Three Phase Power Controller

ASR-002

USER MANUAL

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

The information in this manual was correct at the time of printing. However, Good Will continues to improve products and reserves the rights to change specification, equipment, and maintenance procedures at any time without notice.

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Table of Contents

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	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

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 ~ 240 Vac • Frequency: 50/60 Hz • To avoid electrical shock connect the protective grounding conductor of the AC power cord to an earth ground.
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.

Operation Environment	• Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below) • Relative Humidity: 20%~ 80%, no condensation • Altitude: < 2000m • Temperature: 0°C to 40°C
Storage environment	• Location: Indoor • Temperature: -10°C to 70°C • Relative Humidity: ≤90%, no condensation
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.
	Certification of Compliance --- The product is in conformity with the directive: EN 61010-1 / EN 61326-1 / WEEE / RoHS

GETTING STARTED

This chapter describes the ASR-002 power controller in a nutshell, including its main features and front/rear panel introduction.

ASR-002 Overview

ASR-002, which is a three-phase power controller, is able to control up to 3 single phase power supply units (For ASR-2000 Series, the factory installed option Opt 1 is necessary).

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

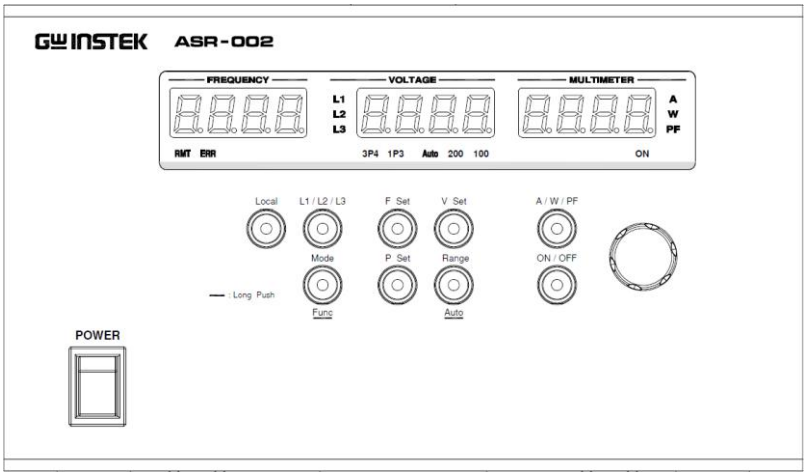
When the select single phase power is greater than the capacity of 2kVA, it is suggested that output should be connected to external terminal for safety consideration.

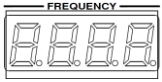
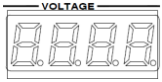
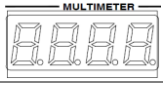
Note

The communnication process for ASR-002 and ASR series:

1. First power on ASR series *3 followed by ASR-002.
2. Manually perform output on for ASR-002 and it will execute connection detection one time.

Front Panel



Section	Figure	Description
Header Displays		FREQUENCY: It displays frequency.
Note		For setting the target amplitude of the Voltage Ramp, it will show Ramp.
		VOLTAGE: It displays voltage. Normally, it displays measured voltage value by current phase. While user presses V Set key, it displays the set voltage value by current phase.
Note		For setting the target frequency of the Frequency Sweep, it will show SWEP.
		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.

Note

It can be operated when connected to ASR series only.

V Set: It configures voltage.

Range: It toggles between 100V and 200V.

Auto: It enters Auto range by long press.

When operating under Advance Setting Menu, this key functions as Enter.

F Set: It configures frequency.

P Set: It configures L2 / L3 phase.

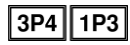
L1 / L2/ L3: It changes among L1 ➔ L2 ➔ L3.

When operating under Advance Setting Menu, this key functions as next menu item.

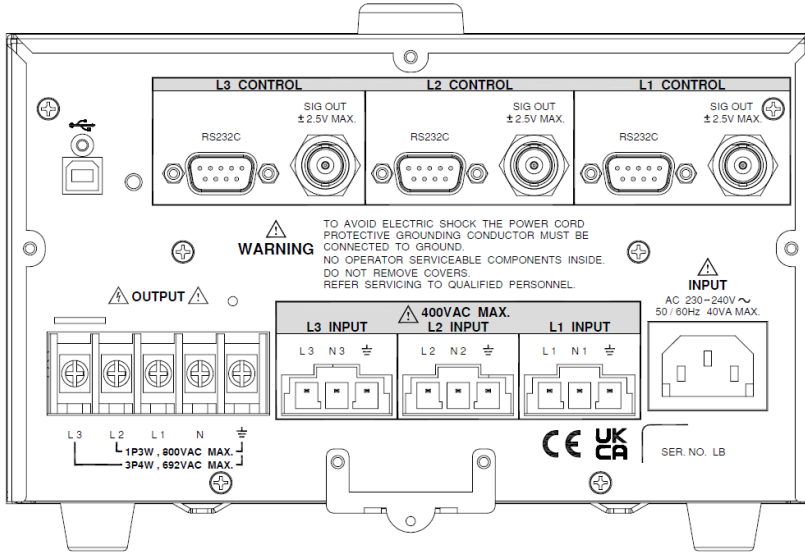
Mode: It toggles between 1P3W ➔ 3P4W.

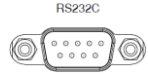
Func: It configures advance setting by long press.

When operating under Advance Setting Menu, this key functions as previous menu item.

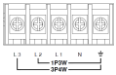
		Local: It cancels connection and enters the local opeation mode.
		Knob Key: It adjusts value by scroll. Also, it switches input adjustion position by press.
Display Icons		It indicates remote control mode.
		It indicates that error of control occurs.
		It indicates output phase.
		It indicates output 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. Warning: Input Voltage 400VAC Max.

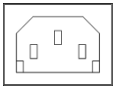
Output Terminal



1P3W: Single phase 3 wire.
Warning: Output Voltage 800VAC Max.

3P4W: Three phase 4 wire.
Warning: Output Voltage 692VAC Max.

Power Voltage Input



Voltage Input: AC 230~240V.

Power Frequency: 47 – 63Hz.

OPERATION

Basic Operation

Note

The basic operation settings can be saved by "Advance Setting Menu" → "Save Setting".

Output Mode Setting Process

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. 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
   200V: 0 – 350 V
   Auto: 0 – 350V
   Resolution is 0.1V
4. After adjustment, press the V Set key again to upload the set value to ASR series unit.

Frequency Setting Process

Steps

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

   Resolution is 0.01 Hz at 40 Hz to 100 Hz, 0.1 Hz at 100 Hz ~ 999.9 Hz.

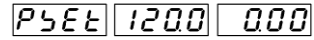
Phase Shift Setting Process

Steps

Current setting: either L1 or L2 LED indicator is lit.

1. Press the P Set key.
2. Scroll the Knob key to adjust phase.

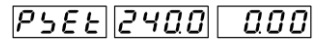
   L2 setting range: 85° - 155°.

3. Press the P Set key to enter the next step.

   Current setting: the L3 LED indicator is lit (only phase shift of L3-L1 is settable).

   L3 (L3-L1) setting range: 205° - 275°.

4. Press the P Set key to exit.

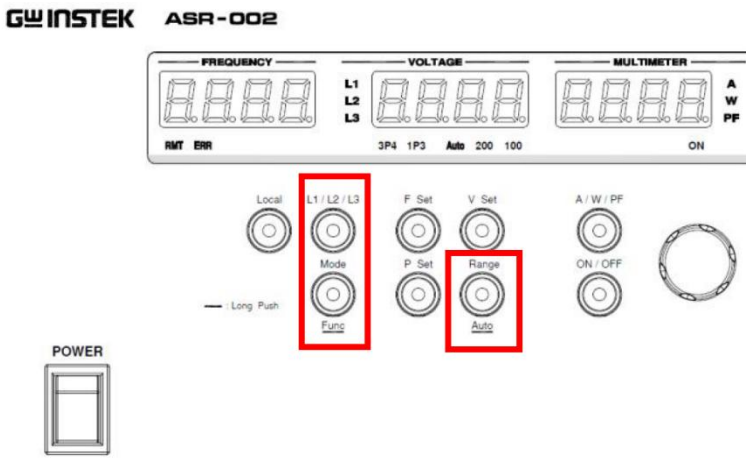
   Resolution is 0.1V

Note

Before user sets up parameters of (L2-L1)(L3-L1) phase shift simultaneously, it is required to select Output Phase to either L1 or L2 lit indicator for operation.

Advance Setting

Major keys of Advance Setting Menu



Key	Function	Definition
L1/L2/L3	Next Item	It sets next item
Mode	Previous Item	It sets previous item
Range	Enter	It confirms setting

Advance Setting Menu

Steps

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

SLEW RATE 0.200	SLEW	rATE	0.200
BAUD 9600	bAUd		9600
FACT DEFA	FACt	dEFA	
SOFT VER T101	SoFt	VEr	t 101
SAVE FUNC SET	SAVE	FUnC	SEt
EXT ASR SET	Ext	ASr	SEt
EXIT FUNC SET	ExIt	FUnC	SEt

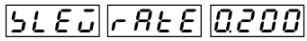
Note

All settings relevant to unit configuration, whether it's setting of panel operation or Advance Setting Menu, can only be saved properly via "Save Setting values" execution.

Slew Rate Setting Process

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).



3. Scroll the Knob key to adjust the slew rate setting. Setting range: 0.01ms - 12.50ms.
4. After configuration, press the Enter(Range) key to confirm the setting.

RS232 Baudrate Setting Process

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).

3. Scroll the Knob key to adjust the baud rate of the RS-232 interface. (9600 by default)

   The setting range: (9600, 19200, 38400, 57600,115200)

4. After configuration, press the Enter(Range) key to confirm the setting.

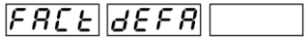
Note

Baudrate of ASR-002 and ASR series must be configured in the identical transmittion speed.

Factory Default Setting Process

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).

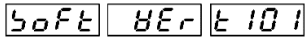


3. Press the Enter(Range) key to recall the factory default setting.

Firmware Version

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).



Save Setting Values

Steps

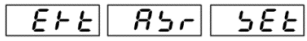
1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).

3. Press the Enter(Range) key to save setting values.

Apply Settings to The External ASR

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).



3. Press the Enter(Range) key to apply all of the current panel settins to external ASR via RS-232 interface.

Exit Advance Function Setting Menu

Steps

1. Press and hold the Mode key to enter the setting.
2. Select to the display as screenshot shown via Next Item (L1/L2/L3) and Previous Item (Mode).

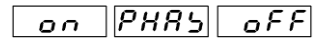
3. Press the Enter(Range) key to Exit Advance Function Setting menu.

Phase Angle Setting

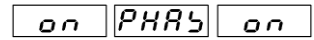
Phase Angle Setting Process

Steps

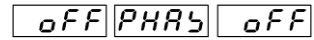
1. Press and hold the P Set key to enter the phase angle setting.
2. Set the starting angle. (On Phase)
3. The default setting is OFF.



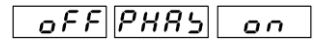
4. Scroll the Knob key to On for the On Phase Angle, and Press the Range key to enter the On Phase Angle setting and enter the next step. The setting range:0° - 359°.



5. Set the ending angle. (Off Phase)
6. The default setting is OFF.



7. Scroll the Knob key to On for the Off Phase Angle setting, and Press the Range key to enter the Off Phase Angle setting and finish the phase angle setting. The setting range:0° - 359°.

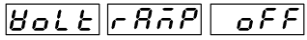


Voltage Ramp Setting

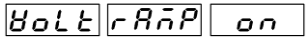
Voltage Ramp Setting Process

Steps

1. Press and hold the V Set key to enter the Ramp setting.
2. The default setting is OFF.



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.

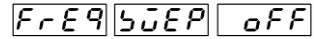


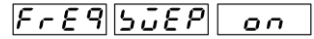
4. The setting range: 0.01sec - 99.99sec
5. Press the Range key to exit.

Frequency Sweep Setting

Frequency Sweep Setting Process

Steps

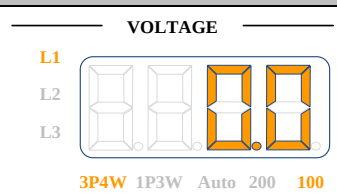
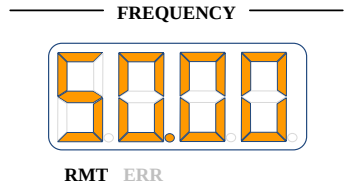
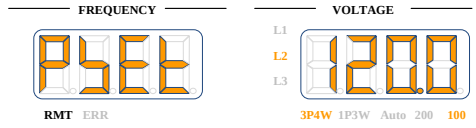
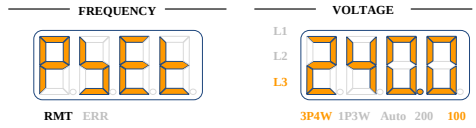
1. Press and hold the F Set key to enter the Sweep setting.
2. The default setting is OFF. 

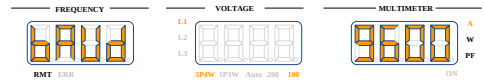
3. Scroll the Knob key to Sweep ON followed by pressing the Range key to enter the Sweep value setting. 

4. The setting range: 0.01sec - 99.99sec
5. Press the Range key to exit.

Factory Default Settings

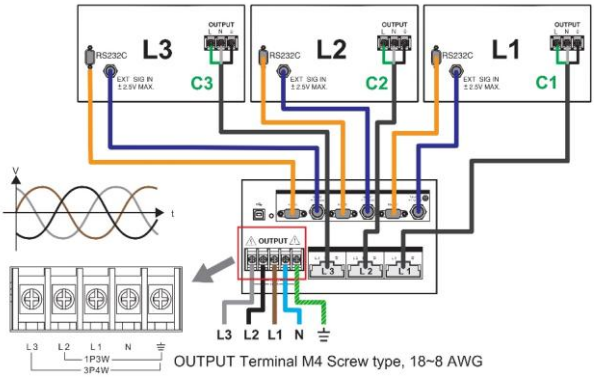
The following default settings are the factory configuration settings for the ASR-002 series. For details on how to return to the factory default settings, please see the page 19.

Basic operation	ASR-002	Display
Output Mode Setting	3P4W	
Voltage Range Setting	100	
Voltage Value Setting	0.0	
Frequency Setting	50.00	
Phase Shift Setting	(L2)Pset 120.0	
	(L3)Pset 240.0	

Advance Setting	ASR-002	Display
Slew Rate Setting	Slew rate 0.2	
RS232 Baudrate Setting	Baud 9600	
Phase Angle Setting	On phase off	
	Off phase off	
Voltage Ramp Setting	Voltage ramp off	
Frequency Sweep Setting	Frequency sweep off	

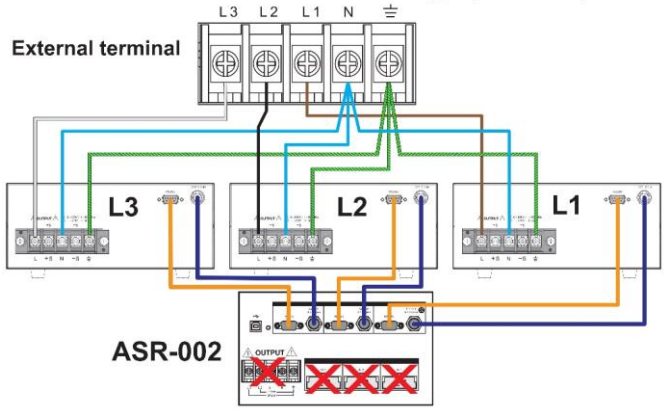
Wire Connection & Accessories

Three-Phase Wire Connection Image (≦2kVA)



OUTPUT Terminal M4 Screw type, 18~8 AWG

Three-Phase Wire Connection Image (>2kVA)



Note

Only the identical series models can be utilized simultaneously. That is, ASR-2000 series and ASR-3000 series are Not available to be used at the same time.

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, 70cm Max Length, UL1015 12AWG, RV5-5, Hirose DF22-4S-7.92C(28) 3P + DF22A-1012SCFA

Optional Accessories

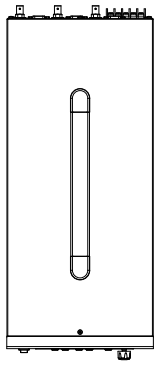
Part Number	Description
GTL-138 x 1	C1/C2/C3 Cable Kit

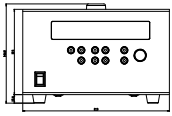
Function Limits for ASR Series

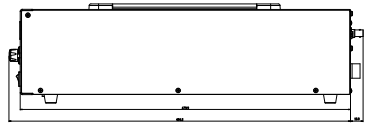
0. The ASR Series must equip with RS-232 interface. For ASR-2000, the RS-232+GPIB is an factory installed option.
1. No DC Output(100% of Rated Power).
2. Measurement Items: only current(A), power(W) and PF for each phase.
3. No voltage and current Harmonic Analysis (THDv, THDi).
4. No Remote Sensing Capability.
5. No Arbitrary Waveform Function.
6. No Sequence and Simulation Function.
7. Not supported Built-in External Control I/O.
8. No memory Function.
9. No LAN and USB port supported.

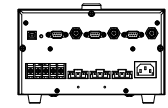
APPENDIX

ASR-002 Dimension







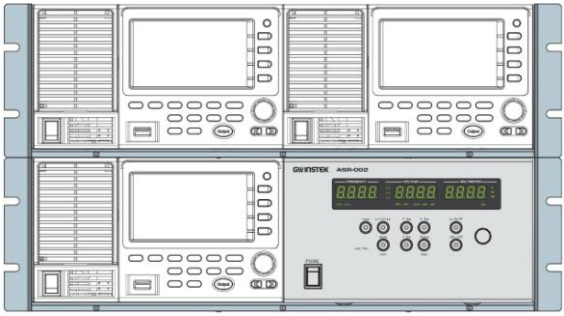


Using the Rack Mount Kit

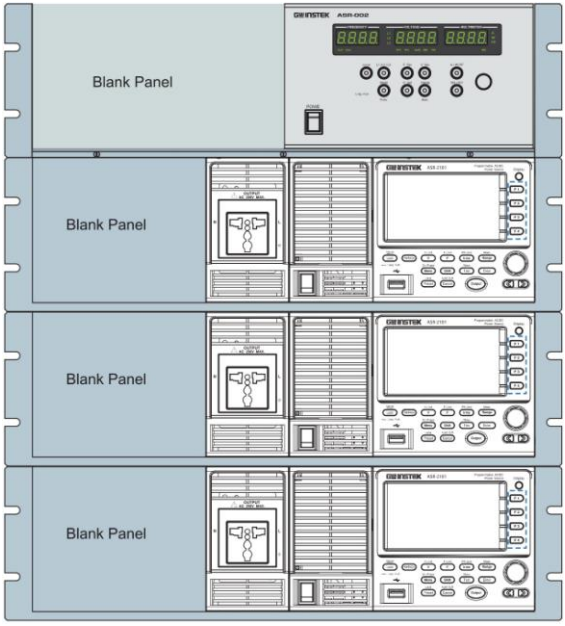
Background

The ASR-002 assembled with ASR-2000 or ASR-3000 has the following optional Rack Mount kits.

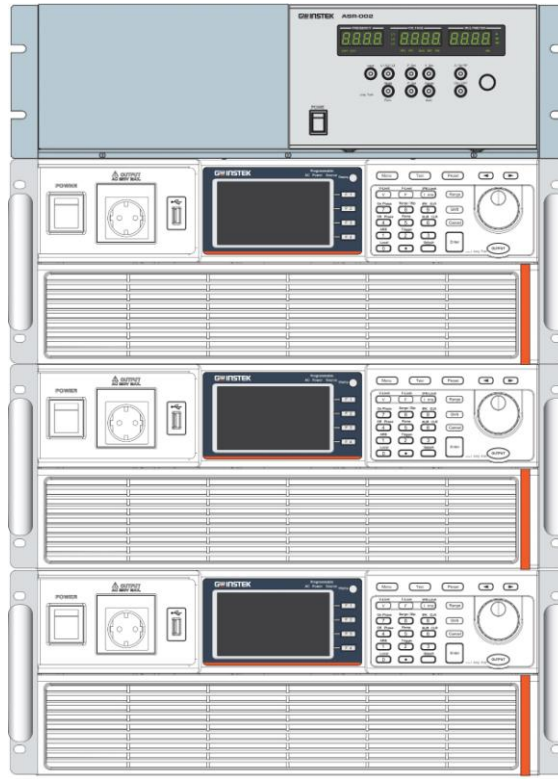
ASR-002 with ASR-2000R assembled with rack EIA



ASR-002 with ASR-2000 assembled with rack EIA



ASR-002 with ASR-3000 assembled with rack EIA



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.

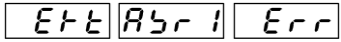
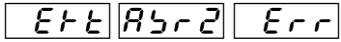
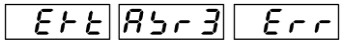
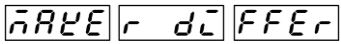
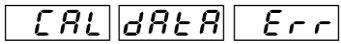
Section	Error Messages	
Command Error	0	"No error"
	-101	"Invalid character"
	-102	"Syntax error"
	-103	"Invalid separator"
	-108	"Parameter not allowed"
	-109	"Missing parameter"
	-113	"Undefined header"
	-121	"Invalid character in number"
	-148	"Character data not allowed"
	-151	"Invalid string data"

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"

Display Error Message

External ASR1 Error	ASR1 connection and communication error	
External ASR2 Error	ASR2 connection and communication error	
External ASR3 Error	ASR3 connection and communication error	
Maker Differ	The differences among varied brands of ASR sales channels	
Command Error	Error occurred in command	
Calibration Error	Error occurred in Calibration data	

Note

When the "err" symbol appears, press the local key to display detailed error message.

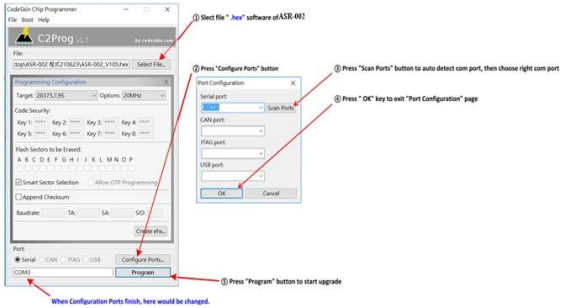
Firmware Upgrade Procedure

Steps

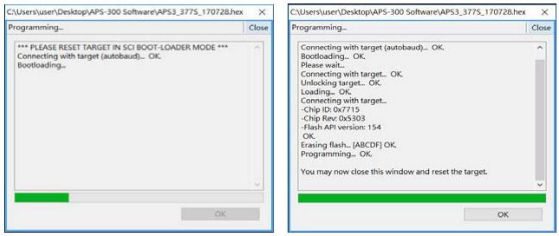
1. Press and hold the switch while turning on the power (Power on button) to enter the firmware update mode.

2. Connect computer to the rear panel USB port.

3. Open the C2prog program.



4. The programming process is underway.



5. Press the OK button when the programming process is complete, and then turn the ASR-002 off and on again followed by the completion of the programming.

LED ASCLL Table Character Set

LED ASCII Table Character Set

Use the following table to read the LED display messages.

0	1	2	3	4	5	6	7	8	9	A	B	C	D
													
E	F	G	H	I	J	K	L	M	N	O	P	Q	R
													
S	T	U	V	W	X	Y	Z	(	)	+	-	,