

Radio Control Operation and Maintenance Manual

Série FIREFLY-XFLY-MFLY PWM-CAN

Version 1.0





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1 Safety notes

The E-Chronos radio control is not an independent product and is considered exclusively as a component of a machine :

- Allowing the use of a radio control in an appropriate way.
- Can be operated safely and in accordance with all legal provisions, regulations and standards applicable to this radio control.

1.1 Responsibility of the machine manufacturer

The manufacturer of the machine on which the E-Chronos radio control will be installed is responsible for carrying out a risk assessment to determine whether the E-Chronos radio control is suitable for operating a machine under safe and effective conditions. He must take into account normal operating conditions as well as (reasonably foreseeable) improper use. It is his duty to ensure that the installation, maintenance and use of the E-Chronos radio control and all its components are carried out solely and entirely in accordance with this Manual and in compliance with all local regulations and safety standards.

1.2 System Owner's Responsibility

It is the responsibility of the owner to ensure that the installation, and use of the E-Chronos radio control and all its components are carried out solely and components are performed solely and entirely in accordance with this manual and in compliance with applicable regulations and standards.

- The receiver may only be connected by a specialist according to the enclosed pin assignment diagram.
- The radio control may only be used in perfect condition. perfect condition. In the event of faults and defects that could affect safety safety, the system must be stopped immediately and repaired by a qualified and repaired by a qualified professional.
- If a wireless controller is used, you must ensure that it does not interfere with other that it does not interfere with the other systems around it and that it is not interfered with by them.
- Perform regular visual inspections of cables, plugs and other cables, plugs and other equipment necessary to ensure safety and and repair them prior to the start of the work.
- Persons whose responsiveness is impaired by the influence of medication, alcohol or drugs may not operate, maintain or repair the radio control system.

1.3 Responsibility of the user



DANGER! Danger of unintentional function activation

Make sure that no unintended operation of the transmitter by clothing or other objects.



Exigences pour un fonctionnement sûr

- Turn off the transmitter during breaks and at the end of the work work and secure it against unauthorized access.
- Wear protective work clothing appropriate to the activity and deployment location.
- Before turning on the radio control, make sure that no one could be endangered by its operation.
- Failure to observe the safety information may result in accidents and serious injury.
- In addition to the generally applicable regulations for accident prevention, local regulations must also be observed.
- Follow the instructions in the "Maintenance" section.
- Use the radio control only under the climatic and environmental conditions that are specified in the "Technical Data" section.
- The operator is obliged to use the remote control only for the control of the machine and according to the rules of "good faith".

1.4 Safety check and start-up



ATTENTION !

When starting up the radio control, the following checks must be carried out

1.4.1 Control of the emergency stop "ESTOP"

To control the emergency stop ("ESTOP" function) proceed as follows :

- 1. Turn on the receiver.
- 2. Turn on the transmitter by pressing the "START" button for 3 seconds or with the key.
- 3. Check that the green light is flashing.
- 4. At this point your radio is ready to work.
- 5. Press and hold any function on the transmitter.
- 6. Press the emergency stop button "ESTOP".
- 7. Make sure the current function stops immediately.
- 8. Also check that no command can be activated when the "ESTOP" is pressed.



DANGER! If you find a fault during this check, stop the machine immediately. Never work with the machine if the emergency stop is not functioning

1.4.2 Control of the start-up lock

Some functions, in particular those that activate movements on the machine, prevent the radio control from starting. To identify which functions are concerned, refer to the project specifications, delivered with the product.

To check the start-up interlock, proceed as follows :

- 1. Turn off the receiver by turning off the power.
- 2. Turn on the transmitter by pressing the "START" button for 3 seconds or with the key.
- 3. Turn on the receiver.
- 4. Check that the green light is on and the red light is off.
- 5. At this point, the transmitter communicates with the receiver but the system is not started.
- 6. Press and hold a function of the transmitter to be locked.
- 7. Press the "START" button.
- 8. Make sure that the radio has not been started and that the function is not engaged.
- 9. Repeat steps 5, 6 and 7 for each function affected by the start-up lock.



DANGER!

If you find a fault during this check, stop the machine immediately. Never work with the machine if the start-up lock is not functioning

1.4.3 Control of functions

In order to guarantee the correct operation of the radio control and the wiring on the machine, it is necessary to check each function controlled by the transmitter. Follow the procedure below :

- 1. Turn on the receiver.
- 2. Turn on the transmitter by pressing the "START" button for 3 seconds or with the key.
- 3. Check that the green light is flashing.
- 4. At this point your radio is ready to work.
- 5. Activate each function one by one.
- 6. Check that the corresponding action on the machine is correct.

1.5 Special risks

1.5.1 Defective control elements



CAUTION! Residual Risk

Even if the operator follows the procedures correctly, a residual risk is always present. Example : a control element remains blocked (electrical or mechanical failure) in the "ON" position. The corresponding action is maintained against the operator's will and can lead to a dangerous situation.

Constantly monitor your working environment so that you can react quickly and carefully, even in unexpected dangerous situations.

1.5.2 Short circuit



ATTENTION ! Risk of fire due to short circuit !

In the event of a short circuit, high currents can occur, which could currents can occur, which could, for example, cause connectors and cables to become very hot. and cables. This could result in a fire. The supply voltage of the receiver must be protected with a fuse, 1.5 to 2x the rated current of the application, to avoid the risk of fire.

1.6 Transport, matériaux d'emballage et stockage

1.6.1 Safety instructions for transport



NOTICE!

In case of incorrect transport, material damage may occur.

- Be careful when unloading packaging parts or transporting them transporting them on your company premises. Observe the symbols on the packaging.
- Make sure you are ready to begin assembly before removing remove the packaging.

1.6.2 Control of the delivery

- When you receive the delivery, immediately check the contents and any transport damage.
- If a delivery has been damaged in transit and the damage is visible, do not accept the delivery.

1.6.3 Handling of packaging materials

Packaging materials are valuable raw materials that can often be be reused or recycled.

- Dispose of packaging materials in a proper environment.
- Observe the applicable waste disposal regulations. Hire a specialized company for disposal, if necessary.



DANGER! Risk of choking and injury to children due to packaging materials

Keep packaging materials out of the reach of children.

1.6.4 Storage of packaging parts

Store packaging materials under the following conditions :

- Do not store in open air.
- Store in a dry, dust-free area.
- Protect from direct sunlight.
- Avoid mechanical vibrations.
- Storage temperature : see technical data
- Relative humidity : see technical data
- If stored for more than 3 months, inspect the general condition of all parts and packaging. If If necessary, repackage or replace the packaging.

1.7 Transmitter Battery Storage and Handling

- Batteries gradually lose capacity with age and their operating time becomes shorter.
- Recharge the battery only when it is empty. If it is charged after only a short period of operation, it will shorten the life span.
- Do not charge the battery at temperatures below 0°C or above +40°C.
- If handled properly, the battery life is approximately 500 charge and discharge cycles.
- A deep discharge, which damages the battery, is prevented by the prevented by the battery protection circuit.
- If the battery has not been used for an extended period of time, charge it before use.
- Charge the batteries only with chargers that have been that have been supplied or recommended by the recommended by the manufacturer.
- Keep unused batteries away from metal objects that could cause a short circuit.
- Use only batteries designed for E-Chronos devices (technology and battery type).
- Liquid may leak from the battery if it is not used properly. use. Avoid contact with this liquid. In case of accidental contact with battery fluid, rinse with water, seek medical attention if necessary.



If the unit is turned off for an extended period of time, the battery should be removed from the removed from the transmitter. Under no circumstances should an empty battery be left in the unit permanently (risk of battery acid leakage).



According to the directive on waste electrical and electronic equipment, batteries must not be disposed of with household waste! Take them to a recycling center or you can send them back to E-Chronos

1.8 Behaviour in case of danger and accident

Preventive measures

- You should always be prepared in case of an accident or fire.
- Store first aid supplies (medical kit, blankets, etc.) within easy reach.
- Store first aid supplies (medical kit, blankets, etc.) within easy reach.
- Ensure that personnel are trained in accident management first aid and the use of life-saving equipment.
- Maintain clear access routes for emergency vehicles.



ATTENTION!

In the event of a hazardous situation, immediately press the red emergency stop button "ESTOP"

In a dangerous situation : proceed correctly !

- Turn the unit off immediately.
- Secure the accident area.
- Place the breakdown triangles if the area is near a road.
- Assist people in the danger zone.
- Initiate first aid measures.
- Notify emergency services and/or fire department.
- Inform those involved of the location of the accident.

2 Product identification

For any request or complaint you must provide the serial number, system number and type of device. This information allows the manufacturer to quickly identify the product concerned. The receiver identification label is located on the housing. The transmitter identification label is located on the back of the transmitter.

2.1 Receiver nameplate

Positioning of the receiver nameplate :



Rue des sillons 1 CH-2800 Delémo

- 1. System number.
- 2. Product number.
- 3. Serial number.

2.2 Transmitter Nameplate



- 1. Product number.
- 2. System number.
- 3. Serial number.

3 Presentation of the transmitter



А	Actuators (joystick, selector, buttons,)		
В	Indicator lights		
С	Battery		
D	Emergency stop button		
Е	Button "START"		
F	Magnetic sensor		
G	Transmitter nameplate		

4 Mounting

4.1 Transmitter

4.1.1 Assembly/disassembly of the battery

To install the battery in the transmitter, follow these instructions :



- 1. Insert the battery, slightly tilted, into the transmitter compartment.
- 2. Rotate the battery until it "clicks".

To remove the battery, follow the steps above in reverse order.

4.1.2 Wear on the body

Wear the transmitter on your pelvis The radio control transmitter can be worn on your pelvis using the belt included in the package. To do this, the belt must be attached to the transmitter :



Use the rings highlighted in red to attach the carabiners to the belt.

4.2 MA1 Receiver

4.2.1 Mounting Location



ATTENTION!

The installation of the receiver on the electrical system of a machine can only be done by a competent and specialized technician who knows the electrical circuit of the machine as well as the technical characteristics of the radio control

- The receiver must be firmly attached to the machine!
- Avoid mounting the receiver in a completely enclosed metal box. This greatly reduces the quality of the radio link.
- Avoid mounting near other radio systems or radio systems or other electronic devices that may cause electromagnetic interference.
- Select a mounting location so that a vertical installation (antenna against the top and cable outlet against the bottom).
- Do not block the visibility of the LED controls.

For proper operation of the radio control, the receiver must be installed in a position that allows the antenna to receive the best possible radio waves. The metal parts of the machine surrounding the receiver unit greatly attenuate the radio signal.

However, in extreme environments or due to lack of space, it is sometimes necessary to carry out the installation inside electrical panels or in unsuitable areas of the machine. In this case it would be necessary to use a remote antenna with an antenna extension cable.

E-Chronos can advise and supply this kind of device.

If the machine on which the receiver is to be mounted is mobile and/or generates strong vibrations, it is necessary to use rubber dampers. These are available from your E-Chronos dealer.

4.2.2 Installation



Mount the receiver vertically with the antenna facing up. The antenna should be as far away from the metal as possible to obtain an optimal wireless connection. Use the 4 mounting points on the receiver



- 1. Mark the mounting holes using the sketch.
- 2. Drill appropriate holes for mounting screws. Possibly tap if possible.
- 3. Attach the receiver box to the vehicle with 4 M6 screws. Use spring washers to prevent loosening.
- 4. If necessary, use the shock absorbers.

5 Wiring diagrams and installation

To carry out the wiring on the machine, refer to the receiver diagram supplied with the radio control and to the machine diagram.

6 General Operating Instructions

The start-up of the radio control consists in establishing the radio link between the transmission and reception units.

6.1 START button/selector

The "START" button turns on the radio and starts the system. On some models the "START" is not a button but a key or lever switch. It is recognizable by the standard start symbol. Here is an overview of a model with a button :



6.2 ESTOP"

button



DANGER! The ESTOP button is pressed when the machine must be stopped immediately due to a dangerous situation

The emergency stop button, sometimes abbreviated ESTOP for "emergency stop switch", is used to stop the machine and switch off the transmission unit. To resume work after the ESTOP pushbutton has been pressed, you must :

- 1. Check that the operating and use conditions are safe.
- 2. Deactivate the ESTOP push button by turning it in the direction indicated.
- 3. Start the radio control (see autoref sec :starting).

Here is an overview of the emergency stop button on a FireFly model :



6.3 Lighted signalling

6.3.1 Transmitter

A transmitter without display always has 2 LEDs that indicate the status of the system. You can recognize them by the logos next to the LEDs, see the example below :



Here is the meaning of the indicators :

CHAPITRE 6. GENERAL OPERATING INSTRUCTIONS

		Carat and at a tage
LED green	LED red	System status
OFF	OFF	The transmitter is switched off
ON	OFF	The radio link is OK.
		The system is not started
ON	ON	No radio link with the receiver.
ON	Flashing	ESTOP pressed.
Flashing 1x, 2x, 3x	Flashing 1x	Low battery level.
ON	Flashing quickly	Quickset" mode
Flashing quickly	Flashing quickly	Quickset" mode joystick
Plasning quickly	Plasning quickly	out of neutral
Flashing 1x	OFF	Bad radio link
Flashing 2x	OFF	Good radio link
Flashing 3x	OFF	Excellent radio link

6.3.2 Receiver

On the receiver side 5 or 6 lights (depending on the model) are available to inform about the system status. Here is their position :



Generic LEDs

On the MA1 receiver, the "Power" LED indicates the presence or absence of power. For the other indicators, refer to the table below :

"RF LINK"	"RUNNING"	"ERROR"	System status	
OFF	OFF	OFF	The receiver is switched off.	
ON Flashing OFF The progr		The program runs normally.		
Flashing	Flashing	OFF	The system is started.	
ON	Flashing	ON	The system is in pairing mode.	
Flaghing	Flaching	Flaching	The system is in cable	
rasning	riasning	riasning	$\operatorname{control}$ mode.	
-	_	Flashing 1x	Internal system error.	

Critt Bus specific LLDs					
LED CAN OK	LED CAN ERROR	CAN bus status			
OFF	OFF	Receiver off or no CAN option			
ON	OFF	Operational CAN bus			
Flashing 1x	Flashing 1x	Connection error			
Flashing 1x	Flashing 2x	Heartbeat error			
Flashing 1x	Flashing 1x	Synchronization problem			

CAN bus specific LEDs

6.4 Battery Recharge

ATTENTION! Use only the charger provided by E-Chronos

The E-Chronops charger is an automatic charger compatible with E-Chronos batteries. The charger automatically detects the batteries when inserted and applies the appropriate charging mode (DC, CV). It has 2 slots and can charge 2 batteries simultaneously. Each of the two slots follows the charge independently. In addition, the indicator lights show the progress of the charge and/or the defects. The charging time for an empty battery is about 3 hours.

6.4.1 Power supply connection

Mains power connection

The E-Chronos charger only accepts 12V or 24V DC voltage. To connect it to the mains (230 VAC/50 Hz or 120 VAC/60 Hz) you must use the adapter supplied with the system :



Connect the corresponding end of the adapter to the charger and the other end to a suitable power outlet. The green "power on" indicator should light up.

Connection to the vehicle

The E-Chronos charger can be connected directly to the vehicle via a cigarette lighter adapter :



Connect the corresponding end of the adapter to the charger and the other end to the vehicle's cigarette lighter socket. The green "power on" indicator should light up.

6.4.2 Inserting the batteries

Once the charger is powered up you can insert 1 or 2 batteries into the charger to start a charge cycle. To determine the direction of insertion of the batteries refer to the following image :



The orange light starts to flash, indicating that charging is in progress.

6.4.3 Load Indicators



LED D indicates that the charger is powered correctly.

For location 1 :

A1	B1	C1	Status
OFF	OFF	OFF	No battery 1
OFF	Flashing	OFF	Battery 1 is charging
ON	OFF	OFF	Battery 1 is charged.
OFF	ON	ON	Battery 1 is defective

For location 2 :

A2	B2	C2	Status
OFF	OFF	OFF	No battery 2
OFF	Flashing	OFF	Battery 2 is charging
ON	OFF	OFF	Battery 2 is charged.
OFF	ON	ON	Battery 2 is defective

6.5 Starting the radio control

Starting up the radio control consists of establishing the radio link between the transmitting and receiving units and activating the main safety relays or MC for "Main Contact" of the receiver. This is necessary before you can use the machine's controls. To start the radio control, proceed as follows :

- 1. Make sure the receiver is turned on.
- 2. Insert a charged battery into the transmitter.
- 3. Release all transmitter controls and verify that all components are in neutral position.
- 4. Deactivate the ESTOP push button by turning it in the direction indicated.
- 5. Turn on the transmitter and start the radio control by pressing the START button or the transmitter key for 3 seconds.
- 6. The green indicator starts to flash.

Locking on start-up

For safety reasons, most functions prevent the radio from starting if they are activated. The functions affected by this lockout are product specific, refer to the documentation of the system concerned.

6.6 Command Activation

With the radio control started, the joysticks, push-buttons and selectors related to the commands being executed can be operated. In order to know the correspondence between the actuators and the machine manoeuvres, the operator must be correctly trained in the symbols used on the panel of the transmission unit (the symbols used are decided by the machine manufacturer according to its operational and functional character).

6.7 Interruption of the radio link

When the radio link is poor or interrupted, the receiving unit decides to stop the radio control by itself, this feature is called "passive emergency stop". The green light on the transmitter unit changes from flashing to steady and the red light is also permanently on. Once the radio connection has been re-established, the red light goes out and you should proceed to start the radio control by pressing the START push-button.

6.8 Automatic Transmitter Shutdown

If the transmitter remains activated for a certain period of time but without a motion command, it switches off automatically. This time depends on the application and is set by either the machine manufacturer and/or the standards for the application.

6.9 "Data Feedback" function

The Data Feedback function provides the operator with information and/or signals relating to the machine being controlled. During normal operation of the radio control, pay attention to the indications displayed and signalled by the display or by the LEDs : they help you to evaluate the operating situation of the machine.



ATTENTION!

Any indication displayed and signaled by the display or by the indicator lights can never be considered or used as a safety signal

6.9.1 Operation with display

If there is a display on the transmission unit, it will be possible to view the signaling icons, the values of the measurements made on the machine and their description. The information and the way in which it is displayed (icons and/or measurements and/or descriptions) depend on the configuration chosen by the machine manufacturer. The battery charge level and the quality of the radio link are also normally indicated.

6.9.2 Operation with lights

If there are indicators on the drive unit, their illumination indicates particular machine states (e.g. load limits, end of travel, etc.) The states indicated depend on the configuration chosen by the machine manufacturer. This also applies to indicators other than lights, such as buzzers or vibration detectors.

6.10 LEARN

The pairing procedure or "LEARN" is a feature that allows you to link a transmitter with a receiver. In a situation where you lose or break the transmitter, in order to work again you will need to pair the new transmitter. This procedure allows the receiver to register the unique identification number of the transmitter.

6.10.1 Put the transmitter in "LEARN" mode

To put the transmitter in "LEARN" mode, use the following procedure :

- 1. Turn on the transmitter by pressing the "START" button for 3 seconds.
- 2. Release the "START" button.
- 3. Press and hold the "START" button until the procedure is complete.
- 4. Press the "ESTOP" button.

The transmitter is now in Pairing Mode and will remain there until you release the START button.



To identify the "START" and "ESTOP" buttons please refer to the chapitre 3

6.10.2 Put the receiver in "LEARN" mode



You have 15 seconds after the receiver is turned on to perform the pairing. After these 15 seconds, it is no longer possible to "LEARN" the system

To put the receiver in "LEARN" mode, follow the procedure below :

- Turn on the receiver.
- Place the magnet in the specified location.
- The red light on the receiver should be on continuously.
- Remain in this state for at least 3 seconds (red light on).

The system is now paired, and you can release the "START" button on the transmitter.

6.11 Setting "quick set"

The values for the current or voltage that control the proportional hydraulic values are set by default in the factory according to the manufacturer's specifications. Depending on the hydraulic installation of the machine, it may be necessary to adjust these values during commissioning.

This can be done using the "Quickset" adjustment mode.

6.11.1 Activation

To activate the "quickset" mode, proceed as follows :

- 1. Power the receiver.
- 2. Turn on the transmitter.
- 3. Place a magnet near the area marked by a circle (voir chapitre 3) during 2s.
- 4. The red battery indicator flashes rapidly, the "quickset" mode is activated.

6.11.2 Setting

For a proportional axis it is possible to adjust the following 4 values :

- 1A : minimum positive sense.
- 2A : maximum positive sense.
- 1B : minimum negative sense.
- 2B : maximum negative sense.

The transfer function is shown below :



To adjust the minimum :

- 1. Push (or turn depending on the model) the relevant joystick until the green "radio link" indicator flashes rapidly. This indicates that the joystick is out of the neutral zone.
- 2. Increase or decrease the proportional output value for this joystick position with the switch on the transmitter provided for this purpose.

To adjust the maximum :

1. Push (or turn, depending on the model) the relevant joystick as far as it will go, until the mechanical stop.

2. Increase or decrease the proportional output value for this joystick position with the switch on the transmitter provided for this purpose.

For each proportional output controlled by an analog control element (jostick, potentiometer or other) you can :

- Adjust the min and max independently for each direction (positive and negative directions).
- Adjust the min and max for each available speed which can be selected by a lever switch or a selector.
- If 2 or more proportional outputs are multiplexed on a single jostick you can also set the outputs independently.

Once you have completed the adjustment you can exit quickset mode by placing a magnet near the area marked by a circle (see chapitre 3) during 2s.

7 Dépannage

Si vous rencontrez des problèmes lors de l'utilisation de la radiocommande, voici une liste non-exhaustive des problèmes, de leur cause et leur solution.

Problème	Cause possible	Vérification	
L'émetteur ne réagit pas quand on l'allume	Perte de l'alimentation	 Vérifier les contacts de la batterie (endommagés ou oxydés) Insérer une batterie chargée Recharger la batterie 	
Indication d'une batterie vide après un temps d'utilisation court	 Les contacts de la batterie sont endommagés ou oxydés La batterie n'est pas chargée La batterie est défectueuse 	 Vérifier les contacts de la batterie (endommagés ou oxydés) Recharger la batterie Vérifier que le chargement ce déroule correctement 	
L'émetteur et allumé mais aucune fonction n'est utilisable	 Le récepteur n'est pas alimenté Il n'y a pas de lien radio Le système n'a pas été démarré 	 Contrôler le câblage du récepteur Contrôler l'antenne du récepteur Démarrer le système avec le bouton "START" 	
Certaines fonctions ne s'activent plus	- Le récepteur a un problème - Il y une interruption du câble ou du connecteur	Contrôler si toutes les connections sont correctes	

Si aucune des mesures ci-dessus ne résout le problème, veuillez contacter votre service technique, le revendeur ou E-Chronos SA.

8 Maintenance

8.1 Recommended Maintenance Interval

It is recommended that maintenance work be carried out at least once a year.

8.2 Scope of Maintenance

- Have a specialist check the electrical wiring of your vehicle and appliances to make sure it is in perfect condition. to ensure that it is in perfect condition.
- Check the connection cable and the antenna cable (if an antenna extension cable is used) for any bare or frayed spots.
- Before each maintenance operation, you must the vehicle's ignition and remove all plugs from the wireless Before any maintenance is performed, the vehicle's ignition must be turned off and all plugs removed from the wireless control unit to ensure that no functions are accidentally triggered.

If you discover a defect :



DANGER! Danger due to malfunctions

Do not work with a defective system. Return the complete system for repair in an appropriate package with the transmitter and transmitter and receiver, including the connecting cables and an accurate description of the problem.



ADVICE!

Risk of damage to the device by welding on the vehicle

Before doing any electrical welding work on the vehicle, remove the connections from the receiver to avoid damage to the receiver electronics.

8.2.1 Nettoyage de l'émetteur et du récepteur

Before cleaning, you must turn off the vehicle's ignition and remove all plugs from the wireless control unit to avoid accidentally activating a function. Clean the system components with a damp cloth.



ADVICE! Risk of damage to the unit during cleaning

Risk of damage to the unit due to vehicle cleaning. Prevent system parts from coming into direct contact with oils or lubricants. Do not clean the system components with

degreasing agents, steam cleaners or high pressure cleaners.

8.2.2 Transmitter batteries

To prevent deep discharge, the transmitter will shut off when the battery voltage is very low. Charge the batteries regularly.

If the transmitter's status LEDs go out shortly after the transmitter is turned on, the battery must be replaced.

8.2.3 Fuse Replacement

Before replacing a fuse, it is first necessary to identify the cause of the failure.



ADVICE ! Risk of damage to the device if the receiver is opened

The receiver may only be opened by a qualified specialist. In general, do not interfere with the device as this will invalidate the warranty.



ADVICE !

Risk of damage to the device due to electrostatic discharge

Discharge by touching grounded metal parts. This procedure avoids damage to electronic circuits by electrostatic discharge (ESD).

Receiver MA0



Fuse	Description	Rated current/voltage	Models	Brand
F1 and F2	Relay STOP	8A/250VAC	••	Schurter



Les fusibles F1 et F2 sont des composants SMD directement soudés sur la carte électronique. Leur remplacement ne doit se faire que par une personne maitrisant le brasage SMD

Récepteur MA1 DC



Fuse	Description	Rated current/voltage	Models	Brand
F1	Alim. DC	5A/58VDC	0297005.WXNV	LittleFuse
F2	Alim. AC	$15 \mathrm{A}/250 \mathrm{VAC}$	0297015.WXNV	Schurter
F3 and F4	Relay STOP	$12.5\mathrm{A}/250\mathrm{VAC}$	3403.0285.11	Schurter



Les fusibles F3 et F4 sont des composants SMD directement soudés sur la carte électronique. Leur remplacement ne doit se faire que par une personne maitrisant le brasage SMD

Récepteur MA1 AC



Fuse	Description	Rated current/voltage	Models	Brand
F1	Relay STOP	$12.5\mathrm{A}/250\mathrm{VAC}$	3403.0285.11	Schurter
F2	Alim. AC	$1\mathrm{A}/250\mathrm{VAC}$	3403.0166.11	Schurter
F3	Alim. DC	5A/58VDC	0297005.WXNV	LittleFuse



Fuses F1 and F2 are SMD components directly soldered on the electronic board. Their replacement should only be done by a person who knows SMD soldering

9 Disassembly and disposal

9.1 Disposal

At the end of the device's life, you must dismantle the device and dispose of it in an and dispose of it in an environmentally friendly manner. It is necessary to follow local regulations for waste disposal.

You must turn off the unit before disassembling it.

- Turn off the receiver and unplug it from the machine.
- Turn off the transmitter and remove the battery.

9.2 Dismantling the receiver

- 1. If available, remove the antenna and extension cable.
- 2. Remove the screws securing the receiver housing.

9.3 Elimination

- Remove metal parts.
- Bring synthetic elements to recycling.
- Recycle electrical and electronic parts or return them to E-Chronos.



The product is subject to the European WEEE (Waste Electrical and Electronic Equipment) directive. The owner is required by law to dispose of used equipment at a recycling plant, separately from household waste. Please follow the country-specific instructions for disposal



In accordance with the battery ordinance, batteries must not be disposed of with household waste!

10 Technical data

10.1 System

Frequency range	ISM 868MHz (863-870MHz)
Number of channels	20
Method of accessing the spectrum	LBT+AFA
Addressing	Unique par système (16.7Mio)
Modulation	CSS (chirp spread spectrum)
Transmission speed	5208 bps
Category	2
Radiated power	25 mW
Communication	Half-duplex
Hamming distance	D=6
Response time	$< 100 \mathrm{\ ms}$
Range	500m en champs libre
Emergency stop response time active	$<\!50\mathrm{ms}$
Passive emergency stop response time	${<}550{ m ms}$
Humidity	Storage : 40% , Use : 100%
Protection class	IP65
Performance level ESTOP function	ISO 13849-1 Cat. 3 PLe

10.2 Transmitter

Power supply	Batterie E-Chronos 3.7V, 2000mAh
Duration of operation	40h
Antenna	Intégrer
Dimension (WxHxD)	$96 \mathrm{x} 182 \mathrm{x} 102 \mathrm{mm}$
Color	Noir
Material	PA66 (chargé de verre 20%)
Weight	620g avec la batterie
Digital controls	9 (8 multiplexées)
Proportional controls	6 (2 multiplexées)
Operating temperature	-20 à 55 °C
Storage temperature	-20 à 30 °C

10.3 Receiver

Power supply	12/24 VDC (9-36V)
Consumption	0.1A@24V (2.4W)
Antenna	TNC quart d'onde
Dimension (WxHxD)	233x189x103mm (sans antenne)
Color	Noir
Material	PA66 (chargé de verre 20%)
Weight	998g (sans cable)
Rated current of ESTOP / Safety outputs	10A (250 VCA)
Digital transistor outputs	8
Transistor output current	3.5A continu (7.5A max)
	8 PWM (dir. A+B) ou
Proportional outputs	$8~{ m VC}~{ m (signal+alim.)}~{ m ou}$
	16 TOR
PWM output current	3.16A
PWM output mode	Current control loop
	open loop
Output mode VC	Relative voltage 0.25 to 0.75 Ubat
	Absolute voltage 0-5V or 0-10V
Inputs	4
Input mode	Digital TOR or
	analog current 0-20mA our
input mode	analog voltage $0-10$ V
	analog 0-30V
Operating temperature	-20 à 70 °C
Storage temperature	-20 à 30 °C

10.4 Battery

Technology	lithium polymer
Nominal voltage	3.7V
Voltage range	3.0 à 4.2V
Capacity	$2000~{ m mA}$ / 7.7 Wh
Color	Red
Material	PA66 (loaded with glass 25%)
Weight	$60\mathrm{g}$
Dimension	80x34x20mm
	Overloads
$\operatorname{Protection}$	$deep \ discharge$
	short circuit
Température de fonctionnement (décharge)	-20 à 60 °C
Température de fonctionnement (charge)	0 à 45 °C
Température de stockage	-10 à 45 °C

10.5 Chargeur

Alimentation	12/24 VDC
Puissance max.	24W
Nombre d'emplacement batterie	2
Technologie	CC/CV
Tension / courant de charge	4.2V / 2A
$\operatorname{Couleur}$	Noir
Matière	PA66
Poids	190g
Dimension	$133 \mathrm{x} 126 \mathrm{x} 35 \mathrm{mm}$
Température de fonctionnement	0 à 45 °C
Température de stockage	-10 à 45 °C
Accessoires	Adaptateur secteur $110/230$ VAC à 12 VDC
	Adaptateur allume cigare pour véhicule