1-4. Specifications

Display: LED (light-emitting diode)
Display Mode (3 displayes):

Mode	Max. Display	Display Item
A	±99999	V, A, W
B	±99999	V, A, W, integration lapse (option)
C	±99999 (±999999 Wh, Ah)	V, A, W, VA, var, PF (Hz, Wh, Ah ... option)

Unit: m, k, M, V, A, W, VA, var, Hz h, ►
Function Change: display A, B, C can be changed independently (except VA, var, PF)
(mode is changed by GP-IB or RS-232-C interface)
Sample Rate: approx. 2.5 samples/s
Range Changeover: manual, auto and external control (GP-IB ... option) change for V and A independently
Auto Range Change: by RMS or MEAN value in case of V, RMS value in case of A
Demagnetizing: Demagnetizes DC-CT core by pressing the [LOCAL/DEMAG] key in local mode, or receiving a DM command in remote or local mode. Demagnetizing time is approximately 5 seconds.
Effective Input Range: 10 to 110% of rated value (range)
Response Time: approx. 0.4 s (time required for analog value to reach specified accuracy at change of 30→100% or 100→30% when filter is OFF). Approx. 2 s (when filter is ON.)
Data Output: wave output; *v*, *i* (for monitor)
Analog output: V, A, W
D-A output: one of VA, var, PF, Wh, Ah, Hz (Data indicated on display C)
GP-IB or RS-232-C interface: display data and measurement data
External Control: measurement sample start, A-D BUSY (standard), integrator (option) start, stop and reset
Operating temperature and humidity ranges: 5 to 40°C (23 to 104°F), 20 to 80% R.H.
Storage Temperature Range: −10 to 50°C (14 to 122°F) (non-condensing)
Warmup Time: approx. 30 min (until all specifications are satisfied)
Insulation Resistance: Use a 500 V insulation resistance tester. At least 50 MΩ between: (input terminal and case, input and output terminals, voltage and current terminals, input terminal, output terminal, case and power supply terminal)
Dielectric Strength: 3,000 V AC, 50/60 Hz, 1 min (input terminal and case, input and output terminals, voltage and current terminals).
1,500 V AC, 50/60 Hz, 1 min. (input and output terminals, case and power supply terminal)
Source: 100 or 115 V±10% AC, 48 to 63 Hz (200 series to be specified)
Power Consumption: approx. 35 VA
External Dimensions: approx. 149×444×364 mm (5-7/8″×17-1/2″×14-5/16″)
Weight: approx. 12 kg (26 lbs.)(for AC meter)
approx. 14 kg (31 lbs.)(for DC/AC meter)
Accessories: power cord ... 1. Fuse ... 2 (1 A for 100 V series, 0.5 A for 200 V series). Connector ... 1. Mounting fixture ... 1 set. Dry cells (R6P) ... 2. Instruction manual ... 2 copies (separate manual for options).
Input section

Item \ Input		Voltage	Current
Type of input	AC	Direct input (CT isolation after changing range)	CT isolation (secondary switching)
	DC/AC	Direct input (DC-CT isolated after changing range)	DC-CT isolated (secondary switching)
Rated value (range)	AC	30/60/150/300/600 V	0.5/1/2/5/10/20 A
	DC/AC		1/2/5/10/20 A
Frequency range	AC	10 Hz to 30 kHz	10 Hz to 30 kHz
	DC/AC	DC, 10 Hz to 30 kHz	DC, 10 Hz to 30 kHz
Max. allowable input for 1 s		Peak 3.5 times range or 1,400 V whichever smaller	Peak 10 times range or 70 A, whichever smaller
Max. continuous allowable input (at 50/60 Hz)		Peak 1,000 V or rms value 2 times range, whichever smaller	Peak 50 A or rms value 3 times range, whichever smaller
Instrument loss	AC DC/AC	Input resistance approx. 1 MΩ (all ranges)	At 50 Hz, 2 mΩ in all ranges
Max. continuous common mode voltage, 50/60 Hz		1,000 Vrms	1,000 Vrms
Influence by common mode voltage at 50/60 Hz		Less than ±0.025% of range (input terminals shorted, 1,000 V applied to input-case)	Same as voltage (input terminal open)

*DC/AC meters do not cover 0.5 A range.

Measurement Functions

Item \ Measurement Functions		Voltage	Current	Power
Principle		Change of mean value rectification and true RMS by LOG-anti LOG	True RMS by LOG-anti LOG	PWM time division multiplication
Measurement frequency	AC	10 Hz to 30 kHz	10 Hz to 30 kHz	10 Hz to 30 kHz
	DC/AC	DC, 10 Hz to 30 kHz	DC, 10 Hz to 30 kHz	DC, 10 Hz to 30 kHz
Crest factor	AC	Max. 2	Max. 3	Same as these described in voltage and current column.
	DC/AC		Max. 3 or 50 A (peak)	
Accuracy At ambient temperature: 23 ±3°C Humidity: 45 to 75% R.H., Source voltage: 100 v ±1%, Input waveform: sinusoidal, Calibration cycle: 90 days same phase voltage 0 V, and after demagnetization (only for DC/AC model)	AC	10 to 20 Hz ±(0.3% of rdg +0.3% of range) 20 to 45 Hz ±(0.2% of rdg +0.2% of range) 45 to 66 Hz ±(0.1% of rdg +0.1% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.2% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±1.5% of range 20 k to 30 kHz ±2.0% of range (at input 10 to 110%)	10 to 20 Hz ±(0.3% of rdg +0.3% of range) 20 to 45 Hz ±(0.2% of rdg +0.2% of range) 45 to 66 Hz ±(0.1% of rdg +0.1% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.2% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±1.5% of range 20 k to 30 kHz ±2.0% of range (at input 10 to 110%)	At cos ϕ= 1 10 to 20 Hz ±(0.3% of rdg +0.4% of range) 20 to 45 Hz ±(0.2% of rdg +0.2% of range) 45 to 66 Hz 400 Hz ±(0.1% of rdg +0.1% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.2% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±2.0% of range 20 k to 30 kHz ±3.0% of range
	DC/AC	DC: ±(0.1% of rdg +0.2% of range) 10 to 20 Hz ±(0.2% of rdg +0.4% of range) 20 to 45 Hz ±(0.2% of rdg +0.4% of range) 45 to 66 Hz ±(0.1% of rdg +0.2% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.4% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±1.5% of range 20 k to 30 kHz ±2.0% of range (at input 10 to 110%)	DC: ±(0.1% of rdg +0.2% of range +3 mA) 10 to 20 Hz ±(0.2% of rdg +0.4% of range) 20 to 45 Hz ±(0.2% of rdg +0.4% of range) 45 to 66 Hz ±(0.1% of rdg +0.2% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.4% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±1.5% of range 20 k to 30 kHz ±2.0% of range (at input 10 to 110%)	At cos ϕ= 1 DC: ±(0.1% of rdg +0.3% of range) 10 to 20 Hz ±(0.3% of rdg +0.4% of range) 20 to 45 Hz ±(0.2% of rdg +0.4% of range) 45 to 66 Hz 400 Hz ±(0.1% of rdg +0.2% of range) 66 Hz to 2 kHz ±(0.2% of rdg +0.4% of range) 2 k to 10 kHz ±1.0% of range 10 k to 20 kHz ±2.0% of range 20 k to 30 kHz ±3.0% of range
Influence by power factor		—	—	Within 50/60 Hz ±0.5% of rdg at cos ϕ=0.5
Accuracy (analog output) at same conditions as for display		Add 0.05% of range to display accuracy shown above.		
Temperature coefficient 5 to 20°C (41 to 68°F), 26 to 40°C (79 to 104°F)		Less than ±0.03% of range/°C (Less than ±0.02% of range/°F)	Same as voltage	Same as voltage

Computing Functions

Apparent Power, Reactive Power and Power Factor Computations

Item \ Computing Function	Apparent Power (VA)	Reactive Power (var)	Power Factor (PF)
Arithmetic expression	V×A	$\sqrt{(V\times A)^2-W^2}$	$\frac{W}{V\times A}$
Computation range	Rated value depends on V, A ranges (F.S. resolution same as corresponding W range)	Same as apparent power	−1 to 0 to +1 (10 to 110% of rating for V and A)
Computation accuracy with respect to value calculated from measured value (V, A, W)	±0.05% of rated value (VA)	±0.05% of rated value (var)	±0.001

*When distorted waveshapes are mesured, differential in measured values using this instrument and other instrument with different principle of measurement may occur.

Scaling Function

Each measured value multiplied by PT ratio, CT ratio, SCALING FACTOR or others is displayed (unit is changed automatically)

Effective Digit: selected automatically according to effective digit of voltage and current ranges

Setting Range: 0.0001 to 10000

Set Value: DISPLAY A settable for PT ratio, DISPLAY B for CT ratio, DISPLAY C for scaling factor

Averaging Function

Principle: exponential averaging with attenuation factor K=8

Optional Specifications

■ GP-IB Interface

Electrical, Mechanical Specifications: conform to IEEE Std 488-1978

Functional Specifications: SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0 (ADDRESSABLE/TALK ONLY)

■ RS-232-C Interface

Data Transmission System: Start-stop system

Data Transmission Rate: 75, 150, 300, 600, 1200, 2400, 4800, 9600 bps.

■ Frequency Measurement (/FRQ)

Measurement Principle: reciprocal

Measurement Frequency Range: 8 Hz to 200 kHz (filter OFF), 2 to 200 Hz (filter ON)

Accuracy: ±(0.1% +1 digit)

Min. Voltage and Current Input Sensitivity: ±10% of F.S.

Display Range: 2.000 Hz to 240.0 kHz (4 digits)

Sampling Rate: 400 ms (filter OFF), 1.6 s (filter ON)

Measurement Input: V or A

■ Integrator Function (/INTEG)

Max. Display: ±999999 (6 digits)

Integration Time: 999 h

Display: Ah or Wh by DISPLAY C

Timer: integration can automatically be stopped by timer setting. Set value ... 000 h:01 min to 999 h:00 min (timer OFF at 000 h:00 min).

Lapse of Time: lapse of time after integration start can be indicated as 0 to 999 h:00 min by display B

Count Over: if integrated value over ranges, lapse of time is held and control stops

Accuracy: ± (mainframe accuracy +0.02% of rdg +1 digit)

Temperature Characteristics: ±0.025% of range/°C (±0.045 of range/°F)

Timer Accuracy: ±0.02%

Remote Control: start, stop and reset control are made by external contact closure command

■ D-A Converter Function

Principle: 16 bit PWM system, D-A converter

Output Range: (−7.5 to +7.5V) rating: 5V/F.S.

Accuracy: mainframe accuracy +0.1% of F.S.

Temperature Characteristics: ±0.02%/°C (±0.036%/°F)

Output Contents: one of Wh, Ah, var, VA, PF and Hz (data specified at DISPLAY C)

Sampling Rate: 400 ms