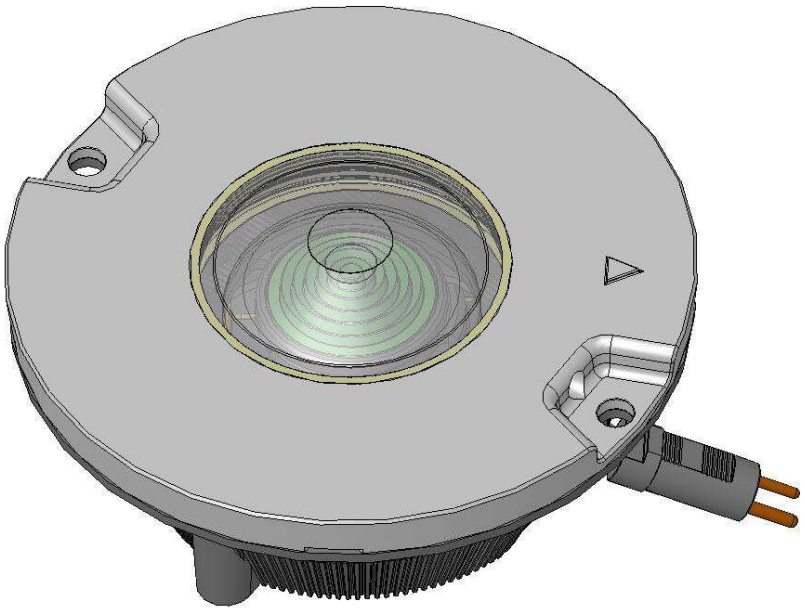
Instruction Manual

AM.11.100e Edition 1.4

8”F-Range Inset Light



Inset heliport lights for TLOF

Type FTO

Record of Change AM.11.100e

Revision	Description	Editor	Checked	Date
- Draft 1	- FTO version for TLOF	- WL	- MR	15/05
1.1	Safety instructions, warranty, procedures to unlock and fasten screws, screw references, Loctite types, tightening torques, adapter ring	BUG	TP, KC, VDV, VI	4/09
1.2	Spare parts, limitation of the scope to TLOF application	BUG	RAS	05/09
1.3	Rebranding	EV		05/10
1.4	Introduction of Torx screws with pre-applied Loctite, improved procedures to release screws, correction of code numbers, code torque wrench	BUG	JWA, MA, AHU, LM, JBU	10/14

Safety Instructions

Safety precautions

This section contains general safety instructions for using your ADB equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this 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 constant current series circuits* for 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 & IEC 61821.
- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this 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.

Safety Instructions, *continued*

Safety Symbols

Become familiar with the safety symbols presented in this section. 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. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING 3 : Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

WARNING 4 : Wear safety goggles. Failure to observe may result in serious injury.

WARNING 5 : Do not touch. Failure to observe this warning may result in personal injury, death, or equipment damage.

CAUTION: Failure to observe may result in equipment damage..

Qualified Personnel

The term qualified personnel is defined here as individual who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified 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 this equipment to see that its personnel meet these requirements.

Safety Instructions, *continued*

Intended Use

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

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

Unintended uses may result from taking 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 unqualified personnel to perform any task.

Safety Instructions, *continued*

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 system safely and efficiently.

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

- Allow only qualified 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.

Safety Instructions, *continued*

Operation

Only qualified 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 this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system 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 this equipment only in the environments for which it is rated. Do not operate this 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.

Safety Instructions, *continued*

Action in the Event of a System or Component Malfunction

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

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

Maintenance and Repair

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

- Always use safety devices when working on this 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 CPR (Cardio Pulmonary Resuscitation) 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.

Use Restriction Notice, Warranty and Disclaimers

Use restriction notice

This Instruction Manual is the property of

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Warranty

For warranty obligations, ADB General Conditions for Deliveries and Services available at the time of the offer made by ADB for the delivery of products and services shall apply unless otherwise agreed in writing.

Disclaimers

This manual could contain technical inaccuracies or typographical errors. ADB reserves the right to revise this manual from time to time in the contents thereof without obligation of ADB to notify any person of such revision or change.

Details and values given in this manual are average values and have been compiled with care. They are not binding, however, and ADB disclaims any liability for damages or detriments suffered as a result of reliance on the information given herein or the use of products, processes or equipment to which this manual refers. No warranty is made that the use of the information or of the products, processes or equipment to which this manual refers will not infringe any third party's patents or rights. The information given does not release the buyer from making their own experiments and tests.

Similarly, ADB disclaims any liability for damages or detriments suffered as a result of modification made on site on the products by any other party than ADB.

Information about this Manual

Chapter overview

Each chapter starts with an overview of the topics of that chapter.

Using icons

Additionally to safety symbols, icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

Icon	Type of information	Description
	Note	A 'note' provides information that is not indispensable, but may nevertheless be valuable to the reader, such as hints and tips.
	Reference	A 'reference' guides the reader to other places in this manual, where he/she will find additional information on a specific topic.

Parts Identification

Parts identification symbols (e.g. A1, B4, …) appearing in the text refer to the Exploded views page 45.

Comments and Proposals

This manual has been compiled with all possible care and in view of providing a valuable and practical tool to the Airport Maintenance personnel.

We encourage customers to address us their comments and proposals for improving further the contents of this manual.

Communications should be addressed to the "**Customer Service Department**" of ADB:

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Table of Contents

Chapter 1: Product Information

Overview

Introduction

In this chapter you will find all the information about the shipment and the identification of the ADB FTO inset lights for heliports.

Contents

This chapter contains the following topics.

General information

FTO Inset Lights

The ADB FTO inset lights are light fixtures providing optimum visual guidance with minimal maintenance, low life-cycle costs and maximum reliability. It is designed to withstand the high impact and roll-over loads imposed by today's widebody aircraft during taxiing operations while remaining waterproof and serviceable.

The FTO fixture is shipped ready for installation on an ADB 8" shallow base or on 12” shallow base or FAA deep bases (L-867 size B or L-868 size B) with an adapter ring

The ADB heliport inset lights type FTO are intended to use as omni directional light for:

- Final approach and take-off area (for this model refer to manual AM.03.441);
- Touch-down and lift-off area (TLOF).

Purpose of this manual

This manual describes procedures for the installation, maintenance and troubleshooting of the FTO heliport inset light for TLOF application. For other applications of the FTO, please refer to Instuction Manual AM.03.441.

Scope of this manual

This manual covers the FTO light fixture for TLOF application manufactured in accordance with FAA specification AC 150/5345-46 (except for photometry when it differs from ICAO Annex 14) and compliant to ICAO Annex 14.

Equipment data

Equipment supplied

Each unit is supplied completely assembled, tested and sealed, ready for installation. The electrical connection is made via a cable assembly with

FAA L-823 style 2-pole plug. A labyrinth gasket is included.

The FTO light for 230V AC parallel supply is always supplied mounted on a shallow base. (with dedicated extension housing the transformer).

Each unit is individually packed in a durable, cushioned and corrugated cardboard box, labelled with ADB and ordering numbers.

At least one instruction manual is delivered per order.

Film disc cut-out

For some applications, optional film disc cut-outs are available. They form an electrical bypass over the lamp within 15 seconds after lamp failure. After a lamp failure, the film disc cut-out must be replaced.

References

Ordering codes and reference data pertinent to the light fixture and its components are listed in the tables from page 39 onwards.

Differences between versions

All the inset lights used for a particular function look externally identical. The differences between versions depend on the lens colour (E1) and lamp (E3). Make sure to use the correct version when installing the light onto its base.

Equipment required for installation and maintenance

Beyond the light itself, some equipment is required for installation and maintenance.

This equipment is not supplied with the light but can be obtained through ADB.

It is listed on page 48.

Chapter 2: Mounting and connection

Overview

Introduction

This chapter instructs you how to connect and mount the TLOF inset light on its base or adapter ring.

It includes important safety notifications regarding the choice and use of fixing hardware.

It is supposed that the base supporting the TLOF inset light, the adapter ring (if needed) and the secondary connector are already installed. All information pertinent to the installation of bases is available in the instruction manual Am.05.120, Edition 2.2 or subsequent.

Contents

This chapter contains the following topics.

Important safety notifications

Fixing hardware

Various types of fixing hardware can be used for the fixation of the light on its base or adapter ring (e.g. screws or studs and nuts). Moreover, bases and adapter rings may be supplied with threaded holes according either to ISO metric or UNC standards.

Only use fixing hardware of the same type as the one originally supplied with the base or adapter ring!

Always tighten the fixing hardware to the recommended torque, using a calibrated torque wrench and applying the recommended type of sealant!

Refer to the paragraph "How to mount the light assembly", page 17, for the tool to use, the requirement for use of Loctite and the torque to apply.

It is possible to insert a 3/8"-16 UNC screw in a M10 threaded hole. However, such a combination damages the female thread and does not ensure a correct fastening so that the screw could become loose under repeated operation of rolling aircrafts. Using screws of incorrect standard might lead to either damage to the thread in the base or to an incorrect fixation of the lights.

Generally, using fixing hardware of a different type of the one originally supplied with the bases or adapter rings, or tightening it at an incorrect torque, may lead to a loosening of the fixing hardware, damage to the light and base, and potentially to the separation of the light fitting or parts thereof from its base. This can lead to a highly dangerous situation of Foreign Object Debris (FOD), with potential lethal consequences.

General recommendations

Receiving, storage and unpacking

Upon receipt of goods at the site store, check all packings for visible damage. Every damaged box should be opened and its content inspected for damage.

If equipment is damaged, a claim form shall be filed with the carrier immediately. It may then be necessary for the carrier to inspect the equipment.

Store the light assembly preferably in its original packing in a protected area. When stored unpacked, please take care not to damage the cable insulation.

Unpack the light assembly at the installation site to avoid damage during transportation and handling.

Electrical connection

The light assemblies covered by this manual are designed for connection to either series circuits via one L-830 or L-831 series transformer or to a 230V AC parallel circuit.

Refer to ADB cat. leaflet A.06.112 or Instruction manual AM.06.112 for more information on series transformers.

The series transformer has to be ordered separately.

Base Earthing

Whatever the chosen installation method, it is strongly recommended to earth the base, especially in locations presenting a risk of lightning strikes.

Failure to earth correctly the base will void the warranty for all damages occurring as a result of voltage surges.

Note: Guidelines on how to realize the earthing of the base are given in instruction manual Am05.120

Location and tolerances

The applicable documents for location details and tolerances are the following:

Organisation	Applicable documents
ICAO	Annex 14
	Aerodrome Design Manual Part 4
FAA	Advisory Circular AC no. 150/5340-28

How to mount the light assembly?

Before you start

Make sure that the contact surfaces of the light assembly with base or adapter ring and the gaskets are absolutely clean and smooth.

Use the correct fixing hardware

Please refer to the paragraph, page 8: only use fixing hardware of the same type as the one originally supplied with the base or adapter ring!

In ADB shallow bases delivered since mid-2006, the type of thread is indicated on the bottom or the flange of the base: **METRIC M10** or **3/8”-16UNC**.

How to be sure of the type of fixing hardware you are using?

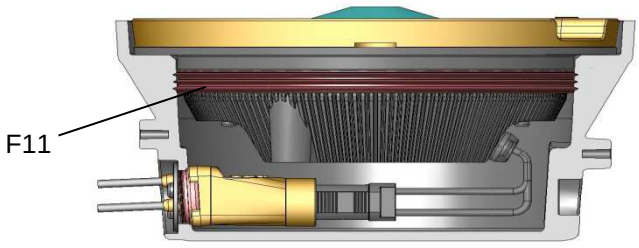
- M10 screws require the use of a 17mm socket.
- 3/8"-16UNC screws require a 9/16" socket, this is approximately 14.3mm.

On a base or adapter ring with metric M10 female thread, never use a screw that can be fastened with a socket smaller than 17mm: it would indicate that you are inserting a 3/8"-16UNC screw in a M10 female thread.

The opposite -inserting a M10 screw in a 3/8"-16UNC female thread- is impossible.

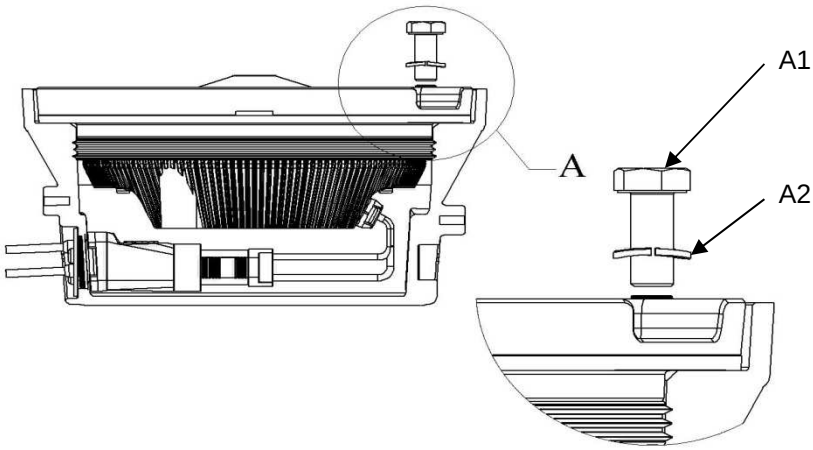
How to mount the light assembly?

To mount and connect the light assembly, proceed as follows:

Step	Action
1	In case a light has already been mounted on the base, remnants of Loctite are present in the fixation holes. Clean them using a cleaning tap for blind holes (preferably use a tap with a right spiral groove) and blow with dry, oil-free compressed air.
2	If the labyrinth gasket (F11) is not installed, put a new, clean one in the dedicated groove at the cover periphery  **CAUTION:** Never re-use an already used gasket.

How to mount the light assembly?, *continued*

How to mount the light assembly?

Step	Action
3	Slightly moisten the gasket with soapy water, to lubricate. **CAUTION: Never lubricate the gasket with silicone or any other kind of grease. Avoid the use of soap containing silicone or glycerine.**
4	Connect the light by inserting its two-pole plug into the receptacle of either the shallow base, the secondary cable or the transformer
5	Apply Loctite on the three first threads of the threaded holes in the base. **CAUTION:** Always use Loctite 2701 to fasten the light fixture on its support.
6	Gently install the light fixture in the base or the adapter ring and press it home. **CAUTION:** Make sure not to drop the light assembly or to pinch the wires when mounting the light on the adapter ring.
7	Make sure that the lock washers are mounted correctly-dents facing upwards - to avoid denting the cover. 
8	Torque down gradually the 2 screws (or self-locking nuts in case of a stud-equipped base). **CAUTION:** Make sure the screws are tightened with a torque of 21 Nm/ 190 Lb.in .

Installation of adapter ring

Adapter ring Installation

To install the adapter ring, proceed as follow:

Step	Action
1	Clean the contact surfaces of the deep base and adapter ring. In case an adapter ring has already been mounted on the base, remnants of Loctite are present in the fixation holes. Clean them using a cleaning tap for blind holes (preferably use a tap with a right spiral groove) and blow with dry, oil-free compressed air.
2	Put onto the contact layer of the base a layer of RTV106 (ADB NC 7835.55.151 or equivalent.
3	Apply Loctite on the three first threads of the threaded holes in the base. **CAUTION:** Always use Loctite 2701 to fasten the adapter ring on its support.
4	Mount the adapter ring onto the base and torque down the fixation screws. **CAUTION:** Make sure the screws are tightened with a torque of 21 Nm/ 190 Lb.in .
5	Install the light as described above.

Chapter 3: Maintenance

Overview

Introduction

This chapter describes the general ideas on workshop maintenance and preventive maintenance and you will learn how to lift the unit out of the base or adapter ring. The servicing of the light assembly in the maintenance workshop will be described in detail in Chapter 4: Servicing in the Maintenance Base, page **24**.

Warranty limitation

The lights are delivered fully tested and sealed. In case of malfunctioning during the warranty period, the defective light shall be shipped back to ADB without opening it. Any attempt to open the light during the warranty period will void the warranty.

Contents

This chapter contains the following topics.

Workshop maintenance and preventive maintenance

In the field maintenance

The light assemblies can be serviced in the field, but it is recommended to limit field maintenance to cleaning the lens. It is recommended to replace the inset lights at regular intervals and to have them overhauled in the maintenance shop. The same applies to lights found unserviceable in the field.

No specific tools are required to remove or re-install the fittings, except for the lifting tool (see page 23).

Preventive maintenance

The assembly's service life depends to a large extent on its waterproofness. All metal mating surfaces and seals must be clean, smooth, dry and free of all foreign particles if the light fixture is to operate for extended periods without requiring maintenance.

Greasing of O-ring seals may be required as indicated in this manual.

Preventive maintenance of the light fixtures should be performed as listed in the table on the next page.

Maintenance frequency depends on the conditions under which the runway is used (i.e. climate, traffic, etc.). The recommended practices for maintenance are described in the FAA advisory circular no. AC 150/5340-26 and in the ICAO Aerodrome Design Manual, Part 9 Airport Maintenance Practices.

For components mentioned in this chapter, refer to the exploded view on page 45.

Workshop maintenance and preventive maintenance, *continued*

Preventive maintenance tasks

In the table below you will find a checklist of preventive maintenance tasks: In case lights are found to be defective during the warranty period, do not open them as explained below, but replace them by new units, and send the defective ones, unopened, to ADB.

Interval	Check	Action
Daily	for lamp failure	Replace lamp and film disc cut-out (if any).
	for low light output	1. Clean outer surface of prism if dirty. 2. Check for misalignment or presence of moisture in fixture. 3. Check for lamp ageing or displacement
Weekly	for obstruction in light output channel	Clean channel and prism surface
Monthly *	for presence of moisture or water (visual inspection on condensation inside of prisms)	1. Open up light assembly. 2. Clean, dry and inspect. 3. Replace O-ring and other parts found defective
Bimonthly	torque on hold-down bolts	Refer to the paragraph " How to mount the light assembly?", page 17, for the tool to use, the requirement for use of Loctite and the torque to apply.
Semi-annually *	for presence of water in base	1. Pump water from base. 2. Remove, dismantle and inspect light for water damage. 3. Cure the cause of water ingress
After 800 hours of operation at 6.6 A	Replace lamps of complete subsystem	It is recommended to replace the lamps systematically when 80 % of the useful life has been reached. At full brightness (6.6 A), it represents 800 hours, but, in practice, life spans of 2000 to 4000 hours can be expected.
After snow removal	for damaged light fixtures	1. Replace badly damaged fixtures. 2. Use a power broom for snow removal in the vicinity of the light fixture, if practical. 3. Follow recommended snow removal techniques described in FAA AC 150/5200-30 to avoid or at least to reduce damage to light fixtures.

* More frequently during rainy seasons.

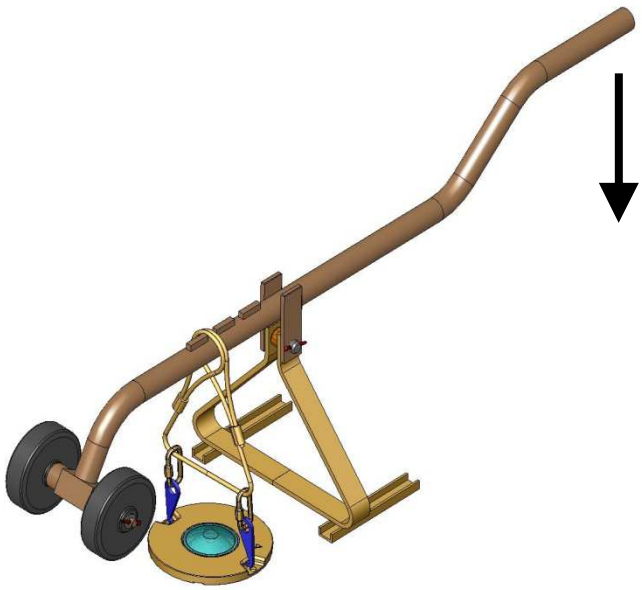
How to lift the light assembly out of the base or adapter ring

Lifting tools

Beside the simple jig delivered with the standard tool case, ADB has developed a more sturdy and efficient lifting tool (see illustration below). See paragraph Accessories, page 48 for references.

Procedure

To lift the optical unit out of the base receptacle or adapter ring, proceed as follows:

Step	Action
1	Remove the fixing screws and washers (A1-A2) or self locking nuts and discard them.
2	Fit the appropriate lifting tool into both holes located (180° apart) in the cover (B1), lift the optical unit out of the base or adapter ring and place it next to it. 
3	Disconnect the light fixture wires from the power wires coming from the transformer(s).
4	Remove the labyrinth gasket and discard it.
5	Mount a serviced or new fitting as described on page 17.
6	Take the optical unit back to the maintenance base where it can be serviced entirely.

CAUTION: Never hold the light fixture by the wires as this may damage the insulation, break the waterproof seal and cause insulation faults and water leakage.

Chapter 4: Servicing in the Maintenance Base

Overview

Introduction

In this chapter you will learn how to perform the servicing tasks in the maintenance base.

Preliminary

All the screws used in this product are listed at the end of this manual.

Refer to the table "Screws Overview ", page 44 for the tool to use and the torque to apply.

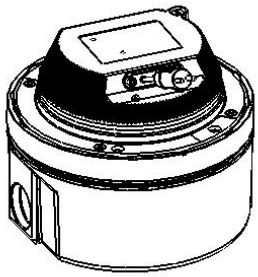
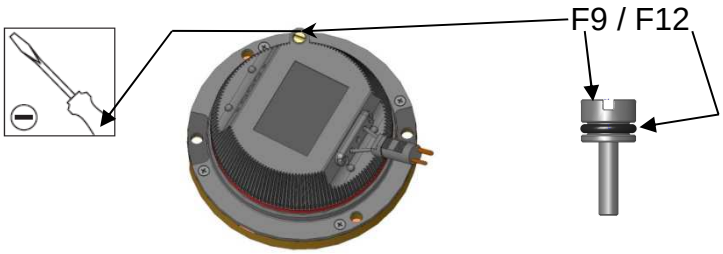
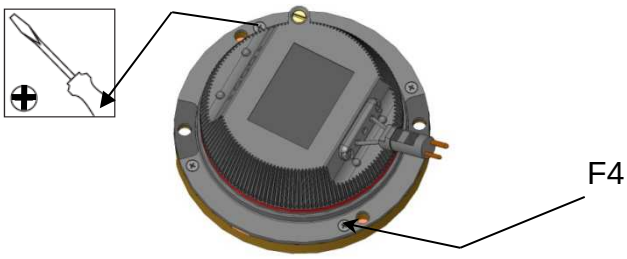
Contents

This chapter contains the following topics.

How to open the light assembly

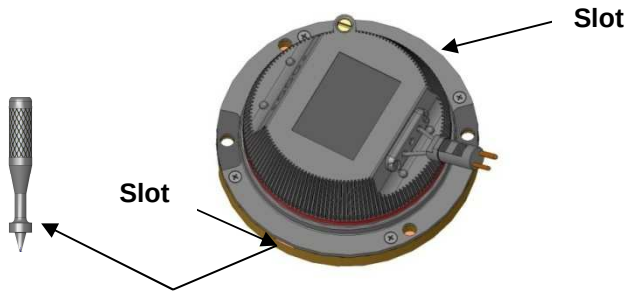
Procedure

To open the light assembly, proceed as follows (for the tools to use, refer to, page 44"Screws Overview "):

Step	Action
1	Turn the light unit upside-down. In order for the light to rest on a stable surface it is advised to lay it upside down on the top of a shallow base. 
2	Remove the pressure release screw (F9). 
3	Remove the four screws (F4). The use of an attack driver may be required to unlock the screws (see page 48). • Always use a new bit for each light requiring the use of an attack driver. • Take care that the bit is well positioned on the screw head and that the driver is aligned with the axis of the screw. 

How to open the light assembly, *continued*

Procedure

Step	Action
4	Introduce the special opening tool (see page 48) in the dedicated slot between cover and inner cover and rotate it to separate the inner cover from the cover. 

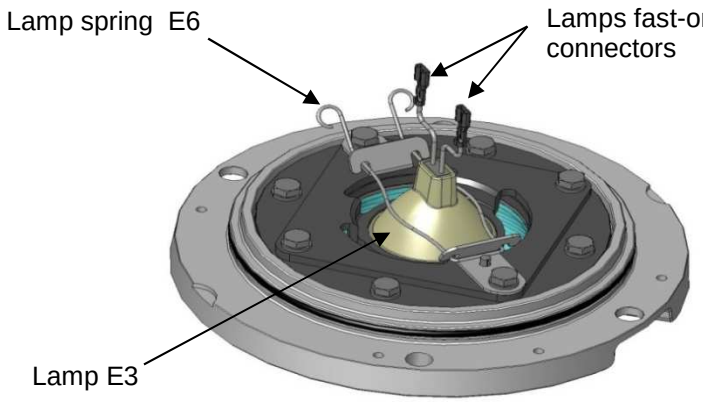
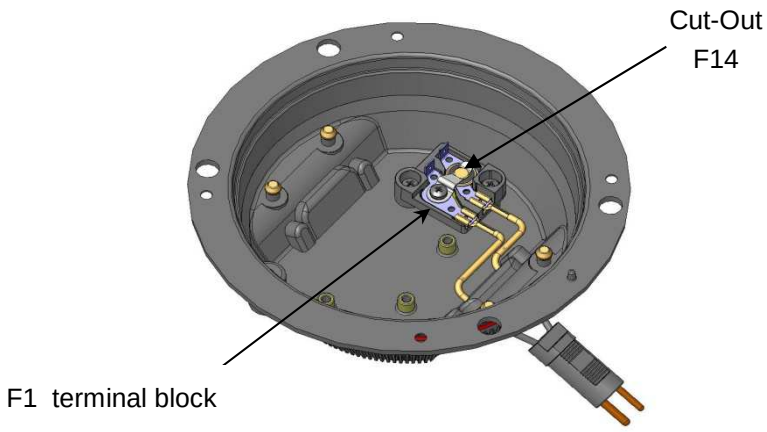
How to replace the lamp

Film disc cut-out

When used, always replace the film disc cut-out each time a lamp has to be replaced.

Procedure

To replace a lamp, proceed as follows:

Step	Action
1	Open the light assembly (see page 25).
2	Unplug the lamps fast-on connectors from the terminal block (F1).
3	Pull out the lamp (E3) from underneath, take care for the lamp spring (E6). 
4	If a cut-out (F14) is used, remove it by loosening the screw which secures the cut-out clip to the terminal block and rotate cut-out clip free.
5	If a cut-out is used, position a new disc (small button side up) in the terminal block. Rotate the cut-out clip on top of the cut-out and hold while tightening the screw. Make sure that the pressure applied by the clip on the film disc is sufficient to assure good contact. If loosened, remove the clip and bend it slightly to increase its pressure. 

How to replace the lamp, *continued*

Procedure

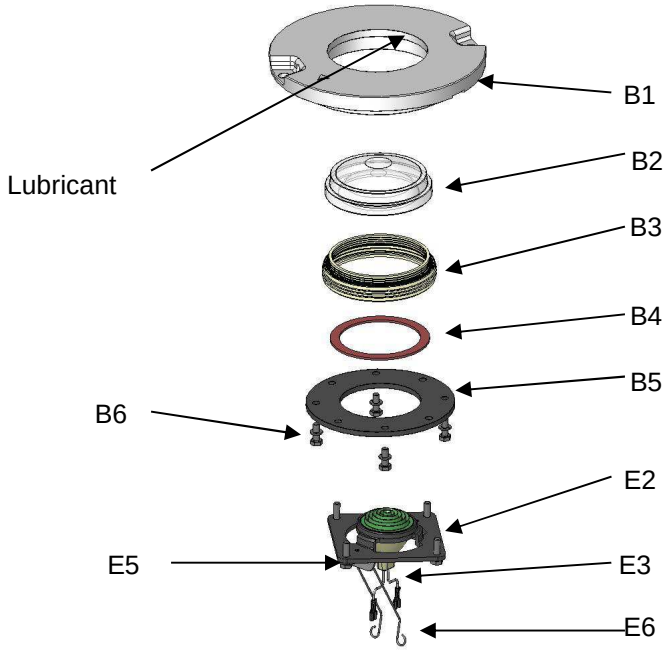
Step	Action
6	Introduce a new lamp and secure with the lamp spring (E6). **CAUTION:** Never touch the bulb of the lamp with your bare fingers. It would reduce the lifetime of the lamp considerably. Should it happen, clean the bulb with methylated spirit.

Make sure there is good contact between fast-on connectors and terminals.

How to replace the outer lens

Procedure

To replace a lens, proceed as follows:

Step	Action
1	Open the light assembly (see page 25).
2	Unplug the lamps fast-on connectors from the terminal block (F1).
3	Pull out the lamp (E3) from underneath; take care for the lamp spring (E6).
4	Unscrew the 4 screws (E5). Remove the lockwashers. 
5	Remove the lamp support plate (E2) .
6	Unscrew the 4 screws (B6). Remove the lockwashers.
7	Remove the lens support plate (B5) and the lens gasket protection (B4)

How to replace the outer lens, *continued*

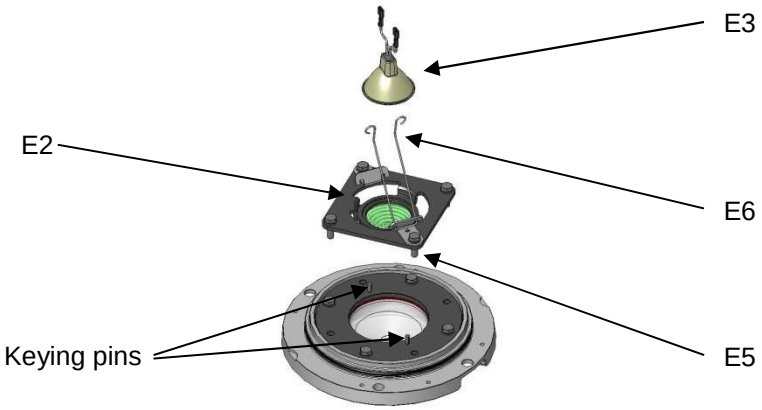
Procedure

Step	Action
8	Push the lens (B2) with the lens gasket (B3) towards the inside of the cover (B1)
9	Clean and degrease the lens chamber with any effective solvent. **CAUTION:** Never use any abrasive substance. Remnants of Loctite are present in the fixation holes of the screws B6. Clean them using a cleaning tap for blind holes (preferably use a tap with a right spiral groove) and blow with dry, oil-free compressed air.
10	Using a small brush, apply a thin layer of lubricant MOLYKOTE HP870 INERTA (ADB PN 7850.05.061) in the top section of the lens chamber of the cover (see in the figure above).
11	Bring a **new lens gasket** (B3) over the lens. **CAUTION:** Always replace the lens gasket (B3) and the 8 screw and lock-washers (B6, E5) by new ones when a lens is replaced. This to guarantee fixture water tightness.
12	Push the lens/ gasket assembly in the lens chamber from the inside, put the lens gasket protection (B4) and clean the inner surface of the lens.
13	Secure it to the cover by means of the lens support plate (B5) and 4 new screws (B6). Don't forget the lock washers. Refer to the table "Screws Overview" page 44 for the tool to use and the torque to apply.
14	Reinstall the lamp support plate (E2) by means of 4 new screws E5. Don't forget the lock washers. Refer to the table "Screws Overview" page 44 for the tool to use and the torque to apply.
15	Introduce the lamp (E3) and secure with the lamp spring (E6).. **CAUTION:** Never touch the bulb of the lamp with your bare fingers. It would reduce the lifetime of the lamp considerably. Should it happen, clean the bulb with methylated spirit.

How to replace the optical assembly

Procedure

To replace the optical assembly, proceed as follows:

Step	Action
1	Open the light assembly (see page 25).
2	Unplug the lamps fast-on connectors from the terminal block (F1). 
3	Pull out the lamp (E3) from underneath; take care for the lamp spring (E6).
4	Unscrew the 4 screws (E5). Remove the lockwashers.
5	Remove the lamp support plate assy' (E2) with sealed inner lens. Remnants of Loctite are present in the fixation holes of the screws E5. Clean them using a cleaning tap for blind holes (preferably use a tap with a right spiral groove) and blow with dry, oil-free compressed air.

How to replace the optical assembly, *continued*

Procedure

Step	Action
7	Reinstall a new support plate assy' (E2) by means of 4 new screws E5. Respect the keying pins and don't forget the lock washers. Refer to the table "Screws Overview" page 44 for the tool to use and the torque to apply.
8	Introduce the lamp (E3) and secure with the lamp spring (E6).. **CAUTION:** Never touch the bulb of the lamp with your bare fingers. It would reduce the lifetime of the lamp considerably. Should it happen, clean the bulb with methylated spirit.

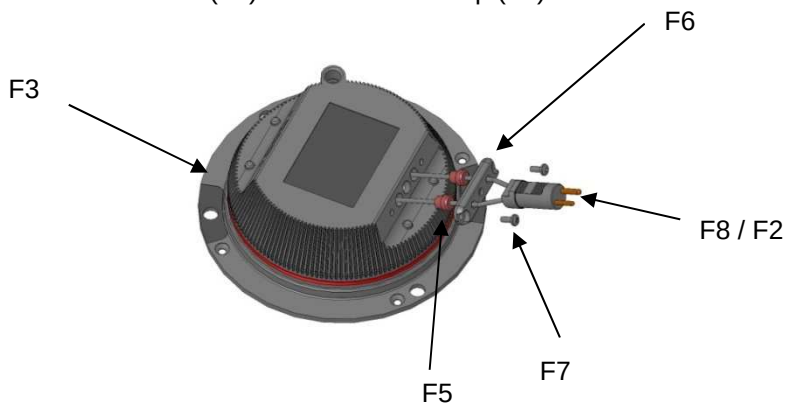
How to replace the cable set assembly

ADB cable sets

Only use ADB cable sets. Usage of substitutes voids the warranty.

Procedure

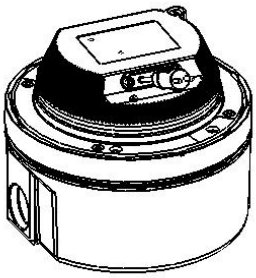
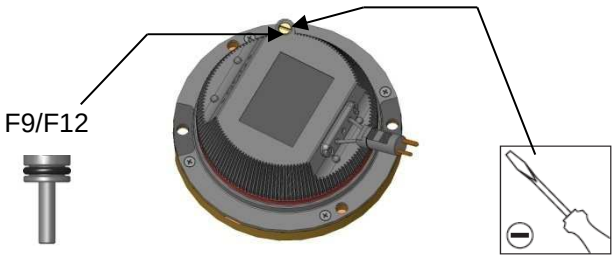
To replace the cable set assembly, proceed as follows:

Step	Action
1	Open the light assembly (see page 25).
2	Remove both screws (F7) and the wire clamp (F6). 
3	Cut the fast-on connectors (F2) from the cable assembly (F8).
4	Pull the cable assembly out of the inner cover and discard the grommets (F5).
5	Bring the new ADB cable assembly through the wire clamp (F6) **CAUTION:** One wire per hole.
6	Put a **new wire grommet** (F5) on each of the wires, taking care of the direction (the smaller diameter into the inner cover recesses).
7	Introduce the wires in the inner cover (F3).
8	Reinstall the wire clamp (F6) by means of both screws (F7). Do not torque down the screws entirely at this step.
9	Remove the insulation of the wires over about 5 mm.
10	Crimp on new fast-on connectors (F2- ADB CN 6111.87.140) and connect to the terminals. Adjust the wires inside the inner cover.
11	Torque the screws (F7). Refer to the table table “Screws Overview” page 44 for the tool to use and the torque to apply.

How to close and test the light fixture

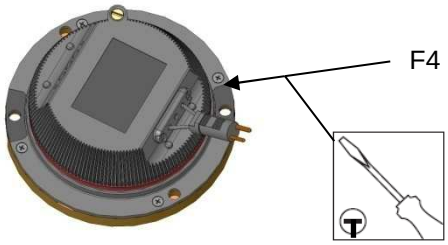
Procedure

To close an optical unit, proceed as follows:

Step	Action
1	Turn the cover (B1) upside down. In order for the cover to rest on a stable surface it is advised to lay it upside down on the top of a shallow base. 
2	Make sure that the contact surfaces with the O-ring are clean. Remnants of Loctite may be present in the fixation holes of the screws F4. Clean them using a cleaning tap for blind holes (preferably use a tap with a right spiral groove) and blow with dry, oil-free compressed air.
3	Put a **new O-ring gasket** (B8) greased with high quality neutral silicone grease (ADB PN 7850.42.210) over the cover in the appropriate groove.
4	Remove the pressure release screw (F9). 

How to close and test the light fixture, *continued*

Procedure

Step	Action
5	Gently put the inner cover (F3) on top of the cover, taking into account the keying pin between both parts. Make sure the optical assembly (F14) and the lamp (E3) are correctly positioned and that the wires do not get damaged between both parts: cover (B1) and inner cover (F3).
6	Press the inner cover (F3) on the cover (B1) and secure with new screws (F4). Refer to the table “Screws Overview” page 44 for the tool to use and the torque to apply. 
7	Check electrical insulation from two-pole plug to frame by means of a 500V insulation tester. Apply an AC or DC voltage not exceeding 6 V across the two-pole plug and observe normal operation of the lamp.
8	Check waterproofness of the fitting by applying **with dry air** a pressure of 0.4 bar (40 kPa) above the atmospheric pressure via the pressure release hole. Whilst pressure is applied, immerse the light fixture for three minute in water and look carefully for NO stream of bubbles emanating from the light fixture. If no leakage occurs, dry the fixture and remove the air hose. Else, locate the leak source. Dry the fixture, remove the air hose. Replace the leaking gasket or part (check the contact surfaces for any scratches, corrosion or other damage) and repeat the test. For this purpose a water-tightness test adapter can be ordered from ADB (see ordering code page 48).
9	Replace the O-ring seal of the pressure release screw (F9) and secure the pressure release screw. Refer to the table “Screws Overview” page 44 for the tool to use and the torque to apply.

Chapter 5: Troubleshooting

Troubleshooting table

In the table below a number of problems are listed in the first column. In the second column, you will find the possible causes of the problem and in the third column the solution.

Problem	Possible cause	Solution
Light does not energise.	Lamp defective	1. Replace lamp. 2. Replace film disc cut-out (when used).
	Loose or broken contacts	Tighten or replace the contacts.
	Moisture inside assembly causing current leakage	1. Open light assembly. 2. Clean, dry, inspect or replace damaged components.
	Defective cable assembly or defective crimping	1. Open light assembly. 2. Replace cable assembly.
	Defective isolation transformer or secondary wiring	Check transformer output current with Am meter. Check power line between the light fixture and the transformer, including connectors.
Light does not energise at normal level.	Resistance too high or partial short circuit. Dirty lens. Defective isolation transformer.	1. Replace cable assembly or inner cover assembly. 2. Replace lamp and/or transformer. 3. Clean lens.
Improper beam colour	Wrong fitting	Replace fitting with one of the proper colour.
Short lamp life	Too high current (lamp will have black burns)	Check output current of isolating transformer at full brightness. Current should not exceed 6.7 A. Replace transformer if defective; if not, adjust CCR output current.
	Moisture in assembly	1. Open light assembly. 2. Clean, dry, inspect or replace damaged components.
	Defective lamp or lamp bulb touched with bare fingers (lamp interior will have a yellow-white powdery appearance if air has entered through a hole or crack)	1. Replace lamp. 2. If used, replace film disc cut-out.

Chapter 6: Ordering codes and Exploded View

Overview

Introduction

References of the types of products described in this manual, of their spare parts and accessories are listed in this chapter, together with exploded views.

Contents

This chapter contains the following topics.

Complete products and Spare parts

List of tables

Below you will find a list of all tables in this chapter:

Complete products and Spare parts, *continued*

Table 1 In the table below you will find all fixtures and main assemblies of the FTO TLOF inset lights:

Fixtures				*Main assemblies*		
Category	**Description**	**Ordering code**	**ADB code**	**Cover**	**Optical assy**	**Inner cover**
TLOF	Green	FTO-3-048-0-G-0	1TOA33001103	1411.20.650	1411.22.110	1411.24.520

Note: Complete lights are delivered **without fixing hardware**. This hardware is delivered together with the mounting system (base or adapter ring), or can be ordered separately (see Fixing hardware kits)

Complete products and Spare parts, *continued*

Table 2 In the table below you will find the FTO TLOFcover and optical assembly parts and their availability as spare part or not; in the latter case, order the complete light (see table 1):

No.	ADB part number	Description	Components per fitting	Order quantity
B1	4071.76.002	FTO cover machined	1	1
B2	1428.00.445	Clear outer lens for TLOF	1	1
B3	4071.76.041	FTO lens gasket	1	10
B4	4071.76.060	FTO lens protection gasket	1	10
B5	4071.76.020	FTO lens support	1	1
B6	7100.08.563 7284.10.445	HEX SCREW M6x16 DIN 933-A2-LOCK 2045 Lockwasher M6 Stainless steel - DIN 7980	4 4	100 100
B8	7080.90.335	O-ring gasket between cover and inner cover	1	10

No.	ADB part number	Description	Components per fitting	Order quantity
E	1411.22.110	Optical assy TLOF	-	1
E1	1428.00.390	TLOF Inner lens Green	1	1
E2	4072.13.630	TLOF Inner lens and lamp support	1	1
E3	2990.40.827	Cold mirror prefocus halogen lamp 48W 6.6A - 1500h	1	100
E4	4072.13.611	Lamp support clamp	2	100
E5	7100.08.571 7284.10.445	SCREW TH M6 20 DIN933-A2-LOCK 2045 Lockwasher M6 Stainless steel - DIN 7980	4 4	100 100
E6	4072.13.600	Spring for lamp	1	1

Complete products and Spare parts, *continued*

Table 3

In the table below you will find the FTO inner cover assembly components and their availability as spare part or not; in the latter case, order the complete inner cover assembly (see table 1):

No.	ADB part number	Description	Quantity in filting	Order quantity
F	1411.24.520	Inner covery assy	1	1
F1	1411.21.010	terminal block assembly with fixing hardware and w/o cut-out	1	10
F1	1411.21.000	terminal block assembly with fixing hardware and film disc cut-out	opt.	10
F14	1420.22.410	film disc cut-out	opt.	100
F2	6111.87.140	female fast-on connector	2	100
F3	4071.50.082	inner cover machined for one cable inlet	1	-
F4	7100.10.190	SCREW M5x10 DIN 965-T-A2-LOCK 2045	4	100
F5	6126.01.031	wire grommet	2	100
F6	4071.50.090	wire clamp	1	10
F7	7100.08.360	SCREW M4x10 DIN 7500CE-T-A2	2	100
F8	1458.03.670	FAA L-823 2-pole plug moulded on heat resistant 30 cm wires 1.9 mm² STY6	1	1
F9 F12	4070.77.150 7080.90.016	pressure release screw O-ring seal	1 1	10 10
F10		name plate	1	-
F11	4071.73.100	labyrinth gasket	1	10

Complete products and Spare parts, *continued*

Table 4 In the table below you will find the fixing hardware kits:

	METRIC FIXING HARDWARE KITS							
	Fixing hardware kit		Components					
	Description	ADB Part Number	7100.08.759 St. Steel Screw M10 X25	7150.53.320 St. Steel nut M10	7150.53.330 St. St. self-locking nut M10	7284.10.470 St. Steel lock washer M10	7284.70.345 Nylon encap. washer M10	4071.50.240 Metric anti-rotation pin
For mounting 8" inset lights on to ADB 8" shallow bases or adapter rings (1)	Metric screw kit 8" (with anti-rotation pins)	1411.20.400	2			2		2
	Metric nut kit 8"	1411.20.420		2		2		
	Self-locking metric nut kit 8"	1411.20.430			2			
	Metric screw kit 8" (Germany)	1411.20.440	2				2	
	Metric screw kit 8" (w/o anti-rotation pins)	1411.20.520	2			2		
For mounting 12" inset lights or adapter rings on to ADB 12" shallow or deep bases	Metric screw kit (France) 12"	1411.20.480	6			6		
	Metric nut kit (Frankfurt) 12"	1411.20.510		6		6		
	Metric screw kit 12" (Germany)	1411.20.490	6				6	
	Self-locking nut kit 12"	1411.20.500			6			

Note (1): HPI bases only accept Metric hardware

Complete products and Spare parts, *continued*

Table 4, *continued*

UNC FIXING HARDWARE KITS								
	Fixing hardware kit		Components					
	Description	ADB Part Number	71200.13.806 St. St. Screw 3/8"-16 UNC	7284.10.470 St. Steel lock washer M10	4071.50.120 UNC anti-rotation pin			
For mounting 8" inset lights on to ADB 8" shallow bases or adapter rings	UNC screw kit 8"	1411.20.410	2	2	2			
For mounting 12" inset lights or adapter rings on to ADB 12" shallow or deep bases	UNC screw kit 12"	1411.20.450	6	6				

FIXING HARDWARE KIT FOR SIEMENS BASES								
	Fixing hardware kit		Components					
	Description	ADB Part Number	1428.81.010 BEFEST.SCHRAUBE	4070.50.930 Glockendichtung	4071.21.920 PROFILSCHEIBE 5NQ	4071.21.930 RUNDSCHNURRING	4071.21.940 RUNDSCHNURRING	
For mounting Siemens lights or adapter rings on to Siemens 300mm shallow bases	5NQ screw kit	1411.20.460	4	4	4	4	4	

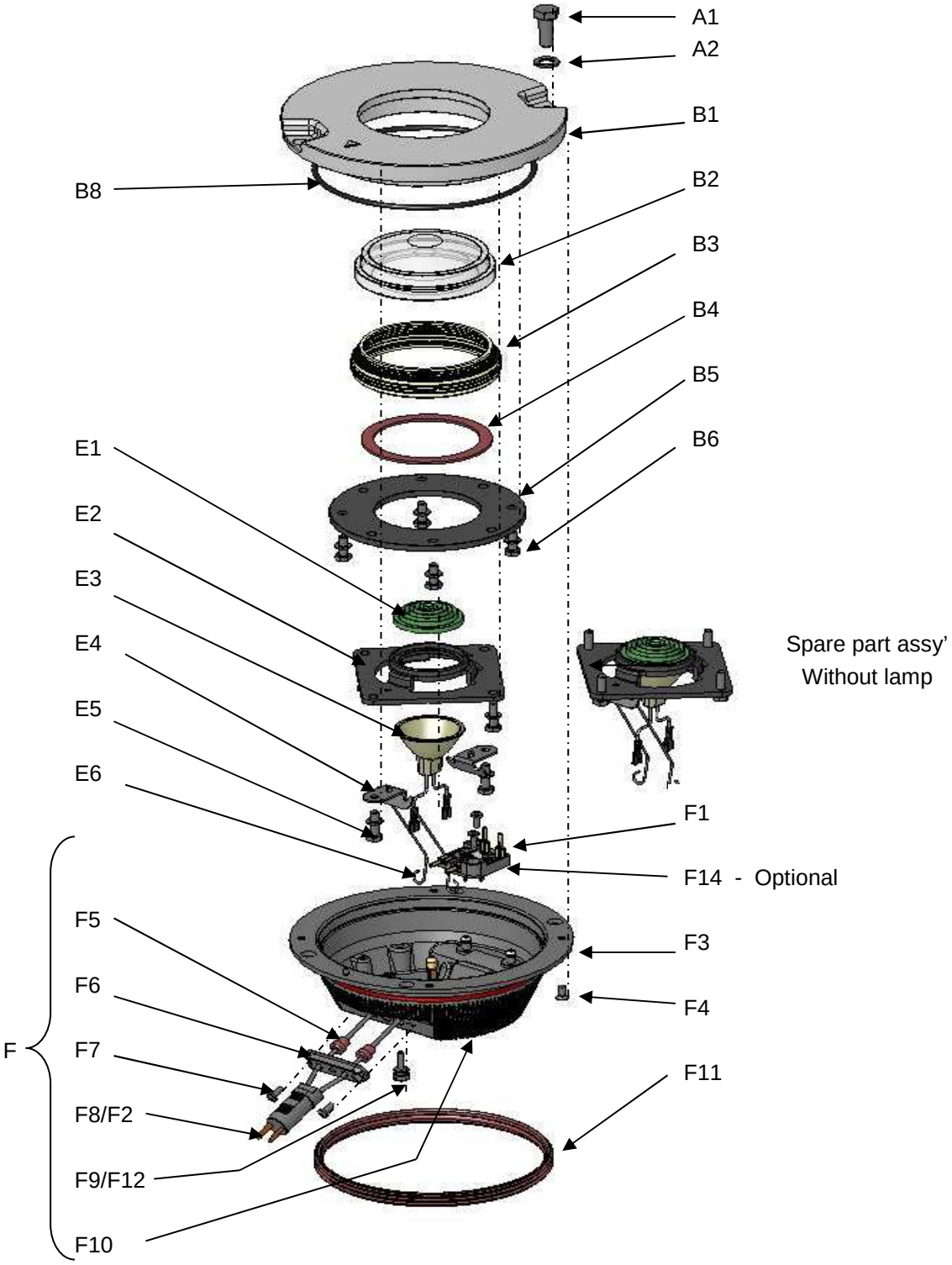
Screws Overview

Important information The table below gives for each screw used in this product , the reference on the exploded view, the type of screw, the tool to use and the torque.

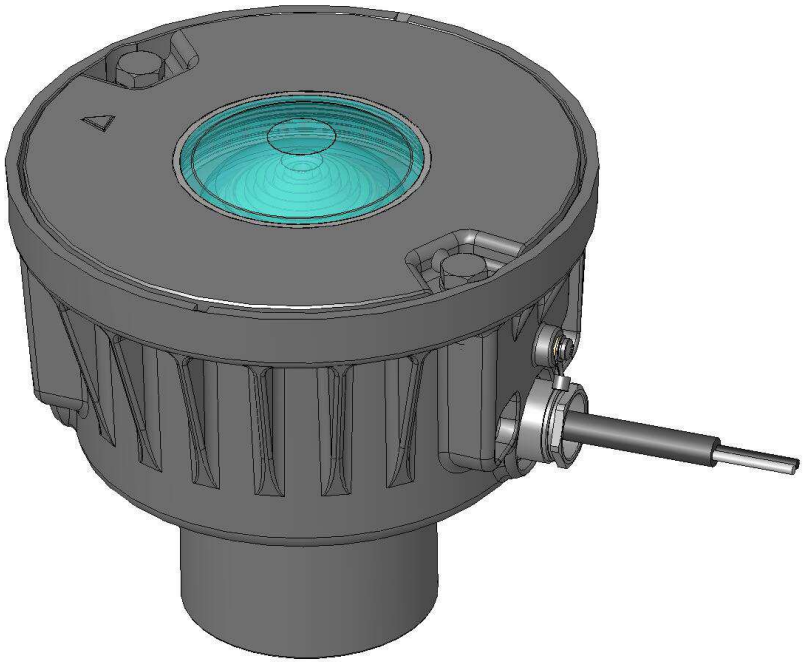
Screw	Tool		Torque
A1 (not supplied with the light) Screw FT.HEX M10 x 25, SST, Hex Head or Screw FT.HEX 3/8”-16UNC X7/8”	Socket hex 17mm or Socket hex 9/16”		21 Nm / 190 Lb.in
B6 - 7100.08.563 - HEX SCREW M6x16 DIN 933-A2-LOCK 2045	Socket head 10mm		3.5 Nm / 31 Lb.in
E5 - 7100.08.571 - HEX SCREW M6x20 DIN 933-A2-LOCK 2045	Socket head 10mm		3.5 Nm / 31 Lb.in
E1, F7 - 7100.08.360 - SCREW M4x10 DIN 7500CE-T-A2	Torx20		3.5 Nm / 31 Lb.in
F4 - 7100.10.190- SCREW M5x10 DIN 965-T-A2-LOCK 2045	Torx25		2.5 Nm / 23 Lb.in
F9 - 4070.77.150 - Pressure release screw	1.6 x 8 Flat		2.5 Nm/ 23 Lb.in
Self-locking nut (M10)	Socket hex 17mm		21 Nm / 190 Lbin
Screws delivered for installation of adapter ring on deep base	Socket hex 17mm or Socket hex 9/16”		21 Nm/ 190 Lb.in

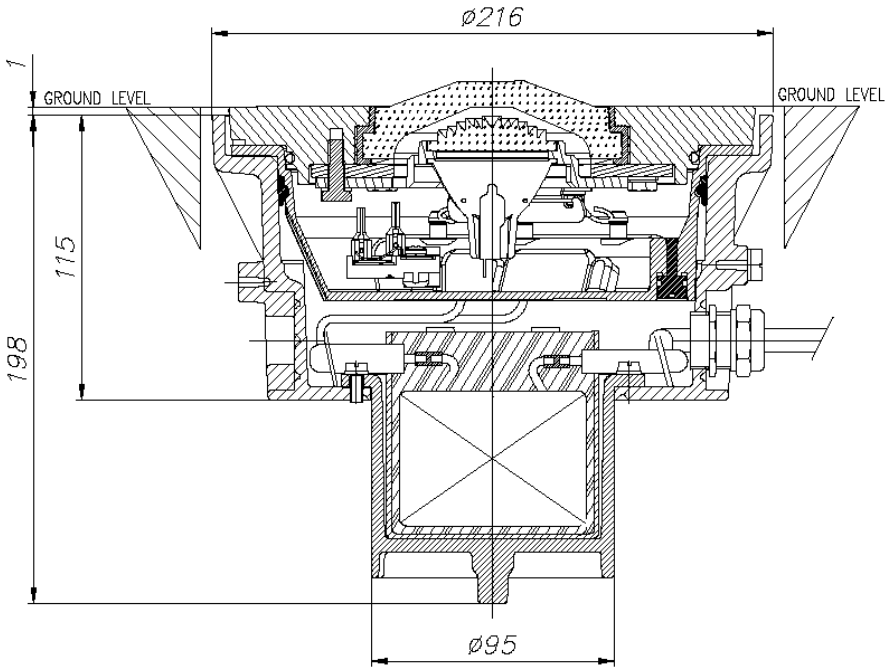
Exploded views

FTO Inset light The illustration below represents the exploded view of a FTO TLOF inset light:

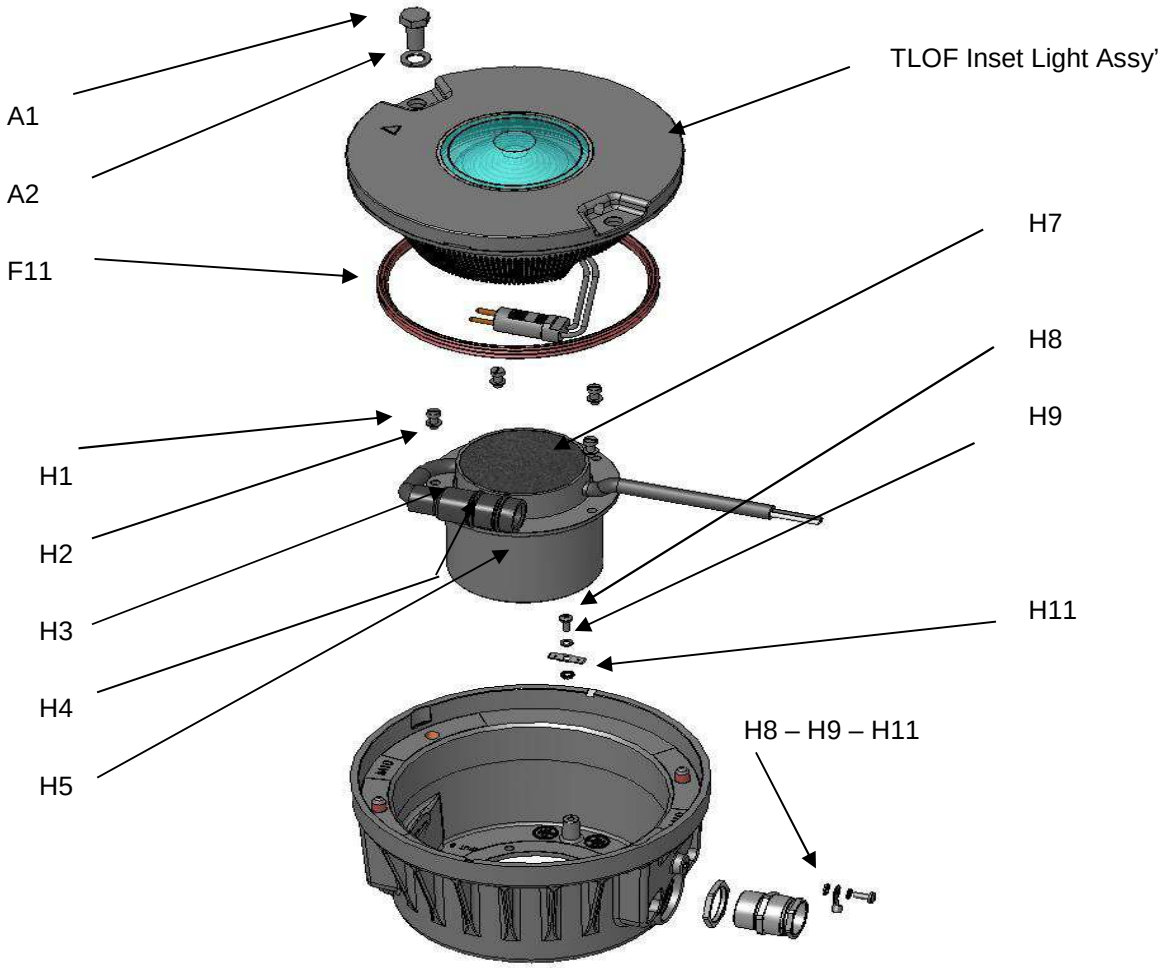


Addendum FTO 230V





Addendum FTO 230V, *continued*



N°	Description	ADB Part Number	Order quantity
H1	Screw M5 x 12 - Stainless steel	7110.08.428	100
H2	Lock washer M5 - Stainless steel	7284.10.428	100
H3	Connector kit	PAK3RB500001	1
H4	Sealing	7870.05.120	1
H5	Transformer support	4071.86.360	1
H7	Transformer 230V to 7,27 V	4072.14.460	1
H8	Taptite screw M4 x 10 - Stainless steel	7110.08.400	
H9	Lock washer M4 - Stainless steel	7284.10.416	
H11	Contact washer M4	7284.40.250	

Accessories

Accessories

In the lists below you will find useful accessories for the installation, maintenance and repair of the FTO lights.

Tool case

ADB has designed a tool case (ADB part number **1411.19.421**) including the basic tools necessary for the maintenance of inset lights. It can also be used for the installation of the light fixture (please note this is a general tool case, some tools are of no use for FTO Lights). The table below lists the tools included in the case:

Description	ADB Part Number	Description	ADB Part Number
Tool case	6169.01.007	Screwdriver, flat blade AG. 8x150	8961.05.250
Torque wrench	8961.06.255	Screwdriver, Pozidriv AD.2x125	8961.05.220
Socket hex 3/8", screw 3/8", J 9/16LA	8961.06.008	Loctite 2701	7870.05.130
Socket hex 3/8", screw M10, J 17LA	8961.06.000	Loctite 222	7870.05.140
Socket, 1/4", 1.6x8 Flat, RS.8E	8961.05.050	Lubricant Molykote HP870 Inerta (100 gr) (to replace lens)	7850.05.061
Socket, 1/4", Pozidriv2, RD.2	8961.05.060	Natural hydraulic vacuum silicone grease	7850.42.220
Extension, 1/4", R.210	8961.06.220	Attack driver	8961.04.100
Adaptation, 1/4"-3/8", R.232	8961.06.010	Hammer 212A50	8961.04.110
Hinged handle - short	8961.06.110	Bit holder	8961.04.120
Plier	8981.10.110	Bits END202, Pozidriv2	8961.04.130
Opening tool	4071.53.220	Lifting tool assembly for inset lights	1411.19.550
Screwdriver ANX25x100 TX20	8961.05.300	Bit Torx 1/4" - TX20 EX.620 L=70mm	8961.06.020
Screwdriver ANX25x100 TX25	8961.05.290	Bit Torx 1/4" - TX20 EX.625 L=70mm	8961.06.025

Additional accessories

The following accessories can be purchased separately:

Description	ADB Part Number
Watertightness test adapter for inset lights	4060.84.570
Set of spare anchor hooks for lifting tool 1411.19.550	1411.19.560
Lifting tool on wheels (see illustration page 23)	1420.55.600

Fixing hardware

The fixing hardware for securing the fitting on to the mounting interface is generally not supplied with the fitting as it depends on the exact type of mounting interface. It can be purchased as kits or loose components, as listed on page 42

ADB
Leuvensesteenweg, 585 – B 1930 Zaventem – Belgium
Tel: 32/2/722.17.11 – Fax: 32/2/722.17.64

ADB
Airfield Solutions