

R&S[®] HMP Series Power Supplies Getting Started



1178.6791.02 – 02

This manual applies to the following models and options of the R&S®HMP series:

- R&S®HMP2020 Two-Channel Power Supply (3629.6718.02)
- R&S®HMP2030 Three-Channel Power Supply (3629.6718.03)
- R&S®HMP4030 Three-Channel Power Supply (3629.6776.03)
- R&S®HMP4030 Four-Channel Power Supply (3629.6776.04)

This manual describes firmware version FW V2.61 and later for the instruments of the of the R&S®HMP Series.

© 2018 Rohde & Schwarz GmbH & Co. KG

Mühl Dorfstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Fax: +49 89 41 29 12 164

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

Subject to change – Data without tolerance limits is not binding.

R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG.

Trade names are trademarks of their owners.

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®HMP2020 is indicated as R&S HMP2020, or R&S HMP.

Contents

1 Documentation Overview.....	5
1.1 Getting Started Manual.....	5
1.2 User Manual.....	5
1.3 Basic Safety Instructions.....	5
1.4 Brochure and Specifications.....	5
1.5 Release Notes.....	6
1.6 Remote Control Drivers.....	6
2 For Your Safety.....	7
3 Key Features.....	8
4 Preparing for Use.....	9
4.1 Putting into Operation.....	9
4.2 Setting Up a Network (LAN) Connection.....	18
5 Instrument Tour.....	22
5.1 Front Panel Views of the R&S HMP2030 and the R&S HMP2020....	22
5.2 Front Panel Views of the R&S HMP4040 and the R&S HMP4030....	23
5.3 Rear Panel Views of the R&S HMP2030 and the R&S HMP2020.....	24
5.4 Rear Panel Views of the R&S HMP4030 and the R&S HMP4040.....	25
6 Trying Out the Instrument.....	27
7 Instrument Control.....	30
7.1 Ways to Operate the Instrument.....	30
7.2 Means of Manual Interaction.....	30
7.3 Remote Control.....	33
Index.....	34

1 Documentation Overview

This section provides an overview of the R&S HMP user documentation. Unless specified otherwise, you find the documents on the R&S HMP product page at:

www.rohde-schwarz.com/manual/hmp

1.1 Getting Started Manual

Introduces the R&S HMP and describes how to set up and start working with the product. Includes basic operations, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.2 User Manual

Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance and instrument interfaces. Includes the contents of the Getting Started manual.

1.3 Basic Safety Instructions

Contains safety instructions, operating conditions and further important information. The printed document is delivered with the instrument.

1.4 Brochure and Specifications

The brochure provides an overview of the instrument and deals with the specific characteristics. It contains the technical specifications of the R&S HMP, and provides ordering information for the base units, available options and accessories. See www.rohde-schwarz.com/brochure-datasheet/hmp.

1.5 Release Notes

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The release notes are part of the download up-to-date firmware at www.rohde-schwarz.com/firmware/hmp.

1.6 Remote Control Drivers

The instrument drivers enable remote control via the corresponding interfaces. The drivers and installation instructions are available for download on the product page at www.rohde-schwarz.com/driver/hmp.

2 For Your Safety

The instruments of the R&S HMP series are designated for use in industrial, administrative, and laboratory environments, and residential, business, commercial and small business areas. The instruments comply with protection class II.

Use an R&S HMP only for its designated purpose. Observe the safety and usage instructions documented in the user manual, and operating conditions and performance limits stated in the data sheet.

The product documentation helps you to use the R&S HMP safely and efficiently. Keep the product documentation in a safe place and pass it on to the subsequent users.

Safety information is part of the product documentation. It warns you about the potential dangers and gives instructions how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In the "Basic Safety Instructions", safety issues are grouped according to subjects. For example, one subject is electrical safety. The "Basic Safety Instructions" are delivered with the R&S HMP in different languages in print.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation. Always read the safety instructions carefully. Make sure to comply fully with them. Do not take risks and do not underestimate the potential danger of small details such as a damaged power cable.

3 Key Features

The R&S HMP Series power supplies sets standards in performance and usability. Outstanding key features are:

- High output power within a minimum space, high efficiency and low residual ripple.
- High programming and readback resolution for applications with the highest demands.
- Realtime voltage, current and power values.
- EasyArb function for programming voltage and current processes directly on the instrument.
- Individual electronic fuses freely combinable for all channels, with a fuse delay from 10 to 250 ms.
- Adjustable overvoltage protection (OVP) independently for each channel.
- Advanced parallel and serial operation via V/I tracking.
- Remote control via dual Ethernet/USB interface, USB/RS-232 dual interface or IEEE-488 (GPIB) using SCPI-based commands.

For a detailed specification, refer to the data sheet.

4 Preparing for Use

4.1 Putting into Operation

This section describes the basic steps to be taken when setting up the R&S HMP for the first time.

4.1.1 Safety

This instrument is built in compliance with DIN EN 61010-1 (VDE 0411 part 1), safety regulations for electrical measuring instruments, control units and Laboratory equipment. It has been tested and shipped from the plant in safe condition. It complies to the regulations of the European standard EN 61010-1 and the international standard IEC 61010-1.

To maintain this condition and ensure safe operation, you must observe all instructions and warnings given in this user manual.

⚠ DANGER**Risk of electric shock**

Casing and all chassis parts are connected to a protective earth conductor. It is prohibited to disconnect the earthed protective connection inside or outside the instrument.

⚠ DANGER**Risk of electric shock due to exceeding low voltage protection**

For the series connection of all output voltages, it is possible to exceed the low voltage protection. In this case, any contact with live components is life-threatening. It is assumed that only qualified and trained personnel operate the power supplies and the connected loads.

⚠ WARNING**Risk of injury due to disregarding safety information**

Observe the information on appropriate operating conditions provided in the data sheet to prevent personal injury or damage to the instrument. Read and observe the basic safety instructions provided with the instrument, in addition to the safety instructions in the following sections. In particular:

- Do not open the instrument casing.
- Operate the instrument in the positions specified by the manufacturer without obstructing the ventilation of the product.

If the manufacturer's specifications are not observed, electric shock, fire, and / or serious injury, and even death can occur.

NOTICE**Risk of instrument damage due to inappropriate operating conditions**

Specific operating conditions are required to ensure accurate measurements and to avoid damage to the instrument. Observe the information on appropriate operating conditions provided in the basic safety instructions and the instrument's data sheet.

NOTICE**Risk of interference by electrostatic discharge**

When the front and rear connectors are connected simultaneously, interferences due to electrostatic discharge can occur. To prevent interferences, leave the output sockets at the front disconnected, when using the rear panel outputs.

NOTICE**Risk of instrument damage during operation**

An unsuitable operating site or test setup can damage the instrument and connected devices. Ensure the following operating conditions before you switch on the instrument:

- Make sure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If you have a different line voltage, it can be necessary that you have to change the power fuse of the product.
- It is hazardous and not permitted to repair a defective fuse or to use other tools to bypass the fuse. Resulting damage to the instrument are not covered by the warranty.
- Never use the instrument in dusty or damp conditions, in an explosion hazard area, or near aggressive chemicals. The ambient temperature and humidity must not exceed the ranges specified in the data sheet.
- The instrument is dry and shows no sign of condensation.
- The instrument can only be used indoors and is positioned as described in the following sections, see [Chapter 4.1.4, "Placing or Mounting the Instrument"](#), on page 14.

Always position the instrument that you can disconnect the unit from the mains at any time and without restrictions.

- All fan openings are unobstructed and the airflow perforations are unimpeded. Make sure that there is sufficient space on both sides for the heat exchange.
If the temperature inside the instrument exceeds the value specified in the data sheet, the channel-specific overheat protections turn off the corresponding outputs.
- The ambient temperature does not exceed the range specified in the data sheet.
- The instrument can only be operated with a properly grounded safety socket outlet. Never use a cheater plug or other means to defeat or disconnect the protective ground lead.
- Check the power cable for damage, and replace it if necessary. The power cord must be plugged in before signal circuits are connected.
- Use the instrument only with authentic Rohde & Schwarz test accessories, signal cables and power cords. Never use power cords with insufficient ratings.

- Before each measurement, check the instrument for proper operation using a known signal source or sample.
- Signal levels at the input connectors are all within the specified ranges.
- Signal outputs are correctly connected and are not overloaded.

If it is assumed that a safe operation is no longer possible, the instrument must be shut down and secured against any unintended operation.

Note: To disconnect from the mains, unplug the IEC socket on the back panel.

Also remove the instrument from operation if:

- The instrument shows visible damage
- The instrument includes loose parts
- The cables show damage
- The fuse holder shows damage
- The instrument is no longer working
 - After an extended period of storage under unfavorable conditions (e.g. outdoors or in damp rooms)
 - After rough handling during transport (e.g. packaging that does not meet the minimum requirements by post office, railway or forwarding agency)



EMI impact on measurement results

Electromagnetic interference (EMI) can affect the measurement results.

To suppress the generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality which must not exceed the maximum cable length, and must not be outside of buildings.
We recommend that you use double-shielded data cables with a length of 3 m at a maximum, e.g. the IEEE bus data cable R&S HZ72 (GPIB-cable 2 m, Order No. 3594.4269.02).
 - Always terminate open cable ends.
 - Note the EMC classification in the data sheet.
-

4.1.2 Unpacking and Checking the Instrument

To remove the instrument from its packaging and check the equipment for completeness, proceed as follows:

- Check the package for damage.
- Carefully unpack the instrument and the accessories.
- Check the package contents for completeness using the delivery list see ([Chapter 4.1.3, "Delivery List"](#), on page 13) and package contents.
- Check the equipment for any visible shipping-related damage or other mechanical problems, e.g. loose parts inside.

If there is damage or anything missing, contact the supplier and the carrier who delivered the instrument.

Do not operate the instrument in this case.



Packing material

Retain the original packing material. If the instrument needs to be transported or shipped later, you can use the material to protect the control elements and connectors.

The instrument must be stored in dry, closed indoor premises. If the instrument was transported under extreme temperatures, it is recommended that you allow a minimum of two hours to reach the appropriate temperature before operating the instrument.

4.1.3 Delivery List

The instrument comes with the following components:

- R&S HMP power supply preloaded with two main fuses (230 V)
- Fuses for 115 V operation
- Universal cable set
- Getting Started manual
- Document folder containing safety instructions and information on the instruments calibration

4.1.4 Placing or Mounting the Instrument

The R&S HMP is designed for use under both, industry and laboratory conditions, either on a bench top or in a rack.

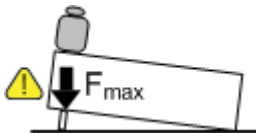
Bench Top Operation

If the R&S HMP is operated on a bench top, the surface must be flat. You can place the instrument horizontally, or in a slope position by unfolding the front feet.

⚠ WARNING**Risk of injury if feet are folded out**

The feet can fold in if they are not folded out completely or if the instrument is shifted. Collapsing feet can cause injury or damage the instrument.

- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 500 N.



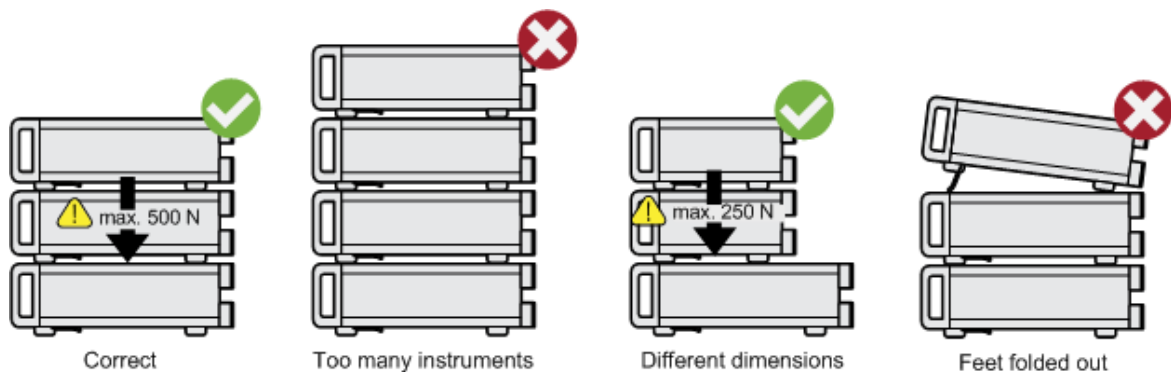
If the front support feet are folded in, it is possible to stack the instrument with other Rohde & Schwarz instruments securely.

⚠ WARNING**Risk of injury when stacking instruments**

A stack of instruments can tilt over and cause injury if not stacked correctly. Furthermore, the instruments at the bottom of the stack can be damaged due to the load imposed by the instruments on top.

Observe the following instructions when stacking instruments:

- Never stack more than three instruments. If you need to stack more than three instruments, install them in a rack.
- The overall load imposed on the lowest instrument must not exceed 500 N.
- It is best if all instruments have the same dimensions (width and length). If you need to stack smaller instruments on the top, the overall load imposed on the lowest instrument must not exceed 250 N.
- If the instruments have foldable feet, fold them in completely.



If multiple instruments are stacked, the collapsed support feet are positioned in the locking mechanism of the instrument beneath, preventing unintended movement.

Mounting in a Rack

You can install the R&S HMP in a rack using a rack adapter kit (R&S HZ42 for R&S HMP20xx instruments, and R&S HZP91 for R&S HMP40xx). The installation instructions are part of the adapter kit.

To prepare the R&S HMP for installation in a rack, you can remove the feet on the bottom:

1. Unscrew the mounting screws on the bottom of the instrument.

2. Remove the feet.

Tip: Save the feet with the screws if you want to operate the R&S HMP as bench top later.

NOTICE**Risk of instrument damage due to insufficient airflow in a rack**

If the instrument is run with insufficient airflow for a longer period, the instrument overheats, which can disturb the operation or turn off the R&S HMP.

Make sure that all fan openings are unobstructed, that the airflow perforations are unimpeded, and that the minimum distance from the wall is 10 cm.

4.1.5 Starting the Instrument

The R&S HMP is equipped with an AC power supply connector, which can be used with different AC power voltages. The voltage is adjusted by a switch. The AC power connector is located at the rear panel of the instrument.

Refer to the data sheet for the requirements of voltage and frequency.

4.1.5.1 Powering On

To connect the AC supply

Note: The instrument must only be connected to an outlet that has a ground contact

1. Check the available line voltage.
2. If necessary, adjust the line voltage with the voltage selector at the rear panel.

Notice:

When changing the line voltage, it is essential to check and replace the fuse if necessary. Otherwise the instrument can be destroyed.

3. Check the fuse type.
4. If necessary, replace the fuse type suitable for the line voltage (see ["To replace the fuses"](#) on page 17).
5. Connect the R&S HMP to the power source using the supplied power cable.

The instrument must only be connected to an outlet that has a ground contact, according to the specifications for safety class EN 61010.

Replacing the Fuses

The instrument has main power fuses, which are located on the rear panel of the unit. Depending on the line voltage setting, the fuses of the correct type must be installed.

WARNING

Risk of electric shock

The fuses are part of the main power supply. Therefore, handling the fuses while power is on can lead to electric shock. Before opening the fuse holder, make sure that the instrument is switched off and disconnected from all power sources.

Always use fuses supplied by Rohde & Schwarz as spare parts, or fuses of the same type and rating.

The nominal current of the fuse depends on the line voltage, and the R&S HMP model:

Table 4-1: Fuse types

Line Voltage	R&S HMP2020 / R&S HMP2030	R&S HMP4030 / R&S HMP4040
115 V	2 x T6.3H/250 V	2 x T10H/250 V
230 V	2 x T3.15H/250 V	2 x T5H/250 V

To replace the fuses

The instrument has an externally accessible fuse holder combined with the IEC socket at the rear panel.

1. Select the fuses according to the voltage of the AC line, see [Table 4-1](#).
2. Press the plastic locks on the sides of the fuse holder inwards using a screwdriver (with a blade width of approximately 2 mm).
The insertion points are marked by two slanted guides on the casing.
When unlocking the mechanism, the fuse holder is pushed outwards by compression springs.
3. Remove the fuse holder.

4. Exchange the fuses.
5. **Note:** The protruding contact springs must not be deformed, therefore: Align the fuse holder with the guide bar facing the socket.
6. Carefully slide the fuse holder against the spring pressure into the slot until both plastic locks latch.

4.1.6 Starting Up and Shutting Down



An instrument of the R&S HMP series saves all instrument settings (nominal values) in non volatile memory when it is turned off, and retrieved when it is powered on again.

To start up the instrument

1. Make sure that you have connected the R&S HMP to the AC power supply.
2. Turn on the instrument with the main Power key in the upper left corner at the front panel.

The R&S HMP starts up using the same operating mode that was in use at the time the unit was last turned off.

The instrument turns off the output signals at the beginning of operation. This function prevents a connected load from being supplied unintentionally at startup. It also prevents the load from being destroyed caused by an exceedingly high voltage or power, e.g due to the last instrument settings.

After booting, the instrument is ready for operation.

To shut down the instrument

- ▶ Press the Power key at the front panel.
All current settings are saved, and the firmware shuts down.

4.2 Setting Up a Network (LAN) Connection

If the R&S HMP is equipped with the combined LAN/USB network interface, you can connect it to a LAN (Ethernet). Provided the appropriate rights are assigned, you can use the interface for remote control and data transfer from a remote PC.

This section describes how to set up and configure the LAN interface.

For remote control via the alternative interfaces, refer to the user manual of the R&S HMP.

NOTICE**Risk of network failure**

Consult your network administrator before performing the following tasks:

- Connecting the instrument to the network
- Configuring the network
- Changing IP addresses
- Exchanging hardware

Errors can affect the entire network.

You can establish either a non-dedicated LAN connection from the instrument to an existing network, or a dedicated network connection between the instrument and a single computer.

For addressing, the instrument and the remote PC require an IP address, which is usually assigned automatically, depending on the network capabilities.

**Risk of network connection failure**

Network cables and cable connectors of poor quality, or failures in the auto-negotiation process, can cause network connection failures.

If the network connection to the instrument fails, check the network infrastructure and contact your network administrator.

To set up a network (LAN) connection

- ▶ Connect the instrument to the network or a single PC.

Depending on the network capacities, the TCP/IP address information for the instrument can be obtained in different ways.

- If the network supports dynamic TCP/IP configuration using the DHCP (Dynamic Host Configuration Protocol), the address information is assigned automatically.
- If the network does not support DHCP, you can set the IP address manually, see [To assign the IP address manually on the instrument](#).

To assign the IP address manually on the instrument

To assign the IP address, first select the interface. In addition, check if DHCP is not active. Otherwise, you cannot edit the IP address.

1. To disable DHCP, perform the following steps:

Tip: Skip these steps, if DHCP is not supported.

- a) Press the Menu key.
- b) Select "Interface > Interface Settings > Port Settings /DHCP".
- c) Select "DHCP: > OFF".
- d) Return with the left arrow key.

When DHCP is turned off, the instrument enables you to set the IP address manually.

2. To set the IP address, select "Interface > Select Interface > LAN".
3. Return with the left arrow key.
4. Select "Settings > IP Settings".
5. Assign the IP address.

The IP address is part of the VISA resource string used by the program to identify the instrument. The resource string has the form:

```
TCPIP::<IP_address>::<IP_port>::INSTR
```

The default port for socket communication is 5025.

Example: If the IP address of the instrument is 192.1.2.3, the valid resource string is: TCPIP::192.1.2.3::5025::INSTR

The R&S HMP displays the IP address and port number in the "IP Settings" dialog.

Switching to remote control

When you turn on the instrument, it always starts in manual operation state ("local" mode) to be operated via the front panel.

1. To establish communication via remote control, send a SCPI command.
The R&S HMP switches to remote control mode automatically. The Remote key illuminates.
The remote control mode disables all front panel keys on the instrument.
2. To return to local mode, press the Remote key.

Checking the LAN connection

To verify the connection, you can use the `ping` command.

- ▶ In the command prompt on the remote PC, enter `ping <ip_address>`

When the connection is working, the command returns the reply from the instrument.

5 Instrument Tour

The following sections explain the control elements and the connectors of the R&S HMP Series instruments by their front and rear views.



- The control elements on the front panel illuminate when you turn them on. In addition, the instrument illuminates keys for navigating or entering settings automatically if necessary.
- The channel keys also change their color. They indicate whether you are in setting mode, have the constant voltage supplied at the outputs, or the channel is in constant current mode.

See [Chapter 7.2, "Means of Manual Interaction"](#), on page 30 for details.

• Front Panel Views of the R&S HMP2030 and the R&S HMP2020	22
• Front Panel Views of the R&S HMP4040 and the R&S HMP4030	23
• Rear Panel Views of the R&S HMP2030 and the R&S HMP2020	24
• Rear Panel Views of the R&S HMP4030 and the R&S HMP4040	25

5.1 Front Panel Views of the R&S HMP2030 and the R&S HMP2020



For the R&S HMP2020, channel 3 is omitted.

Front Panel Views of the R&S HMP4040 and the R&S HMP4030



Figure 5-1: Front view of the R&S HMP2030

- 1 = Power key: Turning the instrument on and off
- 2 = Display (LCD): Parameter display
- 3 = Arrow keys and Rotary knob: Navigating on the display, setting and confirming the parameters
- 4 = Ch1, Ch2, Ch3 keys: Selecting Channels
- 5 = Output key: Turning on or off the selected channels
- 6 = Voltage key: Setting the output voltage
- 7 = Track key: Activating the tracking function
- 8 = Store key: Saving a measurement configuration
- 9 = Menu key: Accessing the list of functions
- 10 = Current key: Setting the current limit
- 11 = Fuse key: Activating the electronic fuse function
- 12 = Recall key: Loading a saved measurement configuration
- 13 = Remote key: Switching between manual and external control
- 14 = Ground socket: Reference potential connection (connected to protective earth)
- 15 = Ch1, Ch2, Ch3 sockets: Output channels; 0 V to 32 V / 5 A (HMP2020 0...32 V / 10 A)
- 16 = Sense sockets (2 x per channel): Compensating the lead resistances

5.2 Front Panel Views of the R&S HMP4040 and the R&S HMP4030



For the R&S HMP4030, channel 4 is omitted.

Rear Panel Views of the R&S HMP2030 and the R&S HMP2020

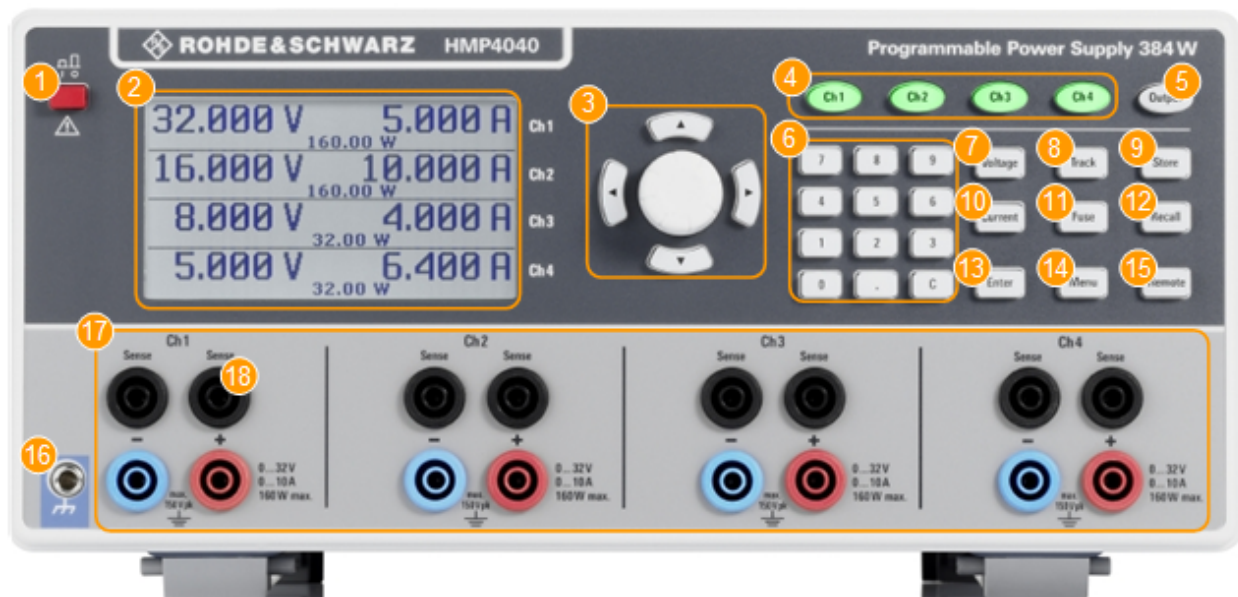


Figure 5-2: Front view of the R&S HMP4040

- 1 = Power key: Turning the instrument on and off
- 2 = Display (LCD): Parameter display
- 3 = Arrow keys and Rotary knob: Navigating on the display, setting and confirming the parameters
- 4 = Ch1, Ch2, Ch3, Ch4 keys: Selecting Channels
- 5 = Output key: Turning on or off the selected channels
- 6 = Keypad keys: Setting the nominal values
- 7 = Voltage key: Setting the output voltage
- 8 = Track key: Activating the tracking function
- 9 = Store key: Saving a measurement configuration
- 10 = Current key: Setting the current limit
- 11 = Fuse key: Activating the electronic fuse function
- 12 = Recall key: Loading a saved measurement configuration
- 13 = Enter key: Confirming values via keypad
- 14 = Menu key: Accessing the list of functions
- 15 = Remote key: Switching between manual and external control
- 16 = Ground socket: Reference potential connection (connected to protective earth)
- 17 = Ch1, Ch2, Ch3, Ch4 sockets: Output channels; 0 V to 32 V / 5 A
- 18 = Sense sockets (2 x per channel): Compensating the lead resistances

5.3 Rear Panel Views of the R&S HMP2030 and the R&S HMP2020

The interface for remote control varies depending on the equipped option.

Rear Panel Views of the R&S HMP4030 and the R&S HMP4040



Figure 5-3: Rear view of the HMP20x0 series

17 = Interface: Ethernet / USB dual interface R&S HO732 (default for all instruments of the R&S HMP series)

18 = Output connector: Rear panel outputs for integration into rack systems (2 to 3 channels)

19 = Voltage selector: Selecting the line voltage 115 V or 230 V

20 = Power supply connector: IEC socket and fuse holder

5.4 Rear Panel Views of the R&S HMP4030 and the R&S HMP4040

The interfaces on the rear panel vary depending on the instrument model.



Figure 5-4: Rear view of the HMP40x0 series

Rear Panel Views of the R&S HMP4030 and the R&S HMP4040

- 19 = Interface: Ethernet / USB dual interface R&S HO732 (default for all instruments of the R&S HMP series)
- 20 = Output connectors: Rear panel outputs for integration into rack systems (3 to 4 channels, depending on the R&S HMP40x0 model)
- 21 = Power supply connector: IEC socket and fuse holder
- 22 = Voltage selector: Selecting the line voltage 115 V or 230 V

NOTICE**Risk of interference by electrostatic discharge**

When the front and rear connectors are connected simultaneously, interferences due to electrostatic discharge can occur. To prevent interferences, leave the output sockets at the front disconnected, when using the rear panel outputs.

6 Trying Out the Instrument

This chapter describes the first steps with the R&S HMP. It shows a simple configuration for providing the power at the output. For basics on operating the instrument, see [Chapter 7, "Instrument Control"](#), on page 30.

The complete description of the functionality and its usage is given in the R&S HMP user manual.

Prerequisites

- The instrument is set up, connected to the mains, and started up as described in [Chapter 4.1.6, "Starting Up and Shutting Down"](#), on page 18.
- Before you connect and activate a load:
 - Make sure that you have deactivated the corresponding output of the R&S HMP to prevent unintended transient currents. Follow this order to get an optimal transition behavior when activating the output.
 - Set the current limit to prevent damage to the test circuit in case any error occurs (e.g. as a short circuit), see ["Setting the current limit"](#) on page 28.
- Make sure to operate highly sensitive semiconductors, such as laser diodes, only as specified by the manufacturer.
- Before trying out the instrument, note the maximum voltage, current and power ranges given in the data sheet.

We recommend that you follow the sequence of steps given in this description before you activate an output.

The instructions describe the manual control with the rotary knob and the arrow keys, setting the channel 1. For information on alternative controls, see [Chapter 7.2, "Means of Manual Interaction"](#), on page 30. Before trying out, observe the safety instructions and maximum specification.

For information on the settings and the corresponding remote control commands, see the user manual of the R&S HMP Series.

Selecting the channels

- ▶ Press the channel key, e.g. Ch1.
An active channel key is illuminated in green.

Selecting the output voltage

1. Press the Voltage key.
The Voltage key and the arrow keys are illuminated, indicating that they are active.
2. Press the channel key, e.g. Ch1.
Activates the voltage setting. The Ch1 key illuminates blue.
3. Set the output voltage value by turning the rotary knob.
The R&S HMP applies the setting immediately.
4. To terminate the setting, press the Voltage key.
The Ch1 key illuminates green again.

Tip: If you do not terminate with the Voltage key, the instrument exits the setting mode after the key fallback time has elapsed. See Chapter "Instrument Functions > Basic Functions > Key Fallback Time" in the user manual.

Setting the current limit

1. Press the Current key.
2. Press the Ch1 key.
The current setting in the display is in edit mode.
3. Set the current limit value.
The R&S HMP applies the setting immediately.
4. Press the Current key to terminate the setting mode.
If you do not press the Current key, the instrument automatically exits the setting mode after the key fallback time expires.
See Chapter "Instrument Functions > Basic Functions > Key Fallback Time" in the user manual.

Activating the fuse

The R&S HMP series includes an electronic fuse function that enables you to protect a connected sensitive test circuit even better from damage.

1. Press the Fuse key.
The R&S HMP activates the fuse function.
2. Press the Ch1 key to activate the fuse.

The R&S HMP immediately applies the setting and indicates the activated fuse in the display.

After the fallback time has elapsed, the instrument exits the setting mode.

See Chapter "Instrument Functions > General Functions > Key Fallback Time" in the user manual.

3. Repeat step 1 and step 2 to disable the fuse function.

Activating the output

You can turn on and off the output voltages regardless of the operating mode the instrument is in.

1. Press the Ch1 key.
2. Press the Output key.

The Output key turns on the outputs of all activated channels and supplies the connected loads.

Saving instrument settings

You can save up to 10 measurement configurations in the memory locations provided by the instrument.

1. Press the Store key.
The "Store Settings" dialog opens.
2. Use the rotary knob to select the memory location.
3. Confirm with the rotary knob.
4. Return with the Store key.

The R&S HMP saves the settings. Previous settings are overwritten.

Recalling instrument settings

To retrieve a saved configuration:

1. Press the Recall key.
2. Use the rotary knob to select the memory location.
3. Press the rotary knob again to load the configuration.
4. To exit the "Recall Settings" dialog, press the Recall key.

7 Instrument Control

This chapter provides an overview on how to work with the R&S HMP. It covers the following topics:

- [Ways to Operate the Instrument](#)..... 30
- [Means of Manual Interaction](#)..... 30
- [Remote Control](#)..... 33

7.1 Ways to Operate the Instrument

You can operate an R&S HMP in two ways:

- **Manual operation**
Use the front panel controls to configure your test setup. The principles of manual operation are explained in [Chapter 7.2, "Means of Manual Interaction"](#), on page 30.
- **Remote control**
Create programs to automatize repeating settings, tests and measurements. The instrument is connected to a computer running the program. [Chapter 7.3, "Remote Control"](#), on page 33 provides a brief overview of the interfaces provided for remote control.
See [Chapter 4.2, "Setting Up a Network \(LAN\) Connection"](#), on page 18 and the user manual, chapter "Network and Remote Control".

7.2 Means of Manual Interaction

To configure the R&S HMP manually, use the front panel controls, see [Chapter 5, "Instrument Tour"](#), on page 22. The display shows the current settings, menus and dialogs, when you perform your settings.

This section briefly explains the controls and some additional features, e.g.:

- The use of the arrow keys or alternatively the rotary knob to adjust settings.
- The meaning of the color of the channel keys (Ch1, ...).

Understanding the display information

Brief overview of the displayed elements:

- **Home screen:** Displays the channel parameters.
- **Menus:** Lists functions leading to the setting dialogs.
- **Dialogs:** Provide the settings of the specific functions.

Illuminated keys

The illuminated front panel keys provide access to the instrument settings and to activate functions and operating modes. The channel keys illuminate in varying colors indicating their current activities or states.

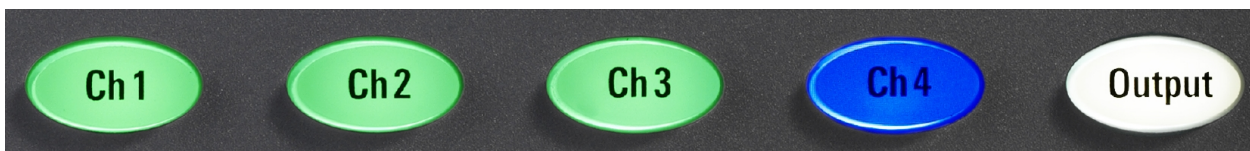


Figure 7-1: Example of the illuminated channel and output keys of the R&S HMP4040

Meaning of the key colors:

- **White:** the function or operating mode is activated.
- **Green** (channel key): the channel is in constant voltage mode (CV).
- **Red** (channel key): the channel is in constant current mode (CC), i.e. the current limit is active.
- **Blue** (channel key): the channel is in setting mode, i.e. a function is activated.
- **Flashing** (channel key): if the Output key and the Voltage key are active, and you change a setting of a channel, the color changes depending on the operating mode:
 - **Blue / Green** flashing: CV = constant voltage.
 - **Blue / Red** flashing: CC = constant current.
- **Off:** the channel, function, or operating mode are not active.

The navigation controls include a rotary knob and arrow keys. They allow you to navigate within a setting, menus or dialogs.

- Rotary knob

The rotary knob has several functions:

- Moves the selection, e.g. to a parameter in a settings dialog
- Activates the edit mode of a parameter

- Increments (clockwise direction) or decrements (counterclockwise direction) the instrument parameter at a defined step size in the case of a numeric entry
- Acts like the Enter key, when it is pressed
- Arrow keys
 - Move the selection up and down, or forward and backward, e.g. to a parameter in a settings dialog
 - Return to a previous menu level (left arrow key)
 - In a numeric entry field, increase or decrease the value, or move between the digits.

Settings controls

Alternative methods for setting parameters:

- Rotary knob, Arrow keys

The rotary knob and arrow keys also enable you to set nominal values by:

- Navigating to the corresponding parameter and activating the edit mode
- Increasing or decreasing the value.

Note: If you enter the voltage or current limit value using the rotary knob, the R&S HMP immediately applies the set value. You can terminate the entry by pressing the corresponding key, e.g. Voltage, but for these parameters, the instrument also exits the setting mode after the fallback time has elapsed. See the user manual, chapter Instrument Functions > General Functions > Key Fallback Time .

Settings in menus are not affected by the fallback time. Either you confirm a setting, or return using the arrow keys.

- Numerical Keypad (R&S HMP40x0 only), enables you to:
 - Directly enter values ("0...9")
 - Insert a decimal point (".")
 - Delete a value ("C")

Note: If you enter a value using the keypad, you must press Enter to confirm your entry. Otherwise, the instrument disables the edit mode without the changes taking effect.



Throughout the user documentation, the instructions for configuring settings use the rotary knob and arrow keys. The alternative operating methods are only noted here.

7.3 Remote Control

In addition to operating the R&S HMP directly on the instrument, it is also possible to operate and control it from a remote PC.

Remote Control Interfaces

The R&S HMP supports various interfaces for remote control:

- Dual interface Ethernet / USB (standard)
- Dual interface USB / RS232 (option)
- GPIB Interface IEEE-488 (option)

Remote control via USB / RS232 or GPIB Interface IEEE-488 requires that the corresponding options are installed. Drivers and information on their installation are provided for download on the product pages www.rohde-schwarz.com/product/hmp and www.rohde-schwarz.com/product/hmp4000.

See [Chapter 4.2, "Setting Up a Network \(LAN\) Connection"](#), on page 18 for an example on how to set up a remote control connection via LAN.

Index

A

Activating the fuse	28
Activating the output	29
Application examples	6
Application notes	6

B

Bench top operation	14
Brochure	5
Brochures	5

C

Checking the LAN connection	21
-----------------------------------	----

D

Data sheet	5
Delivery list	13
Display information	31
Drivers for remote control	6

E

Electrostatic discharge	10, 26
ESD	10, 26

F

Failure	
Network connection	19
Front panel	
HMP20x0	22
HMP40x0	23
Fuse replacing	17

G

Getting started manual	5
------------------------------	---

I

Illuminated keys	22, 31
Instrument control	30
Manual operation	30
Remote control	30
Ways of operation	30
Instrument tour	22

K

Key features	8
--------------------	---

L

LAN connection	
Not working	19

M

Manual interaction	30
Manual operation	30

N

Navigation controls	31
Network connection	
Error	19

O

Operation	
Manually	30
Remotely	33

P

Ping	21
Placing the instrument	14
Power on	16
Preparing for use	9
Putting into operation	9
Bench top operation	14
Delivery list	13
Fuse replacing	17
Placing the instrument	14
Power on	16
Rack mounting	14
Safety	9
Setting up a LAN connection	18
Shut down	18
Start up	18
Starting	16
Unpacking	13

R

Rack mounting	14, 15
Rear panel	
HMP2020	24
HMP2030	24
HMP4030	25
HMP4040	25
Recalling instrument settings	29
Release notes	6

Remote connection	
Not working	19
Remote control	30, 33
Drivers	6
Interfaces	33
S	
Safety	7, 9
Safety instructions	5
Saving instrument settings	29
SCPI programmers manual	5
Selecting a channel	27
Selecting the current limit	28
Selecting the output voltage	28
Setting up a LAN connection	18
Checking the LAN connection	21
Switching to remote control	20
To assign the IP address manually	20
To set up a network (LAN) connection	19
Settings controls	32
Shut down	18
Specifications	5
Start up	18
Starting the instrument	16
Switching to remote control	20
T	
To assign the IP address manually	20
To set up a network (LAN) connection	19
Trying out	27
Activating the fuse	28
Activating the output	29
Prerequisites	27
Recalling instrument settings	29
Saving instrument settings	29
Selecting a channel	27
Selecting the current limit	28
Selecting the output voltage	28
U	
Unpacking	13
User manual	5
W	
Ways of operation	30