# **Digital Power Meter**

GPM-8320/8330

USER MANUAL Rev. A



ISO-9001 CERTIFIED MANUFACTURER



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# **SAFETY INSTRUCTIONS**

This chapter contains important safety instructions that you must follow during operation and storage. Read the following before any operation to ensure your safety and to keep the instrument in the best possible condition.

#### Safety Symbols

These safety symbols may appear in this manual or on the instrument.

	Warning: Identifies conditions or practices that could result in injury or loss of life.
	Caution: Identifies conditions or practices that could result in damage to the GPM-8320/8330 or to other properties.
<u>Å</u>	DANGER High Voltage
<u>!</u>	Attention Refer to the Manual
	Protective Conductor Terminal
Ţ	Earth (ground) Terminal



Do not dispose electronic equipment as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased.

#### Safety Guidelines

General Guideline •	Make sure that the voltage input level does not exceed AC600V.
CAUTION .	Make sure the current input level does not exceed 20A.
•	Do not place any heavy object on the instrument.
•	Avoid severe impact or rough handling that can lead to damaging the instrument.
•	Do not discharge static electricity to the instrument.
•	Use only mating connectors, not bare wires, for the terminals.
•	Do not perform measurement at the source of a low-voltage installation or at building installations (Note below).
•	Do not disassemble the instrument unless you are qualified as service personnel.
•	Make sure that the COM terminal to earth is limited to 600Vpk.
•	Remove all test leads before disconnecting the mains power cord from the socket.
•	If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
•	The device should be placed in a place where the plug connected to it can be removed easily.
•	Interface: USB / RS232 / LAN2/ Mini GPIB

 Interface: USB / RS232 / LAN2/ Mini GPIB /Digital IO DA12 ports are only to be connected to the circuits which are separated from mains supply by double / reinforce insulation.

	(Note) EN 61010-1 specifies the measurement categories and their requirements as follows. The GPM-8320/8330 falls under category II 600V.
	<ul> <li>Measurement category IV is for measurement performed at the source of low-voltage installation.</li> </ul>
	<ul> <li>Measurement category III is for measurement performed in the building installation.</li> </ul>
	• Measurement category II is for measurement performed on the circuits directly connected to the low voltage installation.
Power Supply	AC Input voltage: 100-240 VAC 50/60Hz
	• The power supply voltage should not fluctuate more than 10%.
	• Connect the protective grounding conductor of the AC power cord to an earth ground, to avoid electrical shock.
Cleaning the	• Disconnect the power cord before cleaning.
Instrument	• Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.
	• Do not use chemicals containing harsh material such as benzene, toluene, xylene, and acetone.
Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below)
	• Temperature: 0°C to 40°C
	<ul> <li>Humidity: &lt; 30°C: &lt; 80%RH(non-condensing);</li> <li>30°C~40°C:&lt;70%RH(non-condensing);</li> <li>&gt;40°C: &lt;50%RH (non-condensing)</li> </ul>
	• Altitude: <2000m
	Overvoltage category: OVC II

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	(Note) EN 61010-1 specifies the pollution degrees and their requirements as follows. The GPM-8320/8330 falls under degree 2.	
	<ul> <li>Pollution refers to "addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity".</li> </ul>	
	<ul> <li>Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.</li> </ul>	
	• Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.	
	• Pollution degree 3: Conductive pollution occurs, or dry, non- conductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.	
Storage	Location: Indoor	
environment	• Temperature: -40°C to 70°C	
	• Humidity: <90%RH(non-condensing)	
Disposal	Do not dispose this instrument as unsorted municipal waste. Please use a separate collection facility or contact the supplier from which this instrument was purchased. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.	

# **G**ETTING STARTED

This chapter describes the GPM-8320/8330 in a nutshell, including accessories, package contents, its main features and front / rear panel introduction.

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# Characteristics

The GPM-8320/8330 is a high-precision, programmable power meter for using increase 3-phase simultaneous measurement, for high power, such as motors, etc.. It equips with a color TFT-LCD screen and also multiple graph displays which are very convenient for reading the measurement results. The GPM-8320/8330 has become a reliable power measurement instruments because of its simple operation, excellent performance, user-friendly graph displays and automatic measurement interface.

Operation	• Press the buttons on the front panel to easily turn on the GPM-8320/8330 measurement function. All settings and measurements results are displayed on the 5-inches TFT-LCD screen panel for easy use of each function.
	• Standard display mode: 2 main measurement results and 8 secondary measurement results are displayed in this screen.
	<ul> <li>Simple display mode: 4 major measurement results are displayed in this screen.</li> </ul>
Performance	• 7 selectable voltage ranges available from 15V to 1000V with 0.1% of reading + 0.05% of range.
	<ul> <li>6 selectable current ranges available from 0.5A to 20A with 0.1% of reading + 0.05% of range.</li> </ul>
	• It can even measure the voltage of abnormal wave of CF 3. The half-range CF is up to 6 or 6A.
	• It can even measure the current of abnormal wave of CF 3. The half-range CF is up to 6 or 6A.
	Total harmonic distortion measurement.
	• 50-orders harmonic test and analysis function.
	<ul> <li>Graph display for measurement results including harmonic orders distribution.</li> </ul>
	Plug-in USB disk data store function including

	log and screenshot.
	Auto range function for integration     measurement.
Features	• Full five-digit measurement.
	<ul> <li>Voltage measurement range: 15V ~ 1000V or automatic switching</li> </ul>
	<ul> <li>Current measurement range: 0.5A ~ 20A or automatic switching</li> </ul>
	• 3-channel simultaneous display screen and total calculation value screen
	• Maximum accuracy of 0.1% of reading + 0.05% of range
	• 2 main measurement readings and 8 minor measurement readings are displayed in the screen of standard display mode.
	• 4 main measurement readings are displayed in the screen of simple display mode.
	<ul> <li>Added stand-alone display of total harmonic distortion measurement function (50 steps)</li> </ul>
	<ul> <li>Test bandwidth of voltage and current: DC ~ 100kHz.</li> </ul>
	• Selectable boot settings (Previous / Default)
	<ul> <li>Waveform display up to 10kHz along with Harmonic bar and list table</li> </ul>
Interface	<ul> <li>Interface: USB/ RS232/ LAN/ Mini GPIB/Digital IO DA12</li> </ul>
Application	• It can be applied to production test such as power supplies, transformers, motors, electrical equipment.

#### Accessories

Standard Accessories	Part number	Description	Q'ty
		User Manual CD	1
	82GW1SAFE0M01	Safety Instruction Sheet	1
	Region dependent	Power Cord	1
	GTL-209	Test leads (For GPM-8330)	3
	GTL-209	Test leads (For GPM-8320)	2
	GTL-212A	Test leads (For GPM-8330)	3
	GTL-212A	Test leads (For GPM-8320)	2
	GPM-002	Terminal Cover	1
Optional Accessories	Part number	Description	
	GTL-234	RS232C cable	
	GTL-246	USB cable	
	GTL-248	GPIB cable	
	GCP-300	Current Probe	
	GRA-452	Rack Adapter Panel (19", 3U)	
Option	Name	Description	
	GPM-DA12	GPIB+DA12 interface card (Factory installed)	

#### Package Contents

Check the contents before using the instrument.



Contents (single unit)

- Main unit
- Test lead sets (depends on model)
- Terminal Cover
- Power cord x1 (region dependent)
- User manual CD
- Safety instruction sheet

#### Appearance

Front Panel

GPM-8320/8330



3 USB Host Port Connects with USB flash drive for data storage or screenshot.

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4	Hardcopy key	Hardcopy	Captures the current screenshot or saves the data log for reading. For details, refer to page 65.
5	Waveform key	Waveform	It can simultaneously display voltage, current and power waveforms. Display one channel at a time.
6	Wiring key	Wiring	There are 1P3W, 3P3W, 3P4W, 3V3A wiring more available.
7	Harmonic key	Harmonic	Setting parameters of 3 phases can display 50-order harmonic values or graphics.
8	Enter Key	Enter	This button is used to enter the menu, confirm the settings and switch between the standard display mode and simple display mode (no function table and display icon). See page 95.
9	Arrow Keys		This four arrow keys are used to edit the parameters, browse the menu system and select the parameter range.
10	Trigger key	Trigger	Activates the Trigger function. See page 95.
11	ESC Key	ESC	Press this button to cancel the current setting. The cursor returns to the default position or return to the previous menu according to the situation. See page 95.
12	Function Keys	V-Range Enter	V-Range key, up/down arrow keys and Enter key can be used together to select a voltage range or auto range measurement mode. Also, press and hold the V-Range key to toggle between manual and auto range setting. See page 29.

## G≝INSTEK

I-Range Enter	I-Range key, up/down arrow keys and Enter key can be used together to select a current range or auto range measurement mode. Also, press and hold the I-Range key to toggle between manual and auto range setting. See page 29.
MAX Hold	Press this button to display the maximum measurement reading. See page 94.
Mode	Press this key to select measure mode (DC/AC/AC+DC/V-MEAN). See page 96.
Setup	Press this key to enter the measurement settings menu. See page 33.
Hold	Press this key to switch window and stop refreshing. See page 95.
INTEGI Start St	Use the left and right arrow keys to select Integrator mode, and press Enter button to enter the time integrator function. See page 97.
Key Lock Local	Press this key to toggle to key lock. In Remote control mode, press this button to switch to local mode. See page 95.

14 F1~F5 function keys

13 LCD

Main Display Overview



No.	ltem	Status icon	Description	
1	Voltage Range	V-A 15V	Voltage measurement range. Example here range is 15V.	
			V-Auto means that Voltage Auto Range is turned on.	
2	2 Current Range I-A 2A		Current measurement range. Example here range is 2A.	
			I-Auto means that Current Auto Range is turned on.	
Â	\ Note	If status icon o <mark>red</mark> means that are restricted. I	f Voltage Range or Current Range lit in t the range selected is inappropriate or Please select another range again.	
3	Wiring mode	1P3W	This icon displays present wiring mode (1P3W, 3P3W, 3P4W, 3V3A).	

#### G≝INSTEK

#### **GETTING STARTED**

4	Mode	AC+DC	Measurement mode (AC, DC, AC+DC, V-MEAN)
5	Date Update Rate	Update 0.25s	Data update rate (0.1/0.25/0.5/1/2/5/10/20/Auto)
6	Crest Factor	CF3	Crest Factor (3/6/6A)
7	Remote	RMT	Remote control mode (On/Off)
8	Ratio State	Scaling	The icon will lit when any external magnification (voltage, current, power) is activated,
9	Maximum Hold	MAX Hold	Retain and display the maximum measurement reading.
10	Average	AVG-8	Average number of sampling (8/16/32/64)
11	Sync Source	SYNC.V	Synchronization source (V/I/Off)
12	Harmonic Calculation	HRM.I	Harmonic calculation method (IEC/CSA/Off)
13	Measure Storage	STORE	Measured date storage (On/Off)
14	External Input	EXT1	External signal input function (Ext1/Ext2/Off)
15	Peak Voltage	P.V	The voltage exceeds the measurement range
16	Peak Current	P.I	The current exceeds the measurement range
17	Display Hold	Hold	Retain and display the current measurement reading.
18	Keyboard Lock	Key Lock	Lock Key button
19	Frequency Filter	F.F	Frequency filters (On/Off)

20	Secondary menus	Display secondary function menu				
		To navigate the secondary function menu, use left and right arrow keys alternately. The arrow keys are loopback, which means, for example, when it stops at Graph, press the right arrow key to move to Enlarge in a promptly loopback manner.				
		• Enlarge	This function key is used to switch display of measurement result from 2 major plus 8 minor to 4 major ones.			
		• Integrator	This function key is used to set up integrator measurement parameters and execute integrator measurement function.			
		• Parameter	This function key is used set up measurement parameters.			
		• System	This function key is used to enter the system setting and system configuration screens.			
		• Graph	This function key is used to set up graph measurement settings and execute measurement in the intuitive graph displays.			
21	Simple Display Mode	Display the measurement result of 4 major measurement parameters				
22	Standard Display Mode	Display the measurement result of 2 major and 8 minor measurement parameters				
23	Line Filter	L.F Voltage and current filters (On/Off)				

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Rear Panel

GPM-8330



GPM-8320



# GWINSTEK

GPM-8330 (without GPIB +DA 12 interface)



1	Power Cord Socket	ACC 240V 100 - 240V 50/ 60Hz 35VA MAX O WARNING TO A WARNING INPU	Connects the power cord. AC 100~240V ±10%, 50/60Hz
2	RS232 Connector	O R5232 O	Accepts an RS-232C cable for remote control; DB-9 male connector. For remote control details, see page 136.
3	Mini GPIB Connector	(Mini) GPIB	Accepts an optional GPIB card for remote control. For GPIB details, see page 138.
4	USB Device Port	<b>*</b>	Accepts a USB device cable for remote control; Type B, female connector. For remote control details, see page 135.
5	Digital IO / DA12	Digital IO DA12	Accepts a digital I/O cable for signal output; SCSI 26 pin, female connector. For digital I/O details, see page 126

# **GWINSTEK**

Accepts a LAN for remote control. LAN Port 6 For remote control details, see page 140. 7 Voltage/Current Voltage/Current input input terminal terminals is used to connect the main measurement signals. The number on the left side means the number of channel. There are 3 channels for GPM-8330 and 2 channels for GPM-8320. A = 20A MAX 8 External Input 1/2 Connects output signal to the EXT1 terminal which receives up to 10V, or the EXT2 terminal that receives at the maximum of 2V. See page 57 for setting.



- Do not use damaged device. Before using the equipment, check its housing first to sure there is no any cracks. Do not operate this device in an environment containing explosive gases, steam or dust.
- The maximum measurable current and voltage are 600 V and 20A for voltage and current terminals of the rear panel of the GPM-8320/8330. Do not input exceeded voltage and current, otherwise it will burn the device.
- The maximum input voltage are 10 V and 2V for EXT1 and EX2 terminals of the rear panel of the GPM-8320/8330. Do not input exceeded voltage, otherwise it will burn the device.
- Always use the supplied cable for connection.
- Before connecting the device, observe all the safety symbols marked on the device.
- Turn off the power to the device and the application system before connecting I/O terminals.
- Do not install replacement parts on the device or perform any unauthorized modifications.
- Do not use this device if the removable cover is removed or loosened.
- Do not connect any cables and terminals before performing self-test.
- Use only the power adapter supplied by the manufacturer to avoid accidental injury.
- Do not use this device for life support systems or any other equipment that has safety requirements.

# Set Up

#### Power Up

Steps	1.	Ensure the AC voltage is 100~ 240V.				
	2.	Connect the power cord to the AC voltage input.				
Note Note		Make sure the ground connector on the power cord is connected to a safety ground. This will influence the measurement accuracy.				
	3.	Push to turn on the main power switch on the front panel.				

4. The display turns on and shows the last function that was used before the power was reset.

#### Connect the wires to the GPM-8320/8330

Background Two separate wires is used to connect the GPM-8320/8330, so voltage and current measurement are isolated and don't interfere with each other.

Connection diagram



Description	V +	The positive voltage input (+), 600V for input on the rear panel.
	V -	The negative voltage input (-), 600V for input on the rear panel.
	I +	The positive current input (+), 20A for input on the rear panel.
	I -	The negative current input (-), 20A for input on the rear panel.
	EXT1	The external 1 voltage input, 10V for input on the rear panel.
	EXT2	The external 2 voltage input, 2V for input on the rear panel.

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### Setting up measurement range

To get the accurate measurement results, you should set an appropriate measurement range before you perform measurement task.



Enter

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- 2. Use up and down arrow keys to select the desired range.
  - 3. Press **Enter** button to confirm your selection.
- Available range Crest Factor AUTO, 0.5A, 1A, 2A, 5A, 10A and 20A is 3: Crest Factor AUTO, 250mA, 0.5A, 1A, 2.5A, 5A and is 6/6A: 10A
- When the measurement range is set manually, if the range status icon lights in green means that the measured value meets the setting range. On the contrary, If the range status icon lights in red means that the measured value doesn't meet the best setting range. In this case. It is better to switch to other range to get more accurate measurement results.

folds (CF is set to 6/6A).

Note Note

The P.V status icon lights in red when the voltage measurement circuit detects that the measured value exceeds setting range by 3 folds (CF is set to 3) or 6 folds (CF is set to 6/6A).

measurement circuit detects that the measured value exceeds setting range by 3 folds (CF is set to 3) or 6

The P.I status icon lights in red when the current

#### Auto Range

The range is automatically switched according to the voltage and current of input signal.

Range is shift up	The range is shifted up when either of the following conditions is met.			
	• Vrms or Irms exceeds the measurement range by 130% at CF 3/6.			
	• Vrms or Irms exceeds the measurement range by 260% at CF 6A.			
	• The Vpk or Ipk value of the input signal exceeds the current setting range by 300% at CF 3.			
	• The Vpk or Ipk value of the input signal exceeds the current setting range by 600% at CF 6/6A.			
Range is shift down	The range is shifted down when all of the following conditions are met.			
	<ul> <li>Vrms or Irms is equal to or less than the measurement range by 30% at CF 3/6/6A.</li> </ul>			
	• Vrms or Irms is equal to or less than the next lower measurement range by 125% at CF 3/6/6A.			
	• The Vpk or Ipk value of the input signal is equal to or less than the next lower measurement range by 300% at CF 3.			
	• The Vpk or Ipk value of the input signal is equal to or less than the next lower measurement range by 600% at CF 6/6A.			

#### Example



To begin with, the measured Irms1 value is within the current range of I-A 1A.



The measured Irms1 (1.3601A) exceeds the I-A 1A by 130%, so the range is shifted up to 2A automatically.



The measured Irms1 (199.78mA) is less than 30% of the I-A 1A, so the range is shifted down to 0.5A automatically.

# Setting up measurement status

#### Setting up synchronization source

Steps	1. Press	Setup buttor	Setup			
	2. Press	Enter button	Enter button.			
	3. Press curso	down arrow or to the <b>Sync</b>	down arrow key to move r to the <b>Sync Source</b> field.			
	4. Use s the de	oft keys to se esired option	nfirm			
	SETUI Sync Line Freq Cresi Auto Hann Data Meas	P Source Filter uency Filter t Factor Zero nonics IEC Order Update Rate 0.25s sure Storage Interval	V Off Off 3 Off 50 Sync V1 Time Out 1s Sync V1 Off 0 0:00:00			
Option	V	Select the voltage of signals as synchronization source. The <b>SYNC.V</b> sta icon, for example, on the display lights u in green when V is selected for sync sour				
	I	Select the current of signals as synchronization source.				
	Off	Select the entire interval of data updatir period as synchronization source.				
Default value	v					

### Setting up line filter

Steps	1. Pre 2. Pre	Press Setup button. Setup Press Enter button. Enter				
	3. Pre cur	ess down arrow sor to the <b>Line</b>				
	4. Use the	e soft keys to so desired option	elect and confirn n.	confirm		
	SE S C C A H H D	TUP sync Source ine Filter requency Filter irrest Factor uto Zero larmonics IEC Order hata Update Rate 0.25 leasure Storage Interval	V On Off Off 3 Off 50 Sync V1 is Time Out 1s Sync V1 Off 0 0 : 0 0 : 0 0			
Option	On	Turn on the line filter function, which is inserted into voltage and current measurement input circuits and affects voltage, current as well as power measurements without high frequency components included within measured values. The <b>L.F</b> status icon on the display lights up in green.				
	Off	off Turn off the line filter frequency is 500Hz.		n. The cutoff		
Default value	Off					

# Setting up frequency filter

Steps	1. Press	Press Setup button. Setup			Setup	
	2. Press	Enter buttor	1.		Enter	
	3. Press curso	Press down arrow key to move cursor to the <b>Frequency Filter</b> field.				
	4. Use s the de	4. Use soft keys to select and confirm the desired option.				
	SETUI Sync Line Freq Cres Auto Harm Data Meas	P Source Filter uency Filter t Factor Zero nonics IEC Order Update Rate 0.25s sure Storage Interval	V On 3 Off 50 Sync V1 5 Time Out 1s Sync V1 Off 0 0 : 0 0 : 0 0	On		
Option	On	Turn on the frequency filter function, which is inserted into frequency measurement input circuit and affects frequency measurements with high frequency components included within measured values. The <b>F.F</b> status icon on the display lights up in green.				
	Off	Turn off the f cutoff freque	requency fil ncy is 500H	ter funct z.	tion. The	
Default value	Off					

### Setting up crest factor

Steps	1. Pro	ess Setup button. Setup			
	2. Pro	ess Enter button.			
	3. Pro cur	ess down arrow key to move rsor to the <b>Crest Factor</b> field.			
	4. Us the	e soft keys to select and confirm e desired option.			
	S	ETUP Sync Source V 3 Line Filter On 6 Crest Factor 3 Auto Zero Off 6 Harmonics IEC Order 50 Sync V1 Data Update Rate 0.25s Time Out 1s Sync V1 Measure Storage Off Interval 00:00:00			
Option	3	Crest Factor is 3.			
	6	Crest Factor is 6.			
	6A	Crest Factor is 6A where input range of measurement range will be extended and greater than 6. This is practical for restraining from frequent range changes while measuring, under auto range, a distorted waveform.			
Default value	3				
# Setting up auto-zero function

Steps	1. Pres	ss <b>Setup</b> butto	on.	Setup
	2. Pres	ss <b>Enter</b> butto	n.	Enter
	3. Pres curs	ss down arrov sor to the <b>Aut</b>	v key to move <b>o Zero</b> field.	
	4. Use the	soft keys to s desired option	elect and confir n.	m
	SET Sy Lin Fro Cr Au Ha Da Me	TUP nc Source he Filter equency Filter est Factor to Zero urmonics IEC Order ta Update Rate 0.23 easure Storage Interval	V 0n On 07 3 0ff 50 Sync V1 55 Time Out 1s Sync V1 0ff 00:00:00	
Option	On	Auto-zero fu hour or whe	unction is activate en range is switch	ed once per ied.
	Off	Auto-zero fu when the ra function is t function is e	unction is only ac nge is switched. curned off when t executed.	tivated once The auto-zero he integrator
Default value	Off			

### Setting up method of calculating harmonics

Steps	1. Press	Setup button.	Setup
	2. Press	Enter button.	Enter
	3. Press curso	down arrow key to m r to the <b>Harmonics</b> fie	ove Id.
	4. Use s the de	oft keys to select and o esired option.	confirm
	SETUI Sync Line Freq Cres Auto Harm Data Meas	Source     V       Filter     On       uency Filter     On       : Factor     3       Zero     Off       nonics     IEC       Order     50       Sync     V1       uer Storage     Off       Interval     0 0:00:00	LLC CSA Off
Option	IEC	Calculate the ratio of h the 2nd through the up harmonic to the 1st ha status icon, for exampl lights up in green when harmonics.	armonic quantity of oper limit 50th rmonic. The <b>HRM.I</b> e, on the display 1 IEC is selected for
	CSA	Calculate the ratio of h the 2nd through the up harmonic to the 1st the harmonic.	armonic quantity of oper limit 50th rough the 50th
	Off	Turn off the harmonic calculation function.	
Default value	IEC		
Steps	5. Press curso	right arrow key to mo r to <b>Order</b> field.	ove



### Setting up data update rate

Steps	1. Press <b>Setu</b>	<b>p</b> button.	Setup
	2. Press Ente	er button.	Enter
	3. Press dow cursor to t field.	n arrow key to move he <b>Data Update Rate</b>	
	<ol> <li>Use soft key the desired "More" so pages for for the second second</li></ol>	eys to select and confirm d option. Press the off keys to toggle among further options. v 0.15 further options. v 0.15 0n 0.255 3 0ff 0.255 IEC Order 50 Sync V1 Rate 0.255 Time Out 15 Sync V1 rage Off 15 sync V1	
Option	0.1s/ 0.25s/ 0.5s/ 1s/ 2s/ 5s/ 10s/ 20s	Measured value is updat accordance with the desi interval. The <b>Update 5s</b> s for example, on the displ in green when 5s option	ed in ignated time status icon, lay lights up is selected.
	Auto	Data is only updated who period (Time Out) of the waveform is detected.	en a set e input
Default value	0.25s		
Steps	5. When Aut selected, p move curs	to for Data Update Rate i press right arrow key to or to <b>Time Out</b> field.	s 🕞

	6. Use soft keys to select and confirm the desired option.
	SETUP Sync Source V is Line Filter Off Frequency Filter Off Crest Factor 3 Auto Zero Off Harmonics IEC Order 50 Sync V1 Data Update Rate Auto Time Out 15 Sync V1 Measure Storage Off Interval 00:00:00
Option	1s/ 5s/ 10S/Time out period acts like the time limet20Sfor detecting a period of the input waveform
Default value	ls
Note Note	Time Out function is only available when Auto is selected for Data Update Rate.
Steps	7. When Auto for Data Update Rate is selected, press right and down arrow keys to move cursor to <b>Sync</b> field.
	8. Use soft keys to select and confirm the desired option.
	SETUP       V       VI         Sync Source       V       VI         Line Filter       Off       V2         Crest Factor       3       V3         Auto Zero       Off       V3         Harmonics IEC Order       50 Sync V1       13         Data Update Rate Auto       Time Out 1s       13         Sync       V1       Measure Storage       Off         Interval       0 0: 0 0: 0 0       12
Option	<b>Sync Source</b> V1, V2, V3, I1, I2, I3 (For GPM-8330)

V1, V3, I1, I3 (For GPM-8320)

Default value 1s



Sync function is only available when Auto is selected for Data Update Rate.

### Setting up measure storage

Steps	1. Press	<b>Setup</b> button.	Setup
	2. Press	Enter button.	Enter
	3. Press curso field	s down arrow key to mo or to the <b>Measure Stora</b>	ge
Note Note	Measure is selecte	Storage function is Not ed for Data Update Rate.	available when Auto
	4. Uses the d Syn Line Free Aut Har Data Mea	soft keys to select and c esired option. P c Source V Filter Off juency Filter Off st Factor 3 o Zero Off monics IEC Order 50 Sync V1 a Update Rate 0.25s Time Out 1s Sync V1 sure Storage Off	onfirm
Option	On	All measured date will internal memory by de interval for repeating tl The <b>STORE</b> status icor the display lights up in Measure Storage funct	be stored to the signated time ne storage operation. n, for example, on green when ion is turn on.
	Off	Turn off the measure s	torage function.
Default value	Off		
Steps	5. Press curso	s down arrow key to mo or to <b>Interval</b> field.	ove

	6. Use soft keys to increase or decrease the interval.
	SETUP Sync Source V Incr + Line Filter Off Frequency Filter Off Crest Factor 3 Auto Zero Off Harmonics IEC Order 50 Sync V1 Data Update Rate 0.25s Time Out 1s Sync V1 Measure Storage Off Interval 00:000
Option	The setting range for Interval is from 00:00:00 to 99:59:59.
Default value	00:00:00
Note Note	When it is set 00:00:00, the interval for measure storage will be synchronized with the designated Data Update Rate.
	Storage stops in the following circumstances:
	<ul> <li>When data has been stored to all blocks, Normal measure data can be stored 10000 blocks and Normal with Harmonic data can be stored 1000 blocks.</li> </ul>
	<ul> <li>When the storage setting is set to Off (while storage is in progress)</li> </ul>
	• If you press the HOLD key to hold the display while storage is in progress, the measurement operation and the storage interval time counter are held (paused), which causes the storage operation itself to be held. If integration is in progress, this instrument continues measurement and integration in the background.

### Setting up average function

Steps	1. Press S	Setup button. Setup
	2. Press A	Average soft key.
	3. Press I	Enter button.
	4. Press of to the	down arrow key to move cursor <b>State</b> field.
	5. Use so desiree	ft keys to select and confirm the d option.
	AVERAG State Type Count	E Off On Linear of S
Option	On	Turn Average function On for either Linear or Exponential averages of numeric data. It is particularly practical for large changes in load or power of low input signal frequency.
	Off	Turn off Average function.
Default value	Off	
Steps	6. Press of to Typ	down arrow key to move cursor <b>v</b>



Default value 8

### Setting up the voltage and current skipping configuration

Steps	1. Press	Setup button.	Setup
	2. Press	V/I Range soft key.	V/I Range
	3. Press	Enter button.	Enter
	4. Press cursor	down arrow key to move t to the <b>Mode</b> field.	
	5. Use so the de	oft keys to select and confirm sired option.	
	MEASU Mode Skippi V-Range 150 150 150 100 Peak I-Range 0.5 5A Peak	REMENT RANGE CONFIG Menu ing Confg Off V 30V 60V V 300V 60V Over Off 5A 1A 2A 10A 20A Over Off	
Option	Menu	When user is configuring rang the measured data will Not be	e setting, displayed.
	Quick	The measured data will be dis simultaneously while measure is being switched by user. This for frequent switch of measure range.	played ement range is practical ement
Default option	Menu		
Steps	6. Press cursor	down arrow key to move r to <b>Skipping Config</b> field.	

	7. Use the	soft keys to select and confirm desired option.
	ME/ M SI V-Ra P P P I-Ra P P P	ASUREMENT RANGE CONFIG ode Menu On tipping Config On ange 15V 30V 60V 150V 300V 600V 150V 300V 600V 1000V tabk Over Off 5A 10A 20A bak Over Off
Option	On	It is able is skip certain measurement range(s) that are not used by turning on this feature. It can reduce measured data loss which happens while ranges are switched.
	Off	Turn off the function.
Default option	Off	
Steps	8. Pres curs <b>V-R</b>	ss down arrow key to move sor to each field of both <b>Range</b> and <b>I-Range</b> .
	9. Use the rang v-ra v-ra v-ra v-ra	e soft keys to enable or disable skipping function for each ge. ASUREMENT RANGE CONFIG ode Menu Off isv 300V 660V 150V 300V 660V 150V 300V 660V 150V 300V 600V 150V 300V 60V 150V 60V
Option	On	The box of range will be checked when the range is enabled for skipping function.
	Off	The range is disabled for skipping function.
Default option	Off	

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Steps 10. Press down arrow key to move cursor to Peak Over field for V-Range and I-Range, respectively. 11. Use soft keys to select and confirm the desired option. Press the More soft key to toggle among pages for Peak Over of V-Range and I-Range. Off Skipping Config On 30V 60V ✓ 300V 600V Peak Over Of **1**A 2A ✓ 20A 10A Over Option When the occurrence of peak over-range happens in Auto range mode, user is able to define a measurement range to switch to. The available options for each mode are listed below. When it is under CF3 mode for V-Range. Off/ 15V/ 30V / 60V/ 150V/ 300V/ 600V When it is under CF6/6A mode for V-Range. Off/ 7.5V/ 15V / 30V/ 75V/ 150V/ 300V When it is under CF3 mode for I-Range. Off/ 0.5A/ 1A/ 2A/ 5A/ 10A/ 20A When it is under CF6/6A mode for I-Range. Off/ 250mA/ 0.5A/ 1A/ 2A/ 5A/ 10A Default option Off The available options for Peak Over field are limited Note within the selected options from the V-Range and I-

Range sections above.

Setting up the skipping configuration for external

Steps	1. Press S	Setup button.	Setup
	2. Press	V / I Range soft key.	V / I Range
	3. Press l	E <b>nter</b> button.	Enter
	4. Press c cursor	down arrow key to move to <b>Skipping Config</b> field.	
	5. Use so the dea	ft keys to select and confirm sired option.	
	MEASUR Mode Skippi V-Range 159 150 100 Peak 0 1-Range 0.5 5A Peak 0	REMENT RANGE CONFIG Menu ng Config On On Off V 300V 600V V 300V 600V OV Over Off A 1A 2A 10A 20A Over Off	
Option	On	It is able is skip certain measu range(s) that are not used by this feature for external input. reduce measured data loss wh while ranges are switched.	urement turning on It can hich occurs
	Off	Turn off the function.	
Default option	Off		
Steps	6. Press l	ESC button.	ESC
	7. Press <b>External</b> soft key.		External
	8. Press l	E <b>nter</b> button.	Enter

- Press down arrow key to move cursor to each field of either External Sensor 1 or External Sensor 2.
- 10. Use soft keys to enable or disable the skipping function for each range.

**5V** 

100mV

1V

Off

✓ <mark>10V</mark>

200mV

√2V

EXTERNAL SKIPPING CONFIG Extenal Sensor 1

✓ 2.5V

Peak Over Extenal Sensor 2

> 50mV 500mV

Peak Over

Option	On	The box of range will be checked when the range is enabled for skipping function.
	Off	The range is disabled for skipping function.
Default option	Off	
Steps	11. Pres curs Exte Sen	ss down arrow key to move sor to <b>Peak Over</b> field for ernal Sensor 1 or External sor 2, respectively.
	12. Use des to to Ove resp	e soft keys to select and confirm ired option. Press <b>More</b> soft key oggle among pages for Peak er of Ext-1 and Ext-2, pectively.
	EXT Exte	real Sensor 1     off       2.5V     5V     10V       2.5V     0ff     2.5V       sensor 2     50mV     100mV       50mV     100mV     20mV       500mV     1V     2V

Option	When the occurrence of peak over-range happens in Auto range mode for external input, user is able to define a measurement range to switch to. The available options for each mode are listed below.			
	When it is under CF3 mode for External Sensor 1.			
	Off/2.5V/5V/10V			
	When it is under CF6/6A mode for External Sensor 1.			
	Off/1.25V/2.5V/5V			
When it is under CF3 mode for External Sensor 2				
	Off/50mV/100mV/200mV/500mV/1V/2V			
	When it is under CF6/6A mode for External Sensor 2.			
	Off/25mV/50mV/100mV/250mV/0.5V/1V			
Default option	Off			
Note Note	• The available external is based on which external sensor input is enabled beforehand. Be aware that it requests to enable either Ext1 or Ext2 prior to enabling the skipping config for external.			
	• The available options for Peak Over field are limited within the selected options from the External Sensor 1 and External Sensor 2 sections above.			

### Setting up the Element for Ratio

Steps	1.	Setup	
	2.	Press <b>Ratio</b> soft key.	Ratio
	3.	Press Enter button.	Enter
	4.	Press down arrow key to move cursor to the <b>Element</b> field.	
	5.	Use soft keys to select and confirm the desired option. Select ALL and then press OK.	
Option	All		
	1		
	2		
	3		
Default option	All		

### Setting up the VT ratio state

Steps	1. Press <b>Setup</b> button.	Setup			
	2. Press <b>Ratio</b> soft key.	Ratio			
	3. Press Enter button.	Enter			
	<ol><li>Press down arrow key to move cursor to the VT Ratio State field.</li></ol>				
	5. Use soft keys to select and confirm the desired option.				
	RatioOnElementAllOnVT Ratio StateOffOffRatio0 0 0 1 . 0 0 0OffCT Ratio StateOffRatioPower Ratio StateOffOffRatio0 0 0 1 . 0 0 0OtherKatio0 0 0 1 . 0 0 0OtherConstantOffOtherConstantOffOtherConstantOtherO				
Option	<b>On</b> Turn on the VT (Voltage Transfor calculation function and the <b>VT</b> s on the display lights up in green.	mer) ratio status icon			
	<b>Off</b> Turn off the VT ratio calculation f	function.			
Default option	Off				
Steps	6. Press down arrow key to move cursor to <b>Ratio</b> field.				



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Option	On	Turn on the CT (Current Transformer) ratio calculation function and the <b>CT</b> status icon on the display lights up in green.				
	Off	Turn off the CT ratio calculation	on function.			
Default option	Off					
Steps	6. Press curse	ess down arrow key to move rsor to <b>Ratio</b> field.				
	7. Use decr decr Rati Elei VT cT Pov	soft keys to increase or ease coefficient of CT ratio.				
Option	The setting range for CT Ratio is from 0000.001 to 9999.999.					
Default value	0001.00	001.000				
Setting up the	power ra	atio state				
Steps	1. Pres	s <b>Setup</b> button.	Setup			
	2. Pres	. Press <b>Ratio</b> soft key.				
	3. Pres	s <b>Enter</b> button.	Enter			
	4. Press curse field	ss down arrow key to move sor to the <b>Power Ratio State</b> d.				

	5. Use s the d Ratii Elen VT CT Pow	soft keys to estired optic nent Ratio State Ratio Ratio State Ratio State Ratio State Ratio	select and c on. All 0 0001.000 0 0 0001.000 0 0001.000	onfirm on of ot	
Option	On	Turn on the and the <b>SF</b> up in greer	e power ratio status icon o 1.	calculation the dis	on function play lights
	Off	Turn off the function.	e power ratio	calculatio	on
Default option	Off				
Steps	<ul> <li>6. Press down arrow key to move cursor to <b>Ratio</b> field.</li> <li>7. Use soft keys to increase or</li> </ul>				
	decre Rati Elen VT CT Pow	ease coeffici nent Ratio State Ratio State Ratio rer Ratio State Ratio	All on 0 0 0 1 . 0 0 0 On 0 0 0 1 . 0 0 0 On 0 0 0 1 . 0 0 0	rr ratio. Incr* Incr*	
Option	The setti 9999.999	ng range for ).	power ratio	is from 00	)00.001 to
Default value	0001.000	)			

Setting up the external sensor input terminal

Steps	1. Pres	Press Setup button. Setup					
	2. Pres	2. Press <b>External</b> soft key.					
	3. Pres	ss <b>Enter</b> button.	Enter				
	4. Pres curs field	4. Press down arrow key to move cursor to the <b>External Sensor State</b> field.					
	5. Use the	5. Use soft keys to select and confirm the desired option.					
	Exte Ex Ra Ex	ernal eternal Sensor State Ext1 off atio Element All ett1 Ratio(V/A) 0001.000 Ext2 ett2 Ratio(mV/A) 0010.000 Ext2					
Option	Ext1	Turn on the Ext1 terminal functi receives voltage up to 10V inclu and clamps from external outpu sensor for measurement and th status icon on the display lights green.	on that ding shunts ut current e <b>EXT1</b> s up in				
	Ext2	Almost identical with the Ext1, t terminal receives up to 2V volta <b>EXT2</b> status icon on the display green when it is enabled.	he <b>Ext2</b> ge and the lights up in				
	Off	Turn off the external sensor inpo return to current input terminal	ut and				
Default option	Off						

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Steps	6.	Press down arrow key to move cursor to the <b>Ratio Element</b> field.			
	7.	Use soft keys to select and confirm the desired option. Select <b>ALL</b> and then press <b>OK</b> .			
		External       All         Ratio Element       All         Ext1 Ratio(V/A)       0 0 0 1 . 0 0 0         Ext2 Ratio(mV/A)       0 0 1 0 . 0 0 0         2       3         ok       0k			
Option	All				
	1				
	2				
	3				
Default option	All				
Steps	8.	Press down arrow key to move cursor to either <b>Ext1 Ratio (V/A)</b> or <b>Ext2 Ratio (mV/A)</b> field.			
	9.	Use soft keys to increase or decrease the conversion ratio of either Ext1 or Ext2.			
		External External Sensor State Ext1 Ratio Element All Ext1 Ratio(V/A) © 0 0 1 . 0 0 0 Ext2 Ratio(mV/A) 0 0 1 0 . 0 0 0			

Option

The setting range for both Ext1 and Ext2 is from 0000.001 to 9999.999.

Default value	Ext1	0001.000
	Ext2	0010.000
Note Note	In order to external (j input func	o enable range skipping configuration for page 49), it is required to enable external ction first.

### Saving and loading the setup parameters

Steps	1. Press	1. Press <b>Setup</b> button.				
	2. Press	<ul> <li>Press Page 1/2 soft key.</li> <li>Press Save Load soft key.</li> <li>Press Enter button.</li> </ul>				
	3. Press					
	4. Press					
	5. Press cursor	Press down arrow key to move cursor to the <b>Type</b> field.				
	6. Use so the de	. Use soft keys to select and confirm the desired action.				
	SAVE / Type File State	LOAD Save Sove				
		Ok				
Option	Save	Select Save to store setup par the internal memory.	ameters into			
	Load	Select Load to recall setup pa back from the internal memo	rameters ry.			
Default option	Save					

# GWINSTEK

Steps	7. Press curso	down arrow key to move <b>(File</b> field.				
	8. Use s the d by cl the S	soft keys to select and confirm lesired memory set followed icking <b>Ok</b> soft key to confirm Gave or Load action.				
	SAVE	/ LOAD				
	File					
	Stat	te Free a				
		4 Ok				
Option	1 - 4	There are 4 sets of internal memories for saving and loading setup parameters. The <b>State</b> field below indicates the status of selected memory set.				
		Free represents the set is empty without saved parameters, whereas Saved indicates the set has been stored with setup parameters.				
Default option	1					

### Setting up the D/A output configuration

Steps	1. Press <b>Setup</b> button.	Setup
	2. Press <b>Page 1/2</b> soft key.	Page 1/2
	3. Press <b>D/A</b> soft key.	D/A
	4. Press Enter button.	Enter

A Note

Since the DA12 connector is an optional accessory, if it is not available on your unit, the D/A soft key will be disabled in grey color as the figure below shown.

SETUP		Savo
Sync Source	V	Load
Line Filter	Off	
Frequency Filter	Off	D/A
Crest Factor	3	
Auto Zero	Off	Hardcopy
Harmonics IEC	Order 50	MATH
Data Update Rate 0.25s	Time Out 1s	PLATTI
Measure Storage	Off	Page
Interval	00:00:00	2/2

5. Press down arrow key to move cursor to the **Preconfigured format** field.



6. Use soft keys to select and confirm the desired option.

D/A OUT	грит с	ONFIG				
Precont	Preconfigured format				Normal	
Rated	00	01:00:				
CH1	V1	CH5	11	CH9	P1	Integrator
CH2	<b>V2</b>	CH6	12	CH10	P 2	
CH3	V3	CH7	13	CH11	<b>P3</b>	
CH4	٧E	CH8	IΣ	CH12	PΣ	



Option	Normal	Th ch set	The D/A output parameters for each channel will be changed to the defa setting of Normal mode as follows		
	Normal Mode		Default va	alue	
	For example		CH1	٧١	
			CH2	12	
			CH3	P3	
			CH4	VHzΣ	
	Integrator	r The D/A output parameters for channel will be changed to the setting of Integrator mode as for			
	Integrator Mod	le	Default va	alue	
	For example		СН1	P1	
			CH2	WP2	
			CH3	q <b>3</b>	
			CH4	VHzΣ	

Default option	Normal
Steps	7. Press down arrow key to move cursor to <b>Rated Integrator</b> field.
	8. Use soft keys to increase or decrease time for rated integrator.
	D/A OUTPUT CONFIG

D/A OU		ONFIG				
Precon	figured	format	Norr	nal		Incr +
Rated	Integra	tor	00	01:00:	00	
CH1	V1	CH5	11	CH9	P1	Incr -
CH2	V2	CH6	12	CH10	P 2	
СНЗ	V3	CH7	13	CH11	P3	
CH4	٧E	CH8	IΣ	CH12	PΣ	



Option	In the int 8320/833 continuo and assig time of ra 9999:59:1 output va	tegrated values of D/A output, GPM- 30 presumes a rated value is received ously over the designated time to be 100%, gns the value to 5V. The setting range for ated integrator is from 0000:00:00 to 59. When the time is set 0000:00:00, D/A alue will be 0V.				
Default value	0001.00:	00				
Steps	9. Press CH1 respe	arrow keys to move cursor to through <b>CH12</b> field, extively.				
	10. Use soft keys to select and confirm desired option. Press <b>More</b> soft key to toggle among pages for options.					
	D/A C Prec Rate CH1 CH2 CH3 CH4	DUTPUT CONFIG         V           onfigured format         Normal         V           dd Integrator         0 0 0 1 : 0 0 : 0 0         1           V 1         CH5         I1         CH9         P1           V2         CH6         I2         CH10         P2         P           V3         CH7         I3         CH11         P3         VI           VI         CH8         II         CH12         PI         VA				
Option	It is available to designate the following output items for each output channel.					
	V	Voltage				
	I	Current				
	Ρ	Active power				
	VA	Apparent power				
	VAR	Reactive power				
	PF	Power factor				
	DEG	Phase angle				

VHz Voltage frequency

	-	
	IHz	Current frequency
	VpK	Voltage peak
	ІрК	Current peak
	WP	Total watt hour
	WP+	Positive watt hour
	WP-	Negative watt hour
	q	Total ampere hour
	q+	Positive ampere hour
	q-	Negative ampere hour
	Off	0V D/A Output
Steps	11. Also curse thro	, press arrow keys to move or to <b>channel number</b> of <b>CH1</b> ugh <b>CH12</b> field, respectively.
	12. Use desin	soft keys to select and confirm red option.
	D/A Pre Rat CH: CH: CH:	OUTPUT CONFIG       1         configured format       Normal       1         ed Integrator       0 0 0 1 : 0 0 : 0 0       2         1       VI CH5       II CH9       P1         2       V2       CH6       I2       CH10       P2         3       V3       CH7       I3       CH11       P3         4       VI CH8       II CH12       PI       I
Option	1	
	2	
	3	

Σ

# Setting up the hardcopy and log configuration

Steps	1. Press Se	Setup	
	2. Press <b>Pa</b>	<b>ge 1/2</b> soft key.	Page 1/2
	3. Press Ha	<b>rdcopy</b> soft key.	Hardcopy
	4. Press En	<b>ter</b> button.	Enter
	5. Press do cursor to		
	6. Use soft the desir	keys to select and confirm red option.	
	Hardcopy Type Overwrite	Capture Off Log	
Option	Capture	Select Capture to save scree into the inserted USB disk. name ranges from SCREEN SCREEN99.BMP.	enshot file The file 00.BMP to
	Log	Select Log to save data log inserted USB disk. The file from DATA000.CSV to DATA	file into the name ranges \999.CSV
Default option	Capture		
Steps	7. Press do cursor to	wn arrow key to move • <b>Overwrite</b> field.	

	8. Use s the d	Use soft keys to select and confirm the desired action.					
	Har Typ Ove	dcopy e rwrite	Capture Off	On			
Option	On	On Turn on overwrite function so that the existed file within the USB disk will be overwritten when saving action is executed.					
	Off	By turni saved fi the USE action.	By turning off overwrite function, a new saved file will be created and saved into the USB disk when executing saving action.				
Default option	Off						
Note Note	When O the inser instance exist in U overwrith	verwrite fu ted USB di , when bot JSB disk, tl cen accordi	nction is On isk will be ov h DATA000.0 he DATA001. ngly when sa	, the latest fi verwritten. Fc CSV and DAT .CSV will be aving file.	le name in or 74001.CSV		
	When, on the other hand, Overwrite function is Off, a new one with the latest file name will be created. However, for example, when both SCREEN00.BMP and SCREEN02.BMP exist, a new file named SCREEN01.BMP will be saved since system fills filename vacancy automatically. Also, when saved files are full in USB disk, e.g., from SCREEN00.BMP to SCREEN99.BMP, a warning message will be shown and save action will be Not available.						

### Setting up the MATH configuration

Steps	1. Press Setup		Setup	
	2. Press Page 1	<b>/2</b> soft key.		Page 1/2
	3. Press MATH	I soft key.		МАТН
	4. Press Enter l	outton.		Enter
	5. Press down a cursor to the	ove ield.		
	6. Use soft key: the desired o	onfirm		
	MATH Computation Item A Item B	A/B Vi Il	A+B A+B A+B A/B More 1/2	
Option	A+B, A-B, A*B, A/B, A/B², A²/B	Up to 6 comput AxB, A÷B, A÷B <sup>2</sup> based on the fo arithmetic (add multiplication a executed by GP select items out P, VA, VAR). The computation wi unit.	ations (A <sup>2</sup> , A <sup>2</sup> ÷B), v ur elemen ition, sub nd divisio M-8320/8 t of 5 vari e result o Il be a val	+B, A–B, which are ntary traction, on), can be 3330 with 2 ables (V, I, f lue without
Default option	A/B			
Steps	7. Press down a cursor to <b>Ite</b>	arrow key to mc <b>m A</b> field.	ove	

	8. Use the c					
	MA Cor Iter	TH mputation m A m B	A/B P 1 I1	v I VA More 1/2		
Option	V I P VA VAR	Voltag Currer Active Appar Reacti	e nt power ent power ve power			
Default option	v					
Steps	<ul> <li>9. Press right arrow key to move cursor to channel number of Item A field.</li> <li>10. Use soft keys to select and confirm</li> </ul>					
	the constraints of the constrain	desired oj TH mputation m A m B	A/B PI Ii	1 2 3 x		
Option	1					
	2					
	3					
	Σ					
Default option	1					

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Steps	11. Press down arrow key to move cursor to <b>Item B</b> field.						
	12. Use soft keys to select and confirm the desired option.						
	MATH Comp	utation	A/B	v I			
	Item	B	VA 1	P VA More 1/2			
Option	V	Voltage					
	I	Current					
	P	Active p					
		Appare	nt power				
	VAR	Reactiv	e power				
Default option							
Steps	<ul><li>13. Press right arrow key to move cursor to channel number of Item</li><li>B field.</li></ul>						
	14. Use so the de						
	MATH			1			
	Comp	utation	A/B	2			
	Item	A	P1				
	Item	В		3			
				Σ			
Option	1						
	2						
	2						
	5						
	Σ						

## Setting up System status

### System information screen

Steps

1. Press soft key to select **System** function.



2. Press Enter button to Enter SYSTEM INFORMATION screen where detailed information including Model, Serial Number, MCU/FPGA Version and MAC Address of the unit is displayed. Enter

System information for GPM-8320

System information for GPM-8330



## **G**<sup>w</sup>**IIISTEK**

#### BASIC SETTING

Enter

- 3. Press Enter button.
- 4. Press down arrow key to move cursor to Calibration Password field.
- 5. Use soft keys along with left and right arrow keys to input the password followed by pressing Enter button twice to enter the Calibration page.



#### Default option



Refer to qualified technician and service manual for the calibration procedure.

Steps

Config

#### SYSTEM CONFIG1 screen

1.	Press soft key to function.	select <b>System</b>
	V-R 1000 V AC+DC CF3 I-R 20 A 1P3W Update 0.25s	SYNC.V HRM.I



2. Press **Config1** soft key to Enter **SYSTEM CONFIG1** setting screen.

SYSTEM CONFIG		
Power On Statu	s Setup Default	Config2
Brightness	7	
Key Sound	Off	Info
I/O Model	LAN	
		Measure
IP Model	DHCP	
Socket Port	00023	
IP Address	172. 16. 26.164	
Subnet mask	255.255.128. 0	
Gateway	172. 16. 0.254	

#### Setting up power on status

Background	Continue the following setting from <b>SYSTEM</b> <b>CONFIG1</b> setting screen	
Steps	1. Press Enter button.	Enter
	2. Press down arrow key to move cursor to <b>Power On Status Setup</b> field.	
3. Use soft keys to select and confirm the desired option. SYSTEM CONFIG1 Power On Status Setup Default Brightness Default Off Key Sound I/O Model LAN IP Model DHCP Socket Port 00023 172. 16. 26.164 IP Address Subnet mask Gateway 172. 16. 0.254 Previous The status of unit on powering on is set Option to the status before the last shutdown. Default The status of unit on powering on is set

to the factory default status.

Default value	Default
---------------	---------

## Setting up brightness

Background	Continue the following setting from <b>SYSTEM</b> <b>CONFIG1</b> setting screen			
Steps	1. Press Ente	Enter		
	2. Press dow cursor to <b>H</b>	<ol><li>Press down arrow key to move cursor to <b>Brightness</b> field.</li></ol>		
	3. Use soft ke decrease th	eys to increase or he brightness level		
	SYSTEM CON Power On S Brightness Key Sound I/O Model IP Model Socket Port IP Address Subnet mask Gateway	FIG1 tatus Setup Default 7 off LAN DHCP 00023 172. 16. 26.164 (255.255.128. 0 172. 16. 0.254		
Option	1 - 10	The display is the darkest 1. On the contrary, it turns brightest when set to 10.	when set to out the	
Default option	7			
Setting up key	sound			
Background	Continue the <b>CONFIG1</b> set	following setting from <b>SY</b> tting screen	STEM	
Steps	1. Press Ente	<b>r</b> button.	Enter	
2. Press down arrow key to move cursor to <b>Key Sound</b> field.				

3. Use soft keys to select and confirm the desired option.

		SYSTEM CONFIG Power On State Brightness Key Sound I/O Model IP Model Socket Port IP Address Subnet mask Gateway	1 us Setup Default 7 Off LAN DHCP 00023 172. 16. 26.16 255.255.128. 172. 16. 0.25	0n 0ff 4 0 4	
Option	On	A short when p	t sound is heard pressing the keys	from sp on the f	eaker of unit front panel.
	Off	No sou pressir	and from speake ng the keys on th	r of unit e front p	when banel.
Default option	Off				

## Setting up remote interface

Background	Continue the following setting from <b>SYSTEM</b> <b>CONFIG1</b> setting screen			
Steps	1. Press Enter button.	Enter		
	2. Press down arrow key to move cursor to <b>I/O Model</b> field.			
	3. Use soft keys to select and confirm the desired option. SYSTEM CONFIGI Power On Status Setup Default Brightness 7 Key Sound Off I/O Model R5232 Baud Rate 115200 Terminator CR+LF LN			

# **G**<sup>w</sup>**INSTEK**

Option **RS232** If interface is set to RS232, the **Baud Rate** and the **Terminator** fields can be selected. For details about configuring RS 232 interface, please see page 136.



USB

For details about configuring USB interface, please see page 135.



GPIB

If interface is set to GPIB, the **GPIB Address** can be selected from "1" to "30". Please see page 138 for details.



LAN

If interface is set to LAN, the IP model is can be selected from "**Manual**" and "**DHCP**". For details about configuring LAN interface, please see page 140.

SYSTEM CONFIG Power On State	61 us Setup <mark>Default</mark>	RS232
Brightness Key Sound	7 Off	USB
I/O Model IP Model	LAN DHCP	GPIB
Socket Port IP Address	00023	LAN
Subnet mask Gateway	255.255.128. 0 172. 16. 0.254	

#### SYSTEM CONFIG2 screen

Steps 1. Press soft key to select **System** function.



2. Press **Config2** soft key to Enter **SYSTEM CONFIG2** setting screen.





## Setting up SCPI identity

Background	Continue CONFIG	Continue the following setting from <b>SYSTEM</b> C <b>ONFIG2</b> setting screen				
Steps	1. Press	<ol> <li>Press Enter button.</li> <li>Press down arrow key to move cursor to SCPI Type field.</li> </ol>				
	2. Press cursor					
	3. Use so the de	3. Use soft keys to select and confirm the desired option.				
	SYSTER SCPI Displa	4 CONFIG2 Type Default Default ying Numeric data Form 10 Item User				
Option	Default	The return message in remot returns the default manufact number, serial number, amot	te control urer, model ng other info.			
	User	User User-defined manufacturer, mod number and so forth will be retu remote control mode.				
Default value	Default					

## Setting up Numeric data Form

Background	Continue the following setting from <b>SYSTEM</b> <b>CONFIG2</b> setting screen			
Steps	1. Press Enter button.			
	<ol> <li>Press down arrow key to move cursor to Displaying Numeric data Form field.</li> </ol>			
	3. Use soft keys to select and confirm the desired option.			
	SYSTEM CONFIG2 SCPI Type Default to Item Displaying Numeric data Form 10 Item All Item			
Option	10 ltem			
	Matrix			
	All Item			
Default value	10 Item			

# MEASUREMENT AND OTHER FUNCTIONS

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# Measurement function

The GPM-8320/8330 provides a wide range of basic electricity and power measurement functions. It equips with different accurate measurement parameters for accurately measuring the voltage, current, power, DC/AC/AC + DC/V-MEAN, power factor, harmonics, frequency, etc. The input impedance of the device is  $2M\Omega$ , and the maximum input voltage is 1000Vrms. The internal resistance (Shunt) of the device is  $5m\Omega$ , and the maximum input current is 20Arms. Also, there are 2 external current input terminals (EXT1, EXT2). The device will issue a warning sound when the input voltage and current exceed 1050Vrms or 28.5Arms.

#### Introduction to measurement parameters



Current	lac (AC) Idc (DC)	
	Vmn (V-MEAN)	
	Vdc (DC) Vrms (AC+DC)	
Voltage	Vac (AC)	
Parameter name	Display icon	

## GWINSTEK

Reactive power	VAR
Power Factor	PF
Phase Angle	DEG
Frequency	IHz, VHz
Voltage Peak	V+pk, V-pk
Current Peak	l+pk, l-pk
Active Power Peak	P+pk, P-pk
Total Harmonic Distortion	THDI, THDV
Crest factor	CFV, CFI
Mathematical Computation	MATH
Maximum Current Ratio	MCR
(Crest Factor(CFI) / Power Factor)	

## Measurement display pages overview

Single channel	1.	Press up and down arrow keys to	<b>C</b> .
display mode		navigate through the display pages.	F
		The $\Sigma$ shows summations of all	
		channels for each measurement	
		parameter.	
		-	

Page 1







It is available to set measurement parameters for each page. Refer to page 86 for more details.

- Multiple channels display mode
- 2. When it is under "Element 1, 3" or "Element 1, 3 &  $\Sigma$ " numeric displays, press up and down arrow keys to navigate through different pages in which more measurement parameters for each channel are clearly shown. Refer to page 91 for details of Numeric display.





Note Note	It is available to set measurement parameters for each page. Refer to page 86 for more details.				meters for etails.
Element 1, 3 display mode (For GPM-8320)	Page 1	Page 1 V-A 15 V AC-1 1-A 15 V MC-1 Page: 1 Vrms[V] Irms[A] P[W] VA[VA] VA[Var] PE[ ] DEG[°]	C cF3 Update 0.256 Element1 9.9984 6.9908 6.9908 8.2462m 1.0000 0.1	SYNC.V Element2	HRM.1 Element3 5.5896 91.434m 511.07m 511.08m +2.6780m 1.0000 +0.3
		VHz[Hz] Enlarge	Integrator Para	ameter Syste	55.000
	Page 2	Page 2			

V-A	15 V AC+	DC CF3 V Undate 0 25c	SYNC.V	HRM.I
Pag	e: 2			
		Element1	Element2	Element3
Vr	ms[V]	9.9985		5.5895
V	pk[V]	10.02		7.929
۷	-pk[V]	9.972		-7.910
•	CFV[]	1.0026		1.4186
۱	/Hz[Hz]	m		55.000
ΤН	DV[%]			
	VA[VA]	6.9904		511.05m
V	AR[var]	8.2462m		+2.6839m
	Enlarge	Integrator	ameter	m Numeric

#### Page 3 Page 3

age 3	
-------	--

/-A 15 V AC+	DC CF3 / Update 0.25s	SYNC.V I	HRM. I
Page: 3	Element1	Element2	Element3
Irms[A]	699.12m		91.831m
I+pk[A]	702.1m		131.0m
I-pk[A]	696.5m		-130.8 m
CFI[ ]	1.0043		1.4267
IHz[Hz]	m		55.000
THDI[%]			
VA[VA]	6.9902		513.29m
VAR[var]	8.2462m		+2.6280m
Enlarge	Integrator	ameter System	Numeric

Page 4 Page 4

V-A 15 V I-A 1 A	/ AC+ 1P3V	DC CF3 V Update 0.25s	SYNC.V	HRM.I
Page: 4		Element1	Element2	Element3
P[	<b>w</b> ]	6.9898		510.56 m
P+pk[	<b>w</b> ]	7.0239		1.0318
P-pk[	<b>W</b> ]	6.9534		-0.0243 m
VA[	VA]	6.9898		510.57m
VAR[	var]	8.4853 m		+2.6955m
PF[	1	1.0000		1.0000
VHz[	Hz]	m		55.000
IHz[	Hz]	m		54.999
Enlan	ne	Integrator	meter	Numeric

## G≝INSTEK

Element 1,3 &  $\Sigma$  display mode

Page 1

Page 1

V-A 15 V AC+ I-A 1 A 1P3	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 1	Element1	Element2	Element3	Σ
Vrms[V]	9.9984		5.5894	7.7939
Irms[A]	699.08m		91.336m	395.21m
P[W]	6.9897		510.50m	7.5002
VA[VA]	6.9897		510.51m	7.5002
VAR[var]	8.0000m		+2.8804m	10.880m
PF[]	1.0000		1.0000	1.0000
DEG[°]	0.1		+0.3	0.1
VHz[Hz]	m		55.000	m
Enlarge	Integrator	Parameter	System	Numeric

### Page 2 Page 2

V-A 15 V AC+ I-A 1 A 1P3V	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 2	Element1	Element2	Element3	Σ
Vrms[V]	9.9982		5.5893	7.7938
V+pk[V]	10.02		7.929	
V-pk[V]	9.972		-7.907	
CFV[]	1.0026		1.4186	
VHz[Hz]	m		55.000	m
THDV[%]				
VA[VA]	6.9895		508.98m	7.4985
VAR[var]	8.2462m		+2.7698m	<b>11.016</b> m
Enlarge	Integrator	Parameter	System	Numeric

#### Page 3 Page 3

V-A I-A	15 V AC+ 1 A 1P3V	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page	8: 3	Element1	Element2	Element3	Σ
Ir	ms[A]	699.09m		91.201m	<b>395.1</b> 4m
I	pk[A]	701.9m		130.5m	m
ŀ	pk[A]	696.5m		-130.8m	m
(	CFI[]	1.0040		1.4345	
1	Hz[Hz]	m		54.996	m
TH	DI[%]				
	VA[VA]	6.9896		509.74m	7.4994
۷	AR[var]	8.9443m		+3.0388m	<b>11.983</b> m
	Enlarge	Integrator	Parameter	System	Numeric

#### Page 4 Page 4

V-A I-A	15 V AC+ 1 A 1P3V	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Pag	e: 4	Element1	Element2	Element3	Σ
	P[W]	6.9896		508.10m	7.4977
P	+pk[W]	7.0255		1.0285	m
P	-pk[W]	6.9594		-0.0141m	m
	VA[VA]	6.9896		508.11m	7.4978
v	/AR[var]	8.2462m		+2.9817m	11.228m
	PF[]	1.0000		1.0000	1.0000
<b>١</b>	/Hz[Hz]	m		55.000	m
	[Hz[Hz]	m		54.998	m
	Enlarge	Integrator	Parameter	Sustem	Numeric

Element 1 – 3 display mode (For GPM-8330) Page 1

Page 2

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Pa	ge 1		
AC	-DC_CF3 W Update 0.25s	SYNC.V H	RM.I
Page: 1	Element1	Element2	Element3
Vrms[V]	0.0000	0.0000	0.0000
Irms[A]	0.0000m	0.0000m	0.0000m
P[W]	0.0000m	0.0000m	0.0000m
P-pk[W]	-1.3775m	-2.7574m	-2.0680m
VAR[var]	0.0000m	0.0000m	0.0000m
PF[]			
DEG[°]			
VHz[Hz]	m	m	m
Enlarge	Integrator	ameter System	Numeric



V-R 1000 AC+ I-R 2 A 1P3W	DC CF3 V Update 0.25s	SYNC.V H	RM.I
Page: 2	Element1	Element2	Element3
Vrms[V]	0.0000	0.0000	0.0000
V+pk[V]	0.452	0.226	0.339
V-pk[V]	-0.226	-0.452	-0.339
CFV[]			
VHz[Hz]	m	m	m
THDV[%]			
VA[VA]	0.0000 m	0.0000 m	0.0000 m
VAR[var]	0.0000 m	0.0000 m	0.0000m
Enlarge	Integrator	ameter	Numeric



DC CF3 V Update 0.25s	SYNC.V H	RM. I
Element1	Element2	Element3
0.0000m	0.0000 m	0.0000m
10 . 17 m	10.17 m	10.17 m
-6.101m	-6.104 m	-6.104 m
m	m	m
0.0000 m	0.0000 m	0.0000 m
0.0000 m	0.0000m	0.0000 m
Integrator	ameter System	Numeric
	C C73 (Update 0.25s Elementi 0.0000m 10.17m -6.101m m 0.0000m 0.0000m Unregater For	C G3         SYNC.Y H           V Update 0.25s         Element1           D. 0000m         0.0000m           10.17m         10.17m           -6.101m         -6.104m          m        m           0.0000m         0.0000m           0.0000m         0.0000m           0.0000m         0.0000m           0.0000m         0.0000m           0.0000m         0.0000m



-R 100 V AC	DC CF3 V Update 0.25s	SYNC.V H	RM.I
Page: 4	Element1	Element2	Element3
P[W]	0.0000m	0.0000 m	0.0000m
P+pk[W]	2.7549m	2.7574m	2.0677m
P-pk[W]	-1.3775m	-2.7574m	-3.4466 m
VA[VA]	0.0000 m	0.0000 m	0.0000 m
VAR[var]	0.0000 m	0.0000 m	0.0000m
PF[ ]			
VHz[Hz]	m	m	m
IHz[Hz]	m	m	m
Enlarge	Integrator	ameter System	Numeric

## G≝INSTEK

Element	1	-3&Σ	
1. 1			

display mode

Pag	ge 1			
V-R 1000 AC-	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 1	Element1	Element2	Element3	Σ
P+pk[W]	2.7549m	2.7574m	2.0677m	
Irms[A]	0.0000m	0.0000m	0.0000m	0.000
P[W]	0.0000m	0.0000m	0.0000m	0.000
VA[VA]	0.0000m	0.0000m	0.0000m	0.000
VAR[var]	0.0000m	0.0000m	0.0000m	0.000
PF[]				
DEG[°]				
VHz[Hz]	m	m	m	
Enlame	Integrator	Parameter	System	Numeric



Page 1

Page 2 nt 1 n#3 0.0000 0.0000 0.0000 0.0000 0.452 0.226 0.339 -0.452 -0.452 -0.339 0.0000m 0.0000m 0.0000m 0.0000 0.0000m 0.0000m 0.0000m 0.0000m



Page 3

AC+R 1000 AC+	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 3	Element1	Element2	Element3	Σ
Irms[A]	0.0000m	0.0000m	0.0000m	0.0000m
I+pk[A]	10.17m	10.17m	10.17m	m
I-pk[A]	-6.101m	-6.104m	-6.104m	m
CFI[]				
IHz[Hz]	m	m	m	m
THDI[%]				
VA[VA]	0.0000m	0.0000m	0.0000m	0.0000m
VAR[var]	0.0000m	0.0000m	0.0000m	0.0000m
Enlarge	Integrator	Parameter	System	Numeric

Page 4

Page 4

V-R 100 V AC+	DC_CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 4	Element1	Element2	Element3	Σ
P[W]	0.0000m	0.0000m	0.0000m	0.0000m
P+pk[W]	1.3775m	2.7574m	2.0677m	m
P-pk[W]	-1.3775m	-2.7574m	-3.4466m	m
VA[VA]	0.0000m	0.0000m	0.0000m	0.0000m
VAR[var]	0.0000m	0.0000m	0.0000m	0.0000m
PF[ ]				
VHz[Hz]	m	m	m	m
IHz[Hz]	m	m	m	m
Enlarge	Integrator	Parameter	System	Numeric

#### Setting measurement parameters

Setting parameter 1. Press the Parameter soft key. in single channel display



2. The 1st measurement parameter will be highlighted in green.



3. Press up, down, left and right arrow keys to select other desired measurement parameter. Press Enter button to set desired parameter.







4. Use up and down arrow keys to switch display options followed by pressing **Enter** button to confirm the selected parameter.





- User is able to apply the previous same process for each measurement parameter. There are up to 2 major and 8 minor measurement parameters to be switched.
- 6. In addition, when changing to "Element 1 – 3" or "Element 1 – 3 & Σ" Numeric mode, it is available to set desired options for up to 8 measurement parameters for one page (up to 4 pages). Refer to page 91 for Numeric display.

Setting parameter in "Element 1 – 3" Numeric display

Setting parameter in "Element 1 – 3 &  $\Sigma$ " Numeric display

Page: 1	Element1	L Elem	ent2	Element3
Vrms[V]	0.0000	0.0	000	0.0000
Irms[A]	0.0000	)m 0.0	000m (	0.0000m
P[W]	0.000	)m 0.0	000m	0.0000m
P-pk[W]	-1.3775	5m -2.7	574m –	2.0680m
VAR[var]	0.000	)m 0.0	000m	0.0000m
PF[ ]				
DEG[°]				
VHz[Hz]		-m	m	m
Enlarge	Integrator	Parameter	System	Numeric
V-R 1000 V AC+ 1-R 20 A 1P3	DC CF3 V Update 0.25s		SYNC.V HRM	
V-R 1000 V AC+ I-R 20 A 1P3V Page: 1	DC CF3 V Update 0.25s Element1	Element2	Element3	
V-R 1000 V AC- I-R 20 A 1P3V Page: 1 P+pk [W]	DC CF3 V Update 0.25s Element1 2.7549m	Element2 1.3787m	Element3	LI Σ nm
V-R 1000 V AC+ I-R 20 A 1P3V Page: 1 P+pk [W] Irms[A]	DC CF3 V Update 0.25s Element1 2.7549m 0.0000m	Element2 1.3787m 0.0000m	Element3 2.0677# 0.0000#	Σ nm n 0.0000m
V-R 1000 V AC+ I-R 20 A 1P3N Page: 1 P+pk[W] Irms[A] P[W]	DC CF3 V Update 0.25s Element1 2.7549m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m	Element3 2.0677# 0.0000# 0.0000#	Σ nm n 0.0000m n 0.0000m
V-R 1000 V AC4 1-R 20 A 1P3V Page: 1 P+pk [W] Irms [A] P [W] VA [VA]	DC CF3 V Update 0.25s Element1 2.7549m 0.0000m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m 0.0000m	SYNC.Y HRM Element3 2.0677# 0.0000# 0.0000# 0.0000#	E Σ nm n 0.0000m n 0.0000m n 0.0000m
V-R 1000 V AC- 1-R 20 A 1P3V Page: 1 P+pk [W] Irms[A] P[W] VA[VA] VAR[var]	DC CF3 V Update 0.25s Element1 2.7549m 0.0000m 0.0000m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m 0.0000m 0.0000m	SYNC.V HRM Element3 2.0677m 0.0000m 0.0000m 0.0000m	E Σ nm n 0.0000m n 0.0000m n 0.0000m n 0.0000m
V-R 1000 V AC- 1-R 20 A 1P30 Page: 1 P+pk [W] Irms[A] P[W] VA[VA] VAR[var] PF[]	DC CF3 V Update 0.255 Element1 2.7549m 0.0000m 0.0000m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m 0.0000m 0.0000m	Element3 2.0677# 0.0000# 0.0000# 0.0000#	E Σ mm n 0.0000m n 0.0000m n 0.0000m n 0.0000m 
V-8 2000 V AC- 1-8 20A 129 Paget 1 P*pk [W] Irms [A] P[W] VA[VA] VA[VA] VA[var] PF[ ] DEG[°]	DC CF3 V Update 0.259 Element1 2.7549m 0.0000m 0.0000m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m 0.0000m 0.0000m	Elementa 2.0677m 0.0000m 0.0000m 0.0000m	<b>Σ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b> <b>Δ</b>
V-R 1000 V AC- 1-R 204 100 Paget 1 P*pk[W] Irms[A] P[W] VA[VA] VA[VA] VA[Var] PF[ ] DEG[°] VHz[Hz]	DC CF3 V Update 0.25s Element1 2.7549m 0.0000m 0.0000m 0.0000m 0.0000m	Element2 1.3787m 0.0000m 0.0000m 0.0000m  m	Element3 2.0677# 0.0000# 0.0000# 0.0000# 0.0000#	L1 Σ 0.0000m 0.0000m 0.0000m 0.0000m 0.0000m 0.0000m 0.0000m 0.0000m



Steps to set channels

 Also, when pressing up, down, left and right arrow keys to select other measurement parameter, it is available to assign channel number of each measurement parameter.







8. Press **Enter** button to set desired parameter followed by using up and down arrow keys to switch channel number for the selected measurement parameter.





9. User is able to apply the previous same process for assigning channel number of each measurement parameter. There are up to 2 major and 8 minor measurement parameters to be assigned.



If user changes Numeric display to "Element 1 – 3" or "Element 1 – 3 & Σ", the channel number selection is Not available since the parameters of all 3 channels are shown on the display already. Refer to page 91 for Numeric display.

Steps

#### Changing the numeric display

 Under the single channel display mode, press the Numeric soft key.



 The screen is changed to the "Element 1 – 3" display mode in which the 8 measurement parameters of each channel (1 through 3) are shown.

R 1000 V AC+DC CF3 R 20 A 1P3W Update 0.25s		SYNC.V HRM.I		
age: 1	Element1	Element2	Element3	
Vrms[V]	0.0000	0.0000	0.0000	
Irms[A]	0.0000m	0.0000 m	0.0000m	
P[W]	0.0000m	0.0000 m	0.0000 m	
P-pk[W]	-2.2958 m	-2.7574m	-2.0680 m	
VAR[var]	0.0000 m	0.0000 m	0.0000 m	
PF[ ]				
DEG[°]				
VHz[Hz]	m	m	m	
Enlarge	Integrator	ameter System	Numeric	

3. Press the **Numeric** soft key again to change to the "Element 1 – 3 &  $\Sigma$ " display mode in which the 8 measurement parameters of each channel (1, 2, 3 and  $\Sigma$ ) are shown.

V-R 1000 V AC+	DC CF3 V Update 0.25s		SYNC.V HRM.I	
Page: 1	Element1	Element2	Element3	Σ
P+pk[W]	2.7549m	2.7574m	2.0677m	m
Irms[A]	0.0000m	0.0000m	0.0000m	0.0000m
P[W]	0.0000m	0.0000m	0.0000m	0.0000m
VA[VA]	0.0000m	0.0000m	0.0000m	0.0000m
VAR[var]	0.0000m	0.0000m	0.0000m	0.0000m
PF[ ]				
DEG[°]				
VHz[Hz]	m	m	m	m
Enlarge	Integrator	Parameter	System	Numeric







4. By pressing the **Numeric** soft key repeatedly to navigate through 3 display modes at any time.



Single channel	V-R 1000 V AC-D I-R 20 A 192W Pase: 1 Vrms1 Irms1 P1 0 VA1 0 VHz1 - THDV1 -	C CF3 Update 0.25s 0 0000 m 0000 m	. O ( . O ( . O ( . Pp . VA . Pp . THD	SYNC V HRM. T 0 0 0 0 0 0 F1	V mA 000 mvar 775 mW
Element 1 – 3	Enlarge V-R: 1000 V AC+I I-R: 20 A 1P3W Page: I Vrms [V] Irms [A] P[W] P-pk[W] P-pk[W] PF[] DEG [°] VHZ [Hz] Enlarge	Integrator Update 0.259 Update 0.259 Element: 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	Parameter	System           SYNC.V HRM.1           ent2         E           0000         0           000m         0           000m         0           574m         -2           000m         0	Numeric
Element 1–3 &Σ	V-R 1000 V AC+R 1-R 20 A 103W Page: I P+pk[W] Irms[A] P[W] VA[VA] VAR[VA] PF[ ] DEG[°] VH2[H2]	C CF3 Update 0.25s Element1 2.7549m 0.0000m 0.0000m 0.0000m 	Element2 2.7574m 0.0000m 0.0000m 0.0000m  	SYNC.V HRM.1 Element3 2.0677m 0.0000m 0.0000m 0.0000m  m	Σ m 0.0000m 0.0000m 0.0000m  m

Steps

#### Changing the standard and simple display modes

 In the standard display mode, press soft key to select Enlarge function.



2. The screen is changed to the simple display mode.



Enter



The simple mode covers 4 major measurement parameters deriving from the top 4 parameters of standard mode as shown below.



3. Press **ESC** button to return back to original display mode.

ESC

# Other functions

#### Introduction to other functions



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Enter	Enter	This button is used to select function or confirm selection.
Hold	Hold	When the <b>Hold</b> button is pressed, the Hold status icon will light in red in the LCD display to indicate that this function is activated. To deactivate this function, press this button again.
		When the Hold function is activated, the displayed value on the LCD display is not updated and the range is locked. Measurement is performed in the background.
Trigger	Trigger	Press the <b>Trigger</b> button when Hold function is activated to update displayed value to the latest status once in accordance with the Data Update Rate period.
ESC	ESC	This button is used to exit current screen or return to the main measurement screen.
Local/ Key Lock	Key Lock Local	Dual function key. When Remote mode is activated, press this button to deactivate Remote mode and switch to Local mode. When Remote mode is not activated, this button is used as lock key of keypad.

Mode



Press the Mode button to select measurement mode. There are 4 measurement modes.

- AC+DC: Displays all the components of measurement signal.
- **DC**: Displays the DC part of the measurement signal.
- AC: Displays the AC part of the measurement signal.
- V-MEAN: Displays the voltage rectified as a mean value that is calibrated to RMS value. The value is same with those obtained from RMS mode when sine waves are measured, but it is different when DC or distorted waves are measured.

## Integration measurement function

#### Setting up Integrator measurement



4. Press Enter button to enter Mode field. Use up and down arrow keys to toggle between Manual, Standard and Continuous mode. Press Enter button again to confirm your selection.



Enter





If you select Standard or

**Continuous** mode, you need to set integrator measurement time before using integrator function. It can be set from 1 second to 9999 hours, 59 minutes and 59 seconds.





When the Set Time is zero, neither Standard mode nor Continuous mode can be executed.

Select integrator measurement function

5. Press down arrow key to move to **Function** field in the integrator measurement setting screen.





 Press Enter button to enter Function field. Use up and down arrow keys to toggle between Ampere Hours and Watt Hours. Press Enter button again to confirm your selection.





If you select **Ampere Hours**, the measured value in the bottom half section will be displayed in "**q1**".



If you select **Watt Hours**, the measured value in the bottom half section will be displayed in "**WP1**".



Select integrator measurement parameter  Press down arrow key to move to the bottom half section where measured values are displayed.



8. Press Enter button to enter the 1st minor parameter followed by using up and down arrow keys to switch to preferred measurement parameter. Press Enter button again to confirm the selection.





Press left or right arrow keys to move to the 2nd minor parameter followed by using the steps above to select a preferred parameter.



#### Introduction to integrator parameters

Parameter name	Description
Mode	• Standard
	It allows user to define a period of Set Time for integrator measurement, which ranges from 1 second to 9999 hours, 59 minutes and 59 seconds.
	• Manual
	User is not able to define a Set Time. The integrator measurement will be running constantly till Stop button is pressed by user.
	Continuous
	Partly identical with the Standard mode, the integrator measurement runs for a cycle of the Set Time and repeats the cycle indefinitely until Stop button is pressed by user.

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#### GPM-8320/8330 User Manual

E		P3W
Function	• Watt Hours Mode Manual WP1: Total power Set Time 0000:00:00 WP+1: State Reset	
	Positive total power   WP1 <b>0.0000</b> WP-1:   WP1   0.000 - WE	mWh
	Negative total power P(avg)1: Average power	JO mwn
	• Ampere Hours q1: Total mAh q+1: Mode Function Mode Function Ampere Hours 0000:00:00 Test Time 0000:00:00 Reset Reset	P3W
	Positive total mAh q-1: Negative total mAh	<b>mAh</b> 00 mAh
	q(avg)1: Average current	
Test time	It indicates that elapsed time of integrator measurement.	
Set time	It indicates the time of integrator measurement to be State Rescue State Mode Standard Ampere Hours Set Time Standard Standard Mode Standard Standard Standard Test Time State Rescue State Rescue Standard State Standard Standard Standard State Standard State State Standard State Standard State Standard State Standard State State St	P3W
	set. It can be set from 1 second to 9999 hours, 59 minutes and	mAh 00 mAh
	59 seconds.	
State	• Running Integrator measurement is in Mode Standard Function Set Time 0200:00:00 Test Time 0000:00:00 State Running	P3W
	progress. <b>q1 0.0008</b>	mAh
	q+1         0.0008 mAh         q-1         0.00           Measure         Set         Element	00 mAh

	• Stop Integrator measuremer been stopped manually.	ht has d d <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del> <del>1</del>	Standard         DOW           Ampere Hours         0 2 0 0 : 0 0 : 0 0           0 2 0 0 : 0 0 : 0 0 : 0 0         Stop           O . O O O O O O O MAN         q-1           Q0 mAh         q-1           Q1 DEBENT
	• <b>Timeout</b> The time for running inte measuremer	ngrator nt is up.	Standard         UPW           Ampere Hours         0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	• Reset The integrate measuremer status is clea	or Set Time Test Time t State red. q1 q+1 0.00	Standard         193W           Ampere Hours         0.000:00:00:00           0.000:00:00:00         0.000           Reset         000000000000000000000000000000000000
Measured value parameters	For Watt Hours Positive total power: WP+ Negative total power: WP- Average power: P(avg) Voltage: Vdc (DC voltage), Vac (AC voltage), Vrms (AC+DC voltage),Vmn (Voltage mean) Current: Idc (DC current), Iac (AC current), Irms (AC+DC current)		
	Mode Function Set Time Test Time State WP1	Standard           Watt Hours           0000:00:05           0000:00:00:00           Reset           000 mWb         WB=1	193W 0 mWh

Measure Set Element

For Ampere Hours

Total mAh: **q** Positive total mAh: **q**+ Negative total mAh: **q**-Average Current : **q**(avg) Voltage: **Vdc** (DC voltage), **Vac** (AC voltage), **Vrms** (AC+DC voltage), **Vmn** (Voltage mean) Current: **Idc** (DC current), **Iac** (AC current), **Irms** (AC+DC current)



#### Using the integrator function

Manual mode 1. In manual mode, you can directly press the **Start** button in the front panel to start integrator function.





Stop

Reset

2. To stop integration function, press the **Stop** button in the front panel.



3. Press the **Reset** button in the front panel to clear integrator.



- Standard mode 1. Set integrator measurement time before using integrator function.
  - 2. Other steps are same as running in manual mode.

When integrator performing, the test time will increase until the set integrator measurement time is reached.



Continuous mode

- 1. Set integrator measurement time before using integrator function.
  - 2. Other steps are same as running in manual mode.

When integrator performing, the test time will increase until the set integrator measurement time (a cycle) and repeat the cycle indefinitely until the Stop button is pressed by user.





- In the integration process, select the **Measure** key and press **Enter** button to return main measurement screen. Select **Integrator** key and press **Enter** button to switch back to integration measurement screen.
  - In the integration process, you can Not change measurement range and enter system to set measurement parameters.
  - In the integration process, if the voltage or current measurement value exceeds, the measured value will display in red. However, it will not turn out red color when Auto Range is activated.

# Graph measurement function

The GPM-8320/8330 provides the professional graph measurement function via which user can have a well grip over fluctuations of measured values in waveform and harmonic in bar and list graphs in a friendly user interface. It is available, under the graph mode, to adjust both voltage and current ranges in real time and change the display modes along with relevant parameters with ease.

#### 1. Press the Waveform key on the Steps front panel of unit. Sync: V Zoom: 1 Vac1 0.0000v Iac1 0.0000 Ρ1 VA1 0.000 Select waveform 2. Press the **Set** soft key. Set display mode Time Div: 10 Vac1 Iac1

#### Setting up waveform graph measurement

3. Press Enter button to enter Display field. Use up and down arrow keys to toggle between options. Press Enter button again to confirm your selection.





Option V, I, P Three items including the measured voltage, current and power are displayed in waveforms of different colors (V: yellow, I: red, Power: green) within the waveform chart.

- V, I Two items including the measured voltage and current are displayed in waveforms of different colors (V: yellow, I: red) within the waveform chart.
- V Only the measured voltage in the waveform of yellow color is displayed within the chart.
- I Only the measured current in the waveform of red color is displayed within the chart.
- P Only the measured power in the waveform of green color is displayed within the chart.

Default option V, I, P
Select waveform display time division

4. Press down arrow key to move to **Time Div** field in the waveform setting section.



	1P3W	(,P	P: 🛯 ): V, ]	: 🛛 I: 🗖	Display( V	15 V	-A
		Zoom: 1	Sync: V	10ms	Time Div:	10 V	-R
Vac1 0.0000v							
Iac1 0.0000mA							
P1 0.0000mW							
VA1 0.0000mVA							
	Element	sure	Mea		Para	Set	

5. Press **Enter** button to enter **Time Div** field. Use up and down arrow keys to toggle between options. Press **Enter** button again to confirm your selection.



Vac1 0.0000v
Iac1 0.0000mA
P1 0.0000mW
VA1 0.0000mVA

The diversified time units allow user to customize a preferred waveform graph display. In theory, shorter the measured period, smaller the time unit is fitting. In contrast, longer the measured period, greater the time unit is suitable. Select a proper option

Default option	5ms
Note Note	The available options for Time Div vary per set Update Time. Refer to page 113 for correlations.

Select waveform display sync source	6.	Press right arrow key to move to <b>Sync</b> field in the waveform setting section.
	7.	Set     Parameter     Maxing     Entent       Press Enter button to enter Sync     Enter     Enter       field. Use up and down arrow keys     to toggle between options. Press     Enter       Enter button again to confirm your     selection.     Image: Confirm your
		VA       15 V       Dieplay(V: © 1: @ P: @): V, LP       193W         1:R       10 V       Time Div: 10ms       Sync: @ Zoom: 1         Vac1       0.0000v       Iac1         0.0000mA       P1       0.0000mA         Val       0.0000mV       VA1         0.0000mV       VA1       0.0000mV         Set       Parameter       Measure
Option V Select the voltage of synchronization sou I Select the current of synchronization sou		Select the voltage of signals as synchronization source.
		Select the current of signals as synchronization source.
	Of	<b>f</b> Select the entire interval of data updating period as synchronization source.

Default option V

### MEASUREMENT AND OTHER FUNCTIONS

Select waveform display zoom magnification

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8. Press right arrow key to move to Zoom (V) field in the waveform setting section.



	1P3W	Zoom: 1	P: ): V, Sync: V	V: I:	Display( V Time Div:	15 V 10 V	/-A I-R
Vac1 0.0000v							
Iac1 0.0000mA							
P1 0.0000mw							
VA1 0.0000mVA							
	Element	sure	Mea	rameter	Par	Set	

9. Press Enter button to enter Zoom (V) field. Use up and down arrow keys to toggle between options. Press Enter button again to confirm your selection.



A 15 V Display(V: I: P: ): V, I, P	
R 10 V TIME DIV: 10ms Sync: V 200m: Z	Vac1 0.0000v
	Iac1 0.0000mA
	P1 0.0000mW
	VA1 0.0000mV/

Option	1, 2, 3	The varied zoom magnifications allow user to customize a preferred waveform graph display. In theory, narrower the measured value, greater the zoom magnification is suitable. In contrast, wider the measured value, smaller the zoom magnification is fitting. The 1 stands for the standard magnification and the 3 represents the highest zoom magnification.
Default option	1	

#### Default option



Frequency over When frequency of either voltage or current is beyond limit the limit, which varies per set Time Div, the warning message in the upper-right corner will be shown to alarm user as the figures below.







Take few examples below that derive from the table above for further descroptions.

- When Update Time is set 20s, the range of Time Div is from 5ms to 1s and the available Frequency is up to 50Hz.
- When Update Time is set 0.1s, the range of Time Div is from 25us to 5ms and the available Frequency is up to 10kHz.

$\wedge$	
<u> </u>	Note

- The maximum frequency for Graph mode is up to10kHz.
- When the measured frequency of either voltage (VHz) or current (IHz) surpasses the available frequency, which is based on the set Time Div, the warning message will be shown accordingly.

Steps

### Setting up waveform graph parameter and element

 Press the Waveform key on the front panel of unit to enter the waveform page.



2. Press the **Parameter** soft key.



3. Press **Enter** button to enter the 1st parameter. Use up and down arrow keys to toggle between options. Press **Enter** button again to confirm your selection.



Parameter



Option

V

4. Press down arrow key to move cursor to the 2nd parameter and repeat the above steps to set up. Also, repeat the same steps for the 3rd and 4th parameters.

V-R 1000	Display( V: 1:	■ P: ■ J: V,	I.		
I-R 20 A	Time Div: 5ms	Sync: V	Zoom: 1		
					Vac1
					0.000v
					Iac1
					0.000mA
					P1
					0.0000mW
					VA1
					0.0000mV#
Set	Parameter	Mea	sure	Element	
altara			,	Vac	
Juage				vac (/	<del>(</del> C)
				Vdc (	
				vuc (I	)()

	Vrms (AC+DC)
	Vmn (V-MEAN)
Current	lac (AC)
	ldc (DC)
	Irms (AC+DC, V-MEAN)
Active Power	Ρ
Apparent Power	VA
Reactive power	VAR
Power Factor	PF
Phase Angle	DEG
Frequency	IHz, VHz
Voltage Peak	V+pk, V-pk
Current Peak	I+pk, I-pk
Active Power Peak	P+pk, P-pk

	Total Harmonic Distortion	THDI, THDV
	Crest factor	CFV, CFI
	Mathematical Computation	MATH
	Maximum Current Ratio	MCR
Default option	Default options are based from the standard displa	d on the Parameter settings y mode.
	5. Press the <b>ESC</b> key to front panel of unit.	wice on the Enter
	<ul> <li>6. Press the Element so change channel num parameter</li> </ul>	IPSW       Image: I       Vac1       0.0000v       Iac1       0.0000mk       P1       0.0000mk       VA1       0.0000mk       VA1       0.0000mk       Element
	Element 1	II:         IP:         IP:         IP::3W           Syme:         V         Zoom: 1         Vac1           Vac1         0.0000v         Iac1           0.0000mA         P1         0.0000mW           VA1         0.0000mV         VA1           0.0000mV         Element         Element
	Element 2	■ I:= P:=):V,I 1P3W Sms Sync: V Zoom: 1 Vac2

0.0000 Iac2 0.0000 P2 0.0000 VA2 0.0000

Ma

Element 3



### Setting up Harmonics bar graph measurement and element

Steps 1. Press the **Harmonic** key on the front panel of unit to enter the harmonics bar graph display screen where measured values of each harmonic order are shown in the histogram-like bar display.



2. Press the **Set** soft key.

Set



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display mode

Select harmonics 3. Press Enter button to enter Display Mode field. Use up and down arrow keys to toggle between options. Press Enter button again to confirm your selection.



The THDV measured factor will be Option V displayed in the right-side section in yellow and also shown in the left-side bar graph. L The THDI measured factor will be

displayed in the right-side section in yellow and also shown in the left-side bar graph.

Default option V

display order

number

Select harmonics 4. Press down arrow key to move to Order No. field in the harmonics setting section.





Enter

Enter

Enter

Enter

5. Press Enter button to enter Order No. field. Use up and down arrow keys to toggle between options. Press Enter button again to confirm your selection.



Option 1 - 50 Select a measured harmonic order with related values to be displayed in both the right-side section in green and the leftside bar graph. Note that the upper limit of order number is relevant to the Harmonics setting (page 38).

Default option 1

certificate

Select harmonics 6. Press right arrow key to move to HRM field in the harmonics setting section.



7. Press **Enter** button to enter **HRM** field. Use up and down arrow keys to toggle between options. Press Enter button again to confirm your selection.

A R	15 V 10 V	Disp Orde	er No.	ode: '	V HR	IM: 🕻	SA		1P3V	1
00										THDV1
5 -										Vrms 1
•										0.0000
3										No: 1 mHz
	,	40		-	~	~				v
	List		15	20 Set		Mea	asure	 Elen	nent	

Option	IEC		
	CSA		
	OFF		
Default option	IEC		

8. Press the **ESC** key twice on the front panel of unit.



Element

Enter

Enter

/-R [-R		Disp Orde	er No.	ode: \ : <u>1</u>	HR	M: (	SA				V
100											THDV 1
75 50											Vrms 1 0.0000v
×											No: 1 mHz
•	5	10	15	20	25	30	35	40	45	50	v %

9. Press the **Element** soft key to change channel number of each parameter



### Setting up Harmonics list graph measurement

Steps

1. Press the **Harmonic** key on the front panel of unit to enter the harmonics bar graph display.





2. Press the List soft key to enter the harmonics list display.



-A 1	5 V I-R	10 V		1P3W HF	RM.I			
F1	PF 1	-1	- THD	V1	%	VHz1		mHz
DEG	1	•	THD	I1	%	IHz1		mHz
Order	V (V)	I (mA)	P (mW)	V Hdf(%)	I Hdf(%)	P Hdf(%)	V(°)	I(o)
Total								
1								
3								
4								
5								
6								
7								
E	Bar	Meas	ure	Elemen	t			

Turn pages of harmonics list 3. Press up and down arrow keys individually to flip over pages of the harmonics list in which relevant values of each order of harmonics are well displayed. See the section below for descriptions of each item within the list.



V-A 1	5 V I-R	10 V		1P3W HF	RM.I			
PF1	PF :	1-1	- THD	V1	%	VHz1		mHz
DEG	L	•	THD	I1	%	IHz1		mHz
Order	V (V)	I (mA)	P (mW)	V Hdf(%)	I Hdf(%)	P Hdf(%)	V(°)	I(°)
Total								
50								
	Bar	Measu	ure	Elemen	t			
		10.14		102041-146				
	V 1-K			TPSW H	(14).1			
PF1	PF:	1-1	- THD	V1	%	VHz1		mHz
DEG	L	•	THD	II	%	IHz1		mHz
Order	V (V)	I (mA)	P (mW)	V Hdf(%)	I Hdf(%)	P Hdf(%)	V(°)	I(°)
Total								
8								
9								
10								
11								
12								
13								
14								
	Bar	Meas	ure	Elemen	t			

Items of the list Order

V

The harmonic order number

RMS voltage value of the harmonic order

I	RMS current value of the harmonic order
Ρ	Active power value of the harmonic order
V Hdf(%)	Voltage harmonic distortion factor of the harmonic order
l Hdf(%)	Current harmonic distortion factor of the harmonic order
P Hdf(%)	Power harmonic distortion factor of the harmonic order
V (°)	The phase difference between the fundamental voltage and the voltage of the harmonic order
l (°)	The phase difference between the fundamental current and the current of the harmonic order

# DIGITAL I/O / DA12

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# Digital I/O / DA12 Overview

Background The digital I/O /DA12 port contains up to two modes: External Remote Control and DA12 Output Function.

Use the external I/O connector on the rear panel to control the instrument remotely and produce D/A output.

By providing separate VCC power for the terminal, the outputs can also be used as a power source for TTL and CMOS circuits.





Pin No.	Signal Name	Pin No.	Signal Name
1	EXT COM	14	EXT SINGLE In
2	EXT HOLD In	15	EXT STOP In
3	EXT START In	16	INTEG BUSY Out
4	EXT RESET In	17	No connection
5	No connection	18	DA 12Ch Out
6	DA 11Ch Out	19	DA 10Ch Out
7	DA 9Ch Out	20	DA 8Ch Out

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	8	DA 7Ch Out	21	DA 6Ch Out					
	9	DA 5Ch Out	22	DA 4Ch Out					
	10	DA 3Ch Out	23	DA 2Ch Out					
	11	DA 1Ch Out	24	DA COM					
	12	DA COM	25	No connection					
	13	DA COM	26	No connection					
Note	The Digital GND and D/A GND signals are connected internally.								
	1.	<ol> <li>Do not apply voltage outside the range of 0 to 5 V to the remote control input pins. Also, do not short the output pins or apply external voltage to them. If you do, the instrument may malfunction.</li> </ol>							
	<ol> <li>Do not short the D/A output terminal or ap external voltage to it. If you do, the instrum may malfunction.</li> </ol>								
	3.	When connecting the D/A output to another device, do not connect the wrong signal pin. Doing so may damage this instrument or the connected instrument.							
	4.	Pin17: VCC output, unregulated max po device/logic. The m	5V. It ser ower sour aximum	rves as the rce for the external current is 100mA.					
	5.	<ol> <li>Pin5: Flyback Diode. It connects to VCC or External power source.</li> </ol>							

# External Remote Control

Overview	Through external control, yo single measurements, and s integration.	u can hold values, perform tart, stop, and reset			
Remote Control IO Circuit	Input diagram $10 \text{ k}\Omega$ $10 \text{ k}\Omega$ $0.01 \mu \text{ F}$	Output diagram			
Pulse width timir	igStart, Stop, Reset, hold, Trigger	+5V 0V			
	Integ Busy Out	+5V			
Note Note	The Integ Busy output signa during integration. Use this observing integration.	Il is set to low level signal when you are			

# DA12 Output Function

Overview	You can output voltage, current, active power, apparent power, reactive power, power factor, phase angle, frequency, voltage peak, current peak, and integrated values using a ±5V FS DC voltage. The output range mode and maximum/minimum value of manual range mode can only be used when using a remote control interface. Likewise this parameter can only be configured via remote control. Please see the commands on page 155 for full usage datails								
Output Format	You can s configure	elect a your o	precon wn orig	ifigured inal for	l output mat.	forma	t or		
Preconfigured Format	D/A OU Precon Rated CH1 CH2 CH3 CH3 CH4 D/A OU	TPUT C figured Integra V1 V2 V3 VΣ TPUT C	CONFIG format ntor CH5 CH6 CH7 CH8 CH8	Norr 000 11 12 13 12	nal 0 1 : 0 0 : CH9 CH10 CH11 CH12	00 P1 P2 P3 PΣ	Measure		
	Precon	figured	format	Inte	grator		Normal		
	Rated	Integra	itor	00	01:00:	00	Integrator		
	CH1	P1	CH5	WP1	CH9	<b>q1</b>			
	CH2	P2		WP2	CH10	q 2			
	CH3 CH4	PΣ	CH7 CH8	WPΣ	CH11 CH12	qΣ			
Rated Integration Time	In the D/A output of integrated values, 5.0 V FS represents the integrated value when the rated range value is applied for the rated integration time. The default setting is 1.00.00 (1 h, 0 min, 0 s).								
	If you set the rated integration time to 0.00.00, the D/A output value will be 0 V.								

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Output Range Mode	The DA12 have two output range mode: Fixed range mode or Manual range mode. The default setting is Fixed.
Fixed (Fixed range mode)	When a measurement function's rated value is received, +5V is output.
Manual (Manual range mode)	You can set which measurement function values result in a D/A output of -5V, and which result in a D/A output of +5V. By doing so, you can enlarge or reduce (zoom) the D/A output of each channel.
	For example, if you are measuring a current that fluctuates between 0.4A and 0.6A with a measurement range of 1A, when the D/A output range mode is Fixed, the D/A output voltage will fluctuate between 2.0V and 3.0V. When you want to observe the fluctuations more closely, you can use the D/A zoom feature. If you set the D/A output range mode to Manual and set the minimum value to 0.4 and the maximum value to 0.6, the instrument will produce – 5V when the measured current value is 0.4A and +5V when the measured current value is 0.6A.



Compare (Comparator Mode)	By comparing with the comparator limits, this instrument outputs +5 V, 0 V, or -5 V.			
	<ul> <li>Below the lower limit: -5 V output</li> <li>Greater than or equal to the lower limit and less than the upper limit: 0 V output</li> <li>Greater than or equal to the upper limit: +5 V output</li> </ul>			
Maximum and Minimum Values in Manual Range Mode and	The value maximum and minimum is between - 9.999E+12 and 9.999E+12. The default value is 100.0 and -100.0.			
Comparator Mode	2			
Relationship between Output	Frequency D/A output			



#### Other



#### Examples of D/A Voltage: Output

When the voltage range is set to 150 V and measurement value is 100 V, the output is 100 V/150 V  $\times$  5V = 3.3 V.

### Frequency:

When the voltage frequency measurement value is 60Hz, the D/A output is 60 Hz/100 Hz × 5V = 3 V.

### Power:

When the voltage range is set to 150 V and the current range is set to 2 A, the rated power range is  $150 \text{ V} \times 2\text{A} = 300 \text{ W}.$ 

When the measured power value is 150 W, the output is 150 W/300 W  $\times$  5V = 2.5 V.

### **Integrated Power:**

When the voltage range is set to 150 V and the current range is set to 1 A, the rated power range is 150 V  $\times$  1A = 150 W. In manual integration mode, when the rated integration time is set to 1 hour, the rated electrical energy value is 150 W  $\times$  1 h = 150 Wh.

If you perform integration for 1 hour and the measured electrical energy is 150 W, the D/A output one hour after integration start is +5 V.

Note Note	1.	The rar not out output	tige between +5 to +3 put for $\lambda$ and $\Phi$ . Wh is approximately ±7	7 V and -5 to -7 V is en an error occurs, the .5 V.
	2.	For Vp of 3 tin range v	k and Ipk, ±5 V repre nes the rated range v value when the crest	esents the application value (6 times the rated factor is 6 or 6A).
	3.	Refer to	o the table below for	GPM-8320/8330 DA
		parame	eters calculation.	
		ltem	Calculation	Note
		V	(X / V_range) * 5V	
		<u> </u>	(X / I_range) * 5V	
		Р	(X / V_range * I_range) * 5V	
		VA	(X / V_range * I_range) * 5V	
		VAR	(X / V_range * I_range) * 5V	
		PF	(X / 1.0) * 5V	
		DEG	(X / 180) * -1 * 5V	
		VHz	(X / Base Hz) * 5V	For example:
		IHz	(X / Base_Hz) * 5V	Hz = 0.5Hz,Base_Hz = 1Hz Hz = 6Hz,Base_Hz = 10Hz Hz = 50Hz,Base_Hz = 100Hz Therefore, (<0.1Hz = 0V, >110kHz = 7.5V)
		Vpk	(X / (V_range*CF)) * 5V	+/- peak (Take the absolute
		Ipk	(X / (I_range*CF)) * 5V	value and output on the basis of the greater value) CF:Crest Factor(3 or 6)
		WP	(X / V_range * I_range) * 5V * (3600 / DA_Time)	DA_Time Refer to Setup- >D/A->Rated Integrator for details.
		WP+	(X / V_range * I_range) * 5V * (3600 / DA_Time)	
		WP-	(X / V_range * I_range) * 5V * (3600 / DA_Time)	
		q	(X / I_range) * 5V * (3600 / DA_Time)	
		q+	(X / I_range) * 5V * (3600 / DA_Time)	
		q-	(X / I_range) * 5V * (3600 / DA_Time)	
		OFF	0V	

\*Variable Definition: X = measured value

# **R**EMOTE CONTROL

This chapter describes basic configuration of IEEE488.2 based remote control. For a command list, refer to the Command Overview chapter on page 143.

Configure Remote Control Interface	
Configure USB Interface	
Configure RS232 Interface	
Configure GPIB Interface	
Configure LAN Interface	
Configure EOL Character	142
Return to Local Control	142

# Configure Remote Control Interface

### Configure USB Interface

USB CDC Class	Due to the USB port configured to CDC (Communications Device Class) by default, the GPM-8320/8330 will appear as a virtual COM port to a connected PC. Before, hence, using remote control via CDC USB class, install the appropriate CDC USB driver included on the User Manual CD.			
Background	Continue the followin <b>CONFIG</b> setting scre	ng setting from <b>SYSTEM</b> en		
Steps	1. Press <b>Enter</b> buttor	Enter		
	2. Press down arrow key to move cursor to <b>I/O Model</b> field.			
	3. Use soft keys to see the USB option.           SYSTEM CONFIG           Power On Status Setup De           Brightness         7           Key Sound         Off           I/O Model         U	elect and confirm		
USB	PC connector	Type A, host		
Configuration	GPM-8320/8330 connector	Rear panel Type B, slave		
	Speed	1.1/2.0 (full speed/high speed)		
	USB Class	CDC (Communications device class)		
	Hardware flow control	Off		
	Data Bits	8		
	Stop bit	1		

## Configure RS232 Interface

Background	Continue the following setting from <b>SY CONFIG</b> setting screen	STEM
Steps	1. Press Enter button.	Enter
	<ol><li>Press down arrow key to move cursor to I/O Model field.</li></ol>	
	3. Use soft keys to select and confirm the <b>RS232</b> option.	
	SYSTEM CONFIGPS237Power On Status Setup DefaultFS237Brightness7Key SoundOffI/O ModelRS5232Baud Rate9600TerminatorCR+LFLAN	
	4. Press down arrow key to move cursor to <b>Baud Rate</b> field.	
	5. Use soft keys to select and confirm the <b>Baud Rate</b> option.	
	SYSTEM CONFIG9000Power On Status Setup Default9000Brightness7Key SoundOffI/O ModelR5232Baud Rate9600TerminatorCR+LF57600115200	
Option	9600, 19200, 38400, 57600,115200	
Default value	9600	

6. Press down arrow key to move cursor to **Terminator** field.



7. Use soft keys to select and confirm the **Terminator** option.

SYSTEM CONFIG		
Power On Status Setu	<b>Default</b>	CR
Brightness	7	
Key Sound	Off	LF
I/O Model	RS232	
Baud Rate	9600	CR+LF
Terminator	CR+LF	

Option	CR, LF, CR+LF	Terminator indicates the end of line for return message.
Default value	CR+LF	
RS232 Configuration	Selectable Baud rat	e 9600, 19200, 38400, 57600, 115200
	Parity	None
	Hardware flow cont	rol Off
	Data Bits	8
	Stop bit	1
RS232 Pin Assignments	Pin 2: RxD Pin 3: TxD Pin 5: GND Pin 1, 4, 6 ~ 9: No Connection	12345 6789
PC Connection	Use a Null Moden diagram below.	n connection as shown in the
	GPM-8320/8330 Pin2 RxD Pin3 TxD Pin5 GND	PC RxD Pin2 TxD Pin3 GND Pin5

## Configure GPIB Interface

Background	Continue the following setting from <b>SYSTI</b> <b>CONFIG</b> setting screen	Continue the following setting from <b>SYSTEM</b> C <b>ONFIG</b> setting screen		
Steps	1. Press <b>Enter</b> button.	Enter		
	2. Press down arrow key to move cursor to <b>I/O Model</b> field.			
	3. Use soft keys to select and confirm the <b>GPIB</b> option.			
	SYSTEM CONFIG       R5232         Power On Status Setup Default       R5232         Brightness       7         Key Sound       Off         I/O Model       GPIB         GPIB Address       15			
	4. Press down arrow key to move cursor to <b>GPIB Address</b> field.			
	5. Use soft keys to increase or decrease to a target GPIB Address.			
	SYSTEM CONFIG       Invr.         Power On Status Setup Default       Invr.         Brightness       7         Key Sound       Off         I/O Model       GPIB         GPIB Address       15			
Ontion	The range of CDIR Address is from 1 to 30			

Option The range of GPIB Address is from 1 to 30. 15

Default option

# G≝INSTEK

### **REMOTE CONTROL**

GPIB Pin	Pin	Signal	Pin	Signal
Assignments	1	Data I/O 1	13	Data I/O 5
	2	Data I/O 2	14	Data I/O 6
	3	Data I/O 3	15	Data I/O 7
	4	Data I/O 4	16	Data I/O 8
	5	EOI	17	REN
	6	DAV	18	Ground (DAV)
	7	NRFD	19	Ground (NRFD)
	8	NDAC	20	Ground (NDAC)
	9	IFC	21	Ground (IFC)
	10	SRQ	22	Ground (SRQ)
	11	ATN	23	Ground (ATN)
	12	SHIELD Ground	24	Single GND

## Configure LAN Interface

Background	Continue the following setting from <b>SYSTEM</b> <b>CONFIG</b> setting screen		
Steps	1. Press Ente	er button.	Enter
	2. Press dow cursor to <b>I</b>	n arrow key to move <b>/O Model</b> field.	
	3. Use soft ke the LAN o	eys to select and confirm option.	
	SYSTEM CON Power On St Brightness Key Sound I/O Model IP Model Socket Port IP Address Subnet mask Gateway	FIG tatus Setup Default 7 Off LAN DHCP 00023 192.168.0.100 192.168.0.1	
	4. Press dow cursor to <b>I</b>	n arrow key to move <b>P Model</b> field.	
	5. Use soft ke the desired	eys to select and confirm d option.	
	SYSTEM CON Power On St Brightness Key Sound I/O Model IP Model Socket Port IP Address Subnet mask Gateway	FIG         Menual           7         Off           0ff         DHCP           00023         01100           255.255.255.0         0           192.168.0.1         0	
Option	Manual	Set up IP Address, Subnet Gateway manually.	mask and

DHCP server automatically assigns IP Address, Subnet mask and Gateway.

DHCP

## G≝INSTEK

Default option	DHCP		
Steps	6. Press down arrow key to move cursor to <b>Socket Port</b> field.		
	7. Use soft keys to increase or decrease the parameter of Socket Port.		
	SYSTEM CONFIG       Incr.*         Power On Status Setup Default       Incr.*         Brightness       7         Key Sound       Off         I/O Model       LAN         IP Model       DHCP         Socket Port       0023         IP Address       192.168.       0.100         Subnet mask       255.255.255.       0         Gateway       192.168.       0.		
Option	The range of Socket Port is from <b>00000 to 65535</b> .		
Default option	00023		
Steps	8. When selecting Manual for IP Model, press down arrow key to move cursor to <b>IP Address</b> , <b>Subnet</b> <b>Mask</b> and <b>Gateway</b> fields, individually.		
	<ul> <li>9. Use soft keys to increase or decrease the parameters of IP Address, Subnet Mask and Gateway fields, individually.</li> </ul>		
Default option	IP Address: <b>192.168.0.100</b>		
	Subnet Mask: <b>255.255.255.0</b>		
	Gateway: <b>192.168.0.1</b>		

# Configure EOL Character

#### Description The system config menu can set the EOL(end-ofline) character for return message.

### (The USB, GPIB and LAN's EOL character is fixed with CR+LF)

The EOL characters that can be received from the PC include CR+LF, LF+CR, CR or LF. The most common EOL character is CR+LF.

# Return to Local Control

Background	When the unit is in remote control mode, the RMT icon above the main display can be seen. When this icon is not displayed, it indicates that the unit is in local control mode.
Procedure	1. Press the <b>Local</b> key when in remote mode.
	2. The unit will go back into local mode and the RMT icon will turn off.

# 

The Command overview chapter lists all programming commands in functional order as well as alphabetical order. The command syntax section shows you the basic syntax rules you have to apply when using commands.

# **Command Syntax**

Compatible Standard	IEEE488.2 SCPI, 1994	Partial compatibility Partial compatibility	
Command Structure	SCPI (Standard Commands for Programmable Instruments) commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in a SCPI command represents each node in the command tree. Each keyword (node) of a SCPI command is separated by a colon (:).		
	For example, the diagram below shows an SCPI sub-structure and a command example.		
	:INPut:MODE I	DC •:MODE AC ACDC	

Command Types	There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.			
	Command types			
	Simple	A single command with/without a parameter		
	Example	:INPut:MODE DC		
	Query	A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.		
	Example	:INPut:CFACtor?		
Command Forms	Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.			
	The commands can be written either in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.			
	Below are examples of correctly written commands.			
	Long form	:INPut:SYNChronize VOLTage		
		:COMMunicate:HEADer ON		
	Short form	:INP:SYNC VOLT :COMM:HEAD ON		
Square Brackets	Commands that contain square brackets indicate that the contents are optional. The function of the command is the same with or without the square bracketed items, as shown below. For example, for the query:			
----------------------------	--	---	-------------------------------	--
	[:INPut]:FILTe	er?		
	Both :INPut:	FILTer? and :FILTer? are	e valid forms.	
Command Format	:INPut:VOL	Tage:RANGe     300       1     2		
	1. Command header 3. Parameter 1			
	2. Space			
Common Input Parameters	Туре	Description	Example	
	<boolean></boolean>	boolean logic	0, 1	
	<nr1></nr1>	integers	0, 1, 2, 3	
	<nr2></nr2>	decimal numbers	0.1, 3.14, 8.5	
	<nr3></nr3>	floating point with exponent	4.5e-1, 8.25e+1	
	<nrf></nrf>	any of NR1, 2, 3	1, 1.5, 4.5e-1	
	[MIN] (Optional parameter)	For commands, this will set the setting to the lowest value. This parameter can be used in place of any numerical parameter where indicated.		
		For queries, it will re possible value allowe particular setting.	turn the lowest ed for the	

	[MAX] (Optional parameter)	For command setting to the parameter can numerical par	ls, this will set the highest value. This n be used in place of any rameter where indicated.
		For queries, it possible value particular sett	will return the highest allowed for the ting.
Message Terminator (EOL)	Remote Command	Marks the end following mes with IEEE488	d of a command line. The ssages are in accordance .2 standard.
		CR+LF	The most common EOL character is CR+LF
Message Separator	EOL or ; (semicolon)	Command Sep	parator

# Command List

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### SCPI Commands

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*ESE	
*ESR	
*IDN	
*OPC	
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*STB	
*TRG	154

*CLS		$\subset$	Set )→
Description	Clears the event sta	e standard event status re tus register ,and error que	gister, extended eue.
Syntax	*CLS		
*ESE		(	Set → →Query
Description	Sets or re Register)	eturns the ESER (Event Sta contents.	atus Enable
Syntax	*ESE <nf< td=""><td>R1&gt;</td><td></td></nf<>	R1>	
Query Syntax	*ESE?		
Parameter/ Return parameter	<nr1></nr1>	0~255	
Example	*ESE 65 Set the ES *ESE? ->130 ESER=100	SER to 01000001 000010	

*ESR		
Description	Returns a Status Re	and clears the SESR (Standard Event gister).
Query Syntax	*ESR?	
Return parameter	<nr1></nr1>	0~255
Example	*ESR? ->198 SESR=110	000110
*IDN		
Description	Returns t number,	he manufacturer, model number, serial and system version of the instrument.
Query Syntax	*IDN?	
Return parameter	<string></string>	
Example	*IDN? ->GWInst	ek,GPM-8320/8330, GXXXXXXX,V1.00
*OPC		
Description	Sets or re SERS (Sta pending	turns the operation complete bit (bit0) in andard Event Status Register) when all operations are completed.
Syntax	*OPC	
Query Syntax	*OPC?	
Return parameter	<nr1>0</nr1>	Operation isn't completed.
	<nr1>1</nr1>	Operation is completed.
Example	*OPC? Returns 1	

*OPT		
Description	Returns	he installed option.
Query Syntax	*OPT?	
Return parameter	<string></string>	C1:GBIP
	-	C2:RS232
		C3:USB Device
		C7:Ethernet
		EX1:External Sensor 1(2.5V/5V/10V)
		EX2:External Sensor 2
		(50mV/100mV/200mV/500mV/1V/2V)
		G5:Harmonic measurement
		DA12:4 channel D/A output
Example	*OPT? ->C1,C2,C	C3,C7,EX1,EX2,G5,DA12
*RST		(Set)->
Description	Initialize	s the settings
Syntax	*RST	
		(Set)
*SRE		
Description	Sets or re Register)	eturns SRER (Service Request Enable
Syntax	*SRE <n< td=""><td>२१&gt;</td></n<>	२१>
Query Syntax	*SRE?	
Parameter/ Return parameter	<nr1></nr1>	0~255

Example	*SER 7 Set the the SRER to 00000111 *SRE? ->3 SRER=00000011
*STB	
Description	Returns the SBR (Status Byte Register) contents.
Query Syntax	*STB?
Return parameter	<nr1> 0~255</nr1>
Example	*STB ? ->34 SBR=00100010
*TRG	(Set)
Description	Executes single measurement (the same operation as when Trigger is pressed).
Syntax	*TRG

## AOUTput Commands

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:AOUTput:DIGital:OUTPut	159
:AOUTput:DIGital:SETup	159

:AOUTput		
Description	Returns all	D/A output settings.
Query Syntax	:AOUTput?	
Return parameter	<string></string>	
:AOUTput[:NO	RMal]:CHA	$(Set) \rightarrow \rightarrow (Query)$
Description	Sets or returns a D/A output item.	
Syntax	:AOUTput[:NORMal]:CHANnel <x> {<function>[,<element>]}</element></function></x>	
Query Syntax	:AOUTput[:NORMal]:CHANnel <x>?</x>	
Parameter/	<x></x>	1 to 12 (channel)
Return parameter	<function></function>	U I P S Q LAMBda PHI UPeak IPeak FU  FI WH WHP WHM AH AHP AHM  NONE
	<element></element>	1 (If <element> is omitted, the element is set to 1) (For the GPM-8320/8330, only set to 1 or omitted)</element>

Example	:AOUTPUT:NORMAL:CHANNEL1 NONE			
	Turns D/A channel1 output off (0V)			
	:AOUTPUT:NORMAL:CHANNEL1?			
	->:AOUTPU	T:NORMAL:CHANNEL1 I,1		
		(Set)		
:AOUTput[:NO	RMal]:IRTii	me — Query		
Deservición				
Description	Sets or retur	The rated integration time that is		
	used in the	D/A output of the integrated value.		
Syntax	:AOUTput[:N	NORMal]:IRTime { <nrf>,<nrf>,<nrf>}</nrf></nrf></nrf>		
Query Syntax	:AOUTput[:N	NORMal]:IRTime?		
Parameter/	1st <nrf></nrf>	0~9999(hour)		
Return parameter	2nd <nrf></nrf>	0~59(minute)		
	3rd <nrf></nrf>	0~59(second)		
Example	:AOUTPUT:NORMAL:IRTIME 1,1,10			
	:AOUTPUT:NORMAL:IRTIME?			
	->:AOUTPUT:NORMAL:IRTIME 1,1,10			
		(Set)		
:AOUTput[:NO	RMal]:MOI	DE <x></x>		
Description	Sets or returns a D/A range mode. (Remote Control Only)			
Syntax	:AOUTput[:NORMal]:MODE <x> {FIXed MANual COMPare}</x>			
Query Syntax	:AOUTput[:NORMal]:MODE <x>?</x>			
Parameter/	<x></x>	1 to 12 (channel)		
Return parameter	FIXed	Fixed range mode.		
	MANual	Manual range mode.		
	COMPare	Comparator mode.		

Example	:AOUTPUT:NORMAL:MODE1 FIXED
	:AOUTPUT:NORMAL:MODE1?
	->:AOUTPUT:NORMAL:MODE1 FIXED
Â.	<ul> <li>FIXed = Fixed range mode (default value)</li> </ul>
└∙॓Note	Outputs +5 V when the rated value of each measurement function is received.
	<ul> <li>MANual = Manual range mode</li> </ul>
	The displayed values of the measurement function when +5 V and -5 V are output as D/A output can be set to any values of your choice. This enables the D/A output to be expanded or reduced for each channel (D/A zoom).
	COMPare = Comparator mode
	By comparing with the comparator limits, this instrument outputs +5 V, 0 V, or -5 V.

### :AOUTput[:NORMal]:PRESet

(Set)→

Description	Sets the D/A output items to their default values.		
Syntax	:AOUTput[:NORMal]:PRESet {NORMal INTEGrate}		
Parameter	NORMal         CH1:U1, CH2:U2, CH3:U3, CH4:UΣ, CH5:I1, CH6:I2, CH7:I3, CH8:IΣ, CH9:P1, CH10:P2, CH11:P3, CH12:PΣ           INTEGrate         CH1:P1, CH2:P2, CH3:P3, CH4:PΣ, CH5:WP1, H6:WP2, CH7:WP3, CH8:WPΣ, CH9:q1, CH10:q2, CH11:q3, CH12:qΣ		
Example	:AOUTPUT:NORAML:PRESET NORMAL		
:AOUTput[:NO	RMal]:RAT	$E < x > \qquad \qquad \underbrace{\text{Set}}_{\text{Query}}$	
Description	Sets or returns the maximum and minimum values for when the D/A output is in manual range mode. (Remote Control Only)		
Syntax	:AOUTput[:NORMal]:RATE <x> {<nrf>,<nrf>}</nrf></nrf></x>		

Query Syntax	:AOUTput[:NORMal]:RATE <x>?</x>	
Parameter/	<x></x>	1 to 12 (channel)
Return parameter	<nrf></nrf>	-9.999E+12~9.999E+12
Example	:AOUTPUT:R	ATE1 100,-100
	:AOUTPUT:R	ATE1?
	->:AOUTPUT	:NORMAL:RATE1 100.0E+00,-100.0E+00
<b>^</b>	• When the	D/A output is in manual range mode
∠•_Note	Set the rated value for +5 V output and then that for –5 V output.	
	• When the	D/A output is in fixed range mode
	There is no do not affe	o need to set these values. (The values ect the output operation.)
	• When the	D/A output is in comparator mode
	Set the upper limit and then the lower limit.	
:AOUTput:DIGi	ital:MODE	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets the application mode of digital I/O (Remote Control Only).	

Syntax	:AOUTput:DIGital:MODE {IO 4094}	
Query Syntax	:AOUTput:DIGital:MODE?	
Parameter/ Return parameter	10	Sets the digital I/O to IO mode.
	4094	Sets the digital I/O to 4094 (serial to parallel) mode.
Example	:AOUTPUT:DIGITAL:MODE IO	
	:AOUTPUT:DIGITAL:MODE?	
	->:AOUTPUT:DIGITAL:MODE IO	

:AOUTput:DIGItal:OUTPut
-------------------------

Set )->

(

Description	When the 4094 mode (serial to parallel) is selected for digital I/O, make use of this command to set output status.	
Syntax	:AOUTput:DIGital:OUTPut { <nr1>,<boolean>}</boolean></nr1>	
Parameter	<nr1></nr1>	0~255 (serial input data)
	<boolean></boolean>	0,1 (strobe pulse)
Example	:AOUTPUT:DIGITAL:MODE 4094	
	:AOUTPUT:DIGITAL:OUTPUT 10,1	

:AOUTput:DIGital:SETup			(Set)→	
Description	When the I I/O,make u status.	When the IO mode is selected for digital I/O,make use of this command to set output status.		
Syntax	:AOUTput:D	:AOUTput:DIGital:SETup { <boolean>}</boolean>		
Parameter	<boolean></boolean>	0,1 (OUT1,OUT2,C	DUT3,OOUT4)	
Example	:AOUTPUT: :AOUTPUT:	:AOUTPUT:DIGITAL:MODE IO :AOUTPUT:DIGITAL:SETUP 0,1,0,1		
	Sets OUT1 t to high	Sets OUT1 to low, OUT2 to high, OUT3 to low, OUT4 to high		

### COMMunciate Commands

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:COMMunicate:LOCKout	161
:COMMunicate:REMote	161
:COMMunicate:STATus	162
:COMMunicate:VERBose	162

:COMMunicate		$\rightarrow \mathbb{Q}$	uery
Description	Returns all communication settings.		
Query Syntax	:COMMunica	ate?	
Return parameter	<string></string>		
:COMMunicate	:HEADer		) → uery)
Description	Sets or returns whether headers are attached to query responses.		
Syntax	:COMMunicate:HEADer { <boolean> OFF   ON}</boolean>		
Query Syntax	:COMMunicate:HEADer?		
Parameter	<boolean>0 OFF</boolean>		
	<boolean>1</boolean>	ON	
Return parameter	0	Returns without a header.	
	1	Returns with a header.	
Example	:COMMUNICATE:HEADER ON		
	:COMMUNICATE:HEADER? ->:COMMUNICATE:HEADER 1		

Note	Example of a response with a header :INPUT:VOLTAGE:RANGE 150.0E+00 Example of a response without a header 150.0E+00		
:COMMunicate	:LOCKout	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$	
Description	Sets or retur	rns local lockout.	
Syntax	:COMMunica	ate:LOCKout { <boolean> OFF   ON}</boolean>	
Query Syntax	:COMMunica	ate:LOCKout?	
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Disable the local key.	
	1	Enable the local key.	
Example	:COMMUNICATE:LOCKOUT ON		
	:COMMUNICATE:LOCKOUT?		
	->:COMMU	NICATE:LOCKOUT 1	
:COMMunicate	::REMote	$\underbrace{\text{Set}}_{} \longrightarrow \\  \\ \underbrace{\text{Query}}_{} $	
Description	Sets or returns the GPM-8320/8330 series to remote or local mode. ON is remote mode.		
Syntax	:COMMunicate:REMote { <boolean> OFF   ON}</boolean>		
Query Syntax	:COMMunicate:REMote?		
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the remote function off.	
	1	Turn the remote function on.	

## Example

:COMMUNICATE:REMOTE ON :COMMUNICATE:REMOTE?

->:COMMUNICATE:REMOTE 1

:COMMunicate	e:STATus		
Description	Returns and clears the line-specific status.(Only for RS-232)		
Query Syntax	:COMMunica	ate:STATus?	
Return parameter	Bit 0	Parity error.	
(each status bit)	Bit 1	Framing error.	
	Bit 2	Noise error Break character detection.	
	Bit 3 and hig	her Always zero.	
Example	:COMMUNI	CATE:STATUS?	
	->0		
Note	• When an event occurs, the corresponding bit is set in the status.		
	• When the bit is read, it is cleared.		
	• Zero is returned for interfaces other than RS-		
:COMMunicate	e:VERBose	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$	
Description	Sets or returns whether the response to a query is returned fully spelled out or in its abbreviated form.		
Syntax	:COMMunicate:VERBose { <boolean> OFF   ON}</boolean>		
Query Syntax	:COMMunicate:VERBose?		
Parameter	<boolean>0 OFF</boolean>		
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the verbose function off.	

	1	Turn the verbose function on.		
Example	:COMMUNICATE:VERBOSE ON			
	:COMMUNI	:COMMUNICATE:VERBOSE?		
	->:COMMUI	->:COMMUNICATE:VERBOSE 1		
<b>A</b>	Example of a	response fully spelled out		
∠•_Note	:INPUT:VOL	:INPUT:VOLTAGE:RANGE 150.0E+00		
	Example of a response in abbreviated form			
	:VOLT:RANC	i 150.0E+00		

## DISPlay Commands

:DISPlay	164
:DISPlay:NORMal	164
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:DISPlay:NUMeric[:NORMal]:PAGE	168

:DISPlay			
Description	Returns all c	lisplay settings.	
Query Syntax	:DISPlay?		
Return parameter	<string></string>		
:DISPlay:NORN	/Ial		
Description	Returns all r settings.	normal measuremen	t data display
Query Syntax	:DISPlay:NO	RMal?	
Return parameter	<string></string>		
:DISPlay[:NORI	Mal]:ITEM<	x>	$\underbrace{\text{Set}}_{\text{Query}}$
Description	Sets or retur display item	ns a normal measur . Refer to page 81 fc	ement data or details.
Syntax	:DISPlay[:NC <function>[,•</function>	PRMal]:ITEM <x> <element>]}</element></x>	
Query Syntax	:DISPlay[:NC	PRMal]:ITEM <x>?</x>	

Parameter/	<x></x>	1 to 10 (display).	
Return parameter	<function></function>	U UPPeak UMPeak I IPPe  P PPPeak PMPeak S Q L  CFI PHI FU FI UTHD ITH  EFFi	eak IMPeak AMBda CFU HD MATH MCR
	<element></element>	{ <nrf> SIGMa}(<nrf> =</nrf></nrf>	= 1 to 3)
Example	:DISPLAY:NO :DISPLAY:NO ->:DISPLAY:	ORMAL:ITEM1 U,1 ORMAL:ITEM1? NORMAL:ITEM1 U.1	
<function></function>	Function		GPM- 8320/8330 Indicator
U	Voltage V		[V]
UPPeak	Maximum vo	oltage: V+pk	[V+pk]
UMPeak	Minimum voltage: V-pk		[V-pk]
I	Current I		[I]
IPPeak	Maximum current: I+pk		[l+pk]
IMPeak	Minimum cu	ırrent: I-pk	[I-pk]
Р	Active power P [P]		[P]
PPPeak	Maximum power: P+pk		[P+pk]
PMPeak	Minimum power: P-pk		[P-pk]
S	Apparent power S		[VA]
Q	Reactive power Q		[VAR]
LAMBda	Power factor $\lambda$		[PF]
CFU	Voltage facto	pr λ	[CFV]
CFI	Current facto	or λ	[CFI]
РНІ	Phase difference $\Phi$ [DEC		[DEG]
FU	Voltage frequency fV [VHz]		[VHz]
FI	Current frequ	uency fl	[AHz]

UTHD	Total harmonic distortion of voltage [THDV] Vthd			
ITHD	Total harmonic d	istortion o	of current Ithd	[THDI]
MATH	Mathematical Co	mputatior	ı	[MATH]
MCR	Maximum Currer	nt Ratio		[MCR]
EFFi	Power Efficiency			[EFFI]
:DISPlay:INTeg	rate:ITEM <x></x>		Set → →Query	)
Description	Sets or returns a display item. Re	Integrate	e measureme ge 103 for det	nt data ails.
Syntax	:DISPlay:INTegra <function>,[,<el< td=""><td>te:ITEM&lt;× ement&gt;]}</td><td>&gt;</td><td></td></el<></function>	te:ITEM<× ement>]}	>	
Query Syntax	:DISPlay:INTegrate:ITEM <x>?</x>			
Parameter/	<x> 1 to 2(disp</x>		play).	
Return parameter	<function> {WHP WHM WHAVG AHP AHM HAVG U I}</function>		AHP AHM A	
	<element></element>	1 (If <elem element is 8320/8330</elem 	nent> is omitte s set to 1)( For 0, only set to 1	ed, the r the GPM- I or omitted).
Example	:DISPLAY:INTEGRATE:ITEM1 WHP,1			
	:DISPLAY:INTEGRATE:ITEM1?			
	->:DISPLAY:INTE	GRATE:IT	EM1 WHP,1	
<function></function>	Function		GPM-8320/8	330 Indicator
WHP	Positive watt hour WP+		[WP+]	
WHM	Positive watt hour WP-		[WP-]	
WHAVG	Average power		[P(avg)]	
АНР	Positive ampere hour q+		[q+]	
АНМ	Positive ampere	hour q	[q-]	
AHAVG	Average current		[q(avg)]	
U	Voltage V		[V]	

#### **COMMAND OVERVIEW**

<u>I</u>	Current I	[1]		
:DISPlay:PAGE		$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$		
Description	Sets or retur	rns the display page item.		
Syntax	:DISPlay:PAC	GE { <function>}</function>		
Query Syntax	:DISPlay:PAC	JE?		
Parameter/ Return parameter	<function></function>	{MEASurement ENLArge INTEgrator  SYSTem_INFO SYSTem_CONFig SETUp  AVERage VA_RANGe_CONFig EXT_RA NGe_CONFig RATIo EXTernal SAVE_LO AD OPTIon_DA GRAPh HARMonic_GR APh HARMonic_LIST_GRAPh HARDCO PY SCPI MATH}		
Example	:DISPLAY:PA	GE MEASUREMENT		
	:DISPLAY:PA	GE?		
	->:DISPLAY:PAGE MEASUREMENT			
:DISPlay:NUM	eric[:NORN	$(Set) \rightarrow (Ial]:FORMat \rightarrow (Query)$		
Description	Sets or queries the numeric display format.			
Syntax	:DISPlay:NUMeric[:NORMal]:FORMat {VAL10 MATRix  ALL}			
Query Syntax	:DISPlay:NU	Meric[:NORMal]:FORMat?		
Parameter/ Return parameter	VAL10	Numeric display items are displayed in order by their item numbers.		
	MATRix	Selected functions are displayed in order by element.		
	ALL	All functions are displayed in order by element.		
Example	:DISPLAY:NU	JMERIC:NORMAL:FORMAT VAL10		
	:DISPLAY:NUMERIC:NORMAL:FORMAT?			
	->:DISPLAY:I	ISPLAY:NUMERIC:NORMAL:FORMAT VAL10		

 $\overline{}$ 

:DISPlay:NUMeric[:NORMal]:PAGE $\rightarrow$ Query			
Description	Sets or queries the displayed page of the numeric display		
Syntax	:DISPlay:NUMeric[:NORMal]:PAGE{ <nrf>}</nrf>		
Parameter/	<nrf> 1 to 4 (Page number)</nrf>		
Return parameter			
Example	:DISPLAY:NUMERIC:NORMAL:PAGE 1		
	:DISPLAY:NU	JMERIC:NORMAL:F	PAGE?
	->:DISPLAY:	NUMERIC:NORMAL	.:PAGE 1

### HARMonics Command

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:HARMonics:DISPlay	169
:HARMonics:DISPlay[:STATe]	169
:HARMonics:DISPlay:ORDer	170
:HARMonics:PLLSource	170
:HARMonics:ORDer	171
:HARMonics:THD	171

:HARMonics			
Description	Returns all h	narmonic measurem	ent settings.
Query Syntax	:HARMonics	?	
Return parameter	<string></string>		
:HARMonics:D	ISPlay		
Description	Returns all l settings.	narmonic measurem	ent display
Query Syntax	:HARMonics	:DISPlay?	
Return parameter	<string></string>		
:HARMonics:D	ISPlay[:STA	Te]	$\underbrace{\text{Set}}_{\text{Query}}$
Description	Sets or retur	rns the on/off state o	of harmonic
·	measuremen	nt data display.	
Syntax	:HARMonics:DISPlay[:STATe] { <boolean> OFF ON}</boolean>		
Query Syntax	:HARMonics	:DISPlay[:STATe]?	
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	

Detune a currenter	0	Tuma tha hamaisnia dianlau aff	
Return parameter	0	iurn the harmionic display off.	
	1	Turn the harmionic display on.	
Example	: HARMONICS:DISPLAY:STATE OFF		
	: HARMONICS:DISPLAY:STATE?		
	->:HARMON	IICS:DISPLAY:STATE 0	
		(Set)	
:HARMonics:D	ISPlay:ORD	er – Query	
Description	Sets or returns the harmonic order of the harmonic component that is shown in graph- >hormoics->bar page for the harmonic measurement data display.		
Syntax	:HARMonics	:DISPlay:ORDer { <nr1>}</nr1>	
Query Syntax	:HARMonics	:DISPlay:ORDer?	
Parameter/	<nr1></nr1>	1 to 50 (harmonic order).	
Return parameter			
Example	:HARMONIC	CS:DISPLAY:ORDER 1	
	:HARMONIC	CS:DISPLAY:ORDER?	
	->:HARMONICS:DISPLAY:ORDER 1		
		(Set)->	
:HARMonics:P	LLSource		
Description	Sets or returns the PLL source.		
Syntax	:HARMonics:PLLSource {U <x> I<x>}<x> = 1 to 3 (element)</x></x></x>		
Query Syntax	:HARMonics:PLLSource?		
Parameter/	U1/U2/U3	Select pll source at voltage.	
Return parameter	11/12/13	Select pll source at current.	
Example	:HARMONIC	CS:PLLSOURCE U1	
:HARMONICS:PLLSOURCE?		CS:PLLSOURCE?	
	->:HARMONICS:PLLSOURCE U1		

:HARMonics:O	RDer	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets or returns the maximum and minimum harmonic orders that are analyzed.	
Syntax	:HARMonics:OR	Der { <nrf>,<nrf>}</nrf></nrf>
Query Syntax	:HARMonics:OR	Der?
Parameter/ Return parameter	1st <nrf></nrf>	1 (minimum harmonic order,fixed at 1)
	2nd <nrf></nrf>	50 (maximum harmonic order)
Example	:HARMONICS:C	PRDER 1,20
	:HARMONICS:C	PRDER?
	->:HARMONICS	:ORDER 1,20
:HARMonics:TI	HD	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets or returns the equation used to compute the THD (total harmonic distortion).	
Syntax	:HARMonics:THD {TOTal FUNDamental}	
Query Syntax	:HARMonics:TH	D;
Parameter/	TOTal (	CSA)
Return parameter	FUNDamental (	IEC)
Example	:HARMONICS:T	HD FUNDAMENTAL
	:HARMONICS:T	HD?
	->:HARMONICS	THD FUNDAMENTAL

#### HOLD Command

:HOLD		Set → Query	
Description	Sets or returns the on/off state of the output hold feature for display, communication, and other types of data.		
Syntax	:HOLD { <boolean> OFF ON}</boolean>		
Query Syntax	:HOLD?		
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the hold function off.	
	1	Turn the hold function on.	
Example	:HOLD OFF		
	:HOLD?		
	->:HOLD 0		

#### **INPut Commands**

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[:INPut]:CURRent:EXTSensor:CONFig <x></x>	179
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[:INPut]:RCONfig	181
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[:INPut]:SCALing[:STATe]	181
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:INPut			
Description	Returns all i	nput settings.	
Query Syntax	:INPut?		
Return parameter	<string></string>		

[·INPutl·CFACt	or	$(Set) \rightarrow$	
Description	Sets or ret	turns the crest factor.	
Syntax	[:INPut]:C	FACtor {3 6 A6}	
Query Syntax	[:INPut]:C	FACtor?	
Parameter/	3	crest factor 3.	
Return parameter	6	crest factor 6.	
	A6	Display range expand mode (6A) for crest	
		factor 6.	
Example	:INPUT:CF	FACTOR 3	
	:INPUT:CFACTOR?		
	->:INPUT:CFACTOR 3		
		(Set)	
[:INPut]:WIRin	B		
Description	Sets or ret	turns the wiring system.	
Syntax	[:INPut]:WIRing {P1W3 P3W3 P3W4 V3A3}		
Query Syntax	[:INPut]:WIRing?		
Parameter/	P1W3		
Return parameter	P3W3		
	P3W4		
	V3A3		
Example	:INPUT:W	IRING P1W3	
	:INPUT:WIRING?		
	->:INPUT:	WIRING P1W3	
		(Set)	
[:INPut]:MODE			
Description	Sets or ret measuren	turns the voltage and current nent mode.	

Syntax	[:INPut]:MODE {DC AC/RMS ACDC  VMEan}	
Query Syntax	[:INPut]:MODE?	
Parameter/	DC	Select the dc measurement mode.
Return parameter	AC/RMS	Select the ac measurement mode.
	ACDC	Select the acdc measurement mode.
	VMEan	Select the vmean measurement mode.
Example	:INPUT:MODE DC	
	:INPUT:MODE?	
	->:INPUT:MODE DC	

[:INPut]:VOLT	age
---------------	-----

Description	Returns all voltage measurement settings.
Query Syntax	[:INPut]:VOLTage?

Return parameter <String>

(	Set )-	
		)

[:INPut]:VOLTage:RANGe

Description	Sets or returns the voltage range.	
Syntax	[:INPut]:VOLTage:RANGe { <voltage>}</voltage>	
Query Syntax	[:INPut]:VOLTage:RANGe?	
Parameter/ Return parameter	<voltage></voltage>	15, 30, 60, 150, 300, 600, 1000(V) when the crest factor is set to 3. 7.5, 15, 30, 75, 150, 300, 500(V) when the crest factor is set to 6 or 6A.
Example	:INPUT:VOLTAGE:RANGE 600V :INPUT:VOLTAGE:RANGE?	
	->:INPUT:VOLT/	AGE:RANGE 600.0E+00

[:INPut]:VOLTa	ge:AUTO	(	Set → → Query
Description	Sets or retur	rns the voltage auto rar	nge on/off state.
Syntax	[:INPut]:VOL	Tage:AUTO { <boolean> </boolean>	OFF ON}
Query Syntax	[:INPut]:VOL	Tage:AUTO?	
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the voltage auto ra	nge function off.
	1	Turn the voltage auto ra	nge function on.
Example	:INPUT:VOL	TAGE:AUTO ON	
	:INPUT:VOLTAGE:AUTO?		
	->:INPUT:VC	DLTAGE:AUTO 1	
[:INPut]:VOLTa	ge:CONFig	( 	<u>Set</u> )→ →Query
Description	Sets or return	rns the valid voltage ra	nge.
Syntax	[:INPut]:VOLTage:CONFig {ALL  <voltage>[,Voltage]}</voltage>		
Query Syntax	[:INPut]:VOLTage:CONFig?		
Parameter/	ALL	All ranges are valid.	
Return parameter	<voltage></voltage>	See(:INPut:VOLTage:RA	NGe).
Example	:INPUT:VOL	TAGE:CONFIG 300,150,3	30
	:INPUT:VOLTAGE:CONFIG?		
	->:INPUT:VOLTAGE:CONFIG 300.0E+00,150.0E+00,		
	30.0E+00		
		(	Set )
[:INPut]:VOLTa	ge:POJump	· –	→ Query
Description	Sets or retur	rns the jump destinatio	n range that is
-	used when a voltage peak over-range occurs.		
	used when	a voltage peak over-rar	nge occurs.

(Query)

(Set)-

Query)

→

Query Syntax	[:INPut]:VOLTage:POJump?	
Parameter/ Return parameter	OFF	No jump destination voltage range.
	<voltage></voltage>	See(:INPut:VOLTage:RANGe).
Example :INPUT:VOLTAGE:POJUMP 600V		FAGE:POJUMP 600V
	:INPUT:VOLTAGE:POJUMP?	
	->:INPUT:VOLTAGE:POJUMP 600.0E+00	

#### [:INPut]:CURRent

Description Returns all current measurement settings.

Query Syntax [:INPut]:CURRent?

Return parameter <String>

### [:INPut]:CURRent:RANGe

Description	Sets or returns the current range.	
Query	[:INPut]:CURRent:RANGe { <current> (EXTernal<x>,<voltage>)}</voltage></x></current>	
Query Syntax	[:INPut]:CU	IRRent:RANGe?
Parameter/	<x></x>	1,2(EXT1,EXT2)
Return parameter	<current></current>	0.5, 1, 2, 5, 10, 20(A) when the crest factor is set to 3.
		250(mA), 0.5, 1, 2.5, 5, 10(A) when the crest factor is set to 6 or 6A.
	EXTernal1 <voltage></voltage>	2.5, 5, 10(V) when the crest factor is set to 3.
		1.25, 2.5, 5(V) when the crest factor is set to 6 or 6A.
	EXTernal2 <voltage></voltage>	50, 100, 200, 500,(mV), 1, 2(V) when the crest factor is set to 3.
		25, 50, 100, 250,(mV), 0.5, 1(V) when the crest factor is set to 6 or 6A.

Example	:INPUT:CURRENT:RANGE 20A			
	:INPUT:CURRENT:RANGE?			
	->:INPUT:CURRENT:RANGE 20.0E+00			
	:INPUT:CURRENT:RANGE EXTERNAL1,10V			
	:INPUT:CURRENT:RANGE?			
	-> :INPUT:CURRENT:RANGE EXTERNAL1,10.0E+00			
		Set →		
[:INPut]:CURRe	ent:AUTO			
Description	Sets or retur	rns the current auto range on/off state.		
Syntax	[:INPut]:CURRent:AUTO { <boolean> OFF ON}</boolean>			
Query Syntax	[:INPut]:CURRent:AUTO?			
Parameter	<boolean>0</boolean>	OFF		
	<boolean>1</boolean>	ON		
Return parameter	0	Turn the current auto range function off.		
	1	Turn the current auto range function on		
Example	:INPUT:CURRENT:AUTO ON			
	:INPUT:CURRENT:AUTO?			
	->:INPUT:CURRENT:AUTO 1			
		(Set)		
[:INPut]:CURRe	ent:CONFig			
Description	Sets or returns the valid current range.			
Syntax	[:INPut]:CURRent:CONFig {ALL  <current>[,Current]}</current>			
Query Syntax	[:INPut]:CURRent:CONFig?			
Parameter/ Return parameter	ALL	All ranges are valid.		
	<current></current>	See(:INPut:CURRent:RANGe).		

Example	:INPUT:CURRENT:CONFIG 20,10,1 :INPUT:CURRENT:CONFIG? ->:INPUT:CURRENT:CONFIG 20.0E+00,10.0E+00,		
[:INPut]:CURRe	ent:POJump	Set → →Query	
Description	Sets or returns the jump destination range that is used when a current peak over-range occurs.		
Syntax	[:INPut]:CURRent:POJump {OFF  <current>}</current>		
Query Syntax	[:INPut]:CURRent:POJump?		
Parameter/ Return parameter	OFF	No jump destination current range.	
	<current></current>	See(:INPut:CURRent:RANGe).	
Example	:INPUT:CURRENT:POJUMP 20A		
	:INPUT:CURRENT:POJUMP?		
	->:INPUT:CURRENT:POJUMP 20.0E+00		
[:INPut]:CURRe	ent:EXTSens	sor:CONFig <x> <math>\rightarrow</math> Query</x>	
Description	Sets or returns the valid external current sensor range.		
Syntax	[:INPut]:CURRent:EXTSensor:CONFig <x> {ALL <voltage>[,Voltage]}</voltage></x>		
Query Syntax	[:INPut]:CURRent:EXTSensor:CONFig <x>?</x>		
Parameter/ Return parameter	<x></x>	1,2(EXT1,EXT2), If <x> is omitted, by default sets or returns EXT2 config.</x>	
	ALL	All ranges are valid.	
	<voltage></voltage>	See(:INPut:CURRent:RANGe).	

Example	:INPUT:CURRENT:EXTSENSOR:CONFIG1 2,0.5,0.1		
	:INPUT:CURRENT:EXTSENSOR:CONFIG1?		
	->:INPUT:CURRENT:EXTSENSOR:CONFIG1 2.00E+00,500.0E-03,100.0E-03		
		(Set)	
[:INPut]:CURRe	ent:EXTSen	sor:POJump <x> —Query</x>	
Description	Sets or returns the jump destination range that is		
	used when a current peak over-range occurs.		
Syntax	[:INPut]:CURRent:EXTSensor:POJump <x> {OFF <voltage>}</voltage></x>		
Query Syntax	[:INPut]:CURRent:EXTSensor:POJump <x>?</x>		
Parameter/ Return parameter	<x></x>	1,2(EXT1,EXT2), If <x> is omitted, by default sets or returns EXT2 config.</x>	
	OFF	No jump destination current range.	
	<voltage></voltage>	See(:INPut:CURRent:RANGe).	
Example	:INPUT:CURRENT:EXTSENSOR:POJUMP1 2V		
	:INPUT:CURRENT:EXTSENSOR:POJUMP1?		
	->:INPUT:CURRENT:EXTSENSOR:POJUMP1 2.00E+00		
		(Set)	
[:INPut]:CURRe	ent:SRATio:	ELEMent <x><y> — Query</y></x>	
Description	Sets or returns the external current sensor conversion ratio of the specified element.		
Syntax	[:INPut]:CURRent:SRATio:ELEMent <x> <y></y></x>		
Query Syntax	[:INPut]:CURRent:SRATio:ELEMent <x><y>?</y></x>		
Parameter/ Return parameter	<x> 1 to 3</x>	(element)	
	<y> 1,2 (E</y>	XT1,EXT2)	
Example	:INPUT:CUR	RENT:SRATIO:ELEMENT 10	
	:INPUT:CURRENT:SRATIO:ELEMENT?		
	->:INPUT:CURRENT:SRATIO:ELEMENT1 EXT1,10.000		
Sate or rotur			
--	---		
Sets or returns the on/off state of the range configuration (valid range selection) feature.			
[:INPut]:RCO	Nfig { <boolean> OFF ON}</boolean>		
[:INPut]:RCO	Nfig?		
<boolean>0</boolean>	OFF		
<boolean>1</boolean>	ON		
0	Turn the range configuration feature off.		
1	Turn the range configuration feature on.		
:INPUT:RCONFIG ON			
:INPUT:RCO	NFIG?		
->:INPUT:RC	ONFIG 1		
	configuratio [:INPut]:RCO <boolean>0 <boolean>1 0 1 :INPUT:RCO :INPUT:RCO</boolean></boolean>		

[:INPut]:SCALin	ıg		
Description	Returns all s	scaling settings.	
Query Syntax	[:INPut]:SC	ALing?	
Return parameter	<string></string>		
[:INPut]:SCALir	ng[:STATe]		$\underbrace{\text{Set}}_{\text{Query}}$
Description	Sets or retur	rns the scaling on/of	f state.
Syntax	[:INPut]:SCA	Ling[:STATe] { <boolea< td=""><td>n&gt; OFF ON}</td></boolea<>	n> OFF ON}
Query Syntax	[:INPut]:SCA	Ling[:STATe]?	
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the scaling funct	tion off.
	1	Turn the scaling funct	tion on.

### Example :INPUT:SCALING:STATE ON :INPUT:SCALING:STATE? ->:INPUT:SCALING:STATE 1

[:INPut]:SCALir <x></x>	ng:{VT CT S	SFACtor}:ELEMent	$\underbrace{\text{Set}}_{\text{Query}}$	
Description	Sets or retu coefficient o	Sets or returns the VT ratio, CT ratio, or power coefficient of the specified element.		
Syntax	[:INPut]:SCALing:{VT CT SFACtor}:ELEMent <x> {<nrf>}</nrf></x>			
Query Syntax	[:INPut]:SCA	Ling:{VT CT SFACtor}:E	LEMent <x>?</x>	
Parameter/	<x></x>	<x> = 1 to 3 (element)</x>		
Return parameter	<nrf></nrf>	0.001 to 9999		
Example	:INPUT:SCALIG:VT:SRATIO:ELEMENT1 10			
	:INPUT:SCALIG:VT:SRATIO:ELEMENT1?			
	->:INPUT:SCALIG:VT:SRATIO:ELEMENT1 10			
[:INPut]:SYNCł	nronize	(	Set → →Query	
Description	Sets or returns the synchronization source.			
Syntax	[:INPut]:SYNChronize {VOLTage CURRent OFF}			
Query Syntax	[:INPut]:SYNChronize?			
Parameter/ Return parameter	VOLTage	Select the voltage synch source.	ironization	
	CURRent	Select the current synch source.	ironization	
	OFF	Select the off synchroni	zation source.	
Example	:INPUT:SYN	CHRONIZE VOLTAGE		
	:INPUT:SYNCHRONIZE?			

[:INPut]:FILTer		
Description	Returns all i	input filter settings.
Query Syntax	[:INPut]:FIL	.Ter?
Return parameter	<string></string>	
[:INPut]:FILTer:	LINE	Set → →Query
Description	Sets or retur	rns the line filter.
Syntax	[:INPut]:FILT	er:LINE { <boolean> OFF ON}</boolean>
Query Syntax	[:INPut]:FILT	er:LINE?
Parameter	<boolean>0</boolean>	OFF
	<boolean>1</boolean>	ON
Return parameter	0	Turn the line filter function off.
	1	Turn the line filter function on.
Example	:INPUT:FILT	ER:LINE OFF
	:INPUT:FILT	ER:LINE?
	->:INPUT:FIL	TER:LINE 0
		Set →
[:INPut]:FILTer:	FREQuenc	y Query
Description	Sets or retur	rns the frequency filter.
Syntax	[:INPut]:FILTer:FREQuency { <boolean> OFF ON}</boolean>	
Query Syntax	[:INPut]:FILTer:FREQuency?	
Parameter	<boolean>0</boolean>	OFF
	<boolean>1</boolean>	ON
Return parameter	0	Turn the frequency filter function off.
	1	Turn the frequency filter function on.

# Example :INPUT:FILTER:FREQUECNY OFF

:INPUT:FILTER:FREQUECNY?

->:INPUT:FILTER:FREQUECNY 0

[:INPut]:POVer			
Description	Returns the peak over-range information.		
Query Syntax	[:INPut]:POVer?		
Return parameter	Bit 7 6 5 4 3 2 1 0	Voltage peak over-range is occurring.	
	13 U3 12 U2 11 U1	Current peak over-range is occurring.	
Example	:INPUT:POVER?	]	

### [:INPut]:CRANge

Description	Sets or returns the check range status.	
Query Syntax	[:INPut]:CRA	Nge?
Return parameter	Bit0	The voltage is at the condition for reducing the auto range or less.
	Bit1	The voltage exceeds the condition for raising the auto range.
	Bit2	The voltage is over-range.
	Bit3	The voltage is peak over-range.
	Bit4	The current is at the condition for reducing the auto range or less.
	Bit5	The current exceeds the condition for raising the auto range.

	Disc	<b>T</b> I
	Bitb	The current is over-range.
	Bit7	The current is peak over-range.
Example	:INPUT:CRAI	NGE?
	->:INPUT:CR	ANGE 8
	(Indicate the	voltage is peak over-range)
		(Set)-+
[:INPut]:ZERO		
Description	Sets or retur	rns the zero state.
Syntax	[:INPut]:ZER	O { <boolean> OFF ON}</boolean>
Query Syntax	[:INPut]:ZER	0;
Parameter	<boolean>0</boolean>	OFF
	<boolean>1</boolean>	ON
Return parameter	0	Turn the zero function off.
	1	Turn the zero function on.
Example	:INPUT:ZERO	) OFF
	:INPUT:ZERG	D;
	->:INPUT:ZE	RO 0

#### **INTEGrate Commands**

:INTEGrate	186
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:INTEGrate:STATe	
:INTEGrate:ELEMent	188

### :INTEGrate

-Query

Description	Returns all integration settings	
Description	Returns an integration settings	۶.

Query Syntax :INTEGrate?

Return parameter <String>



#### :INTEGrate:MODE

Description	Sets or returns the integration mode.		
Syntax	:INTEGrate:MODE {MANUal NORMal CONTinuous}		
Query Syntax	:INTEGrate:MODE?		
Parameter/ Return parameter	MANUal	Manual integration mode.	
	NORMal	Standard integration mode.	
	CONTinuou	Continuous integration mode.	
	s		
Example	:INTEGRATE:MODE MANUAL		
	:INTEGRATE:MODE?		
	->:INTEGRATE:MODE MANUAL		

:INTEGrate:FU	NCtion		Set → →Query
Description	Sets or retu	irns the integration fu	nction.
Syntax	:INTEGrate	FUNCtion {WATT AMI	PEre}
Query Syntax	:INTEGrate	:FUNCtion?	
Parameter/	WATT	Select the integration f	function watt.
Return parameter	AMPEre	Select the integration f	function ampere.
Example	:INTEGRAT	E:FUNCTION WATT	
	:INTEGRAT	E:FUNCTION?	
	->:INTEGR/	ATE:FUNCTION WATT	
:INTEGrate:TIN	/ler		$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets or retu	irns the integration ti	ner value.
Syntax	:INTEGrate:TIMer { <nrf>,<nrf>,<nrf>}</nrf></nrf></nrf>		
Query Syntax	:INTEGrate:TIMer?		
Parameter/	1st <nrf></nrf>	0 to 9999 (hours)	
Return parameter	2nd <nrf></nrf>	0 to 59 (minutes)	
	3rd <nrf></nrf>	0 to 59 (seconds)	
Example	:INTEGRAT	E:TIMER 1,0,0	
	:INTEGRAT	E:TIMER?	
	->:INTEGR/	ATE:TIMER 1,0,0	
:INTEGrate:ST	ARt		(Set)

Description	Starts integration.
Syntax	:INTEGrate:STARt
Example	:INTEGRATE:START

:INTEGrate:ST	ОР		(Set)→
Description	Stops integration.		
Syntax	:INTEGrate	e:STOP	
Example	:INTEGRA	TE:STOP	
:INTEGrate:RE	Set		(Set)→
Description	Resets the	integrated value.	
Syntax	:INTEGrate	e:RESet	
Example	:INTEGRA	TE:RESET	
:INTEGrate:ST	ATe		
Description	Returns th	e integration statu	IS.
Query Syntax	:INTEGrate	e:STATe?	
Return parameter	ERRor	Integration overflows.	
	RESet	Integration reset	s.
	STARt	Integration is in	progress.
	STOP	Integration stops	5.
	TIMeup	Integration stops timeout.	s due to integration
Example	:INTEGRATE:STATE?		
	->RESET		
:INTEGrate:ELI	EMent		Set → Query
Description	Sets or display each element and all measured values		
Syntax	:INTEGRATE:ELEMENT		
Query Syntax	:INTEGRATE:ELEMENT?		

Example :INTEGRATE:ELEMENT 1-3/SIGMA/All :INTEGRATE:ELEMENT? 1-3/SIGMA/All

### Math Commands

		Set )
:MATH		
Description	Sets or returns	s the MATH equation.
Syntax	:MATH{ <equat [,<parameter2></parameter2></equat 	tion>[, <parameter1>][,<element1>] •][,<element2>]}</element2></element1></parameter1>
Query Syntax	:MATH{ <equat arameter2&gt;][,&lt;</equat 	tion>[, <parameter1>][,<element1>][,<p Element2&gt;]}?</p </element1></parameter1>
Parameter/	Equation	{ADD SUB MUL DIV DIVA DIVB}
Return parameter	Parameter1,2	{U I P S Q}
	Element1,2	1 to 3, SIGMa
Example	:MATH ADD Set math equat :MATH? ->:MATH ADD	tion to A+B
<equation></equation>	Definition	
ADD	A+B	
SUB	A-B	
MUL	AxB	
DIV	A/B	
DIVA	A/B <sup>2</sup>	
DIVB	A <sup>2</sup> /B	
<parameter1,2></parameter1,2>	Definition	
U	Voltage U	
<u> </u>	Current I	
Р	Active power P	
S	Apparent powe	r S
Q	Reactive power	Q

#### **MEASure Commands**

:MEASure	191
:MEASure:AVERaging	191
:MEASure:AVERaging[:STATe]	191
:MEASure:AVERaging:TYPE	192
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:MEASure:MHOLd	192

:MEASure	
Description	Returns all measured and computed data output settings.
Query Syntax	:MEASure?
Return parameter	<string></string>

:MEASure:AVE	Raging		
Description	Returns all averaging settings.		
Query Syntax	:MEASure:A	/ERaging?	
Return parameter	<string></string>		
			Set →
:MEASure:AVE	Raging[:STA	ATe]	
Description	Sets or returns the on/off state of averaging.		
Syntax	:MEASure:AVERaging[:STATe] { <boolean> OFF ON}</boolean>		
Query Syntax	:MEASure:AVERaging[:STATe]?		
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Turn the averaging fu	nction off.
	1	Turn the averaging fu	nction on.

#### Example :MEASURE:AVERAGING:STATE ON :MEASURE:AVERAGING:STATE? ->:MEASURE:AVERAGING:STATE 1 Set :MEASure:AVERaging:TYPE Query Description Sets or returns the averaging type. :MEASure:AVERaging:TYPE {LINear|EXPonent} Syntax Query Syntax :MEASure:AVERaging:TYPE? Parameter/ LINear Select averaging type to linear. Return parameter Select averaging type to exponent. EXPonent :MEASURE:AVERAGING:TYPE LINEAR Example :MEASURE:AVERAGING:TYPE? ->:MEASURE:AVERAGING:TYPE LINEAR Set )-:MEASure:AVERaging:COUNt Query Description Sets or returns the averaging coefficient. Syntax :MEASure:AVERaging:COUNt {<NRf>} :MEASure:AVERaging:COUNt? Query Syntax <NRf> Parameter/ 8,16,32,64 Return parameter Example :MEASURE:AVERAGING:COUNT 8 :MEASURE:AVERAGING:COUNT? ->:MEASURE:AVERAGING:COUNT 8 Set :MFASure:MHOId Query Description Sets the MAX hold on/off state. :MEASure:MHOLd {<Boolean>|OFF|ON} Syntax :MEASureMHOLd? **Query Syntax**

Parameter	<boolean>0</boolean>	OFF
	<boolean>1</boolean>	ON
Return parameter	0	Turn the MAX hold function off.
	1	Turn the MAX hold function on.
Example	:MEASURE:MHOLD ON	
	:MEASURE:MHOLD?	
	->:MEASURE:M	1HOLD 1

#### NUMeric Commands

:NUMeric	194
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:NUMeric[:NORMal]:VALue	195
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:NUMeric[:NORMal]:PRESet	201
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:NUMeric[:NORMal]:DELete	204
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:NUMeric:LIST:VALue	205
:NUMeric:LIST:NUMber	206
:NUMeric:LIST:ORDer	207
:NUMeric:LIST:SELect	207
:NUMeric:LIST:ITEM <x></x>	208
:NUMeric:LIST:PRESet	209
:NUMeric:LIST:CLEar	210
:NUMeric:LIST:DELete	211
:NUMeric:HOLD	211

:NUMeric			
Description	Returns all r	numeric data output	settings.
Query Syntax	:NUMeric?		
Return parameter	<string></string>		
:NUMeric:FOR	Mat		Set → →Query
Description	Sets or returns the numeric data format.		
Syntax	:NUMeric:FC	DRMat {ASCii FLOat}	
Query Syntax	:NUMeric:FC	DRMat?	

#### COMMAND OVERVIEW

Parameter/	ASCii	Select numeric data format to ascii.
Return parameter	FLOat	Select numeric data format to float.
Example	:NUMERIC:F	ORMAT ASCII
	:NUMERIC:F	ORMAT?
	->:NUMERIC	EFORMAT ASCII
	• ASCii	
∠•_Note	Physical values are output in the <nr3> format.</nr3>	
	(Only the output in a	elapsed integration time—TIME—is <nr1> format).</nr1>
	The data items are separated by comma	
<ul> <li>FLOat</li> <li>A header (for example, "#240" or "#320 added in front of each numeric data bloc</li> </ul>		
		for example, "#240" or "#3208") is ront of each numeric data block.
	A physical point (4-by	value in IEEE single-precision floating /te) format follows the header.
	#N (N-digit byte number)(data byte sequence).	
The byte order of the data of each First.		rder of the data of each item is MSB

#### :NUMeric:NORMal



Description	Returns all normal numeric data output settings.	
Query Syntax	:NUMeric:NORMal?	
Return parameter	<string></string>	
<b>A</b>	The number	of numeric data items output by :
∠•_Note	NUMeric[:NORMal]:ITEM <x> is determined by :</x>	
	NUMeric[:NORMal]:NUMber.	

:NUMeric[:NORMal]:VALue		
Description	Returns the numeric data.	
Query Syntax	:NUMeric[:NORMal]:VALue? {<	:NRf>}

Parameter	<nrf></nrf>	1 to 200 (item number)		
Example	<ul> <li>If <nrf> is specified ite</nrf></li> </ul>	• If <nrf> is specified, only the numeric data for the specified item is output.</nrf>		
	:NUMERIC:I	NORMAL:VALUE? 1		
	-> 103.79E+0	00		
	<ul> <li>If <nrf> is to the numb</nrf></li> </ul>	s omitted, the numeric data items from 1 er specified by the :		
	NUMeric[:N order.	ORMal]:NUMber command are output in		
	:NUMERIC:I	NORMAL:VALUE?		
	-> 103.79E+00, 01E+00	1.0143E+00,105.27E+00,(omitted),50.0		
Numeric Data Format	<ul> <li>Measure Q, LAME</li> </ul>	ment values U, I, P, PPPeak, PMPeak, S, 8da, CFU, CFI, FU, FI, UTHD and ITHD		
	<ul> <li>Integrate AHM. ASCII: <i< li=""> </i<></li></ul>	d values WH, WHP, WHM, AH, AHP and NR3> format. Example: [-]12.345E+00		
	<ul> <li>Measure and IMP ASCII: <i< li=""> </i<></li></ul>	ment values UPPeak, UMPeak, IPPeak eak. NR3> format. Example: [-]12.34E+00		
	<ul> <li>Measure ASCII: <i ASCII: <i Example: ASCII: <i Example:</i </i </i </li> </ul>	ment values (PHI) NR3> = 0~9.9 format. Example:[-]9.9E+00 NR3> = 10~99.9 format. :[-]99.9E+00 NR3> = 100~999.9 format. :[-]999.9E+000		
	<ul> <li>Elapsed i ASCII: <i Example:</i </li> </ul>	integration time (TIME) NR1> format in units of seconds. : 3600 for 1 hour (1:00:00).		
	• FLOAT: I byte) for	EEE single-precision floating point (4- mat		
	<ul> <li>No items</li> <li>ASCII: N</li> <li>FLOAT: 0</li> </ul>	s (NONE) AN (Not A Number) )x7E951BEE (9.91E+37)		

Error Data	<ul> <li>Data does not exist (the display shows "") ASCII: NAN (Not A Number) FLOAT: 0x7E951BEE (9.91E+37)</li> <li>Data over (the display shows "")</li> </ul>		
	ASCII: INF (INFinity) FLOAT: 0x7E94F56A (9.	, 9E+37)	
:NUMeric[:NO	RMal]:NUMber	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$	
Description	Sets or returns the number of numeric data items that are transmitted by the :NUMeric[:NORMal]:		
Syntax	:NUMeric[:NORMal]:NUM	ber { <nrf> ALL}</nrf>	
Query Syntax	:NUMeric[:NORMal]:NUM	ber?	
Parameter/ Return parameter	<nrf> 1 to 200</nrf>		
Example	:NUMERIC:NORMAL:NUM	1BER 10	
	:NUMERIC:NORMAL:NUM	1BER	
	->:NUMERIC:NORMAL:NU	JMBER 10	
Note	<ul> <li>If the parameter is omit the :NUMeric[:NORMal numeric data items from are output in order.</li> </ul>	ted from ]:VALue? command, the n 1 to the specified value	
	• By default, the number set to 3.	of numeric data items is	
:NUMeric[:NO	RMal]:ITEM <x></x>	Set → Query	
Description	Sets or returns the specifi item function.	ed numeric data output	
Syntax	:NUMeric[:NORMal]:ITEM <x> {NONE <function>[,<element>][,Order]}</element></function></x>		
Query Syntax	:NUMeric[:NORMal]:ITEM <x>?</x>		

Parameter/ Return parameter	<x></x>	1 to 200	
	NONE	No output item	l.
	<function> {U UPPeak UMPeak I IPPeak IMPea  P PPPeak PMPeak S Q LAMBda CF  CFI PHI FU FI UTHD ITHD WH  WHP WHM AH AHP AHM TIME  URANge IRANge MATH MCR} {UK IK PK LAMBDAK PHIK PHIUK  HIIK UHDFK  IHDFK PHDFK}</function>		Peak I IPPeak IMPeak eak S Q LAMBda CFU UTHD ITHD WH H AHP AHM TIME ge MATH MCR} BDAK PHIK PHIUK P HDFK PHDFK}
	<element></element>	<nrf> SIGMa}</nrf>	( <nrf> = 1 to 3)</nrf>
	<order></order>	{TOTal DC  <nf< td=""><td>Rf&gt;} (<nrf> = 1 to 50)</nrf></td></nf<>	Rf>} ( <nrf> = 1 to 50)</nrf>
Example	<ul> <li>:NUMERIC:NORMAL:ITEM1 U,1</li> <li>:NUMERIC:NORMAL:ITEM1 ?</li> <li>-&gt;:NUMERIC:NORMAL:ITEM1 U,1</li> <li>:NUMERIC:NORMAL:ITEM1 UK,1,1</li> <li>:NUMERIC:NORMAL:ITEM1 UK,1,1</li> <li>• If <order> is omitted, the order is set to TOTal.</order></li> <li>• This instrument does not measure data for <order> = DC.</order></li> </ul>		U,1 U,1 JK,1,1 UK,1,1 order is set to TOTal. neasure data for
<function></function>	Function		GPM-8320/8330 Indicator
U	Voltage V		[V]
UPPeak	Maximum volta	age: V+pk	[V+pk]
UMPeak	Minimum volta	ige: V-pk	[V-pk]
L	Current I		[1]
IPPeak	Maximum curre	ent: I+pk	[I+pk]
IMPeak	Minimum current: I-pk		[I-pk]
Р	Active power P		[P]
PPPeak	Maximum power: P+pk		[P+pk]

PMPeak	Minimum power: P-pk	[P-pk]
S	Apparent power S	[VA]
Q	Reactive power Q	[VAR]
LAMBda	Power factor $\lambda$	[PF]
CFU	Voltage factor $\lambda$	[CFV]
CFV	Current factor $\lambda$	[CFI]
PHI	Phase difference $\Phi$	[DEG]
FU	Voltage frequency fV	[VHz]
FI	Current frequency fl	[AHz]
UTHD	Total harmonic distortion of voltage Vthd	[THDV]
ITHD	Total harmonic distortion of current Ithd	[THDI]
EFFi	Power Efficiency	[EFFI]
WH	Watt hour WP	[WP]
WHP	Positive watt hour WP+	[WP+]
WHM	Positive watt hour WP-	[WP-]
AH	Ampere hour q	[q]
АНР	Positive ampere hour q+	[q+]
AHM	Positive ampere hour q	[q-]
TIME	Integration time	
URANge	Voltage range	
IRANge	Current range	
MATH	Mathematical Computation	[MATH]
MCR	Maximum Current Ratio	[MCR]
URMS	True rms voltage Vrms	
UMN	Rectified mean voltage calibrated to the rms value Vmn	[Vmn]
UDC	Simple voltage average Vdc	[Vdc]

URMN	Rectified mean voltage Vrmn	
UAC	AC voltage component Vac	[Vac]
IRMS	True rms current Irms	
IMN	Rectified mean current calibrated to the rms value Imn	
IDC	Simple current average Idc	[ldc]
IRMN	Rectified mean current Irmn	
IAC	AC current component lac	[lac]
UK	Rms voltage of harmonic order k V(k)	[V]
IK	Rms current of harmonic order k I(k)	[A]
РК	Active power of harmonic order k P(k)	[P]
LAMBDAK	Power factor of harmonic order kλ(k)	
РНІК	Phase difference between the voltage and current of harmonic order kφ(k)	
PHIUk	Phase difference between harmonic voltage V(k) and the fundamental wave V(1) $\phi$ V(k)	
PHIIk	Phase difference between harmonic current $I(k)$ and the fundamental wave $I(1) \; \phi I(k)$	
UHDFk	Harmonic distortion factor of voltage Vhdf(k)	
IHDFk	Harmonic distortion factor of current Ihdf(k)	
PHDFk	Harmonic distortion factor of power Phdf(k)	

:NUMeric[:NORMal]:PRESet			(Set)->
Description	Presets the numeric data output item pattern.		
Syntax	:NUMeric[:N	IORMal]:PRESe	t { <nrf>}</nrf>
Parameter/ Return parameter	<nrf> 1 to 4</nrf>		
Example	:NUMERIC:	NORMAL:PRES	ET 1
Patterns 1	ITEM <x></x>	<function></function>	<element></element>
	1	U	1
	2	I	1
	3	Р	1
	4~ 6	U to P	2
	7~9	U to P	3
	10 ~ 12	U to P	SIGMA
	13 ~ 200	None	None
Patterns 2	ITEM <x></x>	<function></function>	<element></element>
	1	U	1
	2	I	1
	3	Р	1
	4	S	1
	5	Q	1
	6	LAMBda	1
	7	PHI	1
	8	FU	1
	9	FI	1
	10	None	None
	11 ~ 19	U to FI	2
	20	None	None

# GWINSTEK

	21 ~ 29	U to FI	3
	30	None	None
	31 ~ 39	U to FI	SIGMA
	40 ~ 200	None	None
Patterns 3	ITEM <x></x>	<function></function>	<element></element>
	1	U	1
	2	I	1
	3	Р	1
	4	S	1
	5	Q	1
	6	LAMBda	1
	7	PHI	1
	8	FU	1
	9	FI	1
	10	UPPeak	1
	11	UMPeak	1
	12	IPPeak	1
	13	IMPeak	1
	14	PPPeak	1
	15	PMPeak	1
	16 ~ 30	U to Peak	2
	31 ~ 45	U to Peak	3
	46 ~ 60	U to Peak	SIGMA
	61 ~ 200	None	None
Patterns 4	ITEM <x></x>	<function></function>	<element></element>
	1	U	1
	2	I	1
	3	Ρ	1
	4	S	1

5	Q	1
6	LAMBda	1
7	PHI	1
8	FU	1
9	FI	1
10	UPPeak	1
11	UMPeak	1
12	IPPeak	1
13	IMPeak	1
14	TIME	1
15	WH	1
16	WHP	1
17	WHM	1
18	AH	1
19	AHP	1
20	АНМ	1
21 ~ 40	U to AHM	2
41 ~ 60	U to AHM	3
61 ~ 80	U to AHM	SIGMA
81 ~ 200	None	None

:NUMeric[:NORMal]:CLEar		(Set)→	
Description	Clears numeric data output items (sets the items to NONE).		
Syntax	:NUMeric[:NORMal]:CLEar {ALL  <nrf>[,<nrf>]}</nrf></nrf>		
Parameter	ALL	Clear all items.	
	1nd <nrf></nrf>	1 to 200 (the number of the first item to clear)	

	2nd <nrf></nrf>	1 to 200 (the number of the last item to clear)
Example	:NUMERIC:NO	RMAL:CLEAR ALL
Note	If the 2nd <nrf> is omitted, the output item specified by the first and all following output items (up to number 200) are cleared.</nrf>	

### :NUMeric[:NORMal]:DELete Set →

Description	Deletes numeric data output items.		
Syntax	:NUMeric[:NORMal]:DELete { <nrf>[,<nrf>]}</nrf></nrf>		
Parameter	1st <nrf></nrf>	1 to 200 (the number of the first item to delete)	
	2nd <nrf></nrf>	1 to 200 (the number of the last item to delete)	
Example	:NUMERIC:NORMAL:DELETE 1 (Deletes ITEM1 and shifts ITEM2 and subsequent items forward).		
	:NUMERIC:N ITEM3 and sh forward).	ORMAL:DELETE 1,3 (Deletes ITEM1 to nifts ITEM4 and subsequent items	
Note	• When output items are deleted, subsequent items shift forward to fill the empty positions. Empty positions at the end are set to NONE.		
	<ul> <li>If the second <nrf> is omitted, only the output item specified by the first number is deleted.</nrf></li> </ul>		

:NUMeric[:NORMal]:HEADer -Query				
Description	Returns	Returns the numeric data header.		
Syntax	:NUMer	:NUMeric[:NORMal]:HEADer? { <nrf>}</nrf>		
Parameter	<nrf></nrf>	1 to 200 (item nun	nber)	

Example	<ul> <li>If <nrf> is specified, only the data name for the specified item number is output.</nrf></li> </ul>
	:NUMERIC:NORMAL:HEADER? 1
	-> U-E1
	<ul> <li>If <nrf> is omitted, the data names of the items from 1 to the number specified by the :</nrf></li> </ul>
	NUMeric[:NORMal]:NUMber command are output in order.
	:NUMERIC:NORMAL:NUMBER 3
	:NUMERIC:NORMAL:HEADER?
	-> U-E1,I-E1,P-E1

:NUMeric:LIST		
Description	Returns all h data output	harmonic measurement numeric list settings.
Query Syntax	:NUMeric:LIS	ST?
Return parameter	<string></string>	
Note	The number NUMeric:LIS NUMeric:LIS	of numeric list data items output by : 5T:ITEM <x> is determined by : 5T:NUMber.</x>

:NUMeric:LIS		
Description	Returns the data.	harmonic measurement numeric list
Query Syntax	:NUMeric:LI	ST:VALue? { <nrf>}</nrf>
Parameter	<nrf> 1 t</nrf>	o 8 (item number)

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Example	<ul> <li>if <nrf> is specified :NUMERI</nrf></li> <li>103.58E+00,NAN,103.53E+00,</li> <li>0.04E+00, (omitted),0.01E+00,</li> <li>(up to 52 data values)</li> <li>if <nrf> is omitted (when :NU is set to 5)</nrf></li> </ul>	C:LIST:VALUE? 1 0.09E+00,2.07E+00, .0.01E+00 Meric:LIST:NUMber		
	:NUMERIC:LIST:VALUE?			
	-> 103.58E+00,NAN,103.53E+00,	0.09E+00,2.07E+00,		
	0.04E+00,(omitted),0.00E+00,	0.00E+00		
	(up to 52*5 = 260 data values)			
	<ul> <li>When :NUMeric:FORMat is se</li> </ul>	t to {FLOat}		
	:NUMERIC:LIST:VALUE?			
	-> #N (N-digit byte number)(dat	a byte sequence)		
Note	<ul> <li>A single numeric list data iter 52 items of numeric data in the TOTal, DC, 1st harmonic,, :NUMeric:LIST:</li> <li>If <nrf> is specified, only the the specified item number is</nrf></li> </ul>	n consists of up to he following order: ORDer. numeric list data of output (up to 52		
	items of data)	output (up to 52		
	<ul> <li>If <nrf> is omitted, the num- numbers from 1 to :NUMeric output in order (up to 52 time specified by :NUMeric:LIST:C</nrf></li> </ul>	eric list data of item :LIST:NUMber is es the number PRDer)		
:NUMeric:LIS	Γ:NUMber	$(Set) \rightarrow (Query)$		
Description	Sets or returns the number of r items that are transmitted by	numeric list data		
	:NUMeric:LIST:VALue? comm	and.		
Syntax	:NUMeric:LIST:NUMber { <nrf></nrf>	ALL}		
Query Syntax	:NUMeric:LIST:NUMber?			

Parameter/ Return parameter	<nrf></nrf>	1 to 8(ALL)		
Example	:NUMERI	C:LIST:NUMBER 3		
	:NUMERI	C:LIST:NUMBER?		
	->:NUME	RIC:LIST:NUMBER 3		
Note	• If the parameter is omitted from the :NUMeric:LIST:VALue? command, the numeric list data items from 1 to the specified value are output in order.			
	<ul> <li>By def set to</li> </ul>	ault, the number of numeric 3.	data items is	
			Set )-	
:NUMeric:LIST	:ORDer			
Description	Sets or returns the maximum output harmonic			
	order of	the harmonic measuremen	t numeric list	
	data.			
Syntax	:NUMeric	::LIST:ORDer { <nrf> ALL}</nrf>		
Query Syntax	:NUMeric	::LIST:ORDer?		
Parameter/ Return parameter	<nrf></nrf>	1 to 50(ALL)		
Example	:NUMERI	C:LIST:ORDER 10		
	:NUMERIC:LIST:ORDER?			
	->:NUME	RIC:LIST:ORDER 10		
			Set )	
:NUMeric:LIST	:SELect			
Description	Sets or re	turns the output compone	nts of the	
	harmonio	c measurement numeric lis	et data.	
Syntax	:NUMeric	::LIST:SELect {EVEN ODD A	LL}	
Query Syntax	:NUMeric	::LIST:SELect?		

Parameter/ Return parameter	EVEN	Outputs the components of TOTal, DC, and even-order harmonics.		
	ODD	Outputs the components of TOTal, DC, and odd-order harmonics .		
	ALL	Outputs all components.		
Example	:NUMERI	C:LIST:SELECT ALL		
	:NUMERIC:LIST:SELECT?			
	->:NUME	RIC:LIST:SELECT ALL		
		(Set)		
:NUMeric:LIST	ITEM <x< td=""><td>&gt; — Query</td></x<>	> — Query		
Description	Sets or returns the output item (function and			
	element) of the specified harmonic measurement			
	numeric	list data item.		
Syntax	:NUMeric:LIST:ITEM <x> {NONE <function>,<element>}</element></function></x>			
Query Syntax	:NUMeric	:NUMeric:LIST:ITEM <x>?</x>		
Parameter/	<x></x>	1 to 24		
Return parameter	NONE	No output item.		
	<functior< td=""><td>n&gt; {U I P PHIU PHII UHDF UHDF PHDF}</td></functior<>	n> {U I P PHIU PHII UHDF UHDF PHDF}		
	<element> 1 (If <element> is omitted, the element is set to 1) ( For the GPM-8320/8330, only set to 1 or omitted)</element></element>			
Example	:NUMERI	C:LIST:ITEM1 U,1		
	:NUMERIC:LIST:ITEM1?			
	->:NUME	RIC:LIST:ITEM1 U,1		

:NUMeric:LIST	:PRESet			(Set)→
Description	Presets the harmonic measurement numeric list data output item pattern.			
Syntax	:NUMeric	LIS	T:PRESet { <n< td=""><td>Rf&gt;}</td></n<>	Rf>}
Parameter/ Return parameter	<nrf> 1 to 4</nrf>			
Example	:NUMERI	C:LI	ST:PRESET 1	
Patterns 1	ITEM <x></x>		<function></function>	<element></element>
	1		U	1
	2		I	1
	3		Р	1
	4 ~ 6		U to P	2
	7~9		U to P	3
	10 ~ 24		None	None
Patterns 2	ITEM <x></x>		<function></function>	<element></element>
	1		U	1
	2		I	1
	3		Р	1
	4		PHIU	1
	5		PHII	1
	6 ~ 10		U to PHII	2
	11 ~ 15		U to PHII	3
	16 ~ 24		None	None
Patterns 3	ITEM <x></x>		<function></function>	<element></element>
	1		U	1
	2		I	1
	3		Р	1

	4	UHDF	1
	5	IHDF	1
	6	PHDF	1
	7~12	U to PHDF	2
	13 ~ 18	U to PHDH	3
	19 ~ 24	None	None
Patterns 4	ITEM <x></x>	<function></function>	<element></element>
	1	U	1
	2	I	1
	3	Р	1
	4	PHIU	1
	5	PHII	1
	6	UHDF	1
	7	IHDF	1
	8	PHDF	1
	9~16	U to PHDF	2
	17 ~ 24	U to PHDF	3

### :NUMeric:LIST:CLEar

-		~	
1	Cat	<u>۱</u>	•
(	Ser		-
~	•••	/	

Description	Clears numeric data output items (sets the items to NONE).		
Syntax	:NUMeric:LIST:CLEar {ALL  <nrf>[,<nrf>]}</nrf></nrf>		
Parameter	ALL	Clear all items.	
	1st <nrf></nrf>	1 to 24 (the number of the first item to clear)	
	2nd <nrf></nrf>	d <nrf> 1 to 24 (the number of the last item to clear)</nrf>	
Example	:NUMERIC:LI	ST:CLEAR ALL	

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Note If the 2nd <NRf> is omitted, the output item specified by the first and all following output items (up to number 8) are cleared.

#### :NUMeric:LIST:DELete

Set )-

Description	Deletes numeric data output items.			
Syntax	:NUMeric:LIST:DELete { <nrf>[,<nrf>]}</nrf></nrf>			
Parameter	1st <nrf></nrf>	1 to 24 (the number of the first item to delete)		
	2nd <nrf></nrf>	1 to 24 (the number of the last item to delete)		
Example	:NUMERIC:LIST:DELETE 1 (Deletes ITEM1 and shifts ITEM2 and subsequent items forward).			
	:NUMERIC:LIST:DELETE 1,3 (Deletes ITEM1 to ITEM3 and shifts ITEM4 and subsequent items forward).			
Note	<ul> <li>When output items are deleted, subsequent items shift forward to fill the empty positions. Empty positions at the end are set to NONE.</li> </ul>			
	• If the second <nrf> is omitted, only the output item specified by the first number is deleted.</nrf>			
:NUMeric:HOL	.D	$\underbrace{\text{Set}}_{} \longrightarrow \\ \underbrace{\text{Query}}_{}$		
Description	Sets or retur	ns the on/off (hold/release) status of		
	the numeric	data hold feature.		
Syntax	:NUMeric:H	 DLD { <boolean> OFF ON}</boolean>		
Query Syntax	:NUMeric:H	OLD?		
Parameter	<boolean>0</boolean>	OFF		
	<boolean>1 ON</boolean>			
Return parameter	0	Turn the numeric hold function off.		
	1	Turn the numeric hold function on.		

Example	:NUMERIC:HOLD ON
	:NUMERIC:HOLD?
	->:NUMEIRC:HOLD 1
Note	<ul> <li>If :NUMeric:HOLD is set to ON before :NUMeric[:NORMal]:VALue? or :NUMeric:LIST:VALue? is executed, all the numeric data at that point in time can be held internally.</li> </ul>
	<ul> <li>As long as :NUMeric:HOLD is set to ON, numeric data is held even when the numeric data on the screen is updated.</li> </ul>
	<ul> <li>If :NUMeric:HOLD is set to ON after having already been set to ON before, the numeric data is cleared, and the most recent numeric data is held internally. When retrieving numeric data continuously, this method can be used to circumvent the need to repeatedly set :NUMeric:HOLD to OFF.</li> </ul>

#### **RATE Commands**

RATE	213
RATE:AUTO	213
RATE:AUTO:TIMeout	213
RATE:AUTO:SYNChronize	214

:RATE		$\underbrace{\text{Set}}_{\text{Query}}$	
Description	Sets or returns the data update interval.		
Syntax	:RATE { <time> AUTO}</time>		
Query Syntax	:RATE?		
Parameter/ Return parameter	<time></time>	100, 250, 500(ms), 1, 2, 5, 10, 20(s)	
	AUTO	Select update rate at auto.	
Example	:RATE 500MS		
	:RATE?		
	->:RATE 500.0E-03		
·RATE·ΔΙΙΤΟ			
.IATE.AOTO			
Description	Returns all ap	pplicable settings for when the data	
	update interv	val is set to Auto.	
Query Syntax	:RATE:AUTO?		
Return parameter	<string></string>		
:RATE:AUTO:T	IMeout	Set → Query	
Description	Sets or returns the timeout for when the data		

update interval is set to Auto.

Syntax	:RATE:AUTO:TIMeout { <time>}</time>
--------	-------------------------------------

Query Syntax	:RATE:AUTO:TIMeout?		
Parameter/ Return parameter	<time></time>	1, 5, 10, 20(s)	
Example	RATE:AUTO:TIMEOUT 1		
	:RATE:AUTO:TIMEOUT?		
	-> :RATE:AUTO:TIMEOUT 1		
		(Set)-	
:RATE:AUTO:S`	YNChron	ize  —Query	
Description	Sets or returns the synchronization source for		
	when the	data update interval is set to Auto.	
Syntax	:RATE:AUTO:SYNChronize {U <x> I<x> }</x></x>		
Query Syntax	:RATE:AUTO:SYNChronize?		
Parameter/ Return parameter	U <x></x>	Select synchronize source at voltage. <x> = 1 to 3 (element)</x>	
	l <x></x>	Select synchronize source at current. <x> = 1 to 3 (element)</x>	
Example	:RATE:AUTO:SYNCHRONIZE U1		
	:RATE:AU	TO:SYNCHRONIZE?	
	-> :RATE:A	AUTO:SYNCHRONIZE U1	

### **RECall Commands**

:RECall:NUMber	. 215
:RECall[:NORMal]:VALue	. 215
:RECall:LIST:VALue	. 216
:RECall:PANel	. 216

:RECall:NUMb	er - Query	
Description	Returns the number of blocks of measured data	
	that is stored.	
Query Syntax	:RECall:NUMber?	
Example	:RECall:NUMber?	
	->100	

### :RECall[:NORMal]:VALue

Description	Returns the numeric data at the specified block	
	number.	
Query Syntax	:RECall[:NORMal]:VALue? { <nrf>}</nrf>	
Parameter	<nrf> 1 to 10000 (block number)</nrf>	
Example	<ul> <li>If <nrf> is specified, the numeric data at the specified block number will be returned.</nrf></li> </ul>	
	<ul> <li>If you omit <nrf> or specify a number greater than the number of blocks that contain stored measured data (the number returned by :RECall:NUMber?), the entire returned numeric data will be "NAN" (no data).</nrf></li> </ul>	
	• The output items and format are the same as those of ":NUMeric[:NORMal]:VALue? (when the item number is not specified)." To set the output items and format, use the NUMeric group commands.	

#### :RECall:LIST:VALue

Description	Returns the numeric list data of harmonic measurement at the specified block number.	
Query Syntax	:RECall:LIST:VALue? { <nrf>}</nrf>	
Parameter	<nrf> 1 to 1000 (block number)</nrf>	
Example	<ul> <li>If <nrf> is specified,the numeric list data at the specified block number will be returned.</nrf></li> <li>If you omit <nrf> or specify a number greater than the number of blocks that contain stored measured data (the number returned by :RECall:NUMber?), the entire returned numeric data will be "NAN" (no data).</nrf></li> <li>The output items and format are the same as those of ":NUMeric:LIST:VALue? (when the item number is not specified)." To set the output items and format, use the NUMeric group commands.</li> </ul>	
:RECall:PANel	<u>Set</u> →	

Description	Loads a setup parameter file.	
Syntax	:RECall:PANel { <nrf>}</nrf>	
Parameter	<nrf></nrf>	1 to 4 (file number)
Example	:RECall:PANel 2	
- Query

## STATus Commands

:STATus	217
:STATus:CONDition	217
:STATus:EESE	217
:STATus:EESR	218
:STATus:ERRor	218
:STATus:FILTer <x></x>	219
:STATus:QENable	220
:STATus:QMESsage	220

:STATus	
Description	Returns all the settings for the communication
	status feature.
Query Syntax	:STATus?
Return parameter	<string></string>

## :STATus:CONDition

Description	Returns the contents of the condition register.		
Query Syntax	:STATus:CONDition?		
Return parameter	<nr1> 0 to 65535</nr1>		
Example	:STATUS:CO	NDITION?	
	-> 8		
Note	For information about the condition register, see Appendix,"Status system" at page 239.		
		Set	
:STATus:EESE	-+(Query)		
Description	Sets or returns the extended event enable register.		

Syntax :STATus:EESE {<NRf>}

Query Syntax	:STATus:EESE?		
Parameter/ Return parameter	<nrf></nrf>	0 to 65535	
Example	:STATUS:EESE 16		
	:STATUS:EESE?		
	-> :STATUS:EESE 16		
Note	For information about the condition register, see Appendix,"Status system" at page 239.		

### :STATus:EESR

Description	Returns the contents of the extended event register and clears the register.	
Query Syntax	:STATus:EESR?	
Return parameter	<nr1></nr1>	0 to 65535
Example	:STATUS:EESR?	
	-> 16	
Note	For information about the condition register, see Appendix,"Status system" at page 239.	

:STATus:ERRor

Description	Returns the error code and message of the last		
	error that has occurred (top of the error queue).		
Query Syntax	:STATus:ERRor?		
Return parameter	<string></string>		
Example	:STATUS:ERROR?		
	-> 113,"Underfined Header"		

	• If no errors have occurred, 0,"No error" is returned.
∠•_Note	<ul> <li>User can use the :STATus:QMESsage command to specify whether the message is included.</li> </ul>
	Error message description:
	Error_103: Invalid separator
	Error_104: Data type error.
	Error_108: Parameter not allowed.
	Error_109: Missing parameter.
	Error_113: Undefined header.

Error\_131: Invalid suffix.

Error\_141: Invalid character data.

Error\_221: Setting conflict.

Error\_222: Data out of range.

Error\_813: Invalid operation.

## :STATus:FILTer<x>

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Description	Sets or returns the transition filter.		
Syntax	:STATus:FILTer <x> {RISE FALL BOTH NEVer}</x>		
Query Syntax	:STATus:FILTer <x>?</x>		
Parameter/	<x></x>	1~16	
Return parameter	RISE	An event is set when the bit changes from 0 to 1.	
	FALL	An event is set when the bit changes from 1 to 0.	
	вотн	An event is set when the bit changes either from 1 to 0 or form 0 to 1.	
	NEVer	An event is never trigger.	
Example	:STATUS:FILTER2 RISE :STATUS:FILTER2? -> :STATUS:FILTER2 RISE		

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Note	<ul> <li>Set how each bit in the condition register must change to trigger the setting of an event.</li> </ul>		
	<ul> <li>For information about the condition register, see Appendix, "Status system" at page 239.</li> </ul>		
:STATus:QENa	ble	$\underbrace{\text{Set}}_{} \rightarrow \\ \rightarrow \\ \underbrace{\text{Query}}_{}$	
Description	Sets or returns whether messages other than errors will be stored to the error queue (ON) or not (OFF).		
Syntax	:STATus:QEN	lable { <boolean> OFF ON}</boolean>	
Query Syntax	:STATus:QEN	lable?	
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Function is off.	
	1	Function is on.	
Example	:STATUS:QENABLE ON		
	:STATUS:QENABLE? -> :STATUS:QENABLE 1		
		Set	
:STATus:QMESsage			
Description	Sets or returns whether message information will be attached to the response to the STATus:ERRor? query (ON/OFF).		
Syntax	:STATus:QMESsage { <boolean> OFF ON}</boolean>		
Query Syntax	:STATus:QMESsage?		
Parameter	<boolean>0</boolean>	OFF	
	<boolean>1</boolean>	ON	
Return parameter	0	Function is off.	
	1	Function is on.	

Example :STATUS:QMESSAGE ON :STATUS:QMESSAGE? -> :STATUS:QMESSAGE 1

## STORe Commands

222
222
222
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:STORe		
Description	Returns all s	storage settings.
Syntax	:STORe?	
Return parameter	<string></string>	
:STORe[:STATe	]	$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets or retur	ns the storage on/off state.
Syntax	:STORe[:STA	Te] { <boolean> OFF ON}</boolean>
Query Syntax	:STORe[:STA	Te]?
Parameter	<boolean>0</boolean>	OFF
	<boolean>1</boolean>	ON
Return parameter	0	Storage function is off.
	1	Storage function is on.
Example	:STORE:STATE ON	
	:STORE:STATE?	
	->:STORE:STATE 1	
:STORe:INTerval $\xrightarrow{\text{Set}}$		
Description	Sets or retur	ns the storage interval.
Syntax	:STORe:INTerval { <nrf>,<nrf>,<nrf>}</nrf></nrf></nrf>	
Query Syntax	:STORe:INTerval?	

Parameter/	1st <nrf></nrf>	0 to 99 (hours)	
, Return parameter	2nd <nrf></nrf>	0 to 59 (minutes)	
	3rd <nrf></nrf>	0 to 59 (seconds)	
Example	:STORE:INTERVAL 0,0,1		
	:STORE:INTERVAL?		
	->:STORE:INTE	RVAL 0,0,1	
Note	• When time interval is set 00:00:00, the storage interval is identical with the designated data update interval.		

:STORe:PANel		C	Set )->
Description	Saves set	up parameters to a file.	
Syntax	:STORe:PANel { <nrf>}</nrf>		
Parameter	<nrf></nrf>	1 to 4 (file number)	
Example	:STORe:P/	ANel 1	

## SYSTem Commands

:SYSTem	224
:SYSTem:BRIGhtness	224
:SYSTem:COMMunicate:COMMand	225
:SYSTem:COMMunicate:ETHernet:MACaddress	s 225
:SYSTem:FIRMware:DATE	225
:SYSTem:KEY:BEEPer	226
:SYSTem:KLOCk	226
:SYSTem:MODel	227
:SYSTem:RESolution	227
:SYSTem:SERial	227
:SYSTem:VERsion[:FIRMware]	227

:SYSTem			
Description	Returns all	system settings.	
Query Syntax	:SYSTem?		
Return parameter	<string></string>		
:SYSTem:BRIG	ntness		$\underbrace{\text{Set}}_{} \rightarrow \underbrace{\text{Query}}_{}$
Description	Sets or retu	urns the brightness l	evel.
Syntax	:SYSTem:BRIGhness { <nrf>}</nrf>		
Query Syntax	:SYSTem:BRIGhness?		
Parameter/ Return parameter	<nrf> 1</nrf>	~10	
Example	:SYSTEM:B	RIGHTNESS 7	
	:SYSTEM:B	RIGHTNESS?	
	->:SYSTEM:	BRIGHTNESS 7	

:SYSTem:COMMunicate:COMMand $\rightarrow$ Query					
Description	Sets or returns the command type.				
Syntax	:SYSTem:COMMunicate:COMMand {DEFAULT USER}				
Query Syntax	:SYSTem:COMMunicate:COMMand?				
Parameter/	DEFAULT	GPM8320/8330.			
Return parameter	USER	User-define.			
Example	:SYSTEM:C	OMMUNICATE:COM	MAND DEFAULT		
	:SYSTEM:C	OMMUNICATE:COM	MAND?		
	->:SYSTEM:	COMMUNICATE:CO	MMAND DEFAULT		
Note	<ul> <li>The SCPI *IDN? quidentificat</li> </ul>	mode is used to deter ery returns the "Defau tion string.	rmine whether the Ilt" or "User"		

### :SYSTem:COMMunicate:ETHernet:MACadd

ress	
Description	Returns the Ethernet MAC address.
Query Syntax	:SYSTem:COMMunicate:ETHernet:MACaddress?
Example	:SYSTEM:COMMUNICATE:ETHERNET: MACADDRESS?
	- >:SYSTEM:COMMUNICATE:ETHERNET:MACADDRE SS 00:22:24:00:00:00

:SYSTem:FIRMware:DATE			
Description	Returns the firmware date.		
Query Syntax	:SYSTem:FIRMware:DATE?		
Return parameter	<date> yyyymmdd</date>		

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Example	:SYSYEM:FIRMWARE:DATE?			
	->:SYSYEM:FIRMWARE:DATE 20200101			
		(Set)		
:SYSTem:KEY:E	BEEPer			
Description	Sets or returns t	the keyclick beeper state.		
Syntax	:SYSTem:KEY:BE	EPer { <boolean> OFF ON}</boolean>		
Query Syntax	:SYSTem:KEY:BE	EPer?		
Parameter	<boolean> 0</boolean>	OFF		
	<boolean> 1</boolean>	ON		
Return parameter	0 Turn the keyclick beeper function off.			
	1	Turn the keyclick beeper function on.		
Example	:SYSTEM:KEY:BE	EEPER OFF		
	:SYSTEM:KEY:BEEPER?			
	->:SYSTEM:KEY:BEEPER 0			
		(Set)→		
:SYSTem:KLOC	Ck			
Description	Sets or returns t protection.	the on/off state of the key		
Syntax	:SYSTem:KLOCk { <boolean> OFF ON}</boolean>			
Query Syntax	:SYSTem:KLOCk?			
Parameter	<boolean> 0</boolean>	OFF		
	<boolean> 1</boolean>	ON		
Return parameter	0	Turn the key protection function off.		
	1	Turn the key protection function on.		
Example	:SYSTEM:KLOCK	( OFF		
	:SYSTEM:KLOCK?			
	->:SYSTEM:KLOCK 0			

:SYSTem:MO	Del	
Description	Returns the model code.	
Syntax	:SYSTem:MODel?	
Example	:SYSTEM:MODEL?	
	->:SYSTEM:MODEL "GPM-832	0/8330"
:SYSTem:RES	Solution	
Description	Returns the numeric data dis	play resolution.
Query Syntax	:SYSTem:RESolution?	
Example	:SYSTEM:RESOLUTION?	
	->:SYSTEM:RESOLUTION 5	
:SYSTem:SER	tial	
Description	Returns the serial number.	
Syntax	:SYSTem:SERial?	
Example	:SYSTEM:SERIAL?	
	->:SYSTER:SERIAL 123456789A	
:SYSTem:VER	Rsion[:FIRMware]	
Description	Returns the firmware version	l.
Query Syntax	:SYSTem:VERsion[:FIRMware]?	
Example	:SYSTEM:VERSION:FIRMWAR	Ε?
Note	Returns the Ver. item string of t menu.	he system Information



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# Specifications

Below are the basic conditions required to operate the GPM-8320/8330 within specification:

- 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.

## **General Specifications**

**Specification Conditions:** Temperature: 23°C±5°C Humidity: <80%RH(non-condensing) Operating Environment: (0~40°C) Temperature Range: 30~40°C, Relative Humidity: <70%RH(non-condensing); >40°C, Relative Humidity: <50%RH (non-condensing) Indoor use only Altitude: <2000 meters Pollution degree 2 Storage Conditions (-40~70°C) Humidity: <90%RH(non-condensing) General: Power Source: 100-240 VAC 50/60Hz Power Consumption: Max 35VA Bench Dimensions: 220 mm (W) X 132 mm (H) X 402.5 mm (D) (w/t bumpers) Weight: Approximately 3.85 kg

Input

Item	Specifications	Specifications		
Input type	Voltage	Floating input through resistive voltage divider		
1 71	Current	Floating input through shunt		
	Voltage	15 V, 30 V, 60 V,150 V, 300 V, 600 V and 1000V		
	Current			
Measure range	Direct input	0.5 A, 1 A, 2 A, 5 A, 10 A and 20 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		
	Voltage	Input resistance: approach 2 M $\Omega$		
	Current			
	Direct input range 0.5A ~ 20 A	Input resistance: approach 5 m $\Omega$		
Input impedance	Sensor input			
	Input range 2.5 V ~ 10 V (EX1)	Input resistance: approach 100 k $\Omega$		
	Input range 50 mV ~ 2 V (EX2)	Input resistance: approach 20 k $\Omega$		
	Voltage	Peak value of 1.5 kV or RMS value of 1 kV, whichever is less		
Continuous	Current	When Range 1000V CF=1.5		
input	Direct input range 0.5A ~ 20 A	Peak value of 100 A or RMS value of 30 A, whichever is less		
	Sensor input	Peak value is less than or equal to 5 times of the rated range		
Input bandwidth	DC, 0.1 Hz ~ 100kHz	Z		
Continuous maximum Common-mode voltage	600 Vrms, CAT II			
Line filter	Select OFF or ON (c	ut off frequency of 500 Hz)		
Frequency filter	Select OFF or ON (c	ut off frequency of 500 Hz)		
	Simultaneous conversion voltage and current inputs			
A/D converter	Resolution	16bits		
	Maximum conversion rate Approx. 300kHz			

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 250ms 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 1s.

# Voltage and Current Accuracy

ltem	Specification	s			
	Temperature			23 ± 5°C	
	Humidity			30~75% RH	
	Input wavefor	rm		Sine wave crest factor = 3	
	common-mo	de volta	ge	0 V	
	Number of di	isplayed	digits	5 digits	
Requirements	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 interv	/al is 250	0 ms		
	DC	:	± (0.1%	6 of reading + 0.2% of range)	
	0.1 Hz $\leq$ f $<$	45 Hz	± (0.1 %	% of reading + 0.2 % of range)	
	45 Hz $\leq$ f $\leq$ 66 Hz $\pm$ (0.1 %		± (0.1 %	% of reading + 0.05 % of range)	
	$66 \text{ Hz} < f \le 1 \text{ kHz} \pm (0.1 \text{ g})$		± (0.1 %	% of reading + 0.2 % of range)	
Accuracy	$1 \text{ kHz} < f \le$	10 kHz :	± (0.07 range)	*f) % of reading + 0.3% of	
	10 kHz < f≤ kHz Values for vo	100 Itage in	± (0.5 % [{0.04x	% of reading + 0.5 % of range) $\pm$ (f-10)}% of reading] of 750V for which 30kHz < f <	
	100kHz are reference only				
Temperature coefficient	Add	±0.03% 18°C or	of read 28 to 4	ling/°C within the range 5 to 0°C.	
When the line filter	45 ~ 66 Hz	Add 0.3	% of re	eading	
is turned ON	< 45 Hz	Add 1 %	6 of rea	ding	
Accuracy when the	Accuracy obta	ained by	doubli	ng the measurement range	
crest factor is set to 6 or 6A	error for the a	accuracy	when t	the crest factor is set to 3	
Accuracy changes caused by data update interval	When the dat 0.05% of read	ta updat ding to t	e interv he 0.1 I	al is 100 ms, and Auto, add Hz to 1 kHz accuracy.	

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Influence of	Add 0.02% of range/°C to the DC voltage accuracy.
temperature changes after zero- level compensation or range change	Add the following value to the DC current accuracies.0.5 A/1 A/2 A/5 A/10 A/20 A ranges500 μA/°CExternal current sensor input (/EX1)1 mV/°CExternal 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.

Item	Specifications		
Requirements	same as the conditions for voltage and current.		
Requirements	Power factor	1	
	DC	(0.1 % of reading + 0.2 % of range)	
	$0.1$ Hz $\leq f < 45$ Hz	± (0.3 % of reading + 0.2 % of range)	
	45 Hz $\leq f \leq$ 66 Hz	± (0.1 % of reading + 0.05 % of range)	
Accuracy	66 Hz $<$ f $\le$ 1kHz	$\pm$ (0.2 % of reading + 0.2 % of range)	
	1 kHz $<$ f $\leq$ 10 kHz	± (0.1 % of reading + 0.3 % of range) ± [{0.067x(f-1)}% of reading]	
	10 kHz $<$ f $\leq$ 100 kHz	$\pm$ (0.5 % of reading + 0.5 % of range) $\pm$ [{0.09x(f-10)}% of reading]	
	when power factor $(\lambda) = 0$	(S: apparent power)	
	$\pm$ 0.1 % of S for 45 Hz $\leq$ f $\leq$ 66 Hz		
	$\pm$ {(0.1 + 0.15 $\times$ f) % of S } for up to 100 kHz as reference data		
finituence of power	<ul> <li>f is frequency of input signal in kHz</li> </ul>		
factor	when $0 < \lambda < 1$ ( $\Phi$ : phase angle of the Voltage and current)		
	(power reading) × [(power reading error%) + (power range $%$ ) × (power range (indicated appearant power range)		
	+ $\{\tan \Phi \times (\text{influence when } \lambda = 0)\%\}$		
When the line filter	45 ~ 66 Hz A	dd 0.3 % of reading	
is turned ON	< 45 Hz A	dd 1 % of reading	

## Active Power Accuracy

## **GWINSTEK**

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 $\lambda$	$\pm [(\lambda - \lambda/1.0002) +   \cos \theta - \cos \{\theta + \sin - 1 \text{ (influence from the power factor when } \lambda = 0\%/100)\}   ] \pm 1 \text{ digit when voltage and current are at the measurement range rated input}$
Accuracy of phase difference $\Phi$	$\pm$ [   ø-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.
* fis the frequency of	finnut signal in kHz

\* f is the frequency of input signal in kHz

## Voltage, Current and Active Power Measurements

Item	Specifications		
Measurement method	Digital sampling method		
Crest factor	3 or 6 (6A)		
Wiring system	Single-phase, two	o-wire(1 P2 W)	
Range select	Select manual or	auto ranging	
	Auto-range increa	ase	
	The range is upper conditions is met	ed when any of the following	
Auto range	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 Vri cu Vp exc mexc	ms or Irms exceeds 260% of the rrently set measurement range. k, Ipk value of the input signal ceeds 600% of the currently set easurement range		
	Auto-range decline			
	The range is downed when all of the following			
	conditions are met.	0		
	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 6,	A 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.		
	Vrms (the true RMS	value of voltage and current)		
	VOLTAGE MEAN (th	e rectified mean value		
Display mode	calibrated to the RMS value of the voltage)			
Switching	AC			
	DC			
	Select voltage current or off			
Measurement	In the case of Auto Update Rate select the voltage or			
synchronization source	current from the equ	ipped element.		
Line filter	Select OFF or ON (c	utoff frequency at 500 Hz).		
	Measures the peak (	max, min) value of voltage.		
Peak measurement	current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.			
Zero-level compensation	Removes the interna (After measurement	l offset of the measure unit range is changed)		
	Voltage	Vrms , Vmn, Vdc , Vac		
Measurement parameters	Current	Irms , Idc , Iac		
	Active Power	Р		

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
Maximum Current Ratio	MCR

## Frequency Measurement

ltem	Specifications		
Measurement item	Voltage and current		
	Data update interval	Measurement Frequency Range	
	0.1 s	20 $Hz \le f \le 100 \text{ kHz}$	
	0.25 s	$10 \text{ Hz} \le f \le 100 \text{ kHz}$	
	0.5 s	5 Hz $\leq$ f $\leq$ 100 kHz	
	1 s	$2.0 \text{ Hz} \le f \le 100 \text{ kHz}$	
	2 s	$1.0 \text{ Hz} \le f \le 100 \text{ kHz}$	
	5 s	$0.5 \text{ Hz} \leq f \leq 100 \text{ kHz}$	
Maaguramant fraguancy	10 s	$0.2 \text{ Hz} \leq f \leq 100 \text{ kHz}$	
range	20 s	$0.1 \text{ Hz} \leq f \leq 100 \text{ kHz}$	
range	Auto(*)	0.1 Hz $\leq$ f $\leq$ 100 kHz	
	(*) Limit of the meas	urement 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 Hz, 100 Hz, 1 kHz, 10	; six types: 100mHz, 1 Hz, 10 kHz, and 100 kHz.	
Frequency filter	Select OFF or ON (cut off frequency of 500 Hz)		

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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
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 (Frequency must be 50Hz/60Hz and Update Rate must be greater than or equal to 0.55S)			
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 x 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	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders
Analysis orders*	10 Hz to 67 Hz	f x 1024	1	50
	67 Hz to 150 Hz	f x 512	2	32

	150 Hz to 300 Hz	f x 256	4	16
	300 Hz to 600 Hz	f x 128	8	8
	600 Hz to 1200 Hz	f x 64	16	4
	Frequency	Voltage	Current	Power
Accuracy	$10 \text{ Hz} \le f < 45 \text{ Hz}$	0.15% of reading	0.15% of reading	0.35% of reading
		+ 0.35% of range	+ 0.35% of range	+ 0.50% of range
	$45 \text{ Hz} \le f < 440 \text{ Hz}$	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 < 1.2kHz	0.20% of reading	0.20% of reading	0.40% of reading
		+ 0.35% of range	+ 0.35% of range	+ 0.50% of range
		-		

\* 50Hz/60Hz Compliant IEC61000-4-7 (Update Rate must be  $\geq$  0.5s). \* 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.

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	$\pm$ (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

## D/A Output (Options)

#### 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),  $\lambda$  (PF) and  $\Phi$  (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-8320/8330 unit.

\* "Zero" will be shown for S or Q and "--" will be displayed for  $\lambda$  and  $\Phi$  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 or 6A).

## Status system

#### The diagram below is a description of the status system



The extended event register receives information about changes in the condition register, which indicates the instrument's internal condition. The information is the result of edge detection performed by the transition filter.

The following table lists the bit definitions for the condition register:

Bit	Name	Decimal	Definition	
0	Updating	1	The measured data is being updated. UPD changing from 1 to 0 indicates that updating has been completed.	
1	Integrate Busy	2	During integration.	
2	Integrate Time Busy	4	The integration timer is operating.	
3	Not Used	8	(Reserved for future use)	
4	Frequency Over	16	The frequency is outside the measurement range.	
5	Store Busy	32	During storage.	
6	Measured Data Over	64	The voltage or current exceeds its range.	
7	Voltage Peak Over	128	A peak over-range is detected in the voltage.	
8	Current Peak Over	256	A peak over-range is detected in the current.	
9	Not Used	512	(Reserved for future use)	
10	Not Used	1024	(Reserved for future use)	
11	Not Used	2048	(Reserved for future use)	
12	Not Used	4096	(Reserved for future use)	
13	Not Used	8192	(Reserved for future use)	
14	Not Used	16384	(Reserved for future use)	
15	Not Used	32768	(Reserved for future use)	

The transition filter parameters detect changes in the specified condition register bits (numeric suffixes 1 to 16) and overwrite the extended event register in the following ways.

Condition	Definition
RISE	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 0 to 1.
FALL	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 1 to 0.
вотн	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 0 to 1 or from 1 to 0.
NEVer	Always zero.

The following table describes the Standard Event Register

Bit	Name	Decimal	Definition
0	Operation Complete	1	All commands prior to and including *OPC have been executed.
1	Not Used	2	(Reserved for future use)
2	Query Error	4	The instrument tried to read the output buffer but it was empty. Or, a new command line was received before a previous query has been read. Or, both the input and output buffers are full.
3	Device Error	8	A device error, including a self-test error or calibration error, occurred (an error in the - 300 range or any positive error has been generated).
4	Execution Error	16	An execution error occurred (an error in the -200 range has been generated).
5	Command Error	32	A command syntax error occurred (an error in the -100 range has been generated).
6	Not Used	64	(Reserved for future use)
7	Power On	128	Power has been cycled since the last time the event register was read or cleared.

## The following table describes the Status Byte Register.

Bit	Name	Decimal	Definition	
0	Not Used	1	(Reserved for future use)	
1	Not Used	2	(Reserved for future use)	
2	Error Queue	4	One or more errors have been stored in the Error Queue. Use STAT:ERR? to read and delete errors.	
3	Extended Event	8	One or more bits are set in the Extended Event Register (bits must be enabled, see STAT:EESE).	
4	Message Available	16	Data is available in the instrument's output buffer.	
5	Standard Event	32	One or more bits are set in the Standard Event Register (bits must be enabled, see *ESE).	
6	Request Service	64	One or more bits are set in the Status Byte Register and may generate a Request for Service (RQS). Bits must be enabled using *SRE.	
7	Not Used	128	(Reserved for future use)	

# Dimensions



Unit = mm





# Certificate Of Compliance

#### We

#### GOOD WILL INSTRUMENT CO., LTD.

declare that the CE marking mentioned product

satisfies all the technical relations application to the product within the scope of council:

Directive: EMC; LVD; WEEE; RoHS

The product is in conformity with the following standards or other normative documents:

© EMC			
EN 61326-1	Electrical equipment for measurement, control and laboratory use EMC requirements		
Conducted & Radiated Emission		Electrical Fast Transients	
EN 55011 / EN 55032		EN 61000-4-4	
Current Harmonics		Surge Immunity	
EN 61000-3-2 / EN 61000-3-12		EN 61000-4-5	
Voltage Fluctuations		Conducted Susceptibility	
EN 61000-3-3 / EN 61000-3-11		EN 61000-4-6	
Electrostatic Discharge		Power Frequency Magnetic Field	
EN 61000-4-2		EN 61000-4-8	
Radiated Immunity		Voltage Dip/ Interruption	
EN 61000-4-3		EN 61000-4-11 / EN 61000-4-34	
© Safety			
EN 61010-1 :	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements		
GOODWILL INSTRUMENT CO., LTD.			

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## Power measurement

Method	• Direct read method: Directly read the measurement value measured from power measuring instrument.
	• The average power method: Record the actual power value within a settable period of time and then take the average. A settable period of time isn't less than 10min. The maximum measurement interval is one second.
	• Energy accumulation method: Measure the energy within a settable period of time and then divide it by the time to get the power. A settable period of time isn't less than 10min. The cumulative energy must be greater than the resolution by 200 times.

### Measurement for small current

Voltage measurement mode measured from power supply side (Connect to ammeter internally). The current measurement is accurate. The voltage measurement on load could be larger than the actual one due to partial pressure of multi-measurement ammeter.



Power loss =  $(Input current[A])^2 \times 505 m\Omega$ 

## Measurement for large current

Voltage measurement mode measured from load side (Connect to ammeter externally).

The voltage measurement is accurate. The current measurement on load could be larger than the actual one due to leakage current of multi-measurement voltage.





### Measurement Function

functions	Wiring mode		Single-phase, three-wire 1P3W	Three-phase, three-wire 3P3W	Three-voltage, three- current measurement 3V3A	Three-phase, four-wire 3P4W
	UΣ [V]		(U1 + U3) / 2		(U1 + U2 + U3) / 3	
	ΙΣ [Α]		(11 + 13) / 2		(11 + 12 + 13) / 3	
	ΡΣ [W]		P1 + P3			P1 + P2 + P3
	SΣ [VA]		S1 + S3	$\frac{\sqrt{3}}{2}$ (S1 + S3)	$\frac{\sqrt{3}}{3}$ (S1 + S2 + S3)	S1 + S2 + S3
	QΣ [var]		Q1 + Q3			Q1 + Q2 + Q3
M	WPΣ W		WP1 + WP	23	WP1 + WP2 + WP3	
	WPΣ [Wh]	WP+Σ	WP+1 + WP+3			WP+1 + WP+2 + WP+3
		WP-Σ	WP-1 + WP-3			WP-1+WP-2+WP-3
		qΣ		q1 + q2 + q3		
	qΣ [Ah] q+Σ q-Σ	q+Σ	q+1 + q+3			q+1 + q+2 + q+3
		q-Σ		q-1 + q-2 + q-3		
	λΣ		<u>ΡΣ</u> <u>SΣ</u>			
	$\Phi\Sigma["] \qquad \qquad COS^{-1}\left(\frac{P\Sigma}{S\Sigma}\right)$					

## Wiring diagram

There are four wiring modes available for GPM-8320/8330. Please refer to the wiring diagrams below for selecting a suitable wiring mode and wiring correctly.



Wiring 3P4W



Wiring 3V3A

