Sunlight to Electricity

Precise Measurement of Energy Conversion for Complete System Efficiency

PCS

Power Conversion System

4 CH



GPM-8340 Digital Power Meter

* 4 Input Elements
* 5" TFT LCD
* Voltage/Current Test Freq. Bandwidth: DC, 0.1 Hz to 10 kHz
* Lowest Current Range 5 mA & 0.1 mW Watt Resolution
* Waveform Display : V (Voltage), I (Current), P (Wattage)
* Meeting IEC 61000-4-7 Harmonic Measurement (50/60Hz)
* Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
* Harmonic Measurement & Analysis up to 50 Orders
* Supports Inrush Current and Energy Measurement
* Provide External Current Sensor Input (EXT)
* Standard Interface1: RS-232C, USB Device/ Host, LAN
* Standard Interface2: mini GPIB + Digital I/O or CAN + Digital I/O (factory installed only)

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SPECIFICATIONS

Input Channel	4
Parameters	Vrms , Vmn, Vdc , Vac, Irms , Idc , Iac, P, VA, VAR, PF, CFI, CFV, DEG, IHz, VHz, V+pk, V-pk, I+pk, I-pk, P+pk, P-pk,THDI, THDV, MATH, MCR
VOLTAGE	
Range	15 V/30 V/60 V/150 V/300 V/600 V/1000 Vrms (CF=3), 7 range
Accuracy	DC, 0.1 Hz to 45 Hz : ± (0.1 % of reading + 0.2 % of range) 45 Hz to 66 Hz : ± (0.1 % of reading + 0.05 % of range) 66Hz to 1kHz : ± (0.1 % of reading + 0.2 % of range) 1kHz to 10kHz : ± (0.07 *f) % of reading + 0.3 % of range)
Harmonics Accuracy	10 Hz to 45 Hz : 0.15 % of reading + 0.35 % of range 45 Hz to 440 Hz : 0.15 % of reading + 0.35 % of range 440 Hz to 1.2 kHz : 0.2 % of reading+ 0.35 % of range
Input Resistance	4 MΩ
CURRENT	
Range	5 mA/20 mA/50 mA/200 mA/500 mA/2 A/5 A/20 Arms (CF=4), 8 range
Accuracy	DC, 0.1 Hz to 45 Hz : ± (0.1 % of reading + 0.2 % of range) 45 Hz to 66 Hz : ± (0.1 % of reading + 0.05 % of range) 66Hz to 1kHz : ± (0.1 % of reading + 0.2 % of range) 1kHz to 10kHz : ± (0.07 *f) % of reading + 0.3 % of range)
Harmonics Accuracy	10 Hz to 45 Hz : 0.15 % of reading + 0.35 % of range 45 Hz to 440 Hz : 0.15 % of reading + 0.35 % of range 440 Hz to 1.2 kHz : 0.2 % of reading+ 0.35 % of range
POWER SOURCE	
Range	75 mW to 20 kW (56 ranges)
Accuracy	DC : ± (0.1 % of reading + 0.2 % of range) 0.1 Hz to 45 Hz : ± (0.3 % of reading + 0.2 % of range) 45 Hz to 66 Hz : ± (0.1 % of reading + 0.05 % of range) 66 Hz to 1 kHz : ± (0.2 % of reading + 0.2 % of range) 1 kHz to 10 kHz : ± (0.1 % of reading + 0.3 % of range) ± [{0.067x(f-1)} % of reading]
FREQUENCY	
Range	0.1 Hz to 10 kHz
Accuracy	± (0.06 % of reading)
Frequency Source	Voltage or Current source selectable
OTHERS	
Display Resolution	5 Digits
Display Update Rate	0.1 s / 0.25 s / 0.5 s / 1 s / 2 s / 5 s / 10 s / 20 s
Interface1	RS-232C, USB host/device, LAN & mini GPIB+Signal IO
Interface2	RS-232C, USB host/device, LAN & CAN+Signal IO
Power Source	AC 100 V to 240 V, 50/60 Hz; Consumption: 140 VA
Dimension	220 mm(W) x 132 mm(H) x 444 mm(D)
Weight	5.24 kg

Specifications subject to change without notice. PM-8340CD1BH

ORDERING INFORMATION

GPM-8340 (with GPIB) Digital Power Meter (RS-232C/USB device & host/LAN/mini GPIB+IO)

GPM-8340 (with CAN) Digital Power Meter (RS-232C/USB device & host/LAN/CAN+IO)

ACCESSORIES

Power cord x 1, Safety guide x 1
Test lead GTL-209 x 4, Test lead GTL-212A x 4,
Signal IO cable GTL-214 x 1

OPTION ACCESSORIES

GCP-300 Current Probe (suitable for the external input, EXT2, connection)
GTL-209 Test Lead, Banana to Bare-wire, Approx. 1000 mm
GTL-212A Test Lead, O-Type to Bare-wire, Approx. 1000 mm
GTL-214 Signal IO Cable, Approx. 1000 mm
GTL-232 RS-232 Cable, 9 pin F-F type, null modem for computer, Approx. 2000 mm
GTL-246 USB Cable, A-B type, Approx. 1200 mm
GTL-258 GPIB Cable, 25-pin Micro-D connection, Approx. 1900 mm
GTL-266 Signal IO coverter cable, Approx. 1000 mm
GRA-452 Rack Mount Kit (19" 3U)


GPM-002


GTL-209


GTL-212A


GTL-214


GTL-266

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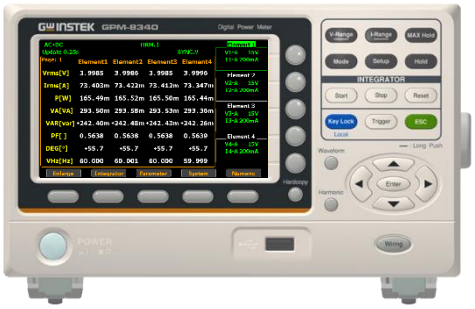
GPM-8340 Specifications (see Note)

The specifications apply when warmed up for at least 30 minutes and operates under the slow rate & 18 °C to 28 °C.



GPM-8340 Front Panel



GPM-8340 Rear Panel

USB Host	USB	RS-232C	LAN	CAN + IO	GPIB + IO
Standard	Standard	Standard	Standard	Standard	Standard

Alternative

Input

Item	Specifications		
Input type	Voltage	Floating input through resistive voltage divider	
	Current	Floating input through shunt	
Measure range	Voltage (CF=3)	15 V, 30 V, 60 V, 150 V, 300 V, 600 V and 1000 V	
	Current (CF=4)		
	Direct input	5 mA, 20 mA, 50 mA, 200 mA, 500 mA, 2 A, 5 A, 20 A	
	Sensor input	EXT: 10 mV, 25 mV, 50 mV, 100 mV, 2.5 V, 5 V, 10 V	
Input impedance	Voltage		Input resistance: approach 4 MΩ
	Current		
	Direct input range 5 mA to 200 mA		Input resistance: approach 505 mΩ
	Direct input range 0.5 A to 20 A		Input resistance: approach 5 mΩ
	Sensor input		Input resistance: approach 100 kΩ
Continuous maximum allowable input	Voltage		Peak value of 1.5 kV or RMS value of 1 kV, whichever is less.
	Current		
	Direct input range 5 mA to 200 mA		Peak value of 30 A or RMS value of 20 A, whichever is less.
	Direct input range 0.5 A to 20 A		Peak value of 100 A or RMS value of 30 A, whichever is less. Guaranteed specification 30 A.
	Sensor input		Peak value less than or equal to 5 times of the rated range
Input bandwidth	DC, 0.1 Hz to 10 kHz		
Continuous maximum Common-mode voltage	600 Vrms, CAT Ⅱ		
Line filter	select OFF or ON (cut off frequency of 5.5 kHz)		
Frequency filter	select OFF or ON (cut off frequency of 5.5 kHz)		
A/D converter	Simultaneous conversion voltage and current inputs		
	Resolution 16 bits		
	Maximum conversion rate Approx. 300 kHz		

Voltage and Current Accuracy

Item	Specifications	
Requirements	Temperature	23 °C ± 5 °C

	Humidity	30 % to 75 %RH	
	Input waveform	Sine wave	
	common-mode voltage	0 V	
	Number of displayed digits	5 digits	
	Frequency filter	Turn on to measure voltage or current of 200 Hz or less	
	After 30 minutes after warm-up time has passed		
	After measurement range is changed (zero-level compensation)		
	Update interval is 250 ms		
Accuracy	Effective range	1 % to 105 % of range	
	DC	± (0.1 % of reading + 0.2 % of range)	
	0.1 Hz ≤ f < 45 Hz	± (0.1 % of reading + 0.2 % of range)	
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)	
	66 Hz < f ≤ 1 kHz	± (0.1 % of reading + 0.2 % of range)	
	1 kHz < f ≤ 10 kHz	± ((0.07 x f) % of reading + 0.3% of range)	
Temperature coefficient	Add	± 0.03 % of reading/°C within the range 5 °C to 18 °C or 28 °C to 40 °C.	
When the line filter is turned ON	45 Hz to 66 Hz	Add 0.2 % of reading	
	< 45 Hz	Add 0.5 % of reading	
Accuracy changes caused by data update interval	When the data update interval is 100 ms, and Auto, add 0.05 % of reading to the 0.1 Hz to 1 kHz accuracy.		
Influence of temperature changes after zero-level compensation or range change	Add 0.02 % of range/°C to the DC voltage accuracy.		
	Add the following value to the DC current accuracies.		
	5 mA / 20 mA / 50 mA / 200 mA ranges		5 µA/°C
	0.5 A / 2 A / 5 A / 20 A ranges		500 µA/°C
	EXT: 2.5 V/ 5 V/ 10 V		1 mV/°C
	EXT: 10 mV/ 25 mV/ 50 mV/ 100 mV		50 µV/°C

Active Power Accuracy

Item	Specifications	
Requirements	same as the conditions for voltage and current.	
	Power factor	1
Accuracy	Effective range	1 % to 110 % of range
	DC	± (0.1 % of reading + 0.2 % of range)
	0.1 Hz ≤ f < 45 Hz	± (0.3 % of reading + 0.2 % of range)
	45 Hz ≤ f ≤ 66 Hz	± (0.1 % of reading + 0.05 % of range)
	66 Hz < f ≤ 1 kHz	± (0.2 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz	± (0.1 % of reading + 0.3 % of range) ± [{0.067 x (f-1)} % of reading]
Influence of power factor	when power factor (λ) = 0 (S: apparent power)	
	± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz	
	± {(0.1 + 0.15 × f) % of S }	
	•f is frequency of input signal in kHz	
	when 0 < λ < 1 (Φ: phase angle of the Voltage and current)	
	(power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=o)%}]	
When the line filter is turned ON	45 Hz to 66 Hz	Add 0.3 % of reading
	< 45 Hz	Add 1 % of reading
Temperature coefficient	same as the temperature coefficient for voltage and current	
Accuracy of apparent power S	voltage accuracy + current accuracy	
Accuracy of reactive power Q	accuracy of apparent power + (√1.0004 - λ2) - (√1 - λ2) × 100 %	
Accuracy of power factor λ	± [(λ-λ/1.0002)+ ｜ cosø-cos{ø+sin-1 (influence from the power factor when λ = 0 %/100)}｜] ± 1 digit when voltage and current are at the measurement range rated input	
Accuracy of phase difference Φ	± [｜ ø-cos-1(λ/1.0002)｜+ sin-1 (influence from the power factor when λ = 0 % / 100)] ± 1 digit when voltage and current are at the measurement range rated input	

Voltage, Current and Active Power Measurements

Item	Specifications	
Measurement method	Digital sampling method	
Crest factor	3 (voltage) or 4 (current)	
Wiring system	1P3W, 3P3W, 3P4W, 3V3A	
Range select	Select manual or auto ranging	
Auto range	Auto-range increase	
	The range is upped when any of the following conditions is met.	
	Vrms or Irms exceeds 130 % of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 300 % of the currently set measurement range.	
	Auto-range decline	
	The range is downed when all of the following conditions are met.	
	Vrms or Irms is less than or equal to 30 % of the measurement range. Vrms or Irms is less than or equal to 125 % of the next lower measurement range. Vpk, Ipk value of the input signal exceeds 300 % of the currently set measurement range.	
Display mode Switching	AC+DC (the true RMS value of voltage and current)	
	V-MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current)	
	AC	
	DC	
Measurement synchronization source	Select voltage, current, or off	
	In the case of Auto Update Rate, select the voltage or current from the equipped element.	
Line filter	Select OFF or ON (cutoff frequency at 5.5 kHz).	
Peak measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.	
Zero-level compensation	Removes the internal offset of the measure unit (After measurement range is changed)	
Measurement parameters	Voltage	Vrms , Vmn, Vdc , Vac
	Current	Irms , Idc , Iac
	Active Power	P
	Apparent Power	VA
	Reactive power	VAR
	Power Factor	PF
	Crest Factor	CFI, CFV
	Phase Angle	DEG
	Frequency	IHz and VHz
	Voltage Peak	V+pk and V-pk
	Current Peak	I+pk and I-pk
	Active Power Peak	P+pk and P-pk
	Total Harmonic Distortion	THDI and THDV
	Mathematical Computation	MATH, EFFi
	Maximum Current Ratio	MCR

Frequency Measurement

Item	Specifications	
Measurement item	Voltage and current	
Measurement frequency range	Data update interval	Measurement Frequency Range
	0.25 s	10 Hz ≤ f ≤ 10 kHz
	0.5 s	5.0 Hz ≤ f ≤ 10 kHz
	1 s	2.0 Hz ≤ f ≤ 10 kHz
	2 s	1.0 Hz ≤ f ≤ 10 kHz
	5 s	0.5 Hz ≤ f ≤ 10 kHz
	10 s	0.2 Hz ≤ f ≤ 10 kHz
	20 s	0.1 Hz ≤ f ≤ 10 kHz
	Auto (*)	0.1 Hz ≤ f ≤ 10 kHz
	(*) Limit of the measurement lower limit frequency by the Timeout setting	

	Timeout	lower limit frequency
	1 s	2.0 Hz
	5 s	0.5 Hz
	10 s	0.2 Hz
	20 s	0.1 Hz
Measurement range	Auto switching among six types: 100 mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz.	
Frequency filter	Select OFF or ON (cut off frequency of 5.5 kHz)	
Accuracy	Requirements	When the input signal level is 30 % or more of the measurement range. • Frequency filter is ON when measuring voltage or current of 200 Hz or less.
	± (0.06 % of reading)	

Integration

Item	Specifications
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.
Timer	Automatically stop integration by setting a timer.
	Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds
Count overflow	WP: 999999 MWh / -99999 MWh q: 999999 MAh / -99999 MAh
Accuracy	± (Power accuracy (or current accuracy) + 0.1 % of reading) (fixed range)
Range setting	Auto range or fixed range is available for Integration
Timer accuracy	± 0.02 %
Remote control	Start, stop and reset operations are available using an external remote signal.

Harmonic Measurement

Item	Specifications			
Measured item	Voltage, Current, Power			
Measured method	Zero-cross simultaneous calculation method			
Frequency range	10 Hz to 1.2 kHz.			
FFT data length	4096			
	(Auto switch when both (50 / 60) Hz and update rate must be greater than or equal to 0.25 s)			
Sample rate, window width, and upper limit of Analysis orders*	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
	45 Hz to 55 Hz	f × 512	10	50
	54 Hz to 66 Hz	f x 512	12	50
FFT data length	1024			
Sample rate, window width, and upper limit of Analysis orders*	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
	10 Hz to 67 Hz	f × 1024	1	50
	67 Hz to 150 Hz	f × 512	2	32
	150 Hz to 300 Hz	f × 256	4	16
	300 Hz to 600 Hz	f × 128	8	8
	600 Hz to 1200 Hz	f × 64	16	4
Accuracy	Frequency	Voltage	Current	Power
	10 Hz ≤ f < 45 Hz	0.15 % of reading	0.15 % of reading	0.35 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range
	45 Hz ≤ f < 440 Hz	0.15 % of reading	0.15 % of reading	0.25 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range
	440 Hz ≤ f < 1.2 kHz	0.20 % of reading	0.20 % of reading	0.40 % of reading
		+ 0.35 % of range	+ 0.35 % of range	+ 0.50 % of range
* 50 Hz / 60 Hz Compliant IEC61000-4-7 (update rate must be > 0.25 s) * Harmonic calculation: FFT method in which FFT data length is divided into 2 types: 1024 and 4096. * FFT data length automatically switches in accord with the Frequency and Update Rate of measured signal.				

Remote Control Input/Output Signal (Options)

Item	Specifications
Remote control input signal	Is_trig, Limit_trig
I/O level	TTL
I/O logic format	Negative logic, Falling edge
Remote control out signal	M1_Pass, M2_Pass, M3_Pass, M4_Pass M1_Fail, M2_Fail, M3_Fail, M4_Fail
I/O level	Relay form A
Output rate voltage	30 Vdc
I/O sink current	Max. 0.5 A

* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process. In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8340 unit.
* "Zero" will be shown for S or Q and "--" will be displayed for λ and Φ when either current or voltage is less than 0.5 % of the rated range.

General

Display	5" TFT LCD
Interfaces (with CAN) Interface (with GPIB)	RS-232C, USB host/device, LAN, CAN + Digital I/O RS-232C, USB host/device, LAN, mini GPIB + Digital I/O
Power Source	AC 100 V to 240 V, 50 Hz to 60 Hz
Power Consumption	140 VA max.
Dimensions & Weight	220 mm(W) x 132 mm(H) x 444 mm(D), Approx. 5.24 kg

(Note)

Below are the basic conditions required to operate the GPM-8340 within specification:

- Calibration: Yearly
- Operating environment: (18 to 28) °C (64.4 to 82.4) ˚F
- Humidity: < 80 % RH,
- Accuracy: ± (% of reading + % of range)
- The specifications apply when it warmed up for at least 30 min and operates in the slow rate.
- The power supply cable must be grounded to ensure accuracy.
- Input voltage and current must be standard sine wave.
- The power factor must be 1.
- The common-mode voltage must be zero.