PowerBox Systems®

World Leaders in RC
Power Supply Systems

V 2.80

Functions · Servos · ServoMonitor · GPS · Receiver

Settings · FlightModes · Model · Timer · Mixer

CORE®

Made in Germany

Dear PowerBox-Pilot,

Many thanks for placing your trust in us, and purchasing our **PowerBox CORE**. You have chosen an extremely unusual radio control system: the **CORE** has great presence and allure, which you cannot fail to appreciate when you pick up the transmitter for the first time. The **CORE** fits perfectly in your hands, and is the perfect tool for controlling your valuable models with precision.

30 months have passed between the initial idea and the start of series production: in this time, we have developed everything from the ground up: electronics, mechanical systems, choice of components and suppliers, external appearance, technical design, mold construction, software architecture, basic operating philosophy and endless details.

Development started late, and the system had to be completely re-designed, but over time we realized that this offered one great advantage: compatibility with old systems developed in the past did not have to be considered in any way. This is a very important benefit, since there have been significant technical advances in the field of 2.4 GHz systems since the start of the current era.

A single example will suffice to underline this advantage: the highly developed radio link, offering a range of more than 9 km. This is unique, and provides unrivalled system reserves.

Further advances are evident in our new bi-directional **P²BUS** which operates as the telemetry interface, and is capable of transferring data at unprecedented speed. The most important advance as far as the pilot is concerned is the user interface, which is controlled using the transmitter's integral touch-screen: the entire menu system is accessed from here, and the self-explanatory menus are completely logical in their structure. The internal high-performance Linux computer provides unlimited future expansion potential.

We are confident that we can guarantee our customers durability and quality at the very highest level, because we exclusively use components of the highest possible industrial quality, produced by top manufacturers.

The entire production process – starting with circuit board assembly and extending right through to final assembly in our own premises – takes place in Germany. Each **CORE** is hand-made, and represents an example of German craftsmanship at its best! All our staff are united in their shared aim: perfection!

We wish you many hours of pleasure and countless successful flights with your new **PowerBox CORE**!

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2. First Steps

• Switching on

The **CORE** is switched on by holding the ⏻ -button pressed in until it lights up red. Release the button briefly, then confirm the power-on process by briefly pressing the button a second time. The transmitter is switched off in exactly the same way. The button changes to green when the Linux system starts booting; this process takes about 25 seconds. Once the **CORE** is running, you will see the Home display on the screen: this shows fields containing telemetry values, timers, servo positions or quick-select buttons for menus. These fields are known as widgets.

> **⚠ NOTE**
>
> The CORE is fitted with a fully redundant power supply system, which is deliberately kept separate from the Linux computer and the other processors. This means than any malfunctions in the complex Linux system cannot possibly result in the transmitter switching itself off. The two real-time processors also function completely independently of the Linux computer. The model remains fully controllable even if the Linux computer is pulled out when the system is running!

• Entering the Menu

The main menu is accessed by swiping a finger downwards from the top edge. You can now touch the left-hand menu symbol ⊞:
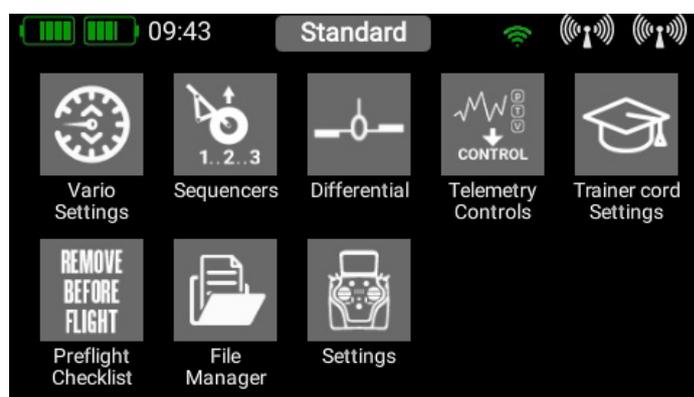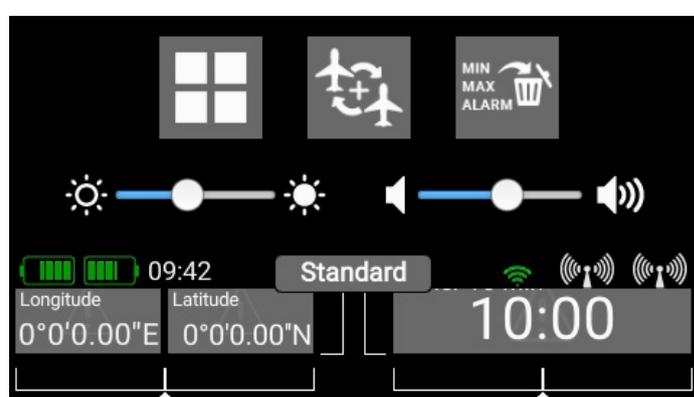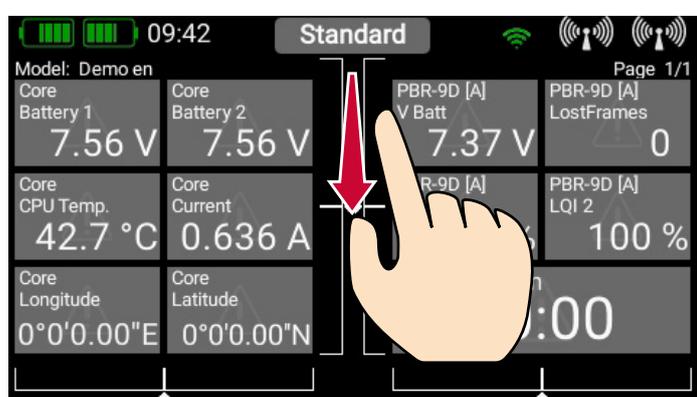
There is no need to press firmly, as the capacitive touch-screen simply responds to touch, like all modern smartphones. The symbols in the Main menu are arranged in order of importance.

> **⚠ NOTE**
>
> You can transfer any menu point to your own personal menu. This is accomplished simply by holding your finger on the appropriate menu for a few seconds. When the "Person symbol" appears, the menu point is transferred into your personal menu, which you can access conveniently using the quick-select button ☖ at the bottom of the screen. If you wish to remove a menu point again, use the same procedure: keep your finger on the menu symbol in question, and that entry is duly erased.

• Main Screen

❶ Battery indicator

The two green battery symbols indicate the state of charge of the two internal batteries. The charge status is divided up into five blocks, each of which stands for 20% of charge. The charge symbols change to orange and then red if the state of charge falls below 20% and 10% respectively. You can also set up a telemetry widget to display the exact battery voltage. Setting up a telemetry widget provides the opportunity to add an audible or spoken alarm.
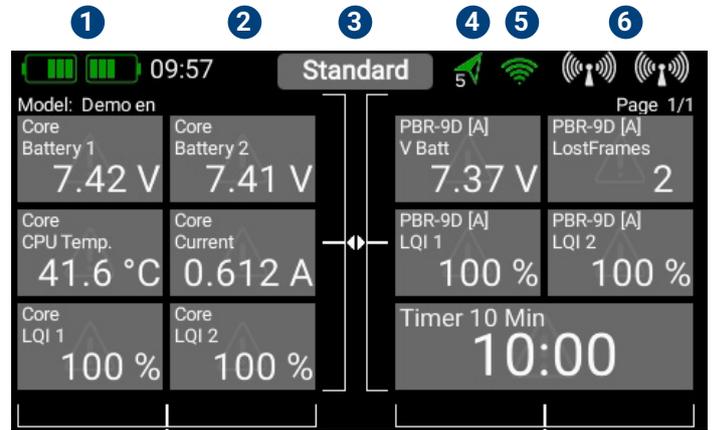
❷ Processor Status

This symbol is displayed when the workload on the Linux computer reaches a particular level. The symbol flashes briefly when data is being processed.

❸ Flight Mode

This field shows the current flight phase (flight mode). The name of the flight phase can be set individually in the Flight Mode menu.

❹ GPS

This symbol appears when the integral GPS has what is known as a "FIX". This means that sufficient satellites have been picked up to receive GPS data.

❺ Wifi

This symbol is cancelled with a red line if WiFi is not active. WiFi is only active when it has been switched on manually, or automatically during the Update process.

❻ Aerial symbols

The aerial symbols illustrate in graphic form the LQI value of the CORE's aerials, i.e., it corresponds to the reception quality of the return channel.

3. Menü

Functions - Function overview - Create or erase functions	**Mixer**	**FM** Flight Modes	**Virtual switches**
Servos - Servo overview - Create or erase functions	**ST-A OUT 50%** Servo Cut-off	**Rx** Receiver management - Receiver overview - Bind or remove receiver - Range check	**Speech output**
Servo Monitor	**Model** - Model overview - Create, load, copy and erase models	**File manager**	**Settings** - System settings - Screen - Audio
Teacher / Student	**Vario**	**Sequencer** 1..2..3	**Differential**
CONTROL Telemety Controls	**REMOVE BEFORE FLIGHT** Remove before flight		

3.1 Menu Settings

This menu is used to enter your name, set the time display format and select your preferred language. At this point you will also find the Display settings such as background and icon color, and the Audio menu for setting the various volume levels.

These settings are global for all models.
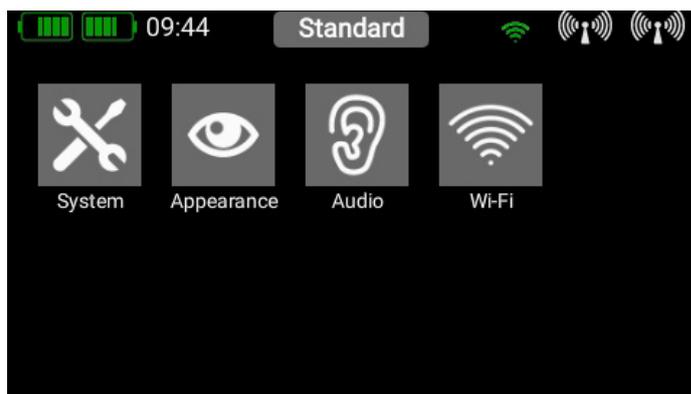
3.1.1. System
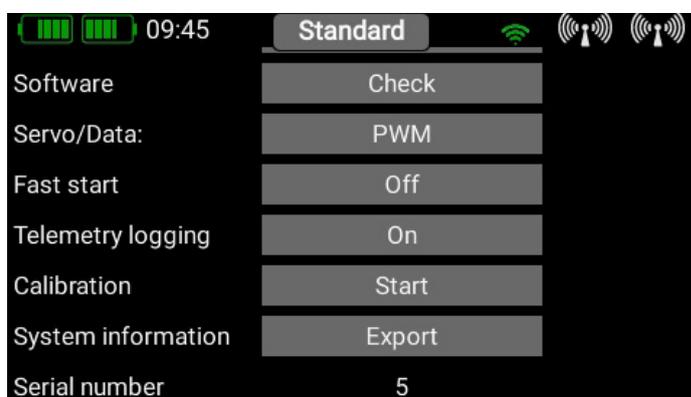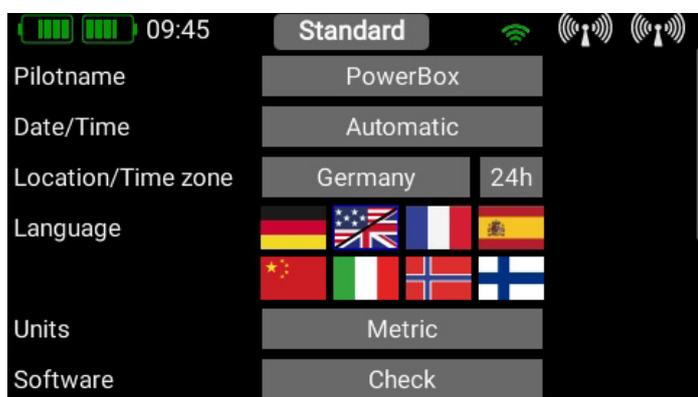
• Pilot name, Date and Time

Enter your name at Pilot 's name. You can change the name at any time. It is very important to set the correct Time of day and Date, as the telemetry data log files cannot be assigned unambiguously without that information. Please be sure to set the date and time of day. A later update will activate the internal GPS of the CORE, and at that time the clock will set itself automatically.

- **Language**

  The Language setting affects the output of speech and telemetry data. When the sensors are scanned, the selected language is sent to the sensor, which then sends back the telemetry values using the terminology in that language - if implemented.

- **Units**

  It is also important to set your preferred units of measurement: the system sends your choice of Metric or Imperial to the telemetry sensors, and the sensors then deliver all telemetry values using your preferred units, such as kilometers / miles or liters / gallons.

- **Software**

  The Software menu will be discussed later; the transmitter and receivers can be updated at this point.

- **Servo/Data**

  The Servo / Data setting determines whether the 3-pin output under the cover generates a PWM servo signal to act as a servo tester, or a real-time telemetry output in the P²BUS format. The latter makes the telemetry data from the model accessible at the transmitter itself for further processing. Typical uses of this would be for recording devices or variometers with expanded functions used for Triangle competitions.

  Since Version 2.35 this socket has acted as **S.BUS** or **SRXL input** for the Teacher / Student system. These two protocols can be generated by the receivers used by virtually all radio control systems. This allows the CORE' s Teacher / Student system to be very flexible in operation, even in conjunction with low-cost Student transmitters made by a variety of manufacturers.

- **FastStart**

  This feature stores the currently loaded model settings in the real-time computer when the transmitter is switched off. Next time you switch on, you immediately have control of the model. The Linux computer boots in the usual way. Settings and trims are only available once the Linux computer is running. This feature is extremely practical for competition work, or if you simply want to extend or retract the undercarriage when rigging or dismantling the model.

- **Telemetrie Logger**

  This button activates or disables the recording of telemetry data on the SD card. The default setting for this feature is **ON**.

- **Calibration**

  Another important point is the Calibration menu; this is described in full at a later stage.

- **System Informations**

  This button exports the system informations to an external memory stick.

3.1.2. Screen

Background,Color, Icons, Brightness

You can select your preferred color scheme here. The brightness control should be set to a value which enables you to see the screen content clearly and distinctly. Please note that the screen brightness does have a perceptible effect on battery duration!

- **Dimmer**

  The Dimmer time setting determines the point at which the screen is automatically darkened.

- **Automatic lock**

  The automatic screen lock can be released again using the 🔓 - button.
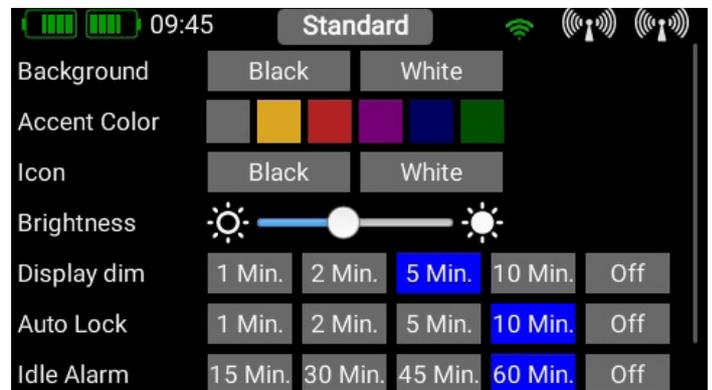
- **Idle Alarm**

    Enter a time here after which you wish the transmitter to generate an alarm if the sticks have not been moved. The purpose of this feature is to help you to avoid leaving the transmitter switched on accidentally.

- **Intro**

    The Intro Video setting enables you to switch the brief **CORE** logo sequence on or off when the system is switched on. Disabling it shortens the initial boot time by a few seconds.

3.1.3. Audio

The Audio menu enables you to set different volume levels. In the right-hand field you can set the volume to a fixed value. However, you also have the option of assigning a rotary control or switch for this purpose. The first step is to click on the central field, which causes a further context window to open where you can assign a transmitter control. All you have to do here is move the rotary control or switch which you wish to use for volume adjustment. When you leave the Context menu in which you assigned the control, you will see directly in the Audio menu how the rotary control or switch alters the volume level.
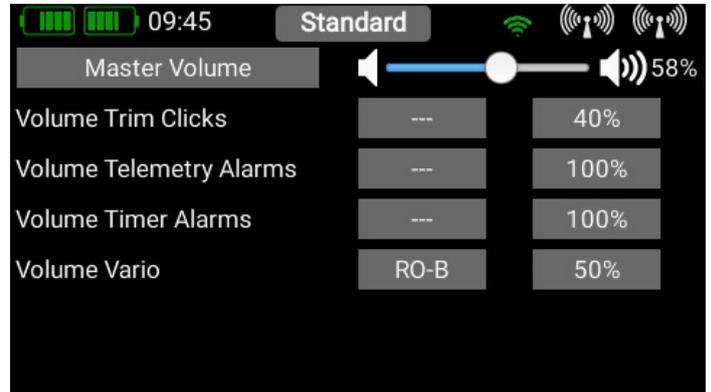
3.1.4. Wifi

If you wish to use the Online Update function you must first set up your WiFi connection. The **CORE** transmitter can be bound to your stationary router at home, or to a hotspot which you create with your mobile phone. This means that you can even update your system at the flying field!

You will find the WiFi settings in the **System settings** menu. First switch on the WLAN module by pressing the **OFF** button. The WiFi module in the transmitter immediately searches for all WLAN hotspots which are in range.
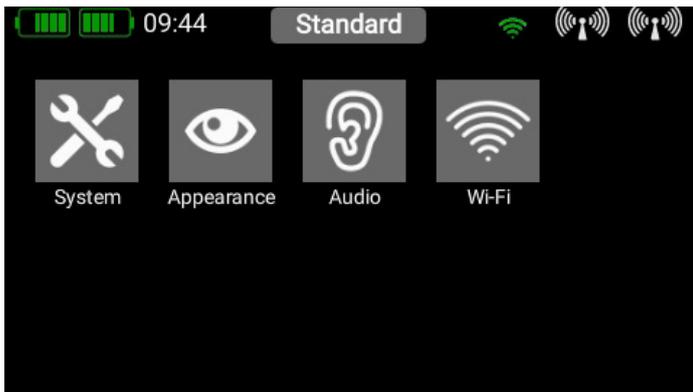
Select the hotspot you wish to use. You will now see the Network Password mask. Enter this, and press Connect. As soon as the connection is made, your IP address is displayed, and the WiFi symbol at the top turns green.
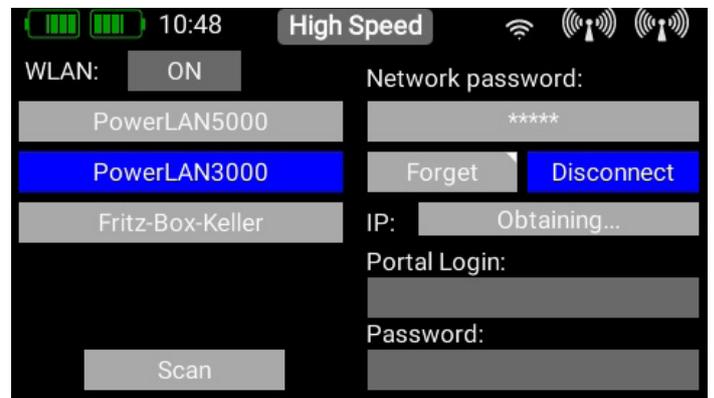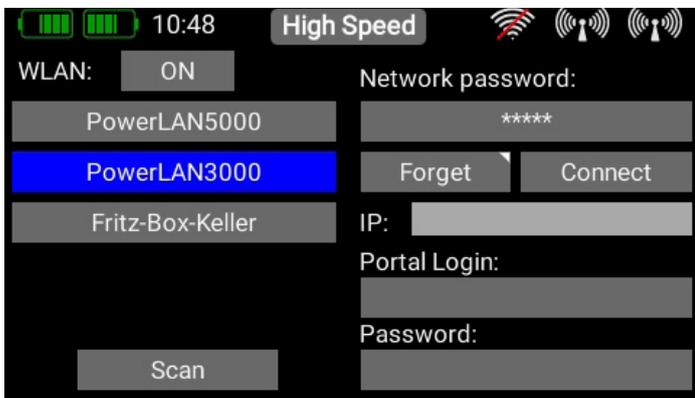
All passwords are stored in encoded form in the transmitter's Linux computer memory, and cannot be read out. The purpose of the Forget button is to erase this information.

At the bottom right you will find two input fields for the Portal login. This feature will be available as soon as the web portal goes online. This enables you to store model files and log files online in a cloud or to evaluate telemetry logs.
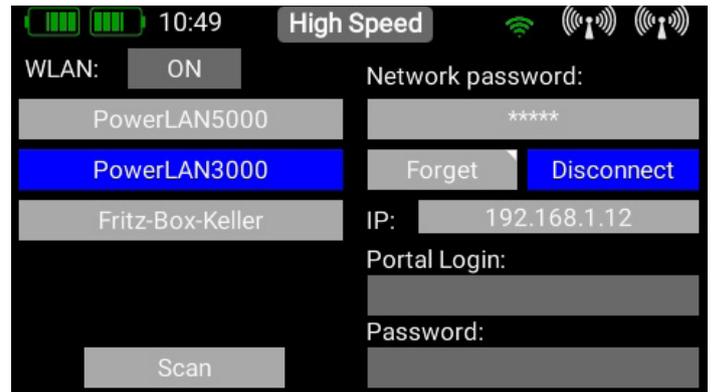
3.2 Model Menu

Select the **Model** button in the **Main** menu, and you will see an overview of all models stored in the transmitter. You can also set up, rename or erase models and model folders.

At this point you can also store pictures (215 x 100 pixels, *.jpg or *.png) for your model, and reset the model operating time. The Export function makes it swift and simple to export a model file onto a USB memory stick.

To create a new model, briefly touch the + button at the bottom of the screen. Assign a name to your model, and confirm your choice with OK. You will now see the Select screen for the model type. At this point you can select the appropriate model type, with the additional options of delta wing and V-tail.


NOTE

Do not delete the Deme model. If all models are deleted the radio cannot start!

On the next screen you select one of the ranges on the right-hand side, e.g. Wing. The screen now shows a diagram of a wing corresponding to your chosen type. If your configuration is more specialized, that presents no problems: at a later stage you can very easily program individual functions manually.
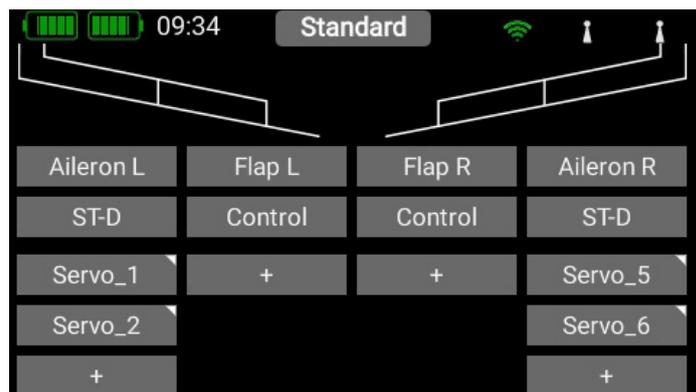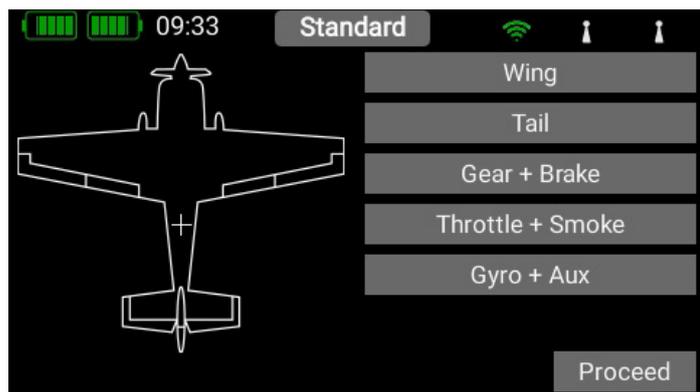
Briefly press Control, and move the aileron stick to select the Aileron control in the Context menu. Now you select a transmitter control which is to control the left aileron; this will be the left or right primary stick, depending on the transmitter mode you prefer.

⚠ NOTE

The software of the CORE has no modes – it is only the mechanical settings of the transmitter sticks which determines the stick mode.

If you now leave the Select screen again, you will see that the same transmitter control has also been assigned automatically to the right aileron. The next step is to select the servo outputs to which you intend to connect the aileron servos; this is accomplished by pressing **+**. Note that you can assign up to eight servos to a single function.

If your model is an aerobatic aircraft, you would naturally select two or three servos at this point, if you have multiple servos mechanically connected to a single control surface. At a later stage you will be able to set the travel, direction of rotation and center position for each servo separately. If these parameters are too coarse for your application, you can set an individual curve with up to 17 points for each servo.

Back in the Assignment screen it is also possible to rename the functions to suit your own preference.

If you decide to assign the wing flaps at this point, you will learn to appreciate one of the truly unique features of the CORE. As with the ailerons, you again assign a transmitter control to the flaps. If each flap is operated by a separate servo, you won't notice anything unusual: you simply assign the flaps to your preferred servo outputs. However, if you also want the ailerons to double as flaps, or want the ailerons to be mixed in to the flaps, you also assign the aileron outputs to the flap function. These functions are now superimposed, i.e. the mixing is accomplished simply by assigning the servos. At a later stage you can adjust the servos individually, both for the Aileron function and the Flap function. Servo travel, center and direction can be set separately for both functions!

An even clearer example of this exceptional feature relates to models with a **Delta wing**. If you select a delta using the Assistant, the correct functions are assigned automatically. To clarify this, the manual method would be as follows:
As an example, servos 1 and 5 are assigned to Aileron. Servos 1 and 5 are also assigned to Elevator. Since the servos are installed in a mirror-image arrangement, it is logical that the servos always operate as ailerons, regardless of whether the pilot moves the elevator stick or the aileron stick. Now we switch to the Elevator function and reverse the direction of rotation of one servo. The elevator function now works correctly, but the "reversed" elevator function has no effect on the servo direction when an aileron command is applied, i.e. the ailerons still work correctly. That's all there is to setting up a "**Delta mixer**".

Back to our Wing screen: when all the assignments are complete, press the **‹ button**, amongst the quick-select buttons at the bottom in order to return to the overview. You can now continue assigning transmitter controls and servos to all the remaining assigning transmitter controls and servos to all the remaining functions. When everything is finished, touch **Continue** at bottom right. The functions and servo assignments are complete.

ƒx 3.3 Function Menu

You now arrive at the most important screen display: The **Function overview**. In principle, the set-up of the whole model is carried out from this starting point. The display is arranged logically from left to right:

```
Function > Control > Trim > Setup > Failsafe
> Servo(s)
```
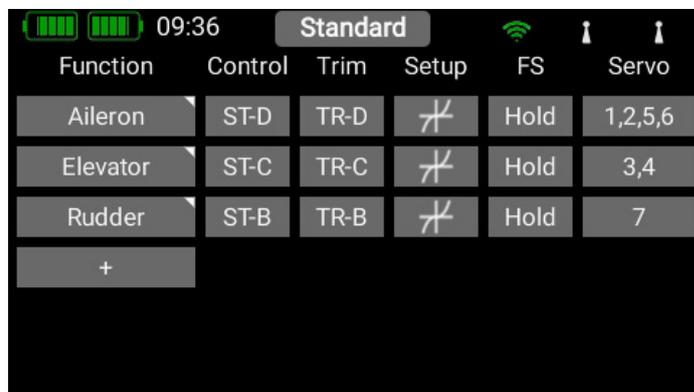
The individual points in detail:

3.3.1. Function

Each function always contains a transmitter control, the associated trim, the settings for the transmitter control – such as Expo and Travel, Failsafe or Hold – and the assigned servos. Each function can also be renamed just as you wish at this screen: simply touch the Function name.

3.3.2. Control

Here you can assign a transmitter control or a fixed value to the function. The transmitter control can be a stick, a slider, a rotary control, a switch or a button. As of Version 2.70 it is also possible to use telemetry data as the transmitter control. More on this in the Telemetry Control menu.
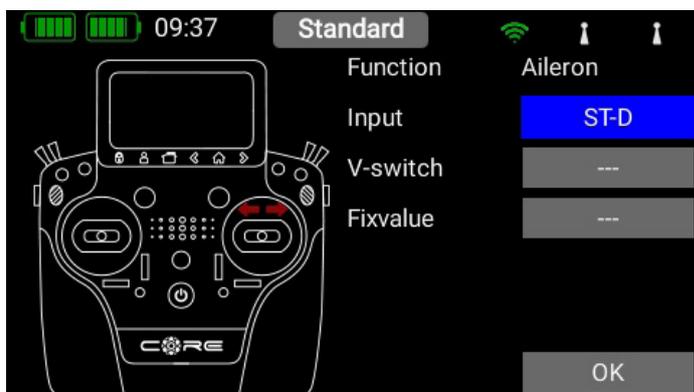
3.3.3. Trim

• Flight Mode

Here you can select whether the effect of any trim adjustment is to be Global – i.e., the trim value should be the same in all flight modes – or Single – i.e., the trim value should be variable separately in each flight mode. The method of using flight modes is discussed later.

• Trim Control

It is necessary to assign a trim control as the first step here. This can be one of the four trims located adjacent to the primary sticks, or two of the four rubberized push-buttons. If you select the push-buttons, the buttons always work together left and right as the trim.
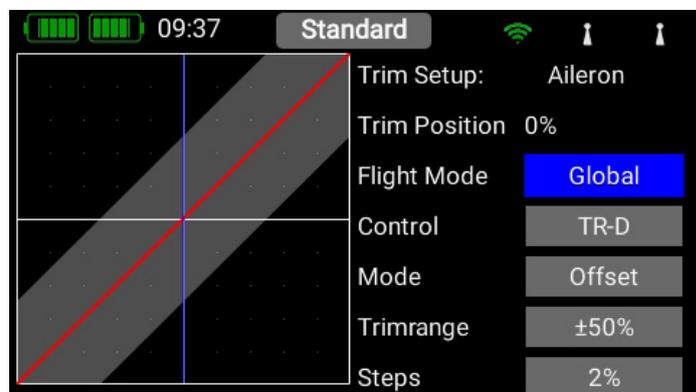
- **Trim Mode**

  You can choose any of four different trim modes. The standard one is Offset mode: In this mode a trim adjustment affects the entire range of stick travel, i.e. including the end-points. Alternative trim modes are Left and Right; typically, these are intended for idle adjustment in the case of engines and turbines. In the Center trim mode any adjustment only affects the center range, i.e. the end-points remain unchanged.
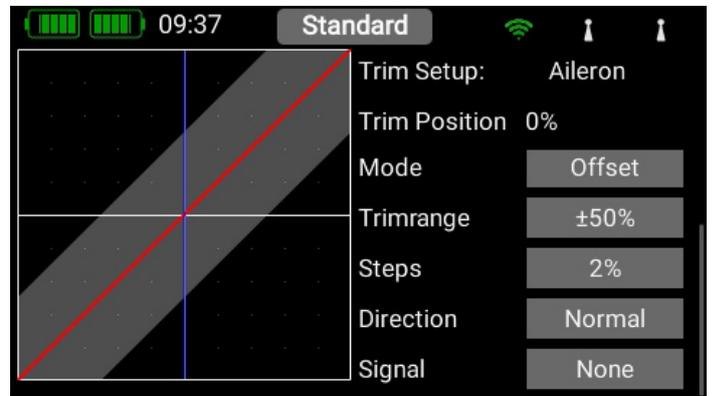
- **Trim Range**

  At this point you can limit the permissible trim range. The percentage value defines the max. throw which the trim can move.

- **Steps**

  Here you can set the number of trim steps or increments; not the size of the step.

> **NOTE**
>
> If you alter the Min./Max. values, the increment size also changes - assuming that the number of increments remains the same.

- **Direction**

  Here you can set the direction of the trim control; for example, you may need this function in connection with the trim buttons.

- **Signal**

  At this point you can set whether the trims are to generate an audio signal when they are adjusted, or when they pass through the center point. A vibration signal is also available.

3.3.4. Setup

At this point you can adjust the transmitter control input, Expo, transit time and curves.
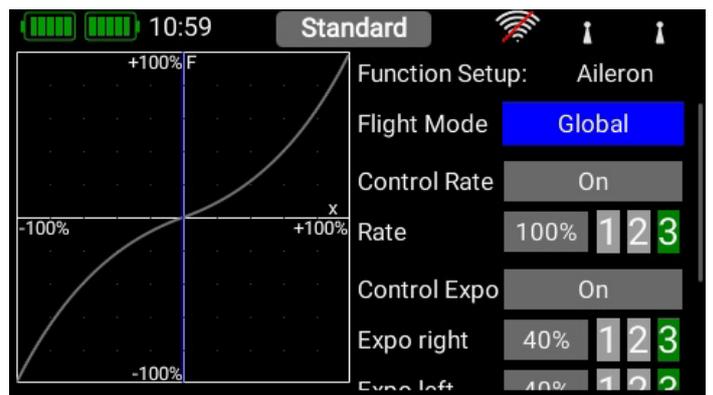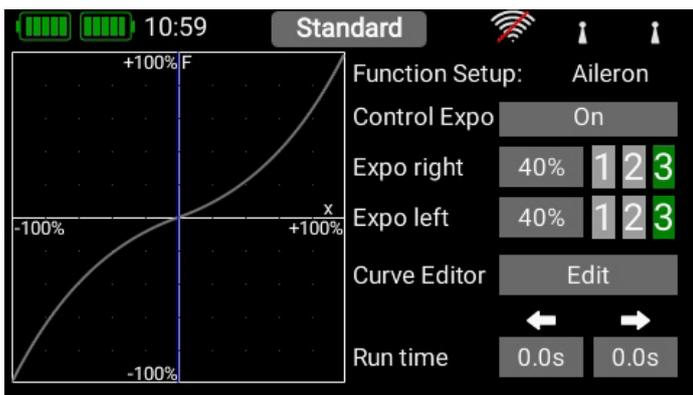
- **Flight Mode**

  If you want the adjustments you make to affect all flight modes, set this menu point to **Global**. If you set this point to **Single**, you can carry out individual adjustments for each flight mode separately. This tool is extremely powerful, but if you wish to make use of it, you must first create flight modes – more on this later. Once you have set up the flight modes, all you need to do is activate them, then enter your preferred adjustments for the transmitter control concerned. The transmitter control settings (travel, curve, etc.) which you enter for, say, the "Landing" flight mode, will then have no effect in the "Thermal" flight mode.

- **Transmitter control Rate**

  Here you can select a transmitter control which switches the rate on and off, or sets it to linear. The transmitter control can be any of the primary sticks, proportional controls or switches.

- **Rate**

  The purpose of the **Rate** button is to adjust the travel of the **transmitter control**. If you select nothing for Transmitter control rate, the value is fixed. If you assign a **transmitter control** to Transmitter control rate, you can set different values on three levels. The level initially selected with the **transmitter control** you have selected is shown in green. If you select a proportional control as transmitter control, the values are applied in a linear fashion within the three levels.

- **Transmitter control expo**

  At this point you can select a transmitter control which is used to switch an Expo characteristic, or set it to linear. You can choose any transmitter control from the primary sticks, proportional controls or switches.

- **Expo**

  The purpose of the **Expo** button is to adjust the exponential factor. If you select nothing for **Transmitter control expo**, the value is fixed. If you assign a transmitter control to **Transmitter control expo**, you can use it to set different values on three levels. The level initially selected using the transmitter control you have selected is shown in green. If you select a proportional control as transmitter control, the values are applied in a linear fashion within the three levels.

- **Curve editor**

  he curve editor is used to set up special curves, for example, to program throttle curves.
  - The first step is to select the number of points: up to 17 can be specified.
  - Use the arrow buttons to select the point which you wish to move; the selected point changes color to green.
  - Adjust the percentage value to shift the point up or down.
  - The Smooth option can be used to even out the curve, and thereby avoid jerks in the servo's response.
  - Raw removes the effect of the curve smoothing.
- - Reset curve resets the curve to linear travel.
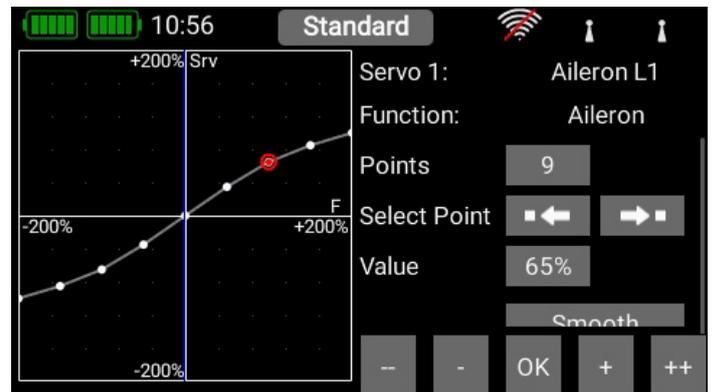
- **Transit time**

  At this point you can set two transit times: one determines the servo transit time to the left, the other to the right. The time in seconds determines how long the servo takes to move from one end-point to the other.

3.3.5. Hold / Failsafe

If you want a servo to take up a pre-determined position in case of radio signal loss, you should select Failsafe here. The Learn button now appears, enabling you to store the current position in the receiver.

⚠ NOTE

The receiver or receivers do not need to be bound at this point. The Failsafe positions are repeatedly transmitted to the receivers at regular intervals.

3.3.6 Servo

Here you will find the assigned servos again. Up to eight servos can be assigned to each function. As already mentioned in the **Assistant**, the travel and end-points of each servo can be adjusted separately here. Any adjustments you make to a servo at this point have no influence on the settings of the same servo if it is also assigned to another function. This provides a simple means of mixing in aircraft with multi-flap wings, delta wings and V-tails.

Aileron	Limit	Way	Center	Way	Limit	Direct.
Servo 1	-150	-50	0	50	150	Norm
Aileron L1	0 %					
Servo 2	-150	-50	0	50	150	Norm
Aileron L2	0 %					
Servo 5	-150	-50	0	50	150	Norm
Aileron R1	0 %					

- If you wish to adjust a servo's travel or center position, the first step is to touch the appropriate button; you can now adjust the value. As soon as you move the associated stick, the **Select** button shifts to the corresponding position. This means that you do not need to select **Left**, **Right** and **Center** when adjusting the control surface; instead, you select each point very conveniently using the transmitter stick, altering the position of the control surface using the arrow buttons at the bottom of the screen. At the same time, you can observe the effect of any change directly on the servo.

- **Servo number**

  Indicates the receiver output at which this servo signal is present.

- **Servo name**

  The servo name can be changed individually. Hold your finger on it to open up the keypad.

- **Limit**

  Works like a mechanical stop – the servo does not move beyond the set point.

- **Way**

  Adjusts the servo travel.

- **Center**

  Offsets the servo center position. Acts like a "mechanical" center offset – it also affects the end-points.

- **Direction**

  Reverses the direction of rotation of the servo.

- **Curve editor**

  The travel of each servo can be adjusted using a 17-point curve to match the mechanical installation even more accurately. The most common use for this function is to match servos to each other where they are mechanically linked (servo matching). At top right you will see the name of the servo whose curve you wish to adjust, and the function which the servo controls. If you alter the servo curve in the selected function, the change will have no effect on the travel which you have set for the same servo in other functions.
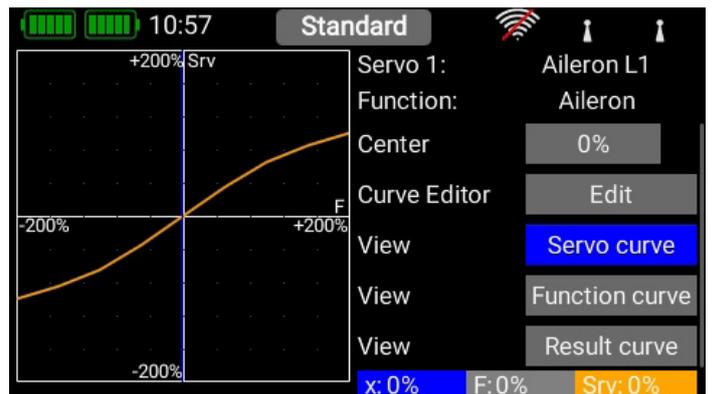
- Center

  The **Center button** is used to set a center offset which affects the whole of the servo's travel. You will see the effect of the change immediately in the graph on the left-hand side.

- Curven Editor

  Press Edit, when you wish to adjust servo travel using a maximum of 17 points.
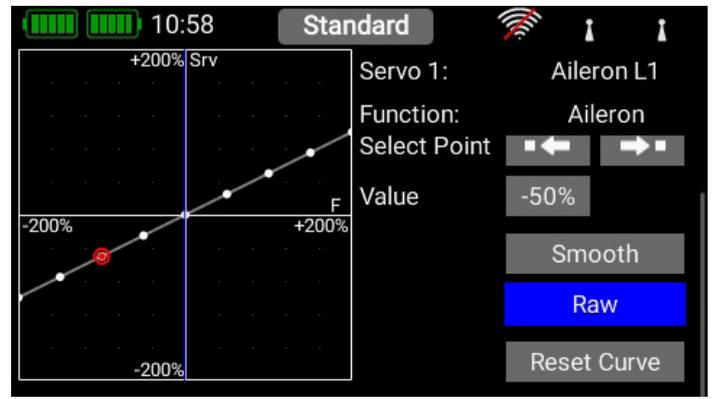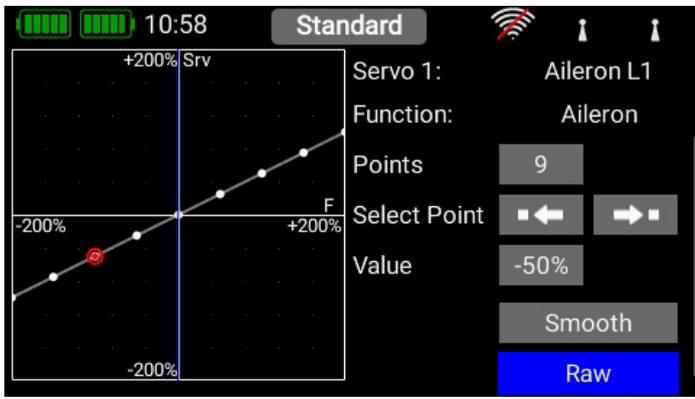
This is the procedure: use the arrow buttons to select the point you wish to adjust. Briefly press the displayed setting at **Value**, then adjust the servo for this position. The **Smooth button** can be used to even out the course of the curve. Right at the bottom you will find a **Reset button** which sets the curve back to a straight line. Once you have set the desired curve, return to the Servo Curve menu, where you will find three Preview buttons:

- Servo curve

This displays the shape of the pure servo curve.
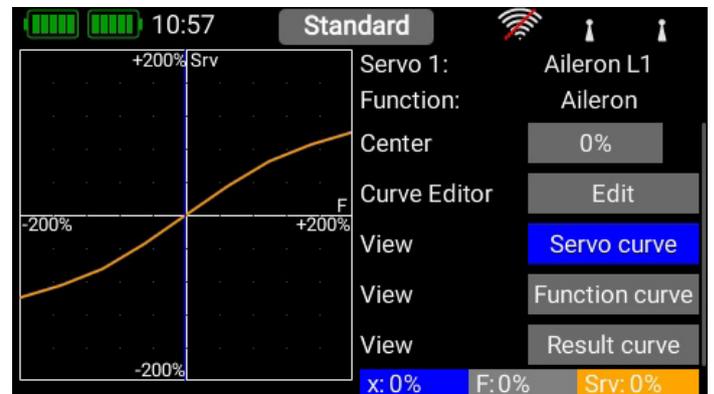
- Function curve

This displays the shape of the pure function curve. If you have already set up Expo or Dual Rates, this will be shown in this view.
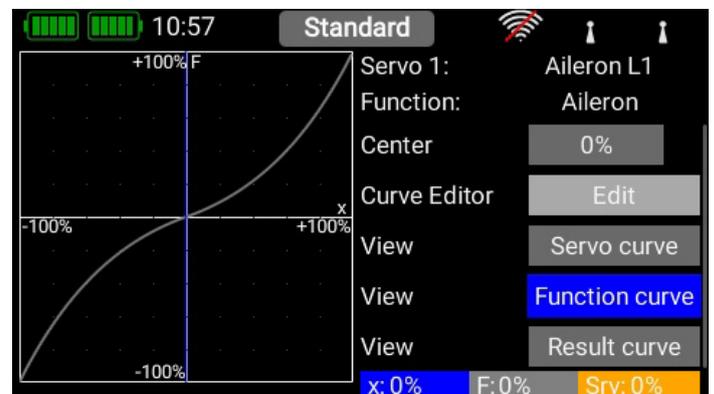
- Result

This displays the net result of the function curve and the servo curve.
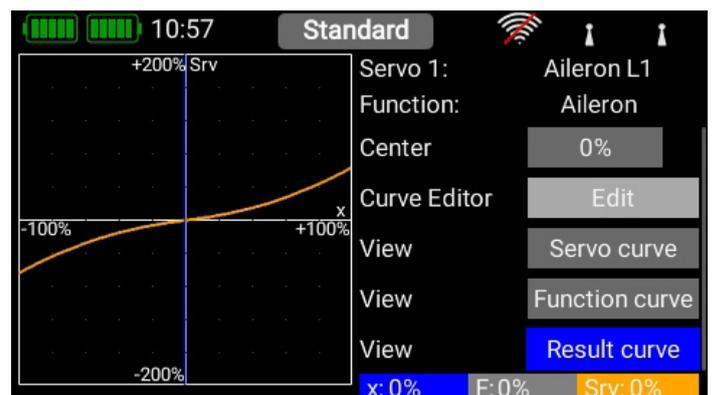
> **⚠ NOTE**
>
> If you wish, you can reset the servo curve once you return to the Servo Overview. If you accidentally find yourself at the Reset button, that is not a problem: simply select the Curve Editor again, and the curve will still be present there with the settings you last selected.

3.4 Binding a receiver

Select the **Receiver button** from the Main menu. As you will now see, up to four receivers can be bound to the **CORE** simultaneously.

It is even possible to use different types of receiver; for example, one **PBR-9D** and one **PBR-5S** can be bound. All four receivers are of "equal value", i.e. there is no Master / Slave assignment, and no restrictions in terms of telemetry. Telemetry sensors can be connected to all four receivers, all of which send data to the **CORE** on an equal footing.
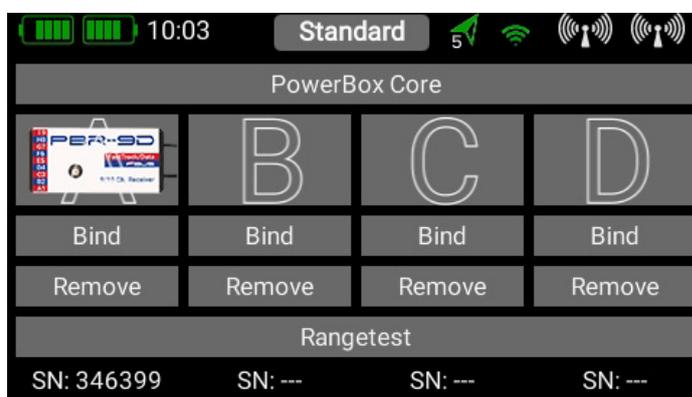
The receivers are identified by the four capital letters A to D. The same letters appear in the telemetry data sent from the receivers, helping to differentiate between them.

3.4.1. Binding

There are two methods of binding receivers:

- **Option 1**

    Connect a power supply to the receiver, and it will respond by flashing green at high frequency for ten seconds. Press the **Bind button** on your **CORE** transmitter, and the receiver now binds to it; the LED lights a continuous green.

    If you do not press the Bind button within the ten-second period, the LED switches to flashing slowly red – at this point the receiver can no longer be bound to the transmitter. You can only re-start the process if you first disconnect the power supply.

- **Option 2**

    Press the **Bind button** on your **CORE**, then connect the receiver to a power supply. The LED switches to continuous green once the receiver is bound.

> ### ☝ NOTE
>
> **Technical information: during the binding procedure the PowerBox CORE generates a random sequence from a total of more than 32 million numbers; this is then used as the basis for calculating the hopping sequence and encoding the signals. The likelihood that two identical codes could be generated is therefore**

3.4.2. Remove

The Remove button has an important function: if you wish to uninstall a receiver from a model, it is essential to remove that receiver from the model memory beforehand using this button. If you simply uninstall the receiver without first removing it at the transmitter, then the other bound receivers will not work when you next switch the system on. This is an important safety feature, as it ensures that all the bound receivers are working when you switch the system on, i.e. before you take off!

3.4.3. Range check

The Range check function reduces the transmitter's output power, thereby simulating a large distance between transmitter and model. This enables you to determine any possible weaknesses in reception in the receivers. In range check mode all the controls should work perfectly at a range of at least 50 m. During the Range Test you can see the values for Link Quality (LQI). This enables you not only to see whether the radio link is working, but also the quality of the link. This can be helpful in determining the optimum aerial positions in the model before you fly it.

3.4.4. Selecting CORE/M-Link

If your transmitter is equipped with a supplementary **Multiplex M-Link** aerial, you will find the button for switching from the **CORE** system to the **M-Link system** right at the top.

The M-Link system offers two binding modes:

• Bind 12K

14ms frame rate, 12 channels

• Bind 16K

21ms frame rate, 16 channels

Choose your setting. If you do not need more than twelve channels, you should always give preference to **Option 12K**, as the servos are addressed at a higher rate in this mode. This can be advantageous in respect of smooth running, transit speed and precision. In contrast, **Option 16K** offers sixteen channels and a slower frame rate; this is the best choice for use with older servos.

Your choice applies to the current model, and is stored in the model file together with the relevant Bind information. If you change the setting for a model which has already been bound, you will need to re-bind the receiver!

3.5 Differential

The Differential function is a simple method of setting up differential aileron travel. It is possible to set differential as a fixed value, assign it to any transmitter control or trim, and also set different levels for individual flight phases. These features enable you to adjust the degree of differential accurately in flight. To set up differential, select the Differential menu point, and you will see this screen display. Press the **+** button, and select from the list the function to which the differential should apply:
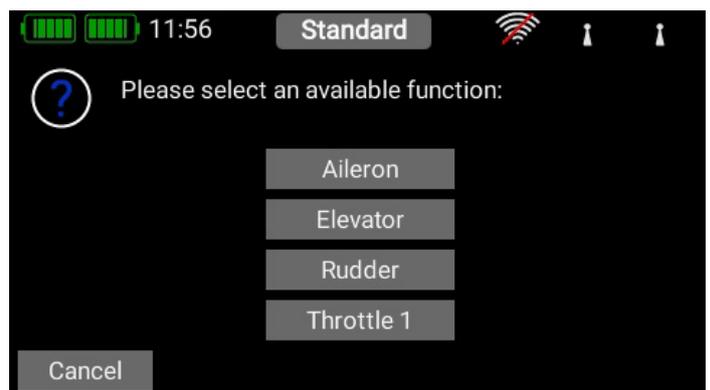
– The next step is to select the **servos** which the differential travel is to affect:
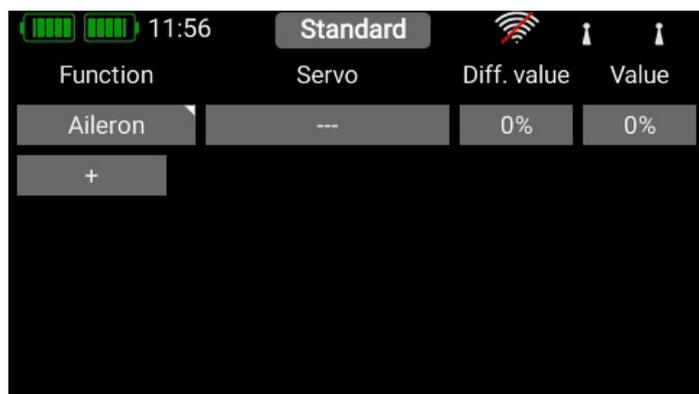
– Now briefly press the button under **Diff. Value** in order to set the percentage value, or to assign a transmitter control for adjusting the value. As the screenshot shows, you can also see any Expo values which you have already set..

• Setting up differential using a fixed value:

Enter a fixed value at **Diff. Value**. This value can also vary according to flight phase, if you select **Single** at the Flight Phase point..
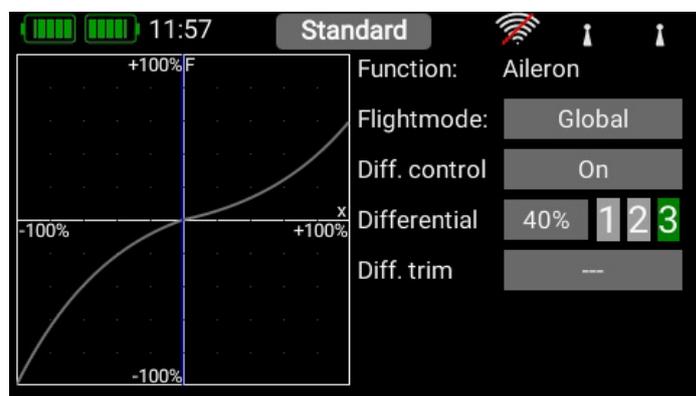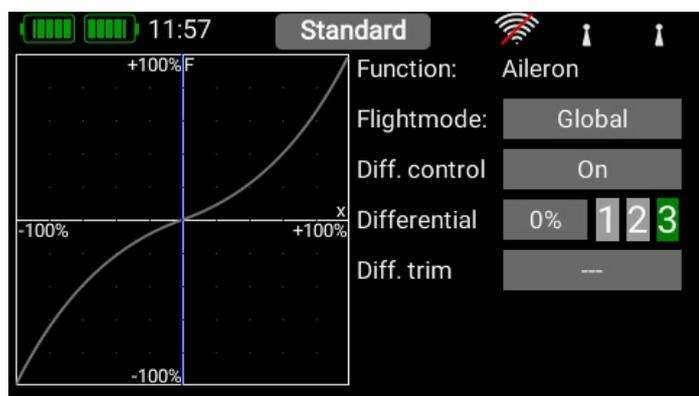
• Assigning a transmitter control

Briefly press the **On** button after the **Diff. Control field**. In this example the right-hand slider has been assigned to in-flight differential variation. Once the optimum value has been found, you can later set it as the fixed value.
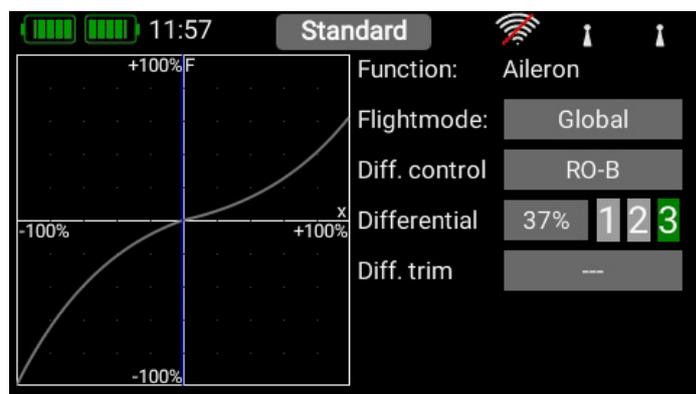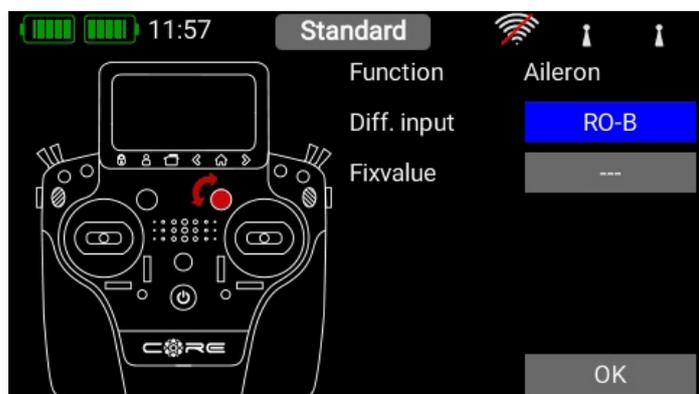
• Assigning a trim

The **Diff Control** must be set to **On**. Now briefly press **Diff. Trim** to select one of the trims.

The trim controls are the ideal choice if you wish to set differential settings which vary for each flight phase. With this option the differential value you set always applies to the currently selected flight phase. This only works if the button after **Flight Phase** is set to **Single**.
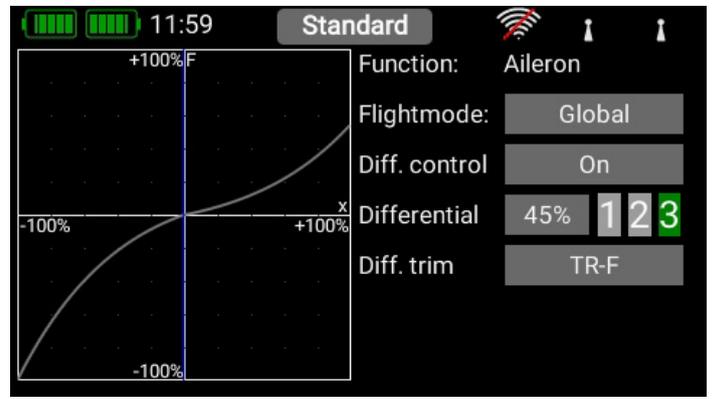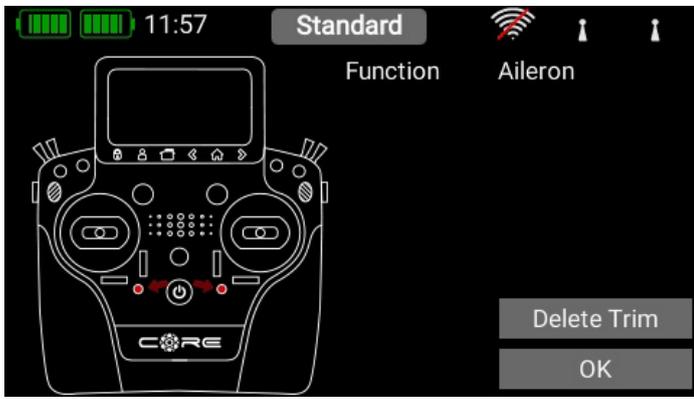
> ⚠️ **CAUTION**
>
> Do not assign this function to a trim which is already associated with one of the primary functions!

In the overview you will now see the relative percentage travels of the servo outputs.
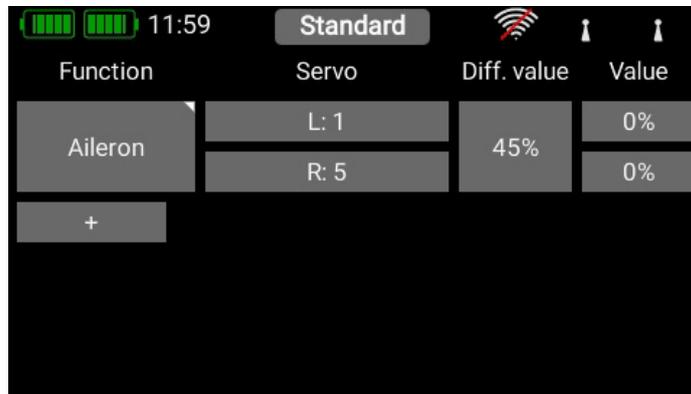
3.6 Virtual Switches

The virtual switches can be used to digitize linear transmitter controls by setting up a switching threshold to generate a switched state. It is also possible to set up a logical link between two or more switches or linear controls. This facility can be used as a very easy method of implementing functions such as safety switches for electric power systems.
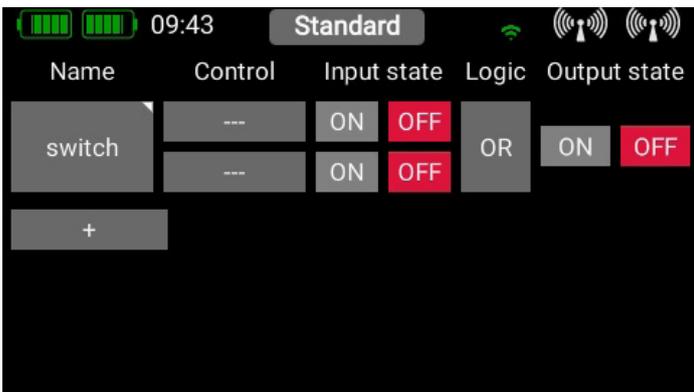
Select the **Virtual Switch** button in the menu, then press **+** to set up a new virtual switch. You can rename the virtual **switch** by pressing the switch button. As you can see, this field includes a small triangle at top right. This means that a function can be selected here by holding your finger on it. In this case the virtual switch can be erased again by holding your finger on the switch button.

First select a transmitter control by briefly pressing the blank field (**three dashes**) under Control; press **Control** again at the next screen. You can now select a switch or linear control as transmitter control by operating it.
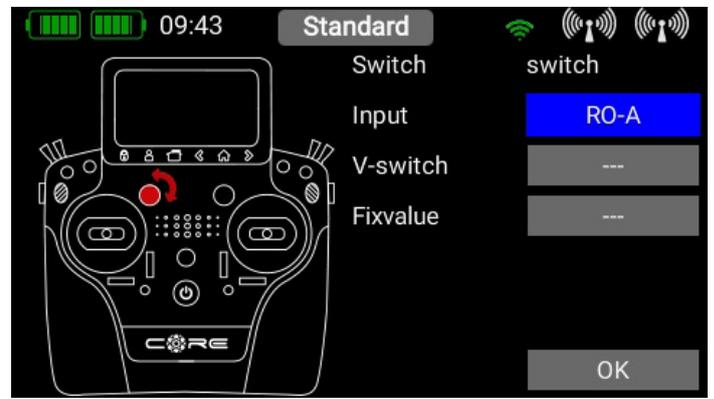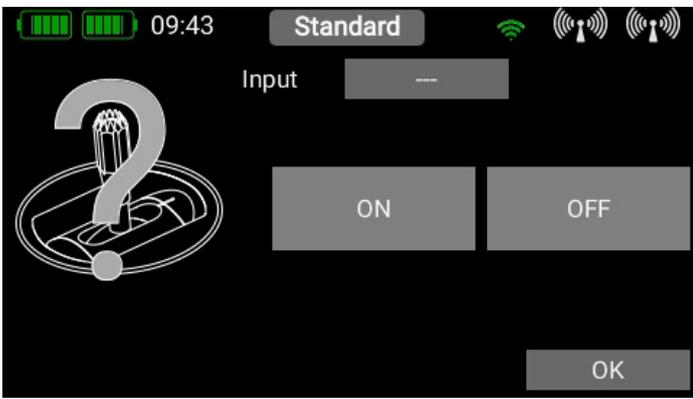
A further alternative is to define a fixed value - **On** or **Off**. This is necessary, for example, if you only wish to assign a switching threshold to one linear control. In this case select one transmitter control as fixed value, and define a linear control for the other transmitter control.

Yet another option is to use the output of a previously defined logical switch in turn as a transmitter control input.

In this way you can set up a logical link between three or more switches!

In this example a linear rotary control has been selected. In the following section you will see your transmitter control on the left, and a bar display on the right showing two switching points.

The two switching points can now be placed in any position you like by moving them with your finger. The red area indicates the "**Off**" state; the green area the "**On**" state. The orange area indicates "**hysteresis**", i.e. the area in which no switching takes place.

You can very easily reverse the "**Off**" state and the "On state" by moving one of the two switching point sliders in front of or behind the other. This adaptability provides maximum flexibility and simplicity, and you can immediately check the effect of your settings by moving the switch or linear control. The transmitter control symbol on the left changes color to indicate the switched state.

If you wish to use a switch, you can very easily set the desired switch position to **ON**. If you select a 3-position switch it is also possible to set two **ON** positions. Press **OK** once you have completed your settings.

You are now returned to the virtual switch overview, and you can define the second input using exactly the same procedure as the first.

Selecting **AND** or **OR** logic defines the switching characteristics you wish to use. At far right under **Output** you will see the result of the two inputs. The virtual switch is immediately available in order to control **Functions**, or switch a **Mixer** or a **Servo Cut-Off**.
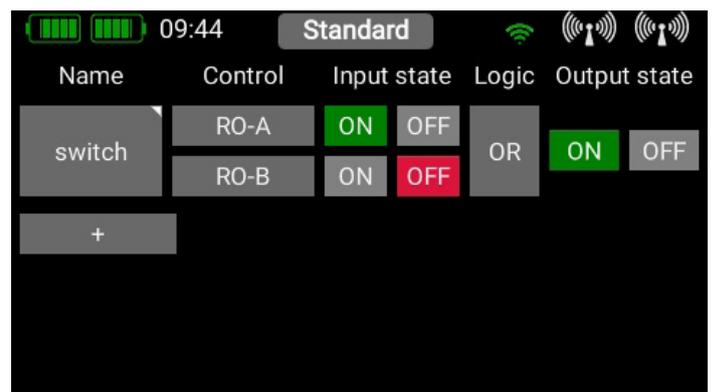
⬛ 3.7 Servo Cut-OFF

This feature provides a very easy means of switching a servo output to a fixed, previously defined value. An example of this might be a motor arming switch, or a fixed, pre-defined nosewheel position when the undercarriage is retracted. Select the **Servo Cut-Off** menu, then press **+** in order to create a new cut-off function. At this point select the servo which you wish to move to a fixed, pre-defined position, then press **OK**.
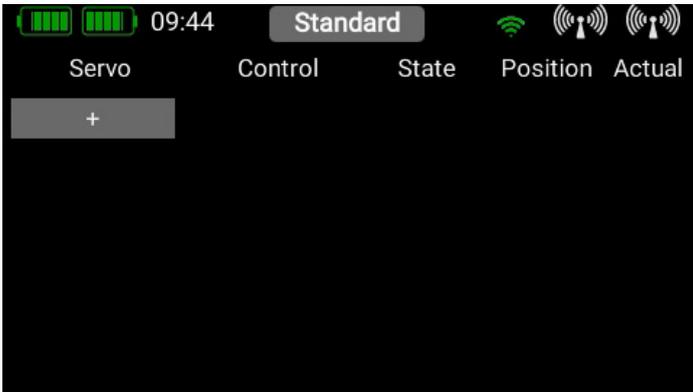

First select a **transmitter control** by briefly pressing the blank field (three dashes) under Control; press Control again at the next screen. You can now select a switch or linear control as transmitter control by operating it.
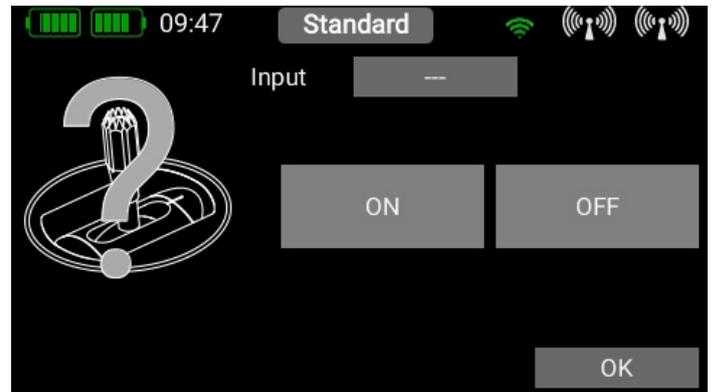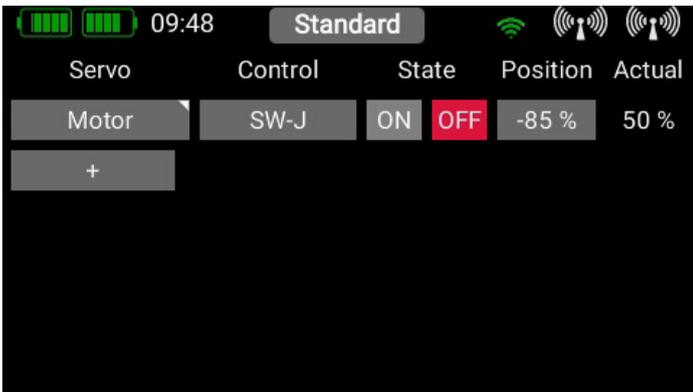
Yet another option is to use the output of a previously defined **logical switch** in turn as a transmitter control input. Press **OK** when you have made your selection.In the following section you will see your transmitter control on the left. Depending on whether you have selected a linear input or a switch, you will see one of these screens:
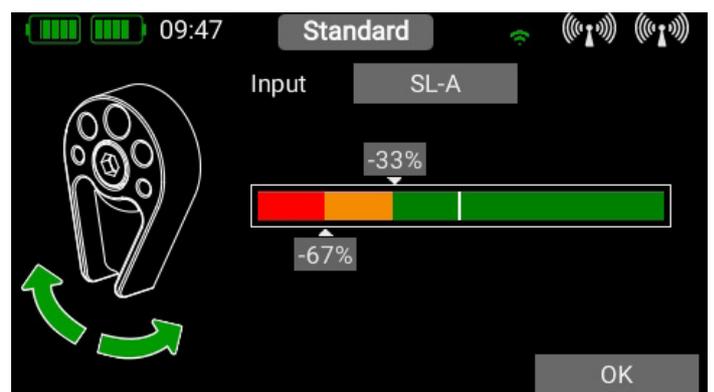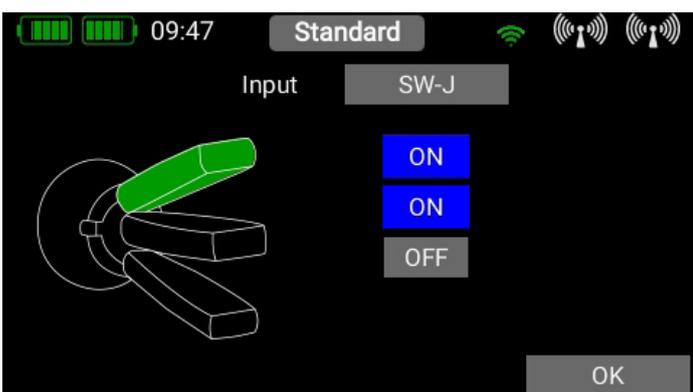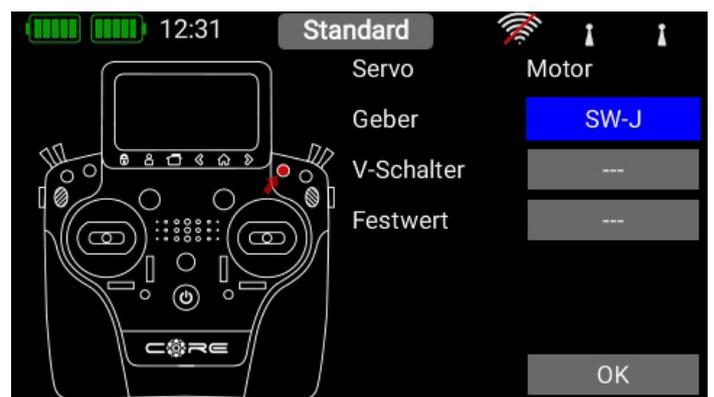
When you have selected a linear transmitter the two switching points can be placed in any position you like by moving them with your finger. The red area indicates the "**Off**" state; the green area the "**On**" state. The orange area indicates "**hysteresis**", i.e. the area in which no switching takes place. You can very easily reverse the "**Off**" state and the "**On**" state by moving one of the two switching point sliders in front of or behind the other.

This adaptability provides maximum flexibility and simplicity, and you can immediately check the effect of your settings by using the linear control. The transmitter control symbol on the left changes color to indicate the switched state.

If you wish to use a switch, you can very easily set the desired switch position to **ON**. If you select a 3-position switch it is also possible to set two **ON** positions. Press **OK** once you have completed your settings. You are now returned to the **Cut-Off** function overview. Under **Position** set the servo position to which the servo is to move when the transmitter control is operated.

If the assigned transmitter control is set to **OFF**, the servo output works as previously defined for that function. As soon as the transmitter control is moved to the **ON** position, the servo moves to the previously defined position; you can read off the current value at far right.
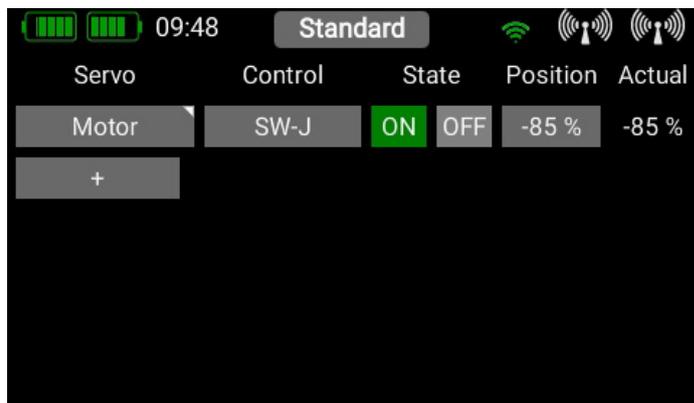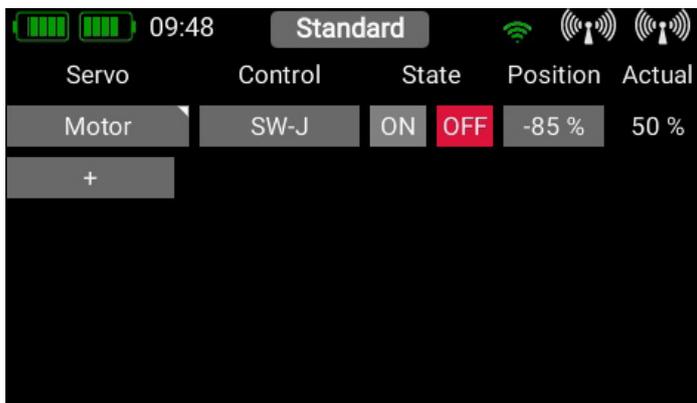
3.8 Telemetry Control

The telemetry controls exploit the potential performance of **CORE** telemetry to the full. They enable you to use any of the telemetry values to control functions in the model. Since **CORE** telemetry operates virtually in real time, it would be possible, for example, to control motor power in relation to speed within certain limits. Another practical application is to monitor air pressure in order to control a retractable undercarriage: if a defect in the system causes a drop in air pressure, the undercarriage automatically extends.

To set up a telemetry control, first press **+**, then briefly press the button under **Source** to select a telemetry value. This only works if the receiver is already bound, and the telemetry sensor is already connected.
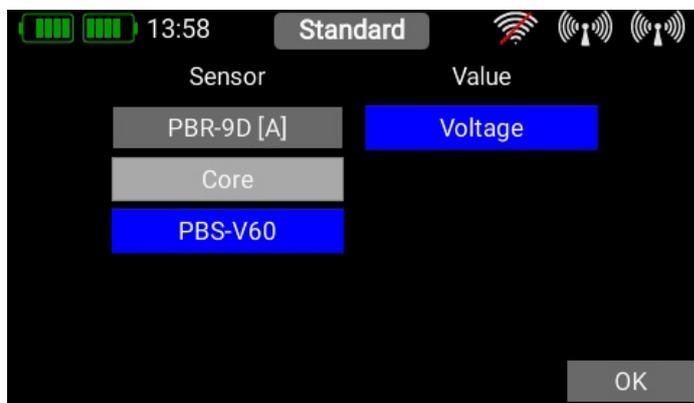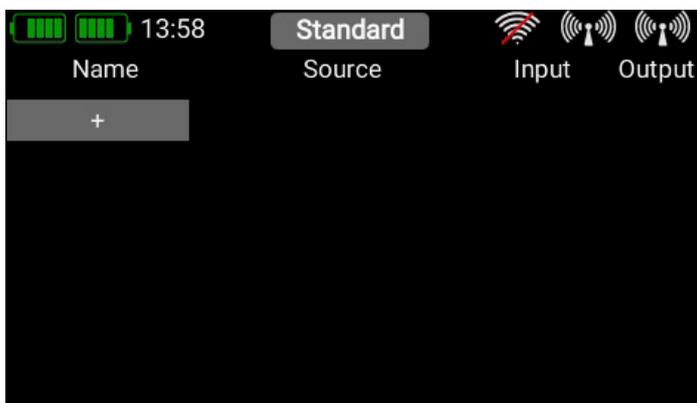
In this example the **PBS-V60** voltage sensor is to be used to reduce motor power if the voltage of the flight battery falls to a dangerous level. You can rename the telemetry control under the **Name** field.

Now locate the field under **Output** showing the percentage value and briefly press it in order to set all the parameters. The following display now shows various possible settings. The **Sim**. button can be used to simulate all the settings, avoiding the need to carry out protracted tests.
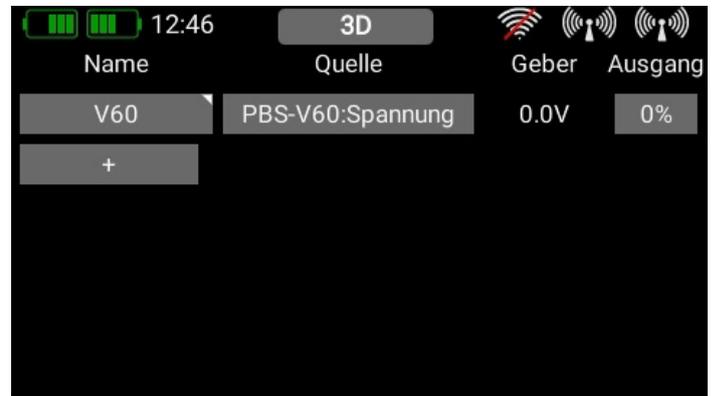
Explanation of the control elements:

3.8.1. Source

Under **Source** you will see three buttons which you can press in turn to select the telemetry control input.

- **FS**

  At this point you enter the value which is to be adopted if - for whatever reason - the telemetry value no longer arrives at the transmitter. Since you may have set the telemetry control to operate a safety-relevant function, it is very important to select at this point a value for that function which is non-critical.

- **Source**

  Here you find the current sensor value, including the name and unit of measurement.

- **Sim.**

  At this point you can see how the output behaves by simulating values using the **Plus / Minus** buttons. The values which can be entered here apply to the decimal point of the actual sensor.
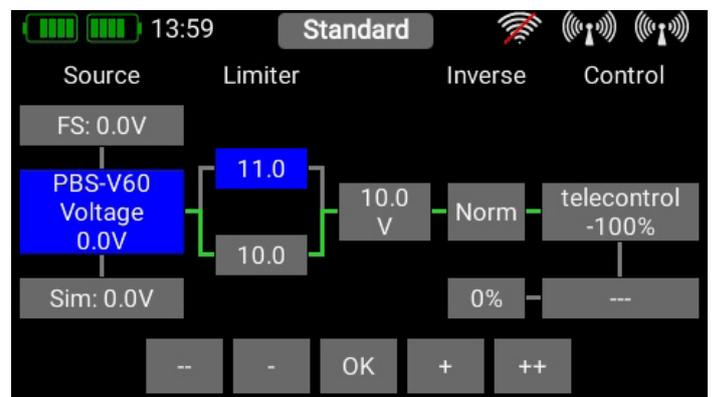
3.8.2. Limiter

Here you enter the numerical range within which the telemetry function is to operate. The lower limit defines the telemetry value corresponding to -100% of the function. The upper limit defines +100% of the telemetry control.

In our example the system starts to reduce motor power in the range 11.0V to 10.0V.

In the field to the right of the limiter you will see the output after the limit has taken effect. The simulator function allows you to see which values are present in the function:

.
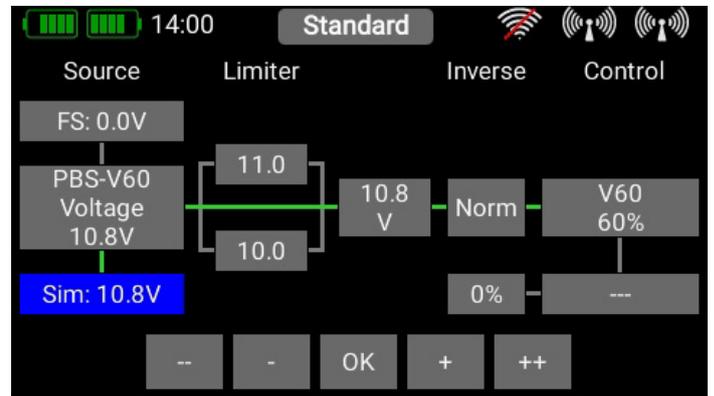
3.8.3. Invert

This button can be used to invert the output of the telemetry control.

3.8.4. Control

Here you see the value after the calculation. This output can now be used to control functions, switch flight phases, operate Servo Cut or control other things. The telemetry control can be used to do anything that a stick or switch can also do.

3.8.5. Switching off the telemetry control

This function can be used to override the telemetry control, typically using a switch. At this point you can assign a switch or slider. In the field to its left you can enter the value which the telemetry control is to adopt when it is switched off.
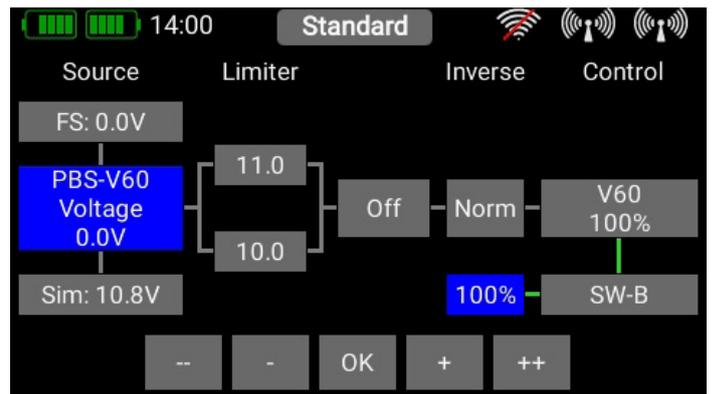
To conclude our example, you can now see how the telemetry control is set in such a way that motor power is reduced by 50% when battery voltage falls to 11.0V.

This is accomplished by setting up a further function: selecting the telemetry control as transmitter control, and altering the curve of the telemetry control in Setup.
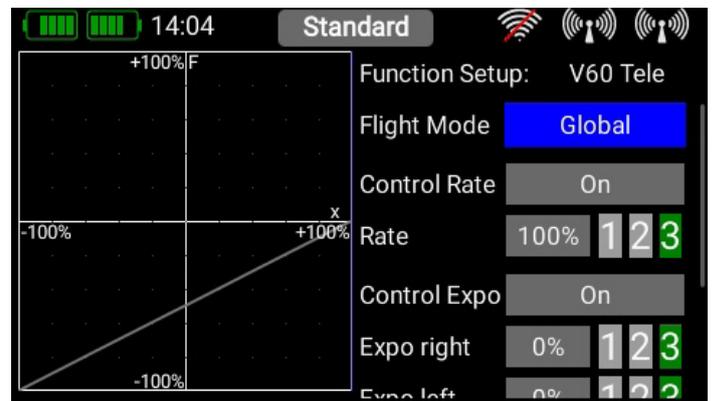
If the telemetry control is above the set value of 11.0V, 0% is added to the throttle servo, i.e. the throttle channel behaves in the usual way.

Below 11.0V an increasing negative value is added, which reduces the output of the throttle channel.
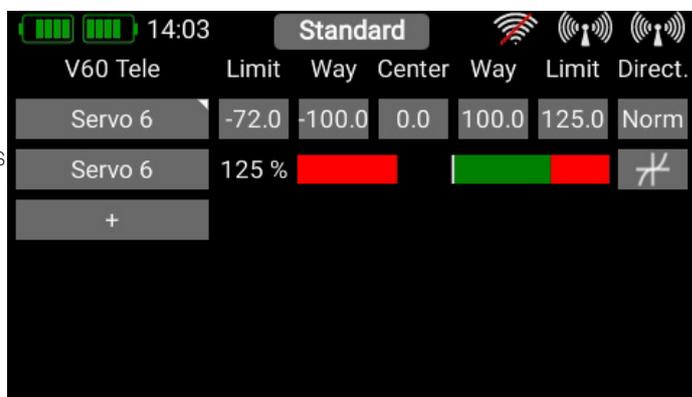
The procedure described above is just an example. Naturally, alternative approaches and solutions are possible with the aid of mixers, Servo Cut or other features.

FM 3.9 Flight Modes

Flight modes, also known as flight phases, are one of the **CORE's** most powerful features, but they are still easy to use! You can imagine a flight mode as a copy of a particular model memory, but one with slightly altered settings.
A switch can be used to select different modes when the model is flying. In the simplest case this might simply be a different landing flap position and the appropriate elevator trim for that position.

The practical advantage of this feature is, that you can adjust the trim when the landing flaps are lowered, without altering the trim in the normal "**flight mode**".

When you select the Flight Mode menu you will see a graphic representation of the Flight Mode tree structure.
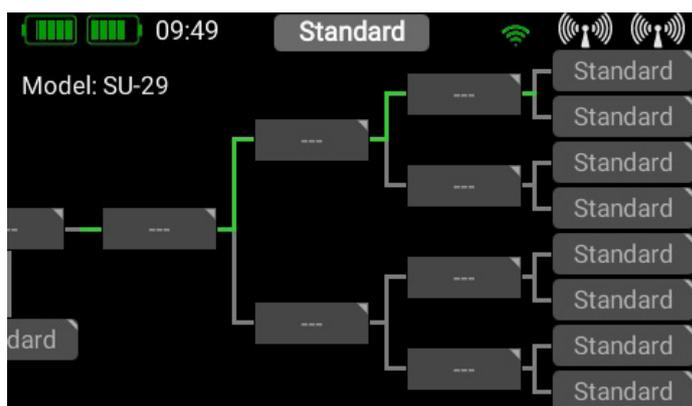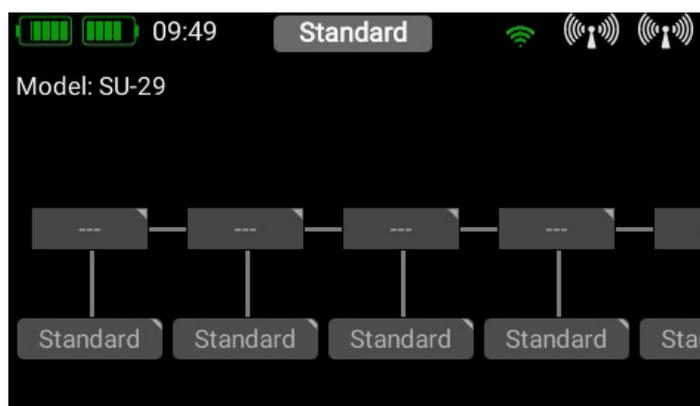
The most important thing to know at this point is that the **CORE** prioritizes the flight modes. Priority runs from left to right, i.e. the flight modes in the left-hand tree diagram have the highest priority, and those on the right the lowest priority. Even when the flight mode structure is complex, this means that you can, for example, overrule all other switch positions with a single switch, returning you very quickly to "normal" flight mode.

Before you set up flight modes it is worthwhile considering which flight modes are important, and which are of secondary importance.

To create a flight mode, press briefly on one of the boxes labelled "Standard", and you will see the following screen display:
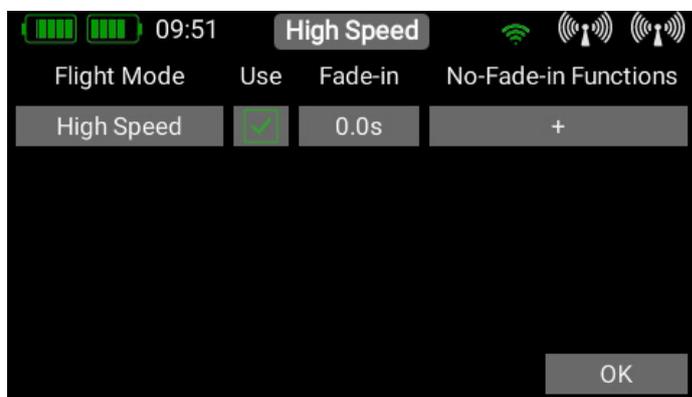
You can immediately assign an informative name to the new flight mode by briefly pressing the left-hand field. Bear in mind that you should not use abbreviations here if you intend the flight mode names to be used for speech output later, as the TTS systems reads the text exactly as you have entered it!

In the field below **Fade-in** you can set how fast the settings for the new flight mode are to affect the servos. For example, if you lower the landing flaps by selecting the appropriate flight mode, it makes sense to set a delay at this point.

In contrast, selecting **No-Fade-in Functions** enables you explicitly to remove transmitter control functions from the delay.

Once you have entered all the settings, press the -button to return to the Flight Mode tree diagram. Now press the field with the three dashes **---** above the Flight Mode to select the transmitter control which you want to use to activate this flight mode.

In the next screen display press briefly on Transmitter Control again.
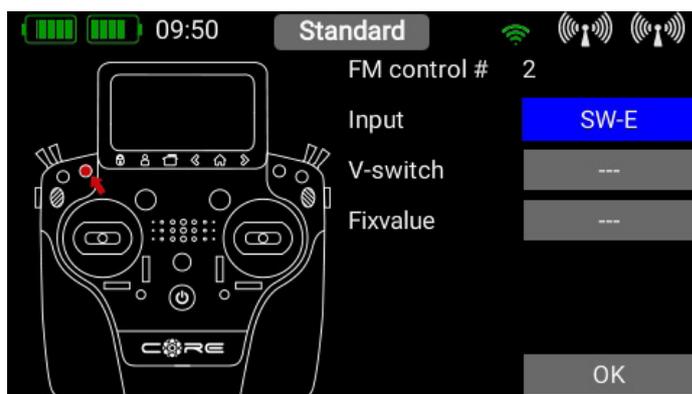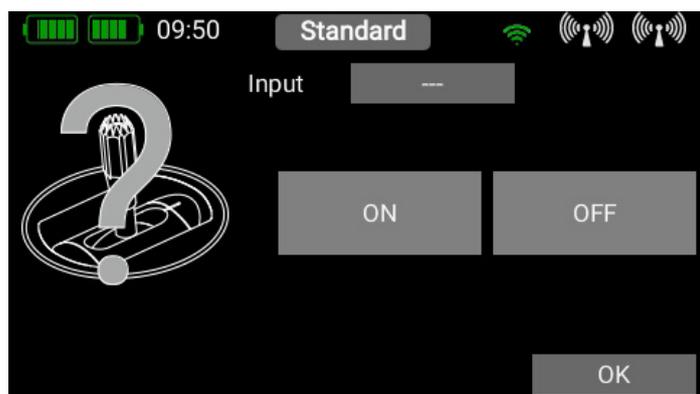
At this point you can select the appropriate transmitter control. If you select a switch, you can activate one or two switch positions. If you choose a linear control, you can set the switching threshold and hysteresis here. If you have already set up virtual switches, please note that you can also use these for selecting the flight mode.

Exactly the same procedure is used to set up additional flight modes. The picture below shows a switch which is used to select three flight modes; **FM Normal** has the **highest priority**.
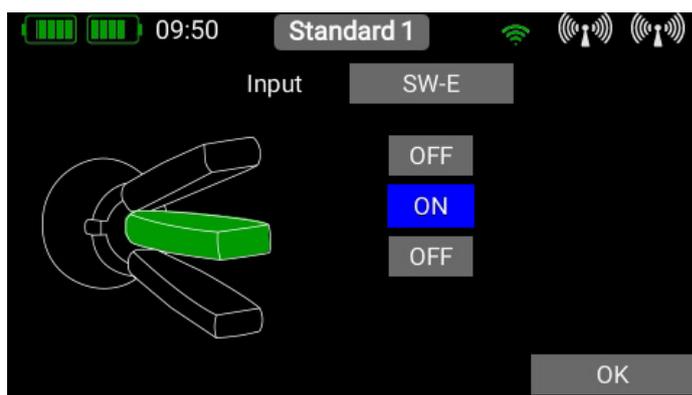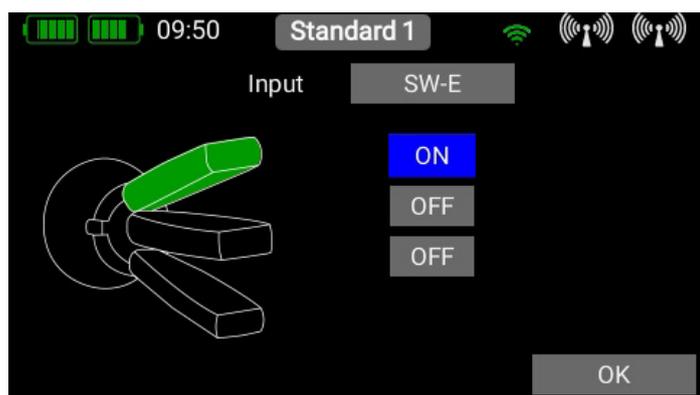
When you have set up multiple flight modes, you will see green dashes in the Flight Mode tree which indicate which flight mode is currently active. You can now select various settings for the different flight modes in the Transmitter Control, Trim and Mixer menus after selecting the Single setting at Flight Mode.
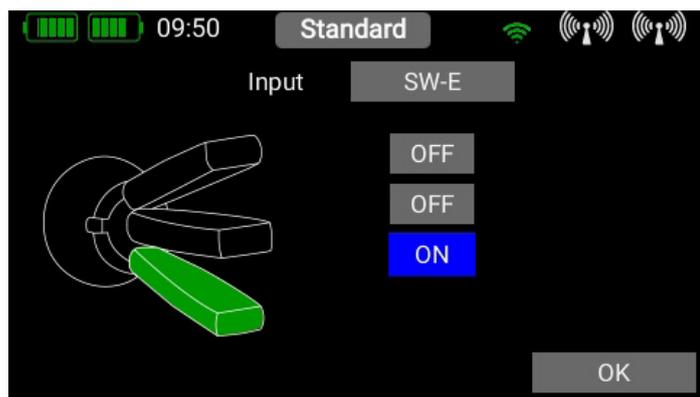

3.10 Speech output

The speech output function of the **CORE** is based on the latest **TTS** (Text to Speech) technology. Each transmitter possesses a license for the **Accapella@** speech module. For optimum speech quality we have implemented what is probably the most highly developed TTS system available; the **license is a chargeable** item which is included in the **CORE** as standard. For each language several male and female voices are available. Due to the file size these are gradually loaded into the transmitter by means of updates. This means that the recording of speech files, and copying from WAV or MP3 files, is now a thing of the past.

There is one important point to bear in mind regarding speech output: German text will not be reproduced correctly using an English voice, and vice versa. It is therefore essential to assign German names to, say, flight modes if the transmitter is set to the German language. However, that is the only point you need to note; in every other respect the TTS system will give you loads of fun!

When you open the Speech Output menu, the following screen display appears.

The only speech output implemented as standard is the statement of Flight Modes. All other speech outputs can be set up in the usual way using the + character. To select a new speech output, just press the **+** button.
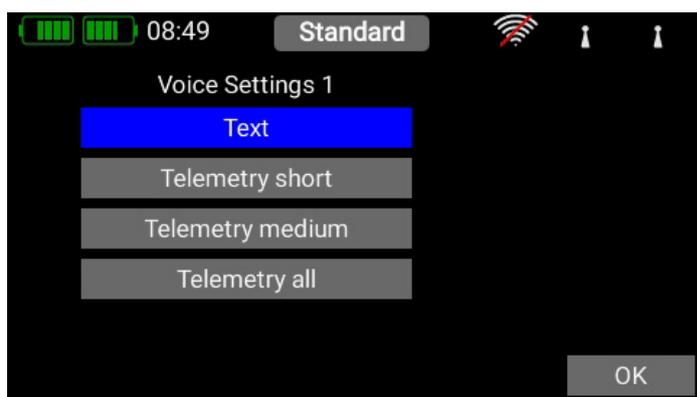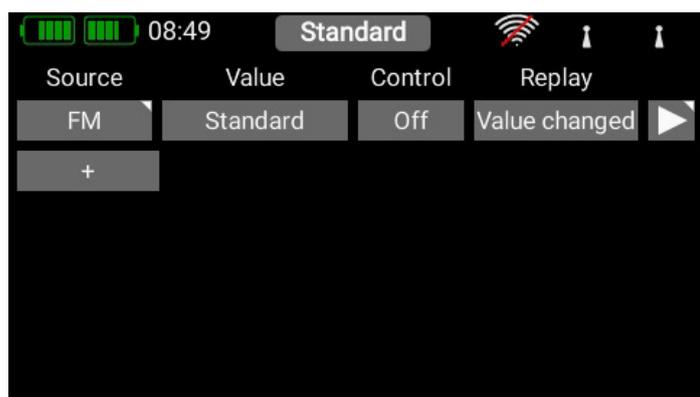
3.10.1. Source

At this point select the Source for the text to be spoken.

⚠ NOTE

Spoken telemetry alarms can be set at the appropriate telemetry alarms in the Telemetry widgets.

- **Text**

  At the Text option you can enter any text, which is then spoken by the TTS system, for example, by a switch.

- **Telemetry short**

  The selected telemetry value is spoken together with its unit. The message can be triggered by switch activation, at regular intervals, or by a change in the value.

- **Telemetry medium**

  The sensor name and the value - without unit - is spoken.

- **Telemetry all**

  The sensor name, sensor value and unit are spoken.

- **Timer**

  As of Version 2.80 it is possible to select the speech output of timer messages in the Timer menu.

3.10.2. Value

If you want the system to speak free text or a telemetry value, at this point you should select the sensor value which is to act as data source.

- **Text**

  In the case of free text, you can enter up to 64 characters here.

- **Telemetry**

  If Telemetry was selected as the source, you can choose here what value should be spoken.
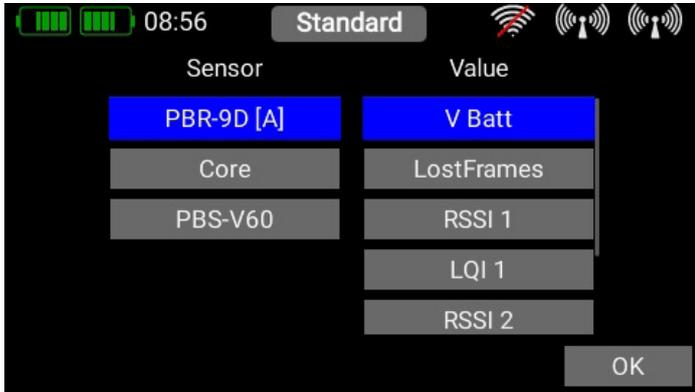
3.10.3. Control

At this point you can select a transmitter control for activating the speech output, or select permanently **ON/OFF**.
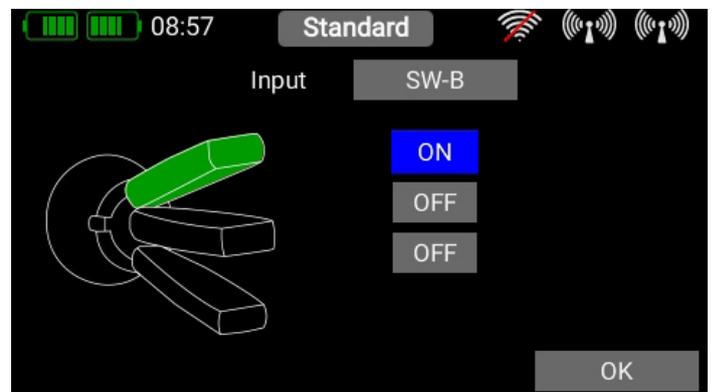
3.10.4. Replay

In this menu you can activate **single** and **repeated** statements, or a statement in response to a change in a value. Depending on your choice, you have the option of setting the interval period or the extent to which the selected telemetry value must change in order to activate speech output.
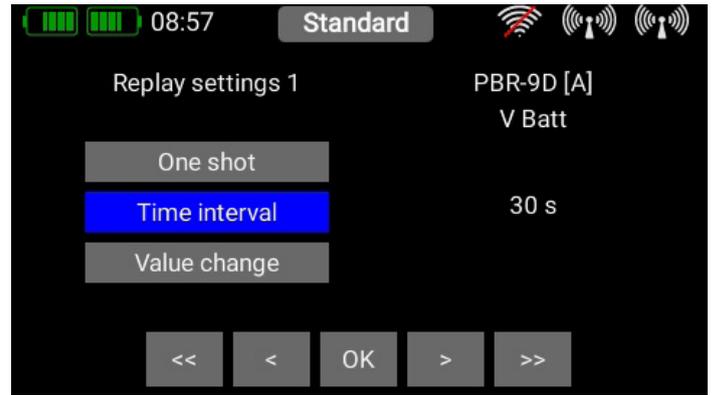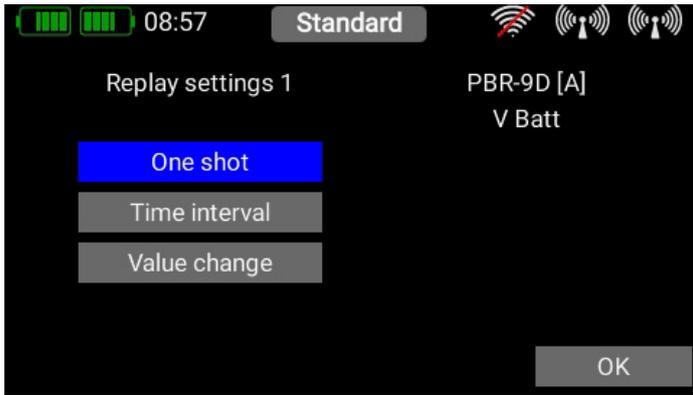
The **Once** option is used if you wish to have a timer or a telemetry value spoken when a switch is operated.

The **Interval** option is used to set a fixed time after which the output is to be spoken at regular intervals.

The **Value change** option is only available if a telemetry value has been selected as source. Here you can set a threshold value; the telemetry value must change by this amount in order to trigger the speech output.
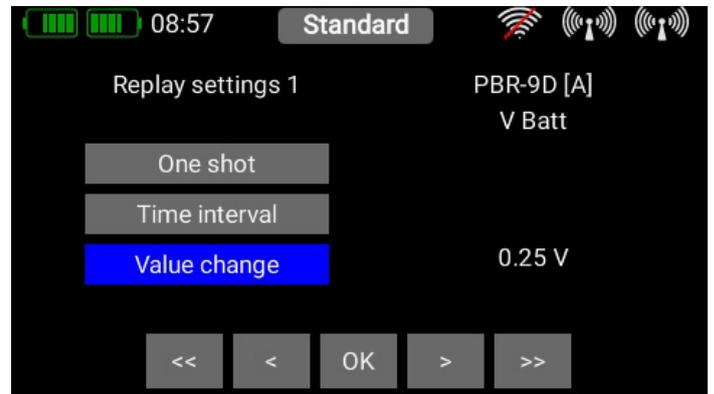
3.10.5. Test

This button has two functions, as can be seen by the small triangle at top right:

• **Function 1**

If operated briefly, the parameters entered on the left are played back once; this only works if the fixed value **ON** is entered as **Transmitter control**.

• **Funktion 2**

If you keep the button pressed, you can change the voice in this menu. First you will see the voices which are available for your set language. Pressing on the globe at bottom right displays all the voices together with the associated language. This enables you, for example, to have English expressions spoken using an English voice, even though the **CORE** is set to German.

⚙ 3.11 Vario

The **CORE** Vario offers a number of options for fine-tuning the sound output relating to your model's climb and sink.

• Sensor

The vario must be connected to a bound receiver, and must be visible in the Sensor List; a brief press on the Sensor button displays all the available sensors. At this point you should select the value for rate of climb for your sensor.
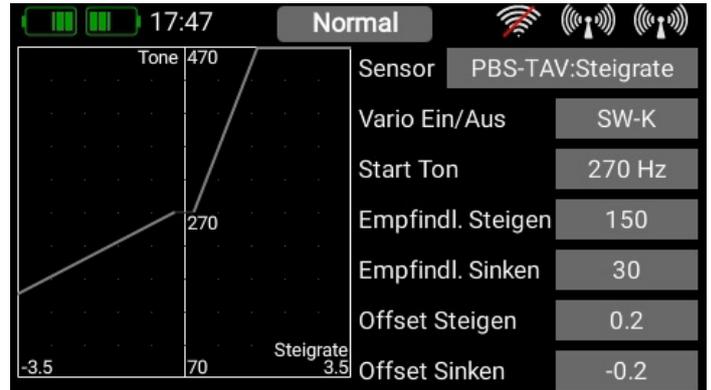
• Vario ON/OFF

At this point you can choose a transmitter control which switches the Vario tone on and off.

• Start tone

Here you determine the basic frequency of the tone output when the Vario is generating 0 m/s.

• Climb sensitivity

At this point you can define how steeply the tone is to change when the model's climb rate alters. If you enter a high value, the Vario tone will alter more rapidly, even when the climb rate is small.

• Sink sensitivity

Here you can define how steeply the tone is to change when the model's sink rate alters. If you enter a low value, the change in Vario tone will be less marked, even when the sink rate is high.

• Climb offset

This value determines the threshold for climb at which the Vario is required to generate a tone. In weak thermal conditions you would probably set this to a low value to enable you to detect even small areas of lift acoustically. The filtering of the Vario sensor also plays a role here. If you place the Vario on a stationary surface and it fluctuates by 0.2m/s to 0.3m/s, then it makes sense to set this value slightly higher. Varios with good digital filtering such as the **PowerBox PBS-Vario** allow low values here.

• Sink offset

Here the same applies as for **climb offset**, but for the sink range.

The **CORE** door sequencer allows you to create two entirely independent sequences, which are activated with a switch.
The sequencer includes a special feature in the form of a Pause function. For example, if you use a three-position switch, the sequence can be paused by moving the switch to the center position. The switch can also be used to halt the sequencer at any time during the sequence and reverse its direction. The sequence does not have to reach the end before the direction can be changed.
Another outstanding feature of the sequencer is its two modes. You can set up the sequences to run individually, as is usual, for example, with a retractable undercarriage, or in loop mode. The latter is particularly useful for scale functions which repeat the same process.

Each sequence is capable of controlling a maximum of six servos. The travel of each servo can be set separately in two directions - forward and reverse - with up to seven defined points on its travel. The travel points are freely variable in terms of servo position and timing.

To set up a sequence, press **+** in the menu, and the following display appears. The first step is to select a **Transmitter control**.
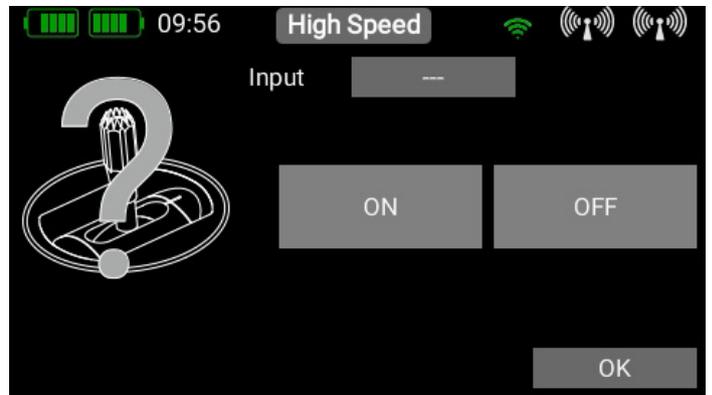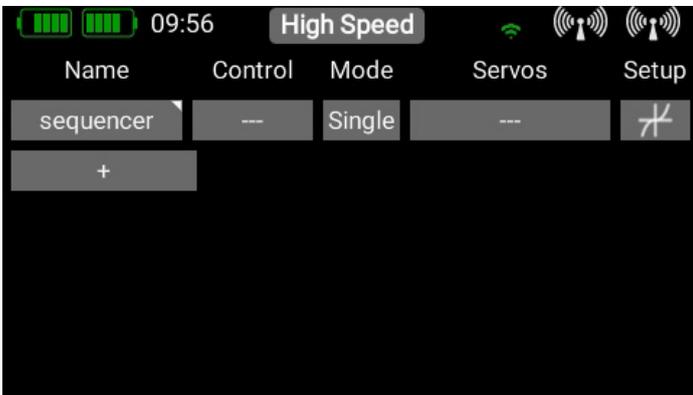
The transmitter control can be either a switch or a linear control. In both cases you can set the desired switching points and the switching direction. Please note that the green range covers the sequencer running **forward**, the red range the **reverse** range. More on this later when we discuss the method of setting travel points.
The Pause function mentioned earlier is active in the yellow range, i.e. the sequence can be paused in the centre position of a three-position switch.
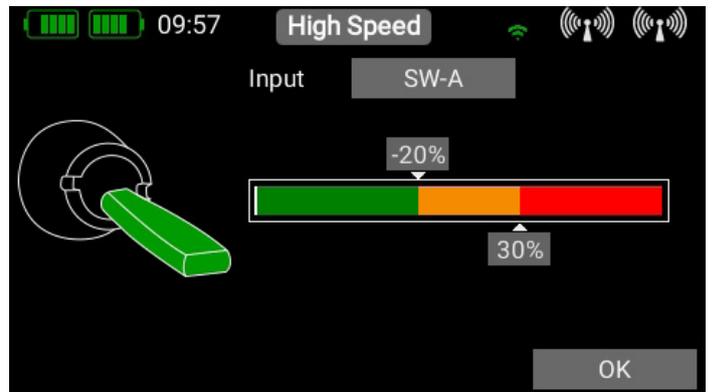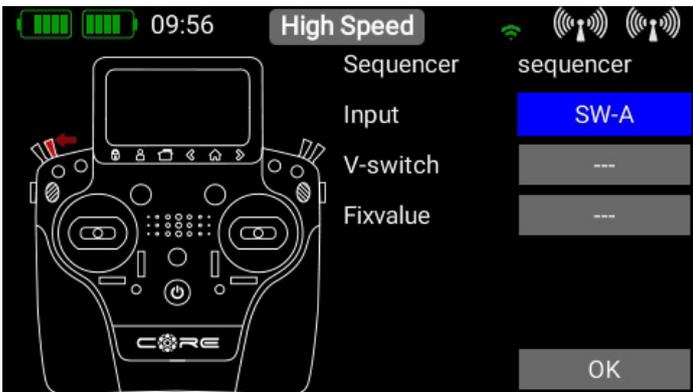
Once you have defined your transmitter control, press **OK** to return to the overview. In the next step you select your preferred mode:

• Single Mode
The sequence runs either forward or back, and stops when the sequence is complete. Select this option, for example, to control a retractable undercarriage with wheel doors.

• Loop Mode

The sequencer runs as long as you keep the switch in the Active position. As soon as you move the switch to the Off position, the sequence - once started - runs through to the end, and then stops.

Now select all the servos which are to be included in the sequence; up to six servos can be selected.

⚠ NOTE

The servos you select at this point no longer appear in the servos available for functions!
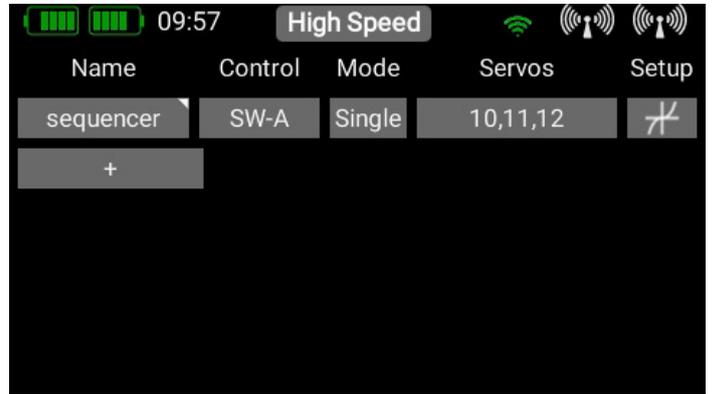
At the Overview screen press **Setup** to set the travel points. You will see the next screen display shown here. The first servo is marked, and the sequence **Forward** and **Reverse** is displayed. The standard run time is 6.0 seconds, and the two travel points are set at ±20%.

In the picture below you will see the three buttons **Srv.10**, **Srv.11** and **Srv.12**; **Srv.** stands for servo. The sequencer curve **Srv.10** is the only one displayed at the moment – that's why the button is blue. You can also display the two other servo sequencer graphs if you briefly push the appropriate buttons. Now you can scroll up and down through the selected sequencer graphs on the left.
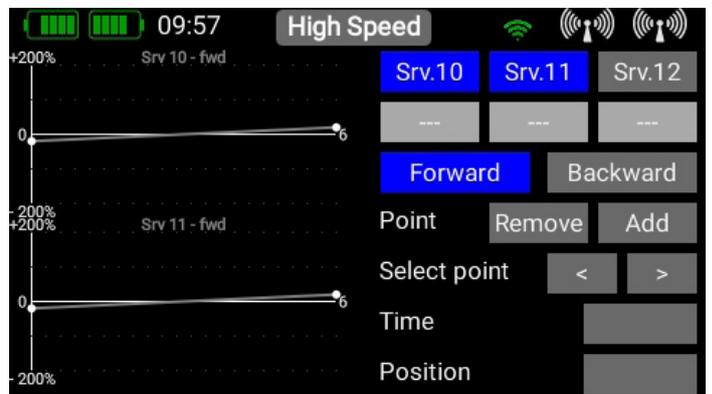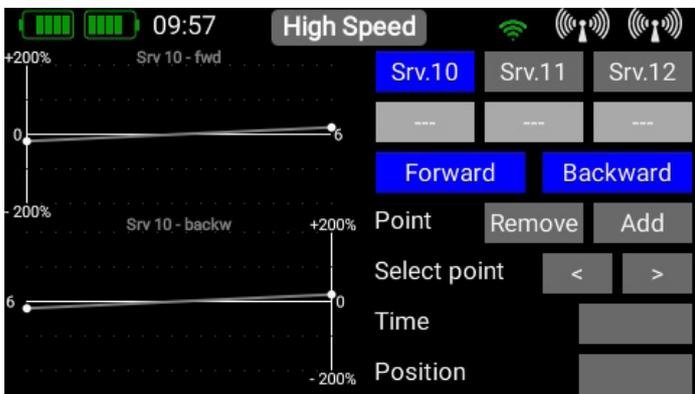
Below the **Srv.** buttons you will see two further buttons: **Forward** and **Reverse**. These buttons are also designed to display only those sequencer graphs which you wish to see or adjust at the moment.

You can use the Servo and Direction buttons to arrange the graphs in a clear manner. The time axis is always scaled to show the longest time in a particular direction. For example, you can switch on all the Forward graphs, in order to display the timed sequence of the retract system and of the wheel doors, one directly above the other, enabling you to adjust them accurately to avoid clashes.

If you wish to adjust a sequencer's action, press the graph on the left that you wish to alter. The line and the selected points now turn blue. This indicates the point you are currently able to adjust, and the section in which a new point is placed if you press the **Addition** button at **Point**.

As you can see in the above illustrations, as standard the sequencer simply runs from the Start point at -20% to the Stop point at +20%. To insert an additional point, press on the graph, then on **Addition**.
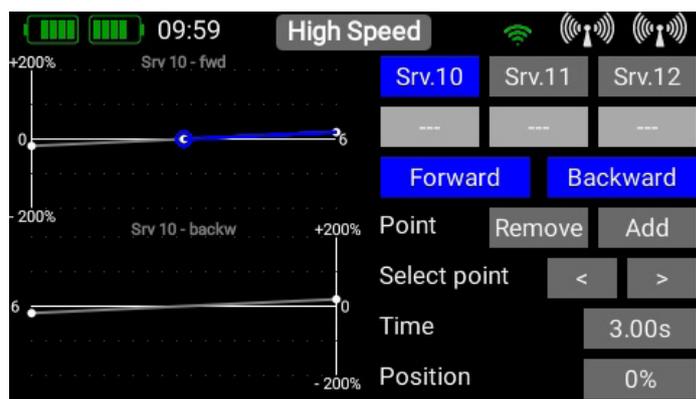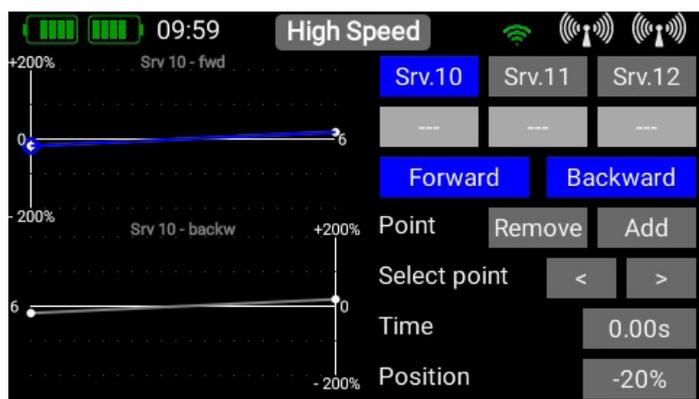

As you can see in the picture above right, an additional travel point has been added in the **Servo 10-Forward sequence**. You can now select the point you wish to alter using the arrow buttons after **Select point**.

NOTE

- Each point can be adjusted in terms of position and time - with the exception of the point at time 0.
- If you increase the time at the last point, the scaling of the time axis also changes accordingly.
- If you adjust the position of the first or last point, the End position in the opposite direction of operation is automatically adjusted to suit!
- When you select a point, the associated servo moves slowly to the selected position. As soon as you operate the sequencer switch, the marker   is removed and the sequence commences. This enables you to check the sequence at any time.

In the example shown here, Servo 10 remains motionless for three seconds after the switch is moved. After three seconds it moves slowly - over three seconds - from +100% to -100%.

When reversed, the servo moves immediately from -100% to +100%, then remains motionless again for a period of six seconds.
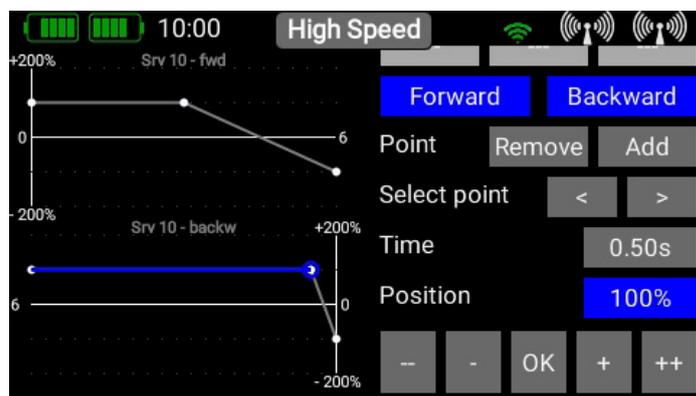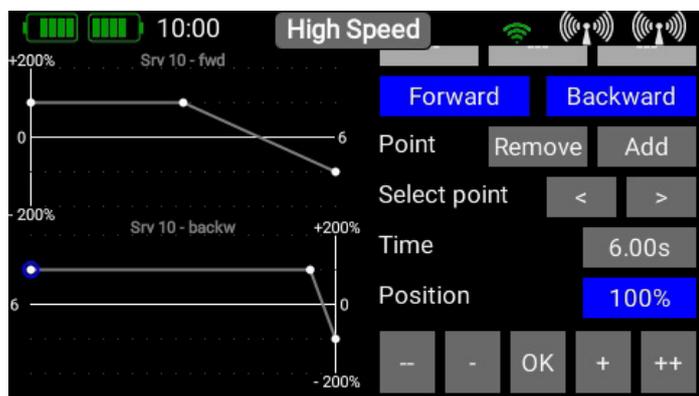
In this example the door would stay still for one second, then run from -100% to +100% over a period of one second. After a two-second pause, the door would run from +100% to -100%, again with a one-second delay. After a further second the sequence is complete.

The reverse travel is identical to the forward travel.

## 3.13 Mixer

The free servo mixers represent an additional method of mixing functions with each other. Servo mixing by servo assignment has already been described in the Function menu, but this option also enables you to mix functions with each other with a response curve.

You can create a new mixer by selecting the Mixer menu and pressing +. You can also immediately rename the Mixer to your own choice by touching the **Mixer** button.

Press the Setup button on the right in order to program the mixer. The following display appears:
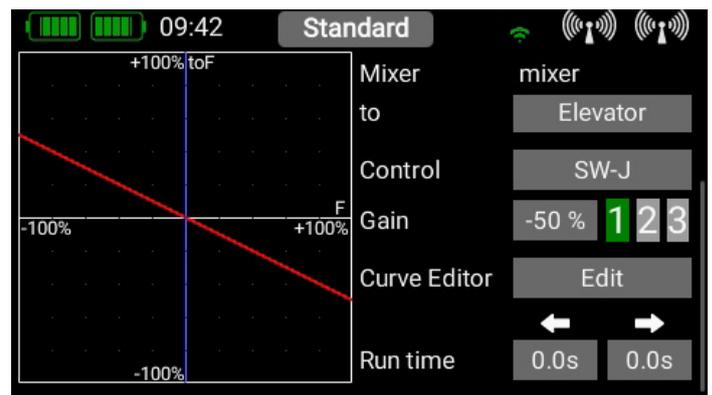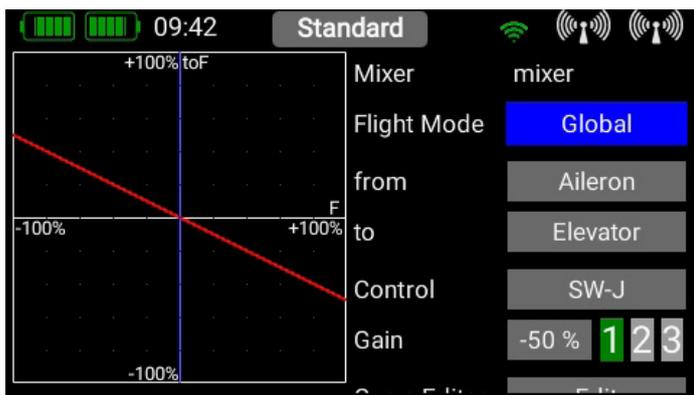
• Flight Mode

As is the case with the transmitter controls and trims, the mixers also include the option of programming mixed functions from one transmitter control to another separately for each flight mode. If you select the **Global** setting, the mixer will be identical in all flight modes, and also if you are not using flight modes. Select **Single** if you wish the mixer to be effective only in particular flight modes.

• From/To

The first step is to select the source function under **From**, and the target function under **To**.

• Transmitter control

At this point you should select a switch, stick or proportional control. You can then use it to activate the mixer, switch the input to **the three available levels** (**1-2-3**), or set it to **linear response**. The default entry here is **On**, which means that a fixed mixer input is set.

• Gain

The Gain button is used to set the magnitude of the mixer. Selecting On at Transmitter control sets a fixed value. If you assign a switch or proportional control at transmitter control, you can set different values on three levels; the level selected by the transmitter control is shown in green. If you select a proportional control as transmitter control, the values are applied in a linear fashion between the three levels.

3.13.1 Curve Editor

The curve editor enables you to set up special mixing curves.

• Points

Select the number of points – up to a maximum of 33 points.

• Select Point

Use the arrow buttons to select the point you wish to adjust. The selected point turns green.

• Value

Move the point up or down by altering the percentage value.

• Smooth

The Smooth option can be used to even out the curve, thereby causing the servo to move smoothly over its travel.

• Raw

Raw eliminates curve smoothing.

• Reset Curve

Reset curve sets the curve back to linear travel.
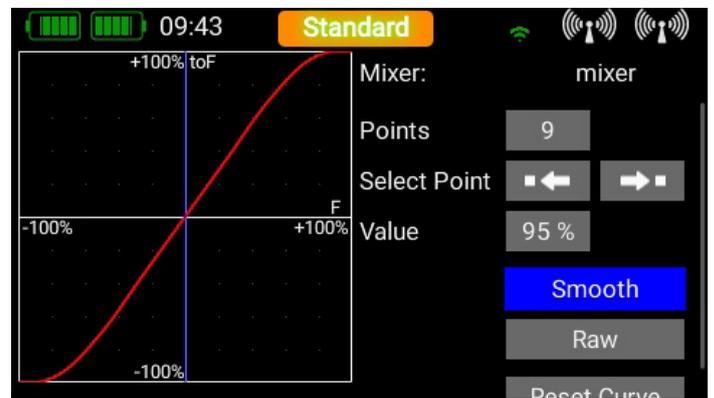
3.14 Preflight Checklist

In the PreFlight Check menu, you can define which transmitter controls are to be checked for correct position when you switch on, or when you change models. The radio link is not activated until all the defined positions are correct.
Typical examples would be the throttle stick or the retract switch.

–   In the PreFlight Check menu start by switching PreFlight Check on.

–   Activate the button after select.

–   Locate the transmitter control which you wish to have checked in the pre-flight check, and move it. The controls you select are marked red.

–   If you wish to de-select a control, wait a moment then move the control again.

–   De-activate Select again once you have selected all the transmitter controls.

–   Now move the selected transmitter controls to the position which they are required to adopt when you switch the system on, or change models.

–   Press the Learn button.

If you switch on or change models and the selected transmitter controls are not in the correct position, then the screen looks like this:

As soon as you move the transmitter controls to the correct position, the radio link is activated and the normal screen display appears. Pressing the **Interrupt** button skips the check, and the radio link is immediately switched on.
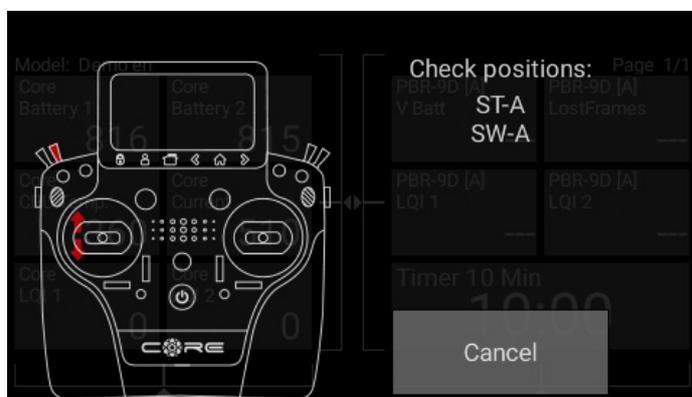

3.15 File Manager

The File Manager enables you to exchange files on the SD card in the **CORE** transmitter with files stored on a USB memory stick. File types include model data, log files and also audio files for audible signals.
We have kept the structure and operation of this function simple. On the left-hand side you will see the content of the **CORE** transmitter's internal SD card.
At top right you will see the various memory facilities available to you. Currently the external USB port and the internal SD card are available, typically for copying or moving files within the transmitter. In a later version it will also be possible to exchange files with a **PowerBox** Cloud.

When you plug a USB stick into the **CORE** transmitter, you can display the content of the memory stick by briefly pressing the USB symbol on the right-hand side.
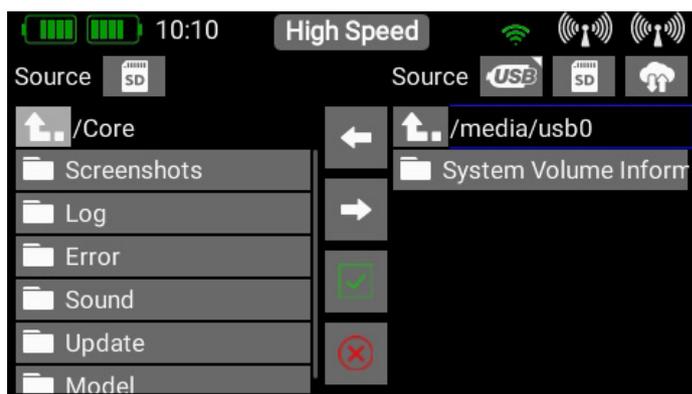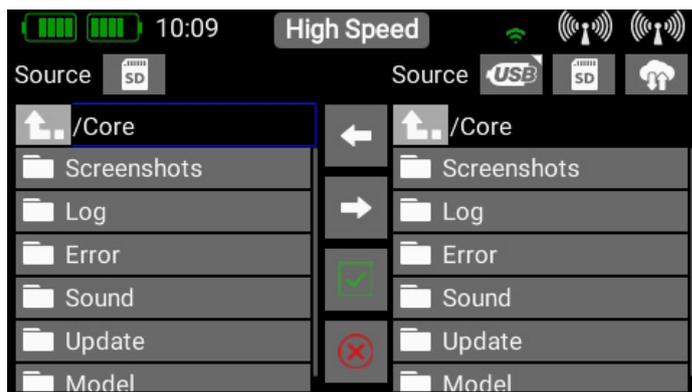
You now have the opportunity to copy files: navigate to the folder which contains the files you wish to copy, then briefly press the green tick in the center. After this you can select one or more files which you wish to copy; the selected files are marked blue.
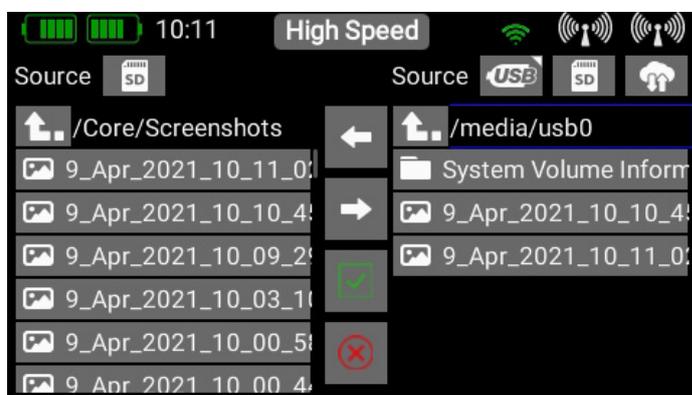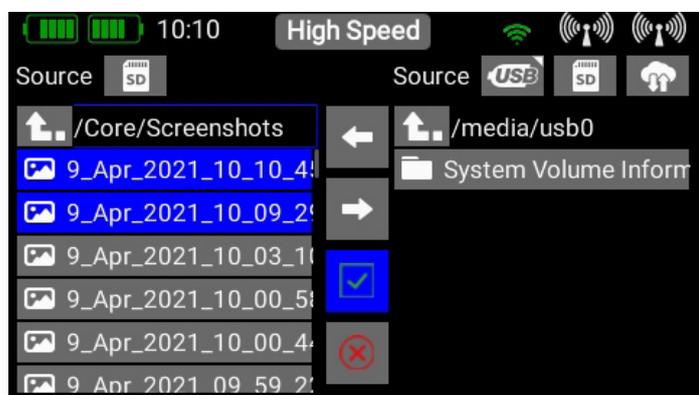
Once you have selected your files, press on one of the two arrow buttons in the center – depending on the direction in which you want to copy the files.

It is also possible to erase files – but caution: if you wish, for example, to erase a sound file for a telemetry alarm, then that alarm will no longer function! Even though you can quickly copy the files back into the transmitter, you may well find yourself wasting a lot of time searching for the cause of the error.

> ⚠ **NOTE**
>
> Before removing the USB stick, hold the USB symbol pressed in until the stick is ejected.

3.16 Teacher/Student System

The **CORE**'s Teacher / Student system has been designed in such a way that the Student transmitter can be almost any transmitter currently available commercially. The whole system operates in the modern way with a radio link, i.e. without a cable connecting the two transmitters. Apart from a Student transmitter, all you need is a receiver bound to it which can generate a standardized S.BUS or SRXL (UDI) signal.

Futaba Jeti Graupner	S.BUS
Multiplex Jeti	SRXL / UDI

This table provides an overview of which radio control systems are capable of generating which signal. For all other current radio control systems please ask your supplier whether it generates one of the bus systems listed here.

The **CORE** transmitter is always the Teacher transmitter, and is bound to the model. All functions, mixers and flight modes are set at the **CORE** transmitter. The only requirement on the Student transmitter is that it must generate all the desired functions on a single channel. For example, only one aileron channel can be set, even if the model is controlled using two separate channels.

At the Student transmitter you therefore need to set up a model with throttle, aileron, elevator and rudder. If you want the Student pilot to be able to assume control of landing flaps, retracts or other functions, these functions should also be set up. The channel sequence at the Student transmitter is of no importance, as the channels are assigned later at the **CORE** transmitter. Set these channels to ±100% at the Student transmitter, as this provides the same performance as with the Teacher transmitter. However, you can also reduce the travels at the Student transmitter if you intend to help a beginner with those first attempts at flying. Bind the receiver to this model memory.

Most systems will also require you to activate the **S.BUS** or **SRXL** output at the receiver. In the case of Jeti and Graupner this is carried out using the receiver's telemetry, but with M-Link the activation is carried out using the MPX Launcher program. No changes are required with Futaba systems: the **S.BUS2** or **S.BUS** can be accessed directly at the receiver. Connect the receiver's Bus output to the **Servo/PPM** socket on the **CORE** transmitter using a patch lead. The **CORE** transmitter provides power to the receiver.

Now open the **Teacher / Student** menu and start by selecting the switch to be used to transfer control to the Student. To the right of the Switch button, you will see either a red cross ⊗ if the Teacher transmitter is active - or a green tick, if control has already been transferred to the Student transmitter.
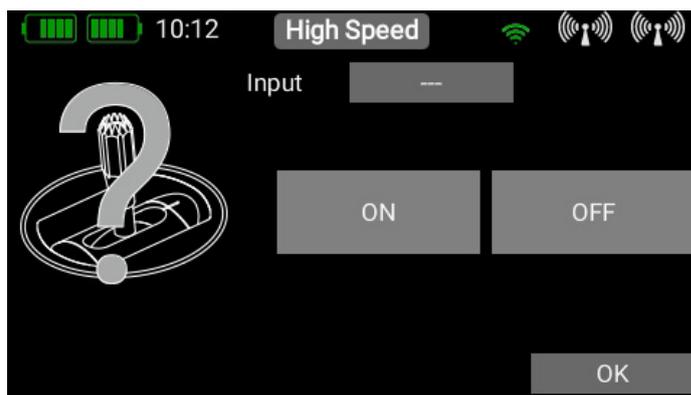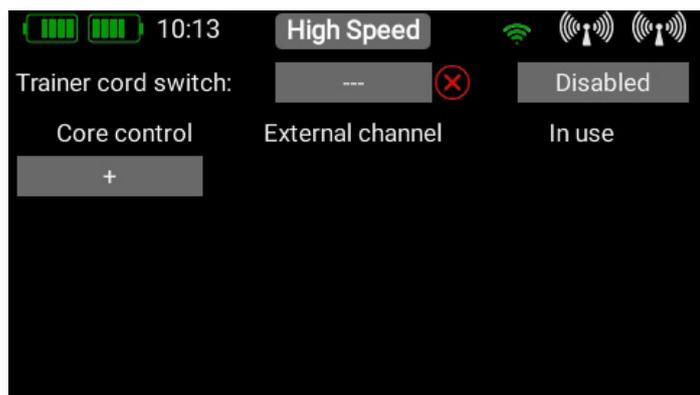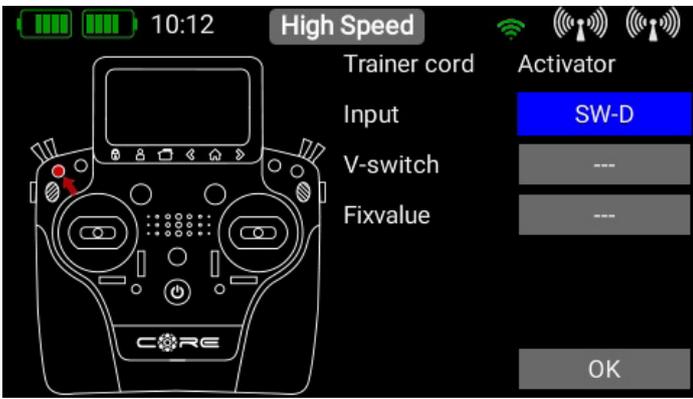
The next step is to assign a pair of transmitter controls by pressing the **+** symbol at **CORE transmitter control**. Here you can assign one of the Student's transmitter controls to a transmitter control at the Teacher transmitter. If you operate the switch assigned in this way, the control signals from the Student transmitter replace the transmitter control from the Teacher transmitter.
The two transmitter controls are detected automatically simply by moving the sticks or switches. At **CORE transmitter controls** press the empty field in order to select a transmitter control in the usual way.
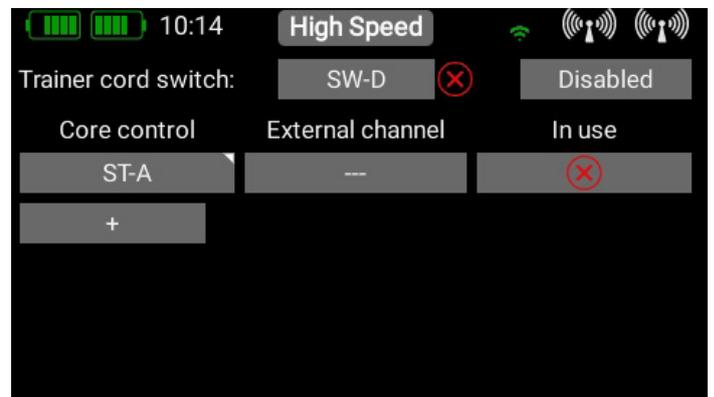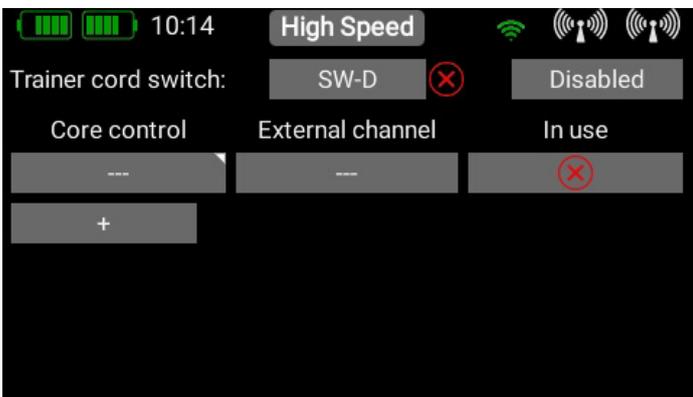
Repeat the procedure with the transmitter control from the Student transmitter: press the empty field under **External channel** and move the appropriate stick or switch at the Student transmitter. The **CORE** automatically detects which channel has been moved, and assigns this channel to the transmitter control at the **CORE**.
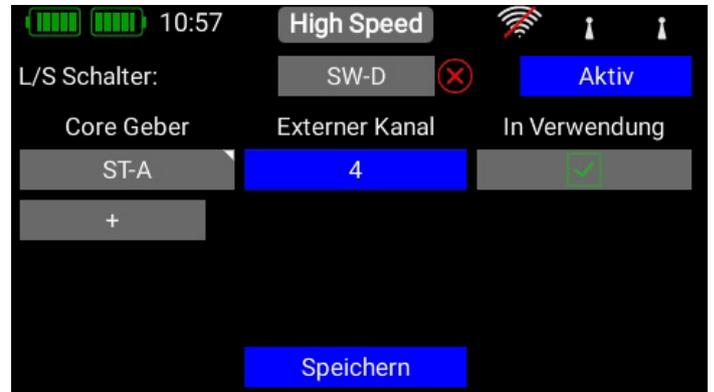
In the field under **In use** you can remove assigned channels whose control you don't want to transfer. This allows you to assign the complete model to the Student transmitter, but include only specific functions when control is transferred to the Student pilot - according to the Student's skill level.

At top right there is a further button - **Active** or **Inactive**. This can be used to disable the Teacher / Student system completely,
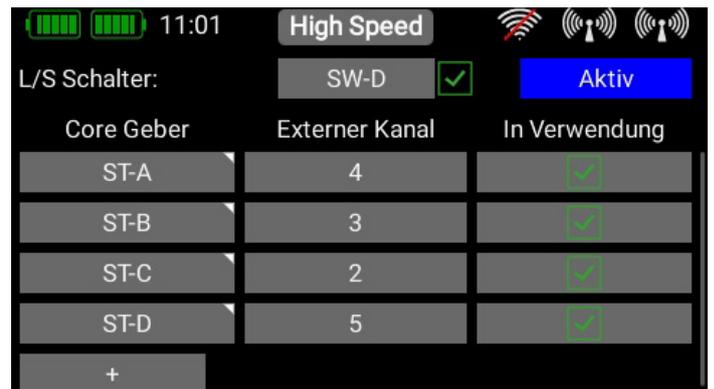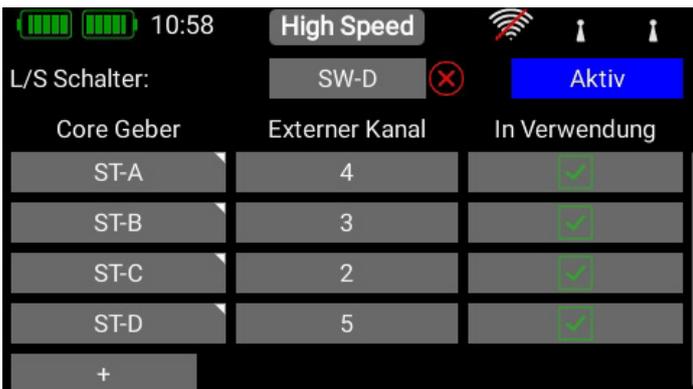
4.Telemetry, Timer, Servo Display, Notes and Quick-Select-Buttons

Once you have created a new model and bound one or more receivers, you can display important information on the main screen using the telemetry widgets. You can select any of five different types of widgets.

- **Telemetry**
- **Servo Dislpay**
- **Timer**
- **Quick-Select-Button**
- **Notes**

Creating a Widgets

To create a widget, touch an empty area of the main screen, and you will see the following display:

You will now see twelve grey fields, together with a P+ button and a P- button. The P+ button can be used to create additional pages, so that more telemetry widgets can be displayed. You can move to and from between the pages by swiping with your finger. The P- button is used to erase empty pages. Touch one of the grey fields, and this screen display appears:

Now select the type of widget you wish to create:
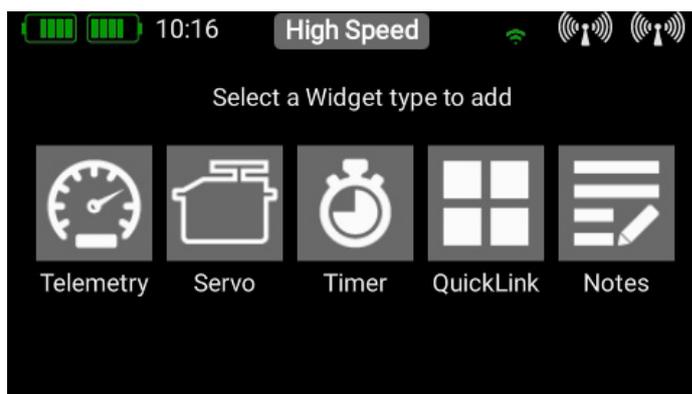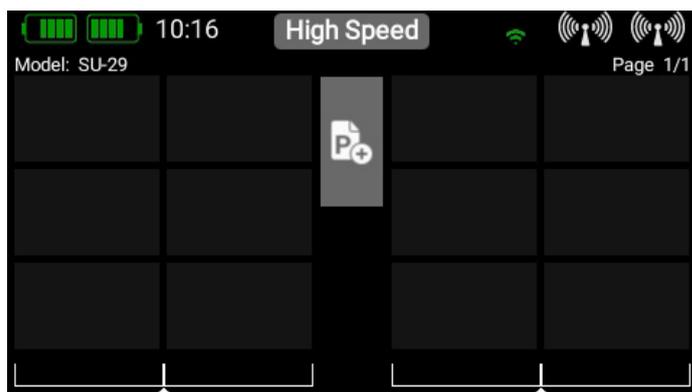
4.1. Telemetry

This can be used to display all the sensors connected to the **P²BUS**, and show the data they generate. This information also includes the receiver and transmitter data.

Technical information:

The **PowerBox CORE** telemetry system and the **P²-BUS** are designed in such a way that each sensor supplies its own information, including sensor name, unit, number of sensor values, decimal point, priority and other data. A new sensor designed for use with the **P²-BUS** can be connected to the system at any time without updating the transmitter. The advantage of the system is that all the text information relating to the sensor values is collected only when the system is switched on, i.e., when the system is booting.
Once the system is running, only the pure sensor values are transferred; this permits very fast data transmission with maximum flexibility, and ensures a thoroughly user-friendly system.

If you have selected the Telemetry widget type, this display appears, and the following options become available:

4.1.1. Size

With these three buttons you can adjust the size of the widgets:
Small, **Medium** and **Large**.


4.1.2. Delete Widget

You can delete the widget with this button.

4.1.3. Rescan Sensors

You will need this function if you connect new sensors when the system is already running. The process gathers all sensor information on the **P²-BUS**. Basically, all sensor information is automatically collected when the system is switched on.

4.1.4. + Button

At this point you can select sensor values using the **+ button**. Each widget can display multiple sensor values, even from separate sensors; the values then alternate in the widget's display. This is accomplished by selecting one or more sensor values which you want to appear in your widget, and pressing **OK** to confirm.
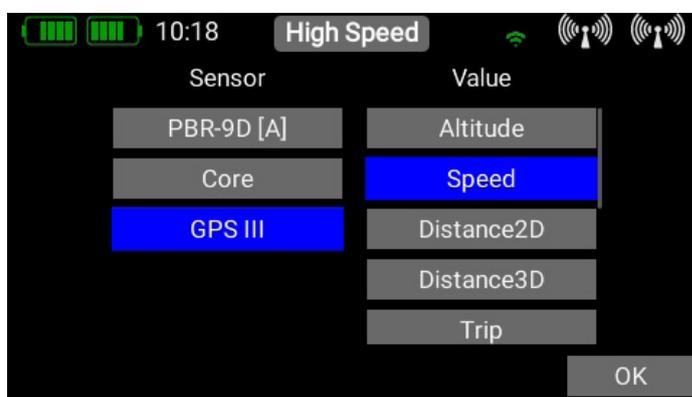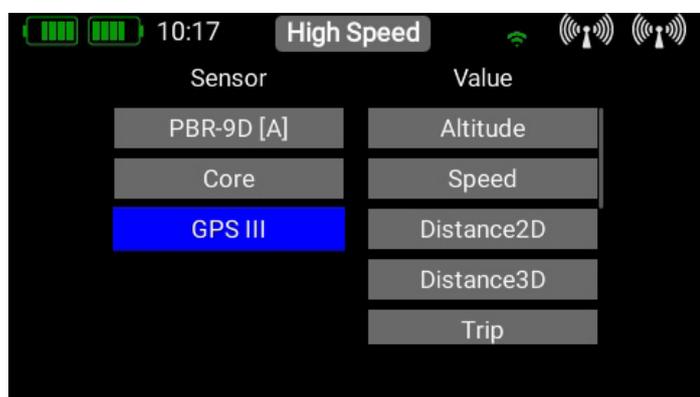
The left-hand column shows all the connected sensors, while the right-hand column shows all the values which these sensors supply. The **P²BUS** is an in-house development, and is capable of transmitting up to **255 sensors each with 32 individual values** – and at a speed of up to **800 values per second**!

At this point you can select which sensor value this widget is to display, and press **OK** to confirm your choice. It is possible to set up each widget to display multiple sensor values, even from different sensors; these values are then displayed in turn by the widget. This is accomplished by selecting one or more sensor values which you want your widget to display, then confirming your choice with **OK**.

The selected sensor value now appears in the list. In the example below several sensor values have already been selected.

When one or more sensors is selected - as shown above - additional functions are displayed.
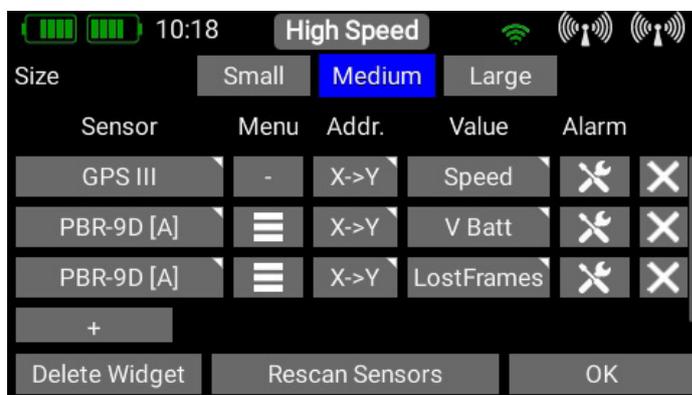
4.1.5. Sensor

f you briefly press one of the values in the **Sensor** column, you can place a different value at this point. Keep your finger on a sensor name, and the following display appears:
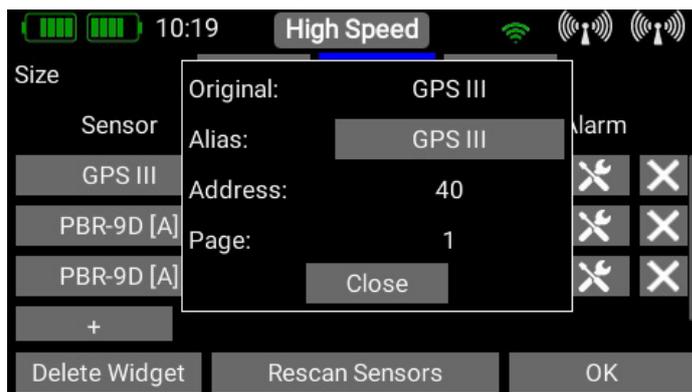
In this menu you can change the sensor name, and see the current sensor **Address**. To rename the sensor, open the keypad by pressing the field after **Alias**. Note that long sensor names, in particular, can result in extended spoken messages. If you are using M-Link sensors, the standard M-Link-XY can be changed to a more informative name. If you wish to restore the original name supplied by the sensor, simply erase all the characters in the Alias field, and confirm the empty field.
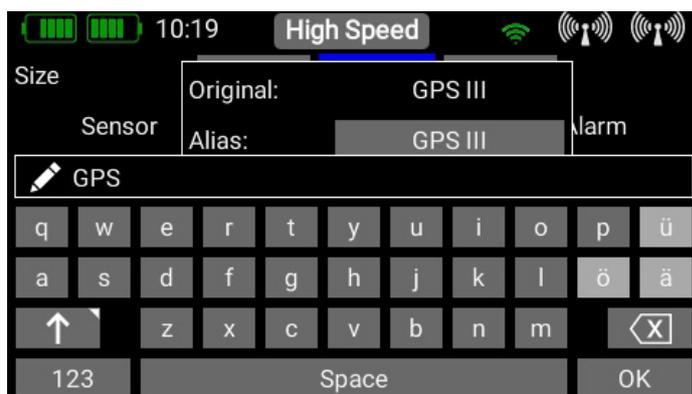
4.1.6. Menu

The Telemetry menu is an important function, since it enables you to configure and set up sensors and other devices which are connected to the **P²BUS**. An example of this is the **iGyro SAT**, which can be connected to **PBR receivers**.
The receiver's Setup menu can be called up by pressing the **Menu** button at the corresponding sensor. The three thick bars in the **Menu** column indicate whether the sensor has an integral menu or not.
Briefly press these **three bars** to access the sensor's menu.
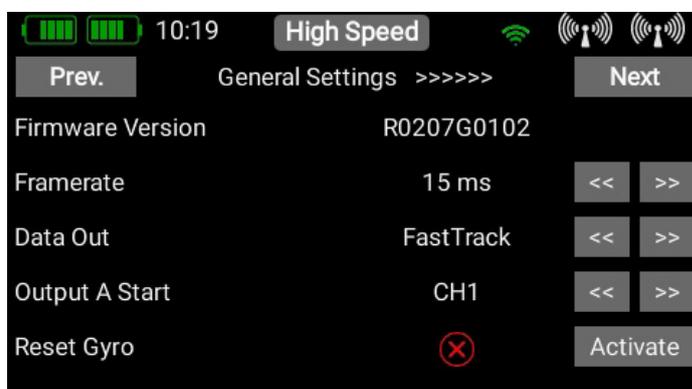
The **Next** and **Previous** buttons at top left and right can be used to navigate through any sub-menus which the sensor offers. Briefly pressing the **arrow** buttons to the right of the sensor values allows you to alter the sensor values. You can set larger values more quickly by keeping your finger on the **arrow** buttons. To leave the menu press the ‹ -button at the bottom of the touchscreen.

4.1.7. Adress

The **Addr.** button is important if you wish to connect multiple sensors of the same type. For example, if you wish to use two **PBS-V60** sensors to monitor two flight batteries in an electric-powered model.
This is the procedure for registering two sensors of the same type:

- Connect one of the sensors, and carry out a rescan.
- Press **+** in order to select one (or more than one) of the telemetry values generated by this sensor. The sensor appears in the list. In our example this is the **PBS-V60**.
- You can now display the current address by keeping your finger on the sensor name, as explained above. This is purely for information, as the **CORE** automatically manages the addressing. The standard address 41 of the **PBS-V60** is shown on the left of the picture.
- Press the **X->Y** button in order to shift the address.
- If you again hold your finger on the sensor name, you will see that the address is different from the previous one. As you can see in the right-hand illustration, the address has been shifted automatically to 200.
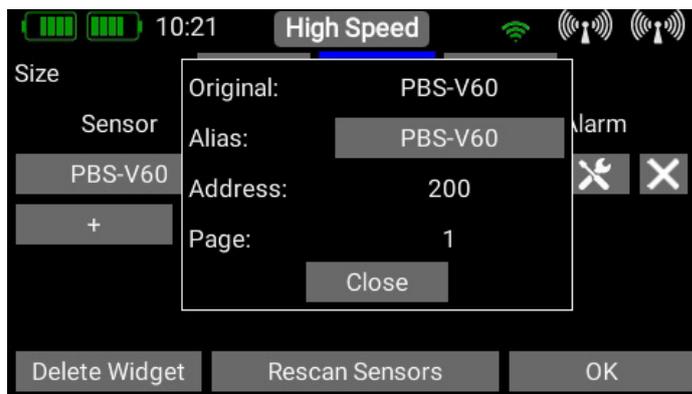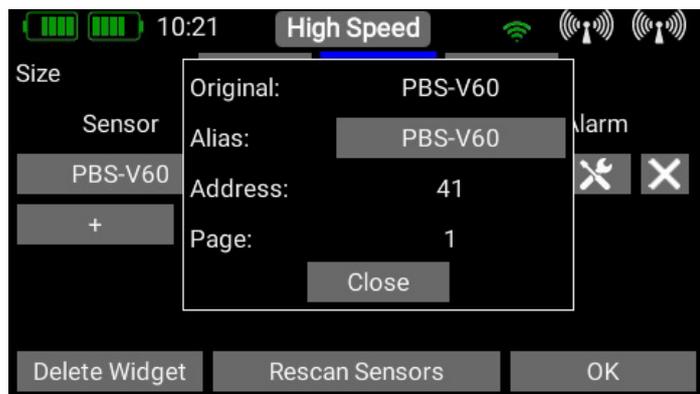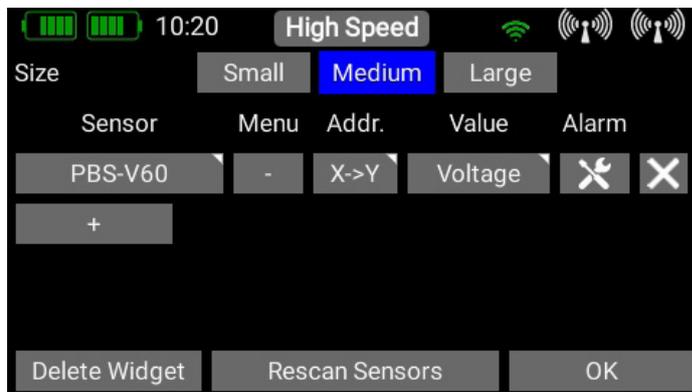
- Now connect the next sensor, and carry out another **Sensor Rescan** process. Press **+** to accept the second sensor into the system.
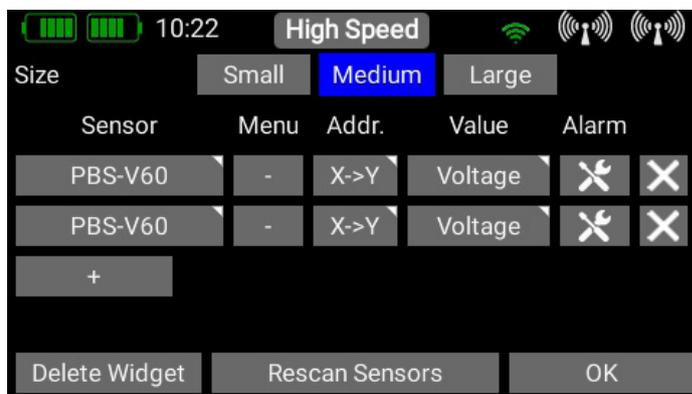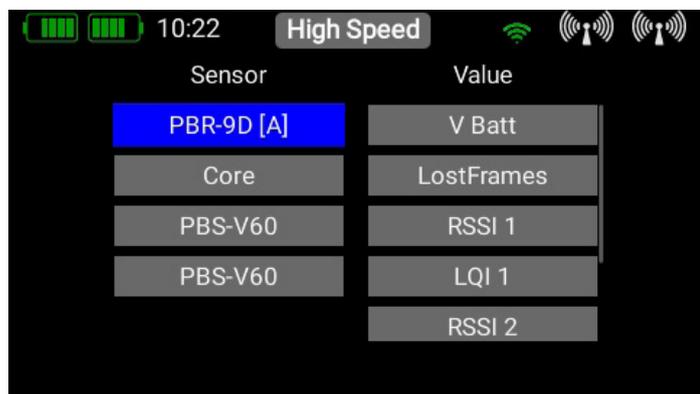
- Proceed as before if more sensors of the same type are to be connected..

4.1.8. Value

In the column below **Value**, you will see the name of the sensor value. If you press the name briefly, the screen will display all available values generated by the sensor.

If you keep your finger on the button, a new window appears which displays the name and the current address of the sensor value. If you wish to change the name of the value, press the grey field after **Alias**.
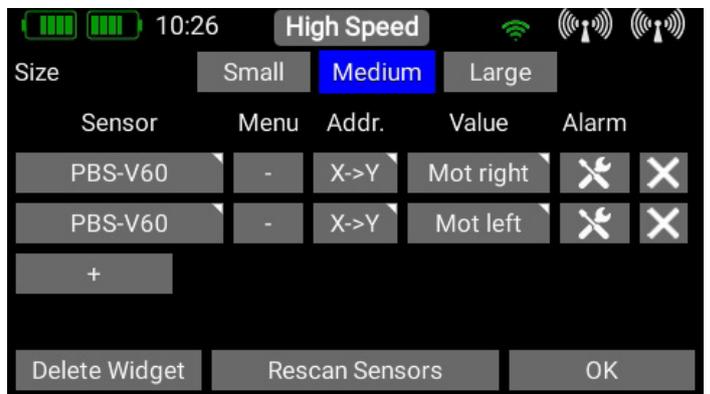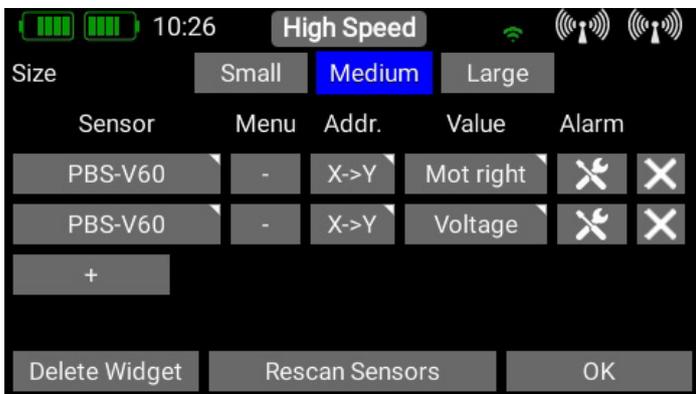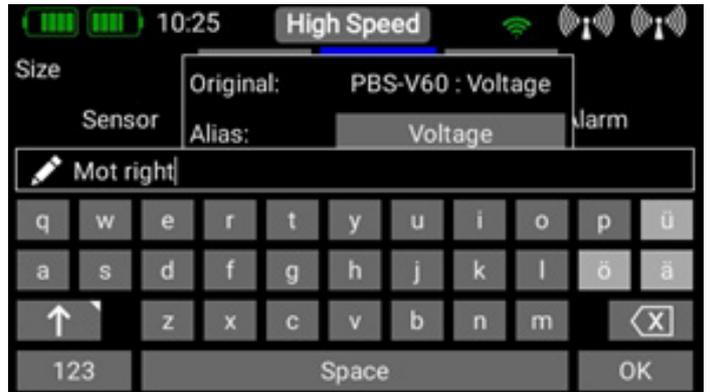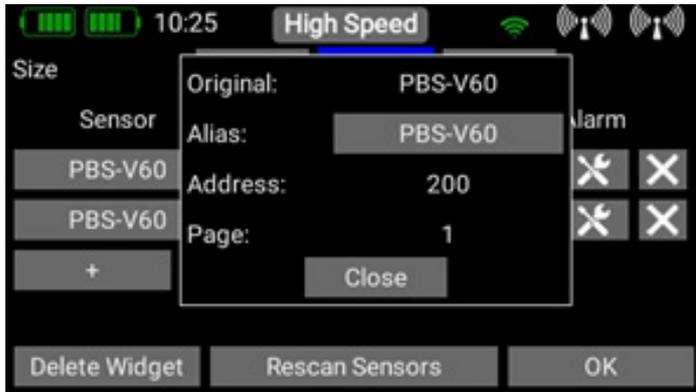
This procedure lets you give the sensor value a new name – and it also lets you adjust the speech outputs to your personal preference.

4.1.9. Alarm

After the individual sensor values you will see the **Alarm** button. In the Alarm menu you can set a maximum of four alarm thresholds: one **yellow** alarm and one **red** alarm for each direction. Starting from the **green** area in the middle, in which there is no alarm, you can set an alarm in the two **left-hand** fields which are tripped if the value falls **below** a threshold. In the two fields to the **right** of the green area you can set the alarms which are tripped when the value **exceeds** a threshold. For each threshold you can select different **sounds**, **text** or **vibration**.

In our example we want the **GPS** speed value to generate a warning when the model flies too fast. When you select the alarm screen for the first time, default values are already entered which vary according to the current sensor value. You can now change the threshold values to meet your requirements.

The final step is to select the type of warning you want. In our example a warning tone is set to be generated at 200 km/h, while a spoken message is generated at 220 km/h.
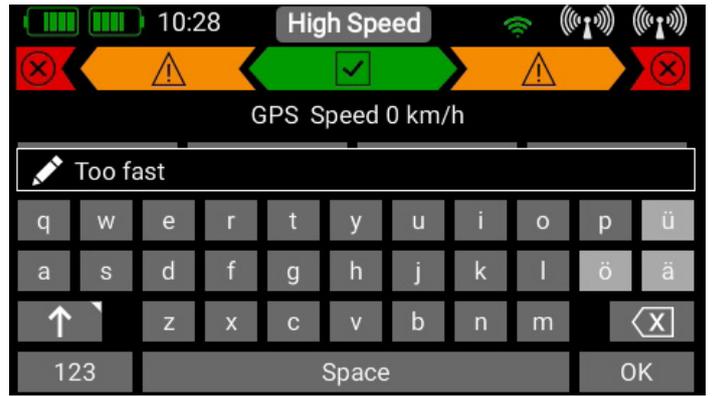
If you opt for speech output, you can enter any text you wish to be spoken.

Alarm Type at the bottom of the screen lets you determine whether the alarm is to be generated only once, or every time the sensor value exceeds or falls below the set threshold. Press the **Back** button to return to the Sensor Overview.
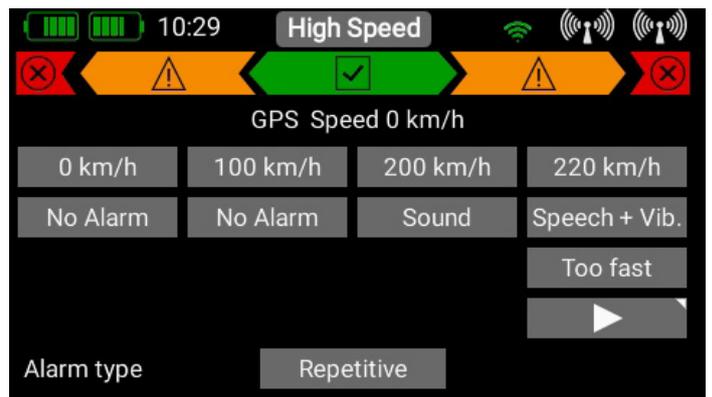
4.1.10. Erase

The last button **x** in the Sensor Overview can be used to erase individual telemetry values from the widget.
Once you have entered all the settings, press **OK** at the bottom of the screen.

4.2 Timer

The **CORE** permits you to use eight different, independent timers. For each timer it is possible to set a maximum of six different alarm sounds or spoken messages.
If you select the **Timer** widget type, you will see the screen display shown on the right. Here you can set the timer, and the associated alarms and spoken messages. Press the + button to set up a timer:

Briefly press the field under Settings in order to configure the timer:
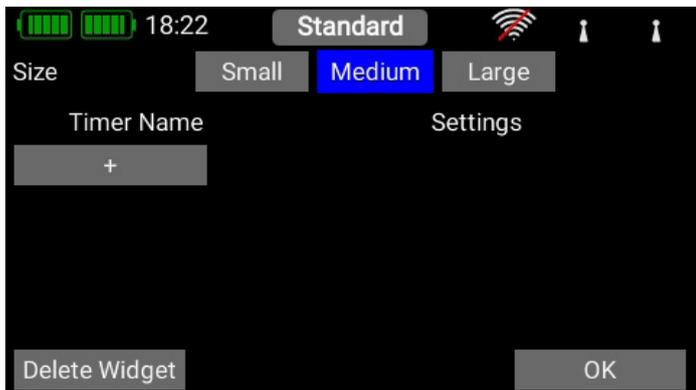
4.2.1. Timer Name

Briefly press the **Timer Name** field if you wish to assign a meaningful name to the timer.

4.2.2. Start and Stop time

The next step is to enter the **Start** and **Stop** times: if the Start time is greater than the Stop time, then the timer counts down; if the Stop time is greater than the Start time, it counts up.
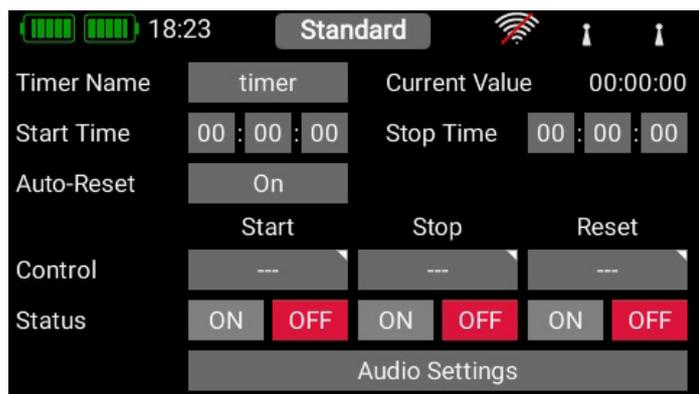
4.2.3 Transmitter control for Start / Stop / Reset

The next step must be to select a transmitter control which starts the timer: briefly press the **empty field** under **Start**. The transmitter control can be a switch, linear slider or rotary control, virtual switch or telemetry control. In our example the throttle stick is used to start the timer. In the following section you will see the transmitter control and a bar display with two switch points.
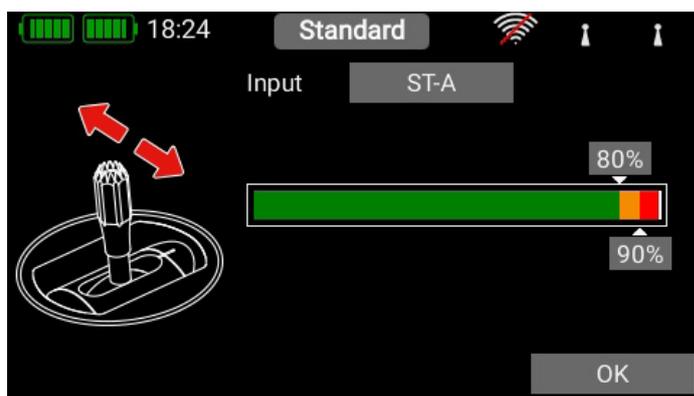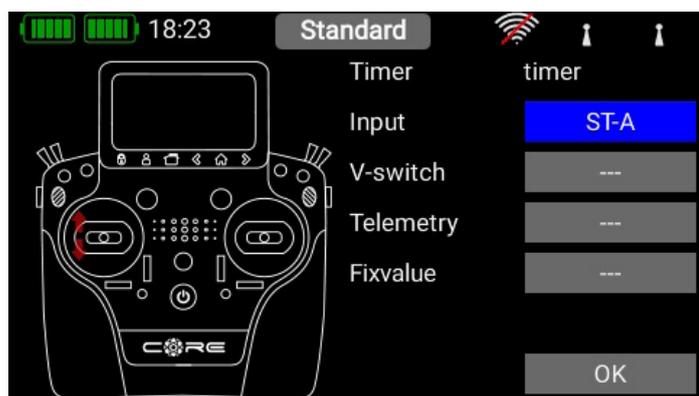
The two switching points can now be placed in any position you like by moving them with your finger. The red area indicates the "**Off**" state, the green area the "**On**" state. The orange area indicates "**hysteresis**", i.e., the area in which no switching takes place.

You can very easily reverse the "**Off**"state and the "**On**" state by moving one of the two switching point sliders in front of or behind the other.

This adaptability provides maximum flexibility and simplicity, and you can immediately check the effect of your settings by moving the switch or linear control. The transmitter control symbol on the left changes color to indicate the switched state.

Press **OK** once you have entered the settings. The procedure for assigning the transmitter control for Stop and Reset is identical.

> ⚠ **NOTE**
>
> If you wish the timer to start and run continuously until it is reset, then you do not need to assign a transmitter control for Stop. If you want the timer to start and stop alternately using a single control, simply assign the same transmitter control to the Stop control as you have to Start, and invert the switch points.
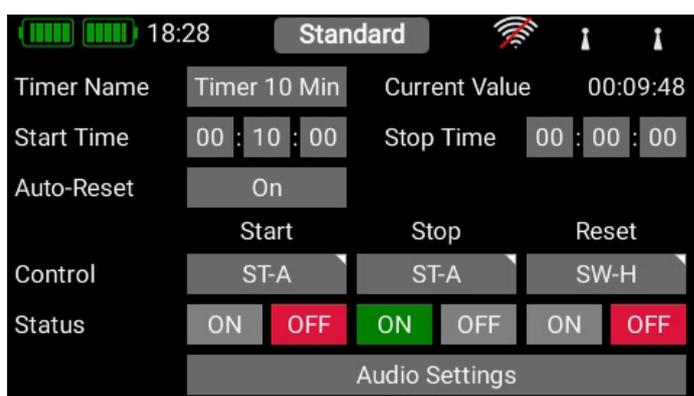
4.2.4. Auto Reset

If Auto Reset is set to **On**, then the timer will be reset to the starting time when the model is loaded, or when the transmitter is re-started. If Auto Reset is set to **Off**, the timer value at the time the transmitter is switched off is stored by the transmitter in the associated model file. This feature can be useful, for example, if you wish to use a single flight battery for more than one flight.

4.2.5. Audio Settings

In Version 2.80 the adjustment facilities for audio output have been significantly enlarged, and incorporated centrally in the Timer menu. For each timer one can use up to six audio or vibration alarms at various times or in various time ranges.
Briefly press **Audio settings** at the bottom of the screen. In the display which then appears press **+** to set up a new audio output.
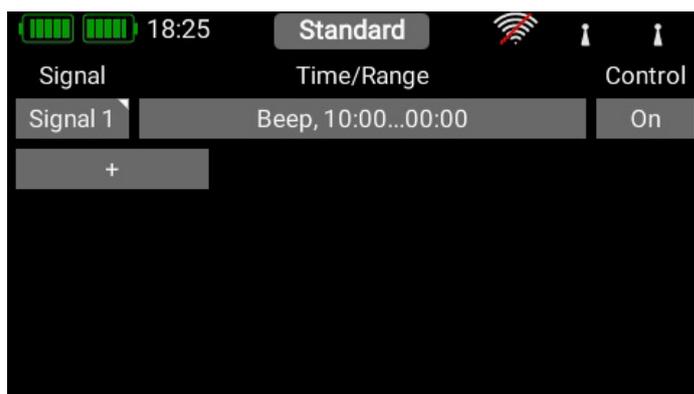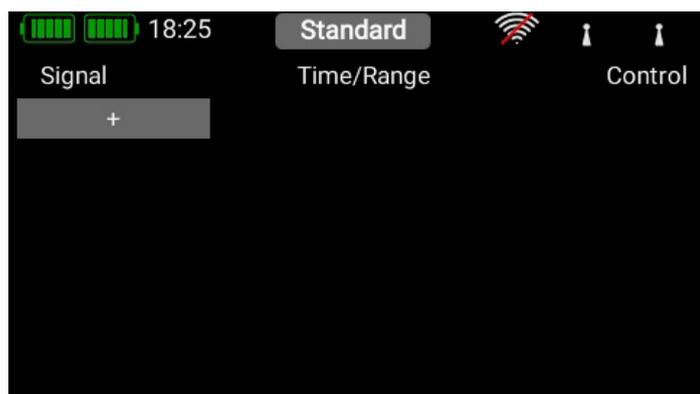
Select the button under Time/Range in order to set the time range and the type of alarm. You will then see the following display:
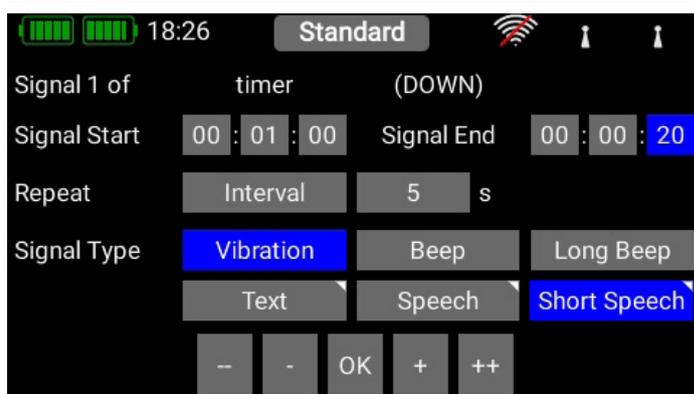
• Signal Start
Here you enter the Start time, i.e. the point from which the audio output is to commence. In the case of a count-down timer the Start time must always be greater than the Stop time.

• Signal End
Here you enter the stop time for audio output.

• Repeat
At this point you can select the interval at which the audio output is to be repeated. You will then hear the audio output in the time window which you entered at **Start/Stop** time.
If you only want the audio output to occur once, briefly press the Interval button to switch it to **Once**.

• Signal Typ
Here you can select the Signal Type: various outputs can be combined, such as Beep and Vibration.
If you want to use the output for **Text**, **Speech** and **Short Speech**, hold the button pressed in order to select an individual text or voice.

Press **OK** to confirm your selections. If you want to set up additional audio outputs for this timer, press **+** again. Up to six audio outputs can be selected for each timer.

Press the ‹ button to leave Timer Setup. In the overview you will now see all the timers you have set up. The timer with the blue background is the one displayed in the current widget.

4.3 Servo display

This widget can show the servo output position. Especially for the gyro gain or flaps this is a useful display.
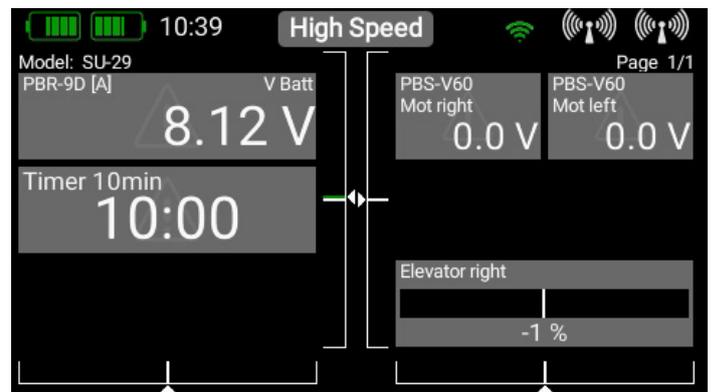
4.4 Quick select Menu

This widget type can give you a quick entry in menus which are used frequently.
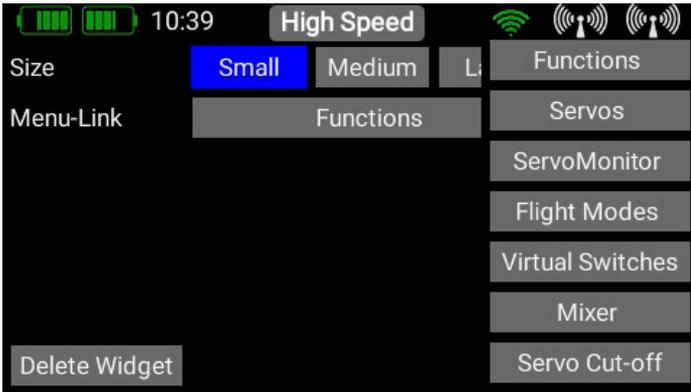
4.5 Notes

You can make text notes here – for example for pre-flight checks or any other important things.
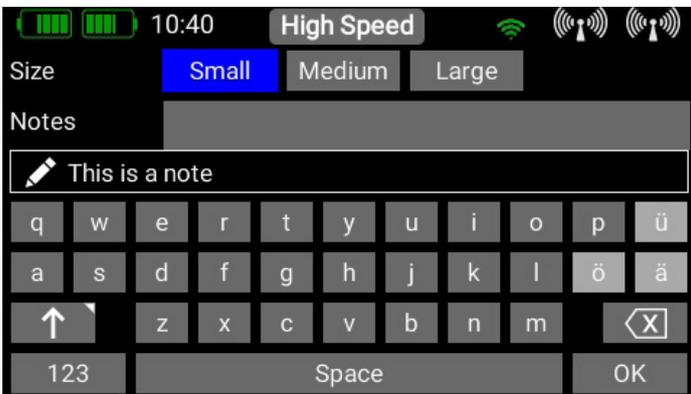
4.6 Arranging the widgets

The newly created widget is now displayed at the position in which you previously started. The widgets can be re-positioned at will: hold your finger on the screen until the widgets start to waver; they can now be moved around the screen.

To freeze the widgets again simply wait a few seconds, or press the **HOME** button.
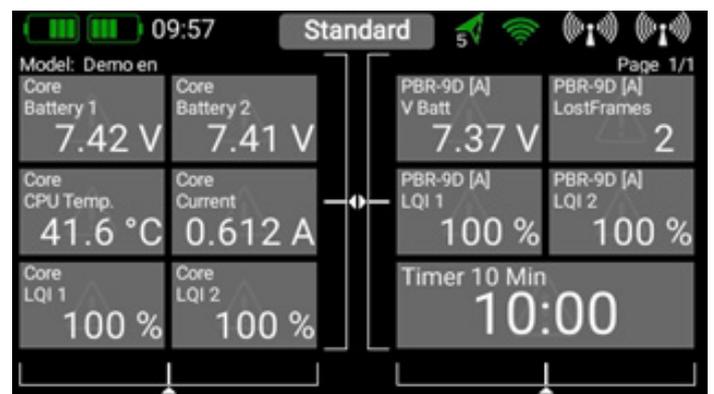
4.7 Minimum and Maximum display

Another important feature relating to telemetry data: the **CORE** automatically records the maximum and minimum values for the incoming data. You can display these values very easily simply by double-pressing the widget:
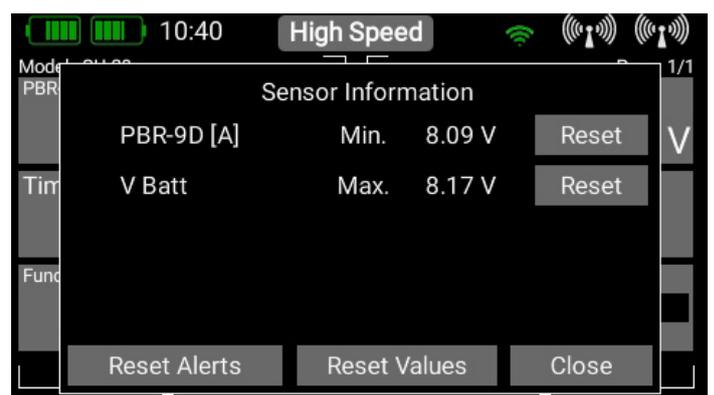
The recorded minimum and maximum values and alarms can be erased individually in each widget. If you wish to be able to erase all the alarms and all the minimum and maximum values at once, you can press the **Right-hand** button in the **Pull-down menu**. This action resets **all** values and alarms.
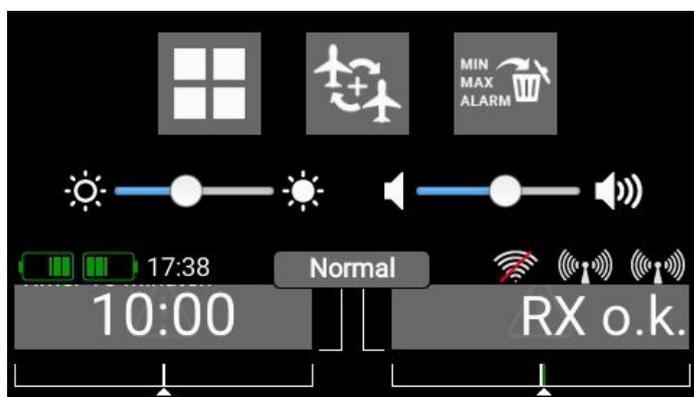
5. Update

5.1 CORE

The CORE transmitter can be updated using either a USB memory stick (1GB – 32GB) or WiFi.

5.1.1. USB Update

If you wish to update the transmitter, the first step is to download the **PowerBox** Terminal program from our website, and install the program on your PC or laptop. Start the program and select **CORE Update** at top left.
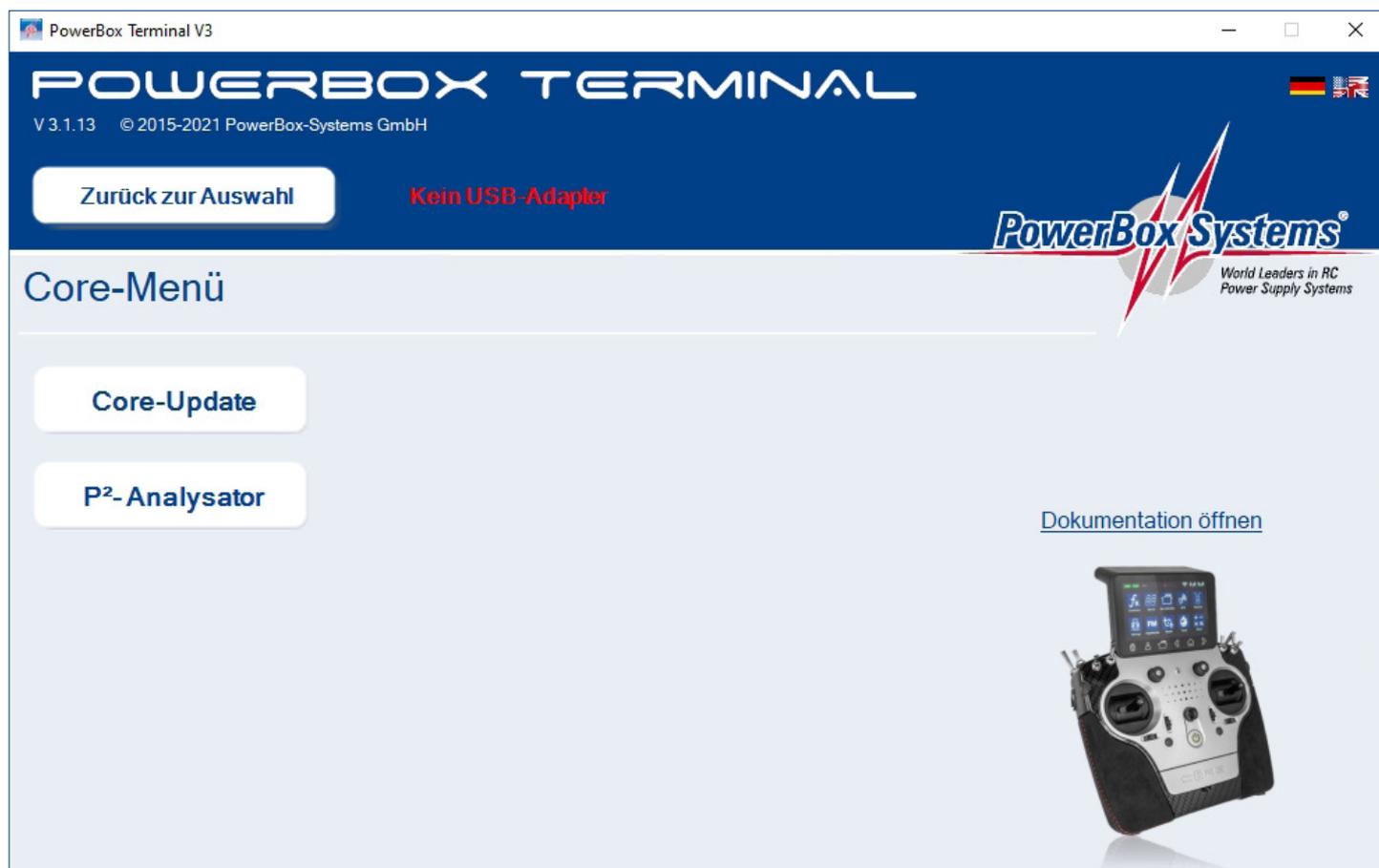
Insert a USB stick in your PC, and follow the on-screen instructions. The USB stick will now be formatted, and all the essential data copied onto it. Once that is finished, switch your CORE transmitter on and wait until it has booted up. Now insert the USB stick in the CORE transmitter, move to the **Settings > System > Software**.

Application	2.50	Update	
Voice packages		Load	
CoreStart script	5		
Transceiver	1.33	Update	
Stickcontroller	1.4	Update	
Receiver A	2.7	Update	
Receiver B	0.0	Update	

Transceiver	1.33	Update	
Stickcontroller	1.4	Update	
Receiver A	2.7	Update	
Receiver B	0.0	Update	
Receiver C	0.0	Update	
Receiver D	0.0	Update	
Firmware recovery		Run	
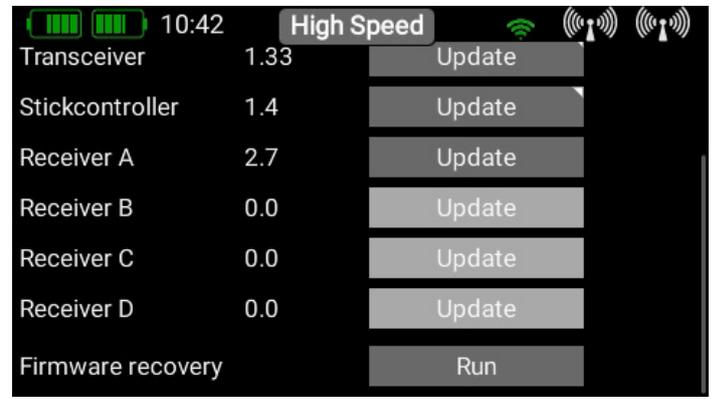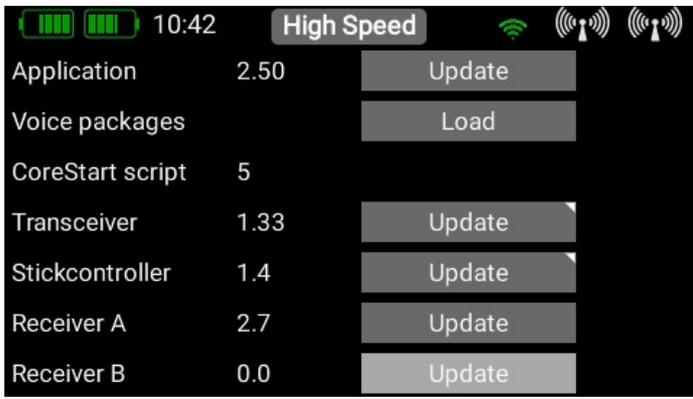
▯ NOTE

Check menu, and briefly press Update. Depending on which version is currently loaded in your CORE transmitter, it is absolutely essential to observe the following procedure, otherwise the Linux system may crash, and you will need to return the transmitter to our Service department. This problem has been cured with Version 1.6.

- **Update from Version 1.0 or 1.4:**

  Pressing Update opens a window, and the transmitter invites you to carry out a restart. Do not switch the transmitter off immediately!! It is essential to wait for about 20 seconds, as the files must first be copied. When this period has elapsed you can restart the transmitter, and the update will be completed automatically.

- **Update from 1.5:**

  Nothing happens when you press Update. **Do not press Update a second time** – the transmitter is already working, and copying the files. Simply wait until the transmitter displays the message that you need to restart the transmitter. You can then restart the transmitter, and the update will be completed automatically. As of Version 1.6 a Status message relating to the copy process appears immediately, followed by a Complete message when the copy process is finished.

- **Update from 1.6 or higher:**

  As of Version 1.6 a Status message relating to the copy process appears immediately, followed by a Complete message when the copy process is finished.

5.1.2. Wifi Update

The WiFi update is only from version 2.0. The essential preparation is to set up the WiFi system as described under Point 6. Access to your router or mobile hotspot must be present. The rest of the process operates automatically. If you press Update and a connection to your WiFi exists, all the necessary files will be downloaded from the web and installed. Afterwards the transmitter must be powered down and then rebooted, exactly as with a USB update.

5.2 Receiver

Version 1.6 introduces a feature which is unique in the entire RC market: from this version all PBR receivers (except the PBR-8E) can be updated from the transmitter, provided that they are already bound to it. For this to work you must first switch on the model, i.e. the bound receiver. Now navigate to the **System -> Software -> Check menu**.

Briefly press Update for one of the bound receivers. The following screen displays the software version which is currently in the transmitter's memory. Select the latest version, and wait until the update is complete. If multiple receivers are bound to the transmitter, repeat the procedure with each one.
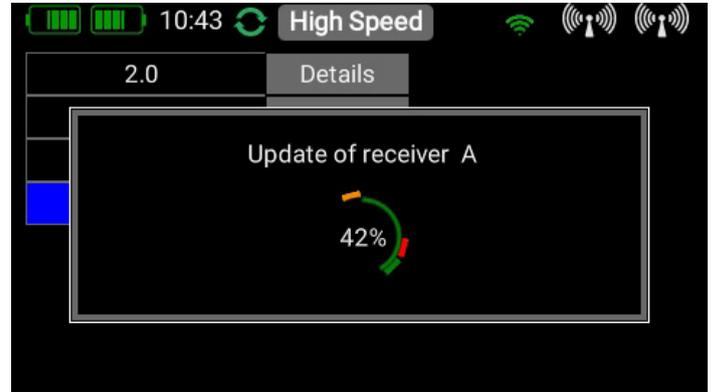
NOTE

Don't hold the transmitter too close to the receiver, as transmission is very poor at a range of less than 50 cm. The transmitter and receiver are designed to operate at long range, and at very close range the input amplifiers may be overloaded. At a range of 1m to 9km the update process functions without any delay!

Important: if a radio update - for whatever reason - should fail, that is not a problem. Right at the bottom of the Update menu you will find the **Restore Firmware** button. Disconnect all other bound receivers from their power supply, and re-connect the receiver which you wish to update. Now press **Restore Firmware**.
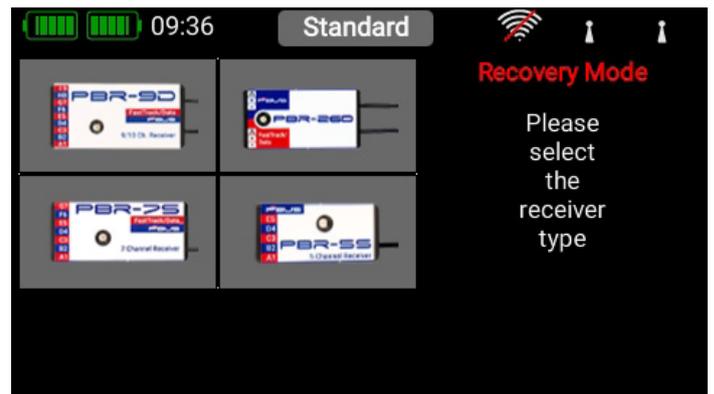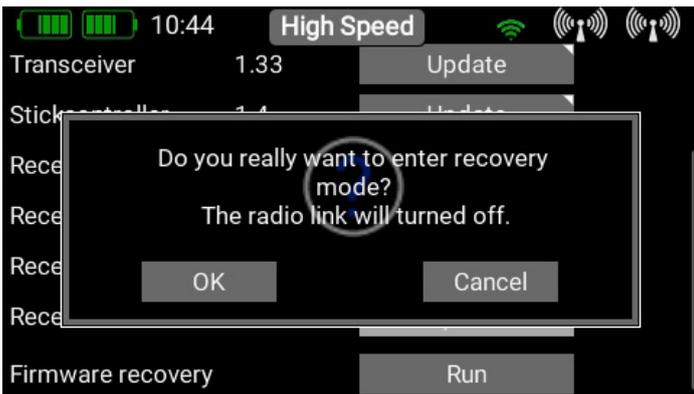
The Update procedure itself is the same like a regular update.
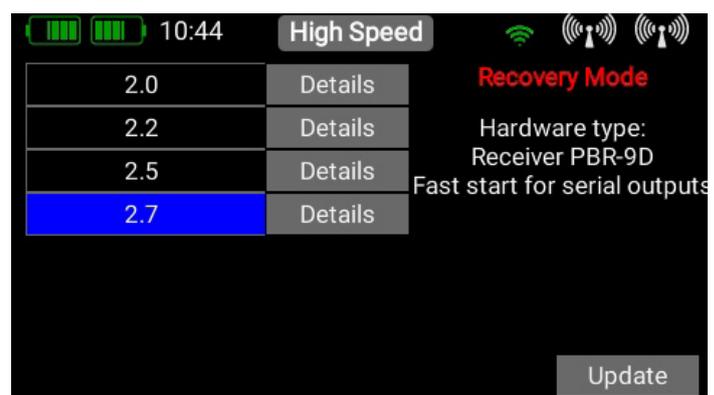
6. Charging the transmitter

If you wish to charge the **CORE**, the first step is to open the front cover. Locate the two plugs attached to the mains PSU, and insert either one into the charge socket. If the battery symbol is displayed large and flashing on the screen, this means that you have a reserve for about 20 – 30 minutes. You must charge your CORE at this point, if not sooner.

For safety reasons the CORE does not feature a battery cut-off. Never allow the transmitter to become deep-discharged!

The LEDs light up red when the batteries are on charge, and green when the charge process is complete. The charger can be left connected to the CORE after charging without causing damage, as the internal charge control circuits regulate the charge process completely automatically. The battery charge process takes about 3.5 hours from the fully discharged state. The CORE can also be recharged while it is switched on, e.g. for protracted programming work.

> **NOTE**
>
> In addition to the bar display at top left on the screen, you can also set up the transmitter to display its own exact battery voltage on the main screen in the form of a telemetry widget, and set a corresponding alarm. The transmitter is fitted with two internal 7.2 V Li-Ion batteries of 3400 mAh capacity. Sensible alarm values would be 6.8 V for an orange alarm, and 6.6 V for a red alarm.

> **NOTE**
>
> The mains PSU is the same type used for **PowerBox Batteries** and **PowerPaks**, and can also be used to recharge these batteries.

7. Connections

Under the flap you will find additional sockets:

| Headphone socket | Charge status LED | Charging socket (10-16V) | USB A socket | Servo/PPM |
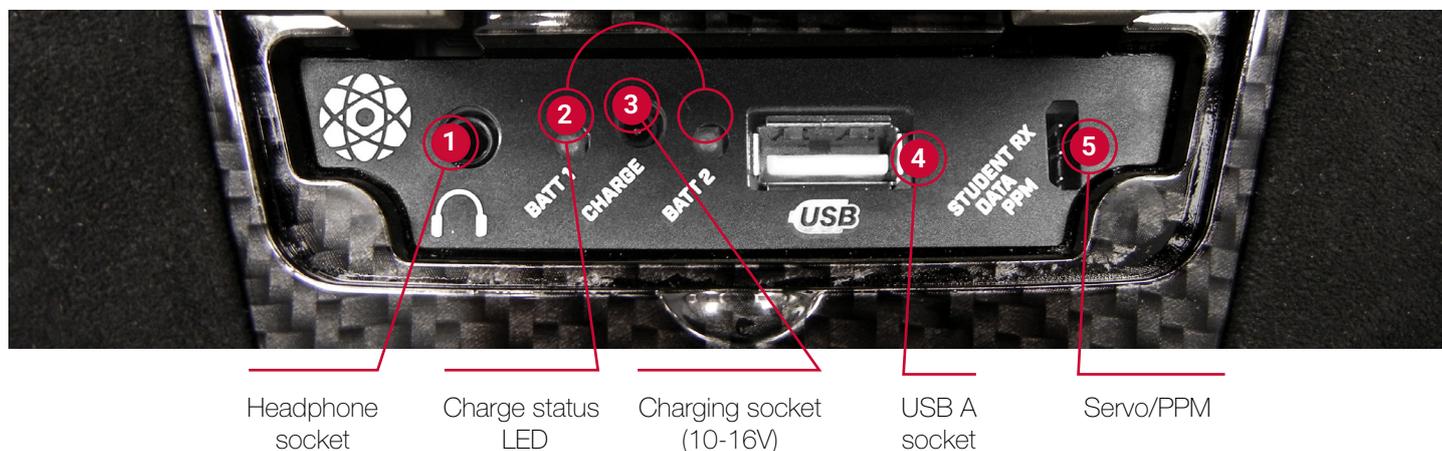
❶ Headphone socket

You can connect stereo headphones to this socket for spoken Vario and telemetry messages.

❷ Charge status LED

❸ Charging socket (10-16V)

❹ USB-A socket

For future applications

❺ Servo/PPM

This socket can be connected to servos, which then respond directly to the inputs of a transmitter stick. This can be very useful for centering servos before installation, or subjecting them to a quick function check. This output is protected by a 1A fuse, so it is not suitable for servo load tests! The socket can also be switched to P²-BUS output, in order to power external Varios or recording devices with real-time telemetry from the model.

If the Teacher / Student function is activated, this output switches to act as input for the Student receiver's SRXL or S.BUS signal.

8. Mechanical transmitter adjustments

• Removing the handrests

The handrests fitted to the CORE can be removed quickly and easily: simply undo the four socket-head screws in the feet, and the handrests can be slid down and off.

> **⚠ NOTE**
>
> Alcantara is not, as often supposed, natural leather, but a micro-fibre material. Alcantara is incredibly tough and durable, and is very easy to maintain. If your handrests become soiled, simply rinse them clean using warm water and ordinary hand soap.

Caution: If you clean the handrests, it is essential to allow them to dry out completely before re-attaching them to the transmitter, otherwise damp could enter the transmitter and cause corrosion damage!

• Opening the transmitter

As standard the CORE is supplied in the correct mode, as specified by the customer, but some users may find that the centring spring tension or the ratchet function needs to be adjusted to meet their personal preferences. The first step is to remove the handrests. Lay the CORE on a soft surface – ideally a thick layer of foam. Now undo and remove all ten socket-head screws holding the back cover. Don't remove the back cover yet, as the cables for the switches and proportional controls in the cover must first be disconnected.

This is the procedure: raise one side of the back cover slightly, and loosen the connectors by moving them to left and right whilst pulling gently, then repeat the process on the other side. The back cover is now free, and can be lifted off. You will see the transmitter's internal features:
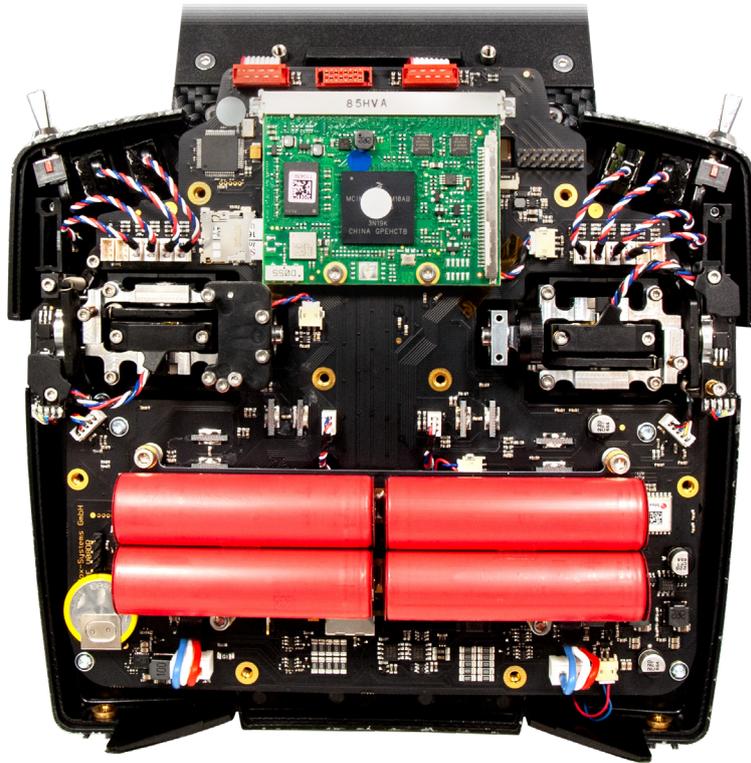
• **Adjusting the tension of the primary stick centering springs**

On the screws 1 and 2, the centering spring tension can be adjusted for the respective axis. Tightening the screw further increases the spring tension. If you find it impossible to set your preferred spring tension, we can supply a range of stronger springs.

> ☝ **NOTE**
>
> If you tighten the screw too far, you may find that the lower spring tensioner partially moves out of its guide. You can correct this by moving the stick fully to one side, at the same time pressing the spring tensioner back into its guide using a small screwdriver.
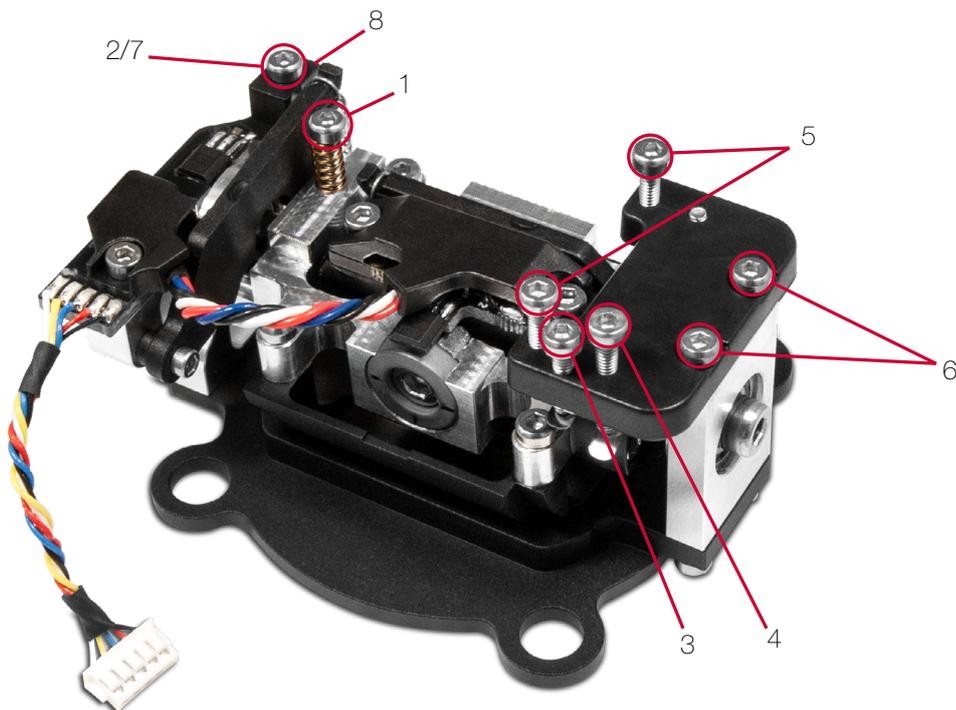
- **Adjusting the throttle ratchet and brake**

  The hardness of the throttle ratchet can be adjusted using screw 3. Screw 4 adjusts the friction brake.

- **Adjusting the throttle travel**

  The travel of the throttle stick on the CORE is adjustable. This is useful for 3D pilots in particular, as it enables them to set a mechanical limit on throttle travel. Adjustment is carried out by tightening screws 5. The throttle travel can also be set up asymmetrically. Once you have set the travel of the throttle stick to meet your requirements, it is essential to re-calibrate that function.

- **Switching modes**

  As already mentioned, the software has no modes, but naturally the hardware must correspond to your preferred mode. If you wish to change the factory default mode, first undo screws 6 from the ratchet plate, then install the ratchet plate on the other primary stick unit, as an exact mirror-image of the original installation. Tighten the retaining screws, pressing the plate towards the center of the transmitter. The next step is to re-install the spring blocker (8): remove screw 7. The screw with the spring can immediately be installed again on the other side. To re-install the spring blocker, move the stick fully to its end-point, fit the spring blocker pin under the spring lever, then tighten the spring blocker screw.

9. Calibrating the transmitter controls

Naturally the **PowerBox CORE** is supplied with all functions correctly calibrated. However, if you wish to swap a switch or replace a broken switch, we recommend that you re-calibrate the new switch. Re-calibration is also necessary if, for example, you limit the throttle stick travel, or change the transmitter mode mechanically.

Move to the Calibration menu by this route: **Settings > System > Calibration**.

Move the transmitter control you wish to calibrate in order to select it. The information relating to this transmitter control is now superimposed on the right. For example, if you wish to change from a 3-position switch to a 2-position switch, select the appropriate switch type in the Type field.
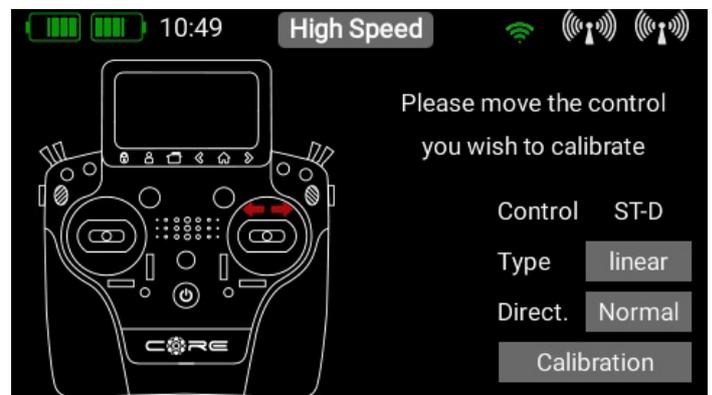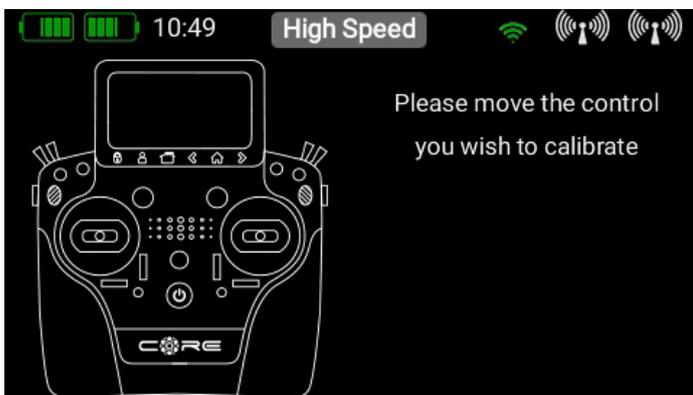
Once you have done this, touch Calibration at the bottom, then move the control to both end-points. The Continue field now appears.
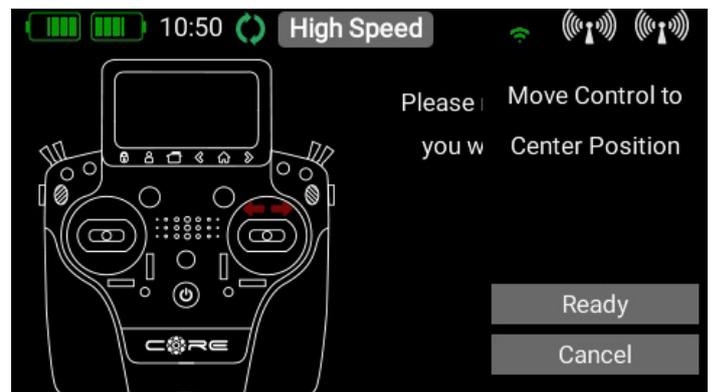
If you have installed a proportional control or a 3-position switch, you also need to move the transmitter control to the center. Touch Finished to complete the process. The **Direct** button can be used to reverse the transmitter control's direction of operation.

> ⚠ **NOTE**
>
> This has the same effect as installing the switch the other way round, i.e. this change affects all models!

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10. Specifications

Power supply	Li-Ion
Channels	26
Servo signal resolution	4096 Bit
Display	TFT - Touch
Weight	Handsender Version: 1190 g Pultsender Version: 1330 g
Temperature range	-30 °C bis +85 °C

11. Set Contents

- **PowerBox CORE**
- 1x PBR-9D
- Case
- padded neck strap
- main adapter
- conversion tool
- sticker set
- screen cleaning cloth
- exclusive Shirt „CORE"
- Instruction manual in German and English

12. CORE accessories

RECEIVERS

PBR-9D
Order No. 8210

This is a nine-channel receiver with two redundant receiver circuits. The unit features a **P²BUS** interface for servo and telemetry data, and an auxiliary output which can be configured either as SRXL bus or as channel 10.

PBR-7S
Order No. 8220

This is a seven-channel receiver with a single receiver circuit. The unit features a **P²BUS** interface for servo and telemetry data, and an auxiliary output which can be configured either as SRXL bus or as channel 8.

PBR-5S
Order No. 8230

This is a five-channel receiver with a single receiver circuit. The unit features a **P²BUS** interface for servo and telemetry data, while its minuscule size makes it the natural choice for small models.

PBR-26D
Order No. 8240

This is a satellite receiver featuring two redundant receiver circuits. The unit features a **P²BUS** interface for servo and telemetry data, and an auxiliary output which can be configured either as SRXL bus or S-BUS. This unit is designed to be connected to our **PowerBox** power supply systems or a flybarless system.

13. Service note

We are anxious to offer good service to our customers, and to this end we have set up a Support Forum which deals with all queries concerning our products. This relieves us of a great deal of work, as it eliminates the need to answer frequently asked questions time and again. At the same time, it gives you the opportunity to obtain help quickly - all round the clock and even at weekends. All the answers are provided by the **PowerBox** team, which guarantees that the information is correct.

Please use the Support Forum before you telephone us.

You can find the forum at the following address:
www.forum.powerbox-systems.com

14. Guarantee conditions

At **PowerBox-Systems** we insist on the highest possible quality standards in the development and manufacture of our products. They are guaranteed **"Made in Germany"**!
That is why we are able to guarantee the **PowerBox CORE** for a period of **24 months** from the initial date of purchase. The guarantee covers proven material faults, which will be corrected by us at no charge to you. As a precautionary measure, we are obliged to point out that we reserve the right to replace the unit if we deem the repair to be economically unviable. Repairs which our Service department carries out for you do not extend the original guarantee period. The guarantee does not cover damage caused by incorrect usage, e.g. reverse polarity, excessive vibration, excessive voltage, damp, fuel, short-circuits, etc. The same applies to defects due to very severe wear. We accept no liability for further claims, e.g. consequential damage.
We also deny liability arising from the equipment or the use of the same.
We accept no liability for transit damage or loss of your shipment. If you wish to make a claim under guarantee, please send the equipment to our Service department address, together with proof of purchase and a description of the defect.

15. Liability exclusion

We are not in a position to ensure that you observe our instructions regarding installation of the **PowerBox CORE**, fulfil the recommended conditions when using the set, or maintain the entire radio control system competently. For this reason, we accept no liability for loss, damage or costs which arise due to the use or operation of the **PowerBox CORE**, or which are connected with such use in any way. Regardless of the legal arguments employed, our obligation to pay compensation is limited to the invoice total of our products which were involved in the event, insofar as this is deemed legally permissible.

16. FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

17. IC

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

17. IC

Appareils radio exempts de licence (ISDE) L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

18. RF exposure statement (Portable Device)

This device complies with the RF exposure requirements for portable devices. The device is intended for handheld use, with the transmitter antennas kept more than 60mm from the hands and more than 20cm from the body in normal use.

18. Déclaration d'exposition aux RF (appareil portable)

Cet appareil est conforme aux exigences d'exposition aux RF pour les appareils portables. L'appareil est destiné à être utilisé à la main, les antennes de l'émetteur étant maintenues à plus de 60 mm des mains et à plus de 20 cm du corps en utilisation normale.

We wish you every success with your new **PowerBox CORE**!

Donauwörth, April 2022
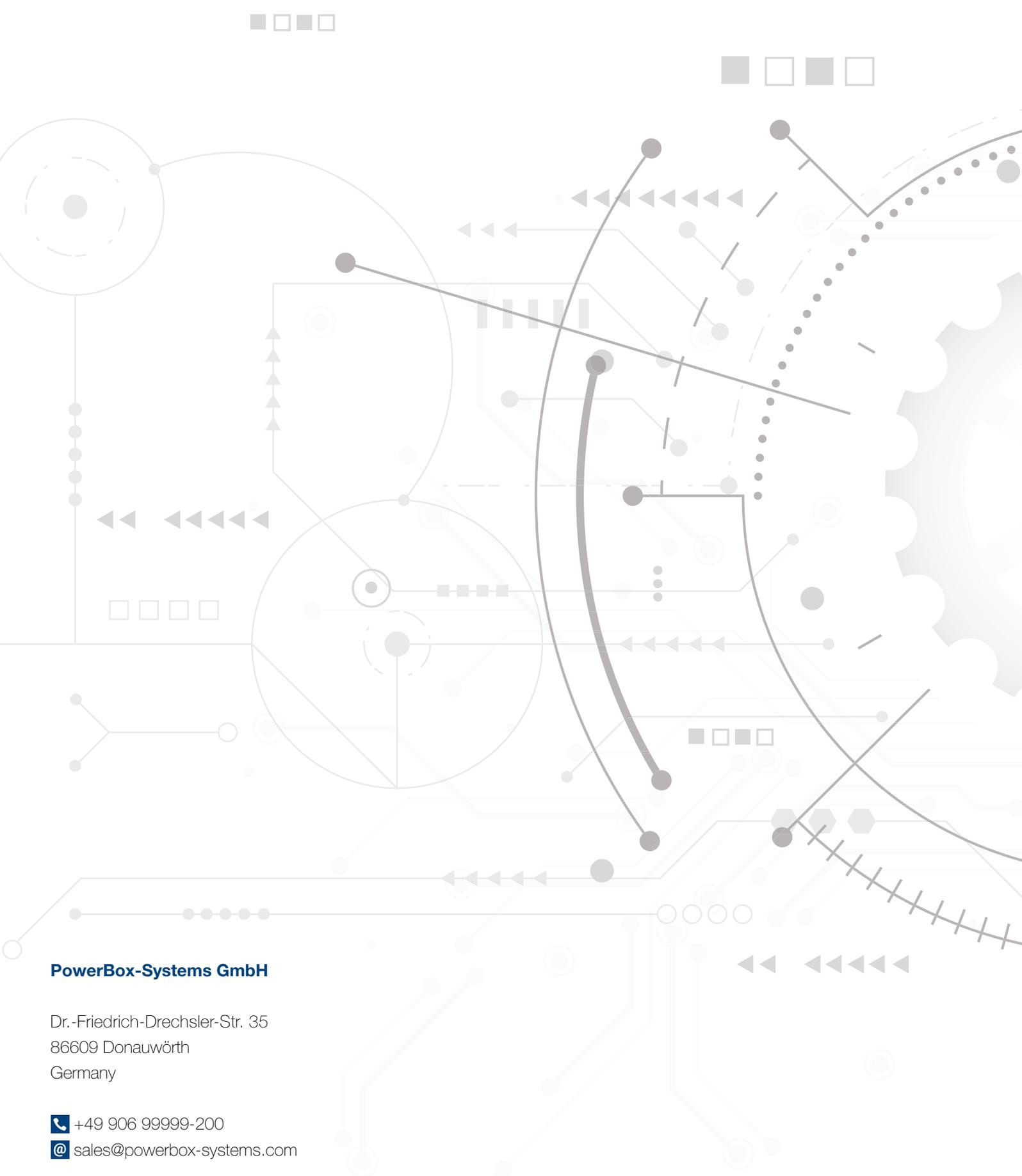
PowerBox-Systems GmbH

Dr.-Friedrich-Drechsler-Str. 35
86609 Donauwörth
Germany

📞 +49 906 99999-200
@ sales@powerbox-systems.com

www.powerbox-systems.com