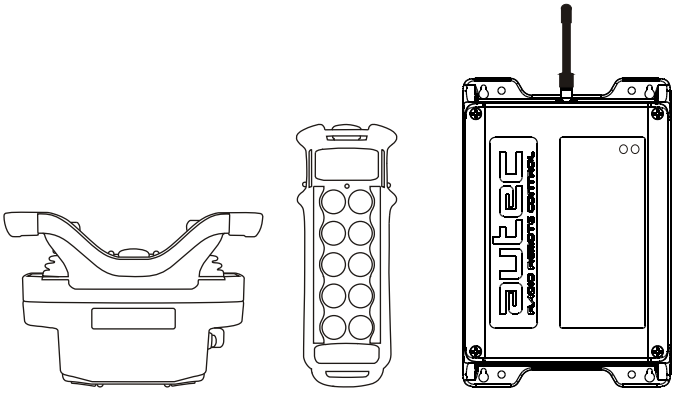
autec
RADIO REMOTE CONTROL

Modular Series

Master/Slave system
Master/Master system

User Manual



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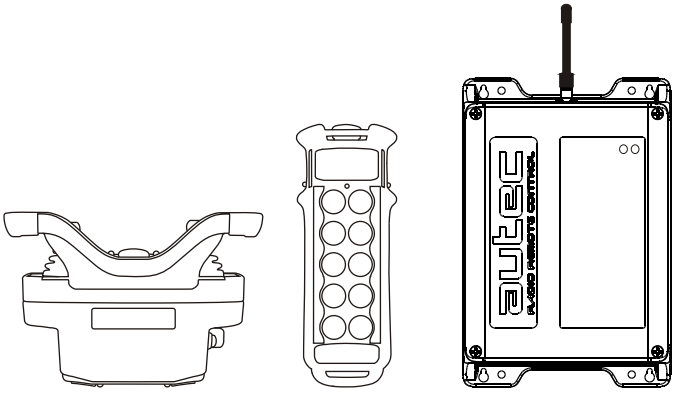

Follow the indications and warnings given by the machine producer regarding the machine on which the radio remote control is installed.

If this manual is lost or damaged, ask for a copy from Autec. Please specify the serial number of the related radio remote control.

Contact AUTEC if any of the instructions and/or warnings given in this manual is not clear.

The information contained in this manual is subject to modification without notice and is not binding.

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1 INTRODUCTION

1.1 Conventions

In this manual, all important information is highlighted in the following symbols and conventions:

WARNINGS

⚠ **abcd...** : This symbol highlights all extremely important indications and information: failure to observe them could cause grave danger to people or objects.

abcd... : **IMPORTANT TEXTS**

1.2 System description

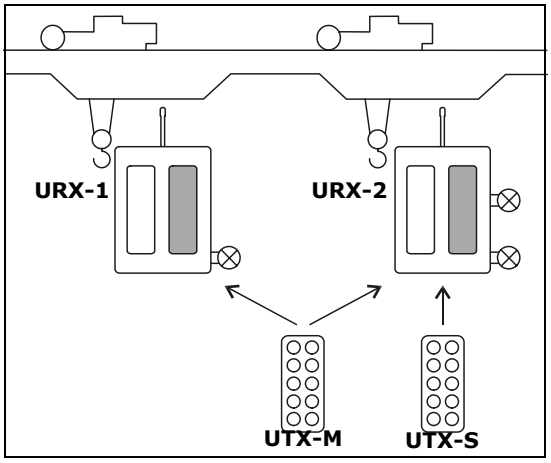
Industrial radio remote controls of the Modular series are used to control machines from a distance.
Each industrial radio remote control is made up of at least one portable transmitting unit, from which the user can remotely control the machine, and at least one receiving unit installed on board the machine itself.

Each transmitting unit uses radio frequencies to transmit a coded message which contains a value called address. Each receiving unit can only decode the messages coming from its own transmitting unit with the same address.
This excludes the possibility of an interference activating any system function. If the radio transmission is disturbed, incorrect or interrupted, the receiving unit autonomously stops the whole system thanks to the passive emergency function (passive stop).

The radio remote controls of the Modular series are equipped with a dual channel processing that protects the system "radio remote control+machine", when it is in neutral (standstill) position, from unintended movements caused by possible radio remote control single faults. Such safety function is only possible if the wiring instructions in the technical data sheet (see paragraph 1.5) and the regulations for correct installation are respected (see paragraph 3.4 or paragraph 3.5).

"Master/Slave" system A "Master/Slave" system consists of two transmitting units (called UTX-M and UTX-S) and of two receiving units (called URX-1 and URX-2).

⚠ **A "Master/Slave" system is designed and implemented so that all its units always work in the same working application, and they cannot be split into two independent radio remote controls.**

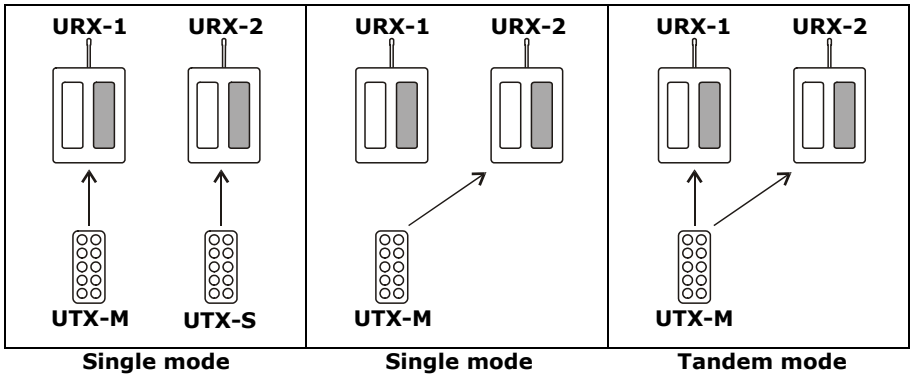


The transmitting unit UTX-M can work:
- in single mode, namely it can work with either of the two receiving units (either URX-1 or URX-2)
- in tandem mode, namely it can work with both receiving units simultaneously

The transmitting unit UTX-S can only work in single mode with the receiving unit URX-2.

The receiving unit URX-1 can only be controlled by the transmitting unit UTX-M.

The receiving unit URX-2 can be controlled by the two transmitting units, one at a time in an independent and exclusive way.

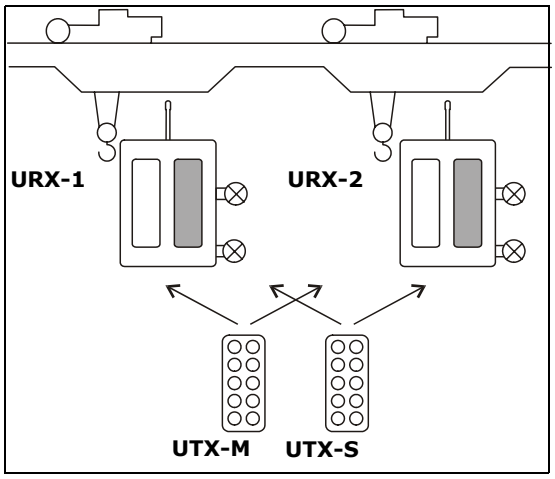


Radio transmission of a “Master/Slave” system uses two different addresses:
- one is used for the transmitting unit UTX-M, and can be decoded by both receiving units
- one is used for the transmitting unit UTX-S, and can only be decoded by the receiving unit URX-2.

“Master/ Master” system

A “Master/Master” system consists of two transmitting units (called UTX-M and UTX-S) and of two receiving units (called URX-1 and URX-2).

A “Master/Master” system is designed and implemented so that all its units always work in the same working application, and they cannot be split into two independent radio remote controls.

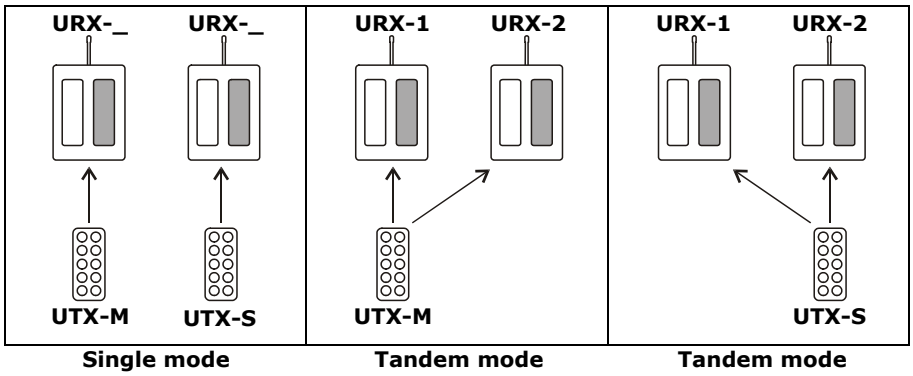


The transmitting unit UTX-M can work:
- in single mode, namely it can work with either of the two receiving units (either URX-1 or URX-2)
- in tandem mode, namely it can work with both receiving units simultaneously

The transmitting unit UTX-S can work:
- in single mode, namely it can work with either of the two receiving units (either URX-1 or URX-2)
- in tandem mode, namely it can work with both receiving units simultaneously

The receiving unit URX-1 can be controlled by the two transmitting units, one at a time in an independent and exclusive way.

The receiving unit URX-2 can be controlled by the two transmitting units, one at a time in an independent and exclusive way.



Radio transmission of a “Master/Master” system uses two different addresses:
- one is used for the transmitting unit UTX-M, and can be decoded by both receiving units
- one is used for the transmitting unit UTX-S, and can be decoded by both receiving units

1.3 Conformity

Each Modular series radio remote control is in conformity with FCC Rules (Part 90 for the transmitting unit and Part 15 for the receiving unit).

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 undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance 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.

Permitted uses **Permitted applications are hoisting machines (construction cranes, bridge cranes, machines for material handling in general,...).**

Forbidden uses Forbidden applications are:
- **machines installed in areas where equipment with explosion-proof characteristics is required**
- **machines for moving, raising and transporting people.**

Autec cannot be held responsible if the radio remote control is installed on applications that are different from those permitted.

Working conditions To guarantee correct radio remote control operation, all current regulations regarding safety at work and accident prevention should be respected. All applicable standards and regulations valid in the user country regarding the use of both the machine and the radio remote control must always be respected.
Autec cannot be held responsible if the radio remote control is used in unlawful working conditions.

System must be installed by a licensed technician and in accordance with all relevant local, state/provincial and federal regulations, including but not limited to NEC, OSHA, CE; etc.

1.4 Risk analysis

All warnings listed in this manual have to be taken into account during risk analysis and when setting out protection measures.

All machines must undergo a risk analysis: it is therefore necessary to evaluate, within the limits of this analysis, if the machine can be radio remote controlled.
Some warnings and information for risk analysis for one or more machines controlled by a “Master/Slave” or “Master/Master” system are provided in this paragraph.
Following information is NOT exhaustive and/or DOES NOT replace requirements of current regulations in this field.

Risk analysis must always be carried out bearing in mind that the radio remote control system consists of one or more transmitting units and of more receiving units.

The machine producer and/or the person who decides upon radio remote control use and installation is responsible for this analysis.

Autec cannot be held responsible if the risk analysis is not carried out correctly.

When carrying out risk analysis for the machine, the following aspects regarding the radio remote control have to be considered:
1. working application
2. loss of radio link
3. the unintended activation or loss of a command

Working application

Following has to be taken into account:
- wiring must guarantee correct operation according to whether the receiving unit is installed on a single machine or on different machines;
- if paired controls amongst the different machines are needed, the radio remote control cannot guarantee synchronism between the different receiving units;
- if the remote controlled machines are not within the same visual field, the operator should always be able to know which machines are being activated in a particular moment (i.e. through an acoustic or light signal).

Loss of radio link

It must be taken into account the fact that radio link with one or more receiving units can be lost due to radio interferences, power supply disconnection and electrical failures
Carefully evaluate which consequences such malfunction can have.

Activation and loss of a command

It must be taken into account that unintentional activation of a command and/or loss of command selection can be possible. Such unusual situations can be caused by electromechanical or mechanical failure of the system “machine+radio remote control”.
Carefully evaluate which consequences such malfunction can have.

If required by the risk analysis, draw up protection measures to prevent, reduce and report potential hazard situations.

1.5 Documentation

Instructions for the management of documentation

Documentation enclosed with each radio remote control includes at least the following:
- instruction and warnings manual
- battery charger manual
- technical data sheet.

Make sure that such documents have been supplied: if they are not, please ask them to Autec specifying the product serial number.

Technical data sheet

The technical data sheet shows the wiring diagram between the receiving unit and the machine. The technical data sheet must be filled in and checked by the installer, who is responsible for a correct wiring. Once all necessary checks have been carried out, the installer must undersign the technical data sheet, which must be kept with the user's manual (always keep a copy of this data sheet for administrative purposes).

Identification plates

The radio remote control identification and approval data is given on plates that are on both the transmitting unit and the receiving unit.
These plates MUST NOT be:
- **removed from their position**
- **altered or damaged in any case.**

1.6 Modular Series technical data

Frequency band with radio module E16S_XEU1	902 - 928 MHz
Available radio channels	32
Hamming distance	≥ 8
Probability of undetected error	<10 exp-11
Typical working range	330 ft [100 m]
Command response time	~ 100 ms
STOP command response time[a]	~ 100 ms
Passive emergency time (or passive stop)[b]	0.35/1 sec.
Safety function category according to the EN 954 - 1	
STOP protection	Cat. 3

a. valid when the radio link between transmitting and receiving unit is not disturbed.
b. depending on DIP nr. 1 settings, see paragraph 8.2.

Due to the characteristics of radio propagation (i.e.: EM interferences, near out-of-range condition), a delay up to one second may occasionally occur between command release and actual deactivation of the corresponding output. Care must be taken to ensure that this could never lead to a dangerous situation in the specific uses.

1.7 Frequencies

The radio frequency of Autec radio remote controls is included in the group of frequencies permitted by regulations that are current at the moment of radio remote control entry onto the market.

The two transmitting units UTX-M and UTX-S and the two receiving units URX-1 and URX-2 operate in manual selection mode: when operating in this mode it is possible to work at a specific frequency that must be set manually by programming the dip switches in the radio modules (see chapter 8).

Frequencies for the "Master/Slave"

Frequencies set in a "Master/Slave" system must undergo the following rules:
- **the transmitting unit UTX-M and the transmitting unit UTX-S must work at two different frequencies**
- **the receiving unit URX-1 must have the same working frequency as the transmitting unit UTX-M**
- **both working frequencies of the receiving unit URX-2 must be set as explained in paragraph 3.2.**

Frequencies for the "Master/Master"

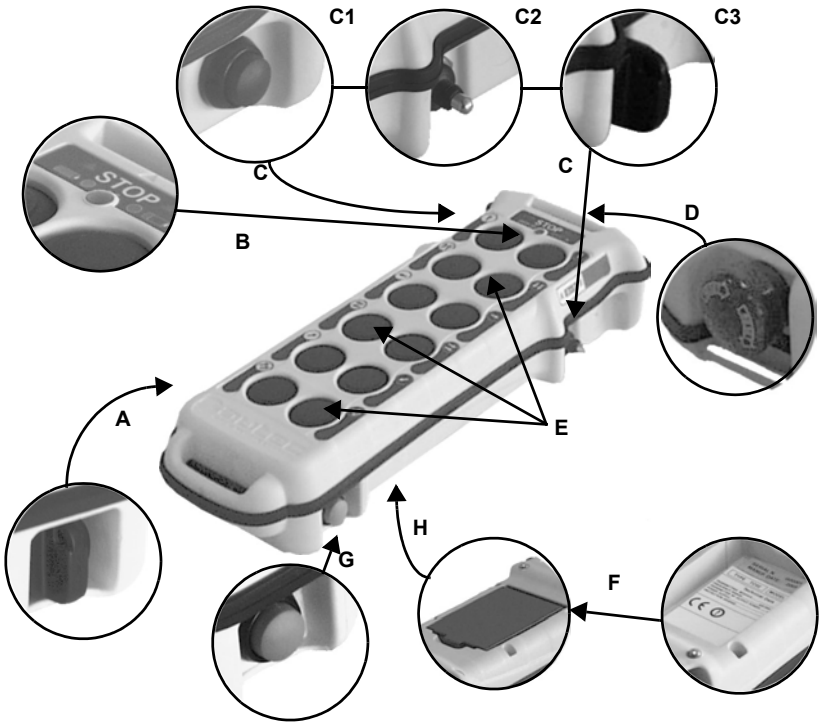
Frequencies set in a "Master/Master" system must undergo the following rules:
- **the transmitting unit UTX-M and the transmitting unit UTX-S must work at two different frequencies**
- **both working frequencies of the receiving unit URX-1 must be set as explained in paragraph 3.3.**
- **both working frequencies of the receiving unit URX-2 must be set as explained in paragraph 3.3.**

2 TRANSMITTING UNITS

2.1 Description of MK12 and MK10

(photos shown below only represent two of the possible configurations)

MK12



MK10

A	starting keyswitch			**D**	STOP pushbutton
B	signalling LED			**E**	pushbuttons
C	Actuator (if present)	**C1**	pushbutton	**F**	technical data plate, identification plate *(in the battery housing)*
		C2	toggle switch	**G**	START pushbutton
		C3	keyswitch selector	**H**	battery

Technical data

Power supply (battery pack MBM06MH)[a]	NiMH 7.2 Vdc
Antenna	internal
Battery capacity with fully charged battery (continuous use at 20°C)	15 hours
"Low battery" warning	3.5 min
Housing	PA 6 (20% fg)
Protection degree	NEMA 4 [IP65]
Dimensions	3.3" x 10.2" x 2" [85 x 260 x 50 mm]
Weight	1.4 lbs [650 g]
Transmitting power (frequency 433 MHz)	meets FCC Part 15 for free-license operation
Transmitting power (frequency 870 MHz)	meets FCC Part 15 for free-license operation

a. refer to battery technical data in the battery charger manual.

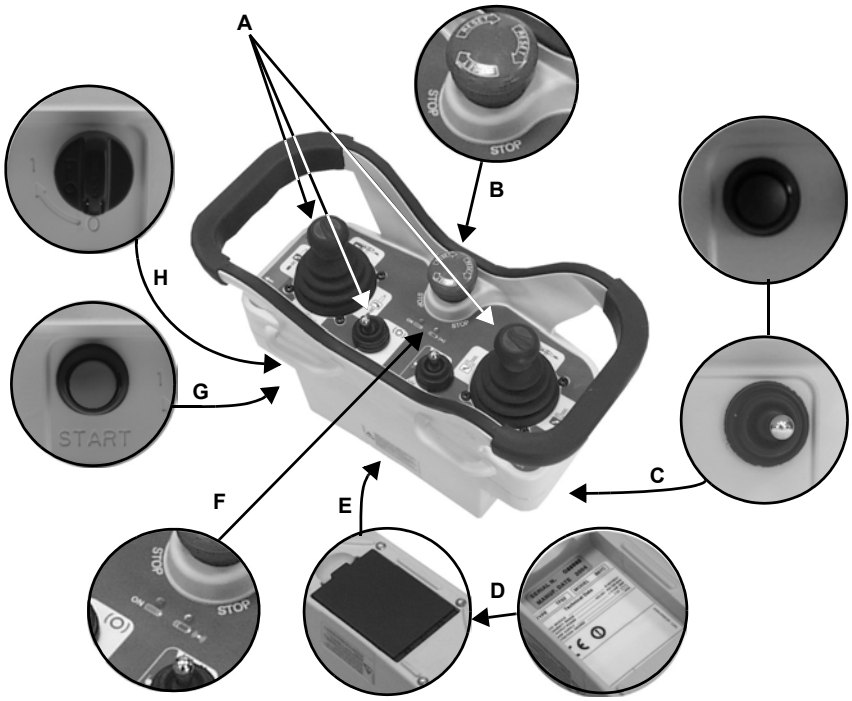
Climatic conditions

	Temperature	Relative Humidity	Air Pressure
Working	Class 4K4H -5°F to +130°F (-20°C to +55°C)	Class 4K4H 4% to 100% (0,9 g/m^3 to 36 g/m^3)	Class 4K4H 86 kPa to 106 kPa
Storage	Class 1K5 -40°F to + 160°F (-40°C to +70°C)	Class 1K3 5% to 95% (1 g/m^3 to 29 g/m^3)	Class 1K4 86 kPa to 106 kPa
Transportation	Class 2K3 -13°F to + 160°F (-25°C to +70°C)	Class 2K3 95% (60 g/m^3)	Class 2K3 70 kPa to 106 kPa

2.2 Description of MJ

(photos shown below only represent a possible configuration)

MJ



A	actuators *(joysticks and selectors)*	**E**	battery *(at the bottom)*
B	STOP pushbutton	**F**	signalling LED
C	pushbutton and/or selector (*optional*)	**G**	START pushbutton
D	identification plate and technical data plate *(in the battery housing)*	**H**	starting keyswitch

Technical data

Power supply (battery pack MBM06MH)[a] ..... NiMH 7.2 Vdc
Antenna ..... internal
Battery capacity with fully charged battery (continuous use at 20°C) ..... 14 hours
“Low battery” warning ..... 3.5 min
Housing ..... PA 6 (20% fg)
Protection degree ..... NEMA 4 [IP65]
Dimensions ..... 10" x 6.7" x 5"[255 x 170 x 126 mm]
Weight ..... 2.9 lbs [1.3 kg]
Transmitting power (frequency 433 MHz) .... meets FCC Part 15 for free-license operation
Transmitting power (frequency 870 MHz) .... meets FCC Part 15 for free-license operation

a. refer to battery technical data in the battery charger manual.

Climatic conditions

	Temperature	Relative Humidity	Air Pressure
Working	Class 4K4H -5°F to +130°F (-20°C to +55°C)	Class 4K4H 4% to 100% (0,9 g/m^3 to 36 g/m^3)	Class 4K4H 86 kPa to 106 kPa
Storage	Class 1K5 -40°F to + 160°F (-40°C to +70°C)	Class 1K3 5% to 95% (1 g/m^3 to 29 g/m^3)	Class 1K4 86 kPa to 106 kPa
Transportation	Class 2K3 -13°F to + 160°F (-25°C to +70°C)	Class 2K3 95% (60 g/m^3)	Class 2K3 70 kPa to 106 kPa

2.3 Warnings for the use of the transmitting units

FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS MAR RESULT IN SERIOUS INJURY OR DEATH TO PERSONNEL AND DAMAGE TO EQUIPMENT.

The user must always respect the following warnings:

Autec, or its distributors, cannot be held responsible if the radio remote control is installed on applications other than those permitted and if used in irregular working conditions.

The operator should always ensure that both units are complete and that the gaskets, bellows and hoods of the actuators (joysticks, selectors, pushbuttons) are whole. If they are not, the radio remote control must not be used before being repaired.

Visually follow all movements of all remote controlled machines and of all correspondent loads; the user must therefore be in a position that offers the best visibility condition of the whole area.

Before using the radio remote control always make sure that the STOP pushbutton can be pressed and released: if it does not work, do not use the radio remote control.

First switch on and start the transmitting unit, and then check that the STOP pushbutton works properly: if the machine movements are not stopped when it is activated, do not use the radio remote control.

Switch off the transmitting unit when work is interrupted. Avoid leaving the load suspended in the air (even when changing the battery).

Never leave the transmitting unit unguarded when the starting keyswitch is inserted.

Switch on or use the transmitting unit only when starting work: improper use could be hazardous.

Never switch on or use the transmitting unit in closed spaces, with the machine not in sight, or outside the typical working range.

When operating in tandem mode, always stay within the working range of both receiving units, in order to facilitate radio link with each of them and to be sure to control both receiving units.

Pay attention to the entire work area. Immediately press the STOP pushbutton in case of hazard.

If the two machines do not have an alignment control system (see paragraph 3.5), the user must be properly trained in order to operate correctly if loss of alignment occurs.
In this case, immediately release the active command and/or activate the STOP command.

Pay attention not to let elements such as concrete, sand, lime, etc. deposit on the transmitting unit because they can compromise transmitting unit use and safety.

In case of malfunctions and/or damaged and/or faulty parts, put the radio remote control out of use until the problem has been completely eliminated.

2.4 Warnings for the maintenance of the transmitting units

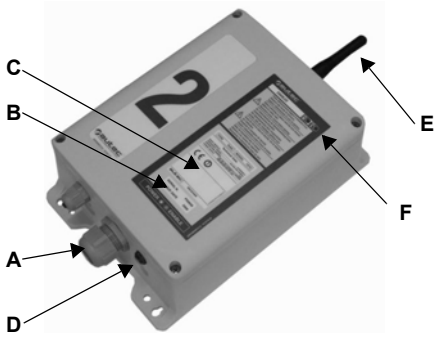
Ensure that the battery has been removed from the transmitting unit before carrying out any maintenance work.

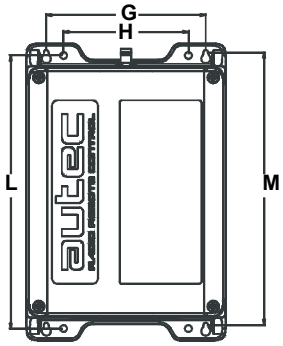
Any failures should be repaired by authorised Autec personnel using original Autec spare parts only.

In order to work with a unit that is always efficient and safe, it is necessary to carry out correctly maintenance work (see chapter 7).

3 RECEIVING UNIT

3.1 Description of the receiving unit





A	cable gland *(opt. plug)*
B	identification plate
C	technical data plate
D	POWER ENABLE light
E	antenna
F	"ENABLED" lights *(if present)*

Drilling template	
G	5.8" (148 mm)
H	4.6" (116 mm)
L	10" (253 mm)
M	10" (253 mm)

Number 1 or 2 on the receiving unit identifies respectively URX-1 and URX-2.

These receiving units are equipped with a safety function called SAFETY that protects the system "machine+radio remote control" from unintended movements, namely machine movements not activated intentionally by the user, but by possible electrical or mechanical failure of the radio remote control. Such safety function protects from failure the neutral (rest) position of the actuators in the radio remote control.

The SAFETY function is only active if both the wiring instructions in the technical data sheet and the prescriptions for correct installation included in the following manual are respected.

Receiving unit technical data

Supply voltage (POWER SUPPLY)

	Min.	**Nom.**	**Max**
Voltage (Vac)	18	**25**	30
	25	**35**	42
	36	**50**	62
	70	**110**	132
	150	**230**	250
Frequency (Hz)	50		60
Absorbed power (VA)		11	

Antenna ..... dedicated
STOP contact rated current ..... 4 A (250 Vac)
SAFETY contact rated current ..... 4 A (250 Vac)
Command contact rated current ..... 6 A (250 Vac)[a]
Fuse F1 (POWER SUPPLY) ..... 1.25 A T 250 V [0.2"x0.8" (5x20 mm)]
Fuse F2 and F3 (STOP circuit) ..... 4 A T 250 V [0.2"x0.8" (5x20 mm)]
Fuse F4 and F5 (SAFETY circuit) ..... 4 A T 250 V [0.2"x0.8" (5x20 mm)]
Housing ..... PA 6 (20% fg)
Protection degree ..... NEMA 4 [IP65]
Dimensions ..... 7.1" x 9.1" x 3.7" [180 x 230 x 95 mm]
Weight ..... 5.7 lbs [2.6 kg]

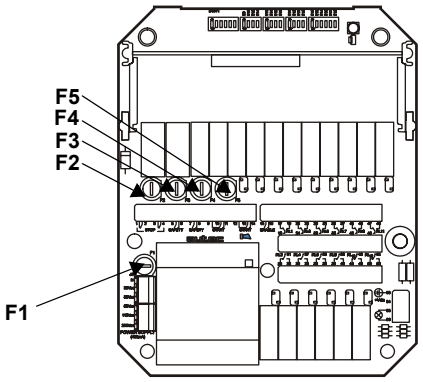
a. the rated current of commands contacts for the optional modules that may be present is indicated in the technical data sheet

Climatic conditions

	Temperature	Relative Humidity	Air Pressure
Working	Class 4K4H -5°F to +160°F (-20°C to +70°C)	Class 4K4H 4% to 100% (0,9 g/m^3 to 36 g/m^3)	Class 4K4H 86 kPa to 106 kPa
Storage	Class 1K5 -40°F to + 160°F (-40°C to +70°C)	Class 1K3 5% to 95% (1 g/m^3 to 29 g/m^3)	Class 1K4 86 kPa to 106 kPa
Transportation	Class 2K3 -13°F to + 160°F (-25°C to +70°C)	Class 2K3 95% (60 g/m^3)	Class 2K3 70 kPa to 106 kPa

3.2 Inner parts of the "Master/Slave" receiving units

Mother board The mother board in the receiving units is the E16B14AC.

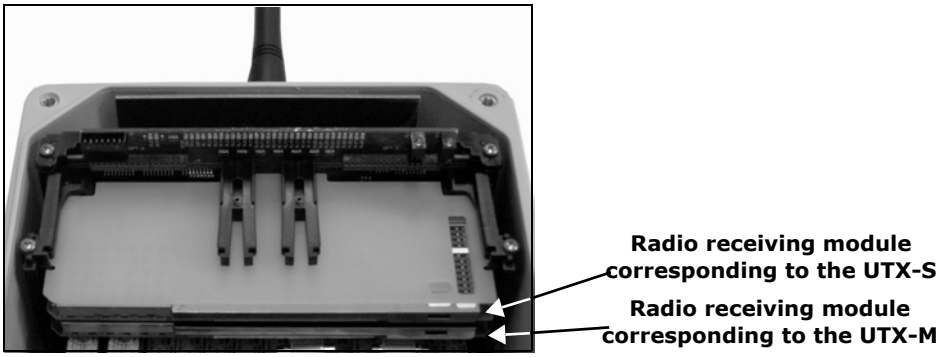


F1	POWER SUPPLY protection fuse
F2 and F3	STOP circuit protection fuses
F4 and F5	SAFETY circuit protection fuses

Bus board of the unit URX-1 The receiving unit URX-1 contains the bus board E16RI02B.

See paragraph 8.4 to program the bus board E16RI02B.

Bus board of the unit URX-2 The receiving unit URX-2 contains the bus board E16RI02D, where two radio receiving module have their seats; the one corresponds to the transmitting unit UTX-M and the other to the UTX-S.



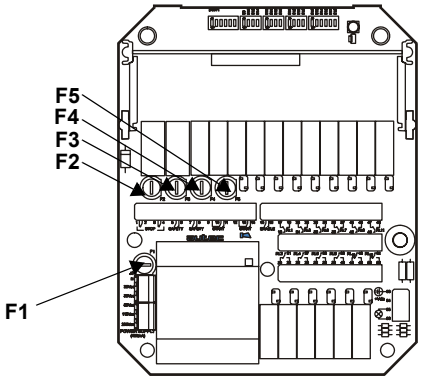
Position of the two radio receiving module is the one showed in the previous photo.

Frequencies set in the two radio receiving modules must undergo the following rules:
- **the radio receiving module corresponding to the transmitting unit UTX-M must have the same working frequency as the transmitting unit UTX-M**
- **the radio receiving module corresponding to the transmitting unit UTX-S must have the same working frequency as the transmitting unit UTX-S.**

See paragraph 8.4 to program the bus board E16RI02D.

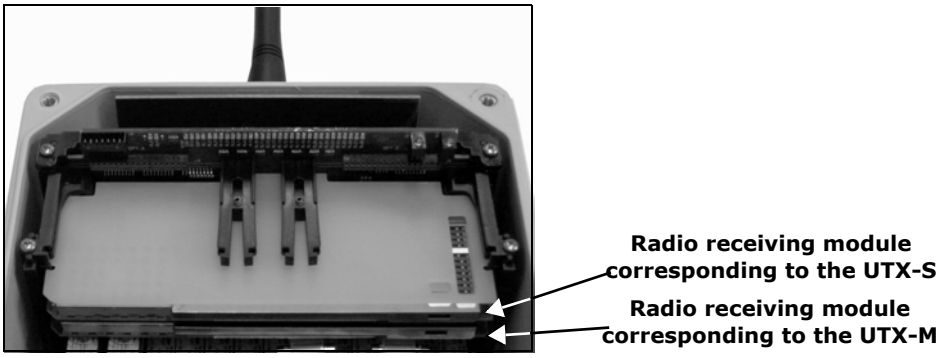
3.3 Inner parts of the "Master/Master" receiving units

Mother board The mother board in the receiving units is the E16B14AC.



F1	POWER SUPPLY protection fuse
F2 and F3	STOP circuit protection fuses
F4 and F5	SAFETY circuit protection fuses

Bus board The receiving units URX-1 and URX-2 contain the bus board E16RI02D, where two radio receiving module have their seats; the one corresponds to the transmitting unit UTX-M and the other to the UTX-S.



Position of the two radio receiving module is the one showed in the previous photo.

Frequencies set in the two radio receiving modules must undergo the following rules:
- **the radio receiving module corresponding to the transmitting unit UTX-M must have the same working frequency as the transmitting unit UTX-M**
- **the radio receiving module corresponding to the transmitting unit UTX-S must have the same working frequency as the transmitting unit UTX-S**

See paragraph 8.4 to program the bus board E16RI02D.

3.4 General warnings for the installation of the receiving unit

FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS MAR RESULT IN SERIOUS INJURY OR DEATH TO PERSONNEL AND DAMAGE TO EQUIPMENT.

Installation must only be carried out by qualified people and in accordance with installation country rules.

The installer must always respect the following warnings:

Place the receiving unit vertically, with the cable gland (or plug) facing down.

Install the receiving unit so that the radio link is facilitated.
- **the receiving unit must not be shielded by metal objects**
- **the antenna stylus must be at least 50 cm far from metal objects in its surroundings**

WARNING: If the receiving unit is covered by metal structures or installed inside metal cabinets, use the appropriate extension kit for the antenna.

In this case, install the antenna in a vertical position, and possibly place it near the work area.

Place the receiving unit so that it can be reached easily.

Fix the receiving unit in 4 points, using the specific holes in the housing and the specific vibration dampers.

Do not modify or tamper with the radio remote control, the machine or its electrical panel. Do not perforate the receiving unit in any case.

Check that the receiving unit power supply is within the voltage range given in the "Technical Data", and that the voltages and currents being used do not exceed the maximum permitted values.

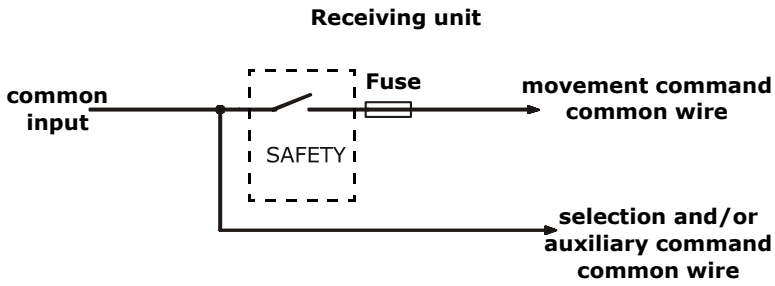
Do not bypass the radio remote control safety devices and/or those present inside the machine.

Respect the IEC60204-32 (for hoisting machines) and/or IEC60204-1 prescriptions (for machines).

Never power on the receiving unit directly from the mains. A main switch should always be present to allow power supply removal.

Remember to carefully wire the SAFETY contact in series with the movement commands inside the receiving unit.

(wiring example)



After installation and wiring, always check that the manoeuvres carried out are exactly the same as the commands given (in particular check the STOP command).

Group the wiring away from the radio modules in order to avoid interferences and hazards related to electrical safety.

Never remove the jumper between the STOP-command contacts 2 and 3, unless a circuit with 2 separate contacts (4 wires) is required. If removed, the STOP circuit could loose its safety functions.

When maintenance is carried out on the machine (i.e. when soldering), remove power supply by disconnecting all electric connections (both during installation and during normal operation).

The installer must CHECK and/or FILL IN the "Technical Data Sheet", indicating the date the system has been put into service, signing and stamping it.

3.5 Specific warnings for the installation of the receiving unit

IEC60204

Pursuant to section 9.2.7.5 of the IEC60204-1 (and IEC60204-32), installation of two different lamps (or horns) in the receiving units, connected to the dedicated terminals ENA-M and ENA-S (as explained in the technical data sheet) is recommended.
These two signal devices indicate the working status of the receiving units (see chapter 4 for the "Master/Slave" system and chapter 5 for the "Master/Master" system).

Wiring

The installer must carry out wiring and/or check that this one assures correct operation of the machines working together.

Wiring is fundamental for the system to operate in a correct and safe way, as it is for all radio remote controls with different receiving units. In some cases wiring could be the only way to implement any possible measure for risk reduction.

For example, given the possibility to use the same commands in different receiving units on different machines or parts of a machine, it is fundamental to carry out appropriate wiring to implement any possible measure for risk prevention, reduction and signalling in the various situations.

Radio link

Install the two receiving units and their antennas so that the radio link is facilitated.
- **minimum distance between the two units or antennas must be more than 3 meters**
- **maximum distance between the two units or antennas must be shorter than twice the typical working range of the radio remote control**

Alignment control

While operating in tandem mode, if unusual adverse conditions occur (such as electromagnetic disturbance, interferences or failure and disconnection) a transmitting unit could lose radio link with only one of the two receiving units. Correct installation of the two receiving units reduces considerably likelihood that such a situation occurs because of radioelectrical causes.

A "Master/Slave" or "Master/Master" system does non assure alignment between the remote controlled machines: if required in the risk analysis, it must be installed an alignment control system that intervenes properly.

3.6 Warnings for the maintenance of the receiving unit

Ensure that the receiving unit has been disconnected from the power source before carrying out any maintenance work.

Any failures should be repaired by authorised Autec personnel using original Autec spare parts only.

In order to work with a unit that is always efficient and safe, it is necessary to carry out correctly maintenance work (see chapter 7).

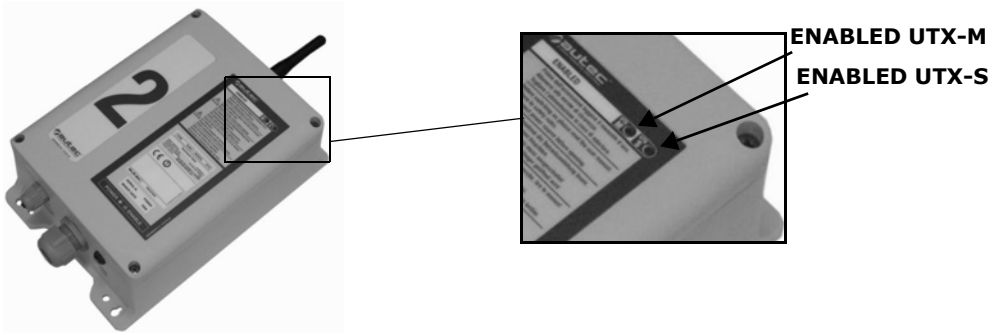
3.7 External signal lights of the receiving unit

POWER ENABLE light Each receiving unit is equipped with a status indicating light:

Signal type	Meaning
Light switched off	receiving unit not powered on
Steady light	receiving unit powered on (POWER ON)
Blinking light	radio link between transmitting and receiving unit is present (ENABLE ON)

ENABLED lights in "Master/ Slave" The receiving unit URX-2 has two "ENABLED" lights that indicate its status in relation to the transmitting units:

Signal type	ENABLED UTX-M	ENABLED UTX-S
Light off	the receiving unit URX-2 is free from the transmitting unit UTX-M	the receiving unit URX-2 is free from the transmitting unit UTX-S
Steady light	the receiving unit URX-2 is engaged by the transmitting unit UTX-M	the receiving unit URX-2 is engaged by the transmitting unit UTX-S



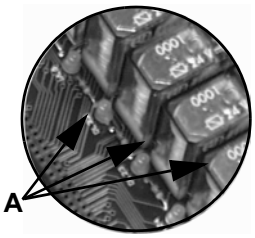
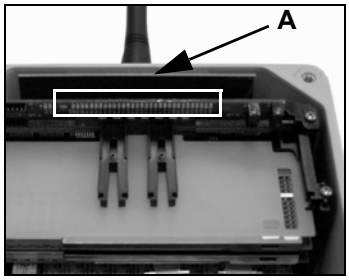
ENABLED lights in "Master/ Master" The receiving units have two "ENABLED" lights that indicate their status in relation to the transmitting units:

Signal type	ENABLED UTX-M	ENABLED UTX-S
Light off in the unit URX-1	the receiving unit URX-1 is free from the transmitting unit UTX-M	the receiving unit URX-1 is free from the transmitting unit UTX-S
Steady light in the unit URX-1	the receiving unit URX-1 is engaged by the transmitting unit UTX-M	the receiving unit URX-1 is engaged by the transmitting unit UTX-S
Light off in the unit URX-2	the receiving unit URX-2 is free from the transmitting unit UTX-M	the receiving unit URX-2 is free from the transmitting unit UTX-S
Steady light in the unit URX-2	the receiving unit URX-2 is engaged by the transmitting unit UTX-M	the receiving unit URX-2 is engaged by the transmitting unit UTX-S

3.8 Internal signal lights of the receiving unit

Relay LEDs

The activation of each relay on the mother board E16B14AC is signalled by a LED (A) near the relay. The same indication is also given in the bus board (E16RI02_).

Mother board	E16RI02_ bus board
	

LED on the radio module

Three LEDs are present on the receiving module, that indicate:

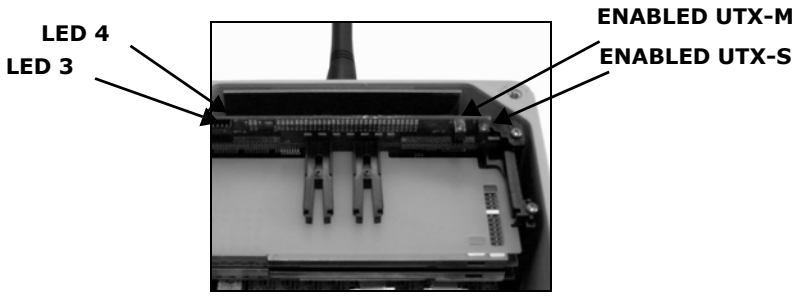
1. power supply on
2. radio link on
3. frequency scanning search

LEDs in the bus board

Two diagnostic LEDs are present both on the bus board E16RI02B and on the bus board E16RI02D indicating:

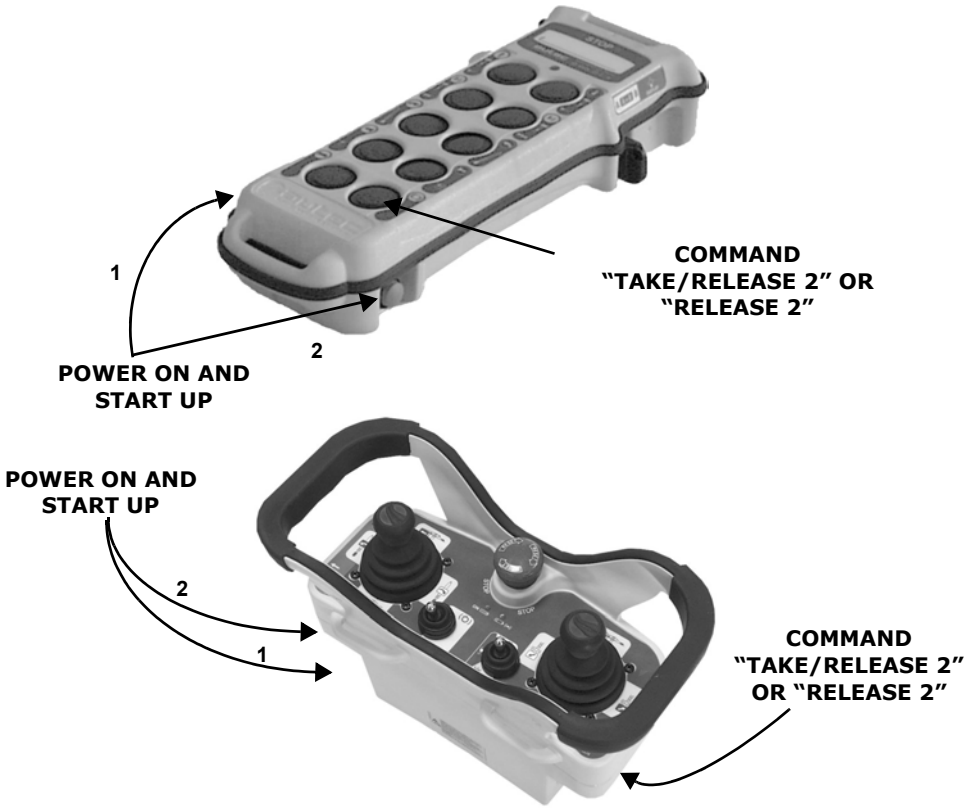
LEDs	Meaning
LED 3 (green)	power supply on
LED 4 (red)	code alarm in the data memory (see paragraph 9.2)

The lights ENABLED UTX-M and ENABLED UTX-S (see paragraph 3.7) are also present in the bus board E16RI02D.



4 OPERATING MODE OF "MASTER/SLAVE"

4.1 Command "Take/Release 2" or "Release 2"



Transmitting unit UTX-M

The transmitting unit UTX-M has a "Take/Release 2" command that engages and releases the receiving unit URX-2.
In order for the transmitting unit UTX-M to take control of the receiving unit URX-2 during start up or working:
- press the START pushbutton and do not release it until the lamp (or horn) ENA-M of the receiving unit URX-2 switches on with **ON blinking fast**
- activate the "Take/Release 2" command within 3 seconds

A **steady ON** signal of the lamp (or horn) ENA-M indicates that the connection has succeeded.

From now on, the transmitting unit UTX-M completely controls the receiving unit URX-2, which cannot be used by the transmitting unit UTX-S.
In order to release the receiving unit URX-2, activate the command "Take/Release 2" again. An **OFF** status of the lamp (or horn) ENA-M confirms that the unit has been released. When the transmitting unit UTX-M is switched off but has not released the receiving unit URX-2, the lamp (or horn) ENA-M stays **ON blinking slowly**.

Transmitting unit UTX-S

The transmitting unit UTX-S has a "Release 2" command to release the receiving unit URX-2.
During start up the transmitting unit UTX-S engages automatically the receiving unit URX-2, if it is free: press the START pushbutton and do not release it until the lamp (or horn) ENA-S switches on with **steady ON**.
From now on, the transmitting unit UTX-S completely controls the receiving unit URX-2, which cannot be used by the transmitting unit UTX-M.
In order to release the receiving unit URX-2, activate the command "Release 2". An **OFF** status of the lamp (or horn) ENA-S confirms that the unit has been released. When the transmitting unit UTX-S is switched off but has not released the receiving unit URX-2, the lamp (or horn) ENA-S stays **ON blinking slowly**.

Status of the receiving unit URX-2

The receiving unit URX-2 has three working modes:
- **free**: it can be used by the transmitting unit that first requests its control. The receiving unit has this status when the lamps or horns (if present) are not switched on
- **engaged**: it is reserved but not used by one of the transmitting units, which is off. It cannot be used by the other transmitting unit until it is released and therefore set to the free status by the transmitting unit that is controlling it. The receiving unit has this status when one of the two lamps (or horns) ENA-M or ENA-S is **ON blinking slowly**
- **engaged and used**: it is reserved and used by one of the two transmitting units and cannot be used by the other until it is released and therefore set to the free status by the transmitting unit that is controlling it. The receiving unit has this status when one of the lamps or horns (if present) is not switched on.

Signal type	LAMP (OR HORN) connected to the terminal ENA-M	LAMP (OR HORN) connected to the terminal ENA-S
OFF	the receiving unit URX-2 is free from the transmitting unit UTX-M	the receiving unit URX-2 is free from the transmitting unit UTX-S
ON blinking fast (3 sec.)	the receiving unit URX-2 waits to be engaged by the transmitting unit UTX-M (during start up)	//
steady ON	the receiving unit URX-2 is used by the transmitting unit UTX-M	the receiving unit URX-2 is used by the transmitting unit UTX-S
ON blinking slowly	the receiving unit URX-2 is engaged by the transmitting unit UTX-M	the receiving unit URX-2 is engaged by the transmitting unit UTX-S

A transmitting unit that has engaged the receiving unit URX-2 keeps control on it even after the STOP pushbutton has been activated or after the transmitting unit has been switched off.
The receiving unit URX-2 gets back to its free status:
- **if it is disconnected from its power source**
- **if it is released by the transmitting unit that had engaged it; release takes place when the "Take/Release 2" or "Release 2" command is activated.**

4.2 Power on and start up

Transmitting unit UTX-M

The following procedure allows the transmitting unit UTX-M to work with the receiving unit URX-1 only (single mode):
1. To switch on the transmitting unit UTX-M, insert the starting keyswitch and turn it to "I" position.
2. To start the radio remote control functions, press the START pushbutton for 3-4 seconds. After start up, the green signalling LED in the transmitting unit always lights up.

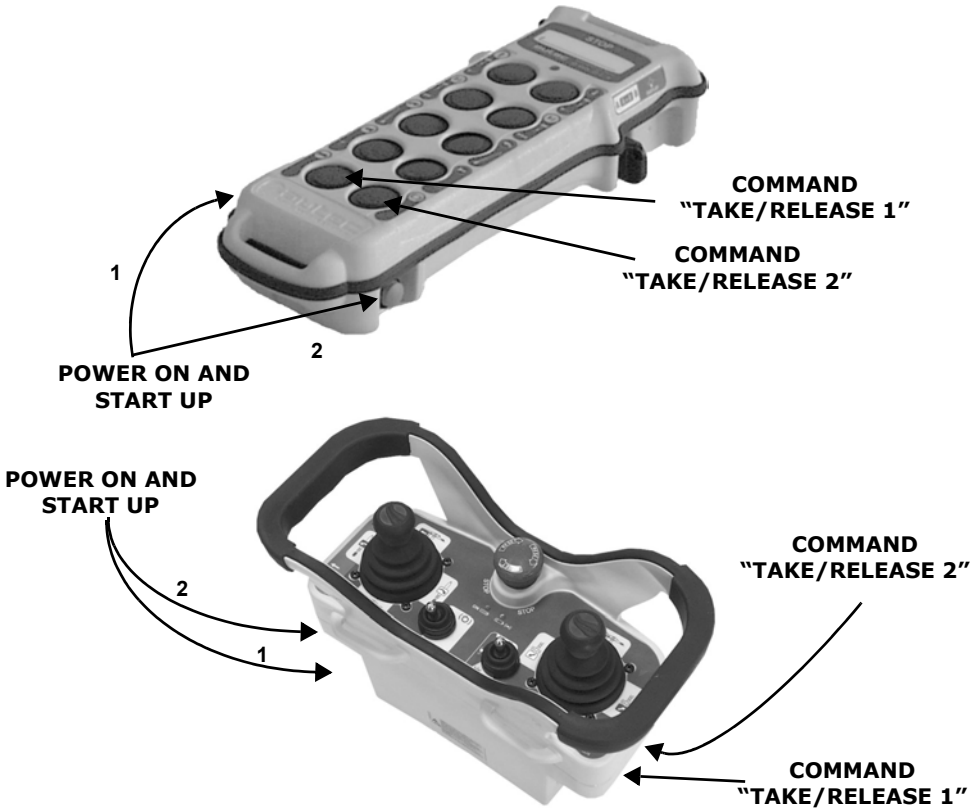
In order to engage the receiving unit URX-2 (single or tandem mode), follow the procedure in paragraph 4.1.
In order to activate commands, follow instructions given in paragraph 6.1.

Transmitting unit UTX-S

The following procedure allows the transmitting unit UTX-S to engage the receiving unit URX-2 when it is free (single mode):
1. To switch on the transmitting unit UTX-S, insert the starting keyswitch and turn it to "I" position.
2. In order to start the functions of the radio remote control, keep the START pushbutton pressed until the lamp (or horn) ENA-S **switches ON steadily**. After start up, the green signalling LED in the transmitting unit always lights up.

5 OPERATING MODE OF "MASTER/MASTER"

5.1 Command "Take/Release"



The transmitting unit UTX-M and the transmitting unit UTX-S have a "Take/Release 1" command and a "Take/Release 2" command that engage and release respectively the receiving unit URX-1 and the receiving unit URX-2.

In order for one of the transmitting units take control of a receiving unit during start up or working:
- press the START pushbutton and do not release it until the lamps (or horns) ENA-M or ENA-S of the receiving units switches on with **ON blinking fast**
- activate within 3 seconds the "Take/Release" command related to the receiving unit to be engaged

A **steady ON** signal of the related lamp (or horn) indicates that the connection has succeeded.

From now on, the transmitting unit completely controls the receiving unit, which cannot be used by the other transmitting unit.
In order to release the receiving unit, activate once again the corresponding "Take/Release" command. An **OFF** status of the related lamp (or horn) confirms that the unit has been released.
When a transmitting unit is switched off without having released a receiving unit, the related lamp (or horn) is **ON blinking slowly**.

Receiving units status

The two receiving units have three working modes:
- **free**: it can be used by the transmitting unit that first requests its control. The receiving unit has this status when the lamps or horns (if present) are not switched on
- **engaged**: it is reserved but not used by one of the transmitting units, which is off. It cannot be used by the other transmitting unit until it is released and therefore set to the free status by the transmitting unit that is controlling it. The receiving unit has this status when one of the two lamps (or horns) ENA-M or ENA-S is **ON blinking slowly**
- **engaged and used**: it is reserved and used by one of the two transmitting units and cannot be used by the other until it is released and therefore set to the free status by the transmitting unit that is controlling it. The receiving unit has this status when one of the lamps or horns (if present) is not switched on.

Signal type	LAMP (OR HORN) connected to the terminal ENA-M	LAMP (OR HORN) connected to the terminal ENA-S
OFF	the receiving unit URX-1 or URX-2 is free from the transmitting unit UTX-M	the receiving unit URX-1 or URX-2 is free from the transmitting unit UTX-S
ON blinking fast (3 sec.)	the receiving unit URX-1 or URX-2 waits to be engaged by the transmitting unit UTX-M (during start up)	the receiving unit URX-1 or URX-2 waits to be engaged by the transmitting unit UTX-S (during start up)
steady ON	the receiving unit URX-1 or URX-2 is used by the transmitting unit UTX-M	the receiving unit URX-1 or URX-2 is used by the transmitting unit UTX-S
ON blinking slowly	the receiving unit URX-1 or URX-2 is engaged by the transmitting unit UTX-M	the receiving unit URX-1 or URX-2 is engaged by the transmitting unit UTX-S

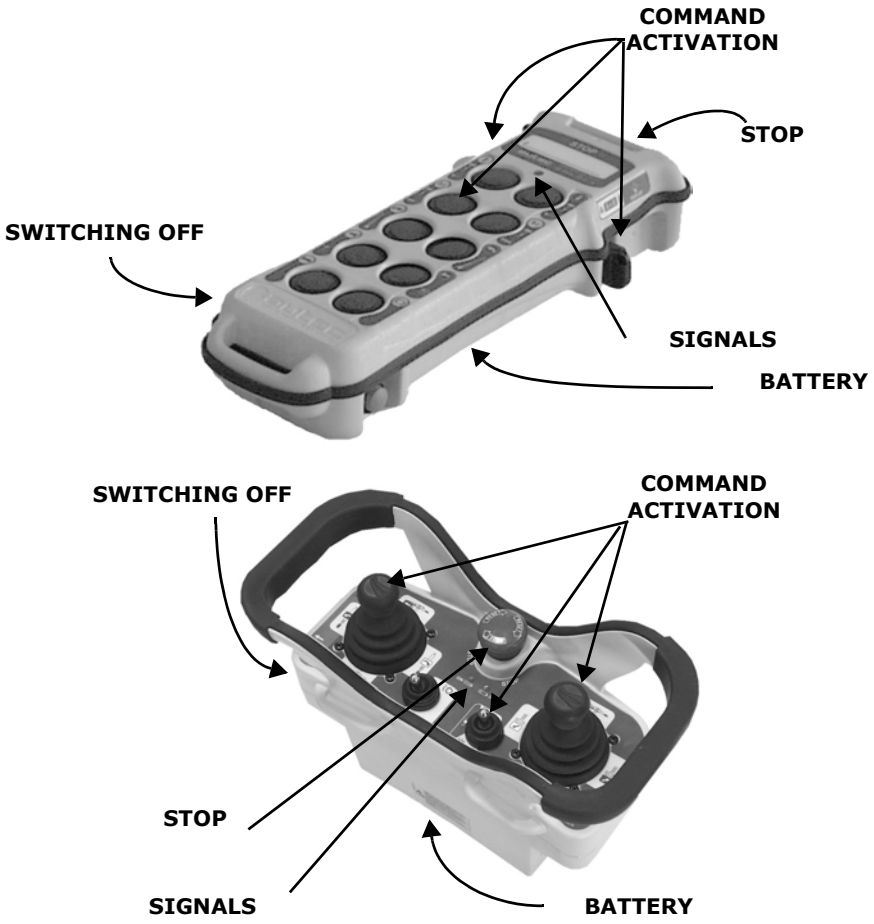
A transmitting unit that has engaged a receiving unit keeps control on it even after the STOP pushbutton has been activated or after the transmitting unit has been switched off.
A receiving unit gets back to its free status:
- **if it is disconnected from its power source**
- **if it is released by the transmitting unit that had engaged it; release takes place when the "Take/Release" command is activated.**

5.2 Power on and start up

Follow this procedure to switch on and start up the transmitting units:
1. To switch on a transmitting unit, insert the starting keyswitch and turn it to "I" position.
2. To start the radio remote control functions, press the START pushbutton without releasing it for 3-4 seconds. In order to engage a receiving unit, follow the procedure in paragraph 5.1. After start up, the green signalling LED in the transmitting unit always lights up.

In order to engage the receiving unit, follow the procedure in paragraph 5.1.
In order to activate commands, follow instructions given in paragraph 6.1.

6 OPERATING MODE OF THE TRANSMITTING UNITS



6.1 Command activation

Activate the joysticks, pushbuttons and/or selectors related to any of the movement or selection commands to be carried out.

Selector 1/1+2/2 in a Master/Slave

The transmitting unit UTX-M has a selector 1/1+2/2 to select the working position:
- position 1 (single mode): the transmitting unit UTX-M works with the receiving unit URX-1
- position 1+2 (tandem mode): the transmitting unit UTX-M works both with the receiving unit URX-1 and the receiving unit URX-2 (in this case the transmitting unit UTX-M must previously engage the receiving unit URX-2: see paragraph 4.1)
- position 2 (single mode): the transmitting unit UTX-M works with the receiving unit URX-2 (in this case the transmitting unit UTX-M must previously engage the receiving unit URX-2: see paragraph 4.1)

Selector 1/1+2/2 in a Master/Master

The transmitting units UTX-M and UTX-S have a selector 1/1+2/2 to select the working position:
- position 1 (single mode): the transmitting unit works with the receiving unit URX-1
- position 1+2 (tandem mode): the transmitting unit works both with the receiving unit URX-1 and with the receiving unit URX-2
- position 2 (single mode): the transmitting unit works with the receiving unit URX-2

Selection of the desired position with the toggle switch is only possible after the transmitting unit has engaged the receiving unit/s needed for working (see paragraph 5.1).

6.2 STOP

The STOP pushbutton should be pressed when it is necessary to stop the machine immediately when a dangerous condition should occur.

To stop the machine **immediately**, press the STOP pushbutton.
To **start working again**, after checking that the working conditions are safe, turn the STOP pushbutton in the direction indicated to deactivate it and repeat the starting procedure.

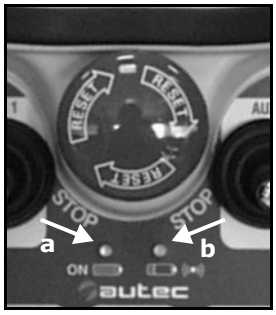
The STOP circuit complies with category 3 according to the EN 954 - 1.

6.3 Battery

To recharge a low battery, proceed as follows:
1. Insert the battery into its proper battery charger, which should be positioned in an area with a temperature between +5°C and +45°C: the battery now starts charging, a state signalled by the lighting up of the “CHARGE” pilot light.
2. After a maximum of 3 hours the “CHARGE” light switches off: the battery is fully charged. Remove the battery from the charger (if the battery is not removed, the charger switches to trickle charging).

Read and stick to the warnings given in the battery charger manual in order to lengthen the life of the battery itself.

6.4 Signals



TYPE	MEANING	ACTION
green LED blinks	NORMAL OPERATION	///
red LED blinks, and intermittent sound of the buzzer	LOW BATTERY: the transmitting unit switches off 3.5 minutes after the LED starts blinking	switch off the transmitting unit and replace the battery
red LED with steady light at starting, and continuous sound of the buzzer	ONE OR MORE (movement) ACTUATORS and/or STOP PUSHBUTTON are ACTIVATED	Disconnect all actuators and/or the STOP pushbutton

6.5 Switching off

The transmitting unit should be switched off each time work is stopped by turning the starting keyswitch to “O” position and extracting it (always put the key in a safe place).

The transmitting unit may also switch off automatically if the battery is not sufficiently charged and/or when the radio remote control is not used for more than 3 and a half minutes (see paragraph 8.1, DIP nr. 1 settings).

7 MAINTENANCE

These instructions do not in any case substitute the norms and laws that regulate work safety, nor do they limit the responsibility of the purchaser and user of the radio remote control.
All control and maintenance actions carried out on the radio remote control must be verified and recorded by the person in charge of carrying out maintenance on the machine.

Before carrying out maintenance, it is recommended to replace the battery with a charged one and to ensure the efficiency of the starting keyswitch.

After each maintenance action, always make sure that commands sent by the transmitting unit only activate the corresponding expected operations.

Routine maintenance carried out as described in this manual is fundamental for using the radio remote control safely.

7.1 Routine maintenance

Routine maintenance consists of operations carried out to maintain (through verifications, restoration, programmed replacements) the use and working conditions foreseen by Autec when the product is placed on the market.

Special applications may need more specific routine maintenance actions to be carried out at different periods.
All given instructions must be followed correctly each time the machine and the radio remote control are put into service.

Component	Interval			
	Daily	Every 3 months	Every 6 months	Every 12 months
Transmitting units	X			
Receiving units		X		
Electrical operation			X	
External electrical conductors				X

If problems are noted while carrying out routine maintenance, disable the system "machine+radio remote control" and follow the indications provided in chapter 9.

Transmitting units

Every day:
1. remove dust or accumulations of other material from the transmitting unit: never use solvents or flammable/corrosive materials to clean, and do not use high pressure water cleaners or steam cleaners
2. store the transmitting unit in clean and dry areas
3. make sure that the gaskets, bellows and caps of the joysticks, selectors and pushbuttons are intact, soft and elastic
4. make sure that the battery housing and the battery contacts are always clean
5. check structural integrity of the transmitting unit
6. make sure that the panel symbols can be easily recognised and replace the panel if necessary
7. check that the identification plate is readable and not damaged
8. make sure that the STOP pushbutton works properly before using the radio remote control
9. check that the selector 1/1+2/2 works properly before starting to work.

Receiving units

Every 3 months:
1. remove dust or accumulations of other material from the receiving unit: never use solvents or flammable/corrosive materials to clean, and do not use high pressure water cleaners or steam cleaners
2. check structural integrity of the receiving unit
3. check that the internal wiring of the receiving unit is intact and connected
4. make sure that the panel symbols can be easily recognised and replace the panel if necessary
5. check that the identification plate is readable and not damaged

Electrical operation

Every six months:
1. make sure that all the relay contacts of the receiving unit operate correctly, and check that the contact closes when the corresponding manoeuvre is enabled and opens when the manoeuvre is disabled
2. check the correct correspondence between the commands that are sent and the manoeuvres that are carried out
3. check that the contact for the SAFETY relay is open when no movement command has been sent. This is safety critical maintenance. it is necessary to keep a record (date, signature,

comments) showing that this check has been regularly carried out. Keep the record together with other installation documents.

External electrical conductors

Every twelve months:
1. make sure that the cable which connects the receiving unit to the machine is intact along the full length
2. make sure that the connecting plugs and sockets are intact and connected
3. check the strips or other fixing systems and replace them if necessary
4. make sure that the connecting cable is not damaged, particularly at the cable glands

7.2 Special maintenance

Special maintenance consists of operations carried out in order to restore use and working conditions foreseen when the product is placed on the market; this happens through non-programmed replacement of damaged or worn out parts or components with original parts or components.

Always ensure that the receiving unit has been disconnected from the power source and that the battery has been removed from the transmitting unit before carrying out any special maintenance work.

Any fault should be repaired by authorised personnel (contact Service), using original Autec spare parts only.

The following radio remote control data must be communicated in order to make interventions faster and more reliable:
- serial number
- purchase date (given on the certificate of guarantee)
- description of the problem found
- address and telephone number of the place where the device is being used (with the name of the person to contact)
- local supplier.

It is recommended to read and understand all parts of this manual, and make sure that all the instructions it contains have been followed correctly before contacting the Service Technicians.

7.3 Disposal

When disposing of a radio remote control, give it to the waste separate collecting services in the user's country.
Please pay particular attention when recycling the batteries, applying local rules. Do not throw them away with domestic trash.

8 PROGRAMMING

The dip switches can only be programmed by authorised personnel; programming is only possible when the receiving unit is not powered and the battery has been removed from the transmitting unit.

The incorrect closure of the transmitting and the receiving unit can compromise the seal between the casings and thereby the protection degree from dust and water.

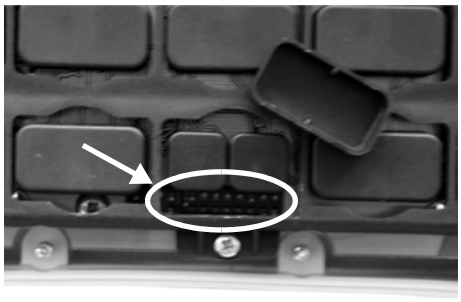
8.1 Programming the transmitting module

To change the programming set in the radio module, it is necessary to open the transmitting unit.
The group of eight dip switches located on the radio modules is used to program some functions and set the working frequency. The programming set in the other group of four dip switches must never be modified.

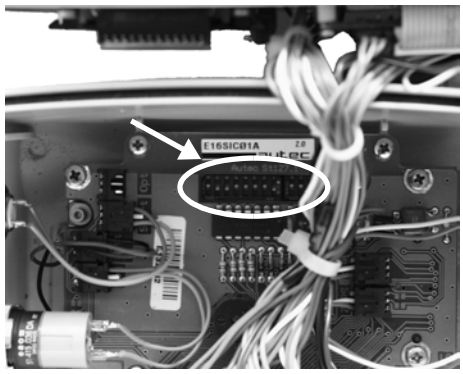
For the correct functioning (see paragraph 1.7), the group of 8 dip switches (excluding DIP 1) for the radio modules E16STXEU_ and E16SRXEU_ must be set in the same way.

Set the group of 8 dip switches as described below:

MK transmitting unit



MJ transmitting unit



Group of 8 dip switches

DIP	MODULE	STATE	FUNCTION
1	E16STXEU_	ON	The transmitting unit never switches off automatically
		OFF	If the transmitting unit stays switched on without any movement commands activated, it switches off after approx. 3.5 minutes.
2[a]	E16STXEU_	ON	Deactivation of low battery warning from horn on machine
		OFF	Activation of low battery warning from horn on machine
3-7	E16STXEU_	ON/OFF	See paragraph 1.7 and paragraph 8.5
8	E16STXEU_	ON	Manual selection mode of the frequencies using DIP 3 - DIP 7 (see paragraph 8.5)
		OFF	DO NOT USE

a. With MK12 transmitting units this dip switch must be at ON.

Pay particular attention when closing the unit at the end of the operation.

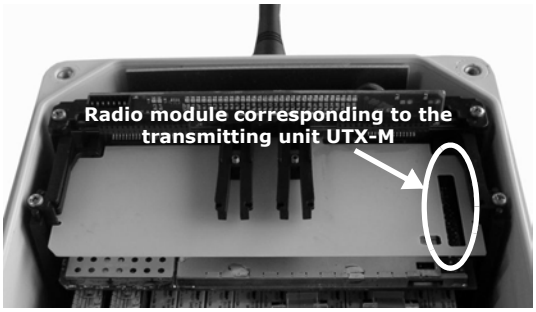
8.2 Programming the receiving module

To change the programming set in the radio module, it is necessary to open the receiving unit. The group of eight dip switches located on the radio modules is used to program some functions and set the working frequency. The programming set in the other group of four dip switches must never be modified.

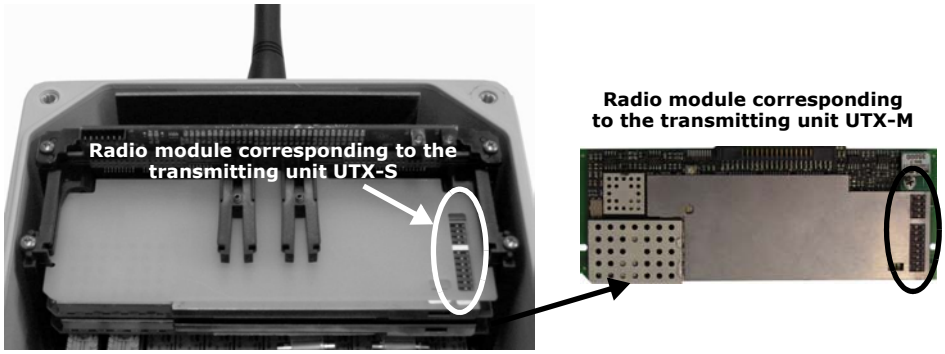
For the correct functioning (see paragraph 1.7), the group of 8 dip switches (excluding DIP 1) for the radio modules E16STXEU_ and E16SRXEU_ must be set in the same way.

Set the group of 8 dip switches as described below:

Receiving unit URX-1 in the "Master/Slave" system



Receiving unit URX-2 in the "Master/Slave" system
Receiving units URX-1 and URX-2 in the "Master/Master" system



Group of 8 dip switches

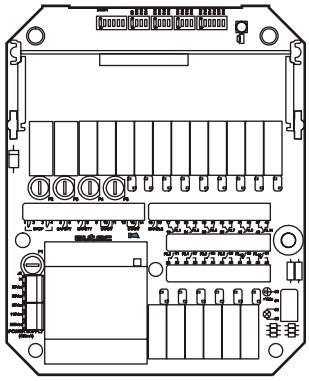
DIP	MODULE	STATE	FUNCTION
1	E16SRXEU_	ON	Stop after 0.35 sec with invalid radio signal
		OFF	Stop after 1 sec with invalid radio signal
2[a]	E16SRXEU_	ON	Deactivation of low battery warning from horn on machine
		OFF	Activation of low battery warning from horn on machine
3-7	E16SRXEU_	ON/OFF	See paragraph 1.7 and paragraph 8.5
8	E16SRXEU_	ON	Manual selection mode of the frequencies using DIP 3 - DIP 7 (see paragraph 8.5)
		OFF	DO NOT USE

a. With MK12 transmitting units this dip switch must be at ON.

Pay particular attention when closing the unit at the end of the operation.

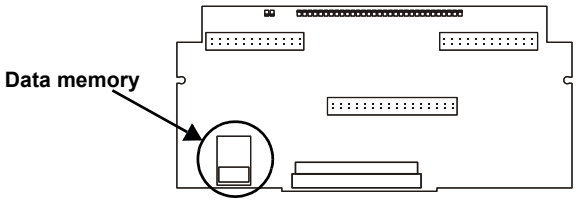
8.3 Programming the master board E16B14AC

Dip switch programming has to correspond to that given in the technical data sheet and must not be modified.



8.4 Programming the bus board E16RI02_

Autec programs this bus board and programming is recorded in the data memory that configures outputs of the receiving unit.



8.5 Frequency tables

Settable frequencies

E16STXUS1 and E16SRXUS1

MHz	DIP SWITCH					
	3	4	5	6	7	8
902.150	OFF	OFF	OFF	OFF	OFF	ON
903.050	OFF	OFF	OFF	ON	OFF	ON
903.850	OFF	OFF	OFF	OFF	ON	ON
904.650	OFF	OFF	OFF	ON	ON	ON
905.525	OFF	ON	OFF	OFF	OFF	ON
906.325	OFF	ON	OFF	ON	OFF	ON
907.175	OFF	ON	OFF	OFF	ON	ON
907.975	OFF	ON	OFF	ON	ON	ON
908.850	OFF	OFF	ON	OFF	OFF	ON
909.650	OFF	OFF	ON	ON	OFF	ON
910.450	OFF	OFF	ON	OFF	ON	ON
911.250	OFF	OFF	ON	ON	ON	ON
912.125	OFF	ON	ON	OFF	OFF	ON
912.925	OFF	ON	ON	ON	OFF	ON
913.775	OFF	ON	ON	OFF	ON	ON
914.525	OFF	ON	ON	ON	ON	ON

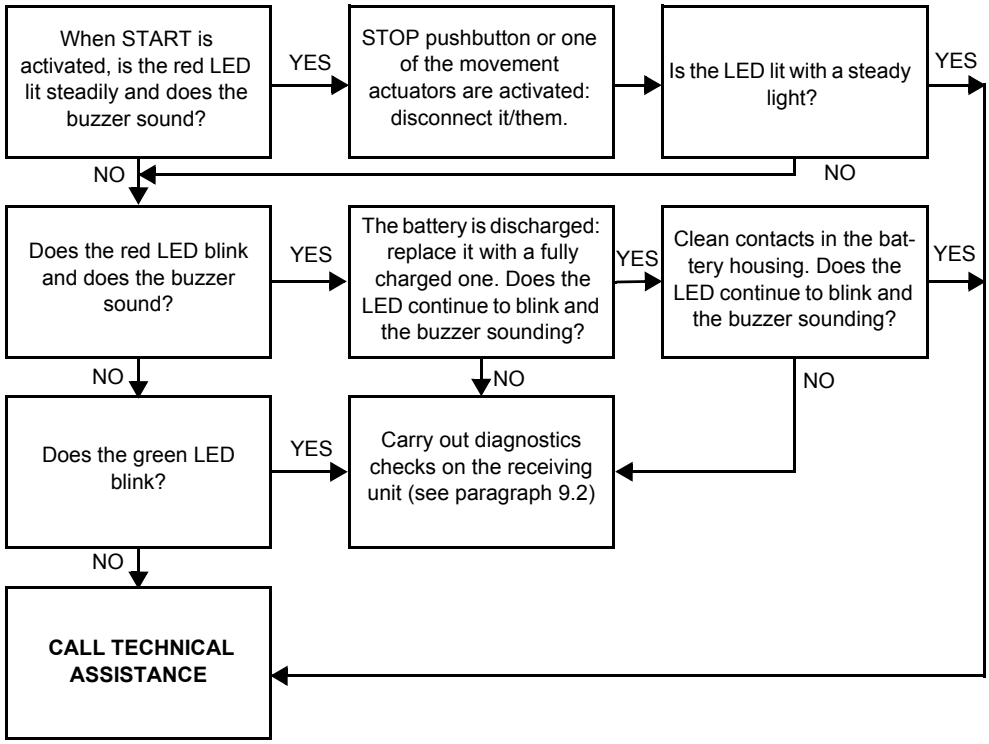
MHz	DIP SWITCH					
	3	4	5	6	7	8
915.350	ON	OFF	OFF	OFF	OFF	ON
916.250	ON	OFF	OFF	ON	OFF	ON
917.050	ON	OFF	OFF	OFF	ON	ON
917.850	ON	OFF	OFF	ON	ON	ON
918.675	ON	ON	OFF	OFF	OFF	ON
919.525	ON	ON	OFF	ON	OFF	ON
920.375	ON	ON	OFF	OFF	ON	ON
921.175	ON	ON	OFF	ON	ON	ON
922.050	ON	OFF	ON	OFF	OFF	ON
922.850	ON	OFF	ON	ON	OFF	ON
923.650	ON	OFF	ON	OFF	ON	ON
924.450	ON	OFF	ON	ON	ON	ON
925.325	ON	ON	ON	OFF	OFF	ON
926.175	ON	ON	ON	ON	OFF	ON
926.925	ON	ON	ON	OFF	ON	ON
927.725	ON	ON	ON	ON	ON	ON

9 DIAGNOSTICS

If the system “machine+radio remote control” does not start, check if the problem is caused by the radio remote control or the machine. Therefore, before carrying out any verification connect the cable control unit: if the machine does not start, the problem lies with the machine itself. If, on the other hand, the machine only starts when using the cable control unit, the problem lies with the radio remote control. In this case, follow the diagnostic procedure related to the transmitting unit and that related to the receiving unit if it is the case, and proceed as follows.

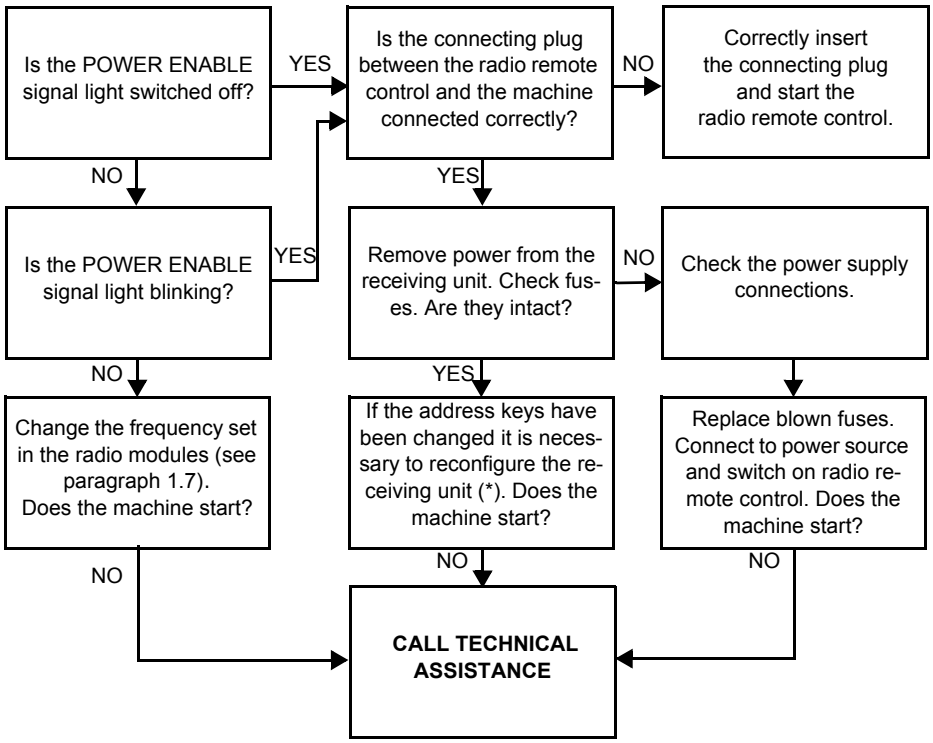
Before carrying out diagnostics it is recommended to replace the battery with a charged one and ensure the efficiency of the starting keyswitch.

9.1 Transmitting unit diagnostics



9.2 Receiving unit diagnostics

If diagnostics described in paragraph 9.1 has been carried out with the transmitting unit UTX-S of a “Master/Slave” system, carry out the diagnostic procedure with the receiving unit URX-2.
If diagnostics described in paragraph 9.1 has been carried out with the transmitting unit UTX-M of a “Master/Slave” system, carry out the diagnostic procedure twice, one with the receiving unit URX-1 only, the other with the receiving unit URX-2 only.
If, on the contrary, diagnostics of paragraph 9.1 has been carried out with a transmitting unit of a “Master/Master” system, carry out diagnostic procedure twice, one with the receiving unit URX-1 only and another one with the receiving unit URX-2 only.



(*) If the address keys (E16SCHEU_) have been replaced, do the following:
- check that the transmitting unit is off and the receiving unit is powered
- switch on the transmitting unit
- press the START pushbutton without releasing it for at least 5 seconds.

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