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Standards: FCC 15.249/IC RSS-210
ID's: PVT-R70MR06C3 & 4166A-R70MR06C3
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Appendix J: Manual

Please see the following pages.



I-syon[®] **70-M**



ENGLISH





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1.- SYSTEM DESCRIPTION: CHARACTERISTICS

The systems are based on several handheld transmitter models (with the possibility of single step keypads by function, known as generic transmitter, or double step keypads by function, known as hoisting transmitter) and several receiver models, available with relays or static outputs –PWM outputs-.

The radio, integrated in the PCB of the transmitter and the receiver, is ready to work in different ISM bands, according to different models.

The transmitter can be powered by alkaline batteries, type AA or rechargeable NiMH AA type batteries.

Applications are many and varied, depending on the emitter-receiver combination; basically the applications' areas are as follows:

- Mobile applications (on board systems)
- Industrial hoisting applications (no EC overhead cranes)
- Other industrial hoisting applications (Chain hoists / Cat. 3 ;EN-954-1: EC)
- Other applications

SYSTEM CHARACTERISTICS

Transmitters: T70MG10-T70MH3-T70MH2-T70MH3D	Specifications
Available frequencies (ISM bands)	915MHz 870MHz/433MHz 419MHz
RF Power (ERP)	< 1mW 915MHz < 5mW 870 MHz; <10 mW 433MHz < 10mW 419MHz
Modulation type	FSK 4800 bps and 7.200 bps
Protection	IP65 / NEMA-4
Channel bandwidth	25KHz
Number of IDs	64K per band
Response time	< 150ms
Working channel selection	Automatic at transmitters' start-up
Display option (Remote Programmer:T70MH3D model)	2 lines x 12 characters / line + icons
Antenna	Printed circuit board integrated (standard)
Weight	180gr (without batteries)
Dimensions	Length = 160mm / Wide = 75mm / Height = 45mm
Non rechargeable (Alkaline) and rechargeable (NiMH) batteries	Alkaline type AA 1,5V 2600mAh (-10°C / +50°C) (14°F / 122°F) Commercial Range NiMH type AA 1,2V 1200mAh (-20°C / +70°C) (-4°F / 158°F) Industrial Range
Battery life	>12h (100% duty cycle) Alkaline 2500mAh >6h (100% duty cycle) NiMH 1200mAh
EEPROM	Internal (EP70 compatible)
Hoisting Safety Standards	EN 954-1 Cat. 3 (T70MH2 model)
Active STOP (time)	< 500ms (Cat.3 CE)
Passive STOP (time)	< 2s (Cat.3 CE)
Operating temperature range	-20°C / +70°C (-4°F / 158°F)
Storage temperature range (24h)	-25°C / +75°C (-13°F / 167°F)
Storage temperature range –long periods-	-25°C / +55°C (-13°F / 131°F)
Signalling (transmitters without display)	1 bicoloured LED (RUN labelled)
Acoustic signalling	Internal buzzer
T70MG10: Generic keypad transmitter (without display)	10 functions max. (1 step) + ON/OFF function
T70MH3: Hoisting keypad transmitter (without display)	6 functions max. (2 steps) + 2 AUX (1 step) + START + ON/STOP functions
T70MH2: Hoisting keypad transmitter (without display)	4 functions max. (2 steps) + START + ON/STOP functions
T70MH3D: Hoisting keypad transmitter / Remote Programmer	6 functions max. (2 step) + START + ON/STOP function



R70MP10: Receiver with PWM outputs (10 outputs)	Specifications
Available frequencies (ISM bands)	915MHz 870MHz/433MHz 419MHz
Power supply	9-35V DC
Number of outputs	10 MOSFET (PWM)
Protection	IP65 / NEMA-4
Antenna	Printed circuit board integrated (standard)
Working channel selection	Automatic at transmitters' start-up
Weight	430 gr.
Dimensions	Length = 151mm / Wide = 129mm (160mm with PG) / Height = 61mm
EEPROM	Internal (EP70 compatible)
Status signalling	MultiLED: 7 LED visible externally
Connexions	Plug-In terminals: inputs/outputs with PG cable glands 1) PG11 model power supply cable gland 2) PG16 model outputs cable gland
Maximum current per output	5A
Maximum current output (total)	15A
PWM outputs frequency range	30 – 300Hz
Output accuracy	16 bits (power supply range)
Electrical input protection	Fuse protected
Electrical output protections	Polarity inversion / Short-circuit
Operating temperature	-20°C / +70°C (-4°F / 158°F)
Storage temperature (24h)	-25°C / +75°C (-13°F / 167°F)
Storage temperature –long periods-	-25°C / +55°C (-13°F / 131°F)
Disconnecting security	A MOSFET transistor connected with the positive value of the power supply provides security functions.

R70MR11: Receiver with relays outputs (11 outputs)	Specifications
Available frequencies (ISM bands)	915MHz 870MHz/433MHz 419MHz
Power supply (depending on the model)	24/48V AC 50/60Hz (+20% / -30% Vin) 115/230V AC 50/60Hz (+20% / -30% Vin)
Number of outputs	11 RELAYS MODEL (No valid for CE hoisting applications) 11 relays outputs.
Protection	IP65 / NEMA-4
Antenna	Printed circuit board integrated (standard).
Working channel selection	Automatic at transmitters' start-up
Weight	980 grs.
Dimensions	Length = 205mm / Wide = 156mm / Height = 62mm
EEPROM	Internal (EP70 compatible)
Status signalling	MultiLED: 7 LED visible externally
Connexions	Plug-In terminals. Inputs/outputs with PG 21 (25 poles maximum) cable gland.
Maximum current over resistive load	8A
Operating temperature range	-20°C / +70°C (-4°F / 158°F)
Storage temperature (24h)	-25°C / +75°C (-13°F / 167°F)
Storage temperature –long periods-	-25°C / +55°C (-13°F / 131°F)
Consumption (maximum)	15 VA



R70MR06: Receiver with output relays (6 outputs)	Specifications
Available frequencies (ISM bands)	915MHz 870MHz/433MHz 419MHz
Power supply (depending on the model)	24V AC 50/60Hz (+20% / -30% Vin) 48V AC 50/60Hz (+20% / -30% Vin) 115V AC 50/60Hz (+20% / -30% Vin) 230V AC 50/60Hz (+20% / -30% Vin)
Number of outputs	06 RELAYS MODEL (CE hoisting applications / Cat.3 EN-954-1) 06 relays outputs (3 Hoist / 3 Travel)
Protection	IP65 / NEMA-4
Antenna	Printed circuit board integrated (standard).
Working channel selection	Automatic at transmitters' start-up
Weight	640 grs.
Dimensions	Length = 151 mm / Wide = 129mm / Height = 61mm
EEPROM	Internal
Status signalling	MultiLED: 7 LED visible externally
Connexions	Plug-In terminals: inputs/outputs with PG16 model output cable gland.
Maximum current over resistive load	6A
Operating temperature range	-20°C / +70°C (-4°F / 158°F)
Storage temperature (24h)	-25°C / +75°C (-13°F / 167°F)
Storage temperature –long periods-	-25°C / +55°C (-13°F / 131°F)
Consumption (maximum)	10 VA



2.- SAFETY INSTRUCTIONS

2.1.- GENERALS



These instructions must be read carefully. This will allow you to install, use and maintain this device in a proper state, reducing the risk of incorrect use.

Do not install the equipment in machines for the elevation of people or in explosive atmospheres.

Any failure to comply with that set out in this manual will create a hazard, for which reason the following must be respected:



- Ensure that the installation is carried out by trained, competent staff.
- The safety rules of the work area and of all competent authorities must be respected every time.
- Ensure that this manual is permanently available to the operator and to the person in charge of maintenance.
- Keep the transmitter out of the reach of unauthorised people.
- At the start of each day, check the correct working of the STOP button and the other safety devices of the machine.
- In the event of any anomaly, use the STOP button.
- If there are several radio remote systems working in the same area, ensure that the used transmitter corresponds to the machine that is being controlled. Identify the machine which the transmitter corresponds to.
- Carry out regular checks and preventive maintenance.
- In the case of repairs, only use original spare parts.



- Never modify the device without prior study and approval of the manufacturer.
- Never use the device with a power supply other than the indicated.
- Never allow the device to be used by unqualified people.
- After being used, do not leave the transmitter in service without having pressed the STOP button in order to prevent accidental operations.
- Do not use the device without visibility.
- Avoid knocking or dropping the set.
- Do not use the set if failure is detected.

2.2.- HOISTING MACHINES



- Ensure that the machine is fully halted throughout the estimated assembly time; clear the work area and use safety clothing.
- In the case of overhead cranes, park the crane and position stop-ends (if these are not available use appropriate signs) at a suitable distance in order to prevent collision with other cranes in the same area.
- Verify the power supply and turn off the main contactor.
- Remember that the receiver has at least, more than one circuit under voltage.
- Even if the power supply is disconnected, there is still a risk of electrical discharges.
- Never forget to connect the ground cable.
- Use fireproof cables for the electrical connections.
- Check that the input power supply corresponds to the right voltage of the receiver.
- Be cautious: it may occur that the equipment has not been connected properly, which can result in unforeseen movements during the start-up.



2.3.- FCC RECOMMENDATIONS (only valid for equipment that works in 915MHz ISM band)



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

To comply with FCC RF exposure compliance requirements, this device and its antenna must not be co-located with, or operating in conjunction with, any other antenna or transmitter.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rule.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3.- INSTALATION / SYSTEM ASSEMBLY

3.1.-TRANSMITTER

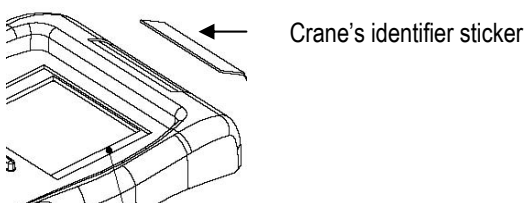
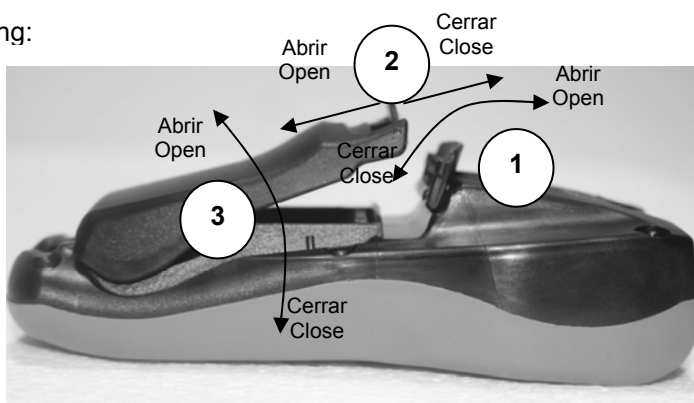
Proceed to open the transmitter's battery compartment and introduce the supplied batteries into the battery housing (2 AA type 1,5V alkaline batteries) respecting the +/- polarity, indicated inside the battery housing.

Procedure to open the mechanism of the battery housing:

- 1 "Open" the safety lock: rotate in the direction indicated by the arrow.
- 2 "Open" lock tab: press in the direction indicated by the arrow.
- 3 "Open" battery housing cover: rotate in the direction indicated by the arrow.

Procedure to close the mechanism of the battery housing:

- 3 "Close" battery housing cover: rotate in the direction indicated by the arrow.
- 2 "Close lock tab": press in the direction indicated by the arrow.
- 1 "Close the safety lock": rotate in the direction indicated by the arrow.

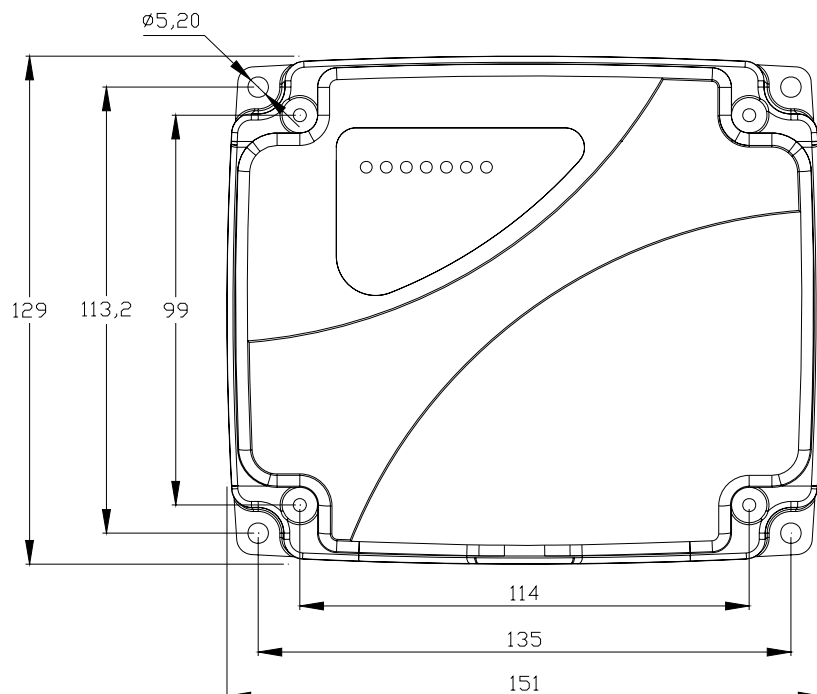




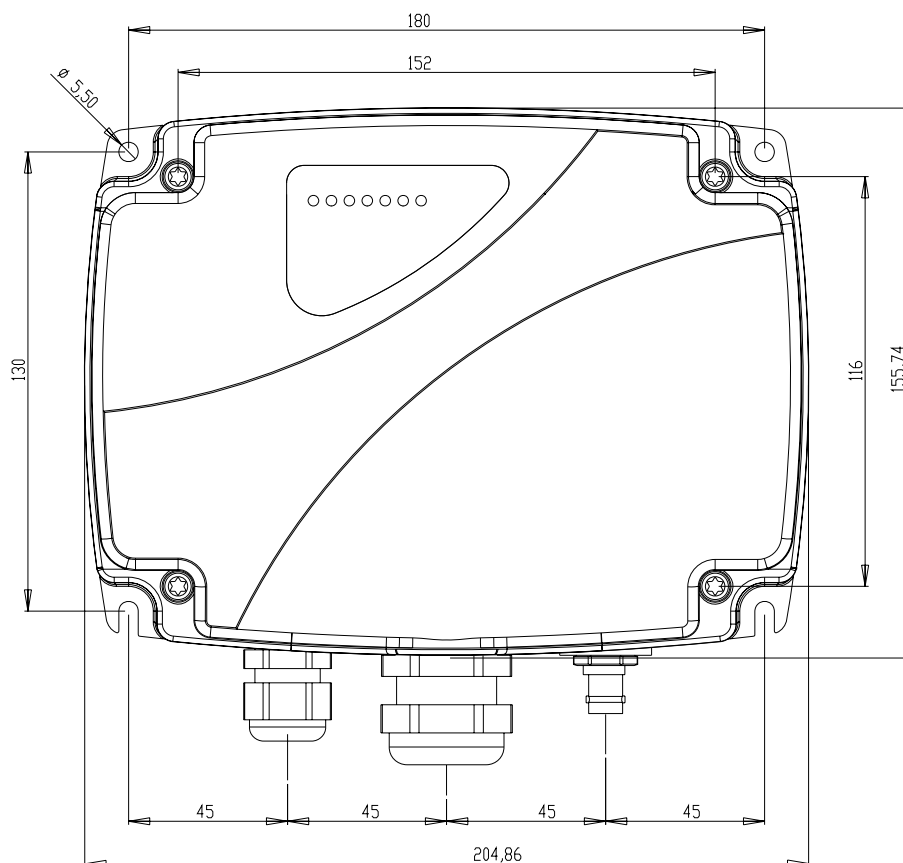
3.2.-RECEIVER

Find an easy access location for the receiver, free from obstacles, in order to facilitate the reception of the transmitter's radio signal, and far away from elements that can produce intense electric disturbance.

R70MP10 and R70MR06 models receiver dimensions:



R70MR11 model receiver dimensions:





3.3.- STARTING UP.

TRANSMITTERS:

Switching on T70MG10 transmitter model:

- 1- Insert the batteries (two AA type batteries).
- 2- Press ON/OFF function, until the first green LED flashes. The LED will keep blinking in green colour while the transmitter is in the initializing process; later the LED lights off. The transmitter remains in "stand-by" mode. If an EP70 eeprom module is connected, the initializing process becomes slower, because the content of the EP70 module is copied into the internal eeprom, **erasing or updating the internal eeprom content.**
- 3- *Press the "key software", if the module has been configured in such way, pressing at the same time "7" and "8" functions, until the green LED starts blinking.*
Default configuration: without "key software".
- 4- Press "any function", until the green LED is permanently lighting. It indicates that the radio link has been performed. The transmitter remains in ON state. If there is no external EP70 eeprom module connected to the transmitter, the previous synchronization between the transmitter and the receiver is signalled with the orange LED blinking.
- 5- To switch off the transmitter, press ON/OFF key; the orange LED blinks and then, it switches off.

T70MG10



Switching on T70MH3 and T70MH2 transmitter models:

- 6- Insert the batteries (two AA type batteries).
- 7- Press ON/STOP function, until the first green LED flash. The LED will keep blinking in green colour while the transmitter is in the initializing process; later the LED lights off, and the transmitter remains in "stand-by" mode. If an EP70 eeprom module is connected, the initializing process becomes slower, because the content of the EP70 module is copied into the internal eeprom, **erasing or updating the internal eeprom content.**
- 8- *Press the "key software", if the module has been configured in such way, pressing at the same time "◀ ▶" functions, until the green LED starts blinking.*
Default configuration: with "key software".
- 9- Press "START" function, until the green LED is permanently lighting. It indicates that the radio link has been performed. The transmitter remains in ON state. If there is no external EP70 eeprom module connected to the transmitter, the previous synchronization between the transmitter and the receiver is signalled with the orange LED blinking.
- 10- To switch off the transmitter, press ON/STOP key; the orange LED blinks and then, it switches off.

T70MH3



T70MH2



Switching on T70MH3D transmitter model:

- 11- Insert the batteries (two AA type batteries).
- 12- Press ON/STOP function, until the message "INITIALIZING PLEASE WAIT" appears in the LCD display. This message remains in the display while the transmitter is in the initializing process; later the LED lights off, and the transmitter remains in "stand-by" mode. If an EP70 eeprom module is connected, the initializing process becomes slower, because the content of the EP70 module is copied into the internal eeprom, **erasing or updating the internal eeprom content.**
- 13- *Press the "key software", if the module has been configured in such way, pressing at the same time "◀ ▶" functions, until the green LED starts blinking.*
Default configuration: with "key software".
- 14- Press "START" function, and the message "DOWNLOADING CHECKSUM" appears in the LCD display. If the "checksum" is OK the message **"WORKING OK" is shown in the LCD display and it indicates that the radio link has been performed.** If the "checksum" is wrong a second message will appear "DOWNLOADING EEPROM" previously to the final message "WORKING OK".
- 15- To switch off the transmitter, press ON/STOP key; the message "SWITCH OFF" is shown in the LCD display and the transmitter switches off.

T70MH3D



Transmitters without display: RUN signalling LED in solid green colour. In transmitters with LCD display: "WORKING OK"; if the transmitter is the owner of the receiver.



After switching off the transmitter please wait about two seconds before pressing ON/OFF or ON/STOP functions, to start up again.



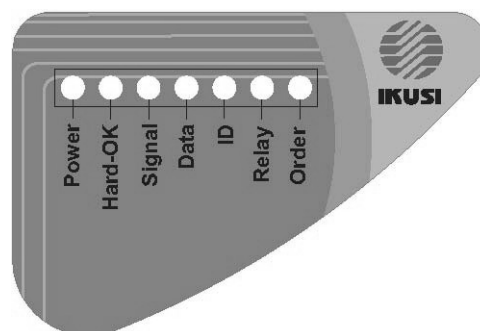
RECEIVERS

Proceed to connect the power supply and the output connections. Use the plug-in terminals and the connection block diagram provide in this manual (page 11).



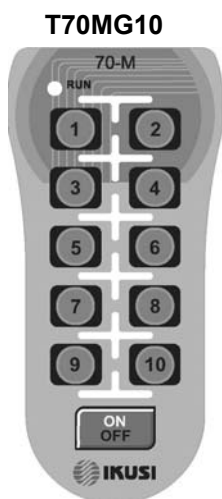
LED's signalling in correct operating mode:

- 1) No radio link with the transmitter:
 - "Power": solid green.
 - "Hard-OK": solid green.
 - "Signal": Blinking if there are transmitters near and in the same band.
- 2) There is a radio link with the transmitter:
 - "Power": solid green.
 - "Hard-OK": solid green.
 - "Signal": green blinking fast.
 - "Data": green blinking fast.
 - "ID": green blinking fast.
- 3) With STOP relay activated and active outputs:
 - "Power": solid green.
 - "Hard-OK": solid green.
 - "Signal": green blinking fast.
 - "Data": green blinking fast.
 - "ID": green blinking fast.
 - "Relay": solid green if the STOP relay is activated.
 - "Order": green (variable intensity), if one or more PWM outputs are activated.
 - "Order": green (fixed intensity), if at least one or more relay outputs are activated.

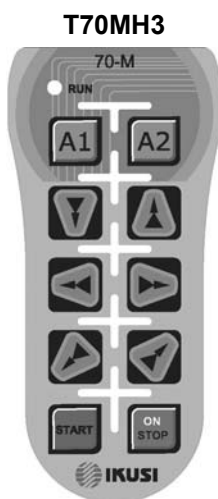


4. – TRANSMITTERS

4.1. – TYPES OF TRANSMITTERS



Generic: máx. 10 functions (1 step) + ON/OFF (without display)



Hoisting: máx. 6 functions (2 steps) + 2 AUX: A1 and A2 (1 step) + START + ON/STOP



Hoisting: máx. 6 functions (2 steps) + START + ON/STOP (with display).
REMOTE PROGRAMMER



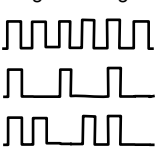
Hoisting (Cat. 3 EN-954-1): máx. 4 functions (2 steps) + START + ON/STOP (without display)



The models with LCD display are always required for Tele-Alignment purposes.



4.2.- MAINTENANCE / TROUBLE SHOOTING GUIDELINE (TRANSMITTERS WITHOUT DISPLAY)

TRANSMITTER'S LED SIGNALLING MODELS: T70MG10/T70MH3/T70MH2					
Status	Correct operating mode	Activated function	Low battery	Lost transmitter frame found	ERROR
LATENCY	Green flashing LED 	Without signal	Switches to SWITCHED OFF mode 	Without signal	Red LED and buzzer continuously activated.
SWITCHED ON: TRANSMISSION MODE (max. 1 min., it only signalizes during START action)	Without signal	Red LED + buzzer 	Red LED + buzzer. 	Without signal	Red LED and buzzer continuously activated. It maintains after releasing START
TRANSMISSION	Green solid LED	Without signal	Red LED + buzzer: switches to SWITCHED OFF mode (máx = 4 minutes; min = 30 seconds) 	Without signal	Red LED and buzzer continuously activated
LOST	Without signal	Without signal	Switches to SWITCHED OFF mode	Buzzer bips during 1 minute	Red LED and buzzer continuously activated
PASSWORD	Orange solid LED	Without signal	Switches to SWITCHED OFF mode	Without signal	Red LED and buzzer continuously activated.
AUTOID	Orange LED 	Without signal	Switches to SWITCHED OFF mode	Without signal	Red LED and buzzer continuously activated.
LIBID	Orange LED 	Without signal	Switches to SWITCHED OFF mode	Without signal	Red LED and buzzer continuously activated.
PROGRAMMING	Orange solid LED	Without signal	Red LED + buzzer 	Without signal	Red LED and buzzer continuously activated.
PARAM	Orange flashing LED 	Without signal	Red LED + buzzer 	Without signal	Red LED and buzzer continuously activated.
TELE-ALIGNMENT	Without signal	Without signal	Without signal	Without signal	Buzzer continuously activated
SEARCHING MODE	Orange LED 	Without signal	Red LED + buzzer 	Without signal	Red LED and buzzer continuously activated.



4.3.- MAINTENANCE / TROUBLE SHOOTING GUIDELINE (TRANSMITTER WITH DISPLAY)

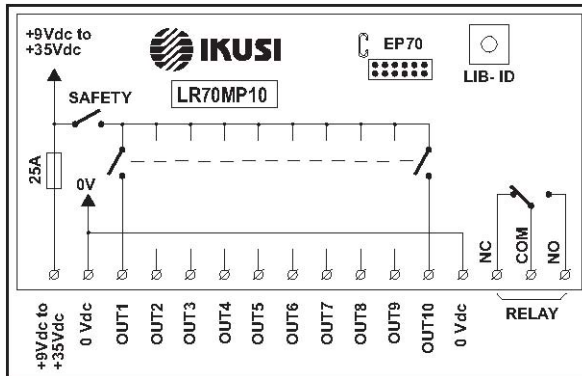
TRANSMITTER' SIGNALLING MODEL: T70MH3D					
Status	Correct operating mode	Activated function	Low battery	Lost transmitter frame found	ERROR
LATENCY	Without signal	Without signal	It switches to OFF state	Without signal	ERROR Buzzer continuously activated
SWITCHED ON: TRANSMISSION MODE (max. 1 min., it only signalizes during START action)	PRESS START	Buzzer sounds	Buzzer sounds It switches off after 5 minutes máximum	Without signal	ERROR Buzzer continuously activated
TRANSMISSION	WORKING OK	Without signal	Buzzer sounds It switches off after 5 minutes máximum	Without signal	ERROR Buzzer continuously activated
LOST	Without signal	Without signal	It switches to OFF state	Buzzer sounds during 1 minute	ERROR Buzzer continuously activated
PASSWORD	*****	Without signal	It switches to OFF state	Without signal	ERROR Buzzer continuously activated
AUTOID	TRANSMITTING NEW ID	Without signal	It switches to OFF state	Without signal	ERROR Buzzer continuously bips
LIBID	***** Buzzer sounds	Without signal	It switches to OFF state	Without signal	ERROR Buzzer continuously activated
PROGRAMMING	PROGRAMATION	Without signal	Buzzer sounds It switches off after 5 minutes máximum	Without signal	ERROR Buzzer continuously activated
PARAM	1 PARAMETERS	Without signal	Buzzer sounds It switches off after 5 minutes máximum	Without signal	ERROR Buzzer continuously activated
TELE-ALIGNMENT	2 TELETEACH	Without signal	Without signal	Without signal	ERROR Buzzer continuously activated
SEARCHING MODE	3 SEARCH	Without signal	Buzzer sounds It switches off after 5 minutes máximum	Without signal	ERROR Buzzer continuously activated



5.- RECEIVERS

5.1.- TYPES OF RECEIVERS (CONNECTIONS BLOCK DIAGRAMS)

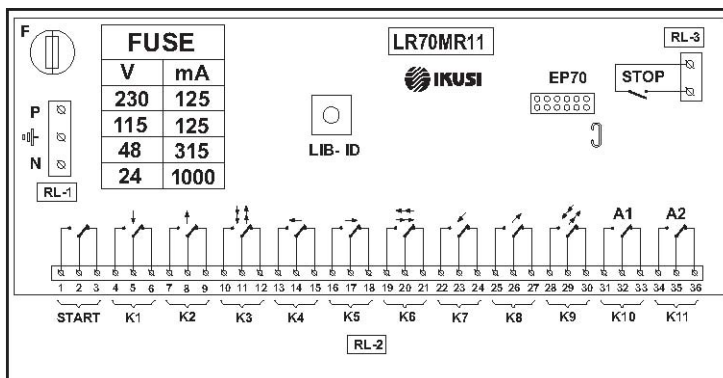
R70MP10: PWM OUTPUT RECEIVER (10 OUTPUTS).



The voltage DC of the power supply (from 9v to 35v DC), is conducted to the common wiring of the ten output switches (OUT1 until OUT10), through a SAFETY switch which guarantees the output disconnection in case of breakdown of some of the outputs. The "RELAY" switches between two fixed positions NO (normally opened) and NC (normally closed).

LIB-ID: pushbutton to release the ID from the receiver. Press < 2 seconds without EP70 module connected.
EP70: On board plug in connector to connect an external EP70 (External EEPROM).

R70MR11: RECEIVER WITH OUTPUT RELAYS (11 OUTPUTS).



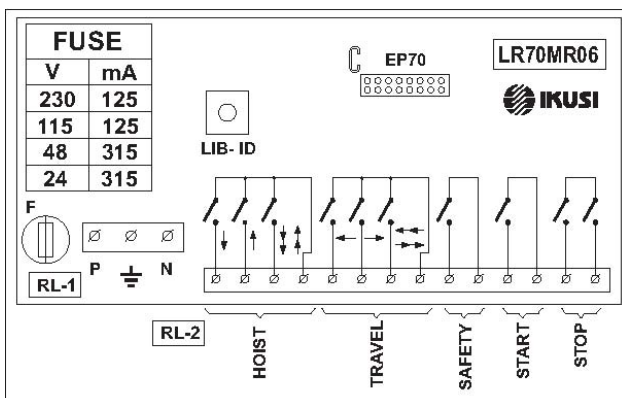
RL-1: Power supply plug in terminals (24,48,115 or 230 V AC). Please note –see table- the right fuse values depending on the input voltage.

RL-2: Plug in identified connection terminals, 1st and 2nd speed (K1....K11) and START relay.
RL-3: Plug in terminal for connecting the STOP relay (**NO Cat.3 EN-954-1**)

LIB-ID: pushbutton to release the ID from the receiver. Press < 2 seconds without EP70 module connected.

EP70: On board plug in connector to connect an external EP70 (External EEPROM).

R70MR06: RECEIVER WITH OUTPUT RELAYS (6 OUTPUTS).



RL-1: Power supply plug in terminals (24,48,115 or 230 V AC). Please note –see table- the right fuse values depending on the input voltage.

RL-2: Plug in identified connection terminals, 1st and 2nd speed, HOISTING; TROLLEY TRAVELLING; SAFETY; START: STOP (Cat.3 EN-954)

LIB-ID: pushbutton to release the ID from the receiver. Press < 2 seconds without EP70 module connected.

EP70: On board plug in connector to connect an external EP70 (External EEPROM).



R70MR11 and 70MR06 models only:

- Remember to connect the ground cable.
- Only use fireproof cables for connections.
- Select the appropriate voltage on the receiver, (230, 115 or 48 Vac). R70MR11 and R70MR06 models.



5.2.- MAINTENANCE / TROUBLE SHOOTING GUIDELINES

RECEIVER'S LED SIGNALING				
LED	COLOUR	STATUS	REMARKS	PROPOSED ACTION
POWER	GREEN	Switch On if powered	Power supply OK	Check the power supply
HARDOK	GREEN	Solid green LED if no error detected Blinking during start up process	Receiver hardware OK	OK Please wait to finish the start up process
HARDOK	RED	Solid red LED if one of these errors appears: - Watchdog activated / Oscillator breakdown / wrong ROM checksum - Reset activated - Blinking fast : wrong EEPROM checksum / Data corrupted.	Electronic board hardware breakdown	Replace the electronic board Reprogramme EEPROM
SIGNAL	GREEN	LED Off if no radio signal detected (Squelch)	- LED On and the transmitter switched Off indicates occupied radio channel - LED On and DATA switched Off indicates radio channel occupied by a non IKUSI system	Verify transmitter's radio and battery
DATA	GREEN	LED Off if a wrong frame is received Blinking if receiving good frames	LED Off and SIGNAL LED On: Radio breakdown	Replace radios
ID	GREEN	Blinking if a correct ID is received	Switched Off and DATA LED switched On: no valid ID	If the radio channel is not busy: verify transmitter's selected ID or reset receiver ID
			SIGNAL; DATA and ID LED On, indicates valid frames from the transmitter. Correct link.	OK
RELAY	GREEN	STOP relay activated		
ORDER	GREEN	Proportional lightning intensity depending on the number of activated outputs (PWM outputs); or indicates that at least one output is activated (RELAY outputs)		



6.- RADIO REMOTE SYSTEM FUNCTIONALITIES

6.1.- GENERALS



The transmitter models without LCD display have restrictions with the access to the programation parameters, due to the impossibility to show the Software Menu in the Programming Mode.



The remote system's receiver remembers the last ID used by the last current working transmitter. This transmitter can be considered as the receiver's owner. It means that if the receiver is going to be used with another transmitter with a different ID, the receiver must released the current transmitter's ownership releasing the current ID code (LIB ID). This operation can be performed from the current or a new transmitter (performing LIB ID special function) or by pressing the LIB ID button inside the receiver.



In double step keypads the fast access functions are always activated with the first step (first speed)



The working channel used for Tele-Alignment purposes (Remote Programming) as well as the remote downloading of parameters is the CURRENT WORKING CHANNEL. For the lost transmitter searching function, ID release function and ID auto-teaching function the system uses a RESERVED CHANNEL (Allways the last useful and available channel in each ISM band).

6.2.- BATTERY LEVEL INDICATION

TRANSMITTER'S MODEL T70MH3D

Full battery: three black LED's + frame.	
Medium battery: two black LED's + frame.	
Low battery: one black LED + frame.	
Empty battery: Blinking frame.	

TRANSMITTER'S MODEL T70MH3 / T70MG10 / T70MH2

Low battery state will be indicated with red LED blinking and intermittent buzzer's sound (pulses of 0.1 sec. every 0.9 sec.:).



6.3.- BASE CHANNEL CHANGE (TRANSMITTER MODELS:T70MG10;T70MH3D;T70MH3;T70MH2)

T70MG10 TRANSMITTER MODEL



1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) Entering the base channel changing mode:



BASE CHANNEL CHANGE MODE (Press "5" and "10" functions simultaneously) -> Wait until the orange LED lights on continuously.

3) The current base channel information is displayed: Number of red pulses = Number of units of the channel; Number of green pulses = Number in units of ten of the channel.

4) Once the orange LED lights continuously, proceed to change the base channel



Press function "1", as many times as the number of units of ten of the new base channel.
Note: To programme channels from 1 to 9, do not press this function –equivalent to 0 value--



Press function "2", as many times as the number of units of the new base channel.

Note: Press "4" function to leave the process without updating the new base channel.
The transmitter switches to stand-by or LOW CONSUMPTION mode.



5) To validate the new base channel, immediately, press "10" function.

Remark: If "10" function is not pressed immediately, the new base channel is updated after a few seconds.



The new updated base channel value will show with red and green LED pulses:

Number of red pulses = Number of units of the channel.

Number of green pulses = Number in units of ten of the channel.

6) Updating and sending the new base channel data to the receiver (orange LED blinking).

7) Once the new base channel is recorded in the receiver the transmitter switches to stand-by or LOW CONSUMPTION mode (Orange LED stops blinking).

T70MH3 and T70MH2 TRANSMITTER MODELS



1) With the transmitter switched off, press "ON/STOP". Transmitter in stand-by or LOW CONSUMPTION

2) Entering the base channel changing mode:



BASE CHANNEL CHANGE MODE (Press "RIGHT" and "START" functions simultaneously) -> Wait until the orange LED lights continuously.

3) The current base channel information is displayed: Number of red pulses = Number of units of the channel; Number of green pulses = Number in units of ten of the channel.

4) Once the orange LED lights continuously, proceed to change the base channel



Press function "DOWN", as many times as the number of units of ten of the new base channel.
Note: To programme channels from 1 to 9, do not press this function –equivalent to 0 value--



Press function "UP", as many times as the number of units of the new base channel.

Note: Press "ESC"->T70MH3 model or "RIGHT"->T70MH2 model function to leave the process without updating the new base channel. The transmitter switches to stand-by or LOW CONSUMPTION mode.



"ESC"



"RIGHT"

5) To validate the new base channel, immediately, press "START" function.

Remark: If "START" function is not pressed immediately, the new base channel is updated after a few seconds.



The new updated base channel value will show with red and green LED pulses:

Number of red pulses = Number of units of the channel.

Number of green pulses = Number in units of ten of the channel.

6) Updating and sending the new base channel data to the receiver (orange LED blinking).

7) Once the new base channel is recorded in the receiver the transmitter switches to stand-by or LOW CONSUMPTION mode (Orange LED stops blinking).



T70MH3D TRANSMITTER MODEL



1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) Entering in the base channel changing mode:



BASE CHANNEL CHANGE MODE (Press "RIGHT" and "START" functions simultaneously) -> Message in the LCD display: "FREQ CHANGE"

3) The current base channel information is displayed:

"Freq Change"

"Channel NN" -> (01,02,03.....MAXCAN)

NN = 01,02,03,....., MAXCAN

MAXCAN = 11 in 870 MHz

MAXCAN = 69 in 433MHz and 915MHz

4) Use "UP" and "DOWN" functions to change the current base channel:



With "DOWN" function, choose the units of the new channel.

Remark: 0 -> "no touch" to programme channels from 1 to 9.



With "UP", function choose the number of units of ten of the new channel.

5) To validate the new channel, immediately, press "START" .

Remark: If "START" function is not pressed immediately, the new base channel is updated after a few seconds.



The new channel information will be displayed in the LCD:

"Freq Change"

"Channel __" -> (01,02,03.....MAXCAN)

NN = 01,02,03,....., MAXCAN

MAXCAN = 11 in 870 MHz

MAXCAN = 69 in 433MHz and 915MHz

Note1: To leave without updating the change, press "ESC" .



6) Updating and sending the new base channel data to the receiver.(the message blinks in the LCD display).

7) Once the new base channel is recorded in the receiver the transmitter switches to stand-by or LOW CONSUMPTION mode. (LCD display switches off).



6.4 ID RELEASE (LIB ID) (TRANSMITTER MODELS:T70MG10;T70MH3D;T70MH3;T70MH2)

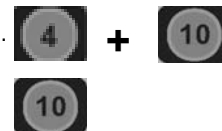
T70MG10 TRANSMITTER MODEL



A) ID release from the current transmitter which has the ownership of the receiver.

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) To enter in LIB ID mode, press simultaneously "4" and "10" functions, until the orange LED lights on.



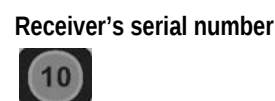
3) To execute ID release, press "10" function. During the ID release process the LED blinks in orange colour and the buzzer sounds, indicating that the current ID is being released in the receiver. When the process has finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.

B) ID secure release from a new transmitter which has not the ownership of the receiver.

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.



2) To enter in LIB ID mode, **press simultaneously "4" and "10" functions**, until the orange LED lights on. Enter the **receiver's serial number** (see the procedure in **Note 1**), and then **press "10" function to validate**. If the receiver recognises the serial number, the ID code is released. During the release process the LED blinks in orange colour and the buzzer sounds, indicating that the current ID is being released in the receiver. When finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.



Note 1: Procedure to enter the receiver's serial number.

The serial number is inserted in a sequential way introducing each number, from the left to the right:

- The function number "1" performs the validation from one digit to the following digit (from the left to the right).
- The function number "2" is used to press it as many times as the number, of each digit.

Example: Insert the serial number 01071035 -> remote manufactured on January of 2007, with number 1035.

1st digit (0): press function "2" zero times -> press function "1" to jump to the following digit.

2nd digit (1): pulsar la función "2", one time -> press function "1" to jump to the following digit.

3rd digit (0): pulsar la función "2" zero times -> press function "1" to jump to the following digit.

4th digit (7): pulsar la función "2" seven times -> press function "1" to jump to the following digit.

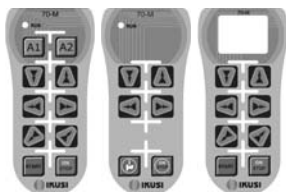
5th digit (1): pulsar la función "2" one time -> press function "1" to jump to the following digit.

6th digit (0): pulsar la función "2" zero times -> press function "1" to jump to the following digit.

7th digit (3): pulsar la función "2" three times -> press function "1" to jump to the following digit.

8th digit (5): pulsar la función "2" five times -> press function "1" to jump to the following digit.

T70MH3 / T70MH2 / T70MH3D TMTRANSMITTER MODELS



A) ID release from the current transmitter which has the ownership of the receiver.

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) To enter in LIB ID mode, press simultaneously "UP" and "START" functions, until the orange LED lights on.



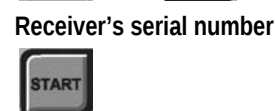
3) To execute ID release, press "START" function. During the ID release process the LED blinks in orange colour and the buzzer sounds, indicating that the ID is being released in the receiver. When the process has finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.

B) ID secure release from a new transmitter which has not the ownership of the receiver.

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.



2) To enter in LIB ID mode, **press simultaneously "UP" and "START" functions**, until the orange LED lights on. Enter the **receiver's serial number** (see the procedure in **Note 1**), and then **press "START" function to validate**. If the receiver recognises the serial number the ID code is released. During the release process the LED blinks in orange colour and the buzzer sounds, indicating that the current ID is being released in the receiver. When finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.





6.5 AUTO TEACHING MODE (AUTO ID) (TRANSMITTER MODELS:T70MG10;T70MH3D;T70MH3;T70MH2)

T70MG10 TRANSMITTER MODEL



It allows to **register a new transmitter** into the receiver's database -new ID- (maximum = 32 ID)

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) To enter in LIB ID mode, **press simultaneously "UP" and "START" functions**, until the orange LED lights on. Insert the **receiver's serial number** (see the procedure in **Note 1 page 15 in this Manual**), and then **press "START" function to validate**.

If the receiver receives the right serial number the ID code is stored. During the recording process the LED blinks in orange colour, indicating that the new ID is beeing updated in the receiver.

When finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.



Receiver's serial number



T70MH3 / T70MH2 and T70MH3D TRANSMITTER MODELS



It allows to **register a new transmitter** into the receiver's database -new ID- (maximum = 32 ID)

1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.

2) To enter in LIB ID mode, **press simultaneously "UP" and "START" functions**, until the orange LED lights on. Insert the **receiver's serial number** (see the procedure in **Note 1 page 15 in this Manual**), and then **press "START" function to validate it**.

If the receiver receives the right serial number, the ID code is stored. During the recording process the LED blinks in orange colour, indicating that the new ID is beeing updated in the receiver.

When finished the LED lights off and the transmitter sets to stand-by or LOW CONSUMPTION mode.



Receiver's serial number



Remark (for the T70MH3D model):

The blinking asterisk in the display, indicates the position of the digit that is introducing and storing at that moment.



6.6 LOST TRANSMITTER SEARCHING MODE (TRANSMITTER MODELS: T70MG10;T70MH3;T70MH2)

T70MG10 TRANSMITTER MODEL



It allows to find one or more lost transmitters in the same working area.

1) With the transmitter switched off, press "ON/OFF". Transmitter is stand-by or LOW CONSUMPTION mode.

2) To enter in SEARCH mode, press simultaneously "7" and "10" functions.

+ Keep pressed until the orange LED lights continuously.

3) Enter "3"- "1"- "3" function's sequence. The SEARCH function will execute.

► ► SEARCH FUNCTION EXECUTING
ORANGE LED BLINKS PERMANENTLY

4) Press "10" function and the transmitter switches to stand-by or LOW CONSUMPTION mode.

STAND BY or LOW CONSUMPTION MODE

T70MH3 TRANSMITTER MODEL



It allows to find one or more lost transmitters in the same working area.

1) With the transmitter switched off, press ON/STOP to switch on (stand-by state).

2) To enter in SEARCH mode, press simultaneously "ENTER" and "START" functions.

+ Keep pressed until the orange LED lights continuously.

3) Enter "ENTER-DOWN-ENTER" function's sequence. The SEARCH function will execute.

► ► EXECUTE SEARCH

4) Press "START" and the transmitter switches to stand-by or LOW CONSUMPTION mode.

STAND-BY or LOW CONSUMPTION MODE

T70MH2 TRANSMITTER MODEL



It allows to find one or more lost transmitters in the same working area.

1) With the transmitter switched off, press "ON/STOP". Transmitter in stand-by or LOW CONSUMPTION mode.

2) To enter in SEARCH mode, press simultaneously "ENTER" and "START" functions.

+ Keep pressed until, the orange LED will light

3) Enter "ENTER-DOWN-ENTER" function's sequence. The SEARCH function will execute.

► ► EXECUTE SEARCH

4) Press "START" and the transmitter switches to stand-by or LOW CONSUMPTION mode.

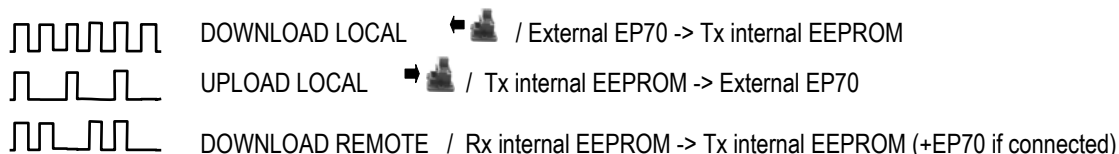
SWITCHED OFF or LOW CONSUMPTION MODE



6.7 PROGRAMMING PARAMETERS (PARAM) (TRANSMITTER MODELS: T70MG10;T70MH3;T70MH2)



- 1) When executing DOWNLOAD/UPLOAD LOCAL, if the EEPROM is wrong or not connected, the red LED will indicate "EEPROM Error" (red LED blinking during 5 secs. aprox.) and the transmitter switches to PARAM mode, ready to select a new sequence (DOWNLOAD LOCAL or UPLOAD LOCAL or DOWNLOAD REM).
- 2) In case of "Grave Error", the red LED and the buzzer becomes active continuously.
- 3) The beginning of the EEPROM updating process is signalized with orange LED, blinking in different ways.



- 4) The right ending of the EEPROM updating process is signalized with the green LED continuously lightning on during 5 seconds aprox. and the transmitter switches to stand-by or LOW CONSUMPTION mode.

It allows to make EEPROM backup copies between: internal EEPROM and external EP70 EEPROM; between EP70 external EEPROM and internal EEPROM; and to recover the content of the receiver's internal EEPROM into the transmitter's internal EEPROM, and simultaneously in a external EP70, if connected.

- 1) DOWNLOAD LOCAL: It allows discharging the content of an internal EEPROM into an external EP70 extractable EEPROM.
- 2) UPLDAD LOCAL: It allows discharging the content of an extractable EP70 EEPROM into the internal EEPROM.
- 3) DOWNLOAD REM: It allows discharging the content of a receiver's internal EEPROM into the transmitter's internal EEPROM. **If an external EP70 EEPROM is connected to the transmitter, the content is also copied in the external EP70.**
- 4) SWITCHED OFF: With this option the transmitter switches to a low consumption mode.

Transmitters:



If during transmitter's start up, an external EP70 is connected, the content of this EP70 is automatically stored into the internal EEPROM. **Remark: This operation disables the internal EEPROM check between the transmitter and the receiver contents.**

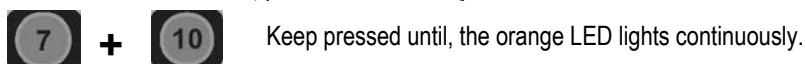
Receivers:

If an external EP70 is connected to the receiver's logic board and the LIB ID pushbutton is pressed during at least 2 seconds, the content of the EP70 is stored into the internal EEPROM. (HARD OK LED blinks during the copy process; solid green when finished)

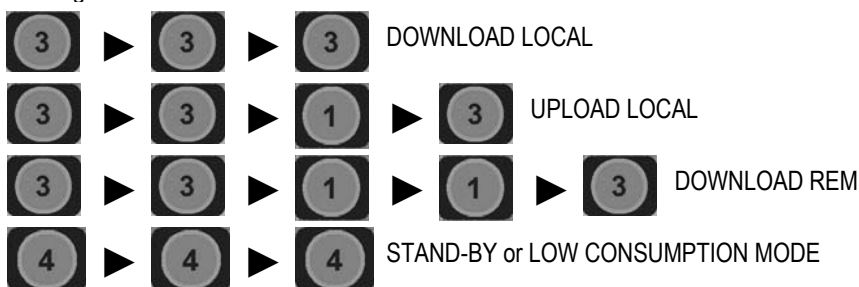
T70MG10 TRANSMITTER MODEL



- 1) With the transmitter switched off, press "ON/OFF". Transmitter in stand-by or LOW CONSUMPTION mode.
- 2) To enter in PARAM mode, press simultaneously "7" and "10" functions.



- 3) Entering modes:





T70MH3 TRANSMITTER MODEL

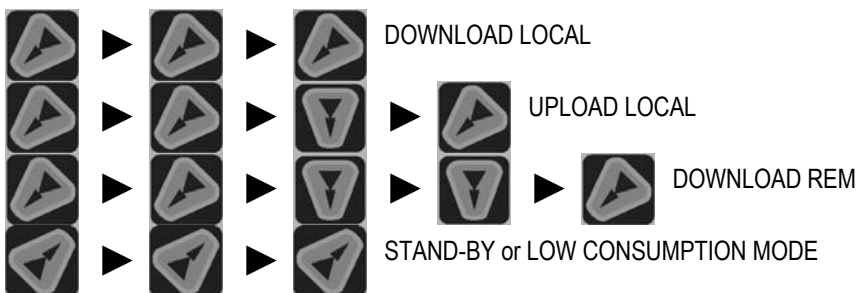


- 1) With the transmitter switched off, press "ON/STOP". Transmitter in stand-by or LOW CONSUMPTION mode.
- 2) To enter in PARAM mode, press simultaneously "ENTER" and "START" functions.



Keep pressed until the orange LED lights continuously.

- 3) Entering modes:



T70MH2 TRANSMITTER MODEL

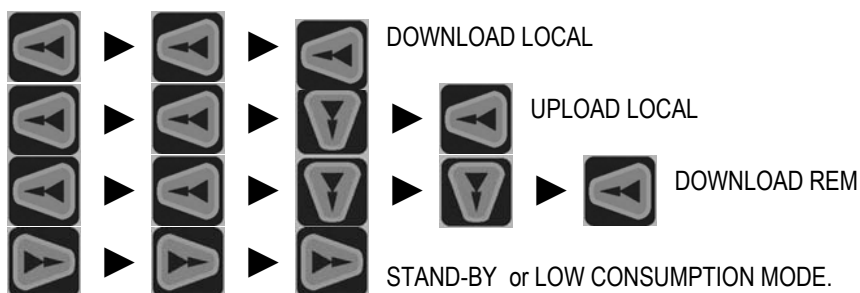


- 1) With the transmitter switched off, press "ON/STOP". Transmitter in stand-by or LOW CONSUMPTION mode.
- 2) To enter in PARAM mode, press simultaneously "ENTER" and "START" functions.



Keep pressed until the orange LED lights continuously.

- 3) Entering modes:





6.8 PROGRAMATION (TRANSMITTER MODEL T70MH3D)

The availability to enter in programming mode is restricted to transmitter's models with LCD (model T70MH3D -> Remote Programmer).

The software architecture presents this following message's levels:

1											
M	E	S	S	A	G	E					

1	.	X1									
M	E	S	S	A	G	E					

1	.	X1	.	X2							
M	E	S	S	A	G	E					

1	.	X1	.	X2	.	X3					
M	E	S	S	A	G	E					

TRANSMITTER'S SWITCH ON PROCESS

With the transmitter switched off, press "ON/STOP" during 2 secs. and the following message is displayed in the LCD:

I	N	I	T	I	A	L	I	Z	I	N	G
P	L	E	A	S	E		W	A	I	T	

This message will remain in the LCD display when reading the internal EEPROM. Finally, the transmitter will switch off remaining in switched off mode, (no message will be displayed); only the battery level icon will be displayed:

/ / / (different battery level indications: full, medium, low and empty).

SEQUENCE TO ACCESS TO PROGRAMATION MODE

With the transmitter switched off, press "ENTER" and "SART" simultaneously, during 3 secs. The message "PROGRAMATION" will be displayed in the LCD.



+



Programming mode sequence activation from switched off mode.

P	R	O	G	R	A	M	A	T	I	O	N

Pressing ESC, the transmitter turns to "switched off" mode.

Pressing ENTER, the software menu is available (use "UP" / "DOWN" arrows to navigate in the software):



UP

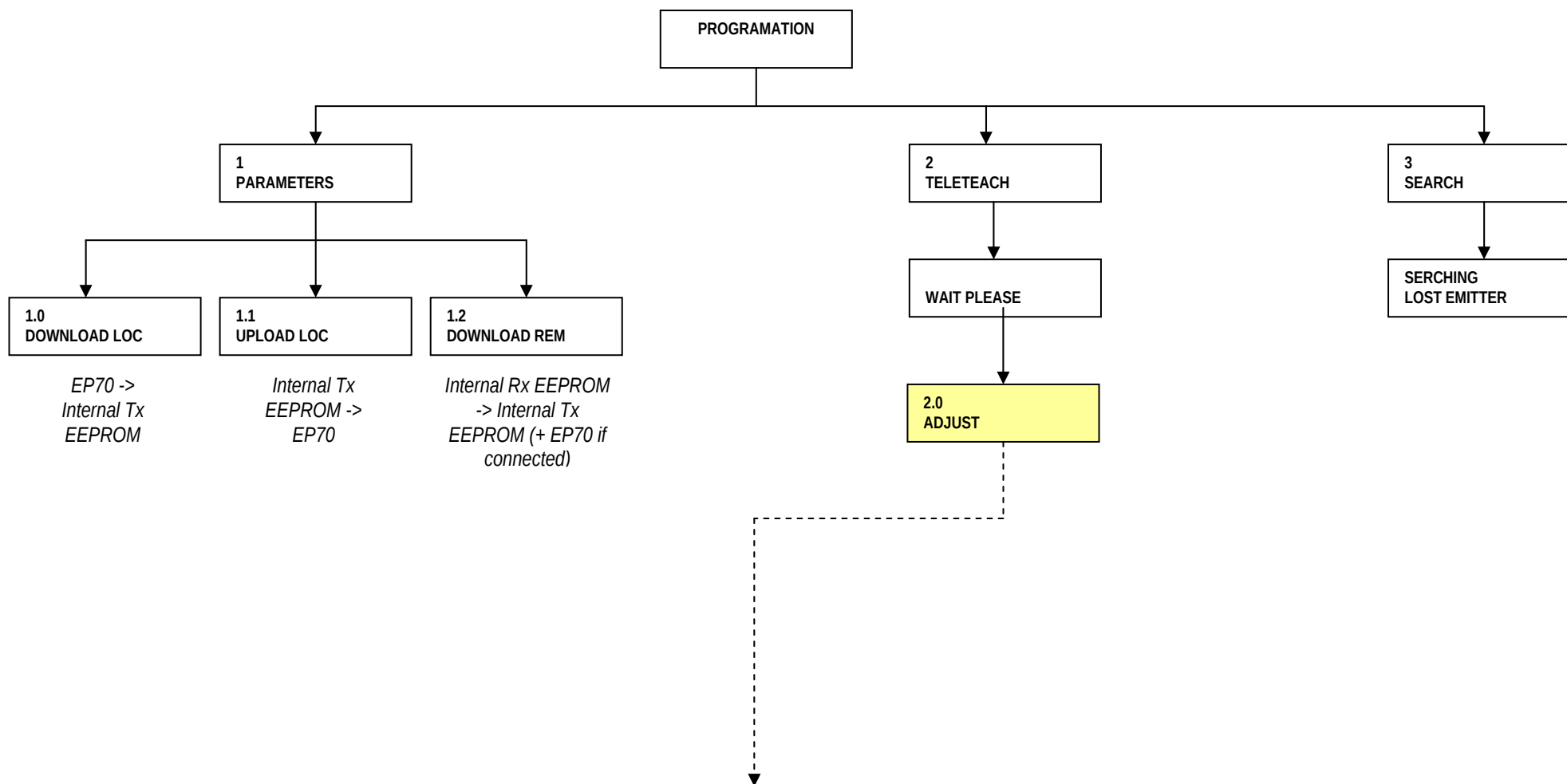
DOWN

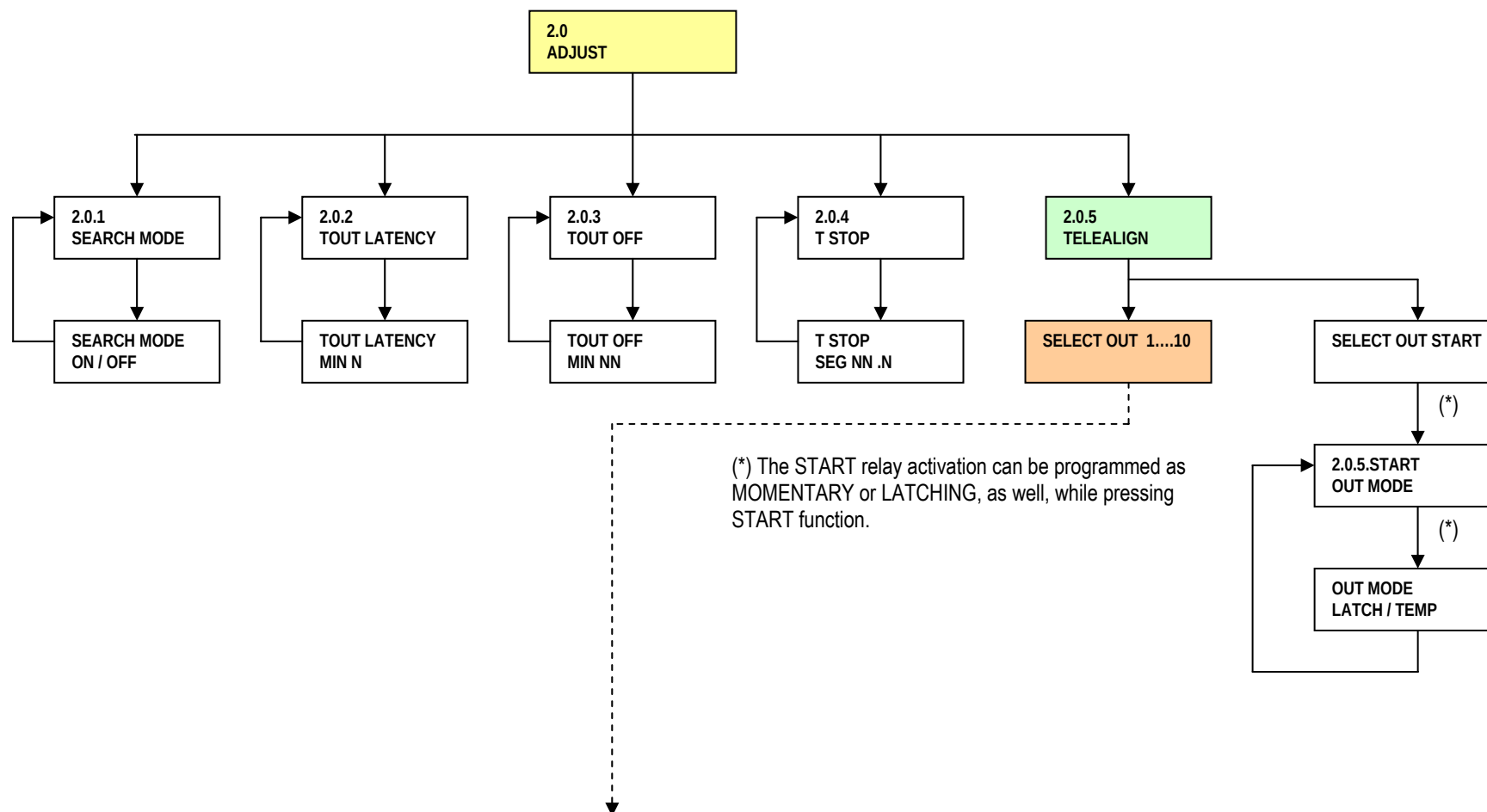
VALIDATE "ENTER" / ACCESS TO A LOWER LEVEL OF THE MENU

LEAVE "ESC" / ACCESS TO AN UPPER LEVEL OF THE MENU



6.8.1- PROGRAMMING MODE: BLOCK DIAGRAM







6.8.2.- PROGRAMMABLE PARAMETERS (TELE-ALIGNED):

PROGRAMMABLE VALUES (TELE-ALIGNED)		
Parameter	Default value	Range (programmable values)
START (KEY SOFTWARE)	T70MG10: NO T70MH3/T70MH3D/T70MH2: ◀ ▶	See User's Manual
SEARCH MODE	OFF	ON, OFF. (SEARCH MODE)
TOUT LATENCY	4min	1 to 6min; steps of 1 min, and infinite ("INF" value) minutes. (Time to LATENCY state).
TOUT OFF	15min	10 to 20min step of 1 min, and infinite ("INF" value). (Time from LATENCY state to "Stand-by" state or "low consumption" mode).
TSTOP	2sec	1 to 10sec.: steps of 0,1sec. (Passive STOP time)
OUTMODE	MOMENTARY	MOMENTARY or LATCHING (OUTPUTS: OPERATING MODES)
SOFTSTART	ON	ON or OFF (Enable or Disable soft start)
SOFTSTOP	ON	ON or OFF (Enable or Disable soft stop)
ACCEL RAMP	0,1sec	0,0sec, 0,1sec, 0,2sec, 0,3sec, 0,4sec, 0,5sec, 0,6sec, 0,8sec, 1,0sec, 1,2sec, 1,5sec, 1,7sec, 2,0sec, 2,5sec 3,5sec, 5.0sec (Ramp acceleration adjustment for each output)
DECEL RAMP	0,1sec	0,0sec, 0,1sec, 0,2sec, 0,3sec, 0,4sec, 0,5sec, 0,6sec, 0,8sec, 1,0sec, 1,2sec, 1,5sec, 1,7sec, 2,0sec, 2,5sec 3,5sec, 5.0sec (Ramp deceleration adjustment for each output)
PWM FREQ	300Hz	30Hz to 300Hz; Step = 10Hz. (R70MP10: PWM output frequency adjustment. Independent for each output).



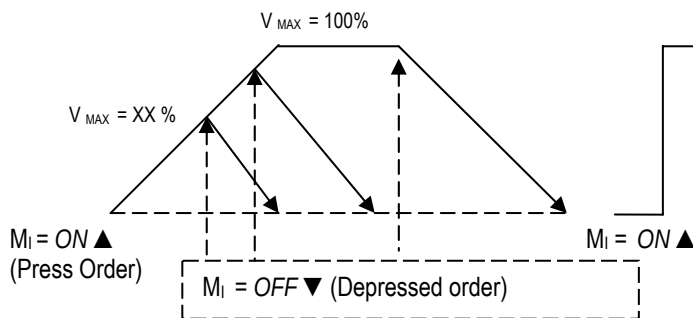
6.8.3.- OUTPUT PROGRAMMING MODES (TELE-ALIGNED)

In Menu 2.0.5.x.0 OUTMODE: select “MOMENTARY” for MOMENTARY OUTPUT and “LATCHING” FOR LATCHED (LOCKED) OUTPUT.

OUTPUT PROGRAMMING WITH ONE STEP KEYPAD: “MOMENTARY” OUTPUT MODE or “LATCHING” OUTPUT MODE.

1) RAMP-UP PROGRAMMING (RAMP= ON)

2) ON/OFF PROGRAMMING (RAMP= OFF)



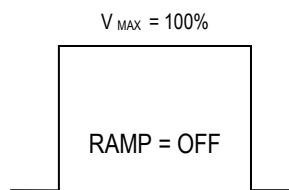
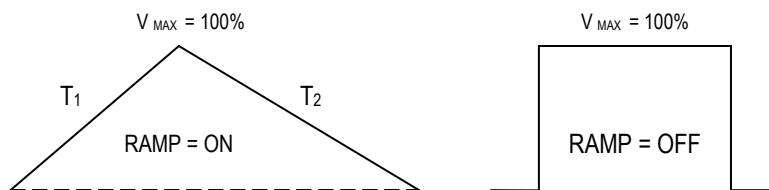
In 2.0.5.x.1 software menu SOFT START, select:
ON to enable ACCELERATION RAMP
OFF to disable ACCELERATION RAMP

In 2.0.5.x.2 software menu SOFT STOP, select:
ON to enable DEACCELERATION RAMP
OFF to disable DEACCELERATION RAMP



In MOMENTARY mode, the outputs remain active while the orders are pressed. They can be programmed in ramp mode (soft start and soft stop programmable independently) or ON/OFF mode.

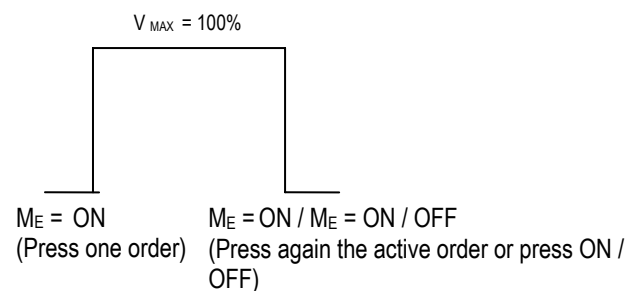
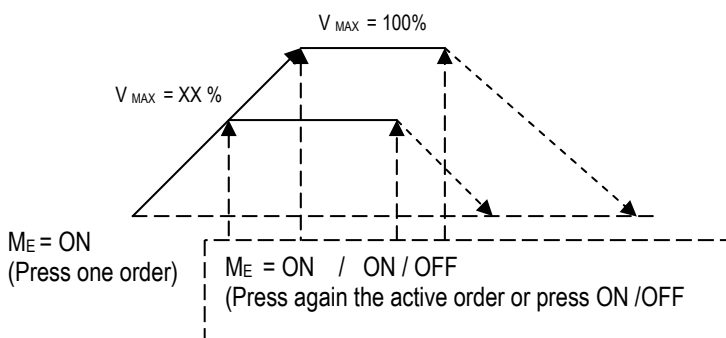
M_I = Whatever 10 functions or generic keypad orders (1, 2, 3.....8, 9 10)



OUTPUT PROGRAMMING WITH ONE STEP KEYPAD: “LATCHING” OUTPUT MODE.

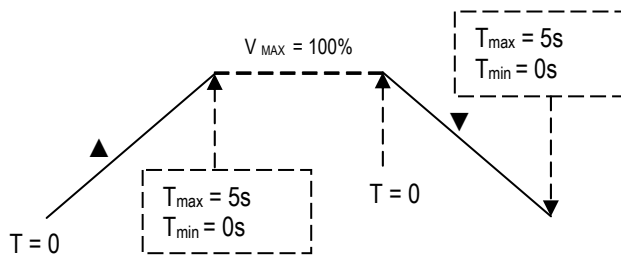
1) RAMP-UP PROGRAMMING (RAMP= ON)

2) ON/OFF PROGRAMMING (RAMP= OFF)



In LATCHING output mode the outputs remain active, once the order has been pressed until: a) the same order is pressed again; b) the ON/OFF function is pressed. They can be programmed in ramp mode (soft start and soft stop programmable independently) or ON/OFF mode.

M_I = Whatever 10 functions or generic keypad orders (1, 2, 3.....8, 9 10)



In 2.0.5.x.3.0 software menu ACCEL RAMP, select:
ACCEL TIME
SEG NN

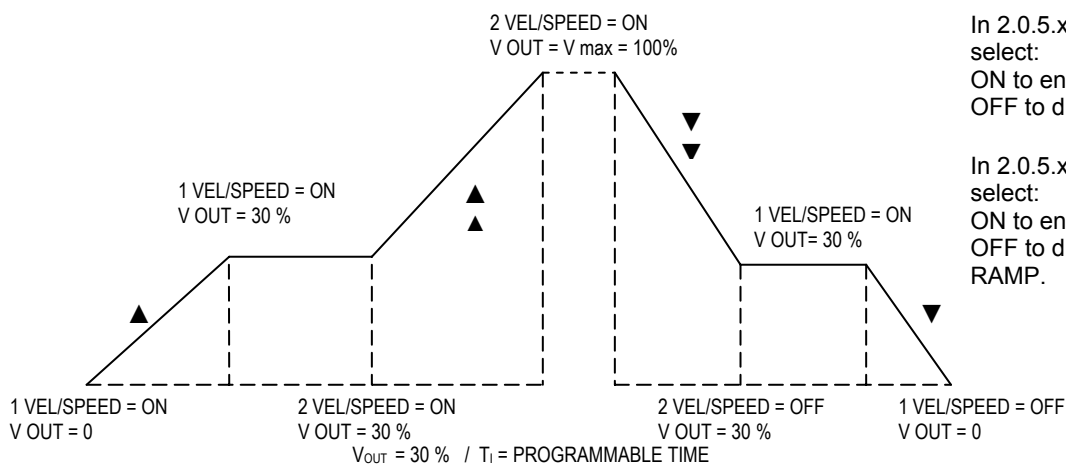
In 2.0.5.x.3.1 software menu DECEL RAMP, select:
DECEL TIME
SEG NN



The ramp up time (up or down) is fully programmable (Tele-Aligned). The programmed time is the time to achieve V_{max} from 0v in each PWM output signal.

TWO STEP KEYPAD PROGRAMMING

1) RAMP-UP PROGRAMMING (RAMP= ON)



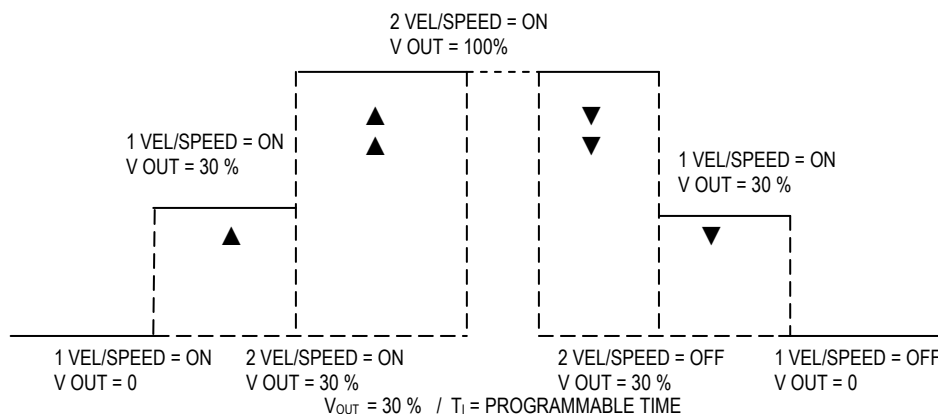
In 2.0.5.x.1 software menu SOFT START, select:
ON to enable ACCELERATION RAMP.
OFF to disable ACCELERATION RAMP.

In 2.0.5.x.2 software menu SOFT STOP, select:
ON to enable DEACCELERATION RAMP.
OFF to disable DEACCELERATION RAMP.



For two steps keypads, the 2nd speed value is V_{max} (100%).
The 1st speed value is V_{out} . It will be programmable (Tele-aligned = XX %) in future software versions.

2) ON/OFF PROGRAMMING (RAMP= OFF)



For two steps keypads, the 2nd speed value is V_{max} (100%).
The 1st speed value is V_{out} . It will be programmable (Tele-aligned = XX %) in future software versions.

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AENOR Asociación Española de
Normalización y Certificación

Copia



**CERTIFICADO DE
REGISTRO DE EMPRESA**
REGISTERED FIRM CERTIFICATE

ER-0149/1996

La Asociación Española de Normalización y Certificación (AENOR) certifica que el Sistema de Gestión de la Calidad adoptado por: *The Spanish Association for Standardization and Certification (AENOR) certifies that Quality Management System adopted by:*

ANGEL IGLESIAS, S.A. (IKUSI)

para: *for:*

LAS ACTIVIDADES DETALLADAS EN EL ANEXO AL CERTIFICADO

THE ACTIVITIES SPECIFIED IN ANNEX TO THE CERTIFICATE

que se realiza/n en o desde el establecimiento: *which is/are carried out in or from the establishment:*

PO MIRAMON, 170
20009 - SAN SEBASTIAN
(GUIPUZCOA)

es conforme a las exigencias de la Norma Española **UNE-EN ISO 9001:2000** Sistemas de Gestión de la Calidad. Requisitos. *Complies with the requirements of the Standard UNE-EN ISO 9001:2000 Quality Management Systems. Requirements.*

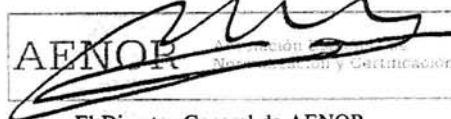
El presente Certificado es válido salvo suspensión, expiración o retirada notificada en tiempo por AENOR. *The Certificate is valid unless it is suspended, cancelled or withdrawn upon AENOR'S written notification.*

Cualquier aclaración adicional relativa tanto al alcance de este certificado como a la aplicabilidad de los requisitos de la norma ISO 9001:2000 puede obtenerse consultando a la organización. *Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2000 requirements may be obtained by consulting the organization.*

Fecha de emisión: **1996-04-12**
Issued on

Fecha de renovación: **2005-09-30**
Renewed on

Fecha de expiración: **2008-09-30**
Expires on



AENOR Asociación Española de
Normalización y Certificación

El Director General de AENOR
General Manager of AENOR



AENOR es miembro de la RED IQNet (Red Internacional de Certificación), cuyos miembros operan de acuerdo con la norma europea EN 45012. *AENOR is a member of the IQNet NETWORK (The International Certification Network). The members of which operate in accordance with the EN 45 012 European standard.*

AENOR - CI Génova, 6 - 28004 MADRID(España) - Teléfono: (+34) 914 326 090 - Telefax: (+34) 913 104 518 - www.aenor.es

Entidad de certificación acreditada por ENAC con acreditación n° 01/C-SC003



AENOR Asociación Española de
Normalización y Certificación

ANEXO AL CERTIFICADO DE REGISTRO DE EMPRESA

ANNEX TO THE REGISTERED FIRM CERTIFICATE

ER-0149/1996

El alcance del Certificado de Registro de Empresa de ANGEL IGLESIAS, S.A. (IKUSI) con nº ER-0149/1996 incluye las siguientes actividades: *The scope of Registered Firm Certificate of ANGEL IGLESIAS, S.A. (IKUSI) n° ER-0149/1996 includes the following activities:*

EL DISEÑO, EL DESARROLLO, LA PRODUCCIÓN, LA INSTALACIÓN Y EL SERVICIO POSVENTA DE: SISTEMAS DE INFORMACIÓN AL PÚBLICO: PANELES TELEINDICADORES, MONITORES GRÁFICOS Y ALFANUMÉRICOS, MEGAFONÍA AUTOMÁTICA, SOFTWARE GENERAL DEL SISTEMA. GESTIÓN Y CONTROL DE INSTALACIONES DE TRÁFICO Y SEÑALIZACIÓN FERROVIARIA Y VIARIA. COMUNICACIONES DE VOZ Y DATOS, ADQUISICIÓN DE DATOS Y MONITORIZACIÓN DE PROCESOS, SOFTWARE GENERAL DEL SISTEMA. SISTEMAS ELECTRÓNICOS A BORDO PARA FERROCARRIL Y VEHÍCULOS DE TRACCIÓN.

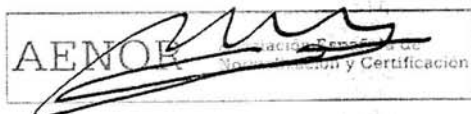
EL DISEÑO, EL DESARROLLO, LA PRODUCCIÓN Y EL SERVICIO POSVENTA DE:
EQUIPO ELÉCTRICO Y ACCESORIOS PARA EL SUBSISTEMA RADIANTE, CABECERA, RED EXTERIOR, Y ABONADO, EN REDES DE BANDA ANCHA DESTINADAS A LA TRANSMISIÓN Y DIFUSIÓN AUDIOVISUAL Y MULTIMEDIA. EL EQUIPO DE ANTENA, CABECERA, DISTRIBUCIÓN Y USUARIO PARA INSTALACIONES O COLECTIVIDADES DESTINADAS A LA CAPTACIÓN DE SEÑALES DE RADIOFRECUENCIA TRANSMITIDAS POR VÍA TERRENA O POR SATÉLITE (SMATV, MATV). EL EQUIPO DE RADIOFRECUENCIA Y EQUIPO DE FIBRA ÓPTICA PARA TRANSMISIÓN, PROCESAMIENTO Y RECEPCIÓN DE SEÑALES ANALÓGICAS Y DIGITALES POR CABLE O RADIADAS. TELECONTROL: CONTROL REMOTO POR RADIO, TELEMANDO POR INFRARROJOS.

THE DESIGN, THE DEVELOPMENT, THE PRODUCTION, THE INSTALLATION AND AFTER SALES SERVICE OF: PUBLIC INFORMATION SYSTEMS: INFORMATION PANELS, GRAPHIC AND ALPHANUMERICAL SCREENS, AUTOMATIC MEGAPHONE SYSTEMS, GENERAL SYSTEM SOFTWARE. MANAGEMENT AND CONTROL OF TRAFFIC INSTALLATIONS AND ROAD AND RAIL SIGNALLING. VOICE AND DATA COMMUNICATION, DATA ACQUISITION AND PROCESS MONITORING, GENERAL SYSTEM SOFTWARE. ELECTRONIC ONBOARD SYSTEMS FOR TRAINS.

THE DESIGN, THE DEVELOPMENT, THE PRODUCTION AND AFTER SALES SERVICE OF: ELECTRONIC EQUIPMENT AND ACCESSORIES FOR RADIATING SUBSYSTEM, HEADEND, OUTSIDE NETWORK AND SUBSCRIBER IN BROADBAND NETWORKS INTENDED FOR TRANSMISSION AND AUDIOVISUAL BROADCASTING AND MULTIMEDIA. AERIAL, HEADEND, DISTRIBUTION AND USER EQUIPMENT FOR INDIVIDUAL AND COMMUNITY INSTALLATIONS FOR THE CAPTURING OF RADIO FREQUENCY SIGNALS COMING FROM SATELLITE OR TERRESTRIAL TRANSMITTERS (SMATV, MATV) RADIO FREQUENCY AND FIBRE OPTIC EQUIPMENT FOR TRANSMISSION, PROCESSING AND THE RECEPTION OF ANALOGUE AND DIGITAL SIGNALS BY CABLE OR RADIATED. REMOTE CONTROL. RADIO REMOTE CONTROL: REMOTE CONTROL BY INFRARED.

Fecha de emisión: 1996-04-12 Fecha de renovación: 2005-09-30
Issued on Renewed on

Fecha de expiración: 2008-09-30
Expires on



Por AENOR. El Director General
On behalf of AENOR. The General Manager

AENOR - Génova, 6 - 28004 MADRID (España) - Teléfono (+34) 914 326 090 - Telefax (+34) 913 104 518 - www.aenor.es



THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and AENOR
hereby certify that the organization

ANGEL IGLESIAS, S.A. (IKUSI)

PO MIRAMON, 170
20009 - SAN SEBASTIAN
(GUIPUZCOA)

for the following field of activities

THE ACTIVITIES SPECIFIED IN ANNEX TO THE CERTIFICATE

has implemented and maintains a

Quality Management System

which fulfills the requirements of the following standard

ISO 9001:2000

Issued on: **1999-08-01**

Renewed on: **2005-09-30**

Validity date: **2008-09-30**

Registration Number: **ES-0149/1996**



Dr. Fabio Roversi
President of IQNet

AENOR
Asociación Española
de Normalización y Certificación
Ramón NAZ
General Manager of AENOR

IQNet Partners*:
AENOR Spain AFAQ France AIB-Vincotte International Belgium ANCE Mexico APCER Portugal CISO Italy CQC China CQM China
CQS Czech Republic Cro Cert Croatia DQS Germany DS Denmark ELOT Greece FCAV Brazil FONDONORMA Venezuela
HKQAA Hong Kong ICONTEC Colombia IMNC Mexico IRAM Argentina JQA Japan KEMA Netherlands KFG Korea MSZT Hungary
Nemko Certification Norway NSAI Ireland ÖQS Austria PCBC Poland PSB Certification Singapore QMI Canada RR Russia
SAI Global Australia SFS Finland SII Israel SIQ Slovenia SQS Switzerland SRAC Romania TEST St Petersburg Russia
YUQS Serbia and Montenegro

IQNet is represented in the USA by the following partners: AFAQ, AIB-Vincotte International, CISO, DQS, KEMA, NSAI, QMI and SAI Global
* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com



THE INTERNATIONAL CERTIFICATION NETWORK

Annex to IQNet Certificate Number ES-0149/1996
ANGEL IGLESIAS, S.A. (IKUSI)

Activities within the scope of IQNet Certificate ANGEL IGLESIAS, S.A. (IKUSI) Number ES-0149/1996 include the following:

THE DESIGN, THE DEVELOPMENT, THE PRODUCTION, THE INSTALLATION AND AFTER SALES SERVICE OF: PUBLIC INFORMATION SYSTEMS: INFORMATION PANELS, GRAPHIC AND ALPHANUMERICAL SCREENS, AUTOMATIC MEGAPHONE SYSTEMS, GENERAL SYSTEM SOFTWARE. MANAGEMENT AND CONTROL OF TRAFFIC INSTALLATIONS AND ROAD AND RAIL SIGNALLING, VOICE AND DATA COMMUNICATION, DATA ADQUISITION AND PROCESS MONITORING, GENERAL SYSTEM SOFTWARE. ELECTRONIC ONBOARD SYSTEMS FOR TRAINS.

THE DESIGN, THE DEVELOPMENT, THE PRODUCTION AND AFTER SALES SERVICE OF: ELECTRONIC EQUIPMENT AND ACCESSORIES FOR RADIATING SUBSYSTEM, HEADEND, OUTSIDE NETWORK AND SUBSCRIBER IN BROADBAND NETWORKS INTENDED FOR TRANSMISSION AND AUDIOVISUAL BROADCASTING AND MULTIMEDIA. AERIAL, HEADEND, DISTRIBUTION AND USER EQUIPMENT FOR INDIVIDUAL AND COMMUNITY INSTALLATIONS FOR THE CAPTURING OF RADIO FREQUENCY SIGNALS COMING FROM SATELLITE OR TERRESTRIAL TRANSMITTERS (SMATV, MATV) RADIO FREQUENCY AND FIBRE OPTIC EQUIPMENT FOR TRANSMISSION, PROCESSING AND THE RECEPTION OF ANALOGUE AND DIGITAL SIGNALS BY CABLE OR RADIATED. REMOTE CONTROL. RADIO REMOTE CONTROL. REMOTE CONTROL BY INFRARED.

Issued on: 1999-08-01

Renewed on: 2005-09-30

Validity date: 2008-09-30

This annex is only valid in connection with the above-mentioned certificate.



Dr. Fabio Roversi
President of IQNet

AENOR
Asociación Española
Normalización y Certificación
Ramón NAZ
General Manager of AENOR

IQNet Partners*:
AENOR Spain AFAQ France AIB-Vincotte International Belgium ANCE Mexico APCER Portugal CISQ Italy CQC China
CQM China CQS Czech Republic DQS Germany DS Denmark ELOT Greece FCAV Brazil FONDONORMA Venezuela
HKQAA Hong Kong ICONTEC Colombia IMNC Mexico IRAM Argentina JQA Japan KEMA Netherlands KFG Korea MSZT Hungary
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SAI Global Australia SFS Finland SII Israel SIQ Slovenia SQS Switzerland SRAC Romania TEST St Petersburg Russia
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