



## GW Instek GPM-8310

Digital Power Meter

New Product  
Announcement

This document allows GW Instek's partners to quickly grasp product's main features, FAB and ordering information.

## GPM-8310 Digital Power Meter

### New Product Announcement

GW Instek GPM-8310 is a digital power meter for single-phase (1P/2W) AC power measurement. Features include DC, 0.1Hz~100kHz test bandwidth, 16bits A/D, and 300 kHz sampling rate. It adopts 5" TFT LCD screen with a five-digit measurement display and provides 25 power measurement related parameters, and has a high-precision measurement capability. It also features the ability to display waveform (voltage/current/power), the integration measurement function, harmonic measurement and analysis of each order, external sensor input terminals, and various communication interfaces, etc., to help users achieve clear, convenient and accurate power measurements. This power meter is a most cost-effective power meter with most complete functionalities among the products of the same category.



**GPM-8310**  
Digital Power

The rated direct input voltage of GPM-8310 is 600V (1000V maximum) and the input current is 20A (30A maximum). The minimum current level is 5mA (resolution up to 0.1uA) and the power measurement resolution is 0.1uW. The crest factor can reach 3 (half measurement range can reach 6 or 6A), and the voltage/current/power measurement capability can reach ( $\pm 0.05\%$  reading  $\pm 0.1\%$  level). Different measurement modes can be selected according to ( AC+DC/ AC/ DC/ V-MEAN), providing up to 25 relevant parameters for power measurement, including voltage (Vrms/ Vac/ Vdc/ Vmn/ V+pk / V-pk), current (Irms/ Iac/ Idc/ I+pk/ I-pk), frequency (VHz/ IHz), power (P/ P+pk/ P-pk), crest factor (CFV/ CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion rate (THDV/THDI), maximum current ratio (MCR), and the MATH calculation function. Hence, for the measurement of low current/low power such as standby power consumption, or the measurement of power consumption of general products, this power meter provides the best range and accuracy support.

GPM-8310 also makes good use of the advantages of the TFT LCD to display the results of parameter measurement by using numerical and graphical methods. In terms of numerical values, the general mode and the simple mode are provided. The general mode can display 10 measurement parameters (2 main measurements + 8 monitoring measurements), and the simple mode can display four measurement parameters. These displayed parameters can be arbitrarily selected from 25 power parameters according to the needs of users. In terms of graphic display, a simple oscilloscope mode is provided to display waveforms for three parameters including voltage, current and power. In addition, the measurement and analysis of each harmonic order of the measurement signal can be completely displayed by numerical values or bar graphs. This power meter not only meets the needs of accuracy and legibility in process testing, but also meets the needs of diverse measurement applications in R&D design and quality verification.

In addition, the performance of GPM-8310 in auxiliary measurement mechanism/function is also comprehensive. For the application of measuring large voltage, the VT rate setting can be used with an external voltage Potential Transformer. For the measurement of large current, the type of current transformer ~ voltage output type or current output type will determine the applied method. If it is a current output type, it can be directly locked to the rear panel of the instrument and collocated with the CT rate setting to conduct measurement. If it is a voltage output type, measurement can be conducted through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8310.

Automatic level-changing can self-define the required level to save level-changing time. 10,000 lots of internal memories can be used to store measurement data according to the update rate set by GPM-8310 or a user-defined time interval for subsequent analysis.

In terms of data retrieval and storage, GPM-8310 provides a variety of communication interfaces including RS-232C/ USB device (virtual COM)/ LAN/ GPIB. Users can write programs to read the measurement results according to their habits or with existing system interfaces and there is no need to procure interfaces. USB host supports GPM-8310 screen capture, internal record data access, and firmware update. For the needs of external signal control or the use of data recorder to record data, GPM-8310 also provides an optional Digital I/O (DA4) interface (must be installed before leaving the factory), which can be connected to an external controller such as PLC or a data recorder to meet the application of automatic measurement or long recording.

## Various display modes

GPM-8310 provides the numerical value display mode and the waveform display mode, which help users to maximize the benefit of their measurement. Under the numerical mode, there are the general mode and the simple mode. The general mode has related measurement settings and can simultaneously display 10 measurement parameters (2 main measurements and 8 secondary measurements). The simple mode displays only 4 measurement parameter results. The parameters in each mode can be arranged and combined as required. Under the graphic mode, a simple oscilloscope function is provided to display the waveforms of three parameters including voltage, current and power. The horizontal scale can be adjusted (from 25us/div ~ 1s/div according to the set data update rate), and 3 magnification rates for waveform observation are also provided for users to select. In the harmonic measurement, the measurement results of each order of harmonics can be displayed by bar graphs, and a specific observation order can be specified. The relevant values of each order of harmonics (voltage/current/power/voltage distortion ratio/current distortion ratio/power distortion ratio/voltage phase angle/current phase angle) can be completely recorded and displayed.



Numerical (general) mode



Numerical (simple) mode



Waveform mode



Harmonic (bar graph) measurement



Harmonic (table column) measurement



**Rich measurement parameters**

GPM-8310 provides a variety of measurement items and functions, including voltage, current, frequency, effective power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and can also measure the maximum current ratio. GPM-8310 is also equipped with the measurement function of power or current time integration for the DUT. Users set a period of time to perform instantaneous power integration at the set time period, and then divide by the time to obtain the average power of the DUT. In addition, when performing integration measurement, GPM-8310 supports automatic level-changing function for the power change of the DUT at different times in order to obtain the most complete integration result within the set time.

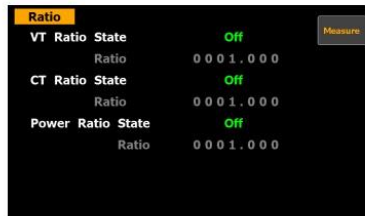
Measurement Items	Symbols
Voltage	Vrms, V+pk, V-pk, Vac*, Vdc*, Vmn*
Current	Irms, I+pk, I-pk, Iac*, Idc*
Power	P, P+pk, P-pk, VA, VAR
Power Factor	PF
Crest Factor	CFV, CFI
Phase Angle	DEG
Frequency	VHz, IHz
Total Harmonic Distortion	THDV, THDI
Maximum Current Ratio	MCR
Integration	WP, WP+, WP-, q, q+, q-, Vac, Iac

\* : Only applicable to specific measurement modes for selection

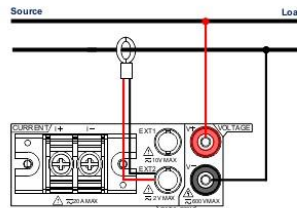


**Superb measurement assistance**

With respect to the support of measurement assistance, the performance of GPM-8310 is outstanding. First of all, for the measurement of high voltage/high power, the setting of voltage ratio/power ratio is provided to restore the attenuated ratio to a true value. For the measurement of large current, other than the setting of current ratio, external current sensor terminals (EXT1/EXT2) can be utilized to connect with a voltage output type current transformer, making large current measurement more convenient. In addition, GPM-8310 provides 4 sets of panel settings for storage/recall and memory for storing 10,000 lots of measurement values. The measurement storage can log the measurement results based upon the update rate or a self-defined time interval to facilitate the subsequent analysis. The USB host on the front panel supports screen capture, measurement value storage, and GPM-8310 firmware update.



Ratio configuration



External current sensor input

### Flexible level-changing mechanism

GPM-8310 provides the measurement of the integration function under the automatic level-changing mode to allow users to fully calculate the total value of the power consumption of the DUT from the beginning to the end of the integration function. In addition, GPM-8310 also supports self-defined setting mechanism for level-changing. Users can select the required level to be changed to save time on level-changing and expedite the test.



Automatic level-changing under the integration function



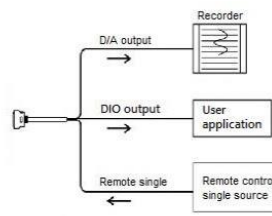
Self-defined automatic level-changing mechanism

### Convenient and practical interface

GPM-8310 provides comprehensive and diverse communications interfaces including RS-232 / USB / LAN / GPIB, which are suitable for customers to write computer software for remote control and the collection of measurement results through commands. The optional Digital I/O (DA4) interface provides 3 different modes: the external control mode, the DA4 output mode and the self-defined output mode based on user settings. When the setting is in the external control mode, it allows users to activate, stop, trigger or reset the integration measurement function through external signals. When the setting is in the DA4 output mode, users can define 4 measurement parameter values from the 25 measurement parameters provided (even with the result of integration measurement) to produce outputs by a fixed level (full scale +5V) or a manual level (full scale  $\pm 5V$ ) and receive results by collocating with a data recorder. When the setting is in the self-defined output mode, a communications interface is required to control the action of each defined pin through commands.



Practical interface



DA4 interface mechanism

**Key Features**

- 5" TFT LCD
- DC, 0.1Hz ~ 100kHz voltage/current test bandwidth
- Two numerical display modes
  - General mode: displays 2 main test items + 8 secondary test items
  - Simple mode: displays the test values of 4 main test items
- Waveform display: V (voltage), I (current), P (power)
- The current/voltage can be measured to a deformed wave with CF of 3, and the half-range CF can reach 6 or 6A
- 50th order of harmonic measurement and analysis (value and bar graph)
- Integration function supports automatic level-changing
- External current sensor input terminals (EXT1/EXT2)
- Standard interfaces: RS-232C, USB device/ host, LAN, GPIB
- Optional interface: Digital I/O (DA4) (must be installed before leaving the factory)
- Optional accessory: GPM-001

USB host provides screen capture, internal record data storage, and version update

5" TFT LCD provides excellent setting parameters, waveform display and measurement value observation



Function and direction keys provide a convenient operating environment

Measurement of voltage/current input terminal, and external current sensor (EXT1/EXT2) input terminals

Standard interfaces ~ RS-232/LAN/USB, suitable for remote control



Digital I/O / DA4 (opt.) suitable for connecting external controller or data logger

## Specifications comparison

Specifications highlighted in red represent better performance

“X” represents “no such function” or “function not available”

Company	GW Instek GPM-8310	GW Instek GPM-8213
Display	5" TFT LCD	4" TFT LCD
Input Terminal	Rear	Front & Rear
Freq. Range	DC, 0.1~100kHz	DC, 45Hz~6kHz
Sample Rate	300 kHz	96kHz
Update Rate	0.1~20 sec	0.1 sec
Input Resistance	A:500m/5mΩ, V:2MΩ	A:500m/5mΩ, V:2.4M Ω
Max input V,A	1000V, 30A	600V, 20A
Waveform Display	Yes (V, I, P)	No
Harmonics Analysis / Order	Yes / 50	No
Total Harmonics Distortion	Yes	Yes
Measurement Mode	AC+DC / V-MEAN / DC / AC	AC+DC / DC / AC
Parameters <sup>[Note3]</sup>	V, Vpk±, I, Ipk±, P, Ppk±, VA, var, PF, CFV, CFI, DEG VHz, IHz, THDV, THDI, <b>MCR, MATH</b> Wh, Wh±, <b>P(avg)</b> , q, q±, <b>q(avg)</b> TIME, V, I	V, Vpk±, I, Ipk±, P, Ppk±, VA, var, PF, CFV, CFI, DEG VHz, IHz, THDV, THDI WP, WP±, q, q±, TIME, V, I
Integrator		
V Range <sup>[Note1]</sup>	15.000/30.000/60.000/ 150.00/300.00/600.00V, V Crest Factor CF:3 or 6 or <b>6A</b> (selectable) V Accuracy <b>±(0.1%rdg+0.05%rng)</b>	15.000/30.000/60.000/ 150.00/300.00/600.00V, CF:3 or 6 (selectable) ±(0.1%rdg+0.1%rng)
A Range <sup>[Note1]</sup>	5.0000m/ 10.000m/20.000m/50.000m/ 100.00m/200.00m/500.00m/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, A Crest Factor CF:3 or 6 or <b>6A</b> (selectable) A Accuracy <b>±(0.1%rdg+0.05%rng)</b>	5.0000m/ 10.000m/20.000m/50.000m/ 100.00m/200.00m/500.00m/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, CF:3 or 6 (selectable) ±(0.1%rdg+0.1%rng)
Power Range	75.000m~12.000kW (72 ranges) Power Accuracy <b>±(0.1%rdg+0.05%rng)</b>	75.000m~12.000kW (72 ranges) ±(0.1%rdg+0.1%rng)
Interface <sup>[Note2]</sup>	RS232,USB,LAN, <b>GPIB</b> <b>Digital I/O (DA4)</b> (Opt.)	RS232,USB,LAN GPIB (Opt.)
Dimensions	270(W)x110(H)x380(D)mm, 3kg	270(W)x110(H)x350(D)mm, 2.9kg
Other Features	<b>Internal memory (10000 blocks)</b> <b>Screen Capture (USB storage)</b> <b>Auto ranging for Integration mode</b> <b>External current sensor input * 2</b>	X X X X

Note 1: When the level is CF=3

Note 2: Option must be installed before leaving the factory

Note 3: By the selected Measurement Mode, V / I / P each has a different form.



## Specifications comparison

Specifications highlighted in red represent better performance

“X” represents “no such function” or “function not available”

Company	Yokogawa WT310E	GW Instek GPM-8310	Hioki 3335	R & S HMC8015
Display	7 segment LED (RED)	<b>5" TFT LCD</b>	7 segment LED (RED)	3.5" 320*240 TFT LCD
Freq. Range	DC, 0.1Hz~100kHz	DC, 0.1~100kHz	DC, 0.1~100kHz	DC~100 kHz
Sample Rate	100 kHz	300 kHz	<b>700kHz</b>	500 kHz
Display Rate	0.1~20 sec	0.1~20 sec	0.2~20 sec	0.1 sec
Input Resistance	A:500m/6~16mΩ, V:2M Ω/13pF	A:500m/5mΩ, V:2MΩ	A:520m/5~15mΩ, V:2MΩ	A:500m/10mΩ, V:2MΩ/20 pF
Max input V,A	1000V, 30A	1000V, 30A	1000V, 30A	1800Vpp, 60App
Harmonics Analysis / Order	Yes / 50	Yes / 50	Yes / 50	Yes / 50
Total Harmonics Distortion	Yes	Yes	Yes	Yes
Parameters	V, Vpk, A, Apk, W, Wpk, VA, var, PF, DEG, THDV, THDA, TIME, VHz, AHZ, Wh, Whz, Ah, Ahz, MATH, V', A', V%, A%, W%	V, Vpk, A, Apk, W, Wpk, VA, var, PF, DEG, THDV, THDA, TIME, VHz, AHZ, Wh, Whz, Ah, Ahz, MATH, V', A', V%, A%, W%, MCR	V, Vpk, A, Apk, W, VA, var, PF, DEG, THDV, THDA, TIME, VHz, AHZ, Wh, Whz, Ah, Ahz, CF_V, CF_A, AV_V, AV_A, <b>MCR</b>	V, Vpk, A, Apk, W, Wpk, VA, var, PF, DEG, THDV, THDA, VHz, Ahz, Wh, Whz, Ah, Ahz, <b>IEC62301, EN50564, EN61000-3-2</b>
V Range <sup>[Note1]</sup>	15.000/30.000/60.000/ 150.00/300.00/600.00V, CF: 3 or 6 or 6A (selectable) V Accuracy $\pm(0.1\%rdg+0.05\%rng)$	15.000/30.000/60.000/ 150.00/300.00/600.00V, CF: 3 or 6 or 6A (selectable) $\pm(0.1\%rdg+0.05\%rng)$	<b>6.0000/</b> 15.000/30.000/60.000/ 150.00/300.00/600.00/ <b>1.0000k V,</b> <b>CF: 6</b> $(\pm 0.1\%rdg \pm 0.05\%fs)$	<b>5.0000/</b> 15.000/30.000/60.000/ 150.00/300.00/600.00, CF: 3 or 6 (selectable) $\pm(0.05\%rdg+0.05\%rng)$
A Range <sup>[Note1]</sup>	5.0000m/ 10.000m/20.000m/50.000m/ 100.00m/200.00m/500.00m/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, CF: 3 or 6 or 6A (selectable) A Accuracy $\pm(0.1\%rdg+0.05\%rng)$	5.0000m/ 10.000m/20.000m/50.000m/ 100.00m/200.00m/500.00m/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, CF: 3 or 6 or 6A (selectable) $\pm(0.1\%rdg+0.05\%rng)$	<b>1.0000m/2.0000m/5.0000m/</b> 10.000m/20.000m/50.000m/ 100.00m/200.00m/500.00m/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, <b>CF: 6</b> $(\pm 0.1\%rdg \pm 0.05\%fs)$	5.0000m/ 10.000m/20.000m/50.000m/ 100.00m/200.00m/0.50000/ 1.0000/2.0000/5.0000/ 10.000/20.000 A, CF: 3 or 6 (selectable) $\pm(0.05\%rdg+0.05\%rng)$
Power Range	75.000m~12.000kW (72 ranges)	75.000m~12.000kW (72 ranges)	6.0000m~20.000kW (112 ranges)	50 μW~12 kW (84 ranges)
Power Accuracy	$\pm(0.1\%rdg+0.05\%rng)$	$\pm(0.1\%rdg+0.05\%rng)$	$(\pm 0.1\%rdg \pm 0.05\%fs)$	$\pm(0.05\%rdg+0.05\%rng)$
Interface <sup>[Note2]</sup>	USB, (RS232 or GPIB) LAN (Opt.)	<b>RS232, USB, LAN, GPIB</b> <b>Digital I/O (DA4)</b> (Opt.)	LAN, RS-232C GPIB (Opt)	USB, LAN GPIB(Opt.)
Dimensions	88x213x379mm, 3kg	88x220x382mm, 3kg	100x210x245mm, 3kg	88x222x280mm, 3.25kg

Note 1: When the level is CF=3, except Hioki

Note 2: Option must be installed before leaving the factory



**Target Markets and Associated Features****■ Manufacturing Engineering**

- Simple display mode (four major measurement items) and 0.05% basic accuracy (voltage/current/power) meet the requirements of measurement observation and accuracy on manufacturing process.
- Test fixture box (optional) can effectively assist the manufacturing process to improve testing efficiency.
- Voltage ratio/current ratio/input terminal of external current sensor meet the needs of large current measurement.
- The self-defined automatic level-changing can effectively assist the manufacturing process to improve the testing efficiency.
- RS-232C/ USB device / LAN / GPIB provide the need for the process to automatically collect and manage the test results to facilitate product analysis and improvement.

**■ Quality Assurance Verification**

- 0.05% basic accuracy (voltage/current/power) and high resolutions (0.1uA/ 0.1uW) meet the requirements of precision and accuracy on quality verification.
- 25 related parameters in power measurement meet the needs of various measurements in quality.
- Voltage ratio/current ratio/input terminal of external current sensor meet the needs of large current measurement.
- Waveform display (voltage/current/power) facilitates product analysis and improvement.
- The integration function supports automatic level-changing to meet the need for measurement in quality verification.
- 10,000 lots of memories and settable storage interval. Data can be stored for analysis without connecting to the computer.
- RS-232C/ USB device / LAN / GPIB provide the need for the process to automatically collect and manage the test results to facilitate product analysis and improvement.
- Optional accessory Digital I/O (DA4) meets the needs of external control or data recorder to collect test results.

**■ Research and Development**

- 0.05% basic accuracy (voltage/current/power) and high resolutions (0.1uA/ 0.1uW) meet the requirements of precision and accuracy on quality verification.
- A variety of measurement items and auxiliary functions meet the measurement needs of various design and development.
- Voltage ratio/current ratio/input terminal of external current sensor meet the needs of large current measurement.
- Waveform display (voltage/current/power) facilitates product analysis and improvement.
- The integration function supports automatic level-changing to meet the need for measurement in quality verification.
- Support 50th order of harmonic measurement and analysis function, and the harmonic order can be set according to the requirements to meet the needs of measurement in design verification.
- 10,000 lots of memories and settable storage interval. Data can be stored for analysis without connecting to the computer.
- RS-232C/ USB device / LAN / GPIB meet the need for long R&D numerical monitoring and collect and manage test results through a PC to facilitate analysis.

**Key Dates for Product Announcement**

1. New product announcement to distributors (sample unit order) – July 6, 2020
2. Global market announcement – July 31, 2020

**Service Policy**

1. 1-year warranty
2. Service Support

The service instructions in the Service Manual will help distributors repair defective units promptly. Should the board replacement is necessary to fix the defective unit, the board swapping service support is provided by Good Will Instrument to facilitate the repair jobs done at the distributor's site.

3. GW Instek continually provides the after-sales support through its website. The most up-to-date version of service manual and Marcom material of GPM-8310 will be posted on the distributor zone of GW Instek Website at <http://www.gwinstek.com>

**Specifications**

**General**



Note

- The below are the basic conditions required to operate the GPM-8310 within specifications:
  - 1-year Calibration: Yearly
  - Operating Environment: 18~28 °C (64.4~82.4 °F)
  - Humidity: <80%RH,
  - Accuracy: ± (% of reading + % of range)
  - The specifications apply when it warmed up for at least 30 minutes 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 crest factor must be 3.
  - The common-mode voltage must be zero.

Specification Condition	Temperature: 23 °C±5 °C Humidity: <80%RH(non-condensing) Temperature 0°C ~ 40°C, <ul style="list-style-type: none"> <li>• 30 ~ 40°C, Relative Humidity &lt; 70%RH (non-condensing)</li> <li>• &gt;40°C, Relative Humidity &lt; 50%RH (non-condensing)</li> </ul>
Operation Condition	Indoor use only Altitude: < 2000 meters Pollution degree 2
Storage Condition	Temperature -40°C ~ 70°C Humidity: < 90%RH (non-condensing)
Power Source	AC 100-240V, 50-60Hz ; Consumption Max. 30VA
Dimensions	268(W) x 107(H) x 379(D) mm (w/t bumpers)
Weight	Approx. 2.9kg

**Input**

Item	Specifications
Input type	Voltage Floating input through resistive voltage divider
	Current Floating input through shunt
Measure range	Voltage 15V, 30V, 60V, 150V, 300V, 600V
	Current Direct input 5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 5A, 10A, 20A Sensor input EX1: 2.5 V, 5 V, 10 V EX2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V
Input impedance	Voltage Input resistance: approach 2 MΩ
	Current Direct input range 5mA ~ 200mA Input resistance: approach 505 mΩ
	Direct input range 0.5A ~ 20A Input resistance: approach 5 mΩ
	Sensor input Input range 2.5V ~ 10V (EX1) Input resistance: approach 100 kΩ Input range 50mV ~ 2V (EX2) Input resistance: approach 20 kΩ
Continuous maximum allowable input	Voltage peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current Direct input range 5mA ~ 200mA peak value of 30 A or RMS value of 20A, whichever is less
	Direct input range 0.5A ~ 20A peak value of 100A or RMS value of 30A, whichever is less
	Sensor input peak value less than or equal to 5 times of the rated range
Input bandwidth	DC, 0.1 Hz ~ 100kHz
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 16bits Maximum conversion rate Approx. 300kHz
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**Voltage and Current Accuracy**

Item	Specifications	
Requirements	Temperature 23 ± 5 °C	
	Humidity 30~75% RH	
	Input waveform Sine wave crest factor = 3 common-mode voltage 0 V	
Requirements	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	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 *f) % of reading + 0.3% of range)		
10 kHz < f ≤ 100 kHz ± (0.5 % of reading + 0.5 % of range) ± [(0.04x(f-10))% of reading]		
Temperature coefficient Add ±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.		
When the line filter is turned ON	45 ~ 66 Hz Add 0.2 % of reading < 45 Hz Add 0.5 % 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.	
	5 mA/10 mA/20 mA/50 mA/100 mA/200 mA ranges 5 μA/°C	
	0.5 A/1 A/2 A/5 A/10 A/20 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	DC (0.1 % of reading + 0.2 % of range)
	0.1Hz ≤ 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 ≤ 1kHz ± (0.2 % of reading + 0.2 % of range)
	1 kHz < f ≤ 10 kHz ± (0.1 % of reading + 0.3 % of range) ± [(0.067x(f-1))% of reading]
10 kHz < f ≤ 100 kHz ± (0.5 % of reading + 0.5 % of range) ± [(0.09x(f-10))% 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=0)%}]
	When the line filter is 45 ~ 66 Hz Add 0.3 % of reading

Simply Reliable

turned ON	< 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 + $(\sqrt{1.0004 - \lambda^2} - (\sqrt{1 - \lambda^2})) \times 100 \%$	
Accuracy of power factor $\lambda$	$\pm [(\lambda - \lambda/1.0002) +  \cos\theta - \cos\theta + \sin^{-1} $ (influence from the power factor when $\lambda = 0\%/100$ ) ] $\pm 1$ digit when voltage and current are at the measurement range rated input	
Accuracy of phase difference $\Phi$	$\pm [  \theta - \cos^{-1}(\lambda/1.0002)   + \sin^{-1}$ (influence from the power factor when $\lambda = 0\% / 100$ ) ] $\pm 1$ 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	Single-phase, two-wire (1 P2 W)
Range select	Select manual or auto ranging
	Auto-range increase
	The range is upped when any of the following conditions is met.
	Crest factor 3 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range.
	Crest factor 6 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
	Crest factor 6A Urms or Irms exceeds 260% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
	Auto-range decline
Auto range	The range is downed when all of the following conditions are met.
	Crest factor 3 Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range.
	Crest factor 6 or 6A Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.
	Vrms (the true RMS value of voltage and current)
Display mode Switching	VOLTAGE 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
Line filter	In the case of Auto Update Rate, select the voltage or current from the equipped element.
Peak measurement	Select OFF or ON (cutoff frequency at 500 Hz).
Zero-level compensation	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.
	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
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 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: 100mHz, 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)	
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.	
Accuracy	± (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	1024
Sample rate, window width, and upper limit of Analysis orders*	4096 (Auto switch when both 50Hz/60Hz and update rate > 0.1s conditions are met)
Fundamental	Sample rate
Frequency	Window Width
10 Hz to 44 Hz	f × 1024
45 Hz to 55 Hz	f × 512
	1
	10
	upper limit of Analysis orders
	50
	50





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	54 Hz to 66Hz	f × 512	12	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
	Frequency	Voltage	Current	Power
Accuracy	10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range
	45 Hz ≤ f < 440 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range
	440 Hz ≤ f < 1.2kHz	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range

\* 50Hz/60Hz Compliant IEC61000-4-7

#### D/A Output (Options)

Item	Specifications
Output voltage	±5 V FS (approach ±7.5 V maximum) against each rated value.
Number of output channels	4
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 100ms.
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

#### Digital IO Signal (Options)

Item	Specifications
I/O control output signal	OUT1, OUT2, OUT3, OUT4
I/O level	TTL
I/O sink current	Max 100mA (per/ch)

\* 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-8310 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).

### Ordering information

GPM-8310	Digital Power Meter with RS-232C / USB device & host / LAN / GPIB
GPM-8310 with DA4	Digital Power Meter with RS-232C / USB device & host / LAN / GPIB and opt. DA4

### Standard Accessories

Safety Instruction Sheet x 1, Power cord x 1  
Test lead GTL-209 x 1, Test lead GTL-212 x 1  
CD x 1 (including complete user manual and USB driver)  
DA4 cable GTL-214 (available for GPM-8310 with DA4 only)

### Optional

Opt.01 DA4 Interface (including cable, GTL-214)

Note : Optional DA4 interface must be installed in factory.

### Optional Accessories

GPM-001	Test Fixture (including GTL-210 x 2, GTL-213 x 1)
GPM-001 (EU)	Test Fixture (including GTL-210 x 2, GTL-213 x 1)
GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000mm
GTL-210	Test Lead, Banana to Banana, Approx. 1000mm
GTL-212	Test Lead, O-Type to Bare-wire, Approx. 1000mm
GTL-213	Test Lead, O-Type to Banana, Approx. 1000mm
GTL-214	DA4 Cable, Approx. mm
GTL-232	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm
GTL-246	USB Cable, A-B type, Approx. 1200mm
GTL-248	GPIB Cable, Approx. 2000mm
GRA-422	Rack Mount Kit, 19" 2U size



Should you have any questions on the GPM-8310 announcement, please don't hesitate to contact us.

Sincerely yours,

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**Appendix**

Model	Part Number	EAN Code
GPM-8310	01PM831000GT	4713008673584
GPM-8310 with DA4	01PM831010GT	4713008673591
GPM-001	11PM-00100101	4713008671696
GPM-001 (EU)	11PM-00100201	4713008671702
GTL-209	1100MTL209001	4713008671832
GTL-210	1100MTL210001	4713008671849
GTL-212	1100MTL212001	4713008673638
GTL-213	1100MTL213001	4713008673621
GTL-214	1100MTL214001	4713008673645
GTL-232	1100-TL232001	4719692507174
GTL-246	1100MTL246001	4719692507211
GTL-248	1100MTL248001	4719692507259
GRA-422	01RA422000T	4719692509970
Opt.01 DA4 Interface	11PM-83100101	4713008673614

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