

Airfield Lighting

Product Description

Flashing Systems for Approach Guidance

- EL-ATF
- EL-ODF
- IN-ATF
- FTB/FUB
- CMS
- RTIL



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1. INTRODUCTION

When it is necessary to reinforce visibility of approach systems (bad weather conditions or aerodromes near street lighting which may be mistaken with runway approach lighting), the CAT I, CAT II and CAT III precision approach lighting systems must be completed by SFLS (Sequential Flashing Lighting System), also called "Running Rabbit". These systems comprise of 20 light units in CAT II and III systems, or 30 light units in CAT I systems. These flashing units are illuminated in sequence in the direction of the approach two times per second.

When it is necessary to reinforce visibility of runway threshold (bad weather conditions or when it is impossible to install a complete approach system), the approach systems are complemented by RTIL (Runway Threshold Identification Lights). These systems comprise of 2 flashing units located on both sides of the threshold which are illuminated simultaneously one or two times per second.

The runway equipped with simplified approach systems can be equipped with sequential flashing lighting systems of ODALS type (Omni directional Approach Lighting System). These systems comprise of 7 (SFLS of 5 flashing units and 1 x set of RTIL (2) flashing units illuminated consecutively in sequence in the direction of the approach at one time per second.

The THORN flashing units will meet all the requirements of the flashing systems described above and comprise of:

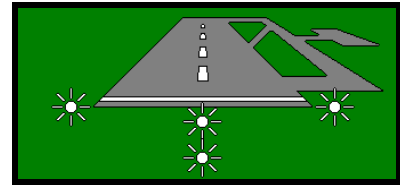
1. One power supply box. This box exist in two versions:
 - FTB box for three brilliancy levels.
 - FUB box for one brilliancy level.
2. One flashing head fitting. Three types are available:
 - Unidirectional elevated fitting EL-ATF type.
 - Unidirectional inset fitting IN-ATF type.
 - Omni directional elevated fitting EL-ODF type.

Sequential Flashing Lighting Systems can be supplied with the option of a CMS box which allows remote control and monitoring. The CMS box has the following main functions:

1. Remote control all the flashing units in the "Flashing System" (SFLS, ODAL). Dependent upon the command selected on the front panel and the supply on the rear connector the CMS will produce signals necessary to:
 - Remotely control the supply of the flashing system (On/Off Command).
 - Remotely control the "brilliancy level" of the flashing system (HI = 100%, MI = 10% or LI = 3%).
2. Monitor the flashing system status and produce LED display on the front panel
 - Monitors in real time the flashes of each unit of the system.
 - Monitor in real time any defect of individual flashing units.
 - Monitor in real time the defective status of the flashing system.
3. Receive control commands from and report alarm status to another location (for example tower). When the CMS is selected on "Remote" mode it transfers to the flashing system the commands (On/Off and Brilliancy Level) received via the "OUT" rear connector. A dry contact permits transfer via the "Out" connector of "Alarm Status" information.

Utilisation

- Sequential Flashing Lighting Systems SFLS or ODALS types
- Runway Threshold Identification Lights RTIL type
- Sequential Flashing Lighting Systems for Heliport



Compliance with standards

- ICAO: Annex 14 Volume I
- Paragraphs 5.3.4, 5.3.8, for use in CAT I, II and III. Annex 14 Volume II Paragraph 5.3.3
- FAA: AC 150/5345-51
- NATO: STANAG 3316
- French STAC
- BS 3224



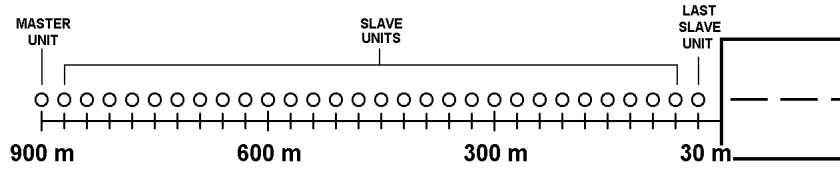
2.

MAIN ADVANTAGES

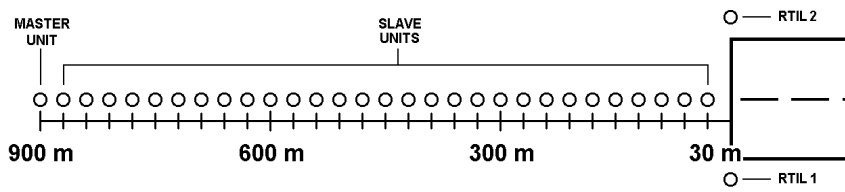
- All the Flashing System for airport approach guidance use common basic components.
- For a fixed sequence flashing rate, all FTB/FUB are identical and can be configured to obtain the system requested function (SFLS Master/Slave, RTIL 1/2...). This configuration is obtained by positioning of micro switches located within the power supply box.
- Cabling operations are simple (chaining between units and functions separation).
- Remote control and monitoring of the status for all the flashing units of the system is possible using a CMS box.
- With dedicated accessories, FTB/FUB boxes can be installed vertically on a pole or horizontally on a concrete plinth.
- It is possible to remove a faulty FTB/FUB from the SFLS system without stopping the system.
- For use in cold and/or humid climate the external power supply box can be equipped with the option of a heating resistor.
- Security: The power box capacitors are automatically discharged when the box or associated flashing light head is opened.
- The elevated or inset flashing head fitting can be mounted on standard supports.

Different Types of Flashing System

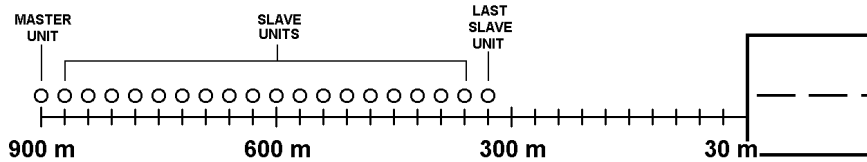
SFLS CAT I (30 Units)



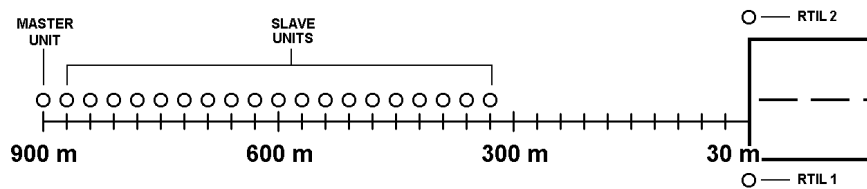
SFLS CAT I + RTIL (32 Units)



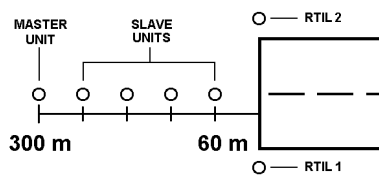
SFLS CAT II (20 Units)



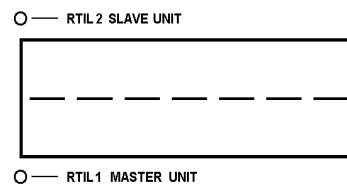
SFLS CAT II + RTIL (22 Units)



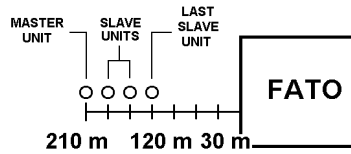
ODALS (7 Units)



RTIL (2 Units)



HELIPORT (4 Units)



3. DESCRIPTION OF FLASHING SYSTEMS

Flashing systems for airports approach guidance (SFLS, RTIL, ODALS,) comprise basic elements called “Flashing Unit” linked by cabling. The Fig 1 hereafter shows the recommended electrical cabling for a SFLS CAT I + RTIL system comprising of 32 flashing units. The cabling design shows Fig 1 stays available for flashing systems comprising of less flashing units.

Note: For ODALS, Heliport, RTIL, power box not necessary, the power supply from substation must be connected directly to RTIL2.

The SFLS systems must be supplied from 3 phase 400 Vac source (two phases to supply the FTB/FUB Boxes + one phase to supply the box heating resistors). In this case the characteristics of the cables dedicated to supply the system are the following:

- Connection between flashing units: LV H07RNF cable with 5 wires of 4mm² and external diameter between 12,5mm and 18mm.
- Connection between substation and distribution box: LV H07RNF type cable with 5 wires. Wire section of the cable will depend on distance substation/distribution box as well as the number of units. To make the calculation for this cable the installer must take into account the following data: Maximum consumption of one FTB/FUB Box = 230 VA, minimum power supply voltage acceptable by an FTB/FUB Box = 215 Vac.

Cabling of the control links between Flashing Units and the Remote Control device (CMS or Desk) must be done using telecommunication shielded cables SYT2 type (or equivalent) containing 4 pairs (between units) and 3 pairs (between unit and CMS or Desk) with wires of 0.9 mm diameter. The external diameter of these cables must be between 7.5 mm and 13 mm.

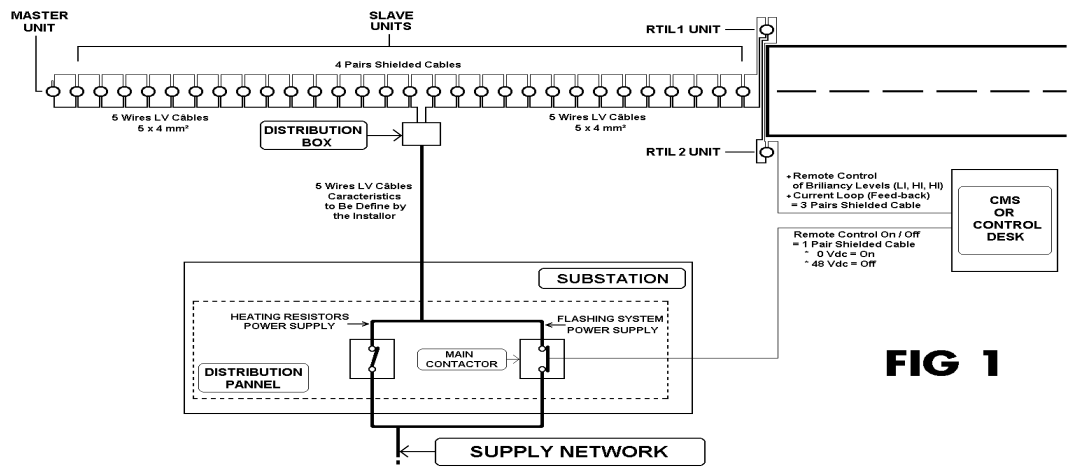


FIG 1

4. DESCRIPTION OF ONE FLASHING UNIT

All the Flashing Units of the Flashing System (See Fig 1) comprise of the same basic components (See Fig 2a and Fig 2b).

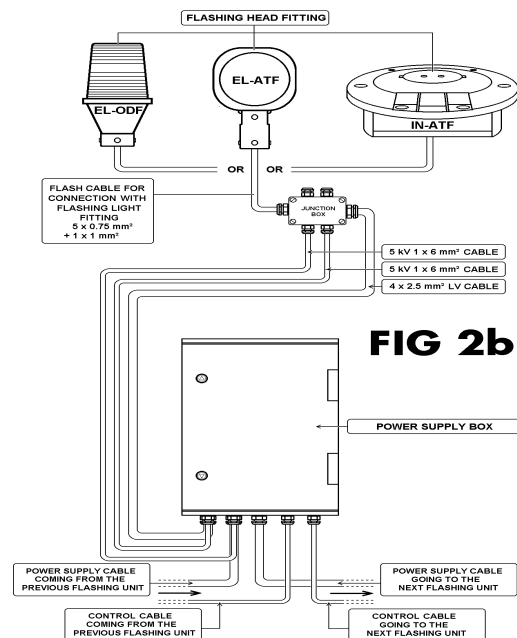
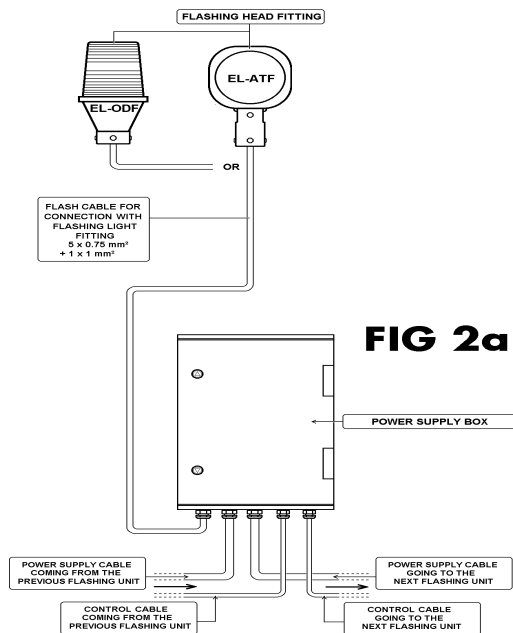
1. One FTB/FUB Power Supply Box.
2. One Flashing Head Fitting EL-ATF, IN-ATF or EL-ODF
3. Electrical cabling between power supply box and flashing head fitting.

Depending of the distance existing between the power supply box and the flashing head fitting, two types of cabling are recommended. One for distances less than 15 metres (see Fig 2a) and another for distances greater than 15 metres and less than 45 metres (see Fig 2b). For distances greater than 45 metres consult Safegate.

Note: Cabling in accordance with Fig 2b must always been used for IN-ATF Flashing Head fitting.

4. One Light Fitting Support.

FTB / FUB Power Supply Box



5. TECHNICAL CHARACTERISTICS

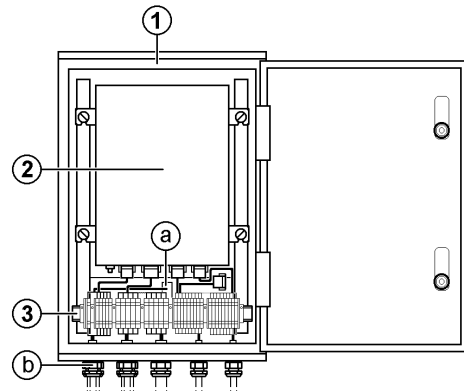
- Power supply: 230 Vac (+/- 10%) at 50 Hz (110 Vac / 60 Hz on request).
- Cycles Frequency: 2 Hz (SFLS, RTIL), 1 Hz (ODALS and Heliport).
- Brilliancy Levels: The FTB boxes have three remote controlled brilliancy levels (HI = 100%, MI = 10% and LI = 3%).
- Power Consumption: Lower than 230 Watts for the maximum brilliancy level (= 100%).
- Power/Efficiency Factor :< 0.95 / <0.80.
- Working Temperature: From – 25 to + 55 °C.
- Heating Resistor: The power outer boxes can be equipped with heating resistor allowing working in cold conditions (-55°C) and/or humid climate. A dedicated wire for independent supply of the resistor is necessary.
- Security: When the FTB/FUB box is open, the power capacitors are discharged in 5sec. For more security, an internal small neon bulb shows the presence of remaining high voltage.
- Outer Box: The FTB/FTB boxes are mounted in outer boxes in polyester. The outer boxes ensure IP55 protection; electrical connections and fixings to be positioned on the support (see Fig 3a or 3b).
- Energy of the Flashes: The Main Capacitor (30µF) loaded under a max voltage of 2000 Vdc is able to deliver a 60J energy.
- Brilliancy Remote Control: Consumption of one relay for brilliancy remote control = 10 mA under 48 Vdc.

Packing Data			
Designation	Volume m³	Dimensions mm	Weight kg
EL-ATF Fitting	0.012	310 x 200 x 200	2.4
EL-ODF Fitting	0.055	340 x 340 x 480	4
IN-ATF Fitting	0.038	455 x 455 x 185	20.5
FTB Box	0.081	420 x 245 x 185	20.5
CMS Box	0.045	600 x 250 x 300	4

6. DESIGN

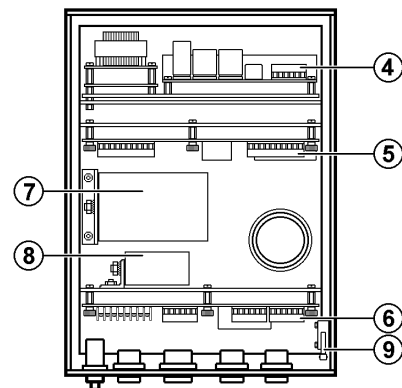
Complete Power Supply Box

1. Outer box in polyester.
 2. FTB/FUB supply box.
 3. Connection main terminal.
 - a) Compression packers cables input / output.
 - b) Heating resistors (option).
- Sizes = 645 mm x 435 mm x 250 mm
- Weight = 20 kg



FTB/FUB Subassembly

4. High voltage PCB.
 5. Timer PCB.
 6. Auxiliary PCB.
 7. Main power capacitor.
 8. Auxiliary power capacitor.
 9. Security switch
- Sizes = 450 mm x 300 mm x 160 mm
- Weight = 10 kg

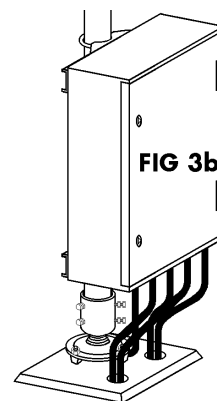
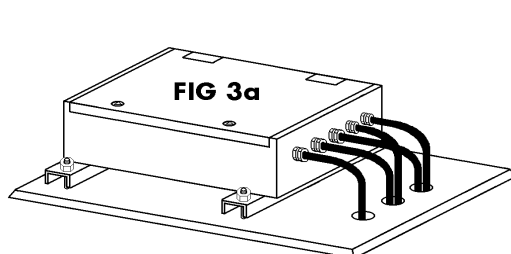


7. INSTALLATION

The Outer Box can be mounted:

- Horizontally on concrete plinth (Fig 3a). Recommended Sizes: 900 x 650 x 150 mm
- Vertically on concrete block (Fig 3b). Recommended Sizes: 400 x 450 x 400 mm

The mounting accessories (for horizontal or vertical options) are delivered with the outer box.



8. TECHNICAL CHARACTERISTICS

Elevated Flashing Head Fitting

Elevated Flashing Head Unidirectional EL-ATF and Omni directional EL-ODF

- Lamp: EL-ATF = PAR 56 FT 34/HP 60 Joules Xenon lamp. Anode voltage = 2,000 V. EL-ODF = OMNI 60 Joules Xenon lamp with three pins for connection. Anode voltage = 2,000 V.
- Lamp Life: Lamp life is greater than 1,000h for a continuous use at 60 Joules with 2 flashes per second.
- Ignition coil and protection capacitor: Standard in all fitting.
- Security: One (EL-ODF) or two (EL-ATF) micro switches located in the fitting allow triggering FTB/FUB power capacitors discharge in 5sec when fitting is opened.
- Finish: Body and support in aluminium alloy casting, phosphated and painted in aviation yellow. The black rear door of EL-ATF in full-coloured polyamide-fibreglass. Fixing and fastening in stainless steel.
- Fixing/Alignment: By three sets of nuts and screws.
- EL-ATF elevation Angle: By two sets of nuts and screws.
- Net weight: 1.9 kg for EL-ATF and 2.5 kg for EL-ODF.

Elevated Flashing Head Unidirectional IN-ATF

- Lamp: 60 Joules Xenon linear lamp with reflector. Anode voltage = 2,000 V.
- Lamp Life: Lamp life is greater than 1,500h for continuous use at 60 Joules with 2 Flashes per second.
- Ignition Coil and Protection Capacitor:
- Security: Standard in all fitting.
- Finish: Micro-switch in IN-ATF allows triggering FTB/FUB power capacitor discharge in 5s when fitting opened. All external parts in anodised tempered aluminium alloy casting. All fixing and fastening in stainless steel.
- Sizes: Diameter 16" (= 401 mm). Depth = 150 mm and projection = 1".
- Fixation: On 16" Shallow Base or FAA Deep Can using 6 sets of M10 Stud / Nut
- Net weight: 20 kg.

Electrical Cabling of the Flashing Head Fittings (see Fig 2)

Electrical connections of the flashing head fitting require six wires to carry the following signals: ground, common for power and trigger, power, trigger, security switches input and output.

Regardless of the distance between the power supply box and the Flashing head fitting the final connection on the fitting must be done using a Special 2,5 kV flash cable of 6 wires (5 x 0.75 mm² + 1 x 1mm²).

For all distances less than 15 metres, cabling for EL-ATF and EL-ODF (see Fig 2a) using only the special flash cable is possible

For distance greater than 15 metres (always for IN-ATF) the cabling must be as shown in Fig 2b. In this case we add to the "Flash Cable" (# 1 m) delivered with the flashing head fitting, one junction box (delivered with the fitting) + two 1 x 6 mm² 5kV cables for lamp power supply + one 4 x 2.5 mm² LV cable for ground, lamp trigger and security switches input and output.

Note: In this case (distance > 15m IN-ATF), The Flashing head fittings are delivered equipped with an optional trigger module.

CMS Box for Control and Monitoring

- Power Supply: 230 Vac (+/- 10%) at 50 Hz (110 Vac / 60 Hz on request).

- Remote Control: All the signals sent or received by the CMS are in 48 Vdc. The 48 Vdc used for the signals sent are generated by the CMS.
- Monitoring: Monitoring of the FTB/FUB boxes is only possible using a CMS box. This monitoring is done using the current loop generated by the CMS.
- Sizes: 19" Rack (W=480mm, H=132mm, D=240mm) distances between fixing holes (W=420mm, H=64mm).
- Electrical cabling: All the electrical connections on the CMS box are made on the CMS rear panel. Note: Even if the CMS can be installed in a separate control room, the CMS also can be installed directly in the sub station.
- Net weight: 3 kg.

CMS with serie digital bus (JX5600)

It is used to monitor and remote control a SFLS assembly such as described below.

The power station supplies the sets with main 240Vac (black wire on diagram).

The sets are hierarchically sequenced via a unique analogical time base line (clock signal, blue wire on diagram).

The sets are monitored and controlled via a series (RS485) digital bus (green wire on diagram). This bus is constructed with a double shielded telephone cable.

This bus allows JX5600 to:

- Command the sets
- Query the sets.

The JX5600 can exchange information with operator and/or system administrator.

The Flash sets may not be directly commanded or monitored.

Commanding the flash sets

The JX5600 can:

- Switch on/off the sets.
- Select brilliancy level (3% night, 10% crepuscular or 100% day).

Querying the flash sets

The JX5600 can ask the sets:

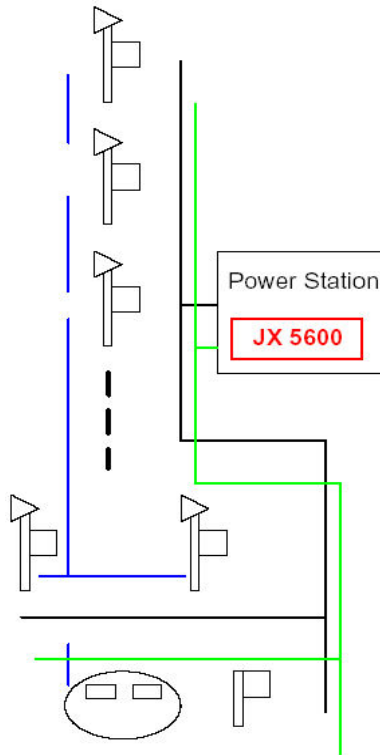
- The present brilliancy set up.
- The real voltage applied on the lamp.
- Whether a lamp operates or not (curative maintenance).
- The number of flashes a lamp has done since the last global switch on (preventive maintenance).
- Internal un-documented technical data.

The JX5600 is internally architected around a web server which allows the maintenance engineer and/or control tower to set up configuration and monitor the present state of the SFLS.

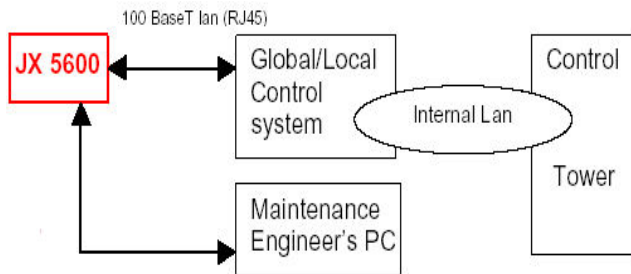
Connecting a standard PC compatible equipped with a web explorer to the JX5600 lets the user inter-act with it.

Depending on the request (human level or machine level) the JX5600 sends user friendly pages or simply encoded variable values data.

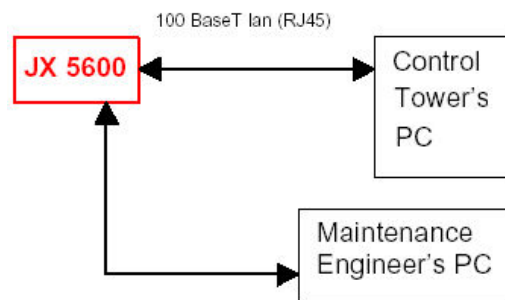
The JX5600 software allows the maintenance engineer to over drive the control tower orders on the SFLS to prevent any unsafe situation.



Example of implementation 1



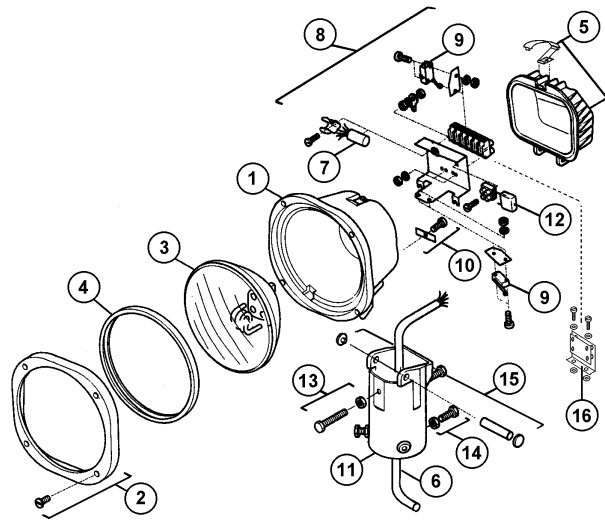
Example of implementation 2



9. DESIGN

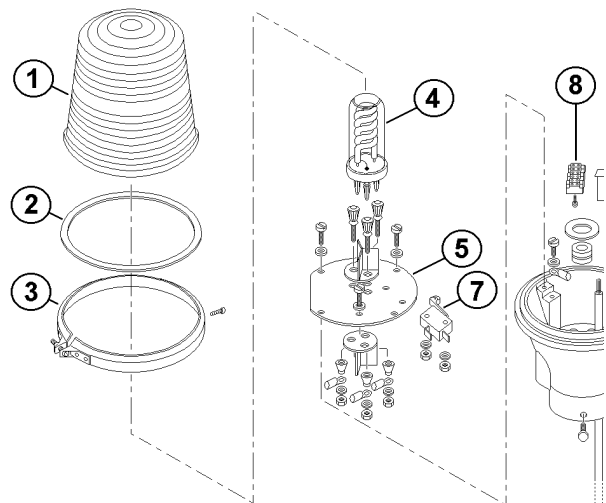
EL-ATF

1. Body
2. Front clamping ring with fixing screws
3. Flashing lamp
4. Lamp gasket
5. Rear door with closing clamp
6. Special flash cable
7. Ignition coil
8. Equipped plate
9. Safety switches
10. Cable fixation string and screws
11. Hinged support
12. Capacitor
13. Lock tight screws for elevation angle
14. Lock tight screws for fixing on support
15. Hinged axis with stop
16. Help to trig module (optional)



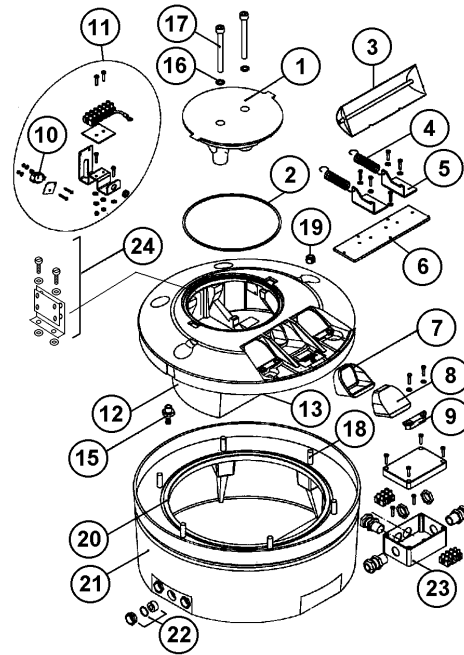
EL-ODF

1. Fresnel optic prismatic Tempered Glass Lens
2. Water tightness Gasket
3. Assembly Ring
4. OMNI 60 J Xenon Lamp
5. Isolating Plate with Lamp Support
6. Ignition Coil With Protection Capacitor and Support
7. Safety Switch
8. Cable Terminal
9. Special Flash Cable
10. Fitting Body and fixation Screws
11. Help to Trig Module (Optional)



IN-ATF

1. Removable Cover
2. Cover Gasket
3. Linear Reflector Flashing Lamp
4. Lamp Spring
5. Lamp Supports
6. Plate For Lamp Supports
7. Prism Gasket
8. Prism
9. Prism Clamp with Screws and Washers
10. Security Switch
11. Equipped Terminal Plate
12. Fitting Body
13. Compression Packer for Flash Cable
14. Flash Cable
15. Valve for Water tightness Test
16. BS Rings- 17. Removable Cover Screws
- 18. Shallow Base M10 Stud
- 19. Shallow Base M10 Nuts
- 20. Shallow Base Gasket
- 21. 16" Shallow Base
- 22. Shallow Base Compression Packer
- 23. Junction Box For Connections
- 24. Help to Trig Module

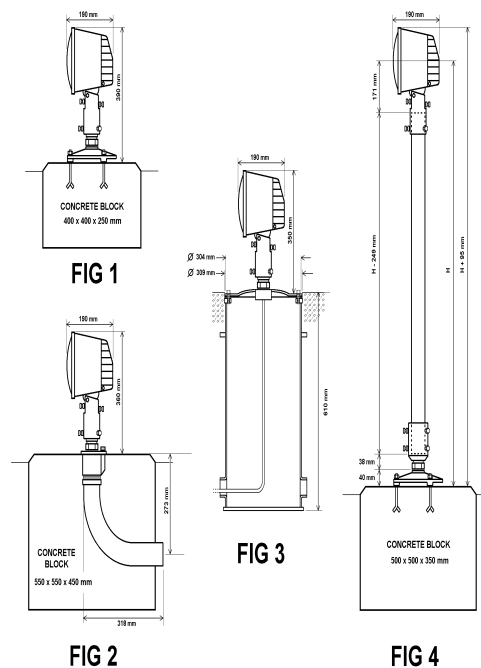


10. INSTALLATION

EL-ATF

As the EL-ATF and the EL-AT has the same body, the EL-ATF can be installed on all the supports available for the EL-AT. The EL-ATF can be installed in the following ways:

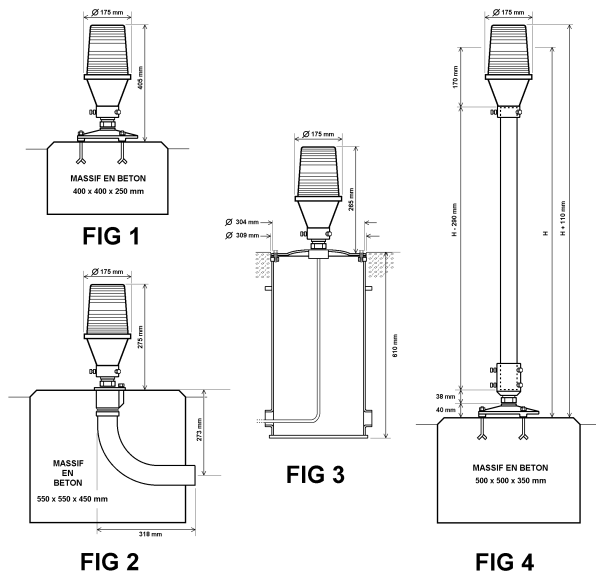
- Ground level mounting with frangible collar on a tripod stand (fig 1).
- Ground level mounting with frangible collar on conduit elbow (fig 2).
- Ground level mounting with frangible collar on FAA deep can and base plate (fig 3).
- Up to 1.8 metres on a pole and a frangible coupling (fig 4).
- Between 1.8 m and 8.10 m on tilt able mast.
- On any other safety support with 44 mm, 50 mm or 60 mm external diameter.



EL-ODF

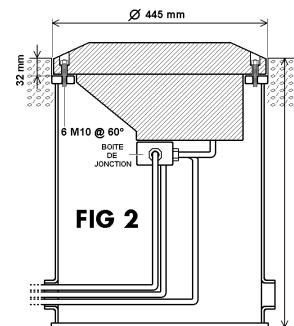
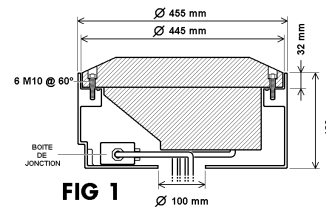
As the EL-ODF and the F16 has the same body, the EL-ODF can be installed on all the supports available for the F16. The EL-ODF can be installed in the following ways:

- Ground level mounting with frangible collar on a tripod stand (fig 1).
- Ground level mounting with frangible collar on conduit elbow (fig 2).
- Ground level mounting with frangible collar on FAA deep can and base plate (fig 3).
- Up to 1.8 m on a pole and a frangible coupling (fig 4).
- Between 1.8 m and 8.10 m on tilt able mast.
- On any other safety support with 44 mm, 50 mm or 60 mm external diameter.



IN-ATF

The IN-ATF inset flashing light could be installed on a 16" shallow base (see fig 1) with a minimum depth of 183 mm or on a 16" FAA deep can " (see fig 2), in this case the Junction Box must be fixed on the bottom of the fitting.



11. ORDERING CODE

Before any quotation or order in order to help us to know exactly the needs, the customer must fill in a questionnaire supplied by THORN This questionnaire permit to specify characteristics of the system requested. Characteristics to supply are the following:

Component	Order code
Type of flashing system:	SFLS CAT I, SFLS CAT I + RTIL, SFLS CAT II, SFLS CAT II + RTIL, RTIL alone, Heliport or ODALS
Number of flashing units:	2, 7, 20, 22, 30, 32
Brilliance levels:	1 or 3
Power Supply:	230 Vac/50hz or 110 Vac/60 Hz
Installation:	
Power supply Box:	
	<ul style="list-style-type: none"> • Number of boxes installed vertically • Number of boxes installed horizontally
Inset flashing head fittings:	
	<ul style="list-style-type: none"> • Number of IN-ATF flashing head fittings
Elevated flashing head fittings:	
	<ul style="list-style-type: none"> • Number of EL-ATF or EL-ODF flashing head fittings • Number of fittings installed at more than 15 m from the FTB box
Control and Monitoring:	Use of CMS

12. SPECIFICATION

THORN flashing systems for runway approach guidance will comply with ICAO Annex 14, Volume I, paragraphs 5.3.5 and 5.3.8 or Annex 14, Volume II, paragraph 5.3.3 with FAA AC 150/5345-51, with STANAG 3316, with CAP 168 and BS 3224.

The different equipment supplied by THORN will allow assembling of all the types of flashing systems for approach guidance (= SFLS, RTIL, Heliport or ODALS).

Each flashing unit of the system will comprise of one power supply box (FTB or FUB) and one flashing head fitting (EL-ATF or EL-ODF or IN-ATF).

For specific cycle frequency (2 or 1 Hz), all the FTB/FUB power supply boxes will be identical, will be configured easily (Master, Slave, RTIL1, RTIL2) by positioning of micro switches located on one PCB of the FTB/FUB.

The flashing units within the flashing system will be supplied in 230Vac/50Hz (110Vac/60Hz will be possible on request) and will have a consumption lower than 230 Watts (for a maximum brilliancy of 100%). Their power factor will be better than 0.95 and efficiency greater than 0.8.

The maximum energy delivered by the 30 μ F main capacitor of the FTB/FUB box loaded under 2000 V will be 60 J.

The power supply boxes will be available in two versions, FTB and FUB, allowing respectively three or one brilliancy level. The three brilliancy levels of the FTB (HI = 100 %, MI = 10 % and LI = 3%) will be remotely controlled in 48 Vdc.

For use in cold (-55°C) and/or humid climates, the outer box will be equipped as an option with a heating resistor.

Sequential flashing lighting systems will have the option of CMS box allowing their remote control and monitoring.

Note: All descriptions and photometric characteristics in this publication present only general particulars and shall not form part of any contract. The right is reserved to change them without prior notification.

Check in to the future

How many aircraft can your airport handle today?
Can this number be increased without adverse effects on the airport's safety level?
It is a known fact that traffic volume will rise in the foreseeable future. More movements will demand monitoring of the entire airport. Requirements will be sharpened and the development of an integrated system

controlling not only ground movements but also air traffic close to the airport is of the highest interest.
The International Civil Aviation Organization (ICAO) already describes A-SMGCS, Advanced Surface Movement Guidance and Control System, as the answer to the future modern airport need to control the entire airport space in one superior system.

To a larger extent than today's systems, A-SMGCS will rely on automated processes to give both pilots and traffic controllers exact information about positions and directions. Safegate Group delivers complete A-SMGCS solutions already, as well as all vital parts relating to it. Safegate Group can check your airport into the future – today!



Safegate Group HQ
Djurhagegatan 19
SE-213 76 Malmö, Sweden
Phone: +46 (0)40 699 17 00
Fax: +46 (0)40 699 17 30
E-mail: market@safegate.com

Australia
australia@safegate.com
+61 (0)3 9720-3233

Brazil
brazil@safegate.com
+55 11 2137 4405

China
china@safegate.com
+8610-85275297

Dubai
dubai@safegate.com
+971 4 452 75 75

Finland
finland@safegate.com
+358 (0)20754 7700

France
france@safegate.com
+33 (0)1 49 53 62 62

Germany
germany@safegate.com
+49 (0)231 9776754

India
india@safegate.com
+91 11 4106 1545

Malaysia
malaysia@safegate.com
+60 16 551 7126

Qatar
qatar@safegate.com
+974 436 9628

Russia
russia@safegate.com
+7 495 917 4614

Singapore
singapore@safegate.com
+65 6289 6893

Spain
spain@safegate.com
+34 917 157 598

UK
uk@safegate.com
+44 (0)208 573 0384

USA
usa@safegate.com
+1 763 535 92 99

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Safegate Group offers solutions for increased safety, efficiency and environmental benefits to airports around the world. The company was founded in 1973 and has its headquarters in Malmö, Sweden. Safegate Group has over 70 partners around the globe in order to be close to its customers. The latest members of Safegate Group, Thorn AFL and Idman, have both over 40 years of experience in airfield lighting solutions for airports and heliports worldwide. Safegate Group's complete range of products and services, a "one-stop shop", provides solutions to customers and airborne travellers around the globe.

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