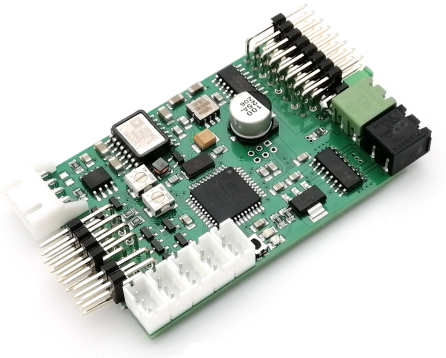
TVC-GSU-12

gun stabilizer module for rc main battle tanks

The module stabilizes the horizontal and the vertical movement of the gun in a radio controlled main battle tank model. This is acccomplish by using modern gyro- and inertialsensor technology. As soon as this sticks are released to return to neutral, this is stored as the new position to be stabilized.
The gun elevation is controlled by a servo, the tower rotation by a geared motor placed in the turret. A speed controller with 5A continuous load is already integrated to control the tower rotation motor.
The modul simulates the barrel retraction, too. A servo or a motor driven unit can be used to realize this.
The device can simulate the autoloader automatic move to the loading position and return to the initial position.

A back rear collision avoidance input lifts the barrel automatic to a settable hight, to avoid collision of the barrel with the hull.

The modul can be operated with a rc receiver or using the SGS Scalebus connection. Scalebus Operation additionally controls the periscope and a machine gun turret (urban fighting PSO variant).



1 Note

Installation of the module requires intermediate to advanced modeling skills. Soldering skills are required to connect the wiring. Inexperienced modelers and persons aged under 16 years old should seek the assistance of an experienced modeler. Always switch off power when working on the wiring. Especial take care when connecting more than one receiver energy source. Prevent the device from getting wet. Check loads before connecting them to the modul at a current limited, or fuse protected source.

Contents

List of Figures

List of Tables

2 Functional Description

2.1 Operation with Stabilization switched off

When switched off, the tower can be used as usual with the channels for tower rotation and gun elevation control.

2.2 Automatic Stabilization of the Tower Rotation

If the stabilization is active, the horizontal orientation of the tower will be automatic maintained by the module. Only when the transmitter stick for turret turn is operated, the automatic control stops until the manual intervention ends, then immediately starts stabilization within the new position.

The sensitivity of the control can be adapted to the model. This can either be done remote using a proportional channel on the radio, or through a trimmer on the module.

2.3 Automatic Stabilization of the Gun Elevation

The module simulates a geared motor with the servo (This is also known as a hydraulic function). The servo moves in the direction of the stick deflection until it is in the neutral position again. The servo only moves back when the stick is deflected in the opposite direction. The adjustment speed is proportional to the stick deflection. If the stabilization is active, the vertical orientation of the tower will be automatic maintained by the module.

The sensitivity of the control can be adapted to the model. This can either be done remote using a proportional channel on the radio, or through a trimmer on the module.

2.4 Firing the main weapon

The module controls the recoil of the gun mount when firing the main weapon with a servo. The function is triggered by quickly moving the control stick for the barrel cradle forwards.

The servo then moves back fast and slowly returns to its original position. At the same time, a digital output is activated to which a high-flux LED can be connected in order to simulate the muzzle flash and/or trigger a sound module.

To simulate the automatic loading function, the module moves to the loading position after the shot and then returns to the initial position. This function can be switched off.

If you do not use the barrel retraction, flash and automatic loading of the module, the double assignment of the control stick can be irritating. If you unknowingly trigger the gun, nothing (visible) happens for the user. However, the internal processes are running. For this reason, the double assignment of the channel can be deactivated during parametrisation. The control stick for the gun elevation then only controls the gun elevation.

2.5 turning stabilisation on/off

Automatic stabilisation can be switched on and off via a proportional channel on the remote control or via a contact on the module. The green LED indicates the activated status. An additional output is also switched. This can be used to connect a connect a e.g. a laser. The output switches the battery voltage and can draw a load of 500mA.

2.6 Technology Used

The controller is microprocessor controlled. The processor works at 16MHz clock frequency. The inertial sensors are so-called MEMS sensors (Micro Electro Mechanical Systems), i. the micro mechanical gyro / inertia system is completely in implemented a semiconductor.

A gyroscope is used as the sensor for the rotation axis stabilization. The maximum detectable angular velocity is $\pm 300 \frac{°}{s}$. The sensor gives signal

proportional to the angular velocity. This signal becomes the position integrated. Principle-related quantization errors grow over the time a position error, so that the horizontal deflection drifts. This especially noticeable at standstill. This behaviour is, as mentioned, by the principle conditioned and occurs also in the original.

For measuring the angular position of the Earth gravitational field is used an acceleration sensor. To suppress high-frequency accelerations are in the software implemented digital filters and attenuators (moving averaging). The damping parameters of the tower rotation and the cradle are over each one servo channel during operation of the model adjustable.

2.7 Scope of Delivery

- the module
- black and green connector fro power supply and turret rotation motor
- jumper for autoloader on/off
- five plugable servo leads

3 Installation

The module can be operated with the SGS full option modules or directly on a rc receiver. No additional modules are required for tower stabilisation.

If the module is operated on an SGS Fulloption module, the Scalebus is connected instead of the servo inputs for the tower and tube cradle and for switching the stabilisation on/off. The Scalebus mode is recognised by the fact that the servo cables are not connected when switching on.

3.1 Installation of the modul

There are motion sensors on the module that require a certain alignment. Accordingly, the module cannot be placed anywhere in the model in a random position.

The module must be orientated parallel to the base of the tower.

The direction has to be aligned, too.

Figure 2 shows a coordinate system. In delivery state, the modul is set to be the X axis must be mounted in parallel to the barrel pointing in firing direction. The exact position in the turret is not decisive.

If space is limited within the turret, it may be more favourable to install the module in an orientation other than X-, e.g. because of the cable routing. You can select X-, X+, Y- and Y+ in the optional setting procedure.

Attach the module using double-sided foam tape or Velcro tape, for example.

3.2 Preconditions servo elevation

There are no special requirements for installation. If possible, the maximum possible travel of the servo should be utilised because the positioning accuracy of servos decreases as a percentage with decreasing travel. This is achieved by mechanically adjusting the length of the servo arms or the pivot points in your model. The end positions of the levelling effect, the position of the autoloader and the position when lifting in the collision avoidance mode can be set electronically. (See commissioning)

Note The servo travel limit in the transmitter cannot be used because the channel for the gun elevation controls the travelling speed and not the position.

Note The use of a geared motor for gun elevation is **not possible**.
The module can move the height levelling servo to user-definable positions for the rear deflector function and the loading position of the autoloader. This would not be possible with a geared motor gun elevation.

Note The servo should not constantly carry the load of the barrel, the barrel should be balanced with a spring or counterweight. For large models in which conventional servos are too weak, the following options are available:

- our PowerServo electronics GFMC-PS10 with a geared motor and a potentiometer on the rotary axis
- our PowerServo electronics GFMC-PS10 with an electric cylinder with built-in potentiometer
- off the shelf PowerServo that is supplied with 12V to 24V instead of loading the BEC

3.3 Preconditions servo gun recoil

There are no special requirements for installation. If possible, the maximum possible travel of the servo should be utilised. This is achieved by mechanically adjusting the length of the servo arms or the pivot points in your model.
The rest position and the position at maximum retraction can be set electronically. (See commissioning)

3.4 Preconditions turret turn motor

The tower rotation motor should be mounted in the turret, because the stabilisation module must be mounted in the turret. The turret rotation

mechanism should run smoothly and be free of play. If it jams, the electronics will try to compensate for this and then overshoot. We recommend measuring the motor current of the turret rotation motor in both directions during a full rotation before installation. The current should be the same at all positions of the tower. The gear ratio should be selected to match the originals speed when supplied with the battery voltage. In modern MBTs this typically 4 rpm equals approx. 15 seconds per revolution.

4 Anschluss

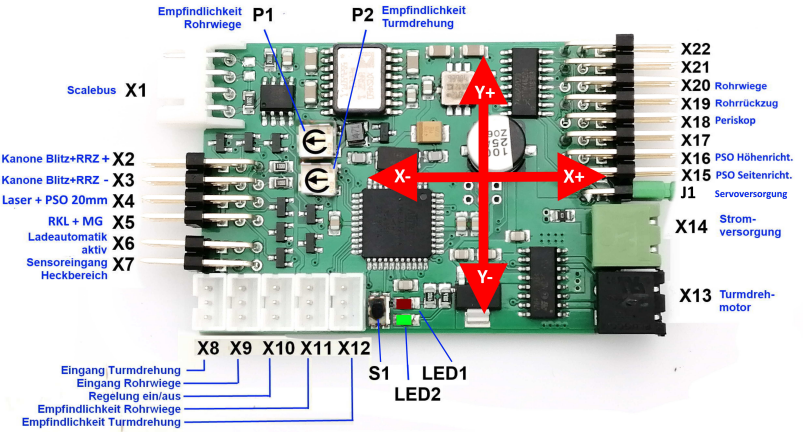


Figure 1: connection overview

4.1 Scalebus connection

When operating with one of our FO modules, the scale bus is used instead of the servo inputs (X8 to X12). One plug of the scale bus cable (no matter which one) is plugged into X1 and another into the FO module. (Further modules can be operated on the bus).

The Scalebus connection is established using a four-lead cable. In order to realise infinite rotation of the tower on the hull, a GFMC-SBR-10 scale bus repeater can also be connected in between. As the module has its own BEC controller, it then supplies itself and the scale bus repeater from the battery for the turret.

The servo cables can be disconnected during scale bus operation.

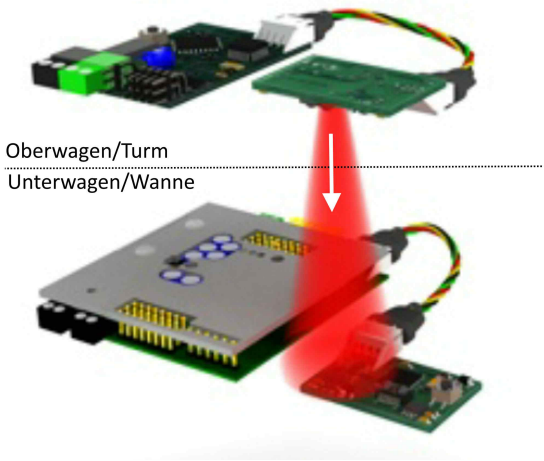


Figure 2: Scalebus operation using two infrared repeaters

If the module is connected wireless to the chassis via a Scalebus repeater, a bus cable with two slots is usually used. The scale bus repeater is supplied with power via the TVC-GSU12.

4.2 receiver connection

In case the module is operated using a rc receiver, the inputs X8 to X12 are used.

Whether a channel is controlled via the RC receiver is recognised when the module is switched on. Plugging in the channel during operation does not work.

If the input channel is not connected in the receiver, alternative control is active.

If channel X11 and/or X12 are not connected to the receiver, the control sensitivity is taken over by the respective trimmer on the circuit board.

If channels X8 and X9 (and X10) are not connected to the receiver, the corresponding control information is expected from an FO module via the Scalebus. It is then not necessary to connect all five servo cables to the receiver.

con-nec-tion	op-tional	Funktion	connected to	sug-gested actor	alterna-tive
X8	no	turret turn	receiver turret chanel	KkS	Scalebus
X9	no	gun elevation	receiver gun ele-vation	KkS	Scalebus
X10	yes	stabilisation on/off	receiver stabilisa-tion on/off	DStS	Scalebus
X11	yes	sensitivity gun elevation	receiver gun ele-vation	PotM	Onboard Trimmer
X12	yes	sensitivity tur-ret rotation	receiver turret ro-tation	PotM	Onboard Trimmer

Table 1: Overview of servo inputs. Abbreviations for the operating elements in table 5 on page 32.

If a recognised channel is removed during operation, the module switches off. If individual channels are not required, the servo cables can be unplugged from the white connector to save space in the model.

The controller is equipped with JR servo cables. The assignment is shown in figure 3.

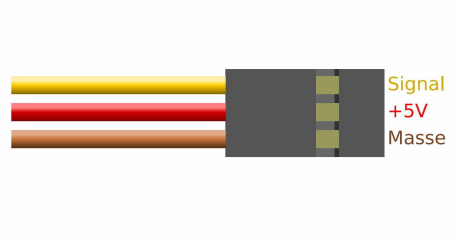


Figure 3: Servo cable assignment

The built-in BEC regulator supplies power to the receiver via the servo cable.

General note The receiver also acts as a power busbar via which all connected loads are connected. If there is now a second ESC with BEC in the model, two sources supply the receiver and all consumers connected

to it. This is not possible with all types of BEC controllers and, in the worst case, can lead to the destruction of the electronics.

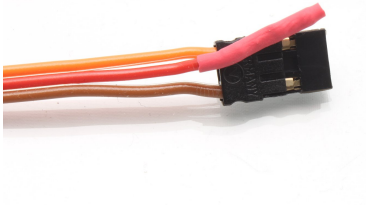


Figure 4: unplugged and insulated poitiv supply cable in the servo plug

It must be ensured that there is only one source for supplying the receiver. The BEC supply of other controllers must be interrupted. This can be done, for example, by pulling the red + wire out of the servo connector.

4.3 Connection of the tower motor, battery and servos

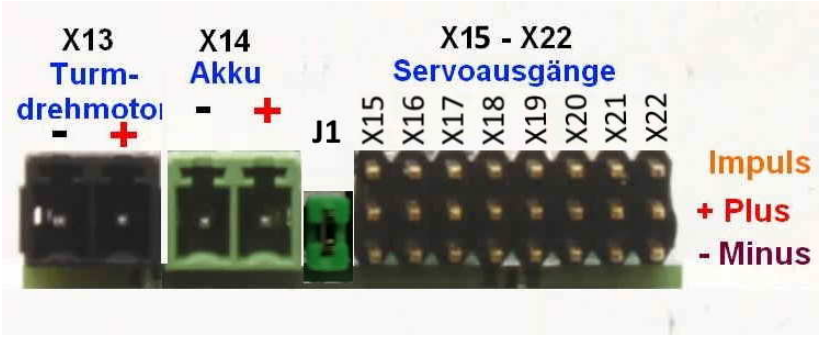


Figure 5: Assignment of the plug connectors for servo outputs, battery connection and tower motor

4.3.1 Connection of the tower motor

A plug-in, black screw terminal (X13) is provided for the tower motor. Together with the gyro sensor, the tower motor forms a feedback control

loop. The polarity of the motor is therefore important.
The direction of rotation of the tower motor is first checked by operating it on a DC voltage source. The motor is connected to a DC voltage source in such a way that the tower (viewed from above) rotates anti-clockwise. The cable that is connected to the positive of the DC voltage source in this direction of rotation is labelled Plus.
This cable is connected to the black screw terminal X13 +, the other to X13-.

Warning In case the motor is connected the wrong way, the control loop is not counter-coupled, but co-coupled. When the stabilisation is activated, this causes the tower to start running in one direction. It can be stopped by switching off the stabilisation or overriding the tower rotation on the transmitter.

Warning If the assignment of the direction of movement on the control stick is the wrong way round, the polarity of the motor must not be reversed. The servo reverse function on the transmitter must be used.

Note The colours of the connecting cables attached to the motor at the factory cannot be used as a guide. The number of gears in the gearbox and the installation position do not necessarily indicate the direction of rotation of the tower.

Note The motor must be interference-suppressed, as is usual in rc modelling.

4.3.2 Connecting the battery

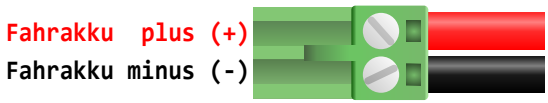


Figure 6: Assignment of the plug for the power supply

Power is supplied via the green, plug-in screw terminal (X14). Please ensure the correct polarity of the supply voltage! (see figure 6)
It makes sense to include a switch for switching the model on/off in the supply line to the battery.

The integrated BEC regulates the battery voltage to 5V, which is passed on to the receiver via the servo cable.

There is a fuse on the circuit board which is soldered to the PCB. If this fuse blows, the BEC no longer supplies any voltage and the controller no longer functions.

4.3.3 Jumper servo power supply

The jumper J1 disconnects the internal BEC from the plus connections of the servo outputs X15 to X22. In large models, the maximum current of 1A supplied by the BEC may not be sufficient for the connected servos. You can then plug an external BEC into a free servo output and remove the jumper.

4.3.4 servo connection

Anschluss	Funktion	gesteckt
X15	Seitenrichten	Nur PSO Version: Seitenrichten Waffenturm
X16	Höhenrichten	Nur PSO Version: Höhenrichten Waffenturm
X17	frei	
X18	Periskop	Nur bei Scalebus-Betrieb
X19	Rohrrückzug	Servo Rohrrückzug
X20	Rohrwiege	Servo Rohrwiege
X21	frei	
X22	frei	

Table 2: Assignment of the plug connectors for servo outputs, battery connection and tower motor

The servo for the gun elevation is connected to X20, the servo for the barrel recoil to X19.

In Scalebus mode, a servo for controlling the commander periscope can be connected to X18. It precedes the turret rotation OR the drive rotation.

When operating on servo lines, the output has no function because the information on the drive rotation is missing.

Main battle tanks with machine canonen turrets for urban fighting can connect servos to X15 and X16 for lateral and elevation control. These outputs are not stabilised.

Ensure that the servos can reach their controlled end position. If they are mechanically blocked (e.g. by a stop on the linkage levers), high currents usually flow, which drive the BEC into the current limit and lead to a reset of the module.

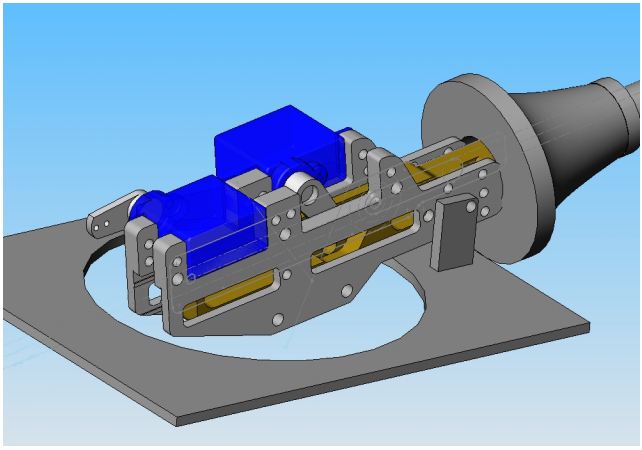


Figure 7: Example of a gun level and retraction unit with servos

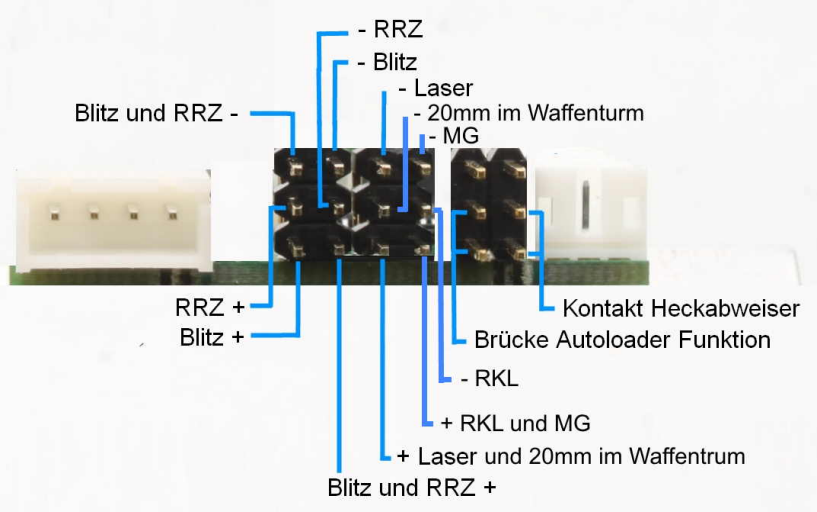


Figure 8: Assignment of the plug connectors for inputs and switching outputs

Anschluss	Funktion	Anschluss an
X1	Scalebus	Scalebus Leitung
X2	Kanone und RRZ + schaltend	LED,Hochspannungsblitz, motorischer Rohrrückzug
X3	Kanone und RRZ - schaltend	LED,Hochspannungsblitz, motorischer Rohrrückzug
X4	Lasermodul (und Waffenturm)	Lasermodul, LED für 20mm Kanonen-LED
X5	RKL und MG	automatisches RKL, LED für Koaxial MG
X6	Ladeautomatik ein/aus	Jumper
X7	Sensor Heckbereich	Schalter Heckbereich

Table 3: Belegung Motor, Servo, Akkuverbinder

The output for the gun generates a short flash when the shot is fired. This signal is positively switched on X2 (e.g. for Heng Long high-voltage flash) and negatively switched on X3 (e.g. for Tamiya high-voltage flash). An electric motorised gun retraction can be connected to the RRZ output. This output is also available with positive and negative outputs.

4.4 RKL, MG, 20mm gun and Laser

X4 and X5 each have a common plus for their consumers.

An output for a laser is active at X4 when the weapon stabilisation is switched on. This is also the output for the LED of the 20mm cannon (PSO version only).

An electronic rotating beacon (RKL) and the LED for the coaxial MG can be connected to X5.

4.5 muzzle flash

The module can simulate the muzzle flash in various ways. High-voltage flash units and LEDs can be controlled.

4.5.1 muzzle flash LED

A flash LED can be connected directly to the **flash and RRz +** and **flash -** pins of the module.

When the shot is triggered, the LED is switched on for approx. 300ms. The output switches max. 500mA against battery plus. High-current (HiFlux) LEDs can also be connected.

When using an LED *it is essential* to connect a resistor to limit the current.

4.5.2 high tension flasher

Electronic flash units from Tamiya or Heng Long can be controlled.

These have three connections, minus and plus to supply the high-voltage unit and a trigger input, which triggers the discharge of the high voltage via the flash lamp.

Heng Long and Tamiya units trigger with a positive pulse **(connection flash+)**

Note The electronic flash units of the above-mentioned manufacturers are designed for 7.2V supply voltage. If they are used, the module should be supplied with 7.2V accordingly.

Figure 9: Assignment of the Tamiya flash unit

Figure 10: Assignment of the Heng Long flash unit

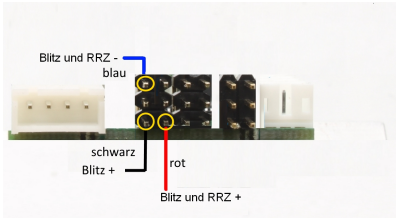


Figure 11: Connecting the HL and Tamiya flash unit to the module

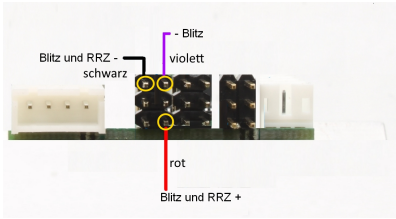


Figure 12: Connection for flash units with negative trigger pulse

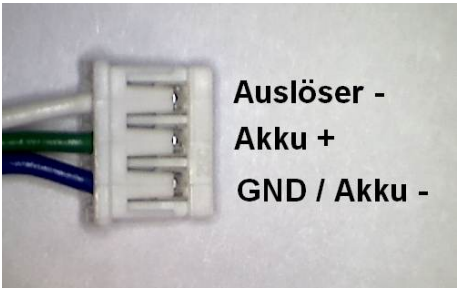


Figure 13: Belegung des Tamiya Rohrrückzugmotors

4.6 Connection of a motorised gun recoil unit

If **no** servo is used for the pipe retraction, a gun recoil unit with motor and limit switch can also be used. These units have three connections. One connection leads directly to the motor and carries constant + **(flash and RRz +)**. The second connection of the unit goes to the start pulse **(RRz -)**.

A second line leads from the 2nd motor connection via a switch to the continuous - **(flash and RRz -)**. These units have three connections. One connection leads directly to the motor and carries duration + (battery+). The second motor connection goes to the start pulse -. A second line leads from the 2nd motor connection via a switch to the continuous - (battery-). This switch ensures that the motor continues to run to the end position after receiving the start pulse. The output for the start impulse can be loaded with max. 500mA.

4.7 installation collision avoidance switch

A roller lever switch in micro design, is suitable for the optional collision avoidance switch. The switch and the actuating cams must be fitted and wired in such a way that the contact is closed when the gun is in the rear area. It is advisable to make the actuating cams adjustable so that the position of the gun elevation can be set.

Note Note that the switch is active when the turret is in the rear area (normally open). Tamiya uses a normally closed switch . This must be changed by using the free connection on the switch. The input can also remain open, in which case the lift does not work.

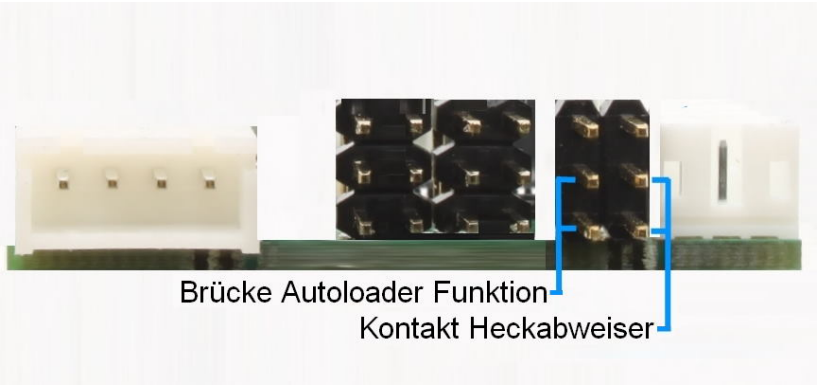


Figure 14: Jumper input for collision detection and automatic loader enable

4.8 autoloader simulation

After firing and recoil the gun, the module moves the gun to the loading position for approx. 1 second to simulate the loading process. If this function is not required, the jumper can be plugged into the position shown in figure 14.

5 Commissioning

5.1 Important notes

5.1.1 Independent movement during transport

Slowly familiarise yourself with the behaviour of the stabilisation! When stabilisation is switched on, the module compensates for any changes in position, even if you do not actively control anything on the remote control. If you lift the model off the ground as usual and turn round, the cannon remains levelled. The same applies to transport on low-boys.

Switch off the stabilisation in these situations or switch off the model completely.

5.1.2 polarity of the turret rotation motor

If the turret rotation motor is connected the wrong way round, it will start running immediately when the stabilisation function is switched on and can only be stopped by switching off the stabilisation or overdriving the transmitter. **Pay particular attention to this when switching on for the first time and prepare for a quick switch-off**.

If necessary, change the + connections in X13.

5.2 Setup

The setup can be divided into calibration and parametrisation

Calibration is always necessary.

Parametrisation is optional. Parametrisation is divided into two groups:

1. parametrisation mode for the tube positions for stops, loading and rear deflector position
2. parametrisation mode for the installation position and weapon release

The module operates with the following factory default settings:

- Alignment of the module in X- direction
- max and min gun position to maximum possible servo deflection
- Loading position and rear deflector at centre servo position
- max. and min pipe retraction to maximum possible servo deflection
- Double function for triggering the shot via the elevation channel active

If you do not want to set the gun positions, you must mechanically ensure that the servos can reach their end position. Entry into settings mode is always indicated by alternate flashing. If no button is pressed during the alternate flashing, settings mode is terminated after approx. 10 seconds.

5.2.1 Calibration

During calibration, the signals of the RC system are measured and the inertial sensors are calibrated.

This calibration must be carried out during the first installation and in the following cases:

- Changing the assignment of the servo channels
- Replacing the transmitter or receiver
- changing the moduls position in the turret

To do the calibration, please proceed as follows

1. switch on the transmitter
2. set the control lever of the turret, the gun elevation and the sensitivities to the centre position. Move the on/off switch to the centre position.
3. Hold down the button on the module and turn model power on
4. The LED1 and LED2 light up
5. Release the button
6. LED2 lights up and LED1 flashes until the controller has detected the centre position of the channels. If zero point detection is not possible, LED1 does not light up.
7. The module now waits approx. 10 seconds for the button to be pressed. This is indicated by LED 1 and LED2 flashing alternately.

8. If the button is not pressed within the 10 seconds, LED2 goes out and LED1 lights up continuously

The two sensitivity channels are set to 50% after this procedure.

5.2.2 settings

At the end of the calibration, you have the option of entering the settings mode for the barrel positions. At the end of calibration, the module flashes alternately for approx. 10 seconds. During this time, you have the following options:

do not change settings If the button is not pressed within 10 seconds, settings mode is not called and the settings remain unchanged. The module then switches to normal operating mode.

Change settings and apply old values If the button is pressed briefly, the module switches to setting mode for the gun positions. Previously set positions are retained and moved to.

Change settings and set to default If the button is pressed (approx. 3 seconds) until the module flashes twice, the module also switches to setting mode, but all positions are reset to the centre position. This prevents the gun from unintentionally moving to a mechanical stop during adjustment. Because the upper and lower stops are the same, you must change the values for the upper and lower stops below. Otherwise the tube will not move after the end of settings mode. The double flashing can be recognised by the double flashing of LED2, after which LED1 lights up to indicate the start of a new cycle.

Position	gun elevation and barrel recoil	blinkcode
1	maximal hight	double
2	minimal hight	tripple
3	loading position	quadruple
4	minimal hight with gun in deflection area	fivefold
5	recoil max. recoil	sixfold
6	recoil idle position	sevenfold

Table 4: LED Flash codes when setting the barrel positions

The height and retraction are set using the height adjustment control on your remote control. Turret turn and other functions are inactive during this adjustment mode.

Tipp Before setting the heights, move the turret just before the area in which the tail section switch is triggered. This allows you to better estimate the minimum height in the rear area.

1. The module flashes alternately and the button was pressed within 10 seconds
2. The module moves the gun elevation to the last set position of the maximum height and shows two flashes. The two flashes can be recognised by the double flashing of LED2, after which LED1 lights up to indicate the start of a new cycle.
3. Use the transmitter to move the gun elevation servo to the top position that makes sense for your model.
4. briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
5. the module moves the gun elevation to the last set minimum height position and flashes three times
6. Use the transmitter to move the gun elevation servo to the lowest position that makes sense for your model
7. briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
8. the module moves the gun elevation to the last set position of the loading position and shows four flashes
9. Use the transmitter to move the height adjustment servo to the

charging position of the autoloader (if you are not using it, set any position)

10. briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
11. the module moves the gun elevation to the last set position of the minimum height in the rear area and flashes five times
12. Use the transmitter to move the gun elevation servo to the minimum height position at which it does not collide with the tail. This height is approached when the tail area switch is active.
13. briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
14. The module moves the barrel servo to the last set position for maximum retraction and flashes six times
15. Use the transmitter to move the retract servo to the maximum retract position.
16. briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
17. the module moves the barrel servo to the last set position for the rest position of the retract servo and shows seven flashes
18. Use the transmitter to move the retract servo to the rest position.
19. Briefly press the button (LED1 and LED2 light up continuously as long as the button is pressed)
20. The module now waits approx. 10 seconds for the button to be pressed. This is indicated by LED 1 and LED2 flashing alternately.
21. If the button is not pressed within the 10 seconds, LED2 goes out and LED1 lights up continuously
22. If the button is not pressed, the module saves all six servo positions and switches to operating mode. If you switch off the module beforehand, nothing is saved.

At the end of the barrel settings positions, you have the option of entering the settings mode for the installation position and gun triggering. At the end of the barrel settings positions, the module flashes alternately for approx. 10 seconds. During this time, you have the following options:

do not change settings If the button is not pressed within 10 seconds, the parameterisation mode for the installation position and gun triggering is not called up and the settings remain unchanged. The module then switches to normal operating mode.

change settings If the button is pressed briefly, the module switches to the setting mode for the installation position and the gun trigger.

1. The module flashes alternately and the button was pressed within 10 seconds
2. LED1 lights up continuously and goes out briefly periodically. You are now in the mode for setting the installation position of the module. You can install the module in four directions +X,-X,+Y and -Y
3. Tilt the model in the direction of the main weapon so that the tube is pointing downwards. The LED2 indicates that one of the four possible positions has been recognised. Briefly press the button as long as LED 2 lights up. If you press the button while LED2 is not lit, this deactivates the vertical stabilisation function.
4. LED1 now flashes briefly and periodically. This indicates the mode for activating the shooting function. If you are not using the firing function (flash output, tube retraction and autoloader), the double assignment of the elevation levelling can be annoying, as you will not notice that the flash and retract are not connected, that you have triggered the shot and therefore the elevator servo does not react to the stick.
5. LED2 indicates the status of the firing function. If it lights up, the firing function is on. It is active in the neutral position of the remote control stick. If you move the stick away from the centre, the LED goes out and deactivates the shooting function.
6. briefly press the button in the state you want to save (LED1 and LED2 light up continuously as long as the button is pressed)
7. the module saves the settings. If you switch off the module beforehand, nothing is saved.
8. the module stops flashing and LED 1 lights up

Settings aredone now and the module is ready for operation. The settings made are saved so that they are retained the next time the module is

switched on.

5.3 turn on

1. When switching on, the module measures the zero point of the inertial sensors, so the model must be level when switching on.
2. The right-hand LED2 indicates whether stabilisation is active.

6 Optionen

For Tamyia models with DMD-T07 we recommend the *TVC-GSU-11*.

7 Glossary of terms

BEC **B**attery **E**liminator **C**ircuit
This circuit replaces a extra Battery needed for the receiver and connected servos, by generating a fixed voltage from the drive battery.

ESC **E**lectronic **S**peed **C**ontroller
This is a unit to control the speed and direction of a DC motor.

LED **L**ight **E**mmitting **D**iode
A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it. Benefits of LEDs are low power requirement and long life. Disadvantages is the more complicated wiring, compared to a classic bulb, it has a polarity and a resistor is needed to limit the current.

Scalebus The Scalebus is a development of **SGS electronic** to connect controllers and modules to compose solutions for complex RC models.

SBus The Sbus has been introduced by **Futaba** to simplify the wiring between RC Receivers and servos / esc.

SBus The SBus was introduced by the company **Futaba** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

IBus The IBus was introduced by the company **Flysky** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

SUMD The SUMD sum signal has been introduced by the company **Graupner** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

Abbre-vation	meaning	explanation
Stick	**S**tick	Stick not self centering
StickS	**S**tick **S**elfcentering	self centering Stick
TSMS	**T**hree **S**tage **M**omentary **S**witch	self centering momentary switch with three stages
TSS	**T**hree **S**tage **S**witch	switch with three stages
Pot	**Pot**entiometer	linear- or rotary knob
PotC	**Pot**entiometer with **C**enter key	linear- or rotary knob with a center key

Table 5: Abbrevation for the manipulators in the transmitter housing

8 Technische Daten

Nenn-Motorstrom	5 Ampere
Kurzschlussfest gegen Masse, Versorgung und Klemmenschluss, Überlastungsfest und Übertemperatur-gesichert	
Versorgungsspannung (ohne BEC)	5 bis 24 V
Versorgungsspannung (mit BEC)	6,5 bis 24 V
Zulässiger BEC Strom	800mA
PWM Frequenz	8kHz
Typische maximale Verlustleistung	25 Watt
Typischer Spannungsabfall in der Endstufe	1.5 Volt
Abmessungen	62x41x18mm
Softwareversion	28.0e.78

9 Important

This equipment described above has been tested and inspected for quality and function. And it is intended for installation and use only as described above. This equipment does not contain any user serviceable parts. The supplier accepts no responsibility, financially or otherwise, for damages caused by use or misuse of the equipment described above. The equipment must be protected from exposure to water to prevent short circuit. Do not open the equipment or attempt to change function, wiring, or documentation in any way. Do not connect to incorrect voltage or reverse the battery polarity. Do not use in a careless or abusive fashion around persons or property. Do not attempt to repair. Any legitimate use, e.g. Installation in a model makes the user responsible to ensure that the operating instructions and non-liability agreement are provided to the purchaser of the module described above.

Do operate the device only in the permissible operating conditions. Do not make any changes to the controller through. The device shall not be exposed to splashing water or rain (causing a short circuit).

9.1 Warning

Due to choking hazard caused by small parts that may be swallowed, this product is not suitable for children under 6 years of age.

9.2 Environmental protection

For defective devices, repair is possible in many cases. Please contact us. If you do decide to dispose of the device, you will be making a contribution to environmental protection if you return the device to a municipal collection point for recycling. Electronic devices do not belong in household waste.

9.3 Address

SGS electronic
Zeppelinstraße 36
47638 Straelen
Germany / Europe

9.4 Contact

Web www.sgs-electronic.de
Email info@sgs-electronic.de

Ust-IdNr.: DE 249033623
WEEE-Reg.-Nr.: DE 90290947

9.5 Document date

This document was created on 2024-03-05 18:08:10+01:00

9.6 Documentation

We reserve the right to make updates, changes or additions to the information and data provided.

The documentation that accompanies your product applies.

Please note that documents obtained later via download may not correspond to the status of your module.