



## **NBOX**

PROJECT DESIGN GUIDE FOR YOUR EMERGENCY ESCAPE LIGHTING SYSTEM



## UNIQUE

A group battery system with dimensions as small as this is rare. Yet the nBox effortlessly outshines similar systems. With 48V low voltage, state-of-the-art communication technologies and handy apps, technical variety is seen in its best light:  
Secure. Simple. And reliable.

### NBOX APP

The nBox app converts your smartphone into a handy remote control for:

- Commissioning
- Access during operation
- Convenient maintenance
- Calling up documentation easily





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# TASKS OF EMERGENCY ESCAPE LIGHTING

Emergency escape lighting is prescribed  
in buildings for specific reasons.

## **TO ENABLE PEOPLE TO EXIT THE BUILDING SAFELY**

Such as

- if there is a large number of people in the building
- from a certain building size
- if there is a hazard potential
- from a certain building height
- from a certain building area
- if there is unclear escape route guidance

## **IF THERE IS AN INCREASED HAZARD**

Such as

- in multi-storey building complexes
- due to a large number of people unfamiliar with the location
- due to a high share of people with limited mobility

## **IF THERE IS A HIGH RISK OF ACCIDENT**

Such as

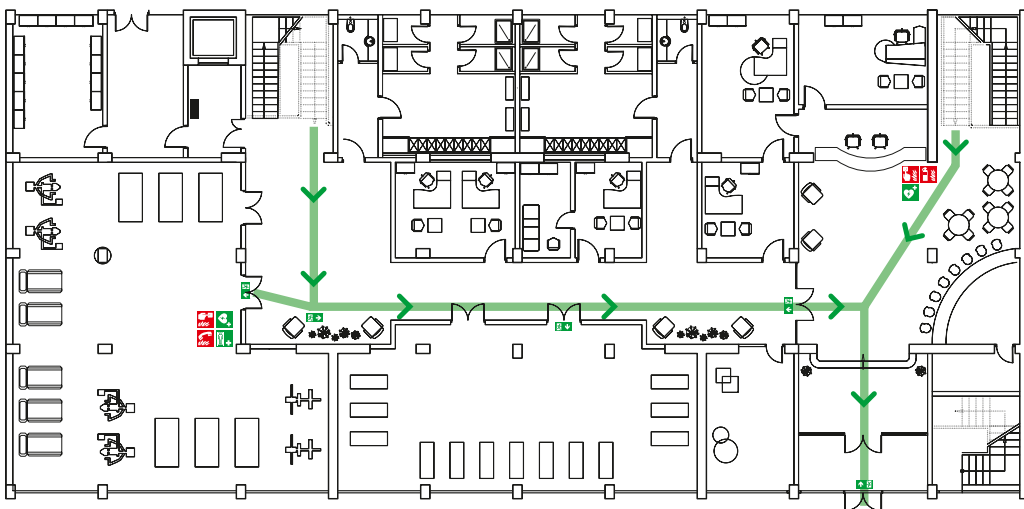
- in electrical operating rooms
- in laboratories
- on construction sites
- in areas with machines with a long after-run period
- in areas with control devices

In Europe, these points are regulated by EN 50172 Emergency escape lighting systems and the country-specific standards. Additional assistance is offered by the standards brochures provided by Zumtobel on the subject of emergency escape lighting.

# ESCAPE AND RESCUE PLAN

For the emergency escape lighting project design, exact information about the course of the escape routes, the positions of the escape doors and the locations of the first aid equipment (defibrillator, fire extinguisher, stretcher, eye wash, etc.) is crucial. The escape and rescue plan is used as a template for this.

## ESCAPE AND RESCUE PLAN



Escape signs



Defibrillator



Muster station



Emergency shower



Stretchers



Fire extinguisher



Central fire alarm system



Emergency call system



Fire alarms

### What to do in the event of a fire

Stay calm

#### 1. Report the fire



Activate the fire alarm  
or  
Where is the fire?  
What is on fire?  
How much is on fire?  
What are the hazards?  
Wait for feedback!

#### 2. Move to safety



Take people who are in danger with you  
Close doors  
Follow the highlighted escape routes  
Do not use the lift  
Follow instructions

#### 3. Try to extinguish the fire



Use the fire extinguisher



# RISK ASSESSMENT

All facts are recorded and must be available in writing.

A risk assessment can either be performed independently by the employer or by specially commissioned persons with corresponding qualification. Commissioning of a risk assessment must always be done in writing and must include an exact description of the tasks and competencies being transferred.

The risk assessment is a key element of occupational health and safety. It includes a systematic assessment of all hazards and loads that exist for the employees at the place of work. It is therefore an essential basis for deriving targeted occupational health and safety measures.

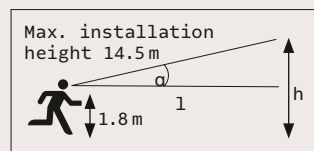
## THE KEY POINTS:

- Preparation of the risk assessment
- Determination of the hazards
- Assessment of the hazards
- Definition of specific occupational health and safety measures
- Implementation of the measures
- Checking the implementation and effectiveness of the measures
- Continuation of the risk assessment

The standards brochure from Zumtobel provides information about the country-specific conditions.

# POSITIONING OF THE ESCAPE-SIGN LUMINAIRES

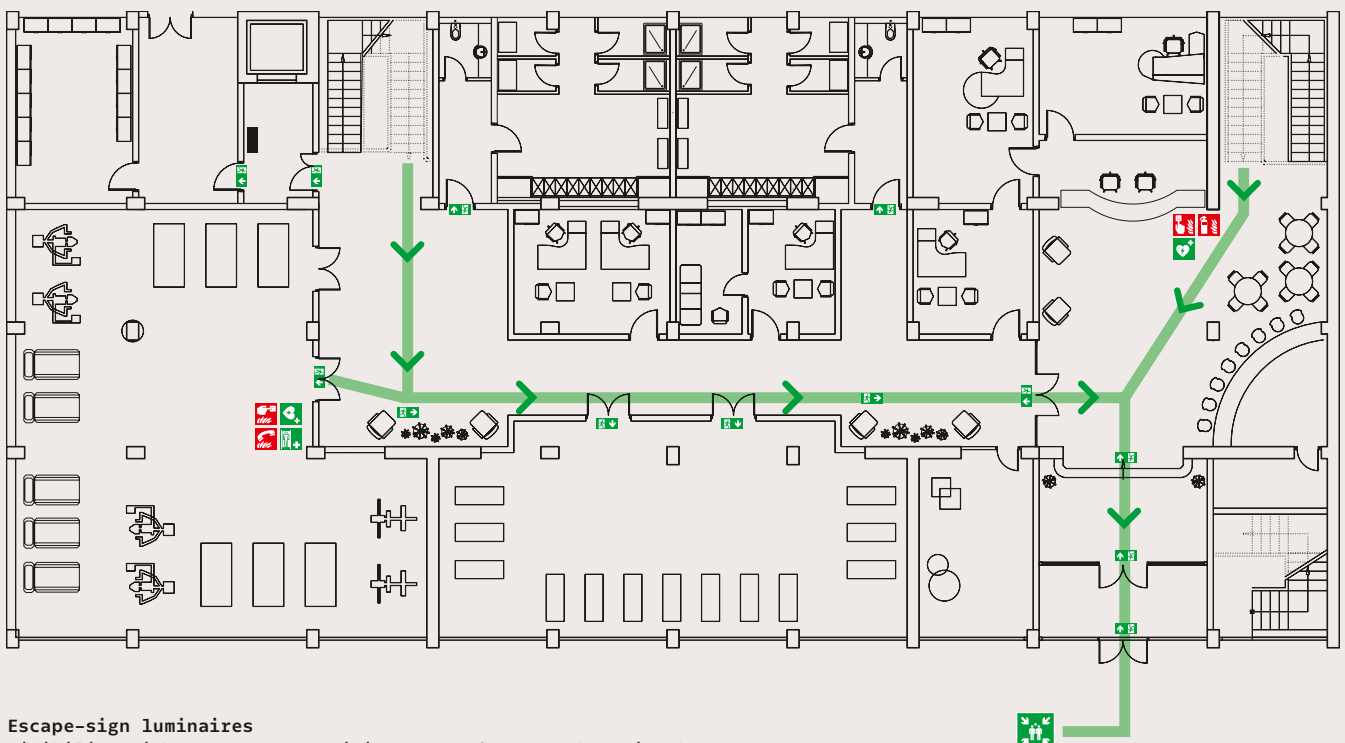
Escape-sign luminaires must be positioned directly above the highlighted escape doors as well as along longer escape routes. This ensures that an escape-sign luminaire is always in sight. The recognition range, sign symbol, safety colours and luminance are regulated in standards and must meet the country-specific requirements. In addition, it is specified that the luminaires must be installed at a height of at least 2 m. They must not exceed an angle of 20°.



Example: Person viewing is 2m tall  
 Recognition range 20m >  $h_{\max.} = 8.8\text{m}$   
 Recognition range 35m >  $h_{\max.} = 14\text{m}$



For easy project design, you can use the Zumtobel Sign Web-App:  
[signwebapp.zumtobel.com](http://signwebapp.zumtobel.com)



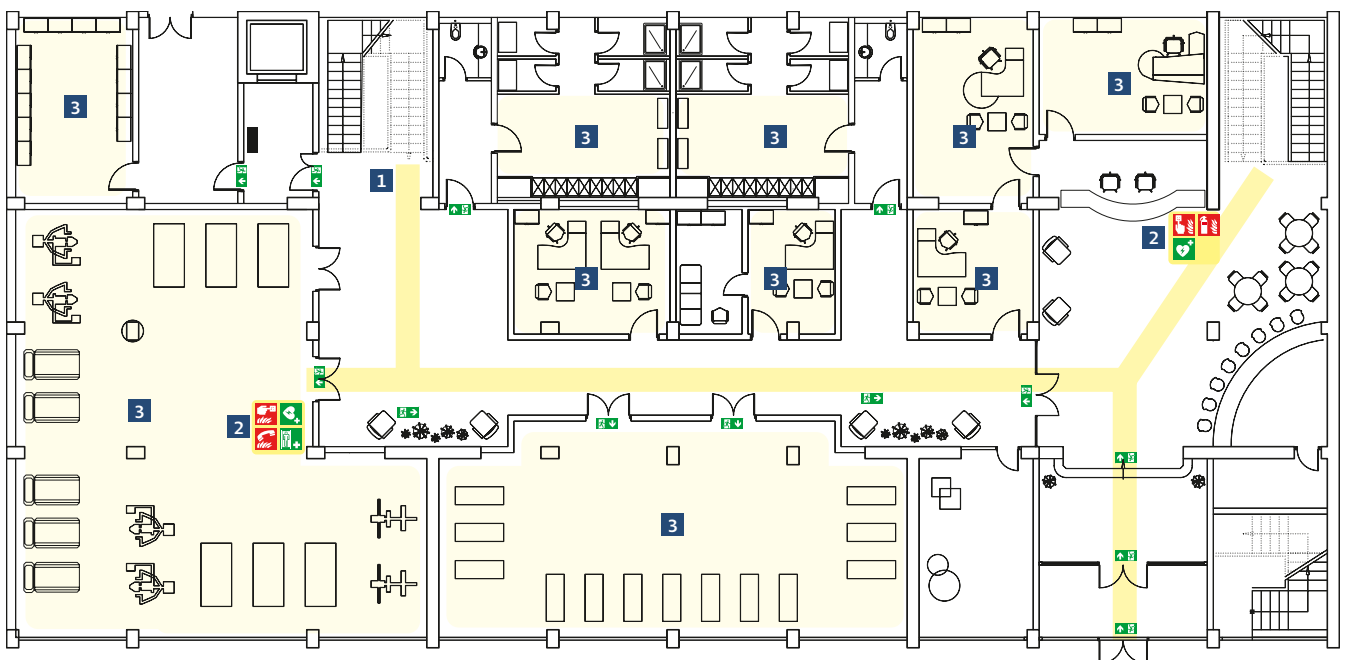
**Escape-sign luminaires**  
 Visibility with correct recognition range from anywhere in the room

# DESIGN OF THE EMERGENCY ESCAPE LIGHTING

The aim of emergency escape lighting is to enable people to safely escape from a room or building. For this purpose, adequate visual conditions and orientation towards escape routes and in special areas must be ensured so that fire fighting and first aid equipment can be found easily and put to use.



The Zumtobel RESCLITE PRO web app automatically selects the right safety luminaire for every light distribution:  
[resclitewebapp.zumtobel.com](http://resclitewebapp.zumtobel.com)



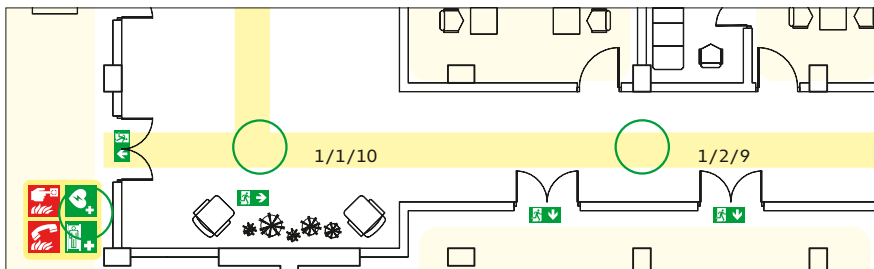
**1 Escape**  
Escape route lighting  
1lx centre line

**2 Spot**  
First aid equipment  
5lx vertical

**3 Anti-panic**  
Areas, emergency escape  
lighting  
0.5lx wide-area

# ESCAPE ROUTES

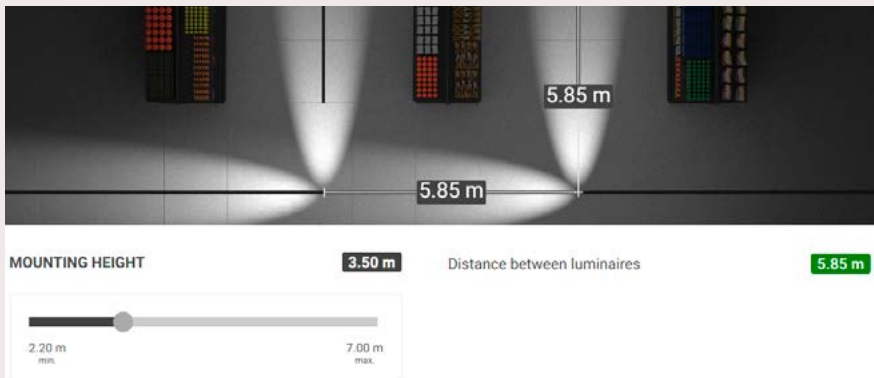
Special emergency luminaires with the suffix “ELP” (Emergency Low-voltage Powerline) for 48 V $\approx$  are available for the nBox. The designated escape route needs to be illuminated with a minimum illuminance of 1 lx, taking account of maximum glare reference values on the centre line. The measurement plane is fixed at 2 cm, and a maintenance factor of 0.8 needs to be taken into account (which implies a planning design of at least 1.25 lx).



**RESCLITE PRO ELP** for illumination of escape routes

Possible designs:

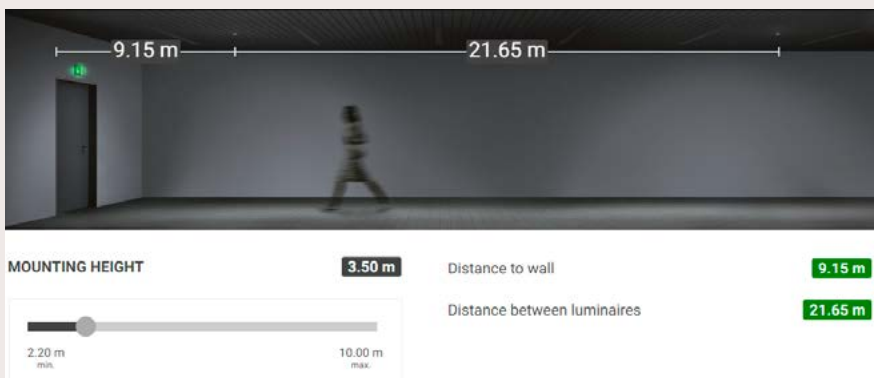
- Standard size in IP40 for recessed mounting or surface mounting on the ceiling
- Mini in IP40 for recessed mounting on the ceiling or TECTON
- IP65 for surface mounting on the ceiling



## Example 1

1/1/10 RESCLITE PRO MRCR MINI ESC90 ELP WH (art. no. 42 934 331) ESCAPE:

- 1.25 lx at 2 cm measurement level
- Ideal up to 6 m mounting height
- 48 V DC 3.2 W



## Example 2

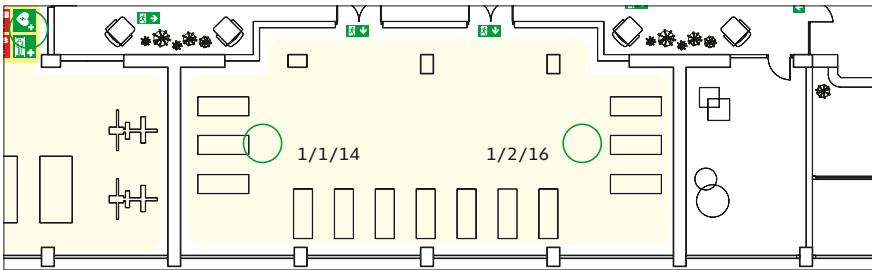
1/2/9 RESCLITE PRO MRCR MINI ESC ELP WH (art. no. 42 934 330) ESCAPE:

- 1.25 lx at 2 cm measurement level
- Ideal up to 6 m mounting height
- 48 V DC 3.2 W



## AREAS AND ANTI-PANIC

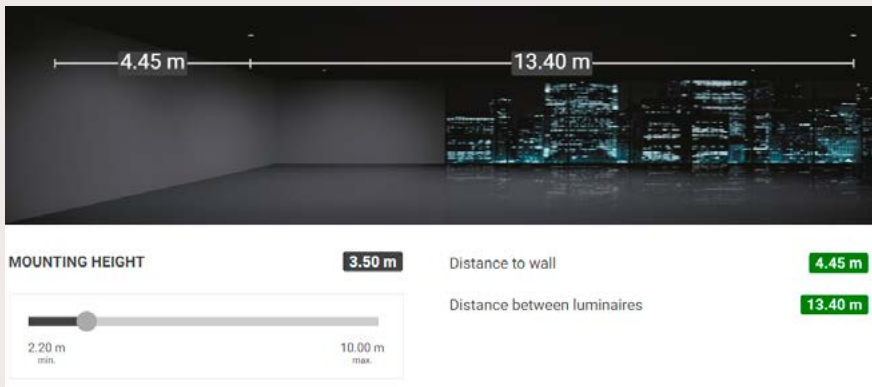
Anti-panic areas are illuminated with a minimum illuminance of 0.5 lx, which is designed for the respective mounting height (measurement height 2 cm). The maintenance factor of + 25% is already taken into account by the nBox Planning web app. The minimum illuminance of 0.5 lx is based on EN 1838. However, the favourable light distribution of the anti-panic luminaires also enables 1 lx and more. A higher illuminance reduces the area and must be taken into account in the Resclite PRO web app.



**RESCLITE PRO** for surface and anti-panic lighting

Possible designs:

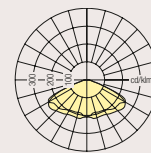
- Standard size in IP40 for recessed mounting or surface mounting on the ceiling
- Mini in IP40 for recessed mounting on the ceiling or TECTON
- IP65 for surface mounting on the ceiling



**Example:**

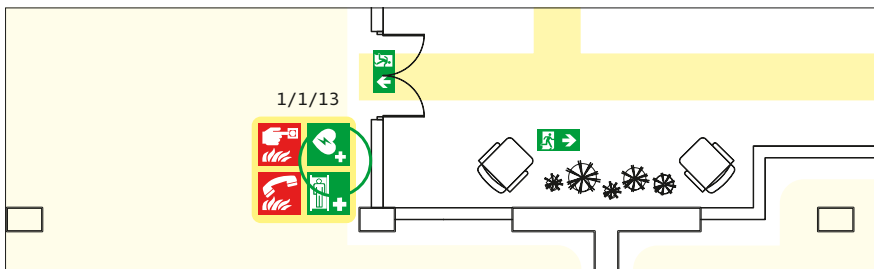
1/1/14 and 1/2/16 RESCLITE PRO MRCR MINI ANT ELP WH (art. no. 42 934 329):

- 0.5 lx at 2 cm measurement level
- Ideal up to 6 m mounting height
- 48 V DC 3.2 W



# FIRST AID EQUIPMENT

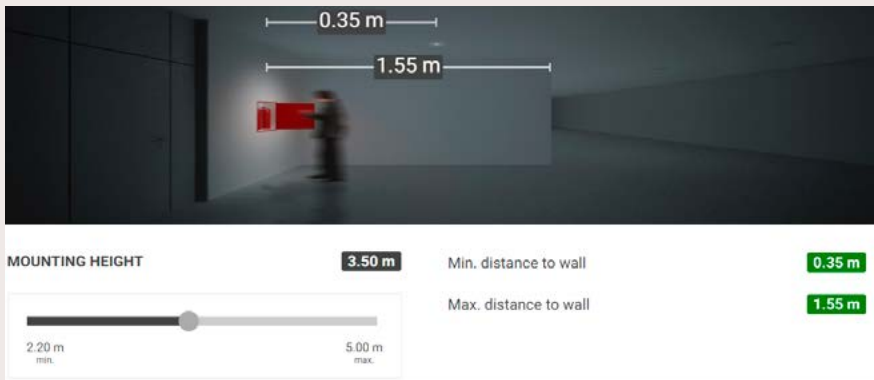
According to EN 1838, first aid equipment such as fire extinguishers, fire alarm buttons, fire alarm devices, eye washes or defibrillators must be illuminated vertically with a minimum illuminance of 5 lx. The maintenance factor of +25% is already taken into account by the nBox Planning web app.



**RESCLITE PRO xx ELP** for illumination of first aid equipment

Possible designs:

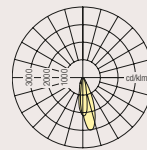
- Standard size in IP40 for recessed mounting or surface mounting on the ceiling
- Mini in IP40 for recessed mounting on the ceiling or TECTON
- IP65 for surface mounting on the ceiling



**Example:**

1/1/13 RESCLITE PRO MRCR MINI SPOT ELP WH (art. no. 42 934 332):

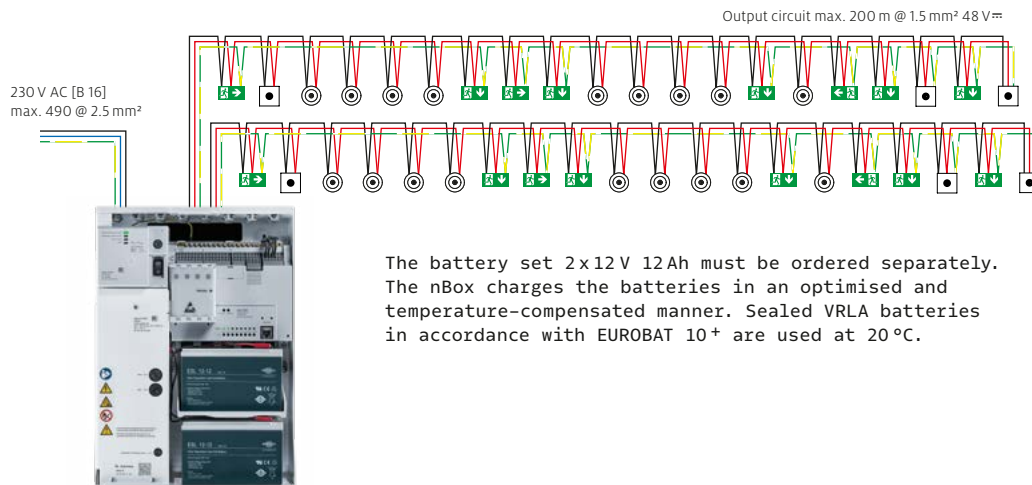
- 5 lx vertical
- Ideal up to 5 m mounting height
- 48 V DC 3.2 W





# NBOX S SYSTEM LIMITS

The nBox S has a maximum mains power draw of 300 VA at 230 V 50/60 Hz mains voltage. A device is protected by a type B 16A circuit breaker (cable connection L/N/PE max. 2.5 mm<sup>2</sup>). The maximum output power of the nBox S is 200 W. The system is equipped with an OCM-ELP\* module as standard. This includes two autarkic final circuits with 50 W maximum power each. The circuit output is routed to dual connectors and designed for 1.5 mm<sup>2</sup>. The output voltage is 48 V DC (FELV), the maximum total line expansion of the line topology is 200 m per circuit at a line diameter of 1.5 mm<sup>2</sup> Cu (also cannot be expanded through use of a larger Cu cross section). Depending on the protection class of the luminaire, the earth must be carried in the final circuit, +/-/PE. So, for example, with protection class I, the polarity of the direct voltage must be noted. Taking into account the maximum available total power, the nBox S can be extended to up to eight final circuits. Each final circuit allows individual mixed operation of continuous and stand-by luminaires of max. 20 safety luminaires.



The battery set 2x12 V 12Ah must be ordered separately. The nBox charges the batteries in an optimised and temperature-compensated manner. Sealed VRLA batteries in accordance with EUROBAT 10+ are used at 20 °C.

nBox S	
Battery type	VRLA
Battery type	ESL 12-12
Battery capacity	12 Ah
Number of battery blocks	2
nBox DC output power for 1 h	100.5 W
nBox DC output power for 2 h	49.8 W
Battery terminal	Faston
Battery dimensions (L x W x H)	151 x 98 x 95 mm
Battery weight (per unit)	3.4 kg

## Output availability example


The maximum output power for the required nominal operating duration can be found in the table. The power reserve of 25% required by the norms is already included in this. This means, for example, that a constant power of 100.5 W (VRLA batteries) is available for safety luminaires with a 1 h nominal operating duration. The total power must be split across the respective final circuits.

\*OCM-ELP = Output Circuit Module – Emergency Low Voltage Powerline





### nBox S

<b>Dimensions HxWxD</b>	428 x 308 x 148 mm
<b>Weight without battery</b>	7.6 kg
<b>Installation</b>	Wall cabinet
<b>Housing</b>	V2A steel sheet, powder-coated in white (RAL 9016)
<b>Cover</b>	Polycarbonate, halogen-free
<b>Degree of protection</b>	IP20
<b>Protection class</b>	SK 1 
<b>Nominal voltage</b>	220 – 240 V 50/60 Hz
<b>Fuse protection on-site</b>	B 16A
<b>Power</b>	Max. 300 VA (full expansion, load-dependent)
<b>Ambient temperature</b>	Permissible for 0 °C to +40 °C Max. battery life time at 20 °C
<b>Cable entry</b>	16 grommets, cable diameter min. 6 mm / max. 13 mm
<b>Opening on rear side</b>	150 x 30 mm
<b>Output voltage</b>	48 V (FELV)
<b>Output power (50W per circuit)</b>	2 x 12 V 12 Ah, DC output power 1 h* 100.5 W, DC output power 2 h* 49.8 W
<b>Output circuits</b>	8 units, 2 units included in delivery
<b>Slots</b>	For 4 nBox OCM ELP 48 V=
<b>Final circuit</b>	Line length 200 m @ 1,5 mm <sup>2</sup> Cu
<b>Weight</b>	Approx. 7.6 kg (without batteries) Approx. 14.5 kg (with batteries)

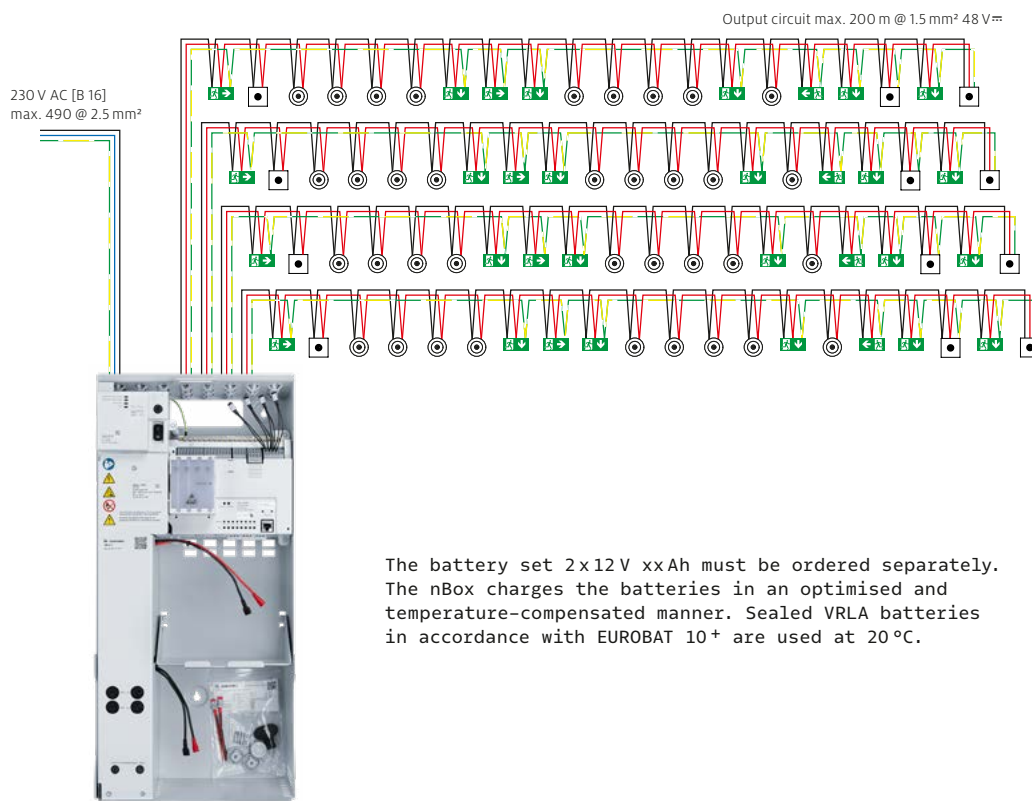
\*including the power reserve of 25%  
required by the relevant standards



nBox product video

# NBOX L SYSTEM LIMITS

The nBox L has a maximum mains power draw of 630 VA at 230 V 50/60 Hz mains voltage. A device is protected by a type B 16A circuit breaker (cable connection L/N/PE max. 2.5 mm<sup>2</sup>). The maximum output power of the nBox L is 400 W. The system is equipped with two OCM-ELP\* modules as standard. These include four autarkic final circuits with 50 W maximum power each. The respective circuit outputs are routed to dual connectors and designed for 1.5 mm<sup>2</sup>. The output voltage is 48 V DC (FELV), the maximum total line expansion of the line or tree topology is 200 m per circuit at a line diameter of 1.5 mm<sup>2</sup> Cu (also cannot be expanded through use of a larger Cu cross section). Depending on the protection class of the luminaire, the earth must be carried in the final circuit, +/-PE. So, for example, with protection class I, the polarity of the direct voltage must be noted. Taking into account the maximum available total power, the nBox L can be extended to up to eight final circuits. Each final circuit allows individual mixed operation of continuous and stand-by luminaires of max. 20 safety luminaires.



The battery set 2x12 V xxAh must be ordered separately. The nBox charges the batteries in an optimised and temperature-compensated manner. Sealed VRLA batteries in accordance with EUROBAT 10+ are used at 20 °C.

nBox L	
Battery type	VRLA
Battery type	ESL e.g.: 12-45
Battery capacity	45 Ah
Number of battery blocks	2
nBox DC output power for 1 h	400 W
nBox DC output power for 2 h	177.1 W
Battery terminal	M6 on Faston
Battery dimensions (L x W x H)	198 x 165 x 167 mm
Battery weight (per unit)	13.8 kg (± 5 %)

## Output availability example

The maximum output power for the required nominal operating duration can be found in the table. The power reserve of 25 % required by the norms is already included in this. This means, for example, that a constant power of 400 W (2 x 12 V 45 Ah VRLA batteries) is available for safety luminaires with a 1 h nominal operating duration. The total power must be split across the respective final circuits.

\*OCM-ELP = Output Circuit Module – Emergency Low Voltage Powerline



### nBox L

<b>Dimensions HxWxD</b>	648 x 308 x 200 mm
<b>Weight without battery</b>	16.7 kg
<b>Installation</b>	Wall cabinet
<b>Housing</b>	V2A steel sheet, powder-coated in Light grey (RAL 7035)
<b>Cover</b>	Polycarbonate, halogen-free
<b>Degree of protection</b>	IP20
<b>Protection class</b>	SK 1 ⚡
<b>Nominal voltage</b>	230 – 240 V 50 Hz
<b>Fuse protection on-site</b>	B 16A
<b>Power</b>	Max. 630 VA (full expansion, load-dependent)
<b>Ambient temperature</b>	Permissible for 0 °C to +40 °C Max. battery life time at 20 °C
<b>Cable entry</b>	24 grommets, cable diameter min. 6 mm/max. 13 mm
<b>Opening on rear side</b>	150 x 45 mm
<b>Output voltage</b>	48 V (FELV)
<b>Output power (50W per circuit)</b>	2 x 12 V 45 Ah, DC output power 1h* 400W, DC output power 3h* 177W
<b>Output circuits</b>	8 units, 4 units included in delivery
<b>Slots</b>	For 4 nBox OCM ELP 48V=
<b>Final circuit</b>	Line length 200m @ 1.5mm <sup>2</sup> Cu
<b>Weight with batteries 17 / 28 / 33 / 45 Ah</b>	Approx. 28.5 / 35.5 / 38.5 / 46.3 kg

\*including the power reserve of 25%  
required by the relevant standards

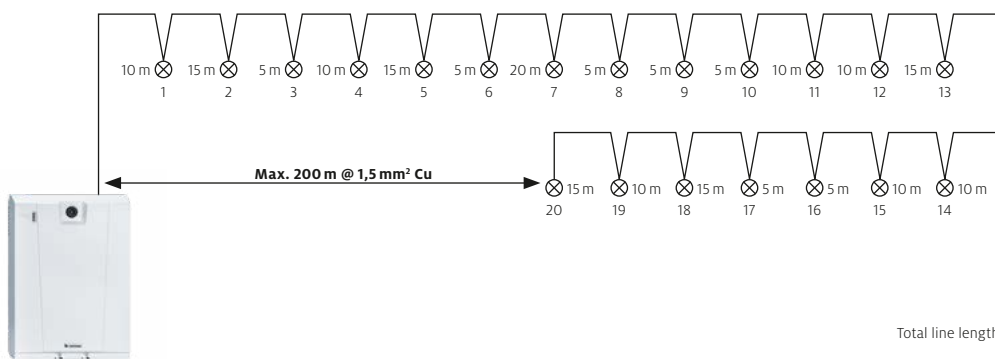


nBox product video

# LINE TOPOLOGIES

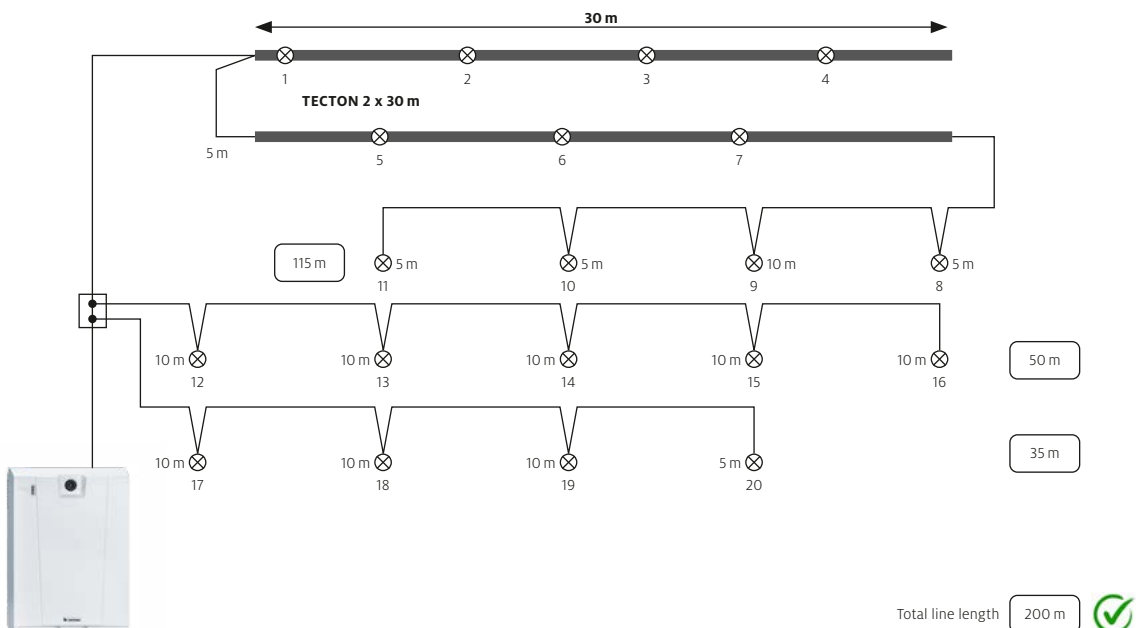
## LINE TOPOLOGY

- Maximum, total line length per final circuit: 200 m at 1.5 mm<sup>2</sup> Cu
- The individual safety luminaires are looped through
- Maximum of 20 luminaires per final circuit at 50 W



## TREE TOPOLOGY

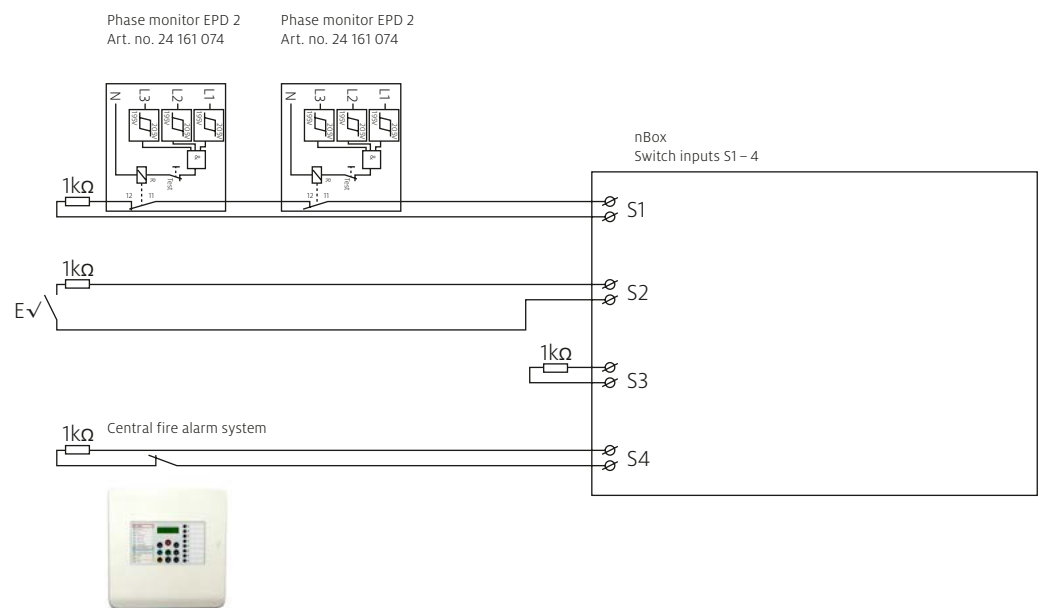
- Maximum, total line length per final circuit: 200 m at 1.5 mm<sup>2</sup> Cu
- The individual safety luminaires are looped through
- The example below shows the use of TECTON continuous rows
- Maximum of 20 luminaires per final circuit at 50 W





## CENTRAL SWITCH INPUTS

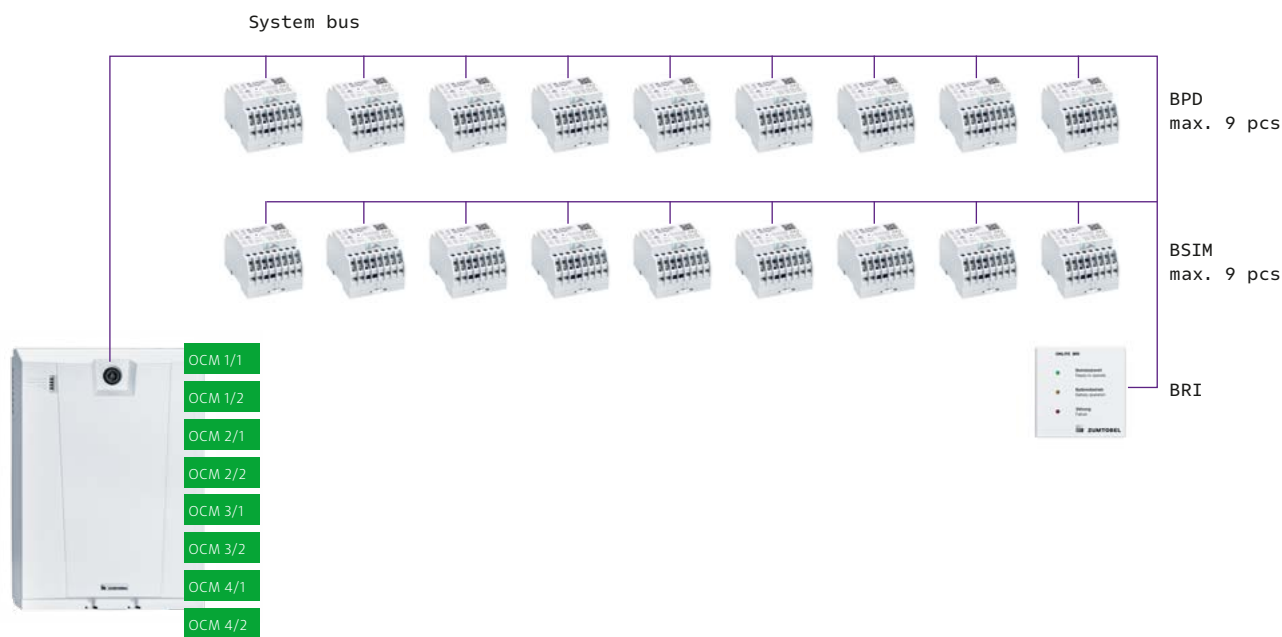
Functions can be selected and assigned via four current-characterised inputs with 1 kOhm. This enables assignment of luminaire circuits, luminaire groups and individual luminaire functions.



# N BOX SYSTEM BUS

## FUNCTIONS

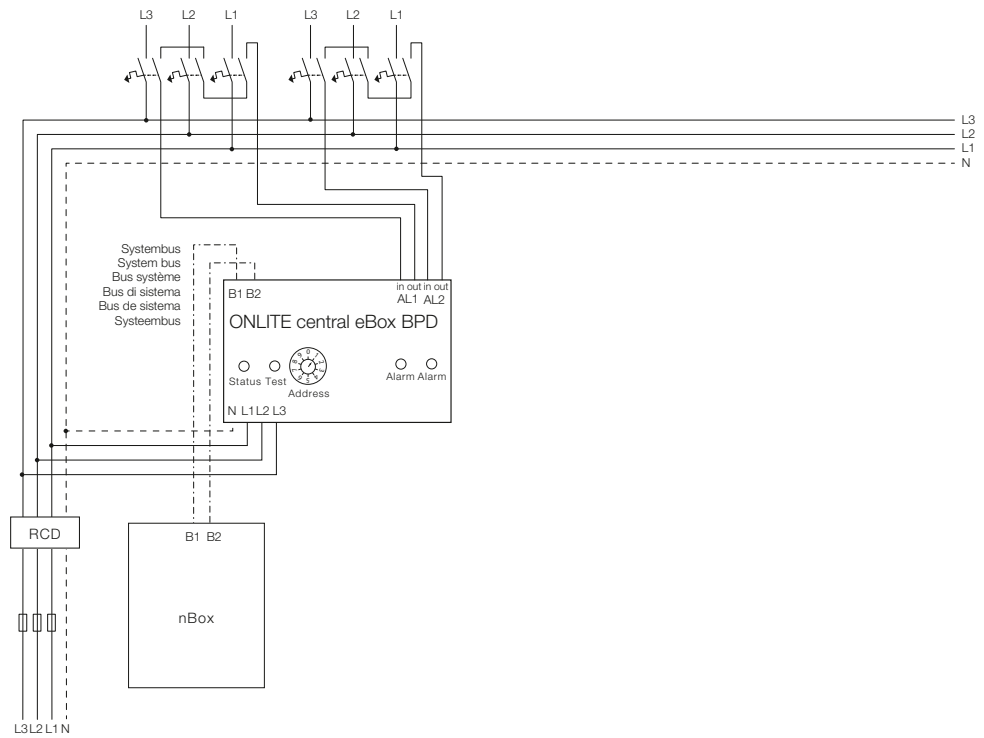
The 2-wire line provides the system bus for up to nine bus phase monitors (BPD) and bus switch input modules (BSIM). In addition, a central monitoring module BRI can be connected, which displays the current state of the system via three LEDs. The ONLITE central BPDs have a heartbeat control, which also monitors the function of the phase monitor and system bus. This means there is no need for a functional integrity cable.



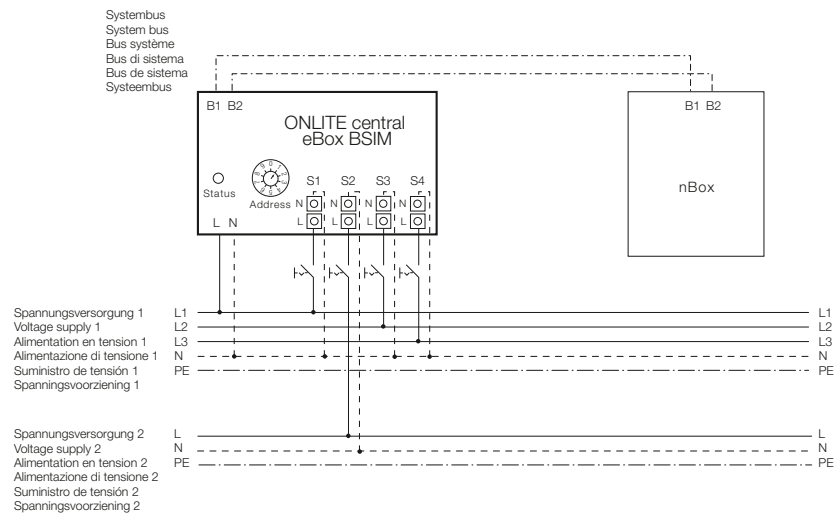
System bus design	Conductor cross-section 2 x 0.75 mm <sup>2</sup>	Conductor cross-section 2 x 1.50 mm <sup>2</sup>
Line length	350 m	500 m

## NBOX SYSTEM INFORMATION

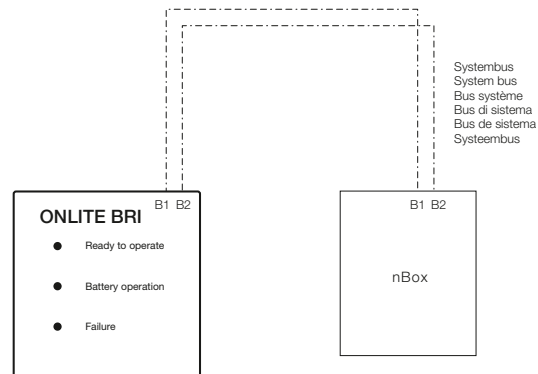
BPD bus phase monitor



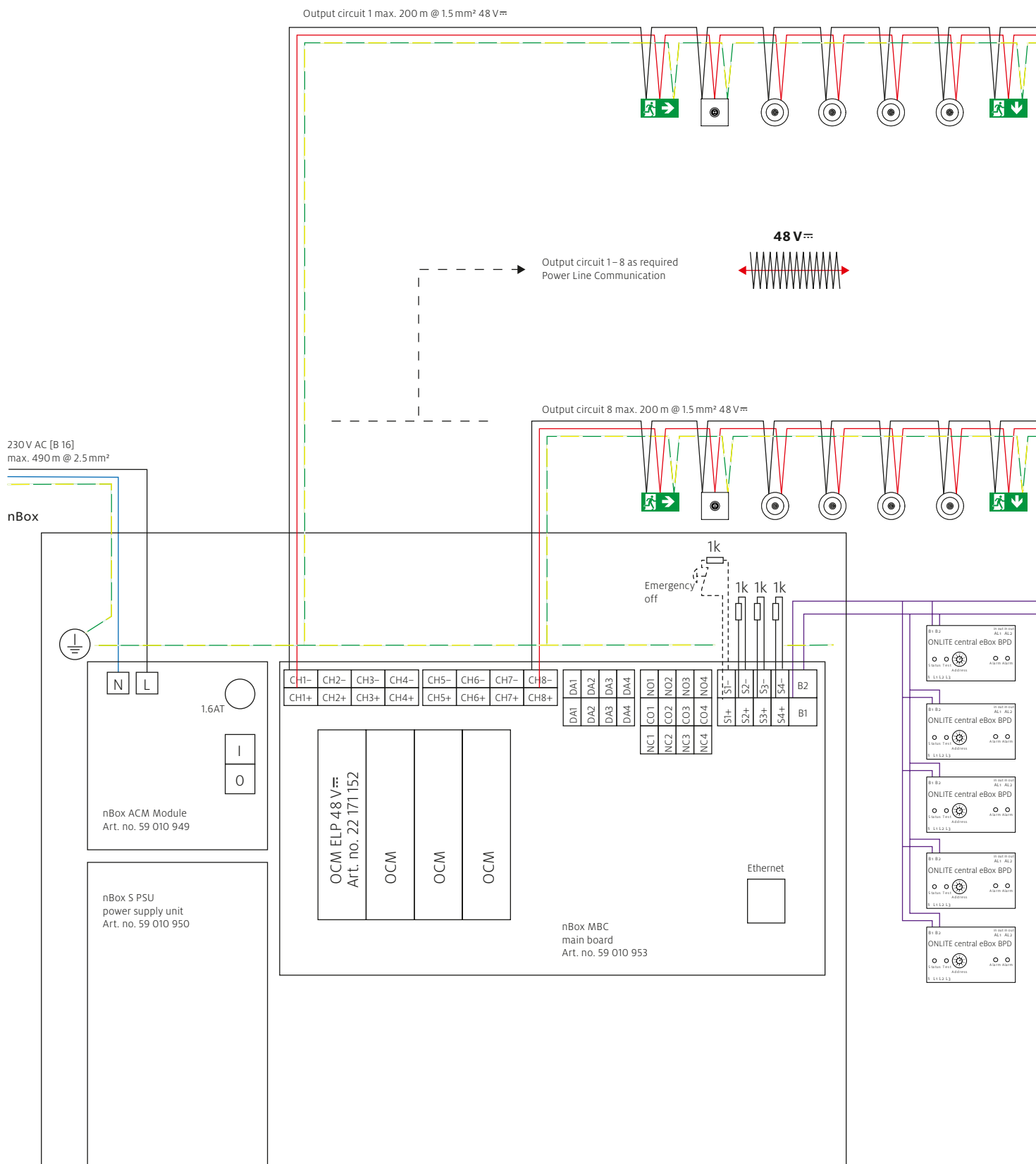
BSIM switch inputs



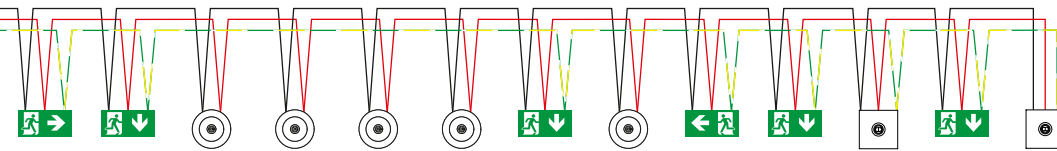
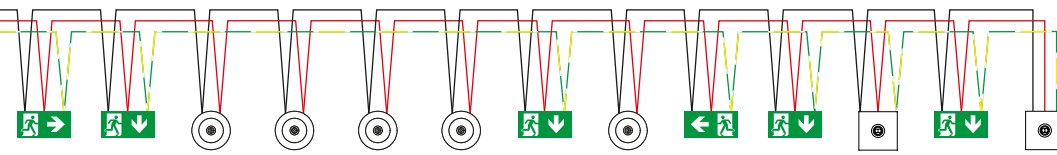
BRI remote display



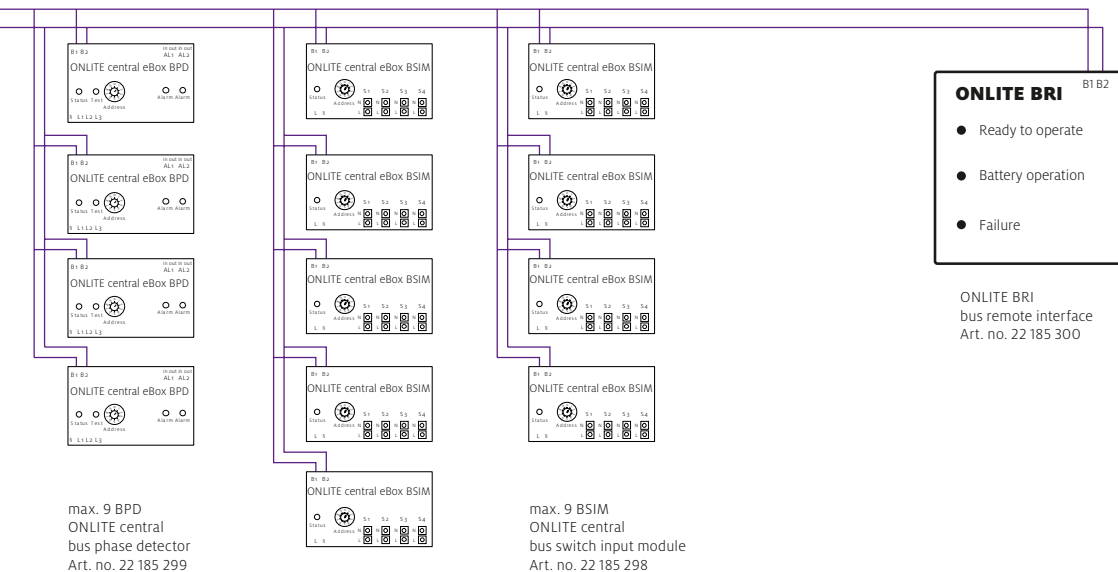
# MAXIMUM EXTENSION



## NBOX SYSTEM INFORMATION



Systembus max. 300m @ 1.5 mm<sup>2</sup>



### Housing

Sturdy V2A stainless steel,  
powder-coated in white (RAL  
9016), IP20, protection class I

### Invisible port

Rear, 150 x 30 mm  
opening for concealed  
cable installation

### AC module

For 230 V mains  
connection with  
main switch and  
hardware protection

### Mainboard controller

To control  
the complete system

### Test button

Manual operation  
via push-button

### Power supply unit with charger

For the clear technical  
separation of 230V alternating  
voltage from 48V extra-low  
voltage in addition to the  
supply and safe separation  
of the batteries

### Certified by TÜV Rheinland



### QR code

Direct link to all nBox S  
product information on  
the Zumtobel website







#### Cable entry

16 grommets with strain relief for cables with diameters of 6-13 mm, for an IP54-protected upper side of the device

#### Switch inputs

1k0hm line-monitored, programmable functions for the assignment of luminaire circuits or luminaire groups and for individual luminaire functions

#### 4 slots

To plug in the modular polar circuits (x2 as standard, extension to up to 8 circuits is possible)

#### Status LEDs

Green and red LEDs show the circuit status at a glance

#### RJ45 socket

TCP/IP networking for integration in LAN network technology

#### Battery space

To hold 2x12V VRLA or 1x24V LiFeP04 batteries



#### Housing cover



Made of halogen-free polycarbonate, for reliable protection of the system



# N BOX

## PRODUCT OVERVIEW




Product	Article number	Product name	Description
	22171150	nBox S	nBox S with 2 output circuits
<b>Included in scope of delivery</b>			
			
1 x 22171152 nBox OCM-ELP 48V $\overline{\text{AC}}$			
1 x 59010954 nBox FS (Fuse Set)			
1 x 59010957 nBox G IP54 (Grommet Set)			
1 x Wrench triangle tool			
Second device label			
A5 quickstart guide in six languages			

Product	Article number	Product name	Description
	22171151	nBox L	nBox L with 4 output circuits
<b>Included in scope of delivery</b>			
			
2 x 22171152 nBox OCM-ELP 48V $\overline{\text{AC}}$			
1 x 59010954 nBox FS (Fuse Set)			
1 x 59010957 nBox G IP54 (Grommet Set)			
1 x Wrench triangle tool			
Second device label			
A5 quickstart guide in six languages			

#### Order separately

Product	Article number	Product name	Description
	22171152	nBox OCM ELP 48 V	nBox double output circuit module ELP 48 V
	22171154	nBox BATTERY SET PB 2 x 12 V/12 Ah	nBox S VRLA battery set 2 x 12 V/12 Ah 10+ year batteries, sealed design
	22171155	nBox BATTERY SET PB 2 x 12 V/17 Ah	nBox L VRLA battery set 2 x 12 V/17 Ah 10+ year batteries, sealed design
	22171156	nBox BATTERY SET PB 2 x 12 V/28 Ah	nBox L VRLA battery set 2 x 12 V/28 Ah 10+ year batteries, sealed design
	22171157	nBox BATTERY SET PB 2 x 12 V/33 Ah	nBox L VRLA battery set 2 x 12 V/33 Ah 10+ year batteries, sealed design
	22171158	nBox BATTERY SET PB 2 x 12 V/45 Ah	nBox L VRLA battery set 2 x 12 V/45 Ah 10+ year batteries, sealed design

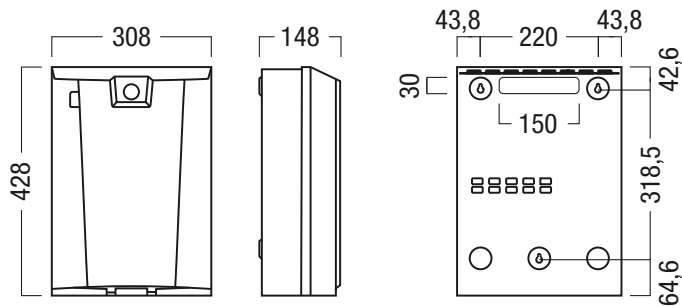
#### Optional spare parts

Product	Article number	Product name	Description
	59010954	nBox X FS	nBox set of spare fuses
	59010957	nBox G IP54	nBox IP54 grommet with strain relief
	59011258	nBox LCR 4x1kOHM	4 x loop resistances

# NBOX

## INSTALLATION NOTES

### NBOX S DIMENSIONAL DRAWINGS



### NBOX S CABLE ENTRIES



View from top  
16 grommets  
(cable diameter min. 6 mm max. 13 mm)

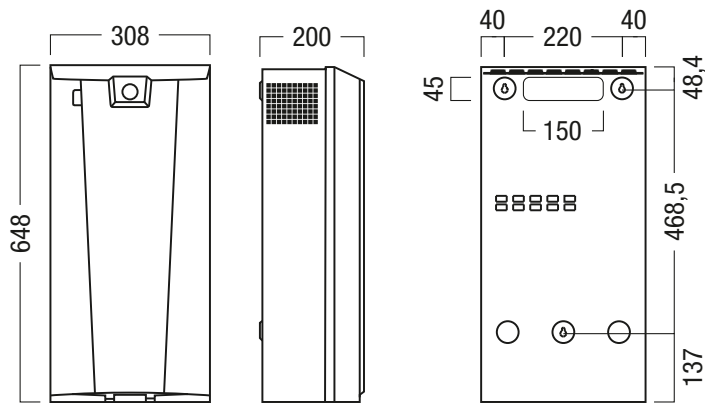


Rear side  
Opening 150 x 30 mm

### Installation notes

For a comfortable working height of the terminals, it is recommended that the top mounting holes be made at a height of 1650 to 1700 mm. To ensure adequate cooling of the device, a distance of at least 150 mm from the wall on the left and at least 50 mm from the wall on the right must be provided for.

## NBOX L DIMENSIONAL DRAWINGS



## NBOX L CABLE ENTRIES












## Installation notes

For a comfortable working height of the terminals, it is recommended that the top mounting holes be made at a height of 1650 to 1700 mm. To ensure adequate cooling of the device, a distance of at least 150mm from the wall on the left and at least 50mm from the wall on the right must be provided for.

# ESCAPE-SIGN LUMINAIRES

The escape-sign luminaires are compliant with EN 1838 and DIN 4844.  
The digitally printed escape route symbol corresponds to ISO 7010.  
All luminaires can be addressed via the PROset Pen or PROset App.

- Luminaire connection max 1.5 mm² with double terminals for looping
- 48 V-DC connection with power line communication to nBox
- Power draw is used to calculate and design the nBox system

Product*	Article no.**	Product name	Power draw
	42934357	ARTSIGN 75 P MRC ELP SR SP-1D	1.50 W
	42934355	ARTSIGN 75 P MRC ELP SR SP-1L	1.50 W
	42934361	ARTSIGN 75 P MRC ELP SR SP-1R	1.50 W
	42934359	ARTSIGN 75 P MRC ELP SR SP-1UP	1.50 W
	42934358	ARTSIGN 75 P MRC ELP SR SP-2D	1.50 W
	42934362	ARTSIGN 75 P MRC ELP SR SP-2R	1.50 W
	42934356	ARTSIGN 75 P MRC ELP SR SP-2LR	1.50 W
	42934360	ARTSIGN 75 P MRC ELP SR SP-2UP	1.50 W
	42934363	ARTSIGN 75 P MRW ELP SR	1.50 W
	42934364	CROSSIGN 110 P MSC ELP WH	2.30 W
	42934367	CROSSIGN 110 P TEC-GP ELP WH	2.30 W
	42934368	CROSSIGN 110 P TEC-GP ELP BK	2.30 W
	42934365	CROSSIGN 160 P MSC ELP WH	3.50 W
	42934366	CROSSIGN 160 P MSC ELP WH IP54	3.50 W
	42934369	CROSSIGN 160 P TEC-GP ELP WH	3.50 W
	42934370	CROSSIGN 160 P TEC-GP ELP BK	3.50 W
	42934371	ECOSIGN 160 P MSC ELP WH IP65	3.90 W
	42934373	ECOSIGN 160 P TEC-GP ELP WH	3.90 W
	42934372	ECOSIGN 160 P TRINOS ELP WH IP65	3.90 W
	42934374	ERGOSIGN 80 P MSW ELP WH IP54	1.60 W
	42934375	PURESIGN 150 P MRW ELP WH	3.90 W
	42934376	PURESIGN 150 P MSW ELP WH	3.90 W
	42934377	PURESIGN 150 P TEC-GP ELP WH	3.90 W
	42934378	PURESIGN 150 P TEC-GP ELP BK	3.90 W
	42934379	PURESIGN/COMSIGN 150 P MRC ELP SR	3.90 W
	42934380	PURESIGN/COMSIGN 150 P MRW-WF15 ELP SR	3.90 W
	42934381	PURESIGN/COMSIGN 150 P MRC-WF15 ELP SR	3.90 W
	42934382	PURESIGN/COMSIGN 150 P MSC-WF15 ELP SR	3.90 W
	42934383	PURESIGN/COMSIGN 150 P MSC ELP SR	3.90 W

\* Luminaire symbol photos

\*\* Article numbers relate to the basic luminaire type, without pictograms and accessories

# SAFETY LUMINAIRES

The safety luminaires are compliant with EN 1838. All luminaires can be addressed via the PROset Pen or PROset App.

- Luminaire connection max 1.5 mm<sup>2</sup> with double terminals for looping
- 48 V-DC connection with power line communication to nBox
- Power draw is used to calculate and design the nBox system

Product*	Article no.**	Product name	Power draw
	42934325	RESCLITE PRO MRCR ANT ELP WH	3.20 W
	42934326	RESCLITE PRO MRCR ESC ELP WH	3.20 W
	42934327	RESCLITE PRO MRCR ESC90 ELP WH	3.20 W
	42934328	RESCLITE PRO MRCR SPOT ELP WH	3.20 W
	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.20 W
	42934330	RESCLITE PRO MRCR MINI ESC ELP WH	3.20 W
	42934331	RESCLITE PRO MRCR MINI ESC90 ELP WH	3.20 W
	42934332	RESCLITE PRO MRCR MINI SPOT ELP WH	3.20 W
	42934333	RESCLITE PRO MRWR ESCW ELP WH	3.20 W
	42934334	RESCLITE PRO MSC ANT ELP WH	3.20 W
	42934335	RESCLITE PRO MSC ESC ELP WH	3.20 W
	42934336	RESCLITE PRO MSC ESC90 ELP WH	3.20 W
	42934337	RESCLITE PRO MSC SPOT ELP WH	3.20 W
	42934338	RESCLITE PRO MSC ANT ELP WH IP65	3.20 W
	42934339	RESCLITE PRO MSC ESC ELP WH IP65	3.20 W
	42934340	RESCLITE PRO MSC ESC90 ELP WH IP65	3.20 W
	42934341	RESCLITE PRO MSC SPOT ELP WH IP65	3.20 W
	42934342	RESCLITE PRO MSW ESCW ELP WH	3.20 W
	42934343	RESCLITE PRO MSW ESCW ELP WH IP65	3.20 W
	42934344	RESCLITE PRO TEC-GP ANT ELP WH	3.20 W
	42934345	RESCLITE PRO TEC-GP ESC ELP WH	3.20 W
	42934346	RESCLITE PRO TEC-GP ESC90 ELP WH	3.20 W
	42934347	RESCLITE PRO TEC-GP SPOT ELP WH	3.20 W
	42934353	RESCLITE PRO MSC ANT HC ELP WH IP65	3.70 W
	42934354	RESCLITE PRO MSC ESC HC ELP WH IP54	3.70 W
	42934351	RESCLITE PRO TEC-GP ANT HC ELP WH	3.70 W
	42934352	RESCLITE PRO TEC-GP ESC HC ELP WH	3.70 W
	42934348	RESCLITE PRO TRINOS ANT ELP WH	3.20 W
	42934350	RESCLITE PRO TRINOS SPOT ELP WH	3.20 W
	42934384	RESCLITE PRO TRINOS ANT HC ELP WH	3.70 W
	42934349	RESCLITE PRO TRINOS ESC HC ELP WH	3.70 W

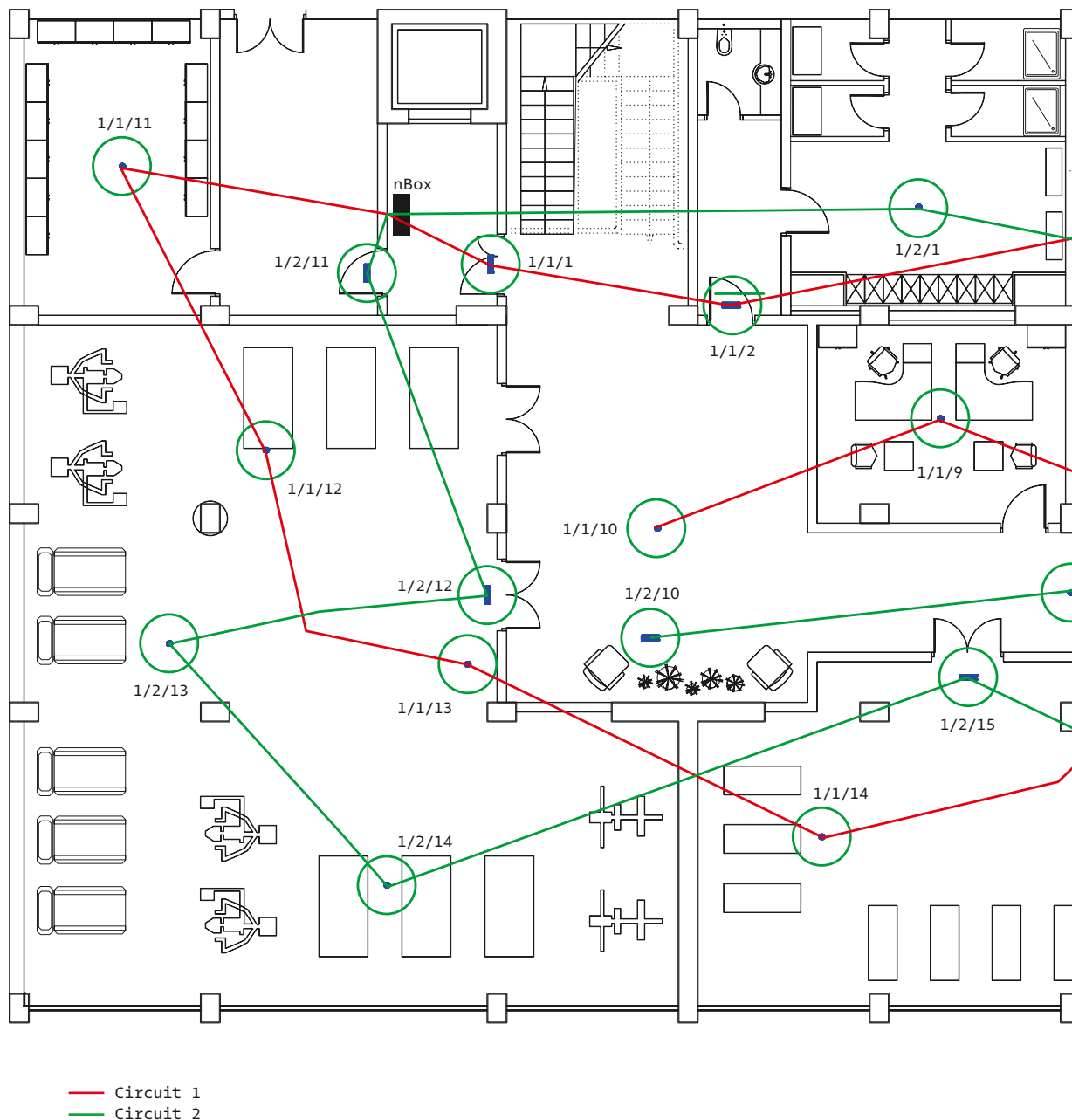
\* Luminaire symbol photos

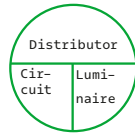
\*\* Article numbers relate to the basic luminaire type, without pictograms and accessories



# SYSTEM DESIGN

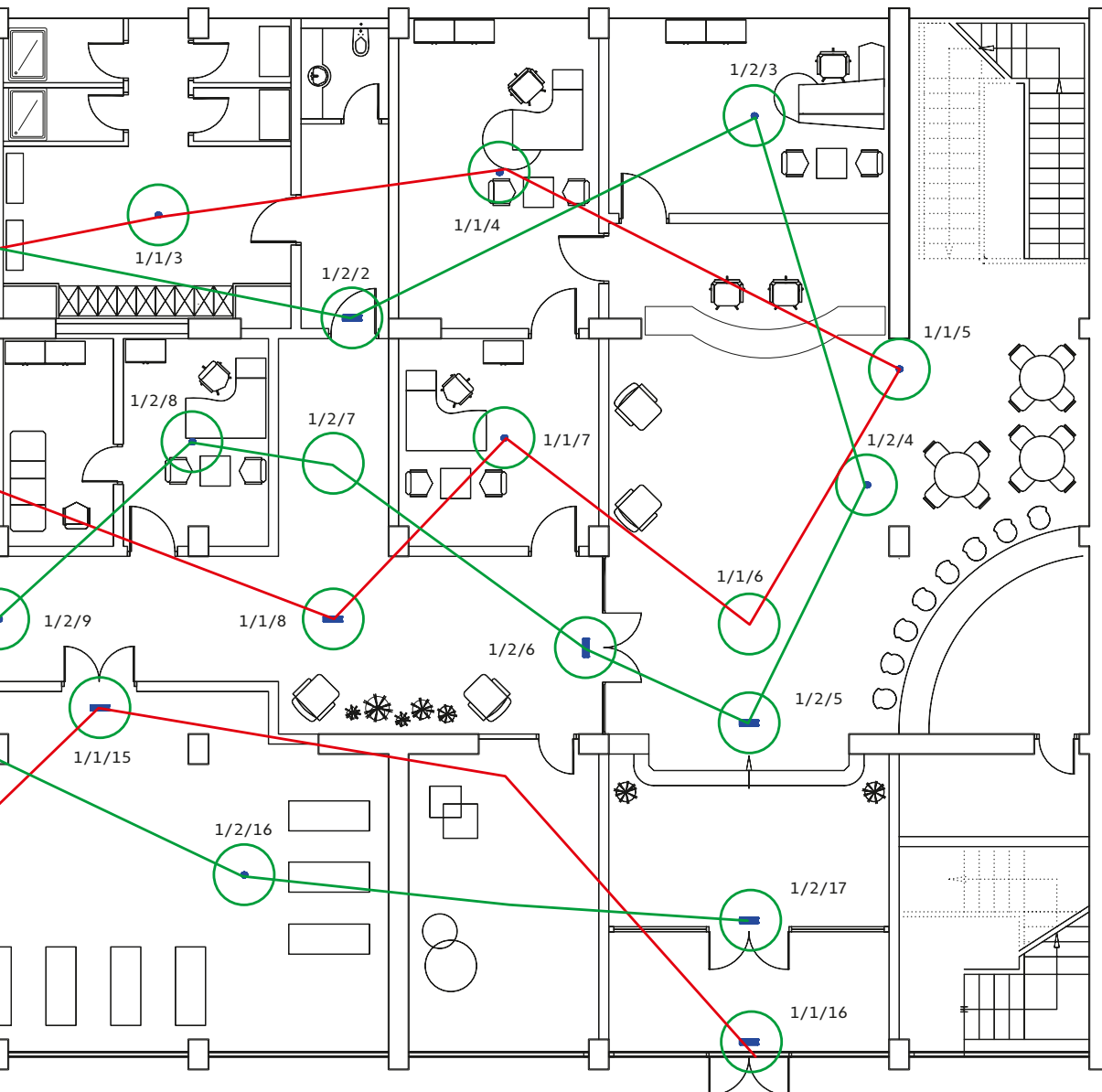
After the photometric design of the escape-sign luminaires and safety luminaires, the safety power supply is planned, taking into account the fire sections. If, as in the example below, no further fire sections are operated, the nBox group battery system is mounted directly in the fire section from which it supplies the individual safety luminaires. Installation with functional integrity is not necessary in this case. For Austria and Germany, two autonomous final circuits are required. For all other countries, at least one circuit with a maximum of 20 safety luminaires is required.





### Assignment of safety luminaires

Each safety luminaire and escape-sign luminaire is – depending on the country – assigned to one or two final circuits. The maximum possible output power of 50 W per final circuit and 100.5 W for the 1 h emergency operation of an nBox S system with 2 x 12 V 12 Ah VRLA batteries must be taken into consideration.



# PLAUSIBILITY CHECK

In the project design template, the required safety luminaires and escape-sign luminaires are listed by final circuit and checked for their system limits. If the total number of luminaires is determined, a counter-check with the total connected load and the available system load of the nBox is performed.

Plausibility check for our example from page 34/35

## Circuit 1

No. according to plan	Art. no.	Designation	Performance
1/1/1	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/1/2	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/1/3	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/4	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/5	42934332	RESCLITE PRO MRCR MINI SPOT ELP WH	3.2 W
1/1/6	42934331	RESCLITE PRO MRCR MINI ESC90 ELP WH	3.2 W
1/1/7	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/8	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/1/9	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/10	42934331	RESCLITE PRO MRCR MINI ESC90 ELP WH	3.2 W
1/1/11	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/12	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/13	42934332	RESCLITE PRO MRCR MINI SPOT ELP WH	3.2 W
1/1/14	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/1/15	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/1/16	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
<b>Total</b>		16 luminaires	46.7 W
<b>Check</b>		16 pcs ≤ 20 safety luminaires / escape sign luminaires ✓	
		46.7 ≤ 50 W ✓	

## Circuit 2

No. according to plan	Art. no.	Designation	Performance
1/2/1	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/2	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/3	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/4	42934330	RESCLITE PRO MRCR MINI ESC ELP WH	3.2 W
1/2/5	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/6	42934365	CROSSIGN 160 P MSC ELP WH	3.4 W
1/2/7	42934330	RESCLITE PRO MRCR MINI ESC ELP WH	3.2 W
1/2/8	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/9	42934330	RESCLITE PRO MRCR MINI ESC ELP WH	3.2 W
1/2/10	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/11	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/12	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/13	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/14	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/15	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
1/2/16	42934329	RESCLITE PRO MRCR MINI ANT ELP WH	3.2 W
1/2/17	42934364	CROSSIGN 110 P MSC ELP WH	2.3 W
<b>Total</b>		17 luminaires	48.3 W
<b>Check</b>		17 pcs ≤ 20 safety luminaires / escape sign luminaires ✓	
		48.3 ≤ 50 W ✓	

<b>Grand total circuit 1 + 2</b>		33 luminaires	95 W
<b>Check</b>		Maximum possible power nBox S with 1 hour nominal operating duration (2 x 12 V 12 Ah) = 100.5 W	
		95 W ≤ 100.5 W ✓	

#### Circuit 1

No. according to plan	Art. no.	Designation	Note	Performance
1/1/1				W
1/1/2				W
1/1/3				W
1/1/4				W
1/1/5				W
1/1/6				W
1/1/7				W
1/1/8				W
1/1/9				W
1/1/10				W
1/1/11				W
1/1/12				W
1/1/13				W
1/1/14				W
1/1/15				W
1/1/16				W
1/1/17				W
1/1/18				W
1/1/19				W
1/1/20				W
<b>Total</b>		_____ Luminaires		_____ W
<b>Check</b>	<input type="text"/>	≤ 20 safety luminaires / escape sign luminaires	✓	
	<input type="text"/>	≤ 50 W	✓	

#### Circuit 2

No. according to plan	Art. no.	Designation	Note	Performance
1/2/1				W
1/2/2				W
1/2/3				W
1/2/4				W
1/2/5				W
1/2/6				W
1/2/7				W
1/2/8				W
1/2/9				W
1/2/10				W
1/2/11				W
1/2/12				W
1/2/13				W
1/2/14				W
1/2/15				W
1/2/16				W
1/2/17				W
1/2/18				W
1/2/19				W
1/2/20				W
<b>Total</b>		_____ Luminaires		_____ W
<b>Check</b>	<input type="text"/>	≤ 20 safety luminaires / escape sign luminaires	✓	
	<input type="text"/>	≤ 50 W	✓	

<b>Grand total</b> circuits 1 to 8	_____ Luminaires	_____ W
<b>Check</b>	Maximum possible power	
	<input type="text"/>	
	<input type="text"/> ≤ <input type="text"/>	✓



	<b>NBOX S</b> Art. no. 22171150		<b>NBOX L</b> Art. no. 22171151		
					
					
Battery capacity	12 Ah		17 Ah	28 Ah	33 Ah
Battery type	VRLA		VRLA	VRLA	VRLA
Article number	22171154		22171155	22171156	22171158

Nominal duration:		Output power range in W. Total load for all output circuits together including 25 % normative reserve.				
nBox DC output power for 0.5 h		169	327.4	400	400	400
nBox DC output power for 1 h		100.5	192.6	316.2	342.1	400
nBox DC output power for 2 h		49.8	96.7	167.6	188.3	240.1
nBox DC output power for 3 h		31.6	64.2	118.3	137.3	177.1
nBox DC output power for 8 h		–	15.2	40.8	49.6	72.5
Power dissipation nBox	W	18.2	18.2	18.2	18.2	18.2
Battery capacity	pcs.	2	2	2	2	2
Number of battery blocks	pcs.	12	12	12	12	12
Q – required air volume flow	m³/h	0.0072	0.01	0.017	0.02	0.027
A – required ventilation cross section	cm²	0.202	0.286	0.47	0.554	0.756
Required space n = 0.4	m³	0.045	0.0625	0.10625	0.125	0.16875
Required space n = 1	m³	0.018	0.025	0.0425	0.05	0.0675

Q = air volume, in m³/h ( $Q = 0.05 \times n \times I_{\text{gas}} \times C_n \times 10^{-3}$ )

n = ventilation rate

$I_{\text{gas}}$  = current that causes gas to form, in mA per Ah nominal capacity, e.g. float current  $I_{\text{float}} = 1$

$C_n$  = capacity C10 for lead-acid batteries in Ah,  $U_s = 1.80 \text{ V / cell at } 20^\circ\text{C}$

If there is no ventilation according to EN IEC 62485-2, the TRGS 722 (technical regulations for operational safety / hazardous materials – prevention or reduction of hazardous explosive atmospheres) may be used as the standard. These technical regulations for operational safety and hazardous materials state that aboveground buildings should have natural air exchange with a ventilation rate of at least  $n = 1$  and that cellars and basements should have natural air exchange with a ventilation rate of  $n = 0.4$ . Under Point 2.4.4.2, TRBS 2152 – Part 2 / TRGS 722, the term “natural ventilation” is described, providing a better understanding of the process of automatic air circulation: “Natural ventilation is air exchange without the use of specific technical equipment. Air exchange is the result of differences in density or pressure of the air in adjacent areas, triggered by temperature differences inside / outside the room or by wind.”

The ZVEI – Zentralverband Elektrotechnik- und Elektronikindustrie e.V. (German Electrical and Electronic Manufacturers' Association) – also defines the ventilation of battery charging rooms for traction batteries in its information sheet: “Well-ventilated rooms must have a free air volume (= room volume minus the volume of all objects in the room) that corresponds to at least 2.5 times the air volume flow to be changed hourly,  $Q_{\text{ges}}$  [m³/h].”

Taking into account the above-mentioned definitions, the following formula can be used to calculate the size of the battery installation room required in order to keep the concentration of hydrogen under the threshold of 4 % VOL hydrogen content and avoid an explosive environment.  $Q = 0.05 \times n \times I_{\text{gas}} \times C_n \times 10^{-3}$

If the actual free room volume is below the calculated guide values, a ventilation system must be installed in accordance with the requirements of EN IEC 62485-2.

The assessment and calculation of the actual flow conditions in the battery installation room, as well as the fulfilment of the necessary requirements is the responsibility of the planning and ventilation companies carrying out the work.

# SPECIAL FUNCTIONS

## NBOX NETWORKING OF SEVERAL SYSTEMS (BASIC LICENCE)

### Art. no. 22171741 nBox licence linking

TCP/IP networking of up to 100 nBoxes

Up to 100 nBoxes can be networked via the internal RJ45 socket using the TCP/IP infrastructure. The licence code is purchased once and is valid for an unlimited period for one networked nBox.

The function can also be activated for 30 days free of charge, during which time it can be purchased, or the networking function cancelled upon request.

## NBOX LICENCE NETWORKING FEATURES

- Up to 100 nBox and eBox systems can be networked
- ONLITE Central BRI (Bus Remote Interface) status can be aggregated
- The nBox app (for iOS and Android) shows the status of all nBoxes and eBoxes
- Basic licence for all additional software special functions

Requirement:

A standard set-up of a customer LAN network via switches or WLAN infrastructure is required.



TCP/IP information:

All network cables used should be at least CAT5.

## NBOX INTERFACE

The installed nBox app (free to download for iOS or Android) enables access to one or more nBox systems.





## NBOX DEVICE SHARING

### Art. no. 22171744 nBox shared devices licence

Sharing of nBox functions via TCP/IP with other nBox systems

Information from switch inputs or modules on the system bus of an nBox can be shared with up to 100 nBoxes via TCP/IP. The licence code is purchased once and is valid for an unlimited period for one networked nBox. The function can also be activated for 30 days free of charge, during which time it can be purchased, or the shared devices function cancelled upon request. The shared devices licence is only required for nBox systems where common functions are to be shared.

## NBOX DEVICE SHARING FEATURES

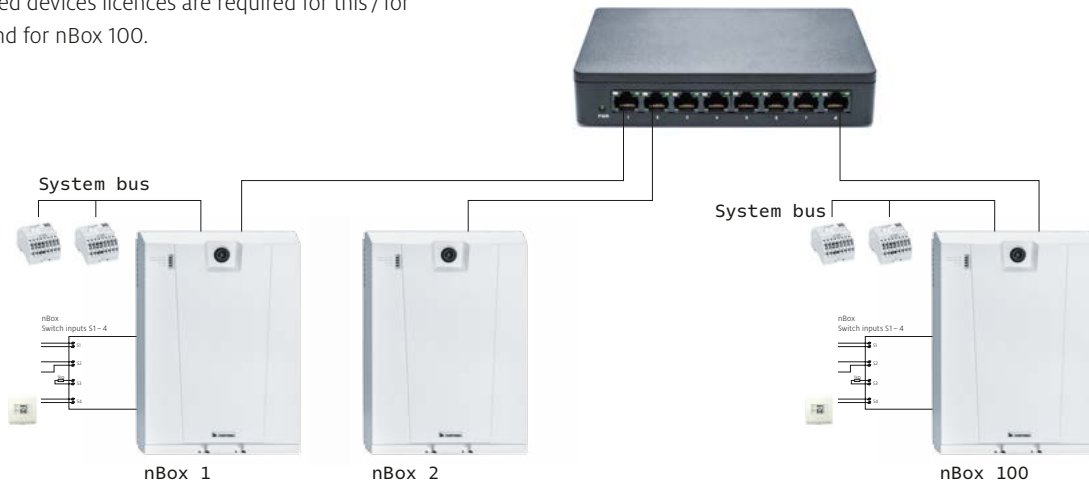
- Share bus phase monitor (BPD) function of a system with another nBox
- Share bus switch input module (BSIM) switch input function transmission with another nBox
- Share programmable switch inputs of a system with another nBox

Requirement:

The networking of the nBox systems via TCP/IP and a valid nBox linking licence are required. A shared devices licence is only required for the nBox systems that are to be dedicated to shared switching information and for the installations that are to be shared.

## DEVICE SHARING EXAMPLE

Switch inputs, bus phase monitors or the freely programmable inputs of the nBox system 1 should also interact with safety luminaires or safety luminaire groups in nBox 100. Two shared devices licences are required for this/for nBox 1 and for nBox 100.



For details about the switch inputs, see page 21 / 23.

## NBOX FM WEB APPLICATION LICENCE

### Art. no. 22171740 nBox licence dashboard

nBox web application for facility manager

All the networked IP addresses of up to 100 nBox systems can be viewed. It is also possible to switch easily from one nBox to another in order to view the system status. The licence code is purchased once and is valid for an unlimited period for one nBox. The function can also be activated for 30 days free of charge, during which time it can be purchased, or the FM web application function cancelled upon request.

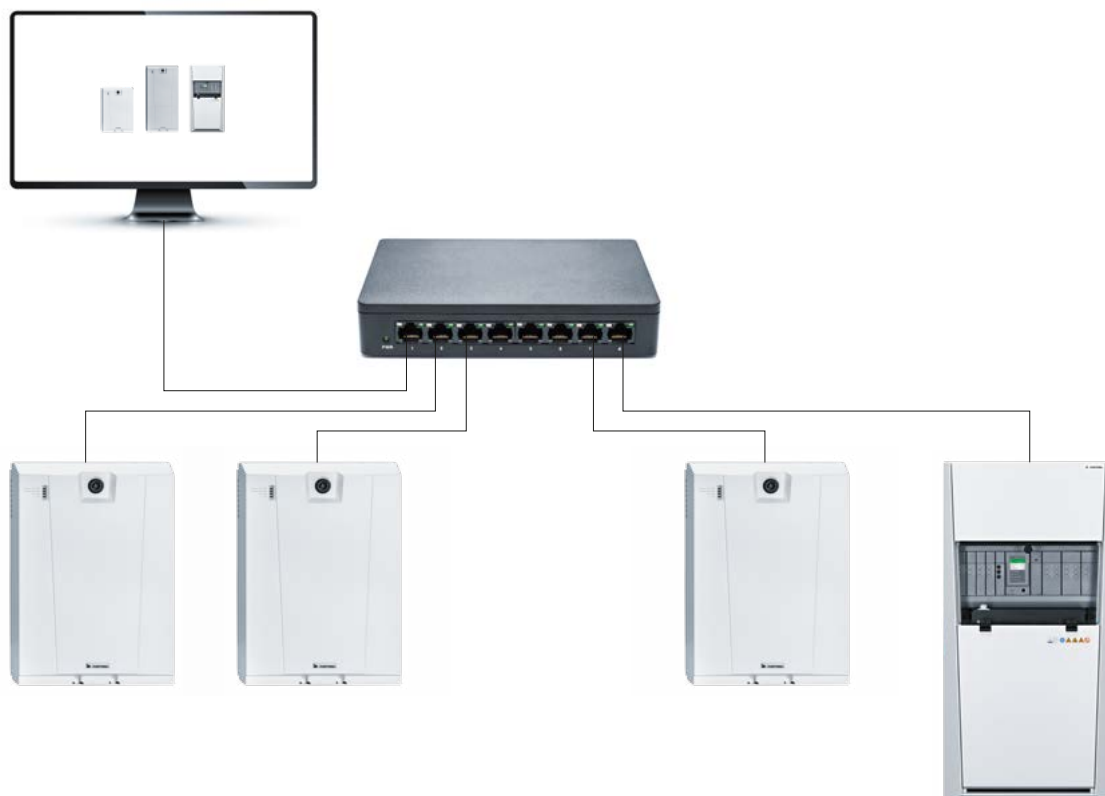
Various options for monitoring the nBox system are available on the website. The emergency lighting tests can be run, and the results of previous emergency lighting tests can be viewed in the test book. System documentation (including system image, configurations and temperature curve) can be created, and the current status of the devices and the set of batteries can also be viewed. In addition, it is possible to check at any time which faults were detected during operation or during emergency lighting tests. The system software can also be updated.

## FM WEB APPLICATION FEATURES

- Maintenance and service cockpit
- All other networked nBoxes and eBoxes can be viewed from one nBox

### Requirement:

The standard set-up of a customer LAN network via switches infrastructure is required for this, as is the respective valid nBox networking licence for each system, when several systems are used.





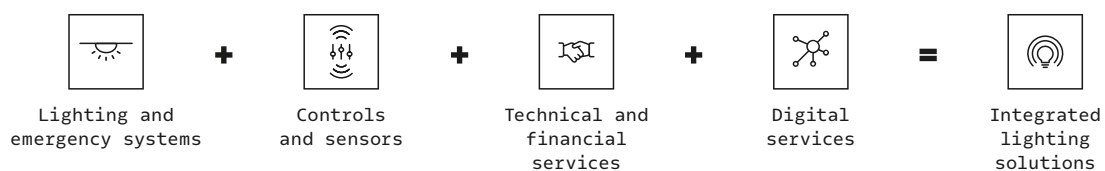
## GUARANTEE EXTENSION THROUGH MAINTENANCE AGREEMENT

The scope of ONLITE Maintenance is based on EN 50172, the norm for safety lighting systems, as well as on other country-specific norms, and can be optionally extended with further maintenance activities that extend the life time of the safety lighting system.

Safety lighting systems are subject to cyclic maintenance, which is required in accordance with EN 50172. With a Zumtobel maintenance agreement for emergency lighting, a specially trained service engineer will carry out a professional inspection of the safety lighting. The added value: The manufacturer's guarantee for nBox is extended to 5 years.

Maintenance ONLITE	Gold	Silver
<b>Services</b>		
Direct access to the local Zumtobel hotline	•	•
Exclusive access to product-related knowledge base	•	•
Zumtobel service booklet with log book	•	•
Prioritised processing	•	•
<b>Compliance with legal regulations and preventive services</b>		
Proactive scheduling of the annual service	•	•
Annual service of the control unit	•	•
Visual check of the safety luminaires incl. documentation	•	
<b>Privileges</b>		
Special rates for Zumtobel spare parts	•	
Special rates for standard hourly rate and travel expenses	•	

# T H E L I G H T



[zumtobel.com/contact](https://zumtobel.com/contact)