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# LED LUMINOUS GUIDANCE SIGN

# LIMS

# INSTRUCTION MANUAL FOR USE, INSTALLATION AND MAINTENANCE

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## EDITIONS

| Ver. | Date | Description | Authors | Reviewers | Approver |
|---|---|---|---|---|---|
| 1.0 | 20/01/2017 | FIRST ISSUE | P. CORINTO | E. RAULI | M. MAZZOTTI |
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## LIST OF ATTACHMENT

| Reference n° | Document Code | Description |
|---|---|---|
| | | |

## ABBREVIATIONS AND TERMS

| Term or abbreviation | Description |
|---|---|
| LED | Light Emitting Diode |
| ICAO | International Civil Aviation Organization |
| EASA | European Aviation Safety Agency |
| PMMA | Polymethylmethacrylate |
| CCR | Constant Current Regulator |
| FAA | Federal Aviation Administration |

# 1 GENERAL

The internally LEDs illuminated LIMS signs are designed to be used on airport taxiways and runways to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of Surface Movement Guidance.
LIMS are single face signs in compliance with ICAO - Annex 14 Vol.1, EASA CS-ADR-DSN Chapter N and NATO-STANAG 3316. White on Red, Yellow on Black and Black on Yellow colour combination may be ordered with any desired message.
The signs described in this manual are manufactured to be used on airport series circuits, through isolating transformers, powered by 5-step (2.8 A - 6.6 A), 3-step (4.8 A - 6.6 A), and 1-step (6.6 A) Constant Current Regulators.
Consult ICAO Specs - Annex 14 and ICAO Aerodrome Design Manual - Part 4 for sign features and use.

# 2 CLASSIFICATION OF SIGNS

## 2.1 Type

| | |
|---|---|
| **Mandatory signs** | White legend on Red background |
| **Location signs** | Yellow legend on Black background |
| **Information (direction, destination, boundary) sign** | Black legend on Yellow background |

*Table 1: Types of signs*

A sign may consist of multiple arrays of the above messages.

## 2.2 Legend Sizes

| | |
|---|---|
| **Height of large legend** | 400 mm |
| **Height of mid legend** | 300 mm |

*Table 2: Legend Sizes*

# 3 MAIN FEATURES

## 3.1 Signs Description

The signs practically include the following sections (Figure 1):

A. Frame
B. Supports
C. Panels
D. LEDs luminous source
E. Electronic board

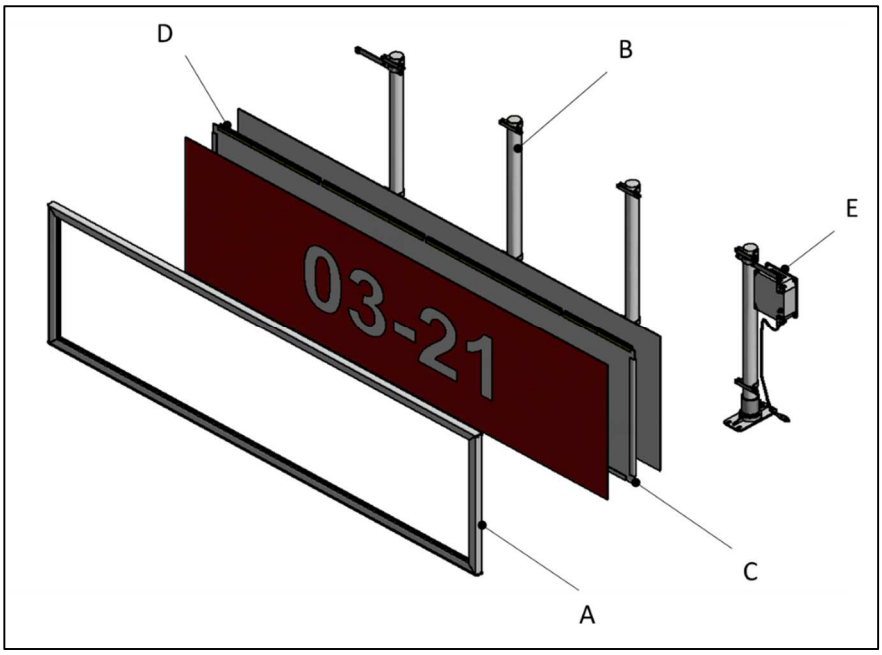



*Figure 1: Exploded view*

### 3.1.1 Frame

The frame principally consists of a bearing bottom structure, two sides and one top cover (Figure 2).
Bottom structure, sides and top cover are made of extruded aluminium profiles, realized according to our design.
The signs are equipped with a single top cover, locked to the main structure by means of four hexagonal knob. The main structure is white outside painted (other colours are available on request).

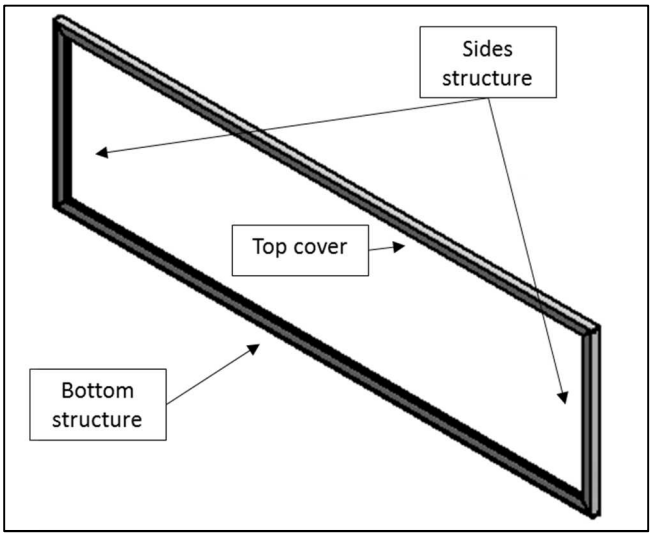



*Figure 2: Frame*

### 3.1.2 Supports

Each support includes a pole, a BREAKABLE COUPLING KIT and a floor flange (Figure 3). All components are made of aluminium. The supports are fixed to the structure with “C” clamps.

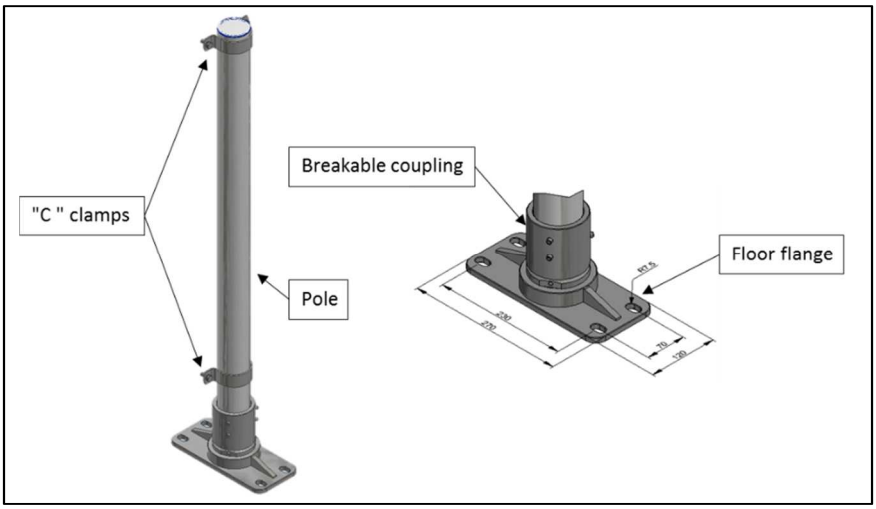



*Figure 3: Support*

### 3.1.3 Panels

The panels enclosed in the frame are (Figure 4):

- Text panel
- Light-guide panel
- Back panel

The text panel is made of high performance methacrylate 4 mm thick.
The light-guide panel is made of PMMA, while the back panel is made of a composite material.
The legend is obtained by means of adhesive coloured translucent films applied to the internal side of the text panel.

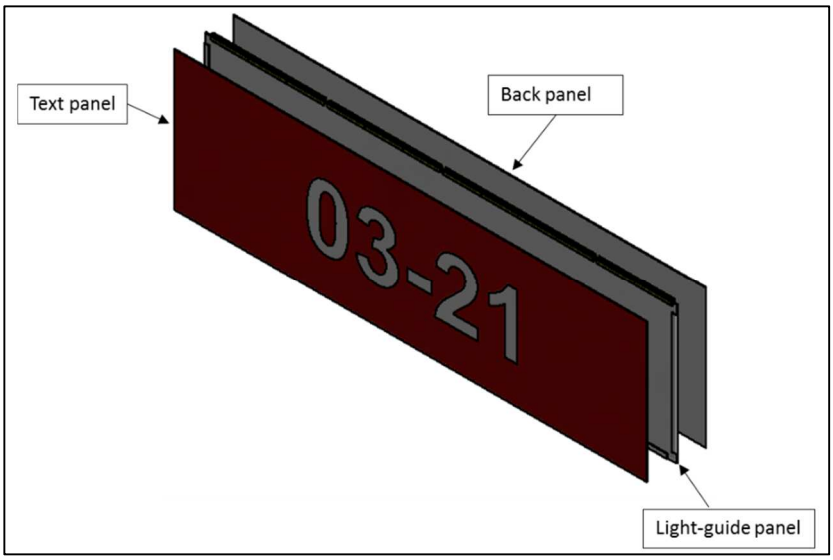



*Figure 4: Panels*

### 3.1.4 LEDs Luminous Source

The signs are illuminated by strips LEDs (Figure 5) inserted in suitable supports.
High efficiency white LEDs are used, with an average life of 60.000 hours.
The positioning of the LEDs has been determined through photometric tests in order to meet the luminance values as required by ICAO Specs - Annex 14.
Three different strips lengths are used (720, 960 and 1200 mm) for the different signs lengths (see Table 4).

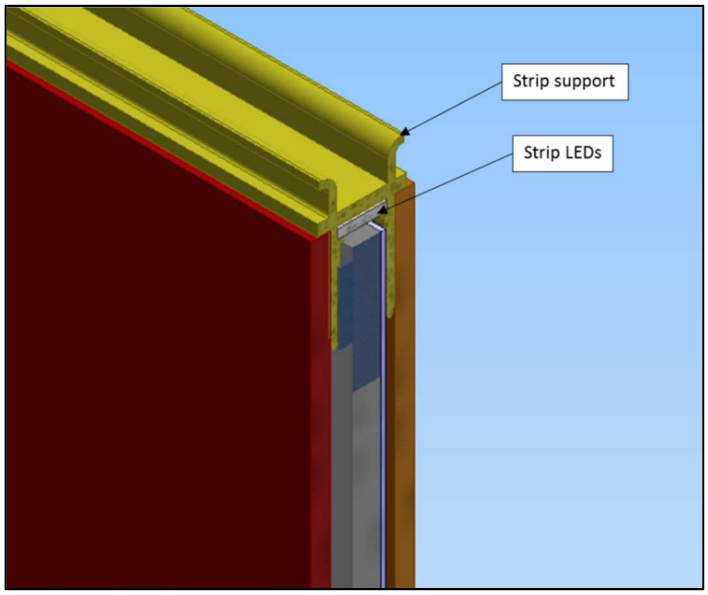



*Figure 5: LEDs luminous source*

### 3.1.5 Electrical circuit

Constant Current supply (AGL Series Circuit)
Signs for constant current series circuits are equipped with an electronic current converter housed inside a water proof aluminium box, mounted on a side of the external frame.
About the luminance levels, two versions are available:

- 1 luminance level over the whole input current range 2.8 A ÷ 6.6 A;
- 2 luminance levels depending on the input current value: in the standard version the current threshold at which the luminance level changes is 5.9 A (but optionally this threshold is customizable).

An option in available to monitor the light sources status, compliant with the fail open operation (see 3.1.8).

Further, to facilitate the feeding of the sign with different topologies of CCR, an optional stabilization circuit is available, composed by an inductor and a capacitor (see Figure 12Figure 12: Wiring diagram (sign with circuit stabilizer).

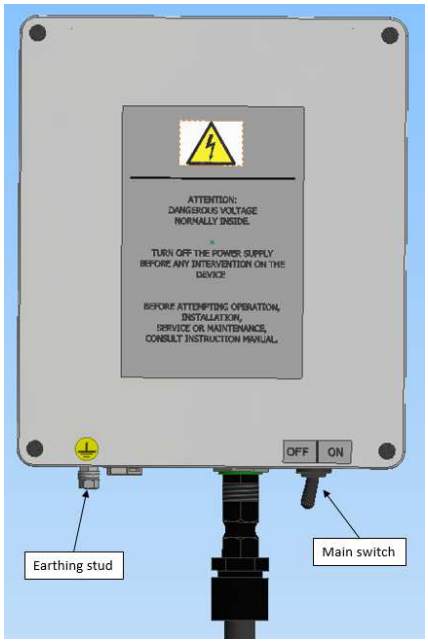



*Figure 6: Electronic board*

For the electrical connection to the isolating transformer the sign is equipped with a two-pole cable lead with L-823 plug, style 1, protected by a corrugated pipe.

The sign is also equipped by an external disconnecting switch (main switch), which allows to light off the sign and at the same time short circuit the isolating transformer. The main switch permits to light off the sign without disconnecting it from the series circuit.

The main switch MUST BE OPERATED ONLY WITH THE CCR OFF.
In general the CCR must be turned off before any intervention on the sign.

See Figure 11 and Figure 12 for the two types of wiring diagram of the signs (without and with stabilization circuit).

Low Voltage supply (230 V – 50/60 Hz) (OPTION)
An option is available that permits to feed the sign through a 230Vac supply network.
In this case the luminance level is constant and the monitoring of the sign status is not available.

### 3.1.6 Protection earthing

On the aluminium box containing the electronics, an earthing stud is available (see Figure 6).

**FOR SAFETY PURPOSES**, A CABLE OF 4 $MM^2$ MINIMUM SECTION, CONNECTED TO THE EARTHING SYSTEM OF THE AGL CIRCUIT **MUST BE CONNECTED** TO THE EARTHING STUD OF THE SIGN.

### 3.1.7 Models

The main sign dimensions are depicted in Figure 7. The possible values for the lengths A, A', B, C, D and H are indicated in Table 3.

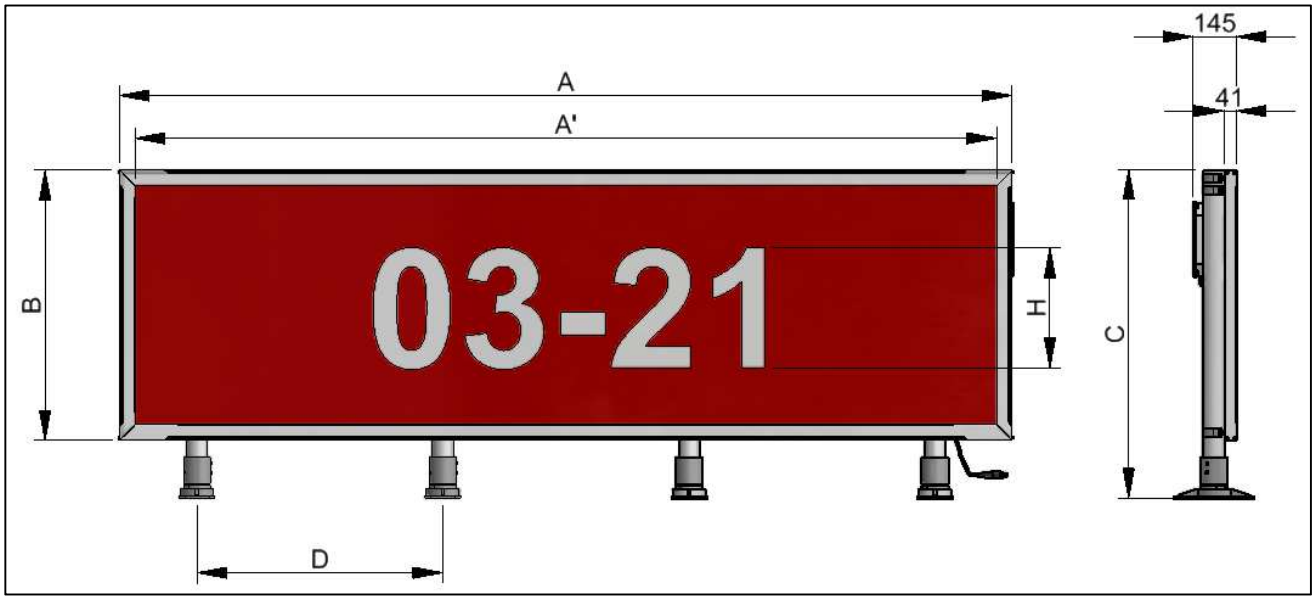



*Figure 7: Overall dimensions*

| Length A [mm] | Visible length A' [mm] | H=300mm B=704mm C=900mm | | | | H=400mm B=904mm C=1100mm | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Wind @ 320 km/h | | Wind @ 480 km/h | | Wind @ 320 km/h | | Wind @ 480 km/h | |
| | | Supports quantity | Distance D [mm] | Supports quantity | Distance D [mm] | Supports quantity | Distance D [mm] | Supports quantity | Distance D [mm] |
| 1094 | 990 | 2 | 574 | 2 | 574 | 2 | 574 | 2 | 574 |
| 1354 | 1250 | 2 | 834 | 2 | 834 | 2 | 834 | 3 | 417 |
| 1574 | 1470 | 2 | 1054 | 2 | 1054 | 2 | 1054 | 3 | 527 |
| 2054 | 1950 | 3 | 767 | 3 | 767 | 3 | 767 | 4 | 511 |
| 2294 | 2190 | 4 | 591 | 4 | 591 | 4 | 591 | 4 | 591 |
| 2534 | 2430 | 4 | 671 | 4 | 671 | 4 | 671 | 6 | 403 |
| 2994 | 2890 | 4 | 825 | 4 | 825 | 4 | 825 | 6 | 495 |

*Table 3: Signs dimensions*

Three different LED strips are possibly mounted on the signs, according to the overall sign lengths. The correspondence between sign length and LED strip length are showed in Table 4:

| **Sign length A [mm]** | Strip LEDs | |
|---|---|---|
| | **Quantity** | **Length [mm]** |
| 1094 | 1 | 960 |
| 1354 | 1 | 1200 |
| 1574 | 2 | 720 |
| 2054 | 2 | 960 |
| 2294 | 3 | 720 |
| 2534 | 2 | 1200 |
| 2994 | 3 | 960 |

*Table 4: Sign-strip length combination*

### 3.1.8 Monitoring Option

The electronic card of the signs with Monitoring Option has an electromechanical relay with a normally closed contact. This contact is assembled in series with the feeding circuit of the electronic card.
When one or more LED strips fail, the normally closed contact opens, turning off the electronic board and the sign lights off.
A manual intervention is needed to restore the relay contact in closed position and then to permit the sign to switch on again.

*Note: If the relay contact is restored after a LED strip failure and no replacement is performed, the monitoring functionality is automatically disabled. The monitoring will not be reactivated by the system until the failed LED strips will be replaced with good strips.*

The Figure 8 shows the positions of the relay contact.

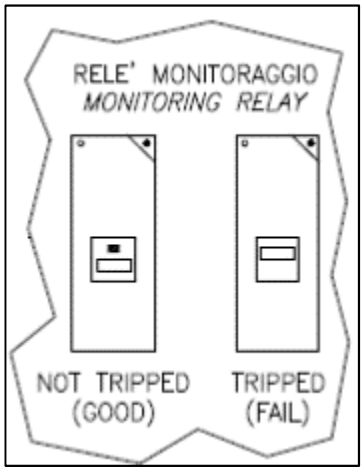



*Figure 8: Electromechanical relay*

### 3.2 Part Number Identification

**LIMS01 – 3 – 20 – 1 – 01**

**Basic Part Number:**

**Version:**

**Message Size:**
3 = Sign, 300 mm Legend Height
4 = Sign, 400 mm Legend Height

**Type (visible length mm):**
10 = 990 20 = 1950 30 = 2890
13 = 1250 22 = 2190
15 = 1470 24 = 2430

**Luminance Level:**
1 = Constant Luminance
2 = Two Luminance Levels

**Options:**
01 = Tether (2 tethers for signs with number of supports ≥ 3)
02 = Yellow frame
03 = Black frame
04 = Circuit Stabilizer
10 = Monitoring
48 = Reinforced version FAA-mode 3 (483 km/h)
69 = Orange rear side for single face signs (Italy)
70 = Bird Spikes

### 3.3 Environmental data

| | |
|---|---|
| **Temperature** | -40°C to +55°C |
| **Weather** | All outdoor conditions, exposure to: driving rains, snow and icing, salt-laden atmospheres, relative humidity from 5 % to 95 %. |
| **Wind Speed** | 322 Km/h (standard version) or 483 km/h (reinforced version – OPTION 48) ICAO Aerodrome Design Manual Part 6 Frangibility |

*Table 5: Environmental Data*

### 3.4 Electrical Data

The luminous signs are powered by series circuits through isolating transformers compliant to FAA Specs FAA L830-L831. The power consumption of the LIMS signs is reported in Table 6: for all sign type the power factor is higher than 0.9.

| Type | Power Consumption [W] |
|---|---|
| 10 | 32 |
| 13 | 36 |
| 15 | 40 |
| 20 | 51 |
| 22 | 53 |
| 24 | 61 |
| 30 | 70 |

*Table 6: Power consumption at maximum luminance*

The minimum size of the isolating transformer depends on both the sign type and the selected power supply (i.e. the number of current steps provided by the CCR), according to Table 7 and Table 8.

| Type | CCR TYPE | CCR 5 STEP (2.8 A-6.6 A) | | CCR 3 STEP (4.8 A-6.6) | | CCR 1 STEP (6.6 A) |
|---|---|---|---|---|---|---|
| | | Constant Luminance | Two Luminance Levels | Constant Luminance | Two Luminance Levels | Constant Luminance |
| 10 | SINUSOIDAL | 150 | 65* | 65* | 65* | 65* |
| | PHASE CUT | 150 | 100 | 100 | 65* | 65* |
| 13 | SINUSOIDAL | 150 | 100 | 100 | 65* | 65* |
| | PHASE CUT | 150* | 100 | 100* | 100 | 100 |
| 15 | SINUSOIDAL | 150 | 100 | 100 | 100 | 65* |
| | PHASE CUT | 200 | 100* | 100* | 100 | 100 |
| 20 | SINUSOIDAL | 200 | 100 | 100* | 100 | 100 |
| | PHASE CUT | 200* | 100* | 150 | 100* | 100* |
| 22 | SINUSOIDAL | 200 | 100 | 150 | 100 | 100 |
| | PHASE CUT | 200* | 100* | 150 | 100* | 100* |
| 24 | SINUSOIDAL | 200* | 100* | 150 | 100* | 100* |
| | PHASE CUT | 300 | 150 | 150* | 150 | 150 |
| 30 | SINUSOIDAL | 300 | 150 | 150 | 150 | 150 |
| | PHASE CUT | 300 | 150 | 200 | 150 | 150 |

*(*) we suggest to select a larger transformer size in case individual monitoring is performed with MCC devices*

*Table 7: Isolating Transformer Size [Watt] without Circuit Stabilizer*

| Type | CCR Type | CCR 5 STEP (2.8 A-6.6 A) | | CCR 3 STEP (4.8 A-6.6) | | CCR 1 STEP (6.6 A) |
|---|---|---|---|---|---|---|
| | | Constant Luminance | Two Luminance Levels | Constant Luminance | Two Luminance Levels | Constant Luminance |
| **10** | SINUSOIDAL | 150 | 100* | 100* | 100* | 100* |
| | PHASE CUT | 150* | 150 | 150 | 150 | 150 |
| **13** | SINUSOIDAL | 150 | 150 | 150 | 150 | 150 |
| | PHASE CUT | 200 | 150 | 150 | 150 | 150 |
| **15** | SINUSOIDAL | 150* | 150 | 150 | 150 | 150 |
| | PHASE CUT | 200 | 150 | 150 | 150 | 150 |
| **20** | SINUSOIDAL | 200 | 150 | 150 | 150 | 150 |
| | PHASE CUT | 300 | 150* | 150* | 150* | 150* |
| **22** | SINUSOIDAL | 300 | 200 | 200 | 200 | 200 |
| | PHASE CUT | 300 | 300 | 300 | 300 | 300 |
| **24** | SINUSOIDAL | 300 | 200 | 200 | 200 | 200 |
| | PHASE CUT | 300 | 300 | 300 | 300 | 300 |
| **30** | SINUSOIDAL | 300 | 200* | 200* | 200* | 200* |
| | PHASE CUT | 300 | 300 | 300 | 300 | 300 |

*(*) we suggest to select a larger transformer size in case individual monitoring is performed with MCC devices*

*Table 8: Isolating Transformer Size [Watt] with Circuit Stabilizer*

### 3.5 Luminance Data

Two versions of LIMS signs are available, according to the luminance option selected. For the constant luminance sign, the luminance is practically constant for any value of the series circuit current from 2.8A to 6.6A and the relevant values are shown in Table 9. In case of two luminance levels, the high intensity level is selected with a current greater than 6A, while with any values between 2.8A and 6A the low intensity luminance is provided. The high and low luminance levels are reported in Table 9.

| | High Intensity Level (and Constant Luminance) | | Low Intensity Level | |
|---|---|---|---|---|
| | ICAO Requirements | Typical Value | ICAO Requirements | Typical Value |
| **Average luminance yellow** | >150 cd/m$^2$ | 180 cd | >50 cd/m$^2$ | 110 |
| **Average luminance red** | >30 cd/m$^2$ | 40 cd | >10 cd/m$^2$ | 16 |
| **Average luminance white** | >300 cd/m$^2$ | 350 cd | >100 cd/m$^2$ | 135 |
| **Maximum ratio between two adjacent points** | <1.5 | 1.3 | <1.5 | 1.3 |
| **Maximum ratio across sign** | <5.0 | 1.8 | <5.0 | 1.8 |

*Table 9: Typical Photometric Performance*

**NOTE: the electrical and luminous data are referred to constant current regulators and isolating transformers manufactured and/or distributed by OCEM. The data may change with constant current regulators and/or transformers manufactured by other Companies.**

## 4 INSTALLATION

a) Take as reference Figure 7 for spacing between breakable couplings.

b) Remove the sign from the relevant packing.

c) The signs are normally installed so that the cable entry is located toward the runway or taxiway edge.

d) The concrete foundation for the sign should be flat and levelled. Refer to Figure 9 for relevant data. The isolating transformer must be placed inside a concrete pit complete with pipe elbow for the secondary cable passage or inside a steel base complete.

e) It is recommended that the anchor bolts (M12X60) used for the flange anchoring, are mounted after the completion of the concrete foundation. The anchor bolts have to be walled accurately as shown in Figure 9 and in manner to assure the parallelism of the centreline marked on the flange and the sign centreline.

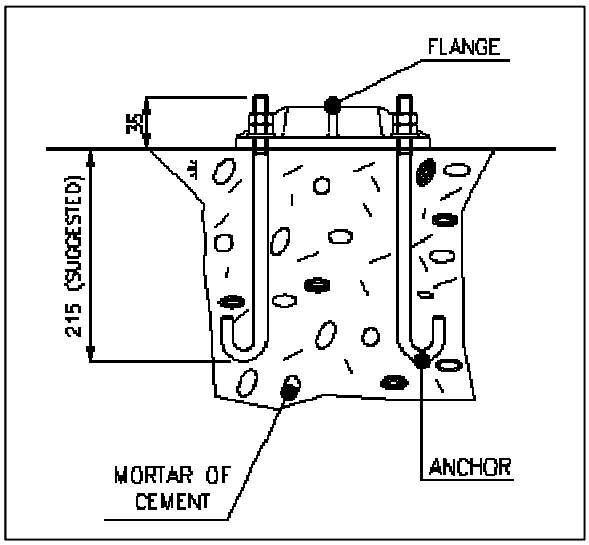



*Figure 9: Flange Installation with Anchor Bolts*

f) Remove the frangible couplings/floor flanges from the bottom of the sign by loosening the locking screws (set screw M8x14).

g) Taking care of the levelling of the floor flanges is very important to ease the installation of the sign. Place a long carpenter level across the top of the breakable couplings to verify their

alignment and levelling. Do not tighten the flanges anchor nuts, tight (only finger-tight) until the sign installation is complete.
Lower the sign with the legs onto the frangible couplings and tight the locking screws. Check the sign to be sure that it is levelled. Shim the floor flanges as required and put drying grout under the flange if necessary.

**NOTE:** some vertical adjustment can be obtained by rotating the frangible couplings a turn or two in the floor flanges.

h) Once the sign has been levelled, tighten the anchor nuts securely. (NOTE: anchor hardware is not supplied with the sign). Anchor hardware should be corrosion resistant.

i) Connect the cable plug of the sign to the socket of the isolating transformer. The plug-socket connection should be secured depending upon the installation method.

j) **CONNECT** THE EARTHING STUD OF THE SIGN TO THE EARTHING SYSTEM OF THE AGL CIRCUIT THROUGH A CABLE OF AT LEAST 4 $MM^{2.}$

**THE CONNECTION OF THE SIGN EARTHING STUD TO THE AGL EARTHING SYSTEM IS MANDATORY FOR SAFETY PURPOSES.**

k) After the signs have been installed, turn the circuit on to the lowest step and check to see that all the signs are lighted.

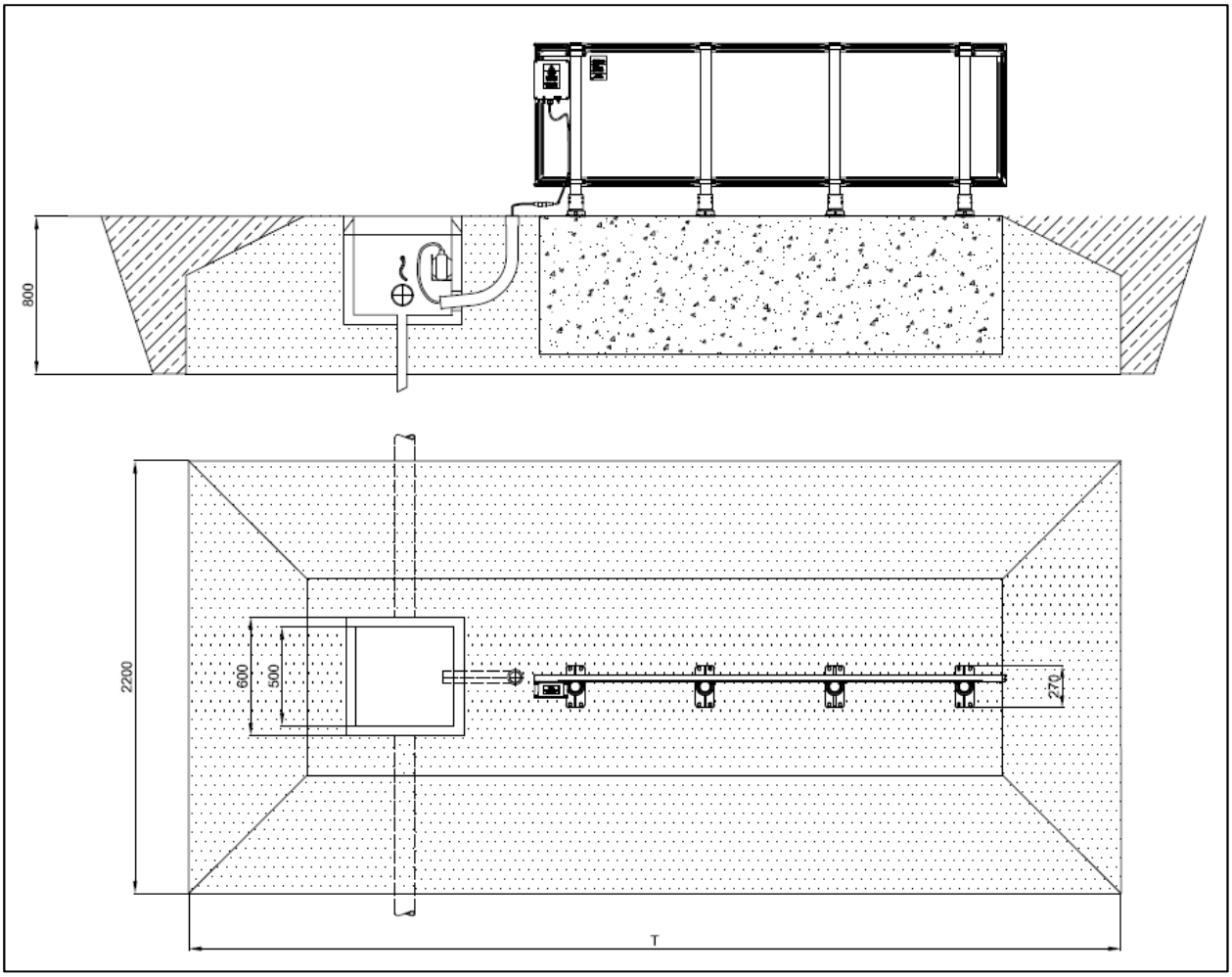



*Figure 10: Concrete foundation*

| **Type** | T [mm] |
|---|---|
| 10 | 3469 |
| 13 | 3729 |
| 15 | 3949 |
| 20 | 4429 |
| 22 | 4669 |
| 24 | 4909 |
| 30 | 5369 |

*Table 10: Foundation sizes*

# 5 MAINTENANCE

**ATTENTION!**

**The CCR MUST be TURNED OFF before any intervention on the sign.**

## 5.1 Periodical Checks

| | |
|---|---|
| **Daily** | Check for burned-out led |
| **Monthly** | Check for dirty panels |
| **Semi-Annual** | Check for loose wire connections |
| | Check for cracked or deteriorated wires |

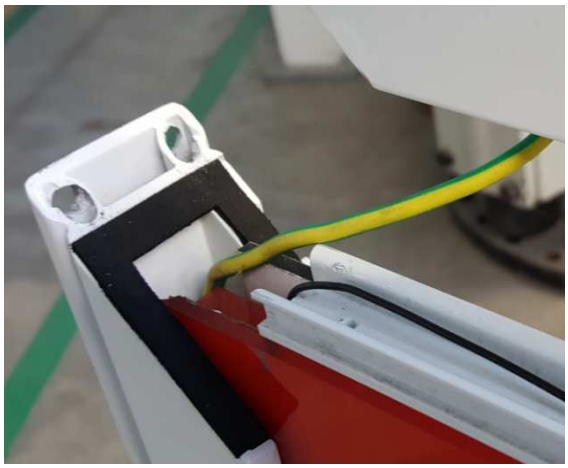
## 5.2 LEDs Luminous Source Replacement

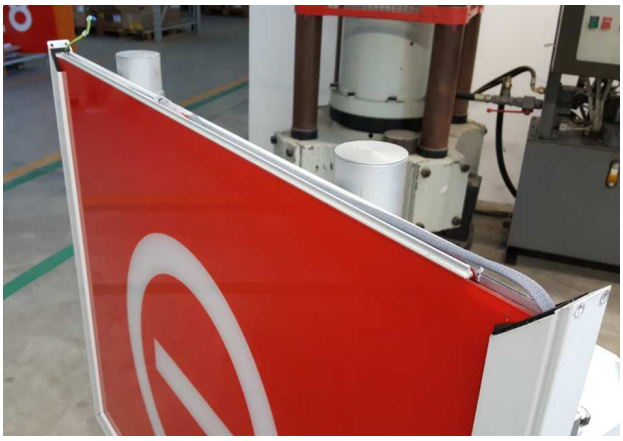
a) Be sure that the series circuit is de-activated (CCR OFF); in any case turn the main switch to OFF position.

b) Loosen the screws (without removing them) of the top "C" clamps of the supports. The number is variable based on the poles number.

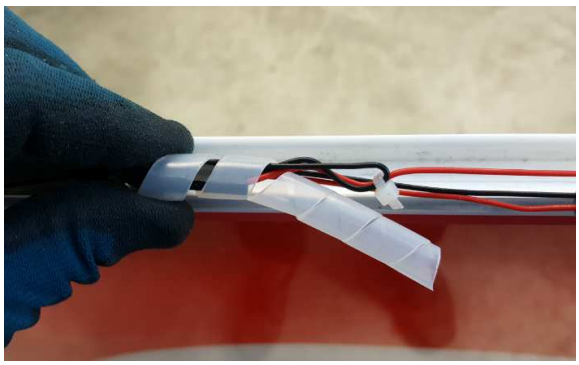
c) Remove four screws that connect the top cover with the sides of the structure.

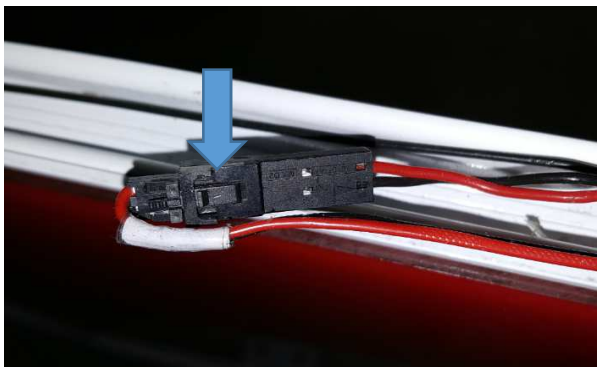
d) Lift the top cover carefully of a few centimeters, disconnect the earth cable and remove the top cover.



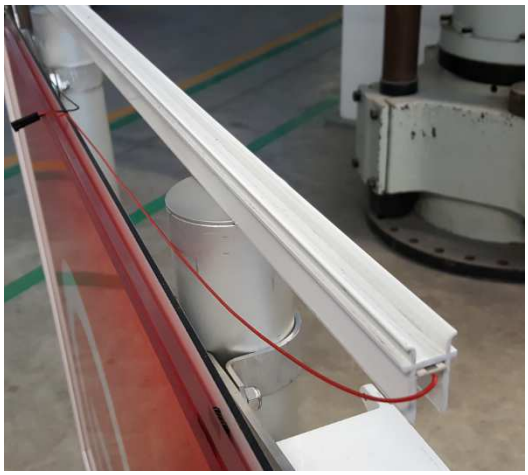
e) Remove the spiral and disconnect the connector of the damaged LEDs luminous source by pressing on the tab indicated by the arrow.



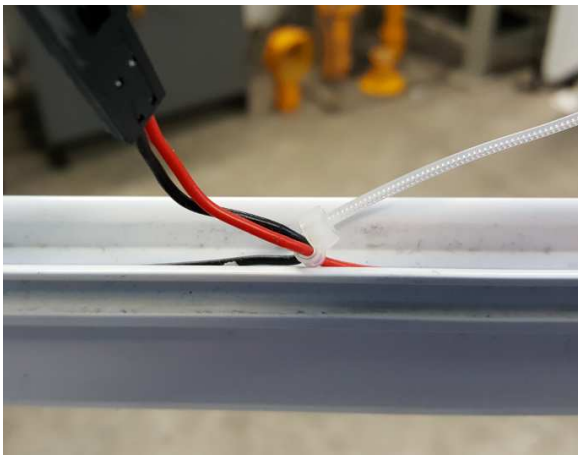


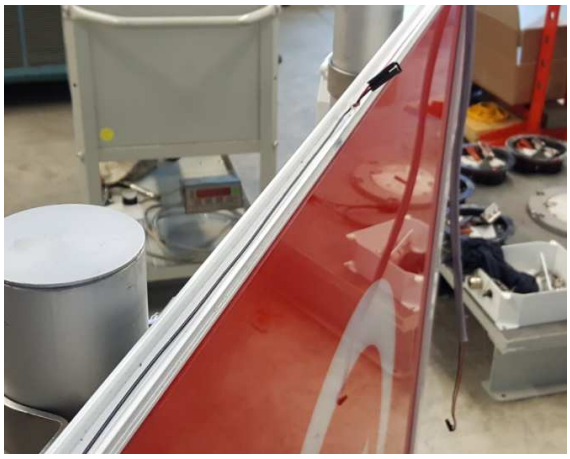
f) Cut the tie wrap.

g) Lift and rotate the LEDs support and pull the LEDs strip as shown in figure.

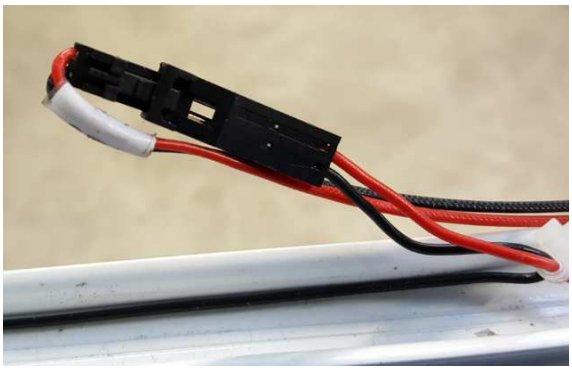


h) Insert the new strip LEDs in the support, link the wires with a tie wrap and reposition the support on the panels.





i) Reconnect the strip LEDs connector and insert the spiral.




j) Connect the earth cable on the top cover and close the sign.


k) Tighten the top cover screws and the screws of the “C” clamps.


l) Turn the main switch to ON position, turn On the CCR and check the correct operation of the sign.

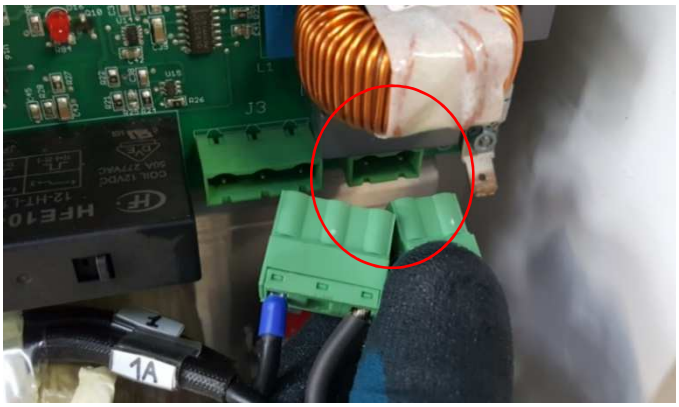
NOTE: if the sign has the Monitoring Option, prior to turn the CCR on, you have to restore in GOOD position the contact of the monitoring relay on the electronic board (see par. 3.1.8)

### 5.3 Electronic Card Replacement

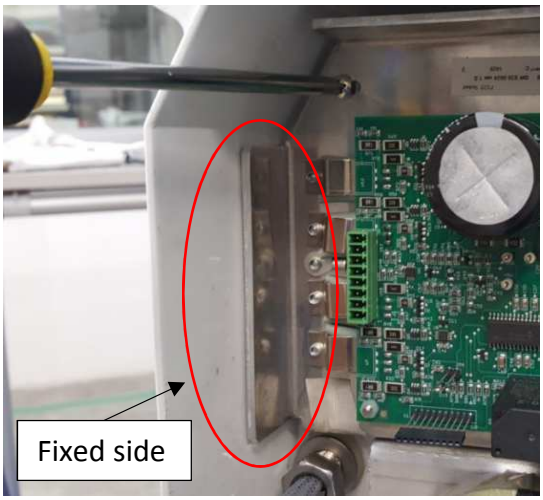
a) Be sure that the series circuit is de-activated (CCR OFF); in any case turn the main switch to OFF position.

b) Remove the electronic board cover by unscrewing the relevant 4 screws.

c) Unplug the three connectors shown in the figures.



d) Remove the relevant two fixing screws, carefully unstick the left side of the card from the box and pull it.


e) Paste the thermal-conductive adhesive on the side of the new electronic board and reassemble everything with reverse procedure.

f) Turn the main switch of the sign to ON position.

g) Turn the CCR on and check the correct operation of the sign.

### 5.4 Front Panel Replacement

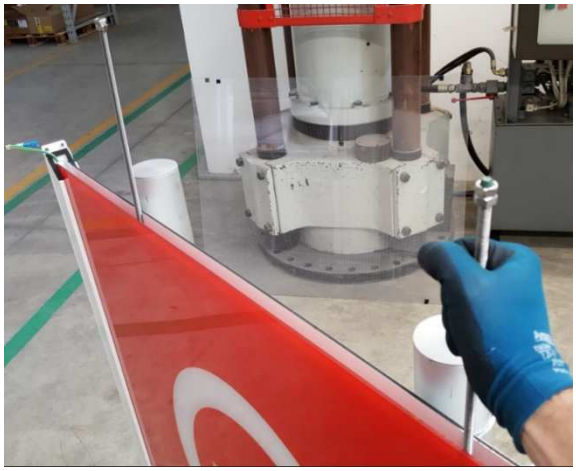
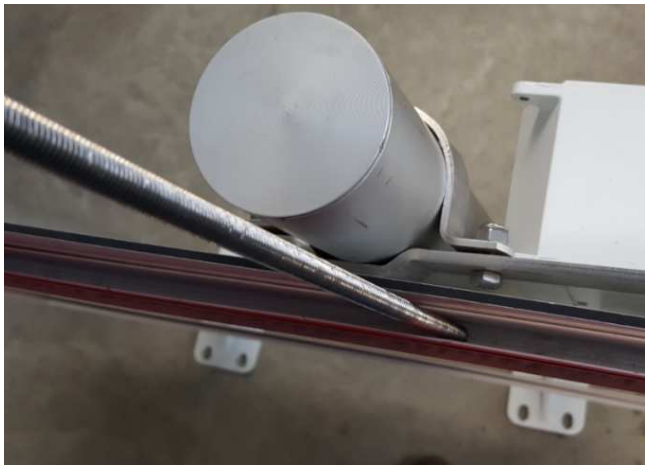
a) Be sure that the series circuit is de-activated (CCR OFF); in any case turn the main switch to OFF position.

b) Follow the instructions up to the point “e” of the paragraph 5.2.

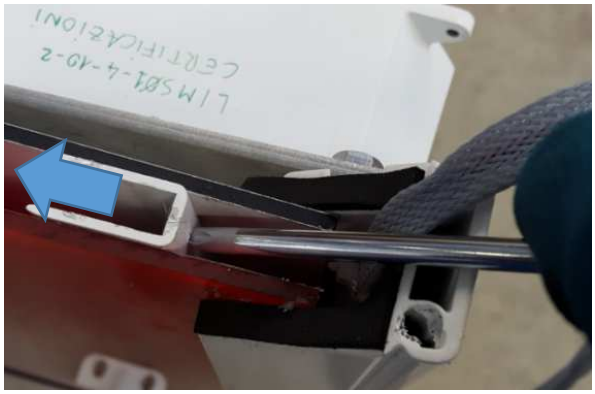
c) Lift the LEDs support and the light-guide panel carefully.

d) Screw the threaded bars onto the horizontal spacers (located at the bottom, between the text panel and the back panel) and extract them. The number of the spacers depends on the type of sign.

<u>Careful not to scratch the back panel!</u>

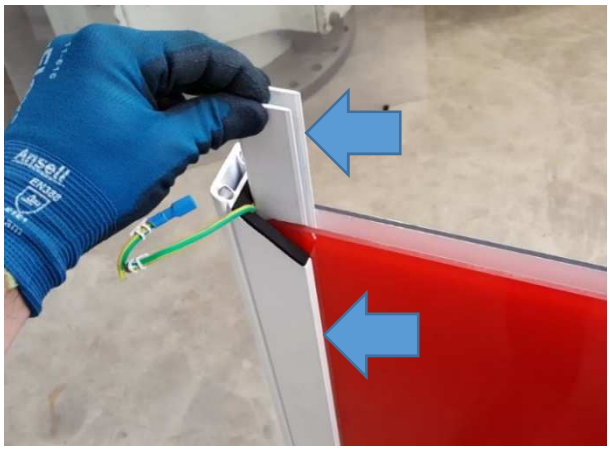
e) Extract the vertical spacers with the help of a screwdriver using the hole at the top, pushing them inwards and lifting them up




f) Lift the old text panel.

g) Insert the new text panel.

h) Insert the spacers keeping them adherent to the walls. Careful not to scratch the panels!




i) Insert the horizontal spacers with the help of the threaded bars and push them until they touch the lower structure.

Careful not to scratch the panels!


j) Reposition the light-guide panel carefully and the LEDs support on the panels.


k) Follow the instructions in the paragraph 5.2 from point “I” to “I” to restore the sign.

### 5.5 Electronic Equipment Replacement

If troubles to the electrical/electronic are suspected proceed as follows:

a) Be sure that the series circuit is de-activated (CCR OFF)

b) Turn the main switch of the sign in OFF position

c) Remove the top cover of the electronic box by loosening the relevant four screws

d) Check the wiring, the connection to the terminal strips and the continuity

e) If necessary replace the electronic board and then check again the wire connections.
The electronic board has to be replaced for sure if the GDT1 gas discharger is tripped. This could be checked by disconnecting the J1 plug and measure the ohmic resistance between the two pins of the J1 PCB connector: the GDT1 discharger is tripped if the measured resistance is zero or near zero (see Figure 11).

f) Mount the top cover with reverse procedure

g) Turn the main switch of the sign to ON position

h) Turn the CCR on and check the correct operation of the sign.

## 5.6 Troubleshooting

| Problem | Problem cause | Solution |
|---|---|---|
| The sign is partially not lighted | LEDs strip completely open or partially short circuited | Replace the LEDs strip. |
| | LEDs strip connector unplugged | Plug the LEDs strip connector (check the connector on the electronic card and the connectors inside the top cover) |
| The sign is totally not lighted | Main switch left in off position | Move the main switch in on position (with the CCR off) |
| | Isolation transformer damaged | Replace isolating transformer |
| | Electronic card damaged | Replace the electronic card |
| | Bad connection | Check the connections |
| The text panel looks bad | The text panel is dirty | Clean the text panel with a glass cleaner and a soft cloth |
| | The text panel is broken | Replace the text panel |

# 6 DRAWINGS

## 6.1 Wiring diagram

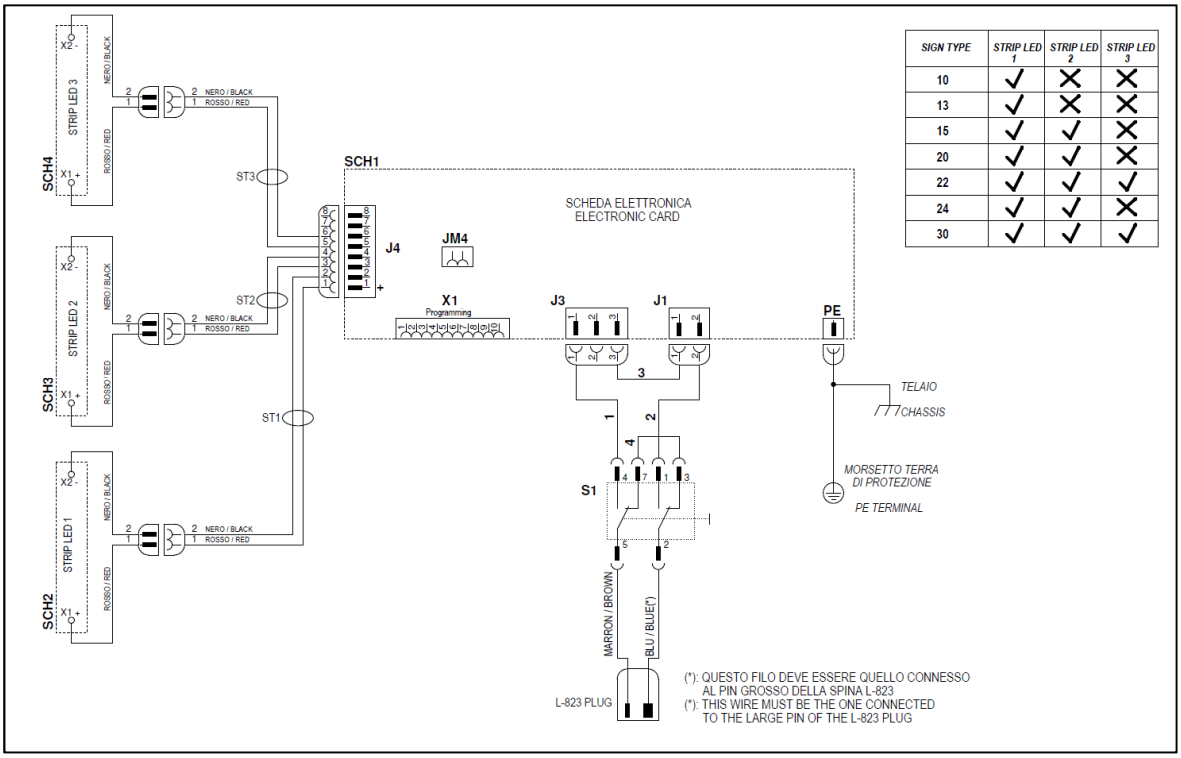



*Figure 11: Wiring diagram (sign without circuit stabilizer)*

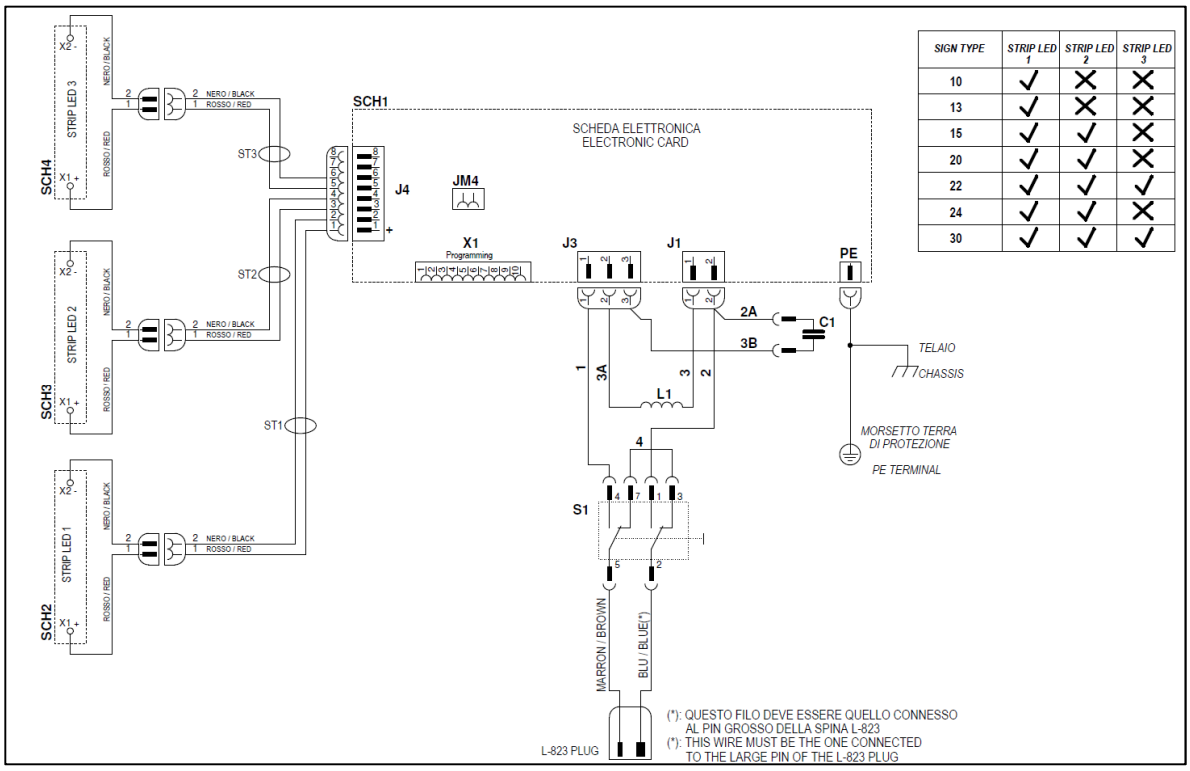



*Figure 12: Wiring diagram (sign with circuit stabilizer)*

## 7 LIST OF RECOMMENDED SPARE PARTS

| Article | Description |
|---|---|
| RISLT0002 | F323 power supply board w/o monitoring 1 level |
| RISLT0003 | F323 power supply board w/o monitoring 2 levels |
| RISLT0044 | F323 power supply board w/ monitoring 1 level |
| RISLT0045 | F323 power supply board w/ monitoring 2 levels |
| RISLT0004 | White strip LEDs 720 mm |
| RISLT0005 | White strip LEDs 960 mm |
| RISLT0006 | White strip LEDs 1200 mm |
| RISLT0008 | BREAKABLE COUPLING KIT L10 H300 |
| RISLT0009 | BREAKABLE COUPLING KIT L13/L15 H300 |
| RISLT0010 | BREAKABLE COUPLING KIT L20 H300 |
| RISLT0011 | BREAKABLE COUPLING KIT L22 H300 |
| RISLT0012 | BREAKABLE COUPLING KIT L24/L30 H300 |
| RISLT0013 | BREAKABLE COUPLING KIT L10 H400 |
| RISLT0014 | BREAKABLE COUPLING KIT L13/L15 H400 |
| RISLT0015 | BREAKABLE COUPLING KIT L20 H400 |
| RISLT0016 | BREAKABLE COUPLING KIT L22 H400 |
| RISLT0017 | BREAKABLE COUPLING KIT L24/L30 H400 |
| RISLT0018 | BREAKABLE COUPLING KIT 480Kh L10/13/15 H300 |
| RISLT0019 | BREAKABLE COUPLING KIT 480Kh L20 H300 |
| RISLT0020 | BREAKABLE COUPLING KIT 480Kh L22/24/30 H300 |
| RISLT0021 | BREAKABLE COUPLING KIT 480Kh L10 H400 |
| RISLT0022 | BREAKABLE COUPLING KIT 480Kh L13 H400 |
| RISLT0023 | BREAKABLE COUPLING KIT 480Kh L15 H400 |
| RISLT0024 | BREAKABLE COUPLING KIT 480Kh L20/22 H400 |
| RISLT0025 | BREAKABLE COUPLING KIT 480Kh L24 H400 |
| RISLT0026 | BREAKABLE COUPLING KIT 480Kh L30 H400 |
| RISLT0028 | FRONT PANEL L10 H300 with writing |
| RISLT0029 | FRONT PANEL L13 H300 with writing |
| RISLT0030 | FRONT PANEL L15 H300 with writing |
| RISLT0031 | FRONT PANEL L20 H300 with writing |
| RISLT0032 | FRONT PANEL L22 H300 with writing |
| RISLT0033 | FRONT PANEL L24 H300 with writing |
| RISLT0034 | FRONT PANEL L30 H300 with writing |
| RISLT0035 | FRONT PANEL L10 H400 with writing |
| RISLT0036 | FRONT PANEL L13 H400 with writing |
| RISLT0037 | FRONT PANEL L15 H400 with writing |
| RISLT0038 | FRONT PANEL L20 H400 with writing |
| RISLT0039 | FRONT PANEL L22 H400 with writing |
| RISLT0040 | FRONT PANEL L24 H400 with writing |
| RISLT0041 | FRONT PANEL L30 H400 with writing |
| RISLT0042 | STABILIZER 3.5mH max 20dm LIMS |
| RISLT0043 | STABILIZER 7mH da 22dm LIMS |
| RISLT0007 | Toggle diverter 2P 16A 250V and RUBBER CUP FOR SWITCH FEME B3T18/1 |
| RISLT0027 | Plug 2P L-823 600V VUL. 2X2.5 L250cm |

## 8 ACCESSORIES

| Article | Description |
|---|---|
| 013.0010 | Set of two ryton rings for receptacle support inside pipe elbow |
| 013.0008 | Galvanized steel pipe elbow with upper threaded end only |
| 315.3210 | Galvanized steel pipe elbow with both threaded ends |
| 315.1228 | Base L-867, Class I, Size B, 24” deep |
| 315.1062 | Baseplate for L-867 base with gasket and cable clamp |
| 011.3100 | Consolidating harness |
| 315.4150 | M12x60 anchoring rod, 250 mm long, complete with hardware (4 pieces for each floor flange) |