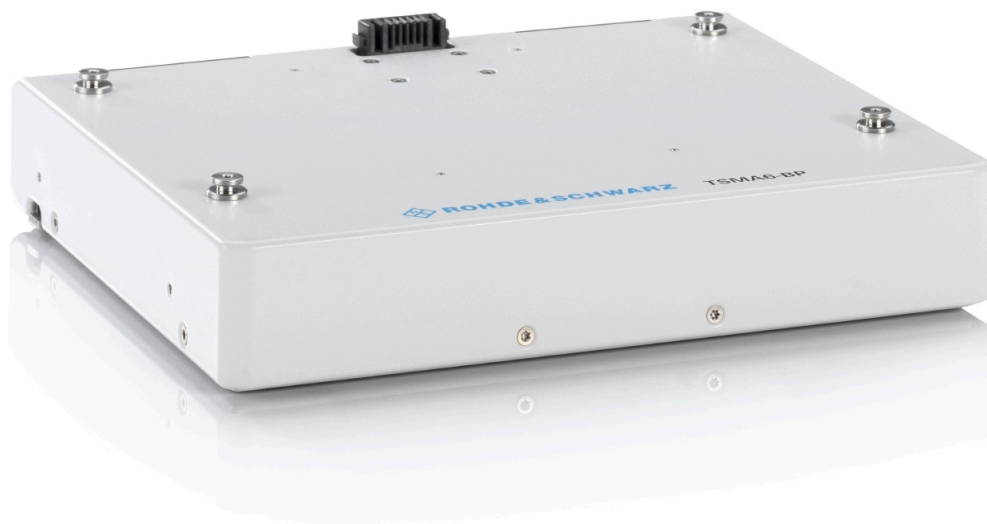


R&S® TSMA6-BP

Battery Pack Unit

Getting Started



4900902402

Version 07

ROHDE & SCHWARZ

Make ideas real



This manual describes the following R&S®TSMA6 accessory:

- R&S®TSMA6-BP Battery Pack Unit (4900.9001.02)
- R&S MNT®BP89WH Batteries (1321.3772.00) for R&S®TSMA6-BP

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4900.9024.02 | Version 07 | R&S®TSMA6-BP

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®TSMA6 is indicated as R&S TSMA6.

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1 Safety and regulatory information

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

Intended use

The R&S TSMa6-BP is intended to enhance the R&S TSMx scanner family via a vibration-proof mechanical connection to allow mobile operation. It contains two easily accessible, rechargeable and hot-swappable batteries.

Where do I find safety information?

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

- In [Chapter 1.1, "Safety instructions"](#), on page 5. The same information is provided in many languages as printed "Safety Instructions". The printed "Safety Instructions" are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety instructions

The product contains exchangeable or built-in lithium polymer or lithium ion cells or batteries. The use of the word battery in the following always means all types. Only the battery contents are potentially hazardous. As long as a battery is undamaged and the seals remain intact, there is no danger.

Impact, shock or heat can cause damage such as dents, punctures and other deformations. A damaged battery poses a risk of personal injury. Handle a damaged or leaking battery with extreme care. Immediately ventilate the area since the battery releases harmful gases. If you come into contact with the battery fluid, immediately remove all contaminated clothing. Irritation can occur if the battery fluid comes in contact with your skin or eyes. Immediately and thoroughly rinse your skin or eyes with water and seek medical aid.

For safe handling, follow these rules:

- Do not short-circuit the battery.

Labels on the product

- Do not mechanically damage the battery. Do not open or disassemble the battery.
- Do not expose the battery to high temperatures such as open flames, hot surfaces and sunlight.
- Only use the battery with the designated Rohde & Schwarz product.
- Only use the appropriate Rohde & Schwarz charger to charge the batteries. If the batteries are improperly charged, there is a risk of explosion. For charging and discharging temperature ranges, see the product documentation.
- Replace exchangeable batteries only with the same battery type.
- Store the battery in the product or use the product packaging.
- Dispose of exchangeable batteries separately from normal household waste as specified by the local waste disposal agency.

If you disregard these rules, you risk serious personal injury or even death due to explosion, fire or hazardous chemical substances. The product documentation provides further details.

If exchangeable batteries or products with built-in batteries are defective, contact the Rohde & Schwarz customer service. Rohde & Schwarz classifies the severity of the defect. When returning batteries or Rohde & Schwarz products containing batteries, use a carrier qualified to transport dangerous goods and notify the carrier of this classification. Follow the carrier's transport stipulations in line with IATA-DGR, IMDG-Code, ADR or RID.



Figure 1-1: Disposal information in line with EU battery directive



1.2 Labels on the product

Labels on the casing inform about:

- Product and environment safety, see [Table 1-1](#)
- Identification of the product, see bottom label of the R&S TSMA6-BP.

Warning messages in the documentation

Table 1-1: Labels regarding product and environment safety

| | |
|---|---|
|  | Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see " Disposing electrical and electronic equipment " on page 30. |
|  | Labeling in line with directive 2006/66/EC for disposal of batteries after they have come to the end of their service life. For more information, see " Disposing batteries " on page 30. |

1.3 Warning messages in the documentation

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

NOTICE

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

2 Welcome

2.1 Documentation overview

This section provides an overview of the R&S TSMA6-BP user documentation. Unless specified otherwise, you find the documents on the R&S TSMA6-BP product page at:

www.rohde-schwarz.com/manual/tsmx

2.1.1 Manual

Introduces the R&S TSMA6-BP, includes general information, e.g. safety instructions and describes how to exchange and charge batteries. A printed version is delivered with the product. The R&S TSMA6B user manual includes basic setups and typical measurement examples.

2.1.2 Lithium-ion batteries safety instruction

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

2.1.3 Data sheets and brochures

The data sheet contains the technical specifications of the R&S TSMA6-BP. It also lists optional accessories.

The brochure provides an overview of the product and deals with the specific characteristics.

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

2.2 Key features

The R&S TSMA6-BP enhances the R&S TSMA6/6B device to a portable measurement solution based on a battery-powered system.

Key Features

- Power supply for R&S TSMA6/6B in portable applications
- Power supply for up to 4 additional devices (mobile network scanner R&S TSME6 and R&S TSME30DC and R&S TSME44DC downconverter)
- Usage as a power buffer for connected devices in scenarios with cracking or shortly interrupted external DC power supplies / (e.g. in vehicles)
- Dual battery bay for hot-swap support and endless portable mode
- In-bay charging via smart battery controller
- Charge indicator LED for each individual battery bay
- SMBus interface with connected R&S TSMA6/6B

3 Preparing for use

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

3.1 Unpacking the instrument

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

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

3.2 Connecting to power

This section describes how to connect the R&S TSMA6-BP to a power supply unit.

You connect the R&S TSMA6-BP to a power supply unit to recharge the batteries. For details, see [Chapter 3.4, "Charging the batteries for the first time"](#), on page 13.

3.2.1 Connecting to a vehicle DC power supply via cigarette lighter

The R&S TSMA6-BP is delivered with a 12 V DC power supply cable with a cigarette lighter connector.

1. Check the rating of the vehicle DC power supply. It has to be 12 V.
2. Connect the 7-pin connector to DC IN.

3. Connect the cigarette lighter adapter to the 12 V outlet of the vehicle.

3.2.2 Connecting to the vehicle power supply via terminal

To connect vehicle power supply via terminal

1. Demount the cigarette lighter adapter from the cable.
2. Connect the open ends of the cable to the DC supply. Ensure that the polarity is correct. (see [Figure 3-1](#)).

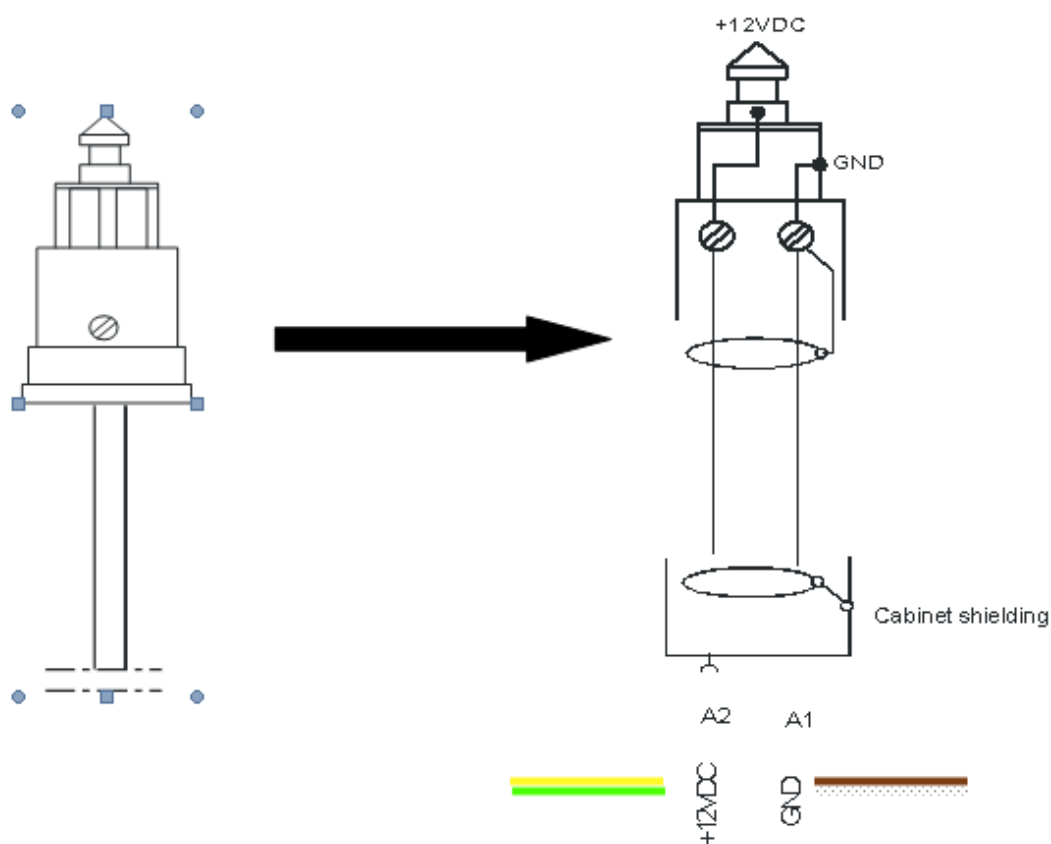


Figure 3-1: Supplied power cable with cigarette lighter adapter

+12 V DC = green/yellow cabling

GND = brown/white cabling

3.2.3 Connecting to an AC power supply

If you operate the product with an external power supply, you can use it indoors only in pollution degree 2 environments where nonconductive contamination can

Inserting and removing the batteries

occur. Suitable AC power supplies are listed in the data sheet. They differ in the output power:

- R&S TSME-Z1 has an output power of about 30 W, sufficient for up to two products, one TSME6 and one TSME30/44DC.
- R&S TSMA6-Z1 has an output power of 105 W and is suitable for multiple TSMx products.

1. Ensure that the required ratings listed in the data sheet are matched.
2. Connect the round connector to DC IN.
3. Insert the AC power plug into a power outlet with ground contact.

3.3 Inserting and removing the batteries

To insert the batteries

1. Press one battery bay lid and open it up.
2. Insert the batterie in the correct way (charge indicator facing up). Take care of the nut in the battery and the pin inside the battery bay.
NOTE: Use only the battery type R&SMNT-BP99WH (order no. 3660.9109.02)
3. Close the lid until it clicks into place.
NOTE: The R&S TSMA6B-BP may be used only with closed battery lids.
4. Repeat the steps [step 1](#) to [step 3](#).


To remove the batteries

1. Press one battery bay lid and open it up.
2. Remove the batterie.
3. Close the lid until it clicks into place.
4. Repeat the steps [step 1](#) to [step 3](#).

For details about recharging and storing batteries, see [Chapter 8.2, "Handling batteries"](#), on page 26 .

3.4 Charging the batteries for the first time

The batteries are shipped separately with max. 30 % of charge.

 Before first usage, the batteries must be fully charged in the R&S TSMA6B-BP or with an external charger.

For charging batteries, see [Chapter 8.2.1, "Charging the batteries"](#), on page 27.

4 Instrument tour

The meanings of the labels on the product are described in [Chapter 1.2, "Labels on the product"](#), on page 6.

4.1 Front panel view

The front panel of the R&S TSMA6-BP does not provide any connectors or control elements for operation.

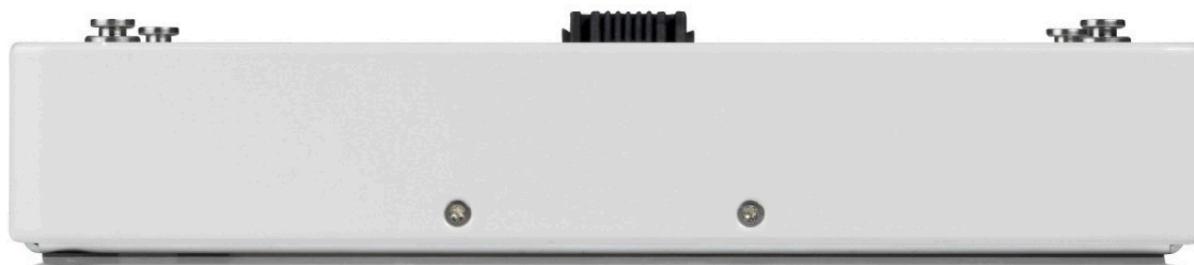


Figure 4-1: R&S TSMA6-BP - Front panel

4.2 Rear panel view

The following figure provides an overview of the control elements and the connectors on the rear panel of the instrument.

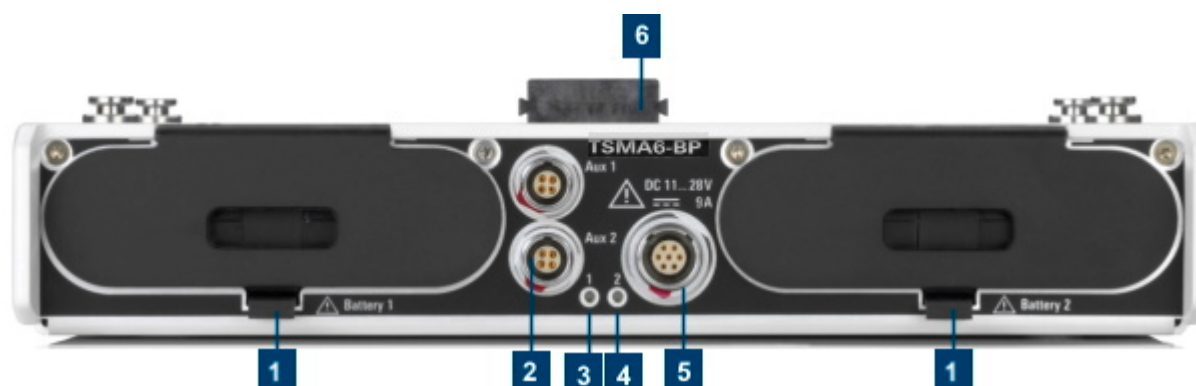


Figure 4-2: R&S TSMA6-BP - Rear panel

- 1 = Battery bay 1 / 2
- 2 = DC Output Aux 1 / Aux 2
- 3 = Status LED for battery 1
- 4 = Status LED for battery 2
- 5 = DC IN connector
- 6 = DC Output / Control R&S TSMA6/6B (docking connector)

Battery bay 1 / 2

Use the batteries delivered with the product. See also [Chapter 3.3, "Inserting and removing the batteries"](#), on page 12 and [Chapter 8.2, "Handling batteries"](#), on page 26.

DC Output Aux 1 / Aux 2

Aux 1 / Aux 2 are used as DC output.

- U_{out} (battery mode): 14 V to 16.5 V
- U_{out} (DC powered): 18.5 V

Max. output current is 2 A per port.

With the power cables R&S TSMA6-BP1T and R&S TSMA6-BP2T (not part of the standard accessory), up to four R&S TSMx (TSME6, TSMExxDC) devices can be connected.

You find the connection description in the product user manuals.

Status LEDs for battery 1 and 2

For details about the status LEDs, see [Chapter 6.4.2, "Rear panel LEDs in stand-alone operation"](#), on page 22.

DC IN connector

The DC IN connector is used to supply the R&S TSMA6-BP with DC power. A wide DC input range 11 V to 28 V is supported. Max. input current is 12 A.

See also [Chapter 3.2, "Connecting to power"](#), on page 10.

DC Output / Control R&S TSMA6/6B (docking connector)

The docking connector is used for the power connection of a R&S TSMA6/6B device and offers a I2C/SMBus interface for power management, charge control and LED control.

You find the connection description in the R&S TSMA6/TSMA6B user manuals.

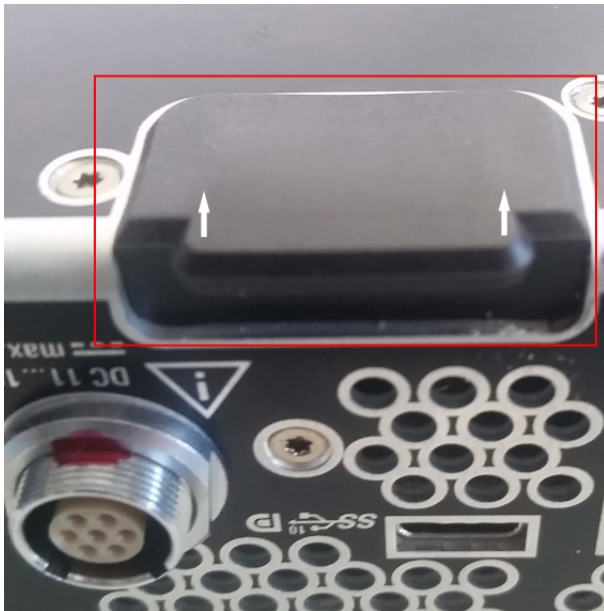
5 Connecting R&S TSMA6/6B with R&S TSMA6-BP-BP

 Before initial operation, the batteries must be fully charged without an R&S TSMA6-BP connected.

To connect the R&S TSMA6/6B with the R&S TSMA6-BP, the following steps must be performed.

To connect a battery pack

1. Remove the cover cap from the docking connector of the R&S TSMA6/6B.



2. Screw the collar screws on the top of the R&S TSMA6-BP with a Torx 8 screw driver.
 - Torque: $0.66 \text{ Nm} \pm 0.05 \text{ Nm}$

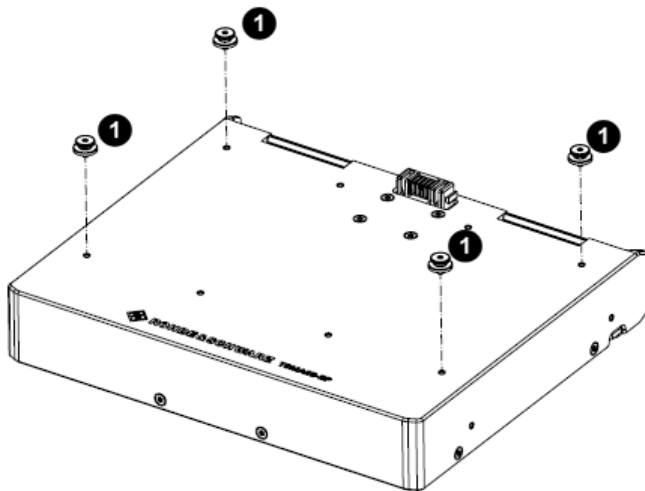


Figure 5-1: Collar screws

1 = Collar screws

3. Align the collar screws with the snap-in holes on the bottom of an R&S TSMA6/6B and press the device down.

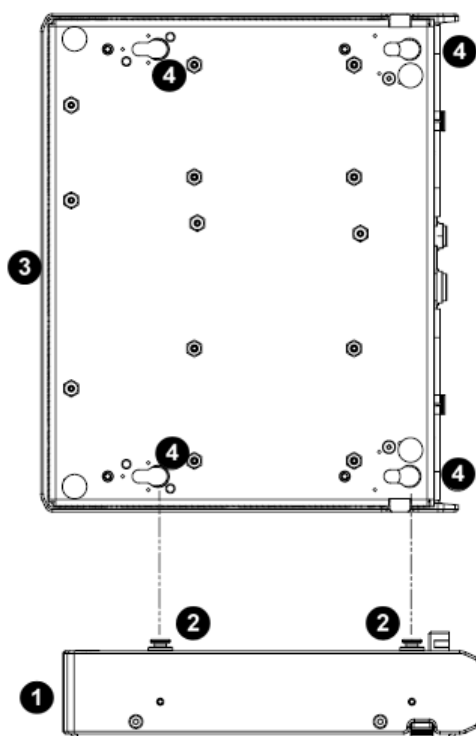


Figure 5-2: Aligning R&S TSMA6-BP-BP and R&S TSMA6/6B

- 1 = R&S TSMA6-BP-BP
- 2 = Collar screws
- 3 = R&S TSMA6/6B
- 4 = Snap in holes on the bottom pane of R&S TSMA6/6B


- 4. Move the R&S TSMA6/6B to the rear side (2) until you hear a click when the collar screws are locked in.



Figure 5-3: Connected R&S TSMA6/6B and R&S TSMA6-BP-BP

- 1 = Attach R&S TSMA6-BP to R&S TSMA6-BP-BP
- 2 = Move R&S TSMA6/6B to the rear side
- 3 = Power connection established (docking connector is snapped in)

6 Operating the battery pack

 For portable operation powered from the batteries, we recommend to use the R&S TSMA6-BP always with 2 batteries in the bay. Then the batteries have a comparable charging state as they are discharged simultaneously.

Seamless switching of the output power is done automatically. As long as sufficient DC IN power is available, the external power supply supplies the connected devices and charges the batteries.

If DC IN power is removed or cracking, the batteries power the connected devices.

6.1 Standalone operation

In the standalone mode, the R&S TSMA6-BP is used without an R&S TSMA6/6B. The R&S TSMA6-BP handles battery charging and output power path switching. The charging state of the batteries can be read from the rear panel LEDs only when an external DC supply is connected (see [Chapter 6.4.2, "Rear panel LEDs in standalone operation"](#), on page 22).

6.2 Host-controlled operation

The R&S TSMA6-BP is used in combination with a R&S TSMA6/6B. Charging info is provided via the SMBus interface of the docking connector (see [Chapter 4.2, "Rear panel view"](#), on page 14). The rear panel LEDs are controlled by R&S TSMA6/6B. Charging state and remaining battery power are displayed when the R&S TSMA6/6B is switched on (see [Chapter 6.4.2, "Rear panel LEDs in standalone operation"](#), on page 22).

6.3 Power states

6.3.1 Enabling auto power

Start the output of DC power at the docking connector and AUX1 / AUX2 by doing one of the following.

- Insert fully charged batteries in the empty battery bays while no external DC power supply is connected.
- Connect an external DC power supply while the battery bays are empty.

6.3.2 Standby / power On/Off

To switch to standby in host-controlled mode (R&S TSMA6/6B connected)

- ▶ Press the power off button of the R&S TSMA6/6B.

The R&S TSMA6-BP is in standby mode

In standby mode, the output voltages on the R&S TSMA6/6B connector and the AUX connectors are switched off. Only the standby voltage for the R&S TSMA6/6B is provided.

In standalone mode, there is no possibility to power off the output voltages of the R&S TSMA6-BP.

To power on the R&S TSMA6-BP from standby (R&S TSMA6/6B connected)

- ▶ R&S TSMA6/6B connected:
Press the power button the R&S TSMA6/6B.

To power on the R&S TSMA6-BP from standby (R&S TSMA6/6B removed)

- ▶ Disconnect the DC input power and the batteries for a short time and connect them again.

6.4 Monitoring the battery charge status

You can monitor the battery charge status in several ways.

6.4.1 Checking the charge status of the individual battery



Figure 6-1: R&S TSMA6-BP with R&S BP89WH batteries (R&S No.1321.3772.00)

1 = Charging state display (only for R&S TSMA6-BP and R&S BP89WH batteries)

MNT-BP89WH: The discharge status is visible via the battery internal display without removing the batteries (see [Figure 6-1](#)).

When the batteries are being charged, the upper segment of the LCD display is blinking.



| Capacity | LCD Segments | | | | |
|------------|--------------|--|--|--|--|
| Below 1% | | | | | |
| 1% - 20% | | | | | |
| 21% - 40% | | | | | |
| 41% - 60% | | | | | |
| 61% - 80% | | | | | |
| 81% - 100% | | | | | |

6.4.2 Rear panel LEDs in standalone operation

The status of each battery is displayed separately. For details, see [Figure 4-2](#).

No R&S TSMA6/6B is connected and R&S TSMA6/6B switched off.

Monitoring the battery charge status

In standalone mode, the battery charge status is only displayed when an external DC power supply is connected. The charge in battery mode without connected DC power supply can only be read directly from the battery (see [Chapter 6.4.1, "Checking the charge status of the individual battery"](#), on page 22).

Table 6-1: LED states in standalone operation

| Color | LED state | Comment |
|-------|-----------------|--|
| --- | OFF | Battery 1/2 not present or external DC power not available |
| green | BLINKING (2 Hz) | Battery fully charged (100 %) |
| green | ON | Battery charging in progress / external DC power connected |

6.4.3 Rear Panel LEDs in host-controlled operation

A R&S TSMA6/6B is connected and switched on.

Table 6-2: LED states in host-controlled operation

| Battery status | Color | State | Comment |
|-----------------------------------|-------|-------------------|----------------------------------|
| No battery | --- | OFF | Battery 1/2 not present |
| Battery powered / Full charge | blue | ON | Charging state > 21% |
| Battery powered / Low charge | blue | BLINKING (0.5 Hz) | 20 % > Charging state > 10% |
| Battery powered / Critical charge | blue | BLINKING (2 Hz) | Charging state < 10% |
| External Power / Charging | green | ON | Battery 1/2 charging in progress |

Monitoring the battery charge status

| Battery status | Color | State | Comment |
|------------------------------------|-------|-----------------|--|
| External Power / Charging finished | green | BLINKING (2 Hz) | Battery 1/2 charging completed |
| Misc | cyan | BLINKING (5 Hz) | any other reported state, e.g. battery error |

6.4.4 R&S TSMA6/6B web-GUI / tray icon (only host-controlled mode)

In host-controlled mode, you can monitor the battery charging status from the R&S TSMA6/6B web-GUI or from the tray icon in the Windows OS.

For details, refer to "R&S TSMA6 Autonomous Mobile Network Scanner - User Manual" (R&S No. 4900.8057.02).

7 Transporting

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.

Securing

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.

Transport altitude

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

Products containing batteries

Products with built-in batteries or exchangeable batteries are dangerous goods and have to be transported as such. Follow the instructions described in [Chapter 1.1, "Safety instructions"](#), on page 5.

8 Maintenance, storage and disposal

The product does not require regular maintenance. It only requires occasional cleaning. It is however advisable to check the nominal data from time to time.

8.1 Cleaning

Do not use any liquids for cleaning. Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

8.2 Handling batteries

Safe handling of batteries is described in [Chapter 1.1, "Safety instructions"](#), on page 5. Maintenance information is provided here.

Keep the batteries clean and dry. If the terminals become soiled, clean them with a dry, clean cloth.

Charging batteries

Charge the battery before using it for the first time. Following a long storage period, it can be necessary to charge and discharge the battery several times to reach full capacity. For charging, use the product or the charger with the order number 3660.9109.02.

Look up the following details in the data sheet:

- Charging conditions
- Recharging interval to avoid deep discharge

For details, see [Chapter 8.2.1, "Charging the batteries"](#), on page 27.

External charger for batteries

- R&S TSMA-BC2
Dual charger for R&S TSMA6-BP batteries
NOTE: Customer must provide country-specific power supply cable for IEC60320 / C6 socket.

- R&S TSMA6-BC4
4-bay charger for R&S TSMA6-BP batteries

Replacing batteries

To replace an exchangeable battery

1. **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first.
Proceed as described in [Chapter 6.3.2, "Standby / power On/Off"](#), on page 21.
2. Disconnect the power supply and all accessories.
3. Fold out the tilt stand on the back of the product.
4. Open the battery cover.
5. Remove the old battery.
6. Insert the new battery R&S MNT_BP99WH with order number 3660.9109.02.
7. Close the battery cover and secure it.
8. Dispose of the old battery as described in ["Disposing batteries"](#) on page 30 .

Storing batteries

Ideally, store the battery in the product and follow the instructions in [Chapter 8.3, "Storage"](#), on page 30. Otherwise, observe the following rules:

- Prevent short-circuiting of the batteries, which can happen if batteries touch each other or come into contact with metallic objects in the storage container. As storage container, you can use the product packaging.
- Do not expose to direct sunlight.
- Store the battery at room temperature.
- Store the battery at a state of charge between 50 % and 70 %.

8.2.1 Charging the batteries

During operation with external power supply, the batteries are automatically charged. Charging time for the batteries may differ depending on the connected load as the maximum power consumption of the R&S TSMA6-BP is limited.

For charging the batteries, you have two possibilities:

To charge the batteries in-bay

1. Insert the batterie(s) in the correct way (charge indicator facing up).
2. Take care of the nut in the battery and the pin inside the battery bay (see [Chapter 8.2.2, "Hot swapping battery exchange"](#), on page 28).

Charging starts automatically when DC power is connected. For checking the charging state, see [Chapter 6.4.2, "Rear panel LEDs in standalone operation"](#), on page 22.

To charge the batteries with an external charger

1. Press the battery bay lid(s) and open it up.
2. Remove the batteries.
3. Connect the batteries with an external charger.
NOTE: For allowed charger types, see ["External charger for batteries"](#) on page 26.
4. To check, if the batteries are fully charged, refer to [Chapter 6.4.1, "Checking the charge status of the individual battery"](#), on page 22.

8.2.2 Hot swapping battery exchange

When the battery charge reaches a low level, the batteries need to be replaced. Replacement can be done through hot swapping without interrupting the measurement on the connected devices.

1. Press one battery bay lid and open it up.



Figure 8-1: Open battery cover

2. Remove the battery by the tab.
3. Insert the batterie(s) in the correct way (charge indicator facing up). Take care of the nut in the battery and the pin inside the battery bay.

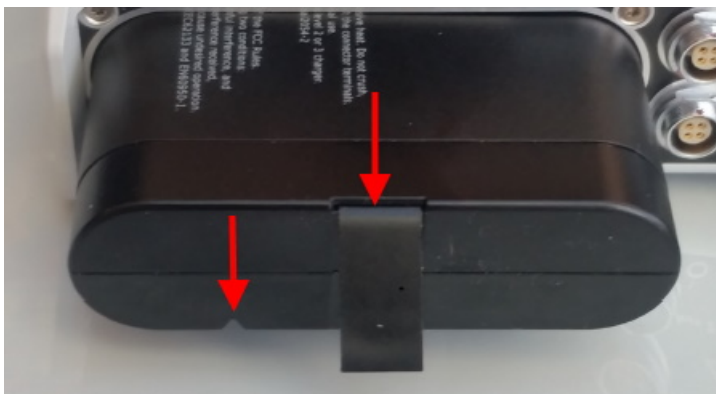


Figure 8-2: Battery orientation

4. Close the lid(s) until it clicks into place.
Only use the R&S TSM6-BP with closed battery lids.

The batteries are both discharged evenly. We recommend replacing always both batteries. Repeat [step 1](#) to [step 4](#) for battery bay 2.

8.3 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.

8.4 Disposal

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.

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 8-3: 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.

Disposing batteries

A product that contains a battery cannot be disposed of in the normal household waste after it has come to the end of its service life. It is labeled as follows:



Figure 8-4: Disposal information in line with EU battery directive

Dispose of batteries as specified by the local waste disposal agency. Alternatively, you can contact the Rohde & Schwarz local service representative.

For information on returning batteries to Rohde & Schwarz subsidiaries, see [Chapter 1.1, "Safety instructions"](#), on page 5.

9 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 9-1: QR code to the Rohde & Schwarz support page

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