

R&S®HMP Series Power Supplies Getting Started



1178679102
Version 03



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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)

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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.

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1 Safety and regulatory information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the following chapters.

Intended use

The products of the R&S HMP series provide adjustable DC voltage, current and power for electrical loads. They are designed for industrial use, e.g. production testing, maintenance and engineering labs.

Observe the operating conditions and performance limits stated in the data sheet.

Target audience

Only connect, set up and use a power supply if you are an electrically skilled person. Such persons have the education and experience needed to recognize risks and avoid hazards of working with electricity.

This document provides information throughout the life cycle of the product, for installers, operators, technicians, maintenance and service personnel.

Follow the safety instructions provided in [Chapter 1.1, "Safety instructions"](#), on page 6 and the additional information provided during setup or operation procedures.

Where do I find safety information?

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

- In [Chapter 1.1, "Safety instructions"](#), on page 6. The same information is provided in many languages as printed "Safety Instructions". The printed "Safety Instructions" are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the data sheet, manuals and the printed "Safety Instructions". If you are unsure about the appropriate use, contact Rohde & Schwarz customer service.

Only people skilled in electrical work should connect, set up and use the product. Such persons have the education and experience needed to recognize risks and avoid hazards of working with electricity. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

Reconfigure or adjust the product only as described in the product documentation or the data sheet. Any other modifications can affect safety and are not permitted.

Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. If any part of the product is damaged or broken, stop using the product. Contact Rohde & Schwarz customer service at <https://www.rohde-schwarz.com/support>.

Lifting and carrying the product

Look up the maximum weight in the data sheet. A single person can only carry a maximum of 18 kg safely depending on age, gender and physical condition. If your product is heavier than 18 kg, do not move or carry it by yourself.

To move the product safely, you can use lifting or transporting equipment such as lift trucks and forklifts. Follow the instructions provided by the equipment manufacturer.

Choosing the operating site

Only use the product indoors. The product casing is not waterproof. Water that enters can electrically connect the casing to live parts, which can lead to electric shock, serious personal injury or death if you touch the casing.

Unless otherwise specified, you can operate the product up to an altitude of 2000 m above sea level. The product is suitable for pollution degree 2 environ-

ments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature and humidity, see the data sheet.

Setting up the product

Always place the product on a stable, flat and level surface with the bottom of the product facing down. If the product is designed for different positions, secure the product so that it cannot fall over.

If the product has foldable feet, always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the product is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

If stacking is possible, keep in mind that a stack of products can fall over and cause injury.

If you mount products in a rack, ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the products from the bottom shelf to the top shelf so that the rack stands securely. Secure the product so that it cannot fall off the rack.

Connecting to power

The product is an overvoltage category II product. Connect the product to a fixed installation used to supply energy-consuming equipment such as household appliances and similar loads. Keep in mind that electrically powered products have risks, such as electric shock, fire, personal injury or even death. Replace parts that are relevant to safety only by original parts, e.g. power cables or fuses.

Take the following measures for your safety:

- Before switching on the product, ensure that the voltage and frequency indicated on the product match the available power source. If the power adapter does not adjust automatically, set the correct value and check the rating of the fuse.
- If a product has an exchangeable fuse, its type and characteristics are indicated next to the fuse holder. Before changing the fuse, switch off the product and disconnect it from the power source. How to change the fuse is described in the product documentation.
- Only use the power cable delivered with the product. It complies with country-specific safety requirements. Only insert the plug into an outlet with protective conductor terminal.

- Only use intact cables and route them carefully so that they cannot be damaged. Check the power cables regularly to ensure that they are undamaged. Also ensure that nobody can trip over loose cables.
- Only connect the product to a power source with the safety fuse specified in the data sheet.
- Ensure that you can disconnect the product from the power source at any time. Pull the power plug to disconnect the product. The power plug must be easily accessible. If the product is integrated into a system that does not meet these requirements, provide an easily accessible circuit breaker at the system level.

Working with hazardous voltages

Voltages higher than 30 V RMS, or 42 V peak, or 60 V DC are regarded as hazardous contact voltages. Direct contact with them can cause serious injuries.

When working with hazardous contact voltages, use protective measures to preclude direct contact with the measurement setup:

- Before each measurement, inspect all components for damage and replace them if necessary.
- Do not touch exposed connections and components when power is applied.
- Casing, chassis and all measuring terminals are connected to a grounding connection. Never disconnect a grounding connection on the product.
- Switch off the power before connecting or disconnecting the terminal block to the rear panel connector. Tighten all wires connected to the terminal block.
- Only use the wires and terminal blocks delivered with the product.
- Only use insulated wires, not stripped wires, for the terminal connections.
- Turn the mains switch off when the product is not in use.
- When operating measuring accessories, only use the cables delivered with the accessory. If you have to use cables from other manufacturers, make sure that they are of the required overvoltage category.

Do not operate the product in series or parallel unless that setup is supported. If accessories are provided for a product, only use them for that product. See the data sheet.

In series or parallel setups, protect yourself against electric shock before connecting access ports such as the Ethernet port or the USB port using one of the following measures:

Labels on the R&S HMP

- Ensure that all products are grounded by connecting them to the AC power.
- Disconnect all power connections to the product, including outputs.

Measurement categories

IEC 61010-2-030 defines measurement categories that rate products on their ability to resist short transient overvoltages that occur in addition to the working voltage.

This product is designed for measuring within measurement category 0 only. Measurements in this category are performed on circuits not directly connected to mains, such as electronics, battery powered circuits, and specially protected secondary circuits. This measurement category is also known as CAT I.

Cleaning the product

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.
	Electrical hazard Indicates live parts. Risk of electric shock, fire, personal injury or even death.
	Hot surface Do not touch. Risk of skin burns. Risk of fire.
	Protective conductor terminal Connect this terminal to a grounded external conductor or to protective ground. This connection protects you against electric shock if an electric problem occurs.

1.2 Labels on the R&S HMP

Labels on the casing inform about:

- Personal safety, see ["Meaning of safety labels"](#) on page 9.
- Product and environment safety, see [Table 1-1](#).

Warning messages in the documentation

- Identification of the product, see the serial number on the [rear panel](#).

Table 1-1: Labels regarding the R&S HMP and environment safety

	Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see the product user manual, chapter "Disposal".
	Take care when handling electrostatic sensitive devices.
	Grounding terminal (earth ground contact)
	Chassis grounding terminal
	ON (supply voltage)
	OFF (supply voltage)
	Read the manual for information.

1.3 Warning messages in the documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

WARNING

Potentially hazardous situation. Could result in death or serious injury if not avoided.

CAUTION

Potentially hazardous situation. Could result in minor or moderate injury if not avoided.

NOTICE

Potential risks of damage. Could result in damage to the supported product or to other property.

1.4 Korea certification class A

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

2 Documentation overview

This section provides an overview of the R&S HMP user documentation. Unless specified otherwise, you find the documents at www.rohde-schwarz.com/manual/hmp.

Further documents are available under www.rohde-schwarz.com/hmp2000 and www.rohde-schwarz.com/hmp4000.

2.1 Getting started manual

The getting started 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.

2.2 User manual

The 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, instrument interfaces and error messages. Includes the contents of the getting started manual.

The user manual is also available for download or for immediate display on the Internet.

2.3 Service manual

Describes the performance test for checking the rated specifications, module replacement and repair, firmware update, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

<https://gloris.rohde-schwarz.com>

2.4 Instrument security procedures

Deals with security issues when working with the R&S HMP in secure areas. It is available for download on the Internet.

2.5 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

2.6 Datasheet

The datasheet 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.

2.7 Calibration certificate

The document is available on <https://gloris.rohde-schwarz.com/calcert>. You need the device ID of your instrument, which you can find on a label on the rear panel.

2.8 Release notes and open-source acknowledgment (OSA)

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

The software makes use of several valuable open source software packages. An open-source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/hmp.

2.9 Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/hmp

2.10 Remote control drivers

The instrument drivers enable remote control using the corresponding interfaces. The drivers and installation instructions are available for download on the product page.

See www.rohde-schwarz.com/driver/hmp.

3 Key features

The R&S HMP series power supplies set 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 ms 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

Here, you can find basic information about setting up the product for the first time.

4.1 Lifting and carrying

See ["Lifting and carrying the product"](#) on page 6.

For mounting the R&S HMP in a rack, see [Chapter 4.4.2, "Mounting the R&S HMP in a rack"](#), on page 18

4.2 Unpacking and checking

1. Unpack the product carefully.
2. Retain the original packing material. Use it when transporting or shipping the product later.
3. Using the delivery notes, check the equipment for completeness.
4. Check the equipment for damage.

If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

4.3 Choosing the operating site

Specific operating conditions ensure proper operation and avoid damage to the product and connected devices. For information on environmental conditions such as ambient temperature and humidity, see the data sheet.

See also ["Choosing the operating site"](#) on page 6.

Electromagnetic compatibility classes

The electromagnetic compatibility (EMC) class indicates where you can operate the product. The EMC class of the product is given in the data sheet.

- Class B equipment is suitable for use in:
 - Residential environments
 - Environments that are directly connected to a low-voltage supply network that supplies residential buildings
- Class A equipment is intended for use in industrial environments. It can cause radio disturbances in residential environments due to possible conducted and radiated disturbances. It is therefore not suitable for class B environments. If class A equipment causes radio disturbances, take appropriate measures to eliminate them.

4.4 Setting up the R&S HMP

See also:

- ["Setting up the product"](#) on page 7
- ["Intended use"](#) on page 5

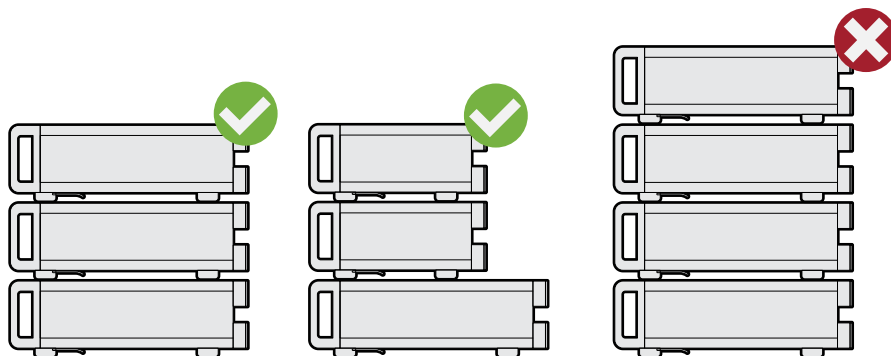
4.4.1 Placing the R&S HMP on a bench top

To place the product on a bench top

1. Place the product on a stable, flat and level surface. Ensure that the surface can support the weight of the product. For information on the weight, see the data sheet.
2. **CAUTION!** Foldable feet can collapse. See ["Setting up the product"](#) on page 7.
Always fold the feet completely in or out. With folded-out feet, do not place anything on top or underneath the product.
3. **WARNING!** A stack of products can fall over and cause injury. Never stack more than three products on top of each other. Instead, mount them in a rack.
Stack as follows:
 - If the products have foldable feet, fold them in completely.

Setting up the R&S HMP

- It is best if all products have the same dimensions (width and length). If the products have different dimensions, stack according to size and place the smallest product on top.
- Do not exceed the permissible total load placed on the product at the bottom of the stack:
 - 50 kg when stacking products of identical dimensions (left figure).
 - 25 kg when stacking smaller products on top (middle figure).



Left = Stacked correctly, same dimensions

Middle = Stacked correctly, different dimensions

Right = Stacked incorrectly, too many products

4. **NOTICE!** Overheating can damage the product.

Prevent overheating as follows:

- Keep a minimum distance of 10 cm between the fan openings of the product and any object in the vicinity.
- Do not place the product next to heat-generating equipment such as radiators or other products.

4.4.2 Mounting the R&S HMP in a rack

To prepare the rack

1. Observe the requirements and instructions in ["Setting up the product"](#) on page 7.
2. **NOTICE!** Insufficient airflow can cause overheating and damage the product. Design and implement an efficient ventilation concept for the rack.

To mount the R&S HMP in a rack

1. Use an adapter kit that fits the dimensions of the R&S HMP to prepare the instrument for rack mounting.
 - a) Order the rack adapter kit designed for the R&S HMP. For the order number, see the data sheet.
 - b) Mount the adapter kit. Follow the assembly instructions provided with the adapter kit.
2. Lift the R&S HMP to shelf height.
3. Push the R&S HMP onto the shelf until the rack brackets fit closely to the rack.
4. Tighten all screws at the rack brackets with a tightening torque of 1.2 Nm to secure the R&S HMP in the rack.

To unmount the product from a rack

1. Loosen the screws at the rack brackets.
2. Bring the lifting equipment to shelf height.
3. Remove the product from the rack.
4. If placing the R&S HMP on a bench top again, unmount the adapter kit from the R&S HMP. Follow the instructions provided with the adapter kit.

4.5 Considerations for test setup

Cable selection and electromagnetic interference (EMI)

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:

- Use high-quality shielded cables, for example:
 - Double-shielded data cables for connecting external devices. The length of data cables must not exceed 3 m.
 - Double-shielded USB cables. The length of passive USB cables must not exceed 1 m.
 - CAT5e LAN cables, e.g. RJ-45 with a length ≤ 3 m.

Considerations for test setup

- Double-shielded IEEE-488 (GPIB) bus cables. We recommend that you use the double-shielded cable "R&S HZ72" from Rohde & Schwarz (GPIB-cable 2 m, order no. 3594.4269.02).
- Cables for output supply:
 - Use insulated cables of the same type
 - Keep the cable length as short as possible
 - Use cables with maximum cross-section to minimize the conductor resistance
- Terminal blocks (included) for connecting to the rear panel connectors.
- Always terminate open cable ends.
- Ensure that connected external devices comply with EMC regulations.
- Check regularly that all cables, including power cables are in perfect condition.

Input and output levels

Information on voltage levels is provided in the data sheet. Keep the voltage levels within the specified ranges to avoid damage to the product and connected devices.

Preventing electrostatic discharge (ESD)

Electrostatic discharge is most likely to occur when you connect the front and rear connectors simultaneously.

Electrostatic discharge is most likely to occur:

- When connecting the output connectors at the front and rear panels simultaneously.
 - When connecting or disconnect a DUT.
1. **NOTICE!** Electrostatic discharge can damage the electronic components of the product and the device under test (DUT).
Ground yourself to prevent electrostatic discharge damage:
 - a) Use a wrist strap and cord to connect yourself to ground.
 - b) Use a conductive floor mat and heel strap combination.
 2. Leave the output sockets at the front disconnected, when using the rear panel outputs.

4.6 Preparing for mains voltage

The R&S HMP is designed for 115 V or 230 V mains voltage. The range is specified on the label below the [AC power supply](#) at the [rear panel](#), and in the data sheet.

If the mains voltage exceeds the permissible range, contact the Rohde & Schwarz customer service, see [Chapter 8, "Contacting customer support"](#), on page 46.

Take care to adjust the R&S HMP to the supplied mains voltage. When delivered, the R&S HMP is configured for 230 V mains voltage.

The product is protected by two fuses. The suitable fuse type depends on the supplied mains voltage and the R&S HMP model. [Table 4-1](#) shows the suitable fuse types.

Table 4-1: Fuse types

Mains voltage	R&S HMP2020 / R&S HMP2030	R&S HMP4030 / R&S HMP4040
115 V	2 x T6.3H/250V (IEC 60127-2/5-T6.3H/250V, order no. 0020.7630.00)	2 x T10H/250 V (IEC 60127-2/5-T10H/250V, order no. 0606.3136.00)
230 V	2 x T3.15H/250 V (IEC 60127-2/5-T3.15H/250V, order no. 0099.6729.00)	2 x T5H/250 V (IEC 60127-2/5-T5H/250V, order no. 0099.6735.00)

4.6.1 Preparing for 115 V

If you want to supply the R&S HMP with 115 V mains voltage, you need to do the following:

- ["To change the fuses"](#) on page 21
- ["To set the supplied mains voltage"](#) on page 23

To change the fuses

The fuses for 115 V mains voltage are delivered with the R&S HMP.

1. **WARNING!** The fuse is part of the main power supply. Handling the fuse while the power is on can lead to electric shock.

Before changing the fuse, disconnect the product from the power source.

Preparing for mains voltage

2. Insert a flathead screwdriver with a blade width of approximately 2 mm under the small opening tab of the fuse holder.



Figure 4-1: AC power connector

1 = Power supply connector

2 = Opening tab of the fuse holder

When unlocking the mechanism, the fuse holder is pushed outwards by compression springs.

3. Pull out the fuse holder.
4. Lever out the fuses.
Keep the fuses for later use, if intact.
5. **WARNING!** If the fuse protection is insufficient, the R&S HMP can overheat and even cause a fire.
Check the fuse rating on the caps of both fuses that were delivered with the R&S HMP. Make sure that the fuse types match the characteristics that are indicated next to the fuse holder for 115 V mains voltage.
6. Inspect the compression springs of the fuse holder carefully. With deformed or protruding springs, you cannot insert the fuses properly. Contact Rohde & Schwarz at <http://www.customersupport.rohde-schwarz.com>.
7. Insert the fuses into the groove of the fuse holder.
8. Align the fuse holder with the guide bar facing the socket.
9. Carefully slide the fuse holder against the spring pressure into the slot until both plastic locks latch.

To set the supplied mains voltage

The [AC voltage](#) switch selector is at the [rear panel](#).

- ▶ To set to 115 V mains voltage, use a tool e.g. a flat screwdriver to slide the voltage selector so that the label indicates *115 V*.

4.6.2 Reverting to 230 V

If needed, you can revert to 230 V mains voltage by:

- Inserting the fuses for 230 V mains voltage.
- Selecting 230 V as supplied mains voltage.

4.7 Connecting to power

For safety information, see:

- ["Connecting to power"](#) on page 7
- ["Working with hazardous voltages"](#) on page 8

To ground the chassis

1. Plug a cable with a banana plug into the ground socket  at the [front panel](#), see ["Protective conductor terminal"](#) on page 32.
See also [Table 1-1](#).
2. Connect the cable to ground.

To connect to AC supply

1. If necessary, ground the chassis of the R&S HMP. See ["To ground the chassis"](#) on page 23.
2. **WARNING!** If the fuse protection is insufficient, the R&S HMP can overheat and even cause a fire.
Ensure that R&S HMP is prepared for the supplied mains voltage. See [Chapter 4.6, "Preparing for mains voltage"](#), on page 21.
3. Plug the AC power cable into the AC power supply connector. Only use the AC power cable delivered with the R&S HMP.

4. Plug the AC power cable into a power outlet with ground contact.
Do not use a cheater plug or other means to bypass or disconnect the protective ground lead.
The required ratings are listed on the front panel of the R&S HMP, see [Chapter 5.2, "Rear panel tour"](#), on page 32.

4.8 Connecting to LAN

Option: R&S HO732 dual Ethernet / USB interface

Equipped with the interface, the R&S HMP provides Ethernet (LAN) connectivity. If you have assigned the corresponding rights, you can use this interface for remote control and data transfer from a controller PC. Make sure that you have connected the controller PC in the same network.

Consult your network administrator before performing the following tasks to avoid a network failure:

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

For remote control over other interfaces, refer to the description in chapter "Network and remote control operation" in the user manual of the R&S HMP.

To operate securely

1. **NOTICE!** The R&S HMP is designed to operate at local workplaces or in secured networks (LAN).
When connected to the LAN, the R&S HMP can potentially be accessed from the internet, which constitutes a security risk. For example, attackers can misuse or damage your device.
Use secured connections for internet or remote access, if applicable.
2. Ensure that the network settings comply with the security policies of your company. Contact your local system administrator or IT department before connecting your product to your company LAN.
3. Always install the latest firmware.

Connecting a device under test (DUT)

To connect to the LAN

Option: R&S HO732 dual Ethernet / USB interface

The LAN connector is at the [rear panel](#).

1. **WARNING!** Risk of electric shock. In series or parallel setups, you achieve higher voltages and currents. Observe the safety information in "[Working with hazardous voltages](#)" on page 8.

Ensure that all products are grounded by connecting them to the AC power.

2. Connect the LAN socket using an RJ-45 cable to the LAN.

By default, the R&S HMP uses DHCP that assigns the IP address automatically.

If the R&S HMP cannot obtain an IP address automatically, it returns a time-out message after about three minutes and clears the parameters in the "Interface settings" dialog. Possible reasons are that the LAN does not support DHCP or requires a specific TCP/IP configuration, or that the connection is missing.

3. If the time-out message is displayed, proceed as follows:
 - a) Check the LAN connection of both, the R&S HMP and the controller PC.
 - b) Consult your network administrator to request support and an IP address, if necessary.
 - c) If necessary, assign the IP address manually as described in chapter "Network operation and remote control > Adjusting the interface addresses > LAN interface" in the user manual.

If connected and switched on, the R&S HMP indicates the address information and LAN parameters in the "Interface Settings HO732" dialog.

See "General instrument functions > Interfaces" in the user manual. For information on how to control the instrument remotely, see "Network and remote control operation > Operating the instrument remotely" in the user manual.

4.9 Connecting a device under test (DUT)

For safety information, see "[Working with hazardous voltages](#)" on page 8.

The R&S HMP series instruments with two, three or four output channels enable you to supply DUTs with power in a wide variety of applications.

As a brief introduction, the following example describes the basic steps to be taken when setting up a measurement.

For specific applications and setups, see chapter "Application examples" in the user manual.

To connect to the DUT and set up the measurement

It is assumed that the R&S HMP is connected to power, see [Chapter 4.7, "Connecting to power"](#), on page 23.

1. If any output channels are on, press the [Output] key to switch off all channels.
2. To connect the R&S HMP to the DUT, use cables that fulfill the requirements in [Chapter 4.5, "Considerations for test setup"](#), on page 19:
 - a) Connect one cable to the [-] output connector of the channel at the [front panel](#).
 - b) Connect the second cable to the [+] output connector of the same channel.
3. Connect both cables to the DUT.
4. To improve accuracy, connect the sense lines the same way.
See chapter "Application Examples > Compensating voltage drops on the supply lines" in the user manual.

Now you can switch on the R&S HMP to configure the setup and start the measurement, see:

- ["To switch on the R&S HMP"](#) on page 27
- ["Selecting the channels"](#) on page 36
- ["Setting the current limit"](#) on page 37
- ["Selecting the output voltage"](#) on page 36
- ["Activating the output"](#) on page 38

4.10 Switching on and off



For safety reason, switch off at the mains switch when the R&S HMP is not in use.

To switch on the R&S HMP

The instrument is off but connected to power, see [Chapter 4.7, "Connecting to power"](#), on page 23.

- ▶ Press the [Power] key at the [front panel](#).

The R&S HMP performs a system check, boots the operating system, and starts the firmware.

It starts up in the operating mode used before the last switch-off.

Note: At startup, the instrument turns off all signal outputs to protect a connected DUT (load). This function prevents the DUT from being supplied and even damaged unintentionally caused by the latest instrument settings.

To shut down the R&S HMP

- ▶ Press the [Power] key.

The operating system shuts down.

The R&S HMP saves all current instrument settings (nominal values) in non-volatile memory, and restores the settings when you switch it on again.

To disconnect from power

The R&S HMP is switched off, i.e. the [Power] key is off.

- ▶ **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first.

Disconnect the AC power cable from the socket outlet.

5 Instrument tour

This chapter explains the control elements and the connectors of the R&S HMP instruments. The views of the front panel and the rear panel help you to get familiar with the instrument and to perform first steps. For specifications of the interfaces, see the data sheet.

The meanings of the labels on the R&S HMP instruments are described in [Chapter 1.2, "Labels on the R&S HMP"](#), on page 9.

- 
- The control elements on the front panel light up 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 39 for details.

- [Front panel tour](#).....28
- [Rear panel tour](#)..... 32

5.1 Front panel tour

The front panel covers control elements and connectors for connecting and configuring the R&S HMP. The shown views of the R&S HMP2030 and the R&S HMP4040 represent the elements of all instrument models.

On the [rear panel](#), you find further connectors, e.g. remote control interfaces, and the AC supply.

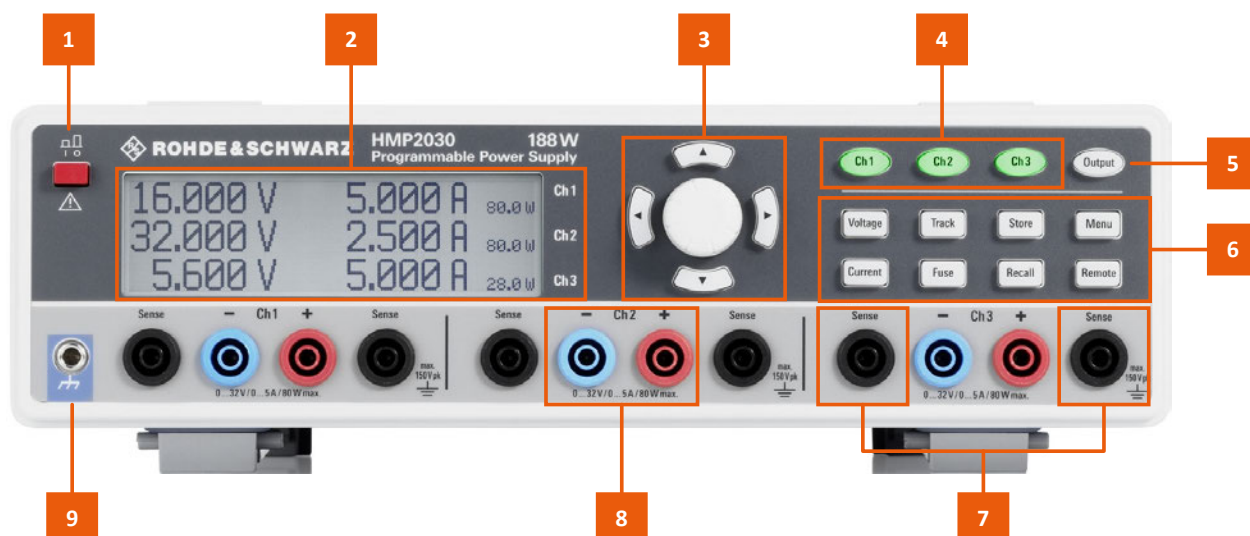


Figure 5-1: Front view of the R&S HMP2030

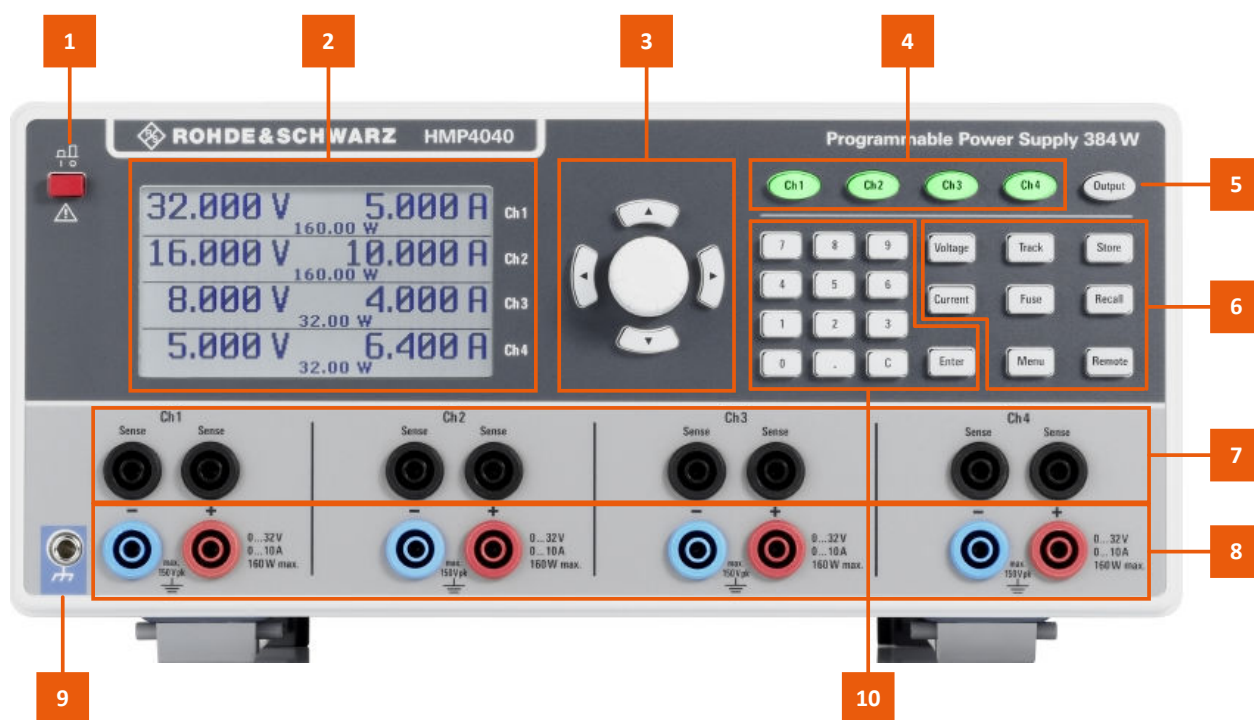


Figure 5-2: Front view of the R&S HMP4040

- 1 = [Power] key, see [Chapter 5.1.1, "\[Power\] key"](#), on page 30.
- 2 = Display, see [Chapter 5.1.2, "Display"](#), on page 30.
- 3 = Navigation controls, see [Chapter 5.1.4, "Navigation controls"](#), on page 30
- 4 = Channel keys, see [System and function keys > Table 5-2](#).
- 5 = [Output] key, see [System and function keys > Table 5-2](#).
- 6 = Function keys, see [System and function keys > Table 5-3](#) and [Table 5-4](#).
- 7 = Sense connectors, see ["Sense"](#) on page 32.

8 = Channel output connectors, see ["CHn"](#) on page 32.

9 = Protective conductor terminal, see ["Protective conductor terminal"](#) on page 32.

10 = [Keypad], see [System and function keys](#) > [Table 5-5](#).

5.1.1 [Power] key

Switches the instrument on and off, see [Chapter 4.10, "Switching on and off"](#), on page 26.

5.1.2 Display

The LCD screen at the front panel is the graphical user interface.

The initial screen indicates the parameters of up to four output channels, depending on the instrument model. For configuring the instrument functions and settings, the display indicates the corresponding settings dialogs.

5.1.3 Keys

This section introduces the functionality of the hardkeys at the front panel. These controls lead you to menus and dialogs displayed on the screen. For information on how to operate the instrument, see [Chapter 7.2, "Means of manual interaction"](#), on page 39.

5.1.4 Navigation controls

The [rotary knob] and [arrow] keys allow you to navigate within the display, and to configure and confirm settings.

Table 5-1: Navigation controls

Key	Assigned functions
[rotary knob]	Selects, activates or confirms settings.
[left] / [right] / [up] / [down]	Moves the cursor in entry fields.

5.1.5 System and function keys

The system and function keys enable you to operate the instrument manually, including measurement and instrument settings.

Table 5-2: Channel controls

Key	Assigned functions
[Ch1] ^{1,2,3,4)} [Ch2] ^{1,2,3,4)} [Ch3] ^{2,3,4)} [Ch4] ⁴⁾	Selects a channel for output. The number of provided channel keys corresponds to the instrument model.
[Output]	Activates the output of the selected channels.
¹⁾ R&S HMP2020 / ²⁾ R&S HMP2030/ ³⁾ R&S HMP4030 / ⁴⁾ R&S HMP4040	

Table 5-3: Measurement controls

Key	Assigned functions
[Voltage]	Sets the output voltage for the selected channel.
[Current]	Sets the current limit for the selected channel.
[Track]	Starts the tracking function.
[Fuse]	Activates the electronic fuse function.

Table 5-4: Utility controls

Key	Assigned functions
[Store]	Saves the measurement configuration.
[Recall]	Loads a saved measurement configuration.
[Menu]	Accesses the list of instrument functions.
[Remote]	Switches between manual and remote control.

Table 5-5: Keypad ¹⁾

Key	Assigned functions
[Keypad]	Sets the nominal values.
[Enter]	Confirms settings.
¹⁾ R&S HMP4030 & R&S HMP4040	

5.1.6 Connectors

The channel output connectors are on the [front panel](#).

Sense

4 mm safety sockets.

Two connectors provided for each channel are used for compensating lead resistances.

CHn

4 mm safety sockets.

Depending on the instrument model, the number of output channels (up to four channels) and the voltage and current range varies. See the labels next to the connectors of each channel.

For detailed specifications, see the data sheet.

Protective conductor terminal

Protective ground socket (4 mm banana socket) to secure the R&S HMP, e.g. with a grounded external conductor.

The protective conductor terminal is directly connected to the mains safety ground by the line cord.

See [Chapter 1.2, "Labels on the R&S HMP"](#), on page 9.

5.2 Rear panel tour

The rear panel covers the AC power supply, interfaces for remote control and output terminals for connecting the R&S HMP in a rack. The shown rear views of the R&S HMP2030 and the R&S HMP4040 represent the elements for all instrument models (standard equipment).

The interfaces for remote control vary, depending on the equipped option:

- R&S HO732 dual Ethernet / USB interface
- R&S HO720 dual RS232 / USB interface
- R&S HO740 IEE-488 GPIB interface



Figure 5-3: Rear view of the HMP20x0 series



Figure 5-4: Rear view of the HMP40x0 series

- 1 = LAN interface, see "[LAN](#)" on page 34
- 2 = USB type B, see "[USB B](#)" on page 34
- 3 = Power supply, see "[AC supply with fuse holder](#)" on page 35
- 4 = Voltage selector, see "[AC power supply voltage selector switch](#)" on page 35
- 5 = Terminal block, see "[Rear panel connector](#)" on page 35

5.2.1 Connectors

LAN

Option: R&S HO732

RJ-45 connector to connect the R&S HMP to a LAN for remote control, remote operation, and data transfer.

See [Chapter 4.8, "Connecting to LAN"](#), on page 24.

USB B

Option: R&S HO732, R&S HO720

Female USB (universal serial bus) type B connector. This interface provides remote control of the instrument from a controller PC.

See chapter "Network operation and remote control > Connecting the R&S HMP for remote access" in the user manual.

RS-232

Option: R&S HO732

Serial interface to connect a computer for remote control or data transfer.

See chapter "Network operation and remote control > Connecting the R&S HMP for remote access" in the user manual.

For information on the pin assignment, see "Hardware interfaces > RS-232 " in the annex of the user manual.

GPIO Interface IEEE-488

Option: R&S HO740

General purpose interface bus (GPIO) interface to connect a computer for remote control of the R&S HMP.

See chapter "Network operation and remote control > Connecting the R&S HMP for remote access" in the user manual.

For information on the pin assignment, see "Hardware interfaces > GPIO" in the annex of the user manual.

Rear panel connector

Rear panel output connector for connecting the R&S HMP in 19" rack systems.

Depending on the instrument model, the instrument provides up to two 8-pin connector blocks. A connector block covers four lines for voltage, current sense and trigger signals for each channel.

5.2.2 AC power supply

AC supply with fuse holder

Mains power supply with fuse holder and IEC socket.

- Fuse holder
Socket for the fuse securing the source voltage. Depending on the power supply system, the corresponding fuse must be plugged before connecting to power.
See ["To change the fuses"](#) on page 21.
- IEC socket
Power supply connector for connecting the R&S HMP to the mains.
See [Chapter 4.7, "Connecting to power"](#), on page 23.

AC power supply voltage selector switch

Switch for selecting the line voltage 115 V or 230 V.

See ["To set the supplied mains voltage"](#) on page 23.

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 39.

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, "Preparing for use"](#), on page 16.
- 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 37.
- 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. 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 lights green.

Selecting the output voltage

1. Press the [Voltage] key.

The [Voltage] key and the arrow keys are lighting, indicating that they are active. For information on the color coding, see [Chapter 7.2.2, "Characteristics of setting controls"](#), on page 41.

2. Press the channel key, e.g. [Ch1].

Activates the voltage setting. The [Ch1] key lights 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 has elapsed.

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	39
• Means of manual interaction	39
• Entering data	44
• Remote control	45

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 39.
- **Remote control**
Create programs to automatize repeating settings, tests and measurements. A controller PC with remote access to the instrument runs the programs. See [Chapter 7.4, "Remote control"](#), on page 45 for an overview of the interfaces provided for remote control.

7.2 Means of manual interaction

For manual interaction with the R&S HMP, use the front panel controls, see [Chapter 5.1, "Front panel tour"](#), on page 28. The display shows the current settings, menus and dialogs, when you perform your settings.

- **Settings controls**
The system and function keys on the front panel provide all functions and controls to operate the instrument, see [Chapter 7.2.2, "Characteristics of setting controls"](#), on page 41.
- **Navigation controls**
The navigation controls include the [rotary knob] and [arrow] keys.

Means of manual interaction

The [rotary knob] allows you to navigate on the home screen or in dialogs, and to set parameters. The [arrow] move the cursor in entry fields.

7.2.1 Understanding the display information

- **Home screen**

The initial screen shows the power parameters applied to the corresponding channel output.

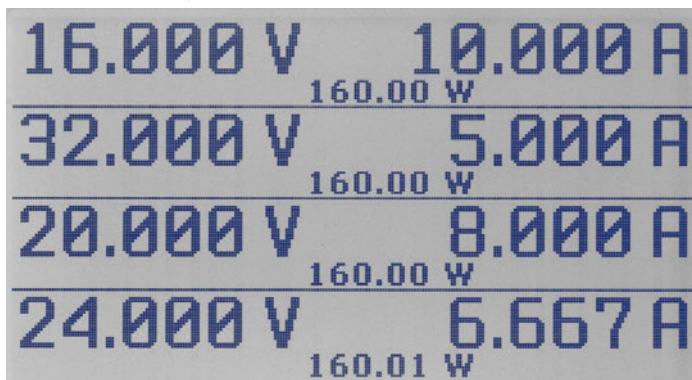


Figure 7-1: Home screen example

- **Setting dialogs**

Cover the setting parameters of the specific functions.

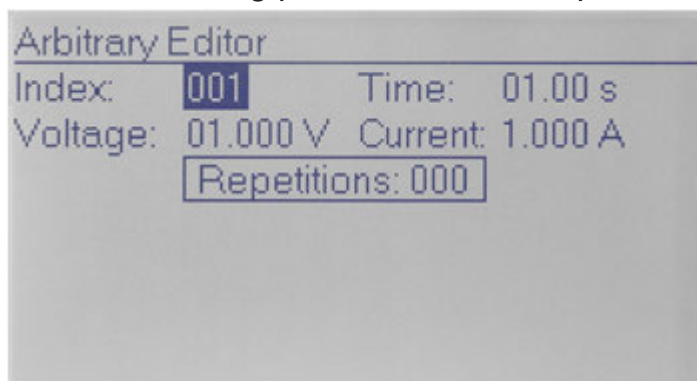


Figure 7-2: Settings dialog example

- **Selection lists**

List parameters or functions, or lead to setting dialogs.

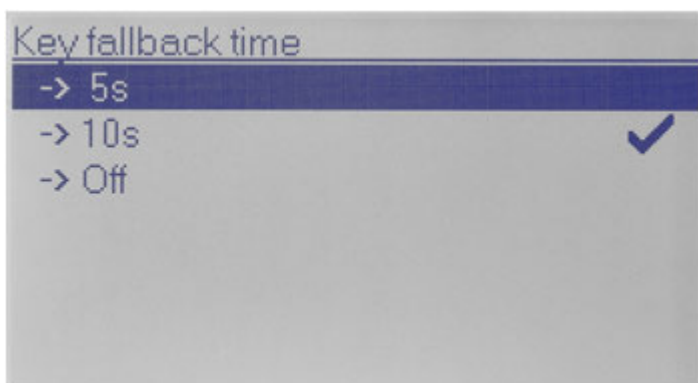


Figure 7-3: Selection list example

7.2.2 Characteristics of setting controls

All system and function keys are backlit keys, indicating, e.g. the operating mode of a channel, or an active function.

Channel keys

Enable you to configure a channel. The keys light up in different colors indicating their current activities or states.



Figure 7-4: Example of the lighting channel and output keys of the R&S HMP4040

Table 7-1: Colors of channel keys

Color	State
Green	The channel is in constant voltage mode (CV)
Red	The channel is in constant current mode (CC), i.e. the current limit is active
Blue	The channel is in setting mode, i.e. a function is activated.
Flashing	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: CV = constant voltage. • Blue / Red: CC = constant current.

Function keys

Table 7-2: Colors of function keys

Color	State
White	The function or operating mode is activated
Off	The function or operating mode is not active.

Navigation controls

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



When you select a function key, e.g. the [Voltage] key, the [arrow] keys light up, indicating that they are usable for input.

- 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 of a numeric entry with a defined step size.
- 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.



If you enter the voltage or current limit value with the [rotary knob], the R&S HMP immediately applies the set value. It exits the setting mode automatically, after the fallback time has elapsed, or you can manually exit the setting mode by pressing the corresponding function key.

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

See the user manual, chapter Instrument functions > General functions > Key fall-back time .

Numerical Keypad

The instrument models R&S HMP4030 and R&S HMP4040 provide a keypad on the front panel, to enter numerical values.

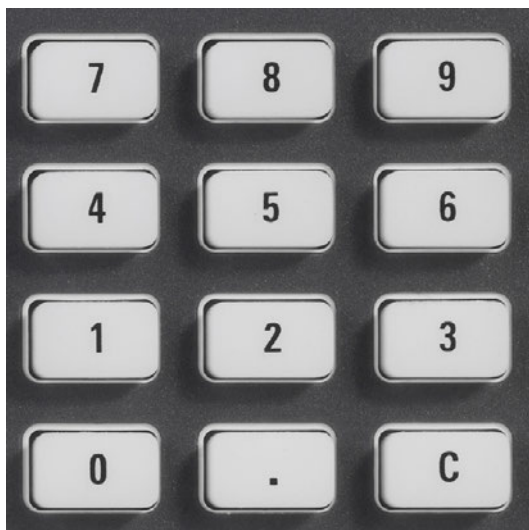


Figure 7-5: Keypad of the R&S HMP40xx instruments

7.2.3 Accessing the functionality

You can access the main functions and parameters, measurement and display modes and configure general instrument settings with the function keys on the front panel. When selected, i.e. a function is active, the corresponding function key lights up.

To open a dialog

Instrument functions that are not assigned to a dedicated function key are accessed with the [Menu] key.

1. Press the [Menu] key.
The R&S HMP displays the main menu.
2. Select the function by turning the [rotary knob].
Alternatively, use the [arrow] keys.

3. Press the [rotary knob] to confirm the selection.

The selected dialog opens.

To select a parameter in a dialog

1. Open the dialog as described in ["To open a dialog"](#) on page 43.
2. To select the settings parameter, turn the [rotary knob] or use the [arrow] keys.
3. To activate the edit mode for the selected parameter, press the knob.
4. To enter the value, proceed as described in [Chapter 7, "Instrument control"](#), on page 39.

To close or exit a dialog

- Press the [Menu] key.
The instrument exits the menu mode or returns to the previous menu level.

7.3 Entering data

To adjust values, you can use either the [rotary knob] or use the [arrow].

To adjust a numerical value

For numeric settings, you must select the parameter and activate the edit mode.

1. If not accessible directly, select the item in the provided function list to navigate to the corresponding settings dialog, e.g. as described in ["To open a dialog"](#) on page 43.
2. Select the parameter and activate the edit mode as described in ["To select a parameter in a dialog"](#) on page 44.
3. When the selected parameter is in edit mode, you have the following options to adjust the setting:
 - a) Turn the [rotary knob] to increase or decrease the value.
 - b) Use the [up] and [down] keys to decrease or increase the value.
 - c) Press the [rotary knob] to confirm the value.
4. For R&S HMP40xx instruments:
 - a) Enter the value directly on the keypad.
 - b) Apply with the [Enter] key.

5. Turn the [rotary knob] to increase or decrease the value.
Alternatively, use the [up] and [down] keys.
6. Press the [rotary knob] to confirm the value.



Values adjusted with the keypad must be applied with the [Enter] key. Otherwise, the instrument disables the edit mode without the changes taking effect.

7.4 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 Ethernet / USB interface, option R&S HO732
- Dual USB / RS232 interface, option R&S HO720
- GPIB Interface IEEE-488, option R&S HO740

To control the instrument remotely, you need one of the listed options installed in your R&S HMP. 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 4.8, "Connecting to LAN"](#), on page 24 for an example on how to set up a LAN connection for remote control.

8 Contacting customer support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:



Figure 8-1: QR code to the Rohde & Schwarz support page

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