

User Manual

HMR Series

ATE System DC Power Supplies



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Compliance Information

1.1 EMC

1.1.1 EC Declaration of Conformity - EMC

Compliance was demonstrated to the following specifications listed in the Official Journal of the European Communities: EMC Directive 2014/30/EU.

EN 61000-3-2: 2006 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3: 1995+A1: 2001+A2: 2005 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

EN 61000-4-2 / -3 / -4 / -5 / -6 / -11 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques:

- Electrostatic discharge immunity test
- Radiated, radio-frequency, electromagnetic field immunity test
- Electrical fast transient/burst immunity test
- Surge immunity test
- Immunity to conducted disturbances, induced by radio-frequency fields
- Voltage dips, short interruptions and voltage variations immunity tests

EN 61326-1: 2006 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

1.2 Safety

1.2.1 EC Declaration of Conformity - Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive: 2006/95/EC.

EN61010-1: 2001 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

1.3 IEC Measurement Category & Pollution Degree Definitions

Measurement Category (CAT) - classification of testing and measuring circuits according to the types of mains circuits to which they are intended to be connected.

Measurement Category other than II, III, or IV: circuits that are not directly connected to the mains supply.

Measurement Category II (CAT II): test and measuring circuits connected directly to utilization points (socket outlets and similar prints) of the low-voltage mains installation.

Measurement Category III (CAT III): test and measuring circuits connected to the distribution part of a building's low-voltage mains installation.

Measurement Category IV (CAT IV): test and measuring circuits connected at the source of the building's low-voltage mains installation.

Mains Isolated: is for measurements performed on circuits not directly connected to a mains supply.

Pollution - addition of foreign matter, solid, liquid, or gaseous (ionized gases) that may produce a reduction of dielectric strength or surface resistivity.

Pollution Degree 2 (P2) - only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

1.4 Product End-of-Life Handling

The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product to an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This product is subject to Directive 2012/19/EU of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product.

1.5 Terms and Symbols

1.5.1 Terms

CAUTION

A caution statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.

WARNING

A warning statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.

NOTICE

A note statement calls attention to an operating procedure, practice, or condition, which, should be noted before proceeding.

1.5.2 Symbols



WARNING - HIGH VOLTAGE - possibility of electric shock.



CAUTION – Statements or instructions that must be consulted in order to find out the nature of the potential hazard and any actions which must be taken.



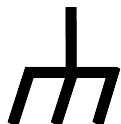
On (Supply). This is the AC mains connect/disconnect switch on the front of the instrument.



Off (Supply). This is the AC mains connect/disconnect switch on the front of the instrument.



Alternating current



Chassis (earth ground) symbol



Earth (ground) TERMINAL - Refer to the instructions accompanying this symbol in this manual.

Safety Notices

The following safety precautions apply to both operating and maintenance personnel and must be followed during all phases of operation, service, and repair of this instrument.

Before applying power to this instrument:

1. Read and understand the safety and operational information in this manual.
2. Apply all the listed safety precautions.
3. Verify that the voltage selector at the line power cord input is set to the correct line voltage. Operating the instrument at an incorrect line voltage will void the warranty.
4. Make all connections to the instrument before applying power.
5. Do not operate the instrument in ways not specified by this manual or by B&K Precision.

Failure to comply with these precautions or with warnings elsewhere in this manual violates the safety standards of design, manufacture, and intended use of the instrument. B&K Precision assumes no liability for a customer's failure to comply with these requirements.

2.1 Electrical Power

This instrument is intended to be powered from a CATEGORY II mains power environment. The mains power should be 115 V RMS or 230 V RMS. Use only the power cord supplied with the instrument and ensure it is appropriate for your country of use.



Do not use this instrument in an electrical environment with a higher category rating than what is specified in this manual for this instrument.



You must ensure that each accessory you use with this instrument has a category rating equal to or higher than the instrument's category rating to maintain the instrument's category rating. Failure to do so will lower the category rating of the measuring system.

2.2 Ground the Instrument

 WARNING

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical safety ground. This instrument is grounded through the ground conductor of the supplied, three-conductor AC line power cable. The power cable must be plugged into an approved three-conductor electrical outlet. The power jack and mating plug of the power cable meet IEC safety standards.

 WARNING

Do not alter or defeat the ground connection. Without the safety ground connection, all accessible conductive parts (including control knobs) may provide an electric shock. Failure to use a properly-grounded approved outlet and the recommended three-conductor AC line power cable may result in injury or death.

 WARNING

Unless otherwise stated, a ground connection on the instrument's front or rear panel is for a reference of potential only and is not to be used as a safety ground. Do not operate in an explosive or flammable atmosphere.

2.3 Environmental Conditions

This instrument is intended to be used in an indoor pollution degree 2 environment. The operating temperature range is 0°C to 40°C and 20% to 80% relative humidity, with no condensation allowed.

Measurements made by this instrument may be outside specifications if the instrument is used in non-office-type environments. Such environments may include rapid temperature or humidity changes, sunlight, vibration and/or mechanical shocks, acoustic noise, electrical noise, strong electric fields, or strong magnetic fields.



Do not operate the instrument in the presence of flammable gases or vapors, fumes, or finely-divided particulates.

The instrument is designed to be used in office-type indoor environments. Do not operate the instrument:

- **In the presence of noxious, corrosive, or flammable fumes, gases, vapors, chemicals, or finely-divided particulates.**
 - **In relative humidity conditions outside the instrument's specifications.**
 - **In environments where there is a danger of any liquid being spilled on the instrument or where any liquid can condense on the instrument.**
 - **In air temperatures exceeding the specified operating temperatures.**
 - **In atmospheric pressures outside the specified altitude limits or where the surrounding gas is not air.**
 - **In environments with restricted cooling air flow, even if the air temperatures are within specifications.**
 - **In direct sunlight.**
-



2.4 Do not operate instrument if damaged

** WARNING**

If the instrument is damaged, appears to be damaged, or if any liquid, chemical, or other material gets on or inside the instrument, remove the instrument's power cord, remove the instrument from service, label it as not to be operated, and return the instrument to B&K Precision for repair. Notify B&K Precision of the nature of any contamination of the instrument.

** WARNING**

Hazardous voltages may be present in unexpected locations in circuitry being tested when a fault condition in the circuit exists.

2.5 Clean the instrument only as instructed

** WARNING**

Do not clean the instrument, its switches, or its terminals with contact cleaners, abrasives, lubricants, solvents, acids/bases, or other such chemicals. Clean the instrument only with a clean dry lint-free cloth or as instructed in this manual. Not for critical applications.

2.6 Do not touch live circuits

** WARNING**

Instrument covers must not be removed by operating personnel. Component replacement and internal adjustments must be made by qualified service-trained maintenance personnel who are aware of the hazards involved when the instrument's covers and shields are removed. Under certain conditions, even with the power cord removed, dangerous voltages may exist when the covers are removed.

To avoid injuries, always disconnect the power cord from the instrument, disconnect all other connections (for example, test leads, computer interface cables, etc.), discharge all circuits, and verify there are no hazardous voltages present on any conductors by measurements with a properly-operating voltage-sensing device before touching any internal parts. Verify the voltage-sensing device is working properly

before and after making the measurements by testing with known-operating voltage sources and test for both DC and AC voltages.

Do not attempt any service or adjustment unless another person capable of rendering first aid and resuscitation is present.

2.7 General Safety



Do not insert any object into an instrument's ventilation openings or other openings.



This instrument is not authorized for use in contact with the human body or for use as a component in a life-support device or system.

2.8 Servicing

⚠ WARNING

Do not substitute parts that are not approved by B&K Precision or modify this instrument. Return the instrument to B&K Precision for service and repair to ensure that safety and performance features are maintained.

⚠ WARNING

Fuse replacement must be done by qualified service-trained maintenance personnel who are aware of the instrument's fuse requirements and safe replacement procedures. Disconnect the instrument from the power line before replacing fuses. Replace fuses only with new fuses of the fuse types, voltage ratings, and current ratings specified in this manual or on the back of the instrument. Failure to do so may damage the instrument, lead to a safety hazard, or cause a fire. Failure to use the specified fuses will void the warranty.

2.9 For continued safe use of the instrument

- Do not place heavy objects on the instrument.
- Do not obstruct cooling air flow to the instrument.
- Do not place a hot soldering iron on the instrument.
- Do not pull the instrument with the power cord, connected probe, or connected test lead.
- Do not move the instrument when a probe is connected to a circuit being tested.

Introduction

3.1 Overview

The HMR Series 10 kW/18 kW multi-range DC power supplies provide dependable performance for ATE applications requiring a wide output voltage and current in a compact 3U form factor. Unlike conventional fixed-range power supplies, multi-range (autoranging) operation enables the HMR Series to deliver maximum power at multiple voltage/current combinations.

Integrators will benefit from fast command response times and low noise characteristics. Additionally, the wide AC input range simplifies installation. The HMR Series incorporates SiC MOSFETs, which deliver lower on-resistance, reduced switching losses, and superior thermal performance compared to traditional silicon (Si) FETs. This advanced design results in higher overall performance, improved efficiency, and increased reliability.

The large touchscreen display combined with dedicated rotary knobs and an output on/off button offer intuitive front panel control. The HMR Series also supports USB and LXI compliant LAN interfaces for remote PC control and programming. Optional GPIB and analog interface modules are user-installable.

Model	Max. Output Voltage	Max. Output	Max. Output Power
HMR80360	80 V	360 A	10 kW
HMR65046	650 V	46 A	10 kW
HMR130023	1300 V	23 A	10 kW
HMR500108	500 V	108 A	18 kW
HMR195027	1950 V	27 A	18 kW

Table 3.1 HMR Series Models

3.2 Features

- Multi-range operation, capable of replacing multiple fixed range power supplies
- Output up to 1950 V or 360 A
- Compact 3U form factor
- 10 kW and 18 kW models available
- Master/Slave mode operation provides up to 1.8 MW with 100 units connected in parallel
- Configurable internal resistance to simulate the output of a battery
- Overvoltage (OVP), overcurrent (OCP), overpower (OPP), overtemperature (OTP) protection, and key-lock
- Adjustable voltage and current slope (rise and fall time)
- Save/recall up to 16 list mode programs with up to 500 steps each
- Standard LAN (LXI-compliant) and USB interfaces
- User installable GPIB and analog interfaces optional
- Wide range AC input support (200 to 415 VAC)

3.3 Package Contents

Please inspect the instrument mechanically and electrically upon receiving it. Unpack all items from the shipping carton, and check for any obvious signs of physical damage that may have occurred during transportation. Report any damage to the shipping agent immediately. Save the original packing carton for possible future reshipment. Every power supply is shipped with the following contents:

- 1 x HMR Series DC Power Supply
- 1 x AC Input Cover Assembly
- 1 x Output Protection Cover
- 1 x Ethernet Cable
- 1 x Certificate of Calibration

NOTICE

Verify that all items above are included in the shipping container. If anything is missing, please contact B&K Precision.

3.4 Dimensions

The HMR Series dimensions are approximately.

Model	Dimensions (W x H x D)	Weight
HMR80360	440 x 132 x 660 mm	34.8 kg (76.8 lbs)
HMR65046	440 x 132 x 660 mm	36.3 kg (80.1 lbs)
HMR130023	440 x 132 x 660 mm	34.8 kg (76.8 lbs)
HMR500108	440 x 132 x 660 mm	36.3 kg (80.1 lbs)
HMR195027	440 x 132 x 660 mm	43.6 kg (96.2 lbs)

Table 3.2 Dimensions and Weight

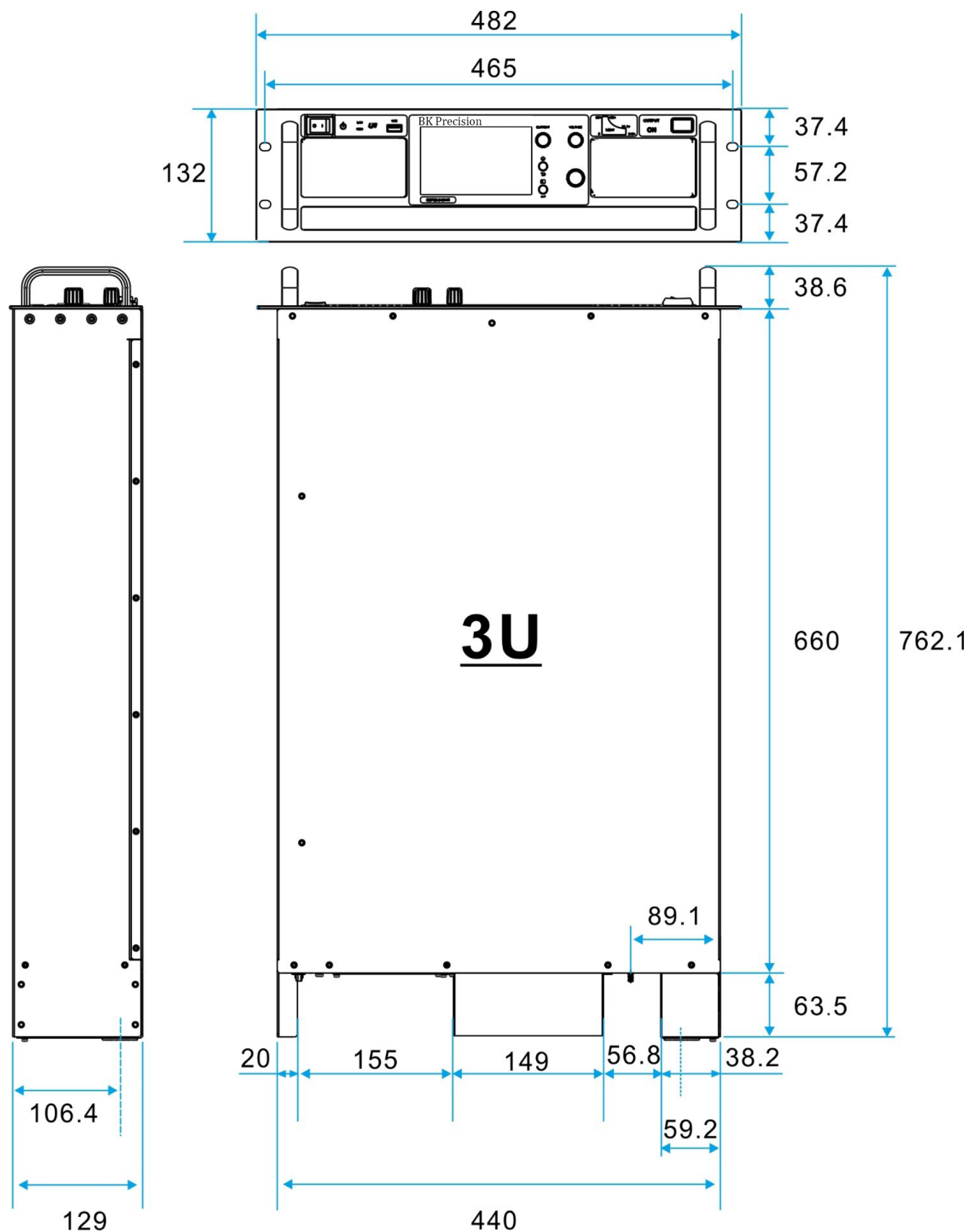


Figure 3.1 HMR Series Dimensions

3.5 Front Panel Overview

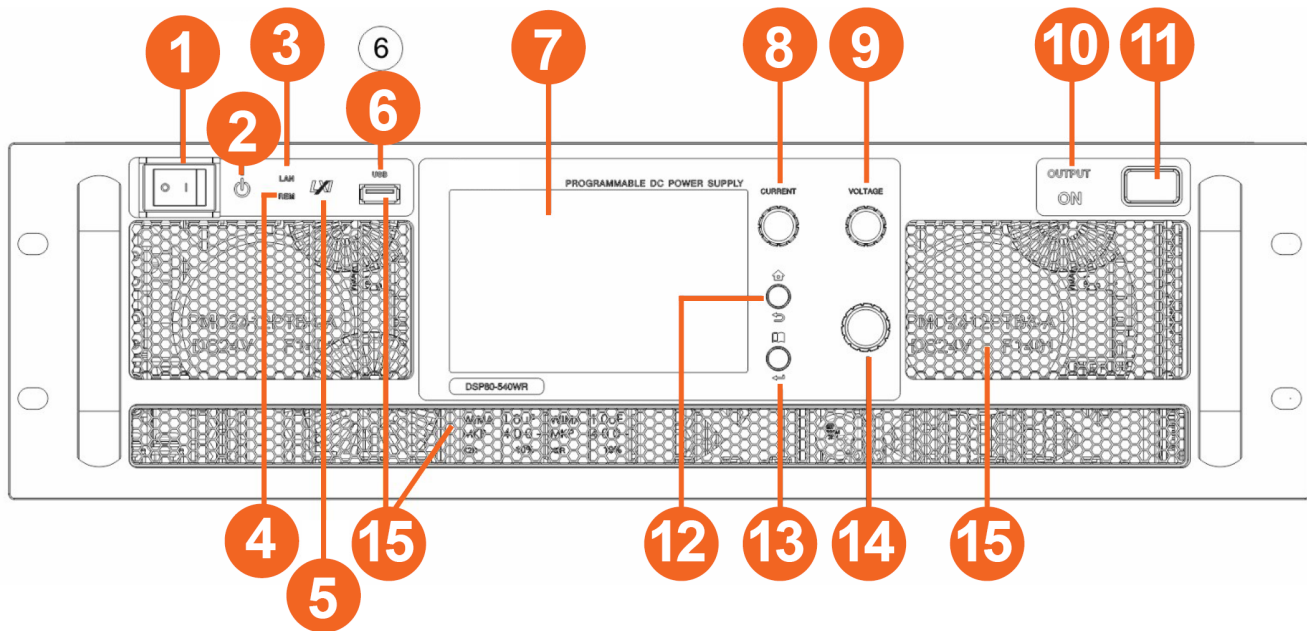


Figure 3.2 Front Panel Overview

Item	Name	Description
1	Power Switch	Main power ON/OFF switch (O = OFF, I = ON).
2	Power Indicator	Lights up when the unit is powered on.
3	LAN / REM Indicators	Indicates LAN connection status and Remote control state.
4	LXI Logo	Indicates the instrument is LXI compliant.
5	Output Indicators	Status LEDs for CV, CC, CP modes and Error conditions.
6	USB Host	Port for USB flash drives (Sequence uploading/Firmware update).
7	Touch Screen	5-inch color touch display for settings and monitoring.
8	Current Knob	Rotary knob for adjusting current settings.
9	Voltage Knob	Rotary knob for adjusting voltage settings.
10	Output Indicator	Lights up when the output is active.
11	Output ON/OFF	Button to enable or disable the power output.
12	HOME / RETURN	Multi-function key to return to the previous menu or Home screen.
13	MENU / ENTER	Accesses the setting menu or confirms selections.
14	Power / Edit Knob	Multi-function knob for adjusting power or navigating menus.
15	Air Intake	Ventilation intake. Keep clear of obstructions.

Table 3.3 Front Panel Overview

3.6 Rear Panel Overview

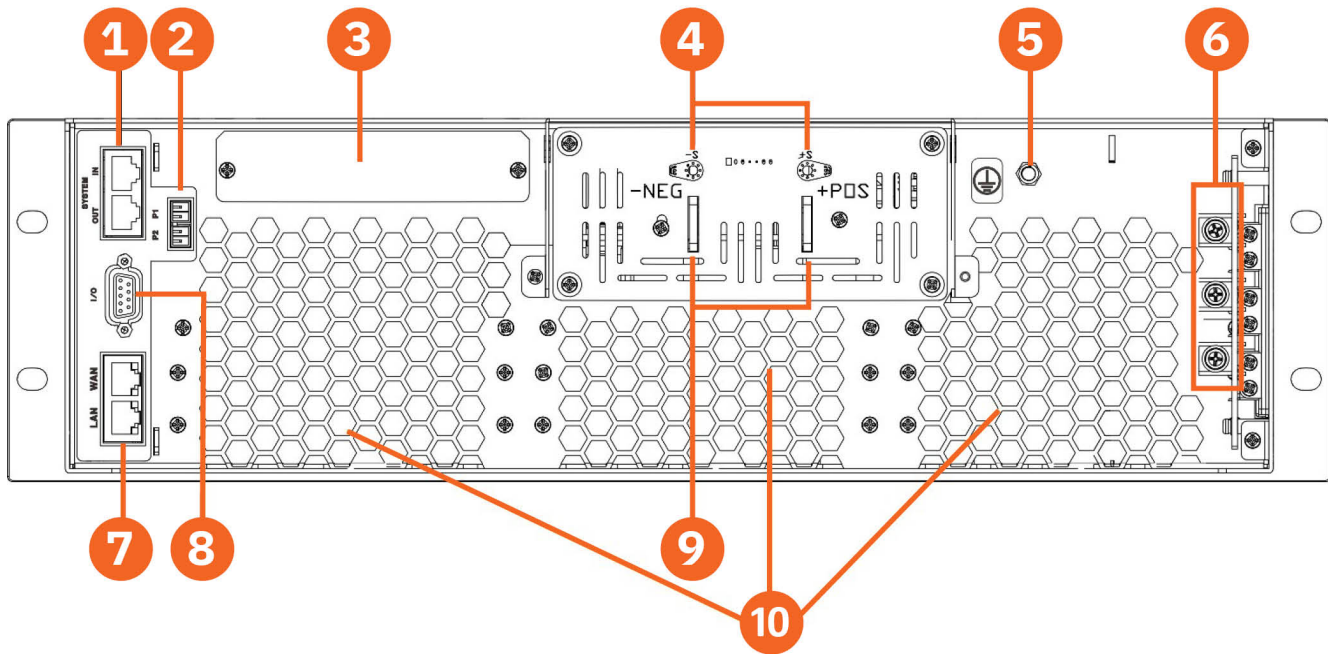


Figure 3.3 Rear Panel Overview

Item	Name	Description
1	System IN/OUT	Connects to instruments to achieve synchronization or parallel operation.
2	Current Sharing	P1/P2 connectors used for current sharing when operating two or more units in parallel.
3	Optional Interface	Slot for installing optional GPIB or Analog interface modules.
4	Remote Sense	Sense lines used to compensate for voltage drops due to test leads.
5	Ground Terminal	Chassis ground connection point.
6	AC Input	Terminal used to connect external 3-phase AC power to the instrument (200–415 VAC).
7	WAN/LAN Interface	Built-in 2 ports HUB (LXI compliant) for remote control and parallel unit connection.
8	J1 Auxiliary Control	Digital I/O for Interlock, External ON/OFF, Shut OFF, and Alarm signal output.
9	Output Bus Bars	Large bus bar terminals for DC output connection.
10	Air Vents	Exhaust vents for the integrated cooling fans. Do not block.

Table 3.4 Rear Panel Overview

Installation

4.1 Input Wiring

All HMR Series models operate with 3-phase AC mains power. Identical phase current keeps the AC mains system balanced. The operation voltage range 3-phase AC 180V~460V meets worldwide power distribution regulations.



WARNING

To minimize shock hazard, the product chassis must be connected to an electrical ground. AC mains connections must be made by a qualified electrician. Any interruption of the earth ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

4.1.1 AC Input Connection

AC mains power cable is not provided with the power supply. It is required to install a circuit breaker between the AC mains and the unit. Keep the AC mains cables as short as possible to reduce impedance and voltage drop.

Unit Power	AC Input	L1/L2/L3 Max Current	Wire Size	Circuit
10 kW	200V	34A	8.0 mm ² (8 AWG)	50A
	415V	17A	3.5 mm ² (12 AWG)	25A
18 kW	200V	60A	22 mm ² (4 AWG)	80A
	415V	30A	5.5 mm ² (10 AWG)	40A

Table 4.1 Recommended AC Input Wire Size

4.1.2 Input Wiring Procedure

- Step 1.** Insert the L1, L2, and L3 lines through the AC input cover.
- Step 2.** Install M5 Ring-type terminals to L1, L2, L3 lines.
- Step 3.** Fasten the terminals to the input block using M5x12L screws.
- Step 4.** Connect the Ground wire to the chassis ground screw using an M5 stainless hex nut, spring washer, and flat washer.
- Step 5.** Secure the input protective cover to the rear panel using the provided M3 screws.

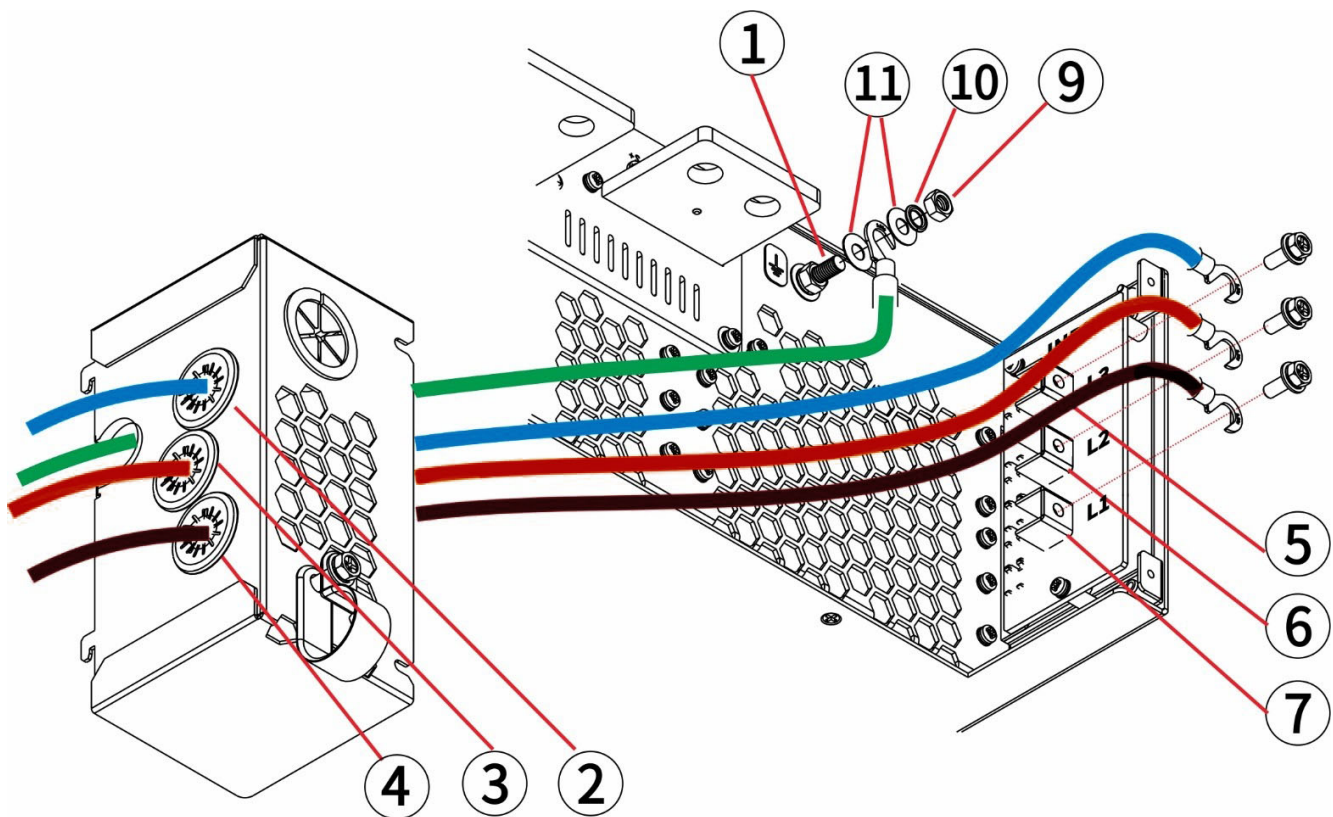


Figure 4.1 AC Input Wiring Diagram

4.2 Output Terminals and Wiring

⚠ WARNING

The output voltage of this series can reach up to 1950V. Ensure that all terminals, load wiring, and load connections are insulated or covered to prevent accidental contact. Power off the unit and switch off the circuit breaker before proceeding with output wiring.

4.2.1 Output Connection (HMR65046, HMR130023, HMR500108, HMR195027)

This section applies to models with output voltages $\geq 250V$.

Step 1. Use M8x20L hex head cap screws.

Step 2. Place the wire terminal against the bus bar.

Step 3. Sequence: Screw → Washer → Terminal → Bus Bar → Washer → Spring Washer → Nut.

Step 4. Ensure the flat side of the terminal faces the copper bar.

Step 5. Install the output protective cover using the M3 screws provided.

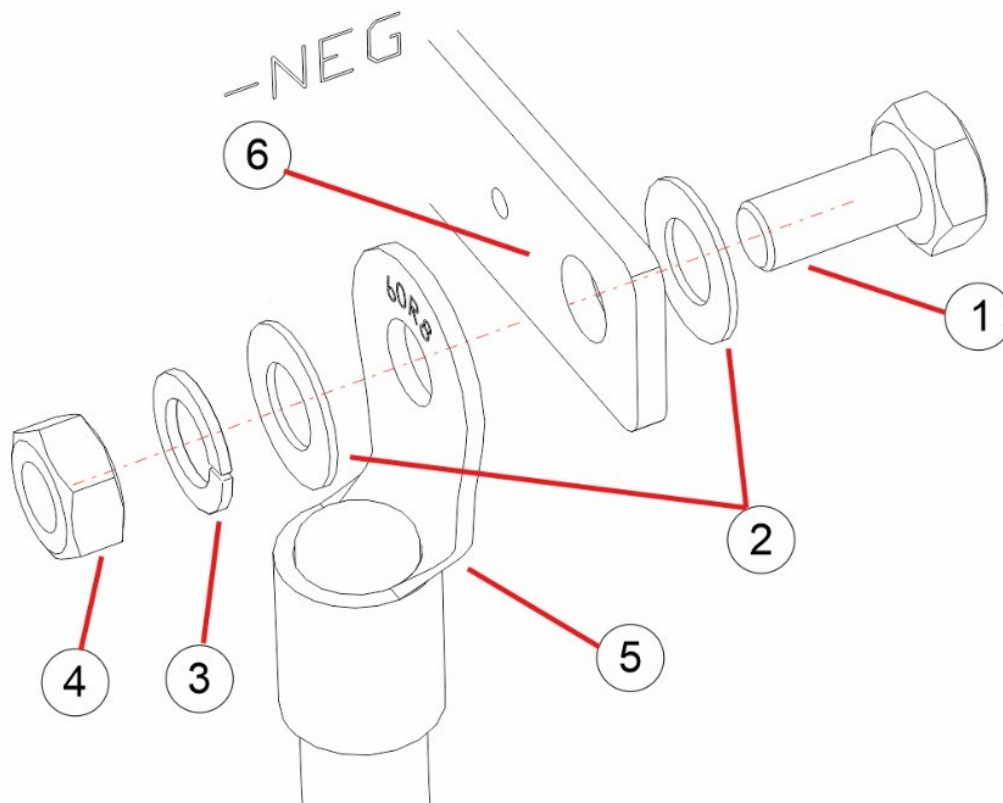


Figure 4.2 Output Connection (High Voltage Models)

4.2.2 Output Connection (HMR80360)

This section applies to the 80V High Current model.

Step 1. Use M10x20L hex head cap screws.

Step 2. Sequence: Screw → Washer → Terminal → Bus Bar → Washer → Spring Washer → Nut.

Step 3. For high currents (360A), it is recommended to use 2 pieces of wire per polarity (e.g., 100mm²) to minimize voltage drop and heating.

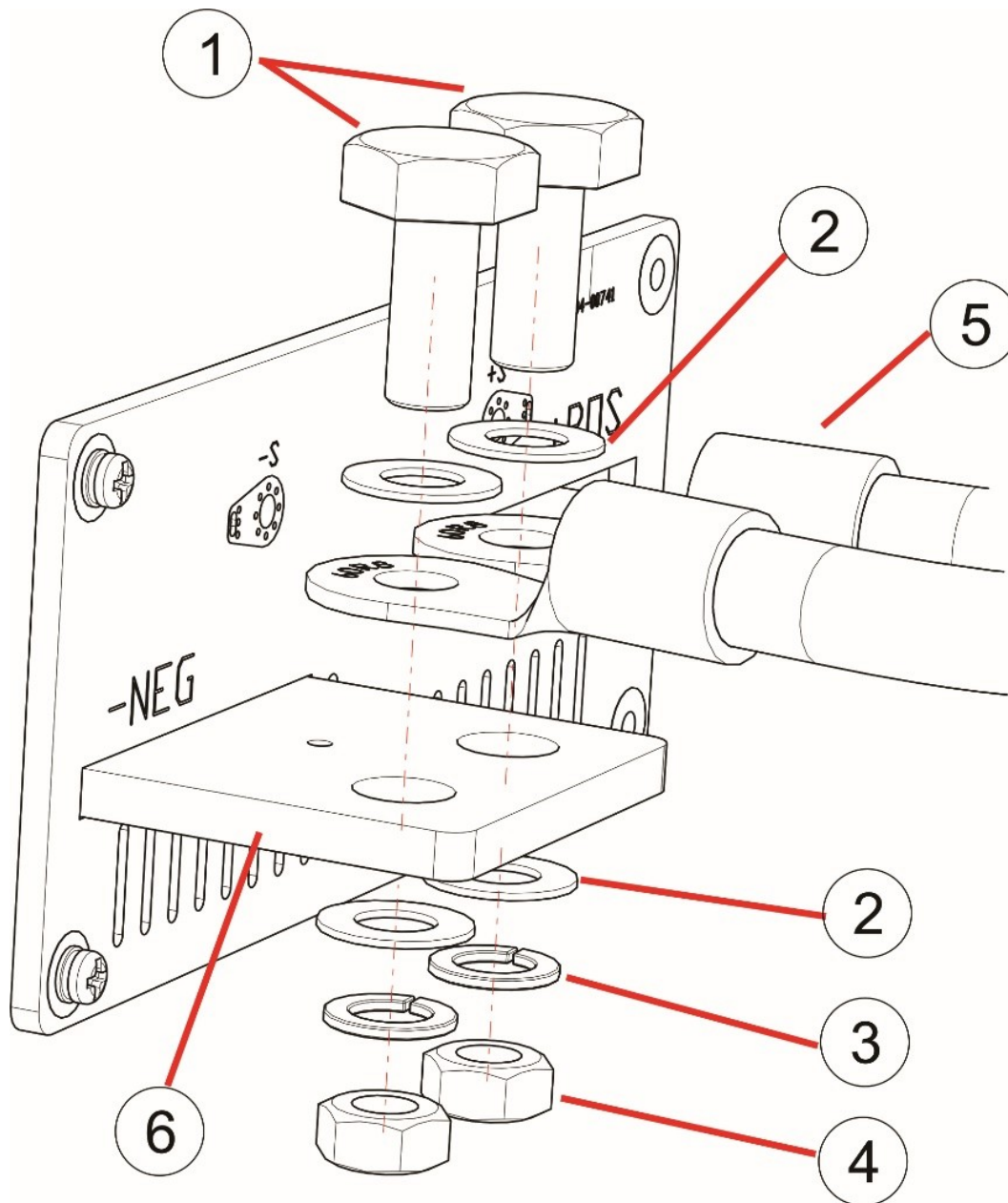


Figure 4.3 Output Connection (HMR80360)

4.2.3 Output Wire Sizing

AWG	Area (mm ²)	Max Current (60°C)	Max Current (75°C)
2/0	67.4	145 A	175 A
4/0	107	195 A	230 A
250 MCM	127	215 A	255 A
350 MCM	177	260 A	310 A

Table 4.2 Recommended DC Output Wire Size

4.3 Load Connection

The output of the unit is floating; either positive or negative can be connected to ground if required. Maximum isolation voltage varies by model (refer to specifications).

4.3.1 Connecting Single and Multiple Loads

To minimize wiring impedance, keep wires as short as possible. Twisting the Positive and Negative load wires reduces inductance and noise pickup.

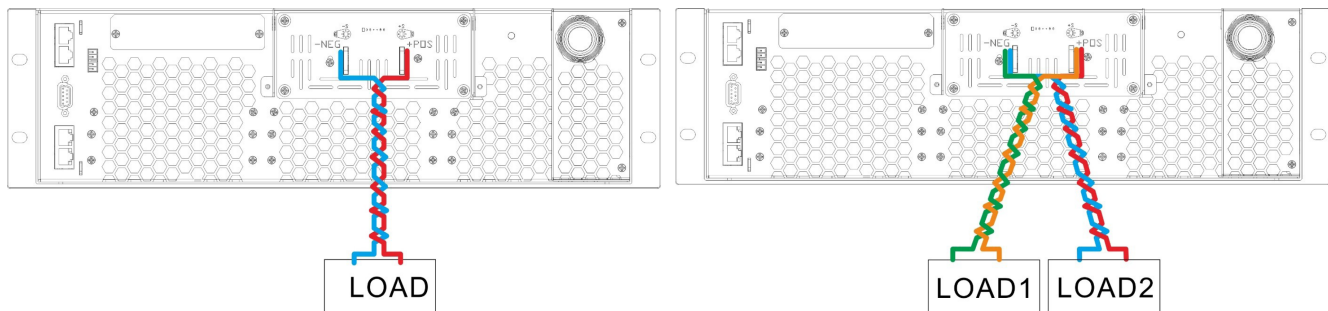


Figure 4.4 Proper Load Connection



Do not distribute power from one load device to another (Daisy-chaining loads). Always connect each load directly to the power supply output terminals to ensure proper regulation and safety.

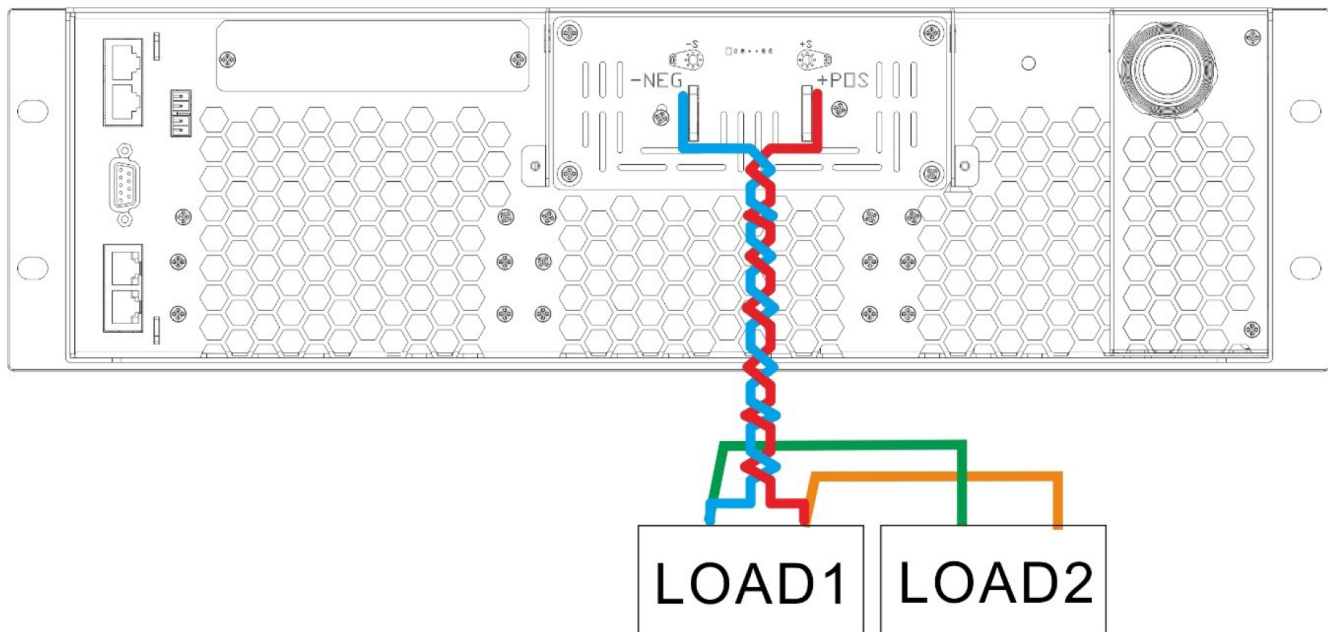


Figure 4.5 Improper Load Connection

4.4 Protection of Power Supply

When connecting loads with specific characteristics (inductive, battery, etc.), additional protection components are required to prevent damage to the HMR power supply.

4.4.1 Freewheeling Diode

For a load with high electric inductance or with a frequent operation cycle, it is recommended to add a freewheeling diode close to the load leads to protect the DC power supply unit.

- **Nominal Voltage:** 1.2 times higher than the output rating voltage of the HMR unit.
- **Nominal Current:** 1.2 times higher than the total output current of the HMR unit (rating current of single unit $\times$ numbers in parallel).

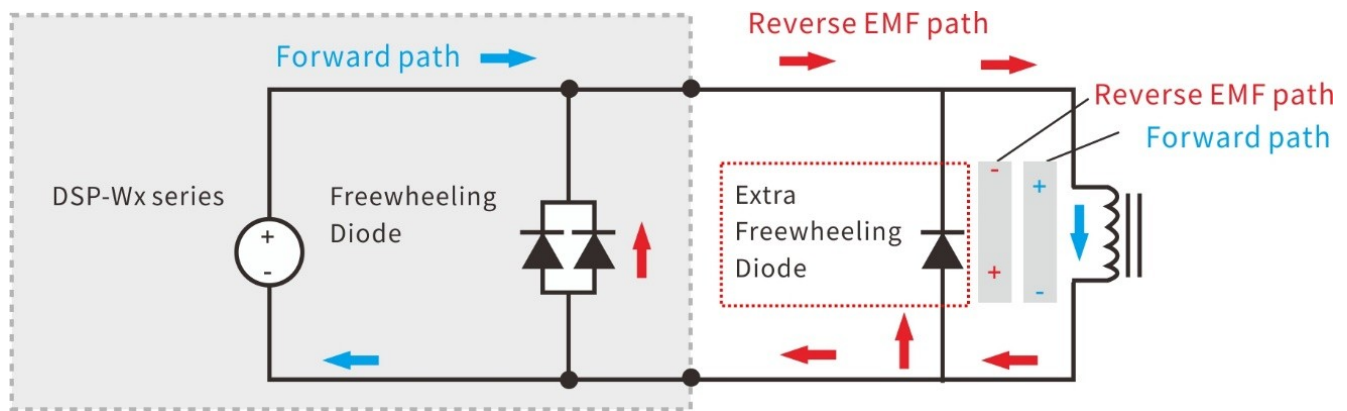


Figure 4.6 Freewheeling Diode Connection

4.4.2 Reverse Diode

For a load with energy storage characteristics over a certain period of time (such as battery charging, inductive load, high capacitance load), it is recommended to add a reverse diode close to the load leads to protect the HMR power supply unit.

- **Nominal Voltage:** 1.2 times higher than the maximum output voltage of the HMR unit.
- **Nominal Current:** 1.2 times higher than the total output current of the HMR unit.

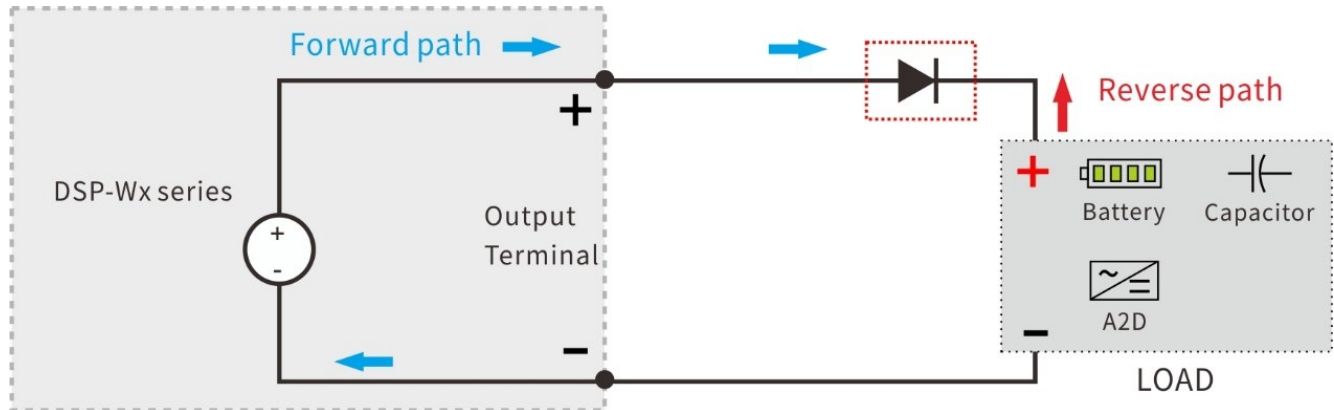


Figure 4.7 Reverse Diode Connection

4.4.3 Freewheeling Diode and Reverse Diode

For a load with motor characteristics, it is recommended to connect in series both a reverse diode and a freewheeling diode close to the load leads to protect the HMR power supply unit.

- **Nominal Voltage:** 1.2 times higher than the maximum output voltage of the HMR unit.
- **Nominal Current:** 1.2 times higher than the total output current of the HMR unit.

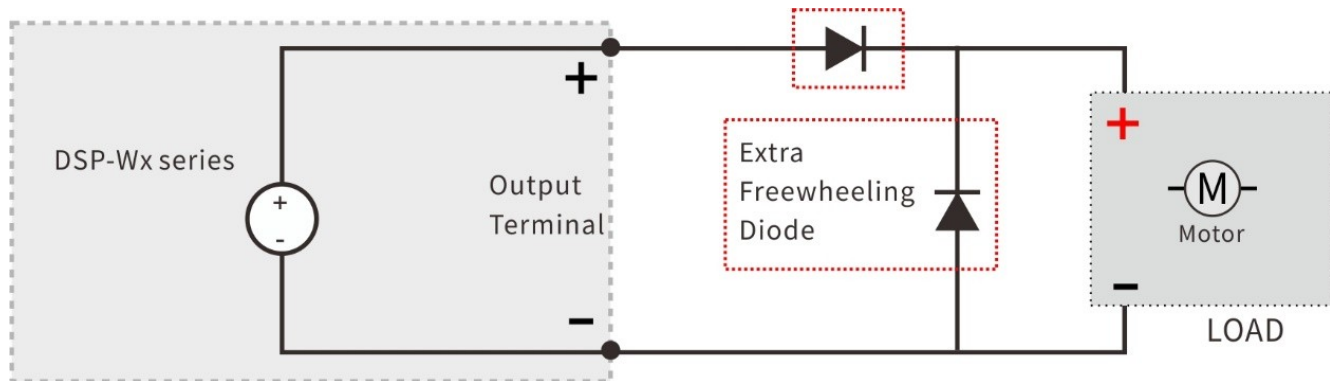


Figure 4.8 Motor Load Protection

4.4.4 Reverse Diode and Discharge Circuit

For a load with energy storage characteristics over a period of time (such as battery charging, inductive load, high capacitance load) and with remote sensing function, it is recommended to connect in series a reverse diode close to the load leads and add a discharge circuit to protect the power supply unit as well.

- **Nominal Voltage:** 1.2 times higher than the maximum output voltage of the HMR unit.
- **Nominal Current:** 1.2 times higher than the total output current of the HMR unit.

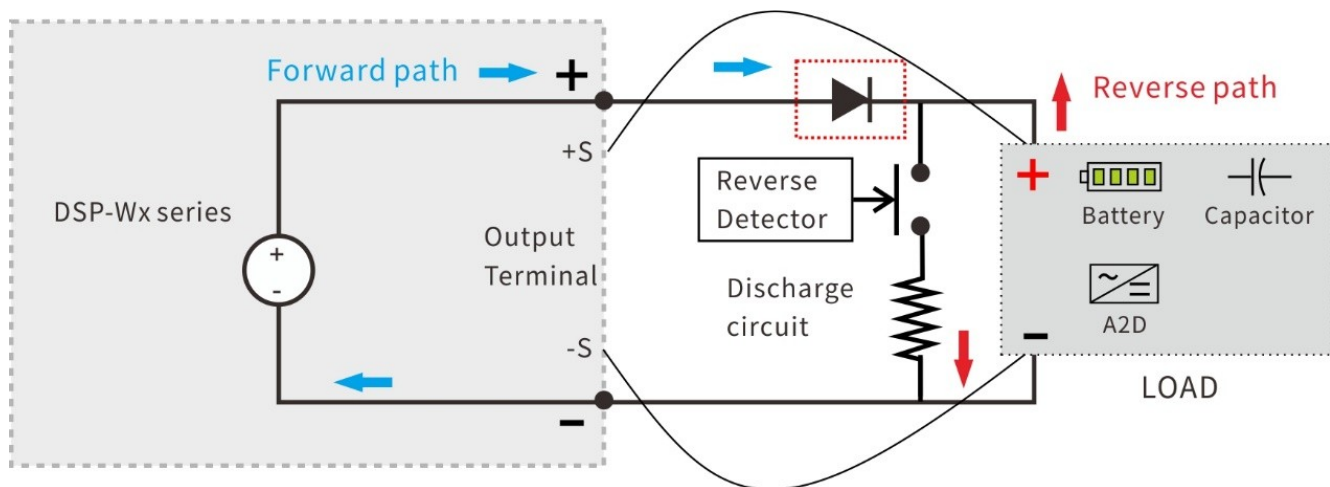


Figure 4.9 Reverse Diode with Discharge Circuit

4.4.5 Long Load Line

For some switching (Switching / PWM) load structures, if the output load line is long ($>20\text{cm}$), it is recommended to use twisted wire (loose twist) and connect a capacitor in parallel at the input terminal of the load to avoid unexpected oscillation.

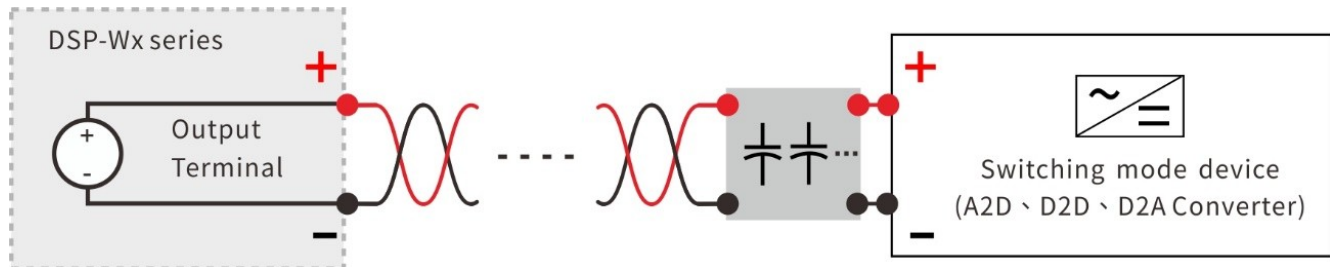


Figure 4.10 Long Load Line Protection

4.5 Maximum Ground Withstanding Voltage

The ground withstanding voltage of the output terminals varies by model. Ensure the voltage does not exceed the limits listed below to prevent damage to the unit.



Please confirm the ground withstanding voltage of the output positive and negative terminal of the model before use. If the voltage exceeds the listed withstanding voltage, it may cause damage to the HMR Series unit.

Power	Model	Output +/- Terminal
10 kW	HMR80360	750 VDC
10 kW	HMR65046	1500 VDC
10 kW	HMR130023	2000 VDC
18 kW	HMR500108	1500 VDC
18 kW	HMR195027	+POS: 3000 VDC -NEG: 2000 VDC

Table 4.3 Maximum Ground Withstanding Voltage

4.6 Remote Sense Connection

Remote sense compensates for voltage drops on the load cables (up to 5V).

Step 1. Connect the positive remote sense ($+S$) to the positive terminal of the load.

Step 2. Connect the negative remote sense ($-S$) to the negative terminal of the load.

Step 3. Use twisted pair wires for sensing to avoid noise interference.



Never short the $+S$ to $-S$, or reverse the polarity ($+S$ to $-$, $-S$ to $+$). This will damage the instrument.

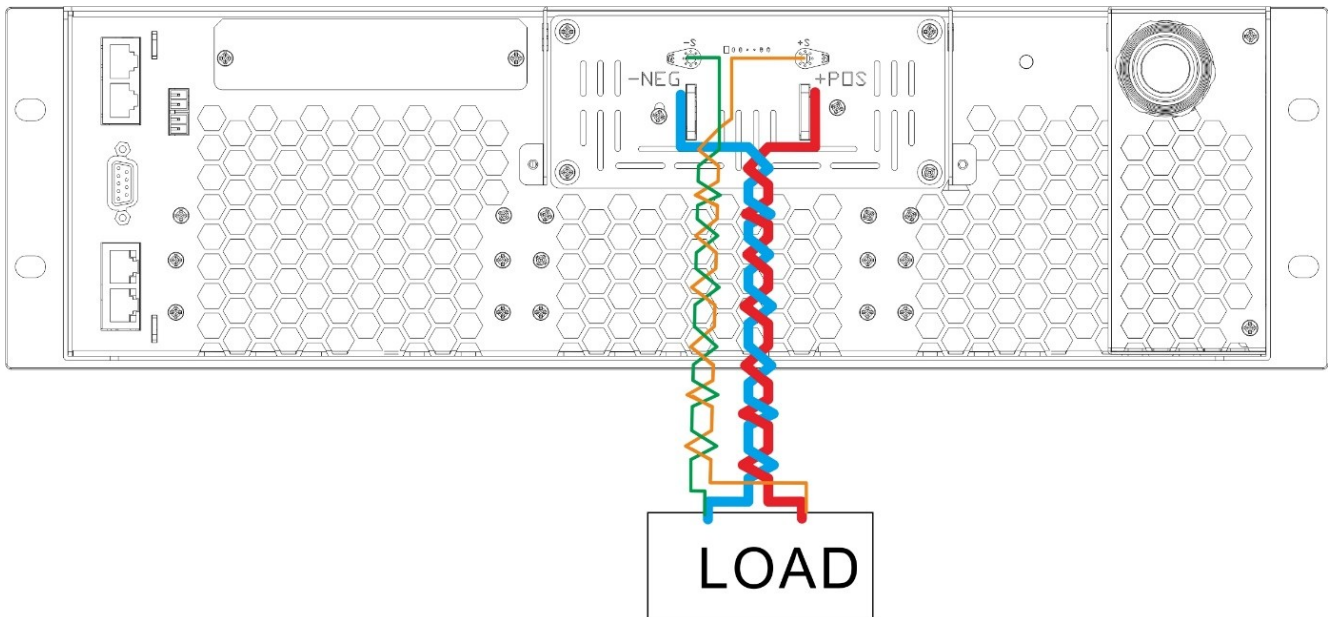


Figure 4.11 Correct Remote Sense Wiring

4.7 Parallel Wiring

The HMR Series supports parallel operation for up to 100 units.

4.7.1 Parallel Connection Steps

- Step 1.** ****Master/Slave Configuration:**** Configure one unit as Master and the others as Slaves via the front panel menu.
- Step 2.** ****System Bus:**** Connect the ****System OUT**** of the Master to the ****System IN**** of the first Slave using a standard CAT5e cable. Chain subsequent slaves.
- Step 3.** ****Current Sharing:**** Connect ****P2**** of the Master to ****P1**** of the first Slave using a twisted pair cable.
- Step 4.** ****Output Connection:**** Connect the DC outputs of all units to a common bus bar.

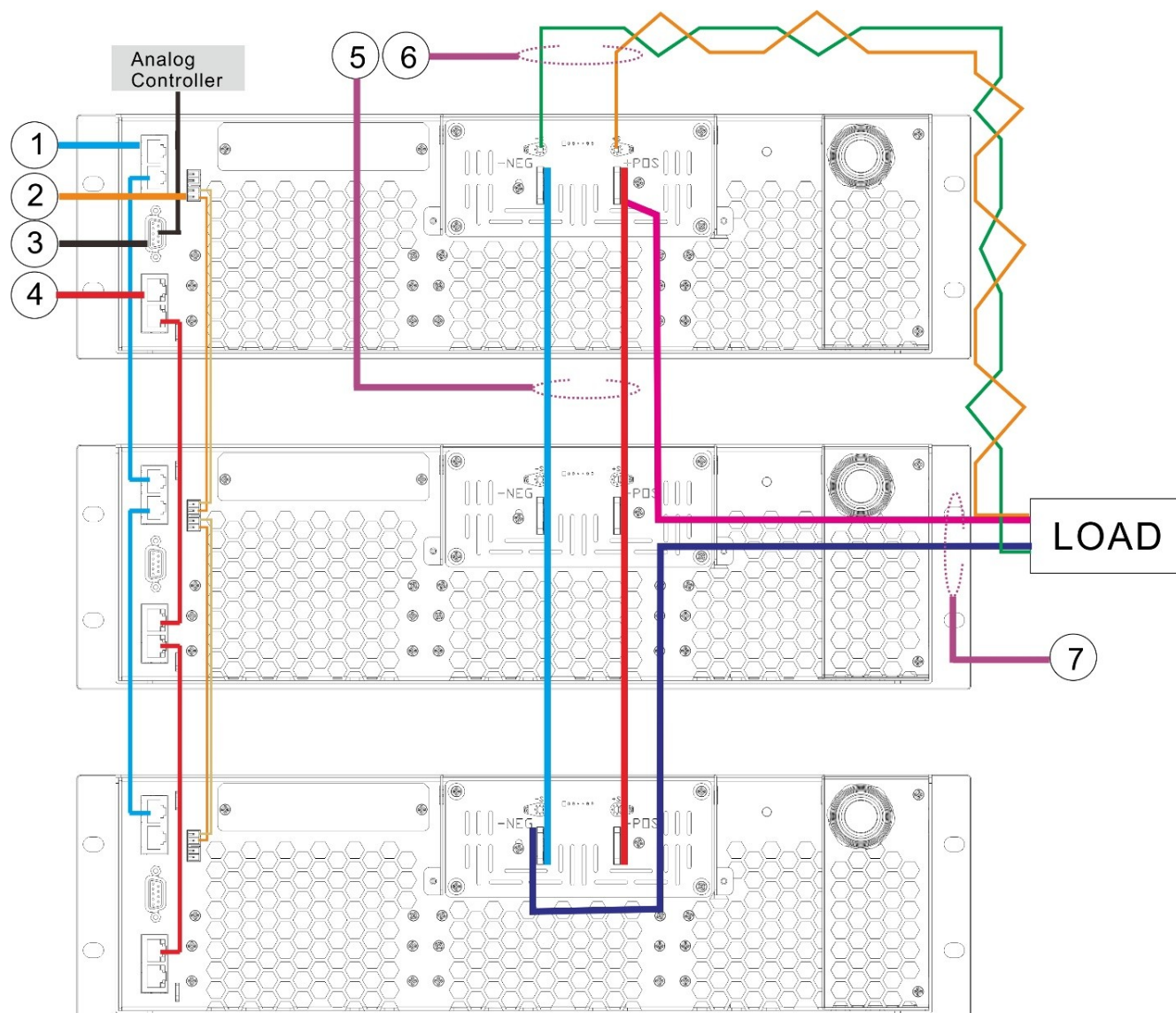


Figure 4.12 Parallel System Wiring

4.8 Series Wiring

CAUTION

The HMR Series does ****not**** support Master/Slave control for series operation. Both units must be controlled independently.

Maximum two units of the same model can be connected in series.

- Ensure total voltage does not exceed the isolation rating.
- Connect a reverse diode across the output terminals of each unit.

4.9 Rack Mounting

The HMR Series fits standard 19-inch racks.

Step 1. Install L-shaped support brackets (rails) in the rack cabinet.

Step 2. Slide the instrument onto the support rails.

Step 3. Fasten the instrument using the front panel mounting holes.

WARNING

The weight of the HMR Series exceeds 34kg (75 lbs). Two or more people are required to lift and install the unit safely.

Menu Content and Description

The HMR Series brings you a modern operation experience, with an operation style similar to modern IT products. The simplified control panel combined with a full-color touchscreen makes the instrument intuitive to use. Besides the touchscreen, you can operate the complete functions of the HMR Series using only the 2 keys and 3 knobs on the front panel.

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5.1 Voltage/Current/Power Adjusting Note

The HMR Series provides two methods for adjusting Voltage, Current, and Power (V/A/W).

5.1.1 By Knobs

Make the display show the home screen by pressing and holding the **Home** key for 1.5 seconds.

5.1.1.1 Voltage Setting

- Step 1.** Push the **Voltage** knob. The last digit of the voltage value will blink.
- Step 2.** Rotate the knob to change the value, or push the knob again to shift the blinking digit to the next adjustable digit.
- Step 3.** Press the knob to confirm, or press the return key to cancel.

5.1.1.2 Current Setting

- Step 1.** Push the **Current** knob. The last digit of the current value will blink.
- Step 2.** Rotate the knob to change the value, or push the knob again to shift the blinking digit to the next adjustable digit.
- Step 3.** Press the knob to confirm, or press the return key to cancel.

NOTICE

The Master unit controls and displays the actual values of the entire system when in parallel mode.

5.1.1.3 Power Setting

- Step 1.** Push the larger **Power/Edit** knob (without symbol). The last digit of the power value will blink.
- Step 2.** Rotate the knob to change the value, or push the knob again to shift the blinking digit to the next adjustable digit.
- Step 3.** Press the knob to confirm, or press the return key to cancel.

5.1.2 By Touchscreen

Tap the parameter icon (e.g., **Voltage**, Current) or the existing number on the screen. A numeric keypad will appear. Key in the desired value and tap **ENT** to confirm, or tap **ESC** (or press and hold the return key) to cancel.

5.1.2.1 Adjustable Parameters via Touchscreen

Voltage	Adjust CV, OVP, or Under Voltage Limit (UVL)
Current	Adjust Constant Current value, OCP value, Under Current Limit (UCL), or OCP delay time.
Power	Adjust Constant Power value, OPP value, or Under Power Limit (UPL).
Time	Set the output duration. If set to 0.0, output is continuous. If set > 0 , the timer counts down after output is ON.
Resistance	Set the internal resistance simulation value (See section 5.3.2).

Table 5.1 Touchscreen Adjustment Parameters

5.1.2.2 Store and Recall Memories

Store	Set the desired V/A/W/Time values. Tap Recall on the screen; the icon will turn blue (Store). Tap A , B , or C to save the current settings to that memory slot.
Recall	When the icon is gray (Recall), tap A , B , or C to recall the settings.

5.2 Setting Menu

To access the Setting Menu:

Step 1. Press and hold the **Home** key for 1.5 seconds to ensure you are on the home screen.

Step 2. Press the **Menu/Enter** key.

Step 3. Rotate the large **Power/Edit** knob to select an item.

Step 4. Push the knob to enter the selected item.

Step 5. Press the return key to return to the previous screen.

There are two types of menu interactions: ****Function Selecting**** (choosing a mode) and ****Value Adjusting**** (setting a number).

5.3 Menu Content

5.3.1 A. Error Code

Used to check error codes. The error code will be cleared from the list after it has been reviewed.

5.3.2 B. Configuration

5.3.2.1 B-1. Setting

Provides an alternative way to set output parameters without using the touchscreen.

- **CV / CC / CP:** Set output Voltage, Current, or Power.
- **OVP / OCP / OPP:** Set protection limits.
- **UVL / UCL / UPL:** Set under-limit warnings.
- **Time:** Set output timer.
- **OCP Alarm Delay:** Set delay before OCP trips.
- **Store/Recall A/B/C:** Manage memory slots.
- **Master Delay Time:** Default is 100ms.

5.3.2.2 B-2. Operating Mode

Selects the operating behavior of the power supply.

Simple Mode	Basic operation. Constant Power is forced to the maximum rated value.
Complete Mode	Full control. Voltage, Current, Power, and Time are all adjustable. Access to Memory A/B/C.
Sequence Mode	Executes complex V/A/W/Time sequences loaded from a USB drive. • Max 16 Sequences, up to 500 Steps each. • Can be edited via PC Software, Spreadsheet (CSV), or SCPI.

CSV Editing Format:

NOTICE

To link sequences, fill "link list" in Column A after the last sequence, then specify the sequence numbers.

Name	End Step	Loop Num	
sequence01	4	3	
Voltage	Current	Power	Time
50	600	15000	0.001
...	...	...	...

Table 5.2 Sequence CSV Format

Insertion Mode

Allows inserting a single sequence or LIST while the DC power supply is outputting set values. The output returns to the previous condition after the sequence completes.

5.3.2.3 B-3. Sequence List

Defines the execution order of loaded sequences (e.g., Run Seq 01 → Seq 10 → Seq 01).

5.3.2.4 B-6. Master Slave Mode

Configures parallel operation.

- **Independent:** Normal single-unit operation.
- **Master:** Controls the system.
- **Slave:** Controlled by the Master via System Bus.

NOTICE

A restart is required when switching between Independent/Master and Slave modes.

5.3.2.5 B-7. Power ON Mode

Determines output state after power-up.

- **OFF:** Output is always OFF at startup.
- **LAST:** Restores the state (ON or OFF) from before power loss.
- **ON:** Output is always ON at startup.

CAUTION

Using "LAST" or "ON" may cause immediate voltage output at startup. Ensure this is safe for your connected load.

5.3.2.6 B-8. Output Priority

Sets the operating priority (CV, CC, or CP) to minimize overshoot.

5.3.2.7 B-9. Output Vary - Adjust

- **Enter:** Output changes only after pressing ENTER.
- **Direct:** Output changes immediately while rotating the knob.

5.3.2.8 B-10. Output Vary - Recall

Same as above, but applies when recalling Memory presets.

5.3.2.9 B-11. Internal Resistance

Simulates the internal resistance of a battery.

Model	Range
HMR80360	0~0.2222 Ω
HMR65046	0~14.130 Ω
HMR130023	0~56.521 Ω
HMR500108	0~4.629 Ω
HMR195027	0~72.222 Ω

Table 5.3 Internal Resistance Ranges

5.3.2.10 B-12 / B-13. Output ON/OFF Ramp Time

Sets the time (0.001s ~99.999s) for the output to ramp up to the set value or down to zero.

5.3.2.11 B-14 / B-15 / B-16. Slew Rate

Sets the specific Voltage, Current, or Power slew rate (in V/ms, A/ms, W/ms).

5.3.2.12 B-17. I/O

- **External ON/OFF:** Enables control via Pin 2 of the J1 connector.

- **Interlock:** Enables safety interlock (Pin 1). Output is disabled if the circuit is open.

5.3.2.13 B-18. Master Delay Time

Sets the detection delay for Master mode (Default: 100ms).

5.3.2.14 B-20. Measure At Off

Enables voltage measurement at the output terminals even when the output is OFF.

5.3.3 C. System

Global system configuration.

- **C-1 Alarm Buzzer:** Enable/Disable audible alarm for faults.
- **C-2 Key Beep:** Enable/Disable click sound for keys/knobs.
- **C-3 LCD Brightness:** Adjust backlight (1-9).
- **C-4 Display Color:** Select theme (White, Black, Green).
- **C-5 Touch Screen:** Enable/Disable touch input.
- **C-6 Network Time Sync:** Enable NTP (requires Internet).
- **C-7 Calendar Setting:** Manually set Date/Time.
- **C-8 Time Zone:** Set Time Zone.
- **C-9 Calibration:** Protected by passcode. Contact B&K Precision.

5.3.4 D. LAN Interface Setting

Configures the Ethernet connection (LXI).

D-1 IP Information Displays current MAC, IP, Subnet, Gateway.

D-2 Auto IP

- **Enable (DHCP):** Automatically obtains IP from server.
- **Disable (Static):** User sets IP manually in D-3.

D-3 Manual IP Allows manual entry of IP, Subnet, Gateway, and DNS when Auto IP is disabled.

D-4 SCPI-RAW Port Default: 5025.

D-5 Message Terminator Select CR, LF, or CR+LF (Default).

D-7 Reset LAN Resets LAN settings to default (Auto IP, Port 5025).

5.3.5 E. Optional Interface Setting

The following optional accessories are available for the HMR Series.

Part Number	Description
HMRGPIB	GPIB Interface Card
HMRALG	Isolated Analog Interface Card
HMRPB	Parallel Bus Bars (HMR80360 only)
HMRPU180	Protection unit for models: HMR65046, HMR130023, HMR500108, HMR195027
HMRPU540	Protection unit for HMR80360

Table 5.4 Optional Accessories

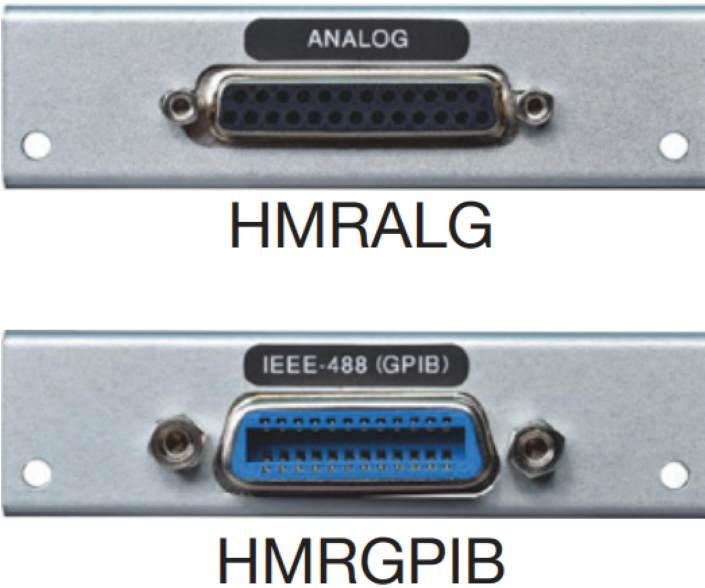


Figure 5.1 Optional Accessories

5.3.6 F. Information

Displays System Info (Model, Serial, Firmware), Contact Info, System Log, and Patents.

5.3.7 G. Load Default

Resets the instrument to factory default settings.

Operating Mode	Complete Mode
Power ON Mode	OFF
Output Priority	CC
Output Vary	Enter
Ramp Time	0 (Disabled)
Slew Rate	Maximum
External On/Off	Disable
Interlock	Disable
Touch Screen	Enable
Protection (OVP/OCP/OPP)	110% of Rated

Table 5.5 Factory Default Settings

Interface Connection

6.1 J1 (Auxiliary Control)

The J1 connector provides auxiliary control functions such as Interlock, External Output ON/OFF, Shut OFF, and Alarm Signal output. A D-sub 9-pin connector is provided as a standard accessory.

⚠ CAUTION

When the External output ON/OFF (PIN 2) function is enabled, other control methods such as the front panel and digital interface will not be able to set the output ON/OFF.

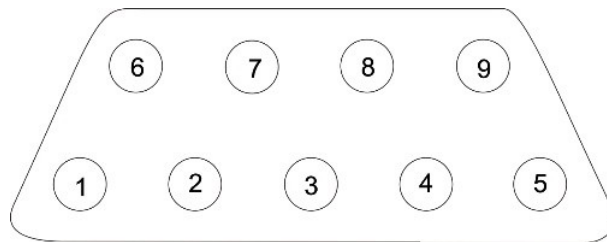


Figure 6.1 J1 Connector Pinout

Pin	Name	Function
1	Interlock	When the interlock function is enabled in the Configuration menu, PIN 1 must be shorted to one of the Common pins (PIN 6~9). If open, error code 81 will occur.
2	External Output ON/OFF	When External On/Off is enabled in the Configuration menu, short PIN 2 to Common (PIN 6~9) to enable the output. Open to disable.
3	Shut OFF	The output will be shut off when shorted to Common (PIN 6~9). Error code 82 will be generated.
4	Alarm State	Open collector output. Shorted to Common (PIN 6~9) when the unit alarms. Max 30V, 8mA.
5	Fast Discharge	Open collector output. Shorted to Common (PIN 6~9) when the output voltage is adjusted downward (more than 1% of present value). Useful for triggering external discharge circuits.
6~9	State Comm.	Common pins for control signals.

Table 6.1 J1 Auxiliary Control Pinout

6.1.1 Connecting Schematic of J1 Auxiliary Control

The following schematic illustrates the internal circuit connections for the J1 Auxiliary Control connector.

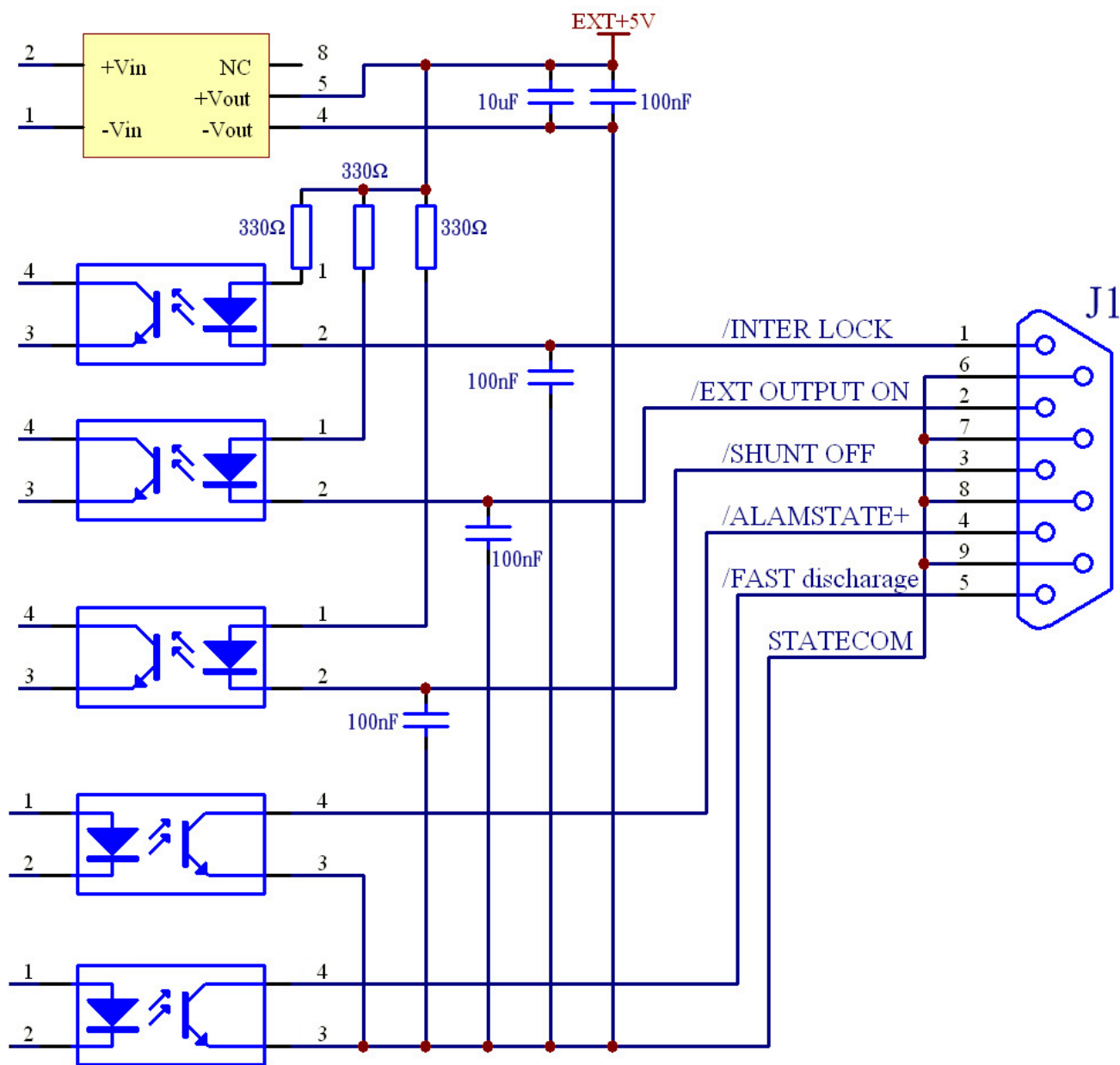


Figure 6.2 J1 Auxiliary Control Schematic

6.2 Ethernet Connection

The HMR Series utilizes LXI-compliant Ethernet for remote control. Please use a Cat5e or higher-grade Ethernet cable.

When connecting to a LAN with a DHCP server and DNS, the DC power supply will automatically obtain an IP address. This process typically takes around 1 minute. The obtained IP address can be read from the front panel or via the application software.

For SCPI command details, please refer to the programming manual.

6.2.1 Connection Methods

- | | |
|------------------------------------|---|
| Direct Connection | Connect the HMR Series directly to a PC using a standard Ethernet cable (Auto-MDIX ensures crossover cables are not strictly required, though standard patch cables are recommended). |
| Switch or Router Connection | Connect the HMR Series to a network switch or router. This allows access via the local network or VPN if configured. |

6.2.2 Web Server Access

The HMR Series features a built-in web server for configuration and control.

Step 1. Open a standard web browser on a PC connected to the same network.

Step 2. Enter the IP address of the HMR unit into the browser's address bar.

Step 3. The Home Page will appear, displaying basic instrument information.

6.3 Web Server Configuration

6.3.1 Log In

To access configuration settings or control the instrument, you must log in.

- Click ****Network Configuration**** or ****Instrument Control**** on the left side of the browser.
- Enter the password when prompted.

NOTICE

The default password is "admin". The password can be changed in the Security page.

6.3.2 Network Configuration

The Network Configuration page allows modification of LAN settings.

Host Name Set the host name and enable/disable mDNS Discovery.

IP Configuration Set the IP Address, Subnet Mask, and Gateway.

NOTICE

These are assigned automatically if **Auto IP**** is enabled in the front panel menu.**

DNS Server Set the DNS Server Address.

Socket Port Set the port number for raw socket communication (e.g., for Terminal Emulation).
Default is **5025**.

6.3.3 Instrument Control

The Instrument Control page allows direct remote operation of the HMR Series via the web interface.

Monitor	Displays measured output values (Voltage, Current, Power) and operating status (ON/OFF, CV, CC, CP).
Waveform Monitor	Displays a real-time graph of output. • **Vertical Axis:** Amplitude (0~110% of rated value). • **Horizontal Axis:** Time (Selectable: 0.5s, 1s, 2s, 5s per division). • **Traces:** Voltage (Yellow), Current (Green), Power (Purple).
Control Settings	Allows setting of: • Output Voltage, Current, and Power set points. • Protection limits (OVP, OCP, OPP). • Output Slew Rate. • Internal Resistance.
Output Control	Toggle the Output ON/OFF.

6.3.4 Security

This page allows changing the web interface password.

NOTICE

Ensure the "New Password" and "Confirm Password" fields match exactly.

If the password is forgotten, execute the Reset LAN function in the front panel Utility menu. Note that this will reset all network settings to factory defaults.

6.4 Terminal Emulation

You can use terminal emulation software (such as PuTTY or HyperTerminal) to verify the connection and send raw SCPI commands.

6.4.1 Configuration

- Step 1.** Obtain the ****IP Address**** and ****Socket Port**** (Default: 5025) from the front panel or web server.
- Step 2.** Open your terminal software (e.g., PuTTY).
- Step 3.** Select ****Raw**** or ****Telnet**** connection type.
- Step 4.** Enter the IP address and Port (5025).
- Step 5.** Establish the connection.

6.4.2 Testing the Connection

Once connected, type a standard SCPI command to query the instrument identity:

*IDN?

The instrument should return the identification string (Manufacturer, Model, Serial Number, Firmware Version).

NOTICE

Microsoft HyperTerminal is not supported on Windows 7 or later versions. PuTTY is recommended as a free, open-source alternative.

Specifications

Note: All specifications apply to the unit after a temperature stabilization time of 30 minutes over an ambient temperature range of 23 °C ± 5 °C. Specifications are valid for single unit operation only. Under 80% humidity.

Model		HMR80360	HMR65046	HMR130023	HMR500108	HMR195027
Output Rating						
Output Voltage		0 to 80 V	0 to 650 V	0 to 1300 V	0 to 500 V	0 to 1950 V
Output Current		0 to 360 A	0 to 46 A	0 to 23 A	0 to 108 A	0 to 27 A
Output Power		10 kW			18 kW	
Line Regulation						
Voltage		16 mV	130 mV	260 mV	100 mV	390 mV
Current		180 mA	23 mA	11.5 mA	54 mA	13.5 mA
Load Regulation						
Voltage		40 mV	325 mV	650 mV	250 mV	975 mV
Current		540 mA	69 mA	34.5 mA	162 mA	40.5 mA
Ripple and Noise (20 Hz to 20 MHz)						
Voltage p-p		288 mV	720 mV	1800 mV	375 mV	3360 mV
Voltage rms ⁽¹⁾		23 mV	180 mV	395 mV	75 mV	645 mV
Current rms		144 mA	29 mA	20 mA	54 mA	42 mA
Resolution						
Programming		1 mV / 10 mA	10 mV / 1 mA	100 mV / 1 mA	10 mV / 10 mA	100 mV / 1 mA
Readback		1 mV / 10 mA	10 mV / 1 mA	100 mV / 1 mA	10 mV / 10 mA	100 mV / 1 mA
Programming Accuracy						
Voltage		80 mV	650 mV	1.3 V	500 mV	1.95 V
Current		720 mA	92 mA	46 mA	216 mA	54 mA
Readback Accuracy						
Voltage		80 mV	650 mV	1.3 V	500 mV	1.95 V
Current		720 mA	92 mA	46 mA	216 mA	54 mA
Output Response Time ⁽²⁾						
Rise Time	Full Load	< 30 ms				
Fall Time	Full Load	< 80 ms				
	No Load	< 5 s	< 6 s	< 6 s	< 5 s	< 6 s
Protection						
OVP Range		0 to 88 V	0 to 715 V	0 to 1430 V	0 to 550 V	0 to 2145 V
OCP Range		0 to 396 A	0 to 50.6 A	0 to 25.3 A	0 to 118.8 A	0 to 29.7 A
Internal Resistance						
Adjustment Range		0 to 0.2222 Ω	0 to 14.13 Ω	0 to 56.5217 Ω	0 to 4.6296 Ω	0 to 72.222 Ω
Resolution		0.1 mΩ	1 mΩ		0.1 mΩ	1 mΩ
Accuracy		< 2.3% of maximum setttable resistance				

(1) Measurement bandwidth up to 300 kHz.

(2) From 10% to 90% or from 90% to 10% of total voltage excursion.

General

Model		HMR80360	HMR65046	HMR130023	HMR500108	HMR195027
General						
Remote Sense Compensation		5 V				
Transient Response Time ⁽³⁾		< 1.5 ms				
Command Response Time ⁽⁴⁾		3 ms				
Efficiency ⁽⁵⁾		93%	95%	94%	93%	95%
I/O Interfaces		LAN (LXI-compliant 1.4)				
AC Line Input	Nominal	200 to 415 VAC, 50 Hz/60 Hz				
	Operating	180 to 460 VAC, 47 Hz to 63 Hz				
AC Line Phase		3-phase				
Maximum Rated Input Power		12 kVA			21.6 kVA	
Input Current		40 A/phase				
Inrush Current		66 A/phase			99 A/phase	
Power Factor (typical)		0.95 (200 - 415 V input)			0.95 (380 - 415 V input)	
Temperature Ratings	Operation	32 °F to 122 °F (0 °C to 50 °C)				
	Storage	-4 °F to 158 °F (-20 °C to 70 °C)				
Temperature Coefficient	Voltage	8 mV / °C	65 mV / °C	130 mV / °C	50 mV / °C	195 mV / °C
	Current	36 mA / °C	4.6 mA / °C	2.3 mA / °C	10.8 mA / °C	2.7 mA / °C
Weight		80.1 lbs (36.3 kg)	76.8 lbs (34.8 kg)		96.2 lbs (43.6 kg)	
Warranty		3 Years				
Dimensions (W x H x D)		17.3" x 5.2" x 26" (440 x 132 x 660 mm)				
Standard Accessories		Certificate of calibration, output protection cover, AC input cover assembly, and Ethernet cable				
Optional Accessories		GPIB Interface Card (HMRGPIB), Isolated Analog Interface Card (HMRALG), Parallel Bus Bars (HMRPB), Protection Unit (see protection unit details in ordering information section)				

Regulatory Compliance	
Safety	Low Voltage Directive (LVD) 2014/35/EU, EN61010-1:2010, +A1:2019
Electromagnetic Compatibility	EMC Directive 2014/30/EU, EN61326-1:2021

Optional Analog Interface	
Input Range	0 to 5 V or 0 to 10 V
Accuracy	± 0.2% of rating
Reference Output	0 to 5 VDC or 0 to 10 VDC (5 A max.)

(3) Time for output voltage to recover within 1% of its rated output voltage for a load change of 10-90%.

(4) Typical time required for output to begin to change following receipt of command data.

(5) At nominal line and maximum load.

Service Information

Warranty Service: Please go to the support and service section on our website at bkprecision.com to obtain an RMA #. Return the product in the original packaging with proof of purchase to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors and accessories that you are using with the device.

Non-Warranty Service: Please go to the support and service section on our website at bkprecision.com to obtain an RMA #. Return the product in the original packaging to the address below. Clearly state on the RMA the performance problem and return any leads, probes, connectors and accessories that you are using with the device. Customers not on an open account must include payment in the form of a money order or credit card. For the most current repair charges please refer to the service and support section on our website.

Return all merchandise to B&K Precision Corp. with prepaid shipping. The flat-rate repair charge for Non-Warranty Service does not include return shipping. Return shipping to locations in North America is included for Warranty Service. For overnight shipments and non-North American shipping fees please contact B&K Precision Corp.

Include with the returned instrument your complete return shipping address, contact name, phone number and description of problem.

B&K Precision Corp.
22820 Savi Ranch Parkway
Yorba Linda, CA 92887
bkprecision.com
714-921-9095

LIMITED THREE-YEAR WARRANTY

B&K Precision Corp. warrants to the original purchaser that its products and the component parts thereof, will be free from defects in workmanship and materials for a period of **13years** from date of purchase.

B&K Precision Corp. will, without charge, repair or replace, at its option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form of a sales receipt.

To help us better serve you, please complete the warranty registration for your new instrument via our website www.bkprecision.com

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. The warranty is void if the serial number is altered, defaced or removed.

B&K Precision Corp. shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages. So the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

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