MULTI ELECTRIC
OCEM AIRFIELD
A company of ARETÈ COCCHI TECHNOLOGY

LED ELEVATED RUNWAY EDGE AND THRESHOLD/ END LIGHT

LERE

LED, Runway & Apron

Original Instructions (EN)

Operation and Maintenance Manual

LERE-UM_EN(1.0)

Intertek

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1 GENERAL INFORMATION

1.1 LERE overview

LERE elevated LED runway edge light is high intensity, bidirectional or unidirectional steady burning type.

These fixtures are intended for use as runway edge and threshold/end light, in order to provide a visual aid to the moving aircrafts.

LERE lights are in compliance with ICAO Annex 14 Vol.1, EASA CS-ADR DSN.M.745, FAA AC 150/5345-46, IEC TS 61827 CASA Manual of Standard Part 139 and NATO-STANAG 3316.

The fixtures described in this manual are designed to be connected to series circuit, replacing those equipped with incandescent lamps, fed through standard isolation transformers connected to CCR with variable current from 2.8 A to 6.6 A.

Location of these fittings shall be in compliance with ICAO - Annex 14, STANAG 3316 and FAA 150/5340-30.

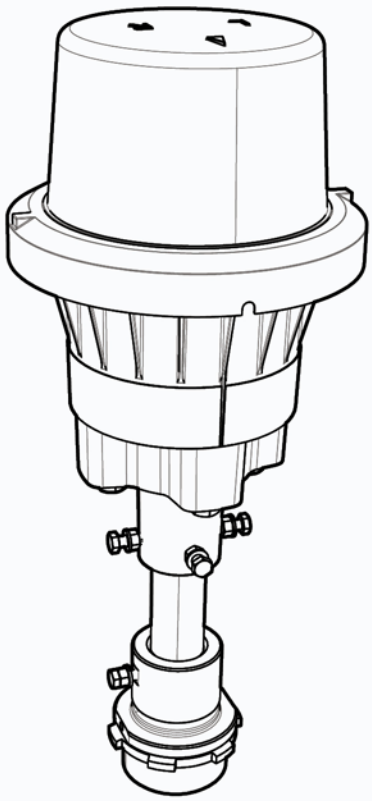

Figure 1 - Fixture general view

1.2 Manual reference guide

This document contains all the information related to the equipment and describes the procedures to follow during the installation of the product and during ordinary maintenance. The document is indented for all operators that must intervene on the equipment.

This document does not replace in any manner applicable laws, rules or regulations, included the standards FAA and ICAO.

The precautions provided in the manual are always preceded by a symbol as illustrated below:

	**Indicates the warnings, the notes, the suggestions and other points on which is intended to draw the attention of the reader.**
	**Indicates the operations to be carried out mandatorily or the information which should be carefully read to avoid possible risks.**
	**Indicates particular risks connected with the power supply. It reports the operations to be carried out mandatorily or the information which should be carefully read to avoid possible risks.**

These precautions safeguard the personal security of everyone who work on and/or are in proximity of the equipment and of the relative supply circuits.

The failure to comply with the instructions (in particular those preceded by danger, warning, caution precautions) can cause serious injury or death.

1.2.1 Copyright

1.2.2 Document reviews

In the event of changes to the equipment, whereby this document and/or its annexes need to be updated, the Manufacturer will provide a new copy of the technical documentation on a suitable support.
The Manufacturer also reserves the right to:

- change, at any moment, the contents of this documentation;
- update the documentary project specifications and to improve the equipment performances without the obligation to communicate such changes;
- upgrade the equipment already installed and update the relevant documentations, issuing a new revision of the document and disseminating it to its Customers on a suitable support.

Any further documentation, relevant to the safety of operators and/or of the equipment, should be preserved together with the manual and considered an integral part of the technical documentation.

1.2.3 Preservation of the manual

The management and storage of technical documentation is the responsibility of the Customer. This manual must be kept in good condition and completely legible in all its parts. In addition, the operator as well as the persons who carry out maintenance, adjustments must know where it is located and be able to consult it at all times. Should the manual get lost or become illegible, ask the Manufacturer for a copy.

1.3 Safety instructions

CAREFULLY READ THIS DOCUMENT.
The improper use of the equipment or the failure to comply all the precautions indicated implies life danger and serious injury to persons and damages to things.

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ELECTRIC ARC
Carefully read the enclosed documentation before installing or starting to use the equipment.
Do not install the equipment until the completion of all construction works required to carry out the work.

Always proceed with the utmost attention. Safe intervention procedures indicated aim to protect the operator against possible risks and to preserve the fixture from any damages.

SAFE INTERVENTION ON THE FIXTURE POWERED BY SERIES CIRCUIT
Operate in this way:
- **Switch off the constant current regulator**
- **Disconnect the supply plug from the related socket of the secondary of the isolation transformer**
- **Disconnect the plug of the monitoring circuit (if present) from the related socket of the secondary of the dedicated isolation transformer**

Carry out all the operations on the fixture and complete the intervention. At the end, proceed to restore the operating condition:
- **Reconnect the supply plug to related socket of the secondary of the isolation transformer**
- **Reconnect the plug of the monitoring circuit (if present) to the related socket of the secondary of the dedicated isolation transformer**
- **Restart the constant current regulator**

RESIDUAL ENERGIES
Always wait for the discharging time (at least 5 min) before operating on the equipments. Check the complete de-energization of the equipments before accessing the potentially active parts. The failure to comply all the precautions indicated implies life danger and serious injury to persons.

GROUND CONNECTION
The body/envelope of the fixture must be connected to the earth potential before the commissioning of the fixture.
Check that the protective conductor yellow-green is connected to the terminal predisposed on the fixture.
In case of isolation transformer with secondary ground connected it is advisable to ground connect the fixture at the point where the secondary of the dedicated isolation transformer is connected to the ground.

IN CASE OF MALFUNCTION OF THE EQUIPMENTS
Do not leave the devices who have expressed evidence of deterioration or of malfunction. Disconnect the energy sources and proceed as soon as possible to repair/replacement of devices.

DO NOT OPERATE ON POWERED CIRCUITS
Do not carry out any operation on powered circuits.
Before every access, inspection or intervention on the equipment, ensure to have switched off the equipment by opening the main power switch and by removing the supply from the unit (open the power switch at the beginning of the line or switch off the constant current regulator).
The failure to comply all the precautions indicated implies life danger and serious injury to persons.

1.4 Safety symbols

The symbols illustrated in the following table are used in the user and maintenance manual and on the device. These symbols indicate the existence of any dangerous situations, to indicate obligations and prohibitions in relation to the situations that may represent an hazard for the operator or indicate the behavior to adopt to minimize the risk for the operator.

Warning signs	
	W001 | General warning sign
	W004 | Laser beam
	W005 | Non-ionizing radiation
	W006 | Magnetic field
	W012 | Electricity
	W017 | Hot surface
	W027 | Optical radiation

Prohibition and obligation signs	
	P001 | General prohibition sign
	M001 | General mandatory sign
	M002 | Refer to instruction manual/booklet
	M005 | Connect an earth terminal to the ground
	M009 | Wear protective gloves
	M015 | Wear high visibility clothing
	M021 | Disconnect before carrying out maintenance or repair

1.5 Definition of operator

All operations on devices and on its internal parts must be performed by professional staff, properly formed and aware of the risks connected with the power supply and to the use of low and high voltage circuits.

Take all the precautions in compliance with the safety standards for the work carried out on electrical installations and however for the works carried out using electrical installations or in buffer zones of the installations and of the electrical devices.

All operations on equipments and on its internal parts must be performed by professional staff, properly trained for Cardio Pulmonary Resuscitation (CPR) techniques.

Never operate on devices if there is not at least another operator properly trained for CPR techniques.

Check that Operators do not operate outside their own specific fields of competence and responsibility. Multi Electric Mfg., Inc. declines any and all liability arising from wrong operations carried out by untrained personnel in the use of the devices, or deriving from the non-compliance of general safety standards.

1.6 Limited warranty

The following warranty is exclusive and in lieu of all other warranties, expressed, implied, or statutory, including, but not by the way of limitation, any warranty of merchantability or fitness of purpose

Multi Electric Mfg., Inc. (the Company) warrants the LED based products manufactured by the Company, to be free of defects in materials and workmanship, for a period of (5) year from date of installation. The Company's sole liability is limited to either repair or replacement of defective material at the manufacturer's sole discretion. The manufacturer reserves the right to inspect or test at its facility, any product claimed to be defective during normal business hours.

The Purchaser making claim against warranty are responsible for the full cost associated with removal and replacement of defective materials, transportation of all materials along with other permits, fees and costs associated with the disruption of serve, restoration, replacement or repair of the product and facilities.

Material and Products not manufactured by Multi Electric Mfg., Inc. but supplied under the same contract or purchase order carry the original equipment manufacturers warranty.

Failures caused by improper handling, storage and transportation, Acts of God, Civil and Political conflict, accident, incursion with moving vehicles, tampering, or unauthorized modification are specifically excluded from coverage under this warranty agreement.

For more details on warranty conditions, please contact Multi Electric Mfg., Inc. sales office.

1.7 Confidentiality, industrial property rights

The Customer needs to adopt the maximum confidentiality with respect to all the information of technical nature (including, by way of example and not exhaustively, plans, programmes, documentation, formulas, scenarios, setting and correspondence) received by the Supplier or in any case assimilated or gained during the conclusion of the Contract of sale.

Any right regarding intellectual and industrial property connected to equipment and to any other element included in the supplied Goods as indicated in the Contract remain exclusive property of the Supplier.

1.8 Article identification

On each equipment there is an identification plate of the article, where the article code is reported; on the plate there are additional data: the name of the model, employments or use, power supply features, any trademarks and/or marks that attest the agreement of the equipment to specific regulations or legislations.

1.9 ETL verified lable

This equipment has been ETL verified and meets the criteria established by an independent certification program administrators. The user should carefully read this document and respect all the requirements quoted.

Performances and quality of this equipment have been successfully verified. This product bear the Intertek's ETL verification mark.

1.10 Disposal

At the end of use, the user must confer all the waste in suitable differentiated waste collection centres. It is the responsibility of the user the correct disposal of the equipment in accordance with an environmentally responsable disposal and with the respective national and federal regulations in force at the time of disposal. These equipments must never be disposed of in the household waste.

1.11 Photo-biological risk

The fixtures LERE are designed and manufactured in compliance with current regulations, but if used unsafely or without precautions, the light emitted by the fixture, reaching even high levels of intensity, can be harmful not only to those who use the light fixture locally, but for anyone within the light beam range.

The optical radiation issued by the equipment does not present any particular photo-biological risks, however can be harmful.

Don't look directly inside the light source during high intensity operation. Wear appropriate personal protective equipment (goggles or similar protections).

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2 FIXTURE DESCRIPTION

2.1 General information

The fixture consists of:

- Heat resistant transparent glass lens; it is mechanically secured to the body by metal ring with gasket.
- Aluminum body mounted on the pole using four screws. These screws also allow the levelling of equipment.
- The power supply/control PCB and the LED circuit are mounted inside the aluminum body.
- Steel 1-inch tube (FAA), available in different length, connecting the main body and fragile joint; to lock the tube, the breakable coupling is equipped with one screw.
- Aluminum breakable coupling provided with a breakable groove with a lower 2” GAS (IEC) male thread. Meeting FAA Specs the breakable coupling is provided with 1”1/2 - 12 UNF or 2” - 11 1/2 NPS.
- Two, single-pole neoprene cable leads, size 2.5 mm^2, with plug meeting FAA Specs L-823; a wire, XHHW, 600V, AWG12 type is provided for grounding purpose.
- Two LED assemblies, consisting of seven LED, mounted on a PCB complete with a dedicated optic to collect the LED luminous flux so to maximize the light output.

All hardware is made of stainless steel.

Power consumption is 40 VA (bidirectional) and 20 VA (unidirectional).

2.2 Complete part number Identification

LERE - F - T - WR - 14 - C - M - A - CG

Basic P/N:

Compliance:
S = ICAO 45 m Runway edge and Threshold/Runway end
I = ICAO 60 m Runway edge
F = FAA Threshold

Use:
T = Threshold
E = Edge

Color (Side L / Side R)*:
W = White
Y = Yellow
R = Red
G = Green (NO Runway edge ICAO)

Height:
00 = Without pole (only I and S compliance)**
14 = 14” total height
20 = 20” total height
24 = 24” total height
30 = 30” total height

Breakable coupling:**
A = 1” 1/2 - 12 UNF (for 14” to 30” height)
B = 2” - 11 1/2 NPS (for 14” to 30” height)
C = 2” - 11 GAS*** (mandatory for 00” height)
D = 2” - 11 GAS*** (for 14” to 30” height)

Monitoring:
0 = Without Monitoring
M = With Monitoring

Arctic Kit:
0 = Without Arctic Kit
A = With Arctic Kit

Options:
CG = With circular guide component with fixed brightness (only W+ and Y++ colors)

(*) The beam aiming is not field adjustable
(**) Breakable couplings mate with 1” EMT pole
(**) Not define by FAA
(+) White >30 cd of 2.8 A | >50 cd from 4.1 to 6.6 A
(++) Yellow >15 cd of 2.8 A | >50 cd only 6.6 A

2.2.1 Beams aiming on field

Three optical assemblies, with toe-in, are available for this fixture:

- Color “GR”
- Color “RG”
- Color “WW”/”YW”/”WY”

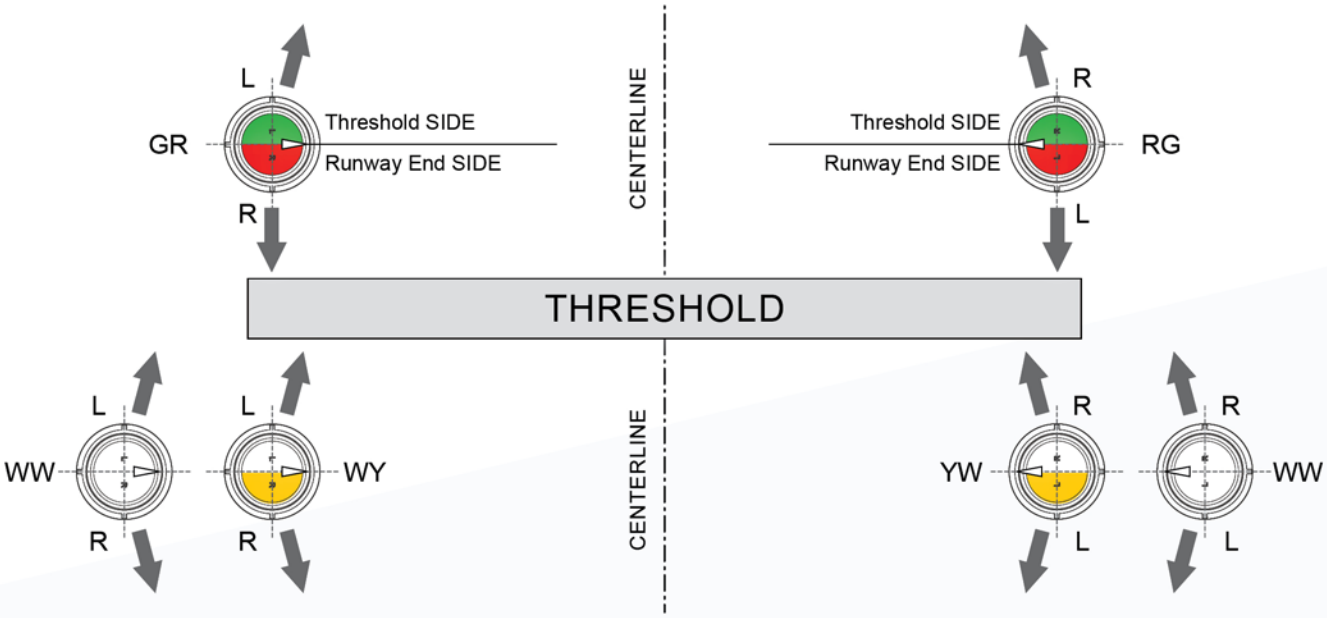


Figure 2 - Beams aiming on field

2.3 Removable light unit

The removable fixture mainly consists of a glass lens, an optical assembly, a power supply / control board, and a aluminum body.

For further information about the fixture, please see the following exploded-view drawing.

Always check the version of the fixture to be installed and any accessories supplied.
Each change and/or tampering made to the product immediately terminates the warranty.

To minimize operations, always pay the greatest attention to handling and storage of devices and carry out installation procedures with extreme precision.

Before carrying out any intervention on the device, cut off all external power sources and place appropriate work-in-progress warnings on the systems.
Wait for the discharging time (at least 5 min) and check using appropriate instruments that there are no residual energies before accessing the electrical equipment.

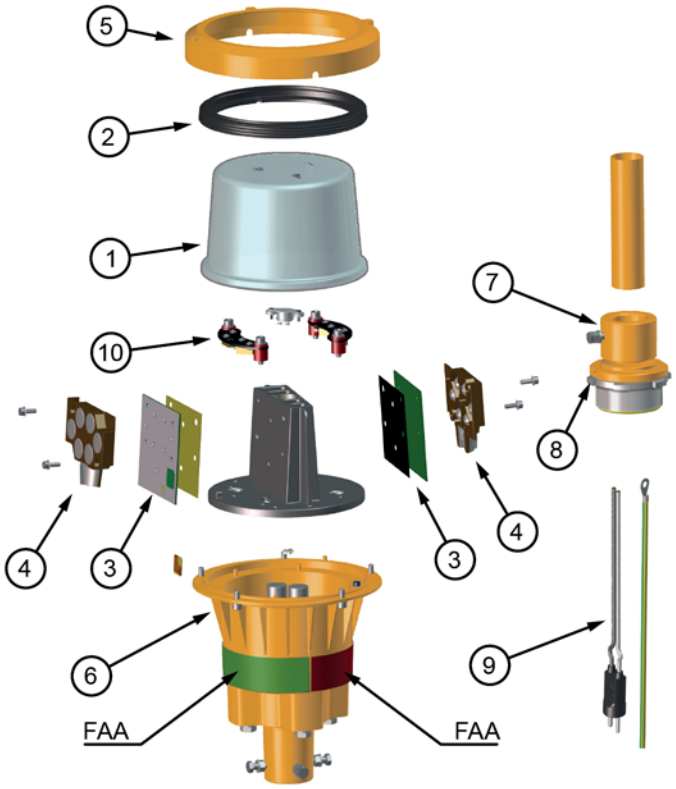


Figure 3 - Exploded view (LERE)

No.		Description	Q.ty
1	|	Clear outer cover	1
2	|	Gasket for glass cover	1
3	|	LED module	1-2
4	|	Lens array	1-2
5	|	Glass cover locking ring	1
6	|	Body with electronic and plug	1
7	|	Breakable coupling	1
8	|	Ring nut (ICAO versions)	1
9	|	FAA L-823 plug	1
10	|	Arctic kit heater (option available only for version FAA)	1-2

2.4 Electronic section

The electronic section consists of the following circuits:

- Current / current conversion circuit.
- LED command circuit.
- Control circuit.

2.4.1 Current/current conversion circuit (patented)

This electronic section provide a conversion from the input current value (within range from 2.8 A to 6.6 A) to the specified LED current value.

This conversion, performed in one transformation only, allows to achieve several benefits:

- Minimize the power losses.
- Significant increase of efficiency.
- High input power factor.
- Independent form the CCR topology: the CCR may have any output current waveform.
- No percentage of load dependent: the CCR can feed without any problem also few lights in the series circuit.
- Isolation transformers of smaller size can be used, respect to those used with the equivalent fixtures equipped with halogen lamps.

To meet the previous features, the conversion circuit is based on the MOSFET technology. This circuit has been designed to withstand the several field stresses (like withstand at elevated current peak) determinate by:

- **Defective connections along the series circuit.**
- **Sudden variations of the CCR power supply voltage; in many cases the CCRs don't provide suitable response time in order to compensate these variations.**
- **Use of circuit selectors.**

The input circuit is protected against over-voltage, tested in accordance with the requirements in FAA "Engineering Brief N°67" document.

2.4.2 LED command circuit

A PWM technique is used to command the LEDs. As known LEDs need to be supplied with a constant current; therefore in order to vary the luminous emission with a proper linearity is necessary the supply current will be applied at impulses. In other words, the LED luminous output depends on the time of application (duty-cycle) of constant current impulses.

2.4.3 Control circuit

The main task of the control circuit is to assure the correct LED light emission according to the series circuit current. To perform this features, the circuit is provided with a current sensor that generate a signal proportional to the series circuit current.

This signal is analyzed by a DSP which perform a RMS conversion of the input current. The RMS conversion give a good accuracy with any input current waveform.

Other functions:

- Diagnostic, auxiliary voltage control and LED status control. In case of any LED failure or relative power supply circuit failure, the electronic control circuit commands the intervention of the monitoring device so that the secondary side of the isolation transformer becomes open, like in the case of an incandescent lamp failure. **This features is essential when the monitoring option is required.**
- Events recording (not-volatile memory) for diagnostic purposes.
- PC operator interface through serial connection: this features allows to calibrate the brightness depending on the current, to modify the emission curve, to read the events occurred during the operating time.

2.5 Arctic kit

The optional arctic kit is in compliance with FAA “Engineering Brief N°67” document and it prevents from the ice over the prisms area.

The arctic kit is connected in series to the PCB and it is consists of a thermostat (two in case of fixture with double cable lead) and one or two heaters. It starts when the dome temperature is less than about -1° C and turns-off when the dome temperature reaches about 10° C.

Arctic kit consumption is less than 20 VA.

3 INSTALLATION

3.1 Civil works

Each light is usually installed on a suitable concrete block, into which a pipe elbows is cemented. The isolating transformer is housed into a separate concrete pit which is normally placed close the above concrete block.

The pit can be placed far from the concrete block too, but in this case a suitable cable duct has to be provided between the pit and the pipe elbow for passing the secondary cable.

As alternative the assembly pit-pipe elbow can be replaced by a steel sheet base, which can be used to house the isolating transformer, complete with an upper steel plate with a threaded sleeve.

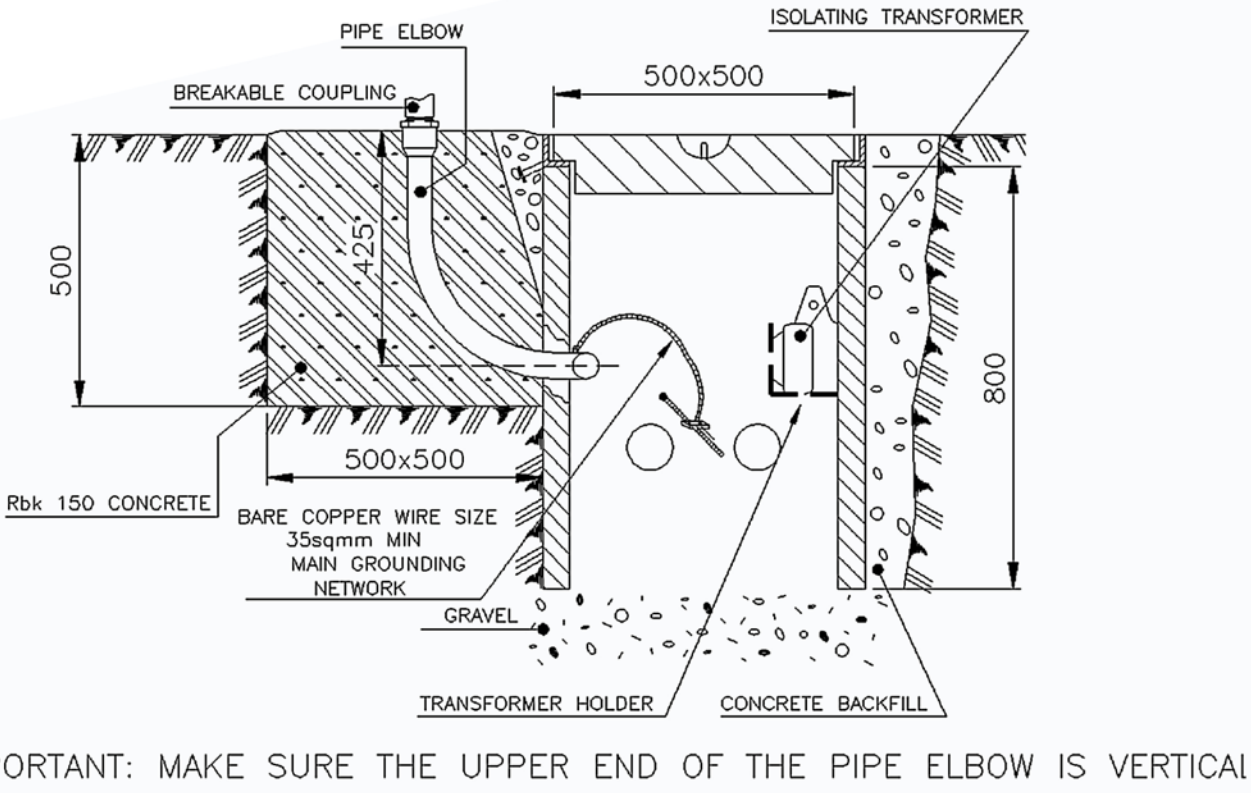


Figure 3 - Civil works

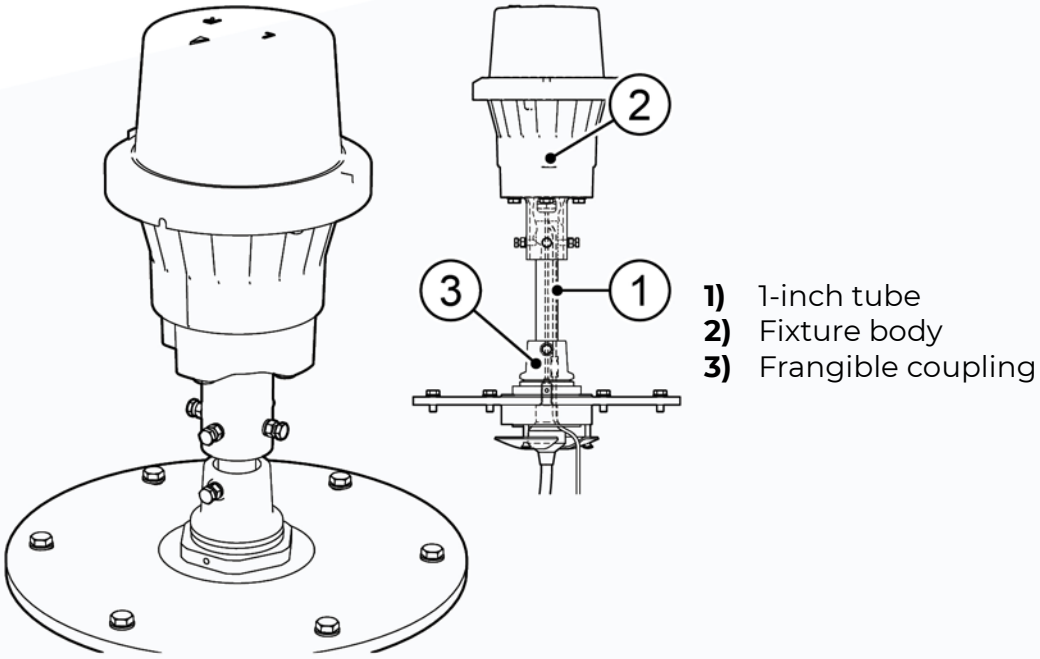
3.2 Installing the light unit

The light is shipped completely assembled including the LED module, except the 1-inch tube and the breakable coupling which are delivered separately inside the same carton.

If the fixture has been ordered with an extra height option, the tubing may be packaged separately.

For the installation of the light the following steps are suggested and follow the instructions given in procedure (UT-PT-0443 available on request):

- Pass together the secondary cable lead with receptacle and a suitable length of grounding wire (grounded inside the pit) through the pipe elbow.
- Place the receptacle into the upper threaded section of the pipe elbow, by holding it between the two plastic rings, and pass the grounding wire through the rings (in correspondence of break point provided on the rings).
- Slide one end of the 1-inch tube (1) over the fixture cable assembly (cable leads with plug plus yellow-green wire) and into the fixture body (2) until the body bottoms against the tube.
- Approach, without tighten, the set screws on the side of the body to the 1-inch tube.
- Slide the frangible coupling (3) over the cable assembly (cable leads with plug plus yellow-green wire) and onto the other end of the 1-inch tube until it bottoms against the tube.
- Connect the fixture grounding wire to the grounding wire coming from the pit (or from the base): splice both the wires and connect them together by using a crimping connector.
- Connect the light plug to the secondary receptacle inside the pipe elbow.
- Slide the frangible coupling down over the plug and tighten it into pipe elbow (or the base plate) until coupling bottoms out. Push any extra cable length into the 1-inch tube.
- Tighten the tube to the coupling with the setscrew on the coupling.



1) 1-inch tube
2) Fixture body
3) Frangible coupling

Figure 4 - Installing device

3.3 Fixture pointing

Make an initial pointing of the fixture by hand, using the references on the dome. Rotate the body of the fixture until orienting the arrow towards the runway edge.

The positioning of the light elements varies depending on the use. Ensure that the device is used correctly for its intended purpose, in accordance with the installation project and the regulations in force.

Install the pointing tool on the body of the fixture and proceed to adjust the light beams.

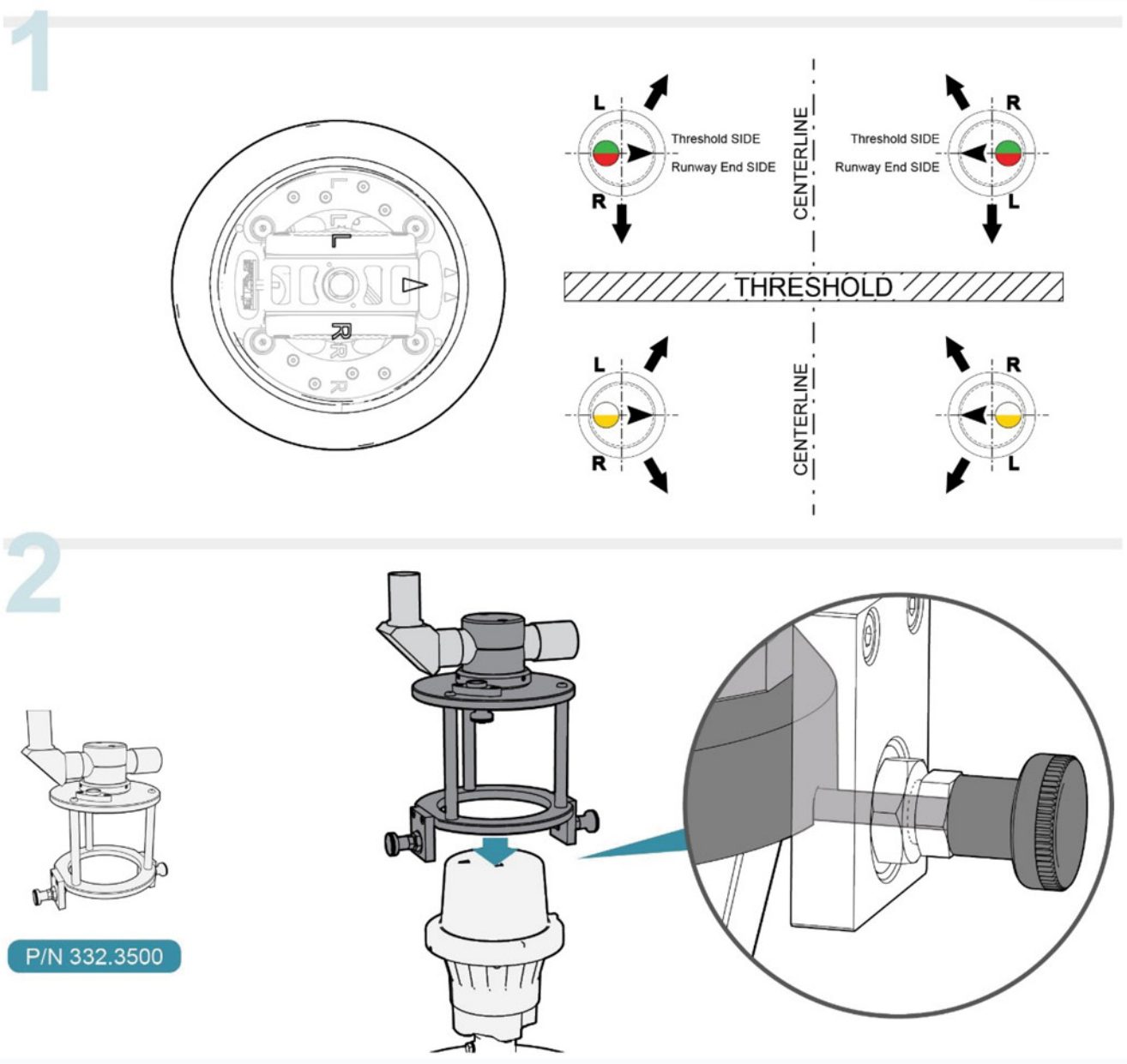


Figure 5 - Pointing of the fixture

3.3.1 Align the fixture

For the ICAO version of the fixture, if the breakable coupling system (C) is equipped with ring nut, tighten the locking screw present on the coupling to the indicated torque and align the fixture.

Use the optical pointer to correctly align the light beams. Use a reference pole installed on the runway edge, or if necessary refer to fixtures already correctly pointed. Check that the reference arrow faces the runway. Make small movements until reaching the right position.

Keeping the alignment fixed, carefully tighten the flange on the base using the relevant key.

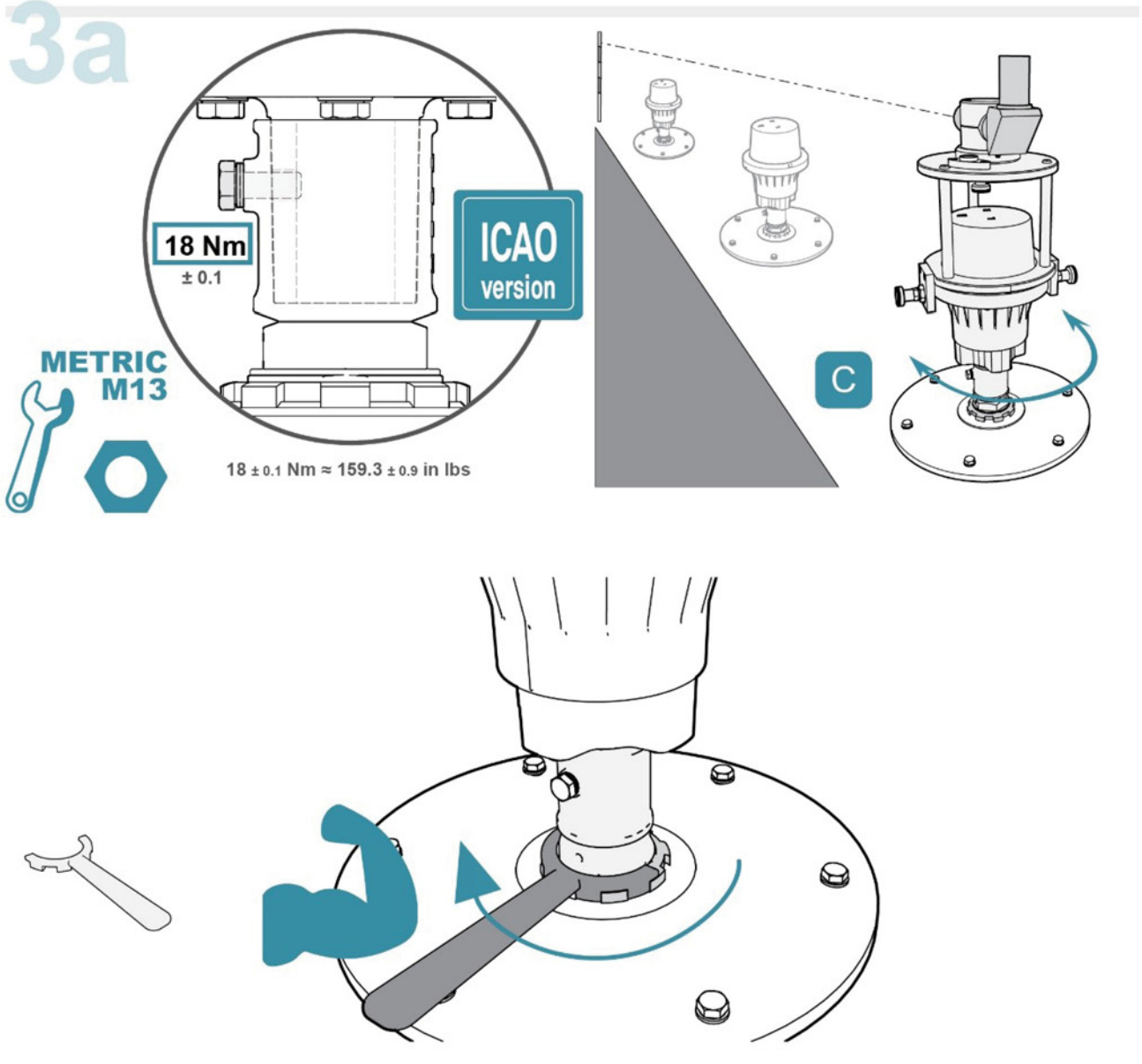


Figure 6 - Alignment of the fixture (ICAO)

For the FAA version of the fixture, if the breakable coupling system (B) is equipped with ring nut, align the fixture and carefully tighten the flange on the base using the relevant key.
For the ICAO version of the fixture, directly pass on the next phase.

Use the optical pointer to correctly align the light beams. Use a reference pole installed on the runway edge, or if necessary refer to fixtures already correctly pointed. Check that the reference arrow faces the runway. Make small movements until reaching the right position.

Keeping the alignment fixed, tighten the screw present on the coupling to the indicated torque paying attention not to send the locking nut to stroke on the coupling.

Carry out alignment procedures carefully. Only for the FAA version of the fixture is possible recover small misalignments even during subsequent pointing phases.

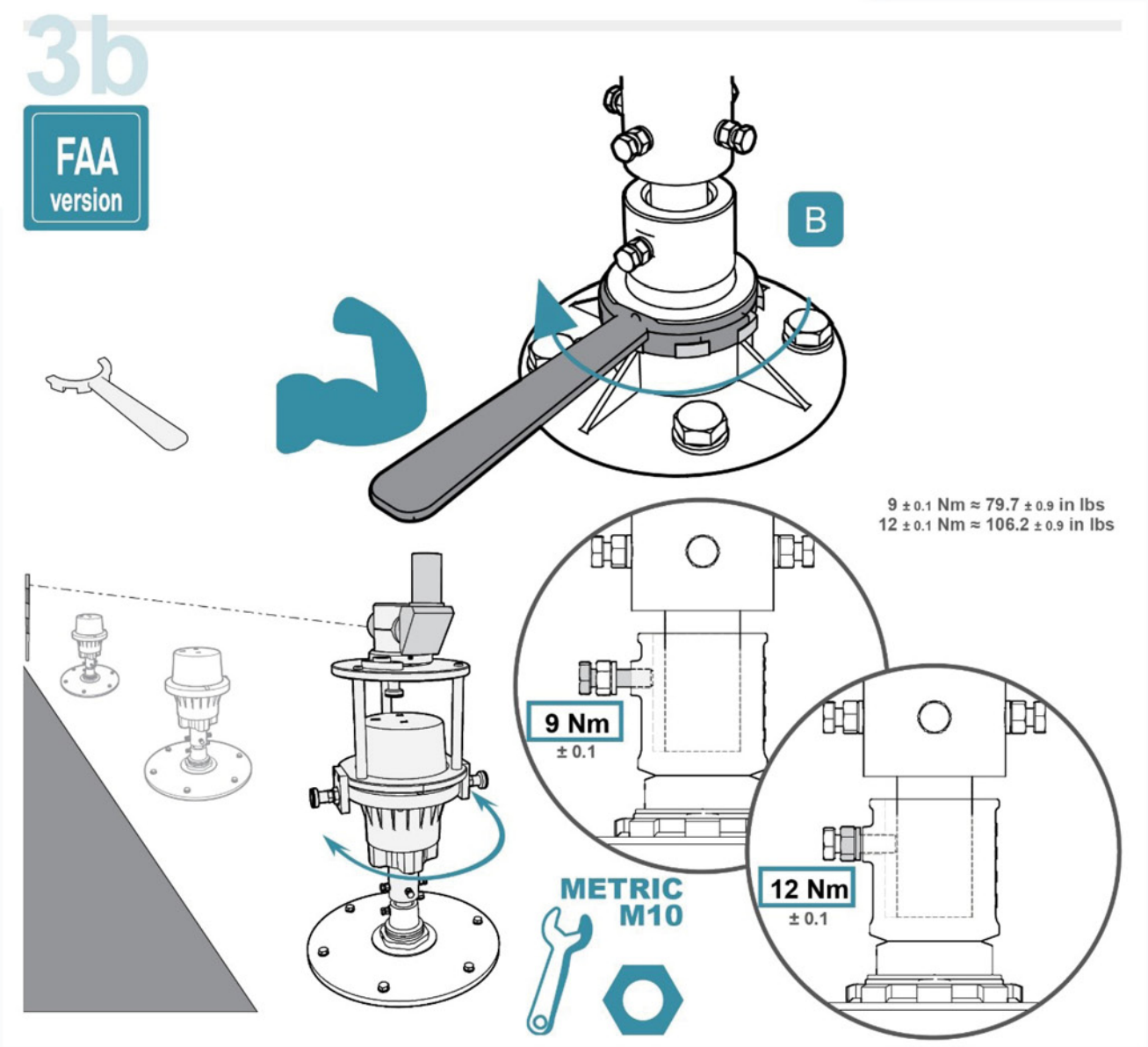


Figure 7 - Alignment of the fixture (FAA)

3.3.2 Level the fixture.

For the FAA version of the fixture, proceed preliminarily to a rough levelling adjustment. If necessary loosen the locking screws slightly.

Use the level present on the pointing tool to correctly level the fixture. Make small movements until reaching the right position.

Check that the fixture has maintained the correct alignment and if necessary make the necessary corrections. Keeping the alignment fixed, tighten the screws present on the support acting alternately on each of them.

Once reached the desired position, tighten the nuts to the indicated torque.

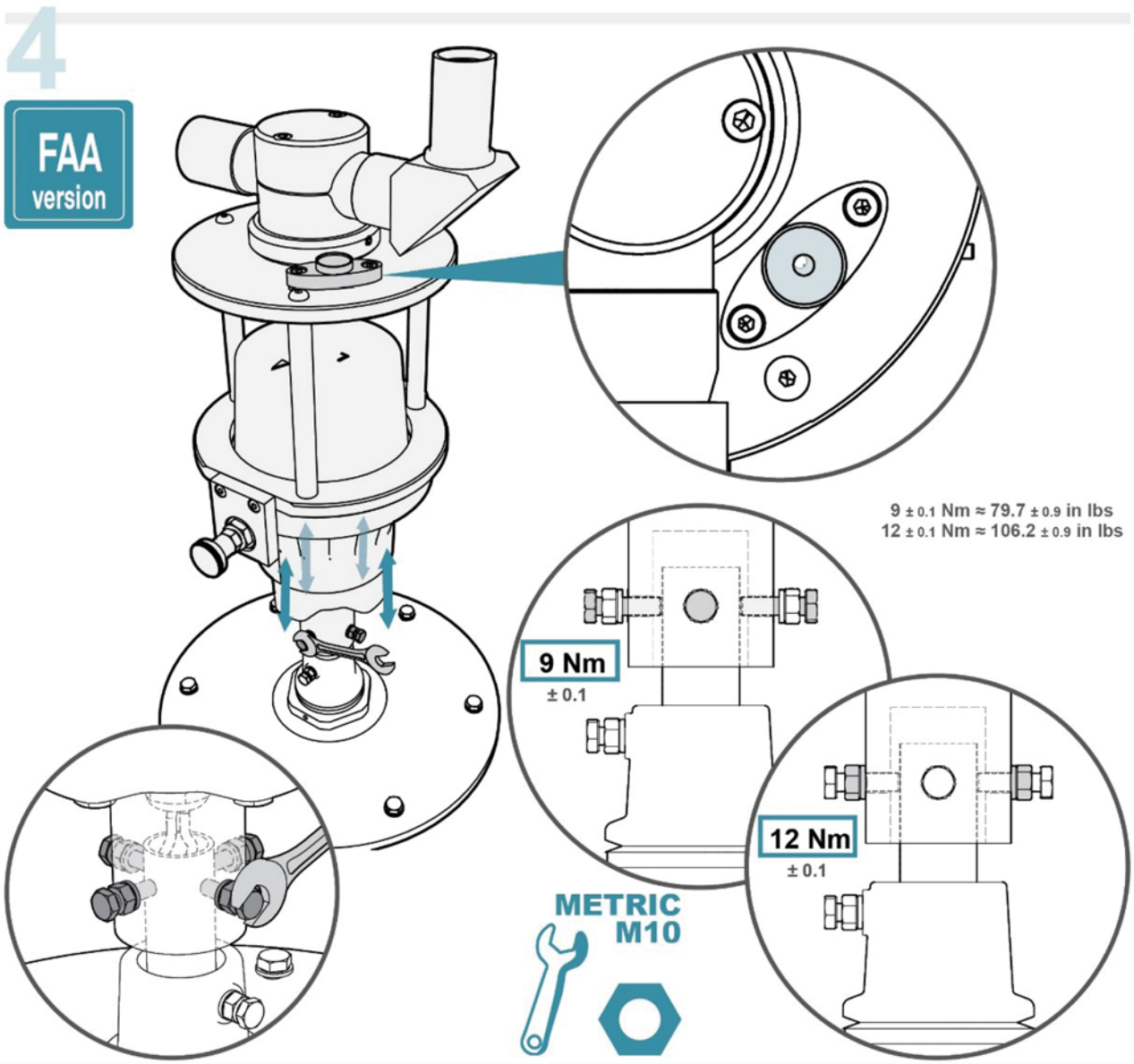


Figure 8 - Levelling the fixture

Proceed to fine adjustments of the levelling using the adjusting screws present on the lower part of the body of the fixture.

Make small movements until reaching the right position. Screw tightening values must all be within the permitted range.

Alternatively act on the adjusting screws until reaching with all the minimum tightening torque (tightening sequence 1-3-2-4).

Therefore tighten the screws until reaching the right position.

If the maximum permitted tightening value is exceeded during adjustment by acting on an adjusting screw, correct the problem by reducing the tightening torque until bringing it within the permitted range and compensate the misalignment by acting on the opposed screw.

At the end of the operations remove the tool and complete the installation.

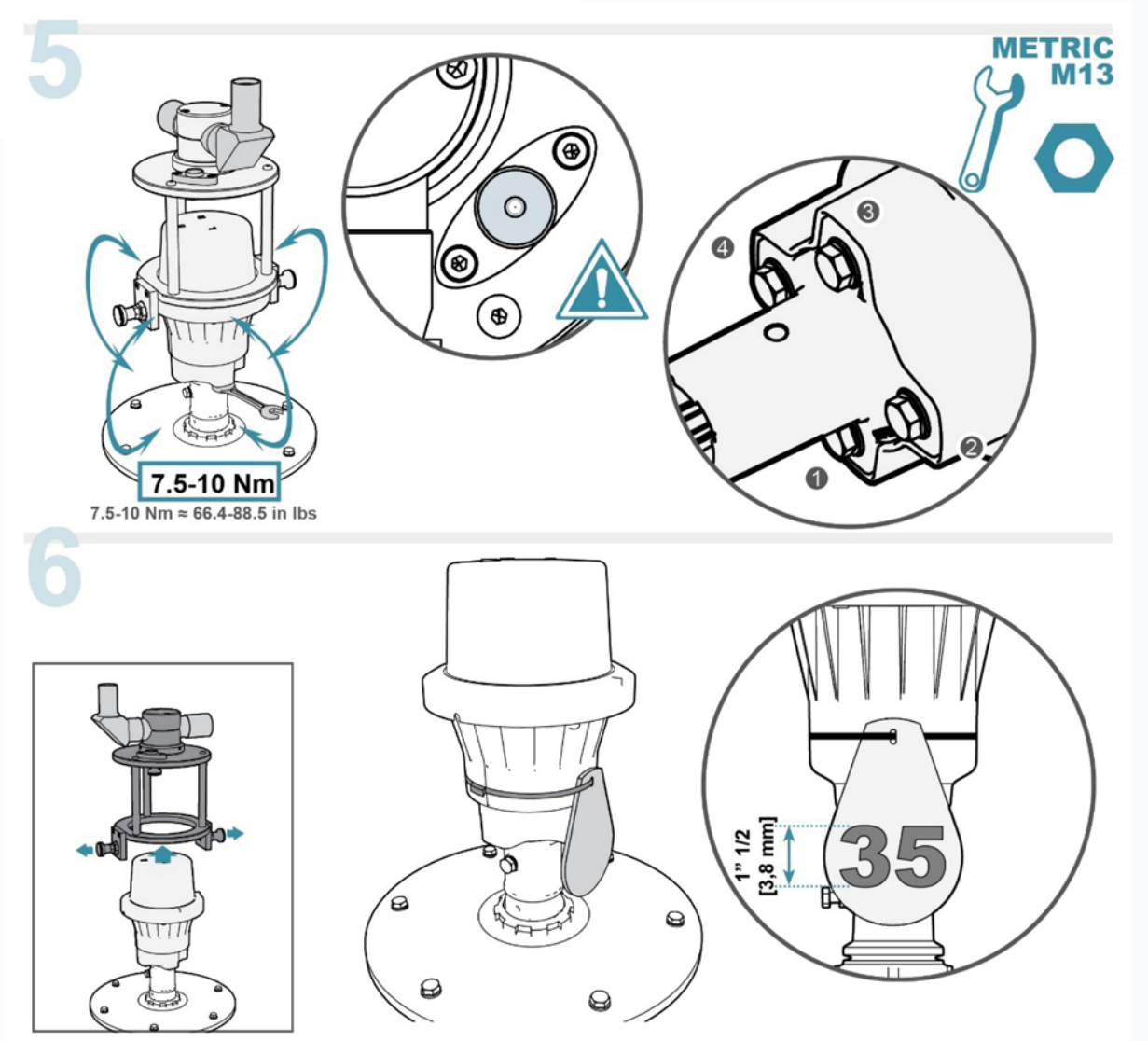


Figure 9 - Levelling of the fixture (follows)

3.4 Secondary wiring

The IEC 61823 International Standard (AGL series transformers) states at para. 4.6 that *"if an earthing connection is provided, it shall be connected to the larger socket of the transformer secondary connector."*

This means that, when a fixture is directly connected to the relevant isolation transformer (provided with earthing connection), the fixture secondary side is wired to the grounding network through the larger pin of fixture plug.

In case of a fixture, installed in the taxiway/runway pavement on its concrete pit far from the relevant isolation transformer, it is necessary to provide a secondary extension between fixture and transformer. To help the installer to identify the larger socket of the female connector inside the concrete pit, the concrete pit secondary cable leads are identified by a colour code: the grey wire is wired to the larger socket, the black wire to the other one. In this way it will be easy to assure the earthing wiring, above described, between the larger socket of the transformer secondary connector and the larger pin of the fixture plug.

It is possible to connect in series more fixtures on the secondary side of a single isolation transformer: please contact Multi Electric Mfg., Inc. technical department for additional information about this electrical solution.

4 MAINTENANCE

Before any maintenance intervention, make sure the power supply be switched off.
DO NOT OPERATE ON LIVE PARTS!!!

LED lighting fixtures do not require frequent maintenance. With well-run installations and handling fixture carefully, avoiding excessive falls or collisions, the only maintenance work to be carried out on the field is to clean the prisms.

4.1 Maintenance program

In order to ensure maximum light fixture life, the installed units should be subject to a maintenance program in accordance with the following instructions and taking as reference the Airport Service Manual ICAO - Part 9 - Airport Maintenance Practices or FAA AC 150/5340-30.

4.1.1 Periodical Checks

Daily	Burnt-out luminous source
	Broken parts of lights
Monthly	Cleaning of the lenses
	Correct setting of the lights
Semi-annually	Painting or replacement of rusted parts
	Check the tightening torque of the adjustment screws and fix the signal
Annually	Stability of the civil works
	Stability and assembly of lights
	Electrical connections and insulation degree
	Luminous efficiency of luminous sources
	Condition of all the gaskets
Unscheduled	After unusual atmospheric precipitation, check the light condition and remove any luminous beam obstructions

4.1.2 Snowplow Operations

Snowplow operators should exercise extra care not to strike the light fixtures with snowplow blades. After snow removal operations, inspect all light fixtures to locate and replace, if necessary, any damaged light assemblies.

Recommended snow removal techniques are described in Airport Service Manual ICAO - Part 9 - Airport Maintenance Practices or FAA AC 150/5200-30.

4.1.3 Installing the light unit

Reference name	Type of screw	Quantity	Torque [inch/pound]	Torque [Nm]
Optical lenses Led board	M4x12	4 (2 each side)	9 ±1	1.0 ±0.1
Control electronics CG option	M3x6	2	13 ±1	1.5 ±0.1
Closing ring	M5x12	5	26 ±1	3.0 ±0.1
Alignment screws	M8x30	4	66-88 ±8	7.5-10 ±0.1
Arctic kit resistance lock screws	M5x20	4	26 ±1	3.0 ±0.1
Fixing screws of the pole to the TYPE A breakable coupling and of the pole to the light (FAA version - UT-PT-0443)	M6x20	4	80 ±8	9.0 ±0.1
Lock nut of the fixing screws of the pole to the TYPE A breakable coupling and of the pole to the light (FAA version - UT-PT-0443)	M6	4	105 ±10	12.0 ±0.1
Fixing screws of the pole to the TYPE B breakable coupling and of the pole to the light (FAA version - UT-PT-0443)	1/4”-20x3/4”	4	80 ±8	9.0 ±0.1
Lock nut of the fixing screws of the pole to the TYPE B breakable couplig and of the pole to the light (FAA version - UT-PT-0443)	1/4”	4	105 ±10	12.0 ±0.1
Breakable coupling fixing screw (FAA version - UT-PT-0443)	M8x20	1	160 ±16	18.0 ±0.1

4.2 Removing and opening the light unit

4.2.1 Removing the fixture

- Unscrew the frangible coupling screw.
- Hold the fixture and unscrew the frangible coupling.
- Lay the fixture and disconnect plug to the secondary receptacle inside the pipe elbow.
- Disconnect the fixture grounding wire to the grounding wire coming from the pit (or from the base).

4.2.2 Opening the fixture

- Open the fixture by unscrewing the HEX M5x12 locking screws 6.

Every time the fixture is opened, all the seals must be replaced: use only original spare by Multi Electric Mfg., Inc..
Every time the fixture is opened, inspect the following parts and replace them if necessary:

- **optical unit, if it is dirty or damaged**
- **glass gasket, check the integrity**
- **cable lead with plug**

4.2.3 Closing the fixture

Every time the fixture is opened replace the following items with a new ones:

- Gasket between glass dome (2) and fixture body (3);

Verify the correct position of the dome and of cards during assembly phase. Mount the frame (4) on the dome and fasten it by means the HEX M5x12 screws 6 (1), tightening torque is 26 in-lb [3.0 Nm].

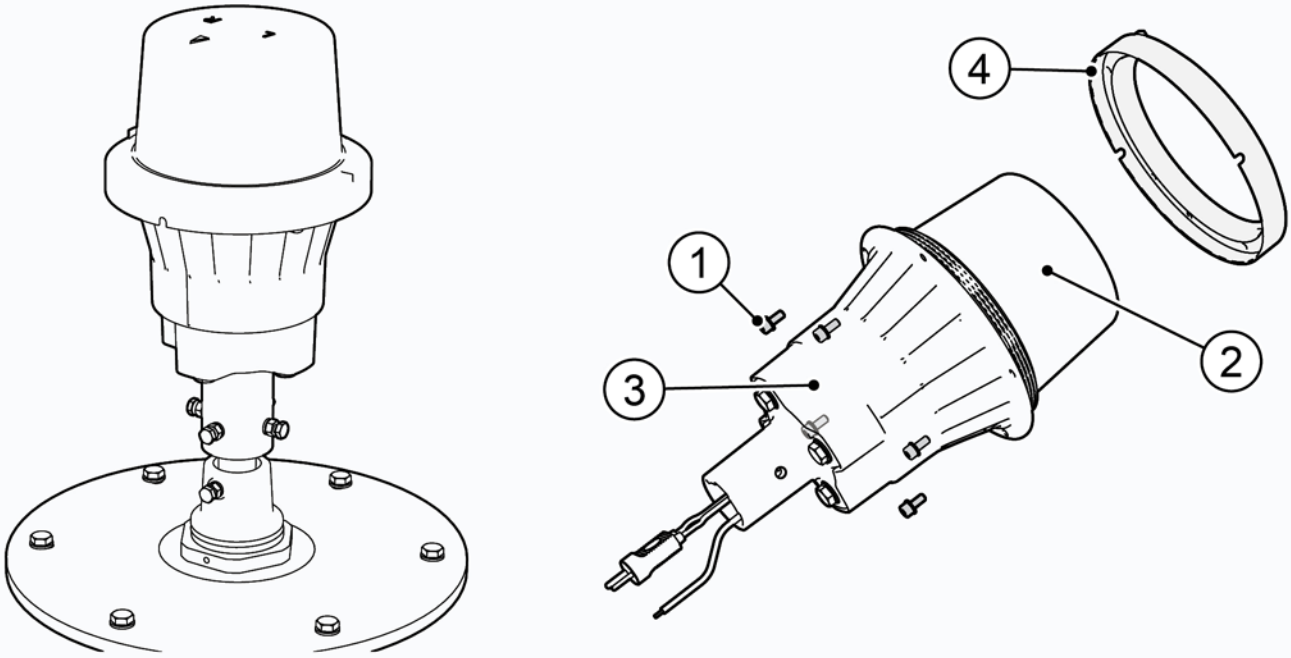


Figure 8 - Fixture removing and opening

4.3 Lens cleaning

4.3.1 Lens outside cleaning

Removing the fixture is not necessary to clean the outer surface of the lens, and if already removed is not necessary to open it. Clean the lens surface with non abrasive glass product.

4.3.2 Lens inside cleaning

Normally the cleaning of the lens inside surfaces is not necessary because fixture is watertight. Whenever it is necessary, remember the following rules.

Remove the fixture from the base and open it following instructions of *"Removing and Opening the Light Unit From the Base"* and proceed as follows:

- Clean the lens surfaces (1) with non abrasive glass product.
- Dry them carefully.
- Reassembly the light unit following instructions of paragraph *"Closing the Fixture"*, *"Leakage Test"* and *"Reinstalling the fixture"*.

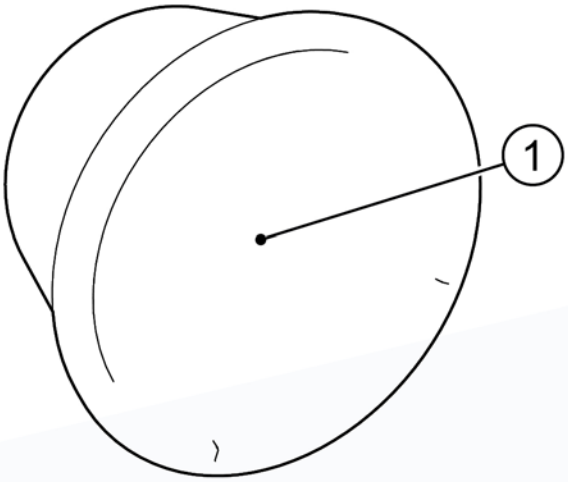


Figure 9 - Lens cleaning

4.4 Led module replacement

Remove the fixture from the base and open it following instructions of *"Removing and Opening the Light Unit From the Base"* and proceed as follow:

- Disconnect the power supply connector (5) from the LED module (2).
- Remove the LED module (2) and the relevant lens array (1) from the mounting plate unscrewing the two screw (4) HEX M4x12.
- Replace the LED module (2) with a new one.
- Check that the thermal interface (3) is placed under the LED module (2) and right-positioned.
- Fasten the LED module and the relevant lens array with a tightening torque of 1.0 Nm.
- Reconnect the power supply connector (5) to the LED module (2).

Check that the replacement LED module match the desired color configuration. If necessary, replace the lens with spare parts matching the original configuration.

Reassembly the fixture following instructions of paragraph *"Closing the Fixture"*, *"Leakage Test"* and *"Reinstalling the fixture"*.

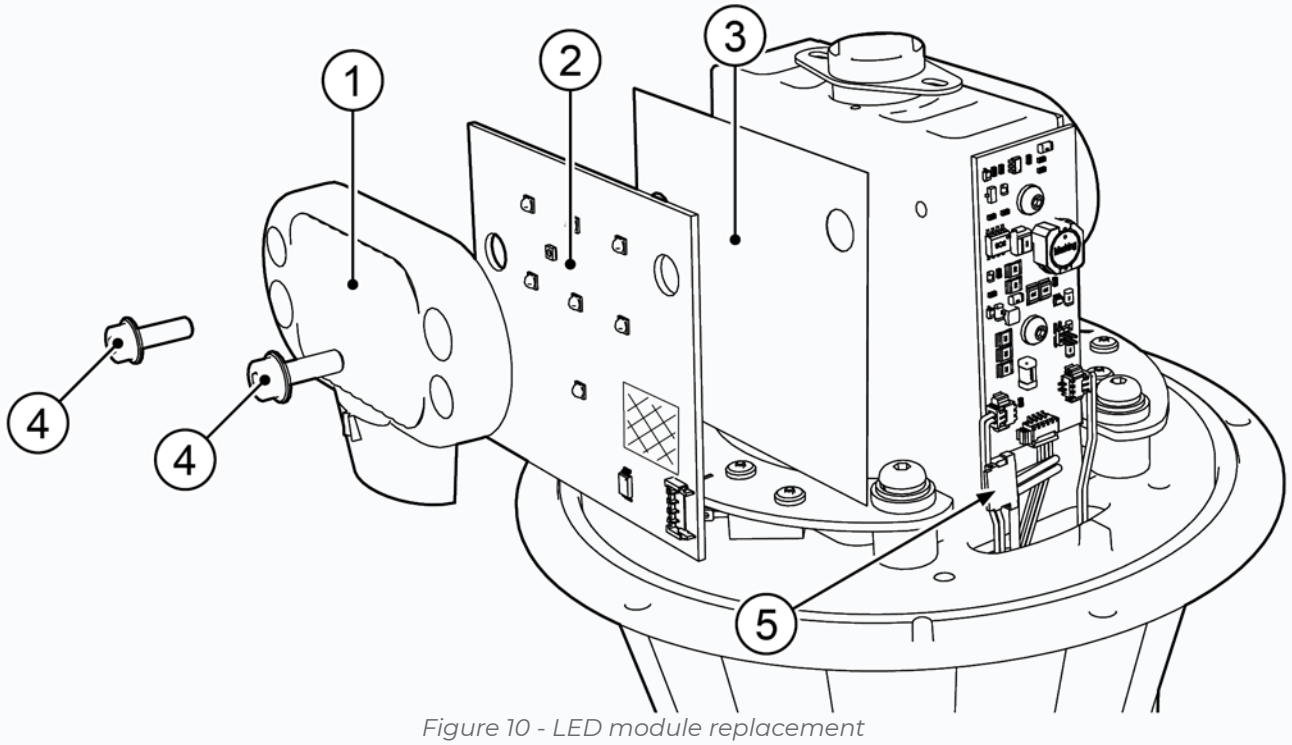


Figure 10 - LED module replacement

4.5 Electronics replacement

Remove the fixture from the base and open it following instructions of "*Removing and Opening the Light Unit From the Base*" and proceed as follow:

- Disconnect the power supply connector(s) from the LED module(s).
- Disconnect the LED assembly from the PCB assembly.
- Remove the PCB assembly from the breakable coupling unscrewing the four levelling screws.
- Provide a new PCB assembly and reassembly the unit with reverse procedure.
- Reconnect the power supply connector(s) to the LED module(s).

Reassembly the fixture following instructions of paragraph "*Closing the Fixture*", "*Leakage Test*" and "*Reinstalling the fixture*".

4.6 Arctic kit replacement

Remove the fixture from the base and open it following instructions of "*Removing and Opening the Light Unit From the Base*" and proceed as follow.

- Disconnect the LED assembly from the PCB assembly.
- Unscrew the arctic kit fixture, lift up the optical module in order to disconnect the supply fastons of the arctic kit.
- Provide a new arctic kit and reassembly the unit with reverse procedure.

Reassembly the fixture following instructions of paragraph "*Closing the Fixture*", "*Leakage Test*" and "*Reinstalling the fixture*".

4.7 Breakable coupling replacement

- Unscrew the lower threaded section of broken breakable coupling from the pipe elbow (or base plate).
- Cut the grounding wire, disconnect the light plug from the secondary receptacle and remove the threaded section.
- Remove the upper section of the broken breakable coupling from the 1-inch pipe by releasing the setscrew.
- If damaged, replace the 1-inch tube too. To make free the tube, release the setscrew on the main body.
- Provide a new breakable coupling and, if required, a new 1-inch tube.
- Reassembly the unit by following the installation steps.

4.8 Cable lead with plug

The assembly of the power supply cable must be performed only by professional staff, in compliance with all the safety requirements of the laws and regulations in force in the country of use.
Carry out operations only if all the elements have been properly detached from field and energy sources. Never operate on potentially active components.

Unscrew the lower threaded section of broken breakable coupling from the pipe elbow (or base plate), cut the grounding wire, disconnect the light plug from the secondary receptacle and remove the threaded section.

Open the fixture following instructions of "*Removing and Opening the Light Unit From the Base*".

4.8.1 Removing the cable lead with plug

- Inside the body, disconnect the pair of wires from the electronics by cutting the cables atleast 30 mm from the bottom of the fixture body.
- Unscrew the gland.
- Pull out the cable lead with gland gasket.

4.8.2 Installing the new cable lead with plug

- Insert the gland nut (2) on the new unipolar cable (1) lead so that the length (L) of the cable outside the fixture is the same of the original one.
- Splice the ends of the cables (3) for a length of approx. 7 mm.
- Tighten the gland nut (2) at 6 Nm.
- Restore the electrical connections through cylindrical butt connectors.

Close the light fixture following instructions of paragraph "*Closing the Fixture*" and "*Reinstalling the fixture*".

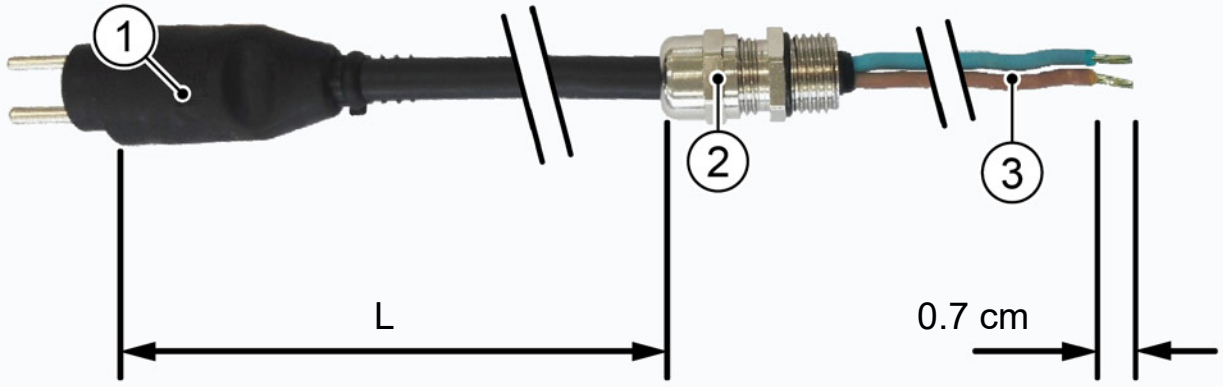


Figure 11 - Cable lead with plug

4.9 Monitoring

The fixtures can be provided with the option of monitoring. This device allows to show at the constant current regulator as if the fixture circuit was open when a LED burns out. The fixture thus acts as a traditional lamp fixture.

When the fixture has a bad operation, the internal monitoring device disconnects definitively the fixture from the series circuit; after this operation to restore the normal operation of the fixture it's necessary to replace the LED board and unlock the monitoring device.

For this operation it is necessary to follow these steps:

- Remove the fixture from the base and open it following instructions of "*Removing and Opening the Light Unit*"
- Replace the LED module following instructions of "*LED Module Replacement*"
- Insert the JM1 jumper (1) and make sure that the LED modules are connected.
- Feed the electronic through a CCR set at 4.1 A (third step).
- Wait for the switch off of the D13 LED (2) and turn off the CCR.
- Remove the JM1 jumper (1).
- Turn on the CCR and verify the proper functioning of the fixture.

Reassembly the fixture following instructions of paragraph "*Closing the Fixture*", "*Leakage Test*" and "*Reinstalling the fixture*".

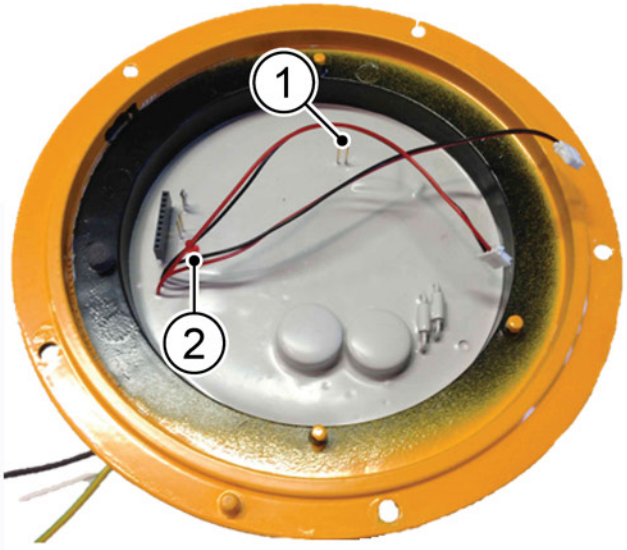


Figure 12 - Restoring the monitoring device

5 TROUBLESHOOTING

Problem	Possible cause	Solution
Distorted light beam output	Broken or damaged lens	Replace lens
Weak light output	Primary loop with partial short circuit	Check cable assembly
	Defect in the isolation transformer	Replace transformer
	Dirty lens	Clean the light fixture
	One LED of the luminous source damaged in short circuit (only without the monitoring option)	Replace the LEDs board
	Wrong power PCB installed	Check parts list and install the correct PCB
Luminous source not working	LEDs defective	Replace the LEDs board
	Power PCB defective	Replace the Power PCB
	Moisture inside the fixture	Replace damaged components. Clean and dry the inside area of the fixture
	No connection of primary circuit	Check transformer output current with A-meter
	Defective isolation transformer or secondary wiring	Check power line between the light fixture and the transformer, including connectors
	Monitoring device locked (only if this option)	Unlocked monitoring device
Water or moisture inside the fixture	Lens gasket	Replace the gasket
	Pinched fixture power cables	Replace fixture leads

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6 SPARE PARTS

Code	Description
RISL30001	Kit lens with locking ring and gaskets
RISL30002	LED module F240, 7 LED WHITE, versions S and F
RISL30003	LED module F240, 7 LED WHITE, version I
RISL30004	LED module F240, 7 LED YELLOW
RISL30005	LED module F240, 7 LED RED
RISL30006	LED module F240, 7 LED GREEN, version F
RISL30007	LED module F240, 7 LED GREEN, version S
RISL30008	Optical system at 7 lenses
RISL30009	Electronic 1I/2O-ICAO with monitoring, vers. S-E
RISL30010	Electronic 1I/2O-ICAO without monitoring, vers. S-E
RISL30011	Electronic 1I/1O-ICAO with monitoring, vers. S-E
RISL30012	Electronic 1I/1O-ICAO without monitoring, vers. S-E
RISL30013	Electronic 1I/2O-ICAO with monitoring, vers. S-T and I-E
RISL30014	Electronic 1I/2O-ICAO without monitoring, vers. S-T and I-E
RISL30015	Electronic 1I/1O-ICAO with monitoring, vers. S-T and I-E
RISL30016	Electronic 1I/1O-ICAO without monitoring, vers. S-T and I-E
RISL30017	Electronic 1I/2O-FAA with monitoring, vers. F-T (Plug style 3)
RISL30018	Electronic 1I/2O-FAA without monitoring, vers. F-T (Plug style 3)
RISL30019	Electronic 1I/1O-FAA with monitoring, vers. F-T (Plug style 3)
RISL30020	Electronic 1I/1O-FAA without monitoring, vers. F-T (Plug style 3)
RISL30021	Electronic 1I/2O-FAA with monitoring, vers. F-E (Plug style 3)
RISL30022	Electronic 1I/2O-FAA without monitoring, vers. F-E (Plug style 3)
RISL30023	Electronic 1I/1O-FAA with monitoring, vers. F-E (Plug style 3)
RISL30024	Electronic 1I/1O-FAA without monitoring, vers. F-E (Plug style 3)
RISL30025	Electronic 1I/2O-FAA with monitoring, vers. F-E (Plug style 7)
RISL30026	Electronic 1I/2O-FAA without monitoring, vers. F-E (Plug style 7)
RISL30027	Electronic 1I/1O-FAA with monitoring, vers. F-E (Plug style 7)
RISL30028	Electronic 1I/1O-FAA without monitoring, vers. F-E (Plug style 7)
RISL30029	Electronic 1I/1O-FAA without monitoring, vers. F (Plug style 7) 0.4 A
RISL30030	Kit Breakable coupling 1” ½-12 UNF (version A)
RISL30031	Kit Breakable coupling 2”-11 ½ NPS (version B)
RISL30032	Kit Breakable coupling 2” - 12 GAS (version C)
RISL50005	Kit Breakable coupling 2” - 12 GAS (version D)
RISL30033	Kit 1-inch tube H=14”
RISL30034	Kit 1-inch tube H=20”
RISL30035	Kit 1-inch tube H=24”
RISL30036	Kit 1-inch tube H=30”
RISL30037	Arctic Kit (only for FAA versions manufactured after May 2019)

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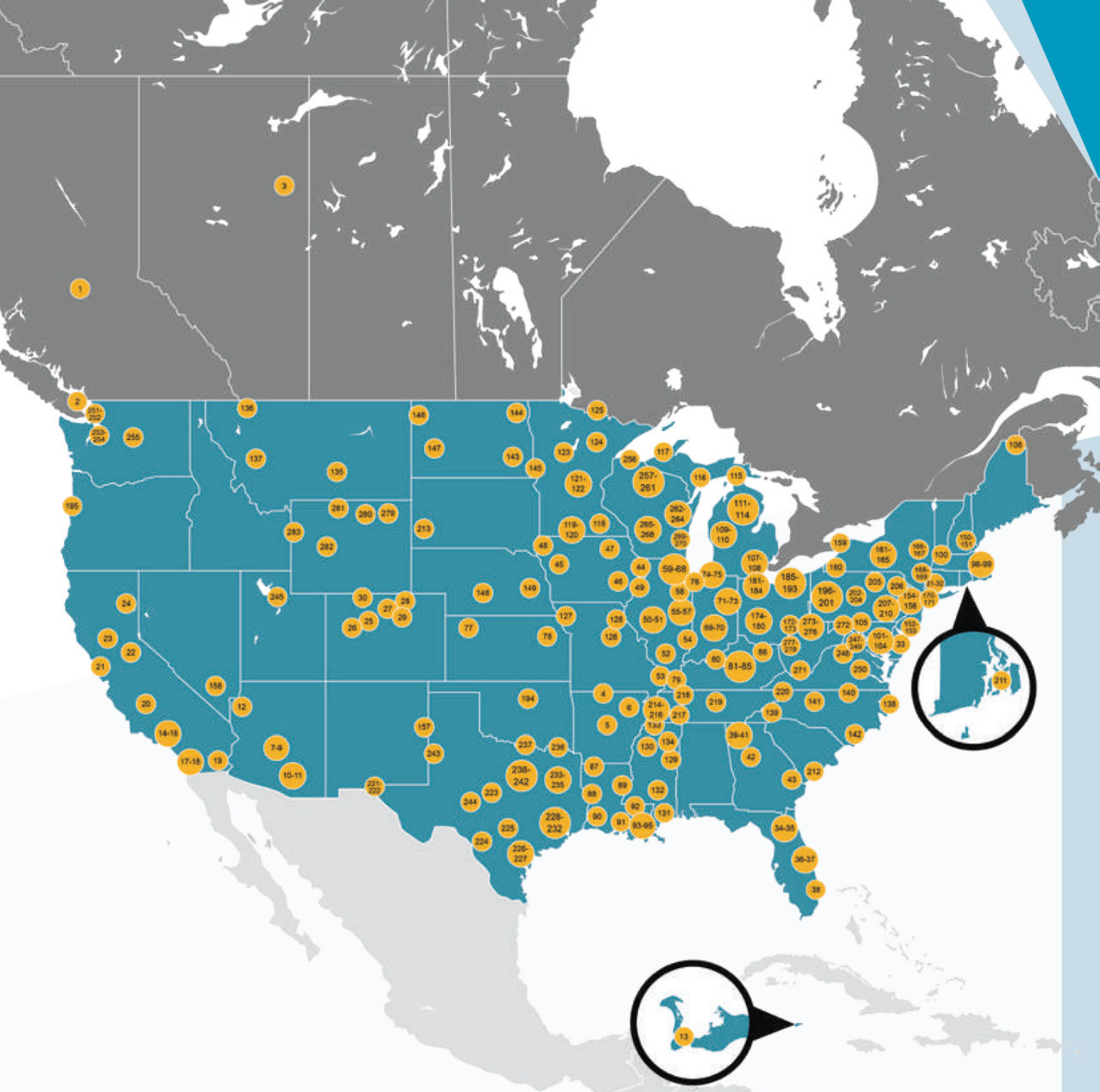

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