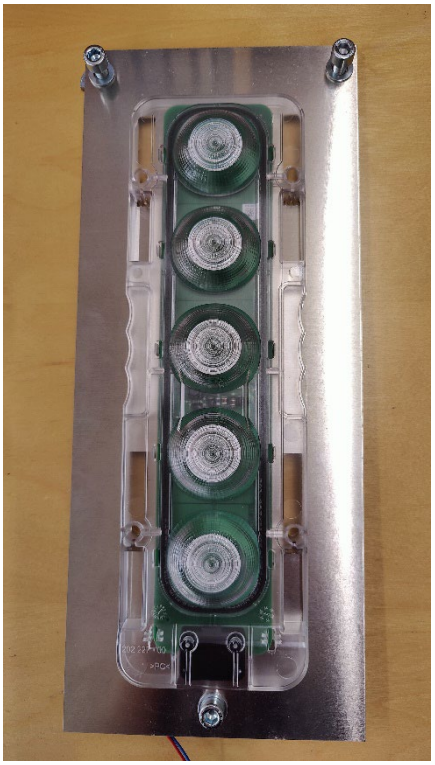
TKH AIRPORT SOLUTIONS



Installation and Operation Manual

LED Retrofit Kit for Guidance Signs

LED AGL
Airfield Ground Lighting

03-71094
V2.0

Preface

- Please read carefully and understand the contents of this manual.
- Failure to read the manual may result in serious injury, or serious damage to equipment.
- Make sure these instructions are always accessible for all users and ensure that you have read and understood the contents

Document Information

Name : ***05_LED_AGL_Installation_Instructions_Retrofit-Kit_For_Guidance_Signs_03-71094_EN_V2_0.pdf***

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2.0	06-12-2024	Full update

For the latest version of this document see https://www.tkh-airportsolutions.com/airfield-products/ or scan:

Table of Contents

1. About this manual

This manual includes technical information about the TKH Airport Solutions LED Retrofit Kit for Guidance Signs.

All standards settings and operations are detailed described in the Step-by-Step instruction in chapter 4.

1.1 Symbols used

The following marking conventions are used in this manual to draw attention to specific topics or actions:

DANGER! - This sign indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING - This sign indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION - This sign indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE - is used in this manual to indicate a situation that could result in damage to property or equipment.

The following symbols are used on equipment and in this manual to warn of potential hazards:

DANGER of electrical shock or arc flash. Failure to observe this warning will result in serious injury or death.

WARNING or **CAUTION**: where this symbol is used on the equipment, it is mandatory to consult the manual to find out the nature of potential hazards and any actions which have to be taken to avoid them.

1.2 Storing the manual

- This manual is a part of your product. Store the manual in a location that can be easily accessed by personnel working on the product.
- It is the responsibility of the company operating this equipment to ensure that its personnel is provided with a copy of this manual.

1.3 Limitations of the Document

TKH Airport Solutions reserves the right to revise this document without notification.

The data provided in this document is based on the most recent information at the time of publication. TKH Airport Solutions is continually seeking to ensure that its products are developed to the latest technological standards. As a result, it is possible that there may be some differences between the product and the information in this manual.

For further information regarding adjustment, maintenance or repair which is not described in this document, please contact the Customer Service department of TKH Airport Solutions on service@tkh-airportsolutions.com.

The information in this document concentrates solely on use of the products as intended by the manufacturer.

1.4 Terms and Abbreviations

This document may include the terms and abbreviations as listed below.

AGL	Airfield Ground Lighting
EASA	European Aviation Safety Agency
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Committee
LED	Light Emitting Diode

1.5 Liability and Warranty

TKH Airport Solutions cannot be held responsible for injuries or damage resulting from non-standard, unintended use, faulty or improper installation of its equipment, or failure to follow the instructions and safety guidelines in this manual. The safety of any system incorporating the LED module and Power Supply is the responsibility of any site installation, commissioning, maintenance, and operational personnel using the system.

NOTICE Disregarding the safety instructions in this manual will result in the loss of warranty in case of damage.

Refer to the general TKH Airport Solutions Terms and Conditions document supplied with your sales order contract for a complete liability and warranty description.

1.6 Manufacturer Details

TKH Airport Solutions

Elektrostraat 17
7483 PG Haaksbergen
The Netherlands

Tel.: +31 (0)53 5741456

Email: info@tkh-airportsolutions.com

Internet: www.tkh-airportsolutions.com

For service requests, please contact the TKH Airport Solutions Customer Service department:

Email: service@tkh-airportsolutions.com

2. Safety

2.1 General Safety Instructions

This section contains general safety instructions for using your TKH Airport Solutions equipment. Some safety instructions may not apply to the equipment in this manual. 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.

2.2 Qualified Personnel

The term "qualified personnel" is defined here as a person who thoroughly understands the equipment and its safe installation, 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 installing, operating, or maintaining this equipment to ensure that its personnel meet these requirements.

2.3 Intended use

Use of this equipment in ways other than described in the datasheet and this manual may result in personal injury, death, or property damage. TKH Airport Solutions cannot be held responsible for injuries or damage resulting from non-standard, unintended application 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 to be unintended use. Unintended use 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 TKH Airport Solutions replacement parts or accessories
- using materials or auxiliary equipment that are inappropriate or incompatible with your TKH Airport Solutions equipment
- allowing unqualified personnel to perform any task

2.4 Installation

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.

Read the safety and installation sections of all system component manuals before installing your equipment.

- Allow only qualified personnel to install TKH Airport Solutions equipment 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.
- Do not hold or carry the light assemblies by the cables.
- Install all electrical connections according to local codes and regulations, 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 the wires will not be damaged by moving equipment and animals (e.g. rodents).
- Protect components from damage, wear, and harsh environmental conditions.
- Allow sufficient 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 maintenance, re-install them immediately after the work is completed and check them for proper functioning.

2.5 Operation

Only qualified personnel (see section Qualified Personnel) 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.
- Never look directly in the light source while the power is ON.

2.6 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. Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks. Only persons who are properly trained and familiar with TKH Airport Solutions equipment are permitted to service this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved TKH Airport Solutions 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.

3. About the LED Retrofit Kit for Guidance Signs

Taxiway Guidance Signs (TGS) equipped with halogen lamps or fluorescent tubes are inefficient and consume a lot of power. With the LED Retrofit Kit, existing TGS can be upgraded to LED technology, reducing power consumption by up to 70% while creating a uniform light distribution. The signs could be upgraded to meet ICAO light distribution requirements. The retrofitted signs will have low power consumption with more than 50,000 hours lifetime of the LED modules when in full operation.

The LED Retrofit Kit consists of four main components: the LED Module, an internal connection cable, an external connection cable, and an electronic driver with 6.6A or 230V supply.

One LED Module array will illuminate a sign surface area of 400mm wide and 600mm high. The amount of LED Modules required per sign will depend upon its overall size (length, height and depth). A configuration table is available in section 3.4 of this manual or in the Data Sheet, to calculate requirements for each size of sign.

3.1 Key Features

- Simple retrofit method requiring no more than 1 hour for each sign
- Each LED module array fitted with 5 high-performance LEDs with an expected lifetime of 50,000 hours
- All components resistant to corrosion
- Optional fail-open functionality

3.2 Standards

The LED module and Power supplies have been developed according to the following standards:

- IEC 62031:2020
- IEC 60598-1:2020
- ICAO Annex 14, 9th edition

Be aware that the above standards only apply to the items delivered by TKH Airport Solutions (LED module and power supply) and not to the complete sign.

3.3 Description

To retrofit your Taxiway Guidance Sign, the following items are required:

- A number of LED sign modules, each for 24 VDC – 400 mA.
- The same number of aluminum plates with socket for the LED module.
- 1x internal cable for every LED module
- 1 or more electronic drivers with 6.6 A or 230 V supply
    - Maximum 6 LED modules can be connected on one 6.6 A electronic driver
    - Maximum 10 LED modules can be connected on one 230 V electronic driver
- 1x external cable from the external power supply to the electronic driver

3.4 Sign configuration

To choose the optimal orientation and quantity of LED modules in the sign, please refer to the tables below. Follow the configuration table to get as close as possible to ICAO standards. Be aware that the ICAO/EASA compliance is dependent on the complete sign.

To calculate the amount of LED modules per sign, please follow these steps:

1. Determine the distance between the LED modules after installation and the front plate of the sign. Look at the below table to determine which calculation table to follow. The optimal distance between the LED module and the front plate would be 140 mm.

Configuration Table				
Distance to the front plate	**Optimal distance between modules (width)**	**Optimal distance between modules (height)**	**Relative illumination intensity**	**Follow configuration table:**
100 mm	300 mm	500 mm	196%	1
120 mm	350 mm	550 mm	136%	2
140 mm	400 mm	600 mm	100%	3
160 mm	450 mm	650 mm	77%	4
180 mm	500 mm	700 mm	60%	5

2. Measure the width and height of the sign surface (fascia)

3. Look at the appropriate configuration table below (as concluded in step 1) to determine the amount of LED modules per sign.

Table 1

Illuminated width x 100mm		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Height of sign surface (mm)	**Module configuration**	**Number of modules per sign**																								
400 – 500	**single row vertical**	2	3	3	3	4	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9	9	9	10	10	10
>500 – 600	**two rows horizontal**	4	4	4	4	4	6	6	6	6	6	8	8	8	8	8	10	10	10	10	10	12	12	12	12	12
>600 – 1000	**two rows vertical**	4	6	6	6	8	8	8	10	10	10	12	12	12	14	14	14	16	16	16	18	18	18	20	20	20
>1000 – 1200	**four rows horizontal**	-	8	8	8	8	12	12	12	12	12	16	16	16	16	16	20	20	20	20	20	24	24	24	24	24
>1000 – 1500	**three rows vertical**	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2

Illuminated width x 100mm		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Height of sign surface (mm)	**Module configuration**	**Number of modules per sign**																								
400 – 550	**single row vertical**	2	2	3	3	3	4	4	4	4	5	5	5	6	6	6	6	7	7	7	8	8	8	8	9	9
>550 – 700	**two rows horizontal**	4	4	4	4	4	4	6	6	6	6	6	8	8	8	8	8	8	10	10	10	10	10	12	12	12
>700 – 1100	**two rows vertical**	4	4	6	6	6	8	8	8	8	10	10	10	12	12	12	12	14	14	14	16	16	16	16	18	18
>1100 – 1400	**four rows horizontal**	-	-	8	8	8	8	12	12	12	12	12	16	16	16	16	16	16	20	20	20	20	20	24	24	24
>1100 – 1650	**three rows vertical**	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3																										
Illuminated width x 100mm		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Height of sign surface (mm)	Module configuration	Number of modules per sign																								
400	single row horizontal	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5
>400 – 600	single row vertical	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8
>600 – 800	two rows horizontal	2	4	4	4	4	4	4	6	6	6	6	6	6	8	8	8	8	8	8	10	10	10	10	10	10
>800 – 1200	two rows vertical	4	4	4	6	6	6	6	8	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14	16	16

Table 4																										
Illuminated width x 100mm		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Height of sign surface (mm)	Module configuration	Number of modules per sign																								
400 – 450	single row horizontal	1	2	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	5	5	5	5
>450 – 650	single row vertical	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	6	6	7	7	7
>650 – 900	two rows horizontal	2	4	4	4	4	4	4	4	6	6	6	6	6	6	8	8	8	8	8	8	8	10	10	10	10
>900 – 1300	two rows vertical	4	4	4	4	6	6	6	6	8	8	8	8	8	10	10	10	10	12	12	12	12	12	14	14	14

Table 5																										
Illuminated width x 100mm		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Height of sign surface (mm)	Module configuration	Number of modules per sign																								
400 – 500	single row horizontal	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	4	4	4	4	5	5
>500 – 700	single row vertical	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6
>700 – 1000	two rows horizontal	2	2	4	4	4	4	4	4	4	6	6	6	6	6	6	6	8	8	8	8	8	8	8	10	10
>1000 – 1400	two rows vertical	4	4	4	4	4	6	6	6	6	6	8	8	8	8	8	10	10	10	10	10	12	12	12	12	12

4. Installation

4.1 General recommendations prior to the installation

Upon receipt of goods at the site store, check all packaging 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.

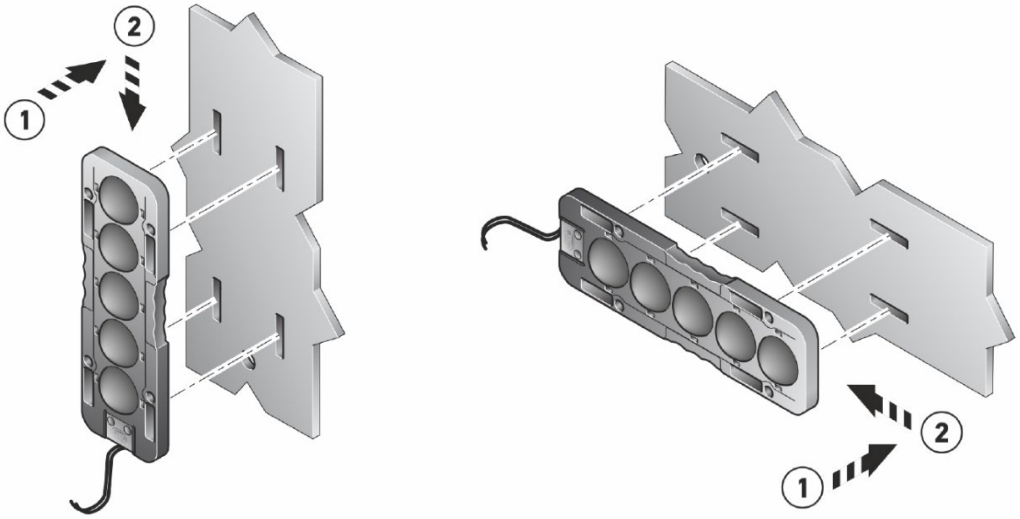
Store the LED-module preferably in its original packaging in a protected area. When stored unpacked, please take care not to damage the cable insulation.

Unpack the LED-module at the installation site to avoid damage during transportation and handling.

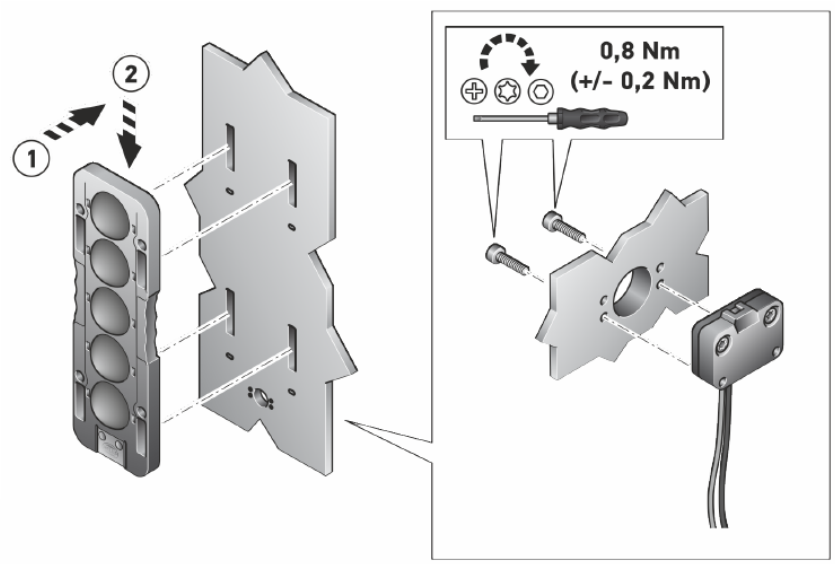
4.2 LED Module Assembly

The LED modules should be assembled to the aluminum plates using the clips. Assembly can be done vertically or horizontally:

- Vertically: introduce the LED module into the aluminum plate and push it down (cable plug showing downward)
- Horizontally: introduce the LED-module into the aluminum plate and push it sideward (orient the cable plug as shown on the picture)



Fix the plug in the aluminum plate as shown on the below picture. Use the two 3 x 12mm screws and tighten them with a Torx screwdriver (torque setting 0.8 Nm (+/- 0.2 Nm).



Connect the internal cables to each other and connect the internal cable group to the power supply as explained in chapter 4.4.

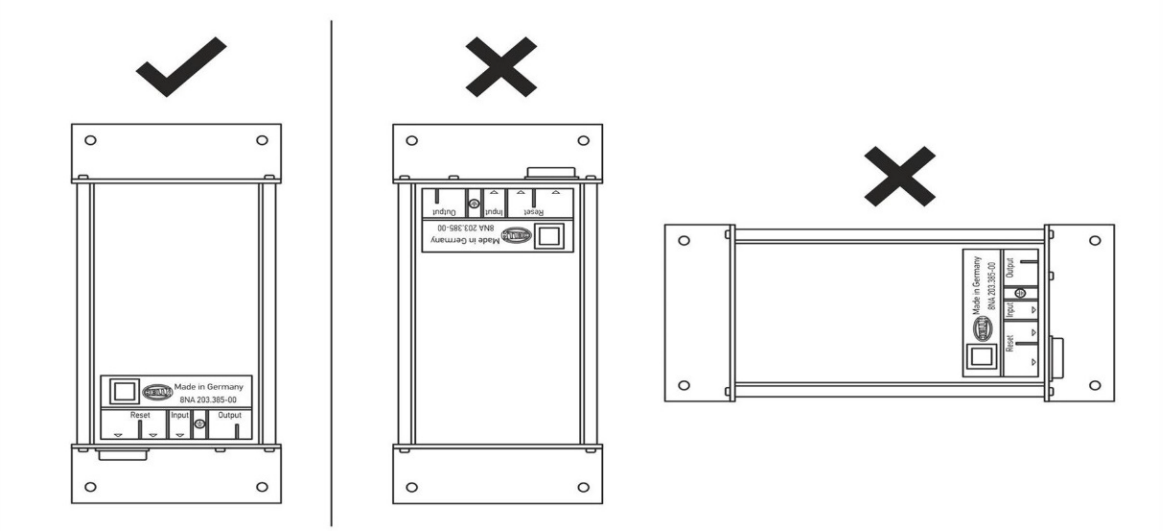
4.3 Power Supply

The LED Retrofit kit is available with a 6.6 A Power Supply and a 230 V Power Supply.

4.3.1 6.6 A Power Supply

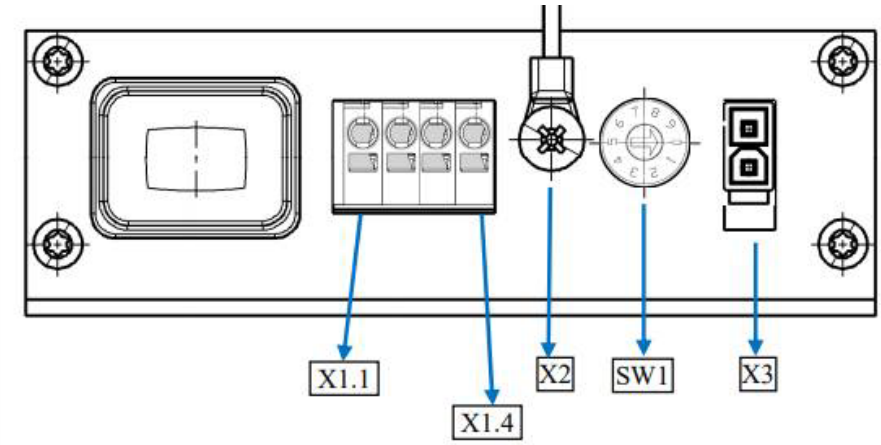
Depending on the type of sign, the power supply should be mounted inside the sign box. When mounting the power supply, make sure that it is built vertically and the connections show downward.

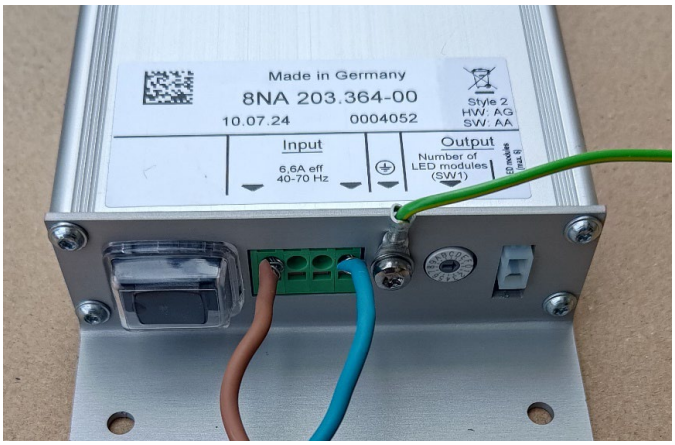
Recommended screw size for installing the power supply is M4 x 10mm. Screws are not included by default but can be ordered upon request (or bought in a regular tool shop).



Follow the steps below to configure the power supply:

1. Connect the external red cable (minus) into socket X1.1
2. Connect the external blue cable (plus) into socket X1.4
3. Connect the green earthing cable into socket X2
4. Connect the internal cable group (for LED modules) into socket X3.
5. Set the SW1 wheel:
    a. For power supplies without fail-open functionality: set wheel SW1 to “0”
    b. For power supplies with fail-open functionality: set wheel SW1 according to the number of LED modules you want to connect (maximum 6 per power supply)





4.3.2 230 V Power Supply Interface

The 230 V power supply does not have any monitoring of the LED modules (e.g. no fail-open functionality). Input voltage is 110 V / 230 V.

Follow the steps below to install the power supply:

1. Mount the power supply in the sign box
2. Connect the external cables in the input socket
3. Connect the internal cable group (for LED modules) in the output socket

5. Maintenance and Trouble shooting

When a sign is reported as failed, the following steps should be followed.

5.1 Maintenance of Power Supplies with Fail-Open

1. Switch off the power
2. Set the SW1 to “0”
3. Open the sign
4. Remove or change the failed LED
5. Reset the fail-open connector with a fail-open reset tool (magnet)
6. Close the sign
7. Set the SW1 back to the number corresponding with the amount of LED modules connected to the power supply
8. Switch the power back on

5.2 Maintenance of Power Supplies without Fail-Open

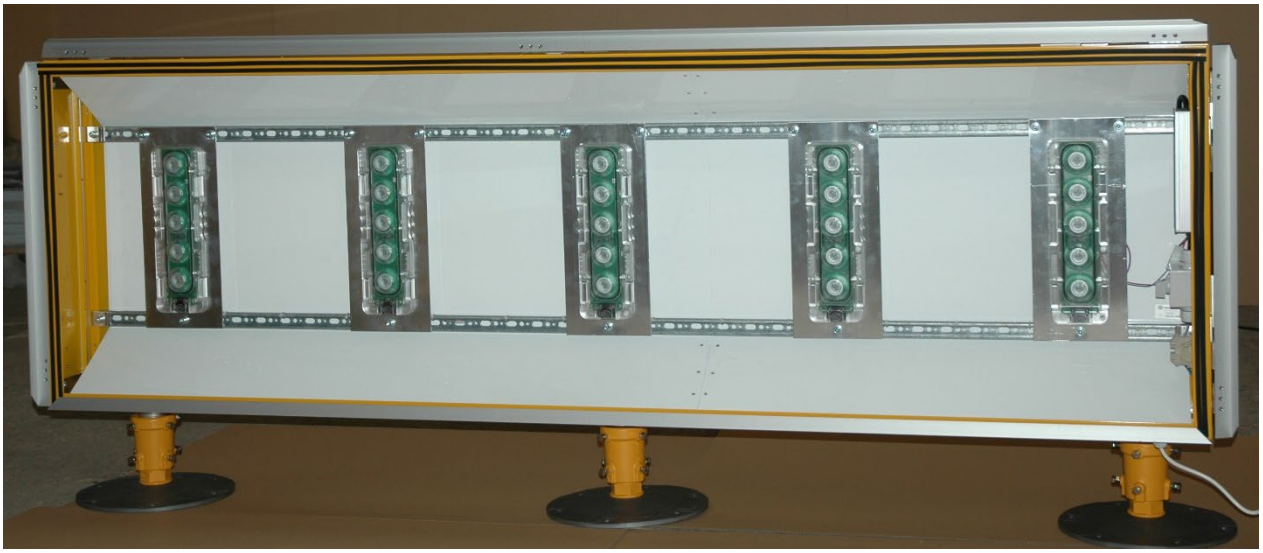
1. Switch off the power
2. Open the sign
3. Remove or change the failed LED
4. Close the sign
5. Switch the power back on

6. Spare Parts

The following items can be ordered separately – contact our sales team for more information and pricing.

Name	Product Number
LED Module	203.361-008
Aluminium plate with socket for LED Module	40-6352
Internal cable (1 per LED module)	203.362-008
Power Supply (electronic driver) 6.6 A	203.364-007
Power Supply (electronic driver) 6.6 A with fail-open monitoring	203.365-007
Power Supply (electronic driver) 230 V	845250
External cable group	203.363-008
Fail-Open Reset Adapter	214.528-007/1
M4 x 10 mm screws, per piece	P-904055

7. Examples of retrofitted signs



Company profile:

TKH Airport Solutions is an innovator in airfield ground lighting, offering a complete range of LED AGL products. We build upon the know-how from a long and successful tradition of pioneering developments in the AGL and connectivity industry. Being part of the TKH Group, our company can build on a history of more than 90 years in smart connectivity, energy distribution and AGL.

More information:

TKH Airport Solutions
sales@tkh-airportsolutions.com
www.tkh-airportsolutions.com
+31 (0)53 57 414 56

Visiting address

TKH Airport Solutions
Elektrostraat 17
7483 PG Haaksbergen
The Netherlands

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