REMdevice
Radio Control Equipment

INSTRUCTION MANUAL
RADIO CONTROL DEVICES

T3 T5 T7

NEW!
REMsys CODE
Patented system

REMdevice S.r.l.
Via Andrea Mantegna, 12/14
36061 Bassano del Grappa (VI)
Italy

Tel. +39 0424 500 262
Fax +39 0424 508 631
www.remdevice.com
E-mail: info@remdevice.com

SUMMARY

ATTENTION!

Before installing and/or using the radio control device, CAREFULLY READ this instructions manual and follow the advice it contains. Use of the radio control device by non qualified personnel and/or incorrect installation may cause severe harm to persons and things.

INSTRUCTIONS FOR CORRECT AND SAFE USE OF THE RADIO CONTROL DEVICE

The **use** of the radio control device is reserved to expert operators who have read the instructions on the conditions of use of the radio controlled machine and who respect the safety regulations imposed by law in the work area.

The manufacturer of the radio control device does not answer for damage to persons or things caused by:

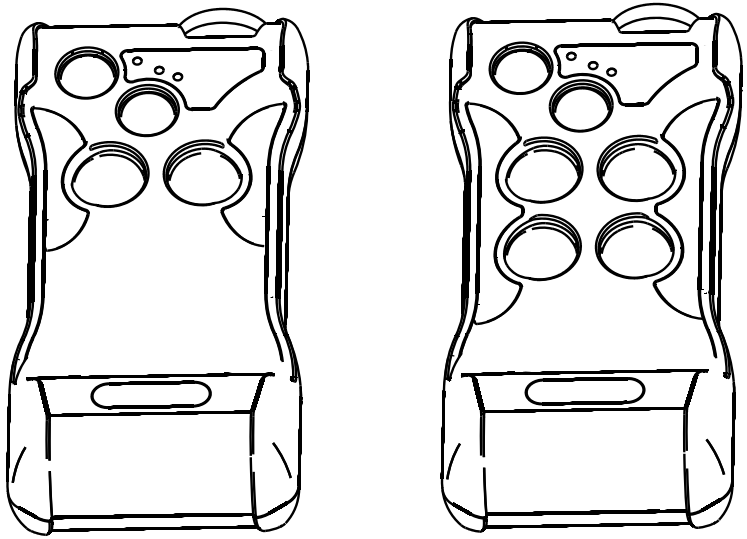
- clumsy and improper use of the radio control device;
- incorrect wiring or electrical connection;
- tampering;
- modification of the structural characteristics of the radio control device;
- replacement of parts with non original spare parts;
- lack of maintenance;
- failure to replace worn, broken or faulty parts;
- use of the radio control device bypassing its intrinsic safety or in any way altering its original functionality.

The radio control device operates with radio signals, it is able to operate the machine to which it is connected even in the presence of barriers that prevent visibility, such as: masonry walls, metal or wooden panels, machines, equipment, buildings, vehicles, etc.

Use of the radio control device

- Place the transmitter in conditions of perfect and complete visibility of the radio-controlled machine;
- do not stand under hanging weights;
- do not operate in a position of unsafe equilibrium;
- pay attention to the identification symbols of the control device located next to each button;
- avoid pressing the buttons if you do not know exactly what their function is.

Transmitter T3 - Transmitter T5



Transmitter T7

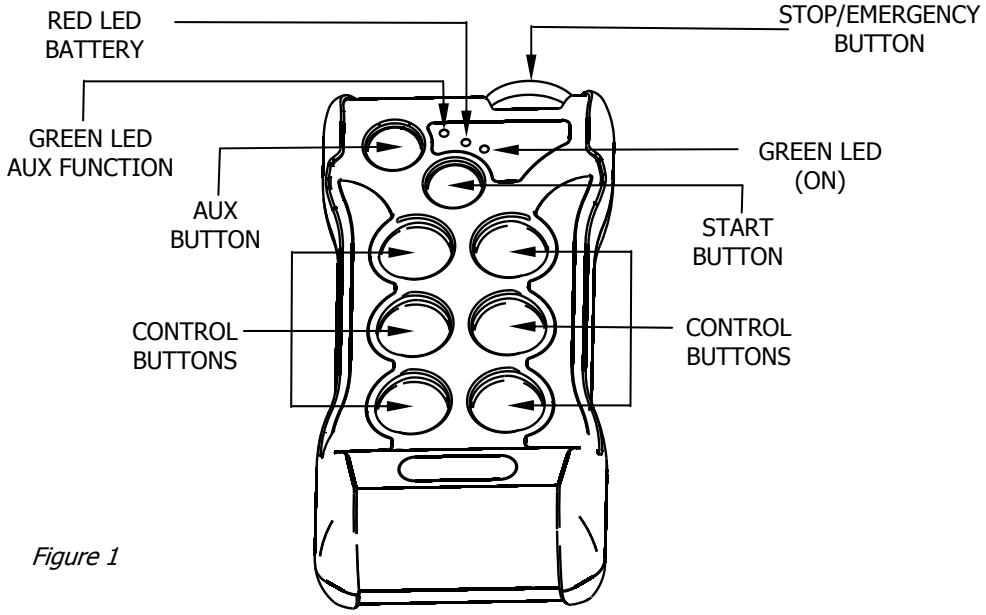


Figure 1

Activation

1- Turn and release the Stop/Emergency button (Figure 1): power is supplied to the transmitter.
2- Press the START button. Activation is indicated by the blinking of the green led (ON) at intervals of about 1 second. If the transmitter gives a Beep accompanied by the lighting of the red led, check to make sure that other buttons have not been pressed. If the receiver is ready too, you should hear the sound of the obligatory acoustic warning installed on the operating machine.

Use of the radio control device

Press the control buttons for the desired function, taking care as they may be of the type with a sequential double click: by increasing the pressure on the button, a second contact is made that is normally assigned to increasing the speed of a machine movement.
If any kind of difficulty occurs in controlling the operating machine (for mechanical or electrical reasons, or at any rate independent of the intentions of the operator), immediately press the red Stop/Emergency mushroom button.
The radio control device has an automatic interlock on the controls of opposite or incompatible functions: for example, Up/Down, Left/Right, Forward/Back.
Periodically check the efficiency of the red Stop/Emergency mushroom button.

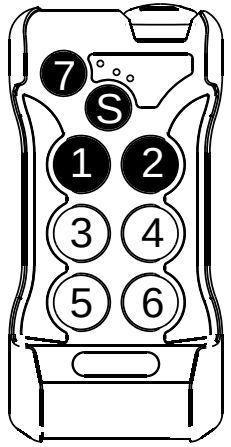
Switching off

Press the red Stop/Emergency mushroom button.
At the end of the manoeuvres, and anyway before putting the transmitter away, always switch it off.
Do not leave the transmitter unattended when switched on and unlocked.
Put the transmitter away in a safe place, inaccessible to unauthorised persons.
Never entrust the transmitter to unskilled personnel.

Self cut-out

When this function is activated (factory setting), the transmitter switches off automatically after 3 minutes of inactivity. It is restarted when the START button is pressed.
In self cut-out condition, the equipment still uses a small amount of energy: to avoid this unnecessary consumption, press the red Stop/Emergency mushroom button.

2



Locking and Unlocking the keypad

It is possible to block the use of the transmitter as follows:

- supply power to the transmitter by turning and releasing the red Stop/Emergency mushroom button
- press the buttons **1**, **2**, **7** together and simultaneously the Start button **S**, then release.

If you try to activate the transmitter after this operation, the Red Led (BATTERY) and the Green one (ON), blink alternately and the transmitter emits an acoustic warning.
To unlock the use of the transmitter, repeat the sequence.

Battery Life

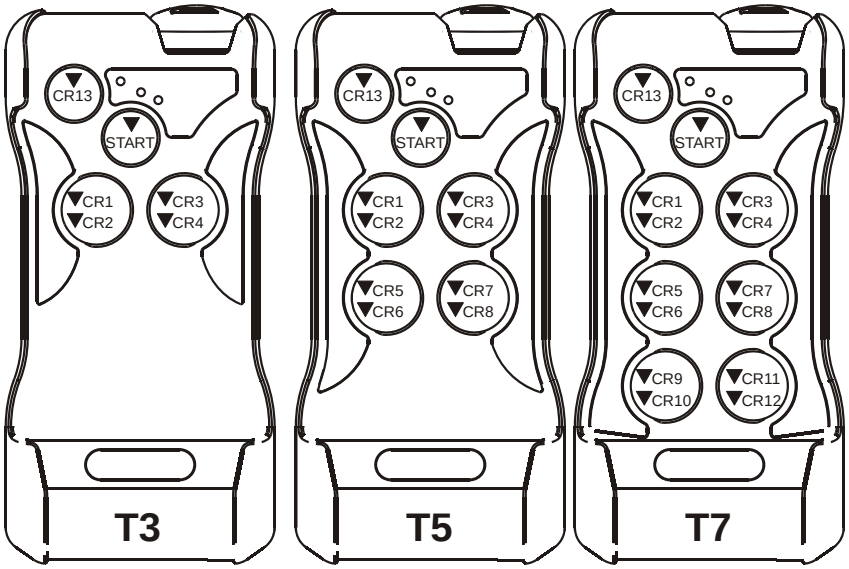
The battery is inside the transmitter. When it is run down, this is indicated on the transmitter by the regular blinking of the Red Led (BATTERY).
After the first signal, the radio control device is able to work perfectly for over 30 hours consecutively.
The working life of the transmitter with a new and fully charged battery is about 1200 hours (continuous duty in medium power mode).

INSTALLATION OF THE RADIO CONTROL DEVICE

REMdevice is at the disposal of installation technicians to supply useful information that will ensure the correct installation and commissioning of the radio control device.

The **installation** of the radio control device on operating machines must be carried out in compliance with the Machines Directive and the harmonised regulations. Installation must be performed by qualified technical personnel, who know the technical characteristics of the radio control device and of the operating machine, and who are enabled to compile the document certifying correct installation.
The installer is responsible for any damage to persons or things resulting from receiver wiring errors, from failure to observe the safety regulations, from the use of unsuitable material for installing the receiver, and from non inspection or incomplete inspection of the radio-controlled machine.

Position of the controls in the transmitter



See also the paragraph: CHANGE OF RECEIVER FUNCTIONS

Figure 3

Two receiver models are available:

- **ECOBOX** watertight receiver for outdoor use
- **Ruby-T7** watertight receiver for outdoor use
- **Rx-DIN T7** DIN receiver for indoor use with external aerial

The receiver must be placed in a position where it is easily accessible for the maintenance and repair personnel.

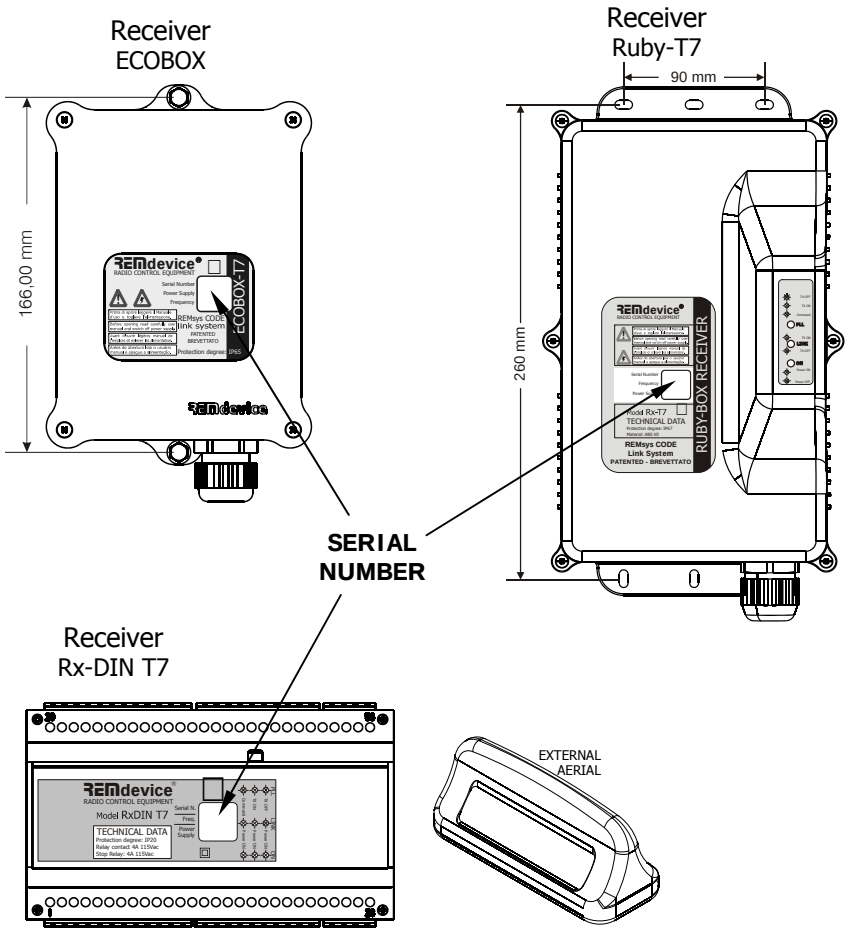


Figure 4

The Ruby-T7 receiver must not be positioned inside screened metal structures (boxes, cupboards, trellises, tubes, grids, etc.), so as not to jeopardise the reception of the radio signal; it must be installed with the entry of the multicore cable facing down, so as to avoid water infiltrations through the cable clamp. To fix it, use the assembly kit supplied.
The measurements for drilling the holes are indicated in Figure 4.
Never make a hole in the box. Avoid precarious fixing systems.

For correct and safe wiring of the receiver, use a multicore cable and plug of the same type as those used for the wired pushbutton panel supplied with the machine.
Use caps to terminate the leads to be tightened to the receiver terminals and check the fastening accurately.

The simultaneous control of an operating machine with the radio control device and the wired pushbutton panel is NOT allowed.
Pay particular attention to the connection of the STOP/EMERGENCY circuit, following and respecting the machine's original wiring diagram.

Supplying power to the Receiver

Check that there is a suitable isolating device on the machine. Use a voltmeter to check that there is a suitable voltage on the machine's electric panel to supply the receiver. These feeding voltage values are given in the paragraph TECHNICAL CHARACTERISTICS and printed next to the connecting terminals, inside the receiver.
The phase and neutral or positive and negative polarities are indifferent.
The characteristics of the receiver relay contacts are given in the paragraph TECHNICAL CHARACTERISTICS..
The presence of voltage on the receiver is indicated by the Green Led ON with a fixed light.

Arrangement of controls

ECOBOX Receiver

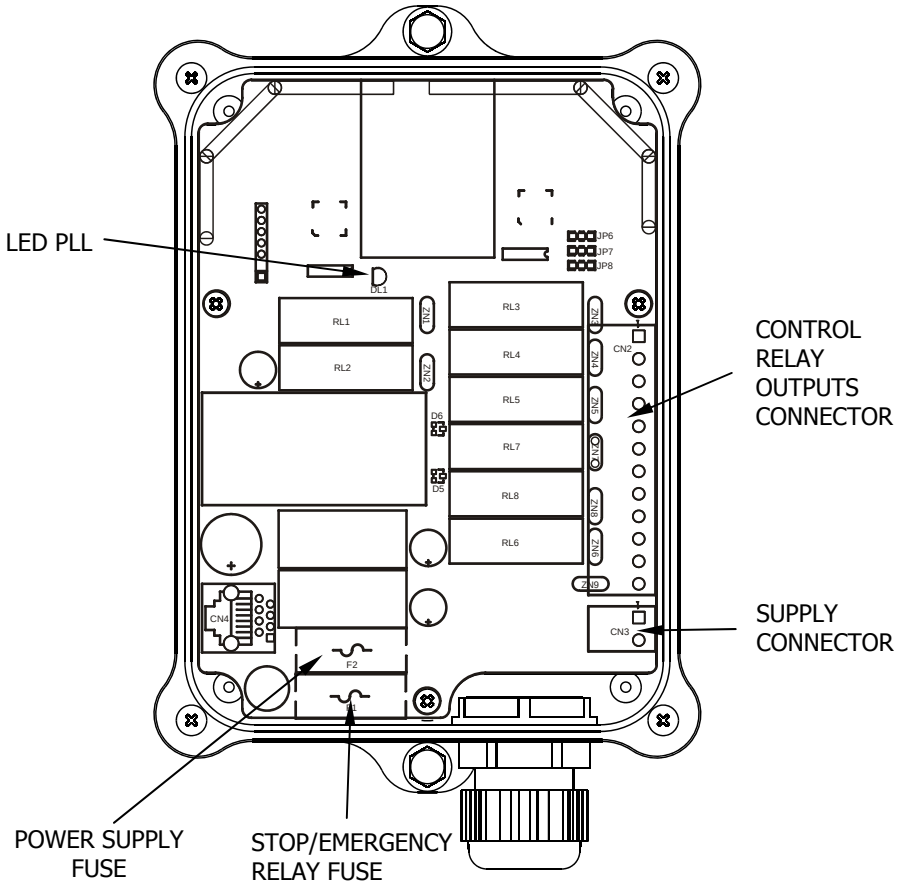


Figure 5

Arrangement of controls in the receiver ECOBOX

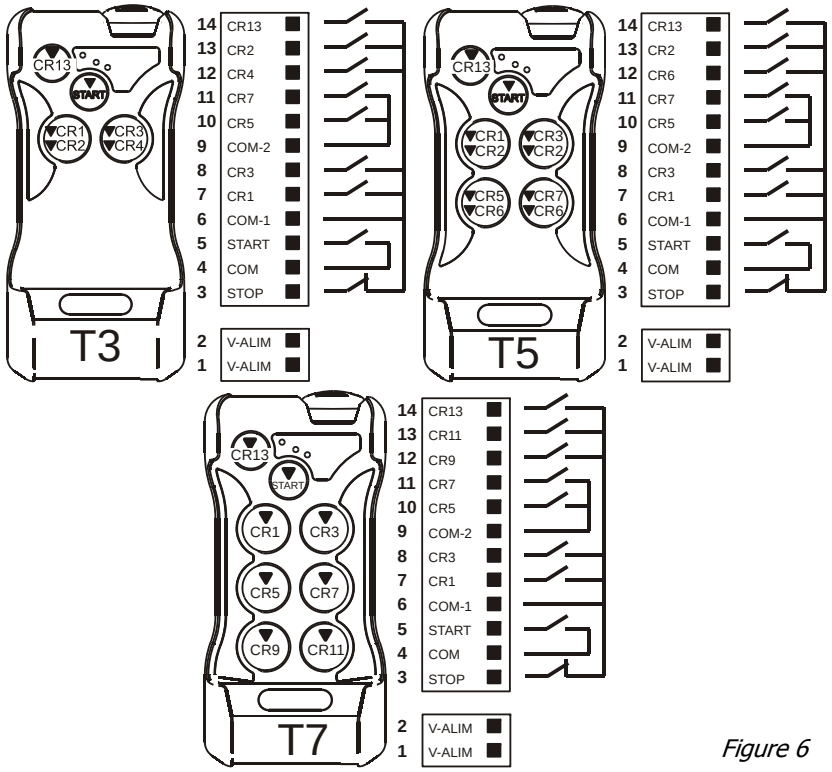


Figure 6

V-ALIM = Receiver power supply

STOP = Stop/Emergency Contact (N.C. with transmitter active)
START= Start Contact (N.A.)
CR1-13 = Control relay contacts
COM, COM1, COM2 = Common contact supply

Ruby T7 Receiver

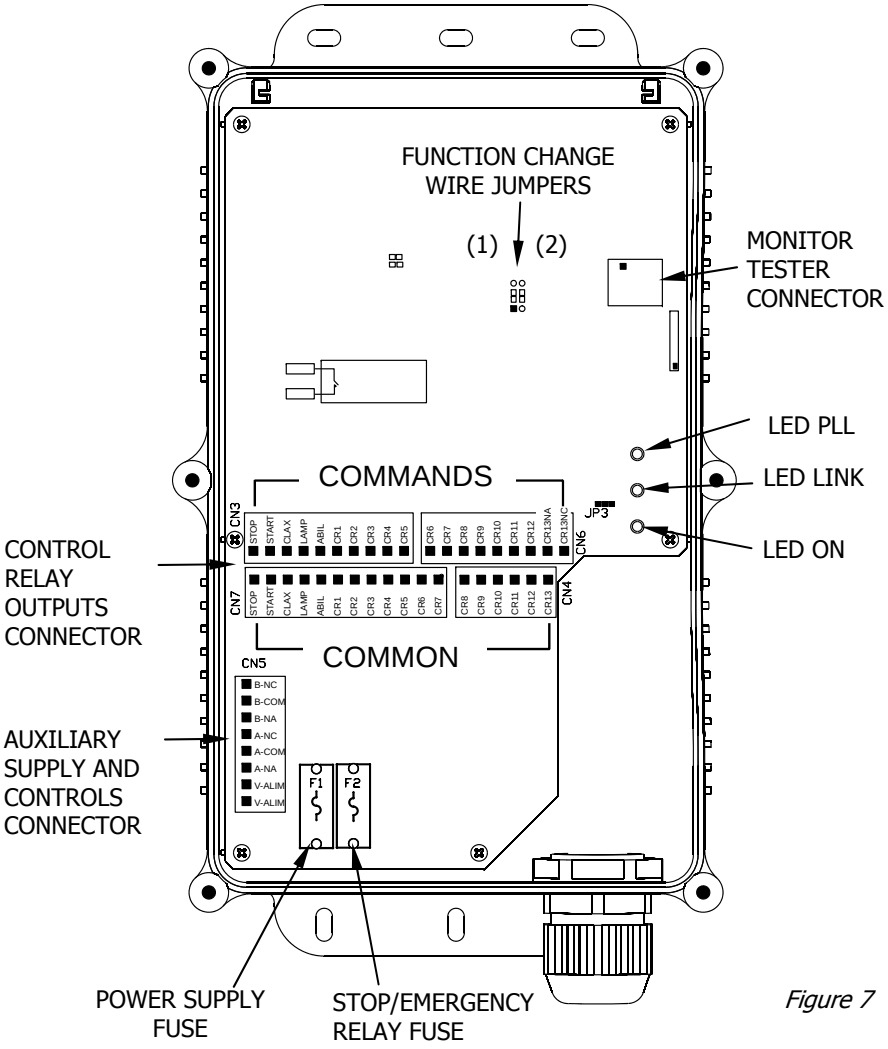


Figure 7

Arrangement of controls in the receiver Ruby T7

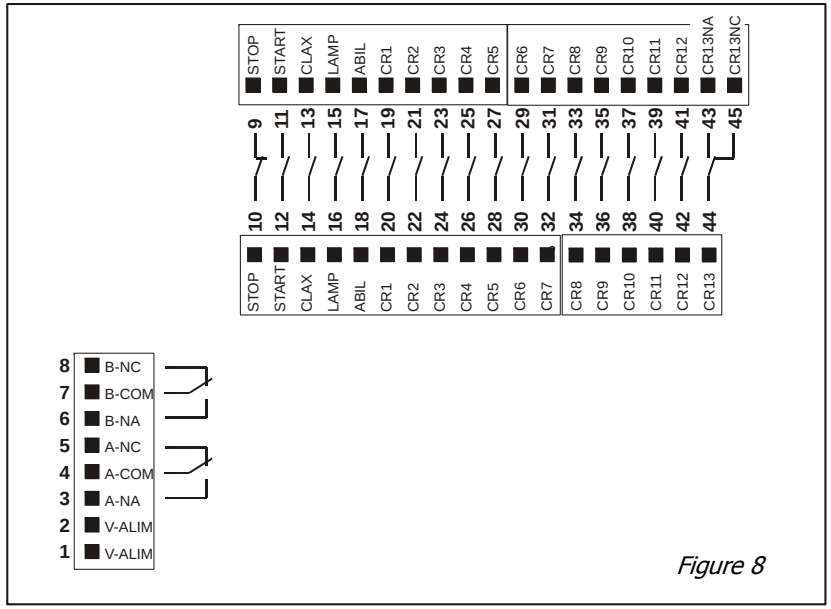


Figure 8

V-ALIM = Receiver power supply

STOP = Stop/Emergency Contact (N.C. with transmitter active)
START= Start Contact (N.A.)
CLAX = Horn Contact (N.A., it closes with the START command)
LAMP = Contact for flashing light (N.C. with transmitter active)
ABIL = Enabling Contact (N.A., it closes with any control button)

CR1-12 = Control relay contacts
CR13, A, B = Contacts of the relays assigned to the auxiliary button
N.A. = Normally Open
N.C. = Normally Closed

Rx DIN T7 Receiver

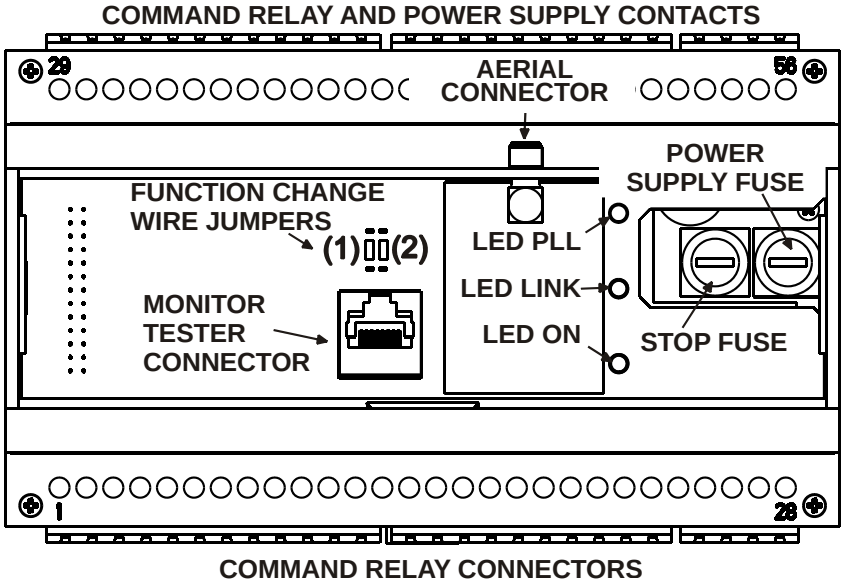


Figure 9

Arrangement of controls in the receiver Rx-DIN T7

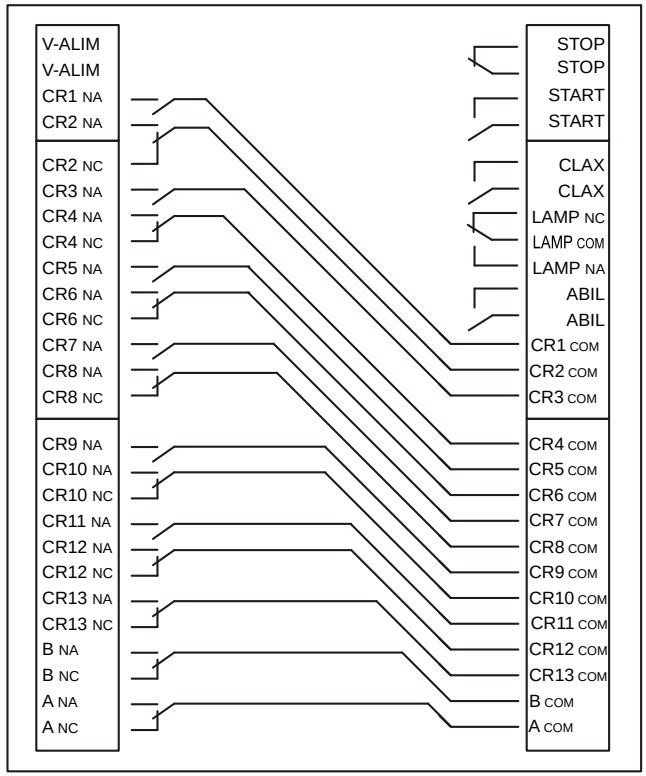


Figure 10

V-ALIM = Receiver power supply

STOP = Stop/Emergency Contact (N.C. with transmitter active)
START= Start Contact (N.A.)
CLAX = Horn Contact (N.A., it closes with the START command)
LAMP = Contact for flashing light (N.C. with transmitter active)
ABIL = Enabling Contact (N.A., it closes with any control button)

CR1-12 = Control relay contacts
CR13, A, B = Contacts of the relays assigned to the auxiliary button
N.A. = Normally Open
N.C. = Normally Closed
COM = Common contact supply

INSPECTION OF THE RADIO CONTROL DEVICE

With the operating machine turned off, insert the plug of the multicore cable of the receiver in place of that of the wired pushbutton panel and secure it with the fastening hooks; check that the connecting cable between the receiver and the machine does not hinder or get caught in the mechanical parts during movement of the machine.
Switch on the operating machine, remaining at a safe distance, that is outside its radius of action, as an error in wiring could cause it to start up accidentally.
In the receiver, check that the green led ON is lit (see Fig. 7,9), indicating that it is powered.
In the receiver, check that the green led PLL is blinking (see Fig. 5,7,9), indicating that waiting status of the radio signal.
Switch on the transmitter and check in the receiver that the green led LINK has a fixed light (see Fig. 7,9), indicating the correct communication between transmitter and receiver.

Checking the efficiency of the Stop/Emergency button and of the control buttons

Press the Stop/Emergency button (see Fig. 1) and check in the receiver that the led LINK switches off (see Fig. 7,9), indicating that the radio control has been deactivated.
To continue the inspection procedure, **reset** the Stop/Emergency button, activate the transmitter with the START button and then press a control button to make the machine perform the assigned movement: now while it is moving, press the Stop/Emergency button to check that the machine stops immediately.
After having reactivated the transmitter, press one button at a time and check that the machine performs the respective movement.
Walk away from the receiver and, still checking the machine movements, give the various commands in the different zones of the work area, to ensure that it is fully covered by the radio signal.

At the end of inspection, clearly fill in the wiring diagram of the receiver and sign the declaration of correct installation.

The **serial number** of the radio control device to be given on the documentation is indicated on the Receiver (fig. 4) and is not on the Transmitter.

KEEPING THE RADIO CONTROL DEVICE IN GOOD WORKING ORDER

Clean the transmitter periodically to prevent the accumulation over time of dirt which is difficult to remove and may cover the graphic symbols on the control buttons.
If the symbols become illegible, or the adhesive labels come off, it is recommended to apply new labels available from REMdevice.
Avoid using solvents to clean the device.
The transmitter must not be immersed in water.
Check the perfect seal of the transmitter gasket the absence of cracks on the shells and the integrity of the rubber of the buttons.
Any liquid infiltrations may severely damage or jeopardise the regular operation of the electric circuits inside the transmitter.
Special maintenance and repairs must be carried out only by specialised personnel authorised by REMdevice.
Perform the controls as described in the chapter "Checking the efficiency of the Stop/Emergency button and of the control buttons".
Never use the appliance if the Stop/Emergency button is not efficient.
The correct operation of the mushroom button ensures the immediate stop of all the functions of the operating machine and the deactivation of the radio control device. The breakage, even partial, or the imperfect efficiency of this button endanger the safety of the radio control device, making it no longer comply with the regulations.

Entrust reject material or the product to be scrapped to the authorised disposal centres in your territory.

CHANGING THE BATTERY

Remove the 8 closing screws and open the transmitter cover.
Take out the battery connector and replace it with a new one.
Close the cover and retighten the closing screws.

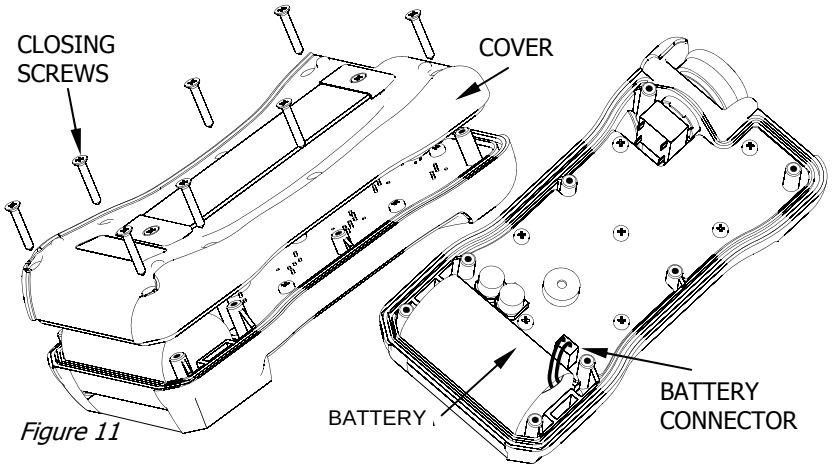


Figure 11

The battery is not rechargeable, do not apply voltage to its terminals, do not expose to high temperatures or to flames.
Do not dispose of old batteries in the environment and do not throw them into the containers for household waste.
The batteries must be disposed of according to local regulations, using the disposal service available in your own territory.

As an alternative to the battery provided it is possible to use alkaline batteries or ones that can be recharged with the battery charger provided.

Figure 12

CHANGING THE TRANSMITTER

In the event of malfunction, breakage or loss of the transmitter, it is possible to replace it with a new one.

The programming of the code involves only the transmitter, while the receiver is combined and tuned automatically, thanks to the exclusive new patented **"REMSYS CODE" System**. For this reason the **serial number** of the radio control device is marked only on the Receiver.
The replacement of the transmitter does not involve any operation of modifying or labelling the transmitter itself.

- Disconnect the power from the receiver: if it is powered by the electric panel of the machine, turn off the main switch.
- Release the red Stop/Emergency mushroom button of the transmitter.
- Press the buttons **2** and **7** together and simultaneously the Start button **S**, and release.
  The green led ON starts to blink rapidly.
- Switch on the power to the receiver.
- When the transmitter recognises the receiver, the green led ON lights with a fixed light.
- Switch off the receiver by pressing the red Stop/Emergency mushroom button.
- Wait about 10 seconds, after which the new transmitter is ready for use.

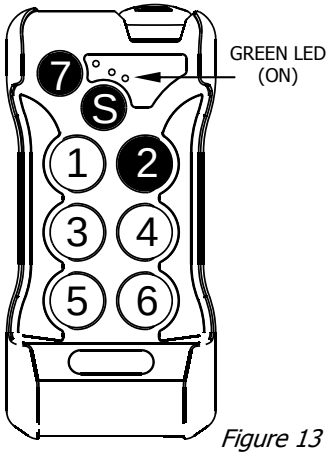


Figure 13

If the radio control device does not work, repeat the entire operation.

PROGRAMMING THE RADIO CONTROL DEVICE

Changing the frequency

The operation of changing frequency is carried out only on the transmitter, the receiver is tuned automatically.

- Release the red Stop/Emergency mushroom button.
- Press the buttons **1** and **7** together and simultaneously the Start button **S**, and release.
- The set channel is indicated first with the tens (number of pulses of the red Led), then with the units (number of pulses of the green Led).
- Example: channel 23 is displayed with 2 pulses of the red Led and three pulses of the green Led.
- The frequency values are given in the table on the facing page.

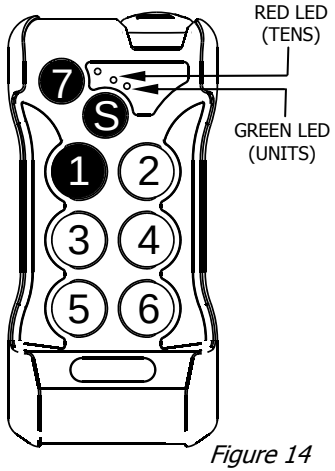


Figure 14

At the end of this sequence the transmitter has entered **frequency changing** mode

- Each time button **1** is pressed, the **CHANNEL –** function is obtained (units)
- Each time button **2** is pressed, the **CHANNEL +** function is obtained (units)
- Each time button **3** is pressed, the **CHANNEL – 10** function is obtained (tens)
- Each time button **4** is pressed, the **CHANNEL +10** function is obtained (tens)
- The set channel is indicated first with the tens (number of pulses of the red Led), then with the units (number of pulses of the green Led).
- Once the desired frequency value has been set, press the red Stop/Emergency mushroom button and wait at least 3 seconds, then release it.
- Press the START button **S** for a few seconds and hold it down until the machine starts.

Attention: the frequency changing operation must be carried out with the transmitter programmed in medium or normal power operating mode, this operation is not possible if the "low power start" function has been activated in the transmitter. See the chapter "Programming the transmitter functions (page 22).

Tables of frequencies

Band 869.700 – 870.000 MHz			
CH**1** 869.7125	CH**2** 869.7375	CH**3** 869.7625	CH**4** 869.7875
CH**5** 869.8125	CH**6** 869.8375	CH**7** 869.8625	CH**8** 869.8875
CH**9** 869.9125	CH**10** 869.9375	CH**11** 869.9625	

I - Band 433.050 – 434.025 MHz				
CH**1** 433.0625	CH**2** 433.0875	CH**3** 433.1125	CH**4** 433.1375	CH**5** 433.1625
CH**6** 433.1875	CH**7** 433.2125	CH**8** 433.2375	CH**9** 433.2625	CH**10** 433.2875
CH**11** 433.3125	CH**12** 433.3375	CH**13** 433.3625	CH**14** 433.3875	CH**15** 433.4125
CH**16** 433.4375	CH**17** 433.4625	CH**18** 433.4875	CH**19** 433.5125	CH**20** 433.5375
CH**21** 433.5625	CH**22** 433.5875	CH**23** 433.6125	CH**24** 433.6375	CH**25** 433.6625
CH**26** 433.6875	CH**27** 433.7125	CH**28** 433.7375	CH**29** 433.7625	CH**30** 433.7875
II - Band 434.050 – 434.790 MHz				
CH**31** 434.0625	CH**32** 434.0875	CH**33** 434.1125	CH**34** 434.1375	CH**35** 434.1625
CH**36** 434.1875	CH**37** 434.2125	CH**38** 434.2375	CH**39** 434.2625	CH**40** 434.2875
CH**41** 434.3125	CH**42** 434.3375	CH**43** 434.3625	CH**44** 434.3875	CH**45** 434.4125
CH**46** 434.4375	CH**47** 434.4625	CH**48** 434.4875	CH**49** 434.5125	CH**50** 434.5375
CH**51** 434.5625	CH**52** 434.5875	CH**53** 434.6125	CH**54** 434.6375	CH**55** 434.6625
CH**56** 434.6875	CH**57** 434.7125	CH**58** 434.7375	CH**59** 434.7625	CH**60** 434.7875

Programming the transmitter functions

It is possible to program the following functions only using a transmitter unit **T5** or **T7**:
1 - Self cut-out
2 -Radio frequency output power
3 - Enabling of **AUXILIARY 7** button (relay CR13)
4 - Operation of **AUXILIARY 7** button (relay CR13 or A-B)
5 - Low power start-up

To enter **function programming** mode
- Supply power to the transmitter by releasing the red Stop/Emergency mushroom button.
- Press the buttons **3, 4, 7** together and simultaneously the Start button **S**, then release.

After this sequence the green Led blinks rapidly.
Programme the functions following the table given below.
Each time the button chosen (1, 2, 3, 4, 5) is pressed the associated function changes status as displayed by the red Led.
To quit programming mode, press the red Stop/Emergency mushroom button.

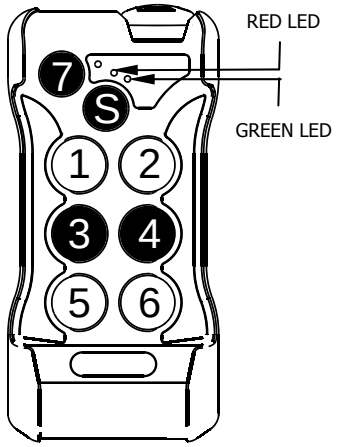


Figure 15

Button to press programmed function	Red Led Off	Red Led On	Red Led Blinking
Button 1 SELF CUT-OUT	**EXCLUDED**	**ACTIVE** after 3 minutes' inactivity	
Button 2 RADIO POWER	**MEDIUM**	**NORMAL**	**HIGH**
Button 3 AUXILIARY BUTTON	Button 7 **EXCLUDED**	Button 7 **ACTIVE**	Button 7 **ACTIVE** **Relay A – Relay A+ B with CR1 or CR3**
Button 4 AUXILIARY BUTTON	Button 7 ACTIVE **Relay CR13 Pulse**	Button 7 ACTIVE **Relay CR13 Step by step**	Button 7 ACTIVE **Relay A - Relay B - Relay A+B**
Button 5 LOW POWER START-UP	**EXCLUDED**	**ACTIVE**	

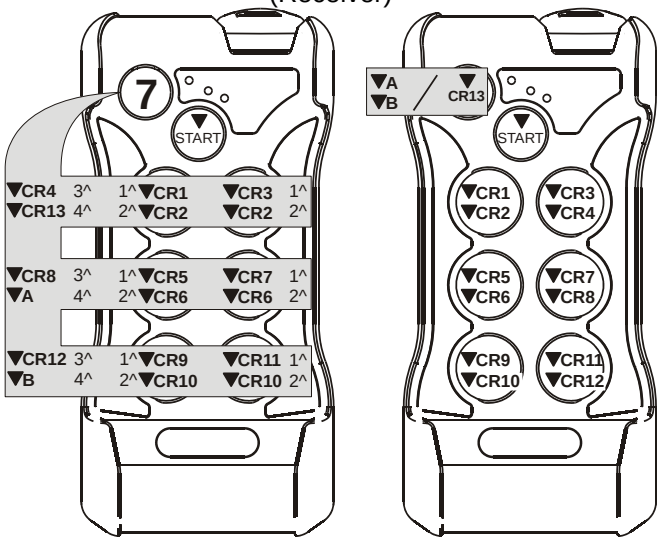
Change of receiver functions

Operate on the "FUNCTION CHANGE" wire jumpers inside the receiver.

Wire Jumper		RECEIVER OPERATION
1	Open	Frequency change blocked. The last frequency set becomes the working frequency and can no longer be changed. After this operation it is necessary to perform the procedure described in the chapter "Changing the transmitter" (page 15).
1	Closed	Frequency change released.
2	Open	Button **7** performs the function of 3rd and 4th speed (self-retaining relays) for the first control activated. When the button for the opposite control is pressed, the 3rd and 4th speed self-retaining relays are disconnected step by step. If two or more controls are activated at the same time, the function of the button T7 has no effect.
2	Closed	The second click of each button activates a relay of its own.

BUTTONS-RELAYS CORRESPONDENCE
(Receiver)

(Receiver) - WIRE JUMPER 2 OPEN



4 self-retaining speeds Recommended for CRANES

Recommended for Bridge Cranes

(Receiver) WIRE JUMPER 2 CLOSED

DIAGNOSTICS

If the radio-controlled machine is not working correctly, it is necessary to understand whether the problem depends on the machine or on the radio control device.
For thus purpose, connect the wired control and check that the machine works correctly without the radio control device.
If the machine works correctly without the radio control device, it is necessary to check the operation of the radio control device following the diagnostic procedure described below.

Diagnostics

OPERATING PRINCIPLE

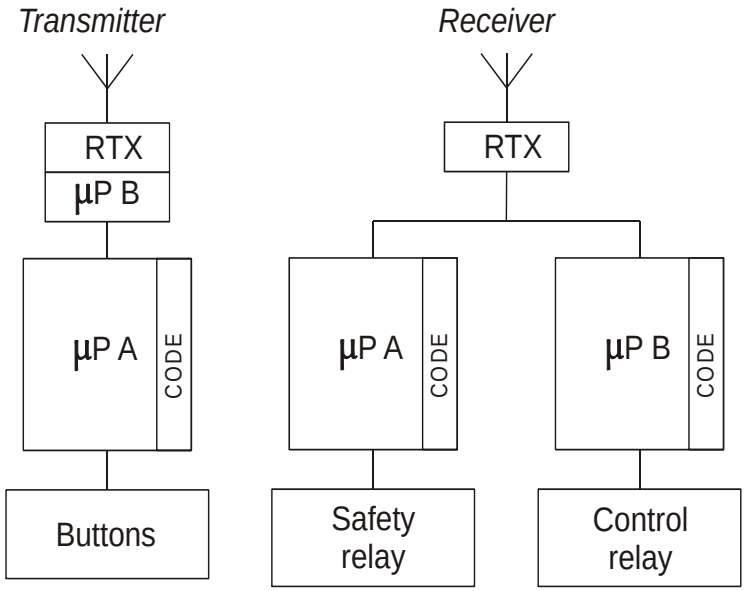
Description of the Transmitter

The commands given with the buttons are processed by the microprocessor which constructs the coupling telegram including the univocal code and sends it to the radio transmission module.

Description of the Receiver

The coupling telegram received by the radio receiving module is processed by both microprocessors µPA and µPB which check its authenticity, comparing it with the univocal code. If the data received are valid, microprocessor A activates the Safety Relays while microprocessor B activates the relays of the controls.
In the case of active or passive emergency commands, lack of radio signal or disturbance, the microprocessors A and B both block the operating machine.
The processing of the data is carried out independently in the two microprocessors. This means that safety is always guaranteed even in the case of a breakdown of one of the two microprocessors (redundant safety system).

Radio control device block diagram



Description of the coupling telegram

The telegram has a constant length, composed of 144 bits:
- 48 bits are dedicated to the start line;
- 48 bits are assigned to the coupling address between receiver and transmitter;
- 8 bits are used for the progressive count of the telegrams;
- 16 bits implement a protection algorithm with a marked probability of detecting errors lower than 10^{-8} (less than 1 in 100,000,000);
- 24 bits are used for the control code.

The 48 address bits are used to couple the transmitter to the receiver with a code which is set by the manufacturer and assigned univocally to each radio control device produced using the new and exclusive "REMSYS CODE" system.

IDENTIFICATION OF THE FUSES

Receiver (fig. 3)

- STOP RELAY fuse 5x20 **4 A**

- Power supply fuse
  Power supply 10-30 Vdc 5x20 **1.6 A**
  Power supply 24-48 Vac/Vdc 5x20 **1 A**
  Power supply 48-115 Vac/Vdc 5x20 **0.5 A**

TECHNICAL CHARACTERISTICS

Parameters of the Radio Control device

- Operative frequency available in the following ranges:
869.700 – 870.000 MHz/ Channelling pitch 25 kHz/ N° channels 11
433.050 – 434.790 MHz/ Channelling pitch 25 kHz/ N° channels 60
Hamming Code Distance > 4
Maximum number simultaneous commands: 10
Command response time: 50 ms
Active stop/emergency command response time: 50 ms
Passive emergency response time: 1 sec.
Range: 100 mt.
Operating and storage temperature: -20°C / +70°C

Receiver

Radio-frequency receiver: Single Chip
Aerial: ¼ λ integrated
Power of command relay contacts: 4A 115 Vac.
Power of stop relay contacts: 4A 115 Vac.
Power supply (depending on model):
- 10-30Vdc 1,0A
- 24-48Vac/dc 50-60 Hz 0.4A
- 48-115Vac/dc 50-60 Hz 0.4A
Container Rx-DIN T7: Modulbox for assembly on guide DIN EN 50022, degree of protection IP20, dimensions (L×H×D) 158×90×75 mm
Watertight case for outdoor assembly Ruby-T7: degree of protection IP65
Dimensions: (L×H×D) 169×266×89 mm
Watertight case for outdoor assembly ECOBOX: degree of protection IP65
Dimensions: (L×H×D) 124×176×45 mm

Transmitter

Modulation: Manchester FM encoding
Radio frequency output power: from -10 dBm to +7dBm
Oscillator: PLL digital synthesis
Aerial: ¼ λ integrated
Supply voltage: 3.6 Vdc.
Absorption: from 13.5 mA to 24 mA
Battery: integrated lithium ions 3.6V - 16.5Ah
Working life (medium power): up to 1200 hours (20°C)
Battery flat early warning: 30 hours
Casing: ABS, degree of protection IP65
Dimensions: (L×H×D) 174x85x37 mm
Weight: 350 g

GUARANTEE CONDITIONS

REMdevice guarantees the radio control device for 12 months.
The starting date of the guarantee period is that of the transport document.
The guarantee is valid only for appliances that present manufacturing defects. The radio control device MUST NOT have undergone attempted repairs, tampering, or replacement of parts by personnel not authorised by REMdevice.
The guarantee is void in the case of incorrect use or incorrect installation.
The appliances under guarantee must be repaired at an authorised service centre or directly at REMdevice.
The components in which manufacturing defects are found will be replaced free of charge; the transport costs for collecting and delivering the appliance are excluded.
This guarantee does not cover parts subject to wear.
REMdevice does not accept requests for refund for machine down times, since the operating machines are equipped with a wired pushbutton panel.
REMdevice does not answer for damage, loss, theft occurring during the transport of new or repaired appliances, or ones to be repaired.
REMdevice does not carry out operations (under guarantee or out of guarantee) on appliances without the serial number and without having had prior contact with the requesting party.

Manufacturer: REMdevice® s.r.l. **E-Mail: info@remdevice.com**
http://www.remdevice.com

Registered Head Office - Research and Development
REMdevice s.r.l.
via Roma n. 27
28010 Bogogno (NO)
ITALY

Commercial Offices - Production
REMdevice s.r.l.
via Mantegna n. 12
36061 Bassano del Grappa (VI)
ITALY
TEL +39 0424 500 262
FAX +39 0424 508 631