

# Three Phase Power Controller

ASR-002

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## USER MANUAL

Rev. A



ISO-9001 CERTIFIED MANUFACTURER

**GW INSTEK**

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# S 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.

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WARNING

Warning: Identifies conditions or practices that could result in injury or loss of life.



CAUTION

Caution: Identifies conditions or practices that could result in damage to the ASR-002 or to other properties.



DANGER High Voltage



Attention Refer to the Manual



Protective Conductor Terminal



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

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### General Guideline



#### CAUTION

- Do not place any heavy object on the ASR-002.
- Avoid severe impact or rough handling that leads to damaging the ASR-002.
- Do not discharge static electricity to the ASR-002.
- Use only mating connectors, not bare wires, for the terminals.
- Do not block the cooling fan opening.
- Do not disassemble the ASR-002 unless you are qualified.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

### Power Supply



#### WARNING

- AC Input voltage range:  
230 Vac  $\pm$  15%
- Frequency: 50/60 Hz
- To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.

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### Cleaning the ASR-002

- Disconnect permanently connected power input before cleaning.
  - 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.
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Operation Environment	<ul style="list-style-type: none"><li>• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below)</li><li>• Relative Humidity: 20%~ 80%, no condensation</li><li>• Altitude: &lt; 2000m</li><li>• Temperature: 0°C to 40°C</li></ul>
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Storage environment	<ul style="list-style-type: none"><li>• Location: Indoor</li><li>• Temperature: -10°C to 70°C</li><li>• Relative Humidity: ≤90%, no condensation</li></ul>
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**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 ASR-002 power controller in a nutshell, including its main features and front/rear panel introduction.

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## **ASR-002 Overview**

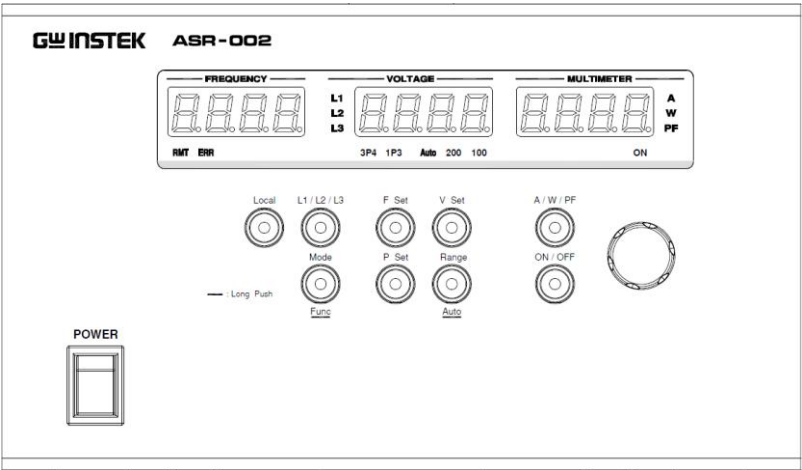
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ASR-002, which is a three-phase power controller, is able to controll up to 3 single phase power supply units (ASR series only).

It effectively makes AC output conformed to 1P3W/3P4W that generally unit requires, and also turns output into 3P3W via designated wire method.

When the select single phase power is greater than the capacity of 2kVA, it is suggested that output should be connected to external terminal for safety consideration.

Front Panel



Section	Figure	Description
Header Displays		FREQUENCY: It displays frequency.
		VOLTAGE: It displays voltage.
		MULTIMETER: It displays A current / W power / PF power factor.

Function Keys		It changes header display A → W → PF.
		ON: Output on. OFF: Output off.



V Set: It configures voltage.



Range: It toggles between 100V and 200V.

Auto: It enters Auto range by long press.



F Set: It configures frequency.



P Set: It configures L2 / L3 phase.



L1 / L2 / L3: It changes among L1 → L2 → L3.



Mode: It toggles between 1P3W → 3P4W.

Func: It configures advance setting by long press.



Local: It cancels connection and enters the local operation mode.



Knob Key: It adjusts value by scroll. Also, it switches input adjustment position by press.

## Display Icons



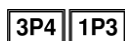
It indicates remote control mode.



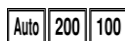
It indicates that error of control occurs.



It indicates output phase.



It indicates output mode.

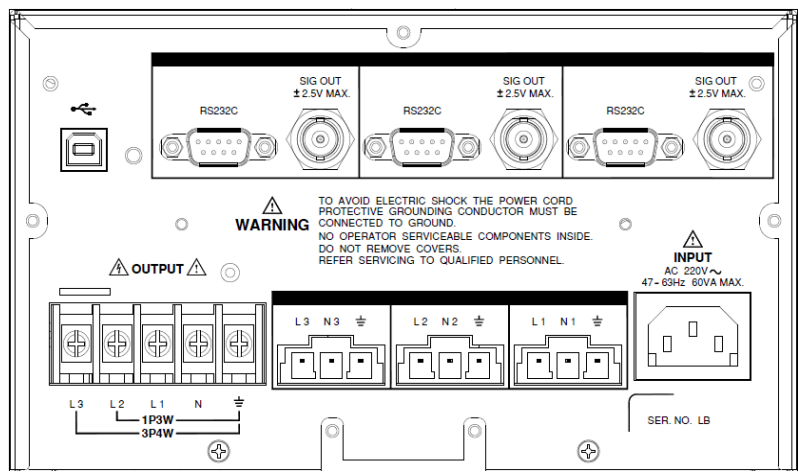






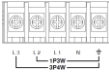
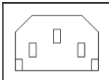
It indicates output range.



It indicates measurement unit display.

Rear Panel



Section	Figure	Description
USB Port		USB B-type port for remote control.
RS232C Port		RS232C port for remote control.
SIG OUT		SIG OUT for phase control signal output.
Phase Terminal		The phase terminals for L1/L2/L3.
Output Terminal		1P3W: Single phase 3 wire. 3P4W: Three phase 4 wire.
Power Voltage Input		Voltage Input: AC 220V. Power Frequency: 47 – 63Hz.

# OPERATION

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## Basic Operation

### Output Mode Setting Process

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- |       |                                |
|-------|--------------------------------|
| Steps | 1. Press the Mode key.         |
|       | 2. Toggle between 1P3W → 3P4W. |

### Voltage Range Setting Process

---

- |       |   |
|-------|---|
| Steps | 1. Press the Range key.   |
|       | 2. Toggle between 100V → 200V.<br>Press and hold the Range key to enter Auto. |

### Voltage Value Setting Process

---

- |       |  |
|-------|--|
| Steps | 1. Press the V Set key.  |
|       | 2. Scroll the Knob key to adjust voltage value.  |
|       | 3. 100V: 0 – 175V<br>200V: 0 – 350 V<br>Auto: 0 – 350V                                     |
|       | 4. After adjustment, press the V Set key again to upload the set value to ASR series unit. |

## Frequency Setting Process

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- Steps
1. Press the F Set key.
  2. Scroll the Knob key to adjust frequency value.
  3. Frequency range: 40 – 999.9Hz.

## Phase Shift Setting Process

---

- Steps
1. Press the P Set key.
  2. Scroll the Knob key to adjust phase.  
  
L2 setting range: 85° - 155°      P5Et 1200 000
  3. Press the P Set key to enter the next step.  
  
L3 setting range: 205° - 275°      P5Et 2400 000
  4. Press the P Set key to exit.

## Advance Setting

### Voltage Amplification Setting Process

---

- Steps
1. Press and hold the Mode key to enter the setting.
  2. Adjust L1/L2/L3 based on voltage amplification.

3. Scroll the Knob key to adjust amplification. The setting range: 0 – 3.5.

Press L1/L2/L3 key to enter next step.

L1	8rEF	1000
L2	8rEF	1000
L3	8rEF	1000

4. After configuration, press the Range key to enter the next step.

### Slew Reate Setting Process

---

- Steps
1. Slew Rate setting. Setting range: 0.001 – 0.5.
  2. After configuration, press the Range key to enter the next step.

## RS232 Baudrate Setting Process

---

- Steps            1. RS232 interface            baud  9600  
transmission speed  
setting (9600 by default).  
Setting range: (9600 →  
19200 → 38400 → 57600  
→ 115200).

## Factory Default Setting Process

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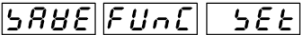
- Steps            1. Restore to the factory            FACT DEFA   
default setting. Press the  
Range key, and the system  
exits automatically.

## Phase Angle Setting

### Phase Angle Setting Process

---

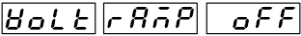
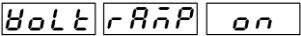

- Steps
1. Press and hold the P Set key to enter the phase angle setting.
  2. Set the starting angle.
  3. The default setting is OFF.
  4. Press the Range key to enter next step or scroll the Knob key to adjust to ON for angle setting. The setting range: 0° - 359°.
  5. Press the Range key to enter the next step and exit from starting angle setting.
  6. Set the ending angle.
  7. The default setting is OFF.
  8. Press the Range key to finish phase angle setting or scroll the Knob key to adjust to ON for angle setting. The setting range: 0° - 359°.
  9. After configuration, press the Range key to finish phase angle setting.

10. Press and hold the Mode key and display will be shown as the right figure.  

11. Press the Range key to save the setting and exit.

## Voltage Ramp Setting

### Voltage Ramp Setting Process

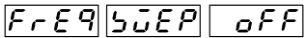
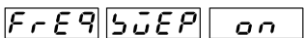
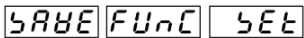
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- |       |   |
|-------|---|
| Steps | <ol style="list-style-type: none"><li>1. Press and hold the V Set key to enter the Ramp setting.</li><li>2. The default setting is OFF. </li><li>3. Press the Range key to exit from Ramp setting or scroll the Knob key to Ramp ON followed by pressing Range key to enter the Ramp value setting. </li><li>4. The setting range: 0.001 – 9.999</li><li>5. Press the Range key to exit.</li><li>6. Press and hold the Mode key and display will be shown as the right figure. </li><li>7. Press the Range key to save the setting and exit.</li></ol> |
|-------|---|

## Frequency Sweep Setting

### Frequency Sweep Setting Process

---

- Steps
1. Press and hold the F Set key to enter the Sweep setting.
  2. The default setting is OFF. 
  3. Scroll the Knob key to Sweep ON followed by pressing the Range key to enter the Sweep value setting. 
  4. The setting range: 0.001 – 9.999
  5. Press the Range key to exit.
  6. Press and hold the Mode key and display will be shown as the right figure. 
  7. Press the Range key to save the setting and exit.

## Unit Setting Value Display

### Unit Setting Value Display Setting Process

- Steps
1. Press and hold the Mode key to enter the setting.
  2. Press the L1/L2/L3 key to browse the default settings as follows.

L1 Vref 1.000      L1 VREF 1000

L2 Vref 1.000      L2 VREF 1000

L3 Vref 1.000      L3 VREF 1000

SLEW RATE 0.200      SLEW RATE 0200

BAUD 9600      BAUD  9600

FACT DEFA      FACT DEFA

SOFT VER T101      SOFT VER T101

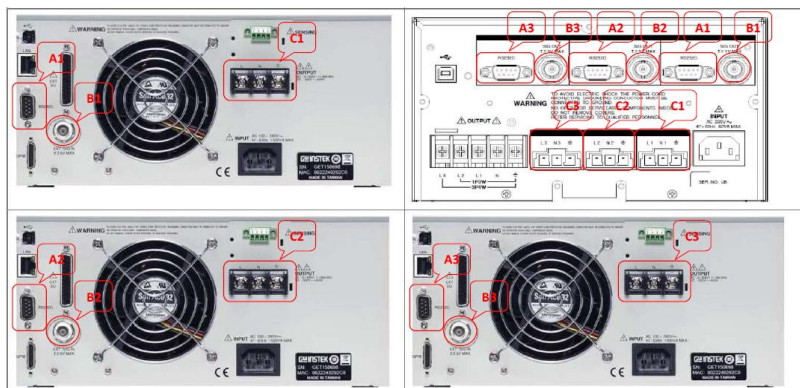
SAVE FUNC SET      SAVE FUNC SET

EXT ASR SET      EXT ASR SET

EXIT FUNC SET      EXIT FUNC SET

# Wire Connection & Accessories

## ASR-2000 Series Example



ASR-2100 A1 to ASR-002 A1

B1 to B1

C1 to C1

ASR-2100 A2 to ASR-002 A2

B2 to B2

C2 to C2

ASR-2100 A3 to ASR-002 A3

B3 to B3

C3 to C3

## Accessories

Part Number	Description
GTL-232 x 3	RS232C cable, approx. 2M
GTL-110 x 3	BNC test lead, approx 1.1M
GTL-246 x 1	USB Cable (USB 2.0 Type A- Type B Cable, Approx. 1.2M)
40WC792030011 x 3	C1/C2/C3 Cable, 4M Max Length, UL1015 12AWG, RV5-5, Hirose DF22-4S-7.92C(28) 3P + DF22A-1012SCFA

# A

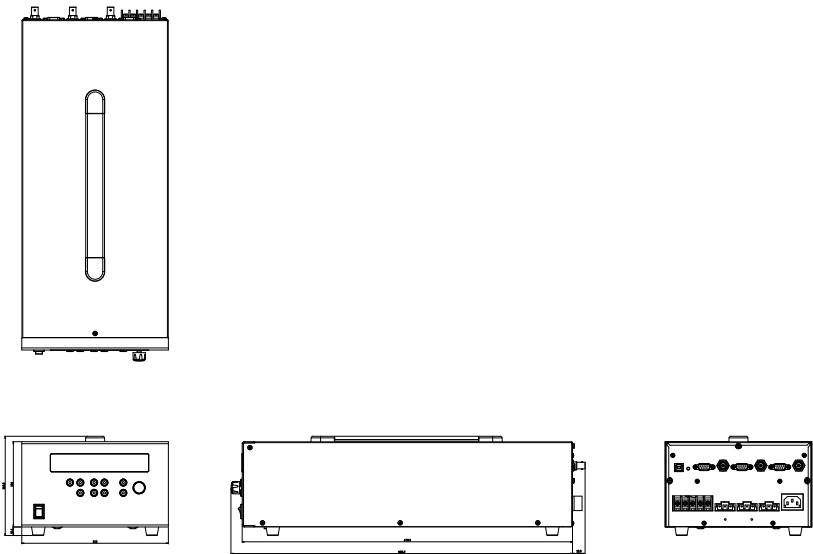
# PPENDIX

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## ASR-002 Dimension

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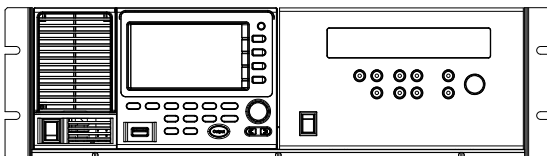
## Using the Rack Mount Kit

### Background

The ASR-002 assembled with ASR-2000 has the following optional Rack Mount kits.

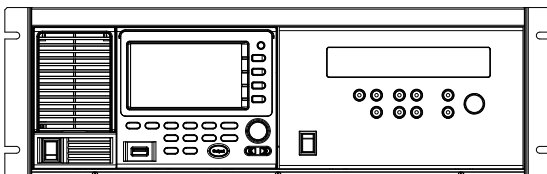
#### ASR-002 Rack-EIA

ASR-002 with  
ASR2000  
assembled with  
rack EIA



#### ASR-002 Rack-JIS

ASR-002 with  
ASR2000  
assembled with  
rack JIS



### CAUTION

Ensure adequate ventilation is provided when using the rack mount. Ensure that a gap is given for air intakes. Failure to do so may cause the instrument to overheat.

## Command List

---

Source Commands	[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] [SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]? [SOURce:]VOLTage:RANGe 100/200/AUTO [SOURce:]VOLTage:RANGe? [SOURce:]VOLTage:MODE FIXed/STEP [SOURce:]VOLTage:MODE? [SOURce:]VOLTage:SLEW xxx [SOURce:]VOLTage:SLEW? [SOURce:]FUNction[:SHApe][:IMMediate] SIN/SQU/TRI [SOURce:]FUNction[:SHApe][:IMMediate]? [SOURce:]FREQuency[:IMMediate] xxx [SOURce:]FREQuency[:IMMediate]? [SOURce:]PHASe:PHASe L12,xxx/L13,xxx [SOURce:]PHASe:PHASe? L12/L13 [SOURce:]PHASe:STARt:ENABle ON/OFF/1/0 [SOURce:]PHASe:STARt:ENABle? [SOURce:]PHASe:STARt xxx [SOURce:]PHASe:STARt? [SOURce:]PHASe:STOP:ENABle ON/OFF/1/0 [SOURce:]PHASe:STOP:ENABle? [SOURce:]PHASe:STOP xxx [SOURce:]PHASe:STARt?
Output Commands	OUTPut[:STATe] ON/OFF/1/0 OUTPut[:STATe]?
Display Commands	DISPlay[:WINDow]:INSTRument:NSElect 0/1/2 DISPlay[:WINDow]:INSTRument:SElect L1/L2/L3
Measure Commands	MEASure[:SCALar]:FREQuency? MEASure[:SCALar]:CURRent[:RMS]? MEASure[:SCALar]:CURRent:AVerage? MEASure[:SCALar]:VOLTage[:RMS]? MEASure[:SCALar]:VOLTage:AVerage? MEASure[:SCALar]:POWer[AC]:REAL? MEASure[:SCALar]:POWer[AC]:APParent? MEASure[:SCALar]:POWer[AC]:REACTive? MEASure[:SCALar]:POWer[AC]:PFACtor?
System Commands	SYSTem:ERRor? SYSTem:CONFigure:NPU 3P4W/1P3W SYSTem:CONFigure:NPU?
Common Commands	*IDN? *CLS *RST

---

## ASR-002 Error Messages

The following error messages may appear on the ASR-002 screen display during varied operations.

Section	Error Messages	
Command Error	0	"No error"
	-101	"Invalid character"
	-102	"Syntax error"
	-103	"Invalid separator"
	-108	"Parameter not allowed"
	-109	"Missing parameter"
	-113	"Undefined header"
	-121	"Invalid character in number"
	-148	"Character data not allowed"
	-151	"Invalid string data"

Section	Error Messages	
Execution Error	-203	"Command protected"
	-222	"Data out of range"
	-224	"Illegal parameter value"

Section	Error Messages	
Device Specific Error	-330	"Self-test failed"
	-350	"Error queue overflow"

Section	Error Messages	
Query Error	-410	"Query INTERRUPTED"
	-420	"Query UNTERMINATED"
	-521	"Input buffer overflow"
	-522	"Output buffer overflow"