

Clamp-On Harmonic Meter

Model 725

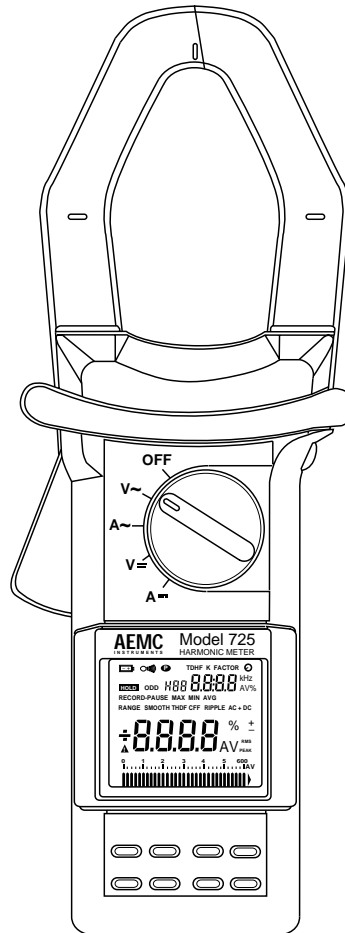
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Features

- Designed for traditional and nonlinear loads
- Simple clamp-on operation with power quality functions
- Accurate TRMS amps or volts (AC or AC + DC)
- Accurate DC measurements (A or V)
- Recording mode, min, max, avg, max peak
- Direct reading of %THD, %DF, CF, and Peak (+ or -)
- Individual harmonic orders 1-25th A or V
- Smooth function for stable readings
- Auto or manual ranging
- Peak measurements (AC or DC) (+ or -)
- K factor for proper transformer sizing
- Percent ripple for DC
- Transformer Harmonic Derating Factor (THDF)
- Auto-off feature
- 31-segment analog bar graph
- Low battery indicator
- Battery voltage level check
- Rugged Lexan® construction
- Audible control/warning indications
- Built to UL®, CSA, IEC 1010 safety standards
- Triple display



APPLICATIONS

- True RMS and DC voltage and current values
- Determine levels of voltage and current distortion
- Identify harmonic distortion patterns and sources of voltage harmonics
- Locate sources of harmonic current
- Measure individual harmonics
- Identify nonlinear loads
- Prevent overheating in electrical distribution equipment, false circuit breaker tripping, power factor correction capacitor failure
- Derate transformers and generators to prevent overheating
- Measure crest factor to evaluate harmonic content and determine CBEMA derating factor

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Description

DESCRIPTION

The Clamp-On Harmonic Meter Model 725 is a portable, battery operated power quality instrument. The Model 725 combines the simplicity and familiarity of digital clamp-ons with today's critical information on power quality and harmonics. Operation is simple and direct. Select Amps/Volts, AC or DC on the rotary dial, connect, and measure. The push of a button gives additional or more specific information. You can trouble shoot and measure power quality and harmonics with the ease of using a digital clamp-on, simply, safely, and economically.

The Model 725 performs current and voltage measurements in True RMS as well as current and voltage in DC, and provides immediate readings of Total Harmonic Distortion (%THD), Individual Harmonic order Hdc and 1st through the 25th, Distortion Factor (%DF), Crest Factor (CF) and Peak of distorted currents and complex voltages. It also gives the Min, Max, and Average measurement values so you can record for over 24 hours with an internal clock logging record time. Frequency (Hz) can be measured through either the current or the voltage at any time for the fundamental as well as the individual harmonic orders.

The Model 725 incorporates True RMS electronics and Hall effect technology to ensure accurate readings on distorted waveforms. The Model 725 uses two balanced Hall sensors to measure current. The voltage and current inputs are filtered, amplified, and sampled by a 12-bit analog-to-digital converter. A 16-bit microprocessor assures all calculations, including an FFT, and recordings. An 8-bit microprocessor assures the management of the measurement functions, the LCD and the EEPROM memory configuration.

The user may select Auto Ranging or Manual Ranging, AC or DC + AC measurements, and even/odd or odd only individual harmonics. The Model 725 also provides percent Ripple for DC measurements, Crest Factor for half cycle peaks, Transformer Harmonic Derating Factor (THDF) and K-Factor. The Smooth function provides a 3-second measurement

average for stable readings, and Hold locks a reading on the display.

The combination digital/analog display gives measurements on a large 4-digit, 10,000 display, with a 31-segment bar graph to indicate trends and surges. During harmonics measurements, the primary/secondary display format allows dual monitoring of measured values. Other features include Auto Off to conserve battery power, low battery indicator, battery voltage test for current battery status, and a beeper for verification of control and MIN/MAX capture.

Beyond the absolute product ruggedness and overall design qualities, the Model 725 is built with GE Lexan® and meets specific physical standards. The Model 725 also meets or exceeds UL® 1244 safety standards as well as IEC 1010-1 Category III for 600 V ratings.

The Model 725 is comfortable to hold, compact and easy to maneuver in a crowded breaker panel or transformer. Yet the hooked jaw design facilitates clamping and accommodates two 500 MCM conductors.

The high sensitivity Model 725 features another uncommon advantage by measuring low input levels (300 mA and 50 mV), permitting power quality measurements on low power or idling equipment.

OPERATIONS & FUNCTIONS

CURRENT & VOLTAGE

The Model 725 performs current and voltage measurements in True RMS as well as current and voltage in DC. Voltage and current measurements may be displayed as AC only or as AC + DC, indicating that the measurement includes the DC component. Significant amounts of DC current in any distribution system can shorten the lives of transformers, motors and switch mode power supplies. DC is also useful for UPS battery measurements and DC motor drive currents. During DC measurements, the Model 725 can be used to display the percentage of AC ripple in a DC signal.

HARMONIC DISTORTION

Pressing the HARM push button in AC volts or AC amps accesses a range of

harmonics information. The 725 will display the amplitude or frequency of individual harmonics, the percentage of each referenced to the fundamental or to the total RMS, as well as %THD (total harmonics referenced to the fundamental) and %DF (total harmonics referenced to total RMS). These parameters permit identification of harmonic sources and their magnitude.

The Model 725 may be set up to display both odd and even harmonics, which normally cause the greatest concern in electrical distribution systems. The bar graph simultaneously displays the True RMS signal value in real time to indicate sudden variations. During harmonics measurements, the dual screen mode simultaneously indicates harmonics information and rotary switch selection on separate screens.

TRANSFORMER EVALUATION

Crest Factor: Crest factor measurements, which can be performed on amps or volts AC, may be used to evaluate harmonic content. Measure the output voltage waveform of your UPS to verify that no "flat-topping" of the waveform is occurring ($CF < 1.414$).

K Factor: K Factor information may be accessed in the harmonic mode while measuring AC current. The K factor is essentially an index of a transformer's ability to handle nonlinear load current without overheating. Applying a K factor rated transformer helps ensure that dangerous heating or transformer failure will not result due to load currents rich in harmonic content. The K Factor may also be used to verify that a currently installed K Factor rated transformer is correctly loaded with nonlinear devices. A typical rating for a transformer supplying power with a variable speed drive is K-4. Typically, a K-20 is required on main-frame computer loads.

THDF: THDF, or transformer Harmonic Derating Factor, is accessed through the AC current range. THDF is a method of calculating transformer derating established by the Computer and Business Equipment Manufacturers Association (CBEMA) for phase-to-neutral loads. THDF can be applied to electrical sys-

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Description (cont.) & Specifications

tems with high third harmonic current and high crest factor, and where large portions of the load are 10 ϕ switch-mode power supplies. THDF yields a value between) and 1. With a TRMS phase current of 75 A and a peak current of 180 A, the result would be 106 A divided by 180, or 0.58. This indicates that nameplate values should be derated to 0.58 of rated KVA.

FREQUENCY

Frequency (Hz) measurements can be made while measuring current or voltage. This helps detect harmonics by measuring the dominant frequency, and is useful for setting frequencies in generators, or measuring frequencies in vari-

able speed motor drives. In Harmonics mode, frequency measurements can be taken on individual harmonic orders.

PEAK/SMOOTH

Peak is a fast-responding function which measures the instantaneous (1 ms) peak values of the measured signal. Typical applications include measurement of starting or inrushing voltages or currents, half-cycle sags or surges, or even high speed circuit breaker trip points. MAX Peak may be recorded in the MIN/MAX record mode.

Smooth stabilizes fluctuating digital readings. In this mode, the Model 725 calculates and displays a 3-second average reading. Smooth can be used in V,

A, and Hz, and in all power quality functions (%THD, %DF, CF). It may also be used during recording mode. The bar graph display will not be affected, and will continue to display Arms or Vrms.

MIN/MAX RECORDING

MIN/MAX Recording simultaneously logs the MIN, MAX and the true running AVG (average) of the displayed digital value (A, V, %THD, %DF, CF, Hz) while measuring. The relative time function indicates elapsed time of the Record mode, as well as relative times of capture of MIN and MAX values. Each time a new MIN or MAX value is recorded, an audible signal is emitted, so the user can be informed of changes without constantly monitoring the display.

SPECIFICATIONS

ELECTRICAL

AC CURRENT (TRMS)

Input Range:

0.3 to 1000.0 Arms
 ± 0.5 to ± 1500.0 A peak

Basic Accuracy:

0.3 to 59.99 A: 2% R \pm 20 cts
60 to 1500 A peak: 2% R \pm 2 cts

Crest Factor: > 5 below 300 A**Frequency Range:**

0.5 Hz to 5 kHz

AC VOLTAGE (TRMS)

Input Range:

0.5 to 600 Vrms
 ± 0.05 to ± 1500 V peak

Basic Accuracy:

0.05 to 59.99 V: 1% R \pm 10 cts
60 to 1500 V peak: 1% R \pm 2 cts

Input Impedance: 1 M Ω **Frequency Range:**

0.5 Hz to 5 kHz

DC CURRENT

Operating Range:

± 0.10 to 1500.0 A

Measurement Range:

± 0.30 to ± 1500.0 A

Basic Accuracy: 2% R \pm 20 cts

DC VOLTAGE

Input Range:

± 0.05 to ± 600 V

Basic Accuracy:

0.05 to 59.99 V: 1% R \pm 10 cts
60 to 1500 V peak: 1% R \pm 2 cts

Input Impedance: 1 M Ω

TOTAL HARMONIC DISTORTION (%THD)

Range: 0.2% to 1000%**Resolution:** 0.1%**Basic Accuracy:** 5%R \pm 2 cts**Frequency Range:**

Fundamental 40 Hz to 70 Hz

Display:

Digital: %THD and True RMS (A or V)

Bar graph: True RMS (A or V)

Distortion Factor (%DF)**Range:** 0.2% to 100%**Resolution:** 0.1%**Minimum Input:**

10 V or 10 A

Basic Accuracy:

5% R \pm 2 cts

Frequency Range:

Fundamental 40 Hz to 70 Hz

Display:

Digital: %DF and True RMS (A or V)

Bar graph: True RMS (A or V)

INDIVIDUAL HARMONICS

Range: 0.2% to 300% (%THD or %DF)**Rank:** Hdc (DC component), H01 to H25**Resolution:** 0.1%**Accuracy:**

Distortion > 10% and rank < H13:

5% R \pm 2 cts

Distortion > 10% and rank > H13:

10% R \pm 2 cts

Distortion < 10% and rank > H13:

15% R \pm 2 cts

Distortion < 10% and rank > H13:

15% R \pm 2 cts

Frequency Range: Fundamental 40 Hz to 70 Hz. 25th order**Display:**

Digital: %THD and Individual Harmonic value (A or V)

Bar graph: True RMS (A or V)

TRANSFORMER HARMONIC

DERATING FACTOR (CBEMA THDF)

Range:

0.10 to 1.00

Resolution: 0.01**Basic Accuracy:**

2% R \pm 2 cts

Display:

Digital: THDF

Bar graph: Arms

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Specifications (cont.)

TRANSFORMER K-FACTOR RATING

Range: 1 to 30

Resolution: 0.1

Basic Accuracy:

1 to 10: 5% R \pm 2 cts

> 10: 10% R \pm 2 cts

Display:

Digital: % Ripple

Bar graph: DC (A or V)

Ripple

Range: .1% to 999.9%

Resolution: 0.1%

Basic Accuracy:

2 to 99.9%: 5% R \pm 10 cts

100 to 999.9%: 5% R \pm 2 cts

Display:

Digital: % Ripple

Bar graph: DC (A or V)

CREST FACTOR (CF)

Range: 1.00 to 10.00

Resolution: 0.01

Minimum Input: > 5 V or > 5 A

Accuracy (40 to 70 Hz):

1.00 to 3.50: 2% \pm 2 cts

3.51 to 5.99: 5% \pm 2 cts

6.0 to 10.0: 10% \pm 2 cts

Display:

Digital: CF

Bar graph: TRMS (A or V)

FREQUENCY (HZ)

Range: 0.5 Hz to 20,000 Hz

Minimum Input: 2 A or 2 V

Accuracy:

0.5 Hz to 999.9 Hz: 0.1% R \pm 2 cts

1000 Hz to 9999 Hz: 0.2% R \pm 2 cts

10 kHz to 20 kHz: 0.5% \pm 2 cts

Display:

Digital: Hz

Bar graph: DC (A or V) TRMS (A or V)

GENERAL SPECIFICATIONS

Battery: 4 x 1.5 V "AA" alkaline (NEDA 15A, IEC LR6)

Life: approx. 40 hrs. continuous use

Dimensions:

10.8 x 4 x 2" (275 x 103 x 52 mm)

Weight: 1.5 lbs (670 g)

Display: Quadriplexed LCD, dual digital display (10 mm, 5 mm), 4 digits 10,000 counts, 31-segment bar graph

Temperature:

Operating: 0 to 90% RH to + 40°C (75% RH @ + 55°C)

Storage: 0 to 95% RH

Material:

Case: Gray Lexan® 920A, UL 94 V2

Jaws: Red Lexan® 500R, 10% fiberglass, UL 94 VO

LCD lens: Crystal Lexan® 920A, UL 94 V1

Mechanical:

Envelope Protection: IEC 529: IP 40

Drop Test: IEC 1010: 1m

Vibration: IEC 68-2-6

Shocks: IEC 817

SAFETY

Protection Level:

Double insulation IEC 1010-1, 600 V Category III, Pollution degree 2

Working Voltage:

600 Vrms

Dielectric Test:

5.5 kV, 50/60 Hz, 1 minute

Overload Protection:

Voltage: 1.5 kV Peak permanent

Current: 1000 A AC (50/60 Hz) permanent

Agency Approvals: UL®, CSA, GS, VDE, CE pending

ELECTROMAGNETIC COMPATIBILITY

Electrostatic Discharge:

IEC 801-2: No influence: 4 kV class 2

Non-destructive: 15 kV class 4

RF:

IEC 801-3: No influence: 3 V/m class 2

Minor influence: 10 V/m class 3

Transients:

IEC 801-4: No influence: 2 kV class 4

Electric Shocks:

IEC 801-5: No influence: 6 kV class 3

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ORDERING INFORMATION

CATALOG NO.

Clamp-On Harmonic Meter Model 725 **Cat. #2111.39**
Includes clamp-on meter, batteries, two 5 ft (1.5 m) leads, two test probes, two grip probes, user manual and hard carrying case