autec
safety remote control

Original instructions

Air series

User manual

Description, warnings and instructions

PROVEN PROTECTION FOR YOUR PEOPLE

LIAIRE00-02

Warnings and caption for the documentation attached to the radio remote control

The attached documentation is an integral part of the radio remote control and it aims at providing the instructions needed for using and maintaining the system, paying particular attention to the safety functions. Always remember that:

- photos and drawings are useful examples that help understand the instructions and warnings of each radio remote control configuration
- if necessary, contact Autec if any of the instructions and/or warnings are not clear

No part of the documentation may be reproduced, in any form or by any means, without written permission of Autec (including recording and photocopying).

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

The documentation must be kept for the whole life of the radio remote control: after reading it, keep it on hand for future reference.

All installation, usage and maintenance operations must be carried out by qualified technicians who are suitably trained with respect to the relevant norms and laws.

Information contained in the documentation adds to and completes the information provided by the manufacturer of the remote controlled and/or by those who install the radio remote control on the machine.

Therefore, this documentation must be read and understood in all its parts by the user and by:

- the radio remote control owner and/or installer
- the person responsible for and in charge of maintenance and/or safety in the workplace where the radio remote control is used.

As for instructions and warnings regarding the machine where the radio remote control is installed, follow the instructions given in the machine's manual.

Three symbols are employed throughout documentation, which are used to highlight specific safety-related issues. They are classified according to the hazardous situation that may arise and on the possible consequences:

Symbol	If the highlighted instructions are not respected ...		
	... a dangerous situation will occur...	**...consequences for people may be...**	**...consequences for property may be...**
DANGER	...highly probable.	... critical (death or physical damage).	... critical.
WARNING	... probable.	... critical (death or physical damage).	... critical.
CAUTION	... probable.	... moderate (non-severe physical damage).	... moderate.

	This symbol is also used, and it identifies texts to be read carefully.

AIR SERIES

Part A: Description, warnings and instructions

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1 Radio remote control description

1.1 How the radio remote control works

Industrial radio remote controls are used to control machines from a distance, without physical connection between the user and the machine (i.e. wires or connecting cables). They consist of a portable transmitting unit, from which the user remotely controls the machine, and a receiving unit installed on board the machine itself.

1.2 Applications

AIR series' radio remote controls can be installed on hoisting and material handling machines (i.e. overhead cranes).
AIR series radio remote controls cannot be installed:

- on machines installed in places where equipment with explosion-proof characteristics is required
- on machines for people lifting and transportation (the machine's manufacturer may authorize installation and use of a radio remote control on such applications under their own responsibility, if the risk assessment they carried out gave positive results)
- on machines that may generate dangerous situations if they stop due to the loss of radio link
- on machines for which a risk assessment is not possible or gave negative results

Autec cannot be held responsible if the radio remote control is installed on forbidden applications.

1.3 Technical Data

Command response time (typical) 100ms
(Typical) working range 75-100m (240-330ft)
Stop time (typical) 100ms
Max. stop time 0.5s
Performance Level of safety functions according to ISO 13849-1:
Stop protection ..... PL d

1.4 Radio link

The transmitting unit constantly communicates with the receiving unit through a radio link. This is an essential requirement to ensure safety for the radio remote controlled machine.
This address is unique (Autec produces it only once), univocal (specific for each radio remote control) and not reproducible. Each unit can only decode the messages coming from the unit with the same address.
This prevents messages from other radio equipment from activating any system function.

1.5 Safety function: stop protection

The stop function brings the machine to a safe state every time it is necessary to stop it due to a potentially hazardous situation. Depending on the situation, this function can either be deliberately activated by the operator through the STOP pushbutton, or it is automatically activated when the radio link is incorrect or interrupted (the receiving unit autonomously stops the radio remote control).

1.6 Protection against unintended movements from the rest position

This function protects the system “machine+radio remote control” from unintended movements, namely machine movements not activated intentionally by the user, but resulting from possible electrical and mechanical failure of the radio remote control.
Such function checks the neutral (rest) position of pushbuttons controlling the machine's movements. Each time one of those pushbuttons is operated, the transmitting unit sends both the movement command and the SAFETY command.

1.7 Identifying the radio remote control

As required by standard IEC 60204-32, each radio remote control is uniquely identified through a serial number (SERIAL N.).
The SERIAL N. is provided in the identification plate on each radio remote control unit.
This is the only reference to be used both for maintenance operations and for declarations to competent bodies.

ⓘ	These plates must not be: - removed from their position (removal will invalidate the guarantee) - altered or damaged (contact Autec for replacement)

2 Risk assessment

When using and installing an industrial radio remote control it is therefore always necessary to evaluate if the machine can be radio remote controlled.
In fact, as required by standards ISO 12100 and ISO 14121, all machines must undergo risk assessment.
The radio remote control can only be installed if this assessment gives positive results.

DANGER	**The machine manufacturer and/or the person who decides upon radio remote control installation and use is responsible for this risk assessment.**

Autec cannot be held responsible if this assessment has not been carried out correctly or is incomplete.
If required by the risk assessment, draw up protection measures to prevent, reduce and report potential hazard situations.

2.1 Risk assessment for radio remote controlled machines

When carrying out risk assessment for the machine or for the system where the radio remote control is installed, the following must be considered:
- some machines cannot be radio remote controlled: check for forbidden applications (see paragraph 1.2)
- the radio link between the two units may be interrupted due to persistent disturbance or interference.
- all warnings related to installation, use and maintenance provided by Autec must be taken into account

2.1.1 Aspects related to radio link

Whenever the radio link is interrupted (i.e. stop, low battery, automatic switch off, receiving unit not powered):
- all outputs of the receiving unit are disabled
- it is not possible to enable or disable the machine commands until the radio remote control is started up again.

2.1.2 Delay in command response time

CAUTION	**Due to the characteristics of radio propagation (i.e.: EM interference, out-of-working-range condition), a delay up to the "Maximum stop time" may occasionally occur from the moment a command in the transmitting unit is released to the moment its corresponding output in the receiving unit is deactivated.**

Those who decide upon the installation of the radio remote control must make sure that this delay never leads to a dangerous situation in the specific uses.

2.1.3 Protection from unintended activation

The transmitting unit housing is manufactured so that it protects the actuators from unintentional activation, while meeting at the same time the operating needs, the comfort requirements and law limits.
Assessment shall be made to establish possible additional protection measures for the actuators (i.e. commands requiring two-hand operation, “dead-man” function) if particular environments, equipment and working modes could cause accidental bumps to the actuators.

2.1.4 Command activation and loss of command

Please consider that it is possible to unintentionally activate a command and/or involuntarily loose the selection of a command. Such anomalous events may be caused by electro-mechanical or mechanical damages in the "machine+radio remote control" system.
Carefully evaluate the possible consequences of such malfunction.
If required by the risk assessment, draw up protection measures to prevent, reduce and report potential hazard situations.

2.2 Staff training

All installation, usage and maintenance operations must be carried out by qualified technicians who are suitably trained with respect to:

- warnings resulting from risk assessment
- regulations and reference laws
- instructions and warnings provided in the documents related to the industrial radio remote control and to the radio remote controlled machine
- instructions provided by those who install the radio remote control on the machine and by the person in charge for workplace safety where the system machine+radio remote control is used

2.3 Working conditions

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

3 Warnings for installation

Besides instructions established by the machine's manufacturers, installers must always observe the following warnings.

3.1 General

WARNING	**Respect and enforce the provisions of all reference standards relevant in the concerned application field (i.e. IEC 60204-32 for hoisting machines.)** **Always follow the instructions provided in the technical data sheet and respect values given in the technical data to carry out correct installation.**

3.2 Mounting and fastening the receiving unit in the best position

WARNING	**Place the receiving unit so that it can be easily reached in case of need.** **Place the receiving unit vertically, with the cable gland or plug facing down.** **Fix the receiving unit in four points, using the specific holes in the housing.** **Do not perforate the receiving unit in any case.** **When installing on machines that vibrate, it is recommended to fix the receiving unit to the machine with the appropriate vibration dampers.**

3.3 Positioning the antenna

WARNING

The antenna is inside the receiving unit. Hence, install the receiving units towards the working area, so that shields, structures or materials do not obstruct the radio link. In particular, the receiving unit must be placed at least 50 cm far from metal objects in its surroundings and never inside closed metal containers.

WARNING: If the receiving unit is shielded by metal structures or is installed inside metal cabinets, use the appropriate extension kit for the antenna.In this case, install the antenna in a vertical position, and possibly towards the work area.

If this warning is disregarded, the radio remote control working range may be reduced.

3.4 Wiring

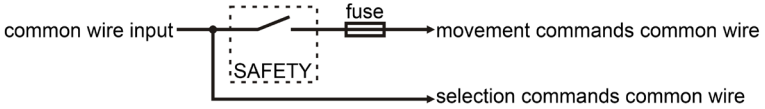
WARNING

The power supply of the receiving unit must be connected using an omnipolar switch with a switch-contact gap of at least 3 mm, that allows power supply disconnection during installation, wiring and/or maintenance operations.

The receiving unit's power supply shall be protected from short circuits by means of a device ensuring a suitable interruption performance (e.g. fuse).

Pay special attention to currents and voltages flowing in the SAFETY and STOP outputs: they shall not exceed the maximum permitted values.

To obtain the protection from unintended movements from the rest position, connect the contact of the SAFETY relay in series with the movement commands.



The STOP circuit in the receiving unit has two contacts connected in series through a wire jumper (manufacturer's standard wiring). If the machine needs a STOP circuit with two separate contacts (four wires), this bridge can be removed. In this case, the installer is responsible for wiring in a way that assures the required safety level.

WARNING	**Group the wiring away from the electronic module, in order to avoid interferences and hazards related to electrical safety.** **Evaluate the radio remote control's wiring and remember that if the output dedicated to the machine's horn, siren or blinker is used for another command due to application's and/or functional reasons, some procedures in the "Configuration Menu" may result unavailable later on.**

	To wire the terminals corresponding to the commands' outputs, to the STOP outputs and to the SAFETY outputs, it is recommended to use a 3.5x0.4mm slot screwdriver (e.g. WAGO code 210-720).

3.5 At end of installation

DANGER	**Make sure that during installation the safety mechanisms on the radio remote control and/or in the machine have not been made ineffective by possible procedures carried out.**

WARNING	**Look up in the technical data sheet and check that the frequency band set in the radio remote control is permitted in the Country of use.** **Correctly close the receiving unit so that the protection degree from dust and water is not jeopardised: check that the gasket is intact, correctly put the housing parts one over the other so that they overlap, and screw in the screws.**

3.6 Testing

The installer must check and complete the technical data sheet in all its parts, adding the date the system has been put into service, his stamp and signature.

WARNING	**After installing and wiring the receiving unit, test the system “machine+radio remote control”, and check that the operations carried out correspond exactly to the commands sent (in particular check the STOP command).** **In case of malfunction, disable the system “machine+radio remote control” until the problem has been completely solved.**

4 Warnings for use

In addition to all instructions provided by the machine manufacturer, by the installer of the radio remote control and by the person responsible for the safety of the work area, users shall always respect the following warnings.

4.1 Before starting to work

DANGER	**Stand in a position that allows the direct supervision of the remote controlled machine and its load, and stay in a place ensuring safety conditions in respect of other operations and/or activities and/or processes that are carried out in the working environment.** **Always check that the mechanical operation of the STOP pushbutton is correct. If it is impossible or difficult to press this pushbutton, do not use the radio remote control.**

WARNING	**Never start up or use the transmitting unit if the working conditions present the risk of losing balance or tripping.** **Only start up the transmitting unit when starting work: improper use may cause hazardous situations.** **Never start up or use the transmitting unit in closed spaces, with the machine not in sight, or outside the radio remote control working range: in such cases it is in fact still possible to build a radio link, thus causing the risk that unwanted commands be carried out by the machine.** **Get familiar with the correspondence between the actuators and the machine's movements (this is indicated in the attached technical data sheet) and learn symbols on the transmitting unit's panel (symbols used are defined by the machine manufacturer and/or installer depending on the machine's operation and functions).**

4.2 During normal operation

DANGER	**Pay attention to the entire work area. Immediately press the STOP pushbutton when a hazardous situation occurs.**

WARNING	**Visually and directly follow all movements of the machine and its load and remain inside the radio remote control working range.** **Pay particular attention to warnings and visual and acoustic signals, and take all measurements and steps to avoid that movements of the remote controlled machine may lead to hazardous situations for people and/or property.** **In case of malfunction, disable the system “machine+radio remote control” until the problem has been completely solved.** **Pay attention to the low battery signals. The A8 unit cannot be used during the charging process; all dangerous operations (i.e. hanging load) must therefore be brought to an end before the battery is completely flat.** **Use the transmitting unit in a simple and comfortable way, avoiding accidental falls. The pouch supplied with the radio remote control is used for this purpose.**

4.3 After using the radio remote control

WARNING	**Switch off the transmitting unit when work is stopped or temporarily interrupted. Do not leave the load hanging (even while recharging the unit).** **Never leave the transmitting unit unattended if it is on.**

5 Radio remote control life cycle

To ensure safe and long-lasting operation of industrial radio remote controls, carefully follow the instructions provided for each stage of the product life cycle.

5.1 Transportation and storage

ⓘ	Radio remote controls must always be transported and stored inside their packing until they are installed on the machine.

Environmental transportation and storage conditions are given in the following table.

	Temperature	Relative Humidity	Air pressure
Transportation	Class 2K4 -40°C to +70°C (-40°F to +158°F)	Class 2K4 95%	Class 2K4 70kPa to 106kPa
Storage	Class 1K5 -40°C to +70°C (-40°F to +158°F)	Class 1K3 5% to 95%	Class 1K5 70kPa to 106kPa

5.2 Installation

ⓘ	The radio remote control can only be installed and tested by competent staff that masters the technical knowledge required to carry out these procedures and is qualified according to the regulation of the country where the radio remote control is mounted. Only if the radio remote control is installed correctly can it be used safely.

⚠ WARNING	**Always follow the instructions provided in the technical data sheet to carry out correct installation.** **Please contact the machine manufacturer or the person who decided upon the installation of the radio remote control for instructions and warnings regarding the installation.**

All warnings for correct installation are given in chapter 3.
All instructions for correct installation are given in "Part D" (related to the receiving unit).

5.3 Use

The use of industrial radio remote controls is strictly limited to skilled and properly trained personnel.
All warnings for correct use are given in chapter 4.
All instructions for correct use are given in "Part C" (related to the transmitting unit).
Environmental working conditions are given in the following table.

	Temperature	**Relative Humidity**	**Air pressure**
Use of the transmitting unit	Class 4K4H -20°C to +55°C (-4°F to +130°F)	Class 4K4H 4% to 100%	Class 4K4H 70kPa to 106kPa
Use of the receiving unit	Class 4K4H -20°C to +70°C (-4°F to +158°F)		

5.4 Radio remote control maintenance

The following instructions provide information to safely carry out routine and special maintenance operations for the radio remote control.
They shall be completed by:
- instructions provided by the machine manufacturer
- directions provided by the installer of the radio remote control on the machine
- regulations regarding safety at work and accident prevention in force in the country where the radio remote control is used.

All fine-tuning, checking and maintenance actions carried out on the radio remote control shall be verified and recorded by the person in charge of carrying out maintenance on the machine.

DANGER	**Before any maintenance operation, disconnect power supply from the receiving unit.** **After each maintenance operation, always make sure that all commands sent by the transmitting unit only activate the corresponding expected operations.**

WARNING	**In case of malfunction or damaged parts, disable the system “machine+radio remote control” until the problem has been completely solved.** **After each maintenance operation, if a unit has been opened, close it correctly, in order not to endanger its protection degree from dust and water: check that the gasket is intact, correctly overlay the two parts of the housing and tighten the screws.**

5.4.1 Routine maintenance

Routine maintenance consists of operations needed to preserve the radio remote control normal usage conditions, thus implementing fine-tuning, checks, planned replacement actions that necessarily arise from the normal use of the product.
All given instructions must be followed correctly at each commissioning, that is:
- whenever the radio remote control and/or the machine is installed or assembled
- whenever the machine location/position changes
- after special maintenance.

Routine maintenance carried out as described in this manual is fundamental for using the radio remote control safely.
Special applications may need more specific routine maintenance actions to be carried out at different periods (i.e. if the working environment is particularly dirt, in case of heavy applications or if the system is used very frequently, some maintenance actions may be required more frequently, depending on the decision of the person in charge for safety in the work site).

5.4.2 Daily routine maintenance

Before starting to work:
- make sure that the transmitting unit panel symbols can be easily recognised and replace the panel if necessary
- check that the three plates on the transmitting unit are readable and intact
- make sure that the mechanical operation of the STOP pushbutton is correct.

During normal operation:
- check structural integrity of the transmitting unit
- make sure that materials that could endanger the transmitting unit usage and safety (such as concrete, sand, lime, dust) do not deposit on it.

After using the radio remote control:
- clean the transmitting unit: never use solvents or flammable/corrosive materials and do not use high-pressure water cleaners or steam cleaners
- store the transmitting unit in clean and dry areas.

5.4.3 Three-month routine maintenance

Every three months:
- remove dust or deposit of material from the receiving unit: never use solvents or flammable/corrosive materials to clean it, and do not use high-pressure water cleaners or steam cleaners
- check structural integrity of the receiving unit
- make sure that the wiring of the receiving unit is intact and connected
- make sure that the receiving unit panel symbols can be easily recognised and replace the panel if necessary
- check that the plates on the receiving unit are readable and intact.

5.4.4 Six-month routine maintenance

Every six months:
- check the correct correspondence between the commands that are sent and the manoeuvres that are carried out by the machine
- check that the contact of the SAFETY relay is open when no movement command has been sent. This is safety critical maintenance: it is necessary to keep a record (date, signature, comments) showing that this check has been regularly carried out. Keep the record together with other installation documents.
- make sure that all the relay contacts of the receiving unit operate correctly, and check that the contact closes when the corresponding manoeuvre is enabled and opens when the manoeuvre is disabled.

5.4.5 Special maintenance

Special maintenance consists of repairs needed due to radio remote control failure, damage or malfunction, carried out with the aim of restoring the original usage and working conditions.

WARNING	**Prior to contacting the support service technicians:** - **read and understand all documents related to the radio remote control, and make sure that all the instructions they contain have been accomplished correctly** - **follow the instructions to detect possible malfunctions and their origins.** **Any fault should be repaired by authorised personnel only (contact the support service of the machine's manufacturer), using original Autec spare parts only.**

The following radio remote control data must be reported in order to make interventions faster and more reliable:

- radio remote control serial number (S/N)
- purchase date (given on the certificate of guarantee)
- description of the problem found
- address and telephone number of the place where the device is being used (with the name of the person to contact)
- local supplier.

5.5 Machine maintenance

Follow instructions provided by the machine manufacturer and by the installer of the radio remote control, in order to carry out machine maintenance.

WARNING	**Disconnect all receiving unit's electrical connections whenever machine maintenance is carried out (i.e. when soldering).**

DANGER	**When carrying out maintenance on the machine, always disconnect power supply from the receiving unit.**

5.6 Disposal

When disposing of a radio remote control, give it to the waste separate collecting services in the user's country.

6 Troubleshooting

When the radio remote control does not work:

- bring the transmitting unit close to the receiving unit to avoid radio interference and disturbances
- establish whether the problem lies with the radio remote control or with the machine. Therefore, before any inspection, try to control the machine from a control unit different from the radio remote control, if present. If the problem persists, it lies with the machine. If not, the problem may lie with the radio remote control.

Look up in “Part C” and/or in “Part D” to identify the radio remote control malfunction signalled by light signals on the units.