KUSAM-MECO®

An ISO 9001:2008 Company

3 PHASE POWER CLAMP-ON METER (TRMS) WITH KWHR & TOTAL HARMONICS MEASUREMENT & PC INTERFACE

17 FUNCTIONS 26 RANGES

Model 2709

Transient Protection 6.5kV (1.2/50 S surge)

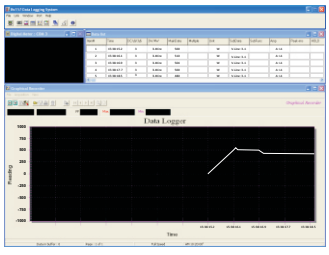
kWHr Reading Screen Display

SPECIAL FEATURES

- Selectable Power parameters of KW, KVAr & KVA with Total Power Factor in dual-display
- kWHr Recording
- AutoVA (Auto Selection on ACV, DCV or ACA functions)
- Total harmonic distortion THD% -F in dual-display
- Backlight display
- Display Hold
- PEAK-rms HOLD
- PC-Comm computer interface capabilities (optional)

GENERAL SPECIFICATIONS :

- ✷ **Sensing :** True RMS sensing
- ✷ **Jaw opening & Conductor diameter :** 45mm max
- ✷ **Display:** Voltage Function : 6000 counts LCD display
  Power, Ohm & Hz functions : 9999 counts LCD display
  ACA clamp-on function : 4000 counts LCD display
- ✷ **Update Rate :**
  Power function : 2 per second nominal
  Voltage, ACA clamp-on & Ohm functions : 2 per second nominal
  Hz function : 1 per second nominal
- ✷ **Polarity :** Automatic
- ✷ **Low Battery :** Below approx 2.4V
- ✷ **Operating Temperature :** 0°C to 40°C
- ✷ **Relative Humidity :** Maximum relative humidity 80% for temperature upto 31°C decreasing linearly to 50% relative humidity at 40°C
- ✷ **Altitude :** Operating below 2000m
- ✷ **Storage Temperature :** -20°C to 60°C, < 80% R.H. (With battery removed)
- ✷ **Temperature Coefficient :** nominal 0.15x (specified accuracy) / °C @ (0°C - 18°C or 28°C - 40°C), or otherwise specified
- ✷ **Power supply :** Standard 1.5V AAA Battery x 2.
- ✷ **Power Consumption :** Voltage, ACA, Hz & Power functions : 11mA typical
  Ohm function : 5.5mA typical
- ✷ **APO Timing :** Idle for 30 minutes
- ✷ **APO Consumption :** 4 A typical
- ✷ **Dimension :** 224(L) x 78(W) x 40(H) mm
- ✷ **Weight :** approx. 224 gms



PC Software Screen

Software CD

BA-1XX Cable | BUA-2303 USB to Serial Adapter | BC-100R USB port Cable

SAFETY :

- **Safety :** Meets IEC61010-2-032(2002), EN61010-2-032(2002), UL61010B-2-032(2003)
- **Measurement Category :** CAT III 600 Volts AC & DC
- **Transient Protection :** 6.5 kV (1.2/50 S surge)
- **Pollution degree :** 2
- **E. M. C. :** Meets EN61326(1997, 1998/A1), EN61000-4-2 (1995,2000/A2), and EN61000-4-3(2002)
  In an RF field of 3V/m :
  Total Accuracy = specified Accuracy + 50 digits
  Performance above 3V/m is not specified
- **Overload Protections :**
  ACA Clamp-on jaws : AC 1000A rms continuous
  + & COM terminals : 600 V DC / V AC rms

ACCESSORIES :

Test leads (pair), Batteries installed, User's Manual & Soft Carrying Case

OPTIONAL ACCESSORIES :

PC interface kit (including BA -1XX Cable, BUA-2303 USB to serial adapter, BC-100R USB port Cable & 2709 Software CD).

All Specifications are subject to change without prior notice

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ELECTRICAL SPECIFICATIONS : 2709

Accuracy is ± (% reading digits + number of digits) or otherwise specified at 23°C ± 5°C & less than 75% R.H.

True RMS ACV & ACA clamp-on accuracies are specified from 5% to 100% of range or otherwise specified. Maximum Crest Factorare as specified below, and with frequency spectrums, besides fundamentals, fall within the meter specified AC bandwidth for non-sinusoidal waveforms. Fundamentals are specified at 50Hz and 60Hz.

ACA CURRENT (Clamp-on)

Range	Resolution	Accuracy[1)2)]
50Hz / 60Hz		
40.00 A	0.01 A	±(1.0%rdg + 5dgts)
400.0 A	0.1 A	
1000 A	1 A	
45Hz ~ 500Hz		
40.00 A	0.01 A	±(2.0%rdg + 5dgts)
400.0 A	0.1 A	
1000 A	1 A	±(2.5%rdg + 5dgts)
500Hz ~ 3.1kHz		
40.00 A	0.01 A	±(2.5%rdg + 5dgts)
400.0 A	0.1 A	
1000 A	1 A	±(3.0%rdg + 5dgts)

ACV AutoVA™ Threshold : 1A AC (40Hz ~ 500Hz only) nominal
Crest Factor : < 2.5 :1 at full scale & < 5.0 :1 at half scale for 40.00A & 400.0A ranges
<1.4 : 1 at full scale & < 2.8 : 1 at half scale for 1000A range.

[1)] Induced error from adjacent current carrying conductor : < 0.06A/A

[2)] Specified accuracy is from 1% to 100% of range and for measurements made at the jaw center. When the conductor is not positioned at the jaw center, position errors introduced are:
Add 1% to specified accuracy for measurements made WITHIN jaw marking lines (away from jaw Opening)
Add 4% to specified accuracy for measurements made BEYOND jaw marking lines (toward jaws Opening)

SINGLE-PHASE & 3-PHASE BALANCED-LOAD POWER

Range	Accuracy [1) 2) 3)]		
0 ~ 600.0kVA	**F ~ 10th**	**11th ~ 45th**	**46th ~ 51st**
@ PF = 0.99 ~ 0.1	2.0%+6d	3.5%+6d	5.5%+6d

Range	Accuracy [1) 2) 4)]			
0~600.0kW/kVAR	**F~10th**	**11th~25th**	**26th~45th**	**46th~51st**
@ PF = 0.98~0.70	2.0%+6d	3.5%+6d	4.5%+6d	10%+6d
@ PF = 0.70~0.50	3.0%+6d			
@ PF = 0.50~0.30	4.5%+6d			
@ PF = 0.30~0.20	10%+6d			15%+6d

[1)] Specified accuracy is for ACA clamp measurement at the center of jaws. When the conductor is not positioned at the jaw center, position errors introduced are :
Add 1% to specified accuracy for ACA measurements made WITHIN jaw marking lines (away from jaw opening)
Accuracy is not specified for ACA measurement made BEYOND jaw Marking lines (toward jaws opening)

[2)] Add 4d to specified accuracy for 3-Phase Balanced-load Power measurements.

[3)] Add 1% to specified accuracy @ ACA fundamental <6A or ACV fundamental < 90V. Accuracy is not specified @ ACA fundamental < 1A or ACV Fundamental < 30V

[4)] Add 1% to specified accuracy @ ACA fundamental < 6A or ACV fundamental < 90V.
Accuracy is not specified @ ACA fundamental < 2A or ACV fundamental <50V

A-LAGS-V INDICATION :

LCD annunciator "A-lags-V" turns on to indicate an inductive circuit, or Current A lags Voltage V (i.e., Phase-shift angle is "+"). A-lags-V Indication is specified at 50 / 60Hz fundamental without the presence of harmonics, and at ACV > 90V, ACA > 9A and PF < 0.95

OHM

Range	Resolution	Accuracy
999.9	0.1	±(1.0%rdg + 6dgts)

Open Circuit Voltage : 0.4VDC typical

FREQUENCY

Range	Resolution
5Hz ~ 500Hz	0.01Hz ~ 0.1Hz

Accuracy : ± (0.5%rdg + 4dgts)
Sensitivity (Sine RMS)
40A range : > 4A
400A range : > 40A
1000A range: >400A
600V range : >30V

TOTAL POWER FACTOR (PF)

Range	Accuracy [1)]	
	F ~ 21st	**22nd~51st**
0.10 ~ 0.99	3d	5d

Specified accuracy @ ACA fundamental >2A; ACV fundamental > 50V

AUDIBLE CONTINUITY TESTER

Audible threshold :
between 10 and 300
Response time :
250 s

PEAK-rms HOLD (ACA & ACV only)

Response :	65 ms to >90%

KWHr (kilo-Watt-Hour Energy)

Time base accuracy : <30ppm
Non-volatile memory :
Separately stores one 3 - Phase -Balanced-load and one Single-Phase result.

THD%-F

Range	Harmonic order	Accuracy[1)]
0.0% ~ 50.0%	Fundamental	1.5% + 6d
	2nd ~ 3rd	7% + 6d
	4th ~ 21st	2.5% + 6d [2)3)]
	22nd ~ 51st	10% + 10d [4)]
50.0% ~ 100%	2nd ~ 3rd	Unspecified
	4th ~ 21st	2.5% + 6d [5)6)]
	22nd ~ 51st	10% + 10d [4)]
100% ~ 450%[7)]	2nd ~ 3rd	Unspecified
	4th ~ 21st	7% + 6d [2)4)]
	22nd ~ 51st	Unspecified

THD%-F is defined as :
(Total Harmonic RMS / Fundamental RMS) x 100%

[1)] Accuracy specified @ fundamental 70V & Total RMS 600V for ACV THD%-F, fundamental 6A & Total RMS 1000A for ACA THD%-F, and Crest Factors @ :
< 2.5 for 600V Range
< 2.5 for 40A Range
< 3.0 for 400A Range
< 1.6 for 1000A Range

[2)] Add 4d to specified accuracy @ 40A Range

[3)] Add 4.5% to specified accuracy @ 1000A range

[4)] Unspecified @ 1000A range

[5)] Add 1% + 4d to specified accuracy @40A Range

[6)] Add 4.5% to specified accuracy @ 400A ~ 750A; Unspecified @ > 750A

[7)] ~150% for 600V Range.

AC VOLTAGE

Range	Resolution	Accuracy
50Hz / 60Hz		
600.0V	0.1V	0.5% + 5d
45Hz ~ 500Hz		
600.0V	0.1V	1.5% + 5d
500Hz ~ 3.1kHz		
600.0V	0.1V	2.5% + 5d

CMRR : > 60dB @ DC to 60Hz, Rs=1k
Input Impedance : 2M , 30pF nominal
Crest Factor : < 2.3 : 1 at full scale & < 4.6 : 1 at half scale
ACV AutoVA™ Threshold : 30VAC (40Hz ~ 500Hz only) nominal

DC VOLTAGE

Range	Resolution	Accuracy
600.0V	0.1V	±0.5% + 5d

NMRR : >50dB @ 50 / 60Hz
CMRR : >120dB @ DC, 50/60Hz, Rs=1k
Input Impedance: 2M , 30pF nominal
DCV AutoVA™ Threshold : 2.4VDC nominal

3-PHASE UNBALANCED-LOAD POWER

This 3-Phase Unbalanced-Load Power measurement is achieved thru the calculation of discrete single - phase measurements that are taken one at a time manually. Since it is not real-time on all 3 phases simultaneously, it is intended only for stable power conditions without significant power fluctuations over the time of measurements. Result accuracy is hence the accumulated accuracy of the discrete single - phase measurements plus the associated fluctuations.

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G-17, Bharat Industrial Estate, T. J. Road, Sewree (W), Mumbai - 400 015. INDIA.
Sales Direct.: 022 -2 4156638, **Tel. :** 022-241224540, 24181649, **Fax :** 022 - 24149659
Email : kusam_meco@vsnl.net, **Website :** www.kusamelectrical.com,