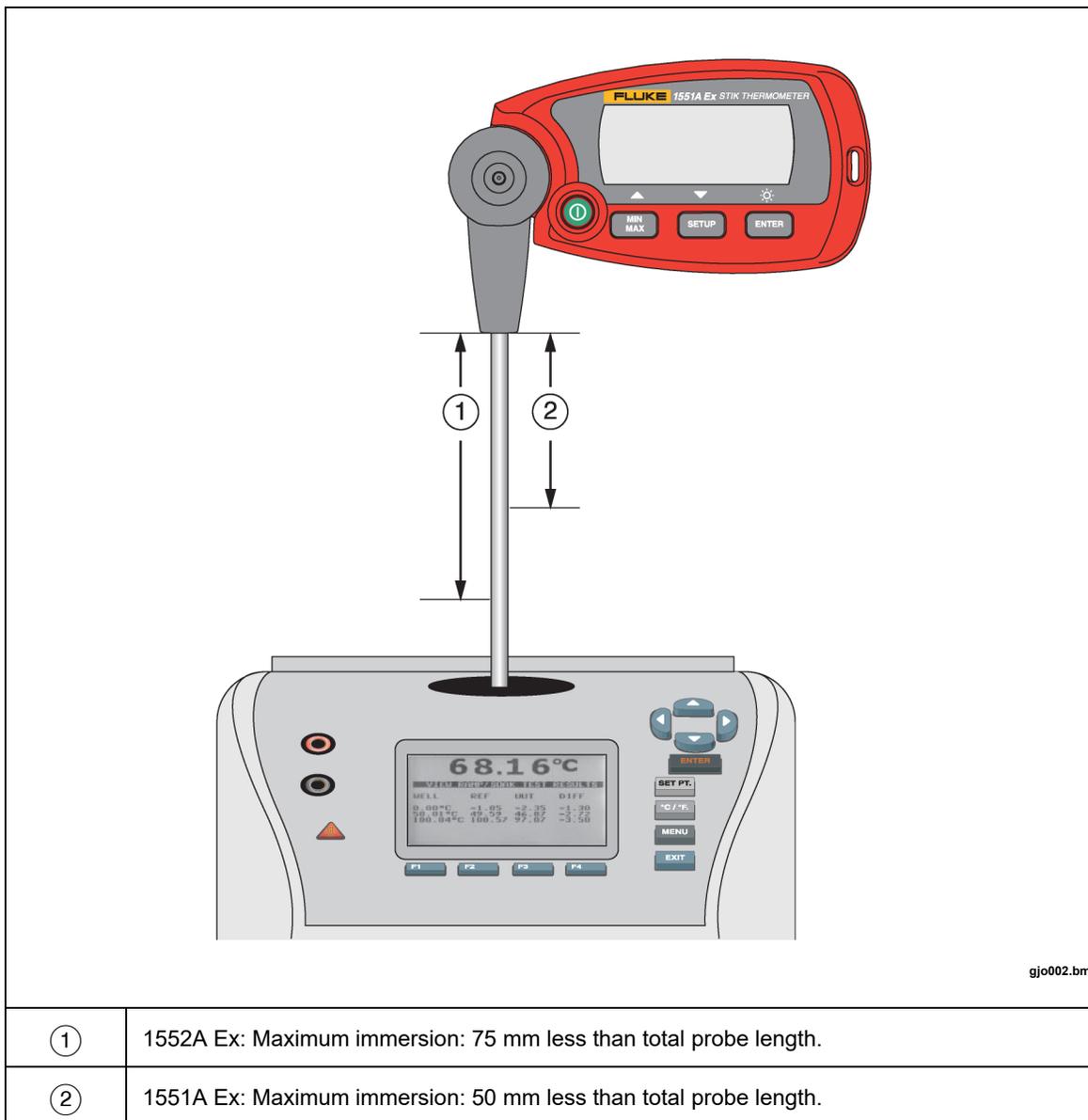


Figure 2. Maximum Immersion Depth

Time Constant

The different probe sizes of the Thermometer exhibit different settling time constants. This parameter describes the time it takes for the Thermometer to change 63 % toward its final temperature (see ASTM E644). The time constant depends on the diameter of the metal sheath of the Thermometer. Typical time constants are given in Table 2.

Table 2. Time Constant

Sheath Diameter	Time Constant
4.8 mm (3/16 in.)	14 seconds
6.35 mm (1/4 in.)	21 seconds

Display and Controls

The Display and Controls are explained below and in the Setup and Configuration section. See Figure 3.

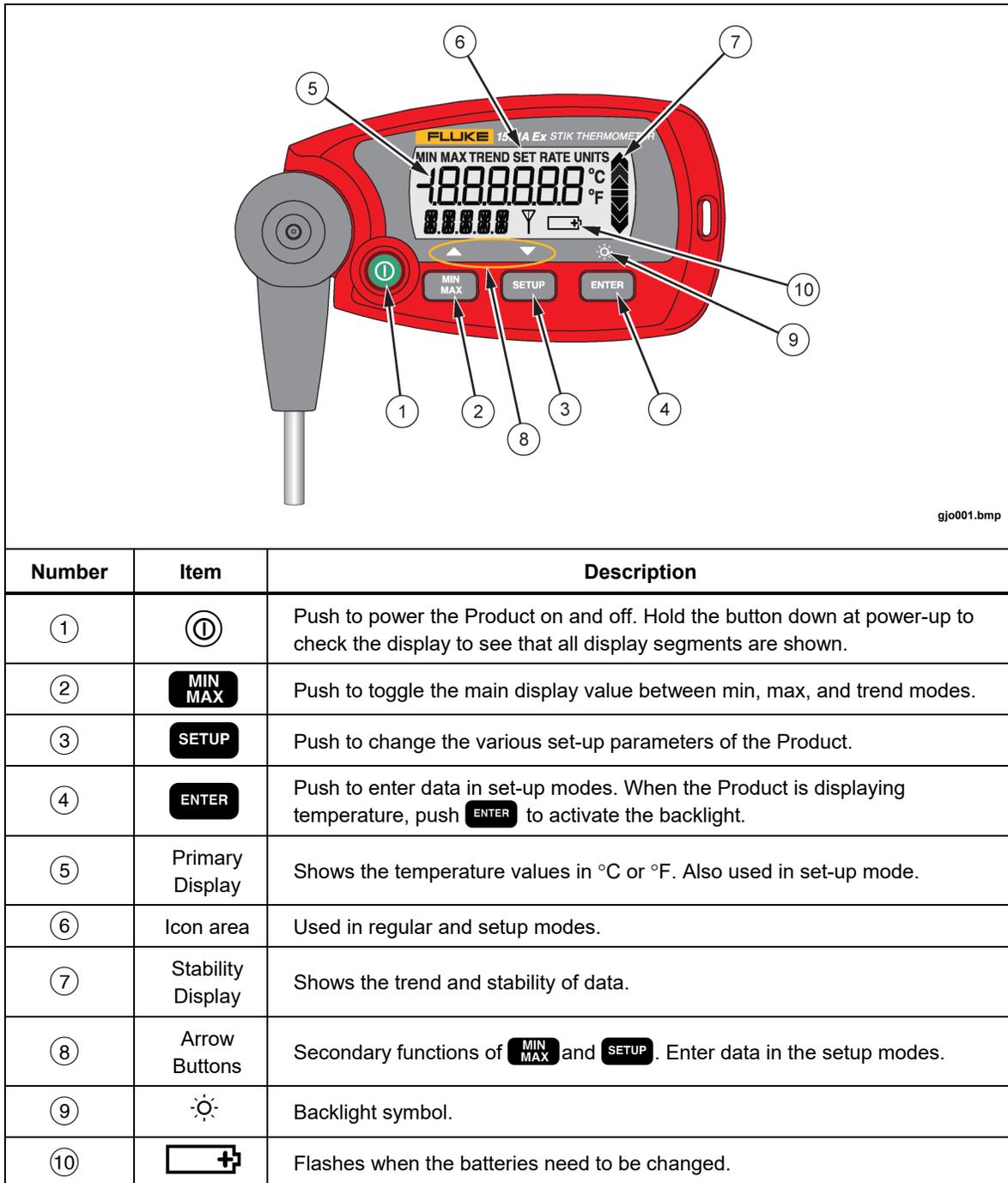


Figure 3. Display and Controls

Primary Display

Push **MIN MAX** to toggle the numeric display between the current reading, minimum, maximum, and 1-minute trend values in °C or °F as calculated since power up or since the last reset of values. Push and hold the **MIN MAX** button for 2 seconds until "CLR" shows to reset the MIN/MAX/TREND values.

Stability Display

The Stability Display shows the general stability level relative to a user-configurable stability limit. There are four presets for stability shown in °C or °F (0.01, 0.1, 1.0, or 10.0). When the limit is exceeded, it also shows the general direction in which the readings are presently moving. The stability level is calculated from a moving sample window of 6 seconds, with the value extrapolated to a 1-minute time base.

Segments are turned on to indicate the stability level as follows:

- Center only (stable) - when half of the 1-minute trend value is less than or equal to the stability limit, i.e. maximum deviation -limit to +limit.
- Center plus one arrow up or down (depending on the trend) - when half of the 1-minute trend value is greater than the stability limit and is less than or equal to twice the stability limit.
- Center plus two arrows up or down (depending on the trend) - when half of the 1-minute trend value is greater than twice the stability limit and is less than or equal to three times the stability limit.
- Center plus three arrows up or down (depending on the trend) - when half of the 1-minute trend value is greater than three times the stability limit.

Setup and Configuration

Push **SETUP** to enter the setup modes. Inside the setup modes the buttons work as follows:

- MIN MAX** Exit to the main display.
- SETUP** Step to the next menu item, exit to the main display after the last item.
- ENTER** Enter the data-edit mode for the present menu item.

During the data-edit mode, use **▲** and **▼** to scroll through the values. Push **ENTER** to save and exit back to the menu item.

The following sections describe the setup items in the order in which they appear.

Temperature Unit Selection

The Temperature Unit Selection Menu lets you choose the unit used when showing the primary variable.

- ▲** Change the unit °C or °F.
- ▼** Change the unit °C or °F.
- ENTER** Exit back to menu item

Stability Limit

The stability limit setting is used to find when the secondary display will show that the reading is stable. There are four preset settings for stability (0.01, 0.1, 1.0, or 10.0) expressed in the presently selected units.

- ▲** Change the unit-stability limit setting to the next greater setting.
- ▼** Change the unit-stability limit setting to the next lesser setting.
- ENTER** Exit back to menu item

Auto-Off Selection

The Auto-off parameters control when the Product automatically turns off after inactivity on the keypad.

- ▲ Increase the auto-off setting and the primary data field from "OFF" to 1 minute and stopping at 20 minutes.
 - ▼ Decrease the auto-off setting and the primary data field from 1 minute to "OFF" and stopping at "OFF".
- ENTER** Exit back to menu item.

Battery Life

Initially, the primary data field shows the percentage of remaining battery life. This display can be toggled to show the battery voltage and is constantly updated to show current battery capacity.

Push **ENTER** to toggle between the two data displays.

Operating Temperature

This selection shows the operating temperature of the internal electronics in °C or °F.

- ▲ Change the unit °C or °F.
 - ▼ Change the unit °C or °F.
- ENTER** Exit back to menu item.

Note

An “**Overtemp**” warning is shown if the internal electronics temperature is more than 50 °C (122 °F).

Damping

The Damping function is a running average of readings used to filter "noisy" temperature sources. The selections are OFF, 2, 5, or 10 sample average.

- ▲ Change the damp setting to the subsequent item in the list, cycling from the last to the first.
 - ▼ Change the damp setting to the previous item in the list, cycling from the first to the last.
- ENTER** Exit back to menu item.

Sampling Rate

The sampling rate calculates how often the Product samples data. The settings are 0.5, 1.0, or 2.0, shown in samples per second.

- ▲ Change the rate setting to the subsequent item in the list, cycling from the last to the first.
 - ▼ Change the rate setting to the previous item in the list, cycling from the first to the last.
- ENTER** Exit back to menu item.

Display Resolution

Display resolution is the number of digits to the right of the decimal point. The settings are 0.1, 0.01, or 0.001.

- ▲ Change the resolution setting to the subsequent item in the list, cycling from the last to the first.
 - ▼ Change the resolution setting to the previous item in the list, cycling from the first to the last.
- ENTER** Exit back to menu item.

RS-232 Communication

The baud rate can be set to 2400 or 9600.

- ▲ Change the RS-232 communication setting in the list, cycling from the last to the first.
 - ▼ Change the RS-232 communication setting to the previous item in the list, cycling from the first to the last.
- ENTER** Exit back to menu item.

Ohms Display

The Primary Display shows the resistance of the sensor. The secondary data field displays “**OHMS**”. **ENTER** is inactive.

Note

The Data Logging functions that follow are only functional in Products that were purchased with option Data Logging configuration (e.g. 155X-D-X).

Start or Stop Data Logging

Logging status messages are:

FULL the data logging memory is full

OFF not presently logging data

ON presently logging data

Push **ENTER** to change the logging status.

Push ▲ and ▼ if not currently logging data, to choose between **START** and **OFF**. If presently logging data, choose between **STOP** and **ON**. The current data logging mode is not changed until **ENTER** is pushed.

ENTER Stop or start data logging.

Display Free Log Memory

Initially, the primary data field shows the percentage of log memory. This display can be toggled to show the number of free records and is updated continually during data logging to show the current memory capacity.

Push **ENTER** to toggle between the two data displays.

Logging Interval

Push **ENTER** to enter the data edit mode. ENTER is ignored if presently logging data.

- ▲ Change the logging interval setting to the subsequent item in the list, cycling from the last to the first.
 - ▼ Change the logging interval setting to the previous item in the list, cycling from the first to the last.
- ENTER** Return to the corresponding menu item.

Send Logged Data

Push **ENTER** to:

- ▲ or ▼ Confirm or cancel the choice to send data.
- ENTER** Send or cancel data.
- ENTER** is ignored if presently logging data.

Erase Logged Data

Push **ENTER** to:

- ▲ or ▼ Confirm or cancel the choice to erase logged data.
- ENTER** Erase or cancel data erase.
- ENTER** is ignored if presently logging data.

Maintenance

Clean the Product

⚠ Caution

To prevent possible damage to the product or to equipment under test, do not use abrasive cleaners. They will damage the case.

To clean the Product, use a cloth with a mild cleaning solution.

Battery Replacement

⚠ Warning

To prevent possible explosion, fire, or personal injury:

- **Change the batteries only in areas that are not Ex-hazardous.**
- **Replace the batteries when the low battery indicator shows to prevent incorrect measurements.**

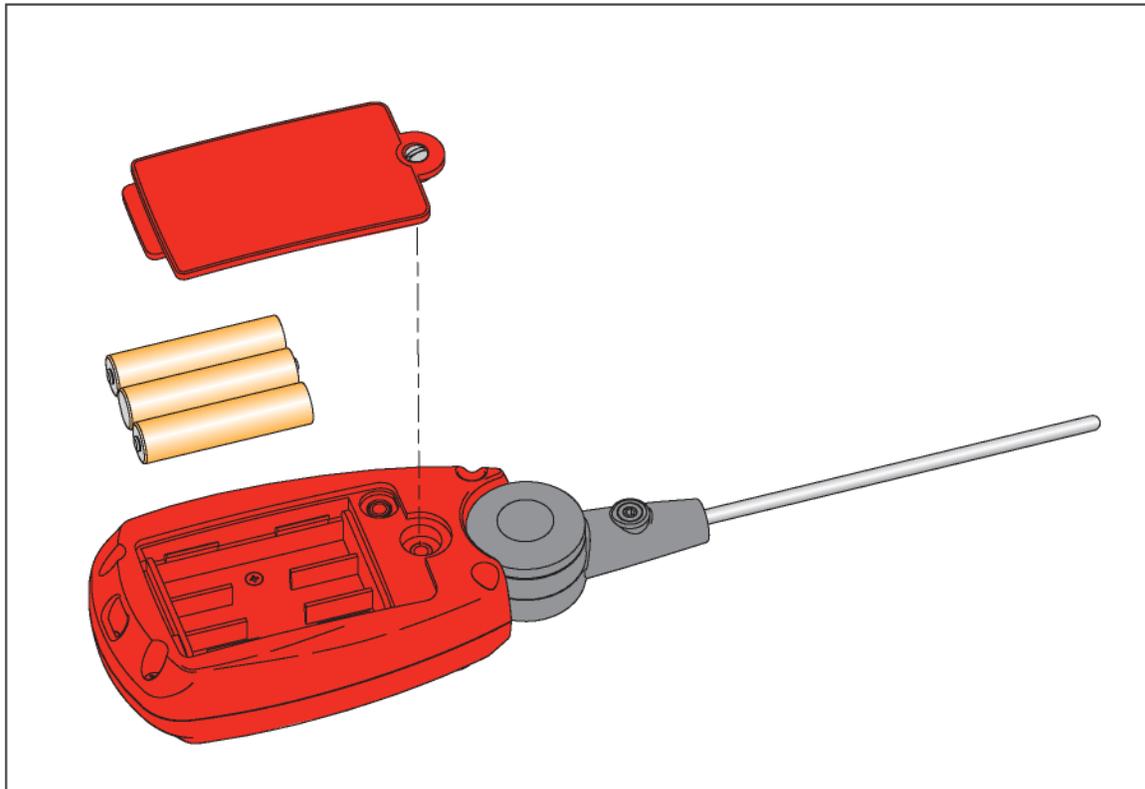
⚠ Caution

To prevent possible damage to the Product or to equipment under test:

- **Remove batteries to prevent battery leakage and damage to the Product if it is not used for an extended period.**
- **Be sure that the battery polarity is correct to prevent battery leakage.**

To change the batteries, see Figure 4:

1. Use a flat-blade screwdriver to loosen the integral battery door screw.
2. Remove the battery door to access the three AAA batteries.
3. Replace only with approved AAA batteries listed in this document. See Table 3. Any substitution voids the Product safety rating.
4. Make sure the battery polarity is correct.
5. Replace the battery door and install the screw.



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Figure 4. Battery Replacement

Table 3. Approved Batteries

Battery	Manufacturer	Type
Alkaline AAA (IEC LR03)	Duracell	MN2400
	Energizer	E92VP
	Panasonic	LR03WXA

Battery Life

Battery life is approximately 300 hours (12.5 days) of continuous operation with the backlight off. A low-battery icon () shows in the lower right of the display when battery level is low. Replace batteries per recommendations found in the specifications section of this manual.

Calibration

For calibration information, refer to the Calibration Manual.

SCPI Commands

This section explains the 1551A Ex/1552A Ex (Product) remote SCPI commands.

Remote Communications

RS-232 Port Operation

The RS-232 configuration is fixed as follows:

- 8 data bits
- 1 stop bit
- no parity
- Xon/Xoff flow control
- End of line is CR (ASCII 13)

The baud rate is 9600 by default but may be changed to 2400.

Command Summary

Commands that allow a setting to be set usually have a query form ending with a question mark. For example:

UNIT:TEMP C Sets the unit to degrees Celsius.

UNIT:TEMP? Returns the unit of measurement.

See Table 4 for an alphabetical list of all SCPI Commands.

Table 4. List of All Commands

Command	Command Explanation
*IDN?	Returns the instrument identification string that indicates the manufacturer, model number, serial number, and code firmware version.
CAL:DEV:DATE <year>, <month>, <day>	Sets the last calibration date for the device. The <year> parameter is a four-digit number, 2000 to 2099. The <month> parameter is a one or two-digit number, 1 to 12. The <day> parameter is a one or two-digit number, 1 to 31. This command is password protected.
CAL:DEV:SI ON OFF	Sets the SI units lock. The parameter is either OFF or ON. This command is password protected.
CAL:USER:ADJ<n> <value>	Sets the adjustment at one of the calibration temperature points for a manual calibration. Number <n> specifies the low-temperature calibration point (1), mid-range calibration point (2), or high-temperature calibration point (3). The parameter <value> is the temperature adjustment in degrees Celsius. This command is password protected.
CAL:USER:LOW <temp>	Automatically calibrates the low range of the Product. The probe temperature must be held at a constant, known temperature near the low end of the range. The <temp> value is the temperature in degrees Celsius or Fahrenheit that the Product should be displaying after it is calibrated. This command is password protected. The Product temperature units must match the units of the <temp> value.
CAL:USER:HIGH <temp>	Automatically calibrates the high range of the product. The probe temperature must be held at a constant, known temperature in degrees Celsius or Fahrenheit near the high end of the range. The <temp> value is the temperature that the Product should be displaying after it is calibrated. This command is password protected. The Product temperature units must match the units of the <temp> value.
CAL:USER:TEMP<n> <temp>	Sets one of the calibration temperature points for a manual calibration. Number <n> specifies the low-temperature calibration point (1), mid-range calibration point (2), or high-temperature calibration point (3). The parameter <temp> is the temperature of the calibration point in degrees Celsius. This command is password protected.

Table 4. List of All Commands (cont.)

Command	Command Explanation
CAL:USER:ZERO <temp>	Automatically calibrates the center of the range of the product. The probe temperature must be held at a constant, known temperature near 0 °C. The <temp> value is the temperature in degrees Celsius or Fahrenheit that the Product should be displaying after it is calibrated. This command is password protected. The Product temperature units must match the units of the <temp> value.
CALC:AVER:CLE	Resets the minimum and maximum to the present reading, and clears the stability trend history.
CALC:AVER<n>:DATA?	Returns the value of a statistical calculation. The AVER suffix, <n>, specifies the calculation type as follows: 1 Maximum 2 Minimum 3 Trend Maximum is returned if no suffix number is given.
CALC:CONV:TEST? <res>	Returns the calculated temperature in Celsius for the given sensor reading, or "0.0,OL" if the result is out of range. The parameter <res> is the sensor reading in ohms.
FETC?	Returns the last measurement in units according to the UNIT:TEMP setting. If there is no valid measurement available the response is "0.0,OL".
SENS:DATA:OHMS?	Returns the present ohms reading. The response is expressed in ohms. If there is no valid measurement available the response is "0.0,OL".
STAT:MEAS?	Reads and clears the Measurement Event Register, indicating whether a new measurement is available to be read. Returns "1" if a new measurement has occurred since the previous command, and "0" otherwise.
SYST:ERR?	Returns a system error message if any are present in the system error queue. Otherwise it returns "0,"No error".
SYST:PASS:CDIS	Disables access to password-protected commands.

Table 4. List of All Commands (cont.)

Command	Command Explanation
SYST:PASS:CEN <pass>	Enables access to password-protected commands. The <pass> parameter is the current password. The original password is "1234".
SYST:PASS:CEN:STAT?	Returns the present state of password protection. The response is "1" if access to password-protected settings is allowed, or "0" if they are locked. Access is always disabled after the power is switched off.
SYST:PASS:NEW <pass>	Sets new password. The <pass> parameter is the new password. It can be up to 10 characters in length and can include any upper or lower case letters, numeric digits, and the underscore('_'). Lower case letters are automatically converted to upper case upon receipt and returned as upper case in any related query commands. IMPORTANT: Do not forget the password.
UNIT:TEMP <unit>	Sets the temperature unit to degrees Celsius or Fahrenheit. The <unit> parameter is C for Celsius or F for Fahrenheit. If the SI unit lock is ON, only Celsius is allowed.

RS-232 Interface

Warning

To prevent possible explosion, fire, or personal injury, the RS-232 interface must not be used in hazardous areas.

An RS-232 interface is standard on the Product. Serial communication can be used for configuration, calibration, and to move measurement data from the Product. An RS-232 cable is included with data logging software purchase.

Specifications

(Ambient: 23 °C ±5 °C)

Measurement Range

1551A Ex	-50 °C to 160 °C (-58 °F to 320 °F)
1552A Ex	-80 °C to 300 °C (-112 °F to 572 °F)
Accuracy (1 year)	±0.05 °C (0.09 °F)
Resolution	Selectable (0.1, 0.01, 0.001) factory default is 0.01
Sample Rate	User selectable 0.5/sec, 1/sec or 2/sec factory default is 1/sec
Readout Temperature Coefficient	Add ±10 ppm/°C of full scale temperature from -10 °C to 18 °C and 28 °C to 50 °C
Probe Temperature Coefficient	0.00385 Ω/Ω/°C nominal
Nominal Probe Resistance at 0 °C	100 Ω
Probe Hysteresis	±0.01 °C
Probe Response Time	Approximately 20 seconds
Operating Temperature Range of Readout	-10 °C to 50 °C (14 °F to 122 °F)
Humidity Range	0 to 95 % RH Non-condensing
Storage Temperature Range	-20 °C to 60 °C (-4 °F to 140 °F)
Safety	IEC 60079-0, IEC 60079-11: Ex ib IIB T4 Gb; IEC 61010-1: Pollution Degree 2

Electromagnetic Compatibility

International	IEC 61326-1: Portable Equipment; IEC 61326-2-2; CISPR 11: Group 1, Class B <i>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.</i> <i>Class B: Equipment is suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.</i>
USA (FCC)	47 CFR 15 subpart B. This product is considered an exempt device per clause 15.103.
Power	3 AAA alkaline batteries (Must use only approved batteries. See Table 3)
Battery Life	Approximately 300 hours without back light
Battery Save (auto-off) Range	Selectable from 1 to 30 minutes or can be disabled
Size (readout only)	125 mm x 62 mm x 35 mm (5 in x 2.5 in x 1.4 in).
Probe Size	1551A-9: 4.8 mm x 229 mm (3/16 in. x 9 in.) 1551A-12: 6.35 mm x 305 mm (1/4 in. x 12 in.) 1551A-20: 6.35 mm x 508 mm (1/4 in. x 20 in.) 1552A: 6.35 mm x 305 mm (1/4 in. x 12 in.)
Weight	200 g (6.9 oz)