Manual

Falcon 12 (plus), GR-18, GR-24 PRO

Firmware V2 for 2,4 GHz HoTT receiver with 3-axis gyro (and vario)
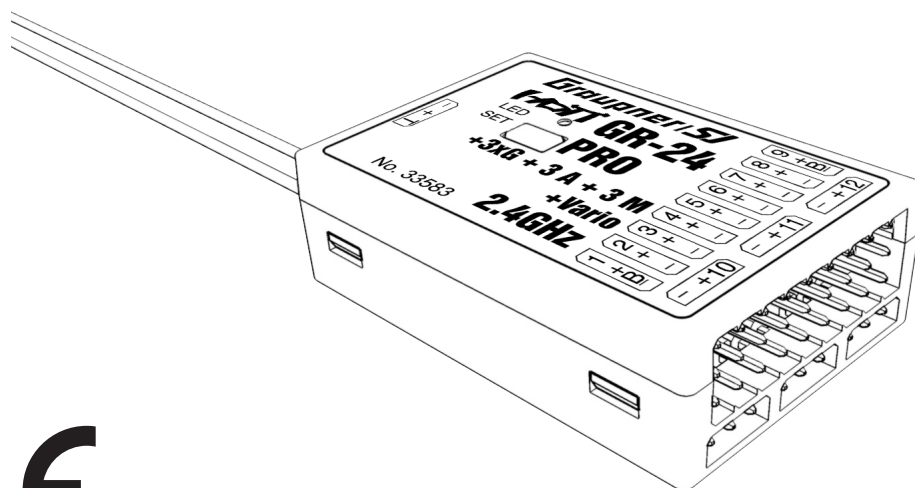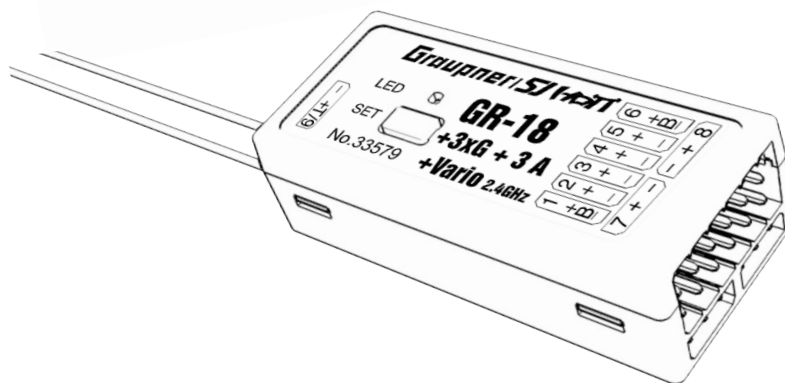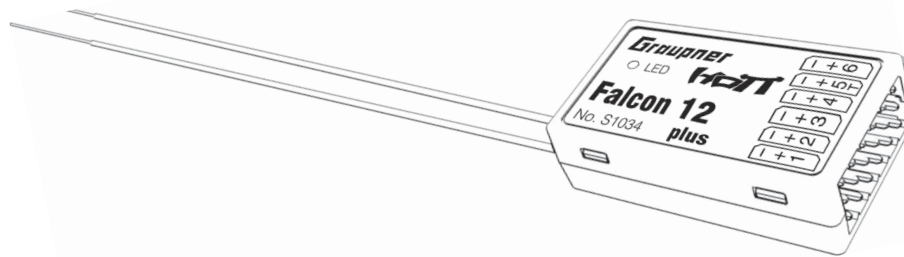
No. S1019.AIR
No. S1034
No. S1035
No. 33579
No. 33583

CE

Graupner

Index

Introduction

Thank you very much for purchasing a ***Graupner receiver with 3-axis gyro of the type Falcon 12 (plus), GR-18 HoTT or GR-24 PRO HoTT.***

Read the manual carefully to use the receiver optimally und 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.

Due to technical changes, the information may be changed in this manual without prior notice. Be always updated by checking periodically on our website, ***www.graupner.de*** to be always uptodate with the products and firmwares.

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 the safety notes before using the product!

》 **Note**

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

Germany, Ostria, Netherlands

D-Power Modellbau
Sürther Straße 92-94
50996 Köln
Deutschland
www.d-power-modellbau.com

Robbe Modellsport
Industriestraße 10
4565 Inzersdorf im Kremstal
Österreich
www.robbe.com

France

Fresh RC   /   www.flashrc.com
ZAC Centre 15 Rue Martin Luther King 38400 Saint-Martin-d'Hères
FRANCE

Italy

Jonathan SRL   /   www.jonathan.it
Via dell'Industria 1 02032 Fara in Sabina -Passo Corese (RI) Italy

Graupner in Internet   For the service centes outside the avobe countries plese refer to our website ***www.graupner.com***

Intended use

These receivers should only be used for the purpose specified by the manufacturer for operation of unmanned remote controlled models. This includes all types of UAVs or all types of unmanned aerial vehicles as well as all types of unmanned land and water vehicles. Any other type of use is impermissible and may cause significant property damage and/or personal injury. No warranty or liability is therefore offered for any improper use not covered by these provisions.

In addition, it is explicitly pointed out that you must inform yourself about the laws and regulations applicable at your respective starting point before starting the remote control operation. Such conditions may differ from state to state, but this must be followed in every case.

» Note

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

Target group

The item is not a toy. It is not suitable for children under 14. The installation and operation of the receiver must be performed by experienced modellers. If you do not have sufficient knowledge about dealing with radio-controlled models, please contact an experienced modeler or a model club.

Package content

- Receiver of your choice
- Manual

» Note
Graupner works continuously to the further development of the products. We must therefore reserve the right to change the scope of delivery in terms of form, technology and equipment.

Technical data

	Falcon 12 (plus) No. S1034	Falcon 12 No. S1035
Temperature range	- 15...+70 °C	- 15...+70 °C
Antenna length	2 x wire 145 mm	1 x wire 145 mm
All-up weight, approx.	8 g	7 g
Frequency	2400 ... 2483.5 MHz	2400 ... 2483.5 MHz
Dimensions approx.	34 x 26 x 12 mm	34 x 26 x 12 mm
Modulation	2.4 GHz FHSS	2.4 GHz FHSS
Current consumption approx.	70 mA	70 mA
Operating voltage	(2.5) 3.6 ... 12,6 V	(2.5) 3.6 ... 12,6 V
3-axis gyro	yes	yes
Vario	yes	no
Switch between "Pulse" and "Level" from transmitter	no	no

	GR-18 HoTT No. S1019.AIR	GR-18 HoTT No. 33579
Temperature range	- 15...+70 °C	- 15...+70 °C
Antenna length	2 x wire 145 mm	2 x wire 145 mm
Total weight	approx.: 14 g	approx.: 14 g
Frequency	2400 ... 2483.5 MHz	2400 ... 2483.5 MHz
Dimensions approx.	46 x 21 x 14 mm	46 x 21 x 14 mm
Modulation	2.4 GHz FHSS	2.4 GHz FHSS
Power consumption	70 mA	70 mA
Operating voltage	(2.5) 3.6 ... 8.4 V	(2.5) 3.6 ... 8.4 V
3-axis gyro	yes	yes
Vario	no	yes
Switch between "Pulse" and "Level" from transmitter	no	yes

	GR-24 PRO HoTT No. 33583
Temperature range	- 15...+70 °C
Antenna length	2 x wire 145 mm
Total weight	approx.: 18 g
Frequency	2400 ... 2483.5 MHz
Dimensions approx.	46 x 31 x 14 mm
Modulation	2.4 GHz FHSS
Power consumption	70 mA
Operating voltage	(2.5) 3.6 ... 8.4 V
3-axis gyro	yes
Vario	yes
Switch between "Pulse" and "Level" from transmitter	yes

Connection table

	Updates / Telemetry sensors	SUMDIN	SUMD	Optional voltage measurement
S1019.AIR	T/9	---	C6	C9
S1034	C5	C6	C5	C5
S1035	C5	C6	C5	C5
33579	T/9	---	C6	C9
33583	T	C7	C8	---

Symbol description

Always observe the information indicated by these warning signs. Particularly those which are additionally marked with the words **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 leave the packaging material lying around, this could be 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 receiver must not use the receiver without supervision or instruction by a responsible person.

- Operation and use of radio-controlled models needs to be learnt! If you have never driven such a model, then start extra carefully and make sure to be familiar with the reactions of the model to the remote control commands. Proceed responsibly.

- First, always perform a range and function test on the ground (to do so, hold your model tight), before you use your model. Repeat the test with running motor and with short throttle bursts.

- 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, 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.

- Due to safety and licensing reasons (CE), any reconstruction and/or modification of the product is prohibited.

- Only use the components and spare parts that we recommend. Always use matching, original Graupner plug-in connections of the same design and material.

- Make sure that all of the plug-in connections are tight. When disconnecting the plug-in connections, do not pull the cables.

- Protect the receiver from dust, dirt, moisture and foreign parts. It 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.

- Always use all your HoTT components only with the latest firmware version.

- If you have questions which cannot be answered by the operating manual, please contact us or another expert in the field.

WARNING

Also while programming, make sure that a connected electric motor cannot accidentally start. Risk of injury by rotating propellers or rotor!

Avoid impacts and crushing. Check the receiver regularly for damages to the housings and cables, specially after model crashes. Damaged or wet receiver, even if re-dried, should no longer be used!
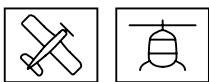
Installation

The receiver must be mounted on the receiver platform so that its axes are aligned parallel to the model axes and that they remain permanent.

The optional double adhesive pads S8376 are suitable for attaching the receiver. Also suitable are power strips or so-called mirror adhesive tape. Any sticker that may be present on the back of the receiver must be removed beforehand.

For a stable power supply the receiver should be connected with at least two power supply lines. Comply with the maximum power consumption permitted by the servos. To connect a power supply all connections except C9 can be used.

Fixed-wing model
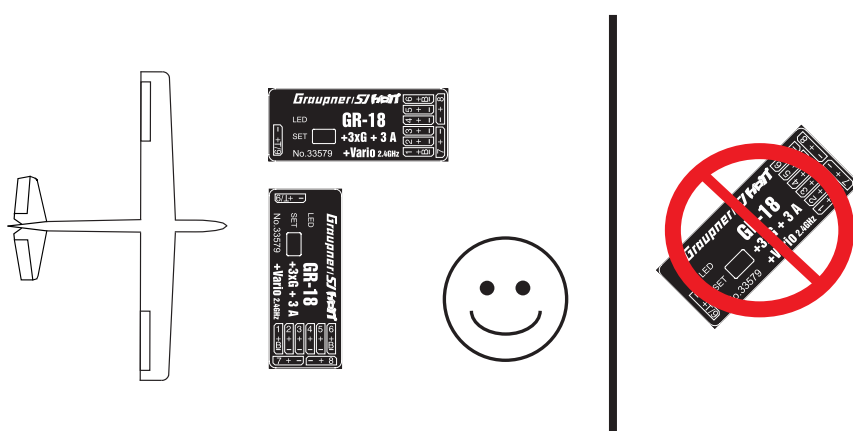
Helicopter model
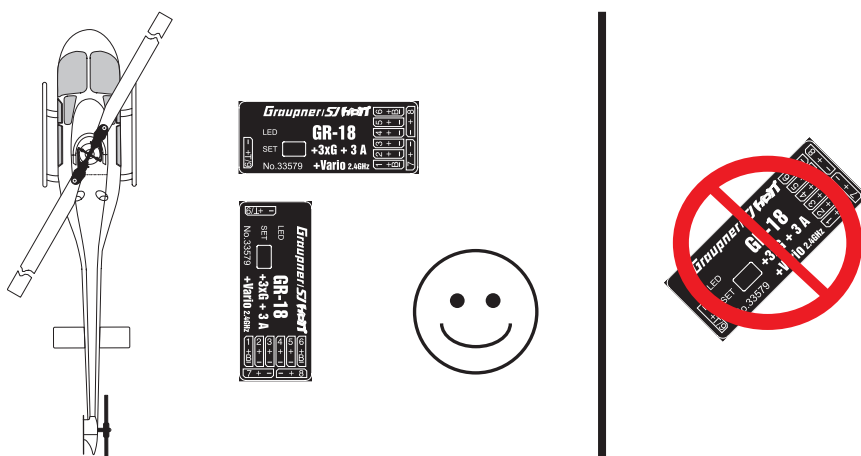
Connections

Connect the devices that have to be connected to the receiver to the row of sockets on one end of the receiver. The servo connections of the **Graupner**-HoTT receiver are numbered.

The polarity of the plug-in system cannot be reversed. Do not apply force.

》

Note

For the receivers Falcon 12 and 12 plus, insert the plugs with the brown or black cable upwards.

Power supply

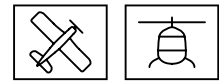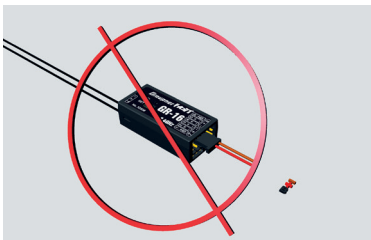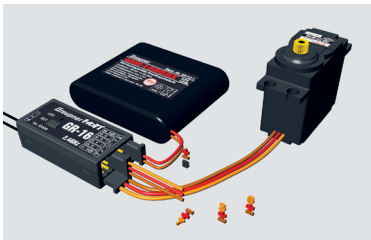For the battery connection are designated the ports provided with an additional "B". With the exception of connector 9 of the receiver **GR-18 HoTT**, a battery can in principle be connected to any free socket. By V- or Y-cable also with any remote control component. We recommend that you connect the power supply to the socket(s) close to the servos already connected to the receiver. If you wish to connect multiple separate batteries, the batteries must be of the same nominal voltage and capacity. Never connect different battery types or batteries with strongly different charges since this can cause an effect similar to a short circuit. In order to avoid such effects from the outset, voltage stabilizers such as PRX-5A receiver power supplies (No. 4136) should always be connected between the batteries and the receiver in such cases.

》

Attention

When selecting and connecting a power supply, be aware that although the operating range of the receiver ranges from 3.6 to 8.4 V. However, practically all of the previously marketed servos, speed controllers, gyros, etc. as well as many which are offered today have a permissible operating voltage range of 4.8 to 6 V.
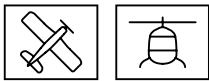
Binding

To establish a connection with the transmitter, the **_Graupner_** HoTT receiver must first be "bound" to at least one model memory in "its" **_Graupner_** HoTT transmitter. This process is generally called "binding". However, the method to be used is not always the same, which is why the following step-by-step instructions apply only to binding the specified receivers to any transmitter:

Receiver Falcon 12 (plus)

Binding step-by-step

- If the receiver is already bound to a specific transmitter and this binding should be maintained, the transmitter should ideally be switched on before the receiver. At the latest, however, within approximately 15 seconds from the moment when the receiver is switched on, the red LED of the receiver is constantly on.

Attention

As soon as the LED starts to flash, the receiver is in bind mode. From this point on, there is a risk that the receiver inadvertently binds to another HoTT transmitter, which also happens to be in the bind mode at the same time and in the same place, whereupon the model can run uncontrolled at any time.

- If the receiver is unbound or it should be bound to another transmitter or only the model memory has to be changed than the previous one, proceed as follows:

1. *Prepare the transmitter or model memory to be bound according to the instructions for binding.*
2. *Switch the receiver power supply on.*
3. *The LED of the receiver **Falcon 12 (plus) HoTT** lights up constantly red.*
4. *Approximately 15 seconds after the receiver is switched on, its red LED starts to flash, indicating that the receiver is now in bind mode.*
5. *Start the transmitter-side binding according to the instructions of the transmitter.*
6. *If the red LED of the receiver goes out within about three seconds, the binding process has been completed successfully.*
7. *Your transmitter/receiver combination is ready for operation.*
8. *If the LED on the receiver remains still red, the "binding" has failed. Change the positions of the associated antennas and try the entire procedure again.*
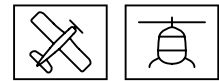
Receiver GR-18 HoTT and GR-24 PRO HoTT

Binding step-by-step

1. *Prepare the transmitter to be bound according to its instructions for binding.*

2. *Switch the receiver power supply on.*

   *The LED of a receiver **GR-18 HoTT** or **GR-24 PRO HoTT** lights up constantly red.*

3. *Push and hold for about three seconds the SET button on the receiver.*

4. *Start the transmitter-side binding according to the instructions of the transmitter:*

   > *If the LED of the receiver **GR-18 HoTT** or **GR-24 PRO HoTT** starts to light constantly green within approximately three seconds, the binding process has been completed success-fully.*

   > *The transmitter/receiver combination is ready for operation.*

   > *If the LED of a receiver **GR-18 HoTT** or **GR-24 PRO HoTT** remains solid red, the "bind" or "Binding" has failed. Change the positions of the associated antennas and try the entire procedure again.*

Receiver reset

Reset the receiver settings step-by-step

1. *As described in the submenu "Setting & data view" of the telem-etry menu described below, in the line "Model Type" of the display page "Receiver" switch from "Airplane" to "Heli", or vice versa.*

2. *Push or press the ENT key or equivalent.*

3. *Disconnect the power supply and reconnect it.*

4. *In the "Model type" line change the model type from "Heli" to "Airplane", or vice versa.*

5. *Push or press the ENT key or equivalent.*

6. *Disconnect the power supply and reconnect it.*

The receiver is reset to factory settings.
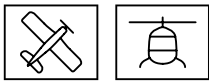
Gyro initialization before starting the flight operation

Each time the receiver system is switched on, the gyro system and possibly also the vario of the receiver require approx. 2 seconds for initialization. During this period, the model must not be moved.

Initialization of the gyro step-by-step

1. *Switch on transmitter.*
2. *Move or hold the sticks in neutral position.*
3. *Switch on the receiver system of the model.*

   The gyro immediately becomes active but still needs to be initialised.
4. *Do not move the model.*
5. *After approx. 2 seconds in still position, the ailerons move briefly in both directions.*

   These "wiggles" indicates that initialization has been successful.
6. *The calibration is completed successfully.*

   The model can be moved.

Notes

- During initialization, the receiver determines the neutral position, for this reason it is imperative that the model is not moved during activation!

- During the gyro initialization also the central position of each control channel is saved. By gyro suppression the gyro correction is reduced with increasing control deflection, at +/-100% of the gyro is deactivated.
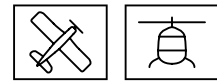
"Telemetry" menu

SETTING & DATA VIEW

```
TELEMETRY

▸SETTING & DATA VIEW
 SENSOR
 DISPLAY RF STATUS
 SELECT ANNOUNCE
 RX DATA       ON
 ALARM SETTING
```

The basic handling of the "Telemetry" menu is described in the respective transmitter instructions or the instructions of the Smart-Box. By way of derogation, only in certain receivers the menu structure is summarized under the generic term "setting & data view". These instructions also provide information on how to access this menu. Change accordingly to the first setting page of the **Falcon 12 (plus)**, **GR-18** or **GR-24 PRO HoTT** receiver.

>> **Note**

The setting values shown in the following display illustrations always show the standard values.

Display "Receiver"

S1019.AIR GR-18 without vario

```
 RECEIVER 2.03          ›
▸LANGUAGE:    English
 Ant1 100%  Ant2 100%
 Model type: Airplane
 ALARM VOLT:     3.8V
 ALARM TEMP:     70°C
 Period:        20ms
 SUMD at C6:       No
 C9:          SERVO
```

S1034 Falcon 12 plus

```
 RECEIVER 2.03          ›
›LANGUAGE:     English
 Ant1 100%  Ant2 100%
 Model type: Airplane
 ALARM VOLT:     3.8V
 ALARM TEMP:     70°C
 Max. altitude:   0m
 Period:        20ms
 SUMD at C5:       No
 SUMDI at C6:      No
 C5:          SERVO
```

S1035 Falcon 12

```
 RECEIVER 2.03          ›
›LANGUAGE:     English
 Model type: Airplane
 ALARM VOLT:     3.8V
 ALARM TEMP:     70°C
 Period:        20ms
 SUMD at C5:       No
 SUMDI at C6:      No
 C5:          SERVO
```

33579 GR-18 with vario

```
 RECEIVER 2.03          ›
›LANGUAGE:     English
 Ant1 100%  Ant2 100%
 Model type: Airplane
 ALARM VOLT:     3.8V
 ALARM TEMP:     70°C
 Max. altitude:   0m
 Period:        20ms
 SUMD at C6:       No
 C9:          SERVO
```

Language

In the "Language" line is set the display language in the receiver menu.

The choices are: German, English, French, Italian, Spanish

Ant1 and Ant2

The percentages behind "Ant1" and "Ant2" indicate how high the receive power is in percent of the respective antenna.

The display is mainly used to find the correct position of the antennas during the installation.

Model Type

Depending on the selected model type "HELI" or "Airplane" different menu pages are displayed.

ALARM VOLT

If the voltage of the receiver power supply falls below the set value, a low-voltage warning is generated by the transmitter in the form of a "general alarm tone" (regular beeping at a rate of approx. one beep per second) or the "receiver voltage" speech output message.
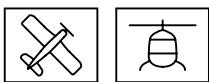
ALARM TEMP

If the receiver temperature exceeds the set temperature, a warning is generated by the transmitter in the form of a "general alarm tone" (regular beeping at a rate of approx. one beep per second) or the "receiver temperature" speech output message.

33583 GR-24 PRO

```
  RECEIVER 2.03          ›
› LANGUAGE:    English
  Ant1 100%  Ant2 100%
  Model type: Airplane
  ALARM VOLT:    3.8V
  ALARM TEMP:    70°C
  Max. altitude: 0m
  Period:        20ms
  SUMD at C8:      No
  SUMDI at C7:     No
```

Max. altitude

Not applicable to receiver S1019.AIR and S1035 Falcon 12

In the value field of this line, a maximum height can be specified, upon reaching which an alarm is triggered. Either in the form of the "general alarm tone" of the transmitter, a steady beeping in the rhythm of about one second or the voice output "height".

Note

The height set in the value field of the "Maximum height" line always refers to the height above the location when the receiver system is switched on. Actively used, this feature supports the compliance with the various regulations regarding the maximum altitude above ground.

PERIOD

If your system is used exclusively with digital servos, you can set a cycle time (frame rate) of 10 ms. If using mixed or with the exclusive use of analogue servos, it is essential to select 20 ms. Otherwise, analog servos will respond with "trembling" or "growling", even total failure.

SUMD at channel X

	SUMD	SUMDI
S1019.AIR GR-18 HoTT (without vario)	**C6**	---
S1034 Falcon 12 plus	**C5**	C6
S1035 Falcon 12	**C5**	C6
33579 GR-18 HoTT (with vario)	**C6**	---
33583 GR-24 Pro HoTT	**C8**	C7

- **"No"**

  The receiver-specific connection is suitable for operating a servo or comparable RC components.

- **"Yes"**

  If the value field of this line has been set to "yes" and the relevant receiver is subsequently put into operation again, it permanently generates a digital sum signal from the control signals of its control channels and makes this available at the receiver-specific fixed servo connection. This type of signal was being used by some of the newest flybarless systems and power supplies.

  In conjunction with another HoTT receiver, which has a SUMDI(N) input, it can also be used to create a simple or reciprocal satellite connection, see below.

SUMDI at channel X

	SUMD	**SUMDI**
S1019.AIR GR-18 HoTT (without vario)	C6	---
S1034 Falcon 12 plus	C5	**C6**
S1035 Falcon 12	C5	**C6**
33579 GR-18 HoTT (with vario)	C6	---
33583 GR-24 Pro HoTT	C8	**C7**

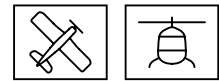Receiver-specific input for a SUMD signal provided by almost all HoTT receivers.

- **"No"**

  The receiver-specific connection is suitable for operating a servo or comparable RC components.

- **"Yes"**

  - If a receiver set to "SUMD" is connected to a receiver set to "SUMDI" as described under "SUMD on channel X", a simple satellite connection is created with the receiver set to SUMDI as the main receiver.

    If two suitable receivers are placed on SUMDI as well as on SUMD and connected crosswise with two satellite cables, a reciprocal satellite connection is created.

Cx

	Servo/Sensor/Voltage
S1019.AIR GR-18 HoTT (without vario)	**C9**
S1034 Falcon 12 plus	**C5**
S1035 Falcon 12	**C5**
33579 GR-18 HoTT (with vario)	**C9**
33583 GR-24 Pro HoTT	---

- **SERVO**

  The receiver-specific connection is suitable for operating a servo or comparable RC components.

- **SENSOR**

  The receiver-specific connection is suitable for connecting telemetry sensors. When the receiver is switched on, previously connected devices are automatically detected.
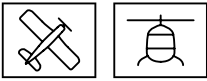
- **VOLTAGE**

  After switching through this connection port as described before, a DC voltage of max. 25,5 V can be displayed instead of the receiver voltage. This way it is possible to monitor the main battery voltage without using external sensors.

Displays "Fixed-wing models"

Display "Free mixer"

»

Notes

When using the gyro, see the following description of the display page "Gyro setting", ...

- ... always set the number of ailerons in the transmitter according to the respective transmitter instructions.

- ... the tail type must always be set to "normal" in the transmitter.
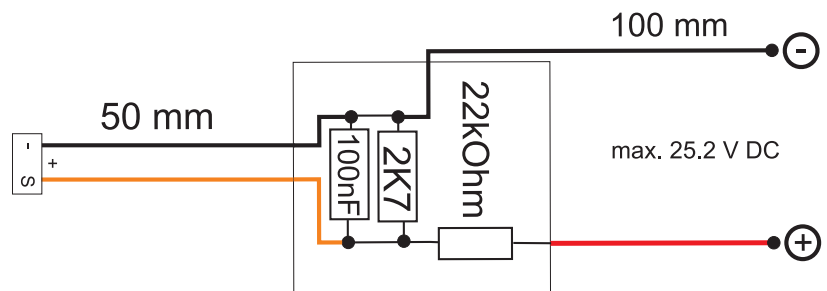
  V-tail, delta wing models or, for example, two elevator servos must never be controlled via the mixers of the transmitter but only via the mixer of the receiver, otherwise the gyro stabilization will only work on one side!

- The five receiver mixers work "downstream" of the gyros.

- If mixing functions are already programmed in the menu "Wing mixer" or "Free mixer" of your HoTT transmitter, make sure that these mixers do not overlap with those of this menu!

MIXER

```
 FREE MIXER        ‹ ›
› MIXER        1
  FROM CHANNEL:    0
  TO CHANNEL:      0
  TRIM:       +0%
  TRAVEL−:    +100%
  TRAVEL+:    +100%
```

In this line you have to select the mixers 1 ... 5 to be set.

The following settings only affect the mixer selected in this line.

FROM CHANNEL

The signal applied to the selected control channel is mixed with the target channel (TO CHANNEL) to an adjustable extent. The method of setting up the values is analogous to the "Free mixers" menu in HoTT transmitters.

If no mixer has to be set, select "0".

TO CHANNEL

Part of the source channel signal (FROM CHANNEL) is mixed into the target channel (TO CHANNEL).

The mixer ratio is determined by the percentage values entered in the "TRAVEL-" and "TRAVEL+" lines.

If no mixer has to be set, select "0".

TRIM

Similar to the trim function of the transmitter, a trim value in the range of ±50% can be entered in this line.

TRAVEL –/+

In these two lines you can define the mixer ratio in relation to the source channel (FROM CHANNEL); the value is set separately for both directions.

Programming examples

V-tail with rudder differential

```
  FREE MIXER        < >
> MIXER        1
  FROM CHANNEL:    3
  TO CHANNEL:      4
  TRIM:      +0%
  TRAVEL−:    +100%
  TRAVEL+:    +100%
```

```
  FREE MIXER        < >
> MIXER        2
  FROM CHANNEL:    4
  TO CHANNEL:      3
  TRIM:      +0%
  TRAVEL−:     +60%
  TRAVEL+:    +100%
```

```
  FREE MIXER        < >
> MIXER        3
  FROM CHANNEL:    4
  TO CHANNEL:      4
  TRIM:      +0%
  TRAVEL−:    +100%
  TRAVEL+:     +60%
```

Differential is not normally necessary with this tail type. Mixer 3 is not required if you do not need rudder differential, and TRAVEL for mixer 2 must then be set to +100%.

Alternatively you may prefer to carry out the programming using the transmitter menu. A 'Rudder-> elevator' mixer can be set up at the transmitter instead of 'Free mixer 3' at the receiver. This option frees up one mixer at the receiver.

Delta with aileron differential

```
  FREE MIXER       < >
> MIXER        1
  FROM CHANNEL:   2
  TO CHANNEL:     3
  TRIM:      +0%
  TRAVEL−:    +100%
  TRAVEL+:     +60%
```

```
  FREE MIXER       < >
> MIXER        2
  FROM CHANNEL:   3
  TO CHANNEL:     2
  TRIM:      +0%
  TRAVEL−:    +100%
  TRAVEL+:    +100%
```

```
  FREE MIXER       < >
> MIXER        3
  FROM CHANNEL:   2
  TO CHANNEL:     2
  TRIM:      +0%
  TRAVEL−:     +60%
  TRAVEL+:    +100%
```

In this example aileron differential is set to 40%. Alternatively you may prefer to carry out the programming using the transmitter menu. An 'Aileron-> elevator' mixer can also be set up at the transmitter instead of 'Free mixer 3' at the receiver. This option frees up one mixer at the receiver.

Two elevator servos

(channel 6 for the second elevator servo)

```
  FREE MIXER       < >
> MIXER          1
  FROM CHANNEL:     3
  TO CHANNEL:       6
  TRIM:       +0%
  TRAVEL−:    +100%
  TRAVEL+:    +100%
```

Butterfly mixer with elevator addition

```
  FREE MIXER        ‹ ›
› MIXER        1
  FROM CHANNEL:    1
  TO CHANNEL:      2
  TRIM:      +0%
  TRAVEL−:     +100%
  TRAVEL+:     +100%
```

```
  FREE MIXER        ‹ ›
› MIXER        2
  FROM CHANNEL:    1
  TO CHANNEL:      5
  TRIM:      +0%
  TRAVEL−:     +100%
  TRAVEL+:     +100%
```

```
  FREE MIXER        ‹ ›
› MIXER        3
  FROM CHANNEL:    1
  TO CHANNEL:      3
  TRIM:      +0%
  TRAVEL−:     +10%
  TRAVEL+:     +10%
```

Notes

»

- These mixers may only be needed on transmitters without transmitter-side butterfly mixers.

- The respective travel setting must be adapted to the model and made so that the servos never stall mechanically.

Display "Gyro setting"

Preparation step-by-step

1. With deactivated gyroscope, carefully trim the model on one or more trim flights on the transmitter side.
2. Switch the receiver off and on again to transfer the flown trim state to the memory of the receiver.
3. Enable gyro control as described below.
4. Set the factor for gyro correction, eventually check the values for the single control surfaces.

MODE

```
  Gyro setting       ‹ ›
› MODE AI/EL      0
  MODE RU         0

  Aile:       5
  Elev:       5
  Rudd:        5
  Factor:      OFF
```

The mode can be set separately for AILE/ELEV and RUDD.

The mode can be set permanently or it can be switched through an assignable control channel. If a proportional control is assigned to the selected control channel in the transmitter, the respective mode can be activated in the following setting ranges of the maximum possible servo travel:

Mode	Range
0 (no regulation)	−150 % … −75 %
1 (normal regulation)	−75 % … −25%
2 (Heading Lock mode with suppress.) (In stick center position Heading-Lock acts. Outside the stick neutral position the gyro control is active.)	−25 % … +25 %
3 (Rate mode) (In the stick neutral position Heading-Lock acts over the entire control area)	+25 % … +150 %

Notes

- The trim of the transmitter, in particular the trim of the ailerons, can only be used without restrictions in mode "0", if necessary with caution in mode "1" and must be left in neutral position in modes "2" and "3".

- If the model is too agile in mode 3, it is then recommended to set in the transmitter DUAL RATE and/or EXPO for this mode. Thus the model will react in a more docile way. In the Rate mode the model tries to reach the controlled rate. Also in mode 2 EXPO can be useful.

Aileron/elevator/rudder

```
Gyro setting        < >
MODE AI/EL      0
MODE RU         0

> Aile:        5
  Elev:        5
  Rudd:        5
  Factor:      OFF
```

The regulation can be fixed separately for "Aileron", "Elevator" and "Rudder" in the range of 0 ... 10; Switched off; or be set accordingly via one of the available control channels C5 ... C16 assigned to this function.

Adjustment range: 10 ... 0, OFF, (0 ... 10)C5 ... C16

Notes

- The setting values should not exceed the range of 4 ... 5 in normal flight, 2 ... 3 in speed flight and 3 ... 6 during landing. Only by Torque the maximum value can be at 10.

- A setting value of "0" switches off the relevant control.

FACTOR

The setting of a factor affects the parameters of "aileron", "elevator" and "rudder" equally.

Adjustment range: OFF, (0 ... 200)C5 ... C16

If a proportional control is assigned to the selected control channel in the transmitter, this can be used to set the desired factor between ± 200% in 1% increments.

Notes

- The OFF value means a gyro action of 100%!

- If no control is assigned to the selected control channel, a factor of "100%" results due to the then normally present neutral position of the control channel.

- The standard factor should cause the gyros to correct the model's attitude quickly when it is upset by an outside influence. Without causing oscillation, but in practice the optimum values for a particular model can only be found by flight-testing. If the model shows little or no automatic stabilization with the default settings, the value should be raised; on the other hand. If the model oscillates (wave-like movements in flight), the value should be reduced.

- Some transmitters allow the corrective factors to be altered during a flight using the proportional controls, whereas others allow fixed values only.

- It is possible to use a channel to control the factor value by setting up flight phase specific transmitter control settings, but only with some transmitters; please see the instructions supplied with your transmitter and refer to the "Transmitter control settings" and "Flight phase settings".

Programming example for transmitters with proportional controls

```
Gyro setting          ‹ ›
  MODE AI/EL    (2)C7
  MODE RU       (2)C7

› Aile:         (2)C9
  Elev:         (2)C8
  Rudd:           6
  Factor:          (44%)C10
```

If your HoTT transmitter is equipped with proportional controls, it is also possible to adjust the value for each axis during a flight: what you might call 'flying the settings'. You need to assign proportional controls to any channel in the range 5 to 16. Now you can alter the value using these controls. The current value is shown in brackets.

Procedure, using the ailerons as an example step-by-step

1. *Assign a free proportional control to a free control channel in the transmitter's control setup menu.*
2. *In the transmitter's telemetry menu, switch to the "Gyro setting" display page of the receiver menus.*
3. *Move the cursor to the desired line, for example to the "Ailerons" line for the aileron.*
4. *Press the SET key to activate the value field.*
5. *Select the channel prepared according to point 1.*
6. *Save it by pressing the SET button again.*
7. *Move the selected proportional control to check.*

   If the value displayed in the bracket changes between 0 and 10, then programming is OK. Otherwise, the relevant settings should be checked and corrected if necessary.
8. *The options "elevator" and "rudder" may have to be set the same.*

Notes

- In flight, the values are to be changed successively until the desired gyro correction is achieved without swinging up.

- Possibly, it makes more sense and the evaluation easier, to activate first one axis of the gyro and to fly the attitude.

Programming example for transmitters WITHOUT proportional controls

```
Gyro setting        < >
MODE AI/EL      4
MODE RU         1

> Aile:        2
  Elev:        4
  Rudd:          6
  Factor:             OFF
```

Procedure, using the ailerons as an example step-by-step

1. *In the transmitter's telemetry menu, switch to the "Gyro setting" display page of the receiver menus.*

2. *Select the desired mode in the two "Mode" lines.*

3. *Move the cursor to the desired line, for example to the "Ailerons" line for the aileron.*

4. *Press the SET key to activate the value field.*

5. *Select the desired value (1 -10 or OFF).*

6. *Save it by pressing the SET button again.*

   Start with a lower value (clues see section Factor) and make a test flight. If the gyroscope correction is too low, increase the value step by step to the desired correction. If the model already oscillates, reduce the value step by step.

7. *The options "elevator" and "rudder" may have to be set the same.*

8. *Leave or reset the "Factor" setting to "OFF".*

Notes

- The values are eventually to be changed successively until the desired gyro correction is achieved without swinging up.

- Possibly, it makes more sense and the evaluation easier, to activate first one axis of the gyro and to fly the attitude.

Display "Axis assignment"

Before starting the settings on a new model, enter the number of aileron servos in the "Aileron servo" line and then assign and set the gyro axes and directions using the "Do setup" option described below.

Aileron servos

```
Gyro setting          < >
> Aile servos    1
  Do setup        NO
  Aile (Right)    +0
  Elev (Push)     +0
  Rudd (Right)    +0
```

The number of aileron servos must be specified in this line.

If 2 aileron servos are specified, the control channel (servo) 2 gyroscope also acts on the receiver output (servo) 5. In addition, the sum of both channels is used for gyro suppression if the ailerons are additionally used, for example, as Flaperon or Speedbrake.

Notes

- Always specify the correct number of aileron servos in the transmitter. If there are more than two, however, then the receiver-side gyro stabilization only affects the servos connected to receiver output 2 and 5.
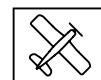
- In the transmitter, the setting of the direction of rotation for both aileron servos must always be identical. So either both normal or both reverse! If this is not possible, the relevant servo must be installed in the model turned accordingly!

- Are used programmable servos, for example *Graupner* DES, HVS or HBS servos, the servo reverse setting can be made directly in the servo according to the corresponding instructions.

- Observe the instructions for receiver installation further in this manual!

- If required, the axes can be manually reset to "+0" (= gyro inactive). Do not manually set any other value unless you know exactly what you are doing.

Do setup

After selecting the line "do setup" and changing the value field to "yes", assign the axes as follows:

Do setup step by step

1. *Select line press or tap the ENT key.*

   "NO" is displayed inverted.

2. *Change the value field to "YES".*

3. *Push or tap on the ENT key.*

4. *At the transmitter, move the aileron control stick in the right hand direction at least 25% of the control way.*

   The display shows the "Aileron" inverted.

5. *Tilt the model more than 45 degrees to the right.*

   As soon as the detected axis with the sign axis number is displayed in "normal" representation, the axis assignation is completed.

   The number results from the addressed gyro axis and the sign from installation position of the receiver and servo direction of rotation.

6. *At the transmitter, move the elevator control stick forward at least 25% of the control way.*

   The display shows the "Elevator" inverted.

7. *Tilt the model more than 45 degrees to the front.*

   As soon as the detected axis with the sign axis number is displayed in "normal" representation, the axis assignation is completed.

8. *At the transmitter, move the rudder control stick in the right hand direction at least 25% of the control way.*

   The display shows the "Rudder" inverted.

```
 Gyro setting        ‹  ›
› Aile servos       2
  Do setup         NO
  Aile (Right)     +2
  Elev (Push)      +1
  Rudd (Right)     -3
```

9. *Turn the model clockwise by more than 45 degrees to the right.*

   As soon as the detected axis with the sign axis number is displayed in "normal" representation, the axis assignation is completed.
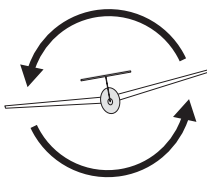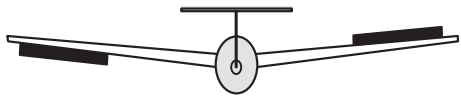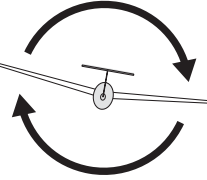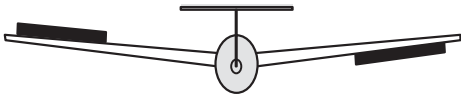
The gyros and their directions of action are now assigned and the line "Do setup" displays "No".
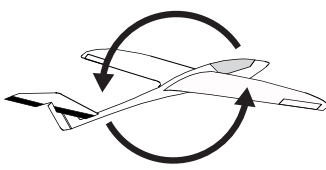
Attention

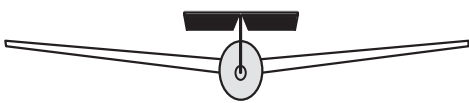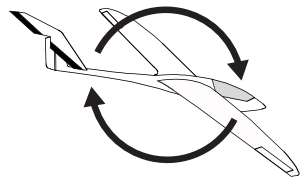After assignation the correct function of all gyros must be checked! To do this, move the model with the receiving system switched on one after the other in all axes and check the control surfaces responses. If a control surface moves in the wrong direction, repeat the "Do setup". You must not fly the model before doing this. There is a risk of crash!

Aileron

Movement of the model	Control surface action (tail view)

Elevator

Movement of the model	Control surface action (tail view)
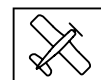
Rudder

Movement of the model	Control surface action (tail view)

Display "Servo limit"

```
SERVO LIMIT          ‹
> 1: -150% +150%  SEL
  2: -150% +150%  SEL
  3: -150% +150%  SEL
  4: -150% +150%  SEL
  5: -150% +150%  SEL
  6: -150% +150%  SEL
  7: -150% +150%  SEL
```

```
SERVO LIMIT          ‹
> 1: -150% +150%  SEL
  2: -150%    +083%   STO
  3: -150% +150%  SEL
  4: -150% +150%  SEL
  5: -150% +150%  SEL
  6: -150% +150%  SEL
  7: -150% +150%  SEL
```
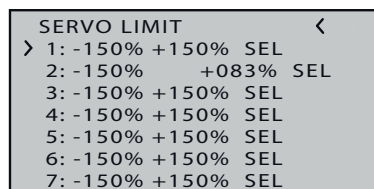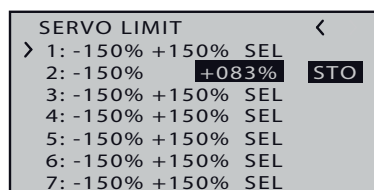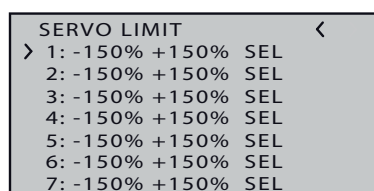
```
SERVO LIMIT          ‹
> 1: -150% +150%  SEL
  2: -150%    +083% SEL
  3: -150% +150%  SEL
  4: -150% +150%  SEL
  5: -150% +150%  SEL
  6: -150% +150%  SEL
  7: -150% +150%  SEL
```

In this menu, the servo travel for all channels can be limited, so that the servos in gyro mode cannot run to the mechanical stop.

Servo limit setting step-by-step

1. *Bring the angle bracket to the desired line.*

   Moving down the angle bracket beyond the lower edge of the display will also display additional channels.

2. *Push or tap on the ENT key.*

   Instead of "SEL" on the right edge of the display, "STO" is displayed.

3. *Now move the servo to be limited in the desired direction and position.*

   The corresponding percentage display is displayed inverted.

4. *Push or tap on the ENT key.*

   The displayed value is saved and "SEL" is displayed again instead of "STO".

5. *Follow the same procedure for further limitations.*

Preparing the helicopter

- On the model, set all servos to "neutral" mechanically, the lever must necessarily be at right angles.
- The swash plate must be neutral, that is perpendicular to the main rotor axis.
- The swashplate pushrods must be the same length.
- If the tail servo has a neutral position deviating from the default value of 1.5 ms, the servo must not yet be connected!
- Arrangement of the swashplate servos at 120/135/140/90 °:
  front left = "1", front right = "2", back = "3".
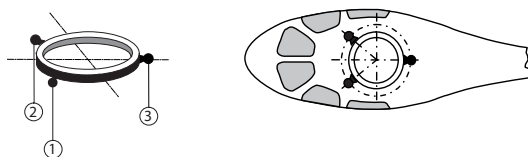
- If the swash plate is turned of 180° and the nick servo is forward, the connection sequence does not change. The left roll servo has always to be connected to "1".
- Arrangement of the swashplate servos at 4 servos 90 °:
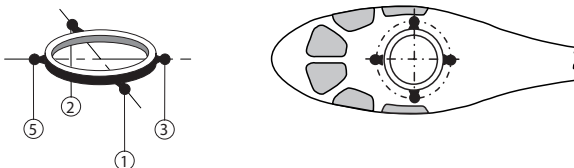
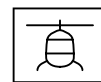- As before: The left roll servo has always to be connected to "1".
- For a helicopter with 3 swashplate servos in a 90 ° arrangement and electronic pitch blending, connection 5 should be left open.

Note

For a "4 Servo" helicopter model, you should first set the center of "Servo 5" with the linkage NOT connected to the swashplate. Otherwise there is a risk that the servos will work against each other.

Transmitter presettings

- Select free / deleted model memory and initialize with model type "helicopter".

- Set "Pitch front/back" according to your personal preferences and do not change it anymore.

- Set all trims to "0" or leave them, never change them in flight. If possible, the trims should be deactivated in the transmitter for safety's sake, for example by setting the trim step to "0".

- As a swashplate type "1 Servo" is to be activated or left. (The swash plate mixers take place in the receiver).

- All servo travel and direction settings will remain at their default values for the moment. So on 100% servo travel and "normal" direction of rotation. Likewise, no further programming, in particular in the heli-specific area, may be undertaken.

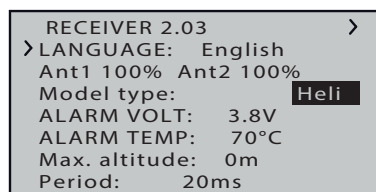- Bind the receiver to the transmitter.

Initialize the receiver

Each time the model is powered up, the gyros are immediately active but not yet calibrated. Since calibration is only performed on a quiet receiver, the model should be kept steady when switched on. As soon as the swashplate moves briefly three times in the idle position after approx. 3 seconds, the initialization has been successfully completed and the calibration is completed.

This process must be awaited each time the receiver system is switched on before the model can be started!

Basic settings

Procedure

1. After successful preparation of the transmitter and the helicopter, the telemetry menu of the transmitter must be called up according to the respective transmitter instructions.

2. In the receiver menu, the model type is set to "Heli", see illustration on the left.

```
 RECEIVER 2.03           >
>LANGUAGE:   English
 Ant1 100%  Ant2 100%
 Model type:        Heli
 ALARM VOLT:    3.8V
 ALARM TEMP:    70°C
 Max. altitude:   0m
 Period:      20ms
```

3. Since the sequence of the subsequent display descriptions is based on the order in the receiver, the first step in the initial setup of a helicopter is to change to the menu "Basic settings control". (The menus between them are only relevant afterwards!)
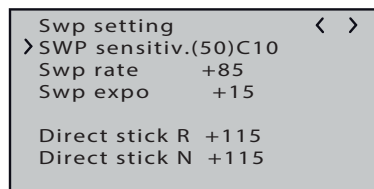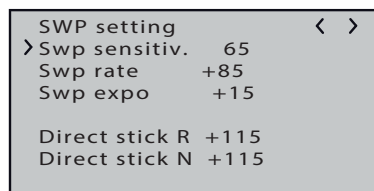
Note

The following display illustrations always show the respective default values.

Display "Swashplate setting"

SWP sensitivity

The "SWP sensitivity" option allows you to adjust the sensitivity either by specifying fixed values or alternatively by assigning a control channel (C5 ... C16) that controls the value from the transmitter with a proportional control. To do this, a rotary or slider control is assigned to one of the control channels 5 ... 16 and the remaining settings are left at the default values. In the value field of the "SWP sensitivity" line, the corresponding channel is then merely to be selected instead of a fixed value. The current control position is displayed in the bracket in front, for example "(50) C10", see lower figure on the left.

Via corresponding settings in the transmitter, a flight-phase-dependent sensitivity control is also possible, for example via the menu "Control settings" or the option "Gyro" in the Helimix menu.

- The heli oscillates around the rotor shaft :

  The sensitivity should then be reduced until vibration-free flies are possible in all flight situations.

- The helicopter does not hover in a stable manner and it is susceptible to wind.

  The sensitivity should then be increase until vibration-free flies are possible in all flight situations.

Adjustment range: 1 ... 100, Min or C5 ... C16

Note

If a control channel is selected in the "SWP sensitivity" line, but no control is assigned to it on the transmitter side, the value in brackets corresponds to the current neutral position of this control channel.

Swp rate

Here is set the max. possible yaw rate for roll and pitch.

Adjustment range: +50 ... +120

Expo Swp

In this line an exponential curve for the control of roll and nick can be set.

With a setting of "0" a linear control of the swashplate takes place, with high percentage values a progressive control is achieved, whereby the helicopter does not react so sensitive around the middle of the stick.

Adjustment range: 0 ... +50
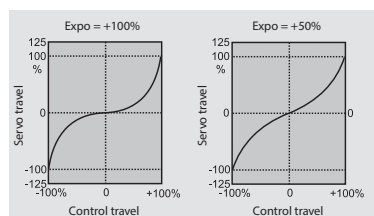
Note

Expo settings should always be made either in the receiver or in the transmitter, otherwise the two Expo settings overlap.

Direct stick R (Roll) and Direct stick N (Nick)

The related direct stick setting allows you to set the direct response of the helicopter to the pilot's commands. If the nick command stops abruptly, the helicopter will oscillate if the value is set too high.

Adjustment range respectively +70 ... +150

Expert mode "Yes"

```
Base sett control    < >
Tail servo    1,5ms
Tail frequency 333Hz
Tail mid       +0
Tail limit B   +50
4.Swp servo mid  +0
Logging         +3
> Expert mode     Yes
```

As soon as the "Expert mode" option on the last line of the display page "Basic setting control" is set to "Yes", further options are available on the display pages "Swash setting" and "Tail rotor settings". Regardles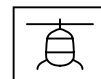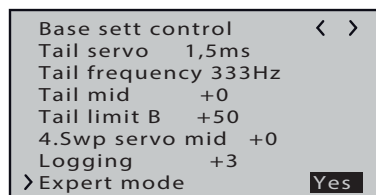s of "yes / no", however, the associated settings are always effective. Switching to "no" thus does not switch off these options, but only fades them out again.

P SWP

```
Swashp. setting     < >
> Swp sensitivity  65
Swp rate        +85
Swp expo        +15

Direct stick R +115
Direct stick N +115
P SWP          +90
I SWP          +85
D SWP          +40
SWP dynamic    +90
Speedflight opt. +15
Stop optimizer   +0
Anti-ballooning  +0
```

The "P SWP" option is responsible for effecting a harder stop with the swashplate. Higher values result in a faster stop. If the P values are too high, the helicopter and/or the swashplate will start to "oscillate". In such cases, the value must be reduced again.

Adjustment range: +40 ... +125
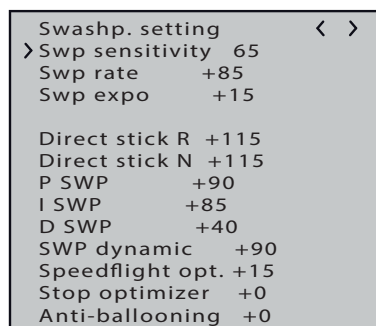
I SWP

The I-factor ensures constant rolling/nicking. Start with low values and only increase them until the roll and nick rates are constant.

Adjustment range: +30 ... +125

D SWP

The D-factor influences the how the swashplate is stopped.

If the helicopter wags or steers slightly while stopping, then this parameter must first be incremented in small steps in order to optimize the engagement of "Nick". If the optimization was unsuccessful, return to the factory defaults and continue with the Stop Optimizer setting.

Adjustment range: 0 ... +70

Note on "P / I / D SWP"

The control is based on the PID principle, where the "P" stands for "proportional", the "I" for "integral" and the "D" for "digital". In short ...

... the deviation from the setpoint proportional to the manipulated variable has an effect at the P value.

... the existing control deviation is continuously summed up at the I value and then acts on the manipulated variable via the I value.

... the differential component only takes into account the speed of the control deviation and then acts on the control accordingly via the D component.

Swp dynamic

Higher dynamic values provide a more direct control feeling, lower values result in a smoother control feel. If the values are too high, the swashplate does not stop and it can overflow. If the values are too low, the control behavior becomes softer.

Adjustment range: +10 … +100

Speedflight optimization

When the helicopter is flying quickly in a straight line, it should fly precisely in one line/at one altitude and not in a wave form. If the helicopter flies in a wave form, the value can be increased until the helicopter flies straight. This parameter should generally not be changed.

Adjustment range: +10 … +40

Stop optimizer

A value "0" means that the default stop optimizer is activated. The values +1 … +10 are provided for the individual adjustment of the extended stop optimizer. If the value is too low, the helicopter jerks up during the fast pitch stop. If the value is too high, the system can oscillate or the stop can be executed in two stages.

Adjustment range: 0 … +10

Anti-ballooning

In extreme high-speed flight, it can happen that the helicopter suddenly descents without the pilot's intervention. This is due to physical factors and depends on the rotational speed of the main rotor and the pitch angle of the rotor blades (pitch).

Pilots who want to fly safely even in this limit range can activate this parameter by entering a value other than "0".

If you want to use the Anti-ballooning compensation, start with the value "+30". A reduction of the parameter eg to the value "+25" increases the "rearing" tendency. An increase to, for example, "+35" reduces the tendency but can also adversely affect the final speed. For this, first start in 5 steps and then make the fine tuning in 1 steps. The target should be to find an optimal compromise between safe flight behavior without rearing and maximum speed.

Adjustment range: 0 … +50
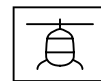
Display "Tail rotor setting"

```
Tail rotor settin    ‹  ›
› Tail sensitivity  65
  Tail rate       +85
  Tail expo       +40
```

Tail sensitivity

The "Tail sensitivity" option allows you to adjust the sensitivity either by specifying fixed values or alternatively by assigning a control channel (C5 … C16) that controls the value from the transmitter with a proportional control. To do this, a rotary or slider control is assigned to one of the control channels 5 … 16 and the remaining settings are left at the default values. In the value field of the "Tail sensitivity" line, the corresponding channel is then merely to be selected instead of a fixed value. The current control position is displayed in the bracket in front, for example "(50) C10", see lower figure under "SWP sensitivity".

Via corresponding settings in the transmitter, a flight-phase-dependent sensitivity control is also possible.

The max. tail sensitivity is first determined at the highest rotor speed and it should be flown individually for each speed. It can be increased until the tail begins to swing up. Afterwards, the tail sensitivity has to be reduced a little, until in all flight positions no swinging of the tail is recognizable anymore.

Adjustment range: 1 … 100, MIN or C5 … C16

Note

If a control channel is selected in the "Tail sensitivity" line, but no channel is assigned to it on the transmitter side, the value in brackets corresponds to the current neutral position of this control channel.

Tail rate

Sets the max. potential rate of rotation in Rate mode for the tail.

Adjustment range: +50 … +120

EXPO tail
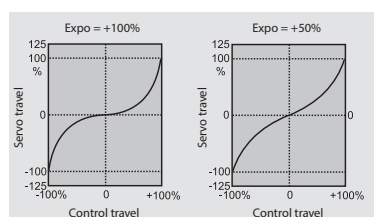
In this line an exponential curve for the control of the tail rotor can be set.

With a setting of "0" a linear control of the tail rotor takes place, with high percentage values a progressive control is achieved, whereby the helicopter does not react so sensitive around the middle of the stick.

Adjustment range: 0 … +50

Note

Expo settings should always be made either in the receiver or in the transmitter, otherwise the two Expo settings overlap.

Expert mode "Yes"

```
┌─────────────────────────────┐
│ Base sett control      ‹ ›   │
│ Tail servo    1,5ms          │
│ Tail frequency 333Hz         │
│ Tail mid        +0           │
│ Tail limit B    +50          │
│ 4.Swp servo mid  +0          │
│ Logging         +3           │
│ › Expert mode          Yes   │
└─────────────────────────────┘
```

As soon as the "Expert mode" option on the last line of the display page "Basic setting control" is set to "Yes", further options are available on the display pages "Swash setting" and "Tail rotor settings". Regardless of "yes / no", however, the associated settings are always effective. Switching to "no" thus does not switch off these options, but only fades them out again.

```
┌─────────────────────────────┐
│ Tail rotor settin      ‹ ›   │
│ › Tail sensitivity  65       │
│ Tail rate      +85           │
│ Tail expo      +40           │
│                              │
│ P tail         +80           │
│ I tail         +70           │
│ D tail         +15           │
│ Pitch- Tail    +25           │
│ Swp- Tail       +4           │
│ Tail dynamic    +65          │
│ Vivration damping No         │
│ Stop damping R   +5          │
│ Stop damping L   +5          │
└─────────────────────────────┘
```

P tail

The "P tail" option is responsible for effecting a harder stop with the tail. Higher values result in a faster stop. If the P values are too high, the tail will start to "oscillate". In such cases, the value must be reduced again.

Adjustment range: +40 ... +125

I tail

The I-factor ensures constant pirouetting. Start with low values and only increase them until the pirouettes are constant. If the values are too high, this will cause the tail to oscillate slowly.

Adjustment range: +20 ... +100

D tail

The D-factor influences how the tail is stopped. If the tail bounces somewhat when the tail is stopped, this parameter should first be increased in 5-degree increments to test the tail stop.

Adjustment range: 0 ... +50

Note on "P / I / D tail"

The control is based on the PID principle, where the "P" stands for "proportional", the "I" for "integral" and the "D" for "digital". In short ...

... the deviation from the setpoint proportional to the manipulated variable has an effect at the P value.

... the existing control deviation is continuously summed up at the I value and then acts on the manipulated variable via the I value.

... the differential component only takes into account the speed of the control deviation and then acts on the control accordingly via the D component.

Pitch => Tail and Swp => Tail

Torque compensation for pitch and tail is optimal when the two options are adjusted together.

- **Pitch => Tail**

  With rapid successive pitch changes (pitch pumping) and the resulting swashplate movements, the tail should remain stable also during the load. If the tail swings out shortly, "Pitch => Tail" should be increased until the tail is still.
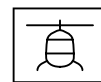
Adjustment range: 0 … +80

Note

On the ground, you can easily check whether the tail is working against the torque.

- **SWP => Tail**

  This option is particularly useful with relatively slow-running tail rotors and is then usually set to 1/3 of the value of "pitch => tail". With high tail rotor speeds and good rear power the value can be set to "0".

  Adjustment range: 0 … +40

Swp dynamic

Higher dynamic values provide a more direct control feeling, lower values result in a smoother control feel. If the values are too high, the tail does not stop and it can overflow. If the values are too low, the control behavior becomes softer.

Adjustment range: +10 … +100

Vibration damping

The vibration damping automatically detects emerging vibrations at the tail rotor, e.g. at extreme speed flights (wind flag effect) or strong speed changes in some 3D maneuvers (over-speed) and prevents an extremely strong swing-up.

The tail rotor should be set free of vibrations WITHOUT active vibration damping in 3D and normal flight situations, only with a solid basic setting it makes sense to activate the vibration damping.

Adjustment range: Yes / No

Stop damping R and L

With the parameters "R" and "L" of this option, the stop behaviour after a yaw movement is optimized. The tail should stop as quickly as possible without moving back.

Select the value so low that the tail does not move back at when stopping. The higher the value, the more the stop is dampened. The value should be determined in increments of 1.

Adjustment range: 0 … +20
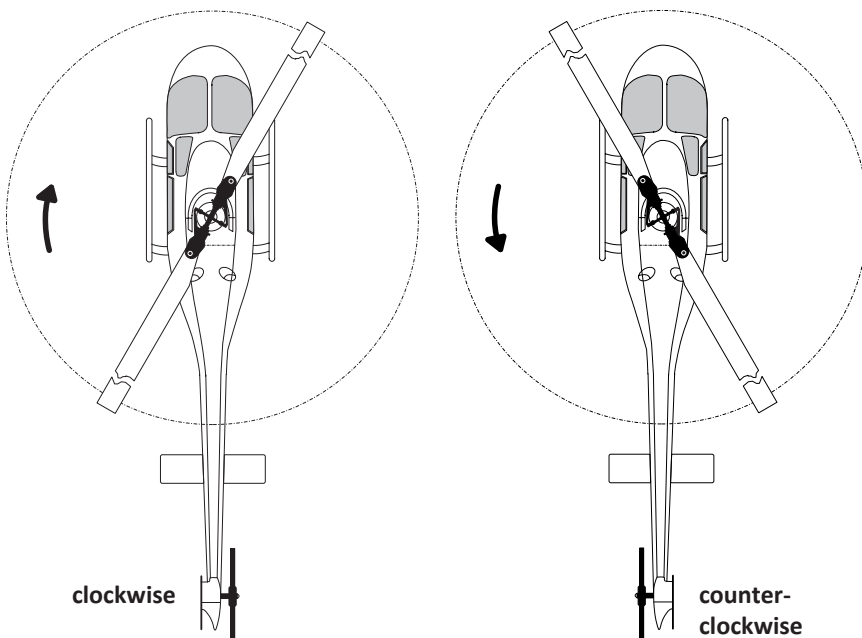
Display "Base setup control"

Attention

- In the course of the initial setting, the helicopter-specific settings in this menu must be started and this menu must be worked through from top to bottom point by point.

- As soon as a value is activated in the "Basic setting control" menu, the gyro control and in some cases also the control is deactivated! Changes to the settings must therefore never be carried out in the air, but only when the drive motor is switched off and on the ground!

Rotating dir

In this line, the direction of rotation of the rotor must be specified. From the top, clockwise (right) or counterclockwise (left).

```
Base sett control    < >
> Direction     right
  Swp type  120 degree
  Swp frequency  200Hz
  Swp direction    +0
  Swp Roll trim    +0
  Swp Nick trim    +0
  Swp Pitch trim   +0
  Swp cyc. trav 8  +80
  Collective A     +80
  Cyclic max.      +80
  Swp rotate       +0
  Tail servo     1,5ms
  Tail frequency 333Hz
  Tail mid         +0
  Tail limit B     +50
  4.Swp servo mid  +0
  Logging          +3
  Expert mode      NO
```


clockwise   **counter-clockwise**

Swp type

In this line, the "swash plate type" is specified, which is defined by an angle specification. The appropriate value can usually be found in the construction manual of the helicopter.

Adjustment range: 4 servos, 90 °, 140 °, 135 ° and 120 °.

Notes

- On the transmitter side it is always set to "1 servo", independently of the actual number of swashplate servos.

- The "90 °" setting is only suitable for operating helicopters with 3 swashplate servos in a 90 ° arrangement and a mechanical pitch mixer.

- For a helicopter with 3 swashplate servos in 90 ° arrangement and electronic pitch blending, the setting "4 Servos" should be selected and the port 5 should be left free.

Swp frequency

Frequency setting for the swashplate servos.

Adjustment range: 50, 53, 57, 61, 66, 72, 80, 88, 100, 114, 133, 160 and 200 Hz.

Attention

- Analog servos may only be operated at 50 Hz, otherwise the servos will be destroyed. Digital servos *can* be operated at a higher frequency. This allows the model to be controlled more quickly.

- The operation of higher frequency servos is at your own risk.

- For *Graupner* servos of type "HBS" we recommend a setting of 200 Hz.

Swp direction

Adjustment of the direction of the swashplate servos.

Adjustment range: 0 ... 7.

Swp direction setting step-by-step

1. *In the value field of this line, select the setting value between 0 and 7, at which all servos in pitch run in the same direction.*

2. *Be sure to control the directions of the Pitch, Roll, and Nick control functions by moving the appropriate sticks.*

3. *If required, the direction of a control function running in the wrong direction is adjusted in the transmitter-side "Servo adjustment" menu as follows:*

   For "Pitch", reverse "Servo 1", for "Roll", "Servo 2" and for "Nick", "Servo 3".

Swp nick trim, Swp roll trim and Swp pitch trim

The swashplate must be aligned as far as possible at right angles to the main rotor axis and with 0° pitch.

After activating one of these 3 values, the gyro control switches off and the servos move into their neutral position. According to this, the swash plate can be aligned optimally with the nick, roll and / or pitch trim. A perfect setting is achieved when the rotor plane does not move in flight when the pirouettes are performed.

Adjustment range:-100 ... +100

Swp cyclic travel 8

Set the "Swp cyclic travel 8" if the menu value is activated so that the rotor blade located above the tail tube is as accurate as 8° by full roll-over stroke. To do this, the field must be selected (highlighted field) so that the swashplate can be controlled and adjusted in direct mode when gyro gain is switched off. This is the only mode in which the travel can be set correctly.

It is very important that the travel is set correctly. It plays a major role in terms of acquiring the correct gyro gain.

Collective_A/B

The display "A" or "B" and its corresponding value changes automatically according to the transmitter-side pitch stick position. The two endpoints are set separately.

Use the pitch gauge to measure the required pitch travel when the full commands are applied (±100%) and set it in this menu. All of the other settings can be made later on the transmitter for the pitch curves in the respective flying phase.

Adjustment range: +50 ... +120

Cyclic max

The swashplate limit must be set so that it is not possible for a servo to reach its mechanical limits, while ensuring that the servo's travel is as large as possible. No humming should come from any of the servos when full travel commands are applied.

Adjustment range: +50 ... +200

Swp rotate

In this line, a virtual swashplate rotation can be set in degrees.

Normally for rotor heads with up to a 3 bladed no rotation is necessary.

Adjustment range: ±90

Tail servo

In this line the correct neutral position for the tail servo has to be set.

As a rule, 1.5 ms are not just usual for tail servos. Narrowband servos (generally special tail rotor servos) may however require a different mid pulse width. You must locate this value in the servo manual and set it correctly. If a value has not been specified, it is probably a standard servo set at 1.5 ms. For **Graupner** servos of type DES, HVS or HBS, this value is partially programmable. However, we recommend sticking with the default setting.

```
Base sett control    ‹ ›
› Direction      right
  Swp type  120 degree
  Swp frequency  200Hz
  Swp direction    +0
  Swp Roll trim    +0
  Swp Nick trim    +0
  Swp Pitch trim   +0
  Swp cyc. trav 8  +80
  Collective A     +80
  Cyclic max.      +80
  Swp rotate       +0
  Tail servo     1,5ms
  Tail frequency 333Hz
  Tail mid         +0
  Tail limit B     +50
  4.Swp servo mid  +0
  Logging          +3
  Expert mode      NO
```

The control direction of the tail rotor can now be checked. If this is wrong, you have to change the direction of channel 4 in the "servo setting" menu of the transmitter.

Adjustment range of the neutral impulse: 1,5 ms, 760 µs or 960 µs.

Tail frequency

The tail frequency can be set in a range between 50 and 333 Hz.

Adjustment range: 50, 52, 55, 58, 62, 66, 71, 76, 83, 90, 100, 111, 125, 142, 166, 200, 250 and 333 Hz.

»

Attention

- Analog servos may only be operated at 50 Hz, otherwise the servos will be destroyed. Digital servos *can* be operated at a higher frequency. This allows the model to be controlled more quickly.

- The operation of higher frequency servos is at your own risk.

- For *Graupner* servos of type "HBS" we recommend a setting of 333 Hz.

Tail mid

As soon as the value field "Value tail mid" is activated (field inverted), the tail servo moves to the neutral position. The tail servo arm should be at a 90-degree angle to the tail linkage pushrod.

The fine trim is then adjusted based on the "Tail mid" option. When the servo is set to neutral, the tail rotor should have a pitch angle of approx. 2 ... 3° against the torque. Check whether the control direction is correct. If this is wrong, you have to change the direction of channel 4 in the "servo setting" menu of the transmitter.

Adjustment range:-100 ... +100

Tail limit A/B

The display "A" or "B" and its corresponding value changes automatically according to the transmitter-side position of the tail rotor control stick. The two endpoints are set separately.

Select the direction with the tail rotor control stick and bring it to the stop. The display shows the respective value for A or B.

Aerodynamically meaningful values should be set, because if the rashes are too great, stalling of the tail rotor blades can occur. It is also important to ensure that the servo and / or the tail rotor mechanism does not overrun mechanically, but the possible travel can be fully utilized.

Adjustment range: +50 ... +200

4. SWP servo mid

Setting the neutral position of the fourth SWP servo.

»

Note

Effective only if "4 Servo" is selected in the "SWP Type" line of the display "Basic settings contr.".

Logging

Logs the selected functions to the transmitter's SD card for later evaluation and error analysis of logging activated on the transmitter side.

0 = no logging

1 = roll and nick logging

2 = roll logging

3 = nick logging

4 = tail logging

We recommend always logging at least one function.

Expertmode

This option is set to "No" by default, and for the first steps with the new system, more experienced helicopter pilots should leave this setting as it is. In particular, the swash plate and tail rotor menu is much clearer. After the acclimation it is still possible to switch, if necessary, to the expert mode and its additional possibilities.

»

Attention

Even with the expert mode set to "no" this is not switched off but it is in the background with the current settings effective. This is particularly important when installing a previously used receiver in a new model. Therefore, for safety's sake, a receiver reset, as described above, should be carried out before the start of the programming work.

Display "Axis assignment"

```
Axis assignation        ‹
› Do setup        No
  Roll (Right):   +0
  Nick (Push):    +0
  Tail (Right):   +0
```

In this display, the axis assignment of the individual gyro elements and their effective direction must be determined.

Do setup

After selecting the line "do setup" and changing the value field to "yes", assign the axes as follows:

Do setup step by step

1. *If not already done, check the directions of movement of all servos and if necessary correct them in the transmitter.*
2. *Change to the display page "Axis assignment".*

3. *Push or tap on the ENT key.*

   "NO" is displayed inverted.

4. *Change the value field to "YES".*

5. *Push or tap on the ENT key.*

6. *At the transmitter briefly bring the roll control stick to the right stop.*

   The display shows the roll axis inverted.

7. *Tilt the helicopter more than 45 degrees to the right.*

   As soon as the detected axis with the required sign is displayed in "normal" representation, the axis assignation is completed.

8. *At the transmitter briefly bring the nick control stick to the front stop.*

   The display shows the nick axis inverted.

9. *Tilt the helicopter more than 45 degrees to the front.*

   As soon as the detected axis with the required sign is displayed in "normal" representation, the axis assignation is completed.

10. *At the transmitter briefly bring the tail control stick to the right stop.*

11. *Turn the helicopter clockwise by more than 45 degrees to the right.*

    As soon as the detected axis with the required sign is displayed in "normal" representation, the axis assignation is completed.

Notes

- The assignment of the axis the pirouette optimization is automatically adjusted.

- If the direction of rotation of the tail servo is later changed for any reason, the axis assignment must be carried out again.

- If one of the directions of operation is wrong, you must repeat the axis assignment process.

- As a result of the control, the servos no longer return to their zero position or move slower. It is not a mistake and it will not be noticeable in the air, since then the regulation can work freely.

- If the directions are changed on the transmitter due to any modifications being made to the helicopter (e.g. new servos) or if the receiver is installed in a different position, the axis assignment procedure must be fully repeated.
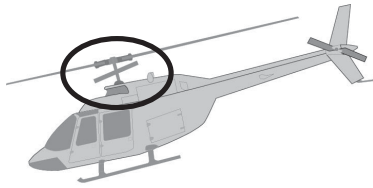
The gyros and operating directions have now been assigned. For safety reasons, the effective directions must be checked.
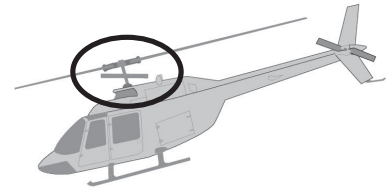
Checking nick

Tilt the helicopter so that its nose is facing downwards; the swash-plate moves consequently backwards.

Incorrect! **Right!**

Checking roll

Tilt the helicopter to the right; the swashplate moves consequently to the left.

Checking the tail direction of operation

The effect depends on whether the helicopter is equipped with a left- or right-handed rotor and on the mounting side and the direction of rotation of the tail rotor. This information is usually found in the helicopter's guide.

Graupner

Firmware update

Firmware updates are carried out via a receiver-specific connection using a PC with Windows 7 ... 10. You will also need a USB interface, No. 7168.6, and adapter lead, No. 7168.6A or 7168.S, which are available separately.

The programs and files required can be found in the Download area for the corresponding products at **www.graupner.de**.

⚠️

CAUTION

By updating to this version, the receiver is automatically reset to the factory settings. Therefore, note in your own interest before updating all setting values and always carry out a setup of the receiver after the update.

Connect the adapter lead to the USB interface. The connectors are reverse polarity protected: note the small chamfers on the sides. Do not use force, the plug should click into place easily.

	Updates
S1019.AIR	T/9
S1034	C5
S1035	C5
33579	T/9
33583	T

For the two Falcon receivers **S1034** and **S1035**, plug the other end of the adapter cable into the port marked "C5", the two GR-18 HoTT receivers **S1019.AIR** and **33579** to the "T/9" and the GR- 24 HoTT No. **33583** into the socket marked "- + T", see also adjacent table.

The polarity of the plug-in system cannot be reversed. Do not apply force. The plug should be fully inserted.

The update is made via the program section "Slowflyer / Gyro Receiver Update" of the program "Firmware_Update_gr_Studio" found in the "Link" section. Please follow the notes of the software. The further procedure is also described in detail in the manual contained in the data package. You can also download these from the download page of the product at **www.graupner.de**.

»

Note

The following information is based on version 4.9.3.x of "Firmware_Update_grStudio". In older versions, the files listed below can be found in the directory into which they were copied during unpacking.

The associated application program can also be started directly by double-clicking the "micro_gyro_swloader.exe" file found in the "\\ Program Files (x86) \ Graupner \ gr_Studio" installation directory of the "HoTT_Software VX" package.

In the program window "micro_gyro_swloader.exe", the "correct" COM port of the USB interface must first be set.

Possibly, the correct port number can be found after opening the "Firmware_Update_grStudio" and clicking on the option "Select port" in the line "Silicon Labs CP210x USB to UART Bridge", for example "COM03".
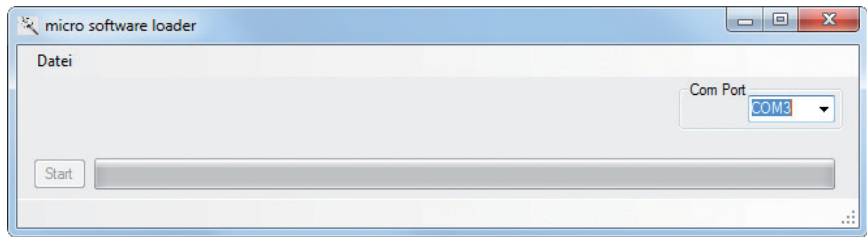
Afterwards, click on the "File" button to load the corresponding firmware file from the hard disk. The file name of the firmware compatible with the receiver to be updated always starts with "« receiver name »_« order number »_xxx", for example with "Falcon12_S1034_xxx_xxx".

After loading the compatible file, click the "Start" button ...
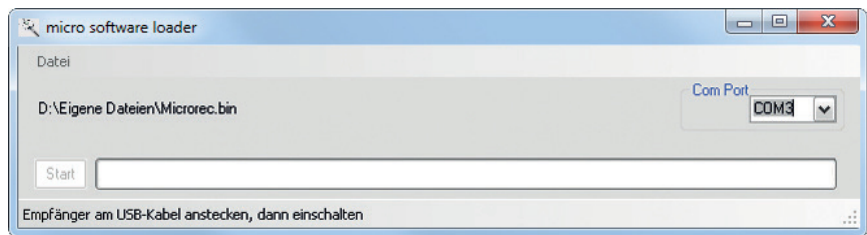
... and then turn on the receiver.

(In practice, the receiver can be connected earlier, it must not be switched on before clicking the "Start" button.)
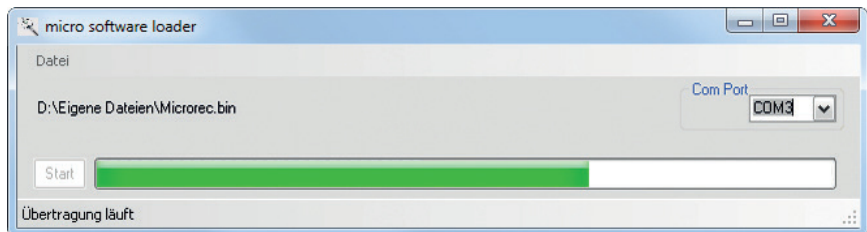
The progress bar shows that the transfer is running normally. Depending on the receiver, its LED indicates the progress of the update.

Manufaturer / Manufakturer

GRAUPNER Co. Ltd
Post Code: 14557
202-809, 18, Bucheon-ro 198beon-gil, Bucheon-si,
Gyeonggi-do, South Korea

Vertrieb Deutschland, Österreich, Niederlande

D-Power Modellbau
Inhaber: Horst Derkum
Sürther Straße 92-94
50996 Köln
Deutschland
www.d-power-modellbau.com

Robbe Modellsport
Geschäftsführer: Matthew White
Industriestraße 10
4565 Inzersdorf im Kremstal
Österreich
www.robbe.com

Distribution France

Flash RC
ZAC Centre 15 Rue Martin
Luther King 38400
Saint-Martin-d'Hères
FRANCE
www.flashrc.com

Contact : support@flashrc.com
Phone : +33 4 76 01 05 23

Distribuzione Italia

Jonathan SRL
Via dell'Industria 1
02032 Fara in Sabina-
Passo Corese (RI) Italy
www.jonathan.it

Contact :
https://shop.jonathan.it/it/contact

Notes on environmental protection

If this symbol is on the product, instructions for use or packaging, it indicates that the product may not be disposed with normal household waste once it has reached the end of its service life. It must be turned over to a recycling collection point for electric and electronic apparatus.

Individual markings indicate which materials can be recycled. You make an important contribution to protection of the environment by utilizing facilities for reuse, material recycling or other means of exploiting obsolete equipment.

Care and maintenance

The product does not need any maintenance. Always protect it against dust, dirt and moisture.

Clean the product only with a dry cloth (do not use detergent!) lightly rub.

Warranty conditions

Graupner

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.

These operating instruction are exclusively for information purposes and are subject to change without prior notification. The current version can be found on the Internet at *www.graupner.com* 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.

Not liable for printing errors.