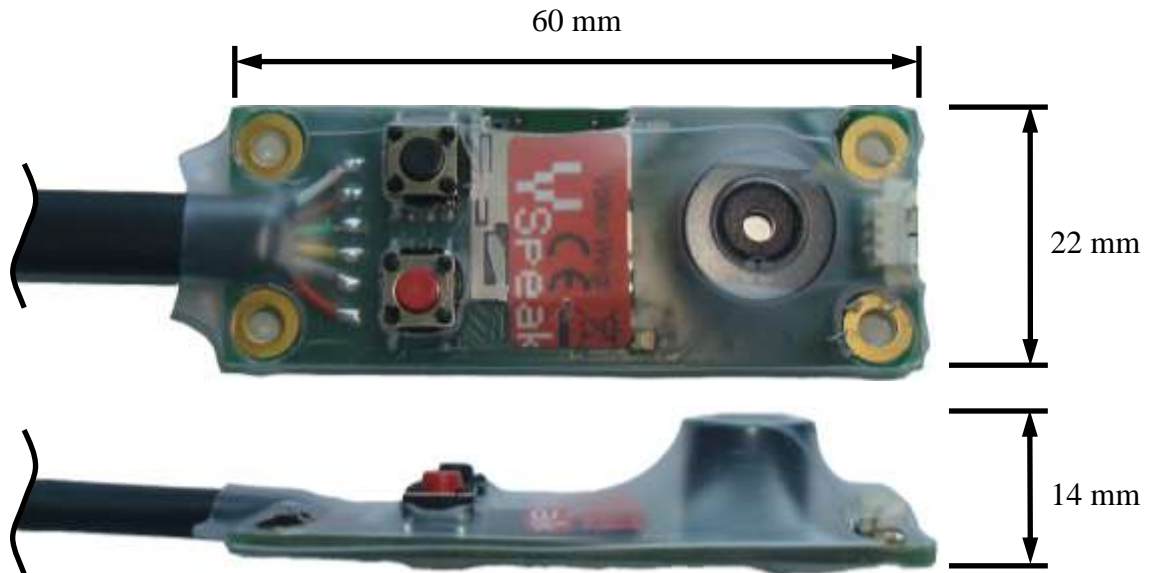




ECU2 converter HORNET

Manual Version 2.2



Introduction

The VSpeak ECU Converter for HORNET ECUs is emulating the IO-BOARD and the TERMINAL. Data, which is shown on the STATUS DISPLAYs of the TERMINAL can be sent via telemetry to the radio. To avoid unwanted electrical effects between the ECU and RC-system the VSpeak ECU Converter is galvanically isolated.

The ECU Converter can interpret and transmit data from the HORNET III and older HORNET II ECU.

The VSpeak ECU Converter can be software-updated by the user.

The current version has been tested with the following ECUs/Versions:

HORNET II V7.1B

HORNET III V2.5A

Content

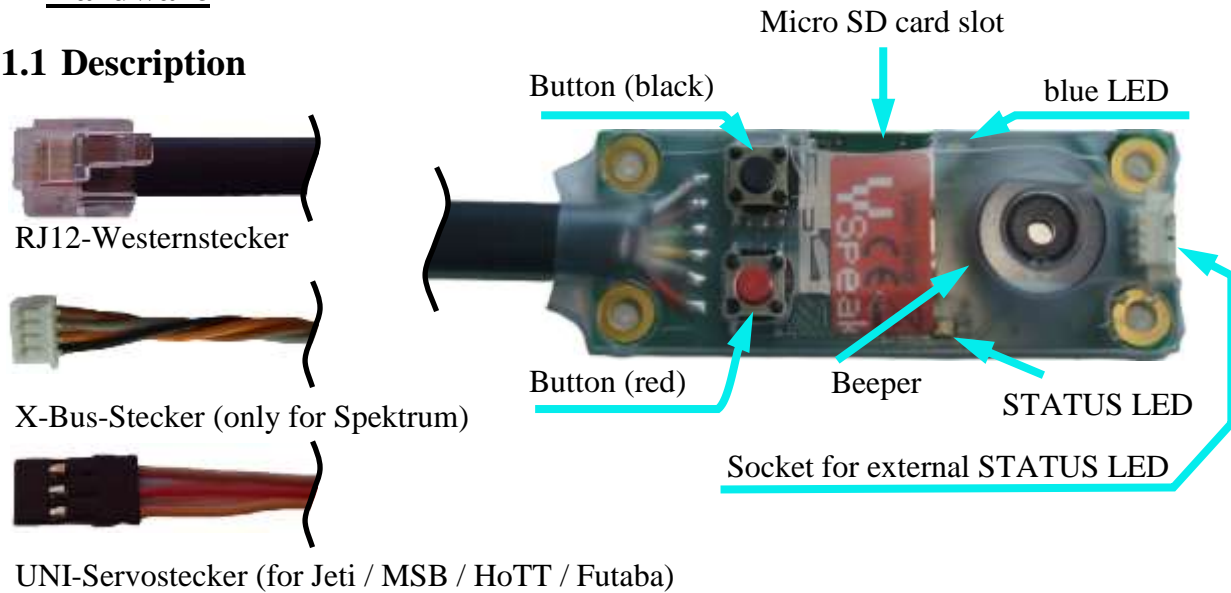
Page

| | | |
|------------|--|-----------|
| 1 | <u>Hardware</u> | 4 |
| 1.1 | Description | 4 |
| 1.2 | Installation | 4 |
| 1.3 | Connection | 4 |
| 2 | <u>Telemetry</u> | 5 |
| 2.0 | Settings | 5 |
| 2.0.1 | <i>Selection of the telemetry system</i> | 5 |
| 2.0.2 | <i>HORNET 3</i> | 6 |
| 2.0.2.1 | <i>Activation Wireless Telemetry</i> | 6 |
| 2.0.2.2 | <i>FUEL consumption</i> | 6 |
| 2.0.3 | <i>HORNET 2 - Limitations</i> | 6 |
| 2.1 | Jeti Duplex EX | 7 |
| 2.1.1 | <i>EX-data DC/DS-radio</i> | 7 |
| 2.1.2 | <i>Jetibox</i> | 7 |
| 2.1.2.1 | <i>Key assignment</i> | 7 |
| 2.1.2.2 | <i>Special Characters</i> | 8 |
| 2.1.2.3 | <i>Turbinestatus – numerical Values</i> | 9 |
| 2.1.2.4 | <i>Alarms / Parameterization</i> | 10 |
| 2.1.2.5 | <i>Expandermenu</i> | 11 |
| 2.1.3 | <i>Profibox - autonomous telemetry system for HORNET-ECU</i> | 11 |
| 2.2 | Multiplex MLink (MSB) | 12 |
| 2.2.1 | <i>Adress-Assignment</i> | 12 |
| 2.2.2 | <i>Turbine-Status</i> | 12 |
| 2.3 | Graupner HoTT | 13 |
| 2.3.1 | <i>Sensortype</i> | 13 |
| 2.3.2 | <i>Textdisplay</i> | 13 |
| 2.3.2.1 | <i>Special Characters</i> | 14 |
| 2.3.2.2 | <i>Key assignment</i> | 15 |
| 2.3.3 | <i>Data-Display/Speech</i> | 15 |
| 2.3.3.1 | <i>GAM - General Air Modul</i> | 15 |
| 2.3.3.2 | <i>ESC - Electronic Speed Control</i> | 16 |
| 2.3.3.3 | <i>VAR - Vario</i> | 16 |
| 2.3.4 | <i>Parameterization</i> | 17 |
| 2.3.4.1 | <i>Alarms / Sensor setting</i> | 17 |
| 2.3.4.2 | <i>MSB – Adresses Multiplex Sensor Bus</i> | 17 |
| 2.4 | Futaba S.BUS2 | 18 |
| 2.4.1 | <i>Registration at the transmitter</i> | 18 |
| 2.4.2 | <i>Mapping Sensor – ECU Values</i> | 18 |
| 2.4.3 | <i>Turbinestatus – numerical „Current“-Values</i> | 19 |
| 2.4.4 | <i>Alarms</i> | 20 |
| 2.4.5 | <i>Telemetry Box</i> | 20 |
| 2.5 | Futaba S.BUS2 V10 | 21 |
| 2.5.1 | <i>Registration at the transmitter</i> | 21 |
| 2.5.2 | <i>Mapping JetCat V10 – ECU Values</i> | 22 |
| 2.5.3 | <i>Turbinestatus – numerical „Current“-Values</i> | 22 |
| 2.6 | FrSky S.Port | 23 |

| | | |
|------------|--|-----------|
| 2.6.1 | <i>Turbinenstatus – numerical „Temperature“-Values</i> | 24 |
| 2.6.2 | <i>S.Port ID</i> | 24 |
| 2.6.3 | <i>LUA script for Taranis</i> | 25 |
| 2.7 | JR PROPO | 26 |
| 2.7.1 | <i>Turbinenstatus – numerical „Current“-Values</i> | 27 |
| 2.8 | Spektrum (X-Bus) | 28 |
| 2.8.1 | <i>Telemetry display</i> | 28 |
| 2.8.2 | <i>Curent / FUEL</i> | 28 |
| 3 | <u>Update</u> | 29 |
| 4 | <u>Accessories</u> | 29 |
| 5 | <u>Technical data</u> | 29 |
| 6 | <u>Instructions for disposal</u> | 29 |
| 7 | <u>EG Declaration of Conformity</u> | 30 |
| 8 | <u>Version history</u> | 30 |
| 9 | <u>Contact</u> | 30 |

1 Hardware

1.1 Description



Beeper, STATUS LED and function buttons work like the corresponding components on the IO- BOARD (please refer to the manual of the HORNET ECU for details).

The IO boards are available in different versions. The function of the black button of VSpeak ECU converter is associated with the manual pump control. The red button on the ECU converter is associated with the functions of the second button (at IO boards which are provided with 2 buttons).

On the VSpeak ECU Converter STATUS LED and function button has additional functions (see section 2.0 and 2.5.2).

The Micro SD card slot is used for updates.

The blue LED is blinking every second to signal the normal function of the ECU Converter.

1.2 Installation

The ECU Converter can be mounted inside the model with M3 nylon standoffs and screws or something similar. The optional available external STATUS LED can be mounted using the LED mount in trunk / cockpit etc.

1.3 Connection

The RJ12 Western plug has to be connected DIRECTLY to the "TERMINAL" socket on the HORNET ECU. Since the ECU Converter replicates the function of the IO-BOARD and the TERMINAL, you must not connect both at the same time. If you do so the ECU might show abnormal behaviour.

- For Jeti Duplex, Multiplex (and ACT), HoTT and Futaba the VSpeak ECU Converter is shipped with an 3-pin connector to connect to the telemetry port of the RC system.
- For Spektrum systems the VSpeak ECU Converter is shipped with a 4-pin connector for the X-Bus port of the telemetry module.

2 Telemetry

The voltage for the VSpeak ECU Converter is supplied by the HORNET ECU. As soon as you switch on the HORNET ECU and apply a valid signal to the throttle channel (either from the radio or a servo tester) you will get telemetry data. Otherwise no data is generated.

The telemetry of the ECU Converter can be used to switch between the systems Jetti Duplex EX, HoTT, Multiplex, Futaba, FrSky and JR PROPO. The ECU Converter for spectrum comes with the special XBus connector, so no switching for another telemetry system is possible here.

2.0 Settings

2.0.1 *Selection of the telemetry system*

When you turn on the Telemetry System is signaled by a LED for a period of 3 seconds. While the blue LED flickers, the STATUS LED shows the chosen telemetry system:

- green Jetti Duplex EX (s. section 2.1)
- red Multiplex (s. section 2.2)
- green (flickering) HoTT (s. section 2.3)
- red (flickering) Futaba (s. section 2.4)
- red (flashing) Futaba V10 (s. section 2.5)
- green (flashing) FrSky S.Port (s. section 2.6)
- red/green (flashing) JR PROPO (s. section 2.7)

Double-click on the black function button (similar to the double click of a computer mouse), the telemetry system can be switched. This is acknowledged by the signal generator with a short sound (frequency up and down). At the same time, the LEDs indicate the newly recruited telemetry system. To preserve safety during the selection of the telemetry system, the ECU Converter does not transmit any information until a restart. The setting is saved.

2.0.2 HORNET 3

2.0.2.1 Activation Wireless Telemetry

In order to transfer the turbine battery voltage BATT and the fuel consumption FUEL, the "Wireless Telemetry" must be activated in the HORNET3.

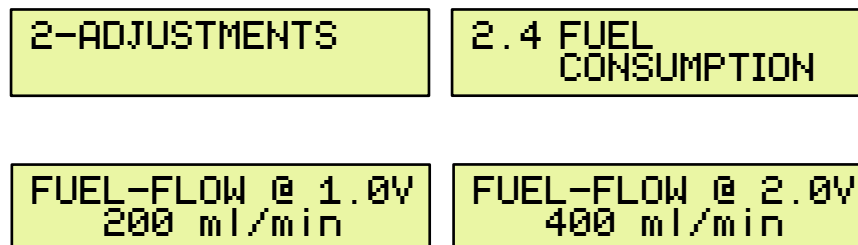


A repetition rate of 5x / second is completely sufficient.

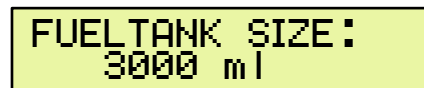
The settings for "COM-CHANNEL" are not relevant for the ECU converter.

2.0.2.2 FUEL consumption

Der Kraftstoffverbrauch wird **IN DER HORNET3** anhand des Zusammenhangs von
The fuel consumption is calculated **in the HORNET3** on the basis of the relationship between the pump voltage and the resulting fuel flow. All adjustments related to this must be made **in the ECU HORNET3**







These two parameters are decisive for the accuracy of the fuel consumption measurement. If the values have not already been set by the turbine manufacturer, these can be easily determined by running the turbine at 1.0 or 2.0 V pumping voltage for 1 minute and measuring the fuel consumption. A more accurate result is obtained by performing the measurement over several minutes and dividing the amount of fuel consumed by the number of minutes.



To the FUELTANK SIZE an alarm can then be generated in the VSpeak-ECU converter to the "reserve" warning threshold which can be adjusted there.

2.0.3 HORNET 2 - Limitations

If you connect a HORNET 2 to the VSpeak ECU converter, there are some limitations:

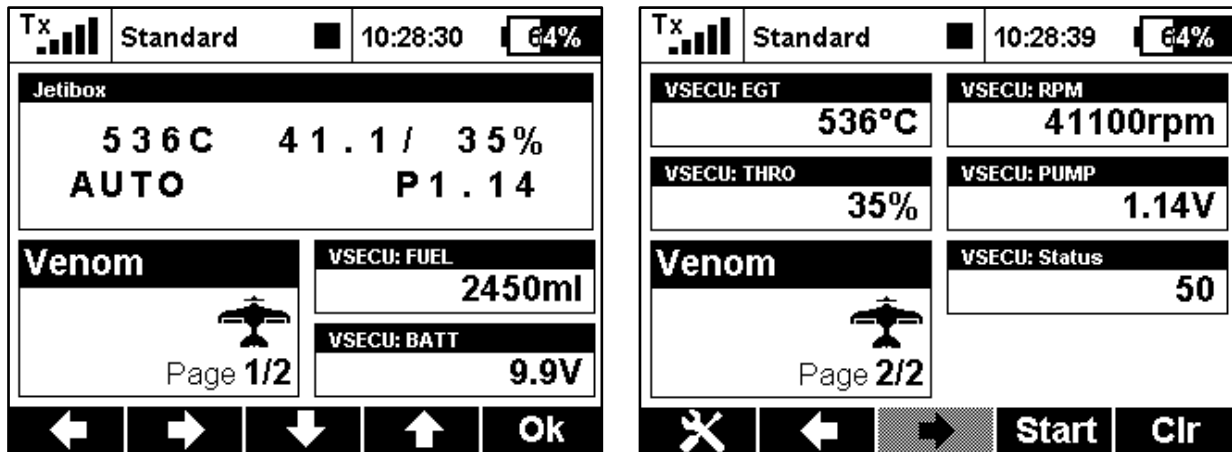
- There will be no values for fuel level and throttle transmitted. These values are set to "0". Thus no alarm can be generated for FUEL.
- Battery and Pump Voltage are only refreshed, if the following symbols are on the HORNET STATUS DISPLAY in front of the voltage.
 - Battery Voltage:  ,  or 
 - Pump Voltage: 

2.1 Jeti Duplex EX

2.1.1 EX-data DC/DS-radio

The EX-Protocol is partially backwards compatible. On older non-EX devices you get only Jetibox functions. On EX devices like the DC/DS radios and the Jeti "Profibox" you get additional data.

(VSECU ... VSpeak ECU Converter):



FUEL and THRO not supported on HORNET II

On HORNET II PUMP and BATT values are only updated as long as these voltages are shown on STATUS DISPLAY 1.

2.1.2 Jetibox

On the Jetibox all data of the HORNET ECU normally displayed on the TERMINAL are shown (except characters that cannot be displayed on Jeti Systems).



































Furthermore you can use the Jeti-keys to edit all values available on the TERMINAL. Please refer to the HORNET ECU's manual.

2.1.2.1 Key assignment





2.1.2.2 Special Characters

The TERMINAL supports some special characters which cannot be displayed on Jeti-systems. Please refer to the following table how these characters are "translated":

|  |  | |
|---|---|--|
|  |  | battery full |
|  |  | battery normal |
|  |  | battery empty |
|  |  | Glow plug defective |
|  |  | Temperature sensor defective |
|  |  | Pump running / Pump voltage |
|  |  | switch operation |
|  |  | unit "°C" |
|  |  | unit "ml" |
|  |  | button "up" (eg in test menu) |
|  |  | button "down" (eg in test menu) |
|  |  | button "Enter" (eg in test menu) |
|  |  | |
|  |  | "empty" Bargraph HORNET III Voltage/Fuel |
|  |  | "full" Bargraph HORNET III Voltage/Fuel |
|  |  | Ignition |

2.1.2.3 Turbinestatus – numerical Values

The turbines status messages are also displayed numerical values. The assignment is given in the following table.

|  |  | Status |
|---|---|----------------------------|
| DEV.DELAY | - | 30 |
| EMERGENCY | - | 10 |
| OFF | | 0 1 (Throttle =OFF) |
| COOL-DOWN | | 10 |
| SLOW DOWN | | 20 - 20 (Throttle =OFF) |
| STANDBY | | 30 |
| PROP IGNIT | | 31 |
| PROP-HEAT | | 32 |
| PUMPSTART | | 33 |
| BURNER ON | | 34 |
| FUELIGNIT | | 35 |
| FUELHEAT | | 36 |
| RAMP DELAY | | 37 |
| RAMP-UP | | 38 |
| STEADY | | 40 |
| CAL IDLE | | 41 |
| CALIBRATE | | 42 |
| WAIT ACC | | 43 |
| GO IDLE | | 44 |
| AUTO | | 50 |
| AUTO-HC | | 51 |

If for Status the value of the lower alarm threshold is set to e.g. -15, then it can be used to signal a alarm for a "flame out".

SLOW DOWN = (minus) 20 can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

These status values can be used in Jeti radios, e.g. in logical links, or in LUA-supported radios for LUA scripts.

2.1.2.4 Alarms / Parameterization

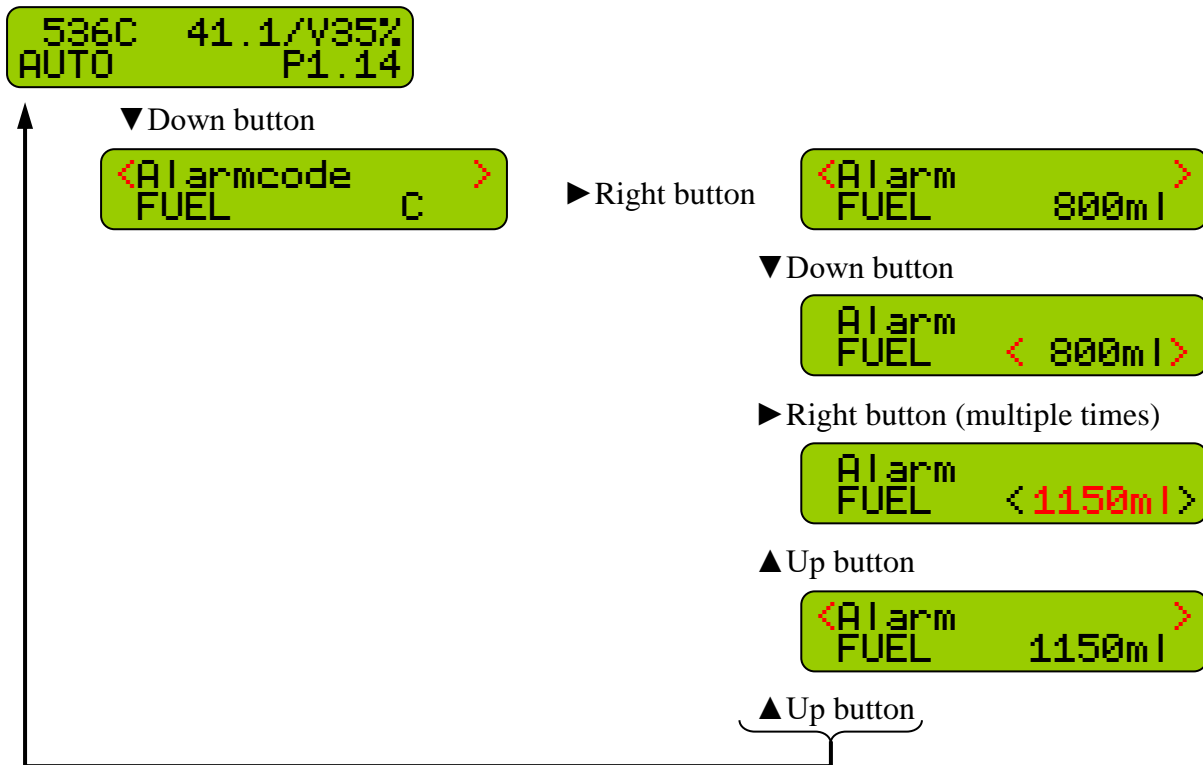
From the STATUS DISPLAY 1, the parameter display can be accessed by pressing the ▼ button down.

With the ▲ Up button the parameter display will left (..to STATUS DISPLAY 1). Within the parameter display you can scroll with the ►Right button - or - ◀Left button between the parameter groups "Alarme", „Alarmcode", "MSB Adressen" and "ECU-EX-Name".

When the desired parameter group is selected, the parameter can be changed by using ▼Down and ▲Up button.

Value changes are made with the ►Right button – or- ◀Left button.

Example of parameter selection and parameterization:



| Parameter group | Parameter | Value range | Step size | Set-Value (Default) |
|-----------------|-----------|------------------------------------|-----------|---------------------|
| Alarme | FUEL | 10 ... 2500 ml | 10 ml | 800 ml |
| | BATT | 3.0 ... 12.0 V | 0.1 V | 4.0 V |
| | RPM | 20.000 ... 99.900 rpm | 100 rpm | 20.000 rpm |
| Alarmcode | FUEL | A, B, C, . . . , X, Y, Z | | C |
| | BATT | | U | |
| | RPM | | V | |
| MSB-Adressen | PUMP | OFF, 0, 1, 2, 3, . . . ,13, 14, 15 | | 2 |
| | FUEL | | 3 | |
| | EGT | | 4 | |
| | RPM | | 5 | |
| | BATT | | 6 | |
| | Status | | 7 | |
| | THRO | | 8 | |
| FUEL-% | 9 | | | |
| Jeti-Sensor | EX Name | VSECU, L-ECU, R-ECU, 1LECU, 2RECU | | VSECU |

The rotation speed monitoring is activated by reaching the AUTO status and deactivates when the pump voltage reaches 0.00V. A speed alarm can signal a "turbine flameout".

In a 2-turbine model 2 VSpeak ECU converter can be used on Jeti Systems via an expander or CentralBox. The EX names are:

"1LECU" for Left turbine ECU on input 1 and

"2RECU" for Right turbine ECU at the expander input 2.

If a value reaches the alarm threshold, the alarm code is signaled or a speech output of the associated alarm code.

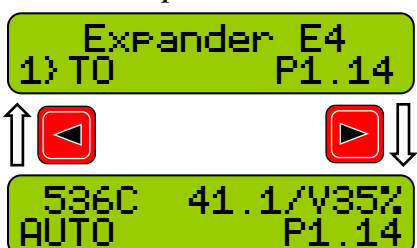
Prolonged alarms are repeated only three times.

MSB addresses

MSB-compliant, the addresses can be arbitrarily set between 0 and 15. Not to show values can be turned off ("OFF").

An address for double occupancy values within the ECU converter is excluded. If an address has been set, which was already associated with another value, the current is set to "OFF".

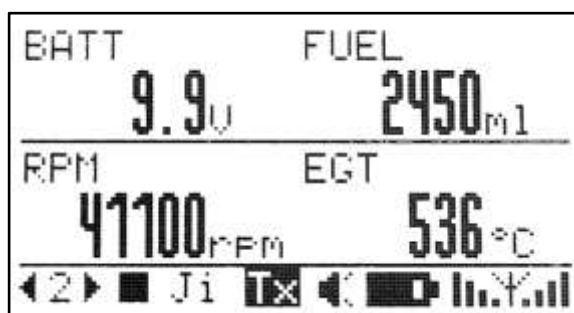
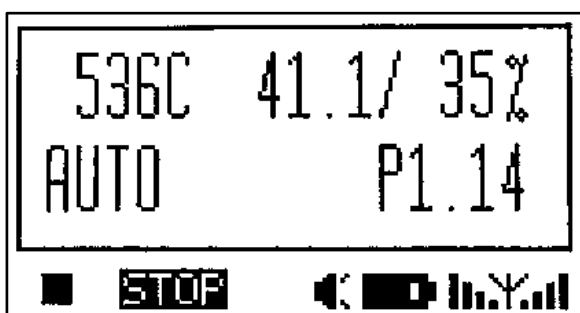
2.1.2.5 Expandermenu



If the VSpeak ECU Converter is connected to an Expander or Centralbox and the ECU Converter display is activated with the ► Right button, the only way back to the expander menu is pressing ◀ Left button in STATUS DISPLAY 1.

2.1.3 Profibox - autonomous telemetry system for HORNET-ECU

Using a Jeti Profibox incl. RSat receiver and the VSpeak ECU converter the telemetry data from a HORNET ECU can be transferred completely self-sufficient to the pilot. Not only the settings using the Profibox can be made, as was shown in the previous chapters - all EX-data and the important alarms are displayed: fuel level, ECU battery voltage and minimum rotation speed are given as voice messages again.





2.2 Multiplex MLink (MSB)

The MSB (Multiplex Sensor Bus) is only uni-directional. You can only see the telemetry data, but you cannot change parameters of the HORNET ECU.



2.2.1 Adress-Assignment

The VSpeak ECU Converter at delivery uses following addresses:

|  |  address | comment |
|---|--|---------------------------------------|
| PUMP | 2 | Pump Voltage in V |
| FUEL Alarm | 3 | Fuel Level in ml *) |
| EGT | 4 | Exhaust Gas Temperature in °C |
| RPM Alarm | 5 | Turbine RPM |
| BATT Alarm | 6 | Battery Voltage in V |
| Status | 7 | Turbine-Status (non on evo and royal) |
| THRO | 8 | Throttle Value in % *) |
| FUEL in percent | 9 | Fuel Level in % *) |

*) FUEL, F-FLOW and Throttle not on HORNET 2

A change of address assignment and setting of alarms for FUEL, RPM, and BATT can be

|  |  |
|---|---|
| AUTO | RUN (reg.) |
| AUTO-HC | RUN ... |
| BURNER ON | PreHeat1 |
| CAL IDLE | LearnLO |
| CALIBRATE | LearnHI |
| COOL-DOWN | Cooling |
| DEV.DELAY | |
| EMERGENCY | |
| FUELHEAT | PreHeat2 |
| FUELIGNIT | Ignite... |
| GO IDLE | Stabilise |
| OFF | -OFF- |
| PROPHEAT | PreHeat2 |
| PROP IGNIT | Ignite... |
| PUMPSTART | MainFStrt |
| RAMP DELAY | AccelrDly |
| RAMP-UP | acceler. |
| SLOW DOWN | SlowDown |
| STANDBY | Stby/START |
| STEADY | Stabilise |
| WAIT ACC | acceler. |

done with the Jeti system, for example, by using a Jetibox, (s. section 2.1.2.3)

- or by using the HoTT system with a Smartbox (see section 2.3.4.).

In section 2.0.1 the requisite change between the telemetry systems is described.

2.2.2 Turbine-Status

To display the turbine status there are various preset messages in the radio or in the external display. These do not match the normal ECU messages 1:1, so the closest match has been chosen. Please refer to the table on the left.

For HORNET status messages without a corresponding MSB message (grey fields in the table) the last message is shown until a new message, which can be translated, is shown.

2.3 Graupner HoTT

Using the HoTT System there are 2 ways to transmit telemetry data, on the one hand as „text“ and on the other hand only the pure values.

Using text mode it is possible to establish a bi-directional data transfer, meaning you can use the keys of the radio or the Smartbox in order to change/enter values in the sensor. Using speech output is not possible in this mode.

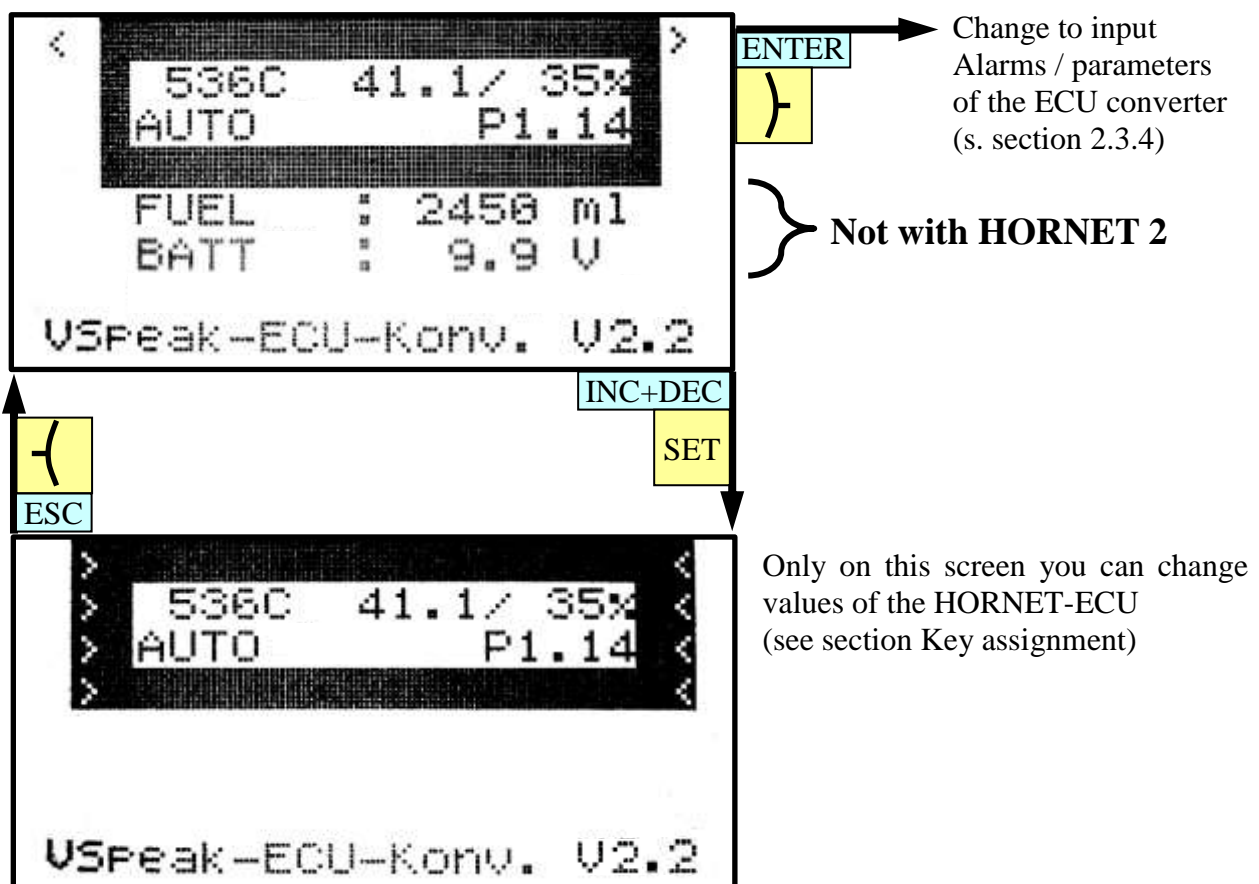
In data-mode the values are only transmitted in a fixed format in one direction. The format is defined by the sensor type. In this mode it is possible to have speech output for the sensor values.

2.3.1 Sensortype

The VSpeak ECU Converter for HoTT is a GAM (General Air Module) , a ESC sensor (Electronic Speed Control) , or a VAR sensor (Vario). Please select this sensor-type on your radio or Smartbox.

2.3.2 Textdisplay



































Using the text-display you can see the current HORNET-ECU data and you can also change parameters of the ECU.



With the HoTT-keys it is possible to emulate the full functionality of the TERMINAL. For further details on the specific values please consult the manual of the HORNET ECU

2.3.2.1 Special Characters

The TERMINAL supports some special characters which cannot be displayed on HoTT system. Please refer to the following table how these characters are "translated":

|  |  | |
|---|---|--|
|  |  | battery full |
|  |  | battery normal |
|  |  | battery empty |
|  |  | Glow plug defective |
|  |  | Temperature sensor defective |
|  |  | Pump running / Pump voltage |
|  |  | switch operation |
|  |  | unit "°C" |
|  |  | unit "ml" |
|  |  | button "up" (eg in test menu) |
|  |  | button "down" (eg in test menu) |
|  |  | button "Enter" (eg in test menu) |
|  |  | |
|  |  | "empty" Bargraph HORNET III Voltage/Fuel |
|  |  | "full" Bargraph HORNET III Voltage/Fuel |
|  |  | Ignition |

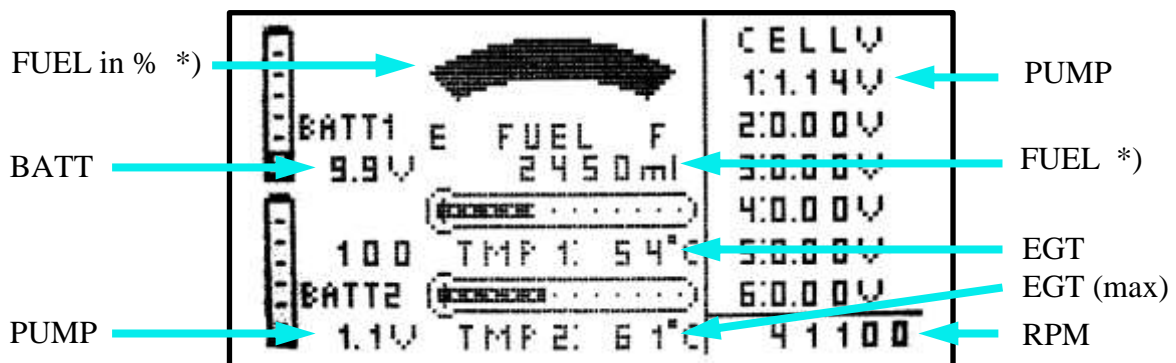
2.3.2.2 Key assignment

| | | | | |
|--|-----|-----|-----|-------|
| | | | | |
| | ESC | DEC | INC | ENTER |

| | |
|-------|--|
| MX-12 | |
| MX-16 | |
| MC-16 | |
| MC-20 | |
| MC-32 | |
| ⋮ | |

2.3.3 Data-Display/Speech

2.3.3.1 GAM - General Air Modul



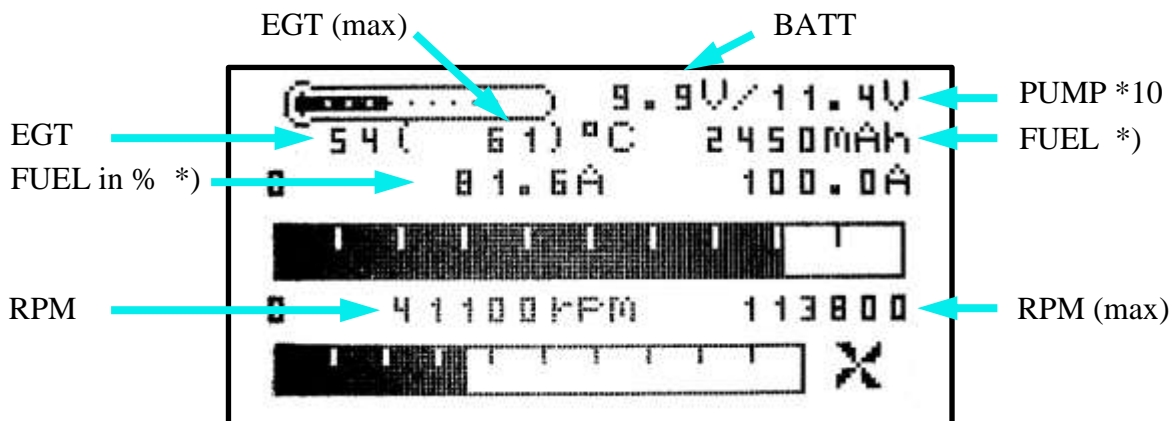
*) FUEL, and FUEL in % not on HORNET2

Since the GAM can only display temperatures up to 235°C, the temperature is divided by 10. If you see a value of 54°C on the display, you have a “real” temperature of 535-544°C.

The pump voltage is displayed as “Cell Voltage 1”, ranging from 0V up to 5.10V (accuracy 20mV). It is also displayed as “Batt 2” (bigger values than 5.1V possible, accuracy 100mV).

The fuel level is shown as gauge in % and as numbers in ml. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

2.3.3.2 ESC - Electronic Speed Control



*) FUEL, and FUEL in % not on HORNET2

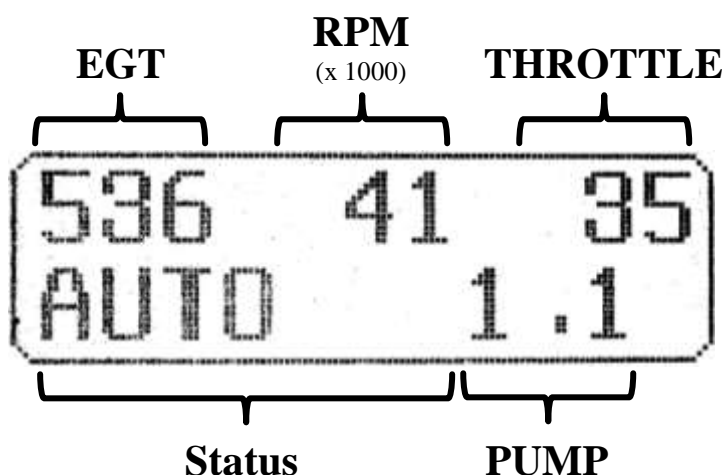
The ESC temperature display is limited to 235 ° C, so the turbine jet temperature is shown divided by 10, or the other way around: 54 ° C in the display corresponds to 535 ... 544 ° C (digit is rounded).

The pump power is indicated by a factor of 10, ie, 11.4V correspond to a pump voltage of 1.14V.

The tank level is displayed on the display as capacity value, ie, 2450mAh are 2450ml. On the other hand, the percentage tank level is displayed as the current, ie, 81,6A correspond to 81.6% tank level. The tank level is thus easy to read via the associated bar display. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

2.3.3.3 VAR - Vario

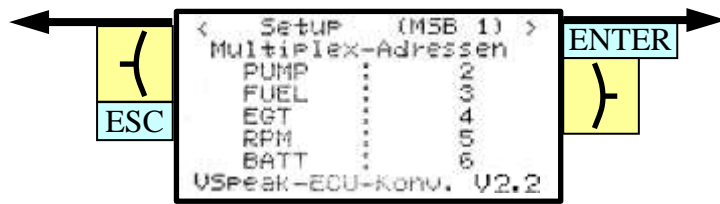
The HoTT Vario offers the possibility to display texts, in the example two lines with an MC20. However, since the displayable number of 21 characters is less than in the two-line display of the HORNET (2x 16 characters), the display was "compressed" as follows:



The tank level is converted in a percentage and displayed as altitude, e.g. 76m corresponds to 76% tank level (can be used for the speech output). The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

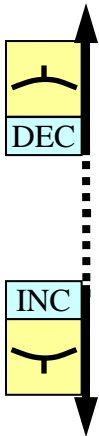
Furthermore, the alarms according to section 2.3.4.1 are also effective here.

2.3.4 Parameterization



The change of sides takes place with Enter and ESC button of the SmartBox or with the appropriate buttons on the HoTT transmitter.

The parameter is selected with the INC- and DEC-buttons of the SmartBox (or the buttons of the HoTT transmitter) „>“.



With **INC+DEC** or **SET** the value of the selected parameter is enabled for change (inverted).

With **INC** the value can be increased,

With **DEC** it can be reduced.

Stored is after **INC+DEC** or **SET**

2.3.4.1 Alarms / Sensor setting



| Settings | | |
|-------------------------|-----------|-------------|
| Value range | Step size | Signal tone |
| 10 ... 2500 ml | 10 ml | U |
| 3.0 ... 12.0 V | 0.1 V | P |
| 20.0 ... 99.9 x 1000rpm | 100 rpm | T |

GAM / ESC / VAR

Upon delivery, the warning thresholds are set as shown in the picture.

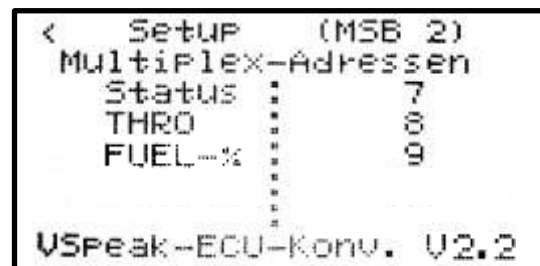
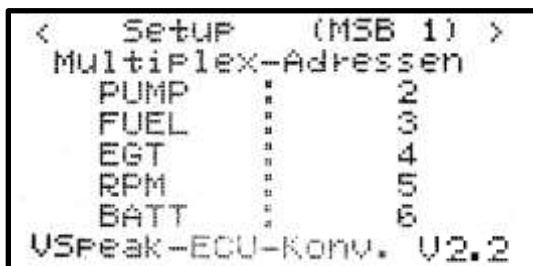
If a value falls below the warning threshold, the set signal tone will sound or a speech output of the associated signal tone.

Prolonged alarms are repeated only three times.

The rotation speed monitoring is activated by reaching the AUTO status and deactivates when the pump voltage reaches 0.00V. A speed alarm can thus signal a "turbine flameout"

2.3.4.2 MSB – Adresses Multiplex Sensor Bus

Upon delivery, the addresses for the display of the measured values are set as shown below:



MSB-compliant, the addresses can be arbitrarily set between 0 and 15. Not to show values can be turned off ("OFF").

An address for double occupancy values within the ECU converter is excluded. If an address has been set, which was already associated with another value, the current is set to "OFF".

2.4 Futaba S.BUS2

The S.BUS2 is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

The VSpeak ECU converter is fully compatible with S.BUS2. Registration and connection are established as with any other S.BUS2 sensor

Caution:

We generally recommend a strict separation between sensor values and servo data. Although the S: BUS 2 can transmit servo data, the S.BUS2 should exclusively be used for the transmission of sensor data and only the S.BUS1 should be used for the servos. In this way, the servo data are excluded from influencing on failure of a sensor.

2.4.1 Registration at the transmitter

The VSpeak ECU converter must be registered on the transmitter like any S.BUS2 sensor. For this purpose, the UNI-servo plug of the ECU VSpeak converter must be connected with a V cable and a receiver battery to the "S.I/F" jack of the transmitter. Furthermore, the ECU converter must first be connected to the terminal port of the powered HORNET.

Now the registration of VSpeak ECU converter can be done - please look up into the instructions for the transmitter.

Since the VSpeak ECU converter displays its data using a total of 4 sensors, the registry has also be done 4 times. Of course, the starting slots can also be set manually.

2.4.2 Mapping Sensor – ECU Values

| No | Sensor name | Slots | Start (default) | original Sensor value | ECU value |
|----|-------------|-------|-----------------|-----------------------|---|
| 1 | CUR-F1678 | 3 | 24 | CURRENT | Turbinestatus (s. section 2.4.3) |
| | | | | VOLTAGE | BATT in V |
| | | | | CAPACITY | FUEL in ml *) (fuel consumption, s. section 2.4.4) |
| 2 | SBS-01RM/O | 1 | 27 | R.P.M | RPM in rpm |
| 3 | SBS-01V | 2 | 28 | BATTERY | PUMP in V |
| | | | | EXT-VOLT | THROTTLE in % *) |
| 4 | SBS-01T | 1 | 30 | TEMP | EGT in °C |

*) FUEL and THROTTLE not on HORNET 2

E.g. using a T18MZ transmitter: The sensors are displayed after registration as seen below:

| Sensor | | | Eurofigther | | |
|--------|-----------|------|-------------|-------------|------|
| Slot | Sensor | ID | Slot | Sensor | ID |
| 1 | CUR-F1678 | 3456 | 7 | Temperature | 3456 |
| 2 | CUR-F1678 | | 8 | Inhibit | |
| 3 | CUR-F1678 | | 9 | Inhibit | |
| 4 | RPM | 3456 | 10 | Inhibit | |
| 5 | Voltage | 3456 | 11 | Inhibit | |
| 6 | Voltage | | 12 | Inhibit | |
| | | | 13 | Inhibit | |
| | | | 14 | Inhibit | |
| | | | 15 | Inhibit | |
| | | | 16 | Inhibit | |
| | | | 17 | Inhibit | |
| | | | 18 | Inhibit | |

The T18MZ has the ability to rename the sensors:





-2380mAh is an example for alarm fuel consumption (s. section 2.4.4)

Thus the speed is displayed correctly, you have to set the magnetic and transmission factor to 1.

2.4.3 Turbinestatus – numerical „Current“-Values

The turbines status messages are displayed numerically as current values. The assignment is given in the following table.

|  |  |
|--|--|
| DEV.DELAY | - 30.0 A |
| EMERGENCY | - 10.0 A |
| OFF | 0.0 A 1.0 A (Throttle =OFF) |
| COOL-DOWN | 10.0 A |
| SLOW DOWN | 20.0 A - 20.0 A (Throttle =OFF) |
| STANDBY | 30.0 A |
| PROP IGNIT | 31.0 A |
| PROP-HEAT | 32.0 A |
| PUMPSTART | 33.0 A |
| BURNER ON | 34.0 A |
| FUELIGNIT | 35.0 A |
| FUELHEAT | 36.0 A |
| RAMP DELAY | 37.0 A |
| RAMP-UP | 38.0 A |
| STEADY | 40.0 A |
| CAL IDLE | 41.0 A |
| CALIBRATE | 42.0 A |
| WAIT ACC | 43.0 A |
| GO IDLE | 44.0 A |
| AUTO | 50.0 A |
| AUTO-HC | 51.0 A |

If the current value of the lower alarm threshold is set to e.g. -15.0A, then it can be used to signal an alarm for a "flame out".
SLOW DOWN = (minus) 20.0A can only occur in Throttle values between 0 and 100% - but NOT at Throttle = "OFF".

2.4.4 Alarms

The Futaba System generates alarms in the transmitter or the telemetry box. The alarm thresholds can be set for each value. It's not possible to set an alarm in the sensors.

Fuel consumption / FUEL

The VSpeak ECU Converter generates an alarm for the fuel consumption (not with HORNET2). The fuel consumption is shown as a capacity value in the sensor CUR-F1678. The fuel consumption (e.g. 1560mAh = 1560ml) is calculated by the difference of the tank volume at start (e.g. 3000ml) and the current decreasing tank volume (e.g. 1440 ml).

The alarm threshold value should be set to e.g. 2200mAh for a tank volume of 3000ml to have a reserve of 800ml. The Futaba system has not the ability to quit an alarm. So it would be active until powering down. This could be very annoying and it blocks all other alarms. Therefore the VSpeak ECU Converter has an alternative:

Bei Unterschreiten der mittels Jeti- oder HoTT-System einstellbaren Alarmschwelle FUEL für den Tankfüllstand (im Auslieferungszustand = 800ml) wird der Wert für den Kraftstoffverbrauch im Abstand von 10 Sekunden für die Dauer von 5 Sekunden als negativer Wert übertragen. Um beim Beispiel mit den 3000ml Tankvolumen zu bleiben, wird bei einem Kraftstoffverbrauch größer 2200ml der übertragene Wert abwechselnd mit negativem Vorzeichen übertragen. Ist nun im Sender/Telemetry Box nur die Alarmschwelle auf Unterschreiten von z.B. MINUS 100ml aktiviert, dann erfolgt die Alarmmeldung für 5 Sekunden, im Wechsel mit 10 Sekunden Alarmpause. Dieser Alarm lässt sich auch „Quittieren“, indem für einen Moment der Throttle-Wert unter 10% gesendet wird.

Set the alarm value for FUEL with the Jeti or HoTT System. Factory set value is 800ml. When falling below this value the VSpeak ECU Converter displays the fuel consumption as a negative value for 5s every 15s. E.g. with a tank volume of 3000ml and a fuel consumption of more than 2200ml the value is transmitted as a negative value. Set the alarm value of your transmitter to e.g. MINUS 100ml and the alarm will be active for 5s with a following pause of 10s. You can quit this alarm by setting the throttle below 10% for a small moment.

Turbine flameout / Status

The status messages are transmitted as numerical current values as described in section 2.4.3.

If the current alarm value is set to MINUS 15.0A a turbine flameout will be active with the status message SLOW DOWN = MINUS 20.0A.

When powering down (means THROTTLE = OFF) no alarm will be generated because SLOW DOWN -> PLUS 20.0A is transmitted

2.4.5 Telemetry Box



On the Telemetry Box, the data of the VSpeak ECU converter can also be displayed (in the picture e.g. fuel consumption 1560ml) and alarms corresponding section 2.4.4 are generated:

STATUS, BATT, FUEL und RPM

With the latest software (V1.003 - as of May 2015) the sensors **SBS-01V** and **SBS-01T** are not supported yet.

Caution:

The VSpeak ECU converter sends its data **always taking advantage of all sensors**, including the sensors 1 x SBS-01V and 1 x SBS-01T. These occupy the slots in accordance with the table in section 2.4.2 - or the last saved values.

2.5 Futaba S.BUS2 V10

The S.BUS2 is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

The VSpeak ECU converter is fully compatible with S.BUS2. Registration and connection are established as with any other S.BUS2 sensor

Caution:

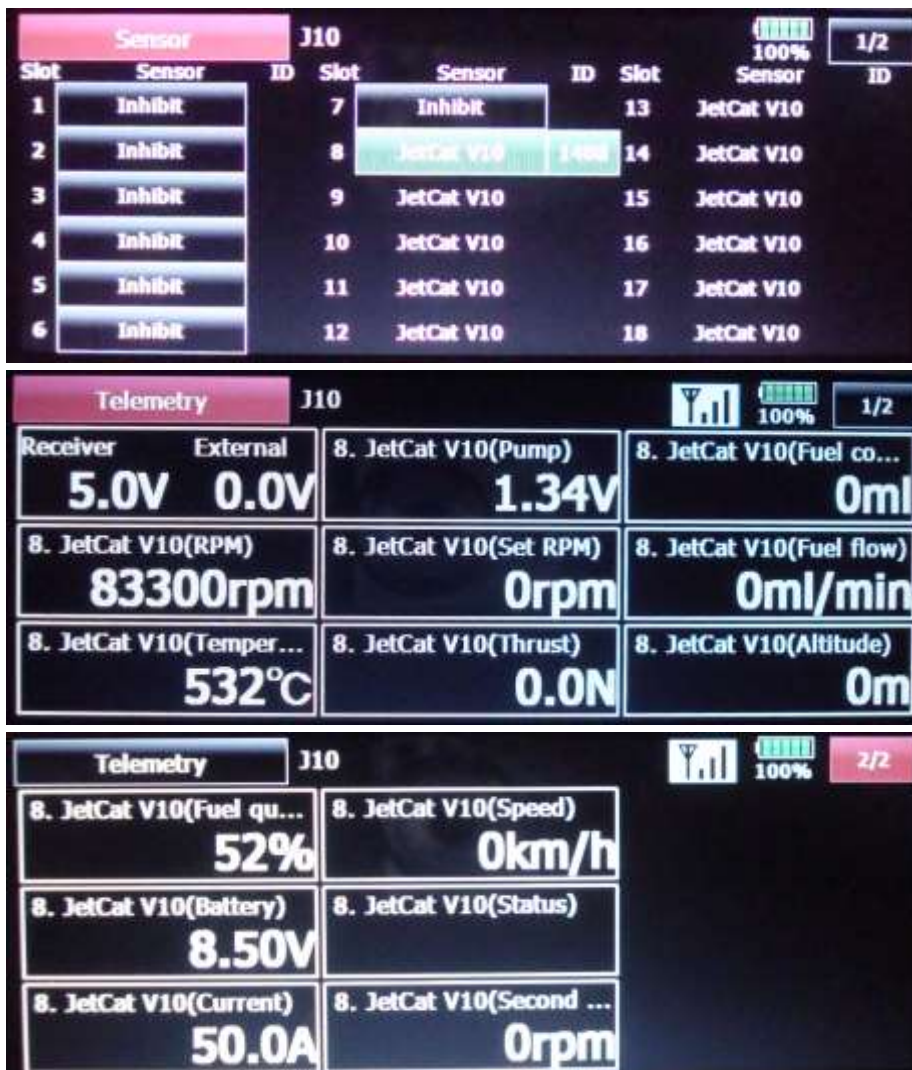
We generally recommend a strict separation between sensor values and servo data. Although the S: BUS 2 can transmit servo data, the S.BUS2 should exclusively be used for the transmission of sensor data and only the S.BUS1 should be used for the servos. In this way, the servo data are excluded from influencing on failure of a sensor.

2.5.1 Registration at the transmitter

The VSpeak ECU converter must be registered on the transmitter like any S.BUS2 sensor. For this purpose, the UNI-servo plug of the ECU VSpeak converter must be connected with a V cable and a receiver battery to the "S.I/F" jack of the transmitter. Furthermore, the ECU converter must first be connected to the terminal port of the powered HORNET.

Now the registration of VSpeak ECU converter can be done - please look up into the instructions for the transmitter.

In contrast to the 4 standard sensors in section 2.4, here the slots of the special sensor JetCat V10 are used to display the ECU data (not every Futaba transmitter supports the JetCat V10 sensor).





2.5.2 Mapping JetCat V10 – ECU Values

The JetCat V10 sensor occupies 14 slots, the assignment to the values of the HORNET ECU is as follows

| No | JetCat V10 | HORNET |
|----|---------------|---|
| 1 | RPM | RPM |
| 2 | Temperature | EGT |
| 3 | Pump | PUMP |
| 4 | Set RPM | - |
| 5 | Thrust | - |
| 6 | Fuel consumed | FUEL (consumed) |
| 7 | Fuel flow | - |
| 8 | Altitude | - |
| 9 | Fuel quality | THROTTLE |
| 10 | Battery | BATT |
| 11 | Current | ECU State as numerical current value (s. section 2.5.3) |
| 12 | Speed | - |
| 13 | State | - |
| 14 | Second Shaft | - |

2.5.3 Turbinestatus – numerical „Current“-Values

|  |  |
|---|---|
| DEV.DELAY | 130.0 A |
| EMERGENCY | 110.0 A |
| OFF | 0.0 A 1.0 A (Throttle =OFF) |
| COOL-DOWN | 10.0 A |
| SLOW DOWN | 20.0 A 120.0 A (Throttle =OFF) |
| STANDBY | 30.0 A |
| PROP IGNIT | 31.0 A |
| PROP-HEAT | 32.0 A |
| PUMPSTART | 33.0 A |
| BURNER ON | 34.0 A |
| FUELIGNIT | 35.0 A |
| FUELHEAT | 36.0 A |
| RAMP DELAY | 37.0 A |
| RAMP-UP | 38.0 A |
| STEADY | 40.0 A |
| CAL IDLE | 41.0 A |
| CALIBRATE | 42.0 A |
| WAIT ACC | 43.0 A |
| GO IDLE | 44.0 A |
| AUTO | 50.0 A |
| AUTO-HC | 51.0 A |

The turbines status messages are displayed numerically as current values. The assignment is given in the table.

If the current value of the upper alarm threshold is set to e.g. 115.0A, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = 120.0A can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

2.6 FrSky S.Port

(tested with Taranis X9D with FW: opentx-taranis-plus VERS: 2.1.8)

The telemetry data from the ECU converter are only transmitted to the sender via the FrSky SmartPort. A parameterization of the HORNET ECU is not possible with this system.

After the sensor settings of the VSpeak ECU converter have been read in the "TELEMETRY" model settings with "Start Sensorsuche", the PREZISION of "fuel" should be changed from 0.00 to 0.- ml, and for A3 (BATT) from 0.00 to 0.0 V.

| TELEMETRIE | | | | 12/12 | |
|----------------|------|---|----------|-------|----|
| ---Sensoren--- | | | | Wert | ID |
| 1: | RPM | * | 79600rpm | 28 | |
| 2: | Tmp1 | * | 493°C | 28 | |
| 3: | Tmp2 | * | 50°C | 28 | |
| 4: | A4 | * | 1.32V | 28 | |
| 5: | A3 | * | 9.2V | 28 | |
| 6: | Fuel | * | 1820ml | 28 | |

The second "fuel" value with the unit % is renamed "Thro" (exactly this notation, otherwise the LUA script does not work correctly).

| TELEMETRIE | | | | 12/12 |
|------------|------|---|----------|-------|
| 1: | RPM | | 79600rpm | 28 |
| 2: | Tmp1 | | 493°C | 28 |
| 3: | Tmp2 | | 50°C | 28 |
| 4: | A4 | * | 1.32V | 28 |
| 5: | A3 | * | 9.2V | 28 |
| 6: | Fuel | * | 1820ml | 28 |
| 7: | Fuel | * | 49% | 28 |

| TELEMETRIE | | | | 12/12 |
|------------|------|---|----------|-------|
| 1: | RPM | * | 79600rpm | |
| 2: | Tmp1 | * | 493°C | |
| 3: | Tmp2 | * | 50°C | |
| 4: | A4 | * | 1.32V | |
| 5: | A3 | * | 9.2V | |
| 6: | Fuel | * | 1820ml | |
| 7: | Thro | * | 49% | |

With the following arrangement of the values in Telm-Bild 1



| TELEMETRIE | | | | 12/12 |
|-------------|------|-----------------|------|-------|
| Telm-Bild 1 | | Werte | | |
| | Tmp2 | A4 | Tmp1 | |
| | RPM | Fuel | A3 | |
| | | Thro | | |
| --- | | --- | | |
| Telm-Bild 2 | | Script USHornet | | |
| Telm-Bild 3 | | None | | |

...the telemetry data are represented as follows:

| J10 | | 8.1V | |
|------|-------|------|------|
| Tmp2 | 50 | A4 | 132 |
| RPM | 79600 | Fuel | 1820 |
| | | Thro | 49 |
| | | Tmp1 | 493 |
| | | A3 | 9.2 |

| FrSky Telm-Bild 1 | HORNET |
|-------------------|--|
| Tmp2 | ECU Status as Temperature (s. section 2.6.1) |
| A4 | PUMP in V |
| Tmp1 | EGT in °C |
| RPM | RPM |
| Fuel | FUEL (remaining fuel) in ml |
| A3 | BATT in V |
| Thro | THROTTLE in % |

2.6.1 Turbinenstatus – numerical „Temperature“-Values

|  |  Tmp2 | |
|---|---|--|
| DEV.DELAY | - 30 °C | |
| FLAME OUT | - 20 °C | Status = SLOW DOWN and Throttle not OFF |
| EMERGENCY | - 10 °C | |
| OFF | 0 °C | |
| ON | 1 °C | Status = OFF and Throttle is not OFF |
| COOL-DOWN | 10 °C | |
| SLOW DOWN | 20 °C | |
| STANDBY | 30 °C | |
| PROP IGNIT | 31 °C | |
| PROP-HEAT | 32 °C | |
| PUMPSTART | 33 °C | |
| BURNER ON | 34 °C | |
| FUELIGNIT | 35 °C | |
| FUELHEAT | 36 °C | |
| RAMP DELAY | 37 °C | |
| RAMP-UP | 38 °C | |
| STEADY | 40 °C | |
| CAL IDLE | 41 °C | |
| CALIBRATE | 42 °C | |
| WAIT ACC | 43 °C | |
| GO IDLE | 44 °C | |
| AUTO | 50 °C | |
| AUTO-HC | 51 °C | |

The turbines status messages are displayed numerically as temperature values. The assignment is given in the table.

2.6.2 S.Port ID

On delivery, the ID of the ECU VSpeak converter is set to 28.

With the help of the FrSky DASHBOARD the converter can be set to IDs from 1 ... 28. This is useful if another sensor with the same ID is already connected to the S.Port bus, or a model is equipped with several turbines.

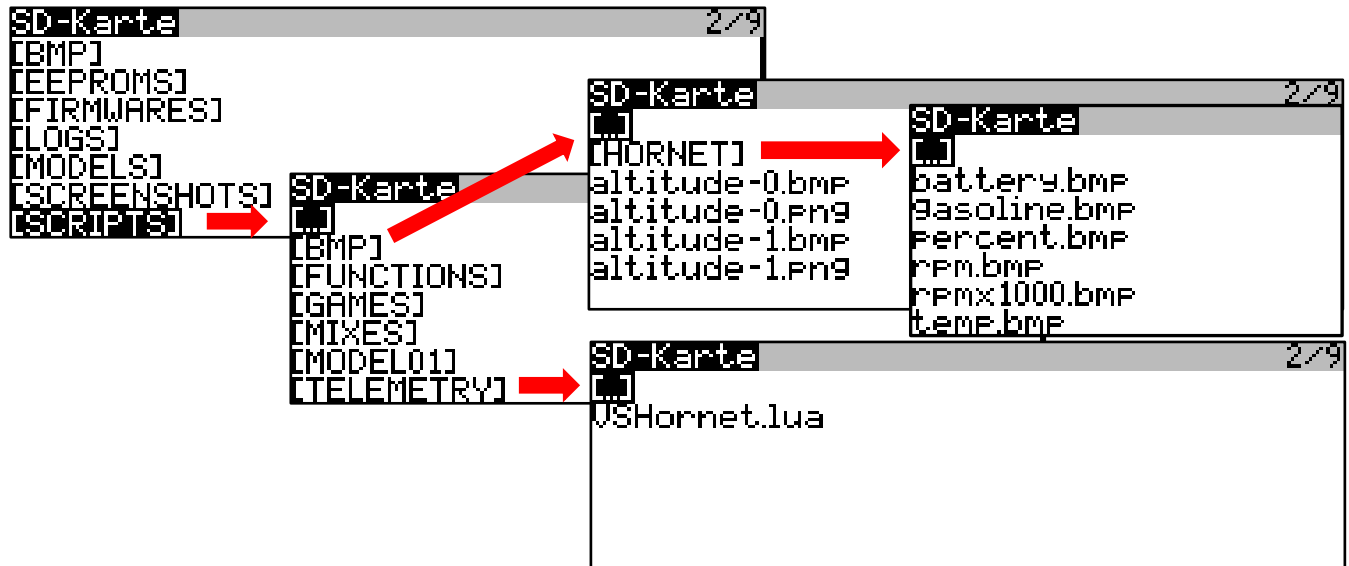


For this purpose, the UNI-servo plug of the VSpeak ECU converter must be connected with a V cable and a receiver battery to the FrSky DASHBOARD. Furthermore, the ECU converter must first be connected to the terminal port of the powered HORNET ECU.

2.6.3 LUA script for Taranis

(X9D and X9E)

On the website of VSpeak you can download the packed file [VS Taranis LUA.zip](#) for free. After unpacking, the folder "SCRIPTS" can be copied completely to the SD card of the Taranis so that the SD card has the following directory structure:



In the Model Settings "TELEMETRY" can then as in the example below for Telm-Bild2 select "Script" and then set "VSHorNet"

| TELEMETRY | | 12/12 |
|-------------|--------|----------|
| Telm-Bild 1 | Werte | |
| Tmp2 | A4 | Tmp1 |
| RPM | Fuel | A3 |
| --- | Thro | --- |
| Telm-Bild 2 | Script | VSHorNet |
| Telm-Bild 3 | None | |

... so that the telemetry data of the VSpeak ECU converter can be displayed clearly with the corresponding status messages:

| | | |
|----------------------------|--------------------------|------------------------|
| RPM x1000 796 | FUEL (ml) 1820 | THROTTLE 49% |
| EGT 493 | STATUS AUTO | 9.1V |
| | | PUMP 1.32V |

2.7 JR PROPO

The JR telemetry data system is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

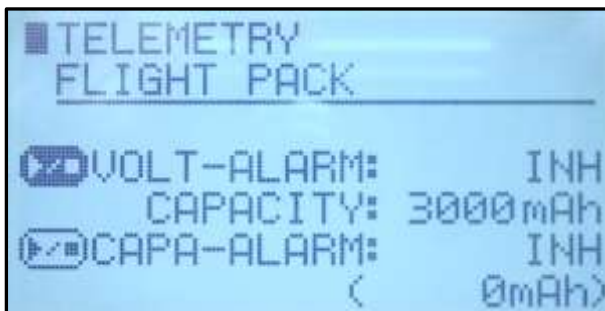
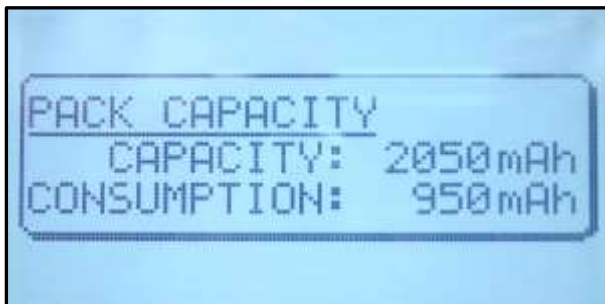
The displays are described below using the example of an XG8.



| JR Display (Ex. XG8) | HORNET |
|----------------------|---|
| F-PACK A | ECU- Status as numerical current value (s. section 2.7.1) |
| F-PACK W | THROTTLE in % |
| F-PACK V | BATT |
| F-PACK C | FUEL (remaining fuel) in ml |
| TEMP. | EGT |
| RPM | RPM |

In order to display the rotation speed correctly, the parameters for RPM must be set to: GEAR RATIO , PROPELLER and MAGNET POLE to INH.

The parameter type (MAGNETIC , OPTICAL or MOTOR) does not matter.





The ECU converter transmits the consumed FUEL (950ml) – but on the radio the remaining fuel is displayed.

This means that the actual tank size must be parameterized in ml in the settings in the radio, here in the example the main tank has 3000 ml volume, which is set as capacity 3000mAh.

The tank size in the ECU should be greater than or equal to the actual tank size (see section 2.0.2.2).

2.7.1 Turbinestatus – numerical „Current“-Values

The turbines status messages are displayed numerically as current values. The assignment is given in the following table.

|  |  F-PACK A |
|---|---|
| DEV.DELAY | 130.00 A |
| EMERGENCY | 110.00 A |
| OFF | 0.00 A 1.00 A (Throttle =OFF) |
| COOL-DOWN | 10.0 A |
| SLOW DOWN | 20.0 A 120.0 A (Throttle =OFF) |
| STANDBY | 30.00 A |
| PROP IGNIT | 31.00 A |
| PROP-HEAT | 32.00 A |
| PUMPSTART | 33.00 A |
| BURNER ON | 34.00 A |
| FUELIGNIT | 35.00 A |
| FUELHEAT | 36.00 A |
| RAMP DELAY | 37.00 A |
| RAMP-UP | 38.00 A |
| STEADY | 40.00 A |
| CAL IDLE | 41.00 A |
| CALIBRATE | 42.00 A |
| WAIT ACC | 43.00 A |
| GO IDLE | 44.00 A |
| AUTO | 50.00 A |
| AUTO-HC | 51.00 A |

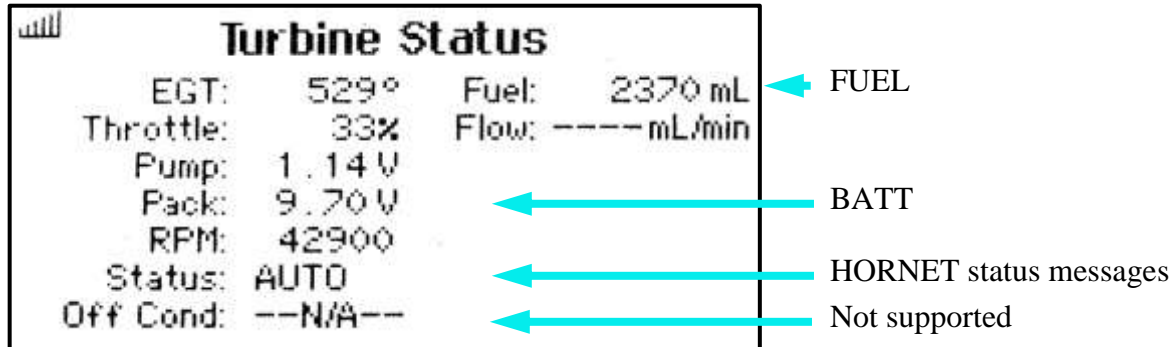
If the current value of the upper alarm threshold is set to e.g. 115.00A, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = 120.00A can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

2.8 Spektrum (X-Bus)

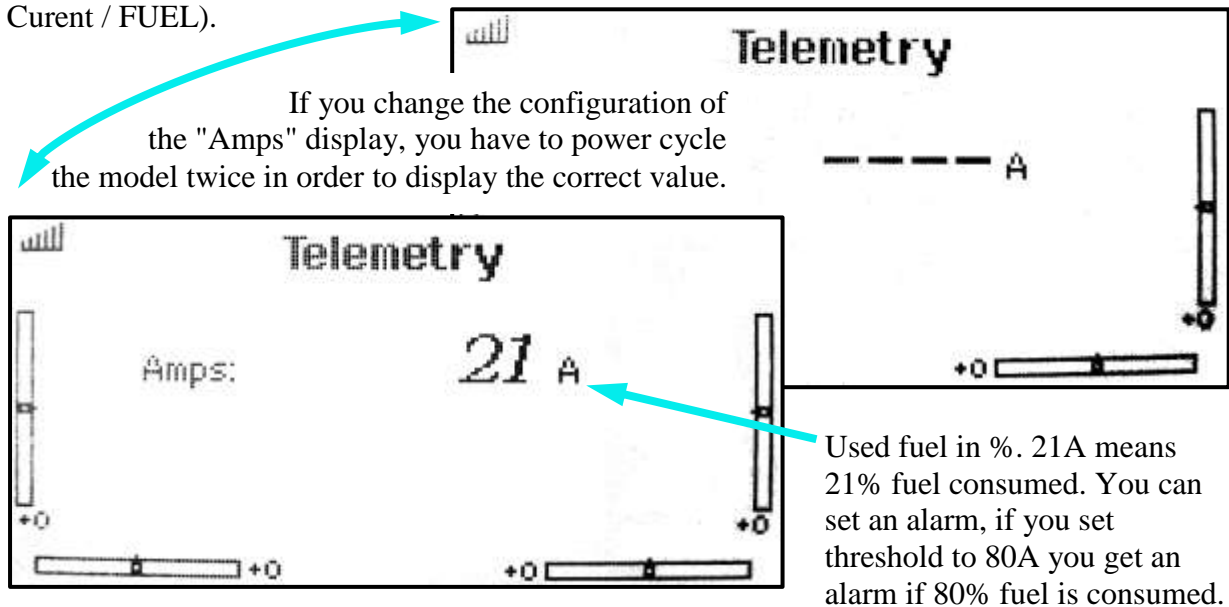
The Spektrum Telemetry System is only uni-directional. You can only see the telemetry data, but you cannot change parameters of the HORNET ECU.

You need at least a DX9 in order to view ECU Telemetry (using JetCat Sensor). DX6, DX7s and DX8 do not support this sensor.

2.8.1 Telemetry display



To display the fuel consumption the telemetry sensor “Curent/AMPS” is used (see section Curent / FUEL).



2.8.2 Curent / FUEL

Fuel consumption is converted into % and the level is displayed in the current/Amps display. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation. So after powerup you get a consumption of 0% (0A).

You can change the value displayed on “Amps” by double-clicking the black button on the VSpeak ECU Converter. Please refer to the table below.

The Display-change will be acknowledged by a short beep, frequency rising and falling.

| | Current display Ampere | LED |
|---|---------------------------------|-----|
| 1 | ---- | |
| 2 | Consumption: 0 ... 100 A | |

Double click

3 Update

The processor on the ECU Converter contains a SD bootloader with a version counter.

If firmware updates are available they will be sent via mail. The data-files attached to the e-mail have to be copied to the Micro SD card (formatted FAT or FAT16), this card has to be inserted into the ECU Converter and the power has to be switched on. The boot loader will recognize the new software version and will install it (blue LED "flickers") and is then up to date.

4 Accessories

A micro SD card is NOT included in the package. For updates only Micro-SD cards with a maximum capacity of 2GB are supported. You can obtain a matching card at www.vspeak-modell.de.

Western-cables can be obtained at www.reichelt.de and many other stores.



At www.vspeak-modell.de an external STATUS LED can be ordered. This has a suitable connector and a 20 cm long connecting cable for "clean" installation in fuselage / cockpit etc. The external status light comes with a mount.

5 Technical data

| | |
|----------------------|--|
| Power supply | 3,5 ... max. 12V from HORNET ECU |
| Power usage | ~20 mA (at 5V from HORNET ECU) |
| Telemetry connection | 3,5 ... max. 9V from receiver |
| Dimensions | 60 x 22 x 14 mm |
| Weight | 18 g (incl. connection cables) |
| Connections | RJ12 Western plug (cable length ~ 25 cm) UNI servo plug (cable length ~ 30 cm) Jeti / HoTT / MSB / Futaba X-Bus plug (cable length ~ 28 cm) Spektrum |

6 Instructions for disposal



Equipment marked with the symbol should not be disposed of within household waste.

7 EG Declaration of Conformity

Manufacturer

VSpeak-Modellbau (Volker Weigt)
Priestewitz



We hereby declare that the product

VSpeak ECU Converter

complies with the following European directives:

2004/108/EC EMC Directive
2006/95/EC Low Voltage Directive (LVD)
2011/65/EC Restriction of Hazardous Substances (RoHS)

The presumption of conformity is taken by applying the following harmonized standards:

EN60065 Audio-, video- and similar electronic apparatus - Safety requirements
EN60332 Tests on electric and optical fibre cables under fire conditions
EN60950 Information technology equipment - Safety
EN61000-6-1 Electromagnetic compatibility (EMC)
EN61000-6-3
EN55022 Information technology equipment - Radio disturbance characteristics

Priestewitz, 2015/05/01

.....
Signature
Volker Weigt
Managing Director

8 Version history

| Vers. | Date | Comment |
|-------|---------|---|
| 2.0 | 05.2015 | first retail version |
| 2.1 | 08.2015 | adjusting the timing to all telemetry systems Spektrum: Display Fuel capacity in ml |
| 2.2 | 11.2016 | Value FUEL-FLOW is no longer transmitted Jeti: ECU Status messages as numerical EX data max. 3 Alarm repeats HoTT: ECU data transfer as Vario sensor max. 3 Alarm repeats Futaba: JetCat V10 – data display Spektrum: The HORNET 3 status messages are displayed 1:1 FrSky S.Port and JR PROPO are supported |

9 Contact

Volker Weigt

www.VSpeak-Modell.de

mail: volker.weigt@vspeak-modell.de