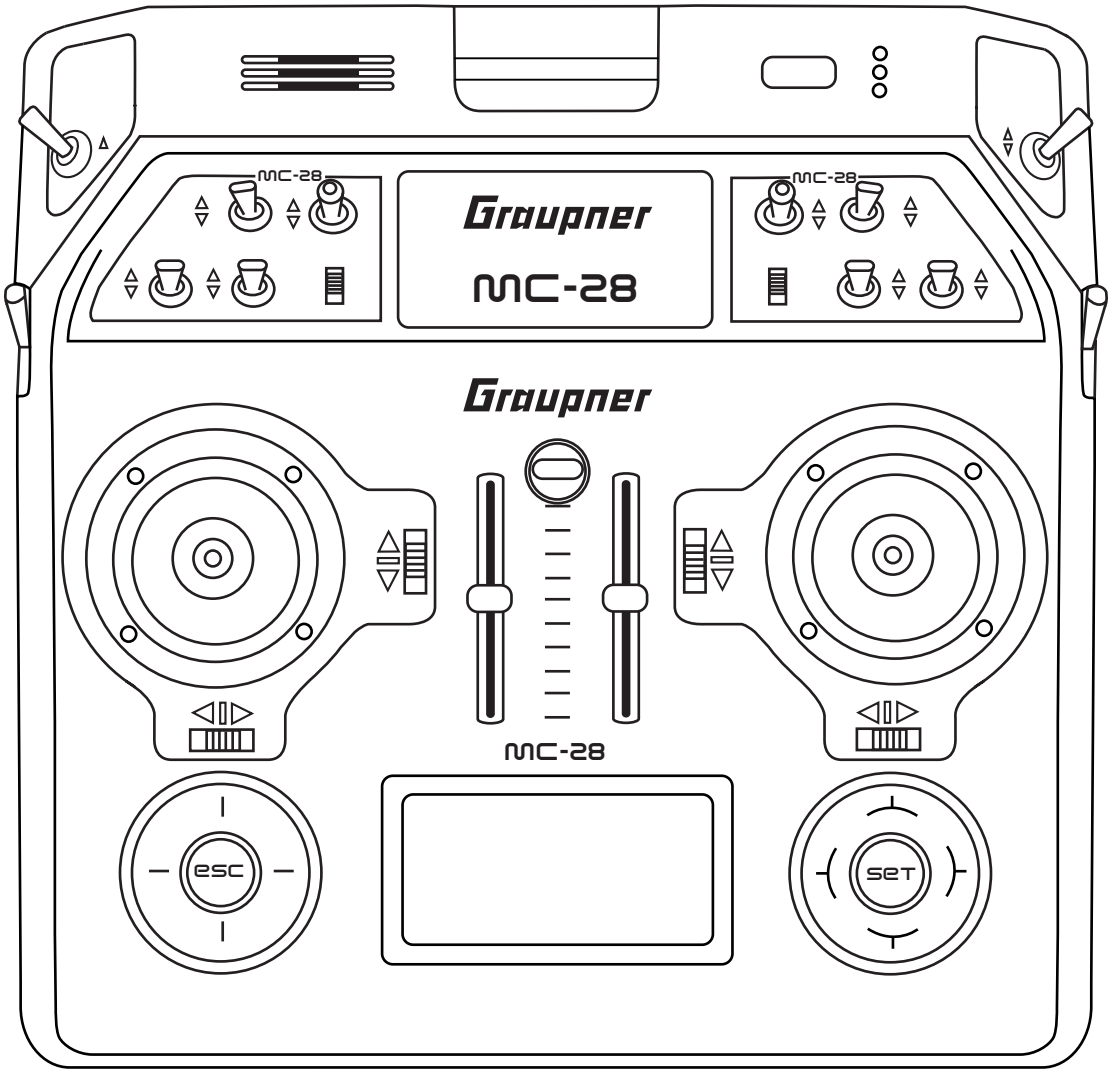
EN

Manual

mc-28 Manual

16 channel HoTT 2,4 GHz transmitter

No. S1033



CE

Part 1

Graupner

Copyright © Graupner/SJ GmbH

Index

Introduction 5
Service Centre 5
Intended use 6
Target group 6
Package content 6
Technical Data 7
Symbols explication 7
Safety notes 7
For your safety by handling the transmitter 8
For your safety by handling the battery 9
Description of the transmitter 11
Control elements on the transmitter 11
Inside view 13
Interfaces 14
DSC socket 15
Memory cards 16
Display and touchpad 17
Symbols in the display 18
Key pad 18
Commissioning 20
Hand pads 20
Brackets for transmitter belt 20
Anchorage for the transmitter belt 21
Opening/closing the transmitter housing 21
Switch the transmitter off 23
Binding 23
Charging the transmitter battery 24
Low voltage warning 24
Battery use timer in the display 24
Lithium battery 24
Use and menu functions 25
Short-Cuts 25
Hidden mode 27
Firmware update/Changing the display language 28

Stick calibration 28
Telemetry data display 30
Firmware update 32
Update through memory card 32
Update through USB port 33
Problems during firmware update 33
Declaration of conformity 33
Notes on environmental protection 34
Care and maintenance 34
Warranty 34

Introduction

Thank you very much for purchasing the ***Graupner*** **mc-28 HoTT transmitter**.

Read this manual carefully to achieve the best results with your transmitter and first of all to safely control your models. If you experience any trouble during operation, take the instructions to help or ask your dealer or ***Graupner*** Service Centre.

NOTICE

This manual is composed by two parts. Part 1 is contained in the product's package content. Part 2 can be found in its last version on www.graupner.de by the related item page.

Due to technical changes, the information may be changed in this manual without prior notice. Keep updated by regularly checking our own website, **www.graupner.de** to be always updated with the products and firmware.

This product complies with national and European legal requirements.

To maintain this condition and to ensure safe operation, you must read and follow this user manual and all the safety notes before using the product!

NOTICE

This manual is part of that product. It contains important information concerning operation and handling. Keep these instructions for future reference and give it to third person in case you gave the product.

Service Centre

Graupner Central Service
Graupner/SJ GmbH
Henriettenstraße 96
D-73230 Kirchheim / Teck

Servicehotline
☎ (+49) (0)7021/722-130
Monday - Thursday
9:15 am - 4:00 pm
Friday
9:15 am - 1:00 pm

Graupner USA
3941 Park Dr Suite 20-571
El Dorado Hills, CA 95762

Website: **www.graupnerusa.com**
Phone: +1 855-572-4746
Email: service@graupnerusa.com

Graupner **in Internet**

For the service centers outside Germany please refer to our web site **www.graupner.de**

Intended use

This remote-control system may only be used for the purpose specified by the manufacturer for operation of remote control models without passengers. Any other type of use is impermissible and may damage the system and cause significant property damage and/or personal injury. No warranty or liability is therefore offered for any improper use not covered by these provisions.

Read through this entire manual before you attempt to install or use the transmitter.

Graupner/SJ constantly works on the development of all products; we reserve the right to change the item, its technology and equipment.

Target group

The product is not a toy. It is not suitable for children under 14 years. The operation of the **mc-28 HoTT transmitter** must be performed by experienced modelers. If you do not have sufficient knowledge about dealing with radio-controlled models, please contact an experienced modeler or a model club.

Package content

- Transmitter **mc-28 HoTT**
- Transmitter battery
- Receiver (optional)
- USB Adapter/Interface
- USB cable
- Micro SD card with adapter
- Hand pads
- Transmitter belt
- Brackets for transmitter belt
- Short and long stick-tops
- Aluminum case
- Transmitter manual (Part 1)
- Receiver manual (optional)

The programming manual (manual part 2) can be found in its last version on **www.graupner.de** by the related item page.

Technical Data

Transmitter mc-28 HoTT

Frequency band	2,4 … 2,4835 GHz
Modulation	FHSS
Transmitting power	100 mW EIRP
Control functions	16 functions of which 4 can be trimmed
Temperature range	-10 … +55 °C
Antenna	Patch integrated in the case
Operating voltage	3,4 … 4,35 V (1S LiPo)
Power consumption	approx. 400 mA
Range	approx. up to 4.000 m
Dimensions	approx. 235 x 228 x 66 mm
Weight	approx. 1250 g with transmitter battery

Note

The technical data of the optional receiver are available in the manual included in the receiver package content.

Symbols explication

Always observe the information indicated by this warning sign. Particularly those which are additionally marked with the **CAUTION** or **WARNING**. The signal word **WARNING** indicates the potential for serious injury, the signal word **CAUTION** indicates possibility of lighter injuries.

The signal word **Note** indicates potential malfunctions.

Attention indicates potential damages to objects.

Safety notes

These safety instructions are intended not only to protect the product, but also for your own and other people's safety. Therefore please read this section very carefully before using the product!

- Do not carelessly leave the packaging material lying around, since it might become a dangerous toy for children.
- Persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, or not capable to use safely the transmitter must not use the transmitter without supervision or instruction by a responsible person.

- Operation and use of radio-controlled models needs to be learned! If you have never operated a model of this type before, start carefully and make yourself familiar with the model's reactions to the remote control commands. Proceed always responsibly.

Inform yourself before flying your model on which maximum altitude you can fly in the uncontrolled airspace over the starting position and do not exceed it.

- Before you start using the remote control model, you have to check the further relevant laws and regulations. These laws you must obey in every case. Pay attention to the possibly different laws of the countries.
- The insurance is mandatory for all kinds of model operation. If you already have one, so please inform yourself if the operation of the respective model is covered by your insurance. If this is not the case, conclude a special liability insurance policy for models.
- Protect all equipment from dust, dirt, moisture. All equipment must be protected from vibration as well as excessive heat or cold. The models may only be operated remotely in normal outside temperatures such as from -10°C to +55°C.
- First, always perform a range and function test on the ground before you start using your model. Only so you can grant a safe use! How to perform a range test is explained in the Part 2 of the manual.
- Only operate all your HoTT components using the current software version.
- Start a data log every time you use your model. With a log-data an occurred technical defect can be recognized and verified. Only so it is possible to considerate an eventual compliant.

For your safety by handling the transmitter

WARNING

Also while programming the transmitter, make sure that a connected motor cannot accidentally start. Disconnect the fuel supply or drive battery beforehand.

CAUTION

Risk of fire! Avoid every kind of short-circuit in all sockets of the transmitter! Use only the suitable connectors. In no case the electronic component of the transmitter may be changed or modified. Due to licensing reasons, any reconstruction and/or modification of the product is prohibited.

Note

During transport protect the model and the transmitter from damages.

For your safety by handling the battery

CAUTION

- Protect all equipment from dust, dirt, moisture. Only use in dry locations.
- Do not use any damaged battery. Risk of injury!
- Any alterations to the battery can cause serious injury. Risk of fire!
- Batteries may not be heated, burned, short-circuited or charged with excessive current or with reversed polarity.
- While they are being charged, the batteries must be placed on a non-flammable, heat-resistant and non-conductive surface. Combustible or highly flammable objects are to be kept away from the charging area. Batteries must be monitored while they are being charged.
- The maximum quick charging current specified for the respective cell type may not be exceeded.
- If the battery heats up above 60°C while it is being charged, stop charging and let the battery cool down to approximately 30 - 40°C.
- The batteries must not be modified. Do not directly solder or weld the cells.
- If handled improperly, there is a danger of fire, explosion, irritation and burns. To extinguish a fire use: water, CO^2, sand.
- Leaked electrolyte is caustic and should not be touched or come into contact with your eyes. In case of emergency, rinse with a large quantity of water and consult a Med. Doctor.
- Always charge the battery fully.

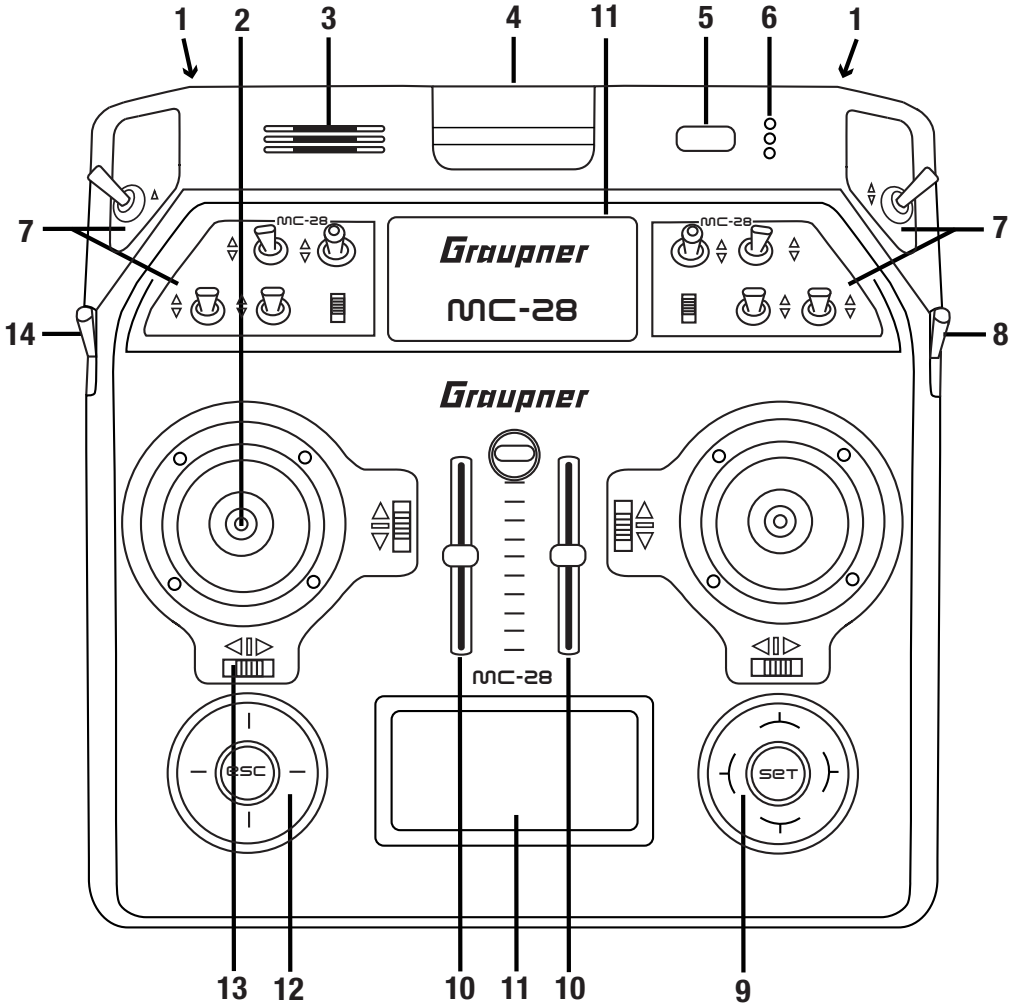
- The maximum charging current permitted may not be exceeded.
- Never leave the charger unattended when it is connected to the power supply.
- Batteries may only be charged in rooms fitted with smoke detector.

Safety notes for stocking LiPo / Lilo batteries

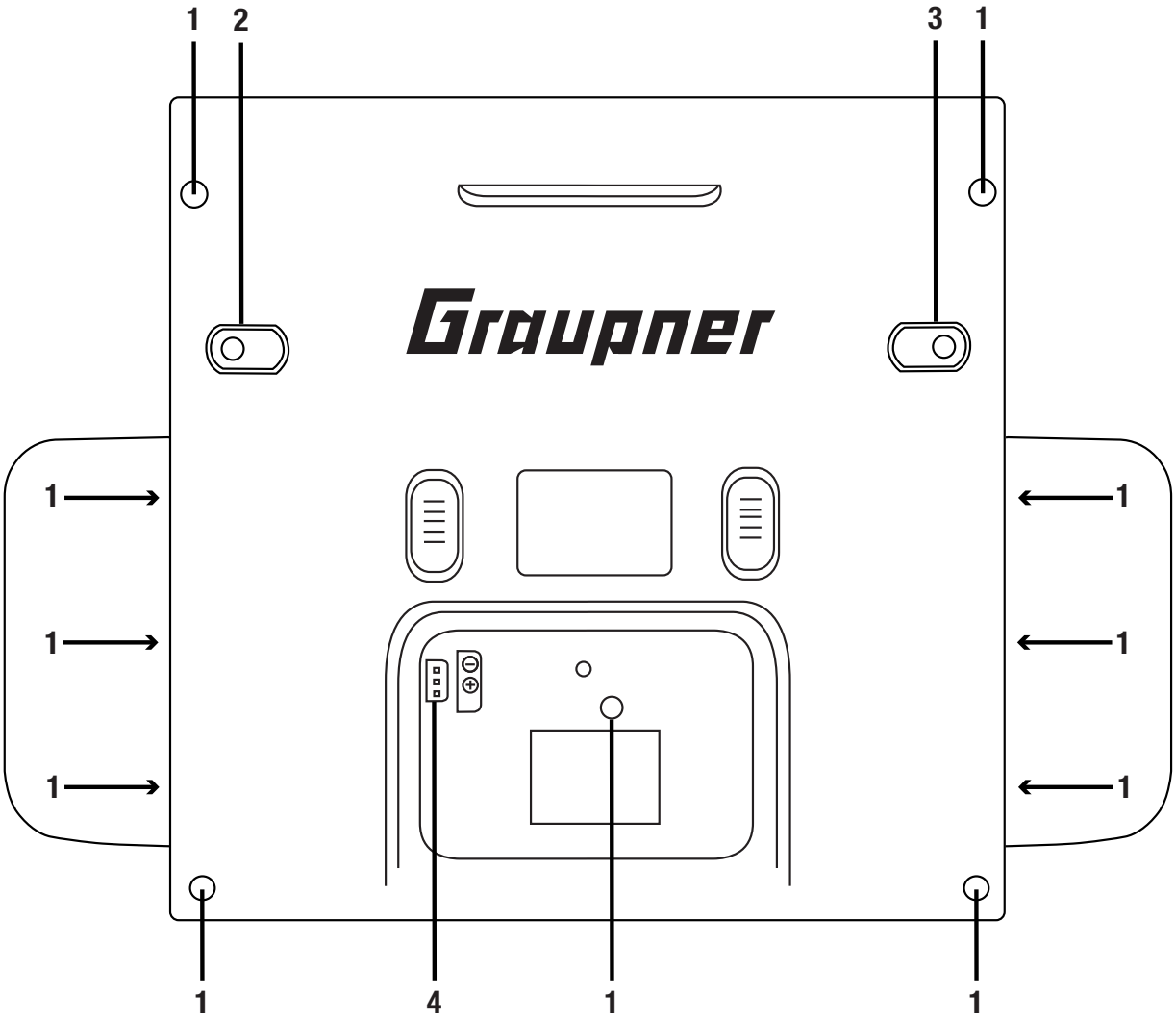
- Batteries may only be stored in non completely discharged condition.
- Batteries may only be stored in dry rooms with an ambient temperature of +5°C to +25°C.
- Stock the LiIo/LiPo batteries with a cell voltage of about 3,8V. If the cell voltage falls below 3 V, then the battery must be necessarily charged. Deep discharge and storage in discharge status (cell voltage < 3V) make the battery useless.
- Charge and transport your batteries always in a safety bag.

Description of the transmitter

Control elements on the transmitter

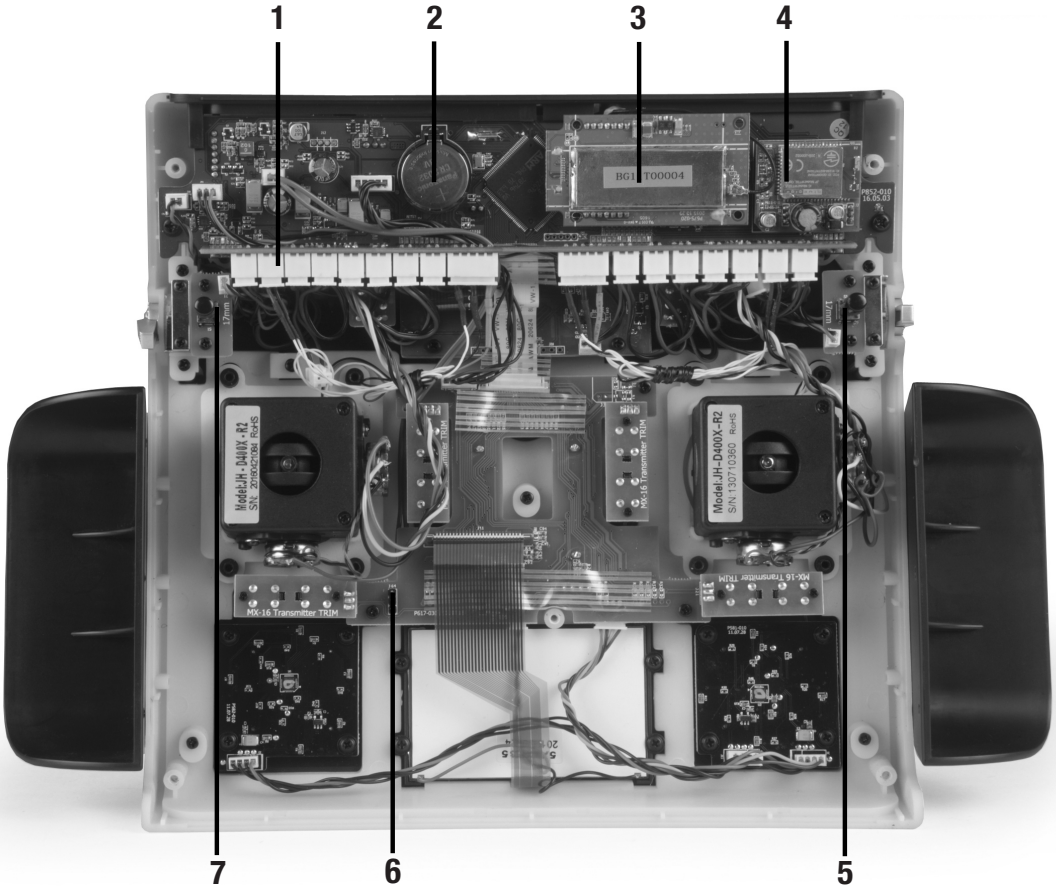


1	Connection sockets (protected by a cover)
2	Control stick; left and right with 4D controls
3	Speaker
4	Antenna (integrated in the case)
5	ON/OFF switch
6	LED indicators (battery, RF radiation, warning signals, charge indicator)
7	Places for switches and buttons As standard are installed: 12 switches with different designs, 2 INC/DEC buttons
8	Right rotary control "SD1"
9	Right touch pad with four-way keys
10	Slider controls "SR1" and "SR2"
11	LCD
12	Left touch pad with four-way keys
13	Digital trim
14	Left rotary control "SD2"



1	Five housing screws and six screws for the hand pads
2	SW16/PB18
3	SW17/PB19
4	Connection socket for transmitter battery (pay attention to the correct polarity)

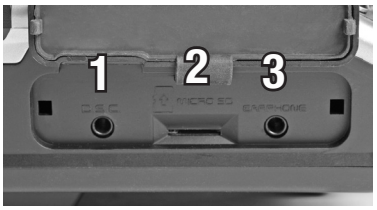
Inside view



1	Sockets for optional transmitter controls and switches (connection sequence as preferred)
2	Lithium battery
3	RF module
4	Bluetooth module
5	SW17/PB19 (when transmitter is closed)
6	Transmitter battery plug
7	SW16/PB18 (when transmitter is closed)

Interfaces

Provided connection



Left provided connections

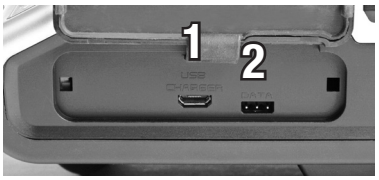
1- DSC socket
On the left side is located the DSC socket. This socket allows the trainer/pupil function and the use of flight simulators.

For more information on the DSC socket and the trainer/pupil function see the section "DSC socket".

2- SD card slot
The card slot is suitable for micro SD memory card. For information on removing and inserting the memory card, refer to the section "memory cards".

3- Ear phones port
The ear phones port is suitable for a 3,5 mm jack. Though this interface both acoustic signals and voice messages are emitted.

The volume can be controlled by "Voice volume" and "Signal volume" in the general settings.



Right provided connection

1- Micro USB port / battery charge and PC connection

Note
The micro USB socket is not suitable for flight simulator connection.

USB connected
▶PC COM Port
Mass storage
Charge only

As soon as you connect the USB cable to the transmitter a selection menu appears.. Here you can set up the function of the micro USB port.

PC COM Port - for updates

Mass storage memory - to access to the SD card

Battery charge - only battery charging

Battery charging
Through the micro USB port you can charge the transmitter battery. Use the included USB cable to connect the transmitter to a suitable USB port and charge the transmitter battery. If the transmitter is switched on the charge time is longer than if the transmitter is switched off.

The maximum charge current is 2 A.

Note
The full capacity is reached by the HV-LiPo batteries only if they are externally charged with 4,35 V. The internal charging tension is limited to 4,2 V for compatibility reasons.

More information are available in the section "Charging the transmitter battery".

PC COM Port connection

Through this socket it is also possible to connect the transmitter to a PC. The software that the computer needs as well as the appropriate USB driver can be found on the download page on **www.graupner.de** for the respective product.

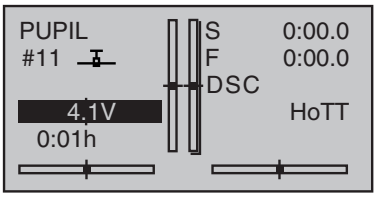
Mass storage memory

If you select this option, then you can accede from your PC directly to the SD card (if insert).

2- Data socket

The data socket is suitable for connection of an optional smart box or an external optional Bluetooth module.

DSC socket



Connection socket for flight simulator or T/P systems

The standard two-pin DSC socket on the transmitter functions as a TRAINER or PUPIL socket as well as an interface for flight simulators or other external RF modules.

To ensure a correct DSC connection, observe the following:

Attention

When your transmitter is directly connected to a desktop computer by a connecting cable (DSC cable) and/or a computer interface is connected to your simulator, the transmitter may be destroyed by electrostatic discharge. This type of connection should therefore only be used if you protect yourself from electrostatic discharge while operating the simulator by wearing a commercially available grounding armband. *Graupner* therefore strongly recommends only using wireless simulators.

Perform any necessary adaptations in the menu.

When using the transmitter with a flight simulator or during the teacher-pupil operation, leave the transmitter **always** OFF. Only in this position even after connecting the DSC cable the RF module of the transmitter remains inactive. Connect now the DSC cable and switch the transmitter on.

The status LED is constantly red and in the display will appear DSC.

In the upper display appears the transmitter logo.

The transmitter is now ready for use.

Note

If the transmitter is used as teacher transmitter it has to be switched on before connecting the proper cable.

Connect the other end of the connecting cable to the device while observing the relevant operating instructions.

Note

Make sure that all the plugs are securely inserted in the respective sockets, and only use the provided plug-in connections with a 2-pin jack plug on the DSC side.

In the "Transmitter setting" sub-menu, you can set one of the following modes in the "DSC output" line depending on the number of functions to be transmitted: PPM10, PPM16, PPM18 and PPM24. Default setting: PPM10.

Memory cards

Compatible memory cards:

- micro SD up to 2 GB
- micro SDHC up to 32 GB

Our recommendation: For a normal use a memory card with a storage capacity of up to 4 GB is sufficient.

Inserting and removing the memory card step by step:

Switch off the transmitter.

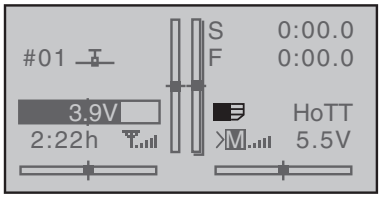
The memory card slot is located in the left provided connections of the transmitter.

To insert:

Push the SD card as deep as you need to win the spring resistance of the slot. (contacts upward)

To remove:

Push the SD card slightly toward the card slot to unlock it and then remove it.



The included memory card is ready for use as soon as the transmitter is switched on. In the display appears the symbol of a memory card.

Otherwise, folders are created on the memory card (represented in the transmitter display by a permanent filling from left to right memory card). When the animation finishes, the inserted memory card is ready for use.

You can connect the memory card to your PC by using a memory card reader. Copy the data downloaded from the transmitter page on the web site in the related folder of the memory card. Insert the memory card in your transmitter.

Data recording/Data saving

The data recording in the SD card is linked to the log timer. If it is started, the data recording starts as well and it stops when the log timer is stopped.

The data writing on the memory card is remarked by the symbol of the "filling" of the memory card with black from left to right.

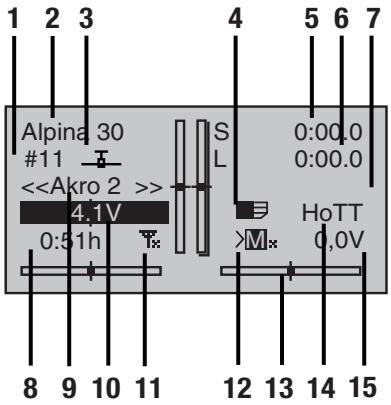
After the installation of the memory card, there is a folder structure in it. These folders are actually empty.

Finally, the log files are saved in sub-folders called "Modelname" named according to the structure **0001_year-month-day.bin**. If a model memory is still nameless, the corresponding log files are saved in a sub-folder entitled "NoName".

In the folder "Models" are saved the exported model memories.

The data can be evaluated on a compatible computer using the programs found on the downloads page for the transmitter under **www.graupner.de**.

Display and touch-pad



1	Model memories 1 … 120
2	Model name
3	Model type display
4	Micro SD card (inserted)
5	Flight chronometer in min:s (forward/reverse)
6	Log timer in min:s
7	Flight phase timer display
8	Transmitter use timer
9	Phase name
10	Transmitter battery voltage with dynamic bar indicator (if the battery voltage falls below the 3.6 V (adjustable) threshold a warning message will appear and an acoustic warning will sound)
11	Signal power
12	M = Model function, P = Pupil Near: Signal strength
13	Graphic display of the position of the four digital trimming levers with a direction display.
14	Operating mode
15	Receiver battery voltage RX-VOLT

Symbols in the display

Telemetry symbols in the display

The active model memory has not yet been bound to a receiver.

Not flashing: RF transmitter function switched off.

Blinking antenna symbol: Last receiver bound to the active model memory is inactive or out of reach

No telemetry signal to receive

Signal strength display of the model connection

Signal strength display of the connection with pupil transmitter in the teacher transmitter display with wireless connection

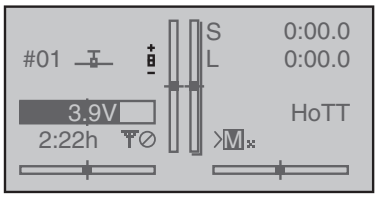
Position indicator

INC/DEC buttons CTL 5 and 6

Once you activate one of the CTRL dials 5 + 6 in the middle of the transmitter upper part, a symbol appears on the left near the vertical trim position indicators in the lower display.

Contemporaneously the vertical position indicators change during the operation from the trim position to the CTRL dials 5 + 6 indicating their actual position.

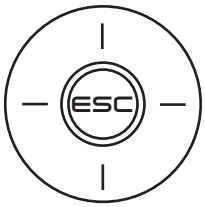
The left bar shows the position of the left INC/DEC CTRL dial 5 and the right bar shows the position of the position of the right CTRL dial 6 (both horizontal bars show the trim position of the related sticks trims).



Approx. 2 seconds after the end of the operation of both buttons, the display shows again the actual trim position of the trims (elevator/nick and throttle/pitch) of the related sticks.

Key pad

Keys left of the display



- ESC button

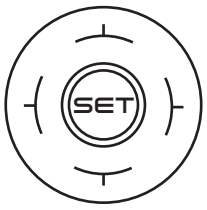
Pressing the ESC button brings about a stepwise return to function selection or back to the basic display. Any setting changed in the meantime is retained.

Momentarily touching the ESC key for about 1 second while in the base screen will open and close the Telemetry menu.

- Selection keys

Momentarily pressing one of these keys will cause analogous paging in the given arrow direction through lists, e. g. through the model selection list or the multi-function list or within menus though the menu lines.

Keys to the left of the display



- SET key

1. Briefly pushing the SET key will cause a jump from the displayed base screen to the multi-function menu.

2. In the settings menu activate (confirm) the settings fields by pressing the SET button.

- Selection keys ◀ ▶ ⬍

1. "Paging" through the multi-function menu and the menu lines within the Basic Settings menu analogous to the arrow keys of the left touch pad.

2. Select or set parameters in setting fields after they have been activated by briefly touching the SET key, whereby the ▶ ▲ keys and ◀ ▼ are used for the same corresponding functions.

3. By briefly pressing the ⬍ keys simultaneously or ◀ ▶ an altered parameter value for the active entry field will again be restored to its default value (CLEAR).

By the mc-28 HoTT it concerns with the keypad to touch-sensitive Cap-touch keys. Confirm the key by gently tapping.

Note

In the event the touch pads do not exhibit any functionality immediately after switching the transmitter off and then on again right away, this is not a fault. Just switch the transmitter off again then wait for several seconds before switching it on again

Commissioning

Hand pads

Installing the hand pads

The hand pads have to be installed on the sides of the transmitter. Hold the hand pad exactly upon the six holes and fix it with the 6 fixing screws. Use the same procedure for the other hand pad.

Attention!

Screw the fixing screws only with the hand pads on the transmitter case. The place inside the transmitter case will otherwise not be enough and you could damage the boards.

Removing the hand pads

The hand pads are removed by unscrewing the fixing screws.

After removing the screws glue the included rubber pins on the holes. So you will protect the transmitter interior.

Attention!

Do not screw the fixing screws in the holes after removing the hand pads! The place inside the transmitter case will not be enough and you could damage the boards.

Brackets for transmitter belt

Installing the metal brackets:

Insert the included metal bracket in the bracket holder on the side of the transmitter.

Push the bracket against the spring (approx. 1 cm in the transmitter direction).

Contemporaneously rotate the bracket to the outside to fix it.

Proceed similarly with the second bracket.

Removing the metal brackets:

Unlock a bracket, by gently pushing it inwards and then fold in the direction of the transmitter center.

Once the retaining pin is free again, you can pull the bracket away from its place.

Proceed similarly with the second bracket.

Anchorage for the transmitter belt

On the upper side of the transmitter there is an eyelet which can be used to hook a neck-strap.

Opening/closing the transmitter housing

The transmitter should be opened only in the following cases:

- If a self centering stick has to be converted in non self centering
- If a non self centering stick has to be converted in self centering
- To set the control stick centering force

Open step by step

Before opening the housing switch the transmitter off.

Open the battery case.

Remove the battery.

If the hand rests are installed: Loosen each of the three lower screws of the six fixing screws securing the hand pads.

Loosen the five case screws.

Hold both housing halves with both hands and let the screws fall on a proper surface turning the transmitter upside-down.

Rotate the lower case and lay it on one side.

Attention

Never switch the transmitter on while the housing is open! Do not touch the electronic boards.

Closing step by step:

Check if the upper and the lower part of the transmitter housing are correctly coupled.

Screw the housing screws in their original position.

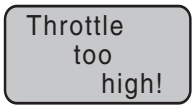
Connect the battery.

Install the hand pads again.

General commissioning

Notice-safety query throttle position

As soon as the transmitter is switched on then the throttle position is checked. If the throttle position is not in the motor-off area, then the drive motor may start in an uncontrolled manner. This check is performed by all the models with the setting "Motor at CH1 front/ back". The warning alarm "Throttle too high" appears. For this reason in this case the RF module will not be switched on. This check is performed for every model types. With helicopter models the warning works only if you use a Motor-off programming or if a throttle limiter is set.

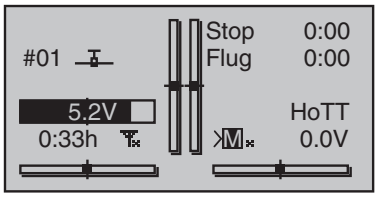


WARNING

If you do not follow the afore mentioned instructions, the connected drive motor can run accidentally when the transmitter is switched on. Risk of injury! Always program a switch for motor stop!

If the previously mentioned checks are passed, the RF module will be activated when the transmitter is switched on and in the display appears a selection indicator.

Select with the selection buttons of the right four way keys RF ON/OFF. By tipping the SET button on "OFF" the RF module is switched off.



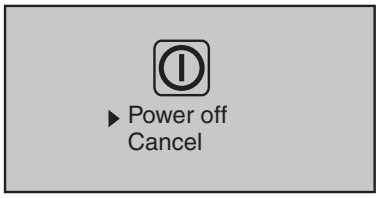
The color of the lighting central LED changes to red and you are now in the transmitter main menu display.

The symbol mean that the currently active model memory has once been linked to a receiver but is presently not linked. (We have turned the RF module off for example reasons.) If instead the transmitter was switched on without turning off the RF module, the central LED would light blue and the symbol would blink. Contemporaneously a warning acoustic signal is emitted until a connection is established with the respective receiver. As soon as this connection is established appears a a field strength indicator and the warning signal stops.

If the telemetry connection is established the respective indication of the receiver signals strength so as the actual receiver power supply voltage.

On the other hand, if the screen displays the symbol combination and the center LED illuminates in red continuously then the currently active model memory is not "bound" to any receiver.

Switch the transmitter off



If you push on the POWER button, by switched on transmitter, for more than 2 sec. a safety query appears (see image). Select the desired option with one of the pouch pads (up or down) and push the SET button.

This safety query avoids an accidental switch off of the transmitter while in use.

Binding

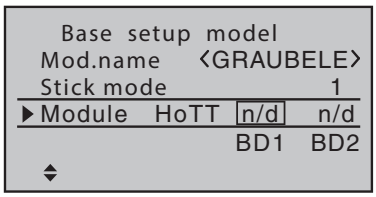
The description of the binding process can be found in the Part 2 of the manual.

To use a transmitter you must associate a receiver to the transmitter. This binding process is essential for the use of the model!

The precise binding process follow-up is described in the section "Binding" of the Part 2 of the manual and in the related receiver manual.

NOTICE

The process is different for the various receiver types.



Binding-principle step by step:

1. Select the "main settings" menu in the transmitter
2. switch the RF module OFF
3. Connect the power supply to the receiver

... receiver with binding button:

- Push and hold the binding button at the receiver
- Start the binding process in your transmitter in the main settings menu

... or receiver without binding button:

- The receiver is automatically in binding mode after switch on
- Start the binding process in your transmitter in the main settings menu

4. If the binding process has been unsuccessful, repeat the process.

Charging the transmitter battery

You have two charge possibilities:

1. Removing the battery from its case and charging it with a charger

WARNING

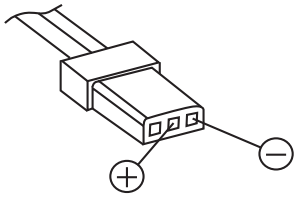
The charger should always be supervised during charge and it should be used only in rooms fitted with a smoke detector.

Removing transmitter battery

Remove the battery case cover. Then remove and disconnect the battery plug by carefully pulling on the supply cable.

Charge the battery following the charger manual.

Inserting the transmitter battery



Connect the battery plug in the transmitter socket. Make sure that the polarity is correct. Pay attention to the respective "+" and "-" symbols near the socket.

Red= + Black/brown = -

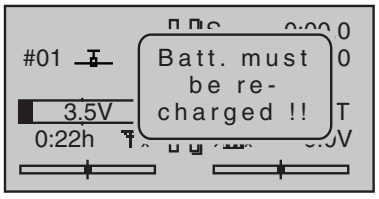
Place the battery into its compartment and close the cover.

2. Through the USB port by charging with USB cable

The transmitter battery can be charged by the current supplied by the USB port (5 V/max. 2 A).

Connect the transmitter to a USB port in your PC using the included micro USB cable or a USB net charger.

Low voltage warning



The transmitter battery voltage should be monitored in the display during operation. In case the voltage drops under a preset threshold, standard setting 3,6 V, an acoustic warning signal is emitted and in the display appears in a window "battery needs charging".

Now at the latest, the operation must be stopped and the transmitter battery must be charged!

Battery use timer in the display

The battery use timer is shown in the lower left part of the display.

The battery use time is added at every use. After every charge the timer is reset to "00:00". This happens only if the battery voltage increases at least of 0,3V or if the battery is full.

Lithium battery

On the transmitter board there is a replaceable lithium battery of type CR 2032. This battery maintains the date and time settings during a transmitter power supply outage.

Short-Cuts

The following key combinations can be used to directly call up certain menus and options:

- CLEAR

Brief simultaneous touch of the ⬍ keys or ◀▶ on the right four way keys will restore the active entry field's changed parameter value back to its default value.

- "Servo screen"

Brief simultaneous activation of the ◀▶ keys of the left four-way keys will cause a jump from the transmitter's base screen or from almost any menu position to the "Servo display" menu,

- "Telemetry" menu

Press the center ESC key in the left four-way keys for about 1 s to call up the "Telemetry" menu from the transmitter's base screen.

To come back to the base screen it is enough a "normal" touch on the ESC key.

- Graphic display of telemetry data

Briefly touching one of the arrow keys of the left or right four-way keys will cause a jump from the base screen directly to the transmitter's graphic display of telemetry data or will allow paging back and forth between individual graphic displays.

Briefly touching the ESC or SET key will cause a return back to the base screen.

- "HIDDEN MODE"

Press and hold arrow keys ⬍ of the left four-way keys then momentarily touch the SET key of the right four-way keys.

- Entry lock

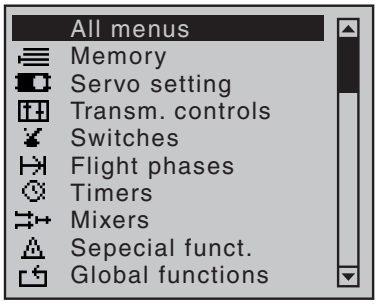
Entry lockout is activated and deactivated from the base screen by simultaneously pressing the ESC and SET keys for a little longer. The entry lock function is displayed by a key symbol:

The controls remain operational.

Press the ESC and ENT buttons again for about two second to release the lock.

- Quick-Select

From the multi-function list, a jump can be made to a "Structure overview" by a simultaneous touch on the ⬍ or ◀▶ keys of the right four-way keys.



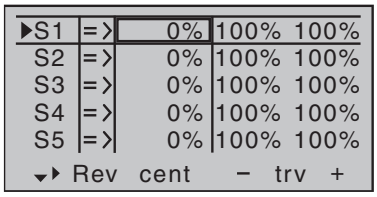
Menus are arranged in clear groups in this overview.

Select the desired group with the ⬍ selection keys and confirm this selection with the SET key.
Only the menu points associated with the selected preamble are shown.

Select the desired menu point with the selection keys and confirm with the SET key.

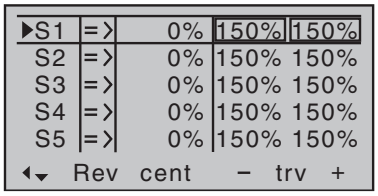
The description of the single menu point is available in the programming manual (Manual part 2) on **www.graupner.de**.

Hidden menu options



In some menus specific setting options are available but hidden. These options are marked with a triangle oriented to the right in the low left corner of the display. In the left represented menu the section "- limit +" on the right of the "- trvl. +" is hidden.

View hidden sections:



Follow the triangle oriented to the right in the lower part of the display, in which you skip the selection frame with the selection key ▶ over the section "- trvl. +" to the right.

To come back to the "- trvl. +" or more to left, follow the triangle oriented to the left, on which you can move the selection frame moving the related selection key to the left.

Use the same procedure for the other menus.

Function field in the display

Depending on the given menu, certain function fields will appear on the bottom display line.

A marked function is activated by pushing the SET key.

CLR (CLEAR)	Delete
SEL (SELECT)	Selection
SET (SET)	Setting
STO (STORE)	Store
SYM	Set values symmetrically
ASY	Set values asymmetrically
	Switch symbol field (assignment of all types of switches)
	Within a menu, change to the next page

Hidden mode

The menu "Hidden Mode" can be reached from any menu position.

Press and hold the selection key ⬍ of the left four way keys and the SET key.

Announcements

These messages are in German by default. These announcements are summarized in a voice packet which is stored in a transmitter-internal memory but they can be replaced by a voice packet of a different language at any time.

Here you can also load user speech packets in the transmitter. These packets must be created in the "Firmware upgrade studio" as .wav files and they must be saved in the SD card.

On the included micro SD card are already available the following languages: German, English, French, Dutch, Italian and Spanish, Czech and Russian.

The most actual language packets are available on the web site **www.graupner.de**.

Language change

Language change step by step:

Insert the included memory card in its slot as described in the "Memory card" section.

Switch the transmitter on with the RF module on.

```
    *HIDDEN MODE*
>VOICE              =>
 FIRMWARE UPDATE    =>
 STICK CALI.
 BLUETOOTH INIT.
```

Change in the "Secret mode" menu.

Move to the line "ANNOUNCEMENT" by using the selection keys.

Select the "ANNOUNCEMENT" option with the SET key.

```
FILE LIST
 MC-28_DUTCH.VDF
 MC-28_ENGLISH.VDF
 MC-28_FRANCE.VDF
▶MC-28_GERMAN.VDF
 MC-28_ITALIANO.VDF
 MC-28_SPAIN.VDF
```

Select the language or the user speech packet with the selection keys.

Confirm by pressing the SET key. The selected language packet will be stored in the transmitter memory.

The loading process is finished as soon as the progress bar at the lower edge of the display disappears.

When this process is finished, switch the transmitter off.

Note

If the warning message "RF OFF OK", the RF module is still active. Switch the RF module off and repeat the process,

Note

If the data list is empty. the transmitter is not finding any valid language data in the SD card. Verify the content of the "VoiceFile" folder in the SD card by a PC.

Firmware update/Changing the display language

Note

Before each update, check the transmitter battery charge or charge it as a precaution, and save all model memories so that they can be restored if necessary.

Note

Follow the "Firmware update step by step" manual steps from the section "Firmware update" "Update per memory card".

```
FILE LIST
 MC-20_1V234_Dutch.bi
 MC-20_1V234_France.
 MC-20_1V234_German.b
▶MC-20_1V234_English.
 MC-20_1V234_Italiano
 MC-20_1V234_Spain.bi
```

Firmware update step by step:

Move with a short pressure on the SET key to the selection page of the option "FIRMWARE UPDATE".

Select the firmware version with the selection keys.

Confirm by pushing the SET key.

The storing in the transmitter memory will start:

```
* Firmware Download    *   * Boot Download       *   * Firmware            *
* Prozess Start         *   * Success!!!          *   * Downloading...      *
* Please Wait....       *   * Please Wait....     *   * Progress 023/208    *
```

When the counter reaches the storing amount the storage process is finished and the message "Firmware upgrade success!" appears.

Stick calibration

```
   *HIDDEN MODE*
 VOICE              =>
 FIRMWARE UPDATE    =>
>STICK CALI.
 BLUETOOTH INIT.
 NEUTRAL ZONE
```

If the center position of your self-neutralizing control stick does not precisely correspond to 0% control travel, you can check and correct it as follows:

Stick calibration step by step:

Move to the "Model select" menu and initialize a free model memory.

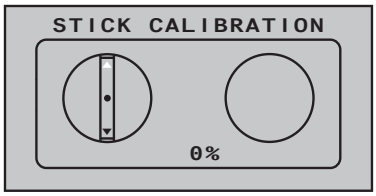
Move to the "Servo display" menu, pressing simultaneously the ◀▶ keys in the left touch pad, **without** any interim change to trim settings or other program settings.

```
1  0%   2  0%
3  0%   4  0%
5  0%   6  0%
7  0%   8  0%
9  0%   10 0%
11 0%   12 0%
```

In this menu point you can check if your sticks are correctly centered. Bring then all the sticks in the middle position. If the sticks are correctly placed, this display should ideally look like the one shown on the left.

One after the other, put both sticks into each of their four possible limit positions without exerting force at the limit position and check if the value are between -100% and +100%.

If you note that the sticks do not reach the desired values, move to the "Stick calibration" line in the "HIDDEN MODE" menu and tip on the SET key.

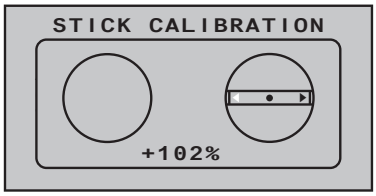


The flashing arrows indicate in which direction you have to push the sticks.

Confirm by pushing the SET key.

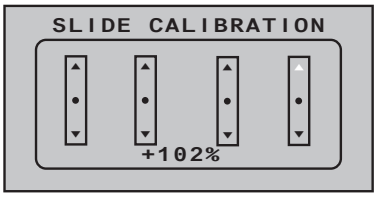
With the selection keys ◀▶ of the right four way keys allow you to cyclically select the positions of the four calibrated sticks.

Pushing the ESC key will terminate the process and return to the sub-menu "Stick cali.".



Example: Bring here the respective left blinking selection arrow of the right stick to the left limit. Tip on the SET key. Push the SET key. So the calibration of the right stick left limit. The circle in the middle of the stylized stick blinks as confirmation.

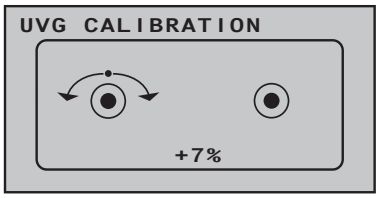
Slider control calibration



Here both central slide controls (SR1-2) and the lateral lever controls (SD1-2) are calibrated. The blinking arrows indicate you in which direction you have to move the controls.

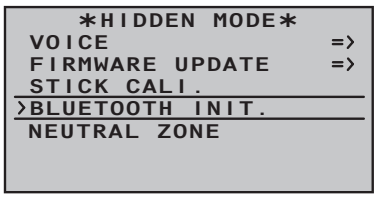
With the selection keys ◀▶ of the right four way keys allow you to cyclically select the positions of the four calibrated controls. Proceed as described in the upper example.

UVG (Universal control) calibration



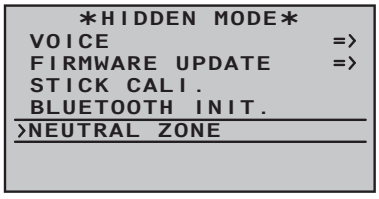
Here are calibrated the travels of the control of the 4D control stick or the optionally installed rotary control. Proceed as described in the upper example.

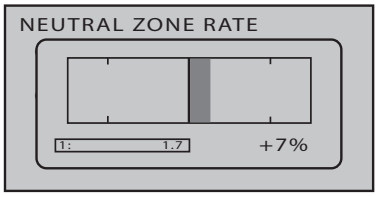
Bluetooth initialization



In this display you can initialize the Bluetooth module. The menu is only for service functions, this process has already performed in the factory.

Neutral zone





In this menu you can calibrate the "dead" zone in the central point of the sticks and controls, so that in this zone there is no control movement. Menu only appears when the Stick type is set as 4D-Stick at basic setting.

Push the SET button, increase the lower left value until the end point is no longer visible in the central line. Perform this process for all the four stick directions and both rotary controls. With the selection keys ◀▶ of the right four way keys allow you to cyclically select the positions of the calibrated travels (1 to 6).

Telemetry data display

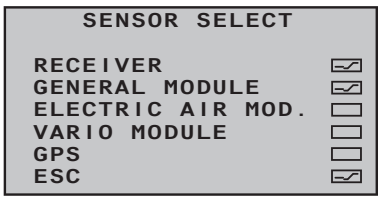
Sensors

The upper display serves as graphical representation of the telemetry data.

If a receiver is bound the telemetry display appears. By tipping again the selection keys ⬍, you can select which sensor or module you want to be displayed.

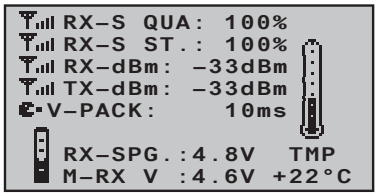
If instead there are two "X" instead of ..:!!! in the lower part of the display and it appears the message "CAN'T RECEIVE ANY DATA", it means that there is no connection between receiver and transmitter and that no telemetry data is available. Turn on your receiver, or bind a receiver to the active model memory.

Depending on the connected modules and sensors, several selectable displays will appear. The description of these displays is contained in the manual included in the sensor package.



The transmitter recognizes automatically the sensors. You can view the sensors by changing from the main menu to the telemetry menu. The sensors will be listed in the display and marked with a check mark.

Receiver



This display offers a graph of the data from the display "RX DATAVIEW“ of the "Telemetry" menu "SETTINGS, DISPLAYS".

Value	Explanation
RX-S QUA	Quality expressed as a percentage of the signal packages from the transmitter arriving at the receiver
RX-S ST	Signal strength expressed in percentage of the signal from the transmitter arriving at the receiver
RX-dBm	Level in dBm expressed as the percentage of the transmitter signal arriving at the receiver
V PACK	Level in dBm expressed as the percentage of the receiver signal arriving at the transmitter
TX-dBm	Shows the longest time in ms in which the data packets are lost during a transmission from the transmitter to receiver
RX-VOLT	Current operating voltage of the receiver power supply in Volts

M-RX V	Lowest operating voltage of the receiver power supply since the last startup in Volts
TMP	The thermometer visualizes the current operating temperature of the receiver

Firmware update

The programs and files which are also required for updating the transmitter combined into one software package can be downloaded from **www.graupner.de**.

Download this software package from the Internet, and unpack it on your computer. All other information can be found in internet in the same page where the software package is available.

Firmware updates of the transmitter can be performed in two ways.

- Update through memory card
- Update through USB port

Note

- **Please note that compatible firmware is required for reliable communication between the HoTT components. The programs and files that are required to update are therefore combined into a single file.**
- **The current firmware version can be found on the Internet at www.graupner.de.**
- **Only operate your transmitter using the current software version. these information can also be found at: www.graupner.de => Service & Support => Update and revision history for GRAUPNER HoTT components.**
- **Before each update, check the transmitter battery charge or charge it as a precaution, and save all model memories so that they can be restored if necessary.**
- **Do not disconnect the link to the computer during an update! Make sure that the link between the transmitter and computer is operational.**
- **After each update, check to make sure that the models function correctly.**

Update through memory card

Download the actual software package from the Internet, and unpack it on your computer. Insert the supplied mini SD Card in the card slot of your PC and copy the required firmware file from the unpacked software package into the directory "Firmware“ on the memory card. Then, remove the memory card from the PC and insert it in the card slot of the transmitter. Switch on the transmitter and the RF module off.

Go to the sub-menu "FIRMWARE UPDATE" in the menu "Hidden mode" and proceed as described in the "Hidden mode" section.

Update through USB port

Download the actual software package from the Internet, and unpack it on your computer. Connect your switched off transmitter with your PC, by using the included USB cable, which is supplied with the package content, plug USB cable directly to the micro USB port of the transmitter and the other end to a free port in your computer. All other information can be found in the instructions that come in the software package.

Problems during firmware update

Problem: POWER switch without function

If a firmware update for the transmitter is unsuccessful or the transmitter program freezes and the transmitter cannot be turned off using the "POWER" switch, then remove the transmitter's battery after setting the switch to "POWER = OFF" position, or pull the plug from the transmitter battery, reconnect it after few seconds and leave the transmitter switched OFF.

Download the actual update file from internet and save it in the "RECOVERY" folder in your SD card. The change the file name in "R280.bin".

Insert the SD card in the transmitter.

Push and hold the Ctl 5 and Ctl 6 buttons at the same time to the top and push the POWER button.

Now push and hold to the lower side within 2 - 3 seconds the Ctl 5 and Ctl 6 for about 10 seconds.

Wait then at least 30 seconds. In the display will be shown no image. During the update the transmitter cannot be switched on.

After 30 seconds the transmitter switches on.

Declaration of conformity

S1033 mc-28 HoTT

Graupner/SJ declares that the product is conform to EU norms.

EMV 2004/108/EC:

EN 301 489-1 V1.9.2

EN 301 489-17 V2.1.1

EN 62479:2010

LVD 2006/95/EC:

EN 60950-1 + A11 + A1 + A12 + A2:2013

R&TTE 1999/5/EC:

EN 300 328 V1.8.1

EN 62311:2008

Notes on environmental protection

Disposal notes

This symbol on the product, user manual or packaging indicates that this product must not be disposed of with other household waste at the end of its life. It must be handed over to the applicable collection point for the recycling of electrical and electronic equipment.

The materials are recyclable as marked. By recycling, material reusing or other forms of scrap usage you are making an important contribution to environmental protection.

Batteries and accumulators must be removed from the device and disposed of at an appropriate collection point. Please inquire if necessary from the local authority for the appropriate disposal site.

Care and maintenance

Notes on care

The product does not need any maintenance, it works so as it is without any special care. In your own interests protect it from dust, dirt and moisture.

Warranty

The Graupner, Henriettenstrassee 96, 73230 Kirchheim/Teck grants from the date of purchase of this product for a period of 24 months. The warranty applies only to the material or operational defects already existing when you purchased the item. Damage due to misuse, wear, overloading, incorrect accessories or improper handling are excluded from the guarantee. The legal rights and claims are not affected by this guarantee. Please check exactly defects before a claim or send the product, because we have to ask you to pay shipping costs if the item is free from defects.

The present construction or user manual is for informational purposes only and may be changed without prior notice. The current version can be found on the Internet at **www.graupner.de** on the relevant product page. In addition, the company ***Graupner*** has no responsibility or liability for any errors or inaccuracies that may appear in construction or operation manuals.

No liability can be accepted for printing errors.

IC warning

This device complies with Industry Canada licence-exempt RSS standard(s).
Operation is subject to the following two conditions:
(1) This device may not cause interference and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Note 2: 1.Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.