

Control Box Control NT

GB

Operator's Manual

Translation of the original



27248 - C

Table of contents

| | | |
|----------|---|-----------|
| 1 | Introduction | 3 |
| 1.1 | General Information | 3 |
| 1.2 | Safety Instructions | 3 |
| 2 | Functional Description | 4 |
| 2.1 | Functional Variants | 4 |
| 2.2 | Operating Display | 4 |
| 2.3 | Runtime Limiting, Time lag relays | 5 |
| 2.4 | Piezo Button/Sensor button, Latching switch, Pneumatic Button (pressure wave mode) | 5 |
| 2.5 | Calibrating the Pneumatic Button | 5 |
| 2.6 | Current Monitoring | 6 |
| 2.7 | 1-Phase and 3-Phase Operation | 6 |
| 2.8 | Fault Message | 6 |
| 2.9 | Additional function | 6 |
| 2.9.1 | External sensor button | 6 |
| 2.9.2 | Function 2-way valve (BESGO) | 7 |
| 3 | Wall Installation with Dimensions | 8 |
| 4 | Connections and settings | 9 |
| 4.1 | Mains / Pump Connection Terminal | 9 |
| 4.2 | Connection Terminals for Control and Feedback Contacts | 9 |
| 4.2.1 | Feedback contact | 10 |
| 4.2.2 | Control contacts | 10 |
| 4.2.3 | Adjustable functions | 10 |
| 4.3 | Terminal compartment disconnection | 11 |
| 4.4 | Configuration using DIP switches | 12 |
| 4.5 | Installation Instructions | 12 |
| 4.6 | Connection diagrams | 13 |
| 4.6.1 | Connection diagram 1~ mains 230V AC | 13 |
| 4.6.2 | Connection diagram 3~ mains 400V AC | 14 |
| 4.6.3 | Connection diagram 3~ mains 230V AC | 15 |
| 4.6.4 | External sensor button connection diagram | 16 |
| 5 | Technical Data | 17 |
| 6 | Nameplate | 18 |
| 7 | Service / notes | 19 |



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.

1 Introduction

The Control NT is an independent control box designed for switching 1-phase and 3-phase pumps and swimming pool attractions. Depending on how the device is designed, the actuator can be an external switching contact and a piezo button or a pneumatic button, run-time-limited shutoff is optionally possible. The device status is displayed by two operating LEDs with output via two floating feedback contacts.

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 operating instructions
- consider the operating instructions to be part of the product
- keep the operating instructions in a safe place throughout the service life of the product
- forward the operating instructions to each successive owner or user of the product
- ensure that all additions that are received are inserted into the operating instructions
- 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 operating instructions, all claims under warranty shall be void. The manufacturer cannot accept any liability for resulting consequential damages.

- The device must only be used when it is in flawless technical condition.
- If serious operating problems occur, disconnect the system from the electrical power source.
- 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.

Subject to technical changes

- The housing cover may only be opened by the manufacturer. (guarantee seal)
- In the event of a malfunction we recommend contacting the manufacturer.

Caution:

- 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.

2 Functional Description

The control box can be used to switch a 1-phase or 3-phase pump on and off.

2.1 Functional Variants

The following functions can be selected when the device is ordered:

- | | |
|--|-----------------------|
| • Sensor button / Piezo button and latching N/O contact | Basic function |
| • Pneumatic button (pressure wave mode) | additional option |
| • Runtime Limiting, Time lag relays | additional option |

The functions are available individually or they can be combined. For enabled functions please refer to the nameplate. For details see section 6.

2.2 Operating Display

Two LEDs on the front of the control box indicate the current device status. The green operating LED flashes four times per second immediately after the device starts. The application starts after five seconds and the green LED flashes once per second. When this happens the control box is ready for operation.

The green LED is lit continuously when the pump is active. A red flashing service LED indicates a malfunction..

| | | |
|-------|---------|---|
| Green | POWER | Mains power ON: LED flashes 4x per second After 5 seconds the LED flashes 1x per second -> control box is ready for operation Continuously lit: control box running |
| Red | SERVICE | Flashing for malfunction |

2.3 Runtime Limiting, Time lag relays

The control box can be used for runtime-limited switching off of a 1-phase or 3-phase pump. The runtime (1 - 60 minutes) can be determined with a potentiometer in the terminal compartment. Adjusting the potentiometer while the pump is running has no effect on the runtime that has started. The modified runtime will not be used until the next time the pump starts. When the pump is running, relay output 1 "Pump on" is active.

2.4 Piezo Button/Sensor button, Latching switch, Pneumatic Button (pressure wave mode)

A floating switching contact (for example a piezo button), latching switch or a pneumatic button **must** be used as the actuator to switch the pump on and off. The two actuators are equal in priority and can be used individually or together depending on what is enabled. A latching switch is connected to the same terminal as a piezo button. The functionality can be configured with DIP switch 6 (see section 4.4).

An output for lighting is provided for the piezo button. It is on outside of the pump disable time and off during pump disable time. When pressure is applied to the piezo button or the pneumatic button, the lighting flashes briefly. This feedback function is deactivated in state as supplied, but it can be activated with DIP switch 5 (see section 4.4). The pump can be turned on with the actuators. The pump can optionally be switched off after the runtime elapses or after pressure is applied to the actuator again. After the pump is switched off a disable time of 2 seconds is active. The pump cannot be activated again until after the disable time elapses.

2.5 Calibrating the Pneumatic Button

Semi-automatic calibration of the control unit pressure input is provided to be able to use different pneumatic buttons and hoses of different lengths. At the time of delivery the control unit is set for maximum sensitivity to be able to reliably evaluate pneumatic buttons with small volume used together with long hoses.

Calibration of the pneumatic button input is performed by 5 activations within a time window of 15 seconds.

The sensitivity can be reset to the setting at the time of delivery (for example after replacing the pneumatic button or extending the hose).

To do this follow these steps:

- Disconnect the power to the control unit
- Disconnect the piezo button and bridge the terminals for the piezo button to the control unit
- Supply the control unit with electrical power and wait for the following LED pattern: At first the green LED flashes quickly (four times per second). Then the red LED is lit for five seconds. After the five seconds elapse, the red LED goes out. The sensitivity is now reset to the setting at the time of delivery. The control unit does not respond until after a restart on the piezo and pneumatic button.
- Disconnect the power to the control unit, remove the bridge and reconnect the piezo button.

2.6 Current Monitoring

When the pump is active the phase currents are monitored for overcurrent and undercurrent. Current monitoring is performed in accordance with IEC 60947-4-1. The set rated current can be found on the nameplate. Undercurrent monitoring checks whether the current drops below the minimum current for a minimum time. If an overcurrent or undercurrent error is detected, the pump is switched off, the red fault LED is lit and relay output 2 "Malfunction" is active. After a malfunction the pump cannot be activated again until the control box has been reset by disconnecting the mains power.

2.7 1-Phase and 3-Phase Operation

The control box distinguishes between 1-phase and 3-phase operation. This means that control boxes that are programmed for 1-phase operation can **not** be used for 3-phase operation and vice versa. For programming instructions please refer to the nameplate and see section 6.

When the setting is "1 phase", the other two phases are checked for an impermissible current. If the measured current of phases V and W exceeds the set minimum current for the set minimum duration, an overcurrent error is triggered for phases V and W.

When the setting is "3 phases", all three phases are checked for the minimum current. If this measured value exceeds the set minimum current, an undercurrent error is triggered.

2.8 Fault Message

Display: Red LED flashing

Signal contact: closed

| | | Possible causes |
|---|--------------------|--|
| 1 | Overcurrent error | <ul style="list-style-type: none"> - Phase current $I > \text{rated current } I_N$ (see nameplate) - 3-phase motor on 1-phase control box - Phase error |
| 2 | Undercurrent error | <ul style="list-style-type: none"> - Phase current $I < 0.3 \text{ A}$ - 1-phase motor on 3-phase control box - Phase error |



After operational reliability is ensured and malfunctions are rectified, the control box fault message can be reset by disconnecting the mains power.

2.9 Additional function

2.9.1 External sensor button

When using a converter box 3.0, additional sensor buttons can be connected. This functionality can be activated via DIP switch 4. (see chap. 4)

Requirement for the function "external sensor button":

- Switch box NT with SW 0.47 and higher (see Nameplate, chapter 6)
- Converter box 3.0 with SW 0.23 and higher
- Converter box 3.0 **must** be supplied via an external 24V DC voltage source with $I_{min}=100mA$.





Sensor buttons connected to the converter box behave in the same way as the sensor buttons connected to the switch box. The total of four buttons that are now available are linked to each other with a logical OR. If a sensor button is activated, visual feedback of all connected sensor buttons is given if they light up. The LEDs go out during the blocking time.

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

| Switch box status | Converter box output | ● LED converter box | ○ LED converter box |
|-------------------|----------------------|---------------------|---------------------|
| Pump ON | DOUT1 | Active | Inactive |
| Malfunction | DOUT2 | Active | Inactive |
| Enable | DOUT3 | Active | Inactive |

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.

Configuration

| | |
|---|--|
|  | Requirement: SW 0.47 or higher Master mode: DIP4 ON |
|  | Requirement: SW 0.23 or higher BUS mode: MODE A |
| BUS-LED  | The communication between converter box and switch box is active when the <u>yellow</u> BUS-LED in the converter box lights up. |
| POWER-LED  | 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. |

The switching device and the converter box are connected via the "BUS" connections with a two-wire cable. The polarity is arbitrary.

In this case no other bus participants can be connected apart from the converter box.

See connection diagram, section 4.6.4

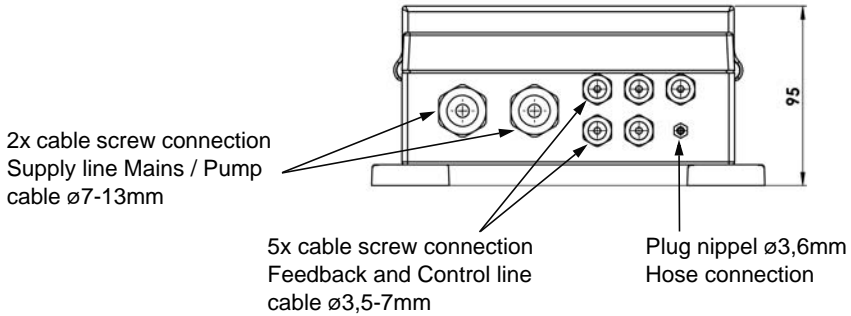
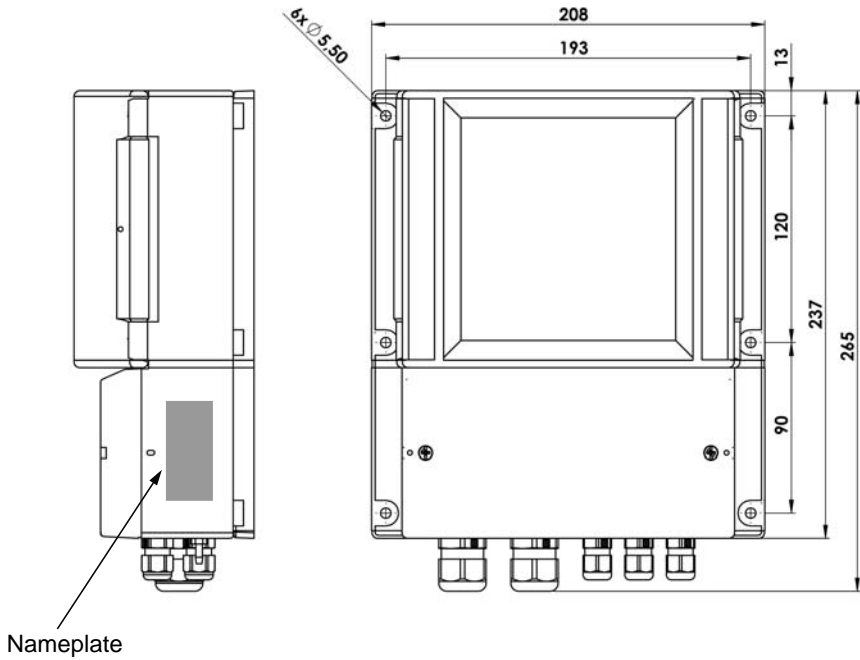
Also observe the Operator's Manual 27251 "Converter Box 3.0"

2.9.2 Function 2-way valve (BESGO)

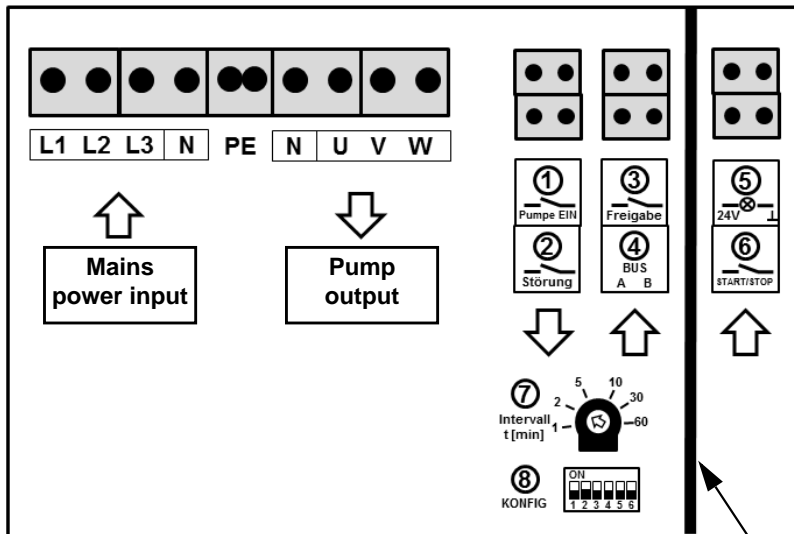
→ see supplement 27265

Subject to technical changes

3 Wall Installation with Dimensions



4 Connections and settings



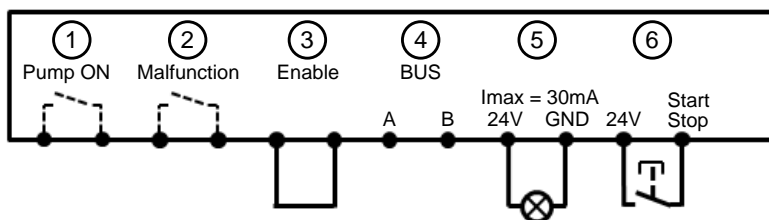
Terminal compartment disconnection

4.1 Mains / Pump Connection Terminal

| | |
|-------------------|----------------------|
| L1, L2, L3, N, PE | 3~ Mains power input |
| U, V, W, N, PE | 3~ Pump output |

| | |
|-----------|----------------------|
| L1, N, PE | 1~ Mains power input |
| U, N, PE | 1~ Pump output |

4.2 Connection Terminals for Control and Feedback Contacts



Floating switching contact



4.2.1 Feedback contact

| | | |
|---|-----------------------|--------------------------------------|
| 1 | Pump ON | Floating N/O contact (Relay contact) |
| 2 | Malfunction / service | Floating N/O contact (Relay contact) |

Note: Outputs 1 and 2 can be used for both mains power and low voltage (e.g. 24V). If one of the two outputs is used for the mains voltage, the other output must **not** be used for low voltage.

4.2.2 Control contacts

Decive enable

| | | |
|---|--------|---|
| 3 | Enable | Input for a floating latching switching contact, for example Shutter control. The switching device is active when the contact is closed. In state as supplied the contact is "closed" with a wire bridge. |
|---|--------|---|

Note: Input 3 must not be connected with the mains voltage or with low voltage. It may only be connected with a floating switching element.

BUS connection



| | | |
|---|----------------|--|
| 4 | BUS A BUS B | Interface für Betrieb via Bus. Connection is protected against polarity reversal. For address setting see section 4.4. |
|---|----------------|--|

Button and latching N/O contact

| | | |
|---|--------------------|---|
| 5 | 24V ⊥ | Connection terminals for button lighting. Configurable, see section 4.4 Pos.5. OFF - LED lit continuously ON - Flash 3x when the device switches The factory setup is OFF |
| 6 | 24 V START/STOP | Connection terminal for piezo buttons or latching N/O contact. Both switching contacts must always be floating. For activation see section 4.4. |

4.2.3 Adjustable functions

Runtime and configuration of DIP switches

| | | |
|---|---|--|
| 7 | Interval  | Potentiometer for setting the runtime (1 - 60 minutes) |
| 8 | CONFIG  | DIP switches for setting the device address and switch functionality. See section 4.4. |

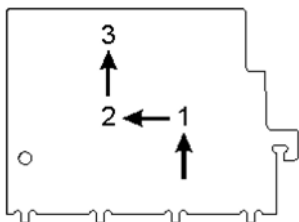
4.3 Terminal compartment disconnection



Safety instruction:

A terminal chamber disconnect is provided for the connection area of the piezo button. It is designed to prevent loose connecting lines from setting the piezo button under mains voltage.

The terminal chamber disconnect is inserted and can be removed for easier wiring as follows:

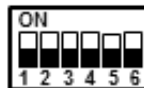


Terminal compartment disconnection

Installation is in the opposite order.

4.4 Configuration using DIP switches

The device bus address is set with the switches items 1 - 4



| Hexadecimal adress | item 1 | item 2 | item 3 |
|--------------------|--------|--------|--------|
| 0x50 | OFF | OFF | OFF |
| 0x51 | ON | OFF | OFF |
| 0x52 | OFF | ON | OFF |
| 0x53 | ON | ON | OFF |
| 0x54 | OFF | OFF | ON |
| 0x55 | ON | OFF | ON |
| 0x56 | OFF | ON | ON |
| 0x57 | ON | ON | ON |

From SW ≥ 0.47 and higher (for identification, see Nameplate)

Position 4 defines whether a converter box is connected for connecting additional sensor buttons. In this case the switch box assumes the role of the BUS master and queries the converter box independently.

| Function | item 4 | Note |
|-------------------|--------|------------------------|
| Switch box slave | OFF | Normal operation |
| Switch box master | ON | with converter box 3.0 |

Note: Communication possible from converter box 3.0 with SW 0.23 and higher

Item 5 determines whether the LED output is continuously energised or is used as a feedback output for the piezo button input:

| Function | item 5 | Note |
|-------------------|--------|-----------------------------------|
| Feedback inactive | OFF | LED lit continuously |
| Feedback active | ON | Flash 3x when the device switches |

Item 6 defines whether input 6 "Button mode" will be used for a button or for a latching switch:

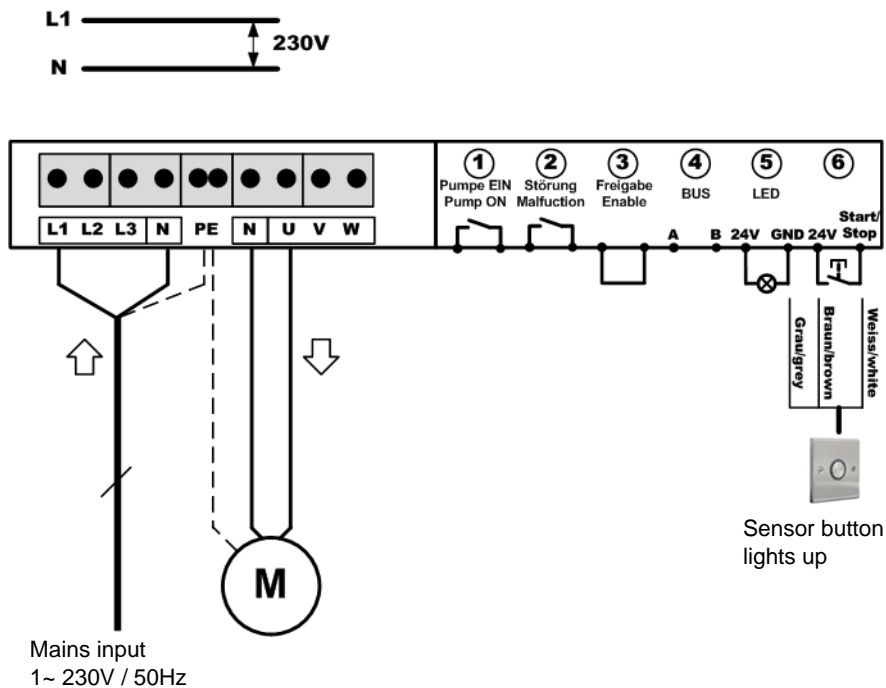
| Function | item 6 | Note |
|-----------------|--------|--|
| Button | OFF | The device switches with every signal pulse |
| Latching switch | ON | The device switches as long as the signal is present |

4.5 Installation Instructions

- Provide a 0.03 A FI circuit breaker in the mains power supply line.
- For the fuse see the identification on the cover of the terminal box.

4.6 Connection diagrams
4.6.1 Connection diagram 1~ mains 230V AC

For 1~ mains 230V AC



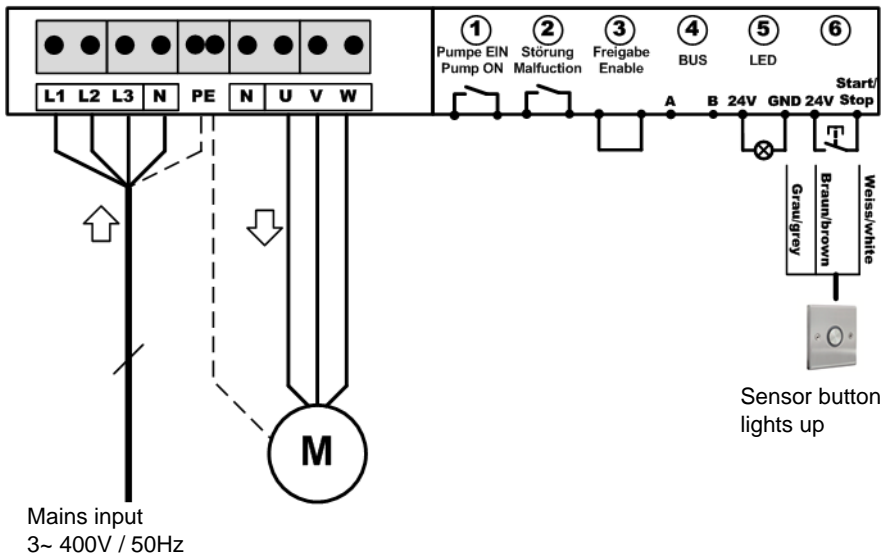
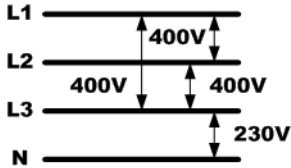
Attention!

The operating voltage between L1 and N is 230V!

Higher voltages can destroy the device.
Smaller voltages can lead to malfunctions.

4.6.2 Connection diagram 3~ mains 400V AC

For 3~ mains 400V AC



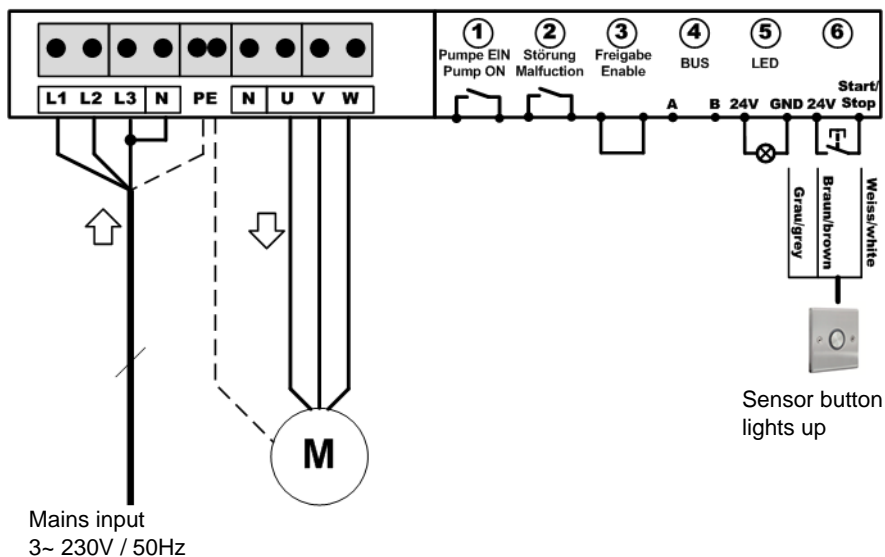
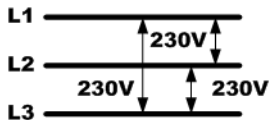
Attention!

The operating voltage between L1 and N is 230V!

Higher voltages can destroy the device.
Smaller voltages can lead to malfunctions.

4.6.3 Connection diagram 3~ mains 230V AC

For 3~ mains 230V AC



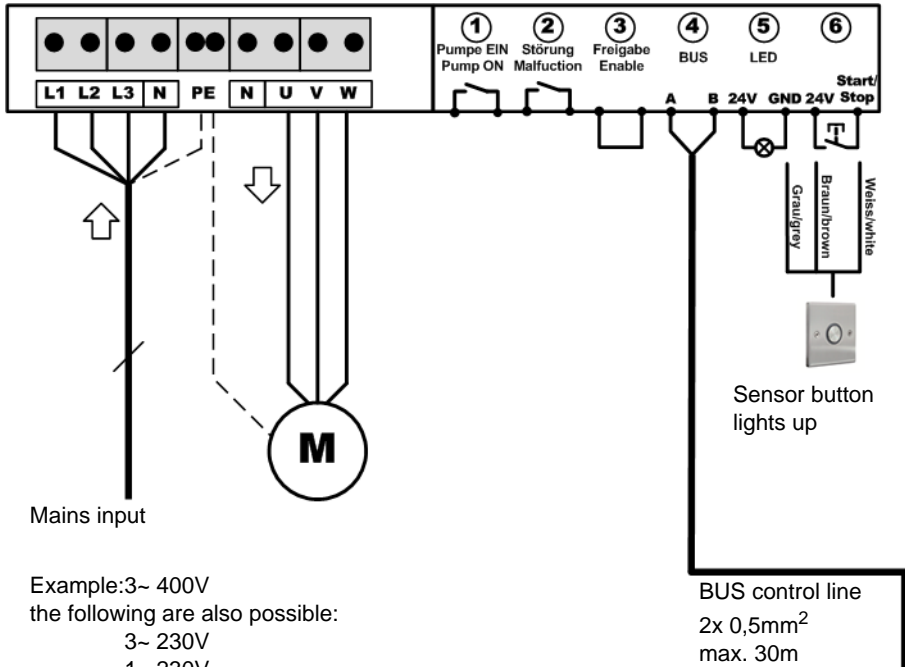
Attention!

The operating voltage between L1 and N is 230V!

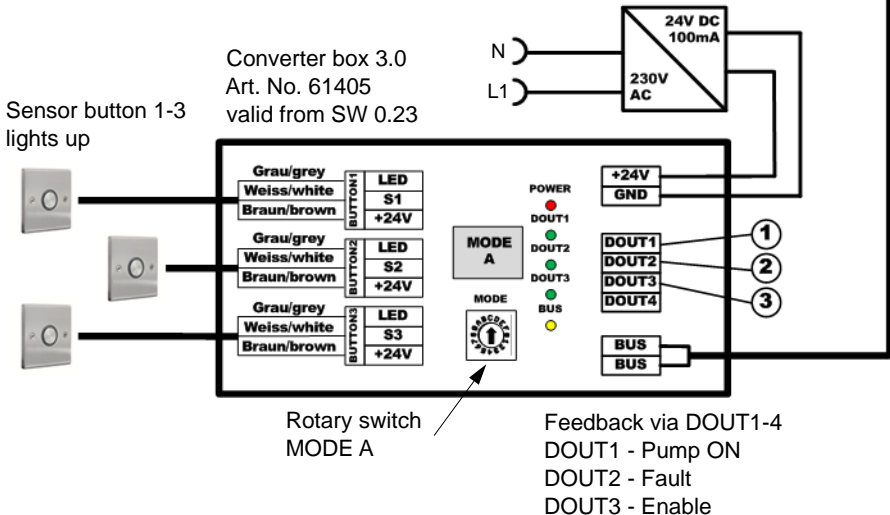
Higher voltages can destroy the device.
Smaller voltages can lead to malfunctions.

4.6.4 External sensor button connection diagram

Requirement: SW 0.47 or higher



Example: 3~ 400V
 the following are also possible:
 3~ 230V
 1~ 230V



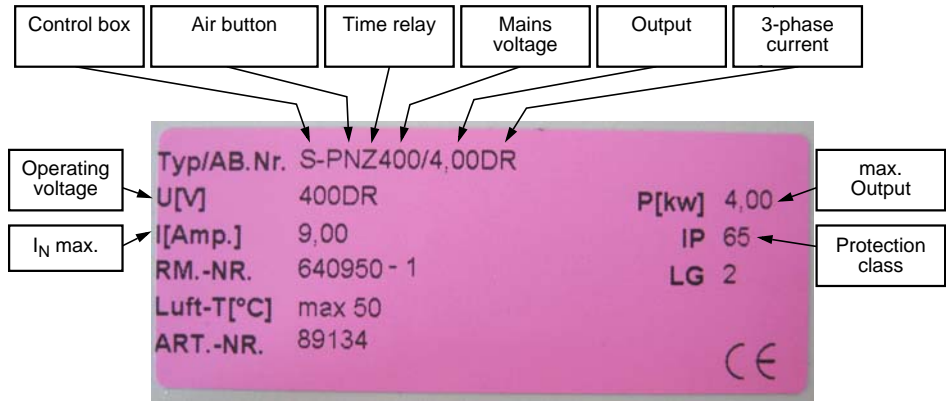
5 Technical Data

| Parameter | | | Comments |
|--|---------|---------------------|--|
| Dimensions | [mm] | 270 x 205 x 95 | |
| ENVIRONMENT | | | |
| Ambient temperature | [°C] | - 25 ... + 55°C | Only if unused cable screw connections are sealed with plugs |
| Degree of protection | | IP65 | |
| POWER SUPPLY | | | |
| Mains voltage | [V AC] | 207 ... 276V AC | with 1-phase operation with 3-phase operation |
| | [V AC] | 360 ... 480V AC | |
| Mains frequency | [Hz] | 45 ... 65Hz | |
| PUMP OUTPUT | | | |
| Rated current | [A] | see nameplate | Limit value for undercurrent error |
| Minimum current | [A AC] | 0,3A AC | |
| Duration for undercurrent error | [s] | 60 | |
| Disable time | [s] | 2 | |
| RELAY OUTPUTS | | | |
| Switching voltage | [V AC] | max. 276V AC | „Pump on“ und „Malfunction“ |
| Switching current | [A AC] | max. 3A AC | |
| PIEZO BUTTON | | | |
| Voltage on button and LED | [V DC] | 22,5 ... 25,5V DC | |
| Switching threshold for button | [V DC] | 10 ... 14V DC | |
| LED current | [mA DC] | max. 30mA DC | |
| AIR BUTTON | | | |
| Hose length | [m] | max. 20m | Rubber hose inside diameter \varnothing 2,25x1mm |
| Male coupling for hose connector | | \varnothing 3,6mm | |
| Mains / Pump CONNECTION TERMINALS | | | |
| cross-section rigid | | max. 4,0 qmm | |
| cross-section flexible | | | |
| with end splice | | max. 2,5 qmm | |
| CONNECTION TERMINALS for Control and Feedback | | | |
| Contacts | | | |
| cross-section rigid | | 0,5 - 1,5 qmm | |
| cross-section flexible | | | |
| with end splice | | 0,5 - 1,0 qmm | |
| OVERCURRENT MONITORING | | | |
| IEC 60947-4-1 | | CLASS 10 | |

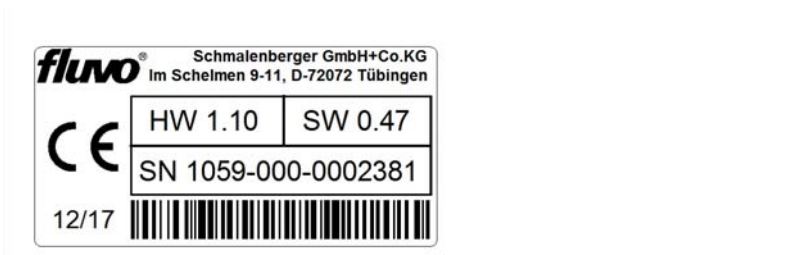
Subject to technical changes

6 Nameplate

For position of nameplate see section 4



| Abbreviation for functional enable: | |
|-------------------------------------|--------------------------------------|
| S = Control box | DR = 3~ phases L1 / L2 / L3 / N / PE |
| PN = Air button | AC = 1~ phase L1 / N / PE |
| Z = Time relay | IN = Rated pump current |
| E = External / piezo | PN = Rated motor power |
| BESGO = 2-way valve | |



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

7 Service / notes

| Who | When | What |
|------------|-------------|-------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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

© 2018 Schmalenberger GmbH + Co. KG; All rights reserved

Manual is subject to changes

Control box Control NT

Version: 27248 - C