

22 SHOCK SENSOR MODULE

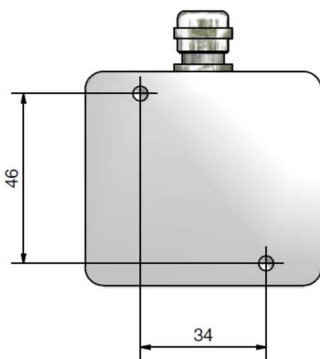
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22.1 INSTALLATION

The shock module includes the shock sensor that must be fitted correctly on the vehicle.

The shock sensor must be installed horizontally or vertically using the fixing bores in the box. In this way the device is rigidly joined to the vehicle.



Fixing bores: \varnothing 4.2 mm. Screws to be used: M4.

The device should be installed with the cable gland turned downwards.



The shock sensor must NOT be installed in a damped section of the vehicle (e.g. the driver's cabin) but in an area rigidly connected to the vehicle and parallel to the anchoring point (e.g. ballast).

The shock sensor is supplied with a 5-m UTP cable which must end with an RJ45 connector (see section 8.3.1) and must be connected either directly to a sensor port of the CPU or to a splitter.

22.2 VISUALISATION



With this device, the system can acquire the three components of the acceleration vector (A_x , A_y , A_z) that will be used to determine whether a shock was detected or not.



The icon of the SHOCKS module is green: the system is receiving data from the sensor.



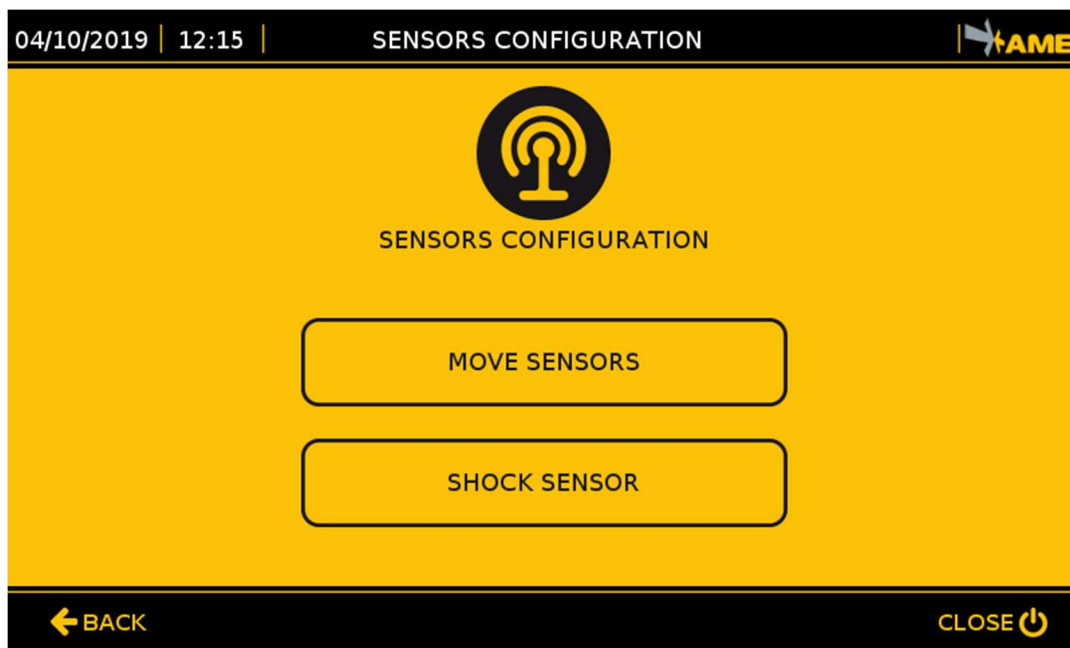
The icon of the SHOCKS module is red: the system is not receiving data (communication error or a problem in the sensor itself).

In case of a shock, the system warns the user with a sound and a message in red shown on the lower left-side corner, which also displays the axis on which the shock occurred.

The system automatically saves the 100 measurements before the shock and the 100 measurements after the shock to provide the dynamics of the event. The data related to the shocks recorded are:

- Date and time
- Intensity
- Position on the map (if the GPS is active)
- Vehicle speed (if the GPS or the speed indoor sensor is active)

22.3 CONFIGURATION



To adjust the speed sensor, configure the settings in the 'SENSORS SEARCH' sub-menu in the 'SENSORS CONFIGURATION' menu.

These are the options in the 'Sensor search' submenu:

- **MOVE SENSORS:** It defines active sensors.
- **SHOCK SENSOR:** It configures the shock sensor.

Press the '**SHOCK SENSOR**' key and access the configuration menu.

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	Value	THR.
X	5	2500
Y	1972	2500
Z	-35	3000

Test Sensor

Save Settings

← BACK CLOSE

This screen displays the current value of the sensor (Value) and also allows setting the thresholds for the three axes (THR). Thresholds are always referred to the average value.

Therefore, the shock is determined as a sudden variation in reference to the average.

Ax, Ay and Az can have values of about ± 8192 , and depend on how the sensor is oriented in reference to the surface. If the sensor is placed over a surface, the vector related to that direction is about 1 g (2048). The signal is positive or negative according to the direction.

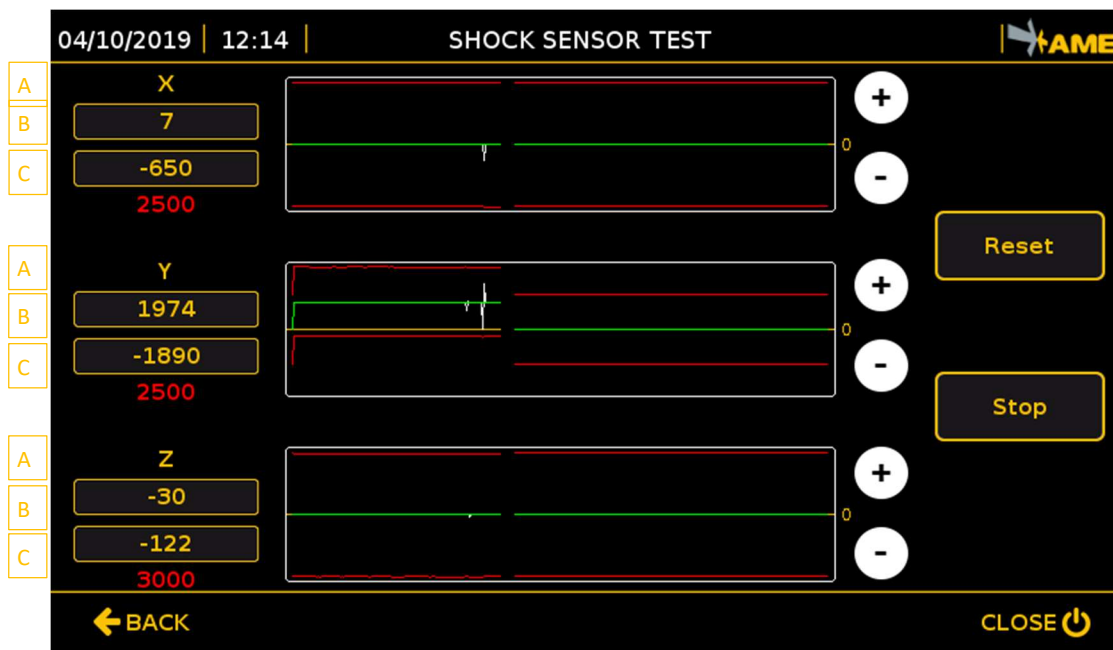
X, y and z values serve to check that the position of the shock sensor is the correct one. If the sensor has been mounted correctly, that is, fixed to the vehicle (not in a damped section) and parallel to the anchoring point, the data of the axes should follow these values:

- The value of one axis must be between +1848 and +2048
- The value of the other two axes must be between -200 and +200



The THR value is editable so it can be changed.

22.4 SHOCK SENSOR TEST



Access the menu of test of the sensor by pressing 'Sensor Test'. 3 values are reported for each axis:

- A: current value
- B: maximum peak width
- C: threshold (THR)

If a shock occurs, value B becomes red and an alarm sound is triggered.

Moreover, a diagram is shown for each axis, in which:

- White: real-time value
- Green: average of the last samples
- Red: lower and upper threshold

In order to display values in an appropriate scale, the software uses the 'Autoscale' function. To display the graph in a position centred on the average value, and therefore easier to read, use the and keys. Each time the key is pressed, the offset increases or decreases by 100.

'Stop' interrupts the capture; the 'Reset' key interrupts the recording process and deletes the diagram.

23 MAINTENANCE

23.1 SOLVING COMMON PROBLEMS

23.1.1 Sensors diagnosis

If an error is detected by the self-diagnosis of the system, refer to the following table as a guide on how to solve the problems.

Error detected	Description	Possible solution
Communication Error	The CPU does not communicate with the HUB or the HUB does not communicate with one or more sensors.	<ul style="list-style-type: none"> Check the data connection cables between the CPU and the HUB, and between the HUB and the sensors in error. For M12 connectors, check for correct tightening. Replace the cables if they are damaged. If all the sensors are in error, there may be a problem between the CPU and the HUB; if this is the case, also check if the HUB is correctly powered (see section 6.3.4).
Microwave Error	The power level emitted by the sensor is below the expected limit and/or the reception sensitivity is below the minimum threshold.	<ul style="list-style-type: none"> The system could work anyway, but both tag detection in the 'pre-warning' zone and the vehicle-vehicle anti-collision function will be poor. <i>We therefore recommend contacting the support centre.</i>
Low Frequency Error	The power level emitted by the sensor is below the expected limit or the LF antenna is not connected.	<ul style="list-style-type: none"> The system could work anyway, but tag detection in the 'warning' zone will be poor. If the tags are not detected in the 'warning' zone by a dedicated sensor, the LF antenna inside may not be connected. Make sure that the sensor is installed correctly (see section 8.3.3). Check that the LF antenna wire is not damaged; disconnect the J3 connector and use a tester to check that the resistance measured at the ends of the connector is less than 4 ohm.
RF Sensor Error	The power level emitted by the sensor is below the expected limit.	<ul style="list-style-type: none"> The system could work anyway, but the vehicle-vehicle anti-collision function will be poor. Check that the wire antenna connected to the J9 connector (see section 8.3.3) is connected and correctly anchored to the sensor housing. <i>If the error does not disappear, we recommend contacting the support centre.</i>
Radio frequency Error	The reception sensitivity of the HUB is below the minimum threshold.	<ul style="list-style-type: none"> The system could work anyway, but both tag detection and the vehicle-vehicle anti-collision function will be poor. <i>We recommend contacting the support centre.</i>

23.1.2 Solution to common problems

Device	Description	Possible solution
CPU	Does not turn on	<ul style="list-style-type: none"> Check the power supply; if it is higher than 30V, the CPU goes into protection mode to avoid any damage. Check the fuse inside the CPU. <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
	The stand-by function does not work	<ul style="list-style-type: none"> Check the V_Q signal <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
	It restarts repeatedly	<p><i>If the system never makes a complete start, contact the support centre.</i></p>
DISPLAY	The screen is black	<ul style="list-style-type: none"> Check the connection of the display connector to the CPU. Disconnect and connect again the CPU power supply; if no sound is heard, check the CPU power supply. <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
	The screen is white	<ul style="list-style-type: none"> Check the connection of the display connector to the CPU. Disconnect and connect again the CPU power supply. Check if the power supply line of the CPU has sufficient current (1.5A). <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
	Touchscreen does not work	<ul style="list-style-type: none"> Disconnect and connect again the display connector to the CPU. Restart the system by disconnecting and connecting again the CPU power supply. <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
	No sound	<ul style="list-style-type: none"> Check the volume from the system settings. <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
TAG	Not detected by the system	<ul style="list-style-type: none"> Check the battery of the TAG. If the CheckPoint is present, check the status of the TAG on this device. Check the configuration of the sensors, in particular the power set. Check if the RF antenna is correctly installed and connected to the HUB (see section 8.3.4). If the Filter Sens module is present, check its configuration, and check that the tag is not inhibited beyond the driver's cabin limit. <p><i>If the error does not disappear, we recommend contacting the support centre.</i></p>
GPS	Video icon is always in red	<ul style="list-style-type: none"> Check the position of the external antenna. It must be facing the sky and not be shielded by metal parts. Check the connection to the CPU connector.

23.2 RECOMMENDED CHECK INTERVALS

Although there is a self-diagnostics for the system, before using the vehicle, always conduct a quick visual inspection of the condition of the components, in particular the sensors and their connection cables, which are the elements highly subject to damage caused by impacts or improper use of the vehicle.

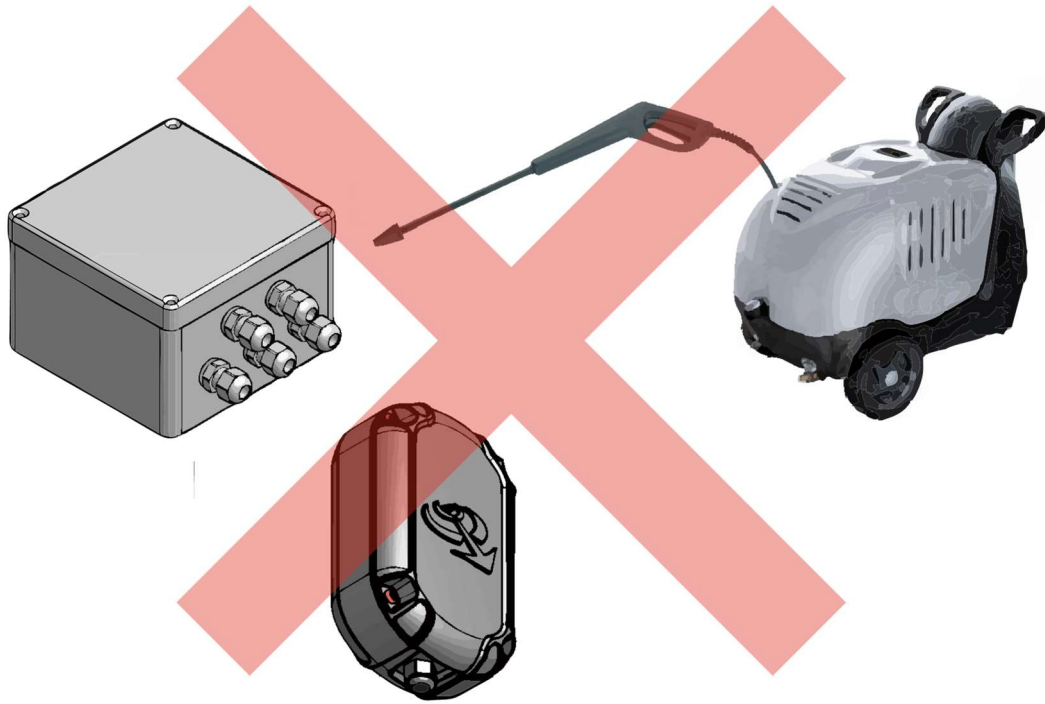
It is also advisable to conduct a more thorough checking of the system periodically by following the procedure shown in the table below. It can be repeated also after a major maintenance of the vehicle or after a wash, in particular if high pressure water cleaning systems have been used.

1. Start the system and wait for the main screen to appear.
2. Check the status of the sensors; all sensor icons must be green.
3. Check the status of the sensors by pressing the relevant sensor icons. The message 'Sensor Ok' must appear for each of the sensors.
4. Run the tag activation test as described in section 9.3.2

23.3 CLEANING COMPONENTS

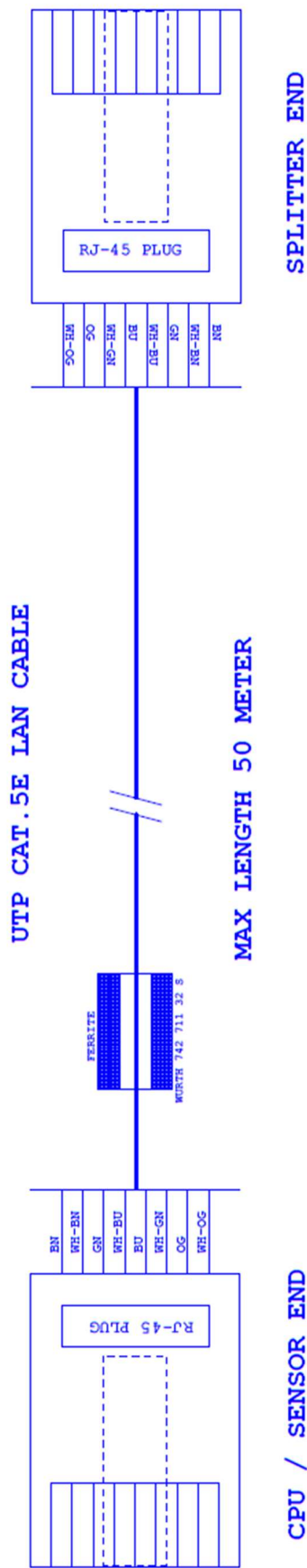
To clean the display, do not use aggressive products that could damage the surface of the panel and the housing.

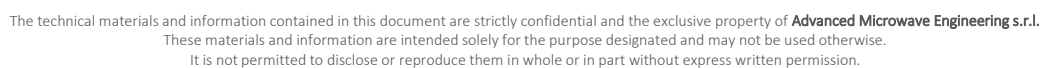
To clean the devices found outside the vehicle, in particular the sensors and the HUB, it is advisable not to use direct jets of pressurised water (e.g., pressure washer). However, avoid aiming the jet directly to the connection area of the cables and the union between the cover and the housing; in any case keep a safe distance of at least 1 meter from these devices.



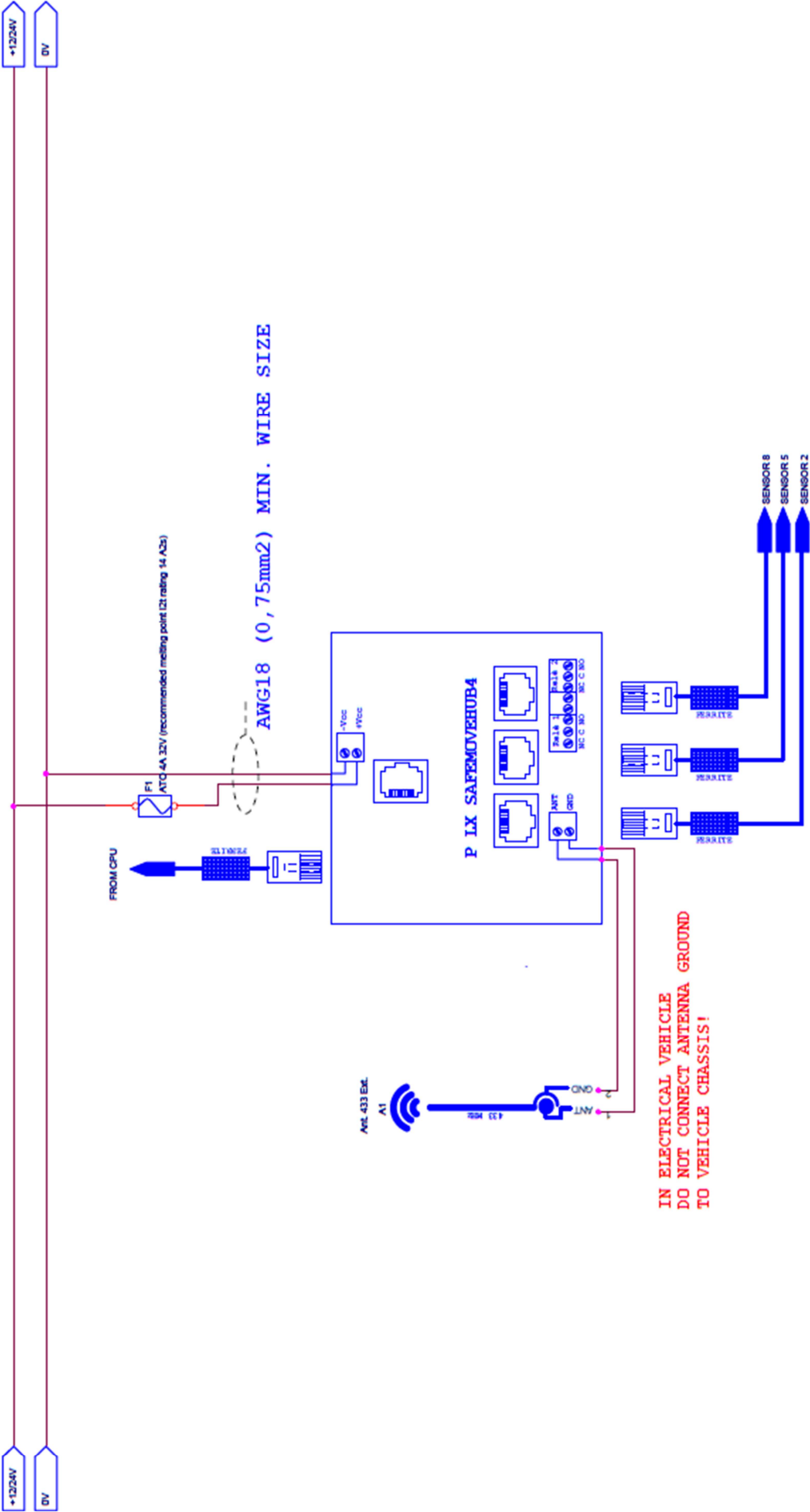
24 WIRING DIAGRAMS

24.1 CABLES OF SENSORS

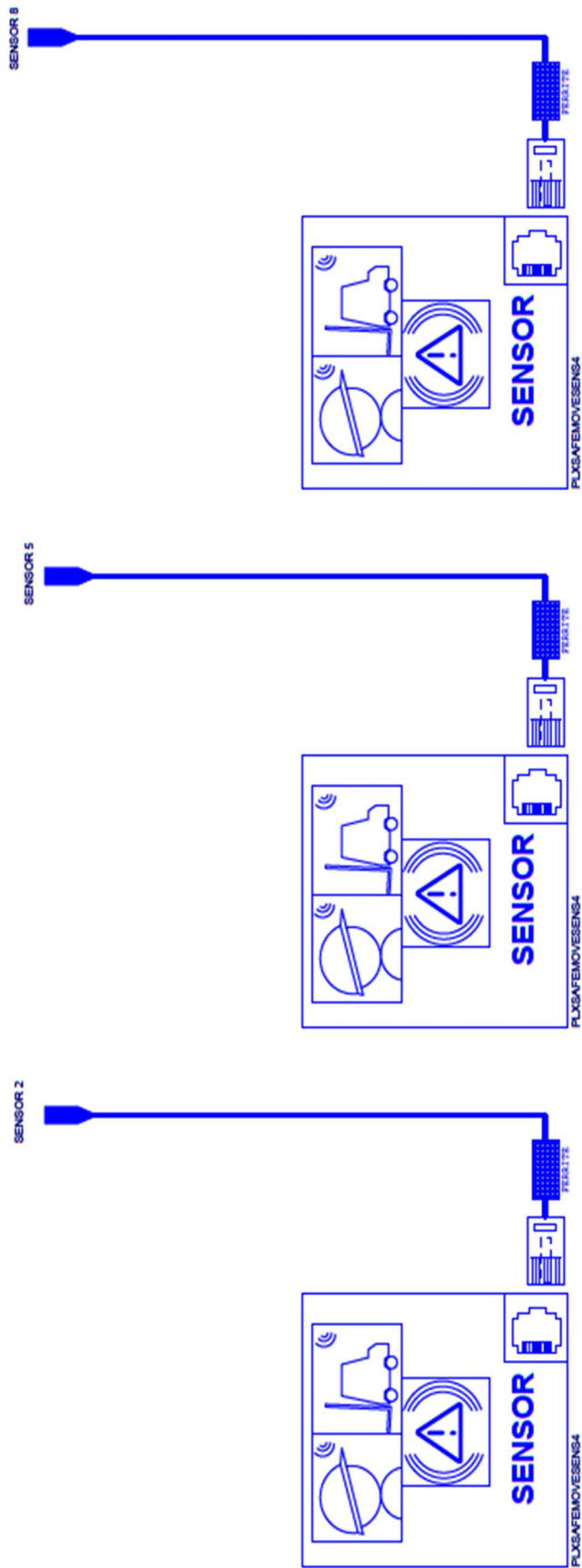




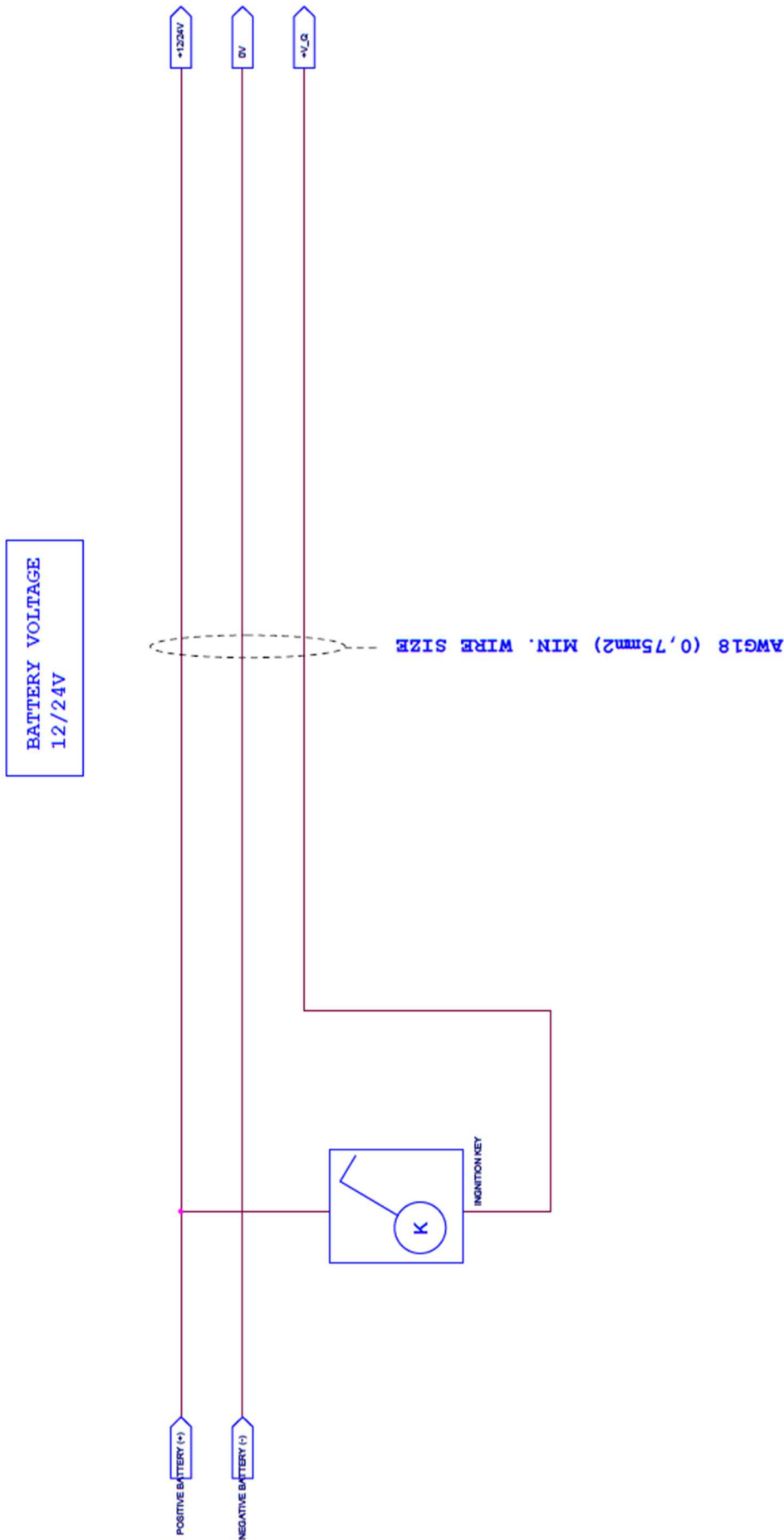
24.3 HUB-SENSORS CONNECTION



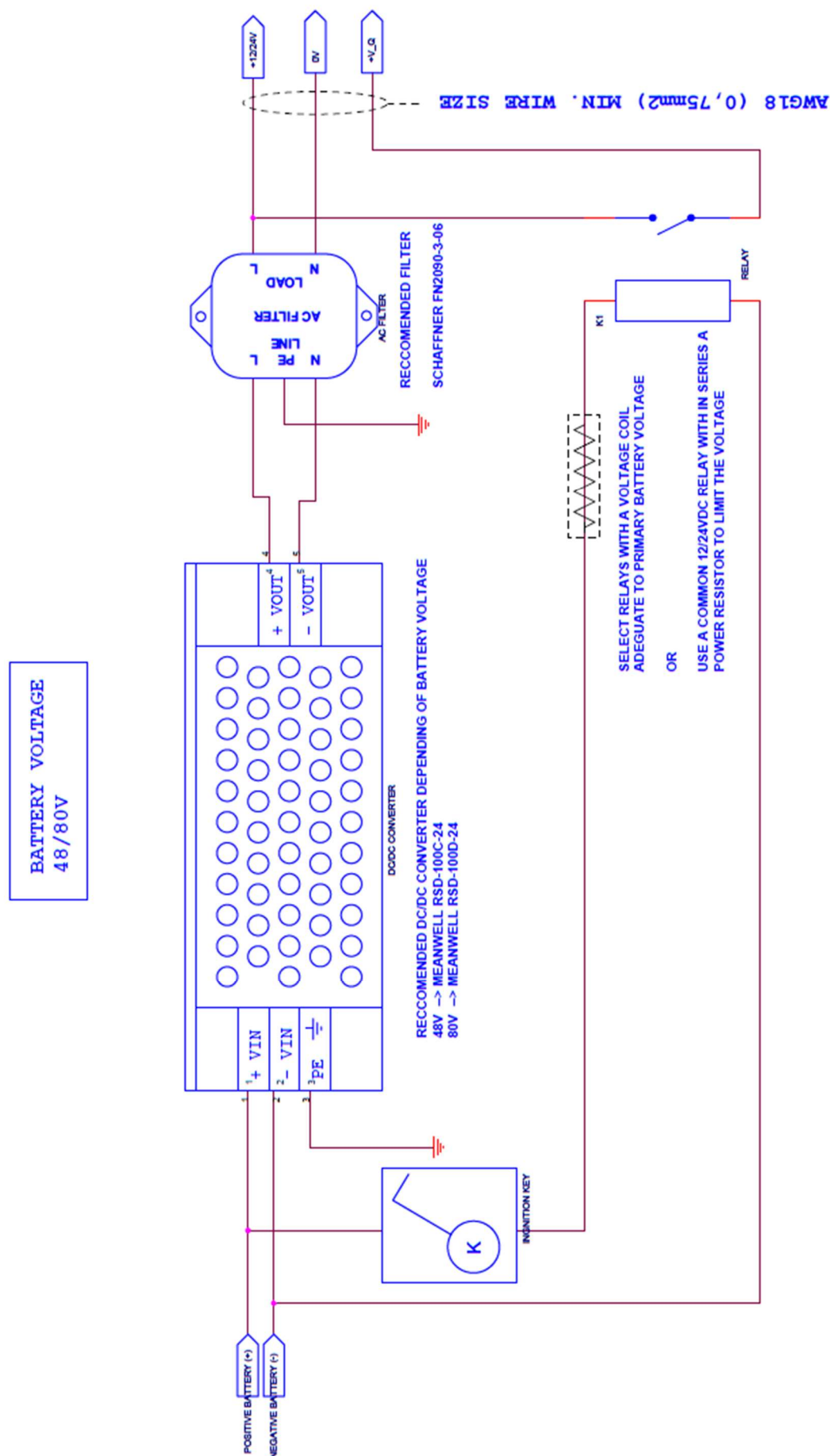
24.4 SENSORS CONNECTION



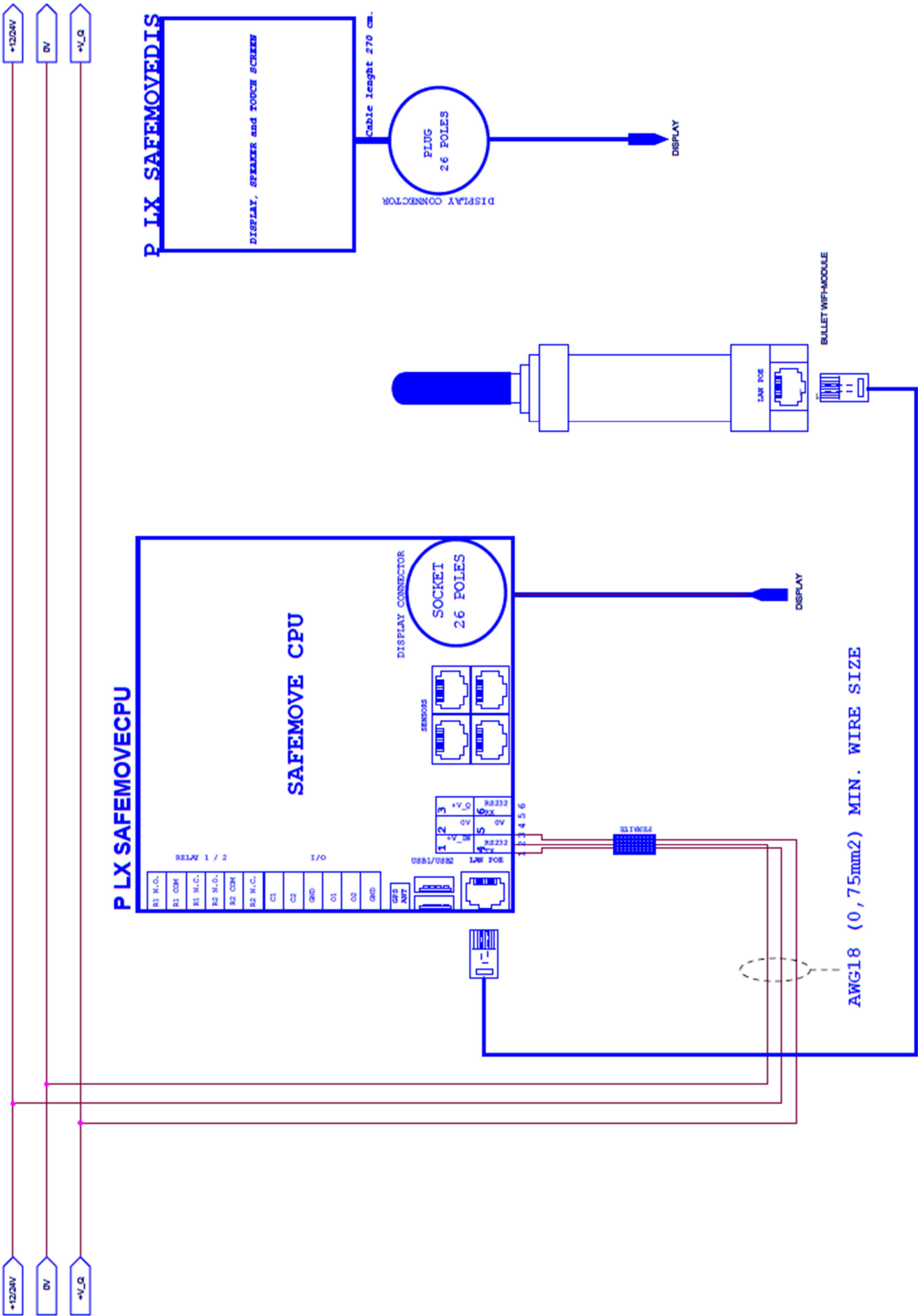
24.5 SAFE MOVE POWER DISTRIBUTION



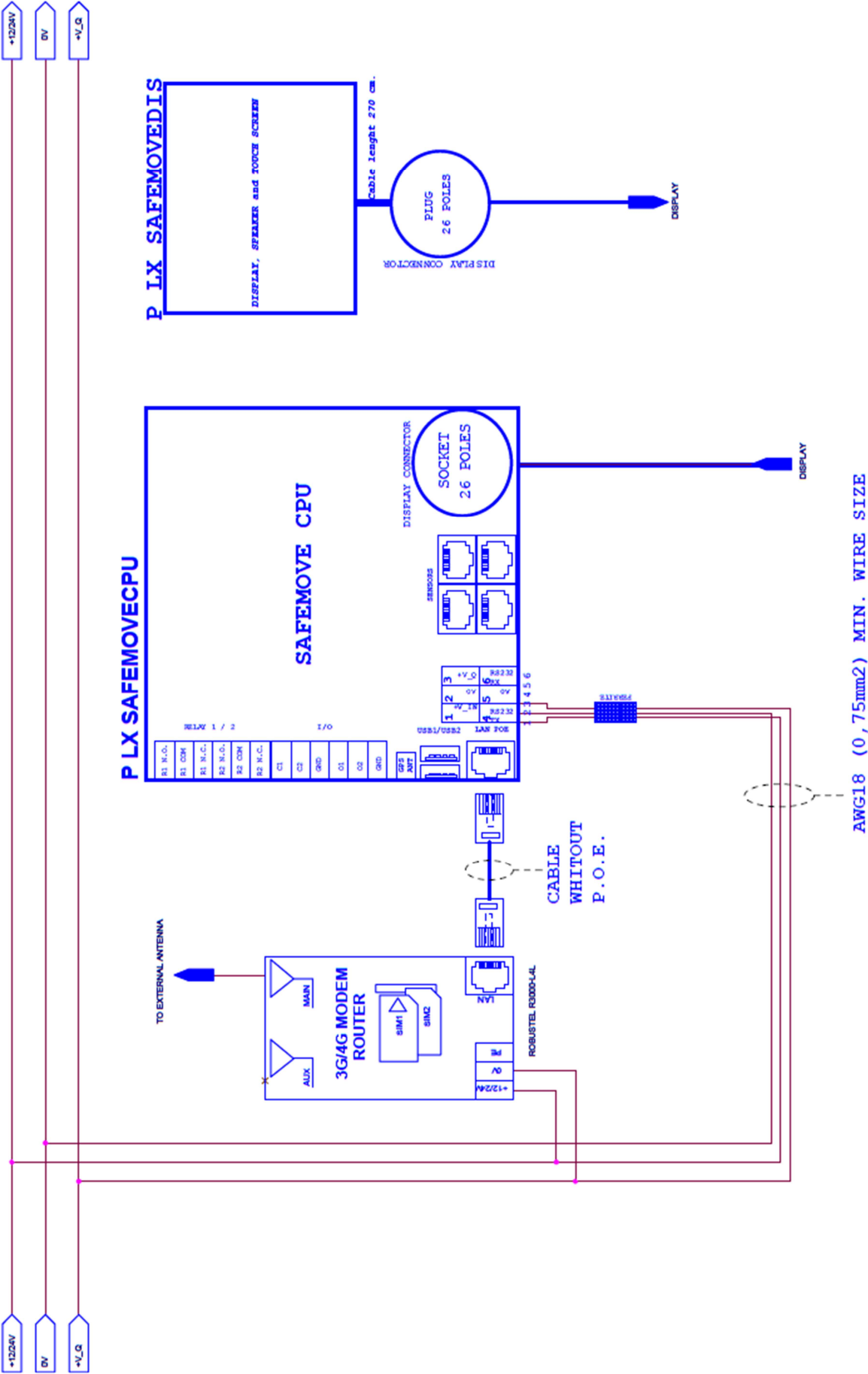
24.6 SAFE MOVE POWER DISTRIBUTION (HIGH VOLTAGE BATTERY)



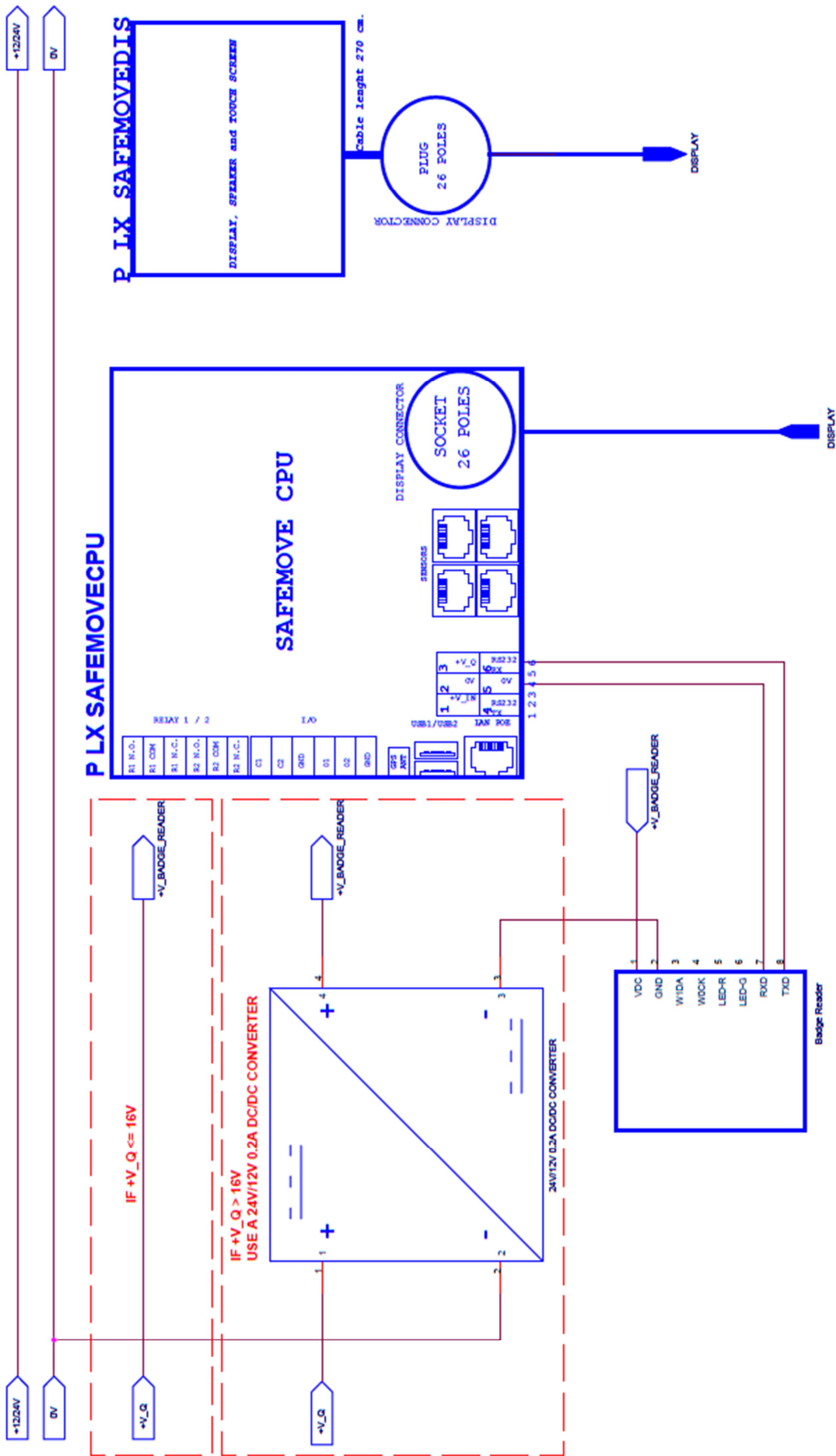
24.7 Wi-Fi MODULE CONNECTION



24.8 CELLULAR MODEM CONNECTION



24.9 BADGE READER CONNECTION



24.10 HUB EXTENSION (UP TO 8 SENSORS)

