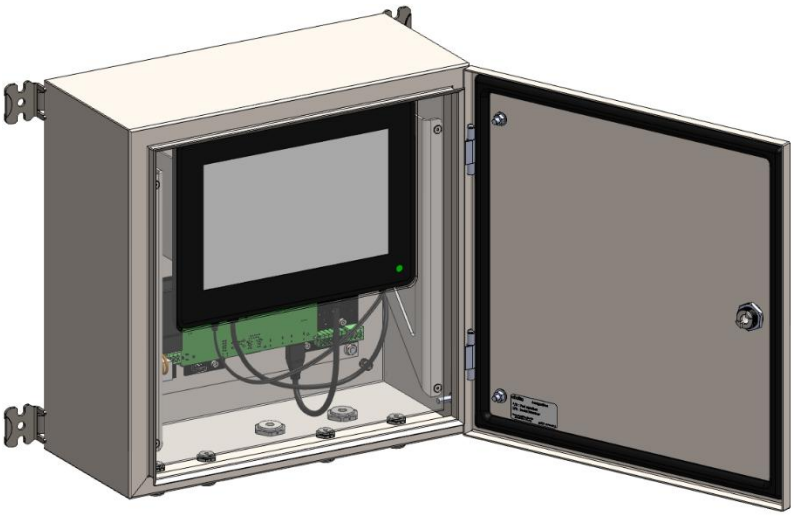
O-MAN-00022-OFH

USER MANUAL

Control unit for managing and monitoring medium- and high-intensity beacons in day and night modes.

OFH-CTR-CAN // 114803



www.obsta.com

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1. Product name and part number

1.1. Model identification

Designation	Part number (P/N)	Power supply	QR code
OFH-CTR-CAN	114803	110-240 Vac ±10% 50/60 Hz	
OFH-CTR-CAN (without GSM modem)	113625LA	110-240 Vac ±10% 50/60 Hz	

1.2. Version history and technical developments

Although the part number remains unchanged to ensure continuity in our catalog, this product has undergone major technical improvements since August 2026.

	Old version	Actual version
MODEM (only for 114803)	TRB 140	Integrated to the PCBa
SIM card	TRB 140	Integrated to the PCBa

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2. Caution



- Do not proceed with any maintenance job when the product is under operation.
- Power supply must be shut down when opening the flash-head or the cabinet.
- Installation must be performed only by an electrically skilled operator, and National electrical installation rules must be respected.
- Always wear appropriate Personal Protective Equipment (PPE) when installing, maintaining, or servicing the system.
- Any installation or maintenance operation performed at height must be carried out in strict compliance with fall-protection procedures.
- Do not look directly at the projector while it is in operation: LED projectors produce brilliant flashes of light which can result in temporary or permanent eye damage.
- OBSTA products may be affected by ESD, use state of the art precaution before manipulation.
- Unless otherwise specified, all cables must be shielded, and the shielding must be connected to ground.
- All cables connected to PCBs and terminal blocks must be equipped with a cable connector to prevent false contacts when connecting devices.



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3. Warranty

OBSTA warrants the equipment described in the instruction manual and sold to purchasers to be free from defects in material and workmanship at the time of shipment. OBSTA's liability under this warranty being limited to repairing or replacing, at OBSTA's option, items which are returned to it prepaid within twenty-four (24) months from shipment to the original Purchaser, or twelve months from commissioning, and found, to OBSTA's satisfaction, to have been defective. In no event shall OBSTA be liable for consequential damages. NO PRODUCT IS WARRANTED AS BEING FIT FOR A PARTICULAR PURPOSE AND THERE IS NO WARRANTY OF MERCHANTABILITY.

This warranty applies only if: (I) the items are used solely under the operating conditions and in the manner recommended in OBSTA's instruction manual, specifications, or other literature; (II) the items have not been misused or abused in any manner or repairs attempted thereon; (III) written notice of the failure within the warranty period is forwarded to OBSTA and the directions received for properly identifying items returned under warranty are followed; and (IV) such return notice authorizes OBSTA to examine and disassemble returned products to the extent OBSTA deems necessary to ascertain the cause of failure. The warranties stated herein are exclusive.

THERE ARE NO OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, BEYOND THOSE SET FORTH HEREIN, and OBSTA does not assume, nor does OBSTA authorize anyone else to assume for it, any other obligation or liability in connection with the sale or use of said products. OBSTA's liability on any claim of any kind, including negligence, for loss or damages arising out of or connected with the manufacture, sale, delivery, repair or use of any equipment or services provided by OBSTA shall in no case exceed the price allocable to the item or service or part thereof which gives rise to the claim.

The integrity and reliability of OBSTA aviation obstruction lighting systems is dependent on the use of OBSTA parts and components. To ensure the optimum performance and reliability of your OBSTA system, it is strongly advised that only components and modules manufactured by OBSTA be used.

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4. Introduction

4.1. General information

This manual provides information about the installation, operation and maintenance of the OFH-CTR-CAN controller that is used for LED medium and high intensity obstruction lighting systems manufactured by OBSTA. That controller can be used for white light only, bi-color or white in day and red at night.

4.2. Description

The controller enables maintenance, configuration, installation, and administration up to 64 white only or bicolor obstruction lights of high or medium intensity OFH series through a unique shield cable 3x0.5mm^2.

Key features:

- 316L stainless steel cabinet.
- Large touchscreen.
- Status and telemetry, humidity and temperature of each obstacle light connected to the controller via the control cable.
- Alarm threshold parameters.
- GPS for wireless synchronization and time setting.
- Surge protection
- Mode changing
- Connection of external photocell for DTN (Day/Twilight/Night) detection.
- Web monitoring on the OBSTA server via MQTT (modem >Ethernet or GSM).
- MODBUS TCP monitoring (on Ethernet).
- External wireless modem 4G, LTE (2G 3G compatible) with optional SIM card.

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4.3. Operation

The OFH-CTR-CAN controller performs several functions:

Beacon Monitoring and Management:

- **Centralized control**: This system allows you to control up to 64 medium- or high-intensity obstruction lights (white or two-color) via a single control cable.
- **Mode Management**: It controls the switching between day, twilight, and night modes using either an external light sensor or the built-in GPS. It is also possible to manually select one of these three modes via the touchscreen.
- **Flash settings**: This allows you to set the flash rate (flashes per minute – FPM) for each lighting mode.
- **Synchronization**: It ensures that the flashes are synchronized across the various beacons, primarily using the GPS signal.

Monitoring and Telemetry:

- **Real-time status**: It monitors the individual status of each connected light and displays its internal supply voltage, temperature, and humidity levels.
- **Service life**: This tracks the operating time of each beacon since its initial installation to plan for maintenance (default threshold is 131,400 hours).
- **System diagnostics**: It calculates the overall failure rate of the system in real time (the percentage of lights that are out or disconnected relative to the total number).

Communication and alerts:

- **Web Monitoring (MQTT)**: It transmits system data to OBSTA's remote monitoring server every 30 minutes via the MQTT protocol.
- **Local network integration (Modbus TCP):** It acts as a Modbus TCP slave, allowing a third-party monitoring system (SCADA/BMS) to read the controller's status and tag values.
- **Network connection**: It connects via an Ethernet port (RJ45) or can accommodate an optional external GSM modem (2G/3G/4G/LTE).

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Configuration and maintenance (via touchscreen interface):

- **Access security**: The interface offers three password-protected access levels (Read-only, Maintenance, and Configuration/Installation).
- **Visual topology**: The screen allows you to assign tags to different virtual “levels” of the obstacle using drag-and-drop, and to name them to facilitate visual maintenance.
- **Alarm Customization**: Users can set the trigger threshold for global alarms and configure a confirmation delay before an alert is sent.
- **Updates and Backups**: The controller allows you to update its own firmware as well as that of the connected sensors. It also lets you export and import all configuration data via a USB flash drive.

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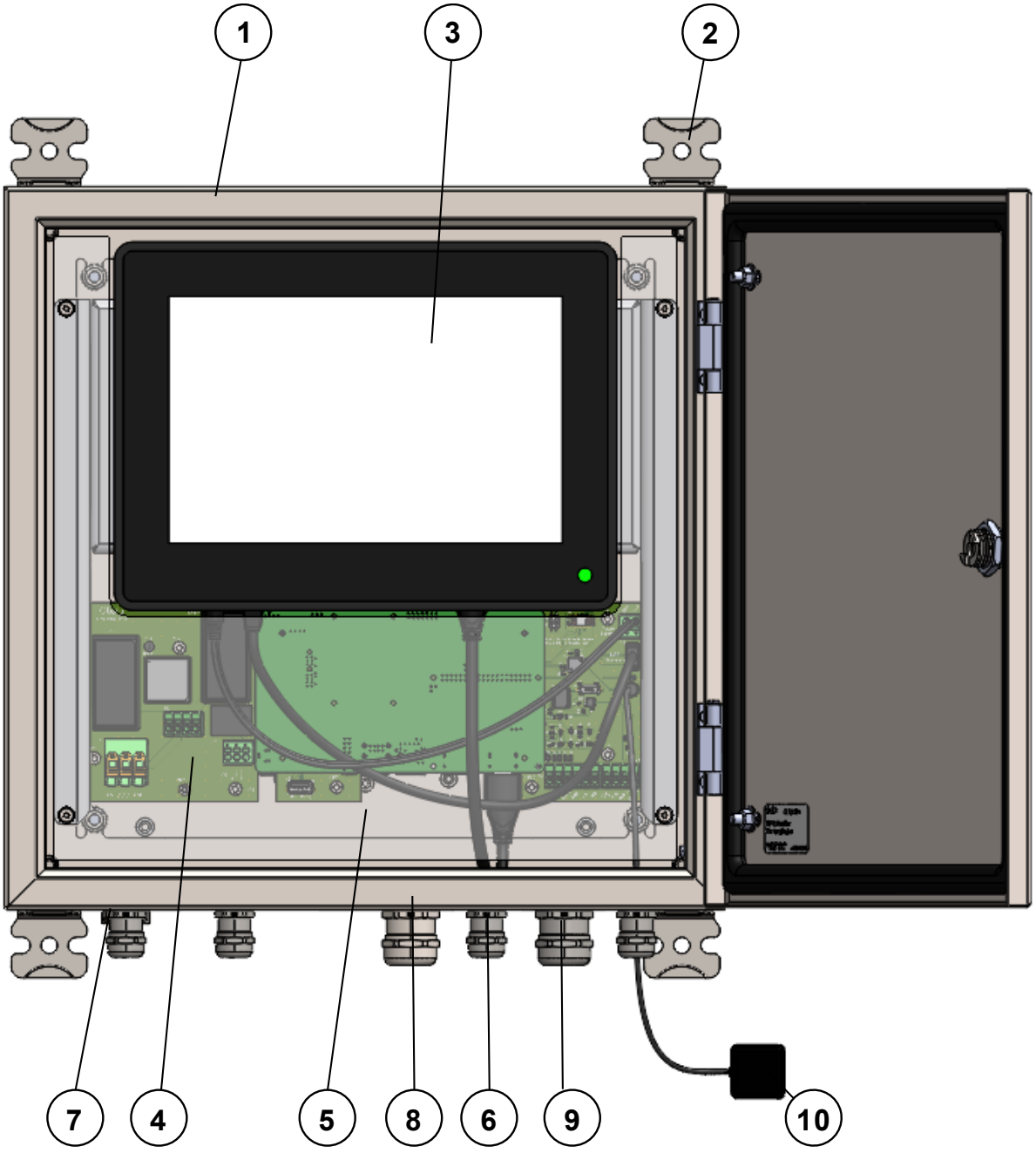
5. Installation

5.1. Unpacking

Carefully unpack the product and remove any internal packing material. Examine each item for obvious physical damage. Immediately report any claims to the carrier.

It is strongly recommended that you wire the product and check that it works correctly at ground level before final installation.

5.2. Overview



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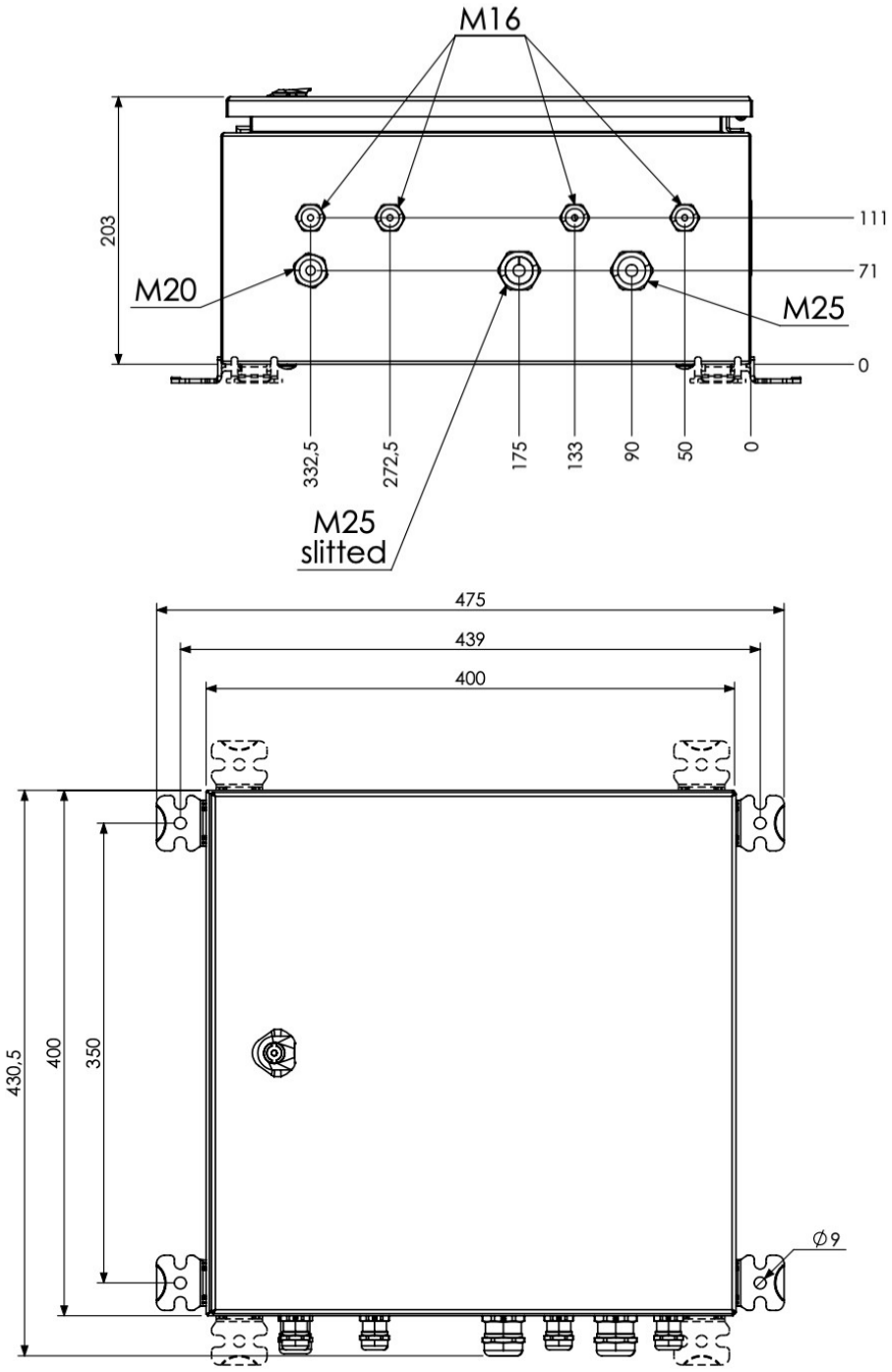
Nbr	Designation
1	Stainless steel enclosure
2	Mounting bracket (hole diameter 9 mm)
3	Touch screen
4	PCB
5	Plexiglass protective plate
6	M16 Cable gland
7	M20 ventilated gland
8	Slitted M25 cable gland
9	M25 cable gland
10	Antenna

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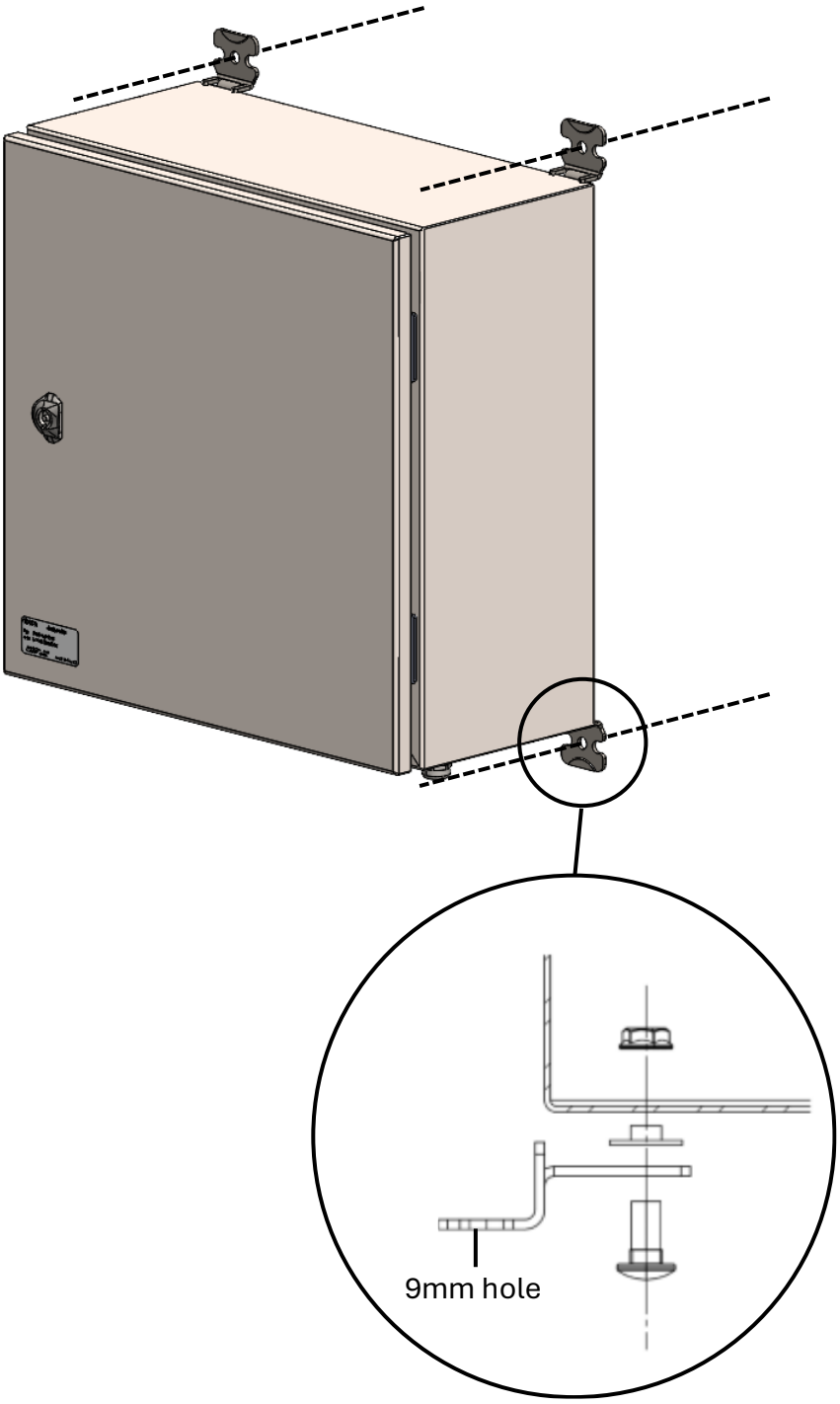
5.3. Mounting

Any work on the cabinet must be carried out with the power supply disconnected. Any intervention on OBSTA products without precaution can cause physical injury to the operator and irreversible damage to the equipment.

The controller must be installed in a vertical position with the cable glands pointing towards the ground using a spirit level, in a position that is easy to access for maintenance purposes.



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6. Wiring

6.1. Caution before wiring

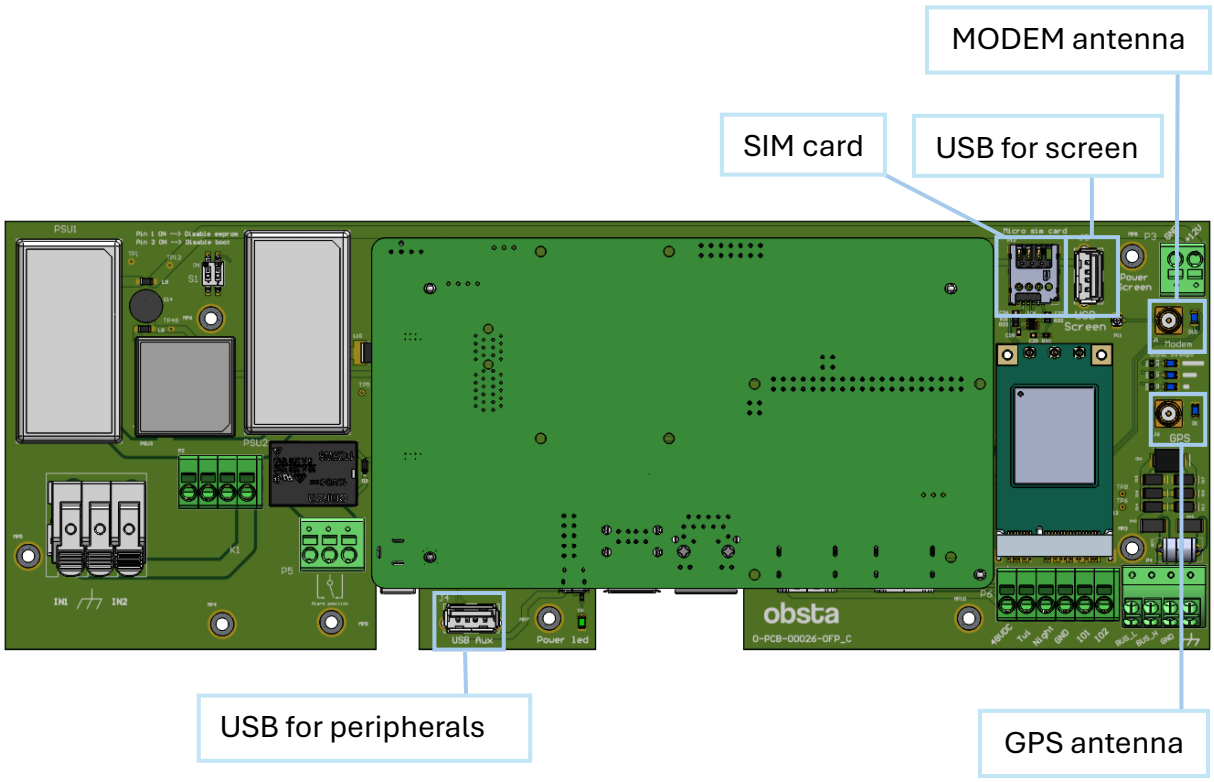
- **Power OFF**: Always ensure the main power supply is completely turned off before starting any wiring work.
- **Verify voltage**: Confirm the voltage level of the circuit. Be aware of high-voltage hazards.
- **Use proper PPE**: Wear personal protective equipment (insulated gloves, safety glasses, and safety shoes).
- **Secure the work area**: Ensure the aera below is cordoned off to prevent injury from falling tools or components.
- **Check equipment ratings**: Confirm the product's voltage and current ratings match the installation circuit.
- **Inspect components**: Examine all parts (wires, connectors, terminals) for damage before wiring.
- **Proper tools**: Use insulated tools appropriate for electrical work.
- **Follow wiring diagram**: Refer to OBSTA's schematic to ensure correct connections.
- **Grounding**: verify proper grounding/earthing for all metal parts and enclosures.
- **Secure wiring**: Fasten cable properly to prevent strain, chafing, or accidental disconnection.
- **Verify before powering**: Double check all connections before restoring power.
- **Shielded cable**: Cables must be shielded when used in electromagnetic fields.
- **Position**: The lamps shall be installed as close as possible to the command box and connected using a 2x1.5mm^2 cable.
- **Polarities**: The polarities must be correctly positioned on the DC power supply. If reversed, the printed circuit board may be seriously damaged.

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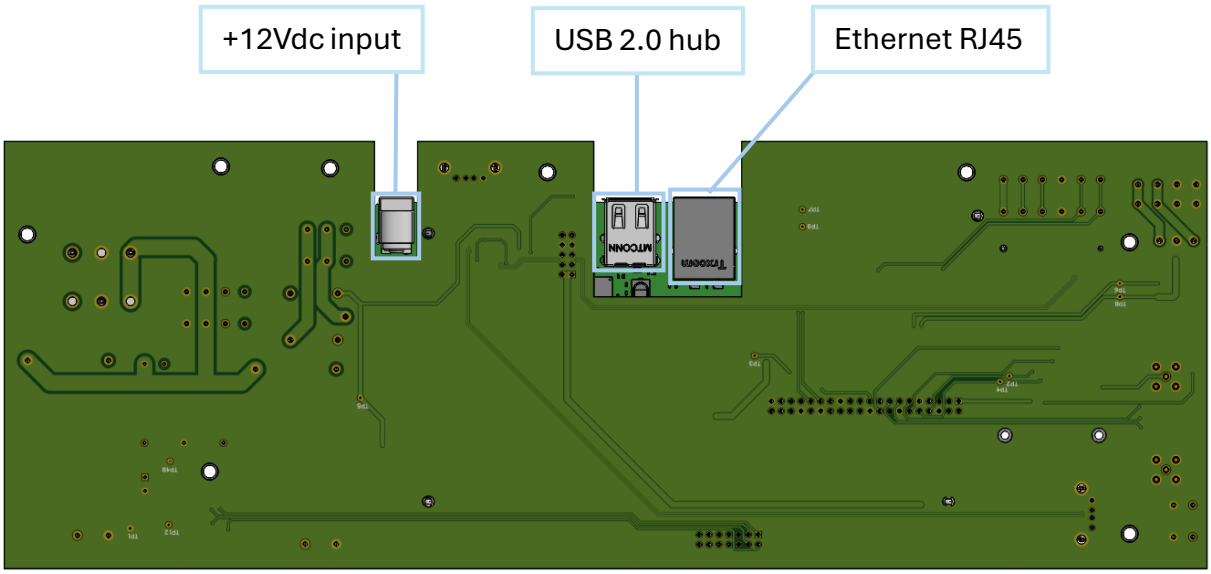
6.2. Overview

6.2.1. Peripherals

Front:

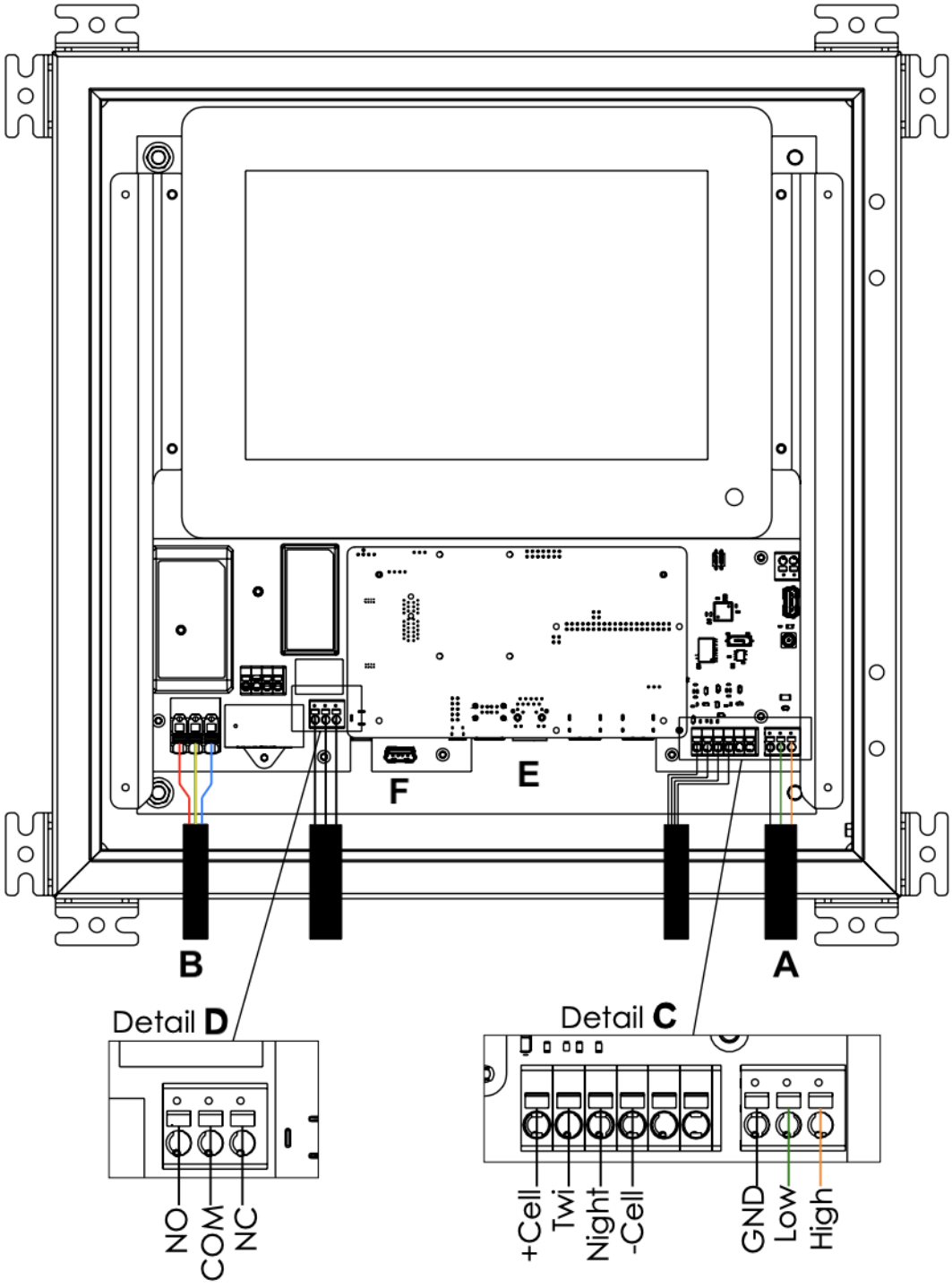


Back:



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6.2.2. Terminal block



A: Command cable; B: Power supply; C: Photocell; NO/NC relay; E: RJ45 connector; F: USB connector (For external GSM modem in option).

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6.3. Lamps terminal connection

The obstruction lamps are connected to the controller via one three-core command cable (see detail B on 6.2). This command cable connects the controller to all the lamps. The cable must be shielded and have a minimum section of 0.5 mm^2.

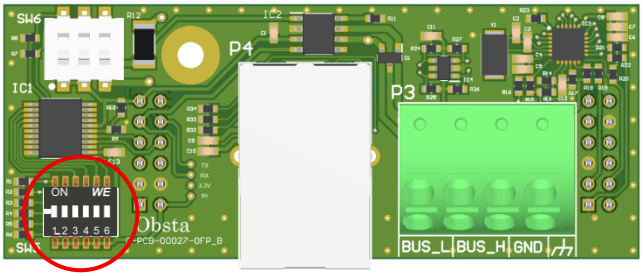
OBSTA recommends ensuring the continuity of its shielding between the controller and all beacons.

Like all the other cables in the installation, it must be securely fastened to prevent any oscillation caused by wind pressure.

In the presence of strong electromagnetic fields, additional protection may be required on cables and beacons to ensure optimum operation. OBSTA can supply or suggest additional protective equipment. Contact OBSTA if the lights need to be subjected to this type of disturbance.

6.4. Defining an address per lamp

Each tag must be configured with a unique identifier using the 6-position DIP switches (SW1).



Important: These switches are located inside the beacon's local control box (O-PCB-00027-OFP circuit board). They are not local in the main control unit (OFH-CTR-CAN).

This unique identifier is typically configured at the factory during the pre-shipment inspection of the equipment. This procedure is only necessary if a tag is added or its configuration is modified on-site.

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6.5. GPS wiring

GPS can be used to synchronize flashes and/or change DTN. If there is no NTP server (via internet or local network). It can also be used to perform an update based on the UTC clock when the controller is first powered up and to set the geographical position.

The GPS magnetic antenna must be mounted on a ferrous metal part with clear view of the sky. This antenna is supplied with a 5-metre cable and plugs into the jack socket inside the controller.

During initialization after start-up, the GPS chip waits for a precise signal. When preliminary signals are received, the GPS status LED may blink or light up (depending on version).

Once the preliminary signals have been received, it may take up to 15 minutes for the card to receive a complete, valid signal, enabling the product to synchronize correctly. During this phase, synchronization may not be fully valid, and a GPS fault may occur. We recommend waiting at least 20 minutes before considering the synchronization valid. If a GPS fault LED is still activated after 20 minutes, the product is not receiving signals correctly.

CAUTION: If the GPS is not being used, we recommend that you disable it via the menu (see paragraph 7.5.6) to avoid nuisance alarms.

6.6. Photocell wiring

If included, this ambient light sensor should be mounted vertically, away from artificial light (such as floodlights) and in a position that will allow the sensor window to have an unobstructed view of the polar sky (for example, pointing north in the northern hemisphere).

The photocell must be connected to the controller using a 4-conductor cable (detail C in figure 3):

- The 2 black and white wires are for the DC power supply from the controller.
- The purple wire returns the DC voltage at dusk to the controller (during the day, it remains 0V)
- The red wire returns the DC voltage at night to the controller (during the day and at night, it remains at 0V)

CAUTION: If the photocell is activated and its sensor does not detect a change of mode for more than 48 hours, the alarm is activated. During the installation period, if the time setting is changed or if the controller is switched off for more than 48 hours, an unwanted alarm may occur: simply wait for the next mode change or cover the photocell with your hand to reset the alarm.

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6.7. Ethernet

If a local network is available, the RJ45 cable must be connected to the controller (position E in paragraph 6.2) and the network configuration set according to the instructions (see paragraph 7.4.9) and access to the server on the Internet *monitoring.taack.com*.

Note regarding Modbus TCP: If the controller is connected to the local network for monitoring via the Modbus TCP protocol, the network administrator must ensure that the network allows communication on the standard TCP port 502. This port is set by default and cannot be changed.

6.8. Modem GSM

If a GSM modem is available, it must be connected to the controller (position F in paragraph 6.2).

6.9. Power supply wiring

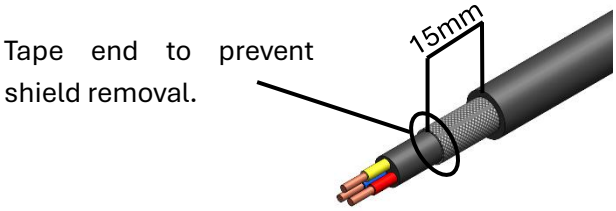
This operation must only be carried out by qualified personnel. Once the installation is completed, the 110 Vac to 240 Vac 50/60Hz power supply must be wired to the controller as detail A figure3. The controller will then start up.

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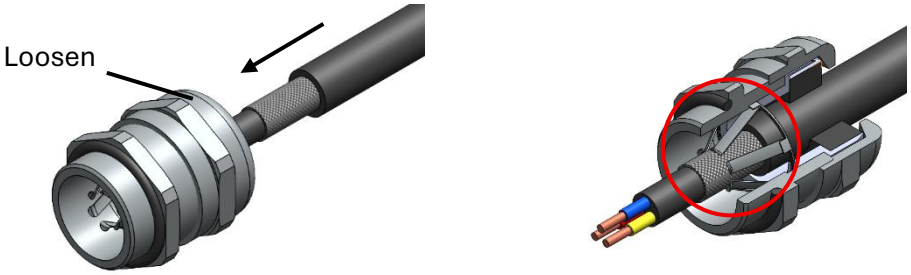
6.10. Cable gland installation

As a reminder, all shielded cables must be earthed at both ends. It is the installer's responsibility to check that OBSTA cabinets and lamps are correctly wired.

- Strip excess cable length to expose shielding.
- Leave 15mm of shielding, strip the rest.



- Thread the cable through the cable gland (the ring is loosened but not removed) so that the shield is in contact with the gland springs.
- The gasket must be correctly positioned flat and in its housing for optimum sealing.



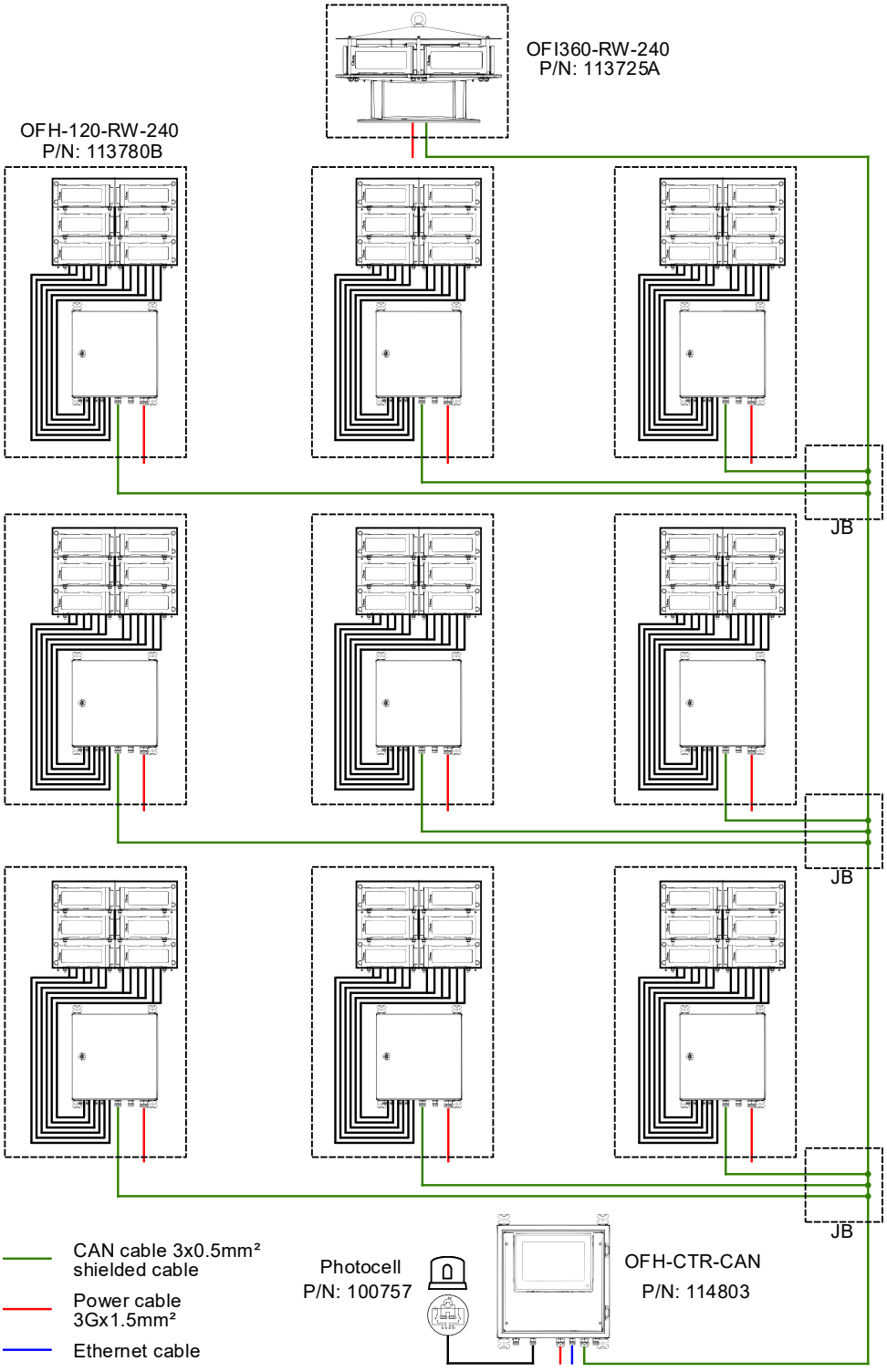
- Tighten the gland ring with the appropriate wrench.
- Once the cable has been clamped in the cable gland, cut and strip the wires to the length required to connect the terminal blocks (do not forget to fit cable ferrules before connection).

CEM	Cable diameter min (mm)	Cable diameter max (mm)	Pressure nut wrench	Locknut wrench
M16	4.5	10	20	20
M20	7	13	24	24
M25	9	17	29	29

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6.11. Typical wiring

The following typical wiring are provided for illustrative purposes only.



The size of the power cables depends on the number of lights and their maximum power, as well as whether the system is single-phase or three-phase. Contact OBSTA or its representative for more information.

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7. Startup and configuration

7.1. Power-up

Before turning on the power, ensure that all electrical connections are properly made and that the supply voltage matches the product specifications. Check that the wiring is secure and that there are no bare wires or conductive elements that could cause a short circuit.

Startup procedure:

- Connecting peripherals:
  - Connect the power supply.
  - Connect the required inputs and outputs.
- Powering on
- Initialization phase
  - Check that the screen turns on.
  - Make sure the red indicator light (LED) is on
- Startup sequence
  - Let the video play automatically on the screen.

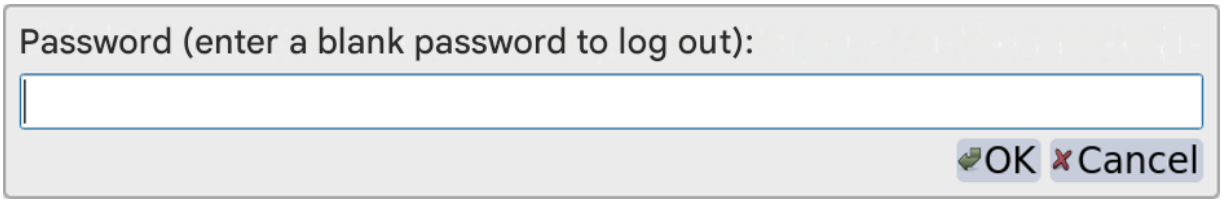
7.2. Access rights

The main screen can be accessed without a password. Three passwords grant three levels of access:

No password required		Read only mode
Password 1		Maintenance level
Password 2		Maintenance level + configuration
Password 3		Maintenance level + configuration+ installation level

If nothing is specified, if the screen goes into standby (15min of inactivity), the access level is reset to read-only mode.

To log in from the home screen, click on ***Config*** the ***Login***, and the following dialogue box will appear.



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7.3. Home screen



(1) These colored buttons represent the high-intensity and/or medium-intensity obstacle lights assigned to each obstacle level (in this obstacle: 2 levels of 1 and 4lamps). Unassigned lamps are not displayed. Click on the “maintain” button to check that all lamps are correctly assigned. The color represents the status of each lamp and is updated every 3 seconds.

	Lamp in “normal” status
	The lamp reaches 150 000 operating hours, or alarm relay is activated
	Lamp in “critical” mode
	The data link is lost (lamp disconnected, power off, communication failure).

(2) This indicator represents the day, twilight, or night (DTN) mode of the selected source (photocell or GPS).

(3) These 3 buttons are used to bypass the selected DTN source (photocell and GPS) and force of the 3 modes.
For all “forced” buttons, if at least one LED “managed” by this button are forced, it will flash as:

FORCE DAY ⟺ FORCE DAY

Then, if all the lamps “managed” by this button are forced, the button will also be selected.

FORCE DAY

By clicking on it, all lamps “managed” by this button will be turned off.

Note: home page buttons do not manage unassigned lights.

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(4) Button to access the advances" screen.

(5) Button to access to "maintain" screen:

If a mode 'Day, Twilight, or Night) is forced or a reset is activated on at least one lamp, this button will flash (as described for "force button" above).
This behavior applies to all other screens where the "maintain" button is present.

(6) Access button to "configuration" screen.

(7) These colored indicators show the status of communication with GPS, CAN bus (control cable to lamp); DTN (photocell), Mod bus (TCP Modbus), or MQTT (OBSTA server).

	Not used, the interface is disabled
	The interface in use is OK
	Interface is not OK or not connected. For example, the GPS antenna is not connected, or the photocell status has not changed for more than 48 hours.
	For Modbus, an MQTT, it indicates that another operator is transmitting a command from this interface.

(8) If internet or ethernet is enabled, display the IP address assigned to the controller (or display "WAIT DHCP / MODEM" if the interface address is IP-configured).

(9) Display time and date of controller.

(10) Display the flash per minute (FPM) set in the controller.

(11) Display the number of connected lamps.

(12) Display the number of lamps failures.

(13) Display the number of unconnected lamps.

(14) Display of percentage of all failures (lamp out of order, unaffected)

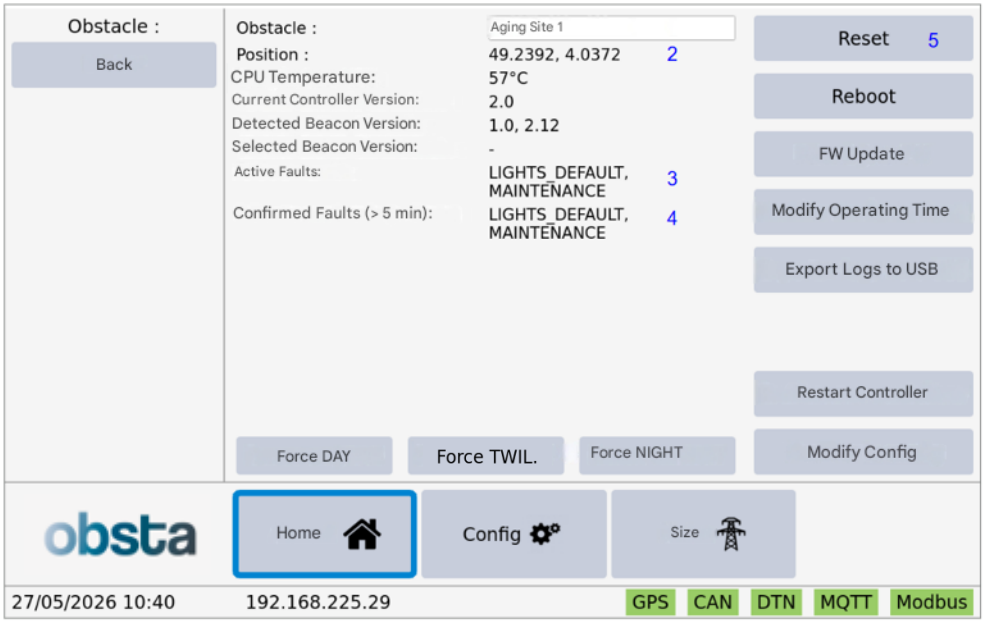
Note: the lamp is "faulty" if a fault indicator is present.

The color of this LED also indicates whether the percentage is below or above the threshold set in the controller.

	Not used, the interface is disabled
	The interface in use is OK

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7.4. Advanced setting (Maintenance level)



(1) Modify obstacle name field (displayed on main screen).

(2) Last GPS position received by controller.

(3) Fault currently detected. The alarm may still not be reported, see next field.

(4) Faults confirmed for more than “n” minutes and generation of an alert.

(5) The reset buttons flash with the same rules, followed by the “Force” mode as explained for the main screen.

The “Reset availability” and “Confirm micro software update dialog” buttons manage the behavior of the entire obstacle (all connected lamps). Will be displayed.

(6) The buttons to force the mode blink according to the same rules as explained for the main screen.

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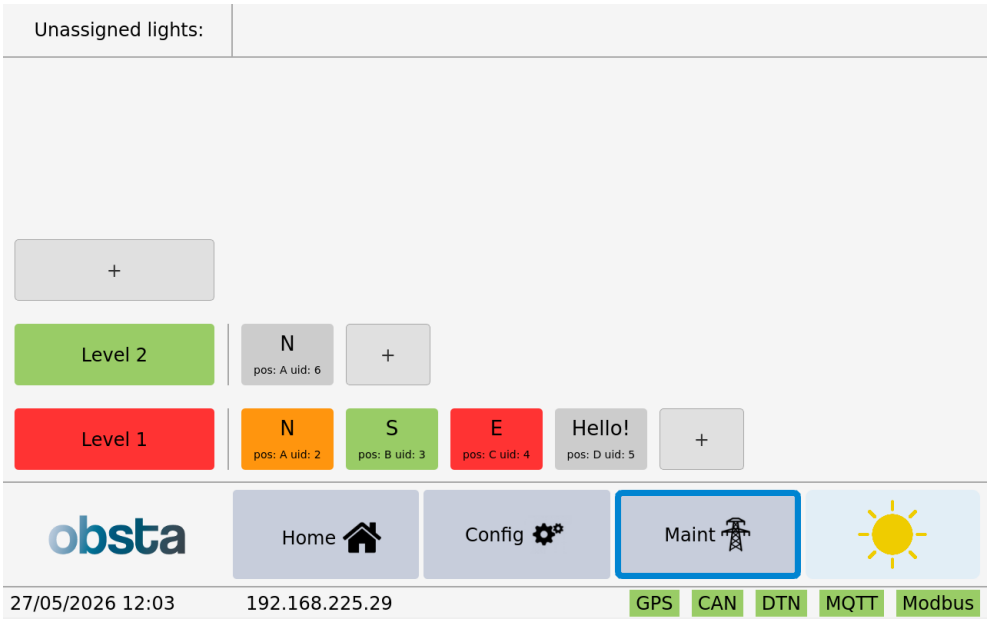
7.5. Maintenance screen (maintenance level)

7.5.1. Lamp assignment

This screen describes the procedure for assigning lighting levels and naming them.

Drag and drop is possible:

- To move lamps to
  - A different location within the given level
  - From one level to another
  - From unassigned section to assigned section and reversed
- To move up to the next level
  - At a different point inside the obstacle
  - To delete the level (by dragging and dropping into the “unaffected” section)



(1) Create a new third level.
(2) The remaining lamp signal assigns UID21 to an existing level 1 or 2 (or create a new lamp with a different UID, if you plan to connect it later).
(3) Button to access level details (see “level data”)
(4) Button to access assigned lamps detail (see “Lamp data”)

When you click 2, the following dialog box appears. It allows you to set the label and ID:



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7.5.2. Level data

Level name to be set on this screen.
All “Force,” “Reset”, “Reboot”, “Update FW” and “Reset uptime” buttons function as described but only affect lights at this level.



(1) Defines the light label.
(2) Display LED circuit number in error.
(3) Display light mode, here the light is in DAY mode.
(4) Button with detailed display of lights configuration (selected by SWI). Click on this button to access light data configuration). Displays the version of firmware installed in the beacon, internal voltage, temperature, and humidity inside its power supply.
(5) Operating time since first installation

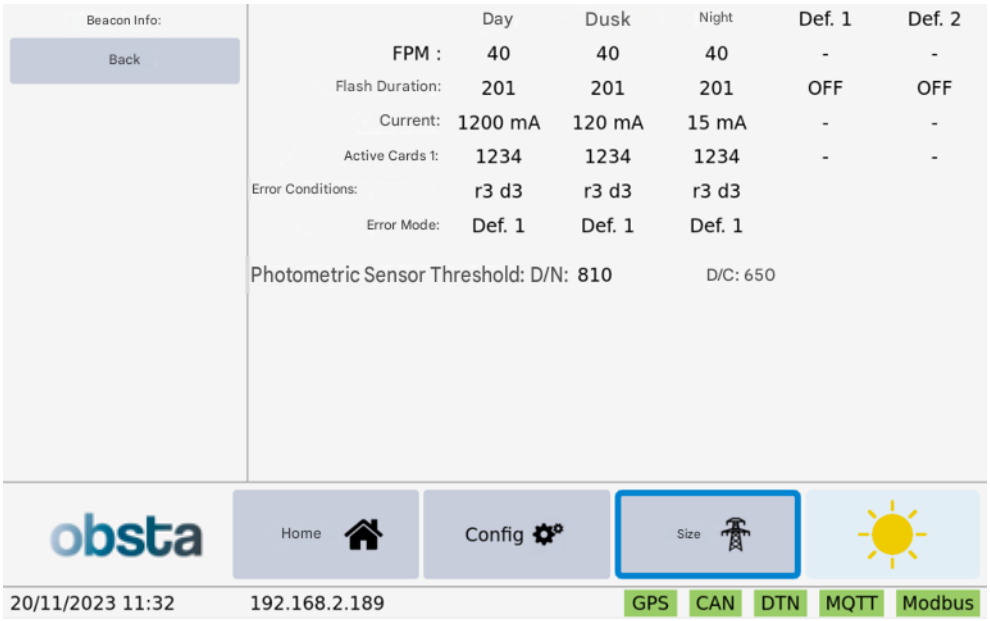
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7.5.3. Configuration data

This screen gives access to the detailed configuration of the selected luminaires with:

- Number of flashes per minute during the day, twilight, and night (DTN)
- Flash duration and current value.
- Number of power supply cards used for this light.
- Default action in the event of an error; depending on mode (Day / Twilight / Night)

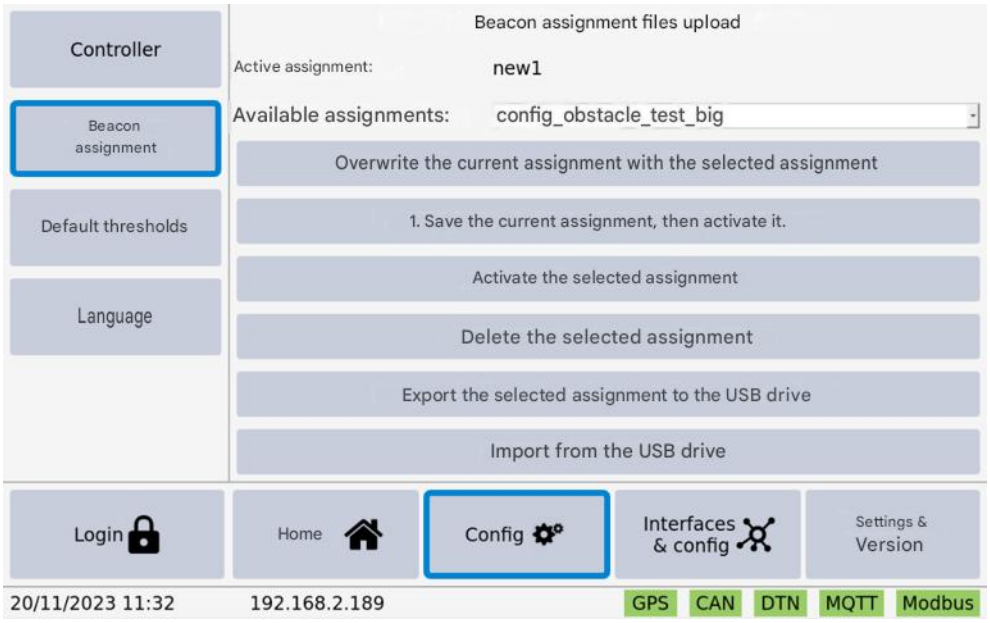
If used, the sensitivity of the light's integrated photosensor is also set for night and twilight modes.



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7.5.4. Light affectation backup

Once the light assignment has been defined in the controller, it must be saved.



(1) For a new installation, click on “Save current assignment, then activate it” then provide a file name.

The lights are now stored in the controller.

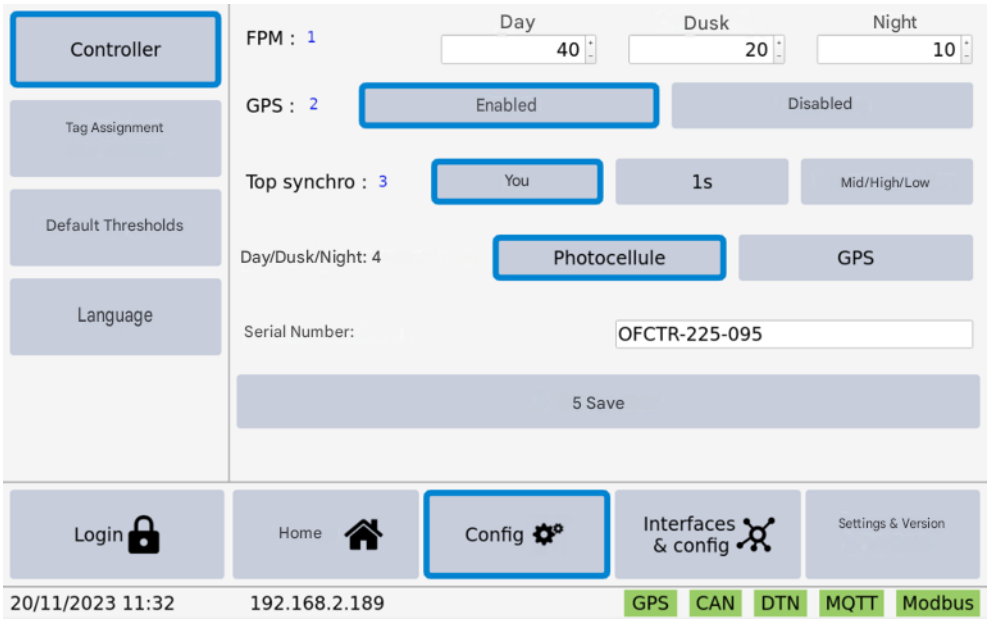
Another button offers the possibility of:

- To save the current assignment in the active assignment file (overwrite it)
- To activate / delete the selected assignment file from the list above.
- To export / import assignment files to a USB stick (for any recovery / restoration needs).

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7.5.5. Controller configuration (Config button of main menu)

This screen is used to define the flashes per minute (FPM) and Day / Twilight / Night (DTN) modes generated by the controller:



(1) Set the flash per minute for all lights connected to the controller.

CAUTION: Modification of this parameter must be carried out in accordance with local regulations (or with the ICAO definition in appendix 14 of chapter 6, which requires 20 to 60 FPM for medium-intensity systems and 40 to 60 FPM for high-intensity systems). These parameters will also replace the default setting in each light's configuration.

(2) Set whether to activate the controller's GPS. If enabled, the GPS:

- Update clock with local time / location and set the flash sequence to 3.

Provide calculated DTN mode to controller if selected in 4.

(3) If GPS enabled, set flash start to "0" second of every minute of UTC time, or to UTC time, or at "1" second of each minute of UTC time, or if flashes are to be in sequence (as a special requirement for the transmission line, this option must also be configured in the configuration light via micro-switches)

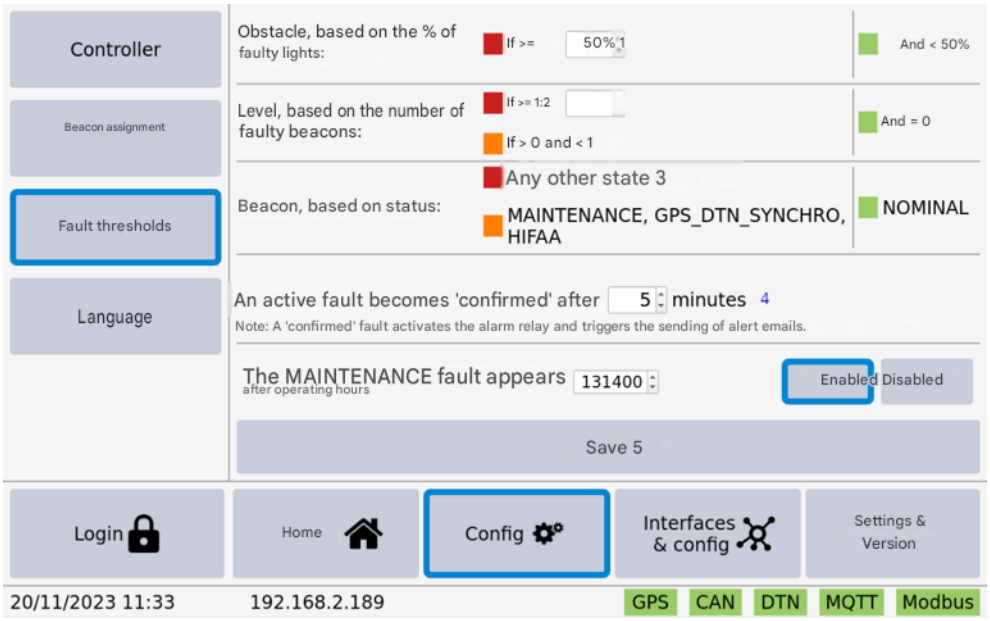
(4) Define whether photocell or GPS is to be used for source mode changeover DTN.

(5) Save settings in the controller's memory by clicking on "Save".

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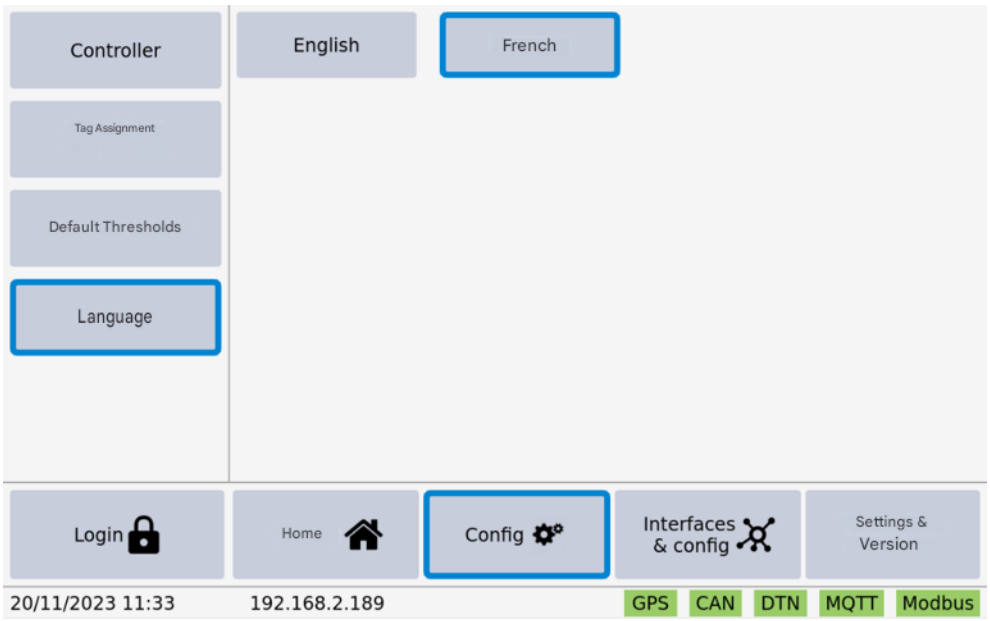
7.5.6. Controller alarm settings (“Fault thresholds” button)

This screen is used to define the condition before the controller does not trigger a remote alarm.



(1) The percentage of lamp failures connected to the controller.
(2) Fault color (red, orange, or green) depending on the number of lamp faults.
(3) Color according to lamp operating condition.
(4) Set time before alarm is acknowledged and signaled.
(5) Save these settings in the controller's memory by clicking on “Save”.

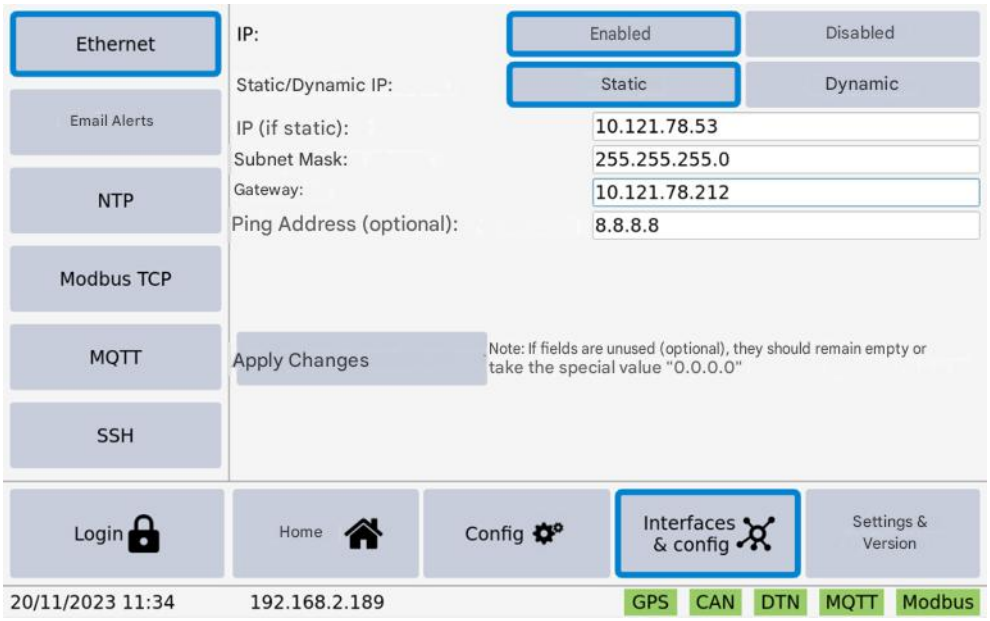
7.5.7. Language settings



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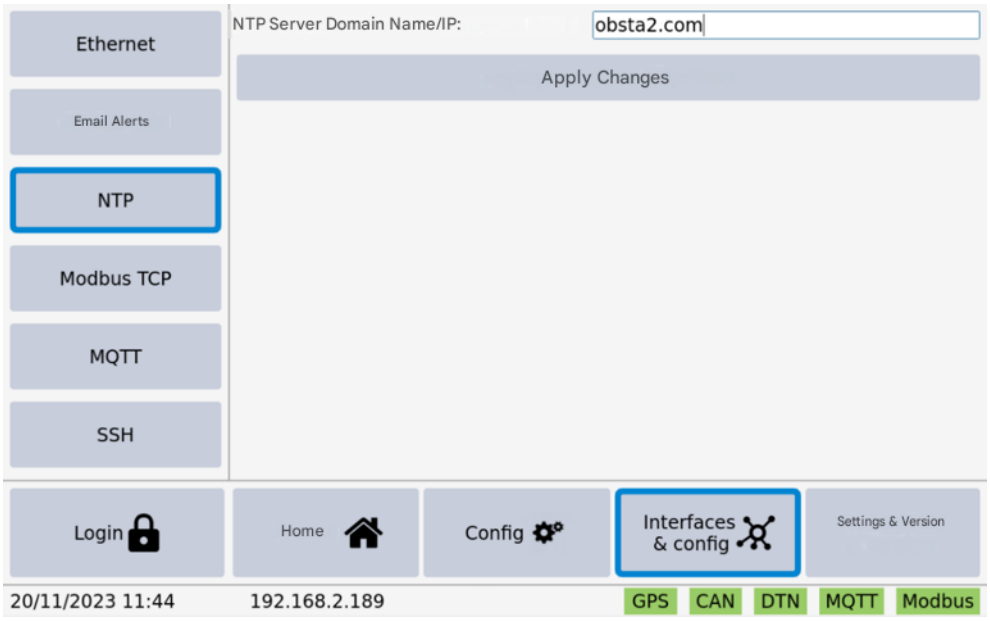
7.5.8. Ethernet settings

This screen is used to define the Internet network parameter so that the controller can communicate via an RJ45 or GSM modem. This screen must be configured so that the controller can communicate.



7.5.9. NPT

When an internet connection is available, this screen lets you define the address of an NTP server for time synchronization (useful only if no GPS is used).



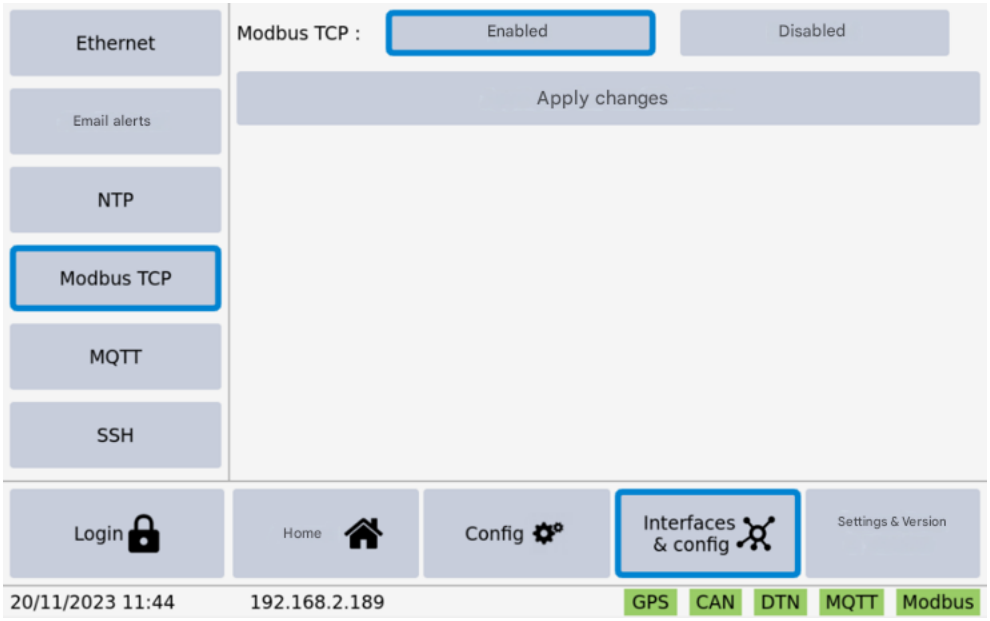
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7.5.10. Modbus TCP protocol settings

If a local Ethernet connection is available, this screen allows you to enable Modbus TCP (slave) so that a third-party server (SCADA/BMS) can read the controller's status.

Modbus Protocol Limitations and Operation:

- The interface operates in monitoring mode (read-only) only. It supports Modbus functions 3 (Read Holding Registers) and 4 (Read Input Registers).
- The data format is big-endian with a 16-bit register size.
- Reading is limited to a maximum of 64 consecutive words in a single request.



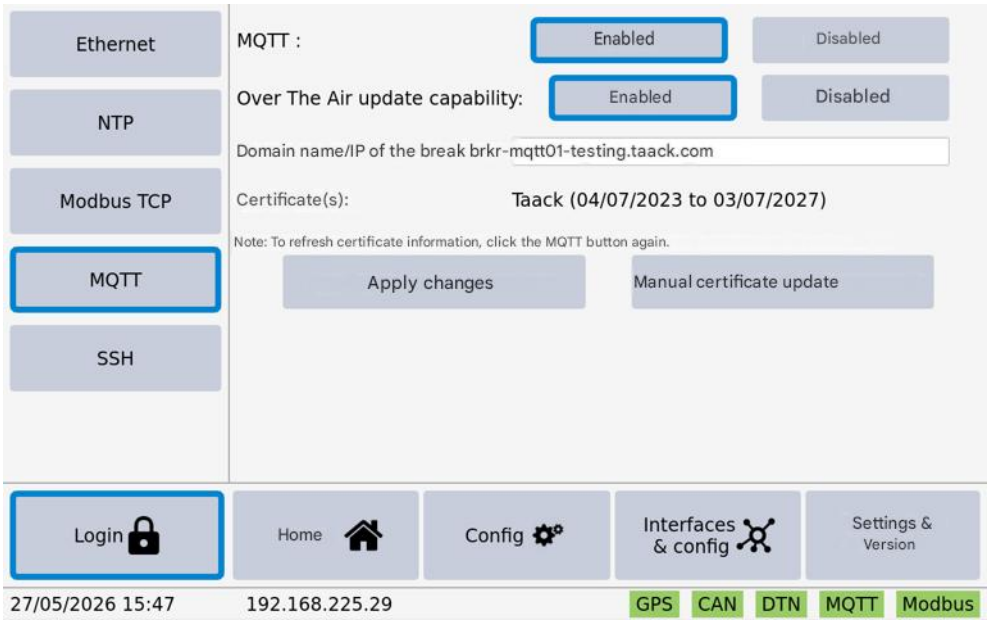
Please refer to Appendix at the end of this manual for the complete register mapping (Modbus Mapping).

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7.5.11. OBSTA server settings

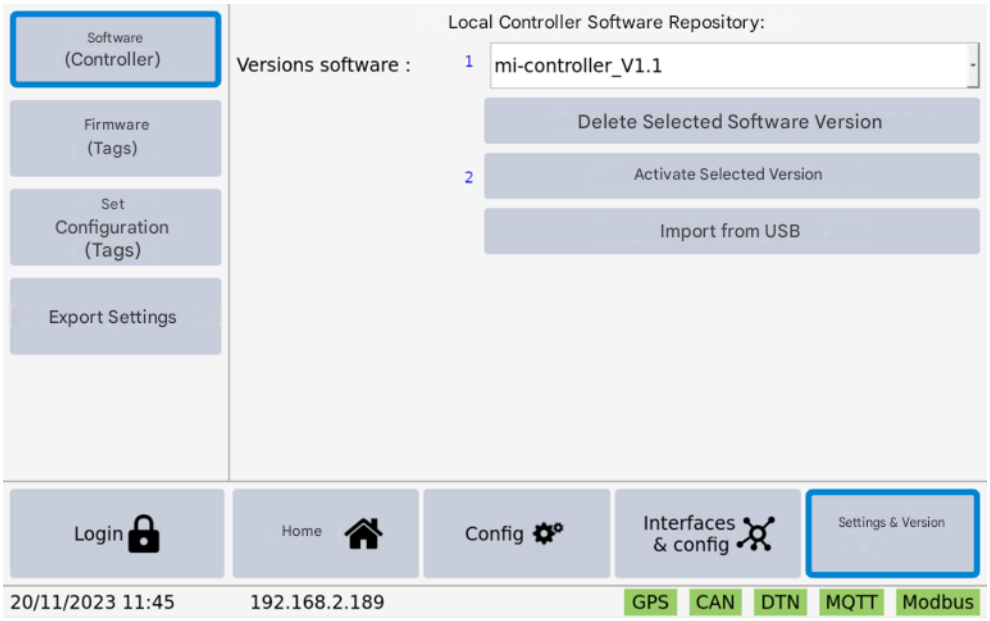
If an Internet connection is available, this screen enables the controller to communicate with the OBSTA server (Internet address). The controller will then send all controller information to the OBSTA server every 30 minutes. This enables precise remote diagnostics of the entire system.

Over the Air update capability (OTA)**:** Enables the remote search for and automatic installation of the latest firmware versions.



7.5.12. Select the firmware version of the lights to be updated

This action must be carried out with OBSTA's authorization. This screen is used to select the firmware version before initiating the LED update (“update FW” button).



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(1) List of headlight firmware versions available on the controller.

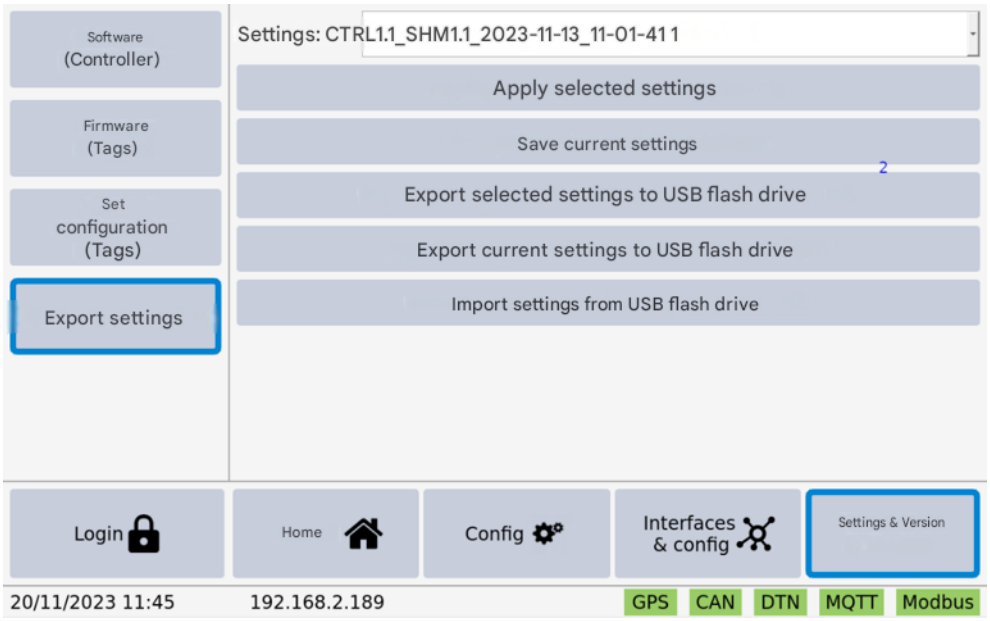
(2) Select the version to use when you click on an “Update FW” button.

Other buttons allow you to:

- Delete all existing firmware versions on the controller.
- Import a new firmware version from a USB key.

7.5.13. Export controller setting

This action must be performed with OBSTA's authorization. This screen allows you to export all controller configuration data, to save/restore the entire controller configuration in a single operation.



(1) List of previously saved parameters

(2) The buttons allow you to:

- Save current controller parameters,
- Apply an existing backup, i.e., restore all parameters from this backup,
- Import/export parameters define files from/to the USB stick.

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7.6. Alarm and defaults

7.6.1. Controller

The following default values can be triggered by the controller and set an alarm, in order of priority:

Default/Alarm	Description
CAN_DISCONNECTED	No lights detected via data link or major interface error
LIGHTS_DEFAULT	Default brightness threshold has been reached
GPS_OUT_OF_SYNC	GPS controller activated but out of sync
DTN_UNCHANGED	Controller day/dusk/night mode power source (photocell or GPS) has not changed in the last 48 hours
EXTERNAL_COM	Controller has some external interfaces enabled but not in nominal state (Ethernet/modem down and/or Modbus or MQTT down)
MAINTENANCE	When the internal hour meters reach the maintenance threshold (131,400 hours, or approximately 15 years)

7.6.2. Light

The following default value can be triggered on Lights, in order of priority:

Default/Alarm	Description
POWER	Excessive or insufficient supply voltage
CONFIG	Inconsistent light switch configuration
ERRORS_TRIGGERED_DEF_MODE	Channel error threshold reached for activation of default mode
ERRORS_TRIGGERED_RELAY	Threshold reached for the number of channel errors required to activate the relay
SLAVE_SYNCHRO	The LED is a slave, and no signal is received from the master (no upper synchronization message received on the data link).
GPS_SYNCHRO	The light's GPS is activated, and the synchronization is (still) not synchronized with the GPS clock.
DAYNIGHT_UNCHANGED	DTN unchanged for 48 hours, or transition too late / GPS info
EXTERNAL_COMM_PROBLEM	Ethernet or CAN data link communication problem
GPS_DTN_SYNCHRO	GPS is used as DTN source and DTN is (still) not available
HIFAA	HIFAA mode is enabled, but there is a communication failure between the Auxiliary and Main units.

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Power Cards Detailed Diagnostics (Sub-faults)

When a general light error or hardware failure occurs, the controller can read the precise status of each internal power card (up to 8 cards per system). These sub-faults help identify the exact hardware root cause during maintenance:

- **NOMINAL LAMP:** The power card is fully operational.
- **ONE REGUL UNRELIABLE ERROR:** At least one channel (but not all) has a persistent regulation default.
- **ONE OPEN CIRCUIT ERROR:** At least one channel (but not all) is disconnected or in an open circuit condition.
- **ONE PERSISTED OPEN CIRCUIT ERROR:** Persistent open circuit detected on at least one channel during steady lighting operation.
- **ALL REGUL UNRELIABLE ERROR:** All channels on the card have a persistent regulation default.
- **ALL OPEN CIRCUIT ERROR:** All channels on the card are disconnected or in an open circuit condition.
- **ALL PERSISTED OPEN CIRCUIT ERROR:** Persistent open circuit detected on all channels during steady lighting operation.
- **SHORT CIRCUIT ERROR:** A short circuit is detected on one or more channels.
- **PERSISTED_SHORT_CIRCUIT_ERROR:** A persistent short circuit is detected on one or more channels during steady lighting operation.

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7.7. Detailed description of system automation

When the system is first powered on:

- All beacon lights are turned off, and the physical alarm relay activates for 3 seconds. This is normal behavior (the board's LEDs are performing a self-test).
- It automatically switches to night mode to minimize light pollution while waiting for the sensors to synchronize**.**

Memory monitoring (Watchdog RAM):

- The controller continuously monitors its IT resources. If available RAM falls below the critical threshold of 100 MB, the system automatically initiates a clean and secure reboot. This automatic process takes 30 seconds, clears the memory, and prevents any risk of the touchscreen freezing or crashing, without interrupting power to the beacons.

Communication monitoring (Watchdog MODEM):

- In the event of a prolonged loss of connection with the servers (no response from the MQTT protocol or the OBSTA server for more than three consecutive hours), the controller performs a full power reset of the internal cellular modem. This forced shutdown and restart resets the connection with the network operator (2G/3G/4G) to automatically restore alarm reporting and remote monitoring.

GPS:

- If the controller suddenly loses the GPS signal while in operation, it does not immediately trigger the alarm. It keeps the beacons synchronized using its internal clock for 15 minutes. After this period, the ***GPS_OUT_OF_SYNC*** alarm is activated.

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8. Maintenance

Test	Frequency	Preventive action	Risk
Wiring	Annual	Visual control Tightening PCB wires	Cable degradation Poor contact Lamp in default mode
Waterproof	Annual	Visual verification	Water infiltration Short circuit Lamp off
Clamping	Annual	Checking tightness	Box falling Tightness degradation
Aspect (rust, dust…)	Annual	Exterior cleaning	Malfunction

9. Technical specifications

Designation	Min	Nominal	Max	Unit
Input voltage	90	110/240	264	Vac
Input current	-	-	0.5	A
Temperature	-20	-	55	°C
Weight	-	14	-	Kg
Wind load resistance at 320km/h	-	-	834	N

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10. Appendix

10.1. Modbus TCP register Mapping

10.1.1. Controller information

Offset	Modbus size (words)	Data size (bytes)	Data type	Attribute name	Content
0x0000	32	64	64*char	Serial number	String up to 63 char, NULL terminated, equal to controller unique serial number
0x0020	1	2	2*uint8	Modbus interface version	MSB uint8 is major version, LSB uint8 is minor version. Interface version changes each time the present attributes description document changes.
0x0021	64	128	128xchar	Building name	String up to 127 char, NULL, terminated, containing the obstacle name
0x0061	4	8	uint64	Lights mask	Each bit of this mask is set to 1 if light of the corresponding CAN ID is connected
0x0065	1	1	Uint8	Confirmed defaults mask	Mask of controller confirmed defaults, see ***ctrl_default_t*** in 10.1.3
0x0066	1	1	Uint8	GPS status	GPS (for time and position) state, DISABLED = 0, NOMINAL = 1, ERROR = 2
0x0067	1	1	Uint8	Flash service status	Flash service (triggering lights flashes) state, DISABLED = 0, NOMINAL = 1, ERROR = 2
0x0068	1	1	Uint8	Monitoring service status	Monitoring service (for lights ctrl/cmd) state, DISABLED = 0, NOMINAL = 1, ERROR = 2
0x0069	1	1	Uint8	DTN service status	DTN service (for Day/Twilight/Night state + network & GPS management) state. DISABLED = 0, NOMINAL = 1, ERROR = 2
0x006A	1	1	Uint8	Network status	Network (Ethernet RJ45 or USB modem) state, DISABLED = 0, NOMINAL = 1, ERROR = 2
0x006B	1	1	Uint8	MQTT service status	MQTT service (for web monitoring) state, DISABLED = 0, NOMINAL = 1, ERROR = 2
0x006E	1	1	Uint8	Log service status	Log service (for internal event recording) state, DISABLED = 0, NOMINAL = 1; ERROR = 2
0x006F	1	1	Uint8	Services in use mask	Mask of interfaces currently accessing controller, see ***ctrl_default_t*** in 10.1.3

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0x0070	1	1	Int8	CPU temperature	Degree Celsius (from -40 to +105°C)
0x0071	1	1	Uint8	Day/Twilight/Night mode	UNKNOWN = 0, DAY = 1, TWILIGHT =2, NIGHT = 3
0x0073	4	8	Uint64	Forced Day lights mask	Mask of lights currently forced to day mode (Each bit of this mask is set to 1 if light of the corresponding CAN ID is forced to day)
0x0077	4	8	Uint64	Forced Twilight lights mask	Mask of lights currently forced to Twilight mode
0x007B	4	8	Uint64	Forced Night lights mask	Mask of light currently forced to Night mode
0x007F	1	1	Uint8	Day FPM	Number of flashes per minute while in Day mode
0x0080	1	1	Uint8	Twilight FPM	Number of flashes per minute while in Twilight mode
0x0081	1	1	Uint8	Night FPM	Number of flashes per minute while in Night mode
0x0082	1	1	Uint8	Top synchro mode	0 (TOP_SYNC_SEC0) to send top synchro aligned on second 0 of each minute 1 (TOP_SYNC_SEC1) to send top synchro aligned on second 1 of each minute 2 (TOP_SYNC_MID_TOP_BOT) to send specific middle/top/bottom top synchro messages aligned on second 0
0x0083	1	1	Bool	GPS for synchro	Use GPS for controller internal time clock
0x0084	1	1	Bool	GPS for DTN	Use GPS for Day/Twilight/Night mode, from localization + time, compute sun position and determine mean Day/Twilight/Night transition events. If set to false, Photocell is used.
0x0085	2	4	Float	Latitude	Current GPS latitude value (NaN special value if not set)
0x0087	2	4	Float	Longitude	Current GPS longitude value (NaN special value if not set)
0x0089	64	128	128*char	NTP server	String up to 127 char, NULL terminated, containing the NTP server hostname for internal time clock, if GPS is not used or in case of GPS failure.
0x00C9	64	128	128*char	MQTT broker	String up to 127 char, NULL terminated, containing the MQTTY broker hostname
0x0109	64	128	128*char	snmp_community	String up to 127 char, NULL terminated, containing SNMP community name
0x0149	1	2	2*char	Language	String of two char, containing the current language in ISO639-1 format.
0x014A	1	1	Uint8	Log_level	The current log level for all tasks of MIController (may be DEBUG, INFO, WARNING,ERROR or CRITICAL). May be overridden by specific task configuration.

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0x014B	2	2	2*uint8	Software_version	Version of the controller software. It could be 1.1 for example (each uint8 contains one digit)
0x014C	1	1	Uint8	Health	MQTT internal task status: STOPPED = 0, STARTING = 1, RESTARTING = 2, RUNNING = 3
0x014D	1	1	Int8_t	Cpu_percentage	CPU usage percentage.
0x014E	1	1	Int8_t	Free_space	% of free space on system partition
0x014F	1	1	Int8_t	Signal_strength	Integer number ranging from -113 to -51 (in dBm)
0x0150	1	1	Bool	Ota_update_enabled	Over The Air update capability
0x0200	1	1	Uint8	Delay for confirmed default	Minutes delay after which an occurring default appears in Confirmed default mask (and alarm relay is triggered)
0x0201	1	1	Uint8	Max percentage of default lights	Above this threshold of disconnected/defective headlights, a CDEF_LIGHTS_DEFAULT is raised.
0x0203	2	4	Uint32	Up time threshold	Headlights with "Up time" above this value will raise a CDEF_MAINTENANCE.

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10.1.2. Headlights information

Headlight information is starting at offset 0x4000. Each light (given its CAN_ID from 2 to 63) data is located at offset: **0x4000 + CAN_ID * 0x0080.**

Offset within light	Modbus size (words)	Data size (bytes)	Data type	Attribute name	Content
0x00	2	4	Uint32	Last CAN update timestamp	Seconds time stamp since 01/01/1970
0x02	1	1	Uint8	Light type	Constant value for MI-PCB based devices: LIGHT_MI = 1
0x03	17	33	33*char	Serial number	String up to 32 char, NULL terminated, equal to beacon unique serial number.
0x14	1	2	Uint16	Headlight general status	Mask of defaults (see below). Mask to 0x0000 means headlight is in NOMINAL state.
0x17	1	1	Uint8	Configuration number	OBSTA preset index for headlight parameters set, from 0 to 255.
0x18	1	1	Uint8	Day/Twilight/Night mode	UNKNOW = 0, DAY = 1, TWILIGHT = 2, NIGHT = 3
0x1B	1	1	Uint8	Nb flash per minute	40 means 40 FPM. 0 in continuous mode or if lights are OFF.
0x1C	1	2	2*uint8	Firmware version	Most significant byte is major version; less significant byte is minor version
0x1D	1	2	Uint16	Power supply voltage	Measure voltage * 100 (example: 4786 means 47.86V)
0x1E	1	1	Uint8	Hygrometry	As percentage (from 0 to 100%)
0x1F	1	1	Int8	Temperature	Degree Celsius (from -60 to 120°C)
0x20	2	4	Uint32	Up time	Number of hours for which headlight was connected to controller
0x22	4	7	7*char	Obstacle label	String up to 6 char, NULL terminated. Equal to light assignation configured designation label (from Controller HMI).
0x26	1	1	Uint8	Obtacle level	The level number for light localization on obstacle. From 1 (first level) to 255 (last possible level)
0x27	1	1	Uint8	Obstacle position in level	The light position number inside the level, for light localization on obstacle. From 1 (first level) to 255 (last possible position level).

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0x30	8	16	16*uint8	Power cards detailed status	First power card is index 0 of byte array, up to 16 power cards may be used (in HI-FAA case), but systems will only have up to 8 power cards, status is ***lamp_error_status_t***
0x42	1	1	Uint8	Config update status	Status of headlight config update, see ***canbus_config_update_status_t***
0x43	1	2	Uint16	Firmware update status	Status of headlight firmware update, see ***canbus_software_update_status_t***

10.1.3. Enumeration details

Details on controller enumerations:

***ctrl_default_t*:**

CDEF_NONE	= 0	
CDEF_CAN_DISCONNECTED	= 1 << 0	CAN is not connected: no beacon is detected or interface error
CDEF_LIGHTS_DEFAULT	= 1 << 1	Light default threshold has been reached
CDEF_GPS_OUT_OF_SYNC	= 1 << 2	Controller GPS is out of synchronization
CDEF_DTN_UNCHANGED	= 1 << 3	Controller DTN has not changed since last 48 hours
CDEF_EXTERNAL_COM	= 1 << 4	Controller has external interfaces enabled not in nominal state
CDEF_MAINTENANCE	= 1 << 5	Up time counter of one or more lights has reached maintenance threshold

***interface_t*:**

ITF_NONE	= 0	
ITF_HMI	= 1 << 0	Visual HMI from controller touchscreen
ITF_MODBUS_TCP	= 1 << 1	Modbus TCP Ethernet interface
ITF_MQTT	= 1 << 2	MQTT internet interface
ITF_SNMP	= 1 << 3	SNMP ethernet interface

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Details on headlights enumerations:

defaults_t:

DEF_NONE	= 0	No default detected
DEF_GPS_DTN_SYNCHRO	= 1 << 0	GPS DTN source is used and DTN is (still) not available.
DEF_EXTERNAL_COMM_PROBLEM	= 1 << 1	Ethernet or CAN communication problem
DEF_DAYNIGHT_UNCHANGED	= 1 << 2	Day/Twilight/Night unchanged since 48h, or transition too late / GPS info.
DEF_HIFAA	= 1 << 3	HIFAA is enabled and there is a problem of communication between Auxiliary and Main.
DEF_GPS_SYNCHRO	= 1 << 4	GPS is activated, and internal timing is (still) not synchronized with GPS clock
DEF_SLAVE_SYNCHRO	= 1 << 5	Light is slave and no SYNC_IN signal received from master.
DEF_ERRORS_TRIGGERED_RELAY	= 1 << 6	Reached threshold of nb of channel errors for relay activation
DEF_ERRORS_TRIGGERED_DEF_MODE	= 1 << 7	Reached threshold of nb of channel errors for Default mode activation
DEF_CONFIG	= 1 << 8	Dipswitch configuration inconsistency
DEF_POWER	= 1 << 9	Power supply voltage excessive or insufficient

lamp_error_status_t:

NOMINAL_LAMP	= 0	Card is fully operational
ONE_REGUL_UNRELIABLE_ERROR	= 1 << 0	One channel at least but not all have a regulation default. This default persisted.
ONE_OPEN_CIRCUIT_ERROR	= 1 << 1	One channel at least but not all is disconnected/in open circuit
ONE_PERSISTED_OPEN_CIRCUIT_ERROR	= 1 << 2	At least one channel open-circuit while steady lit.
ALL_REGUL_UNRELIABLE_ERROR	= 1 << 3	Card has a regulation default on all channels. This default persisted.
ALL_OPEN_CIRCUIT_ERROR	= 1 << 4	Card has a disconnection/open circuit on all channels
ALL_PERSISTED_OPEN_CIRCUIT_ERROR	= 1 << 5	Card has a persisted disconnection/open circuit on all channels (when steady lighting)
SHORT_CIRCUIT_ERROR	= 1 << 6	Card has a persisted short circuit on one or more channels (when steady lighting)
PERSISTED_SHORT_CIRCUIT_ERROR	= 1 << 7	Card has a short circuit on one or more channels.

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canbus_config_update_status_t:

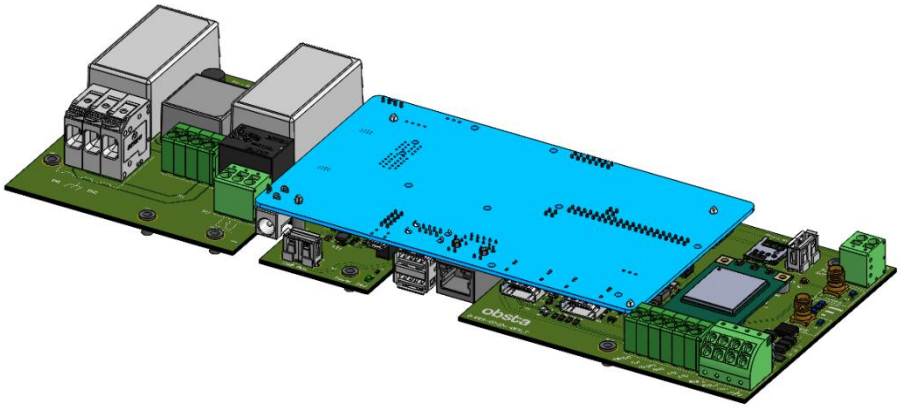
CU_IDLE .....= 0,
CU_OK .....= 1 << 0
CU_ONE_CONFIG_OK .....= 1 << 1
CU_MISSING_PARTS .....= 1 << 2
CU_BAD_CRC .....= 1 << 3
CU_HIFAA_INVALID_CONFIG_SET .....= 1 << 4
CU_UNREACHABLE .....= 1 << 5

***canbus_software_update_status_t*:**

SU_IDLE .....= 0
SU_OK .....= 1 << 0
SU_UNABLE_TO_INITIALIZE_OR_ERASE_FLASH ....= 1 << 1
SU_TOO_LONG_DELAY_BETWEEN_MSG .....= 1 << 2
SU_DECRYPT_ERROR .....= 1 << 3
SU_FLASH_WRITE_DISABLED .....= 1 << 4
SU_FLASH_WRITE_OPERATION_FAILURE .....= 1 << 5
SU_BAD_CRC .....= 1 << 6
SU_FLOW_CONTROL_ERROR .....= 1 << 7
SU_OTHER_UPDATE_ALREADY_IN_PROGRESS .....= 1 << 8
SU_CAN_UPDATE_ALREADY_IN_PROGRESS .....= 1 << 9
SU_UNREACHABLE .....= 1 << 10

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10.2. Comput module replacement



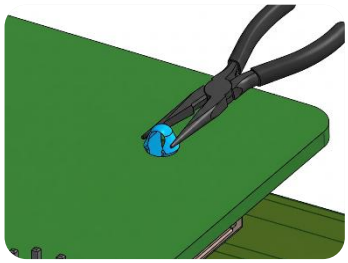
WARNING

Disconnect the unit from the mains before performing any work. Discharge static electricity by touching an unpainted metal part or wearing an antistatic wrist strap to prevent damage to the replacement board.

(1) Clear the area around the device. Keep the new board in its original anti-static bag until you are ready to fit it. Disconnect all peripherals connected to the card being replaced.

***Check**: The device is completely switched off, and you have unobstructed access to the entire PCB*

(2) Using a pair of needle-nose pliers, tighten the tabs on each blue connector in turn. Lift each corner very slightly (no more than one millimeter) to slide the connector head into the hole in the board, so that it can no longer snap back into place. Keep the board as flat as possible throughout the process to avoid bending the connectors.



(3) Grasp the printed circuit board by its edges, as close as possible to the large connectors, to distribute the force evenly. Pull firmly and strictly vertically to separate the board without damaging the rigid pins on the lower board.

(4) Carefully align the holes in the three connectors with the corresponding pins, and the four mounting holes with the blue mounting points. Press down firmly and evenly on the board until you hear the four plastic locking clicks.

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