GPM-8320-60/GPM-8330-60 Specifications

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

GPM-8320-60 Front Panel

GPM-8330-60 Front Panel

GPM-8320-60 Rear Panel with GPM-DA12

GPM-8330-60 Rear Panel with GPM-DA12

Input

Item	Specifications		
Input type	Voltage	Floating input through resistive voltage divider	
	Current	Floating input through shunt	
Measure range	Voltage	15 V, 30 V, 60 V, 150 V, 300 V, 600 V and 1000 V	
	Current		
	Direct input	1 A, 2 A, 5 A, 10 A, 20 A and 60 A	
	Sensor input	EX1: 2.5 V, 5 V and 10 V EX2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V and 2 V	
Input impedance	Voltage		Input resistance: approach 2 MΩ
	Current		
	Direct input range 1 A to 60 A		Input resistance: approach 1.65 mΩ
	Sensor input		
	Input range 2.5 V to 10 V (EX1)		Input resistance: approach 100 kΩ
	Input range 50 mV to 2 V (EX2)		Input resistance: approach 20 kΩ
Continuous maximum allowable input	Voltage		Peak value of 1.5 kV or RMS value of 1 kV, whichever is less. When range 1000 V CF=1.5
	Current		
	Direct input range 1 A to 60 A		Peak value of 150 A or RMS value of 70 A, whichever is less. Guaranteed specifications 65 A
	Sensor input		Peak value less than or equal to 5 times of the rated range
Input bandwidth	DC, 0.1 Hz to 100 kHz		
Continuous maximum Common-mode voltage	600 Vrms, CAT Ⅱ		
Line filter	select OFF or ON (cut off frequency of 500 Hz)		
Frequency filter	select OFF or ON (cut off frequency of 500 Hz)		
A/D converter	Simultaneous conversion voltage and current inputs		
	Resolution 16 bits		
	Maximum conversion rate Approx. 300 kHz		

Display update interval	When the data update interval is 100 ms the numeric display 10 items display update interval is 200 ms.
	When the data update interval is 100 ms or 250 ms and the numeric value display is set to Matrix or ALL Items display update interval is 500 ms.
	The waveform display update intervals are approximately 1 s.

Voltage and Current Accuracy

Item	Specifications		
Requirements	Temperature	23 °C ± 5 °C	
	Humidity	30 % to 75 %RH	
	Input waveform	Sine wave crest factor = 3	
	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	± (0.2 % 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) ~ Voltage ± ((0.13 x f) % of reading + 0.4% of range) ~ Current ± ((0.07 x f) % of reading + 0.3% of range) ~ EXT 1/2	
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 0.5 % of range) ± [{0.04 x (f-10)} % of reading] ~ Voltage ± ((0.13 x f) % of reading + 0.5% of range)) ~ Current ± (0.5 % of reading + 0.5 % of range) ± [{0.04 x (f-10)} % of reading] ~ EXT 1/2	
	Values for voltage in excess of 750 V for which 30 kHz < f ≤ 100 kHz are reference only. Values for current in excess of 20 A for which 30 kHz < f ≤ 100 kHz are reference only.		
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 0.3 % of reading	
	< 45 Hz	Add 1 % of reading	
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3		
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.		
	1 A / 2 A / 5 A / 10 A / 20 A / 60 A ranges		500 µA/°C
	External current sensor input (/EX1)		1 mV/°C
	External current sensor input (/EX2)		50 µV/°C
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3		
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.		

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	± (0.3 % 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	± (0.3 % of reading + 0.5 % of range) ± [{0.13 x f} % of reading]
	10 kHz < f ≤ 100 kHz	± (0.5 % of reading + 1 % of range) ± [{0.13 x f} % 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 } for up to 100 kHz as reference data	
	•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 when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
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	
Accuracy when the crest factor is set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
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.	

Voltage, Current and Active Power Measurements

Item	Specifications	
Measurement method	Digital sampling method	
Crest factor	3 or 6 (6A)	
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.	
	Crest factor 3	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.
	Crest factor 6	Vrms or Irms exceeds 130 % of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600 % of the currently set measurement range.
	Crest factor 6A	Vrms or Irms exceeds 260 % of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600 % of the currently set measurement range.
	Auto-range decline	
	The range is downed when all of the following conditions are met.	
	Crest factor 3	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.

	Crest factor 6 or 6A	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 600 % 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 500 Hz).	
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
	0.1 s	20 Hz ≤ f ≤ 100 kHz
	0.25 s	10 Hz ≤ f ≤ 100 kHz
	0.5 s	5.0 Hz ≤ f ≤ 100 kHz
	1 s	2.0 Hz ≤ f ≤ 100 kHz
	2 s	1.0 Hz ≤ f ≤ 100 kHz
	5 s	0.5 Hz ≤ f ≤ 100 kHz
	10 s	0.2 Hz ≤ f ≤ 100 kHz
	20 s	0.1 Hz ≤ f ≤ 100 kHz
	Auto (*)	0.1 Hz ≤ f ≤ 100 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, and 100 kHz.	
Frequency filter	Select OFF or ON (cut off frequency of 500 Hz)	

Accuracy	Requirements	When the input signal level is 30 % or more of the measurement range If the crest factor is set to 3. (60 % or more if the crest factor is set to 6 or 6A) • 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. (option)

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 Hz / 60 Hz and update rate must be greater than or equal to 0.5 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 > 0.5 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.				

D/A Output (Options)

Item	Specifications
Output voltage	± 5 V FS (approach ± 7.5 V maximum) against each rated value.
Number of output channels	12
Output items	Set for each channel : V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP±, q, q±, Off
Accuracy	± (accuracy of each measurement item + 0.2 % of FS)(FS = 5 V)

D/A conversion resolution	16 bits
Minimum load	100 kΩ
Update Interval	Same as the data update interval.
	In the case of Auto Update Rate, update interval is equal to signal interval. More than 100 ms.
Temperature coefficient	± 0.05 %/°C of FS

Remote Control Input/Output Signal (Options)

Item	Specifications
Remote control input signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET
Remote control output signal	INTEG BUSY
I/O level	TTL
I/O logic format	Negative logic, Falling edge

* 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-8320-60/8330-60 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 (less than or equivalent to 1 % when crest factor is set 6).

General

Display	5" TFT LCD
Interfaces	RS-232C, USB host/device, LAN
Power Source	AC 100 V to 240 V, 50 Hz to 60 Hz
Power Consumption	35 VA max.
Dimensions & Weight	220(W) mm x 132(H) mm x 402.5(D) mm (w/t bumpers), Approx. 3.85 kg