HYBRYD

MANUFACTURER OF
EMERGENCY LIGHTING
LUMINAIRES, MODULES
AND SYSTEMS

H-300

CENTRAL MONITORING SYSTEM

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The main function of the Central Monitoring System H-300 is the monitoring of the emergency lighting luminaires Hybryd.

1.1 THE MAIN SYSTEM ASSUMPTIONS

- Monitoring the efficiency of emergency lighting in accordance with the applicable standards.
- Reporting system status in accordance with the applicable standards
- Support for CT, DYN, HVCBS, LVCBS systems in one place
- Communication with building management systems BMS
- Communication with fire detection systems SSP

2.1. CENTRAL CONTROL UNIT

The central is responsible for controlling, testing and reporting. It comes in three variants, each of them contains the "PC 4 Central", which presents a simple and modern user interface that is accessible from an Internet browser. Operation of the system can be done locally from the central level or remotely from any device that has access to the Internet (laptop, tablet, smartphone).

AVAILABLE VARIANTS:

2.1.1 PC+ PC 4 Central + Interface

In this variant, the function of the central is carried by any PC

with the original Hybryd software "PC 4 Central", which is connected via a dedicated interface, or in the case of HVCBS and LVDBS via Ethernet with the emergency lighting devices. PC-4 Central program can be purchased together with the PC in a form of pre-installation or it can be purchased separately and be installed on any PC that meets the minimum requirements.

Characteristics:
- Small computer's sizes 63x197x220 mm - mini-ITX case
- Ability to hang the monitor behind the computer (VESA standard fixing) or on the wall
- Convenient 21" monitor
- Processor: Intel® Celeron N3050 (1.6 GHz)
- RAM: 2GB
- Drive: SSD
- Operating system: Microsoft Windows 10
- One or two Ethernet interfaces
- The possibility of buying only the software - the installation on own hardware
- The ideal solution for Centraltest system
- User interface accessible via Internet browser

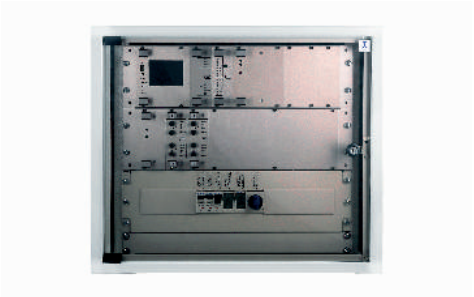
2.1.2 INTEGRATED H-312 CENTRAL

In this variant, the central works as an integrated control cabinet, which combines a PC with PC 4 Central software, touch screen, communication interface and buffered power supply. The cabinet is designed for wall mounting and is ready to cooperate with all emergency lighting systems Hybryd (does not require additional interfaces).

Characteristics:
•Convenient mounting and installation
•The large 12" touch screen
•Built-in H-INT 345 interface - ready to operate in different configurations
•Large LED lighting controls indicating the status of the central and the condition of the entire system
•Built-in battery allows for at least 3h of emergency operation
•An ideal solution for System of Dynamic Emergency Lighting DYN
•Mains supply 230VAC
•User interface accessible via Internet browser
•One or two Ethernet interfaces

2.1.3 Module for HVCBS System

This option provides for a central unit in the form of cassette module in the mechanics system EURO 160mm for the installation in the SZC cabinet. This module is equipped with a PC with PC 4 Central software and touch screen.



As in every variant, after purchasing additional interface, the central is compatible with any Hybryd lighting systems.

Characteristics:
•Integration with SZC cabinet
•Power supply from internal installation
•Convenient touch screen
•An option to purchase the interface to the Centraltest system
•The ideal solution for Central Supply system
•User interface accessible via Internet browser

2.2 LIGHTING SYSTEMS ELEMENTS

Depending on the lighting system:

2.2.1 CT System components

CENTRALTEST OF FIRST AND SECOND GENERATION

•Communication interface
CJS communicates with the Hybryd lighting elements via a dedicated interface. It provides the basic functions that are necessary for the proper lighting operation and it separates galvanically CJS from the other devices.

•Communication wiring
Communication with the luminaries is held via the separate signal wire

•Network expanders
Amplifying equipment and devices increasing the maximum amount of operated luminaires.

•Emergency luminaries
Directional, illuminate luminaires - all with built-in battery, mains supply 230VAC. After a loss of power supply they automatically go into the emergency mode.

•Dynamic Luminaires (only CT 2 Gen)
The luminaires indicate the direction of evacuation depending on the location of danger zone. Depending on the needs, the luminaires are equipped with 1 or 2 arrow or cross modules and the pictogram, they may be one-sided or double-sided. Luminaires with built-in battery, mains supply 230V. After a loss of power supply they automatically go into the emergency mode.

2.2.2 HVCBS System components

HIGH VOLTAGE SYSTEM OF CENTRAL-BATTERY POWER SUPPLY

•Integration with SZC home station
Supplies power to all elements of the system in primary and emergency mode, it is equipped with batteries, charger, voltage control module, line control module and I/O potential-free modules.

•SZC substations
Depending on the size of the installation in the system, there can be up to 31 substations that redistribute power to the furthest luminaires.

•Emergency luminaries
Illuminate and directional luminaries - In the basic mode, mains supply 230VAC, After a loss of power supply they are powered by DC voltage from SZC.

2.2.3 LVDBS system components

LOW VOLTAGE SYSTEM OF BUFFERED POWER SUPPLY

•LVDBS stations
Provides power to the luminaires. Depending on the size of the installation in the system, there can be up to 32 LVDBS stations, each of which operates independently and is equipped with its own battery. The stations communicate each another in EIA-485 standard
•Emergency luminaries
Illuminate and directionminaries - supply from the LVDBS station by DC voltage in range al lufrom 20-27VDC

3.1 DESCRIPTION

Centraltest 1 Gen was the first such system in the Polish market. For many years it was developed, new centrals, luminaires and network expanders were produced. Currently, the system is being replaced by a new generation of Centraltest 2 Gen. but the main idea remained unchanged. Centraltest is successfully used in medium-sized and large buildings such as schools, hospitals, shopping centres, office buildings, industrial buildings. The idea of the system is to apply emergency lighting luminaires equipped with individual batteries and a microprocessor system that ensures the autonomous operation.

Luminaires may be located in one of two operation states:
•Basic - the power supply voltage is required.
•Emergency - working with built-in battery after the loss of power supply voltage. Operation of the luminaire in emergency mode is independent of the other elements of the system.

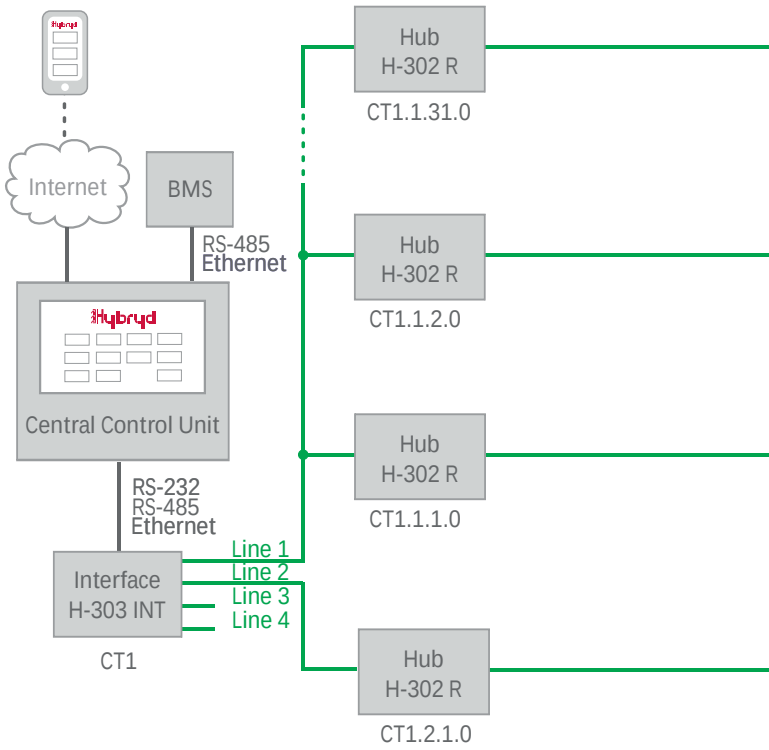
All devices in the system are powered from mains supply 230VAC. Elements of the system are connected by a communication line and each device has its own address. From the central control unit one can perform efficiency tests of the luminaires:

•Test A - a short, one-minute efficiency test of the luminaires, which should be performed once a month.
•B test - a test of emergency mode time, which should be carried out once a year.
•Test C - communication test

During the tests, the mentioned luminaire microprocessor system makes a series of measurements on the basis of which it is able to identify accurately the type of defect, ie. damage of the battery, charging failure, damage of the source of light, etc.

Other features of the system:
•7800 luminaires on a single interface
•Up to 253 H-INT 303 interfaces connected to the central
•4 communication lines in each interface
•Max. 31 network expanders on interface line
•Max. 64 luminaires behind the network expander
•2 km – max. distance of the luminaire from the interface
•The possibility of installing the interface at any place within a LAN network (Ethernet module option)

3.2 SYSTEM SCHEME



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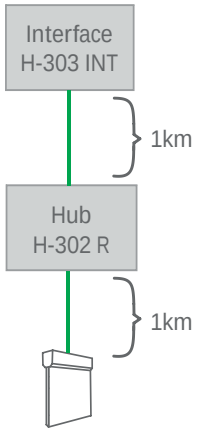
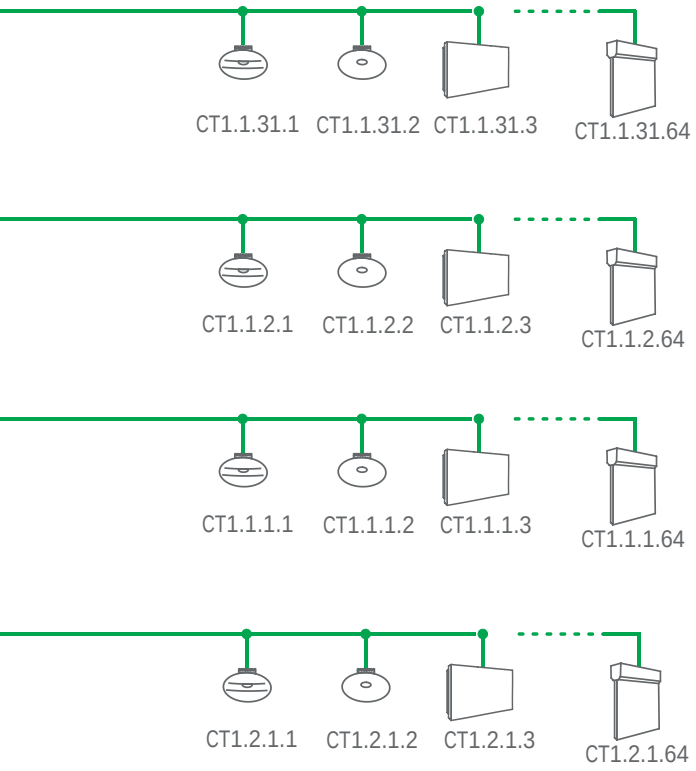
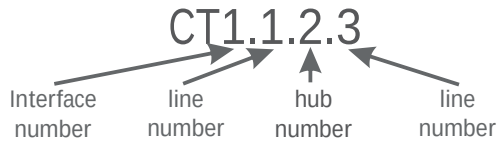




Number of the luminaire:



System components:

- The central control unit is responsible for controlling, testing and reporting.
- Interface H-303 INT - connects the central control unit with luminaire network. It has 4 output lines.
- H-302 R Network expander - is connected in parallel to the H-303I NT interface line. The maximum number of network expanders per line is 31. The maximumnumber of luminaires behind network expanders is 64.
- Luminaires - directional and illuminate performed by Centraltest.The maximum number of luminaires in the system is 7800.

3.3 CT COMMUNICATION

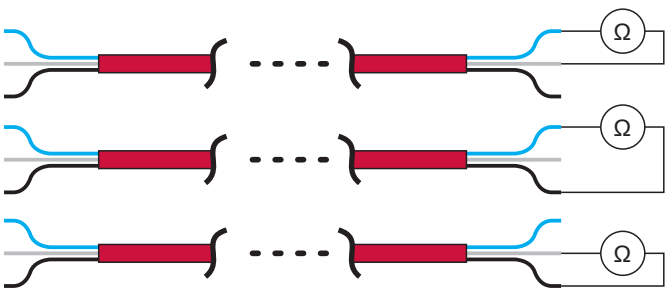
In this system, we may distinguish one method of communication, so called " CT communication" in which manual enumerator assigns a logical number to each device (luminaire: 1-64, network expander: 1-31), which is displayed in the central in the form of physical number consisting of numbers of intermediary devices:
interface_number.line_number.network expander _number.luminaire_number eg. CT1.1.2.3 or CT1.3.20.40.
It is important to be aware not to duplicate numbers within the same line as this results in a loss of communication.

3.4 COMMUNICATION WIRING

- To build the communication line, 2 wires (twisted pair) run in the shield,for example. YTKSY eq 1x2x0,8.
- Communication line signals are marked with the letters A, B and E. They are led out on the interface, network expander and luminaire connectors.
- Signals A and B should be led by the wires of a twisted pair and the signal E should be connected by the cable shield.
- When choosing a provider, make sure that the conductors of wires are well marked to avoid incorrect wiring set up by the installer.
- The wires connected to devices should be carefully prepared. Sheath of the wire should be tightened on the appropriate length and the conductors of wires should be isolated so that their live active part did not protrude beyond the connector.
- Use the same colours of the conductors of wires to connect individual signals in the whole communication wiring of the system (e.g. blue colour for signal A and white colour for signal B).
- During the installation of the wire of communication line in the system, it is not required to maintain the order of the signals A and B.
- During the installation of the communication line, it is important to ensure continuity of the connection between the shield and each of the signals A and B between all system elements.
- The continuity of the PE signal is required between all elements of the system.
- The shield cable of communication line should not be connected with the PE signal.

To ensure smooth running of the system, one should check the parameters of the wire before connecting luminaires. In this purpose one should:

- Measure the resistance between the blue and white wires and between blue wire and shield cable and white wire and shield cable on the one side of the wire, while the conductors on the other end are open. The measured resistance values should be of hundreds of M? . Much lower values mean the damage of the wire.



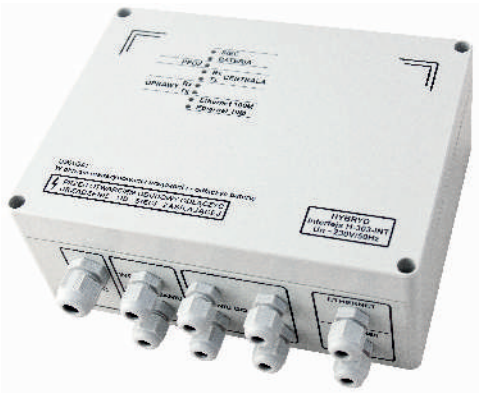
•Short-out the blue and white conductors of wires at one end and measure the resistance between them at the other end of the wire.

The resistance should be, depending on the wire specifications, 0,0375Ω x 2 x L, where L is the length in meters. The given resistance value of installing the YnTKSYekw wire of 1x2x0,8 at 20 0C. The measured resistance should not exceed 100? .

•Short-out the blue or white conductors of wires with the shield cable at one end and measure the resistance between them at the other end of the wire.

The measured resistance should not exceed 200Ω.

3.5 H-303 INT INTERFACE



•Interface system H-303 INT enables the central to communicate and control of emergency lighting luminaires CENTRALTEST. The connection of the interface with the computer of the central is performed via a standard RS-232/RS-485 connection, or via ETHERNET (optional module required).

Characteristics:
•4 output lines, each supporting up to 31 network expanders
•Programmable floating I/O to communicate with BMS/SSP
•Mains supply 230VAC
•Battery allows for at least 3h of emergency operation
•The maximum wire length between the interface and the network expander: 1000m
•LED lighting controls indicating status of operation and the presence of power supply

3.6 H-302 R NETWORK EXPANDER

The network expander is an intermediary element in communication between the interface of the central and the luminaires. To one interface line, up to 31 network expanders may be connected. To the output of the network expander up to 64 luminaires may be connected. Between the luminaire and the central only one network expander may be placed.

Characteristics:
•Battery allows for at least 3h of emergency operation
•The maximum number of supported luminaires: 64
•The maximum wire length between the interface and the luminaire: 1000m
•Power controls

3.7 LUMINAIRES

All luminaires are in Centraltest performance, they have a built-in battery, in emergency mode (after a loss of power supply) they operate from 1-3h depending on the model.

The system "CT 2 Gen" there are two types of luminaires:
•Directional - indicate the direction of evacuation, they have a pictogram in accordance with EN ISO 7010
•Lighting - luminaires illuminating the evacuation route

Luminaires can also be divided according to the mode of operation:
•Bright - the light source is active both when connected to mains supply and in emergency mode after the loss of power supply.
•Dark - the light source is activated only emergency mode after the loss of power supply.
•Night - during mains supply the operation of the light source is controlled by the central. The source of light is always activated in the emergency mode after the loss of power supply.

4.1 DESCRIPTION

The new version Centraltest was based on many years of experience. The aim of the development works was to eliminate the limitations of the original and to adjust to the requirements of the dynamic emergency lighting systems.

Advantages of 2 Gen.:

- Compatibility with CT 1 Gen. luminaires
  CT 2 Gen. is distinguished by a new network expander and central. Wiring and the way of connections remained unchanged. The system has full support for the luminaires in CT performance
- New types of connections
  There are two new connections CT-BUS, CT-LOOP. They allow to install up to seven network expanders from the central to luminaire, which gives even a maximum distance of 7km.
- A new way of transmission
  New, original communication protocol based on MAC addresses transmitted during the manufacture is more reliable and allows for easier diagnosis of problems
- A new way of controlling devices
  Software of microprocessors systems in luminaires was redesigned in such a way to test more accurately the efficiency of the luminaire and maintain a fully effective system.
- Support for dynamic luminaires
  With the second generation of the system, we introduced to the market a new type of luminaires, so called dynamic luminaires that indicate the direction of evacuation depending on the location of danger zone. Dynamic luminaires are fully controllable from the central.
- A new way of addressing
  All devices in the system CTB and CTL have a unique, factory-configured and unchanged hardware address, so called MAC. In addition to the MAC address, each device on the network has a linear logical address (1 - 65535) and the physical address representing a physical route from the main unit to the device (1.23.45.3456). Logical addresses can be changed during system start-up from the user interface level

4.2 LOGICAL ADDRESS

Logical address assumes figures in the range of 1 to 65535, and must be unique within the interface. It is independent of the physical structure of the network, thanks to which connections modifications or the physical change of the devices does not generate the need to make changes on the plan of the building or in the BMS system. This address should be put in a visible place of the device after its installation for easy visual identification.

4.3 PHYSICAL ADDRESS

In analogy to other systems, a physical address is made up of logical addresses and intermediary lines facilitating communication. In this case, the address may look eg. CT1.1.23.43.2 where the order is:
interface_numer.line_number.network expander_number .network expander_number.luminaire_number.

4.4 HARDWARE ADDRESS

The hardware address is assigned to each device during the manufacturing process and is unique in its scale. It consists of four segments - numbers written in hexadecimal form, separated by a colon. It is used for the communication between the system elements, so that even in the case when the installers transmit duplicated logical addresses of the devices during the installation, the system allows to communicate with those devices and to change the logical address from the central unit. An example of the address is as follows: FE:1C:4A:26. This address is printed on the label of the luminaire together with a 2D code that can be read using the application on smartphone or tablet.

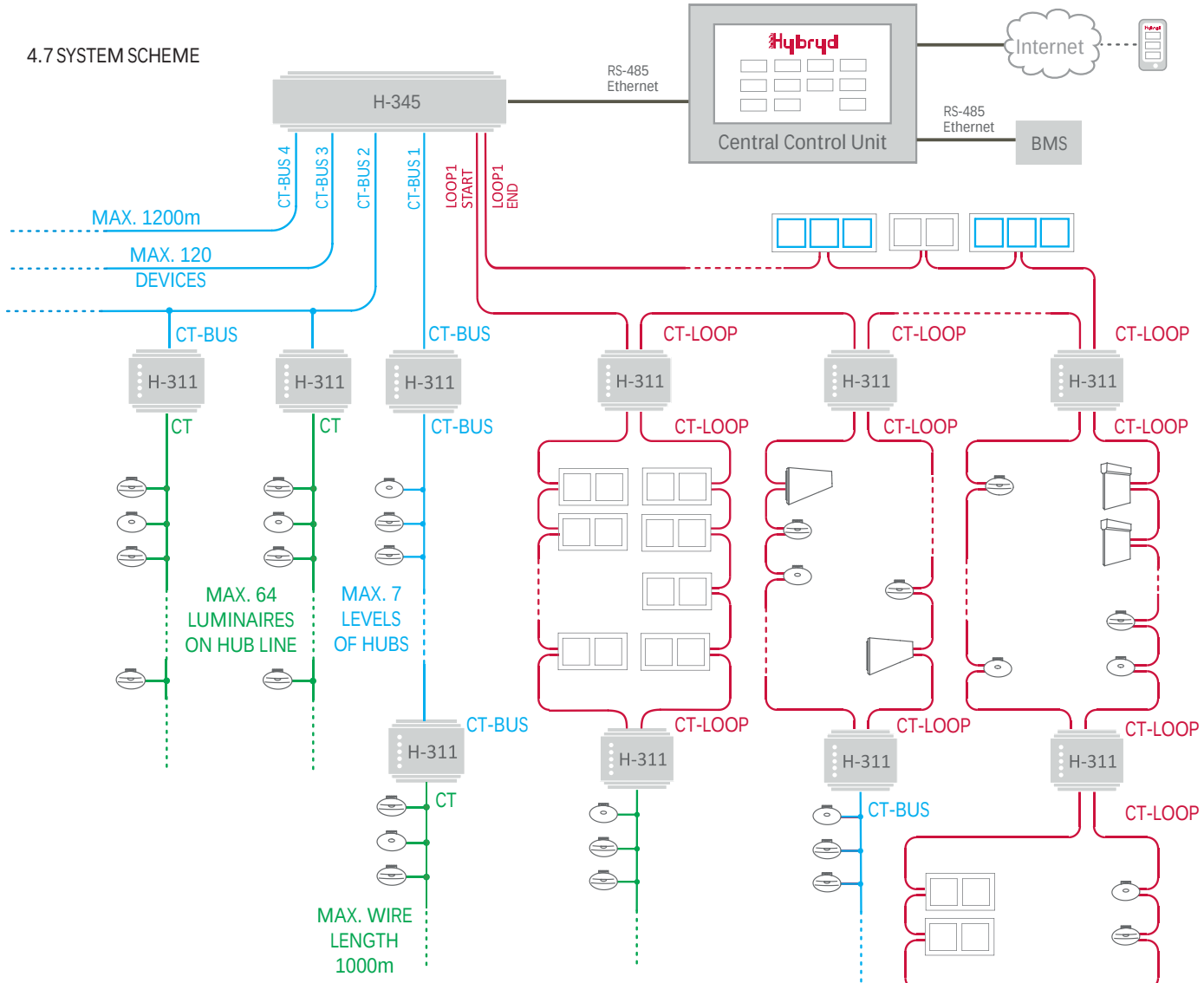
4.5 COMMUNICATION WIRING

Transmission medium and connection method remain unchanged. Description can be found in point Communication wiring. The CT system 1 GEN there was one method of communication called the CT communication. The new generation of the system introduces two new ways of communication described below.

4.6 CT-BUS COMMUNICATION

CT-BUS uses RS-485 communication standard. The devices are connected in a bus-type topology. CT-BUS allows to connect up to 120 devices (luminaires, network expanders, etc.) on a single bus with a line length of 1200 meters. Up to seven network expanders may be nested between the luminaire and the central.

4.7 SYSTEM SCHEME



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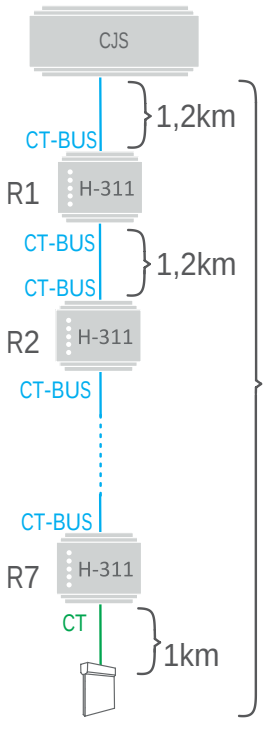
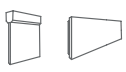


Communication technologies:

- CT
  - MAX. 1 LEVEL OF HUB
  - THE LUMINAIRE IS PRECEDED BY HUB
  - MAX. 64 LUMINAIRES ON HUB LINE
  - MAX. WIRE LENGTH 1000m
  - TYPE OF WIRE YTKSYekw 1x2x0,8
- CT-BUS
  - MAX. 7 LEVELS OF HUBS
  - MAX. 120 DEVICES ON THE LINE
  - MAX. WIRE LENGTH 1200m
  - TYPE OF WIRE YnTKSYekw 1x2x0,8
  - (THIS TECHNOLOGY OF LUMINAIRES ARE IN DEVELOPMENT)
- CT-LOOP
  - OPTIONAL HUBS
  - MAX. 7 LEVELS OF HUBS
  - MAX. 64 DEVICES ON THE LINE
  - TOTAL WIRE LENGTH OF MAX. 1200m
  - TYPE OF WIRE YnTKSYekw 1x2x0,8
  - (CURRENTLY AVAILABLE ONLY DYNAMIC LUMINAIRES, DIRECTIONAL AND ILLUMINATE ARE DEVELOPED)

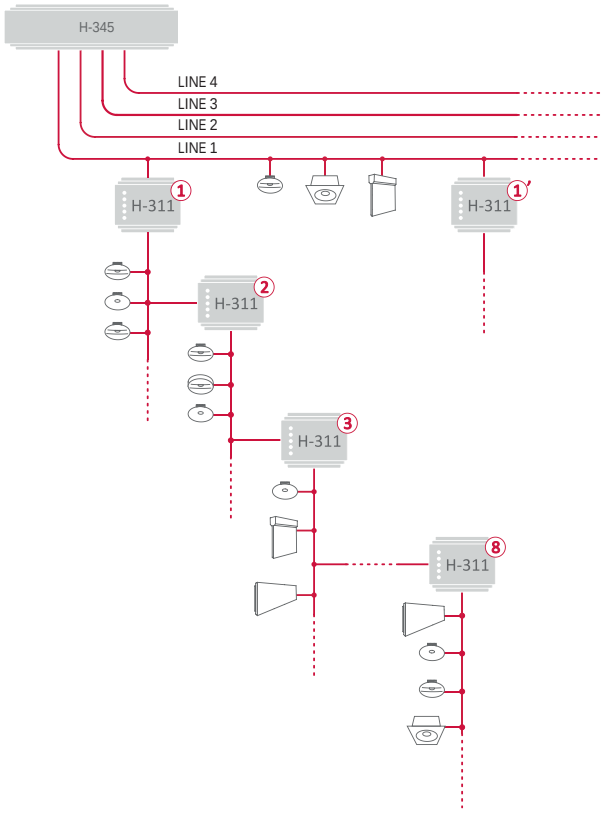
Luminaires



DIRECTION LUMINAIRES

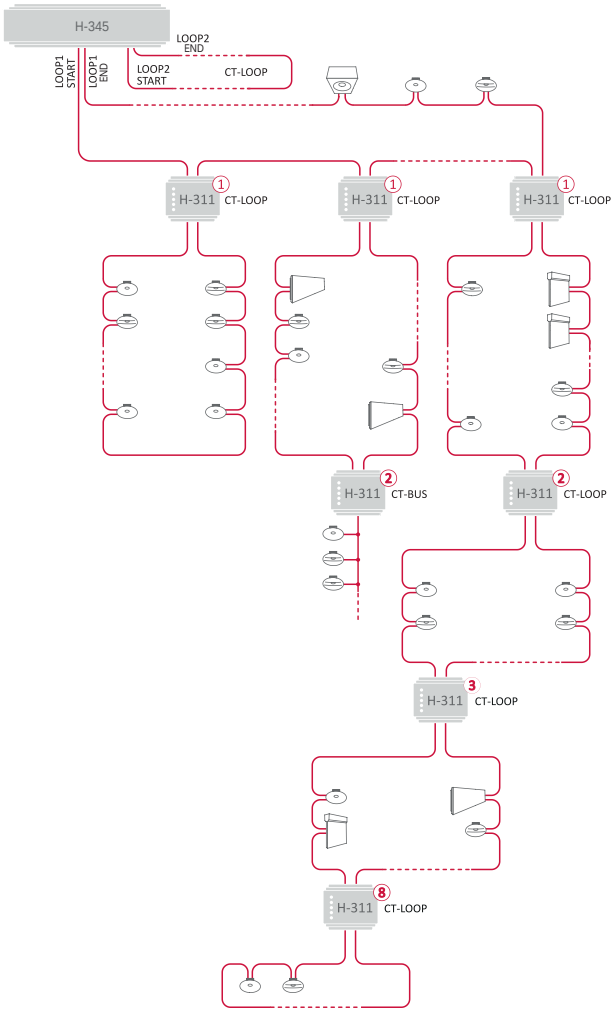
ILUMINATING LUMINAIRES

DYNAMIC SYSTEM LUMINAIRES



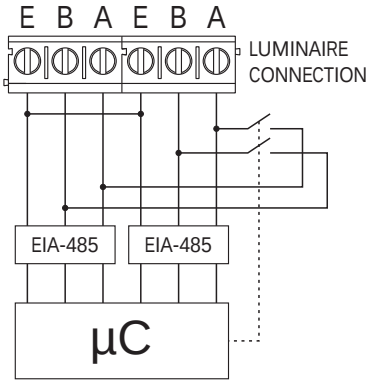
4.8 CT-LOOP COMMUNICATION

Based on the EIA-485 with two-way short-circuit isolation, CT-LOOP enables robust communication between the central and luminaires. The central is able to sense which the network segment is down (between which devices) and reroute communication from one side of the loop to the other one. This also helps during installation and system commissioning. CT-LOOP permits up to 64 devices on a loop of up to seven (for DYN system it is recommended no more than two network expanders) H-311 network expanders between central unit and luminaires. The maximum wire length for a single loop is limited to 1200 meters, which means that the device can be distanced from the parent (central, network expander) not more than 600 meters. Network H-311 network expander can also be used for transition between CT-LOOP and CT- BUS.

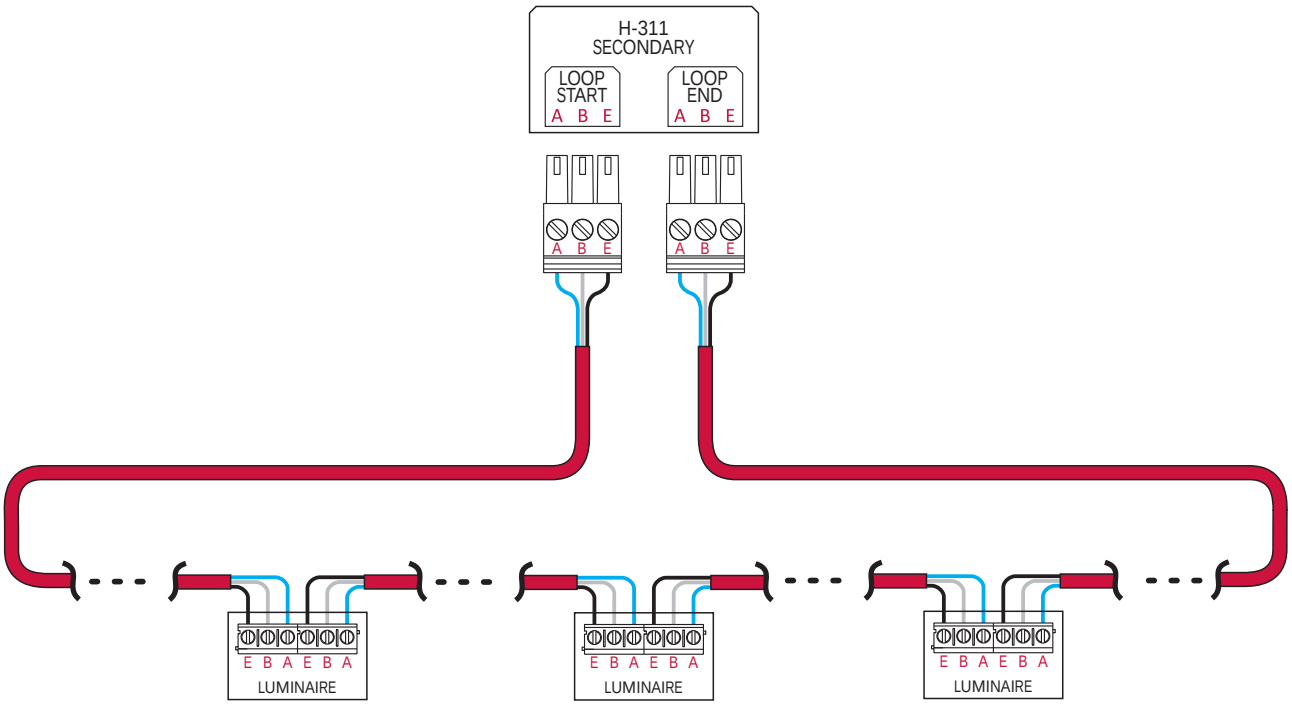


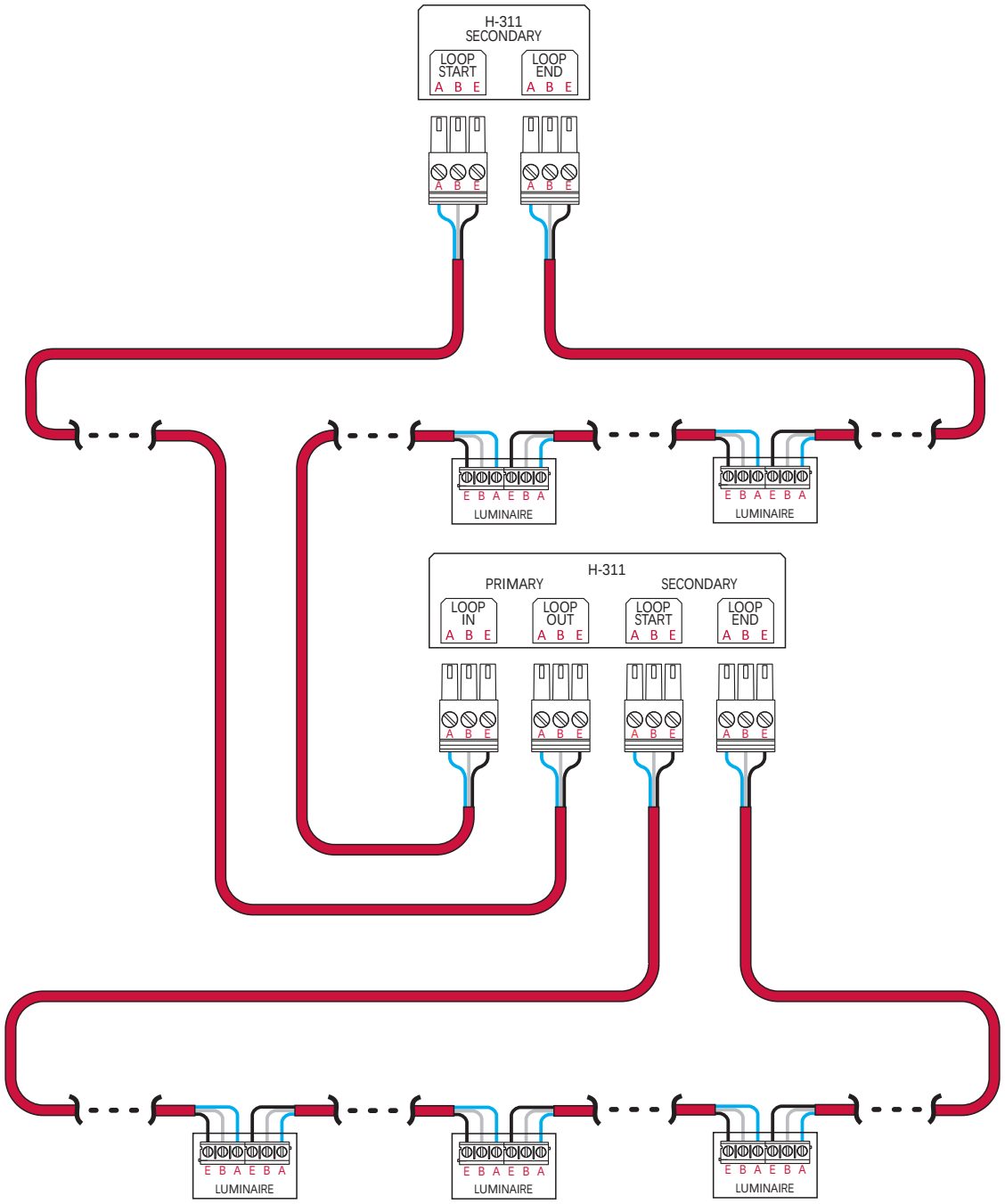
Each device connected to the communication network CT-LOOP is equipped with two sets of connectors, which comprises three connection terminals - for signals A, B and E. It is presented in another drawing, which also contains information about the internal structure of the communication part of the devices of CL-LOOP system

In the case of loss of communication each of the devices in the loop disconnect it, then the parent (central, network expander) again connects loop to the place of its damage, at the same time indicating the user, between which devices the wiring segment has been damaged.



An exemplary connection of system elements is shown for example in two following drawings.





4.9 H-345 INTERFACE

Interface H-345 is a device which allows for communication of central (PC) with a network of emergency luminaires.
- Enabling communication: Central <-> network of luminaires
- Working with fire alarm systems through MODBUS or potential free I/O
- Constant monitoring of the presence of the devices in the system
- Control of dynamic luminairies on the basis of fire detection system SSP signals

The module after receiving a signal from SSP automatically implements (regardless of the central) the scenario stored in the configuration

4.9.1 Connectors

- 4 CT-BUS lines
- 1 CT-1 LOOP
- 2x Ethernet connectors (CJS and Modbus TCP/IP for SSP)
- 16 potential free inputs for SSP
- 16 relay outputs for BMS
- USB for CJS
- RS-485 (Modbus RTU) for SSP

4.9.2 Power supply

The module is powered from an external buffer power supply allowing for at least 3h of emergency operation.

4.9.3 Casing

The electronic interface system was placed in an enclosure for installation on a DIN rail. It has the following specifications:
•Width: 8M - 142mm.
•Protection level: IP20
•Protection class I,
•Material: blend PC/ABS UL 94 V-0

4.10 H-311 NETWORK EXPANDER

H-311 network expander is an intelligent device, which function is to expand the possibilities of communication network for another communication loops/lines on which luminaires and other distributors H-311 are placed. It has the built-in battery ensuring uninterrupted operation for a minimum of 3 hours period.

4.10.1 Realizations

•H-311 network expander may be divided to realizations according to the kinds of input and output interfaces. Types of interfaces available:
•CT-LOOP (CTL) - loop link designed to control and monitor emergency lighting and dynamic evacuation lighting luminaires.
•CT-BUS (CTB) - the bus type line designed to monitor the emergency lighting luminaires.

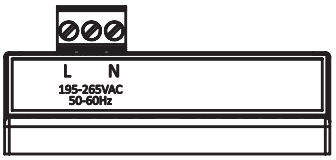
Due to the combination of links, H-311 network expander may occur in the following realizations:
•CTL-CTL - a parent and subordinate network type CT-LOOP. Realization required for DYN system.
•CTL-CTB - parent network type CT-LOOP, subordinate network type CT-BUS.
•CTB-CTB - a parent and subordinate network type CT-BUS. Realization used in most cases with the central monitoring of emergency lighting luminaires.
•CTB-CTL - parent network type CT-BUS, subordinate network type CT-LOOP. It should not be used in situation other than when it is necessary to separate the communication line just near the central.

4.10.2 Casing

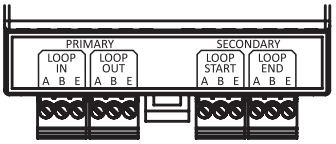
The electronic network expander system and the LiFePO4 battery was placed in an enclosure for installation on a DIN rail. It has the following specifications:
•Width: 4M - 71mm.
•Protection level: IP20
•Protection class I,
•Material: blend PC/ABS UL 94 V-0

4.10.3 Connections

H-311 network expander has two groups of connections. The first consists of communication connections, the second of the supply connection.
Power connection allows to connect the wire of a cross section between 0.5 and 2.5mm2. It is a two-part connection, thanks to which the equipment maintenance is very simple.



Thanks to the plastic enclosure of the network expander, to connect power supply two wires are sufficient - L and N.
The network expander does not require PE protective wire.
Depending on the realization, H- 311 network expander may have two (CTB-CTB) to four (CTL-CTL) communication interfaces.



Interfaces marked as PRIMARY must be connected to the parent loop (CTL) or bus (CTB), i.e. loop/ bus of the central or subordinate loop/bus of another network expander.
Interfaces marked as SECONDARY are used to create a subordinate expander network. In the case of CTB realization there is only one port, in the case of CTL realization there are two. They are used to create a loop. Both interfaces are galvanically isolated from each other.
Besides galvanic isolation of SECONDARY interfaces, network expander has full galvanic isolation between the PRIMARY and SECONDARY interfaces.
In the case of CTL realization, parent (PRIMARY) interface and subordinate (SECONDARY) interface is recommended to maintain the order of inputs (IN) and output (OUT) and the beginning (START) and end (END) of the loop. This facilitates locating damaged wiring segments on the object at the time of system start-up. Yet it is not required for a proper operation of the system.
Communication connectors, alike the power connector, are two-piece, terminal connections. During the installation, make sure the connected wire is in the place where the pressure connector operates and not under it. This is one of the most common errors made when installing communications wiring.

5.1 DESCRIPTION

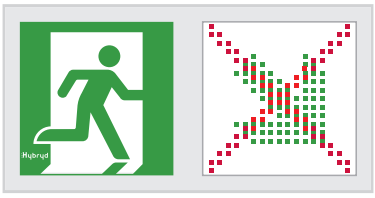
DYN is the Centraltest 2 Gen. component that is characterized by the use of "Spark DYN" type luminaires. While technically it is the CT 2 Gen. system and all described in the previous section is applicable, a different mode of operation of dynamic luminaires requires a separate chapter.
The dynamic emergency lighting system has been designed for safe evacuation of people in public buildings with a developed communication infrastructure. Integrated with the fire alarm systems, it receives information about the emergency location, then it indicates, by the use of dynamic lighting luminaires, the optimal evacuation route. This route is indicated depending on the location of the emergency on the basis of multiple predefined scenarios in the system.

5.2 SPARK DYN LUMINAIRE

SPARK DYN Dynamic lighting luminaires were constructed on the basis of aluminium profiles used in the SPARK luminaires to ensure visual consistency between the classic (static) emergency lighting luminaires (SPARK) and dynamic emergency lighting luminaires (SPARK DYN). Front of the luminaire is made of steel sheet and together with all the visible elements is coated by the powder paint on the desired colour.
The luminaire has a modular structure. It includes two types of modules:
- Pictogram module - a sign of E001 or E002 compliant with the EN ISO 7010: 2012.
- Arrow/cross module - displays an arrow compliant with with EN ISO 7010: 2012 and the cross as a prohibitory sign.

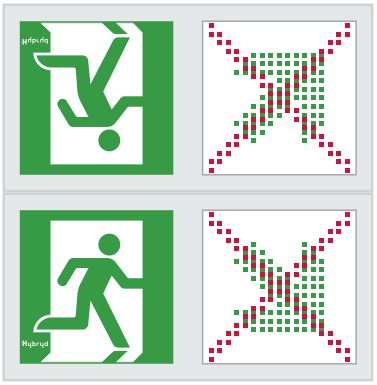
More details about the structure and the possibility of modules is given in sections Pictogram module and Arrow/cross module. The luminaire may have from one to four arrow/cross modules and from one to two pictogram modules. Due to the number of modules it may be divided into:

- single-sided with one arrow/cross module and one pictogram module:

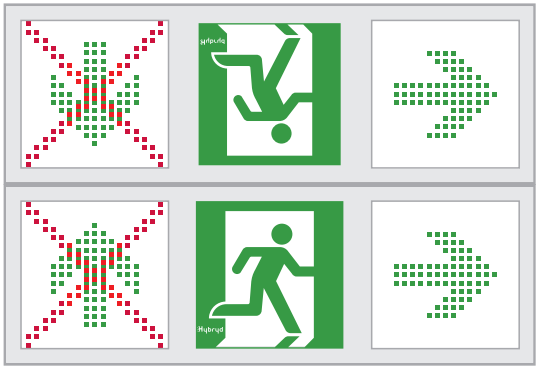


- single-sided with two arrow/cross modules and one pictogram module:

- double-sided with two arrow/cross module and two pictogram modules:



- double-sided with four arrow/cross modules and two pictogram modules:

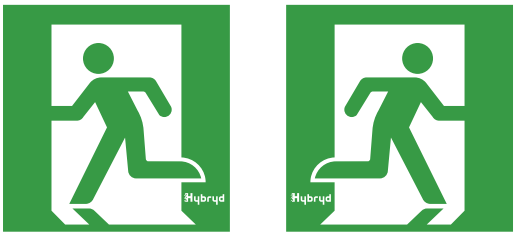


- In order to facilitate installation, the luminaire has been divided into two parts:
- installation element, that is also the enclosure element, installed on a surface, allowing easy access to power supply and communication connections,
- primary element containing arrow/cross and pictogram modules, control electronics of the luminaire and optional battery.

During the installation of luminaire, firstly, the installation element is mounted, power supply and communication lines are processed and connected, then to the two quick couplings, plugs of the primary element are connected, which in a further step is inserted into the enclosure guide. This element is screwed to the installation element by means of two screws placed on the bottom of the left and right sides of the enclosure.

5.2.1 Pictogram module

Pictogram module is made in two variants E001 and E002. Pictogram module has dimensions of 150x150mm. Evacuation sign is visible only when illuminated. The brightness of the sign lighting may be adjusted in the range of from 30 to 100%. Luminance of the sign with 30% brightness meets the requirements of EN 60598-2-22, i.e. exceeds the value of 2cd/m2.

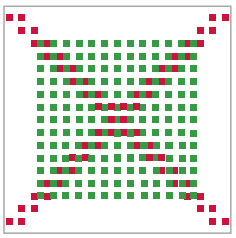


5.2.2 Arrow/cross module

Arrow - complementary sign to the basic sign E001 or E002 is displayed using a 13x13 matrix of green colour LEDs. It is compliant with the EN ISO 7010. Arrow sign may be crossed by the sign of the red cross. Each character can be configured independently.

Configurable parameters include:
- status: on/off,
- pulsation period: off or from 200-750ms every 50ms (filling 50%),
- brightness: one of three levels,
- the direction of the arrow.

The module allows to display eight arrows (supplementary characters) rotated by 45 degrees, placed in permanent module memory and an additionally eight configurable characters in EEPROM module memory by the central unit of the system. The cross (the prohibitive sign) is a static sign. The module does not allow to modify its shape.
In the module applied were 133 green colour LEDs and 66 red colour LEDs of a reputable brand. External dimensions of the module are 150x150mm.



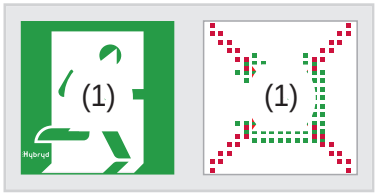
Module arrow/cross - view of the LEDs positioning

The module may be applied in full version, containing both, a matrix of the green LEDs displaying the arrow and of the red LEDs displaying a cross (indicated as CA - cross/arrow), as well as in two incomplete versions:
- marked ad CR (cross) version with red LEDs that display the cross (prohibitive sign),
- marked as AR (arrow) version of the matrix of green LEDs display arrow sign.

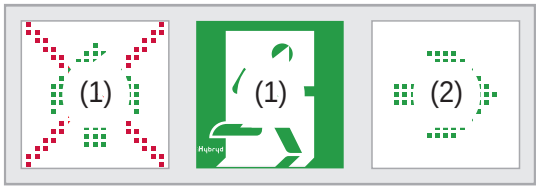
5.2.3. Numbering of luminaire modules

Pictogram modules and arrow/cross modules are numbered separately. The numbering is as follows:

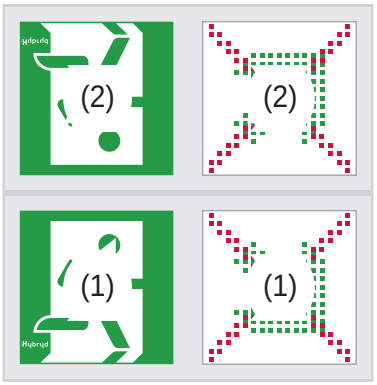
- one-sided with one arrow/cross module and one pictogram module:



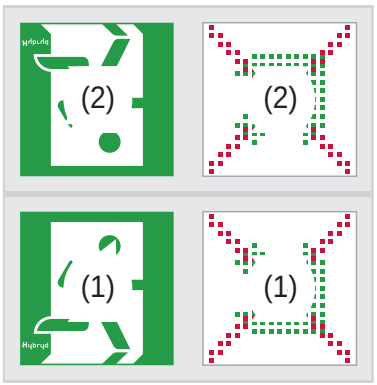
- one-sided with two arrow/cross modules and one pictogram module:



- two-sided with two arrow/cross modules and two pictogram modules:



- two-sided with four arrow/cross modules and two pictogram modules:



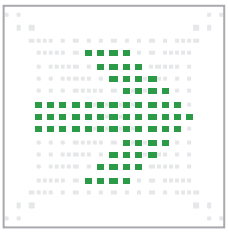
Modules numbering is very important because of formulation of visual messages presented by the luminaire.

5.3. Messages displayed by the luminaire

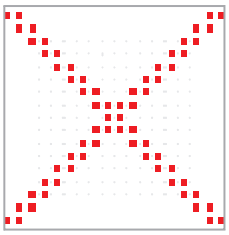
The following set of signs forms the message of the dynamic luminaire:

- base sign E001 or E002 compliant with the EN ISO 7010 with an option of total fading out (visible white surface):

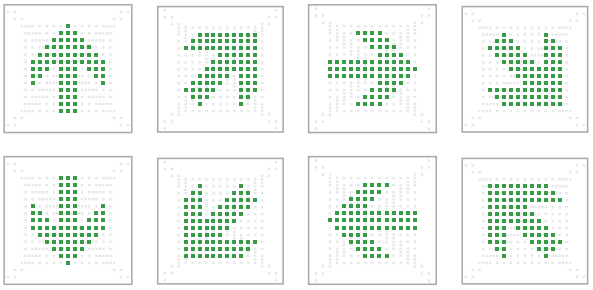
- the complementary sign of the arrow, referring to the shape compliant to the EN ISO 7010:



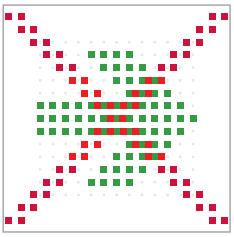
- sign of the cross:



Arrow sign may be rotated by 45 degrees, giving the following possible messages directional:



Arrow sign may be crossed by the red cross sign meaning the prohibition to escape in that direction. An example is as follows:



Arrow, cross and pictogram status signs are completely independently configurable for the particular visual message.

In order to obtain unambiguous message for evacuees, arrow/cross signs should always occur together with the basic sign E001 or E002. Therefore, the luminaires can be divided into two-segment, consisting of the basic and supplementary signs and three-segment consisting of arrow/cross module, basic sign and another arrow/cross module.

In the event that an evacuation scenario requires the reversal of an evacuation route, it may be necessary to display visual messages on both sides of the luminaire. In this case, use the double-sided luminaires.

5.4 LUMINAIRE OPERATING MODES

The luminaire can operate in one of three modes:
- Basic mode - in the presence of mains supply,
- emergency mode - after the loss of power supply or providing the DC voltage by a central battery,
- fire (danger) mode - after receiving instructions from the central.

Each of these modes has an independent configuration of displayed messages, whereas the fire mode allows up to thirty different messages depending on the evacuation scenario. Appropriate scenario in the fire mode is selected by the Central on the basis of the information from the SSP of the zones in which a danger there occurred.

5.5 LUMINAIRE BEHAVIOUR AFTER COMMUNICATION LOSS

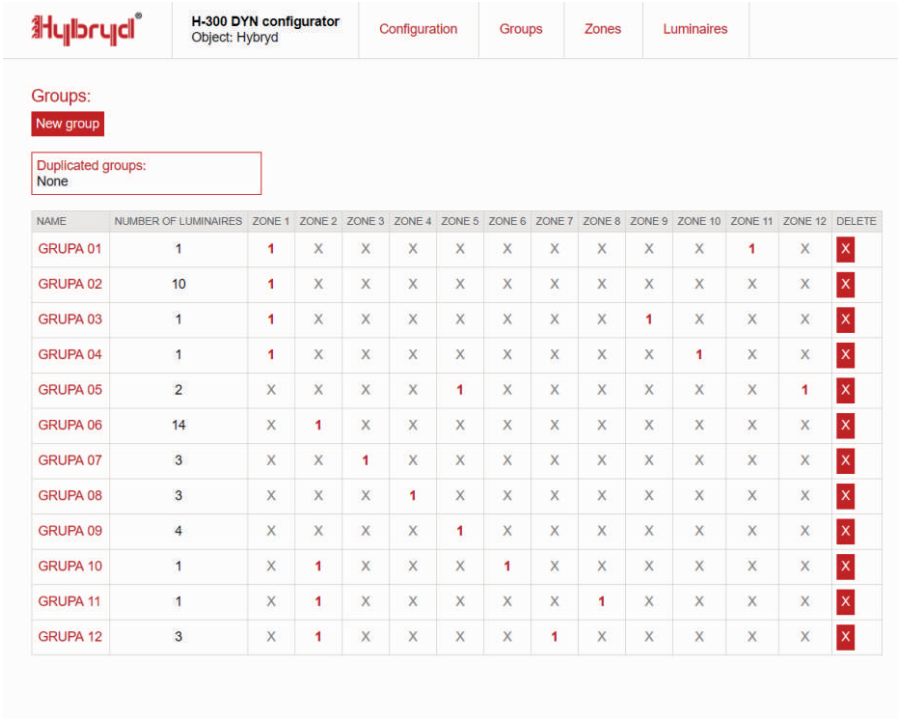
- The luminaire after losing communication with the central unit of H-300 DYN system may behave in one of two ways:
- luminaire displays the current message (remains in the state in which it was at the moment of losing communication).
- luminaire does not display any visual message (stays off).

5.6 CONFIGURATION OF THE EVACUATION SCENARIOS

For system configuration, the information is needed about the messages that the luminaires must display in the case of fire or the danger of fire in specific places on the basis of evacuation scenarios. This information must be entered into the system DYN configurator. Configurator is a web application made available to customers by Hybryd. It allows to configure all functions of luminaires and the system described in this document, and then to generate a configuration file in XML format. This file must be uploaded to the Central.
After loading the file, the Central sends configuration messages to the luminaires. If a record for all luminaires is correct, the system obtains the status of a configured.

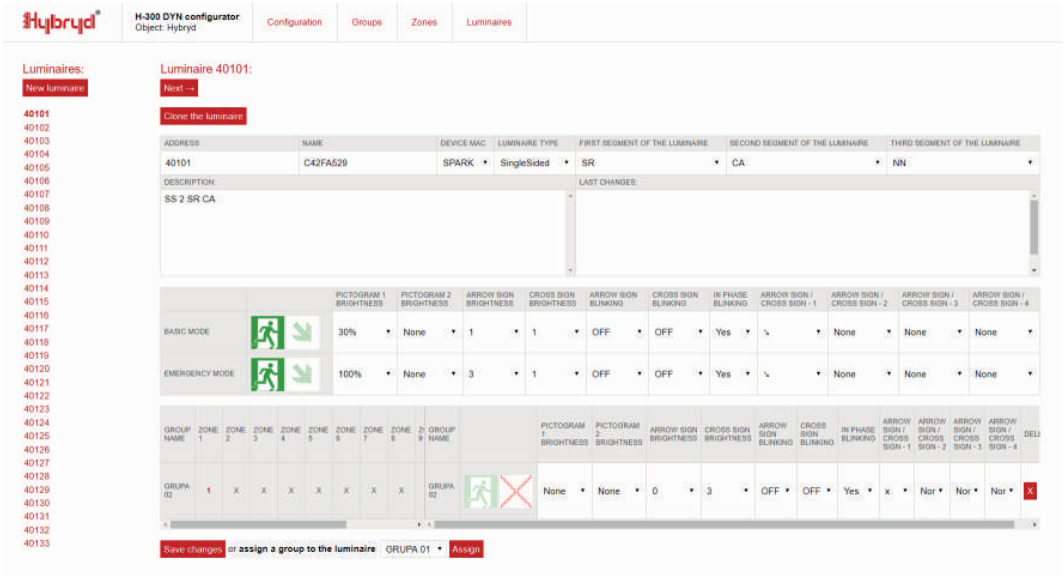
5.6.1 Scenario structure

Scenarios describe the reactions of dynamic luminaires on the danger signals. Each scenario begins with determining the value of each fire detection system SSP signal to which the scenario is related.

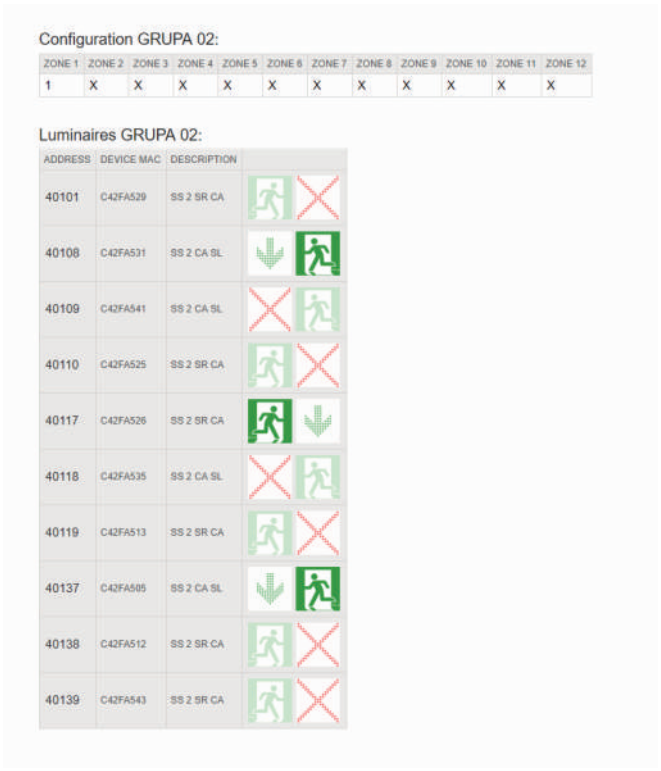


NAME	NUMBER OF LUMINAIRES	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	ZONE 11	ZONE 12	DELETE
GRUPA 01	1	1	X	X	X	X	X	X	X	X	X	1	X	X
GRUPA 02	10	1	X	X	X	X	X	X	X	X	X	X	X	X
GRUPA 03	1	1	X	X	X	X	X	X	X	1	X	X	X	X
GRUPA 04	1	1	X	X	X	X	X	X	X	X	1	X	X	X
GRUPA 05	2	X	X	X	X	1	X	X	X	X	X	X	1	X
GRUPA 06	14	X	1	X	X	X	X	X	X	X	X	X	X	X
GRUPA 07	3	X	X	1	X	X	X	X	X	X	X	X	X	X
GRUPA 08	3	X	X	X	1	X	X	X	X	X	X	X	X	X
GRUPA 09	4	X	X	X	X	1	X	X	X	X	X	X	X	X
GRUPA 10	1	X	1	X	X	X	1	X	X	X	X	X	X	X
GRUPA 11	1	X	1	X	X	X	X	X	1	X	X	X	X	X
GRUPA 12	3	X	1	X	X	X	X	1	X	X	X	X	X	X

Groups 01..06 symbolize the different scenarios of the system operation. For each zone the double-side signal "1" or "0" from the fire detection system SSP can be replaced with "X" symbolizing any signal value. The group is activated when the set signals values are in accordance with signals from the SSP. In this way, the so called Fire Protection Group forms, which is assigned to a given luminaire by selecting an appropriate message that is to be displayed for the situation.



Luminaires not assigned to a given Fire Protection Group will not enter in the fire mode in the case of its activation. In the case of using the "X" sign in the group configuration it is allowed to activate multiple Fire Protection Groups at the same time.
Configurator allows to print the scenario in the form of graphical or tabular documentation.



Configuration GRUPA 02:

ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	ZONE 11	ZONE 12
1	X	X	X	X	X	X	X	X	X	X	X

Luminaires GRUPA 02:

ADDRESS	DEVICE MAC	DESCRIPTION
40101	C42FA529	SS 2 SR CA
40108	C42FA531	SS 2 CA SL
40109	C42FA541	SS 2 CA SL
40110	C42FA525	SS 2 SR CA
40117	C42FA526	SS 2 SR CA
40118	C42FA535	SS 2 CA SL
40119	C42FA513	SS 2 SR CA
40137	C42FA505	SS 2 CA SL
40138	C42FA512	SS 2 SR CA
40139	C42FA543	SS 2 SR CA

Configuration GRUPA 02:

ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	ZONE 11	ZONE 12
1	X	X	X	X	X	X	X	X	X	X	X

Luminaires GRUPA 02:

ADDRESS	DEVICE MAC	PICTOGRAM 1 BRIGHTNESS	PICTOGRAM 2 BRIGHTNESS	ARROW SIGN BRIGHTNESS	CROSS SIGN BRIGHTNESS	CROSS SIGN / CROSS SIGN - 1	CROSS SIGN / CROSS SIGN - 2	CROSS SIGN / CROSS SIGN - 3	CROSS SIGN / CROSS SIGN - 4
40101	C42FA529	None	None	0	3	x	None	None	None
40108	C42FA531	100%	None	3	1	↓	None	None	None
40109	C42FA541	None	None	0	3	x	None	None	None
40110	C42FA525	None	None	0	3	x	None	None	None
40117	C42FA526	100%	None	3	1	↓	None	None	None
40118	C42FA535	None	None	0	3	x	None	None	None
40119	C42FA513	None	None	0	3	x	None	None	None
40137	C42FA505	100%	None	3	1	↓	None	None	None
40138	C42FA512	None	None	0	3	x	None	None	None
40139	C42FA543	None	None	0	3	x	None	None	None

Configuration GRUPA 03:

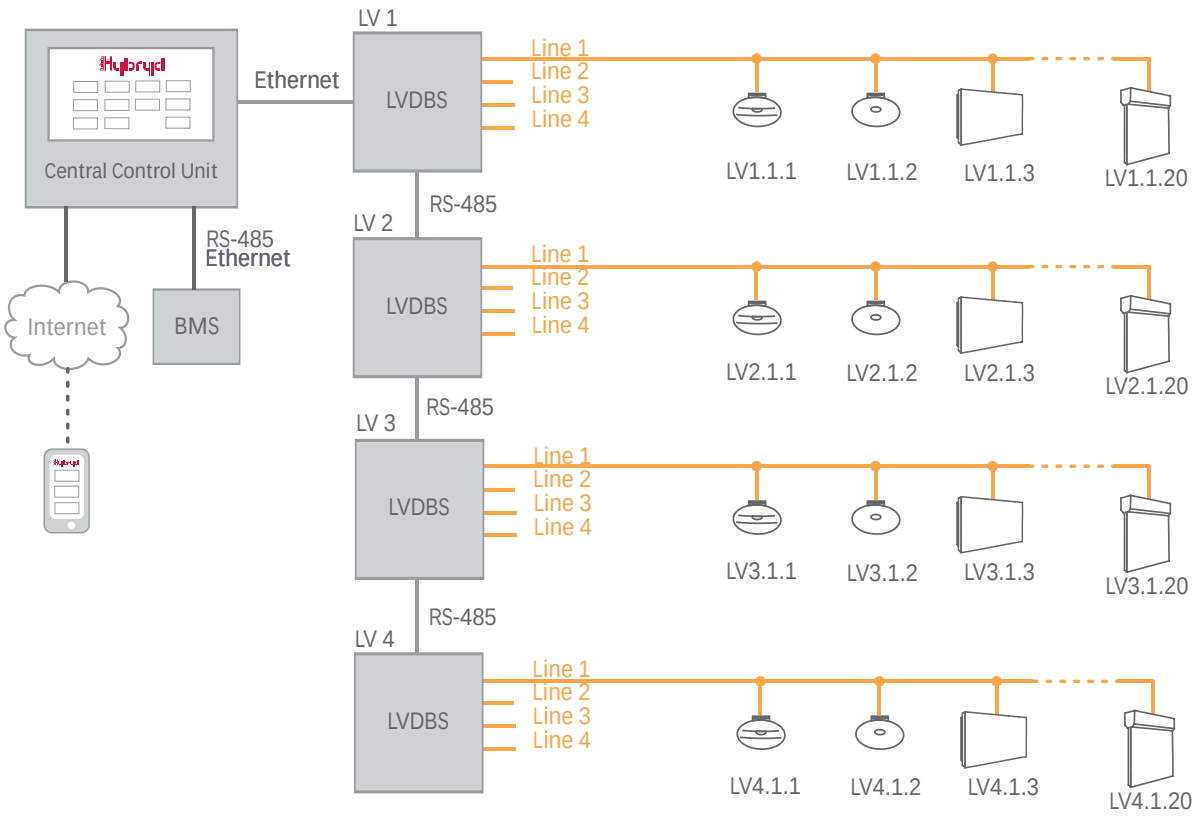
ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	ZONE 11	ZONE 12
1	X	X	X	X	X	X	X	1	X	X	X

6.1 DESCRIPTION

LVDBS low-voltage system (also known as LPS), has several small cabinets with built-in batteries, which supply voltage dedicated housing in the range of 20 to 27.2VDC.

Such a system is intended for small objects, or objects, where the replacement of autonomous luminaires batteries would generate high costs (eg. because of installing heights of the luminaires) and the use of the HVCBS system would be unprofitable. Each luminaire in the system has a unique address consisting of cabinet_number.line_number.luminaire _number for example. LV1.4.5.

6.2 SYSTEM SCHEME



6.3 LVDBS CABINET

LVDBS (LPS) cabinets are connected with each other via RS-485 connection, but they operate as separate units. Communication between the cabinets allows to view the results and the system status from the main unit. The central connects to the main unit Ethernet link.

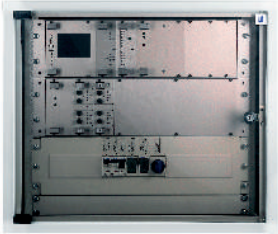
6.4 LUMINAIRES

Luminaires operating in LVDBS (LPS) system are powered by direct current (DC) inside the LVDBS cabinet or in the case of loss of mains supply, is powered from the built-in battery in LVDBS cabinet. They can be turned on by an external switch or by a phase loss sensor in the dashboard. Luminaires can operate either in bright or dark mode, and can be on the same line.

Supply voltage	230VAC lub 230VDC	
Connection power	500VA	
Output power on 1 line	75W	
Number of lines:	4	
Output voltage	it/i	
The level of f buffered voltage	27,2V	
Overall dimensions (width x height x depth)	400 x 500 x 210	
Luminaire control	max 20 luminaires on the line, but no more than 75W	
Time of emergency operation	1h	2h
Battery capacity	20Ah	40Ah
Weight	15 kg	27 kg

7. SYSTEM HVCBS

7.1 DESCRIPTION



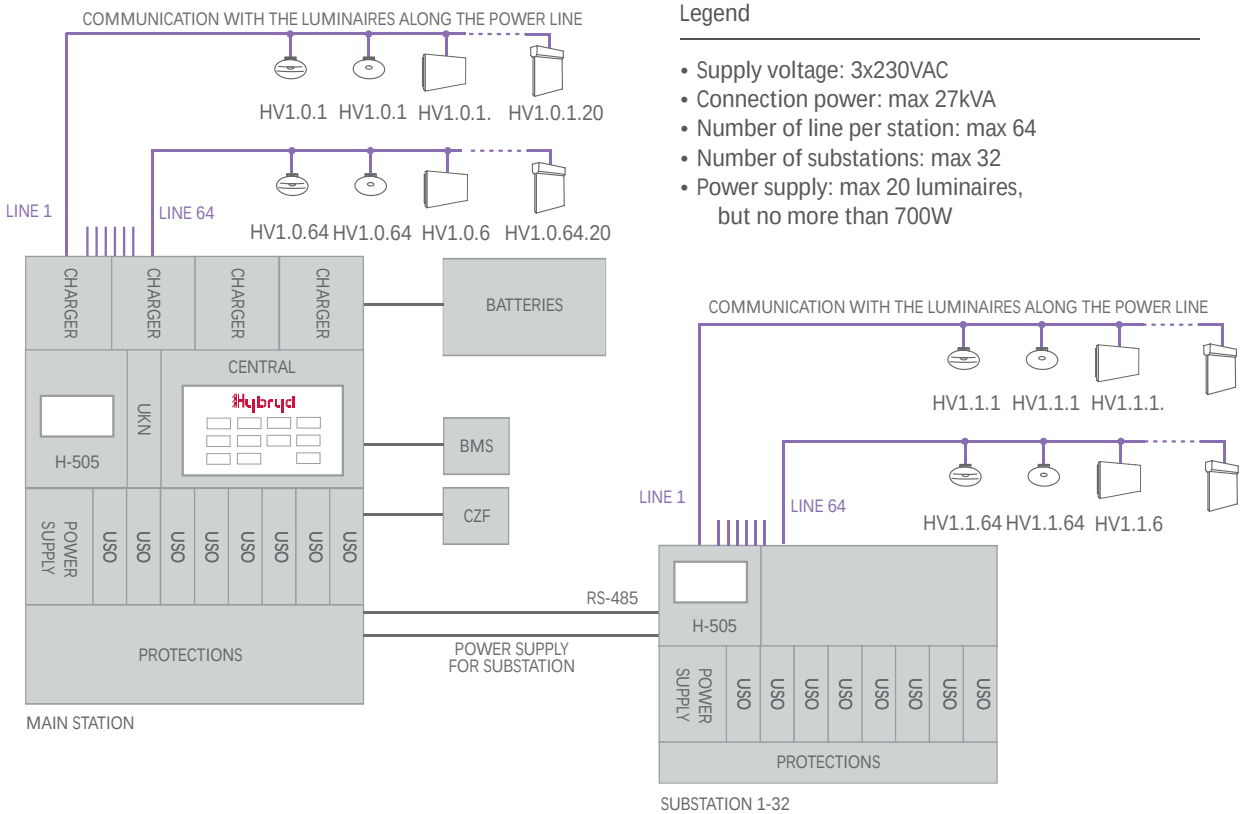
HVCBS is a modular high-voltage system of a central battery based on 19" rack standard. The system has been designed to comply with EN 50171, EN 50172, EN 50272 and EN 1838.

It supplies the emergency lighting luminaires with 230VAC or a 216VDC nominal battery on mains loss.

HVCBS is intended to supply circuits IT type electric networks during battery operation with maximum power up to 27kW. The system may consist of a main station and the substations or only of the main station. Lighting luminaires positioned in so-called final circuits may be affixed both, to the station and to the substation. These circuits can have a maximum power of 700W.

HVCBS system can be powered with single-phase and three phase power supply. It depends on the specific requirements of the customer. Maximum power of one-rack system (without substations), with three-phase power supply, is 27kVA. Such a system can include up to 64 final circuits.

7.2 SYSTEM SCHEME



Legend

- Supply voltage: 3x230VAC
- Connection power: max 27kVA
- Number of line per station: max 64
- Number of substations: max 32
- Power supply: max 20 luminaires, but no more than 700W

7.3 COMMUNICATION

Communication between the main station and substations is carried out via RS-485 bus. In HVCBS system the efficiency control of lighting circuits can be achieved by lines control or luminaires control.
Communication with the luminaires is done along the power line, the system does not require a separate communication line.
Communication of a main station with the central is done through the Ethernet connector of H-505 computer.

7.4 The construction of SZC cabinet

The system is based on 19" rack standard " in which the following blocks in the form of interchangeable modules are included:

- H-505 computer - the computer controlling the operation of the cabinet, providing an interface for the central
- UKN module - voltage, charging, battery control module and insulation control module
- USO module - final circuits control module;
- USI module - input free-potential module of lighting control
- EPS 250/700 module-rectifier module for battery charging

The batteries are located in the same cabinet as electronic circuits or on a separate stand. In HVCBS systems the sealed maintenance-free batteries are used, with a life span of 10 years. These batteries have a low self-discharge and a small gassing. In SZC system there are 18 pcs. of 12V batteries used, connected in series.

Basic parameters:

Supply voltage		3x230VAC
Connection power		Max. 27kVA
Output power (whole system)		Max. 27kVA
Number of lines (one terminal)		Max. 64
Number of sub-terminals		Max. 32
IT network isolated during battery operation		Yes
Output voltage		230VAC or 220VDC
Output lines:	Line control	700W (luminaires of the same power on the line)
	Luminaire control	Max. 20 luminaires with address modules on the line but no more than 700W
The range of battery voltage		176V-264V

7.4.1 Computer H-505

Computer H-505 is intended to collect and store information about system failures. With this information it is possible to generate a report for later printing. The computer has a touch screen on which the messages from the system are shown. Faults are additionally signalled by potential-free relay contact. The signalling may be connected to BMS. PC communicates with computers in the substations via RS 485 port. It reads and displays textual information and emergency conditions. Computer in the main station enables to connect the Central, which is optional in this system.

7.4.2 USO Module

USO type module is intended for measuring the efficiency of lighting luminaires forming part of the final circuit. It may consist of up to 12 identical luminaires when testing the efficiency of the line or up to 20 luminaires with a total power not exceeding 700W. Setting the type of work of line is done from H-505 computer. One USO module may monitor 2 final circuits.

7.4.3 USI Module

This module has 8 binary inputs and 7 relay outputs. Binary inputs can be controlled by potential-free contacts, for example from voltage loss systems of storeyed sub-terminals. From the computer these inputs may be associated with any other lines and their control may be activated.

7.4.4 UKN module

It is intended to measure the voltages in the system. It measures the mains voltage and the battery voltage. When measuring the mains voltage it measures the supply voltage. The module is configured from H-505 computer.
It is possible to measure the voltage of one, two or three phases. This module controls a group of contactors located in the cabinet that are connected in the SZR system. A supply voltage drop below 186V makes the module passing from network operation to battery supply operation.
The module additionally controls the battery voltage and current. Voltage and current values are displayed on the screen of H-505 computer. The module also measures the battery circuit continuity, ie. checks whether an interruption in the battery circuit occurred, caused by a fuse damage or by damage of the connections between the batteries. Periodically and in accordance with a predetermined schedule, it measures the isolation of both battery polarities in relation to ground. The module connects to the computer via the internal RS-485 bus.

7.4.5 EPS 700 Charger

The rectifier is configured as a module. It is placed in the EURO-6U / 220mm cassette module. Outputs from module, in the form of the output connector type H15 allow inserting and removing the modules from the cassette under voltage (hot-swap), the applied number of modules provides redundancy. Optical signalling of a proper work of the block is provided by LED's on the front panel. Inside the enclosure there are fuse slots: F1 power slot and F2 output slot. The rectifier is specially designed to charge the batteries, especially maintenance-free. The module can work independently or in a set of parallel blocks in order to increase power output. For nominal voltage Uo (V) = 245.00 V, the max output current is 3A.

The solutions adopted in the rectifier type EPS-700 provide:
- Limiting the power stroke when switching to the network.
- Output characteristics with pulse limitation of output current of a permanent voltage type- direct current.
- Over-voltage protection at the level of 110 ÷ 120% Uo (continuous voltage regulation).
- Output from the block, the signal of the correct operation of the power supply in the form of no voltage relay contact.
- Optical signalization of the damage of module.
- Eliminating the power stroke when connecting batteries to the power supply.
- Automatic switching on the fan with increasing current load more than 30% of the nominal current.
- Reducing the output power of the power supply to 40% of nominal power in the case of fan damage.
- Adjustment of the change of output voltage from the temperature as required by the battery manufacturers.
- Remote switching on and off the power supply.

7.4.6 EPS 200 Charger

The rectifier is configured as a module. It is placed in the EURO-3U / 160mm cassette module. Optical signalling of a proper work of the block is provided by LED's on the front panel. Inside the enclosure there are fuse slots. The rectifier is specially designed to charge the batteries, especially maintenance-free. The module can work independently or in a set of parallel blocks in order to increase power output. For nominal voltage Uo (V) = 245.00 V, the max output current is 1A.

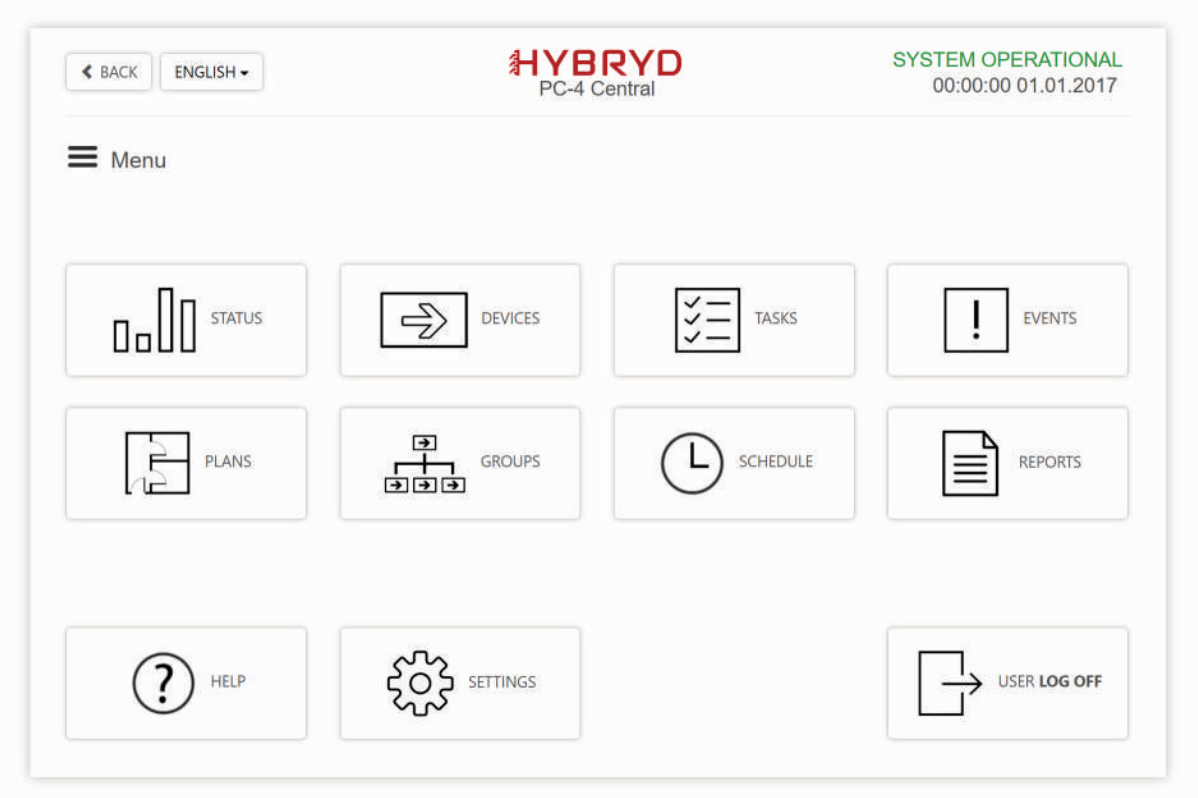
- The solutions adopted in the rectifier type EPS-200 provide:
- Limiting the power stroke when switching to the network;
- Output characteristics with pulse limitation of output current of a permanent voltage type- direct current;
- Over-voltage protection at the level of 110 ÷ 120% Uo (continuous voltage regulation);
- Output from the block, the signal of the correct operation of the power supply in the form of no voltage relay contact;
- Optical signalization of the damage of module;
- Eliminating the power stroke when connecting batteries to the power supply;
- Adjustment of the change of output voltage from the temperature as required by the battery manufacturers;
- Remote switching on and off the power supply.

8.1 DESCRIPTION

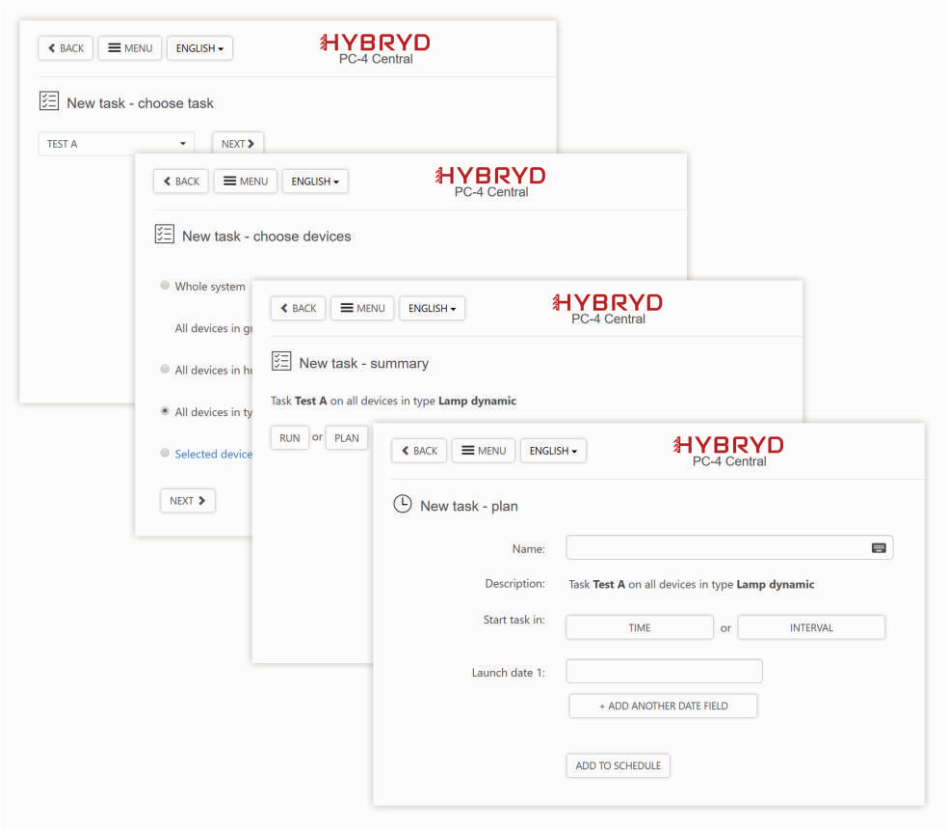
Hybryd Software "PC 4 Central" is the central point of the H-300 system allowing to easily manage all elements of the system. It operates in Microsoft Windows.
The program is divided into 3 parts:
- System service working in the background - responsible for communication and realization of user requests,
- Internet server providing the user interface,
- SQL database.

8.2 USER INTERFACE

The interface is implemented based on Web sites technology. Any internet browser is enough to operate. The interface designed to work with touch screen for both full-size and compact phone/tablet screen.



The system has the user-friendly wizards concerning step-by-step configuration, tasks performing and tasks scheduling.



8.3 FUNCTIONS

- Performance and planning efficiency tests
- Detailed reporting of devices status
- Configuration of dynamic luminaires
- Control of luminaires
- Advanced diagnostics
- Location of damages on the plan of the building
- Operation of all Hybryd centralized systems:
- DYN System (Dynamic Lighting)
- CT System (Centraltest - directional and illuminate lighting)
- LVDBS System (BU - Central buffer supply)
- HVCBS System (CB - Central emergency supply)
- Integration with fire detection systems- SSP
- Integration with building management systems- BMS

8.4 REPORTS

The system can generate numerous reports, depending on the template. One can report luminaires or make a detailed report with a list and description of events at each device. Reports can be generated automatically according to a schedule and then they can be sent to the email address. The system can support SMS notifications.

8.5 VISUALIZATION

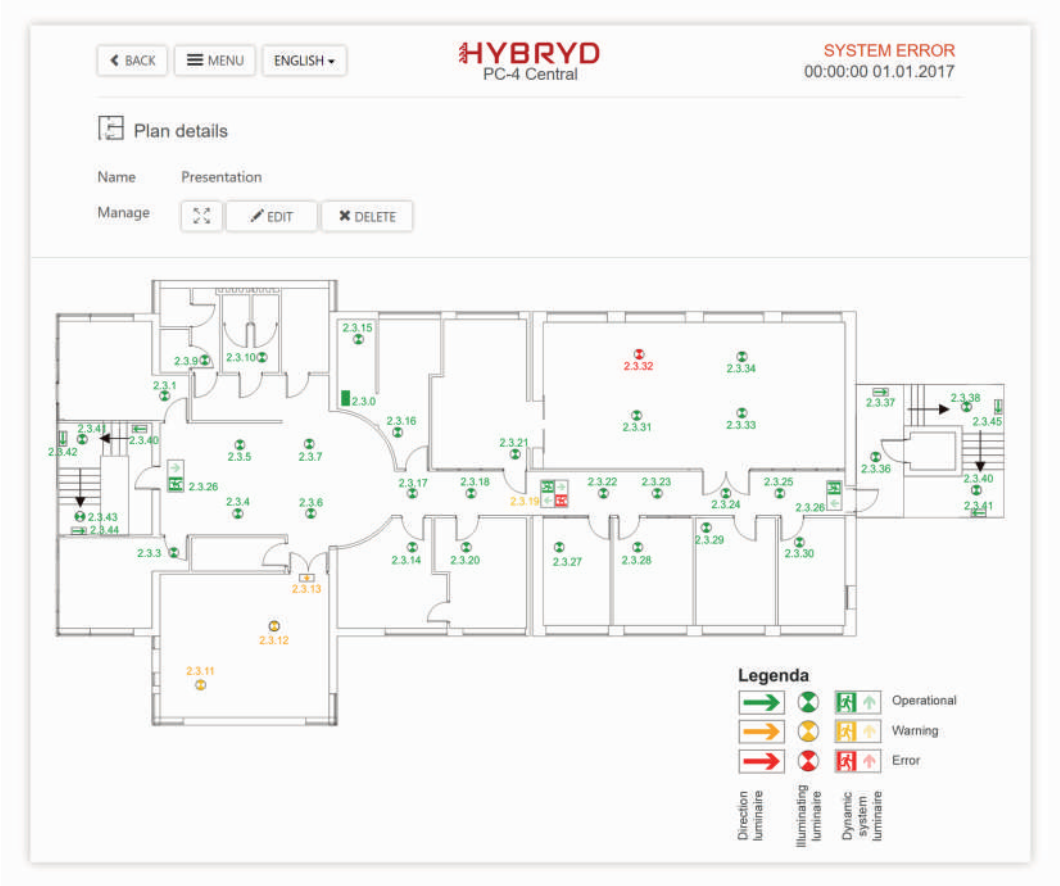
A plan in a vector technology built on the basis of as-built documentation. It allows to quickly locate the defects.
The colour indicates the status of the luminaire.
The choice of luminaire on the plan moves it on the view on the device profile.
The possibility of fast location of a single luminaire on the plan.
Visualization of the signs displayed on the dynamic luminaires.

8.6 INTEGRATION WITH BMS

Integration with BMS is possible in two ways:
- through ETHERNET interface and MODBUS TCP/IP protocol,
- through EIA-485 interface and MODBUS ASCII or RTU protocol.

Details relating to the records applied are available in the document "MODBUS protocol specification in H-300 System".

Support for BACnet/IP protocol is planned for the second half of 2017.



The office building with two escape routes
- examples of error messages:
- 2.3.32 - Module damage
- 2.3.19 - Pictogram highlight damage
- 2.3.11...13 - No communication

LIGHTING THE WAY TO SAFETY
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