User Manual

MPS Series
Modular System DC Power Supplies

BK PRECISION

Contents

Compliance Information

1.1 EMC

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 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements

1.2 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.

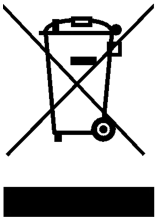
Mains Isolated : is for measurements performed on circuits not directly connected to a mains supply.

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

1.3 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.

1.4 Terms and Symbols

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.**

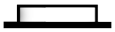
NOTICE A note statement calls attention to an operating procedure, practice, or condition, which, should be noted before proceeding.

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.

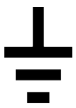
On (Supply). This is the AC mains connect/disconnect switch on the front of the instrument.



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:

- Read and understand the safety and operational information in this manual.
- Apply all the listed safety precautions.
- 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.
- Make all connections to the instrument before applying power.
- 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.

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.

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

WARNING **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.**

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.

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.

WARNING

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.**

WARNING

- **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.**

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.

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.

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.

General Safety

WARNING

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

WARNING

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.

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.

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 Product Overview

The MPS Series Modular System DC Power Supplies are compact, low-profile units offering up to four output channels and 1200 W in a 1U form factor. Users can select from eight modules with various voltage and current ratings to configure a 1 to 4 channel DC power supply, ideal for ATE system applications. The modules provide 100 W (multi-range) or 300 W (fixed range) to suit different power needs. Mainframes can be populated with any combination of modules to achieve a total output power of 600 W or 1200 W.

The MPS Series supports synchronization between modules, enabling sequential activation of multiple outputs. Advanced list mode programming allows complex sequences to be output from the front panel. Operating and battery test software is included for remote PC control and monitoring. Standard interfaces include USB (USBTMC-compliant), LAN (LXI), and GPIB, all supporting SCPI commands.

Applications for the MPS Series include R&D, production testing, and manufacturing environments requiring multiple outputs. The compact and modular design enhances throughput for repetitive testing and validation.

MODEL	MPS1000	MPS1001
Total Available Power	600 W	1200 W
Number of Slots	4	
Form Factor	1U	

Table 3.1 MPS Mainframes

Model	MPS1101	MPS1102	MPS1103	MPS1104	MPS1301	MPS1302	MPS1303	MPS1304
Ranging	**Multi-range (autoraning)**				**Fixed range**			
Rated Voltage	15 V	32 V	60 V	100 V	15 V	32 V	60 V	100 V
Rated Current	20 A	9.4 A	5 A	3 A	20 A	9.4 A	5 A	3 A

Table 3.2 MPS Modules

3.2 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 electronic load is shipped with the following contents:

Mainframe Box

- 1 x MPS Mainframe
- 1 x AC Power Cord
- 1 x Certificate of Calibration

Module Box

- 1 x MPS Module
- 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.

3.3 Features

1. Compact size supports up to four outputs in a 1U form factor
2. Modular design
3. Multi-ranging operation delivers rated power at multiple voltage/current combinations
4. Advanced list mode programming
5. Series/parallel operation increases maximum voltage/current output to 400 V or 80 A (depending on model)
6. Module synchronization and output coupling
7. Overvoltage (OVP), overcurrent (OCP), Overtemperature (OTP) protection, and key-lock function
8. Adjustable voltage/current slew rates
9. Front panel USB host port to save/recall instrument settings and list mode programs
10. Save/recall instrument settings to internal memory
11. Fast command processing time (< 10 ms)
12. Digital I/O terminal offers external triggering, voltage fault, and remote inhibit capabilities
13. Operating software and battery test software provided
14. USB, LAN (LXI), RS232, and GPIB interfaces standard
15. NISPOM-compliant sanitization to securely restore factory settings
16. Rack-mount kit included
17. LabVIEW^{TM}, IVI-C, and IVI.NET drivers provided
18. cTUVus certification mark fulfills CSA and UL safety standards

3.4 Dimensions

The MPS mainframe dimensions are approximately:
424.6 mm (16.71 in) x 44 mm (1.73 in) x 520 mm (20.5 in) (W x H x D)

Model	Dimensions (W x H x D)	Weight
MPS1000		
MPS1001		

Table 3.3 Dimmensions

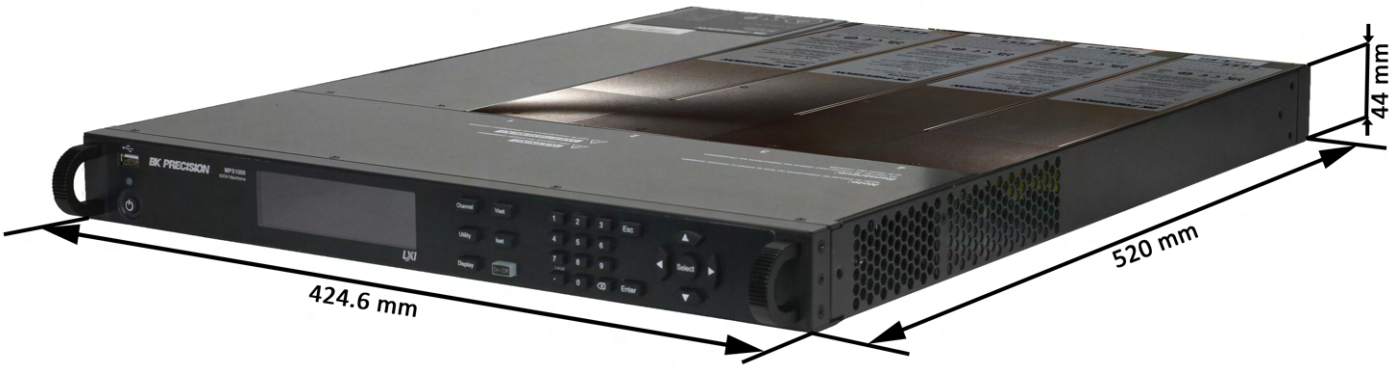


Figure 3.1 Dimensions

3.5 Front Panel

Figure 3.2 Front Panel

Item	Name	Description
1	Power Button and LED	Switch the instrument between normal operation mode and screen-saver mode. The LED indicates power is on. Green indicates normal operation. Amber indicates display is in screen-saver mode.
2	USB Host Port	USB port used to connect flash drives.
3	Display	Visual presentation of the device function and measurements.
4	System Keys	See section ?? for details.
5	Numeric Keypad	Used to enter precise values.
6	Navigation Keys	Used to navigate menus or configure parameters.

Table 3.4 Front Panel

3.6 Rear Panel

Figure 3.3 Rear Panel

Item	Name	Description
1	GPIB Interface	GPIB interface connector.
2	Power Switch	Toggles the instrument **ON** or **OFF**.
3	AC power input & fuse box	Houses the IEC 320 connector and the fuse.
4	Output/Sense	Includes +/− output and +/− sense terminals. Internal relays switch between local and remote sensing.
5	Digital I/O	Send or receive a signal to or from an external device.
6	USB interface	Connect a USB type B to type A to remotely control the unit. (USBTMC and USBVCP connector)
7	LAN interface	LAN interface connector Left LED indicates activity. Right LED indicates link integrity.
8	Chassis ground	Provides a zero potential voltage reference and a dissipation point for interference, transient voltages and static.

Table 3.5 Rear Panel

3.7 Model Descriptions

Model	Description
MPS600MF	600 W MPS Mainframe - without power modules
MPS1200MF	1200 W MPS Mainframe - without power modules
MPS328MR	100 W, 32 V, 8 A multi range power module
MPS329	300 W, 32 V, 9.4 A fixed range power module
MPS604MR	100 W, 60 V, 4 A multi range power module
MPS605	300 W, 60 V, 5 A fixed range power module
MPS1520MR	100 W, 15 V, 20 A multi range power module
MPS1520	300 W, 15 V, 20 A fixed range power module

Table 3.6 Model Description

Installation

4.1 Preliminary Information

Before getting started, 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:

Review Safety Information

This power system is a Safety Class 1 instrument, which means it has a protective earth terminal. That terminal must be connected to earth ground through a power source equipped with a ground receptacle.

Refer to the Safety Summary page at the beginning of this guide for general safety information. Before installation or operation, check the power system and review this guide for safety warnings and instructions. Safety warnings for specific procedures are located at appropriate places throughout this manual.

Some power modules generate voltages exceeding 60 VDC. Ensure that instrument connections, load wiring, and load connections are either insulated or covered so that no accidental contact with lethal output voltages can occur.

Observe Environmental Conditions

The environmental conditions of the power system are documented under Environmental Characteristics. The unit should only be operated indoors in a controlled environment.

The dimensions of your instrument as well as an outline diagram are also documented under Specifications. A fan cools the power system by drawing air through the sides and exhausting it out the side and back. The instrument must be installed in a location that allows sufficient space at the sides and back of the unit for adequate air circulation

WARNING **Do not operate the instrument in the presence of flammable gases or fumes.**

4.2 Installing the Mainframe

4.2.1 Power Module Installation

NOTICE The information in this section applies if you have purchased an MPS mainframe without the power modules installed, or if you are adding a power module to the mainframe.

Turn the mainframe off and disconnect the power cord before installing or removing power modules. Observe all standard electrostatic discharge precautions before handling electronic components.

CAUTION **Modules must be installed next to one another, starting with slot 1. Do not leave any empty slots between modules, otherwise the power system will not operate.**

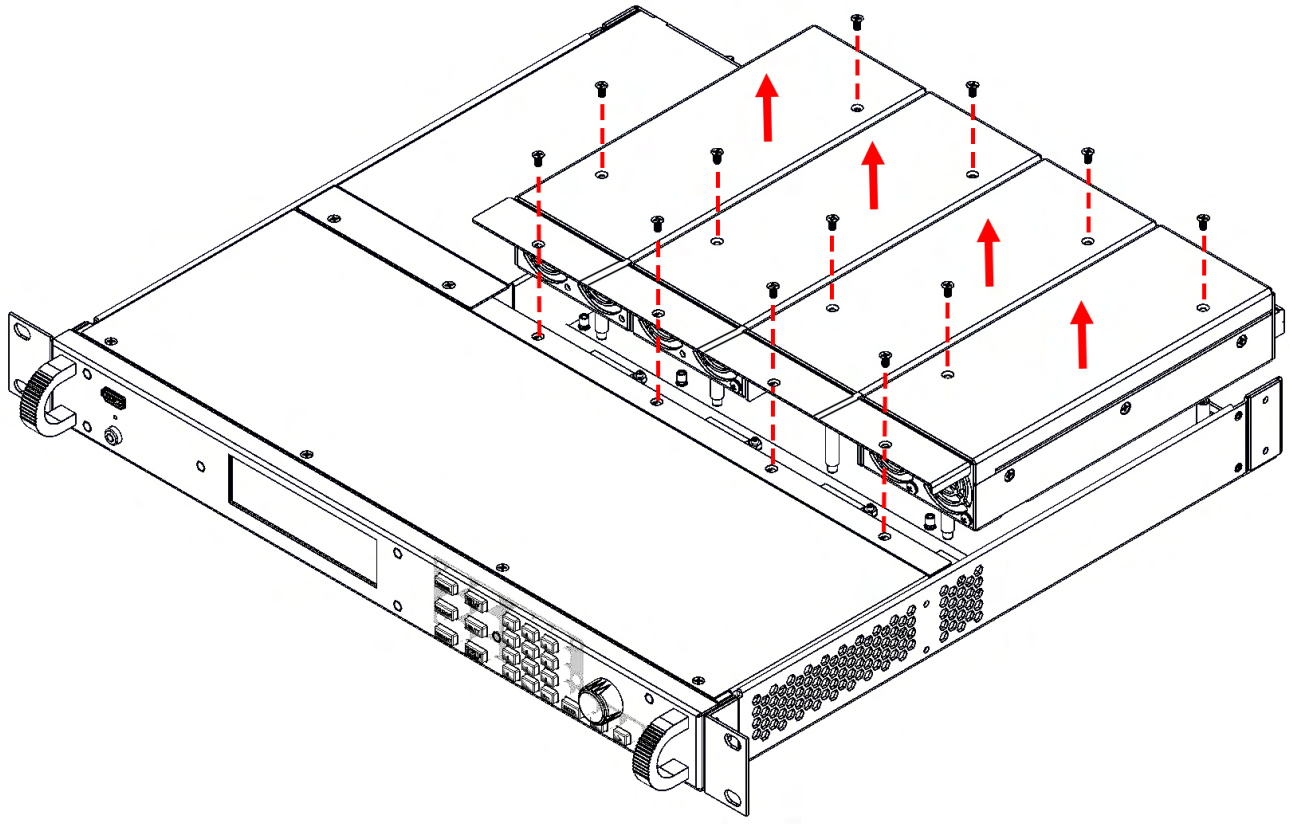
Any remaining unused slots must have a filler module installed to ensure proper cooling. Do not install filler modules between power modules.

Procedure

Tools required: Phillips screwdriver.

Step 1. Remove the filler covers.

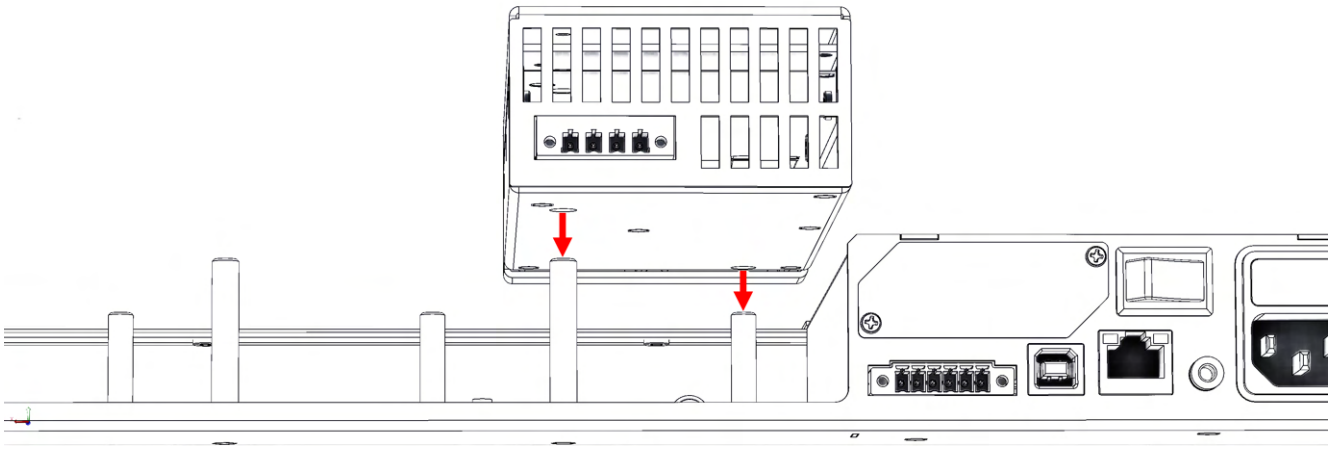
- Remove the 3 screws from the top of the filler covers .
- Slightly tilt the front cover of the filler module up then slide the module upwards by evenly pulling from the rear and front of the module.



CAUTION **If a channel will not be populated with a module the filler cover should remain installed.**

Step 2. Install the power module.

- Align the module over the pins and push it down onto the mainframe connector. See **figure 4.1**



Align Post

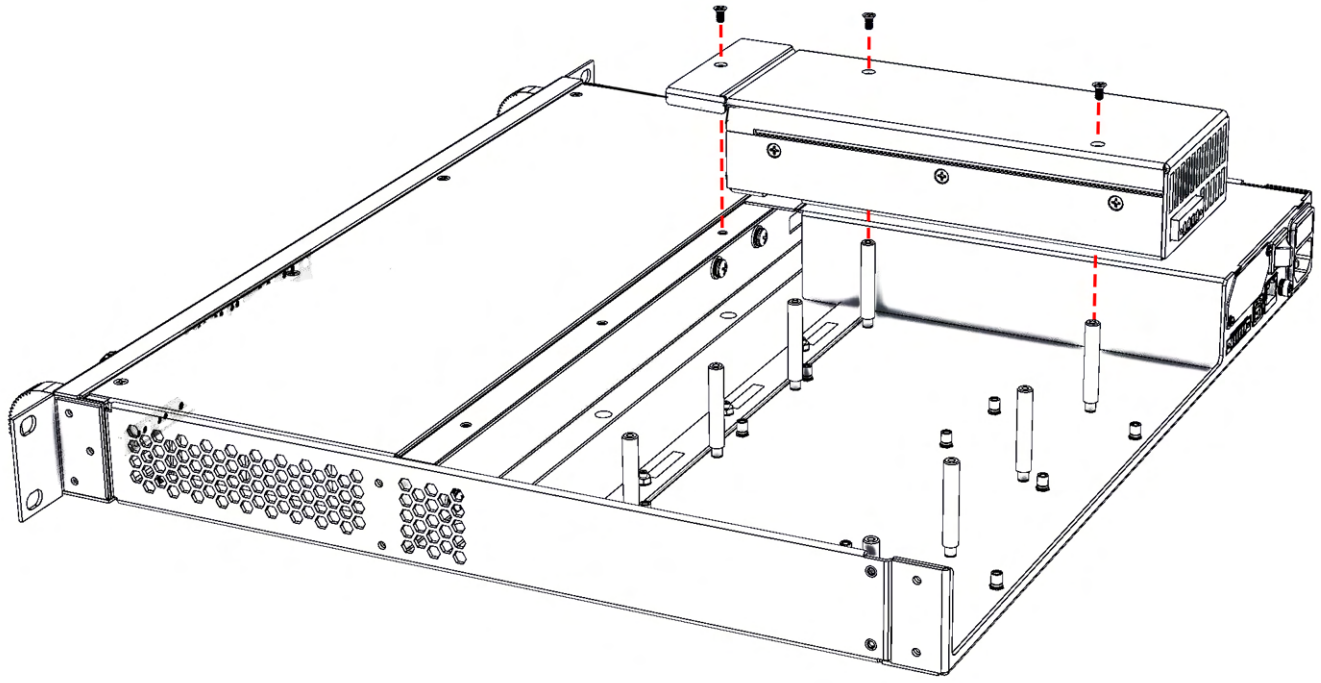


Figure 4.1 Align Modules

Step 3. Install the screws at each end of the power module.

- Each module is secured by 3 screws. See **figure 4.2**

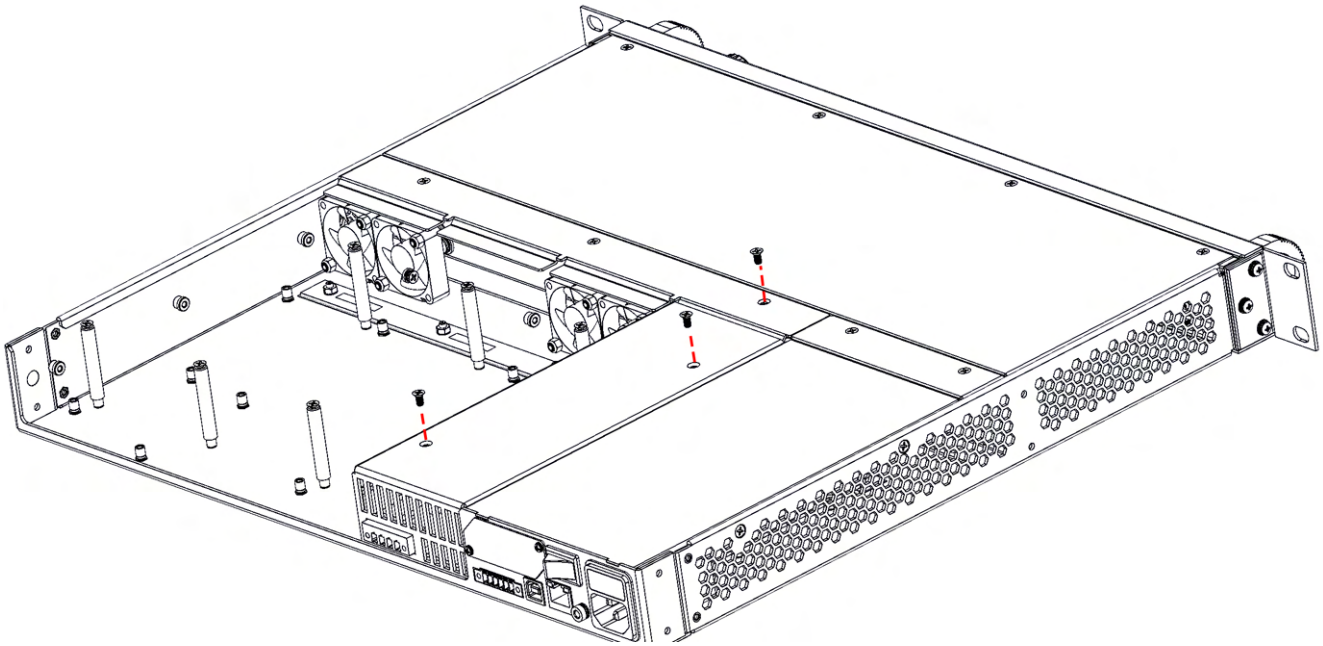


Figure 4.2 Tighten Screws

4.2.2 Power Module Channel Assignment

The slot location of a power module in the mainframe determines the channel assignment of the module. When viewed from the rear, the module next to the GPIB connector is always output channel one. Numbering continues sequentially to the left, from 1 up to 4.

Double-wide power modules are assigned the number of the lowest numbered slot in which is installed. For example, if a double-wide module is installed in slots 3 and 4, it is assigned channel number 3.

Grouped power modules, those that are connected in parallel and have been configured or grouped to act as a single higher-power channel, are assigned the channel number of the lowest numbered slot of the group. Refer to Output Groups for more information.

4.3 Main Frame Input Power and Fuse Requirements

The AC input on the back of your unit is a universal AC input. It accepts nominal line voltages in the range of 100 VAC to 240 VAC. The frequency can be 50/60 Hz.

Item \ Model	MPS1001		MPS1000
Input Rating	100 - 120VAC, 47 to 63 Hz, 850VA MAX	200 - 240VAC, 47 to 63 Hz, 1700VA MAX	100 - 240 Vac, 47 to 63 Hz, 850VA MAX
Max. Output Voltage Per Channel	15 Vdc max. / 32 Vdc max. / 60 Vdc max. / 100 Vdc max.(2)		
Max. Output Current Per Channel	20 A max. / 9.5 A max. / 4 A max. / 3 A max.(2)		
Max. Output Power Per Channel	300 W	300 W	300 W
Total Output Power	600 W	1200 W	600 W

(1) All models are similar except for input/output rating and model designation.
(2) The output channels are configured based on different output modules to generate the corresponding output voltage and output current. Please refer to **table 3.6** for detailed information.

Table 4.1 Main Frame's AC Input & Output Ratings

WARNING

FIRE HAZARD Use only the power cord that was supplied with your instrument. Using other types of power cords may cause overheating of the power cord, resulting in fire.

SHOCK HAZARD The power cord provides a chassis ground through a third conductor. Be certain that your power outlet is of the three-conductor type with the correct pin connected to earth ground.

Before connecting the power cord to the IEC 320 connector on the rear panel of the uint, be sure that the power switch is in the OFF position and verify that the AC power cord, including the extension line, is compatible with the rated voltage/current and that there is sufficient circuit capacity for the power supply. Once verified, connect the cable firmly.

NOTICE

Standard AC mains circuits rated at nominal 100-120 VAC cannot supply enough current to power the mainframe when it is operated at its full rated power. The MPS can be connected to an AC mains circuit rated at nominal 100-120 VAC, in this case, internal circuits will limit the power available to the 600 W modules. As a result of this power limiting, the current drawn from the AC mains will be < 15 A, so that standard 100-120 VAC mains circuits will not be overloaded.

4.4 Fuse Replacement

The fuse is accessible through the rear panel beneath the IEC 320 connector.

Table 4.2shows the fuse requirements.

Model	Fuse Specification
MPS1000	T10AL 250V
MPS1001	T10AL 250V

Table 4.2 Fuse Specification

WARNING **No power should be applied to the instrument while replacing the fuse. Disconnect all cables connected to the instrument before proceeding.**

Fuse Replacement Procedure

Step 1. Locate the fuse box in the rear panel beneath the IEC 320 connector. (See **figure 3.3**)

Step 2. Insert a small flathead screwdriver into the fuse box slit to slide out the fuse box as illustrated in **figure 4.3**.

Step 3. Check the fuse to determine if it must be replaced.

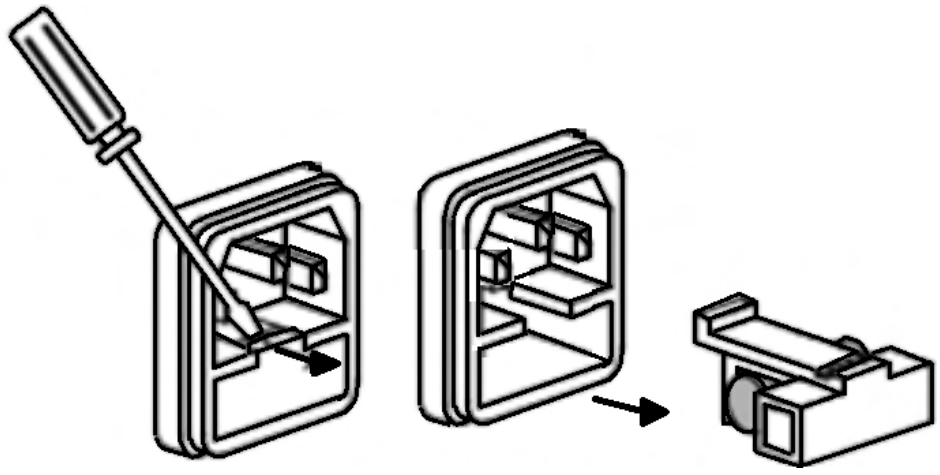


Figure 4.3 Fuse Removal

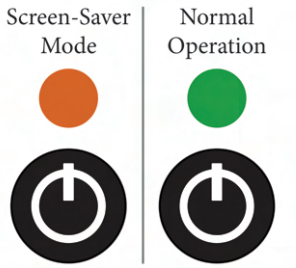
Basic Front Panel Operation

The front panel operation control allows users to manage the power supply. The front panel operation control allows users to manage the power supply efficiently. It includes an on/off switch, LED indicators for power status and faults, navigation and numeric keys for voltage and current settings, and utility keys for configuring the instrument's settings. The MPS Series features a digital display providing real-time information on output levels and system performance. This interface ensures convenient access and control, enhancing overall usability and functionality.

5.1 Power Buttons

The MPS Series features two power buttons in the front panel, one which switches the power supply between normal operation mode and screen-saver mode, and a second power button which enables/disables the output of the selected channel.

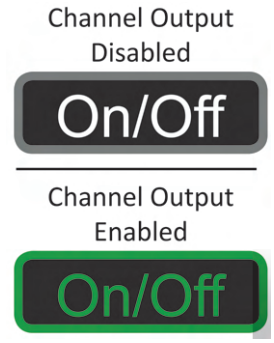
5.1.1 Screen-Saver Mode and Normal Operation Mode



Switch the instrument between normal operation mode and screen-saver mode. The LED indicates power is on. Green indicates normal operation. Amber indicates display is in screen-saver mode.

To toggle the instrument on/off use the power switch in the rear panel.

5.1.2 Enable/Disable Channel Output



Enable or disable the output of the selected channel. To select a channel, refer to Channel Selection.

The LED state indicates the output status: when enabled, the LED will light up green, and when disabled, the LED will turn off, leaving the button with no background color.

5.2 Display

The MPS Series features a color LCD display which provides a clear and intuitive interface for monitoring and controlling the unit. It presents real-time information on voltage, current, and power output levels, along with status indicators and fault notifications. The vibrant, high-resolution screen along with its three display modes enhances visibility and usability, allowing for precise adjustments and easy navigation through the power supply's settings and functions.

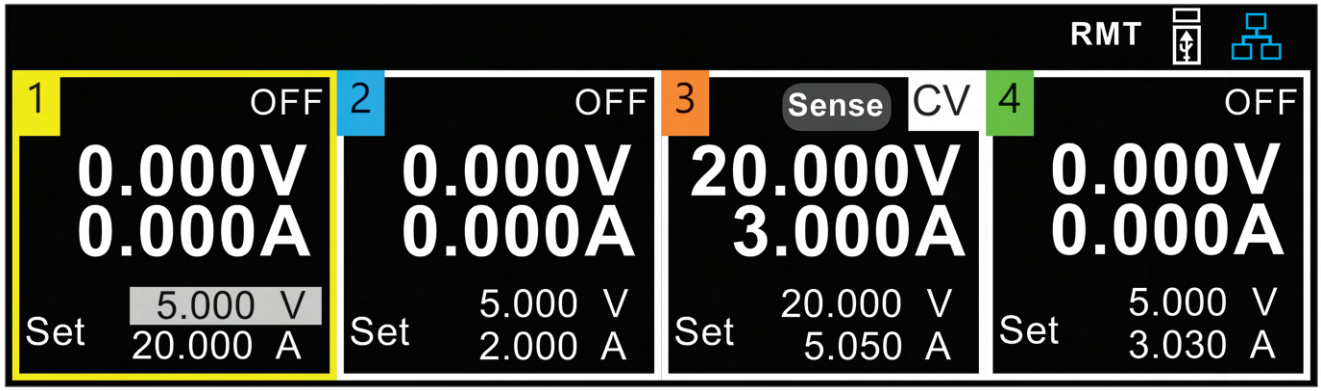


Figure 5.1 Main Display

Icon	Description
OFF	The output is disabled.
CV	The output is enabled and operating in constant voltage mode.
CC	The output is enabled and operating in constant current mode.
	The instrument is connected to a network.
	An issue occurred when attempting to connect to a network.
	The instrument is not connected to a network.
OV	Over voltage protection was triggered.
OC	Over current protection was triggered.
OT	Over temperature protection was triggered.
RMT	The instrument is set to remote mode.
Sense	Remote sense is enabled.
Sense	Remote sense is enabled but not connected properly.

Table 5.1 Display Icons

5.2.1 Display Key

In addition to the Main Display, the MPS offers two other monitoring displays for individual channels. By focusing on a single channel, the output monitor can be magnified, making it easier to view specific metering values.

The user can quickly swap between all 3 display Views by pressing the **Display** key.

Display View 2 monitors the measured voltage and current output values while also displaying the set output values.

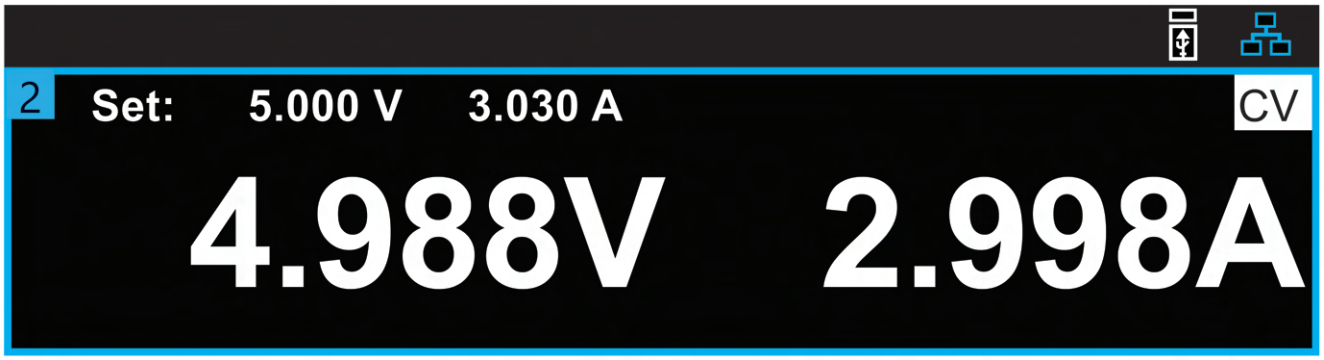


Figure 5.2 Display View 2

Display View 3 focuses on monitoring the measured power, while also monitoring the voltage and current output as a secondary measurement.

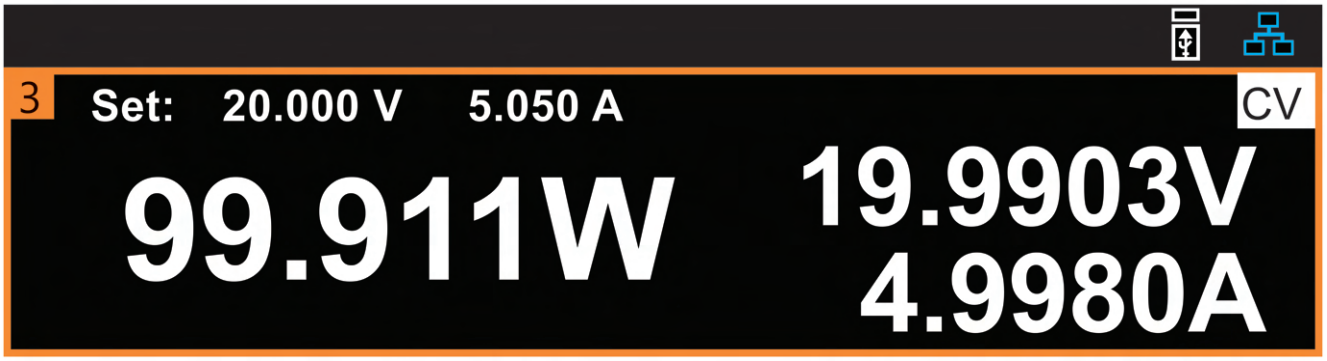


Figure 5.3 Display View 3

CAUTION **While display view 2 and 3 improve the metering visibility of selected channel it provides no monitoring for the remaining channels.**

5.3 Channels Configurations

The MPS Mainframe can be populated with any combination of up to four of the modules listed in table **5.2**.

NOTICE

The available mainframe models offer maximum output powers of 600W or 1200W. By allocating mainframe power efficiently, the total output power of installed modules can surpass the rated power of the mainframe. This approach reduces system setup costs by eliminating the need for a higher-rated mainframe model.

For instance, a 600W mainframe model MPS1000 can house two 300W modules and two 100W modules, delivering a combined output power of 800W. The power limits for each installed module can be adjusted, such as reducing the maximum power limits of both 300W modules to 200W while maintaining the full 100W for the other two modules.

Model	Description
MPS1101	Multi-Range DC Power Supply Module 15 V / 20 A / 100 W
MPS1102	Multi-Range DC Power Supply Module 32 V / 9.4 A / 100 W
MPS1103	Multi-Range DC Power Supply Module 60 V / 5 A / 100 W
MPS1104	Multi-Range DC Power Supply Module 100 V / 3 A / 100 W
MPS1301	Fixed Range DC Power Supply Module 15 V / 20 A / 300 W
MPS1302	Fixed Range DC Power Supply Module 32 V / 9.4 A / 300 W
MPS1303	Fixed Range DC Power Supply Module 60 V / 5 A / 300 W
MPS1304	Fixed Range DC Power Supply Module 100 V / 3 A / 300 W

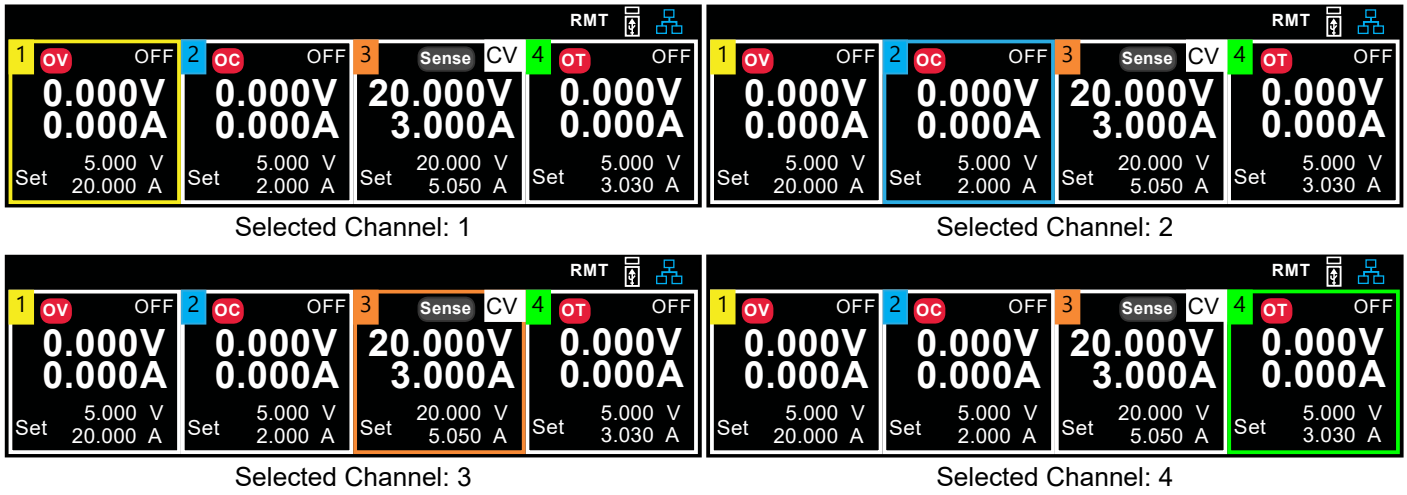
Table 5.2 Available Modules

In Normal Operation mode each module is configured individually.

To configure a channel:

Step 1. Select the desired channel by pressing the pressing the **Channel** key or by using the right and left navigation key.

- The **Channel** key will cycle the selected channel between 1 through 4, regardless of the current menu or display view.
- The **right** and **left** navigations keys will only cycle the through channels in the main display view.



Selected Channel: 1 | Selected Channel: 2

Selected Channel: 3 | Selected Channel: 4

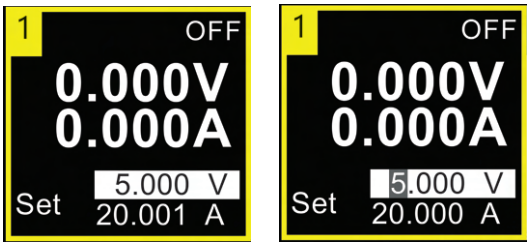
Figure 5.4 Main Display Selected Channel

NOTICE

In the main display the selected channel is emphasized by enabling the corresponding color of the square surrounding the channel. Refer to **figure 5.4**

Step 2. To configure the voltage output press the **Vset** key. The voltage value textbox will be highlighted indication Voltage Level configuration was enabled.

- Use the numeric keypad to enter the desired voltage level.
- The navigation keys can also be used to navigate and configured single decimal place values. When single decimal places are configured the selected digit will be highled with a dark grey selector.
- Press the **Enter** key to confirm the set value. If enter is not pressed the value will not be saved and the previous value will be loaded.



Voltage Level Configuration Enabled

Voltage Single Digit Configuration

Figure 5.5 Voltage Level Configuration

Step 3. To configure the voltage output press the **Iset** key. The voltage value textbox will be highlighted indication Current Level configuration was enabled.

- Use the numeric keypad to enter the desired voltage level.
- The navigation keys can also be used to navigate and configured single decimal place values. When single decimal places are configured the selected digit will be highled with a dark grey selector.
- Press the **Enter** key to confirm the set value. If enter is not pressed the value will not be saved and the previous value will be loaded.

Current Level Configuration Enabled

Current Single Digit Configuration

Figure 5.6 Current Level Configuration

Output Connections

6.1 Output Wiring

WARNING **SHOCK HAZARD Disconnect the AC power before making rear panel connections. All wires must be properly connected with the terminal block screws securely tightened.**

Disconnect the connector plug to make your wire connections. Connect the load wires to the + and - terminals. Connect the sense wires to the +s and -s terminals for local sense. Sense jumpers are provided for local sensing.

Securely fasten all wires by tightening the screw terminals. Insert the connector plug into the back of the unit. Secure the connector by tightening the locking screws. A chassis ground binding post is located next to the AC input connector for ground connections.

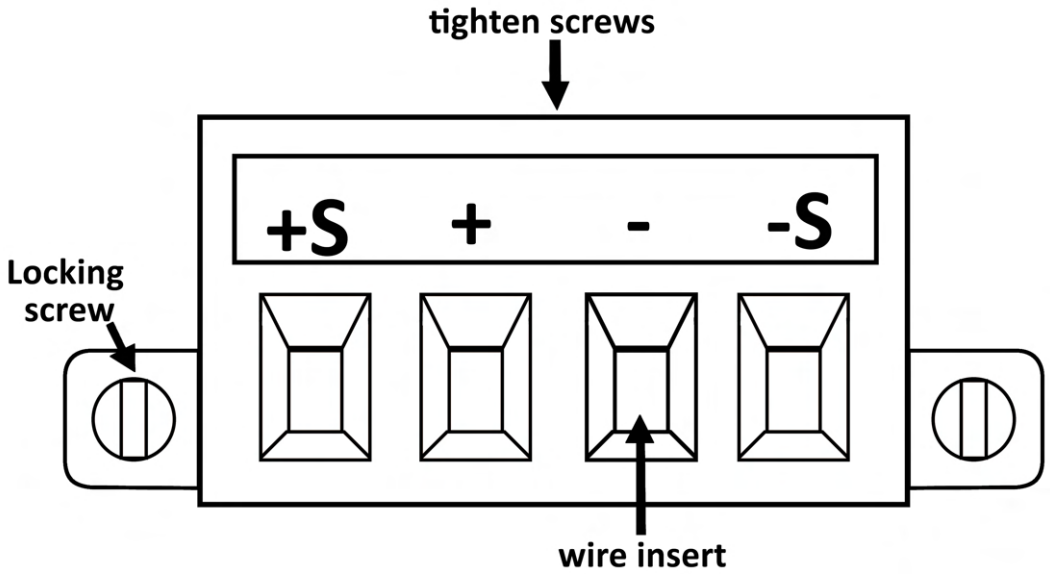


Figure 6.1 Output Connector

6.2 Wire Sizing

WARNING

FIRE HAZARD Select a wire size large enough to carry short-circuit current without overheating (refer to table ??). To satisfy safety requirements, load wires must be heavy enough not to overheat while carrying the short-circuit output current of the unit. The wiring requirements are described in the following section.

Along with conductor temperature, you must also consider voltage drop when selecting wire sizes. The following table lists the resistance for various wire sizes and the maximum lengths to limit the voltage drop to 1.0 V per lead for various currents. Note that the minimum wire size required to prevent overheating may not be large enough to prevent over-voltage tripping or maintain good regulation. Under most conditions, the load wires should also be heavy enough to limit the voltage drop to no more than l.0 V per lead.

To help prevent tripping of the over-voltage circuit, select a wire size sufficient to handle the **FULL** output current of the unit regardless of the intended load current or current limit setting.

Load lead resistance is also an important factor relating to the CV stability of the instrument when remote sensing capacitive loads. If high capacitance loads are expected, you should not use wire gauges heavier than 12 to 14 AWG for long runs of load lead.

Table 6.1 list the minum wire guage required for each module base on the wire's length.

Model	Wire Length in feet	Required Gauge
MPS1101 MPS1301	$\leq$ 50	10 AWG
MPS1102 MPS1302	$\leq$ 15	18 AWG
	$\leq$ 25	16 AGW
	$\leq$ 40	14 AGW
	$\leq$ 63	12 AGW
MPS1103 MPS1303 MPS1104 MPS1304	$\leq$ 20	20 AWG
	$\leq$ 30	18 AGW
	$\leq$ 50	16 AGW
	$\leq$ 80	14 AGW
	$\leq$ 125	12 AGW

Table 6.1 Minimum Wire Guage

6.3 Multiple Load Wiring

To connect multiple loads to one output while using local sense, connect each load to the output terminals using separate load wires as shown in **figure 6.2**.

This minimizes mutual coupling effects and takes full advantage of the power module's low output impedance. Keep each wire-pair as short as possible and twist or bundle the wires to reduce lead inductance and noise pickup. The goal is to always minimize the loop area or physical space between the + and - load wires from the power system to the load.

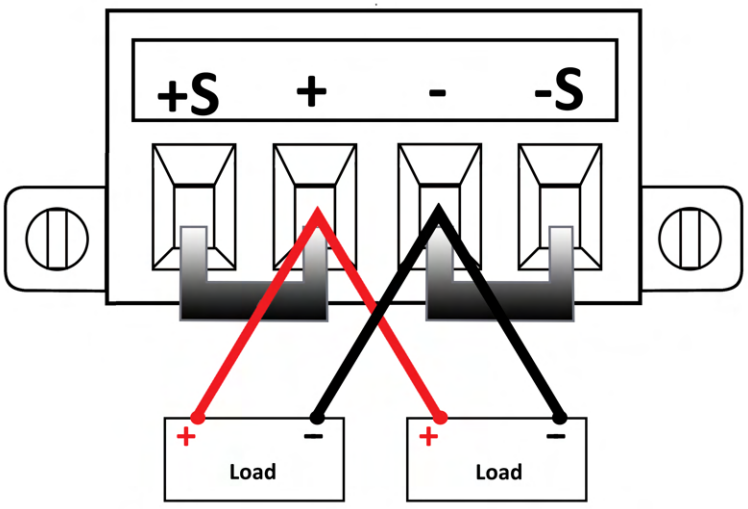


Figure 6.2 Multiple Loads Connected

If the load's terminals that are located away from the instrument, connect the output terminals by a pair of twisted or bundled wires. Connect each load's terminals separately. Remote voltage sensing is recommended under these circumstances. Sense either at the remote distribution terminals or, if one load is more sensitive than the others, directly at the critical load. Refer to **Remote Sense Connections**

6.4 Remote Sense Connections

Remote sensing improves the voltage regulation at the load by monitoring the voltage there instead of at the output terminals. This allows the power system to automatically compensate for the voltage drop in the load leads. Remote sensing is especially useful for CV operation with load impedances that vary or have significant lead resistance. It has no effect during CC operation.

Connect the unit for remote sensing by first disconnecting the shorting bars between sense and the output terminals. Make your connections as shown in **figure 6.3**. Connect the load to the output terminals using separate connecting wires. Keep the wire-pair as short as possible and twist or bundle it to reduce lead inductance and noise pickup. Keep load leads under 14.7 meters (50 feet) per lead because of inductance effects.

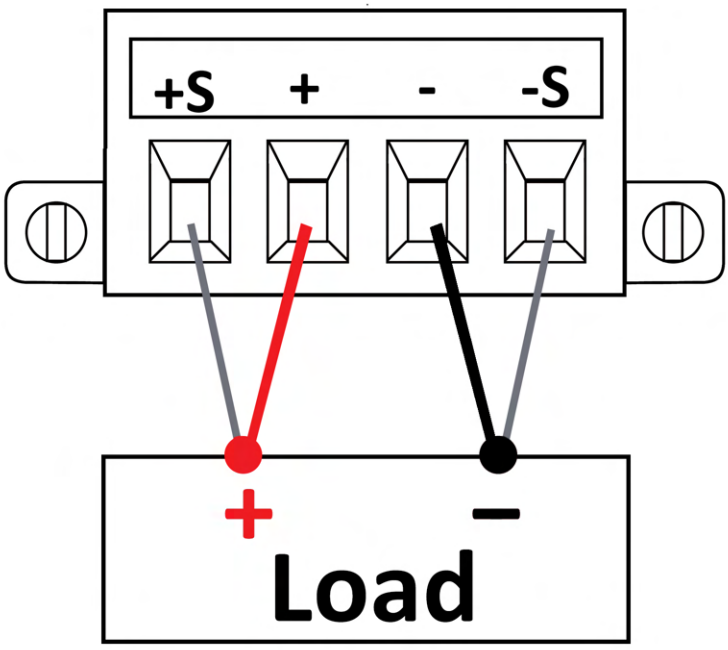


Figure 6.3 Remote Sense Connections

NOTICE

Do NOT bundle the sense wire-pair together with the load leads; keep the load wires and sense wires separate. The sense leads carry only a few milliamperes of current and can be a lighter gauge than the load leads. However, note that any voltage drop in the sense leads can degrade the voltage regulation of the instrument. Keep the sense lead resistance less than about 0.5 Ω per lead (this requires 20 AWG or heavier for a 50 foot length).

⚠WARNING

Never connect any power source into any of the terminals at any time during operation. When output is enabled, DO NOT use your hands to touch the terminals or the screws that are designed to tighten wires to the terminals. Doing so may create a shock hazard under high voltage output conditions.

⚠CAUTION

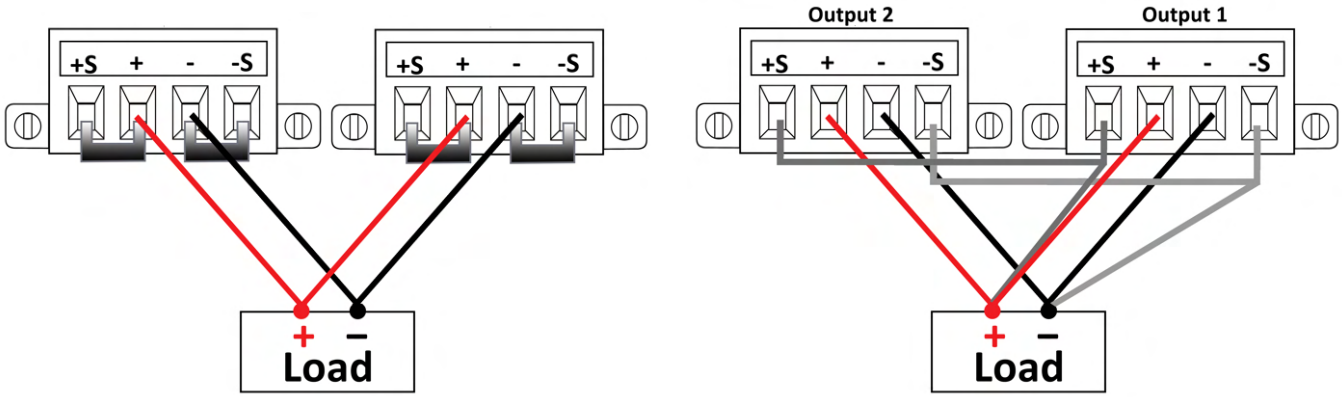
DO NOT at any time disconnect the wires from the S+ and S- terminals to the DUT while output is enabled (ON). Doing so may damage the power supply and cause unstable output.

6.5 Parallel Mode

CAUTION **Only connect power supplies that have identical voltage and current ratings in parallel.**

Connecting power supplies in parallel provides a greater current capability that can be obtained from a single unit.

Figure 6.4 illustrates how to connect two outputs in parallel. the figure on the left illustrates local sensing. If voltage drop in the load leads is a concern, the figure on the right shows how to connect the remote sense. Note that in both cases, the remote sense terminals must be connected.



Parallel Mode Local Sense Parallel Mode Remote Sense

Figure 6.4 Parallel Mode Sense Connections

6.6 Series Mode

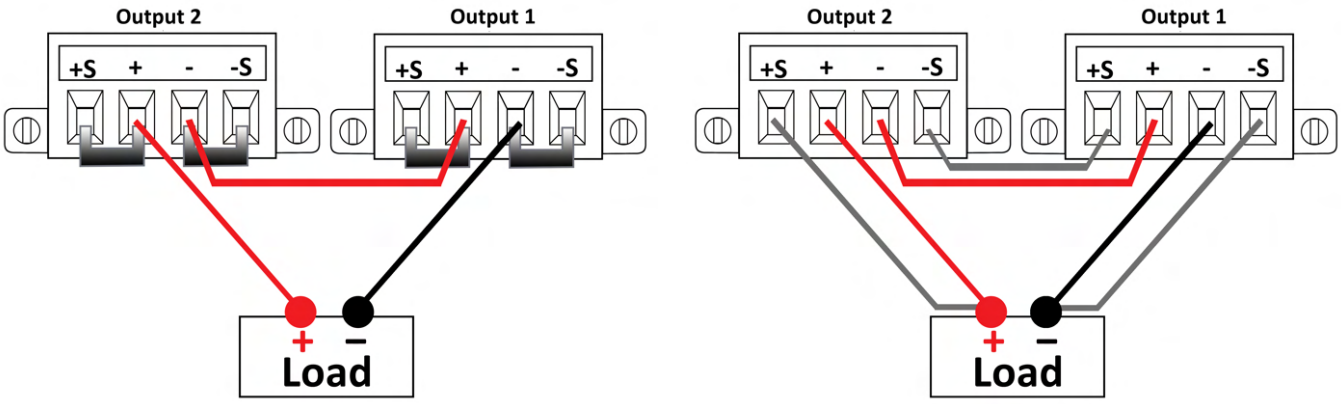
WARNING **Floating voltages must not exceed 240 VDC. No output terminal may be more than 240 VDC from chassis ground.**

CAUTION **Only connect power supplies that have identical voltage and current ratings in parallel.**

Do not leave the output on while the other is off.

Connecting outputs in series provides a greater voltage capability than can be obtained from a single output. Because the current is the same through each element in a series circuit, outputs connected in series must have equivalent current ratings.

Figure 6.5 illustrates how to connect two outputs in series to a single load. If voltage drop in the load leads is a concern, connect the sense leads of output 1 and output 2 for remote sensing as shown in the figure on the right. Note that the + sense lead of output 1 must remain connected to the - sense terminal of output 2.



Series Mode Local Sense Series Mode Remote Sense

Figure 6.5 Series Mode Sense Connections

Output Configuration

The MPS series offers various output features/modes for precise control, protection, and output ranges.

The output menu includes parameters for detailed control and customization of the power supply to meet specific application requirements such as; remote sense, voltage slew rate, current slew rate, on delay, off delay, and power limit.

The protection settings of the MPS series are crucial for ensuring safe and reliable operation. Maintain safe operation, prevent damage, and ensure the longevity and reliability of the power supply and connected equipment. These setting consist of; OVP Limit, OCP state, OCP Limit, Vmax, and Vmin.

The MPS Series can operate in various modes to meet different application requirements. The primary operation modes include; Normal, Parallel, Series, and Tracking mode. These operation modes enhance the versatility and capability of power supplies, enabling them to meet a wide range of voltage and current requirements in various applications.

7.1 Output Parameters

The **Output** menu is acessible by pressing **Utility** →**Output**.

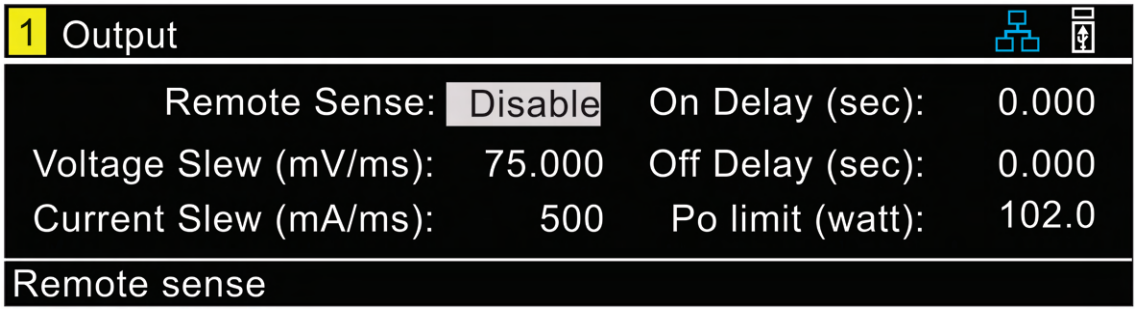


Figure 7.1 Output Menu

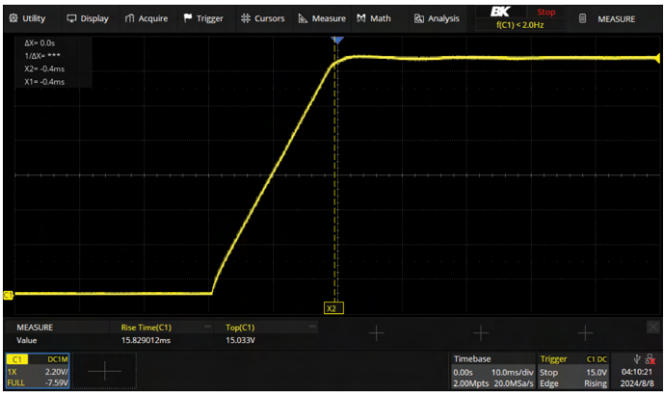
7.1.1 Remote Sense

Remote sense compensates for voltage drops (up to 1 V) in the load leads by sensing the voltage directly at the load, ensuring accurate voltage delivery. The remote sense setup will vary depending on the selected operation mode. For more information refer to **Remote Sense Connections**.

7.1.2 Voltage Slew

Voltage slew configures the rate at which the output voltage can change, critical for applications requiring rapid voltage adjustments. This setting can used to prevent crossover into current limit while up- and down-programming capacitive loads. When set to maximum or high slew rates thethe slew rate will be limited by the analog performance of the output circuit allowing the voltage to exceed the set slew rate. **Figure 7.2** demonstrates the measured rise time when max slew rate is set for MPS1101. Notice the rise time was 16 ms and has a higher overshoot despite the slew rate being configured to 750 mV/ms (20 ms for 15 V).

Slow Slew Rate



Max Slew Rate

Figure 7.2 MPS1101 Slew Rate Example

7.1.3 Current Slew

The current slew parameter defines the rate at which the output current can change. It is specified in units of milliamperes per millisecond (mA/ms). This parameter is crucial for applications requiring control over how quickly the current can ramp up or down, such as in sensitive electronic testing or power conditioning scenarios.

A feedback loop constantly monitors the output current and adjusts the power supply's internal components to match the desired slew rate. This ensures that the current changes smoothly and accurately. To prevent overshoot or undershoot, the power supply incorporates protection mechanisms that ensure the current change does not exceed safe limits, thus protecting both the power supply and the load, however, with high slew rate values the feedback loop may not be fast enough, which in turn may lead to some overshoot as shown in **figure 7.3**.

Slow Slew Rate Max Slew Rate

Figure 7.3 MPS1101 Current Slew Rate Example

The current slew rate parameter is essential for applications where rapid and controlled changes in current are necessary, ensuring stability, precision, and protection in the power delivery process.

7.1.4 On/Off Delay

The on and off delay parameters specify the time delays involved in transitioning the output to an active state or shutting it down. These parameters are essential for applications that require controlled power sequencing to ensure proper operation and protection of connected devices.

On Delay: The on delay is the time interval between the moment the module receives a command to turn on the output is received until the output actually turns on.

Off Delay: The off delay is the time interval between the moment the module receives a command to turn off the output is received until the output actually turns off.

This user-defined offset also makes it possible to connect multiple power supplies together and program accurate turn-on sequences across multiple outputs. The user-programmed turn-on delay will then be added to the common user-defined reference point.

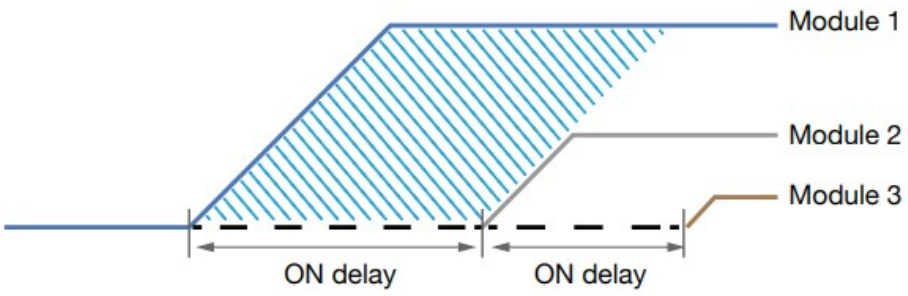


Figure 7.4 Channel Coupling and On-Off Delay Sequence

7.1.5 Power Limit

The power limit parameter in a power supply defines the maximum power output that the module can deliver. This parameter is essential for protecting both the power supply and the connected devices from potential damage due to excessive power.

7.2 Protection Parameters

The protection parameters are designed to safeguard both the MPS Series and the connected devices from potential damage. Key protection parameters include: overvoltage Protection(OVP), overcurrent Protection(OCP) and the voltage's range.

The **Protection** menu is acessible by pressing **Utility** →**Protection**.

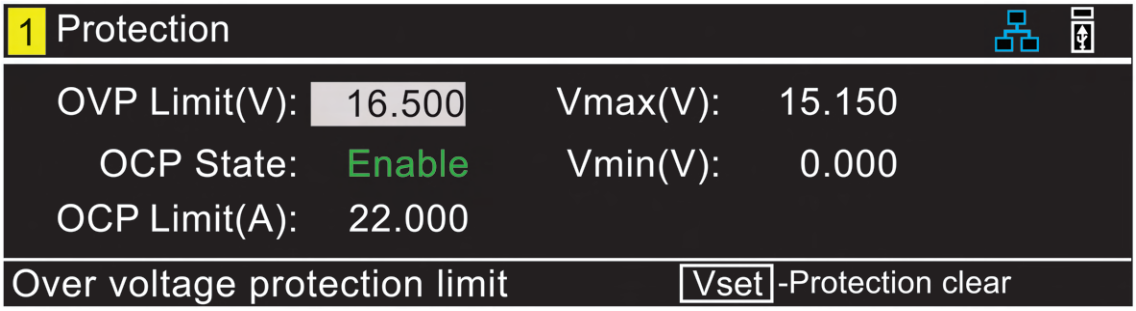


Figure 7.5 Output Menu

NOTICE The MPS offers overtemperature protection despite it not being a configurable parameter in the **Protection** menu.

7.2.1 Overvoltage Protection (OVP)

OVP is a critical safety feature that prevents the output voltage from exceeding the specified limit, which is essential in various testing environments, offering a reliable safeguard against unexpected voltage excursions, ensuring the safety and integrity of both the test equipment and the devices under evaluation.

When the output voltage surpasses the set OVP threshold, the power supply automatically clamp the voltage level to 0 V. Here are some examples of testing scenarios where OVP is implemented:

- During the testing of sensitive electronic components, OVP ensures that any accidental voltage spikes do not damage the device under test (DUT).
- In circuit validation tests, OVP can prevent overstress on circuit components if an unintended voltage increase occurs.
- In battery testing or charging applications, OVP can protect against overcharging, which could lead to battery damage or safety hazards.

NOTICE While the OVP threshold can be configured the OVP state cannot be disabled.

7.2.2 Overcurrent Protection (OCP)

OCP is a vital feature that limits the output current to a predetermined safe level, preventing damage to both the power supply and the connected load due to excessive current draw.

When the output current exceeds the OCP threshold, the power supply limits the voltage level to 0 A to prevent damage. Here are some examples of testing scenarios where OCP is implemented:

- OCP prevents damage to sensitive electronic components during testing by ensuring they are not exposed to currents beyond their rated capacity.
- During the validation of circuit protection devices, such as fuses or circuit breakers, OCP helps in accurately testing their response to overcurrent conditions.
- In battery testing, OCP can prevent excessive charging currents that could lead to overheating, cell damage, or safety hazards.

CAUTION

The OCP state is configureable and is enabled by default. The MPS series will still protect itself by transitioning into constant current mode (CC) once the current limit is reached, however, there will be no protection for the DUTs current limit.

7.2.3 Voltage Range

The MPS's voltage range can be define by setting the minimum and maximum output voltage levels. This range is crucial for determining the suitability of the MPS Series for various testing applications.

The power supply allows users to set the output voltage range anywhere within the specified range, providing limited ranges of functionality for specific test.

7.2.4 Over Temperature Protection (OTP)

The state and limit of both OTP & OTW cannot be set or configured in the protection settings. OTP is set to 85 °C and OTW is set to 75 °C. If the temperature reaches either OTW, the OT icon will blink on the display with a low period beep sound. If temperature reaches OTP the OT icon will show on the display and the output will turn off. The output will not be allowed to turn on until the temperature drops to 75 °C.

7.3 Mode

The MPS Series offer series, parallel, and tracking mode. This modes provide versatile configurations to meet different output requirements.
The **Mode** menu is acessible by pressing **Utility** →**Mode**.

Figure 7.6 Output Menu

7.3.1 Series Mode

Connecting power supplies in parallel increases the total voltage capacity beyond what a single module can provide.

CAUTION **While it's possible to operate units in parallel without enabling the series function, doing so may result in damaging of modules if the output levels of each module are not manually tracked properly.**

To Prevent Equipment Damage:

- Connect no more than four units with identical voltage ratings in parallel.
- Do not connect different models in series.

For more details regarding the parallel mode connections please refer to **Series Mode Connections**.

7.3.2 Parallel Mode

Connecting power supplies in parallel increases the total current capacity beyond what a single module can provide.

CAUTION

While it's possible to operate units in parallel without enabling the parallel function, doing so may result in damaging of modules if the output levels of each module are not manually tracked properly.

To Prevent Equipment Damage:

- Connect no more than four units with identical voltage ratings in parallel.
- Do not connect different models in parallel.

For more details regarding the parallel mode connections please refer to **Parallel Mode Connections**.

7.3.3 Tracking Mode

In tracking mode the mainframe synchronizes multiple output channels to ensure they maintain specific voltage or current levels in relation to each other. This is crucial for applications requiring synchronized power delivery across multiple circuits or devices.
Tracking mode can be paired with the slew and on/off delay parameters to configure unique and precise startup power sequences as shown in figure ??.

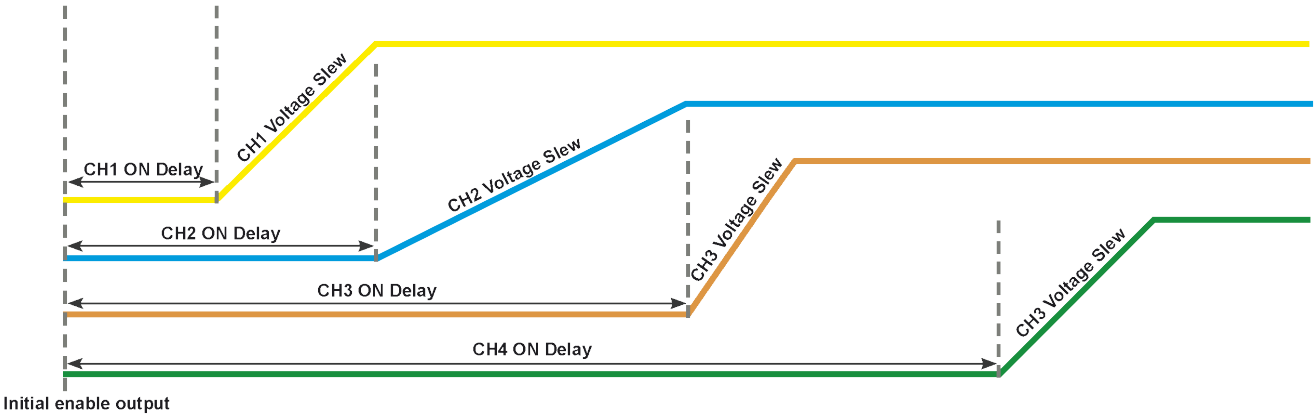


Figure 7.7 Tracking Sequence

List Mode

The List function allows users to program a sequence of output voltage and current levels over a defined period. This function enables the MPS Series to execute a pre-set series of steps automatically, varying its output according to the user-defined parameters.

Each list program can contain up to 512 programmable steps, with a maximum of 10 configured list programs stored in memory. The list memory is shared across all four channels, enabling the channels to either run the same list or different lists simultaneously.

NOTICE

Users can externally store more list program. This allows users to save and load to and from an external flashdrive in order to save more than 10 list programs.

8.1 List Setup

List Mode is broken down into 3 parts; **List Setup**, **List Edit**, and **Steps Edit**.

The **List Setup** menu is acessible by pressing **Utility** →**List** →**Setup**.

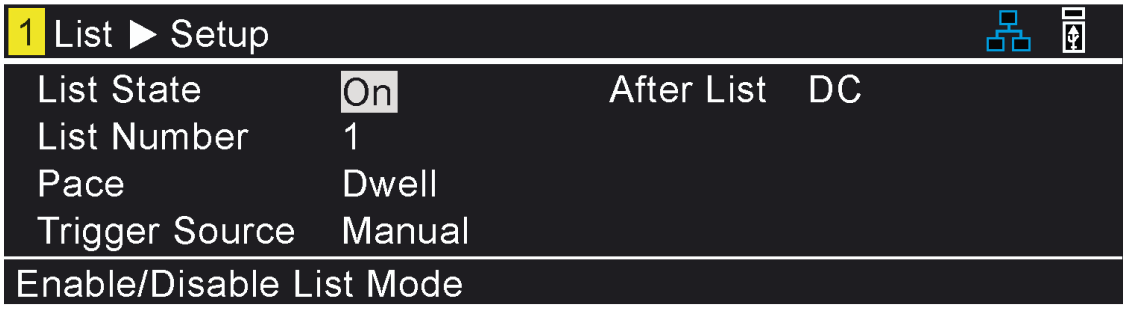


Figure 8.1 List Setup Menu

In the list setup menu user can configure the generic list settings of the active channel. These settings will apply to any list loaded in the active channel and include the list state, the active list, the list's trigger source, and the output state after list completion.

8.1.1 List State

The list state parameter refers to the operational status of a programmed list sequence. It indicates whether the list mode is active or inactive providing control over the execution of the list sequence.

8.1.2 List Number

The List Number parameter allows users to select one of the 10 available list programs stored in the power supply's memory. The selected list will be executed when the list mode is activated and the initiation signal is received.

Setting the List Number, users can quickly switch between different test scenarios or power sequences without reprogramming the steps. This is particularly useful in testing environments where different conditions need to be simulated in rapid succession.

NOTICE

The List Number parameter is set independently for each channel, allowing different channels to run different list programs simultaneously or the same program synchronously.

8.1.3 Pace

The List Pace parameter of a determines the transition between each step in a programmed list sequence. The user can set the pace to either Dwell or Trigger

Dwell: The next step will automatically be executed when once the active step elapses.

Trigger: The MPS output will remain on the active step's levels even after the dwell time of the step elapses. To proceed to the next step the instrument must receive a trigger signal corresponding to the set Trigger Source.

NOTICE

The List Pace can be synchronized with external signals or triggers, allowing the power supply to adjust the timing of the sequence in coordination with other equipment or processes in a test setup.

8.1.4 Triggers Source

The List Trigger Source parameter defines the event or condition that initiates the execution of the next step when List Pace is set to Trigger. This parameter allows users to control when the next steps starts, offering flexibility in how and when the power supply transitions through the programmed steps. The List Trigger Source can be set to various options such as manual initiation, external signal input, or software command. Depending on the configuration, the trigger can be controlled by a user, another device, or an automated system.

When the MPS is waiting for a trigger the -Trigger textbox will be highlighted in white as shown in **figure 8.2**

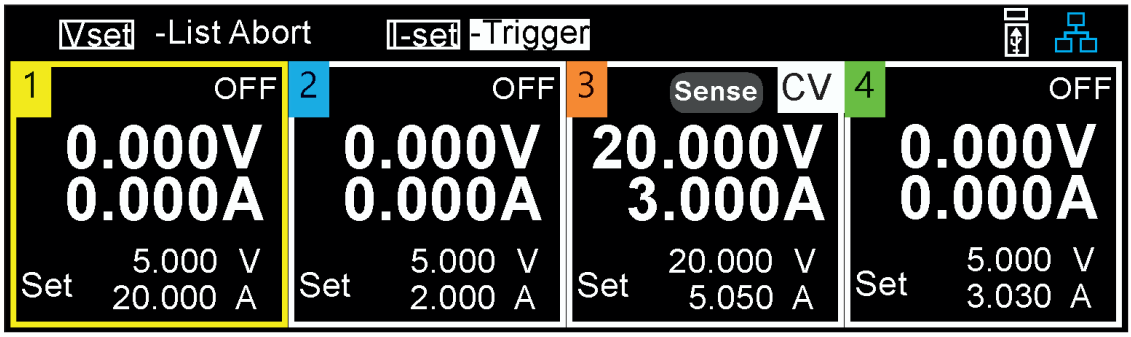


Figure 8.2 Waiting For Trigger

Manual: The trigger can be manually activated by the user via the front panel, allowing direct control over when the next list step begins. This is ideal for scenarios where precise timing is not critical. When trigger source is set for manual the Iset key will function as the trigger button.

Digital IO When set to an digital IO, the next step begins in response to an external signal, such as a voltage pulse or digital input. This is useful in coordinated testing environments where the power supply must synchronize with other equipment.

Remote: In automated systems, the List Trigger Source can be set to respond to software commands sent via a computer or controller. This allows for integration into larger automated test systems, enabling the power supply to operate in sync with other automated processes.

8.1.5 Afters List

The After List parameter provides flexibility in defining the end-state of the list, allowing users to tailor the post-list behavior to specific application needs, whether for safety, efficiency, or ease of use. This ensures that the power supply behaves in a controlled and predictable manner after the list sequence ends.
The After List parameter can be set to either **DC** or **Last**:

DC: After the list is completed, the output levels will revert to the values set before the list was executed. For example, if the voltage was initially programmed to 5 V and 1 A, the output will return to these values once the list finishes.

Last: Upon completing the list, the output levels will stay at the programmed values of the final step. For instance, if the voltage was set to 5 V and 1 A before executing the list, but the last step in the sequence is set to 10 V and 2 A, the output will remain at 10 V and 2 A after the list concludes.

CAUTION

If the list is aborted, the ouptut will return to the programmed voltage and current value before the list was executed regardless of the set After List parameter.

8.2 List Edit

List Mode is broken down into 3 parts; **List Setup**, **List Edit**, and **Steps Edit**.

The **List Edit** menu is acessible by pressing **Utility** →**List** →**Edit**.

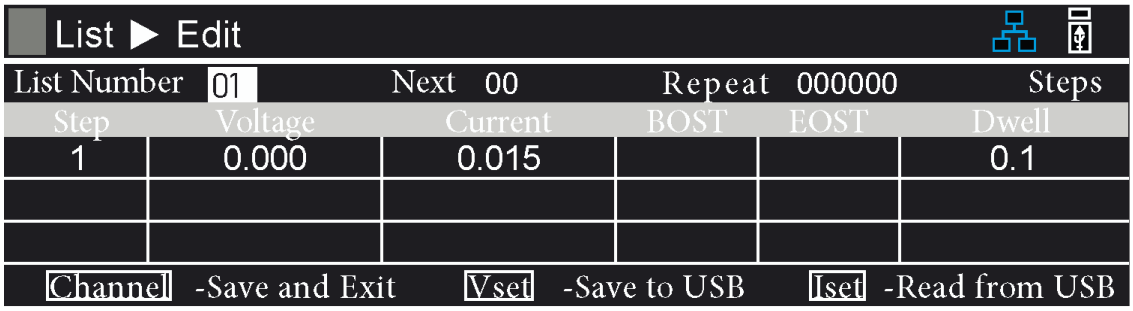


Figure 8.3 Edit List Menu

In the edit list menu user can configure the selected list's parameters as well as enable steps configuration. These settings will only apply to the selected channel and include the list number, Next, Repeat, and Step Configuration mode.

From this menu, the user can save the selected list to the MPS's internal memory or an external drive. Lists saved on an external drive can also be uploaded.

8.2.1 List Number

The List Number parameter allows users to select one of the 10 available list programs stored in the power supply's memory. The selected list parameters will be loaded for the user to configure them.

Setting the List Number, users can quickly switch between different list programs to configure multiple list without having to leave the Edit List menu.

8.2.2 Next

The Next List parameter controls which list sequence will be executed after the current one completes, enabling smooth transitions between different lists. This allows for consecutive execution of multiple sequences, ideal for complex testing scenarios like multi-phase testing or simulations.

The power supply automatically shifts to the next specified list, reducing the need for manual intervention and enhancing efficiency in automated setups. Users can also configure the Next List parameter for looping or dynamic adjustments based on previous test outcomes, supporting repetitive cycles and continuous operation.

8.2.3 Repeat

The Repeat List parameter controls how many times a list sequence is repeated after execution, allowing for extended or cyclical testing without manual reactivation. It can be set to a specific number of repetitions for durability testing or to loop continuously for long-term testing (1 -99999). This feature ensures consistent conditions across iterations, reduces manual intervention, and enhances efficiency in automated test setups. After reaching the set repetitions, the power supply can either maintain the final state, transition to the next list, or return to the output levels programed prior to the execution of the list, depending on other related parameters like After List or Next List.

NOTICE

Setting the Repeat List to maximum (100000) value allows the list to loop continuously until manually stopped, making it ideal for long-term testing or endurance simulations.

8.2.4 Steps

The Steps parameter enables step configuration where user can specify the voltage or current levels, trigger out signals, and the duration for each step. This parameter allows users to create detailed sequences that the power supply will follow during execution. For more information on step configuration refer to **Steps Edit**.

8.2.5 Load and Save List

The **Save and Exit**/**Save to USB** and **Read from USB** functions allows users to store and retrieve programmed list sequences from internal/external memory and to internal/external memory, facilitating the reuse and management of complex power sequences. This feature is essential for efficient test setup and execution, especially in environments where multiple sequences are used regularly.

Save and Exit: In the **List Edit** menu the Channel key serves the "Save and Exit" function. This enables users to store the configured list sequence in the MPS's internal memory or on an external drive. This ensures that the sequence can be easily accessed and reused in future operations without needing to be reprogrammed.

Save to USB: In the **List Edit** menu the Vset key serves the "Save to USB" function. This enables users to store the configured list sequence in an external drive. When lists are saved to an external drive, they can be transferred between multiple MPS.

Read from USB: In the **List Edit** menu the Iset serves the "Read from USB" function. This enables users to load previously configured list sequence from an external drive. This allows users to quickly load a previously saved list sequence, from an external storage device. This is particularly useful when more than 10 programmed files must be saved.

8.3 Stesps Edit

List Mode is broken down into 3 parts; **List Setup**, **List Edit**, and **Step Edit**.

The **Steps Edit** menu is acessible by pressing **Utility** →**List** →**Edit** →**Steps**.

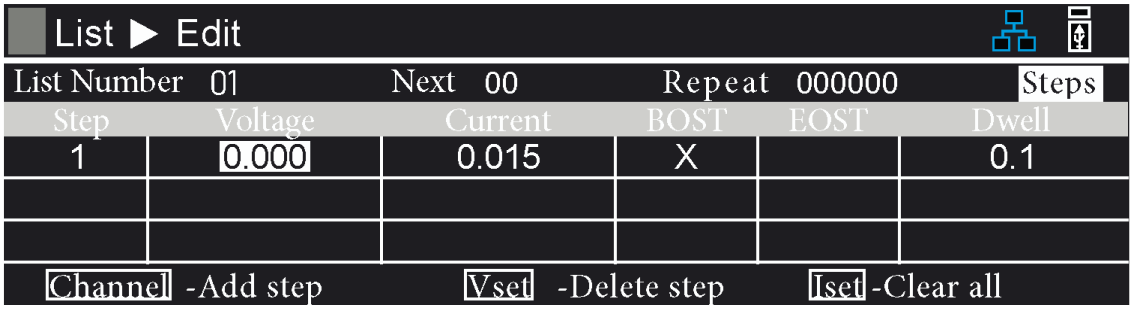


Figure 8.4 Edit List Menu

In the steps edit menu user can configure the selected list's steps. These parameters consist of the step count, voltage or current levels, trigger out signals, and the duration for each step.

8.3.1 Add Delete Clear Steps

Add step: In the **Steps Edit** menu the Channel serves the "Add step" function. This enables users to add up to 512 steps per list.

Delete step: In the **Steps Edit** menu the Vset key serves the "Delete step" function. This enables users delete any selected step.

Clear all: In the Steps Edit menu, the Iset key serves as the "Clear all" function. This allows the user to delete all steps except for step one, which is reset to its default values. The default values are; Voltage - 0.000, Vurrent - 0.015, EOST - disabled, BOST0 - disabled, Dwell - 0.1

8.3.2 Voltage

Specifies the voltage level of the active step. When more than one step is available the up and down navigation arrows can be used to cycle the active step. Use the numeric keypad to enter the desired voltage level of the selected step. Press the Enter key to confirm and assign the voltage level.

NOTICE

If the voltage level of a step exceeds the voltage range of the module recalling the list the voltage level will be clamped to the maximum rated voltage level of the module.

MODEL	MPS1101 MPS1301	MPS1102 MPS1302	MPS1103 MPS1303	MPS1104 MPS1304
Voltage				
Range	0 - 15 V	0 - 32 V	0 - 60 V	0 - 100 V
Resolution	1 mV			

Table 8.1 Voltage Ranges

8.3.3 Current

Specifies the current level of the active step. When more than one step is available the up and down navigation arrows can be used to cycle the active step. Use the numeric keypad to enter the desired current level of the selected step. Press the Enter key to confirm and assign the current level.

NOTICE

If the current level of a step exceeds the current range of the module recalling the list the current level will be clamped to the maximum rated current level of the module.

MODEL	MPS1101 MPS1301	MPS1102 MPS1302	MPS1103 MPS1303	MPS1104 MPS1304
Current				
Range	0 - 20 A	0 - 9.5 A	0 - 5 A	0 - 3 A
Resolution	1 mA			

Table 8.2 Current Ranges

8.3.4 Beggining-Of-Step

The BOST List parameter, when enabled, sends a trigger signal from the Digital I/O at the start of the step. This allows for precise timing and coordination with external devices or systems that rely on the start of step to start their processes. By using the BOST Trigger Output, users can automate and synchronize complex testing procedures. For example, the start of a step could trigger data acquisition, activate another piece of equipment, or move to the next phase of testing.

8.3.5 End-Of-Step

The EOST List parameter, when enabled, sends a trigger signal from the Digital I/O once a step in the sequence is completed. This allows for precise timing and coordination with external devices or systems that rely on the step's completion to start their processes. By using the EOST Trigger Output, users can automate and synchronize complex testing procedures. For example, the completion of a step could trigger data acquisition, activate another piece of equipment, or move to the next phase of testing.

NOTICE The function of the a digital pin must be configured for Trigger_Out for more information refer to Pin Function

8.3.6 Dwell

The Dwell parameter defines the duration for which the output level at each step in a sequence is maintained. It determines how long each step lasts before transitioning to the next, allowing for precise control over testing conditions, from quick transitions between steps to prolonged exposure at a certain output level. This flexibility makes it suitable for a wide range of applications, including stress testing, endurance testing, and performance evaluation.

NOTICE The function of the a digital pin must be configured for Trigger_Out for more information refer to Pin Function

States

The Save/Recall State functions allows users to store and retrieve specific configurations or operational states, providing flexibility and convenience in managing different test setups or operational modes. The Power On State option allows user to select what states saved to internal memory are loaded on boot upd.

The MPS can store up to 10 states in internal memory, and as many states as needed in external drivers, providing a library of configurations that can be accessed as needed. This enhances efficiency, especially in complex or repetitive testing scenarios.

The combination of Save/Recall, Power On State Default, and Reset functions provides users with powerful tools for managing the power supply's configuration. By allowing quick transitions between setups, ensuring consistent startup conditions, and providing easy recovery options, these functions enhance workflow efficiency, reduce setup time, and improve overall testing accuracy and reliability.
The **States** menu is acessible by pressing **Utility** →**States**.

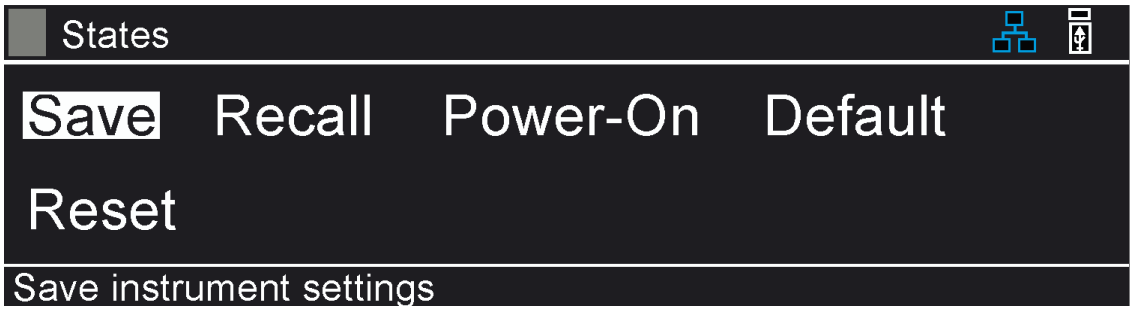


Figure 9.1 States Menu

9.1 Save

This function enables users to store the current configuration of the MPS, including voltage, current settings, protection limits to internal or external memory.

9.2 Recall

This function enables users to reacall previously saved configuration of the MPS, including voltage, current settings, protection limits from either internal or external memory. Saved states can be easily recalled later, allowing users to quickly switch between different test setups or operational modes without needing to manually reconfigure the MPS.

9.3 Power-On

The Power On State allows users to define the default configuration that the MPS will revert to when powered on. This ensures that the MPS starts up with a known set of parameters, which can be critical for safety, consistency, and ease of use. The following power on modes are available:

Off In the **OFF** mode the MPS will power on with the default values for all parameters. Default and Reset functions, help ensure consistent startup conditions and easy recovery to default settings.

Last In the **Last** mode the MPS will power on with the parameters configured before the MPS was powered off. This allows user to return to the last configurd state of the instrument.

User In the **User** mode the MPS will power on with the state specified in the selected memory state. The user must specified a previously saved state in the **User Settings** located under the Power-On menu. The **User Settings** menu is acessible by pressing **Utility** →**States** →**Power-On**.

Users can set a custom Power On State that matches the most commonly used or safest configuration for their specific application. This eliminates the need to manually adjust settings each time the MPS is turned on.

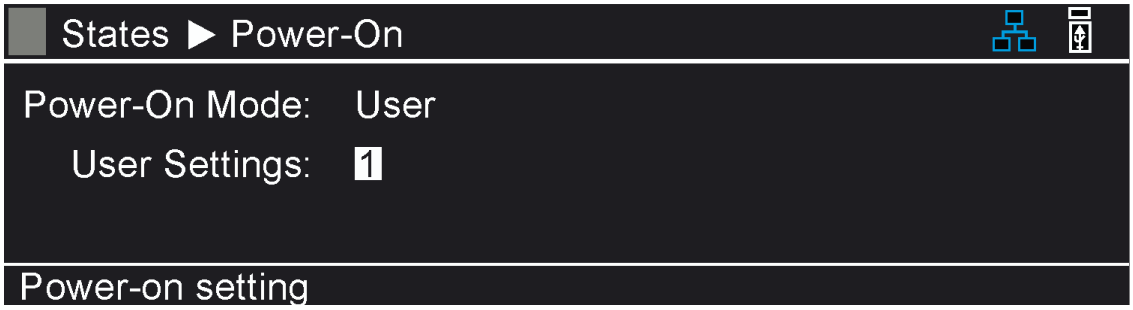


Figure 9.2 Power On Settings

9.4 Default

The "Default" function allows users to reset the MPS's calibration settings back to the original factory calibration. It enables users to revert to the MPS's initial calibration values in cases where calibration adjustments have been made or when there is a need to restore the MPS's accuracy to its factory specifications.

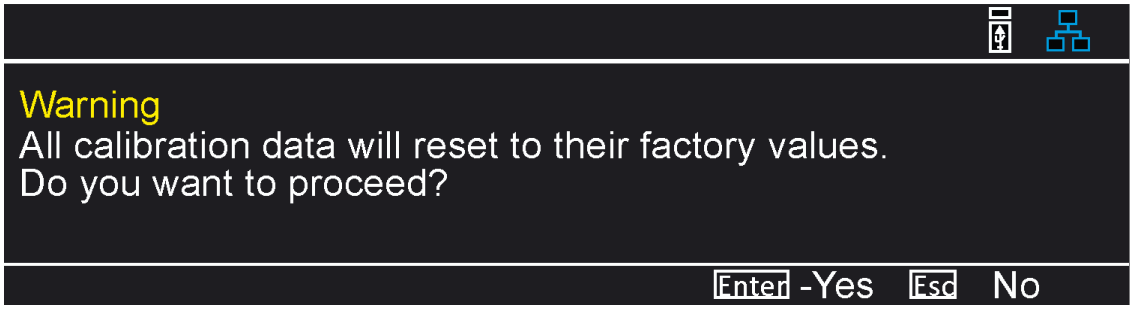


Figure 9.3 Calibration Default

9.5 Reset

The Reset function returns the power supply to its factory default settings or a user-defined baseline configuration. This is useful for troubleshooting, ensuring the power supply is operating with known good settings, or preparing the device for a new set of configurations. The user will be asked to confirm the they intend to recall the factory default settings.

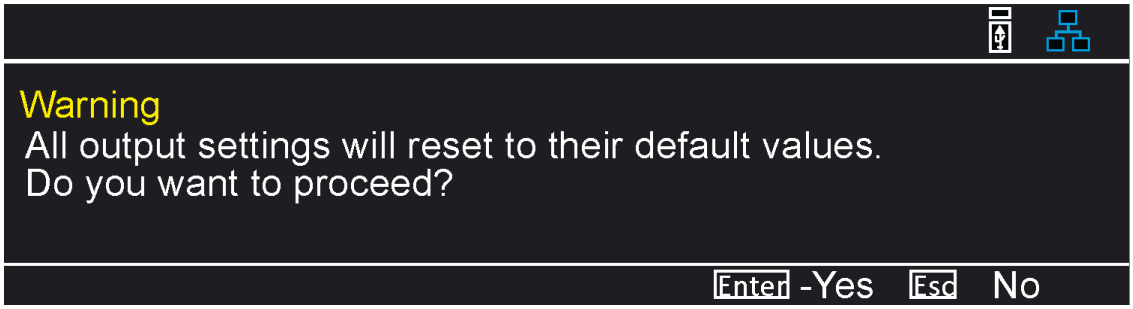


Figure 9.4 Reset Confirmation

Input/Output (I/O) Menu

The I/O settings encompass the configuration of the USB, LAN, GPIB, and DIO interface.

The **User** menu is acessible by pressing **Utility** →**I/O**.

Figure 10.1 I/O Menu

10.1 Remote Interfaces

The remote interface function enables remote control and communication between the MPS and external devices or systems. This feature allows users to operate and monitor the DC MPS from a distance, providing convenience, flexibility, and enhanced integration in various applications.

Through the remote interface function, users can establish a connection between the MPS and a controlling device, such as a computer, programmable logic controller (PLC), or other instrumentation systems. This enables remote configuration, control, and data acquisition, eliminating the need for direct physical interaction with the MPS.

The remote interface function supports various communication protocols, such as USB, Ethernet, and GPIB (General Purpose Interface Bus. This ensures compatibility and interoperability with a wide range of devices and systems, facilitating seamless integration into existing setups.

Once connected, users can remotely adjust MPS parameters, set test conditions, initiate tests, and monitor data. This allows for remote operation in applications where physical access to the MPS may be challenging, unsafe, or impractical.

10.1.1 USB

The MPS series supports USBVCP and USBTMC

Figure 10.2 USB Settings

The VISA Resource string provides the following information:
USB0::<Vendor ID>::<Product ID>::<Serial Number>:INSTR
<Vendor ID> = 0x3121
<Product ID> = 0x000b for
<Serial Number> = XXXXXXXXX

USBTMC

The USBTMC (USB Test and Measurement Class) interface is a standardized protocol used for communication and control between test and measurement instruments and computers via USB (Universal Serial Bus) connections. It provides a reliable and efficient means of transferring data and commands between the computer and the instrument, enabling seamless integration and control of various measurement devices.

The USBTMC interface allows test and measurement instruments, to be recognized and configured as USB devices by the computer. This enables easy plug-and-play functionality and compatibility across different platforms, as the USBTMC protocol is supported by most operating systems.
To access the USBTMC from a PC, the NI-VISA driver has to be installed. It can be found on the National Instruments website.

USBVCP

USBVCP (USB Virtual COM Port) is a communication protocol that emulates a traditional serial COM port over a USB (Universal Serial Bus) connection. It enables the establishment of a virtual serial port between a computer and a peripheral device, allowing bidirectional serial communication between the two.

The USBCP interface requires the following port settings:

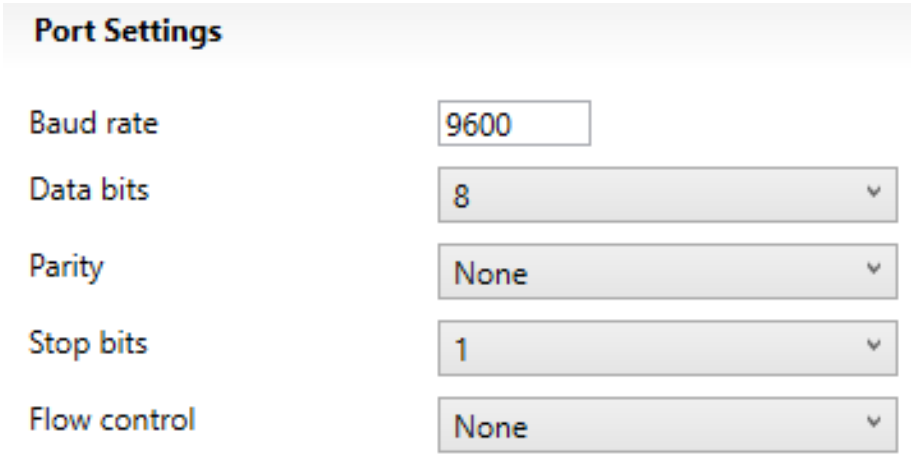


Figure 10.3 USBVCP Port Settings

To access the USB virtual COM from a PC, the USB virtual COM driver has to be installed. It can be found on the web site of B&K Precision.

10.1.2 LAN

The LAN (Local Area Network) interface provides a means for network connectivity and communication between the MPS and other devices or systems within a local network. This interface allows users to remotely control, monitor, and integrate the DC MPS into networked environments, providing convenience, flexibility, and enhanced capabilities.

The MPS series is LXI certified. LXI (LAN eXtensions for Instrumentation) LAN certification is a recognized industry standard that ensures compatibility, interoperability, and compliance of instruments and devices with the LXI specification for LAN-based test and measurement systems.

LXI LAN certification guarantees that the certified instrument conforms to the LXI specification, ensuring seamless integration and interoperability with other LXI-compliant devices and software applications. It establishes a common language and protocol VXI-11 for communication and control, enabling users to easily configure, command, and acquire data from multiple instruments within the LXI ecosystem.
The following parameters must be configured in order to establish connectivity over the LAN interface.

IP Mode

The IP mode setting allows users to define how devices obtain its IP (Internet Protocol) addresses. In the IP mode setting, users have two main options: Static IP and Dynamic IP.

Static IP: In static IP mode, users manually assign a fixed IP address to each device within the LAN network. This means that the IP address remains constant and does not change unless manually reconfigured. Static IP mode provides stability and predictability as devices always have the same IP address, which can be beneficial for applications that require consistent and controlled network communication.

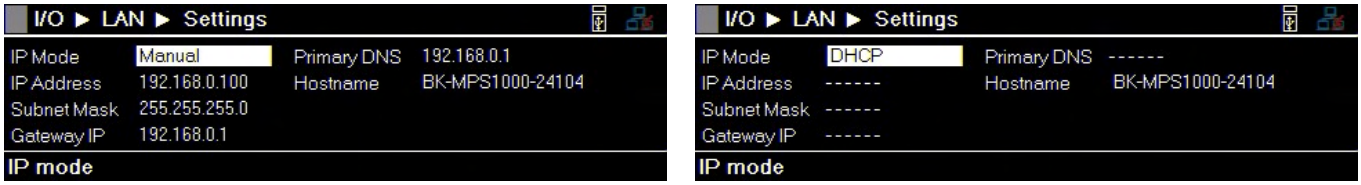
Dynamic IP (DHCP): In dynamic IP mode, the LAN network utilizes a DHCP (Dynamic Host Configuration Protocol) server to automatically assign IP addresses to devices within the network. Devices request an IP address from the DHCP server, which dynamically assigns an available IP address from a pool. Dynamic IP mode simplifies network administration as IP addresses are managed centrally and can be easily reassigned to devices as needed. It is commonly used in larger networks where frequent addition or removal of devices occurs.

NOTICE When IP Mode is set to Static IP the rest of the LAN parameters will have to be configured manually.

10.1.3 Configuring LAN Settings

To configure the LAN settings:

Step 1. Press the **Utility button** →**I/O** →**LAN** →**Settings** to enter the **LAN Settings** menu.



Static IP Mode Dynamic IP Mode

Figure 10.4 LAN Settings Menu

Step 2. Use the navigation keys to select the desired parameter.

Step 3. Use the numeric keypad to enter the appropriate value.

NOTICE

LAN Reset sets all LAN settings and webpage passwords to its default values, while **Restore Default** only sets the LAN settings to default but does not affect webpage passwords.

10.2 LAN Status

A LAN Status function is a feature that provides information about the status of a local network. It allows users to monitor the connectivity of the MPS.

The LAN Status function provides details such as:

- **MAC address**
- **IP Address**
- **Subnet Mask**
- **Gateway IP**
- **Primary DNS**
- **DNS Hostname**
- **mDNS Hostname**

To view the LAN Status page press the **Utility button** →**I/O** →**LAN** →**Status** to enter the **LAN Settings** menu.

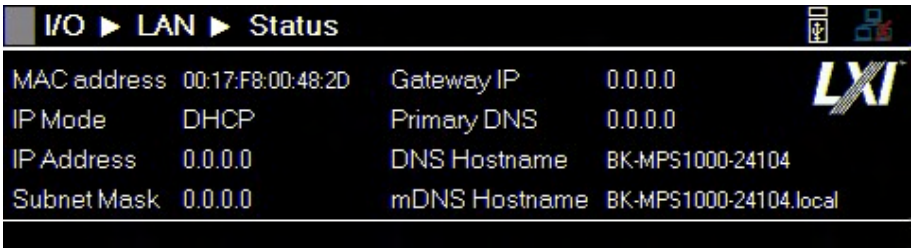


Figure 10.5 LAN Status

10.3 GPIB

The GPIB (General Purpose Interface Bus), also known as IEEE 488, is a standard communication interface. It is primarily designed to facilitate communication between various devices.

The GPIB interface provides a common method for connecting multiple devices and allows them to exchange data and commands over a shared bus. It utilizes a parallel bus architecture, consisting of a host controller (such as a computer) and multiple devices connected via a cable.

Key Features

Key features of the GPIB interface include:

- **Data Transfer**: The GPIB supports fast and reliable data transfer between devices. It allows for both uni-directional and bi-directional communication, enabling devices to send and receive data seamlessly.
- **Addressing**: Each device connected to the GPIB bus is assigned a unique address. This addressing scheme ensures that data is sent and received accurately between the intended devices.
- **Command/Control Signals**: The GPIB supports a set of standardized control signals, such as ATN (attention), REN (remote enable), and EOI (end or identify). These signals help coordinate and synchronize the operation of multiple devices on the bus.
- **Daisy-Chaining**: Multiple devices can be daisy-chained together using the GPIB interface, allowing for easy expansion and scalability of the system. This simplifies the setup and management of complex measurement or control systems.

To configure the GPIB Address of the MPS press the **Utility button** →**I/O** →**GPIB** to enter the **GPIBSettings** menu. and use the numeric keypad to enter the desired address.

Figure 10.6 GPIB

10.4 Digital I/O

The Digital I/O (Input/Output) interface allows the MPS to communicate with external devices or systems. This functionality includes 5 programmable pins that can be configured for trigger in/out, digital output/input, and fault output, inhibit in, and sync out that can be used for various control and monitoring purposes

The **User** menu is acessible by pressing **Utility** →**I/O** →**DIO**.

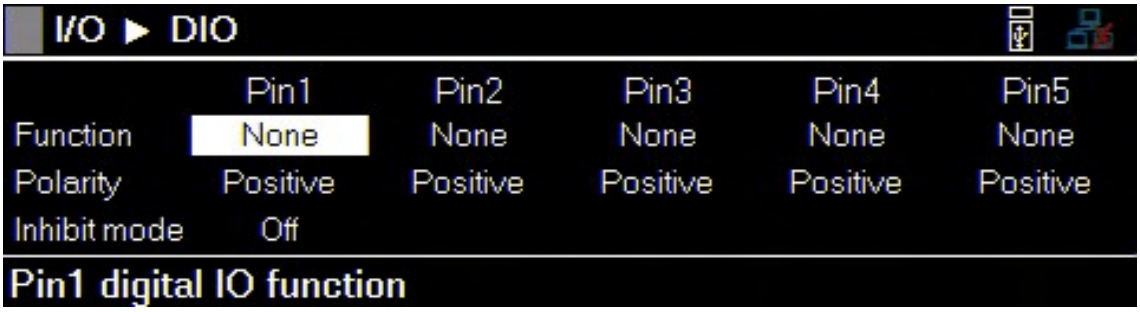


Figure 10.7 Digital I/O Menu

10.4.1 Function

The first 5 pins can be programmed to:

Digital In (Input): The Digital In port allows the MPS to receive TTL signals from external devices. The input typically recognizes logic levels (e.g., 0V for low, 5V for high) and can be used for automation in complex systems.

Digital Out (Output): The Digital Out port provides a TTL output from the power supply to external devices. This output can indicate the status of the MPS (e.g., whether it is a steps starting or ending, fault status, or specific operational states). It is commonly used to interface with other control systems, triggering events based on the MPS conditions.

Trigger In: The Trigger In function allows the MPS to be synchronized or controlled by an external signal. When a trigger signal is received, it can initiate specific actions within the MPS. This is useful in applications where precise timing or coordination with other equipment is necessary.

Trigger Out: The Trigger Out port sends a signal from the power supply to external equipment, signaling an event or condition that has occurred within the MPS. For example, it can indicate a step in the running list has began or completed. This output can be used to synchronize other devices in the system.

Fault Out: The Fault Out function provides an alert signal when the power supply detects an error or abnormal condition, such as overvoltage, overcurrent, or overtemperature. When fault out is triggered the MPS outputs will be clamped to the lowest possible output. This signal can be used to shut down other connected equipment, trigger alarms, or log events for troubleshooting and maintenance purposes.

Inhibit In: The Inhibit In function allows external devices to disable or "inhibit" the MPS's output. When an inhibit signal is applied, the power supply stops delivering power by clamping the output to the lowest possible level, effectively shutting down the output. This function is useful for safety interlocks, emergency stop scenarios, or controlling power delivery in synchronized systems.

Sync In: The Sync In port is used to synchronize multiple mainframes. The synchronization function ensures that multiple MPS mainframes operate in unison by aligning their output time. This function is crucial in applications where consistent and stable power delivery is required across different components or systems. By synchronizing the power supplies, the function minimizes the risks of voltage fluctuations, reduces interference, and enhances overall system reliability.

10.4.2 Synchronization Configuration

To configure the synchronization function follow the steps listed below: S

Step 1. Connect PIN5, PIN4, and the digital ground PIN as shown in **figure 10.8**.

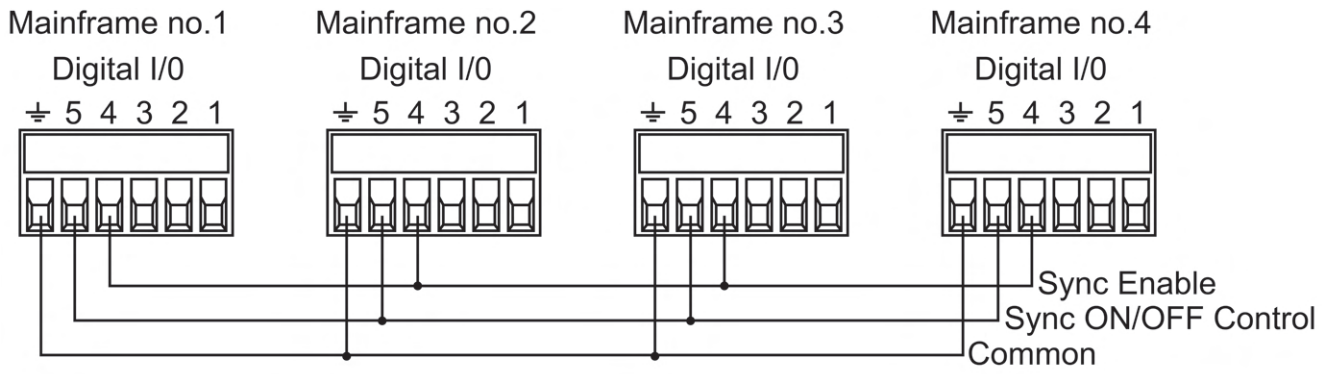


Figure 10.8 Synchronization Configuration

Step 2. Configure PIN5 for the synchronization function. This will automatically configure PIN4 to the corresponding Sync function.

- First configure all slave mainframes for Sync_In as shown in **figure 10.9**.

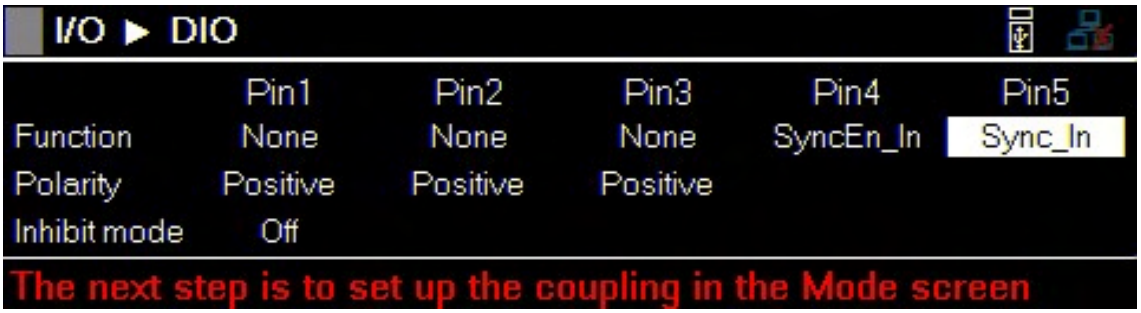


Figure 10.9 Synchronization In

- Once the slave mainframes are configure the master mainframe's PIN5 to Sync_ Out as shown in **figure 10.10**.

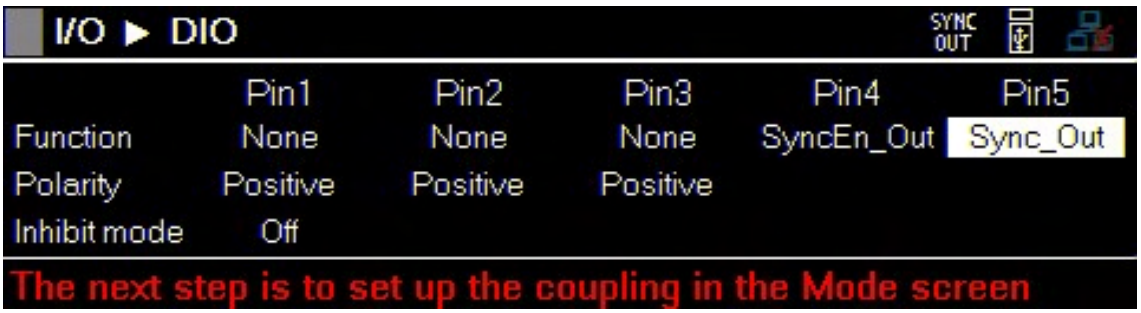


Figure 10.10 Synchronization Out

Step 3. Enable the Coupling function for at least one channel in each of the mainframes.

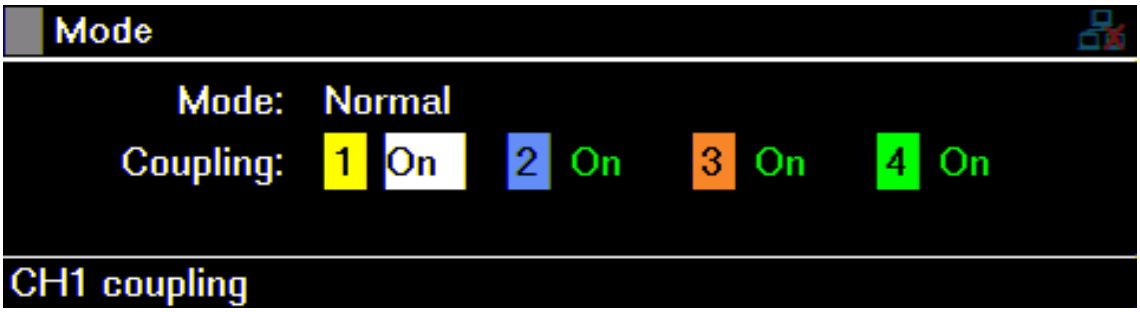


Figure 10.11 Synchronization Coupling

The channels with coupling enable will display a red line below the current readback value as shown in **figure 10.12**.

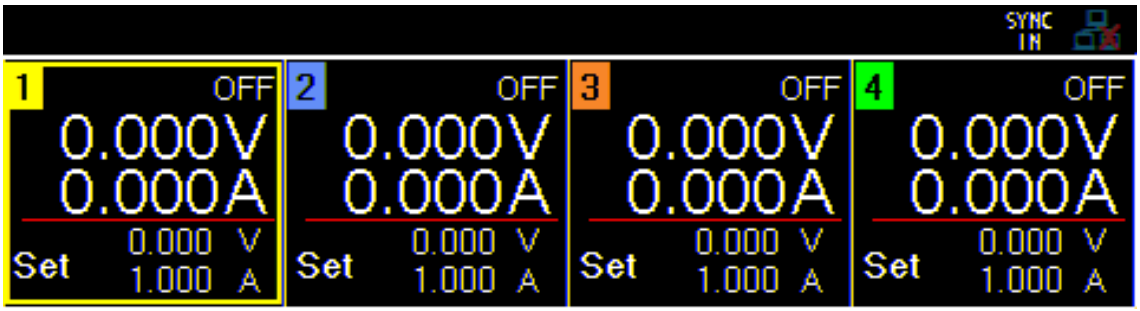


Figure 10.12 Coupling Enabled

NOTICE

The ON/OFF button will be disabled for the slave mainframes' whose channel have coupling enabled. The channels must be enabled from the master mainframe.

10.4.3 Polarity

The polarity parameter determines how the input signal is interpreted in terms of its logic level. Specifically, it dictates whether a high or low voltage is considered an "active" signal.

Positive Polarity: In positive polarity mode, a high voltage level (e.g., 5V) at the digital input is interpreted as an active signal or "logic high" (ON state), and a low voltage level (e.g., 0V) is interpreted as an inactive signal or "logic low" (OFF state).

Negative Polarity: In negative polarity mode, a low voltage level (e.g., 0V) at the digital input is interpreted as an active signal or "logic high" (ON state), and a high voltage level (e.g., 5V) is interpreted as an inactive signal or "logic low" (OFF state).

The polarity function allows for flexibility in interfacing the power supply with various external control systems, ensuring compatibility regardless of whether the controlling system uses positive or negative logic conventions. This is important for integrating the power supply into diverse applications where the nature of the input signal's polarity may vary.

10.4.4 Inhibit Mode

The Remote Inhibit function allows an external device or control system to remotely disable or "inhibit" the MPS output through a digital input. When the Remote Inhibit signal is active, the power supply immediately ceases to deliver power to its output terminals by clampling the output to the lowest possible level, effectively shutting down the output.

This function is critical for safety and operational control in various applications:

- **Safety Interlock:** In scenarios where power needs to be instantly cut off to prevent hazardous conditions, such as during maintenance or in case of an emergency, the Remote Inhibit can be activated by an external safety system.
- **Automated Control:** The Remote Inhibit can be used in automated systems where precise control over the MPS is required. For example, in test setups, the Remote Inhibit can be triggered by a test sequence controller to halt power during specific phases of the test.
- **System Synchronization:** In complex systems with multiple devices, the Remote Inhibit function ensures that the MPS can be easily synchronized with other components, turning off power as needed to align with the overall system operation.

The Remote Inhibit function is typically controlled by a TTL signal applied to the digital input, which can be configured to recognize either a high or low logic level (depending on the polarity setting) as the command to inhibit the power supply. The behavior of the Remote Inhibit mode can also be configured to:

Off: The remote inhibit is disabled.

LATCH: A logic-true transition signal will disable the power supply.
The output will remain disabled.

LIVE: Power supply output follows the state of the inhibit signal. If the inhibit signal is true the output is disabled. When it is false the output is enabled.

Admin

The test and admin menu provides two primary functions: conducting an assessments of the MPS's state and provide administrative capabilities.

The **Admin** menu is acessible by pressing **Utility** →**Admin**.

Figure 11.1 Admin Menu

11.1 Selftest

The self-test function performs a diagnostic tests to verify proper functioning. It allows the MPS to check its internal components to provide a pass fail result on the MPS's state and module.
To perform a self-test press **Utility** key →**Admin** →**Selftest** →**Enter** key.

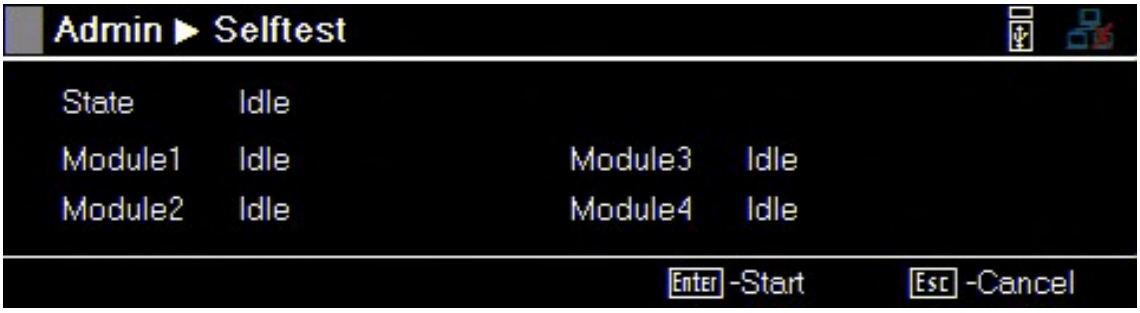


Figure 11.2 Selftest

Once the test is complete, if no issues were reported the instrument will display:

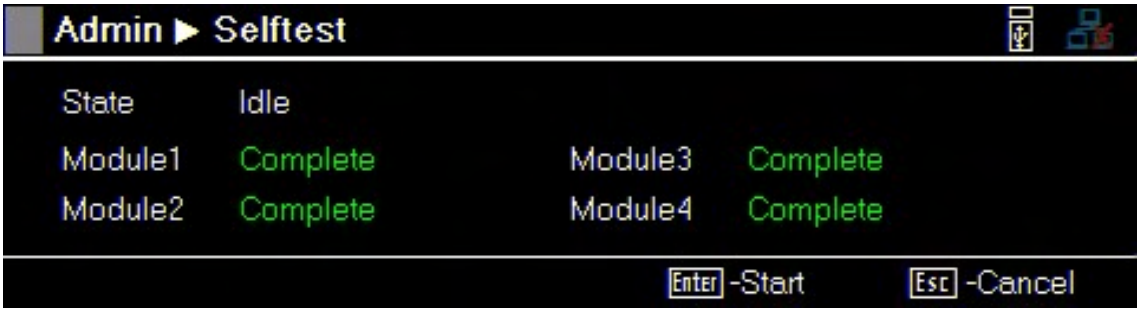


Figure 11.3 Selftest Complete

11.2 Security

The security of the MPS refers to a dedicated section safeguarding the MPS's functions and features from unauthorized access. This function/features are safeguarded since miss used of them could lead to impairment of the MPSs operation.The security page encompasses the following functions/features:

11.2.1 Set Code

The "Set code" function allows the user to update the code required to enter the Security menu.

NOTICE The default code is **77416699**.

11.2.2 Calibration

The calibration function allows for the adjustment and verification of the MPS's measurement accuracy and performance. Calibration ensures that the MPS provides accurate and reliable measurements of voltage, current, and power.

11.2.3 Firmware Update

The firmware update function allows user to update firmware to enhance or address bugs.

11.2.4 NISPOM

The NISPOM function refers to the instrument function to completely wipe: settings, list memory, help files, and hex files from the instrument.

11.2.5 Restore

The "Restore" function returns the power supply to its factory default settings or a user-defined baseline configuration. This is useful for troubleshooting, ensuring the power supply is operating with known good settings, or preparing the device for a new set of configurations. The user will be asked to confirm the they intend to recall the factory default settings. This is similar to the **Reset** function in the **States** menu.

11.2.6 Lock

Exits the Security and locks the security menu requiring the user to input the code to enter the menu the next time the Security menu is selected. If the menu closed without the pressing the Lock option the user will be asked to verify if they want to leave without locking the security menu. If YES is selected the Security menu will be accessible without requiring the code.

11.2.7 Interface

The "Interface" function allows users to deactivate the specificied control interface as well as the USB host. This prevents external devices or systems from interacting with or controlling the power supply through the disabled interface, ensuring secure and isolated operation. It is often used in scenarios where remote control or monitoring is not needed, or when the interface needs to be disabled for security or troubleshooting purposes.

Figure 11.4 Interfaces

NOTICE

All interfaces are enabeld by default, therefore, execuring a factory reset will enable any previously disabled interfaces. When an interface is disabled the, "Disable" will be displayed next to the interface while in the **Admin > Security > Interface** menu.

11.2.8 Access Security Menu

To access the functions/features located in the security section follow the steps below:

Step 1. Press the **Utility** key →**Admin** →**Security**.

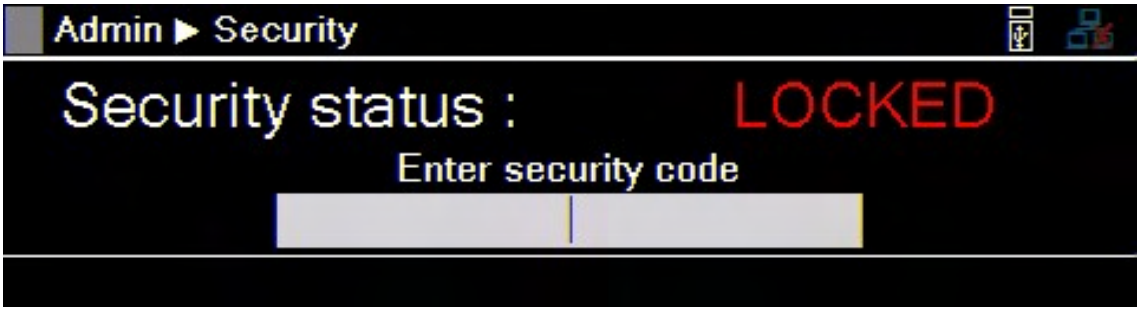


Figure 11.5 Security Menu

NOTICE

The **Security menu** is locked and be accessed by entering the default code **77416699**.

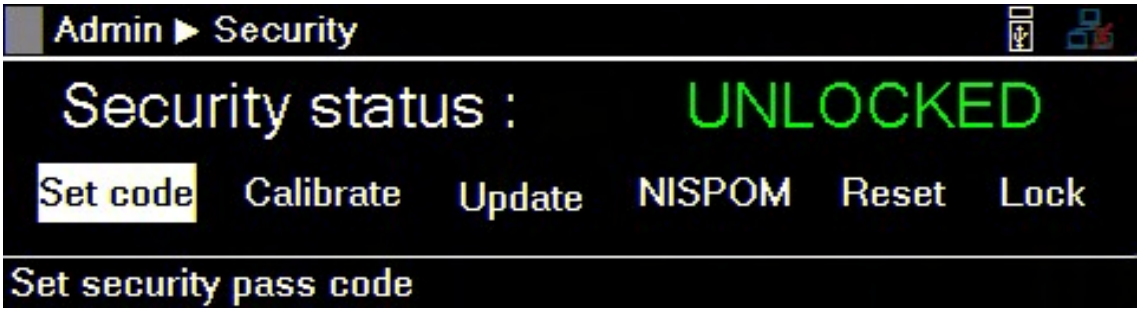


Figure 11.6 Security Menu

NOTICE

The default code can be change in the Set Code menu. If the set code is forgotten contact B&K Precision customer support.

Error Log

The Error Log function is a diagnostic tool that records and stores details of faults or abnormal events that occur during the operation of the power supply. This log captures key information such as the type of error, the time and date it occurred, and channel that reported the error.

NOTICE The error log can store up to 50 previously triggered error codes.

The **Error** menu is acessible by pressing **Utility** →**Error**.

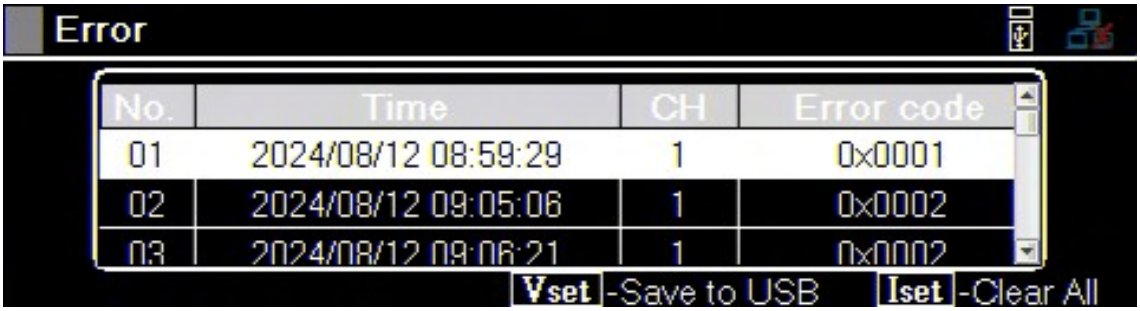


Figure 12.1 Error Menu

Each recorded error is timestamped to indicate when the event occurred. This helps in identifying the sequence of events and analyzing patterns or trends related to specific errors.

Errors are placed in the order that they were encountered. 1 being the most recent. The error log displays up to 50 error codes. After reaching 50 error codes no more codes will be reported in the error log. To continue filing error codes the error log list must be cleared

NOTICE **Table 12.1** provides a description of the reported error codes.

Code	Description
0X01	Over current protection
0X03	Over power protection
0X05	Over temperature protection
0X06	Reverse current protection
0X07	Remote sense fault
0X09	Remote inhibit
0X0b	Over voltage protection
0X0c	Under voltage protection
0X0d	Protect of system shutdown
0X0e	Oscillation
0X10	Internal communication failure
0X12	MOSFET failure
0X14	Wait for trigger
0X1f	General Fault

Table 12.1 Error Log Status Codes

12.1 Saving the Error Log

The error log can be saved into a USB flash drive connected to the USB port on the front panel. To save the error log:

Step 1. Press the **Utility key** →**Error** →**Vset key**.

Step 2. Use the navigation keys to navigate to the directory where the file will be saved.

Step 3. press the **Save** key.

12.2 Clear the Error Log

To clear the error log press the press the **Utility key** →**Error** →**Iset key**.

User

The user settings encompass the adjustable parameters that determine how the user interacts with the MPS. These settings allow user to customize and control the behavior of the front panel, Display, language, date, etc.

The **User** menu is acessible by pressing **Utility** →**User**.

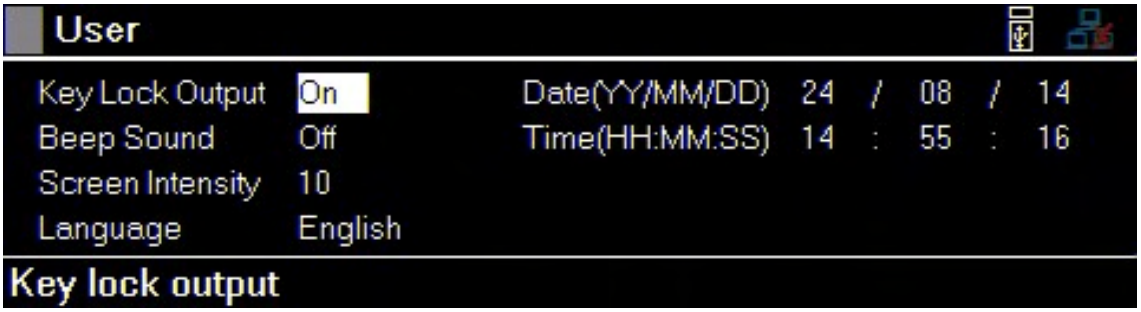


Figure 13.1 User Menu

13.1 Key Lock Output

The "Key Lock Output" function sets the lock state of the On/Off button when **Lock** is enabled.

If both "Key Lock Output" and **Lock** are enabled the output button will be locked. If both "Key Lock Output" is disabled and **Lock** is enabled the output button will not be locked.

13.2 Beep Sound

The beep sound setting controls the audible feedback generated by the MPS during certain operations or events. By enabling or disabling the beep sound, users can customize their experience and adjust the MPS audio notifications to align with their preferences and working environment.

When the beep sound setting is activated, the MPS emits audible signals to indicate various events, such as over protection settings being triggered or error conditions being reported. These beeps serve as a helpful auditory feedback mechanism, providing users with real-time information about the MPS status or changes in its operation.

13.3 Screen Intensity

The screen intensity setting allows users to adjust the brightness or intensity of the screen's backlight. By modifying this setting, users can customize the visual experience to match their preferences and optimize visibility in different lighting conditions.The screen's intensity is represented on a scale from 1 to 10. With 10 being the brightest option and 1 the dimmest.

Increasing the intensity enhances visibility in well-lit environments, making content on the screen more distinct and easier to read. On the other hand, reducing the intensity lowers the brightness, which can be helpful in low-light situations or when working in darkened environments to prevent eye strain or discomfort.

13.4 Language

The language options configure the language for the On Screen Help guide. It does not change the language for display menus. To call the on screen help guide press and hold any soft key that selects a menu branch for 3 seconds.

13.5 Date and Time

The date and time settings options configure the date and time parameters on the device. These settings enable users to synchronize the current date and time information. This ensures that the MPS internal clock is aligned with the correct time reference, providing accurate timestamps for data logging or error logging.

Info

The Info function is an information tool that provides the user with the general information of the MPS mainframe along with the modules installed.

The **Info** menu is acessible by pressing **Utility** →**Info**.

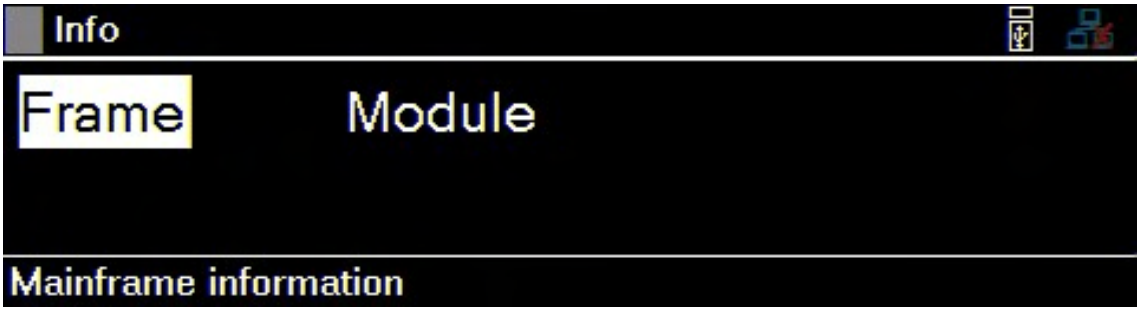


Figure 14.1 Info Menu

Within the Info menu the user can select Frame or Module to view the general information of either the mainframe or the modules.

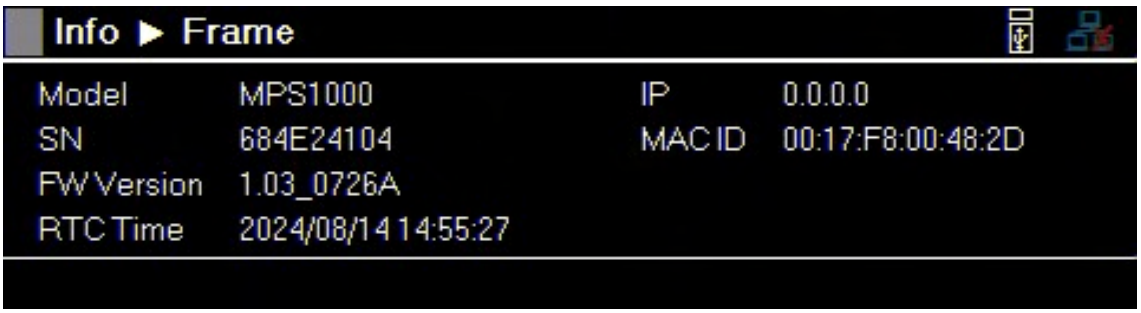


Figure 14.2 Frame Menu

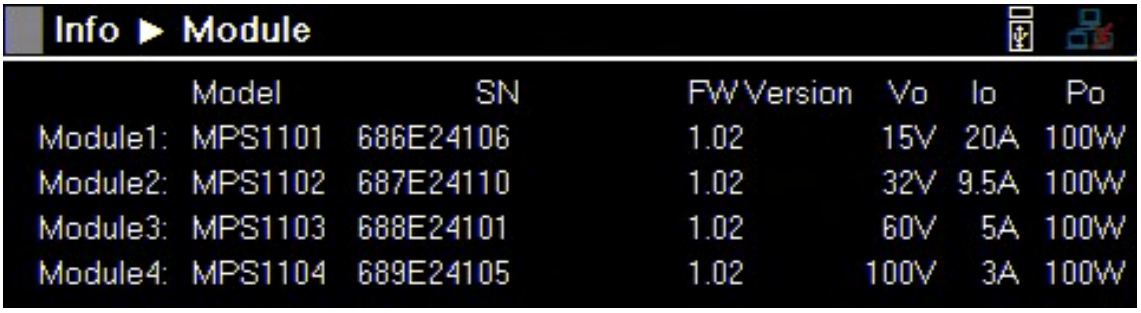


Figure 14.3 Module Menu

Lock

The "Lock" function ensures the security and integrity of MPS settings and parameters. With this function enabled, the front panel controls are locked, preventing accidental or unauthorized changes to critical configurations.

This feature is particularly useful in situations where precise settings are crucial for accurate testing or when maintaining consistent settings conditions is essential.
The user can enable the Lock function by holding the select button for 3 seconds when instruncted to do so in the Lock menu.

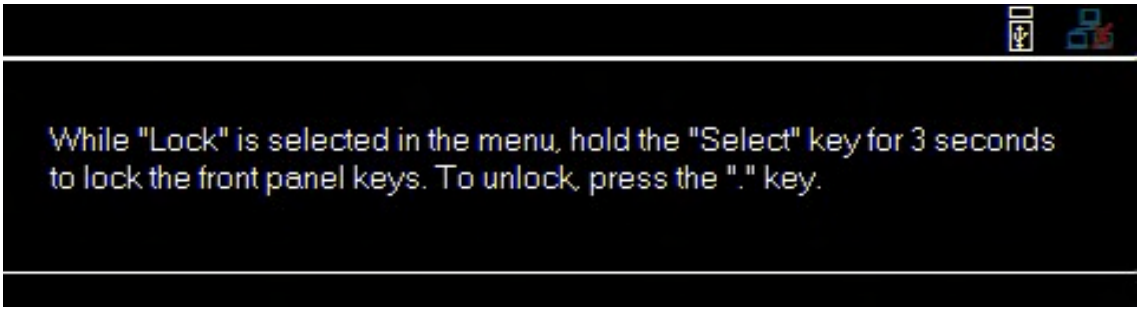


Figure 15.1 Lock Menu

NOTICE

By default Key Lock Input is enabled which will cause the output button to be disabled when Lock is enabled. If Key Lock Input is disabled the output button will not be disabled, even if Lock is enabled.

Specifications

Specifications

Note: All specifications apply to the unit after a temperature stabilization time of 20 minutes over an ambient temperature range of 23 °C ± 5 °C and a maximum relative humidity of 90%. Specifications are subject to change without notice.

Model		MPS1101	MPS1102	MPS1103	MPS1104
Output Rating					
Voltage		15 V	32 V	60 V	100 V
Current		20 A	9.5 A	5 A	3 A
Maximum Output Power		100 W			
Load Regulation [1] ± (% output + offset)					
Voltage		0.01% + 5 mV		0.01% + 3 mV	
Current		0.1% + 3 mA			
Line Regulation ± (% output + offset)					
Voltage		0.01% + 3 mV			
Current		0.1% + 3 mA			
Ripple and Noise (20 Hz to 20 MHz)					
Normal Mode Voltage p-p		20 mV	5 mV	10 mV	15 mV
Normal Mode Voltage rms		2 mV	1 mV	2 mV	3 mV
Normal Mode Current rms		6 mA		3 mA	
Programming / Readback Resolution					
Voltage		1 mV			
Current		1 mA			
Programming / Readback Accuracy ± (% output + offset)					
Voltage		0.03% + 4 mV		0.03% + 8 mV	0.03% + 12 mV
Current		0.1% + 10 mA	0.1% + 5 mA	0.1% + 3 mA	0.1% + 2 mA
Temperature Coefficient per °C					
Voltage		3.2 mV / °C	6.4 mV / °C	12 mV / °C	18 mV / °C
Current		3.2 mA / °C	1.6 mA / °C	0.8 mA / °C	0.4 mA / °C
Output Response Time [2]					
Rise Time	Full Load	20 ms	10 ms	20 ms	20 ms
	No Load	20 ms	10 ms	20 ms	20 ms
Fall Time	Full Load	20 ms	10 ms	20 ms	20 ms
	No Load	200 ms	250 ms	250 ms	250 ms
Transient Response [3]					
Time		0.5 ms			
Protection					
OVP	Range	16.5 V	35.2 V	66 V	110 V
	Accuracy	150 mV	320 mV	600 mV	1000 mV
OCP	Range	22 A	10.45 A	5.5 A	3.3 A
	Accuracy	200 mA	95 mA	50 mA	30 mA

(1) With remote sense terminal connected.
(2) From 10% to 90% or from 90% to 10% of total voltage excursion.
(3) Time for output voltage to recover within 0.5% of its rated output for a load change 50-100% of full load.

Specifications (cont.)

Model		MPS1301	MPS1302	MPS1303	MPS1304
Output Rating					
Voltage		15 V	32 V	60 V	100 V
Current		20 A	9.5 A	5 A	3 A
Max. Output Power		300 W			
Load Regulation [1] ± (% output + offset)					
Voltage		0.01% + 5 mV		0.01% + 3 mV	
Current		0.1% + 3 mA			
Line Regulation ± (% output + offset)					
Voltage		0.01% + 3 mV			
Current		0.1% + 3 mA			
Ripple and Noise (20 Hz to 20 MHz)					
Normal Mode Voltage p-p		20 mV	5 mV	10 mV	15 mV
Normal Mode Voltage rms		2 mV	1 mV	2 mV	3 mV
Normal Mode Current rms		6 mA		3 mA	
Programming / Readback Resolution					
Voltage		1 mV			
Current		1 mA			
Programming / Readback Accuracy ± (% output + offset)					
Voltage		0.015% + 3 mV	0.03% + 4 mV	0.03% + 8 mV	0.015% + 12 mV
Current		0.05% + 8 mA	0.1% + 5 mA	0.1% + 3 mA	0.05% + 2 mA
Temperature Coefficient per °C					
Voltage		3.2 mV / °C	6.4 mV / °C	12 mV / °C	18 mV / °C
Current		3.2 mA / °C	1.6 mA / °C	0.8 mA / °C	0.4 mA / °C
Output Response Time [2]					
Rise Time	Full Load	20 ms	10 ms	20 ms	20 ms
	No Load	20 ms	10 ms	20 ms	20 ms
Fall Time	Full Load	20 ms	10 ms	20 ms	20 ms
	No Load	200 ms	250 ms	250 ms	250 ms
Transient Response [3]					
Time		0.5 ms			
Protection					
OVP	Range	16.5 V	35.2 V	66 V	110 V
	Accuracy	150 mV	320 mV	600 mV	1000 mV
OCP	Range	22 A	10.45 A	5.5 A	3.3 A
	Accuracy	200 mA	95 mA	50 mA	30 mA

(1) With remote sense terminal connected.
(2) From 10% to 90% or from 90% to 10% of total voltage excursion.
(3) Time for output voltage to recover within 0.5% of its rated output for a load change 50-100% of full load.

Specifications (cont.)

Model		MPS1101	MPS1102	MPS1103	MPS1104	MPS1301	MPS1302	MPS1303	MPS1304
General									
Temperature Ratings	Operation	32 °F to 104 °F (0 °C to 40 °C)							
	Storage	14 °F to 158 °F (-10 °C to 70 °C)							
Warranty		3 Years							
Safety		Low Voltage Directive (LVD) 2014/35/EU, EN61010-1:2010, cTUVus certification mark [5] fulfills US (UL 61010-1:2012) and Canadian (CAN/CSA-C22.2 NO. 61010-1-12) safety standards							
Electromagnetic Compatibility		EMC Directive 2014/30/EU, EN61326-1:2013							

Mechanical Specifications

Model	MPS1000	MPS1001	MPS1101	MPS1102	MPS1103	MPS1104	MPS1301	MPS1302	MPS1303	MPS1304
Type	Mainframe		Module							
Dimensions (W x H x D)	16.73" x 1.73" x 21.65" (425 x 44 x 550 mm)		3" x 1.7" x 12.4" (75.4 x 42.6 x 316 mm)							
Weight	15 lbs (6.8 kg)		2.8 lbs (1.25 kg)							

Mainframe Specifications

Model	MPS1000	MPS1001
Maximum Power Available	600 W	1200 W
Command Response Time [4]	10 ms	
Efficiency	70%	
Power Factor	0.97	
AC Line Input [6]	110 VAC to 240 VAC ± 10%, 50/60 Hz	
Maximum Rated Input Power	850 VA	1700 VA

(4) Typical time required for output to begin to change following receipt of command data.
(5) Tested and certified by a Nationally Recognized Testing Laboratory (NRTL), accredited by OSHA.
(6) AC line input power rated from 100 to 180 VAC cannot supply enough power to operate mainframe model MPS1001 at full rated 1200 W power. When AC input power is less than 180 VAC, the output power will be limited to 600 W.

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

S

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 **three years** 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.

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

Version: October 2, 2024