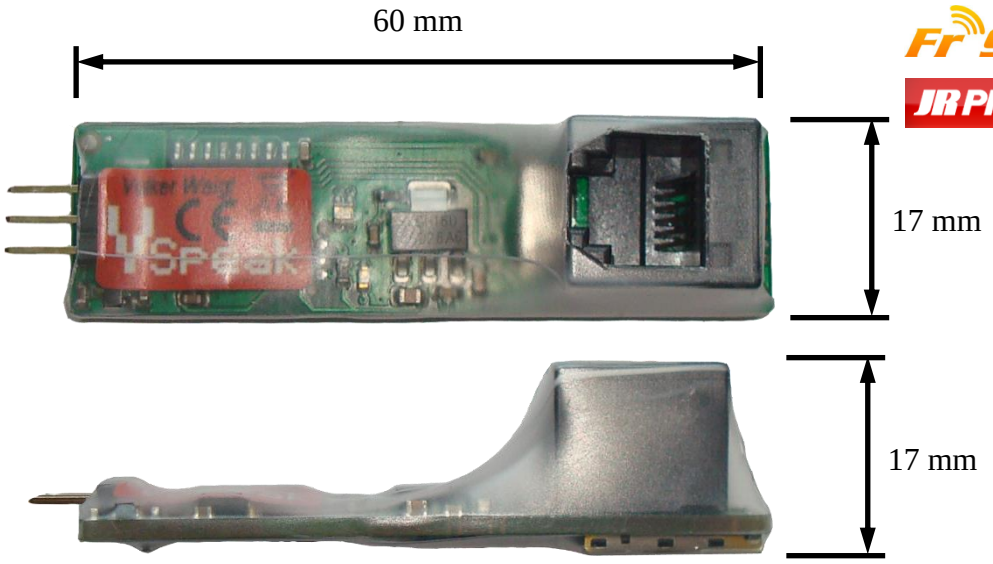
ECU converter JetCat

Manual Version 1.0



Introduction

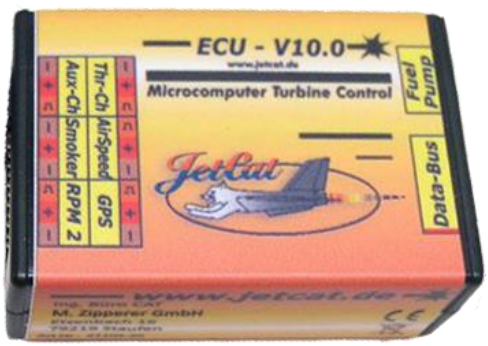
The VSpeak ECU Converter provides the data of the JetCat ECU on the telemetry system of your remote control system.

In the systems Jeti Duplex and Graupner HoTT the VSpeak ECU converter replaces the JetCat GSU (**G**round **S**upport **U**nit) completely, that means not only the indicators of the GSU are displayed on the transmitter - also most entries can be made conveniently via the transmitter.

To avoid unwanted electrical effects between the **ECU and RC-system** the VSpeak ECU Converter is **galvanically isolated**.

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

Supported are:



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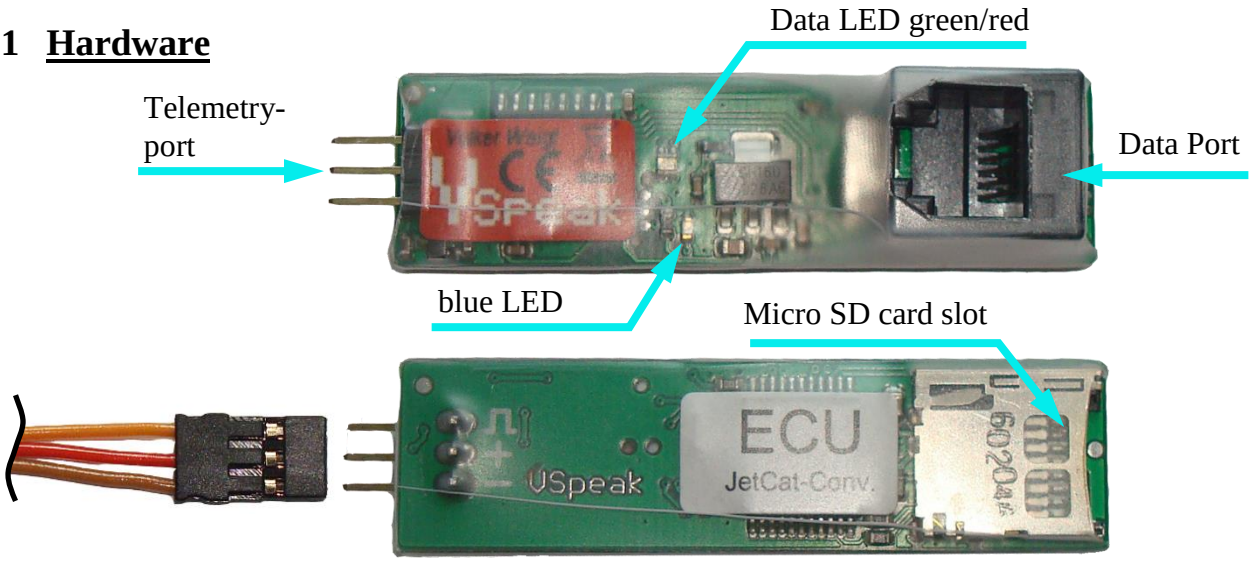
1 Hardware



Data LED: green (ON) → Receiving data from JetCat ECU

green (flashing) → Receiving data from JetCat ECU **and** data transfer to receiver (Jeti only then, if JetiBox buttons are activated)

red (ON) → Data exchange with JetCat GSU (via Programming adapter)

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

The Micro SD card slot is used for updates.

The attachment of the VSpeak ECU converter in the model can be done with velcro tape, double sided tape or cable ties.

1.1 Connection Telemetry port

With the servo patch cable included in the delivery, the Telemetry port of the VSpeak ECU converter is connected to the telemetry input of the respective receiver.

1.2 Connection Data port

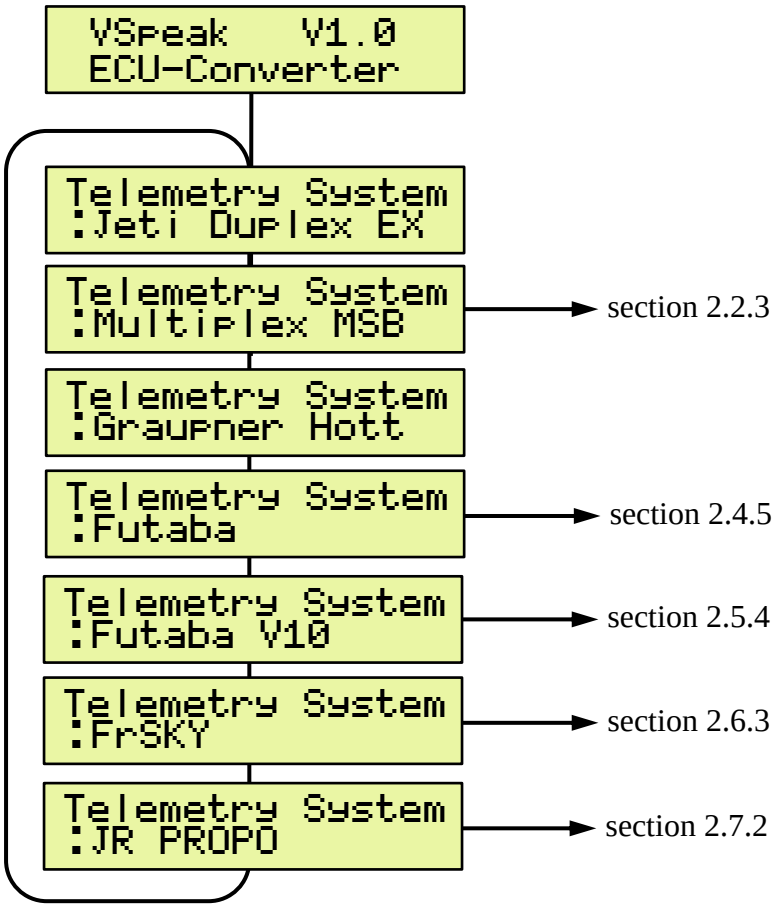
With the Western patch cable included in the delivery, the Data port of the VSpeak ECU converter is connected with the JetCat ECU or I/O board. The VSpeak ECU Converter can be connected wherever the JetCat GSU is connected. With the help of a Y-connector (eg from reichelt.de, see chapter 4), a "parallel operation" of JetCat GSU and VSpeak converter is also possible.

2 Telemetry

The voltage for the VSpeak ECU Converter is supplied by the JetCat ECU. As soon as you switch on the JetCat 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

2.0 Select Telemetry System / Global Parameters

The telemetry system can be adjusted by using the Programming adapter (s. section Accessories) and the JetCat GSU.
If ECU converter, GSU, receiver- or turbine battery are plugged into the programming adapter, the version of the ECU converter appears after a short initialization, followed by the display of the currently set remote control system.
The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons - Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values.

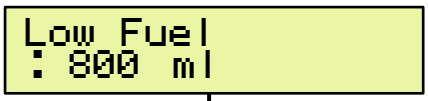
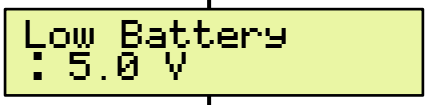
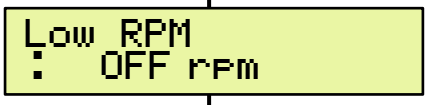
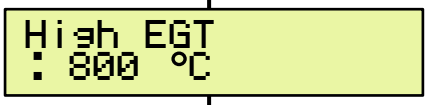
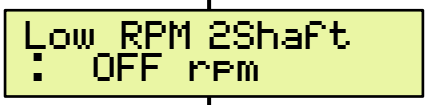
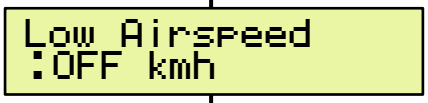
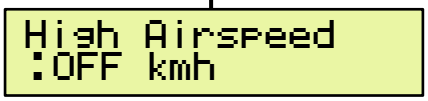


With Jeti and HoTT, all other settings can be made directly from the transmitter. For all other remote control systems further specific settings can be made (follow the respective section).
With the "Limits" button you can switch to the "Global" parameters (see next page). Press the button "Select Menu" returns to the "Telemetry System Selection".
When the "Info" button is pressed, the version of the ECU converter appears.

All other keys of the GSU ("Min / Max" "Run" "Manual" "Set" "Spool") have no function for the VSpeak ECU converter.

Globale Parameters

If ECU converter, GSU and a (2-3 cell LiPo / LiFe) battery are connected to the Programming adapter, the "Limits" button is used to set global parameters which are the same for all remote control systems:

	OFF, 10 . . . 2500 ml	Set: 800 ml
	5.0 . . . 12.0 V	Set: 5.0 V
	OFF, 20.000 . . . 99.900 rpm	Set: OFF
	100 . . . 990°C	Set: 800°C
	OFF, 1.000 . . . 99.900 rpm	Set: OFF
	OFF, 10 . . . 150 kmh	Set: OFF
	OFF, 80 . . . 990 kmh	Set: OFF

The parameters are largely self-explanatory, lower values as "Low" thresholds and exceeding of the "High" thresholds trigger alarms, with "OFF" the respective alarm is deactivated.

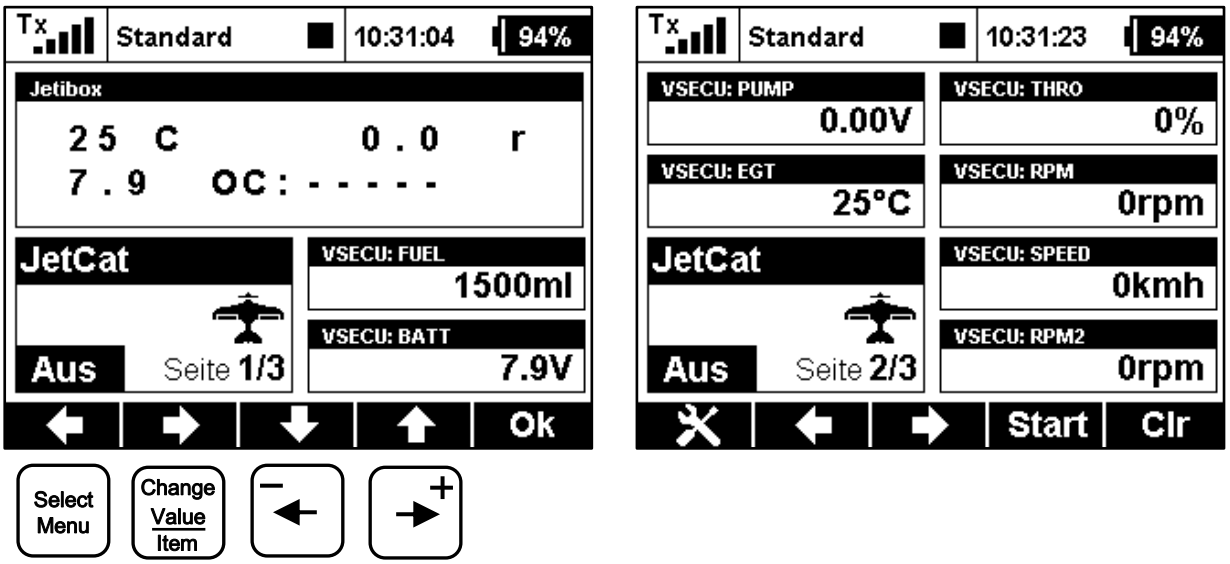
The "Low ..." alarms are activated after at first exceeding the "Low ..." alarm threshold. The low RPM (and RPM2) alarm ends at PUMP = 0.00V, which means that the speed alarm is suitable for signaling a "turbine flameout".

"Set" are the values set at delivery.

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 … **VS***peak* **ECU** *Converter*):



Press the "left" key (= "Select Menu") and additional pressing the "right" (= "Change Value / Item") will take you to the settings of the ECU converter (see section 2.1.2.5).

2.1.2 Jetibox

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

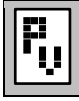
Furthermore you can use the Jeti-keys to edit most values available on the JetCat GSU. Please refer to the JetCat manual.

2.1.2.1 Key assignment

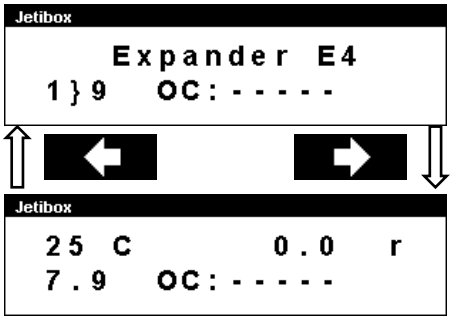
JetCat GSU			Select Menu	Change Value Item
JETIBOX COMPATIBLE	▼	▲	◀	▶
DC / DS	▼	▲	◀	▶

2.1.2.2 Special Characters

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

JetCat GSU	JETIBOX COMPATIBLE	
	M	Turbine is controlled by the GSU
	G	Glow plug defective
	F	Fail Safe
		Battery, charging indicator
	C	Unit "°C"
	r	Unit "rpm"
	P	Pump voltage in "V"

2.1.2.3 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 the ⬅ Left button (more then 3 sec).

2.1.2.4 Turbinestatus / OFF-Condition – numerial Values

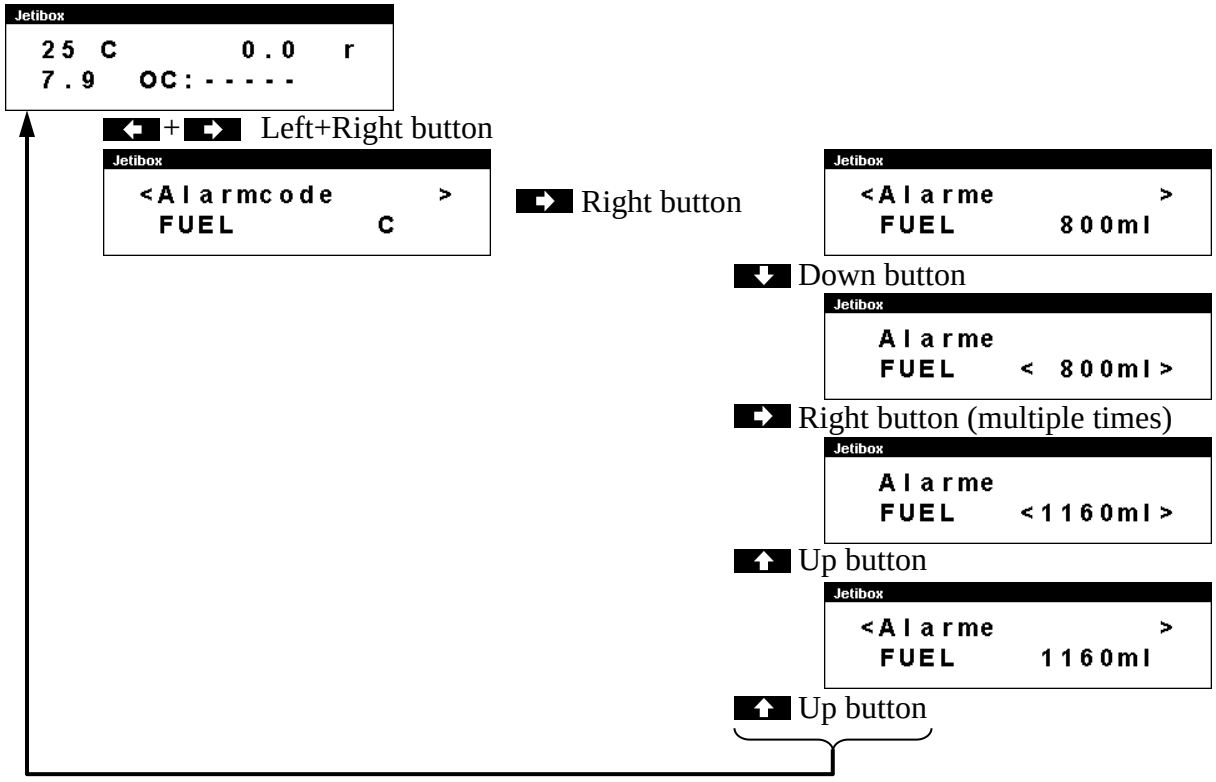
The turbines status messages are also displayed numerical values. The assignment is given in the following table.
These status values can be used in Jeti radios, e.g. in logical links, or in LUA-supported radios for LUA scripts.

Status/OC	Description
0	OFF
1	Slow Down
2	AutoOff
3	WAIT for RPM (Stby/Start)
4	PreHeat1 (only for direct Kerosene startup mode)
5	PreHeat2 (only for direct Kerosene startup mode)
6	Ignite
7	Accleleration delay
8	MainFStrt (only for direct Kerosene startup mode)
9	Keros.FullOn (only for direct Kerosene startup mode)
10	Accelerate
11	Stabilise
12	Learn LO
13	Run (reg.)
14	SpeedReg (Speed Ctrl)
15	Two-Shaft-Regulate (only for turbines with secondary shaft)
-1	Shut down via RC
-2	Auto Off
-3	Manual Off (via GSU)
-4	Acceleration time out
-5	Acceleration too slow
-6	Over RPM
-7	Low Rpm Off
-8	Low Battery
-9	Overtemperature
-10	Low temperature Off
-11	Hi Temp Off
-12	Glow Plug defective
-13	Watch Dog Timer
-14	Fail Safe Off
-15	Ignition timeout
-16	Power fail (Battery fail)
-17	Temp Sensor fail (only during startup)
-18	Fuel fail
-19	Prop fail (only two shaft engines)
-20	2nd engine fail
-21	2nd engine differential to high
-22	2nd engine no communication
-23	No oil (only on engines with separate oil reservoir)
-24	Over current
-25	No fuel pump connected/found
-26	Wrong fuelpump connected
-27	Fuelpump communication error
-28	Out of fuel shut down (only on engines with fuel sensor, like RXi types)
-29	Low Rpm shutdown, possibly due to Pump failure
-30	Low Rpm shutdown, possibly due to frontboard failure
-31	Clutch fail (starter motor clutch is not decoupling)
-32	ECU reboot due to re-matching of new engine connected
-40	(**-4** …-32) once for 2 seconds, e.g. for sum alarm

2.1.2.5 Alarms / Parameterization

From the ECU data display, the parameter display can be accessed by pressing the ◄ + ► Left+Right button.
With the ▲ Up button the parameter display will left (..to ECU data display). Within the parameter display you can scroll with the ► Right button - or - ◄ Left button between the parameter groups "Alarm", "Alarmcode", "F-Flow/Pump-V", 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)**
Alarm	FUEL	OFF, 10 . . . 2500 ml	10 ml	800 ml
	BATT	5.0 . . . 12.0 V	0.1 V	5.0 V
	RPM	OFF,20.000 . . . 99.900 rpm	100 rpm	OFF
	EGT	100 . . . 990 °C	10 °C	800 °C
	RPM2	OFF, 1.000 . . . 99.900 rpm	100 rpm	OFF
	LoSpeed	OFF, 10 . . . 150 kmh	1 kmh	OFF
	HiSpeed	OFF, 80 . . . 990 kmh	10 kmh	OFF
Alarmcode	FUEL	A, B, C, . . . , X, Y, Z		C
	BATT			U
	RPM			L
	EGT			T
	RPM2			L
	LoSpeed			V
	HiSpeed			H
Jeti-Sensor	EX Name	VSECU, L-ECU, R-ECU, 1LECU, 2RECU		VSECU

Alarms

Irrespective of the possibility to program alarm thresholds for the "EX" values in Jeti transmitters the VSpeak ECU Converter has the ability to set alarms (by using alarm codes) that are ECU status depending. These alarms can also be announced by the Profibox as voice messages.
As can be seen in the table, the alarms for FUEL, RPM, RPM2, LoSpeed and HiSpeed can be switched OFF, if no alarm is to be given at BATT and EGT, the alarm thresholds can be set to "inaccessible" values.
Permanently pending alarms, e.g. FUEL or BATT, max. 3 times repeated.

- FUEL
  The alarm Fuel is signaled when the fuel rest is lower than the FUEL set value.
- BATT
  The alarm BATT is signaled when the battery voltage is lower than the BATT set value.
- RPM (turbine)
  The alarm RPM is signaled when the turbine rotation speed is lower than the RPM threshold value.
  The speed monitoring is started after at first exceeding RPM alarm threshold and ends with PUMP = 0.00V.
  The RPM alarm is suitable for signaling a "turbine flameout".
- EGT
  The alarm EGT is signaled if the temperature exceeds the value set at EGT.
- RPM2 (2nd Shaft)
  The alarm RPM2 is signaled when the 2nd Shaft rotation speed is lower than the RPM2 threshold value.
  The speed monitoring is started after at first exceeding RPM2 alarm threshold and ends with PUMP = 0.00V.
- LoSpeed
  The alarm LoSpeed is signaled when the true airspeed is lower than the LoSpeed threshold value.
  The speed monitoring is started after at first exceeding LoSpeed alarm threshold.
- HiSpeed
  The alarm HiSpeed is signaled if the true airspeed exceeds the value set at HiSpeed.

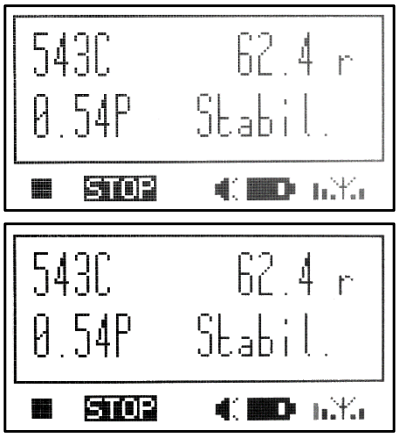
Jeti EX sensor name

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

"**1L**ECU" for **L**eft turbine ECU on input **1** and
"**2R**ECU" for **R**ight turbine ECU at the expander input **2**.

2.1.3 Profibox - autonomous telemetry system for JetCat-ECU

Using a Jeti Profibox incl. RSat receiver and the VSpeak ECU converter the telemetry data from a JetCat 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: EGT, FUEL, ECU battery voltage . . . 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 JetCat ECU.

2.2.1 Address-Assignment

The VSpeak ECU Converter at delivery uses following addresses:

JetCat		MSB address	comment
ECU Status	alarm	**2**	ECU status / OFF condition
Fuel	alarm	**3**	Fuel Level in ml
Battery	alarm	**4**	Battery voltage in V
RPM Turbine	alarm	**5**	Turbine RPM
EGT	alarm	**6**	Exhaust Gas Temperature in °C
Airspeed	alarm	**7**	Model Airspeed in km/h *)
Throttle		**8**	Throttle Value in %
Pump Voltage		**9**	Pump voltage in V
FuelFlow		**10**	FuelFlow in ml/min
RPM 2Shaft	Alarm	**11**	RPM 2nd Shaft
EGT max		**12**	max Exhaust Gas Temperature in °C
RPM Turbine max		**13**	max Turbine RPM
Pump max		**14**	max Pump voltage in V
Airspeed max		**--**	max Model Airspeed in km/h *)
RPM 2Shaft max		**--**	max RPM 2nd Shaft

*) AIRSPEED sensor at ECU connected and activated

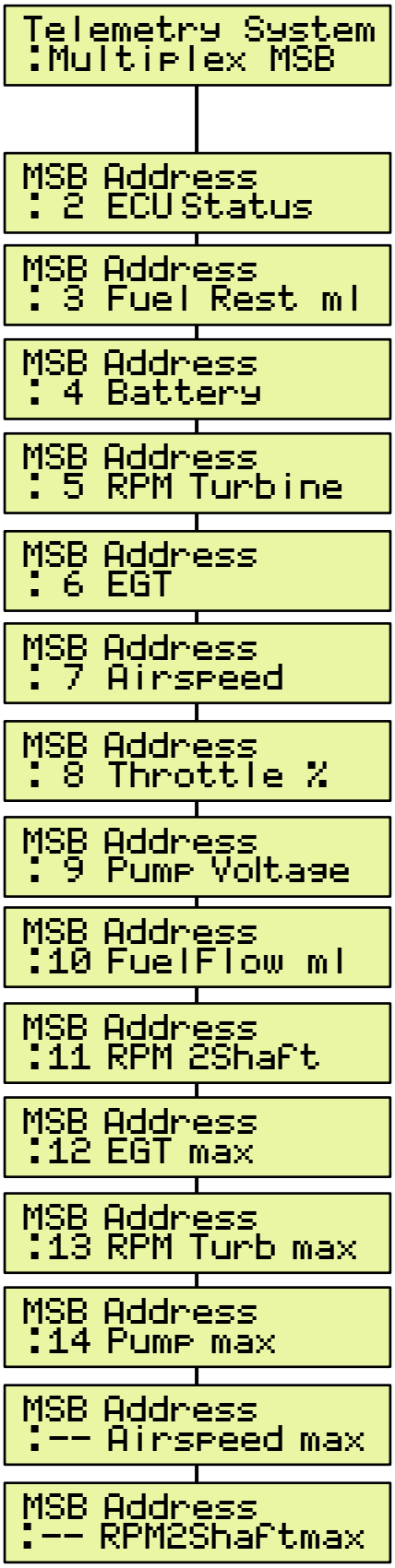
For the values marked "alarm" in the above table, alarm thresholds can be set with the Programming adapter (see section 2.0). In addition, also the MSB addresses can be set using the Programming Adapter (see section 2.2.3) - an address double assignment within the ECU converter is excluded. If an address has been set, which was already associated with another value, than the other address is set to "OFF".

„--“ address ist not used.

2.2.2 Turbinestatus / OFF-Condition

To display the turbine status / OFF-Conditon, short messages are stored in the multiplex transmitters of the PROFI TX series as well as in the "Schwanenhals" telemetry display.
In contrast to the status texts, the OFF Conditons are displayed inversely, with the exception of the regular shutdown reasons:
- Switch OFF via RC
- Auto OFF or
- Manual (via GSU)

2.2.3 Setup



For the Multiplex Sensor Bus (MSB) a variety of settings in VSpeak ECU converter using the Programming adapter + JetCat GSU can be made.

In the overview the complete menu structure for all possible range of settings is shown.

The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons -

Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values.

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.

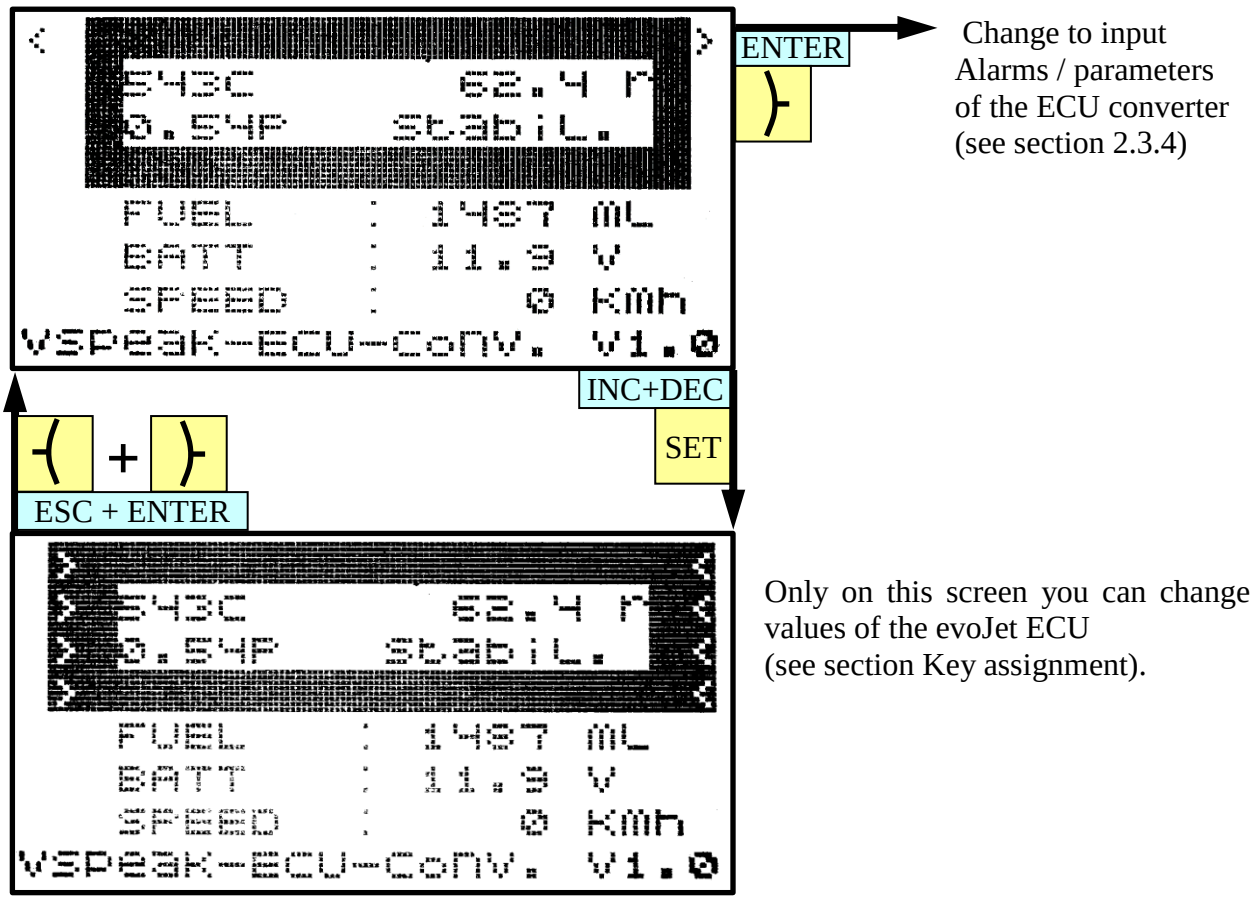
In data-mode the values are only transmitted in a fixed format in one direction. The format is defined by the sensor type. In this mode it is possible to have speech output for the sensor values.

2.3.1 Sensortype

The VSpeak ECU Converter for HoTT is a GAM (**G**eneral **A**ir **M**odul), a ESC (**E**lectronic **S**peed **C**ontroller) – or a VAR (**Var**io). Please select this sensor-type on your radio or Smartbox.

2.3.2 Textdisplay

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

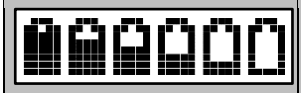
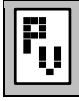


The functionality of the JetCat GSU can be mostly replicated with the HoTT buttons.

For further details on the specific values please consult the manual of the JetCat ECU.

2.3.2.1 Special Characters

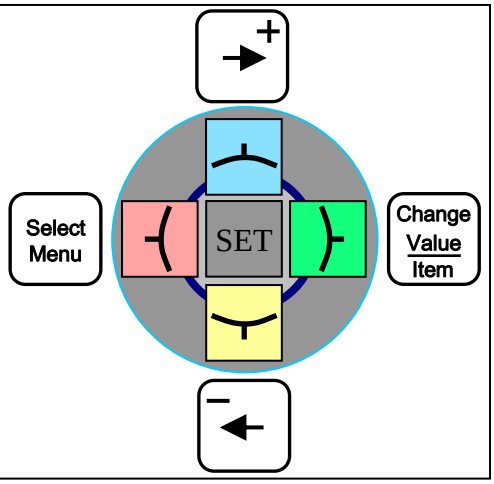
The JetCat GSU supports some special characters which cannot be displayed on HoTT-systems. Please refer to the following table how these characters are "translated":

JetCat GSU	HoTT	
		Turbine is controlled by the GSU
		Glow plug defective
		Fail Safe
		Battery, charging indicator
		Unit "°C"
		Unit "rpm"
		Pump voltage in "V"

2.3.2.2 Key assignment

JetCat GSU	Select Menu	−	+	Change Value Item
Graupner HoTT SMART-BOX	ESC	DEC	INC	ENTER

MX-12
MX-16
MC-16
MC-20
MC-32
⋮



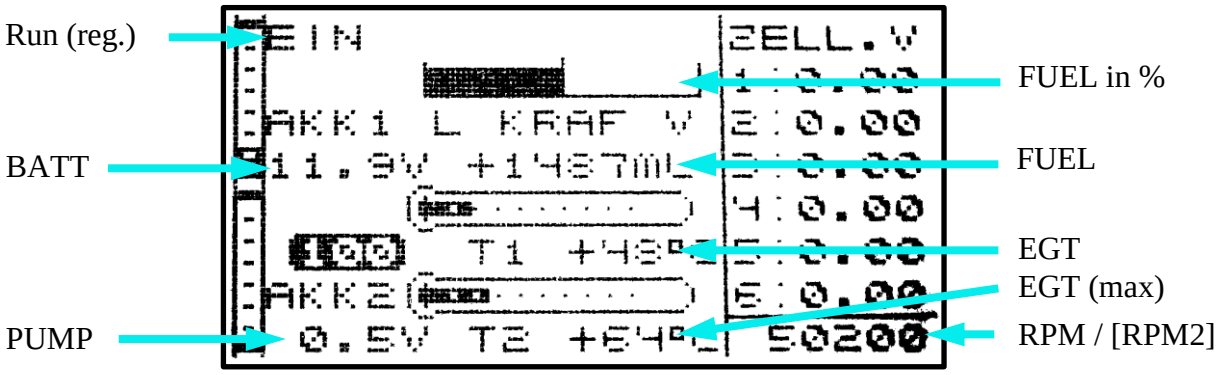
Unlike the JetCat GSU, the HoTT buttons for the functions "Select Menu" and "Change Value / Item" have a switched effect, means, one times pushed the button activates the function - one times again deactivates the function.

When the "Select Menu" is activated, + / - buttons changes to the desired menu.

When "Change Value" is activated, the selected value can be changed with the + / - buttons.

2.3.3 Data-Display/Speech

2.3.3.1 GAM - General Air Modul



"EIN" indicates that the turbine is in the "RUN (reg.)", "SpeedCtrl" or "Rpm2Ctrl" status.

Since the GAM can only display temperatures up to 235°C, the temperature is divided by 10. If you see a value of 48°C on the display, you have a "real" temperature of 480 - 489°C.

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.

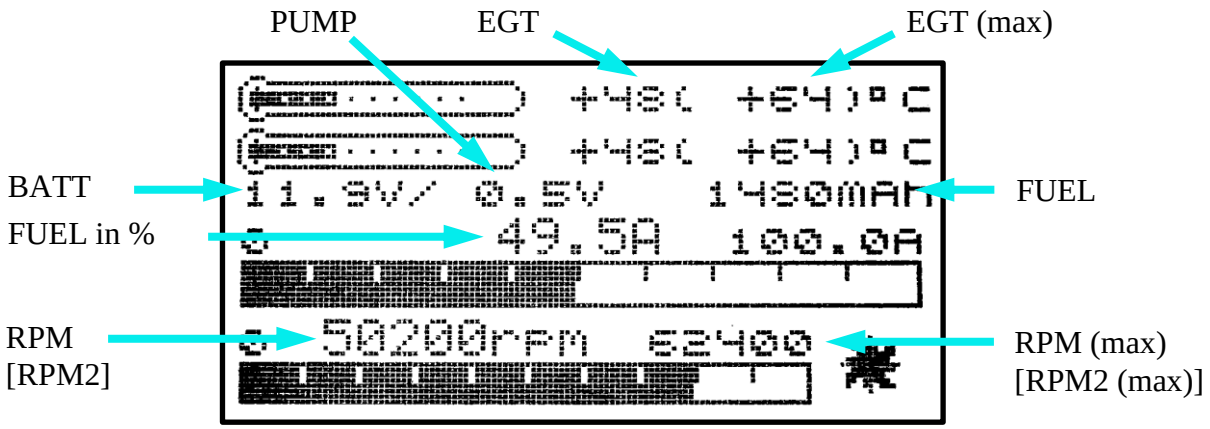
The current is also displayed from JetCat ECU V10.

If an AIRSPEED sensor is connected to the ECU, the speed is displayed in kmh.

The RPM display can be set with the "RPM-sel" parameter between the turbine RPM and RPM2 for 2-shaft turbines..

When the Vario tone is switched on, all switch-off conditions (except "RC-Off", "Auto-Off" and "Manual Off") are signaled as "strong rise" (+ 300.00m / s) for 2 seconds.

2.3.3.2 ESC - Electronic Speed Control



The ESC temperature display is limited to 235 ° C, so the turbine jet temperature is shown divided by 10, or the other way around: 48 ° C in the display corresponds to 480 ... 489 °C.

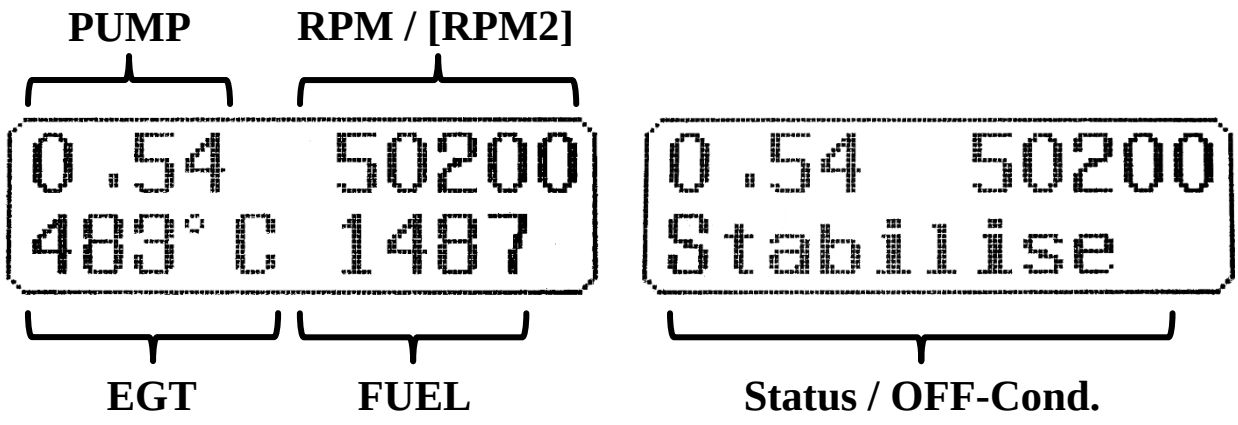
The RPM display can be set with the "RPM-sel" parameter between the turbine RPM and RPM2 for 2-shaft turbines.

The fuel consumption is displayed on the display as capacity value, ie, 1480mAh are 1480ml. On the other hand, the percentage tank level is displayed as the current, ie, 49.5A correspond to 49.5% tank level. The tank level is thus easy to read via the associated bar display. To calculate the percentage of tank volume, F-SIZE is set to 100% after power on. For example a 1480ml fuel consumption and F-SIZE = 3000ml correspond to a current tank ratio of 49.5%.

2.3.3.3 VAR – Variometer

The HoTT Vario offers the possibility to display texts, in the example two lines with an MC20. The bottom line shows the turbine status or the last OFF condition. If the turbine is in the "RUN (reg.)", "SpeedCtrl" or "Rpm2Ctrl" status, the lower line shows the EGT and the remaining fuel in ml.

The RPM display can be set with the "RPM-sel" parameter between the turbine RPM and RPM2 for 2-shaft turbines.

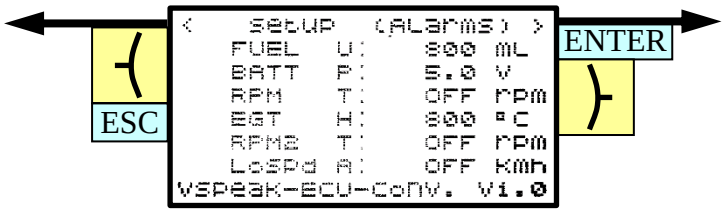


The tank level is converted in a percentage and displayed as altitude, e.g. 49m corresponds to 49% tank level (can be used for the speech output). The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

Furthermore, the alarms according to section 2.3.4. are also effective here.

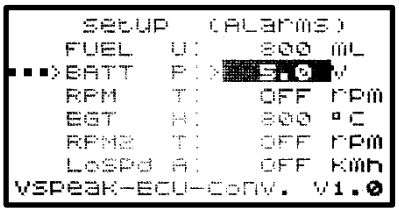
"Failure" displays all OFF conditions except "RC-Off", "Auto-Off" and "Manual Off". This is shown in the display for 2 seconds. For the duration of these display, an acoustic signal is also displayed as a "strong rise" (+ 300.00m / s), when the Varioton switched on.

2.3.4 Alarms / 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
(bzw. den Tasten der HoTT-Sender) angewählt „>“.

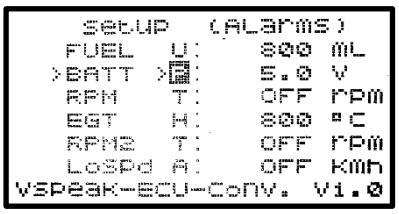


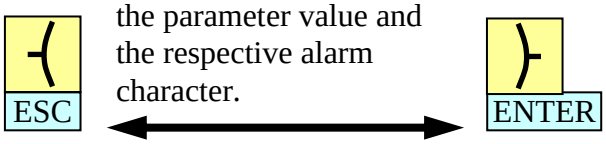
With INC+DEC or SET the value of the selected parameter is enabled for change (inverted).

With INC the value can be increased,

With DEC it can be reduced.

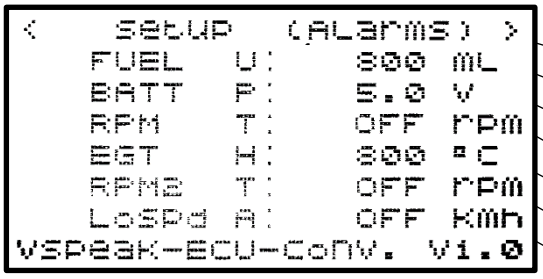
Stored is after INC+DEC or SET





These two keys can be used to switch between the parameter value and the respective alarm character.

If the alarm code is activated (inverse displayed), the alarm message assigned to the respective letter is announced, which can be different for the 3 types of types GAM / ESC and VAR.

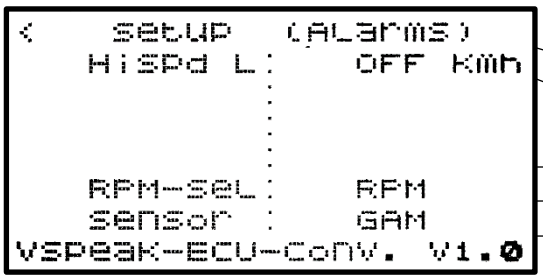


Settings		
Value range	Step size	Signal tone
OFF,10 . . . 2500 ml	10 ml	U
5.0 . . . 12.0 V	0.1 V	P
OFF,20.0 … 99.9 x 1000rpm	100 rpm	T
100 . . . 990 °C	10 °C	H
OFF,1.0 … 99.9 x 1000rpm	100 rpm	T
OFF,10 . . . 150 kmh	1 kmh	A

Upon delivery, the warning thresholds are set as shown in the picture.
As can be seen in the table, the alarms for FUEL, RPM, RPM2, LoSpeed and HiSpeed can be switched OFF, if no alarm is to be given at BATT and EGT, the alarm thresholds can be set to "inaccessible" values.
Permanently pending alarms, e.g. FUEL or BATT, max. 3 times repeated.

- FUEL
  The alarm Fuel is signaled when the remaining fuel is lower than the FUEL set value.

- BATT
  The alarm BATT is signaled when the battery voltage is lower than the BATT set value.
- RPM (turbine)
  The alarm RPM is signaled when the turbine rotation speed is lower than the RPM threshold value.
  The speed monitoring is started after at first exceeding RPM alarm threshold and ends with PUMP = 0.00V.
  The RPM alarm is suitable for signaling a "turbine flameout".
- EGT
  The alarm EGT is signaled if the temperature exceeds the value set at EGT.
- RPM2 (2nd Shaft)
  The alarm RPM2 is signaled when the 2nd Shaft rotation speed is lower than the RPM2 threshold value.
  The speed monitoring is started after at first exceeding RPM2 alarm threshold and ends with PUMP = 0.00V.
- LoSpd
  The alarm LoSpd is signaled when the true airspeed is lower than the LoSpd threshold value.
  The speed monitoring is started after at first exceeding LoSpd alarm threshold.



Settings		
Value range	Step size	Signal tone
OFF,80 . . . 990 kmh	10 kmh	L
RPM / RPM2		
GAM / ESC / VAR		

Upon delivery, the warning thresholds are set as shown in the picture.
As can be seen in the table, the alarms for HiSpd can be switched OFF

- HiSpd
  The alarm HiSpd is signaled if the true airspeed exceeds the value set at HiSpd.
- RPM-sel
  With RPM-select you can set, the setting is made as to whether the turbine speed (RPM) or 2-th shaft (RPM2) is displayed.
- Sensor
  Selection of the current HoTT Sensortype . GAM… **G**eneral **A**ir **M**odul, ESC… **E**lectronic **S**peed **C**ontroller – or VAR… **Var**io.

2.4 Futaba S.BUS2

In contrast to the VSpeak telemetry system setting "Futaba V10", the following version supports ALL telemetry able Futaba transmitters, which also do not support the special "JetCat V10" sensor.

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 JetCat 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. To do this, the telemetry port of the VSpeak ECU converter must be connected to the "SI / F" socket of the transmitter (for some transmitters the power supply must be connected to the "SI / F" socket with a V cable and the receiver battery, read the operating instructions for your transmitter). Furthermore, the ECU converter must be connected to the powered JetCat ECU or with the Programming adapter.

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

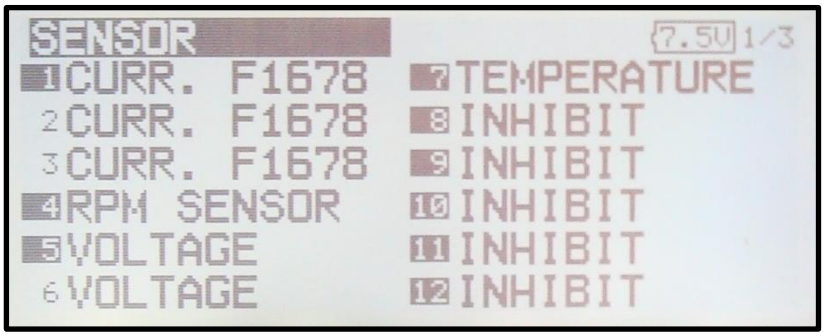
Since the VSpeak ECU converter displays its data using up to 6 sensors, the registry has also be done up to 6 times. Of course, the starting slots can also be set manually.

2.4.2 Mapping Sensor – ECU Values

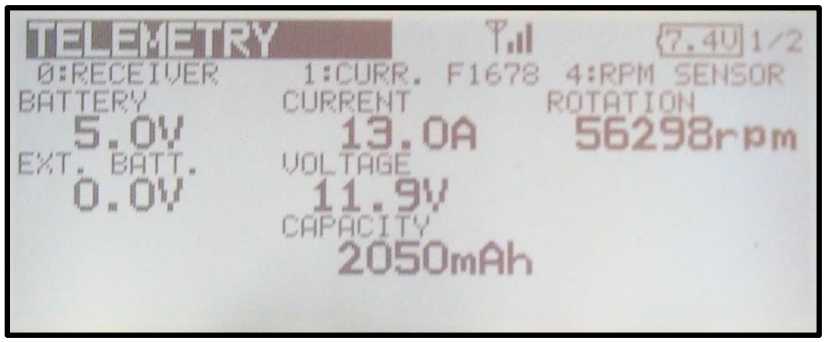
No	Sensor name	Slots	Start *(default)*	original Sensor value	ECU value	
1	CUR-F1678	3	24	CURRENT	Turbine status	(s. section 2.4.1)
				VOLTAGE	BATT	in V
				CAPACITY	FUEL (remaining fuel, s. section 2.4.4)	in ml
2	SBS-01RM/O	1	27	R.P.M	RPM	in rpm
3	SBS-01RM/O	1	(--)	R.P.M	RPM (2Shaft)	in rpm
4	SBS-01V	2	28	BATTERY	PUMP	in V
				EXT-VOLT	THROTTLE	in %
5	SBS-01T	1	(--)	TEMP	AIRSPEED	in km/h
6	SBS-01T	1	30	TEMP	EGT	in °C

(--) = Slot and thus sensor value deactivated

E.g. using a FX32 transmitter: The sensors are displayed after registration as seen below:



… or the telemetry values:

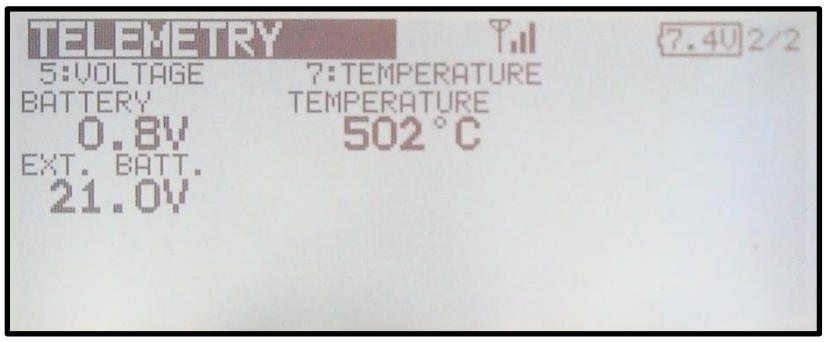


13.0A..... Run (reg.)

11.9V ..... Turbine battery

2050mAh ..... 2050ml remaining Fuel

56298rpm..... Turbine Speed

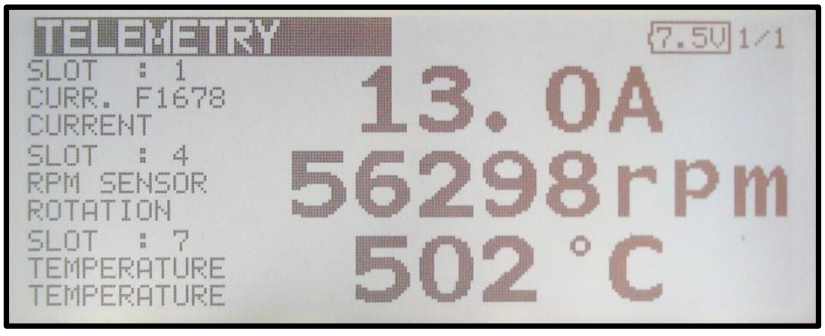


0.8V ..... Pump voltage

21.0V ..... 21% Throttle

502°C ..... EGT

or:



With the Programming adapter, the telemetry values of RPM2 (2nd Shaft) and Airspeed can be programmed, also the alarm thresholds can be individually adjusted.

2.4.1 *Turbinestatus – numerical "Current"-Values*

The turbines status messages are displayed as numerical "Current" values. The assignment is given in the following table:

Futaba CUR-F1678 CURRENT	Description
0.0 A	OFF
1.0 A	Slow Down
2.0 A	AutoOff
3.0 A	WAIT for RPM (Stby/Start)
4.0 A	PreHeat1 (only for direct Kerosene startup mode)
5.0 A	PreHeat2 (only for direct Kerosene startup mode)
6.0 A	Ignite
7.0 A	Accleleration delay
8.0 A	MainFStrt (only for direct Kerosene startup mode)
9.0 A	Keros.FullOn (only for direct Kerosene startup mode)
10.0 A	Accelerate
11.0 A	Stabilise
12.0 A	Learn LO
13.0 A	Run (reg.)
14.0 A	SpeedReg (Speed Ctrl)
15.0 A	Two-Shaft-Regulate (only for turbines with secondary shaft)
- 1.0 A	all turbine shutdowns, except: - RC-Off - Auto-Off - Manual-Off
- 2.0 A	like – 1.0A, but only once for 2 seconds, e.g. for sum alarm

If in the transmitter an alarm thresold for the current of e.g. less than MINUS 1.0A is set, all turbine shutdowns except for "RC-Off", "Auto-Off" and "Manual -Off" are signaled as a current alarm for a period of 2 seconds.

2.4.2 *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, RPM and RPM2

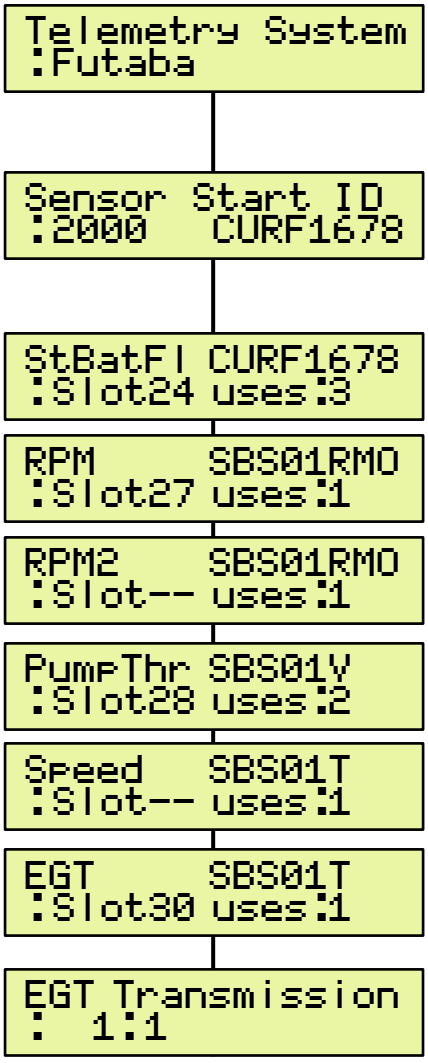
With the latest software (V1.003 - as of May 2015) the sensors **SBS-01V and SBS-01T are not supported yet.**

2.4.3 Setup

For the Futaba SBUS2 system a variety of settings in VSpeak ECU converter using the Programming adapter + JetCat GSU can be made.

In the overview the complete menu structure for all possible range of settings is shown.

The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons - Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values.



Here the sensor start ID can be set, which is used to register the sensors of the VSpeak ECU converter on the Futaba system.
The ID is valid for CUR-F1678, SBS-01V and the first rotation speed and temperature sensor SBS-01T (F-FLOW).
The second rotation speed and temperature sensor SBS-01T then has the sensor start ID + 1.

Here, the StartSlot of each individual sensor can also be set manually: in the transmitter, the assigned sensor is also to be set manually at the corresponding slot address. The corresponding sensor is deactivated with slot "--" - is thus also deactivated for transmitter registry.
So RPM2 can then be activated and assigned to a slot for 2-shaft turbines, Speed - if an airspeed sensor is connected to the ECU.

EGT transmission „1:1“ - or - "devided by 10".
Since the adjustable temperature alarm thresold in futaba transmitters is only possible for max. 200 ° C, here is the possibility to transfer the temperature value divided by 10.

2.4.4 Alarms

In the Futaba system alarms can be generated according to the set alarm thresholds for each value in the transmitter or the Telemetry Box. In the sensors itself no alarms can be set. This is for most sensor data also sufficient, such as an alarm for monitoring the EGT temperature.
But for alerting the fuel consumption and the speed monitoring the VSpeak ECU converter for Futaba offers the following options:

FUEL (s. section 2.0)

FUEL	Value range:	OFF, 10 ….2.500 ml	Step size: 10 ml

1. Setting value = OFF

Fuel is transferred 1 : 1.

However, if an alarm threshold of e.g. <800 is programmed, then, after the tank level is lower, the alarm is also triggered - but the alarm only stops, if the transmitter is switched off. That's why:

2. Setting value = 800ml (as example)

After lowering the tank reserve, the current value 3 x is transferred alternately for 5 seconds as a negative value, followed by 10 seconds as normal positive value.

Rotation speed monitoring (s. section 2.0)

Thus, the speed is displayed correctly, you have to set the speed display to type: magnet and gear ratio 1.

RPM	Value range:	OFF, 20.000 ….99.900 rpm	Step size: 100 rpm
RPM2	Value range:	OFF, 1.000 ….99.900 rpm	Step size: 100 rpm

1. Setting value = OFF

The current speed is transfer 1 : 1.

If an alert threshold of for example <35,000 rpm is programmed in the transmitter, then the alarm is already active at the switching on of the turbine and the receiving system. That's why:

2. Setting value = 35.000rpm (als Beispiel)

The speed is transferred to the transmitter divided by a factor of 10. Only in the alarm case, speeds less than the setting value are transferred 1 : 1. The alarm is active AFTER exceeding the set value.

In the example, the speed monitoring is only activated after exceeding 35,000 rpm. The actual 40.000rpm are displayed on the transmitter as 4.000rpm, 35,100 as 3.510rpm. If speed decreases further then 35.000rpm speed transfer is 1 : 1. Has the transmitter an alarm threshold set to > 15.000rpm, the alarm starts. If turbine speed falls below 15.000rpm - for example, turbine was switched off, then the alarm stops because speed is now less than the alarm threshold value.

Turbinenabsteller / Status (s. Section 2.4.1)

Turbine status messages are tranmitted as numericcal "Current" values.
If in the transmitter an alarm thresold for the current of e.g. less than MINUS 1.0A is set, all turbine shutdowns except for "RC-Off", "Auto-Off" and "Manual -Off" are signaled as a current alarm for a period of 2 seconds.

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 JetCat 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

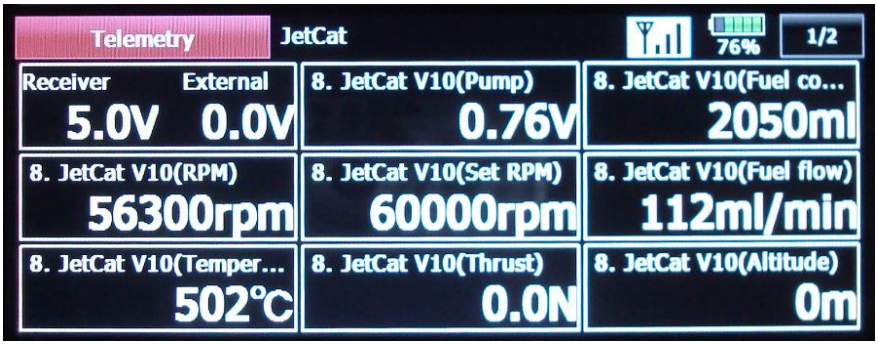
Caution:
We generally recommend a strict separation between sensor values and servo data. Although the S: BUS 2 can transmit servo data, the S.BUS2 should exclusively be used for the transmission of sensor data and only the S.BUS1 should be used for the servos. In this way, the servo data are excluded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

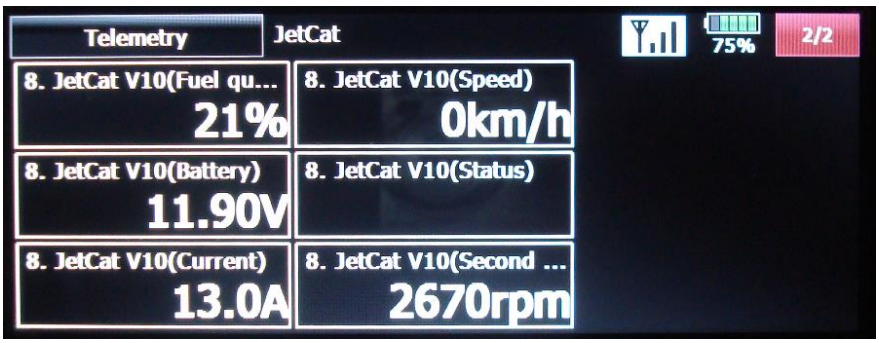
2.5.1 Registration at the transmitter

The VSpeak ECU converter must be registered on the transmitter like any S.BUS2 sensor. To do this, the telemetry port of the VSpeak ECU converter must be connected to the "SI / F" socket of the transmitter (for some transmitters the power supply must be connected to the "SI / F" socket with a V cable and the receiver battery, read the operating instructions for your transmitter). Furthermore, the ECU converter must be connected to the powered JetCat ECU or with the Programming adapter.

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

In contrast to the 6 standard sensors in Section 2.4, the slots of the special sensor JetCat V10 are used to display the data (not every Futaba transmitter supports the JetCat V10 sensor).





Mapping JetCat V10 – ECU Values

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

Nr.	JetCat V10	ECU value
1	RPM	RPM (turbine)
2	Temperature	EGT
3	Pump	PUMP
4	Set RPM	turbine set Solldrehzahl
5	Thrust	-
6	Fuel	FUEL (remaining fuel)
7	Fuel flow	FuelFlow
8	Altitude	-
9	Fuel quality	THROTTLE
10	Battery	BATT
11	Current	ECU status as numerical current value (s. Section 2.5.3)
12	Speed	KMH
13	State	Status / OFF-Condition
14	Second Shaft	RPM2 (2nd shaft)

2.5.2 Turbinestatus – numerical "Current"-Values

The turbines status messages are displayed as numerical "Current" values. The assignment is given in the following table:

Futaba Current	Description
0.0 A	OFF
1.0 A	Slow Down
2.0 A	AutoOff
3.0 A	WAIT for RPM (Stby/Start)
4.0 A	PreHeat1 (only for direct Kerosene startup mode)
5.0 A	PreHeat2 (only for direct Kerosene startup mode)
6.0 A	Ignite
7.0 A	Accleleration delay
8.0 A	MainFStrt (only for direct Kerosene startup mode)
9.0 A	Keros.FullOn (only for direct Kerosene startup mode)
10.0 A	Accelerate
11.0 A	Stabilise
12.0 A	Learn LO
13.0 A	Run (reg.)
14.0 A	SpeedReg (Speed Ctrl)
15.0 A	Two-Shaft-Regulate (only for turbines with secondary shaft)
100.0 A	all turbine shutdowns, except: - RC-Off - Auto-Off - Manual-Off
111.0 A	like 100.0A, but only once for 2 seconds, e.g. for sum alarm

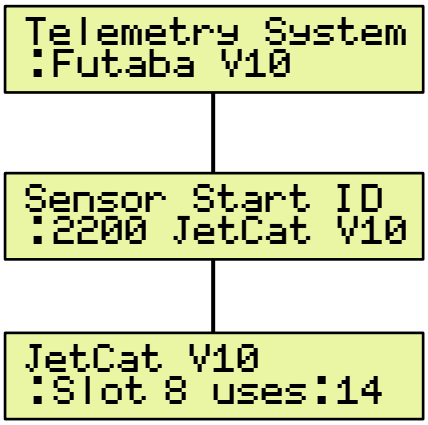
If in the transmitter an alarm thresold for the current of e.g. more than 105.0A is set, all turbine shutdowns except for "RC-Off", "Auto-Off" and "Manual -Off" are signaled as a current alarm for a period of 2 seconds.

2.5.3 Setup

For the Futaba SBUS2 system a variety of settings in VSpeak ECU converter using the Programming adapter + JetCat GSU can be made.

In the overview the complete menu structure for all possible range of settings is shown.

The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons - Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values.



Here the sensor start ID can be set, which is used to register the sensor on the Futaba system. In the case of multi-trubine models, different values must be set here.

Here, the StartSlot can also be set manually: in the transmitter, the " JetCat V10" sensor is also to be set manually at the corresponding slot address (1…14).

2.5.4 Alarms

In the Futaba system alarms can be generated according to the set alarm thresholds for each value in the transmitter. In the sensors itself no alarms can be set. This is for most sensor data also sufficient, such as an alarm for monitoring the EGT temperature.
But for alerting the speed monitoring the VSpeak ECU converter for Futaba offers the following option:

Rotation speed monitoring (s. section 2.0)

Thus, the speed is displayed correctly, you have to set the speed display to type: magnet and gear ratio 1.

RPM	Value range:	OFF, 20.000 ….99.900 rpm	Step size: 100 rpm
RPM2	Value range:	OFF, 1.000 ….99.900 rpm	Step size: 100 rpm

1. Setting value = OFF

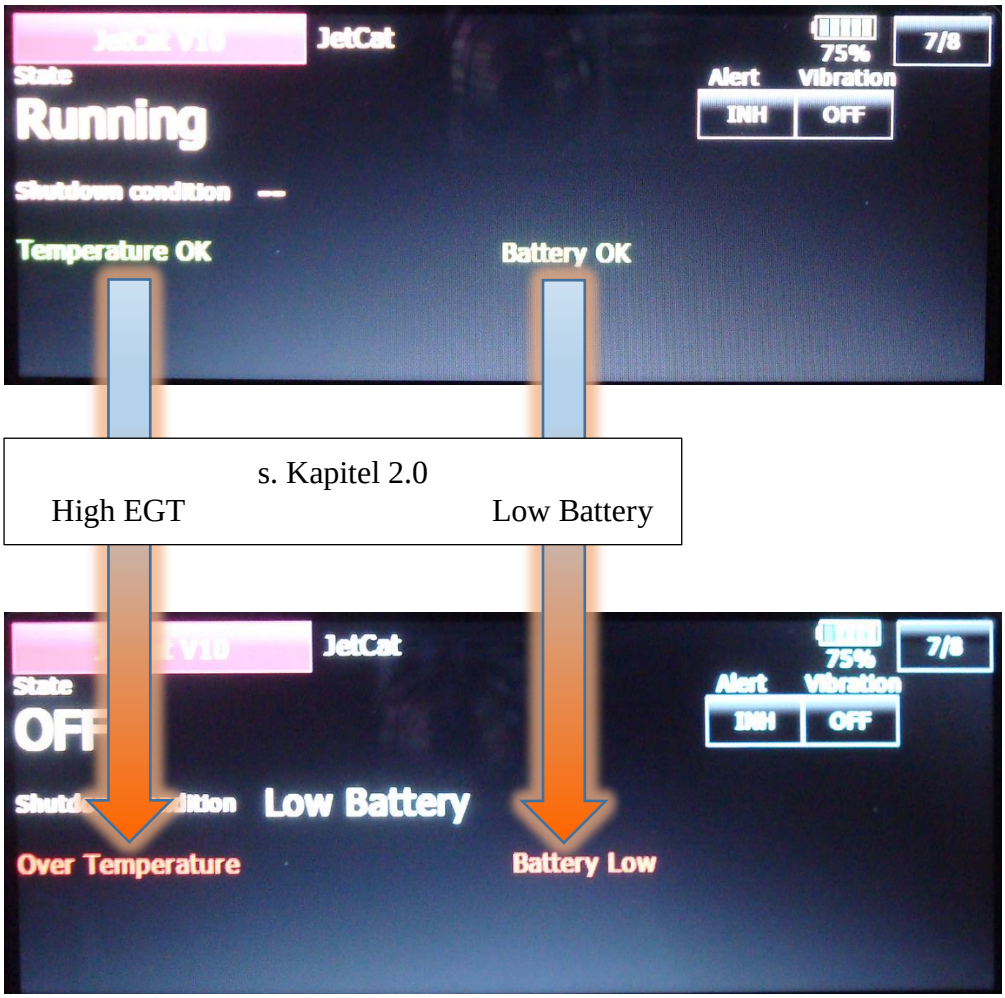
The current speed is transfer 1 : 1.

If an alert threshold of for example <35,000 rpm is programmed in the transmitter, then the alarm is already active at the switching on of the turbine and the receiving system. That's why:

2. Setting value = 35.000rpm (als Beispiel)

The speed is transferred to the transmitter divided by a factor of 10. Only in the alarm case, speeds less than the setting value are transferred 1 : 1. The alarm is active AFTER exceeding the set value.

In the example, the speed monitoring is only activated after exceeding 35,000 rpm. The actual 40.000rpm are displayed on the transmitter as 4.000rpm, 35,100 as 3.510rpm. If speed decreases further then 35.000rpm speed transfer is 1 : 1. Has the transmitter an alarm threshold set to > 15.000rpm, the alarm starts. If turbine speed falls below 15.000rpm - for example, turbine was switched off, then the alarm stops because speed is now less than the alarm threshold value.

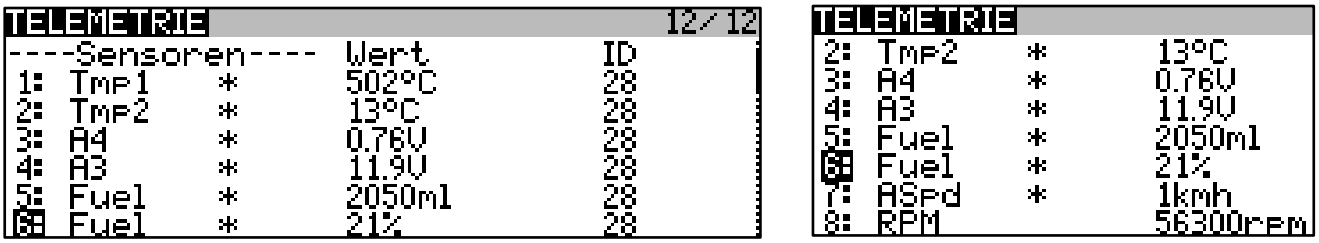

JetCat
State
Running
Shutdown condition ---
Temperature OK
Battery OK
75%
7/8
Alert
Vibration
INH
OFF
s. Kapitel 2.0
High EGT
Low Battery
JetCat
State
OFF
Low Battery
Over Temperature
Battery Low
75%
7/8
Alert
Vibration
INH
OFF

2.6 FrSKY S.Port

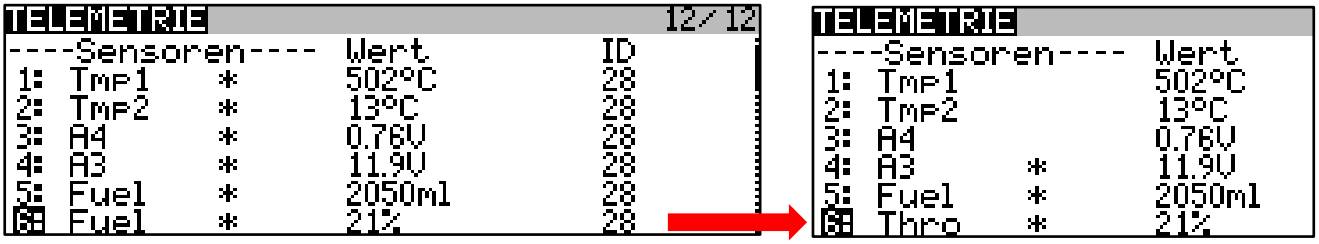
(tested with Taranis X9D with FW: opentx-taranis-plus VERS: 2.1.8)

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

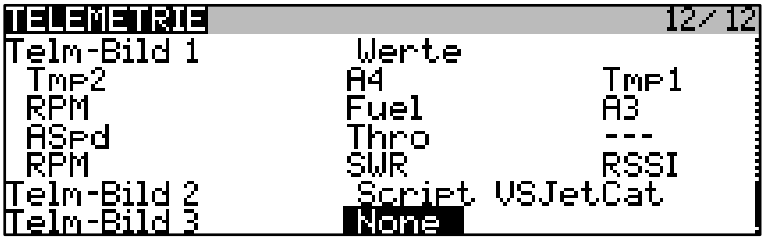
After the sensor settings of the VSpeak ECU converter have been read in the "TELEMETRY" model settings with "Start Sensorsuche", the PREZISION of "fuel" should be changed from 0.00 to 0.- - ml, A3 (BATT) from 0.00 to 0.0 V and for ASpd (Airspeed) from 0.0 to 0.- - kmh



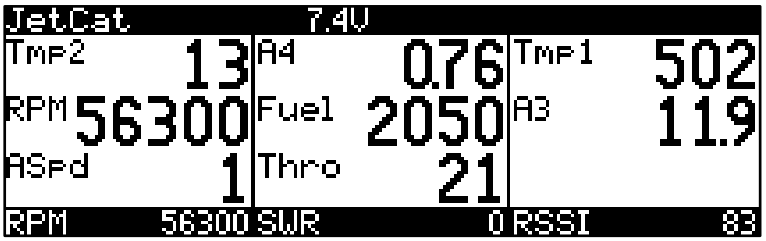
The second "fuel" value with the unit % is renamed "Thro" (exactly this notation, otherwise the LUA script does not work correctly).



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



… the telemetry data are represented as follows:



FrSKY Telm-Bild 1	JetCat	
Tmp2	ECU-Status and OFF Cond. as Temperature	(s. section 2.6.1)
A4	PUMP in V	
Tmp1	EGT in °C	
RPM	Turbine or 2nd Shaft	(s. section 2.6.3)
Fuel	FUEL (remaining fuel) in ml	
A3	BATT in V	
Thro	THROTTLE in %	
ASpd	OFF / kts / kmh	(s. section 2.6.3)

2.6.1 Turbinestatus / OFF-Condition – numerial „Temperature“-Values

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

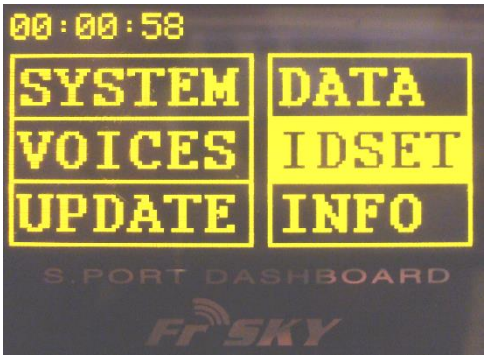
FrSKY Tmp2	Description
0	OFF
1	Slow Down
2	AutoOff
3	WAIT for RPM (Stby/Start)
4	PreHeat1 (only for direct Kerosene startup mode)
5	PreHeat2 (only for direct Kerosene startup mode)
6	Ignite
7	Accleleration delay
8	MainFStrt (only for direct Kerosene startup mode)
9	Keros.FullOn (only for direct Kerosene startup mode)
10	Accelerate
11	Stabilise
12	Learn LO
13	Run (reg.)
14	SpeedReg (Speed Ctrl)
15	Two-Shaft-Regulate (only for turbines with secondary shaft)
-1	Shut down via RC
-2	Auto Off
-3	Manual Off (via GSU)
-4	Acceleration time out
-5	Acceleration too slow
-6	Over RPM
-7	Low Rpm Off
-8	Low Battery
-9	Overtemperature
-10	Low temperature Off
-11	Hi Temp Off
-12	Glow Plug defective
-13	Watch Dog Timer
-14	Fail Safe Off
-15	Ignition timeout
-16	Power fail (Battery fail)
-17	Temp Sensor fail (only during startup)
-18	Fuel fail
-19	Prop fail (only two shaft engines)
-20	2nd engine fail
-21	2nd engine differential to high
-22	2nd engine no communication
-23	No oil (only on engines with separate oil reservoir)
-24	Over current
-25	No fuel pump connected/found
-26	Wrong fuelpump connected
-27	Fuelpump communication error
-28	Out of fuel shut down (only on engines with fuel sensor, like RXi types)
-29	Low Rpm shutdown, possibly due to Pump failure
-30	Low Rpm shutdown, possibly due to frontboard failure
-31	Clutch fail (starter motor clutch is not decoupling)
-32	ECU reboot due to re-matching of new engine connected
-40	(-**4** …-32) once for 2 seconds, e.g. for sum alarm

2.6.2 S.Port ID

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

A change can be made via the settings of the ECU converter (see chapter 2.6.3) or with the FrSky DASHBOARD.

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 Telemetry port 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 be connected to the powered JetCat ECU or with the Programming adapter

2.6.3 Setup

For the FrSKY system a variety of settings in VSpeak ECU converter using the Programming adapter + JetCat GSU can be made.

In the overview the complete menu structure for all possible range of settings is shown.

The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons - Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values.

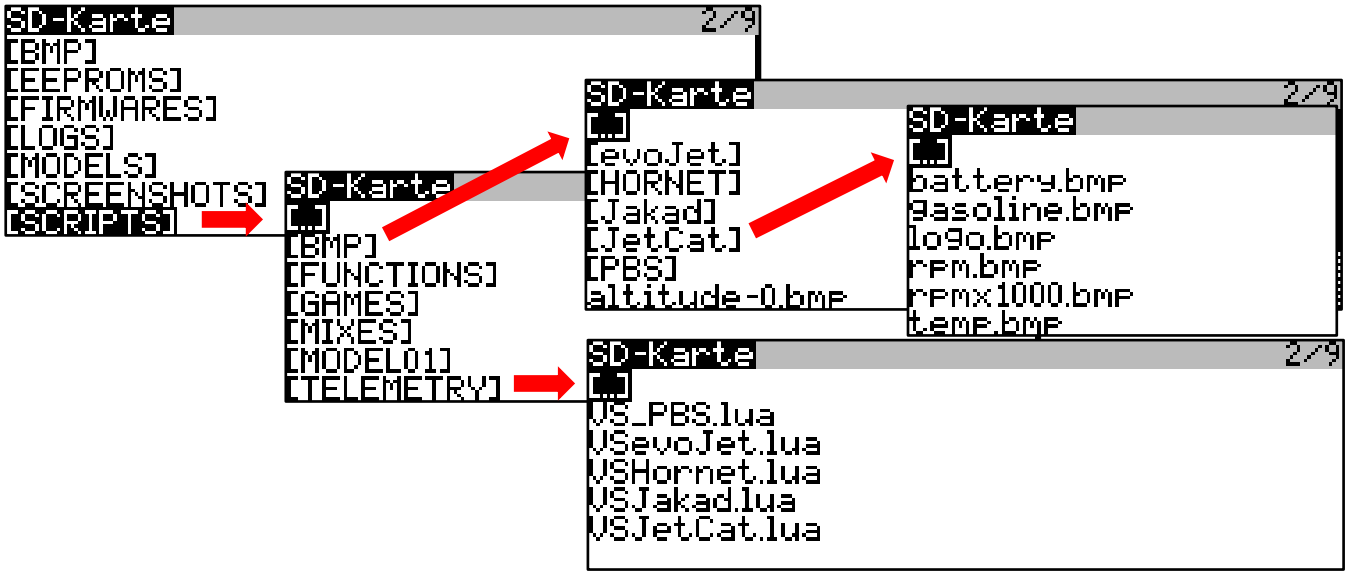
Telemetry System :FrSKY			
Physical ID :28	1 . . . 28	Set: 28	(s. section 2.6.2)
Group Number : 1	1 . . . 16	Set: 1	(s. section 2.6.2)
Sensor RPM :Turbine	Turbine / 2Shaft	Set: Turbine	
Sensor Airspeed :transmit as kts	OFF / kts / kmh	Set: kts	

The parameter "Sensor Airspeed" is used to set how the speed value is to be transmitted via S.Port telemetry. The value supplied by the JetCat ECU in kmh must be transmitted as kts so that the speed value is displayed correctly in kmh in the taranis. The speed transmission can be deactivated with the VSpeak ECU converter - e.g. if a FrSKY speed sensor has been installed in the model.

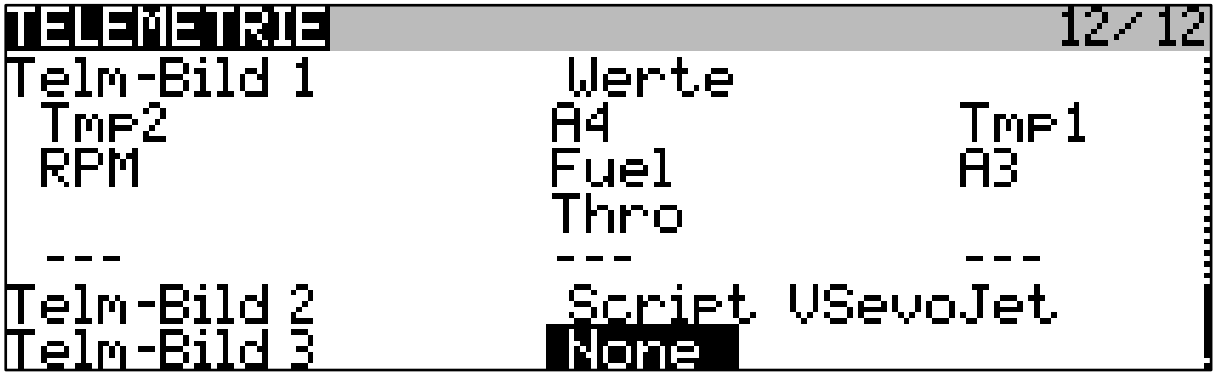
2.6.4 LUA script for Taranis

(X9D und X9E)

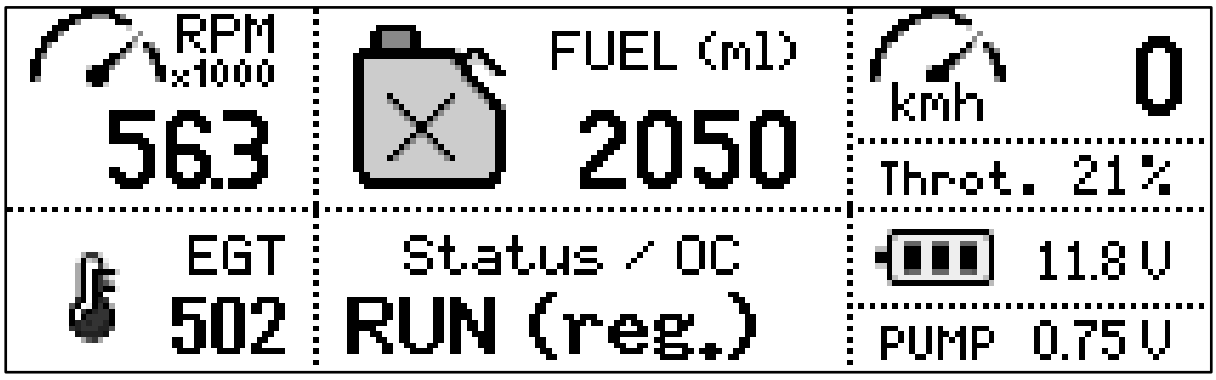
On the website of VSpeak you can download the packed file VS_Taranis_LUA.zip for free. After unpacking, the folder "SCRIPTS" can be copied completely to the SD card of the Taranis so that the SD card has the following directory structure:



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



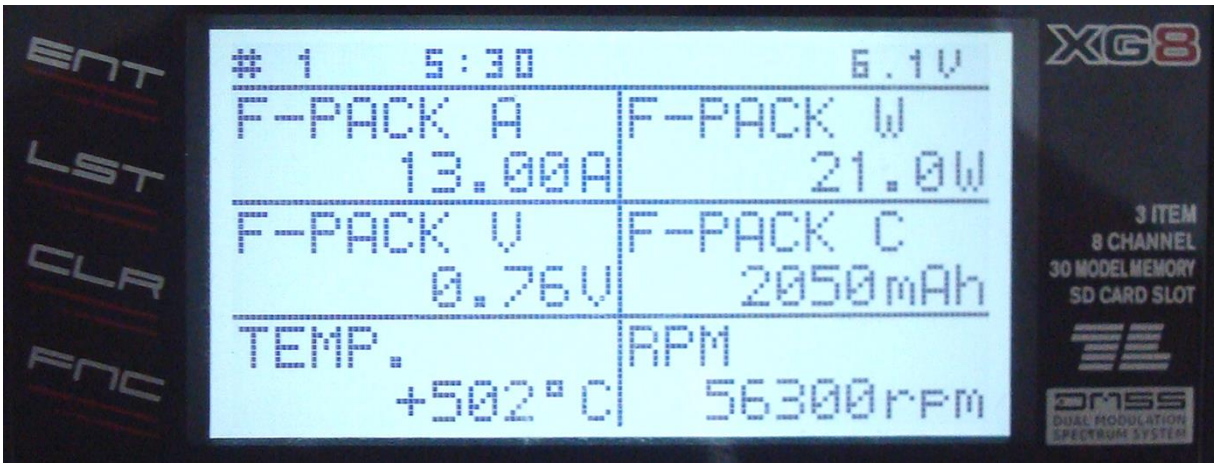
… so that the telemetry data of the VSpeak ECU converter can be displayed clearly with the corresponding status messages:



2.7 JR PROPO

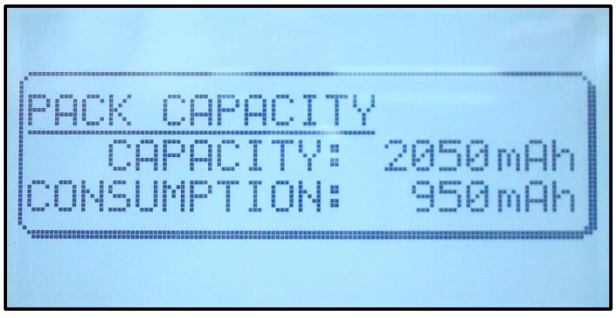
The JR telemetry data system is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the JetCat ECU is not possible with this system.

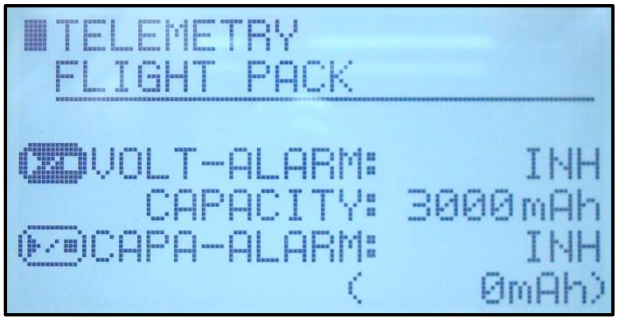
The displays are described below using the example of an XG8.



JR Display (Ex. XG8)	**JetCat**	
F- PACK	ON /OFF	
F-PACK A	ECU- Status as numerical current value	(s. section 2.7.1)
F-PACK W	Throttle (%) or Fuel-Flow (ml/min)	(s. section 2.7.2)
F-PACK V	PumpVoltage or Battery	(s. section 2.7.2)
F-PACK C	FUEL (remaining fuel) in ml	
TEMP.	EGT	
RPM	OFF / Turbine oder 2nd Shaft	(s. section 2.7.2)
A-SPEED	OFF / ON	

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.

t werden, hier im Beispiel hat der Haupttank 3000ml Volumen, die als Kapazität 3000mAh eingestellt sind.

2.7.1 Turbinestatus – numerical "Current"-Values

The turbines status messages are displayed as numerical "Current" values. The assignment is given in the following table:

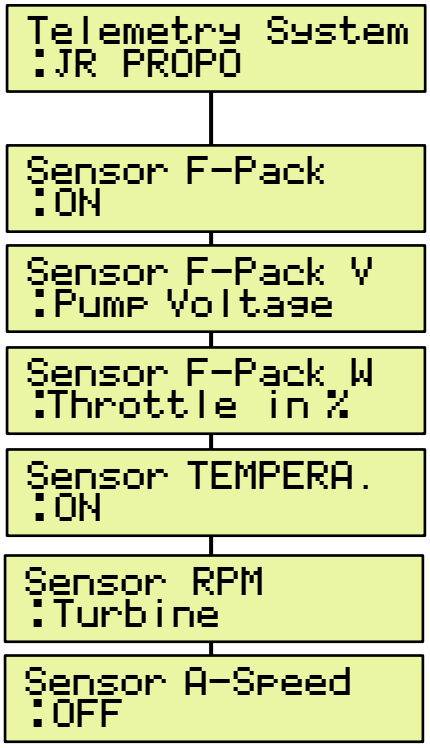
JR PROPO F-AKKU A	Description
0.00 A	OFF
1.00 A	Slow Down
2.00 A	AutoOff
3.00 A	WAIT for RPM (Stby/Start)
4.00 A	PreHeat1 (only for direct Kerosene startup mode)
5.00 A	PreHeat2 (only for direct Kerosene startup mode)
6.00 A	Ignite
7.00 A	Accleleration delay
8.00 A	MainFStrt (only for direct Kerosene startup mode)
9.00 A	Keros.FullOn (only for direct Kerosene startup mode)
10.00 A	Accelerate
11.00 A	Stabilise
12.00 A	Learn LO
13.00 A	Run (reg.)
14.00 A	SpeedReg (Speed Ctrl)
15.00 A	Two-Shaft-Regulate (only for turbines with secondary shaft)
100.0 A	all turbine shutdowns, except: - RC-Off - Auto-Off - Manual-Off
111.0 A	like 100.0A, but only once for 2 seconds, e.g. for sum alarm

If in the transmitter an alarm thresold for the current of e.g. more than 105.0A is set, all turbine shutdowns except for "RC-Off", "Auto-Off" and "Manual -Off" are signaled as a current alarm for a period of 2 seconds.

2.7.2 Setup

For the JR PROPO system a variety of settings in VSpeak ECU converter using the Programming adapter + JetCat GSU can be made.

In the overview the complete menu structure for all possible range of settings is shown.
The navigation takes place in the usual way, ie "scroll" between the parameters with the +/- buttons - Value change with the pushed "Change Value / Item" button and added +/- buttons, then instead of the ":" a small arrow shows the changed values..



ON / OFF	Set: ON
Pump Voltage / Battery	Set: Pump Voltage
Throttle / FuelFlow	Set: Throttle
ON / OFF	Set: ON
OFF, Turbine, 2Shaft	Set: Turbine
ON / OFF	Set: OFF

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

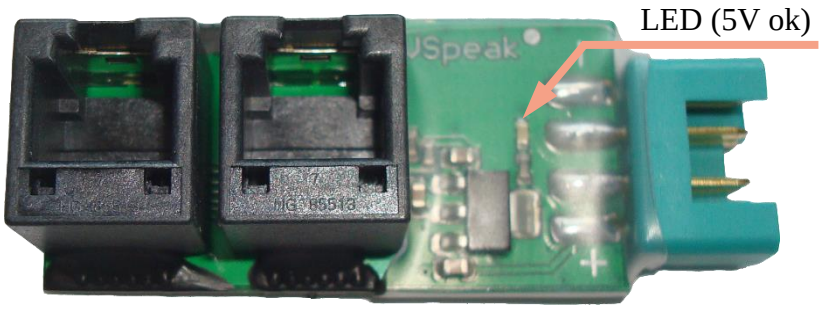
4.1 Telemetry patch cable

A 3-pin servo patch cable is included in the delivery for connecting the ECU converter telemetry port to the telemetry input of the respective receiver.

4.2 Data patch cable

A 6-pin patch cable is included in the delivery for connecting the ECU converter data port to the JetCat ECU (or IO-Port) or with the Programming adapter.

4.3 Programming adapter



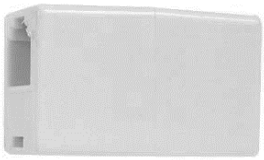
The VSpeak ECU converter can be programmed using the Programming adapter and the JetCat GSU (setting the remote control system, alarm thresholds, etc.).
The Programming adapter is the power supply of the GSU and the VSpeak converter from a 2-3 cell LiPo / LiFe / LiIo battery (for example receiver or turbine battery).
The LED indicates that 5V supply voltage is available for the GSU and converter.
The programming adapter is **NOT included in the scope of delivery**, as it is not required for the systems Jeti and HoTT.

4.4 Micro SD card

For the installation of updates, a Micro-SD card is needed. The Micro SD card is **NOT included in the scope of delivery**
You can obtain a matching card at www.vspeak-modell.de.

4.5 Western cable connector

Western cable connector available at www.reichelt.de: WB 2X6-6



4.6 Y Western cable connector

VSpeak ECU Converter and JetCat GSU can be operated "parallel". For this, a "Y-Western socket" is available at www.reichelt.de: WB 3X6-6

5 Instructions for disposal

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

6 Technical data

Power supply (Data port)	3,5 … max. 15V from JetCat ECU or Programming adapter (~20 mA at 5,0V)
Telemetry port	3,5 … max. 12V (~9mA at 5,0V)
Dimensions	60 x 17 x 17 mm
Weight	~9 g (without connection cables)

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 aparatus - 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, 2017/03/01

.....

Signature
Volker Weigt
Managing Director

8 Version history

Vers.	Date	Comment
1.0	03.2017	first retail version

9 Contact

Volker Weigt

www.VSpeak-Modell.de
mail: **volker.weigt@vspeak-modell.de**