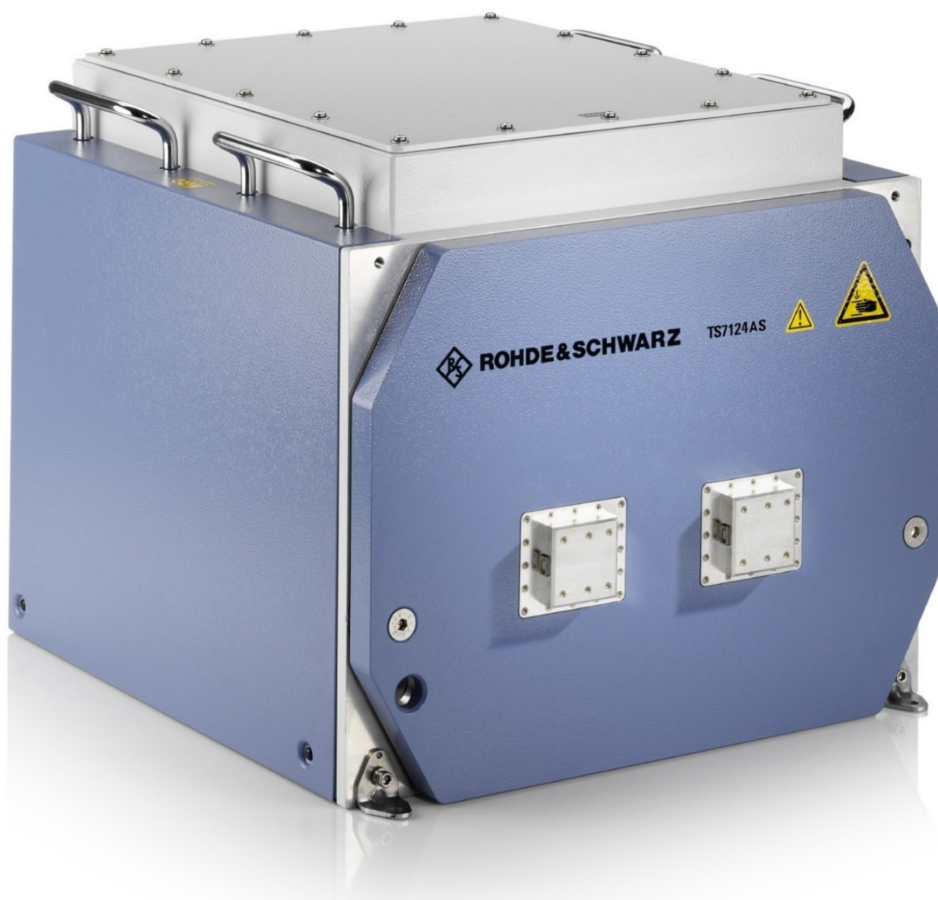


R&S®TS7124AS

RF Shielded Box

Instructions Handbook



1179294802
Version 02

ROHDE & SCHWARZ
Make ideas real



Original instructions, in the following referred to as "this handbook".

It describes the following models of the RF Shielded Box:

- R&S®TS7124AS (order no. 1525.8587.**02**) without front feedthrough ports
- R&S®TS7124AS (order no. 1525.8587.**12**) with two front feedthrough ports

The RF Shielded Box is also referred to as the "chamber" or the "product".

The firmware of the instrument uses several valuable open source software packages. For information, see the "Open Source Acknowledgment" document, which is available for download from the customer web section on GLORIS, the global Rohde & Schwarz information system: <https://extranet.rohde-schwarz.com>.

Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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1179.2948.02 | Version 02 | R&S®TS7124AS

Throughout this handbook, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®TS7124AS is indicated as R&S TS7124AS.

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1 Introduction

This instructions handbook addresses every **user** of the **chamber** (also referred to as the **product**). To use the chamber safely, first read and understand this entire handbook. If you are unsure about a topic, ask your supervisor or contact Rohde & Schwarz customer support.

The instructions handbook helps you to use the chamber safely and efficiently during its entire lifecycle; installation, operation, maintenance and disabling. If you are only involved in one part of the lifecycle, focus on the chapter about that topic. But always get a deep understanding of the safety aspects described in [Chapter 2, "Safety"](#), on page 10 before starting.

The chapter titles give a clear idea of the lifecycle stage and the tasks described. For example, if you are an **operator**, most activities intended for you are described in [Chapter 7, "Operation"](#), on page 42. If tasks are restricted to certain roles, these roles are mentioned at the beginning of the chapter that describes the tasks. The **roles** are explained in the glossary.

Abbreviations and frequently used terms are explained in the glossary at the end of this handbook.

1.1 Regulatory information

The following labels and the associated certificates declare conformance with legal regulations.

1.1.1 CE declaration



Certifies compliance with the applicable provisions of the Directive of the Council of the European Union. A copy of the CE declaration in English is at the beginning of the printed version of this handbook, after the table of contents.

1.1.2 China RoHS certification



Certifies compliance with the Chinese government's regulation on the restriction of hazardous substances (RoHS).

The chamber is built of environmentally sound materials. It is free of substances that are either restricted or prohibited by law.

1.2 Documentation overview

This section provides an overview of the R&S TS7124AS user documentation. Unless specified otherwise, you find the documents on the R&S TS7124AS product page at:

www.rohde-schwarz.com/product/ts7124

1.2.1 Instructions handbook

This handbook contains the description of all operating modes and functions of the chamber. It also provides an introduction to remote control, a complete description of the remote control commands, information on maintenance, interfaces and error messages.

The handbook does **not** describe the special activities required for permitted hardware reconfigurations of the chamber, which are described in the [Configuration manual](#). Only an **expert user** who has read and understood the [Configuration manual](#) is allowed to perform reconfigurations. Other users are limited to tasks described in the instructions handbook.

A printed copy of this handbook is included in the delivery and available at:

www.rohde-schwarz.com/manual/ts7124

1.2.2 Configuration manual

Describes all hardware reconfigurations and adjustments of the chamber that are permitted.

These activities are restricted to the role of an **expert user** who has read and understood the [Configuration manual](#) and who has all skills required for reconfiguring the chamber.

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

gloris.rohde-schwarz.com > Support & Services > Sales Web > Test and Measurement > Wireless Communication > TS7124 > Manuals

1.2.3 Data sheets and brochures

The data sheet contains the technical specifications of the chamber. It also lists optional accessories and their order numbers.

The data sheet is included in the product brochure, which provides an overview of the chamber and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/ts7124

1.2.4 Open source acknowledgment (OSA)

The open source acknowledgment provides verbatim license texts of the used open-source software.

See www.rohde-schwarz.com/software/ts7124

1.2.5 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/ts7124

1.3 Conventions

The R&S TS7124AS is also referred to as the "chamber" or the "product".

The following text markings are used throughout this handbook:

Convention	Description
[Keys]	Names of connectors, keys and knobs are enclosed by square brackets.
Filenames, commands, program code	Filenames, commands, coding samples and screen output are distinguished by their font.
Links	Links that you can click are displayed in blue font.
bold or <i>italic</i>	Highlighted text is shown in bold or italic font.
"quote"	Quoted text or terms are shown in quotation marks.



Tip

Tips are marked as in this example and provide useful hints or alternative solutions.



Note

Notes are marked as in this example and indicate important additional information.

2 Safety

Products from the Rohde & Schwarz group of companies are manufactured in accordance with the highest technical standards. Follow the instructions provided throughout this handbook. Keep the product documentation nearby and offer it to other users.

Use the chamber only for its intended use and within its performance limits, as described in [Chapter 2.1, "Intended use"](#), on page 10 and in the data sheet. Reconfigure or adjust the chamber only as described in the product documentation. Other modifications or additions can affect the safety and are not permitted.

For safety reasons, only trained personnel are allowed to handle the chamber. Trained personnel are familiar with the safety measures and know how to avoid potentially dangerous situations while performing the assigned tasks.

If any part of the chamber is damaged or broken, stop using the chamber. Only service personnel authorized by Rohde & Schwarz are allowed to repair the chamber. Contact Rohde & Schwarz customer support at www.customersupport.rohde-schwarz.com.

- [Intended use](#)..... 10
- [Residual risks](#)..... 10
- [Potentially dangerous situations](#)..... 11
- [Warning messages in this handbook](#)..... 13
- [Labels on the chamber](#)..... 14

2.1 Intended use

The chamber is intended for radiation testing of electronic components and devices in industrial, administrative, and laboratory environments, see [Chapter 6.1, "Choosing the operating site"](#), on page 24. Use the chamber only for its designated purpose, as described in this handbook. Observe the operating conditions and performance limits stated in the data sheet. If you are unsure about the appropriate use, contact Rohde & Schwarz customer support.

2.2 Residual risks

Despite the inherent safe design measures, safeguarding and complementary protective measures adopted, residual risks remain because of the following facts.

Chamber is heavy

The weight of the chamber without accessories and antenna cage is approximately 34 kg. In total, the chamber can weigh up to roughly 45 kg. If the chamber drops on a person, it can cause severe injuries, even death.

If the chamber is mounted in a rack on rails, the center of gravity moves with the chamber when you slide it out of the rack. If the rack topples, it can cause severe injuries, even death.

Door of the chamber is heavy

The center of gravity moves with the door when you open it. If the chamber topples, it can cause severe injuries, even death.

If the chamber sits on rails in a rack, the shift of the center of gravity is enhanced when you slide the chamber out of the rack and open the door at the same time.

Moving door

When you trigger the closing of the door, the door starts closing with reduced force. A built-in soft-close mechanism prevents the door from closing with full force as long as the gap is large enough to put a finger in it, maximum 8 mm. But if this safety mechanism fails, and the door closes with full force with a finger between the door and door frame, the finger is crushed. Even the loss of the limb is possible.

The safety mechanism is described in detail in [Chapter 3.2, "Automatic emergency deactivation"](#), on page 15.

Accidentally disabled soft-close mechanism

A safety cap ([Figure 6-10](#)) on the [X21] connector protects the pins of this connector. The connector is at the rear in the supply and control panel, labeled 3 in [Figure 4-3](#). If the safety cap is missing, an accidental short-circuit of these pins can disable the soft-close mechanism. Without safety mechanism, the door closes completely with full force. A finger between the door and door frame is crushed. Even the loss of the limb is possible.

Therefore, always keep the connector [X21] covered; either by the safety cap, or by the connector of the push-button switch unit ([Figure 4-4](#)).

Electrically powered

The risks, requirements for installation and safety measures are described in ["Connecting to power"](#) on page 12.

Pneumatically operated door

Supply the compressed air for the pneumatic system at a pressure of 6 bar. If the pressure exceeds the limit of 7 bar, the chamber operates under unspecified conditions.

When operating the door at > 7 bar, uncontrolled situations can occur, causing injuries like crushed fingers. See [Chapter 6.4, "Connecting compressed air"](#), on page 31.

2.3 Potentially dangerous situations

Potentially dangerous situations can occur during the following activities.

Transport

Wear appropriate protective clothing that complies with your local rules and regulations. If you are unsure of which equipment to use, ask your safety inspector. For example, gloves help to keep a tight grip on the handles when carrying the chamber.

Without gloves, you have less friction and your grip can slip if your hand is oily or wet. As a result, the chamber can drop and crush your foot or someone else's. Therefore, always wear safety shoes with toe cap when moving the chamber.

Always secure the door when moving the chamber, even if it is only for a short distance. See [Chapter 5.3, "Securing"](#), on page 22 for details on how to do it properly. If the door is not secured and opens while you are carrying the chamber, the center of gravity shifts. As a result, one of the carrying persons suddenly has to bear a much larger portion of the weight. When the sliding door hits its end position, the sudden stop results in a powerful thrust. If the person cannot manage the extra weight or loses grip of the handle, the chamber can drop and cause severe injuries, even death.

The chamber is heavy. Do not move, lift or carry the chamber by yourself. A single person can only carry a maximum of 18 kg safely depending on age, gender and physical condition. So at least 2 people are required. With fewer people, you risk injuries, ranging from back injuries from too heavy lifting to severe injuries like contusions or limb loss if the chamber is dropped.

If you suffer from medical problems such as spinal and back disorder, or if your physical state is not compatible with lifting a heavy chamber, do not participate in carrying it.

Use the handles to move or carry the chamber. See [Chapter 4, "Machine overview"](#), on page 17 to see where the handles are located.

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

For detailed instructions, see [Chapter 5.1, "Lifting and carrying"](#), on page 21.

Setting up

Place the chamber on a sufficiently sturdy support that can bear the weight of the chamber. Secure the support against toppling over, for example by fixing it to the floor. Observe the specifications of the manufacturer. Always place the chamber on a flat and level surface with the bottom of the chamber facing down. If the support is not sturdy enough, it can collapse. If the support is not level, the chamber can slide and drop from the support. In both cases, severe injuries are possible, even death.

When the chamber is positioned, secure the chamber as shown in [Figure 6-2](#). If you do not secure the chamber, the chamber can topple when opening the door, as described in ["Door of the chamber is heavy"](#) on page 11.

Set up a restricted area that only trained personnel are allowed to enter. In the restricted area, mark the space on the floor that is required for fully opening the door.

Route cables carefully and ensure that nobody can trip over loose cables.

For detailed instructions, see [Chapter 6.3, "Mounting the chamber"](#), on page 26 and [Chapter 6.7, "Defining zones of restricted access"](#), on page 38.

Connecting to power

The chamber runs on 24 V DC supplied by an external power supply unit that is included in the delivery. The power supply unit has overvoltage category II. Connect it to a fixed installation used to supply energy-consuming equipment such as household

appliances and similar loads. Be aware of electrical risks, such as electric shock, fire, personal injury or even death.

Take the following measures for your safety:

- Before connecting the power supply unit to a power source (your mains grid), ensure that this source matches the voltage and frequency [INPUT] range indicated on the power supply unit.
- Only use the external power supply unit that is delivered with the chamber. It complies with country-specific safety requirements.
- Only connect the power supply unit to a power source that is protected by a 16 A circuit breaker (branch protection).
- Ensure that you can disconnect the power supply unit from the power source at any time. Pull the power plug to disconnect the chamber. The power plug must be easily accessible.
- Install an easily accessible panic button (power-off switch, not included in the delivery) for interrupting power supply to the chamber.

Operating the door

You can open and close the door by pressing a button while standing next to the chamber. Also, you can operate the door remotely. In either case, ensure that nobody has their fingers on the guide rails of the door or between the door and door frame. Establish safety rules as the following:

- During manual door operation, only the person pressing the button is allowed in the restricted area. After pressing the button, the person steps back from the chamber.
- During remote door operation, nobody is allowed in the restricted area.
- During operation, hands are kept out of the chamber, except for exchanging a **DUT**. During **DUT** exchange, nobody is allowed to operate the door.

Use the chamber as it is designed. Never tamper with its safety installations.

For detailed instructions, see [Chapter 7.3, "Operating the door"](#), on page 44.

Maintenance

Carry out the maintenance tasks as required. You thus ensure flawless functionality of the chamber and, in consequence, the safety of everyone working with the chamber. For detailed instructions, see [Chapter 9, "Inspection and maintenance"](#), on page 55.

Cleaning

See [Chapter 9.4.3, "Cleaning the chamber"](#), on page 57 and [Chapter 9.4.4, "Cleaning the gasket"](#), on page 58.

2.4 Warning messages in this handbook

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.

2.5 Labels on the chamber

Labels with the following symbols point out areas of risk on the chamber. In addition, sections in this chapter which describe a specific risk are marked with the associated symbol in the margin. The symbols have the following meaning:

Symbol	Explanation
	Potential hazard Read the product documentation to avoid personal injury or product damage.
	Risk of crushing your fingers Be careful when operating the door. See: <ul style="list-style-type: none"> • "Moving door" on page 11 • "Operating the door" on page 13 Follow the instructions in this handbook.
	Chamber is heavy Indicates a weight for heavy units > 34 kg, typically up to 45 kg. Be careful when lifting, moving or carrying the chamber. Carry the chamber with a sufficient number of people or with transport equipment. See: <ul style="list-style-type: none"> • "Chamber is heavy" on page 10 • "Transport" on page 11
	Grounding terminal See "To prepare the power connection" on page 36.
	Disposal Do not dispose of the chamber in normal household waste. See Chapter 11, "Disabling and scrapping", on page 62.

The labels providing regulatory information are described in [Chapter 1.1, "Regulatory information"](#), on page 7.

3 Emergencies



Possible emergencies can result from a failure of the soft-close mechanism that stops the door, if an obstacle prevents closing, see [Automatic emergency deactivation](#).

But if the soft-close mechanism fails and you have your hands in the way of the closing door, your hands can get caught between the door and the chamber's frame. In this case, use the [Emergency stop](#).

3.1 Emergency stop



To stop the chamber's door quickly at any time, interrupt the electric power supply.

To interrupt the electric power supply

1. Hit the panic button that switches power off.
See "[Prerequisites for power connection](#)" on page 36.
2. If no panic button is installed:
 - Pull the power supply unit out of the grid power socket.
 - Or pull the DC plug out of its socket on the rear side of the chamber.
See [Figure 7-1](#).

Interrupting the electric power supply has the following effects:

- The door movement stops immediately.
- The light in the [Push-button switch unit](#) (if installed) is off, independent of the door's state.
Also, the status LED next to the door is off.
- The pneumatic system is depressurized and the door is left forceless. You can push it open or close manually against a merely frictional resistance.

To reactivate the chamber, proceed as described in [Chapter 7.1, "Activating the chamber"](#), on page 42.

3.2 Automatic emergency deactivation

During normal operation, the door closes tightly with high force to provide sufficient shielding effectiveness. To prevent injury due to this forced closing, the door's **soft-close mechanism** moves with a lower force until it is almost closed: maximum 8 mm gap remaining. The door mechanism switches to high force to close the final 8 mm gap only if no obstacle stops this low-force closing.

3.2.1 Automatic emergency deactivation due to timeout

If the door does not open or close within the `TIMEOUT` period, the control system switches to `ERROR` mode and automatically depressurizes the pneumatic system, leaving the door forceless. This deactivation prevents a situation in which the operator's hands are caught between the chamber and the door and the operator cannot reach for the push-button switch unit.

Typically, the following reasons can prevent the door from opening or closing within the timeout period:

- If the door speed is set too low, adjust it to match the timeout value; see [Chapter 6.8, "Adjusting the door speed"](#), on page 40.
- If the `TIMEOUT` value is set too low, adjust it to match the door speed; see `TIMEOUT: <seconds>` on page 53.
- If an obstacle is in the door's way, proceed as below:

To reactivate the chamber

1. Remove any obstacle out of the door's way.
2. Disconnect the 24 V DC power supply unit from the chamber.
3. Reactivate the chamber as described in [Chapter 7.1, "Activating the chamber"](#), on page 42.



You can verify proper functioning of the door's soft-close mechanism as described in [Chapter 6.6, "Testing safety systems"](#), on page 37.

4 Machine overview

This chapter describes all components of the chamber. Function and use of these components is described in [Chapter 7, "Operation"](#), on page 42.

Accessories for the chamber are described in the [Configuration manual](#).

- [Front tour](#).....17
- [Rear tour](#).....19
- [Push-button switch unit](#).....20

4.1 Front tour

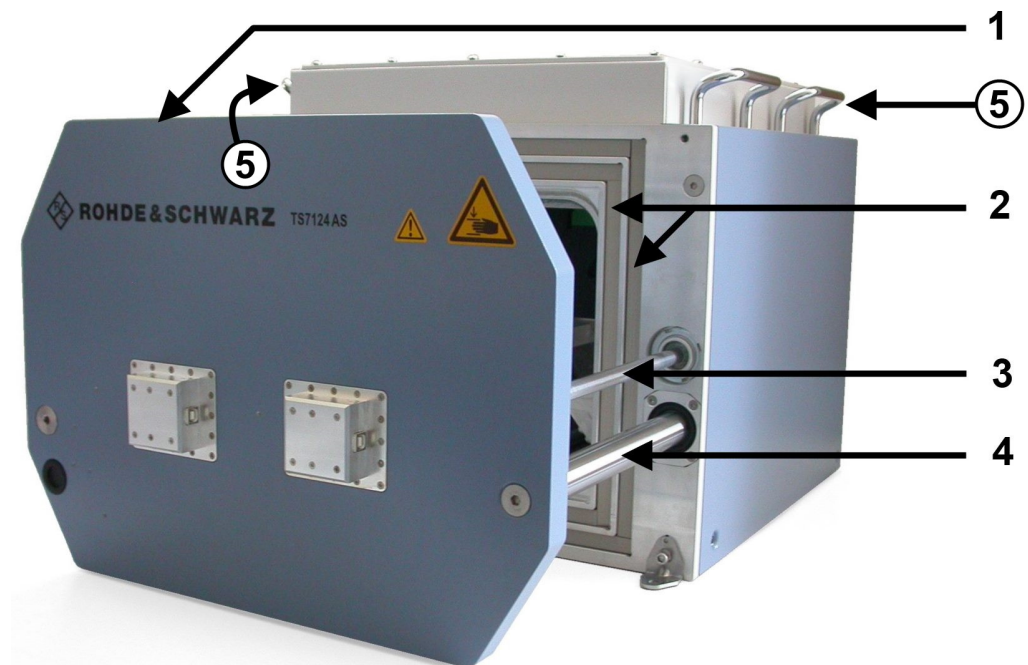


Figure 4-1: Front view of the opened chamber

- 1 = Door (sometimes called drawer) for DUT exchange
- 2 = Two grooves filled with elastic RF gasket for sealing the chamber's door
- 3 = Pneumatic cylinder
- 4 = Guide rail of the door
- 5 = Handles for carrying the chamber, see [Chapter 5.1, "Lifting and carrying"](#), on page 21

You can open the door (1) to place a DUT in the chamber. Version 1525.8587.12 of the chamber (shown here) has a door with two centered openings that can be equipped with optional feedthroughs towards the DUT inside the chamber. Only an [expert user](#) is allowed to mount, unmount or exchange feedthroughs.

Two pneumatic cylinders (labeled 3, one on each side) open and close the door, with two guide rails (4) providing stability.

The polymeric gasket (2) has a conductive nickel coating to prevent leakage of RF radiation out of the chamber, and into it. Avoid touching or soiling the gasket. The door's gasket is highly elastic for a long life over many opening and closing cycles, see [Chapter 5.5, "Storage"](#), on page 23.

The chamber has a status LED that indicates the door status:



Figure 4-2: Status LED next to the door

For operating the door, see [Chapter 7.3, "Operating the door"](#), on page 44.

4.2 Rear tour

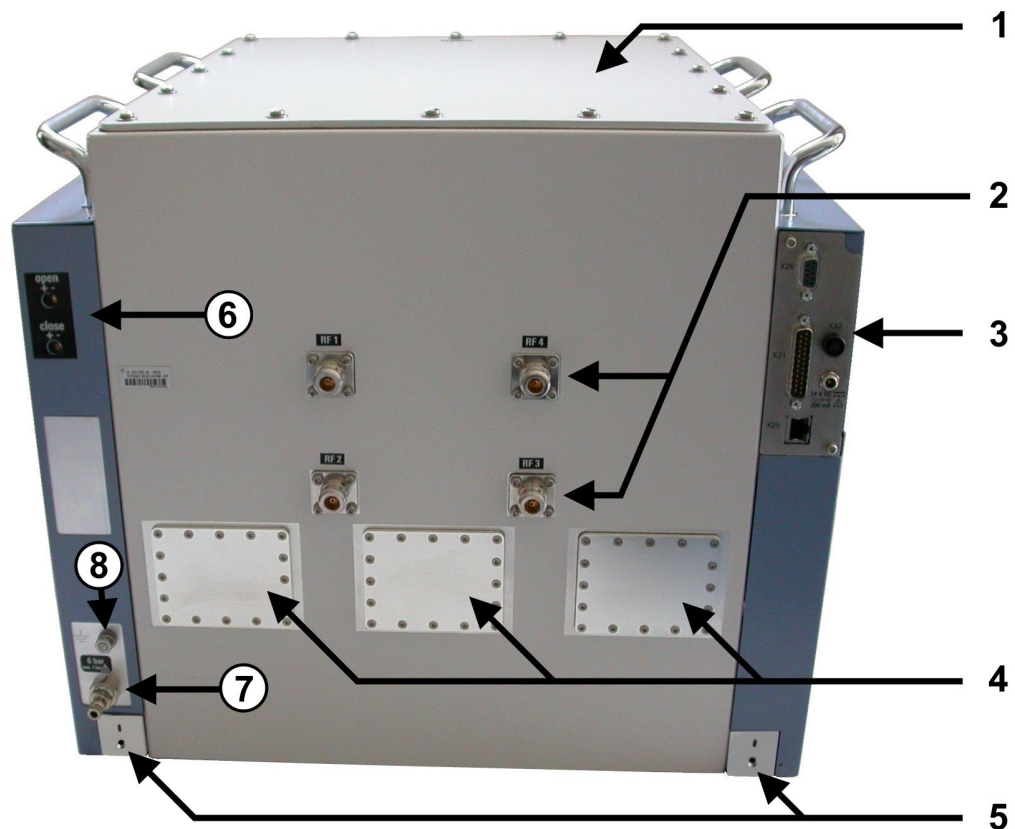


Figure 4-3: Rear view of the chamber

- 1 = Top cover for interior configuration and service (only for expert users)
- 2 = Numbered RF feedthrough connectors for antennas inside the chamber (only for expert users)
- 3 = Supply and control panel, see [Chapter 6.5](#)
- 4 = For optional feedthroughs towards antennas inside the chamber (only for expert users)
- 5 = Two rear screw holes for mounting brackets (included in delivery)
- 6 = Two control screws for [Adjusting the door speed](#) (opening/closing)
- 7 = Compressed-air supply connector
- 8 = Grounding terminal (earth ground contact)

The top cover (1) of the chamber is fixed by 16 screws. Only an **expert user** is allowed to open it.

RF feedthrough connectors (2) allow feeding RF signals through the rear chamber wall to antennas in the chamber. Only an **expert user** is allowed to connect, disconnect or exchange RF cables.

Three openings (4) in the rear wall are provided for optional RF-filtered feedthroughs. Openings that are not used are covered with blank metal plates. Feedthroughs in these openings allow feeding control or RF signals through the wall to antennas or to other equipment in the chamber. Only an **expert user** is allowed to exchange the metal plates or feedthroughs, and to connect, disconnect or exchange cables at the feedthroughs.

4.3 Push-button switch unit

The push-button switch unit is an optional manual control device for opening and closing the chamber at the push of a button, as described in [Chapter 7.3.2, "Push-button door operation"](#), on page 44.

The R&S TS-F24SB1 (order no. 1525.8712.03) has a **non-latching** push-button switch:



Figure 4-4: Push-button switch unit with cable and connector

The switch unit connects to the 25-pin D-Sub connector [X21] in the control array on the rear side of the chamber (labeled 3 in [Figure 4-3](#)).

Table 4-1: Push-button switch unit specifications

Parameter	Value
Connector type	D-Sub 25 pins, female
Cable length	2 m
Switch unit dimensions (W x D x H)	72 mm x 80 mm x 56 mm

For EMC reasons, the length of the switch unit's cable is limited to a maximum of 2 m.

The push-button switch unit is not a serviceable part. If it is defective or not working correctly, replace it.

5 Transportation, handling and storage

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

• Lifting and carrying	21
• Packing	21
• Securing	22
• Transport	23
• Storage	23

5.1 Lifting and carrying



Correct lifting and carrying

1. **WARNING!** The door of the chamber is heavy and can move. See ["Door of the chamber is heavy"](#) on page 11 and ["Moving door"](#) on page 11.

If the door is not secured against opening, secure it as described in [Chapter 5.3, "Securing"](#), on page 22.

2. **WARNING!** Chamber is heavy. See ["Transport"](#) on page 11 and ["Chamber is heavy"](#) on page 10.

For short distances, lift a single chamber at its handles with at least 2 people. [Figure 4-1](#) shows the handles.

3. For longer distances or if one or more chambers are on a pallet, use lifting or transporting equipment such as lift trucks and forklifts.

Follow the instructions provided by the equipment manufacturer.

See also [Chapter 5.4, "Transport"](#), on page 23.

5.2 Packing

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection.

The original packaging material also keeps the door closed. If this material is no longer available, secure the door against opening and use similar materials that provide the same level of protection. Use sufficient padding to prevent unintentional mechanical effects during transportation.

5.3 Securing

When delivered, the chamber is contained in a special transport protection packaging that prevents the door from opening.

After unpacking, to prevent unintentional movement of the door, an additional safety measure is implemented by a metal safety latch next to the top left corner of the front door:

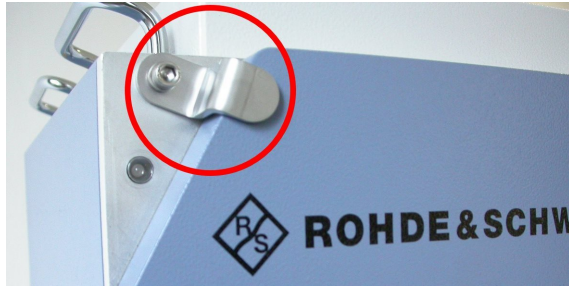


Figure 5-1: Metal safety latch

Use this safety latch to secure the door against unintentional opening.

Otherwise, if you remove the safety latch and tilt the chamber, for example when you lift it, the door can slide open or close unintentionally. Read the consequences in "[Transport](#)" on page 11.

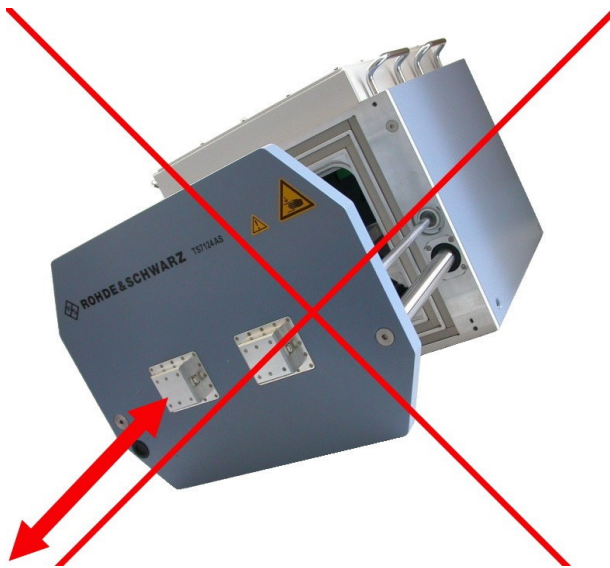


Figure 5-2: Do not lift with unsecured door: risk of uncontrolled door movement

To avoid this risk, close the chamber's door and secure it against opening, before you lift the chamber and until the chamber is securely mounted.

To secure the door

1. Fix the safety latch as described in [Figure 5-1](#).

2. Lift the chamber as described in [Chapter 5.1, "Lifting and carrying"](#), on page 21.

Note: If you proceed with mounting and operating the chamber, we recommend that after mounting, you remove (and not only rotate) the safety latch. Removing the latch avoids unintentional interaction with the door during operation. However, keep the safety latch for future transportation of the chamber.

5.4 Transport

The following activities are restricted to the [transportation appointee](#).

When moving the product in a vehicle or using transporting equipment, make sure that the product is properly secured. Only use items intended for securing objects.

You can secure the chamber at its handles, see [Figure 4-1](#). Do not secure the chamber at any mounted accessories.

Transport altitude

Unless otherwise specified in the data sheet, the maximum transport altitude without pressure compensation is 4500 m above sea level.

5.5 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the data sheet.

If you leave the chamber unused for some time (e.g. between production periods), consider the following:

1. **NOTICE!** Gasket can suffer from wear. Keeping the door's RF gasket under the closed door's mechanical pressure for a long time can reduce the gasket's elasticity.
To improve the chamber's long-term radiation shielding efficiency, we recommend relaxing the gasket by leaving the door open.
2. If the chamber is connected to a compressed-air supply, you can disconnect it.

The attainable radiation shielding efficiency of the door's RF gasket depends on how long the gasket remains in a relaxed state. Extended periods of gasket relaxation preserve its long-term shielding efficiency. The door's gasket was tested by Rohde & Schwarz in a 2:1 time ratio of opened versus closed state. With reverse time ratios, the amount of wear increases, requiring replacement at shorter intervals.

6 Installation and commissioning

The following activities are restricted to the [maintenance personnel](#).

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

Execute these activities in the same order as given in this handbook:

• Choosing the operating site	24
• Unpacking	25
• Mounting the chamber	26
• Connecting compressed air	31
• Connecting to control and power	33
• Testing safety systems	37
• Defining zones of restricted access	38
• Adjusting the door speed	40

6.1 Choosing the operating site

Only use the chamber indoors. The chamber casing is not waterproof.

Select an operating site that provides safe conditions for mounting and operating the chamber.

Ensure the following:

- Only trained personnel can access the operating site, with restrictions as described in [Chapter 6.7, "Defining zones of restricted access"](#), on page 38.
- The room has an even floor and sufficient bearing capacity.
- The operating site leaves sufficient room to open the door without obstruction and to access:
 - Chamber, especially the area behind the open door
 - Connectors on the front and rear side
 - Mounting brackets
 - Panic button or power plug, see ["Prerequisites for power connection"](#) on page 36 and [Chapter 3.1, "Emergency stop"](#), on page 15
- The environmental conditions such as ambient temperature and humidity match the values in the data sheet.
- The operating site is at an altitude of maximum 2000 m above sea level.
- The environment has pollution degree 2, where only nonconductive contamination occurs. Occasionally, temporary conductivity caused by condensation is to be expected.
- The electromagnetic compatibility (EMC) class of the chamber is class A.

Electromagnetic compatibility classes

The [EMC](#) class indicates where you can operate the chamber.

- 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.

6.2 Unpacking



Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

To unpack the chamber

1. If the cardboard box that contains the chamber is strapped to a pallet by plastic laces, cut the laces.
2. Open the cardboard box.
3. If a cardboard insert covers the chamber, remove the insert.
4. If accessories are included next to the chamber, take the accessories out of the cardboard box.
5. Remove the upper part of the cardboard box.

The chamber sits in shaped pieces of polymer foam.
6. **WARNING!** The door of the chamber is heavy and can move. If the door slides open while you lift the chamber, the center of gravity shifts. The door hitting its end position results in a powerful thrust.

Make sure that the door is secured against opening as described in [Chapter 5.3, "Securing"](#), on page 22.
7. **WARNING!** The chamber is heavy. Wear protective clothing. If your physical state is not compatible with lifting heavy loads, do not participate in lifting the chamber.

Lift the chamber out of the box with at least 2 people.
For lifting the chamber, hold it at its handles, see [Figure 4-1](#).
8. Place the chamber on a sturdy, flat and level surface.
9. Remove the antistatic wrap from the chamber.

10. Retain the original packing material. Use it when transporting or shipping the chamber later.
11. Using the delivery notes or an accessories list, check the delivery for completeness.
12. Check the chamber for damage.

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

6.3 Mounting the chamber



Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

Mount the chamber on a stable support that meets the following requirements:

- Type of support is one of the following:
 - [Table or bench](#)
 - [19" rack](#)
- Matches the chamber's dimensions specified in the data sheet.
- Can bear the chamber's weight of up to roughly 45 kg with accessories.
- Can withstand the door's momentum during operation.
- Allows fixing the chamber by mounting brackets, see [step 4](#).
- Keeps the chamber always in a horizontal position:

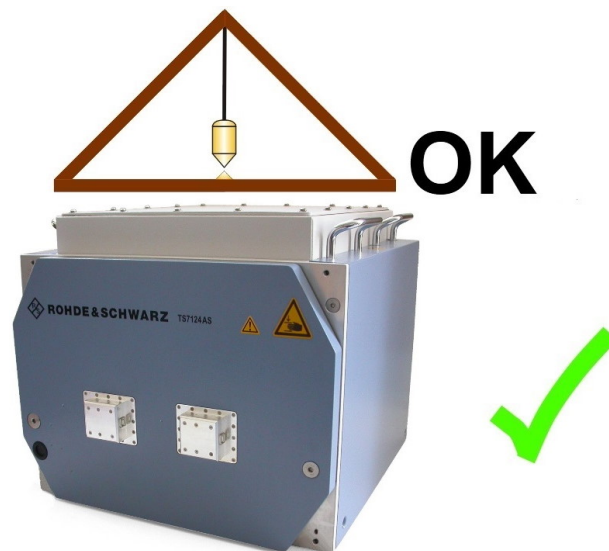


Figure 6-1: Horizontal position of the chamber

6.3.1 Table mounting

Use a support that meets the requirements. Make the support robust and safe.

To mount the chamber on the support

1. **WARNING!** The door of the chamber is heavy and can move. If the door slides open while you lift the chamber, the center of gravity shifts. The door hitting its end position results in a powerful thrust.

Ensure that the metal safety latch in the top-left corner of the chamber's door ([Figure 5-1](#)) secures the door against unintentional opening.

See [Chapter 5.3, "Securing"](#), on page 22.

2. **WARNING!** Risk of injury due to heavy weight. See [Chapter 5.1, "Lifting and carrying"](#), on page 21.

Lift the chamber at its handles with at least 2 people and place it on the support.

3. Position the chamber with its front edge at least 50 mm back from the front edge of the table.

This distance leaves room for the front mounting brackets, see [step 4](#).



4. Fix the chamber in place with mounting brackets (included in delivery):

- a) Place the four mounting brackets at the lower front and rear corners of the chamber.

The black arrows in [Figure 6-2](#) show the positions for the mounting brackets.

- b) Position each bracket so that its notch (see red arrow in top-left picture) is at the upper end, latching into the bore on top of each screw hole.

- c) Screw each bracket to the chamber.

- d) Screw each bracket to the table.



Figure 6-2: Positions of the mounting brackets for fixing the chamber to its support

5. Remove the metal safety latch ([Figure 5-1](#)) from the top-left corner of the chamber's door.

Keep the safety latch for future use.

If you remove the chamber from its location, follow the instructions in [Chapter 5.1, "Lifting and carrying"](#), on page 21.

6.3.2 Rack mounting

With the optional rack mounting kit R&S TS-F24-Z1 (order no. 1526.6942.02), you can mount the chamber in a standard 19" rack.

In the rack, the kit requires a height of 10 HU (17.5" or 444.5 mm). It consists of a metal rack cover sheet and a set of washers and torx screws. The metal sheet has a shape that goes around the chamber's front door. The sheet fits with the threaded holes in the front of the chamber's body and with threaded holes in the frame of a standard rack.

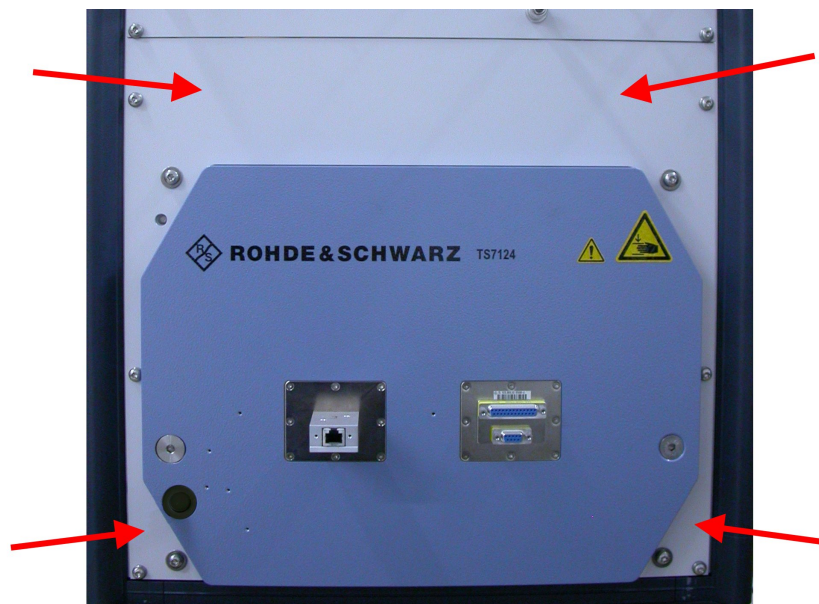


Figure 6-3: Chamber fixed in a 19" rack by the rack mounting kit

Red arrows = Metal sheet of the rack mounting kit

Inside the rack, the chamber must rest on stable rails that jointly can carry a load of at least 40 kg. Fix the chamber to these rails (or to the rack) with screws and brackets (see [Figure 6-2](#)).

As a **prerequisite** for installation, the 19" rack with universal square holes must be equipped with **M5 cage nuts**:

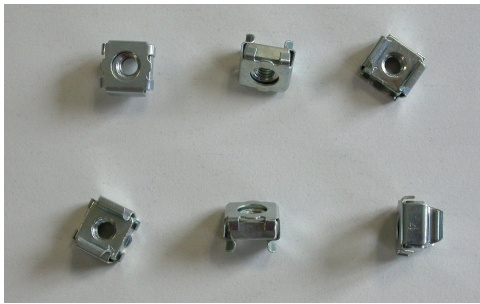


Figure 6-4: Cage nuts for metric M5 screws (not included in the delivery)

Start with the chamber unpacked and transported to the operating site, but not yet positioned and mounted on a support.

To mount the chamber in a rack

For mounting the chamber into a rack, proceed as follows:

1. Prepare the rack with stable rails that jointly can carry a load of at least 45.
2. Mount the rails at the desired altitude, as described the rack manufacturer's mounting instructions.
Make sure that from the level of the rails, a height of 10 HU (444.5 mm) is available for the chamber.
3. **WARNING!** Door of the chamber is heavy and can move. If the door slides open while you lift the chamber, the center of gravity shifts. The door hitting its end position results in a powerful thrust.
If the door is not secured against opening by the metal safety latch ([Figure 5-1](#)), secure it as described in [Chapter 5.3, "Securing"](#), on page 22.
4. **WARNING!** Risk of injury due to heavy weight. See [Chapter 5.1, "Lifting and carrying"](#), on page 21.
With at least 2 people lifting, insert the chamber into the rack.
5. Position the chamber in the rack in such a way that the front of the chamber's body (not the front of the door) is flush with the front of the rack.
6. Remove the metal safety latch.
Keep the safety latch for future transportation of the chamber.
7. Take the included set of screws:

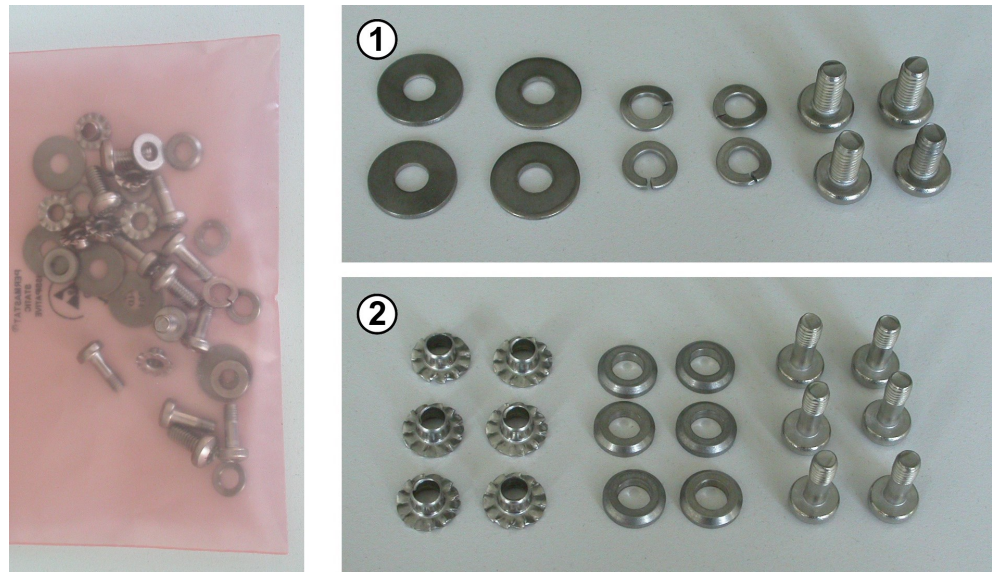


Figure 6-5: Set of torx screws and washers, included in the rack mounting kit

- 1 = Large washers, small spring-lock washers and M6 x 12 screws (4 each) for fixing the metal sheet to the chamber
- 2 = Grounding sockets, small thick washers and M5 x 14 screws (6 each) for fixing the metal sheet to the rack

8. Attach the six screws, washers and grounding sockets (labeled (2) in [Figure 6-6](#)) to the six outer holes in the metal rack cover sheet.

Make sure to insert the grounding sockets (2b) from the rear side of the cover sheet, and the M5 screws and small washers (2a) from the front side. The result is shown in detail (4) in [Figure 6-6](#). Once inserted and tightened to the grounding sockets, you cannot remove the M5 screws from the metal sheet.

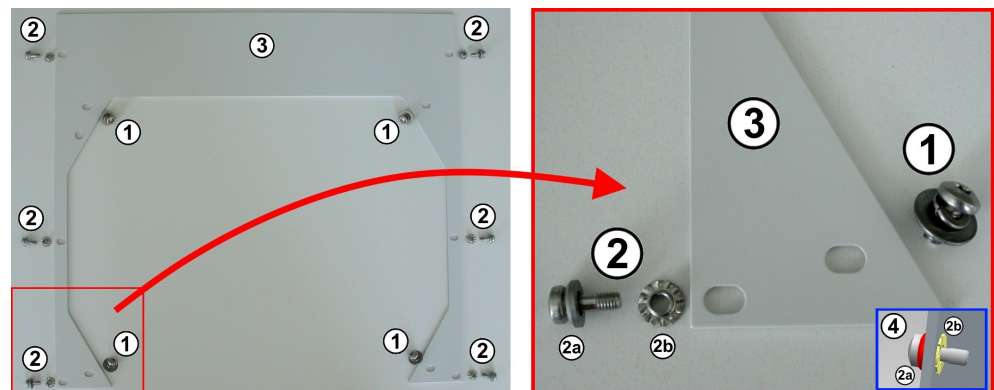


Figure 6-6: Matching the screws and washers to the various holes in the metal rack cover sheet

- 1 = Large washers, spring-lock washers and M6 screws (4 each) for fixing the metal sheet to the chamber
- 2 = Grounding sockets, small washers and M5 screws (6 each) for fixing the metal sheet to the rack
- 2a = M5 screw and small washer. Insert from the front side of the metal rack cover sheet

- 2b = Grounding socket. Insert from the rear side of the metal rack cover sheet
- 3 = Metal rack cover sheet
- 4 = Detail: M5 screw and small washer (2a) inserted from the front side and grounding socket (2b) inserted from the rear side of the cover sheet

9. Position the metal sheet around the chamber's door in such a way that the holes in the sheet align with the holes in the chamber and in the rack.
10. Fix the metal rack cover sheet to the [M5 cage nuts](#) in the rack by the six screws (2) in [Figure 6-6](#).
11. Fix the metal rack cover sheet to the chamber, using the four screws and washers (1) in [Figure 6-6](#).
12. On the rear side of the rack, fix the chamber to the rails that carry the chamber. To do so, use two of the mounting brackets shown in [Figure 6-2](#).
13. **WARNING!** Risk of injury due to heavy moving parts. Only operate the door while the chamber is securely fixed to a stable support.
Remove the metal safety latch ([Figure 5-1](#)) from the top-left corner of the chamber's door.
Keep the safety latch for future use.
14. Connect the chamber as described in [Chapter 6.5, "Connecting to control and power"](#), on page 33 and in [Chapter 6.4, "Connecting compressed air"](#), on page 31.

If you remove the chamber from its location, secure the chamber's door against unintentional opening during transportation and observe [Chapter 5.1, "Lifting and carrying"](#), on page 21.

For marking restricted areas on the ground in front of the chamber, see [Chapter 6.7, "Defining zones of restricted access"](#), on page 38.

If you move the chamber to a new location, mark the restricted areas on the ground again.

6.4 Connecting compressed air

The quick-coupling plug KS3-1/8-A (labeled 4 in [Figure 6-9](#)) is delivered with an additional push-pull adapter to 6 mm diameter flexible tubing for compressed air.

Prerequisites for compressed-air connection

Use the chamber only in a site that features an air preparation or service unit providing the following:

- Filtered, grease-free compressed air at a pressure of 6 bar, limiting the pressure to a maximum of 7 bar (0.7 MPa).
If the pressure from the supply system exceeds the limit of 7 bar, the chamber operates under unspecified conditions as described in ["Pneumatically operated door"](#) on page 11.

- The compressed air is supplied by a flexible push-in tube with a diameter of 6 mm. If the tube has a straight cut end, it is easier to connect it.

To connect compressed air

1. Make sure that the compressed-air supply is switched off.
2. Make sure that the chamber is connected to the grounding terminal (earth ground contact \perp).
3. If the push-pull adapter is connected to the chamber's quick-coupling plug, remove it as shown in [Figure 11-2](#).
4. Insert the 6 mm tube into the rear side of the push-pull adapter, which has a blue plastic ring.
5. Push the tube all the way into the adapter, as shown in [Figure 6-7](#).

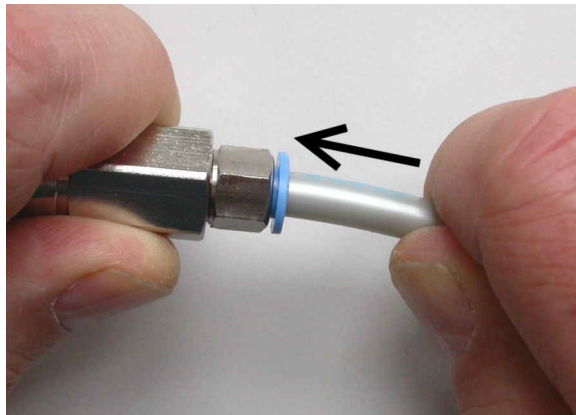


Figure 6-7: Assembly of push-pull adapter (left) and 6 mm tube (right)

Note: For a description of how to **separate** this connection, see ["To disconnect the tube from the push-pull adapter"](#) on page 63.

6. If you want to connect the push-pull adapters of multiple chambers to the compressed-air supply tubing, repeat [step 3](#) and [step 5](#) for each chamber.
7. Before connecting the push-pull adapter to the chamber's quick-coupling plug:
 - a) Switch on the compressed-air supply. If you connect multiple chambers, switch on the compressed-air supply, before you connect the first push-pull adapter.
 - b) Check the pressure. You need to provide an air pressure of 6 bar. See ["Pneumatically operated door"](#) on page 11.
8. Connect the push-pull adapter to the quick-coupling plug.
To do so, hold the adapter at its rear part (see 1 in [Figure 6-8](#)) and push it onto the quick-coupling plug (2).

The adapter's mechanism automatically locks the connection and opens a valve inside the push-pull adapter.

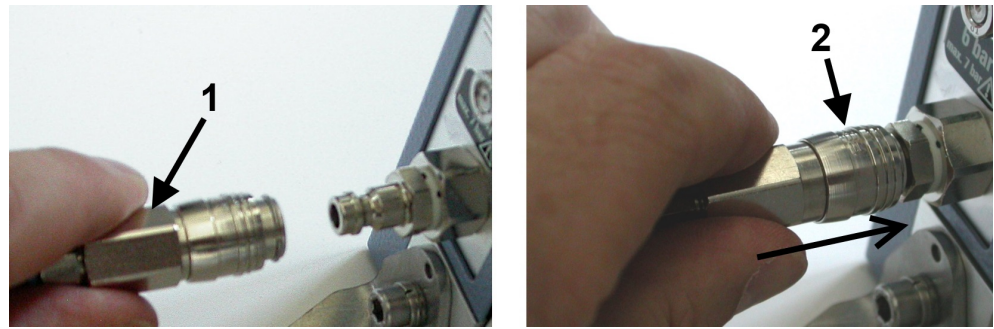


Figure 6-8: Connecting the compressed-air supply

9. Check whether the connection is tight. If compressed air is leaking at the connection, you can hear it or feel it with a wetted finger.
10. If you want to connect the push-pull adapter to the quick-coupling plug of multiple chambers, repeat [step 8](#) and [step 9](#) for each chamber.

6.5 Connecting to control and power

The DC power socket and the control interfaces are at the rear of the chamber.

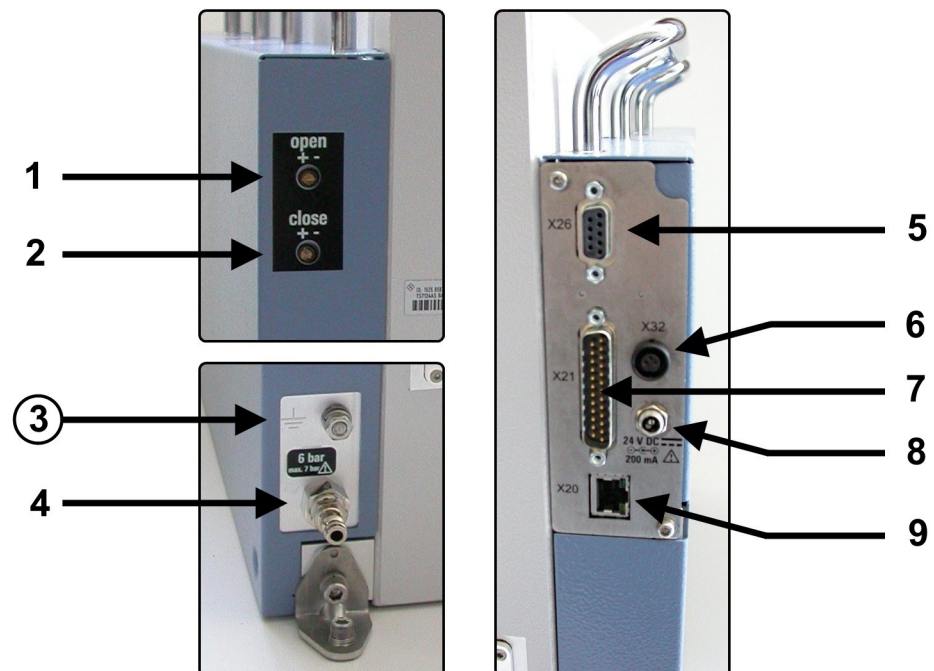


Figure 6-9: Detail views of the left and right arrays of supply and control connectors and control screws on the rear side of the R&S TS7124AS

- 1 = Control screw for door opening speed, see [Chapter 6.8, "Adjusting the door speed"](#), on page 40
- 2 = Control screw for door closing speed, see [Chapter 6.8, "Adjusting the door speed"](#), on page 40
- 3 = Grounding terminal (earth ground contact)
- 4 = Quick-coupling plug KS3-1/8-A for compressed air

- 5 = Connector [X26] (RS-232, 9-pin D-Sub, female) for remote door control via a serial port
- 6 = Connector [X32] (binder socket, 3-way, female) for monitoring the door status
- 7 = Connector [X21] (25-pin D-Sub, male) for push-button door control
- 8 = Socket for 24 V DC power supply unit (center pin: positive voltage)
- 9 = Connector [X20] (LAN) for remote door control via Ethernet

The 24 V DC socket (8) serves for power input from the external power supply unit (included in delivery). See ["To prepare the power connection"](#) on page 36.

The D-Sub 25-pin connector [X21] (7) allows local control of door activity by the external [Push-button switch unit](#). See [Chapter 7.3.2, "Push-button door operation"](#), on page 44. For the connector's safety cap, see [Figure 6-10](#).

The RS-232 connector [X26] (5) and the LAN connector [X20] (9) allow computer-based remote control of door activity by an operator or by software. Use either the RS-232 connector or the LAN connector. See ["To connect a control system"](#) on page 34 and [Chapter 8.3, "Door operation commands"](#), on page 51.

The binder connector [X32] (6) allows monitoring the door's position (open or closed state), in addition to the door status indication by the light in the [Push-button switch unit](#). The binder connector's pins are assigned as follows: pin 1 = door open, pin 2 = chassis ground, pin 3 = door closed.

The quick-coupling plug (4) for compressed air is delivered with an additional push-pull adapter to 6 mm flexible tubing.

The 24 V DC socket [X1] serves for power input from the external power supply unit (included in delivery). See ["To prepare the power connection"](#) on page 36.

The LAN connector [X2] and the RS-232 connector [X3] allow computer-based remote control of door activity by an operator or by software. Use either the RS-232 connector or the LAN connector. See ["To connect a control system"](#) on page 34 and [Chapter 8.3, "Door operation commands"](#), on page 51.

To connect a control system

For local manual control of the door, connect the push-button switch unit ([Figure 4-4](#)) to the chamber.

For remote control, connect the chamber to your control system. Depending on your system requirements, you can use the Ethernet (LAN) or RS-232 interface.

1. For **manual** control by the push-button switch unit ([Figure 4-4](#)), connect this unit as follows:

- a) Remove the safety cap (Figure 6-10) from the control connector [X21] on the rear side of the chamber.



Figure 6-10: Safety cap, covering the D-Sub 25-pin connector [X21]

- b) Keep the safety cap for future use.
 c) Connect the push-button switch unit to connector [X21].
 d) Position the push-button switch unit in a place that avoids its collision with the chamber's opening door.

The operator must be able to reach the control unit easily without entering the door zone (see Figure 6-11).

2. For remote control via a **serial port**, connect an RS-232 cable from your control system to the D-Sub 9 connector (see [X26] in Figure 6-9).
 For port settings, see "Command protocol" on page 48.
 Use a "straight-through" RS-232 cable, see "Use a straight-through cable for the RS-232 connection to the control computer" on page 36.
 For EMC reasons, limit the length of the RS-232 cable to a maximum of 30 m.
3. For remote control via **Ethernet**, connect a LAN cable from your control system to the RJ45 connector (see [X20] in Figure 6-9).
 You can use a LAN cable of arbitrary length. For Ethernet configuration, see "To configure the LAN network" on page 37.

If you want to change the interface, proceed as described in Chapter 10.2, "Controller conflicts", on page 59.



Use a straight-through cable for the RS-232 connection to the control computer

Two types of devices compatible with RS-232 interfaces must be distinguished:

- A "DTE" is a *Data Terminal Equipment*, for example a built-in serial port in a PC
- A "DCE" is a *Data Communications Equipment*, for example the chamber's remote control interface

Connecting two DTE devices requires a cable with crossed wires between the TXD-RXD and RTS-CTS pins. On the contrary, connecting the remote control interface (DCE) of your chamber to a control computer (DTE) requires a **straight-through cable**.

Prerequisites for power connection

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.



We recommend installing a **panic button**. It is a power-off switch that ensures quick deactivation of the chamber if an [emergency](#) occurs. A panic button is not included in delivery. The picture shows an example.

Make sure that:

- The panic button is installed in a place that the operator can reach easily.
- Every operator knows where the panic button is located.
- Hitting the panic button interrupts the AC power supply to the chamber. Meaning the mains grid power socket where the power supply unit is connected is disconnected from power.

To prepare the power connection



1. Connect the grounding terminal (earth ground contact \perp) to earth in the operating site, to avoid electrostatic charging of the chamber's body.
2. Assemble the external power supply unit (order no. 1525.8706.02) with the socket adapter that fits for your regional power socket type.
3. If you use the [Push-button switch unit](#), place it in a position that prevents collision with the opening door.
4. Connect the power supply unit to your mains grid power socket. Use only the 24 V DC power supply unit included in the delivery. For [EMC](#) reasons, limit the DC cable length to a maximum of 3 m. Make sure that the grid power socket is disconnected from mains grid power when you hit the panic button, see ["Prerequisites for power connection"](#) on page 36.

To activate the chamber

Connecting the chamber to power activates it. It does not have a separate [ON / OFF] switch.

1. **CAUTION!** Initial movement of automated door can cause injury. When you connect the chamber to power, the door can move abruptly. To prevent unexpected movement of the door upon first activation, perform the following safety measure.

If the chamber is not fully closed and you activate it for the **first time, close it manually.**

Manual closing is required also, if you **reactivate** the chamber, after it was disconnected from electric power or compressed air.



2. Connect the DC plug of the power supply unit (included in the delivery) to the 24 V DC power supply connector, see "[To prepare the power connection](#)" on page 36.

[Figure 7-1](#) shows the resulting connections.

The chamber is activated.

3. With the chamber still fully closed, **push** the [Push-button switch unit](#) or send the **CLOSE** command.

The chamber closes at full pressure and the status LED turns green.

Note: This initial behavior of the automatic soft-close mechanism is an intentional safety measure. It prevents unexpected closing upon first activation: The pneumatic system is initialized only, if the gap between door and chamber is smaller than 8 mm.

4. When you push the button again or send the **OPEN** command, the door opens and the status LED turns off.

To configure the LAN network

Only a [user](#) can perform this task.

- Configure the LAN network by using the commands described in [Chapter 8.2, "Remote configuration commands"](#), on page 50. The default IP address is 192.168.178.41, port 5000.

6.6 Testing safety systems

Test the door's [automatic emergency deactivation](#) mechanism for proper functioning as follows:

1. Activate the chamber according to "[To activate the chamber](#)" on page 37.
2. Open the door according to [Chapter 7.3.2, "Push-button door operation"](#), on page 44.

3. Hold a flat obstacle across the edge of the door opening.
We recommend using a flat piece of wood or similar material, 1 cm to 2 cm thick.
Alternatively, use the handle of a screwdriver.
4. Close the door.
5. Verify that the door's automatic emergency deactivation mechanism stops the door when it hits the obstacle, as described in "Test passed" on page 38.
If the test fails, see "Test failed" on page 38, and proceed as described in [step 6](#).
6. **WARNING!** Risk of personal injuries. See "Moving door" on page 11.
Take these steps if the automatic emergency deactivation mechanism fails:
 - a) Stop working with the chamber immediately.
 - b) Take the chamber out of commission to make sure that nobody else uses it.
See [Chapter 11.1, "Taking out of commission"](#), on page 62.
 - c) Contact Rohde & Schwarz customer support.

Test passed

If the door **stops closing** and the door's control system switches to error mode, the automatic emergency deactivation works as desired.

1. To verify that the door is in error mode, send the `DOOR?` query. In error mode, the reply is `ERR`.
2. Proceed with reactivating the door as described in [Chapter 3.2, "Automatic emergency deactivation"](#), on page 15.

Test failed

If the door **continues** to try closing against the obstacle without switching to error mode, the emergency deactivation has failed.

The chamber is designed to stop and also to depressurize the pneumatic system, leaving the door forceless if the total closing time exceeds the `TIMEOUT` setting.

6.7 Defining zones of restricted access

To reduce the risk of an accident due to door operation, define two zones that restrict the access to the chamber. Establish exact rules as to who is allowed to enter a zone and when. See "Operating the door" on page 13.

- **Door zone:** the area utilized by the opened door, including accessories mounted at the door's outer face.
Everything and everybody must **stay out** of the door zone during door operation.
- **Work zone:** an area of 1 m radius around the door zone. The distance of 1 m ensures that nobody can reach into the chamber when standing outside of the work zone.
Only **one user** at a time is allowed access to the work zone while the chamber is connected to power.

If more than one person must have access to the work zone, first disconnect the chamber from power. See ["To disconnect from power and control"](#) on page 62.

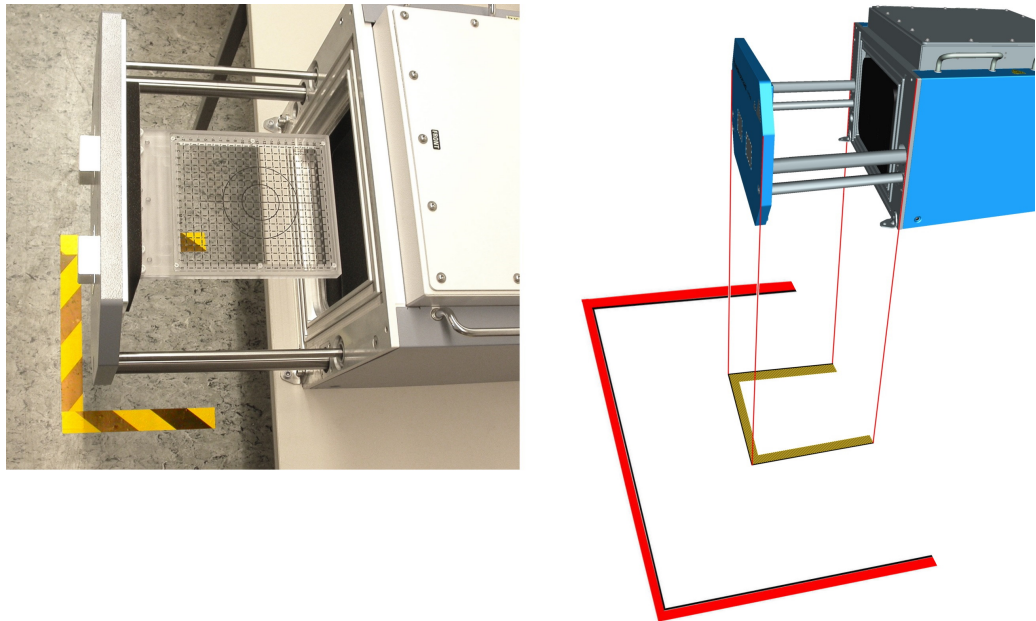


Figure 6-11: Zones of restricted access marked on the ground

Door zone = Inner marking lines; here: yellow and black

Work zone = Outer marking lines; here: red and black

To mark the zones of restricted access

1. Make sure that the chamber is mounted securely and connected to its supplies.
2. Step aside to the left or right of the chamber.
3. Make sure that a space 40 cm in front of the door is clear.
4. Press the button to open the door. See [Chapter 7.3, "Operating the door"](#), on page 44.
5. Mark the door zone on the ground below the chamber's opened door, as shown in [Figure 6-11](#).
If any accessories, for example feedthroughs, are present on the chamber's door, these mounted accessories enlarge the door zone. Mark the door zone according to its actual size.
6. Close the door according to [Chapter 7.3.2, "Push-button door operation"](#), on page 44.
7. Make sure that nobody opens the door again.
8. Mark the work zone at a distance of 1 m outside from the *door zone* on the ground. See [Figure 6-11](#).
9. If the work zones of neighboring chambers overlap or touch each other, establish an extra set of safety rules to regulate the work at neighboring chambers. We rec-

ommend leaving enough space between chambers so that individual work zones can be established.

- If you move the chamber to a new location, mark the zones on the ground again.

6.8 Adjusting the door speed

In the array of control connectors on the rear side of the chamber, there are two control screws for adjusting the door speed. The screws limit the flow rate of the compressed air, which determines the opening and closing speed of the door. The air pressure level is not influenced by the control screws.

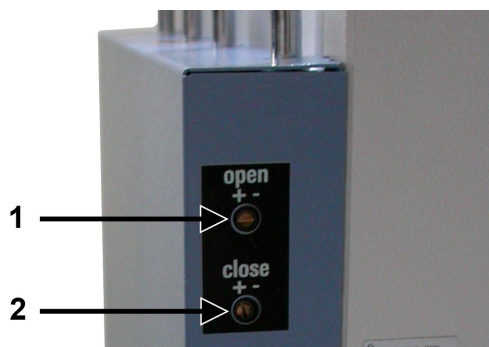


Figure 6-12: Screws for adjusting the pneumatic system

- 1 = Upper screw for adjusting the door opening speed
2 = Lower screw for adjusting the door closing speed

The upper screw (1) is for adjusting the door opening speed, the lower screw (2) is for adjusting the door closing speed.

Table 6-1: Pneumatic adjustment

Door opening speed (upper screw, item 1)		+ : open the door faster - : open the door slower
Door closing speed (lower screw, item 2)		+ : close the door faster - : close the door slower

The manufacturer has preset the door speed for default opening and closing times of 2 s each.

If you adjust the speed for opening or closing times other than 2 s, also set the **TIME OUT** value to the door's actual opening or closing time, whichever takes longer. For example, if you adjust the door to close within 4 s and to open within 3 s, set the time-out value to 4 s.

Otherwise, wrong timeout values can have the following consequences:

- If the timeout value is set too high (long time), it takes the door control system longer than necessary to detect a blocked door.
- If the timeout value is set too low (short time), the door control system returns false `DOOR?` error messages. The control system automatically deactivates the chamber, see [Chapter 3.2.1, "Automatic emergency deactivation due to timeout"](#), on page 16.

7 Operation

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

Operating the chamber consists of the activities described in the following subchapters:

• Activating the chamber	42
• Deactivating the chamber	43
• Operating the door	44
• Placing a DUT in the chamber	46
• Connecting a DUT	46
• Preparing for shift end	47

7.1 Activating the chamber

As a prerequisite, ensure that all instructions described in [Chapter 6, "Installation and commissioning"](#), on page 24 are executed.

To activate the chamber

Connecting the chamber to power activates it. It does not have a separate [ON / OFF] switch.

1. **CAUTION!** Initial movement of automated door can cause injury. When you connect the chamber to power, the door can move abruptly.
To prevent unexpected movement of the door upon first activation, perform the following safety measure.

If the chamber is not fully closed and you activate it for the **first time, close it manually**.

Manual closing is required also, if you **reactivate** the chamber, after it was disconnected from electric power or compressed air.



2. Connect the DC plug of the power supply unit (included in the delivery) to the 24 V DC power supply connector, see ["To prepare the power connection"](#) on page 36.

[Figure 7-1](#) shows the resulting connections.

The chamber is activated.

3. With the chamber still fully closed, **push** the [Push-button switch unit](#) or send the **CLOSE** command.

The chamber closes at full pressure and the status LED turns green.

Note: This initial behavior of the automatic soft-close mechanism is an intentional safety measure. It prevents unexpected closing upon first activation: The pneumatic system is initialized only, if the gap between door and chamber is smaller than 8 mm.

- When you push the button again or send the **OPEN** command, the door opens and the status LED turns off.

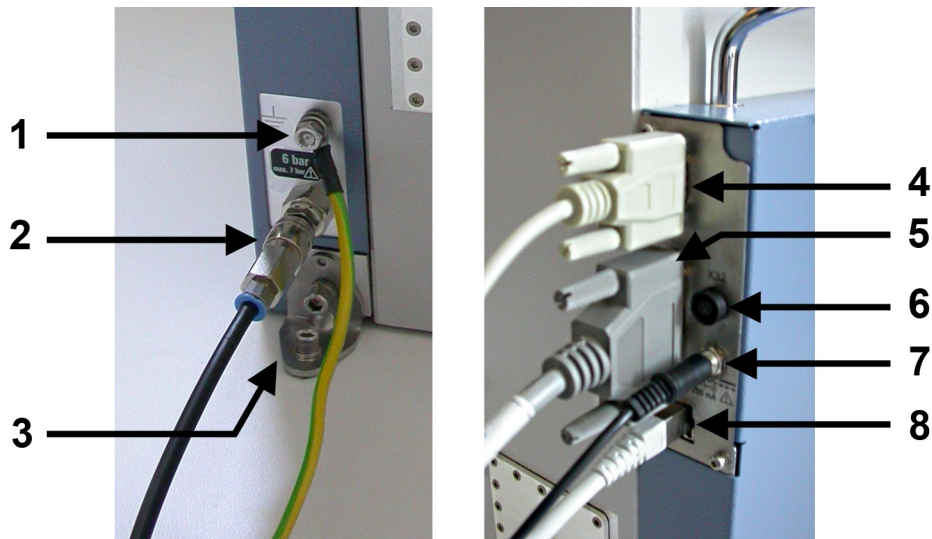


Figure 7-1: Control and supply connectors on the left and right rear arrays of the chamber

- 1 = Grounding terminal (earth ground contact)
- 2 = Compressed-air supply (6 mm tube with push-pull adapter), connected to quick coupling plug KS3-1/8-A
- 3 = Mounting bracket, fixed to a stable bench or support
- 4 = RS-232 connector for computer-based remote control of chamber activity via serial interface
- 5 = D-Sub 25-pin connector for push-button control of chamber activity
- 6 = 3-way binder plug (female) for monitoring the drawer status
- 7 = 24 V DC power supply connection
- 8 = LAN connector for computer-based remote control of chamber activity via Ethernet

7.2 Deactivating the chamber

Disconnecting the chamber from power deactivates it. It does not have a separate [ON / OFF] switch.

To deactivate the chamber

- Disconnect it from its electric power supply.
- Disconnect the pneumatic system (see ["To disconnect from compressed air"](#) on page 63).
- If you deactivate the chamber for a long time, we recommend relaxing the door's gasket by manually opening the chamber's door (as far as you wish), see [Chapter 5.5, "Storage"](#), on page 23.

Emergency deactivation

See [Chapter 3, "Emergencies"](#), on page 15.

7.3 Operating the door

This chapter describes manual control of the door by pushing the [Push-button switch unit](#).

For remotely controlled door operation, refer to [Chapter 8.3, "Door operation commands"](#), on page 51. If the software of a test system sends the door control commands, also DUT handling can be automated by a system that replaces the tasks of a human operator.

- [Door status indication](#).....44
- [Push-button door operation](#).....44

7.3.1 Door status indication

The LED in the top-left corner of the chamber indicates the door's status as follows.



Figure 7-2: Status LED next to the door

LED	Door and chamber status
Green light	Door is completely closed and the chamber is in a state ready for measurement.
Red light	Door is not yet closed , but the high-pressure closing mechanism is engaged.
No light	Door is open (wider than 8 mm), or the chamber is disconnected from power.

If the [Push-button switch unit](#) is connected, the light in its button also indicates the door status: "Green light" and "no light" have the same meaning as described here for the status LED next to the door.

For querying the door's status remotely, use the [DOOR?](#) command.

7.3.2 Push-button door operation



Familiarize yourself with residual risks and potentially dangerous situations.

See ["Operating the door"](#) on page 13 and [Chapter 6.7, "Defining zones of restricted access"](#), on page 38.

To control opening and closing of the door manually, you can use the [Push-button switch unit](#). Also, you can manually push the open door to let it close, see "[Push door to close it](#)" on page 45.

Use the non-latching push-button switch unit as follows:

1. If the door is closed, push the button to **open** it.

The green status-indicating light in the button is switched **off**, and the door opens.

2. If the door is open, push the button to **close** it.

When the door is completely closed, the green light in the button is turned **on** to indicate that the chamber is in a state ready for measurement.

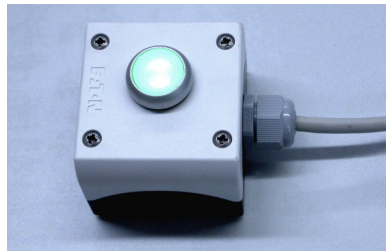


Figure 7-3: Green light in the button indicates that the door is closed

When you disconnect the push-button switch unit from the chamber, the door remains in its current position (opened or closed). Make sure to cover the unoccupied connector [X21] with the safety cap, see [Figure 6-10](#).

If you use the push-button switch unit together with some remote control, refer to [Chapter 10.2, "Controller conflicts"](#), on page 59.



Push door to close it

If the `DOOR_TOUCH_CLOSE` state is enabled, you can trigger the pneumatic closing mechanism by giving the open door a manual push. Your push moves the door away from its fully opened position and hence releases a sensor, which is integrated to detect this position. When the sensor is released, it triggers the control module to close the chamber automatically.

The `DOOR_TOUCH_CLOSE` function works in parallel with the push-button switch unit and does not interfere with it. Both status LEDs in the push-button switch unit and next to the door behave as described above.

Similar to the loading mechanism in typical CD/DVD players, this function provides an additional option for starting the automatic closing of the door, besides remote control and using the push-button switch unit.

Note that the door control system returns an error message, if you push the door to close it, while the `DOOR_TOUCH_CLOSE` state is disabled. See [DOOR?](#) on page 52.

7.4 Placing a DUT in the chamber



Familiarize yourself with residual risks and potentially dangerous situations.

See "[Moving door](#)" on page 11 and "[Operating the door](#)" on page 13.

Placing options

You can place your DUT on a tray that is mounted at the inside of the door in an upper or lower position. With the opening door, the DUT holder tray comes out of the chamber and is easy to reach:

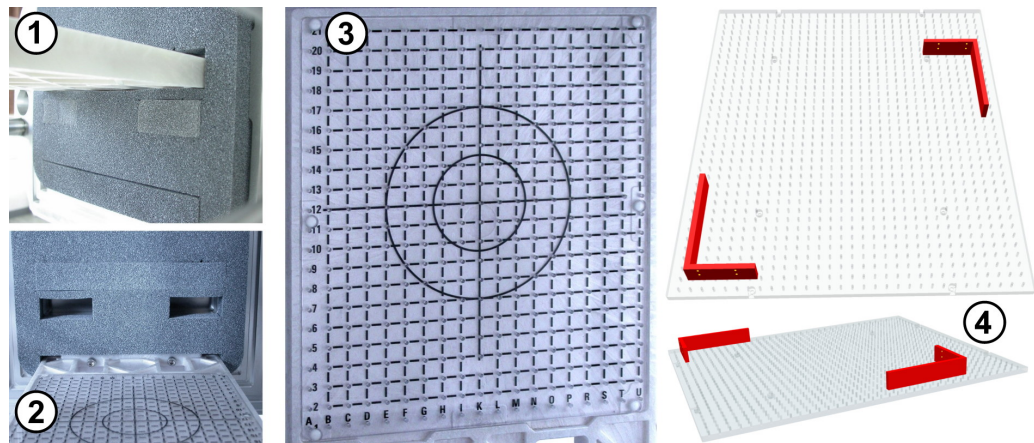


Figure 7-4: Examples of a DUT holder tray

1 = Tray mounted at the door in the upper position

2 = Tray mounted at the door in the lower position

3 = Top view of tray with printed raster from A to U and from 1 to 21

4 = Raster plate (2 views) with 2 rectangular stop brackets (here shown in red color)

The standard or custom-made DUT holder tray can have a printed raster and drilled holes for holding stop brackets. If your DUT holder tray is preconfigured with stop brackets in defined raster positions, use these features for best repeatability of DUT positioning in the chamber.

Only an [expert user](#) is allowed to mount and configure DUT holders.

7.5 Connecting a DUT



Familiarize yourself with residual risks and potentially dangerous situations.

See "[Moving door](#)" on page 11 and "[Operating the door](#)" on page 13.

Feedthroughs

Optional feedthroughs in the chamber's door allow feeding control or RF signals or power through the door to the DUT while it is tested in the chamber.

These feedthroughs have interior and exterior connectors.

- Every **user** can connect a DUT to **interior** feedthrough connectors in the door, hence connectors that face the chamber's inside.
- Only an **expert user** is allowed to do the following:
 - Mount, remove or exchange feedthroughs
 - Connect, disconnect or exchange cables at exterior feedthrough connectors

If you connect your DUT to a feedthrough via RF cables, use shielded RF cables and a torque wrench to tighten the connectors.

Risk of RF connector and cable damage / torque recommendations

Excessive tightening of coaxial RF connectors can damage the cables and connectors. Too weak tightening causes inaccurate measurement results.

Always use a torque wrench suitable for the connector type and apply the torque specified in **application note 1MA99**, which is available on the internet at www.rohde-schwarz.com. It provides additional information on the care and handling of RF connectors.

For RF connectors, we recommend applying the following torque limits:

- **56 N·cm** for **SMA** connectors
- **90 N·cm** for **PC** connectors (3.5 mm / 2.92 mm / 2.4 mm / 1.85 mm)

Never use a standard open-end wrench. We offer torque wrenches for various connectors. For ordering information, see application note 1MA99.

7.6 Preparing for shift end

Between production periods, do the following:

1. Open the chamber's door. See [Chapter 7.3.2, "Push-button door operation"](#), on page 44.

Opening the door relaxes the gasket and maintains its RF shielding efficiency, see [Chapter 5.5, "Storage"](#), on page 23.

2. Deactivate the chamber. See [Chapter 7.2, "Deactivating the chamber"](#), on page 43.

8 Remote control commands

Every **user** except the **operator** is allowed to use all remote control commands.

As an **operator**, you are allowed to use only the remote control commands in [Chapter 8.3, "Door operation commands"](#), on page 51.

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.



Risk of hurting another person

During remote operation, nobody is allowed in the work zone. Make sure of it by observing the work zone in front of the chamber all the time. See ["Operating the door"](#) on page 13 and [Figure 6-11](#).

Command protocol

For sending remote control (RC) commands to the RC module in the chamber, you must use ASCII characters.

- If you use the serial **RS-232** interface for command communication, set the UART port via a terminal tool as follows:
 - Baud rate: 9600 bps
 - Word length: 8 bit
 - Parity: none
 - Stop: 1 bit
 - Flow control: none
 - Echo input data: none
- If you use the **LAN** interface, you can send RC commands via TCP/IP protocol or VISA, using the chamber's [IP address](#) or [hostname](#).
 - Controlling the chamber via LAN requires specifying port 5000
 - DHCP (dynamic host configuration protocol) is set by default

For selecting the address model, use the command `NET:DHCP`.

Changes in the LAN connection state are communicated via the RS-232 interface:

- Ethernet connection established: `"ETH link up"`
Ethernet connection interrupted, for example when disconnecting the LAN cable: `"ETH link down"`

If you want to change the interface, proceed as described in [Chapter 10.2, "Controller conflicts"](#), on page 59.

Command syntax

The RC commands are **not** compatible with SCPI syntax.

The RC module uses the following termination character:

- You can send commands with either `\n` ("new line", LF, ASCII character 10) or `\r` ("carriage return", CR, ASCII character 13), but not in combination (`\r\n`)
- Returned status messages are sent back with `\r`

For a description of all commands and replies, refer to the following chapters.

Errors

If the RC module detects a syntax error in a command, or if it cannot open or close the door, it returns an `ERR` statement.

Numerical format

As the decimal separator, all numbers sent or returned in the communication commands with the chamber use a dot (or full stop, ASCII character 2E_{hex}).

This chapter describes all available remote control commands:

• Common commands	49
• Remote configuration commands	50
• Door operation commands	51
• List of commands	53

8.1 Common commands

Every `user` except the `operator` is allowed to use these commands.

The following commands allow basic communication and queries.

*IDN?	49
MODEL?	49

*IDN?

Identification

Returns the instrument identification.

Usage: Query only

MODEL?

Queries the model name, firmware version and firmware release date of the chamber.

Example: MODEL?
 Reply:
 RS-TS7124 Ver: 1.1 2015.07.14

Usage: Query only

8.2 Remote configuration commands

Every [user](#) except the [operator](#) is allowed to use these commands.

The following commands allow configuration of the remote control interface.

NET?	50
NET:DHCP	50
NET:<IP>:<NETMASK>:<GATEWAY>	51
NET:HN:<hostname>	51

NET?

Queries the current network configuration of the chamber.

Example:

```
NET?
Reply:
AM=DHCP:HOSTNAME=TS7124AS:IP=192.168.78.4:
NETMASK=255.255.255.0:GATEWAY=192.168.78.1
In this example, the address model (AM) is DHCP, hence not
STATIC, see NET:DHCP.
The hostname is TS7124AS.
The IP address 192.168.78.4
The netmask is 255.255.255.0
The gateway is 192.168.78.1
```

Usage: Query only

If the address model (AM) is STATIC, the hostname part of the reply string is omitted.

NET:DHCP <Boolean>

Sets the address model (AM) to static network configuration ([STATIC](#)) or dynamic host control protocol ([DHCP](#)).

To query the network configuration, use the [NET?](#) command.

In the original state as delivered, the RC module is configured for DHCP.

Using DHCP is functional only if the network provides a domain name server (DNS).

Parameters:

<Boolean>	1
	Enables the DHCP to automatically specify the IP address, netmask and gateway.
	0
	Disables DHCP, requiring static network configuration. You must specify the IP address, netmask and gateway by using the NET:<IP>:<NETMASK>:<GATEWAY> command.

Usage: Setting only

NET:<IP>:<NETMASK>:<GATEWAY>

Sets the static network configuration, if you have disabled DHCP, see [NET:DHCP](#).

To query the network settings, use the [NET?](#) command.

Parameters:

<IP> Specifies the IP address in "000.000.000.000" format.
The default IP port is "5000".

<NETMASK> Specifies the netmask, typically "255.255.255.000".

<GATEWAY> Specifies the gateway in "000.000.000.000" format.

Example: NET:192.168.78.4:255.255.255.000:192.168.78.1

Usage: Setting only

NET:HN:<hostname>

Sets an optional hostname that you can use instead of the IP address.

Using a hostname is functional only in DHCP mode, see [NET:DHCP](#).

Syntax: You can use digits 0 to 9 and letters a to z or A to Z, where the difference between uppercase and lowercase letters is ignored. You can use hyphens ("-"), but not at the beginning or end of the hostname. No special characters or blank spaces are permitted, even though the RC module does not check your input for character validity.

If setting the hostname was successful, the RC module returns "OK".

If you use the command without entering any characters for the hostname, the RC module returns "ERR".

Parameters:

<hostname> We recommend using a combination of the string "TS7124AS-" and the six-digit serial number of the chamber.
For example, "TS7124AS-100123".

Usage: Setting only

8.3 Door operation commands



Familiarize yourself with residual risks and potentially dangerous situations.

See ["Operating the door"](#) on page 13 and ["Risk of hurting another person"](#) on page 48.

DOOR?	52
OPEN	52
CLOSE	52
TIMEOUT:<seconds>	53
DOOR_TOUCH_CLOSE:<boolean>	53

DOOR?

Queries the chamber's door status.

Example:

DOOR?

Possible replies:

OPEN: the door has already opened completely.

CLOSED: the door has already closed completely.

PENDING: the door is currently opening or closing, transmitted once for the `timeout` period, or until the final status message is returned.

ERR: status error, door position is not defined, e.g. if the door did not open or close successfully within the `timeout` period. The error mode leads to [Automatic emergency deactivation due to timeout](#). See [Chapter 10, "Troubleshooting and repair"](#), on page 59.

Usage:

Query only

OPEN

Before you open the door remotely, make sure that nobody is in the work zone; see [Figure 6-11](#).

OPEN opens the door of the chamber and reports the state.

- If the door is already open when you send the command, the RC module sends OPEN
- If the door is closed or has not yet opened completely when you send the command, the RC module first sends PENDING and then
 - OPEN, when the door has completed opening
 - ERR, if the door did not open completely within the expected time
The expected time is defined by the `TIMEOUT` command.

To query the state at any time, use the `DOOR?` command.

Usage:

Event

CLOSE

Before you close the door remotely, make sure that nobody is in the work zone; see [Figure 6-11](#).

CLOSE closes the door of the chamber and reports the state.

- If the door is already closed when you send the command, the RC module sends CLOSED
- If the door is open or has not yet closed completely when you send the command, the RC module first sends PENDING and then
 - CLOSED, when the door has completed closing
 - ERR, if the door did not close completely within the expected time

The expected time is defined by the [TIMEOUT](#) command.

To query the state at any time, use the [DOOR?](#) command.

Usage: Event

TIMEOUT:<seconds>

Sets the timeout value for a door status error.

Per default, the door is assumed to open within 4 seconds and to close within 4 seconds. However, you can adjust the [door speed](#) by two control screws on the rear side of the chamber. If you increase or decrease the opening or closing speed, you must adjust the timeout setting accordingly, to avoid delayed or false door blockage detection ([DOOR?](#)) and unnecessary [deactivation](#).

Set the timeout value to the actual physical opening or closing time, whichever takes longer.

Parameters:

<seconds> Number of seconds that the door control system allows for the opening time and for the closing time of the door, before it assumes a mechanical failure. If the successful completion of opening or closing takes longer than the specified timeout, the control system returns a `DOOR_ERR\r` message and [deactivates](#) the pneumatic system.

Range: 3 to 8, unit = s, default = 4

Usage: Setting only

DOOR_TOUCH_CLOSE:<boolean>

Enables or disables a function for pushing the door to close it, as described in [Chapter 7.3.2, "Push-button door operation"](#), on page 44 > [Push door to close it](#). Per default, the function is enabled. See also [Chapter 10, "Troubleshooting and repair"](#), on page 59.

Parameters:

<boolean> **0**
Disables the function.

1
Enables the function.

*RST: 1

Usage: Setting only

8.4 List of commands

*IDN?.....	49
CLOSE.....	52

List of commands

DOOR_TOUCH_CLOSE:<boolean>.....	53
DOOR?.....	52
MODEL?.....	49
NET:<IP>:<NETMASK>:<GATEWAY>.....	51
NET:DHCP.....	50
NET:HN:<hostname>.....	51
NET?.....	50
OPEN.....	52
TIMEOUT:<seconds>.....	53

9 Inspection and maintenance

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

The chamber has no factory default settings, except the [door speed](#), see [page 40](#).

- [Recommended intervals](#)..... 55
- [Regular safety inspections](#)..... 55
- [Preparing the chamber for maintenance](#)..... 56
- [Performing maintenance tasks](#)..... 56

9.1 Recommended intervals

To ensure safe operation and to retain the functional readiness and long operational life of the chamber, perform the inspection and maintenance tasks as scheduled:

Table 9-1: Scheduled inspection and maintenance

Maintenance interval	Maintenance tasks
Daily	"Daily safety check" on page 55 Chapter 9.4.1, "Daily functional check" , on page 56
Weekly	Chapter 9.4.2, "Checking the absorber" , on page 57
Every 100 000 cycles	Chapter 9.4.4, "Cleaning the gasket" , on page 58
If necessary	Chapter 9.4.3, "Cleaning the chamber" , on page 57
Every time you calibrate test instruments	Chapter 9.4.5, "System calibration" , on page 58
Once a year	"Yearly safety check" on page 55

The intervals in [Table 9-1](#) are recommended for 160 operating hours per month. If you operate the chamber for more hours, adapt the maintenance intervals accordingly.

9.2 Regular safety inspections

Daily safety check

- ▶ Before operation, test the door's automatic emergency deactivation mechanism for proper functioning. See [Chapter 6.6, "Testing safety systems"](#), on page 37.

Yearly safety check

This check is restricted to the Rohde & Schwarz [service personnel](#).

Due to normal wear, the performance of any system can degrade over time. This performance degradation can also impair system safety. To prevent any risks, we recommend a regular safety and performance check of the chamber once a year.

9.3 Preparing the chamber for maintenance

Before carrying out any of the maintenance tasks described in [Chapter 9.4, "Performing maintenance tasks"](#), on page 56, perform the following steps.

1. Make sure that nobody uses the chamber during maintenance. Take the steps that are stipulated in your company for that purpose.
2. Deactivate the chamber. See [Chapter 7.1, "Activating the chamber"](#), on page 42.
3. Disconnect the chamber from the compressed-air supply. See ["To disconnect from compressed air"](#) on page 63.
4. If you need to move the chamber to a different location for maintenance, follow the instructions in ["Correct lifting and carrying"](#) on page 21.

9.4 Performing maintenance tasks

The recommended intervals are listed in [Table 9-1](#).

9.4.1 Daily functional check

To check the door's gasket

1. Check the door's gasket for soiling, damage and wear. For information on increasing the lifetime of the gasket, see [Chapter 5.5, "Storage"](#), on page 23.
2. If the gasket is soiled, clean it as described in [Chapter 9.4.4, "Cleaning the gasket"](#), on page 58.
3. If the gasket has visible damage or wear, contact Rohde & Schwarz customer support to replace it; see [Chapter 10.3, "Contacting customer support"](#), on page 61.

To check the pneumatic system

This check is restricted to the [maintenance personnel](#).

Applies only to chambers with pneumatically operated doors.

1. Check the pressure tubes and couplings:
 - a) Visually inspect the compressed-air supply system.
 - b) Listen for any air leakage.

2. If pressure tubes or couplings are defective, replace these parts.

To check the test equipment

This check is restricted to the [maintenance personnel](#).

1. Check the antennas, cables and connectors by coupling measurements from one antenna towards the others. For example, if six antennas are installed:
 - a) Send a defined RF signal to antenna #1.
 - b) Measure it at antenna #2.
 - c) Send the same RF signal to antenna #2.
 - d) Measure it at antenna #3.
 - e) Proceed in the same way with the other antennas, cables and connectors.

You can automate this procedure, depending on your available measurement equipment and test system. Another way of checking is a measurement of the S11 parameters at all RF ports of the chamber.

2. If one or more antennas, cables or connectors do not seem to function properly, ask an [expert user](#) to solve the problem.

9.4.2 Checking the absorber

This check is restricted to the [maintenance personnel](#).

To check the absorber material

1. Check the absorber material inside the door and around the chamber's door opening for damage or wear.
2. If the absorber material has visible damage or wear, contact Rohde & Schwarz customer support to replace it; see [Chapter 10.3, "Contacting customer support"](#), on page 61. This replacement can require an exchange of the complete door.

9.4.3 Cleaning the chamber

If the chamber is soiled on its inside or outside, clean it.

To clean the chamber

1. If you want to clean only the outside, you can leave the chamber closed. Otherwise, open the chamber as described in [Chapter 7.3.2, "Push-button door operation"](#), on page 44.
2. Deactivate the chamber as described in [Chapter 7.2, "Deactivating the chamber"](#), on page 43.

Deactivation prevents any door movement that can lead to collision during cleaning activities.

For cleaning only the outside, proceed with [step 4](#).

3. Clean the interior of the chamber with a vacuum cleaner.
Run the vacuum cleaner on a low-power setting and move its nozzle carefully, to avoid damaging the absorber material in the chamber.
4. **NOTICE!** Do not use liquid cleaning agents such as contact spray. Liquid agents can cause malfunction and damage to electrical interfaces and mechanical parts.
Clean the outside of the chamber with a dry cloth.
Do not touch the gasket.
5. Optionally, activate the chamber as described in [Chapter 7.1, "Activating the chamber"](#), on page 42.

9.4.4 Cleaning the gasket

The gasket contact area can be soiled, for example by sweat or grease from fingerprints. Clean the gasket every 100 000 cycles to maintain RF shielding.

To clean the door's gasket

1. Open the chamber as described in [Chapter 7.3.2, "Push-button door operation"](#), on page 44.
2. Deactivate the chamber as described in [Chapter 7.2, "Deactivating the chamber"](#), on page 43.
Deactivation prevents any door movement that can lead to collision during cleaning activities.
3. Use the following cleaning equipment and materials:
 - Soft, lint-free cleaning cloth
 - Alcohol
 - Soft brush
4. Carefully use the soft brush in a dry condition to pre-clean the gasket.
5. Carefully use the cloth and alcohol to remove any soil from the gasket's nickel-coated contact area.
6. Optionally, activate the chamber as described in [Chapter 7.1, "Activating the chamber"](#), on page 42.

9.4.5 System calibration

This activity is restricted to the [calibration appointee](#).

When the test system's instruments to which the chamber is connected are calibrated, make sure that the chamber is included in this calibration procedure. Calibration is performed typically once a year.

10 Troubleshooting and repair

Every **user** except the **operator** is allowed to perform the activities described in this chapter. Any **repair** activities are allowed for Rohde & Schwarz **service personnel** only.

For shipment, see [Chapter 5, "Transportation, handling and storage"](#), on page 21.

10.1 Door error

When a door error occurs, the control system automatically deactivates the chamber by depressurizing the pneumatic system.

You can verify a door error by sending a `DOOR?` query: If the reply is "ERR", the door has an error.

To resolve this error, proceed as follows:

1. Disconnect the chamber from its electric power supply.
2. If the door is blocked, which prevents it from closing within the `TIMEOUT` period, remove any obstacle that blocks the door.
3. Reactivate it according to [Chapter 7.1, "Activating the chamber"](#), on page 42.
4. If the `TIMEOUT` period is shorter than the time that it takes the door to open or close, set the `TIMEOUT` value to match the door speed. See [Chapter 6.8, "Adjusting the door speed"](#), on page 40.
Alternatively, adjust the door speed to match the `TIMEOUT` value.
5. If the door is pushed to close while the `DOOR_TOUCH_CLOSE` state is disabled, select one of the following:
 - Enable the `DOOR_TOUCH_CLOSE` state.
 - Leave it disabled, but make sure that no operator pushes the door to close.
6. If there is a controller conflict, resolve any issues described in [Chapter 10.2, "Controller conflicts"](#), on page 59.
7. If the door still has an error and the "ERR" reply persists, inform Rohde & Schwarz customer support.

10.2 Controller conflicts

You can control the chamber by any of the following devices:

- **"IRC"**: Internal remote control module (labeled 1 in [Figure 10-1](#))
- **"MAN"**: External manual [Push-button switch unit](#)
- **"BOTH"**: IRC + MAN at the same time

You can address the IRC remotely via one of the following paths:

- **"SER"**: Computer via RS-232 serial interface
- **"LAN"**: Computer via Ethernet (LAN cable)

If you use a combination of these control devices and paths, some of the following operating modes can result in special cases:

- **MAN** only: no special case
- **IRC + SER**: no special case
- **IRC + LAN**: no special case
- Combined as follows:
 - **IRC + SER** and **MAN**
 - **IRC + LAN** and **MAN**

These combinations establish a special case:

For the computer to detect the presence of the MAN unit, the chamber must open and close once via SER or LAN. In the combined mode of operation, SER/LAN and MAN can send contradicting commands, activating pneumatic mechanisms both for opening and closing the drawer. This conflict makes the chamber remain in its current state, which is not dangerous for the operator, nor does it damage the chamber. For further operation, MAN will be the master over SER or LAN, and there is no restriction in operation.

We recommend avoiding this conflict by the following procedure:

To change the mode of operation

1. Disconnect the chamber from power.
2. Establish a combination of control devices and paths.
3. Activate the chamber as described in [Chapter 7.1, "Activating the chamber"](#), on page 42.
4. After power-up, use MAN as the first control device for sending a door command.

This procedure ensures that the computer detects the [Push-button switch unit](#) and assigns it the role of the master controller.

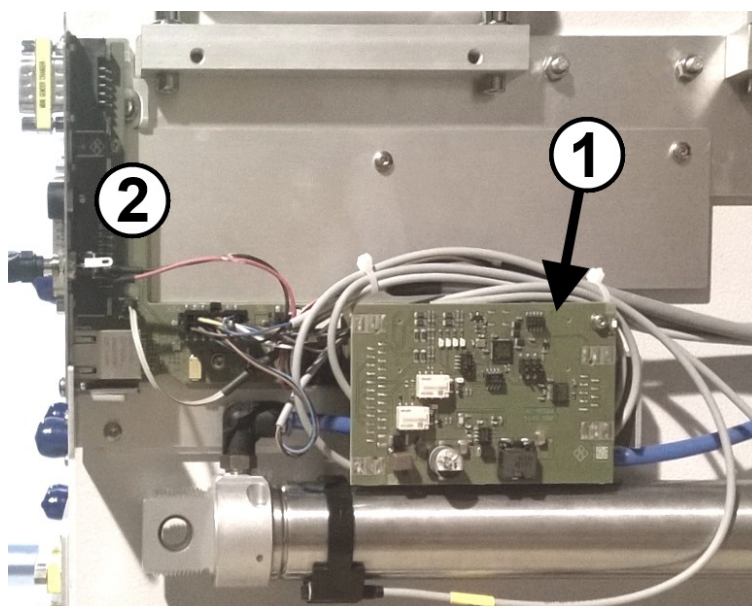


Figure 10-1: IRC module inside the chamber (cover removed)

1 = Internal remote control (IRC) module

2 = Right array of supply and control connectors on the rear side of the chamber

10.3 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 10-2: QR code to the Rohde & Schwarz support page

11 Disabling and scrapping

Every **user** except the **operator** is allowed to perform the activities described in this chapter.

Familiarize yourself with residual risks and potentially dangerous situations.

See [Chapter 2.2, "Residual risks"](#), on page 10 and [Chapter 2.3, "Potentially dangerous situations"](#), on page 11.

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11.1 Taking out of commission

To secure the door

1. If a **DUT** or other equipment of yours is still in the chamber, take it out.
2. Close the door of your chamber.
3. Secure the door against unintentional opening.
If available, use the metal safety latch next to the top left corner of the front door to secure it:

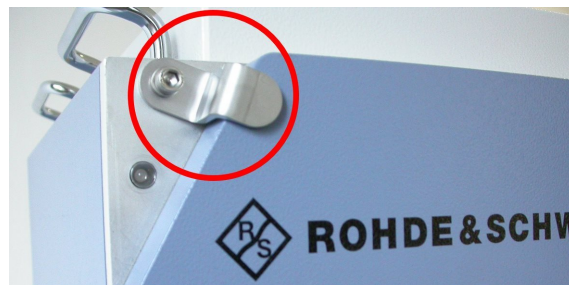


Figure 11-1: Metal safety latch

To label the chamber as out of commission

- ▶ If you take a malfunctioning chamber out of commission, make sure that nobody uses the chamber. Take the steps that are stipulated in your company for malfunctioning equipment.

To disconnect from power and control

1. Disconnect the DC (low voltage) plug of the power supply unit from the chamber.
The chamber is deactivated.
2. Disconnect the power supply unit from mains grid power.

3. Store the power supply unit for later use.
4. Disconnect all control connections from the chamber.
5. If you disconnect the **Push-button switch unit** from the 25-pin D-Sub connector [X21], cover the open male connector [X21] by its safety cap, see [Figure 6-10](#).
6. Disconnect the earth cable from the chamber's grounding terminal (earth ground contact \perp).

To disconnect from compressed air

Proceed as follows:

1. Hold the push-pull adapter at its front ring (1 in [Figure 11-2](#)).
2. Pull the adapter away from the chamber. By doing so, the ring (2) releases the connection with the quick-coupling plug KS3-1/8-A.

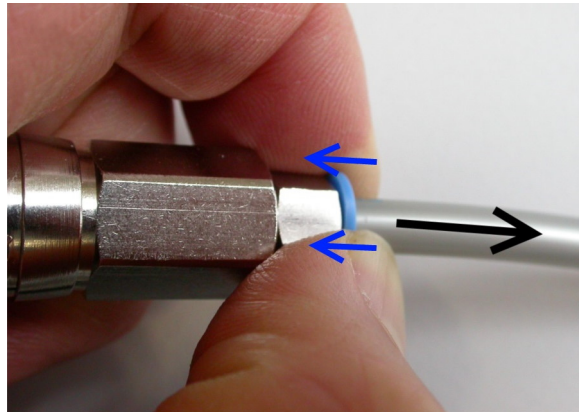
At the same time, the adapter is automatically locked by an internal spring-loaded valve, which prevents losing compressed air.



Figure 11-2: Disconnecting the compressed-air supply

To disconnect the tube from the push-pull adapter

1. Switch off the compressed-air supply.
Otherwise, when you remove the adapter from the tube, your compressed-air supply system loses pressure.
2. Push the push-pull adapter's blue ring firmly in the direction indicated by the blue arrows:



3. While keeping the blue ring pushed in, gently pull the tube out of the adapter in the opposite direction, as indicated by the black arrow.
4. If you wish to keep the push-pull adapter with the chamber, place it back on the quick-coupling plug:
 - a) Hold the adapter at its rear part.
 - b) Push the adapter onto the plug as shown in [Figure 6-8](#).

11.2 Dismounting



1. **WARNING!** Risk of tilting. See "[Chamber is heavy](#)" on page 10.
If the chamber is mounted on a table or similar support, remove the four mounting brackets that fix the chamber in place at its corners.



2. If the chamber is mounted in a rack, detach the chamber as follows:
 - a) On the rear side of the rack, detach the chamber from the rails that carry it.
 - b) On the front side of the rack, detach the metal rack-cover sheet from the chamber and from the rack.
 - c) Remove the metal sheet.
3. **WARNING!** Chamber is heavy. See [Chapter 5.1, "Lifting and carrying"](#), on page 21.
Lift the chamber at its handles with at least 2 people and place it on the floor or on a transporting equipment.

4. If you wish to transport the chamber to a different place or into storage, see [Chapter 5, "Transportation, handling and storage"](#), on page 21.

11.3 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Disposing electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its service life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.



Figure 11-3: Labeling in line with EU directive WEEE

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

Glossary: List of frequently used terms and abbreviations

C

calibration appointee: Person with technical skills and profound experience in calibrating electronic and [RF](#) systems. See also [roles](#).

chamber: The R&S TS7124AS, also referred to as "the product"

D

D-Sub: Electrical D-subminiature connector, surrounded by a D-shaped metal support

DUT: Device under test

E

EMC: Electromagnetic compatibility

expert user: Engineer with professional experience in radiation testing of electronic components and devices. A sound knowledge of the English language is crucial. Expert users are allowed to perform the configuration tasks described in the user documentation. See also [roles](#).

G

gasket: A mechanical seal that, in this case, provides RF shielding.

M

maintenance personnel: Person with technical skills. Has profound experience in installing and maintaining electronic devices and pneumatic systems. See also [roles](#).

O

operator: Person instructed and trained to operate the chamber in well-defined procedures, mainly according to [Chapter 7, "Operation"](#), on page 42. See also [roles](#).

P

PC connector: Precision connector (not to be confused with "personal computer").

product: The R&S TS7124AS, also referred to as "the chamber"

R

Radio key: Car key with remote control features

RF: Radio frequency, electromagnetic oscillation in the range of 3 kHz to 300 GHz

roles: The handbook defines the following roles for performing various tasks with the chamber:

- user
- operator
- expert user
- supervisor
- trainer
- transportation appointee
- maintenance personnel
- service personnel
- calibration appointee

S

service personnel: Service personnel appointed or employed by Rohde & Schwarz. See also [roles](#).

SMA / SMP connector: SubMiniature coaxial RF connector, version A (standard) / version P (precision, pluggable)

supervisor: Expert user who instructs and supervises other users. Has leadership experience and production control expertise. See also [roles](#).

T

trainer: Expert user who trains other users. Has experience in training and instruction. See also [roles](#).

transportation appointee: Carrier with experience in using transporting equipment. Trained to handle heavy, sensitive equipment with care and without disregard for safety and health. See also [roles](#).

U

USB: Universal serial bus, industrial connector standard

user: Anyone who uses or handles the chamber during its lifecycle. Includes the operating company and its personnel, for example maintenance personnel, trainers and operators. See also [roles](#).

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