■ DIGITAL FLEXPROBE®

400D-6
400D-10
400D-24
4000D-14
4000D-24

ENGLISH

User Manual

AEMC® INSTRUMENTS

Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at .

Serial #: _____

Catalog #: _____

Model #: _____

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS

Table of Contents

INTRODUCTION

Thank you for purchasing an AEMC® Digital Flexbprobe.

For best results and for your safety, read the enclosed operating instructions carefully and comply with the precautions for use.

⚠ PRECAUTIONS BEFORE USE ⚠

This instrument is protected against voltages of not more than 1000V with respect to ground in measurement CAT III or 600V in CAT IV between the sensor and the conductor that measures the current.

The protection provided by the instrument may be impaired if the instrument is used other than as specified by the manufacturer.

- Do not exceed the rated maximum voltage and current or the measurement category.
- Observe the conditions of use; temperature, relative humidity, altitude, level of pollution, and location.
- Before each use, check the integrity of the insulation on the sensor, cable and housing. Do not use the instrument if it is open, damaged, poorly assembled, or if its accessories appear damaged.
- The sensor must not be applied to or removed from uninsulated conductors at dangerous voltages.
- Use personal protection equipment systematically.
- All troubleshooting and metrological checks must be performed by competent and accredited personnel.

1.1 International Electrical Symbols

	Signifies that the instrument is protected by double or reinforced insulation.
	**CAUTION - Risk of Danger!** Indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument in all cases where this symbol is marked.
	Must not be applied to or removed from bare conductors at dangerous voltages. Type B current sensor as per IEC 61010-2-032.
	Important instructions to read and understand completely.
	Important information to acknowledge.
	Battery.
	Compliance with the Low Voltage & Electromagnetic Compatibility European directives (73/23/CEE & 89/336/CEE).
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components In accordance with directive WEEE 2002/96/EC.

1.2 Definition of Measurement Categories

CAT IV: For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

CAT III: For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.

CAT II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

1.3 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.4 Ordering Information

Digital FlexProbe® (MiniFlex) Model 400D-6 w/6 ft Lead
(TRMS, 4AAC, 40AAC, 400AAC).....**Cat. #2153.30**

Digital FlexProbe® (MiniFlex) Model 400D-10 w/6 ft Lead
(TRMS, 4AAC, 40AAC, 400AAC).....**Cat. #2153.31**

Digital FlexProbe® (MiniFlex) Model 400D-24 w/6 ft Lead
(TRMS, 4AAC, 40AAC, 400AAC).....**Cat. #2153.36**

Digital FlexProbe® (MiniFlex) Model 4000D-14 w/6 ft Lead
(TRMS, 40AAC, 400AAC, 4000AAC).....**Cat. #2153.32**

Digital FlexProbe® (MiniFlex) Model 4000D-24 w/6 ft Lead
(TRMS, 40AAC, 400AAC, 4000AAC).....**Cat. #2153.35**

All models include one Digital FlexProbe®, two AAA batteries and a product user manual.

1.4.1 Accessories

Multifix Multi-Position Magnetic Mounting Accessory.....**Cat. #5000.44**

Soft Carrying Case .....**Cat. #2118.65**

Small Classic Tool Bag.....**Cat. #2133.72**

Order Accessories and Replacement Parts Directly Online
*Check our Storefront at **www.aemc.com** for availability*

PRODUCT FEATURES

2.1 Description

An ideal addition to the electrician's tool kit, the Digital FlexProbe® series can be used for TRMS AC current measurements from 20mA to 4000A, and are rated 600V CAT IV. They provide a welcomed solution when accessing electrical conductors is difficult and in tight places.

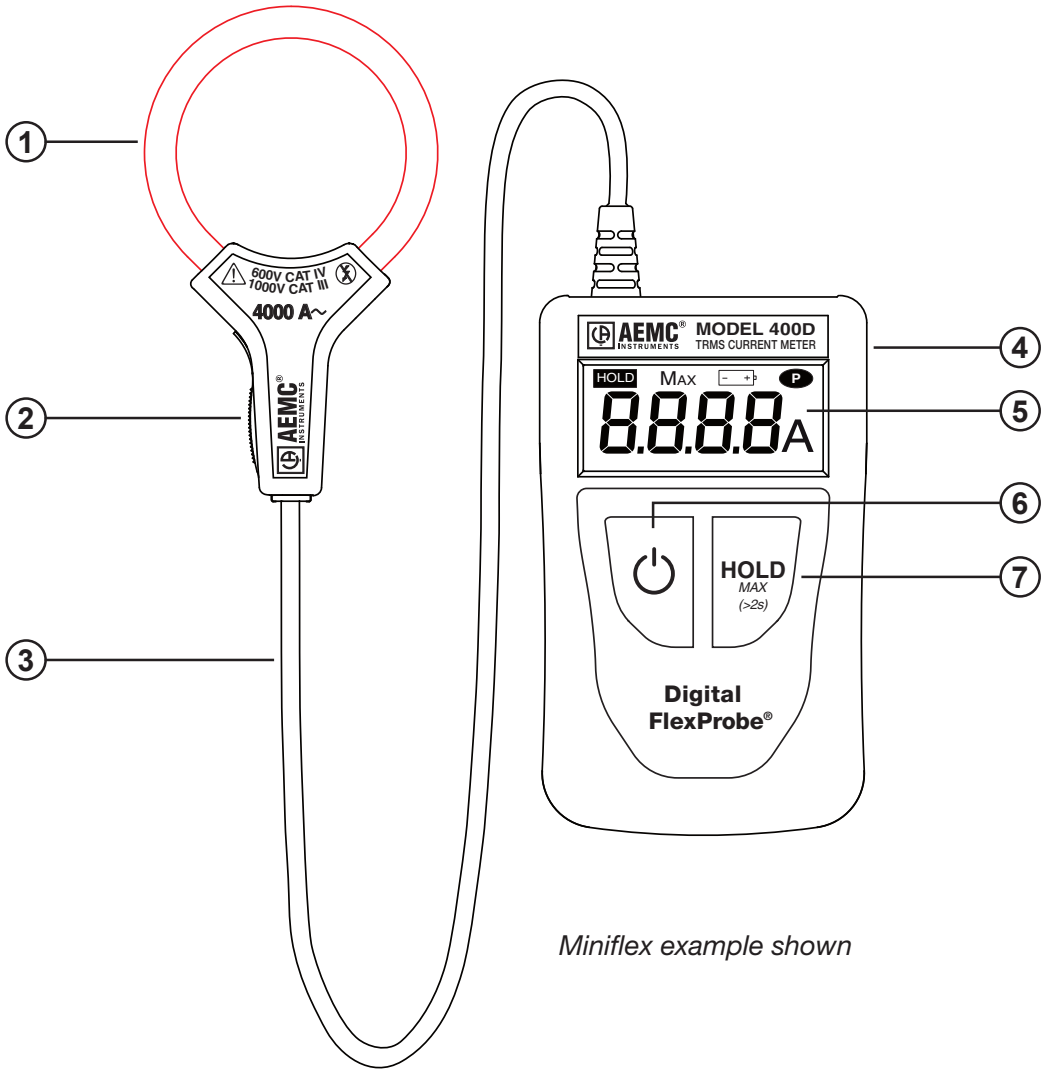
Two models are available. The Model 400D, available with a 6", 10", or 24" sensor, has a measurement range starting at 20mA, and is designed for work in residential, commercial and light industrial applications. It can be used to check electrical distribution systems up to 400A.

The Model 4000D, available with a either a 14" or 24" sensor, has a measurement range starting at 100mA and can be used on higher-power industrial installations, as well as electrical utilities for measurements up to 4000A.

Although they are high-performance instruments, the Digital FlexProbe® series are very simple to use: two buttons are all it takes to start the instrument, deactivate the auto power-off, HOLD the value on the display or store the maximum value (MAX HOLD). The values are read directly on the built-in 4000-count display.

They are ergonomically designed for comfortable handheld use even when bulky gloves are required. The optional articulating, magnetic Multifix mounting system accessory makes it simple to hang on a wall, door, table edge or clip onto a belt.

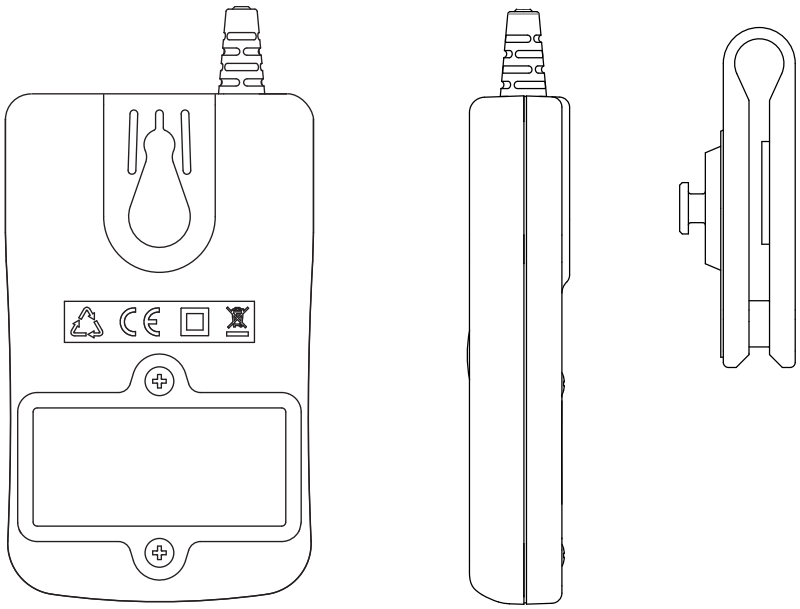
2.2 Control Features



Miniflex example shown

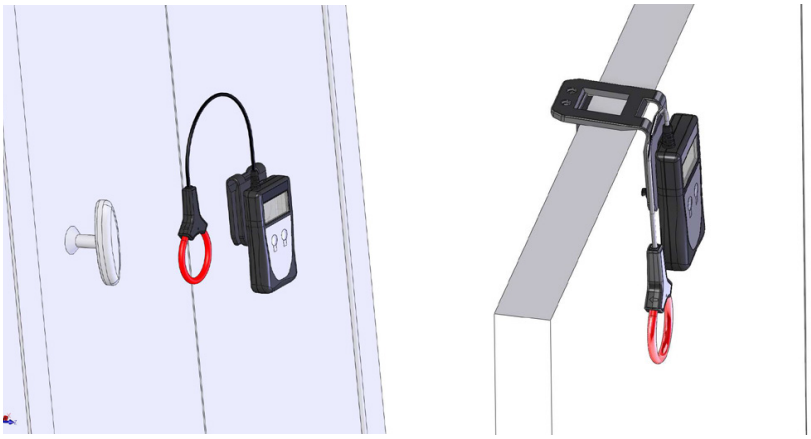
1. Flexible sensor
   - Model 400D (6", 10", 24")
   - Model 4000D (14", 24")
2. Sensor opening/closing lever
3. Shielded lead
4. Protective housing
5. LCD display
6. ON/OFF button
7. HOLD button

On the back of the protective housing is a notch for the attachment of a belt clip (optional).



With the Multifix magnetic mounting accessory, you can position your Digital FlexProbe® anywhere, leaving both hands free. The Multifix can be used to:

- Carry the Digital Flexprobe® on a belt
- Attach it to a metal surface using the built-in magnet
- Attach it to a door top or the edge of a table



OPERATION

3.1 Measurement Principle

The flexible sensor is based on the Rogowski coil.

This principle combines:

- Excellent linearity with no saturation effect (therefore no heating)
- Light-weight (no magnetic circuit)

3.2 Use

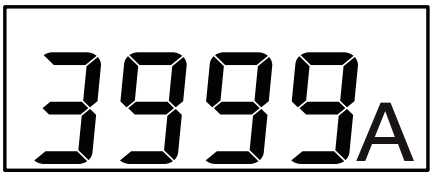
3.2.1 Connection

1. Press the locking clip(s) to open the sensor.
2. Place the sensor around the conductor through which the current to be measured flows (only one conductor in the sensor), then close the sensor.
3. In order to optimize measurement quality, it is best to center the conductor in the coil and make the shape of the coil as nearly circular as possible.
4. Press the ⏻ button to turn the instrument on.

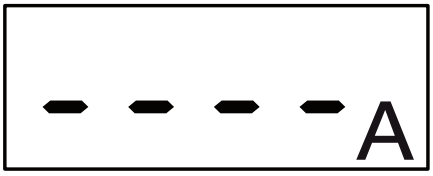
3.2.2 Measurement

Read the measurement on the display. The current is given in Arms.

If the measurement exceeds the display capacity (4000A), the device displays 3999, blinking.



If the measurement is too low (see § 3.2), the device displays dashes.



If the edges of the signal are too steep, or its peak factor is too large, the device displays **OL**.

3.2.3 Freezing the Measurement

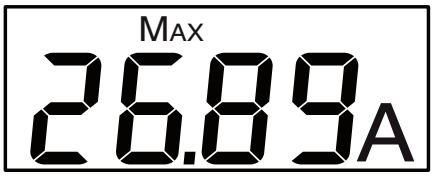
If you want to freeze the display of a measurement, press the **HOLD** button. The **HOLD** symbol is displayed.

The device continues to make measurements, but the display is frozen. To release it, press the **HOLD** button again.

3.2.4 Search for Maximum

To search for a maximum, for example a spike lasting at least 100ms, press the **HOLD (MAX > 2s)** button for more than two seconds.

The **Max** symbol will display and the instrument will begin measuring.



The Digital Flexprobe® compares each new measurement to the one displayed. If the new measurement is greater than the old, it replaces it in the display.

To return to the real-time display mode, press the **HOLD (MAX > 2s)** button again.

3.2.5 Auto Power OFF

If there is no activity after 10 minutes, the Digital Flexprobe® turns off automatically (unless the MAX function is active) to preserve battery life.

To deactivate the Auto Power OFF feature, press the ⏻ and **HOLD** buttons simultaneously when turning the instrument on.

To reactivate automatic switching off, switch the device off, then back on.

3.2.6 Low Battery

When the battery voltage drops and the remaining battery life of the instrument is approximately one hour, the symbol blinks on the display.

When the battery voltage is too low to guarantee the accuracy of a measurement, the symbol lights steadily. The batteries must then be replaced (see § 5.2).

3.2.7 Disconnecting

Turn off the device by pressing the ⏻ button. Press the yellow opening lever to open the flexible sensor. Remove the sensor from the conductor.

SPECIFICATIONS

4.1 Reference Conditions

Quantity of influence	Reference values
Temperature	73.4 ± 5.4°F (23 ± 3°C)
Relative humidity	45 to 75% RH
Frequency of the signal measured	40 to 65Hz
Peak factor of the signal measured	$\sqrt{2}$
Conductor diameter	≤ 5mm
Battery voltage	2.8 to 3.2V
External electric field	none
External DC magnetic field (earth field)	<40 A/m
External AC magnetic field	none
Position of the conductor	centered in the measurement coil
Shape of the measurement coil	nearly circular

4.2 Electrical

Model 400D-6 / 400D-10 / 400D-24

Display Range	4A	40A	400A
Measurement Range	0.020 to 3.999A	4.00 to 39.99A	40.0 to 399.9A
Measurement Range (max)	0.100 to 3.999A	4.00 to 39.99A	40.0 to 399.9A
Resolution	1mA	10mA	100mA
Accuracy	±(2% + 10ct)	±(1.5% + 2ct)	±(1.5% + 2ct)

Model 4000D-14 / 4000D-24

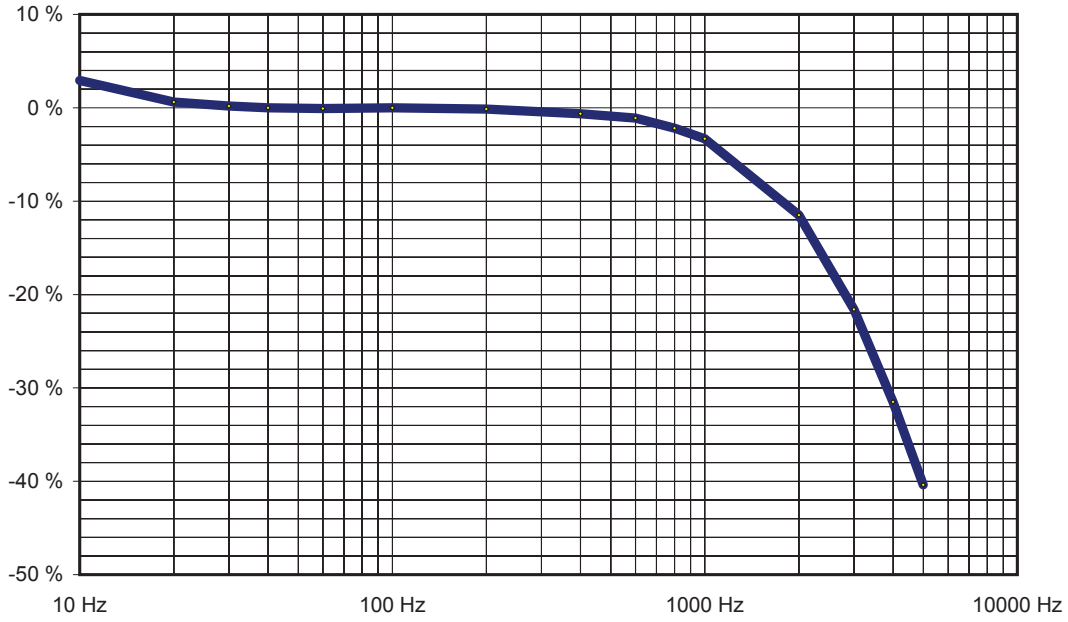
Display Range	40A	400A	4000A
Measurement Range	0.20 to 39.99A	40.0 to 399.9A	400 to 3999A
Measurement Range (max)	1.00 to 39.99A	40.0 to 399.9A	400 to 3999A
Resolution	10mA	100mA	1A
Accuracy	±(2% + 10ct)	±(1.5% + 2ct)	±(1.5% + 2ct)

4.3 Variations in Range of Use

Quantity of influence	Range of influence
Battery voltage	1.8 to 2V
Temperature	32 to 122°F (0 to 50°C)
Relative humidity	10 to 90% RH
Frequency response	10 to 20Hz 20 to 30Hz 30 to 400Hz 400 to 1000Hz 1000 to 3000Hz
Position of the conductor in the sensor (f<400 Hz)	Any position on the interior perimeter of the sensor
Adjacent conductor carrying alternating current	Conductor touching the exterior perimeter of the sensor
Peak factor	1.4 to 3.5 limited to 6000Apeak
Serial mode rejection ratio in AC	0 to 400ADC
Common mode rejection, 50/60 Hz	0 to 600Vrms
Influence of a 50/60Hz external magnetic field	0 to 400A/m
Accuracy	
Typical	**Maximum**
< 1ct	±(2% + 1ct)
± 0.25% / 10°C	±(0.5% / 10°C + 2cts)
0.2%	± (0.3% + 2cts)
See § 3.4	± (5% + 1ct) ± (1% + 1ct) ± (0.5% + 1ct) ± (6% + 1ct) - 3 dB typical
± 0.5 %	± (1.5% ± 1ct)
Away from opening: 55 dB **At opening: 55 dB**	Away from opening: ≥ 45 dB At opening: ≥ 45 dB
at 16.66Hz: ± (2 % + 1ct) **at 50Hz: ± (0.5 % + 1ct)** **at 440Hz: ± (30 % + 1ct)**	± (6% + 1ct) ± (3% + 1ct) —
< 1ct	≥ 50 dB
< 1ct	≥ 60 dB
Housing: 43 dB **Sensor: 50 dB**	Housing: ≥ 30 dB Sensor: ≥ 40 dB

4.4 Typical Frequency Response Curves

(at 39AAC)



4.5 Power Supply

The device can be powered by either:

- Two 1.5V (AAA) alkaline batteries
- Two NiMH storage batteries of the same size

The nominal operating voltage is between 1.8V and 3.2V.

The battery life in continuous operation is:

- 70 hours with super-alkaline batteries
- 50 hours with NiMH storage batteries having a capacity of 1200 mAh

The low battery condition is acknowledged by a blinking symbol on the display. When lit steadily, the batteries must be replaced (see § 5.2).

4.6 Environmental

Operating Temperature: 32° to 122°F (0° to 50°C)

Storage Temperature (without batteries): -4° to 158°F (-20° to +70°C)

Operating Relative Humidity: 80% RH to 122°F (50°C)

Storage Relative Humidity: 90% RH up to 113°F (45°C)
The sensor can withstand a temperature of 194°F (90°C)
Indoor use / Level of pollution: 2 / Altitude: < 2000m

4.7 Mechanical

Dimensions: 3.94 x 2.36 x 0.79" (100 x 60 x 20mm)

Cable Length: 6 ft (1.83m)

Sensor Length: 400D-6: 6" (170mm)
400D-10: 10" (250mm)
400D-24: 24" (610mm)
4000D-14: 14" (350mm)
4000D-24: 24" (610mm)

Sensor Diameter: 400D-6: Ø 1.77" (45mm)
400D-10: Ø 2.75" (70mm)
400D-24: Ø 8" (190mm)
4000D-14 : Ø 3.94" (100mm)
4000D-24 : Ø 8" (190mm)

Weight: 0.29 lbs (130g) approx (MiniFlex)

Index of Protection: IP 40 per IEC 60529
IK 04 per IEC 50102
V0 (per UL 94)

The flexible coil is resistant to oils and aliphatic hydrocarbons.

4.8 Safety

Electrical safety per IEC 61010-2-032 for type B sensors
Rated 600V CAT IV

4.9 Electromagnetic Compatibility

Emissions and immunity in an industrial setting compliant with IEC 61326-1 for portable devices.

CHAPTER 5

MAINTENANCE

Use only factory specified replacement parts. AEMC® will not be held responsible for any accident, incident, or malfunction following a repair done other than by its service center or by an approved repair center.

5.1 Cleaning

Disconnect the instrument from any source of electricity.

- Use a soft cloth lightly moistened with soapy water.
- Wipe with a moist cloth and then dry with a dry cloth.
- Do not allow water or other foreign substances into the case.
- Never use alcohol, solvents or hydrocarbons.

5.2 Replacing the Batteries

Disconnect the instrument from any source of electricity.

The battery must be replaced when the symbol flashes or remains steady on the display.

1. Use a screwdriver to unscrew the two closing screws on the back of the housing.
2. Replace the old battery with a new battery (1.5V or AAA super-alkaline batteries).
3. Close the housing; make sure that it is completely and correctly closed.
4. Screw both screws back in.

Used batteries must not be treated as ordinary household waste. Take them to the appropriate recycling collection point.

5.3 Repair and Calibration

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:
You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To:

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

5.4 Technical and Sales Assistance

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, fax or e-mail our technical support team:

Contact:

5.5 Limited Warranty

The Digital FlexProbe® Models 400D and 4000D are warranted to the owner for a period of two years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

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Please print the online Warranty Coverage Information for your records.

What AEMC® Instruments will do:

If a malfunction occurs within the warranty period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

5.6 Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To:

Caution: To protect yourself against in-transit loss, we highly recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.