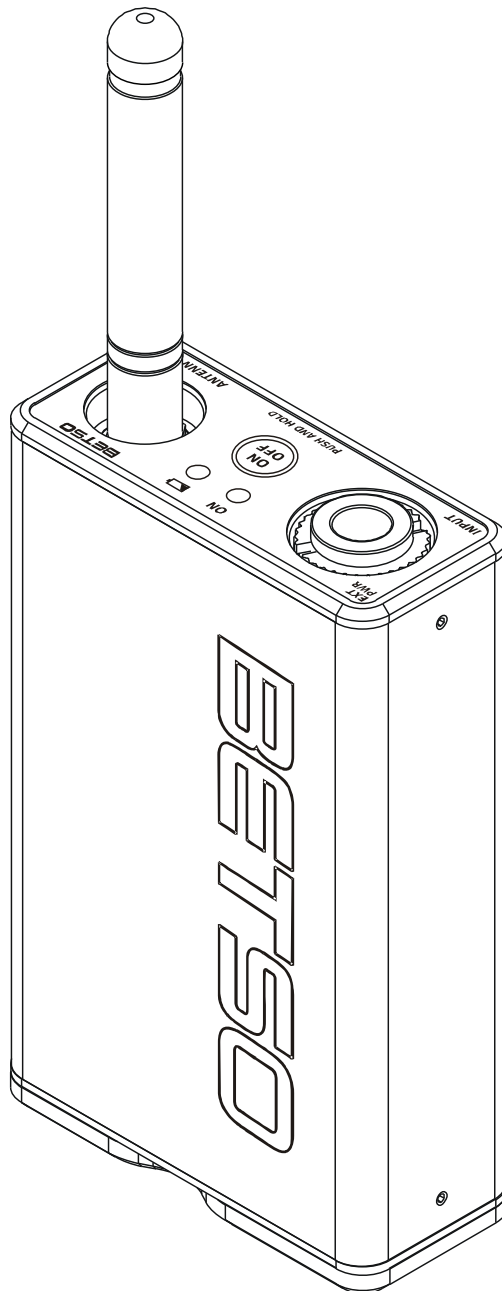


TCX

16 channel wireless TC transceiver

BETSO



Contents

1. Product description.....	3
2. Top features.....	3
3. Control elements.....	4
4. Insertion of battery / accumulator.....	5
5. External power supply.....	5
6. Turning on.....	6
7. Settings of the transceiver.....	6
7.1 Setting of RF channel of the transceiver.....	6
7.2 Transmitter in the packet mode.....	7
7.3 Transmitter in the standard mode.....	7
7.4 Receiver in the standard mode.....	7
8. Control of the transceiver.....	7
8.1 Indication of an active TC signal.....	7
8.2 Indication of preset mode of operation.....	8
8.3 Battery level display.....	8
8.4 Low battery indication.....	8
9. Recommended accessories.....	8
10. Troubleshooting.....	9
11. Safety instruction.....	9
12. Technical specifications.....	10
13. Schematic of connector.....	10
14. EC Declaration of conformity.....	11

Used symbols



Indicates text that has only informative character. If you overlook this information, it can't result in product damage by it's mishandling.



Indicates text that has important instruction character. If you overlook this information, it may result in product damage.

Thank you that you have purchased the product BETSO!

Please pay sufficient attention to the following user manual of your new product BETSO. Following these instructions, you will avoid the possible damages of your new device and at the same time, they will be presented to you all the available features that allow you to take advantage of the potential of the product.

For the latest informations about our products BETSO please contact your local distributor or visit our website <http://www.betso.eu>.

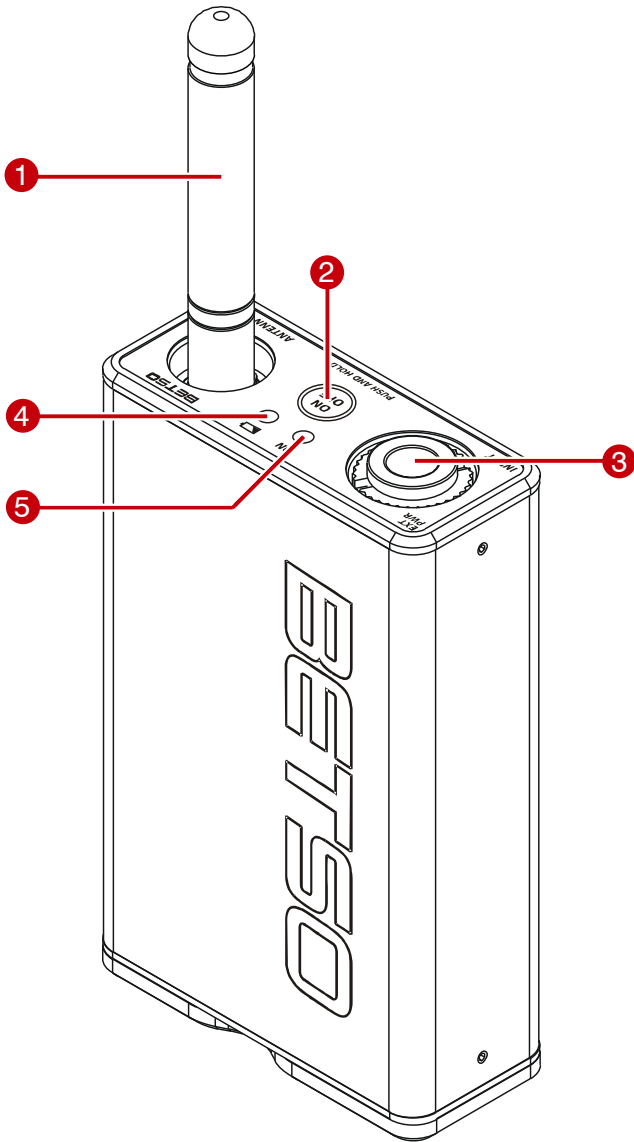
1. Product description

The function of our transceiver BETSO TCX is to transmit and to receive the time code (TC = Time Code) signal of any frame rates including up to double speed up TC signal. Supports reception and transmission of TC in the standard RF format and also the transmission of TC in the packet format of BETSO PACKET™ standard that was developed to significantly reduce the transmission failure in the interfering radio environment. In the standard mode of reception our transceiver can work as a radio receiver with a cable output for SMPTE TC signal. Two transceivers BETSO TCX create our system of transmission of SMPTE TC signal BETSO TCXS. The transceiver can be battery operated or an external power supply can be used.

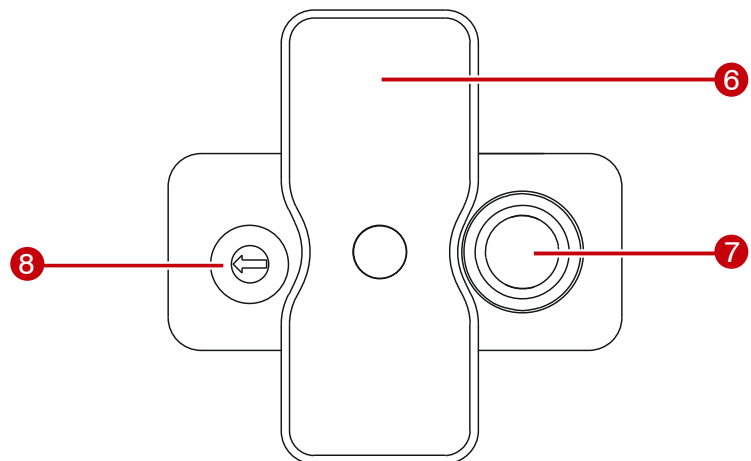
2. Top features

- possibility of setting as a transmitter or receiver of TC signal
- precise mechanic construction from aluminium alloy
- 16 RF channels in the band 433.15 - 434.65 MHz
- packet mode of RF transmission according to BETSO PACKET™ standard minimizing the transmission failure in the interfering radio environment
- wireless range of up to 450 m in packet and up to 350 m in standard mode in the conditions of direct visibility
- In the standard mode of reception our transceiver works as a radio receiver with cable output for SMPTE TC signal (with this feature it is possible to operate any slate / clapperboard or other TC processing device as a wireless device)
- smart power management during standby and "SMPTE-PAUSED" mode
- low power consumption allowing operating time up to 300 hours in standby and 30 hours in active mode
- variable power supply (1x AA battery / accumulator, extern power supply 3-18V DC)
- intelligent battery power monitoring and low battery indicator

3. Control elements

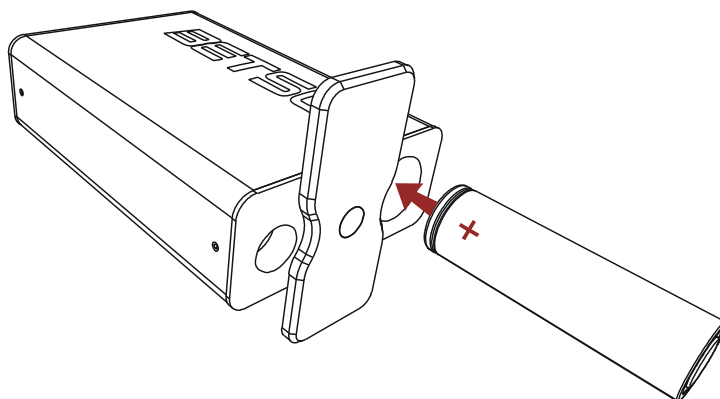


1. Antenna
2. Button „ON/OFF“ for power on of the transceiver
3. Input/output connector for TC and extern power supply
4. LED of indication of mode of operation + battery level
5. LED of indication of power on



4. Insertion of battery / accumulator

To supply the energy to the transceiver insert 1 cell of alkaline battery or accumulator of size AA/UM3. After checking of the polarity of the inserted battery/ accumulator close the door.



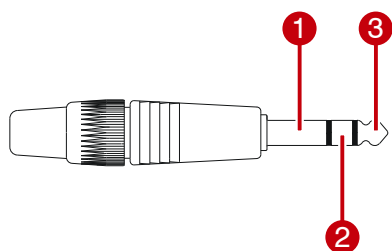
The transceiver is protected against destruction by inserting of batter with wrong polarity.



Warning: Never insert the battery if you use the external power supply. It may result in the damage of the transceiver and battery!

5. External power supply

External power supply 3-18V DC is possible to connect using a special cable connected to the input jack connector, which schematic is shown below.



1. GND
2. 3-18V DC
3. TC SIGNAL



Warning: Never insert the battery if you use the external power supply. It may result in the damage of the transceiver and battery!

6. Turning on

turning on - ON	long (approx. 1s) press ON/OFF button
turning off - OFF	long (approx. 1s) press ON/OFF button



After the turning the transceiver on, it will turn on LED of indication of power on during 1s. If we release the ON/OFF button after its turning off the transceiver will start to operate in its preset mode. Otherwise you will enter the setting mode of the transceiver.

7. Settings of the transceiver

The settings of the transceiver is performed in the setting mode. This mode is indicated by rapid flashing of LED of indication of power on. The transceiver can be configured into three modes. As a packet mode transmitter, a transmitter in standard mode and receiver in standard mode. Two transceivers BETSO TCX create the system of transmission of TC BETSO TCXS.

enter the settings	long (approx. 3s) press ON/OFF button during off state of the transceiver
change setting	short press ON/OFF button
save setting	long (approx. 1s) press ON/OFF button



After the turning the transceiver on, it will turn on LED of indication of power on during 1s. If we release the ON/OFF button after its turning off the transceiver will start to operate in its preset mode. Otherwise you will enter the setting mode of the transceiver.

7.1 Setting of RF channel of the transceiver

Open the battery door and then using the supplied screwdriver, set the rotary switch of RF channel to the desired RF channel (0, 1, ..., 9, A, B, C, D, E, F), where the reception or transmission of SMPTE TC signal will be operated.



You must set the same channel on the transceiver and the other device that will be used - the slate BETSO WTCS, possibly the second transceiver used in the system of transmission of SMPTE TC signal BETSO TCXS. Thanks to various

channels you can operate up to 16 independent TC signal on one place.

7.2 Transmitter in the packet mode

In this mode the transceiver transmits data arranged in packets and uses an advanced system for detecting faulty transmission, which prevents the displaying of incorrectly received data in the interfering radio environment. Use this mode whenever you are not using the transceivers in the system of transmission of TC BETSO TCXS.

Transmission in the packet mode can be activated by changing the setting after entering to the setting mode - see chapter 7. by short pressing the ON/OFF button until the red LED of indication of mode of operation doesn't start flashing.

7.3 Transmitter in the standard mode

In this mode the transceiver transmits data which are not arranged in packets, enabling the use of transceiver with another transceiver set as a receiver.

Transmission in the standard mode can be activated by changing the setting after entering to the setting mode - see chapter 7. by short pressing the ON/OFF button until the red LED of indication of mode of operation doesn't turn on.

7.4 Receiver in the standard mode

In this mode, the transceiver receives TC data which are not arranged in packets and enables the use of transceiver with another transceiver set as a transmitter in the standard mode. Receiving TC signal is available on cable output via jack 6.3 mm connector (schematic of the connector is provided in the technical specifications at the end of this manual).

Reception in the standard mode can be activated by changing the setting after entering to the setting mode - see chapter 7. by short pressing the ON/OFF button until the green LED of indication of mode of operation doesn't turn on.

8. Control of the transceiver

After the turning the transceiver on, it will turn on LED of indication of power on during 1s. If we release the ON/OFF button after its turning off the transceiver will start to operate in its preset mode.

8.1 Indication of an active TC signal

After the turning the transceiver on the validity of TC signal transmitted by an other transceiver on the same RF channel on which the receiver is set is clearly indicated

by the LED of indication of power on. If there is the valid SMPTE TC signal on the input (either cable or radio), the LED of indication of power on will turn on and continue to shine without any interruption. If there is not a valid SMPTE TC signal on the input, the LED of indication of power on will flash each second.

8.2 Indication of preset mode of operation

After the switching the transceiver on its preset mode of operation is clearly indicated by LED of indication of mode of operation. This LED flashes every three seconds and according to its color and number of flashes you can easily recognize the preset mode of operation of the transceiver.

2 flashes red	packet mode of transmission (TX robust)
1 flash red	standard mode of transmission (TX basic)
1 flash green	standard mode of reception (RX basic)

8.3 Battery level display

The transceiver has an integrated function of displaying of the battery power level via LED of indication of mode of operation of the transceiver. This feature can be called by a short press of ON/OFF button in the on-state of the transceiver when the transceiver operates its preset functionality (not in the setting mode). The level of battery power is indicated by the number of flashes of the red LED of indication of mode of operation of the transceiver.

100%	5 flashes
80%	4 flash
60%	3 flashes
40%	2 flashes
20%	1 flashes

8.4 Low battery indication

This feature automatically detects almost discharged battery. When the battery voltage approaches the nominal voltage of the discharged battery the red LED of indication of mode of operation of the transceiver will turn on and continue to shine. In this case, immediately replace the battery with a new one.

9. Recommended accessories

Optional accessories include various cables for the connection of the SMPTE TC signal and the external power supply.

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10. Troubleshooting

It is impossible to turn on the transceiver

If you use an external power supply, check that the inversion of the polarity of the external power supply didn't occur. Otherwise, make sure that there is inserted charged battery, or whether it is not inserted with the reversed polarity.

Transceiver doesn't receive / transmit TC signal

Check if it is set the same RF channel as on the slate / second transceiver - see chapter 7.1 . Transceiver has to be set on the same mode of transmission as the other device (slate / second transceiver) - see chapter 7.

11. Safety instructions



Never open an electrical device! All reparations must be performed by an authorized service center. In the case of opening of the device away from the authorized service center, you will automatically loose the warranty of the device.



Do not use the electrical device in the places with high humidity, especially take care to protect the device against direct contact with water.



To clean the device, use a dampened piece of cloth. Never use any chemical solvents!



When removing the cable from the input / output jack, always hold the transceiver's upper silver part with a front panel.



If the battery door is opened, do not expose it with an excessive mechanical force, and do not insert any other objects than AA/UM3 battery into the battery space.

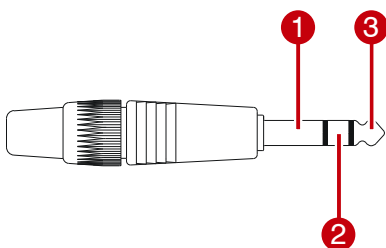
12. Technical specifications

Dimensions (w x h x d)	55 x 89 x 24 mm
Weight	approx. 125g (battery included)
Construction	anodized aluminium alloy
TC signal (SMPTE)	23,976 fps - 30 fps (incl. up to 2x speeded up signal)
Input level	0,2 – 10 V (p-p)
Power supply	1x AA (UM3) alkaline battery / accumulator extern power supply 3-18V via 6,3mm Jack connector
RF output power	1mW (0dBm)
Number of RF channels	16 (0 - F)
Frequency range	433,15 - 434,65 MHz
Channel bandwidth	100 kHz
Frequency deviation	20 kHz
Consumption	9 – 90 mW (approx. 6 – 65 mA) *
Operating time	up to 35 hours **

* depends on the mode of operation

** in the active mode of transmission / reception, depends on capacity of battery

13. Schematic of connector



1. GND
2. Extern power supply 3-18V DC
3. SMPTE TC signal

14. EC Declaration of conformity



BETSO ELECTRONICS s.r.o.

Elisky Premyslovny 1335, 156 00 Praha 5 - Zbraslav, Czech Republic

Reg. Number: 28955706

declares that this device

BETSO TCX (TCXS)

specification: Digital time code transceiver

frequency range: 433,15 – 434,65 MHz

radiated power: 1 mW (0 dBm) max.

RF channels: 16

channel bandwidth: 100kHz

conform to the essential requirements of the R&TTE Directive 1999/5/EC. To demonstrate compliance with these requirements, the following standards were consulted:

EN 300 220 (Radio spectrum Matters ERM)

EN 301 489 (Electromagnetic Compatibility)

EN 60065/2002 (Safety of Electrical Equipment)

Conformity assessed via Annex III. using a Technical Construction and Results of measurements.

August 2010

A handwritten signature in blue ink, appearing to read 'J. Zastera', is written over a light blue grid background.

Ing. Jan Zastera

general manager

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