fluvo®
innovative schwimmbadtechnik

schmalenberger
strömungstechnologie

Converter box 3.0

GB

Operator´s Manual

Translation of the original

27251 – D

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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

1.1 Warranty notice

The entire system or parts of it are not suitable for use in other systems. The function of the entire system in combination with other systems or components can not be guaranteed. Accordingly, we explicitly instruct you only to use such parts or the entire system for their intended purpose.
Failure to comply with the information provided in this operator's manual voids all claims under warrantee.

1.2 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

1.3 Usage Instructions

The converter box 3.0 also serves as a safety isolating element and for evaluating button pulses especially for the sensor button. The signal output is via several digital outputs, an analog output or via BUS.
The main task of the converter box 3.0 is to ensure a safe isolation between the button connections (buttons 1-3) on one side and the digital and analog and Vcc connections on the other side. This serves to ensure safe and reliable operation of the sensor buttons in the swimming pool.
In addition to the safety function, other operating modes are also implemented with the converter box 3.0.

1.4 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 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.
- A protective and isolating device must be provided for turning off the power supply voltage.
- 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.
- In the event of a malfunction, we recommend contacting the supplier.
- If cables or lines are extended, the isolation between the low-voltage cable and the data line must be observed in accordance with DIN VDE 0100-502 to prevent disruptive effects.

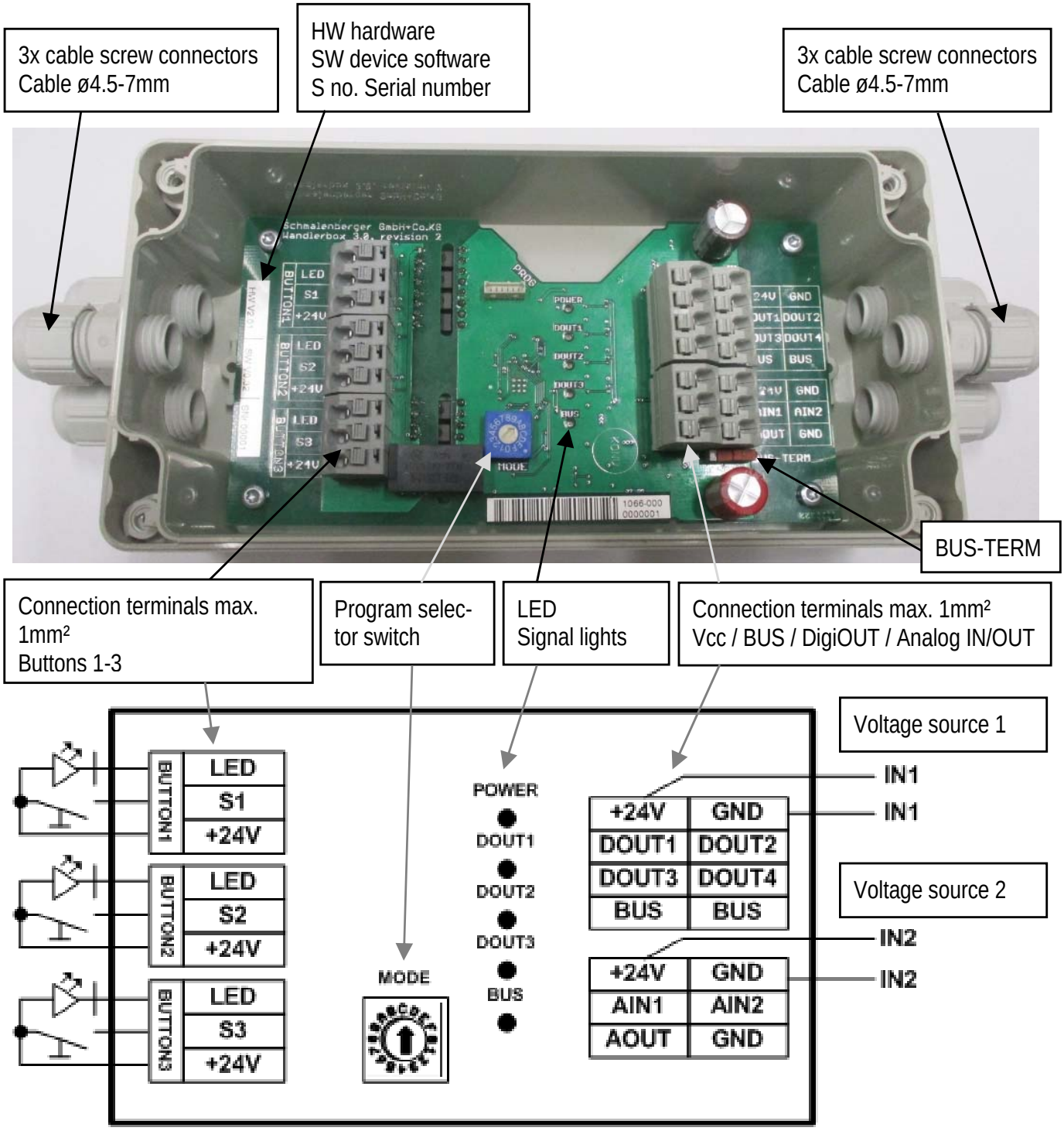
Caution:

- 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.

Definition of abbreviations used

FU - Frequency inverter (German Frequenzumrichter), drive controller, speed-controlled pump
GSA - Counter-current system

2 Device overview



BUS-TERM Terminating resistor for bus system
Slide switch active/inactive Delivery state A → inactive

Connection terminals:

Connection terminals 0.5….1mm² / 20..18AWG

Buttons 1-3 …….	Buttons 1-3, U_{out}= approx. 24 V / I_{max}= 20 mA
Mode ……..	Program selector switch with 15 positions
LED power ……	Operating light
LED-Dout 1-3 ……	Signal light, output terminal Dout 1-3 active
LED bus ……	BUS active
+24V (IN1)……..…	Connection of voltage source 1 for 24V DC ±10% I_{max}=150mA
+24V (IN2)……..…	Connection of voltage source 2 for 24V DC ±10% I_{max}=150mA

The two +24V terminals are used only for the power supply. The +24V terminals are not daisy-chained. They are only separated by a diode. The diode serves as mutual protection against differences in potential.

GND ……..	Earth
DOUT 1-4 ……..…	Digital outputs approx. U_{out}=24V I_{max}=20mA Short-circuit and overload-proof
BUS/BUS ……..…	Data bus with reverse polarity protection
AIN1 + AIN2 ……	Digital / analog input U_{in}=max. 24V Digital mode: High U > 14V, Low U < 11V
AOUT ……	Analog output 0-10V I_{max}=20mA

2.1 Operating modes / BUS address

The device has 15 operating modes that can be set with a 

rotary switch in the device.
The different operating modes are described in the pages that follow.

Overview of operating modes:

0) Non-latching mode
1) ANALOG (3 buttons) LED
2) Compact BUS
3) Compact DIGI
4) ANALOG (1 button) LED
5) Latching mode
6) ANALOG (1 button) RGB
7) ANALOG (3 buttons) RGB
8) Signal out (passive slave)
9) ~
A) Bus address 0x60 (active slave)
B) Bus address 0x61 (active slave)
C) Bus address 0x62 (active slave)
D) Bus address 0x63 (active slave)
E) Bus address 0x64 (active slave)
F) Bus address 0x65 (active slave)

Modes 0 – 7 are MASTER functions
Modes 8 and A – F are SLAVE functions

Passive slave – signal output only
Active slave – signal input and output

Mode 0 – non-latching mode

The button pulses (buttons 1-3) are generated as output pulses (DOUT1-3).

Keying pulse on S1 causes:

- a voltage pulse to Dout1.
- LED display Dout1 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S2 causes:

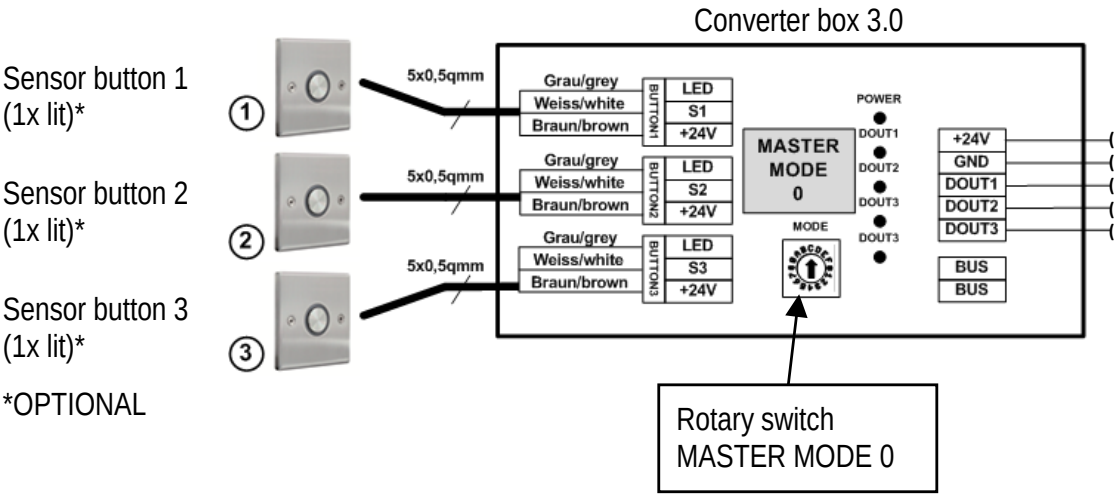
- a voltage pulse to Dout2.
- LED display Dout2 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S3 causes:

- a voltage pulse to Dout3.
- LED display Dout3 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Function - single button

Connection diagram of the switching unit with 3 individual sensor buttons and a 5-pin connection cable



Subject to technical changes

Mode 1 – THREE-button control (1-colour) with analog signal

The button pulses (buttons 1-3) cause an incremental change to analog output AOUT. A 1-colour button provides visual feedback.

Keying pulse on S1 causes:

- A change to AOUT (rising)
- LED display Dout1 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S2 causes:

- A change to AOUT (falling)
- LED display Dout2 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S3 causes:

- Start/stop – activation/deactivate of AOUT
- LED indicator for Dout3 is lit with AOUT active
- Button lighting: flashes 2x, then lit continuously

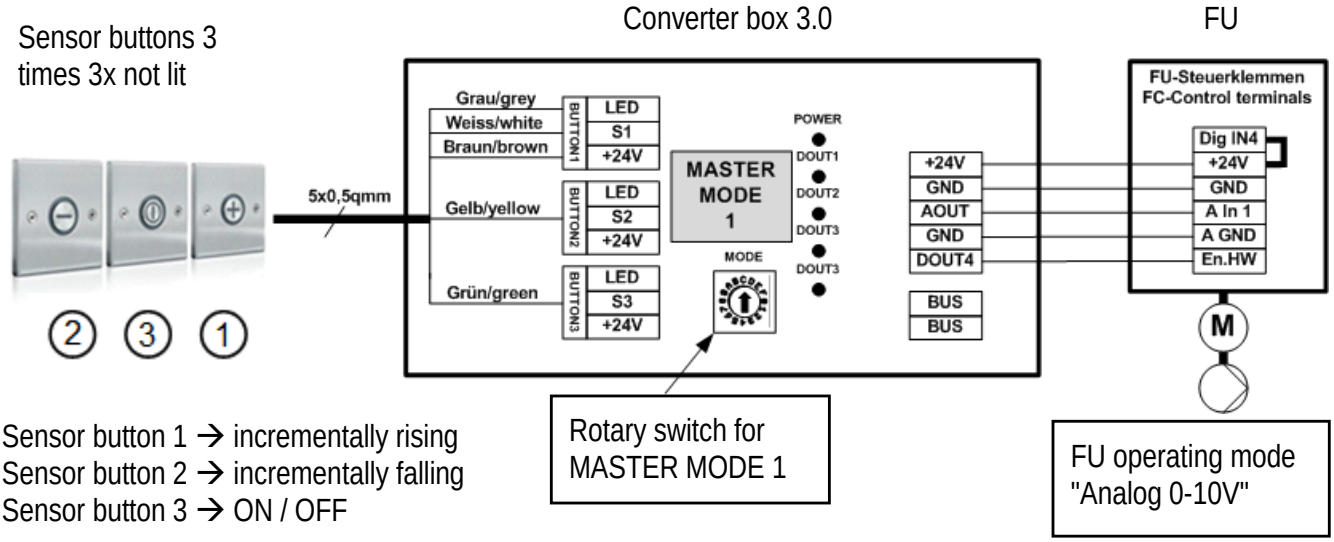
When a 1-colour lit button is connected, optical feedback (flashing) is generated when it is activated.

AOUT: Starting voltage 4V control range 4 / 5 / 6 / 7 / 8 / 9 / 10V

Dout4: ON when AOUT is active / ON when AOUT 0V and non-active (enable)

X-JET function - switching unit

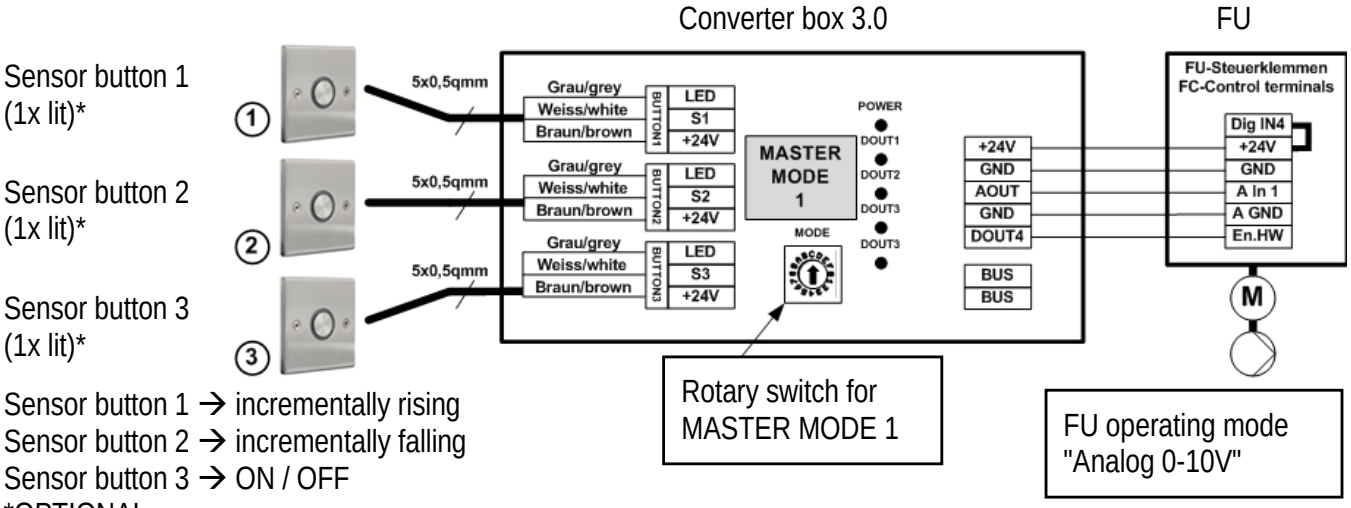
Connection diagram of the switching unit with 3 sensor buttons and a 5-pin connection cable



Sensor button 1 → incrementally rising
Sensor button 2 → incrementally falling
Sensor button 3 → ON / OFF

Function - single button

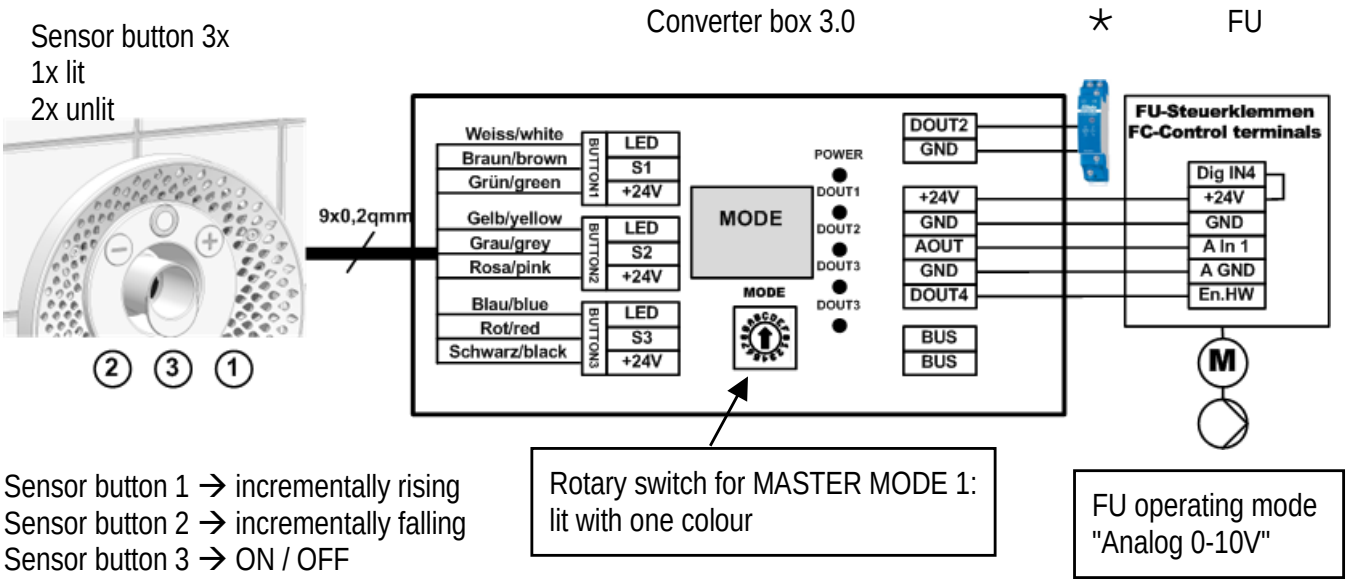
Connection diagram of the switching unit with 3 individual sensor buttons and a 5-pin connection cable



Sensor button 1 → incrementally rising
Sensor button 2 → incrementally falling
Sensor button 3 → ON / OFF
*OPTIONAL

Function of XANAS switching unit with 3 sensor buttons

Connection diagram of the switching unit with 3 sensor buttons and a 9-pin connection cable



Sensor button 1 → incrementally rising
Sensor button 2 → incrementally falling
Sensor button 3 → ON / OFF

✶Air valve control:

If AOUT is active, a pulse combination to S2 (2 pulses within 0.5sec) causes digital output DOUT2 to be activated.

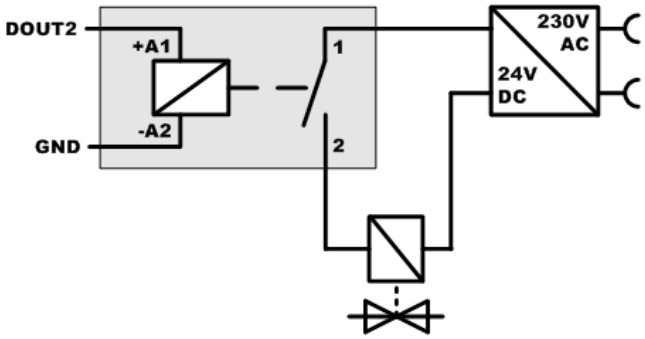
DOUT2 can be set to inactive again with

a) S3 – system OFF
b) Pulse combination to S2 (2 pulses within 0.5 sec)

Switching output of Dout2: 24V DC Imax = 20mA DC

To be able to switch an air valve with a higher electrical output, a multi-function relay item no. 55323 can be connected to DOUT2.

Connection diagrams – air valve control



Mode 2 – compact BUS

Function x-jet compact, 3 buttons, control of two NT control boxes via bus addresses 0x50 and 0x51

Keying pulse on S1 causes:

- Start control box with ADR 0x50
- LED display Dout1 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S2 causes:

- Start control box with ADR 0x51
- LED display Dout2 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S3 causes:

- Switching off all control boxes with ADR 0x50 and 0x51
- LED indicator for Dout3 is lit with AOUT active
- Button lighting: flashes 2x, then lit continuously

Functional Description
Control box assembly group item no. 89270
Connection diagram 100 006 270NT

Mode 4 – ONE-button control (1-colour) with analog signal

The button pulses (button 1 or 3) cause an incremental change to analog output AOUT. A 1-colour button provides visual feedback.

Analog output AOUT is controlled by **one** button.
A keying pulse on S1 or S3 causes:

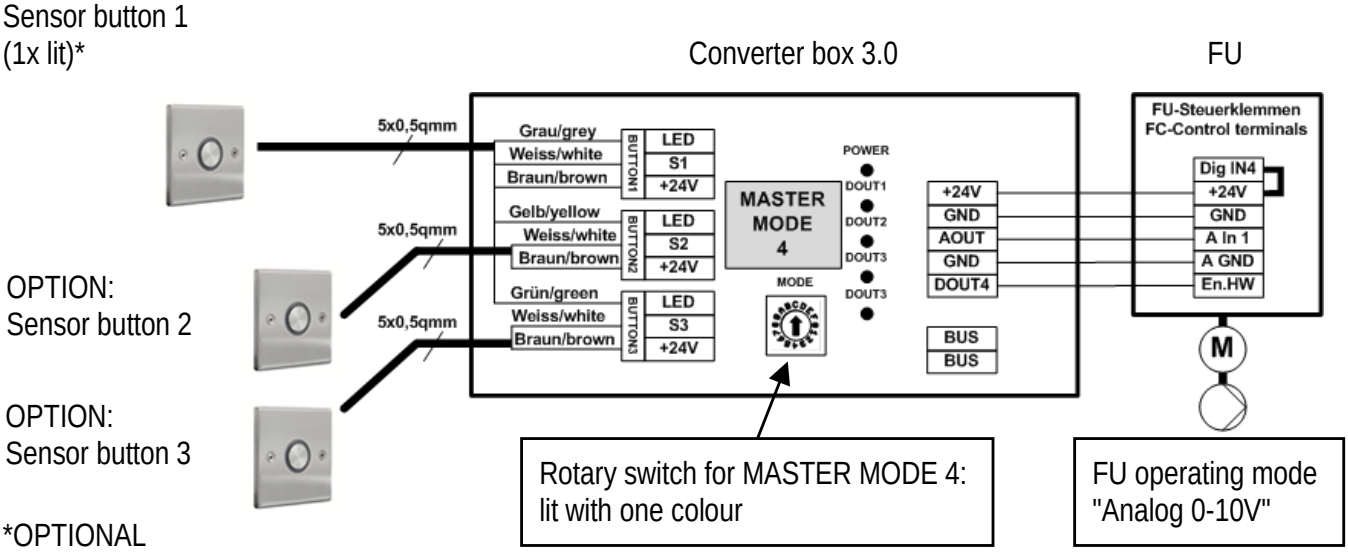
1) A progressive change in AOUT 0 / 4 / 5 / 6 / 7 / 8 / 9 / 10V
2) LED display Dout1 lights up when pressed.
3) Button lighting: flashes 2x, then lit continuously

When a lit button is connected, optical feedback (flashing) is generated when it is activated.
A keying pulse to S2 causes: Stop / deactivation of AOUT
Dout4: ON when AOUT is active / OFF when AOUT 0V and non-active (enable)

Function with FU

The analog signal controls an FU with speed control via analog regulation 0-10V. The hardware enable of the FU is via DOUT4.

Connection diagram for sensor button with 5-pin connection cable.



Main function via sensor button 1
ON → AOUT: 4V - 5V - 6V - 7V - 8V - 9V - 10V - 0V (OFF)
ON → DOUT4: active OFF → DOUT4: inactive

OPTIONAL:
Sensor button 2: OFF button → AOUT=0V / DOUT4=inactive
Sensor button 3: Switching function similar to sensor button 1

Mode 5 – latching mode

The button pulses (buttons 1-3) are generated as a latching signal (DOUT1-3).

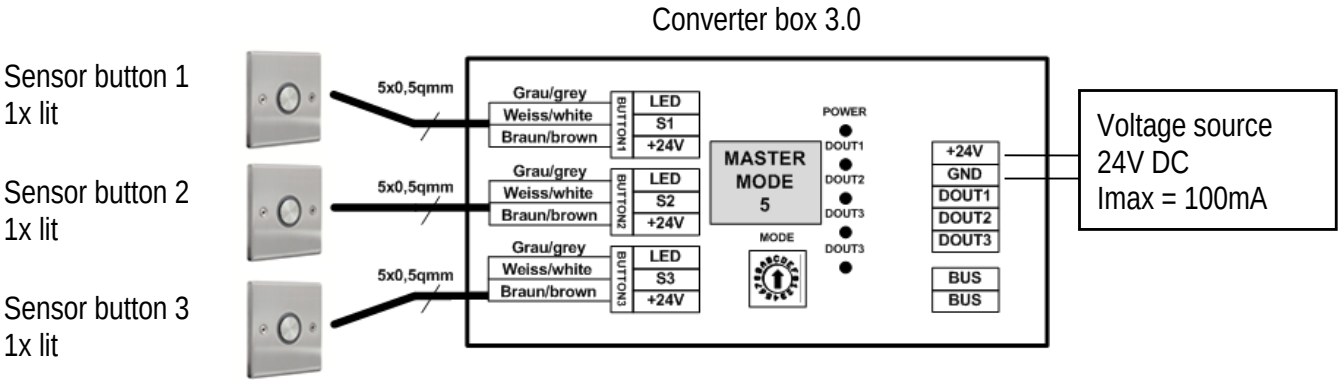
Keying pulse on S1 causes:
- Switch Dout1 on or off.
- LED display Dout1 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S2 causes:
- Switch Dout2 on or off.
- LED display Dout2 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S3 causes:
- Switch Dout3 on or off.
- LED display Dout3 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Function with FU

Connection diagram for sensor button with 5-pin connection cable.



Subject to technical changes

Mode 6 – ONE-button control (3-colour) with analog signal

The button pulses (buttons 1-3) cause an incremental change to analog output AOUT. A 3-colour button provides visual feedback.

Analog output AOUT is controlled by **one** button.
A keying pulse on S1 or S3 causes:

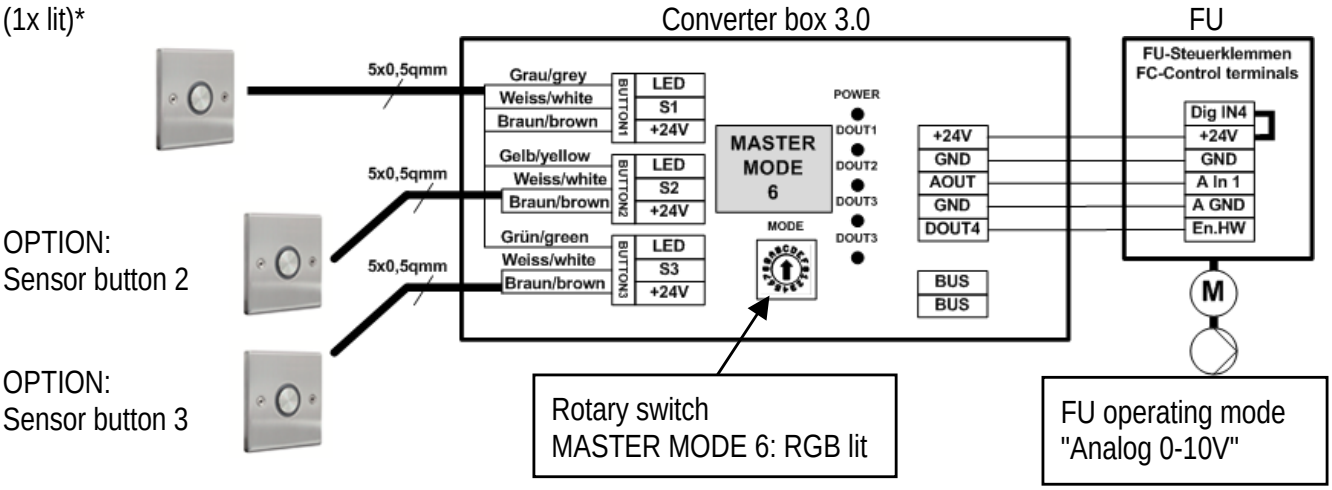
1) A progressive change in AOUT 0 / 4 / 5 / 6 / 7 / 8 / 9 / 10V
2) LED display Dout1 lights up when pressed.
3) Button lighting: flashes 2x, then lit continuously

When an RGB button is connected, optical feedback (flashing + modified colour display) is generated when it is activated
A keying pulse to S2 causes: Stop / deactivation of AOUT
Dout4: ON when AOUT is active / OFF when AOUT 0V and non-active (enable)

Function with FU

The analog signal controls an FU with speed control via analog regulation 0-10V. The hardware enable of the FU is via DOUT4.

Connection diagram for sensor button with 5-pin connection cable.



*OPTIONAL

Main function via sensor button 1
ON → AOUT: 4V - 5V - 6V - 7V - 8V - 9V - 10V - 0V (OFF)
ON → DOUT4: active OFF → DOUT4: inactive

OPTIONAL:
Sensor button 2: OFF button → AOUT=0V / DOUT4=inactive
Sensor button 3: Switching function similar to sensor button 1

Mode 7 – THREE-button control (3-colour) with analog signal

The button pulses (buttons 1-3) cause an incremental change to analog output AOUT. A 3-colour button provides visual feedback.

Analog output AOUT is controlled by three buttons S1/S2/S3.
Keying pulse on S1 causes:

- A change to AOUT (rising)
- LED display Dout1 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

Keying pulse on S2 causes:

- A change to AOUT (falling)
- LED display Dout2 lights up when pressed.
- Button lighting: flashes 2x, then lit continuously

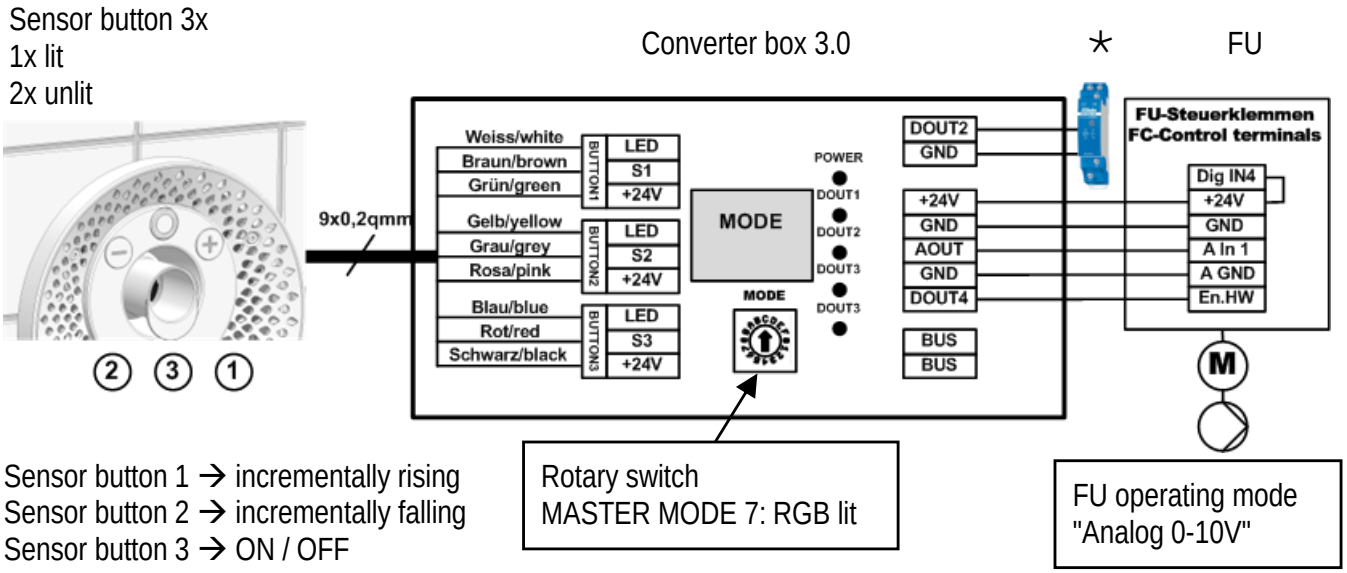
Keying pulse on S3 causes:

- Start/stop – activation/deactivate of AOUT
- LED indicator for Dout3 is lit with AOUT active
- Button lighting: flashes 2x, then lit continuously

When a 3-colour button is connected, optical feedback (flashing + modified colour display) is generated when the button is activated
AOUT: Starting voltage 4V control range 4 / 5 / 6 / 7 / 8 / 9 / 10V
Dout4: ON when AOUT is active / ON when AOUT 0V and non-active (enable)

Function of Xanas switching unit with 3 sensor buttons

Connection diagram of the switching unit with 3 sensor buttons and a 9-pin connection cable



✶Air valve control:

If AOUT is active, a pulse combination to S2 (2 pulses within 0.5sec) causes digital output DOUT2 to be activated.
DOUT2 can be set to inactive again with

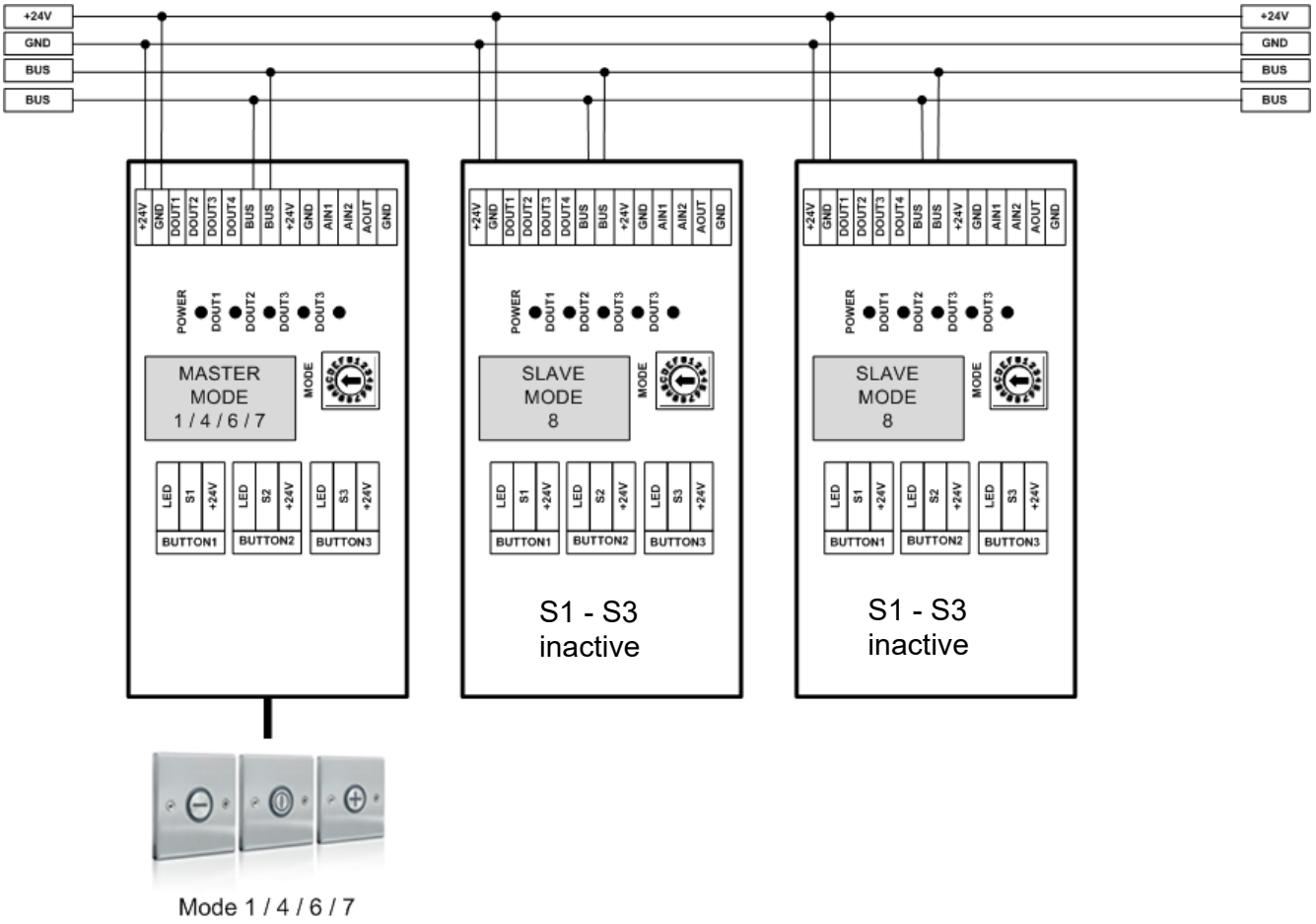
a) S3 – system OFF
b) Pulse combination to S2 (2 pulses within 0.5 sec)

For additional explanation see page 9.

Mode 8 – signal OUT passive slave

This operating mode is only possible in combination with a master device (modes 1-7). The two devices are connected via the BUS.

The device works as an output device only. The signal is generated 1:1 on terminals LED1 + LED2 + LED3 and on the OUT terminals (DOUT1-4, AOUT) as on the master device.



Modes A – Mode F connection of external operation processes via BUS address

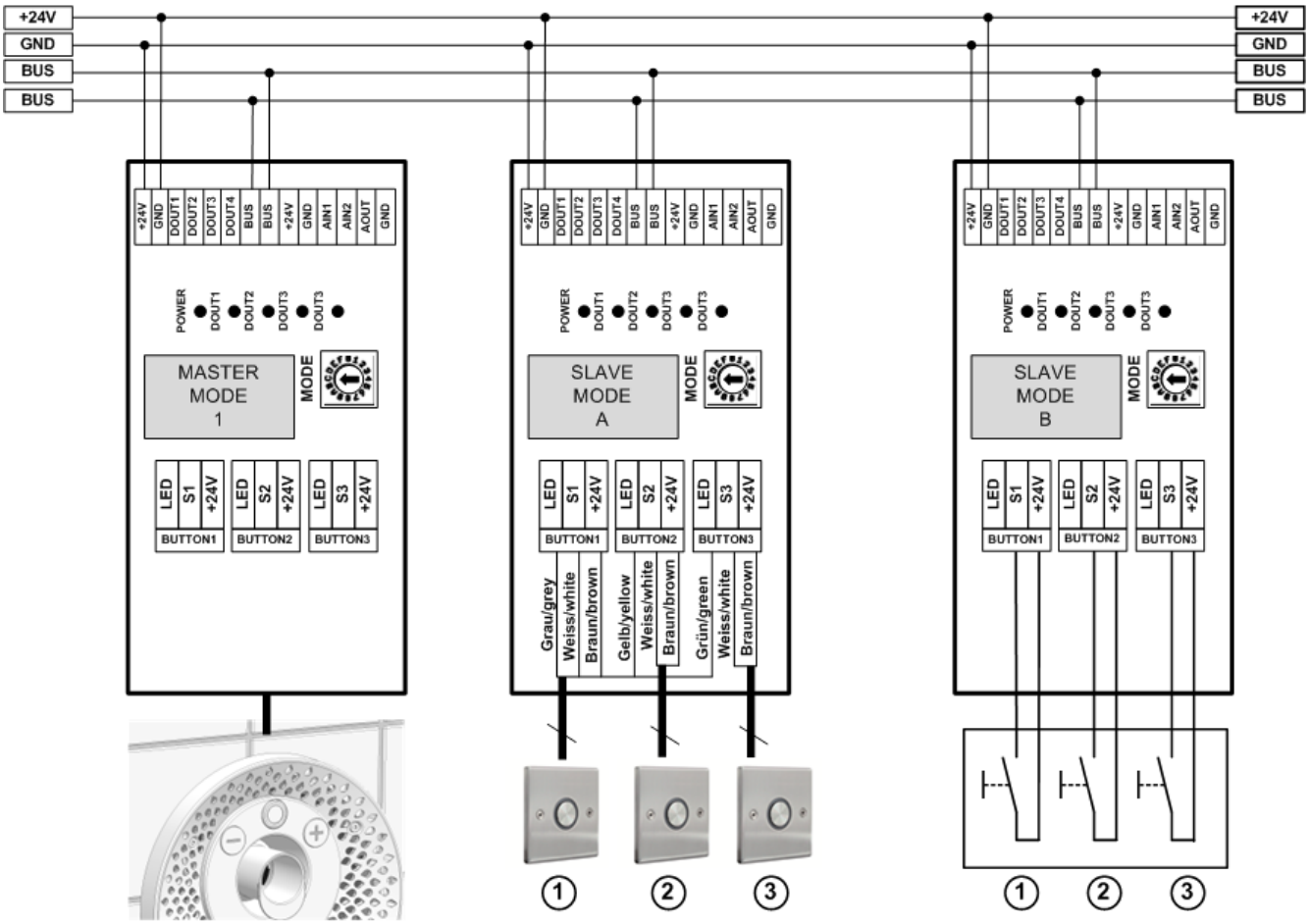
In this mode the device works in SLAVE mode. To do this the device must be operated via the BUS with a master device in modes 1-7 or via **swimming pool control BEHNKE 2.0 Profi Control**.

The converter has a SLAVE function and receives the control commands directly from the master device or the **BEHNKE 2.0 Profi Control** unit. The device must be used with a unique bus address, i.e., two devices with the same BUS address setting are not permitted and will lead to malfunctions. Different bus addresses from 0x60 to 0x65 can be set with the rotary switch so that a maximum of 7 devices can be operated as SLAVES on the MASTER.

Rotary switch position Mode	BUS address	Rotary switch position Mode	BUS address
A ……	0x60	D ……	0x63
B ……	0x61	E ……	0X64
C ……	0x62	F ……	0x65

The buses adjust their status by means of the bus.

Devices in modes A – F have active inputs and can be used optionally as additional input devices, for example to connect the building control unit, relays or additional buttons.

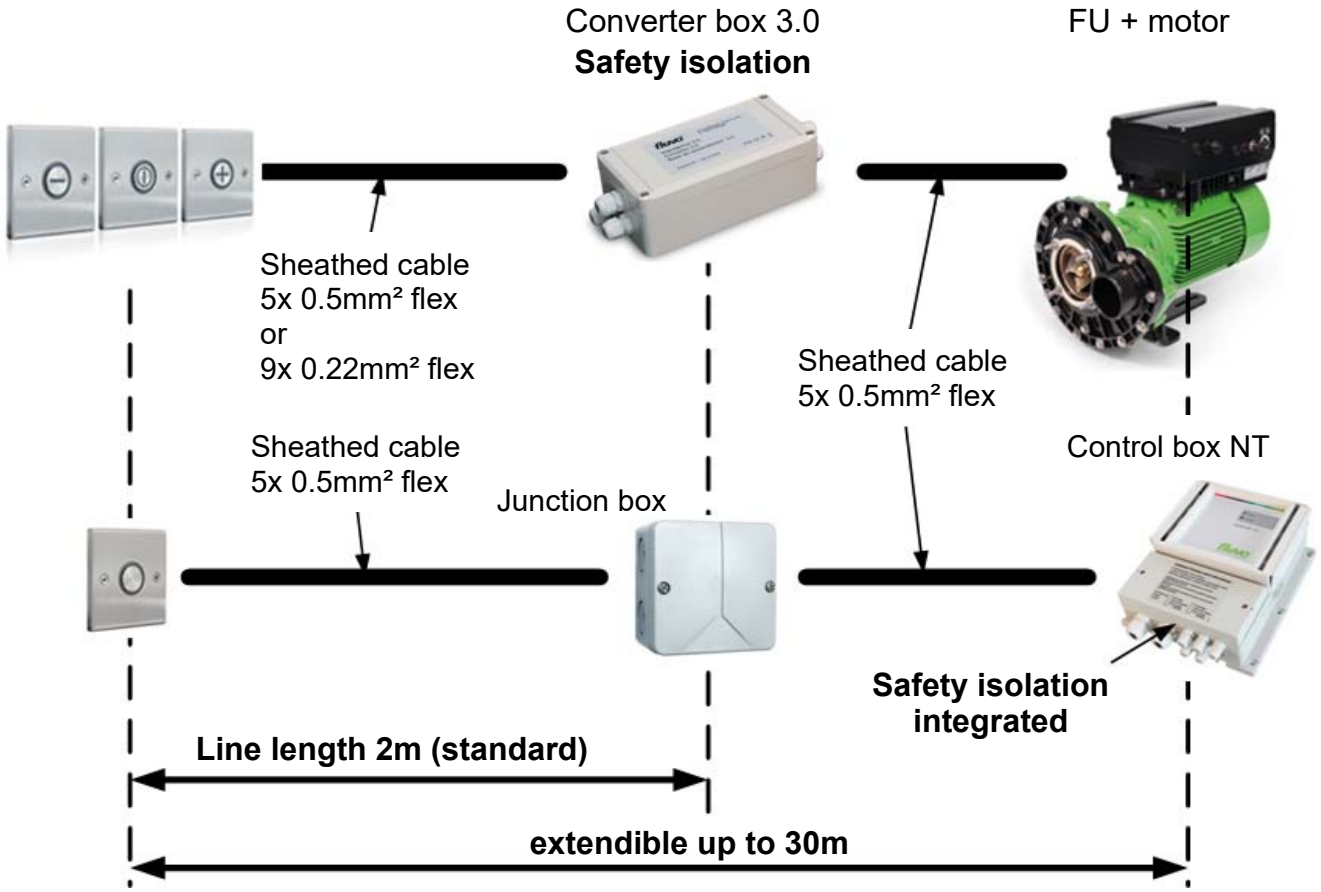


Optional: Customer connection

3 Installation instructions and cable lengths

Note:
When laying cables, safe isolation between different types of currents within an installation system must be ensured without exception.
Comply with the requirements of DIN EN 50174 and DIN VDE 0100-520 for communication wiring when laying the cables.

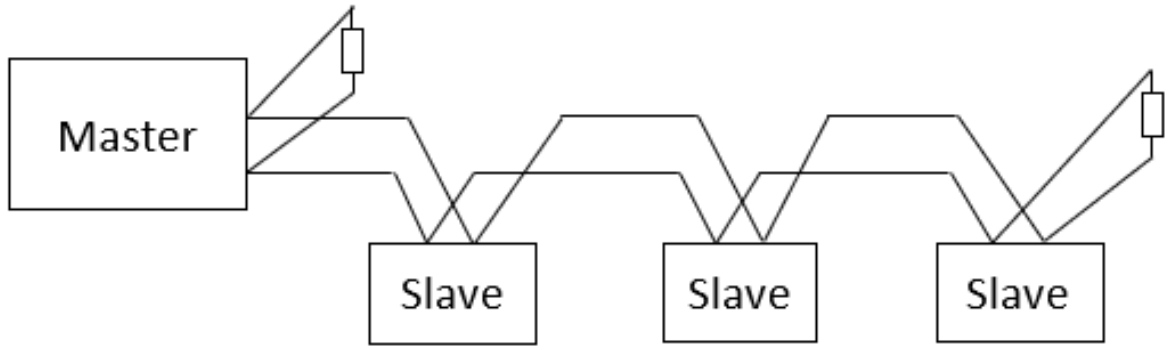
Safety isolation
For reasons of electrical safety, the sensor button must without exception be operated via "safety isolation" such as a control box item no. 61405 or directly on the NT switch box. The defined maximum line lengths must also be observed.



3.1 BUS – terminating resistor

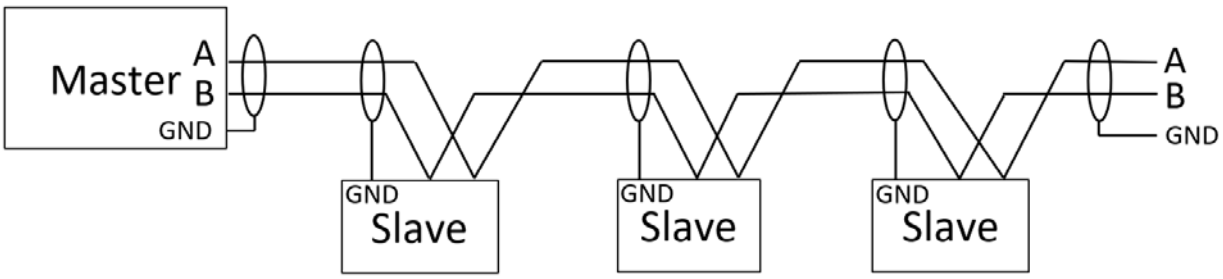
INACTIVE	ACTIVE
 TERM	 TERM

If the converter box 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 converter box forms the terminal device, the terminating resistor must be set here.



Note on BUS data line

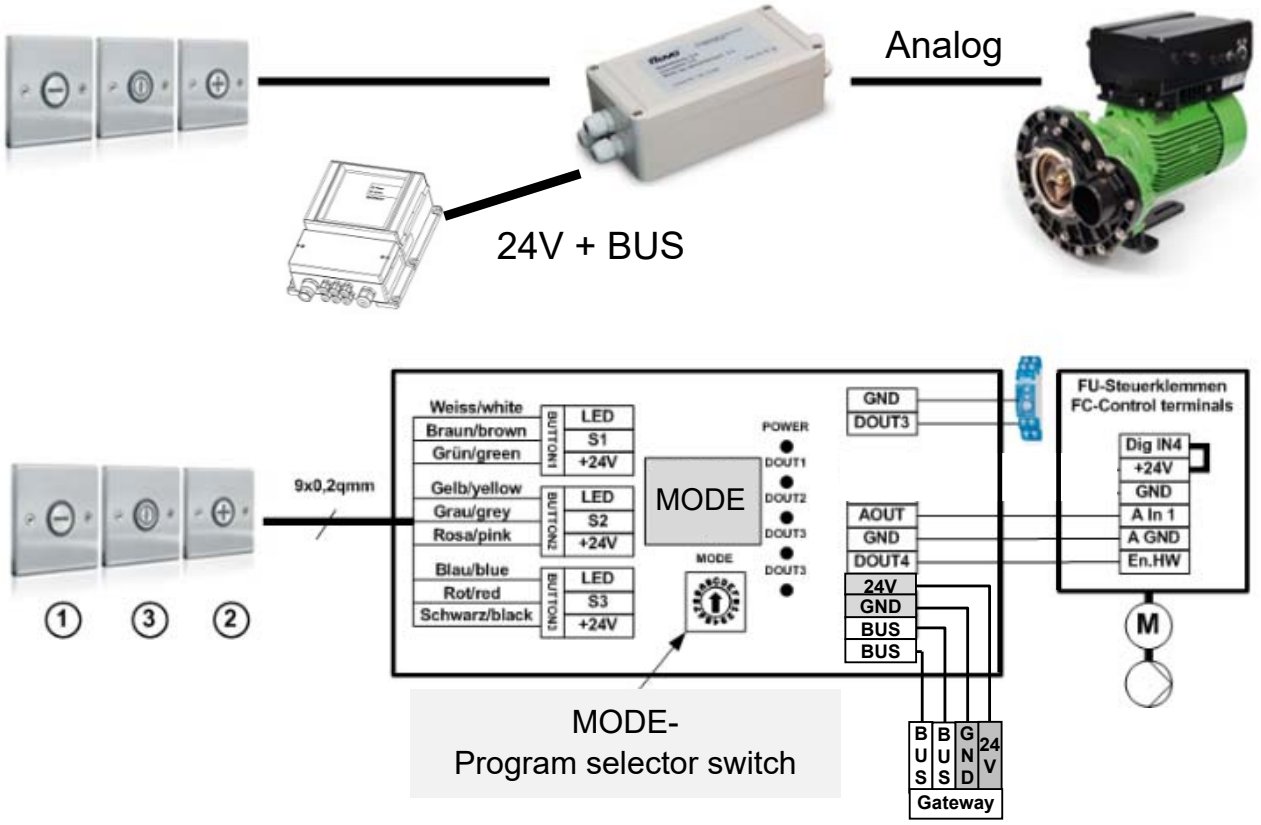
To ensure stable data communication between the bus participants, it is recommended to use a low-capacitance shielded data cable for field bus systems. Connect the cable shield to the terminal marked ⊥ / GND on both sides.



3.2 Converter box power supply

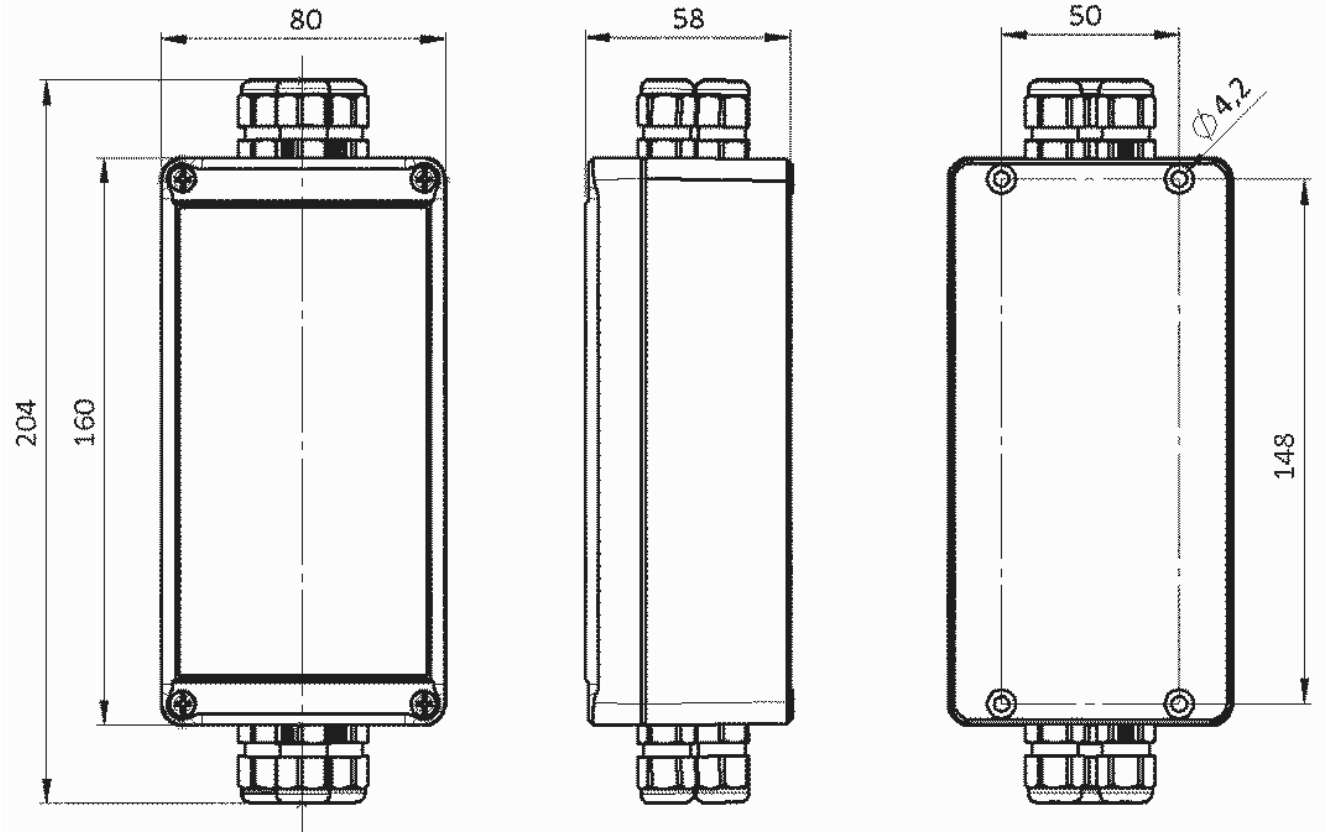
In combination with the gateway, you supply the converter box via the 24V voltage source in the gateway. A maximum of three converter boxes can be connected. Additional converter boxes must then be supplied externally or via the FU using a GND connection. Make sure that there is a GND connection between the converter boxes and the gateway.

The GSA is connected to the gateway via “BUS”:



4 Housing

Dimensions



Fastening holes
4x clearance holes
Ø4.2mm

Properties

Housing material, polycarbonate
Colour light grey, similar to RAL 7035
Protection type IP 65
Housing material ABS, PC (UV-stabilised)

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

Manufacturer:
Schmalenberger GmbH + Co. KG
Flow technology
Im Schelmen 9 – 11
D-72072 Tübingen / Germany

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