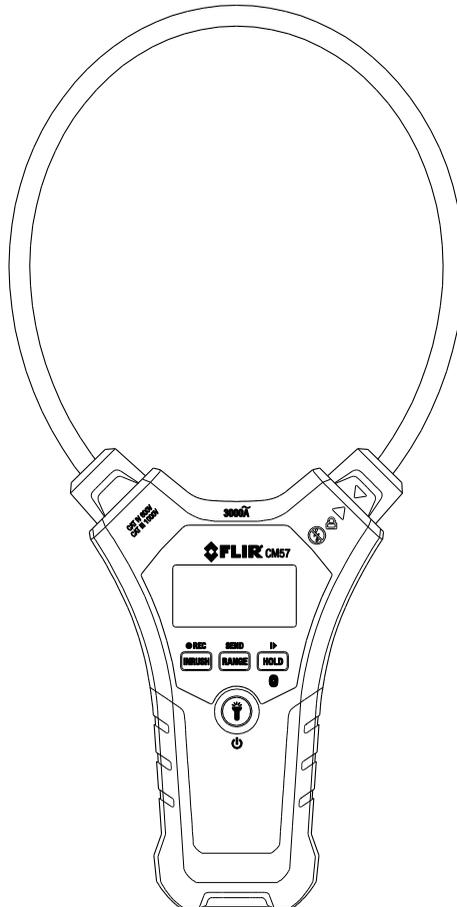




# USER MANUAL

## FLIR MODEL CM55 and CM57

### FLEX CLAMP METERS with Bluetooth®



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# 1. Disclaimers

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## 1.1 Copyright

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The documentation must not, in whole or part, be copied, photocopied, reproduced, translated or transmitted to any electronic medium or machine readable form without prior consent, in writing, from FLIR Systems.

Names and marks appearing on the products herein are either registered trademarks or trademarks of FLIR Systems and/or its subsidiaries. All other trademarks, trade names or company names referenced herein are used for identification only and are the property of their respective owners.

## 1.2 Quality Assurance

The Quality Management System under which these products are developed and manufactured has been certified in accordance with the ISO 9001 standard.

FLIR Systems is committed to a policy of continuous development; therefore we reserve the right to make changes and improvements on any of the products without prior notice.

## 1.3 Documentation

To access the user manuals, extended warranty registration and notifications go to the Download tab at: <http://support.flir.com>. In the download area you will also find the latest releases of manuals for our other products, as well as manuals for our historical and obsolete products. The extended warranty page can also be found at [www.Flir.com/testwarranty](http://www.Flir.com/testwarranty).

## 1.4 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.

## 2. Safety

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### Safety Notes

- Before operating the device, you must read, understand, and follow all instructions, dangers, warnings, cautions, and notes.
- FLIR Systems reserves the right to discontinue models, parts or accessories, and other items, or to change specifications at any time without prior notice.
- Remove the batteries if the device is not used for an extended period of time.



### Warning Statements

WARNINGS identify hazardous conditions and actions that could cause BODILY HARM or DEATH.

- Individual protective equipment should be used if HAZARDOUS LIVE parts in the installation where measurements are to be carried out could be accessible.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.
- Verify the meter operation by measuring a known current. If in doubt, have the meter serviced.
- Do not apply more than the rated voltage/current as marked on the meter.
- To avoid false readings that can lead to electric shock and injury, replace battery as soon as the low battery indicator appears.
- Do not use the meter in or around explosive gas or vapor.
- Do not use a flexible current sensor if the inner copper wire of the flexible cord is visible.
- De-energize the installation under test or wear suitable protective clothing when placing or removing the flexible current probe from a test setup.
- Do not apply/remove the flexible current probe to/from UNINSULATED HAZARDOUS LIVE conductors which may cause electric shock, electric burn, or arc flash.

## Cautions

Do not use the device for a procedure that it is not made for. This can cause damage to the protection.

	This symbol, adjacent to another symbol, indicates the user must refer to the manual for further information.
	Do not apply or remove clamp from HAZARDOUS LIVE conductors
	Equipment protected by double or reinforced insulation
	Battery symbol
	Conforms to EU directives
	Do not discard this product in household trash.
	AC measurement
	Earth ground

## Agency Approvals:



UL listing is not an indication or a verification of the accuracy of the meter

## 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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. 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 part 15 of the FCC Rules. Operation is subject to the following two conditions:

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



### **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.

### 3. Introduction

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Thank you for choosing the FLIR Flex Clamp with Bluetooth® that can measure up to 3000A AC rms. The CM57 is the 18" (45.7cm) clamp version and the CM55 is the 10" (25.4cm) clamp version, otherwise both meters are the same.

These devices are professional CAT IV 600V CAT III 1000V instruments that offer Data Recording, Bluetooth®, Auto Power OFF, Data Hold, Display backlight, and high power Work Light features. These meters are shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

#### 3.1 Key Features

- 3000A AC True RMS Current Measurements
- Convenient Flexible Clamp with locking mechanism
- 0.3" (7.5mm) coil diameter for measuring in tight spaces
- Auto ranging
- 3000 count large scale backlit LCD display
- Bluetooth® communication and Data Recording
- Data Hold
- Auto Power OFF
- Battery status icon
- High power work lights
- Long life battery power

**Register for Extended Warranty**  
[www.Flir.com/testwarranty](http://www.Flir.com/testwarranty)

## 4. Descriptions

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### 4.1 Meter Description

1. Work Lights
2. Flexible Current Clamp Coil
3. Display
4. INRUSH / REC (Record) button
5. Power / Work Light button
6. RANGE / SEND button
7. HOLD / Start-Stop Record / Bluetooth® button
8. Clamp Lock mechanism

Note that battery compartment is located on the back of the meter

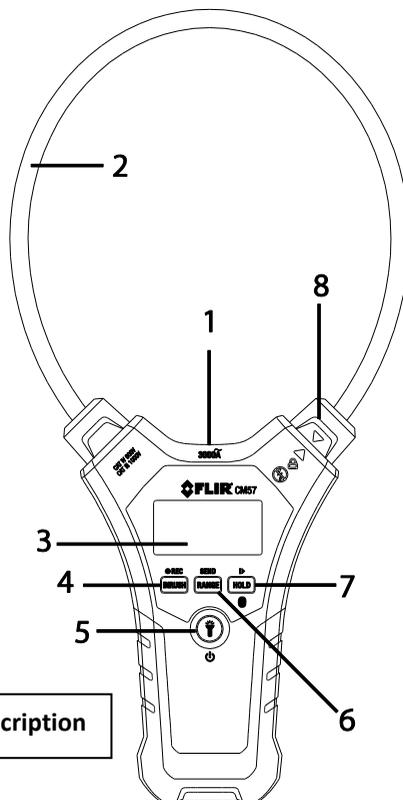


Fig. 4-1 Meter Description

## 4.2 Display Icon Description

	Bluetooth®		Display Hold		Amperes
	Battery status		Inrush Current		Auto Power Off
	Data Transmission		Memory Mode		Auto Range

## 4.3 Control buttons

	<ul style="list-style-type: none"> <li>• Momentary press to access INRUSH mode</li> <li>• Press and hold to access the Record Memory mode</li> </ul>
	<ul style="list-style-type: none"> <li>• Momentary presses step through the ranges manually</li> <li>• Press and hold while in manual range mode to return to Auto range</li> <li>• Press and hold to Send data via Bluetooth</li> </ul>
	<ul style="list-style-type: none"> <li>• Momentary press to access the Data Hold mode</li> <li>• Press and hold to activate/deactivate Bluetooth® communication</li> <li>• While in Record mode, momentary press to Pause/Resume</li> </ul>
	<ul style="list-style-type: none"> <li>• Press and hold to switch power ON/OFF</li> <li>• When powered, press to activate/deactivate work light</li> </ul>

## 5. Operation

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**Note:** Before operating the device, please read and understand all Warning and Caution statements and follow all instructions and notes.

### 5.1 Powering the Meter

The meter is powered by two (2) AAA 1.5V batteries (located in the compartment on the back of the meter). Press and hold the Power button  for > 2 seconds to switch the device ON or OFF.

#### 5.1.1 Auto Power OFF (APO)

The meter switches OFF automatically after an approximately 10-minute period of inactivity. Several seconds before the meter automatically switches OFF the meter beeps several times to alert the user.

To disable the Auto Power OFF feature:

- With the meter power OFF, press and hold the Power and HOLD buttons for >2 seconds.
- The display shows 'AoFF' while it powers up.
- The APO feature is now disabled and the meter will not shut off automatically.
- Note that the next time the meter is powered up, the APO function will be re-enabled and the user must repeat the APO disable instructions to disable this function.
- When APO is active, the APO icon appears on the display .
- APO active is the default condition.

#### 5.1.2 Low Battery Indication

When the displayed battery icon  appears empty and flashing, or if the meter does not power up, the batteries must be replaced immediately. Refer to the battery replacement procedure in the maintenance section. Note that measurement accuracy is maintained even while low battery alerts are displayed.

### 5.2 Work Lights

With the unit powered up, press the Work Light button  to switch the high power Work Lights ON or OFF. Note that excessive use of the Work Lights will shorten battery life.

### 5.3 Data Hold

Press the **HOLD** button with the meter ON to freeze the displayed reading. The HOLD icon (**H**) will appear along with the held reading. Press the **HOLD** button again to release the HOLD feature. The HOLD icon will switch OFF and the meter will revert to displaying real time readings.

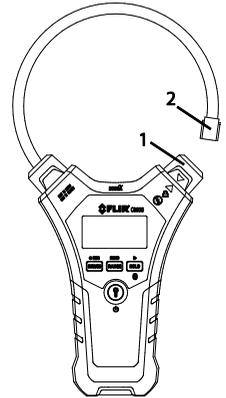
## 5.4 AC Current Measurements

**WARNING:** Ensure that power to the device under test is OFF before starting this procedure. Switch power to the device under test ON only after the clamp has been safely attached to the device under test.



**CAUTION:** Do not move fingers above the LCD at any time during a test.

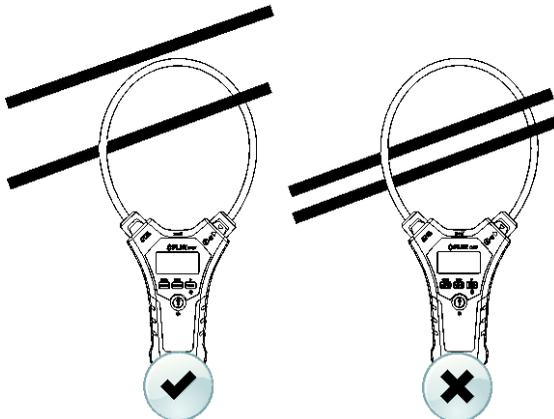
1. Switch the meter OFF and switch power to the device under test OFF.
2. Turn the clamp lock (1) counter-clockwise to release the flexible clamp (2).
3. Fully enclose only one conductor of the device under test with the flexible clamp probe (see diagram below for Correct and Incorrect usage).
4. Re-secure the clamp lock (1) after clamping around a single conductor.
5. Do not attempt to measure current higher than the specified current limit.
6. Switch the meter ON and then switch power to the device under



test ON. Never move fingers above the display area when running a test.

**Fig. 5-1 Unlock/Lock Clamp Jaw**

7. Read the current value in the display; 'OL' will display if the measured signal exceeds the range. The meter defaults to the Auto Range mode; the Auto Range icon  is visible on the display. The meter will automatically select the appropriate range when in Auto Range mode.
8. To manually select the range, use the **RANGE** button to step through the available ranges (30.00A / 300.0A / 3000A).



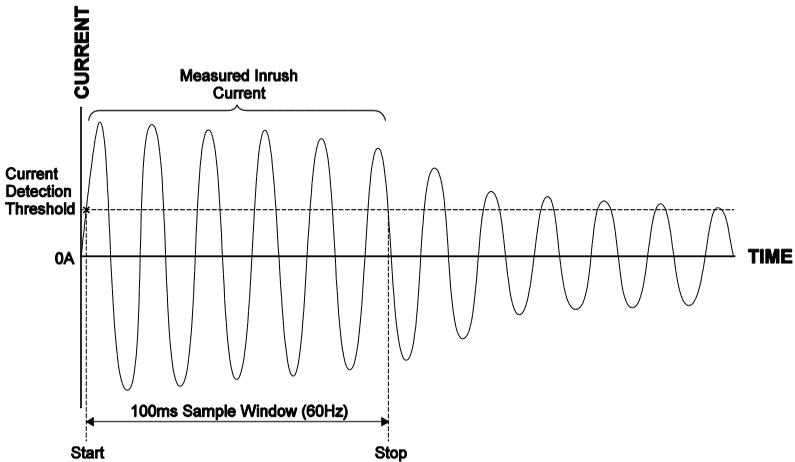
**Fig. 5-2 Correct (left) and Incorrect (right) Conductor Clamping**

### 5.4.1 Inrush Current mode

The meter has the ability to capture an inrush current signal using a 100ms sampling window. The sampling window opens only when the threshold current (see below) is detected. When detecting an input current  $\pm 50$  digits of the selected range the meter will calculate the RMS values for a 100mS period and display this value. Refer to illustration below.

- For the 30A range the minimum triggering current threshold is 0.5A
- For the 300A range the minimum triggering current threshold is 5.0A
- For the 3000A range the minimum triggering current threshold is 50A

1. Press the **INRUSH** button to access the Inrush Current mode.
2. The display will show the Inrush icon  and the display digits will switch to dashes.
3. The meter then waits for a current signal to exceed the threshold.
4. When ready, turn on power to the device under test. The meter will capture the highest reading detected during a 100ms window. Note that the 100ms window does not open until the minimum triggering current is detected.
5. To exit the Inrush mode at any time, press any button. The Inrush icon will switch OFF.



**Fig. 5-3 Inrush Current**

## 5.5 Data Recording and Bluetooth® Data Transfer

### 5.5.1 Data Recording

When prompted, this meter can store readings into its internal memory automatically for later transfer over Bluetooth® (real-time data streaming over Bluetooth® is also possible as explained below) using the FLIR TOOLS™ application. The maximum number of records that can be stored is 20,000 and the fixed sampling (recording) interval is 1 minute.

**IMPORTANT:** Please enable Bluetooth® by long pressing the Bluetooth® button  until the Bluetooth® icon appears flashing before starting the procedure below.

1. Press the **REC** button >2 seconds to enter the Data Record Mode. The display will show the Memory  icon.
2. Use the Start/Stop button  to Start/Stop Recording. The Memory icon will flash when the meter is recording and will stop flashing when recording is stopped. The display digits will show the measured reading.
3. Note that after one (1) start and stop cycle, stored data is erased when a new data recording session is started.
4. To transfer all of the stored readings in one bulk data dump or to data stream in real-time over Bluetooth® please refer to the following sections.
5. Press the REC button > 2 seconds to exit the Data Recording Mode.
6. Note that Data Recording cannot be accessed while the meter is in the Inrush mode.
7. Disable the APO utility when data recording.

### 5.5.2 Meter Identification (ID) Number

A unique numerical ID (01-20) can be assigned to the meter so that, when multiple meters are used over Bluetooth®, each can be specifically addressed.

1. With the meter OFF, press both the **POWER** and **RANGE** buttons simultaneously to access the ID number. The display will show 'ldxx'.
2. Use the **RANGE** button to increment the ID number.
3. When the desired number is shown, press the  button to save the ID number to memory.
4. **Power the meter down and then power back up.**
5. The meter will now be recognized by its unique ID number on Bluetooth® receiving devices.

### 5.5.3 Transferring Recorded Readings with Bluetooth®

To transfer bulk logged readings from the meter's internal memory to a Bluetooth® paired device running the FLIR TOOLS™ application please read the steps below. Note that the Bluetooth range is 32' (10m) maximum.

1. Press and hold the Bluetooth button  until the Bluetooth icon appears flashing
2. Press and hold the **SEND** button until the percent (%) symbol appears
3. The data is now being transmitted.
4. The percentage shown is the percentage of data transmitted. All data is transferred when 100% is shown. Press the **SEND** button at any time to cancel the transmission. RANGE mode is inactive during data transmission.
5. Once all data is transferred (100% displayed), press the **SEND** button to return to the main display.

### 5.5.4 Streaming Bluetooth® Communication

To stream real-time readings over Bluetooth®

1. Press and hold the Bluetooth button until the Bluetooth icon appears flashing.
2. Connect with the FLIR TOOLS™ application.
3. When connected, the Bluetooth icon stops flashing and appears solid.
4. The readings are now automatically transmitted over Bluetooth® as they are taken.
5. See the FLIR TOOLS™ Mobile User Guide for additional information.

## 6. Maintenance

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### 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 batteries and store them separately.

### 6.2 Battery Replacement



**CAUTION:** Remove the meter from the conductor under test and switch the meter OFF before opening the battery compartment.

1. With a Phillips screwdriver, remove the battery compartment screw on the back of the meter.
2. Remove the battery compartment cover.
3. Replace the 2 'AAA' 1.5V batteries observing correct polarity.
4. Re-attach the battery compartment cover.
5. Secure the compartment cover with the Phillips head screw.

#### 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. Specifications

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### 7.1 General specifications

<b>Clamp Jaw</b>	Flexible type with locking mechanism
<b>Coil diameter</b>	0.3" (7.5mm); Coil tip (item 2 in Fig. 5-1): 0.5" (13mm)
<b>Coil Bend Radius</b>	3.1" (80mm) for CM57; 1.5" (38mm) for CM55
<b>Display</b>	3000 count LCD with backlight and multi-function indicators
<b>Display update rate</b>	2 times per second
<b>Low Battery indication</b>	Battery symbol appears empty and flashing
<b>Over-range indication</b>	'OL' display
<b>Work Lights</b>	Two White LEDs
<b>Measurement rate</b>	1.5 readings per second
<b>Data Recording Rate</b>	1 reading per minute
<b>AC bandwidth</b>	45 to 500Hz (sine wave)
<b>AC response</b>	True RMS
<b>Inrush</b>	Min. trigger current 0.50A @ 30.00A, 5.00A @ 300.0A, 50A @3000A; Sampling period 100ms
<b>Operating Temperature</b>	32~122°F (0~50°C)
<b>Operating Humidity</b>	Max 80% up to 95°F (35°C) decreasing linearly to 60% at 113°F (45°C)
<b>Storage Temperature</b>	-4~140°F (-20~60°C) without batteries
<b>Storage Humidity</b>	80% RH maximum
<b>Temperature Coefficient</b>	0.2 x specified accuracy / °C, < 64.5°F (18°C), > 82.4°F (28°C)
<b>Altitude</b>	Maximum operating altitude 6562' (2000m)
<b>Battery</b>	Two "AAA" 1.5V batteries
<b>Battery life</b>	100 hours with alkaline batteries
<b>Auto power OFF</b>	After approx. 10 minutes of inactivity
<b>Dimensions (W x H x D)</b>	CM55: 4.7 x 11.0 x 1.0" (120 x 280 x 25 mm) CM57: 5.1 x 13.8 x 1.0" (130 x 350 x 25 mm)
<b>Weight</b>	CM55: 7.1 oz. (200g) / CM57: 6.0 oz. (170g) with batteries
<b>Drop test</b>	9.8 ft. (3m)
<b>Agency Approvals</b>	CE, UL, RCM
<b>Safety Standards</b>	IP54

For indoor use and in accordance with the requirements for double insulation to EN61010-1, EN61010-2-032, EN61326-1; CAT IV 600V, CAT III 1000V, Pollution Degree 2, CE

## 7.2 AC Current Electrical specifications

Function	Range	Overload Reading (OL)	Resolution	Accuracy (of reading) 45 to 500Hz
AC Current	30.00 A AC	33.00 A AC	0.01A	$\pm(3.0\% + 5 \text{ digits})$
	300.0 A AC	330.0 A AC	0.1A	$\pm(3.0\% + 5 \text{ digits})$
	3000 A AC	3300 A AC	1A	$\pm(3.0\% + 5 \text{ digits})$

### Notes:

Accuracy is given as  $\pm$  (% of reading + least significant counts) at 73.4°F  $\pm$ 9°F (23°C  $\pm$ 5°C) with relative humidity lower than 80%. Accuracy is specified for a period of one year after calibration.

LCD displays '0' counts when the reading is < 10 counts.

ACA specifications are AC Coupled, True RMS.

For non-sinusoidal waveforms, additional accuracy Crest Factor (C.F.) considerations exist as detailed below:

Add 3.0% for C.F. 1.0~2.0

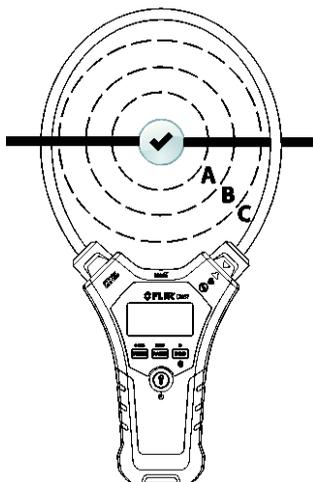
Add 5.0% for C.F. 2.0~2.5

Add 7.0% for C.F. 2.5~3.0

Position Error of Clamp: Accuracy and position error assumes centralized primary conductor at optimum position (center of clamp jaw), no external electrical or magnetic field, and within operating temperature range.

Distance from optimum position	CM55	CM55 Error	CM57	CM57 Error	Position*
	0.6" (15mm)	2.0%	1.4" (35mm)	1.0%	A
	1.0" (25mm)	2.5%	2.0" (50mm)	1.5%	B
	1.4" (35mm)	3.0%	2.4" (60mm)	2.0%	C

\*See position examples in diagram below:



**Fig. 7-1 Positioning Conductor in Clamp Jaw center**

## 8. Technical Support

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<b>Main Website</b>	http://www.flir.com/test
<b>Technical Support Website</b>	http://support.flir.com
<b>Technical support Email</b>	TMSupport@flir.com
<b>Service/Repair Support Email</b>	Repair@flir.com
<b>Support Telephone number</b>	+1 855-499-3662 option 3 (toll-free)

## 9. Warranty

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### 9.1 FLIR Global Limited Lifetime Warranty

The product is protected by the FLIR Global Limited Lifetime Warranty. Visit [www.flir.com/testwarranty](http://www.flir.com/testwarranty) to read the Warranty document. Register your product at the website to receive a free 1-year warranty extension.



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### **Corporate Headquarters**

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### **Customer Support**

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Service and Repair Email	<a href="mailto:Repair@flir.com">Repair@flir.com</a>
Customer Support Telephone	+1 855-499-3662 option 3 (toll free)

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