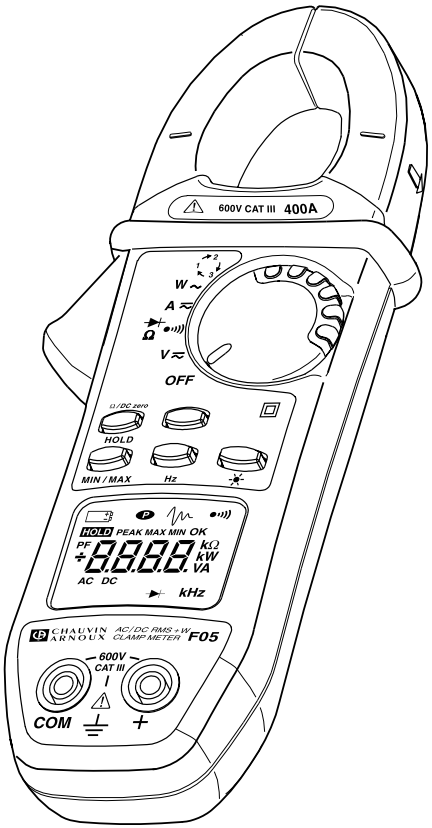
■ CLAMP-ON MULTIMETER

F05



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 **www.aemc.com**.

Serial #: _____

Catalog #: 2129.53

Model #: F05

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS

Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments
www.aemc.com

Table of Contents

INTRODUCTION

⚠ Warning ⚠

- Never use on circuits with a voltage higher than 600V and an overvoltage category higher than Cat. III.
- Use in inside environments with Pollution Degree 2; Temperature 0°C to +50°C; 70% RH.
- Only use accessories compliant with safety standards (NF EN 61010-2-031) 600V min and overvoltage Cat. III.
- Never open the clamp before disconnecting all power sources.
- Never connect to the circuit to be measured if the clamp is not properly closed.
- Before any measurement, check the proper positioning of the conductors and switch.
- When measuring current, check for proper alignment of the conductor in relation to the markers and proper closing of the jaws.
- Always disconnect the clamp from any power source before changing the battery.
- Do not perform resistance tests, continuity tests or semi-conductor tests on a circuit under power.

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 A current sensor. This symbol signifies that application around and removal from HAZARDOUS LIVE conductors is permitted.
	In conformity with WEEE 2002/96/EC

1.1 Definition of Measurement Categories

Cat. I: For measurements on circuits not directly connected to the AC supply wall outlet such as protected secondaries, signal level, and limited energy circuits.

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.

1.2 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.

1.3 Ordering Information

Clamp-on Multimeter Model F05 ..... **Cat. #2129.53**
Includes multimeter, set of red and black leads with probe tips and alligator clips, 9V battery, carrying pouch and this user manual.

1.3.1 Accessories and Replacement Parts

Replacement set of leads (PTL-31),
red and black with probe tips and alligator clips ..... **Cat. #2121.53**

Soft Carrying Pouch ..... **Cat. #2118.65**

Only use accessories adapted to the voltage and overvoltage category of the circuit to be measured (per NF EN 61010).

PRODUCT FEATURES

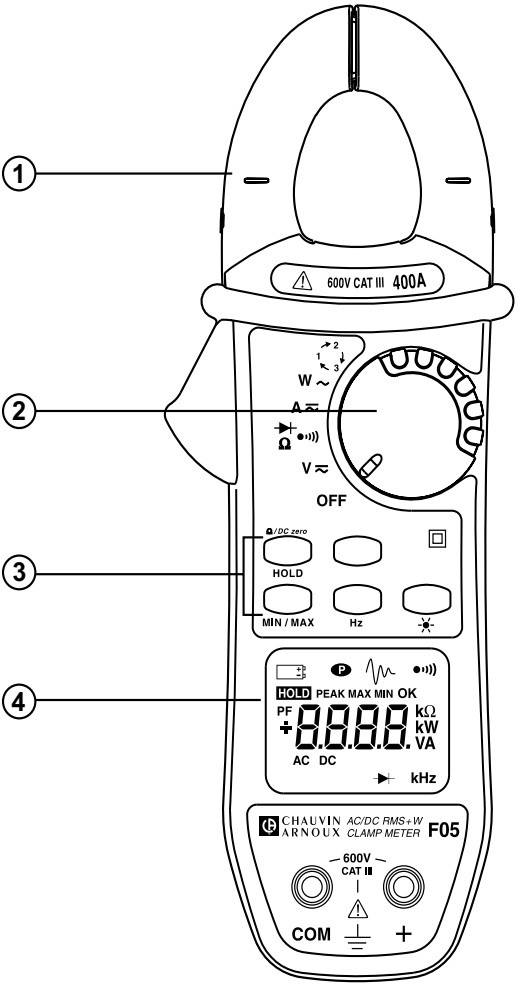
2.1 Description

The Clamp-on Multimeter Model F05 emphasizes reliability and simplicity of use to respond to the needs of power professionals.

Features:

- TRMS measurement
- A compact unit, integrating the current sensor for intensity measurements without breaking the test circuit
- Outstanding ergonomic features:
  - automatic selection of AC or DC measurement
  - automatic selection of measurement ranges
  - programmable audio voltage indication (V-Live)
  - "over-range" indication
  - backlighting of the digital display
  - power auto-off
  - MIN - MAX - PEAK value recording function
  - correction of differences in DC measurement (DC zero)
  - automatic compensation of measurement lead resistance (Ω zero)
- Compliance with IEC electrical safety standards and CE markings
- Light and rugged construction for field use
- "INRUSH" function, for measurement of motor starting currents
- Phase order indication function using "2-wire" technique - PFISTERER License - (instead of 3-wire) capable of determination through contact only, with no particular connections.

2.2 Model F05 Callouts



① Jaws

② 6-way Rotary Switch

③ Command Buttons

④ Liquid Crystal Display

2.3 Rotary Switch Functions

OFF Deactivation of the clamp, activation is ensured by selection of other functions

V ⎓ ≂ Measurement of DC and AC voltages (rms value)

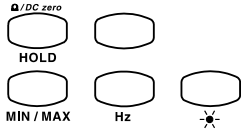
Ω •))) Continuity measurement. Resistance and semi-conductor measurements made by pressing the yellow button.

A ⎓ ≂ Measurement of DC and AC amperes (rms value)

W ∼ Measurement of active power in one phase and power factor

1 2 3 Selection of phase order indicator for 3-phase system with or without neutral

2.4 Command Buttons



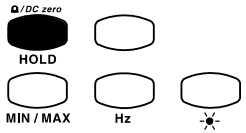
The buttons are capable of 3 types of action:

Short pressure: <1.3 s, valid if the button pressure is detected.

Long pressure: >1.3 s, gives access to a measurement or operating mode. Holding or releasing the button has no effect.

Held pressure: Gives access to a measurement or operating mode and remains in this mode as long as pressure is held. Releasing the button returns you to the previous mode.

2.5 Hold Button Primary Functions



2.5.1 Display Lock

Short-press the **HOLD** button to freeze/lock the display. Press again to unlock.

2.5.2 Preselecting Min/Max Mode

Short-press the **HOLD** button, then the **MIN/MAX** button to preselect the MIN/MAX mode. Press the **HOLD** button again to make the MIN/MAX mode effective.

(e.g. use this function to preselect the MIN/MAX mode to prevent unwanted or mistaken integration of MIN/MAX values.)

2.5.3 Automatic Compensation for Lead Resistance

Press the **HOLD** button when the continuity test (•ıı)) or measurement resistance function (Ω) is selected.

When the button is released and the display shows zero, the correction value is put into memory.

If the value measured is higher than 2Ω, this correction is stopped and the value in memory is reset to zero.

NOTE: This correction is prohibited in MIN/MAX mode.

2.5.4 Automatic Compensation of Current Measurement Zero

Press the **HOLD** button when the current measurement function (**A** ≂) is selected.

When the button is released and the display shows zero, the correction value is put into memory.

If the value measured is higher than 6A, this correction is stopped and the value in memory is reset to zero.

2.6 Hold Button Secondary Functions (with rotary switch)

2.6.1 Disable Auto-off Function

While pressing down the **HOLD** button, turn the rotary switch from the **OFF** position to the •ıı) position .

The unit emits a double beep, then the **P** symbol flashes.

The selected configuration is put into memory when the button is released (the **P** symbol remains lit continuously).

Automatic stop is reactivated when switch returns to **OFF** position.

2.6.2 Activate the V-Live Function

While pressing down the **HOLD** button, bring the rotary switch from the **OFF** position to the **V** ≂ position.

The unit emits a double beep, then the ***V*** and •ıı) symbol flashes.

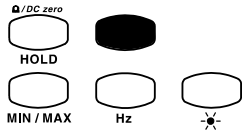
The selected configuration is put into memory when the button is released (the **V** symbol becomes fixed and the •ıı) symbol flashes).

Proceed in the same way to suppress the V-Live function (the •ıı) symbol disappears when the button is released).

2.6.3 Displaying the Internal Software Version

While pressing down the **HOLD** button, bring the rotary switch from the **OFF** position to the **A** position. The unit beeps, the software version is displayed in the form UX.XX for 2 seconds, then all the segments of the display are shown.

2.7 Yellow Button Primary Functions



2.7.1 Manual Selection of AC/DC Mode

By default, the clamp switches to AC or DC mode automatically (AC/DC symbol flashes) for the A and V functions. When the mode is manually selected, the AC/DC symbol is fixed.

Use a series of short presses on the **yellow button** to manually select AC/DC measurement, and to return to automatic mode.

NOTE: Manual selection is not possible in MIN/MAX or HOLD mode.

2.7.2 Selection of INRUSH Function

This is done in function A (AC) by first pressing on the **MIN/MAX** button, then on the **yellow button**.

Consultation of the values corresponding to this function is possible by pressing first on the **HOLD** button, then by short successive presses on the **yellow button**.

To quit this function, perform short presses on the MIN/MAX button.

2.7.3 Possible Selections in Continuity Function

By default, the clamp is in the continuity function (•)).

To select resistance measurement (Ω), semi-conductor test function (→|), and to return to the continuity function (•)), perform a series of short presses on the **yellow button**.

2.7.4 Power Factor Calculation

With the clamp configured in power measurement (switch on position W) and correctly connected (see § 4.7), perform a short press on the **yellow button** (the power factor is displayed).

2.7.5 Phase Order Indication Measurement

Turn rotary switch to the 1 2 3 position, and enter the function. Press the **yellow button** (rEF is displayed). The unit is ready to detect the reference period. (see § 4.10 for details).

2.8 Yellow Button Secondary Functions (with rotary switch)

2.8.1 Modification of Audio Indication Threshold in Continuity Test

While pressing down the **yellow button**, bring the rotary switch from the **OFF** position to the •ᐩ position.

The unit beeps, the Ω and •ᐩ symbols appear, along with the threshold value (40.0 by default).

Adjustment is then possible from 1Ω to 40Ω by pressing the **yellow button** (short pressure: progression of 1Ω by 1Ω; press and hold: progression of 10Ω by 10Ω).

Once the value is chosen, activate the rotary switch to memorize.

2.8.2 Default Configuration

While pressing down the **yellow button**, turn the rotary switch from the **OFF** position to **A** ≂ position.

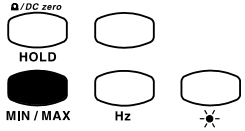
The unit emits a double beep, then all the segments of the digital display and the •ᐩ symbol flashes.

The default configuration is set when the button is released (the display no longer flashes and the •ᐩ symbol disappears).

The default configuration is:

- Audio identification threshold: 40Ω
- Auto-off: ON
- V-Live function: none

2.9 MIN/MAX Button Functions



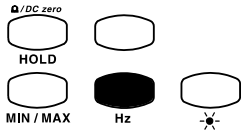
MIN/MAX operates by end-around shift on short pressure:

MIN/MAX	V and A Functions	Other functions
1st press	PEAK value	MAX value
2nd press	MAX value	MIN value
3rd press	MIN value	Return to MAX value
4th press	Return to PEAK value	–

At any time, a long press on the button will quit the MIN/MAX mode. If the INRUSH function was selected (see description § 4.6), a short pressure will return to MIN/MAX mode.

NOTE: In MIN/MAX mode, the Auto-off function of the unit is unavailable (Ⓟ).

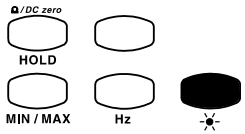
2.10 Hz Button



A short press displays the frequency of the measured signal, another press switches back to the previous value.

This button is active only for the AAC, VAC and W functions.

2.11 ☀ Button



Short pressure: Display backlight command. Auto-off after 2 minutes.

Held pressure: Display of estimated remaining battery power, in hours (except INRUSH and phase order functions).

2.12 Liquid Crystal Display

The liquid crystal display includes the digital display of the measured values, the related units and symbols.

2.12.1 Digital Display

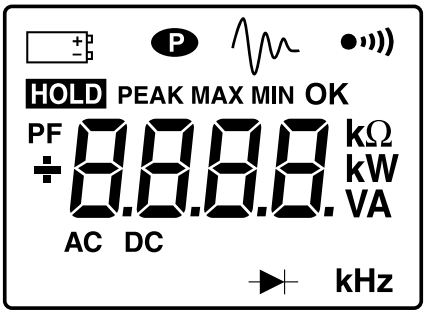
4 digits, 9999 counts, 3 decimal points, + and - signs (DC and peak measurement)

+ OL : Positive value range exceedance (>3999cts)

- OL : Negative value range exceedance

OL : Unsigned value range exceedance

- - - - : Indeterminate value (middle segments)



2.12.2 Symbol Display

Flashing: power limited to approximately 1 hour
Steady: battery drained, operation and accuracy are no longer guaranteed

Constant operation (no automatic shutdown)

ON steady when the INRUSH function is selected

Fixed: Continuity measurement
Flashing: V-Live function selected

HOLD Function active

PEAK ON in V and A in MIN/MAX mode if the measurement of the peak value is selected

MAX	Indicates the display of a maximum value in MIN/MAX mode
MIN	Indicates the display of a minimum value in MIN/MAX mode
OK	Appears during the phase rotation direction detection sequence
PF	Appears for switch position **W**, if power factor display is selected (yellow button)
AC	**Fixed:** measurement in AC manual mode **Flashing:** measurement in AC automatic mode
DC	**Fixed:** measurement in DC manual mode **Flashing:** measurement in DC automatic mode
	Semi-conductor test on position Ω

2.13 Buzzer

Different tones are emitted according to the function given to the buzzer:

- **Short and medium sound:** valid button
- **Short and high-pitched sound:** prohibited button
- **Short and low sound:** quit MIN/MAX mode
- **2 short and high-pitched beeps:** validation of a configuration parameter
- **Short and medium sound every 400 ms:** voltage measured higher than the unit's guaranteed safety voltage
- **5 short and medium recurring beeps:** automatic deactivation of the instrument
- **Short and medium sound:** measured continuity value lower than programmed threshold, short-circuit junction during semi-conductor test
- **Modulated medium continuous sound:** value measured in volts, higher than 45V peak when the V-Live function is selected

SPECIFICATIONS

3.1 Reference Conditions

23°C ±3°K; RH of 45 to 75%; battery power at 8.5V ± 5V; frequency range of applied AC signal 45 to 65Hz; position of conductor centered in clamp jaws; conductor diameter .20"; no electrical field; no external AC magnetic field.

3.2 Electrical Specifications

3.2.1 Voltage (V)

Range	40V	400V	600V*
Measuring Range**	0.2V to 39.99V	40.0V to 399.9V	400 to 600V 400 to 900V peak
Accuracy	1% of Reading + 5cts	1% of Reading + 2cts	1% of Reading + 2cts
Resolution	10mV	0.1V	1V
Input Impedance	1MΩ		
Overload Protection	600V$_{AC/DC}$		

In DC, the display indicates **+OL above +600V and **-OL** above -600 V (900 V in PEAK mode). In AC, the display indicates **OL** over 600Vrms (900V in PEAK mode).*

***In AC if the value of the voltage measured is <0.15V the display indicates **0.00**.*

MIN/MAX Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 100 ms typical

PEAK Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 500 µs typical (2.5 ms max)

Detection Threshold Accuracy (V-Live Mode):
45V peak ± 2V

3.2.2 Continuity (•ıı))

Range	400Ω
Measuring Range	0.0 to 399.9Ω
Accuracy*	1% of Reading + 2cts
Resolution	0.1Ω
Open Circuit Voltage	≤3.2V
Measuring Current	320μA
Overload Protection	500VAC or 750VDC or peak

**with compensation for measurement cable resistance*

MIN/MAX Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 100 ms typical

3.2.3 Resistance (Ω)

Range	400Ω	4000Ω	40kΩ
Measuring Range	0.0 to 399.9Ω	400 to 3999Ω	4.00kΩ to 39.99kΩ
Accuracy*	1% of Reading + 2cts		
Resolution	0.1Ω	1Ω	10Ω
Open Circuit Voltage	≤3.2V		
Measuring Current	320μA	40μA	
Overload Protection	500VAC or 750VDC or peak		

**With compensation for measurement cable resistance*

MIN/MAX Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 100 ms typical

3.2.4 Semi-Conductor Test (→|←)

Display Range	4V
Measuring Range	0 to 3.199V
Accuracy	1% of Reading + 2cts
Resolution	1mV
Measuring Current*	2mA to 4mA
Overload Protection	500VAC or 750VDC or peak

**Per the voltage measured*

MIN/MAX Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 100 ms typical

3.2.5 Current (A ≂)

Display Range	40A	400A	600A*
Measuring Range**	0.20 to 39.99A	40.0 to 399.9A	400 to 600A peak
Accuracy***	1.5% of Reading + 10cts	1.5% of Reading + 2cts	
Resolution	10mA	100mA	1A

In DC, the display indicates **+OL above +400A and **-OL** above -400A (600A in PEAK mode). In AC, the display indicates **OL** over 400Arms (900V in PEAK mode).*

***In AC, if the value of the current measured is <0.15A, the display shows **0.00**.*

****With correction of zero in DC*

MIN/MAX Mode:
Accuracy: same as previous table +0.2% of Reading
Capture Time: 100 ms typical

PEAK Mode:
Accuracy: same as previous table +0.2% of Reading + 0.5A
Capture Time: 500 µs typical (2.5 ms max)

3.2.6 INRUSH Function

Range for Use: ≥5A peak for the first period of the signal

Accuracy: 5% + 0.5A

Capture Time: 10 periods of the signal frequency (200 ms at 50Hz)

3.2.7 Power (W)

Display Range	4000W	40kW	400kW
Measuring range**	5 to 3999W	4.00kW to 39.99kW	40.0kW to 240.0kW*
Accuracy***	2% of Reading + 1ct		
Resolution	1W	10W	100W

The scale is limited to 240kW in one-phase (600V x 400A). Above this value, the display indicates **+OL or **-OL** depending on the sign of the power.*

***If the power value is <5W or if the voltage or current values are respectively <0.15V or < 0.15A, **0** is displayed.*

***The measurement accuracy is affected by an instability linked to current measurement of approx 0.1A
Example:
For a power measurement performed at 10A, the instability of the measurement will be 0.1A/10A, or 1%.

MIN/MAX Mode:
Accuracy: same as previous table +0.3% of Reading
Capture Time: 100 ms typical (every 400 ms)

3.2.8 Power Factor Calculation (PF)

Display range	1.00	
Measuring range*	0.20 to 0.49	0.50 to 1.00
Accuracy	5% of Reading + 2cts	2% of Reading + 2cts
Resolution	0.01	

**The display of the power factor is limited to 1.00*
*If one of the terms of the power factor calculation is outside its power range, the display of the power factor indicates an indeterminate value "**- - - -**".*

MIN/MAX Mode:
Accuracy: same as previous table +1ct
Capture Time: 100 ms typical (every 400 ms)

3.2.9 Frequency (Hz)

Display range	40Hz	400Hz	4000Hz	40kHz
Measuring Range*	10.00 to 39.99Hz	40.0 to 399.9Hz	400 to 3999Hz	4.00 to 19.99kHz
Accuracy	0.4% of Reading + 1ct			
Resolution	0.01Hz	0.1Hz	1Hz	10Hz
Triggering threshold**	5V or 10A			

Below 5 Hz, the display shows **0.0*

***Below the triggering threshold, the display shows an indeterminate value (**- - - -**).*

MIN/MAX Mode:
Accuracy: same as above +0.2% of Reading with limitation to 5kHz
Capture Time: 125 ms typical (every 400 ms)

3.2.10 Phase Order Indication ()

Special Reference Condition:
3-phase and sinusoidal network with 50 or 60Hz stable frequency

Frequency Range: 47 to 53Hz or 57 to 63Hz

Acceptable Voltage Range: 50V to 600V

Acceptable Phase Imbalance Rate: ±10°

Acceptable Amplitude Imbalance Rate: 20%

Acceptable Voltage Harmonic Distortion: 10%

3.2.11 Power Supply

Battery: Standard 9V alkaline (type IEC 6LF22, 6LR61 or NEDA 1604)

Charge life: 60 h or 20,000 x 10 s measurements

Low Battery indicator:

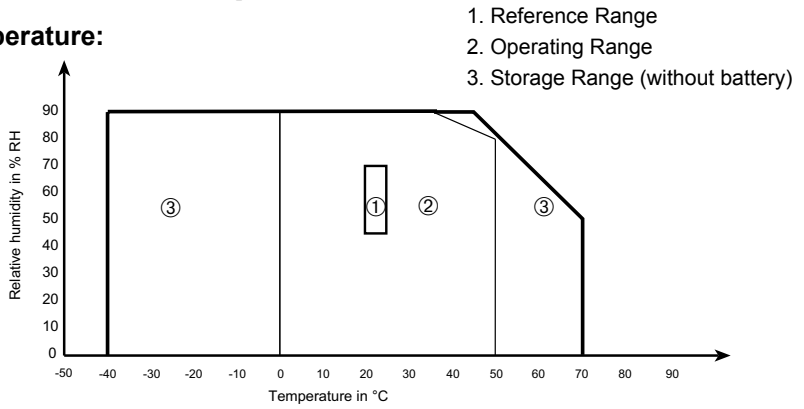
Flashing: Charge life < 1 h

Fixed: Change battery

Auto-off: 10 minutes with no action on the rotary switch or the buttons

3.3 Mechanical Specifications

Temperature:



Operating Temperature: 32 to 122°F (0 to 50°C); 90% RH

Storage Temperature: -40 to 158°F (-40 to 70°C); 90% RH

Altitude:
Operation: ≤2000m
Storage: ≤12,000m

Dimensions: 2.76 x 7.6 x 1.46" (70 x 193 x 37mm)

Weight: 9.17 oz (260g)

Clamp Tightening Capacity: ≤1.00” (≤26mm)

3.4 Safety Specifications

Electrical Safety
(as per EN 61010-1 ed. 95 and 61010-2-032, ed. 93)

- Dual Insulation ⧈
- Category III
- Pollution Degree 2
- Rated Voltage 600V (RMS or DC)

Electric Shocks
(test as per IEC 1000-4-5)

- 6kV in RCD mode on the voltmeter function, aptitude criterion B
- 2kV induced on the current measurement cable, aptitude criterion B

Electromagnetic Compatibility
(as per EN 61326-1 ed. 97 + A1)

Emission: class B

Immunity:

- Electrostatic discharges:
  4kV on contact, aptitude criterion B
  8kV in the air, aptitude criterion B
- Radiated field: 10V/m, aptitude criterion B
- Fast Transients: 1kV, aptitude criterion B
- Conduit interference: 3V/m, aptitude criterion A

Mechanical Resistance

- Free fall 1m *(test as per IEC 68-2-32)*
- Impacts: 0.5 J *(test as per IEC 68-2-27)*
- Vibrations: 0.75mm *(test as per IEC 68-2-6)*

Auto Power OFF *(per UL94)*

- Housing V0; Jaws V0; Display window V2

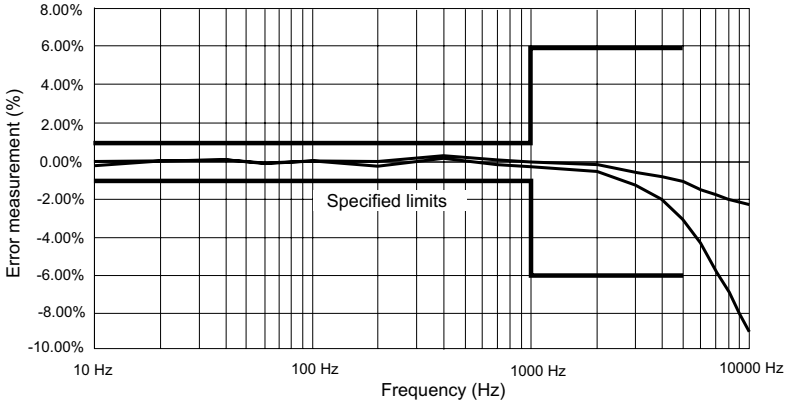
3.5 Variations in Operating Range

Quantity Quantities	Meas. Range Quantities	Quantity Influenced	Influence Typical	Influence Max
Battery Voltage	7.5 to 10V	All	<1ct	0.2% R + 1ct
Temperature	32 to 122°F	V A Ω →||- W PF Hz	0.05% R/50°F 0.3% R/50°F 0.1% R/50°F 0.25% R/50°F <1ct 0.03% R/50°F	0.2% R/50°F + 2cts 0.5% R/50°F + 2cts 0.2% R/50°F + 2cts 0.5% R/50°F + 2cts 2cts 0.1% R/50°F + 2cts
Relative Humidity	10 to 90% RH	V A Ω →||- W PF Hz	≤1ct 0.2% R 0.2% R 0.25% R <1ct 0.25% R	0.1% R + 1ct 0.3% R + 2cts 0.3% R + 2cts 0.5% R +2cts 1ct 0.5% R + 2cts
Frequency	10Hz to 1kHz 1kHz to 5kHz 10Hz to 50Hz 250Hz to 2.5kHz	V A	see curve see curve	1% R + 1ct 6% R + 1ct 1.5% R + 1ct 6% R + 1ct
Position of conductor in the jaws (f ≤ 400Hz)	Position on perimeter internal jaws	A W	0.7% R	1% R + 1ct
Retentivity	0 to 600 peak	A	2mA/A	3mA/A
Adjacent conductor crossed by a current 400A$_{DC}$ or rms	Conductor in contact with external perimeter jaws	A W	45 dB	40 dB
Conductor clamped by the clamp	0 to 400A$_{DC}$ or Trms	V	<1ct	1ct
Application of a voltage on the clamp	0 to 600V$_{DC}$ or Trms	A	<1ct	1ct
Peak factor*	1.4 to 3.5 limited to 600A peak 900V peak	A$_{AC}$ V$_{AC}$	1% R 1% R	3% R + 1ct 3% R + 1ct
PF (inductive and capacitive)	0.7 and I ≥5A 0.5 and I ≥10A 0.2 and I ≥20A	W	0.5% R	1% R + 1ct 3% R + 1ct 8% R + 1ct
Rejection of serial mode in DC	0 to 600V/50Hz 0 to 400A/50Hz	V$_{DC}$ A$_{DC}$	50 dB 40 dB	45 dB 35 dB
Rejection of serial mode in AC	0 to 600V$_{DC}$ 0 to 400A$_{DC}$	V$_{AC}$ W / PF A$_{AC}$ W / PF	>60 dB >50 dB	50 dB 40 dB
Rejection of common mode	0 to 600V/50Hz	V A W	<1ct 0.07A/100V <1ct	60 dB 0.1A/100V 60 dB
Influence of external magnetic field	0 to 400A/m (50Hz)	A W	70 dB	60 dB
Number of moves opening of jaws	50000	A W	0.3% R	1% + 1ct

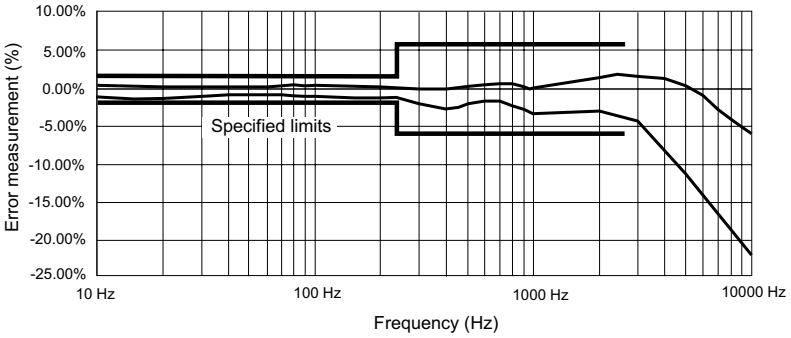
**The influence on quantities W and PF is identical to that on the current assuming sinusoidal voltage*

3.6 Typical Frequency Response Curves

- V f (f)



- I f (f)



OPERATION

4.1 Voltage Measurement - (V ≂)

1. Connect the measurement leads to the instrument's terminals, complying with the polarities indicated: red lead on the "+" terminal and black lead on the "COM" terminal.
2. Set the rotary switch to the "**V ≂**" position.
3. Connect the unit to the voltage source to be measured, making sure that the voltage does not exceed the maximum acceptable limits (see § 3.2.1).
   - Range switching and AC/DC selection are automatic
   - Short-press the **yellow button** to manually select AC/DC

⚠ **If the signal measured is >45V peak**, the audio indication is activated if the V-Live function is selected *(see § 2.6.2)*.

⚠ **For voltages ≥600VDC or Trms**, a repetitive beep of the buzzer indicates that the measured voltage is higher than the acceptable safety voltage **(OL)**.

4.2 Audio Continuity Test - (•))))

1. Connect the measurement conductors to the terminals.
2. Set the rotary switch to the " Ω •)))) " position.
3. Connect the unit to the circuit to be tested. The buzzer is continuously active as soon as contact is established (circuit closed) and if the resistance value measured is lower than the threshold value chosen by the programming (adjustable from 1 to 40Ω,).

NOTE: Above 400Ω, the display indicates ***OL***.

4.2.1 Lead Resistance Compensation (Ω zero)

To measure low resistance values, measure the lead resistance first.

- Short-circuit the leads
- Press down the **HOLD** button until zero appears on the display
- The lead resistance value will then be saved and subtracted from the value of the resistance measured later

⚠ **If the value measured is higher than 2Ω, this correction is stopped and the saved correction value is reset to zero.**

4.3 Resistance Measurement - (Ω)

1. Connect the measurement conductors to the terminals.
2. Set the rotary switch to the " Ω •ıı)) " position and **press once** on the **yellow button** (the •ıı)) symbol disappears).
3. Connect the unit to the resistance to be tested.
   - Range selection is automatic
   - To measure low resistance with accuracy, compensate the lead measurement resistance *(see § 4.2.1)*

NOTE: Above 400Ω, the display indicates ***OL***.

4.4 Semi-Conductor Test - (→|)

1. Connect the measurement leads to the terminals, complying with the polarities indicated: red lead on the "**+**" terminal and black lead on the "**COM**" terminal.
2. Set the rotary switch to the " Ω •ıı)) " position and **press twice** on the **yellow button**: The →| symbol is displayed.
3. Connect the unit to the semi-conductor (junction) to be tested.
   - The measurement current moves from the "**+**" terminals to the "**COM**" terminal. It corresponds to the direct testing of the semi-conductor junction.

- **Short-circuit junction:** audio indication for a threshold <0.050V
- **Cut or reversed junction** (or threshold >3.2V): ***OL*** displayed

4.5 Current Measurements - (A ≂)

1. Set the rotary switch to the **"A ≂"** position.
2. Clamp around the conductor carrying the current to be measured, checking for proper closing of the jaws and for foreign matter in the gap.

   For DC, the "⇨" arrow engraved on the jaws must be directed in the direction of current circulation for the sign of the displayed value to be significant.

   - Range switching and AC/DC selection are automatic
   - Short-press the **yellow button** to manually select AC/DC or AC + DC

4.5.1 Correction of the Current Measurement Zero (DC Zero)

To measure current with a low value, perform a zero correction first.

- Press down the **HOLD** button until zero appears on the display
- The corrected value will then be saved and subtracted from the value of the current measured later

⚠ **This correction is performed only on the DC component of the zero. If the value measured is higher than 6A, this correction is stopped and the saved correction value is reset to zero.**

4.6 INRUSH Function

This function is used to follow quick changes in the current, such as a damped sinusoidal quantity, by measuring the successive rms values calculated on ½, 1, 2½, 5 and 10 periods from the largest rms value computed and updated on ½ period.

The applications are:

- Measurement of motor start-up currents
- Correct definition of fuses and circuit breakers (signal amplitude-time relationship)
- Stress on components by current overload

The field of application is limited to industrial frequencies (15Hz to 70Hz)

4.6.1 Implementation

This function is accessible in AC current measurement only, after selection of the MIN/MAX mode.

Action	Display	Comments
Press the yellow button	0.5 P then the value for rms corresponding ***out F***	Enter the function Signal frequency <15 Hz or >70 Hz
Press on HOLD button, then press successively the yellow button	1P-2, 5P-5P-10P-0, 5P ↑ with each time the rms value corresponding alternately	Consultation of values rms (computed of consecutive periods)
Short pressure on the MIN/MAX key	Return to values MIN, MAX or PEAK	Exit from the function, return to MIN/MAX mode

4.7 Power Measurement - (W)

1. Connect the measurement leads to the terminals, complying with the polarities indicated: red lead on the "**+**" terminal and black lead on the "**COM**" terminal.
2. Set the rotary switch to position "**W**".
3. Connect the clamp on the system selected, for power measurement, complying with the following instructions:
   - Connect the measurement leads for voltage measurement (red lead on phase, black lead on neutral).
   - Clamp the conductor carrying the current to be measured (check for proper closing of the jaws and for foreign matters in the gap).

The " ⇨ " arrow on the jaws, must be directed in the direction of power circulation from the source to the load. In which case:

- the "**+**" sign corresponds to **power consumed** by the load.
- the "**-**" sign corresponds to **power supplied** by the load.

Specific reference conditions: PF = 1; $I \geq 2A$; $U \geq 10V$

4.8 Power Factor Calculation - (PF)

With the clamp configured in power measurement (switch on position W) and correctly connected (see § 4.7), perform a short press on the **yellow button** (the power factor is displayed).

The power factor is, by definition, an unsigned quantity, however, a sign is displayed showing whether the charge is inductive ("+" sign) or capacitive ("-" sign). This sign is significant only in the case of slightly distorted signals (e.g. 3 switches to zero over 1 period).

4.9 Frequency Measurement - (Hz)

This function is active for measurements V, A, W in AC.

For the power function, the frequency measurement is performed on the voltage signal.

1. Short-press the Hz key. The display shows the frequency of the measured signal.
2. Press again to return to the previously displayed measurement.

4.10 Phase Order Indication - ()

This measurement is performed with 2 conductors, sequentially as follows:

1. Integration of a “reference” period on one phase L1-L2, for example.
2. Integration of a “reference” period on one phase L1-L3.
3. Calculation of the time delay between “reference” and “measurement” periods, enabling determination of the phase order or phase rotation direction.

Special reference condition: 3-phase and sinusoidal network with 50Hz or 60Hz stable frequency

Note 1:
In the following table, display of the symbol “ rdY ” refers systematically to the beginning of sequence.

Note 2:
The sequence of the following table is described using:
- L1 on terminal “COM”
- L2 then L3 on terminal “+”

The same result is obtained if:
- L2 on terminal “COM” , L3 then L1 on terminal “+”

or:
- L3 on terminal “COM” , L1 then L2 on terminal “+”

Note 3:
The measurement principle is based upon certain frequency stability and practically sinusoidal signals (THD < 10%).
This excludes in particular measurement on power generators whose spin stabilization system is too weak to ensure adequate frequency stability.

Action	Display	Comments
Switch on the position 		Enter the function
Press the yellow key	rEF	The unit is ready to detect the reference period
Cable connected black on L1 and contact displays red cable on L2	***Err V*** (2 s) then rdy ***Err V*** (2 s) then rdy ***rEF OK***	after 10 seconds maximum result is one of the following opposite: → if voltage <50V → if nominal freq. ≠ 50Hz or 60Hz → if reference period correct
Red cable contact on L3 (less than 10 seconds after leaving L2)	rdy MEAS ***Err V*** (2 s) then rdy ***Err V*** (2 s) then rdy ***Err*** ***1.2.3*** ***3.2.1***	The unit determines the period measurement, the following messages may be displayed (after 10 s max): → determination of period for measurement in progress → contact on L3 a was performed too late (more than 10 s after display *rEF OK*) → voltage incorrect → frequency incorrect → determination of phase direction impossible → direct direction of phase rotation → reverse direction of phase rotation
Press yellow key	rdy	Return to beginning of sequence (valid at all times in the sequence)

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 Changing the Battery

⚠ **Disconnect the instrument from any source of electricity.**

1. Set the switch to OFF.
2. Slide a screwdriver into the slot at the top of the battery cover (rear of the clamp) and push the battery cover forward.
3. Replace the used battery with a 9V battery (type LF22), observing the polarities.
4. Install the battery in its housing, then reattach the battery cover.

5.2 Cleaning

⚠ **Disconnect the instrument from any source of electricity.**

- Use a soft cloth lightly dampened with soapy water.
- Rinse with a damp cloth and then dry with a dry cloth.
- Do not splash water directly on the clamp.
- Do not use alcohol, solvents or hydrocarbons.
- Make sure the gap between the jaws is kept clean and free from debris at all times, to help ensure accurate readings.

5.3 Storage

If the instrument is not used for a period of more than 60 days, remove the battery and store it separately.

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: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(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:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
200 Foxborough Boulevard
Foxborough, MA 02035 USA
Phone: (800) 343-1391
(508) 698-2115
Fax: (508) 698-2118
E-mail: techsupport@aemc.com
www.aemc.com

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

Limited Warranty

The Model F05 is warranted to the owner for a period of one year 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.

For full and detailed warranty coverage, please read the Warranty Coverage Information, which is attached to the Warranty Registration Card (if enclosed) or is available at www.aemc.com. Please keep the Warranty Coverage Information with your records.

What AEMC® Instruments will do:

If a malfunction occurs within the one-year 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.

REGISTER ONLINE AT:
www.aemc.com

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: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

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.

Notes:

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Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA • Phone: (603) 749-6434 • Fax: (603) 742-2346
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