Instruction Manual

Guidance Sign
Type PVL IP34

AM.04.260e Edition 1.2

ADB
Airfield Solutions

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ADB
Airfield Solutions

Table of contents

7. Technical data

1 About this manual

The manual shows the information necessary to:
- install
- carry out maintenance
- carry out troubleshooting

on the PVL guidance sign, in the manual referred to as the equipment.

1.1 How to work with the manual

1. Familiarize yourself with the structure and content.
2. Carry out the actions completely and in the given sequence.

1.2 Record of changes

Edition	Editor	Check	Date	Description
0.1	MR		10/2009	Draft version
0.2	EV		12/2009	Rebranding
Preliminary	MR	DPI, TP, LM, JHE	10/2010	New - preliminary version
Preliminary.1	MA	MA	12/2010	Update guarantee and company addresses
1.0	MR	JBE/ EWE	09/2011	New power adapter and parallel supply added
1.1	MR		05/2011	Para 4.9 change in installation instruction
1.2	TWE	WGR, NBU	10/2015	Update for new parts and minor changes.

1.3 Abbreviations and terms

Term or abbreviation	Description
AGL	Airfield Ground Lighting
CCR	Constant Current Regulator
FAA	Federal Aviation Administration
Fastener	Generic term for an item that holds the equipment together or that holds the equipment on its mounting support, e.g. nut, bolt, washer
FOD	Foreign Object Debris
ICAO	International Civil Aviation Organisation
IEC	International Electrical Committee
IP	Ingress protection
ISO	International Standardization Organisation
Light source	This can be a LED, a fluorescent lamp or an halogen lamp. The type depends on the type of equipment.
LED	Light Emitting Diode
Mounting support	Any mounting interface for elevated lights. It can be a piece of equipment permanently installed in or on the ground, on which the light is installed. It can be a shallow or deep base. It can be with or without adapter ring.
PCB	Printed Circuit Board
UNC	Unified Thread Standard
VOR check-point	Very high Frequency Omni directional Range check-point. A point on the aerodrome where there is sufficient signal strength from a VOR to check the VOR equipment on the aircraft.

1.4 Icons used in the manual

For all WARNING symbols, see § 2.2.

CAUTION
Can cause damage to the equipment.

NOTE
Gives further information.

TIP
Gives information on how to carry out or to understand the instruction or information more easily.

2 Safety

Read all warnings carefully. Failure to do so may result in personal injury, death, or property damage.

2.1 Use

To use the equipment safely:

- Refer to the International Standard IEC 61820, *Electrical installation for lighting and beaconing of aerodromes - Constant current series circuits for aeronautical ground lighting - System design and installation requirements*, and to the International Standard IEC 61821, *Electrical installations for lighting and beaconing of aerodromes - Maintenance of aeronautical ground lighting circuits* for instructions on safety precautions.
- See FAA Advisory Circular AC 150/5340-26, *Maintenance of Airport Visual Aids Facilities*, for additional instructions on safety precautions.
- Observe all safety regulations. To avoid injuries, always remove power prior to making any wire connections and touching any live part. Refer to the International Standards IEC 61820 and IEC 61821.
- In addition for a parallel power supply also take into account the International Standard IEC 60598 (for class I equipment).
- Read and become familiar with the general safety instructions provided in this chapter before you install, operate, maintain or repair the equipment.
- Read and carefully follow the instructions given throughout this manual before installing, operating, maintaining, or repairing the equipment.
- Store this manual within easy reach of personnel installing, operating, maintaining or repairing the equipment.
- Follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used.

2.2 Safety symbols

Become familiar with the safety symbols presented in this chapter. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.

WARNING 1: Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING 2: Risk of electrical shock. Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damages.

WARNING 3: Wear personal protective equipment. Failure to observe may result in serious injury.

WARNING 4: Do not touch. Failure to observe this warning may result in personal injury, death, or equipment damage.

2.3 Skilled personnel

The term skilled personnel is defined here as individual who thoroughly understand the equipment and its safe operation, maintenance, and repair. Skilled personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

2.4 Liability

WARNING
Use of the equipment in ways other than described in the catalogue leaflet and the manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in the manual.

ADB cannot be held responsible for injuries or damages resulting from non-standard, unintended uses of its equipment. The equipment is designed and intended only for the purpose described in the manual. Uses not described in the manual are considered unintended uses and may result in serious personal injury, death or property damage.

Unintended uses includes the following actions:

- Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ADB replacement parts or accessories.
- 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.
- Using materials or auxiliary equipment that are inappropriate or incompatible with your ADB equipment.
- Allowing unskilled personnel to perform any task on or with the equipment.

2.5 Installation

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you install the equipment safely and efficiently.

WARNING
Failure to follow these safety procedures can result in personal injury or death.

- Allow only skilled personnel to install ADB and auxiliary equipment. Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals and will void the warranty.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical connections to local code provided they are not in contradiction with the general rules.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current and voltage demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment and animals (e.g. rodents).
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility (power products), and cover removal (power products).
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

2.6 Fasteners

WARNING

- **Only use fasteners of the same type as the one originally supplied with the equipment.**
- **Always tighten the fasteners to the recommended torque. Use a calibrated torque wrench and apply the recommended adhesive type.**
- **Obey the instructions of the adhesives necessary for the fasteners.**

If this is not the case, this may cause the fasteners to loosen, damage the equipment, potentially to loosen the equipment. This can lead to a highly dangerous situation of FOD, with potential lethal consequences.

Example

It is possible to insert a 3/8” UNC screw in a M10 threaded hole. However, such a combination damages the female thread and does not ensure a correct fastening. The screw could loosen under the influence of aircrafts that roll over. The use of incorrect screws can lead to either damage to the thread in the mounting support or to an incorrect fixation of the equipment.

2.7 Operation

Only skilled personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.

Read all system component manuals before operating the equipment. A thorough understanding of system components and their operation will help you operate the equipment safely and efficiently.

- Before starting this equipment, check all safety interlocks and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the equipment if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Never operate equipment with a known malfunction.
- Do not attempt to operate or service electrical equipment if standing water is present.
- Use the equipment only in the environments for which it is rated. Do not operate the equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Never touch exposed electrical connections on equipment while the power is ON. Make sure the exposed electrical connections are proven to be dead.

2.8 Action in the event of an equipment malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

1. Disconnect and lock out electrical power.
2. Allow only skilled personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

2.9 Maintenance and repair

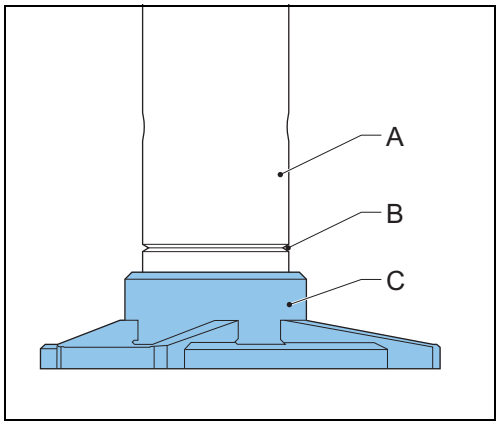
Allow only skilled personnel to perform maintenance, troubleshooting, and repair tasks. Only persons who are properly trained and familiar with ADB equipment are permitted to service the equipment.

- Always use safety devices when working on the equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and Cardio Pulmonary Resuscitation (CPR) is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals, impair specified performance and create safety hazards.
- Check interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.

2.10 Breakable coupling

A: Mounting leg
B: Weakening groove
C: Mounting flange

The equipment is mounted on mounting legs. The mounting legs have a weakening groove, which serves as a breakable coupling. Expansion bolts secure the mounting flanges to the foundation.



2.11 CE certification

The equipment is CE certified. It means that the product complies with the essential requirements concerning health and safety. The directives that have been taken into consideration in the design are available on written request to ADB.

2.12 Guarantee

LED Products of ADB Airfield Solutions manufactured and sold by ADB or its licensed representatives, meet the corresponding requirements of FAA, ICAO and IEC.

Refer to the document ‘General Conditions for Deliveries and Services by ADB’.

3 Description

3.1 Overview

You can find a complete overview of the equipment in all available versions in the chapter 7.

3.2 Intended use

On civil aerodromes:
- Mandatory instruction signs
- Information signs
- VOR check-point sign

3.3 Variants of equipment

The equipment can be also supplied with these options:
- An additional safety switch. The safety switch allows safe servicing on the equipment when the safety switch is set to the OFF position. The safety switch is mainly used for equipments that are supplied directly from the mains supply with 230 V AC.
- Supply cables that go through the mounting legs.
- A tether to secure the equipment.

The manual does not show these variants in detail.

4 Installation

WARNING
The equipment meets IEC 60598-1. Make sure that you make all electrical connections accordingly.

Note
- **The figures show a typical connection that uses an ADB conduit elbow.**
- **The procedures in this chapter show the complete information for a series power supply. For a parallel power supply, the procedures are similar. The difference is that there is no series transformer necessary. The power supply cable that comes from a derivation box or connection box is directly connected to the power adaptor within the equipment.**

4.1 Inspect on delivery

1. Inspect all packings for visible damage.
2. Open every damaged box and inspect the contents for damage.
3. Immediately fill a claim form with the carrier if any equipment is damaged.
4. Store the equipment in its original packing in a protected area.

WARNING
Do not damage the cable insulation.

CAUTION
Do not unpack the equipment before it is at the installation site to avoid damage due to transportation and handling.

4.2 Store

1. Store the equipment in its original packing in a protected area.

4.3 Install according to standards

1. See these standards:
   - ICAO Annex 14, volume 1;
   - ICAO Airport Design Manual, parts 4 and 6, section that refer to signs;
   - ICAO Airport Design Manual, part 5 ‘Electrical Systems’;
   - IEC 61820 and 61821.

2. For a parallel power supply, see also:
   - IEC 61950 (low voltage directive);
   - IEC 60598-1 (class I equipment).

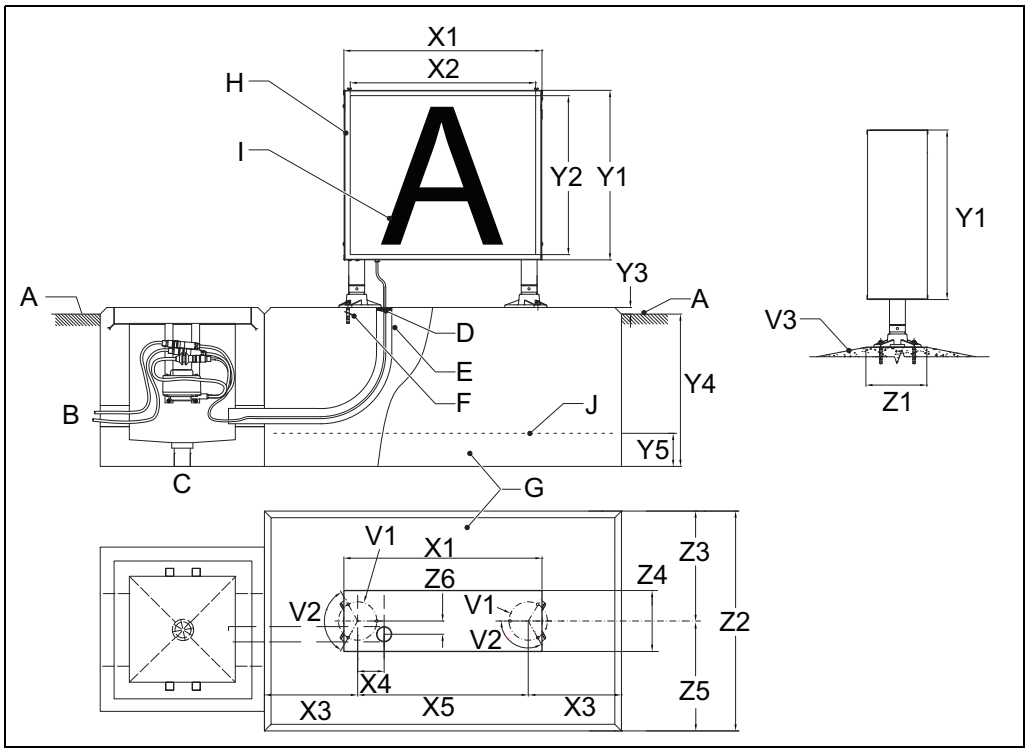
4.4 Overview of components required for installation

- Assembled equipment;
- Secondary cable(s) and possibly a flexible conduit.
  - Series circuit: 2-core cable with FAA plug (supplied with the equipment);
  - Parallel circuit: 2-core cable with earthing wire (not supplied with the equipment);
- Hardware for installation. See § 7.4.
- Tools for installation. See § 7.5.
- Series transformers. See § 7.1. *Series circuit only.*
- Optional: security cable or tether.

4.5 Installation examples

Note
These examples show general installation details. The drawings are for instructional use only, do not use them as construction drawings for specific projects.

Example 1



Items:

A: Ground level
B: Primary series loop
C: Transformer pit or housing with drainage to ground or drain
D: Weather proof sealing and filling
E: Conduit elbow
F: M10 expansion bolt (3 per flange)
G: Concrete block
H: Sign
I: Message
J: Frost line

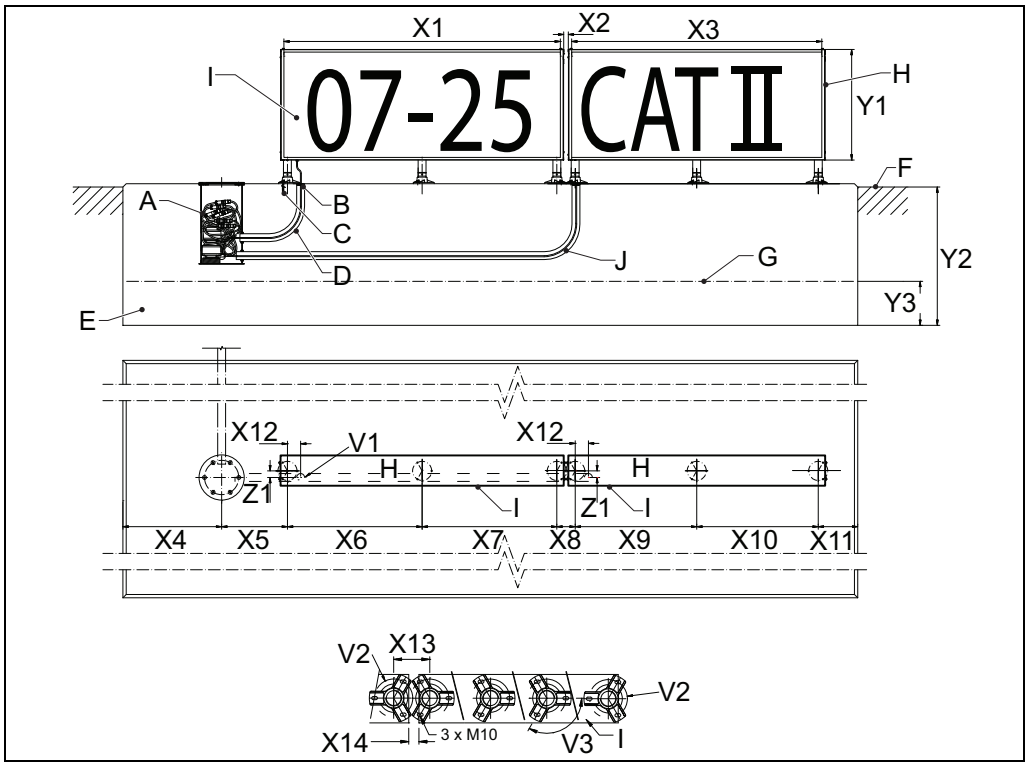
Measurements:

X1: 748 mm
X2: 700 mm
X3: minimum 300 mm
X4: 100 mm
X5: 644 mm
Y1: 640 mm
Y2: 600 mm
Y3: 25 mm
Y4: minimum 575 mm
Y5: minimum 100 mm
Z1: 230 mm horizontal
Z2: minimum 830 mm
Z3: minimum 300 mm
Z4: 230 mm
Z5: minimum 300 mm
Z6: 50 mm
V1: diameter 145 mm
V2: angle 120 degrees
V3: 2 cm per 1 m

NOTE

- **Depending on the type of power supply (series or parallel), the transformer pit contains the series transformer or a derivation box.**
- **You must install one transformer per series power supply. Refer to section 7.1.3 Power consumption series supply to choose the size of the transformer.**

Example 2



Items:

A: Base L-867B or transformer pit
B: Weather proof sealing and filling
C: M10 expansion bolt (3 per flange)
D: Conduit elbow
E: Concrete block
F: Ground level
G: Frost line
H: Sign
I: Message
J: Electrical connection through leg (option)

Measurements:

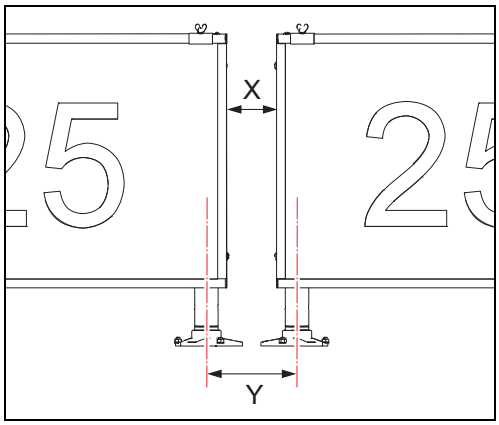
X1: 2100 mm
X2: 36 mm
X3: 1900 mm
X4: 750 mm
X5: 500 mm
X6: 1023 mm
X7: 1023 mm
X8: 140 mm
X9: 923 mm
X10: 923 mm
X11: 300 mm
X12: 100 mm
X13: 140 mm
X14: 36 mm
Y1: 840 mm
Y2: minimum 575 mm
Y3: minimum 100 mm
Z1: 50 mm
V1: diameter 60 mm
V2: diameter 145 mm
V3: angle 120 degrees

NOTE

- **Depending on the type of power supply (series or parallel), the transformer pit contains the series transformer or a derivation box.**
- **You must install one transformer per series power supply. Refer to section 7.1.3 Power consumption series supply to choose the size of the transformer.**

4.6 Determine location of equipment

1. Determine the perpendicular distance for the defined taxiway or runway pavement edge to the nearest edge of the equipment. *Use table 5-5 of ICAO Annex 14, Volume 1.*
2. In the case of adjacent equipment, make sure that:
   - The equipment is separated with a distance X = 36 mm;
   - The centre lines of adjacent mounting legs are separated with a distance Y = 140 mm.
3. Determine the exact location and orientation on site.



Note
Also take into consideration the unobstructed equipment legibility and the protection from direct exhaust blast.

4. Make sure that the Airport Authority approves the exact location.

4.7 Install concrete foundation

Prepare

1. Define the dimensions of the concrete foundation block, based on several factors among which:
   - The length of the equipment;
   - The height of the equipment;
   - The bearing of the soil;
   - The stability of the soil;
   - The frost line: the depth of the foundation must be more than the depth of the frost line.

Note
The drawings in § 4.5 show typical examples.

2. Use one-piece concrete block for adjacent equipment.

CAUTION
If this is not the case, the concrete can crack under the pressure of the expansion bolts of the adjacent (outer) legs.

Choose casting method

1. Choose between:
   - Cast the concrete blocks in situ;
   - Use pre-fabricated concrete blocks.
2. Accurately level and smoothen the top surface of the concrete foundation.

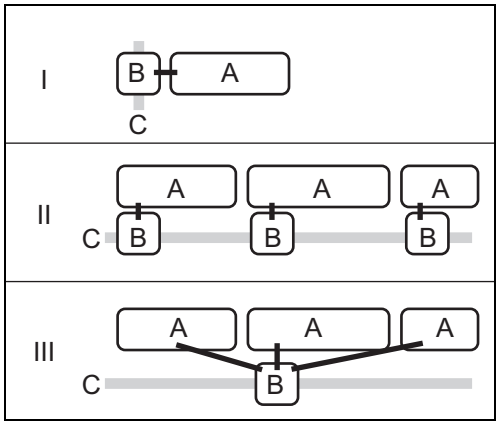
4.8 Install transformer housing (series circuit only)

Each equipment requires one to three series transformers. See § 7.1.3. A series transformer must be installed in a transformer housing, adjacent to the sign foundation.

Define location of transformer housing

A Equipment
B Transformer housing location
C Primary cable

1. Make sure the transformer housing is adjacent to the sign foundation. The figure shows some possible arrangements.
2. Make sure that you can easily access the transformer and do not need to remove the equipment.



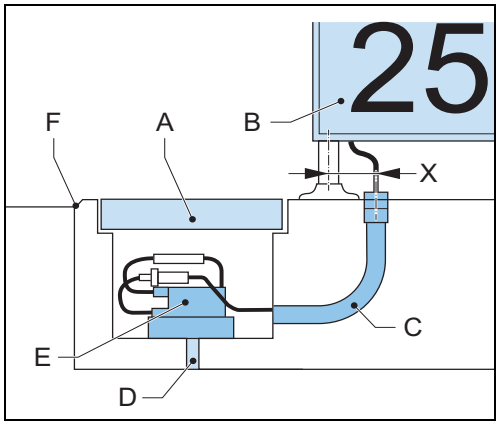
Choose transformer housing type

1. Choose between:
   - Transformer pit;
   - FAA steel base.

Install transformer pit

A Load bearing cover
B Equipment
C Conduit elbow
D Typical water drainage hole
E Series transformer
F Ground level

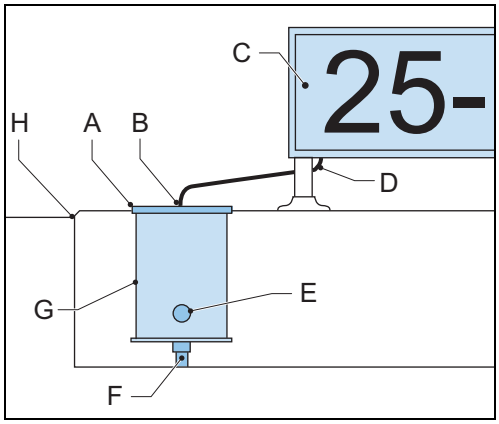
1. Install the transformer pit. *The figure shows a possible installation layout.*
2. Make sure that the space between the centres of the conduit elbow and the adjacent mounting leg (X) is minimum 185 mm.
3. Make sure the space between the side of the base and the adjacent expansion bolts of the equipment is large enough (recommended minimum 100 mm).



Install FAA steel base

A Bolted steel cover, 10 mm thickness
B Conduit coupling
C Equipment
D Flexible conduit
E 2” or 3” diameter entry for primary cables
F Water drainage pipe (optional)
G FAA L867 base, diameter 12, depth 400 or 610 mm
H Ground level

1. Install the FAA steel can. *The figure shows a possible installation layout.*
2. Make sure the space between the side of the base and the adjacent expansion bolts of the equipment is large enough (recommended minimum 100 mm).



4.9 Install equipment

Prepare

1. Put the equipment on the concrete foundation.
2. Align the equipment, especially in the case of adjacent equipments.
3. Mark the position of the fixation holes. *Use the drill template.* See § 7.5.

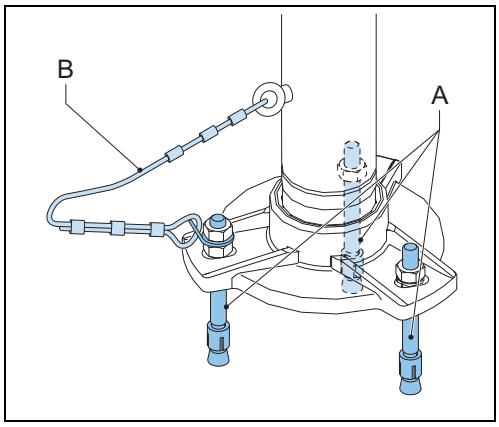
Note
If you do not use the drill template, the figure in § 7.1.2 shows the dimensions.

4. Remove the equipment.
5. Drill the fixation holes.

Note
This procedure describes the use of expansion bolts. You can also use bent anchor bolts or resin bolts. Refer to your bolt supplier for installation instructions.

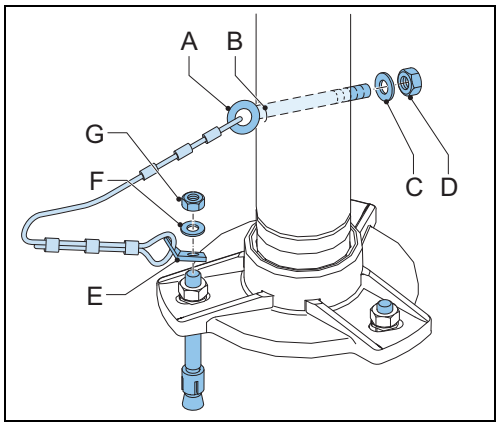
Install

1. Put the equipment above the fixation holes.
2. Tighten the expansion bolts (A) with a torque of 27 Nm.
3. Install the tether (B) (Option).
4. Remove the protection film from the legend panel.



4.10 Install the tether (Option)

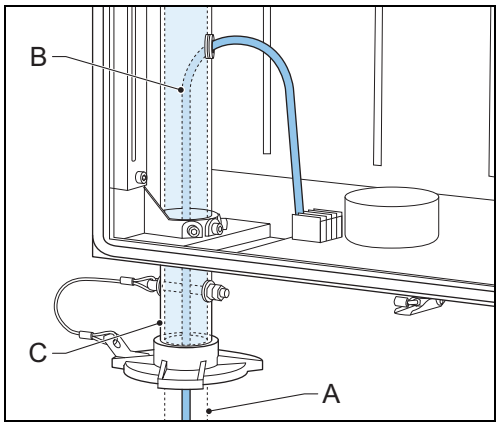
1. Put the fastener (A) through these items:
   - Hole (B)
   - Washer (C)
   - Nut (D)
2. Tighten the nut (D).
3. Install these parts:
   - Bracket (E)
   - washer (F)
   - Nut (G)
4. Tighten the nut (G) with a torque of 27 Nm.



4.11 Electrical connection through leg (option)

1. Prepare a hole (A) with a diameter of 63 mm.
2. Pull the secondary cable (B) through the leg (C).

Note
The secondary cable is not supplied with the equipment



4.12 Install electrical connection

Enter cable into the equipment

Note
We recommend to run the cable either through a flexible conduit or through the left outer leg for protection against damage caused by rodents and UV-radiation.

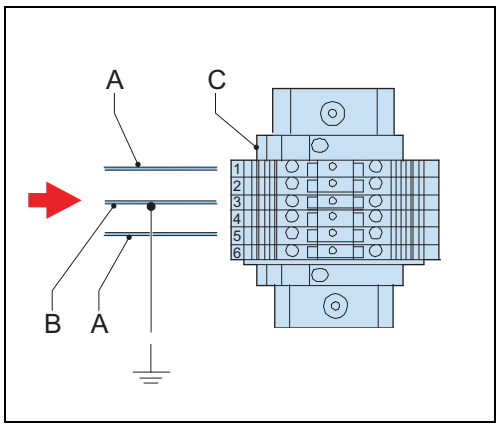
1. Open the equipment. See § 5.2.
2. Slip the flexible conduit over the cable, if used.
3. Enter the supply cable(s) into the equipment through the compression gland(s) or the nipple(s) at the bottom of the equipment or through the compression gland in the leg, see § 4.11.

Connect cable to equipment

For an overview of the location of the input terminals and glands, see § 7.2.3.

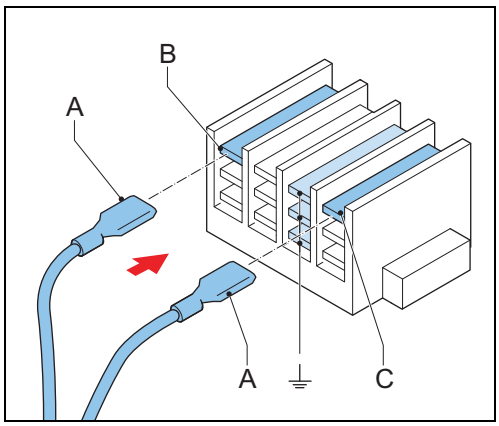
Parallel power supply

1. Connect the cables (A) to the input terminals 1 and 5 of the connector (C). Connect the earth cable (B) to input terminal 3 of the connector (C).



Series power supply

1. Connect the cables (A) to the left receptable (B) and the right receptable (C) of the connector.

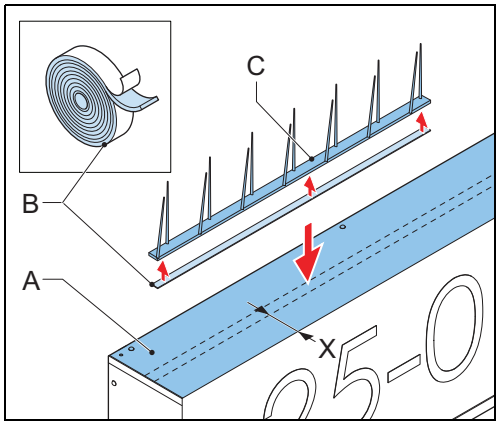


Finish

1. Connect a separate earth cable between the earth connector and the external earthing system. The earth connector is in the bottom of the equipment, in the proximity of the power adapter.
2. Tighten the compression gland(s) at the bottom of the equipment.
3. Connect the cable(s) to the external power supply:
   - Use a FAA-plug for series supplies.
   - Use derivation or connection box for parallel supplies.
4. Remove the protection film from the legend panel.
5. Make sure that all components on the equipment are tightened.
6. Close the equipment. See § 5.3.

4.13 Install anti-bird deterrent (option)

1. Clean and degrease the cover (A). *Use a non-corrosive detergent.*
2. Wait until the cover is dry.
3. Apply double side tape (B) to the anti-bird deterrent (C). *The double-side tape is supplied with the anti-bird deterrent.*
4. Install the anti bird deterrent on the cover. The distance X must be between 30 and 100 mm from the legend panel.



5 Maintenance

Maintenance personnel must refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9, Airport maintenance practices and in FAA Advisory Circular N° AC150/5340-26, chapter 4, section 4.

WARNING
Do not carry out any action on the equipment unless you have read and understood all the information in the chapter 2.

WARNING

- **Make sure that the power is OFF when you carry out maintenance.**
- **The equipment meets IEC 60598-1. Make sure that you make all electrical connections accordingly.**

Note

- **The figures show a typical connection that uses an ADB conduit elbow.**
- **The procedures in this chapter show the complete information for a series power supply. For a parallel power supply, the procedures are similar. The difference is that there is no series transformer necessary. The power supply cable that comes from a derivation box or connection box is directly connected to the power adaptor within the equipment.**

5.1 Preventive maintenance schedule

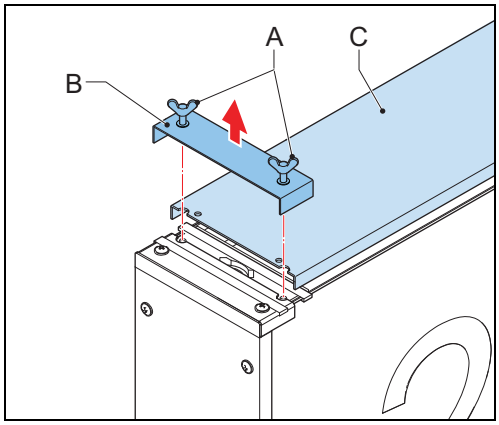
Because of its durable design, the equipment requires only minimum maintenance. As a good practise recommend to perform at least one check per year for:

- Damage of the legend panel, the housing or the legs when exposed.
- Waterthightness: to prevent ingress of water or dirt check.
  - Do a check on the clasp locks, make sure the clasp locks close the equipment correctly and securely
  - Do a check on the closing gaskets, make sure they are not damaged and flexible.
- Electrical functionality: defective LED, LED strips, internal cabling and fuses.
- It is also recommended to check the optical performance of the equipment.

5.2 Open equipment

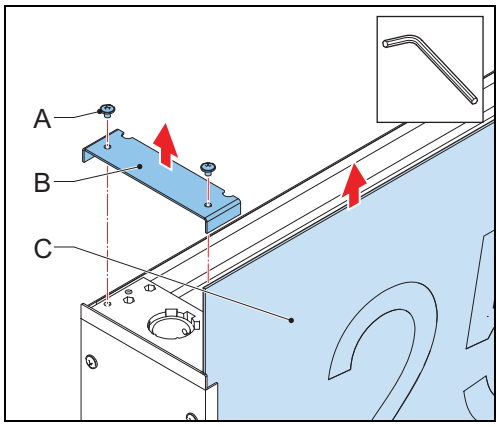
5.2.1 Remove cover panel

1. Loosen the wing screws (A).
2. Remove the cover clamps (B).
3. Remove the cover panel (C).



5.2.2 Remove legend panel

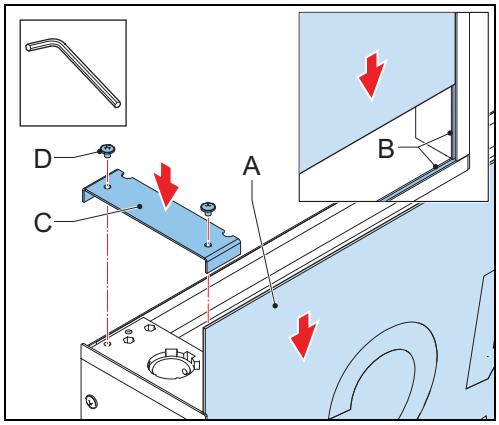
1. Remove the screws (A). Use an Allen key.
2. Remove the cover angle pieces (B).
3. Remove the legend panel (C).



5.3 Close equipment

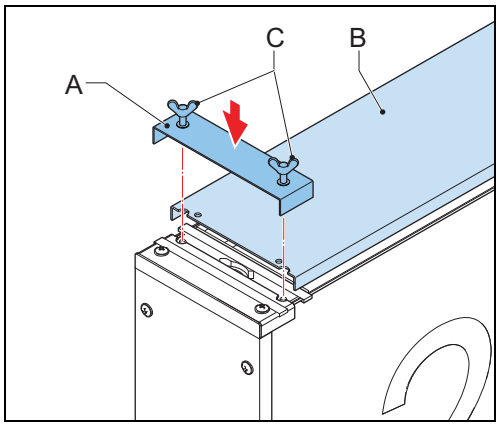
5.3.1 Install legend panel

1. Install the legend panel (A) into the grooves (B).
2. Install the cover angle pieces (C).
3. Apply adhesive on the screws (D). *Use adhesive A. See §* 7.5.
4. Install and tighten the screws (D).



5.3.2 Install cover panel

1. Examine if the gaskets show wear.
2. If a gasket shows wear, dispose of the cover clamp (A).
3. Install the cover panel (B).
4. Apply adhesives on the wing screws (C). *Use adhesive A.* See § 7.5.
5. Install the (new) cover clamps.
6. Tighten the wing screws.



5.4 Part replacement

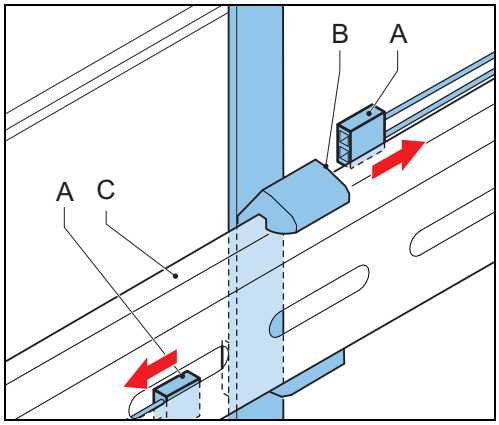
Note
For the correct replacement parts, see § 7.3.

5.4.1 Light source

Part
- LED strip

Remove

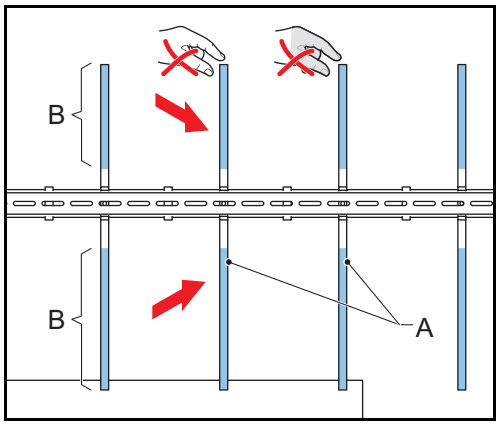
1. Open and/or remove the front panel. See § 5.2.
2. Disconnect the two connectors (A) from the LED strip (B).
3. Remove the LED strip from the supporting rail (C).



Install

CAUTION
Do not touch the LEDs. The lifetime of a LED reduces if you touch it.

1. Install the new LED strip (A). Do not touch the LEDs (B).
2. Connect the two connectors (A) of the LED strip.
3. Close the equipment. See § 5.3.



5.4.2 Legend panel

Part
- Legend panel

1. Open the equipment completely. See § 5.2.
2. With a new legend panel, close the equipment. See § 5.3.

5.4.3 Other component inside the equipment

Part

- Component that needs replacement

1. Open the equipment. See § 5.2.
2. Disconnect the wires to the component that needs replacement.
3. Remove the component.
4. Install the new component.
5. Connect the wires to the component.
6. Close the equipment. See § 5.3.

5.4.4 Power adapter

Part

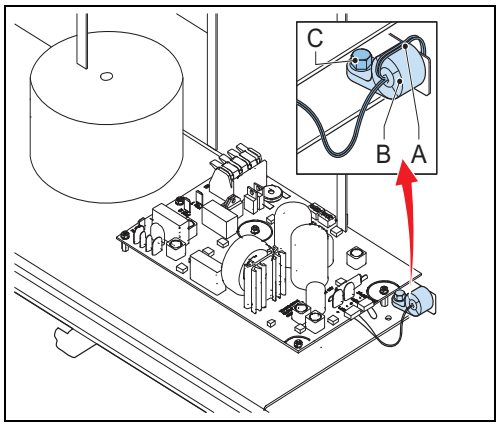
- Power adapter

Remove the power adapter

1. Open the equipment. See § 5.2.
2. Remove the protective cover from the power adapter.
3. Disconnect the wires to the power adapter.
4. Remove the power adapter.

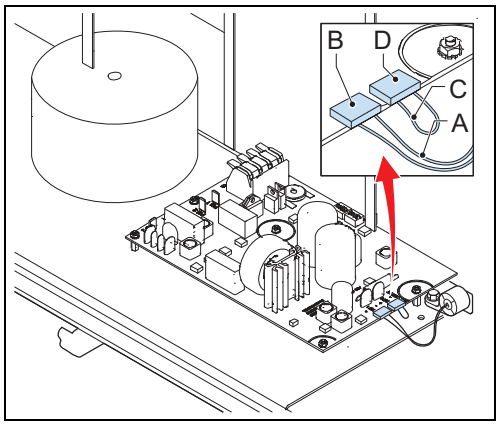
Install the new power adapter

1. On the new power adapter, set the dipswitches in the correct position. See § 7.2.4.
2. Install the new power adapter.
3. Make one loop with the wires (A) through the ferrite core (B).
4. Install the ferrite core with fastener (C).



Connect the wires

1. Connect the wire (A) to the connector OUT1 (B).
2. Connect the bridge (C) to the connector OUT2 (D).
3. Install the new protective cover on the power adapter.
4. Close the equipment. See § 5.3.



5.4.5 Power supply cable

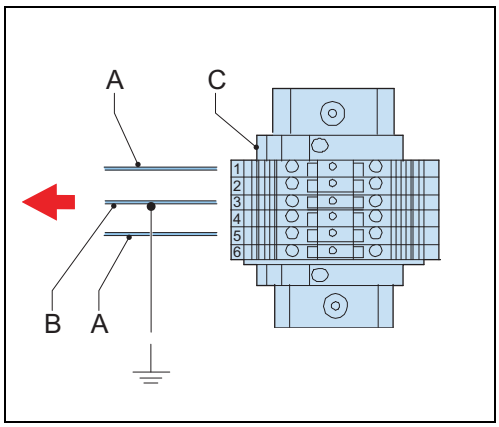
Part
- 2-core cable for a series circuit.
- 3-core cable (2 cores and an earthing wire) for a parallel circuit.

Note
For a parallel circuit it often is not possible to disconnect the cable(s) from the derivation or connection box. In this case also replace the derivation or connection box.

Prepare
1. Open the equipment. See § 5.2.
2. Loosen the compression gland(s) at the bottom of the equipment.

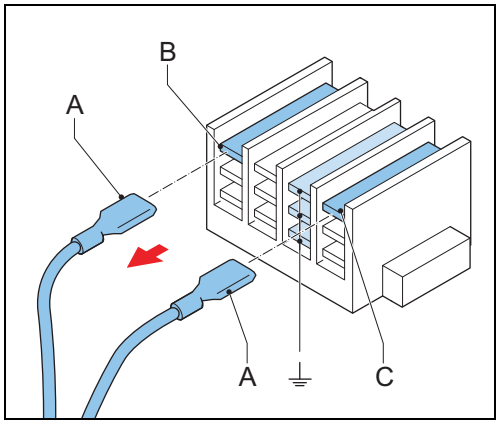
Parallel circuit - disconnect

1. Disconnect the derivation or connection box to cut off the external power supply.
2. Disconnect the cables (A) and (B) from the connector (C).



Series circuit - disconnect

1. Disconnect the FAA-plug to cut off the external power supply.
2. Disconnect the cables (A) from the receptable (B) and receptable (C).



Remove
1. Remove the cable from the equipment.
2. Remove the flexible conduit if applicable. See § 4.12.

Install
1. Install the electrical connection. See § 4.12.
2. Close the equipment. See § 5.3.

6 Troubleshooting

6.1 Troubleshooting guide

Table: 6.1 Troubleshooting guide

Problem	Possible cause	Possible solution
Equipment does not light up homogeneously	Defective LED strip(s)	Replace the LED strip(s). See § 5.4.1.
	Defective cable(s) or cable connection(s)	Repair the connection.
		Replace the cable(s) .
	Defective power adapter PCB	Replace the power adapter. See § 5.4.4.
Equipment does not light up	Defective cable(s)	Replace the cable(s).
	Disconnected cable(s)	Connect the cable(s) .
	Defective series transformer. Series power supply only.	Examine the output current of the series transformer. Use a true RMS Multimeter.
	Any defect in the circuit	Replace the power adapter.
Short LED life	Input voltage too high. For series supplies only.	Correct the CCR or the series transformer.
		Replace the CCR or the series transformer.

7 Technical data

7.1 Specifications

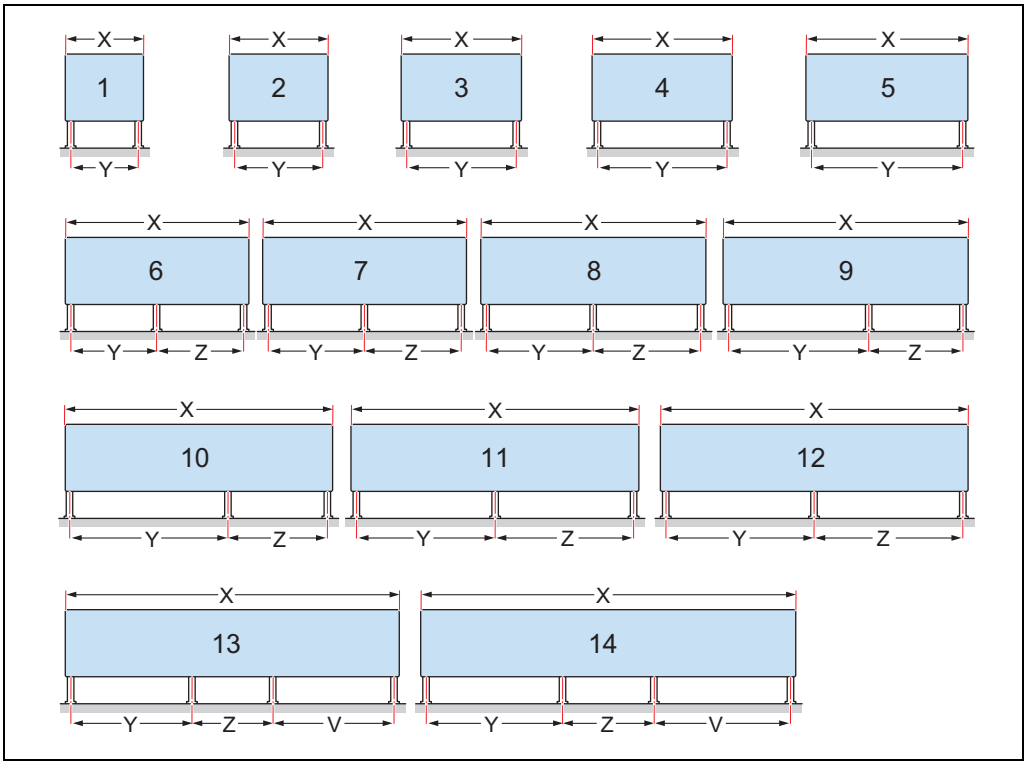
7.1.1 General specifications

Table: 7.1 Specifications

Item	Serial supply	Parallel supply
Light source	LED	
Minimum lifetime at 6.6A	50 000 hours	
Power rating of the LED	1 W	
Dimenions	Equipment type dependent. See § 7.1.2.	
Weight	32 to 107 kg, equipment type dependent. Meets the weight limit in ICAO Aerodrome Design Manual Part 6.	
Protection degree	IP34	
Frangibility	Meets the frangibility requirements for reduced velocity windspeeds up to 322 km/h.	
Current at input terminals	2.8 - 6.6 A (AC)	-
Brightness levels	2 Brightness levels are provided in strict compliance with ICAO annex 14. The brightness is customer adjustable with a switch-band below 4.1 A.	-
Voltage at the input terminals U_N	-	198 - 254 V(AC)
Rated frequencies	50 / 60 Hz (+/- 7.5%)	

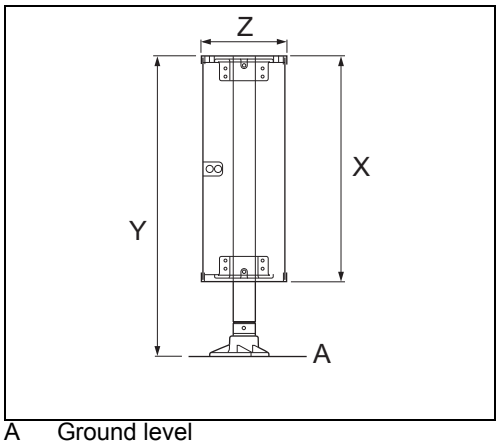
Note
The ICAO design manual part 6 recommends to limit the length of the equipment to 3000 mm. If the total message does not fit on a 3000mm sign, use two adjacent signs.

7.1.2 Dimensions per equipment type



Equipment type	Legend panel length [mm]	X [mm]	Y [mm]	Z [mm]	V [mm]
1	700	748	644	-	-
2	900	948	844	-	-
3	1100	1148	1044	-	-
4	1300	1349	1245	-	-
5	1500	1550	1446	-	-
6	1700	1750	823	823	-
7	1900	1951	923	923	-
8	2100	2151	1023	1023	-
9	2300	2351	1348	899	-
10	2500	2552	1469	979	-
11	2700	2752	1324.5	1324.5	-
12	2900	2953	1425	1425	-
13[1]	3300	3352	1218	812	1218
14[1]	3700	3752	1368	912	1368

1) Only available as a retrofit kit.



A Ground level

Equipment type	Legend panel height [mm]	X [mm]	Y [mm]	Z [mm]
1 to 14	600	640	820	230
2 to 14	800	840	1020	230

7.1.3 Power consumption series supply

Table: 7.2 Mandatory signs, series transformer.

Equipment type	Sign length [mm]	Legend panel height: 600 mm					Legend panel height: 800 mm				
		LED PCB strips	Power adapter type[1]	Power consumption [W]	Power consumption [VA]	Required series transformer (Maximum brightness)	LED PCB strips	Power adapter type[1]	Power consumption [W]	Power consumption [VA]	Required series transformer (Maximum brightness)
1	700	4	1 LP	42	44	65	-	-	-	-	-
2	900	4	1 LP	42	44	65	5	1 LP	47	50	65
3	1100	5	1 LP	47	50	65	6	1 LP	53	55	65
4	1300	7	1 LP	58	61	100	8	1 LP	64	67	100
5	1500	8	1 LP	64	67	100	9	1 LP	70	73	100
6	1700	8	1 LP	64	67	100	10	1 LP	75	79	100
7	1900	8	1 LP	64	67	100	12	1 HP	88	90	100
8	2100	10	1 LP	75	79	100	14	1 HP	99	99	150
9	2300	10	1 LP	75	79	100	15	1 HP	105	105	150
10	2500	12	1 HP	88	90	150	16	1 HP	110	111	150
11	2700	12	1 HP	88	90	150	18	1 HP	121	122	150
12	2900	12	1 HP	88	90	150	18	1 HP	121	122	150
13[2]	3300	16	1 HP	110	111	150	22	2 LP	161	168	200
14[2]	3700	19 (9+10)	2 LP	144	151	200	24 (6+18)	1 LP + 1 HP	174	175	200

1) LP: Low Power: PVLHV (Max. 11 LED strips)
HP: High Power: PVLHP (12 up to 18 LED strips)
2) Only available as a retrofit kit.

Table: 7.3 Information signs, series transformer.

Equipment type	Sign length [mm]	Legend panel height: 600 mm					Legend panel height: 800 mm				
		LED PCB strips	Power adapter type[1]	Power consumption [W]	Power consumption [VA]	Required series transformer (Maximum brightness)	LED PCB strips	Power adapter type[1]	Power consumption [W]	Power consumption [VA]	Required series transformer (Maximum brightness)
1	700	3	1 LP	36	38	45	-	-	-	-	-
2	900	3	1 LP	36	38	45	4	1 LP	42	44	65
3	1100	3	1 LP	36	38	45	5	1 LP	47	50	65
4	1300	4	1 LP	42	44	65	6	1 LP	53	55	65
5	1500	5	1 LP	47	50	65	7	1 LP	58	61	100
6	1700	6	1 LP	53	55	65	8	1 LP	64	67	100
7	1900	6	1 LP	53	55	65	8	1 LP	64	67	100
8	2100	8	1 LP	64	67	100	10	1 LP	75	79	100
9	2300	8	1 LP	64	67	100	10	1 LP	75	79	100
10	2500	9	1 LP	70	73	100	12	1 HP	88	90	150
11	2700	10	1 LP	75	79	100	12	1 HP	88	90	150
12	2900	11	1 LP	81	84	100	12	1 HP	88	90	150
13[2]	3300	11	1 LP	81	84	100	16	1 HP	110	111	150
14[2]	3700	14	1 HP	99	99	150	17	1 HP	116	111	150

1) LP: Low Power: PVLHV (Max. 11 LED strips)
HP: High Power: PVLHP (12 up to 18 LED strips)
2) Only available as a retrofit kit.

7.1.4 Power consumption parallel supply

Table: 7.4 Mandatory signs, parallel transformer.

Equipment type	Sign length [mm]	Legend panel height: 600 mm				Legend panel height: 800 mm			
		LED PCB strips	Power supply quantity	Power consumption [W]	Power consumption [VA]	LED PCB strips	Power supply quantity	Power consumption [W]	Power consumption [VA]
1	700	4	1	30	40	-	-	-	-
2	900	4	1	30	40	5	1	35	45
3	1100	5	1	30	40	6	1	42	51
4	1300	7	1	49	57	8	1	55	62
5	1500	8	1	55	62	9	1	63	70
6	1700	8	2	60	80	10	2	70	90
7	1900	8	2	60	80	12	2	84	102
8	2100	10	2	84	98	14	2	98	110
9	2300	10	2	85	102	15	2	105	121
10	2500	12	2	97	111	16	2	112	127
11	2700	12	2	110	124	18	2	126	140
12	2900	12	2	110	124	18	2	126	140
13[1]	3300	16	3	128	154	22	3	152	175
14[1]	3700	19	3	140	164	24	3	168	191

1) Only available as a retrofit kit.

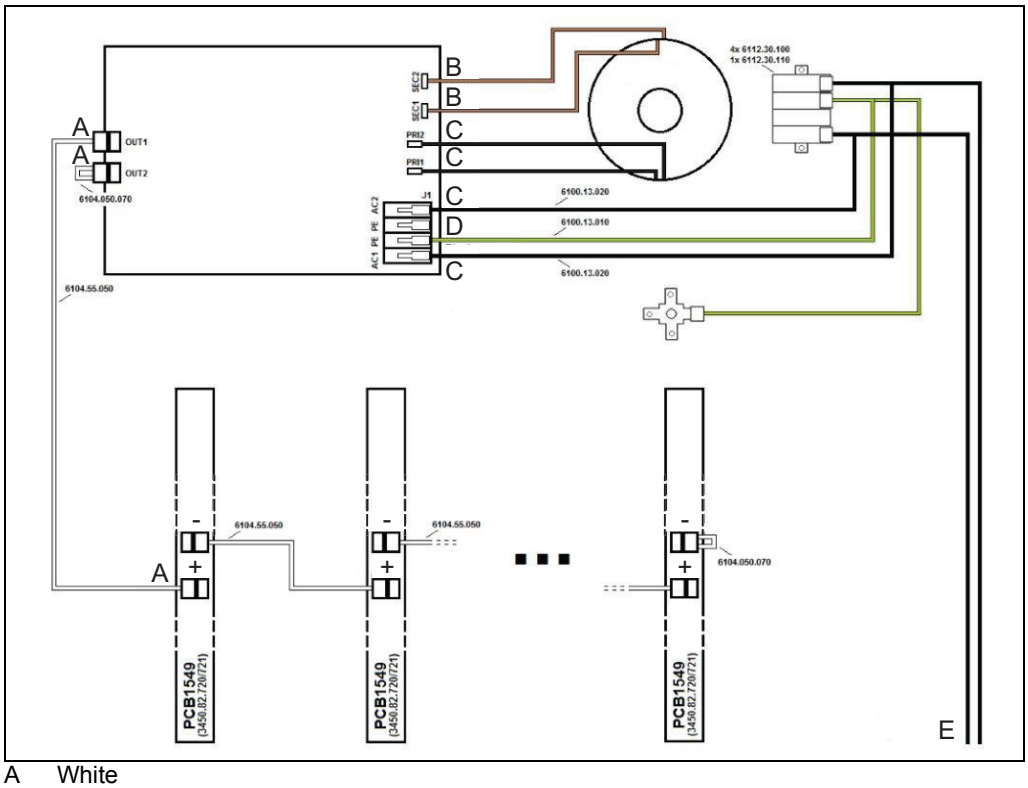
Table: 7.5 Information signs, parallel transformer.

Equipment type	Sign length [mm]	Legend panel height: 600 mm				Legend panel height: 800 mm			
		LED PCB strips	Power supply quantity	Power consumption [W]	Power consumption [VA]	LED PCB strips	Power supply quantity	Power consumption [W]	Power consumption [VA]
1	700	3	1	24	35	-	-	-	-
2	900	3	1	24	35	4	1	30	40
3	1100	3	1	24	35	5	1	35	45
4	1300	4	1	30	40	6	1	42	51
5	1500	5	1	35	45	7	1	49	57
6	1700	6	1	48	70	8	1	60	80
7	1900	6	1	48	70	8	1	60	80
8	2100	8	1	60	80	10	2	70	90
9	2300	8	1	59	80	10	2	72	91
10	2500	9	1	65	85	12	2	84	102
11	2700	10	2	70	90	12	2	84	102
12	2900	11	2	70	90	12	2	84	102
13[1]	3300	11	2	84	115	16	3	114	142
14[1]	3700	14	2	100	130	17	3	119	147

1) Only available as a retrofit kit.

7.2 Electrical wiring and PCB settings

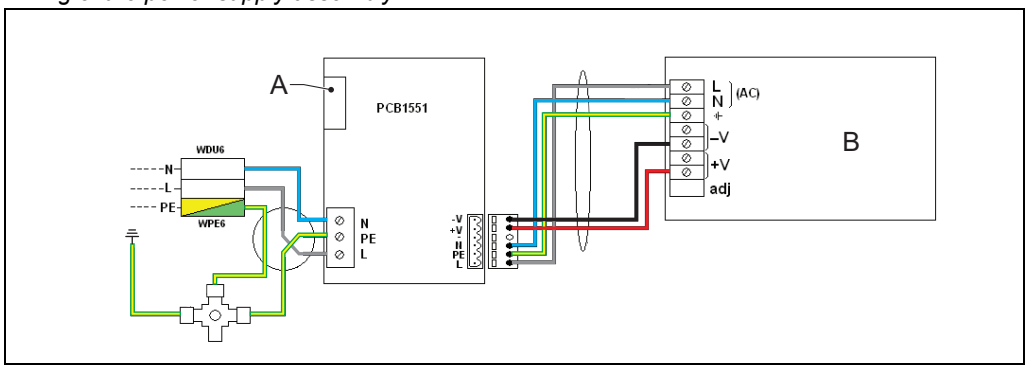
7.2.1 Series power supply wiring diagram



A White
B Brown
C Black
D Green/yellow
E Power in (from RST)
\+ Anode
\- Cathode

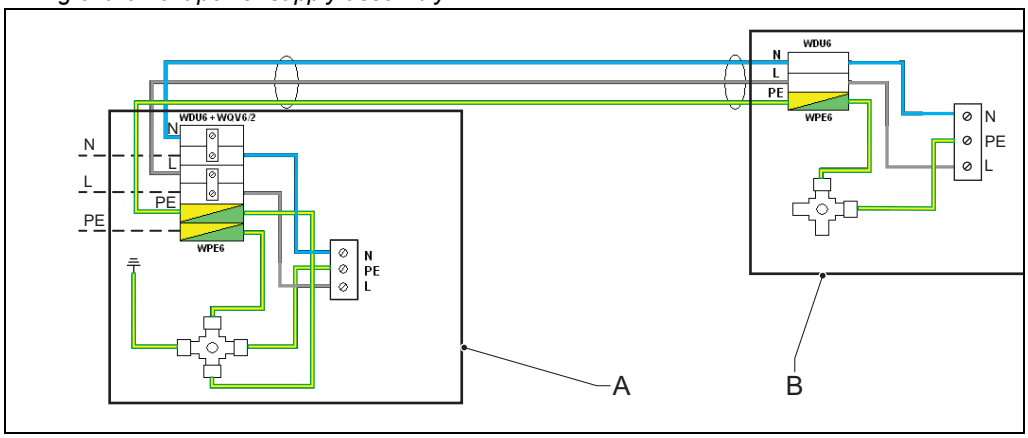
7.2.2 Parallel power supply wiring diagram

Wiring of the power supply assembly



A LED strip connection B Power adapter

Wiring of the next power supply assembly



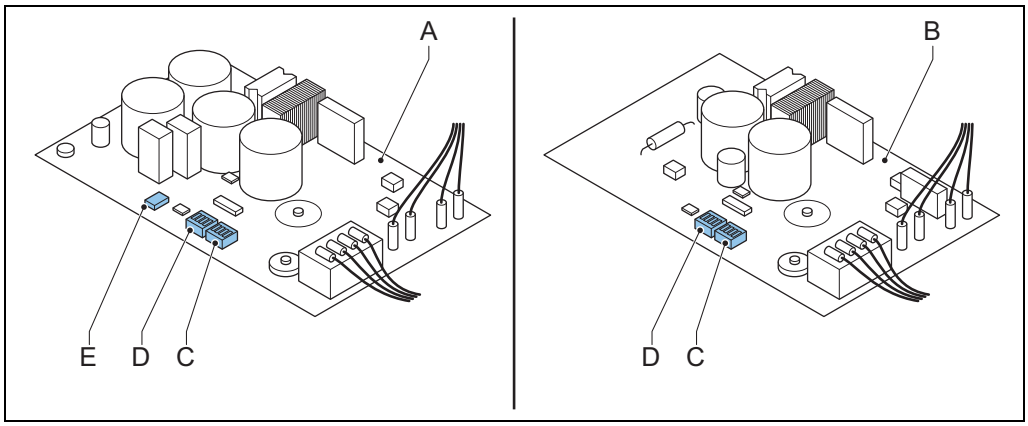
A 1st Power supply assembly B 2nd Power supply assembly

7.2.3 Location of input terminals and power adapters

Note
Only valid for parallel power supply

Power adapter	Location of power adapter	Location input terminals and glands
1	Left-hand bottom corner	Gland right from the left mounting leg, directly connected to the cable assembly
2	Right from the second mounting leg	Connected to the input terminal of the first power adapter via an additional cable

7.2.4 Settings on the PCB



A High power
B Low power
C Dipswitch block Options1
D Dipswitch block Config
E Dipswitch block Options2

Table: 7.6 Settings for dip-switch 'Options1'

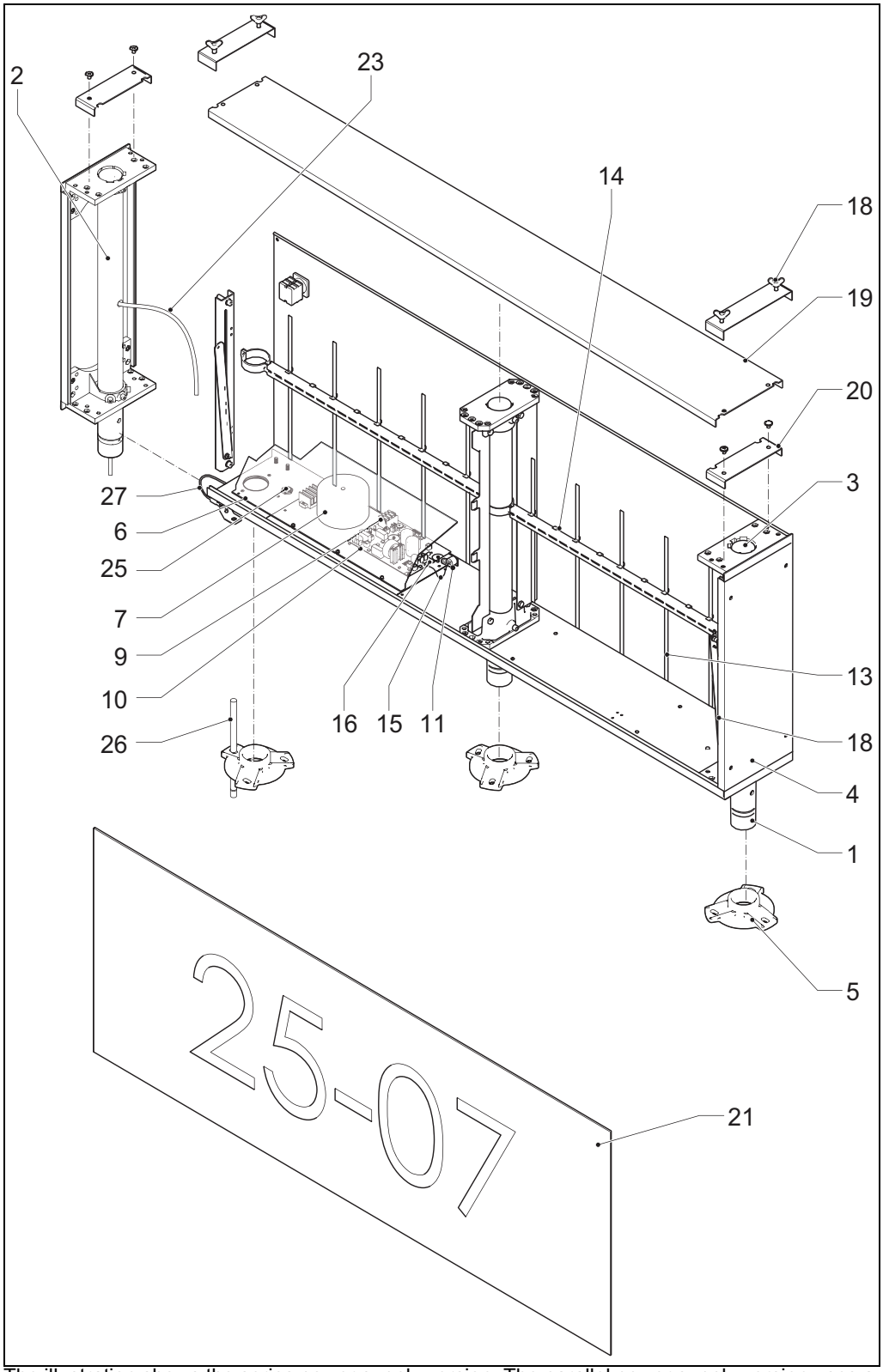
Dipswitch	Mode	OFF	ON
Options1/1	Reserved for future use	Standard	Not applicable
Options1/2	Brightness mode	Low brightness S1 (2.8 A) to S3 (4.1 A) High brightness S4 (5.2 A) to S5 (6.6 A)	Low brightness S1 (2.8 A) to S2 (3.4 A) High brightness S3 (4.1 A) to S5 (6.6 A)
Options1/3	Sign mode	Standard	Info sign mode: Decreased current through the LEDs
Options1/4	Reserved for future use	Standard	Not applicable

Table: 7.7 Settings for dip-switch 'Options2' and ‘Config’

Dipswitch	Mode	OFF	ON
Options2/1-2	Reserved for future use	Standard	Not applicable
Config/1-4	Reserved for future use	Standard	Not applicable

7.3 Exploded view and components

7.3.1 Exploded view



The illustration shows the series power supply version. The parallel power supply version uses a different power adaptor.

7.3.2 Components

	Components	Article number	Spare part description
1	Mounting leg	4071.90.091	Mounting leg for signs of H 600 mm x L up to 2100 mm, 1 mounting flange included
		4071.80.661	Mounting leg for signs of H 600 mm x L from 2300 to 2900 mm, 1 mounting flange included
		4071.80.671	Mounting leg for signs of H 800 mm x L 900-1100-1700 mm, 1 mounting flange included
		4071.91.981	Mounting leg for signs of H 800 mm x L 1300-1500-1900 to 2900 mm, 1 mounting flange included
2	Mounting leg with hole for protected cable run	4072.37.290	For signs of H 600 x L up to 2100 mm, 1 mounting flange included
		4072.44.840	For signs of H 600 x L 2300 to 2900 mm, 1 mounting flange included
		4072.44.860	For signs of H 800 x L 900-1100-1700 mm, 1 mounting flange included
		4072.44.880	For signs of H 800 x L 1300-1500-1900 to 2900 mm, 1 mounting flange included
3	Rubber cap for mounting leg	7092.70.100	
4	Flat gasket between sign body and mounting leg	4072.26.980	
5	Mounting flange	4071.80.681	
6	Power supply assembly for 2.8 to 6.6 A series supply with 2 brightness steps	4072.44.660	Low power powering up to 11 LED strips
		4072.46.050	High power powering up to 18 LED strips
	Power supply assembly for 230 Vac parallel supply	4072.27.700	IP34 and IP54 PVL
7	Toroidal power adapter transformer 6.6/2.5A 160 VA	6302.03.300	Low power powering up to 11 LED strips
	Toroidal power adapter transformer 6.6/1.3A 300 VA	6302.03.310	High power powering up to 18 LED strips
9	Input terminal block	6112.30.120	
10	Animal protection		
11	Ferrite Core 7.5 mm	6304.02.010	
Not shown	Fast on female for terminal block	6110.00.260	

	Components	Article number	Spare part description
13	LED strip with mounting for 2.8-6.6 A series supply	4072.51.250	IP34 PVL
	LED strip with mounting for 230 Vac parallel supply	4072.22.641	IP34 and IP54 PVL
14	Cable between 2 LED strips	6104.55.060	
15	Cable between power supply and first LED strip	6104.55.050	
16	Bridge cable for last LED strip	6104.55.070	
Not shown	Secondary cable with two-pole FAA plug, 2 x 12 AWG, 1m (for series supply only)	1458.06.051	
18	Cover clamp	4071.78.030	Complete set with screws and nuts.
19	Cover	NC	Available upon request.
20	Cover angle piece	NC	Available upon request.
21	Legend panel[1]	3225.60.0xx	Height 600 mm non retro-reflective.
		3225.80.0xx	Height 800 mm non retro-reflective.
23	Secondary cable		Not supplied with the equipment
Not shown	flexible conduit length 800 mm	4071.77.851	Used to protect cable in case of non protected cable run in the leg
Not shown	Compression gland PG21 for flexible conduit	6126.19.030	Compression gland PG21.
25	Breather valve	7074.60.150	
Not shown	Safety switch (IP 55-rated)	6150.95.221	Optional switch operated from the back of the sign
26	Expansion bolt		
27	Tether	4071.88.361	

1) Provide sign dimensions, colours and requested legend.

7.4 Possible hardware for installation

	Details	Article number
Adhesive A	Loctite 222 (50 ml)	7870.05.140
Expansion bolts	Expansion bolts, M10 x 120, stainless steel	1409.20.020
TC3 assembly	2” conduit elbow with MC3 coupling	1409.00.020
Gland	PG13 for flexible conduit	7080.35.855

7.5 Possible tools for installation

	Details
Tool A	Flat spanner for 17 mm hex. head bolts
Tool B	Male hexagonal keys, 4 mm
Tool C	Male hexagonal keys, 6 mm
Tool D	Drill template, article number: 1PVOPVHTOOL1
Tool E	Percussion drill with concrete drill bits
Tool F	Mason’s spirit level

7.6 Ambient conditions

Item	Description
Temperature limits	-40 to +55 °C
Altitude	From sea level to 3000 m
Relative humidity	Up to 100%, condensing

Registered office:

ADB bvba
Leuvensesteenweg 585
B-1930 Zaventem
Belgium
www.adb-air.com
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Fax: +32 (2) 722.17.64

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