

User Manual Motion Sensor RAD

CARLO GAVAZZI



Motion Sensor Radar is a digital uni or bidirectional motion sensor for trouble-free opening of all types of automatic doors (sliding, swinging, folding, revolving, speed-doors, overhead doors, etc...), for pedestrian and civil applications.

It can be adapted to every application without further accessories and can be controlled by an infrared remote controller. Mounting height up to 4m (13.12ft) also available in uni- or bidirectional mode to detect motion towards or away from the device. Like most of other microwave detectors, equipped with planar flat antenna, Carlo Gavazzi Radar activates automatic doors utilizing doppler shift effect for detecting movements.

Safety Notes

Read Instructions!

Before working with this unit, read these instructions carefully and completely. Make sure that you have understood all the information!

Disconnect system from supply network

Before any installation, maintenance or modification work:

Disconnect your system from the supply network. Ensure that

cannot be re-connected inadvertently!

Before start of operation ensure appropriate installation

Warning! Improper installation / operation impair safety and result in operational difficulties or complete failure of the unit.

The unit must be installed and put into service appropriately by qualified personnel. Compliance with the relevant regulations must be ensured.

With stranded wires: all strands must be secured in the terminal blocks (potential danger of short circuit).

In operation: No modifications!

As long as the unit is in operation: do not modify the installation! The same applies also to the secondary side.

- The unit must not be opened except appropriately trained personnel!
- Do not introduce any object

into the unit!

- Keep away from fire and water!

FCC warnings

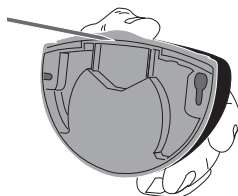
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and

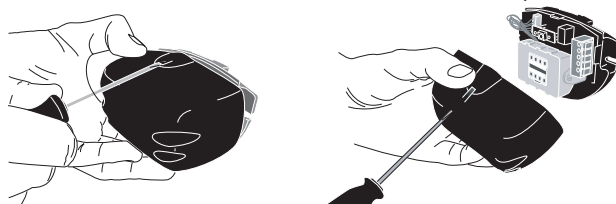
2) this device must accept any interference received, including interference that may cause undesired operation.

Cover Removing

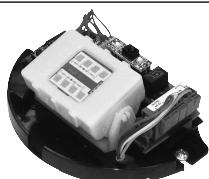
Remove cover from behind, before installation.



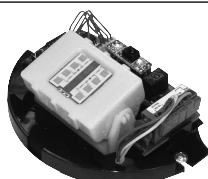
After installation from the front side, insert the screwdriver in the provided slot.



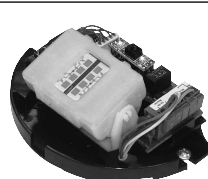
Inside View



RAD 01 To obtain narrow pattern L2 install the planar antenna in horizontal mode.



RAD 01 To obtain wide pattern L1 install the planar antenna in vertical mode.



RAD 02 To obtain wide pattern L3 or L5 install the planar antenna with tie clip.



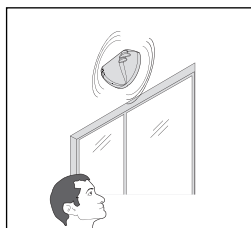
RAD 02 To obtain narrow pattern L4 or L6 install planar antenna without tie clip.

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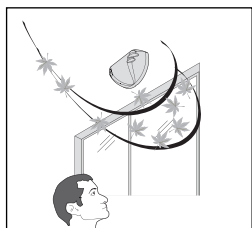
This manual accompanies our equipment for use by the end users.

The technical instructions and illustrations contained in this manual are to be treated as confidential and no part may be reproduced without the prior written permission of Carlo Gavazzi. Service engineers and end users may not divulge the information contained herein or use this manual for purposes other than those strictly connected with correct use of the equipment. Specifications are subject to change without notice. Pictures are just an example.

Installation Tips



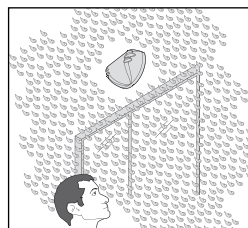
Fix firmly radar sensor to the wall.



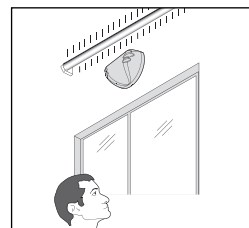
Avoid the presence of moving objects in radar sensing field.



Not install panels or metallic surfaces close to the device.

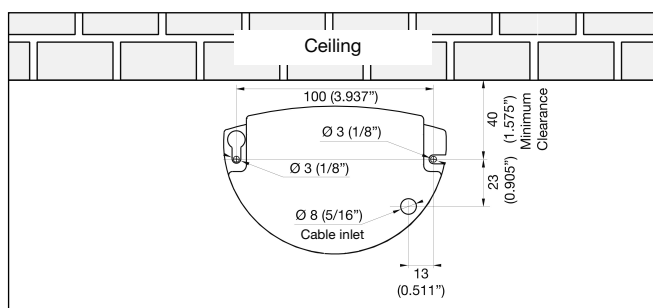


Not install radar on direct exposure of rain.

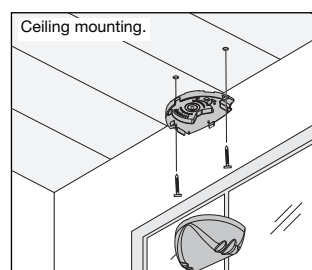
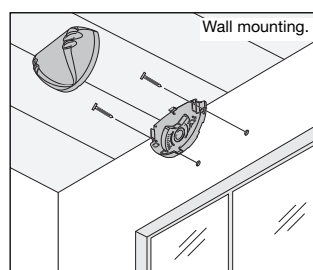


Not install radar close to fluorescent lamp.

Mounting Template mm (inches)



Mounting Instructions

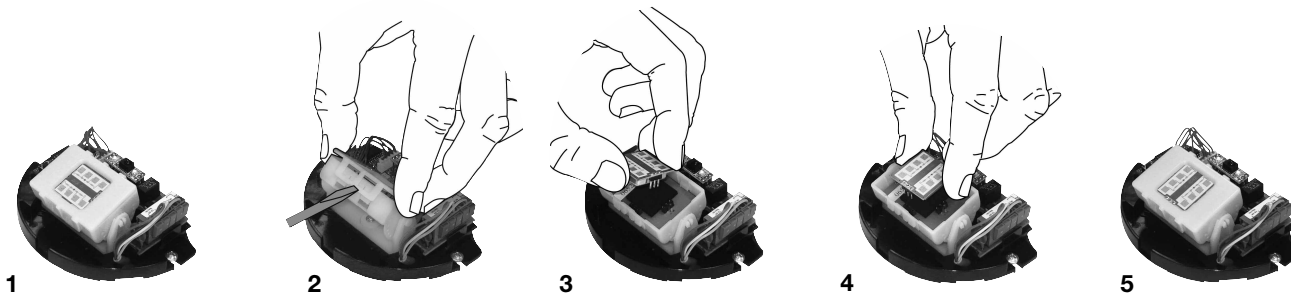


To install radar is necessary only a screwdriver and drill.

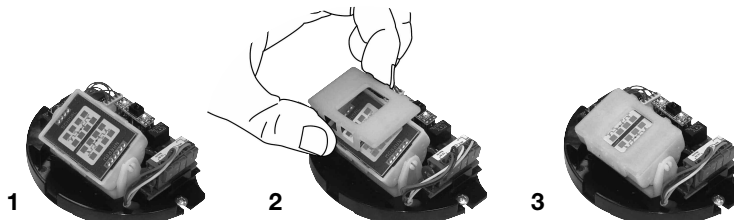
Detection Area Shape modifying instructions

To adjust the type of the sensing field and pattern, verify the following instructions:

RAD 01 To obtain wide pattern install the planar antenna in vertical mode, while to obtain narrow pattern install the planar antenna in horizontal mode. Carefully remove the fixing tie clip with a screwdriver and change the orientation mode of planar antenna.



RAD 02 To obtain wide pattern install the planar antenna with tie clip. To obtain narrow pattern install planar antenna without tie clip. Carefully use a screwdriver to remove the sensing field setting tie clip, when is necessary.



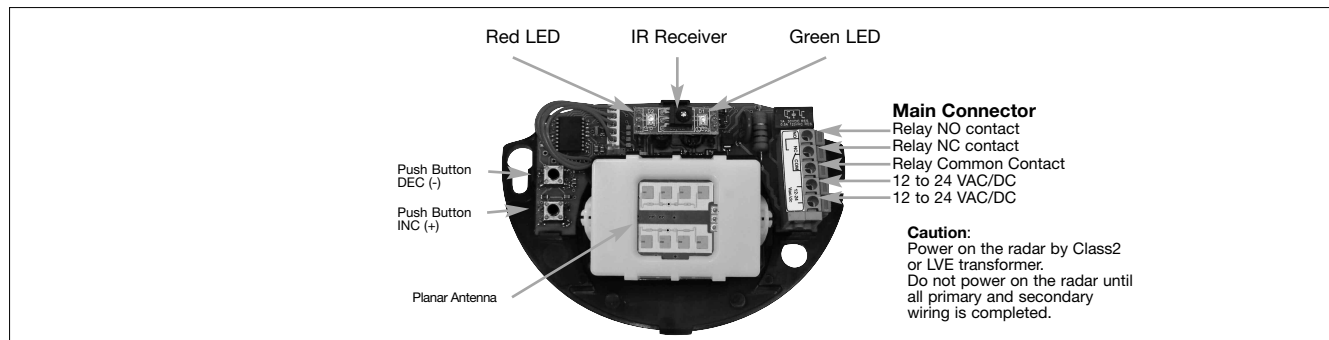
CAUTION!

Power off the radar before removing the planar antenna.

The radar is an electrostatic sensitive device: proceed with caution to remove the planar antenna, don't wear synthetic clothes or rubber sole shoes.

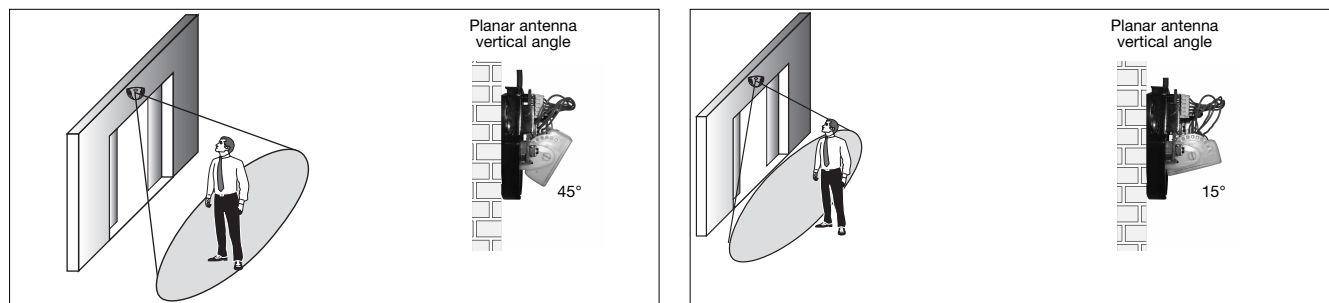


Electrical Connections

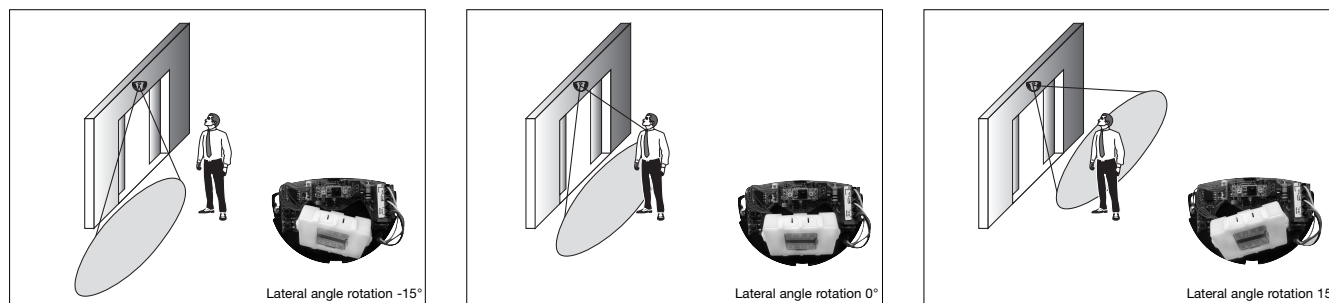


Sensing Field adjustment

Mechanical sensor orientation



Adjust the vertical position to obtain the vertical sensing field close or far from the door.



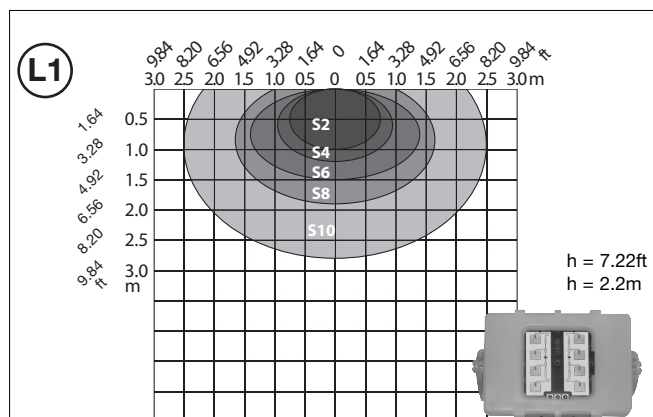
Adjust the lateral position to obtain the desired lateral angle sensing field.

Sensing field adjustment according to Sensitivity setting and mounting Height

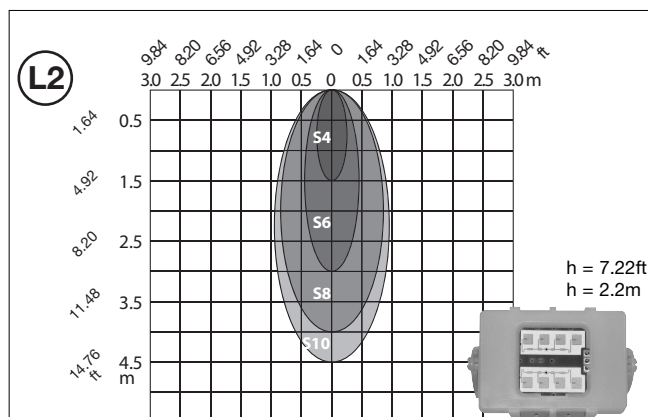
The sensing field area size (lobo) depends on the sensitivity parameter setting and the radar mounting height.

RAD 01 Bidirectional Model

Detection area vs Sensitivity value (vertical angle 45°); vertical mount mode.

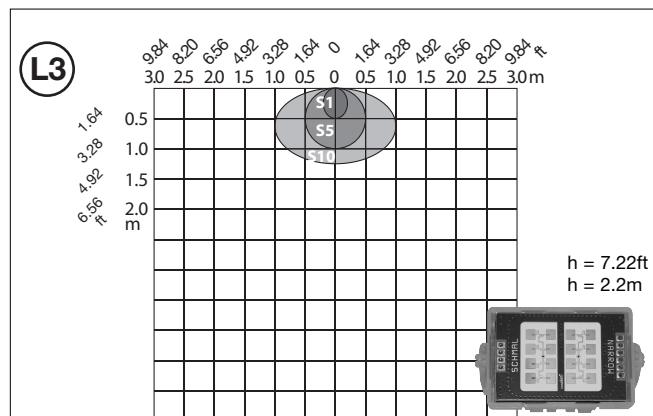


Detection area vs Sensitivity value (vertical angle 45°); horizontal mount mode.

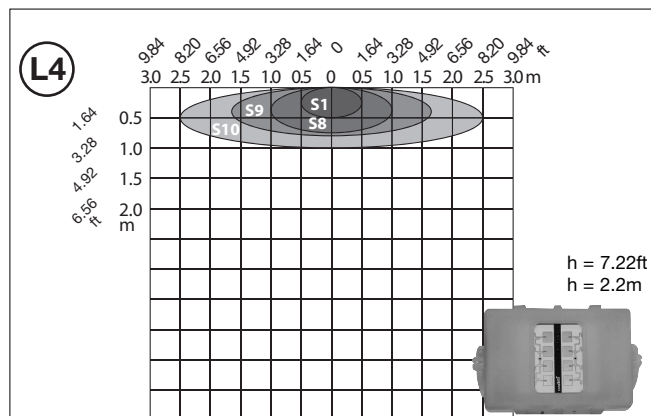


RAD 02 Uni & Bidirectional Model

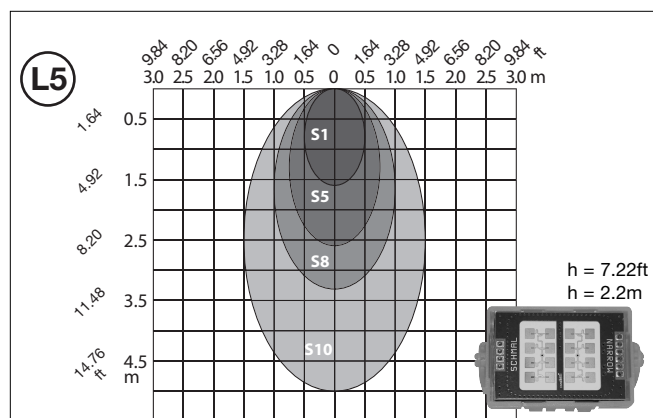
Detection area vs Sensitivity value (vertical angle 15°).



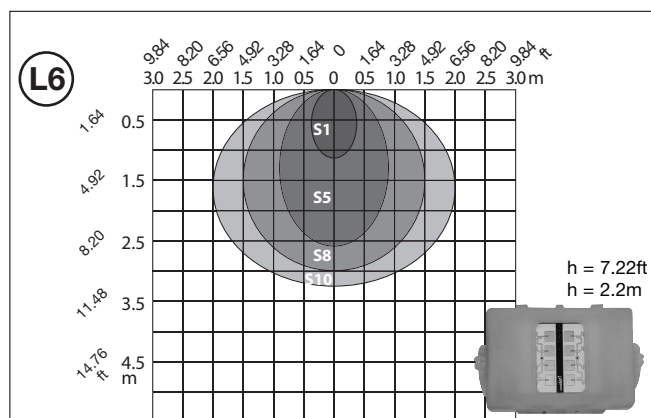
Detection area vs Sensitivity value with leg clip (vertical angle 15°).



Detection area vs Sensitivity value (vertical angle 45°).



Detection area vs Sensitivity value with leg clip (vertical angle 45°).



Adjustment and Setting

Manual Setting Device

By two buttons on main PCB board.

Remote Setting Device

IR remote controller (optional)

Reset to factory set Value

1 - Restore PIN security code

(only by PCB buttons)

2 - Restore all factory values

Sensitivity

10 levels (1 to 10)

It allows increment or decrement of detection field.

Relay hold time

10 levels (0.5 to 9s)

It fixes the maintenance's time of the relay status.

Uni-bidirectional mode

It sets direction mode detection (only for uni-bidirectional device).

Immunity detection

"Quasi-presence", Normal mode, Increased Immunity (Implemented by a digital filter) It prevents some external noise as objects carried by wind, strong rain, etc.

Relay status

Active, Passive,

Automatic mode/

Permanently Open/Close.

Security code

(only by IR remote controller)

(only by PCB buttons)

It permits to fix the relay status: normally open or close.

(only by IR remote controller)

It permits to enable or disable normal sensor detection and set ON or OFF permanently relay output.

AUTO / OPEN / CLOSE

4-digit PIN access code

It permits to lock or unlock optional remote controller keyboard setting.

Factory Default Value

The device is set up in factory at the following default values:

1. **Sensitivity** 10 (max level)
2. **Relay hold time** 1 (min: 0.5 sec)
3. **Uni-Bidirectional Detection Mode** Bi-directional (Uni-directional mode is available only for RAD 02)
4. **Immunity detection** Immunity: OFF ;
Quasi-Presence: OFF
5. **Relay Status:** Passive
6. **PIN security:** 0000 - block disabled
(only for remote controller)

At the first start up, the device loads the default values.

Programming procedure

Radar set value can be modified through the two buttons on the main PC board (On Board setting procedure) or with the IR remote controller [optional] (IR remote controller setting). The differences between on board settings procedure and IR controller settings procedure are only in "Relay

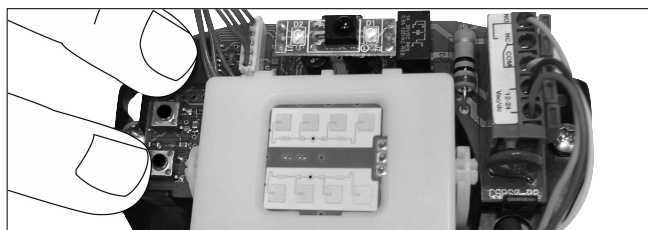
status", "Restore" and the "PIN security code" features. "Restore" feature is only available by on board push buttons while PIN security code function is available only by remote controller. "Relay status feature" is partly available by on board push buttons and partly by remote controller.

On board setting procedure

It is necessary to press simultaneously for 1 second the two PC-board buttons DEC(-) and INC(+) to enter in programming procedure. When the two buttons are released the Green LED states permanently active

(ON) so the device is ready to be set.

Next setting action must be done in 20 seconds, otherwise the device return in normal operation mode and it's necessary to restart.

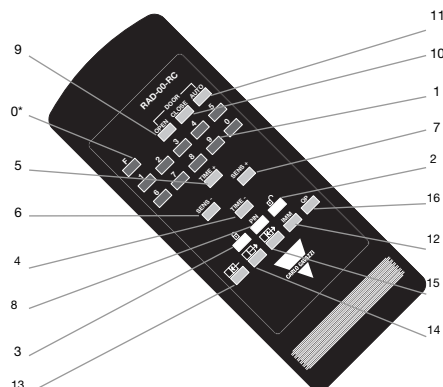


- Refer to the following table to change radar Set Values:

STEPS	STEP 0		STEP 1		STEP 2		STEP 3
SETTING DESCRIPTION	USER'S ACTION	GREEN LED STATUS	USER'S ACTION	RED LED STATUS	USER'S ACTION	RED LED STATUS	USER'S ACTION
PROGRAMMING PROCEDURE START UP	Press together DEC & INC per 1 sec.	Green LED switch on permanently.	X	X	X	X	Press DEC & INC per 1 sec. to go to Sensitivity (see Sensitivity STEP 1) or wait 20 sec. to end setting procedure.
SENSITIVITY	X	X	Press together DEC & INC per 1 sec.	Red LED will flash once.	Press DEC or INC per 1 sec. to increase or decrease Sensitivity current value.	Red LED flashes the number of the new set value (1...10 quick flashes).	Return to Step 2 or press DEC & INC per 1 sec. to go to Hold Time (see Hold Time STEP 1) or wait 20 sec. to end setting procedure.
HOLD TIME	X	X	Press together DEC & INC per 1 sec.	Red LED will flash twice.	Press DEC or INC per 1 sec. to increase or decrease Hold Time current value	Red LED flashes the number of the new set value (1...10 quick flashes).	Return to Step 2 or press DEC & INC per 1 sec. to go to Detection Mode (see Detection Mode STEP 1) or wait 20 sec. to end setting procedure.
DETECTION MODE	X	X	Press together DEC & INC per 1 sec.	Red LED will flash three times.	Feature available only for RAD 02 model. • RAD 01: press DEC & INC per 1 sec. to go to Immunity. • RAD 02: press INC per 1 sec. to change Detection Mode current value.	Only for RAD 02 model: 1 quick Red LED flash: Toward; 2 quick Red LED flashes: Backward; 3 quick Red LED flashes: Toward and Backward;	Return to Step 2 or press DEC & INC per 1 sec. to go to Immunity (see Immunity STEP 1) or wait 20 sec. to end setting procedure.
IMMUNITY	X	X	Press together DEC & INC per 1 sec.	Red LED will flash four times.	Press INC per 1 sec. to change Immunity current value.	1 quick flash: Immunity ON, QP OFF; 2 quick flashes: Immunity OFF, QP ON; 3 quick flashes: Immunity ON, QP ON; 4 quick flashes: Immunity OFF, QP OFF;	Return to Step 2 or press DEC & INC per 1 sec. to go to Relay Status (see Relay Status STEP 1) or wait 20 sec. to end setting procedure.
RELAY STATUS	X	X	Press together DEC & INC per 1 sec.	Red LED will flash five times.	Press INC per 1 sec. to change Relays Status current value	1 quick flash: Relay mode PASSIVE (NO); 2 quick flashes: Relay mode ACTIVE (NC);	Return to Step 2 or press DEC & INC per 1 sec. to go to Restore (see Restore STEP 1) or wait 20 sec. to end setting procedure.
RESTORE	X	X	Press together DEC & INC per 1 sec.	Red LED will flash six times.	Press INC per 1 sec. to change Restore current value.	1 quick flash: Restore PIN to 0000 2 quick flashes: Restore all to factory default values.	Return to Step 2 or wait 20 sec. to end setting procedure.

IR remote controller setting procedure

Please refer to the following tables in order to modify radar parameters setting with remote controller. All changes made by remote controller, except (OPEN, CLOSE and AUTO), are stored into the radar memory and reloaded during radar restart.



* Not available

KEY	FUNCTION	RED LED RESPONSE	GREEN LED RESPONSE
1 0...9	Numerical keys	NONE	NONE
2 UNLOCK	If PIN is not equal to 0000 (factory default value), press "UNLOCK" key and insert the correct PIN code to enable remote controller setting.	See next table	NONE
3 LOCK	If PIN is not equal to 0000 (factory default value), press "LOCK" key to disable remote controller setting.	See next table	NONE
4 TIME -	Press "TIME -" key to decrease Hold Time set value.	1...10 quick flash	NONE
5 TIME +	Press "TIME +" key to increase Hold Time set value.	1...10 quick flash	NONE
6 SENS -	Press "SENS -" key to decrease Sensitivity set value.	1...10 quick flash	NONE
7 SENS +	Press "SENS +" key to increase Sensitivity value.	1...10 quick flash	NONE
8 PIN	Press "PIN" key to change 4-number PIN (it's necessary to insert the user PIN code if it's different from Factory Default Value).	See next table	NONE

KEY	FUNCTION	RED LED RESPONSE	GREEN LED RESPONSE
9 OPEN	Press "OPEN" key to disable normal radar detection functionality and to set Relay Status output always ACTIVE.	NONE	Always ON
10 CLOSE	Press "CLOSE" key to disable normal radar detection functionality and to set Relay Status output always NOT ACTIVE.	NONE	Always OFF
11 AUTO	Press "AUTO" key to available normal radar detection functionality.	NONE	NONE
12 IMM	Press "IMM" key once to activate or twice to disable Immunity feature.	1 quick flash : ON 2 quick flashes : OFF	NONE
13 FORWARD	Press "FORWARD" key to activate uni-directional motion detection towards the sensor (available only for RAD 02).	1 quick flash	NONE
14 BACKWARD	Press "BACKWARD" key to activate uni-directional motion detection away from the sensor (available only for RAD 02).	2 quick flashes	NONE
15 BOTH	Press "BOTH" key to activate bi-directional motion detection towards or away from the sensor (available only for RAD 02).	3 quick flashes	NONE
16 QP	Press "QP" key once to activate or twice to disable Quasi-Presence feature.	1 quick flash : ON 2 quick flashes : OFF	NONE

PIN Security code

The remote controller device can be disabled inserting a four numbers PIN code therefore. All IR-remote setting functions are available only if the correct PIN is inserted. The Security feature is activated only if the PIN is different from 0000 (factory set value).

The next table shows the procedure to modify and set PIN Security code:

FOOUR PIN CODE SETTING	ACTUAL PIN VALUE	STEP 1		STEP 2		STEP 3	
		USER'S ACTION	RED LED ANSWER	USER'S ACTION	RED LED ANSWER	USER'S ACTION	RED LED ANSWER
	Actual PIN code = 0000 (Factory set value)	Press once "PIN" key.	Red LED will flash once.	Compose sequentially 0000 code with remote controller keyboard.	Red LED will flash twice.	Compose sequentially the new XXXX PIN value with remote controller keyboard.	The red LED will flash three times (The new XXXX PIN code now is set).
	Actual PIN code = xxxx (User set value)	Press once "PIN" key.	Red LED will flash once.	Compose sequentially the actual XXXX code value with remote controller keyboard.	Red LED will flash twice if PIN code is OK: get to Step 3. No flash will happen if PIN code is not correct: restart from Step 1.	C o m p o s e sequentially the new YYYYY PIN value with remote controller keyboard.	The red LED will flash three times (The new YYYYY PIN code now is set).

The next tables show the procedure to UNLOCK and LOCK the IR remote controller keyboard.

IR REMOTE CONTROLLER UNLOCK	ACTUAL PIN VALUE	STEP 1		STEP 2		STEP 3
		USER'S ACTION	RED LED ANSWER	USER'S ACTION	RED LED ANSWER	USER'S ACTION
	Actual PIN code = 0000 (Factory set value)	Not available.	X	Not available.	X	Not available.
	Actual PIN code = xxxx (User set value)	Press once "UNLOCK" key.	Red LED will flash once.	Compose sequentially the actual XXXX code value with remote controller keyboard.	Red LED will flash twice if PIN code is OK: get to Step 3. No flash will happen if PIN code is not correct: restart from Step 1.	IR remote device keyboard is activated and it's possible to use the device for setting parameters.

IR REMOTE CONTROLLER LOCK	ACTUAL PIN VALUE	STEP 1		STEP 2
		USER'S ACTION	RED LED ANSWER	USER'S ACTION
	Actual PIN code = 0000 (Factory set value)	Not available.	X	Not available.
	Actual PIN code = xxxx (User set value)	Press once "LOCK" key.	Red LED will flash once.	IR remote device keyboard is disconnected and it's not possible to use the device for setting parameters.

Notes:

- If no events happened per one minute, radar will restart automatically and reload the previous current set values; Red LED will flash quickly per 1 second.
- If you have forgotten PIN XXXX code, it's possible to reset the PIN factory value through the two buttons on the main PC board: please refer to "RESTORE" feature of On Board setting Procedure.

Trouble Shooting

DEFECT	PROBABLE CAUSE	RECOVERY ACTION
Door will not open or close when radar sensor is activated.	The radar is not powered on correctly. The relay output wiring is not correct.	Control electrical wiring diagram.
Door always remains open or closed when radar sensor is activated.	The radar always works with OPEN or CLOSE features set on.	Set on AUTO feature by IR remote controller.
Door is activated in reverse mode.	Relay Status feature is set on ACTIVE (NC) or PASSIVE (NO).	Set on AUTO feature by IR remote controller.
Door constantly recycles (opens and closes).	There is something moving in the field detection area. The radar sensor detects the door motions.	Verify Immunity and Sensitivity set values to increase radar motion sensing feature. Adjust vertical or lateral detection angle and Sensing Field.
IR remote controller keyboard does not work.	Remote control is lock. The user PIN security code entered with remote controller is not correct.	Insert the correct user PIN security code. Refer to On Board Setting Procedure and restore factory PIN code.
Radar does not respond to the Remote Controller Setting Procedure.	Remote controller batteries are run-down. Remote Controller is not well oriented toward radar sensor.	Check remote controller battery insertion and voltage. Orient the remote controller correctly toward radar sensor.

Warnings

Warning: Changes or modifications made to this equipment not expressly approved by **CARLO GAVAZZI LOGISTICS** may void the FCC authorization to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warranty

Carlo Gavazzi guarantees radar device to be free of manufacturing defects for 2 Years from purchasing date. The guarantee intervenes when the device presents a material defect. The faulty device can be returned back to our factory and will be repaired free of charge. If the defect is due to an exceeding of the permissible technical data, wrong wiring, not permissible changes in equipment by the user or a faulty operation no guarantee is carried out.

Ordering Key

Type _____
Detection mode _____

RAD 01

Accessory

Type _____
IR remote controller _____

RAD 00 RC

Type selection

Detection Mode
Bidirectional*
Uni&Bi-directional*

01
02

* Bidirectional: to detect motion towards and away from the sensor
Uni & Bidirectional: to detect motion towards and/or away from the sensor.

Environmental data

Temperature range	-4°F to +158°F (-20°C to +70°C)
Humidity	from 0% to 90%RH
Immunity	R&TTE 1999/5/EC EMC 89/336/EEC
Max. mounting height	13.12ft (4m)
Protection degree	IP54

Electrical data

Frequency emitted	(K-Band) 24.125GHz
Radiated power	< 16dBm EIRP
Rated supply voltage	12 – 24VAC ±10% 12 – 24VDC +30% / -10%
Main frequency	50 to 60HZ
Power consumption	< 0.5W (VA)
Output Relay SPDT	
Rated Voltage	24VDC - 120VAC
Max switching current	1A (resistive load)
Max switching power	30W (DC) / 120VA (AC) (resistive load)
Hold time	0.5 – 9s (adjustable)

Box Content

- Radar Motion Sensor
- Tie Clip for sensor fixing (RAD 01) or sensing field setting (RAD 02)
- Connecting cable
- Screws and anchor fixing set
- Instruction manual

General data

Sensing field orientation	double mechanical adjustment, lateral and vertical
Detection angle Vertical Lateral	0° to 90° in 15° increments +/- 30° in 7.5° increments
Sensing field shape uni & bidirectional model bidirectional model	By means tie clip By Sensor module orientation
Detecting area (mounting height 2.2m) Wide sensing field Narrow sensing field	13.12ft (W) x 6.56ft (D) (4m (W) x 2m (D)) 6.56ft (W) x 8.20ft (D) (2m (W) x 2.5m (D))
Detection mode Only bidirectional Uni & bidirectional	to detect motions towards and away from sensor to detect motions towards or/and away from sensor
Motion detecting speed	0.164 - 3.28fps (0.05 - 1m/s) (measured in the sensor axis)

Mechanical data

Housing Material	Polycarbonate
Dimensions WxHxD	4.645 x 3.149 x 2.086inch. (118 x 80 x 53mm)
Weight	5.29oz (150g)
Cable length	8.20ft (2.5m)
Colour	Glossy/Translucid Black

Approvals

CE 0682


RoHS Compliant