AGS

AIRFIELD GUIDANCE SIGN

Instruction Manual for Operation and Maintenance

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Contents

Ⅰ. ABOUT THIS MANUAL

Rev.	Editor	Check	Date	Description	Pages
1.0	J.M.D	A.H.M	04/03/2024	First Edition	-
2.0					
3.0					
4.0					

The manual shows the information necessary to:

- *Operation*
- *Maintenance*
- *Troubleshooting*
- *Installation*

How to work with this manual:

make sure to read the safety section before doing anything.

It is recommended to read section 1-1, which pertains to the buyer's obligation and warranty terms and condition of the company.

If you are starting up the device for the first time, read the Safety section, Technical specifications, Installation, and Operation.

Otherwise, based on your issue, find and read the relevant chapter.

Ⅱ. SUMMARY

Abbreviation	Definition
AGS	Airfield Guidance Sign
DC	Direct Current
VOR	The Very High Frequency Omni-Directional Range
RVR	Runway Visual Range
FAA	Federal Aviation Administration
ICAO	International Civil Aviation Organization
LV	Low Voltage
V	Volt
A	Ampere
AC	Alternating Current
VA	Volt-Ampere
CCR	Constant Current Regulator
VAC	Volts Alternating Current
AWG	American wire gauge
STANAG	Standardization Agreement
IEC	International Electrotechnical Commission

1. SAFETY

Here is a concise version of the safety instructions for AVIASAFE equipment:

1. General Safety Guidelines: This manual provides essential safety information for installing and using AVIASAFE equipment.
2. Equipment-Specific Warning: Remember that not all instructions apply directly to the specific equipment described here.
3. Refer to Sections: For detailed and specific warnings, check the relevant sections elsewhere in this manual.
4. Stay Informed: Prioritize safety during installation and usage.
5. Handle with Care: Follow guidelines to ensure safe operation.

1-1. Liability

AVIASAFE Company is not liable for injuring or damages arising from non-standard, unintended equipment use. Our equipment is designed solely for the purpose outlined in the manual. Any uses beyond the manual's description are considered unintended and may lead to severe personal harm, fatalities, or property damage.

Unintended uses include the following actions:

ATTENTION:

Please Note that the following cases will void the company's 2-year warranty.

A. Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine AVIASAFE[1] replacement parts or accessories.
B. After installation and device setup, gypsum labels will be placed on the converter screws to indicate the start of the warranty period. Any tampering or removal of these labels will void the warranty.
C. Any cutting or chewing (by Animal or etc.) of the lead wires will not be covered by the company's warranty.
D. Any impact caused by transportation after the product's delivery or the product being removed from its form will not be covered by the warranty.
E. Any discrepancy in installation, operation, maintenance, as well as the information provided in the device specifications section, between to the information stated in the manual, will result in the product being excluded from the company's warranty.
F. Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards if not in contradiction with the general rules.
G. Using materials or auxiliary equipment that is inappropriate or incompatible with your AVIASAFE equipment.

[1] AviaSafe Aviation Services

H. Allowing unskilled personnel to perform any task on or with the equipment.

NOTE:

If necessary and with specific and coordinated arrangement with AVIASAFE Company, you
can proceed with repairs and avail yourself of the company's after-sales services at the earliest opportunity.

1-2. Qualified Personnel

In this manual, "Qualified Personnel" refer to individuals who:

1. Qualified personnel must receive training under the supervision of AVIASAFE Company.
   Or
2. They must have studied in the field of Electrical Engineering at an academic institution.
3. They must have fully read the user Manual.

1-3. Introduction to safety

Please adhere to the following guidelines when dealing with this equipment, as it may contain electrostatic devices, hazardous voltages, and components with sharp edges:

1. Before installation, carefully review the provided instructions.
2. Understand safety guidelines in this section before any equipment-related tasks.
3. Read and adhere to specific task instructions throughout the manual.
4. Ensure personnel can access this manual during installation, operation, and maintenance.
5. Follow local codes for electrical connections.
6. Adhere to company and industry safety protocols.
7. Use appropriately sized, insulated wires for rated current.
8. Safely route electrical wires to prevent damage.
9. Allow ample room for maintenance and front panel access.
10. Install specified safety devices to protect the equipment.
11. If safety devices are removed during installation, reinstall promptly and verify functionality before restoring power.

1-4. Operation

To ensure safe and proper operation of this equipment, please adhere to the following guidelines:

1. Only use this equipment as per the manufacturer's guidelines. Any other operation is strictly forbidden.
2. Entrust equipment operation to qualified individuals only.
3. Understand all system components thoroughly before starting operation.
4. Inspect protective devices. Ensure they function properly.
5. Never disable safety interlocks, electricals disconnect, or air valve.

6. If safety devices are removed during installation, reinstall them promptly and verify functionality.
7. Safely route electrical wiring to prevent damage.
8. Do not operate if aware of any malfunctions.
9. Refrain from servicing equipment near standing water.
10. Use the equipment only in its rated environments.
11. Exercise caution around live electrical connections.

1-5. Maintenance

This equipment may contain electrostatic devices, please follow the guidelines below:

1. Do not operate a system if any of its components are malfunctioning. In such cases, promptly turn the system OFF.
2. Disconnect the electrical power supply and ensure it is securely locked out.
3. Only allow qualified personnel to perform repairs. Refer to the product's manual for instructions on repairing or replacing the malfunctioning components.

2. PRODUCT INTRODUCTION

2-1. Compliance with Standards

A. FAA AC 150/5345-44K

B. ICAO Annex – 14 Vol.1 Para5.4 & Appendix 4

C. ICAO DOC-9157 MANUAL PART4-CHP 11

2-1-1. Standard Compliance Characteristics

ICAO - Annex – 14 Vol.1 Para5.4 & Appendix 4:

- 5-4-1-3. Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table 5-5.
- 5-4-1-4. Signs shall be rectangular, as shown in Figures 5-30 and 5-31 with the longer side horizontal.
- 5-4-1-5. The only signs on the movement area utilizing red shall be mandatory instruction signs.
- 5-4-1-6. The inscriptions on a sign shall be in accordance with the provisions of Appendix 4.
- 5-4-1-6. Figure 5-30 & Figure 5-31

TABLE 2-1 Location distances for taxiing guidance signs including runway exit signs

Sign Height (mm)				Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
Code Number	Legend	Face (Min.)	Installed		
1 or 2	200	300	700	5-11 m	3-10 m
1 or 2	300	450	900	5-11 m	3-10 m
3 or 4	300	450	900	11-21 m	8-15 m
3 or 4	400	600	1100	11-21 m	8-15 m

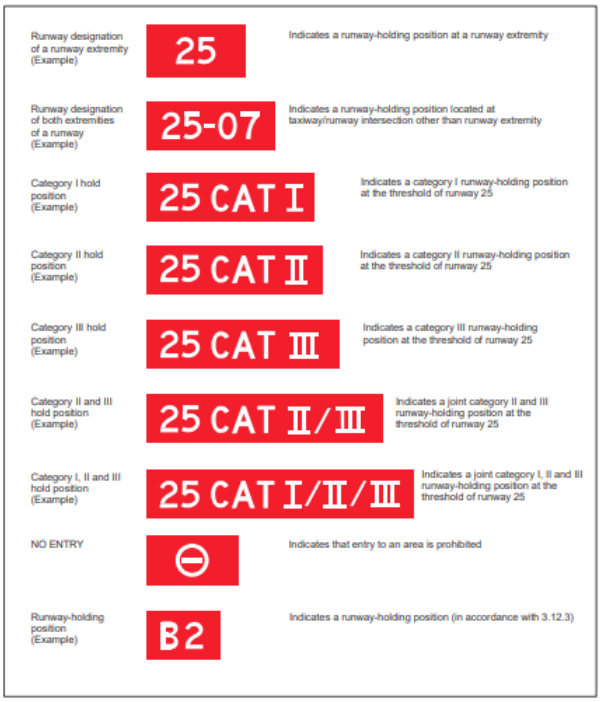


Figure 2-2 Mandatory instruction signs

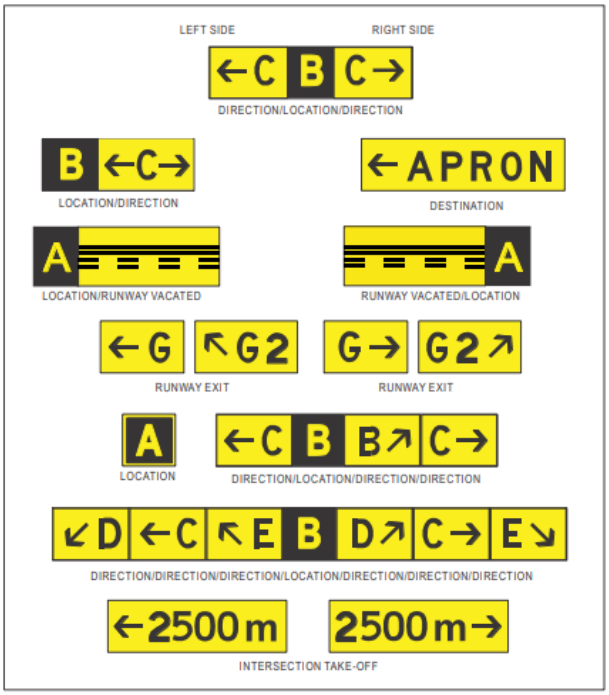


Figure 2-1 Information signs

- Sign inscription heights shall conform to the following tabulation

TABLE 2-2 Inscription heights

Runway code number	Minimum character height		
	Mandatory instruction sign	Information Sign	
		Runway exit and runway vacated signs	Other signs
1 or 2	300 mm	300 mm	200 mm
3 or 4	400 mm	400 mm	300 mm

NOTE:

Where a taxiway location sign is installed in conjunction with a runway designation sign (see 5.4.3.22), the character size shall be that specified for mandatory instruction signs.

- Sign Luminance:
  A. Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance shall be at least:

TABLE 2-3 Sign Luminance

Red	30 $^{cd}/_{m^2}$
Yellow	150 $^{cd}/_{m^2}$
White	300 $^{cd}/_{m^2}$

B. At night in association with instrument and non-instrument runways:

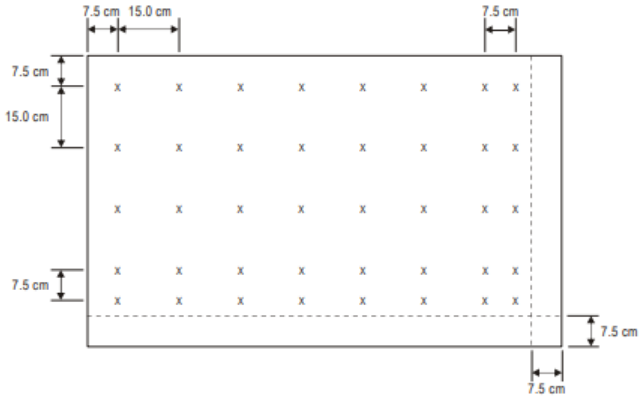


TABLE 2-4 Sign Luminance

Red	10 $^{cd}/_{m^2}$
Yellow	50 $^{cd}/_{m^2}$
White	100 $^{cd}/_{m^2}$

TABLE 2-5 Legend height and stroke

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

- Sign Face:

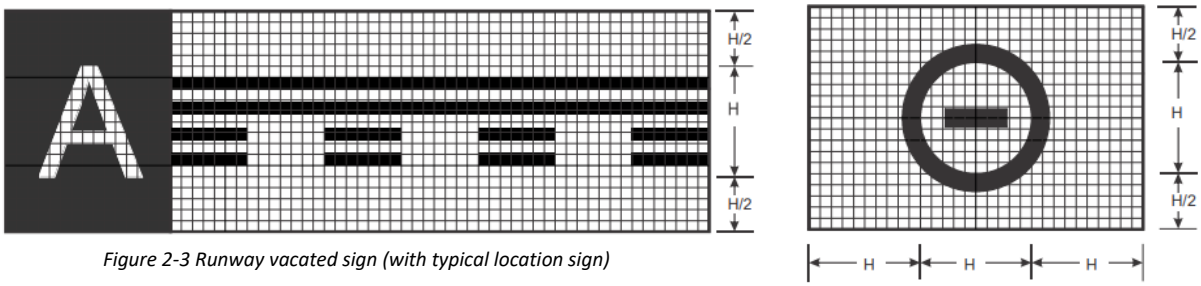
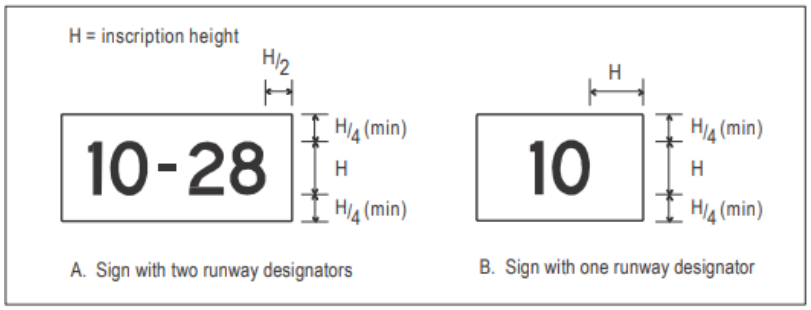


Figure 2-3 Runway vacated sign (with typical location sign)



Explanatory Note to Figure A4-4: "H" stands for the inscription

Figure 2-4 Sign dimensions

2-2. Applications

On civil or military airports as:

1. Mandatory instruction signs

   Mandatory Instruction sign – white inscription on a red background. Designed to identify holding positions, runway intersections, and prohibit aircraft entry into designated areas.

2. Information signs

   Informational Direction, Destination, and Boundary signs - black inscription on a yellow background. Designed to guide pilots to a particular point on the airfield by identifying runway exits, taxiway directions, taxiway intersections, taxiway ending, and inbound/outbound destinations, boundaries.

3. VOR check point signs

   When a VOR aerodrome checkpoint is established, it shall be indicated by a VOR aerodrome checkpoint marking and sign.

   A VOR aerodrome checkpoint sign shall be located as near as possible to the checkpoint and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome checkpoint marking.

4. Runway distance remaining signs

   Runway Distance Remaining Signs - white inscription on a black background. Designed to provide enhanced situational awareness to the pilots for determining the remaining runway distance available.

5. Arresting barrier signs

   A system designed to decelerate an Aeroplan overrunning the runway.

   If an arresting system is installed, the above length may be reduced, based on the design specification of the system, subject to acceptance by the State.

6. Location Sign

   Runway and Taxiway Location signs - yellow inscription on a black background and only where it is a stand-alone sign shall have a yellow border. Designed to identify taxiway and runway location on which the aircraft is located.

2-3. Benefits

1. Highly visible in all weather conditions.
2. Supplied fully assembled.
3. Extruded aluminum profile.
4. UV stabilized 4mm polycarbonate.
5. Water-proof to IP54[2].
6. Temperature range of -40°C to +55°C.
7. Setting of front panel character, luminance intensity and uniformity, and chromaticity achieved ICAO Annex 14[3].
8. Excellent performance and lower energy consumption reduce the operation cost.
9. Front Panel can be open till take out of the fixture to process the internal clean.
10. Frangibility according to ICAO or FAA.
11. Safe and easy maintenance to minimize the work on site.
12. UV printed front panel is highly sustainable and clear.
13. Power supply is secured with Fail-Open.
14. The power supply is installed outside the front panel for easy maintenance.

[2] IP54 Protected from limited dust ingress
[3] ICAO Annex 14 Aerodromes contains standards and recommended practices

15. Long life and less consuming LEDs.
16. Modular LED design reducing maintenance time.
17. Operation below 800 m RVR[4].

2-4. Material and Finish

A. Body: Painted Aluminum extrusions, back plate, corners, leg supports and mounting legs.
B. Front Panel: Long-life polycarbonate, UV and abrasion resistant.
C. Stainless steel fasteners.

2-5. Feature

A. High power factor and efficiency, thanks to new power converter technology.
B. Featured by Open-fail design.
C. Designed for easy maintenance specially in electrical parts by providing an external electrical board box.
D. Electrical board is protected as per to IP55.
E. Electrical board box is designed with a view to providing proper heat transfer conductivity area to the main body (cooling feature).
F. Featured by separate entrance and exit terminals which are placed on top and bottom sides of the board.

2-6. Consumptions

TABLE 2-6 Consumptions

CONSUMPTIONS	
Length	Power
600 – 1100 mm	17W
1150 – 1950 mm	32W
2000 – 2950 mm	44W
3000 mm	53W

[4] Runway Visual Range

2-7. Sign Legends

TABLE 2-7 Sign Legends

Purpose	Legend Color	Background Color
Direction, Destination & Boundary	Black	Yellow
Mandatory Sign	White with Black Outline	Red
Runway Location	Yellow	Black
Runway Distance Remaining	White	Black
One-Half Distance Remaining	White	Black

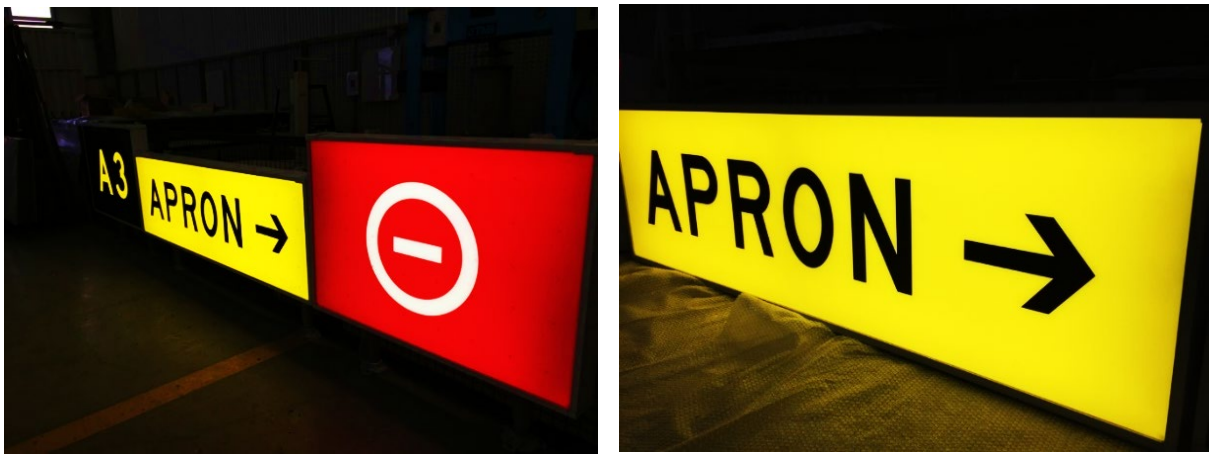


Figure 2-5 Mandatory and Information Signs - AVIASAFE

2-8. Electrical Supply

A. Constant Current Regulator 2.8-6.6A --- 50/60Hz --- 3-7 step CCR

2-9. Operation Condition

A. Temperature -40° C to +55° C

B. Humidity < 95%

C. Wind AVIASAFE signs withstand a wind loading of 322 km/h and break before the wind

loading reaches 483 km/h.

2-11. LED Specification

Max Input Voltage: 24 VDC.

Max Power Consumption: 28.8 W per meter.

Standard Length

A. 130 mm
B. 240 mm
C. 350 mm
D. 460 mm
E. 570 mm
F. 680 mm
G. 790 mm
H. 900 mm
I. 1010 mm

Figure 2-6 LED

3. MECHANICAL DISCRIPTION

3-1. Exploded Diagram

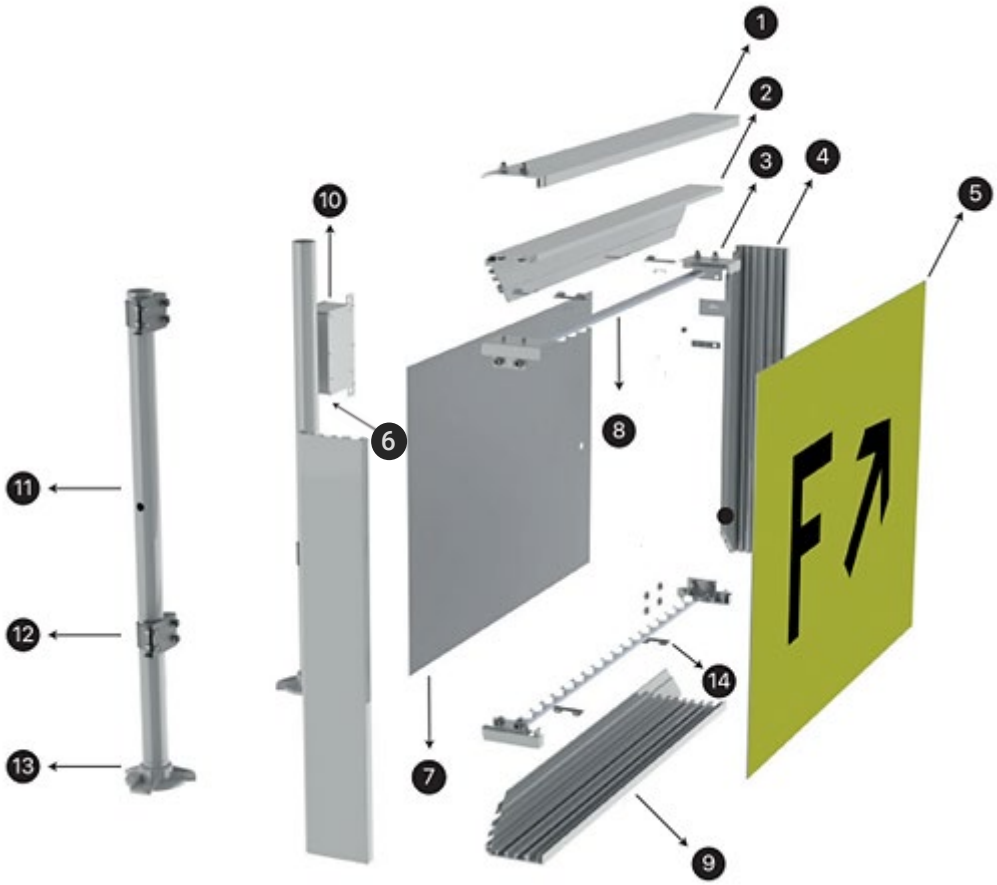


Figure 3-1 Exploded Diagram

1. Upper Cap
2. Upper Frame
3. Upper Cover
4. Side Frame
5. Face (Front Panel)
6. Glands
7. Back Plate
8. LED
9. Lower Frame
10. Airfield Sign Board
11. Pole
12. Pole Holder and pole holder support
13. Base Plate
14. LED Bracket

3-2. Supports

Each support includes a pole, a breakable coupling kit and a floor flange. All components are made of aluminum. The supports are fixed to the structure with “C” clamps. (For more details Refer to *5-1-4*).

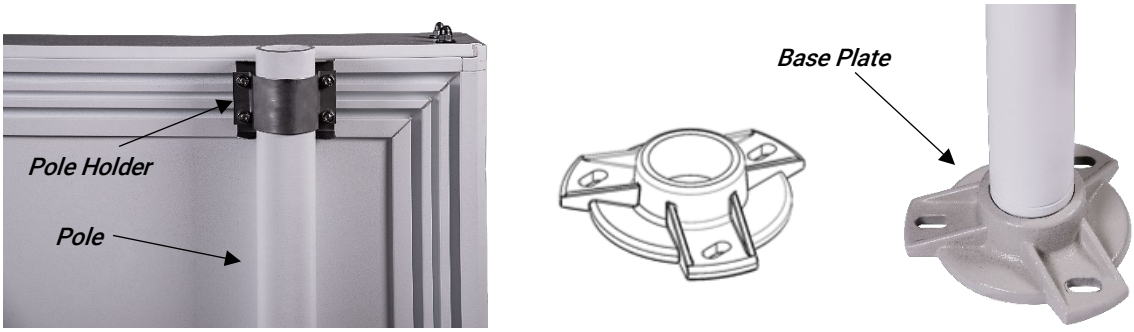


Figure 3-2 Supports

4. INSTALLATION

1. Remove the packaging material form the appropriate sign.
2. The concrete foundation for the sign should be flat and level. The isolating transformer can be placed inside a concrete pit with a pipe elbow for the secondary cable passage, or in a complete steel base.
3. It is recommended to install the M12 [5]anchor bolts for flange anchoring after completing the concrete foundation. Ensure that the anchor bolts are aligned accurately to maintain parallelism between the centerline marked on the flange and the sign centerline.
4. Take care to leveling the floor flanges properly to facilitate the sign installation. Use a long sprite level to check the alignment and leveling of the breakable couplings. Only finger-tighten the flange anchor nuts until the sign installation is complete. Lower the sign onto the frangible couplings and tighten the locking screws. Verify that the sign is leveled. If necessary, shim the floor flanges and apply drying grout underneath the flange.
5. After ensuring that the sign is leveled, securely tighten the anchor nuts. Please note that the anchor hardware is not included with sign. It is recommended to use corrosion-resistance anchor hardware.
6. Connect the cable plug of the sign to the socket of the isolation transformer. Depending on the installation method ensure that the plug-socket connection is properly secured.
7. Connect the earthing stud of the sign to the earthing system of the AGL [6] circuit using a cable that is at least 4mm thick.
8. Once the signs are installed, switch on the circuit to the lowest step and verify that all the signs are illuminated.

WARNING:

Please note that the potential difference between the earth of the sign device and the earth of the airport's power system should be very minimal. If this potential difference is significantly noticeable, please report it immediately.

[5] M12 have 85mm Length and 12mm Drill size
[6] Airfield Guidance Sign

4-1. Installation Distance and angle

TABLE 4-1 Table of Sign Placement and Installation

Sign Height (mm)				distance from defined taxiway pavement edge to near side of sign	distance from defined runway pavement edge to near side of sign
Code Number	Legend	Face (Min.)	Installed		
4	300 mm	450 mm	900 mm	11-21 m	8-15 m
4	400 mm	600 mm	1100 mm	11-21 m	8-15 m

According to the regulations outline in the International Civil Aviation Organization (ICAO) standard, for airport with CODE NO.4, the installation of signs should adhere to certain specifications. For example, the lettering size should be 400 mm, and the sign panel should measure 800mm. The highest point of the sign should be positioned 1100 m from the edge of the asphalt shoulder of taxiway, and the distance between the sign installation location and the corresponding edge of the Taxiway asphalt shoulder should be within the range of 11 to 21 meters, taking into account the positioning of the Taxiway, and it should be done in coordination with the project's supervisory staff. Additionally, the distance between the sign installation location and the edge of the runway asphalt shoulder should be between 8 to 15 meters (all necessary coordination regarding the sign installation location should be carried out after the approval of the expert form the General Directorate of Airport Equipment and System).

TABLE 4-2 Table of Sign Distance from Runway Centerline

Code NO.	1	2	3	4
Non-precision	----	----	75 m	75 m
Precision approach CAT Ⅰ	----	----	90 m	90 m
Precision approach CAT Ⅱ / Ⅲ	----	----	90 m	90 m

The distance of holding position signs installed at the intersection of a taxiway and a runway (Holding position) should be determined based on the airport's CODE NO. for example, in the case of airports with CODE NO.4 for non-precision runways, the distance between the sign installation location and the runway centerline should be 75 meters. For precision approach CAT Ⅰ / Ⅱ / Ⅲ runways, the minimum distance between the sign installation location and the runway centerline is 90 meters.

It is important to note that these distances are provided as examples and may vary depending on specific airport requirements and guidelines. It is advisable to consult the relevant authorities and regulations to determine the accurate sign placement distances for a particular airport and runway configuration.

4-2. Foundation

4-2-1. H600 Foundation

In this type of foundation with a height of 600mm, a width of 800mm, and a length determined by the formula “Length Sign + 600mm,” the distance of each base plate from the foundation is 400mm × 400mm. The concrete height of the foundation is also 50mm above the ground. The implementation plan for this type of foundation is as follows.

The type of concrete used has a grade of 300kg per cubic meter. The reinforced steel is of type “All” and pipe with diameter of 5cm is planned to pass through the concrete during the casting of the foundation. The sign base is installed to the concrete using an M12 Bolt

4-2-2. H800 Foundation

In this type of foundation with a height of 800mm, a width of 1000mm, and a length determined by the formula “Length Sign + 600mm,” the distance of each base plate from the foundation is 400mm × 500mm.

The concrete height of the foundation is also 50mm above the ground. The implementation plan for this type of foundation is as follows.

The type of concrete used has a grade of 300kg per cubic meter. The reinforced steel is of type “All” and pipe with diameter of 5cm is planned to pass through the concrete during the casting of the foundation. The sign base is installed to the concrete using an M12 Bolt

4-2-3. H600 Foundation (Map)

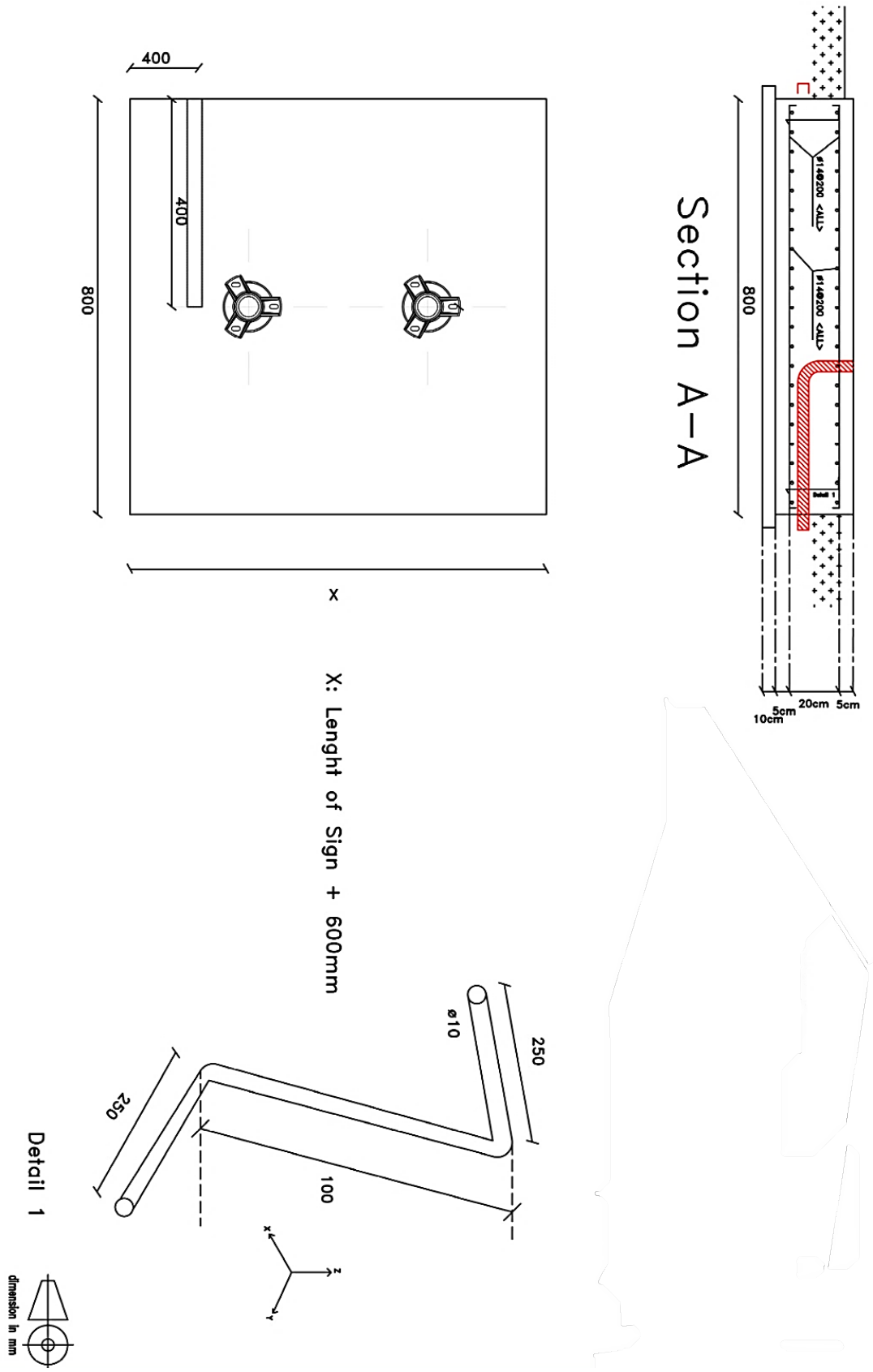


Figure 4-1 H600 Foundation

4-2-4. H800 Foundation (Map)

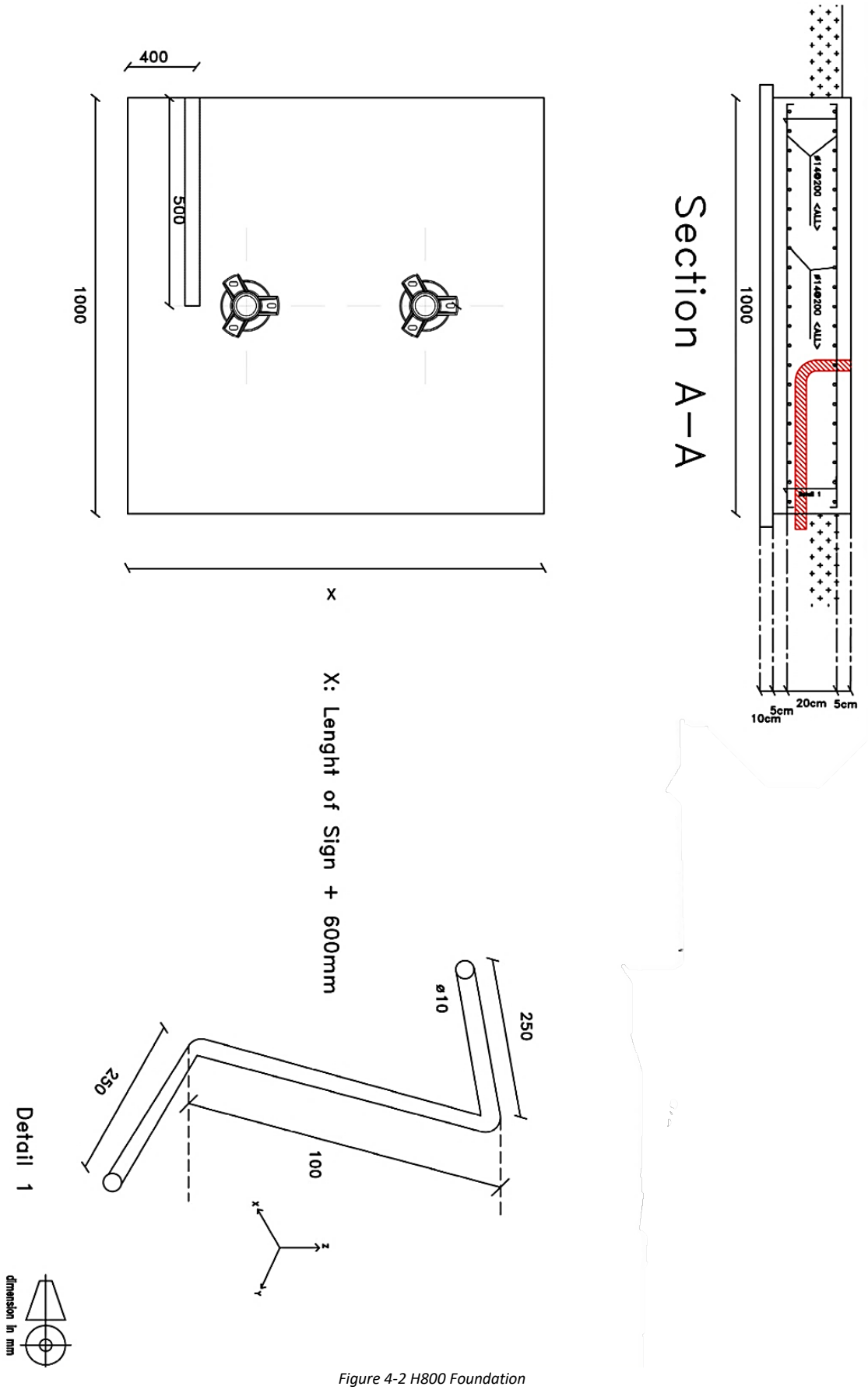
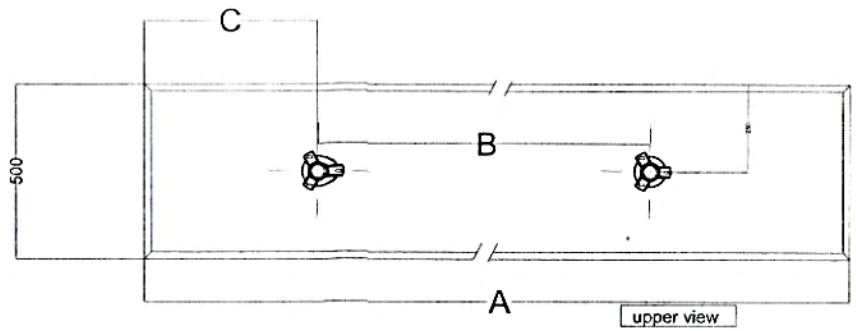


Figure 4-2 H800 Foundation



length of guldance sign	number of legs	distance A	distance B	distance C
600	2	900	300	300
800	2	1100	400	350
900	2	1200	500	350
1000	2	1300	500	400
1100	2	1400	600	400
1200	2	1500	600	450
1250	2	1550	650	450
1300	2	1600	700	450
1400	2	1700	700	500
1500	2	1800	800	500
1600	2	1900	800	550
1700	2	2000	900	550
1800	2	2100	900	600
1900	2	2200	900	650

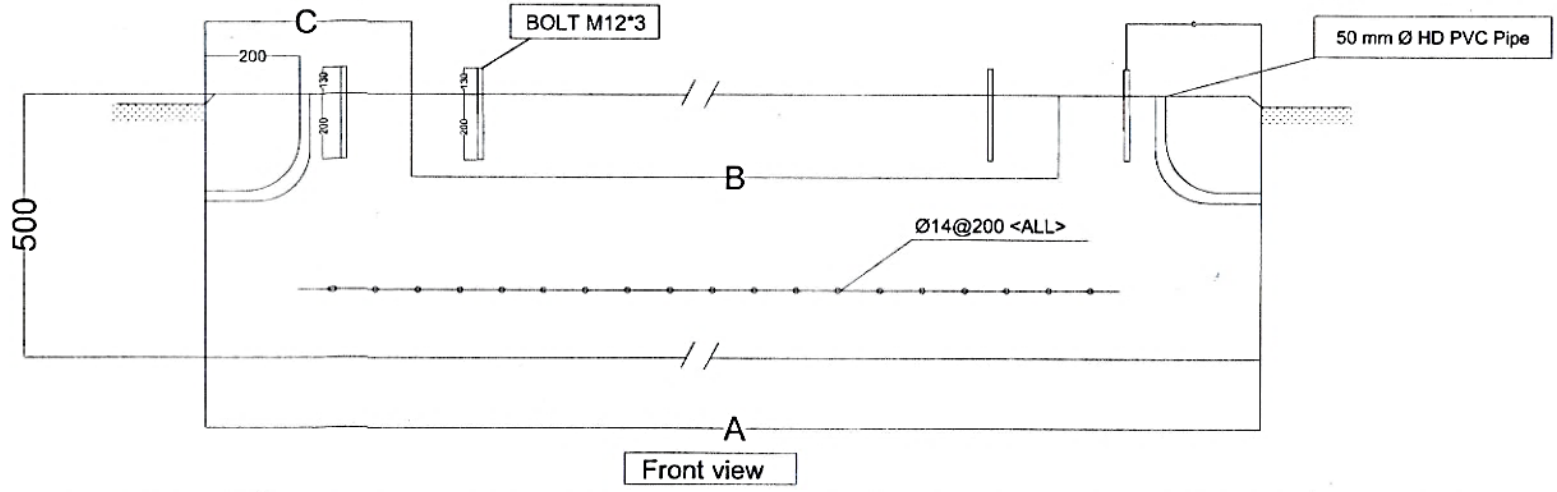
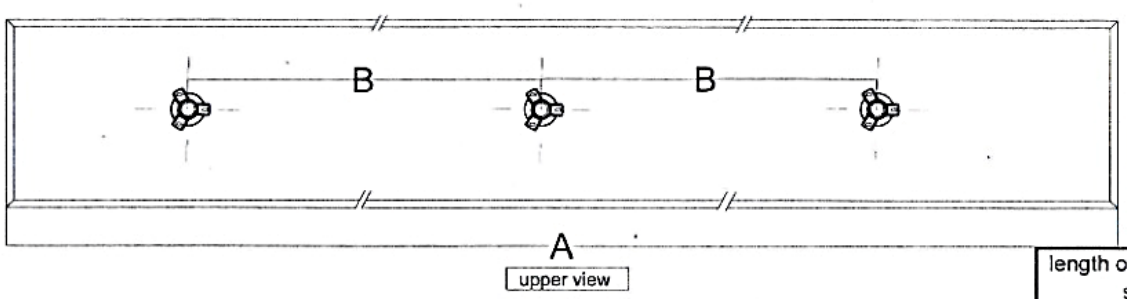
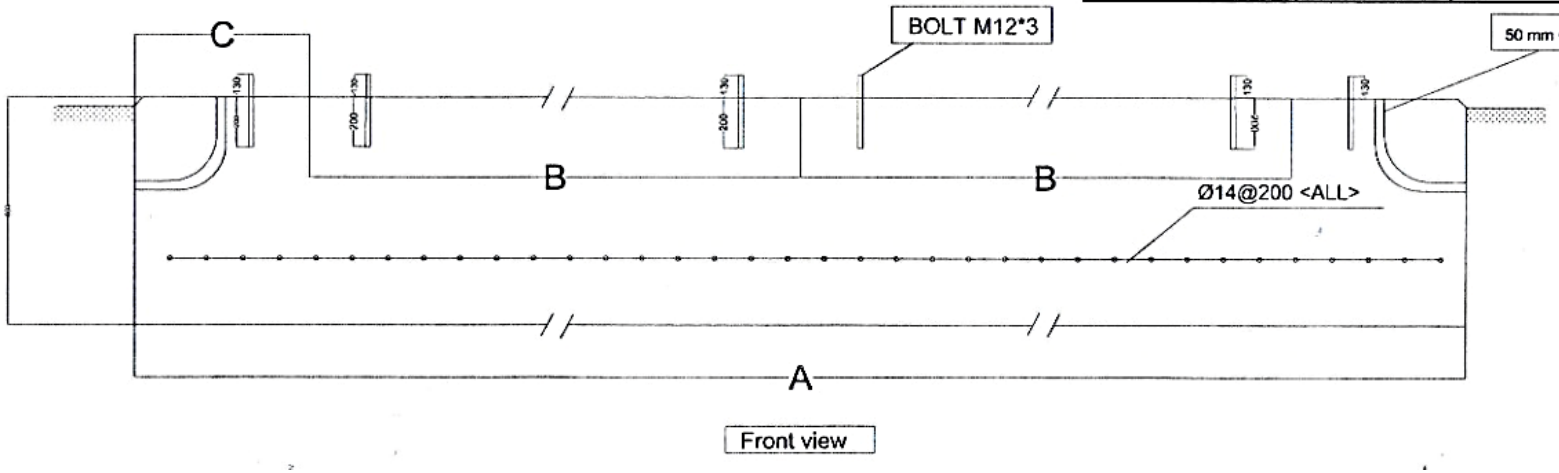


Figure 4-3 Imam Khomeini Airport Foundation



length of guldance sign	number of legs	distance A	distance B	distance C
2000	3	2300	700	450
2100	3	2400	700	500
2200	3	2500	700	550
2300	3	2600	750	550
2400	3	2700	750	600
2500	3	2800	800	600
2600	3	2900	800	650
2700	3	3000	800	700
2800	3	3100	850	700
2900	3	3200	850	750
3000	3	3300	900	750



dimension in mm

Figure 4-4 Imam Khomeini Airport Foundation

4-2-5. Anchor Bolt

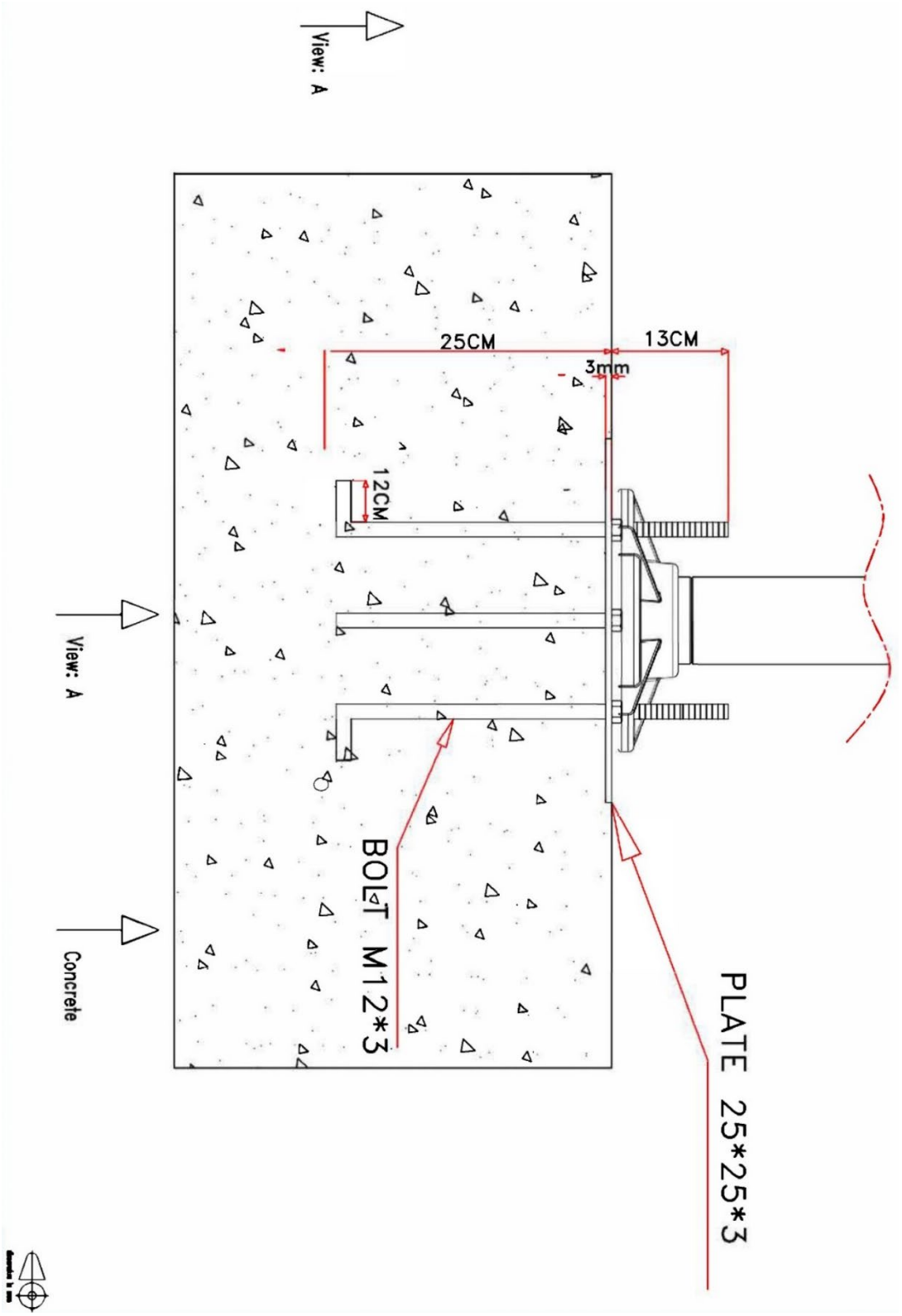


Figure 4-5 Anchor Bolt

4-2-4. Base Plate

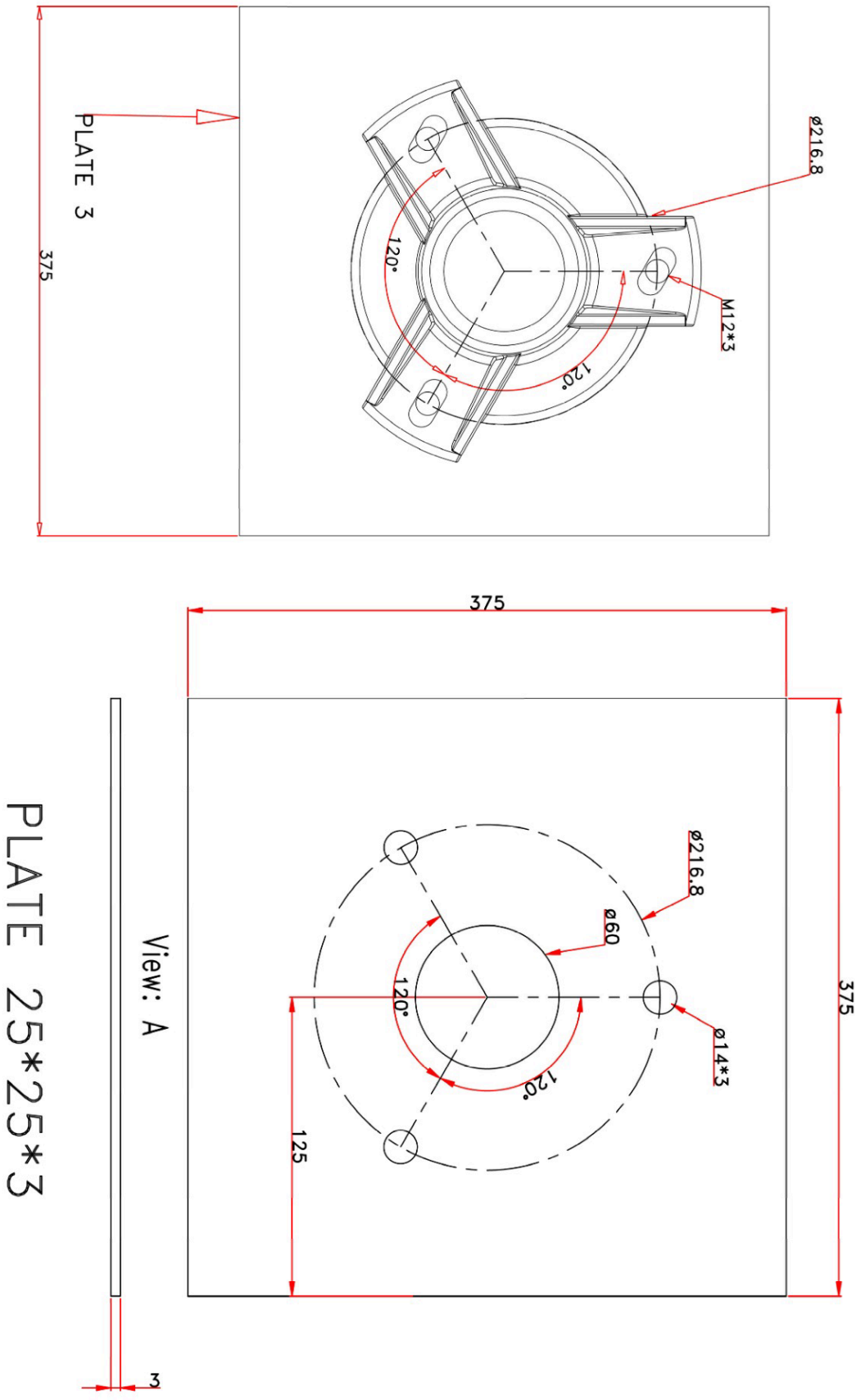


Figure 4-6 Base Plate

4-2-5. Poles NO. & SPEC

TABLE 4-3 Poles No.

Sign Length	Sign Width (mm)	Number of Poles
600 to 1950	600, 800	2-3
2000 to 3000	600, 800	3-4

A. Typical Aluminum Poles Specification:

1. OD: 60 mm
2. ID: 50mm

4-3. Mechanical Installation

4-3-1. Tools

1. Allen size 6
2. Calipers
3. Leveling device
4. Wrench 13mm

4-3-2. Pole Installation

1- Assemble base plate on Anchor bolt. (Refer to chapter *4-1-3*)

2- Assemble Aluminum Pipes on base plate.

3- leveling the poles with spirit level.

4- Poles ready for sign installation.

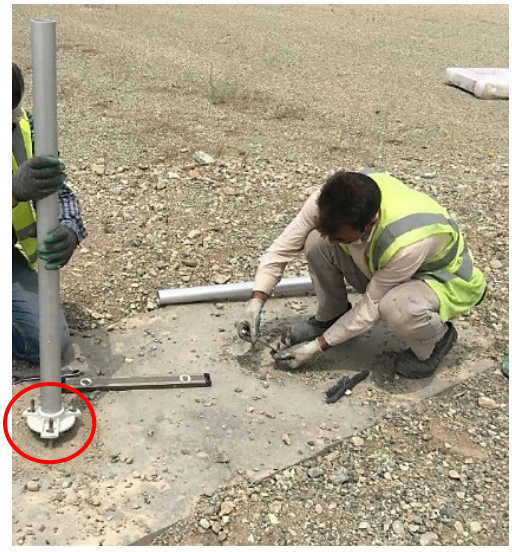


Figure 4-8 Installation (Assemble Aluminum Pipes on base plate)

Figure 4-7 Installation (Leveling the Poles)

4-2-3. SIGN Installation

1- Put the wood block below the sign for easier installation (300 mm height). (Picture A)

2- install sign on poles. (Picture B)

3- Leveling body by wood block.

4- Assemble upper holders first with Allen wrench size 6. (Picture C)

5- Assemble lower poles holders second. (Picture D)

Figure 4-9 Installation (Picture A)

Figure 4-10 Installation (Picture B)

Figure 4-11 Installation (Picture C)

Figure 4-12 Installation (Picture D)

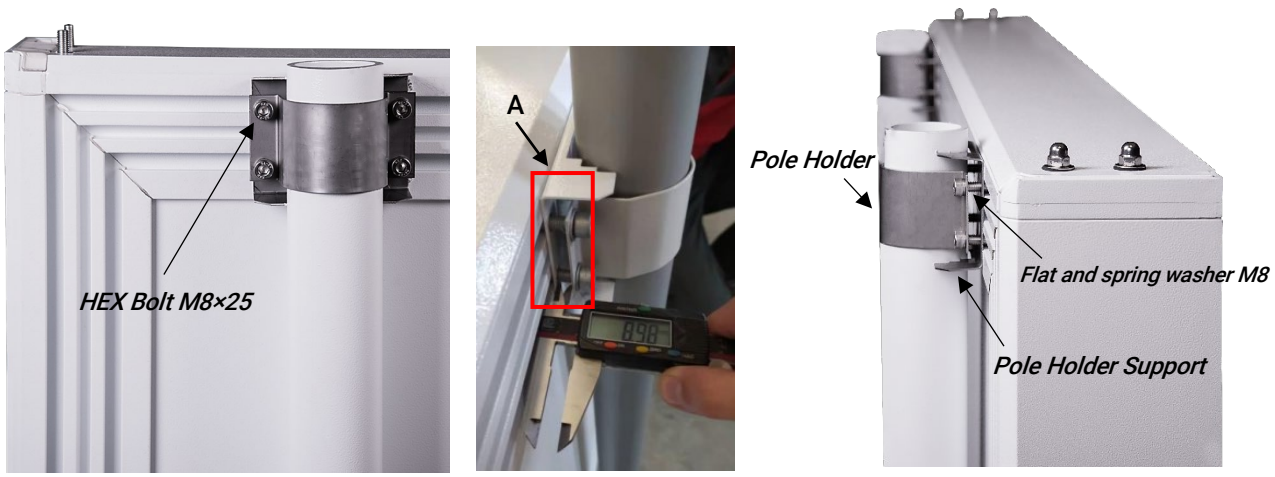


Figure 4-13 Details of the Pole and Pole Holder

The installation location for sign bases is typically as follows for signs up to 2 meters in length, 2 or 3 bases are used, and for signs longer than 2 meters, 3 or 4 bases are used. There should be a minimum distance of 250mm from each side, and if there are 3 bases, the third base is placed between the two existing bases.

An important point to note is that there should always be a gap of 7 to 10mm between the base holders and the sign (use calipers). Otherwise, the screws will exert pressure on the sign. (See A in above figure)

Side by side installation (up), front back installation (down):

It is recommended that in cases where it is necessary to place two or more signs side by side, according to the specified plan, the distance between two base plates should be 621mm, and the distance from the end of the first sign to the beginning of the next sign should be 100mm.

Furthermore, if two signs are to be placed back-to-back, the distance between the base plates should be 370mm, and the distance from the converter box to the pole in the other sign should be 600mm.

Deep Base / Handhole Placement:

Let's delve deeper into the different types of foundation used for positioning sign equipment transformers.

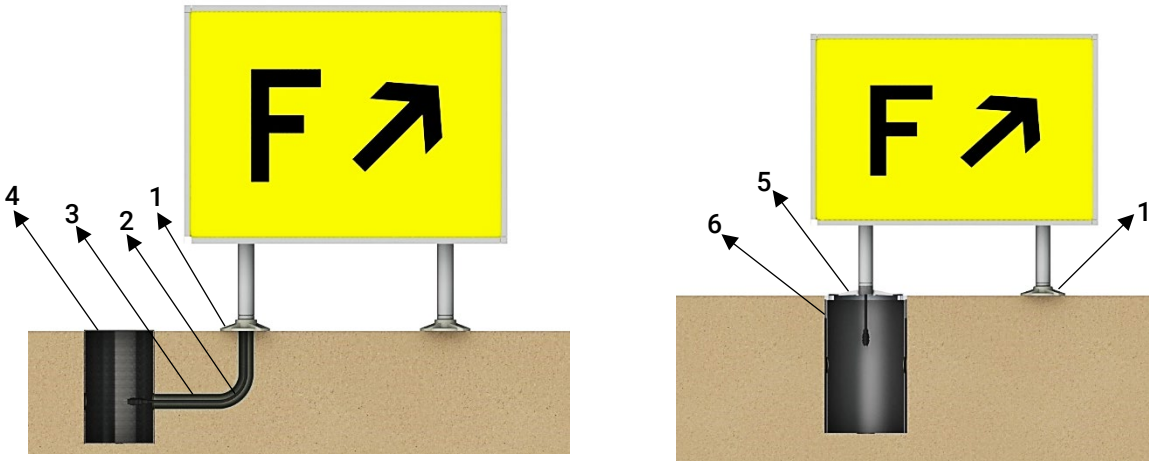


Figure 4-14 Deep Base & Handhole Placement

1. Base Plate
2. Cable
3. Tube with a diameter of 5cm
4. Handhole
5. Heavy Base Plate
6. Deep Base

This section provides instructions for installing L-858 taxiway and runway signs. Refer to the airport project plans and specifications for the specific installation instructions and FAA AC 150/5340-30.

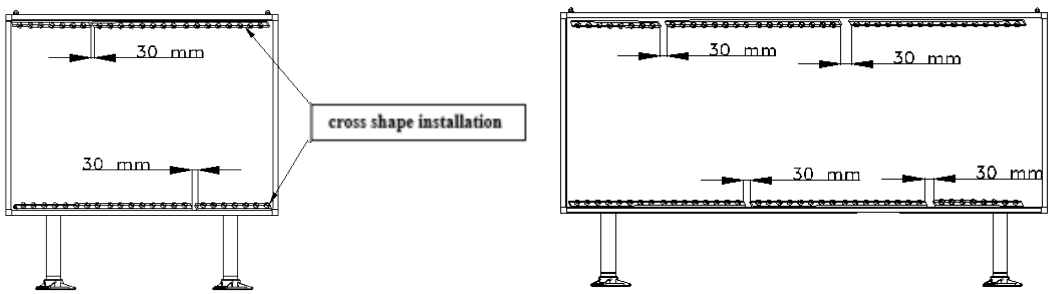


Figure 4-15 Cross shape Installation

4-4. Cord Set Installation

1- Use the sign's handbooks for choosing correct types and lengths of LEDs (based on type and size of SIGNs).
2- LEDs must be installed on the both bottom and top of signs.

A. the quantity and arrangement of LEDs totally depends on SIGN's dimension.

3- The arrangement of LEDs in all types of signs are the same and they must be installed in a cross shape. (The order of arranging of LEDs on the bottom should be in the opposite of the order of those installed on the top).

A. In long Signs (with more than 1 LED on each side) it is crucial to bound to considering at least 30 mm space between every LED in a row.

4- Wiring should be done in this step.

A. All wires must be shaped in a suitable appearance.

B. Some plastic or stainless-steel fasteners can be used for fixing LEDs in the correct positions.

(For avoiding falling the LEDs especially LEDs which will be installed on the top side of Signs)

A. Model A (Handhole Placement):

In this model, the foundation design involves placing a sign. The handhole serves as a housing for the transformer. This design allows for easier access to the transformer for maintenance and inspection purposes. It is a common choice when the ground conditions and the accessibility of the site permit the installation of a handhole near the sign.

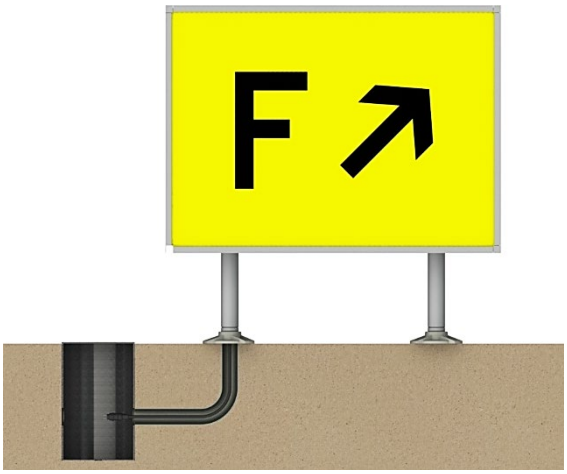


Figure 4-16 Handhole

B. Model B (Deep Base Placement):

In situations where the ground is composed of concrete or other challenging materials, it may not be feasible to install a handhole near the sign. In such cases, Model B is employed. This model involves placing a deep base beneath one of the sign's poles. The deep base serves as housing for the transformer. By locating the transformer within the deep base, it becomes protected and concealed within the structure. However, this design may present difficulties in terms of inspecting and accessing the transformer, as it is not easily visible or readily accessible.

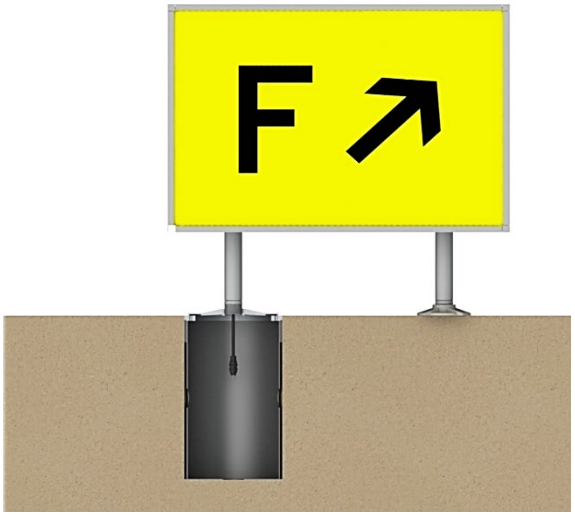


Figure 4-17 Deep Base

It is important to consider various factors, including ground conditions, site accessibility, maintenance requirements, and installation feasibility, when

selecting the appropriate foundation type for sign equipment transformers. The chosen design should ensure the safety, functionality, and longevity of the sign equipment while considering practical considerations for future maintenance and inspections.

4-5. Electrical Connection

Before you start, make sure that the sign is unpowered.

4-5-1. Tools

A. Small screwdriver
B. Spanner with a 25 mm size

4-5-2. Installation

1. Thread the power cable through the cable gland.
2. Open the converter box and connect the wires to the correct terminals.
3. Close the converter box and ensure that the rubber seal is in good condition and properly positioned. Securely tighten the cable gland.
4. Activate the power supply for the circuit that the sign is connected to and verify that everything is working correctly.

4-6. Wiring

Please consult *6-2* for the wiring diagram.

When you're installing the cable, please adhere to the following guidelines:

A. If the cable is intended for direct burial in the ground or placement in a duct, follow the instructions outlined in Item 108 or Item 110 of AC 150/5370-10, depending on the specific tools.
B. Make sure to connect the signs in a series lighting system. This means that the signs are connected to each other in a series circuit using an isolation transformer.

4-7. Earth Ground Lug

The purpose of creating a dedicated earth system is to provide a safe and reliable for electrical current to dissipate into the ground. This helps to prevent electrical shocks, equipment damage, and potential hazards caused by electrical faults.

Figure 4-18 Earth Ground

To create the system, a 2-meter-long copper rod is typically used. Copper is an excellent conductor of electricity and is commonly chosen for its low resistance. The rod is driven vertically into the ground, ensuring good contact with the soil.

A copper clamp is then used to connect the rod to the grounding system. The clamp securely attaches to the rod and provides a connection point for the grounding cable.

The grounding cable, often a Cable 6-in-1 circular cable, is used to establish the connection between the rod and a grounding bridge or grounding point. The cable is typically made of copper for its conductivity and durability.

The grounding bridge or grounding point is an essential component of the system. It serves as the central point where all the grounding conductors are connected, providing a common reference point for the electrical system.

By establishing a dedicated earth system in this manner, any electrical faults or excess current can safely flow into the ground, protecting people and equipment from potential harm. Regular inspections and maintenance of the system are recommended to ensure its effectiveness and adherence to safety standards.

4-8. General Guidelines

A. Place the signs on a concrete slab of concrete pedestals.
B. Make sure the concrete edges are level with the ground and not sticking out.
C. Connect the power to the signs using breakaway cable connectors located in the frangible coupling part of the sign's mounting legs.
D. Install additional equipment, like isolation transformers, in a light base that is embedded in the ground.

5. OPERATION

The sign units are commonly linked to the airfield's power grid and can be accessed by other power control systems at the airport if needed. One example is the Constant Current Regulator (CCR).
These sign units are designed for easy readability during the day, at night, and in low visibility conditions. The excellent legibility is achieved through a high-quality front panel, a distinctive painting technique, and tailored light distribution inside the sign, The sign's durability, advanced electronics, and long-lasting sources make it exceptionally adaptable and fitting with airport settings worldwide.

In the mentioned operation section, it's crucial to pay attention to the power supplier sign, specifically the CCR (which stands for Constant Regulator) as specified in the manual. The CCR is responsible for regulating, and providing a constant current input for airfield devices. (Like lights, signs, and etc.) maintaining a constant current output.

The manual suggests checking steps 2.8 to 6.6 during the operation process. These steps likely refer specific procedures or actions that need to be followed while using the converter. It is important to carefully review and understand these steps to endure proper functioning.

During each step, it is recommended to examine and evaluate the output current and voltage converter box, this involves measuring the current and voltage levels at the output of the converter, First, we check the output voltage of the LEDs, which should typically be around 18.5 volts.
Next, we examine the voltage across the link terminals, which should be around 58 volts (DC voltage). by doing so, you can verify if the converter box is functioning correctly and if it has been properly calibrated.

If any issues or problems arise during the operation, follow the manual's advice referring to the troubleshooting or maintenance chapter. These chapters likely provide detailed instructions on identifying and resolving common problems that may occur. By consulting these sections, you can effectively address any issues and ensure smooth operation.
For more detail you should refer to section *6-10*.

It is important to follow the guidelines and instructions provided in the manual to ensure safe and efficient operation of the device. If you have any specific questions or need further clarification, feel free to contact with the companies after sales service department.

6. MAINTENANCE

6-1. Taxiway and Runway SIGN Maintenance

1. Daily
   - A. Maintenance Task: Check for burned-out LED assemblies
     Action: Check circuit operation

2. Weekly
   - A. Maintenance Task (1): Check for dirty front panels
     Action (1): Clean with mild soap and water
   - B. Maintenance Task (2): Check for vegetation covering front panels
     Action (2): Remove vegetation
   - C. Maintenance Taks (3): Check for correct installation
     Action (3): Checking the converter, cables and foundation

3. Semi-Annually
   - A. Maintenance Task (1): Check for loose wire connection
     Action (1): Tighten wires
   - B. Maintenance Task (2): Check for cracked or deteriorated wires
     Action (2): Replace wire

CAUTION

This equipment may contain electrostatic sensitive devices.

A. Protect from electrostatic discharge.

B. Electronic modules and components should be touched only when this is unavoidable e.g., soldering, replacement.

C. Before touching any component of the cabinet, you should bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.

D. Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets or, synthetic fiber clothing. They must be laid down on conductive surfaces.

E. Electronic modules and components must be stored and transported in conductive packing.

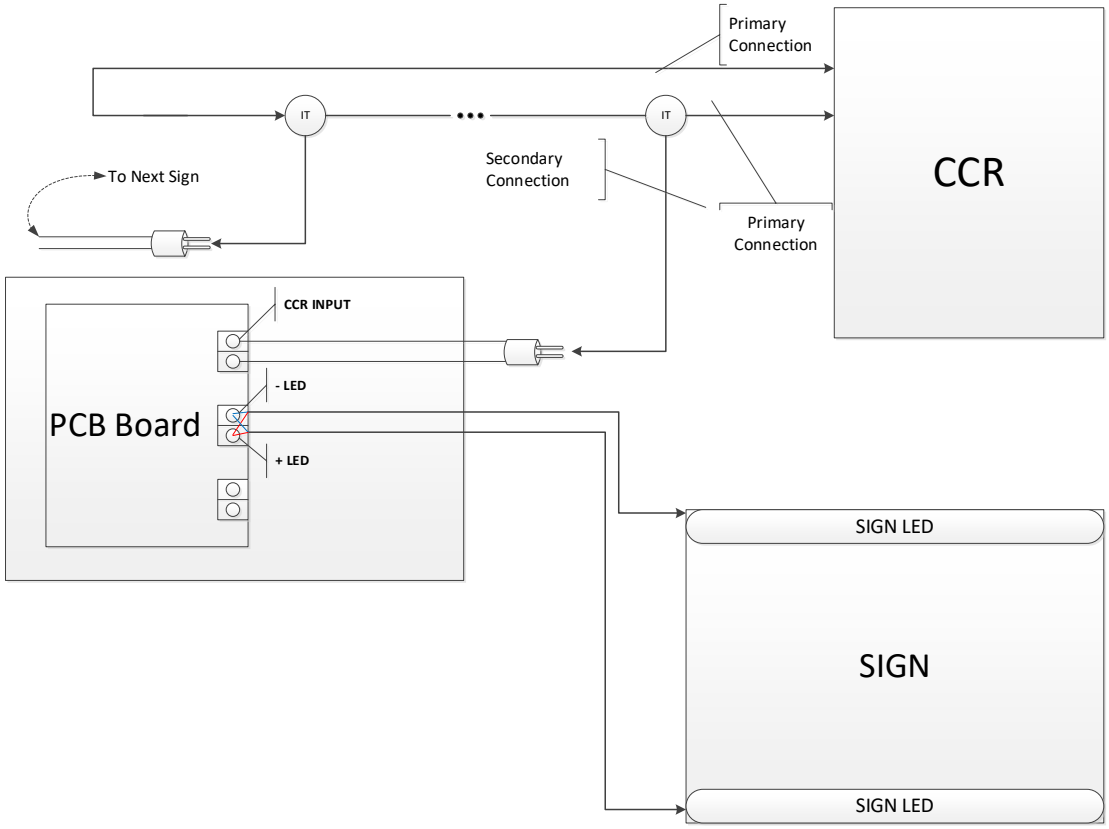
6-2. Wiring the Power Supply

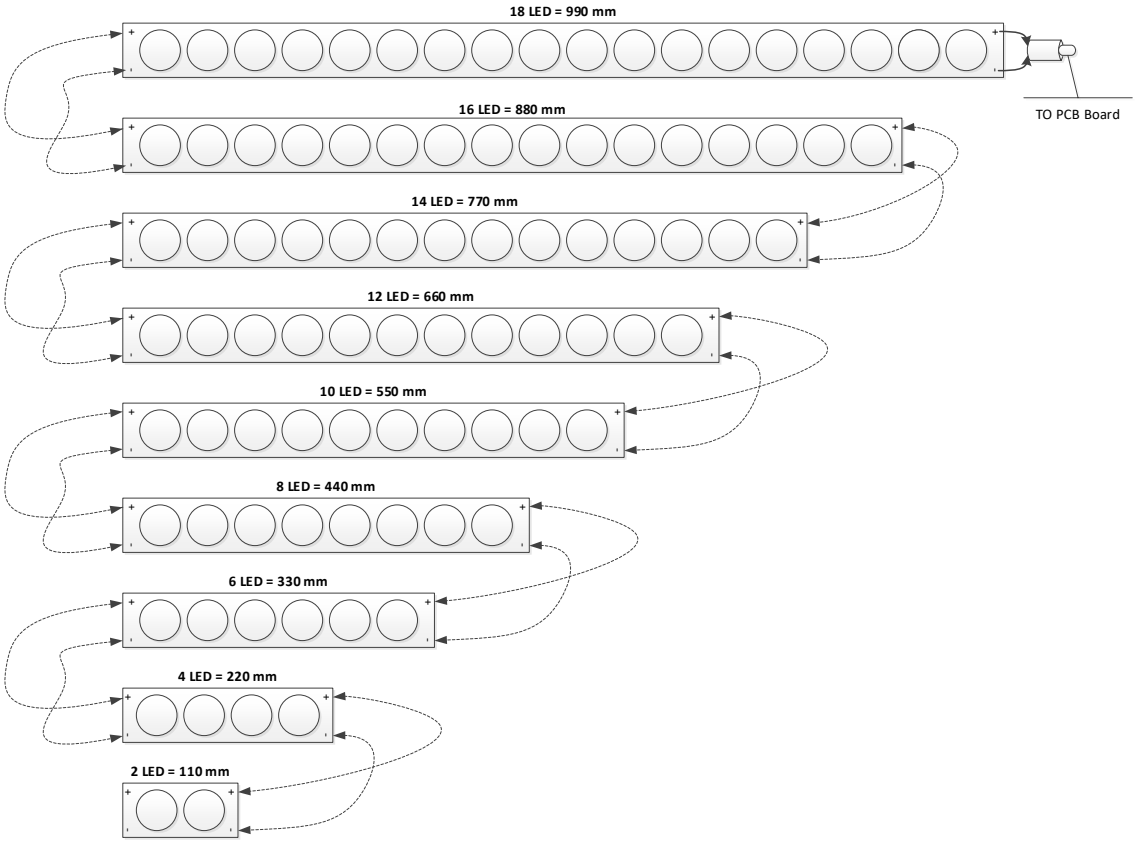
1. Find the wires that carry power from the L-830 secondary. Connect these wires to the terminals on the Power Supply that are labeled "AC INPUT". This is the isolated 6.6A input. The direction of the wires does not matter.

2. Find the wires that were previously connected to the DC Supply and the LED front panels. Connect these wires to the terminals on the Power Supply that are labeled "OUTPUT".

3. Make sure that the wiring of the sign matches with the diagram shown in below Figure

4. You are now ready to turn on the power for the sign.





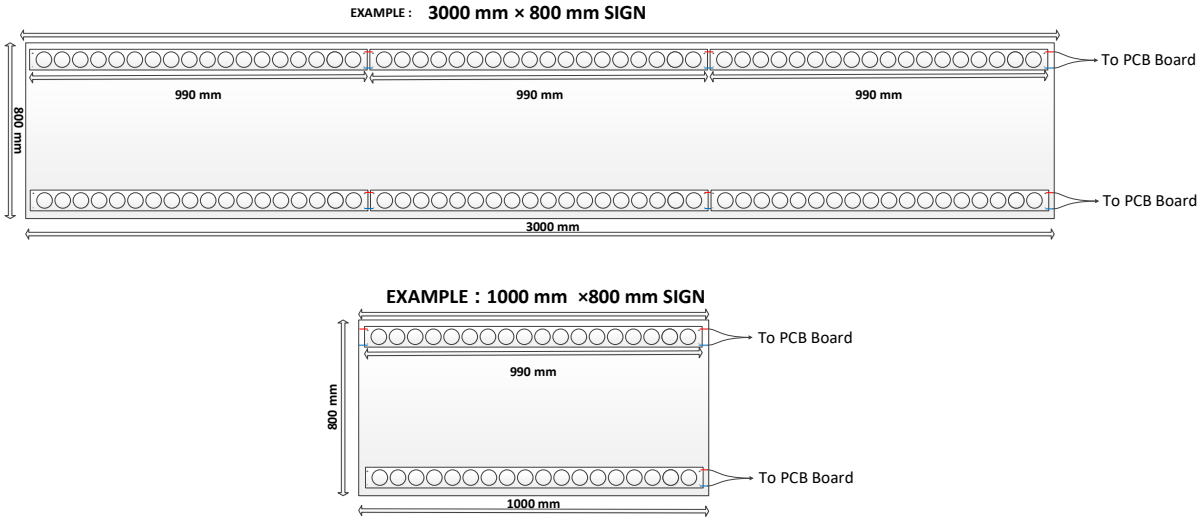


Figure 6-1 Wiring Map

6-3. Replace a Front Panel

Before you start, make sure that the sign is turned off and not energized.

NOTE:

Please note that before starting the process, make sure to clean the front panel and the upper sign area with a clean cloth, and use gloves to remove the front panel.

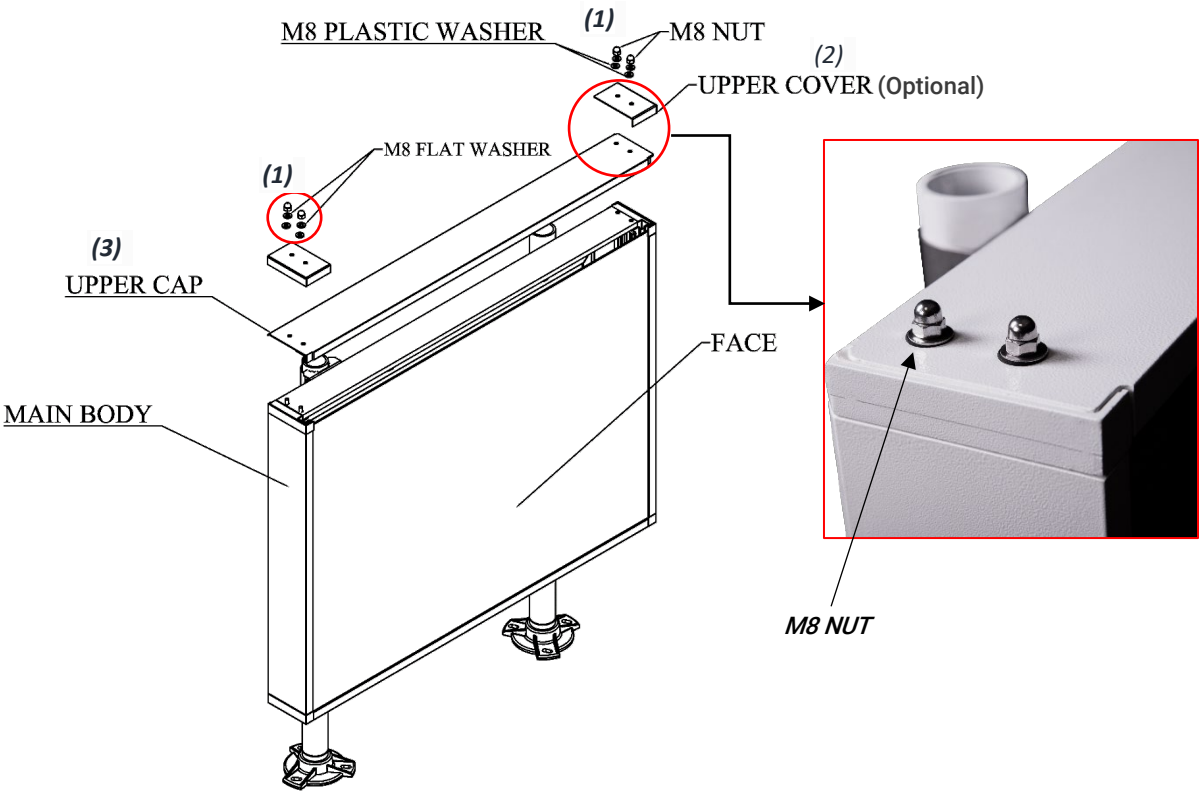


Figure 6-2 Replace Front Panel

1. Remove the four screws *(1)* to remove the sign upper covers.
2. Remove upper cover *(2)* to remove upper cap. (Optional)
3. Remove upper cap *(3)*.
4. Remove face from sign *(4)*.
5. Replace new face (be careful about scratching the face when replace).
6. Put upper cap & upper covers.
7. Fasten 4 screws *(1)*.

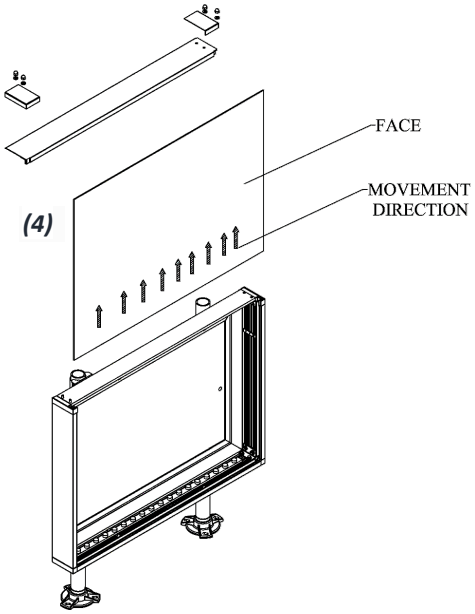


Figure 6-3 Remove Face from sign

6-4. Replace an LED strip

1. Before you begin, make sure the sign is turned off and not plugged in.
2. Follow the replace a Face step to remove face in section *6-3*.

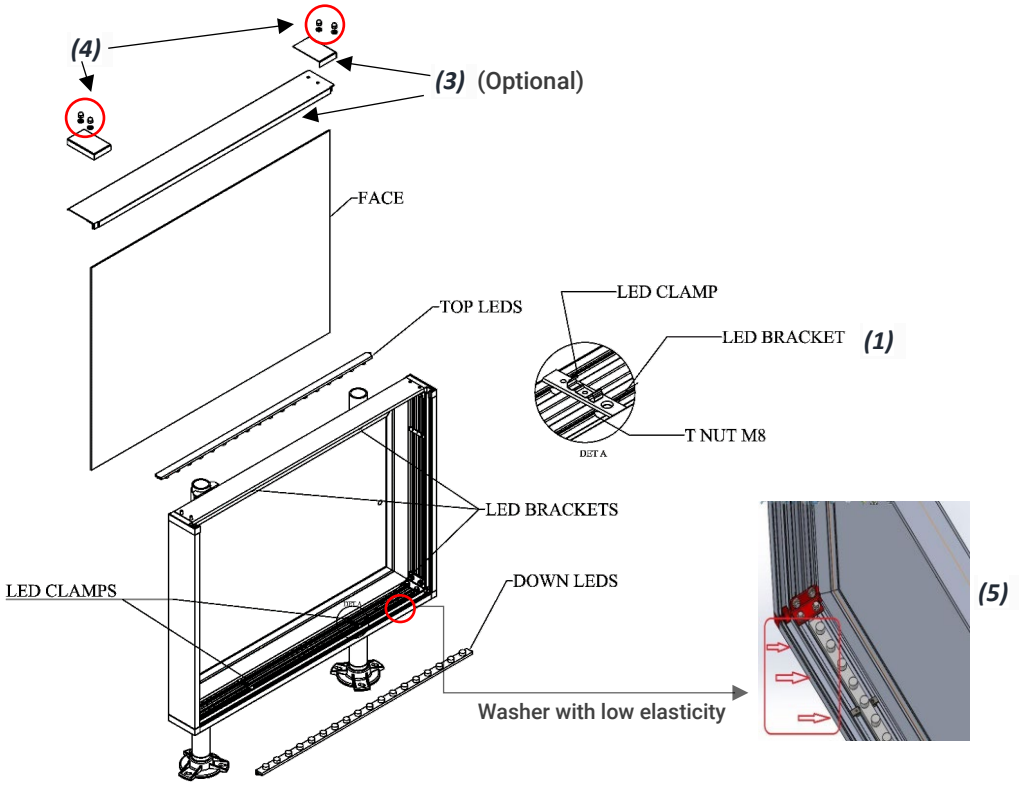
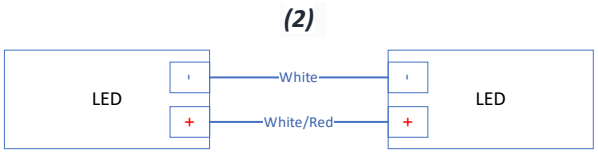


Figure 6-4 Replace an LED strip

3. Release the burned LED wire.



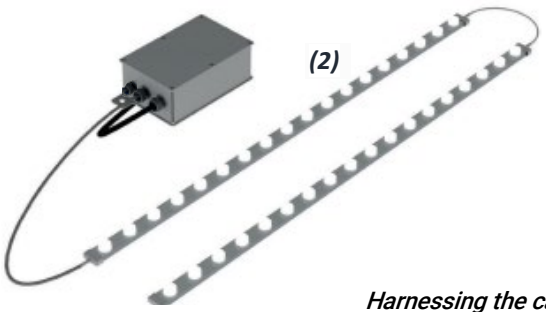


Figure 6-5 LED Connection Diagram

4. Release the burned LED from LED brackets *(1)*.

5. Replace new LED & connect the wires (white/Red wire is (+) & white wire is (-)) according to diagram. *(Polarity is important See (2).*

6. Put upper cap & upper covers *(3).*

7. Fasten 4 screws *(4).*

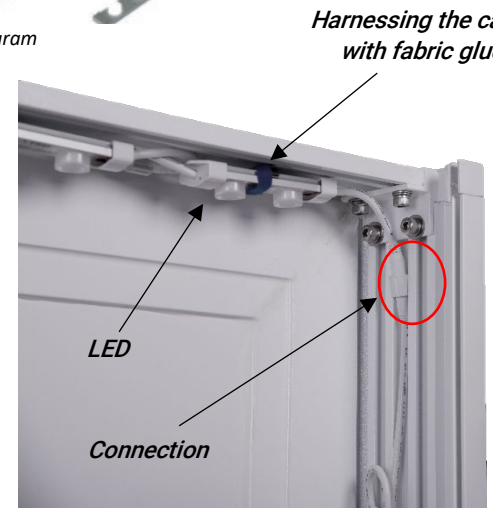


Figure 6-6 Connections between LED and hold

NOTE:

Five pieces of 3cm long O-ring with a diameter of 3mm, made of dry rubber, are placed in the groove of the floor sign profile in such a way that they do not cover the embedded holes for water drainage. (5)

6-5. Replace a Converter

Before you start, make sure that the sign is turned off and not energized.

1. On the Electronic box, remove the six screws (1) that are countersunk. Then, lift off the lid.

2. Release the lower right two screws (2) on the terminal block, then remove the two wires connected to the converter.

3. Release the lower left two screws (3) on the terminal block, then remove the two wires connected to the converter.

4. Remove the two screws (4) attaching the converter to the sign.

5. Remove the old converter from the electronics box, then attach the new one using the two screws (4).

6. Attach the two wires form the lead wire to the two lower right screws (2) of the terminal block.

7. Attach the two wires form the LED power to the two lower left screws (3) of the terminal block.

8. Connect the lead wire to isolating transformer.

9. If the power LED turn ON you can fasten the 6 screws of the cover (1) (step 1).

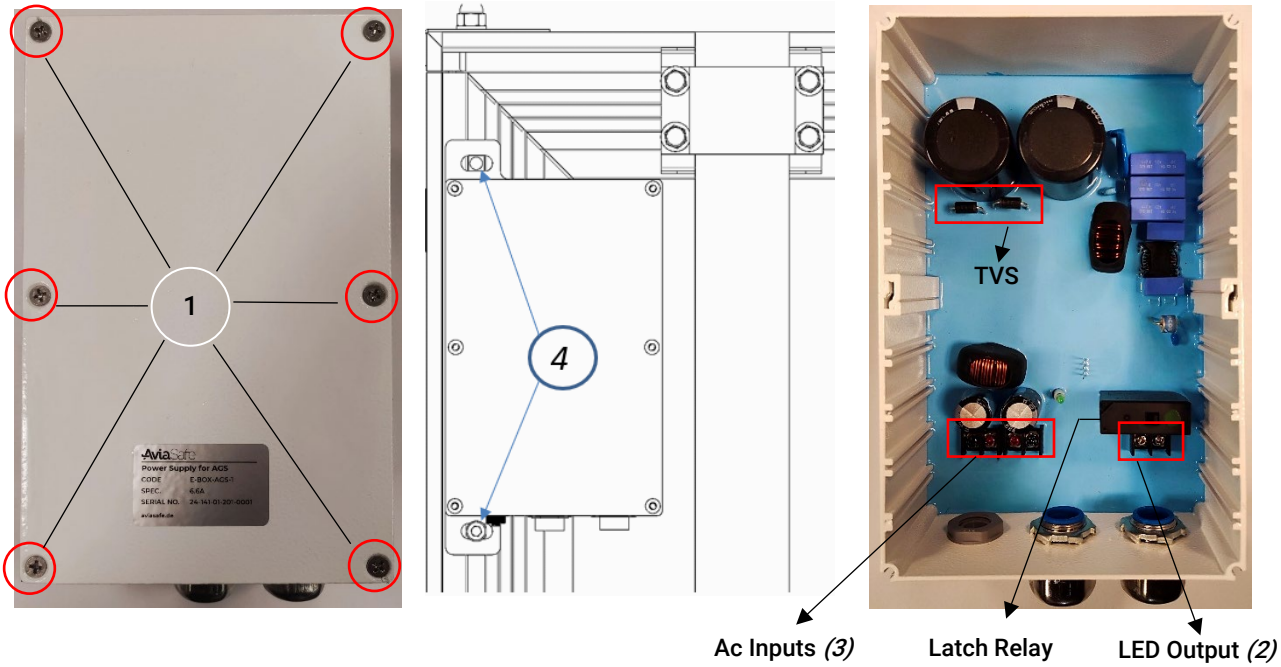


Figure 6-7 Converter Box

6-6. Replace the Complete Electronics Box

If any of the operational or non-operational signs did not functioning not clear for any reason, Check for one of the possible symptoms. The symptoms include the following cases, but not limited to:

1. infrastructure (such as CCR, initial cabling, joint, isolated transformers, etc.)
2. The sign flashes or blinks alternately.
3. The sign is off and turns on automatically after a few minutes.
4. The sign is on and turns off after a while and then turns on again.
5. The converter is burned, broken, or physically damaged.

In this case in any of the above-mentioned cases, before you start, make sure that the sign is turned off and not energized, and the following steps should be taken:

6. Disconnect the roof door of the converter using 6 screws from the converter box.
7. Pay attention to the relay status in the converter. If the switch is on the right, the relay is off, and if it remains on the left, the relay is connected and the converter is operational.
8. Now, if the converter is operational but there is no output, perform the following steps in the order mentioned in sections *6-10.*

To Replace the converter box, follow the steps carefully:

For the installation of a new SIGN, it is essential to ensure that the primary connector from the CCR is without power.

A. First, disconnect the input sign using a secondary connector inside the junction box from the isolated transformer.
B. Remove the door of the converter box using 6 screws.
C. Open the two wires connected to the input terminals of the box.
D. Open the wires connected to the output terminals of the converter box in the adjacent section n to the input terminals.
E. Guide the input and output wires from the gland section of the box to the outside of the box.
F. Open the two retaining screws of the box, which have T-nuts, to separate the box from the sign.

Figure 6-8 The corner of the sign and the cloth fastening of the LED

G. Replace the new converter box and secure it to the body using the two corresponding screws (Note that the edges of the sign body serve as a heat sink and the converter box must be installed in the left groove and the highest and corner part).
H. Now, pass the two input box wires through the gland (on the right side) and connect them to the terminal (A C Input) on the right side of the box.
I. Also, pass the output sign wires through the left gland and connect them to the terminal (LED Output) next to the input terminal.
J. Finally, establish the connection between the sign and the isolated transformer using a secondary connector in the junction box.
K. Make sure the relay is in the ON position.
L. Now, by observing the corresponding light in the box and measuring the output parameters using a multimeter, ensure the proper functioning of the converter box, Finally, proceed to tighten the 6 screws of the box door (Referring to step 2).

Repair of a sign typically takes place during the day and in an offline or powerless manner. However, in emergency situations (such as at night), it may be necessary to perform quick repairs on the sign while ensuring safety and protection measures. In such cases, you can proceed with the service by safely disconnecting the CCR line (The ring related to the power supply of the specific sign) while adhering to safety principles.

6-7. Replace a Damaged Power Cable

1. In the first, based on section *6-6*, please perform steps A to E.

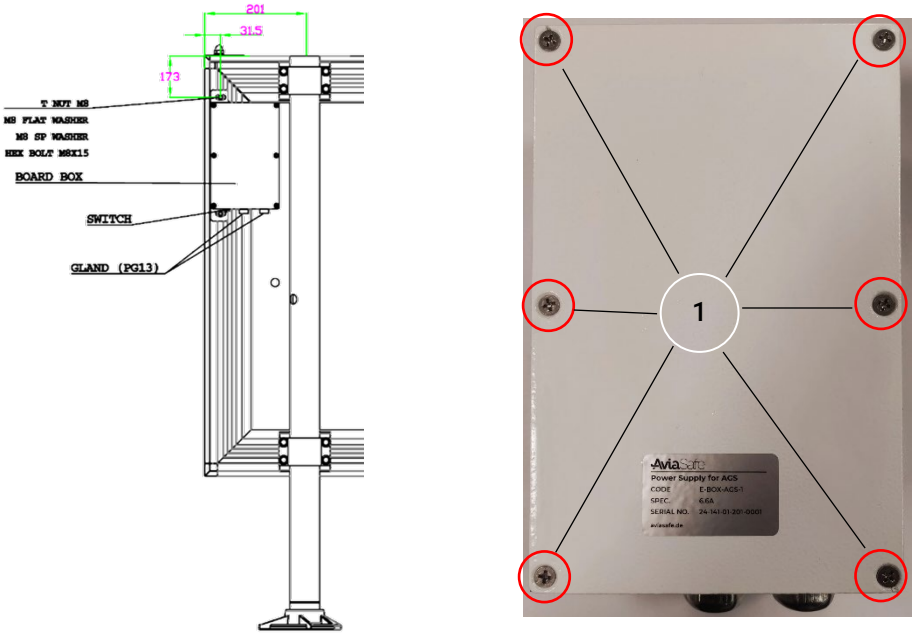


Figure 6-9 Replace a Damaged Power Cable

2. Pull the new cable's open end through the cable gland.

3. Connect the cable to the terminal block (2) inside the converter box.

4. Tighten the cable gland securely.

5. Close the box and attach the lid using the six countersunk screws (1). Make sure the gasket is in place

6-8. Replace a Frangible Coupling

Frangible device is designed to break or shatter upon impact, providing a safety mechanism for various structures, such as poles, signs, or barriers. In the case of AVIASAFE products, these frangible devices are installed on poles and it is not an independent piece. The purpose of using frangible device on these poles is to minimize potential damage in the event of an aircraft collision or excessive pressure from an aircraft.

By using frangible device, the impact force is absorbed, and the energy is directed towards breaking the frangible portion rather than causing significant damage to the aircraft or the structure itself. This design helps protecting the aircraft and its occupants from more severe consequences that could arise from a direct collision with a rigid structure.

If a collision were to occur, the frangible portion, which is typically located close to the base of the pole, is designed to break easily. This means that the sign attached to the pole, for example, will detach

from the frangible portion upon impact, minimizing the transfer of force to the aircraft and reducing the risk of structural damage.

Replacing the frangible device after an impact is crucial for maintaining the safety of the structure. It ensures that the frangible mechanism is intact and capable of performing its intended function in subsequent incidents. Therefore, when a frangible device is damaged or broken, it is necessary to replace the entire pole to ensure the proper functioning of the safety system.

Overall, the use of frangible device on poles in AVIASAFE products is an important safety measure that aims to protect both the aircraft and the structures it may encounter. By sacrificing the frangible portion upon impact, the potential for more severe damage is minimized, contributing to enhanced safety in aviation environments.

For more information on frangibility, you can refer to Section ***APPENDIX A*** where you will find the testing section.

6-9. Reset the Fail-open Converter

The protection of the converter is handled by a protection relay or a microprocessor. If the voltage exceeds a certain limit, this relay will trip and disconnect the circuit. To provide additional assurance, two TVS diodes are placed in the path. If, for any reason, the relay fails to function, these diodes will burn out, preventing excessive voltage from being applied to the circuit. These TVS diodes are easily replaceable.

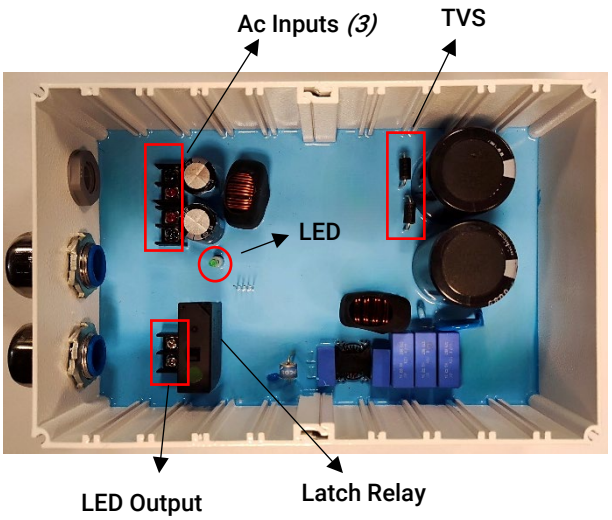


Figure 6-10 Converter Box Details

6-10. Unclear Issue

Before you begin, make sure to disconnect the relay to determine whether you can hear the sound of transformer saturation.

For further assurance, set the multimeter to AC mode and check the two input terminals. This value varies depending on the type of variable transformer.

If you are unable to read the appropriate voltage at the input, perform your own tests on the junction box. This can be done by disconnecting the corresponding ring and removing the secondary connection of the isolated transformer. Then, reconnect the ring and use the multimeter to measure the secondary voltage.

If the measured voltage is appropriate according to the type of transformer, the isolated transformer is in good condition. There may be an issue with the secondary cable.

Now, short-circuit the input connection and use the multimeter to check the two wire ends in the junction box for continuity.

If there is a break in the secondary cable, proceed to replace it and install or connect a secondary connector (Male) to it.

If you are unable to measure the appropriate voltage for the isolated transformer, proceed to replace the isolation.

The selection of the transformer type should be compatible with the power of the sign. To achieve this, use the following table:

TABLE 6-1 The Selection of the Transformer type

P_{Trans}	P_{Sign}
100W	≥ 30W
200W	≤ 30W

If the above steps were not effective, you can perform the following additional steps for further testing:

A. First, we check the output voltage of the LEDs, which should typically be around 18.5 volts.
B. Next, we examine the voltage across the link terminals, which should be around 58 volts (DC voltage).
C. If both of the above conditions are acceptable, we proceed to the third stage, which involves testing integrity of the transformer, focusing on the lower section.
D. Initially, we need to determine if the current relay is present or not.
E. We disconnect the relay.
F. We measure the voltage across the input terminals (with the Open Circuit).
G. The measure voltage in step 3 should be approximately 40 to 50 volts.
H. If the measured voltage in step D is outside the specified range, it indicates a problem with the transformer.

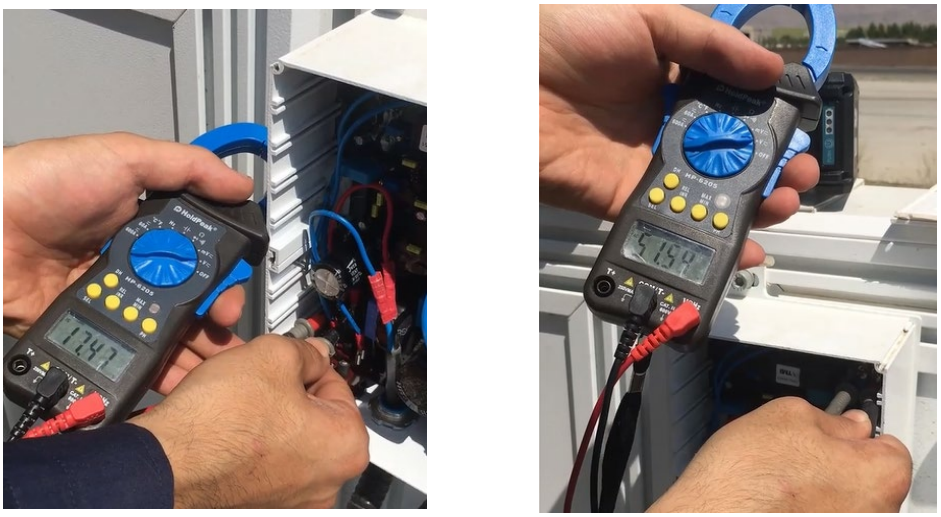


Figure 6-11 Check the output voltage and voltage across the link terminal

7. TROUBLESHOOTING

7-1. The Sign does not light up correctly

TABLE 7-1 Troubleshooting – The Sign does not light up correctly

Issue	Possible reason	Recommended action
Only parts or sections of the sign do not light up.	Damaged LED-strip.	Change LED-strip with a spare.
No part of the sign lights up.	An issue with the input power.	Check using a clamp meter that the input power to the sign is correct. If there is no input power some possible reasons are damaged power cable on the sign or an issue with the transformer.
	An issue with the converter box.	Verify that the converter switch is set to ON.
		After disconnecting the cable from the power, verify that the wiring in the converter box is the same as in the internal wiring diagrams series and voltage and that the cables are securely installed in the terminal block.
the upper right corner is much darker than the rest of the sign.	No contact between the LED strip and the light front panel due to for example, that the LED-cable is clamped between the front panel and strip.	Remove the U-profile. Look at the LED-strip inside the cut-out and remove anything preventing contact between the LED-strip and the light panel.
	Damaged LED-strip.	Change LED-strip with a spare.

7-2. The Sign has mechanical Issues

TABLE 7-2Troubleshooting – Mechanical Issues

Issue	Possible reason	Recommended action
The front panel looks bad or message is hard to read.	The front panel is dirty.	Remove the front panel. and clean it using a mild soap.

		Remove the front panel. Check if the transparent panel behind it is dirty. If so, clean it gently using a mild glass cleaner.
	Front panel is damaged	Replace the front panel with a spare.
The sign is skew after a collision.	Collected water inside the sign	Remove any collected water on the front panel or the light barrier by using a soft cloth. Verify that the drainages are not blocked by dirt. Verify that all gaskets are in good condition, including the sealing washers and LED-cutout tape. Verify that all screws are fastened firmly in place.
	A non-permanent deformation.	Remove the sign from its poles and let the sign recover for ~1 hour.
	Fasteners for the frame have loosened.	Re-tighten the frame fasteners by hand. These are located under the plastic domes on the sign sides.

7-3. The Sign has Electrical Issues

TABLE 7-3 Troubleshooting – Electrical Issues

The asynchronous behavior of LED loads	LEDs not being synchronized in terms of turning on and off	Synchronizing the type and power of LEDs
If the load exceeds 50 to 60 volts	Continuous flickering of LEDs	There is a high probability that the capacitors have burned out and the board needs to be replaced
The input has likely experienced a short circuit	We don't have voltage on the TVS	It is possible that one of the boost converters (PFC) is malfunctioning, and the board needs to be replaced
The Output LED and LED on the board is off.	The relay on the board might be burnt out.	board needs to be replaced.
	The output wires could be connected with reversed polarity.	
	The TVS might be burnt out	

8. SPARE PARTS

8-1. Reliance Sign

This spare part list covers both Guidance signs and Gate signs.

To select the correct spare part, make sure which sign version you have. Complete product information can be found on the product label which is located on the back of the sign.

8-1-1. Sign Front

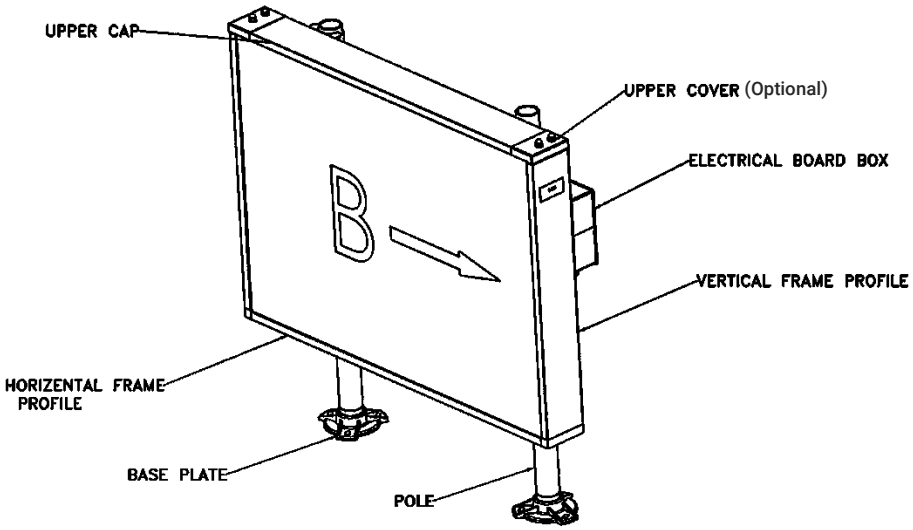


Figure 8-1 Spare Pars - Sign Front

8-1-2. Sign Back

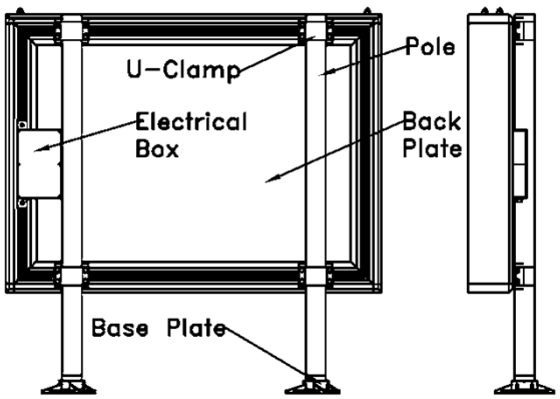


Figure 8-2 Spare Parts – Sign Back

8-2. Spare Part List

TABLE 8-1 Spare Part List

Airfield	Spare Part	141-01-201	E-BOX-AGS-1	-	Power Supply for Airfield Guidance Sign 6.6A
Airfield	Spare Part	141-01-202	E-BOX-AGS-2	-	Power Supply for Airfield Guidance Sign 220V
Airfield	Spare Part	141-02-201	LED-AGS-130	LED-AGS	LED Bar for Airfield Guidance Sign - 130 mm
Airfield	Spare Part	141-02-202	LED-AGS-240	LED-AGS	LED Bar for Airfield Guidance Sign - 240 mm
Airfield	Spare Part	141-02-203	LED-AGS-350	LED-AGS	LED Bar for Airfield Guidance Sign - 350 mm
Airfield	Spare Part	141-02-204	LED-AGS-460	LED-AGS	LED Bar for Airfield Guidance Sign - 460 mm
Airfield	Spare Part	141-02-205	LED-AGS-570	LED-AGS	LED Bar for Airfield Guidance Sign - 570 mm
Airfield	Spare Part	141-02-206	LED-AGS-680	LED-AGS	LED Bar for Airfield Guidance Sign - 680 mm
Airfield	Spare Part	141-02-207	LED-AGS-790	LED-AGS	LED Bar for Airfield Guidance Sign - 790 mm
Airfield	Spare Part	141-02-208	LED-AGS-900	LED-AGS	LED Bar for Airfield Guidance Sign - 900 mm
Airfield	Spare Part	141-02-209	LED-AGS-1010	LED-AGS	LED Bar for Airfield Guidance Sign - 1010 mm
Airfield	Spare Part	141-02-209	LED-AGS-1010	LED-AGS	LED Bar for Airfield Guidance Sign - 1010 mm
Airfield	Spare Part	141-03-101	-	POLE-HOLDER	Pole Holder For Airfield Guidance Sign
Airfield	Spare Part	141-04-101	TALC	TALC	TALC for Airfield Guidance Sign ,600X600
Airfield	Spare Part	141-04-102	TALC	TALC	TALC for Airfield Guidance Sign ,600X700
Airfield	Spare Part	141-04-103	TALC	TALC	TALC for Airfield Guidance Sign ,600X800
Airfield	Spare Part	141-04-104	TALC	TALC	TALC for Airfield Guidance Sign ,600X900
Airfield	Spare Part	141-04-105	TALC	TALC	TALC for Airfield Guidance Sign ,600X1000
Airfield	Spare Part	141-04-106	TALC	TALC	TALC for Airfield Guidance Sign ,600X1100
Airfield	Spare Part	141-04-107	TALC	TALC	TALC for Airfield Guidance Sign ,600X1200
Airfield	Spare Part	141-04-108	TALC	TALC	TALC for Airfield Guidance Sign ,600X1300

Airfield	Spare Part	141-04-109	TALC	TALC	TALC for Airfield Guidance Sign ,600X1400
Airfield	Spare Part	141-04-110	TALC	TALC	TALC for Airfield Guidance Sign ,600X1500
Airfield	Spare Part	141-04-111	TALC	TALC	TALC for Airfield Guidance Sign ,600X1600
Airfield	Spare Part	141-04-112	TALC	TALC	TALC for Airfield Guidance Sign ,600X1700
Airfield	Spare Part	141-04-113	TALC	TALC	TALC for Airfield Guidance Sign ,600X1800
Airfield	Spare Part	141-04-114	TALC	TALC	TALC for Airfield Guidance Sign ,600X1900
Airfield	Spare Part	141-04-115	TALC	TALC	TALC for Airfield Guidance Sign ,600X2000
Airfield	Spare Part	141-04-116	TALC	TALC	TALC for Airfield Guidance Sign ,600X2100
Airfield	Spare Part	141-04-117	TALC	TALC	TALC for Airfield Guidance Sign ,600X2200
Airfield	Spare Part	141-04-118	TALC	TALC	TALC for Airfield Guidance Sign ,600X2300
Airfield	Spare Part	141-04-119	TALC	TALC	TALC for Airfield Guidance Sign ,600X2400
Airfield	Spare Part	141-04-120	TALC	TALC	TALC for Airfield Guidance Sign ,600X2500
Airfield	Spare Part	141-04-121	TALC	TALC	TALC for Airfield Guidance Sign ,600X2600
Airfield	Spare Part	141-04-122	TALC	TALC	TALC for Airfield Guidance Sign ,600X2700
Airfield	Spare Part	141-04-123	TALC	TALC	TALC for Airfield Guidance Sign ,600X2800
Airfield	Spare Part	141-04-124	TALC	TALC	TALC for Airfield Guidance Sign ,600X2900
Airfield	Spare Part	141-04-125	TALC	TALC	TALC for Airfield Guidance Sign ,600X3000
Airfield	Spare Part	141-04-127	TALC	TALC	TALC for Airfield Guidance Sign ,800X700
Airfield	Spare Part	141-04-128	TALC	TALC	TALC for Airfield Guidance Sign ,800X800
Airfield	Spare Part	141-04-129	TALC	TALC	TALC for Airfield Guidance Sign ,800X900
Airfield	Spare Part	141-04-130	TALC	TALC	TALC for Airfield Guidance Sign ,800X1000
Airfield	Spare Part	141-04-131	TALC	TALC	TALC for Airfield Guidance Sign ,800X1100
Airfield	Spare Part	141-04-132	TALC	TALC	TALC for Airfield Guidance Sign ,800X1200

Airfield	Spare Part	141-04-133	TALC	TALC	TALC for Airfield Guidance Sign ,800X1300
Airfield	Spare Part	141-04-134	TALC	TALC	TALC for Airfield Guidance Sign ,800X1400
Airfield	Spare Part	141-04-135	TALC	TALC	TALC for Airfield Guidance Sign ,800X1500
Airfield	Spare Part	141-04-136	TALC	TALC	TALC for Airfield Guidance Sign ,800X1600
Airfield	Spare Part	141-04-137	TALC	TALC	TALC for Airfield Guidance Sign ,800X1700
Airfield	Spare Part	141-04-138	TALC	TALC	TALC for Airfield Guidance Sign ,800X1800
Airfield	Spare Part	141-04-139	TALC	TALC	TALC for Airfield Guidance Sign ,800X1900
Airfield	Spare Part	141-04-140	TALC	TALC	TALC for Airfield Guidance Sign ,800X2000
Airfield	Spare Part	141-04-141	TALC	TALC	TALC for Airfield Guidance Sign ,800X2100
Airfield	Spare Part	141-04-142	TALC	TALC	TALC for Airfield Guidance Sign ,800X2200
Airfield	Spare Part	141-04-143	TALC	TALC	TALC for Airfield Guidance Sign ,800X2300
Airfield	Spare Part	141-04-144	TALC	TALC	TALC for Airfield Guidance Sign ,800X2400
Airfield	Spare Part	141-04-145	TALC	TALC	TALC for Airfield Guidance Sign ,800X2500
Airfield	Spare Part	141-04-146	TALC	TALC	TALC for Airfield Guidance Sign ,800X2600
Airfield	Spare Part	141-04-147	TALC	TALC	TALC for Airfield Guidance Sign ,800X2700
Airfield	Spare Part	141-04-148	TALC	TALC	TALC for Airfield Guidance Sign ,800X2800
Airfield	Spare Part	141-04-149	TALC	TALC	TALC for Airfield Guidance Sign ,800X2900
Airfield	Spare Part	141-04-150	TALC	TALC	TALC for Airfield Guidance Sign ,800X3000

9. DRAWING

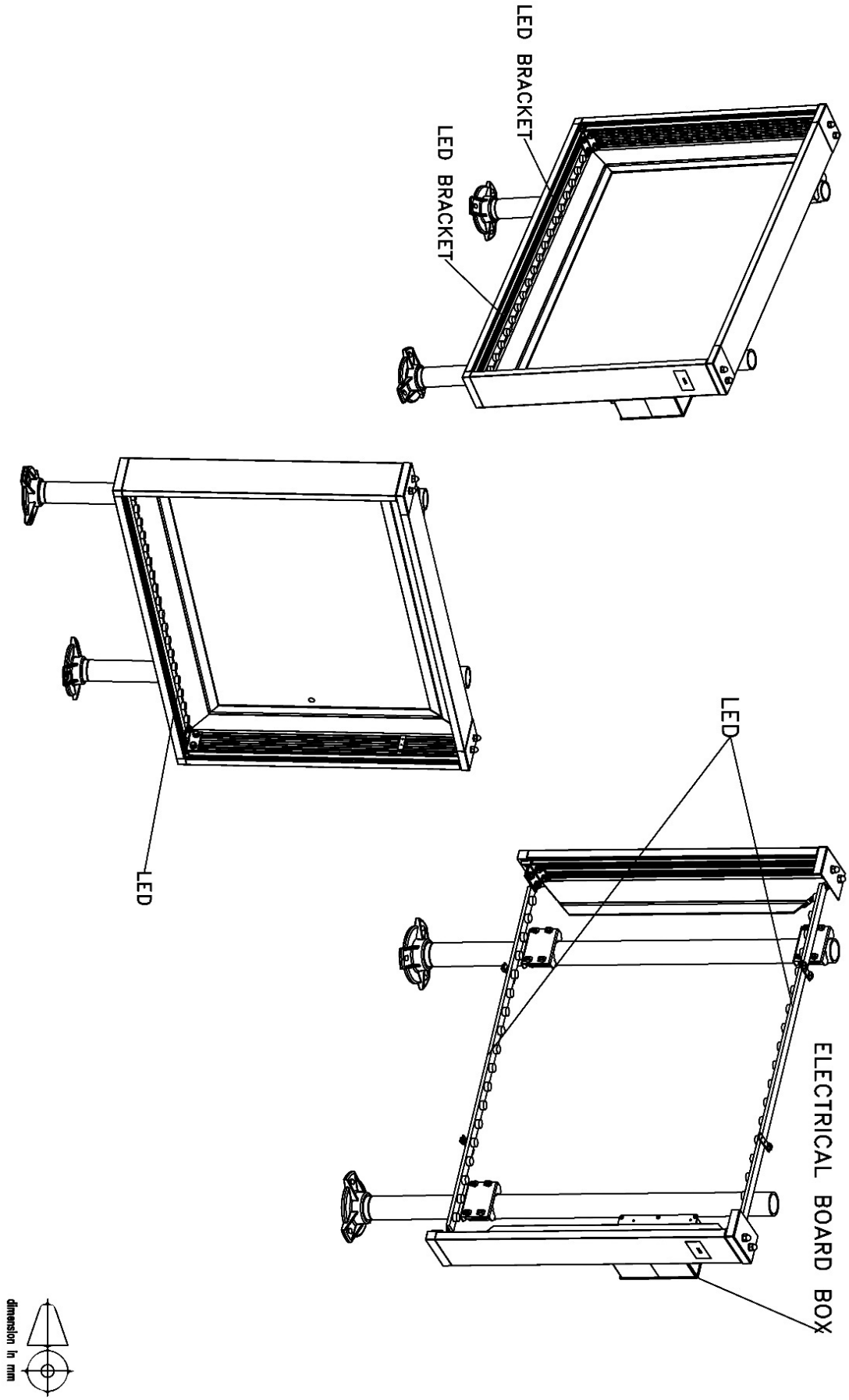


Figure 9-1 Drawing A

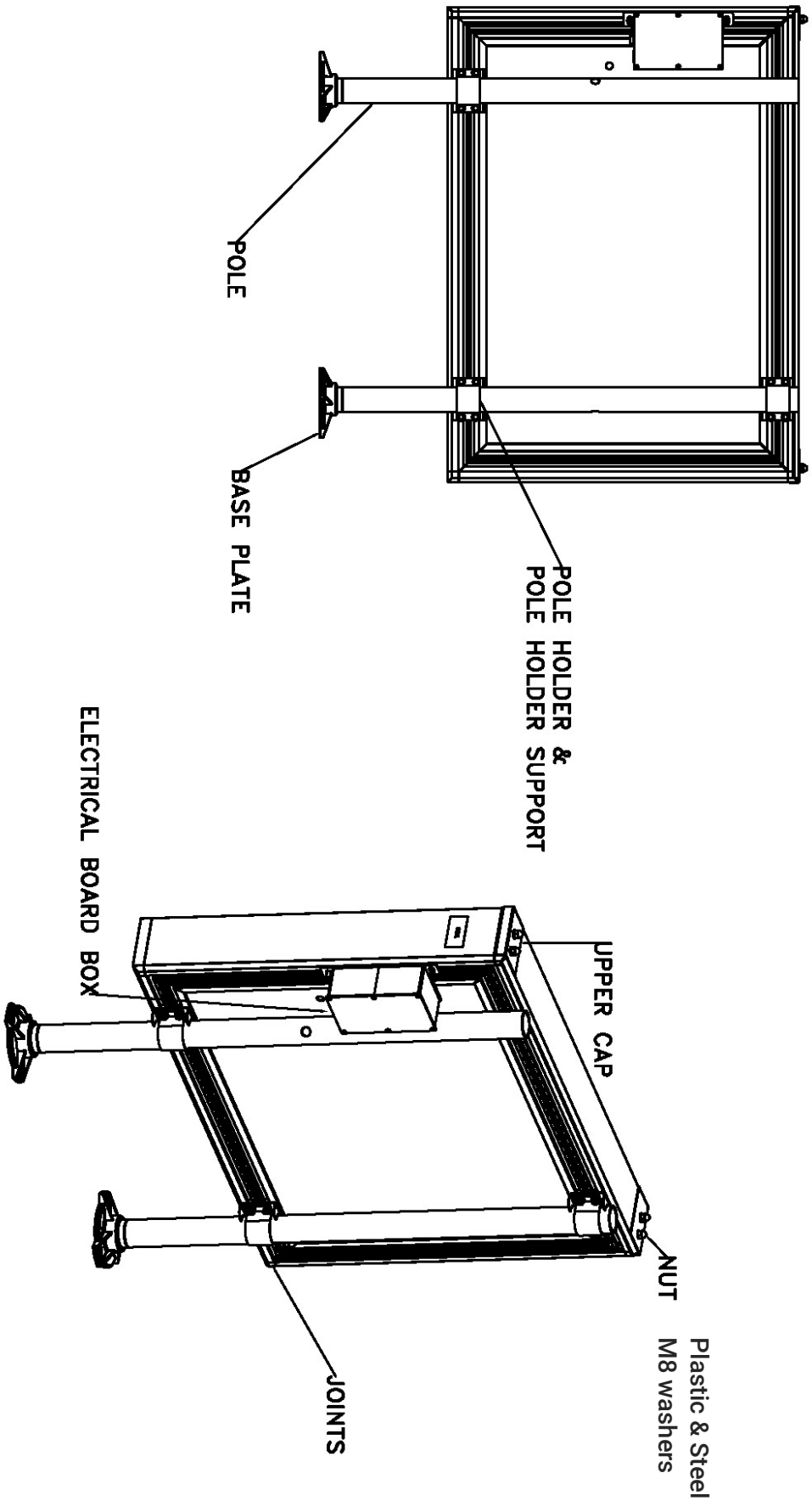


Figure 9-2 Drawing B