

INTRODUCTION

All rights to this manual are the exclusive property of ADEUNIS RF. All rights reserved. Copying this manual (without written permission from the owner) via printing, copying, recording or by any other means, translating this manual (in full or partially) into any other language, including all programming languages, using any electrical, mechanical, magnetic or optical devices, manually or any by other methods, is prohibited.

ADEUNIS RF reserves the right to change the technical specifications or functions of its products, or to cease manufacturing any of its products, or to cease technical support for one of its products without notice in writing and urges its customers to make sure that the information they have is valid.

ADEUNIS RF configuration software and programs are available free of charge in a non-modifiable version. ADEUNIS RF can make no guarantees, including guarantees concerning suitability and applicability for a certain type of application. Under no circumstances can the manufacturer, or the distributor of an ADEUNIS RF program, be held liable for any damage caused by the use of the aforesaid program. Program names, as well as all copy-right relating to programs, are the exclusive property of ADEUNIS RF. Any transfer, granting of licences to a third party, leasing, hire, transport, copying, editing, translation, modification into another programming language or reverse engineering are prohibited without ADEUNIS RF's prior written authorisation and consent.

ADEUNIS RF

283, rue Louis Néel
38920 Crolles
France

Telephone +33 (0)4 76 92 07 77
Fax +33 (0)4 76 08 97 46

Environmental recommendations

All superfluous packaging materials have been eliminated. We have done everything possible to make it easy to separate the packaging into three types of materials: cardboard (box), expanded polystyrene (filler material) and polyethylene (packets, foam protective sheets). Your device is composed of materials that can be recycled and reused if it is dismantled by a specialist company. Please observe local regulations concerning the manner in which waste packaging material, used batteries and your obsolete equipment are disposed of.

Warnings

Valid for relay receivers with the following references: ARF7341B/7341F/7341D and serial receivers ARF7263K/S



Read the instructions in the manual.



The safety of this product is only guaranteed when it is used in accordance with its purpose.
Maintenance should only be carried out by qualified persons.

Please note, do not install the equipment close to a heat source or in damp conditions.

Please note, when the equipment is open, do not carry out any operations other than those specified in these instructions.

Only use this equipment inside a building and at a maximum height of 2000 m above sea level.



Please note: do not open the product as there is a risk of electric shock.



Please note: for your own safety, you must ensure that the equipment is switched off before carrying out any work on it.



Please note: for your own safety, all wired relays must cut either from the SELV, or the ELV (eg: 230V mains power supply). The two types of voltage must not be mixed.



Please note: when the aerial is installed outside, it is essential to connect the cable screen to the building's earth. We recommend using lightning protection. The protection kit chosen must permit the coaxial cable to be earthed (eg: coaxial lightning arrester with earthing of the cable at different places on the aerial at the base of pylons and at the entry, or just before entering the premises).

The product must be equipped with a switching mechanism so that the power can be cut. This must be close to the equipment.

Dangerous voltages are present in the product (other than the power supply). Before carrying out any work these must also be cut.

Any electrical connection of the product must be equipped with a protection device against voltage spikes and short-circuits.

Recommendations regarding use

- Before using the system, check that the power supply voltage shown in the user manual corresponds to your supply. If it doesn't, please consult your supplier.
- Place the device against a flat, firm and stable surface.
- The device must be installed in a location that is sufficiently ventilated so that there is no risk of internal heating and it must not be covered with objects such as newspapers, cloths, curtains, etc.
- The device's aerial must be free and at least 10 cm away from any conducting material.
- The device must never be exposed to heat sources such as heating equipment.
- Do not place the device close to objects with naked flames such as lit candles, blowtorches, etc.
- The device must not be exposed to aggressive chemical agents or solvents likely to damage the plastic or corrode the metal parts.
- Install your device close to its DC power supply.
- Avoid electrical and RS232 extension cables over 3 metres in length.

Disposal of waste by users in private households within the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed off with your other household waste. Instead, it is your responsibility to dispose of your waste by taking it to a collection point designated for the recycling of electrical and electronic appliances. Separate collection and recycling of your waste at the time of disposal will contribute to conserving natural resources and guarantee recycling that respects the environment and human health. For further information concerning your nearest recycling centre, please contact your nearest local authority/town hall offices, your household waste collection company or the shop where you bought the product.

1. Introduction

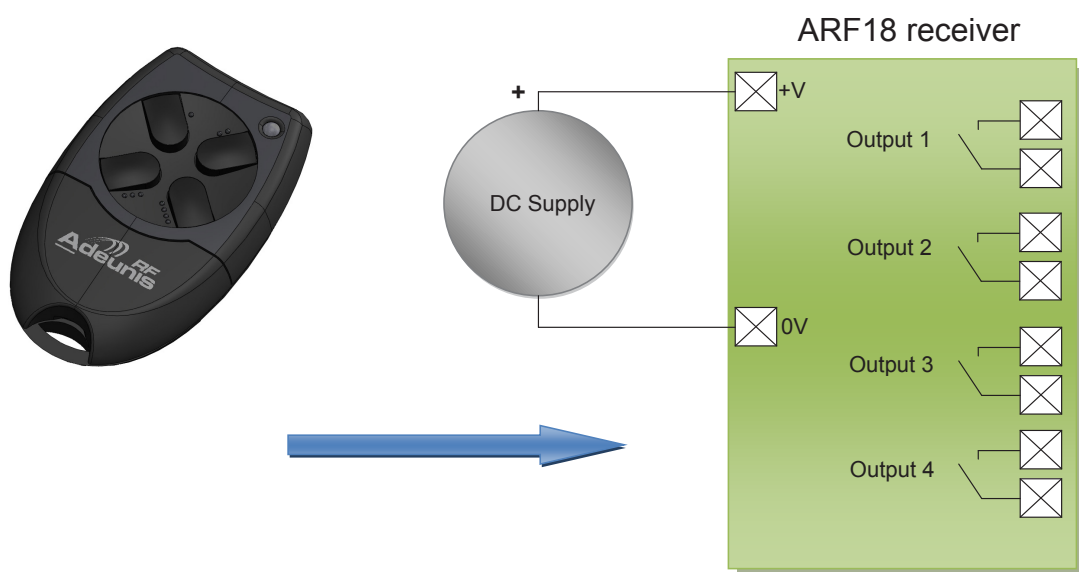
Adeunis receivers allow you to control up to 4 relays according to instructions sent using ARF7291 remote controls.

This is a unidirectional system. The link between the remote control and the receiver is only effective after a training phase.

1.1. References

Type	434 MHz Unidirectional	868MHz Bidirectional
1-key remote control	ARF7291A	ARF7292A
2-key remote control	ARF7291B	ARF7292B
4-key remote control	ARF7291D	ARF7292D
8/24 button remote control	ARF7291R	
OEM receiver	ARF7293A	ARF7294A
IP65 - 1-relay receiver	ARF7341F	
IP65 - 2-relay receiver	ARF7341D	
IP65 - 4-relay receiver	ARF7341B	
IP65 - RS232 serial decoder	ARF7263K	
IP65 - USB serial decoder	ARF7263S	
Starter Kits	ARF7439S	ARF7439M

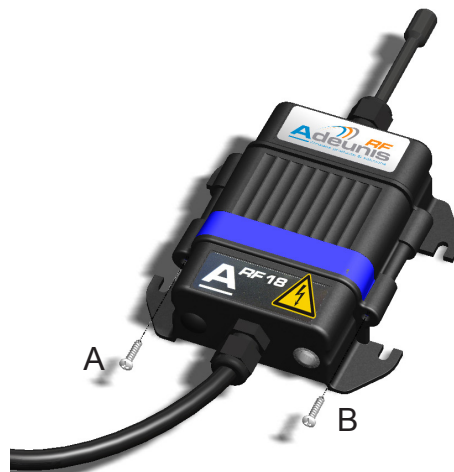
1.2. Principle



2. Relay receivers

2.1. Product installation

The ARF7341 is fixed via the attachment lugs on the top (aerial) and bottom (sealed housing) of the casing. Any work carried out (drilling...) on the casing will cause it to lose its IP65 watertight approval. Remove the two stainless steel screws (A and B) and release the lower part to access the power supply terminals and the contacts.

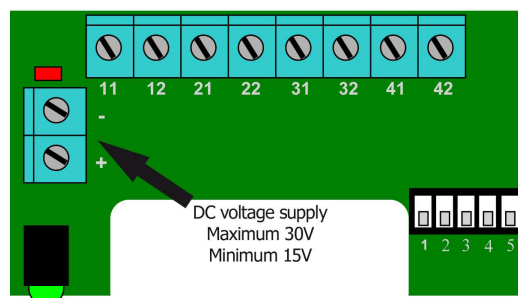


2.2. Power supply voltage

The product must be powered with a 15 to 30V DC power supply that complies with SELV (note: maximum voltages that should not be exceeded: 42.4Vac or 60Vdc). The product's power supply must comply with EN 60950-1 (2006 ed) or EN61010-1 and must be of limited power (§ 2.5 of EN 60950-1 (2006 ed)).

The power supply and relay cables must be 6.5 mm in diameter (1 & 2 relays) or 10 mm (4 relays), black in colour, and be able to carry a current of 10 amperes/per conductor. The number of conductors (cf ¶ 2.2) must correspond to the number of relay terminals used, plus those required for the power supply. Each multi-strand connector must be equipped with an end.

Switch off the power supply, then connect the power supply to the screw terminals marked + and -.

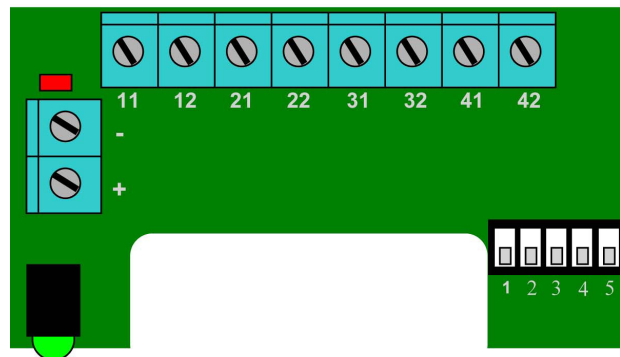


2.3. Connecting the dry contact

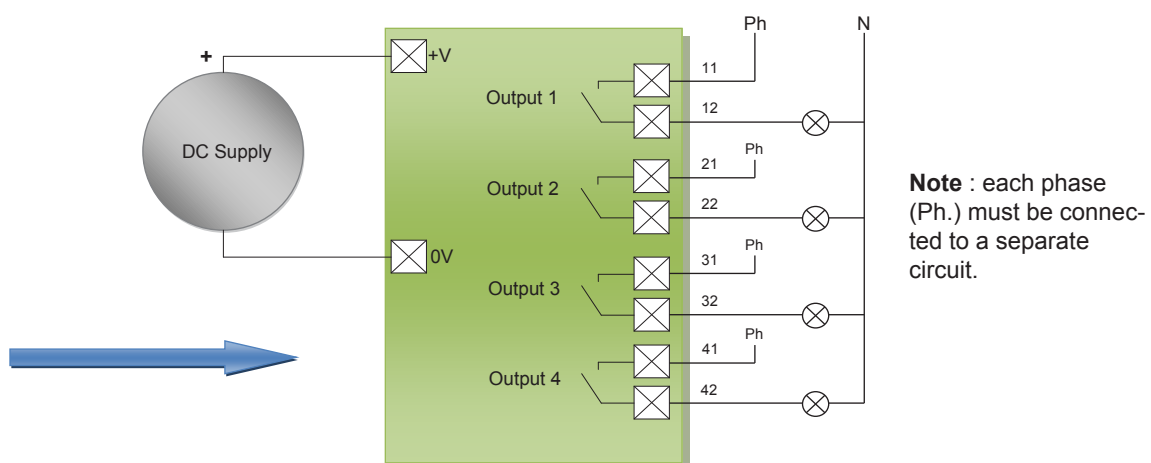
The ARF7341 receiver (4 relays) includes 4 relays with a normally open contact (NO). The contact's characteristics are 10A / 230V. They can be used in mono or bistable mode (by groups of 2 relays: relays 1-2 and relays 3-4).

In bistable mode, the output switches on each input (the state of the contact switches each time you press a key on the remote control).

In monostable mode, the relay is closed during input (while the remote control key is being pressed).



Wiring example:

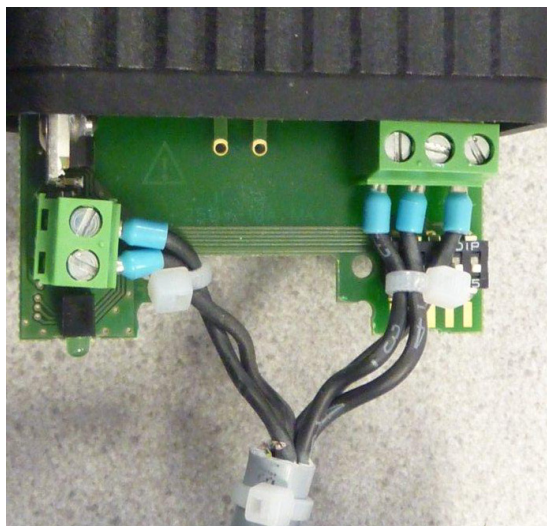


2.4. Procedures for installing/wiring relay receivers

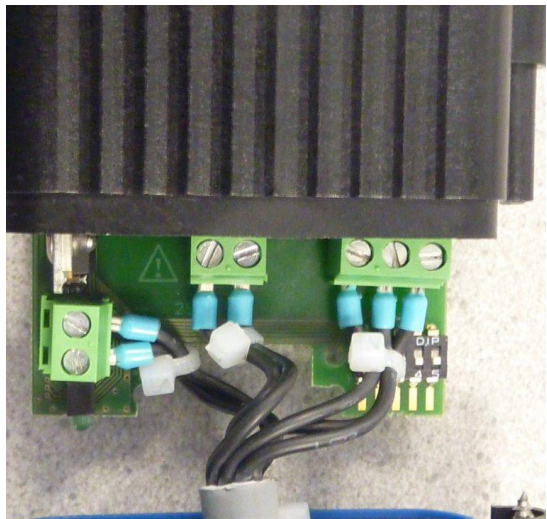
The procedures described below must be followed exactly in order to ensure the correct operation and the electrical safety of the ARF18 products.

The wires connected to each relay must be bound and isolated by a rilsan collar. The rilsan collar attached to the power supply wires must also be installed in the hole drilled for the purpose in the PCB (see diagram below). The type of power supply chosen must be identical for all the relays: SELV or mains

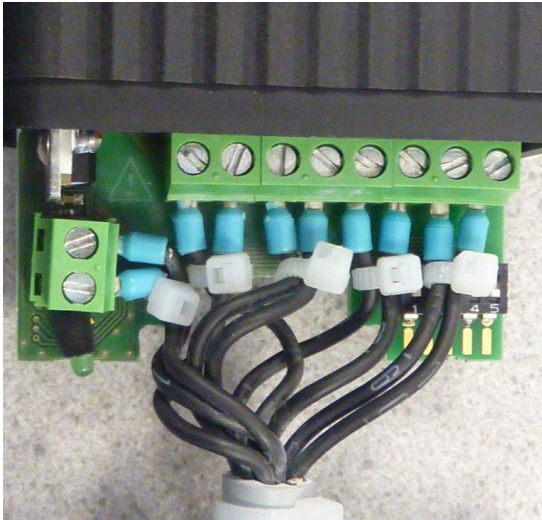
2.4.1 1-relay receiver



2.4.2 2-relay receiver



2.4.3 4-relay receiver



2.5. Training procedure

You can save up to 83 remote controls for one receiver.

For this operation we recommend cutting the electricity supply to the contacts.

This section describes the procedure designed to associate a remote control with the ARF7341's outputs; this association is also called the training procedure. This procedure is compulsory.

This section also describes how to erase all the remote controls associated with the receiver.

The training process is initiated by the five switches SW1 to SW5 on the receiver; you can carry out two types configuration:

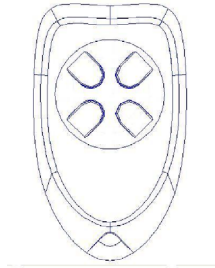
1. The standard training procedure which covers 99% of industrial applications.
2. The advanced training procedure for a small number of specific applications.

2.5.1 Description of standard training

Standard training lets you associate the 1, 2 or 4 outputs to the 1, 2 or 4 keys on the remote control in a given order

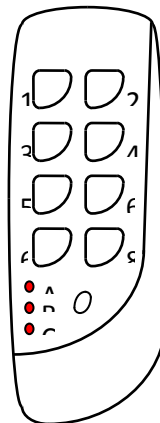
In the case of remote controls with 4 keys or less, the association will be:

- key 1 -> relay 1
- key 2 -> relay 2
- key 3 -> relay 3
- key 4 -> relay 4



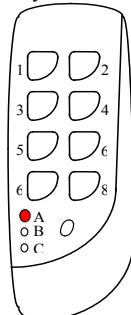
In the case of remote controls with 24 keys, the association will be:

- key 1 -> relay 1
- key 2 -> relay 2
- key 3 -> relay 3
- key 4 -> relay 4
- or
- key 5 -> relay 1
- key 6 -> relay 2
- key 7 -> relay 3
- key 8 -> relay 4
- or
- ...
- or
- key 21 -> relay 1
- key 22 -> relay 2
- key 23 -> relay 3
- key 24 -> relay 4

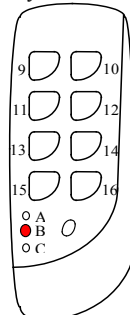


In the case of a remote control with 24 keys, you can access the keys via three different groups (A, B, C). The small key is used to change group.

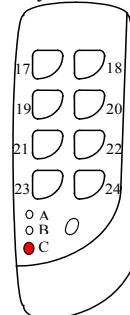
When led A lit,
Key 1 to 8



When led B lit,
Key 9 to 16



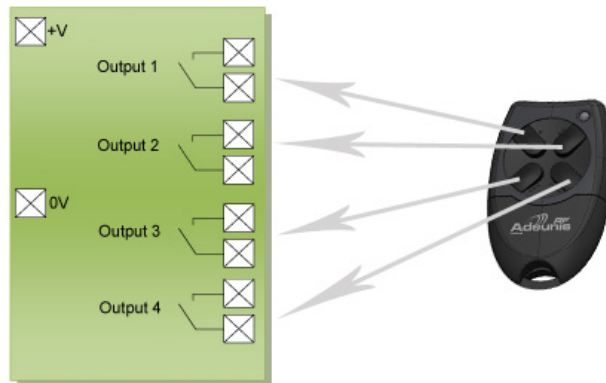
When led C lit,
Key 17 to 24



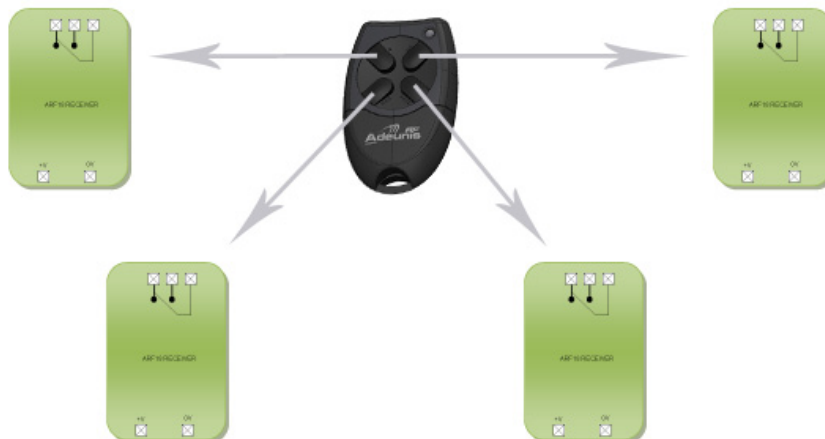
2.5.2 Example of standard use

This paragraph presents some standard uses.

Below: 1, 4-relay receiver controlled by 1, 4-key remote control.



Below: 4, 1-relay receivers controlled by 1, 4-key remote control.



2.6. Training procedure

2.6.1 Training a 4-relay receiver with a 4-key remote control

Global ADD/ERASE operation
1/ Select «Add/Erase» mode with SW5 ON. 2/ Select SW3 ON and SW4 OFF. 3/ Press any key on the remote control (just once - if you press twice in succession training is not recognised). 4/ Exit «Add/Erase» mode with SW5 OFF.
Two results are possible with this operation: - Previously, this remote control did not control any of the receiver's relays: the following links are created in the receiver's database for this remote control: key 1 controls relay 1, key 2 controls relay 2, key 3 controls relay 3, key 4 controls relay 4. The LED flashes once. - Previously, this remote control controlled at least one of the receiver's relays: all the links between this remote control and the relays are erased. The LED flashes twice.

2.6.2 Pairing a 4-key remote control with 4, 1-relay receivers

- Key 1 on the remote control to Rx1
On receiver 1, configure the switches as shown below.

SW1	SW2	SW3	SW4	SW5
ON	ON	OFF	OFF	ON

Press key 1 on the remote control
Then select SW5 OFF
Switch SW1 and SW2 to OFF if monostable mode is required. Leave switch 2 on ON if bistable mode is required.

- Key 2 on the remote control to RX2
On receiver 2, configure the switches as shown below.

SW1	SW2	SW3	SW4	SW5
ON	ON	OFF	OFF	ON

Press key 2 on the remote control
Select SW5 OFF
Switch SW1 and SW2 to OFF if monostable mode is required. Leave switch 2 on ON if bistable mode is required.

- Key 3 on the remote control to RX3
On receiver 2, configure the switches as shown below.

SW1	SW2	SW3	SW4	SW5
ON	ON	OFF	OFF	ON

Press key 3 on the remote control
Select SW5 OFF
Switch SW1 and SW2 to OFF if monostable mode is required. Leave switch 2 on ON if bistable mode is required.

- Key 4 on the remote control to RX4
On receiver 2, configure the switches as shown below.

SW1	SW2	SW3	SW4	SW5
ON	ON	OFF	OFF	ON

Press key 4 on the remote control
Select SW5 OFF
Switch SW1 and SW2 to OFF if monostable mode is required. Leave switch 2 on ON if bistable mode is required.

2.7. Description of advanced training

Advanced training is limited to keys 1 to 4 (it is only available for keys 1 to 4 on a 24 key remote control).

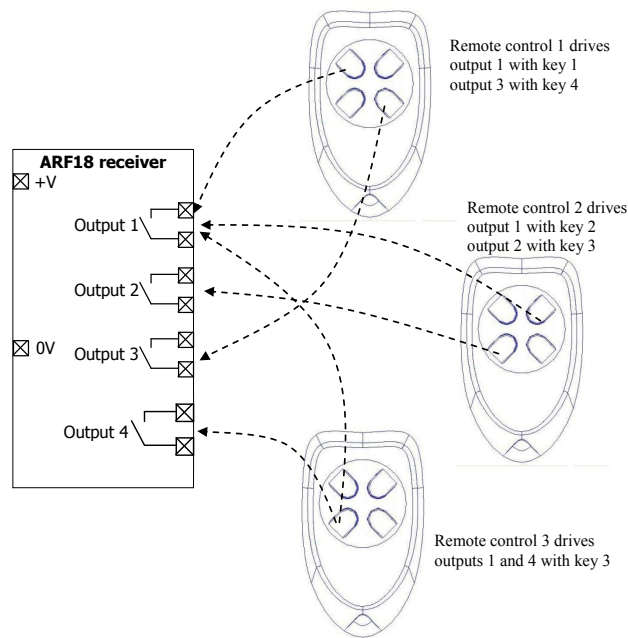
The following associations can be made:

- Any key on the remote control can control any output on the receiver.
- One or more remote controls can control the same outputs.
- Any remote control key can control from 1 to 4 outputs on the receiver.

2.8. Example of advanced use

This paragraph illustrates various advanced uses.

Below: any key on the remote control can control any output on the receiver.



2.8.1 Advanced training procedure

ADD/REMOVE operation for a chosen relay
1/ Select «Add/Remove» mode with SW5 ON. 2/ Select SW3 OFF and SW4 OFF. 3/ Select the relay that the remote control is to be used to control by setting switches SW1 and SW2 (cf Table below). Note: consider switching the switches to ON again if bistable mode is required. 4/ Press any key on the remote control. 5/ Exit «Add/Remove» mode with SW5 OFF.
Two results are possible with this operation: This association had not been set up previously. The association is now created. The LED flashes once. This association had been set up previously. The association is erased. The LED flashes twice.
ERASE operation for a relay
1/ Select «Erase» mode with SW4 ON. 2/ Select SW3 OFF and SW5 OFF. 3/ Select the relay for which the associations need to be erased by setting SW1 and SW2. 4/ Press any key on the remote control. 5/ Exit «Erase» mode with SW4 OFF.
Result of the operation: The output chosen can no longer be activated by any remote-control. The LED flashes twice.

Below: selecting the relay in advanced training mode

SW1	SW2	Relay 1	Relay 2	Relay 3	Relay 4
OFF	OFF	Chosen			
ON	OFF		Chosen		
OFF	ON			Chosen	
ON	ON				Chosen

PLEASE NOTE

In advanced training mode, care must be taken when mixing four-key remote controls (keys 1 to 4) and key numbers above 4 (keys 5 to 24):

An ADD operation for a chosen relay with a key ≥ 5 will be seen as a global addition (for example, key 5 will be associated with relay 1, key 6 will be associated with relay 2, key 7 will be associated with relay 3, key 8 will be associated with relay 4).

A REMOVE operation for a chosen relay will lead to global removal if recording has been carried out for a key ≥ 5 (for example, if key 5 is associated with relay 1, key 6 with relay 2, key 7 with relay 3, and key 8 with relay 4, ALL the associations will be removed).

An ERASE operation for a chosen relay will lead to global erasure if recording has been carried out for a key ≥ 5 (for example, if key 5 is associated with relay 1, key 6 with relay 2, key 7 with relay 3, and key 8 with relay 4, ALL the associations will be erased).

2.8.2 Global erase procedure

Global ERASE operation
1/ Select «Erase» mode with SW4 ON. 2/ Select SW3 ON and SW5 OFF. 3/ Press any key on any valid remote control. 4/ Exit «Erase» mode with SW4 OFF.
Result of the operation: No relay can now be activated by any remote-control. The LED flashes twice.

2.9. Bistable / monostable operation

In operating mode (when training has been finished), users can choose whether the relays will operate in monostable or bistable mode. As described below, SW3-SW4-SW5 must be set to OFF.

SW1	Relays 1 and 2	SW3-SW4-SW5
OFF	Monostable	OFF-OFF-OFF
ON	Bistable	OFF-OFF-OFF

SW2	Relays 3 and 4	SW3-SW4-SW5
OFF	Monostable	OFF-OFF-OFF
ON	Bistable	OFF-OFF-OFF

2.10. Summary of the use of switches

This paragraph summarises switch functionality. For standard use (training), this paragraph adds nothing and can be ignored. Understanding the use of switches is only necessary for advanced use.

In particular, this paragraph sheds light on how to choose a specific relay for the advanced training procedure.

Switch no.	Function	Description
SW5	Add/Remove	SW5 OFF: The «Add/Remove» function is not enabled. SW5 ON: The «Add/Remove» function is enabled.
SW4	Erase	SW4 OFF: The «Erase» function is not enabled. SW4 ON: The «Erase» function is enabled.
SW1 and SW2	Relay selection or operating mode selection (monostable or bistable)	-> When the module is in training mode, («Add/Remove» or «Erase» enabled), «SW1» and «SW2» select the relays to be configured: SW2 SW1 Chosen relay ON ON 4 ON OFF 3 OFF ON 2 OFF OFF 1 -> When the module is not in training mode, input «SW1» selects the operating mode for relays 1 and 2, and «SW2» selects the operating mode for relays 3 and 4. SW1 ON: relays 1 and 2 in bistable mode. SW1 OFF: relays 1 and 2 in monostable mode. SW2 ON: relays 3 and 4 in bistable mode. SW2 OFF: relays 3 and 4 in monostable mode.
SW3	Global	SW3 serves to determine whether the training operation is carried out for all the relays or not. -> SW3 ON: the training operation is carried out for all the relays (SW1 and SW2 are ignored). Functionality depends on the function chosen («Erase» SW4 or «Add/Remove» SW5). Other details concerning the global add/remove and global erase operations are described in the following tables. -> SW3 OFF: the training operation only applies to relays chosen with SW1 and SW2.

3. Specifications

Radio characteristics	
Frequency:	433.92 MHz
Modulation:	ASK
Sensitivity:	-104 dBm
Electrical characteristics	
Power supply (VDC):	15 to 30 VDC
Consumption (all relays open):	30mA
Consumption (all relays closed):	85mA
Interrupting capacity:	230V max 10 A
Relay characteristics	
Contacts	4 relays with 1 NO (4-relay version) 2 relays with 1 NO and 1 NO / NC (2-relay version) 1 relay with 1 NO / NC (1-relay version)
Mechanical characteristics	
Size (mm):	Board 65 x 90 x 25 mm
IP65 casing:	104 x 300 x 35 mm
Terminal	Connection via M3 1.5/2.5mm ² screws
Operating temperature:	-20 to +70 °C

3.1. Power supply for the remote control

In order to replace the battery in the remote control, slide the lower cover as shown below.
Battery: 3 V type CR 2032



Please note, there is a risk of explosion if the battery is thrown into the fire or if it is replaced with a battery of the wrong type. Dispose of used batteries in accordance with the instructions.

Advice concerning lithium batteries

WARNING

Observe the polarities when replacing lithium batteries. Incorrect installation of the battery may lead to an explosion. Only replace the battery with a battery of the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions and your local authority's disposal requirements.

IMPORTANT Switzerland: Appendix 4.10 of standard SR 814.013 applies to batteries.

4. USB & RS232 serial receivers

ARF7263S does the same by emulating a COM port via the USB bus.
ARF7263K sends information from the remote control on the RS232 serial link.

4.1. USB wiring and installation of the driver (ARF7263S receiver)

This section applies to the USB version of the receiver.

4.1.1 On first connection

On first connection to the PC, users receive a frame for installing the USB driver. Please refer to our «USB driver installation guide».

4.1.2 On each new connection of the remote control receiver

This receiver is seen as a virtual COM port available via the USB bus. Users must acquire the number of the serial COM port assigned to the receiver in order to be able to communicate with it. Please refer to our «USB driver installation guide» in order to obtain the serial COM port number.

IMPORTANT NOTE

If the receiver was previously connected to your PC, make sure that it was not disconnected without the terminal session being closed. If this is the case, the driver will appear as though it has not been installed properly in the Windows peripheral manager – this is shown via the «!» icon. If this situation occurs, close the terminal session that was open previously, disconnect the remote control receiver then restart the connection procedure.

4.1.3 Power supply voltage

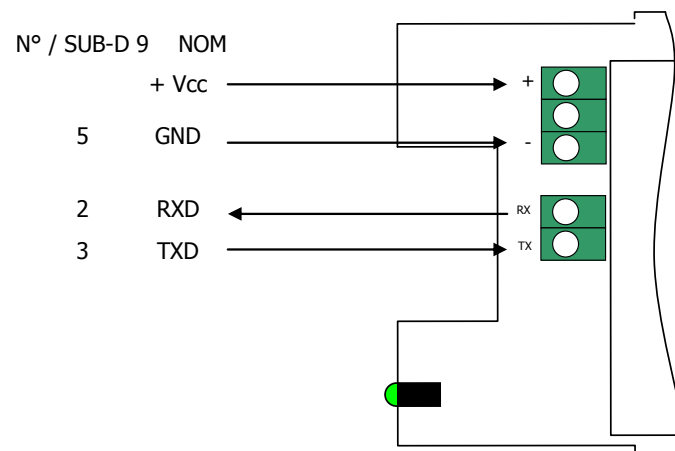
The remote control receiver is self-powered and does not need an external power supply.

4.2. RS232 serial link wiring (ARF7263K receiver)

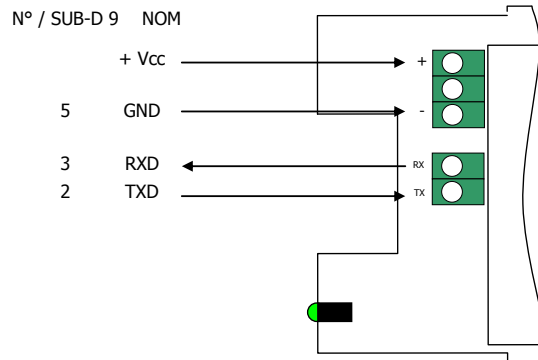
This section applies to the RS232 version of the remote control receiver.

4.2.1 Connecting the receiver as DTE on RS232

This is the case for example, of a remote control receiver connected to a PC.

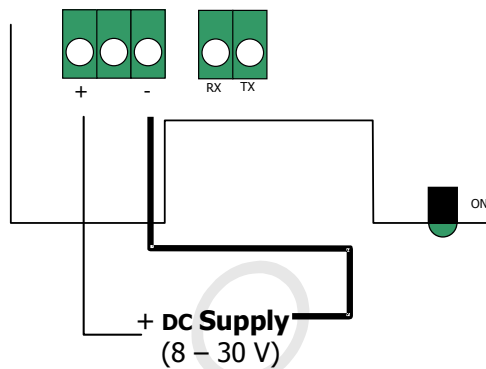


4.2.2 Connecting the receiver as DCE on RS232



4.2.3 Power supply voltage

Switch off the power supply, then connect the power supply to the screw terminals marked + and -.



4.3. Command mode

On delivery, the receiver is operational (the default factory configuration is 9600,n,8,1). However you can customize the module's parameters by using the serial interface (RS232 or USB) which is dedicated to AT commands. You can send these commands from a terminal (with a delay of less than 10 seconds between each character).

Command mode is used to read and update the module's configuration registers. The registers are divided into two types: read only (W) and read/write (R/W) (cf Section 6 «Training procedures»).

4.3.1 Commands

A command starts with the 2 ASCII «AT» characters – «AT means «Attention» – followed by one or more characters or other data.

Each command must end with a <cr> (carriage return, ASCII code 0x0D).

The response sent on the serial output for each command corresponds to the ASCII character 'O' for a command that is accepted and the ASCII character 'E' for an error.

4.3.2 The command set

Commands	Register management
ATSn?	Displays the contents of the register Sn, where n represents the number of the register. The response will have the following format: Sn=y<cr><lf>
ATSn=m	Assigns the value 'm' to the register Sn. n represents the register number (for example, selection of the number of stop bits: ATS213=1).
AT/S	Displays the register values. The response will have the following format: Sxxx=y<cr><lf> for each register.
AT/V	Displays the software version. The response will have the following format: Adeunis RF: One way smart remote control receiver I Vx.yy<cr><lf>
ATR	All the registers are initialized to their default value
AT&W	To save the new configuration in the EEPROM. Each time you switch the serial receiver on, the EEPROM configuration will be loaded into the serial receiver's registers.

4.3.3 Description of the registers

Register values can be updated with the ATSn=m<cr> command and displayed with the ATSn?<cr> command.

Register values are placed in RAM. The parameters are lost if the power is cut. In order to save the registers, you need to use the AT&W<cr> command.

Access	Registers	Function	Description
Serial link			
R/W	S210	Speed	Serial link speeds are as follows: '2': 2400 bits/s '3': 4800 bits/s '4': 9600 bits/s (default value) '5': 19200 bits/s '6': 38400 bits/s '7': 57600 bits/s '8': 115200 bits/s
R/W	S211	Data length	Number of bits '7': 7 bits '8': 8 bits (default value)
R/W	S212	Parity	Parity 1: none (default value) '2': even '3': odd
R/W	S213	Number of stop bits	Number of stop bits (serial link) '1': 1 stop bit (default value) '2': 2 stop bits

4.3.4 Normal mode

Under normal operation, the receiver sends over the serial output the serial number and the key number of the remote control received over the radio link. The format of the ASCII frame received is as follows:
:<serial number> <Key number> <CR><LF>

- : (ASCII code 0x3A)
- Serial number is the serial number of the remote control in decimal format (1 to 8 figures).
- Followed by a space (ASCII code 0x20).
- Key number is the number of the key pressed on the remote control (2 figures from 01 for key 1 to 24 for key 24).
- CR (ASCII code 0x0D), LF (ASCII code 0x0A)

4.4. Specifications of the serial decoders

Radio characteristics	
Frequency:	433.92 MHz
Modulation:	ASK
Sensitivity:	-104 dBm
Electrical characteristics of the RS232 products	
Power supply (VDC):	8 to 30 VDC
Rx consumption (permanent listening)	16mA at 8V
Electrical characteristics of the USB products	
Power supply (VDC):	Powered by the USB bus
Rx consumption (permanent listening)	32mA
Mechanical characteristics	
Size (mm):	Board 65 x 90 x 25 mm
IP65 casing:	104 x 300 x 35 mm
Operating temperature:	-20 to +70 °C

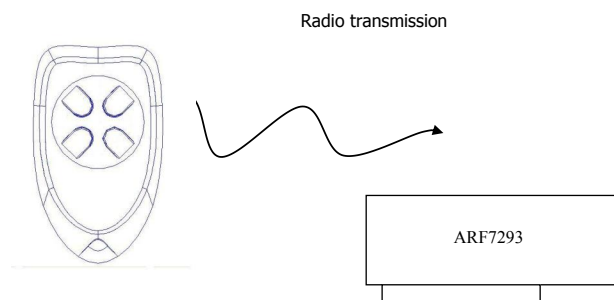
5. «OEM» receiver ARF7293

The radio receiver ARF7293 converts the radio signal from a remote control. The ARF7293 sends information from the remote control on the serial link and/or can manage 4 outputs.

This is a unidirectional system: the system behaves like 4 links where, for example, digital output 1 corresponds to input 1 (key 1 on the remote control), digital output 2 to input 2 (key 2 of the remote control), etc.

The serial output is constantly available. The 4 digital outputs are available after a training phase. The outputs can operate in monostable mode (closed when the remote control key is pressed) or in bistable mode (the position changes each time the corresponding key on the remote control is pressed). The module comprises several inputs dedicated to the choice of training mode and the choice between monostable and bistable output configurations.

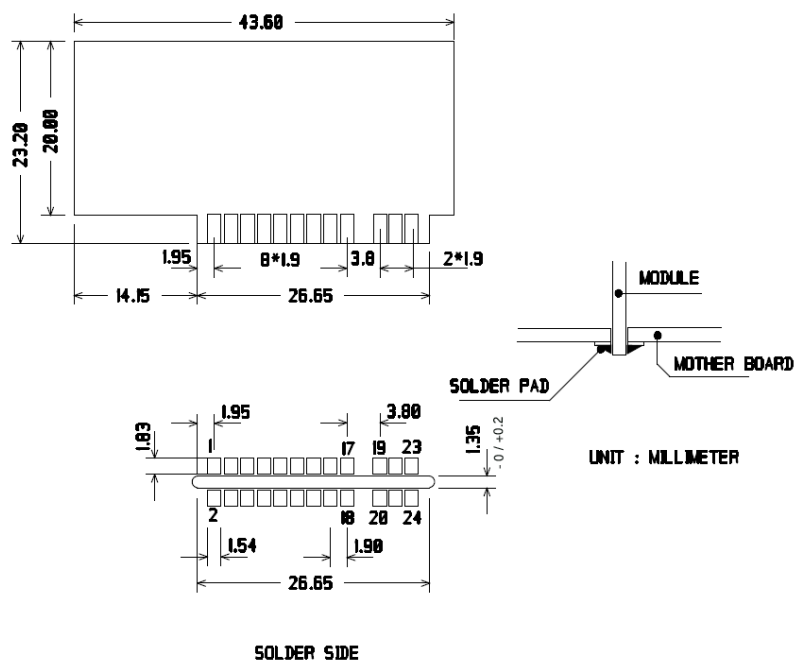
The ARF7293's parameters can be updated (serial link, programming mode, output mode...) using AT commands via the serial link. With an appropriate serial adapter, the module can be connected to an RS232 cable.



5.1. Interface

5.1.1 Mechanical specifications

The transmitter-receiver is available in the form of a plug-in module without an aerial.



5.2. Description of the signals

Pin interface	Name	I/O	Description
Digital interface			
1	GND		Ground
2	VDD		Voltage 3.3V +/-10%
3	Digital output 1	O	Digital output 1 (cf section 6 «Training procedures»)
4	LED	O	Light emitting diode (LED - cf section 6 «Training procedures»)
5	Current saving output	O	Can be used with relays. When a digital output 1 to 4 is set to «1» this output is set to «1» for 50 ms then returns to «0».
6	Erase	I	Erase (cf section 6 «Training procedures»)
7	RXD	I	Reception of serial data
8	TXD	O	Transmission of serial data
9	Digital output 4	O	Digital output 4 (cf section 6 «Training procedures»)
10	/RESET	I	Reinitialization of the transmitter-receiver hardware, LOW active. Can be disconnected.
11	Digital output 3	O	Digital output 3 (cf section 6 «Training procedures»)
12	Global	I	Global (cf section 6 «Training procedures»)
13	Digital output 2	O	Digital output 2 (cf section 6 «Training procedures»)
14	Sel1	I	Sel1 (cf section 6 «Training procedures»)
15	Add/Remove	I	Add/Remove (cf section 6 «Training procedures»)
16	Sel0	I	Sel0 (cf section 6 «Training procedures»)
17, 18	GND		Ground
RF interface			
19, 20	GND RF		RF aerial: ground
21, 22	RF in/out		RF aerial IN/OUT.
23, 24	GND RF		RF aerial: ground

NB: Directions I (Input) and O (output) concern the module.

5.3. Training modes

On delivery, the module is operational (the default factory configuration is 9600,n,8,1).

However you can customize the module's parameters by using the serial interface (RS232 or USB) which is dedicated to AT commands. You can send these commands from a terminal (with a delay of less than 10 seconds between each character).

Command mode is used to read and update the module's configuration registers. The registers are divided into two types: read only (W) and read/write (R/W) (cf. section 5.4.3 «description of the registers» and section 6 «Training procedures»).

5.4. Command mode

On delivery, the module is operational (the default factory configuration is 9600,n,8,1).

However you can customize the module's parameters by using the serial interface (RS232 or USB) which is dedicated to AT commands. You can send these commands from a terminal (with a delay of less than 10 seconds between each character).

Command mode is used to read and update the module's configuration registers. The registers are divided into two types: read only (W) and read/write (R/W) (cf. section «description of the registers» and the document «ARF 18 Remote control training process»).

5.4.1 Commands

A command starts with the 2 ASCII «AT» characters – «AT means «Attention» – followed by one or more characters or other data.

Each command must end with a <cr> (carriage return, ASCII code 0x0D).

The response sent on the serial output for each command corresponds to the ASCII character 'O' for a command that is accepted and the ASCII character 'E' for an error.

5.4.2 The command set

Commands	Register management
ATSn?	Displays the contents of the register Sn, where n represents the number of the register. The response will have the following format: Sn=y<cr><lf>
ATSn=m	Assigns the value 'm' to the register Sn. n represents the register number (for example, selection of the number of stop bits: ATS213=1).
AT/S	Displays the register values. The response will have the following format: Sxxx=y<cr><lf> for each register.
AT/V	Displays the software version. The response will have the following format: Adeunis RF: One way smart remote control receiver I Vx.yy<cr><lf>
ATR	All the registers are initialized to their default value
AT&W	To save the new configuration in the EEPROM. Each time you switch the serial receiver on, the EEPROM configuration will be loaded into the serial receiver's registers.

5.4.3 Description of the registers

Register values can be updated with the `ATSn=m<cr>` command and displayed with the `ATSn?<cr>` command.

Register values are placed in RAM. The parameters are lost if the power is cut. In order to save the registers, you need to use the `AT&W<cr>` command.

Access	Registers	Function	Description
Serial link			
R/W	S210	Speed	Serial link speeds are as follows: '2': 2400 bits/s '3': 4800 bits/s '4': 9600 bits/s (default value) '5': 19200 bits/s '6': 38400 bits/s '7': 57600 bits/s '8': 115200 bits/s
R/W	S211	Data length	Number of bits '7': 7 bits '8': 8 bits (default value)
R/W	S212	Parity	Parity 1: none (default value) '2': even '3': odd
R/W	S213	Number of stop bits	Number of stop bits (serial link) '1': 1 stop bit (default value) '2': 2 stop bits

Other registers S8xx are available for the training process. They are described in section 6 «Training procedures».

5.4.4 Normal mode

Under normal operation, the module sends over the serial output the serial number and the key number of the remote control received over the radio link. The format of the ASCII frame received is as follows:

:<serial number> <Key number> <CR><LF>

- : (ASCII code 0x3A)
- the serial number is the serial number of the remote control in decimal format (1 to 8 figures).
- followed by a space (ASCII code 0x20).
- the key number is the number of the key pressed on the remote control (2 figures from 01 for key 1 to 24 for key 24).
- CR (ASCII code 0x0D), LF (ASCII code 0x0A)

In addition, if the remote control has been paired (training process) with the receiver, outputs 1 to 4 of the receiver are managed according to the key that has been pressed on the remote control. For example: output 1 for key 1 up to output 4 for key 4. These outputs work in monostable or bistable mode depending on inputs Sel0 and Sel1. For further details, cf section 2.4 «Remote control training process».

5.5. «OEM» product technical specification

Radio characteristics	
Frequency:	433.92 MHz
Modulation:	ASK
Sensitivity:	-104 dBm
Electrical characteristics	
Power supply (VDC):	3.3VDC +/- 10%
Rx consumption (permanent listening)	15mA
Mechanical characteristics	
Size (mm):	43.6 x 23.2 mm
Operating temperature:	-20 to +70 °C

6. ARF7293/7294 «OEM» receiver training procedures

The training procedure for the ARF 18 receiver permits the configuration of the system in the following manner:

- All the remote control's keys can control any output on the receiver.
- One or more remote controls can control the same outputs.
- Any remote control key can control from 1 to 4 outputs on the receiver.
- The training process can be initiated either by input switches, or by AT commands via the serial link.

This document also describes the functionality of the receiver after configuration:

- Monostable or bistable functionality of the digital outputs via input switches.
- Transmission of each remote control serial number via the serial link.

Please note: for an 8/24 key remote control, certain training combinations are not available; cf section «8/24 key training characteristics».

6.1. Hardware interface

This section describes the inputs and outputs of the module used to control training mode. The pins may change according to the model of the receiver module. Please check the receiver's user guide,

Pin name	Direction	Description
Add/Remove	Input	Logic '1' assigned: The «Add/Remove» function is disabled. Logic '0' assigned: The «Add/Remove» function is enabled.
Erase	Input	Logic '1' assigned: The «Erase» function is disabled. Logic '0' assigned: The «Erase» function is enabled.

Pin name	Direction	Description															
Sel0 and Sel1	Input	When the module is in training mode, (“Add/Remove” or “Erase” in logic ‘0’), “Sel0” and “Sel1” select the output to be configured: <table><tr><td>Sel 1</td></tr><tr><td>Sel 0</td></tr><tr><td>Digital output chosen</td></tr><tr><td>0</td></tr><tr><td>0</td></tr><tr><td>4</td></tr><tr><td>0</td></tr><tr><td>1</td></tr><tr><td>3</td></tr><tr><td>1</td></tr><tr><td>0</td></tr><tr><td>2</td></tr><tr><td>1</td></tr><tr><td>1</td></tr><tr><td>1</td></tr></table> When the module is not in training mode, input “Sel0” selects the type of functionality of digital outputs 1 and 2, and “Sel1” the type of functionality of digital outputs 3 and 4. • logic ‘0’ on “Sel0”: digital outputs 1 and 2 in bistable mode.’ • logic ‘0’ on “Sel1”: digital outputs 3 and 4 in bistable mode.’ • logic ‘1’ on “Sel0”: digital outputs 1 and 2 in monostable mode.’ • logic ‘1’ on “Sel1”: digital outputs 3 and 4 in monostable mode.’	Sel 1	Sel 0	Digital output chosen	0	0	4	0	1	3	1	0	2	1	1	1
Sel 1																	
Sel 0																	
Digital output chosen																	
0																	
0																	
4																	
0																	
1																	
3																	
1																	
0																	
2																	
1																	
1																	
1																	
Global	Input	The global input is used to determine whether the training operation is carried out or not for several digital outputs. • Logic ‘0’ on “Global”: the training operation is carried out for several outputs (inputs «Sel0» and «Sel1» are ignored). Functionality depends on the function chosen («Erase» or «Add/Remove»). • Logic ‘1’ on “Global”: the training operation only applies to the digital output chosen with ‘Sel0’ and ‘Sel1’.															
Digital output 1	Output	This output is one of the four outputs controlled by the module when a signal is received from a remote control saved for this output.															
Digital output 2	Output	This output is one of the four outputs controlled by the module when a signal is received from a remote control saved for this output.															
Digital output 3	Output	This output is one of the four outputs controlled by the module when a signal is received from a remote control saved for this output.															
Digital output 4	Output	This output is one of the four outputs controlled by the module when a signal is received from a remote control saved for this output.															

PCB recommendations

If they are not used, the training inputs must be connected as described below:

- «Add/Remove» and «Erase» must be connected to logic '1'.
- «Sel0» and «Sel1» must be connected either to logic '1', or to logic '0', depending on how the digital outputs are used (bistable or monostable). Paired outputs are not used, «Sel0» and «Sel1» must be connected. In this case, logic '0' or logic '1' can be applied.
- "Global" must be connected either to logic '1' or logic '0'.

Authentication of the remote control is based on the remote control's serial number. The key number that has been depressed is also used to determine which digital outputs must be set. When the training procedure is carried out, the receiver on the one hand records a pair in its database [serial number of the remote control + key number] and also the output or outputs (1 to 4) to be controlled when this pair is received.

The training procedure only applies to controlling digital outputs. No training process is necessary in order to receive a remote command on the serial link. All the remote-control serial number + key pairs are transferred on the serial link, including the pair that controls the digital outputs.

When a remote command is received, the following operation is carried out:

- The remote-control serial number + key pairs are sent on the serial link in the form of ASCII text in the following format: "<serial number> <key number><CR><LF>", with a serial number between 0 and 16777215, followed by a space (ASCII code 0x20) and a key number between "01" and "24". The serial number is in decimal format.
- The receiver explores the remote command database for the serial number + key pair received, in order to find the outputs to control.
- If an entry is found in the receiver database, the corresponding outputs are controlled. If the output to be controlled is output 1 or 2, the input switch Sel0 is read and used to determine how to control the output: If the level assigned is logic '0', the output is in bistable mode. If the level assigned is logic '1', the output is in monostable mode. The same applies to outputs 3 and 4 /Sel1.

Bistable mode:

When an output is used in bistable mode, the state of the output is reversed each time a key on the remote control controlling this output is pressed.

Monostable mode:

When an output is used in monostable mode, the output is set to logic '1' when the user presses the key. The output is set to logic '0' when the remote control key is released.

The receiver operates in normal mode when the «Add/Remove» and «Erase» inputs are set to logic '1' and when all the registers ATS801=ATS802=ATS803=ATS804=ATS805=0.

6.2. Training modes

Training modes are entered either by applying the appropriate levels to the module's inputs (Sel0, Sel1, Global, Add/Remove, Erase) or by using the serial link and AT commands.

For this section, we will assume that a set of switches is connected to the module and that logic '0' corresponds to the «ON» position of the module input. We will also assume that an LED is connected to the module's «LED» output.

Two commands are available:

Add/Remove: when the logic level on this input is set to «0», the remote-control serial number + key pair can be added to or removed from the receiver's database for a chosen output.

Example, in order to link a pair [remote control serial number + key number] to an output, you must: select the output with «Sel0» and «Sel1», set «Add/Remove» to «0», then press the remote control key. If the link already exists in the receiver's database, this operation will cause it to disappear from the database.

Erase: when level '0' is assigned to this input, this erases all the pairs [serial number + key] from the database for an output chosen with the pins «Sel0» and «Sel1». After this operation, the chosen output is no longer controlled by any remote control. For security reasons, this operation is carried out after receipt of a valid message from any remote control.

Note: association of a command with the «Global» pin.
Enabling the «Global» input (application of level «0») changes the behaviour of the Add/Remove and Erase commands as follows:

Add/Remove command:

- If the remote control used (the key does not matter) controls at least one output on the receiver, all the associations for this remote control are removed: this remote control no longer controls any outputs.
- If the remote control used does not control an output, the following associations are created:
- Key 1 controls output 1, key 2 controls output 2, key 3 controls output 3 and key 4 controls output 4.

Erase command: all the associations in the receiver's memory are erased. The outputs are no longer controlled by any remote-control.

Some important behaviours during the training phases:

- all the keys pressed on the remote control are sent on the serial link.
- the receiver operates in training mode if one of the «Add/Remove» or «Erase» inputs is set to logic '0' or if one of the AT registers (ATS801, ATS802, ATS803, ATS804, ATS805) is set to a value other than 0.
- "Add/Remove" and "Erase" must not be simultaneously set to «0».
- AT commands have priority over switch inputs. If one of the AT commands (ATS801, ATS802, ATS803, ATS804, ATS805) is set to a value other than 0, the switch inputs are ignored.

The following tables summarise the training mode options and the procedure for creating associations between serial number + key pairs and the digital outputs.

ADD/REMOVE for a chosen relay (see below the restrictions for 8/24 key remote controls)	
With command and selection inputs	With AT commands
1/ Select «Add/Remove» mode by setting the Add/Remove input to «0». 2/ Make sure that «Global» and «Erase» are not enabled. 3/ Select the output that the remote control needs to control by setting «Sel0» and «Sel1». 4/ Press the remote control key that will be used to control the chosen output. 5/ Exit «Add/Remove» mode by setting the Add/Remove input to «1».	1/ Enter one of the following AT commands: ATS801=2 to choose output 1 ATS802=2 to choose output 2 ATS803=2 to choose output 3 ATS804=2 to choose output 4 2/ Press the remote control key that will be used to control the chosen output. 3/ Exit «Add/Remove» mode by setting the ATS80x register used to «0».
Two results are possible with this operation: • This association had not been set up previously. The association is now created. The LED flashes once. • This association had been set up previously. The association is erased. The LED flashes twice.	

ERASE operation for a chosen relay (see below the restrictions for 8/24 key remote controls)	
With command and selection inputs	With AT commands
1/ Select «Erase» mode by setting the Erase input to «0». 2/ Make sure that «Global» and «Add/Remove» are not enabled. 3/ Select the output for which the associations need to be erased by setting «Sel0» and «Sel1». 4/ Press the key on any remote control to carry out the operation. 5/ Exit «Erase» mode by setting the Erase input to «1».	1/ Enter one of the following AT commands: ATS801=1 to choose output 1 ATS802=1 to choose output 2 ATS803=1 to choose output 3 ATS804=1 to choose output 4 2/ Press the key on any remote control to carry out the operation. 3/ Exit «Erase» mode by setting the ATS80x register used to «0».
Result of the operation: The output chosen can no longer be activated by any remote-control. The LED flashes twice.	

6.3. ADD / REMOVE and ERASE operation: RESTRICTIONS FOR 8/24 key remote controls

The use of the ADD/REMOVE or ERASE functions for a chosen output, mixing remote controls with 4 keys (keys 1 to 4) and key numbers greater than 4 (keys 5 to 24):

- An ADD operation for a chosen relay with a key greater than or equal to 5 will be seen as a global addition (for example, key 5 will be associated with relay 1, key 6 will be associated with relay 2, key 7 will be associated with relay 3, key 8 will be associated with relay 4).
- A REMOVE operation for a chosen relay will lead to global removal if recording has been carried out for a key greater than or equal to 5 (for example, if key 5 is associated with relay 1, key 6 with relay 2, key 7 with relay 3, and key 8 with relay 4, ALL the associations will be removed).
- An ERASE operation for a chosen relay will lead to a global erase if recording has been carried out for a key greater than or equal to 5 (for example, if key 5 is associated with relay 1, key 6 with relay 2, key 7 with relay 3, and key 8 with relay 4, ALL the associations will be erased).

Global ADD/REMOVE operation	
With command and selection inputs	With AT commands
1/ Select «Add/Remove» mode by setting the Add/Remove input to «0». 2/ Make sure that the «Global» input is set to «0» and that the «Erase» input is disabled. 3/ Press any key on the remote control. 4/ Exit «Add/Remove» mode by setting the Add/Remove input to «1».	1/ Enter the following AT command: ATS805=2 in order to select Add/Remove in global mode. 2/ Press a key on the remote control that needs to be added to or removed from the receiver. 3/ Exit «Add/Remove» mode by setting the register used to «0». ATS805=0.
Two results are possible with this operation: - Previously, this remote control controlled at least one of the receiver's digital outputs: all the links between this remote control and the outputs are removed. The LED flashes twice. - Previously, this remote control did not control any of the receiver's digital outputs: the following links are created in the receiver's database for this remote control: key 1 controls output 1, key 2 controls output 2, key 3 controls output 3, key 4 controls output 4. The LED flashes once.	

Global ERASE operation	
With command and selection inputs	With AT commands
1/ Select «Erase» mode by setting the Erase input to «0». 2/ Make sure that the «Global» input is set to «0» and that the «Add/Remove» input is disabled. 3/ Press any key on any valid remote control. 4/ Exit «Erase» mode by setting the Erase input to «1».	1/ Enter the following AT command: ATS805=1 in order to select Erase in global mode. 2/ Press a key on any remote control. 3/ Exit «Erase» mode by setting the register used to «0». ATS805=0.
Result of the operation: No output can now be activated by any remote-control. The LED flashes twice.	

In the case of all the procedures described, the mode chosen can be exited after several training operations. It is not compulsory to exit the current mode then return if several operations need to be carried out. Each action is carried out when the key is pressed on the remote control.

6.4. Technical specification

The number of remote controls that can be stored in the receiver and the maximum number available from the digital outputs depends on each ARF18 receiver. This information is available in the user guide for each receiver.

6.5. Summary of registers

Access	Registers	Function	Description
W	S801	Starts the training process for digital output 1	'0': Exits the training procedure (default value) '1': Switches to Erase mode for digital output 1 '2': Switches to Add/Remove mode for digital output 1
W	S802	Starts the training process for digital output 2	'0': Exits the training procedure (default value) '1': Switches to Erase mode for digital output 2 '2': Switches to Add/Remove mode for digital output 2
W	S803	Starts the training process for digital output 3	'0': Exits the training procedure (default value) '1': Switches to Erase mode for digital output 3 '2': Switches to Add/Remove mode for digital output 3
W	S804	Starts the training process for digital output 4	'0' : Exits the training procedure (default value) '1' : Switches to Erase mode for digital output 4 '2' : Switches to Add/Remove mode for digital output 4
W	S805	Starts the training process in global mode	"0" : Exits the training procedure (default value) '1' : Switches to Erase mode in global mode. '2' : Switches to Add/Remove mode in global mode.