EGOpro

Safe Move 4.0 KIT

Use and Installation Manual

(V04)

Table of contents

1 TABLE OF REVISIONS

Date	Rev.	Notes
10/12/2018	01	New version draft
15/01/2019	02	Updating figures-tables
14/02/2019	03	Wiring diagrams
15/02/2019	04	Section 6.2.4 update

2 COMPLIANCE

The manufacturer, Advanced Microwave Engineering Srl, hereby declares that the type of radio equipment P LX HUB SR, PLX TAGSAFETY 3H, PLX TAGSAFETY 3TH, P LX SAFEMOVE DIS, P LX SAFEMOVE CPU, PLX SAFEMOVE HUB 4, PLX SAFEMOVE HUB 4M, PLX SAFEMOVE SENS 4, PLX SAFEMOVE SENS 4M complies with the **RED directive 2014/53/EC.** The full text of the EU Declaration of Conformity is available on the following Internet address:
http://www.ameol.it/en/declaration-of-conformity/

3 SAFETY INSTRUCTIONS

3.1 DISPOSAL

Treatment of the electrical or electronic device at the end of its service life (applicable in all European Union countries and in other European Countries with waste sorting system) This symbol indicates that the product must be taken to a suitable collection point for recycling electrical and electronic equipment.
The EGOpro Safe MOVE 4.0 System is a set of electrical and electronic equipment
By making sure that this product is correctly disposed of, you will contribute to preventing potential negative consequences for the environment and for health that would otherwise be caused by its improper disposal. Recycling these materials helps to preserve natural resources. For more detailed information about this product recycling, you can contact the municipal office, the local waste disposal service. In case of unauthorised disposal of electrical and/or electronic equipment, the penalties foreseen by the applicable regulations could be applied (valid only for Italy).

3.2 LIMITATIONS FOR USE

Upon installing the system in industrial vehicles, strictly follow the instructions given by the manufacturer of the vehicle contained in the manual (electrical and mechanical connection, etc.). Only duly trained personnel must install the system. The forklift truck should not be modified in such a way as to render the Declaration of Conformity null and void.
If the installation does not comply with the instructions contained in the manufacturer's manual, AME shall not be held liable for any damage to the vehicle or its poor performance.
The EGOpro Safe MOVE 4.0 system (the Product) is a safety supporting tool to prevent man-vehicle and vehicle-vehicle collisions. This is not a personal safety system.
This system has been designed to offer an additional aid for driving. While driving, the driver's total attention is always required. The driver must always be read to intervene and put on the brakes and turn the steering-wheel to avoid possible collisions. The EGOpro Safe MOVE 4.0 system does not replace the driver's attention and judgement or need to slow down or brake in case of danger, and it does not exonerate the purchaser and the driver from adopting the usual safety procedures foreseen.
The control of the vehicle is still under the driver's responsibility, who must always assess the current conditions in which the vehicle moves, paying attention to the presence of pedestrian workers, other vehicles and obstacles in general.

In no case shall AME be held liable for direct or indirect damage of any kind (personal injuries or damage to objects) suffered for any reason whatsoever by the Purchaser or by third persons due to the use of the Product.

The EGOpro Safe MOVE 4.0 system is a product for professional use, and it may not be used in places frequented by children.

4 INTRODUCTION

4.1 INTENDED USE

The EGOpro Safe MOVE 4.0 System is a safety supporting system that is used for detecting the presence of pedestrian workers and vehicles equipped with suitable devices. When any of those are detected, sound and visual signals are generated, to which the I/O that are present in the system can be associated.

4.2 SYMBOLS

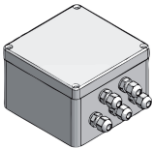
Symbol	Description
	DC or AC voltage
	DC voltage symbol no. 5031 of IEC 60417 is used to indicate on the identification plate that the equipment may only be used with direct current.

5 BASIC KIT COMPONENTS

The EGOpro Safe MOVE 4.0 basic kit consists of:

✓ **1** **P LX SAFEMOVE DIS** - Display with cable (plate and joint included)

✓ **3** **P LX SAFEMOVE SENS4** - SAFE MOVE 4.0 multifunction sensor.



✓ **1** **P LX SAFEMOVE HUB4** - HUB SAFEMOVE 4.0.

✓ **1** **P LX SAFEMOVE CPU** - CPU for SAFE MOVE. (plate and joint included)

GENERAL CONSUMPTION VALUES

- Consumption to the Hub up to 3 sensors 20W
- Consumption of CPU with active display 15W
- Consumption of CPU with display on standby 1W

4 SYSTEM OPERATION

The Proximity Warning & Alert System solution offered by EGOpro Safe MOVE 4.0 minimises the possibilities of accidents between forklifts and pedestrians in common working areas. By means of visual and sound alarms, the system warns the driver, in real time, about the presence and position of pedestrian workers wearing an active TAG that enter the danger areas around a vehicle in motion.

With the system, the driver can promptly take the most appropriate safety measures to avoid hitting other pedestrian workers or other vehicles.

Thanks to a multifunction sensor, the system detects the pedestrian worker, who wears a TAG, in two stages:

4.1 PEDESTRIAN WORKER PRE-WARNING

PRE-WARNING | The activation range can be configured up to 50 m with the control of a relay contact.

By means of a visual and sound alarm, the system warns the driver about the presence and position of the pedestrian worker.

4.2 PEDESTRIAN WORKER WARNING

WARNING | The activation range can be configured up to 5 m with the control of a relay contact.

By means of a visual and sound alarm, the system warns the driver about the presence of the pedestrian worker with a red ring and the turning-on of the lateral LEDs.

4.3 VEHICLE-VEHICLE WARNING

VEHICLE-VEHICLE WARNING | When a vehicle equipped with the EGOpro Safe MOVE 4.0 system gets into the sensor activation area. The activation range can be configured up to 100 m.

By means of a visual and sound alarm, the system warns the driver about the presence and position of the other vehicle.

5 PLACING TAGS

5.1 HELMET TAG FITTING

To fit the PLX TAGSAFETY 03TH Tag, you first need to clean the helmet. Then, you have to suitably remove the grease from the surface with the napkin supplied. Now you can affix the Tag as shown in the figure.

5.2 WEARABLE TAG ACCESSORIES

The wearable Tag is supplied together with a series of accessories that guarantee a wide range of options for wearing it.

Clip for band

Use the screws supplied: 2.2X7

Slot for strap

Use the screws supplied: 2.2X6

Snap fastener

Use the screws supplied: 2.2X7

5.3 PROCEDURE FOR CHANGING THE BATTERY

The battery inside the Tag is a CR2450 button cell battery. To replace it, remove the yellow rubber part, and then replace the battery.

While replacing the battery in the helmet tag, pay attention so as not to damage or disconnect the small coaxial cables connected to the board.

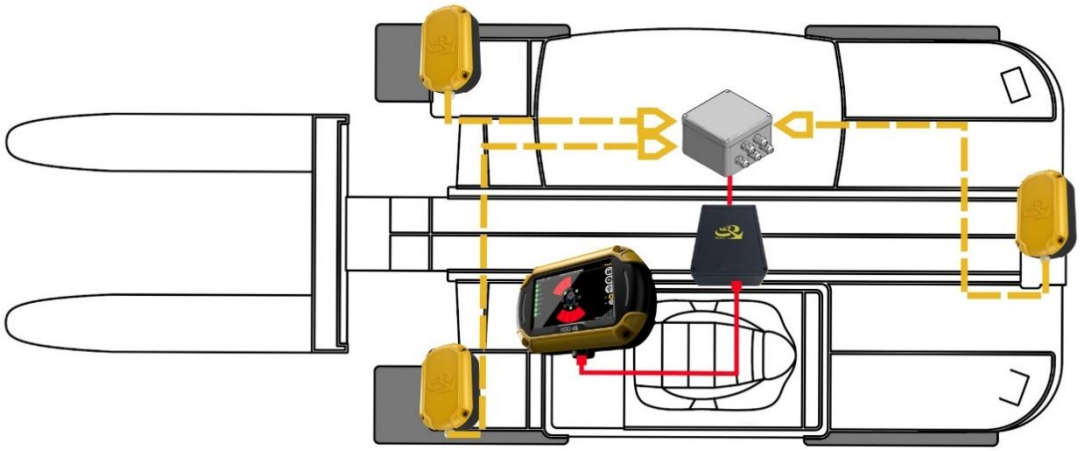
Once the battery has been replaced, make sure that the Tag emits a long initial sound followed by three short sounds. If this does not happen, the device has not started correctly; contact the manufacturer.
Put the tag back in its housing, and place the soft rubber part back in its position.
Then, press it in all directions to make the rubber part correctly adhere to the rigid part.

6 INSTALLATION ON THE VEHICLE

6.1 SYSTEM ARCHITECTURE

The basic KIT of the EGOpro Safe MOVE 4.0 system that is installed on the vehicle consists of the following devices:

- **3 Sensors**
- **1 HUB**
- **1 CPU**
- **1 Display**



6.2 POSITIONING THE DEVICES

To position the devices, you must take into account the system operation characteristics, the mechanical restrictions and the IP protection degree of the devices.

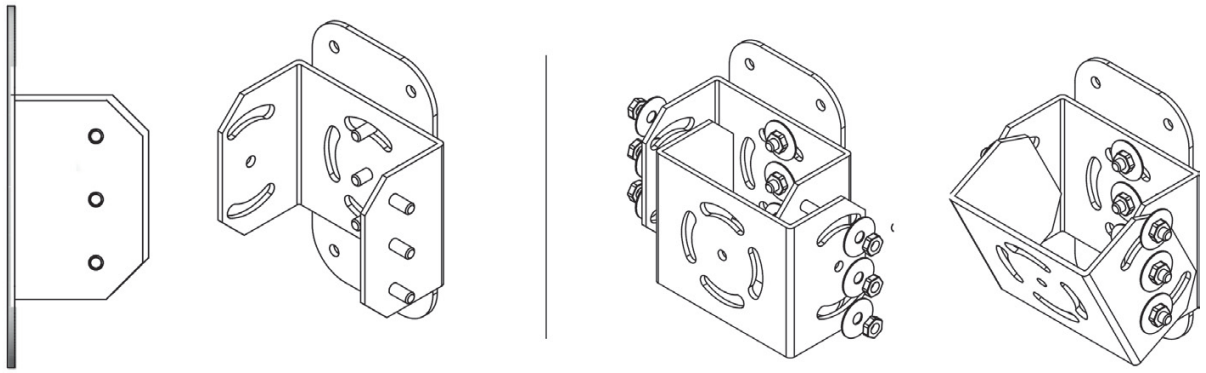
For these reasons, two categories are identified:

- **Devices outside the driver's cabin**
  - **Sensors** are usually positioned outside the driver's cabin, except for exceptional cases such as exposure to high temperatures.
- **Devices inside the driver's cabin**
  - **CPU** and **Display**, due to their function and the IP protection degree, must be inside the driver's cabin or, in any case, in a protected position.

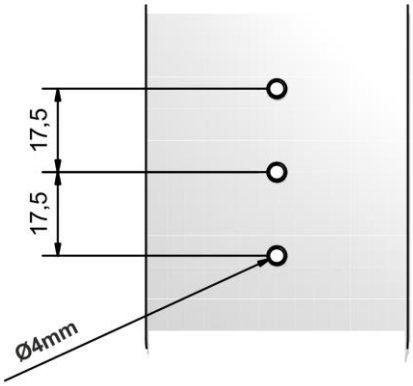
The **HUB** can be positioned either outside or inside the driver's cabin due to both its operation and its high degree of protection.

The 433MHz whip aerial antenna, which is present on the HUB, must be fitted outside

The **Display** and the **Sensors** must be correctly oriented: for this reason, they are supplied with a mounting plate and a mechanical joint onto which the support that is necessary for holding the device must be fitted.
The joint, which is made up of 2 U-shaped mechanical parts, has been designed to be easily connected to the plate that is present on the devices.



Find below the heights for the possible holes to be used for fixing it to the plate.



6.2.1 Positioning the control unit (CPU)

The CPU is the basic element of the system and it can be positioned at any point inside the driver's cabin. The position of the CPU must not obstruct the driver's and the vehicle operability, and it should be handy to connect the HUB and the Display.
To fix the CPU, you can use the 4 holes on the box that can be accessed by removing the device cover.

When choosing the position, keep in mind that there are usable outputs on the CPU; for example, the USB port can be used to download data and for assistance; therefore, access to them must be granted.

⚠ Remember that the CPU has an IP 20 protection degree, and the connection cable is 2.50 m long.

6.2.2 Positioning the Display

The Display must be positioned inside the driver's cabin in accordance with the driver's visibility requirements and taking into account the CPU position: **the connection cable between Display and CPU is 2.5 m long**.

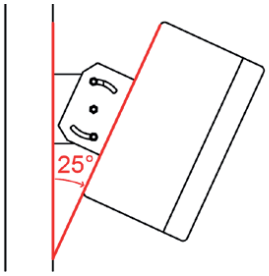
When installing the Display and passing the connection cable, attention must be paid so that they do not disturb the driver's movements and so that the driver's visibility remains unaffected.
The Display has an **IP 20** protection degree. Position it in the cabin, in an area protected from the elements.

6.2.3 Positioning the sensors

The basic Kit is made up of 3 sensors that are sufficient to cover small and medium-sized vehicles. The installation must optimise coverage around the vehicle taking into account the type of mobility of the vehicle.
The most common installation includes 2 Sensors on the front/loading side, driven forward, and 1 Sensor on the rear side/driven in reverse.
NOTE: the number of sensors can be extended up to 8 by adding suitable components.

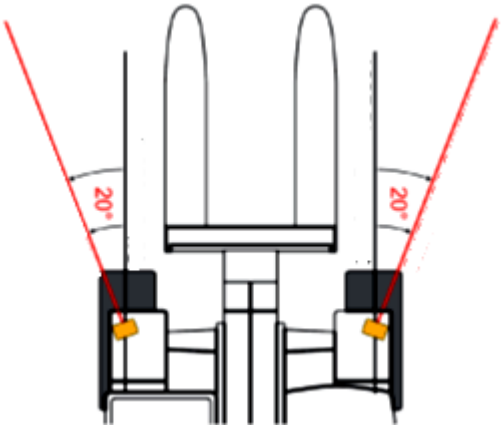
The following pictures show the reference diagram for a counterbalanced forklift truck.

The sensors must be positioned on the perimeter of the vehicle in order to have maximum visibility between Sensors and TAG. On small/medium-sized vehicles, they are usually positioned on the uprights immediately below the roof and with a 25 ° downward inclination.



NOTE: the mechanical joint supplied can be used to obtain the desired inclination.

Front sensors must have a small orientation towards the outside. For example, for a counterbalanced vehicle, they must be positioned outside the shape of the fork/gripper holder mounting, and they must have an orientation angle towards the outside of around 20°.



6.2.4 Positioning the HUB

The HUB can be positioned at any point inside or outside the driver's cabin, even in a hidden area, but the external RF antenna (whip aerial antenna), connected to the HUB by means of a 1.5 m-long cable, must be outside the driver's cabin in vertical position.

To position the external antenna, also refer to the HUB connections (see paragraph 6.3.4).
The position of the HUB must not obstruct the driver's and the vehicle operability, and it should be handy to connect the Sensors and the CPU.

6.3 CONNECTIONS

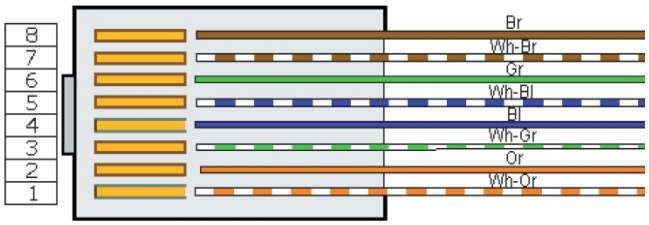
6.3.1 General instructions

The necessary connections on the systems can be summarised in two categories:

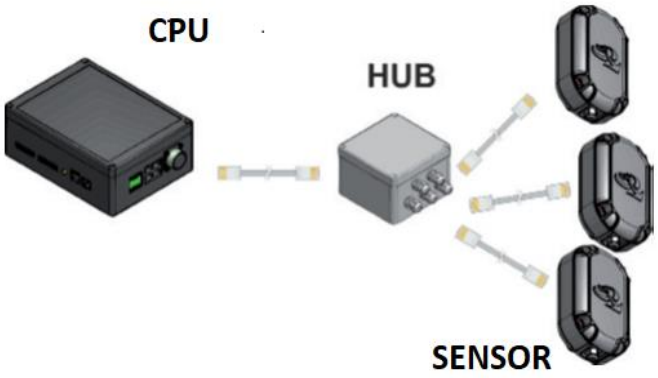
- **Data Connections**
- **Power Supply Connections**

Data Connections

The data connection between the system devices is established with a UTP cable. As a minimum requirement, it is recommended to use a UTP cable belonging to category 5E or above. In the case of RJ45 connections, the same sequence of colours must be followed on each cable end, and it is recommended to use the sequence of colours according to Standard B



The data connection is between Hub-CPU and between Sensors-Hub.



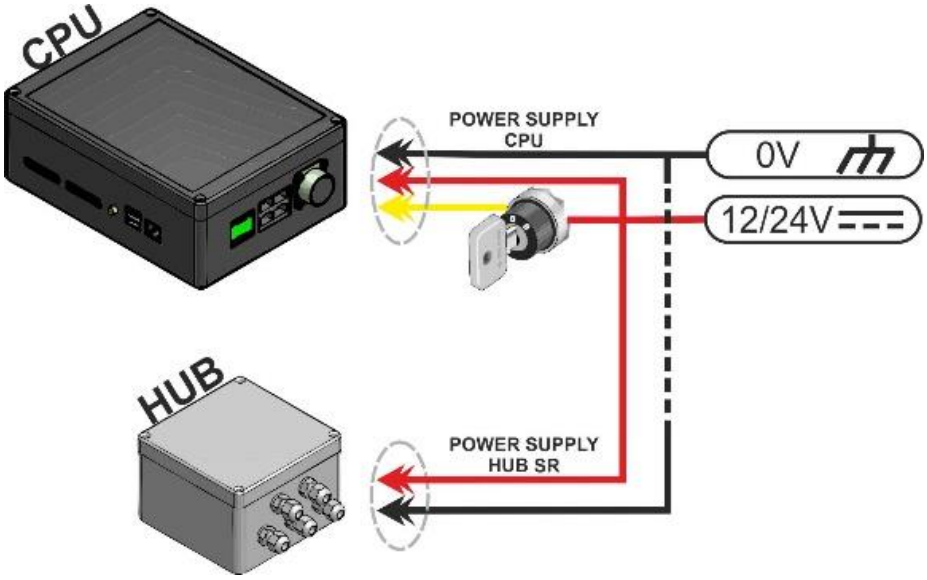
The maximum length of the connection depends on the supply voltage of the system and on the cross section of the UTP cable (AWG). For convenience, the reference tables of both connections will be provided.

	CPU-HUB Connection				HUB-SENSOR Connection	
VDC	**AWG 26**	**AWG 24**		**VDC**	**AWG 26**	**AWG 24**
12 V	20m	40m		**12 V**	3m	6m
24 V	50m	100m		**24 V**	25m	50m

Power Supply Connection

The system must be powered in direct current (VDC) ranging from 12V to 24V (±10%).

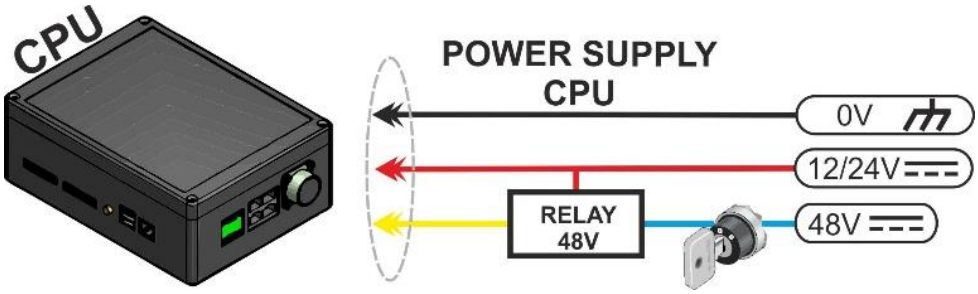
The devices to be powered are the CPU and the HUB. A direct positive wire (V_{IN}) and a positive wire under key (V_Q) must arrive to the CPU, whereas only the direct positive wire must arrive to the HUB.



For the power supply connections, it is recommended to use an AWG 18 /0.75mm^2 cable or a cable with a higher cross section.

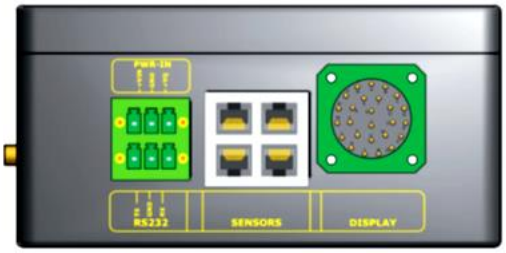
Within the 12÷24 VDC power supply range, the voltage of the direct positive wire (V_{IN}) and of the line under key (V_Q) do not have to be the same.

In some cases, the voltage present on the wire under key is not within the range foreseen by the system. In these cases, one solution would be using a relay at the same voltage available for changing over the forward voltage



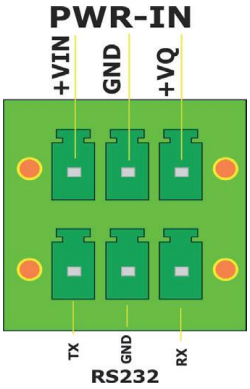
6.3.2 CPU Wiring

The CPU is powered at 12-24V, and it needs a specific +VQ line (under ignition key). The CPU remains turned on even when the vehicle is off in low consumption regime (stand-by). Activation takes place when voltage is supplied to the VQ terminal. This enables a quick turning-on of the system.



Power supply /turning-on RS 232 | Sensors HUB (RJ45) | Display connector

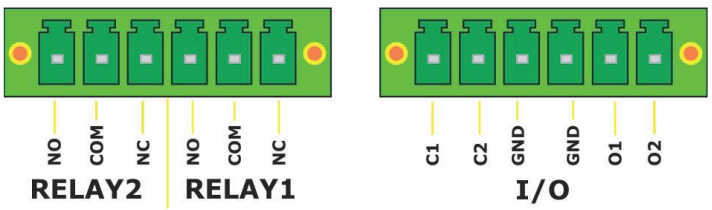
Relay | I/O | GPS Antenna | USB | LAN



+VIN	12/24 VDC power supply
GND	Negative supply voltage
+VQ	12/24 VDC positive voltage of the turning-on signal of the board

To connect the HUB, an UTP cable belonging to Cat. 5e or higher and one of the Sensors ports must be connected.

The CPU has 2 relays that can be controlled independently. There are 3 pins for each relay:
- NO | normally open
- C | common
- NC | normally closed.



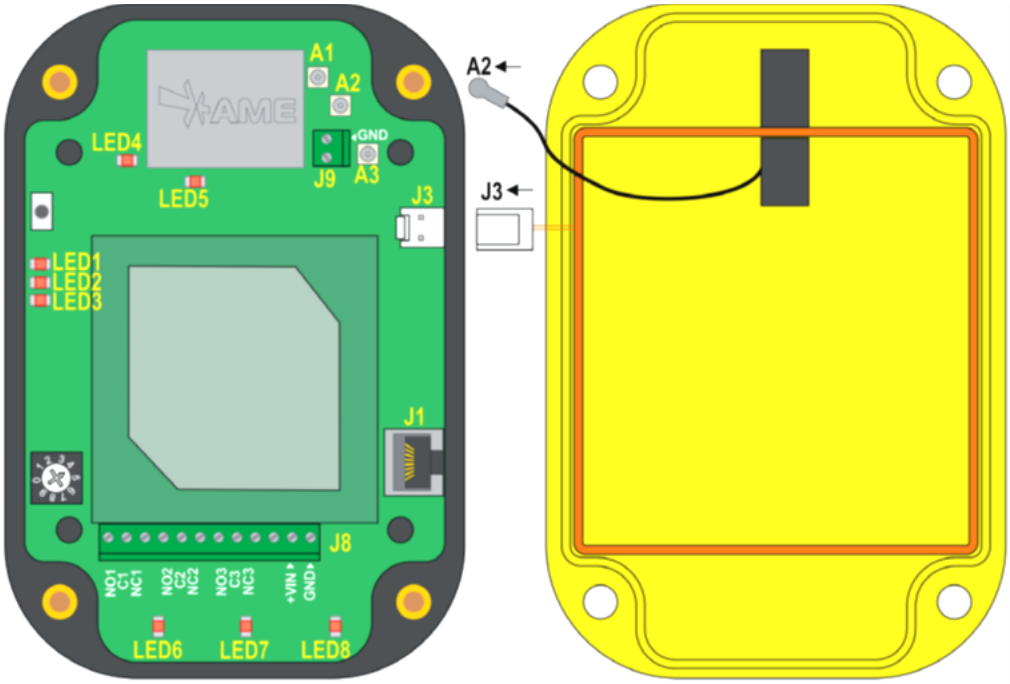
6.3.3 Connecting sensors

The sensors are connected to the HUB with UTP cables with 8 poles. The maximum connection length is related to the supply voltage and the type of cable used

	AWG 26	AWG 24
12 V	3m	6m
24 V	25m	50m

Figure 1 Maximum length of the HUB sensors connection cables according to the type of cable and the power supply

The UTP cable must be connected to the J1 connector inside the sensor box with an RJ45 connector.



A1 — MW transmission antenna uFL connector (antenna already connected)
A2 — MW reception antenna uFL connector (antenna to be connected)
A3 — RF test uFL connector
J9 — RF antenna connector (antenna already connected)
J3 — LF antenna connector (antenna to be connected)
J1 — data BUS and power supply connector
J8 — relay terminal board and stand-alone power supply

LED1 — vehicle-vehicle reception signal (flashing)
LED2 — LF transmission (flashing) and diagnostic error (fixed off)
LED3 — ON status indicator
LED4 — MW status indicator (flashing) and diagnostic error (fixed off)
LED5 — RF status indicator (flashing) and diagnostic error (fixed off)
LED6 — Relay 1 active/inactive (ON/OFF)
LED7 — Relay 2 active/inactive (ON/OFF)
LED8 — Relay 3 active/inactive (ON/OFF)

While the sensor is closing back, make sure that the A2 and J3 connectors are connected; prevent the cables from finishing above the patch antenna (central panel of the figure on the left). Make sure that the sealing O-ring is placed back in its housing.

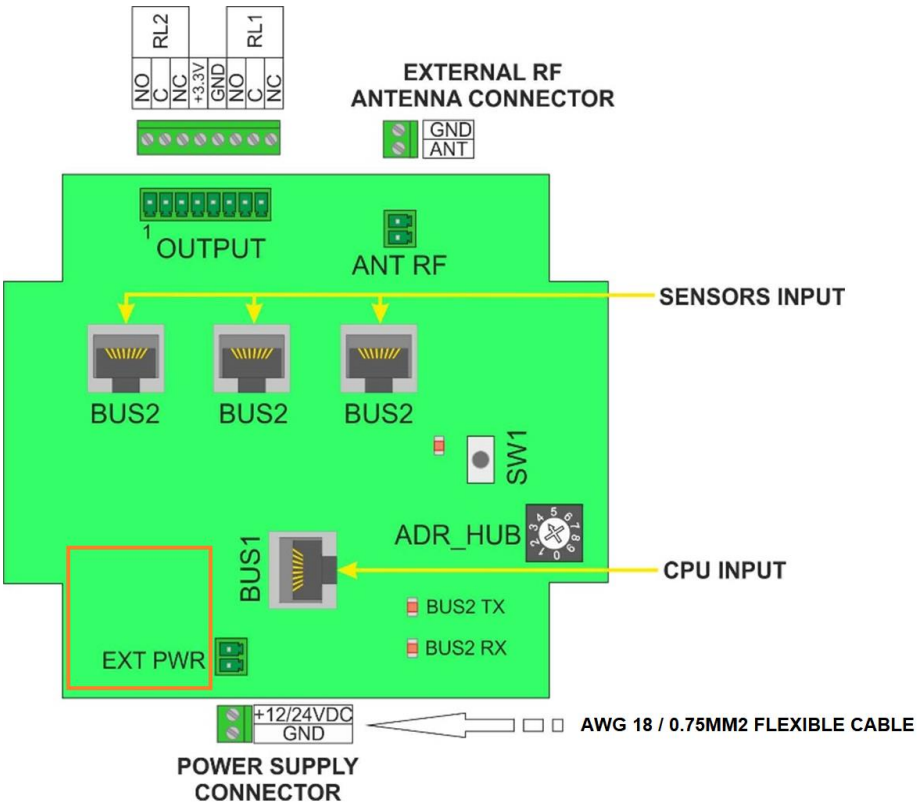
Immediately after the UTP cable comes out of the box, insert a 74271132S type or equivalent ferrite.

6.3.4 Connecting the HUB

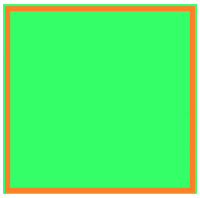
Connect the sensors to BUS 2 by means of UTP cable following the indications given in the sensor connection section. When crimping the UTP cable, follow the same sequence of colours on each cable end.
Connect the HUB to the CPU by means of the BUS 1 connector using a cable belonging to CAT5e or higher.
Connect the power supply to the EXT POWER connector with an AWG 18 / 0.75mm^2 bipolar cable or a cable with a higher cross section.
Insert the 74271132S type or equivalent ferrite on the power cable

INSTALLATION ON THE VEHICLE

The device is powered in direct current with a voltage between 12/24 V.
The power supply to the device must be limited to a maximum of 3A. Use a
T 3 A 125 V L fuse directly fitted on the positive-pole conductor or a 3A 32V automotive fuse.

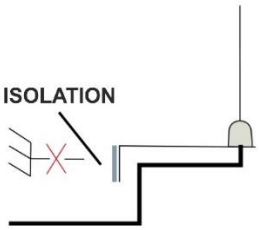


We recommend to keep the coaxial antenna cable far from the zone marked with the orange square.



Connect the antenna supplied paying attention to the polarity with braiding on GND and the central pole on 'ANT'

<u>The antenna support must be kept isolated from the ground of the vehicle</u>.
The length of the RG58 cable stripping of the antenna must observe the measurements shown in the figure.
An excessive stripping could deteriorate the RF behaviour of the system



In the case of installation on electric vehicles, it is recommended to add a power supply filter, such as Shaffner code FN2090-3-06.
If requested, the relays present on the board can be connected following the diagram foreseen
NOTE: The default configuration indicates that:

- **Relay 1** (RL1) remains active until the system detects one or more TAGS in the short-range detection area, i.e. in Warning.
- **Relay 2** (RL2) is deactivated.

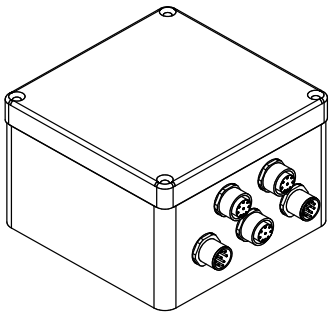
The configuration of relays may be changed from the advanced menu of the CPU.

6.4 INSTALLING THE SYSTEM WITH M12 CONNECTORS

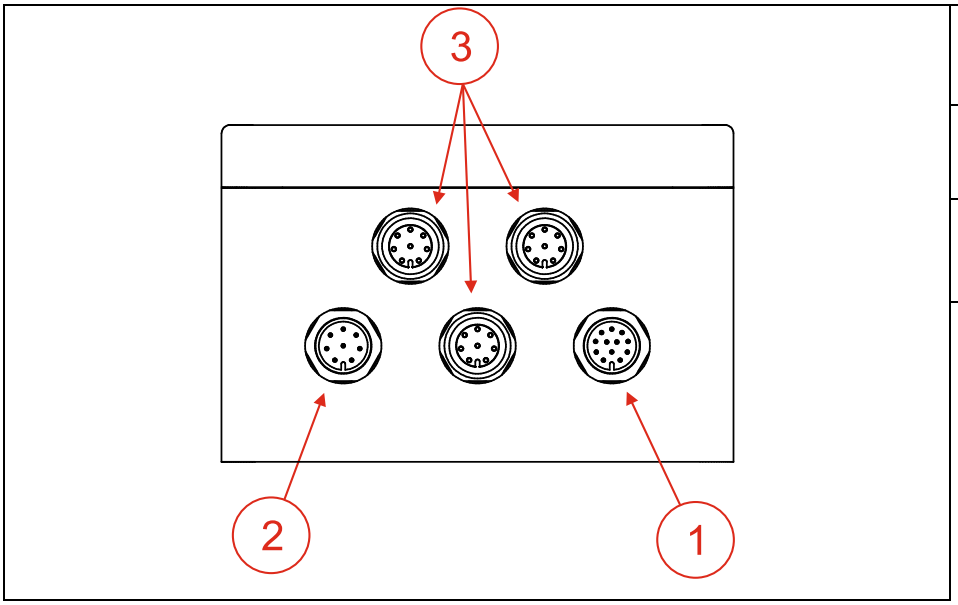
The PLX SAFEMOVE SENS 4 and PLX SAFEMOVE HUB 4 devices are available in a version fitted with M12 connectors. Such version has been designed in order to make the system installation and removal simpler and quicker.
The table below summarises the codes used in the system fitted with connectors.

DEVICE	CODE
HUB	PLX SAFEMOVE HUB 4M
SENSOR	PLX SAFEMOVE SENS 4M

CABLE	POLES	LENGTH (m)	AWG	CODE
RJ45-M12f CPU-HUB CONNECTION CABLE	8	5	24	M12AFRJ45CABLE5M
M12m-M12f HUB SENSOR CONNECTION CABLE	8	5	24	M12AMFCABLE5M
HUB POWER SUPPLY AND RELAY CONNECTION CABLE	12	5	24	M12AFPAN12P5M

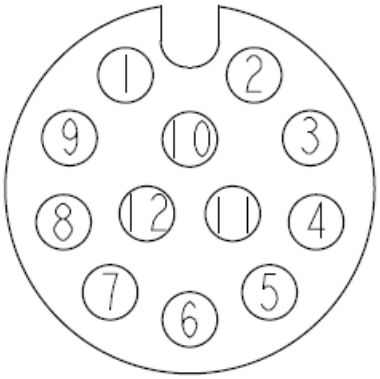


The section below indicates the functions of the different connectors and connections for the HUB power supply and relay



1	**HUB power supply and relay connector**
2	**Connector for HUB-CPU connection cable**
3	**Connection connectors towards sensors**

FEMALE (FRONT VIEW)



1 brown
2 blue
3 white
4 green
5 pink
6 yellow
7 black
8 grey
9 red
10 violet
11 grey-pink
12 red-blue

PIN	Colour	Function
1	Brown	VDC
2	Blue	VDC
3	White	GND
4	Green	GND
5	Pink	Normally Open Relay1
6	Yellow	Common Relay1
7	Black	Normally Closed Relay1
8	Grey	Normally Open Relay2
9	Red	Common Relay2
10	Violet	Normally Closed Relay2
11	Grey Pink	Not Used
12	Red Blue	Not Used

6.4.1 LENGTH OF CONNECTIONS

The cables supplied are 5 m long, and they are AWG 24. If longer connections are to be made between HUB and sensors and between HUB and CPU, M12AMFCABLE5M cables may be used as extensions.

	CPU-HUB Connection				HUB-SENSOR Connection	
VDC	**AWG 26**	**AWG 24**		**VDC**	**AWG 26**	**AWG 24**
12 V	20m	40m		**12 V**	3m	6m
24 V	50m	100m		**24 V**	25m	50m

7 STOPPING DISTANCES AND ACTIVATION DISTANCES

When installing a safety supporting system to be used for reducing the risk of man-vehicle and vehicle-vehicle collisions, it is necessary to take into account which activation distances have to be considered for the system operation. The purpose of this is to adjust the system so that a truly helpful signal can be provided to the driver.
As a matter of fact, the distance at which a pedestrian worker wearing a Tag or a vehicle has to be detected in order to give effective aid for the prevention of collisions depends on many factors such as:

- Shape and dimension of the vehicle.
- Reaction time of the detection system
- Reaction time of the driver
- Deceleration distance
- Conditions of the background

Even though formulating an accurate mathematical model of the vehicle stop physical phenomenon is very complex, the phenomenon can be schematised following a simplified model in order to draw attention to the main physical phenomena involved.

7.1 Vehicle deceleration and driver response distances

The space/distance a vehicle needs to stop safely must be clearly assessed. Firstly, evaluate the deceleration distance- the distance the forklift truck needs to reach zero speed starting from a given speed from the instant the braking system is actuated. In turn, this space depends on the speed of the forklift truck, the maximum deceleration set in the parameters of the vehicle, and the response time of the systems of the forklift truck.
Deceleration, as well as maximum speed, can be set to different values depending on the type of load, vehicle and background. The maximum distances for industrial vehicles are standardised by ISO 6292 that sets the maximum stopping distances from the instant when the braking system is actuated. Such values will be taken as reference. The driver's reaction distance is to be added to the acceleration distance afterwards. Such distance is associated to the time between the alert and the driver's action stop the vehicle. As a normal practice, this response time is estimated in 1 second. By way of an example, find below two charts with the values referring to deceleration space and total stopping space for two types of vehicles defined in the standard.

Chart 1 Stopping distances as per ISO 6292 A1 (<16000 kg)

Speed [km/h]	Deceleration distance [m] (ISO6292 A1)	Driver reaction distance @1s [m]	Total braking distance [m]
3	0.8	0.8	1.6
4	1.3	1.1	2.4
5	1.8	1.4	3.2
6	2.2	1.7	3.8
7	2.5	1.9	4.5
8	2.9	2.2	5.1
9	3.3	2.5	5.8
10	3.6	2.8	6.4
11	4.0	3.1	7.0
12	4.4	3.3	7.7
13	4.7	3.6	8.3

14	5.2	3.9	9.1
15	5.8	4.2	10.0
16	6.4	4.4	10.9
17	7.1	4.7	11.8
18	7.8	5.0	12.8
19	8.5	5.3	13.8
20	9.3	5.6	14.8
21	10.1	5.8	15.9
22	10.9	6.1	17.0
23	11.8	6.4	18.2
24	12.7	6.7	19.3

Chart 2 Calculation of stopping distance as per ISO 6292 A2 (<16000 kg)

Speed [km/h]	Deceleration distance [m] ISO6292 A2	Driver reaction distance @1s [m]	Total braking distance [m]
3	0.9	0.8	1.8
4	1.4	1.1	2.5
5	2.1	1.4	3.4
6	2.5	1.7	4.1
7	2.9	1.9	4.8
8	3.3	2.2	5.5
9	3.7	2.5	6.2
10	4.1	2.8	6.9
11	4.5	3.1	7.6
12	5.0	3.3	8.3
13	5.4	3.6	9.0
14	6.0	3.9	9.8
15	6.7	4.2	10.8
16	7.4	4.4	11.9
17	8.2	4.7	13.0
18	9.1	5.0	14.1
19	9.9	5.3	15.2
20	10.9	5.6	16.4
21	11.8	5.8	17.6
22	12.8	6.1	18.9
23	13.8	6.4	20.2
24	14.9	6.7	21.6

7.2 System activation distances. Setting the powers transmitted

The paragraph above dealt with how to calculate stopping distances for an industrial vehicle. When estimating the distances at which a tag potentially in danger of collision should be detected, a distance margin should be considered as well. A zero distance cannot and should not be set. Besides, the detection system has reaction times that have to be taken into account. To these distances identified, we should add a value that can be calculated according to the chart below.

Speed [km/h]	operational margin [m]
3	0.6
4	0.8
5	1.0
6	1.2
7	1.4
8	1.6
9	1.8
10	1.9
11	2.1
12	2.3
13	2.5
14	2.7
15	2.9
16	3.1
17	3.3
18	3.5
19	3.7
20	3.9
21	4.1
22	4.3
23	4.5
24	4.7

Now the detection distance we want can be calculated. For instance, if a system is installed in a forklift truck falling within category A1, with a maximum speed of 12 km/h and manual braking, the total braking distant will be 7.7 m; some further 2.3 m should be added as margin, to a total distance of 10 meters.

Once the desired distance is defined, adjust the power of the relevant sensors until a safe coverage for the distance calculated is guaranteed. The distance previously identified is that from the interfering worker to the point of contact that is closest to the forklift truck, which in a scenario of a front impact with a forklift truck is the fork.

Since the distance between the sensors and the first point of contact is not known a priori, and since the position of the sensors may vary a lot, check the activation distance by applying control tests. Keep in mind that the law governs the power set and the activation distance is not linear. Find below some graphs that show the trend of the ratio between these two values for both long range (pre-warning) and short range (warning).

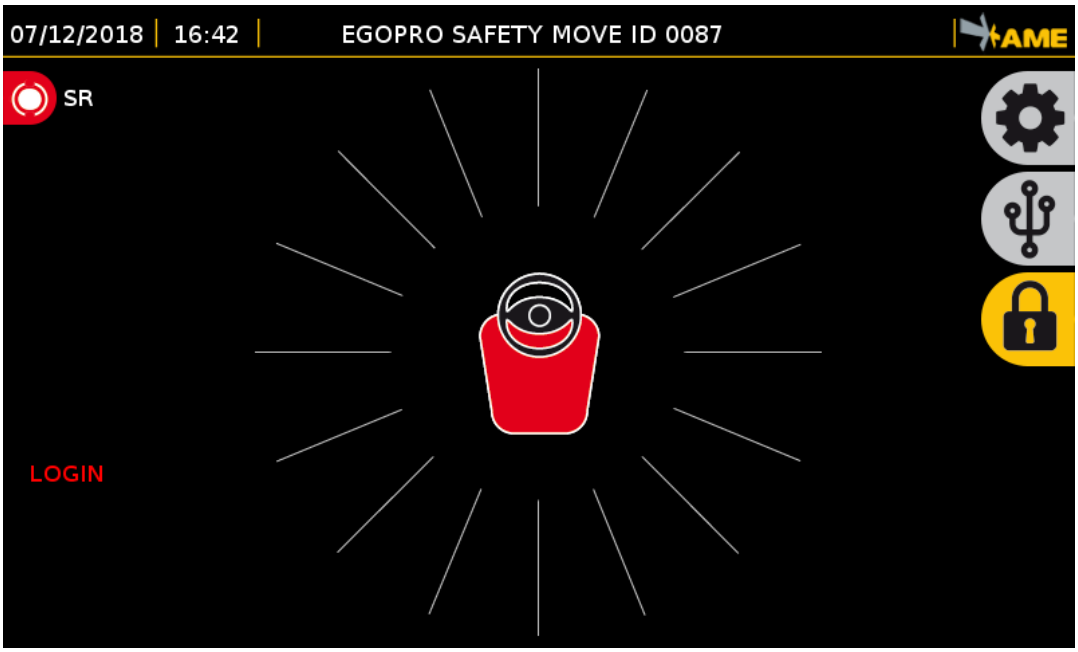
7.3 Calculating the distance in case of vehicle-vehicle collision.

In case of vehicle-vehicle collision, we can consider that the same assessments described in the paragraphs above are applicable. The worst case to be considered is the one in which vehicles move at maximum speed against each other. In this case, the calculated distance is twice the one that was calculated before.

8 TURNING-ON AND CONFIGURATION

8.1 SYSTEM TURNING-ON

The system turning-on is automatic with the connection to the power supply (12/24VDC). While the system is turned on for the first time, the initialisation screen is displayed.
Once initialisation is completed, the following screen is showed.



The first time the system is turned on takes more time.

The sensors, even if they are correctly installed, are not displayed by the system until the search procedure is followed.

8.2 CONFIGURATION

In order for sensors to be recognised by the system, they must be configured from the configuration menu via the touchscreen.

The following procedure describes the steps to be followed in order to configure the system and make sure that the peripheral devices are correctly connected.

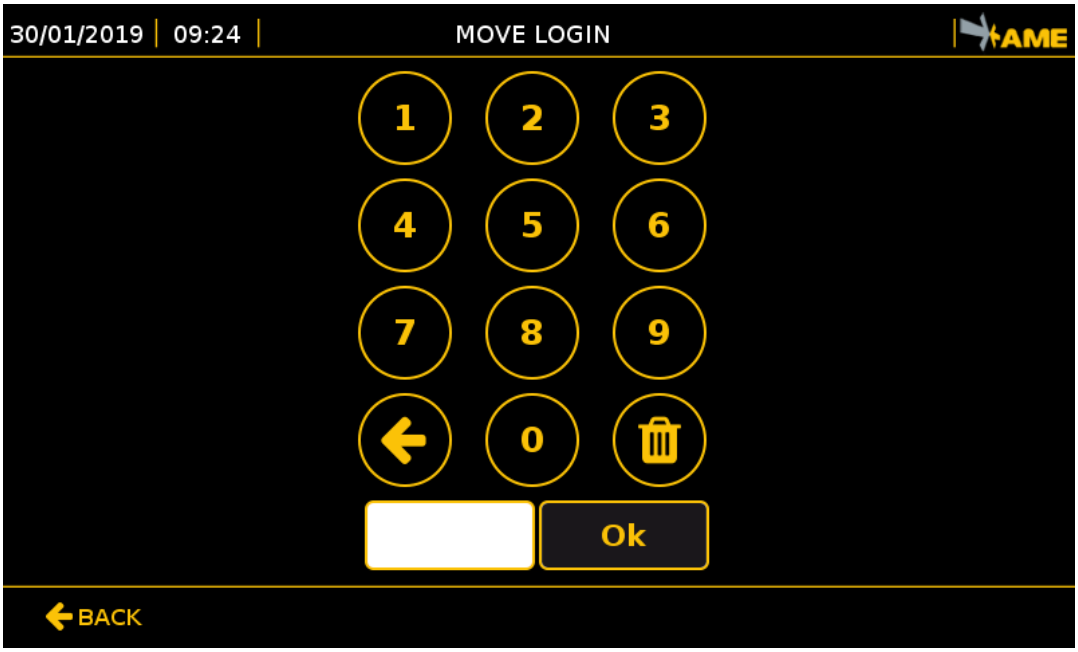
STEP 1	•Open the Configuration menu
STEP 2	•Enter the password
STEP 3	•Open the Sensors Configuration menu
STEP 4	•Open the Sensors Search menu
STEP 5	•Search sensors by ID
STEP 6	•Search sensor by position and save them to the system

8.2.1 STEP 1 | CONFIGURATION MENU

Press the CONFIGURATION icon to access the menu

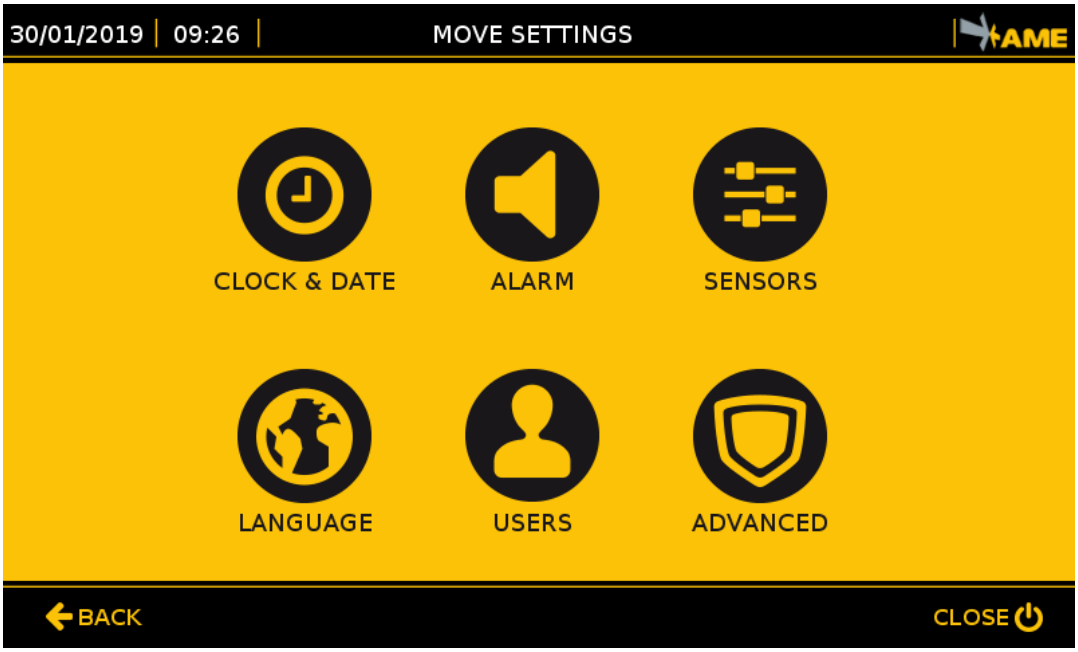
8.2.2 STEP 2 | ENTERING THE PASSWORD

To access the system configuration section, a password must be entered so that only the enabled user can view this screen. The default access password is **1234**. Enter the sequence and press OK.

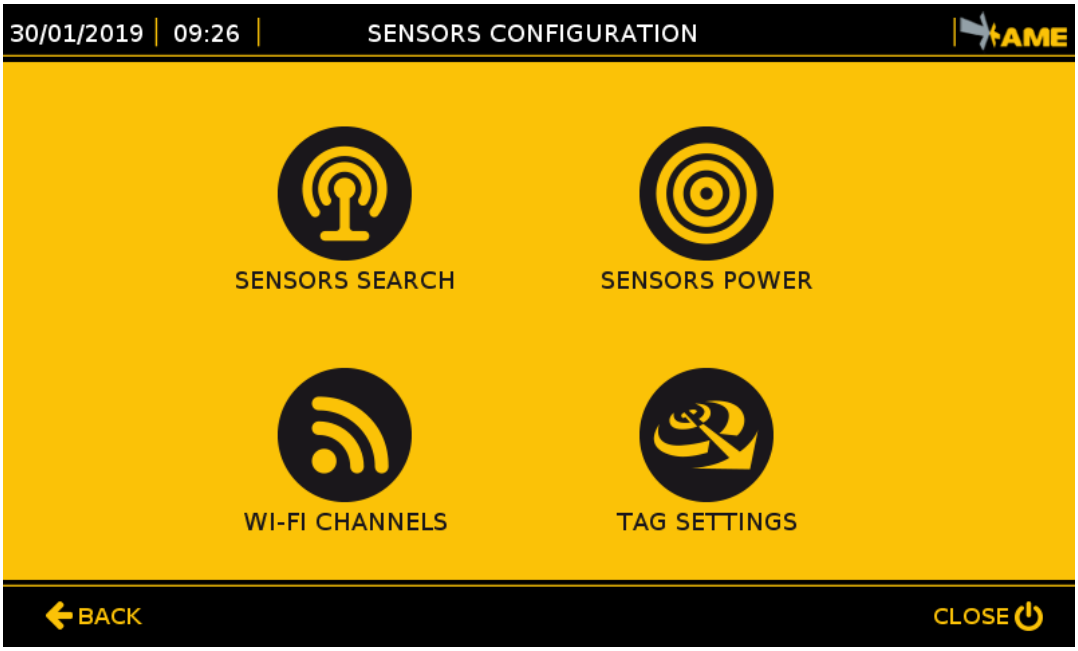


8.2.3 STEP 3 | SENSORS

The first screen when accessing the configuration menu is the following one. To configure the sensors press the *SENSORS* key.

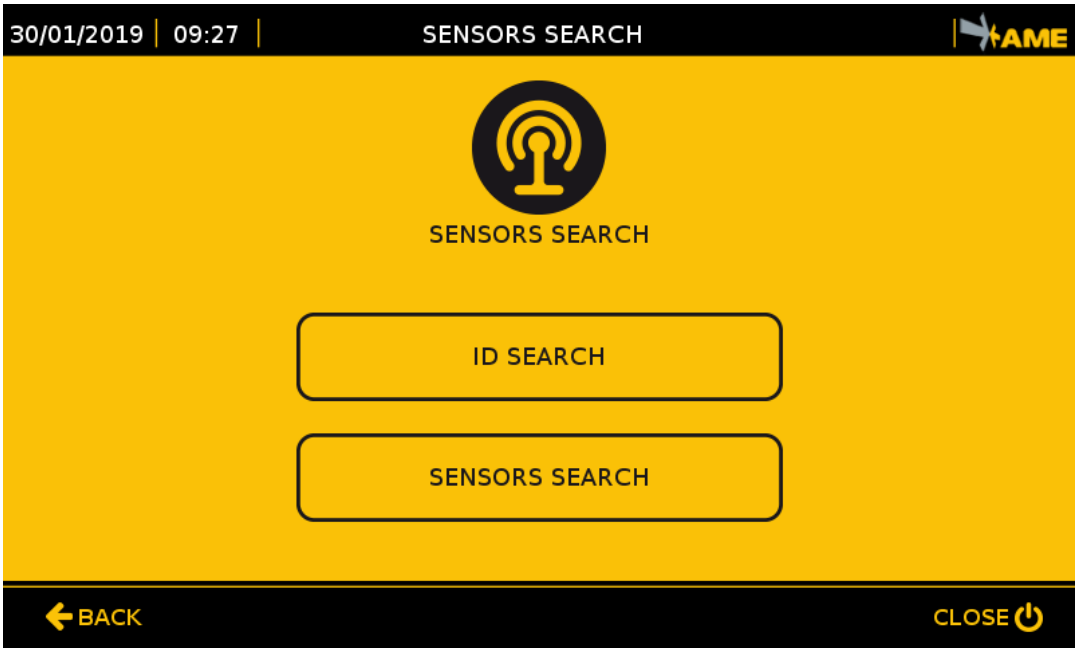


To configure the sensors press the *SENSORS SEARCH* key.



8.2.4 STEP 4 | SENSORS SEARCH

Each sensor has an unequivocal ID that must be saved on the CPU: first perform the ID SEARCH and then the SENSORS SEARCH.



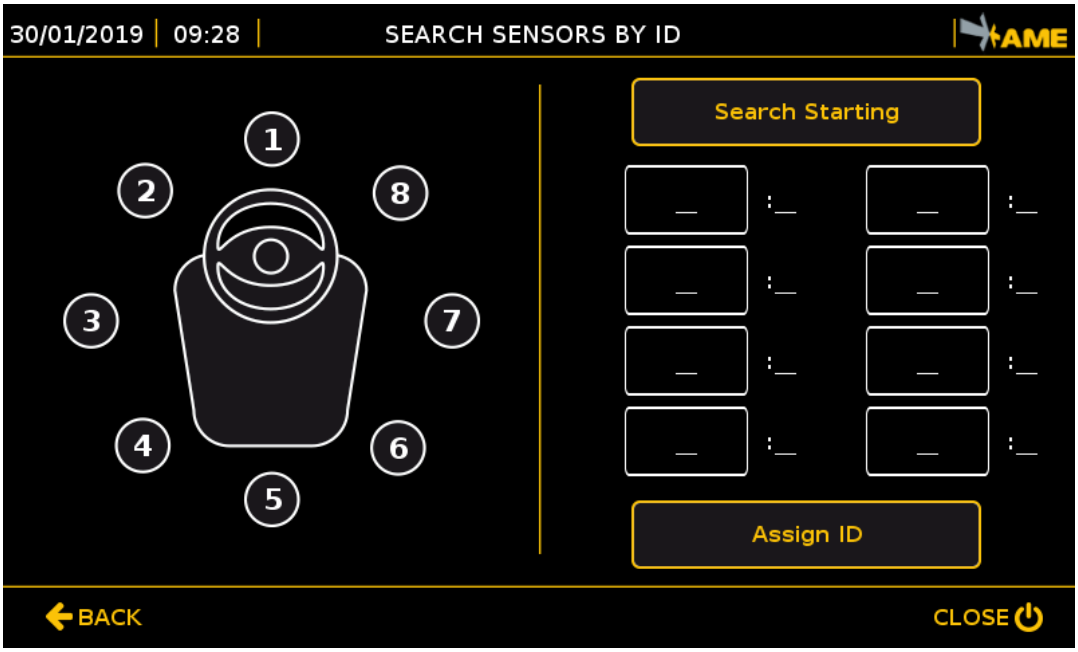
Before making the ID SEARCH, make sure that the selectors present on the HUB and on each sensor are positioned on 0.

The sensors and the HUB, if they have M12 connector, are already correctly set, and they **must not** be opened.

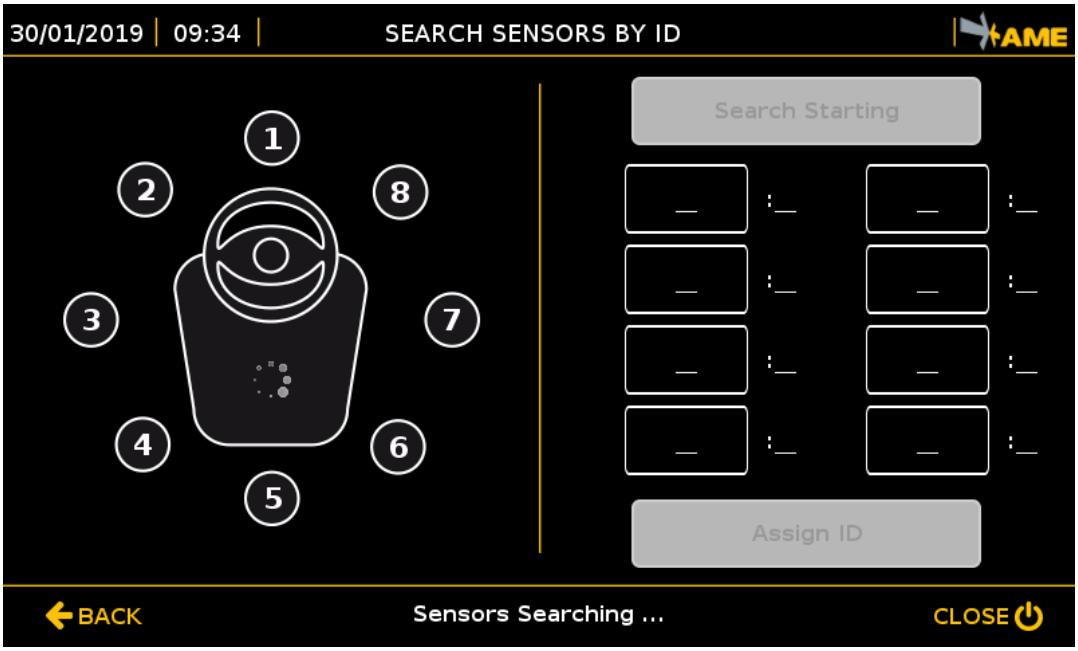
Before making the ID SEARCH note down the code (indicated as FC: XX XX XX) indicated on each sensor so as to be able to save it in the correct position.

8.2.5 STEP 5 | SEARCHING SENSORS BY ID

The search sensors by ID function is used to associate each sensor ID (unequivocal Factory Code assigned by the manufacturer) with a number from 1 to 8 that is necessary for the subsequent system calibration operations.

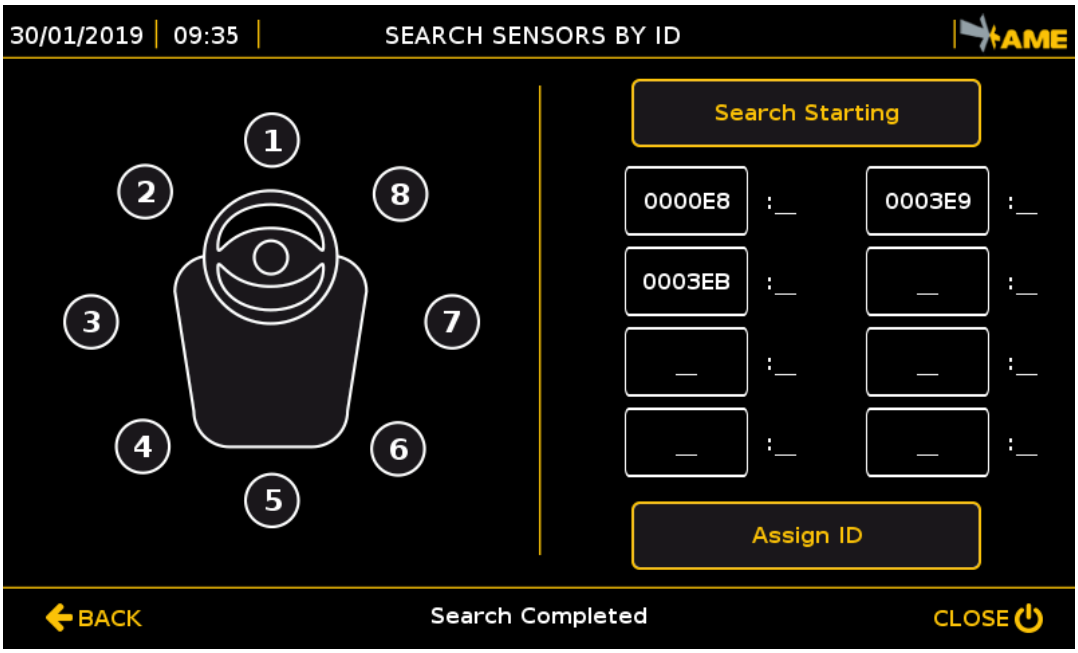


Press the SEARCH STARTING key to display all the sensors connected to the system.



This operation may take several seconds.

Once the Search Sensors by ID stage is completed, the sensors that have been identified are displayed.



If some sensors have not been identified, try repeating the search operation. If it still fails, check:

- Position of all selectors (they must be on 0)
- Connections between sensor and HUB.

If no sensor is identified, check:

- Connections between HUB and CPU
- HUB power supply.

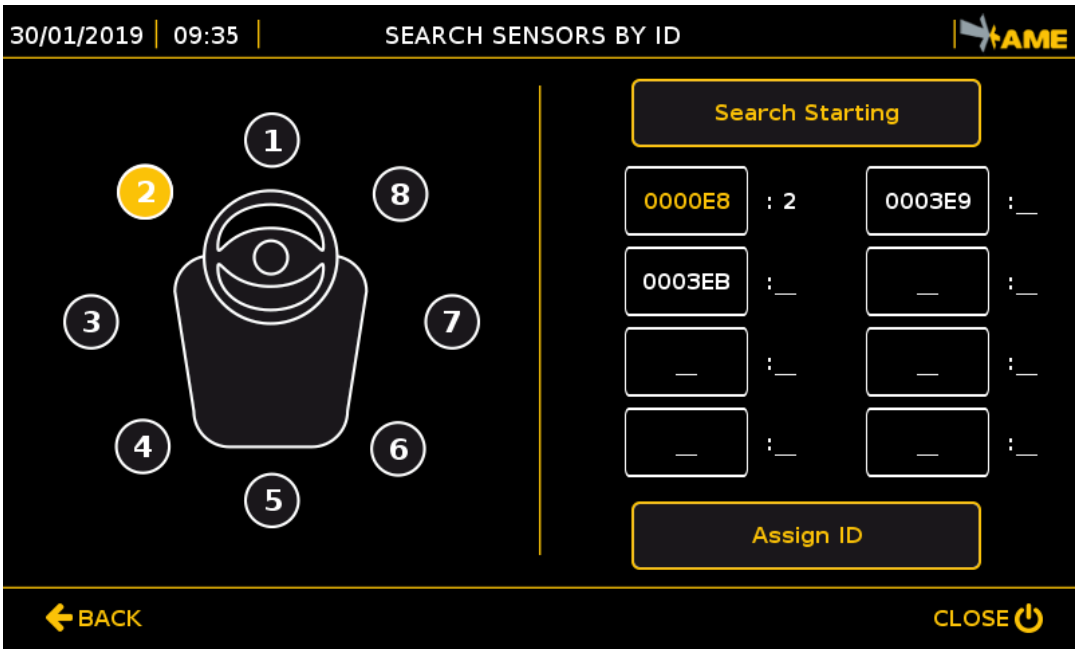
Make sure that the IDs match those that had been previously noted down, and then associate to each ID a position indicated with a number from 1 to 8.
The sensors must be positioned, with respect to the driver's cabin, in the following way:

- FRONT SENSORS: 2 - 1 - 8
- REAR SENSORS: 4 - 5 - 6
- LATERAL SENSORS: 3 - 7

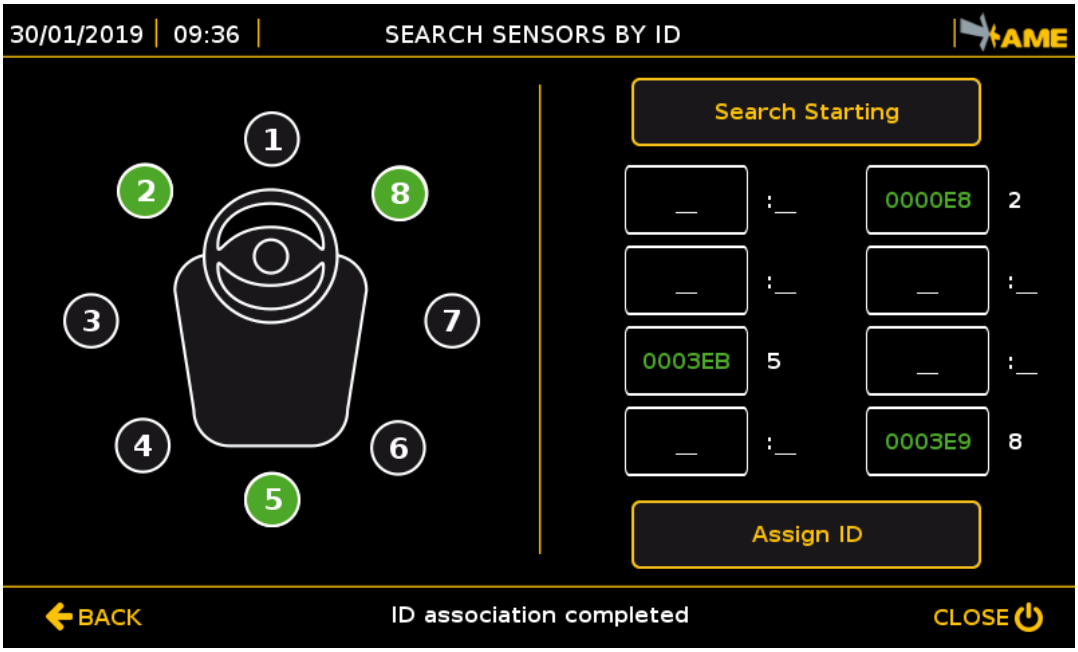
For example, the 3 sensors of the basic kit, for a front counterbalanced vehicle, must be positioned as follows:

- FRONT LEFT: 2
- FRONT RIGHT: 8
- REAR: 5

To associate an ID to the position, press the ID to be associated (it will be highlighted in yellow), and then press the position (it will turn yellow). The position associated to the ID is displayed together with the selected ID. Proceed in the same way with the other sensors, and then press the ASSIGN ID key.



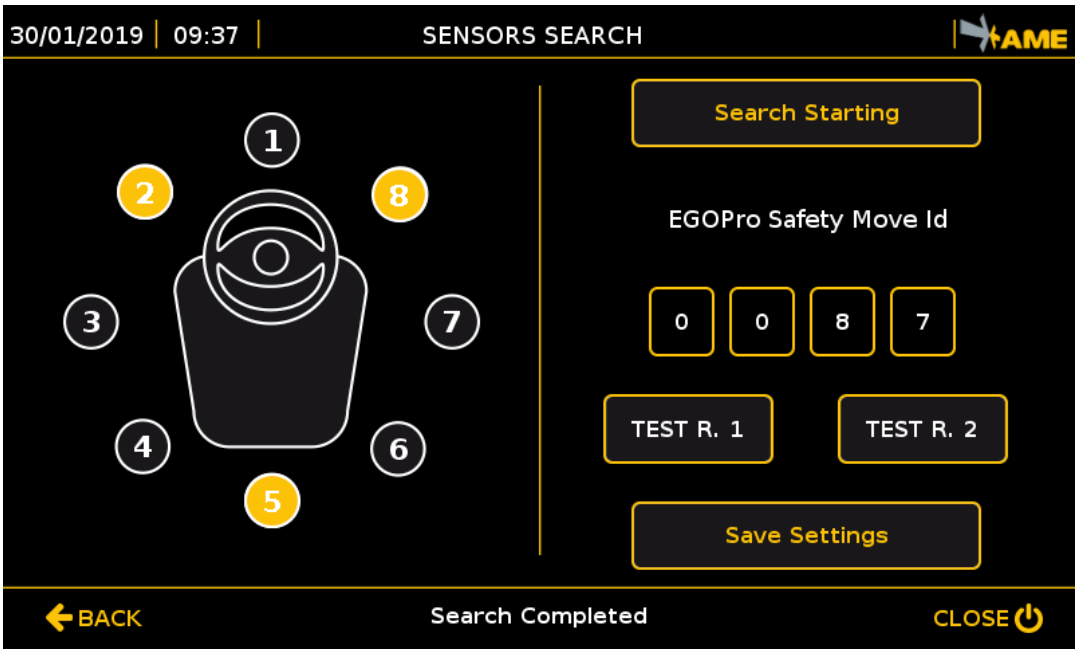
If the allocation procedure has been successful, the sensors turn green and the associated IDs move to the new positions. In case of error, try making the allocation again.



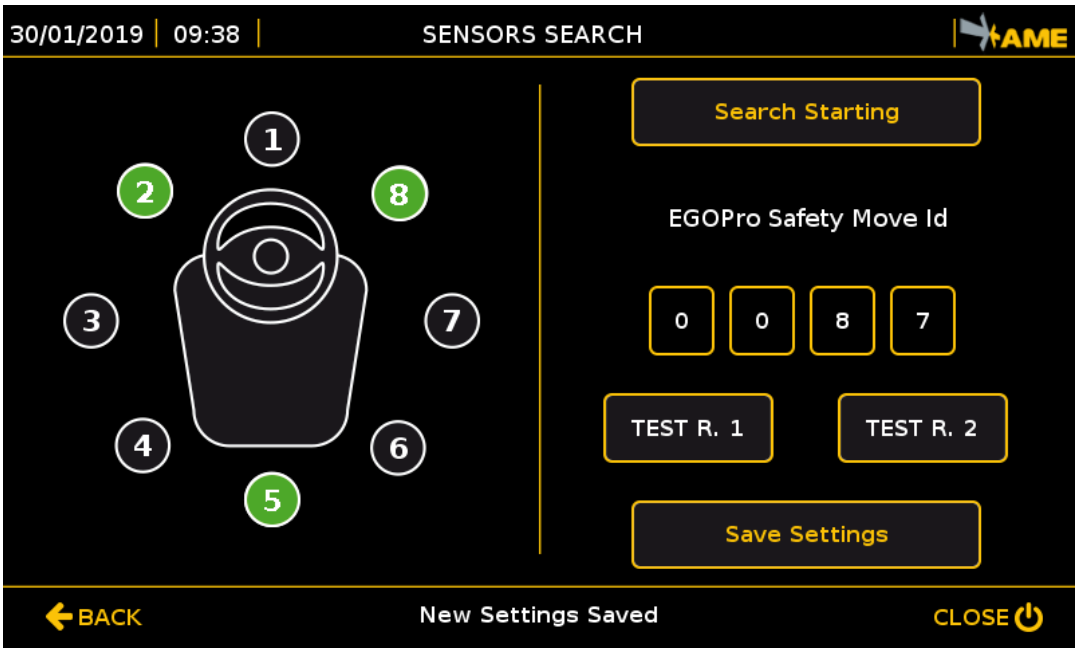
Press BACK and return to the previous screen.

8.2.6 STEP 6 | SEARCHING SENSORS BY POSITION

This step checks the correct operation of the sensors and saves them to the system. Press SENSORS SEARCH (STEP 4 screen). The search for sensors starts automatically.



If the ID search has been correctly performed, the selected sensors (e.g. 2, 5 and 8) will turn yellow.
Press the SAVE SETTINGS key: the colour of the sensors will change from *yellow* to *green*, and, as of that moment, the sensors will be associated to the vehicle.



Press the BACK key to return to the previous menu.
Press the BACK key to return to the main menu.

Press SEARCH STARTING to repeat the operation, for example, when the selected sensors are not highlighted in yellow, or if - once the procedure is completed - they are not green

8.2.7 SEARCHING SENSORS WITHOUT ID

A fixed position can be assigned to the sensors without making the ID search. In this case, place the selector present on each sensor in the desired position. For example, for the basic kit:

- FRONT LEFT: 2
- FRONT RIGHT: 8
- REAR: 5

The selector present on the HUB must be positioned on 0.

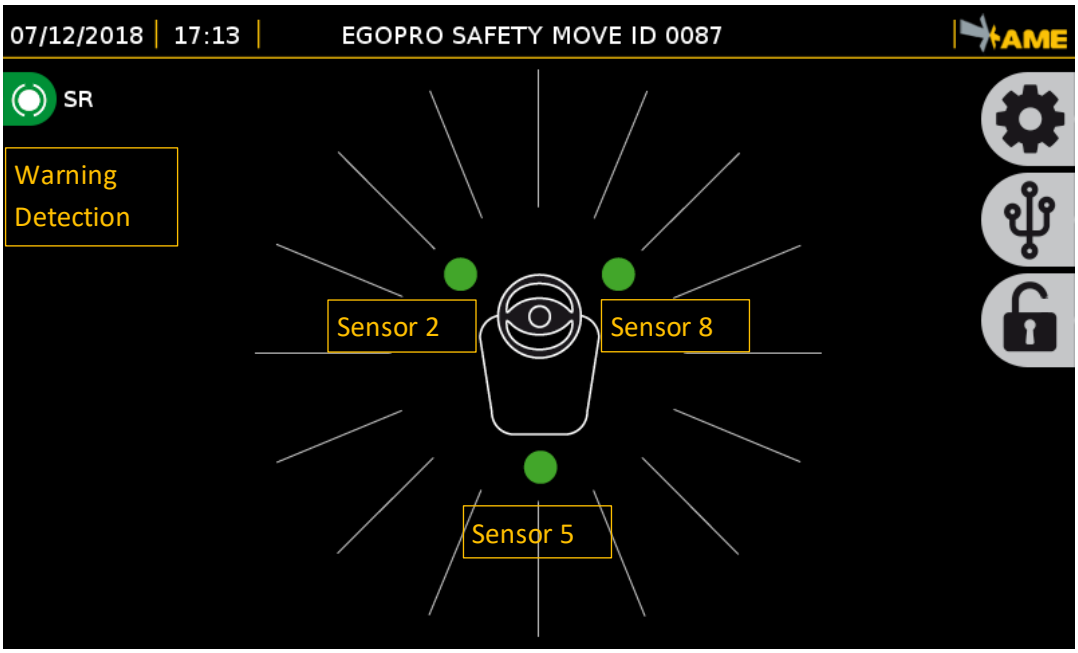
In this case, the SEARCH SENSORS BY ID procedure (STEP 5) must not be followed.

8.3 TEST

Once the sensors have been configured and saved on the system, make a test to check the system correct operation.
In general, the system is working correctly if the central part of the monitor is no longer red.

8.3.1 SENSOR CHECK

All sensors are in good working order if they are all green.
The Warning detection system (indicated with SR) is in good working order if the indicator on the top left corner on the monitor is green.



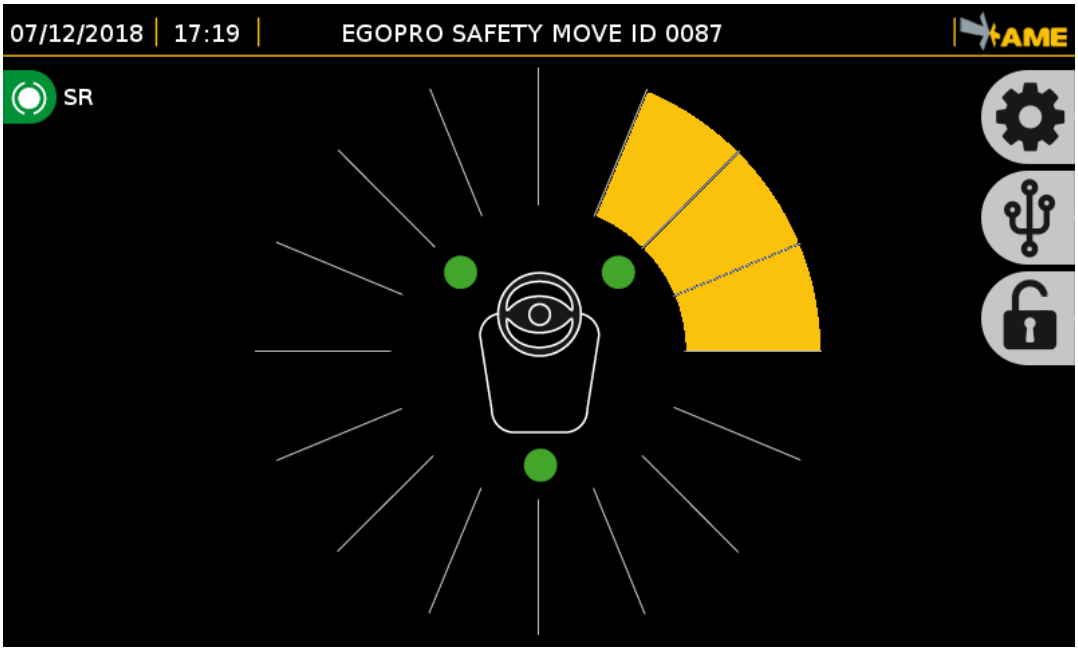
If white sectors are displayed, vehicle-vehicle display, and there are no other vehicles with sensors installed nearby:

- Try restarting the system
- Disconnect and connect again the power supply connector on the HUB
- Repeat the sensors search procedure

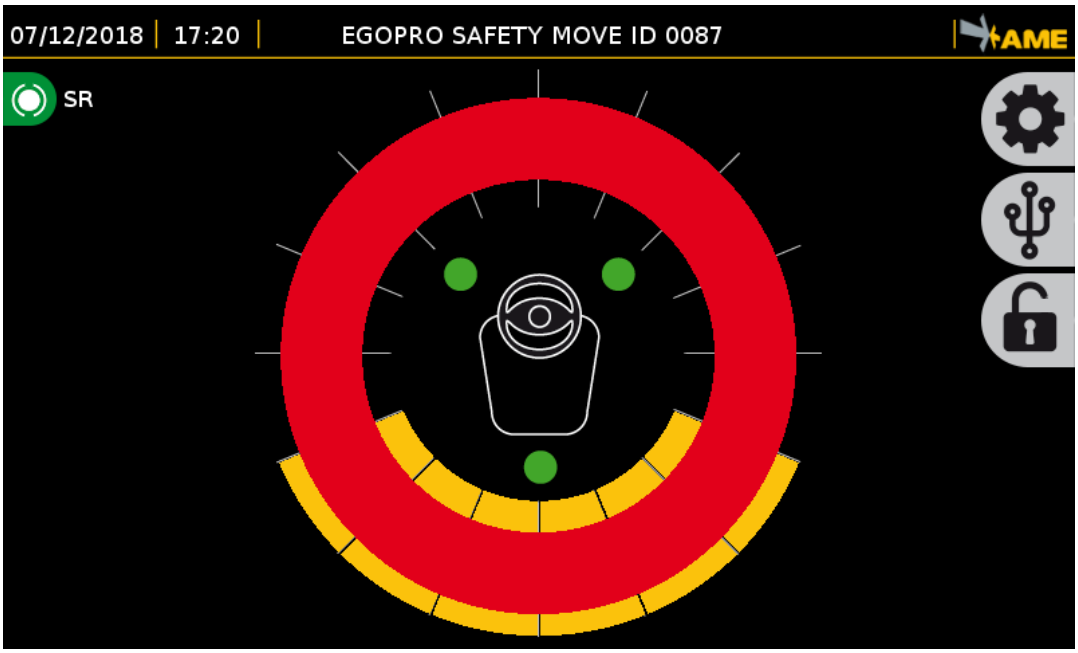
8.3.2 TAG DETECTION TEST

Move a Tag close to each of the sensors installed and check their operation.

The transponder detection in Pre-Warning is yellow. The yellow sectors correspond to the sensor that has detected the Tag and indicate the Tag position with respect to the vehicle.



The transponder detection in Warning is red. In this case, the TAG position with respect to the vehicle is not indicated: there is one single indication with a red ring.



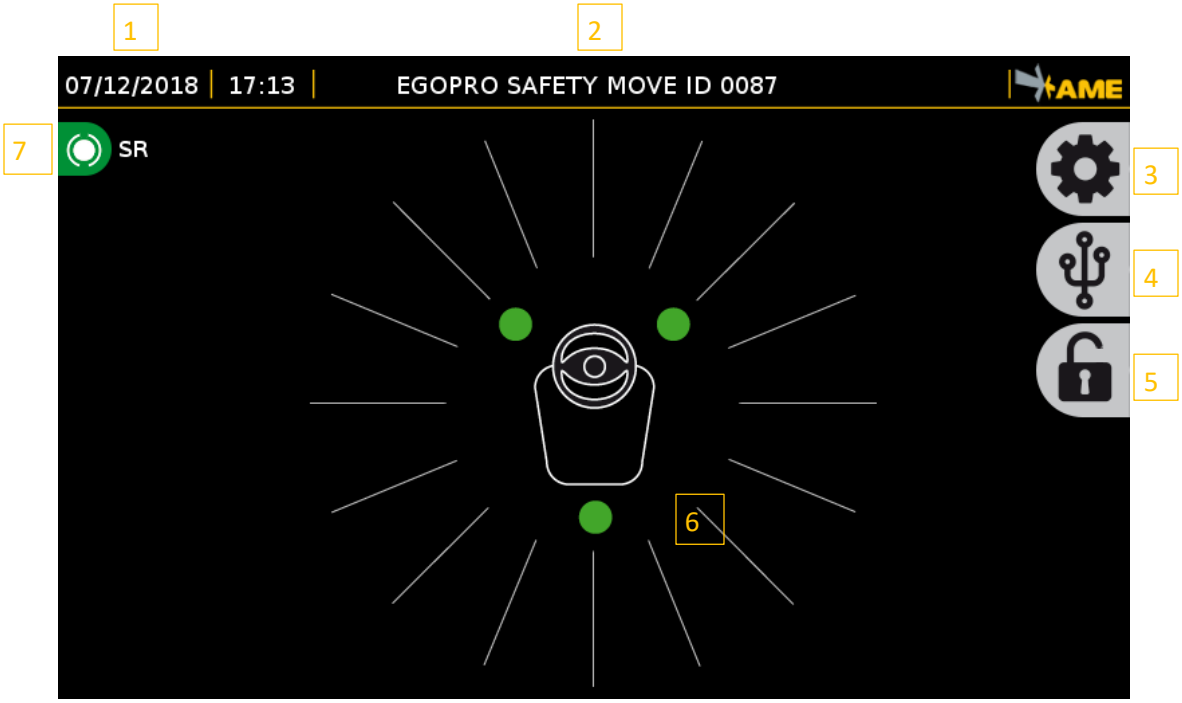
In addition to the visual alarm, a sound is also reproduced.

By default, the power of sensors is set to the minimum value; therefore, the detection distances are very short.

9 OPERATION MODES

9.1 DISPLAY OVERVIEW

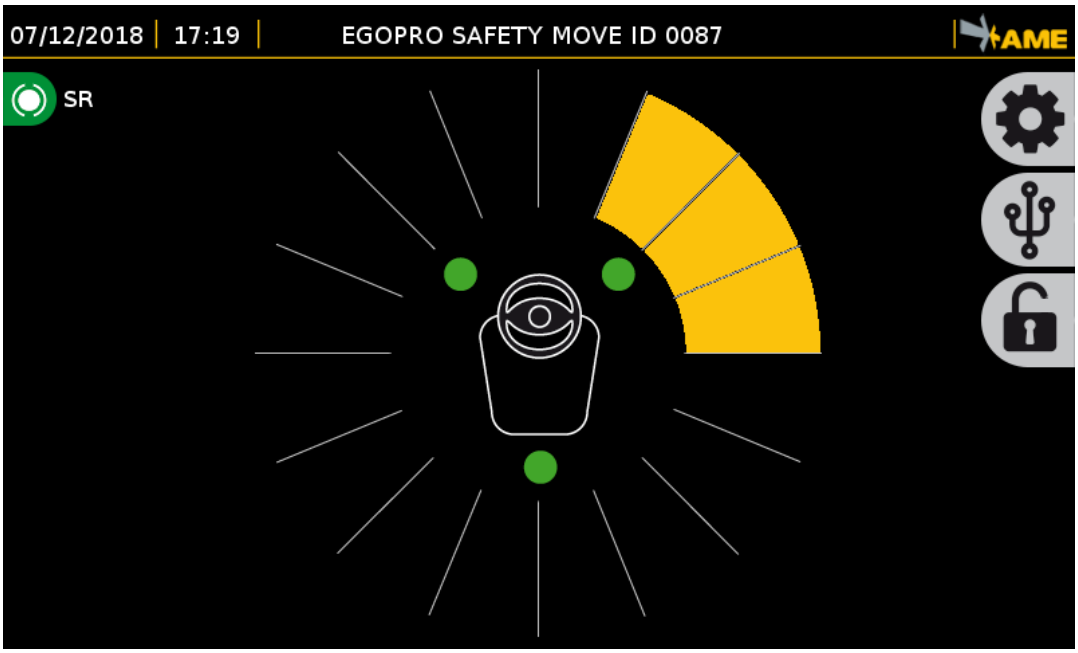
Main screen of EGOpro Safe MOVE 4.0 with 3 sensors installed without any detection of pedestrian workers or vehicles.



In addition, the following elements are also displayed on the screen:

1. Date and time
2. System Identification Code
3. Key to access configurations/settings
4. Key to access the section for data/log downloading
5. Key for the driver login
6. Position and status of the sensors installed. In this case, the three sensors, represented with a green circle, are arranged as follows: two at the front and one at the rear part. The green colour indicates the correct operation of each sensor.
7. Status of the Warning detection (SR).

9.2 PEDESTRIAN WORKER'S TAG DISPLAY ALARM: PRE-WARNING



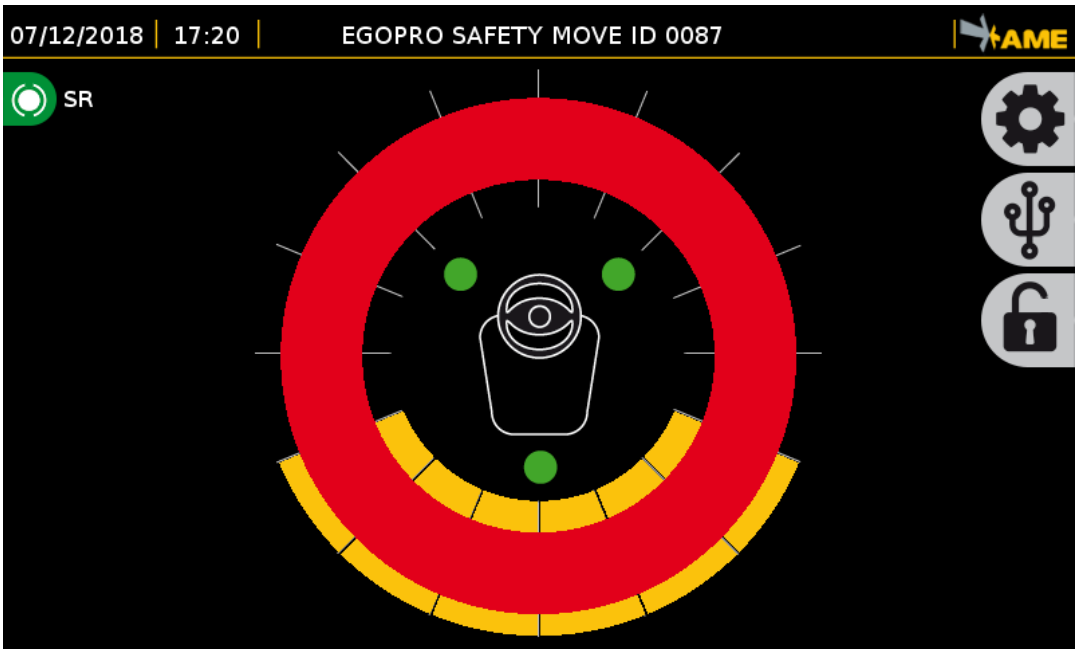
The presence of the pedestrian worker wearing an active TAG within the **PRE-WARNING** activation range is signalled to the driver via the display that shows the position of the pedestrian worker around the vehicle.

Lighted up sectors are associated to the sensor and they are coloured according to the sensor detecting the Tag, and so the pedestrian worker's position.
The sector corresponding to the pedestrian worker's position will remain YELLOW as long as the Tag is in this area.
If several pedestrian workers are found around the vehicle simultaneously at different positions, several sectors will be lighted up on the display corresponding to the pedestrian workers.

The visual alarm is accompanied by two sound alarms that draw the driver's attention. The first alarm, which is loud, is emitted when the pedestrian worker enters the PRE-WARNING area, and the second alarm, which is low, reminds that the pedestrian worker is still within the detection area.
In addition to a visual and sound alarm on the display, the system also control a first relay present on the CPU.

All these alarms can be configured in the ALARM CONFIGURATION section.

9.3 PEDESTRIAN WORKER'S TAG DISPLAY ALARM: WARNING

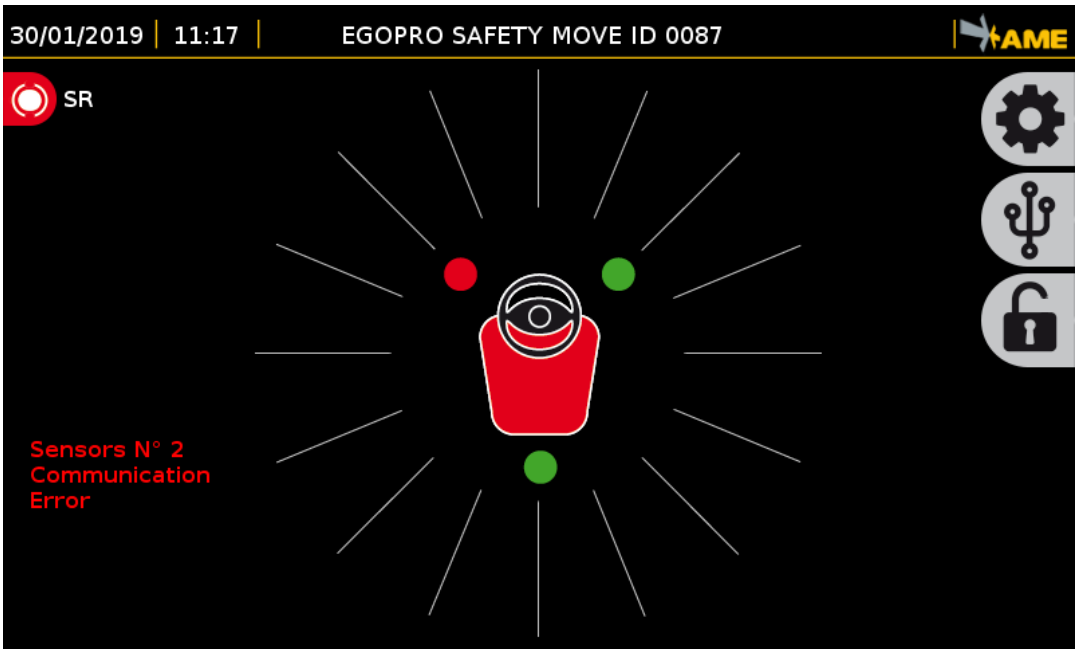


The presence of the pedestrian worker wearing an active TAG within the **WARNING** activation range is signalled to the driver via the display by means of a clearly visible red ring.
The PRE-WARNING alarm indication remains visible and helps the driver locate the personnel on foot.
The red ring will remain lit up, together with the two lateral LEDs in the display, as long as the Tag is in this area.

The visual alarm is accompanied by two sound alarms that draw the driver's attention. The first alarm, which is loud, is emitted when the pedestrian worker enters the WARNING area, and the second alarm, which is low, reminds that the pedestrian worker is still within the detection area.
In addition to a visual and sound alarm on the display, the system also control a second relay present on the CPU and two relays present on the HUB.

All these alarms can be configured in the ALARM CONFIGURATION section.

9.4 SENSORS AND HUB DIAGNOSIS

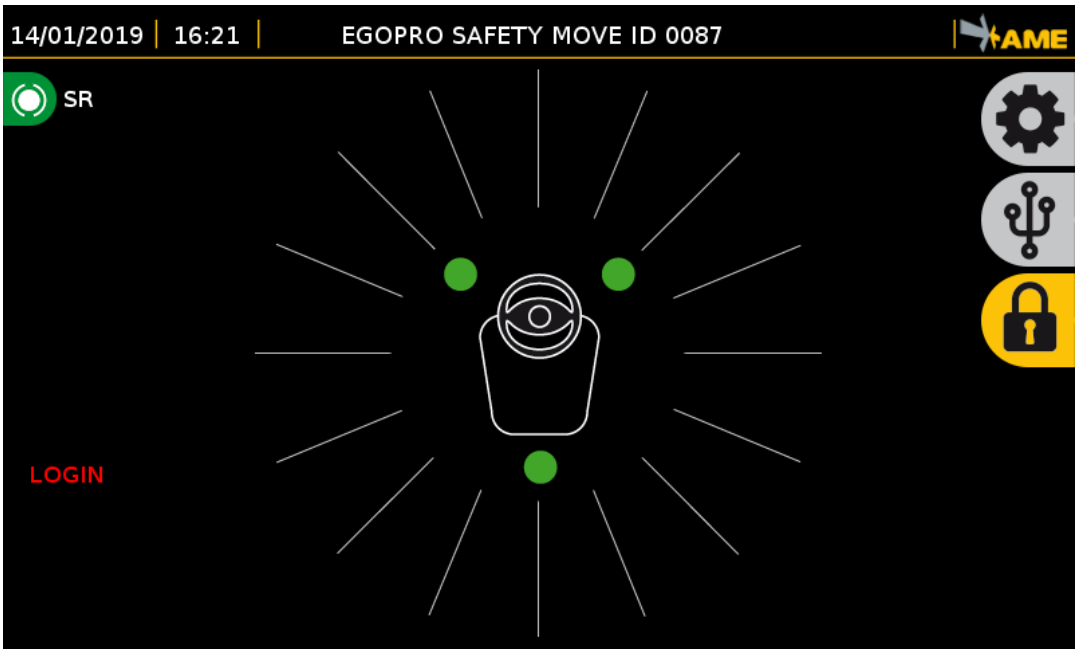


Active sensors are displayed matching their position on the vehicle. Only installed and configured sensors are shown on the display.
The system is equipped with a self-diagnosis system that constantly checks the correct operation of sensors. If the icon of the sensor is GREEN, it means that the sensor is working properly.
The system signals any anomalies by illuminating the seat and the sensor that is not working in red. Moreover, the type of error detected by the system is shown for 5 seconds at the bottom left-side corner.
A sound warning is reproduced together with the visual alarm.
The error message can also be subsequently displayed by pressing the red circle corresponding to the sensor in alarm.

There are four anomalies that can be detected during self-diagnosis:

- **Communication Error:** No communication between HUB and sensor. This may be caused either by the breaking of the sensor or by a problem in the connection between HUB and sensor. If all sensors are in this condition, the failure may be related to the HUB, or the HUB-CPU connection, and not to the sensors.
- **Microwave Error:** the sensor is not able to activate the Tag in pre-warning mode (yellow).
- **Low Frequency Error:** the sensor is not able to activate the Tag in warning mode (red).
- **RF Sensor Error:** the sensor is not able to detect the presence of other vehicles.
- **Radio Frequency Error**: the HUB is not able to receive the activation of the Tags.

9.5 DRIVER LOGIN



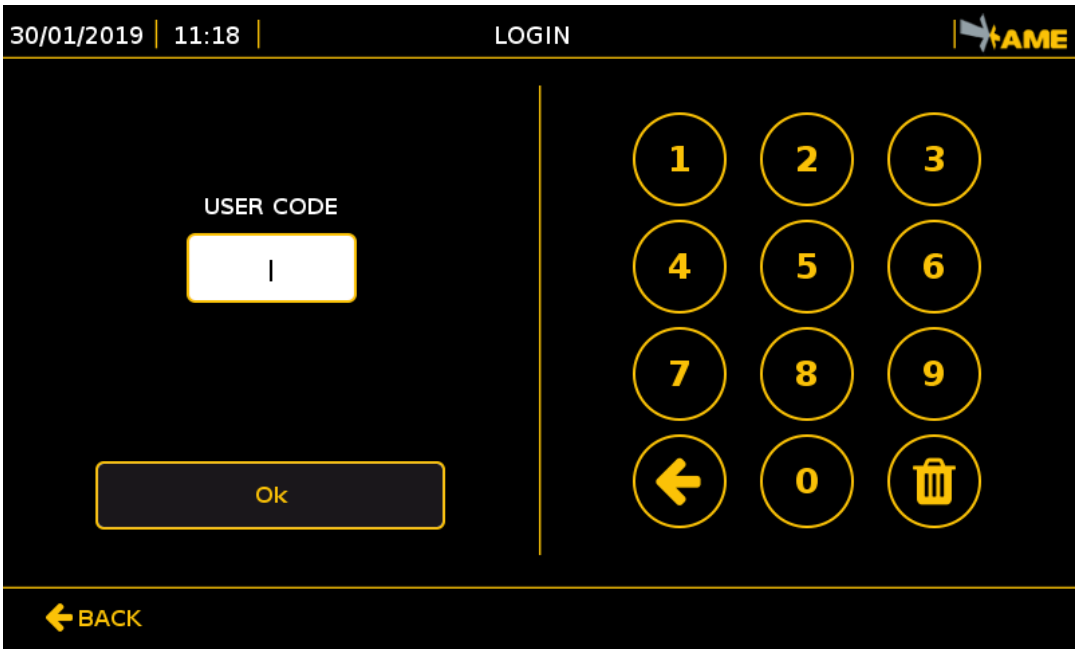
The LOGIN operation is used to check which operator is driving the vehicle at the date and time requested, and it is essential to exclude the driver's TAG from the Proximity Warning & Alert System.
When the system is turned on, the main interface presents a lateral red message inviting the user to LOGIN, which is signalled by a yellow icon.

Press the yellow log in icon representing a closed padlock to be able to login and enter your operator's code/Tag code. Once the login is complete, the icon will become grey, the symbol will convert to an open padlock, and the red "login" message will disappear.

For the LOGOUT operation, press again the grey icon and it will be yellow again.

The LOGOUT operation is essential to be able to make the driver's Tag visible again for the anti-collision system driver.

When the system is turned off, the LOGOUT operation is automatically performed.



For the login operation, enter the unique ID in the space:
USERCODE: unique numerical code of 6 digits: the code usually coincides with the TAG own code.
Use the numerical keyboard to enter the code

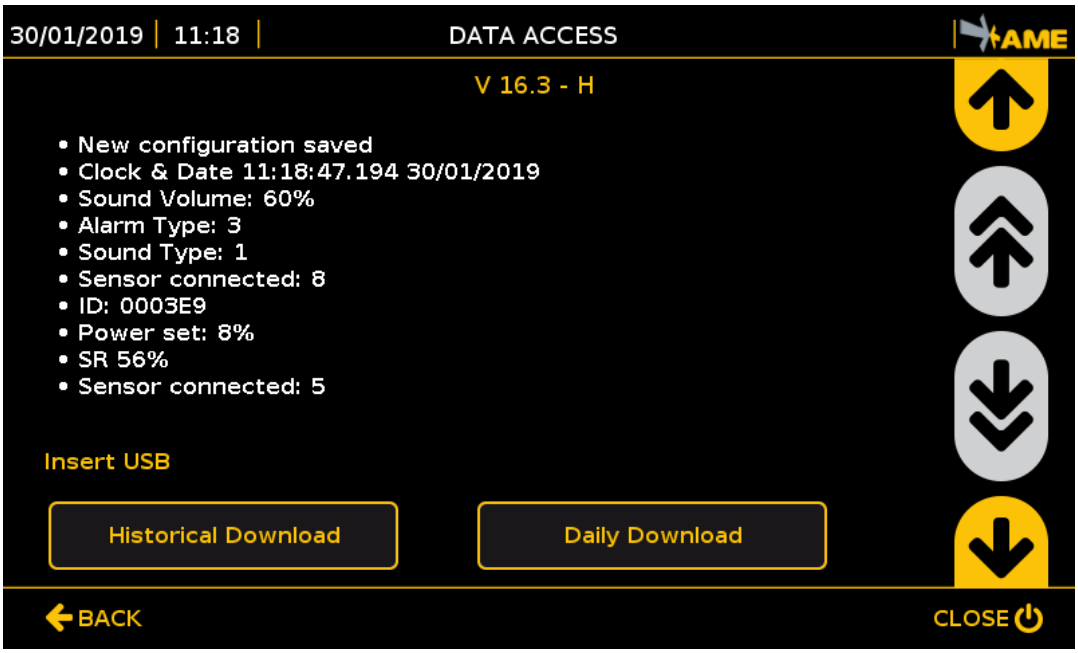
To delete only one character:

To delete all characters together:

Once the code has been entered, press OK. The system automatically returns to the main screen.

In order to log in, the list of users must have been added to the system (see paragraph 10.8).

9.6 DATA ACCESS



Press the key with the USB icon and enter the relative password to access the data page in which the history of events is shown.

Up to 1,000 events can be displayed, including:

- **TAGS detected** with the following information: detected TAG code - activated sensor - date and time - position (if the GPS module is enabled)
- **Configurations carried out**: type of configuration and saved data.
- **Shocks** (if the shocks module is enabled) with the following information: date and time - GPS coordinates (if the option is installed) - shock intensity.

Use the side arrows to scroll the list of information.

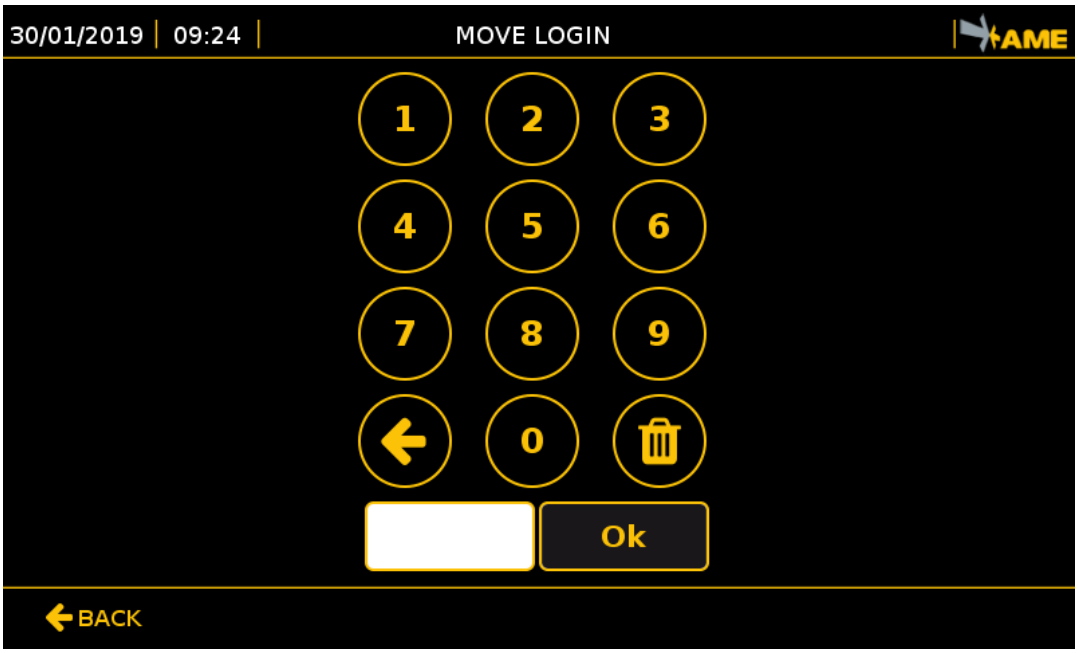
Moreover, in this section, once a USB is inserted into the specific input of the CPU, data can be downloaded by using the following keys:

Daily download: the daily events are downloaded to the USB.

Historical download: the events of the previous 60 days are downloaded to the USB. Data prior to 60 days are automatically deleted from the system.

10 BASIC CONFIGURATION

10.1 ACCESS TO MENU



Press the CONFIGURATION icon to access the menu 

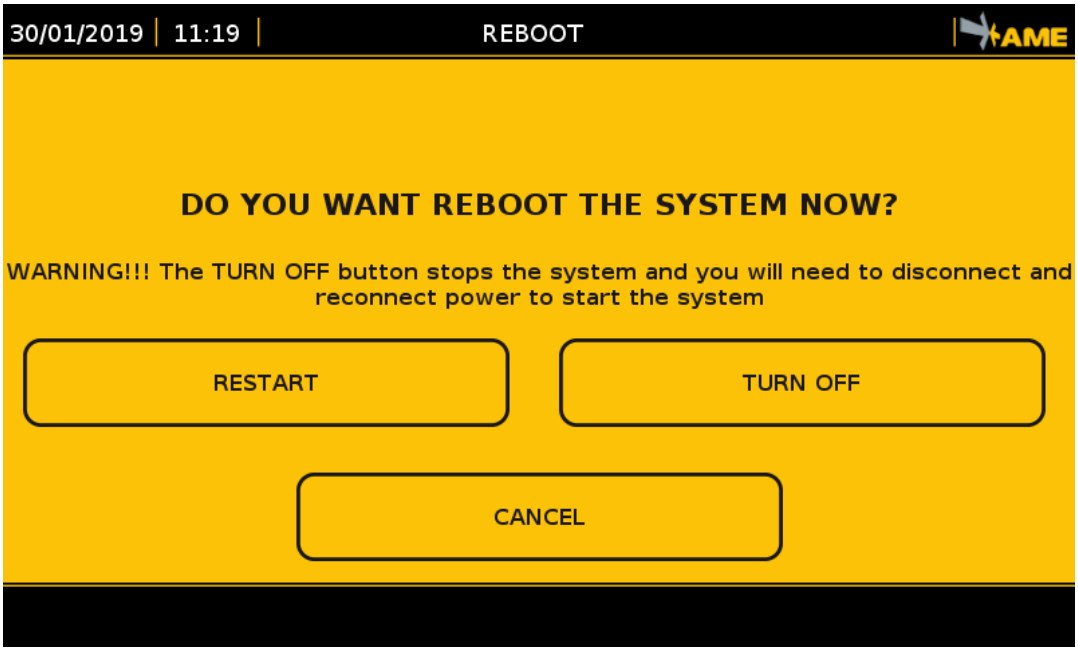
To access the system configuration section, a password must be entered so that only the enabled user can view this screen.

The default password is **1234**.

10.2 REBOOT

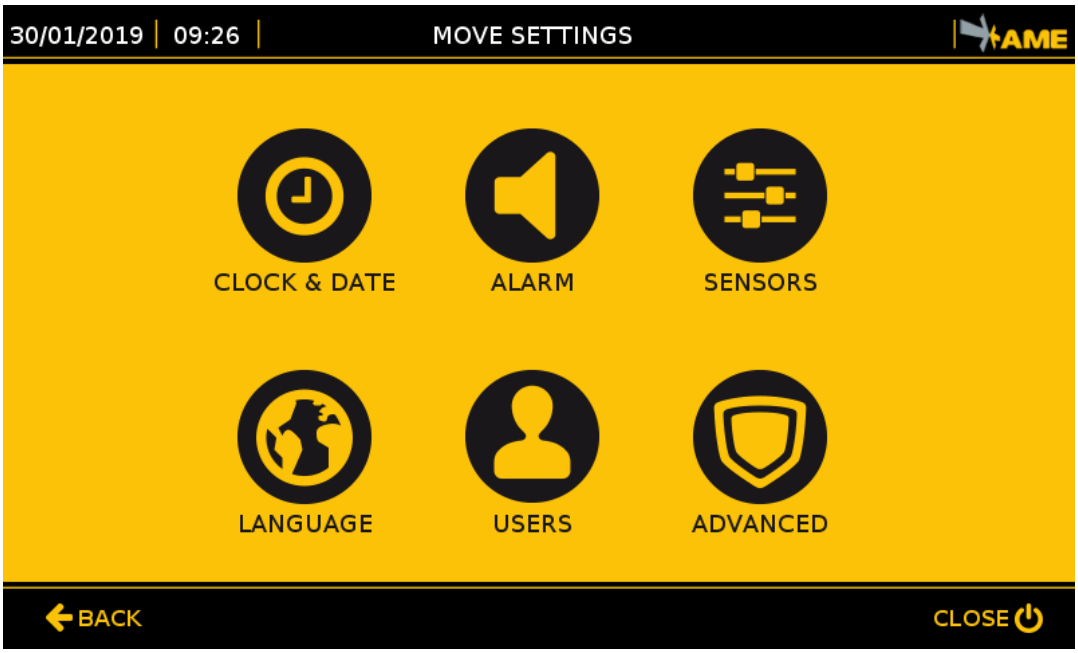
To reboot or stop the system, enter the specific password and open the configuration menu.

CLOSE key to reboot the system. If necessary, press this key to reboot the system. This key is show in all the configuration screens



If the system is turned off, you will need to disconnect and reconnect power to restart it.

10.3 CONFIGURATION MENU



In the configuration menu, you can:

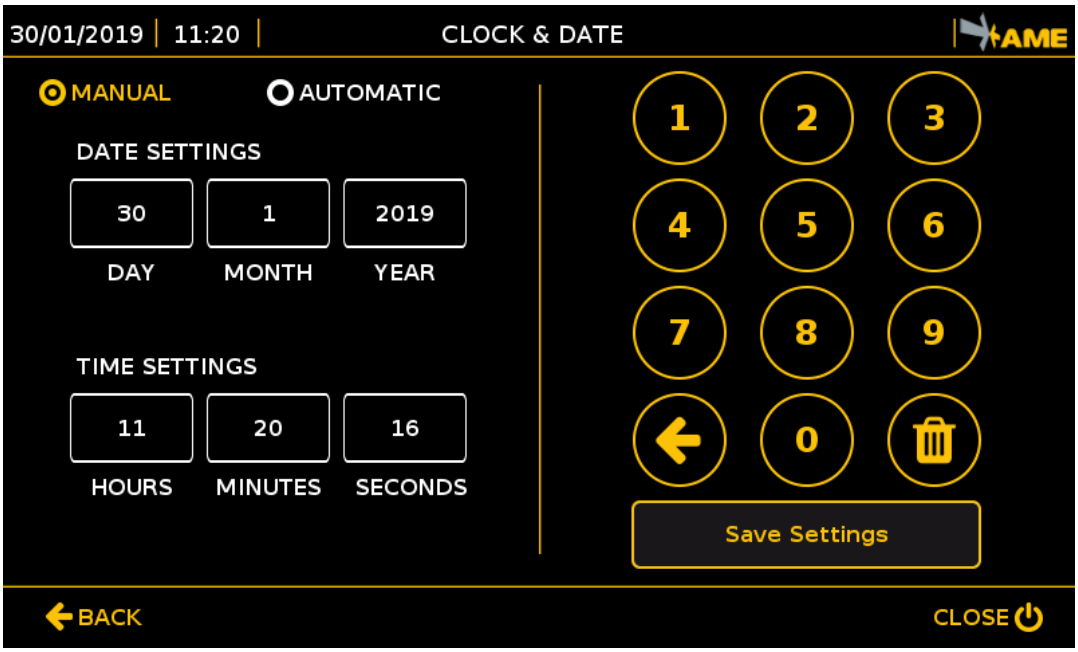
- Set the system Time and Date
- Configure the Modes of the alarms
- Configure the sensors (System Calibration)
- Select the language preferred
- Set the master data of users/drivers
- ADVANCED configurations: only authorised installers can have access to them.

Press the dedicated key to select the function.

10.4 CLOCK & DATE

Press the CLOCK AND DATE icon to access the settings

10.4.1 MANUAL



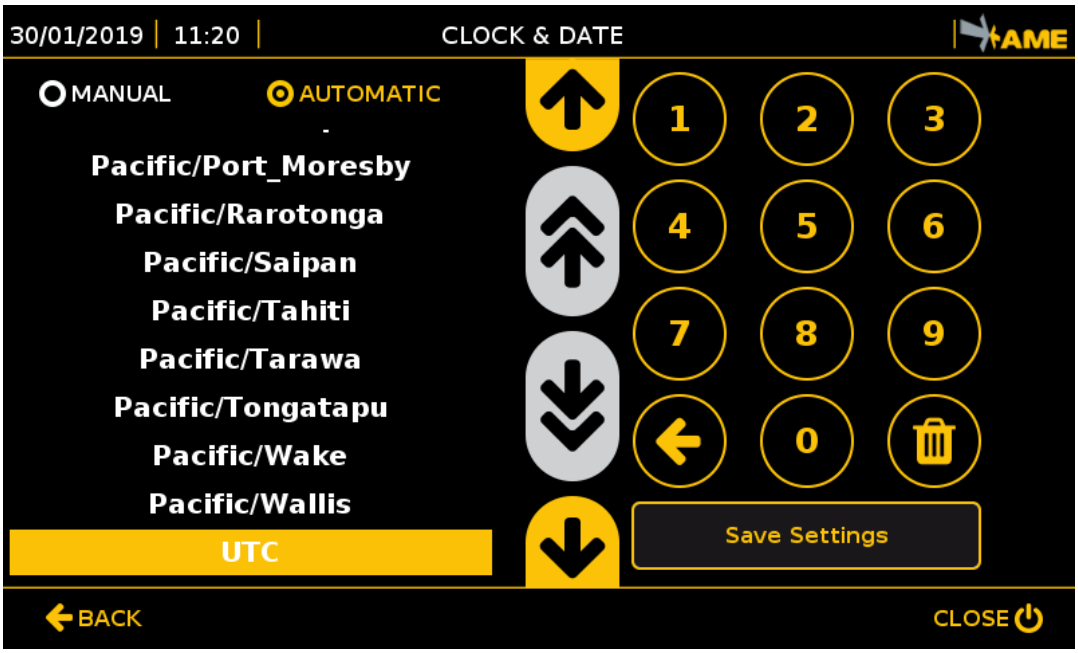
In manual mode, the internal clock of the system must be set by filling in all the fields manually.

On the display, touch the field to be changed and use the numerical keyboard located on the right to delete the old value and set the new one.

1. **'Save settings'**: Key to save the changed settings (to be used at the end of the operations).
2. **'Back'** Key to return to the previous menu without saving the changes.

If the time is changed, the reboot of the CPU will be requested.

10.4.2 AUTOMATIC



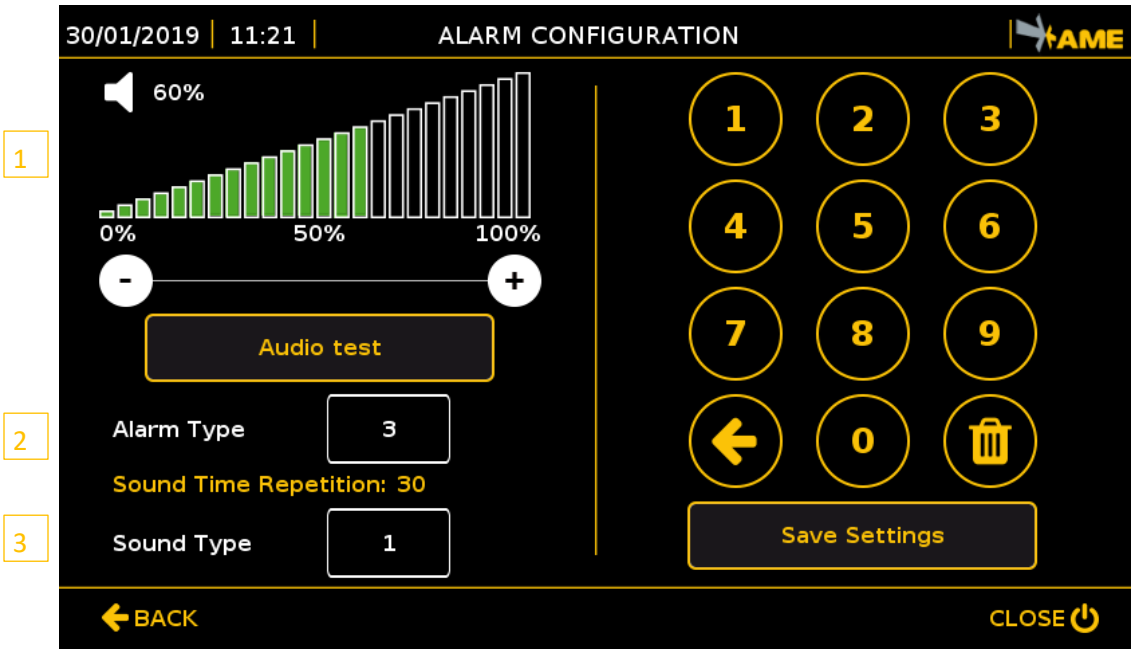
In automatic mode, the internal clock of the system becomes automatically synchronised by means of the network (if available) or the GPS module if installed.

Use the side arrows to scroll the list and select the correct time zone, the system will update the time automatically.

1. **'Save settings'**: Key to save the changed settings (to be used at the end of the operations).
2. **'Back'** Key to return to the previous menu without saving the changes.

If the time is changed, the reboot of the CPU will be requested.

10.5 ALARM CONFIGURATION



Press the ALARM CONFIGURATION icon to access the settings

In the interface, the alarm modes are set.

1. **VOLUME LEVEL**

Press keys  and  to increase or decrease the volume of the loudspeaker.

- Press '**Audio Test**' to start a test (the Tag In sound and the Tag Stay sound will be reproduced consecutively).
- Press '**Stop**' to finish the test.

2. **ALARM MODES**

It defines the mode in which the driver is warned about the presence of personnel wearing an active PPE (TAG) within a dangerous area.
The value, between 1 and 5, defines 5 modes referring to the time elapsed between one alarm sound and the next when a dangerous condition remains. The time set is displayed with a message in yellow. (E.g., Sound alarm repetition time: 5)
To set the value, touch the editable field, which becomes yellow, and set a value between 1 and 5.

- Press '**Audio Test**' to start a test (the Tag In sound and the Tag Stay sound will be reproduced consecutively).
- Press '**Stop**' to finish the test.

The five alarm modes are summarised in the table below:

ALARM MODES	SOUND ALARM REPETITION TIME (S)	TAG LAST RECEPTION TIME (S)	TIME THAT THE ALARM REMAINS IN VIDEO (S)	TIME THAT THE ALARM REMAINS IN THE LISTS (S)
1	5	3	3	10
2	15	3	3	30
3	30	3	3	60
4	60	3	5	60
5	1000	3	5	120

3. SOUND TYPE

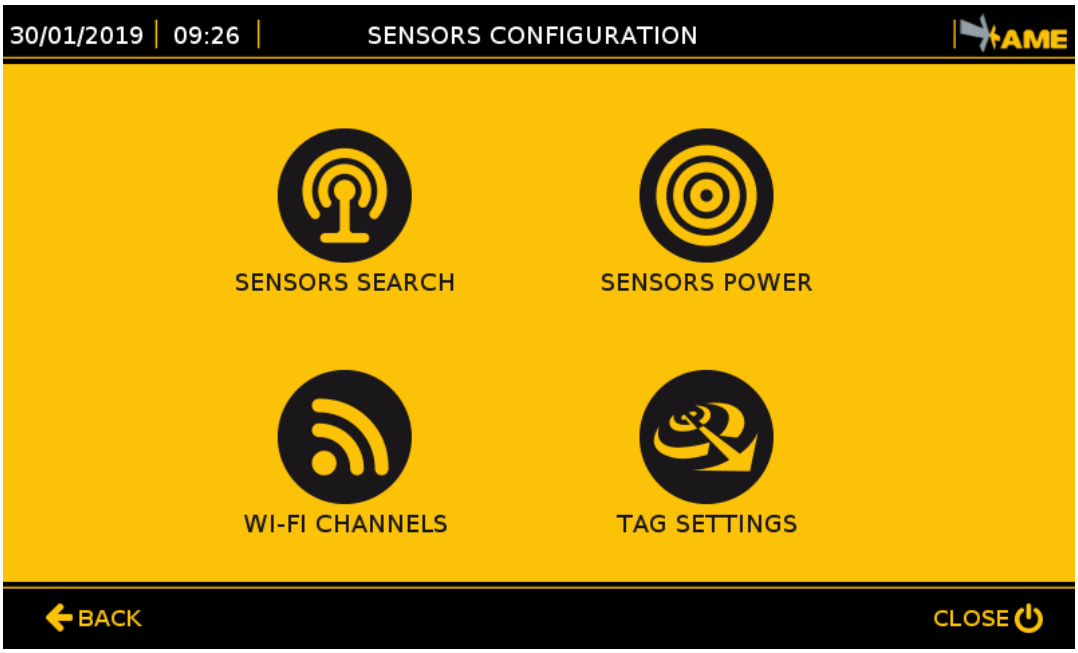
The system manages 2 sound types:

- **Tag In Sound** (Tag detected)
- **Tag Stay Sound** (Tag already present in the activation range)

To set one of the 4 sets of pairs of sounds available, press on the editable field Sound Type and set a value between 1 and 4.

- Press '**Audio Test**' to start a test (the Tag In sound and the Tag Stay sound will be reproduced consecutively).
- Press '**Stop**' to finish the test.

10.6 SENSORS CONFIGURATION



Press the SENSORS CONFIGURATION icon to access the settings

The sensors configuration menu includes 4 STEPS:

1. **Sensors Search**
   Tool to detect and save the sensors installed.
2. **Sensors Power**

   Tool to set the system operating range.
3. **Wi-Fi Channels**

   Tool to select the operation frequency of the sensors.
4. **Tag Settings**

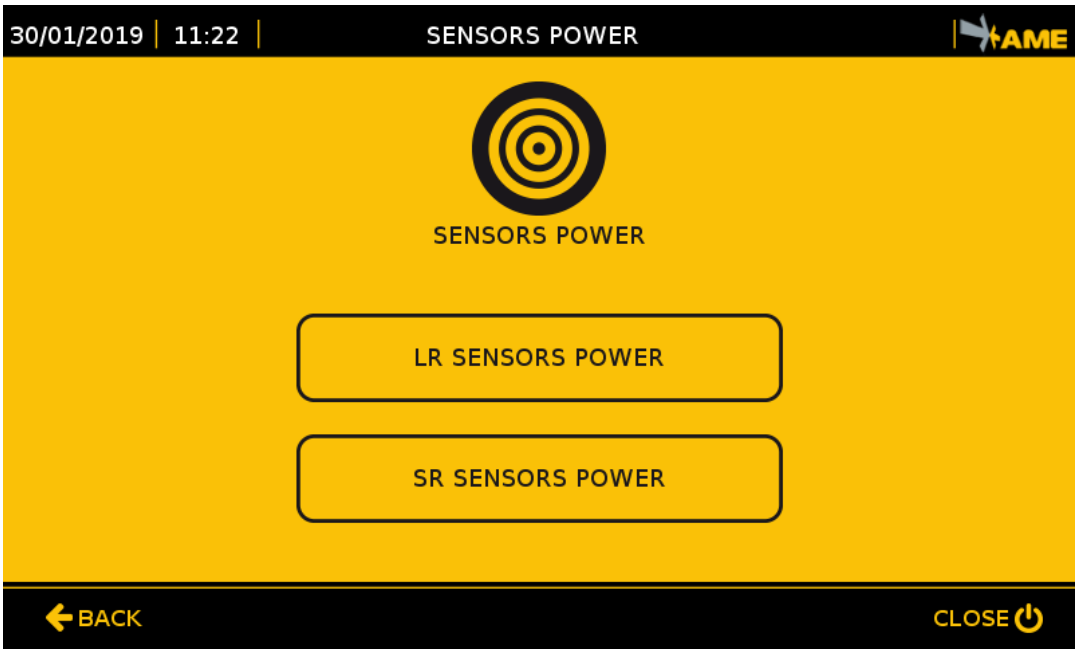
   It configures some parameters on the pedestrian worker's Tag.

10.6.1 SENSORS SEARCH

Press the SENSORS SEARCH icon to access the settings

See paragraphs 8.2.4, 8.2.5, 8.2.6, 8.2.7.

10.6.2 SENSORS POWER

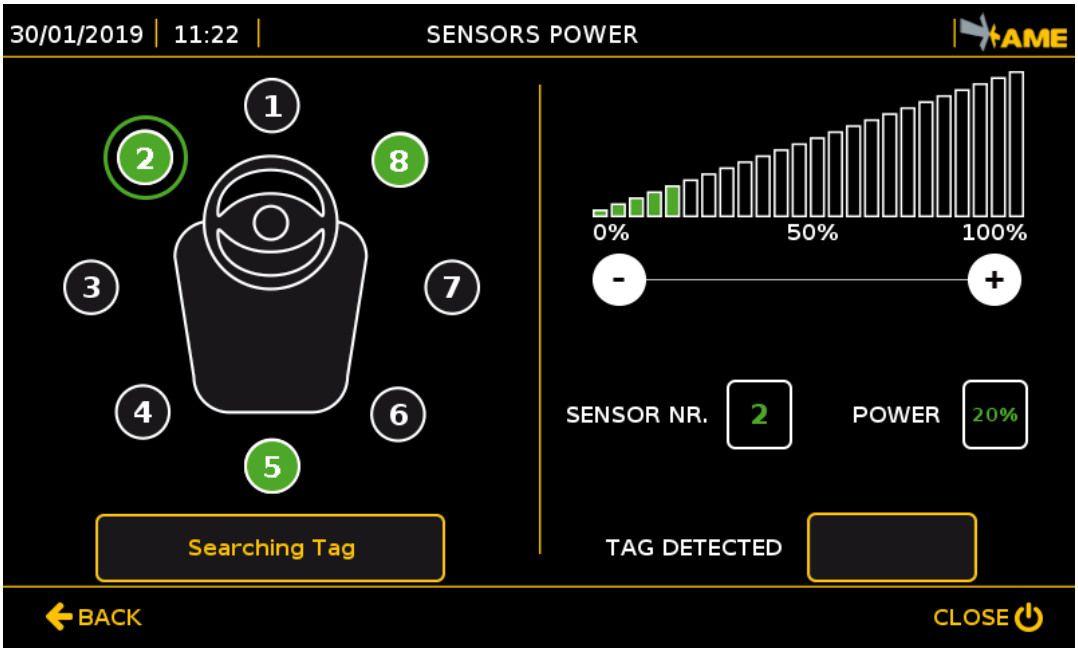


Press the SENSORS POWER icon to access the settings

- Select LR SENSORS POWER to configure the Pre-warning alarm range
- Select SR SENSORS POWER to configure the Warning alarm range

Before adjusting the system power, carefully read chapter 7: STOPPING DISTANCES.

10.6.3 LR SENSORS POWER



Adjust the LR sensor power to change the Tag, and so the pedestrian worker, detection distance in the Pre-Warning area.

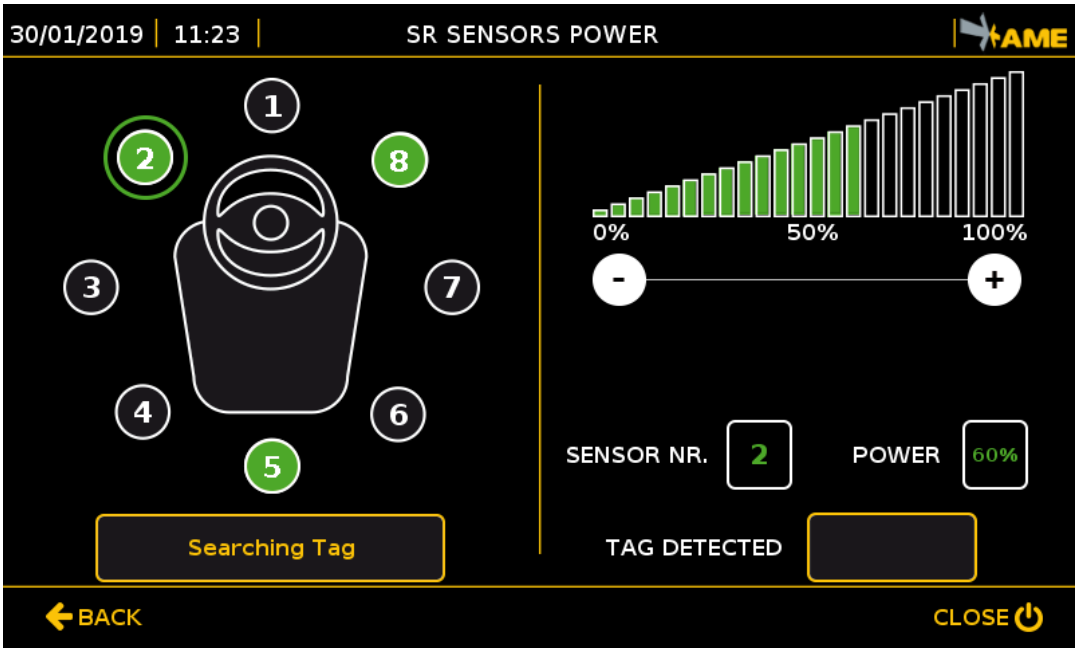
In order to change the power of sensors:

- Select the sensor by pressing the corresponding icon: the selection will be highlighted by a green ring around the icon. In the figure, sensor No. 2 has been selected.
- Once the sensor is selected, the number of the sensor will be shown in the 'SENSOR NR.' field on the right side of the display.
- Change the power of the pre-selected sensor by pressing the and keys to increase it and decrease it:
    - Beside the word POWER, the percentage of power set will be indicated. Once set, changes are saved automatically.
- In order to check power in operation, carry out the following operations:
    - Position a Tag at the minimum distance at which the Tag is to be detected (see chapter 7). Define the range by means of the and keys, as described above.
    - The detected Tag code will be shown by the phrase TAG DETECTED with a red circle next to it if it is a pedestrian worker's Tag.

- The same operations must be carried out for all the sensors in operation.
- When the sensor is at 0% power, it is not off, but at minimum power.

NOTE: Use the Tag search key every time the power is changed.

10.6.4 SR SENSORS POWER



Adjust the SR sensor power to change the Tag, and so the pedestrian worker, detection distance in the Pre-Warning area.

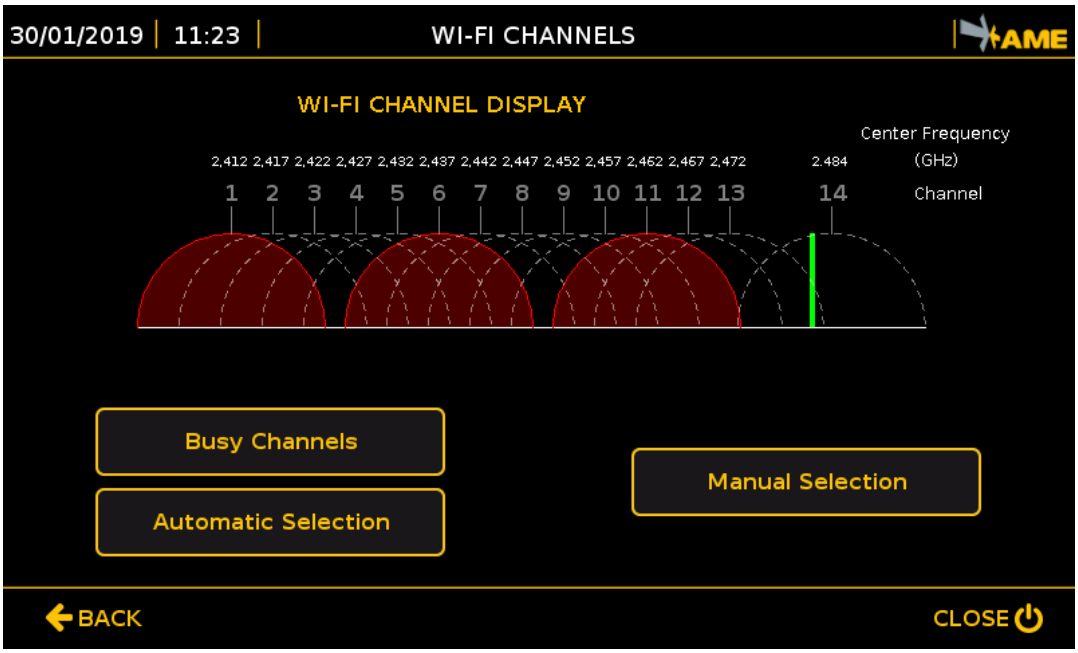
In order to change the power of sensors:

- Select the sensor by pressing the corresponding icon: the selection will be highlighted by a green ring around the icon. In the figure, sensor No. 2 has been selected.
- Once the sensor is selected, the number of the sensor will be shown in the 'SENSOR NR.' field on the right side of the display.
- Change the power of the pre-selected sensor by pressing the and keys to increase it and decrease it:
    - Beside the word POWER, the percentage of power set will be indicated. Once set, changes are saved automatically.
- In order to check power in operation, carry out the following operations:
    - Position a Tag at the minimum distance at which the Tag is to be detected. Define the range by means of the and keys, as described above.
    - The detected Tag code will be shown by the phrase TAG DETECTED with a red circle next to it.

- The same operations must be carried out for all the sensors in operation.
- When the sensor is at 0% power, it is not off, but at minimum power.

NOTE: Use the Tag search key every time the power is changed.

10.6.5 WI-FI CHANNELS



Press the WI-FI CHANNELS icon to access the settings

The system operation frequency can be set according to the configuration of the Wi-Fi network where the system is installed.

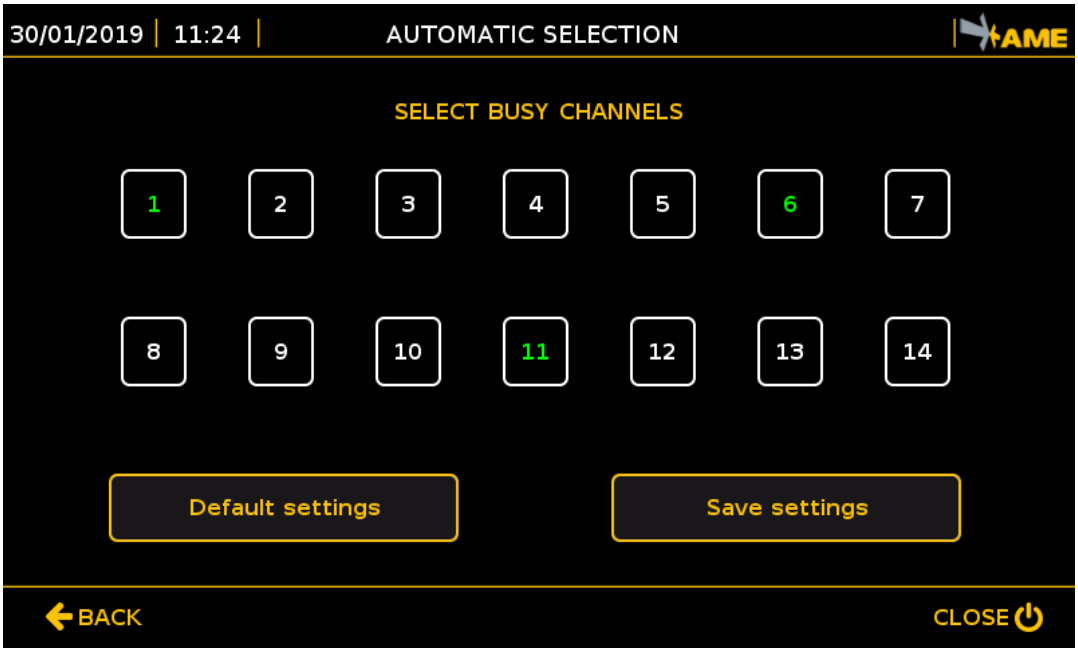
The basic system signals:

- In red, channels 1-6-11 (those mostly used) that are considered busy by default
- In green, the operating frequency used by the system close to 2.484 GHz

If this standard setting is not correct compared to the company's Wi-Fi network, two modes can be used to change the operating frequency of the sensors in the 2.45 GHz band:

1. '**Automatic Selection**' Mode
2. '**Manual Selection**' Mode

10.6.6 WI-FI CHANNELS: AUTOMATIC SELECTION



With the **Automatic Selection** mode, the operating frequency of the sensors is set automatically taking into account the channels, in the 2.45 GHz band, already taken by other systems that were entered into the section of the busy channels.

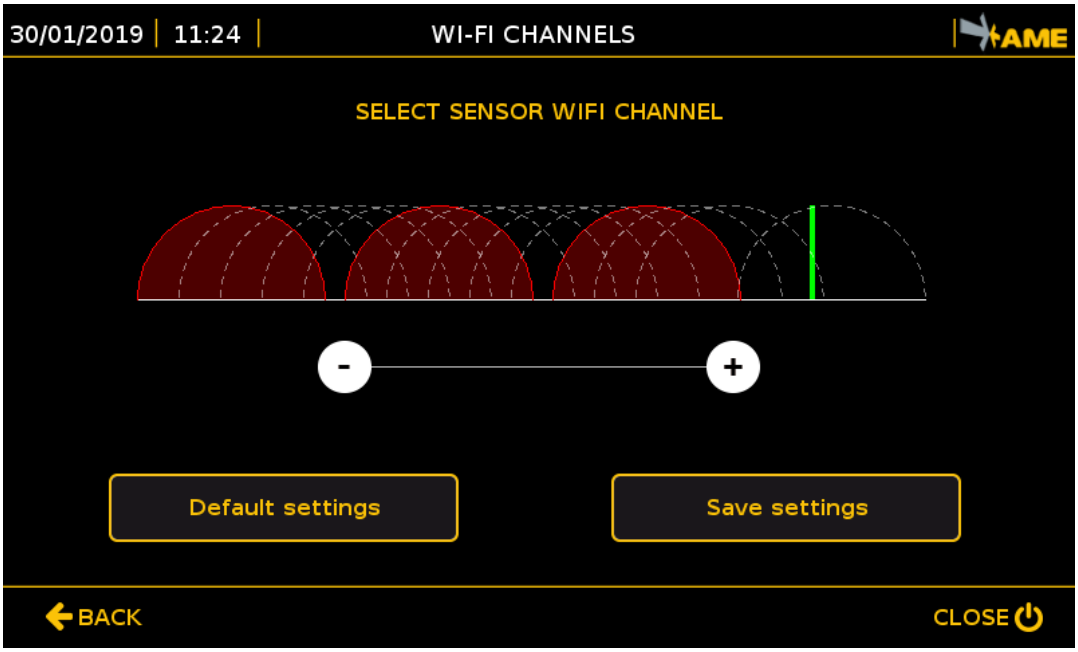
Before pressing the key for the automatic selection of the Wi-Fi channels, go to the section of the busy channels to select the non-available channels.

To select/deselect a channel, press the corresponding key and it will become GREEN.

- The '**Default settings**' key automatically selects channels 1, 6 and 11.
- The '**Save settings**' key saves settings.

Once the selection of busy Wi-Fi channels is saved and completed, press the Automatic Selection key and the system will move the frequency to an available channel.

10.6.7 WI-FI CHANNELS: MANUAL SELECTION

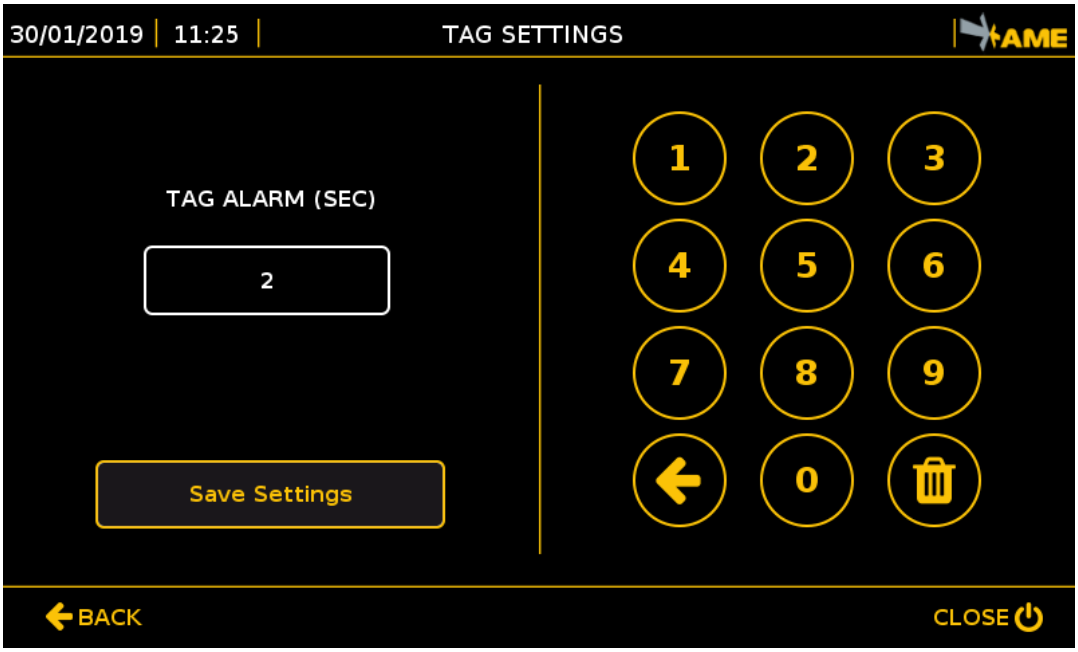


In manual mode, the operating frequency can be selected along the entire 2.45 GHz band no matter if the channels are busy or not.

Press the ⊕ and ⊖ keys to increase or decrease the operating frequency.

- The '**Save settings**' key saves the operating frequency set.
- The '**Default settings**' key automatically selects channels 1, 6 and 11.

10.6.8 TAG SETTINGS



When a pedestrian worker wearing an active PPE enters into a dangerous area around a vehicle, the TAG will be activated and a warning sound with adjustable intermittence will be triggered.

Tag Settings express in second(s) the time that elapses between a sound alarm and the other on the user's Tag, when it is in the detection range of a sensor.

The settable value is a number between 1 and 30 seconds.

To set this parameter, press the Tag alarms editable field and use the numerical keyboard to enter the value preferred.

At the end of the operation, press the '**Save settings**' key to save settings.

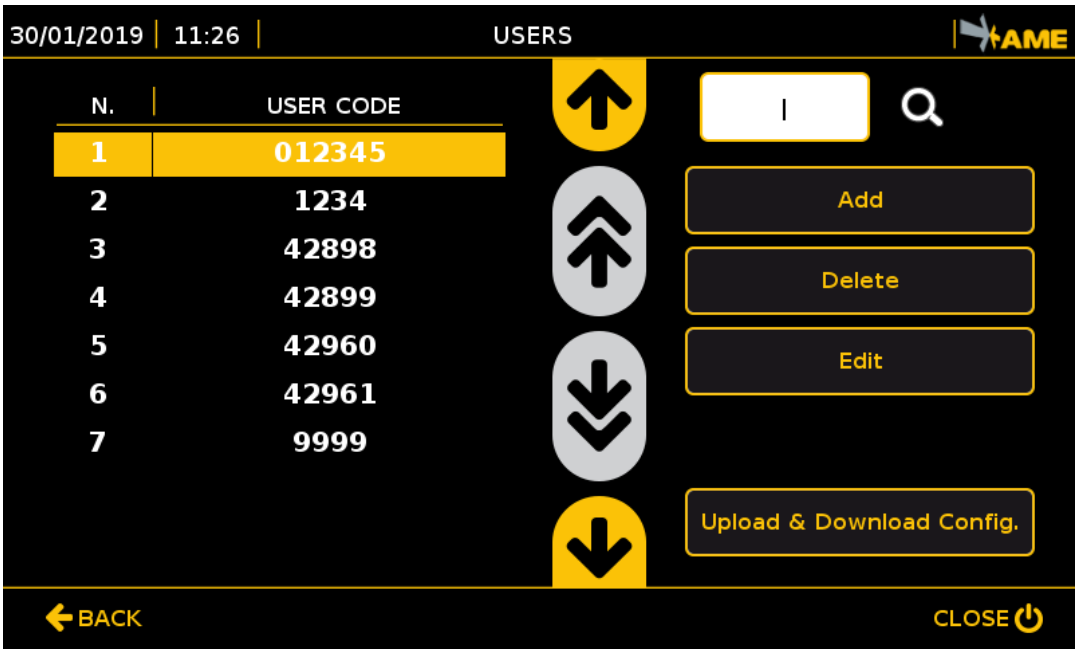
10.7 LANGUAGE

Press the corresponding key to select the language chosen.

These are the settable languages:

1. Italian
2. English
3. French
4. Spanish

10.8 USERS



The Users section shows the codes of the Tags that were entered into the system master data for login and logout (paragraph 9.5).

To change the master data and see the users' codes, log in as an administrator. The default code for administrators is 9999.

In this section, you can use:

- The '**Add**' key to enter a new Tag into the master data.
- The '**Upload & Download Config.**' key to export or import the configuration of all users

To change or delete the code, select a Tag from the list on the left and press, respectively:

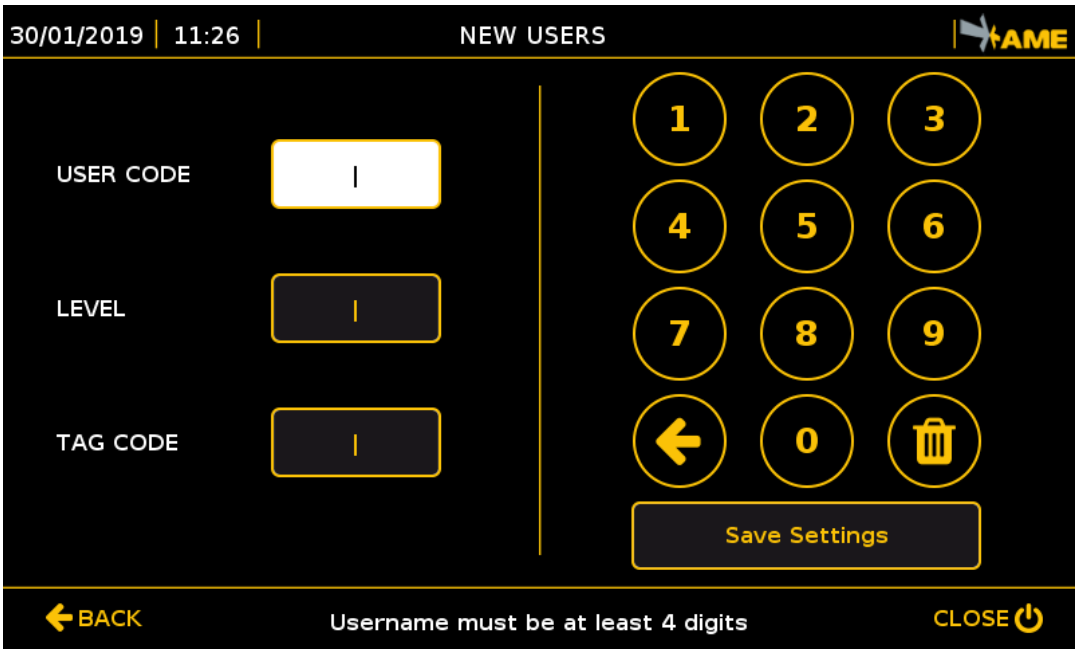
- The '**Delete**' key to eliminate a Tag from the master data.
- The '**Edit**' key to change the data of the Tag selected in the master data.

By means of the search window on the top left corner, you can enter a user code (even partially) and search for it without scrolling the list of all users.

NOTE: the software is supplied with 2 User Codes enabled:

User Code	Password	User	Level
9999	1234	Administrator	4
1234	5678	Driver	1

10.8.1 ADDING/EDITING USERS



Fill in the following boxes for master data to add or edit a user:

'**User code**' Enter the code to be associated to the Tag to be used to log in. The user code will be the code saved and displayed in the file of events.

'**Level**' The level types that can be entered are 1 and 4.

- 1 Driver Level
- 4 Administrator Level

'**Tag Code**' Enter the Tag code shown in the label on the transponder.

NOTE: Associate the Tag code to the same user's code so that they match in the data/events analysis.

Immediately after the driver logs in, every operation detected by the system will be automatically associated to the driver's User Code.

10.8.2 IMPORTING/EXPORTING USERS

All users can be configured in a system, and then, by means of these functions, the list of users can be copied to the remaining systems without having to enter the users in all vehicles manually.

'**Download Config.**' This is used to export the list of the users present on the vehicle to a USB key.

'**Upload Config.**' This is used to import the list of users from a USB key.

Before importing all the data of users, they will be deleted from the database of the EGOpro Safe Move system.

The list of users is saved in the 'MoveDB.csv' file. 'csv' files are text files with data separated by semicolon.

File example:

```
USERNAME;PASSWORD;LEVEL;DATE_CREATION;DATE_MODIFY;LAST_LOGIN;CODE_TAG;CODE_BADGE
111111;;1;09/04/2018;09/04/2018;09/04/2018;111;16451
1234;5678;1;07/05/2013;17/04/2018;04/05/2018;;0417C48C58
12345;;1;30/03/2017;30/03/2017;30/03/2017;12345;4C00DD0A84
9999;1234;4;07/05/2013;01/04/2014;14/01/2019;;
```

- USERNAME: min. 4 figures, max. 6 figures, numerical [**MANDATORY**]
- PASSWORD: max. 8 figures, numerical [NOT MANDATORY]
- LEVEL: possible values 1,2,3,4 (1 figure) [**MANDATORY**]
- DATE CREATION: date in the dd/MM/yyyy format [NOT MANDATORY]

- DATE MODIFY: date in the dd/MM/yyyy format [NOT MANDATORY]
- LAST LOGIN: date in the dd/MM/yyyy format [NOT MANDATORY]
- CODE TAG: max. 6 figures, numerical [NOT MANDATORY]
- CODE BADGE: alphanumeric [NOT MANDATORY]

NOTES:

- The username field must be univocal, and it is used to log in.
- In case of automatic login, use the TAG code as username
- If login without password is used, the password does not have to be entered.

NOTES ON FILE STRUCTURE:

The data to be imported by means of the automatic procedure must be formatted with the following structure:

- First line of heading:

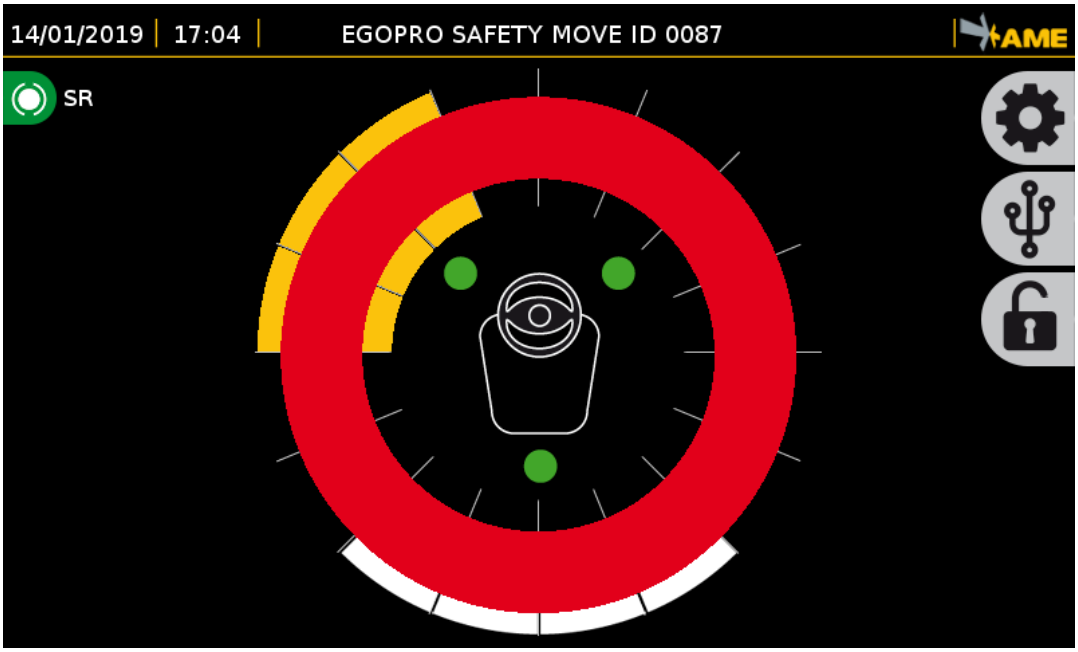
  USERNAME;PASSWORD;LEVEL;DATE_CREATION;DATE_MODIFY;LAST_LOGIN;CODE_TAG;CODE_BADGE
- It must contain 8 fields in each line (any additional fields will be ignored)
- The fields not to be included must be empty (no spaces)
- The elements must be separated by **semicolon (;)**.

11 VEHICLE-VEHICLE ANTI-COLLISION MODULE

11.1 INSTALLATION

The vehicle-vehicle proximity warning module is integrated in the PLX SAFEMOVE SENS 4 sensor, and it does not require any additional installations.

11.2 ALARM DISPLAY

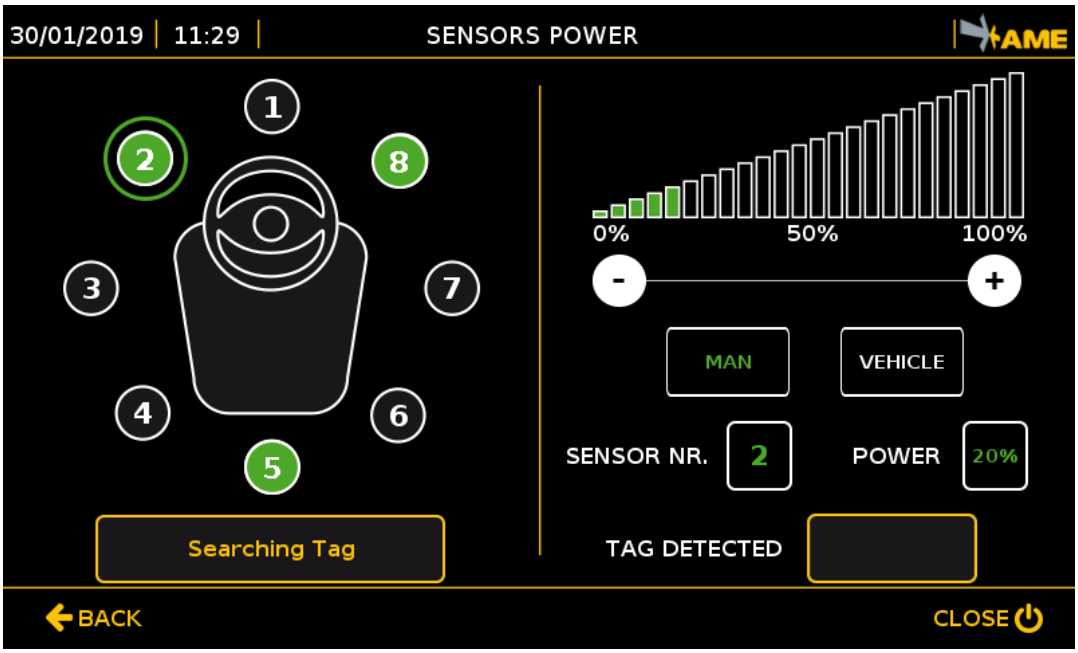


The vehicle-vehicle proximity warning module detects not only the pedestrian worker moving around the vehicle, but also other vehicles equipped with the specific EGOpro Safe MOVE sensors.

In this case, there are three visual alarms:

- **WHITE**: it warns about the presence of other vehicles equipped with the EGOpro Safe MOVE system in a dangerous area around the vehicle. The direction from which the other vehicle is coming is indicated by the sectors. For example, in the figure, the second vehicle is behind the driving position.
- **YELLOW**: it warns about the presence of personnel wearing a Tag in the Pre-warning area around the vehicle.
- **RED**: it warns about the presence of personnel wearing a Tag in the Warning area near the vehicle.

11.3 SENSORS POWER



In this section, the sensor power, and thus the detection distance of both the pedestrian worker's Tag and the vehicle's Tag, can be changed.

To configure the sensor power with respect to the vehicle's Tag, press the 'VEHICLE' key, and carry out all the same operations performed for the pedestrian worker's Tag (paragraph 10.6.3).

In order to check power in operation, carry out the following operations:

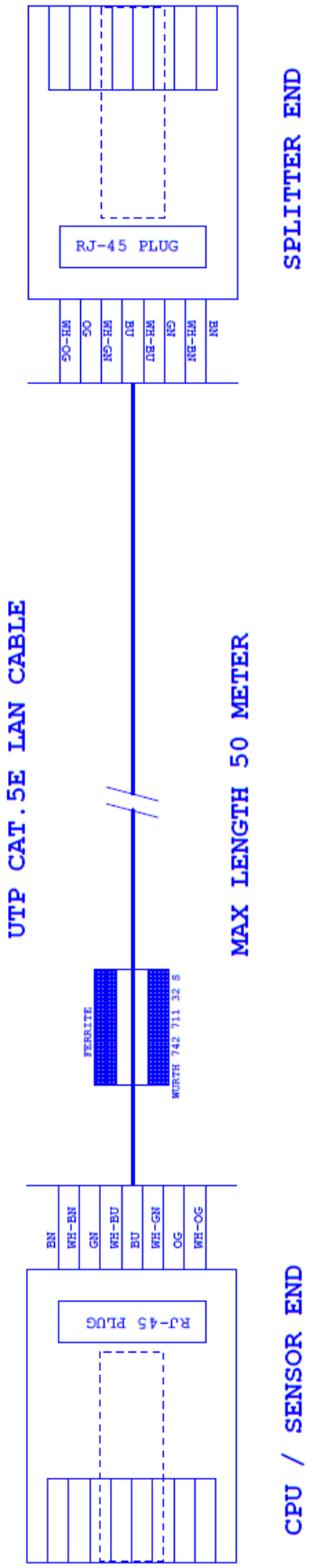
- Position a Vehicle at the minimum distance at which it is intended to be detected, when both vehicles are stopped (See chapter 7 for calculating the minimum distance).
- Select the sensor to be configured.
- Define the range by increasing or decreasing the power by means of the ⊕ and ⊖ keys in this menu until the other Vehicle is detected.
- Once set, changes are saved automatically. The detected Vehicle code will be shown by the phrase 'TAG DETECTED' with a white circle. The code of each Vehicle is shown at the top on the main screen.
- Taking into account the space that is necessary for breaking, make sure that the presence of other vehicles is detected even when they are not moving.

⚠
- The same operations must be carried out for all the sensors in operation.
- When the sensor is at 0% power, it is not off, but at minimum power.
- Both powers, man and vehicle, are independent

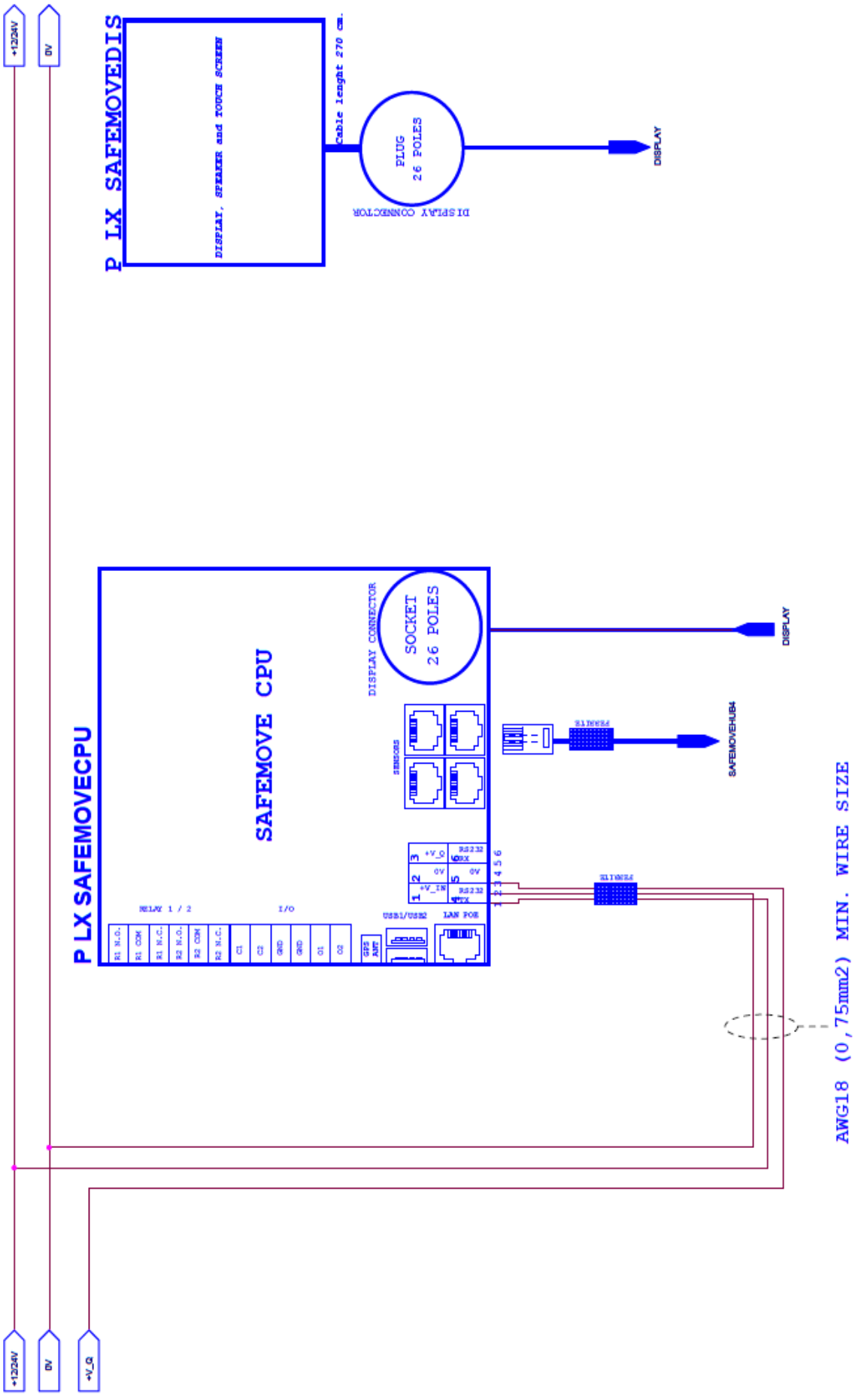
NOTE: Use the Tag search key every time the power is changed.

12 WIRING DIAGRAMS

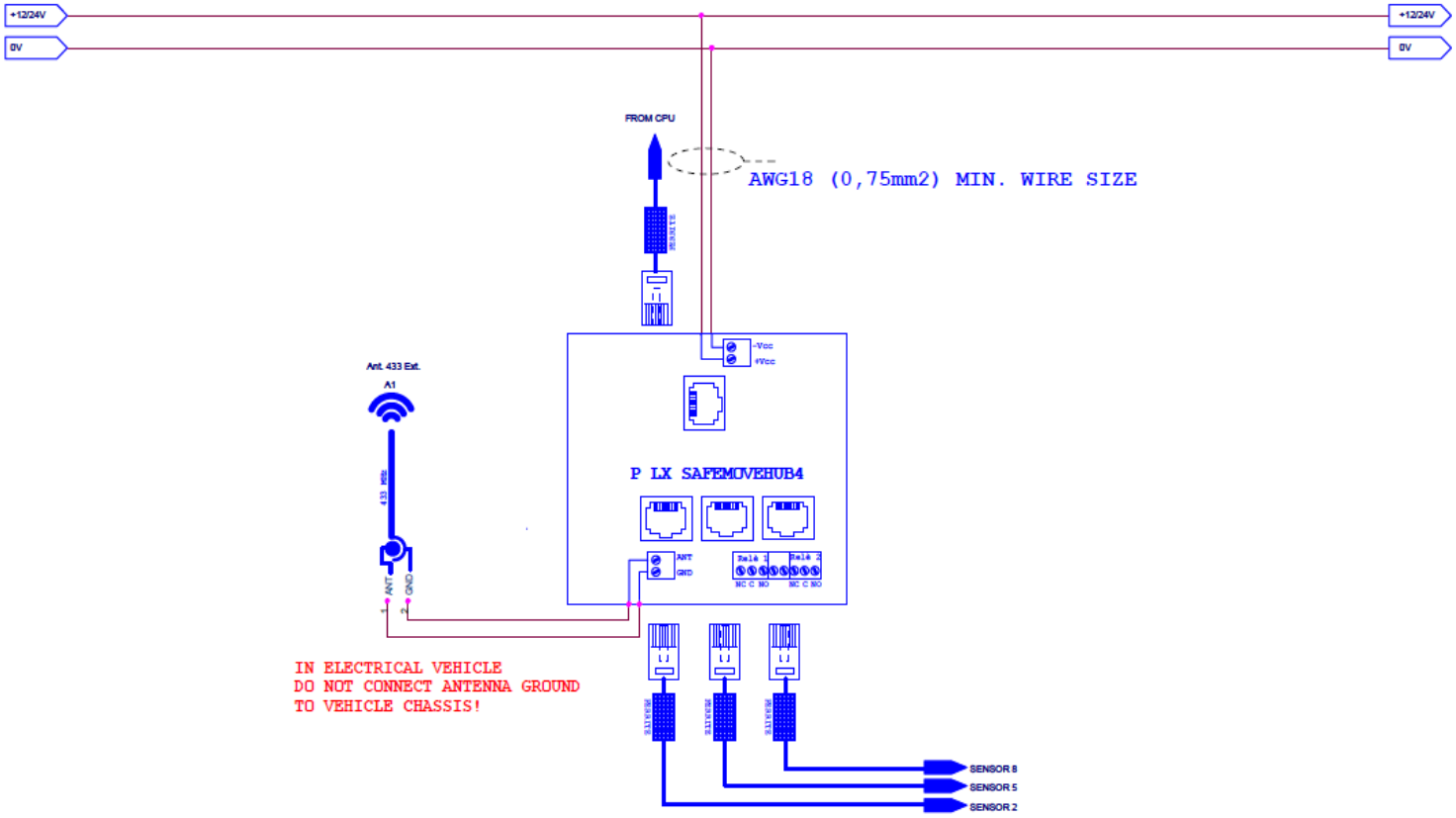
12.1 SENSOR'S CABLE ASSEMBLY



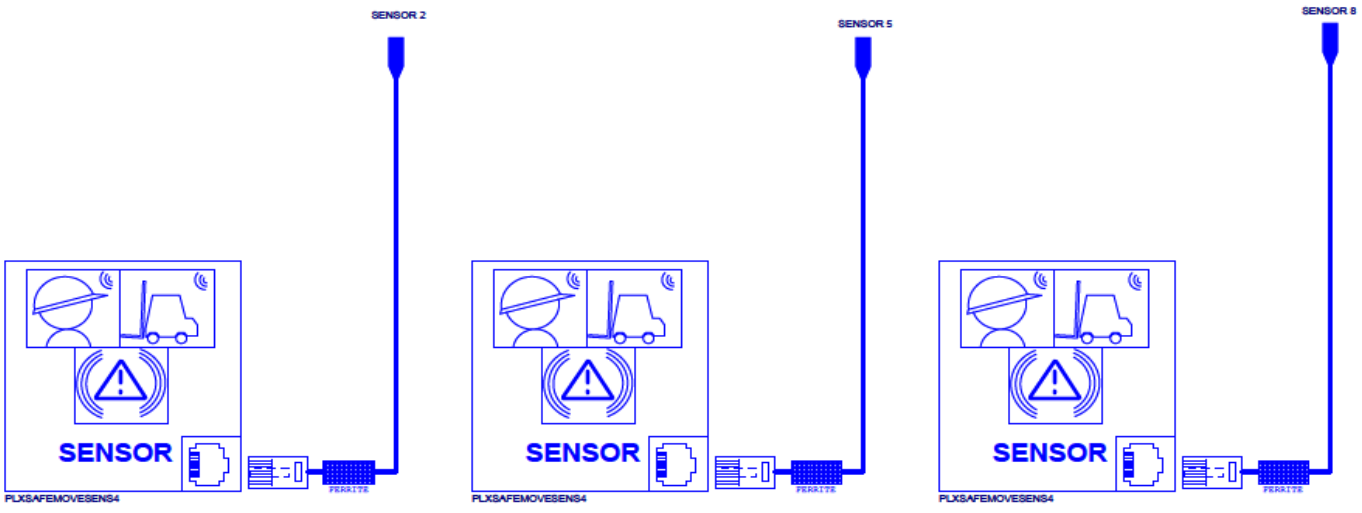
12.2 SAFE MOVE CPU CONNECTIONS



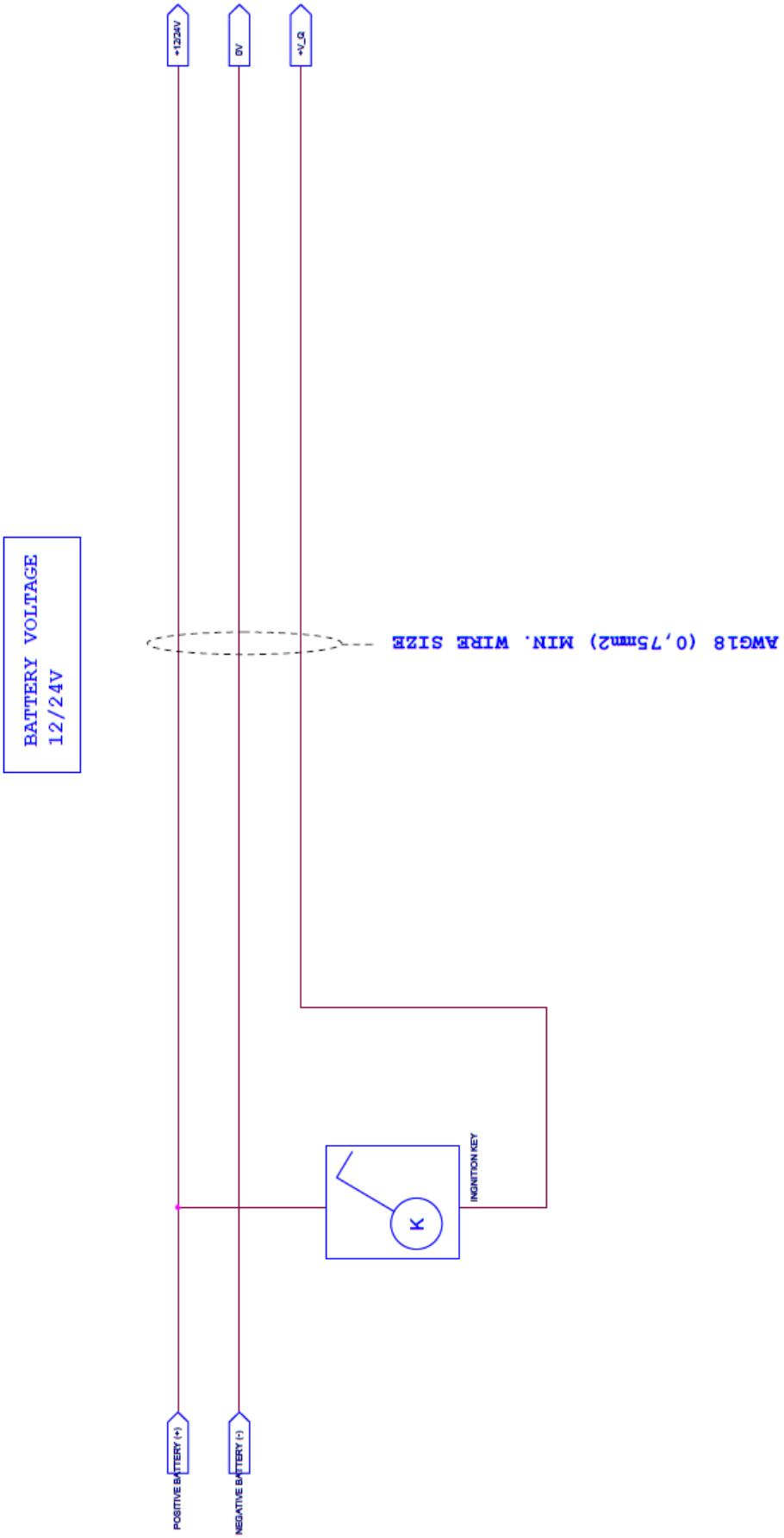
12.3 SENSOR'S HUB CONNECTIONS



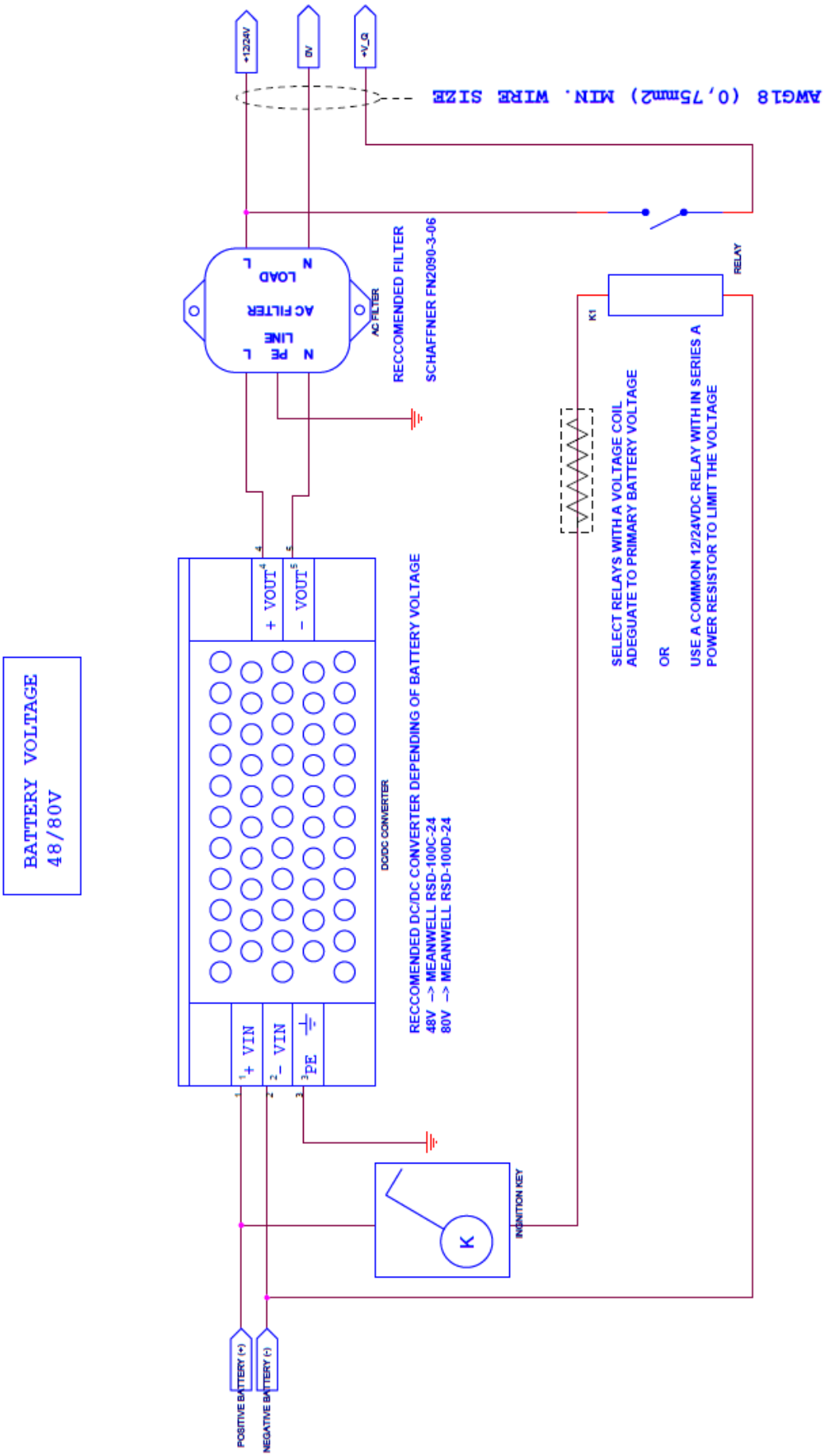
12.4 SENSORS CONNECTIONS



12.5 SAFE MOVE POWER DISTRIBUTION



12.6 SAFE MOVE POWER DISTRIBUTION (HIGH VOLTAGE BATTERY)



13 DATA SHEET OF SYSTEM COMPONENTS

13.1 SENSOR

Code PLX SAFEMOVE SENS 4

The Sensor is positioned around the vehicle, and generates 2 alarm/detection areas around the vehicle:

- Pre-Warning up to 50 m
- Warning up to 5 m

The sensor also detects the presence of other vehicles in the Pre-Warning area up to 100 m. This function is enabled only after activating the SOFTWARE LICENCE and purchasing the Vehicle-Vehicle Module.

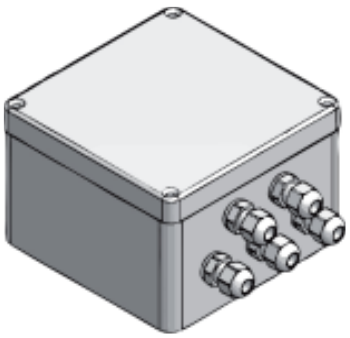
The number of sensors may vary depending on the needs. The basic KIT includes 3 sensors, but there can be up to 8 sensors with an additional module.

The sensor does NOT work if it is not connected to the HUB: P LX SAFEMOVEHUB 4.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	12-24 V ⎓
MAXIMUM POWER (absorbed by HUB)	18W
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP67
WEIGHT	0,3 kg
DIMENSIONS	157 mm x 95 mm x 54 mm

ACCESSORIES INCLUDED	
74271132S	Black snap ferrite
PSMSN002M002	Double-U joint

13.2 HUB



Code PLX SAFEMOVE HUB 4

The HUB is the device in charge of managing the sensors. It has a communication connection towards the CPU and 3 connections towards the sensors. The number of sensors managed can be extended up to 8 with suitable expansion devices.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	12-24 V ⎓
MAXIMUM POWER (1-4 sensors)	20W
MAXIMUM POWER (5-8 sensors)	40W
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP65
WEIGHT	0,9 kg
DIMENSIONS	122 mm x 145 mm x 82 mm

RELAY CHARACTERISTICS	
MAXIMUM COMMUTABLE VOLTAGE	30 V ⎓
MAXIMUM CURRENT	1 A
SERVICE LIFE	5 000 000 CYCLES
COMMUTATION SPEED	18000 CYCLES /h

ACCESSORIES INCLUDED	
74271132S	Black snap ferrite
SALXANT433EXSF0002	External antenna 433 MHz

13.3 WEARABLE TAG

Code PLX TAGSAFETY 3T

Clip for band

Use the screws supplied: 2.2X7

Slot for strap

Use the screws supplied: 2.2X6

Snap fastener

Use the screws supplied: 2.2X7

With the wearable Tag, pedestrian workers can be detected by the EGOpro Safe MOVE 4.0 system either in Pre-Warning or in Warning. The Tag is powered by a lithium button cell battery that is easy to replace.
The case is ergonomic and its upper cover is made of rubber. It is supplied together with a series of accessories thanks to which it can be worn in different ways, such as neck strap, waist clip and snap fastener.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	3 V ⎓
MAXIMUM POWER	50mW
BATTERY TYPE	2450
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP 55
WEIGHT	65 g
DIMENSIONS	50 mm X 24 mm X 66 mm

ACCESSORIES INCLUDED
WAIST CLIP
RING FOR STRAP
SNAP FASTENER
CR2450 BATTERY

13.4 HELMET TAG

Code PLX TAGSAFETY 3TH

The helmet Tag has the same functions as the wearable Tag, but it has been designed to be affixed to safety helmets. It uses two-antenna architecture for Pre-Warning located inside flexible wings fitted with suitable adhesive for polyethylene and HD polyethylene, the material with which safety helmets are made. It is powered by a 2450 button cell battery that is easy to replace. The Tag is put on the helmet in the way described in paragraph 5.1.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	3 V ⎓
MAXIMUM POWER	50mW
BATTERY	2450
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP 55
WEIGHT (g)	75 g
DIMENSIONS	362 X 24 X 76 mm

ACCESSORIES INCLUDED
Cleansing napkin
CR2450 BATTERY

13.5 CONTROL UNIT

Code P LX SAFEMOVE CPU

The CPU of the EGOpro Safe Move 4.0 system is the core of the system. All devices must be connected to a CPU via a Data Bus. It manages everything related to configurations, data logging and the activation of other functions compatible with the system (e.g., speed reduction).
These elements are connected to the CPU: • display • sensors • power supply
Moreover, the USB output is available for downloading data and two relay contacts.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	12-24 V ⎓
MAXIMUM CURRENT (WITH DISPLAY)	1.5 A
POWER CONSUMPTION (WITH DISPLAY)	15W
POWER CONSUMPTION ON STBY	1W
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP 20
WEIGHT (g)	1 kg
DIMENSIONS	213 mm x 154 mm x 75 mm
NUMBER OF RELAY OUTPUTS	2 (see table below)
LOGIC INPUTS	2 (0-24 V ⎓)
LOGIC OUTPUTS	2 (0-24 V ⎓)
232 SERIAL OUTPUTS	1
LAN PORT	10/100 ETHERNET P.O.E. TYPE B OPTIONAL
USB PORT	USB 2.0

RELAY CHARACTERISTICS	
MAXIMUM COMMUTABLE VOLTAGE	30 V ⎓
MAXIMUM CURRENT	1 A
SERVICE LIFE	5 000 000 CYCLES
COMMUTATION SPEED	18000 CYCLES /h

OPTIONAL ACCESSORIES
GPS WITH EXTERNAL ANTENNA

13.6 DISPLAY

Code P LX SAFEMOVE DIS

By means of visual and sound alarms, the Display warns the driver, in real time, about the presence and position of pedestrian workers/vehicles with an active Tag entering the danger areas around a vehicle in motion. The display is connected to the control unit by means of a sole 2.5m-long cable that has a bayonet connector at its end.

TECHNICAL SPECIFICATIONS	
SUPPLY VOLTAGE	12-24 V ⎓
MAX. POWER CONSUMPTION (by CPU)	3 W
OPERATING TEMPERATURE	-20°C +60°C
DEGREE OF PROTECTION	IP 20
WEIGHT (g)	1,2 kg
DIMENSIONS	178 mm x 115 mm x 60 mm
RESOLUTION	800 x 600
TOUCH SCREEN TYPE	RESISTIVE

ACCESSORIES
CONNECTION CABLE (L=2.5m)
FASTENING JOINT PSMSN002M002

UNI EN ISO 9001:2015

SISTEMA DI GESTIONE QUALITÀ CERTIFICATO

CERTIQUALITY È MEMBRO DELLA FEDERAZIONE CISQ

Exclusively to the following activities: research, development, design, creation, maintenance and post-sales assistance of electronic systems

Advanced Microwave Engineering S.r.l.

Via Lucca 50-54, 50142 Florence, Italy

Tel.: +39 055 73921 - ***E-mail***: info@ameol.it

Web: www.ameol.it