duplex«

2.4EX
extended serie

Receivers

1 Introduction

ENGLISH
FW. ver. 3.10

Jeti **DUPLEX Receivers** are designated for use with the **DC/DS transmitters** or the **JETI transmitter modules** in the 2,4 GHz frequency band. **DUPLEX receivers** are offered in a wide range of size and features to suit the numerous demands of our customers. The DUPLEX receivers range from the tiny **DUPLEX R4-R7 receivers** for small and medium model sizes to the **R8-R12 receivers** for larger models. Last but not least, the **R14 and R18 receivers** are available for giant or really complex models. The receiver selection can be expanded through the use of auxiliary receivers (**RSat 2** outside the *US or Duplex EX R5-R11 in the US and Canada*) to increase safety and peace of mind.

The legacy DUPLEX system was designed to give maximum dependability, a property which has proven itself through many successful years of use. Based on user input, the system is continuously improved. Thanks to online updates the improvements are easily accessible to users from any part of the world. From the very beginning bidirectional transmission has been a distinctive feature of the DUPLEX system, this not only handles telemetry data, but it also help to ensure secure primarily transmission safety between the transmitter and receiver.

The **DUPLEX EX telemetry** system uses an open protocol. This gives the advantage of compatibility with a large number of telemetry sensors from both JETI Model and third party producers. For the display of telemetry data you can use purposely designed equipment like the **JETIBOX profi** and **DC/DS transmitters** or you can display the data **onPCs** with the free **Flight Monitor** program.

Although our development of the **DUPLEX system** seems to be very fast, we make the extra effort to keep backward compatibility with earlier DUPLEX versions. By design, users are not forced to continually buy new equipment to take advantage of the latest improvements.

The JETI Model company portfolio contains a diverse offering of electronic modelling equipment like voltage regulators, motor speed controllers, telemetry data display equipment, telemetry sensors and, last but not least, DC/DS transmitters. The JETI Model product manfacturing policy is to constantly produce the highest quality product possible.

2 Technical data

2.1 Technical data receivers outside the U.S. *part 1*

Basic Data	R4	R4C (R4C mini)	R5 (R5 indoor)	R5L (R5L indoor)	R6 (R6 EPC*)	R7 (R7 indoor)	R8 (R8 EPC*)
Dimensions [mm]	35x 20x7	30x23x13	44x20x7	47x20x7	45x24x12	44x20x7	50x30x12
Weight [g]	4,8	8 (7)	5,2 (4,8)	5,4 (5)	11 (14)	5,5	15 (18)
Antenna Length [mm]	2x100	1x200 (internal)	2x100 (2x45)	2x100 (2x45)	2x100	2x100 (2x45)	2x200
# of Channel Outputs	4	4	5	5	6	7	8
Temperature Range [°C]	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage [V]	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4
Average Current [mA]	40	40	40	30	45	40	30
Real Time Transmission of Telemetric Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Programming	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX
Support Satellite Receiver Rsat	no	no	no	no	no	no	no
Power Output [dBm]	6	6	6	15	15	6	15
Receiver Sensitivity [dBm]	-98	-98	-98	-106	-106	-98	-106

* **E**xternal **P**ower **C**onnector

2.1 Technical data receivers outside the U.S. *part 2*

Basic Data	R9	R10	R11 EPC*	R12 EPC*	R14*	R18*	Rsat2 (RMK2)
Dimensions [mm]	51x24x11	50x28x13	51x24x11	50x28x13	62x38x16	62x38x16	35x23x6
Weight [g]	13	17	15	22	30	30	12
Antenna Length [mm]	2x200	2x200	2x200	2x400	2x400	2x400	2x200 (2x75, 2x150)
# of Channel Outputs	9	10	11	12	14	18	PPM 8/16
Temperature Range [°C]	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage [V]	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4
Average Current [mA]	30	30	30	30	40	40	30
Real Time Transmission of Telemetric Data	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Programming	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX	JETIBOX
Support Satellite Receiver Rsat	Yes	Yes	Yes	Yes	Yes	Yes	-
Power Output [dBm]	15	15	15	15	15	15	15
Receiver Sensitivity [dBm]	-106	-106	-106	-106	-106	-106	-106

* **E**xternal **P**ower **C**onnector

2.2 Technical data receivers for the U.S. *part 1*

Basic Data	R4L (R4L indoor)	R5L (R5L indoor)	R6L (R6L indoor)	R7plus
Dimensions [mm]	38x20x7	47x20x7	43x24x11	51x24x11
Weight [g]	4,8 (4,5)	5,4 (5)	13	13
Antenna Length [mm]	2x100 (2x45)	2x100 (2x45)	2x200 (2x50)	2x200
# of Channel Outputs	5	5	6	7
Temperature Range [°C]	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage [V]	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4
Average Current [mA]	40	30	30	30
Real Time Transmission of Telemetric Data	No	Yes	Yes	Yes
Programming	Tx	JETIBOX	JETIBOX	JETIBOX
Support Satellite Receiver Rsat	no	no	no	Yes
Support PPM/EX bus	Yes	Yes	Yes	Yes
Power Output [dBm]	15	15	15	15
Receiver Sensitivity [dBm]	-98	-106	-106	-106

* **E**xternal **P**ower **C**onnector

2.2 Technical data receivers for the U.S. *part 2*

Basic Data	R9	R11 EPC*	R14*	R18*
Dimensions [mm]	51x24x11	51x24x11	62x38x16	62x38x16
Weight [g]	13	15	30	30
Antenna Length [mm]	2x200	2x200	2x400	2x400
# of Channel Outputs	9	11	14	18
Temperature Range [°C]	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply Voltage [V]	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4	3.2 – 8.4
Average Current [mA]	30	30	40	40
Real Time Transmission of Telemetric Data	Yes	Yes	Yes	Yes
Programming	JETIBOX	JETIBOX	JETIBOX	JETIBOX
Support Satellite Receiver Rsat	Yes	Yes	Yes	Yes
Support PPM/EX bus	Yes	Yes	Yes	Yes
Power Output [dBm]	15	15	15	15
Receiver Sensitivity [dBm]	-106	-106	-106	-106

* **E**xternal **P**ower **C**onnector

3 Overview

3.1 Voltage Supply

When designing the on-board wiring for you project always pay attention to the voltageinput range of your receivers and servos.

You can supply voltage to DUPLEX receivers as follows:

- *Directly from the batteries*
- *Via a BEC voltage regulator (either contained in speed controllers or self contained)*

The supply may be connected to DUPLEX receivers via:

- *the throttle channel (when applying speed controllers with BEC)*
- *a free receiver output.* **Do not use the „EXT" input for connecting the voltage supply!**
- *an Y-cable to any arbitrary receiver output (other than the „EXT")*
- *the* **MPX connector** *for receivers with the* **EPC label** *or the* **R14** *and* **R18 receivers** *which are equipped with a power supply connector*

3.2 Operation

We recommend that you switch-on the transmitter first and then subsequently the receiver. The transmitter confirms the switching-on of the receiver with an acoustic signal. When switching-off the system we recommend that you switch-off the receiver first and then subsequently proceed with switching-off the transmitter.

3.3 Binding

When using a new receiver or transmitter it is necessary to carry out the binding process between them . Transmission between the receiver and transmitter occurs in fully digital manner, therefore it is necessary to identify and share the addresses of each device communicating on the mutual 2.4GHz frequency band.

Procedure:

1. *Insert the **BIND PLUG** (included in the receiver packing) into the receiver socket labeled EXT.*

2. ***Switch-on the receiver** – (connect a proper voltage supply to the receiver). Binding of the receiver may now be performed within 60 seconds. After the 60 seconds elapse the receiver returns to setup mode and the binding process must be repeated by starting again from step 1.*

3. ***Switch-on the transmitter** - the transmitter emits an acoustic signal announcing detection of a new receiver.*

Binding may be caried out with the aid of the JETIBOX instead of using the BIND PLUG.

The procedure is as follows:

1. ***Connect the JETIBOX** with the connecting cable to the receiver output EXT.*

2. ***Switch-on the receiver** - (connect a proper voltage supply to the receiver).*

3. *The receiver menu appears on the JETIBOX display. **Select the „Pairing" menu item** (push the right arrow button once from the main receiver display) and then push the upward button. You now have a period of 60 seconds to bind the receiver. After the 60*

*seconds elapse the receiver returns to setup mode and the binding
process must be repeated by starting again from step 3.*

If the bind proces between receiver and transmitter was unsuccessful, try again.

You may bind an arbitrary number of receivers to one transmitter.
The receiver, however, can only be bound to one transmitter, i. e. the
receiver is only bound to the most recently bound transmitter.

Attention, change after FW version update 3.10!
As long as the **BIND PLUG** is inserted into input EXT, the receiver
will always be in **"Normal"** mode regardless of your actual receiver
setup. After **BIND PLUG** is removed, the receiver will return to the
your selected setup mode.

4 Real Time Telemetry

Every receiver is able to transmit the actual voltage supplied to the on-board system (i. e. receiver voltage) without the need to connect any additional external sensors. If you want to take advantage of extended telemetry, connect a telemetry sensor to the EXT input of the receiver. If you are want to operate several telemetry sensors simultaneously with one receiver you must use one or more of the **Expander EX** devices, which , when connected to the **EXT receiver** input, gives you multiple inputs for telemetry sensors.

There are two ways to use Jeti telemetry. The **EX telemetry** is available to owners of **JETI DC/DS transmitters** or the **JETIBOX profi**. The **1st Generation Telemetry** can be used by owners of the **TU, TG, TF** etc. transmitter modules.

4.1 EX Telemetry

This telemetry data is displayed according to user selections in the DC/DS transmitters and the Jetibox profi. You will find more details in actual instruction manuals of the given **Duplex EX** equipment.

4.2 - 1st Generation

Connect the JETIBOX to the transmitter module. Switch on the transmitter and then connect the receiver voltage supply *(see chapter „Voltage supply")*. The Tx heading appears in the JETIBOX display and by pressing the push-button R (right button) twice select the Mx menu. By pressing the push-button D (down) you will enter the telemetry sensor or expander menu. You may leave the telemetry sensor menu by pressing the push-button U(up) slightly longer.

5 Receiver setup

5.1 Receiver Setup via the JETIBOX

There are two receiver setup modes. The first is receiver setup via the JETIBOX, JETIBOX Profi or JETIBOX emulation in the DC/DS transmitters, the second is one is direct setup of the receiver with a DC/DS transmitter.

5.1.1 Direct connection between a JETIBOX and the Receiver.

Insert one end of the connection cable (included with the JETIBOX) into the socket labeled Impuls **+ -** (see the right side of the JETIBOX) and the other end into the reveiver socket labelled EXT. Connect a voltage supply to the receiver (see Voltage supply) or to the supply socket of the JETIBOX. There is no need to supply voltage when using the JETIBOX Profi.

5.1.2 Wireless Connection between a JETIBOX with Transmitter or DC/DS transmitter and the Receiver.

In this case, connect the JETIBOX with the transmitter (if you are using a DC/DS transmitter, then select the JETIBOX emulation). Switch-on the Transmitter and then connect the receiver voltage supply. The Tx heading appears on the display along with right and down arrows. In order to enter the receiver press the **R button** (right), The Rx heading appears on the display and by subsequently pressing the **D button** (down) you will enter the receiver menu, which will be displayed just the same as the direct connection

mode (*see point 4.1.1*). Wireless connection is only possible when a receiver is in *"Normal"* mode (*MeasureOrSetting->Main Setting ->Rx mode: Normal*).

The JETIBOX can be disconnected only after you disconnect the receiver voltage supply. You may monitor the on board state of your receiver during your model's operation.   Pay particular attention, of course, to your setup work. While it is possible, we do not recommend changing setup parameters during model operation. Set-up work should be only done if there is no danger of damaging the model or injuring persons. For safety reasons prevent motor activation or remove the propeller!

5.2. Receiver Set-up via the Transmitter DC/DS

Please see information concerning receiver set-up via transmitters in the DC/DS transmitter instruction manual. You can find the DC/DS instructions on the manufacturer's website.

6 Receiver Menu

6.1 Overview of Receiver Data Items

The introductory display shows the type of receiver. By pushing of
key R (arrow down) more detailed data of receiver
and transmitter can be cued.

Pairing- by pushing the key U (arrow up) pairing of the receiver
with the transmitter will be executed. Pairing of the
receiver should only be carried out when the JETIBOX is directly
connected to the receiver.

RX/TX- Item RX shows the unic production number of the receiver.
Item TX shows the unic production number of the
transmitter, to which the receiver has eventually been paired.

Rx Diag- Item A1 or A2 shows which antenna the receiver is using at
present. Item Kx informs about the number of
transferred channels (this number depends of the transmitter
abilities).

By means of **key D (arrow down)** you arrive at the line of basic
mode selections, where you may select read out of
measured values **(Measure)** or setup of the receiver **(Main setting,
Channel set, Out Pin Set, Auto Set)**.

6.2 Measure

Measure: enables read out of measured data of the maximum, minimum and actual receiver voltage.

Volt Min / Act / Max - the receiver is checking the supply voltage and indicates limit values and extremes which
occurred during operation; at the same time it also shows the actual receiver voltage. Without switching on the paired
transmitter the values MAX and MIN will not change, only the value of the actual voltage ACT will be updated. In order
to delete values MAX and MIN, keys L (arrow left) and R (arrow right) must be pressed simultaneously.

6.3 Main Setting

Fail Safe - switches the Fail Safe function on and off. If the Fail Safe function is disabled, there are no signals generated on receiver outputs in case of signal loss. If the Fail Safe function is activated, the receiver outputs are generated according your your individual channel setup selections in case of signal loss. ("out off", "hold"" fail safe")

Signal Fault Delay - the time interval, from when the receiver detects signal loss to when the fail safe control throws are initiated. After the expiration of this time, the receiver outputs will transition to your selected individual channel outputs.

Volt ACT/ALARM: the first item displays the actual receiver supply

voltage, the second value represents the setup threshold level for alarm purposes. During operation, as soon as the actual voltage becomes lower than the threshold level, the transmitter emits an acoustical warning tone.

This setup is for transmitter modules only. For DC/DS transmitters, this alarm is set in the transmitter.

Output Period: output signal period setup (initial setup for the Autosynchronizing mode with the transmitter). This parameter is fundamentally influencing servo behaviour. With lower output period values the reactions (response) of analog servos becomes faster, but current consumption increases. With a too low setup value some servos may even start chattering.

Output mode - setup for receiver output mode.

Servo - initial setup (except Rsat2 receivers); standard servo signals are generated by the receiver outputs

PPM pos.*- setup of the standard form of PPM signal generation with positive logic at PPM outputs (see the table of receiver output assignments). The bus idle state is log. 0. All remaining receiver outputs with exeption of the PPM output (see table of receiver output assignments) will be disabled (there will be no servo signal generated at the remaining outputs).

PPM neg.*- setup of the standard form of PPM signal generation with negative logic at PPM outputs (see the table of receiver output assignments). The bus idle state is log.1. All remaining receiver outputs with exeption of the PPM output (see table of receiver

output assignments) will be disabled (there will be no servo signal generated at the remaining outputs).

The receiver may be set-up in such a way, that its output will work in digital communication form, which will be used as input by other equipment.

*EX bus** - in this setup information about servo throws will be generated in EX protocol format. EX protocol represents a bidirectional digital communication, which transmits throw and telemetry information with configuration possibilities of equipment connected to this bus, for instance, by a DC/DS transmitter. This interface is physically accessible at the receiver output labeled „EXT". When setting up the alternative "EX bus", all receiver outputs with exeption of output „EXT" will be disabled (there will be no servo signal generated on them). This configuration type is used, for instance, when receivers are connected for example Central Box.

Setup valid for DUPLEX Rsat 2 receivers or US version receivers.

OutputChannelCnt - setup of generated number of receiver outputs. If the receiver receives less channels than selected in setup, the remaining channels will be replaced by a throw specified by the Fail Safe value for individual channels. Otherwise, the number of output pulses will be reduced to the setup number.

Rx mode - the working mode of the receiver. Possible choices:

Normal - bidirectional communication between receiver and

transmitter. Select this setup for the model's main receiver. Use the same setup if you use only one receiver in your model (if you are using only one DUPLEX receiver for remote control).

Clone - unidirectional communication. If you are using several DUPLEX receivers in the model, for instance, in connection with one redundant transmitter module then you should operate one of the receivers in „Normal" mode and the others in „clone" mode. The receiver operating in „Normal" mode is considered to be the main receiver. One of the transmitter modules is able to control only one receiver in „Normal" mode. If you want to operate several receivers with only one transmitter module, you should operate them in „clone" mode.

Bind process in „clone" mode (Attention, change since FW version 3.10!):
1. Switch the receiver to **„clone"** mode *(MeasureOrSetting->Main Setting->RX mode:„clone")*.
2. Switch-off the receiver and insert a bind plug into the EXT socket.
3. Switch-on receiver and transmitter. The transmitter announces by an acoustic signal detection of a new receiver. Remove the bind plug.

Telemetry* - unidirectional communication is usable exclusively for telemetry transmission, for instance, with the US version of the JETIBOX profi

This setup change requires a longer pressing (press and hold) of the left or right push button. The receiver mode change is only accessible via

If you switch the receiver to **„clone"** or **„Telemetry"** modes, further wireless setup communication becomes impossible, because the receiver is now communicating only unidirectionally. In order to change the mode or setup you have to connect the JETIBOX to the receiver and make the desired change or switch the receiver to back to „Normal" mode:

1. Insert BIND PLUG into the receiver socket labeled EXT.
2. Switch-on receiver
3. Switch-on transmitter;
4. Execute the desired setup changes, see „Receiver setup"

* Setup valid only for US version receivers.

6.4 Out Pin Set

Setup of the physical receiver outputs.

Set Output pin - selection of output, which goes for the following set-up. The menu item shows, as a decimal number, the throw of the selected output. Receiver output 1 is labeled as Y1.

For the **R9, R10, R11EPC, R12EPC, R14** and **R18** receivers, some of the outputs may be assigned (see the table of receiver output assignments) to alternative functions. Description of alternative functions:

- standard servo output: assigned to the output is the throw of an actual channel, which uses the standard servo output form and is

labelled CH xx.

- PPM off: for the given output there is no PPM signal generated or received

- PPM input: for the given input there a PPM signal is expected from the connected receiver

- PPM output: the receiver channel will generate a PPM signal

PPM error code- in the case that one of the SAT1/2 outputs is set to PPM input mode, an acoustic signal can be setup to announce when this connected signal is missing. By loading a character from the Morse alphabet you may set-up tones, which will acoustically announce the absence of a PPM signal at the given receiver output. This acoustical signal is generated by the transmitter module. In the factory default setup the acoustical signal is switched off.

SetInChannel - assignment of an actual output (labelled as Yx)or input channel (labelled as Chx)

Output Trim - neutral throw setup for receiver output.

Gain A - amplification of the output throw in the negative half-plain A (from -150 to 0%)

Gain B - amplification of the output throw in the positive half-plain B (from 0% to 150%)

Signal Fault - setup of the receiver behaviour in case of signal loss, „hold"- holds the most recent control throw, „out off" – output switch-off(no signal generated),„failSafe" – moves to preset throws for the individual outputs.

FS position: throw setup of selected FailSafe output position in case of signal loss

FS speed: sets how quickly the throws move to the FailSafe positions in case of signal loss

Output Group - setup of given output into a selected group of output pulses, which will be simultaneously generated by the receiver.

Assignment table of receiver outputs:

	R4, R4C	R5, R5 indoor	R6, R6 EPC	R6F, R6G	R7, R7 indoor	R8,R8 EPC	R9	R10	R11 EPC	R12 EPC	R14	R18	R sat2
Y1	•	•	•	•	•	•	•	•	•	•	•	•	
Y2	•	•	•	•	•	•	•	•	•	•	•	•	
Y3	•	•	•	•	•	•	•	•	•	•	•	•	
Y4	•	•	•	•	•	•	•	•	•	•	•	•	
Y5		•	•	•	•	•	•	•	•	•	•	•	
Y6			•	•	•	•	•	•	•	•	•	•	
Y7				•	•	•	•	•	•	•	•	•	
Y8						•	•	•	•	•	•	•	
Y9							•	•	•	•	•	•	
Y10								•	•	•	•	•	
Y11									•/°	•	•	•	
Y12										•/°/*	•	•	
Y13											•	•	
Y14											•	•	
Y15												•	
Y16												•	
Y17												•/°/*	
Y18												•/°	
SAT1							°	°			°		
SAT2								°/*			°/*		
PPM													*

* - PPM input, ° - PPM output, • - servo

Assignment table of US version receiver outputs

	R4L, R4Li	R5L, R5Li	R6L, R6Li	R7 plus	R9	R11 EPC	R14	R18
Y1	•	•	•/*	•/*	•/*	•/*	•	•
Y2	•	•	•	•	•	•	•	•
Y3	•	•	•	•	•	•	•	•
Y4	•	•/*	•	•	•	•	•	•
Y5		•/*	•	•	•	•	•	•
Y6			•/*	•	•	•	•	•
Y7				•	•	•	•	•
Y8					•/*	•/*	•	•
Y9					•	•	•	•
Y10						•	•	•
Y11						•/°	•	•
Y12							•	•
Y13							•	•
Y14							•	•
Y15								•
Y16								•
Y17								•/°/*
Y18								•/°
SAT1							°	
SAT2							°/*	

* - PPM input, ° - PPM output, • - servo

6.5 Auto Set

Loads a default receiver configuration from preset modes
Factory defaults -factory default receiver setup.

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7 Receiver Update

Beginning with version DUPLEX EX, receivers can be updated via
PC with aid of the JETI USB adapter. You may find a detailed
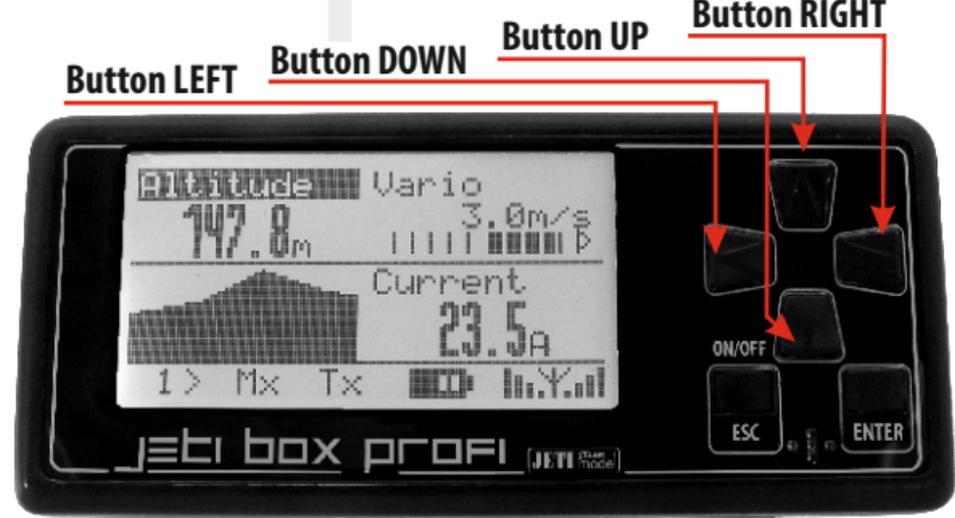description of the receiver update process in the USB adapter
instruction manual.

USB adapter

JETI BOX mini
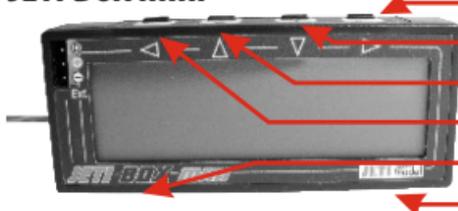
Button right
Button down
Button up
Button left
Button for switching input Ext./Tx
Button backlight
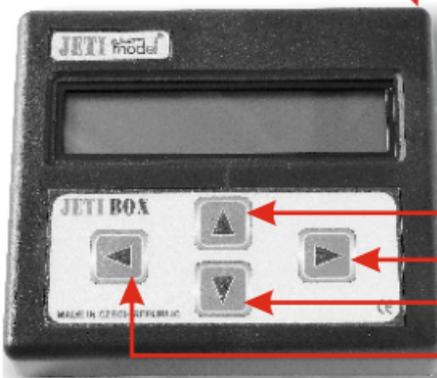
Button UP **U**
Button RIGHT **R**
Button DOWN **D**
Button LEFT **L**

JETI BOX

Button LEFT   Button DOWN   Button UP   Button RIGHT

Altitude   Vario
147.8m   3.0m/s

Current
23.5A

1> Mx Tx

ON/OFF

ESC   ENTER

jeti box profi

JETI BOX profi

ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

For receivers we grant a warranty of 24 months from the day of purchase under the assumption that they have been operated in conformity with these instructions at recommended voltages and that they were not damaged mechanically. Warranty and post warranty service is provided by the manufacturer.

We wish you sucessful flying with the products of:
JETI model s.r.o. Příbor, www.jetimodel.com

ENGLISH

Information on Disposal for Users of Waste Electrical & Electronic Equipment (private households)

This symbol on the products and/or accompanying documents means that used electrical and electronic products should not be mixed with general household waste.

For proper treatment, recovery and recycling, please take these products to designated collection points, where they will be accepted on a free of charge basis. Alternatively, in some countries you may be able to return your products to your local retailer upon the purchase of an equivalent new product.

Disposing of this product correctly will help to save valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling. Please contact your local authority for further details of your nearest designated collection point.

Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

For business users in the European Union

If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Information on Disposal in other Countries outside the European Union

This symbol is only valid in the European Union.

If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.