

LuchsNT RGB / LED



Operator's Manual

Translation of the original



27142 – B

Table of Contents

1	Introduction.....	3
1.1	General Information	3
1.2	Safety Instructions.....	3
1.3	Packaging contents.....	4
2	Functional features	5
2.1	LuchsNT RGB control unit interface.....	5
2.2	LuchsNT LED control unit interface	5
2.3	Functional sequence after mains voltage ON	5
2.4	Switching the spotlights ON / OFF	5
3	Connections and adjusters	6
3.1	Terminal compartment overview	6
3.2	Terminal compartment disconnection	7
3.3	Mains power connection	7
3.4	Spotlights connection area.....	7
3.5	Configuration via DIP switch	8
3.6	"Analog" control terminal.....	9
3.7	"DMX" control terminal	9
3.8	"BUS" control terminal.....	10
3.9	DIAG system diagnosis button.....	12
3.10	Sensor button connection diagram	13
4	Functional Description	14
4.1	Operating mode	14
4.2	LED display	15
4.3	Synchronisation of several LED control units.....	15
4.4	Individual control of the RGB spotlights	16
4.5	Colour light control with customer-specific DMX control unit.....	16
4.6	External sensor button via converter box 3.0.....	17
5	Luchs-NT RGB and LED-white spotlights	19
5.1	Standard.....	19
6	Installation of LuchsNT lighting unit.....	20
6.1	Installation instructions.....	20
6.2	Spotlights – LED control unit connecting cable.....	20
7	Technical data.....	21
7.1	Technical specification	21
7.2	Dimensions	22
7.3	Device installation	23
7.4	Type plate	24
7.5	Guarantee seal.....	24

Subject to technical changes



Electronic devices are not regular household waste. In accordance with Directive 2002/96/EC of the European Parliament and Council of January 27, 2003 regarding electrical and old electronic devices, they must be disposed of properly. Please drop these devices off at public collection points provided for that purpose when you have finished using them.



In addition, the notes and information in the LuchsNT (27134) assembly instructions apply.

1 Introduction

The LuchsNT spotlights is an independent lighting unit for illuminating swimming pools. The LuchsNT lighting unit consists of the spotlights and control unit. It is available in LED-white and RGB versions. The light intensity of the LED-white version can be controlled via a 0-10V interface. The RGB colour light is controlled via the DMX interface. The 2-wire technology makes it possible to operate RGB spotlights with only 2 wires. All spotlights are connected in parallel.

1.1 General Information



For your own safety and to protect the product, please read the Operator's Manual carefully before starting with the installation and settings!

All persons involved in setting up, commissioning, operating, maintaining, and repairing this device must:

- be appropriately qualified
- meticulously observe the operator's manual
- consider the operator's manual to be part of the product
- keep the operator's manual in a safe place throughout the service life of the product
- forward the operator's manual to each successive owner or user of the product
- ensure that all additions that are received are inserted into the operator's manual
- observe all legal requirements

1.2 Safety Instructions



Danger of lethal electrical current!

Electrical connections must only be made by a professional electrician in accordance with VDE Regulation 0100. Observe the local requirements of the responsible electrical power provider as well as standards and safety requirements for electrical systems in swimming pools.

In case of damage caused by failure to observe the information provided in these operator's manual, all claims under warranty shall be void. The manufacturer cannot accept any liability for resulting consequential damages.



The LuchsNT spotlights must only be operated with the control unit designed for it by the manufacturer.

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- **Attention:** The NT control unit is still capable of conducting dangerous voltages for a short time after it is turned off.
- **The LuchsNT spotlights must only be operated under water.**
- The device must only be used when it is in flawless technical condition.
- Eliminate malfunctions without delay.
- Check the device and the electrical power line at regular intervals for damage.
- The L/N/PE connection of the power supply voltage must be made in accordance with VDE 0100 and VDE 0160.
- A protective and isolating device must be provided for turning off the power supply.
- Before beginning installation and service work, the power supply connection must be switched off.
- The device does not contain any components that require servicing by the user.
- The housing cover may only be opened by the manufacturer. (guarantee seal)
- In the event of a malfunction, we recommend contacting the supplier.

Attention:

- Failure to observe the safety instructions, for example touching live parts while the device is open or handling the device in an improper manner is hazardous with potentially fatal consequences.
- If the guarantee seal is destroyed, the guarantee and manufacturer's warranty shall be rendered null and void
- If the values listed in the technical data are exceeded there is danger of the device overheating, which can destroy the power supply and adversely affect electrical safety.

1.3 Packaging contents

- Control input
- Jumper at control terminal
- Operator's Manual

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2 Functional features

2.1 LuchsNT RGB control unit interface

- DMX interface colour light control
- 0-10V analog interface light intensity control 0-100 %
- 6 fixed colours
- 1 fixed colour gradient
- Synchronisation bus for synchronous control of several control units
- Control bus for optional functional enhancement

2.2 LuchsNT LED control unit interface

- 0-10V analog interface light intensity control 0-100 %
- Synchronisation bus for synchronous control of several control units
- Control bus for optional functional enhancement

2.3 Functional sequence after mains voltage ON

The system (control unit + spotlights) boots.

The system is ready for operation after 2 seconds. This means that after 2 seconds the spotlights are lit, depending on activation and assignment of the interface.

2.4 Switching the spotlights ON / OFF

- via START / STOP input



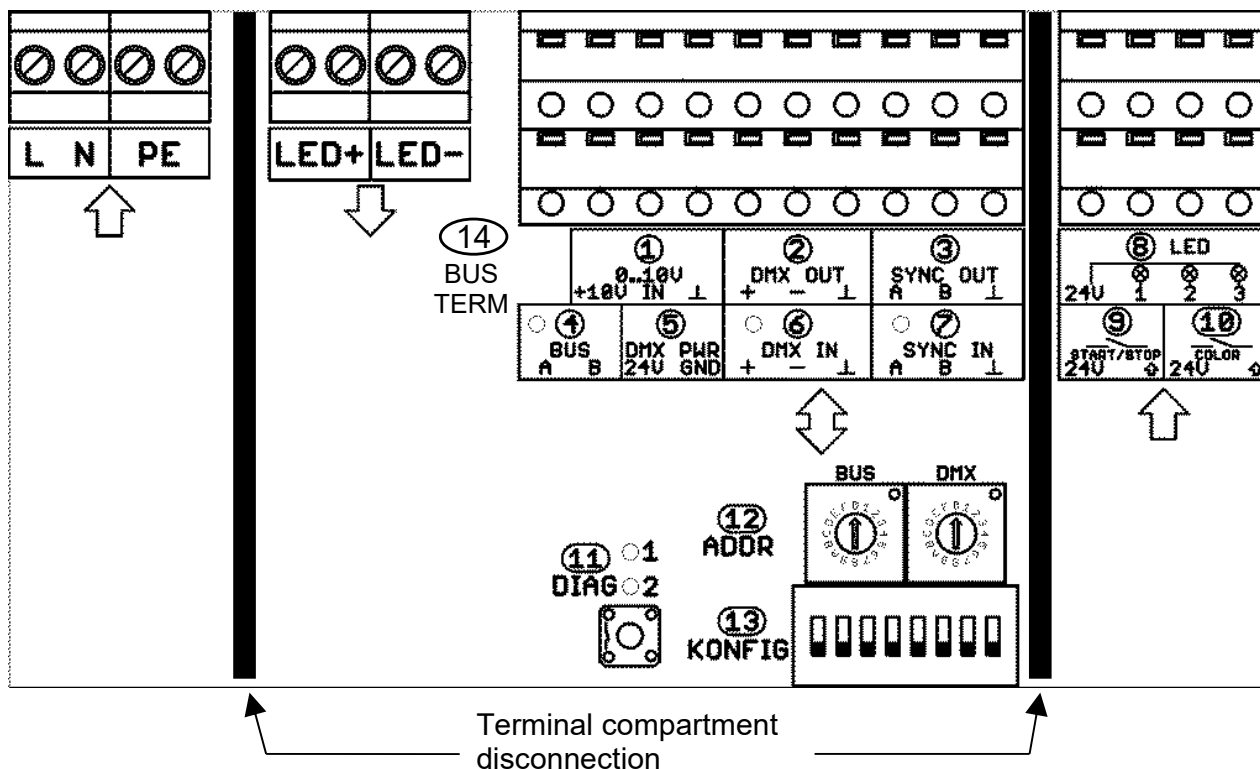
- The input can be set to latching or momentarily via DIP switch 3
- Delivery condition: latching with bridge
- The connected buttons and switches must be potential-free
- For a detailed functional description, see section 3.4

If the spotlights are OFF via the STOP input or control input Analog IN=0V or DMX control input, this is detected by the device and after 60 seconds the output terminals LED + and LED – are disconnected via a relay. If the spotlights are switched ON, a relay switches the voltage back to the output terminal.

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3 Connections and adjusters

3.1 Terminal compartment overview



The control unit has the following connections and adjusters marked on the printed circuit board in the terminal compartment:

L, N and PE: Mains input.

LED+, LED-: Spotlights connection 24 V

- 1: "0..10V: Standard signal input 0..10V with potentiometer power supply 10 V
- 2: DMX OUT: DMX output for series operation
- 3: SYNC OUT: Bus control unit synchronisation output
- 4: BUS: Manchester bus interface
- 5: DMX PWR: DMX 24V power supply for i-light
- 6: DMX IN: DMX input for series operation
- 7: SYNC IN: Control unit synchronisation input
- 8: LED: RGB lighting "START/STOP" piezo button
- 9: START/STOP Sensor button input on/off
- 10: COLOR Sensor button input colour selection
- 11: DIAG: Button and 2 LEDs for diagnostic purposes
- 12: ADDR: Manchester bus and DMX interfaces: Address setting
- 13: KONFIG: Device configuration
- 14: BUS TERM BUS terminating resistor

Notice: Rotary and dip switches 12 and 13 are read in once when the device is started. A change of switch positions during operation is therefore not accepted until the next device start.

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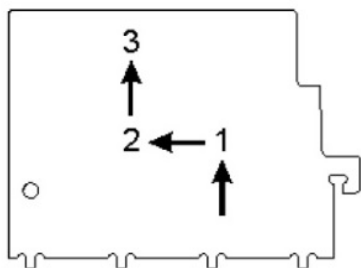
3.2 Terminal compartment disconnection



Safety instruction:

Two terminal compartment disconnects are provided for the connection areas of the spotlights and the piezo buttons. They are designed to prevent loose connecting lines from setting the piezo button under mains voltage.

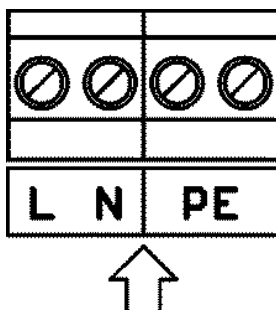
The terminal chamber disconnects are inserted and can be removed for easier wiring as follows:



Terminal compartment disconnection

Installation is in the opposite order.

3.3 Mains power connection



The L/N/PE connection of the power supply voltage must be made in accordance with VDE 0100 and VDE 0160.

A protective and isolating device must be provided for turning off the power supply.

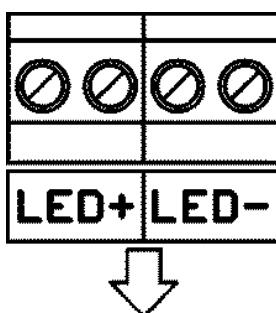
Terminal "PE" must always be connected to a protective ground!!

Screw terminal wire cross-section 0.2 to 2.5 mm²

Operation on circuit breaker 16A

- Trip characteristic B: for 3 control units
- Trip characteristic C: for 6 control units

3.4 Spotlights connection area

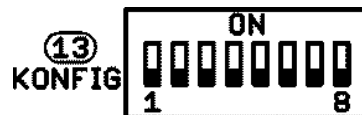


Screw terminals for wire cross-section 0.2 to 2.5 mm²

4 pin: connection 2xLED+
 2xLED-

Subject to technical changes

3.5 Configuration via DIP switch



Notice: Rotary and dip switches 12 and 13 are read in once when the device is started. A change of switch positions during operation is therefore not accepted until the next device start.

The operating mode is set with switch position 1-2

Function MODE	Pos.1	Pos.2	Note
Analog	OFF	OFF	Delivery condition
DMX	ON	OFF	
Piezo	OFF	ON	fixed colours + colour gradient
unassigned	ON	ON	

Notice: The functions under positions 1 and 2 can only be actively selected with the RGB control unit version. In the LED control unit version, the "Analog" function is always active regardless of position 1 and 2.

Position 3 determines whether input 9 "START/STOP" is to be used for a button or a latching switch:

Function	Pos.3	Note
Button	ON	the device switches for each signal pulse
latching switch	OFF	the device is switched as long as the signal is present

Position 4 determines whether a single-colour or an RGB button is connected to input 8 "LED".

Function	Pos.4	Note
Sensor button RGB	ON	Multicoloured visual feedback
Single-coloured sensor button	OFF	Single-coloured visual feedback

Position 5 determines whether the device works as MASTER or SLAVE in synchronous mode

Function	Pos.5	Note
SYNC Slave	ON	
SYNC Master	OFF	Delivery condition

Position 6 defines the BUS communication with the converter box via terminal connection 4.

Function	Pos.6	Note
BUS Master	ON	Control unit with converter box 3.0
BUS Slave	OFF	Normal operation

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Position 7 is unassigned.

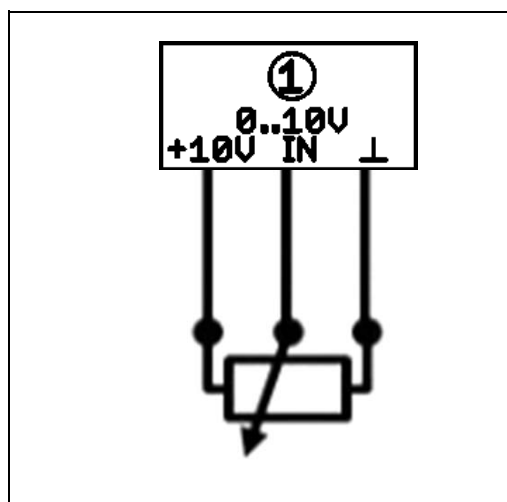
Position 8 defines the termination of the DMX bus.

Function	Pos.8	Note
DMX terminating resistor active	ON	Device identified as BUS terminal device
DMX terminating resistor inactive	OFF	

3.6 "Analog" control terminal

- Used to control the light intensity.
- The control function is always active for the LED-white control unit
- Or for the RGB control unit in operating mode
 - Analog
 - Piezo

The standard signal input 0...10V has the following connection terminals:

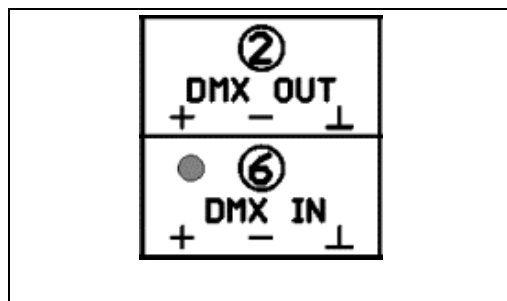


- 10V** Power supply voltage for potentiometer
IN Signal input
⊥ GND

Note:

- Min. potentiometer resistance value 1 kΩ - typically 100 kΩ (optional accessories)
- A defined signal must be present at signal input IN.
- Delivery condition: Wire jumper between IN and 10V

3.7 "DMX" control terminal



- +** Line "A" or "+"
– Line "B" or "–"
⊥ GND / shield
● DMX signal display
LED If the LED lights up, a DMX signal is present at the input


Note:

- The interface is electrically isolated
- For the bus installation, shielded cables twisted in pairs must be used. E.g. CAT6 network cable
- Ensure that the polarity of the bus connection is correct

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- If the polarity is reversed, the DMX signal display may light up!
- The DMX bus must be terminated at both ends with a line terminator. Make sure that the terminating resistor is activated correctly, see 3.4 Switch pos.8. Operation without correct BUS termination can lead to transmission errors.

3.7.1 DMX – Setting the start address

DMX 	0	1	2	3	4	5	6	7	8	9	A	B	C	E	E	F
DMX start address	1	1	16	31	46	61	79	91	106	121	136	151	166	181	196	211

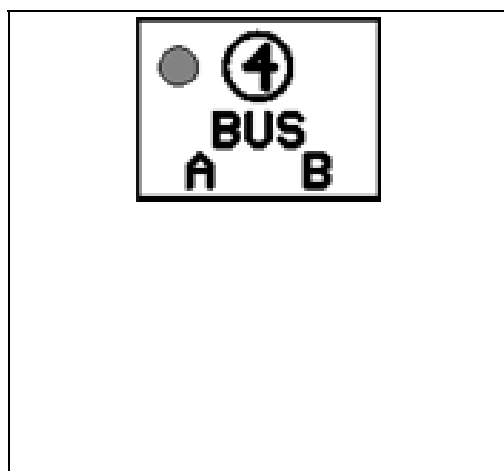
Note on switch position 0

- Variable, only on request
- DMX start address 1 default setting


3.7.2 DMX – Individual control of the LED spotlights

This is optionally available on request. Not included in the standard version.

3.8 "BUS" control terminal



A Line "A"
B Line "B"

 DMX signal display
LED If the LED lights up, a BUS signal is present

BUS BUS terminating resistor
TERM can be activated via jumper

Important in connection with the installation with the gateway

Interface for operation via BUS, for connecting **optional** extras, e.g. gateway or external sensor button via converter box 3.0, see section 4.6

Note:


- The connection is protected against polarity reversal
- BUS line as short as possible, max. line length 30 m

Note on BUS data line

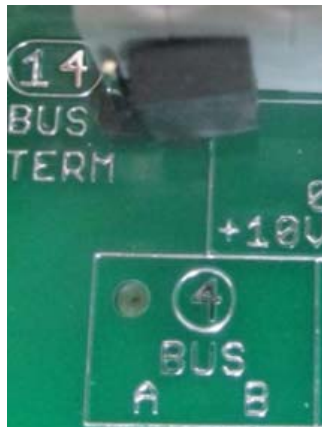
To ensure stable data communication between the bus participants, it is recommended to use a low-capacitance shielded data cable for field bus systems.



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3.8.1 BUS address setting

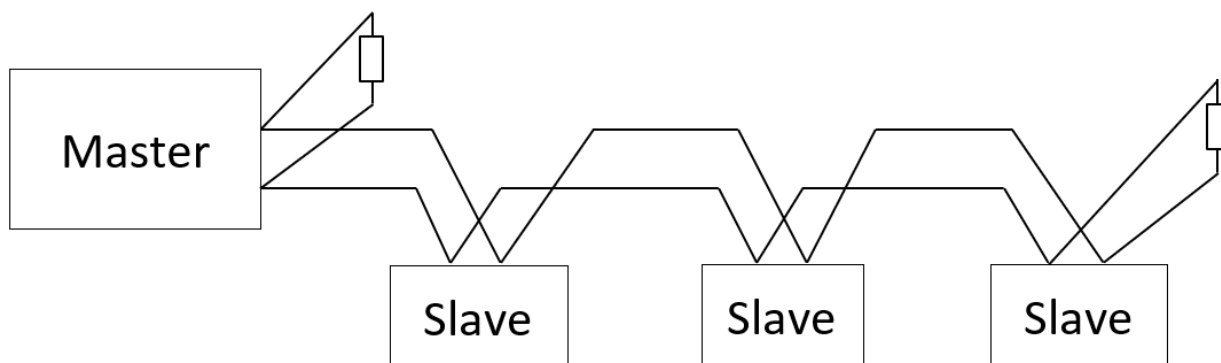
BUS 	0	1	2	3	4	5	6	7	8	9	A	B	C	E	E	F
BUS address	0x80	0x81	0x82	0x83	0x84	0x85	0x86	0x87	0x88	0x89	0x8A	0x8B	0x8C	0x8D	0x8E	0x8F

3.8.2 BUS terminating resistor



INACTIVE	ACTIVE
 Open contact	 Jumper set

If the LED control unit is connected to a MASTER, e.g. gateway, via the BUS, the bus line must be provided with a terminating resistor at the beginning and end. If the LED control unit forms the terminal device, the terminating resistor must be set here.



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3.9 DIAG system diagnosis button

A basic diagnosis is started via button 11 DIAG as follows:

- Basic diagnosis: brief push of the button (shorter than 5 s)

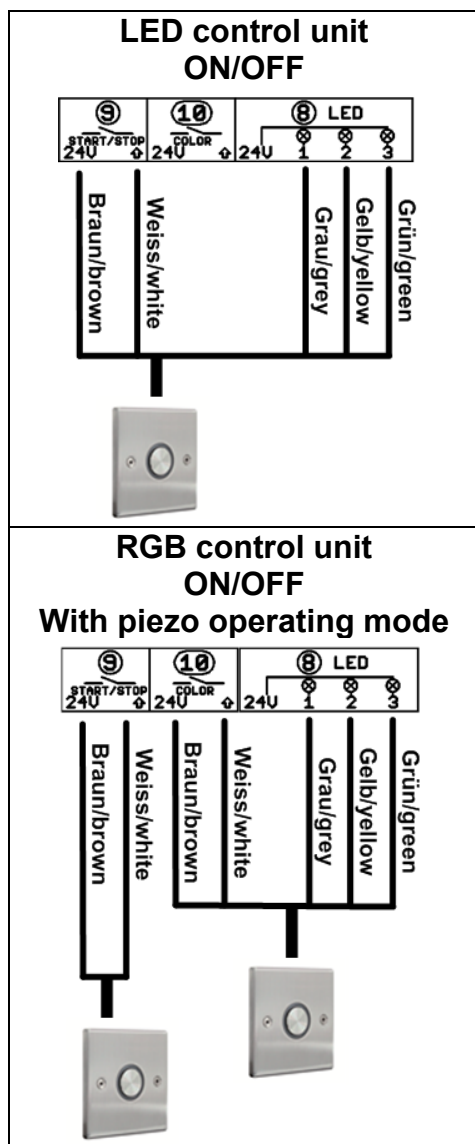
The diagnostic mode can be terminated at the end of the diagnosis by pressing the button again.

3.9.1 Basic diagnosis


The basic diagnosis includes the following procedure: After the start of the diagnosis, connected spotlights are searched for. The diagnostic LED 1 flashes during the spotlights search. After completion of the search, diagnostic LED 1 lights up permanently, diagnostic LED 2 flashes indicating the number of spotlights found. In addition, the spotlights are cyclically controlled alternating every 2 s as follows:

- white + red + green + blue
- white
- red
- green
- blue

3.10 Sensor button connection diagram



In the delivery state, the "Start/Stop" input 9

is switched via  DIP3 = OFF as a latching input.

Delivery condition: Wire jumper between 24 V and ↑

If "Start/Stop" input 9

is switched via  DIP3 = ON as a button input, then the spotlights can be switched ON/OFF via a potential-free sensor button.

For the LED-white control unit or analog operation, the sensor button illumination can be connected to LED1 as shown in the picture on the left. The switching operation is reported back.

For the RGB control unit, an RGB button can be optionally connected which visually reports back the spotlights colours.

In order to control the "Piezo" function of fixed colours and colour gradients, an additional sensor button must be connected to the "COLOR" input. The keying pulses at the "COLOR" input are used to switch between the individual moods.

Functional description, see section 4.1.3



The 27138 "Sensor button" operator's manual applies here

3.10.1 Sensor button - connection assignment

Wire colour	Functions
White	Switching contact S1
Brown	Switching contact 24 V
Grey	LED1
Yellow	LED2
Green	LED3

3.10.2 Sensor button - technical information

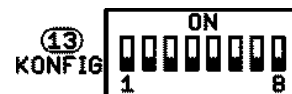
Effect of switching:	Pulse activated one time
Electrical function:	normally open / N/O contact
Electrical data:	I _{max} = 200 mA / U _B = 24 V DC

Subject to technical changes

4 Functional Description

4.1 Operating mode

The 3 possible operating modes are described below:



4.1.1 Analog input mode DIP1=OFF / DIP2=OFF

All LEDs of a spotlights are controlled with the same intensity. The intensity can be set



via the standard signal input. They are enabled via the "START/STOP" input according to the setting on dip switch 3 (latching/momentarily).

4.1.2 DMX mode DIP1=ON / DIP2=OFF

RGBW LEDs of a spotlights are controlled according to DMX. They are enabled via the "START/STOP" input according to the setting on dip switch 3 (latching/momentarily).

4.1.3 Piezo mode DIP1=OFF / DIP2=OFF

RGBW-LEDs of a spotlights are controlled according to the program selection. They are enabled via the "START/STOP" input according to the setting on dip switch 3 (latching/momentarily).



The program is selected via the keying pulse at the "COLOR" input.

The following programs are stored:

Program	1	2	3	4	5	6	7
Colour	Turquoise	Red	Yellow	Green	Light blue	Dark blue	Colour gradient

For the colour gradient, the colours are selected in sequence 1-6 one after the other. The idle time per colour is 120 sec and the fade time is 20 sec.

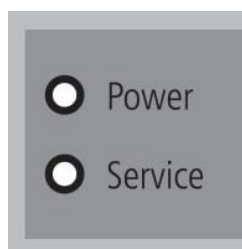
The RGB lighting of the sensor button connected to connection 8 shows the currently selected colour. In this case, the RGB lighting of the button flashes to indicate the selection of the colour gradient program.

For a sensor button with single-colour lighting, the button lighting is briefly dimmed when the colour change button is pressed if the dip switch is set accordingly.

Notice: Rotary and dip switches 12 and 13 are read in once when the device is started. A change of switch positions during operation is therefore not accepted until the next device start.

Subject to technical changes

4.2 LED display



The control unit on the front indicates the current device status. A green LED flashing once every second indicates that a device is ready for operation. The green LED is lit continuously when spotlights are active.

In the event of an error, the error is indicated by a flashing code on the red LED. The following errors are defined:

Error	Flash code	Cause
Internal error	1	
Excess temperature	2	Unit temperature exceeds shut-off temperature
Spotlights power supply module	3	Spotlights power supply does not supply voltage
Power supply module relay	4	Output relay does not switch

The flash code indicates how often the red LED flashes in succession.

If several errors are present at the same time, they are displayed one after the other. After the last error is displayed, the first active error is displayed again.

4.3 Synchronisation of several LED control units

The synchronisation bus is available for the operation of several control units with the same control signal. A device is operated as a MASTER to which the control signals are connected. The remaining devices are operated as SLAVE.

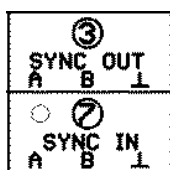
The MASTER [OFF] / SLAVE [ON] setting is configured via pos. 5



A SLAVE device uses only the brightness information from the synchronisation bus. Each LED control unit has one input and one output for synchronisation. This involves an RS485 bus. The input and output are connected in parallel and are therefore electrically equivalent.

An LED control unit can be configured as either a master or slave via DIP switch 5. Up to 32 slaves can be connected to one master. The total cable length of the synchronisation cable should not exceed a total length of 30 m. For longer lengths, a 120 ohm termination must be provided at both ends of the synchronisation bus.

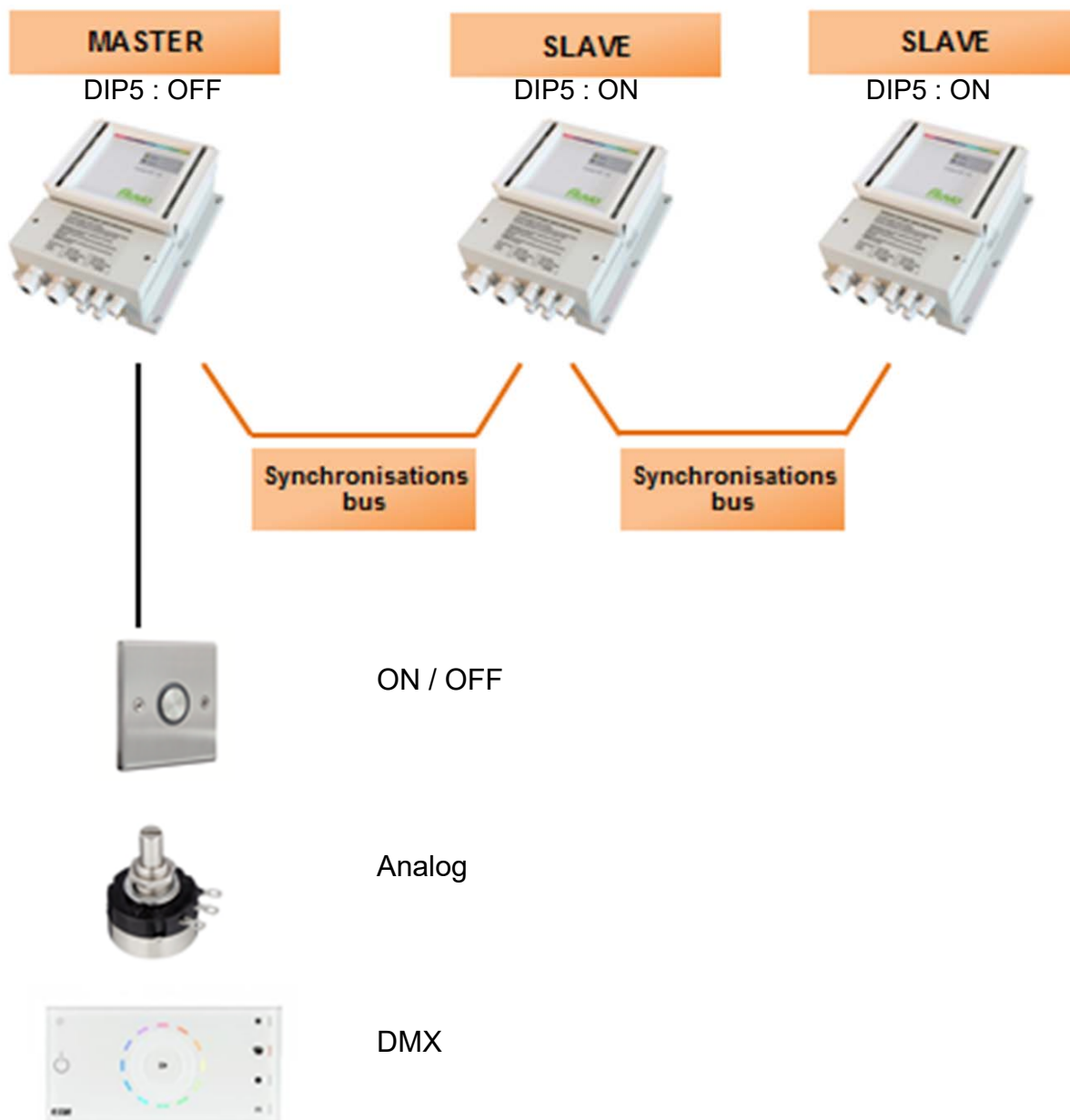
The following terminal connections must be made for synchronous operation of several control units:



SYNC A => SYNC A
 SYNC B => SYNC B
 SYNC GND => SYNC GND

The terminal groups "IN" and "OUT" are connected in parallel on the printed circuit board and are therefore equivalent.

Subject to technical changes



4.4 Individual control of the RGB spotlights

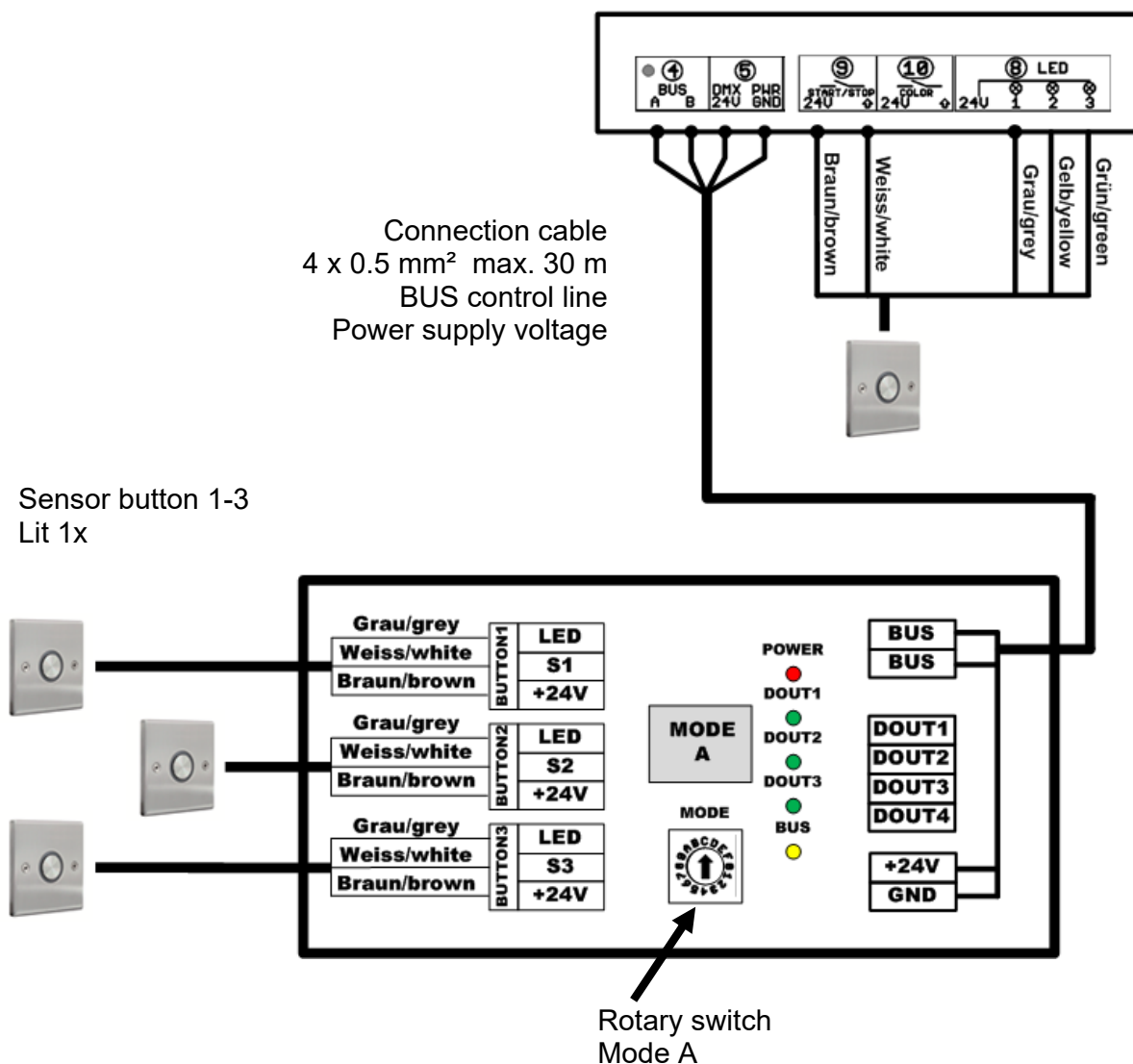
This is optionally available on request. Not included in the standard version.

4.5 Colour light control with customer-specific DMX control unit

The coloured light can be controlled via a customer-specific DMX control unit, e.g. central house control. Several different DMX receivers, e.g. pool lighting, room and hall lighting, can be connected to each other via the DMX bus. The termination of the DMX bus terminating resistor must be set correctly. Whether a signal is present at the DMX-IN input terminal is visible via the diagnostic LED in the terminal compartment.

Subject to technical changes

4.6 External sensor button via converter box 3.0



Sensor buttons connected to the converter box (optional accessory) behave in the same way as the ON/OFF sensor buttons connected to the control unit. The total of four possible buttons are OR-linked to each other. When a sensor button is confirmed, all connected sensor buttons give visual feedback, provided they are illuminated.

The button lighting lights up when the spotlights are ON and light up.

It is unlit when spotlights are OFF.

The LEDs go out during the blocking time.





In the connected converter box, the LED display and digital outputs DOUT1 to DOUT3 show the following status of the switch box:

DOUT4 is switched when spotlights are switched on.

The status of the digital outputs DOUT1 to DOUT3 is displayed via the green LEDs in the converter box. The output is then active when the green LED lights up.

Subject to technical changes

Configuration

	<p>Control unit setting:</p> <p>Position 6: ON Function: BUS Master</p> <p>Position 3: ON Function: Button</p>
	<p>Converter box 3.0 setting</p> <p>Rotary switch: MODE A Requirement: SW 0.23 or higher</p>
<p>BUS LED </p>	<p>The communication between converter box and switch box is active when the <u>yellow</u> BUS-LED in the converter box lights up.</p>
<p>POWER LED </p>	<p>The 24V operating voltage is applied in the converter box when the <u>red</u> POWER LED lights up. The converter box is ready for operation.</p>

The LuchsNT LED control unit is connected to the converter box via a 4-wire cable.

BUS: two wires, any polarity.

Power supply voltage: two wires

If the converter box is connected with mode A, no further bus subscribers can be connected.

External buttons via the converter box can also be connected in the synchronous mode of several control units. The connection is made to the SYNC-MASTER device.

Subject to technical changes

5 Luchs-NT RGB and LED-white spotlights

5.1 Standard



Operation only possible together with LuchsNT control unit.

Dimensions / connection cable / type of installation are the same for LED-white and RGB.

Connection cable

- 2-wire sheathed cable
- Standard length 3 m; other lengths on request
- Cable outer diameter \varnothing 5.80 mm
- Wire cross-section 1.5 mm² / AWG24
- Colour code of cable wires

red -> Power supply voltage VCC +

black -> Power supply voltage GND –

- Maximum electrical power per spotlights 33 W



The spotlights must only be operated under water

- The spotlights is fitted with temperature protection.

Subject to technical changes

6 Installation of LuchsNT lighting unit

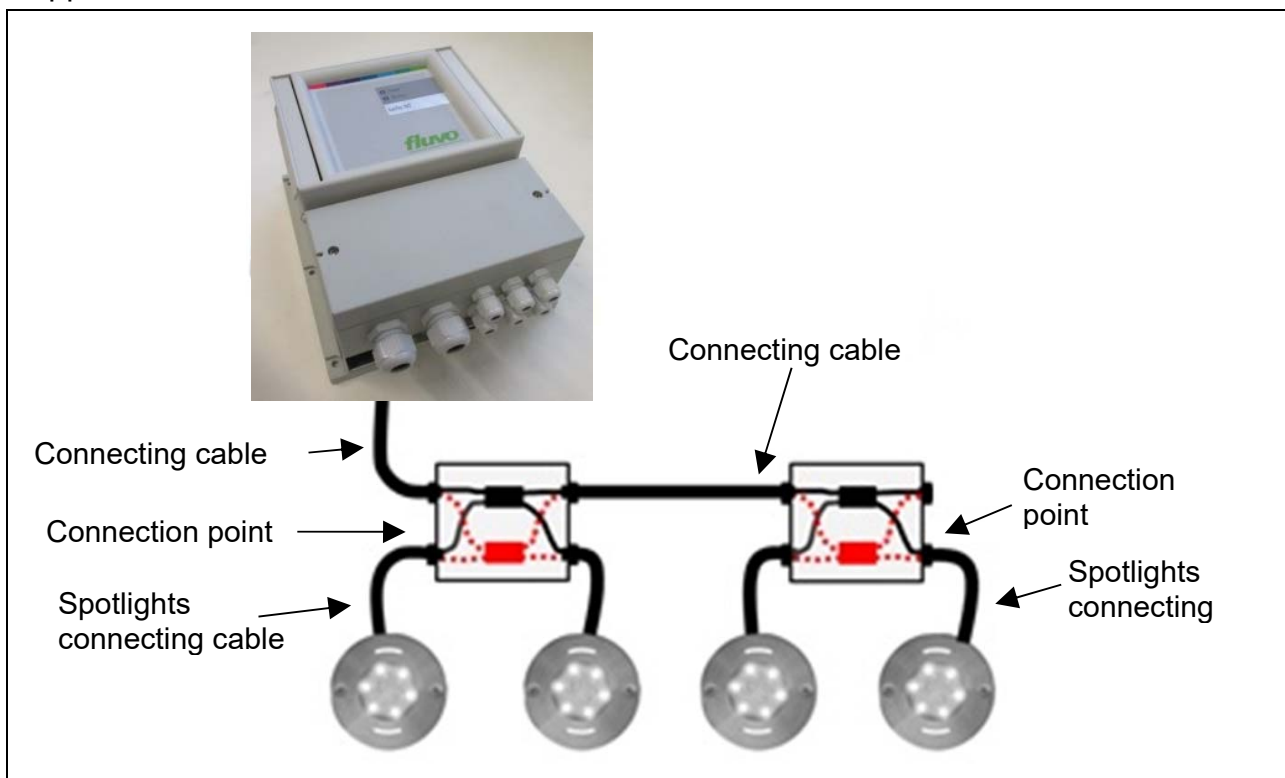
6.1 Installation instructions

The connecting cable between spotlights and LED control unit, as well as connectible control lines, is a communication cable. It is essential to ensure that power supply cables and communication cable are separated. In addition to the requirements for ensuring the electric separation of the systems in accordance with DIN VDE 0100-520 "Wiring Systems", electromagnetic interference must also be taken into account. In order to avoid interference, observe the specifications for communication cabling according to DIN EN 50173 and DIN EN 50174 (VDE 0800-174).

**The maximum cable length between spotlights and LED control unit is 30m.
Pay attention to the cable cross-section.**

6.2 Spotlights – LED control unit connecting cable

Applies to LED-white and LED-RGB



Connecting cable

Cable length <10 m cable cross-section 2.5 mm²

Cable length >10 m cable cross-section 4.0 mm²

Spotlights connecting cable

3 m / 10 m / 20 m with cable cross-section 1.5 mm²

Subject to technical changes

7 Technical data

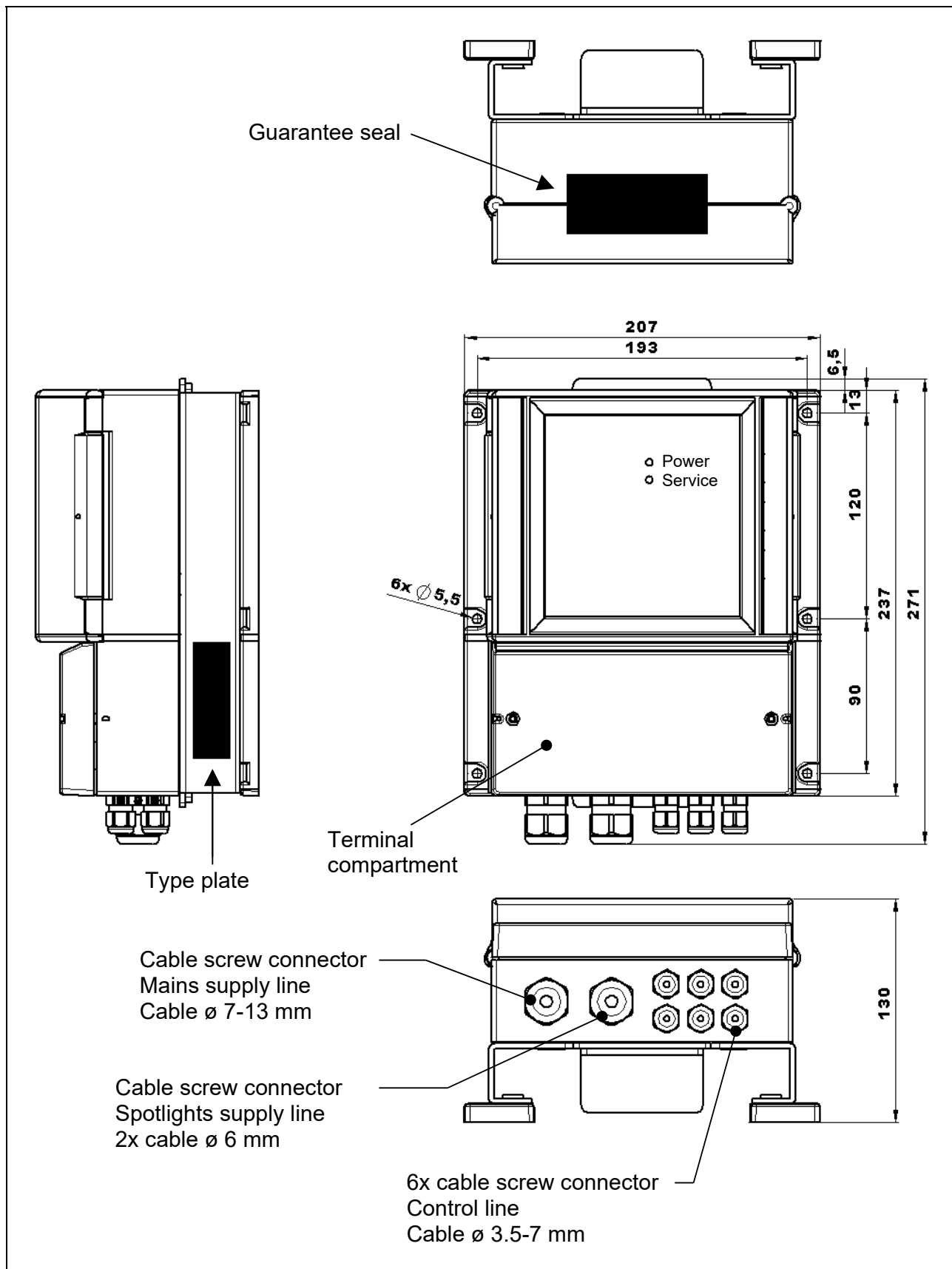
7.1 Technical specification

Dimensions max. W x H x D (in mm)	205 x 130 x 270
Weight	approx. 3.2 kg
Mains input (L, N, PE)	
Nominal voltage U_{in}	230 V AC, 50 Hz 1~
Input voltage range U_N	100 ... 264 V AC 50/60 Hz
Nominal input current $I_{N \max.}$	1.5 A for 230 V AC or 2.2 A for 115 V AC
Standby power /standby losses	5 W
Output (0 V, 24 V)	
Nominal voltage U_{out}	24 V DC SELV
Output current $I_{out \max.}$	5.5 A / 8.5 A
Efficiency type	90 %
Protection and monitoring	
Mains input fuse F1	T1.6 (250V)
Current limitation	continuously short-circuit proof
Overload-proof	yes
Open-circuit proof	yes
Excess temperature	Power derating $T_{amb} > 50^\circ\text{C}$ Shut-off $T_{amb} > 70^\circ\text{C}$
Safety	
Output:	VDE 0805/EN60950/IEC950
Protection class	Safety extra-low voltage SELV Class I
EMC	
	EN55011 EN61000-6-1
Ambient temperature	
Operation	-30°C to +50°C
Storage	-40°C to 70°C
Degree of protection	IP65 Only if unused cable screw connections are sealed with plugs
Mains / LED connection terminals	
Rigid cable cross-section	max. 4.0 mm ²
Flexible cable cross-section with ferrule	max. 2.5 mm ²
Feedback /control contact connection terminals	
Rigid cable cross-section	0.5 ... 1.5 mm ²
Flexible cable cross-section with ferrule	0.5 ... 1.0 mm ²
Piezo button	
Voltage on button and LED	22.5 ... 25.5 V DC
Switching threshold for button	10 ... 14 V DC
LED current	max. 30mA DC
Display	
LED – GREEN	Operation
LED - RED	Service

Subject to technical changes

7.2 Dimensions

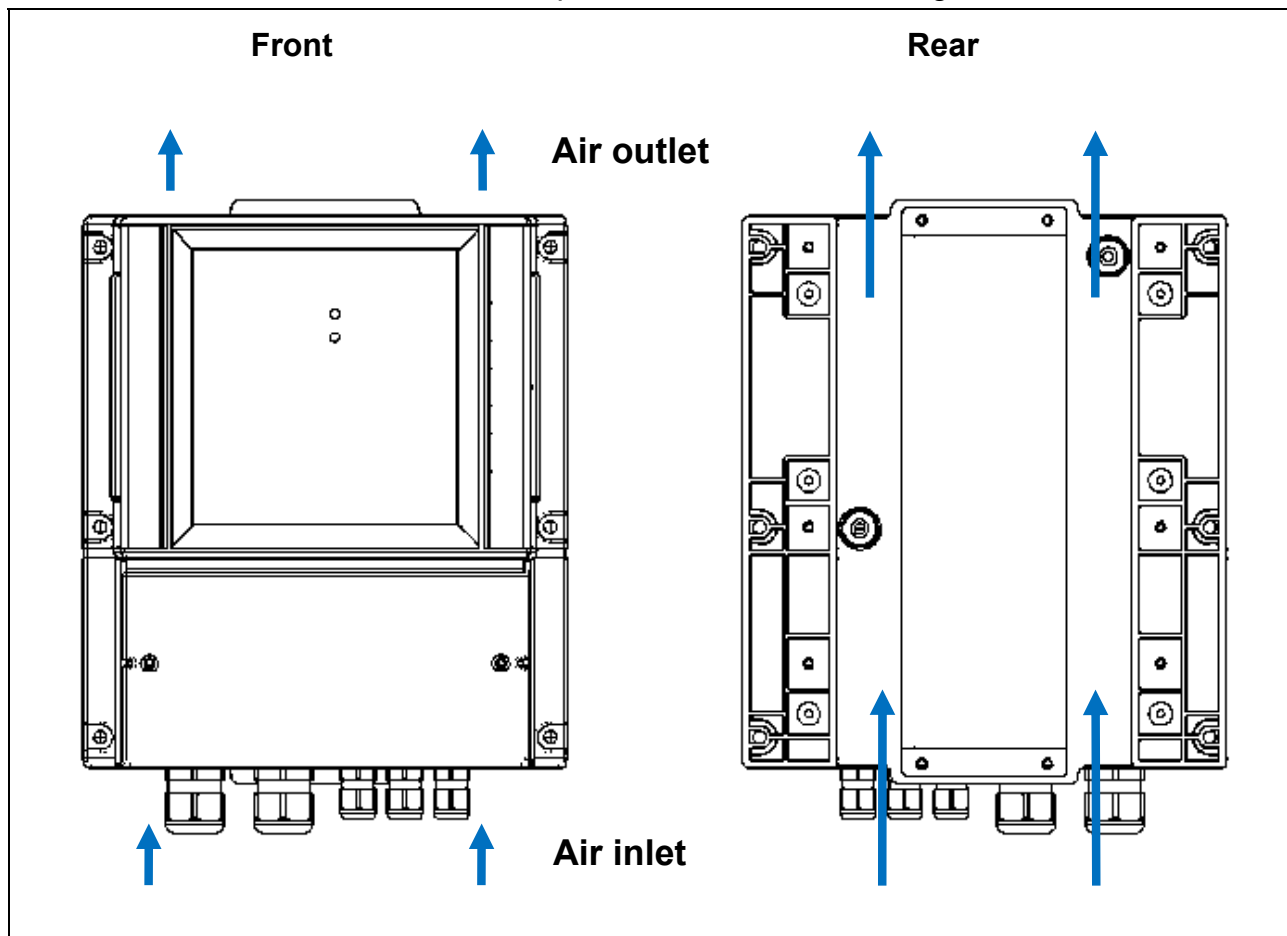
Dimensions in mm



Subject to technical changes

7.3 Device installation

The LuchsNT control unit was developed for direct wall mounting.



Mounting space

Mounting position: Wall mounted

It is crucial to observe the proper installation position in order to ensure optimum cooling. A clearance of at least 50 mm must be maintained below and above the power supply. The air intake temperature at the underside of the device must not exceed the values given in the technical data.


Optional accessories

Adapter plate for DIN rail mounting

Subject to technical changes

7.4 Type plate

For position of type plate see section 7.2

RGB-Steuereinheit / RGB Control Box LuchsNT			
Art-Nr.	98748		
Un[V AC]	1~ 230	Pout [W]	200
f [Hz]	50	Uout [V DC]	24 SELV
In[A AC]	1,5A	Iout [A DC]	8,5A
RM.-NR.	xxxxxxxxxx	LG xx	
Luft-T[°C]	50	IP65	

Un = nominal voltage
In = nominal current
Luft-T = max. ambient temperature

Pout = max. output power
Uout = output voltage
Iout = max. output current



HW = Hardware version
SW = Software/firmware version
SN = Serial number

7.5 Guarantee seal

For position of guarantee seal, see section 7.2



If the guarantee seal is destroyed, the guarantee and manufacturer's warranty shall be rendered null and void.

All setting options are located in the freely accessible terminal compartment.

Subject to technical changes

[illegible]

25

[illegible]

27



Importer:
Certikin International Ltd
4 Tungsten Park
Colletts Way
Witney
Oxfordshire, OX29 0AZ
United Kingdom
www.certikin.co.uk

Manufacturer:

Schmalenberger GmbH + Co. KG
Strömungstechnologie
Im Schelmen 9 – 11
D-72072 Tübingen / Germany

Phone: +49 (0)7071 70 08-0
Fax: +49 (0)7071 70 08-10
Internet: www.fluvo.de
E-mail: info@schmalenberger.de