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Certification Exhibit

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User Manual

COMPLEX RADIO CONTROL SYSTEM

duplex

24EX

EN User Manual

Receivers REX

FW 1.00

JETI  model

ENGLISH

1. Introduction	03
2. Technical data	04
3. Installation	05
3.1 Voltage Supply	05
3.2 Operation	05
3.3 Binding	06
4. Real Time Telemetry	08
4.1 EXTelemetry	08
4.2 - 1st Generation	08
5. Receiver setup	09
5.1 Receiver Setup via the JETIBOX	09
5.1.1 Direct connection between a JETIBOX and the receiver	09

5.1.2 Wireless connection between a JETIBOX with

transmitter or DC/DS transmitter and the receiver 09

5.2. Receiver set-up via the DC/DS transmitter 10

6. Receiver Menu 11

6.1 Overview of receiver data items 11

6.2 Measure 11

6.3 Main setting 12

6.4 Out pin set 15

6.5 Auto set 18

7. Receiver update 19

8. Examples of Rx setup 20



REX Receivers

1 Introduction

ENGLISH
FW. ver. 1.00

JETI **Duplex receivers** are designated for use with the **DC/DS transmitters** or the **JETI transmitter modules** in the 2.4 GHz frequency band.

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 helps 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 **on PCs**.

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 manufacturing policy is to constantly produce the highest quality product possible.

2 Technical data

Basic Data	REX6	REX7	REX10	REX12*
Dimensions [mm]	38x25x11	42x28x11	51x28x11	51x28x11
Weight [g]	11	13	16	24
Antenna length [mm]	2x100	2x200	2x200	2x400
# of channel outputs	6	7	10	12
Temperature range [°C]	-10 to +85	-10 to +85	-10 to +85	-10 to +85
Supply voltage [V]	3.5 – 8.4	3.5 – 8.4	3.5 – 8.4	3.5 – 8.4
Average current [mA]	75	75	75	75
Real time transmission of telemetry data	Yes	Yes	Yes	Yes
Programming	JETIBOX	JETIBOX	JETIBOX	JETIBOX
Support satellite receiver Rsat	Yes	Yes	Yes	Yes
Power output [dBm]	15	15	15	15
Receiver sensitivity [dBm]	-106	-106	-106	-106

* External Power Connector

3 Installation

3.1 Voltage supply

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

You can connect supply voltage to the 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 the Duplex receivers via:

- *the throttle channel (when applying speed controllers with BEC)*
- *a free receiver output.*
- *a **Y-cable** to any arbitrary receiver output*
- *the **MPX connector** for receivers with the **EPC label** 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 the detection of a new receiver.

Binding may be carried 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 Ext. receiver output.
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 binding process 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.

As long as the **BIND PLUG** is inserted into Ext. input, the receiver is always in „**Normal**“ mode, regardless your actual receiver setup. After **BIND PLUG** is removed, the receiver returns to 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 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 the **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 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 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 receiver 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 enter the receiver menu, which will be displayed just the same as the direct connection mode (*see*

paragraph 5.1.1). Wireless connection is only possible when a receiver is in **“Normal”** mode (**MeasureOrSetting->Main Setting ->Rxmode: 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. If it is possible, we do not recommend changing setup parameters during model operation. Set-up work should only be done if there is no danger of damaging the model or injuring people. For safety reasons prevent motor activation or remove the propeller!

5.2 Receiver set-up via the DC/DS transmitter

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 receiver type. By pushing the R key (arrow down) more detailed data of receiver and transmitter can be displayed.

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

RX/TX- RX item shows the unique production number of the receiver. The TX item shows the unique production number of the transmitter, to which the receiver has eventually been paired.

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

By means of the **D key (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, 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 the 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 MAX and MIN values, keys L (arrow left) and R (arrow right) must be pressed simultaneously.

RX Signal Level - strength of radio signal from Tx to Rx.

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 to 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 transfer 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 the 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 become faster, but current consumption increases. With a too low setup value some servos may even start chattering.

PPM-UDIMode - data conversion mode can be:

Direct

- output PPM signal contains data directly from the transmitter, without conversions and channel mapping
- conversions and possible channel mapping are applied to output servo impulses only
- different channels might be assigned to the PPM signal and servo output pins

Computed

- conversions and prospective mappings are applied to output servo impulses and also to PPM signal
- servo impulses and PPM signal contain the same information

OutputChannelCnt - setup of generated number of receiver outputs in PPM. If the receiver receives less channels than selected in setup, the remaining channels (in Computed mode) 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 (in case you are using only one Duplex receiver for remote control)

Clone

- unidirectional communication
- if you use several Duplex receivers in the model, for instance in connection with one 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

If you switch the receiver to „**clone**“ mode, 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 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“

6.4 Out pin set

Setup of the physical receiver outputs.

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

Pin Config - receiver pin config can be:

Servo

- standard impulse output for servos
(-100% = 1ms, 0% = 1,5ms / +100% = 2ms)

Digital

- the output pin is in a stable LOW condition (log. 0) if the position of this channel is negative, otherwise this pin is in HIGH condition (log. 1)
- ensure that pin is used only as logical output, don't draw the current above 1mA

Input

- here the pin is configured as an input and its condition (disconnected/connected to the ground) is sent to the transmitter as other telemetry data from the sensors
- it is allowed to keep the pin disconnected or connected to the common ground of the receiver
- it is not allowed to connect to a different voltage. The pin works exclusively in PullUp mode so all you need to test the function is to connect the signal pin to the ground.

PPM pos. - standard form of PPM signal generation with positive logic at PPM outputs. The bus idle state is log. 0.

PPM neg.- standard form of PPM signal generation with negative logic at PPM outputs. The bus idle state is log.1.

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

JETIBOX EX - telemetry sensor connection or data stream for JETIBOX

EX Bus/EX Bus HS - digital communication, when transmits throw and telemetry information with configuration possibilities of equipment connected to this bus, for instance by a DC/DS transmitter. This configuration type is used, for instance, when receivers are connected for example to Central Box.

Serial UDI12/16 - serial data output suitable for connection of devices with unidirectional UDI interface (e.g. Vbar).

PPM error code- in case of PPM input mode, an acoustic signal can be set up to announce that this connected signal is missing. By loading a character from the Morse alphabet you may set up tones that 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-plane A (from -150 to 0%)

Gain B - amplification of the output throw in the positive half-plane 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 - 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:

	REX 6	REX 7	REX 10	REX 12
Pin1	Y1	Y1	Y1	Y1
Pin2	Y2	Y2	Y2	Y2
Pin3	Y3	Y3	Y3	Y3
Pin4	Y4	Y4	Y4	Y4
Pin5	Y5/E1	Y5	Y5	Y5
Pin6	Y6/E2	Y6/E1	Y6	Y6
Pin7	Ext.	Y7/E2	Y7	Y7
Pin8		Ext.	Y8/E2	Y8/E2
Pin9			Y9	Y9
Pin10			Y10	Y10
Pin11			Bat.	Y11
Pin12			Bat.	Y12
Pin13			E1	E1
Pin14			Ext.	Ext.

• - Output types:*Y - servo output, dig. out, dig. input**E1,2 - JETIBOX-EX, PPM out, PPM input, EX-Bus, UDI**Ext. - JETIBOX-EX***6.5 Auto set**

Loads a default receiver configuration from preset modes.

Factory default - to reset receiver to the factory settings press and hold keys L and R simultaneously.

7 Receiver update

Duplex REX receivers can be updated via PC with the 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

8 Examples of Rx setup

Classic setup of a single receiver

(for any analogue/digital servos)

- servo impulses are generated on servo outputs
- each output can be assigned to one of the groups from A to H
- servo outputs assigned to one group are generated at the same time
- between two consecutive servo groups there is a delay of 2.5ms

FailSafe	SignalFaultDealy	OutputPeriod	Rx mode
Enabled	1.5s	17 ms	Normal

Classic setup of a single receiver (for digital servos)

FailSafe	SignalFaultDealy	OutputPeriod	Rx mode
Enabled	1.5s	Auto	Normal

The second receiver as a backup (clone mode)

- monitors existing connection between the transmitter and the receiver in "Normal" mode
- does not support telemetry (or an indication of the signal strength)
- works in receiving direction only, it never transmits
- any number of receivers in Clone mode can be operated simultaneously

FailSafe	SignalFaultDealy	OutputPeriod	Rx mode
Disabled	1.5s	17 ms (or Auto)	Clone

Receiver with the PPM output

- possibility to select PPM pos./neg.
- PPM output can be selected on E1 or E2 output

FailSafe	OutputPeriod	E1 or E2	Rx mode	OutputChannelCnt	PPM Mode
Enabled	20 ms	PPM pos.	Normal	8	Direct

Receiver with the PPM output in the function of backup receiver

- PPM output can be selected on E1 or E2 output
- no output repetition or fail safe is carried out. Every time the receiver gets the data packet, output impulses and PPM burst are generated once maximally
- if the data from the transmitter is not available for the receiver, all the outputs are in Out-Off mode

FailSafe	OutputPeriod	E1 or E2	Rx mode	PPM Mode
Disabled	Auto	PPM pos.	Normal	Direct

Receiver with the EX Bus output

- suitable especially for connection to JETI model devices (such as Central Box)
- EX Bus can be selected on E1 or E2 output

FailSafe	OutputPeriod	E1 or E2	Rx mode
Enabled	17 ms (or Auto)	EX Bus	Normal

Receiver with the UDI output

- suitable for connection of devices with unidirectional UDI interface (e.g. VBar)
- UDI output can be selected on E1 or E2 output
- the servo impulses are generated on other servo outputs, it is possible to connect telemetry sensors to the Ext. connector as usual

FailSafe	OutputPeriod	E1 or E2	Rx mode	UDI Mode
Enabled	17 ms (or Auto)	UDI12	Normal	Direct

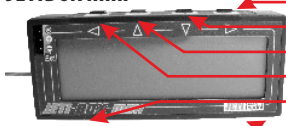


ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

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 successful flying with the products of:
JETI model s.r.o. Příbor, www.jetimodel.com**

JETIBOX mini



Button right

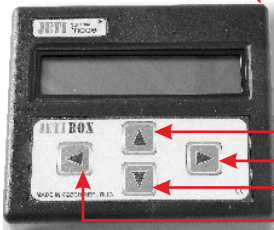
Button down

Button up

Button left

Button for switching input Ext./Tx

Button backlight



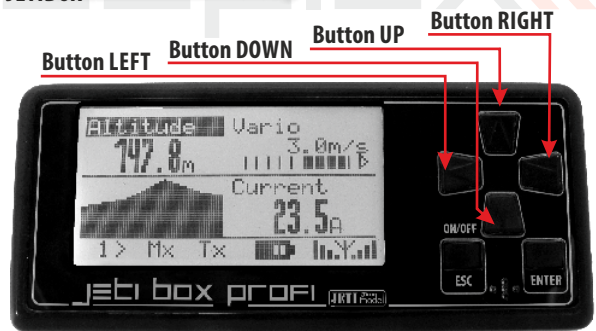
Button UP U

Button RIGHT R

Button DOWN D

Button LEFT L

JETIBOX



Button LEFT

Button DOWN

Button UP

Button RIGHT

JETIBOX profi

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.

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.

Warning: Changes or modifications to this device not expressly approved by Esprit Model/JETI USA could void the user's authority to operate the equipment.

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

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

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. This device complies with the Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

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

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Duplex-System EX:

- Transmitter modules
- Receivers
- Telemetric sensors
- Compatible accessories
- Display units



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