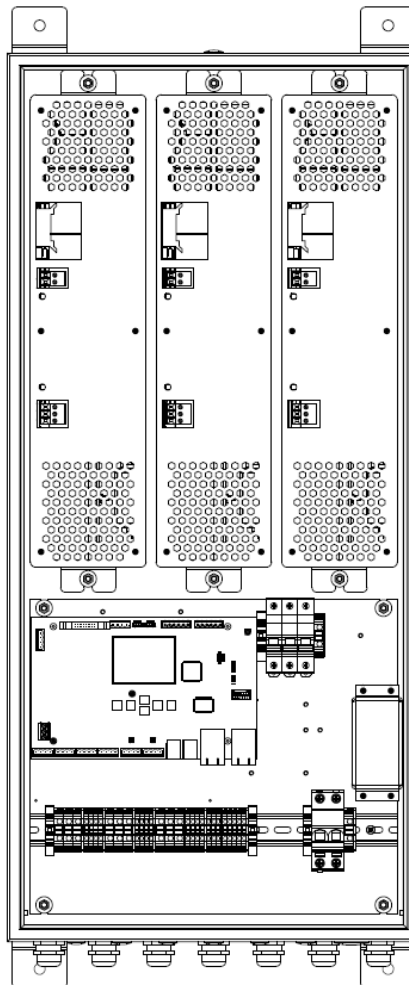


OBELUX Light Head Controller



User's Manual
Version 1.0

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1 CHANGE LOG

Version	Date:	Description:	Author
0.1	07.06.2016	Document created	AHa
0.9	10.10.2016	Draft version for internal review	AHa
1.0	20.10.2016	Document release	AHa

2 ABOUT THIS DOCUMENT

This document describes the Obelux Light Head Controller (LHC) operation for the end-user. This document covers the installation and setup of the LHC unit, use of graphical user interface and operation of the unit on a practical level. This document is intended for everyone who needs to install and setup a LHC unit for operation.

LHC	Light Head Controller Unit
COM	Controller Module of the Light Head Controller (LHC)
CP	Control Panel
GUI	Graphical User Interface
GPS	Global Positioning System

Table 1: Acronyms and Abbreviations

3 ABOUT THIS PRODUCT

Obelux Light Head Controller (LHC) is used for driving Obelux medium- and high-intensity aviation lights. The LHC consists in two major components, Controller Module (COM) and Power Supply Modules (PSM). COM controls PSM so that LHC takes constant power from network between flashing sequences. COM also takes care of lights' current monitoring, flash models, photocell, and GPS receiver to synchronize all LHCs' flash sequences all over the world. It also offers RJ45 and optic fiber connections so that a network of Light Head Controllers can be monitored over the Ethernet.

LHC is microprocessor-controlled. Application software is stored in the CPU, the central processing unit. The controller board is used in several Obelux products, and some of the connectors and features are not used in the Light Head Controller application.

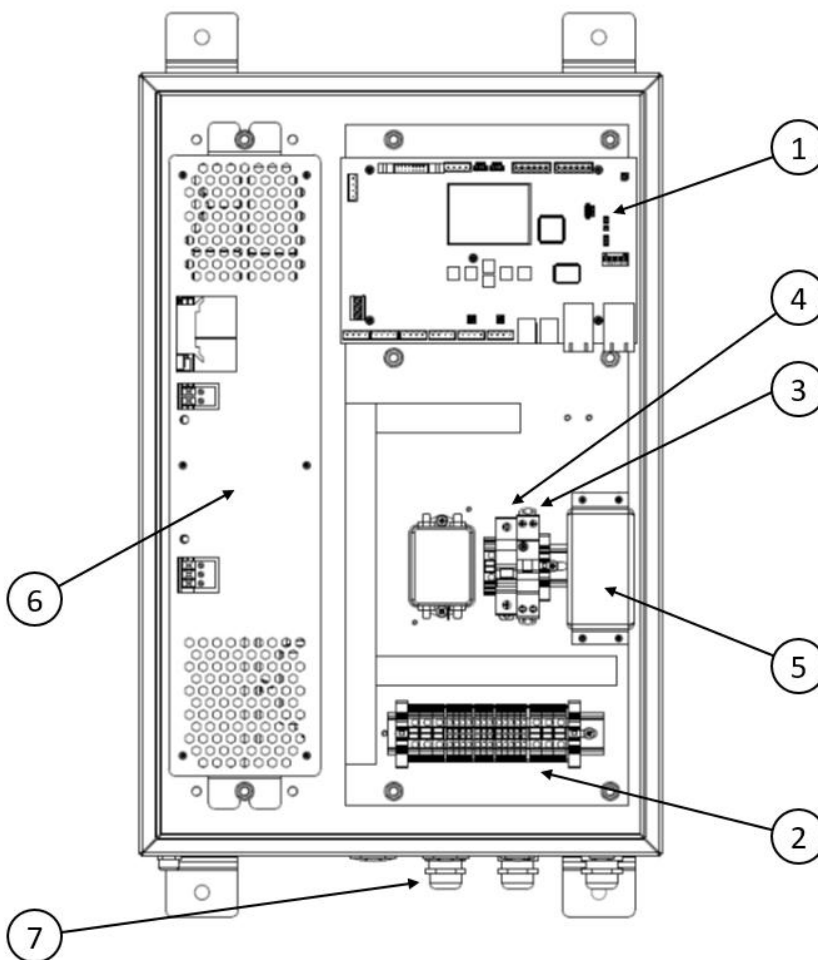


Figure 1: Main functional parts of the LHC 350W version

1. Controller module (COM)
2. Terminal block connectors
3. Main circuit breaker
4. Circuit breaker for PSM
5. Over voltage protectors
6. Power supply module (PSM)
7. Cable glands

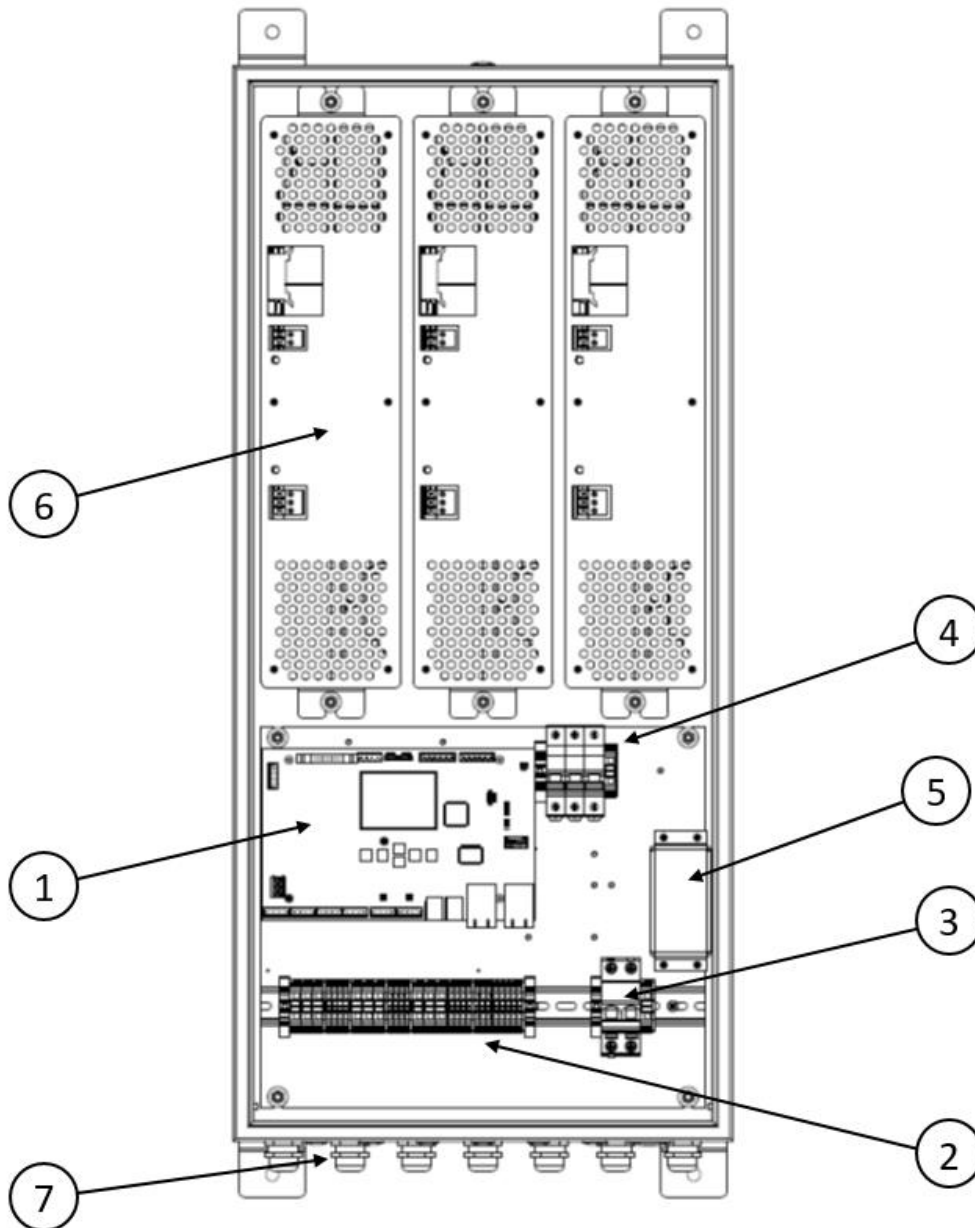


Figure 2: Main functional parts of the LHC 700W and 1050W version. 700W version has one less PSM module.

1. Controller module (COM)
2. Terminal block connectors
3. Main circuit breaker
4. Circuit breakers for PSM
5. Over voltage protectors
6. Power supply modules (PSM)
7. Cable glands

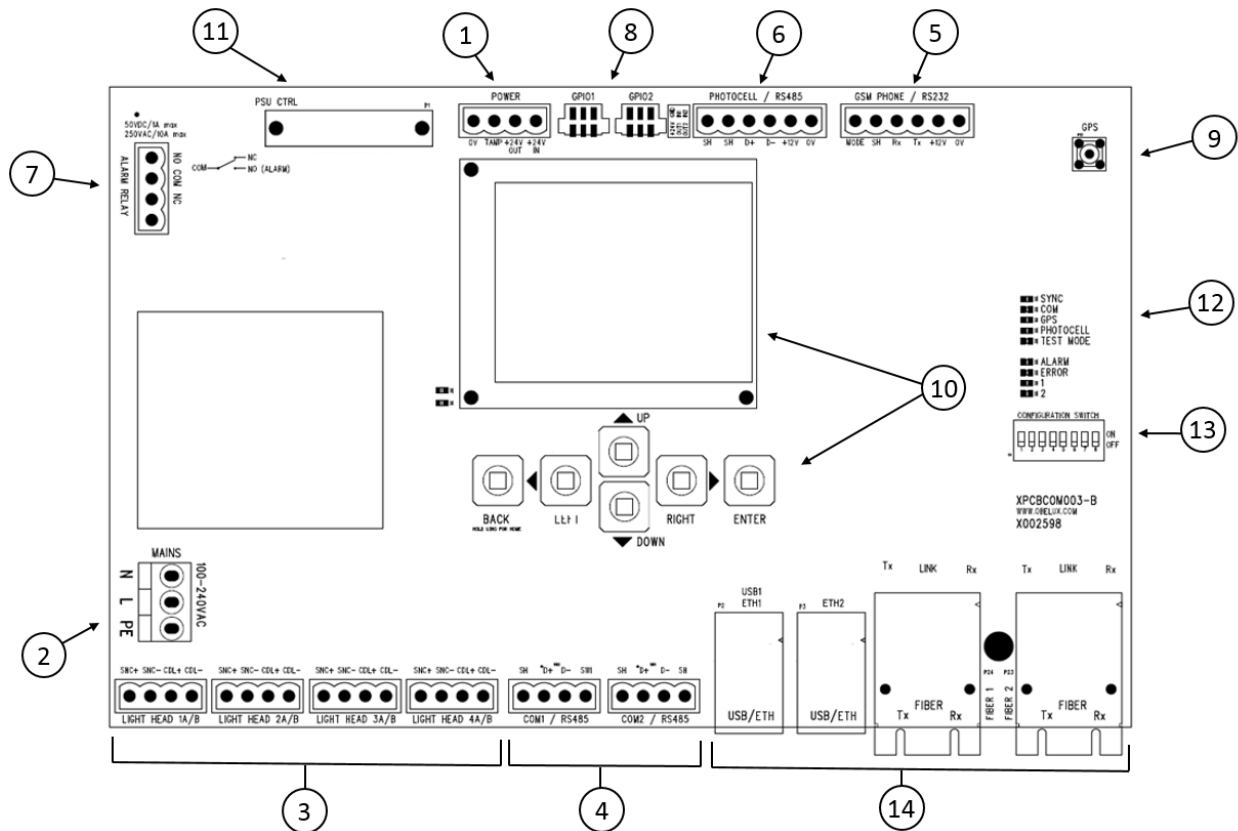


Figure 3: Controller module

1. Power out
2. Main power feed
3. LHC Output connectors (sectors)
4. RS-485 communication connectors
5. External GSM modem connector
6. External photocell connector
7. Alarm relay connector
8. GPIO connectors
9. GPS antenna connector
10. Display and keyboard
11. PSM control connector
12. Status LED indicators
13. Configuration DIP switches (not used in this application)
14. Ethernet LAN connectors (RJ45 and Optic Fibre)

The controller module is used in several Obelux products, and some of the connectors and features are not used in the Light Head Controller application. Most of the needed connections are wired to the terminal blocks shown in Figure 1 and 2.

3.1 Versions

Obelux LHC is available as the following models:

Order code	Max load	Input Voltage	Weight	Dimensions (LxWxD)
LHC048-1-xxx-y	350W	48VDC	25kg	650 x 400 x 213 mm
LHC100-1-xxx-y	350W	100VAC	25kg	650 x 400 x 213 mm
LHC115-1-xxx-y	350W	115VAC	25kg	650 x 400 x 213 mm
LHC200-1-xxx-y	350W	200VAC	25kg	650 x 400 x 213 mm
LHC230-1-xxx-y	350W	230VAC	25kg	650 x 400 x 213 mm
LHC048-2-xxx-y	700W	48VDC	45kg	970 x 450 x 200 mm
LHC100-2-xxx-y	700W	100VAC	45kg	970 x 450 x 200 mm
LHC115-2-xxx-y	700W	115VAC	45kg	970 x 450 x 200 mm
LHC200-2-xxx-y	700W	200VAC	45kg	970 x 450 x 200 mm
LHC230-2-xxx-y	700W	230VAC	45kg	970 x 450 x 200 mm
LHC048-3-xxx-y	1050W	48VDC	55kg	970 x 450 x 200 mm
LHC100-3-xxx-y	1050W	100VAC	55kg	970 x 450 x 200 mm
LHC115-3-xxx-y	1050W	115VAC	55kg	970 x 450 x 200 mm
LHC200-3-xxx-y	1050W	200VAC	55kg	970 x 450 x 200 mm
LHC230-3-xxx-y	1050W	230VAC	55kg	970 x 450 x 200 mm

xxx : G = GPS synchronization
F = Fiber optic connection
W = Webserver

y : M = For medium intensity lights
H = For high intensity lights

4 SAFETY INSTRUCTIONS

In this section you will find general safety instruction for the device. Please read the instructions carefully before installing or using the device to avoid any personal, environmental or material damages.

4.1 General considerations

Install device observing manufactures installation guide

Use only cables and connectors specified by the manufacture

Keep your device away from heat sources, dust, smoke or other harmful substances

Do not add or remove any components inside the device unless otherwise approved by the manufacture

Do not spill food or other liquids on device

If you have any error situation with the device, do not try to fix it by yourself, contact your reseller.

4.2 Environmental considerations

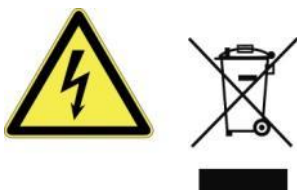
The European Parliament and the Council of European Union issued directive 2012/19/EU to contribute to sustainable production and consumption by, as a first priority, the prevention of WEEE and, in addition, by the re-use, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste and to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials.

Obelux aviation obstacle light products sold inside European Union can be returned to manufacturer if no local WEEE separate collection and re-use services are available. Please contact Obelux for details.

Obelux does not refurbish returned items but forwards them to authorized WEEE treatment facility.

4.3 Personal considerations

HIGH VOLTAGE! Device contains high voltage which is very dangerous to human beings. Any direct contact to high voltage could lead to serious injury, worst case even death.



5 INSTALLATION

5.1 Device installation

Mount the device to the selected mounting point using quality made fasteners. When the cabin door is open, check that there is no inflow of water (incl. hail and snow) into the cabinet. Make sure that all unused glands or gland holes are sealed.

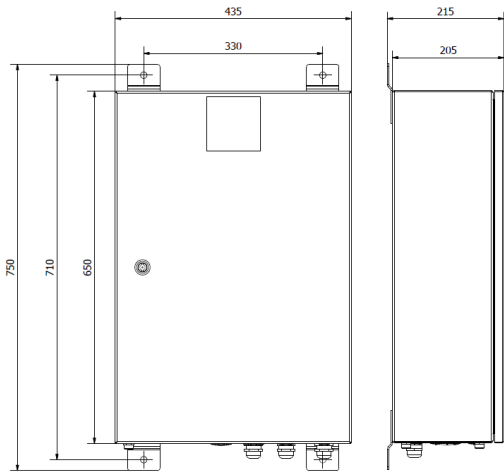


Figure 4: Cabin dimensions for 350W version

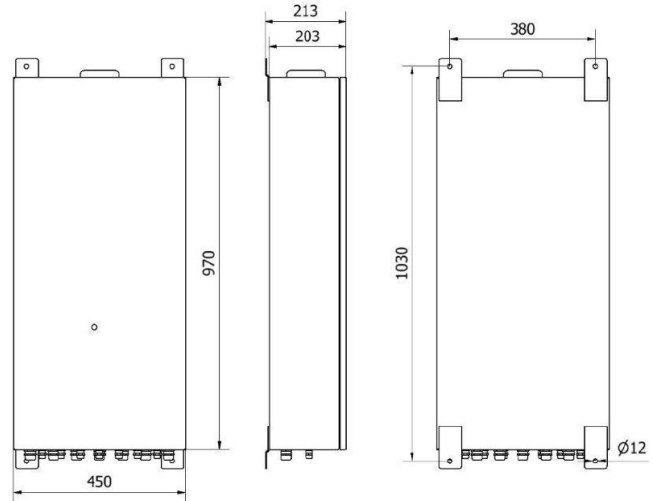


Figure 5: Cabin dimensions for 700W and 1050 versions

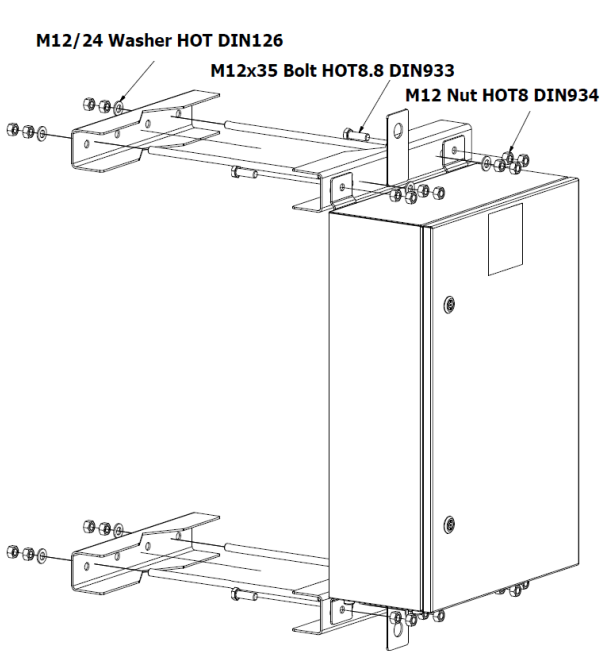


Figure 6: Mounting set for 350W version

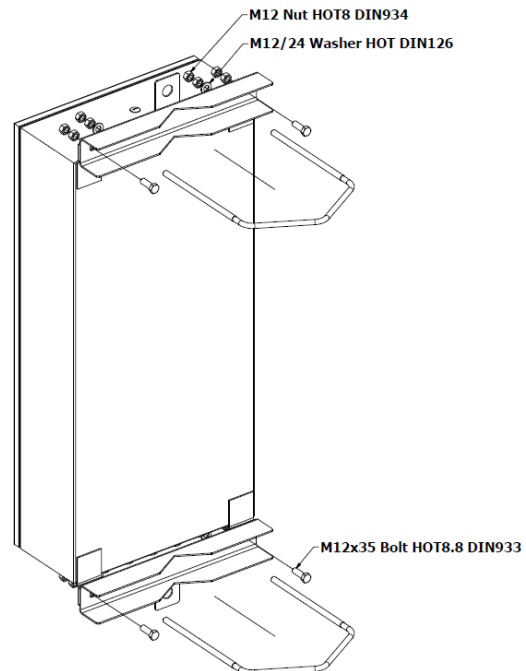


Figure 7: Mounting set for 700W and 1050W version

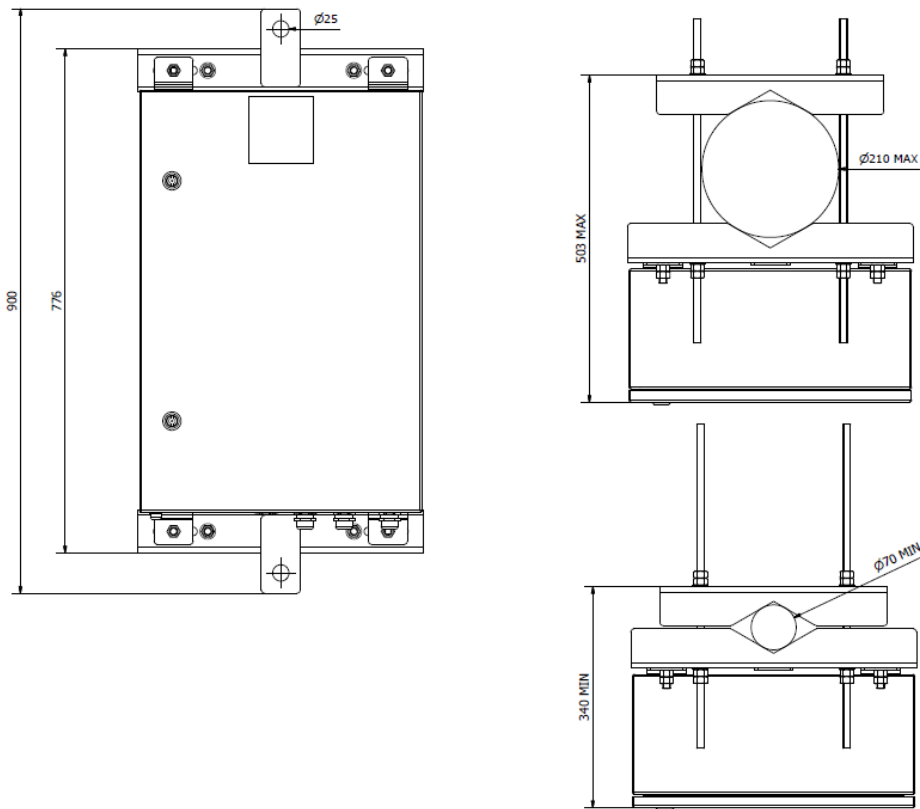


Figure 8: Mounting set dimensions for 350W version

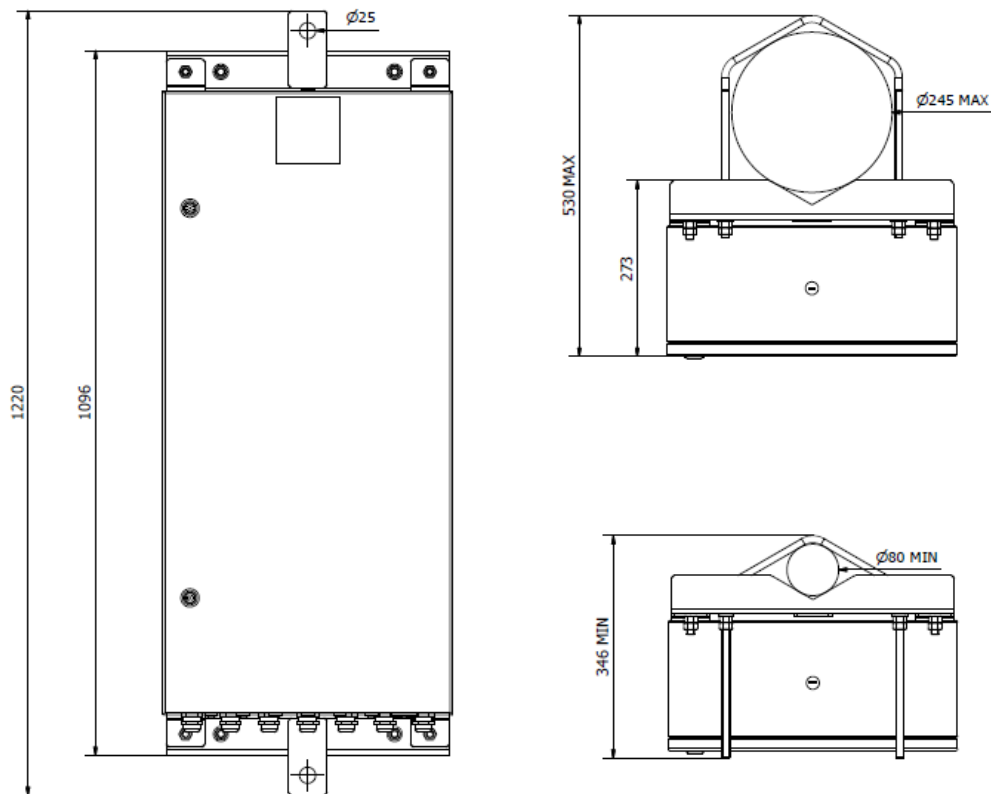


Figure 9: Mounting set dimensions for 700W and 1050W version

5.2 Wiring

Route cables using cable glands on the bottom side of the controller. Connect the cable wires securely to appropriate terminal block connectors. The cable gland used in both cabins is M25 (11-16 mm cable diameter).

Follow the illustration below to achieve desired EMC protection.



Please follow these instructions when routing cable via a cable gland:

1. Partially expose the braided screen by removing the outer sheath of the cable at a length of approx. 10 mm.
2. Insert the cable through the dome nut and the gland body until the contact spring is pressed against the braided screen.

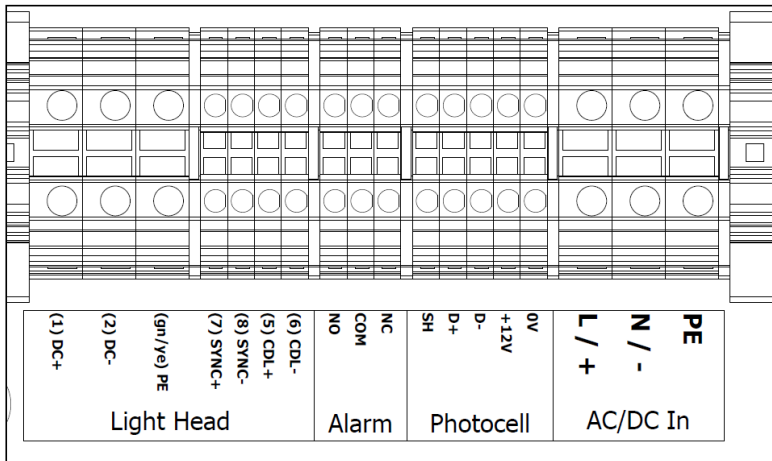


Figure 10: Light Head Controller connectors for 350W version

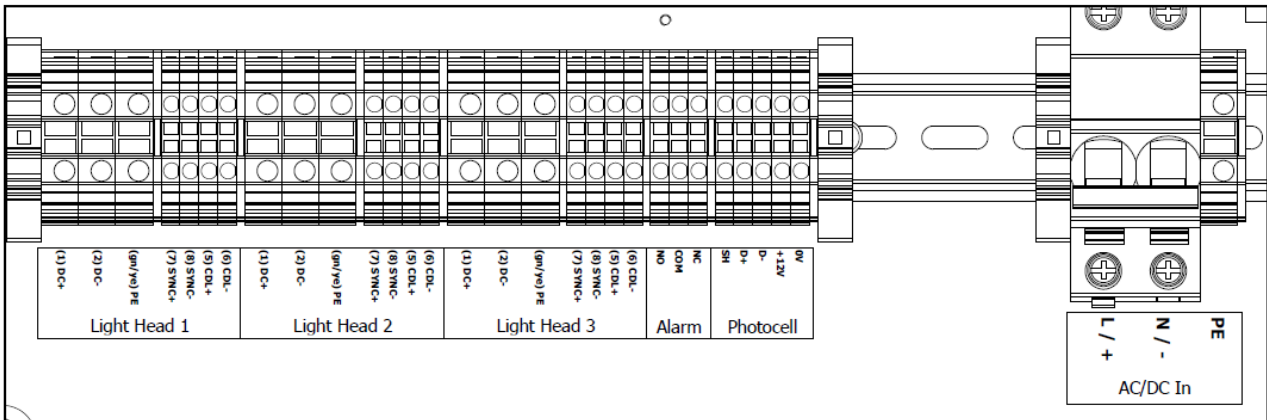


Figure 11: Light Head Controller connectors for 1050W version. 700W version is the same except one light head connector is missing.

5.2.1 AC/DC In

Mark	Description	Information
PE	Protective earth	PE line is typically indicated with yellow/green colour.
N	Neutral terminal	Colour typically blue
L	Live terminal	Colour typically brown

Connector is screw connection terminal block.

Conductor cross-section (350W) 0.2mm² - 10mm²

Conductor cross-section (700W, 1050W) 0.2mm² - 10mm²

5.2.2 Photocell

Mark	Description	Information
0V	0V v	0V voltage
+12V	+12V	12V voltage
D-	Data-	RS485 inverting pin
D+	Data+	RS485 non-inverting pin
SH	Shield	Shield

Connector is push in terminal block.

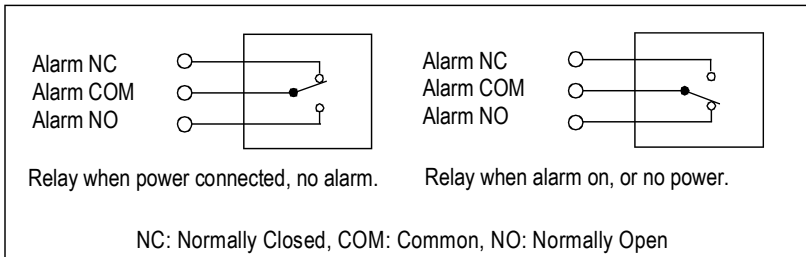
Conductor cross-section 0.2mm² - 4mm²

5.2.3 Alarm Relay Output

Mark	Description	Information
NC	Normally Connected	During normal operations, connected with COM (Common)
COM	Common	Common relay contact
NO	Normally Open	In alarm, connected with COM (Common)

Unused alarm relay connectors can be left floating i.e. no wiring there is required. When LHC is without power and when it starts (reboots), the relay signals an alarm. Alarm relay state changes during start-up process if there are no pending alarms to be signalled. Connector is push in terminal block.

Conductor cross-section 0.2mm² - 4mm²



5.2.4 Light Head 1-3

Mark	Description	Information
CDL-	CDL-	LH monitoring signal, negative
CDL+	CDL+	LH monitoring signal, positive
SYNC-	SYNC-	LH flash synchronization, negative
SYNC+	SYNC+	LH flash synchronization, positive
PE	Protective earth	PE line is typically indicated with yellow/green colour.
DC-	DC-	LH power, negative
DC+	DC+	LH power, positive

Connectors for the two nacelle lights power and data. Connector is push in terminal block.

Conductor cross-section (DC+/-, PE) 0.2mm² - 10mm²

Conductor cross-section (SYNC+/-, CDL+/-) 0.2mm² - 4mm²

5.2.5 GPS Antenna

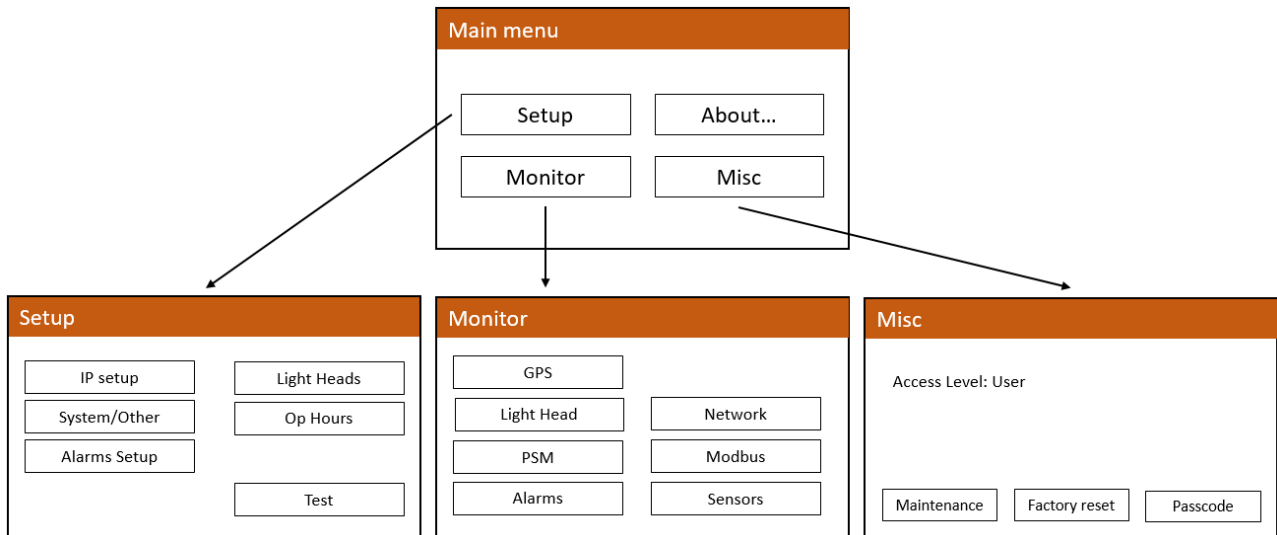
Antenna is connected to the SMA connector on the COM board. Connector location can be seen in the Figure 3. Be careful not to overtighten the connector.

5.2.6 Ethernet LAN connectors

Ethernet LAN ports. Two RJ-45 connectors and two optic fibre SC type connectors. Both connectors are on the COM board. Connector location can be seen in the Figure 3.

6 CONFIGURATION

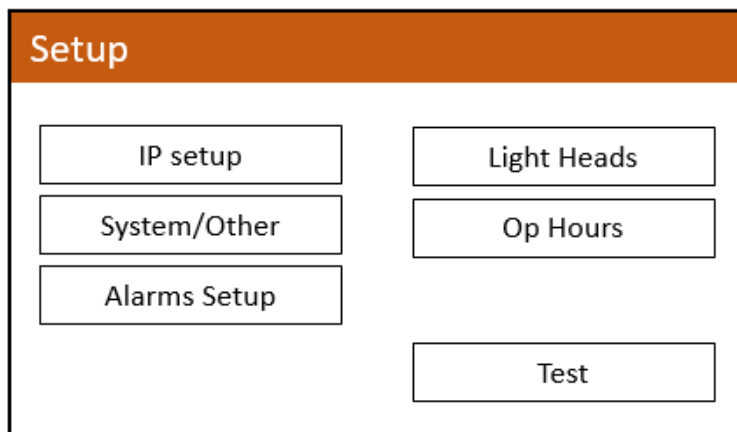
This chapter describes the configuration of the LHC. The configuration is carried out with COM board's keyboard and display. DIP switches are not used. Arrow buttons on the COM board are used to navigate the menus. Enter button selects a menu and back button returns to the previous menu.



The LHC software is divided in to two main sub-menus. From Setup menu the user can do all system configuration related tasks. In the Monitor sub-menu, the user can monitor the system status including possible faults.

6.1 Setup menu

From the setup menu user can setup IP address, Light Heads, change system settings and enable or disable alarm sources.



6.1.1 IP Setup

Ethernet settings for the Light Head Controller are set from IP setup menu. Select Apply to confirm settings. If you change the DHCP setting you must reset Light Head Controller by switching off its power. This can be done with the reboot button from the same menu. The IP address can be checked from the Monitor / Network menu.

IP Setup	
DHCP	OFF
IP	192.168.100.252
Netmask	255.255.255.0
Gateway	192.168.100.1
Reboot	

6.1.2 Light heads

Number and the type of light heads is setup from the Light Heads menu. Input the type of light to the first menu. On the next menu select the PSM (1-3) where the light head is connected to. Same is done for the rest of the light heads.

Light Head Setup			
LH 1	None	PSM1	Cal. Const: 100
LH 2	None	PSM1	100
LH 3	None	PSM1	100
LH 4	None	PSM1	100

When connecting a MI-20KW+2KR light to the LHC you can use one of the following settings.

350W:

LH 1 MI-20KW+ PSM1
LH 2 2KR PSM1

700W:

LH 1 MI-20KW+ PSM1
LH 2 2KR PSM1
LH 3 MI-20KW+ PSM2
LH 4 2KR PSM2

1050W:

LH 1 MI-20KW+ PSM1
LH 2 MI-20KW+ PSM2
LH 3 MI-20KW+ PSM3
LH 4 2KR PSM3

6.1.3 System / Other

From the system menu you can change photocell, visibility sensor and flash rate settings. After this the LHC is fully configured and ready to be used.

System / Other			
Photocell input		Modbus	
Light limits		Night: <50 Day: >100	
Vsen		None	
FPM Day	40fpm	FPM Night	60fpm
Flen. Day	100ms	Flen. Night	500ms

Photocell input

Photocell input options are the following;

None; No photocell

Modbus; Not used in LHC application

Local; A dedicated External photocell is connected to the Photocell terminal.

Light limits

Photocell ambient light limits [lux] for night and day can be selected from this menu.

Vsen

Visibility sensor can be enabled and disabled from this menu.

FPM Day / FPM Night

This menu lets you select the flashing rate for the day and night modes.

Flen. Day/Night

This menu lets you select the flash length for day and night mode.

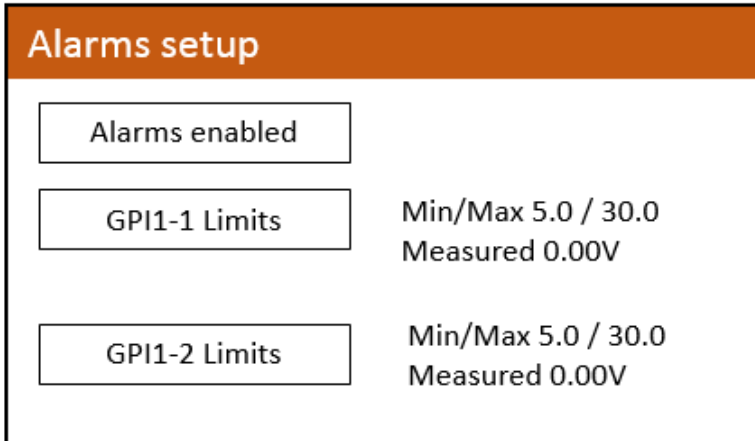
6.1.4 Op hours

Operating hours for different light heads can be monitored and if needed reset from the Operating hours menu. Reset is only available with admin rights.

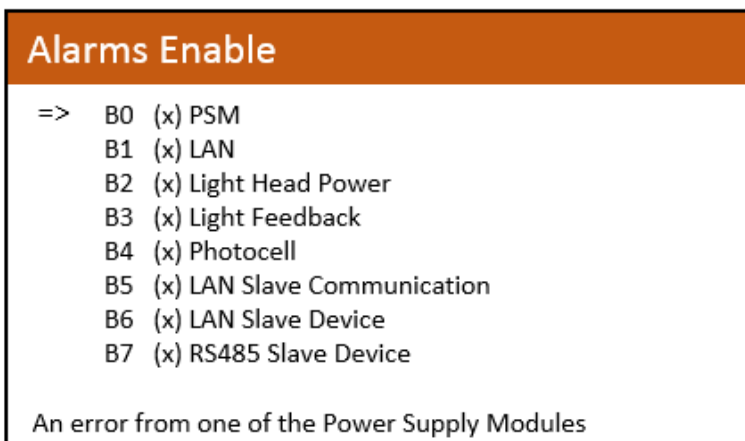
Operating Hours	
Light head 0	
A: 100 hours + 0ms	
B: 100 hours + 0ms	
< Prev	Reset
Next >	

6.1.5 Alarms setup

From the Alarms setup menu, the user can enable or disable certain alarm sources. It is not typically necessary to adjust the alarm settings.



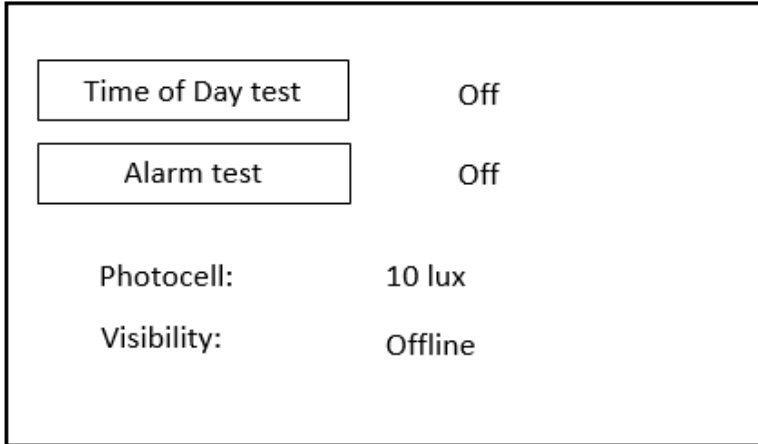
To disable an alarm source, uncheck the (x) mark in front of the alarm with the Enter button. Alarm source is described in more detail in the bottom of the screen.



B0 PSM	An error from one of the Power Supply Modules
B1 LAN	HTTP server or LAN error
B2 Light Head Power	Light head power draw is erroneous
B3 Light Feedback	Light head may not be lit up correctly
B4 Photocell	Photocell is not working properly
B5 LAN Slave Communication	LAN Slave device is not answering calls
B6 LAN Slave Device	LAN Slave device has an error condition
B7 RS485 Slave Device	RS485 Slave device has an error condition
B8 RS485 Communication	RS485 bus communication fault
B9 LH Life 80	Light Head is at 80% of specified usage hours
B10 LH Life 100	Light Head is at 100% of specified usage hours
B11 GPI1-1	Voltage of GPI is out of range
B12 GPI1-2	Voltage of GPI is out of range
B13 Visibility Sens.	Visibility sensor malfunction
B14 Modem	GSM/GPRS/3G modem malfunction

6.1.6 Test menu

This menu contains several test modes to test system installation and functionality. Active test modes are disabled after 24 hours. In other words, the LHC will return to normal operation after 24 hours. The menu also displays data and status of the photocell and visibility sensor.



Time of Day test

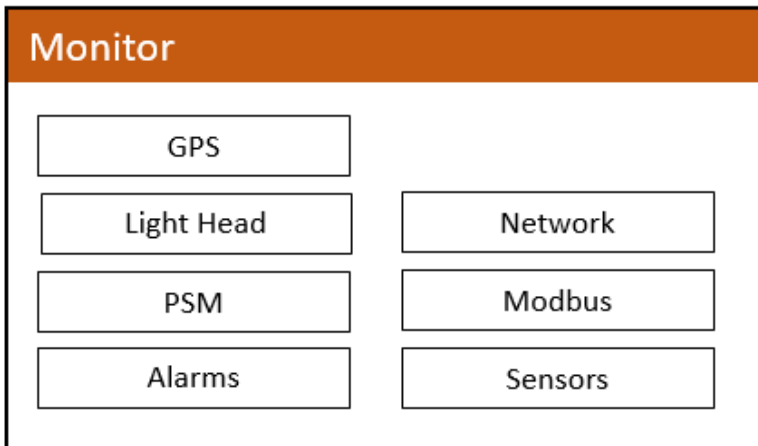
In Time of Day test mode, you can set the lights to day, twilight or night intensity.

Alarm test

Alarm test activates alarm relay(s).

6.2 Monitor menu

From monitor menu you can monitor the system status.



6.2.1 GPS

On GPS sub-menu there is a list about GPS information received from GPS satellite. In list current date and time (UTC) is shown. Also receiver location in latitude and longitude is shown. GPS status can be one of the following:

- GPS not installed; module is not installed
- GPS Error; GPS receiver not responding
- GPS No Fix; insufficient signal for GPS fix
- GPS OK; GPS module working and has GPS fix

6.2.2 Light Head

Light head menu contains data about the status of the light heads.

6.2.3 PSM

COM board collects different kinds of diagnostics data from the PSM module.

Status; Status of the PSM module
Power; Charging power as percentage from max
Setpoint; Target voltage for PSM
Vp; Voltage at the beginning of the flash (measured)
Va; Voltage at the end of the flash (measured)
Vdrop; Voltage drop during one flash

6.2.4 Alarms

Menu displays alarm status. Clear button will clear old alarms (OK* → OK)

OK; No alarm
Warning; Close to alarm limit
Fault; Alarm Active from subsystem
OK*; Subsystem has had an alarm. Alarm condition has since disappeared.

6.2.5 Network

On network status sub-menu there is a list about network settings and status. List shows LHC IP address, subnet mask and default gateway.

GC link; Not used in this application
Time RX; Device is receiving network time broadcast

6.2.6 Modbus

On Modbus sub-menu there is a list of devices connected to the Modbus connectors and their status information. More information is available by selecting the device from the list.

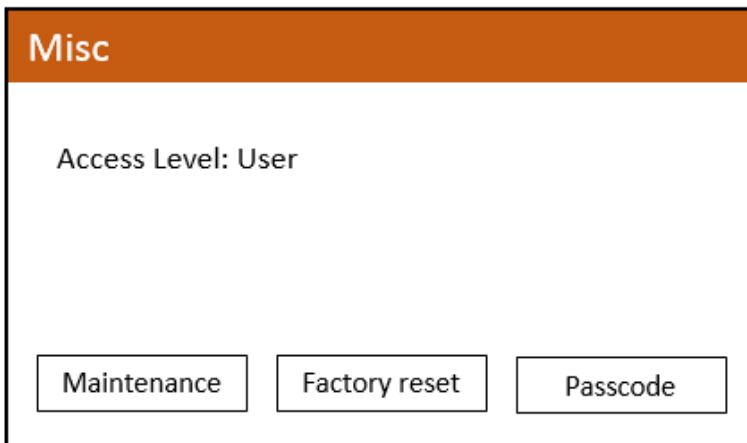
6.2.7 Sensors

On Sensors sub-menu there is information about the photocell and visibility sensors.

6.3 Misc menu

Contents of the *Maintenance* menu is not covered in this manual. Accessing this menu is necessary only in special cases. Obelux can provide more information about this menu if needed.

Factory reset button will reset the LHC to its factory settings. All LHC functionality is not available for the normal user. Entering a valid passcode will give access to these settings.



6.4 About menu

About menu shows different information about Light Head Controller SW version and copyright.

7 OPERATION

The LHC consists in two major components, Controller Module (COM) and Power Supply Modules (PSM). COM controls PSM so that LHC takes constant power from network between flashing sequences. COM also takes care of lights' current monitoring, flash models, photocell, and GPS receiver to synchronize all LHCs' flash sequences all over the world. More detailed description about each operation in next chapters.

7.1 Start-up

The LHC software makes series of start-up initializations when system is powered on. All status LED indicators are set on and off during start-up process. Start-up takes few seconds.

7.2 Current monitoring

The LHC monitors the current from each light heads every time when light is on. Current measurement is calculated from PSM voltage drop during a flash and it is compared to selected light head type. If the current going into a light is outside of light head type range, an alarm is generated.

7.3 Global synchronization with GPS

The LHC unit has an optional GPS module. When a GPS module is installed with appropriate antenna, the LHC synchronizes its clock and its flash models so that all LHC units flash simultaneously all over the world. The timing difference from one LHC to another is less than ± 1 millisecond. Flash synchronization can also come from the Control Panel if one is used in the system.

7.4 Photocell

An Obelux external photocell (PCE) is used to determine if the system should operate in day, twilight or night mode. One PCE unit needs to be installed to a network of LHCs. If there is also a Control Panel in the network, the PCE should be connected to it. For installations without a Control Panel, the PCE unit should be installed to the LHC acting as a master in the network. The LHC can be set as master in the Misc/Maintenance/Settings menu by changing LAN M/S setting to Master.

Readings are averaged to determine if day, twilight or night mode is used. The master then broadcasts this information to all the other LHCs in the network. Every LHC then sets the intensity of the lights based on the light head type's specification threshold.

7.5 Status collection and reporting

The LHC unit collects light head statuses and reports possible errors via alarm relay output or Web API. GUI can be used to see more detail; which light head or controller is causing the alarm and why. Same information is also available from the Global Controller. Status collection is done with 60 seconds interval via Ethernet.

B0 PSM	An error from one of the Power Supply Modules
B1 LAN	HTTP server or LAN error
B2 Light Head Power	Light head power draw is erroneous
B3 Light Feedback	Light head may not be lit up correctly
B4 Photocell	Photocell is not working properly
B5 LAN Slave Communication	LAN Slave device is not answering calls
B6 LAN Slave Device	LAN Slave device has an error condition
B7 Modbus Slave Device	RS485 Slave device has an error condition

B8 Modbus Communication	RS485 bus communication fault
B9 LH Life 80	Light Head is at 80% of specified usage hours
B10 LH Life 100	Light Head is at 100% of specified usage hours
B11 GPI1-1	Voltage of GPI is out of range
B12 GPI1-2	Voltage of GPI is out of range
B13 Visibility Sens.	Visibility sensor malfunction
B14 Modem	GSM/GPRS/3G modem malfunction

7.6 Status LEDs

This chapter describes the behavior of the on-board status LED indicators during normal and alarm situation.

SYNC

This LED will flash in sync with light heads.

COM (Green)

Not used in this application

GPS (Green)

This LED indicates GPS operation status. In normal operation this LED is off if GPS is disabled. If GPS is enabled and the signal is detected, LED is set on. It may take few minutes to detect GPS signal. If GPS signal is lost or valid UTC time is not received, LED will be switched off.

PHOTOCELL (Green)

This LED indicates that photocell is connected and working

ALARM (Red)

Alarm led is used when there is an active alarm

ERROR (Red)

Error LED is used to indicate that one of the alarm sources is close to an alarm limit

TEST MODE, 1, 2

Not used