Instruction Manual

Guidance sign
Type PVO and PVH

AM.04.251e Edition 4.4

ADB
Airfield Solutions

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Table of contents

1 About this manual

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

on the PVO and PVH guidance sign, in the manual referred to as the equipment when the information applies to both types.

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
1.0	TXA			
2.0	TXA	WL	09/1997	Rebranding
2.1	TXA	WL	06/1998	New
3.0	DSE	LM, RB	12/1999	
3.1	DSE	LM, RB	02/2000	
3.2	DSE		04/2000	
3.3	SVR	LM, PC	01/2001	
3.4	SVR	MR	06/2001	
4.0	SVR	MR, PC	08/2001	
4.1	EV		12/2009	
4.2	MR	DPI, TP, LM, JHE	06/2010	
4.3	MA	MA	12/2010	Update guarantee and company addresses
4.4	JVE	JVE	03/2014	Update guarantee, skilled personnel and components

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 damagee.

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

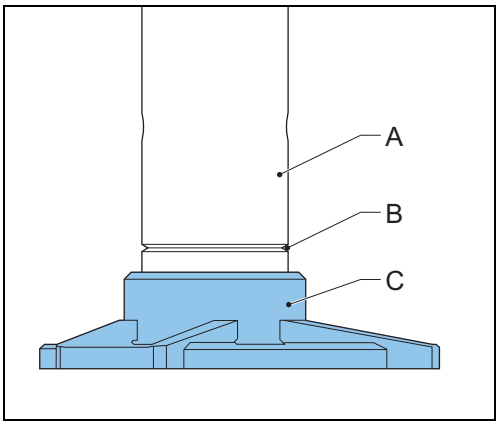
Allow only skilled personnel to perform maintenance, troubleshooting, and repair tasks. Only persons who are properly trained and familiar with ADB equipment are permitted to service the equipment.

- 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 safety and hygiene. 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, meets the corresponding requirements of FAA, ICAO and IEC.

They are, with the exception of obstruction lights, guaranteed against mechanical, electrical, and physical defects for a period of four years after the date of installation with a maximum of five years after delivery. Said products are guaranteed to be merchantable and fit for the ordinary purposes for which such products are made.

3 Description

3.1 Overview

You can find a complete overview of the fixture 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:
- 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.

The manual does not show these variants in detail.

4 Installation

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 fixture is damaged.
4. Store the fixture in its original packing in a protected area.

WARNING
Do not damage the cable insulation.

CAUTION
Do not unpack the fixture 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

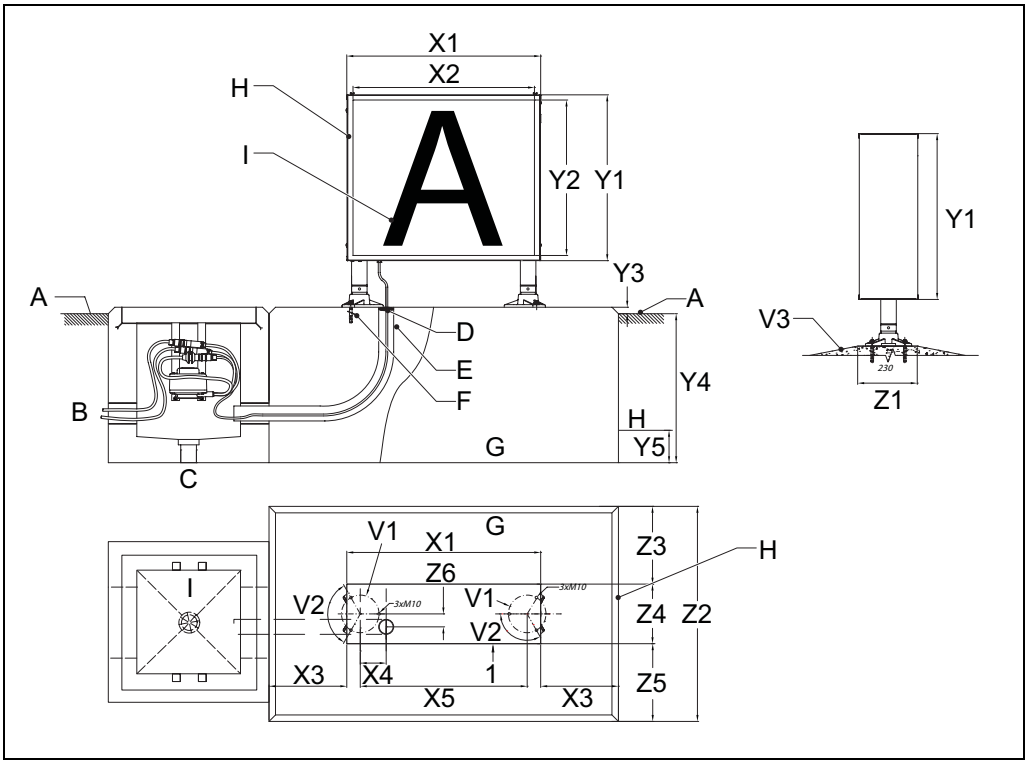
1. See these standards:
   - ICAO Annex 14, volume 1;
   - ICAO Airport Design Manual, parts 4 and 6, section that refer to signs;
   - ICAO Airport Design Manual, part 5 ‘Electrical Systems’;
   - IEC 61820 and 61821.

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

Example 1



Items:

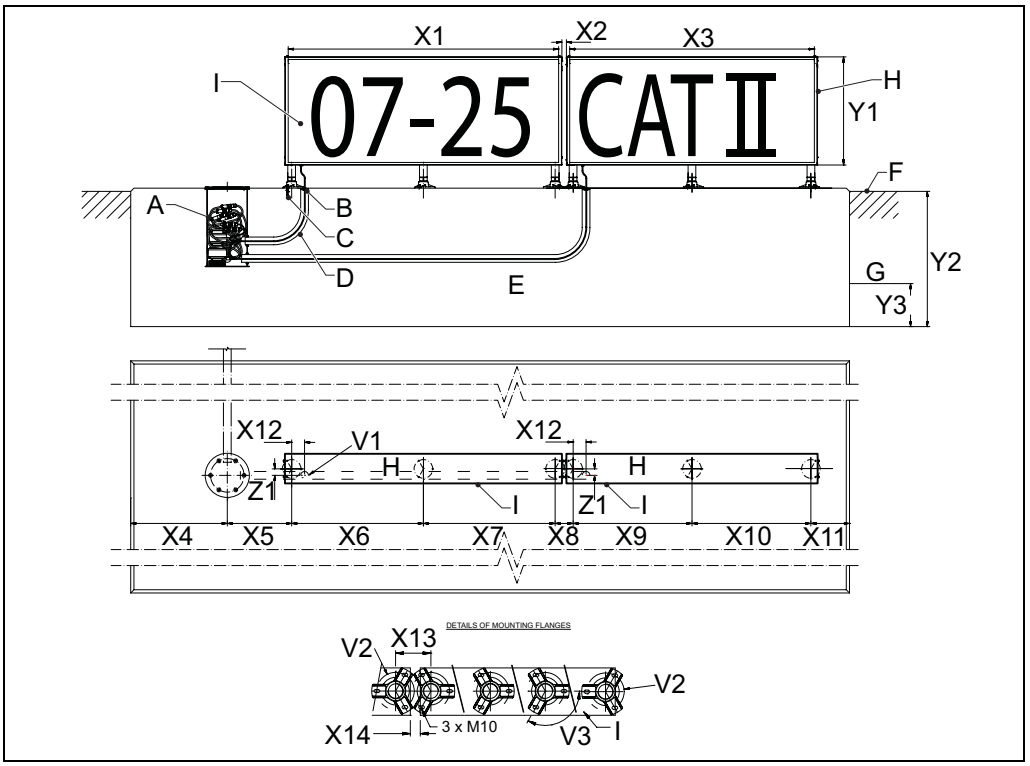
A: Ground level
B: Primary series loop
C: Drainage to ground or drain
D: Weather proof sealing and filling
E: Counduit elbow
F: M10 expansion bolt (3 per flange)
G: Concrete block
H: Sign
I: Message

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: 2300 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

WARNING
The drawing shows general installation details related to ADB equipment and therefore is not to be considered as a “GOOD FOR CONSTRUCTION” drawing for specific projects. The designer/planner/installer must verify compliance of the design with local codes and verify characteristics for each unique airfield application. ADB shall be relieved of any responsibility for amendmends by others to the original ADB drawings, even if such amended drawings still bear the ADB logo.

Example 2



Items:

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

Measurements:

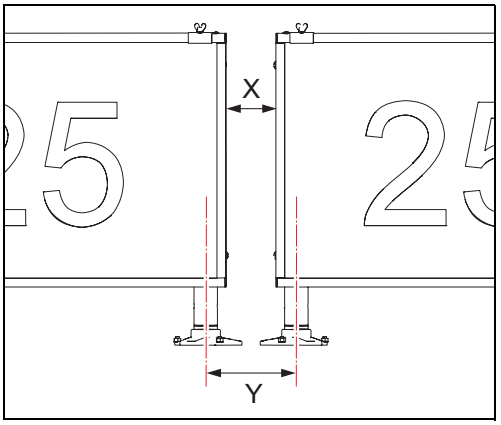
X1:	2100 mm	X12:	100 mm
X2:	36 mm	X13:	140 mm
X3:	1900 mm	X14:	36 mm
X4:	750 mm	Y1:	840 mm
X5:	500 mm	Y2:	minimum 575 mm
X6:	1023 mm	Y3:	minimum 100 mm
X7:	1023 mm	Z1:	50 mm
X8:	140 mm	V1:	diameter 60 mm
X9:	923 mm	V2:	diameter 145 mm
X10:	923 mm	V3:	angle 120 degrees
X11:	300 mm		

WARNING

The drawing shows general installation details related to ADB equipment and therefore is not to be considered as a “GOOD FOR CONSTRUCTION” drawing for specific projects. The designer/planner/installer must verify compliance of the design with local codes and verify characteristics for each unique airfield application. ADB shall be relieved of any responsibility for amendmends by others to the original ADB drawings, even if such amended drawings still bear the ADB logo.

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 equipments, make sure that:
   - The equipments are 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 sign;
   - The height of the sign;
   - 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 a one-piece concrete block for adjacent equipments.

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

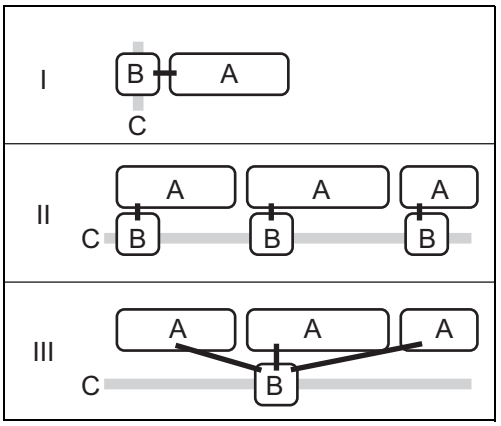
1. Choose between:
   - Cast the concrete blocks in situ;
   - Use pre-fabricated concrete blocks.
2. Accurately level and smoothen the top surface of the concrete foundation.

4.8 Install transformer housing (series circuit only)

Each equipment requires one to three series transformers. See § 7.1. 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



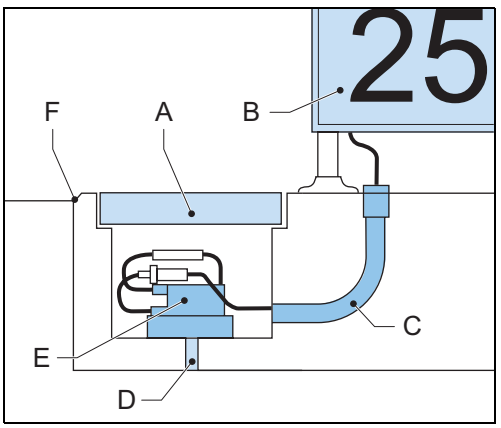
1. Make sure the transformer housing is adjacent to the sign foundation.
2. For single equipments (I), install the transformer housing as indicated.
3. For adjacent equipments, (II) and (III) show some possible arrangements.
4. Make sure that you can easily access the transformer and do not need to remove the equipment.

Choose transformer housing type

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

Install transformer pit

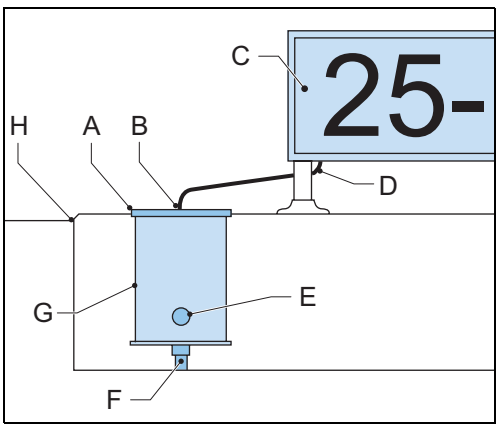
A Load bearing cover
B Equipment
C Conduit elbow
D Typical water drainage hole
E Series transformer
F Ground level



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 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).

4.9 Install equipment

Prepare

Note
For an easy installation, a drill template is available. See § 7.5. When you use the drill template, replace ‘equipment’ in the procedure by ‘drill template’.

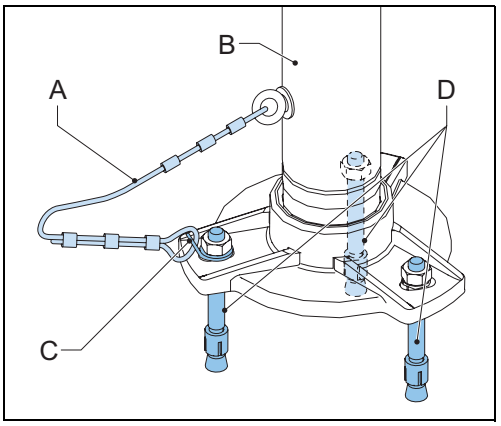
1. Put the equipment on the concrete foundation.
2. Align the equipment, especially in the case of adjacent equipments.
3. Mark the position of the fixation holes

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.
6. Adjust the expansion bolts (or other anchors) at the correct height.

Install

1. Put the equipment above the fixation holes.
2. Connect the security cable (A) to the mounting leg (B) and the mounting flange (C).
3. Tighten the expansion bolts (D) with a torque of 27 Nm.

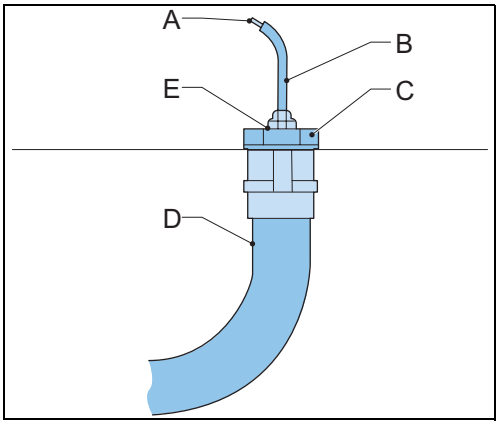


4.10 Install electrical connection

Install cable

Note
The figure shows a typical connection to a series transformer.

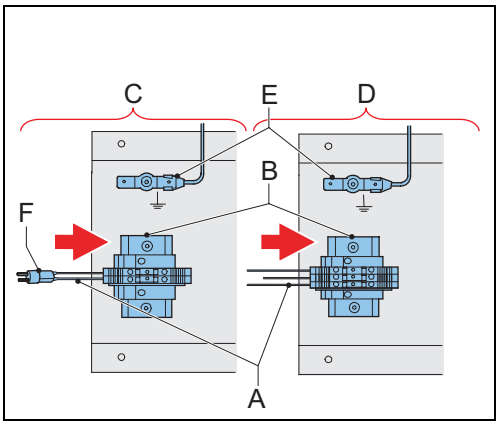
1. Put the gas cap (C) over the 2-core cable (A). *Series circuit only*.
2. Put the gland (E) over the 2-core cable. *Series circuit only.*
3. Slip the flexible conduit (B) over the 2-core cable, if applicable.
4. Enter the supply cable(s) into the equipment through the compression gland(s) at the bottom of the equipment.



Connect cable

For an overview of the location of the input terminals and glands, see § 7.1.8 and § 7.1.9.

1. Connect the 2-core cable (A) to the input terminal (B) of the equipment.
   C Series circuit;
   D Parallel circuit;
   E Earthing terminal.



Note
In the case of a series circuit, the input terminal shows the applicable circuit.

2. Connect the FAA plug (F) to the receptacle of the series transformer. *Series circuit only*.
3. Tighten the gas cap. *Series circuit only.*
4. Connect the earthing wire to the earthing terminal, according to local regulations.

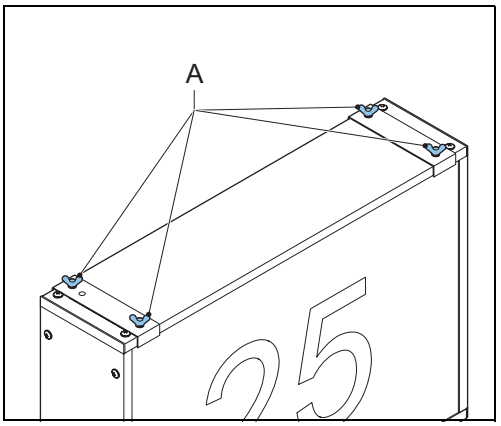
Finish

Finish - 1

1. Install the light sources. See § 5.4.1. or 5.4.2.
2. Remove the protection film from the legend panel.
3. Make sure that all components on the equipment are tightened.
4. Close the equipment. See § 5.3.

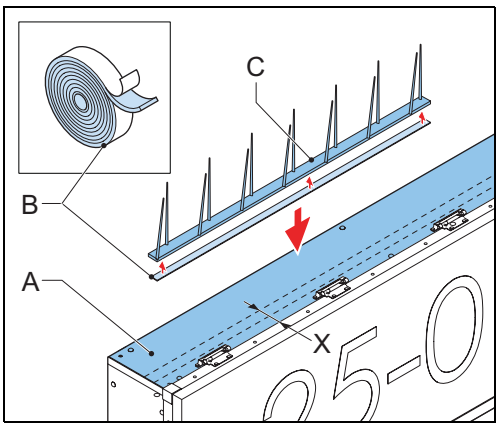
Finish - 2

1. Seal the wing screws (A). *Use adhesive A.* See § 7.4.



4.11 Install anti-bird deterent (option)

1. Clean and degrease the cover (A). *Use a detergent.*
2. Wait until the cover is dry.
3. Apply double side tape (B) to the anti-bird deterent (C). *The double-side tape is supplied with the anti-bird deterent.*
4. Install the anti bird deterent 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 45, section 4.

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

WARNING
Make sure that the power to the series circuit is OFF when you carry out maintenance.

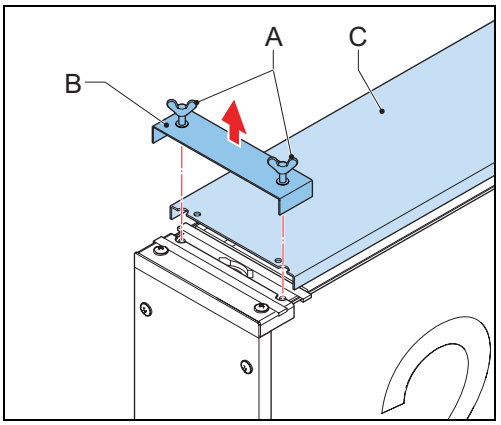
5.1 Preventive maintenance schedule

Frequency	Check	Action
Daily	For good legibility	Remove obstacles, clean legend panel or replace defective components.
Monthly	Visually for electrical connection	Repair damaged or loosened wires.
	If all fasteners are correctly tightened	Tighten the fasteners.
	General condition of the equipment	Replace the damaged components.
Half-yearly		Clean the outside of the equipment with a mild soap solution.
Annually	For damaged housing	Replace the damaged components.

5.2 Open equipment

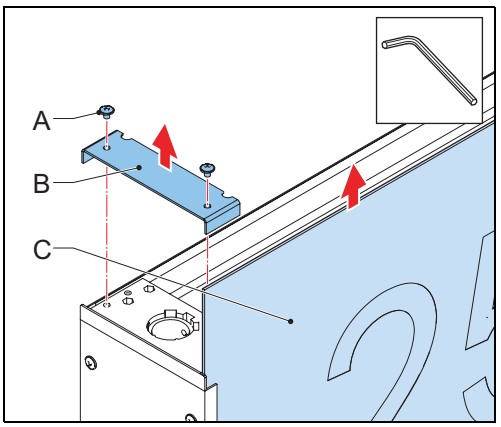
5.2.1 Remove cover panel

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



5.2.2 Remove legend panel

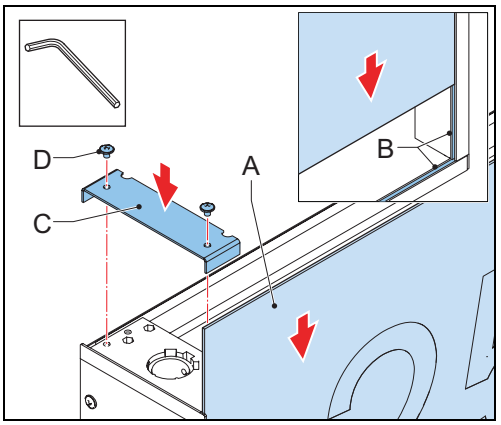
1. Remove the screws (A). Use an Allen key.
2. Remove the cover angle pieces (B).
3. Remove the legend panel (C).



5.3 Close equipment

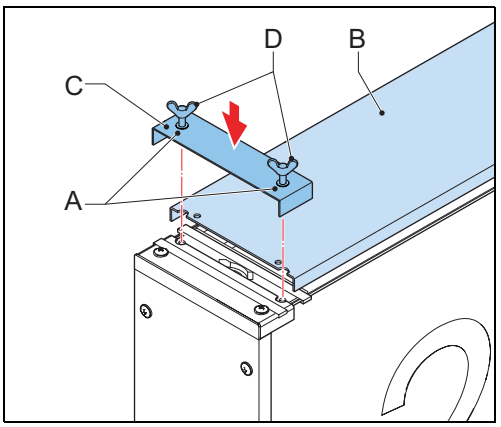
5.3.1 Install legend panel

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 §* 7.4.
4. Install and tighten the screws (D).



5.3.2 Install cover panel

1. Examine if the gaskets (A) show wear.
2. If a gasket shows wear, dispose of the cover clamp.
3. Install the cover panel (B).
4. Install the (new) cover clamps (C).
5. Tighten the butterfly screws (D).



5.4 Part replacement

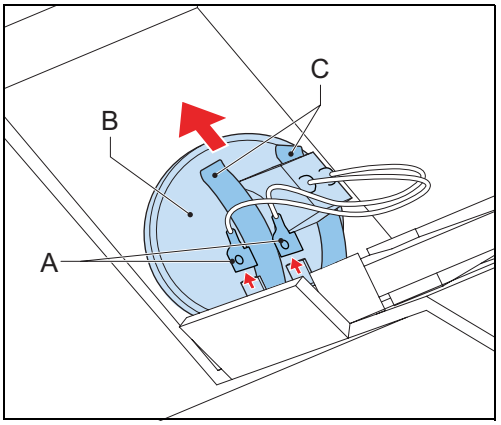
Note
For the correct replacement parts, see § 7.3.

5.4.1 Light source of PVH

Part
- Halogen lamp
- Film-disc cut-out

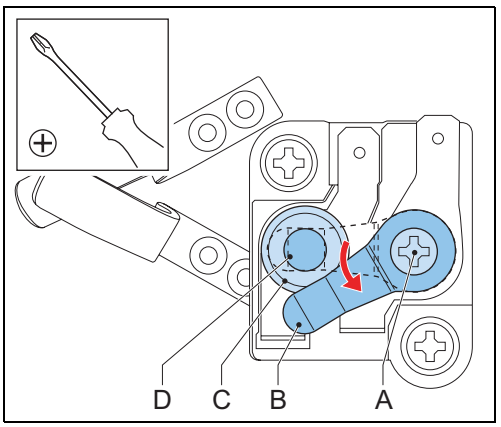
Remove light source

1. Remove the cover panel. See § 5.2.1.
2. Disconnect the fast-on connectors (A).
3. Hold the light source (B) at the end with the wires and pull it out of the clamps (C).



Replace film-disc cut-out

1. Loosen the screw (A).
2. Turn the cut-out clip (B) free.
3. Remove the film-disc cut-out (C).
4. Install a new film-disc cut-out. Make sure that the small button (D) is at the upper side.
5. Turn the cut-out clip (B).
6. Tighten the screw (A).
7. Check if the pressure the cut-out clip applied on the film-disc cut-out is sufficient to ensure good contact.
8. If the pressure is not sufficient, remove the cut-out clip and bend it slightly to increase the pressure.



Install

1. Push the new light source below the lamp spring (A) towards the legend panel.

CAUTION
Do not touch the bulb of the light source with bare fingers. The lifetime of the light source reduces if you touch it with bare fingers.

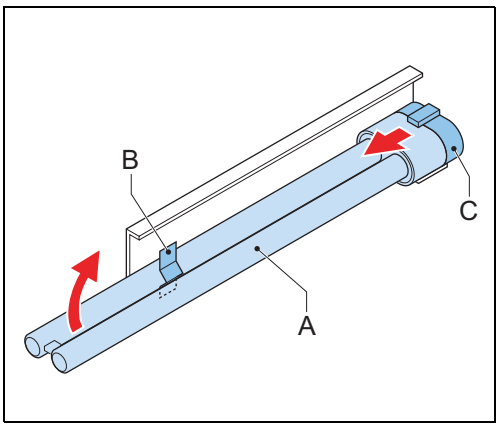
2. If you touched the bulb of the light source with bare fingers, clean the bulb with methylated spirit.
3. Connect the fast-on connectors of the light source to the terminal block.
4. Close the equipment. See § 5.3.

5.4.2 Light source of PVO

Part
- Fluorescent lamp

Remove

1. Remove the cover panel. See § 5.2.1.
2. Hold the light source (A) at the free end and remove the light source from the positioning clamp (B).
3. Pull the light source from the clamp (C) and remove it.



Install
1. Push the new light source in the lamp holder.
2. Push down the light source until the light source fits in the positioning clamp.
3. Close the equipment. See § 5.3.

5.4.3 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.

5.4.4 Front frame with the 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.

5.4.5 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.

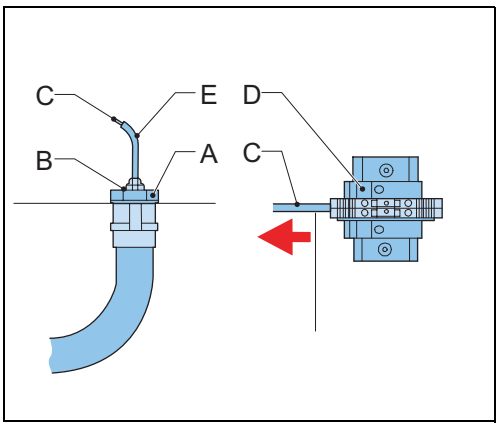
5.4.6 2-core cable

Part
- 2-core cable

Prepare
1. Open the equipment completely. See § 5.2.

Remove

1. Remove the gas cap (A). *Series circuit only.*
2. Disconnect the FAA plug (B) from the receptacle of the series transformer. *Series circuit only.*
3. Disconnect the 2-core cable (C) from the input terminal (D).
4. Loosen the gland that leads the 2-core cable into the equipment.
5. Remove the 2-core cable.
6. Remove the flexible conduit (E).
7. Remove the 2-core cable from the gas cap. *Series circuit only.*



Install
1. With a new 2-core cable, install the electrical connection. See § 4.10.
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	Defective light source(s)	Replace the light source. See § 5.4.1 or 5.4.2.
	Defective ballast	Replace the ballast. See § 5.4.4.
	Defective 2-core cable or defective crimping on the 2-core cable	Replace the 2-core cable. See § 5.4.5.
	Defective series transformer	Examine the output current of the series transformer. Use a true RMS current clamp.
	Defective power adapter	Replace the power adapter. See § 5.4.4.
	Defective flim-disc cut-out (PVH only)	Replace the film-disc cut-out. See § 5.4.1.
Short light source life	Input voltage too high	Correct the CCR or the series transformer.
		Replace the CCR or the series transformer.
		Replace the power adapter. See § 5.4.4.

7 Technical data

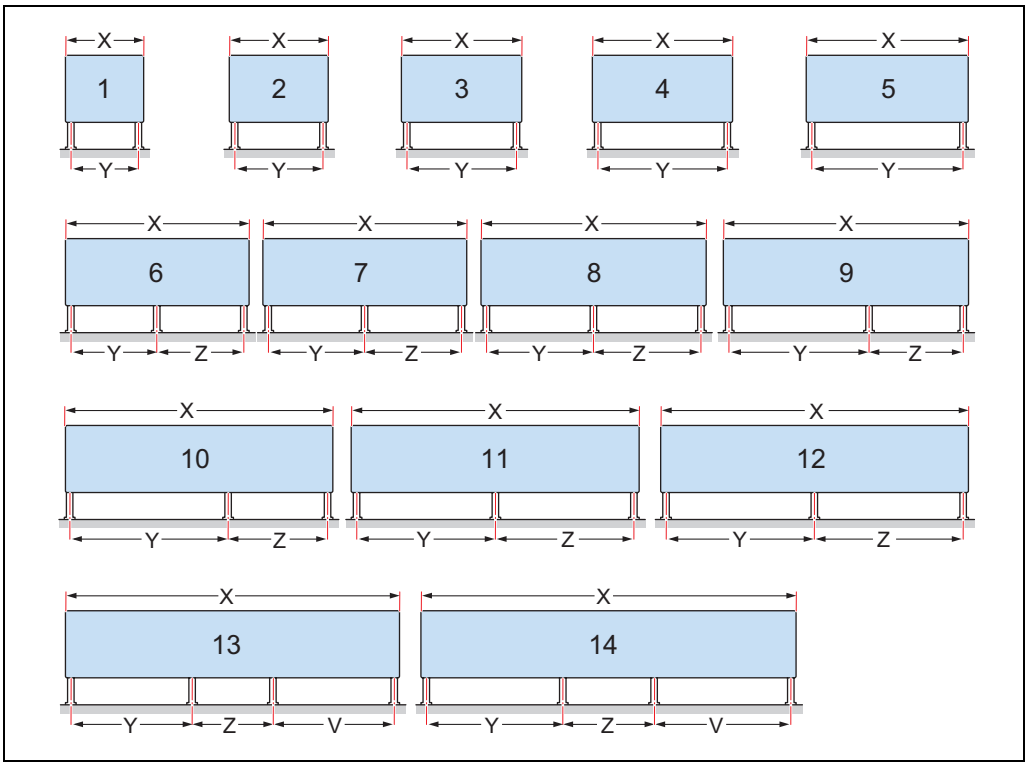
7.1 Specifications

7.1.1 General specifications

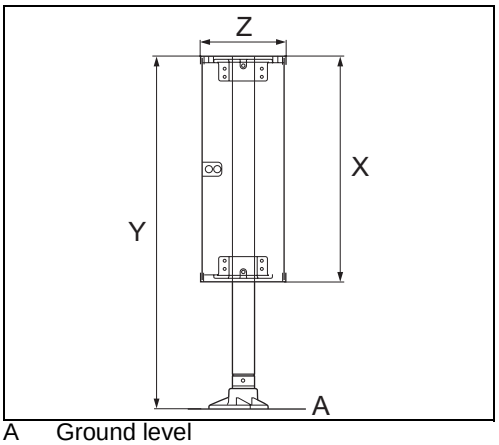
Item	PVO	PVH
Light source	Fluorescent	Pre-focused, cold mirror halogen with faceted reflector
Light output	Constent level as described in ICAO annex 14	Changes with the brightness step of the CCR
Minimum lifetime at 6.6 A	10 000 hours	1 500 hours
Power rating	48 W	24 W
PVO load	Up to 100% of the total installed load (VA) of the CCR	
Rated frequencies	50 / 60 Hz (+/- 7.5%)	
Dimensions	Equipment type dependent. See § 7.1.2.	
Weight	22 to 107 kg, equipment type dependent	
Parallel power supply: voltage at the input terminals U_N PVO ballast	198 - 254 V (AC)	
Total load (values may be different for non-ADB regulators)	Up to 80% of the nominal load of the chosen regulator tap	
Frangibility	To resist wind velocities up to 322 km/h	

Note
The ICAO design manual part 6 recommends to limit the length of the equipment to 3000 mm.

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	3300	3352	1218	812	1218
14	3700	3752	1368	912	1368



A Ground level

Equipment type	Legend panel height [mm]	X [mm]	Y [mm]	Z [mm]
1 to 14	400	440	620	230
1 to 14	600	640	820	230
2 to 14	800	840	1020	230

7.1.3 Electrical characteristics PVH 6.6 A series circuit

Equipment type	Legend panel length [mm]	Number of light sources	EffectiveCCR load [VA]	Required rated power of RST-ADB type series transformers [W]			Number of light sources per series transformer		
				Series transformer 1	Series transformer 2	Series transformer 3	Series transformer 1	Series transformer 2	Series transformer 3
1	700	3	150	150	-	-	3	0	0
2	900	4	200	200	-	-	4	0	0
3	1100	4	200	200	-	-	4	0	0
4	1300	5	250	300	-	-	5	0	0
5	1500	6	300	300	-	-	6	0	0
6	1700	8	400	200	200	-	4	4	0
7	1900	8	400	200	200	-	4	4	0
8	2100	10	500	300	200	-	6	4	0
9	2300	10	500	300	200	-	6	4	0
10	2500	10	500	300	200	-	6	4	0
11	2700	12	600	300	300	-	6	6	0
12	2900	12	600	300	300	-	6	6	0
13	3300	14	700	200	300	200	4	6	4
14	3700	16	800	300	200	300	6	4	6

7.1.4 Electrical characteristics PVO 4-8 6.6 A series circuit

Equipment type	Legend panel length [mm]	Number of light sources	Effective CCR load [VA]	Required rated power of RST-ADB type series transformers [W]		Number of light sources per series transformer	
				Series transformer 1	Series transformer 2	Series transformer 1	Series transformer 2
1	700	1	234	100	-	1	0
2	900	2	234	100	-	2	0
3	1100	2	234	100	-	2	0
4	1300	3	234	100	-	3	0
5	1500	3	234	100	-	3	0
6	1700	4	468	200	-	4	0
7	1900	4	468	200	-	4	0
8	2100	4	468	200	-	4	0
9	2300	5	468	200	-	5	0
10	2500	5	468	200	-	5	0
11	2700	6	468	200	-	6	0
12	2900	6	468	200	-	6	0
13	3300	8	702	100	200	2	6
14	3700	8	702	100	200	2	6

7.1.5 Electrical characteristics PVO 2.8 - 6.6 A series circuit

Equipment type	Legend panel length [mm]	Number of light sources	Effective CCR load [VA]	Required rated power of RST-ADB type series transformers [W]		Number of light sources per series transformer	
				Series transformer 1	Series transformer 2	Series transformer 1	Series transformer 2
1	700	1	234	100	-	1	0
2	900	2	234	100	-	2	0
3	1100	2	234	100	-	2	0
4	1300	3	468	200	-	3	0
5	1500	3	468	200	-	3	0
6	1700	4	468	200	-	4	0
7	1900	4	468	200	-	4	0
8	2100	4	468	200	-	4	0
9	2300	5	702	300	-	5	0
10	2500	5	702	300	-	5	0
11	2700	6	702	300	-	6	0
12	2900	6	702	300	-	6	0
13	3300	8	936	100	300	2	6
14	3700	8	936	100	300	2	6

7.1.6 Electrical characteristics PVO 6.6 A (fixed)

Equipment type	Legend panel length [mm]	Number of light sources	Effective CCR load [VA]	Required rated power of RST-ADB type series transformers [W]		Number of light sources per series transformer	
				Series transformer 1	Series transformer 2	Series transformer 1	Series transformer 2
1	700	1	112	100	-	1	0
2	900	2	112	100	-	2	0
3	1100	2	112	100	-	2	0
4	1300	3	223	150	-	3	0
5	1500	3	223	150	-	3	0
6	1700	4	223	150	-	4	0
7	1900	4	223	150	-	4	0
8	2100	4	223	150	-	4	0
9	2300	5	335	200	-	5	0
10	2500	5	335	200	-	5	0
11	2700	6	335	200	-	6	0
12	2900	6	335	200	-	6	0
13	3300	8	447	100	200	2	6
14	3700	8	447	100	200	2	6

7.1.7 Electrical characteristics PVO 230 V (AC)

Equipment type	Legend panel length [mm]	Number of light sources	Effective load [VA]
1	700	1	30
2	900	2	60
3	1100	2	60
4	1300	3	90
5	1500	3	90
6	1700	4	120
7	1900	4	120
8	2100	4	120
9	2300	5	150
10	2500	5	150
11	2700	6	180
12	2900	6	180
13	3300	8	240
14	3700	8	240

7.1.8 Location of input terminals and glands: PVH

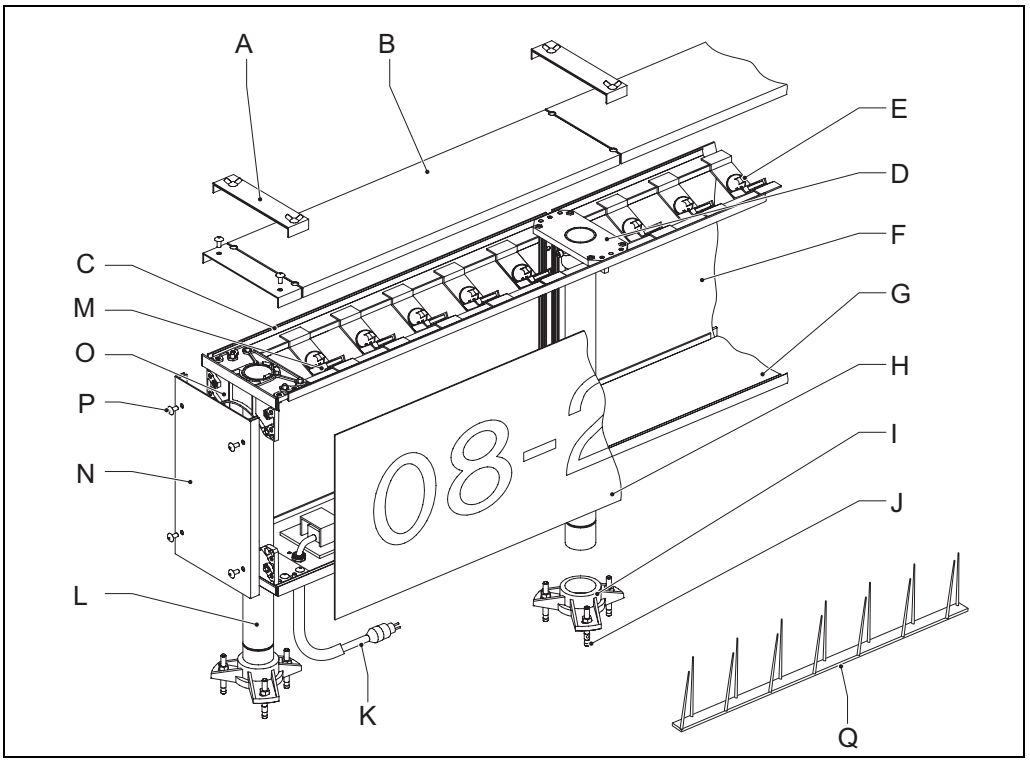
Power adapter	Location of terminals and glands
1	Left-hand bottom corner
2	Left-hand bottom corner
3	Right-hand bottom corner

7.1.9 Location of input terminals and glands: PVO

Power adapter	Location input terminals and glands
1	Left-hand corner of the equipment
2	Right-hand corner of the equipment

7.2 Exploded view and components: PVH

7.2.1 Exploded view: PVH



7.2.2 Components: PVH

	Component description	Article number	Remarks
A	Cover clamp	4071.78.030	Complete set with screws and nuts.
B	Cover panel	NC	-
C	Longitudinal strut	NC	-
D	Intermediate leg support	NC	-
E	Halogen lamp	2990.40.870	Halogen lamp
		1420.22.410	Film-disc cut-out
		4071.95.180	Terminal block clamp (without film-disc cut-out)
F	Rear panel	NC	-
G	Bottom panel	NC	-
H	Legend panel[a]	3255.40.0xx	Height 400 non retro-reflective.
		3255.60.0xx	Height 600 non retro-reflective.
		3255.80.0xx	Height 800 non retro-reflective.
I	Mounting flange	4071.80.681	-
J	Expansion bolt	1409.20.020	M10x120
K	2-core cable	4071.95.170	Complete flexible conduit. Length 800 mm, diameter 14.5/19 mm
		1458.06.050	Cable with moulded plug. Length 1000 mm

	Component description	Article number	Remarks
L	Mounting leg	4071.80.651	Legend panel height 400 mm. Inluding mounting flange.
		4071.80.661	Legend panel height 600 mm. Inluding mounting flange.
		4071.80.671	Legend panel height 800 mm. Inluding mounting flange.
M	Terminal block	NC	-
N	Side panel	NC	-
O	Corner leg support	NC	-
P	Fasteners side panel	7108.08.610	Hexagon-socket button-head cap screw
Q	Anti-bird deterent	4072.24.350	Length 330 mm, width 30 mm. With 2-sided tape.
	Reinforcment profile set	4071.89.890	Legend panel height 800mm only
	Security cable	4071.88.360	-

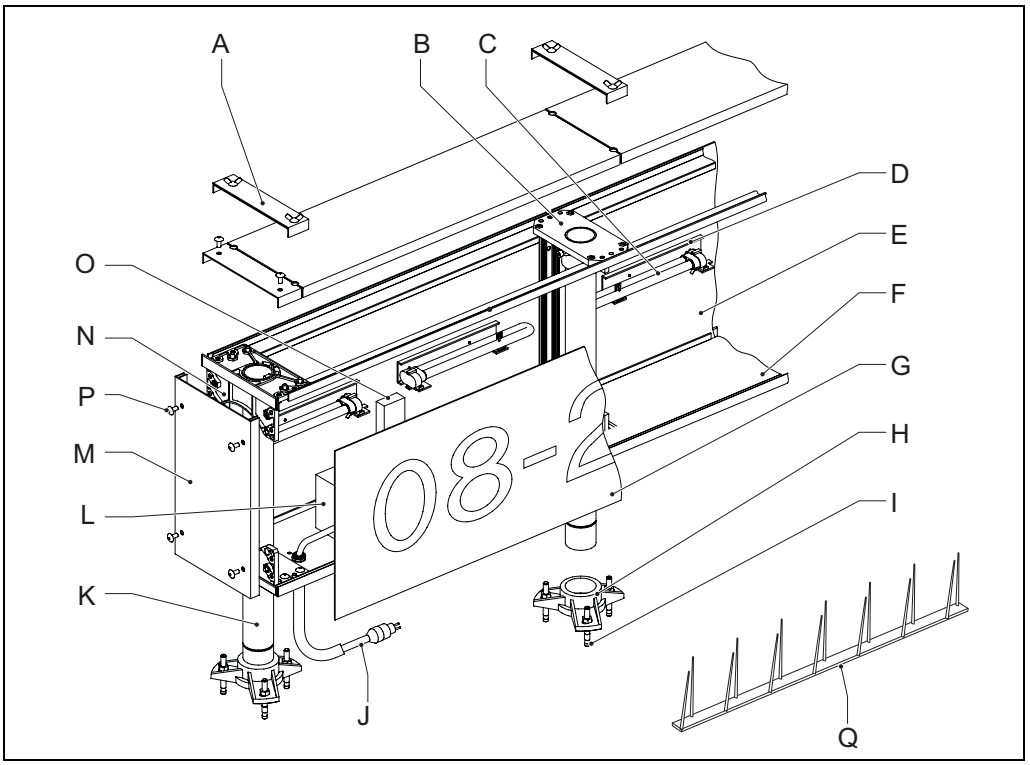
a) Provide sign dimensions, colours and requested legend.

Note

- **An ‘xx’ in the article number refers to the equipment type. See § 7.1.2.**
- **NC means that these components are not available as a commercial spare part.**

7.3 Exploded view and components: PVO

7.3.1 Exploded view: PVO



7.3.2 Components: PVO

	Component description	Article number	Remarks
A	Cover clamp	4071.78.030	Complete set with screws and nuts.
B	Intermediate leg support	NC	-
C	Fluorescent lamp	2990.60.100	-
D	Lamp support	4071.71.580	Lamp support assembly for PVO, lamp socket on the left side
		4071.71.590	Lamp support assembly for PVO, lamp socket on the right side
E	Rear panel	NC	-
F	Bottom panel	NC	-
G	Legend panel[a]	3255.40.0xx	Height 400 non retro-reflective.
		3255.60.0xx	Height 600 non retro-reflective.
		3255.80.0xx	Height 400 non retro-reflective.
H	Mounting flange	4071.80.681	-
I	Expansion bolt	1409.20.020	M10
J	2-core cable	4071.95.170	Complete flexible conduit. Length 800 mm, diameter 14.5/19 mm
		1458.06.050	Cable with moulded plug. Length 1000 mm

	Component description	Article number	Remarks
K	Mounting leg	4071.80.651	Legend panel height 400 mm. Inluding mounting flange.
		4071.80.661	Legend panel height 600 mm. Inluding mounting flange.
		4071.80.671	Legend panel height 800 mm. Inluding mounting flange.
L	Power adapter	4071.81.280	Power adapter with 1 transformer
		4071.81.290	Power adapter with 2 transformers
		4071.81.310	Power adapter with 3 transformers
M	Side panel	NC	-
N	Corner leg support	NC	-
O	High frequency lamp ballast	6172.34.040	Ballast for 1 lamp, for 230V parallel supplied PVO
		6172.34.050	Ballast for 1 lamp, for 6.6A series supplied PVO
		6172.34.060	Ballast for 2 lamps, for 230V parallel supplied PVO
		6172.34.030	Ballast for 2 lamps, for 6.6A series supplied PVO
P	Fasteners side panel	4071.88.360	Hexagon-socket button-head cap screw
Q	Anti-bird deterent	4072.24.350	Length 330 mm, width 30 mm. With 2-sided tape.
	Reinforcment profile set	4071.89.890	Legend panel height 800 mm only
	Security cable	4071.88.361	-

a) Provide sign dimensions, colours and requested legend.

Note

- **An ‘xx’ in the article number refers to the equipment type. See § 7.1.2.**
- **NC means that these components are not available as a commercial spare part.**

7.4 Possible hardware for installation

	Details	Article number
Adhesive A	Loctite 222 (50 ml)	7870.05.140
Adhesive B	Transparent silicone sealant	7835.55.175
Anchor bolts	Anchor bolts (i.e. expansion bolts), stainless steel M10x100, three per leg	1409.20.020
Conduit elbow	2” conduit elbow (depends on installation method)	1409.47.100 and 3225.01.341
Gas cap	2” gas cap	4070.10.510
Gland	Gland 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	Limits
Temperature limits PVO	-30 to +55 °C
Temperature limits PVH	-40 to +55 °C
Altitude	From sea level to 3000 m
Relative humidity	Up to 100%, condensing

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