◆FLIR®

User's manual
FLIR MR77

**Pinless moisture psychrometer with infrared
thermometer and Bluetooth METERLiNK®**

User's manual
FLIR MR77

Table of contents

1 Disclaimers

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⚠	**WARNING**

Do not look directly into the laser beam. The laser beam can cause eye irritation.

⚠	**WARNING**

Do not use the laser pointer near explosive gases or in other possible explosive areas. Injury to persons can occur.

⚠	This symbol, adjacent to another symbol or terminal, indicates that the user must refer to the manual for further information.
⚠	This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present.
▢	Double insulation.

2.1 FCC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee

that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

⚠ **CAUTION**

Exposure to Radio Frequency Radiation.

To comply with FCC/IC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

⚠ **WARNING**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2.2 Industry Canada compliance

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this devicemust accept any interference, including interference that may cause undesired operation of thedevice.

⚠ **CAUTION**

Exposure to Radio Frequency Radiation.

To comply with RSS 102 RF exposure compliance requirements, for mobile configurations, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

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3   Introduction

Congratulations on your purchase of the FLIR MR77 with METERLiNK® Bluetooth capabilities for use with FLIR infrared (IR) cameras.

This pinless moisture meter incorporates a patented built-in IR thermometer and 20-point memory. You can monitor moisture in wood and other building materials with no surface damage with the pinless moisture sensor (pin-type moisture probe included), and measure humidity and air temperature with the built-in probe, plus non-contact IR temperature using its patented IR design. Advanced functions provide moisture content, dew point, and vapor pressure calculations.

This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

3.1   Key features

- Quickly indicates the moisture content of materials with pinless technology without damaging the surface.
- Easy to read, large dual display with backlight feature.
- Simultaneously displays the percentage moisture content of wood or material being tested and the air temperature, IR temperature, or humidity.
- Uses a patented IR design to measure non-contact surface temperature, with an 8:1 distance-to-spot ratio and 0.95 fixed emissivity.
- Built-in humidity/temperature probe measures relative humidity and air temperature plus the mixing ratio and the dew point.
- Measures ambient and surface vapor pressure.
- Automatically calculates the differential temperature.
- Minimum/maximum and data hold modes.
- 20-point internal memory.
- Auto power off and low battery indication.

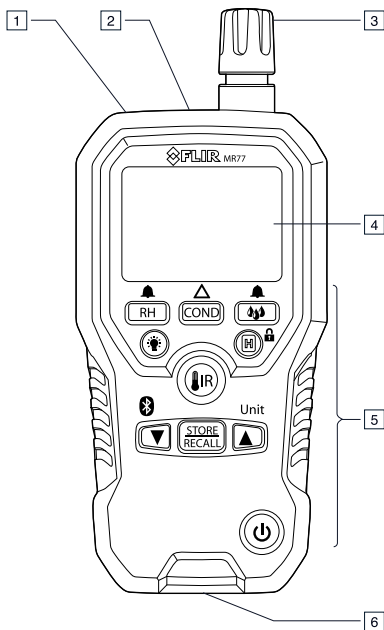# 4 Description

4.1 Meter description

Figure 4.1 Front view

1. IR sensor.
2. Laser pointer diode.

3. Humidity sensor and thermometer.

> 📝 **NOTE**
>
> The humidity sensor is shipped disconnected from the meter in a sealed protective storage/shipping case. When the sensor is connected to the meter, the protective cap should be kept in place when the meter is not in use.

4. LCD display.
5. Function buttons, see section 4.2 *Function buttons*, page 8.
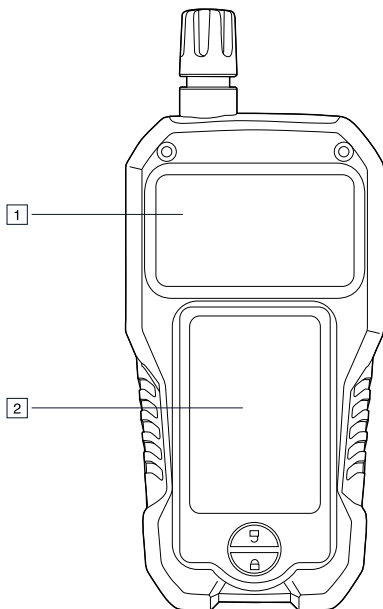6. External pin probe connection jack (RJ45).

Figure 4.2 Rear view

1.   Internal moisture sensor.
2.   Battery compartment.

4.2   Function buttons

|	
[RH]	• Press the button to enter Hygrometer mode, see section 5.4 *Hygrometric measurements*, page 14. • Press the button repeatedly to cycle through the display of relative humidity, dew point temperature, and mix ratio. • Press and hold the button for 2 seconds to enter Humidity alarm set mode, see section 5.10 *Alarm Settings (Pinless mode only)*, page 20.
[COND]	• Press the button to enter Condensation mode, see section 5.6 *Condensation measurements*, page 17. • Press the button repeatedly to toggle between Condensation mode and Vapor pressure mode, see section 5.7 *Vapor pressure measurements*, page 17. • When in Moisture mode, press and hold the button for 2 seconds to toggle between the relative and absolute readings, see section 5.3 *Moisture measurements*, page 12.
[💧]	• Press the button to enter Moisture mode, see section 5.3 *Moisture measurements*, page 12. • Press the button repeatedly to toggle between the internal sensor and external pin probe measurements. • Press and hold the button for 2 seconds to enter Moisture alarm set mode, see section 5.10 *Alarm Settings (Pinless mode only)*, page 20.
(💡)	Press the button to enable/disable the display backlight.
🔒(H)	• Press the button to toggle between Normal and Hold mode. In Hold mode, the display freezes the last reading and continues to display this value. • Press and hold the button for 5 seconds to toggle between Normal and Locked mode, see section 5.11 *Locked mode*, page 21.
(IR)	Press and hold the button to enable IR temperature measurements, see section 5.5 *IR temperature measurements*, page 15.

▲	• Press and hold the button for 2 seconds to change the unit setting. For more information, see section 5.8 *Selecting measurement units*, page 18. • When in View data mode, press the button to step through the datalogger memory locations.
▼	When in View data mode, press the button to step through the datalogger memory locations.
STORE RECALL	Press the button to capture and store the current readings. For more information, see section 5.9 *Storing and recalling measurements*, page 19.
⏻	Press the button to switch the meter on/off.

4.3   Display description
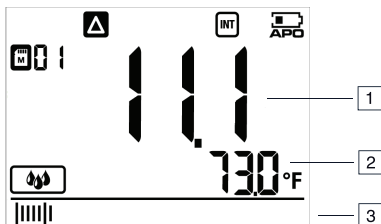
1. Main display.
2. Secondary display.
3. Bar graph (matches the reading on the main display).

4.4   Status icons and indicators

✲	Indicates that METERLiNK® (Bluetooth) communication is active, see section 5.12 *Streaming measurement data using Bluetooth*, page 21.
⚠	Indicates that the IR sensor and the laser pointer diode are active.

△	Indicates that the meter is displaying relative moisture measurements (solid indicator) or absolute moisture measurements (flashing indicator).
H	Indicates that the meter is in Hold mode.
🔔	Indicates that the reading is lower than the Low alarm threshold.
🔔	Indicates that the reading is higher than the High alarm threshold.
🔒	Indicates that the meter is in Locked mode.
INT	Indicates that the internal moisture sensor is active.
EXT	Indicates that the external pin probe is active.
🔋	Indicates the battery voltage status.
APO	Indicates that the auto power off function is enabled.
🔢88	Indicates the active datalogger memory location (1–20).
RH	Indicates that the meter is in Hygrometer mode.
DEW	Indicates that the meter is displaying dew point temperature readings on the main display.
COND	Indicates that the meter is in Condensation mode.
💧	Indicates that the meter is in Moisture mode.
🔢	Indicates the number that represents the material group under test, see section 7 *Material groups*, page 23.
mBar kPa	Indicates that the meter is displaying vapor pressure in millibar (mBar) or in kilopascal (kPa) units.
GPP g/kg	Indicates that the meter is displaying the mixing ratio in grains per pound (GPP) or in grams per kilogram (g/kg) units.

%	Indicates that the meter is displaying relative humidity in percent (%) units.
°C	Indicates that the meter is displaying temperature in degrees Celsius (℃) units.
°F	Indicates that the meter is displaying temperature in degrees Fahrenheit (℉) units.
CAL L|H	High/low calibration point.

5 Operation

5.1 Installing the humidity/temperature sensor

1. The humidity/temperature sensor assembly is stored separately in its protective case when shipped. The storage case is gasket sealed but is easily opened and closed for re-use.
2. When the sensor is removed from its storage case for the first time it must be given 24 hours to stabilize to the ambient conditions before use.
3. The sensor is equipped with a protective cap that should remain on the sensor when not in use.
4. The socket on the bottom of the sensor is keyed and inserts into the jack at the top of the meter.

5.2 Powering the meter

1. Remove the protective cap from the humidity sensor/thermometer assembly.
2. Press the button to switch on the meter.
3. If the battery indicator shows that the battery voltage is low or if the meter does not power on, replace the battery. See section 6.2 *Battery replacement*, page 22.
4. Press the button to switch off the meter.

5.2.1 Auto power off

The meter enters sleep mode after 30 minutes of inactivity. The meter beeps three times 20 seconds before powering off. Press any function button to prevent the meter from powering off. The auto power off time-out is then reset.

5.2.1.1 Disable auto power off

1. To disable the auto power off function, start with the meter switched off.
2. Simultaneously press and hold the and buttons until the **APO** indicator disappears, indicating that the function is disabled.

5.3 Moisture measurements

With the meter in Moisture mode, moisture measurements can be performed using either the internal moisture sensor or by connecting the external pin probe.

The internal moisture sensor can detect moisture to a depth of 19 mm (0.75″). The internal moisture reading can be relative or absolute.

The three-digit main display shows the moisture reading, and the four-digit secondary display shows the ambient air temperature. The bar graph matches the reading on the main display.

While in Moisture mode, IR measurements may also be performed, see section 5.5 *IR temperature measurements*, page 15.

5.3.1 Internal moisture sensor

1. Press the 🔘 button to enter the Moisture mode.

   The 🔘 and [INT] indicators are displayed. The △ indicator is also displayed, indicating that the meter is displaying relative measurements. The ambient temperature is displayed on the secondary display.
2. If the moisture reading is not reading 00.0, you need to zero the meter. See section 5.3.1.1 *Zeroing the meter*, page 14.
3. Place the internal moisture sensor (located on the rear side of the meter) on the surface of the material to be tested.

   The relative moisture reading is displayed on the main display. No units of measurement are displayed.
4. Absolute or Zero Mode measurements. This mode allows measurements to be displayed as a difference between the actual reading and a stored reference reading. Follow the steps below.

   4.1. For best results, keep hands and other surfaces and objects away from the internal moisture sensor area when turning on the unit.
   4.2. Place the internal moisture sensor on the surface that will be the "reference" surface. Press and hold the [COND] button for 2 seconds until the indicator flashes. This will zero the meter at the reference value.
   4.3. Place the internal moisture sensor on the surface of the material to be tested. The measurement will be read as the offset value of your stored reference.
   4.4. Press and hold the [COND] button for 2 seconds to return to normal internal moisture measurement mode.

5.3.1.1   Zeroing the meter

1. Press and hold the ⏹COND button for 2 seconds until the ⚠ indicator flashes
    and the meter beeps.

2. Press and hold the ⏹COND button for 2 seconds until the meter beeps. The

    ⚠ indicator will stop flashing and the meter will then be zeroed.

5.3.2 External pin probe

1. Connect the external pin probe to the EXT connection jack (located at the
    bottom of the meter).

2. Press the 💧 button to enter the Moisture mode. The 💧 indicator is
    displayed.

3. Press the 💧 button once more to activate external pin probe measure-

    ments. The EXT indicator is displayed.

4. The MAT indicator shows the currently selected material group number. Refer
    to section 7 *Material groups*, page 23.

    To change the material group number, do the following:

    4.1.   Press and hold the ▼ and ▲ buttons for 2 seconds to enter the
           Material group selection mode.

           The MAT indicator flashes.

    4.2.   Use the ▼ and ▲ buttons to step through the nine material
           group numbers.

    4.3.   Press the STORE/RECALL button to set the group and exit the Material group
           selection mode.

5. Press the probe pins into the material.

    The moisture reading is displayed on the main display, in percent (%).

5.4 Hygrometric measurements

In Hygrometer mode, the meter measures and displays the relative humidity, dew
point temperature, mixing ratio, and ambient air temperature.

Unpack and insert the humidity/temperature sensor assembly into the meter as described in section 5.1 *Installing the humidity/temperature sensor*, page 12.

The three-digit main display shows the relative humidity, dew point temperature, or mixing ratio, and the four-digit secondary display shows the ambient air temperature. The bar graph matches the reading on the main display.

While in Hygrometer mode, IR measurements may also be performed, see section 5.5 *IR temperature measurements*, page 15.

1. Press the ⌊RH⌋ button to enter Hygrometer mode. The ⌊**RH**⌋ indicator is displayed.
2. The relative humidity is displayed on the main display. The ambient air temperature is displayed on the secondary display.
3. Press the ⌊RH⌋ button repeatedly to cycle through the display of relative humidity, dew point temperature, and mixing ratio.

    • Relative humidity: The ⌊**RH**⌋ indicator is displayed and the reading is displayed in percent (%).
    • Dew point temperature: The ⌊**DEW**⌋ indicator is displayed and the reading is displayed in ℃ or ℉, depending on the unit setting.
    • Mixing ratio: The reading is displayed in grains per pound (GPP) or grams per kilogram (g/kg), depending on the unit setting.

5.5   IR temperature measurements

IR temperature measurements can be performed in all operating modes.

The meter is equipped with a laser pointer diode, which is used as a targeting pointer for the IR temperature measurements. The target of the measurement should be larger than the size of the laser beam spot. As the distance from an object increases, the spot size of the area measured by the meter becomes larger. The meter's field of view ratio is 8:1, meaning that if the meter is 8 inches (20 cm) from the target, the diameter (spot) of the object under test must be at least 1 inch (2.54 cm). Refer to Figure 5.1.
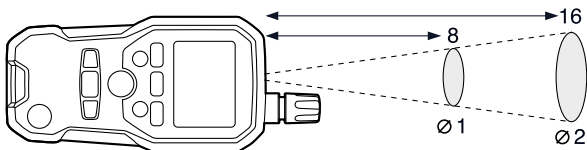
Figure 5.1 IR spot-to-distance ratio

IR measurement notes:

- The object under test should be larger than the than the size of the laser beam spot.
- If the surface of the object under test is covered with frost, oil, grime, etc., clean the surface before measuring.
- If the surface of the object is highly reflective, apply masking tape or flat black paint to the surface before measuring.
- The meter may not make accurate measurements through transparent surfaces such as glass.
- Steam, dust, smoke, etc., may obscure measurements.
- To find a hot spot, aim the meter outside the area of interest, then scan across (in an up and down motion) until the hot spot is located.

/!\ **WARNING**

Do not look directly into the laser beam. The laser beam can cause eye irritation.

/!\ **WARNING**

Do not use the laser pointer near explosive gases or in other possible explosive areas. Injury to persons can occur.

1. Press and hold the (IR) button to enable the IR sensor and the laser pointer diode. The ☒ indicator is displayed.
2. Aim the laser pointer at the surface to be measured. The IR temperature reading is displayed on the four-digit secondary display.

3. Release the (IR) button to disable the IR sensor and the laser pointer diode.

   The last IR temperature reading remains on the display for 8 seconds; then

   the meter returns to a display of the ambient air temperature, and the ⚠ indicator disappears.

5.6 Condensation measurements

In Condensation mode, the meter determines whether a surface is at risk of condensation, based on measurements of the dew point temperature (relative humidity and ambient air temperature) and the IR temperature of the surface.

1. Press the COND button to enter the Condensation mode. The COND indicator is displayed.

2. Aim the meter at the surface. Press and hold the (IR) button. The ⚠ indicator is displayed

3. The dew point temperature is displayed on the main display. The IR temperature of the surface is displayed on the secondary display. The bar graph indicates the level of risk for condensation:

   • If the IR temperature is more than 14℃ (25℉) above the dew point temperature, the bar graph is empty.
   • If the IR temperature is 3–14℃ (5–25℉) above the dew point temperature, the bar graph indicates a percentage of full scale.
   • If the IR temperature is less than 3℃ (5℉) above the dew point temperature, the bar graph is full.

4. Release the (IR) button to disable the IR sensor and the laser pointer diode.

   The last IR temperature reading remains on the display for 8 seconds; then

   the meter returns to a display of the ambient air temperature and the ⚠ indicator disappears.

5.7 Vapor pressure measurements

Vapor pressure measurement is a special variant of condensation measurement. The meter calculates the vapor pressure based on measurements of the relative humidity and the IR temperature of the surface.

1. Press the `COND` button to enter Condensation mode. The `COND` indicator is displayed. The unit of measurement on the main display is °C or °F, depending on the unit setting.

2. Press the `COND` button once more to enter Vapor pressure mode. The unit of measure on the main display changes to kPa or mBar, depending on unit setting.

3. Aim the meter at the surface. Press and hold the (IR) button.

4. The vapor pressure is displayed on the main display. The IR temperature of the surface is displayed on the secondary display.

5. Release the (IR) button to disable the IR sensor and the laser pointer diode.

    The last IR temperature reading remains on the display for 8 seconds; then

    the meter returns to a display of the ambient air temperature and the ⚠ indicator disappears.

5.8   Selecting measurement units

There are two sets of units; US and metric. The unit setting can be changed at

any time in any mode, by pressing and holding the ▲ button for 2 seconds.

The unit setting applies to all modes. It is *not* possible to, for example, display moisture in g/kg while showing temperature in °F.

US unit setting:

• Temperature is displayed in degrees Fahrenheit (°F).
• Mixing ratio is displayed in grains per pound (GPP).
• Vapor pressure is displayed in millibars (mBar).

Metric unit setting:

• Temperature is displayed in degrees Celsius (°C).
• Mixing ratio is displayed in grams per kilogram (g/kg).
• Vapor pressure is displayed in kilopascals (kPa).

5.9 Storing and recalling measurements

5.9.1 Datalogger memory locations

The meter has 20 datalogger memory locations for the storage of measurement data. Each memory location stores the current readings for all operating modes, with the current unit settings. Thus, each location contains moisture, humidity, ambient temperature, and IR temperature data.

5.9.2 Storing a measurement

1. Press the ⌊STORE/RECALL⌋ button to capture and store the currently displayed readings.

   The data is saved to the memory location shown by the 🔲88 indicator. The memory location indicator then advances to the next location. When the 20 memory locations are full, the meter overwrites saved readings, starting with memory location 1.

5.9.3 View data

1. Press and hold the ⌊STORE/RECALL⌋ button for 2 seconds to enter View data mode.

   The 88 indicator flashes, and the data stored in that location is displayed.
2. Press the ▼ or ▲ button to step through the memory locations.
3. Press the ⌊RH⌋, ⌊COND⌋, or ⌊💧💧⌋ button to display the stored data for the different modes.
4. Press and hold the ⌊STORE/RECALL⌋ button for 2 seconds until a single beep sounds to exit View data mode.

5.9.4 Clearing the data from memory

📝	**NOTE**

To avoid deleting valuable data when done viewing your data, advance the memory to an empty location before exiting this mode.

1. Press and hold the ⌊STORE/RECALL⌋ button for 2 seconds to enter View data mode.

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2.   In View data mode, press and hold the ▲ and ▼ buttons simultaneously for 3 seconds to clear all data.

5.10   Alarm Settings (Pinless mode only)

High and low alarm thresholds can be set for moisture and humidity measurements. If either of the thresholds is exceeded during the measurement, the meter beeps and the corresponding alarm indicator is displayed: the low alarm indicator ⬤ or the high alarm indicator ⬤.

The default setting for the moisture and humidity alarms is off.

1.   To enter the alarm set mode, do one of the following:

   •   To enter the Moisture alarm set mode, press and hold the 💧 button for 2 seconds.

   •   To enter the Humidity alarm set mode, press and hold the RH button for 2 seconds.

   The current high threshold or *OFF* (if the alarm is disabled) is flashing on the main display.

2.   To switch from *OFF* to the numerical display, momentarily press both the ▼ and ▲ buttons simultaneously.

3.   Use the ▼ and ▲ buttons to adjust the high alarm threshold.

4.   To disable the high alarm, simultaneously press the ▼ and ▲ buttons.

5.   When the desired high alarm threshold (or *OFF*) is displayed, press the STORE RECALL button to save the value.

   The current low threshold or *OFF* (if the alarm is disabled) is now flashing on the main display.

6.   To switch from *OFF* to the numerical display, simultaneously press the ▼ and ▲ buttons.

7.   Use the ▼ and ▲ buttons to adjust the low alarm threshold. The low alarm value cannot exceed the high alarm value.

8.   To disable the low alarm, simultaneously press the ▼ and ▲ buttons.

9. When the desired low alarm threshold (or *OFF*) is displayed, press the
    STORE RECALL button to save the value and exit the alarm set mode.

5.11   Locked mode

In Locked mode, the meter ignores all button presses except (H) and (⏻).
The auto power off function, see section 5.2.1 *Auto power off*, page 12, is disabled in Locked mode.

1. To enter Locked mode, press and hold the (H) button for 5 seconds.

    The 🔒 indicator is displayed.

2. To exit Locked mode, press and hold the (H) button for 5 seconds once again.

5.12   Streaming measurement data using Bluetooth

5.12.1   General

Some IR cameras from Flir Systems support Bluetooth communication and to those cameras you can stream measurement data from the meter. The data is then merged into the result table in the IR image.

Streaming measurement data is a convenient way to add important information to an IR image. For example, when identifying a water leakage in a wall, you may want to know the humidity in the wall.

The Bluetooth range is 10m (32ft) maximum.

5.12.2   Procedure

1. Pair the IR camera with the instrument. Refer to the camera manual for information on how to pair Bluetooth devices.
2. Turn on the camera.
3. Turn on the meter.
4. Press and hold the (✼) button on the meter to enable Bluetooth.
5. Take a measurement reading. Results from the meter will now automatically be displayed in the result table in the top left corner of the IR camera screen.

6 Maintenance

6.1 Cleaning and storage

Clean the meter with a damp cloth and mild detergent; do not use abrasives or solvents.

If the meter is not to be used for an extended period, remove the battery and store it separately.

6.2 Battery replacement

1. Switch off the meter before attempting to replace the battery.
2. Turn the half turn screw so that the UNLOCK symbol is facing up and then lift open the battery compartment.
3. Replace the standard 9 V battery.
4. Secure the battery compartment cover.

6.2.1 Disposal of electronic waste

As with most electronic products, this equipment must be disposed of in an environmentally friendly way, and in accordance with existing regulations for electronic waste.

Please contact your FLIR Systems representative for more details.

7   Material groups

The tables below list woods types along with the material group number that should be selected for each type.

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood)

Abura	4
Afara	1
Aformosa	6
Afzelia	4
Agba	8
Amboyna	6
Ash, American	2
Ash, European	1
Ash, Japanese	1
Ayan	3
Baguacu, Brazilian	5
Balsa	1
Banga Wanga	1
Basswood	6
Beech, European	3
Berlina	2
Binvang	4
Birch, European	8
Birch, Yellow	1
Bisselon	4

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable
FLIR MR77 material group numbers. Note: Material Group No. 9 should be used
for building materials (chip board, dry wall, and plywood) (continued)

Bitterwood	5
Blackbutt	3
Bosquiea	1
Boxwood, Maracaibo	1
Camphorwood, E African	3
Canarium, African	2
Cedar, Japanese	2
Cedar, West Indian	8
Cedar, Western Red	3
Cherry, European	8
Chestnut	3
Coachwood	6
Cordia, American Light	5
Cypress, E African	1
Cypress, Japanese (18–28%mc)	3
Cypress, Japanese (8–18%mc)	8
Dahoma	1
Danta	3
Douglas Fir	2
Elm, English	4
Elm, Japanese Grey Bark	2
Elm, Rock	4

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood) (continued)

Elm, White	4
Empress Tree	8
Erimado	5
Fir, Douglas	2
Fir, Grand	1
Fir, Noble	8
Gegu, Nohor	7
Greenheart	3
Guarea, Black	8
Guarea, White	7
Gum, American Red	1
Gum, Saligna	2
Gum, Southern	2
Gum, Spotted	1
Gurjun	1
Hemlock, Western	3
Hiba	8
Hickory	5
Hyedunani	2
Iroko	5
Ironbank	2
Jarrah	3
Jelutong	3

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood) (continued)

Kapur	1
Karri	1
Kauri, New Zealand	4
Kauri, Queensland	8
Keruing	5
Kuroka	1
Larch, European	3
Larch, Japanese	3
Larch, Western	5
Lime	4
Loliondo	3
Mahogany, African	8
Mahogany, West Indian	2
Makore	2
Mansonia	2
Maple, Pacific	1
Maple, Queensland	2
Maple, Rock	1
Maple, Sugar	1
Matai	4
Meranti, Red (dark/light)	2
Meranti, White	2
Merbau	2

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable
FLIR MR77 material group numbers. Note: Material Group No. 9 should be used
for building materials (chip board, dry wall, and plywood) (continued)

Missanda	3
Muhuhi	8
Muninga	6
Musine	8
Musizi	8
Myrtle, Tasmanian	1
Naingon	3
Oak, American Red	1
Oak, American White	1
Oak, European	1
Oak, Japanese	1
Oak, Tasmanian	3
Oak, Turkey	4
Obeche	6
Odoko	4
Okwen	2
Olive, E African	2
Olivillo	6
Opepe	7
Padang	1
Padauk, African	5
Panga Panga	1
Persimmon	6

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood) (continued)

Pillarwood	5
Pine, American Long Leaf	3
Pine, American Pitch	3
Pine, Bunya	2
Pine, Caribbean Pitch	3
Pine, Corsican	3
Pine, Hoop	3
Pine, Huon	2
Pine, Japanese Black	2
Pine, Kauri	4
Pine, Lodgepole	1
Pine, Maritime	2
Pine, New Zealand White	2
Pine, Nicaraguan Pitch	3
Pine, Parana	2
Pine, Ponderosa	3
Pine, Radiata	3
Pine, Red	2
Pine, Scots	1
Pine, Sugar	3
Pine, Yellow	1
Poplar, Black	1

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood) (continued)

Pterygota, African	1
Pyinkado	4
Queensland Kauri	8
Queensland Walnut	3
Ramin	6
Redwood, Baltic (European)	1
Redwood, Californian	2
Rosewood, Indian	1
Rubberwood	7
Santa Maria	7
Sapele	3
Sen	1
Seraya, Red	3
Silky Oak, African	3
Silky Oak, Australian	3
Spruce, Japanese (18–28%mc)	3
Spruce, Japanese (8–18%mc)	8
Spruce, Norway (European)	3
Spruce, Sitka	3
Sterculia, Brown	1
Stringybark, Messmate	3
Stringybark, Yellow	3

Table 7.1   Common names of timbers (BS888 & 589:1973) with selectable FLIR MR77 material group numbers. Note: Material Group No. 9 should be used for building materials (chip board, dry wall, and plywood) (continued)

Sycamore	5
Tallowwood	1
Teak	5
Totara	4
Turpentine	3
Utile	8
Walnut, African	8
Walnut, American	1
Walnut, European	3
Walnut, New Guinea	2
Walnut, Queensland	3
Wandoo	8
Wawa	6
Whitewood	3
Yew	3

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers.

Abies alba	1
Abies grandis	1
Abies procera	8
Acanthopanex ricinifolius	1
Acer macrophyllum	1
Acer pseudoplatanus	5
Acer saccharum	1
Aetoxicon punctatum	6
Aformosia elata	6
Afzelia spp	4
Agathis australis	4
Agathis palmerstoni	8
Agathis robusta	8
Amblygonocarpus andogensis	1
Amblygonocarpus obtusungulis	1
Araucaria angustifolia	2
Araucaria bidwilli	2
Araucaria cunninghamii	3
Berlinia grandiflora	2
Berlinia spp	2
Betula alba	8
Betula alleghaniensis	8
Betula pendula	8

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Betula spp	8
Bosquiera phoberos	1
Brachylaena hutchinsii	8
Brachystegia spp	2
Calophyllum brasiliense	7
Canarium schweinfurthii	2
Cardwellia sublimes	3
Carya glabra	5
Cassipourea elliotii	5
Cassipourea melanosana	5
Castanea sutiva	3
Cedrela odorata	8
Ceratopetalum apetala	6
Chamaecyparis spp (18–28%mc)	3
Chamaecyparis spp (8–18%mc)	8
Chlorophora excelsa	5
Cordia alliodora	5
Croton megalocarpus	8
Cryptomelia japonica	2
Cupressus spp	1
Dacryium franklinii	2
Dalbergia latifolia	1
Diospyros virginiana	6

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Dipterocarpus (Keruing)	5
Dipterocarpus zeylanicus	1
Distemonanthus benthamianus	3
Dracontomelium mangiferum	2
Dryobanalops spp	1
Dyera costulata	3
Endiandra palmerstoni	3
Entandrophragma angolense	7
Entandrophragma cylindricum	3
Entandrophragma utile	8
Erythrophleum spp	3
Eucalyptus acmenicides	3
Eucalyptus crebra	2
Eucalyptus diversicolor	1
Eucalyptus globulus	2
Eucalyptus maculate	1
Eucalyptus marginata	3
Eucalyptus microcorys	1
Eucalyptus obliqua	3
Eucalyptus pilularis	3
Eucalyptus saligna	2
Eucalyptus wandoo	8

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Fagus sylvatica	3
Flindersia brayleyana	2
Fraxinus Americana	2
Fraxinus excelsior	1
Fraxinus japonicus	1
Fraxinus mardshurica	1
Gonystylus macrophyllum	6
Gossweilodendron balsamiferum	8
Gossypiospermum proerox	1
Grevillea robusta	3
Guarea cedrata	7
Guarea thomsonii	8
Guibortia ehie	2
Hevea brasilensis	7
Intsia bijuga	2
Juglans nigra	1
Juglans regia	3
Khaya ivorensis	8
Khaya senegalensis	4
Larix decidua	3
Larix kaempferi	3
Larix leptolepis	3
Larix occidentalis	5

Table 7.2 Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Liquidamper styraciflua	1
Lovoa klaineana	8
Lovoa trichiloides	8
Maesopsis eminii	8
Mansonia altissima	2
Millettia stuhimannii	1
Mimusops heckelii	2
Mitragyna ciliata	4
Nauclea diderrichii	7
Nesogordonia papaverifera	3
Nothofagus cunninghamii	1
Ochroma lagopus	1
Ochroma pyramidalis	1
Ocotea rodiaei	3
Ocotea usambarensis	3
Octomeles sumatrana	4
Olea hochstetteri	2
Olea welwitschii	3
Palaquium spp	1
Paulownia tomentosa	8
Pericopsis elata	6
Picaenia excelsa	3
Picea abies	3
Picea jezoensis (18–28%mc)	3

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Picea jezoensis (8–18%mc)	8
Picea sitchensis	3
Pinus caribaea	3
Pinus contorta	1
Pinus lampertiana	3
Pinus nigra	3
Pinus palustris	3
Pinus pinaster	2
Pinus ponderosa	3
Pinus radiate	3
Pinus spp	2
Pinus strobus	1
Pinus sylvestris	1
Pinus thunbergii	2
Pipadeniastrum africanum	1
Piptadenia africana	1
Podocarpus dacrydiodes	2
Podocarpus spicatus	3
Podocarpus totara	4
Populus spp	1
Prunus avium	8
Pseudotsuga menzesii	2
Pterocarpus angolensis	6

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Pterocarpus indicus	6
Pterocarpus soyauxii	5
Pterygota bequaertii	1
Quercus cerris	4
Quercus delegatensis	3
Quercus gigantean	3
Quercus robur	1
Quercus spp	1
Ricinodendron heudelotti	5
Sarcocephalus diderrichii	7
Scottellia coriacea	4
Sequoia sempervirens	2
Shorea smithiana	3
Shorea spp	2
Sterculia rhinopetala	1
Swietenia candollei	1
Swietenia mahogani	2
Syncarpia glomulifera	3
Syncarpia laurifolia	3
Tarrietia utilis	3
Taxus baccata	3
Tectona grandis	5
Terminalia superba	1

Table 7.2   Botanical names of timbers with selectable FLIR MR77 material group numbers. (continued)

Thuja plicata	3
Thujopsis dolabrat	8
Tieghamella heckelii	2
Tilia americana	6
Tilia vulgaris	4
Triploehiton scleroxylon	6
Tsuga heterophylia	3
Ulmus americana	4
Ulmus procera	4
Ulmus thomasii	4
Xylia dolabriformis	4
Zelkova serrata	2

Table 7.3 The table below shows the material group numbers and the moisture range (scale) for each group in %WME.

1		Material Wood Group Nos.							
	2	3	4	5	6	7	8	9	
	%WME (percent wood moisture equivalent)								
7	8.2	9	8	7.1	7	11	10.5	-
8	10	10.5	9.3	7.5	7.4	11.5	11	-
9	10.8	10.9	9.7	7.9	8.1	12.1	11.6	8.5
10	11.7	11.5	10.4	8.6	8.8	12.7	12.2	9.4
11	12.7	12.6	11.3	9.5	9.7	13.4	13.4	10.5
12	13.6	13.7	12.1	10.5	10.5	14	14.3	11.5
13	14.5	14.5	12.7	11.2	11.2	14.5	15.1	12.5
14	15.3	15.5	13.4	11.8	11.8	15	16	13.5
15	16.3	16.7	14.1	12.5	12.6	15.6	17	14.4
16	16.9	17.5	14.8	13	13.2	16	17.7	14.9
17	17.7	18.8	15.7	14.3	13.9	16.6	18.5	15.3
18	18.2	19.7	16.3	15	14.5	17	19.1	16.1
19	19	21	16.9	15.9	15.2	17.6	20	16.7
20	20	22.6	17.8	16.9	16.1	18.4	21.3	17.2

Table 7.3   The table below shows the material group numbers and the moisture range (scale) for each group in %WME. (continued)

21	20.8	23.5	18.5	17.6	16.8	19.1	22.3	18.3
22	21.5	24.5	29.3	18.3	17.4	19.7	23.2	19.1
23	22.9	26.4	20.2	19.8	18.6	21.2	25.3	19.9
24	23.5	27.4	20.8	20.4	19	22	25.8	20.5
25	24.2	27.8	21.2	21	19.4	22.7	26.3	≈23
26	25.3	29	22.4	22.3	20.1	23.9	27.3	-
27	26.5	-	23.3	23.4	20.8	24.7	28.1	-
28	28	-	24.4	24.8	21.7	25.9	-	-
29	29.6	-	25.6	26.3	22.9	27.1	-	-

8 Technical specifications

Accuracy specifications for all measurement ranges are applicable under the following ambient conditions: 18℃ to 28℃ (64.4℉ to 82.4℉); <80% RH.

8.1 General specifications

Display	• 3-digit 15 mm (0.6″) main display • 4-digit 6 mm (0.24″) secondary display • 10-segment bar graph • Memory counter
Controls	• 7 dedicated function buttons: moisture, relative humidity, condensation, hold/lock, up (⇑), down (⇓), store/recall • 4 auxiliary buttons: IR, Bluetooth, backlight/work light, power
Other indications	• 24 icon-style locations + 2-digit memory indicator • Piezo beeper (85 dBA)
Sample rate	2 per second
Backlight	White LED
Internal memory	Twenty (20) data recording memory locations
Power supply	1 × 9 V battery (MN1604 or equivalent)
Battery life	100 hours, using alkaline batteries, with no backlight/work light use
Auto power off (APO)	After 30 minutes (nominal) inactivity, with audible pre-alert; reset when the power button is pressed. Disable function supported

8 Technical specifications

APO quiescent current	50 µA maximum
Operating temperature	0 to 50℃ (32 to 122℉)
Storage temperature	−10 to 60℃ (14 to 140℉)
Operating humidity	• 90%, 0 to 30℃ (32 to 86℉) • 75%, 30 to 40℃ (86 to 104℉) • 45%, 40 to 50℃ (104 to 122℉)
Storage humidity	90% maximum
Dimensions (excluding sensor)	139 mm × 72 mm × 42 mm (5.4″ × 2.8″ × 1.7″)
Weight	0.29 kg (0.65 lb.), including batteries
Bluetooth range	10 m (32 ft) maximum
Agency approvals	FCC Class B

8.2 Humidity meter specifications

Function	Range	Accuracy (of reading)
Relative humidity measurement 20 to 30℃ (68 to 86℉)	0–10%	±3%
	10–90%	±2.5%
	90–99%	±3%

8.3 Moisture specifications

Function	Range	Accuracy (of reading)
Pin moisture	0–99% WME	±5%
Pin-less moisture range	0–99.9	Relative measurement

8.4   Thermal measurement range specifications

Function	IR range	Accuracy (of reading)
IR temperature (8:1 ratio)	−20 to 0℃ (−4 to 32℉)	±5℃ (±9℉)
	1 to 200℃ (33 to 392℉)	Greater of ±3.5% or ±5℃ (±9℉)
IR Emissivity	0.95 (fixed)	
Sensor temperature	-28 to 77℃ (-18 to 170℉)	±2 ℃ (3.6℉)

8.5   Vapor pressure specifications

Function	Range	Accuracy (of reading)
Vapor pressure measurement −1 to 60℃ (30 to 140℉)	0.0–20.0 kPa	Greater of ±2.0% or 0.2 kPa

8.6   Dew Point Temperature specifications

Function	Range	Accuracy (of reading)
Dew Point Temperature range	-30 to 100 ℃ (-22 to 199℉)	Calculated from %RH and Air temperature measurements.

8.7   Mixing Ratio specifications

Function	Range	Accuracy (of reading)
Mixing Ratio range	0-999 GPP (0 to 160 g/kg)	Calculated from %RH and Air temperature measurements.

9 Technical support for external meters

Website	http://www.flir.com/test
Technical support	TMSupport@flir.com
Repairs	Repair@flir.com
Phone number	+1 855-499-3662 (toll-free)

10   Warranties

10.1   FLIR Global Limited Lifetime Warranty

A qualifying FLIR Test and Measurement product (the "Product") purchased either directly from FLIR Commercial Systems Inc and affiliates (FLIR) or from an authorized FLIR distributor or reseller that Purchaser registers on-line with FLIR is eligible for coverage under FLIR's Limited Lifetime Warranty, subject to the terms and conditions in this document. This warranty only applies to purchases of Qualifying Products (see below) purchased and manufactured after April 1, 2013.

PLEASE READ THIS DOCUMENT CAREFULLY; IT CONTAINS IMPORTANT INFORMATION ABOUT THE PRODUCTS THAT QUALIFY FOR COVERAGE UNDER THE LIMITED LIFETIME WARRANTY, PURCHASER'S OBLIGATIONS, HOW TO ACTIVATE THE WARRANTY, WARRANTY COVERAGE, AND OTHER IMPORTANT TERMS, CONDITIONS, EXCLUSIONS AND DISCLAIMERS.

1. PRODUCT REGISTRATION. To qualify for FLIR's Limited Lifetime Warranty, Purchaser must fully register the Product directly with FLIR on-line at http://www.flir.com within Sixty (60) DAYS of the date the Product was purchased by the first retail customer (the "Purchase Date"). Qualifying PRODUCTS THAT ARE NOT REGISTERED ON-LINE WITHIN SIXTY (60) DAYS OF THE PURCHASE DATE WILL HAVE A LIMITED ONE YEAR WARRANTY FROM DATE OF PURCHASE.

2. QUALIFYING PRODUCTS. Upon registration, Test and Measurement products that qualify for coverage under FLIR's Limited Lifetime Warranty are: MR7x, CM7x, CM8x, DMxx, VP5x not including accessories which may have their own warranty.

3. WARRANTY PERIODS. For purposes of the The Limited Lifetime Warranty, Lifetime is defined as seven years (7) after the product is no longer manufactured, or ten years (10) from date of purchase, whichever is greater. This Warranty is only applicable to the original owner of the Products.

Any Product that is repaired or replaced under warranty is covered under this Limited Lifetime Warranty for one hundred eighty days (180) days from the date of return shipment by FLIR or for the remaining duration of the applicable Warranty Period, whichever is longer.

4. LIMITED WARRANTY. In accordance with the terms and conditions of this Limited Lifetime Warranty, and except as excluded or disclaimed in this document, FLIR warrants, from the Purchase Date, that all fully registered Products will conform to FLIR's published Product specifications and be free from defects in materials and workmanship during the applicable Warranty Period. PURCHASER'S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY, AT FLIR'S SOLE DISCRETION, IS THE REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS IN A MANNER, AND BY A SERVICE CENTER, AUTHORIZED BY FLIR. IF THIS REMEDY IS ADJUDICATED TO BE INSUFFICIENT, FLIR SHALL REFUND PURCHASER'S PAID PURCHASE PRICE AND HAVE NO OTHER OBLIGATION OR LIABILITY TO BUYER WHATSOEVER.

5. WARRANTY EXCLUSIONS AND DISCLAIMERS. FLIR MAKES NO OTHER WARRANTY OF ANY KIND WITH RESPECT TO THE PRODUCTS. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (EVEN IF PURCHASER HAS NOTIFIED FLIR OF ITS INTENDED USE FOR THE PRODUCTS), AND NON-INFRINGEMENT ARE EXPRESSLY EXCLUDED FROM THIS AGREEMENT.

THIS WARRANTY EXPRESSLY EXCLUDES ROUTINE PRODUCT MAINTENANCE, SOFTWARE UPDATES, AND REPLACEMENT OF MANUALS, FUSES, OR DISPOSABLE BATTERIES. FLIR FURTHER EXPRESSLY DISCLAIMS ANY WARRANTY COVERAGE WHERE THE ALLEGED NONCONFORMITY IS DUE TO NORMAL WEAR AND TEAR, OTHER ALTERATION, MODIFICATION, REPAIR, ATTEMPTED REPAIR, IMPROPER USE, IMPROPER MAINTENANCE, NEGLECT, ABUSE, IMPROPER STORAGE, FAILURE TO FOLLOW ANY PRODUCT INSTRUCTIONS, DAMAGE (WHETHER CAUSED BY ACCIDENT OR OTHERWISE), OR ANY OTHER IMPROPER CARE OR HANDING OF THE PRODUCTS CAUSED BY ANYONE OTHER THAN FLIR OR FLIR'S EXPRESSLY AUTHORIZED DESIGNEE.

THIS DOCUMENT CONTAINS THE ENTIRE WARRANTY AGREEMENT BETWEEN PURCHASER AND FLIR AND SUPERSEDES ALL PRIOR WARRANTY NEGOTIATIONS, AGREEMENTS, PROMISES AND UNDERSTANDINGS BETWEEN PURCHASER AND FLIR. THIS WARRANTY MAY NOT BE ALTERED WITHOUT THE EXPRESS WRITTEN CONSENT OF FLIR.

6. WARRANTY RETURN, REPAIR AND REPLACEMENT. To be eligible for warranty repair or replacement, Purchaser must notify FLIR within thirty (30) days of discovering of any apparent defect in materials or workmanship. Before Purchaser may return a Product for warranty service or repair, Purchaser must first obtain a returned material authorization (RMA) number from FLIR. To obtain the RMA number Owner must provide an original proof of purchase. For additional information, to notify FLIR of an apparent defect in materials or workmanship, or to request an RMA number, visit http://www.flir.com. Purchaser is solely responsible for complying with all RMA instructions provided by FLIR including but not limited to adequately packaging the Product for shipment to FLIR and for all packaging and shipping costs. FLIR will pay for returning to Purchaser any Product that FLIR repairs or replaces under warranty.

10 Warranties

FLIR reserves the right to determine, in its sole discretion, whether a returned Product is covered under Warranty. If FLIR determines that any returned Product is not covered under Warranty or is otherwise excluded from Warranty coverage, FLIR may charge Purchaser a reasonable handling fee and return the Product to Purchaser, at Purchaser's expense, or offer Purchaser the option of handling the Product as a non-warranty return.

7. NON-WARRANTY RETURN. Purchaser may request that FLIR evaluate and service or repair a Product not covered under warranty, which FLIR may agree to do in its sole discretion. Before Purchaser returns a Product for non-warranty evaluation and repair, Purchaser must contact FLIR by visiting http://www.flir.com to request an evaluation and obtain an RMA. Purchaser is solely responsible for complying with all RMA instructions provided by FLIR including but not limited to adequately packaging the Product for shipment to FLIR and for all packaging and shipping costs. Upon receipt of an authorized non-warranty return, FLIR will evaluate the Product and contact Purchaser regarding the feasibility of and the costs and fees associated with Purchaser's request. Purchaser shall be responsible for the reasonable cost of FLIR's evaluation, for the cost of any repairs or services authorized by Purchaser, and for the cost of repackaging and returning the Product to Purchaser.

Any non-warranty repair of a Product is warranted for one hundred eighty days (180) from the date of return shipment by FLIR to be free from defects in materials and workmanship only, subject to all of the limitations, exclusions and disclaimers in this document.

10.2 FLIR Test and Measurement Limited 2 Year Warranty

A qualifying FLIR Test and Measurement product (the "Product") purchased either directly from FLIR Commercial Systems Inc and affiliates (FLIR) or from an authorized FLIR distributor or reseller that Purchaser registers on-line with FLIR is eligible for coverage under FLIR's Limited Warranty, subject to the terms and conditions in this document. This warranty only applies to purchases of Qualifying Products (see below) purchased and manufactured after April 1, 2013.

PLEASE READ THIS DOCUMENT CAREFULLY; IT CONTAINS IMPORTANT INFORMATION ABOUT THE PRODUCTS THAT QUALIFY FOR COVERAGE UNDER THE LIMITED WARRANTY, PURCHASER'S OBLIGATIONS, HOW TO ACTIVATE THE WARRANTY, WARRANTY COVERAGE, AND OTHER IMPORTANT TERMS, CONDITIONS, EXCLUSIONS AND DISCLAIMERS.

1. PRODUCT REGISTRATION. To qualify for FLIR's Limited Warranty, Purchaser must fully register the Product directly with FLIR on-line at http://www.flir.com within Sixty (60) DAYS of the date the Product was purchased by the first retail customer (the "Purchase Date"). Qualifying PRODUCTS THAT ARE NOT REGISTERED ON-LINE

WITHIN SIXTY (60) DAYS OF THE PURCHASE DATE WILL HAVE A LIMITED ONE YEAR WARRANTY FROM DATE OF PURCHASE.

2. QUALIFYING PRODUCTS. Upon registration, Test and Measurement products that qualify for coverage under FLIR's Limited Warranty are: VS70 Videoscope, VSAxx Articulation Camera, VSCxx Camera, VSSxx Probe Spool, VST handset, MR02 Pin Extension Probe, and TAxx not including accessories which may have their own warranty.

3. WARRANTY PERIODS. The applicable Limited Warranty Period measured from the Purchase data are:

Products	Limited Warranty Period
VS70, VSAxx, VSCxx, VSSxx, VST, MR02, TAxx	TWO (2) Years

Any Product that is repaired or replaced under warranty is covered under this Limited Warranty for one hundred eighty days (180) from the date of return shipment by FLIR or for the remaining duration of the applicable Warranty Period, whichever is longer.

4. LIMITED WARRANTY. In accordance with the terms and conditions of this Limited Warranty, and except as excluded or disclaimed in this document, FLIR warrants, from the Purchase Date, that all fully registered Products will conform to FLIR's published product specifications and be free from defects in materials and workmanship during the applicable Warranty Period. PURCHASER'S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY, AT FLIR'S SOLE DISCRETION, IS THE REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS IN A MANNER, AND BY A SERVICE CENTER, AUTHORIZED BY FLIR. IF THIS REMEDY IS ADJUDICATED TO BE INSUFFICIENT, FLIR SHALL REFUND PURCHASER'S PAID PURCHASE PRICE AND HAVE NO OTHER OBLIGATION OR LIABILITY TO BUYER WHATSOEVER.

5. WARRANTY EXCLUSIONS AND DISCLAIMERS. FLIR MAKES NO OTHER WARRANTY OF ANY KIND WITH RESPECT TO THE PRODUCTS. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (EVEN IF PURCHASER HAS NOTIFIED FLIR OF ITS INTENDED USE FOR THE PRODUCTS), AND NON-INFRINGEMENT ARE EXPRESSLY EXCLUDED FROM THIS AGREEMENT.

THIS WARRANTY EXPRESSLY EXCLUDES ROUTINE PRODUCT MAINTENANCE, SOFTWARE UPDATES, AND REPLACEMENT OF FUSES, OR DISPOSABLE BATTERIES. FLIR FURTHER EXPRESSLY DISCLAIMS ANY WARRANTY COVERAGE WHERE THE ALLEGED NONCONFORMITY IS DUE TO NORMAL WEAR AND TEAR, OTHER ALTERATION, MODIFICATION, REPAIR, ATTEMPTED REPAIR, IMPROPER USE, IMPROPER

10 Warranties

MAINTENANCE, NEGLECT, ABUSE, IMPROPER STOR-
AGE, FAILURE TO FOLLOW ANY PRODUCT INSTRUC-
TIONS, DAMAGE (WHETHER CAUSED BY ACCIDENT
OR OTHERWISE), OR ANY OTHER IMPROPER CARE
OR HANDING OF THE PRODUCTS CAUSED BY ANY-
ONE OTHER THAN FLIR OR FLIR'S EXPRESSLY AU-
THORIZED DESIGNEE.

THIS DOCUMENT CONTAINS THE ENTIRE WAR-
RANTY AGREEMENT BETWEEN PURCHASER AND
FLIR AND SUPERSEDES ALL PRIOR WARRANTY NE-
GOTIATIONS, AGREEMENTS, PROMISES AND
UNDERSTANDINGS BETWEEN PURCHASER AND
FLIR. THIS WARRANTY MAY NOT BE ALTERED WITH-
OUT THE EXPRESS WRITTEN CONSENT OF FLIR.

**6. WARRANTY RETURN, REPAIR AND REPLACE-
MENT**. To be eligible for warranty repair or replacement,
Purchaser must notify FLIR within thirty (30) days of dis-
covering of any apparent defect in materials or workman-
ship. Before Purchaser may return a Product for warranty
service or repair, Purchaser must first obtain a returned
material authorization (RMA) number from FLIR. To obtain
the RMA number Owner must provide an original proof of
purchase. For additional information, to notify FLIR of an
apparent defect in materials or workmanship, or to request
an RMA number, visit http://www.flir.com. Purchaser is
solely responsible for complying with all RMA instructions
provided by FLIR including but not limited to adequately
packaging the Product for shipment to FLIR and for all
packaging and shipping costs. FLIR will pay for returning
to Purchaser any Product that FLIR repairs or replaces
under warranty.

FLIR reserves the right to determine, in its sole discretion,
whether a returned Product is covered under Warranty. If
FLIR determines that any returned Product is not covered
under Warranty or is otherwise excluded from Warranty
coverage, FLIR may charge Purchaser a reasonable han-
dling fee and return the Product to Purchaser, at Purchas-
er's expense, or offer Purchaser the option of handling the
Product as a non-warranty return.

7. NON-WARRANTY RETURN. Purchaser may request
that FLIR evaluate and service or repair a Product not cov-
ered under warranty, which FLIR may agree to do in its
sole discretion. Before Purchaser returns a Product for
non-warranty evaluation and repair, Purchaser must con-
tact FLIR by visiting http://www.flir.com to request an eval-
uation and obtain an RMA. Purchaser is solely
responsible for complying with all RMA instructions pro-
vided by FLIR including but not limited to adequately
packaging the Product for shipment to FLIR and for all
packaging and shipping costs. Upon receipt of an author-
ized non-warranty return, FLIR will evaluate the Product
and contact Purchaser regarding the feasibility of and the
costs and fees associated with Purchaser's request. Pur-
chaser shall be responsible for the reasonable cost of
FLIR's evaluation, for the cost of any repairs or services
authorized by Purchaser, and for the cost of repackaging
and returning the Product to Purchaser.

Any non-warranty repair of a Product is warranted for one
hundred eighty days (180) days from the date of return
shipment by FLIR to be free from defects in materials and
workmanship only, subject to all of the limitations, exclu-
sions and disclaimers in this document.

A note on the technical production of this publication

This publication was produced using XML — the eXtensible Markup Language. For more information about XML, please visit http://www.w3.org/XML/

A note on the typeface used in this publication

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