■ FLEXIBLE
AC CURRENT SENSOR

MiniFlex®

3000-14-1-1
3000-24-1-1

ENGLISH

User Manual

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

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 #: 2132.60/2132.63

Model #: 3000-14-1-1 / 3000-24-1-1

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

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CHAPTER 1

INTRODUCTION

⚠ WARNING ⚠

These safety warnings are provided to ensure the safety of personnel and proper operation of the instrument.

- Read this instruction manual completely and follow all the safety information before attempting to use or service this instrument.
- Safety is the responsibility of the operator. The MiniFlex® must be used only by qualified personnel using applicable safety precautions.
- Wear protective clothing and gloves as required.
- Use caution on any circuit: potentially high voltages and currents may be present and may pose a shock hazard.
- Read the safety specifications section prior to using the current probe. Never exceed the maximum voltage ratings given.
- ALWAYS de-energize the circuit before wrapping the MiniFlex® around bare conductors, bus bars, or near live parts. Do not wrap on live conductors.
- ALWAYS connect the electronic module to the display device before wrapping the MiniFlex® around the sample being tested.
- ALWAYS inspect the module, sensor, sensor cable, and output terminals prior to use. Replace any defective parts immediately. Use only factory parts.
- NEVER use the MiniFlex® on electrical conductors rated above 1000V CAT III; 600V CAT IV.

1.1 International Electrical Symbols

	This symbol signifies that the instrument is protected by double or reinforced insulation.
	This symbol on the instrument indicates a WARNING and that the operator must refer to the user manual for instructions before operating the instrument. In this manual, the symbol preceding instructions indicates that if the instructions are not followed, bodily injury, installation/sample and product damage may result.
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	This symbol refers to a type B current sensor. Do not apply around or remove from HAZARDOUS LIVE conductors without additional protective means (de-energizing the circuit or wearing protective clothing suitable for high voltage work).
	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 II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

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

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

MiniFlex® Model 3000-14-1-1 ..... **Cat. #2132.60**

MiniFlex® Model 3000-24-1-1 ..... **Cat. #2132.63**

CHAPTER 2

PRODUCT FEATURES

2.1 Description

The MiniFlex® is a compact flexible AC current transformer composed of a flexible sensor and an electronic module. The flexible sensor permits measurements on conductors where standard clamp-on probes could not be used. In particular, it can be installed in confined spaces, places where access is difficult, or even wrapped around irregular shapes.

The MiniFlex® is lightweight. It does not use magnetic cores like standard transformers. The transformation principle is based on an air core. It presents virtually no load to the system under test, has a low phase shift and excellent frequency response, and cannot be damaged by overloads. The sensor assembly is insulated for 1000V CAT III; 600V CAT IV. The MiniFlex® meets EN 61010 and is CE marked.

The MiniFlex® has an mV output proportional to the current measured for direct readings on DMMs, data loggers, oscilloscopes, and power or harmonic meters. TRMS measurements are taken when connected to a TRMS meter. The MiniFlex® is insensitive to DC currents and only the AC component of the measured signal is measured.

2.2 Features

- Measures from 0.5Arms to 3000Arms (model dependent)
- Accuracy 1% of Reading ± 0.25A
- TRMS measurements when connected to a TRMS instrument
- No core saturation or damage if overloaded
- Overrange LED indication
- EN 61010; 1000V CAT III; 600V CAT IV; CE Mark
- 9V battery for typical 140 hours continuous operation
- 20kHz frequency response
- Low phase shift for power measurements
- Insensitive to DC, measures only AC component on DC + AC signals
- Excellent linearity
- Lightweight
- Sensor is resistant to oils and aliphatic hydrocarbons

2.3 Control Features

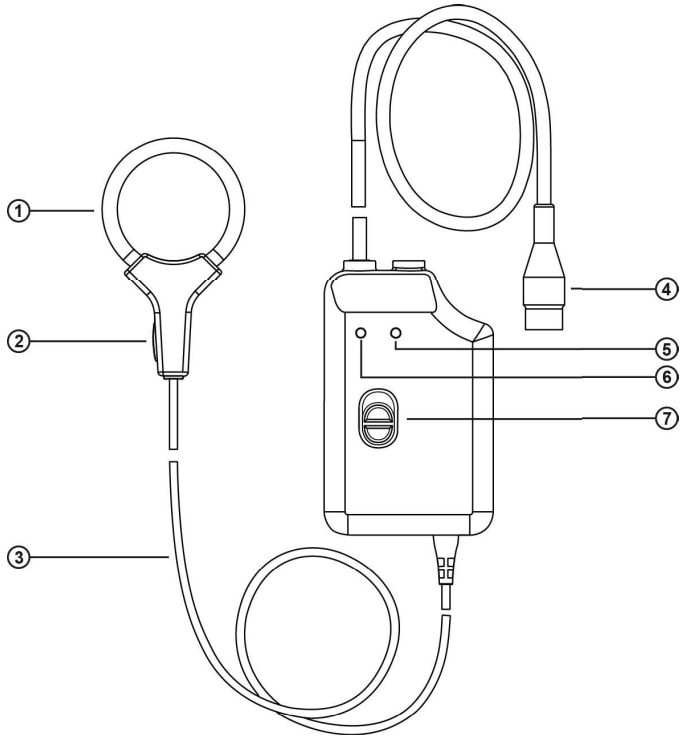


Figure 1

1. Flexible sensor
2. Sensor opening device
3. Shielded cord
4. BNC output connector
5. Red OL (overload) indicator
6. Green ON/OFF and Low Battery indicator
7. Range selection switch

CHAPTER 3

SPECIFICATIONS

REFERENCE CONDITIONS	
Quantity of influence	**Reference values**
Temperature	73° ± 9° F (23° ± 5° C)
Relative humidity	20 to 75% RH
Frequency of the signal measured	40 to 400Hz
Type of signal	sinusoidal
External electric field	< 1V/m
External DC magnetic field (earth field)	< 40A/m
External AC magnetic field	none
Position of the conductor	centered in the measurement coil
Shape of the measurement coil	nearly circular
Input impedance of the display device connected to housing	≥1MΩ

ELECTRICAL	
Measurement Range	3000A
Current Range	0.5A to 3000A
Output Signal	1mV/A
Frequency Range	10Hz to 20kHz with current derating
Frequency Limitation	see § 3.1 (up to 300Arams there is no frequency limitation)
Influence Of Conductor Positioning	1.5% typical, 3% max
Influence Of Conductor Positioning In Sensor Against Handle	4% typical, 6% max
External Conductor Influence	35dB to 40dB on contact
Accuracy	±(1%+0.25A)
Common Mode Rejection	100dB typical, 80dB min
Max peak factor (1) at I nominal	1.5
Residual noise at I = 0 (Arms) (2)	0.25
Max phase shift at 50 Hz	1.5°
Max offset voltage (mVDC)	2
Max output voltage (Vpeak)	± 4.5
Output impedance (kΩ)	1
Overload	Red LED ON when output around >4.5V
Power Source	9V Alkaline, Type LF22
Battery Life	>140 hours continuous
Battery Indicator	Green LED blinks when battery needs replacement.

(1): Peak factor PF = Vpeak/Vrms
(2): The residual noise affects the measurement uncertainty according to the formula:

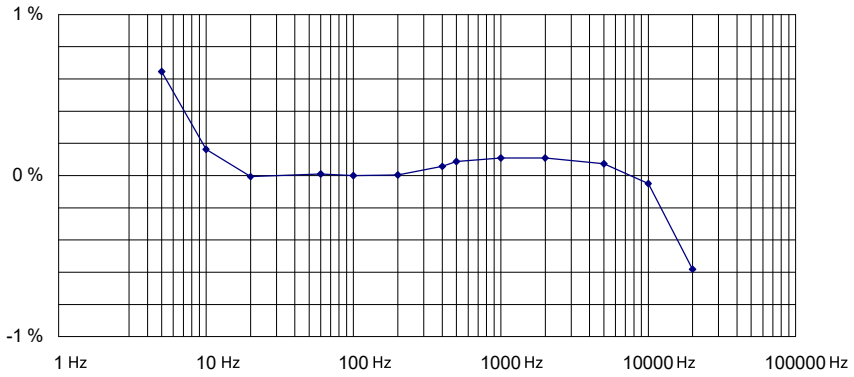
$$\text{global uncertainty} = \frac{\sqrt{(\text{I measured} \times 0.01)^2 + (\text{residual noise})^2}}{\text{I measured}} \quad (\text{I measured} \neq 0)$$

If the current measured is zero, the uncertainty is equal to the residual noise.

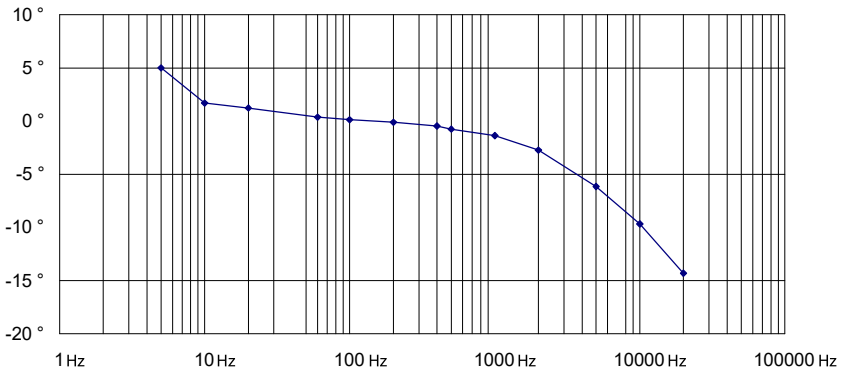
MECHANICAL	
Module Output	10 ft. (3m) BNC cable
Module Dimensions	4.0 x 2.5 x 1.1" (103 x 64 x 28mm)
Weight with Sensor	7.76 oz. (210g)
Sensor Diameter	5mm Ø
Sensor Length	3000-14-1-1: 14" (356mm) 3000-24-1-1: 24" (610mm)
Max Conductor Size	3000-14-1-1: 3.93" (100mm) 3000-24-1-1: 7.5" (190mm)
Connection Cable Length (Module to Sensor)	6ft (2m)
Flammability Rating	Sensor: UL94V0 Housing: UL94V2
Drop Test	Per IEC 68-2-32
Vibration	Per IEC 68-2-6
Mechanical Shock	Per IEC 68-2-27
Weatherproofing	IP50 (Module)
Temperature Resistance	The flexible sensor can withstand a temperature of 194 °F (90 °C) and is resistant to oil and Aliphatic hydrocarbons
ENVIRONMENTAL	
Operating Temperature	14° to 131°F (-10° to +55°C)
Storage Temperature	-40° to 158°F (-40° to +70°C)
Influence of Temperature	Sensor: 14° to 212°F (-10° to 100°C): < 0.5% of Reading per 18°F (10°C) Module: 14 to 131°F (-10° to 55°C): < 0.5% of Reading per 18°F (10°C)
Relative Humidity	10 to 90% RH: 0.1% typical, 0.3% max
Altitude	Operating: 0 to 6562 ft. (0 to 2000m), working voltage derating above Non-operating: 0 to 39,000 ft. (0 to 12,000m)
SAFETY	
Double Insulation	Yes, per IEC 1010-2-32
CE Rated	Yes
Safety Rating	EN/IEC 61010-1 600 V CAT IV, 1000V CAT III, EN/IEC 61010-2-032:2002 CE
Pollution Level	2
Immunity and Emission	Industrial environment
Electromagnetic Compatibility	EN 61326-1

3.1 Typical Frequency Response Graphs

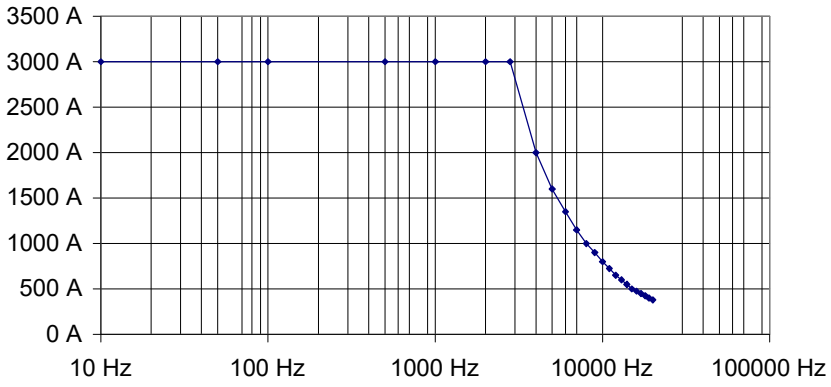
3.1.1 Amplitude Error



3.1.2 Phase Error



3.1.3 Frequency Limitation Versus Amplitude



CHAPTER 4

OPERATION

4.1 Compatibility

The MiniFlex® is compatible with any multimeter, AC voltmeter, or other voltage measuring instrument with an input impedance greater than 1MΩ. To achieve the best overall accuracy, use the MiniFlex® with an AC voltmeter having an accuracy of 0.75% or better.

4.2 Tips for Making Precise Measurements

When using the MiniFlex® with a meter, it is important to select the range that provides the best resolution. Failure to do this may result in measurement errors.

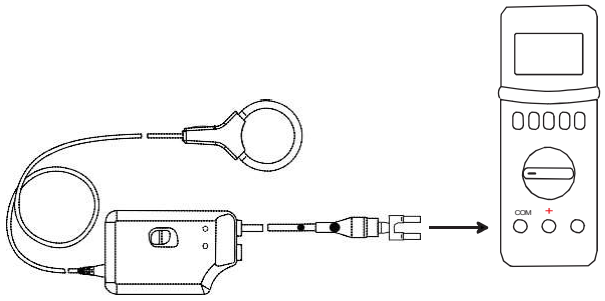
Make sure the DMM or measuring instrument can accurately measure mVAC. Certain inexpensive DMM have poor resolution and accuracy when measuring low mVAC.

For best accuracy, center the MiniFlex® around the conductor to be measured.

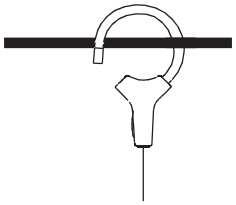
The overall measurement accuracy is the sum of the MiniFlex® accuracy and the displaying instrument accuracy.

4.3 Making Measurements

1. Connect the electronic module to the AC Volt range of a multimeter or measuring instrument. Select the highest range on the MiniFlex®.



2. Press the sensor's yellow opening device to open the flexible coil.
3. Wrap the coil around the conductor to be tested. If possible, within range, select the lowest range to obtain the best resolution.



4. Do not exceed specified current range for the output. Do not use on selected range if overload LED goes on.
5. Read the displayed value on the multimeter and divide it by the range selected (i.e. if reading = 2.59V with the 1mV/A output range, the current flowing through the probe is 2590mV = 2590A).
6. For best accuracy, carefully center the conductor inside the flexible core, and if possible, avoid being in the proximity of other conductors which may create noise and interference (particularly near the latch).
7. True RMS measurements are obtained when the MiniFlex® is connected to a True RMS meter. Note that the DC component is not measured.

CHAPTER 5

MAINTENANCE

5.1 Maintenance

⚠ Warning

- For maintenance use only specified replacement parts.
- To avoid electrical shock, do not attempt to perform any servicing unless you are qualified to do so.
- To avoid electrical shock and/or damage to the instrument, do not get water or other foreign agents into the case.
- Turn the instrument OFF and disconnect the unit from all the circuits before opening the case.

5.1.1 Battery Replacement

The battery must be replaced when the green indicator flashes or remains off when the instrument is switched on.

- Disconnect everything connected to the instrument and set the switch to OFF.
- Use a screwdriver to unscrew the two screws on the housing.
- Replace the old battery with a new one (9V alkaline or lithium battery of type 6LF22).
- Close the housing, making sure that it is completely and correctly closed, then screw both screws back in.

5.1.2 Cleaning

- It is important to keep the sensor latch mating surfaces clean to prevent foreign matter from entering the closing.
- The sensor may be gently cleaned with a soft cloth, soap and water. Dry immediately after cleaning. Avoid water penetration into the electronic module.
- Make sure the sensor, electronic module, and all leads are completely dry before any further use.

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).

(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.

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, mail, fax or e-mail our technical support team:

NOTE: Do not ship Instruments to our Foxborough, MA address.

Limited Warranty

The MiniFlex® is 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.

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.

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 recommend you insure your returned material.

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