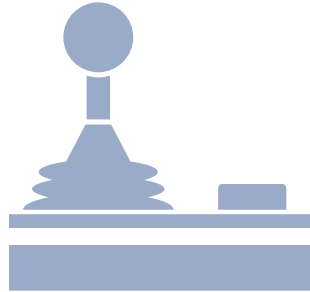


# TECHNICAL MANUAL

NLS 3000 Control Panel



*SINCE 1922*

**Den Haan Rotterdam**



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# Type Approval Certificate



This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 60 303 - 09 HH

Company DECKMA GmbH

Bahnhofstraße 79  
21224 Rosengarten-Klecken, GERMANY

Product Description Navigation Light Controller

Type NLS 3000

Environmental Category A, EMC1

Technical Data / Range of Application 8 - 48 lanterns, bulb type or LED type

Power supply 12VDC, 24VDC; 115VAC, 230VAC, 50/60Hz

consisting of:

NLS 3000 MM01-E Main module  
NLS 3000 LM08-E lantern module 8-line  
NLS 3000 LM02-E lantern module 2-line  
NLS 3000 BK01-E conventional operator panel (mimic)  
NLS 3000 BG01-E graphically operator panel (touch screen)  
NLS 3000 VM01-E VDR module  
NLS 3000 SM01-E interface module  
NLS 3000 DT01-E data module  
RS 232 terminal adapter

Requirements as per MSC.253(83) recognized

Test Standard GL Guidelines for the Performance of Type Approvals Part 2, Edition 2003

Documents "Technical documentation" dated 2008-11-12  
EMV Services report 08/8159-1 dated 2008-11-03  
Paconsult report 08/2137 dated 2008-08-29  
Elektronik Services report 081005 dated 2008-10-05

Remarks Operation instruction of the manufacturer to be observed

Valid until 2019-03-16

Page 1 of 1

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Hamburg, 2014-03-17

Type Approval Symbol



**Germanischer Lloyd**

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# 1. APPLICATION & DESIGN

The NLS3000 navigation light control panel serves for switching and monitoring up to 48 lights onboard ships. These can be switched on or off individually. Two power supplies can be provided for the lights (main and backup). Selection between these two supplies can take place either manually or automatically in the event of failure of the power supply currently in use.

The NLS3000 navigation light control panel is in a modular design. The light modules (light switching and monitoring) are installed in a control cabinet together with the main module (power and master module monitoring). The control panels (conventional with buttons and LEDs or graphic with touchscreen) can be arranged projecting.

The individual modules are interconnected via a bus cable that supplies the modules with operating voltage.

The system is organised according to the master-slave principle. This means that a master module collects the information from the slave modules, evaluates and manages the information and initiates actions at the slave modules.

For this purpose, the master (main module) must know which lights must be evaluated with which values and what actions need to be initiated in the event of failure. The system topology must also be known. This is achieved by the configuration of the main module and is permanently stored in the internal EEPROM. This configuration is simply written into the main module by text file transfer (terminal or SD card via data module). The text file containing configuration data and menu texts is arranged so that it can effectively be generated from Microsoft Excel tables.

## 2. MODULES

### 2.1 NLS 3000 MM01-E Main Module

- Supply 230V/115V AC or 24V DC
- Main and backup power switching
- Power for modules and distribution for bus system
- 2 relay outputs for signalling
- 2 optocoupler inputs for signalling
- Optional control panel with LCD display
- Data module interface (FMS 3000 DT01-E)

### 2.2 NLS 3000 LM08-E 8-circuit light module

- 8 monitored, switched and protected light circuits
- Main and backup power switching

### 2.3 NLS 3000 LM02-E 2-circuit light module

- 2 monitored, switched and protected light circuits
- Main and backup power switching

### 2.4 NLS 3000 BK\*\*-E Conventional control panel (mimic)

- Ship mimic with 7 LEDs for main lights
- Display and switching option for up to 48 individual lights
- 4x buttons for special light functions
- Backlit button labelling field (dimnable)

### 2.5 NLS 3000 BG01-E Graphic control panel (with touchscreen)

- Graphic control panel with touchscreen (control options as on conventional control panel)
- jpg background images for light positions

### 2.6 NLS 3000 VM01-E VDR module (identical with FMS 3000)

- Connection to VDR

### 2.7 NLS 3000 SM01-E Slave module (identical with FMS 3000)

- Connect to ship automation system

### 2.8 NLS 3000 DT01-E Data module (identical with FMS 3000)

- Module for data management and editing on SD card
- Only for connection to specific interface
- Identically used in FMS 3000
- Use for service purposes

### 2.9 FMS 3000 RS232 terminal adapter

- Adapter for connection of data module interface 8 (on NLS 3000 MM01-E) with PC RS232
- Use for service purposes (see separate service manual)

## 3. DESCRIPTION OF MODULES

### 3.1 NLS 3000 MM01-E Main Module

The main module is the communication master within the NLS communication system. In addition to the power for the connected modules, the main module includes a power monitoring circuit. The main module also has a connection for an optional DT01-E data module.

The main module has 10 connections for modules supplying a total power of about 4A.

For conversion of the 230V AC and 115V AC power supplies to the 24V DC internal system supply, an option for the connection of two external power supplies is provided.



Width	168mm
Height	108mm
Depth	50mm ( $\pm 80$ mm with connector)
Mounting Method	Top-hat rail DIN EN 50022
Weight	0.5kg

### 3.1.2 Optional Display

For easy system analysis and display of nominal and actual values, a display board can be added. The display is controlled by a microcontroller via an 8-bit databus and RS, RW and E (clock). The buttons on the display board are read-in directly via microcontroller ports.

The display board also has a battery-backed real-time clock. This is connected to the microcontroller via an I2C bus.



## 3.2 NLS 3000 LM08-E 8-circuit light module



Width	275mm
Height	100mm
Depth	50mm ( $\pm 80$ mm with connector)
Mounting Method	Top-hat rail DIN EN 50022
Weight	0.8kg
Supply	24VDC (from NLS Bus)
Power consumption	0.4A

### 3.2.1 General

The "8-circuit light module" is a communication slave within the NLS communication system. It allows the connection of up to 8 lights which can be switched on or off via relays with two-pole fuse protection.

The current in the individual light circuits is continuously measured. These values are transferred to the master which evaluates these values from which it derives status information for the control panels. Should the current fail to reach the required value, an alarm is generated.

### 3.2.2 Light circuits

The power supplies (main and backup) are supplied jointly for all 8 lights via JN1. For switching between the two power supplies, one switching relay for two lights respectively is arranged downstream of this supply circuit. The respective voltage is then distributed between the individual light circuits.

Each light circuit has a current sensor for two current ranges. The first switching operation takes place for currents up to about 200 mA via a shunt, the second for currents up to about 4 A via a Hall sensor. Both switching operations are sensed by a microcontroller with 10-bit analogue circuit and made available for further processing via the FMS bus.

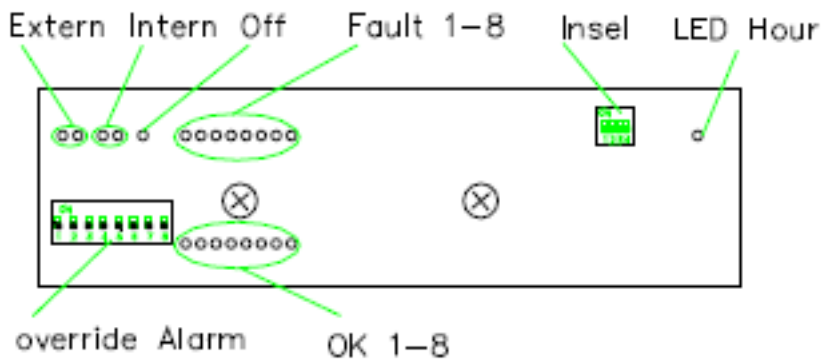
Each light circuit has two-pole fuse protection. Each light circuit can be switched by the microcontroller via one relay respectively. For this purpose, the commands from the master arriving via the FMS bus are evaluated.

The light circuits are each combined in groups of four on the output connectors JL1 and JL2 from where separate wiring to the respective lights takes place.

Each light circuit can be switched via a toggle switch independent of the microcontroller. This is also possible in the event of failed or disconnected electronic circuits, thus enabling emergency light operation.



### 3.2.3 LEDs and DIP switch functions (microcontroller board)



“EXT” » External communication: (2 LEDs)

- Communication status with master via NLS bus system
- Green flashing » Communication without faults
- Red short » Individual communication faults
- Red » Communication in constant fault state

“INT” » Internal communication: (2 LEDs)

- Communication status with module-internal A/D converter
- Green flashing » Communication without faults
- Red short » Individual communication faults
- Red » Communication in constant fault state

“OK” » Light status: (8 green LEDs)

- Light circuit status without faults
- Green » Light is switched on and values are correct
- Green flashing » Delay after switching on continues until valid A/D values are present or “overwrite” is active (DIP switch)

“FAULT” » Light status: (8 red LEDs)

- Light circuit status with faults
- Red flashing » Light fault detected, new fault
- Red » Light fault detected, fault accepted

“OFF” » Fault “overwrite”: (yellow LED, 8-circuit DIP switch)

- Faults in light circuits are not signalled
- LED off » No “overwrite” active on this module
- Yellow LED flashing » Minimum one “overwrite” active on this module
- DIP switch “ON” » Fault in light circuit is not signalled

“ADR” » NLS address: (4-circuit DIP switch)

- Address in NLS system
- Address must correspond with configuration data
- Each address may only be set 1x within the entire system

### 3.3 NLS 3000 LM02-E 2-circuit light module



Width	124mm
Height	108mm
Depth	50mm ( $\pm 80$ mm with connector)
Mounting Method	Top-hat rail DIN EN 50022
Weight	0.8kg
Supply	24VDC (from NLS Bus)
Power consumption	0.4A

#### 3.3.1 General

The “2-circuit light module” is a communication slave within the NLS communication system. It allows the connection of up to two lights which can be switched on or off via relays with two-pole fuse protection.

The current in the individual light circuits is continuously measured. These values are transferred to the master which evaluates these values from which it derives status information for the control panels. Should the current fail to reach the required value, an alarm is generated.

#### 3.3.2 Light circuits

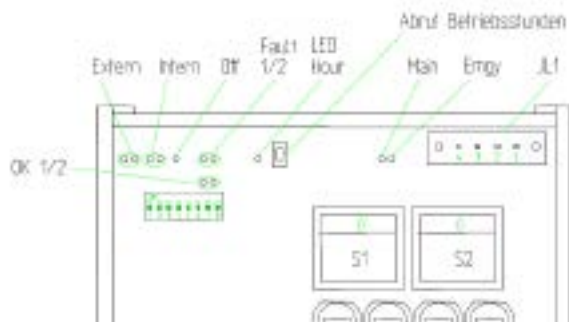
The power supplies (main and backup) are supplied jointly for all two lights via JN1. For switching between the two power supplies, one switching relay for two lights respectively is arranged downstream of this supply circuit. The respective voltage is then distributed between the individual light circuits. Each light circuit has a current sensor for two current ranges. The first switching operation takes place for currents up to about 200 mA via a shunt, the second for currents up to about 4 A via a Hall sensor. Both switching operations are sensed by a microcontroller with 10-bit analogue circuit and made available for further processing via the FMS bus.

Each light circuit has two-pole fuse protection. Each light circuit can be switched on by the microcontroller via one relay respectively. For this purpose, the commands from the master arriving via the FMS bus are evaluated.

The light circuits are each combined on the output connector JL1 from where separate wiring to the respective lights takes place.

Each light circuit can be switched via a toggle switch independent of the microcontroller. This is also possible in the event of failed or disconnected electronic circuits, thus enabling emergency light operation.

### 3.3.3 LEDs and DIP switch functions (microcontroller board)



“EXT” » External communication: (2 LEDs)

- Communication status with master via NLS bus system
- Green flashing » Communication without faults
- Red short » Individual communication faults
- Red » Communication in constant fault state

“INT” » Internal communication: (2 LEDs)

- Communication status with module-internal A/D converter
- Green flashing » Communication without faults
- Red short » Individual communication faults
- Red » Communication in constant fault state

“OK” » Light status: (2 green LEDs)

- Light circuit status without faults
- Green » Light is switched on and values are correct
- Green flashing » Delay after switching on continues until valid A/D values are present or “overwrite” is active (DIP switch)

“FAULT” » Light status: (2 red LEDs)

- Light circuit status with faults
- Red flashing » Light fault detected, new fault
- Red » Light fault detected, fault accepted

“OFF” » Fault “overwrite”: (yellow LED, 8-circuit DIP switch - switch 7/8)

- Faults in light circuits are not signalled
- LED off » No “overwrite” active on this module
- Yellow LED flashing » Minimum one “overwrite” active on this module
- DIP switch “ON” » Fault in light circuit is not signalled

“ADR” » NLS address: (8-circuit DIP switch - switch 1-5)

- Address in NLS system
- Address must correspond with configuration data
- Each address may only be set 1x within the entire system

### 3.4 NLS 3000 BK\*\*-E Conventional control panel (mimic)



Width	111.5 mm	BK 08-E
	144 mm	BK 16-E
	176.5 mm	BK 24-E
	209 mm	BK 32-E
	241.5 mm	BK 40-E
	274 mm	BK 48-E
Height	144 mm	
Depth	60 mm	(±130mm with connector)
Mounting Method	Front Panel Mounting	
Weight	0.6kg	BK16-E

#### 3.4.1 General

The “conventional control panel” is a communication slave within the NLS communication system. It serves for display and control of the NLS, enabling lights to be switched on or off. From this control panel, the NLS generates visual and audible alarms on faults in the light circuits or in the NLS and system power supply.

#### 3.4.2 Buttons

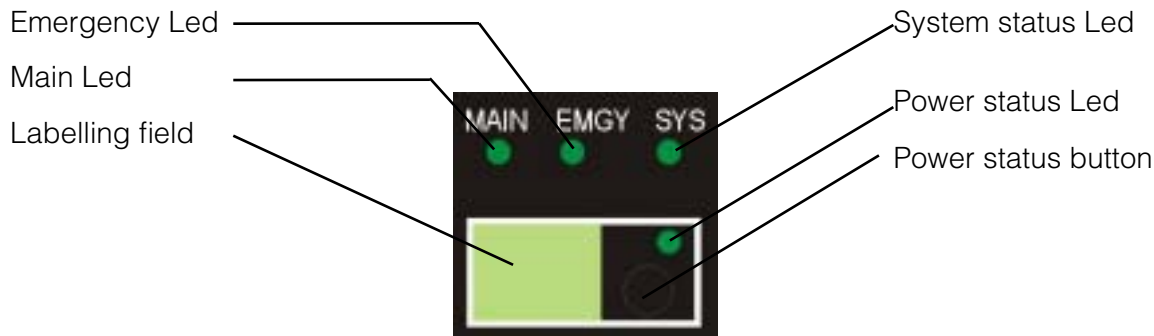
Each individual button consists of a button, a status LED arranged above and a labelling field located on the left. The labelling field (dimnable) is backlit. Marking of the labelling fields takes place via an insertable strip that can be adapted for various projects.

#### 3.4.3 General buttons

For general control of the NLS, permanent and configurable functions are implemented. The associated buttons are arranged in the left section of the control panel or directly below the ship mimic.



### 3.4.5 Power & System



#### Labelling field

- Marking with button function: Here "Power"

#### Power status button

- Switches the power for the lights
- Pressing this button switches on the power via "MAIN"
- With the power switched on, switching takes place between "MAIN" and "EMGY"
- Pressing and holding this button switches off the power after about 3 seconds

#### Power status LED

- Off » Power off
- Green » Power On
- Red flashing » No power ("MAIN" or "EMGY"), new fault
- Red » No power ("MAIN" or "EMGY"), fault accepted

#### System status LED

- Green » System without faults
- Red flashing » System fault (e.g. module not accessible)

#### Main LED and Emergency LED

##### a. "Power off" status

- Green » Power available
- Green flashing » No power

##### b. In "Power on" status

- Green » Lights currently supplied via this power supply
- Off » Lights not currently supplied via this power supply
- Green flashing » No power

### 3.4.6 Function & Light button



#### Labelling field

- Marking with associated button function

#### Status button

- Switches the associated function on or off

#### Status LED

- Off » Function or light switched off
- Green » Function or light switched on
- Green flashing » Delay after switching on continues until valid A/D values are present or "overwrite" is active (DIP switch)
- Red flashing » Light fault detected, new fault
- Red » Light fault detected, fault accepted

#### Mimic



#### Mimic LEDs

- Off » light switched off
- On » Function or light switched on
- Flashing » Light fault detected,

### 3.5 NLS 3000 BG01-E Graphic control panel (with touchscreen)

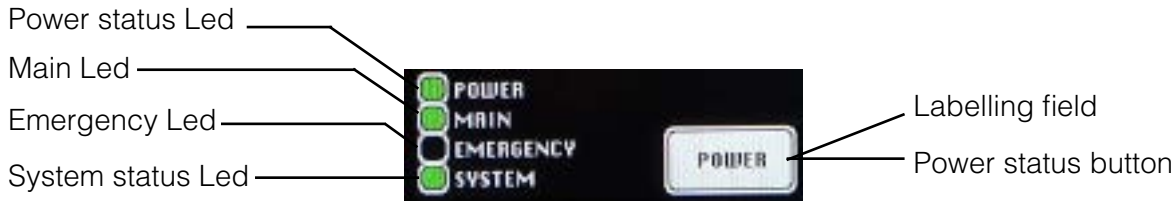


Width	120mm	
Height	95mm	
Depth	50mm ( $\pm$ 130mm with connector)	
Mounting Method	Front Panel Mounting	
Weight	0.4 kg	
Connection NLS Bus in Connection NLS Bus out	15-pin Dsub Male 15-pin Dsub Female	JP1 JPT1
Supply	24VDC (from NLS Bus)	
Power consumption	0.3A	
Display Visible Area	95.4mm x 53.9mm	
Display Resolution	480x272 pixels	
Display Colours	16 Bit	

#### 3.5.1 General

The "graphic control panel" is a communication slave within the NLS communication system. It serves for display and control of the NLS, enabling lights to be switched on or off. From this control panel, the NLS generates visual and audible alarms on faults in the light circuits or in the NLS and system power supply.

### 3.5.2 Power & System



#### Labelling field

- Marking with button function: Here "Power"

#### Power status button

- Switches the power for the lights
- Pressing this button switches on the power via "MAIN"
- With the power switched on, switching takes place between "MAIN" and "EMGY"
- Pressing and holding this button switches off the power after about 3 seconds

#### Power status LED

- Off » Power off
- Green » Power On
- Red flashing » No power ("MAIN" or "EMGY"), new fault
- Red » No power ("MAIN" or "EMGY"), fault accepted

#### System status LED

- Green » System without faults
- Red flashing » System fault (e.g. module not accessible)

#### Main LED and Emergency LED

##### a. "Power off" status

- Green » Power available
- Green flashing » No power

##### b. In "Power on" status

- Green » Lights currently supplied via this power supply
- Off » Lights not currently supplied via this power supply
- Green flashing » No power



### 3.5.3 Function and light button:



#### Labelling field

- Marking with associated button function

#### Status button

- Switches the associated function on or off

#### Status LED

- Off » Function or light switched off
- Green » Function or light switched on
- Green flashing » Delay after switching on continues until valid A/D values are present or "overwrite" is active (DIP switch)
- Red flashing » Light fault detected, new fault
- Red » Light fault detected, fault accepted

#### Mimic



#### Mimic LEDs

- Off » light switched off
- On » Function or light switched on
- Flashing » Light fault detected

### 3.6 NLS 3000 VM01-E VDR module (identical with FMS 3000)



Width	72 mm
Height	104 mm
Depth	88 mm
Mounting Method	Top-hat rail DIN EN 50022
Weight	0.3kg

#### 3.6.1 General

The VDR module sends data via RS485 or RS232 to a VDR (Voyage Data Recorder). The module can alternatively be provided with drivers for RS485 or RS232.

The communication profile of the VDR interface depends on the following specifications:

- IEC 61162-1            Part 1 Single talker and multiple listeners
- IEC 61162-100        Extra requirements for the UAIS
- IEC 61162-102        Extra requirements for the Voyage Data Recorder

#### 3.6.2 VDR interface

The microcontroller, an ATmega162 with two serial interfaces, communicates with the master via one of the interfaces and with the other via the alternative driver provided for RS485 or RS232.

#### 3.6.3 RS485 communication

Communication takes place via an RS485 driver module. The microcontroller takes over direct communication with the RS485 bus and filters the messages for the VDR module. The two status LEDs on the module indicate the status of the RS485 interface:

- Green LED:            Module status scanned by master
- Red LED:              Communication problem or timeout

### 3.7 NLS 3000 SM01-E Slave module (identical with FMS 3000)



Width	54mm
Height	60 mm
Depth	17 mm
Weight	0.05kg
Data & Power connection	25Pin Dsub Male
Supply	5VDC (from NLS Bus)
Power consumption	0.005A supplied from module

#### 3.7.1 General

The slave module serves for connection of the NLS 3000 main module to the ship automation system. It decouples both systems.

#### 3.7.2 Connector

Communication takes place via an RS232 driver module with the main module and via an RS485 module with the ship automation system. The interface output to the ship automation system is isolated via a digital isolator.

The terminating resistor for the RS485 bus can be connected via a slide switch.

### 3.8 NLS 3000 DT01-E Data module (identical with FMS 3000)



Width	54mm
Height	60 mm
Depth	17 mm
Weight	0.05kg
Mounting method	Plug-in
Data & Power connection	25Pin Dsub Male
Supply	5VDC
Power consumption	0.005A supplied from module
SD Card	64MB...1GB (256MB Kingston recommended)

#### 3.8.1 General

The data module serves for the storage of configuration data and data occurring in the operation of AFMS3000 on an SD memory card. For this purpose, the module contains its own microcontroller, which makes reading and writing of the SD memory card independent of the higher-level system. Integration into the system takes place via a special interface.

#### 3.8.2 Power supply

The module receives its 5V power for supplying the microcontroller via the interface. From this voltage, 3.3V is generated internally for supplying the SD memory card.

#### 3.8.3 Connector

Communication takes place via an RS232 driver module. The data module is also supplied with 5V operating voltage via the connector.

#### 3.8.4 LEDs

Three status LEDs are provided on the back of the module:

- Green LED: Module ok, access to SD card file system possible
- Yellow LED: File open for reading or writing
- Red LED: Read or write operation, fault on steady light indication

#### 3.8.5 SD memory card slot

- A slot is provided at the rear of the module for receiving an SD memory card. This locks in place after it is pushed into the slot. The memory card can be removed by exerting light pressure on the same.



## 4. OPERATION OF NLS-3000 (CONVENTIONAL)

### 4.1 Switching on NLS and power supply switching

Provided for switching the NLS on and off are control and indicating elements arranged directly below the ship mimic. Two green LEDs (labelled "MAIN" and "EMGY") indicate via a steady light the presence of the respective power supply. When the NLS is switched on, the LED for the currently used power supply lights up.

Arranged directly on the right next to the "Power" button is a two-colour LED. When this LED lights green, both power supplies are present and the NLS is on. In the event of failure of one of the power supplies, this LED flashes red or shows a steady light.

The NLS is switched on by pressing the "Power" button. The NLS can be switched off by pressing and holding the button for about 3 seconds. When the button is pressed during operation, switching takes place between the main and backup power supply.

The "SYS" LED lights green to signal that the NLS is operating without fault and lights red on faults.

### 4.2 LED brightness setting

There are eight brightness levels for the individual LEDs and button backlight. Provided for this purpose is the "Back Light" button. The brightness is increased one level each time this button is pressed. Selection takes place from the highest level to the lowest level. When the button is pressed and held, these levels are selected in a 0.5 second cycle.

### 4.3 Lamp test

To test the function of the individual LEDs, a lamp test can be performed. The "Test" button is provided for this purpose.

### 4.4 Alarm acceptance

For the acceptance of alarms and simultaneously switching off the buzzer, the "Sound Off" button is provided.

### 4.5 Configurable functions

In order to simplify the setting of specific light scenarios, these can be defined via configuration. Selection can subsequently be made via the buttons labelled according to their specific function.

### 4.6 Light buttons

Each light is assigned a button in the NLS and can be switched on or off via this button. A two-colour LED is arranged directly on the right next to the button. When the button lights green, the associated light is on and the power is in the given range. The LED flashes red on faults in the light circuit. After acceptance of the fault, the LED shows a steady red light.

For lights using LEDs, the operating time is also monitored. If the maximum permissible operating time is exceeded, a fault is generated.

### 4.7 Ship mimic

For the main lights, display is provided in the form a ship mimic. When these lights are switched on, the associated LED in the ship mimic also lights up and flashes on faults.

### 4.8 Buzzer

The buzzer is controlled via a driver transistor and a microcontroller port circuit. The buzzer is located on the back of the control panel. It is activated pulsed on faults.

## 5. OPERATION OF NLS-3000 (GRAPHICS)

### 5.1 Switching on NLS and power supply switching

Provided for switching the NLS on and off are control and indicating elements arranged on the bottom left of the screen. Two green LEDs (labelled "MAIN" and "EMGY") indicate via a steady light the presence of the respective power supply. When the NLS is switched on, the LED for the currently used power supply lights up.

Arranged directly next to the "Power" button is a two-colour LED. When this LED lights green, both power supplies are present and the NLS is on. In the event of failure of one of the power supplies, this LED flashes red or shows a steady light.

The NLS is switched on by pressing the "Power" button. The NLS can be switched off by pressing and holding the button for about 3 seconds. When the button is pressed during operation, switching takes place between the main and backup power supply.

The "SYS" LED lights green to signal that the NLS is operating without fault and lights red on faults.

### 5.2 Backlight brightness setting

The display backlight has ten brightness settings. Provided for this purpose is the "Back Light" button. The brightness is increased one level each time this button is pressed. Selection takes place from the highest level to the lowest level. It is also possible to invert the display by pressing the "Invert Display" button.

### 5.3 Alarm acceptance

For the acceptance of alarms and simultaneously switching off the buzzer, the "Sound Off" button is provided. This is only displayed when the buzzer is active.

### 5.4 Configurable functions

In order to simplify the setting of specific light scenarios, these can be defined via configuration. Selection can subsequently be made via the buttons labelled according to their specific function.

### 5.5 Light buttons

Each light is assigned a button in the NLS and can be switched on or off via this button. A two-colour LED is arranged directly on the right next to the button. When the button lights green, the associated light is on and the power is in the given range. The LED flashes red on faults in the light circuit. After acceptance of the fault, the LED shows a steady red light.

For lights using LEDs, the operating time is also monitored. If the maximum permissible operating time is exceeded, a fault is generated.

### 5.6 Ship mimic

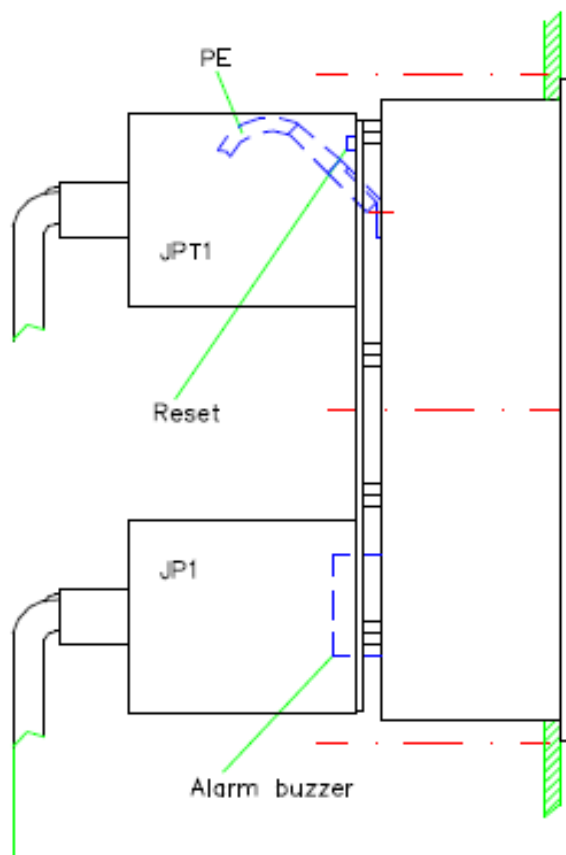
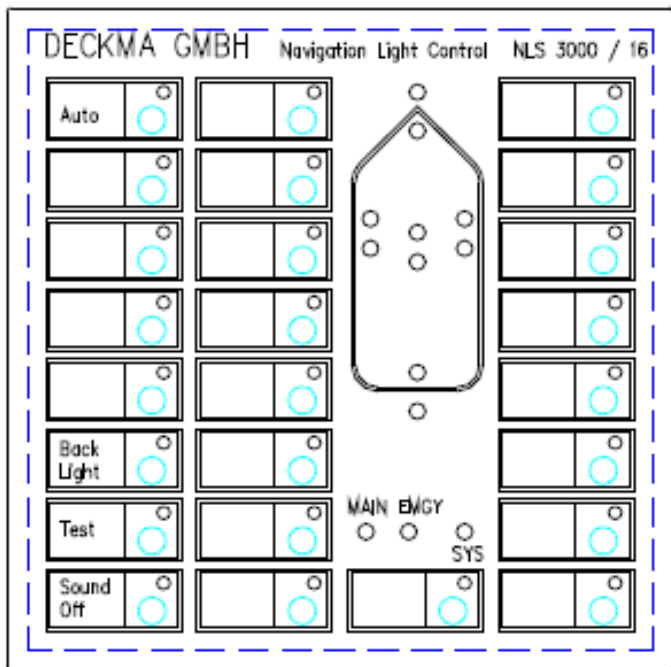
For the main lights, display is provided in the form a ship mimic. When these lights are switched on, the associated LED in the ship mimic also lights up and flashes on faults.

### 5.7 Buzzer

The buzzer is controlled via a driver transistor and a microcontroller port circuit. The buzzer is located on the back of the control panel. It is activated pulsed on faults.

# 6. MECHANICAL SPECIFICATIONS

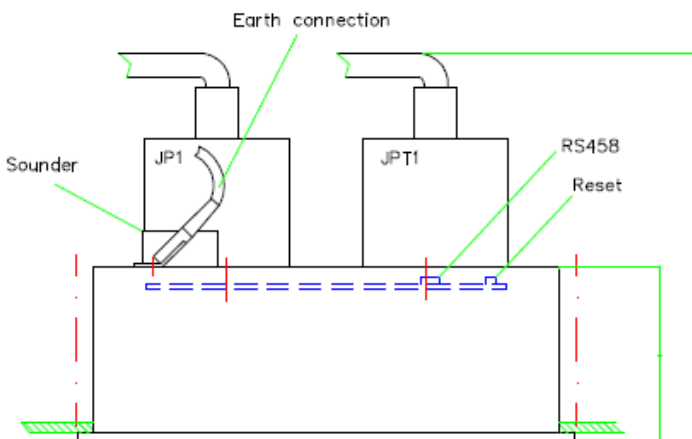
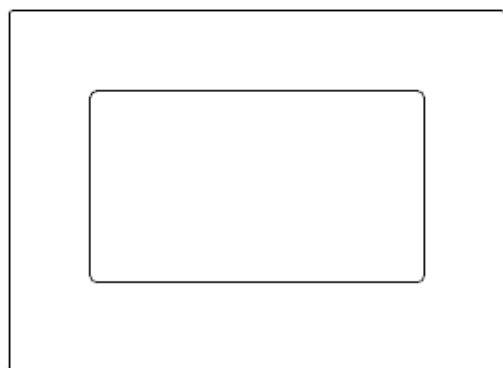
## 6.1 Dimensions of conventional control panel BK 08...48- E



	Front plate	Housing	Panel cut out
NLS 3000 / 8	144x111,5	135x102,5	138x105,5
NLS 3000 / 16	144x144	135x135	138x138
NLS 3000 / 24	144x176,5	135x167,5	138x170,5
NLS 3000 / 32	144x209	135x200	138x203
NLS 3000 / 40	144x241,5	135x232,5	138x235,5
NLS 3000 / 48	144x274	135x265	138x268

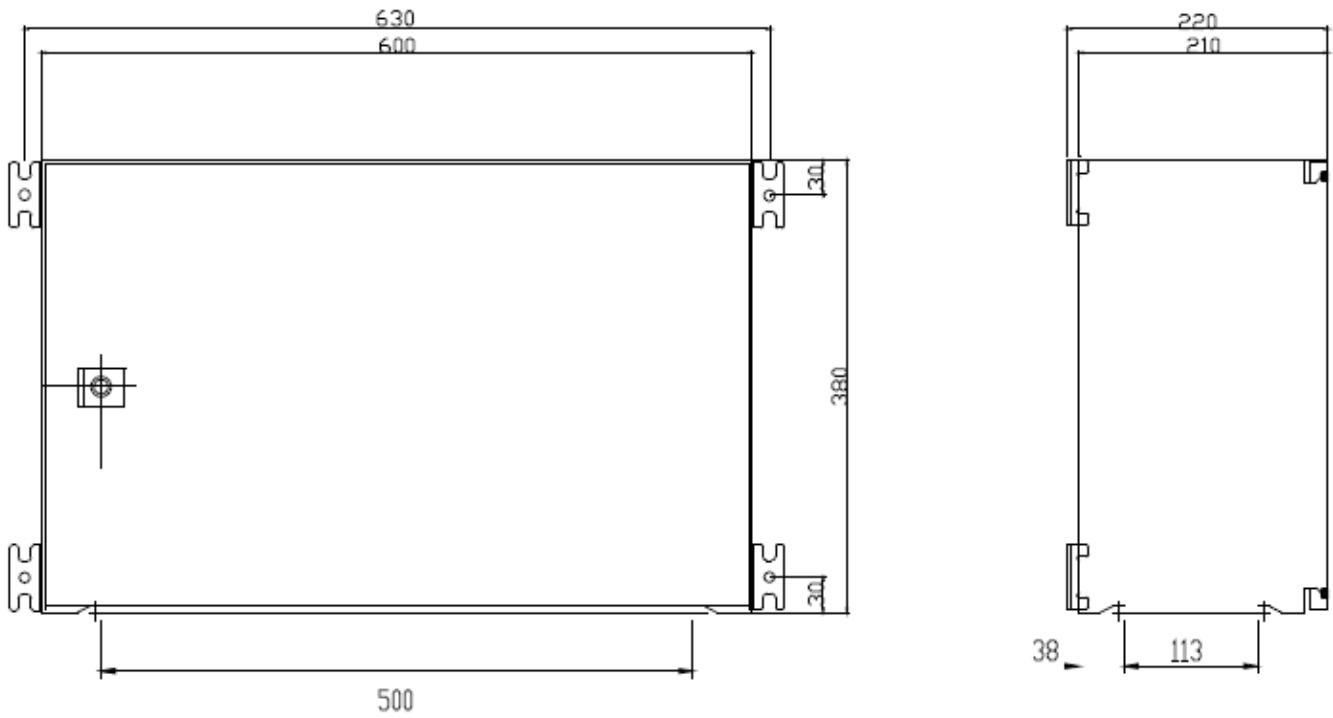
All measurements are in mm

## 6.2 Dimensions of graphic control panel BG 01- E

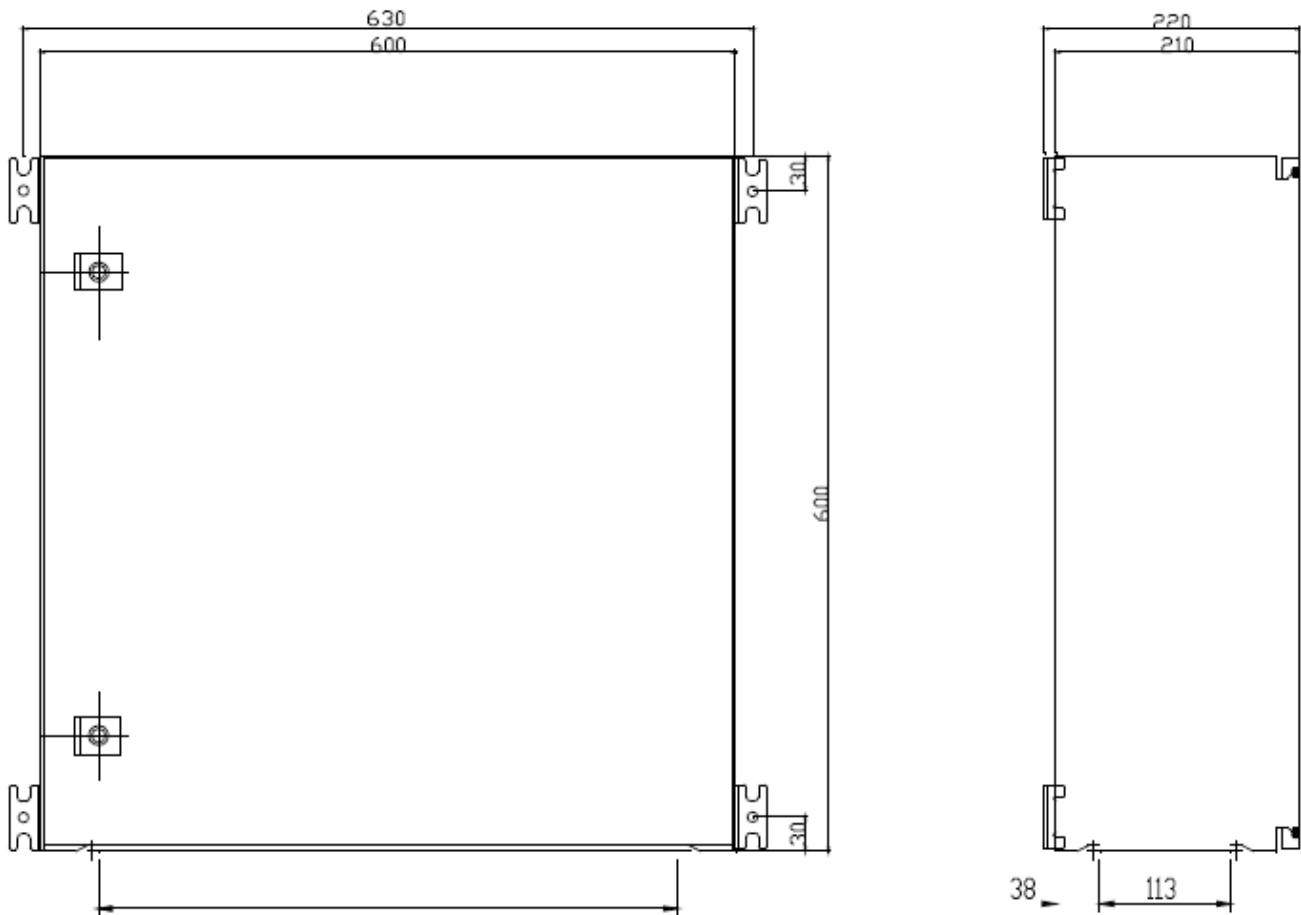


	Front plate	Housing	Panel cut out
dimensions in mm	144 x 105,5	135 x 96,5	138 x 99,5

### 6.3 Dimensions of control cabinet for up to 16 light circuits



### 6.4 Dimensions of control cabinet for 17-48 light circuits





## 7. INSTALLATION INSTRUCTIONS

### 7.1 Cable requirements

The following cables are recommended for safe and reliable operation of the complete system

Main and emergency power supply	unshielded cable min.	3x1.5mm <sup>2</sup>
Light outputs	unshielded cable min.	3x1.5mm <sup>2</sup>
Output contacts	unshielded cable min.	2x0.75mm <sup>2</sup>
Control inputs	shielded cable min.	2x0.75mm <sup>2</sup>
VDR output	shielded twisted pair	2x2x0.75mm <sup>2</sup>
Control panel	shielded twisted pair	2x2x0.75mm <sup>2</sup>
Max. length 500 m		

# ADVANCED MARITIME SIGNALLING SOLUTIONS



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