TAKASAGO

Constant-Voltage/Constant-Current DC Power Supply

HX-S-G4 series Instruction Manual

HX-S-030-200G4/HX-S-030-400G4
HX-S-060-100G4/HX-S-060-200G4
HX-S-0500-12G4/HX-S-0500-24G4
HX-S-01000-6G4/HX-S-01000-12G4

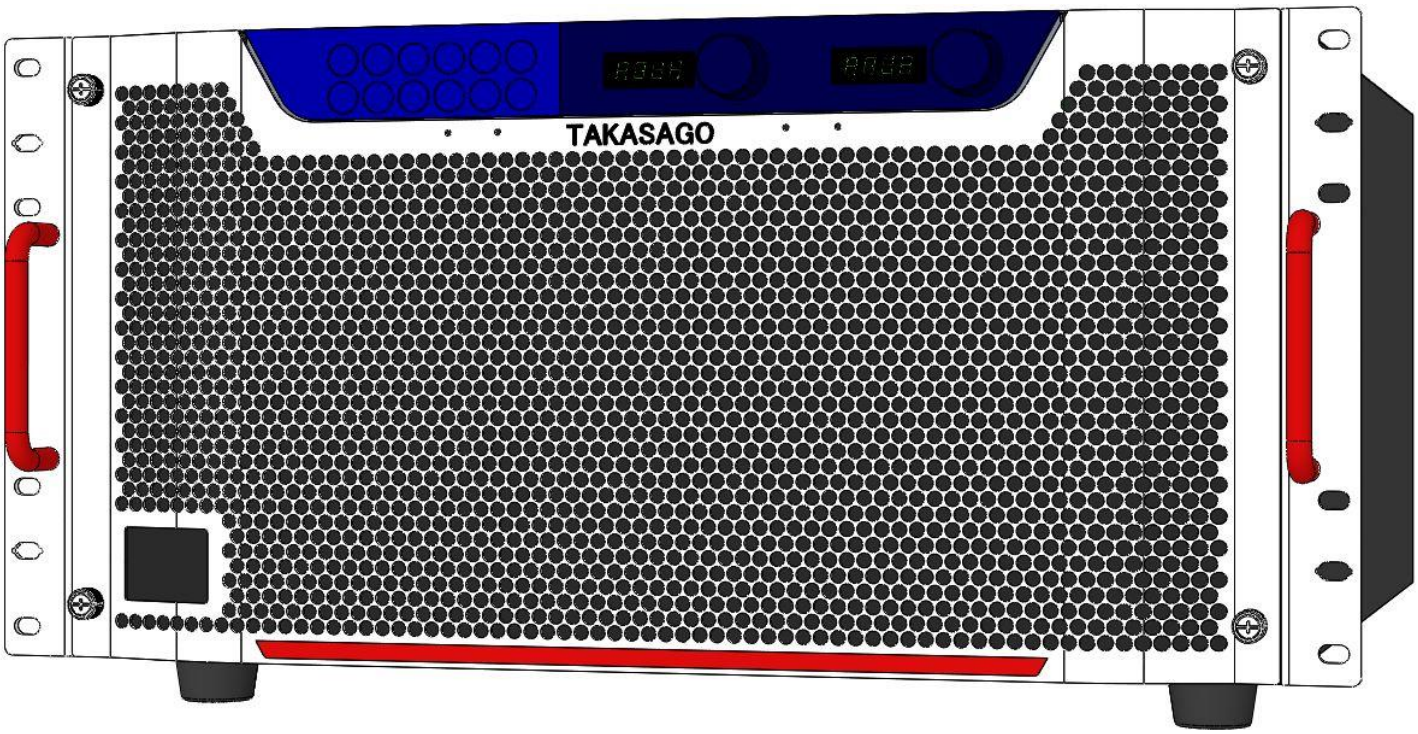

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Table of Contents

Table of Contents

Safety Instructions

This instruction manual uses the various symbols below to indicate areas of caution.
Please thoroughly read and understand these symbols and their significance prior to use.

The section “For your safety” contains information on items not included with your purchased product.

■ This manual uses the following marks and symbols to assist you in the proper use of this product.

DANGER	Failure to observe precautions indicated by this symbol and improper use or handling of the product will result in serious injury or death.
WARNING	Failure to observe precautions indicated by this symbol and improper use or handling of the product will result in serious injury or death.
CAUTION	Failure to observe precautions indicated by this symbol and improper use or handling of the product may result in injury or property damage.

■ Items that must be observed are classified into the following marks.

	This mark indicates items that are "Prohibited".
	This mark indicates items that are "Mandatory".
	This mark indicates general "Caution".

■ Symbols used within this manual are described below.

	Contact with areas on the product indicated by this symbol may result in electric shock.
	Unplug the power supply plug from the outlet. If ■ There is abnormal noise or smell ■ Smoke appears ■ Water or foreign objects has entered the product continual use of the product may cause fire or electric shock.
	Dismantling or modification to the product is prohibited. Do not open the cover. ■ This may result in fire or electric shock. ■ For repairs and adjustments please contact your retailer.
	Protective Earth Terminal. Please make a connection in earth.
	Please connect for loads with earth terminals

⚠ Caution

1. Reproduction of the material contained within this manual without notice is strictly prohibited.
2. Information contained within this manual may be altered without notification.
3. All material contained within this manual has been thoroughly examined. If by chance, any errors, suspicious items, or omissions are discovered, please contact Takasago.
4. Takasago Co., Ltd. shall undertake no responsibility, regardless of clause 2, for any impact this product may have on results.

For your safety

This product is a power supply system for business use, which uses an input power of AC180V~242V (three phase).
Please be forewarned that it is not produced as an electronic device for general home use.
Improper use of this product may result in injury, electric shock or death, and may also result in fire.
Please thoroughly read and understand this manual prior to use. Further, this product should only be handled by a specialist knowledgeable in electricity safety, or under the supervision of such a person.
Please read through this manual to ensure the proper placement and use environment for this product before turning on power.
If any problems arise, please unplug the power supply plug from the outlet power immediately and contact Takasago.
Two or more persons are required to carry the this equipment. Turn off the input power switch "POWER" and remove all cables from the main body beforehand. Hold the bottom surface during carrying.
Do not hold the handles on both sides. The handles are for rack mounting and not for carrying.

⚠ Caution

Using this product near receivers (radios, televisions, etc.) may interfere with reception.
Please do not use this product in any medical, nuclear, or work involving human life.

Exporting

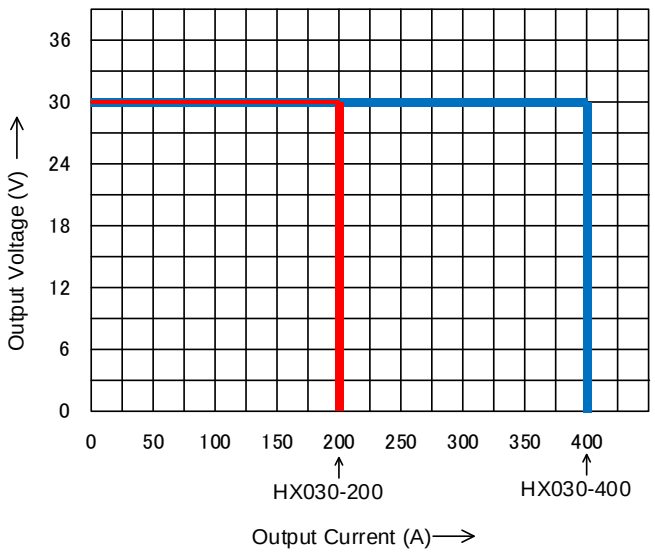
Please contact Takasago in advance if wishing to export or carry this product outside of Japan.

The HX-S-G4 Series is the Switching DC Constant Voltage/Constant Current Power Supply capable of changing from zero-volt and zero-ampere.

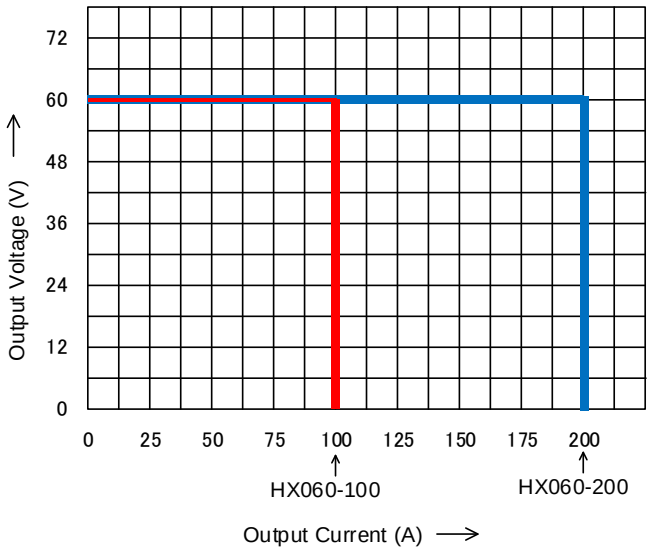
- The HX-S-G4 series allows the use of both the Constant Voltage and Constant Current modes, along with the ability to be able to freely set the power from zero to full scale.
- The HX-S-G4 series, with full digital control, also grants settings with superior accurate reproduction.

[Output Voltage/Current Range]

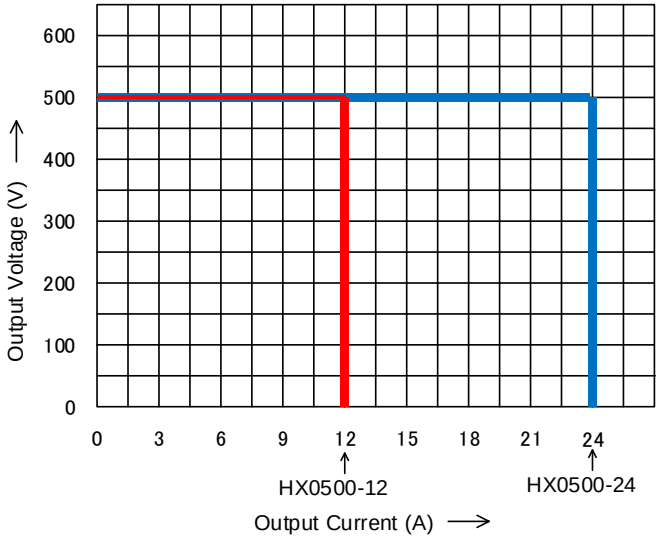
30V Output Type



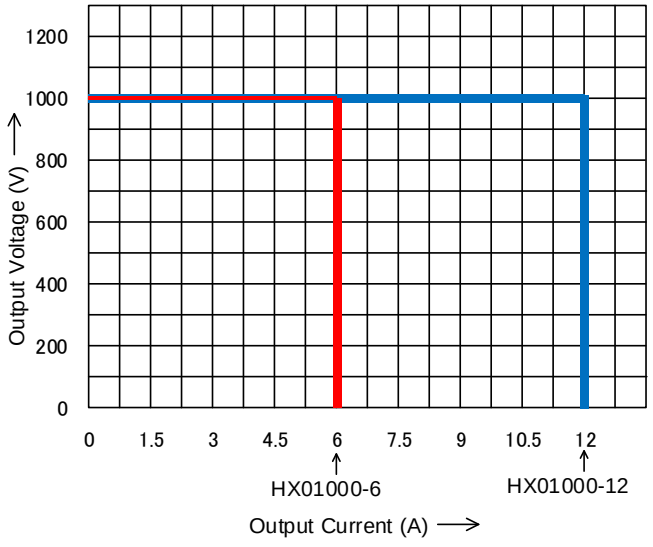
60V Output Type



500V Output Type



1000V Output Type



Features

✧ Improved Parallel Operation (New Master/Slave)

Up to 10 HX-S-G4 power supplies of the same voltage output type (maximum capacity 120 kW) can be operated in parallel.
Constant voltage transient recovery properties will not degrade, even when increasing the number of parallel units, due to the new master-slave method.

✧ Serial Communication Port Standardized System

Equipped with a multi-drop communication port, one RS-232C or RS-485 port is capable of controlling up to 31 units of supported models.

* Special cable (T485-****: * is the code that indicates length.)

Supported models (as of July, 2012)

ZX Series
FK II Series
HX II Series

✧ Useful Functions

☐ Memory

Saving and loading can be done for 3 sets of panel setting status. Tests such as voltage fluctuation test can be conducted by easy operation.

☐ Variable Slew Rate

Changes the slew rate for the rising and falling of the voltage/current.

☐ Startup Mode Selection

Equipped with a CC Priority Mode for loads with nonlinear V-I characteristics similar to diodes, this function is capable of preventing current overshoot when output is ON.

☐ Sequential ON/OFF

Sets the order outputs are toggled ON/OFF through a multi-connection cable.

✧ Protection Functions

Guards valuable loads and power supplies with Over Voltage Protection, Over Current Protection, Over Heating Protection, Excessive Input Current Protection, etc

✧ External Analog Control

Able to control ON-OFF output with external contact points, and voltages and currents based on external DC voltage (0~10V) and external resistance (0~∞ or 0~10kΩ)

* Full-scale and offset adjustments can be performed with the front panel dials.

✧ Analog Monitor

Outputs the output voltage and output current with 0~10V DC.

* Not suited for monitoring transient voltage/current waveforms.

✧ Status Alarm Output

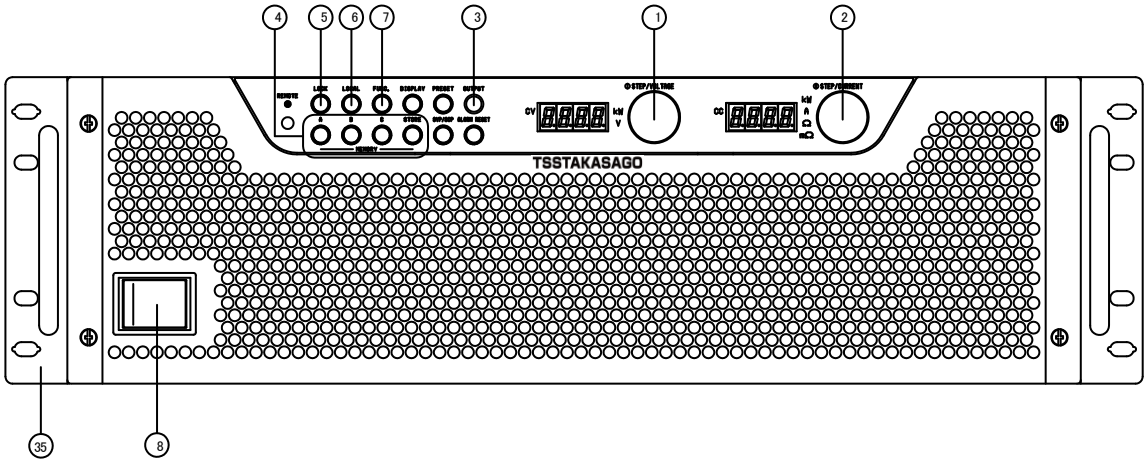
Outputs an alarm or operation status with a photocoupler output (open collector) insulated from outputs and the earth.

✧ Variable Internal Resistance

This function intentionally generates a voltage drop due to load current when running in Constant Voltage mode.
With this function, the power supply is capable of approximating an internal resistance of chemical batteries (during electric discharge) and I-V characteristics of solar/fuel cells.
* Restricted to direct current operations. Not suited for approximating transient effects.

Part Names and Functions

Front Panel (Comon to all models)



①. VOLTAGE

Voltage Setting/Selection Dial

Selects the voltage, the OVP, and various other parameters.
Press the dial to change the settings number place.

②. CURRENT

Current Setting/Selection Dial

Selects the current, the OCP, and various other parameters.
Press the dial to change the settings number place.

③. OUTPUT

Output ON/OFF Toggle Key

Toggles output ON/OFF.
The factory default setting for the output, after inserting power, is OFF.
Lights when the output is set to ON.

④. MEMORY

Memory Display/Settings Key

Saving and loading can be done for the panel setting status with keys "A", "B", and "C". Also, depending on the Function item setting, this can be used to select One-Action or Two-Action loading method.

⑤. LOCK

LOCK Key

Locks panel from use.
Lights when Lock has been enabled.
Below are the 3 types of Lock settings. They can be changed by each function setting key (FUNC.).

- Locks everything but the LOCK key
- Locks everything but the OUTPUT and LOCK key
- Locks only the Voltage/Current Dial, PRESET, and FUNC. keys.

⑥. LOCAL

LOCAL Key

Switches between “LOCAL”, operated from the panel, and “REMOTE”, operated by control via serial data communication.

⑦.FUNC.

Function Key

Used for setting various functions
Lights when Function settings are available.

⑧.POWER

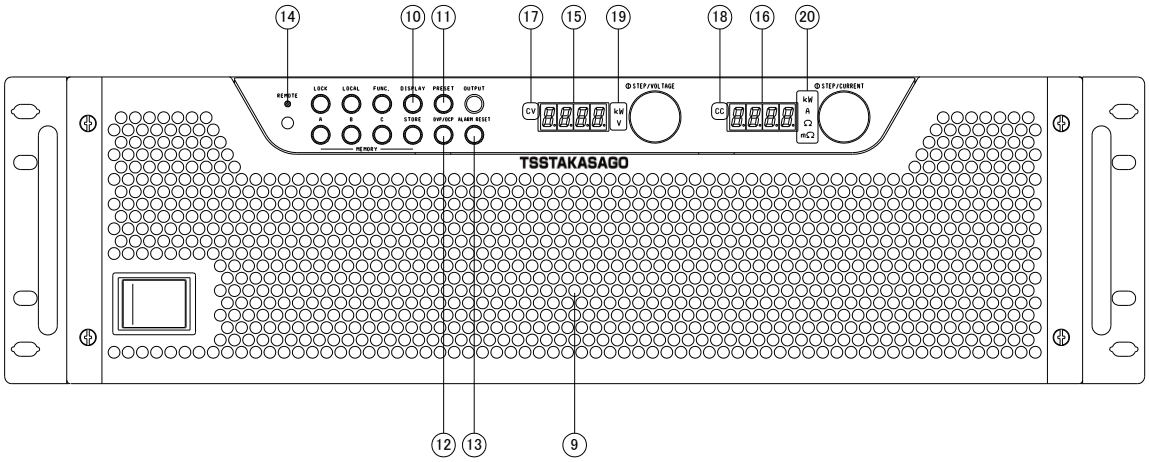
Input Power Switch

Toggles power ON/OFF

㉟. Handle for Rack Mounting

Handles are used for fixing this equipment to the rack.
Do not carry this equipment with these handles.

Front Panel (Comon to all models)



⑨.Ventilation Panels

Panels which allow cool air to enter and cool the product internally.

⑩.DISPLAY

Display Key

Toggles the displayed measurement information.
Can be toggled between 3 display modes: Voltage/Current, Voltage/Power, Power/Current.

⑪. PRESET

Preset Key

Used to set the output voltage and output current.
Lights when Preset settings are available.

⑫. OVP/OCP

Over Voltage Protection (OVP)/Over Current Protection (OCP) Key

Sets the trigger point for the OVP circuit and the OCP circuit.

⑬. ALARM RESET

Alarm Reset Key

Hold down for 1 second or more to cancel an alarm.

⑭. REMOTE

Remote Display Lamp

Lights when control has been transferred to an external computer, etc. being accessed via serial interface.

⑮. Number Display (Voltage)

Displays the output voltage and the output power. When setting functions with the Function key, the item number will be displayed.

⑯. Number Display (Current)

Displays the output current and the output power. When setting functions with the Function key, the parameter will be displayed.

⑰. CV

Constant Voltage Display Lamp

Lights when output is set to “ON” during constant voltage mode.

⑱. CC

Constant Current Display Lamp

Lights when output is set to “ON” during constant current mode.

⑲. kW, V

Measurement Unit Display Lamp

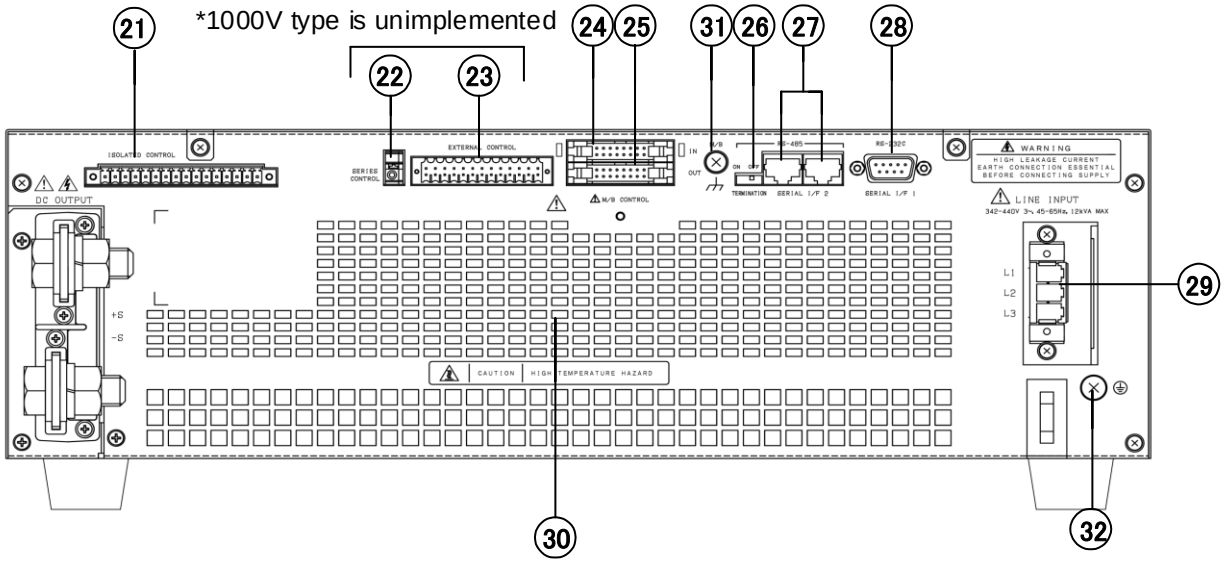
Lights when Number Display (voltage) displays a voltage/power value.

⑳. kW, A, Ω, mΩ

Measurement Unit Display Lamp

Lights when Number Display (current) displays a current/power value. Also, displays the unit of the corresponding resistance value when setting the Variable Internal Resistance function.

Rear Panel



㉑. ISOLATED CONTROL

Isolated Control Connector

This is the Status/Alarm Output Connector.
It is used for external analog control input of isolation type, analog monitor output, and contact input when the isolation analog option is mounted,
Use the included specialized connectors.

㉒. SERIES CONTROL

Series Operation Control Connector

Connector for series connections.
When using in the slave mode, connect with the Master unit's minus output terminal using wires.

㉓. EXTERNAL CONTROL

External Control Connector

Connectors for external analog control input and analog monitor output.
Use the included specialized connectors.

㉔. M/B CONTROL (IN)

Parallel Operation Control (Input) Connector

Control Signal Input Connector for parallel operations.

㉕. M/B CONTROL (OUT)

Parallel Operation Control (Output) Connector

Control Signal Output Connector for parallel operations.

WARNING

Mandatory

As for parallel connection cables, be sure to use the special cable (HXPH-****:*specifies the length).

㉖. TERMINATION

Termination Resistor ON/OFF Switch

When controlling one unit of this product via serial port, please set the termination toggle switch to ON.
When using 2 or more power supplies, please set the first and last units' termination resistor ON/OFF switch to ON (set other units' ones to OFF).

㉗. SERIAL I/F 2

Serial Port/Multi-Channel Connectors

Connectors for when controlling multiple HX-S-G4 Series units or for controlling RS-485 type, serial ports.
Connected with special cable. (T485-****: * is the code that indicates length.)

㉘. SERIAL I/F 1

Serial Port Connector

Connector for connecting computers etc. with serial cables (RS-232C).

㉙. LINE INPUT

Input Terminal Platform

This is the terminal platform that connects the power of this product

㉚. Ventilation Discharge Opening

Ventilation discharge opening for cooling the product internally.

㉛. M/B FG

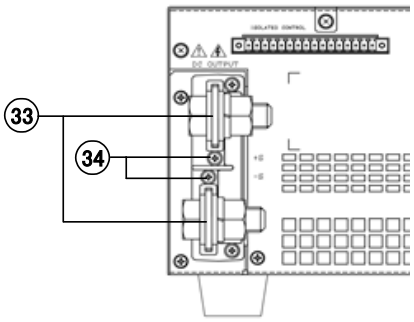
FG terminal for parallel connection cable

This is the terminal for connecting the FG of parallel connection cable.

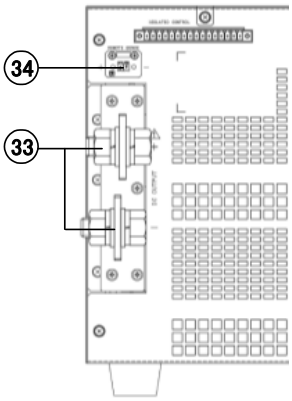
㉜. PROTECTIVE EARTH TERMINAL (M5)

Rear Panel (Each model individual part)

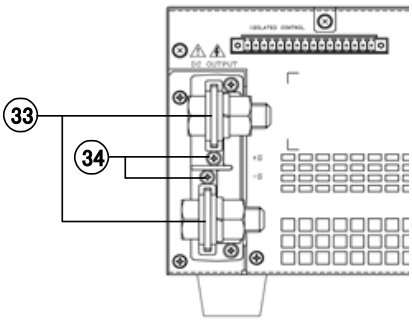
HX030-200



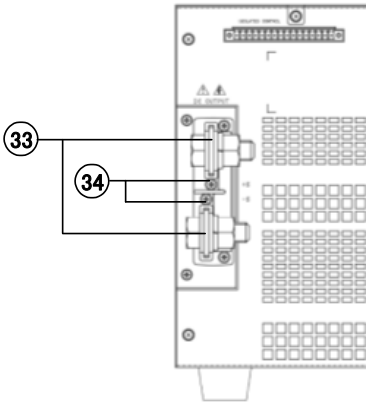
HX030-400



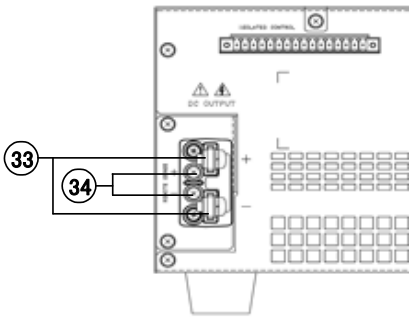
HX060-100



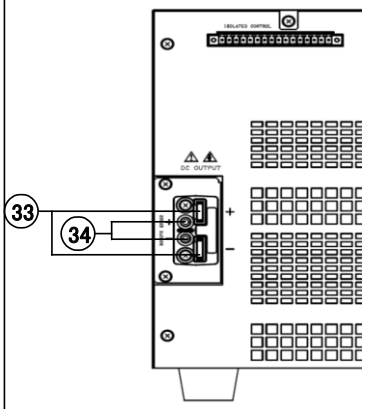
HX060-200



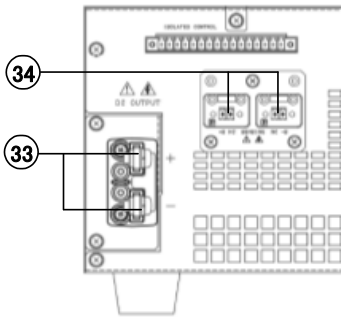
HX0500-12



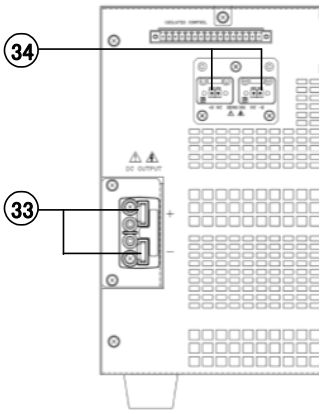
HX0500-24



HX01000-6



HX01000-12



CAUTION

Mandatory

A Crimp-Style Terminal must be used. Please be sure to tighten all attachment screws.
After connecting, attach the output terminal cover before use.

㉝. DC OUTPUT terminal

Always use crimp terminals, please firmly tighten the screws.
Please Once connected sure to attach the output terminal cover.

㉞. REMOTE SENSE terminal

Remote sensing terminal or connector.

Unpacking

Please check the following accessories are included when unpacking.
Please confirm there is no scratches or dents on the power supply and accessories.

No.	Name	The Number Included	HX-S-G4 Series								Remarks
			30 -200	30 -400	60 -100	60 -200	500 -12	500 -24	1000 -6	1000 -12	
1	Input Connector	1	○	○	○	○	○	○	○	○	
2	Dummy Connector	2	○	○	○	○	○	○	○	○	They are attached to the M/B CONTROLs such as ㉔ and ㉕ on the rear panel at the time of shipment.
3	Isolated Control Connector	1	○	○	○	○	○	○	○	○	It is attached to the ㉑ ISOLATED CONTROL on the rear panel at the time of shipment.
4	External Control Connector	1	○	○	○	○	○	○	×	×	It is attached to the ㉓ EXTERNAL CONTROL on the rear panel at the time of shipment.
5	Instruction Basic Manual	1	○	○	○	○	○	○	○	○	
6	Basic Instruction Manual (CD-ROM)	1	○	○	○	○	○	○	○	○	
7	Sequential Operation Setting Software (CD-ROM)	1	○	○	○	○	○	○	○	○	
8	Output Terminal Connection Bolts (for 30V and 60V type)	2 sets	○	○	○	○	×	×	×	×	The following are attached to the ㉝ DC OUTPUT terminal on the rear panel at the time of shipment. - A M12 x 30mm bolt - Two M12 flat-washes - A M12 spring-washer - A M12 nut
9	Output Terminal Connection Screws (for 500V and 1000V type)	2	×	×	×	×	○	○	○	○	M5 x 12mm screws are attached to the ㉝ DC OUTPUT terminal on the rear panel at the time of shipment.
10	Output Terminal Cover (for 30-200 and 60V type)	1 set	○	×	○	○	×	×	×	×	- Two same-shape Output Terminal Covers - A support for mounting cover - Two M3 x 6mm screws
11	Output Terminal Cover (for 30-400)	1 set	×	○	×	×	×	×	×	×	- Output Terminal Cover (4-split) - Six M3 x 6mm screws
12	Output Terminal Cover (for 500V and 1000V type)	1 set	×	×	×	×	○	○	○	○	- Two same-shape Output Terminal Covers - A support for mounting cover - Two M3 x 6mm screws
13	Output Terminal Protection Tube (for 30-200 and 60V type)	2	○	×	○	○	×	×	×	×	
14	Output Terminal Protection Tube (for 30-400)	2	×	○	×	×	×	×	×	×	
15	Wire bands for fixing Output Terminal Protection Tube	4	○	○	○	○	×	×	×	×	
16	Parallel Connection Terminal Cover	1 set	×	×	○	○	○	○	○	○	It is attached to the rear panel at the time of shipment
17	Remote Sensing Connector (30-400)	1	×	○	×	×	×	×	×	×	It is attached to the ㉞ remote sensing terminal at the time of shipment.
18	Remote Sensing Connector (for 1000V type)	2	×	×	×	×	×	×	○	○	It is attached to the ㉞ remote sensing terminal at the time of shipment.
19	Remote Sensing Connector Cover (for 1000V type)	1	×	×	×	×	×	×	○	○	It is attached to the ㉞ remote sensing terminal at the time of shipment.
20	Wire bands for fixing Remote Sensing cable	1	×	×	×	×	×	×	○	○	It is a wire band for fixing the cable for remote sensing to avoid any disconnection.

Note) "○" represents the accessories are included while "×" means not-included.
Please check the all accessories in the list is included.

Placement

To ensure proper and safe use of this product, please observe the following.

WARNING

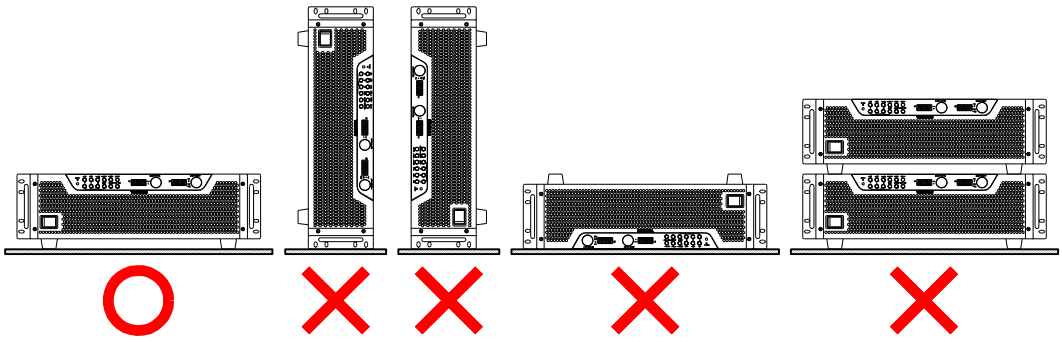
Prohibited — Do not use in areas exposed to rain and water.

Prohibited — Do not place in areas in which flammable gases are present.

Prohibited — Do not insert any metallic pins, wires, screws, etc. in the front ventilation panels and in the rear fan motor. Doing so may result in electric shock and/or fire.

CAUTION

Prohibited — This product was designed to be used in stable areas. Do not use or place in areas prone to vibration.
Improper placement of the power supply may result in damage. Please see below for proper placement.
How to place:



CAUTION

Mandatory — Use only in areas with a room temperature of 0~50℃, humidity of 20~90%RH, and which is absent of any corrosive gases.

Prohibited — This power supply uses a forced air cooling system. Do not obstruct the front ventilation panels and rear ventilation discharge opening. If affixing to a rack, attach ventilation panels or others to the rear of the rack to prevent exhaust from staying inside the rack.
Do not close the front of switch to operate the input power switch "POWER" easily.

Mandatory — If using in environment where electric conductive contamination occurs, considerations needs to be taken such as intaking air using duct.

Caution — Using this product near receivers (radios, televisions, etc.) may interfere with reception.

Connecting the Power Supply

This product operates on a 342V to 440V and 45Hz to 65Hz three-phase AC power supply.
To ensure proper and safe use of this product, please observe the following.

DANGER

Mandatory

Verify that the input power supply (power supply AC 342V to 440V) is turned off when wiring input terminals.

Mandatory

A noise filter is built into the device to prevent EMI (Electromagnetic Interference).
Due to this, even the slightest amount of leaked current may result in electric shock if not properly grounded.
For safety reasons, please ground the device.

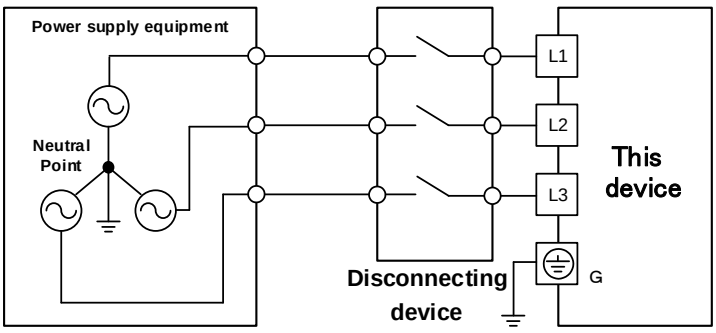
CAUTION

Mandatory

Please use input power within ranges of 342V to 440V and 45Hz to 65Hz (three-phase).
The nominal power supply voltage is displayed near the rear input connector platform.

Mandatory

Since it becomes a cause of failure, please do not use it with the electric supply source line in which each voltage between phase groundings (Between L1-G, Between L2-G, and Between L3-G) is higher than AC254V.
Three-phase three-wire system is not available. Please use three-phase four-wire system.
Set circuit breaker between feeding device and this equipment.
Connect the circuit breaker to the feeding device and the equipment.
The input power switch of the equipment is not used for cutting power from AC line completely.
The breaker should be compliant with IEC60947-1 and IEC60947-3.
The breaker should be installed the position where the equipment can reach easily.
The breaker should be exclusive use of this equipment.
Indicate that the device is used for cutting power from AC line
and Function (ON [|], OFF[○].



Please ground the neutral point.

Mandatory

Please connect maximum power consumption to a possible power supply.

Mandatory

For wiring to the connector platform, be sure to connect it tightly.
Fastening loosely may cause heating and burnout of the connector platform.

Mandatory

The cross-section area of the wiring material should be sufficient against load current.
Please refer to the Appendix 4 "Loaded Current vs Recommended Conductor Area" (page214) when you select the wiring material.
Maximum Input Current is displayed near the input terminals at rear side.

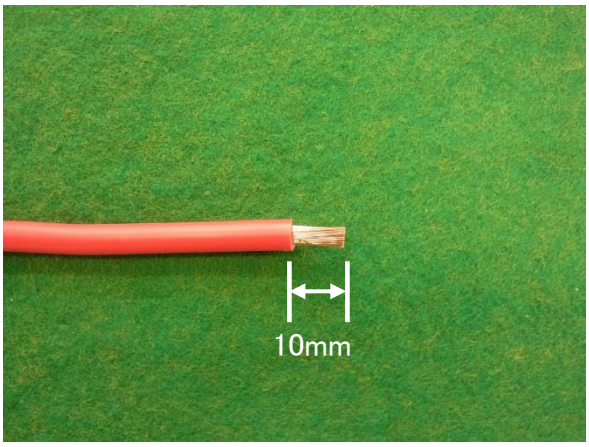
Connecting the Input power source

Mandatory

Please ground wire using more than the cross-sectional area of the following.

・HX030-200,HX060-100,HX0500-12,HX01000-6： 3mm^2(AWG12)more
・HX030-400,HX060-200,HX0500-24,HX01000-12： 8mm^2(AWG8)more

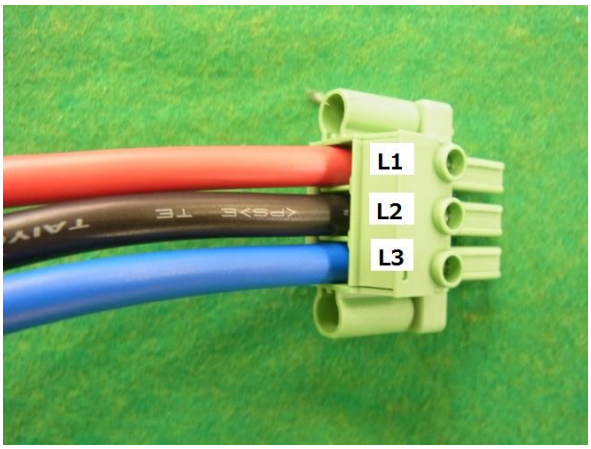
① It peeled the wire as the conductor comes out 10 mm.



② Insert the wire into the connector.

③ Secure the cable to tighten at screw tightening torque 0.5-0.6Nm.

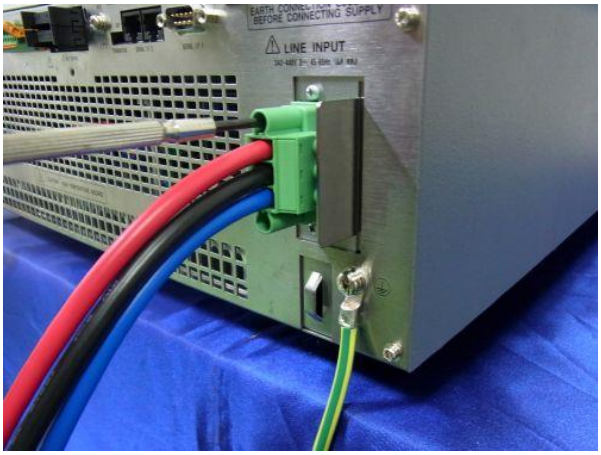
④ Other wire likewise plug into the connector.And secure it by tightening the screws.



⑤ Connect the cable for the ground to protective ground terminal on the rear

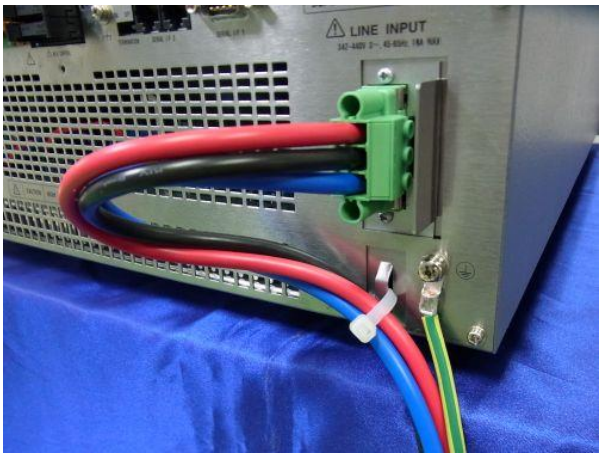
⑥ Firmly insert the connector that was wired in ④ to LINE INPUT connector.

⑦ Secure it by tightening the top and bottom two places screws so that it is not missing is inserted connector. (Photo is Fixed under the screws)



⑧ Secure it by tightening the top and bottom two places screws so that it is not missing is inserted connector. (Photo is Fixed under the screws)

⑨ Secure with tie wraps so that the load of the cable is not applied to the input connector.



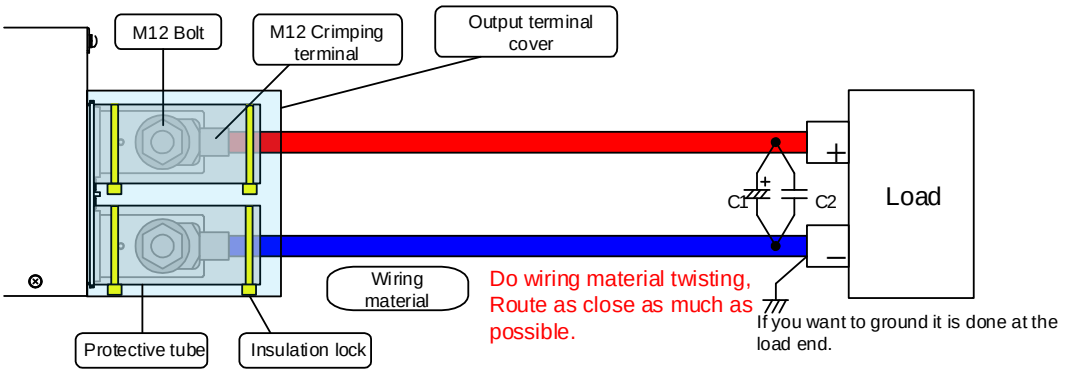
CAUTION

When the cables are removed, please turn off the input power switch (POWER) and remove the input cable after the confirmation of no power supply from the feeding device.
Then remove grounding cable in the end.

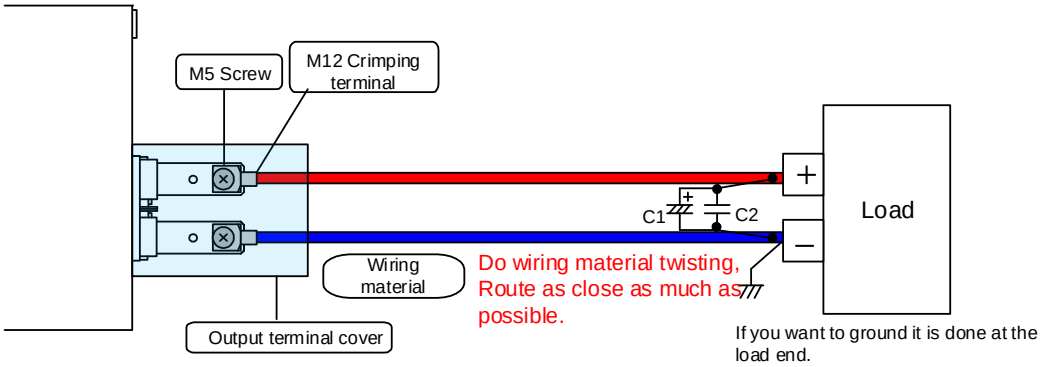
Connecting Loads

Wiring material to the output terminal by attaching a crimp terminals in the figure below specified, please firmly tighten the bolt / screw which is included.

30V/60V Type

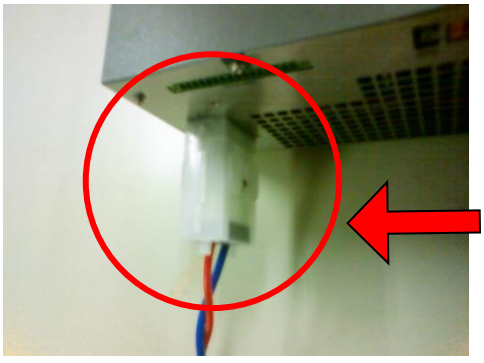


500V/1000V Type



MEMO

- Twisting wires can minimize the ripple and noise at the load terminal.
- The noise level can be lowered to be smaller than the standard value by connecting the C1 and C2 close to the load terminal.
  Use C1 and C2 that are small and with high-frequency impedance, and connect the lead wire cutting it as short as possible.
  C1: Electrolytic Capacitor 100 to 1000 µF
  C2: Film Capacitor 1 to 10 µF



Mandatory

After wiring, be sure to set the attached output terminal cover.

Output Terminal Cover
(Photo is HX-S-0500-12G4)

DANGER

Mandatory

Verify that the main power supply for the power supply is turned off when connecting loads.

Prohibited

Do not wire loads when voltage is being outputted from the power supply.

CAUTION

Mandatory

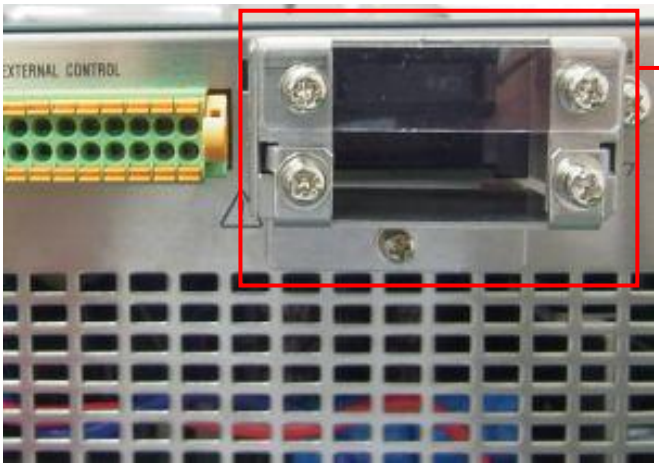
Use wires with sufficient cross section areas for load currents.
For selecting wires, refer to Appendix 4 "Load Current vs Recommended Cross Section Area" (page214).

Mandatory

Attach crimp-style terminals to wires and securely fasten.
If insecurely fastened, wires may become deformed or burn out due to the generated heat at connection points.

Mandatory

Please to use it always attached parallel connection terminal cover (already factory attached).



Parallel connection terminal cover

* 30V type has not been attached.

Attaching the Output Terminal Cover

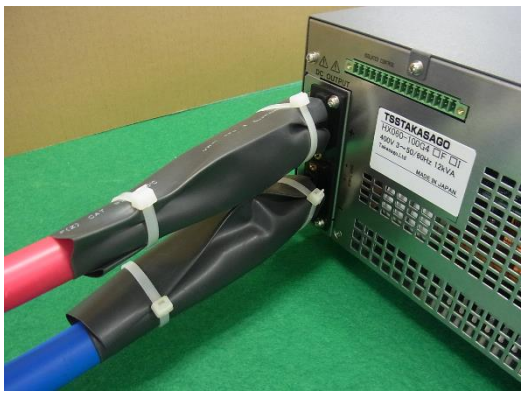
■ HX030-200/HX060-100/HX060-200

1.Attach a supporter for attaching cover on one output terminal cover (both covers are identical in shape).

*. Insert the supporter for attaching into the center part of the inside of the output terminal cover and fix it in place by screwing an M3x6mm from outside.

2.Connect the cable to the output terminal by M12x30mm bolt nut.

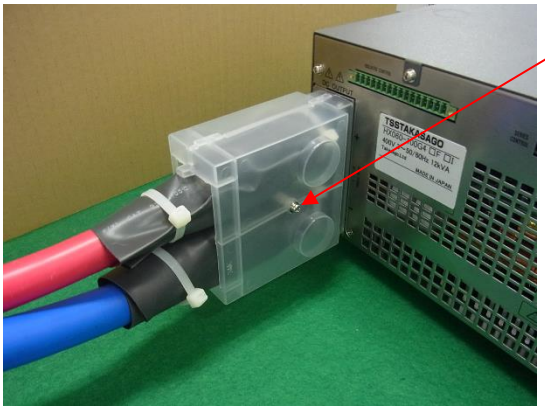
3. Put a “Output Terminal Protection Tube” to the output cable and output terminal.
And the “Output Terminal Protection Tube” fix with Insulation lock.



4. Fix the output terminal cover to which the supporter for attaching cover has been attached on the left-side grooves of the output terminal.

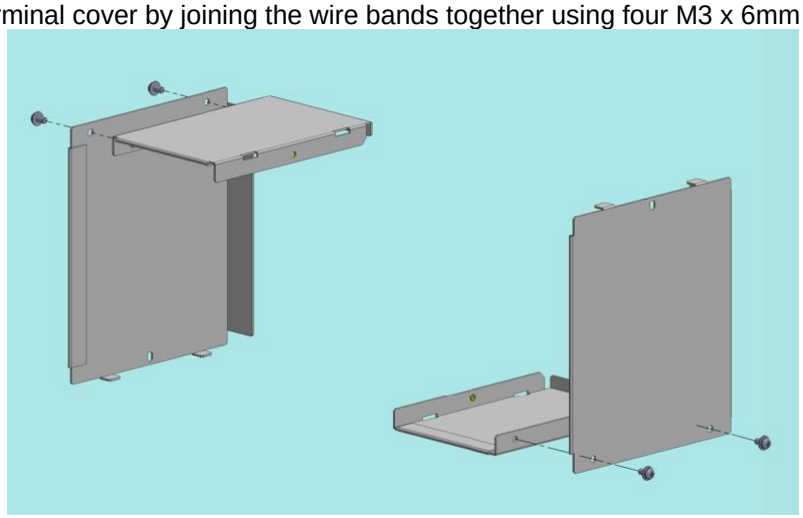
5. Fix the other output terminal cover on the right-side grooves of the output terminal.

6. Fasten the output terminal covers with an M3X6mm screw.
   Attaching the output terminal cover is completed.

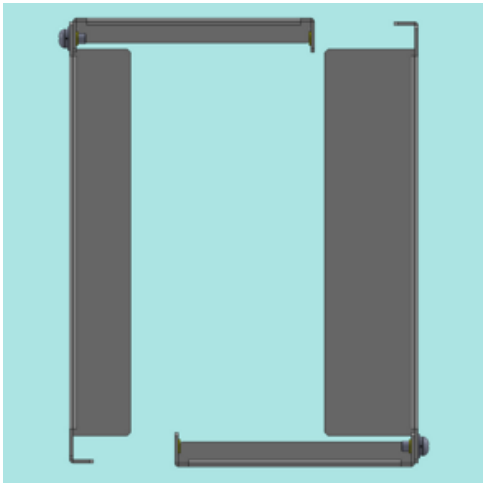


■ HX030-400

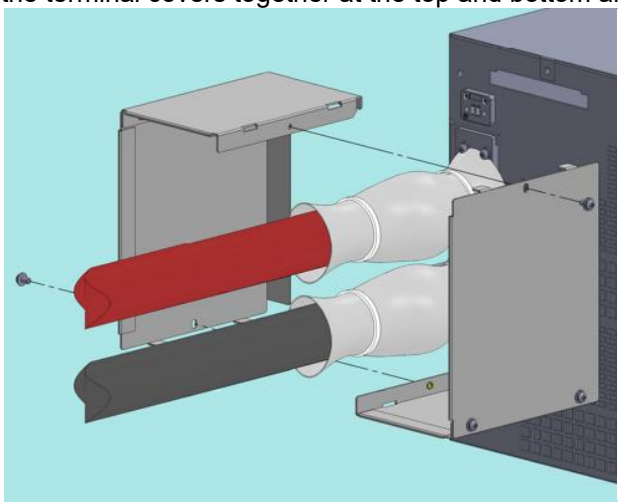
1. Prepare the output terminal cover by joining the wire bands together using four M3 x 6mm screws.

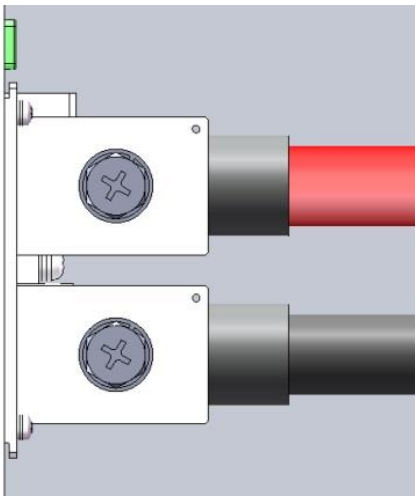


2. The upper and lower output terminal cover can be checked from the front of the cover. Please refer to the following.

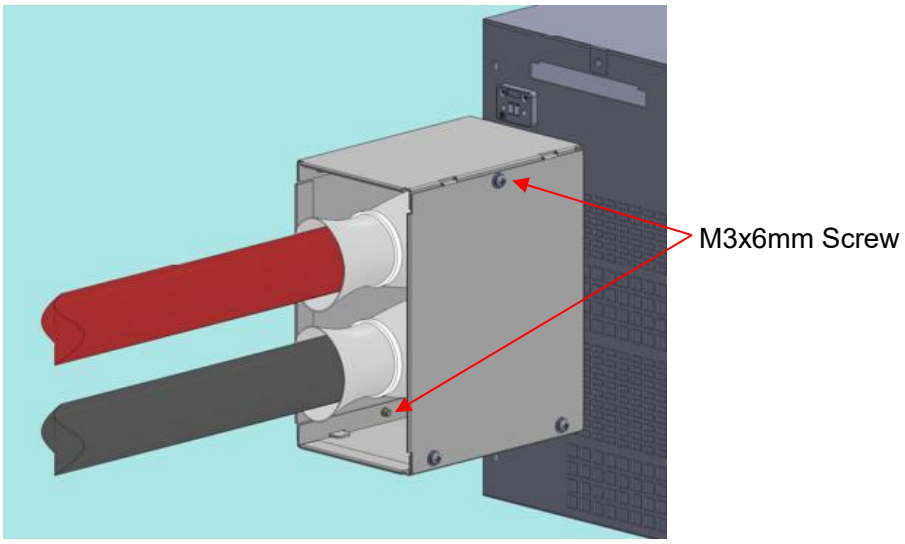


3. Snap the terminal covers together at the top and bottom along the groove on the terminal.



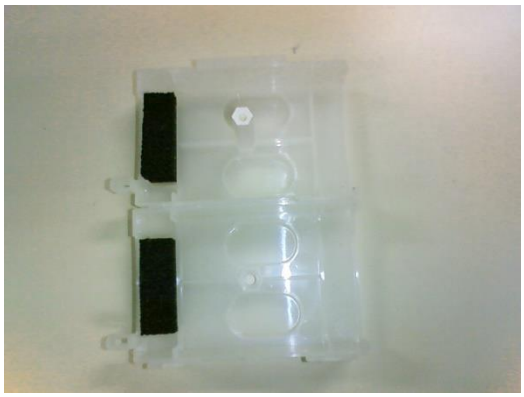


4. To finish the installation, use the 2 M3 x 6mm screws to fix the top and bottom terminal covers together.



■ HX0500-12/HX0500-24/HX01000-6/HX01000-12

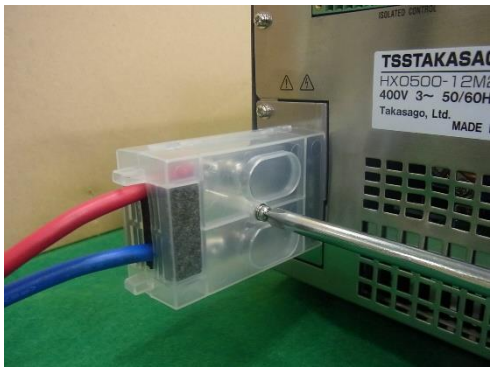
1. Attach a supporter for attaching cover on one output terminal cover (both covers are identical in shape).
   *. Insert the supporter for attaching into the center part of the inside of the output terminal cover and fix it in place by screwing an M3x6mm from outside.



2. Fix the output terminal cover to which the supporter for attaching cover has been attached on the left-side grooves of the output terminal.

3. Fix the other output terminal cover on the right-side grooves of the output terminal.

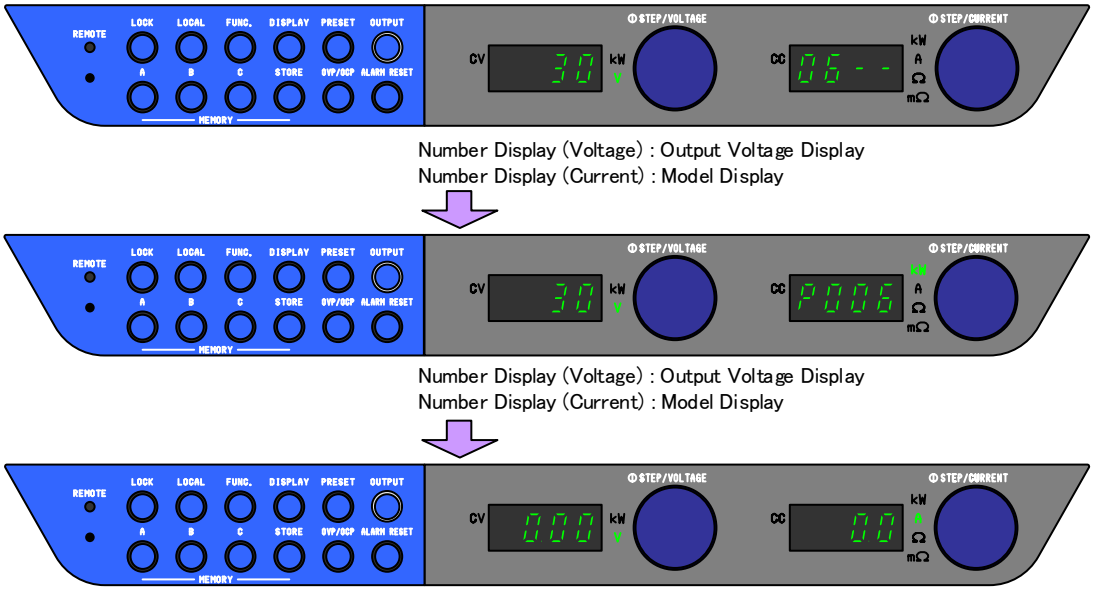
4. Fasten the output terminal covers with an M3X6mm screw.



5. Attaching the output terminal cover is completed.

Startup Display

Once power is turned on (POWER switch pushed to ON), the output voltage will be displayed in the Number Display (voltage) and the model name and the total output capacity (in kW) will be displayed in the Number Display (current).



* The above is the display cases (HX-S-030-200G4)

If the total output capacity differs from that of the previous startup due to changes of parallel connection configuration, the error code “E011” will be displayed on the Number Display (voltage) and the current total output capacity will appear blinking on the Number Display (current).
After confirming the total output capacity, if you hold down the “FUNC.” key for more than 2 seconds to approve the current total output capacity, it returns to the measurement display mode.

MEMO

Models

- HX-S-030-200G4/HX-S-060-100G4/HX-S-0500-12G4/HX-S-01000-6G4: 06--
- HX-S-030-400G4/HX-S-060-200G4/HX-S-0500-24G4/HX-S-01000-12G4: 12--
- HX-S-030-200G4F/HX-S-060-100G4F/HX-S-0500-12G4F/HX-S-01000-6G4F: 06F-
- HX-S-030-400G4F/HX-S-060-200G4F/HX-S-0500-24G4F/HX-S-01000-12G4F: 12F-
- HX-S-030-200G4I/HX-S-060-100G4I/HX-S-0500-12G4I/HX-S-01000-6G4I: 06-I
- HX-S-030-400G4I/HX-S-060-200G4I/HX-S-0500-24G4I/HX-S-01000-12G4I: 12-I
- HX-S-030-200G4FI/HX-S-060-100G4FI/HX-S-0500-12G4FI/HX-S-01000-6G4FI: 06FI
- HX-S-030-400G4FI/HX-S-060-200G4FI/HX-S-0500-24G4FI/HX-S-01000-12G4FI: 12FI

Default Settings

Factory settings and settings after initialization are as follows:

30V/60V Type

Settings Item	HX030-200	HX030-400	HX060-100	HX060-200
Constant Voltage Set Value	0.00V	0.00V	0.00V	0.00V
Constant Current Set Value	210.0A	420.0A	105.0A	210.0A
Over Voltage Protection (OVP) Set Value	33.00V	33.00V	66.00V	66.00V
Over Current Protection (OCP)	220.0A	440.0A	110.0A	220.0A
Settings Values in Memory A,B,C	Same with the above CV set values, CC set values, OVP set values, OCP set values			
Function Settings	See page 33 on Default Values for Function Settings (excluding section 20~38 Calibration Values)			

500V/1000V Type

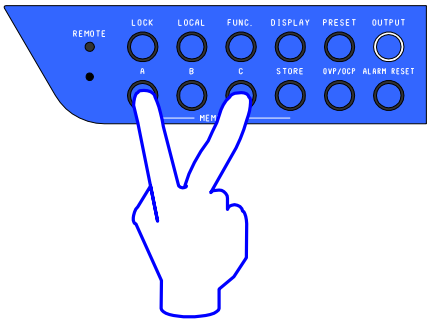
Settings Item	HX0500-12	HX0500-24	HX01000-6	HX01000-12
Constant Voltage Set Value	0.0V	0.0V	0.0V	0.0V
Constant Current Set Value	12.60A	25.20A	6.300A	12.60A
Over Voltage Protection (OVP) Set Value	550.0V	550.0V	1100V	1100V
Over Current Protection (OCP)	13.20A	26.40A	6.600A	13.20A
Settings Values in Memory A,B,C	Same with the above CV set values, CC set values, OVP set values, OCP set values			
Function Settings	See page 33 on Default Values for Function Settings (excluding section 20~38 Calibration Values)			

Returning Factory Settings

All power supply settings can be initialized.

Step 1: Turn the POWER switch ON while holding down the MEMORY keys “A” and “C”.
Step 2: Release the keys “A” and “C” once the Number Display lights up.

Each setting returns to the factory setting.

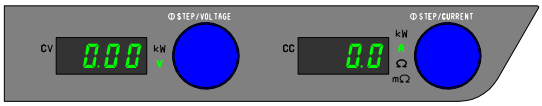


Backing-Up Settings

This power supply saves all settings in non-volatile memory (EEPROM) just before the POWER switch is turned off or immediately before power is cut off.
All previous settings will remain the same when power is turned on again.
* No batteries are used. There is no need to replace batteries.

Operating as Constant Voltage Power Supply

Please verify that the settings for Over Voltage Protection (OVP) circuit (page 40) and Over Current Protection (OCP) circuit (page 42) are in effect.



Turn the POWER switch ON to startup the power supply.

The voltage measurement value will be displayed in the Number Display (voltage) and the current measurement value will be displayed in the Number Display (current). The lamp “V” and “A” will light.
(If parameters for FUNCTION settings item 52 is set to 1, PRESET value will be displayed)

MEMO

When POWER is turned OFF for the top or bottom Number Display, the Number Display will be displayed in the same manner when POWER is turned on again.
* The "kW" lamp will light when the power is displayed.

Press the PRESET key

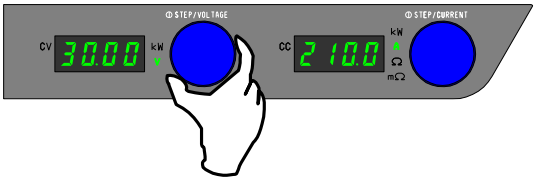
PRESET lamp will light.
Press the PRESET key again if you wish to discontinue and return to the measurement display mode.
The voltage PRESET value will be displayed in the Number Display (voltage) and the current limit PRESET value will be displayed in the Number Display (current).

Turn the VOLTAGE dial to adjust the Constant Voltage Set Value

(Turn the dial right to raise or left to lower the set value.)

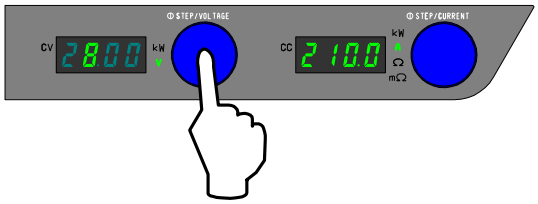
MEMO

Press the VOLTAGE dial to display the current number position. The selected number will be brightened. Press to change position.
If all 4 places are brightened, numbers will change from the lowest place.



If the parameter for FUNCTION item 50 is set to 0, press the PRESET key again. The output voltage will be updated once the PRESET mode has been exited.

If the parameter for FUNCTION item 50 is set to 1, promptly change the set value using the VOLTAGE dial.



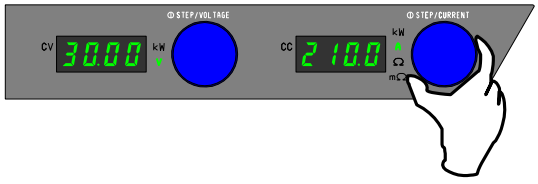
* The above is the display cases (HX030-200G4)。

Turn the CURRENT dial to adjust the Current Limit Value

Set a value greater than the required load current.
(Turn the dial right to raise or left to lower the set value.)

MEMO

If the current limit value is set to a value lower than the required load current, the current will be restricted and the constant current will be used. (CC lamp lights)



* The above is the display cases (HX-S-030-200G4)。

⇒Continued on next page

Press the PRESET key to finalize settings.

Confirms PRESET settings and returns to the measurement display mode.

Press the OUTPUT key.

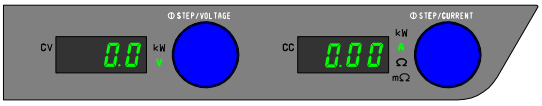
Outputs with the set settings. The OUTPUT and CV lamps will light.

MEMO

While the PRESET lamp is lit, all other keys not mentioned in the above setting procedures cannot be used. (The OUTPUT key is valid.)

Operating as Constant Current Power Supply

Please verify that the settings for Over Voltage Protection (OVP) circuit (page 40) and Over Current Protection (OCP) circuit (page 42) are in effect.



Turn the POWER switch ON to startup the power supply.

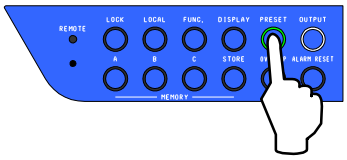
The voltage measurement value will be displayed in the Number Display (voltage) and the current measurement value will be displayed in the Number Display (current). The lamp “V” and “A” will light.
(If parameters for FUNCTION settings item 52 is set to 1, PRESET value will be displayed)

MEMO

When POWER is turned OFF for the top or bottom Number Display, the Number Display will be displayed in the same manner when POWER is turned on again.
* The "kW" lamp will light when the power is displayed.

Press the PRESET key

PRESET lamp will light.
Press the PRESET key again if you wish to discontinue and return to the measurement display mode.
The voltage limit PRESET value will be displayed in the Number Display (voltage), and the current PRESET value will be displayed in the Number Display (current).

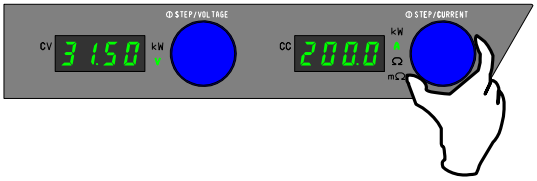


Turn the CURRENT dial to adjust the Constant Current Set Value.

(Turn the dial right to raise or left to lower the set value.)

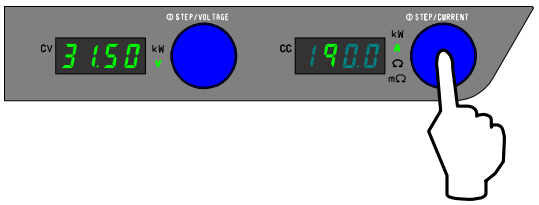
MEMO

Press the CURRENT dial to display the current number position. The selected number will be brightened. Press to change position.
If all 4 places are brightened, numbers will change from the lowest place.



If the parameter for FUNCTION item 50 is set to 0, press the PRESET key again. The output current will be updated once the PRESET mode has been exited.

If the parameter for FUNCTION item 50 is set to 1, promptly change the set value using the CURRENT dial.



* The above is the display cases (HX-S-030-200G4)。

Turn the VOLTAGE dial to adjust the Voltage Limit Value

(Turn the dial right to raise or left to lower the set value.)

MEMO

If the voltage limit value is set to a value lower than the required load voltage, the voltage will be restricted and the constant voltage will be used. (CV lamp lights)

* The above is the display cases (HX-S-030-200G4)。

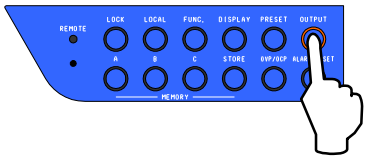
⇒Continued on next page

Press the PRESET key to finalize settings.

Confirms PRESET settings and returns to the measurement display.

Press the OUTPUT key.

Outputs with the set settings. The "OUTPUT" and the “CC” lamp will light.

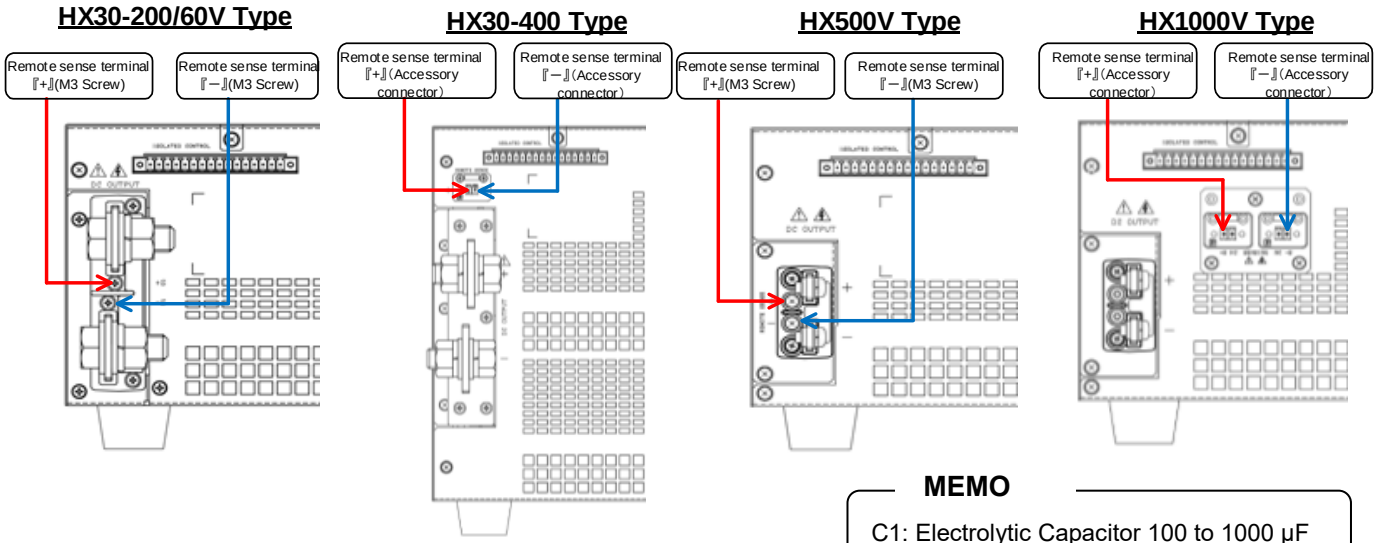


MEMO

While the "PRESET" lamp is lit, all other keys not mentioned in the above setting procedures cannot be used. (The OUTPUT key is valid.)

Remote Sensing

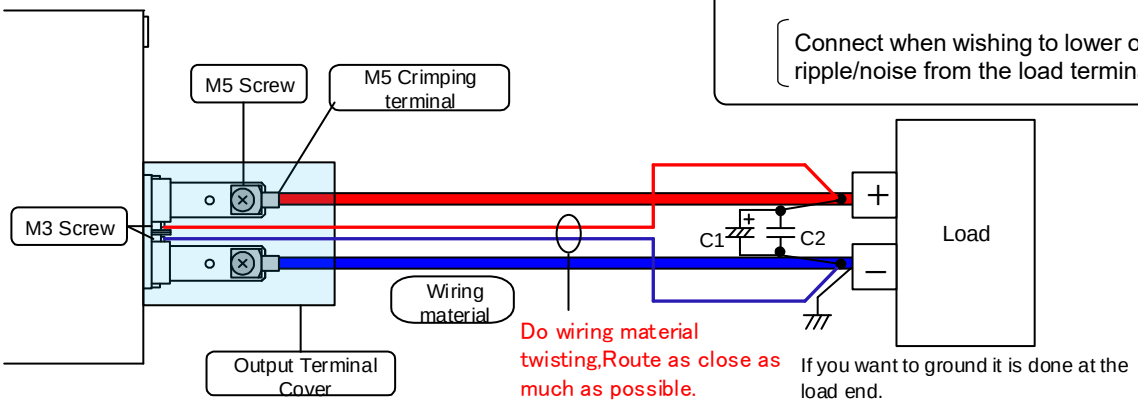
Remote sensing is used for solving problems with voltage drop between the output terminal and load due to wiring by compensating for the voltage drop. Remote sensing is able to compensate voltages up to 5V per direction (one-way).
Wire as shown in the diagram below.
* Crimping terminal to connect to a remote sense terminal, please use the crimp terminal with an isolation coating.



MEMO

C1: Electrolytic Capacitor 100 to 1000 μF
(Low Impedance Item)
C2: Film Capacitor 1 to 10 μF

Connect when wishing to lower output ripple/noise from the load terminal.



* The figure above is an example of connecting HX-S-0500-12G4.

DANGER

Turn POWER switch OFF before wiring to the output terminal.

CAUTION

- While using remote sensing, do not switch output lines using switches, etc.
  Doing so may lead to damaging the power supply..
- Because the output terminal's voltage is detected by the OVP circuit, please set the voltage value of the OVP to include the voltage drop amount (round trip) of the wires outputting the voltage you wish to protect.

Function Settings

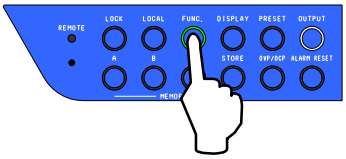
This section covers setting parameters for various functions. Parameters that can be set are the device address, bitrate, parity, Output ON/OFF Toggle at external contact, selection of external analog control, OUTPUT settings when POWER is ON, voltmeter and ammeter display when OUTPUT is OFF, etc.
For details, see the FUNCTION Settings Items List. (page 33).

Setting Functions

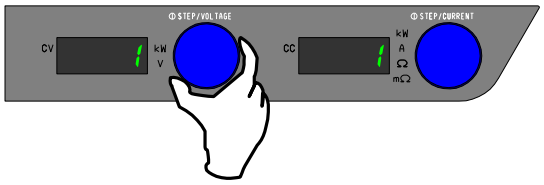
Setting Procedures

Press The Function “FUNC.” key.

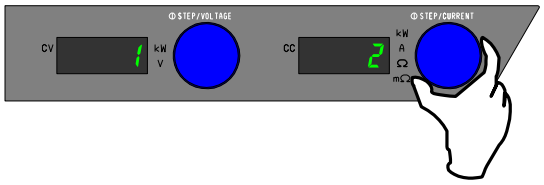
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select the Item Number with the VOLTAGE dial.

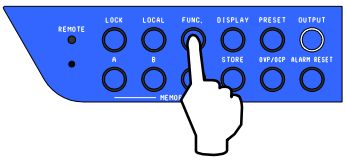


Change the Parameter with the CURRENT dial.



Press the FUNC. key again to finalize settings.

The Number Display (voltage) and the Number Display (current) will return to the measurement display mode.
It is possible to continue to change other setting items without pressing the FUNC. key.
In this case, press the FUNC. key to confirm settings once changes are finished.



Function Settings Items List

General Functions

Item No.		Settings Item	Range and contents of Parameter	Default Value
0	General Functions	Firmware Version	Ex: 1.00 (Cannot be changed)	
1		Startup Mode Selection	0=CV Priority (High Speed) 1=CV Priority (Medium Speed) 2=CV Priority (Low Speed) 3=CV Slew Rate 4=CC Priority (High Speed) 5=CC Priority (Medium Speed) 6=CC Priority (Low Speed) 7=CC Slew Rate	2=CV Priority (Low Speed) * This function can be set for full-featured type "model name with F" only
2		CV Slew Rate Rising	30V Type：0.01V/S-60.00V/S 60V Type：0.1V/S-120.0V/S 500V Type：1V/S-1000V/S 1000V Type：1V/S-2000V/S	Maximum of parameter range * This function can be set for full-featured type "model name with F" only
3		CV Slew Rate Falling		
4		CC Slew Rate Rising	HX030-200：0.1V/S-400.0A/S HX030-400：0.1V/S-800.0A/S HX060-100：0.1V/S-200.0A/S HX060-200：0.1V/S-400.0A/S HX0500-12：0.01V/S-24.00A/S HX0500-24：0.01V/S-48.00A/S HX01000-6：0.01V/S-12.00A/S HX01000-12：0.01V/S-24.00A/S	Maximum of parameter range When Parallel Connection: (Maximum Output Current x 2)/s * This function can be set for full-featured type "model name with F" only
5		CC Slew Rate Falling		
6		Serial I/F2	0=Serial Data Communication Control (Remote Mode) 1=Use for Sequential ON/OFF (Local Mode)	0=Serial Data Communication Control (Remote Mode) * This function can be set for full-featured type "model name with F" only
7		ON Delay Time	0.00s~99.99s	0.00s * This function can be set for full-featured type "model name with F" only
8		OFF Delay Time	0.00s~99.99s	
9		Operation during Alarm	0= Stop switching 1=Input Switch TRIP (Only for TRIP input and serious failures) 2=Input Switch TRIP (TRIP input, serious failures, OVP, and OCP)	0= Stop switching
10		Output ON/OFF Toggle with External Contact	0=Invalid 1=When close Output is ON, When open Output is OFF 2=When close can be ON/OFF by panel control, When open Output is OFF	0=Invalid
11		Measurement Value Moving Average Processing	0=No 1=Yes	0=No
12		Linearity Compensation Function Operation Mode	0=Compensation Mode OFF 1=Operates when Output is turned ON/OFF or when settings are changed. Saves compensation value after converging 2=Performs continuous compensation	1=Operates when Output is turned ON/OFF or when settings are changed. Saves compensation value after converging

Settings Items List (Continued)

Calibration, Isolated option, Panel Operation

Item No.		Settings Item		Range and contents of Parameter	Default Value
20	Calibration	Voltage Setting Offset		Not displayed	
21		Voltage Setting Full-Scale		Not displayed	
22		Current Setting Offset		Not displayed	
23		Current Setting Full-Scale		Not displayed	
24		Voltage Measurement Offset		Voltage measured value	
25		Voltage Measurement Full-Scale		Voltage measured value	
26		Current Measurement Offset		Voltage measured value	
27		Current Measurement Full-Scale		Voltage measured value	
28		External Analog Input	Voltage Setting Offset	Not displayed	
29			Voltage Setting Full-Scale	C: Coarse adjustment, F: Fine adjustment	C: Coarse adjustment
30			Current Setting Offset	Not displayed	
31			Current Setting Full-Scale	C: Coarse adjustment, F: Fine adjustment	C: Coarse adjustment
32		Voltage Monitor Output Offset		Not displayed	
33		Voltage Monitor Output Full-Scale		Not displayed	
34		Current Monitor Output Offset		Not displayed	
35		Current Monitor Output Full-Scale		Not displayed	
36		-		Not displayed	
37		Voltage offset when series slave		Not displayed	
38		Voltage full-scale when series slave		Not displayed	
39		User adjustment value initialization (CV, CC, Voltage/Current measurement)		0=Invalid 1=Valid	0=Invalid
40	Isolattion option	Constant Voltage (CV) Isolation of external analog control signals		0=Invalid 1=Valid	0=Invalid * This function can be set for isolation-function-mounted type "model name with I" only
41		Constant Current (CC) Iisolation of external analog control signals		0=Invalid 1=Valid	
50	Panel Operation	Methods for Determining PRESET Contents		0=Determines PRESET contents after PRESET mode is complete 1=Determines PRESET contents during PRESET mode	0=Determines PRESET contents after PRESET mode is complete
51		OUTPUT Status when POWER ON		0=OFF (TOGGLE) 1=MODE1 (HOT START) 2=MODE2 (HOT START) Startup with OUTPUT OFF when recovering from ALM occurrence or TRIP operation. OUTPUT ON when the OUTPUT key is pressed.	0=OFF (TOGGLE)

Settings Items List (Continued)

Communication Functions, External Control

Item No.		Settings Item		Range and contents of Parameter	Default Value
52	Panel Operation	Voltmeter/Ammeter Display when OUTPUT is OFF		0=Displays Measurement Values 1=Displays Set Values	0=Displays Measurement Values
53		LOCK Mode Selection		0 = only LOCK key is valid 1 = only OUTPUT and LOCK keys are valid 2 = VOLTAGE/CURRENT dial, PRESET, FUNC., OVP, and OCP are invalid	0 = only LOCK key is valid
54		Panel Memory Key Load Procedure		0=Single-Action 1=Double-Action	1=Double-Action
60	Communication Functions	Device Address		1 to 50	1
61		Bitrate		0=2400bps 1=9600bps 2=19200bps 3=38400bps	1=9600bps
62		Parity		0=No 1=ODD 2=EVEN	0=No
63		Command Form		0 = SCPI Standard Conformance 1 = HX Series Compatible	0 = SCPI Standard Conformance
70	External Control	CV Control EXT R/V, PANEL Settings		0=Front Panel 1=External Voltage(0~10V) 2=External Resistance(0~10kΩ A) 3=External Resistance(0~10kΩ B) 4=External Resistance(0~10kΩ C)	0=Front Panel *Function of 2 to 4,It is impossible to use HX-S-01000-G4
71		CC Control EXT R/V, PANEL Settings		0=Front Panel 1=External Voltage(0~10V) 2=External Resistance(0~10kΩ A) 3=External Resistance(0~10kΩ B) 4=External Resistance(0~10kΩ C)	0=Front Panel *Function of 2 to 4,It is impossible to use HX-S-01000-G4
72		Internal Resistance Settings		HX030-200：0Ω-0.15Ω HX030-400：0Ω-0.075Ω HX060-100：0Ω-0.6Ω HX060-200：0Ω-0.3Ω HX0500-12：0.Ω-41.7Ω HX0500-24：0Ω-20.8Ω HX01000-6：0Ω-167Ω HX01000-12：0Ω-83Ω	0Ω * This function can be set for full-featured type "model name with F" only
73		Series Operation		0=Master 1=Slave	0=Master *This function is impossible to use HX-S-01000-G4
74		LEVEL1_ALM	CV_STS	0=Is not included in LEVEL1_ALM 1=Included in LEVEL1_ALM	0=Is not included in LEVEL1_ALM
75			CC_STS	0=Is not included in LEVEL1_ALM 1=Included in LEVEL1_ALM	0=Is not included in LEVEL1_ALM
76		LEVEL1_ALM/ OUTPUT ON/OFF_STS Selection		0＝LEVEL1_ALM 1＝OUTPUT ON/OFF_STS	0＝LEVEL1_ALM

Settings Items List (Continued)

Status Display, Beep Sound

Item No.		Settings Item			Range and contents of Parameter	Default Value
80	Status Display	Status Display 1	4th digit	B15	Over voltage detected	Display only Current status information is displayed in hexadecimal. 4th digit from the left end: Displayed as 1st digit
				B14	Over current detected	
				B13	Status of Output ON/OFF Toggle with External Contact	
				B12	Alarm occurrence	
			3rd digit	B11	Status of Output ON/OFF	
				B10	Status of Master/Booster	
				B09	Input Power Monitoring (Booster)	
				B08	Input Power Monitoring (Master)	
			2nd digit	B07	-	
				B06	Over Heating Protection (OHP)	
				B05	Over Voltage Protection (OVP)	
				B04	Over Current Protection (OCP)	
			1st digit	B03	-	
				B02	-	
				B01	Status of Constant Current (CC)	
				B00	Status of Constant Voltage (CV)	
81		Status Display 2	4th digit	B15	-	Display only Current status information is displayed in hexadecimal. 4th digit from the left end: Displayed as 1st digit
				B14	-	
				B13	External TRIP Input Latch Information	
				B12	External TRIP Input Information	
			3rd digit	B11	-	
				B10	-	
				B09	-	
				B08	-	
			2nd digit	B07	-	
				B06	-	
				B05	Internal Power Part (B) Power Monitoring	
				B04	Internal Power Part (A) Power Monitoring	
			1st digit	B03	-	
				B02	-	
				B01	-	
				B00	Isolated Option Board Mounting Status	
82		HW FPGA Version			Ex: 1.00 (Cannot be changed)	Display only
90	Beep Sound	Beep sound when button is pressed down			0=OFF	1=ON
					1=ON	
91		Beep sound at alarm occurrence			0=OFF	1=ON
					1=ON	

Settings Items List (Continued)
Sequential Operation Function

Item No.		Settings Item	Range and contents of Parameter	Default Value
100	Sequential Operation Function	Sequential Operating Function Mode	0 : Disable 1 : Enable (Normal) 2 : Enable (Continue)	0 : Disable
101		Sequential Operation Number of repetition	0-9999 times	1 = 1 time
102		Output state at the end of the sequential operation	0 : OUT OFF 1 : Maintain state	0＝OUT OFF
110		Sequential Operation Step 1 Pre-set CV value	0V- Max. of each model	0.00V
111		Sequential Operation Step 1 Pre-set CC value	0A- Max. of each model	0.0A
112		Sequential Operation Step 1 Control	0 : OUT OFF 1 : STEP 2 : SWEEP	0 : OUT OFF
113		Sequential Operation Step 1 Control Time (Minute)	0-9999 minutes	0 minute
114		Sequential Operation Step 1 Control Time (0.1 sec.)	0－59.9 sec.	0 second
115		Sequential Operation Step 2 Pre-set CV value	0V- Max. of each model	0.00V
116		Sequential Operation Step 2 Pre-set CC value	0A- Max. of each model	0.0A
117		Sequential Operation Step 2 Control	0 : OUT OFF 1 : STEP 2 : SWEEP	0 : OUT OFF
118		Sequential Operation Step 2 Control Time (Minute)	0-9999 minutes	0 minute
119		Sequential Operation Step 2 Control Time (0.1 sec.)	0－59.9 sec.	0 second
120		Sequential Operation Step 3 Pre-set CV value	0V- Max. of each model	0.00V
121		Sequential Operation Step 3 Pre-set CC value	0A- Max. of each model	0.0A
122		Sequential Operation Step 3 Control	0 : OUT OFF 1 : STEP 2 : SWEEP	0 : OUT OFF
123		Sequential Operation Step 3 Control Time (Minute)	0-9999 minutes	0 minute
124		Sequential Operation Step 3 Control Time (0.1 sec.)	0－59.9 sec.	0 second
125		Sequential Operation Step 4 Pre-set CV value	0V- Max. of each model	0.00V
126		Sequential Operation Step 4 Pre-set CC value	0A- Max. of each model	0.0A
127		Sequential Operation Step 4 Control	0 : OUT OFF 1 : STEP 2 : SWEEP	0 : OUT OFF
128		Sequential Operation Step 4 Control Time (Minute)	0-9999 minutes	0 minute
129		Sequential Operation Step 4 Control Time (0.1 sec.)	0－59.9 sec.	0 second
130		Sequential Operation Step 5 Pre-set CV value	0V- Max. of each model	0.00V
131		Sequential Operation Step 5 Pre-set CC value	0A- Max. of each model	0.0A
132		Sequential Operation Step 5 Control	0 : OUT OFF 1 : STEP 2 : SWEEP	0 : OUT OFF
133		Sequential Operation Step 5 Control Time (Minute)	0-9999 minutes	0 minute

Settings Items List (Continued)

Sequential Operation Function

Item No.		Settings Item	Range and contents of Parameter	Default Value
134	Sequential Operation Function	Sequential Operation Step 5 Control Time (0.1 sec.)	0－59.9 sec.	0 second
135		Sequential Operation Step 6 Pre-set CV value	0V- Max. of each model	0.00V
136		Sequential Operation Step 6 Pre-set CC value	0A- Max. of each model	0.0A
137		Sequential Operation Step 6 Control	0：OUT OFF 1：STEP 2：SWEEP	0：OUT OFF
138		Sequential Operation Step 6 Control Time (Minute)	0-9999 minutes	0 minute
139		Sequential Operation Step 6 Control Time (0.1 sec.)	0－59.9 sec.	0 second
140		Sequential Operation Step 7 Pre-set CV value	0V- Max. of each model	0.00V
141		Sequential Operation Step 7 Pre-set CC value	0A- Max. of each model	0.0A
142		Sequential Operation Step 7 Control	0：OUT OFF 1：STEP 2：SWEEP	0：OUT OFF
143		Sequential Operation Step 7 Control Time (Minute)	0-9999 minutes	0 minute
144		Sequential Operation Step 7 Control Time (0.1 sec.)	0－59.9 sec.	0 second
145		Sequential Operation Step 8 Pre-set CV value	0V- Max. of each model	0.00V
146		Sequential Operation Step 8 Pre-set CC value	0A- Max. of each model	0.0A
147		Sequential Operation Step 8 Control	0：OUT OFF 1：STEP 2：SWEEP	0：OUT OFF
148		Sequential Operation Step 8 Control Time (Minute)	0-9999 minutes	0 minute
149		Sequential Operation Step 8 Control Time (0.1 sec.)	0－59.9 sec.	0 second
150		Sequential Operation Step 9 Pre-set CV value	0V- Max. of each model	0.00V
151		Sequential Operation Step 9 Pre-set CC value	0A- Max. of each model	0.0A
152		Sequential Operation Step 9 Control	0：OUT OFF 1：STEP 2：SWEEP	0：OUT OFF
153		Sequential Operation Step 9 Control Time (Minute)	0-9999 minutes	0 minute
154		Sequential Operation Step 9 Control Time (0.1 sec.)	0－59.9 sec.	0 second
155		Sequential Operation Step 10 Pre-set CV value	0V- Max. of each model	0.00V
156		Sequential Operation Step 10 Pre-set CC value	0A- Max. of each model	0.0A
157		Sequential Operation Step 10 Control	0：OUT OFF 1：STEP 2：SWEEP	0：OUT OFF
158		Sequential Operation Step 10 Control Time (Minute)	0-9999 minutes	0 minute
159		Sequential Operation Step 10 Control Time (0.1 sec.)	0－59.9 sec.	0 second

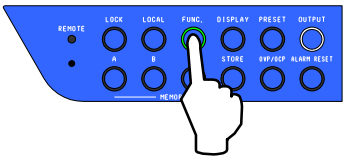
Setting Output ON/OFF Toggle Mode

Output status at power supply is turned on (POWERON) can be changed.
If this is set to 1 or 2 and the power supply is turned on (POWERON), output will begin even if the OUTPUT key is not pressed.

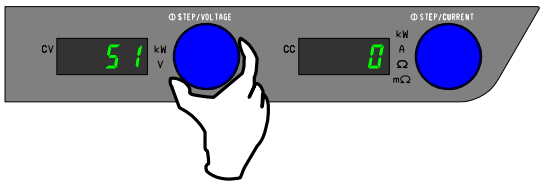
Setting Procedures

Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the top Number Display and the parameter will be displayed in the bottom Number Display.



Select Item number 51 with the VOLTAGE dial.

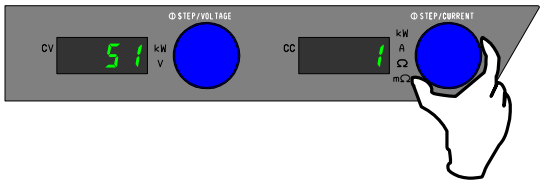


Set Parameter to 0,1 or 2 with the CURRENT dial.

Parameter = 0:
Output is OFF (COLD START) after power is turned on,
Pressing the OUTPUT key will toggle it ON/OFF.

Parameter = 1:
Output turns ON approximately 8 seconds after power is turned on. (HOT START)

Parameter = 2:
Output turns ON approximately 8 seconds after power is turned on.
(HOT START MODE 2)
However, the output status is OFF when recovered from ALM occurrence or TRIP operation. If the OUTPUT key is pressed, the output status becomes ON.



Press the FUNC. key again to finalize settings.

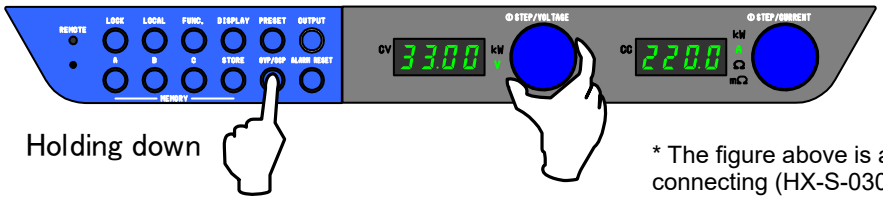
Over Voltage Protection (OVP)

I
n the event of an over voltage due to circuit failure of the power supply, improper use, load opens in constant current mode, etc. the output is turned OFF and switching is ceased to protect the load.
The OVP voltage can be set from 1% to 110% of the rated voltage.

Setting/Canceling Over Voltage Protection

Setting Over Voltage Protection Level

① Set the output to OFF with the OUTPUT key.
② Press the OVP/OCP key to display the current OVP set value in the top Number Display (voltage).
③ Change the set value by turning the VOLTAGE dial while pressing down the OVP/OCP key.
(Turn the dial right to raise or left to lower the set value.)
④ Release the OVP/OCP key to confirm set values and to return to measurement display mode.



* The figure above is an example of connecting (HX-S-030-200G4)

MEMO

- Press the VOLTAGE dial to display the current number position. The selected number will be brightened. Press to change position.
  If all 4 places are brightened, numbers will change from the lowest place.
- Press the OVP/OCP key to display the OVP set value in the Number Display (voltage) and the OCP set value in the Number Display (current).

Verifying Over Voltage Protection Operation

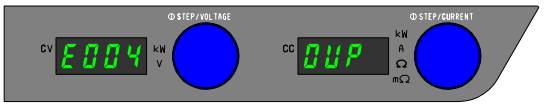
After settings are complete, please follow the procedures below to test verify operation.

① Disconnect the load from the power supply.
② Turn the POWER switch ON with the Output ON/OFF Toggle mode (FUNC.51) set to "0".
③ Set the Output Voltage settings lower than OVP level.
④ Turn OUTPUT to ON.
⑤ Gradually increase the Output Voltage with the VOLTAGE dial. Verify that the output turns OFF once the OVP set voltage has been reached and that the error code "E004" appears in the Number Display (voltage) and "OUP" appears in the Number Display (current).
⑥ Hold down the ALARM RESET key for more than 1 second to cancel the alarm. Return the CV set value to its original value.

Canceling Over Voltage Protection Operation

When Over Voltage Protection Circuit (OVP) is triggered, the OUTPUT is set to OFF and an error code and the alarm message will be displayed in the Number Display (voltage) and the Number Display (current).

The error code "E004" is displayed in the Number Display (voltage) and "OUP" blinks in the Number Display (current).



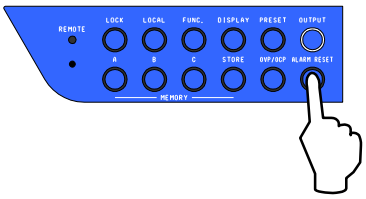
MEMO

When the OVP is triggered, the Falling slew rate setting by the slew rate function becomes invalid and the voltage is decreased most rapidly under the condition of that time point.

Hold down the ALARM RESET key for more than 1 second to erase the displayed error code and OUP.

Caution

If the error code and OVP are not erased after holding down the ALARM RESET key, the power supply may be damaged. Turn power off immediately and please contact Takasago or your retail store.



MEMO

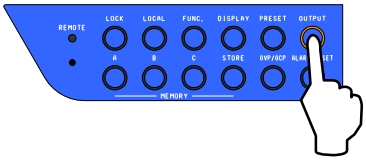
- During serial data communication, recovery from alarm status is possible using commands.
- During parallel operation where the Master unit is the operating normal, if any Slave unit triggers an alarm, the error code “E006” will be displayed in the Master and functioning Slave units.

(Information concerning the alarm will be displayed on the Slave unit that triggered the alarm)

Remove cause which triggered the OVP

(Change CV set values, OVP set values, load status)

Press the OUTPUT key to start output.



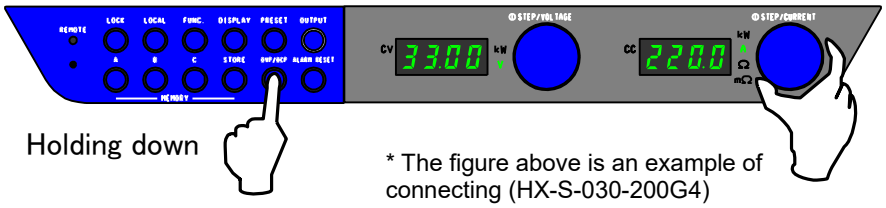
Over Current Protection (OCP)

In the event of an over current due to a short circuit in the load, the output is turned OFF and switching is ceased to protect the load.
The OCP current can be set from 1% to 110% of the rated current.

Setting/Canceling Over Current Protection

Setting Over Current Protection Level

①. Set the output to OFF with the OUTPUT key.
②. Press the OVP/OCP key to display the current OCP set value in the Number Display (current).
③. Change the set value by turning the CURRENT dial while pressing down the OVP/OCP key.
④. Release the OVP/OCP key to confirm set values and to return to measurement display mode.



* The figure above is an example of connecting (HX-S-030-200G4)

MEMO

- Press the CURRENT dial to display the current number position. The selected number will be brightened. Press to change position.
  If all 4 places are brightened, numbers will change from the lowest place.
- Press the OVP/OCP key to display the OVP set value in the Number Display (voltage) and the OCP set value in the Number Display (current).
- If the number of parallel devices (total power) is changed, the OCP set value is set again to the maximum value.

Verifying Over Current Protection Operation

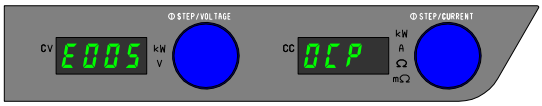
After settings are complete, please follow the procedures below to test verify operation.

①. Disconnect the load from the power supply and short between the +/- output terminals using cross section area wires that can flow rated current.
②. Turn the POWER switch ON with the Output ON/OFF Toggle mode (FUNC.51) set to "0".
③. Set the Output Current settings lower than OCP level.
④. Turn OUTPUT to ON.
⑤. Gradually increase the Output Current with the CURRENT dial. Verify that the output turns OFF once the OCP set current has been reached and that the error code "E005" appears in the Number Display (voltage) and the Number Display (current) becomes the "OCP" display.
⑥. Hold the OVP and OCP keys simultaneously for more than 1 second to cancel the alarm. Return the CC set value to its original value.

Canceling Over Current Protection Operation

When Over Current Protection Circuit (OCP) is triggered, the OUTPUT is set to OFF and an error code and the alarm message will be displayed in the Number Display (voltage) and the Number Display (current).

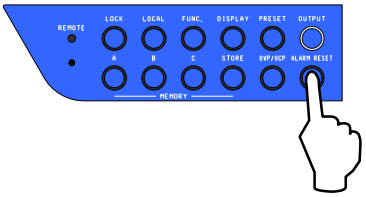
The error code "E005" is displayed in the top Number Display and "OCP" blinks in the ammeter/power meter.



MEMO

When the OCP is triggered, the Falling slew rate setting, based on the slew rate function, is set invalid and the output current is decreased most rapidly under the condition of that time point.

Hold down the ALARM RESET key for more than 1 second to erase the displayed error code and OCP.



CAUTION

If the error code and OCP does not erase after holding down the OVP and OCP keys, the power supply may be damaged. Turn power off immediately and please contact Takasago or your retail store.

MEMO

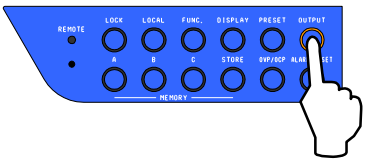
- During serial data communication, recovery from alarm status is possible using commands.
- During parallel operation where the Master unit is the operating normal, if any Slave unit triggers an alarm, the error code “E006” will be displayed in the Master and functioning Slave units.

(Information concerning the alarm will be displayed on the Slave unit that triggered the alarm)

Remove cause which triggered the OCP.

(Change CC set values, OCP set values, load status)

Press the OUTPUT key to start output.



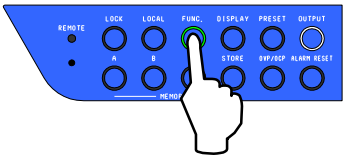
Setting Operation during Alarm

Setting can be done about whether input shutoff is done or switching stop (forced output OFF) is done for this machine at various types of alarm occurrence.

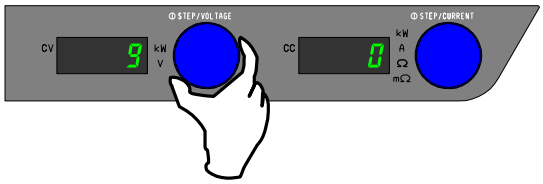
Setting Procedures

Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will display on the top Number Display and the parameter will be displayed in the bottom Number Display.



Select Item number 9 with the VOLTAGE dial.

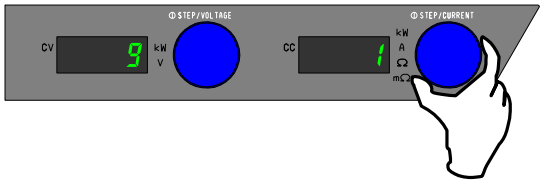


Set Parameter to 0,1 or 2 with the CURRENT dial.

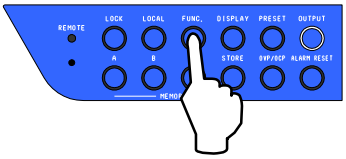
Parameter = 0 [Default value]:
When any alarm occurs, switching is stopped (forced output OFF).

Parameter = 1:
At occurrence of TRIP input and serious failures (failures of this machine), the input switch is turned off and input shutoff is done.

Parameter = 2:
At occurrence of TRIP input, serious failures (failures of this machine), over voltage (OVP), or over current (OCP), the input switch is turned off and input shutoff is done.



Press the FUNC. key again to finalize settings.



Error Codes

Place / Items	No. Display (Voltage)	No. Display (Current)	Content	Verify/Recovery
WDT	E001	-	CPU may have performed an illegal operation	Turn POWER switch OFF and restart
OHP	E003	OHP	Over heating protection is triggered.	● Turn power OFF. Leave device to cool down. Turn power ON ● Check environmental temperatures ● Verify Fan Motor rotates when power is turned on.
OVP	E004	OUP	Over voltage protection was triggered	Check OVP values. See page 40 about how to cancel.
OCP	E005	OCP	Over current protection was triggered	Check OCP values See page 42 about how to cancel.
BST	E006	-	Slave unit malfunctioned.	Check slave unit display.
P_ERR	E007	-	May have had a short interruption or voltage dip at the main power.	May be damaged. Contact Takasago Sales Dept.
BST_NRDY	E008	-	Slave unit's input voltage is abnormal.	Check whether slave unit's power switch is ON
Phase interruption detection alarm			Phase interruption of input power is detected.	Please check the wiring connection to the input connector.
Device Detection Error	E009	-	Cannot detect number of parallel devices	Restart power supply
No. of Parallel Connected Devices Over	E010	-	More than 11 parallel devices are connected	Verify No. of parallel devices. Restart power supply
Device No. Disagreement	E011	-	Difference in the current No. of connected parallel devices and the previous No. of parallel devices remembered by the power supply	If the present number of parallel devices is satisfactory, hold the FUNC. key for more than 2 seconds and confirm the detected number of devices.
TRIP	E012	Shdn	TRIP function was triggered	Cancel by pressing OVP+OCP keys simultaneously or by the remote control command ALM REG CLEAR.
Models of different voltages mixed	E013	-	Models of different voltages are connected.	Verify connection with models of different voltage and restart the power supply.
Communication Error	E100	-	Data was not received	Re-verify sent message. Recovered if normal message is received.
E2P Error	E110	-	Failure to initialize during startup	Cancel by pressing OVP+OCP keys simultaneously or by the remote control command ALM REG CLEAR.

Memory

Saves and loads the set values of the voltage, current, and various functions in memories “A”, “B”, and “C”.

MEMO

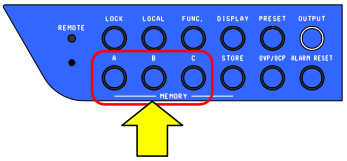
Settings Items that can be saved in memory are listed on page 47 “Panel Memory Savable Settings”.

Caution

If the number of parallel devices (total power) is changed, the saved content of the panel memory is initialized.

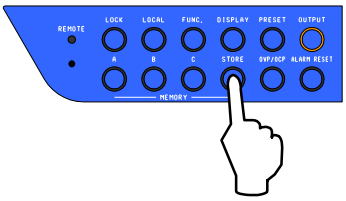
Saving in Memory

This function will save the current set values in memory “A”, “B”, and “C”.



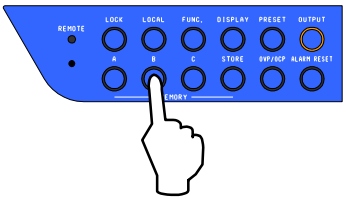
Press the STORE key.

The voltage set value will be displayed in the Number Display (voltage) and the current set value blinks in the Number Display (current).
(Press the STORE key again to cancel.)



Select destination by holding down Memory “A”, “B”,”C” key for more than 1 second.

Saves current set values.
The light will blink faster until finished. Once saving is complete the display will return to measurement display mode.



MEMO

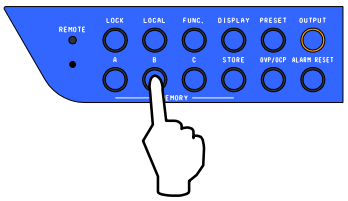
Only the OUTPUT ON/OFF and keys mentioned in the setting procedures can be used.
Values can be saved to memory regardless of OUTPUT ON/OFF status.

Loading from Memory

[Single-Action Loading]

Set the parameter for FUNCTION settings item 54 to”0”.
(See page 35 Function Settings on how.)

Press the memory key you wish to load from.
The settings stored in memory will take effect.



MEMO

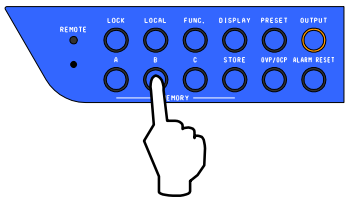
Only the OUTPUT ON/OFF and keys mentioned in the setting procedures can be used.
Memory can be loaded regardless of OUTPUT ON/OFF status.

⇒Continued on next page

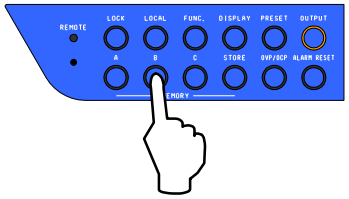
[Double-Action Loading]

Set the parameter for FUNCTION settings item 54 to"1".
(See page 35 Function Settings on how.)

Press the memory key you wish to load from.
The voltage and current values stored in memory will blink in the Number Display.
(Press the same key again to cancel loading. Pressing a different memory key at this point will cause the voltage and current values of the pressed memory key to blink.)



Hold down the memory key to be loaded for more than 1 second.
The light will blink faster until finished. Once loading is complete the display will return to measurement display mode.



MEMO

Only the OUTPUT ON/OFF and keys mentioned in the setting procedures can be used.
Memory can be loaded regardless of OUTPUT ON/OFF status.

Panel Memory Savable Settings

Keys used to set		Savable Parameters
PRESET		CV Set Value
		CC Set Value
		OVP Set Value
		OCP Set Value
FUNC.	1	Selection of Startup Mode
	2	CV Slew Rate Rising
	3	CV Slew Rate Falling
	4	CC Slew Rate Rising
	5	CC Slew Rate Falling
	7	ON Delay Time
	8	OFF Delay Time
	72	Internal Resistance Settings

Startup Mode Selection

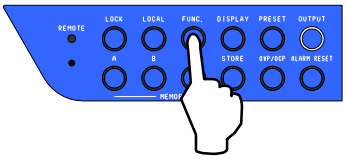
*** This function can be set for full-featured type "model name with F" only.**

Allows you to select the optimal output startup properties for each use.

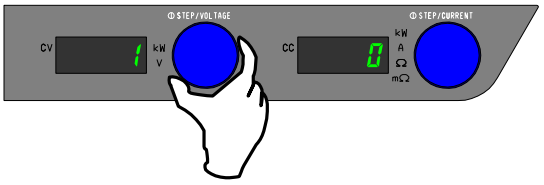
1. Constant Voltage (CV) Priority Mode (High/Medium/Low speed)
   Perfect when using as a normal constant voltage power supply for testing equipment and devices.
2. Constant Current (CC) Priority Mode (High/Medium/Low speed)
   Perfect when wishing to control the current of the load such as electromagnets etc. or when wishing to include the constant current pulse to nonlinear loads such as diodes etc.

Setting Procedures

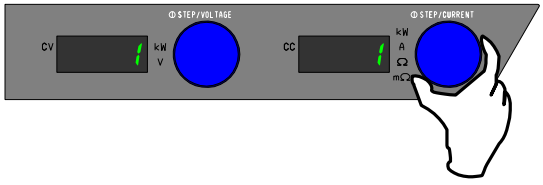
Press the Function "FUNC." key.
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 1 with the VOLTAGE dial.



Select 0 to 6 with the CURRENT dial.
Set Value 0 = Constant Voltage (CV) Priority High Speed Mode
Set Value 1 = Constant Voltage (CV) Priority Medium Speed Mode
Set Value 2 = Constant Voltage (CV) Priority Low Speed Mode
Set Value 4 = Constant Current (CC) Priority High Speed Mode
Set Value 5 = Constant Current (CC) Priority Medium Speed Mode
Set Value 6 = Constant Current (CC) Priority Low Speed Mode



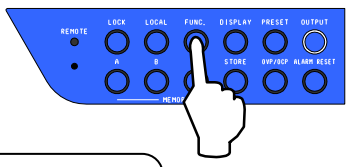
MEMO (30V/60V)

The approximate time of high speed, medium speed, and low speed is as follows:
- CV High Speed: Approx. 10 msec - CC High Speed: Approx. 10 msec
- CV Medium Speed: Approx. 100 msec - CC Medium Speed: Approx. 100 msec
- CV Low Speed: Approx. 200 msec - CC Low Speed: Approx. 200 msec

MEMO (500V/1000V)

The approximate time of high speed, medium speed, and low speed is as follows:
- CV High Speed: Approx. 100 msec - CC High Speed: Approx. 10 msec
- CV Medium Speed: Approx. 300 msec - CC Medium Speed: Approx. 100 msec
- CV Low Speed: Approx. 500 msec - CC Low Speed: Approx. 200 msec

Press the FUNC. key again to set
Setting contents will be confirmed and the "Number Display" returns to measurement display.



MEMO

Setting contents will be confirmed when the FUNC. key is pressed.
Any change of setting item without pressing the FUNC. key is not set.

Variable Slew Rate

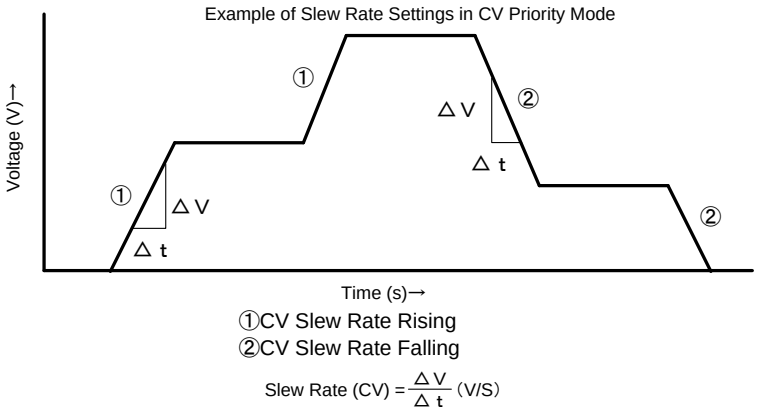
*** This function can be set for full-featured type "model name with F" only.**

Sets the increasing and falling rate for each output voltage and output current individually.

■Constant Voltage (CV) Slew Rate

Use when a small transition rate is desired in the output voltage when using constant voltage.

Range : 30V Type: 0.01V/S – 60.00V/S
60V Type: 0.1V/S – 120.0V/S
500VType: 1V/S – 1000V/S
1000VType: 1V/S – 2000V/S



①CV Slew Rate Rising
②CV Slew Rate Falling

$$\text{Slew Rate (CV)} = \frac{\triangle V}{\triangle t}\ (\text{V/S})$$

■Constant Current (CC) Slew Rate

Use when a small transition rate is desired in the output voltage when using constant current.

Range

The range will vary for the Constant Current (CC) Slew Rate depending on the number of parallel devices.

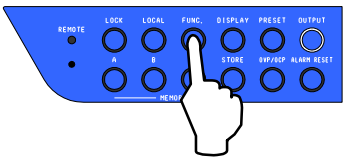
Rated Output Current [Io]	Range	Resolution
Io < 50A	0.01 to (Twice the constant output current) A/s	0.01A
50A≤ Io < 500A	0.1 to (Twice the constant output current) A/s	0.1A
500A ≤ Io < 4000A	1 to (Twice the constant output current) A/s	1A

(Ex) 200A (6kW) type: 0.1A/s to 400.0A/s (Resolution 0.1A/s)

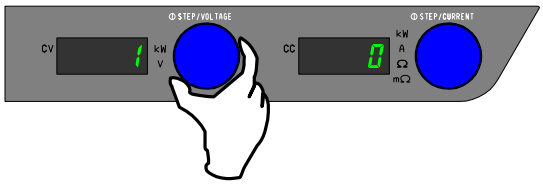
Setting Procedures

Press the Function "FUNC." key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).

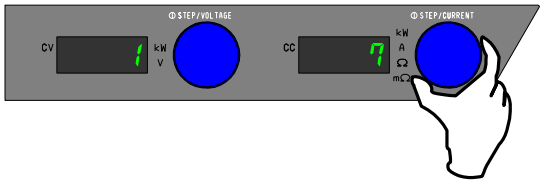


Select Item number 1 with the VOLTAGE dial.



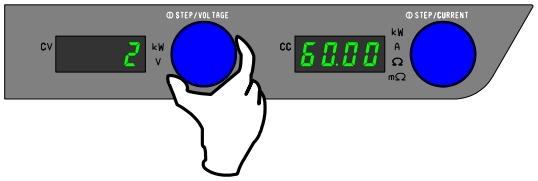
Assign the Startup Priority Mode by setting the parameter to 3 or 7 with the CURRENT dial.

Set Value 3=CV Priority, Variable Slew Rate
Set Value 7=CC Priority, Variable Slew Rate

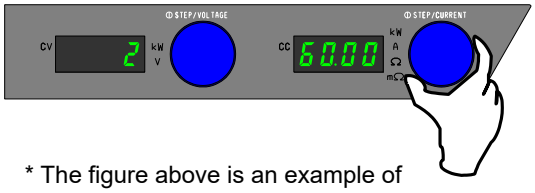


When selecting Constant Voltage (CV) Priority and Variable Slew Rate mode (Item 1 set to 3),

Set to 2 or 3 using the VOLTAGE dial.
Set Value 2 = Rising Voltage Slew Rate
Set Value 3 = Falling Voltage Slew Rate



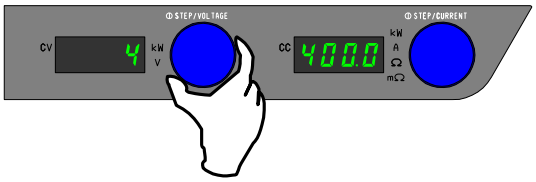
Assign the set value using the CURRENT dial.
Range(EX): 0.01V/s to 30.00V/s (Resolution 0.01V/s)



* The figure above is an example of connecting (HX030-200G4)

When selecting Constant Current (CC) Priority and Variable Slew Rate mode (Item 1 set to 7),

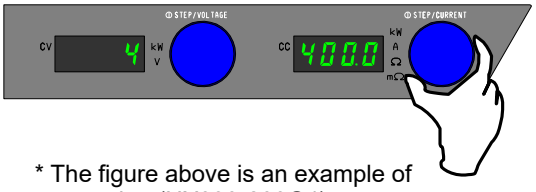
Set to 4 or 5 using the VOLTAGE dial.
Set Value 4 = Rising Current Slew Rate
Set Value 5 = Falling Current Slew Rate



* The figure above is an example of connecting (HX030-200G4)

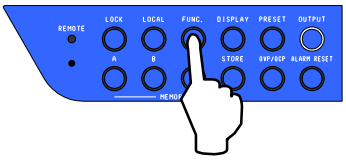
Assign the set value using the CURRENT dial.
Range (Ex)
0.1A/s to 400.0A/s (Resolution 0.1A/s)

If using in parallel operation, Constant Current (CC) Slew Rate in page 49 should be referenced.



* The figure above is an example of connecting (HX030-200G4)

Press the FUNC. key again to finish.
Confirms settings and returns the Number Display to measurement display mode.



MEMO

It is possible to continue to change other setting items without pressing the “FUNC.” key. In this case, press the “FUNC.” key to confirm settings once changes are complete.

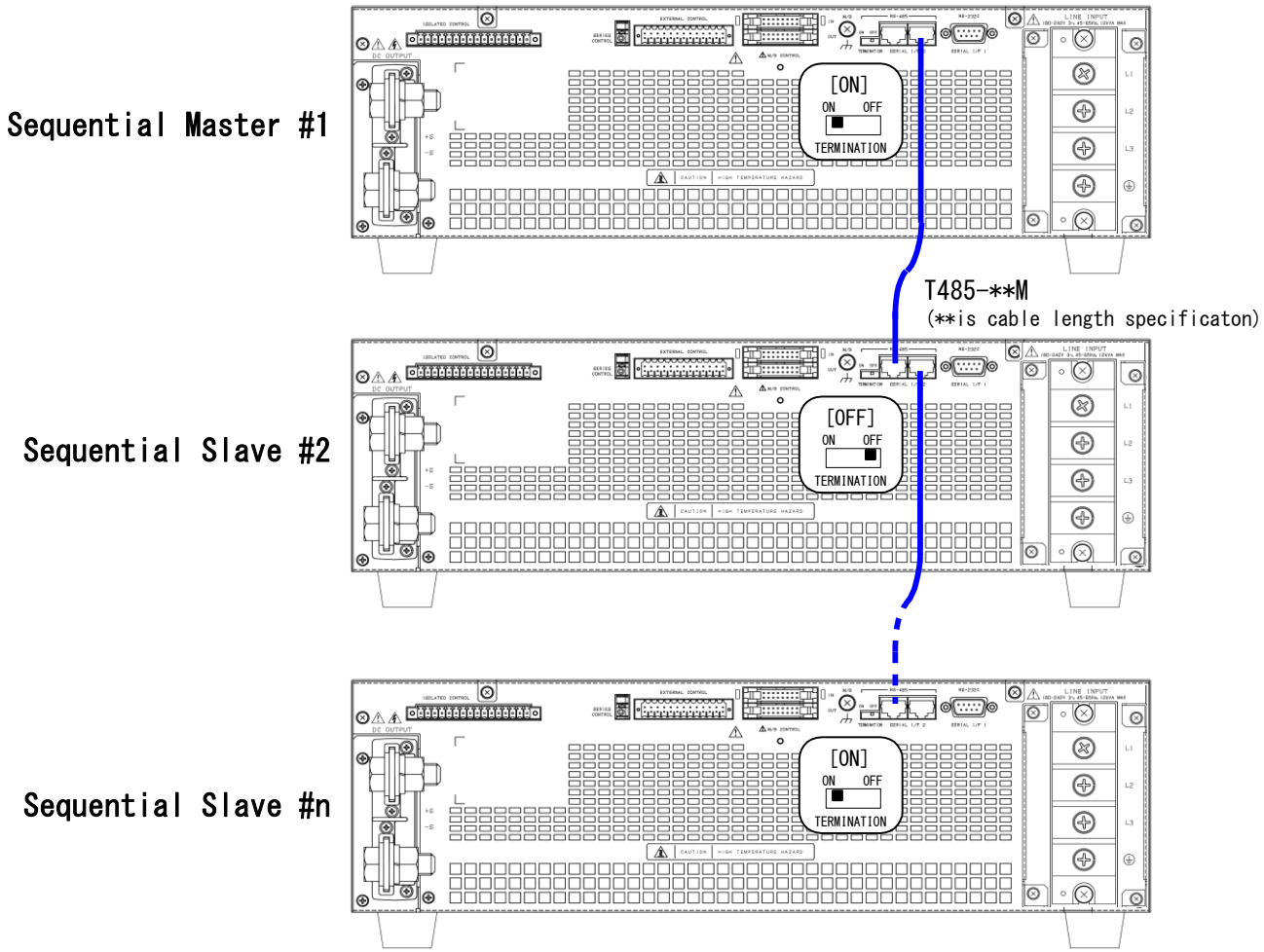
Sequential ON/OFF

*** This function can be set for full-featured type "model name with F" only.**

Toggles the Output ON/OFF for multiple HX-S-G4 Series power supplies simultaneously or using time delays.

Optional cables (T485-**M) are required for connection. (Sold separately)

Sequential ON/OFF Connection



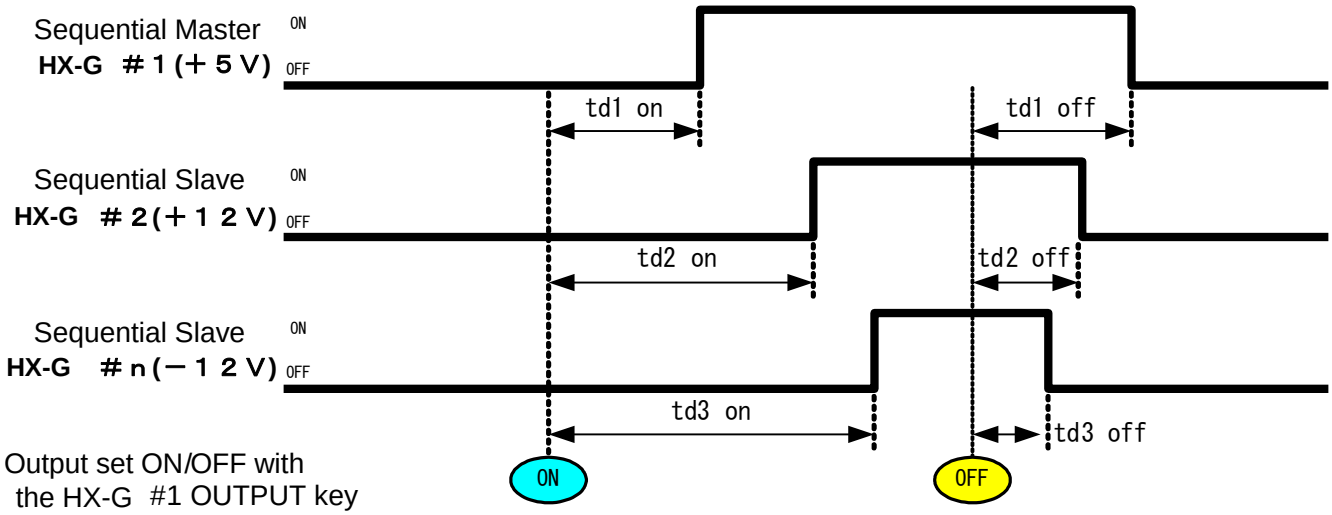
Using the Sequential Function

Output is turned ON/OFF after delay time (tdon, tdoff) that are set for each machine triggered by OUTPUTON signal of the sequential master.

MEMO

For sequential master machines, delay time
(tdon, tdoff) can also be set.

Ex)



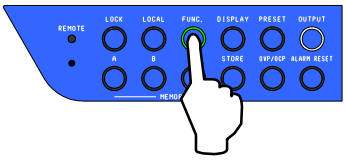
Output set ON/OFF with the HX-G #1 OUTPUT key

Setting Procedures

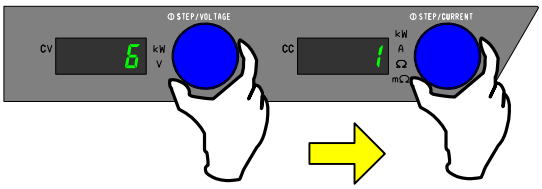
Set Sequential ON/OFF to ON.

Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item Number 6 with the VOLTAGE dial, then set the parameter to 1 with the CURRENT dial.



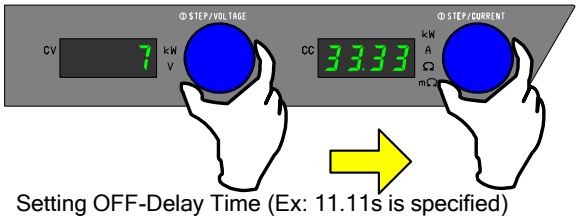
Set the Delay Time

ON-Delay Time and OFF-Delay Time settings have a range of 0.00s~99.99s.
Factory default is 0.00s (no delay time).

Setting ON-Delay Time

Select Item Number 7 with the VOLTAGE dial. Set ON-Delay Time with the CURRENT dial.

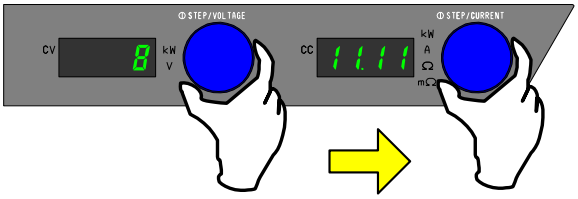
Setting ON-Delay Time (Ex: 33.33s is specified)



Setting OFF-Delay Time

Select Item Number 8 with the VOLTAGE dial. Set OFF-Delay Time with the CURRENT dial.

Setting OFF-Delay Time (Ex: 11.11s is specified)

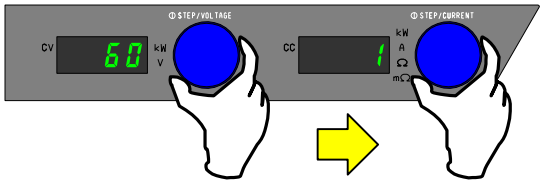


⇒Continued on next page

Set the Sequential Master and Sequential Slave Unit Settings

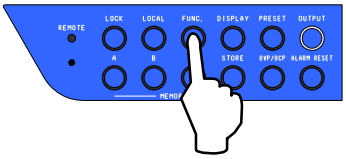
Select Item number 60 with the VOLTAGE dial and
set the Master and Slave settings with the CURRENT dial.

Set the Master to the address "1".
Set the Slave to a setting other than the address "1".
* If there are more than one slaves, set the addresses avoiding address duplication.



Press the FUNC. key to finish.

The "FUNC." lamp is turned off and the Number Display returns to the measurement display mode.

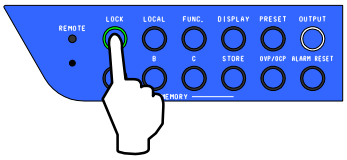


Key Lock

Use the LOCK key when protecting settings from careless operations is desired.

Key Lock Settings

Pressing the LOCK key will restrict key inputs. LOCK lamp will light.



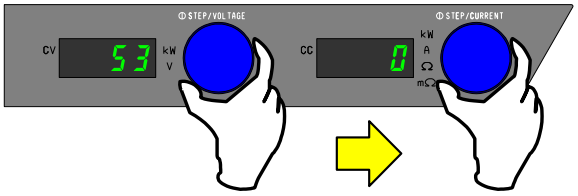
The status of the Lock Key can be selected under the FUNCTION Settings Item Number 53 parameters from the following 3 types below.

Parameter=0:
Only the LOCK key can be used

Parameter=1:
Only the OUTPUT key and LOCK key can be used.

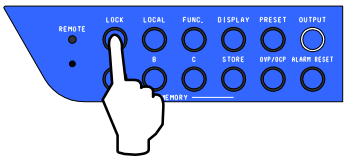
Parameter=2:
Only the DISPLAY key, A, B and C memory keys, STORE key, OUTPUT key, and LOCK key can be used.

Lock Mode Selection (Ex: Select parameter "0")



Canceling Key Lock

Press the LOCK key again to release lock on keys. LOCK lamp will turn off.



*** This function can be set for full-featured type "model name with F" only.**

This function intentionally generates a voltage drop due to load current when running in Constant Voltage mode.
This function is capable of approximating an internal resistance of chemical batteries (during electric discharge) and I-V characteristics of solar/fuel cells.

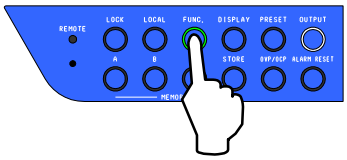
CAUTION

Variable Internal Resistance function is restricted to only DC operations.
Not suited for approximating transient phenomenon.

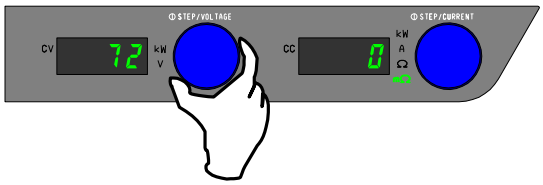
Setting Procedures

Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 72 with the VOLTAGE dial.

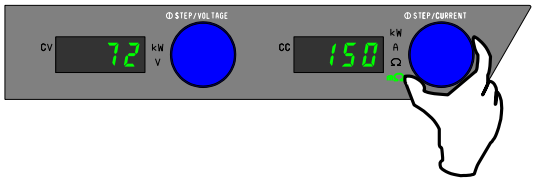


Set the Internal Resistance value with the CURRENT dial.

Range(Ex)
HX-S-030-200G4F: 0mΩ to 150mΩ (Resolution: 2mΩ)

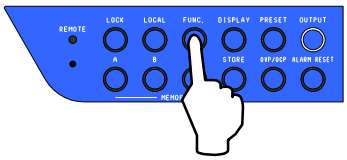
The range of internal resistance value and the resolution depend on the number of parallel connected devices. Refer to the table in page 93 (Setting Internal Resistance Used for Digital Communication).

Factory default is 0mΩ (No Internal Resistance).



Press the FUNC. key again to finish.

Confirms settings and returns the Number Display to measurement display mode.



MEMO

It is possible to continue to change other setting items without pressing the “FUNC.” key. In this case, press the “FUNC.” key to confirm settings once changes are complete.

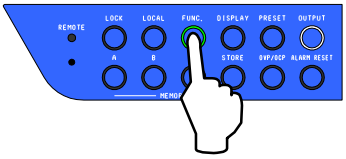
Measurement Display Smoothing

Use when wishing to stabilize displayed values when the load current is periodically fluctuating at high speeds. The displayed value will be the average value of data, including new data, measured within the past 2 seconds. This is renewed approximately every 200ms.
(This method is known as the Moving Average Method)

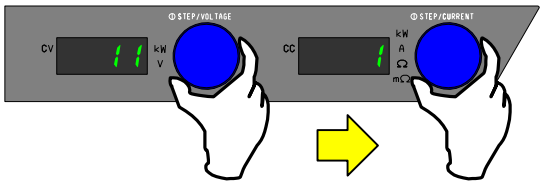
Setting Procedures

Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).

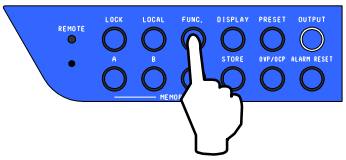


Select Item number 11 with the VOLTAGE dial and set Parameter to 1 with the CURRENT dial.



Press the FUNC. key to finish.

The "FUNC." lamp is turned off and the Number Display returns to the measurement display mode.



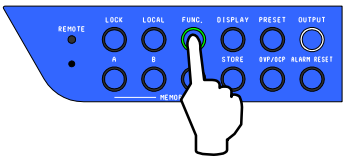
Linearity Compensation

This function provides a high output setting accuracy by measuring and compensating the nonlinearity of the output caused by feedback systems or DA converters/Error Amplifiers used as a DC power supply voltage or current reference value.
This is normally used when the compensation function is turned ON (Parameter 1 or 2).

Setting Procedures

Press The Function “FUNC.” key.

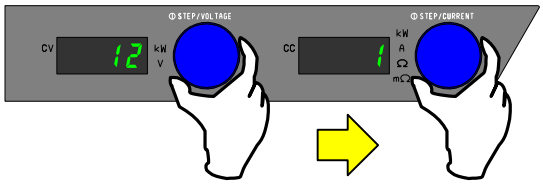
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 12 with the VOLTAGE dial and
Select the operation mode of compensation with the CURRENT dial.

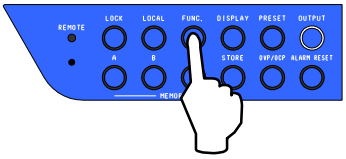
0 = Compensation Function is turned OFF
1 = Once compensation has concluded, the Output is then turned ON, the set values are changed, and the compensation value is maintained until there is a change in the Output mode (CV/CC).
2 = Compensates continually (200ms cycles)

* The default setting is "1".



Press the FUNC. key to finish.

The "FUNC." lamp is turned off and the Number Display returns to the measurement display mode.



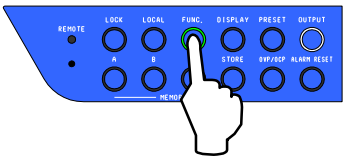
Setting Beep Sound

This machine emits a beep sound when a button is pressed or an alarm occurs.
You can set whether beep sounds are emitted or not.

Setting Procedures

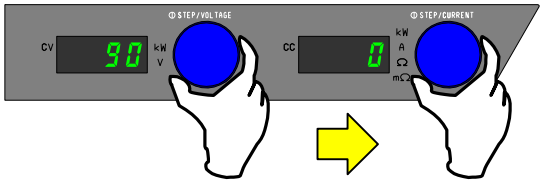
Press The Function “FUNC.” key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



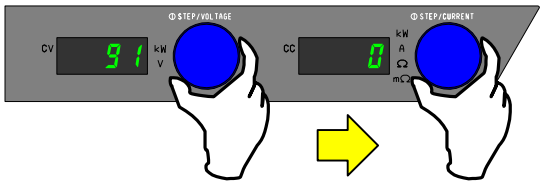
Setting Beep Sound for Pressing Buttons
Set the parameter to 90 with the VOLTAGE dial and perform setting with the CURRENT dial.

1 = With beep sound [Default]
0 = Without beep sound



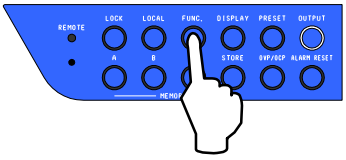
Setting Beep Sound for Pressing Buttons
Set the parameter to 91 with the VOLTAGE dial and perform setting with the CURRENT dial.

1 = With beep sound [Default]
0 = Without beep sound



Press the FUNC. key to finish.

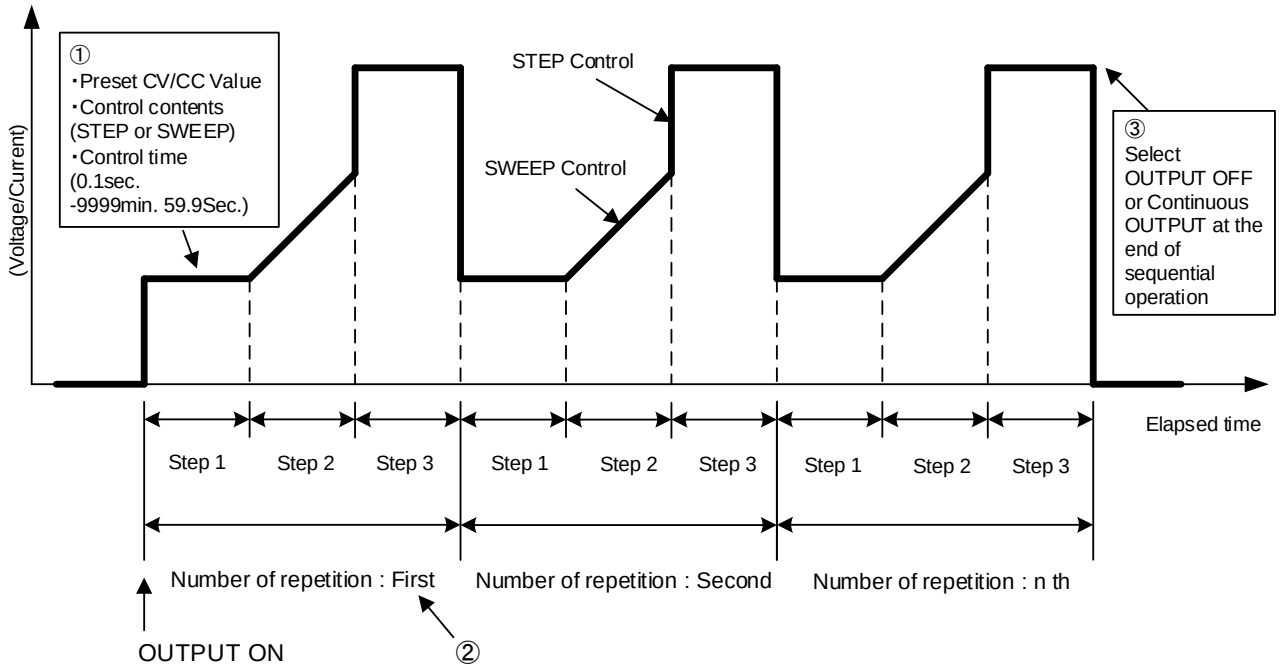
The "FUNC." lamp is turned off and the Number Display returns to the measurement display mode.



Sequential Operating Function

Overview

Sequential Operating Function of HX-S-G4 series is to control output sequentially (regularly and continuously) by applying each settings, such as preset CV/CC value, control contents, control time, to the function.



Conceptual diagram of sequential operation function

■ What can be achieved by the sequential operation function

① Control output by setting preset CV/CC value, control contents (STEP or SWEEP) and control time (0.1 sec. - 9999 min. 59.9 sec.) to each steps from step 1 to step 10. (ref. FUNC110 - 159).
② Number of repetition is enable to set from one to 9999 or permanent repetition. (ref. FUNC101)
③ It is enable to select OUTPUT OFF or Continuous OUTPUT at the end of repetition. (ref. 102)
④ It is enable to select to resume the sequential operation function from the paused point (set 2 for FUNC100) or to restart the sequential operation (set 1 for FUNC100), when the output is paused during the sequential operation.

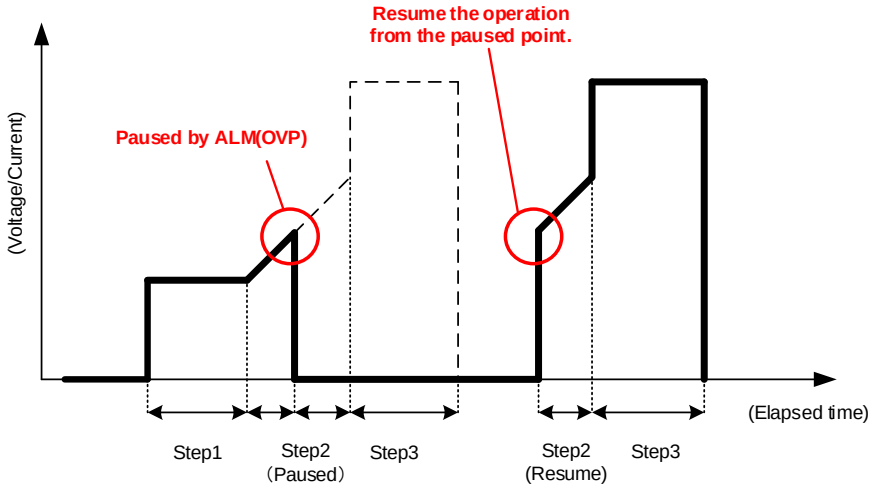


Image of resumed sequential operation

⑤ It is enable to display "Current step number", " Elapsed min. and sec.", and "Current number of repetition" on the Number Display.

■ Important note on sequential operation function

① Please take note that the waveform during SWEEP control is not complete straight line.
SWEEP control is unable to fluctuate exactly in a linear manner. It is fluctuated in steps with the min. setting resolution of each power supply.

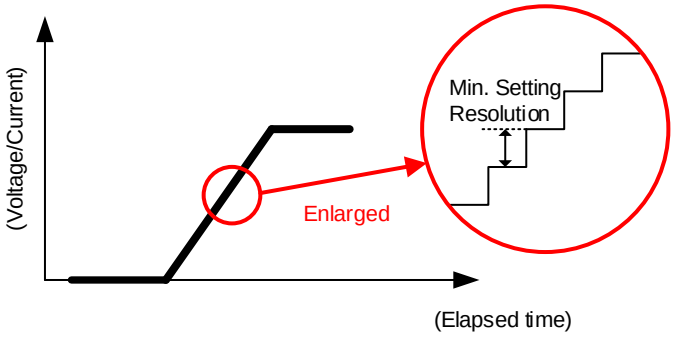
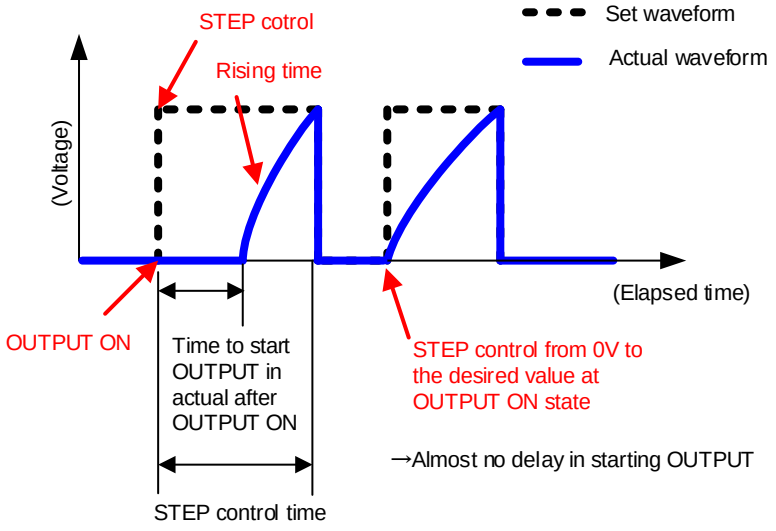


Image of SWEEP Control

② Rising time of waveform after OUTPUT control
It requires some time to start OUTPUT in actual at OUTPUT ON state due to characteristic of internal circuit.
Please take note the control time after OUTPUT ON will be not as set.

◎ Reference time to output the desired waveform in actual during OUTPUT control

Startup mode					
CV in low-speed	CV in mid-speed	CV in high-speed	CC in low-speed	CC in mid-speed	CC in high-speed
150ms	100ms	50ms	100ms	75ms	50ms



③ Rising time of voltage and current during STEP control depends on programming time of output specification.
Actual waveform will be the following image when the programing time (e.g. Model: 500V type and CV low-speed: 500ms) is longer than control time (e.g. 0.1s). Please take note that the waveform dose not rise vertically regardless of programing time and control time.

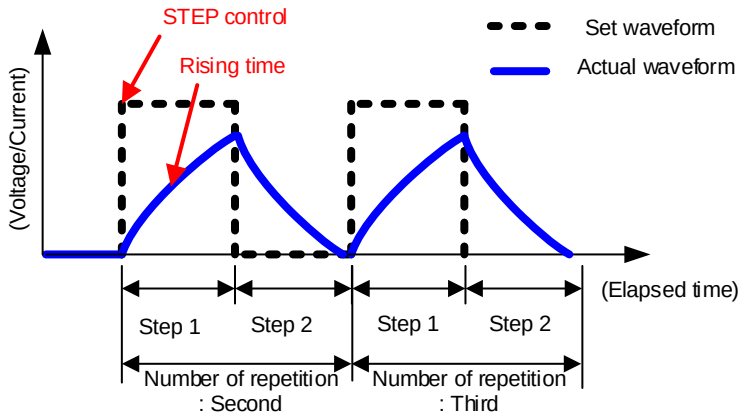


Image of waveform when programming time is longer than control time

Please refer to the following table for programming time.
The programing time of DC power supply except for the model with F option is **fixed as low-speed**.
It is required to purchase the model with F option to set high-speed rising for voltage and current during STEP control.
Please refer to Startup Mode Selection (page 49) and set the desired time.

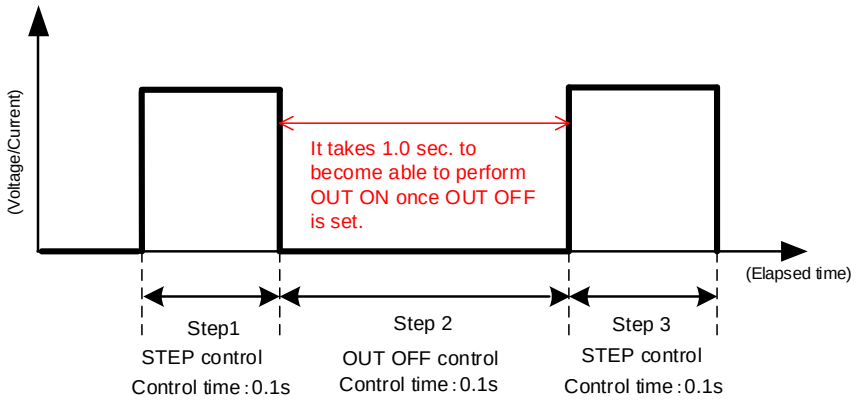
MEMO (30V/60V)

The approximate time of high speed, medium speed, and low speed is as follows:
- CV High Speed: Approx. 10 msec - CC High Speed: Approx. 10 msec
- CV Medium Speed: Approx. 100 msec - CC Medium Speed: Approx. 100 msec
- CV Low Speed: Approx. 200 msec - CC Low Speed: Approx. 200 msec

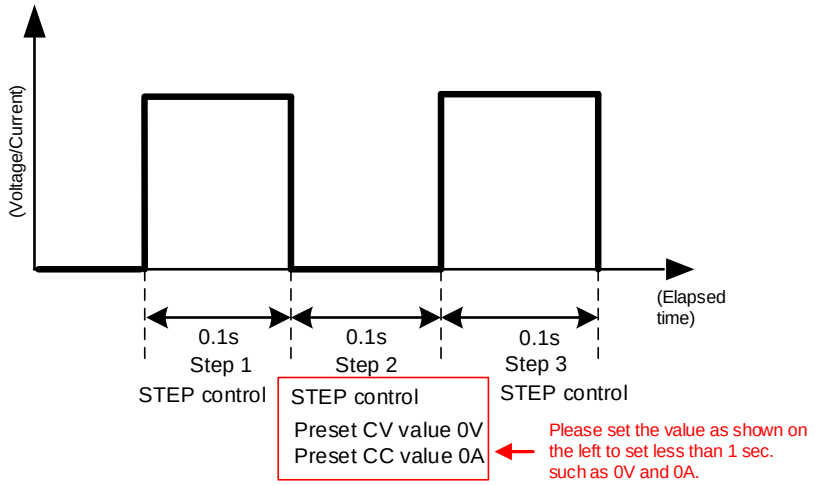
MEMO (500V/1000V)

The approximate time of high speed, medium speed, and low speed is as follows:
- CV High Speed: Approx. 100 msec - CC High Speed: Approx. 10 msec
- CV Medium Speed: Approx. 300 msec - CC Medium Speed: Approx. 100 msec
- CV Low Speed: Approx. 500 msec - CC Low Speed: Approx. 200 msec

④ HX-S-G4 series is designed not to perform OUPUT ON for 1 sec. after OUTPUT OFF.
Therefore, please set 0V or 0A for "STEP" ,without setting control contents as "OUTPUT OFF",
when it requires 0V and 0A output from 0.1 sec. to 1 sec. for min.control time of sequential operation function.



Waveform after setting step2 as OUTPUT OFF



Waveform after setting step2 as STEP control

⑤ It is unable to use sequential operation function, variable threw-rate function (available with F option), and sequential On/OFF function (available with F option) at the same time. The setting for Startup Mode selection will be changed forcibly as follows.

◎ In case of variable threw-rate enabled
- FUNCTION Item 1 = 3: CV Threw-rate → 2: CV Priority (Low-speed)
  7: CC Threw-rate → 2: CC Priority (low-speed)

◎ In case of variable sequential ON/OFF function enabled
- FUNCTION Item 7 = ON delay time = 0.00 sec.
- FUNCTION Item 8 = OFF delay time = 0.00 sec.

How to use sequential operation function

■ Basic Operation

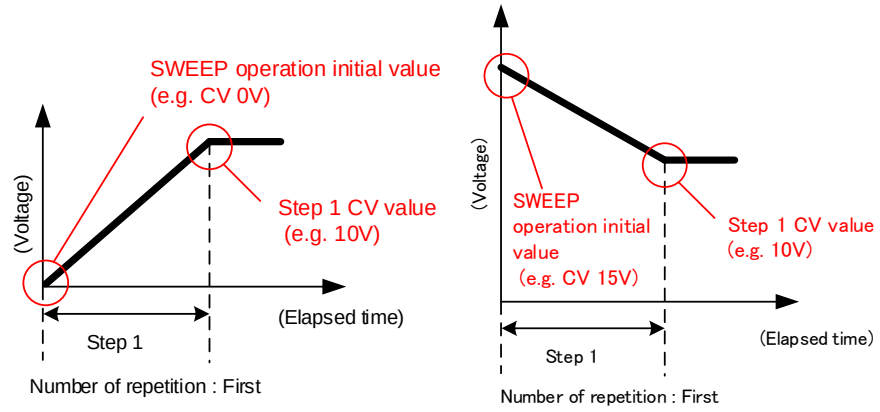
Set initial value of constant voltage (CV) and constant current (CC) at the start of sequential operation function.

- Constant Voltage (CV) setting value : Any voltage
- Constant Current (CC) setting value : Any current

Please refer to page 27 "Use as constant voltage power supply" for constant voltage (CV) setting.
Please refer to page 29 "Use as constant current power supply" for constant current (CC) setting.

MEMO

The set value will be initial value to sweep from the target value for sweep operation



Set value for Over Voltage Protection (OVP) and Over Current Protection (OCP) applying to the sequential operation function.

Please refer to page40 Over Voltage Protection (OVP) and page42 Over Current Protection for setting method.

Press the "FUNC." key

"FUNC" lamp will be lit.

Select enable or disable for sequential operation mode.
Select "100" for parameter with VOLTAGE dial and select the desired sequential operation mode with CURRENT dial.

0 = Sequential operation function is disabled.
1 = Sequential operation function is enabled
(Restart from the beginning after pause of sequential operation)
2＝Sequential operation function is enabled
(Resume from the paused point after pause of sequential operation)

→Continued to next

Set number of repetition for sequential operation mode

Keep the function key "FUNC." pressed and select "101" for parameter with "VOLTAGE" dial and set the desired number of repetition with "CURRENT" dial.

0 - endless repetition
1-9999 = 1-9999 repetitions

Set output state at the end of sequential operation.

Keep the function key "FUNC." pressed and select "102" for parameter with "VOLTAGE" dial and set the desired output state with "CURRENT" dial.

0＝OUT OFF
1 = Keep the output state at the end of sequential operation.

Set Preset CV value, Preset CC value, Control contents, and Control time to the sequential operation for STEP 1.

Keep the function key "FUNC." pressed and select "110" for parameter with "VOLTAGE" dial and set the desired Preset CV value with "CURRENT" dial.

Keep the function key "FUNC." pressed and select "111" for parameter with "VOLTAGE" dial and set the desired Preset CC value with "CURRENT" dial.

Keep the function key "FUNC." pressed and select "112" for parameter with "VOLTAGE" dial and set the desired Control Contents with "CURRENT" dial.

0＝OUT OFF
1＝STEP
2＝SWEEP

Keep the function key "FUNC." pressed and select "113" for parameter with "VOLTAGE" dial and set the desired Control Time (min.) with "CURRENT" dial.

0-9999 min.

Keep the function key "FUNC." pressed and select "114" for parameter with "VOLTAGE" dial and set the desired Control Time (sec.) with "CURRENT" dial.

0～59.9 sec.

→Continued to next

Set Preset CV value, Preset CC value, Control contents, and Control time to the sequential operation after STEP 2.

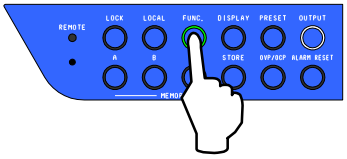
Please refer to page37 FUNCTION setting for sequential function and set same procedures as STEP 1.

MEMO

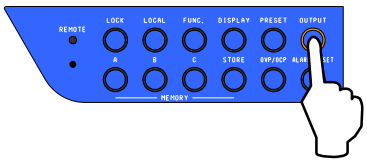
Please set 0 min. 0.0 sec. for STEP 2 to terminate the sequential operation with STEP 1.
If 0 min. 0.0 sec. is set for STEP 2, the setting of the sequential operation after STEP 3 will be disabled.

Once the setting is completed, press "FUNC." again.

" Number Display (Voltage)" and "Number Display (Current)" will be returned to measurement display.



Sequential operation will be started after pressing "OUTPUT" button.



MEMO

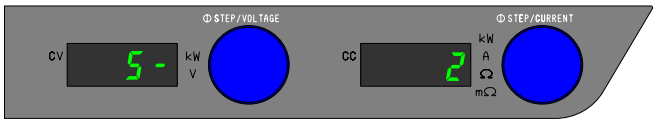
OUTPUT indication will be blinking at Approx. 500mS interval during sequential operation.

Display during sequential operation

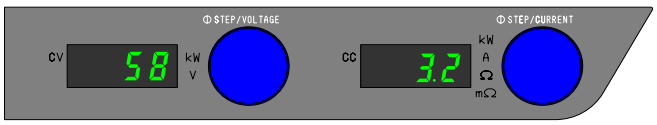
"Number Display (Voltage)" and "Number Display (Current)" will be switched to the followings when "DISPLAY KEY" is pressed during sequential operation.

Normal Operation : "Voltage Measurement Value / Current Measurement Value"
→ "Voltage Measurement Value / Current Measurement Value"
→ "Voltage Measurement Value / Current Measurement Value"
→ (Repetition)

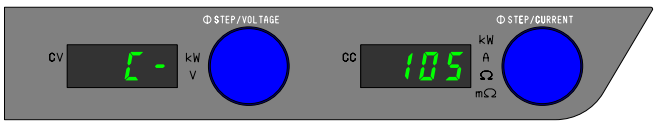
Sequential Operation : "Voltage Measurement Value / Current Measurement Value"
→ "Voltage Measurement Value / Current Measurement Value"
→ "Voltage Measurement Value / Current Measurement Value"
→ "Current Step Number"
→ "Elapsed minute and second of current step"
→ "Current Number of Repetition"
→ (Repetition)



"'Current Step Number" (e.g. step2)



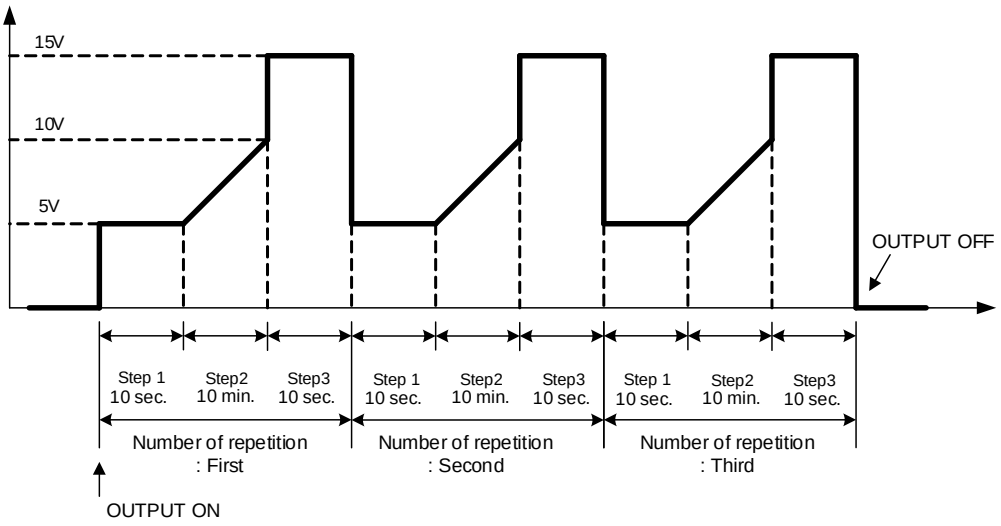
"Elapsed minutes and seconds of current step" (e.g. 58 min. 3.2 sec.)



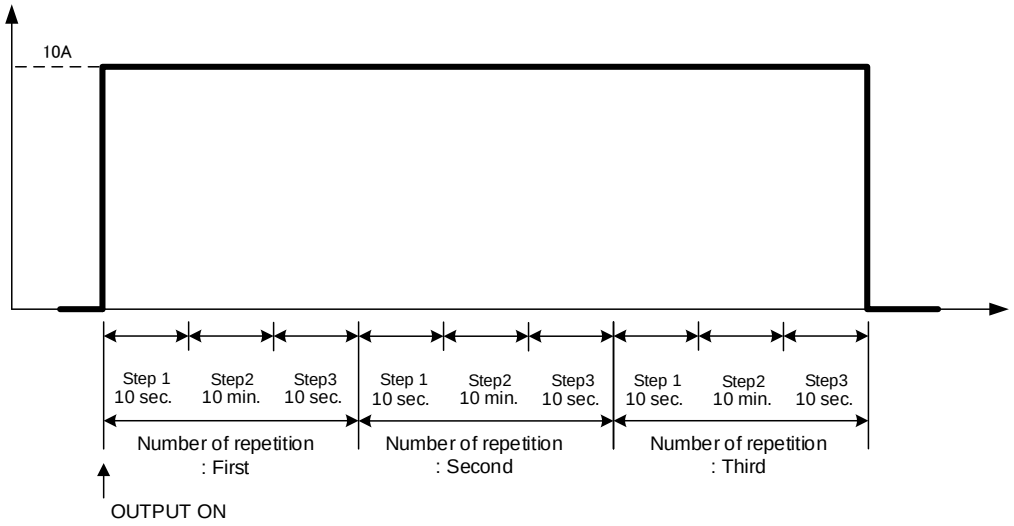
"'Current Number of Repetition" (e.g. 105 times)

e.g. 1 Setting of sequential operation

This page describes FUNCTION setting to create the following setting value.



Constant Voltage (CV) setting value



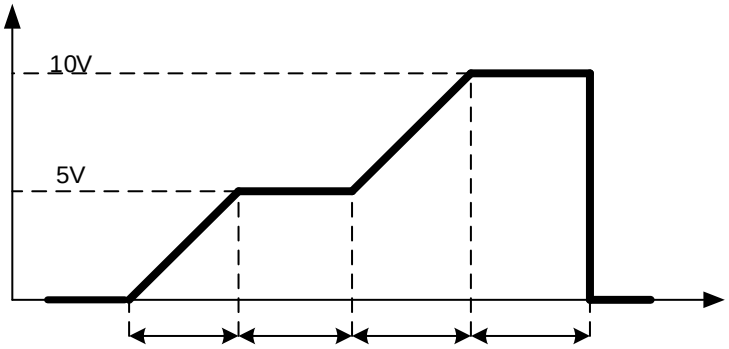
Constant Current (CC) setting value

FUNCTION setting table

Item Number	Setting Item	Parameter	Item Number	Setting Item	Parameter
100	Sequential operation mode	2: Enable (Continue)	116	Sequential operation No.2 Preset CC value	10.0(A)
101	Number of repetition of sequential operation	3	117	Sequential operation No.2 Control contents	2 : SWEEP
102	Output state at the end of sequential operation	0 : OUT OFF	118	Sequential operation No.2 Control Time (min.)	10(min.)
110	Sequential operation No.1 Preset CV value	5(V)	119	Sequential operation No.2 Control Time (0.1 sec.)	0(sec.)
111	Sequential operation No.1 Preset CC value	10.0(A)	120	Sequential operation No.3 Preset CV value	15(V)
112	Sequential operation No.1 Control contents	1 : STEP	121	Sequential operation No.3 Preset CC value	10.0(A)
113	Sequential operation No.1 Control Time (min.)	0(min.)	122	Sequential operation No.3 Control contents	1 : STEP
114	Sequential operation No.1 Control Time (0.1 sec.)	10(sec.)	123	Sequential operation No.3 Control Time (min.)	0(min.)
115	Sequential operation No.2 Preset CV value	10(V)	124	Sequential operation No.3 Control Time (0.1 sec.)	10(sec)

e.g. 2 Setting of sequential operation

This page describes FUNCTION setting to create the following setting value.



Constant Voltage (CV) setting value

Constant Current (CC) setting value

■Power Supply setting：Constant (CV) setting value : 0V
Constant (CC) setting value : 0A

FUNCTION setting table

Item Number	Setting Item	Parameter	Item Number	Setting Item	Parameter
100	Sequential operation mode	2: Enable (Continue)	119	Sequential operation No.2 Control Time (0.1 sec.)	10(sec.)
101	Number of repetition of sequential operation	1	120	Sequential operation No.3 Preset CV value	10(V)
102	Output state at the end of sequential operation	0：OUT OFF	121	Sequential operation No.3 Preset CC value	10.0(A)
110	Sequential operation No.1 Preset CV value	5(V)	122	Sequential operation No.3 Control contents	2：SWEEP
111	Sequential operation No.1 Preset CC value	10.0(A)	123	Sequential operation No.3 Control Time (min.)	0(min.)
112	Sequential operation No.1 Control contents	2：SWEEP	124	Sequential operation No.3 Control Time (0.1 sec.)	10(sec.)
113	Sequential operation No.1 Control Time (min.)	0(min.)	125	Sequential operation No.4 Preset CV value	10(V)
114	Sequential operation No.1 Control Time (0.1 sec.)	10(sec.)	126	Sequential operation No.4 Preset CC value	10.0(A)
115	Sequential operation No.2 Preset CV value	5(V)	127	Sequential operation No.4 Control contents	1：STEP
116	Sequential operation No.2 Preset CC value	10.0(A)	128	Sequential operation No.4 Control Time (min.)	0(min.)
117	Sequential operation No.2 Control contents	1：STEP	129	Sequential operation No.4 Control Time (0.1 sec.)	10(sec.)
118	Sequential operation No.2 Control Time (min.)	0(min.)			

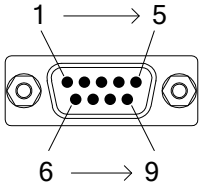
Using Via Digital Data Communication

Summary

Remote control via communication commands can be obtained by connecting the SERIAL I/F 1 connector or SERIAL I/F 2 connector on the rear of the power supply to a communication terminal's COM port of a computer, sequencer, etc. with a RS-232C cross cable or RS-485 compliant cable (full-duplex communication).
Besides, remote control of more than one units using one communication terminal can be realized by multi-connecting a Serial I/F 2 connector. Command forms can be selected from 2 types; command forms in conformance with IEEE488.2 Common Command and SCPI Protocol, or forms in conformance with Takasago HX-S-G Series Commands.

External Control Connector SERIAL I/F 1 Connector Types (RS-232C)

SERIAL I/F 1



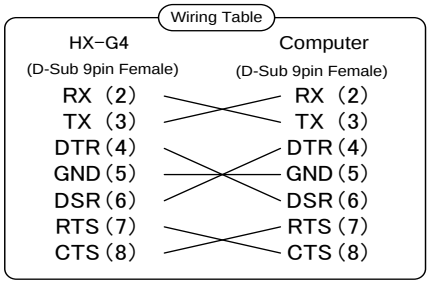
Power supply side: D-SUB9 pin (Male)

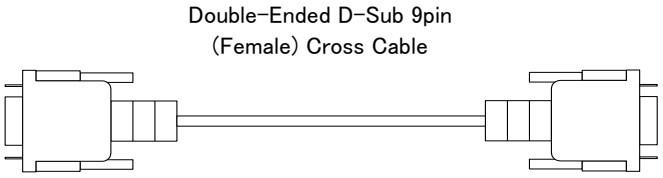
Pin No.	Name	IN/OUT	Pin No.	Name	IN/OUT
1	NC	-	2	RX	IN
3	TX	OUT	4	DTR	OUT
5	GND	-	6	DSR	-
7	RTS	OUT	8	CTS	IN
9	NC	-			

External Control Connector "SERIAL I/F 1" Pin Placement

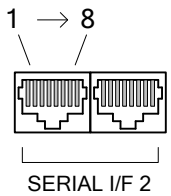
[If connecting with computers, sequencers, etc.]

Use computer serial interface cables (sold in markets) that are wired as shown below.





External Control Connector SERIAL I/F 2 Connector Types (RS-485 compliant)



Power supply side: RJ-45 (Female)

Pin No.	Name	IN/OUT	Pin No.	Name	IN/OUT
1	NC	-	2	NC	-
3	TX+	OUT	4	TX-	OUT
5	RX+	IN	6	RX-	IN
7	NC	-	8	GND	-

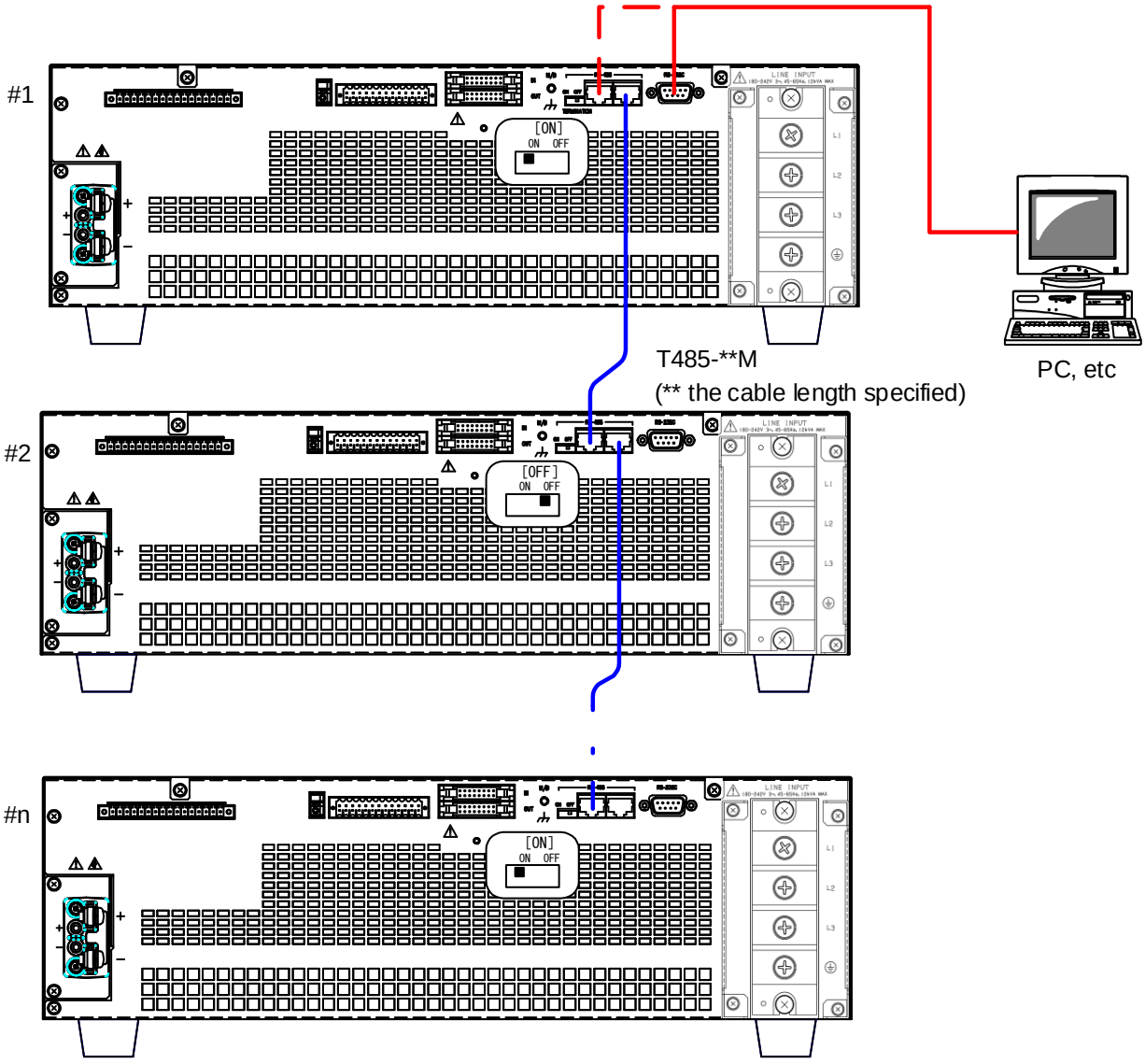
External Control Connector "SERIAL I/F 2" Pin Placement

Multiple Connections

The diagram below shows the connections for controlling multiple HX-S-G4 Series power supplies with one communication terminal including a computer or a sequencer.
By setting each individual address for the HX-S-G4 Series power supplies, it is possible to control up to a maximum of 31 devices with one port.

CAUTION

- When connecting multiple HX-S—G4 Series power supplies, only one communication terminal (computer, etc.) can be connected.
- Be sure to set the device address to 1 if the communication terminal is connected using **RS-232C** "**SERIAL I/F 1**".
- Be sure to set the device address to the one other than 1 if the communication terminal is connected using **RS-485** "**SERIAL I/F 2**".
- Settings can be done under FUNCTION Settings Item 60 “Device Address”.
- Please set the TERMINATION switch to OFF for when there is 2 SERIAL I/F 2 cable connections.
- Please set the TERMINATION switch to ON for when there is none or only one SERIAL I/F 2 cable connection.



Controlling HX-S-G4 Series power supplies on multiple channels via computer

Using via Digital Data Communication

Serial Port Settings

Below are the serial port settings for HX-S-G4 Series power supplies.

Serial Port Settings

Item	Set Value Ranges
Bitrate	2400, 9600, 19200, 38400bps
Data Length	8bit (fixed)
Parity	NOT, ODD, EVEN
Stop Bit	1bit (fixed)
Flow Control	None

* The underlined items are used in the default settings.

Please adjust communication terminal serial port settings with HX-S-G4 power supply serial port settings. Communication cannot be established if settings differ. Set the bitrate and parity under FUNCTION Setting Item 61 "Bitrate" and Item 62 "Parity".
Setting changes will take effect from next startup.

Command Send Interval

When sending commands continuously to the HX-S-G4 power supply due to there being no flow control function, a delay is required on the communication terminal side.
If receiving has failed, the HX-S-G4 Series power supply will return an alarm response.

Alarm response:

HX-S-G4 command system: "ERROR"
HX command system: "ALM128"

Standard command send intervals are shown below.

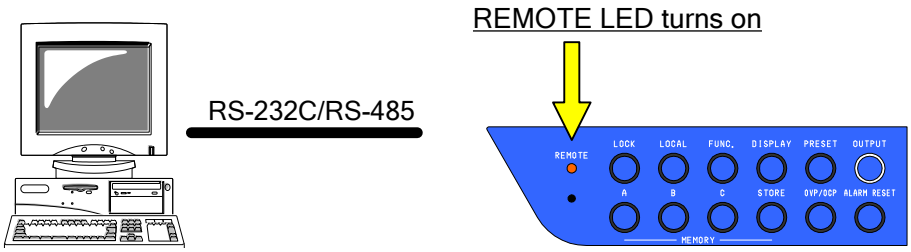
Command Send Intervals

Bitrate	Delay Time
2400bps	200ms
9600bps	50ms
19200bps	40ms
38400bps	20ms

Accessing

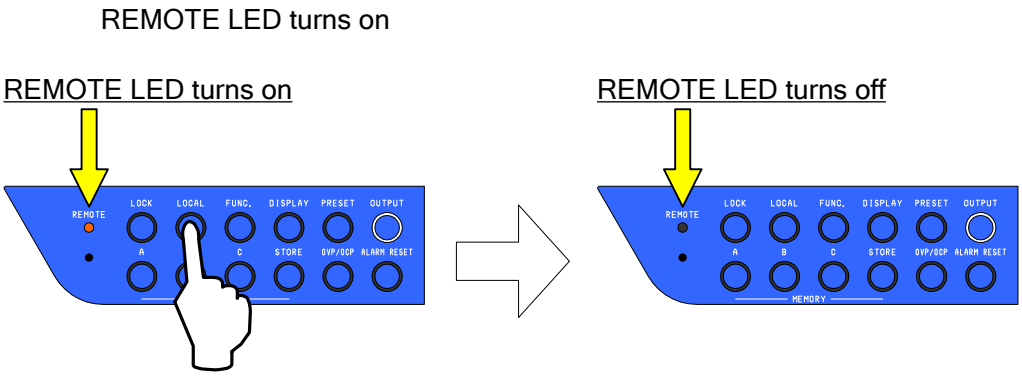
Access Procedure

For controlling via communication commands, match the address assigned by the "Device Address Assign" command with the device address, set under FUNCTION Settings Item 60 "Device Address".
At this point, the front panel "REMOTE" LED will light and control via communication commands will be granted. (hereinafter, "Remote Control Status"). At the same time, control via the front panel will become unable to be accepted. (See diagram below.)
If the set device address differs with the address of the "Device Address Assign" command received, control via communication commands from that point will be released.
Again, when controlling via communication commands, command controls will take effect once the device address has been set with the "Device Address Assign" command.
When returning to Local Control via the front panel from Remote Control Status, press the LOCAL key on the front panel. The REMOTE LED will be turned off and it becomes the local control state.
After this, control via the front panel will be able to be accepted.



Send “A1(CR+LF)”
(Command example when HX Series compatible)

Starting Remote Control



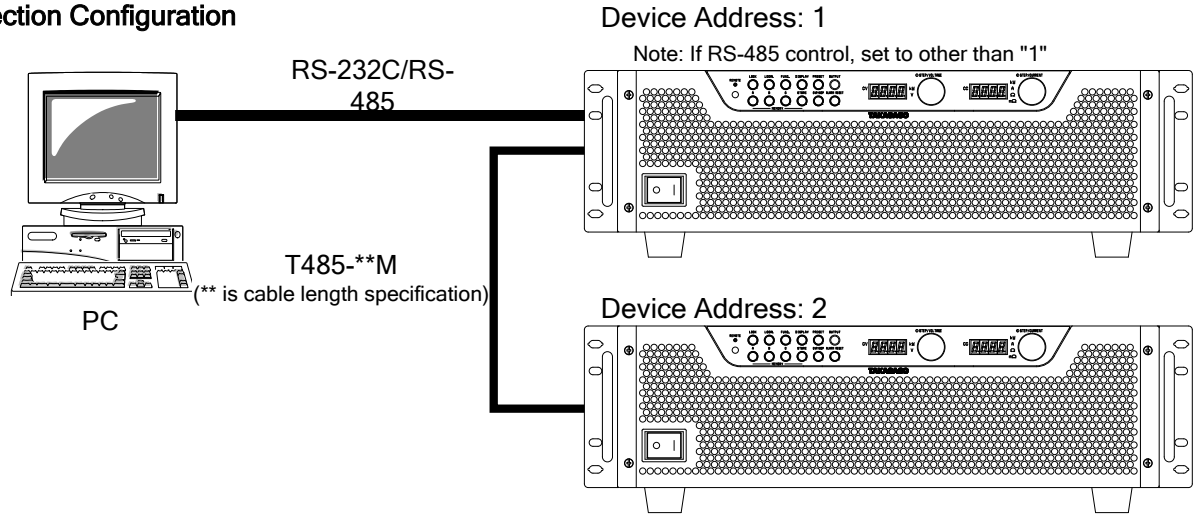
Returning to Local Control from Remote Control

Using via Digital Data Communication

Communication with Multiple Connections

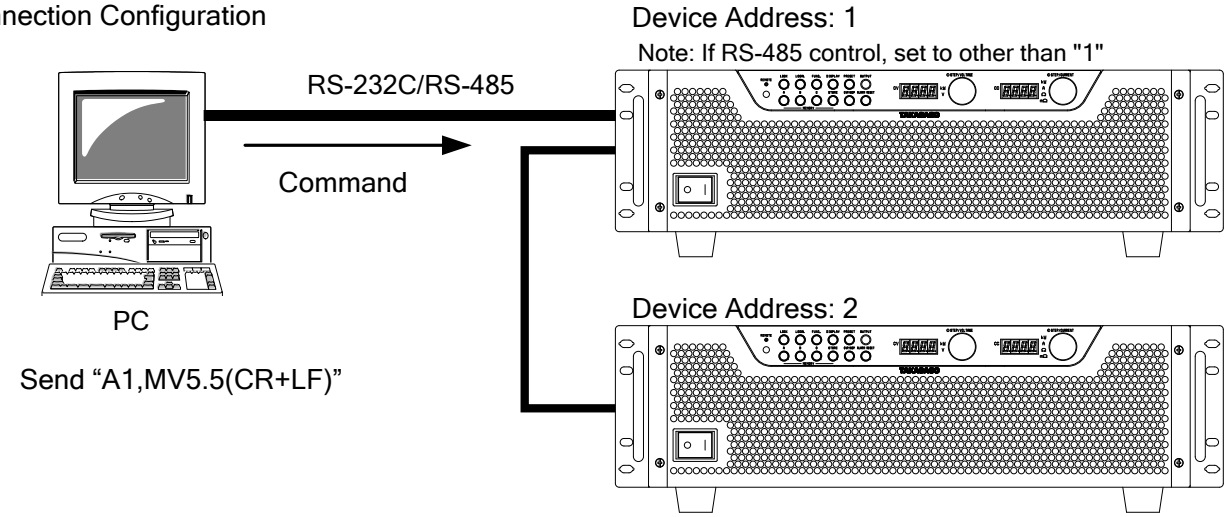
Below are Remote Control examples when connected to two HX-S-G4 Series power supplies.

Connection Configuration



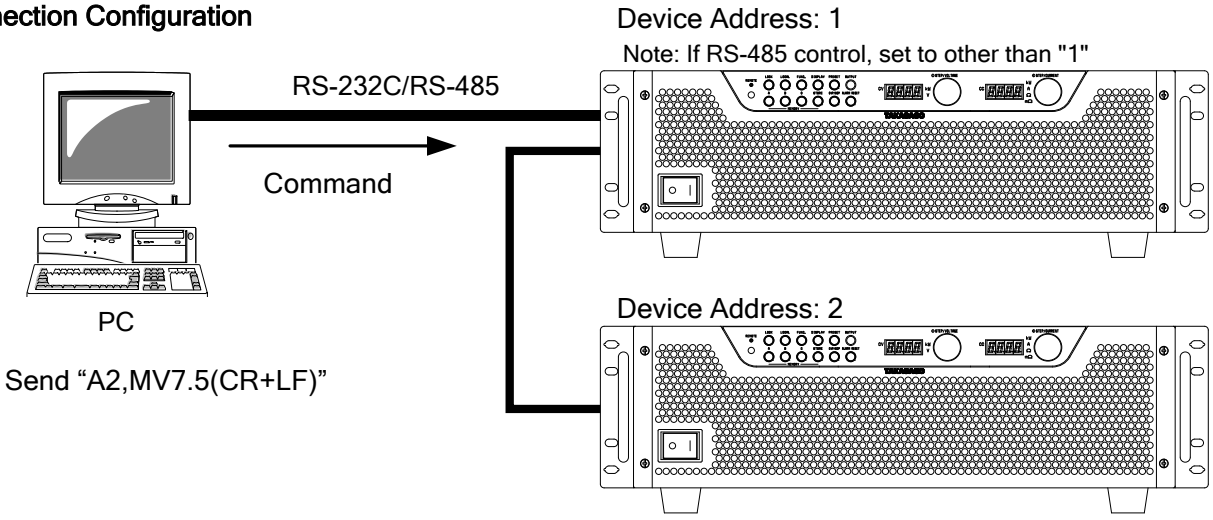
① Set voltage to 5.5V for HX-S-G4 power supply with device address set to 1.

Connection Configuration



② Set voltage to 7.5V for HX-S-G4 power supply with device address set to 2.

Connection Configuration



Communication Commands

Command forms can be selected from 2 types; HX-S-G4 standard command forms in conformance with IEEE488.2 Common Command and SCPI Protocol, or HX command compatible forms in conformance with Takasago HX Series Commands.
Command forms can be selected under FUNCTION Settings Item 63 "Command Forms".
Setting changes will take effect from next startup.

HX-S-G4 Standard Commands

HX-S-G4 Standard commands are commands that conform to IEEE488.2 Common Command (hereinafter, "Common Command") and commands that conform to SCPI Protocols (hereinafter, "SCPI commands").

HX-S-G4 Standard Command Format

Command Description Basics

All commands and responses are ASCII character strings.
One character space " " is required between command words and parameters.
<Ex.>
ADDRess 1

Within text, command word stands for command characters such as ADDRess, OUTPut, etc.
Further, program message stands for a series of strings to be sent such as ALM:CONTain:CC, etc.

QUERY Command

Within commands there are two types, SET commands and QUERY commands. SET commands are commands which set the parameters. QUERY commands are commands which request the current set values. QUERY commands are discriminated by the "?" placed at the end of the command word.
<Ex.>
OUTPut?

OPTION Command

Within command words are OPTION commands which can be omitted. Inside this text, OPTION commands are represented by surrounding brackets ( ). Be careful not to include these brackets when sending commands.
<Ex.>
Below 2 commands are the same commands:
OUTPut
OUTPut[:STAT]

Upper and Lower-Case Sensitive

Common Commands and SCPI Commands are not case-sensitive.

<Ex.>

OUTPUT
Output
Outp
OUTP
OUTPut

Short Form & Long Form

SCPI Command has two forms; abbreviated (Short) and normal (Long) form. Command words must use either of the two forms. If neither are used an error will occur and the command will not be executed.

<Ex.>

OUTPut	Long Form
OUTP	Short Form
OUTPut[:STAT]	Combination of Long and Short Form
OUTPu	Recognized as illegal command

Inputting SCPI Commands

SCPI commands use the following hierarchical structure.

<Ex.>

ALM	Root Command
:CLEar	Command
:CONTain	Pass Command
:CC <NRf>	Command & Parameters (NRf is a numeric parameter. Omit <> when inputting.)
:CV?	Query Command

The program message must begin with the root command with the OPTION command that can be omitted. If root commands are an OPTION command, the next level command is processed as a root command.

A colon (:) can be placed at the beginning of the program message.

<Ex.>

Below 2 commands are the same commands:
stat:pres
:stat:pres

Multiple program messages can be connected by separating them with semi-colons (;).

<Ex.>

ALM:CLEar;:ALM:CONTain:CC <NRf>

⇒Continued on next page

Further, when using semi-colons, if there are commands of the same command level, the root command can be omitted.

<Ex.>

Due to there being a command within the same level, everything after CONTain is executed.
ALM:CLEar;CONTain:CC <NRf>

When a colon " : " is detected in the program message, the command level is moved to the next level. If a colon " : " is detected right after a semi-colon " ; ", the pass pointer is reset to the root level. If there is no colon after a semi-colon to connect the characters, the root is interpreted to be omitted. If there is a colon after a semi-colon, then the root is interpreted to be reset.

<Ex.>

Due there being no colon after the semi-colon, the command level for everything after the semi-colon is interpreted as ALM:. Since there is no ALM command after ALM:, it is interpreted as an error.
ALM:CLEar;ALM:CONTain:CC <NRf>

Common Commands can be inputted so that they are not affected by the SCPI Command's pass pointer. Further, pass pointers also will not be affected by Common Commands.

<Ex.>

ALM:CLEAR;*IDN?;CONTAIN:CC?

Delimiter

Please attach any of the following to the end of the program message; CR/LF/CR+LF (CR:Carriage Return(0x0d), LF:Line Feed 0x0A).

Executing Commands

Commands will be executed in the order in which they appear in the program message.
Invalid commands are interpreted as errors and will not be executed.
If valid and invalid commands are included in a multi-command program message, valid commands will be executed immediately before invalid commands are detected. Everything after an invalid command is ignored even if it includes valid commands.

<Ex.>

Everything up to ALM:CLEar is a valid command so it is executed; everything after becomes an invalid command and is ignored.
ALM:CLEar;:ALM:CONTain:CC <NRf>

Assigning Device Address

All program messages being received are ignored if the device address is not assigned.
The device address only needs to be assigned once, once assigned it can be omitted.

<Ex.>

The device address is assigned to 1 for the first time, all commands then after are executed for the device address 1 HX-S-G4 power supply.
ADDRess 1;:ALM:CLEar;CONTain:CC <NRf>
ALM:CONTain:CV?

Acknowledge Message

When a normal command is received, returns "OK". When an abnormal command is received, returns "Error".
Settings can be set, via command, so that no return is received when normal.
(When receiving QUERY commands, the response message becomes the Acknowledge Message.)

HX-S-G4 Standard Command Details

IEEE488.2 Common Command

This section explains about the commands which conform to IEEE488.2 Common Command.

Common Command List

Command Name	Summary	Command Type
*IDN	Requests device information	QUERY Only
*RST	Resets set parameters	SET Only

*IDN: Identification Query

Function: Retrieves device information (Name of Manufacturer, Name of Model, Software Version)
Format: *IDN?
Type: QUERY command only
Response: Name of Manufacturer, Name of Model, Software Version

<Ex> full specification / Isolated OP attached
*IDN?
TAKASAGO,HX-S-G2FI_60V-12000W,000000000000,FW_VER1.03

*RST: Resets set parameters

Function: Resets set parameters (Factory Default Settings)
Format: *RST
Type: SET command only
No parameters

<Ex.>
*RST

SCPI Command

This section explains about commands which conform to SCPI Protocol.

ADDRess Level

ADDRess level command is used only for assigning the device address.

Command Name	Summary	Command Type
ADDRess	Assigning Device Address	SET Only

ADDRess: Assigns Device Address

Function: Assigns the device address for HX-S-G4 power supplies.
Format: ADDRess <NRf>
Type: SET command only
Range: 0~50
Address 0 is a global address. Assign addresses to all multi-connected HX-S-G4 Series DC power supplies.
Once the global address is assigned, only Output ON/OFF Toggle SET command "OUTPut[:STATe]" is valid.
Further, no Acknowledge Responses will be sent only while the global address is assigned.

CAUTION

Please take note that the address of the HX-S-G4 power supply is not duplicated in the same system.

<Ex.>
ADDR 1

ALM Level

ALM level command corresponds to external output settings for alarm reset and status information.

Command Name	Summary	Command Type
ALM	-	-
:CLEar	Executes alarm reset	SET Only
:CONTain	-	-
:CC	Sets whether to include CC_STS in LEVEL1_ALM or not	Both
:CV	Sets whether to include CV_STS in LEVEL1_ALM or not	Both

ALM:CLEar: Executes Alarm Reset

Function: Executes alarm reset (Cancels generated Over Voltage/Over Current alarm)
Format: ALM:CLEar
Type: SET command only
No parameters
<Ex.>

```
ALM:CLE
```

CAUTION

Important note: Please perform alarm reset after removing the cause without fail.

ALM:CONTain:CC:Sets whether to contain CC_STS in LEVEL1_ALM

Function: Sets whether to contain CC_STS status in LEVEL1_ALM output condition.
Same as FUNCTION Settings Item 75
Format: ALM:CONTain:CC <NRf>
Type: SET command, QUERY command
Parameters: 0: Does not include in LEVEL1_ALM
1: Includes in LEVEL1_ALM
Response: 0, 1
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· If analog option is not attached
· While operating as a parallel operation slave unit

<Ex.>

```
ALM:CONT:CC 1
ALM:CONT:CC?
1
```

ALM:CONTain:CV:Sets whether to contain CV_STS in LEVEL1_ALM

Function:	Sets whether to contain CV_STS status in LEVEL1_ALM output condition. Same as FUNCTION Settings Item 74
Format:	ALM:CONTain:CV <NRf>
Type:	SET command, QUERY command
Parameters:	0: Does not include in LEVEL1_ALM 1: Includes in LEVEL1_ALM
Response:	0, 1
Restrictions:	Alarm response is returned for normal SET commands in the following conditions · If analog option is not attached · While operating as a parallel operation slave unit

<Ex.>

```
ALM:CONT:CV 0
ALM:CONT:CV?
0
```

OUTPut Level

OUTPut level command corresponds to functions concerning output control.

Command Name	Summary	Command Type
OUTPut	-	-
:DELay	-	-
:ON	Sets Output ON Delay Time	Both
:OFF	Sets Output OFF Delay Time	Both
:EXTernal	-	-
:MODE	Sets operation mode for output control at External Contact	Both
:HOT	Sets output status when POWER is ON	Both
:MODE	Sets Startup Mode	Both
[:STATe]	Sets Output ON/OFF	Both

OUTPut:DELay:ON:Sets Output ON Delay Time

Function: Sets Output ON Delay Time
Same as FUNCTION Settings Item 7
Format: OUTPut:DELay:ON <NRf>
Type: SET command, QUERY command
Parameter: 0.00 to 99.99
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
OUTP:DEL:ON 12.34
OUTP:DEL:ON?
12.34

OUTPut:DELay:OFF:Sets Output OFF Delay Time

Function: Sets Output OFF Delay Time
Same as FUNCTION Settings Item 8
Format: OUTPut:DELay:OFF <NRf>
Type: SET command, QUERY command
Parameter: 0.00 to 99.99
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
OUTP:DEL:OFF 56.78
OUTP:DEL:OFF?
56.78

OUTPut:EXTernal:MODE:Sets operation mode for Output Control at External Contact Points

Function: Sets operation mode for Output Control at External Contact Points
Same as FUNCTION Settings Item 10
Format: OUTPut:EXTernal:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Invalid
1: When close Output is ON, When open Output is OFF
2: When close normal operation, When open Output is OFF
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit
· While operating as a series operation slave unit

<Ex.>
OUTP:EXT:MODE 1
OUTP:EXT:MODE?
1

OUTPut:HOT: Sets Output status while POWER is ON

Function: Sets Output status while POWER is ON
Same as FUNCTION Settings Item 51
Format: OUTPut:HOT <NRf>
Type: SET command, QUERY command
Parameters: 0: OFF
1: MODE1(HOT START)
HOT START is valid also when recovered from ALM or TRIP
2: MODE2(HOT START)
Powers up with OUTPUT status OFF when recovered from ALM or TRIP
HOT START is valid again on next startup.
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
OUTP:HOT 1
OUTP:HOT?
1

OUTPut:MODE:Sets Startup Mode

Function: Sets the Output Startup Mode
Same as FUNCTION Settings Item 1
Format: OUTPut:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0=CV Priority, (High Speed)
1=CV Priority (Medium Speed)
2=CV Priority (Low Speed)
3=CV Slew Rate
4=CC Priority (High Speed)
5=CC Priority (Medium Speed)
6=CC Priority (Low Speed)
7=CC Slew Rate
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
OUTP:MODE 3
OUTP:MODE?
3

OUTPut[:STATe]:Sets Output ON/OFF

Function: Sets the Output ON/OFF
Format: OUTPut[:STATe] <String>
Type: SET command, QUERY command
Parameters: ON: Output ON
OFF: Output OFF
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
OUTP ON
OUTP?
ON

MEASure Level

MEASure level command corresponds to functions concerning measurement, such as retrieving voltage and current measurements.

Command Name	Summary	Command Type
MEASure	-	-
:CORRection	-	-
:MODE	Sets operation mode for the Linear Compensation Function	Both
:MVAV	Sets Moving Average process for measurement values	Both
[:SCALar]	-	-
:CURRent	-	-
[:DC]	Retrieves current measurement values	QUERY Only
:VOLTage	-	-
[:DC]	Retrieves voltage measurement values	QUERY Only
:POWer	-	-
[:DC]	Retrieves power measurement values	QUERY Only

MEASure:CORRection:MODE:Sets operation mode for the Linearity Compensation Function

Function: Sets the operation mode for the Linearity Compensation Function
Same as FUNCTION Settings Item 12
Format: MEASure:CORRection:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Compensation OFF
1: Executes only when Output is toggled ON/OFF or when there is a setting change
2: Continual compensates
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
MEAS:CORR:MODE 0
MEAS:CORR:MODE?
0

MEASure:MVAV:Sets Moving Average process for Measurement Values

Function: Sets the Moving Average process for Measurement Values
Same as FUNCTION Settings Item 11
Format: MEASure:MVAV <NRf>
Type: SET command, QUERY command
Parameters: 0: Moving Average for measured value is not processed
1: Moving Average for measured value is processed
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
MEAS:MVAV 0
MEAS:MVAV?
0

MEASure[:SCALar]:CURRent[:DC]:Retrieves Current Measurement Values

Function: Retrieves current measurement values.
Format: MEASure[:SCALar]:CURRent[:DC]?
Type: QUERY command only
Response: Returns same resolution data as the Ammeter
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
MEAS:CURR?
100.0

MEASure[:SCALar]:VOLTage[:DC]:Retrieves Voltage Measurement Values

Function: Retrieves voltage measurement values
Format: MEASure[:SCALar]:VOLTage[:DC]?
Type: QUERY command only
Response: Returns same resolution data as the Voltmeter
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
MEAS:VOLT?
60.00

MEASure[:SCALar]:POWer[:DC]:Retrieves Power Measurement Values

Function:	Retrieves electric power measurement values
Format:	MEASure[:SCALar]:POWer[:DC]?
Type:	QUERY command only
Response:	Returns same resolution data as the power meter
Restrictions:	Alarm response is returned for normal SET commands in the following conditions · While operating as a parallel operation slave unit

<Ex.>

MEAS:POW?
6.000

SOURce Level

SOURce level command corresponds to functions concerning output settings, such as settings for voltage and current values.

Command Name	Summary	Command Type
[SOURce]	-	-
:CURRent	-	-
[:LEVel]	-	-
[:IMMediate]	-	-
[:AMPLitude]	Sets Output Current	Both
:PROTection	-	-
[:LEVel]	Sets OCP Current	Both
:SLEW	-	-
:RISing	Sets CC Slew Rate Rising	Both
:FALLing	Sets CC Slew Rate Falling	Both
:MEMory	-	-
:RECall	Loads from Panel Memory	SET Only
:MODE	Sets Loading Order for Panel Memory	Both
:STORe	Saves to Panel Memory	SET Only
:RESistance	-	-
[:LEVel]	-	-
[:IMMediate]	-	-
[:AMPLitude]	Sets Internal Resistance	Both
:VOLTage	-	-
[:LEVel]	-	-
[:IMMediate]	-	-
[:AMPLitude]	Sets Output Voltage	Both
:PROTection	-	-
[:LEVel]	Sets OVP Voltage	Both
:SLEW	-	-
:RISing	Sets CV Slew Rate Rising	Both
:FALLing	Sets CV Slew Rate Falling	Both

[SOURce]:CURRent[:LEVel][:IMMediate][:AMPLitude]: Sets Output Current

Function: Sets the output current
Format: [SOURce]:CURRent[:LEVel][:IMMediate][:AMPLitude] <NRf>
Type: SET command, QUERY command
Parameters: Range varies depending on the total output capacity of the parallel connection.
Response: Same as parameters

Model(Type) / Total Output Capacity	Output Current(A) Ranges			
	30V Output Type	60V Output Type	500V Output Type	1000V Output Type
6kW	0.0 to 210.0	0.0 to 105.0	0.00 to 12.60	0.00 to 6.300
12kW	0.0 to 420.0	0.0 to 210.0	0.00 to 25.20	0.00 to 12.60
18kW	0.0 to 630.0	0.0 to 315.0	0.00 to 37.80	0.00 to 18.90
24kW	0.0 to 840.0	0.0 to 420.0	0.00 to 50.40	0.00 to 25.20
30kW	0 to 1050	0.0 to 525.0	0.00 to 63.00	0.00 to 31.50
36kW	0 to 1260	0.0 to 630.0	0.00 to 75.60	0.00 to 37.80
42kW	0 to 1470	0.0 to 735.0	0.00 to 88.20	0.00 to 44.10
48kW	0 to 1680	0.0 to 840.0	0.0 to 100.8	0.0 to 50.40
54kW	0 to 1890	0.0 to 945.0	0.0 to 113.4	0.0 to 56.70
60kW	0 to 2100	0 to 1050	0.0 to 126.0	0.0 to 63.00
66kW	0 to 2310	0 to 1155	0.0 to 138.6	0.0 to 69.30
72kW	0 to 2520	0 to 1260	0.0 to 151.2	0.0 to 75.60
78kW	0 to 2730	0 to 1365	0.0 to 163.8	0.0 to 81.90
84kW	0 to 2940	0 to 1470	0.0 to 176.4	0.0 to 88.20
90kW	0 to 3150	0 to 1575	0.0 to 189.0	0.0 to 94.50
96kW	0 to 3360	0 to 1680	0.0 to 201.6	0.0 to 100.8
102kW	0 to 3570	0 to 1785	0.0 to 214.2	0.0 to 107.1
108kW	0 to 3780	0 to 1890	0.0 to 226.8	0.0 to 113.4
114kW	0 to 3990	0 to 1995	0.0 to 239.4	0.0 to 119.7
120kW	0 to 4200	0 to 2100	0.0 to 252.0	0.0 to 126.0

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
CURR 400.0
CURR?
400.0

[SOURce]:CURRent:PROTection[:LEVel]:Sets OCP Current

Function: Sets the over current (OCP).
Format: [SOURce]:CURRent:PROTection[:LEVel] <NRf>
Type: SET command, QUERY command
Parameters: Range varies depending on the total output capacity of the parallel connection.
Response: Same as parameters

Model(Type) / Total Output Capacity	Output Current Ranges (A)			
	30V Output Type	60V Output Type	500V Output Type	1000V Output Type
6kW	2.0 to 220.0	1.0 to 110.0	0.12 to 13.20	0.060 to 6.600
12kW	4.0 to 440.0	2.0 to 220.0	0.24 to 26.40	0.12 to 13.20
18kW	6.0 to 660.0	3.0 to 330.0	0.36 to 39.60	0.18 to 19.80
24kW	8.0 to 880.0	4.0 to 440.0	0.48 to 52.80	0.24 to 26.40
30kW	10.0 to 1100	5.0 to 550.0	0.60 to 66.00	0.30 to 33.00
36kW	12.0 to 1320	6.0 to 660.0	0.72 to 79.20	0.36 to 39.60
42kW	14.0 to 1540	7.0 to 770.0	0.84 to 92.40	0.42 to 46.20
48kW	16.0 to 1760	8.0 to 880.0	1.0 to 105.6	0.48 to 52.80
54kW	18.0 to 1980	9.0 to 990.0	1.1 to 118.8	0.54 to 59.40
60kW	20.0 to 2200	10.0 to 1100	1.1 to 132.0	0.60 to 66.00
66kW	22.0 to 2420	11.0 to 1210	1.3 to 145.2	0.66 to 72.60
72kW	24.0 to 2640	12.0 to 1320	1.4 to 158.4	0.72 to 79.20
78kW	26.0 to 2860	13.0 to 1430	1.6 to 171.6	0.78 to 85.80
84kW	28.0 to 3080	14.0 to 1540	1.7 to 184.8	0.84 to 92.40
90kW	30.0 to 3300	15.0 to 1650	1.8 to 198.0	0.90 to 99.00
96kW	32.0 to 3520	16.0 to 1760	1.9 to 211.2	1.0 to 105.6
102kW	34.0 to 3740	17.0 to 1870	2.0 to 224.4	1.0 to 112.2
108kW	36.0 to 3960	18.0 to 1980	2.2 to 237.6	1.1 to 118.8
114kW	38.0 to 4180	19.0 to 2090	2.3 to 250.8	1.1 to 125.4
120kW	40.0 to 4400	20.0 to 2200	2.4 to 264.0	1.2 to 132.0

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
CURR:PROT 440.0
CURR:PROT?
440.0

[SOURce]:CURRent:SLEW:RISing: Sets the CC Slew Rate Rising

Function: Sets the CC slew rate for rising.
Same as FUNCTION Settings Item 4
Format: [SOURce]:CURRent:SLEW:RISing <NRf>
Type: SET command, QUERY command
Parameters: Range varies depending on the total output capacity of the parallel connection.
Response: Same as parameters

Model(Type) / Total Output Capacity	Output Current Ranges (A)			
	30V Output Type	60V Output Type	500V Output Type	1000V Output Type
6kW	0.0 to 400.0	0.0 to 200.0	0.01 to 24.00	0.060 to 6.600
12kW	0.0 to 800.0	0.0 to 400.0	0.01 to 48.00	0.12 to 13.20
18kW	0 to 1200	0.0 to 600.0	0.01 to 72.00	0.18 to 19.80
24kW	0 to 1600	0.0 to 800.0	0.01 to 96.00	0.24 to 26.40
30kW	0 to 2000	0 to 1000	0.1 to 120.0	0.30 to 33.00
36kW	0 to 2400	0 to 1200	0.1 to 144.0	0.36 to 39.60
42kW	0 to 2800	0 to 1400	0.1 to 168.0	0.42 to 46.20
48kW	0 to 3200	0 to 1600	0.1 to 192.0	0.48 to 52.80
54kW	0 to 3600	0 to 1800	0.1 to 216.0	0.54 to 59.40
60kW	0 to 4000	0 to 2000	0.1 to 240.0	0.60 to 66.00
66kW	0 to 4400	0 to 2200	0.1 to 264.0	0.66 to 72.60
72kW	0 to 4800	0 to 2400	0.1 to 288.0	0.72 to 79.20
78kW	0 to 5200	0 to 2600	0.1 to 312.0	0.78 to 85.80
84kW	0 to 5600	0 to 2800	0.1 to 336.0	0.84 to 92.40
90kW	0 to 6000	0 to 3000	0.1 to 360.0	0.90 to 99.00
96kW	0 to 6400	0 to 3200	0.1 to 384.0	1.0 to 105.6
102kW	0 to 6800	0 to 3400	0.1 to 408.0	1.0 to 112.2
108kW	0 to 7200	0 to 3600	0.1 to 432.0	1.1 to 118.8
114kW	0 to 7600	0 to 3800	0.1 to 456.0	1.1 to 125.4
120kW	0 to 8000	0 to 4000	0.1 to 480.0	1.2 to 132.0

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
CURR:SLEW:RIS 400.0
CURR:SLEW:RIS?
400.0

[SOURce]:CURRent:SLEW:FALLing: Sets CC Slew Rate Falling

Function: Sets the CC slew rate for falling.
Same as FUNCTION Settings Item 5
Format: [SOURce]:CURRent:SLEW:FALLing <NRf>
Type: SET command, QUERY command
Parameters: Range varies depending on the total output capacity of the parallel connection.
See CC Slew Rate Ranges for range settings.
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
CURR:SLEW:FALL 400.0
CURR:SLEW:FALL?
200.0

[SOURce]:MEMory:RECall: Loads from Panel Memory

Function: Loads from panel memory(A/B/C)
Format: [SOURce]:MEMory:RECall <String>
Type: SET command only
Parameters: A: Loads from panel memory A and overwrites current settings
B: Loads from panel memory B and overwrites current settings
C: Loads from panel memory C and overwrites current settings

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
MEM:REC A

[SOURce]:MEMory:RECall:MODE: Sets Load Order for Panel Memory

Function: Sets the order of loading for panel memory(A/B/C)
Same as FUNCTION Settings Item 54
Format: [SOURce]:MEMory:RECall:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Determines by Single-Action
1: Determines by Double-Action
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
MEM:REC:MODE 1
MEM:REC:MODE?
1

[SOURce]:MEMory:STORe: Saves to Panel Memory

Function: Saves to panel memory(A/B/C)
Format: [SOURce]:MEMory:STORe <String>
Type: SET command only
Parameters: A: Overwrites current settings to panel memory A
B: Overwrites current settings to panel memory B
C: Overwrites current settings to panel memory C

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
MEM:STOR A

[SOURce]:RESistance[:LEVel][:IMMediate][:AMPLitude]: Sets internal resistance

Function: Sets the internal resistance
Format: [SOURce]:RESistance[:LEVel][:IMMediate][:AMPLitude] <NRf>
Type: SET command, QUERY command
Parameters: Range varies on the model and the number of parallel connected devices
Response: Same as parameters

Model(Type) / Total Output Capacity	30V Output Type		60V Output Type		500V Output Type		1000V Output Type	
	Internal Resistance(mΩ) Ranges	Internal Resistance Resolution (mΩ)	Internal Resistance(mΩ) Ranges	Internal Resistance Resolution (mΩ)	Internal Resistance(Ω) Ranges	Internal Resistance Resolution (Ω)	Internal Resistance(Ω) Ranges	Internal Resistance Resolution (Ω)
6kW	0 to 150	2	0 to 600	5	0 to 41.7	0.5	0 to 167	2
12kW	0 to 75.0	0.5	0 to 300	2	0 to 20.8	0.2	0 to 83	1
18kW	0 to 50.0	0.5	0 to 200	2	0 to 13.9	0.2	0 to 55.6	0.5
24kW	0 to 37.5	0.2	0 to 150	2	0 to 10.4	0.1	0 to 41.7	0.5
30kW	0 to 30.0	0.2	0 to 120	1	0 to 8.3	0.1	0 to 33.3	0.2
36kW	0 to 25.0	0.2	0 to 100	1	0 to 6.94	0.05	0 to 27.8	0.2
42kW	0 to 21.4	0.2	0 to 86	1	0 to 5.95	0.05	0 to 23.8	0.2
48kW	0 to 18.8	0.2	0 to 75.0	0.5	0 to 5.21	0.05	0 to 20.8	0.2
54kW	0 to 16.7	0.2	0 to 66.7	0.5	0 to 4.63	0.05	0 to 18.5	0.2
60kW	0 to 15.0	0.2	0 to 60.0	0.5	0 to 4.17	0.05	0 to 16.7	0.2
66kW	0 to 13.6	0.2	0 to 54.5	0.5	0 to 3.79	0.02	0 to 15.2	0.2
72kW	0 to 12.5	0.1	0 to 50.0	0.5	0 to 3.47	0.02	0 to 13.9	0.2
78kW	0 to 11.5	0.1	0 to 46.2	0.5	0 to 3.21	0.02	0 to 12.8	0.2
84kW	0 to 10.7	0.1	0 to 42.9	0.5	0 to 2.98	0.02	0 to 11.9	0.1
90kW	0 to 10.0	0.1	0 to 40.0	0.5	0 to 2.78	0.02	0 to 11.1	0.1
96kW	0 to 9.4	0.1	0 to 37.5	0.2	0 to 2.60	0.02	0 to 10.4	0.1
102kW	0 to 8.8	0.1	0 to 35.3	0.2	0 to 2.45	0.02	0 to 9.8	0.1
108kW	0 to 8.3	0.1	0 to 33.3	0.2	0 to 2.31	0.02	0 to 9.3	0.1
114kW	0 to 7.9	0.1	0 to 31.6	0.2	0 to 2.19	0.02	0 to 8.8	0.1
120kW	0 to 7.50	0.05	0 to 30.0	0.2	0 to 2.08	0.02	0 to 8.3	0.1

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
RES 150
RES?
150

[SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]: Sets output voltage

Function: Sets the output voltage
Format: [SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude] <NRf>
Type: SET command, QUERY command
Parameter: 30VType: 0.00 to 31.50/ 60VType: 0.00 to 63.00/ 500VType: 0.0 to 525/ 1000VType: 0 to 1050
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
VOLT 30
VOLT?
30.00

[SOURce]:VOLTage:PROTection[:LEVel]: Sets OVP voltage

Function: Sets the OVP voltage
Format: [SOURce]:VOLTage:PROTection[:LEVel] <NRf>
Type: SET command, QUERY command
Parameter: 30VType: 0.30 to 33.00/ 60VType: 0.60 to 66.00/ 500VType: 5.0 to 550.0/ 1000VType: 1 to 1100
Response: Same as parameters
Restrictions: Alarm response is returned for normal SET commands in the following conditions
· While operating as a parallel operation slave unit

<Ex.>
VOLT:PROT 33
VOLT:PROT?
33.00

[SOURce]:VOLTage:SLEW:RISing: Sets CV Slew Rate Rising

Function: Sets the CV slew rate for rising.
Same as FUNCTION Settings Item 2
Format: [SOURce]:VOLTage:SLEW:RISing <NRf>
Type: SET command, QUERY command
Parameter: 30VType: 0.01 to 60.00/ 60VType:0.1 to 120.0/ 500VType: 1 to 1000/ 1000VType: 1 to 2000
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
VOLT:SLEW:RIS 60.0
VOLT:SLEW:RIS?
60.0

[SOURce]:VOLTage:SLEW:FALLing: Sets CV Slew Rate Falling

Function: Sets the CV slew rate for falling.
Same as FUNCTION Settings Item 3
Format: [SOURce]:VOLTage:SLEW:FALLing <NRf>
Type: SET command, QUERY command
Parameter: 30VType: 0.01 to 60.00/ 60VType:0.1 to 120.0/ 500VType: 1 to 1000/ 1000VType: 1 to 2000
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
· Cases other than full-featured type "model name with F"
· While operating as a series operation slave unit
· While operating as a parallel operation slave unit

<Ex.>
VOLT:SLEW:FALL 0.1
VOLT:SLEW:FALL?
0.1

STATus Level

STATus level command corresponds to retrieving status information.

Command Name	Summary	Command Type
STATus	-	-
:MEASure	-	-
:CONDition	Retrieves Power Supply Status	QUERY Only
:OUTPut	—	—
:MODE	Selection of status output function	Both

⇒Continued on next page

STATus:MEASure:CONDition: Retrieves Power Supply Status

Function: Retrieves the status of the power supply
Format: STATus:MEASure:CONDition?
Type: QUERY command only
Response: 3 byte 16-base data

Power Supply Bit List

Bit	Status Name	Summary	1	0
23	P-ON(D)_STS	Internal power unit (D) P-ON status * 12 kW type only	Power unit power-on	Power unit power-off
22	P-ON(C)_STS	Internal power unit (D) P-ON status * 12 kW type only	Power unit power-on	Power unit power-off
21	P-ON(B)_STS	Internal power unit (B) P-ON status	Power unit power-on	Power unit power-off
20	P-ON(A)_STS	Internal power unit (A) P-ON status	Power unit power-on	Power unit power-off
19	ISO_OPTHION_MOUNT	Isolated Option Mounting Status	Yes	None
18	Not Used	Always 0	-	-
17	EXT_TRIP_LT_STS	External TRIP Latch Status	TRIP ON	Normal
16	EXT_TRIP_STS	External TRIP Status	TRIP ON	Normal
15	OVP_STS	OVP Adjustment Status *1	Above OVP level	Below OVP level
14	OCP_STS	OCP Adjustment Status *1	Above OCP level	Below OCP level
13	Not Used	Always 0	-	-
12	EXT_ON	Toggling Output ON/OFF at External Contacts Input Status	ON	OFF
11	ALM_BUS_STS (SYS_ALM)	System error	Error	Normal
10	DD_ON_BUS_STS	DC/DC Output Status	ON	OFF
9	MST/BST_STS	Master/Booster Status *2	Booster *2	Master
8	P-ON(B)_STS	P-ON(Booster) Status	Booster Main Power Supply ON *2	Booster Main Power Supply OFF *2
7	P-ON(M)_STS	P-ON(Master) Status	Main Power Supply ON	Main Power Supply OFF
6	Not Used	Always 0	-	-
5	OHP_ALM	OHP(Over Heating Protection) Error	Error	Normal
4	OCP_ALM	OCP (Over Current Protection) Alarm	Triggered	Not triggered
3	OVP_ALM	OVP (Over Voltage Protection) Alarm	Triggered	Not triggered
2	Not Used	Always 0	-	-
1	CC_STS	CC Operation Status	CC operating	Not CC
0	CV_STS	CV Operation Status	CV operating	Not CV

*1 It is the status for factory adjustments of OVP and OCP. Practically, the status when OVP and OCP are running is output to Bit4 OCP_ALM and Bit3 OVP_ALM
*2 Booster refers to the HX-S-G4 Series power supply that is running as a slave unit under parallel operation.

<Ex.>
STAT:MEAS:COND?
300180
(This shows the status where P-ON(B)_STS, P-ON(A)_STS, P-ON(B)_STS, and P-ON(M)_STS are 1.)

STATus:OUTPut:MODE: selection of status output function

Function : Select status output function.
Same as FUNCTION Setting Item 76.
Format : STATus:OUTPut:MODE[]＜NR1＞
Type : SET command, QUERY command
Parameter : 0:LEVEL1_ALM、 1:OUTPUT ON/OFF_STS
Response : Same as parameters
Restrictions: Alarm response is normally returned to set command under the following state.
- Alarm is occurring
- Sequential operation is in progress
- Power supply is operating as slave machine in serial operation
- Power supply is operating as slave machine in parallel operation

＜Ex.＞
STAT:OUTP:MODE[]0
STAT:OUTP:MODE?
0

SYSTem Level

SYSTem level command corresponds to the settings of main FUNCTION items.

Command Name	Summary	Command Type
SYSTem	-	-
:COMMunicate	-	-
:SERial	-	-
[:RECeive]	-	-
:BAUD	Sets Bitrate	Both
:PACE	Sets Acknowledge Response	Both
:PARity	-	-
[:TYPE]	Sets Parity	Both
:UNIT	Sets Query Response Unit Load	Both
:CONTrol	-	-
:CURRent	-	-
:MODE	Sets mode for Current Settings Control Method	Both
:ISOLate	Isolated of external analog control signals	Both
:VOLTage	-	-
:MODE	Sets mode for Voltage Settings Control Method	Both
:ISOLate	Isolated of external analog control signals	Both
:ERRor	-	-
[:NEXT]	Reads Error Message	QUERY Only
:KEYLock		
:MODE	Sets LOCK mode	Both
:MONitor	-	-
:MODE	Sets Voltmeter/Ammeter Display when Output is OFF	Both
:PRESet	-	-
:MODE	Sets method to determine PRESET contents	Both
:SERies	Sets Master and Slave for Series Operation	Both
:TRIP	Executes TRIP	SET Only
:BUZzer	Setting Buzzer Sound	-
:BUTtom	Setting Button Sound	Both
:ALArm	Setting Alarm Sound	Both
:POWer	Query about System Capacity	QUERY Only
:STORe	FUNC Set Value Saving (EEPROM Rewrite)	SET Only

SYSTem:COMMunicate:SERial[:RECeive]:BAUD: Sets Bitrate

Function: Sets the bitrate
Same as FUNCTION Settings Item 61
Format: SYSTem:COMMunicate:SERial[:RECeive]:BAUD <NRf>
Type: SET command, QUERY command
Parameters: 0: 2400bps
1: 9600bps
2: 19200bps
3: 38400bps

Response: 2400, 9600, 19200, 38400

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

CAUTION

Setting changes via this command will take effect from next startup.

<Ex.>
SYST:COMM:SER:BAUD 3
SYST:COMM:SER:BAUD?
38400

SYSTem:COMMunicate:SERial[:RECeive]:PACE: Sets Acknowledge Response

Function: sets the Acknowledge Response
Format: SYSTem:COMMunicate:SERial[:RECeive]:PACE <String>
Type: SET command, QUERY command
Parameters: ACK: Returns OK when normal command is received (Default Setting)
OFF: Does not return OK when normal command is received
Response: ACK ON, ACK OFF

CAUTION

Setting changes via this command will take effect from next command.

<Ex.>
SYST:COMM:SER:PACE ACK
SYST:COMM:SER:PACE?
ACK ON

SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE]: Sets the parity

Function: Sets the parity
Same as FUNCTION Settings Item 62
Format: SYSTem:COMMunicate:SERial[:RECeive]:PARity[:TYPE] <String>
Type: SET command, QUERY command
Parameters: ODD: Odd number
EVEN: Even number
NONE: None
Response: ODD, EVEN, NONE

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

CAUTION

Setting changes via this command will take effect from next command.

<Ex.>
SYST:COMM:SER:PAR ODD
SYST:COMM:SER:PAR?
ODD

SYSTem:COMMunicate:SERial:UNIT: Sets Query Response Unit Load

Function: Sets whether to add-on units to the Query Response.
Format: SYSTem:COMMunicate:SERial:UNIT <NRf>
Type: SET command, QUERY command
Parameters: 0: Do not add units (Default Settings)
1: Add-on units
Response: Same as parameters

Explanation: If set to "Add-on unit", the units shown below will be added-on to the response.

V:	Added to responses for Output Voltage Settings, OVP Settings, Voltmeter Measurement Query commands
A:	Added to responses for Output Current Settings, OCP Settings, Ammeter Measurement Query commands
kW:	Added to responses for Power Measurement Query Commands
s:	Added to responses for Rising/Down Delay Time Setting Query Commands
Ohm:	Added to responses for Internal Resistance Setting Query Commands
bps:	Added to responses for Bitrate Setting Query Commands

<Ex.>
SYST:COMM:SER:UNIT 1
SYST:COMM:SER:UNIT?
1
VOLT?
80.0V

SYSTem:CONTrol:CURRent:MODE: Sets Mode for Current Setting Control Method

Function: Sets mode for the method on setting the current
Same as FUNCTION Settings Item 71
Format: SYSTem:CONTrol:CURRent:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Front Panel, Digital Communication
1: External Voltage
2: External Resistance Type-A
3: External Resistance Type-B
4: External Resistance Type-C
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:CONT:CURR:MODE 1
SYST:CONT:CURR:MODE?
1

SYSTem:CONTrol:CURRent:ISOLate: Sets Isolation for external analog control signal constant current (CC)

Function: Sets isolation for external constant current (CC) analog signal
Same as FUNCTION Settings Item 41
Format: SYSTem:CONTrol:CURRent:ISOLate <NRf>
Type: SET command, QUERY command
Parameters: 0: Invalid
1: Valid
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- If isolated option is not attached
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:CONT:CURR:ISOL 1
SYST:CONT:CURR:ISOL?
1

SYSTem:CONTrol:VOLTage:MODE: Sets Mode for Voltage Setting Control Method

Function: Sets mode for the method on setting the voltage
Same as FUNCTION Settings Item 70
Format: SYSTem:CONTrol:VOLTage:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Front Panel, Digital Communication
1: External Voltage
2: External Resistance Type-A
3: External Resistance Type-B
4: External Resistance Type-C
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:CONT:VOLT:MODE 1
SYST:CONT:VOLT:MODE?
1

SYSTem:CONTrol:VOLTage:ISOLate: Sets isolation for external analog control signal constant voltage (CV)

Function: Sets isolation for external constant volume (CV) analog signal
Same as FUNCTION Settings Item 40
Format: SYSTem:CONTrol:VOLTage:ISOLate <NRf>
Type: SET command, QUERY command
Parameters: 0: Invalid
1: Valid
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- If isolated option is not attached
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:CONT:VOLT:ISOL 1
SYST:CONT:VOLT:ISOL?
1

SYSTem:ERRor:Reads Error Message

Function: After an error response is received, send this command to retrieve the cause for the generated error
Format: SYSTem:ERRor?
Type: QUERY command only
Response: Error Code, Error Message

Table-Error Codes & Error Messages

Error Code	Error Messages	Meaning
0	None	Normal
-100	Command error	Command Error (Undefined Command, etc.)
-101	Invalid character	Invalid character sent
-102	Syntax error	Syntax error
-104	Data type error	Data type error Character received instead of numeral in parameter, etc.
-108	Parameter not allowed	Too many parameters
-109	Missing parameter	Too few parameters
-120	Numeric data error	Numerical data error. Exceeds range, etc.
-140	Character data error	Character data error
-150	String data error	String data error
-902	No permission Command.	Command not permitted to execute.
-903	Receive time out.	Receive time out
-905	Unmount isolate option board	Cannot execute since the isolation option board is unmounted

CAUTION

Can only be used for the last generated error response (newest error).

<Ex.>
SYST:CONT:CURR:ISOL?
ERROR
SYST:ERR?
-905,Unmount isolate option board

SYSTem:KEYLock:MODE: Sets LOCK Mode

Function: Sets the mode for the Key Lock on the front panel
Same as FUNCTION Settings Item 53
Format: SYSTem:KEYLock:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Only LOCK key is usable
1: Only OUTPUT and LOCK keys are usable
2: VOLT/CURR dials are non-usable (Along with this, PRESET key, FUNC key, OVP key, and OCP key are also non-usable)
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:KEYL:MODE 1
SYST:KEYL:MODE?
1

SYSTem:MONitor:MODE: Sets Voltmeter/Ammeter Display when Output is OFF

Function: Sets the displays for the voltmeter and ammeter when output is turned OFF
Same as FUNCTION Settings Item 52
Format: SYSTem:MONitor:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Displays Measurement Value
1: Displays Set Value
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:MON:MODE 0
SYST:MON:MODE?
0

SYSTem:PRESet:MODE: Sets Method to Determine PRESET Contents

Functions: Sets the method in which the PRESET contents are determined
Same as FUNCTION Settings Item 50
Format: SYSTem:PRESet:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Changes set values after PRESET mode is completed
1: Changes set values while PRESET mode is operating
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:PRES:MODE 0
SYST:PRES:MODE?
0

SYSTem:SERies: Sets Master and Slave for Series Operation

Function: Sets the Master and Slave for Series Operation
Same as FUNCTION Settings Item 73
Format: SYSTem:SERies <NRf>
Type: SET command, QUERY command
Parameters: 0: Master
1: Slave
Response: Same as parameters

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a series operation slave unit
- While operating as a parallel operation slave unit

<Ex.>
SYST:SER 0
SYST:SER?
0

SYSTem:TRIP: Executes TRIP

Function: Executes TRIP operation (output stop) by setting operation for stopping output
Format: SYSTem:TRIP
Type: SET command only
Parameters: None

<Ex.>
SYST:TRIP

SYSTem:TRIP:MODE: Sets operation for stopping output during TRIP execution or serious/light failure

Function: Sets operation for stopping output during TRIP execution or serious/light failure
Same settings as FUNCTION Settings Item 9
Format: SYSTem:TRIP:MODE <NRf>
Type: SET command, QUERY command
Parameters: 0: Stop switching
1: Execute input power relay trip (at TRIP detection or serious failure)
2: Execute input power relay trip (at TRIP detection or serious failure, or when OVP/OCP triggered).

CAUTION

- Serious failure is defined as a case when an alarm can be canceled via command or by panel reset (holding down the RESET key).
(Restart device with power switch)
- Serious failure Error
For details on WDT, OHP, AD-OV, P_ERR, BST ALM, Device Detection Failure, and Device No. Disagreement error code, see page 45.

Restrictions: Alarm response is returned for normal SET commands in the following conditions
- While operating as a parallel operation slave unit

<Ex.>
SYST:TRIP:MODE 1
SYST:TRIP:MODE?
1

SYSTem:BUZzer:BUTtom: Sets ON/OFF of button sound at front panel operation

Function: Sets ON/OFF of button sound at front panel operation
Same as FUNCTION Settings Item 90
Format: SYSTem:BUZzer:BUTtom <NRf>
Type: SET command, QUERY command
Parameters: 0: OFF
1: ON
Response: Same as parameters

Restrictions: None

<Ex.>
SYST:BUZ:BUT 1
SYST:BUZ:BUT?
1

SYSTem:BUZzer:ALArm: Sets ON/OFF of alarm sound at alarm occurrence

Function: Sets ON/OFF of alarm sound at alarm occurrence
Same as FUNCTION Settings Item 91
Format: SYSTem:BUZzer:ALArm <NRf>
Type: SET command, QUERY command
Parameters: 0: OFF
1: ON
Response: Same as parameters

Restrictions: None

<Ex.>
SYST:BUZ:ALA 1
SYST:BUZ:ALA?
1

SYSTem:POWer: Query about System Capacity (kW)

Function: Retrieves the system capacity (kW)
Format: SYSTem:POWer?
Type: QUERY command only
No parameters
Response: System capacity (kW)

Restrictions: None

<Ex.>
SYST:POW?
6

SYSTem:STORe: Saves FUNCTION settings

Function: Saves FUNCTION settings set by remote command
Format: SYSTem:STORe
Type: SET command only
No parameters

Restrictions: None

<Ex.>
SYST:STOR

CAUTION

Changes of FUNCTION settings by remote command are valid only while the power is on.

If this command is executed, the settings are still reflected after the next startup since they are saved in EEPROM.

SEQUENCE Level

Sequence operation setting is performed by digital data communication too.

Command Name	Summary	Command Type
SEQuence	—	—
:MODE	Setting for sequential operation	Both
:RCOUnt	Number of Repetition Setting for sequential operation	Both
:PATTern	Contents Setting for sequential setting	Both
:STOP	Output Setting at the end of sequential operation	Both
:STATus	Status Acquisition of sequential operation	QUERY Only

SEQuence:MODE: Setting for sequential operation

Function : Set operation mode of DC power supply operation and sequential operation.
Same as FUNCTION Setting Item 100.
Format : SEQuence:MODE[]＜NR1＞
Type : SET command, QUERY command
Parameter : 0 : Disable of sequential operation (DC power supply operation)
1 : Enable of sequential operation (Normal)
2 : Enable of sequential operation (Continue)
Response : Same as parameters
Restrictions : Alarm response is returned for normal SET commands in the following conditions
- Alarm is occurring
- Sequential operation is in progress
- Power supply is operating as slave machine in serial operation
- Power supply is operating as slave machine in parallel operation

＜Ex.＞
SEQ:MODE[]1
SEQ:MODE?
1

SEQuence:RCOUnt: Set number of repetition for sequential operation

Function : Set number of repetition for sequential operation.
Same as FUNCTION Setting Item 101.
Format : SEQuence:RCOUnt[]＜NR1＞
Type : SET command, QUERY command
Parameter : 0 - 9999. Note) 0 : Operation will be looped unless any termination request.
Response : Same as parameters
Restrictions : Alarm response is returned for normal SET commands in the following conditions
- Alarm is occurring
- Sequential operation is in progress
- Power supply is operating as slave machine in serial operation
- Power supply is operating as slave machine in parallel operation

＜Ex＞
SEQ:RCOU[]1
SEQ:RCOU?
1

SEQuence:PATTern:Set contents of sequential operation

Function : Set operation contents of sequenctial operation
Same as FUNCTION Setting Item 110 - 159.

Format: : SEQuence:PATTern[]＜NR1＞, ＜NRf＞, ＜NRf＞, ＜NR1＞, ＜NRf＞, ＜NR1＞
① ② ③ ④ ⑤ ⑥
SEQuence:PATTern?[]＜NR1＞
①

Type : SET command, QUERY command

Parameter : ＜SET command＞
① Sequential operation line 1 - 10
② Constant Voltage Setting Value note) Setting range is depended on the DC power supply.
③ Constant Current Setting Value note) Setting range is depended on the DC power supply.
④ Control Time (min.) 0-9999
⑤ Control Time (sec.) 0.0-59.9
⑥ Control contents 0: OUT OFF, 1: STEP, 2: SWEEP
＜QUERY command＞
① Sequential operation line 1 - 10

Response : ① Constant Voltage Setting Value
② Constant Current Setting Value
③ Control Time (min.)
④ Control Time (sec.)
⑤ Control contents

Restrictions : Alarm response is returned for normal SET commands in the following conditions
- Alarm is occurring
- Sequential operation is in progress
- Power supply is operating as slave machine in serial operation
- Power supply is operating as slave machine in parallel operation

＜Ex.＞
SEQ:PATT[]1,30.0,100.0,1,30.0,2
SEQ:PATT?[]1
30.0,100.0,1,30.0,2

SEQuence:STOP: Set output at the end of sequential operation

Function : Set output at the end of sequential operation
Same as FUNCTION Setting Item 102.
Format : SEQuence:STOP[]＜NR1＞
Type : SET command, QUERY command
Parameter : O: OUT OFF, 1: Keep output state of sequential operation
Response : Same as parameters
Restrictions : Alarm response is returned for normal SET commands in the following conditions
- Alarm is occurring
- Sequential operation is in progress
- Power supply is operating as slave machine in serial operation
- Power supply is operating as slave machine in parallel operation

＜Ex＞
SEQ:STOP[]0
SEQ:STOP?
0

SEQuence:STATus: Status acquisition of sequential operation

機能 : Acquire state of sequential operation
書式 : SEQuence:STATus?
形態 : QUERY command only
レスポンス : ＜NR1＞, ＜NR1＞, ＜NR1＞, ＜NRf＞, ＜NR1＞
① ② ③ ④ ⑤

① State of sequential operation 0: Sequential operation stop, 1: Sequential operation in progress
② Sequential operation line 1 - 10
③ Elapsed time (min.) of sequential operation line
④ Elapsed time (sec.) of sequential operation line
⑤ Current number of repetition of sequential operation

＜Ex.＞
SEQ:STAT?
1,1,0,10.0,1

HX Compatible Commands

HX compatible commands are commands which conform to Takasago HX Series communication command format. Remote control is possible only for common functions between HX series and HX-S-G4 series since the commands and HX are compatible.
HX commands are listed below. For details on each command, see the pages listed below.

SET Command List

Command Name	Control Command Functions	Page
A	Assigning Device Address	Page 114
AR	Executes alarm reset	Page 114
CL	Resets set parameters	Page 114
LC	Sets OCP current	Page 115
LV	Sets OVP voltage	Page 115
MC	Sets Output Current	Page 116
MV	Sets Output Voltage	Page 116
OT	Sets output ON/OFF	Page 117
TP	Executes breaker trip	Page 117

Read-Back Command List

Command Name	Read-Back Command Functions	Page
TK0	Read-back set parameter	Page 118
TK1	Read-back measurement data (Voltage/Current)	Page 118
TK2	Read-back information of equivalent model of HX	Page 119
TK3	Read-back status information	Page 119
TK4	Read-back measured voltage	Page 120
TK5	Read-back measured current	Page 120

HX-compatible Command Format

All commands and responses are ASCII character strings.
Characters "A" to "Z" are recognized as command strings and characters "+", "-", ".", and "0" to"9" are recognized as parameters.

HX-compatible Command Group Sending

Multiple commands can be sent in a single string by separating commands with ",".

<Ex.>A1,MV10.00,MC2.00,OT1

However, a single string with multiple commands assigning addresses will error.

<Ex.>A1,OT1,A2,OT1 /* Error due to multiple address assignment commands */

Alarm Response Trigger Factors of HX-compatible Commands

In the event that any of the following error conditions are met, the HX-S-G4 power supply will promptly return an alarm response "ALM128".
If an error is generated while inputting commands, recovery will not occur until delimiter is received.
To prevent this, make certain to send either "CR, LF, or CR+LF" when an alarm response is received.

- When undefined command is received
- When command parameters exceed the range
- When a character or symbol other than numerals 0~9, +, -, and decimal point is sent in parameters
- When sent with a single parameter containing more than 2 decimal points
- When sent with spaces between the command and parameter
  <Ex.>MV_35
  Space
- When a command is sent in lowercase
  <Ex.>mv35
- When a string received at one time (until delimiter is received) exceeds 128 characters

Setting examples that are not errors

- Throw away digits in parameters which exceed the maximum number of numerical places
  <Ex> MV100.99 → MV100.9

For HX-S-G4 Series power supplies, if either OVP, OCP or OHP error is generated, the alarm response will change to "ALM160". During device errors, only "LV", "LC", "AR", "TP", and "TK" commands are valid. All other commands will return alarm responses.

Delimiter of HX-compatible Command

Please add an end character (delimiter) to the end of commands being sent to the HX-S-G4 power supply.
Possible delimiters that can be used are listed below.

- CR Carriage Return
- LF Line Feed
- CR+LF

Use any of the above as a delimiter.

HX-compatible Command Details

This section explains the SET commands of HX based commands.

A:Assigns Device Address

Function: Assigns the device address for HX-S-G4 power supplies.
Format: A* *: Set value within range
Range: 0~50
Assigned Address 0 is a global address. Assign addresses to all multi-connected HX-S-G4 Series power supplies.
Once the global address is assigned, only Output ON/OFF Toggle SET command "OT" is valid. Further, no Acknowledge Responses will be sent only while the global address is assigned

Caution

Do not set redundant HX-S-G4 power supply addresses within the same system.
Further, only one address can be assigned per send. Assigning multiple addresses at once is not possible.

<Ex.>
A1 /* Assigns HX-S-G4 power supply of address 1 */
<Bad Example>
A1,OT1,A2,OT1 /* Error due to multiple address assignment commands */

AR: Executes Alarm Reset

Function: Executes alarm reset (Cancels generated Over Voltage/Over Current alarm)
Format: AR* *: Set value
Set Value: 1: Resets alarms
Values other than 0 and 1 result in parameter errors (When 0, nothing is executed).

Caution

Execute alarm reset only once cause has been resolved.

<Ex.>
A1,AR1

CL:Resets Set Parameters

Function: Resets the set parameters
Format: CL* *: Set value
Set Value: 1: Resets to factory default settings
Values other than 0 and 1 result in parameter errors (When 0, nothing is executed).

<Ex.>
A1,CL1

LC: Sets OCP Current

Function: Sets the OCP current
Format: LC* *: Set value within range
Range: Values other than ranges result in parameter errors.
Range varies depending on the total output capacity of the parallel connection.

Model (Type) / Total Output Capacity	Output Current Ranges (A)			
	30V Output Type	60V Output Type	500V Output Type	1000V Output Type
6kW	2.0 to 220.0	1.0 to 110.0	0.12 to 13.20	0.060 to 6.600
12kW	4.0 to 440.0	2.0 to 220.0	0.24 to 26.40	0.12 to 13.20
18kW	6.0 to 660.0	3.0 to 330.0	0.36 to 39.60	0.18 to 19.80
24kW	8.0 to 880.0	4.0 to 440.0	0.48 to 52.80	0.24 to 26.40
30kW	10.0 to 1100	5.0 to 550.0	0.60 to 66.00	0.30 to 33.00
36kW	12.0 to 1320	6.0 to 660.0	0.72 to 79.20	0.36 to 39.60
42kW	14.0 to 1540	7.0 to 770.0	0.84 to 92.40	0.42 to 46.20
48kW	16.0 to 1760	8.0 to 880.0	1.0 to 105.6	0.48 to 52.80
54kW	18.0 to 1980	9.0 to 990.0	1.1 to 118.8	0.54 to 59.40
60kW	20.0 to 2200	10.0 to 1100	1.1 to 132.0	0.60 to 66.00
66kW	22.0 to 2420	11.0 to 1210	1.3 to 145.2	0.66 to 72.60
72kW	24.0 to 2640	12.0 to 1320	1.4 to 158.4	0.72 to 79.20
78kW	26.0 to 2860	13.0 to 1430	1.6 to 171.6	0.78 to 85.80
84kW	28.0 to 3080	14.0 to 1540	1.7 to 184.8	0.84 to 92.40
90kW	30.0 to 3300	15.0 to 1650	1.8 to 198.0	0.90 to 99.00
96kW	32.0 to 3520	16.0 to 1760	1.9 to 211.2	1.0 to 105.6
102kW	34.0 to 3740	17.0 to 1870	2.0 to 224.4	1.0 to 112.2
108kW	36.0 to 3960	18.0 to 1980	2.2 to 237.6	1.1 to 118.8
114kW	38.0 to 4180	19.0 to 2090	2.3 to 250.8	1.1 to 125.4
120kW	40.0 to 4400	20.0 to 2200	2.4 to 264.0	1.2 to 132.0

<Ex.>
A1,LC44

LV: Sets OVP Voltage.

Function: Sets the OVP voltage
Format: LV* *: Set value within range
Range: 30VType: 0.30 to 33.00/ 60VType: 0.60 to 66.00/ 500VType: 5.0 to 550.0/ 1000VType: 10 to 1100
Values other than ranges will result in parameter errors.

<Ex.>
A1,LV33.00

MC: Sets Output Current

Function: Sets the output current
Format: MC* *: Set value within range
Range: Values other than ranges result in parameter errors.
Range varies depending on the total output capacity of the parallel connection.

Model (Type) / Total Output Capacity	Output Current Ranges(A)			
	30V Output Type	60V Output Type	500V Output Type	1000V Output Type
6kW	0.0 to 210.0	0.0 to 105.0	0.00 to 12.60	0.00 to 6.300
12kW	0.0 to 420.0	0.0 to 210.0	0.00 to 25.20	0.00 to 12.60
18kW	0.0 to 630.0	0.0 to 315.0	0.00 to 37.80	0.00 to 18.90
24kW	0.0 to 840.0	0.0 to 420.0	0.00 to 50.40	0.00 to 25.20
30kW	0 to 1050	0.0 to 525.0	0.00 to 63.00	0.00 to 31.50
36kW	0 to 1260	0.0 to 630.0	0.00 to 75.60	0.00 to 37.80
42kW	0 to 1470	0.0 to 735.0	0.00 to 88.20	0.00 to 44.10
48kW	0 to 1680	0.0 to 840.0	0.0 to 100.8	0.0 to 50.40
54kW	0 to 1890	0.0 to 945.0	0.0 to 113.4	0.0 to 56.70
60kW	0 to 2100	0 to 1050	0.0 to 126.0	0.0 to 63.00
66kW	0 to 2310	0 to 1155	0.0 to 138.6	0.0 to 69.30
72kW	0 to 2520	0 to 1260	0.0 to 151.2	0.0 to 75.60
78kW	0 to 2730	0 to 1365	0.0 to 163.8	0.0 to 81.90
84kW	0 to 2940	0 to 1470	0.0 to 176.4	0.0 to 88.20
90kW	0 to 3150	0 to 1575	0.0 to 189.0	0.0 to 94.50
96kW	0 to 3360	0 to 1680	0.0 to 201.6	0.0 to 100.8
102kW	0 to 3570	0 to 1785	0.0 to 214.2	0.0 to 107.1
108kW	0 to 3780	0 to 1890	0.0 to 226.8	0.0 to 113.4
114kW	0 to 3990	0 to 1995	0.0 to 239.4	0.0 to 119.7
120kW	0 to 4200	0 to 2100	0.0 to 252.0	0.0 to 126.0

<Ex.>
A1,MC210.0

MV: Sets Output Voltage

Function: Sets the output voltage
Format: MV* *: Set value within range
Range: 30VType: 0.00 to 31.50/ 60VType: 0.00 to 63.00/ 500VType: 0.0 to 525.0/ 1000VType: 0 to 1050

<Ex.>
A1,MV30.00

OT: Sets Output ON/OFF

Function: Sets the output ON/OFF
Format: OT* *: Set value
Set Value: 0: OUTPUT "OFF"
1: OUTPUT "ON"
Values other than 0 and 1 result in parameter errors.

<Ex.>
A1,OT0

TP: Executes Breaker Trip

Function: Executes breaker trip
Format: TP* *: Set values
Set Value: 0: Stop switching
1: Execute input power relay trip (When TRIP is detected or severe breakdown)
2: Execute input power relay trip (When TRIP is detected, severe breakdown, OVP/OCP triggered)
Values other than 0, 1, or 2 result in parameter errors.

Caution

- Serious failure is defined as when an alarm cannot be canceled via command or by panel reset (holding down the A and C key)
(Restart device with power switch)
- Serious failure Error
For details on WDT, OHP, AD-OV, P_ERR, BST ALM, Device Detection Failure, and Device No. Disagreement error code, see page 45.

<Ex.>
A1,TP1

HX-compatible Read-Back Commands

This section explains about the HX based command Read-Back commands.

TK0: Read-Back Set Parameters

Function: Retrieves the output voltage, output current, over voltage, over current, and output ON/OFF status set in the HX-S-G4 power supply with the specified device address.

Format: TK0

Read-Back Format: A*1,MV*2,MC*3,LV*4,LC*5,OT*6
*1~*6:Read-Back Value

Read-Back Value: *1: Device address of the responded HX-S-G4 power supply
*2:Output Voltage Set Value (Max. no. of decimal places is 1)
*3:Output Current Set Value (For max no. of decimal places, refer to Output Current Range in page 116)
*4:Over Voltage Set Value (Max. no. of decimal places is 1)
*5:Over Current Set Value (For max no. of decimal places, refer to OCP Current Range in page 115)
*6:Output ON/OFF Status

<Ex.>

A1,TK0
A1,MV10.0,MC35.0,LV33.00,LC220.0,OT0

TK1: Read-Back Measurement Data (Voltage/Current)

Function: Retrieves measured voltage/current values from the HX-S-G4 power supply with the specified device address

Format: TK1

Read-Back Format: A*1,*2V,*3A
*1~*2:Read-Back value

Read-Back Value: *1: Device address of the responded HX-S-G4 power supply
*2:Output Voltage Set Value (Max. no. of decimal places is 2)
*3:Output Current Set Value (For max no. of decimal places, refer to Output Current Range in page 116)

<Ex.>

A1,TK1
A1,0.00V,0.00A

TK2: Read-Back ID-ROM Parameters

Function: Read-back information of equivalent model of HX
Format: TK2
Read-Back Format: A*1,*2,MV*3,MC*4,LV*5,LC*6
*1~*6:Read-Back Value
Read-Back Value: *1: Device address of the responded HX-S-G4 power supply
*2: Model Information
*3: Constant Output Voltage (Max. no. of decimal places is 1)
*4: Constant Output Current (For max no. of decimal places, refer to Output Current Range in page 116)
*5: Maximum Over Voltage Set Value (Max. no. of decimal places is 1)
*6: Maximum Over Current Set Value (For max no. of decimal places, refer to OCP Current Range in page 115)

<Ex> HX030-200G4FI(Case when full specification / isolated OP attached)
A1,TK2
A1,HX-S-G4FI,MV30.00,MC200.0,LV33.00,LC220.0

TK3: Read-Back Status Information

Function: Retrieves the status information from the HX-S-G4 power supply with the specified device address
Format: TK3
Read-Back Format: A*1,STAT*2
*1, *2: Read-Back Value
Read-Back Value: *1: Device address of the responded HX-S-G4 power supply
*2: Status is represents as 0 or 1
STAT*******
6 0
Retrieved Status Information List

Bit	Status Name	Summary	1	0
0	P-ON(M)_STS	P-ON(Master) Status	Main Power Supply ON	Main Power Supply OFF
1	OHP_ALM	OHP(Over Heating Protection) Error	Error	Normal
2	-	Always 0	-	-
3	OCP_ALM	Over Current Protection Triggered	Triggered	Normal
4	OVP_ALM	Over Voltage Protection Triggered	Triggered	Normal
5	CC_STS	CC Operation Status	CC operating	Not CC
6	CV_STS	CV Operation Status	CV operating	Not CV

<Ex.>
A1,TK3
A1,STAT1000001

TK4: Read-Back Measured Voltage Data

Function: Retrieves the measured voltage data from the HX-S-G4 power supply with the specified device address
Format: TK4
Read-Back Format: *V
*: Read-Back Value
Read-Back Value: *: Specified HX-S-G4 power supply's output voltage measurement value (Max. no. of decimal places is 2)

<Ex.>
A1,TK4
10.00V

TK5: Read-Back Measured Current Data

Function: Retrieves the measured current data from the HX-S-G4 power supply with the specified device address
Format: TK5
Read-Back Format: *A
*: Read-Back Value
Read-Back Value: *: Specified HX-S-G4 power supply's output current measurement value (For max no. of decimal places, refer to Output Current Range in page 116)

<Ex.>
A1,TK5
0.00A

Notes

Communication control functions using multi-connecting cables can be connected with HX-S-G4 Series and ZX series as well as FK2 series.
If you want multi-connection with other models, please contact our Sales Department for more information.

Using in Series/Parallel Operation

Parallel Operation

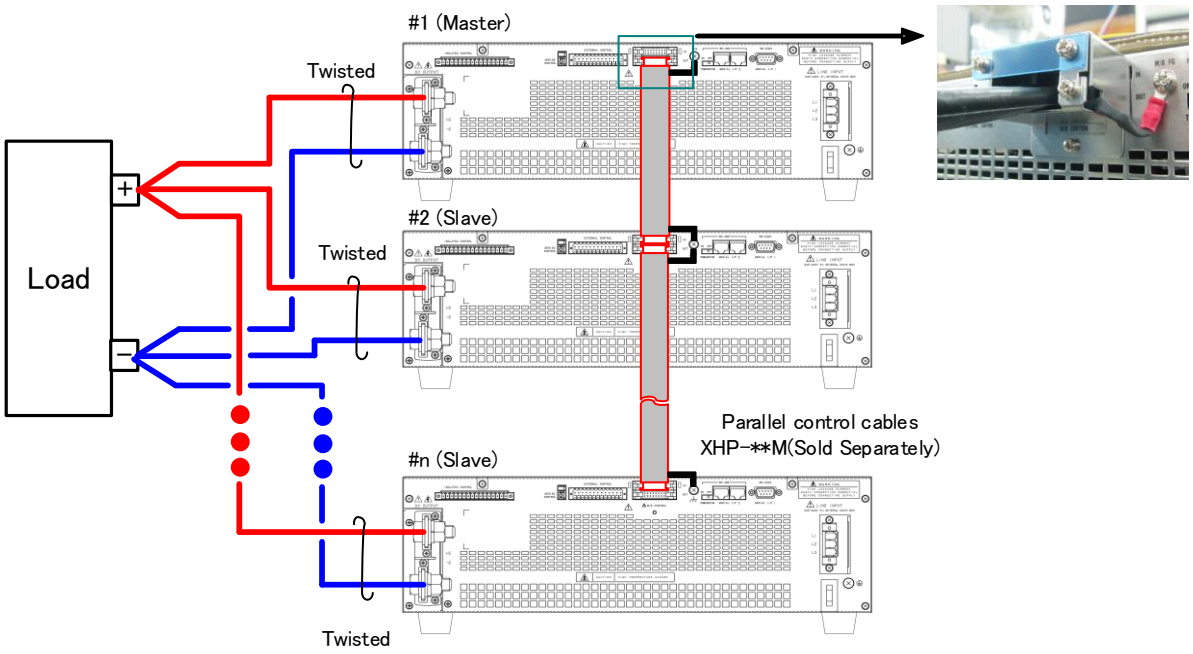
A maximum total of 10 power supply outputs can be connected parallel to increase the output current.
Further, Master-Slave Parallel Operation, the controlling of the overall output voltage and current with a single Master, is available.
Simply connect using a parallel control cable to enable automatic detection of the number of parallel devices.
The measurement value, the total sum of the output current and output power, is displayed on the Master unit.

CAUTION

- Parallel operation is only possible with the same-voltage HX-S-G4 series models.
  (Ex: Parallel operation of HX-S-030-200G4 and HX-S-030-400G4 is possible.)
- FUNCTION items for when operating in Slave cannot be set by only references.
- When operating in Slave, the only valid keys during an alarm reset are the "RESET", "FUNC", and "LOCAL" keys.
- Do not set to OPEN when wiring connections between power supplies with minus output terminals.
- Turn all parallel connected HX-S-G4 Series' input power (POWER switch) ON.
- When using, attach the earth wire of parallel connection cable to the M/B FG terminal.

Connection

Connect as shown in the below diagram.
Connect from the first unit's (Master) M/B CONTROL Connector OUT to the second unit's (Slave) M/B CONTROL Connector IN. Connect from the second unit's M/B CONTROL Connector OUT to the third unit (Slave).



MEMO

●When wiring from each HX-S-G4 power supply to the load,use wires equal in length and cross-section area. Also , wire as short as possible. If the distance to load is approximately 10m or more, parallel connect to a relay terminal block etc. before connecting to load

CAUTION

- Parallel control cable (HXP-***M) Please connect so that it does not block the rear air discharge port.
- In the figure, chronicle is done to make it easier to understand the connection.

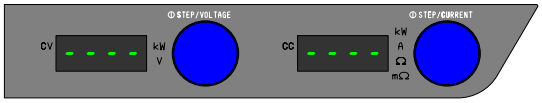
Using in Series/Parallel Operation

Operation

1. Turn on the power switch in orde of slave, then master.
2. After all power is turned on, wait approximately 2 seconds before operating.
3. The HX-S-G4 power supply whose M/B CONTROL Connector IN is not connected to another HX-S-G4 Series power supply is the Master unit (#1 in the previous page).
4. After the POWER switch has been turned ON, the output voltage will be displayed on the Master unit's Number Display (voltage) and the model name and the total power capacity will be displayed on the Master unit's Number Display (current).
   If there is discrepancy in total power capacity (the total power capacity of this time is different from that of the previous time), the error code "E011" is displayed on the Number Display (voltage) and detected total power capacity blinks in the bottom. After checking the total power capacity, hold down the "FUNC" key for more than 2 seconds and approve the detected number of devices to change to the measurement display mode.
5. The voltage measurement is displayed on the Number Display (voltage) of the master, and the current measurement is displayed on the Number Display (current) of the master.
   Total current value is displayed in the bottom Number Display.
   Select power display with the "Display" key to display total power values.

⚠ CAUTION

Slaves, when operating normally, will display bars as shown on the right.



Error Codes

1. Error Codes & Display List for Master Unit

Place / Items	No. Display (Voltage)	No. Display (Current)	Content
WDT	E001	-	Malfunction of CPU
OHP	E003	OHP	Over Heating Protection triggered
OVP	E004	OUP	Over Voltage Protection Function triggered
OCP	E005	OCP	Over Current Protection Function triggered
BST	E006	-	Slave error (Displayed only on the Master during Parallel Operation)
P_ERR	E007	-	Internal rectification voltage or voltage for control circuit is abnormal
BST_NRDY Phase interruption detection	E008	-	Slave input voltage error Detect the phase interruption of input power.
Device Detection Error	E009	-	No. of parallel devices cannot be detected
Max. Device No. OVER	E010	-	More than 11 parallel devices are connected
Device No. Disagreement	E011	-	Discrepancy in total power capacity between previous time and this time
TRIP	E012	Shdn	TRIP function triggered
Models of different voltages mixed	E013	-	Models of different voltages connected
Communication Error	E100	-	Data cannot be received normally
E2P Error	E110	-	Initialization error during startup

2. Error Displays for Slave Units

In the event an alarm is triggered by a Slave while the Master is functioning normally;

①The Slave that detected the alarm will display the error code on the Number Display (voltage) and the alarm type on the Number Display (current).

②Error code "E006" is displayed on the Number Display (voltage) of the Master unit.
(When alarm is triggered by a Slave and Master is functioning normally)

Using in Series/Parallel Operation

Series Operation

A series connection of two HX-S-G4 power supply outputs can be used to double the output voltage.
Further, Master-Slave Series Operation, the controlling of the output with a single Master, is available.

Prohibition

- HX 1000V type does not correspond to the series operation. Please do not connected in series with the series operation absolutely.

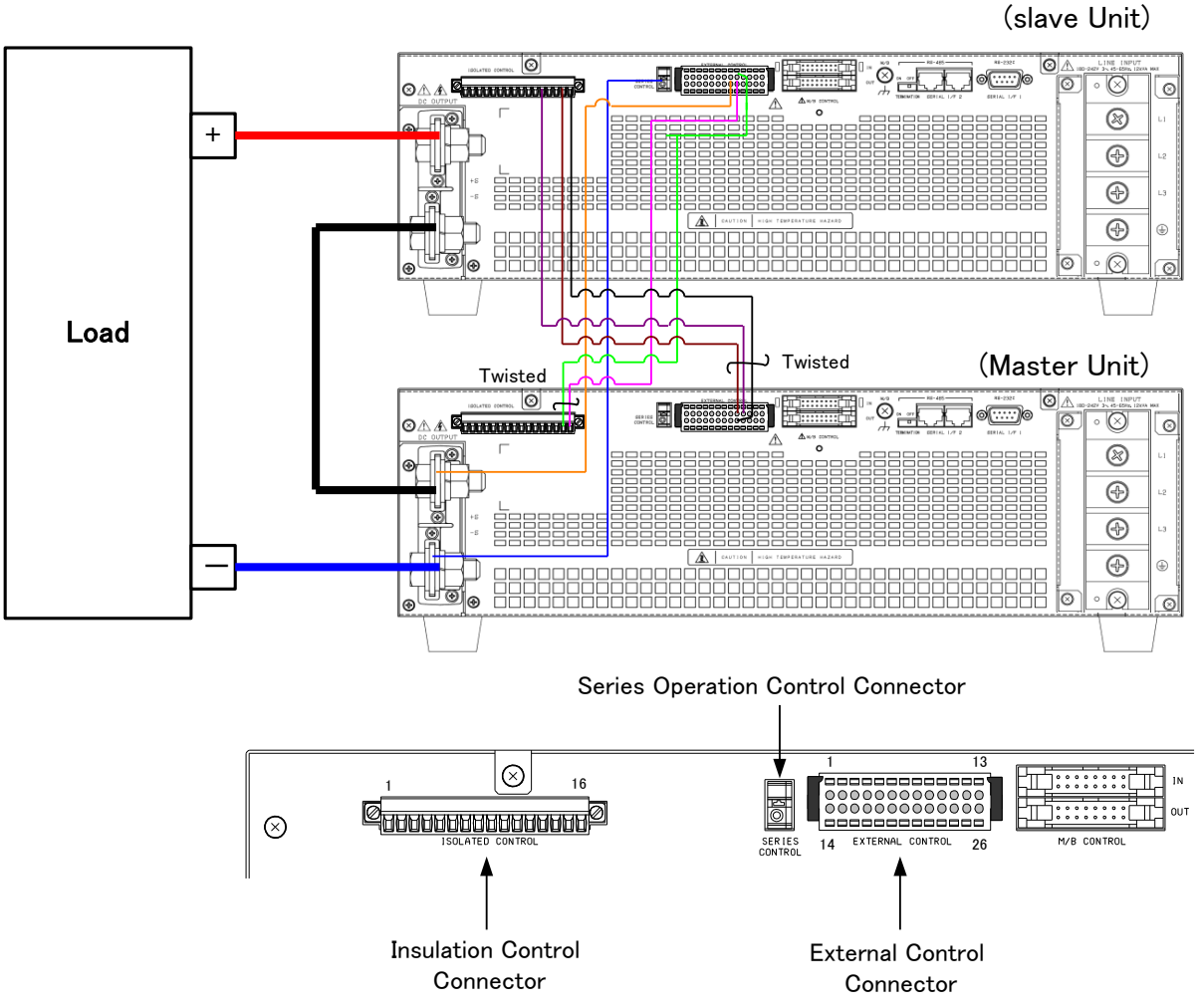
CAUTION

Series operation is possible only between HX-S-G4 whose rated output voltage and rated output current are the same.

- Connecting device models that are different in power capacity will result in breakdown.
- Turn all series connected HX-S-G4 Series' input power (POWER switch) ON.
- Please calibrate the output voltage for the Slave before use.
- FUNCTION Settings items, when operating in Slave, are restricted.
- When operating in Slave, the only valid keys during an alarm reset are the RESET, OVP/OCP, FUNC., and LOCAL keys.
- The indication on the front display during series operation shows the outputs of the Master unit and the Slave unit respectively.
  (When the output voltage is 60V, both the Master unit and the Slave unit will be 30.00V.)

Connection

Connect as shown in the diagram below.



Using in Series/Parallel Operation

◆Load Wire Connection

① Connect wires from the Slave's minus terminal to the Master's plus terminal.
② Connect wires from the Slave's plus terminal to the Load's plus terminal.
③ Connect wires from the Master's minus terminal to the Load's minus terminal.

◆Control Terminal Wiring

① Connect wires from the Slave's external control connector No. 21 terminal to the Master's plus terminal.
② Connect wires from the Series control connector of the Slave to the Master's minus terminal.
③ Connect wires from the Slave's isolatedcontrol connector No. 15 terminal to the Master's external control connector No. 9 terminal.
④ Connect wires from the Slave's isolated control connector No. 12 terminal to the Master's external control connector No. 10 terminal.
⑤ Connect wires from the Slave's isolated control connector No. 16 terminal to the Master's external control connector No. 22 terminal.
⑥ Connect wires from the Master's isolated control connector No. 15 terminal to the Slave's external control connector No. 9 terminal.
⑦ Connect wires from the Master's isolated control connector No. 16 terminal to the Slave's external control connector No. 22 terminal.

* The signal lines of ③, ④, ⑤, ⑥, and ⑦ should be stranded wires.

Operation

1. Setting the Master

① Press the Function "FUNC." key.
② Select Item 10 with VOLTAGE dial.
③ Change the set value to 2 with CURRENT dial.
④ Press the FUNC. key again to finalize settings.

* For the function item 10 "Toggling Output ON/OFF with External Contacts", refer to page 129.

MEMO

By setting this item, output ON of the Master is prohibited when the input power of the Slave is OFF.

2. Setting the Slave

① Press the Function "FUNC." key.
② Select Item 73 with VOLTAGE dial.
③ Change the set value to 1 (Slave Mode) with CURRENT dial.
④ Press the FUNC. key again to finalize settings.
⑤ Turn the POWER switch OFF.
* The device will operate as a Slave unit when the POWER switch is turned ON again. At that time, the "OUTPUT" lamp is lit.

MEMO

When returning to Master, set FUNCTION Item 73 to 0, Item 51 to 0, and Item 60 to 1.

3. Order of turning on "POWER" switch.

① Turn on the power switch in orde of slave, then master.

Toggling Output ON/OFF with External Contacts in Series Operation

For the connecting refer to page133.

Calibrating Slave Unit Output Settings

Calibrate the Slave unit to match the Slave's output voltage in series operation with the Master's voltage.

Preparation

The following measuring device is required for calibration.

Voltage Measuring Digital Multimeter 2 devices

No. of Display Digits: 5 1/2 or more Display Accuracy : 0.005% or more

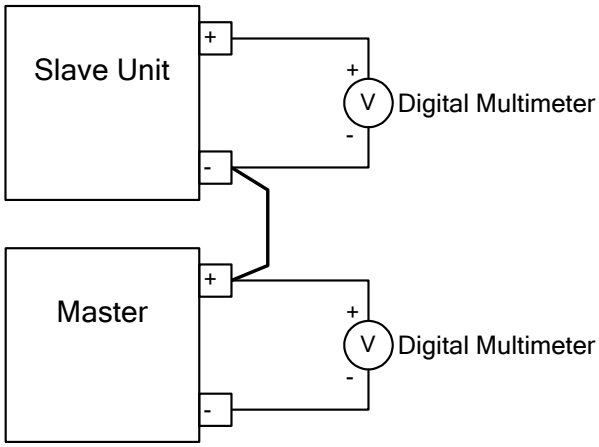
* (30V/60V Type : Equipped with a measuring range from 1mV to 100V)

(500V Type : Equipped with a measuring range from 1mV to 1000V)

Offset/Full Scale Calibration of Slave Unit Output Voltage

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal of the Master and the Slave respectively.**

   Turn the POWER switch ON and OUTPUT OFF in advance.

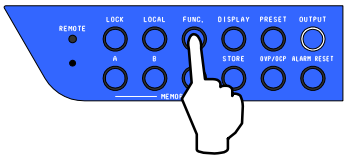


2. **At the Master, set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

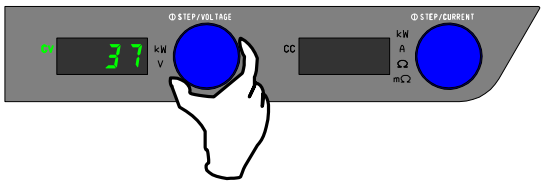
	30V Type	60V Type	500V Type
[xV]	0.01V	0.01V	0.1V
[yA]	1.0A	1.0A	0.1A

   On how to set, see Operating as Constant Voltage Power Supply under Basic Operations.(page27)

3. **Press the FUNC. key of the Slave.**

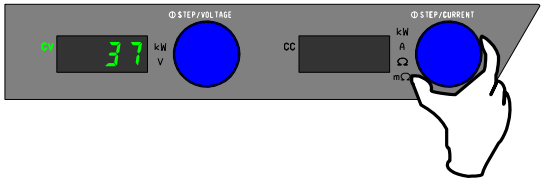


4. **Turn the VOLTAGE dial of the Slave unit to display the setting item number 37 in the Number Display (voltage).**

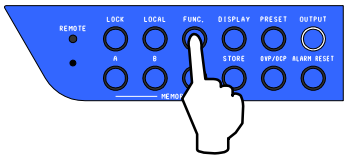


   * At that time, turn off the Number Display (current).

5. **Adjust the CURRENT dial of the Slave so that the display of the digital multimeter for output voltage measurement is the same as the display of the digital multimeter for output voltage measurement.**



6. **Press the FUNC. key of the Slave unit to set the offset calibration value of output voltage setting.**

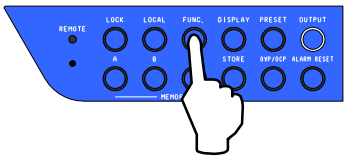


7. **At the Master, set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

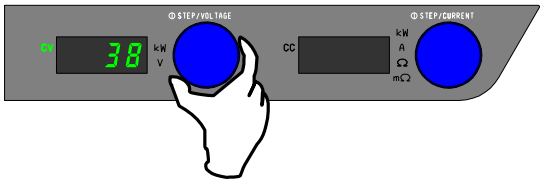
	30V Type	60V Type	500V Type
[xV]	30.00V	60.00V	500.0V
[yA]	1.0A	1.0A	0.1A

   On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (Page27)

8. **Press the FUNC. key of the Slave.**

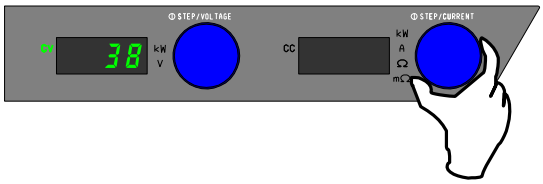


9. **Turn the VOLTAGE dial of the Slave unit to display the setting item number 38 in the Number Display (voltage).**

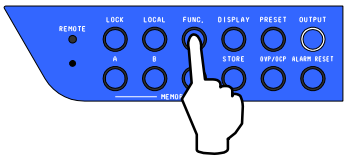


* At that time, turn off the Number Display (current).

10. **Adjust the CURRENT dial of the Slave so that the display of the Slave unit's digital multimeter for output voltage measurement is the same as the display of the Master unit's digital multimeter for output voltage measurement.**



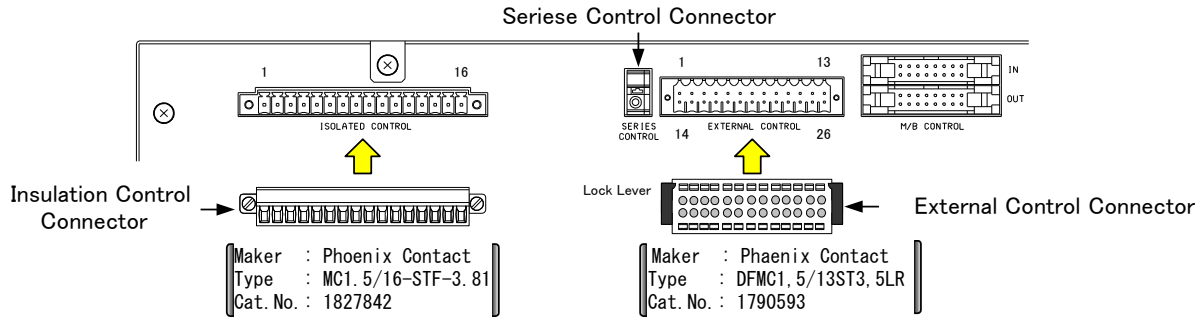
11. **Press the FUNC. key of the Slave unit to set the full-scale calibration value of output voltage setting.**



12. **This completes offset full-scale calibration for the output voltage of the Slave unit in series operation.**
At the Master unit, set the constant voltage setting value and the constant current setting value to the original ones and start using.

Using External Control Terminals

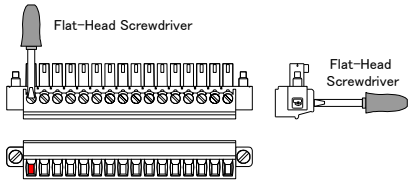
This section covers proper methods when operating the HX-S-G4 Series Power Supply externally.
On the rear panel of this power supply, there are the connector for external control and the connector for isolation control, which can be applied and used for various purposes combined with the FUNCTION items.
A specialized connecting connector is attached to the external control connector.
(Attached to the power supply)



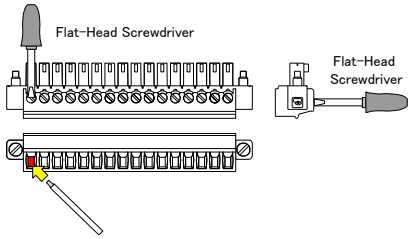
MEMO

How to insert wire into insulation control connector

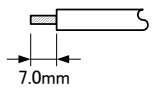
① Turn the screw at the upper part of the connector counterclockwise using a flat head screwdriver to widen the connection insertion part.



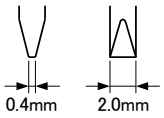
② Insert a cable(wire) into the connection insertion part and turn the screw at the upper part of the connector clickwise using a flat head screwdriver to connect the cable.



Wire Specifications
・Wire Size:28-16AWG(UL)
・Stripped Length:7.0mm



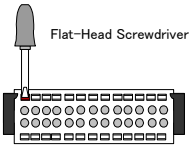
Flat-Head Screwdriver Dimensions



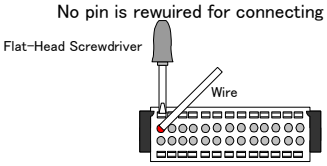
MEMO

How to insert wire into external control connector

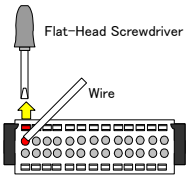
① Push in a flat-head screwdriver to the lever of the hole upper part of a connector.



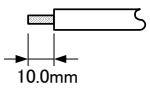
② Keeing pushing the flat head scredriver, insert a cable(wire) to the round hole.
Spring Connection
No pin is rewuired for connecting



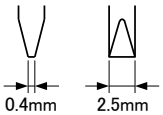
③ Extract Screwdriver



Wire Specifications
・Wire Size:24-16AWG(UL)
・Stripped Length:10.0mm



Flat-Head Screwdriver Dimensions



CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- There is no connector for external control for 1000V type model.
  Please mount the isolated control connector when the external control is required.
- Please do not touch the external control connector terminal and isolated control connector terminal after turning on the "Power SW".

Controlling with External Analog & Contact Signals

External Control Connector Terminal List

Terminal No.	Signal Name	Terminal No.	Signal Name
1	Voltage Monitoring Output	14	Common for Analog Signal
2	Current Monitoring Output	15	Common for Analog Signal
3	Output Voltage Control, External Voltage Input	16	Common for Analog Signal
4	Output Voltage Control, External Resistance (B,C) + Input	17	Output Voltage Control, External Resistance (B,C) - Input
5	Output Current Control, External Voltage Input	18	Common for Analog Signal
6	Output Current Control, External Resistance (B,C) + Input	19	Output Current Control, External Resistance (B,C) - Input
7	Output Voltage Control, External Resistance (A) Input	20	Reference Voltage Output [4.096V]
8	Output Current Control, External Resistance (A) Input	21	Control Input for Series Operation
9	Output ON/OFF Input	22	Common for Contact Signal
10	TRIP Input	23	Common for Contact Signal
11	Logical Selection Input of TRIP Input	24	Common for Contact Signal
12	Logical Selection Input of LEVEL1_ALM	25	Common for Contact Signal
13	Logical Selection Input of LEVEL2_ALM	26	Common for Contact Signal

CAUTION

The commons for analog signal (No. 14, No. 15, No. 16, No. 18) and the commons for contact point signal (No. 22, No. 23, No. 24, No. 25, No. 26) are internally connected with the minus side of the output terminal.

Isolated Control Connector Terminal List

Terminal No.	Signal Name	Without Isolation OP	With Isolation OP
1	Isolation, Voltage Monitoring Output	No	Yes
2	Isolation, Common for Voltage/Current Monitoring Output	No	Yes
3	Isolation, Current Monitoring Output	No	Yes
4	Isolation, Output Voltage Control, External Voltage Input	No	Yes
5	Isolation, Output Voltage Control, Common for External Voltage Input	No	Yes
6	Isolation, Output Current Control, External Voltage Input	No	Yes
7	Isolation, Output Current Control, Common for External Voltage Input	No	Yes
8	Isolation, Output ON/OFF Input	No	Yes
9	Isolation, TRIP Input	No	Yes
10	Isolation, Common for Output ON/OFF/TRIP Input	No	Yes
11	LEVEL1_ALM, Status Output/ OUTPUT ON/OFF STS Output	Yes	Yes
12	LEVEL2_ALM, Status Output	Yes	Yes
13	Constant Voltage (CV), Status Output	Yes	Yes
14	Constant Current (CC), Status Output	Yes	Yes
15	Input Voltage, Control Circuit Voltage Monitoring (P-ON), Status Output	Yes	Yes
16	Common for Status Output	Yes	Yes

CAUTION

The commons for isolation signal (No. 2, No. 5, No. 7, No. 10) are common.

Uses of Terminals

① Output ON/OFF and Input Shutoff with External Contact
② Control output voltage/current with external voltage
③ Control output voltage/current with external resistance
④ Monitor Output
⑤ Status Output
⑥ Master-Slave Series Operation

Toggling Output ON/OFF with External Contacts

***This function can not use 1000V type.**

The output for HX-S-G4 power supplies can be toggled ON/OFF using outputs from small capacity contact or photocoupler.
Use a photocoupler or a small signal relay or switch with a minimum contact capacity of 5V, 2.5mA.

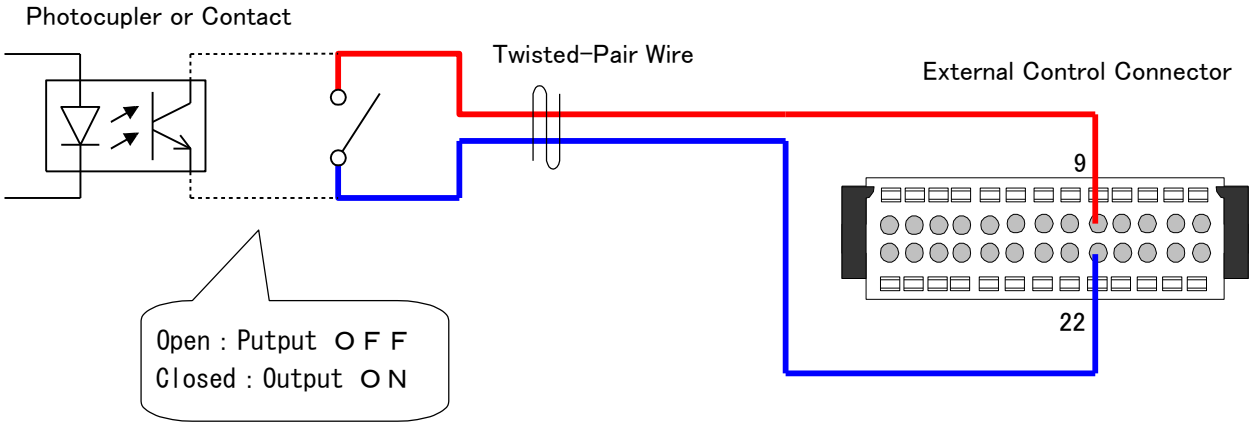
CAUTION

- Not suited for power contacts such as main contacts for electromagnetic contactors or power relays etc.
- For output ON/OFF toggle contact, please use an insulated contact point or open collector.

FUNCTION settings must be changed to "Valid" for Output ON/OFF Control at External Contact Points to be used.
Factory default settings are set to "Invalid".

Connecting

Wire the cables to the external control connector (accessory) terminals No. 9 and 22.
The external control connectors can be simply removed by pushing down the lock levers on both sides.



Toggling Output ON/OFF with External Contacts

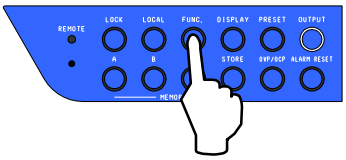
CAUTION

- The common for contact point signal (No. 22) is internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- Please take note that OUPUT lamp may be lit by turning off the operating power supply during the OUTPUTand it is not abnormal state.

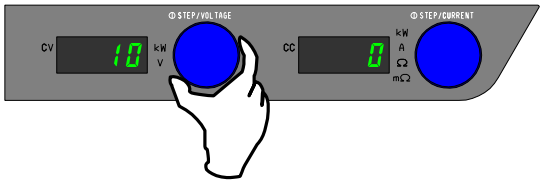
Setting Procedures

Press the Function "FUNC." key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 10 with the VOLTAGE dial.



Select 0 to 2 with the CURRENT dial.

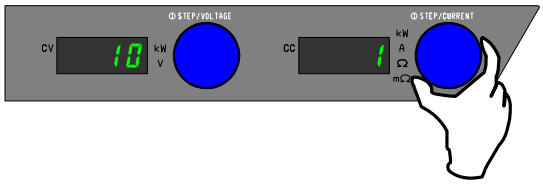
Set value 0: Turns off ON/OFF Toggle by external contact (invalid).

Set this if controlled by the front panel's ON/OFF key or by remote control (commands).

Set value 1: Sets Output ON if the external contact is closed and OFF if the external contact is opened.

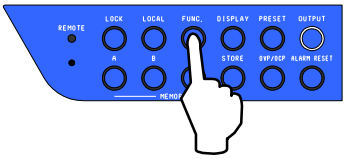
Set this if output is controlled by external contact. Output control by the front panel's ON/OFF key or remote control (commands) is invalid.

Set value 2: If the external contact is closed, power control by the front panel's ON/OFF key or remote control (commands) is enabled. If it is open, the output is set to OFF.



Press the FUNC. key again to finish.

Confirms settings and returns the Number Display to measurement display mode.



Toggling Output ON/OFF with Isolated External Contacts

*** This function can be set for isolation-option-featured type "model name with I" only.**

The output for HX-S-G4 Series power supplies can be toggled ON/OFF using outputs from small capacity contact or photocoupler.
Use a photocoupler or a small signal relay or switch with a minimum contact capacity of 5V, 2.5mA.

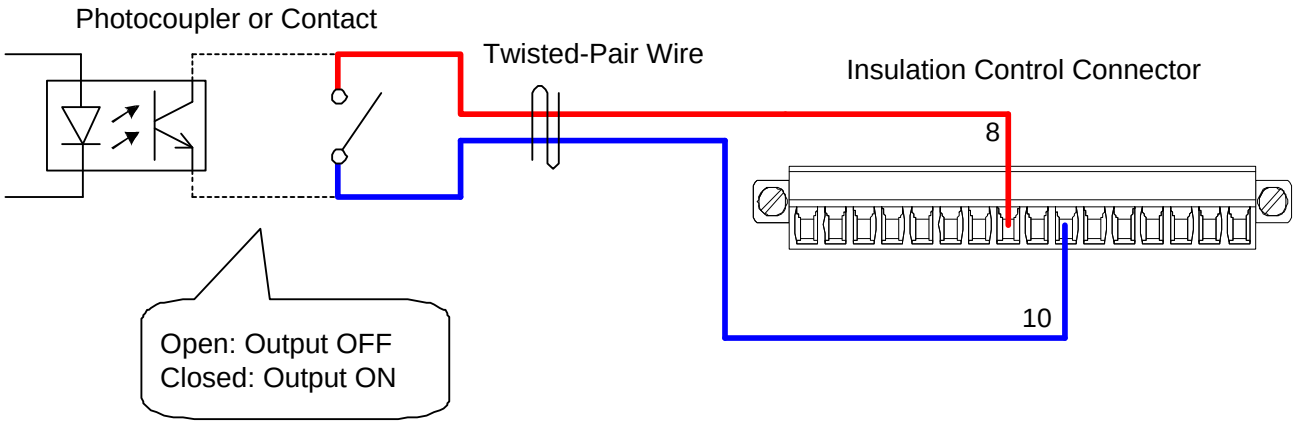
CAUTION

- Not suited for power contacts such as main contacts for electromagnetic contactors or power

FUNCTION settings must be changed to "Valid" for Output ON/OFF Control at External Contact Points to be used.
Factory default settings are set to "Invalid".

Connecting

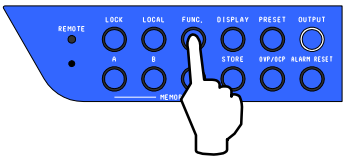
Wire the cables to the isolated control connector (accessory) terminals No. 8 and 10.



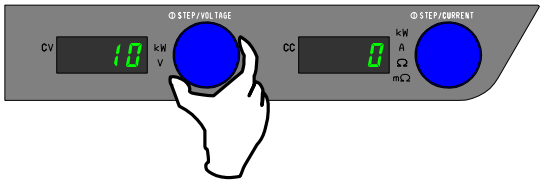
Toggling Output ON/OFF with Insulation External Contacts

Setting Procedures

Press the Function "FUNC." key.
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 10 with the VOLTAGE dial.



Select 0 to 2 with the CURRENT dial.

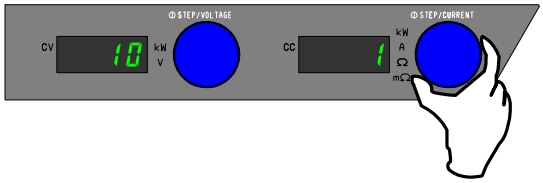
Set value 0: Turns off ON/OFF Toggle by external contact (invalid).

Set this if controlled by the front panel's ON/OFF key or by remote control (command).

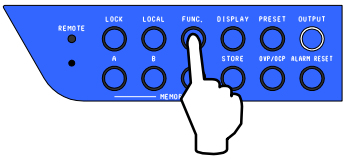
Set value 1: Sets Output ON if the external contact is closed and OFF if the external contact is opened.

Set this if output is controlled by external contact. Output control by the front panel's ON/OFF key or remote control (commands) is invalid.

Set value 2: If the external contact is closed, power control by the front panel's ON/OFF key or remote control (commands) is enabled. If it is open, the output is set to OFF.



Press the FUNC. key again to finish.
Confirms settings and returns the Number Display to measurement display mode.



Toggling Output ON/OFF with External Contacts in Series Operation

The output for HX-S-G4 power supplies can be toggled ON/OFF using outputs from small capacity contact or photocoupler.
Use a photocoupler or a small signal relay or switch with a minimum contact capacity of 5V, 2.5mA.

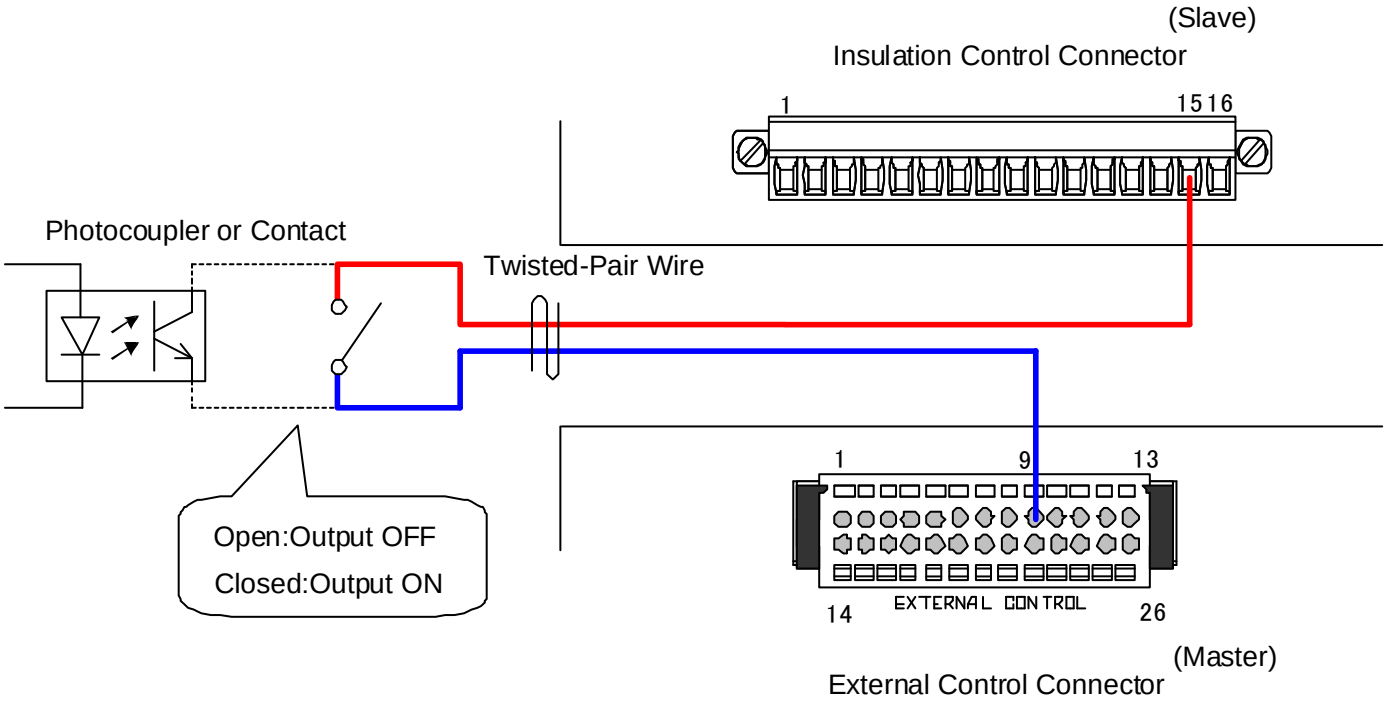
CAUTION

- Not suited for power contacts such as main contacts for electromagnetic contactors or power relays etc.
- For output ON/OFF toggle contact, please use an insulated contact point or open collector.

FUNCTION settings must be changed to "Valid" for Output ON/OFF Control at External Contact Points to be used.
Factory default settings are set to "Invalid".

Connecting

For the connecting, refer to page123.
Wire the cables to the isolated control connector (accessory) terminals No. 15 of Slave and, the external control connector (accessory) terminals No. 9 of Master.

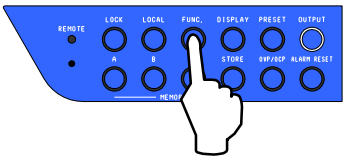


Toggling Output ON/OFF with External Contacts in Series Operation

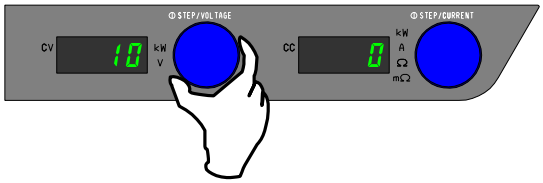
Setting Procedures

Press the Function "FUNC." key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



Select Item number 10 with the VOLTAGE dial.



Select 0 to 2 with the CURRENT dial.

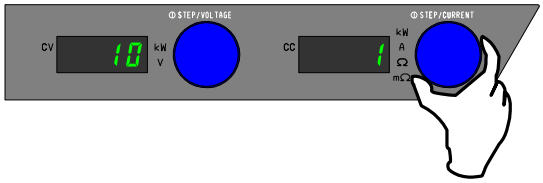
Set value 0: Turns off ON/OFF Toggle by external contact (invalid).

Set this if controlled by the front panel's ON/OFF key or by remote control (command).

Set value 1: Sets Output ON if the external contact is closed and OFF if the external contact is opened.

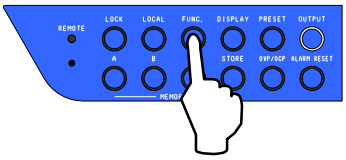
Set this if output is controlled by external contact. Output control by the front panel's ON/OFF key or remote control (commands) is invalid.

Set value 2: If the external contact is closed, power control by the front panel's ON/OFF key or remote control (commands) is enabled. If it is open, the output is set to OFF.



Press the FUNC. key again to finish.

Confirms settings and returns the Number Display to measurement display mode.



TRIP Operation with External Contacts

***This function can not use 1000V type.**

The input for this machine can be shut off (switching stop by setting) using output from small capacity contacts or photocouplers.
Use a photocoupler or a small signal relay or switch with a minimum contact capacity of 5V, 2.5mA.

MEMO

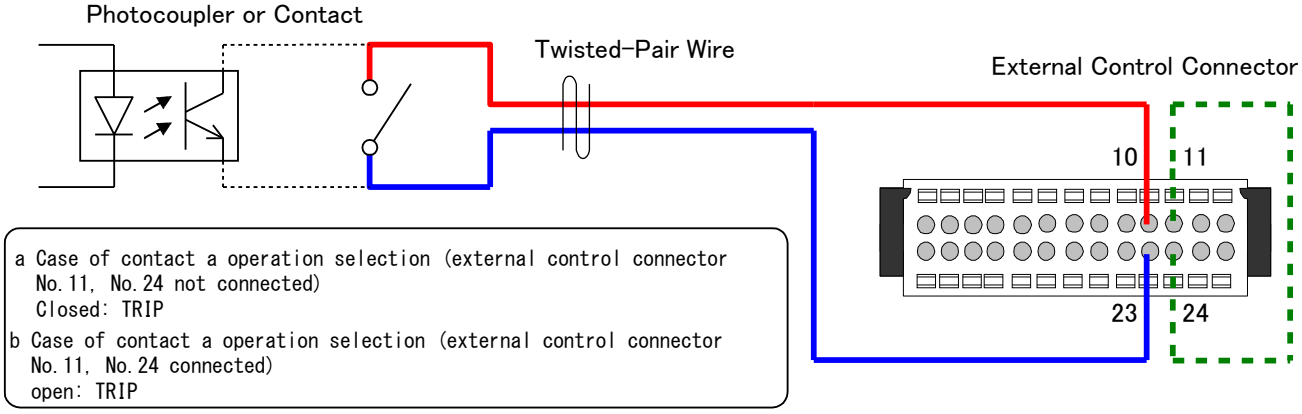
- You can choose TRIP operation by short circuit (make) of contact a and TRIP operation by opening (break) of contact b.

CAUTION

- Not suited for power contacts such as main contacts for electromagnetic contactors or power relays.
- For output ON/OFF toggle contact, please use an insulated contact point or open collector.

Connecting

Wire the cables to the external control connector (accessory) terminals No. 10 and 23. Further, by connecting No. 11 and 24, contact-b operation can be performed.
By connecting the external control connector (accessory) terminals No.11 and 24,contact-b operation can be performed.
The external control connectors can be simply removed by pushing down the lock levers on both sides.



TRIP Operation with External Contacts

CAUTION

- The commons for contact point signal (No. 23, No. 24) are internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.

TRIP Operation with Isolated External Contacts

*** This function can be set for isolation-option-featured type "model name with I" only.**

The input for this machine can be shut off (switching stop by setting) using output from small capacity contacts or photocouplers.
Use a photocoupler or a small signal relay or switch with a minimum contact capacity of 5V, 2.5mA.

MEMO

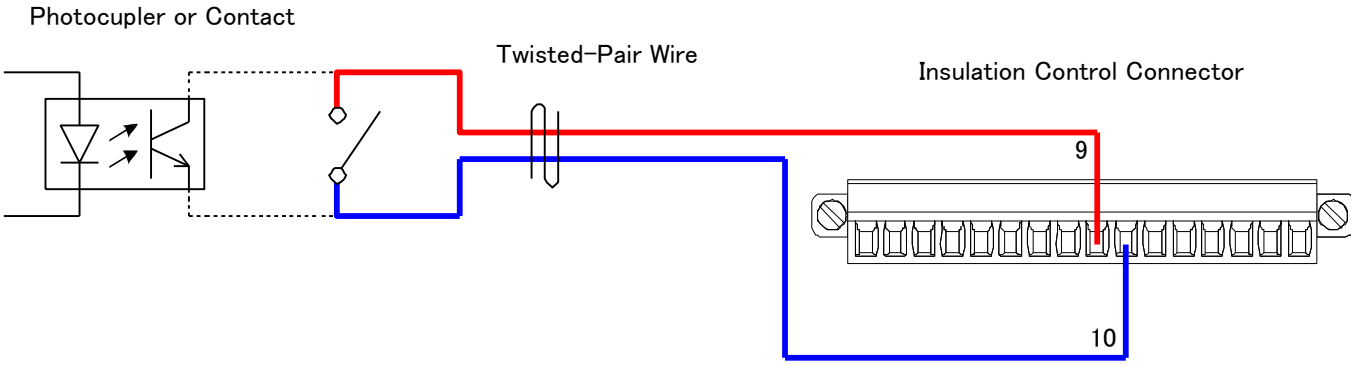
- You can choose TRIP operation by short circuit (make) of contact a and TRIP operation by opening (break) of contact b.

CAUTION

- Not suited for power contacts such as main contacts for electromagnetic contactors or power relays.

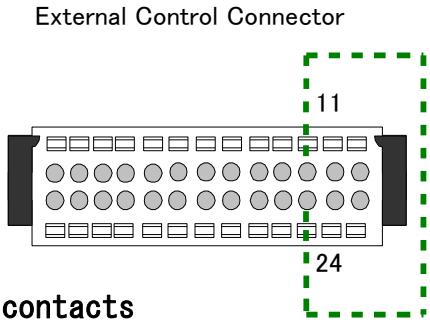
Connecting

Wire the cables to the isolated control connector (accessory) terminals No. 9 and 10.
By connecting the external control connector (accessory) terminals No. 11 and 24, contact-b operation can be performed.



a Case of contact a operation selection (external control connector No. 11, No. 24 not connected)
Closed: TRIP

b Case of contact a operation selection (external control connector No. 11, No. 24 connected)
open: TRIP



TRIP operation with insulation external contacts

CAUTION

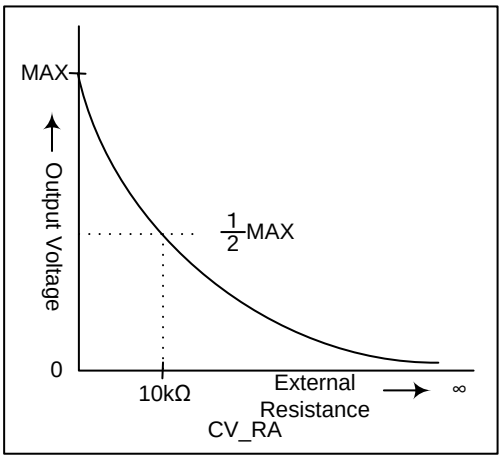
- The commons for contact point signal (external control connector No. 23,24) is internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.

Output Voltage Control

Output Voltage Control with External Resistance

1. Output Voltage Control with External Resistance (A)

***This function can not use 1000V type.**



This section describes how to set the output voltage zero when the external resistance value is infinity.
The output voltage is derived from the following formula.

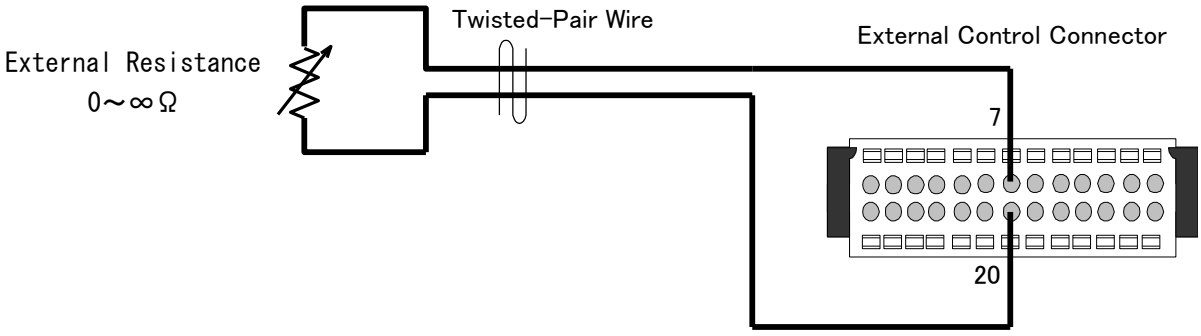
Output Voltage [V]

$$= \text{Maximum Output Voltage}[\text{V}] \times \frac{10}{\text{External Resistance}[\text{k}\ \Omega] + 10}$$

The output accuracy for the external resistance, is the set voltage ± (0.2% of Rated Output Voltage) when 10kΩ.

Connection

Connect the resistor between No. 7 and 20 of the external control connector (accessory).



Output Voltage Control with External Resistance(A)

CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

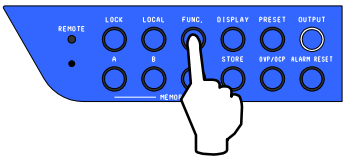
Setting Procedures

Set the parameter to 2 (External Resistance Type A) according to the procedure on page138.

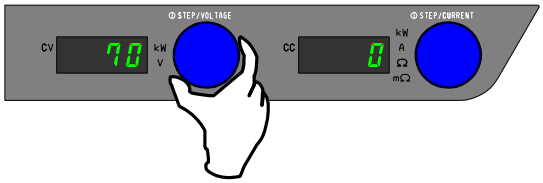
Setting Procedures

Press the Function "FUNC." key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).

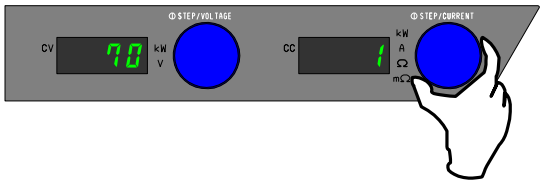


Select Item number 70 with the VOLTAGE dial.



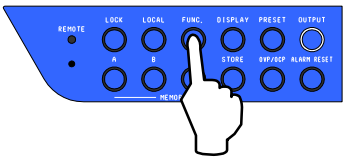
Select the parameter with the CURRENT dial.

0 = Front Panel (Default)
1 = External Voltage (0 to 10V)
2 = External Resistance (0 to ∞Ω: A)
3 = External Resistance (0 to ∞Ω: B)
4 = External Resistance (0 to ∞Ω: C)



Press the FUNC. key again to finish.

Confirms settings and returns the Number Display to measurement display mode.



2. Output Voltage Control with External Resistance (B)
***This function can not use 1000V type.**

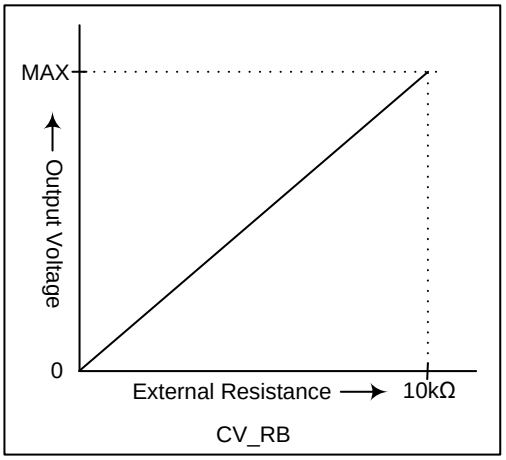
This section describes how to set the output voltage to zero when the external resistance value is zero (short).

The output voltage is derived from the following formula.

Output Voltage [V]

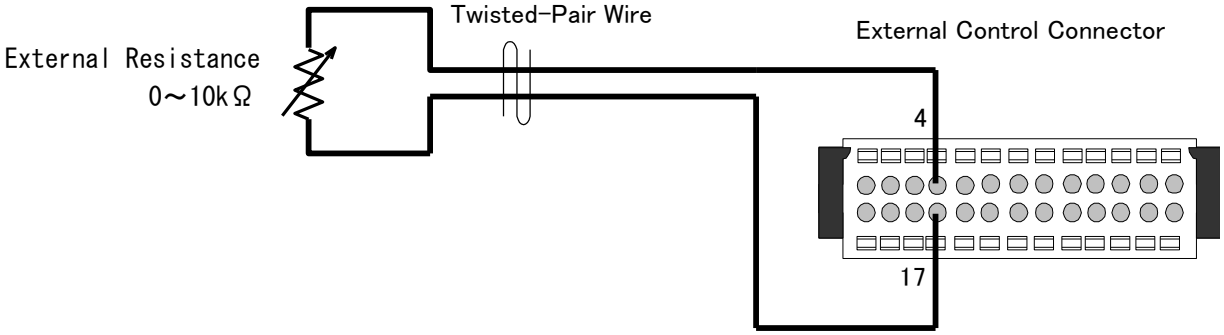
$$= \text{Maximum Output Voltage}[\text{V}] \times \frac{\text{External Resistance}[\text{k}\,\Omega]}{10}$$

The output accuracy for the external resistance is the set voltage ± (0.1% of Rated Output Voltage).



Connecting

Connect the resistor between No. 4 and 17 of the external control connector (accessory).



Output Voltage Control with External Resistance(B)

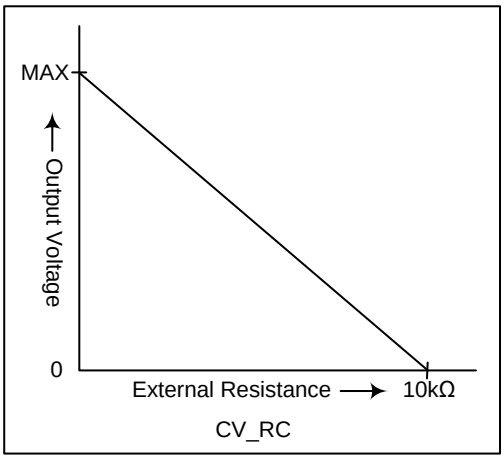
CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.
- If the external resistance opens for even a moment, the output will generate an over voltage.

Setting Procedures

Set the parameter to 3 (External Resistance Type B) according to the procedure on page 138.

3. Output Voltage Control with External Resistance (C)
***This function can not use 1000V type.**



This section describes how to set the output voltage zero when the external resistance value is 10kΩ.

The output voltage is derived from the following formula.

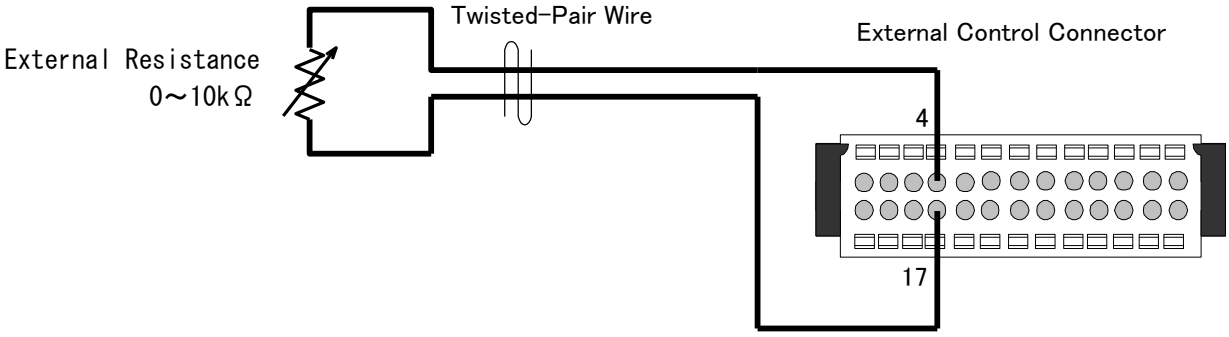
Output Voltage [V] =

$$\text{Max. Output Voltage [V]} - \left(\times \frac{\text{External Resistance[k Ω]}}{10} \right)$$

The output accuracy for the external resistance is the set voltage ± (0.1% of Rated Output Voltage).

Connecting

Connect the resistor between No. 4 and 17 of the external control connector (accessory).



Output Voltage Control with External Resistance(C)

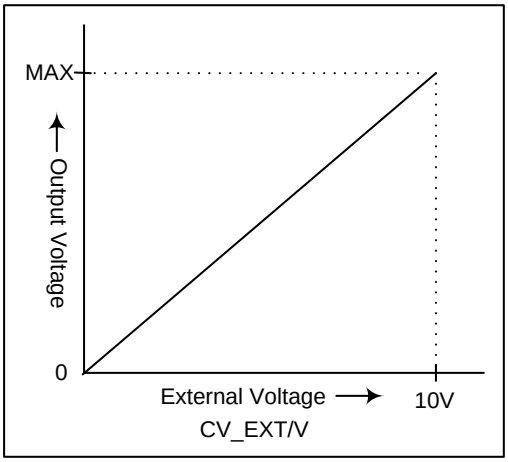
CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.
- If the external resistance opens for even a moment, the output will generate an over voltage.

Setting Procedures

Set the parameter to 4 (External Resistance Type C) according to the procedure on page 138.

Output Voltage Control with External Voltage
***This function can not use 1000V type.**



Output voltage is proportionate to the external DC voltage.
Outputs from 0 to a rated output voltage for external voltages 0 to 10V.
The external voltage uses what can produce a 1mA current.

The output voltage is derived from the following formula.

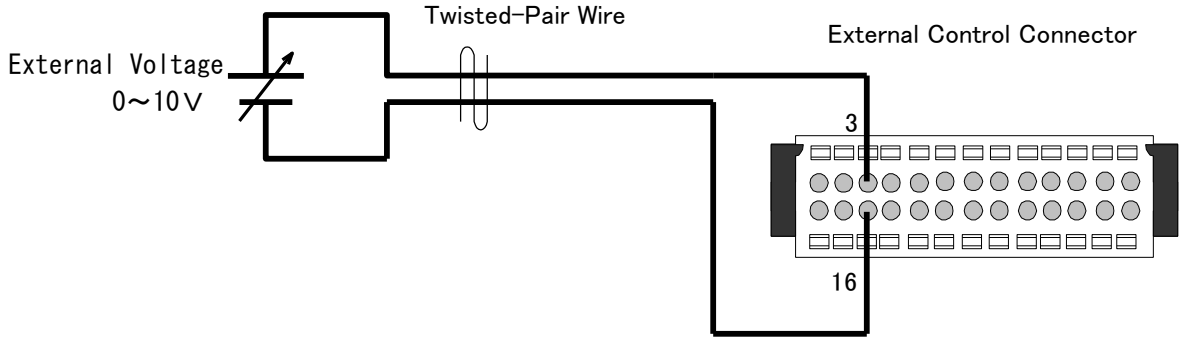
Output Voltage [V] =

$$= \text{Maximum Output Voltage}[\text{V}] \times \frac{\text{External Resistance}[\text{k}\ \Omega]}{10}$$

The output accuracy for the external voltage, is the set voltage ± (0.1% of Rated Output Voltage).

Connecting

Connect the external voltage between No. 3 and 16 of the external control connector (accessory).



Output Voltage Control with External Voltage

CAUTION

- The commons for analog signal (external control connector No. 16) is internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

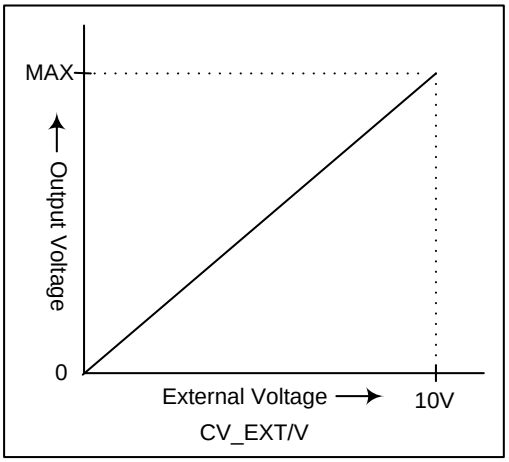
Setting Procedures

Set the parameter to 4 (External Resistance Type C) according to the procedure on page 138.

Output Voltage Control with Isolated External Voltage

*** This function can be set for isolation-option-featured type "model name with I" only.**

Output voltage is proportionate to the external DC voltage.
The external voltage is insulated from output of this machine.
Outputs from 0 to a rated output voltage for external voltages 0 to 10V.
The external voltage uses what can produce a 1mA current.



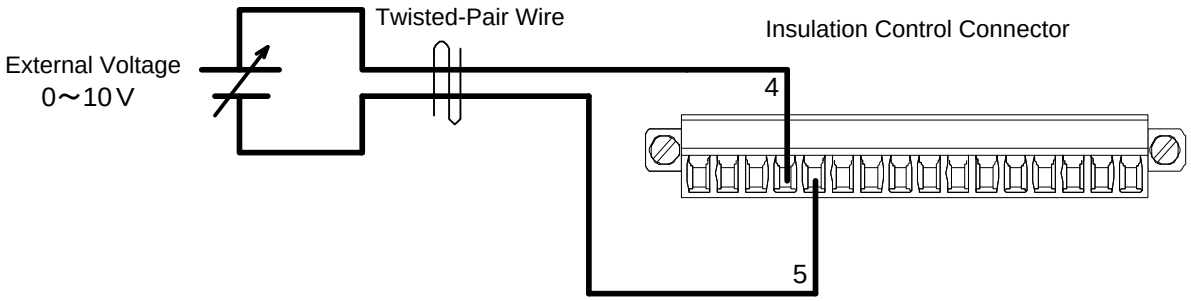
The output voltage is derived from the following formula.

$$\text{Output Voltage [V]} = \text{Maximum Output Voltage}[\text{V}] \times \frac{\text{External Resistance}[\text{k}\,\Omega]}{10}$$

The output accuracy for the external voltage, is the set voltage ± (0.2% of Rated Output Voltage).

Connecting

Connect the external voltage between No. 4 and 5 of the isolated control connector (accessory).



Output Voltage Control with Insulation External Voltage

CAUTION

The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

Setting Procedures

① Set the parameter for FUNCTION item 40 to "1".
② Set the parameter to 1 (External Voltage) according to the procedure on page 138.

Output Current Control

Output Current Control with External Resistance

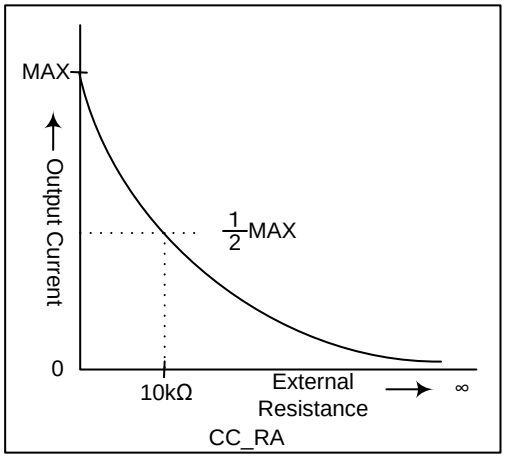
1. Output Current Control with External Resistance (A)
***This function can not use 1000V type.**

This section describes how to set the output current zero, when the external resistance value is infinite (open).
The output current is derived from the following formula.

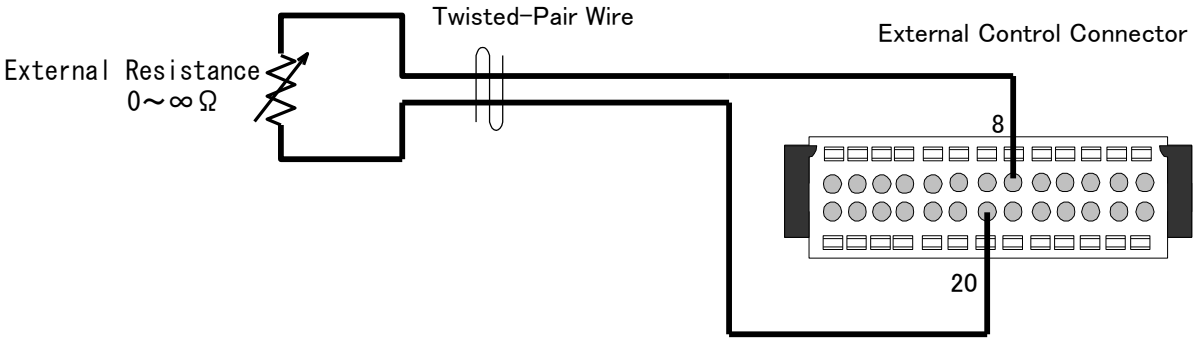
Output Current [A]

$$= \text{Max. Output Current}[\text{A}] \times \frac{10}{\text{External Resistance}[\text{k}\ \Omega] + 10}$$

The output accuracy for the external resistance, is the set current ± (1% of Rated Output Current) when 10kΩ.



Connecting
Connect the resistor between No. 8 and 20 of the external control connector (accessory).



Output Current Control with External Resistance(A)

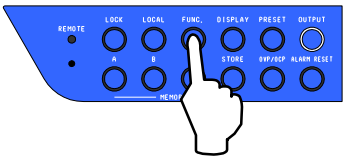
CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

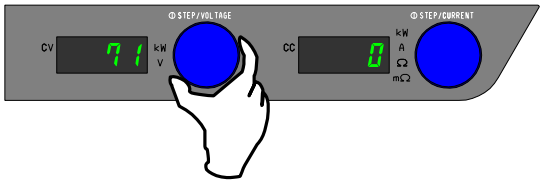
Setting Procedures
Set the parameter to 2 (External Resistance Type A) according to the procedure on page 144.

Setting Procedures

Press the Function "FUNC." key.
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).

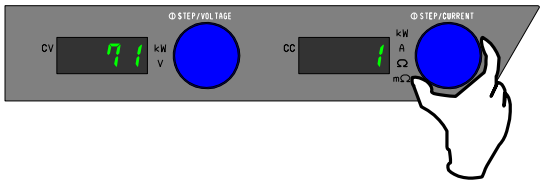


Select Item number 71 with the VOLTAGE dial.

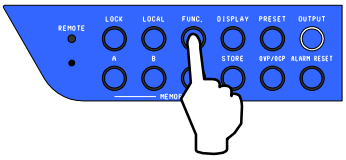


Select the parameter with the CURRENT dial.

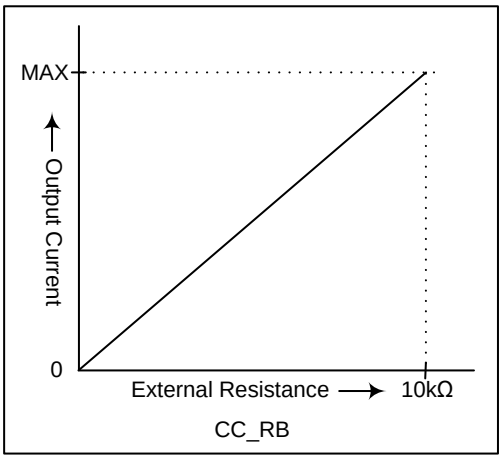
0 = Front Panel (Default)
1 = External Voltage (0~10V)
2 = External Resistance (0 to ∞Ω: A)
3 = External Resistance (0 to 10kΩ: B)
4 = External Resistance (0 to 10kΩ: C)



Press the FUNC. key again to finish.
Confirms settings and returns the Number Display to measurement display mode.



2. Output Current Control with External Resistance(B)



This section describes how to set the output current to zero when the external resistance value is zero (short).

The output current is derived from the following formula.

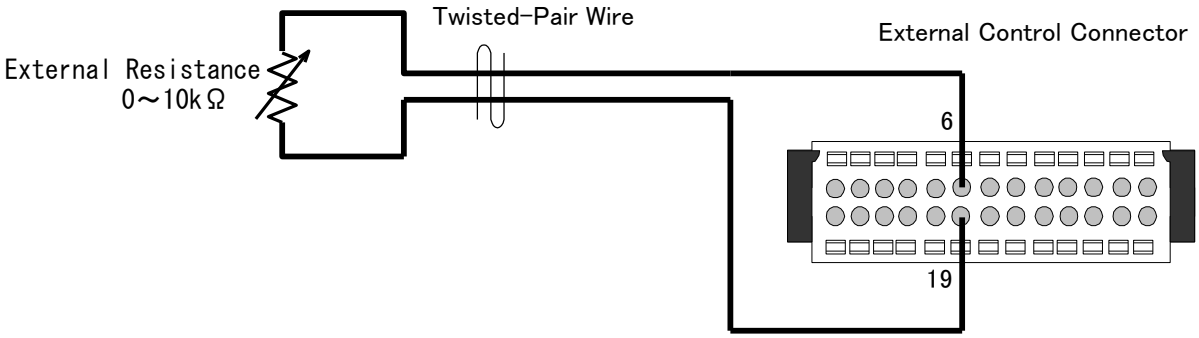
Output Current [A]

$$= \text{Max. Output Current}[A] \times \frac{\text{External Resistance}[k\ \Omega]}{10}$$

The output accuracy for the external resistance, is the set current ± (0.5% of Rated Output Current).

Connecting

Connect the resistor between No. 6 and 19 of the external control connector (accessory).



Output Current Control with External Resistance(B)

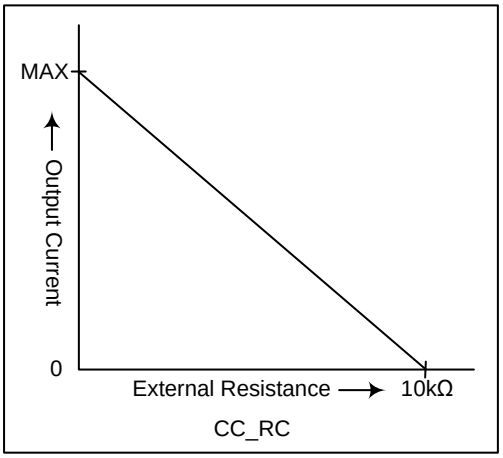
CAUTION

- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.
- If the external resistance opens for even a moment, the output will generate an over voltage.

Setting Procedures

Set the parameter to 3 (External Resistance Type B) according to the procedure on page 144.

3. Output Current Control with External Resistance(C)
***This function can not use 1000V type.**



This section describes how to set the output current zero when the external resistance value is 10kΩ.

The output current is derived from the following formula.

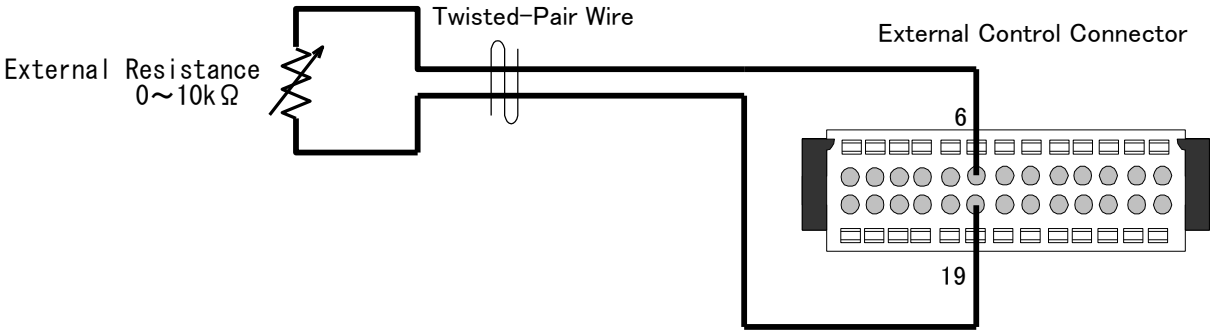
Output Current [A]

$$= \text{Max. Output Curent}\,[\text{A}] - \left(\times \frac{\text{Max. Output Current}\,[\text{A}]}{\text{External Resistance}[\text{k}\ \Omega]} \right) \Big/ 10$$

The output accuracy for the external resistance is the set current ± (0.5% of Rated Output Current).

Connecting

Connect the resistor between No. 6 and 19 of the external control connector (accessory).



Output Current Control with External Resistance(C)

CAUTION

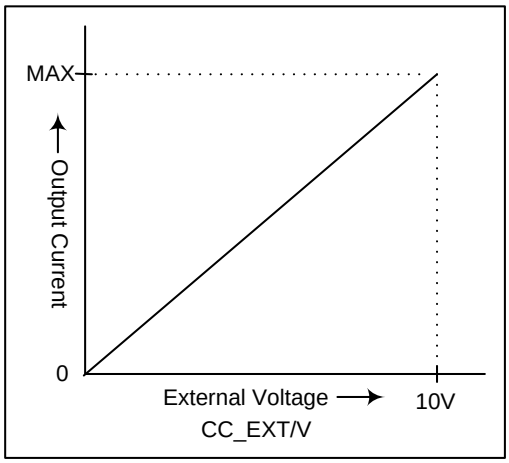
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.
- The system is a fail safe method and is such that if the External Resistance opens, the Output Current will become zero.

Setting Procedures

Set the parameter to 4 (External Resistance Type C) according to the procedure on page 144.

Output Current Control with External Voltage
***This function can not use 1000V type.**

Outputs current, which is proportionate to the direct current voltage added from external voltage.
Outputs from 0 to the maximum output current for external voltage of 0 to 10V.
The external voltage uses what can produce a 1mA current.



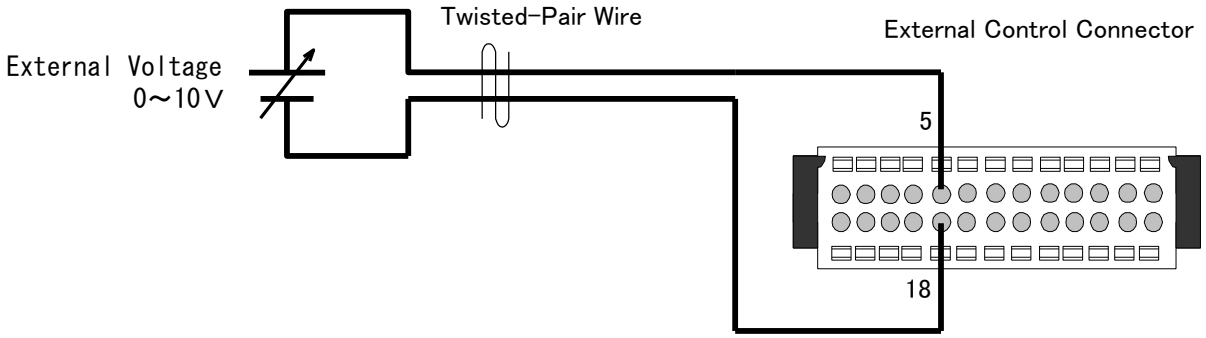
The output current is derived from the following formula.

$$\text{Output Current [A]} = \text{Maximum Output Current}\,[A] \times \frac{\text{External Voltage}\,[V]}{10}$$

The output accuracy for the external resistance is the set current ± (0.5% of Rated Output Current).

Connecting

Connect the external voltage between No. 5 and 18 of the external control connector (accessory).



Output Current Control with External Voltage

CAUTION

- The commons for analog signal (external control connector No. 18) is internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

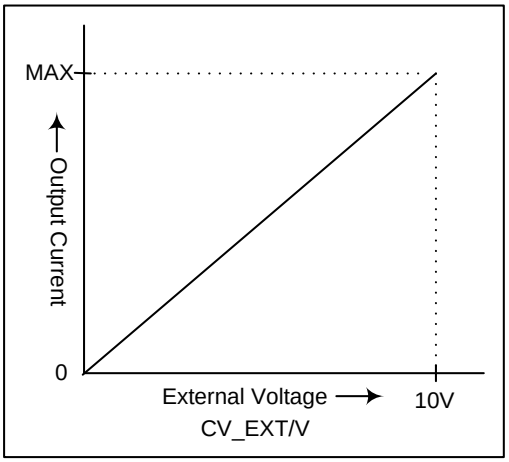
Setting Procedures

Set the parameter to 1 (External Voltage) according to the procedure on page 144.

Output Current Control with Isolated External Voltage

*** This function can be set for isolation-option-featured type "model name with I" only.**

Output current is proportionate to the external DC voltage.
The external voltage is insulated from output of this machine.
Outputs from 0 to the rated output current for external voltage of 0 to 10V.
The external voltage uses what can produce a 1mA current.



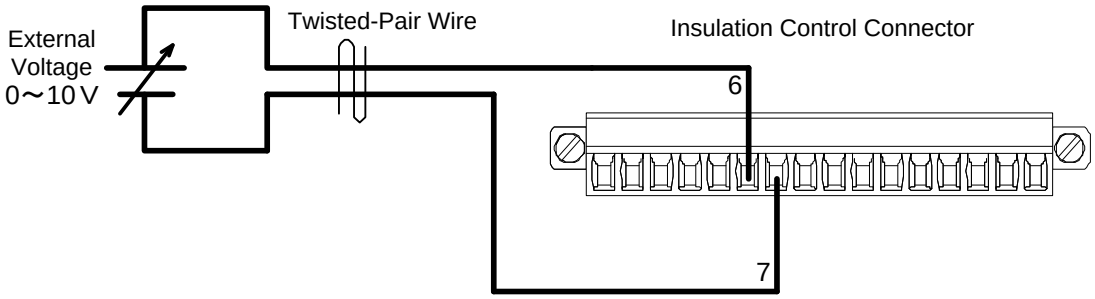
The output voltage is derived from the following formula.

$$\text{Output Current [A]} = \text{Max. Output Voltage [V]} \times \frac{\text{External Voltage [V]}}{10}$$

The output accuracy for the external voltage is the set current ± (1.0% of Rated Output Current).

Connecting

Connect the external voltage between No. 6 and 7 of the isolated control connector (accessory).



CAUTION

The External Resistance A, B, and C and the External Voltage cannot be used together to control the output.

Setting Procedures

① Set the parameter for FUNCTION item 41 to "1".
② Set the parameter to 1 (External Voltage) according to the procedure on page144.

Analog Output Monitor

***This function can not use 1000V type.**

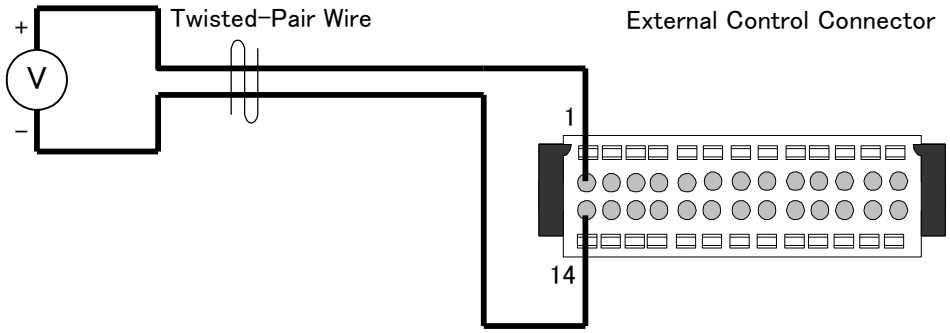
This can produce the DC voltage, which is proportional to the output voltage and output current.
Use when wishing to surveillance the output with an external meter or recorder.
Outputs a "0~10V" DC for output voltage/currents of "0 to rated output".
Please use an input impedance of a 10kΩ or more for the external meter.

Output Voltage Monitor

The accuracy for the output voltage monitor is 0.5% ± 10mV

Connecting

Connect the meter or the recorder between No. 1 and 14 of the external control connector (accessory).



CAUTION

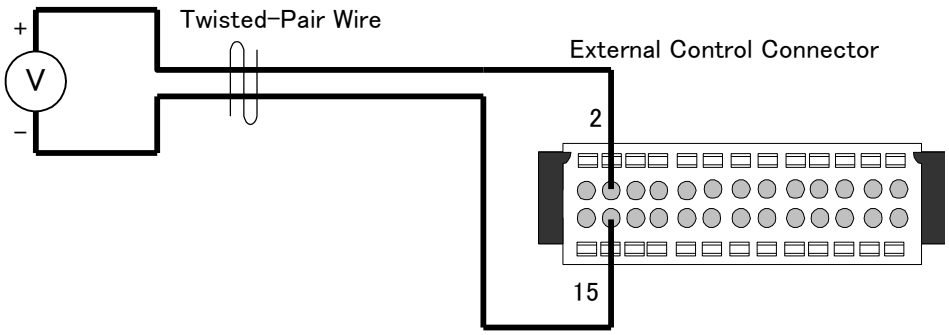
- Control Common (No. 14 pin) is internally connected to the minus side of the output terminal.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.

Output Current Monitor

The accuracy for the output current monitor is 1.0% ± 10mV

Connecting

Connect the meter or the recorder between No. 2 and 15 of the external control connector (accessory).



CAUTION

- Output current wave forms cannot be observed by the current monitor.
- Isolation for the wire connecting to the external control should be more than the relative ground voltage of this product.
  Otherwise, the user may receive electric shock.
- Control Common (No. 15 pin) is internally connected to the minus side of the output terminal.

Isolated Analog Output Monitor

*** This function can be set for isolation-option-featured type "model name with I" only.**

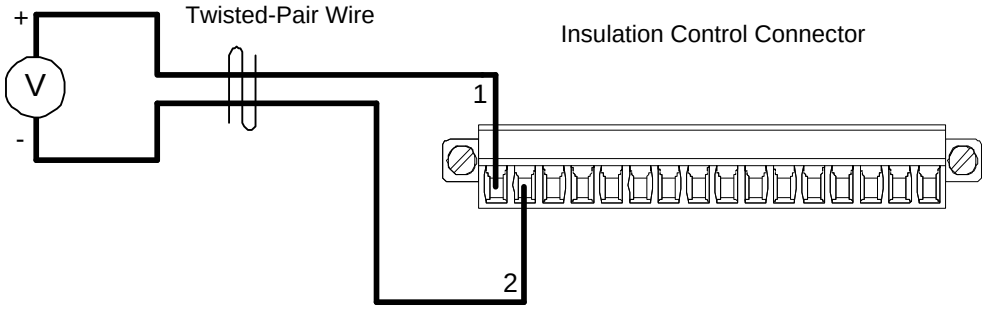
This can produce the DC voltage, which is proportional to the output voltage and output current and is insulated from the output terminal. .
Use when wishing to surveillance the output with an external meter or recorder.
Outputs a "0~10V" DC for output voltage/currents of "0 to rated output".
Please use an input impedance of a 10kΩ or more for the external meter.

Isolated, Output Voltage Monitor

The accuracy for the output voltage monitor is 0.5% ± 10mV.

Connecting

Connect the meter or the recorder between No. 1 and 2 of the isolated control connector (accessory).

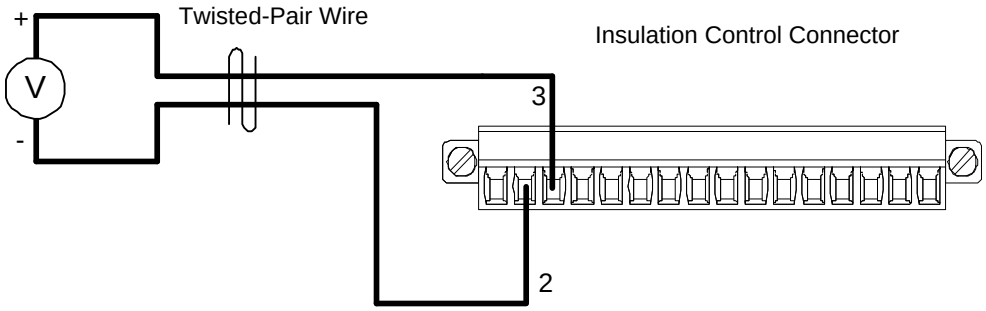


Isolated, Output Current Monitor

The accuracy for the output current monitor is 1.0% ± 10mV.

Connecting

Connect the meter or the recorder between No. 3 and 2 of the isolated control connector (accessory).



CAUTION

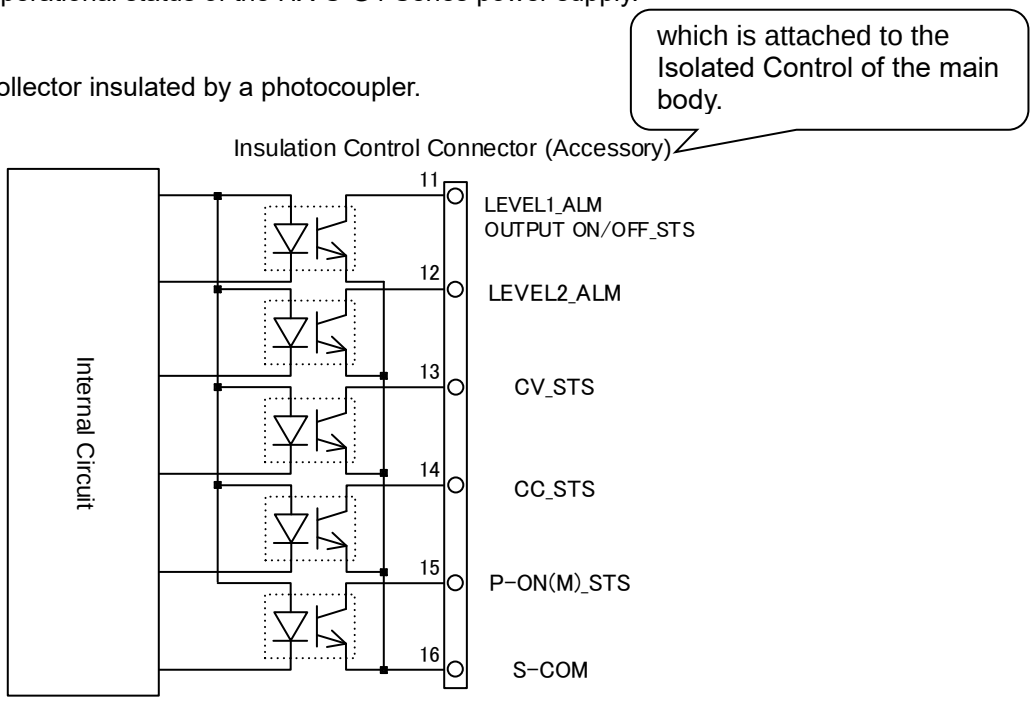
- Output current wave forms cannot be observed by the current monitor.

Status Output

This can externally output the operational status of the HX-S-G4 Series power supply.

Output Circuit

Output is given by an open collector insulated by a photocoupler.



Status List

Output signal is negative logic. When output signal is ON between the collector and emitter, logic is 1.
See the following for details on each terminal's signals.

Terminal	Signal Name	Contents
11	LEVEL1_ALM	Light failure (OVP, OCP) has occurred.
	OUTPUT ON/OFF STS	"OUT PUT ON/OFF"has occurred.
12	LEVEL2_ALM	Alarm has occurred. (Include Several Alarms)
13	CV_STS	Running in Constant Voltage Mode.
14	CC_STS	Running in Constant Current Mode.
15	P-ON(M)_STS	Internal rectification voltage and power supply for control circuits is normal.
16	S-COM	Status Common. Connected to emitters of each photocoupler.

MEMO

- By connecting the external control connector (accessory) No. 12 and 25, the logic of LEVEL1_ALM becomes a positive logic.
- By connecting the external control connector (accessory) No. 13 and 26, the logic of LEVEL2_ALM becomes a positive logic.

Status Output Electric Specifications

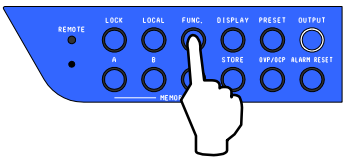
Item	Specifications
Withstand Voltage	DC 1500V (for input, output, and chassis)
Max. Collector Voltage	24V
Max. Collector Current	5mA

LEVEL1_ALM, OUTPUT ON/OFF_STS
For "LEVEL1_ALM" and OUTPUT ON/OFF_STS, either function can be selected by setting the function.

■ LEVEL1_ALM and OUTPUT ON/OFF_STS selection

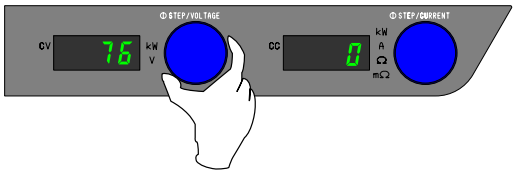
Setting Procedures

Press the Function "FUNC." key.
The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



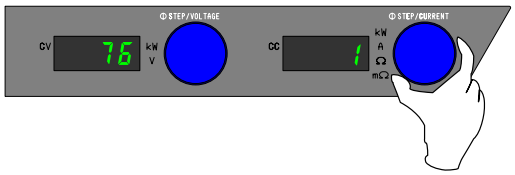
Select the Item number with the VOLTAGE dial.

Select No. 76.

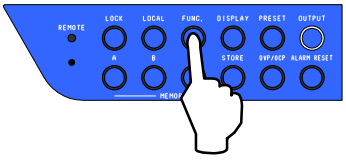


Select the parameter with the CURRENT dial.

0=LEVEL1 [Default]
1=OUTPUT ON/OFF_STS



Press the FUNC. key again to finish.
Confirms settings and returns the Number Display to measurement display mode.



LEVEL1_ALM,

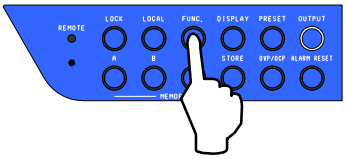
This handles the operation mode's status signal as a LEVEL1_ALM (alarm status).
It can also be used for surveillance as an alarm when switching from constant voltage to constant current.

Status Signals that can be set in LEVEL1_ALM
CV_STS (Constant Voltage Operation)
CC_STS (Constant Current Operation)

Setting Procedures

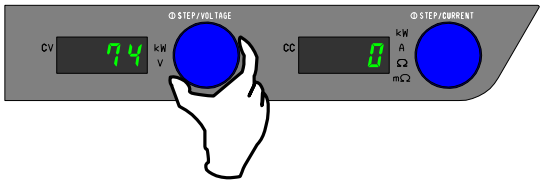
Press the Function "FUNC." key.

The FUNC. lamp will light.
The Setting Item Number will be displayed in the Number Display (voltage) and the parameter will be displayed in the Number Display (current).



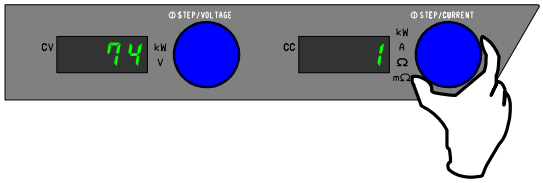
Select the Item number with the VOLTAGE dial.

Item 74 : CV_STS
Item 75 : CC_STS



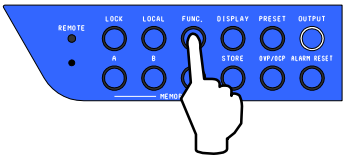
Select the parameter with the CURRENT dial.

0=Not included in LEVEL1_ALM [Default]
1=Included in LEVEL1_ALM



Press the FUNC. key again to finish.

Confirms settings and returns the Number Display to measurement display mode.



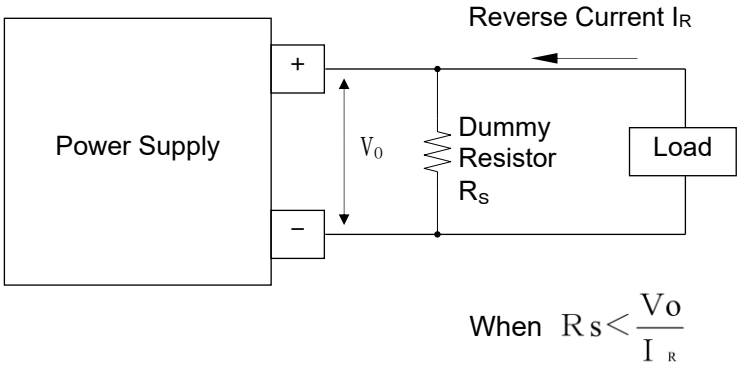
This section explains about loads with reverse current and pulse current loads as special loads.

Loads with Reverse Current

CAUTION

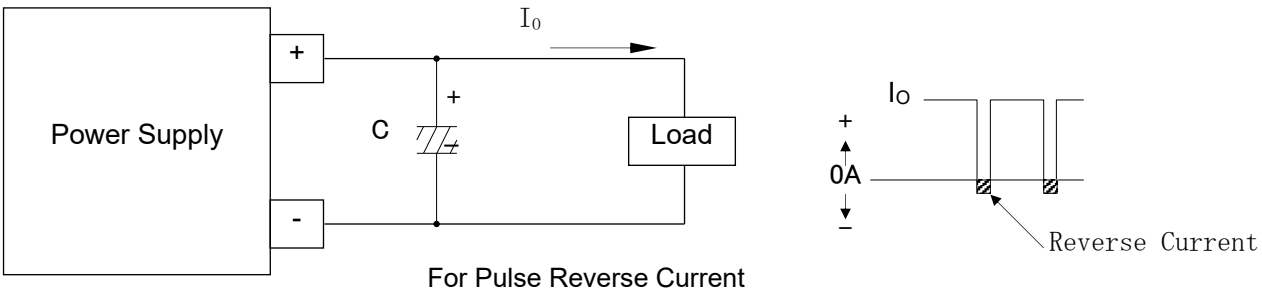
This machine does not have functions to stabilize the output voltage against reverse current from loads. If the maximum sink current is exceeded, the output voltage will rise above the rated value and burn-out the internal circuits.
Please do not apply voltages to the output terminal, which exceed the power supply's rating.

The dummy resistor will shunt the reverse current and prevent the output voltage from rising.



Reverse-Current Absorption by Dummy Resistor

Also, when the pulse reverse current flows and the average current value is in the supply direction, the voltage can be stabilized by connecting capacitor (1000μF to 10000μF) in parallel.



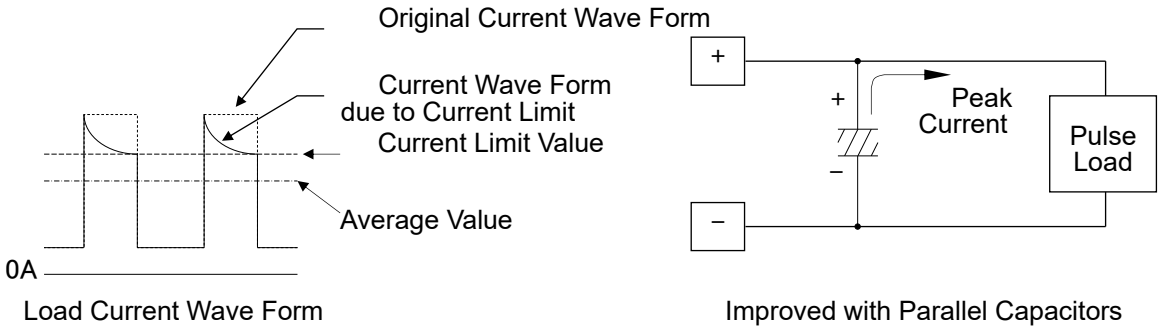
For Pulse Reverse Current

CAUTION

- Please do not apply voltages to the output terminal which exceed the power supply's rated output voltage.
- Please use specialized break units etc. to suppress the generation of over voltage when there is regenerative reverse current in the motor inverter load.

Pulse Current Loads

If the load current exceeds the constant current (current limit) value for even a moment, the constant current circuits will trigger.
Further, if the output power exceeds the rating even for a moment the power limit circuit will trigger.
In these cases, the output voltage will become unstable.
Please take caution so that the peak current does not exceed the current limit value when the load current is in a pulsing state. This cannot be determined by this device's ammeter alone because it only displays the average output current value.
If the constant current circuit (power limit circuit) is triggered intermittently by the peak current, the CC lamp or LIMIT lamp will appear dimly lit or blinking.
For this type of load, stability can be improved by connecting high-capacity capacitors to the load in parallel.



In case of Pulse Current Load

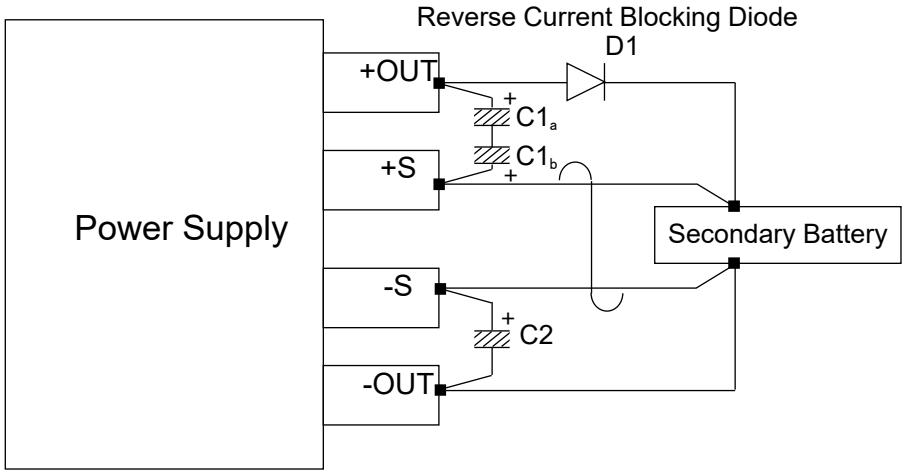
Connection to Secondary Battery

Since this machine lowers the output voltage rapidly, it has the sinking function that absorbs the current from the load side.
For this reason, if connected with the secondary battery, constant current discharge occurs due to sinking current when output is turned OFF.
To prevent discharge from the secondary battery, it should be used connected with a reverse current blocking diode.

sink (absorb) current List

	30-200	30-400	60-100	60-200	50-12	50-24	1000-6	1000-12
sink current	1A ±20%	2A ±20%	1A ±20%	2A ±20%	250mA ±20%	500mA ±20%	125mA ±20%	250mA ±20%

*Sink current is the sum of the parallel-connected unit in the case of parallel connection.



CAUTION

- If sensing is done with the secondary battery connected and the reverse current blocking diode equipped, a potential difference occurs between each output and the sensing terminal because the secondary battery becomes the source of voltage at power supply's output OFF. If this potential difference exceeds about 10V, the protecting circuit works and measurement display of voltage at the load end becomes incorrect.
- If a reverse current blocking diode is connected, the error of voltage measurement display may become large because the input impedance between +S and -S is very large.
  In this case, the error can be reduced by connecting an electrolytic capacitor (C1 to 2) between each output and the sensing terminal (between +OUT and +S, and between -OUT and -S).
  As the additional electrolytic capacitors, use low-impedance ones which is 10 to 100μF and whose voltage is the assumed maximum voltage or more.

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This section covers warranty period, maintenance service, daily inspection, and troubleshooting.

Warranty Period

The warranty period for the HX-S-G4 Series power supply is 3 year from the day of purchase. During this period, Takasago Co., Ltd will take full responsibility for any damages caused to the product due to manufacturing or degradation of parts, and shall repair free of charge. However, repairs for damages incurred to the product due to natural disasters, improper use, etc., or Takasago products, which have been modified by some other entity other than Takasago, shall impose a fee.

Maintenance Service

Fees will be imposed starting from the fourth year after purchase.
At your request maintenance services will be provided. However, this will impose a fee.
Fees will be imposed starting from the second year after purchase.
At your request maintenance services will be provided. However, this will impose a fee.
When you need repair and maintenance services, please contact the sales distributor from that you purchased the product or make requests using the maintenance service form in TAKASAGO's homepage.

Requests

When making repair requests, please include the device's product number (12 digit number at the rear panel of product) and the firmware version. For the firmware version, refer to page 33 FUNCTION "0".

Daily Maintenance and Inspection

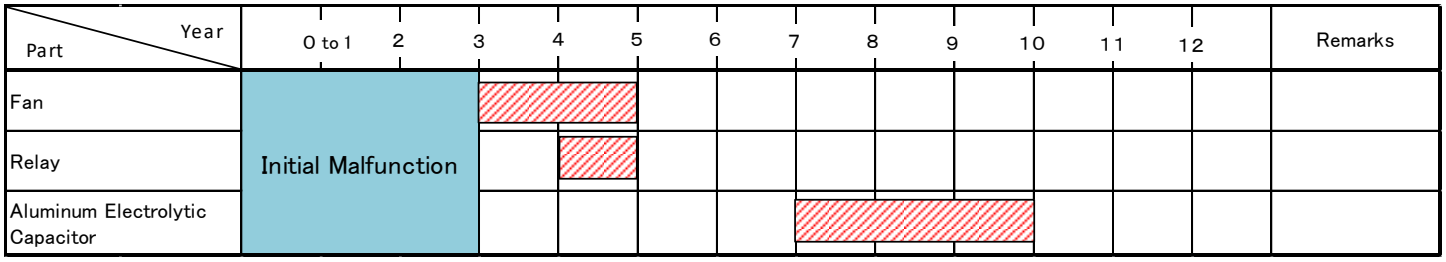
Please perform periodic inspections of the device to maintain product performance and prevent unforeseen accidents.

DANGER

Some parts within the device will generate high voltages. Touching these parts will cause electric shock.
Do not allow anyone other than employees or directed servicemen of Takasago to remove the cover, disassemble, etc., the product.

Lifespan of Parts

This product uses parts possessing lifespans as follows.
Differences in the lifespan may arise due to way of use. The reference table below is a general lifespan of parts.
It is recommend changing parts after 5 and 10 years to ensure prolong use.



CAUTION

Please be careful not to place this product in high temperature and humidity environments, areas with corrosive gases, dust or oils. Doing so will shorten the lifespan of parts.

Cleaning the outer of this equipment

Wipe the outer with commercial cleaning cloth after turning off the input power switch "POWER" and removing all cables from the equipment.
Wipe the outer with the cloth soaked in neutral detergent diluting with water in case the dirt is serious.
Do not use solvent such as thinner and benzene for the cleaning.

Periodical check and replacement of air filter

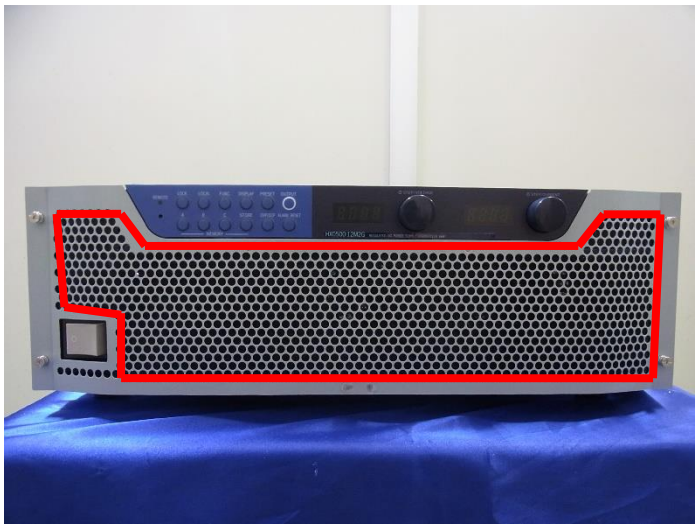
The air filter is attached inside of the front panel.
Please perform the periodical cleaning and replacement of the filter before the clogging becomes severe.

CAUTION

- Deterioration in a cooling effect due to the clogging of the air filter may cause fault.
  Therefore, please perform the periodical cleaning and replacement.
- Do not use anything other than the mounted air filter as standard.

Air filter cleaning

Please remove dirt and dust from the surface, framed as red, of the front cover with vacuum.



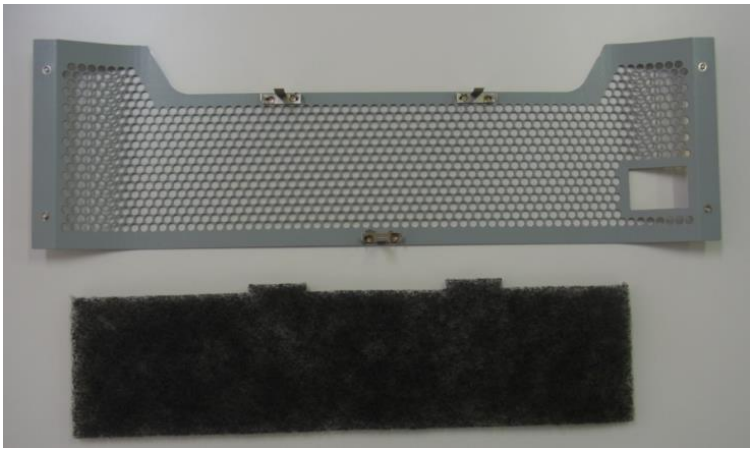
※note) The picture is HX0500-12G4.

In case that the dirt and dust is serious, please remove the filter from the front panel.
Then wash the filter with water or replace the filter.

Remove the front cover and air filter.

Please remove the front panel by loosing the screws circled red and pulling the panel by nipping the screws.
Please remove the air filter from the front cover. Then wash the filter with watar or replace the filter.
If you wash the filter with water, please use a neutral detergent diluted with water.
When you attach the filter to the front cover, the filter should be dried sufficiently.

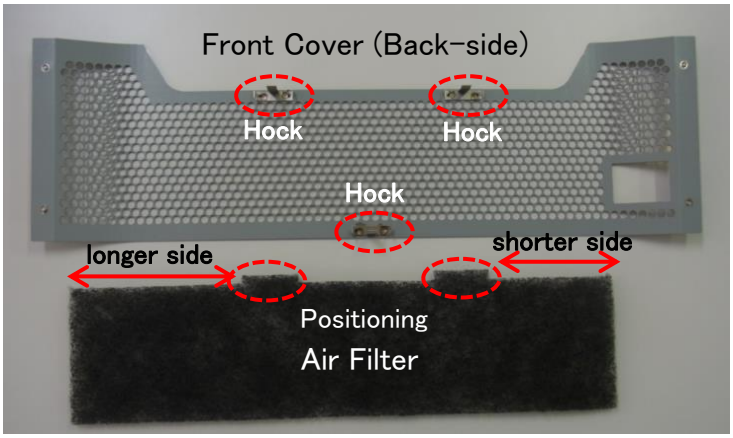
※note) The picture is HX0500-12G4.



Front Cover (Back-side)

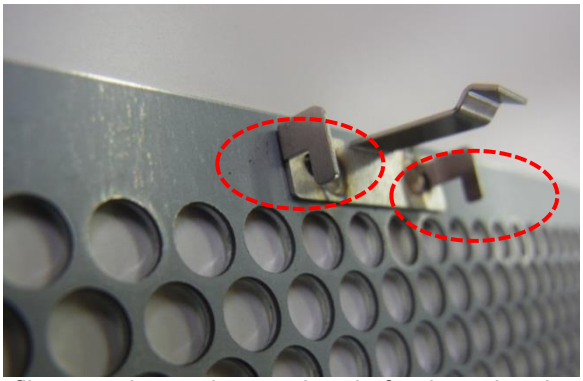
Attach the air filter.

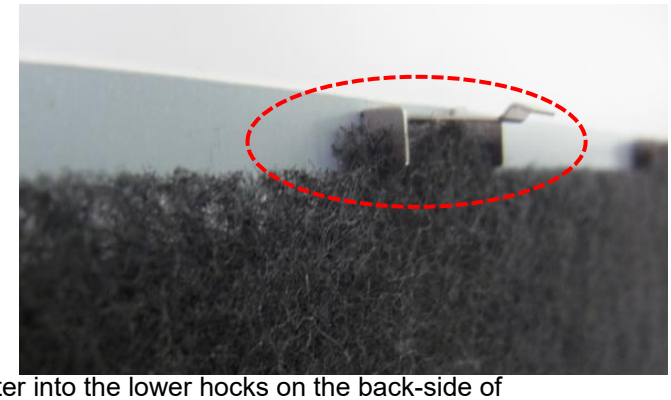
Please fix the filter preventing lateral and vertical movement by holding with the protuberances (three parts) on the back of the front cover. The air filter has directionality.
Set the air filter so that the positioning parts are placed in the upper side. After that arrange shorter side from the edge of the filter on the right side and longer side from the edge of the filter on the left side. Then attach the filter to the back-side of the front cover.



※note) The picture is HX0500-12G4

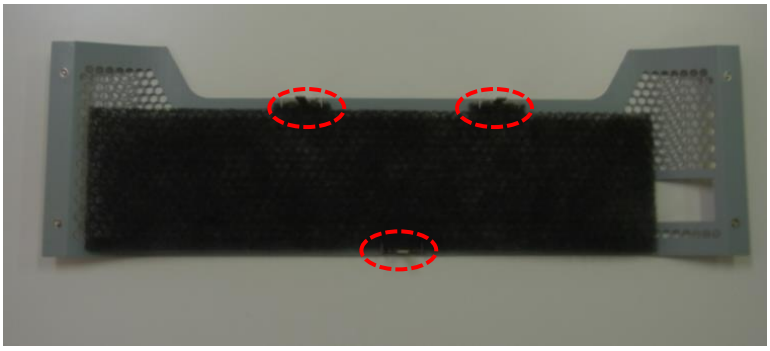
Insert the positioning parts into the upper hocks on the back-side of the front cover.
Both positioning parts shall be set in the same way.





Air filter attachment is completed after inserting the filter into the lower hocks on the back-side of the front cover.

Please fix the filter preventing lateral and vertical movement by holding with the protuberances (three parts) of the front cover.



Replace the front cover.

Please tighten the screws to attach the front cover.

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Calibrating Output Settings

Preparation

The following measuring device is required for calibration.

1. **Digital Multimeter for Voltage/Current Measurement- 1 set**

   No. of Display Digits : 5 1/2 or more

   Display Accuracy : 0.005% or more

   (Equipped with a measuring range from 1mV to 100V)

2. **Shunt Resistor for Current Measurement- 1 set**

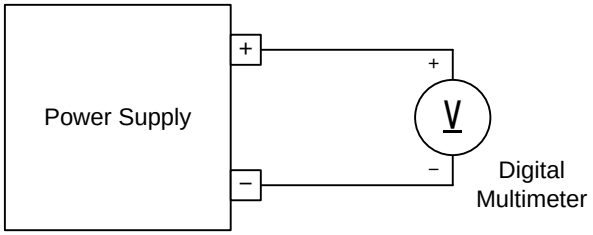
30-200	30-400	60-100	60-200
200A/50mV	500A/50mV	200A/50mV	200A/50mV
500-12	500-24	1000-6	1000-12
15A/50mV	30A/50mV	10A/50mV	15A/50mV

*Please use the 0.1-class product.

Offset/Full Scale Calibration of Output Voltage Settings

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



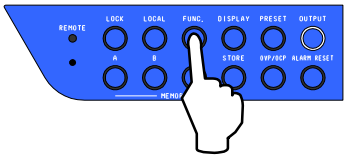
Calibration Circuit

2. Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.

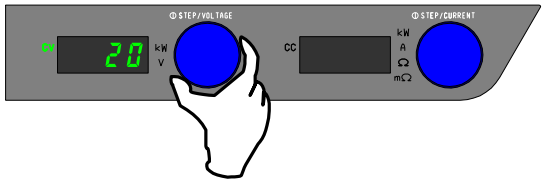
	30-200	30-400	60-100	60-200
[xV]	0.01V	0.01V	0.01V	0.01V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	0.1V	0.1V	1V	1V
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (page27)

3. **Press the FUNC. key.**



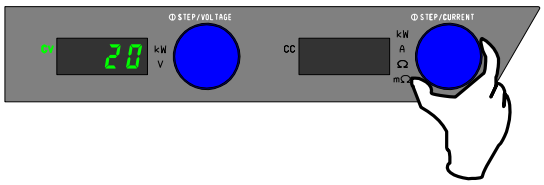
4. **Turn the VOLTAGE dial to display the setting item number 20 in the Number Display (voltage).**



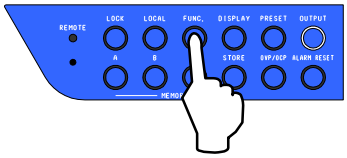
* At that time, turn off the Number Display (current).

5. **Adjust so that the output voltage becomes [xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	0.010V	0.010V	0.010V	0.010V
	500-12	500-24	1000-6	1000-12
[xV]	0.10V	0.10V	1.0V	1.0V



6. **Press the FUNC. key to settle the offset calibration value of the output voltage settings.**

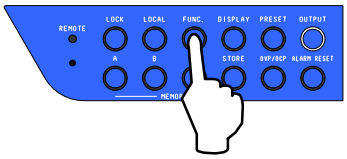


7. Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.

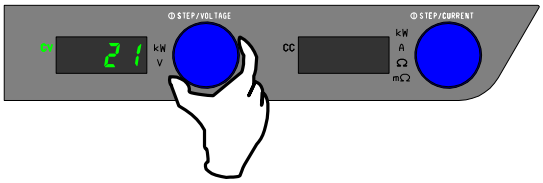
	30-200	30-400	60-100	60-200
[xV]	30.00V	30.00V	60.00V	60.00V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	500.0V	500.0V	1000V	1000V
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (page27)

8. Press the FUNC. key.



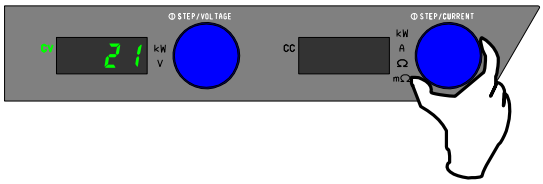
9. Turn the VOLTAGE dial to display the setting item number 21 in the Number Display (voltage).



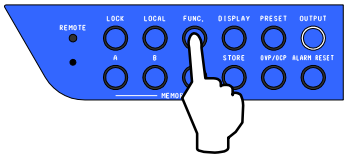
* At that time, turn off the Number Display (current).

10. Adjust so that the output voltage becomes [xV] with the CURRENT dial.

	30-200	30-400	60-100	60-200
[xV]	30.000V	30.000V	60.000V	60.000V
	500-12	500-24	1000-6	1000-12
[xV]	500.00V	500.00V	1000.0V	1000.0V



11. Press the FUNC. key to settle the full-scale calibration value of the output voltage settings.



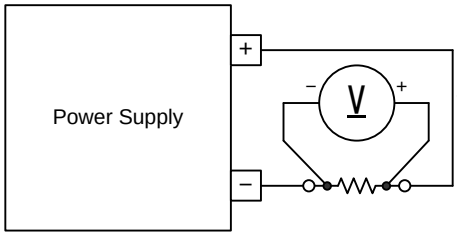
12. This completes offset/full-scale calibration of output voltage.
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

CAUTION

Be certain to perform this along with meter calibration (Offset/Full-Scale Calibration of Voltmeter.)

Offset/Full-Scale Calibration of Output Current Settings

1. **Perform load with only the shunt resistor.**
   Disconnect the load wires and the remote sensing wires.
   Connect the shunt to the output terminal. Connect the digital multimeter to the terminal located on the shunt.
   Turn the POWER switch ON and OUTPUT OFF in advance.



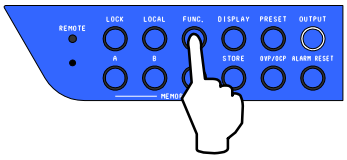
Calibration Circuit

2. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

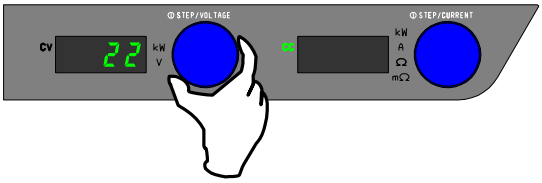
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
[yA]	0.1A	0.1A	0.1A	0.1A
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V
[yA]	0.10A	0.10A	0.010A	0.01A

On how to set, see Operating as Constant Current Power Supply under Basic Operations. (page29)

3. **Press the FUNC. key.**



4. **Turn the VOLTAGE dial to display the setting item number 22 in the Number Display (voltage).**

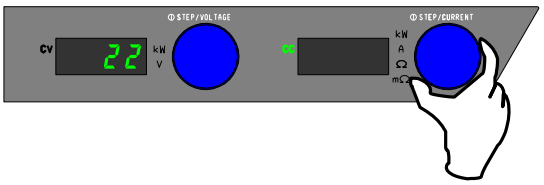


* At that time, turn off the Number Display (current).

5. **Adjust so that the output current becomes [yA] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[yA]	0.1A	0.1A	0.1A	0.1A
DMM display value	0.025mV	0.010mV	0.025mV	0.025mV
	500-12	500-24	1000-6	1000-12
[yA]	0.01A	0.01A	0.01A	0.01A
DMM display value	0.033mV	0.017mV	0.050mV	0.033mV

*DMM display value is the specification of the shunt resistor
The value when had you use.



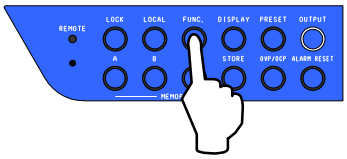
6. **Press the FUNC. key to settle the offset calibration value of the output current settings.**

7. Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.

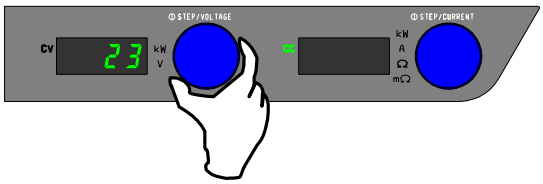
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
[yA]	200.0A	400.0A	100.0A	200.0A
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V
[yA]	12.00A	24.00A	6.000A	12.00A

On how to set, see Operating as Constant Current Power Supply under Basic Operations. (page29)

8. Press the FUNC. key.



9. Turn the VOLTAGE dial to display the setting item number 23 in the Number Display (voltage).

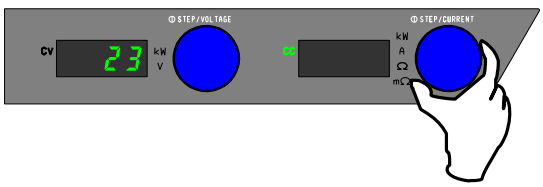


* At that time, turn off the Number Display (current).

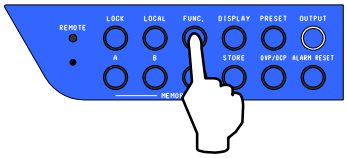
10. Adjust so that the output current becomes [yA] with the CURRENT dial.

	30-200	30-400	60-100	60-200
[yA]	200.00A	400.00A	100.00A	200.00A
DMM display value	50.00mV	40.00mV	25.00mV	50.00mV
	500-12	500-24	1000-6	1000-12
[yA]	12.000A	24.000A	6.000A	12.000A
DMM display value	40.00mV	40.00mV	30.00mV	40.00mV

*DMM display value is the specification of the shunt resistor
The value when had you use.



11. Press the FUNC. key to settle the full-scale calibration value of the output current settings.



12. This completes offset/full-scale calibration of output current.
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

CAUTION

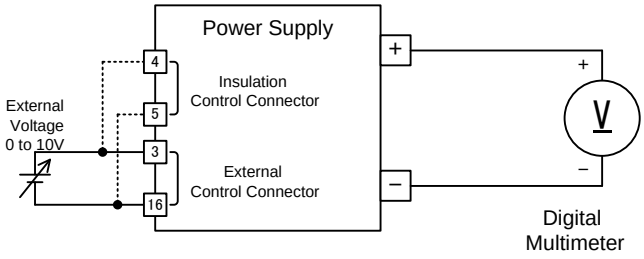
Be certain to perform this along with meter calibration (Offset/Full-Scale Calibration of Voltmeter.)

Offset/Full-Scale Calibration of Output Voltage with External Analog Input

Output Voltage Control with External Voltage (Isolated External Voltage)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



Calibration Circuit

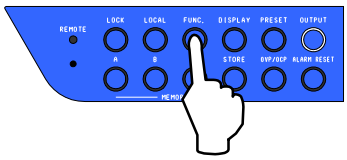
2. **Set the external voltage to 0.010V and the constant current setting value to [yA] and set the output to ON.**

	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

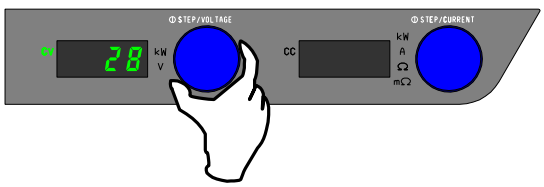
   On how to set, refer to Output Voltage Control with ExternalVoltage.(page141)

   In the case of isolation, refer to Output Voltage Control with Isolated External Voltage. (page142)

3. **Press the FUNC. key.**



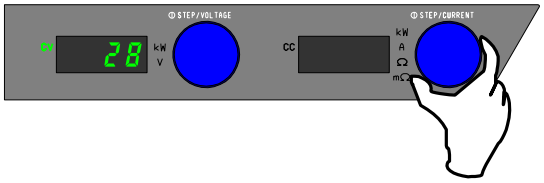
4. **Turn the VOLTAGE dial to display the setting item number 28 in the Number Display (voltage).**



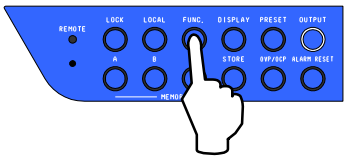
* At that time, turn off the Number Display (current).

5. **Adjust so that the output voltage becomes [xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	0.03V	0.03V	0.06V	0.06V
	500-12	500-24	1000-6	1000-12
[xV]	0.5V	0.5V	1.0V	1.0V



6. **Press the FUNC. key to settle the offset calibration value of output voltage control with external voltage.**

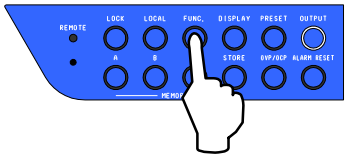


7. **Set the external voltage to 10.000V and the constant current setting value to [yA] and set the output to ON.**

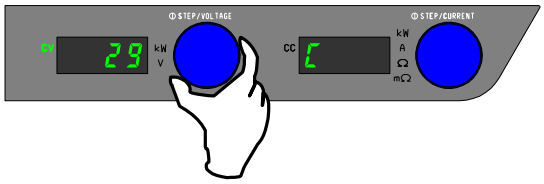
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, refer to Output Voltage Control with ExternalVoltage.(page141)

8. **Press the FUNC. key.**



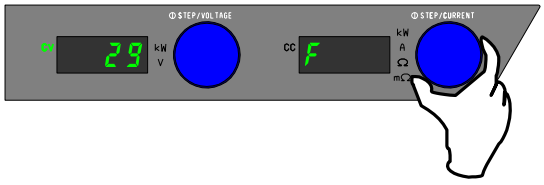
9. **Turn the VOLTAGE dial to display the setting item number 29 in the Number Display (voltage).**



* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

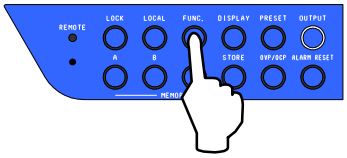
10. **Adjust so that the output voltage becomes [xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	30.000V	30.000V	60.000V	60.000V
	500-12	500-24	1000-6	1000-12
[xV]	500.00V	500.00V	1000.0V	1000.0V



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

11. **Press the FUNC. key to settle the full-scale calibration value of output voltage control with external voltage.**

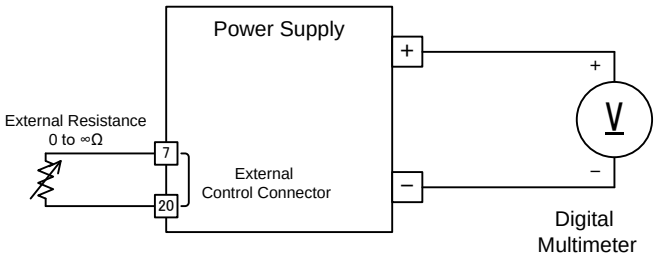


12. **This completes offset/full-scale calibration of output voltage control with external voltage.**

Output Voltage Control with External Resistance(A)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



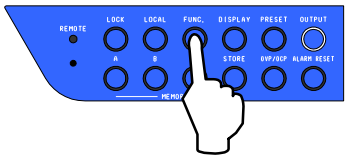
Calibration Circuit

2. **Set the external resistance to infinity (open) and the constant current setting value to [yA] and set the output to ON.**

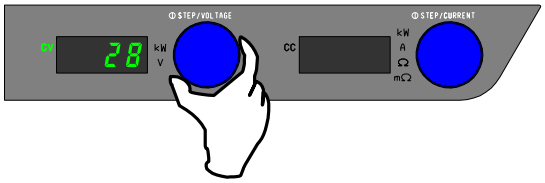
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, refer to Output Voltage Control (A) with External Resistance.(page137)

3. **Press the FUNC. key.**

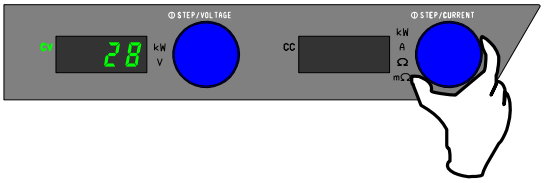


4. **Turn the VOLTAGE dial to display the setting item number 28 in the Number Display (voltage).**

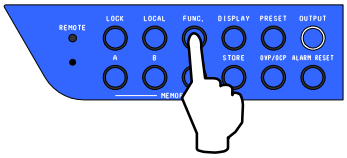


   * At that time, turn off the Number Display (current).

5. **Adjust so that the output voltage becomes "0.000V" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output voltage control with external resistance (A).**

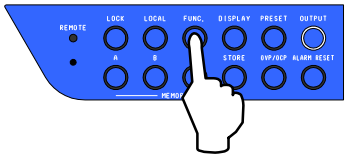


7. **Set the external resistance to 0Ω and the constant current setting value to [yA] and set the output to ON.**

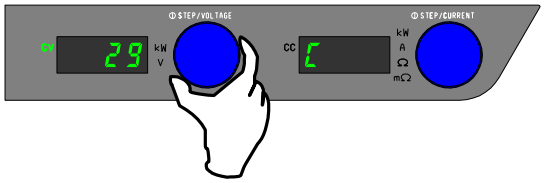
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, refer to Output Voltage Control (A) with External Resistance.(page137)

8. **Press the FUNC. key.**



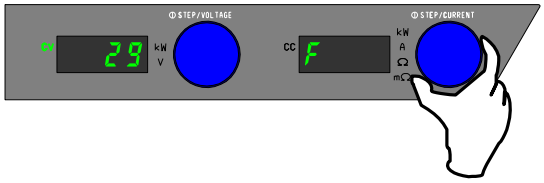
9. **Turn the VOLTAGE dial to display the setting item number 29 in the Number Display (voltage).**



* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

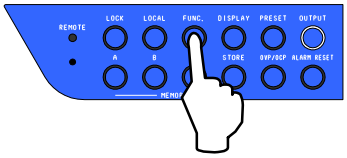
10. **Adjust so that the output voltage becomes "[xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	30.000V	30.000V	60.000V	60.000V
	500-12	500-24	1000-6	1000-12
[xV]	500.00V	500.00V	1000.0V	1000.0V



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

11. **Press the FUNC. key to settle the full-scale calibration value of output voltage control (A) with external resistance.**

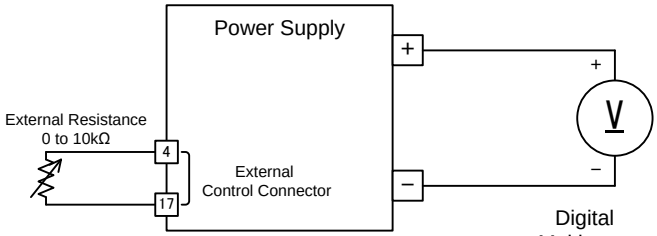


12. **This completes offset/full-scale calibration of output voltage control with external resistance (A).**

Output Voltage Control with External Resistance(B)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



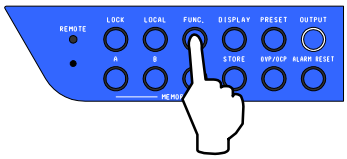
Calibration Circuit

2. **Set the external resistance to 0Ω and the constant current setting value to [yA] and set the output to ON.**

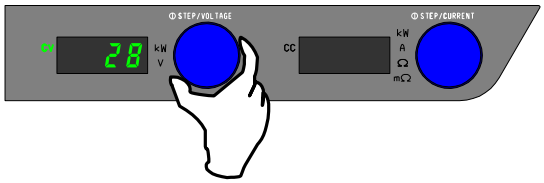
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, refer to Output Voltage Control with External Resistance (B).(page139)

3. **Press the FUNC. key.**

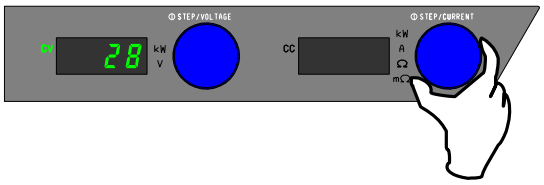


4. **Turn the VOLTAGE dial to display the setting item number 28 in the Number Display (voltage).**

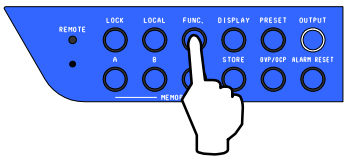


* At that time, turn off the Number Display (current).

5. **Adjust so that the output voltage becomes "0.000V" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output voltage control with external resistance (B).**

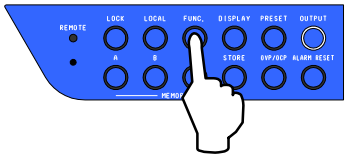


7. **Set the external resistance to 10kΩ and the constant current setting value to [yA] and set the output to ON.**

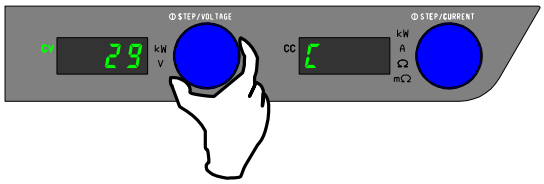
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, refer to Output Voltage Control with External Resistance (B).(page139)

8. **Press the FUNC. key.**



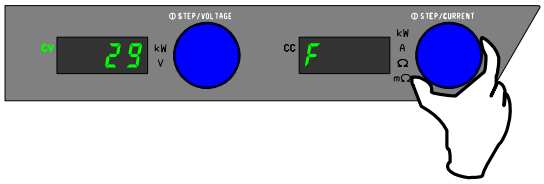
9. **Turn the VOLTAGE dial to display the setting item number 29 in the Number Display (voltage).**



* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

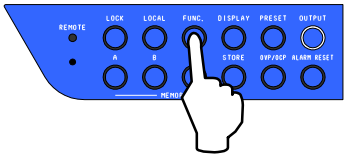
10. **Adjust so that the output voltage becomes [xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	30.000V	30.000V	60.000V	60.000V
	500-12	500-24	1000-6	1000-12
[xV]	500.00V	500.00V	1000.0V	1000.0V



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

11. **Press the FUNC. key to settle the full-scale calibration value of output voltage control with external resistance (B).**

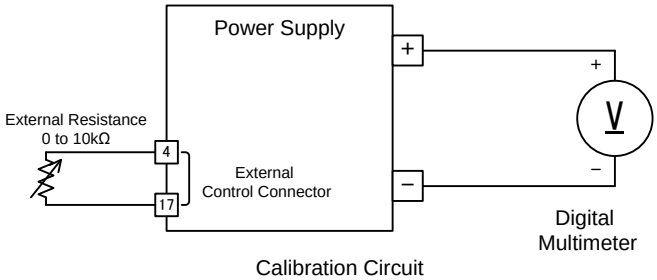


12. **This completes offset/full-scale calibration of output voltage control with external resistance (B).**

Output Voltage Control with External Resistance(C)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



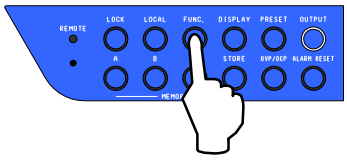
Calibration Circuit

2. **Set the external resistance to 10kΩ and the constant current setting value to [yA] and set the output to ON.**

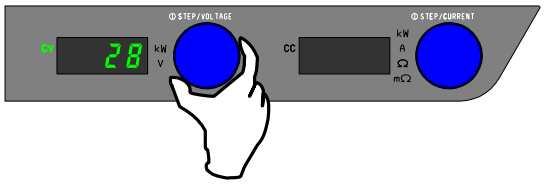
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, refer to Output Voltage Control with External Resistance (C).(page140)

3. **Press the FUNC. key.**

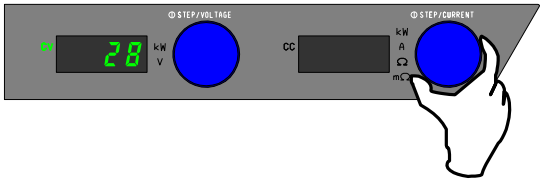


4. **Turn the VOLTAGE dial to display the setting item number 28 in the Number Display (voltage).**

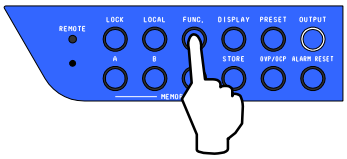


* At that time, turn off the Number Display (current).

5. **Adjust so that the output voltage becomes "0.000V" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output voltage control with external resistance (C).**

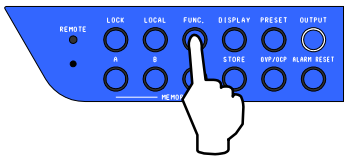


7. **Set the external resistance to 0Ω and the constant current setting value to [yA] and set the output to ON.**

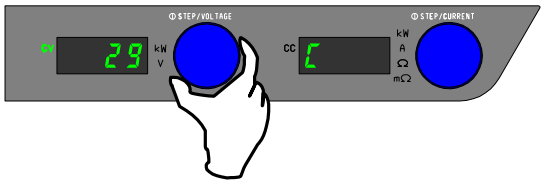
	30-200	30-400	60-100	60-200
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, refer to Output Voltage Control with External Resistance (C).(page140)

8. **Press the FUNC. key.**



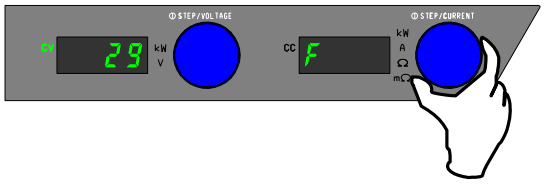
9. **Turn the VOLTAGE dial to display the setting item number 29 in the Number Display (voltage).**



* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

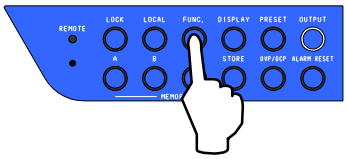
10. **Adjust so that the output voltage becomes [xV] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[xV]	30.000V	30.000V	60.000V	60.000V
	500-12	500-24	1000-6	1000-12
[xV]	500.00V	500.00V	1000.0V	1000.0V



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

11. **Press the FUNC. key to settle the full-scale calibration value of output voltage control with external resistance (B).**

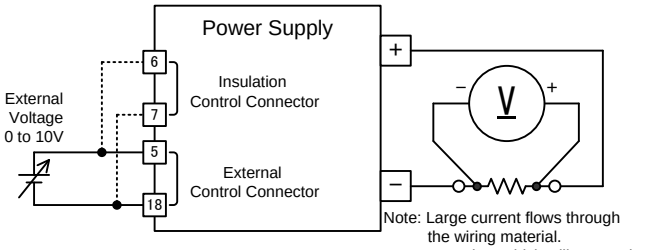


12. **This completes offset/full-scale calibration of output voltage control with external resistance (C).**

Offset/Full-Scale Calibration of Output Current with External Analog Input

Output Current Control with External Voltage (Isolated External Voltage)

1. **Perform load with only the shunt resistor.**
   Disconnect the load wires and the remote sensing wires.
   Connect the shunt to the output terminal. Connect the digital multimeter to the terminal located on the shunt.
   Turn the POWER switch ON and OUTPUT OFF in advance.



Note: Large current flows through the wiring material.
Use wires which will not produce a voltage drop below 0.8V.

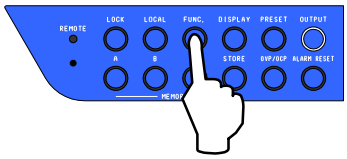
Calibration Circuit

2. **Set the external voltage to 0.010V and the constant voltage setting value to [xV] and set the output to ON.**

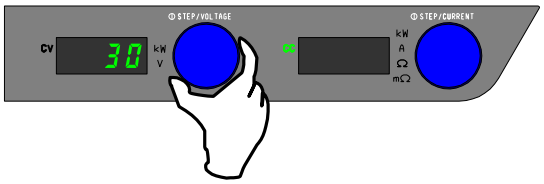
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

For how to set, refer to Output Current Control with External Voltage. (page147)
In the case of isolation, refer to Output Current Control with Isolated External Voltage. (page148)

3. **Press the FUNC. key.**



4. **Turn the VOLTAGE dial to display the setting item number 30 in the Number Display (voltage).**

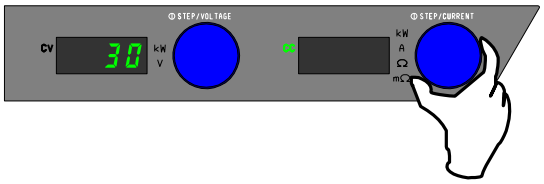


* At that time, turn off the Number Display (current).

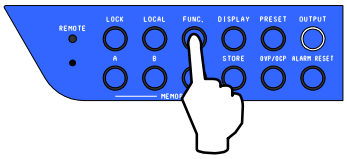
5. **Adjust so that the output current becomes [yA] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[yA]	0.20A	0.40A	0.10A	0.20A
DMM display value	0.050mV	0.040mV	0.025mV	0.050mV
	500-12	500-24	1000-6	1000-12
[yA]	0.012A	0.024A	0.006A	0.012A
DMM display value	0.040mV	0.040mV	0.030mV	0.040mV

*DMM display value is the specification of the shunt resistor
The value when had you use.



6. **Press the FUNC. key to settle the offset calibration value of output current control with external voltage (Isolated external voltage).**

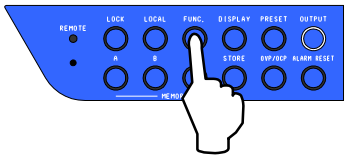


7. **Set the external voltage to 10.000V and the constant voltage setting value to [xV] and set the output to ON.**

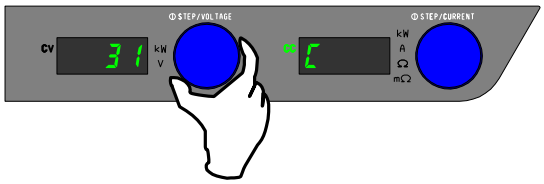
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

For how to set, refer to Output Current Control with External Voltage. (page147)
In the case of isolation, refer to Output Current Control with Isolated External Voltage (page148)

8. **Press the FUNC. key.**



9. **Turn the VOLTAGE dial to display the setting item number 31 in the Number Display (voltage).**

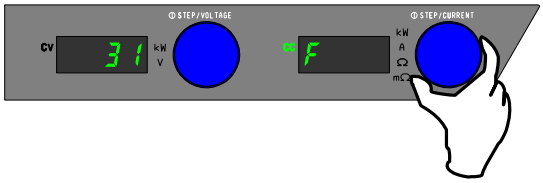


* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

10. **Adjust so that the output current becomes [yA] with the CURRENT dial.**

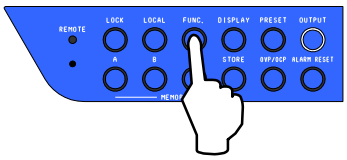
	30-200	30-400	60-100	60-200
[yA]	200.00A	400.00A	100.00A	200.00A
DMM display value	50.00mV	40.00mV	25.00mV	50.00mV
	500-12	500-24	1000-6	1000-12
[yA]	12.000A	24.000A	6.000A	12.000A
DMM display value	40.00mV	40.00mV	30.00mV	40.00mV

*DMM display value is the specification of the shunt resistor
The value when had you use.



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

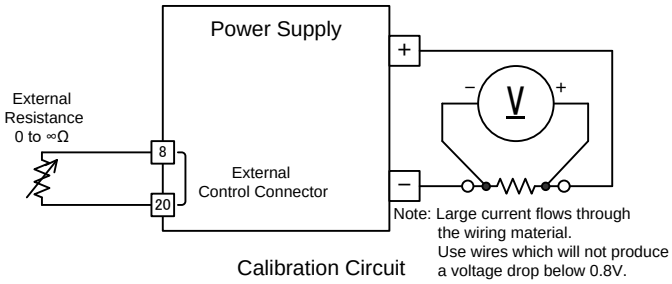
11. **Press the FUNC. key to settle the full-scale calibration value of output current control with external voltage (isolated external voltage).**



12. **This completes offset/full-scale calibration of output current control with external voltage (isolated external voltage).**
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Output Current Control with External Resistance (A)

1. **Perform load with only the shunt resistor.**
   Disconnect the load wires and the remote sensing wires.
   Connect the shunt to the output terminal. Connect the digital multimeter to the terminal located on the shunt.
   Turn the POWER switch ON and OUTPUT OFF in advance.



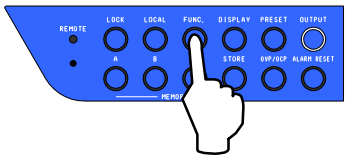
Calibration Circuit

2. **Set the constant voltage setting value to [xV] and the external resistance to infinity (open) and set the output to ON.**

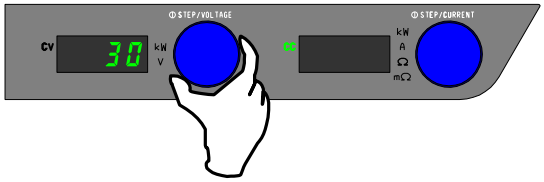
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

   On how to set, refer to Output Current Control with External Resistance (A).(page143)

3. **Press the FUNC. key.**

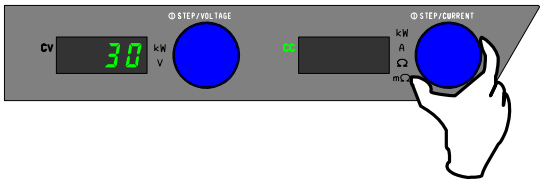


4. **Turn the VOLTAGE dial to display the setting item number 30 in the Number Display (voltage).**

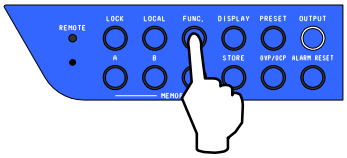


   * At that time, turn off the Number Display (current).

5. **Adjust so that the output current becomes "0A" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output current control with external resistance (A).**

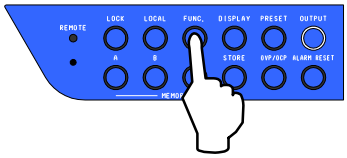


7. Set the constant voltage setting value to [xV] and the external resistance to 0Ω and set the output to ON.

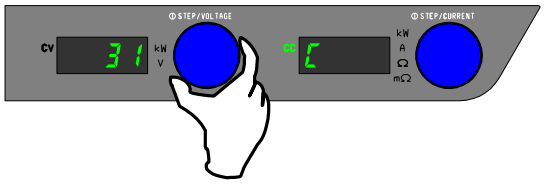
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

On how to set, refer to Output Current Control with External Resistance (A).(page143)

8. Press the FUNC. key.



9. Turn the VOLTAGE dial to display the setting item number 31 in the Number Display (voltage).

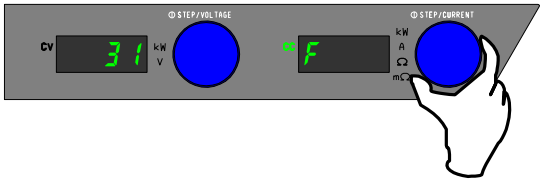


* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

10. Adjust so that the output current becomes [yA] with the CURRENT dial.

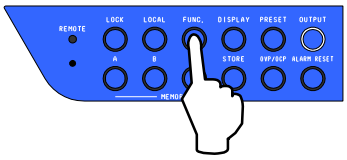
	30-200	30-400	60-100	60-200
[yA]	200.00A	400.00A	100.00A	200.00A
DMM display value	50.00mV	40.00mV	25.00mV	50.00mV
	500-12	500-24	1000-6	1000-12
[yA]	12.000A	24.000A	6.000A	12.000A
DMM display value	40.00mV	40.00mV	30.00mV	40.00mV

※*DMM display value is the specification of the shunt resistor
The value when had you use.



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

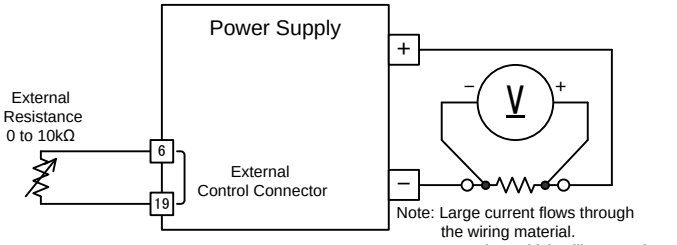
11. Press the FUNC. key to settle the full-scale calibration value of output current control (A) with external resistance.



12. This completes offset/full-scale calibration of output current control with external resistance (A). Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Output Current Control with External Resistance (B)

1. **Perform load with only the shunt resistor.**
   Disconnect the load wires and the remote sensing wires.
   Connect the shunt to the output terminal. Connect the digital multimeter to the terminal located on the shunt.
   Turn the POWER switch ON and OUTPUT OFF in advance.



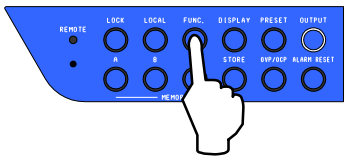
Calibration Circuit

2. **Set the constant voltage setting value to [xV] and the external resistance to 0Ω and set the output to ON.**

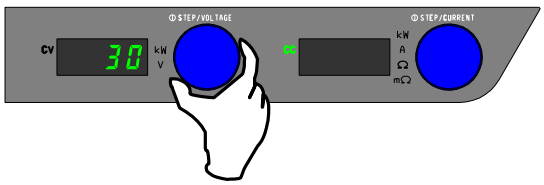
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

For how to set, refer to Output Current Control with External Resistance (B).(page145)

3. **Press the FUNC. key.**

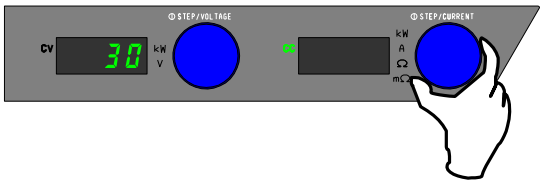


4. **Turn the VOLTAGE dial to display the setting item number 30 in the Number Display (voltage).**

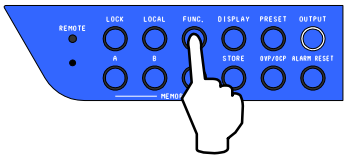


* At that time, turn off the Number Display (current).

5. **Adjust so that the output current becomes "0A" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output current control with external resistance (B).**

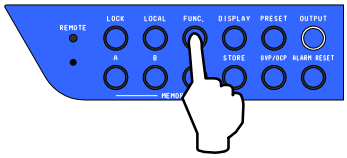


7. Set the constant voltage setting value to [xV] and the external resistance to 10kΩ and set the output to ON.

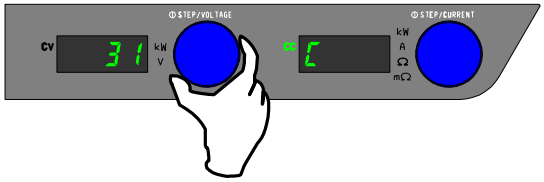
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

For how to set, refer to Output Current Control with External Resistance (B).(page145)

8. Press the FUNC. key.



9. Turn the VOLTAGE dial to display the setting item number 31 in the Number Display (voltage).

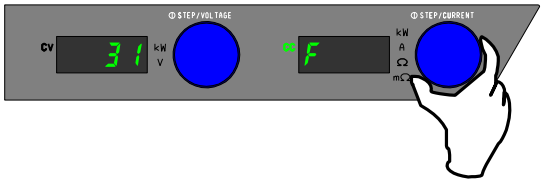


* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

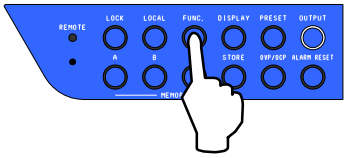
10. Adjust so that the output current becomes [yA]with the CURRENT dial.

	30-200	30-400	60-100	60-200
[yA]	200.00A	400.00A	100.00A	200.00A
DMM display value	50.00mV	40.00mV	25.00mV	50.00mV
	500-12	500-24	1000-6	1000-12
[yA]	12.000A	24.000A	6.000A	12.000A
DMM display value	40.00mV	40.00mV	30.00mV	40.00mV

*DMM display value is the specification of the shunt resistor
The value when had you use.



11. Press the FUNC. key to settle the full-scale calibration value of output current control (B) with external resistance.

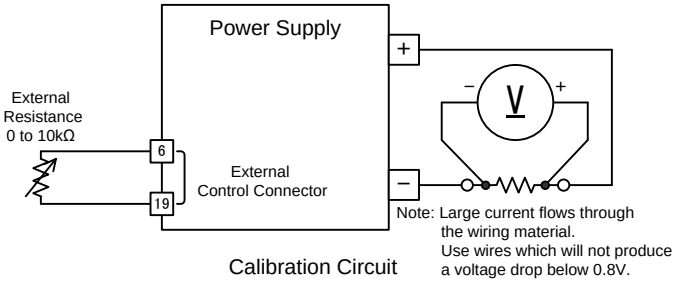


* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

12. This completes offset/full-scale calibration of output current control with external resistance (B). Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Output Current Control with External Resistance (C)

1. **Perform load with only the shunt resistor.**
   Disconnect the load wires and the remote sensing wires.
   Connect the shunt to the output terminal. Connect the digital multimeter to the terminal located on the shunt.
   Turn the POWER switch ON and OUTPUT OFF in advance.



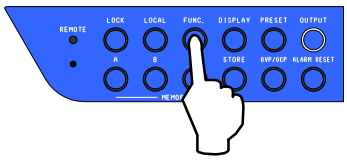
Calibration Circuit

2. **Set the constant voltage setting value to [xV] and the external resistance to 10kΩ and set the output to ON.**

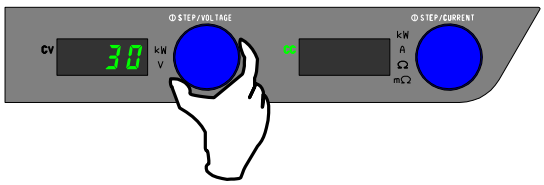
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

On how to set, refer to Output Current Control with External Resistance (C).(page146)

3. **Press the FUNC. key.**

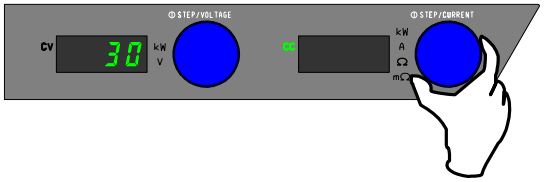


4. **Turn the VOLTAGE dial to display the setting item number 30 in the Number Display (voltage).**

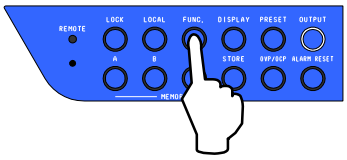


* At that time, turn off the Number Display (current).

5. **Adjust so that the output current becomes "0A" with the CURRENT dial.**



6. **Press the FUNC. key to settle the offset calibration value of output current control with external resistance (C).**

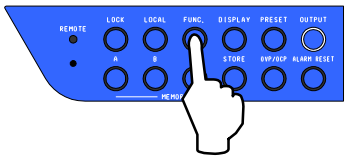


7. **Set the constant voltage setting value to [xV] and the external resistance to 0Ω and set the output to ON.**

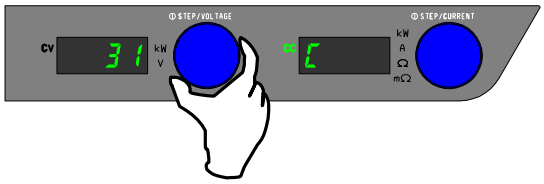
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V

On how to set, refer to Output Current Control with External Resistance (C).(page146)

8. **Press the FUNC. key.**



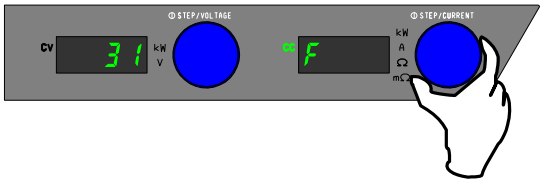
9. **Turn the VOLTAGE dial to display the setting item number 31 in the Number Display (voltage).**



* At that time, "C" or "F" is displayed in the Number Display (current).
C: Coarse adjustment
F: Fine adjustment

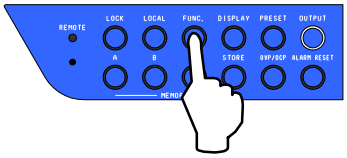
10. **Adjust so that the output current becomes [yA] with the CURRENT dial.**

	30-200	30-400	60-100	60-200
[yA]	200.00A	400.00A	100.00A	200.00A
DMM display value	50.00mV	40.00mV	25.00mV	50.00mV
	500-12	500-24	1000-6	1000-12
[yA]	12.000A	24.000A	6.000A	12.000A
DMM display value	40.00mV	40.00mV	30.00mV	40.00mV



* Pressing the CURRENT dial switches the adjustment between "C" (coarse adjustment) and "F" (fine adjustment).

11. **Press the FUNC. key to settle the full-scale calibration value of output current control (C) with external resistance.**



12. **This completes offset/full-scale calibration of output current control with external resistance (C). Set the constant voltage setting value and the constant current setting value to the original ones and start using.**

Calibrating Meters

Preparation

The following measuring device is required for calibration.

1. **Digital Multimeter for Voltage/Current Measurement- 1 set**
   No. of Display Digits: 5 1/2 or more
   Display Accuracy: 0.005% or more
   (Equipped with a measuring range from 1mV to 1000V)

2. **Shunt Resistor for Current Measurement- 1 set**

30-200	30-400	60-100	60-200
200A/50mV	500A/50mV	200A/50mV	200A/50mV
500-12	500-24	1000-6	1000-12
15A/50mV	30A/50mV	10A/50mV	15A/50mV

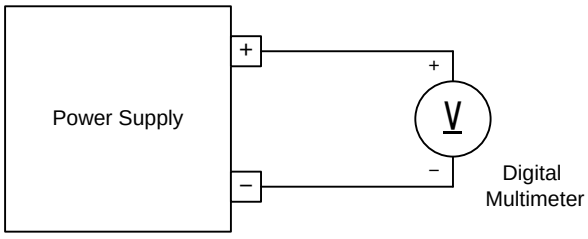
*Please use the 0.1-class product.

Voltmeter Offset/Full-Scale Calibration

Note: Before performing this operation, be sure to perform Offset/Full-scale Calibration (page162) of output voltage setting.

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



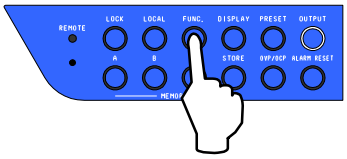
Calibration Circuit

2. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

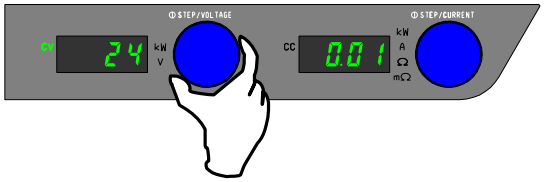
	30-200	30-400	60-100	60-200
[xV]	0.01V	0.01V	0.01V	0.01V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	0.1V	0.1V	1V	1V
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, see Operating as Constant Voltage Power Supply under Basic Operations.(page27)

3. **Press the FUNC. key.**



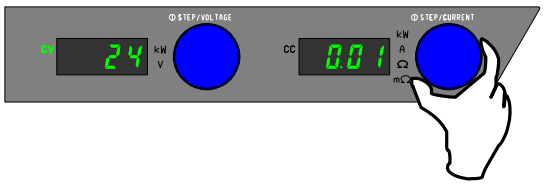
4. **Turn the VOLTAGE dial to display the setting item number 24 in the Number Display (voltage).**



   * At that time, the voltage measured value is displayed in the Number Display (current).

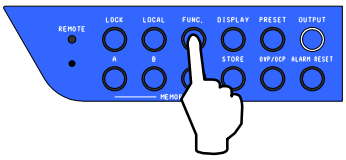
* The figure above is an example of connecting (HX030-200G4)

5. **Adjust the CURRENT dial so that the voltage measured value displayed in the Number Display (current) is the same as the actual output voltage value (digital multimeter measurement).**



* The figure above is an example of connecting (HX030-200G4)

6. **Press the FUNC. key to settle the offset calibration value in the voltmeter.**

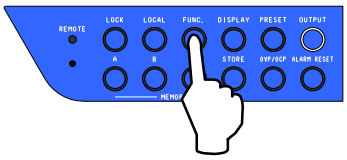


7. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

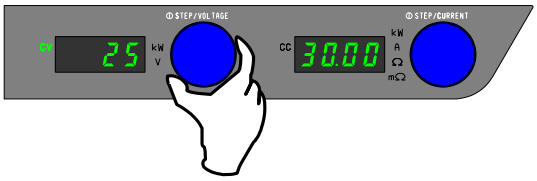
	30-200	30-400	60-100	60-200
[xV]	30.00V	30.00V	60.00V	60.00V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	500.0V	500.0V	1000V	1000V
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, see Operating as Constant Voltage Power Supply under Basic Operations.(page27)

8. **Press the FUNC. key.**

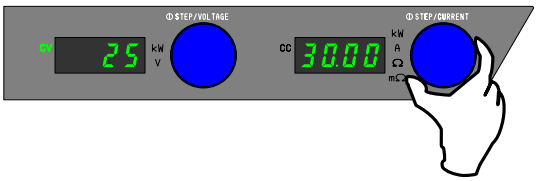


9. **Turn the VOLTAGE dial to display the setting item number 25 in the Number Display (voltage).**



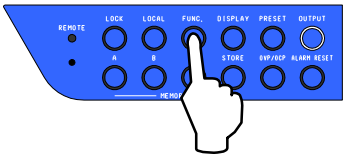
* At that time, the voltage measured value is displayed in the Number Display (current).

10. **Adjust the CURRENT dial so that the voltage measured value displayed in the Number Display (current) is the same as the actual output voltage value (digital multimeter measurement).**



* The figure above is an example of connecting (HX030-200G4)

11. **Press the FUNC. key to settle the full-scale calibration value in the voltmeter.**



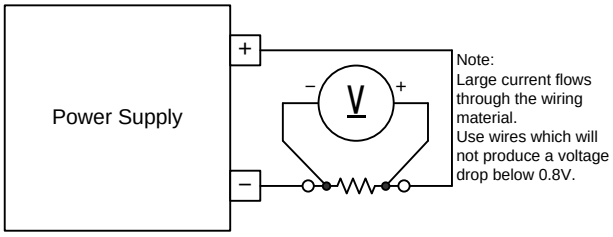
12. **This completes offset/full-scale calibration of voltmeter.**
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Ammeter Offset/Full-Scale Calibration

Note: Before performing this operation, be sure to perform Offset/Full-scale Calibration (page164) of output current setting.

1. Perform load with only the shunt resistor.

Disconnect the load wires and the remote sensing wires.
Connect the shunt (0.1 class) to the output terminal.
Connect the digital multimeter to the terminal located on the shunt.
Turn the POWER switch ON and OUTPUT OFF in advance.



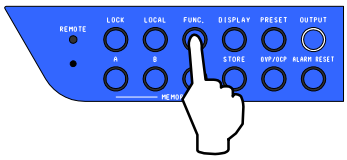
Calibration Circuit

2. Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.

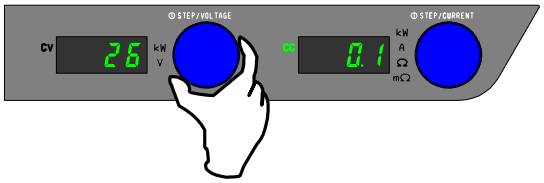
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
[yA]	0.1A	0.1A	0.1A	0.1A
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V
[yA]	0.10A	0.10A	0.010A	0.01A

See Operating as Constant Current Power Supply under Basic Operations on how to set.(page29)

3. Press the FUNC. key.



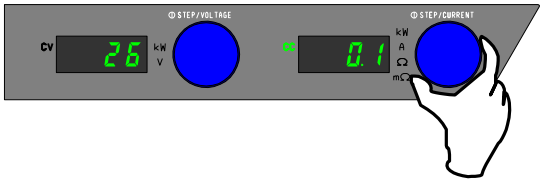
4. Turn the VOLTAGE dial to display the setting item number 26 in the Number Display (voltage).



* At that time, the current measured value is displayed in the Number Display (current).

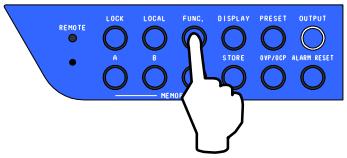
* The figure above is an example of connecting (HX030-200G4)

5. Adjust the CURRENT dial so that the current measured value displayed in the Number Display (current) is the same as the actual output current value (digital multimeter measurement).



* The figure above is an example of connecting (HX030-200G4)

6. Press the FUNC. key to settle the offset calibration value in the ammeter.

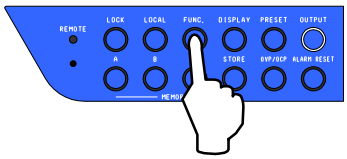


7. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

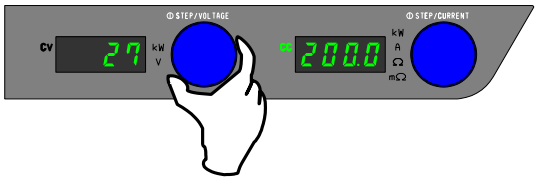
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
[yA]	200.0A	400.0A	100.0A	200.0A
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V
[yA]	12.00A	24.00A	6.000A	12.00A

See Operating as Constant Current Power Supply under Basic Operations on how to set. (page29)

8. **Press the FUNC. key.**

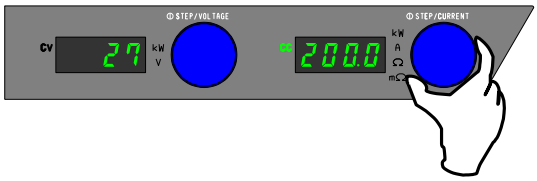


9. **Turn the VOLTAGE dial to display the setting item number 27 in the Number Display (voltage).**



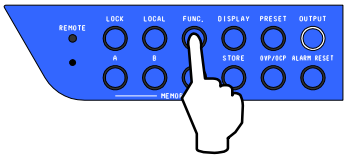
* At that time, the current measured value is displayed in the Number Display (current).
* The figure above is an example of connecting (HX030-200G4)

10. **Adjust the CURRENT dial so that the current measured value displayed in the Number Display (current) is the same as the actual output current value (digital multimeter measurement).**



* The figure above is an example of connecting (HX030-200G4)

11. **Press the FUNC. key to settle the full-scale calibration value in the ammeter.**

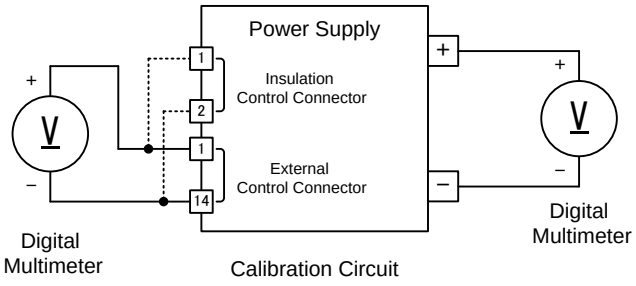


12. **This completes offset/full-scale calibration of ammeter.**
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Offset/Full Scale Calibration of Output Voltage Monitor (Isolated Output Voltage Monitor)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



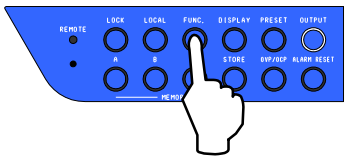
2. **Set the parameter for FUNCTION item 12 to "0" to disable Linearity Compensation Function.**
   On how to set, refer to Linearity Compensation Function under Useful Functions (page 57).

3. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

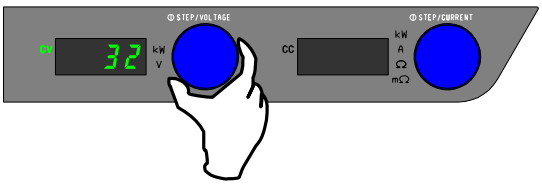
	30-200	30-400	60-100	60-200
[xV]	0.00V	0.00V	0.00V	0.00V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	0.0V	0.0V	0V	0V
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (page27)

4. **Press the FUNC. key.**

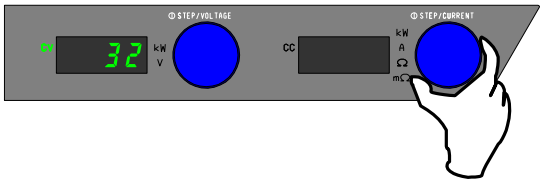


5. **Turn the VOLTAGE dial to display the setting item number 32 in the Number Display (voltage).**

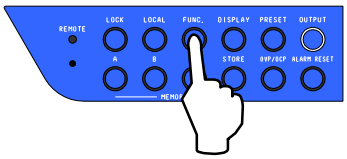


   * At that time, turn off the Number Display (current).

6. **Adjust so that the voltage monitor value becomes "0.00V" with the CURRENT dial.**



7. **Press the FUNC. key to settle the offset calibration value of output voltage monitor (isolated output voltage monitor).**

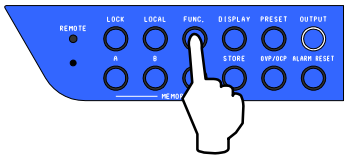


8. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

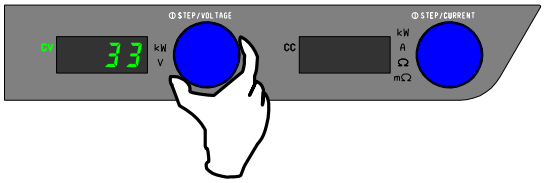
	30-200	30-400	60-100	60-200
[xV]	30.00V	30.00V	60.00V	60.00V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	500.0V	500.0V	1000V	1000V
[yA]	0.10A	0.10A	0.010A	0.10A

On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (page27)

9. **Press the FUNC. key.**



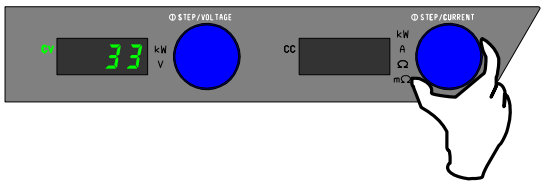
10. **Turn the VOLTAGE dial to display the setting item number 33 in the Number Display (voltage).**



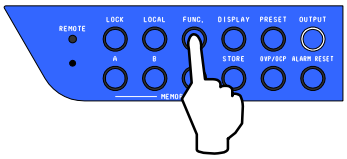
* At that time, turn off the Number Display (current).

11. **Adjust the CURRENT dial so that the voltage monitor value is (the actual output voltage value (digital multimeter measurement) ÷ [a].**

	30-200	30-400	60-100	60-200
[a]	3	3	6	6
	500-12	500-24	1000-6	1000-12
[a]	50	50	100	100



12. **Press the FUNC. key to settle the full-scale calibration value of output voltage monitor (Isolated output voltage monitor).**



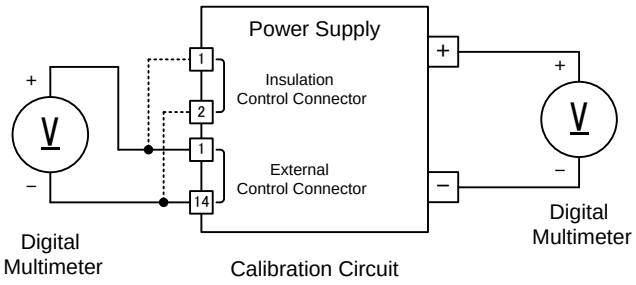
13. **Return the parameter for FUNCTION item 12 back to the original value and enable Linearity Compensation Function.**
On how to set, refer to Linearity Compensation Function under Useful Functions (page57).

14. **This completes offset/full scale calibration of output voltage monitor (isolated output voltage monitor).**
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Offset/Full Scale Calibration of Output Current Monitor (Isolated Output Current Monitor)

1. **Disconnect the load wires and the remote sensing wires. Connect the digital multimeter to the output terminal.**

   Turn the POWER switch ON and OUTPUT OFF in advance.



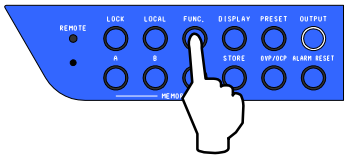
2. **Set the parameter for FUNCTION item 12 to "0" to disable Linearity Compensation Function.**
   On how to set, refer to Linearity Compensation Function under Useful Functions (page 57).

3. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

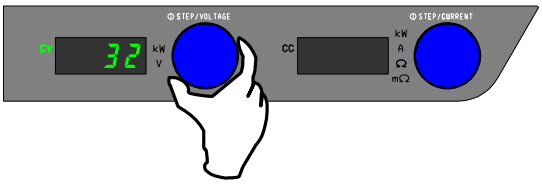
	30-200	30-400	60-100	60-200
[xV]	0.00V	0.00V	0.00V	0.00V
[yA]	1.0A	1.0A	1.0A	1.0A
	500-12	500-24	1000-6	1000-12
[xV]	0.0V	0.0V	0V	0V
[yA]	0.10A	0.10A	0.010A	0.10A

   On how to set, see Operating as Constant Voltage Power Supply under Basic Operations. (page27)

4. **Press the FUNC. key.**

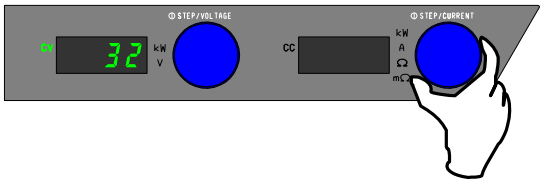


5. **Turn the VOLTAGE dial to display the setting item number 32 in the Number Display (voltage).**

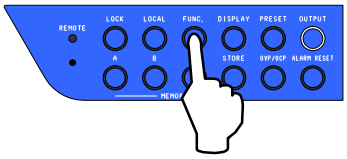


   * At that time, turn off the Number Display (current).

6. **Adjust so that the voltage monitor value becomes "0.00V" with the CURRENT dial.**



7. **Press the FUNC. key to settle the offset calibration value of output voltage monitor (isolated output voltage monitor).**

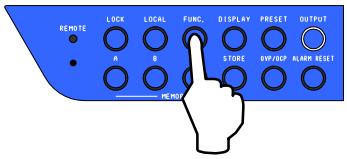


8. **Set the constant voltage setting value to [xV] and the constant current setting value to [yA] and set the output to ON.**

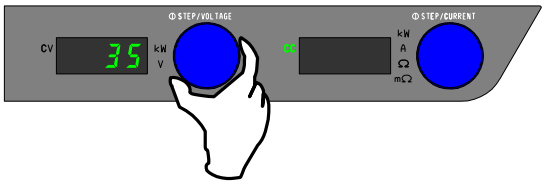
	30-200	30-400	60-100	60-200
[xV]	1.00V	1.00V	1.00V	1.00V
[yA]	200.0A	400.0A	100.0A	200.0A
	500-12	500-24	1000-6	1000-12
[xV]	1.0V	1.0V	1V	1V
[yA]	12.00A	24.00A	6.000A	12.00A

On how to set, see Operating as Constant Current Power Supply under Basic Operations. (page29)

9. **Press the FUNC. key.**



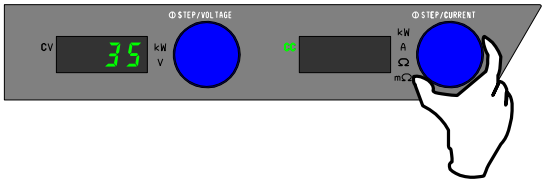
10. **Turn the VOLTAGE dial to display the setting item number 35 in the Number Display (voltage).**



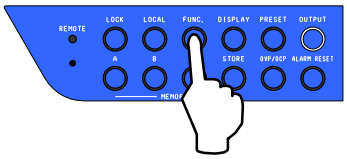
* At that time, turn off the Number Display (current).

11. **Adjust the CURRENT dial so that the current monitor value is (the actual output current value (digital multimeter measurement) ÷ [a].**

	30-200	30-400	60-100	60-200
[a]	20	40	10	20
	500-12	500-24	1000-6	1000-12
[a]	1.2	2.4	0.6	1.2



12. **Press the FUNC. key to settle the full-scale calibration value of output current monitor (isolated output current monitor).**



13. **Return the parameter for FUNCTION item 12 back to the original value and enable Linearity Compensation Function.**
On how to set, refer to Linearity Compensation Function under Useful Functions (page57).

14. **This completes offset/full scale calibration of output current monitor (isolated output current monitor).**
Set the constant voltage setting value and the constant current setting value to the original ones and start using.

Output Specifications

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Rated Output Voltage	30V	30V	60V	60V	500V	500V	1000V	1000V
Rated Output Current	200A	400A	100A	200A	12A	24A	6A	12A
Rated Output Power	6000W	12000W	6000W	12000W	6000W	12000W	6000W	12000W

Input Specifications

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Rated power Source	AC400V three-phase four-wire system 50/60Hz							
Rated power	12kVA	23kVA	12kVA	23kVA	12kVA	23kVA	12kVA	23kVA
Operating power supply	AC342V－440V three-phase four-wire system・45Hz－65Hz							
Input Current*1	16A	32A	16A	32A	16A	32A	16A	32A
Input Power Factor *2	Above 0.6							
Power Efficiency *3	90% or more							
Inrush current (peak value) 440V when the input	65A	130A	65A	130A	65A	130A	65A	130A

Note) *1:When the rated output power or rated output current.
*2:When AC400V input or rated output power or rated output current
Line impedance measured at R:10mΩ, L: 60μH.
(Quoted from impedance distribution of distribution line electric cooperative research Volume 60, No. 2)
*3 When AC400V input, rated output voltage, rated output power.

Constant Voltage Characteristics

Specification/Models		30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Range		0.00V-31.50V		0.00V-63.00V		0.0V－525.0		0V-1050V	
Accuracy *11		±（0.1%+5mV）of set value		±（0.1%+10mV）of set value		±（0.1%+0.1V）of set value		±（0.1%+0.2V）of set value	
Resolution		10mV				0.1V		1V	
Load Regulation *4		Below 0.01% + (0.005% of maximum output voltage)							
Line Regulation *5		Below 0.01% + (0.005% of maximum output voltage)							
Ripple (Effective Value) *6		Below 10 mVrms				Below 50 mVrms		Below 100 mVrms	
Noise(p-p value)(TYP) *7		Below 100mVp-p				Below 300mVp-p		Below 300mVp-p	
Temperature Coefficient (Typical Value)		±100ppm/℃							
Recovery Time *8		1ms or less						2ms or less	
Programming Time *9	Rising	200ms±20%（full load）/200ms±20%（no load）		200ms±20%（full load）/200ms±20%（no load）		500ms±20%（full load）/500ms±20%（no load）		500ms±20%（full load）/500ms±20%（no load）	
	Falling	200ms±30%（full load）/Below /1200ms（no load）		200ms±30%（full load）/Below 1200ms（no load）		500ms±30%（full load）/Below 1200ms (no load）		500ms±30%（full load）/Below 1200ms（no load）	
Maximum Sink Current		1A±20%	2A±20%	1A±20%	2A±20%	250mA±20%	500mA±20%	125mA±20%	250mA±20%
Residual Voltage when OUTPUT is OFF (TYP)		± 10mV or less				± 25mV or less		± 50mV or less	

Constant Current Characteristics

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Range	0.0A - 210.0A	0.0A - 420.0A	0.0A - 105.0A	0.0A - 210.0A	0.00A - 12.60A	0.00A - 25.20A	0.000A - 6.300A	0.00A - 12.60A
Accuracy *12	±(0.5%+0.1A) of set value	±(0.5%+0.2A) of set value	±(0.5%+0.05A) of set value	±(0.5%+0.1A) of set value	±(0.5%+5mA) of set value	(0.5%+10mA) of set value	±(0.5%+3mA) of set value	±(0.5%+6mA) of set value
Resolution	0.1A				10mA		1mA	10mA
Load Regulation *10	Below 0.05% + (0.01% of maximum output current)				Below 0.05% + (0.03% of maximum output current)			
Line Regulation *5	Below 0.05% + (0.005% of maximum output current)							
Ripple (Effective Value) *6	Below 200mArms	Below 400mArms	Below 100mArms	Below 200mArms	Below 10mArms	Below 20mArms	Below 5mArms	Below 10mArms
Temperature Coefficient (Typical Value)	±200ppm/℃							

Note: *4: Measurement at sensing point for 0~100% change in rated load current (Static Load Change)
*5: For ± 10% change in input voltage (Static input Change)
*6: At measurement frequency band of 20Hz~1MHz (Resistance Loaded)
*7: Measured with oscilloscope at measurement frequency band of 20Hz~20MHz
*8: Recovery time within 0.1%+10mV of rated output voltage for 50% to 100% abrupt change in rated load current (Dynamic Load Change)
*9: Time in which set voltage error is reached within 1% due to setting changes via panel operation or communication control or external analog control.
*10: Current change value at the rated output current when load resistance is changed until resistance value outputs 0~rated power (Static Load Change)
*11: At output open-circuit and environmental temperature 23°C ± 5°C
*12: At output short-circuit and environmental temperature 23°C ± 5°C

Measurement and Display

Specification and Models		30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Voltmeter		4-digits Digital Meter							
	Max. Display	99.99V				999.9V		9999V	
	Measure Accuracy *13	±（0.1%+2digit(0.02V)）of reading				±（0.1%+2digit(0.2V)）of reading		±（0.1%+2digit(2V)）of reading	
	Temperature Coefficient (Typical Value)	± 100ppm/°C							
Ammeter		4-Digit Digital Meter							
	Maximum Display *14	999.9A				99.99A		9.999A	99.99A
	Measure Accuracy *13*14	±(0.5%＋4digit(0.4A)）of reading		±(0.5%＋2digit(0.2A)）of reading	±(0.5%＋4digit(0.4A)）of reading	±(0.5%＋2digit(20mA)）of reading	±(0.5%＋4digit(40mA)）of reading	±(0.5%＋2digit(2mA)）of reading	±(0.5%＋2digit(20mA)）of reading
	Temperature Coefficient (Typical Value)	± 200ppm/°C							
Power Meter		4-Digit Digital Meter							
	Maximum Display *14	9.999kW	99.99kW	9.999kW	99.99kW	9.999kW	99.99kW	9.999kW	99.99kW
	Accuracy *14	Displays the multiplication value of the voltage measurement value and current measurement value.							
Sequential mode state*17		Display state during sequential mode operation							
	Step Display	Display number of step during sequential mode							
	Elapsed time display	Display elapsed time during sequential mode							
	Number of repetition display	Display number of repetition during sequential mode							
Measurement Mode		Moving average process can be selected for measurement							

*13: At environmental temperature 23°C ± 5°C
*14: At stand-alone operation
*17: Effective only at sequential mode

Protection Functions

Specification/Models		30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Over Voltage Protection Circuit (OVP)	Range	0.30V to 33.00V		0.60V to 66.00V		5.0V to 550.0V		10V to 1100V	
	Accuracy	± (0.2%＋5 digit (0.05V)) of set value * 11		± (0.2%＋5 digit(0.05V)) of set value * 11		± (0.2%＋5 digit (0.5V)) of set value * 11		± (0.2%＋5 digit (5V)) of set value * 11	
	Operation	Can select from operations below • Output OFF by switching stop • Input switch cut-off (Input switch cut-off turns the power supply's internal input power relays OFF.)							
Over Current Protection Circuit (OCP)	Range	2.0A-220.0A	4.0A-440.0A	1.0A-110.0A	2.0A-220.0A	0.12A-13.20A	0.24A-26.40A	0.060A-6.600A	0.12A-13.20A
	Accuracy	± (0.6%＋5digit (0.5A)) of set value * 12	± (0.6%＋10digit (1A) of set value * 11 *12	± (0.6%＋5digit (0.5A)) of set value * 12	± (0.6%＋10digit (1A)) of set value * 12	± (0.6%＋5digit (50mA) of set value * 12	± (0.6%＋10digit (100mA) of set value * 12	± (0.6%＋5digit (5mA) of set value * 12	± (0.6%＋5digit (50mA) of set value * 12
	Operation	Can select from operations below • Output OFF by switching stop •Input switch cut-off (Input switch cut-off turns the power supply's internal input power relays OFF.)							
Over Heating Protection Circuit		• Stops switching, shuts off output, and displays alarms if the temperature of the radiating section heat exceeds 90°C due to stopped fan motor, etc. • Welds temperature fuses, built in the Inrush Limiting Resistors, at 135°C.							
Excessive Input Current Protection		Fuse 35A	Fuse 60A	Fuse 35A	Fuse 60A	Fuse 35A	Fuse 60A	Fuse 35A	Fuse 60A

Remote Sensing

- Able to compensate a voltage drop, due to lead wire up to load, of up to 5V one-way.
- Restricts the rise in output voltage within 10mV if sensing lines are opened.
- During remote sensing, the output power can be set to a maximum of 105% of rated output voltage at the power supply's output terminals. Also, the output power can be set within the rating.

Other Functions

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Operational Mode Displays	All modes are displayed with LEDs							
	OUT ON ---------- Orange							
	CV (Constant Voltage)---------- Green							
	CC (Constant Current) ---------- Green							
	PRESET (PRESET)---------- Green							
	FUNC. (when setting functions)---------- Green							
	REMOTE (During Remote Operation) ---------- Green							
	LOCK (in Key Lock state)---------- Green							
Master-Slave Parallel Operation	Able to control a maximum of 10 parallel connected same-voltage model products with one master unit							
Master-Slave Series Operation	Able to control a maximum of 2 series connected same model products with one master unit							
Startup Mode	* Only full-featured type "model name with F" CV Priority (High Speed: 10ms) / CV Priority (Medium Speed: 100ms) / CV Priority (Low Speed: 200ms) CC Priority (High Speed: 10ms) / CC Priority (Medium Speed: 100ms) / CC Priority (Low Speed: 200ms) CV Priority (Low Speed: 200ms) for standard version (model name without F)				* Only full-featured type "model name with F" CV Priority (High Speed: 100ms) / CV Priority (Medium Speed: 300ms) / CV Priority (Low Speed: 500ms) CC Priority (High Speed: 10ms) / CC Priority (Medium Speed: 100ms) / CC Priority (Low Speed: 200ms) CV Priority (Low Speed: 500ms) for standard version (model name without F)			
Variable Slew Rate	* Only full-featured type "model name with F" Sets the increasing and falling rate for each output voltage and output current individually.							
Constant Voltage Slew Rate Range	0.01V/s to 60.00V/s		0.1V/s to 120V/s		1V/s to 1000V/s		1V/s to 2000V/s	
Constant Current Slew Rate Range	0.1A/s to 400.0A/s	0.1A/s to 800.0A/s	0.1A/s to 200.0A/s	0.1A/s to 400.0A/s	0.01A/s to 24.00A/s	0.01A/s to 48.00A/s	0.01A/s to 12.00A/s	0.01A/s to 24.00A/s
Sequential ON/OFF	* Only full-featured type "model name with F" Output ON/OFF of multiple units can be controlled from one sequential master unit simultaneously or with time lag (Setting range: 0.00s to 99.99s for ON/OFF respectively) Note: Special cable is needed for use.							
Memory	Saves and loads the set values of the voltage, current, and various functions in memories "A", "B", and "C".							
Key Lock	Locks key operation at the front panel.							
Variable Internal Resistance (⊿R)	* Only full-featured type "model name with F"							
	0Ω to 0.15Ω	0Ω to 0.075Ω	0Ω to 0.6Ω	0Ω to 0.3Ω	0Ω to 41.7Ω	0Ω to 20.8Ω	0Ω to 167Ω	0Ω to 83Ω

Conformity Standards

Specification/Models		30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Conformity Standards	LVD	EN61010-1							
	EMC	EMS EN61326-1 : (Industrial locations) EMI EN61326-1 : (Class A)							
	Applicable conditions	・All cable connecting should be less than 3m and supplied by TAKASAGO, Ltd. as options. ・It is required to wrap 2T of ferrite clamp, such as RFC-20 manufactured by Kitagawa Industries or equivalent, around cables while connectors for external control will be used. ・It is required to wrap 2T of ferrite core, such as GRFC-13 manufactured by Kitagawa Industries or equivalent, around cables while connectors for isolated external control will be used.							

External Control

Specification/Models			30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Output Voltage Control	External Resistance		0~10kΩ (B, C Curve), 0~∞Ω (A Curve)							
	External Voltage		0~10V DC							
	External Voltage (Isolated)		0 to 10V DC only for isolation-option-featured type "model name with I"							
Output Current Control	External Resistance		0~10kΩ (B, C Curve), 0~∞Ω (A Curve)							
	External Voltage		0~10V DC							
	External Voltage (Isolated)		0 to 10V DC only for isolation-option-featured type "model name with I"							
Output ON/OFF Control		Normal	Can be controlled at external contact or photocoupler							
		Isolated	Usable by external contact or photocoupler only for isolation-option-featured type "model name with I"							
Input Cut-Off Control		Normal	Can be controlled at external contact or photocoupler							
		Isolated	Usable by external contact or photocoupler only for isolation-option-featured type "model name with I"							
Voltage Monitoring Output		Normal	For rated output voltage, 10V DC output (non-isolated) accuracy: 0.5% ± 10mV							
		Isolated	Only for isolation-option-featured type "model name with I", 10V DC output (isolated) accuracy: 0.5% ± 10mV for rated output voltage							
Current Monitoring Output		Normal	For rated output current, 10V DC output (non-isolated) accuracy: 1.0% ± 10mV							
		Isolated	Only for isolation-option-featured type "model name with I", 10V DC output (isolated) accuracy: 1.0% ± 10mV for rated output voltage							
Status Output			The following status and alarm output with open collector isolated by photocoupler. CV (Constant Voltage) CC (Constant Current) P-ON (Input Voltage Normal) LEVEL1_ALM (OVP, OCP)/ OUTPUT ON/OFF STS LEVEL2_ALM (Group Alarm)							

Isolation/ Withstanding Voltage

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Isolation	At 500V DC mega-ohm tester, above 20MΩ Between each input and output, input and chassis, output and chassis				At 1000V DC mega-ohm tester, above 20MΩ Between each input and output, input and chassis, output and chassis			
Withstanding Voltage	Between input and output: 3.0kV AC 1minute Between input and chassis: 1.5kV AC 1minute Between output and chassis :1.3kV DC 1 minute				Between input and output: 3.0kV AC 1minute Between input and chassis: 1.5kV AC 1minute Between output and chassis :2.4kV DC 1 minute			
Relative Ground Voltage	At peak voltage value, within ± 500V Between Output and Ground(Includes output voltage)				At peak voltage value, within ± 1200V Between Output and Ground(Includes output voltage)			

Cooling

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Cooling Method	Forced cooling by fan motor							

Operational Environment

Specification/Models		30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
Environment		Indoor, Setting Category Ⅱ, and Pollution Degree 2							
Environmental Temperature	Operation	0 to 50°C							
	Saving	-20°C to 70°C							
Humidity	Operation	20 to 90% RH							
	Saving	20 to 90% RH							
Maximum Heights for use		Up to 2,000m							
Other		No freezing, condensation, or corrosive gas							

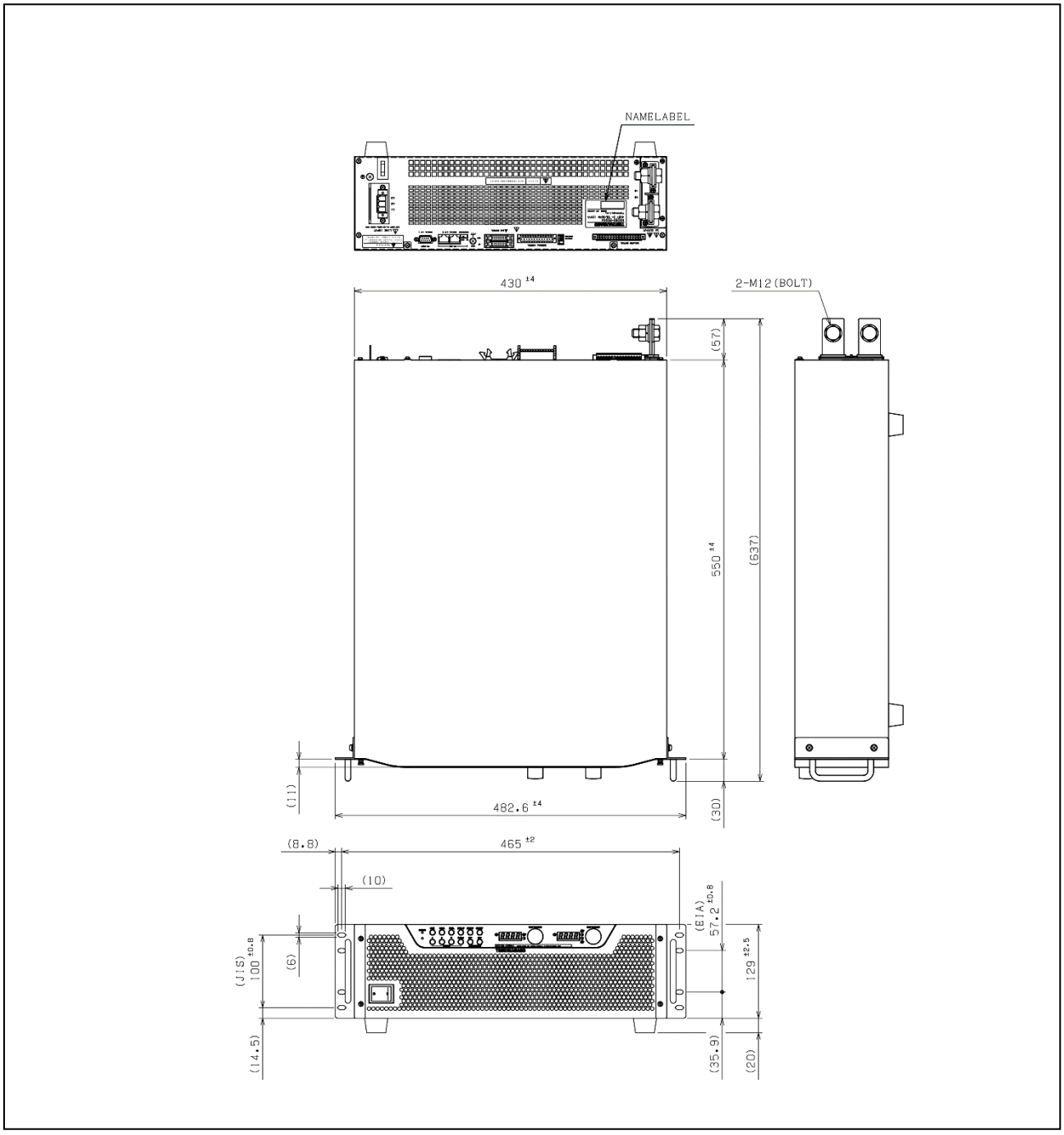
Dimensions/Weight

Specification/Models	30-200	30-400	60-100	60-200	500-12	500-24	1000-6	1000-12
External Dimensions(mm) *15	W:430mm H:129mm D:550mm	W:430mm H:221mm D:550mm	W:430mm H:129mm D:550mm	W:430mm H:221mm D:550mm	W:430mm H:129mm D:550mm	W:430mm H:221mm D:550mm	W:430mm H:129mm D:550mm	W:430mm H:221mm D:550mm
Max. Dimensions(mm) *16	W:482.6mm H:149mm D:637mm	W:482.6mm H:241mm D:646mm	W:482.6mm H:149mm D:637mm	W:482.6mm H:241mm D:637mm	W:482.6mm H:149mm D:625mm	W:482.6mm H:241mm D:625mm	W:482.6mm H:149mm D:625mm	W:482.6mm H:241mm D:625mm
Weight	About 24.0kg	About 43.0kg	About 23.0kg	About 39.0kg	About 22.0kg	About 37.0kg	About 23.0kg	About 38.0kg
Output Terminal	Copper Bar (M12 Bolt)	Copper Bar (M12 Bolt)	Copper Bar (M12 Bolt)	Copper Bar (M12 Bolt)	Copper Bar (M5 Screws)	Copper Bar (M5 Screws)	Copper Bar (M5 Screws)	Copper Bar (M5 Screws)
Input Terminal	3P Connector							

Note: *15: Does not include protruding sections
*16: Includes handle, dial, rubber legs, and output terminal

External Diagrams

1.HX-S-030-200G4(F)･(Ⅰ)



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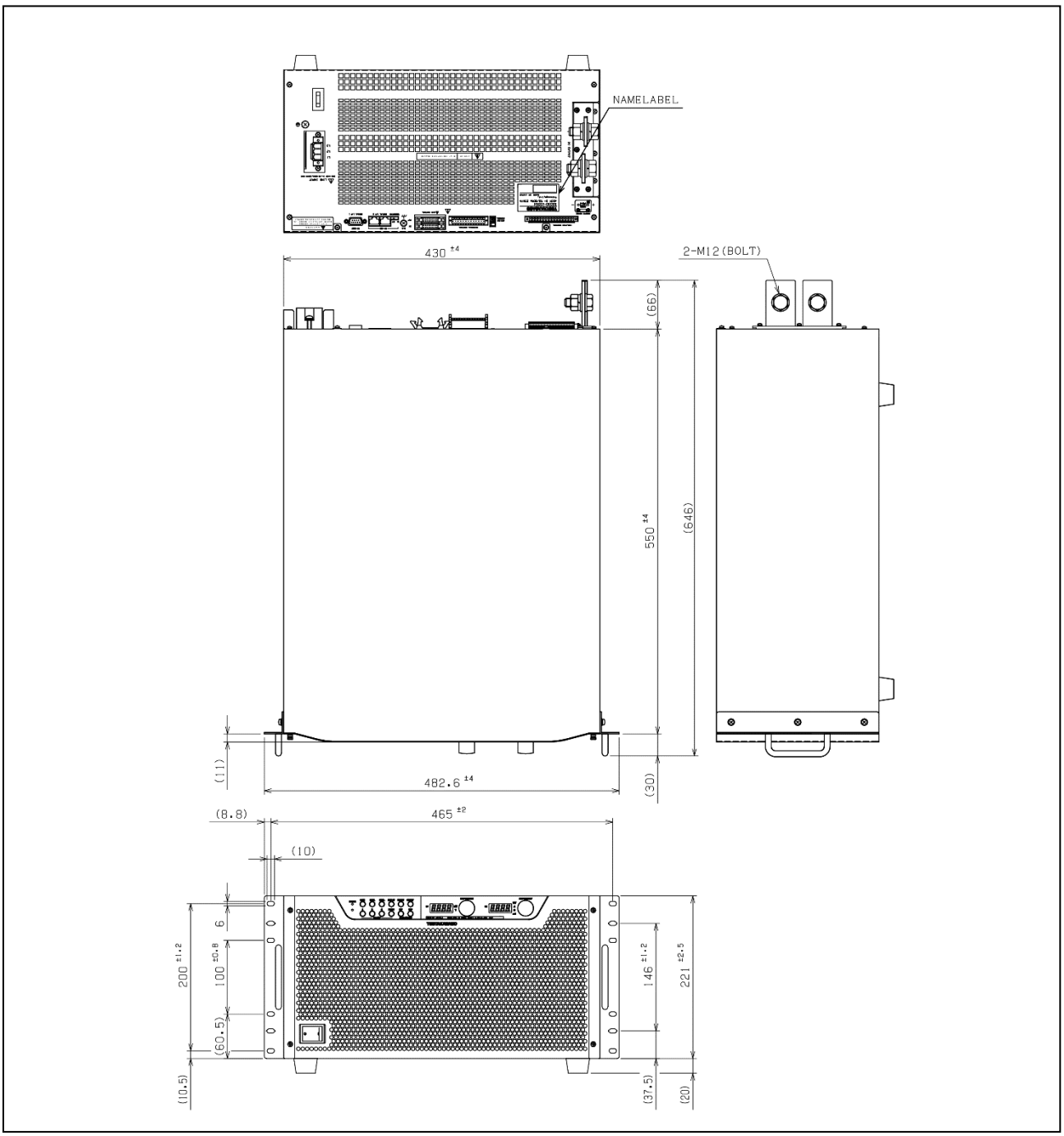
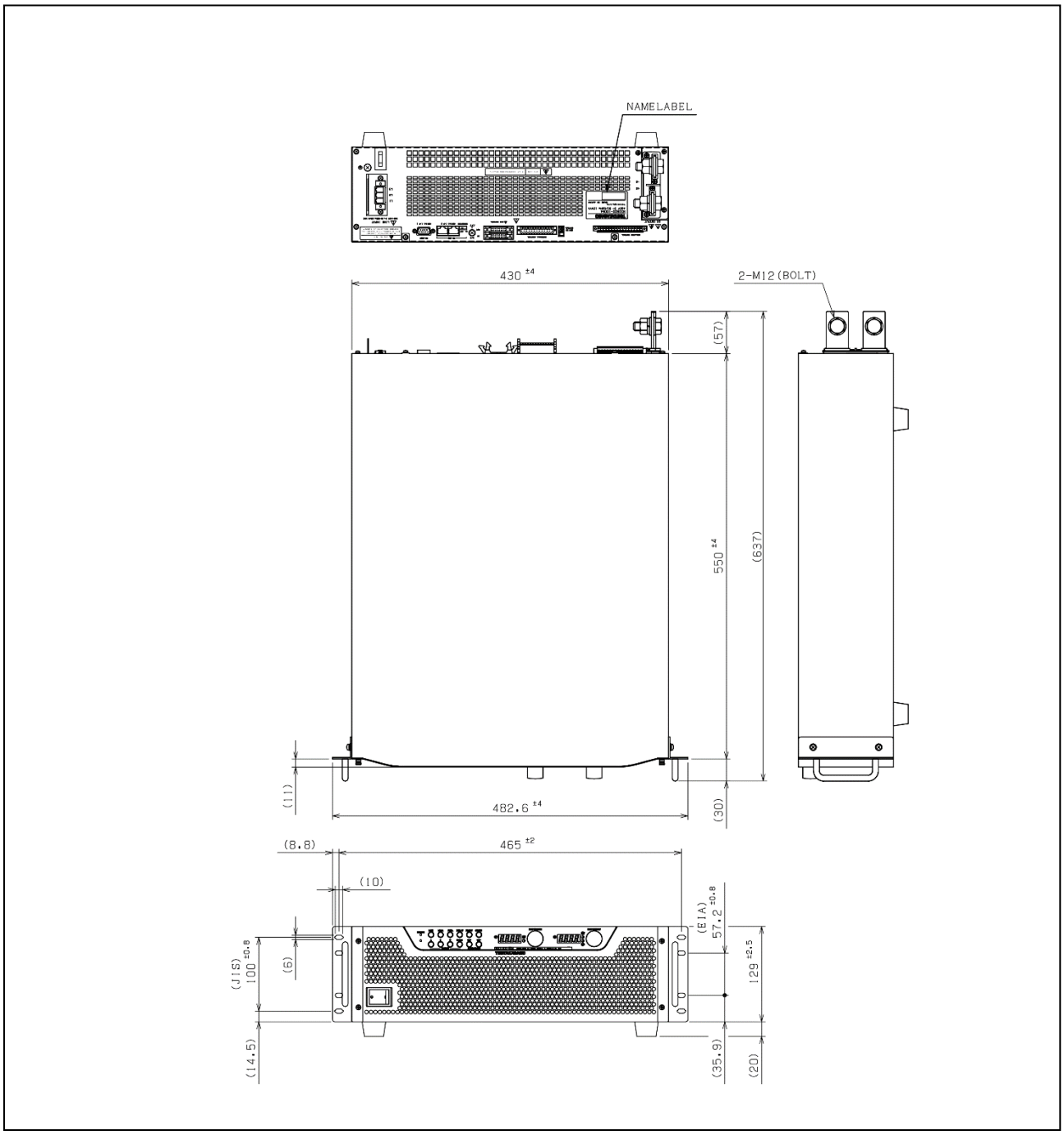


3.HX-S-060-100G4(F)･(Ⅰ)



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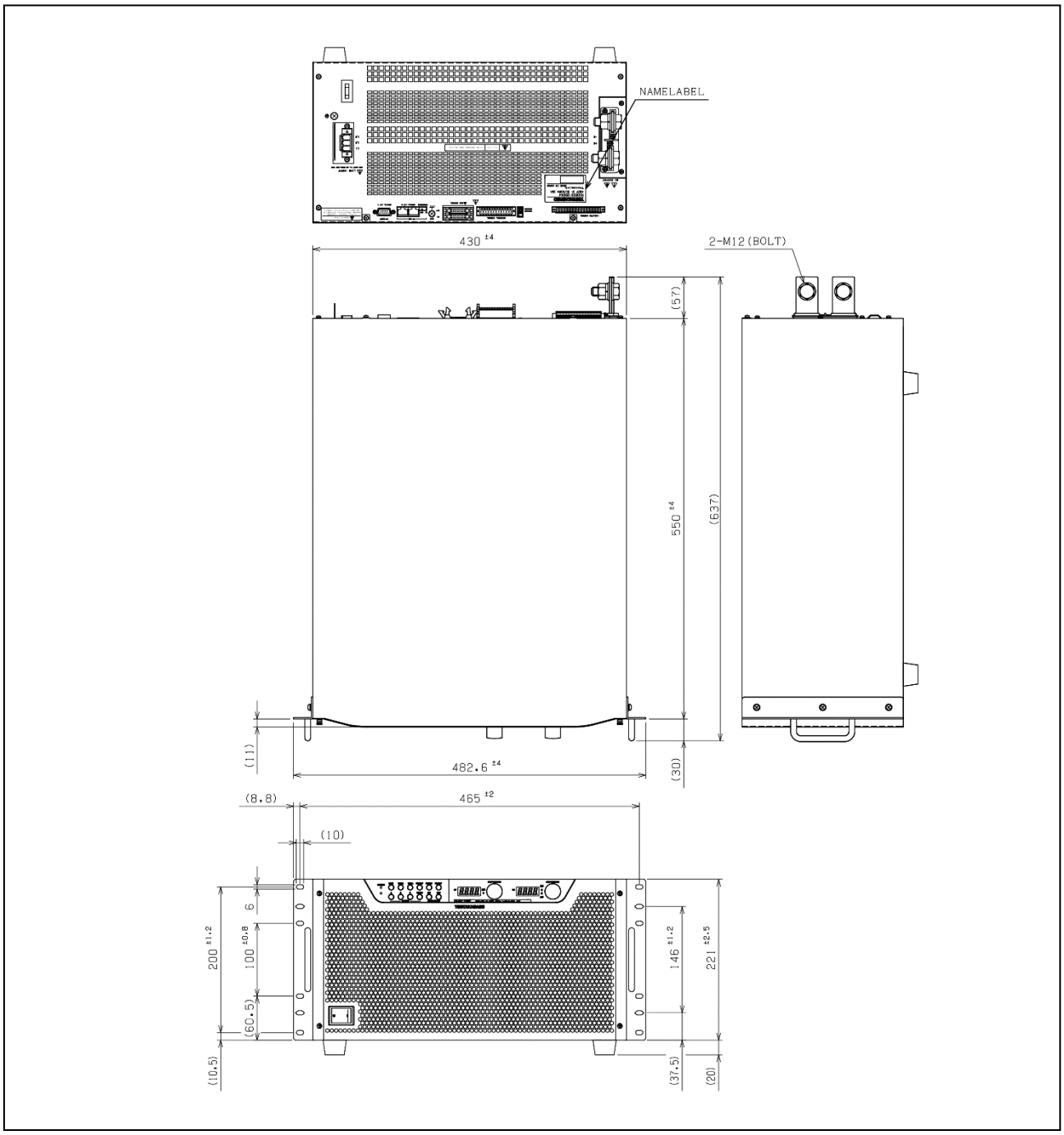

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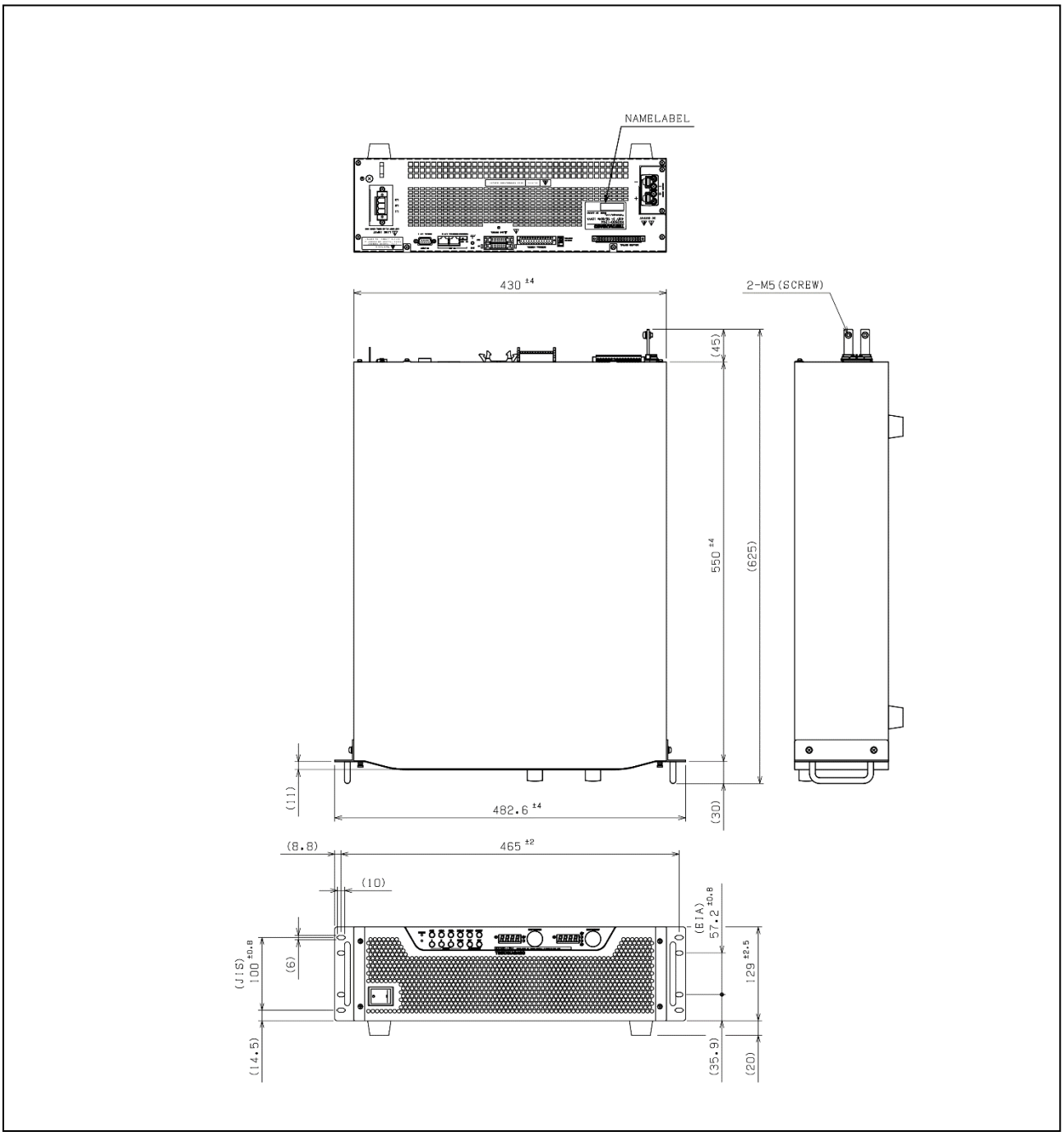
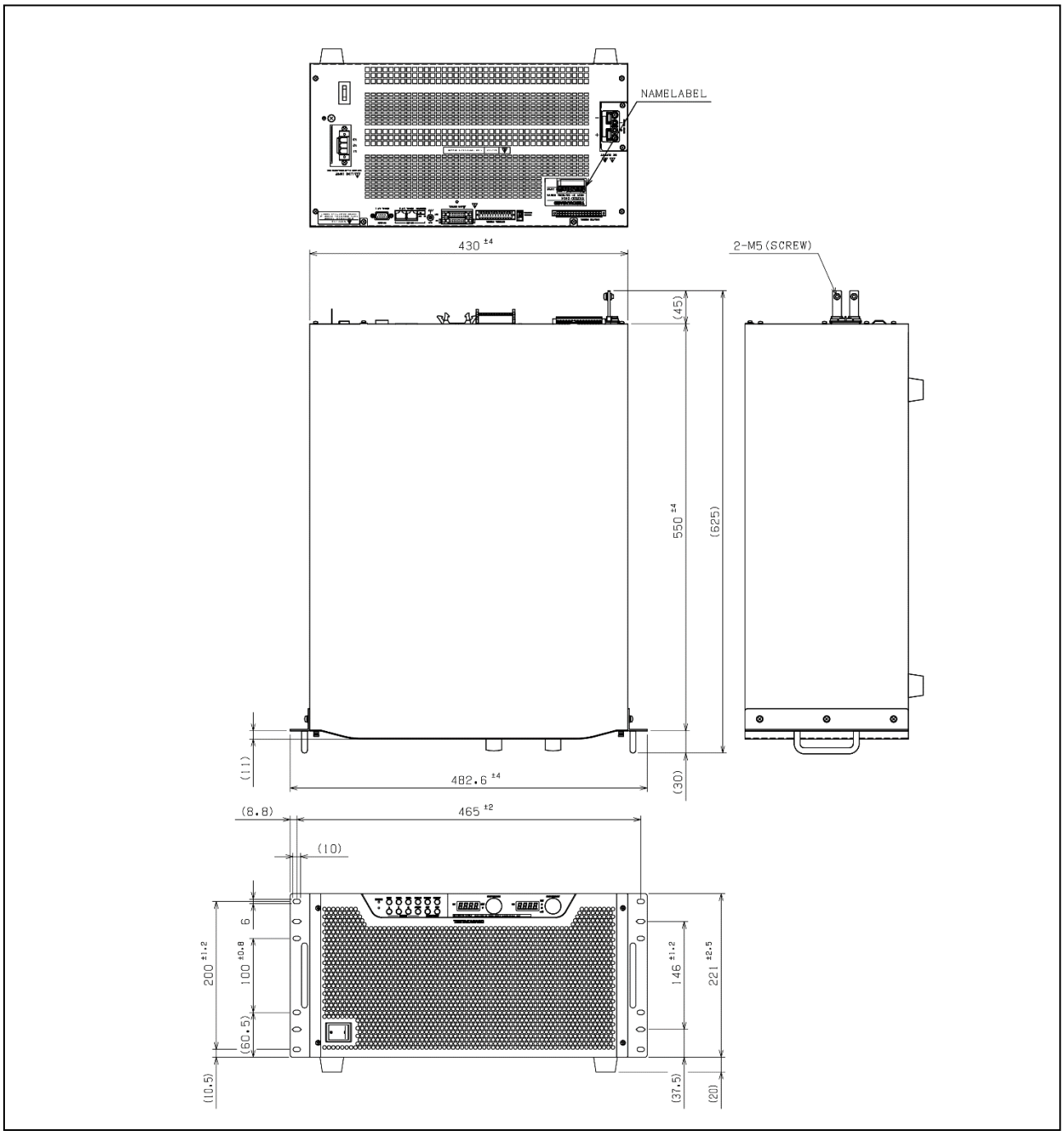


6.HX-S-0500-24G4(F)-(I)



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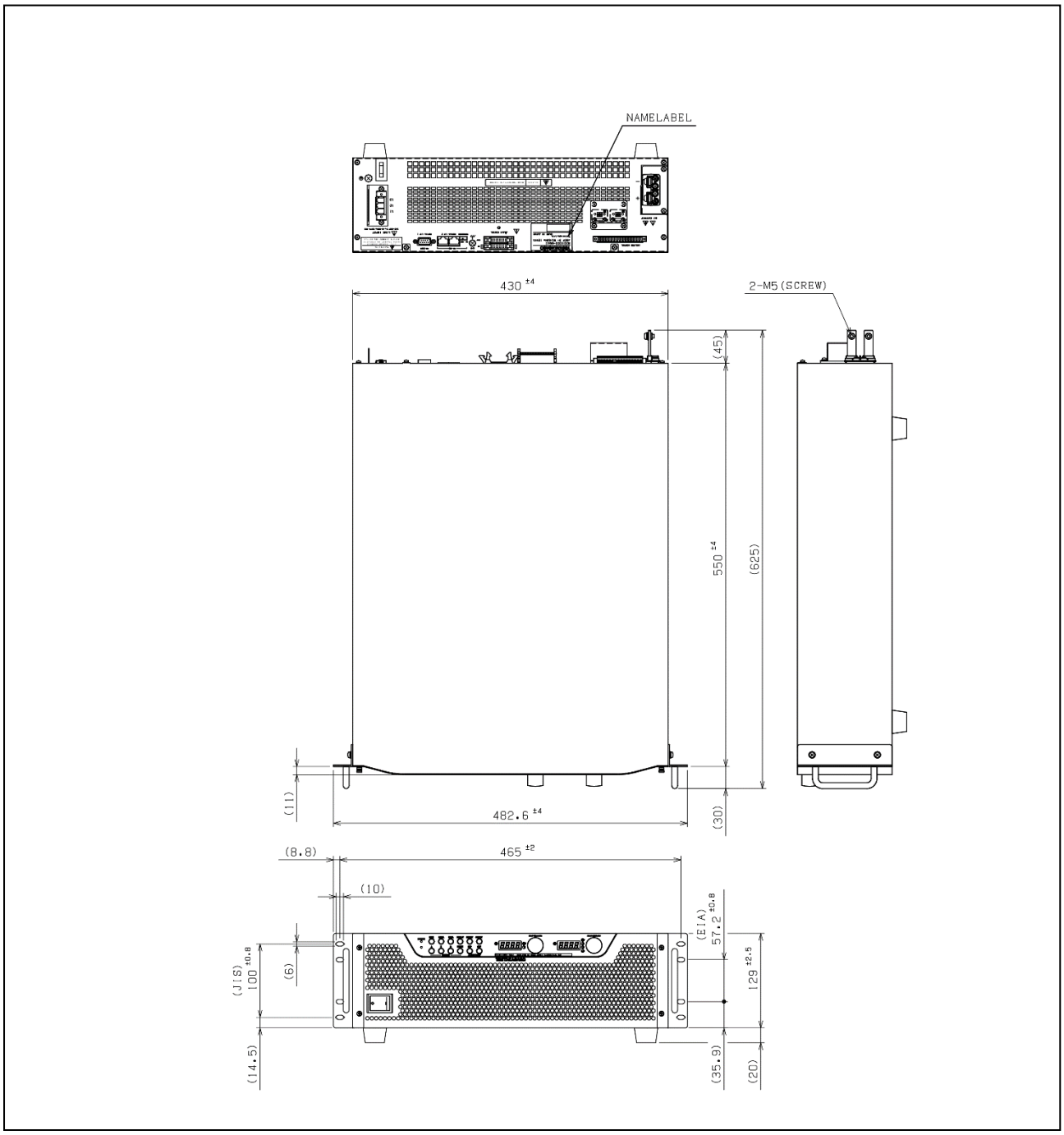

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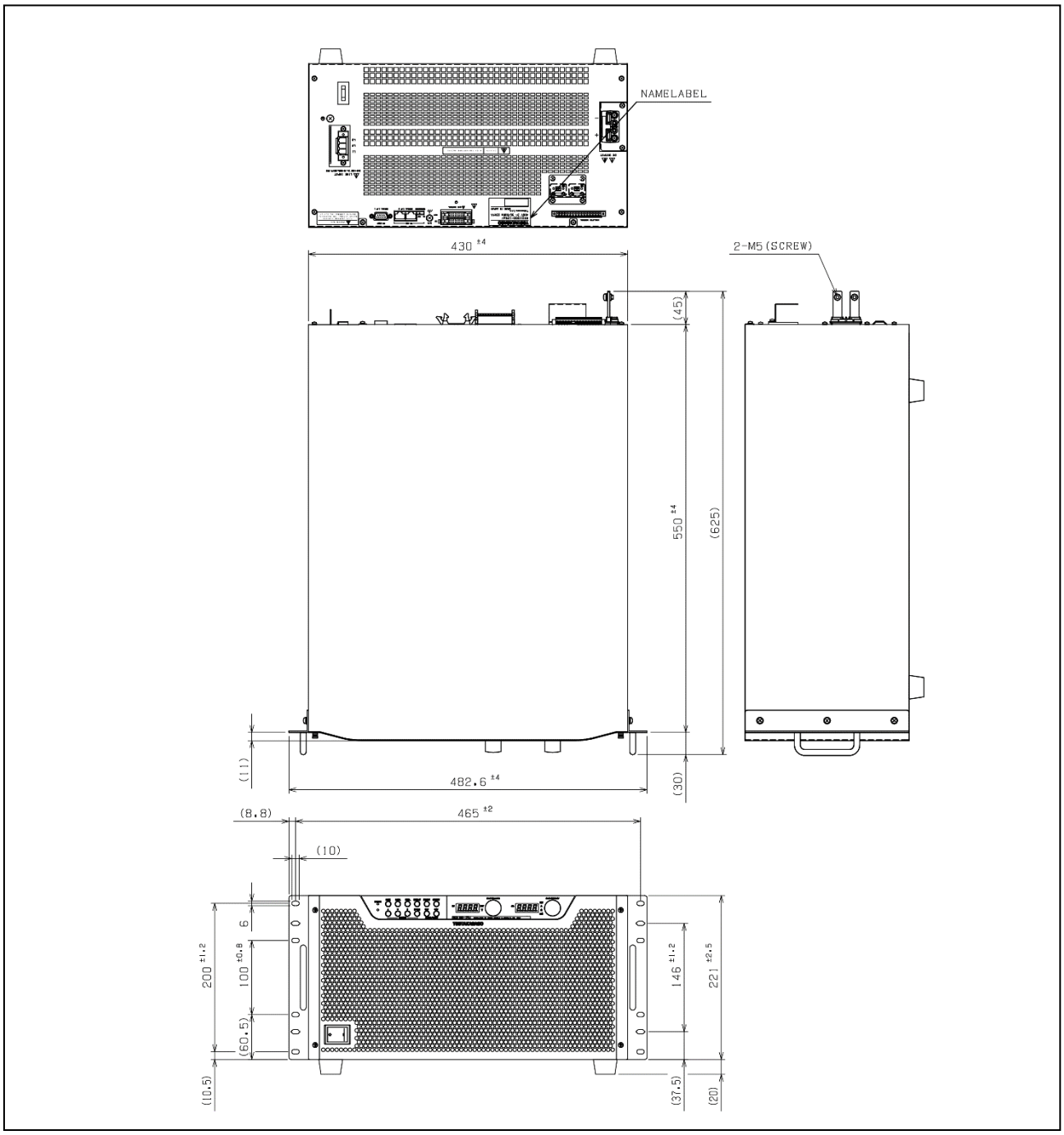
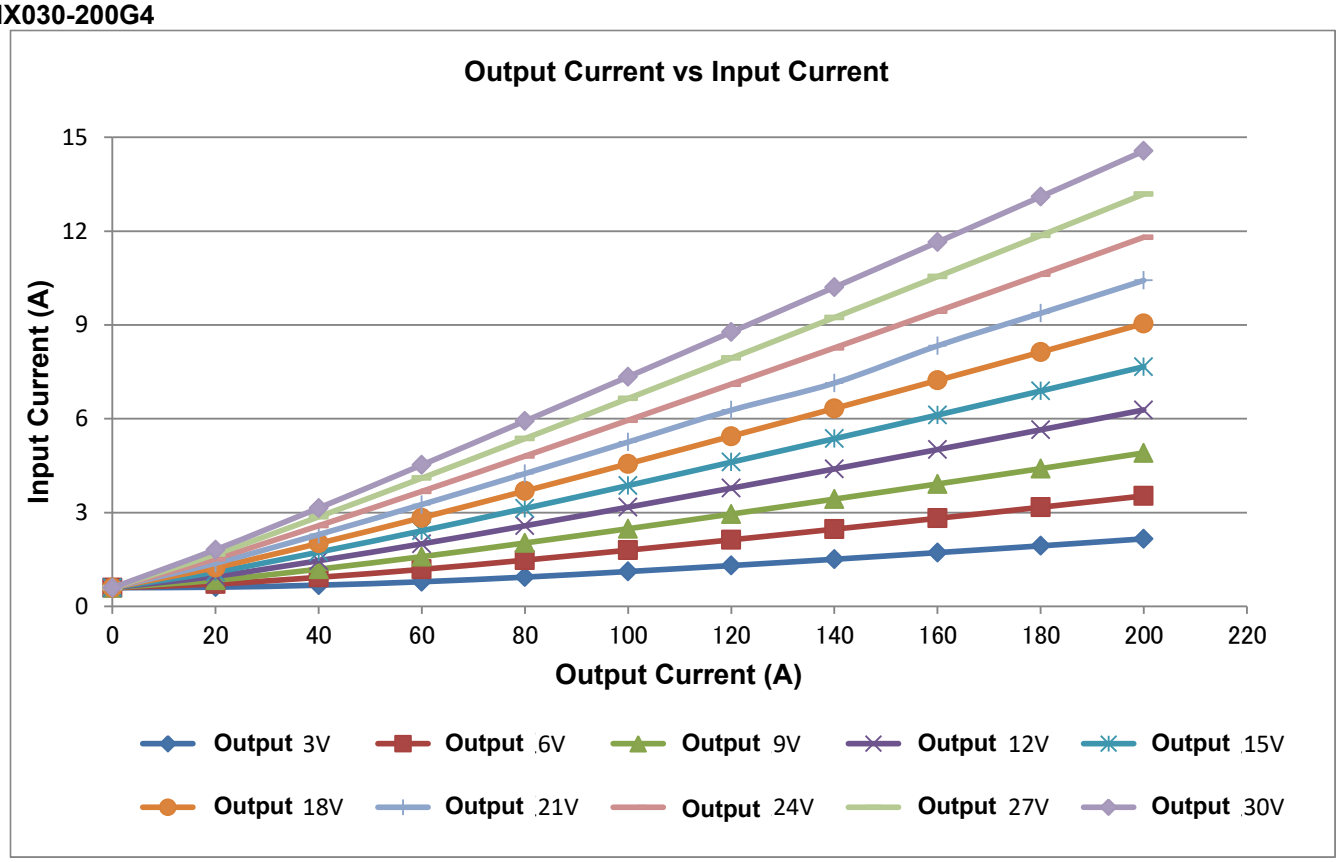


Appendix 1 Output Current vs Input Current

※The graph below is if input voltage AC400V, power factor of 0.65.

1.HX030-200G4



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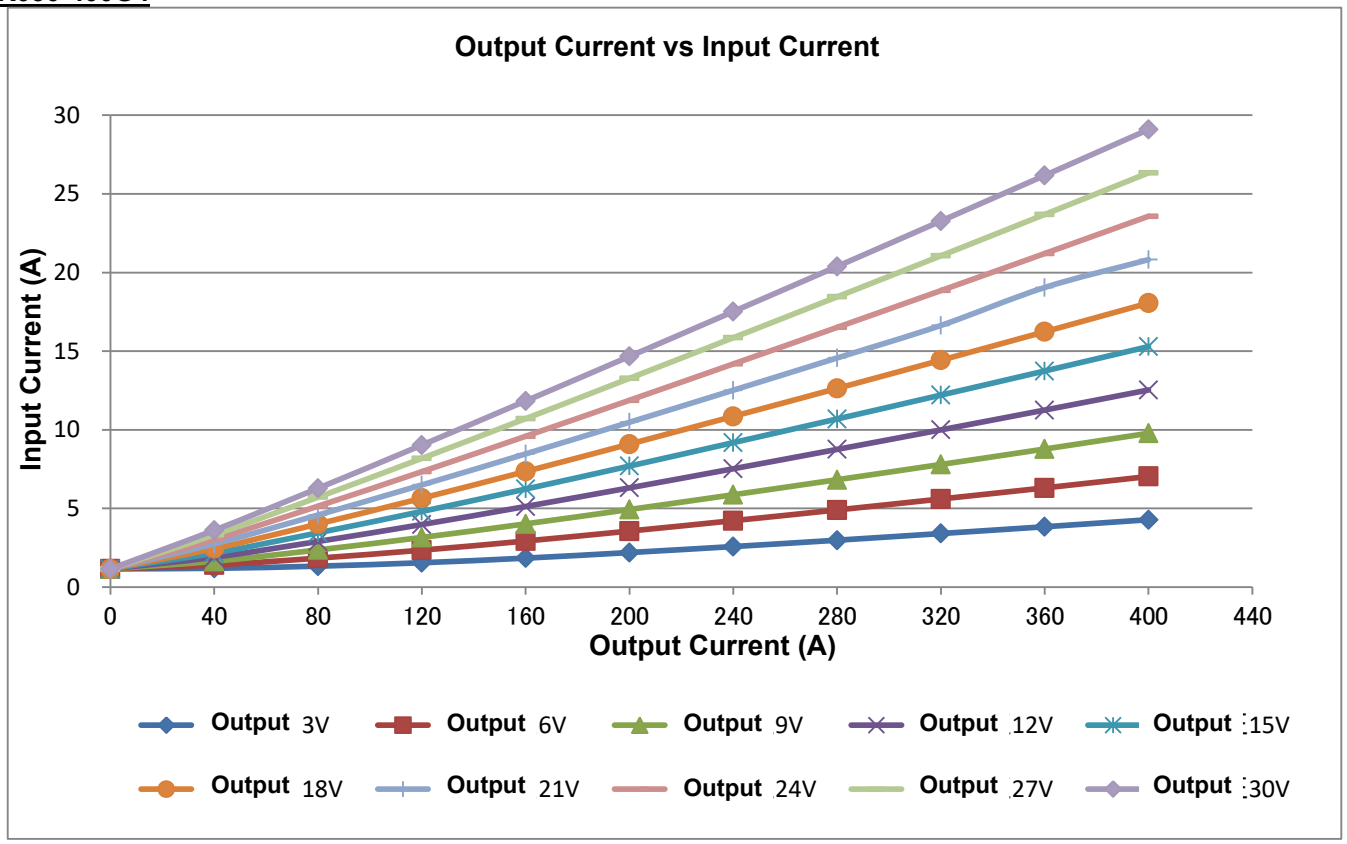

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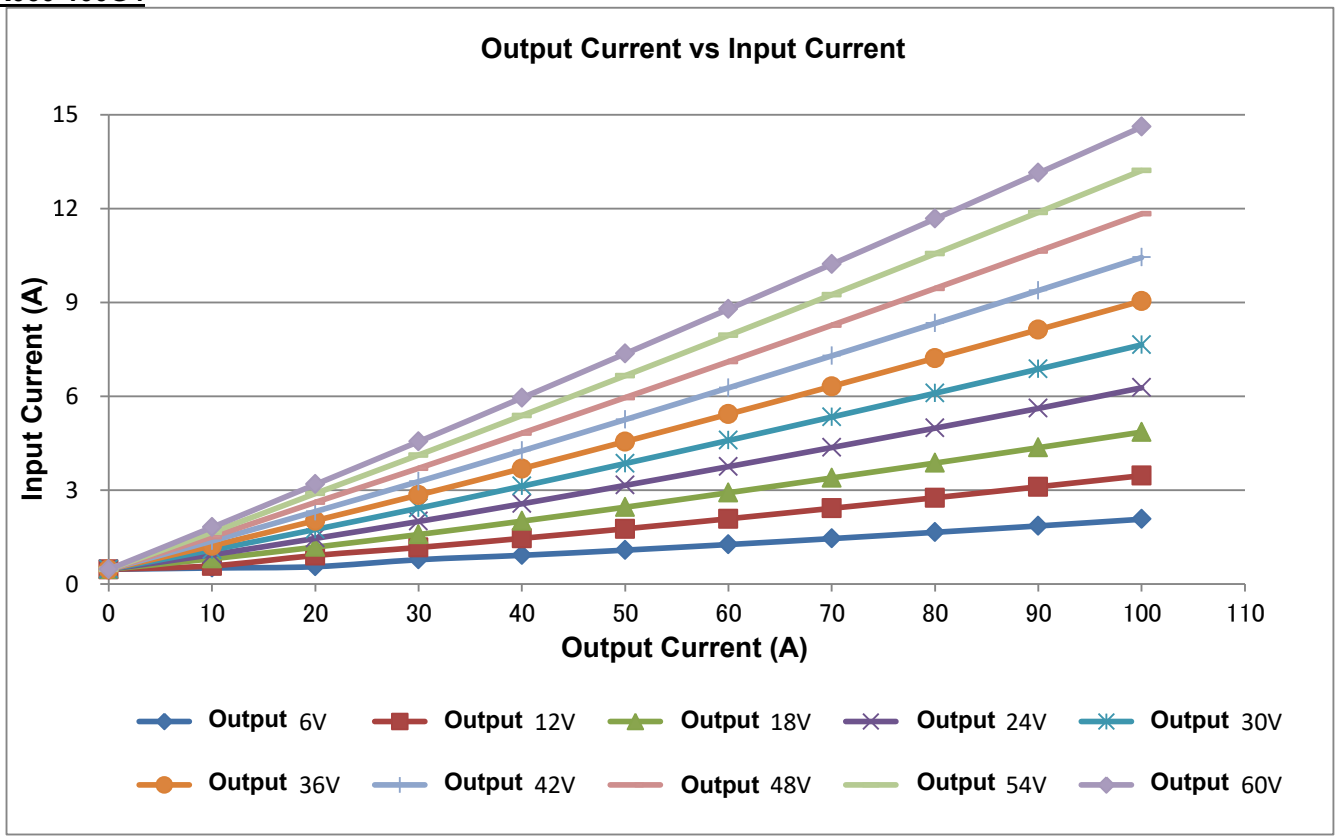

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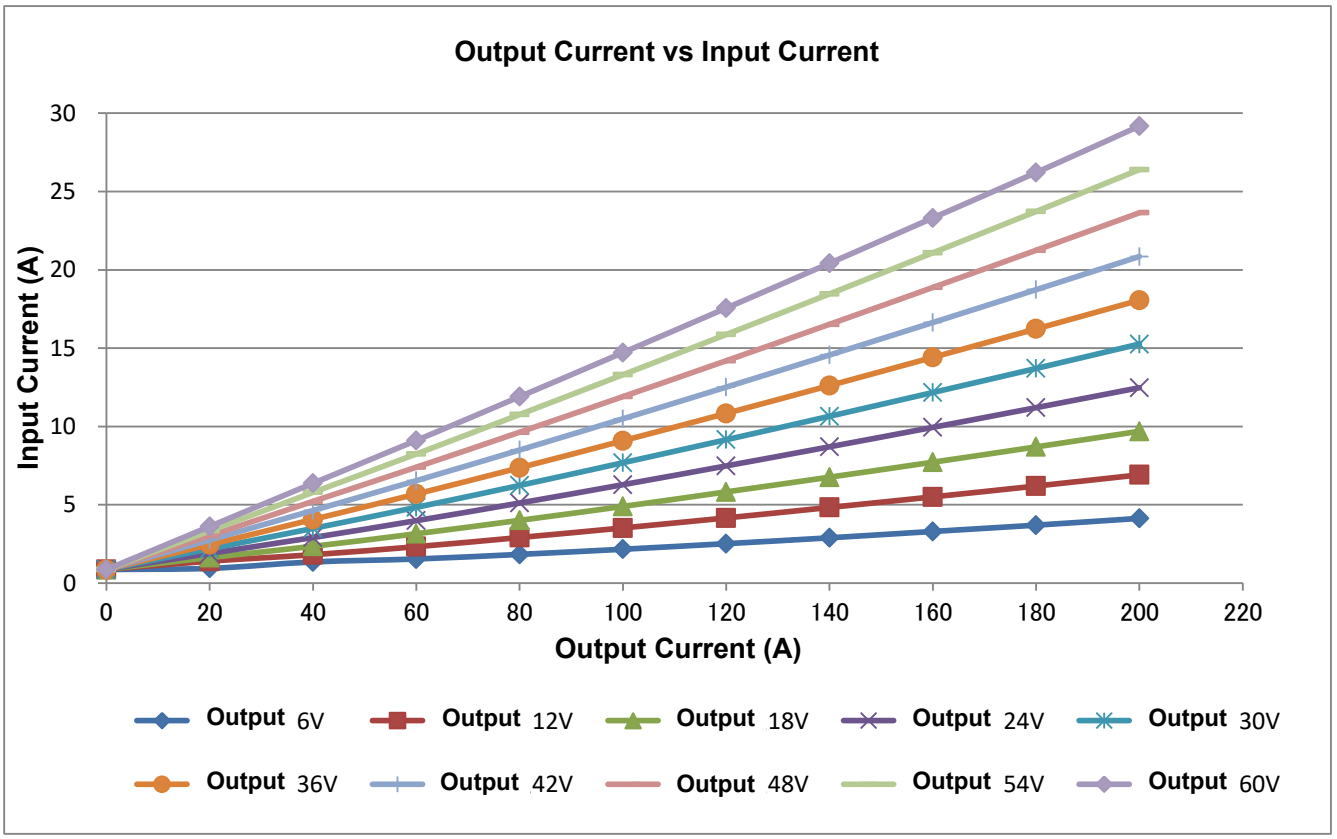

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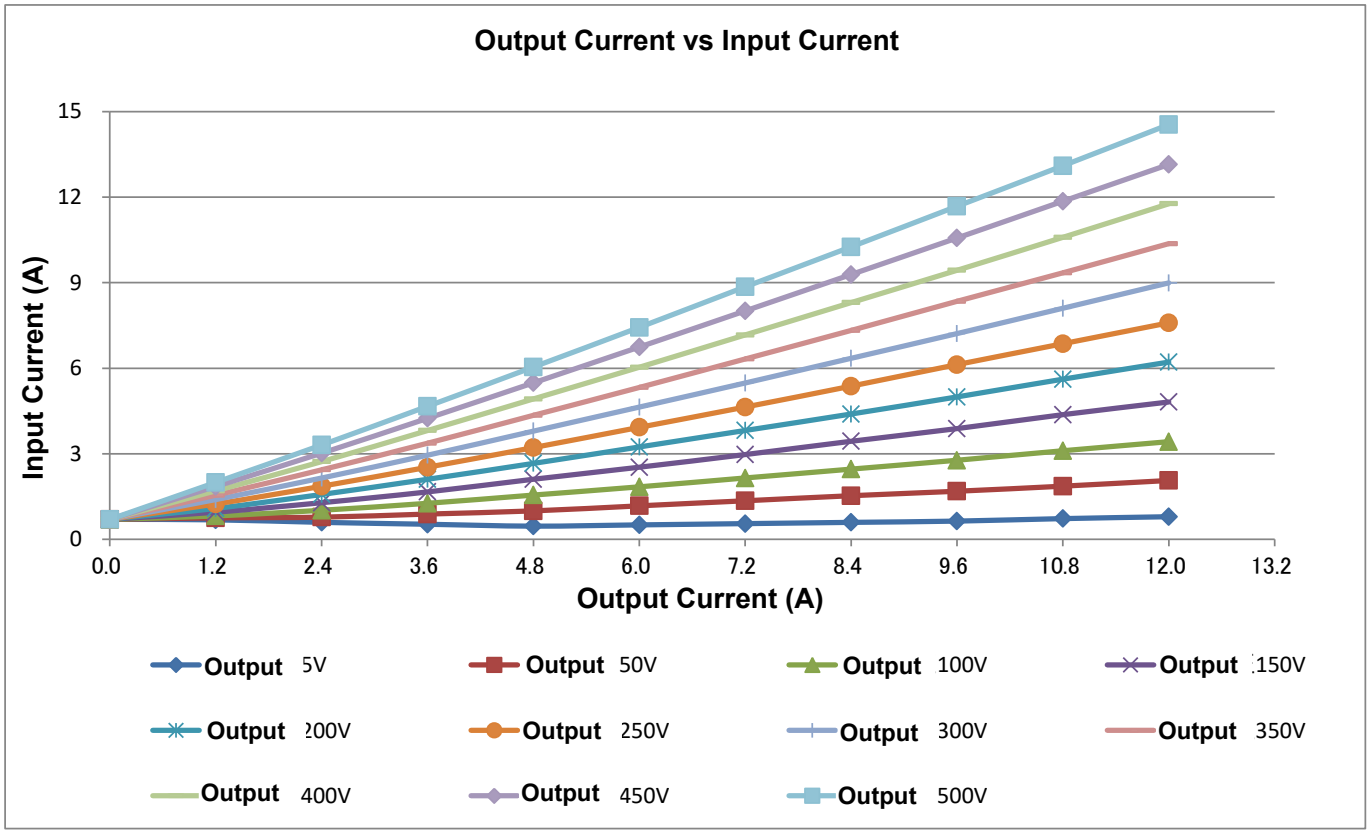

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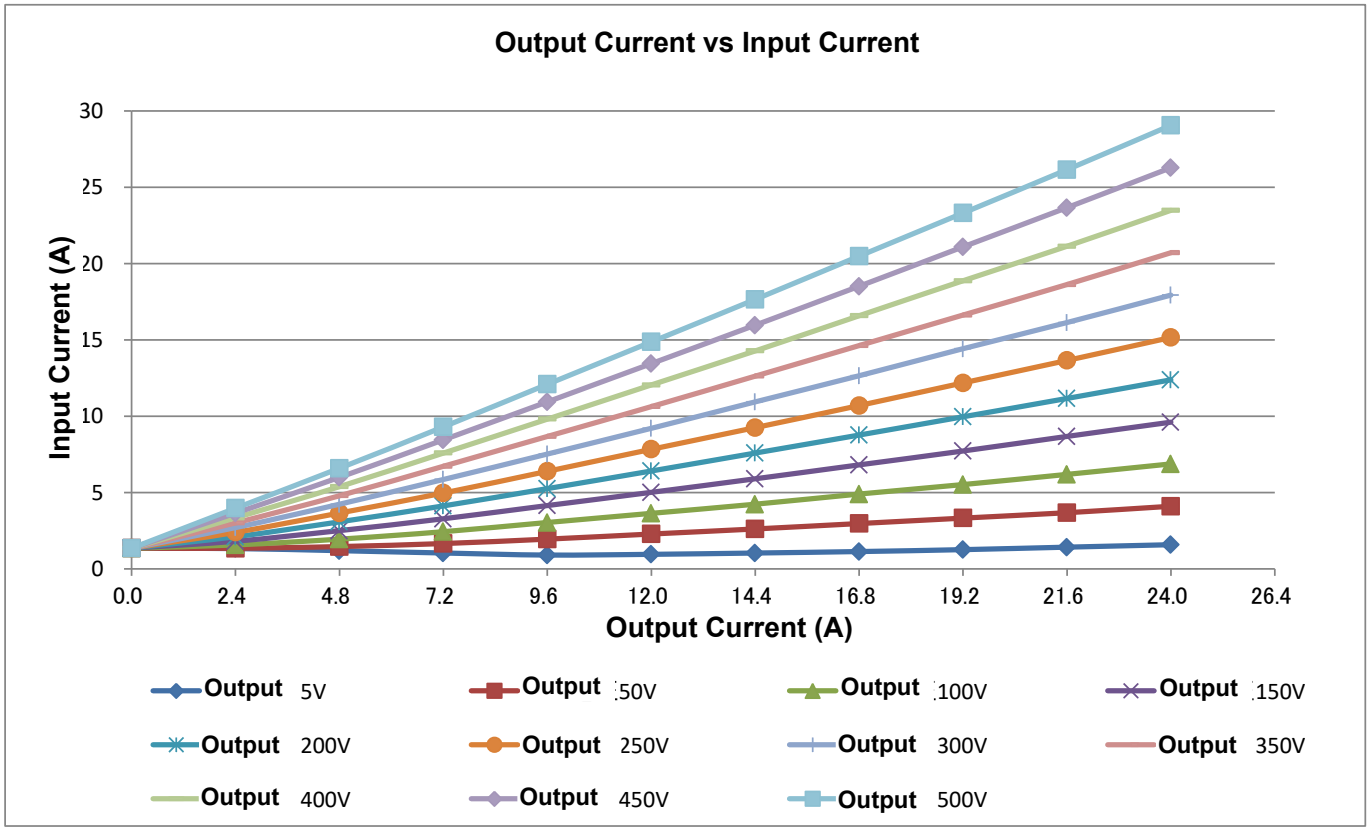

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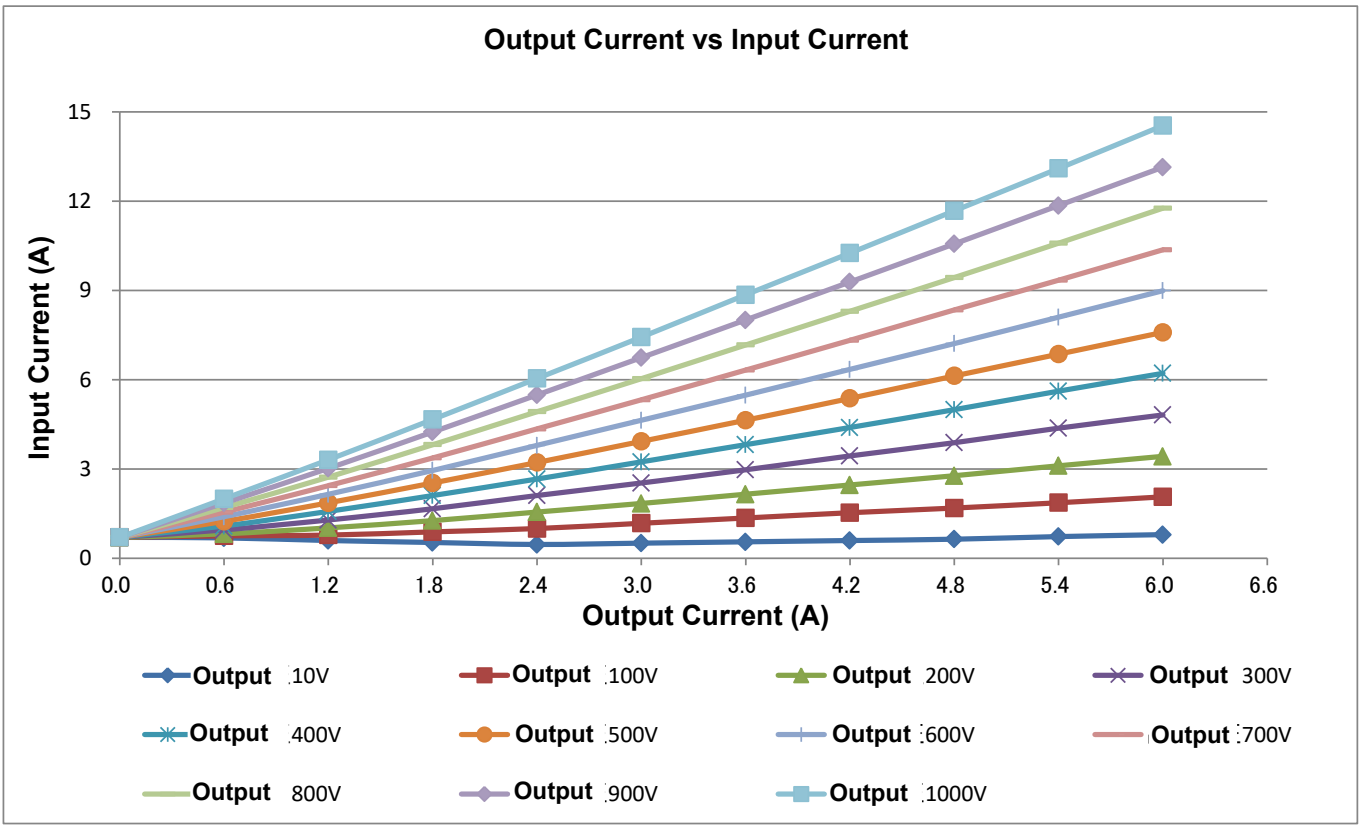

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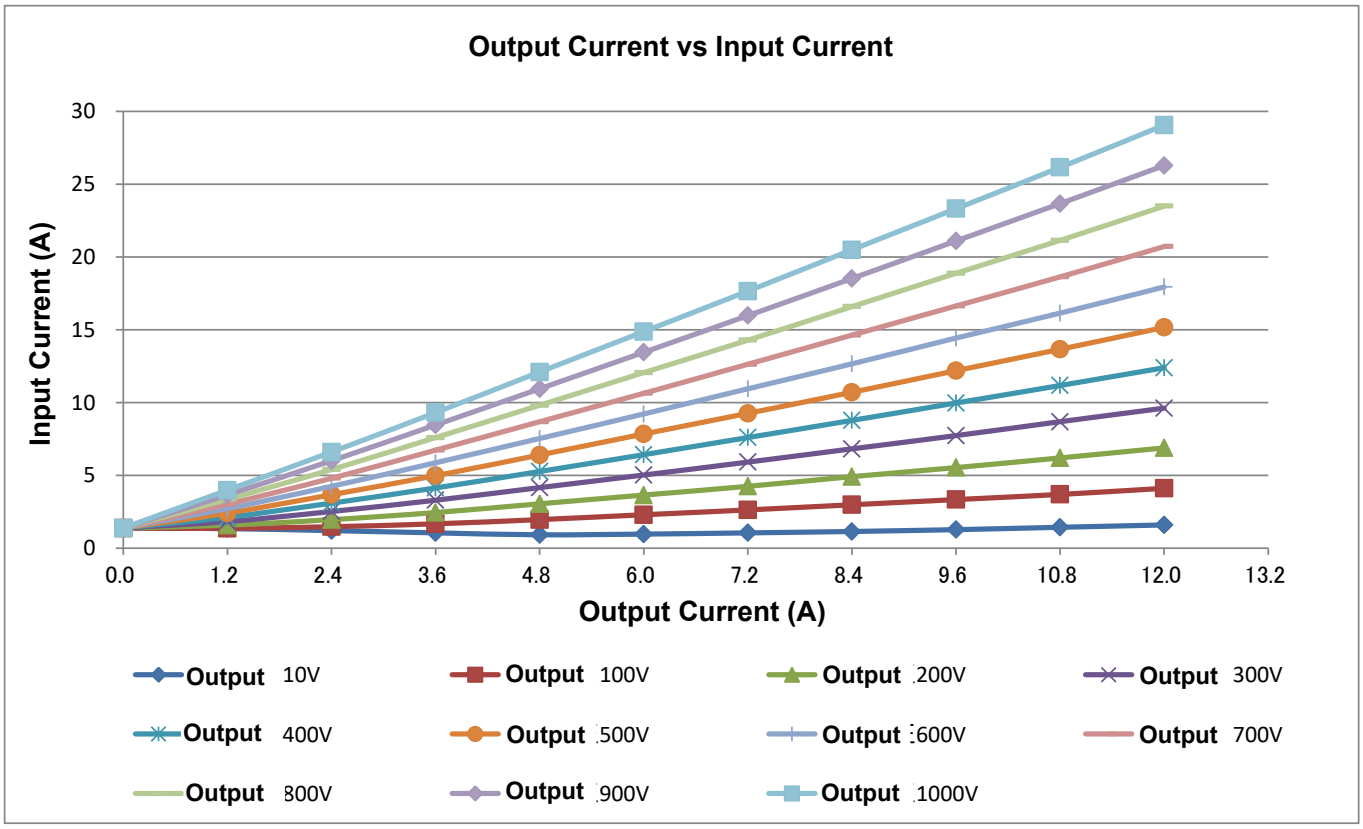
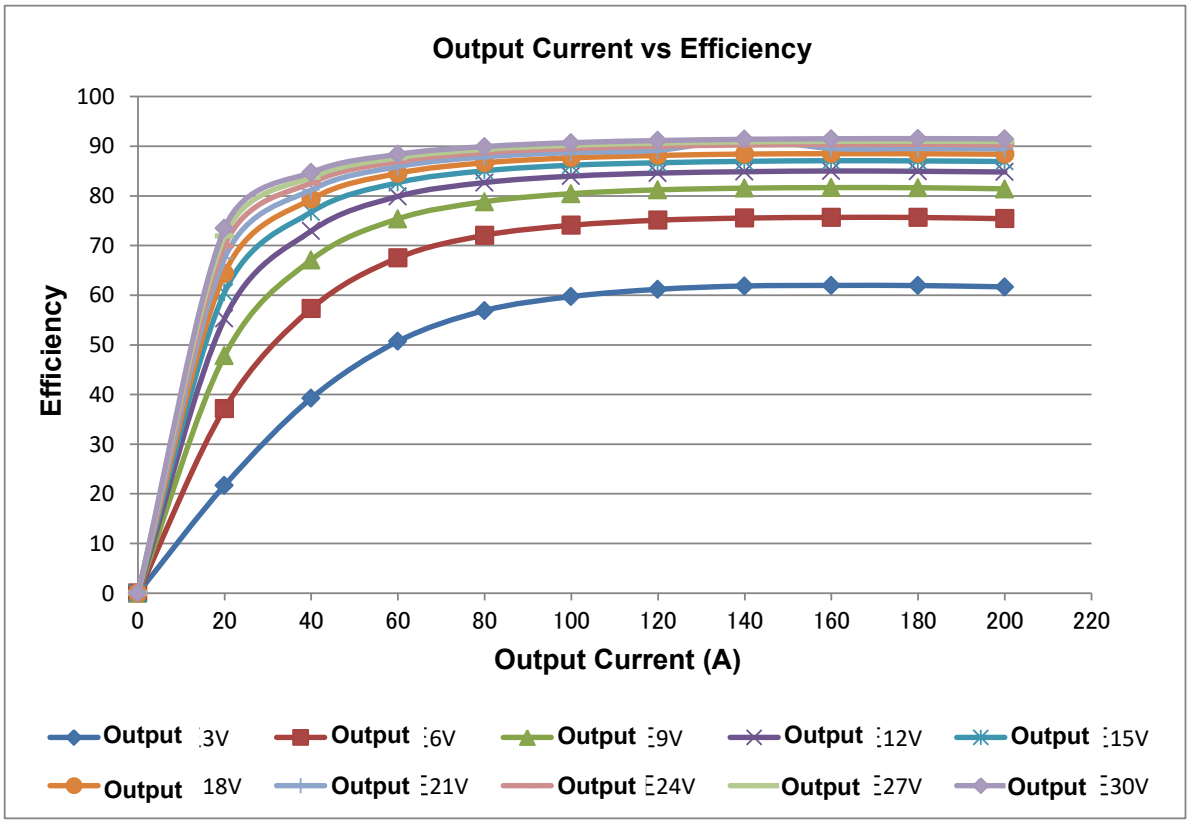
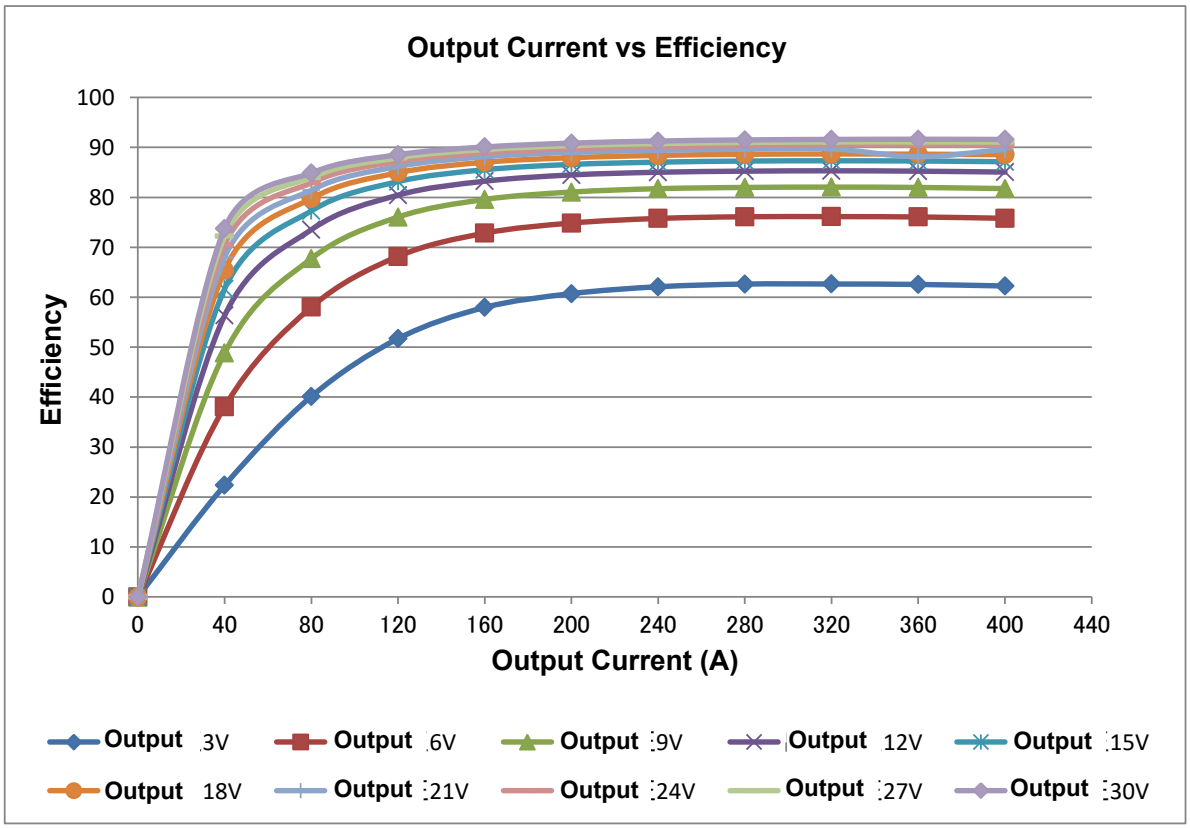


Appendix 2 Output Current vs Efficiency

1.HX030-200G4



2.HX030-400G4



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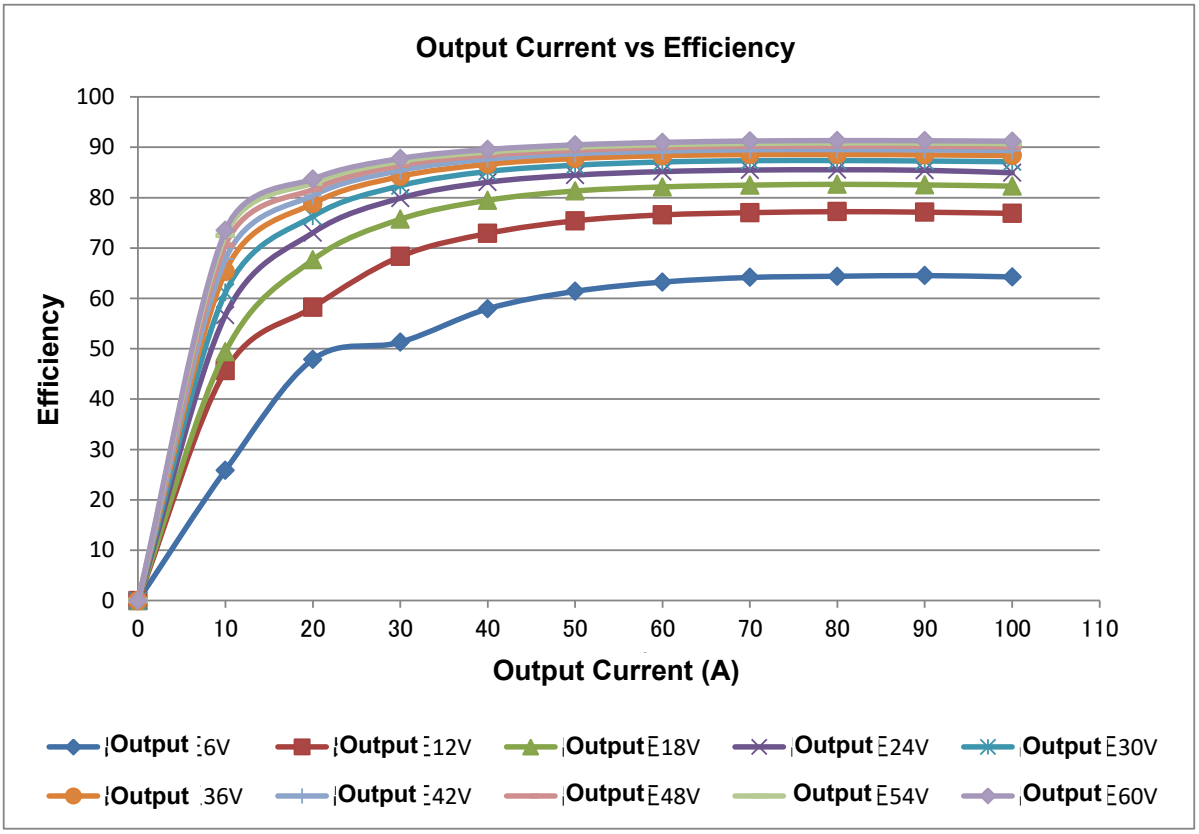

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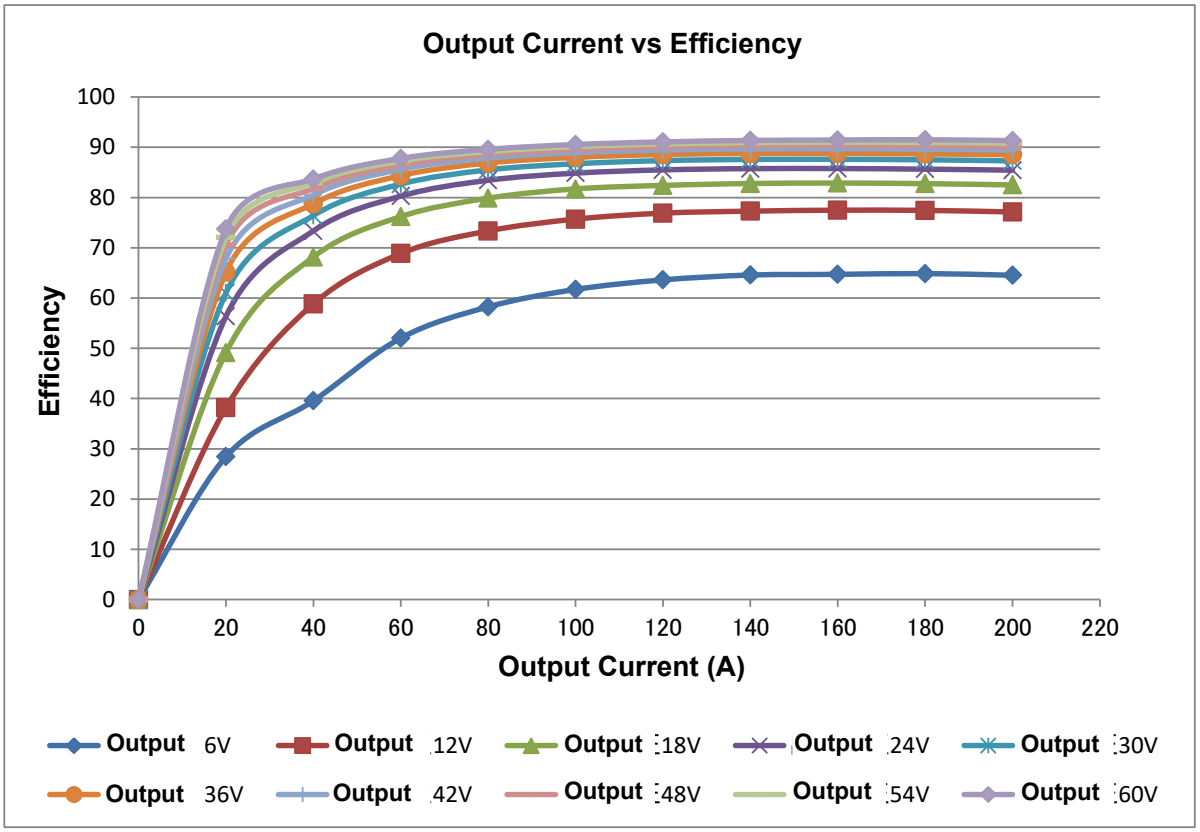

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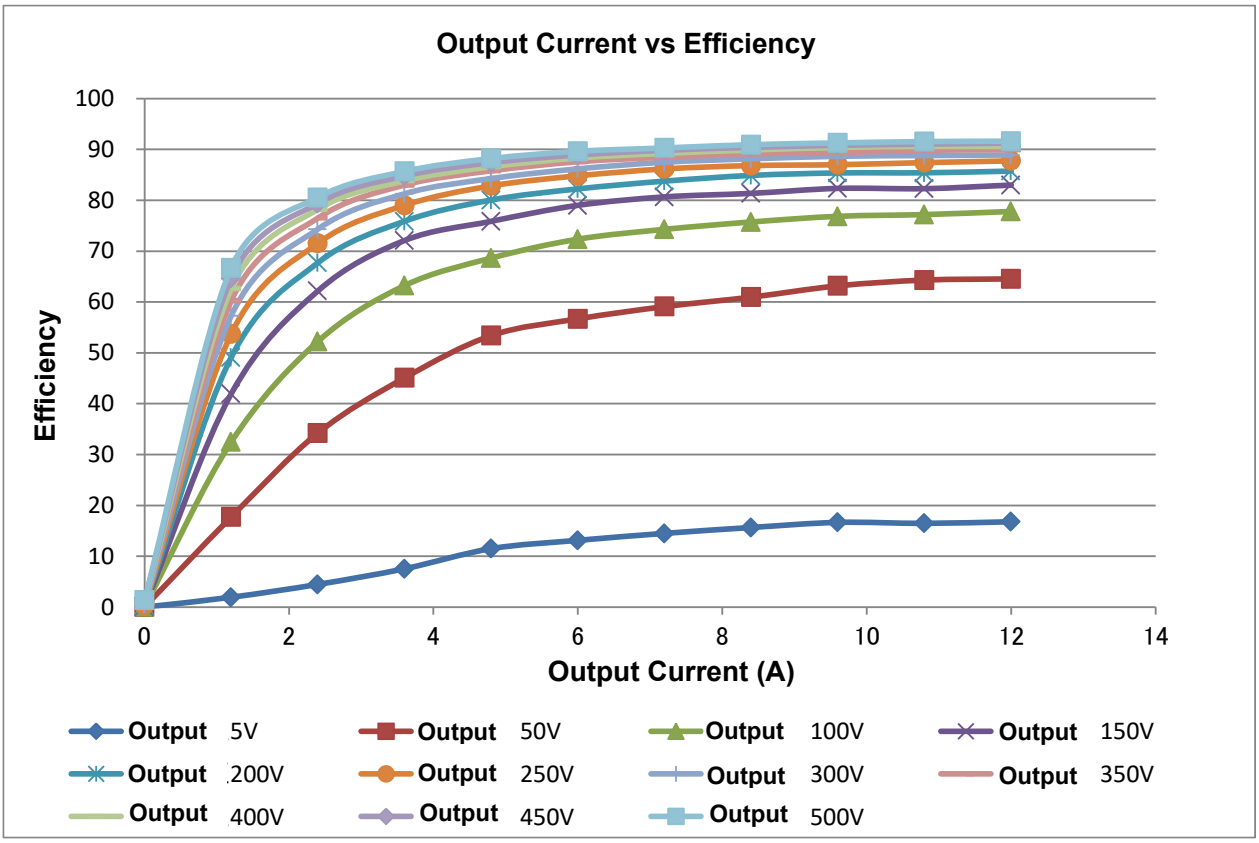

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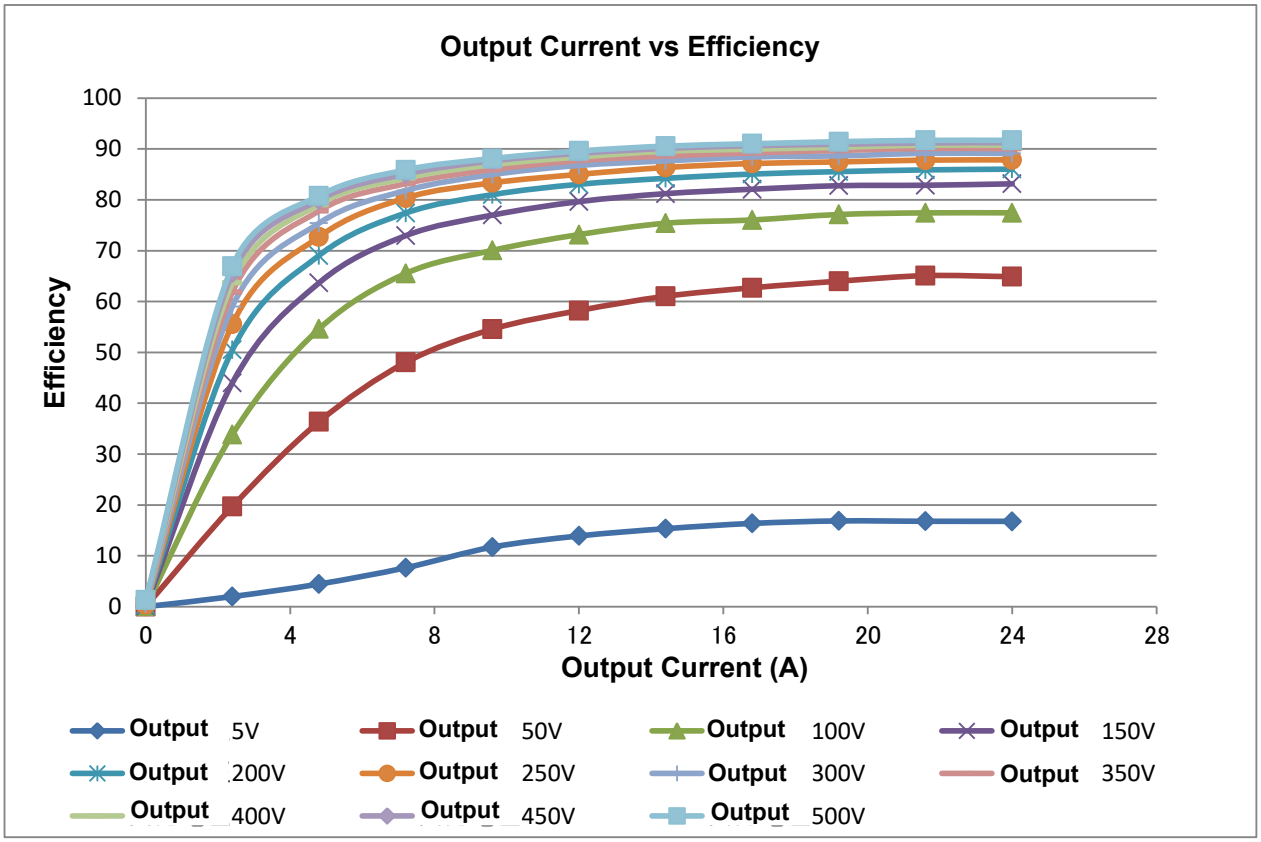

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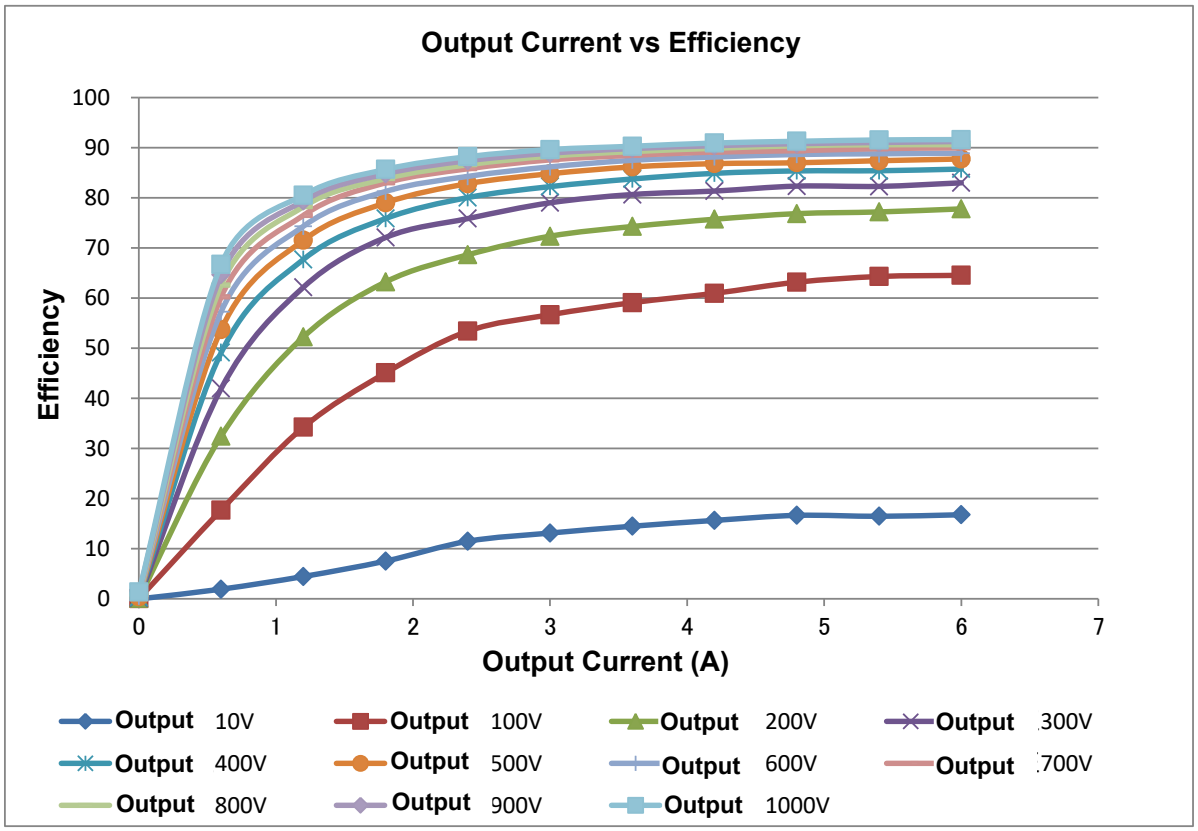

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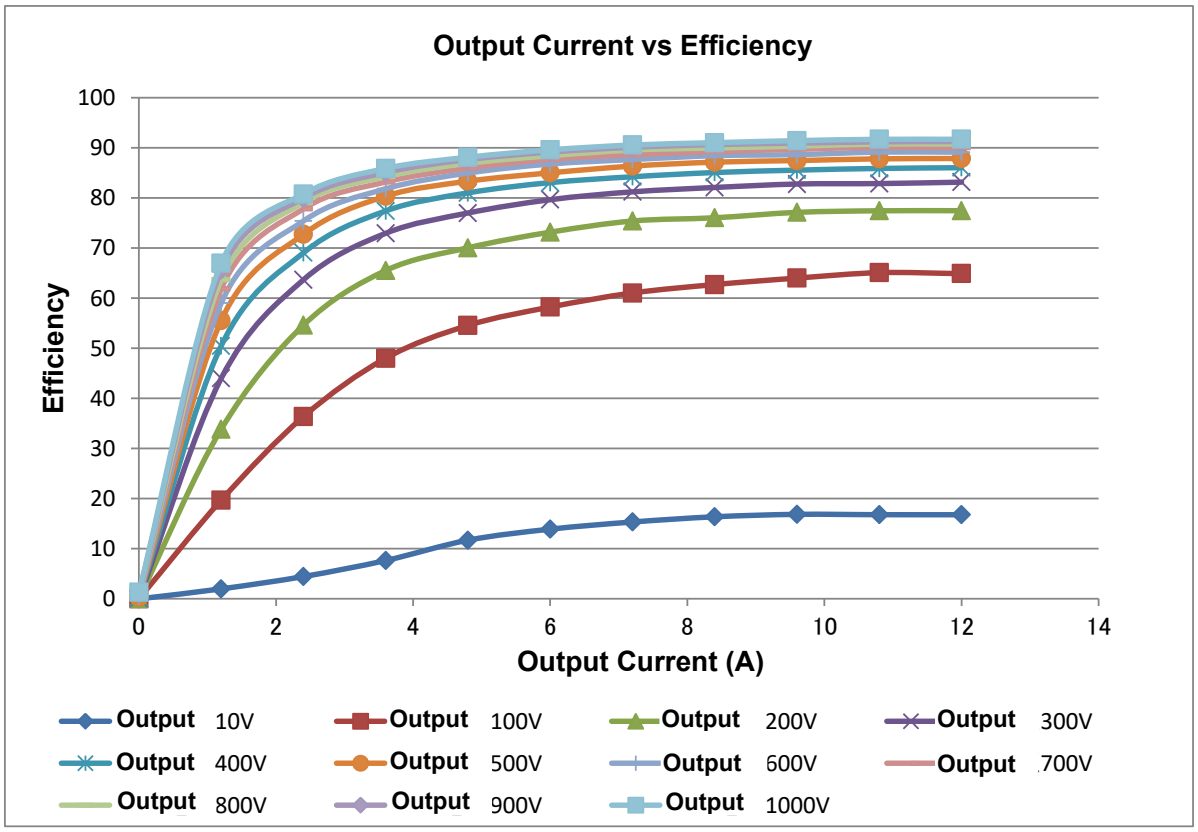
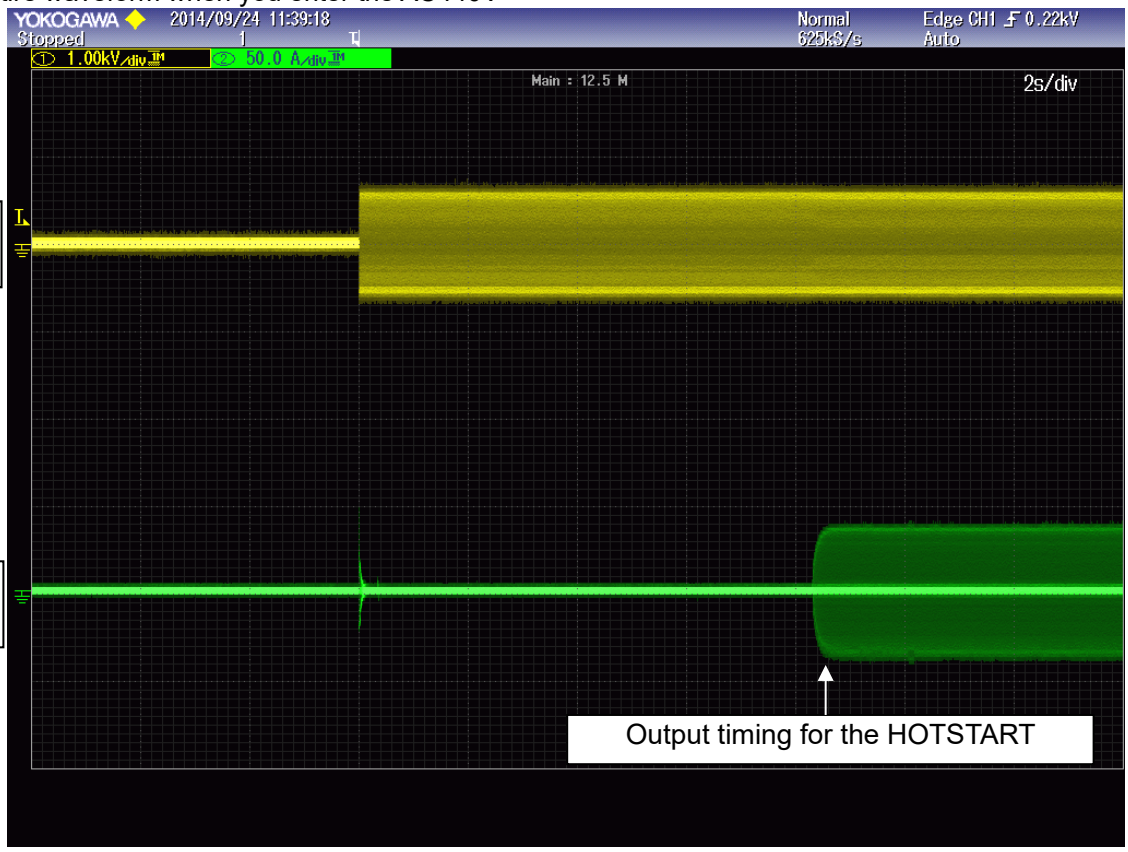


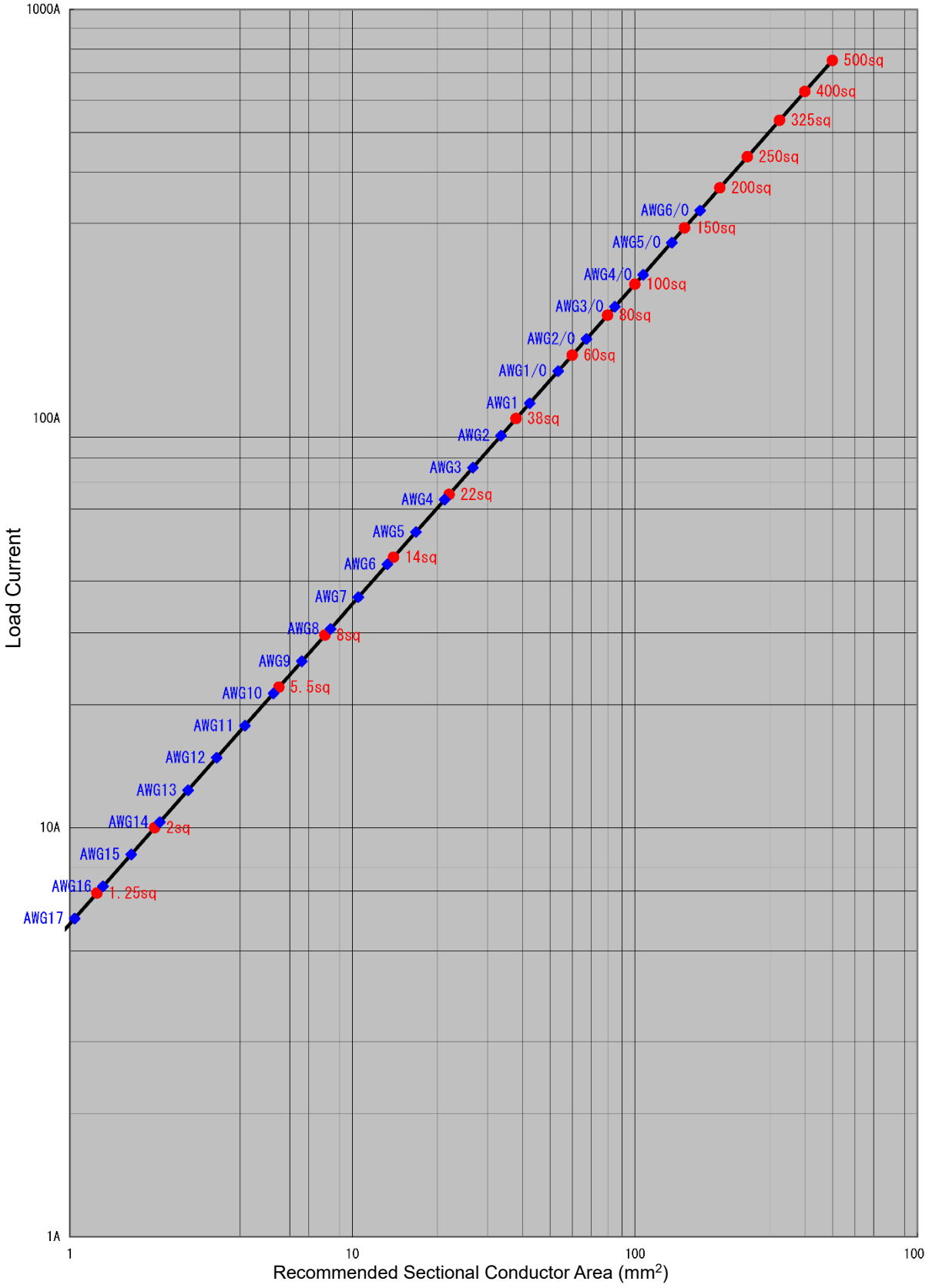
Appendix 3 Rush Current Wave Form

・The entire waveform when you enter the AC440V

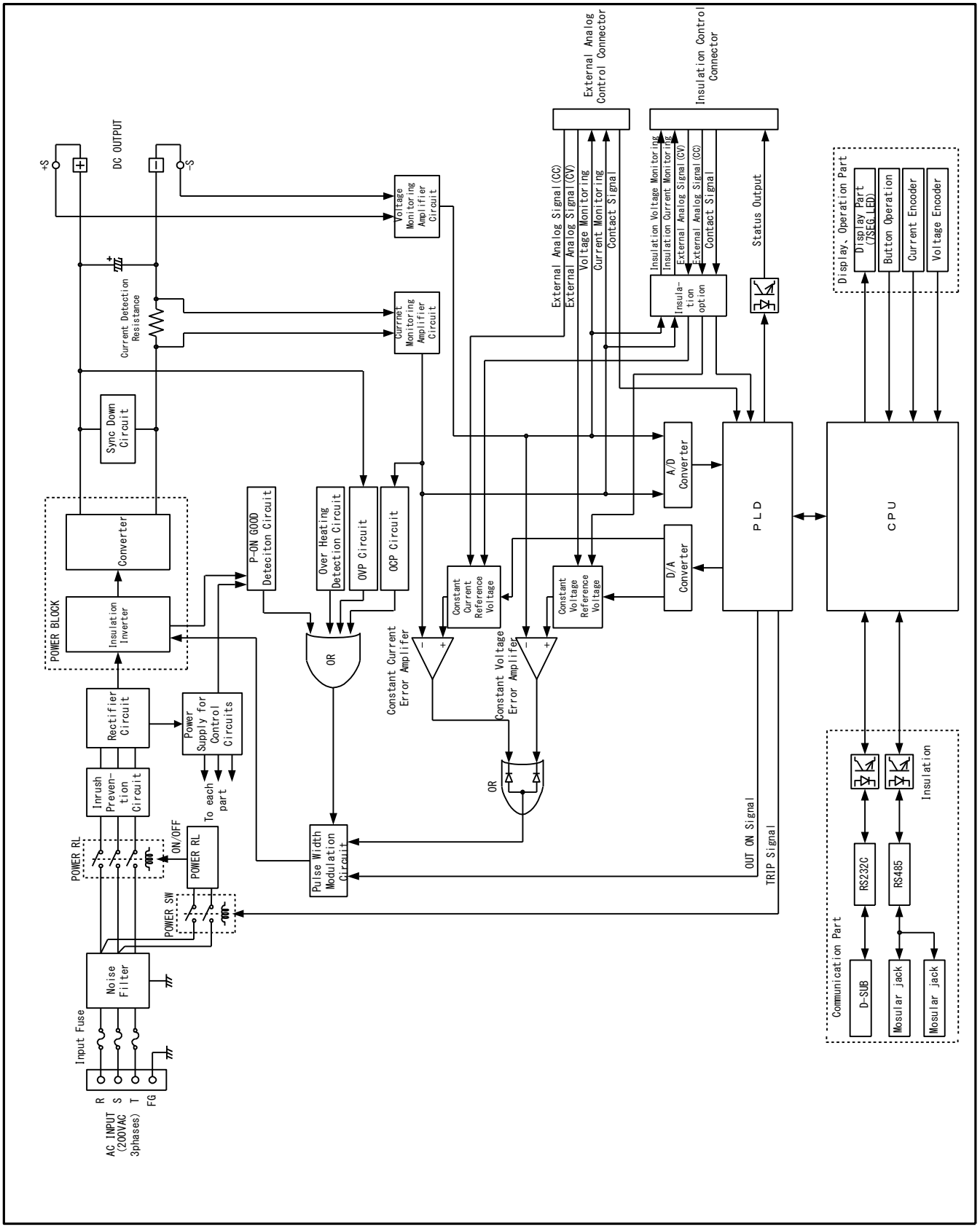


・The expansion waveform when you enter the AC440V

Appendix 4 Loaded Current vs Recommended Conductor Area



Appendix 5 Circuit Block Diagram



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