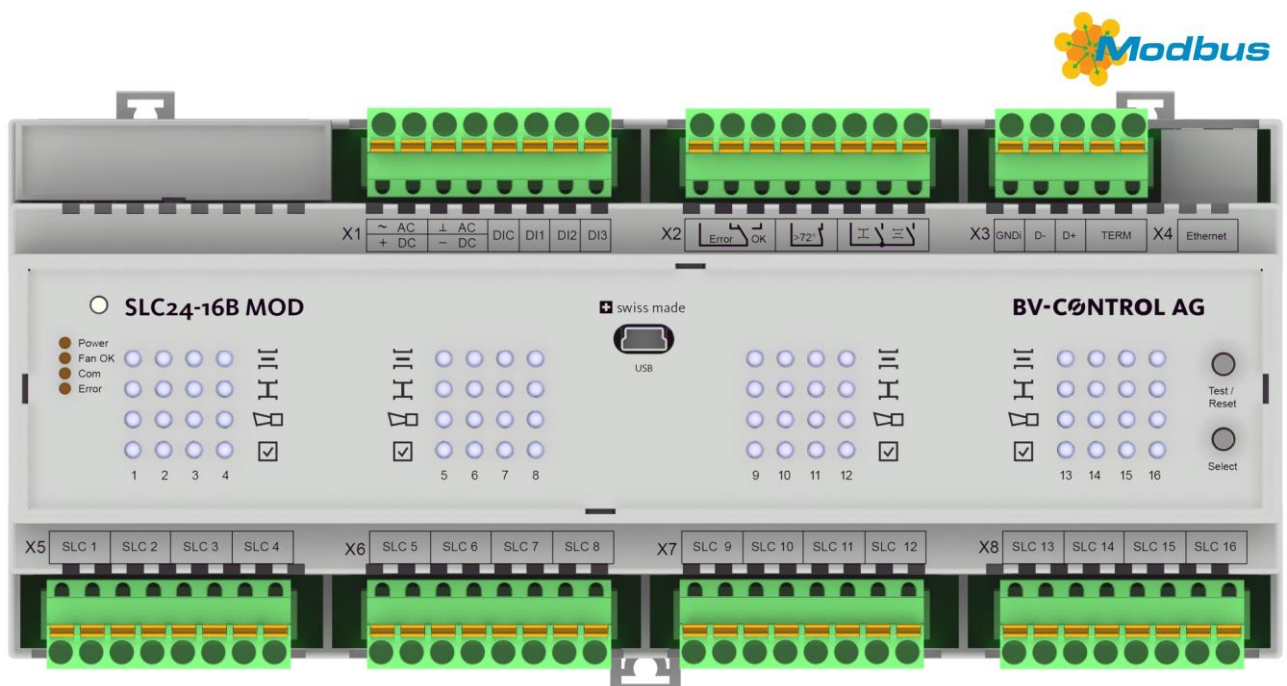**BV-CONTROL AG**
Elektronische Steuersysteme

SLC® line → 16-type BC24 Master

SLC24-16B MOD
Technical data sheet

Digital communication and control unit for the control and reliable monitoring of up to 16 motorised fire dampers in ventilation systems.

Main characteristics

+ **16-type BC24* Master**
+ plug-in spring-loaded terminals for easy installation
+ tried and tested SLC® wiring principle, in star topology via 2 x 1.5 mm^2 cables to the fire dampers (known from the THC24-B/BC24 system)
+ conventional actuation via optically isolated control inputs
+ relay outputs for enabling ventilation
+ optional control and monitoring via **Modbus RTU (RS-485)** or **Modbus TCP/IP (Ethernet)**
+ optional monitoring via an external computer or control cabinet touchscreen (TCP/IP communication)
+ USB interface for optional configuration and on-site diagnostics via a computer
+ zoning (closing of the dampers in groups)

* The data sheet for the BC24 is contained in a separate document

Contents

1 Summary

The SLC24-16B MOD combines **16 x THC24-Bs** in a single unit. Up to **16 x BC24s** (with fire damper actuator, fire alarm tripping unit and smoke detector) can be connected. Supply and communication with the motorised fire damper are via a two-wire line.

Actuation can be potential-free as with the **THC24-B**, direct via digital signals (0, 24 V) or via **MODBUS**.

Individual dampers can be grouped into zones using the **configuration tool**. If a damper in a zone develops a fault, the other dampers in the same zone will close too. Connections which are not being used can also be deactivated again without a USB tool via the two operating buttons.

2 TECHNICAL DATA

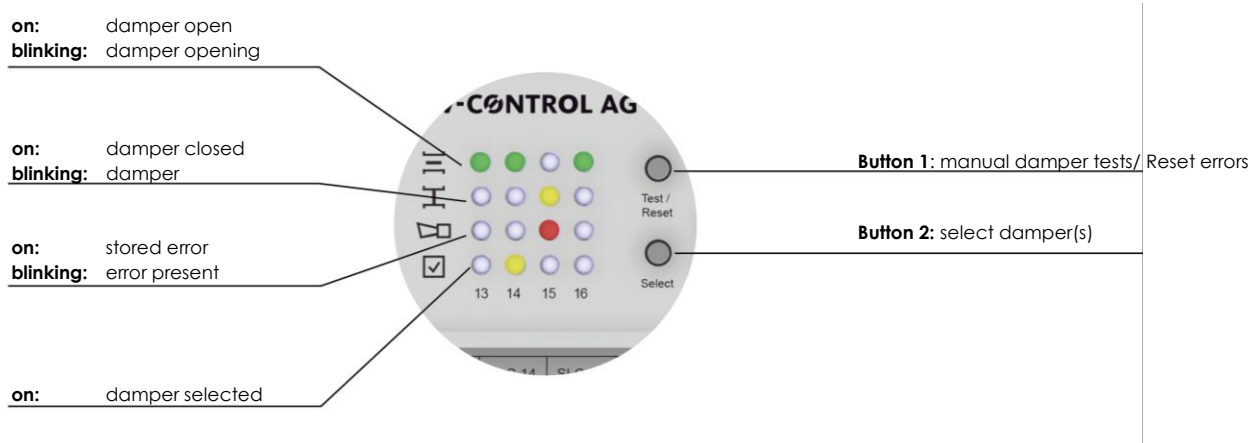| Electrical data	Rated voltage	**24 VAC** - 15% to + 20%, 50/60 Hz **24 to 35 VDC**
	Power consumption	6 VA 4 W
	Connections	Plug-in spring-loaded terminals
	Relay load	0.5 A @ 48 VAC; 1 A @ 24 VDC
	Inputs	Type: optical coupler 10 mA @ 24 VDC (common reference point)
Modbus RTU	Medium	RS-485, galvanically **isolated**
(default)	Transmission formats	**1-8-N-2,** 1-8-N-1, 1-8-E-1 and 1-8-O-1 (start bit, data bits, parity and stop bits)
	Number of nodes	max. 64 (without a repeater)
	Baud rates	9600, 19,200, **38,400** and 76,800 baud
	Addresses	1..127 (0 reserved for broadcasting)
	Termination	150 Ω can be activated via jumper
	Typical response time	> **50 ms** (adjustable)
Modbus TCP/IP	IP address assignment	**Static** or DHCP
		Default: 10.0.0.2.
Safety	Protection class	III (safety extra-low voltage)
	EMC Low Voltage Directive	CE in accordance with 2004/108/EC CE in accordance with 2006/95/EC
	Mode of operation	Type 1 (EN 60730-1)
	Ambient temperature	- 20 °C to + 50 °C
	Storage temperature	- 20 °C to + 80 °C
	Humidity test	95% rh, non-condensing (EN 60730-1)
	Maintenance	maintenance-free
Mechanical data	Dimensions	Installation width 212.1 mm Height 94 mm Depth 58 mm
	Weight	approximately 465 g
	Installation	Clips onto 35 mm DIN rail.

Table 1 Technical data

3 DISPLAY AND OPERATION

The unit has four status LEDs:

System power	**Lights up** when power is connected to the unit
Fan OK Relay 1, relay 4	**Lights up** when there are no errors/faults **and** all dampers programmed as active are open
Communication	**Flashes** when Modbus packages are sent/received
Error	**Lights up** when faults occur **Faults include the following:** • Operating voltage too low/high • Short circuit on at least one SLC line • Communication error affecting at least one damper
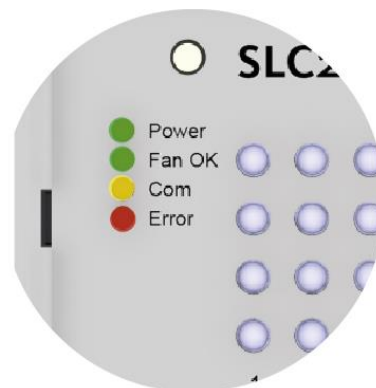
The unit has two damper position LEDs for each damper and an error LED. The fourth LED indicates the damper selected which can be tested directly via the unit. **Press both buttons for T > 3 s to start an automatic search. As a result, SLC connections not being used will be deactivated and removed from the relay logic.**

on: damper open
blinking: damper opening

on: damper closed
blinking: damper

on: stored error
blinking: error present

on: damper selected

Button 1: manual damper tests/ Reset errors

Button 2: select damper(s)

4 CONFIGURATION AND DIAGNOSTIC TOOL

The configuration and diagnostic tool offers the following functions:

Configuration functions:

- Selection and parameterisation of the MODBUS interface
- Addressing
- Zoning
- Firmware update

Diagnostic functions:

- Control command monitoring
- Overview of the damper settings
- Overview of actual/stored faults in the fire damper
- SLC communication check
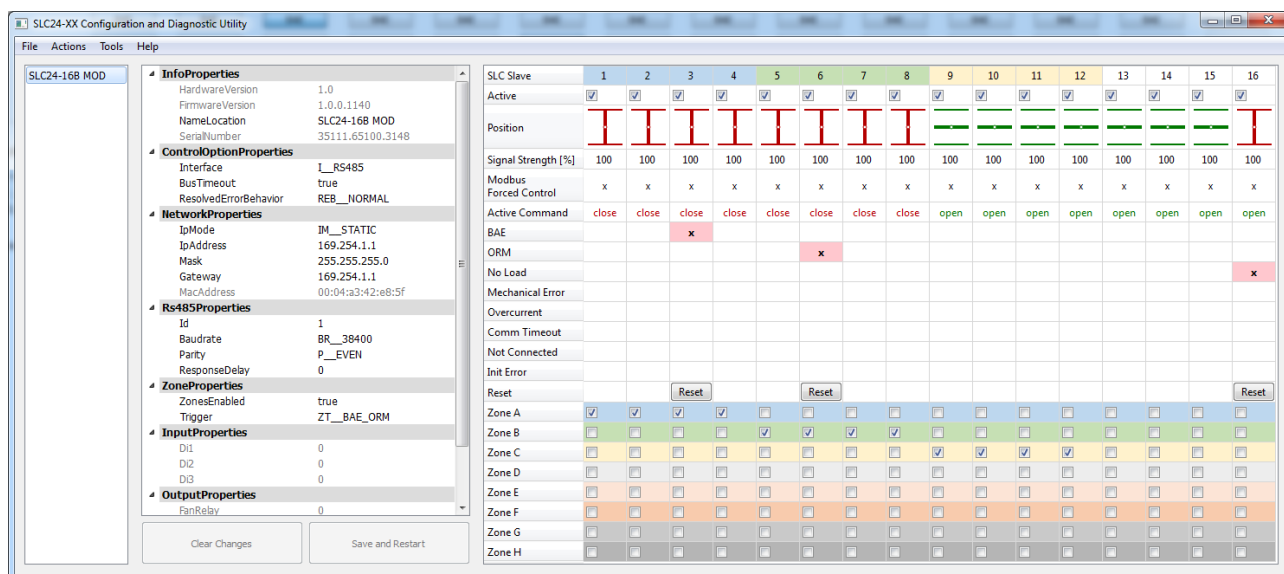
For the most part, the program is self-explanatory. If you have any queries, please contact your damper manufacturer or BV-Control AG directly.

5 OVERVIEW OF CONNECTIONS
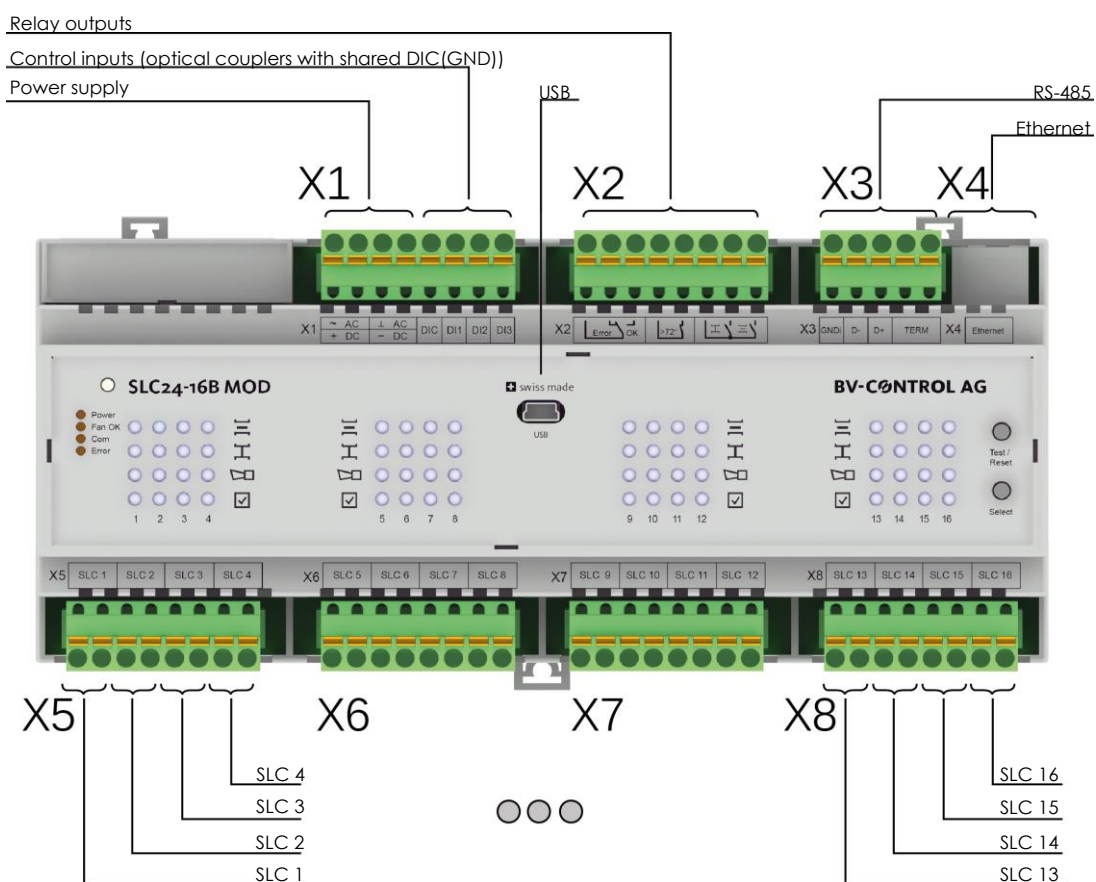
5.1 POWER SUPPLY (TERMINAL BLOCK X1 1..4)
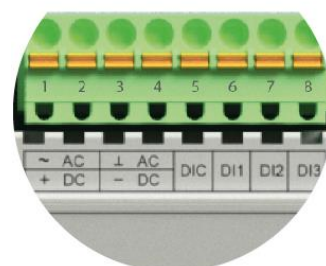
The SLC24-16B MOD can run on 24 VAC or 24 VDC (Internal
active bridge rectification). Power consumption max. 6 VA/4 W.

1	2	3	4
~ AC		⊥ AC	
+ DC		- DC	

Table 2 Terminal block X1 1..4

The output of the transformer or the power supply unit must be adequately dimensioned.
The total output of the actuators is decisive for dimensioning.

5.1.1 Design example (maximum load scenario)

16 x 10 VA/7 W BF24s are connected to a BC24 with smoke detector via a 300 m line length in each case.

Transformer output:

1 x S(SLC24-16B MOD)	+ 16 x S(BF24, BC24, ORS142K line)	=	S_{Tot}
6 VA	+ 16 x 12.5 VA	=	206 VA
		→	**250 VA**

DC power supply unit output:

1 x P(SLC24-16B MOD)	+ 16 x P(BF24, BC24, ORS142K line)	=	P_{Tot}
4 W	+ 16 x 10 W	=	164 W
		→	**200 W**

5.1.2 Fuses and SLC output monitoring

Faulty wiring can lead to high short-circuit currents.

Standard safety fuses are installed in order to protect the unit against destruction. The fuses can be replaced quite easily.

[caption: 2 x **5x20 10 A fast-blow**]
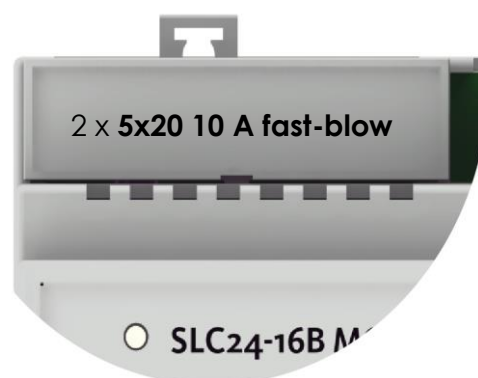
TYPE: **10 A fast-blow, FSF, 0034.1526, Schurter**

Individual SLC® outputs are limited to 700 mA by means of hardware and also monitored by means of software. If a short circuit is detected, the output affected will be deactivated for 1 minute.

Wiring must not be carried out when the unit is live!!!

5.2 INPUTS (TERMINAL BLOCK X1 5..8)

The 3 control inputs are galvanically isolated from the system via **optical couplers** and have a **common reference point DIC**. External voltage can be used (24 VAC or 24 VDC)

Load 10 mA @ 24 VDC

5	6	7	8
Control inputs			
DIC	DI1	DI2	DI3
Common reference point	Locin (forced control)	Test/Reset	Reserved

Table 3 Terminal block X15..8

5.2.1 Actuation by means of potential-free wiring

The SLC24-16B MOD can be actuated by means of conventional potential-free wiring.

Jumper between X1.4 and X1.5
Dampers CLOSED: X1.2 and X1.6 open
Dampers OPEN: X1.2 and X1.6 connected

TEST and RESET dampers
close/open dampers

reserved

~24 VAC or 24 VDC

Transformer/power supply to be dimensioned correctly

X1.1 and X1.2 internally connected
X1.3 and X1.4 internally connected

X1 | ~ AC / + DC | ⊥ AC / − DC | DIC | DI1 | DI2 | DI3
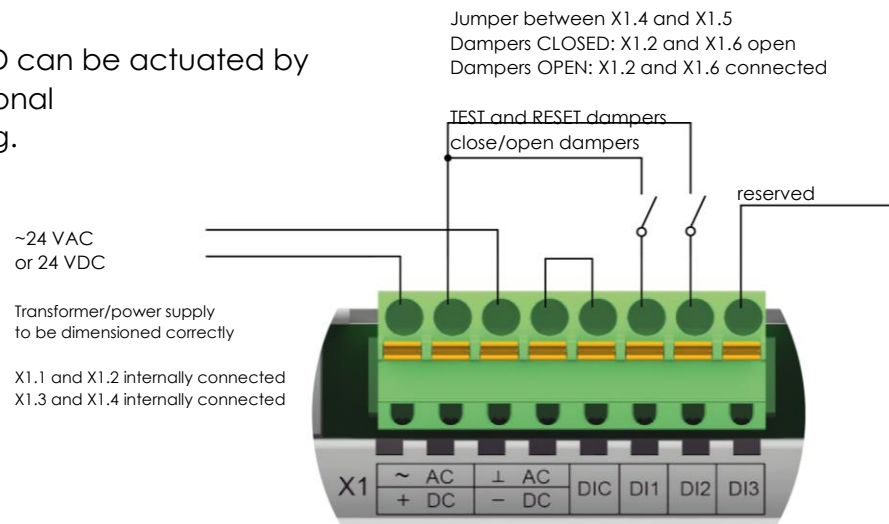
5.2.2 Direct digital controlling

Alternatively, it can be actuated directly via the digital outputs 0V/24 V) of an external controller.

open/close 0 / 24V

test and reset 24V

GND

reserved (0

~24 VAC or 24 VDC

Transformer/power supply to be dimensioned correctly

X1.1 and X1.2 internally connected
X1.3 and X1.4 internally connected

X1 | ~ AC / + DC | ⊥ AC / − DC | DIC | DI1 | DI2 | DI3

Optocoupler inputs with common GND
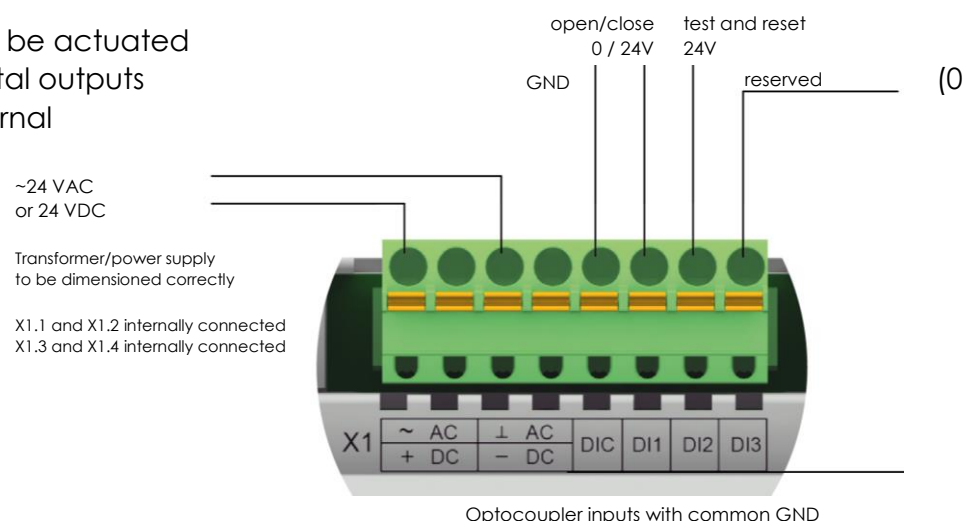
5.3 RELAY OUTPUTS (TERMINAL BLOCK X2)

The functions of the relay outputs are shown in the table below.

Max. contact load 48 VAC with 0.5 A or 24 VDC with 1 A.

Connections **6 and 8** are normally used for enabling ventilation.

Relay 1 Operating relay (changeover ontact)
X2.1 COM
X2.2 NC Collective fault
X2.3 NO All OK (system ON)

Thermal overload relay (fire alarm tripping unit)/smoke detector for BC24* (break contact)
X2.4 COM
X2.5 NC

Relays 3 + 4 Damper position (2 x make contacts)
X2.6 COM
X2.7 NO Dampers CLOSED
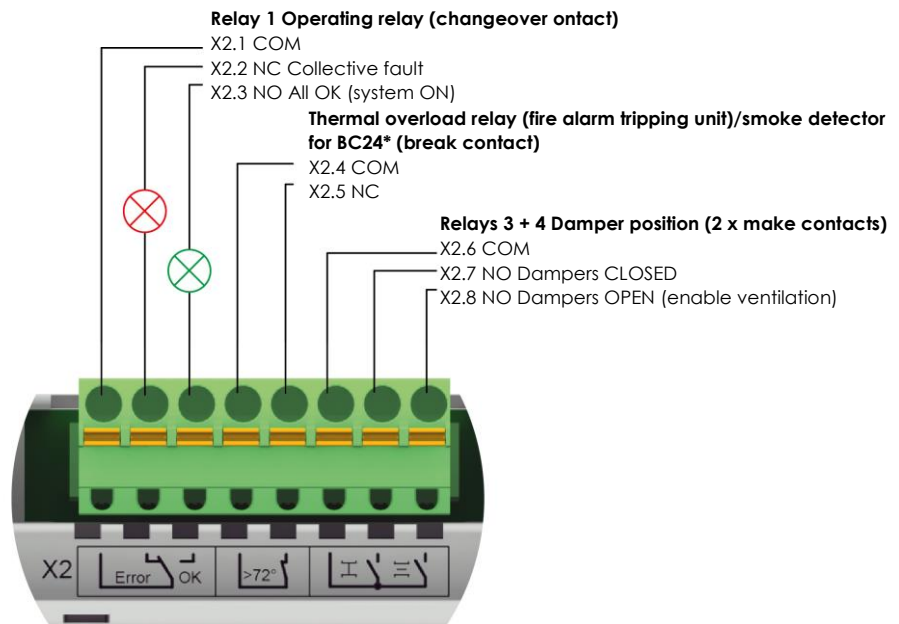X2.8 NO Dampers OPEN (enable ventilation)

1	2	3	4	5	6	7	8
Collective fault			Fire alarm tripping unit*/smoke detector		Damper position		
COM	Fault	No fault	> 72°		COM*	CLOSED	OPEN
Changeover contact			Break contact		2 x make contacts		
1 and 2 connected: Fault present or unit de-energised **1 and 3** connected: No fault present			**4 and 5** connected: Fire alarm tripping unit* and smoke detector for **BC24** OK **4 and 5** open: Fire alarm tripping unit* or smoke detector Fault present in **BC24** or unit de-energised * In BC24 or actuator		**6 and 7** connected: All dampers closed **6 and 8** connected: All dampers open Unit de-energised: Contacts open		

Table 4 Terminal block X2

6 MODBUS MODE

The system can also be controlled and monitored by means of a Modbus RTU (RS-485) **or** Modbus TCP/IP. The configuration of the interfaces can be carried out by means of a USB and the Windows configuration tool as an option. (Download from www.bv-control.ch) The default interface parameters can be found in the section entitled **"Technical data"**.

As soon as the first forced control command is received, the system will go into Modbus mode.

6.1 BUS MONITORING WATCHDOG

The unit has a bus monitoring countdown (watchdog T = 120 s). The time will be reset with each forced control command. However if the time expires because no commands have been sent, the unit will take over the control command from the digital input. This watchdog is activated by default. However, it can be deactivated by diagnostic software.

6.2 COMMANDS IMPLEMENTED

Standard commands	Read Holding Registers [3]
	Write Single Register [6]
Optional commands	Read Input Registers [4]
	Write Multiple Registers [16]
Breakdown of the registers	Register nos. 1-30
	Register assignment for controlling and monitoring all dampers
	Register nos. 101-109
	Service register

6.3 REGISTER ASSIGNMENT

6.3.1 Holding registers

Unless specified otherwise, the following will apply:

Bit 0 = damper 1
Bit 1 = damper 2
Bit 2 = damper 3
Bit 3 = damper 4
...
Bit 15 = damper 16

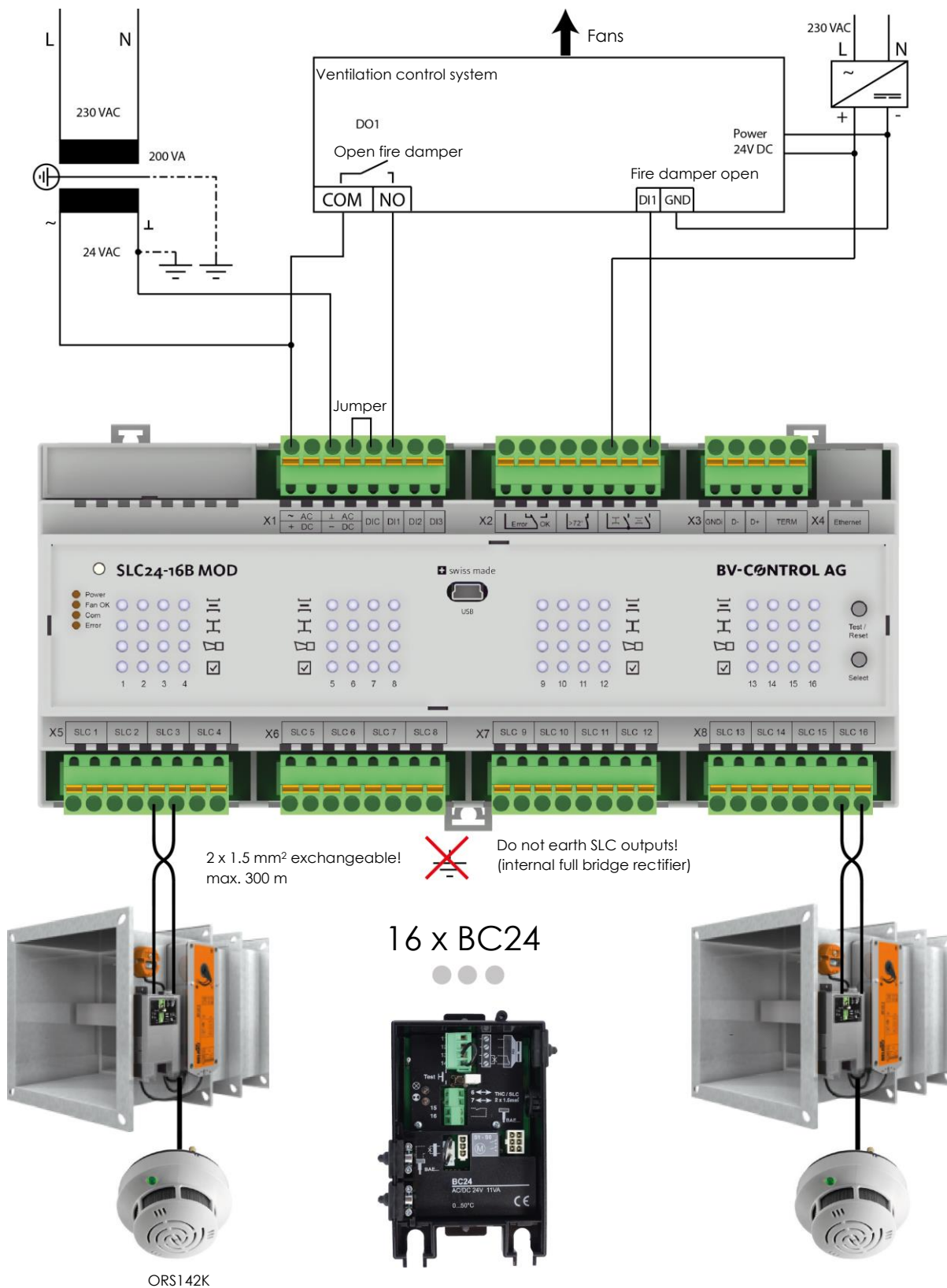| No.	Addr	Name	Description	Read	Write
1	0	Active dampers	Bit X: 0 = damper programmed as inactive 1 = damper programmed as active	X	
2	1	Forced control	Bit X: 0 = Fail-safe position 1 = Operating position	X	X
3	2	Reset	Bit X: 1 = Reset (automatic reset on completion of Reset)	X	X
4	3	Unit code	1000	X	
5	4	Initialisation	Bit X: 0 = Normal 1 = Initialisation active	X	
6	5	Test run	Bit X: 0 = Normal 1 = Test run active	X	
7	6	Active error	Bit X: 0 = no active error 1 = at least one active error (concrete active errors can be read via register nos. 16-23)	X	
8	7	Stored error	Bit X: 0 = no stored error 1 = at least one stored error (concrete stored errors can be read via register nos. 24-30)	X	
9	8	Operating position	Bit X: 0 = damper not in operating position 1 = damper in operating position	X	
10	9	Fail-safe position	Bit X: 0 = damper not in fail-safe position 1 = damper in fail-safe position	X	
11	10	Movement operating position	Bit X: 0 = damper not moving towards operating position 1 = damper moving towards operating position	X	
12	11	Movement fail-safe position	Bit X: 0 = damper not moving towards fail-safe position 1 = damper moving towards fail-safe position	X	
13	12	Relay outputs	Bit 0 1 = OK/0 = Error Bit 1 1 = "< 72°" Bit 2 1 = dampers CLOSED Bit 3 1 = dampers OPEN	X	
14	13	Digital inputs	Bit 0 = DI1 Locin (forced control) Bit 1 = DI2 TEST/RESET Bit 2 = Reserved	X	
15	14	Local forced control	Bit 0: 1 = missing bus forced control or after power up. 0 = bus control active	X	
16	15	Active fire alarm tripping unit error	Bit X: 0 = no error 1 = active fire alarm tripping unit error	X	
17	16	Active optical smoke detector error	Bit X: 0 = no error 1 = active optical smoke detector error	X	

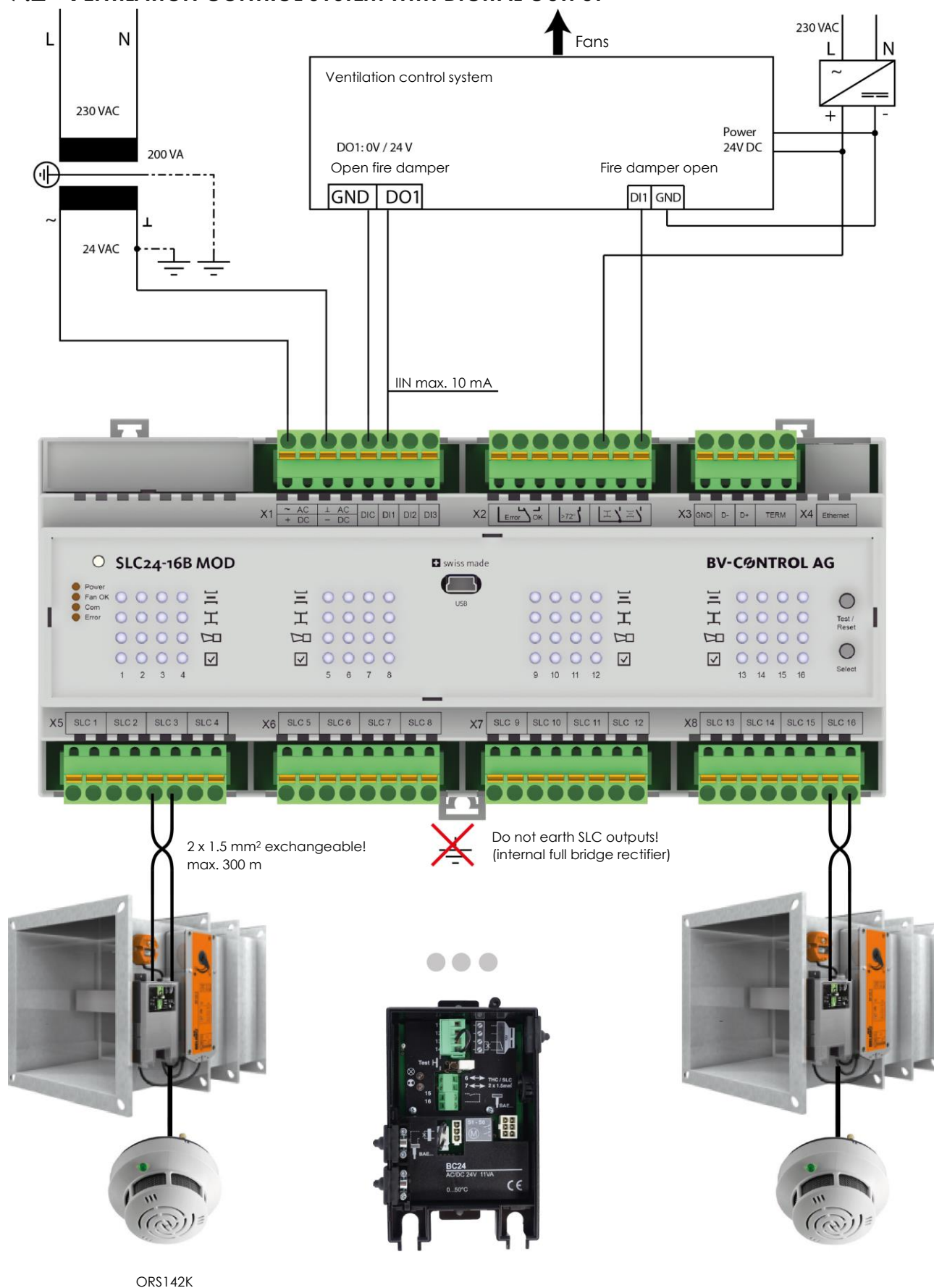| 18	17	No Load	Bit X: 0 = no error 1 = no load detected: either no actuator is connected to the ballast or the fire alarm tripping unit of the actuator has been tripped	X
19	18	Mechanical error	Bit X: 0 = no error 1 = a mechanical error is present; the damper is blocked or is taking too long to reach the target position.	X
20	19	Overcurrent	Bit X: 0 = no error 1 = an overcurrent has been detected: Because of the overcurrent, the power supply to the ballast was interrupted. With this error, self-resetting will take place after one minute.	X
21	20	No SLC communication	Bit X: 0 = no error 1 = no communication between the SLC unit and the ballast. With this error, self-resetting will take place as soon as communication is functioning again.	X
22	21	Not Connected	Bit X: 0 = no error 1 = no ballast is connected to the corresponding port. With this error, self-resetting will take place as soon as a ballast is connected.	X
23	22	Initialisation Error	Bit X: 0 = no error 1 = an error restricting functionality occurred during initialisation. This error is **not** self-resetting and must be acknowledged by means of a Reset (register no. 3).	X
24	23	Stored fire alarm tripping unit error	Bit X: 0 = no stored error 1 = a fire alarm tripping unit error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
25	24	Stored optical smoke detector error	Bit X: 0 = no stored error 1 = an optical smoke detector error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
26	25	Stored "No load" error	Bit X: 0 = no stored error 1 = a "No Load" error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
27	26	Stored Mechanical Error	Bit X: 0 = no stored error 1 = a mechanical error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
28	27	Stored Overcurrent Error	Bit X: 0 = no stored error 1 = an overcurrent error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
29	28	Stored "No SLC communication" fault	Bit X: 0 = no stored error 1 = a "No SLC communication" error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X
30	29	Stored "Not Connected" error	Bit X: 0 = no stored error 1 = a "Not Connected" error was active but has since been rectified. Stored errors are reset by means of a Reset (register no. 3).	X

6.3.2 Service Register

No.	Addr	Name	Description	Read	Write
101	100	Serial number 1		X	
102	101	Serial number 2		X	
103	102	Serial number 3		X	
104	103	Firmware Major		X	
105	104	Firmware Minor		X	
106	105	Firmware Revision		X	
107	106	Build Number		X	
108	107				
109	108	Bus Timeout Enabled	1 = after timeout (120 s without Modbus forced control), forced control will be taken over by the digital input **(default)** 0 = no timeout (last Modbus command received is retained)	X	

7 EXAMPLES OF APPLICATIONS

7.1 VENTILATION CONTROL SYSTEM WITH CONVENTIONAL WIRING

2 x 1.5 mm² exchangeable!
max. 300 m

Do not earth SLC outputs!
(internal full bridge rectifier)

16 x BC24

ORS142K

7.2 VENTILATION CONTROL SYSTEM WITH DIGITAL OUTPUT

Fans

230 VAC
L   N

L   N

230 VAC

200 VA

24 VAC

Ventilation control system

DO1: 0V / 24 V

Open fire damper

GND | DO1

Power
24V DC

Fire damper open

DI1 | GND

IIN max. 10 mA

X1 ~ AC / + DC   ⊥ AC / − DC   DIC   DI1   DI2   DI3   X2   Error   OK   >72°   🗲   X3   GNDi   D-   D+   TERM   X4   Ethernet

○ SLC24-16B MOD   ✚ swiss made   BV-CONTROL AG

Power
Fan OK
Com
Error

USB

Test / Reset

Select

1   2   3   4   5   6   7   8   9   10   11   12   13   14   15   16

X5 SLC 1 SLC 2 SLC 3 SLC 4   X6 SLC 5 SLC 6 SLC 7 SLC 8   X7 SLC 9 SLC 10 SLC 11 SLC 12   X8 SLC 13 SLC 14 SLC 15 SLC 16

2 x 1.5 mm² exchangeable!
max. 300 m

Do not earth SLC outputs!
(internal full bridge rectifier)

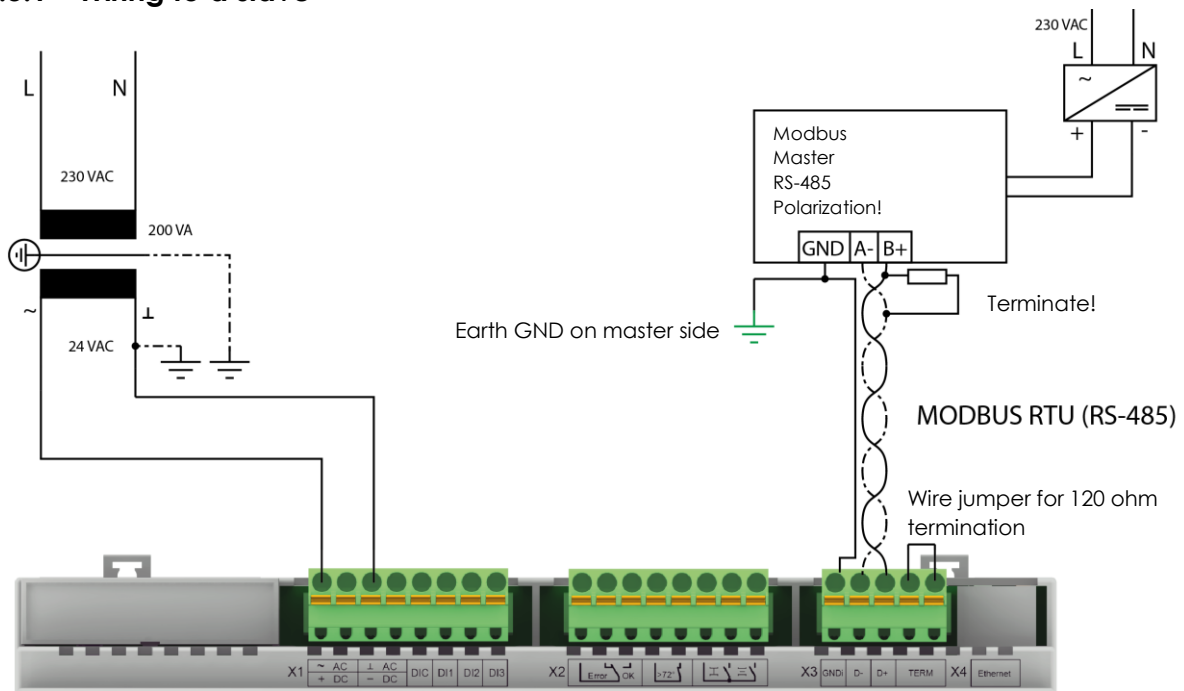● ● ●

BC24
AC/DC 24V 11VA
0...50°C

ORS142K

7.3 CONTROL BY MEANS OF MODBUS MASTER RTU

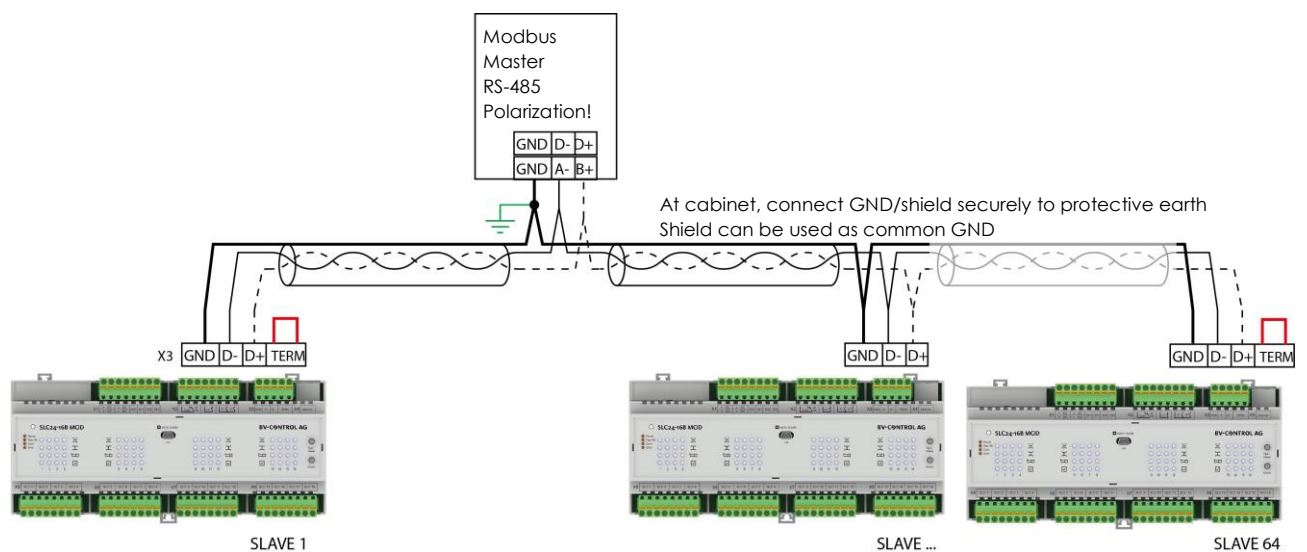The bus wiring is to be in accordance with the official Modbus specifications:

Modbus Serial Line Protocol and Implementation Guide V1.02

Addressing is carried out via a USB interface and the **configuration tool**.
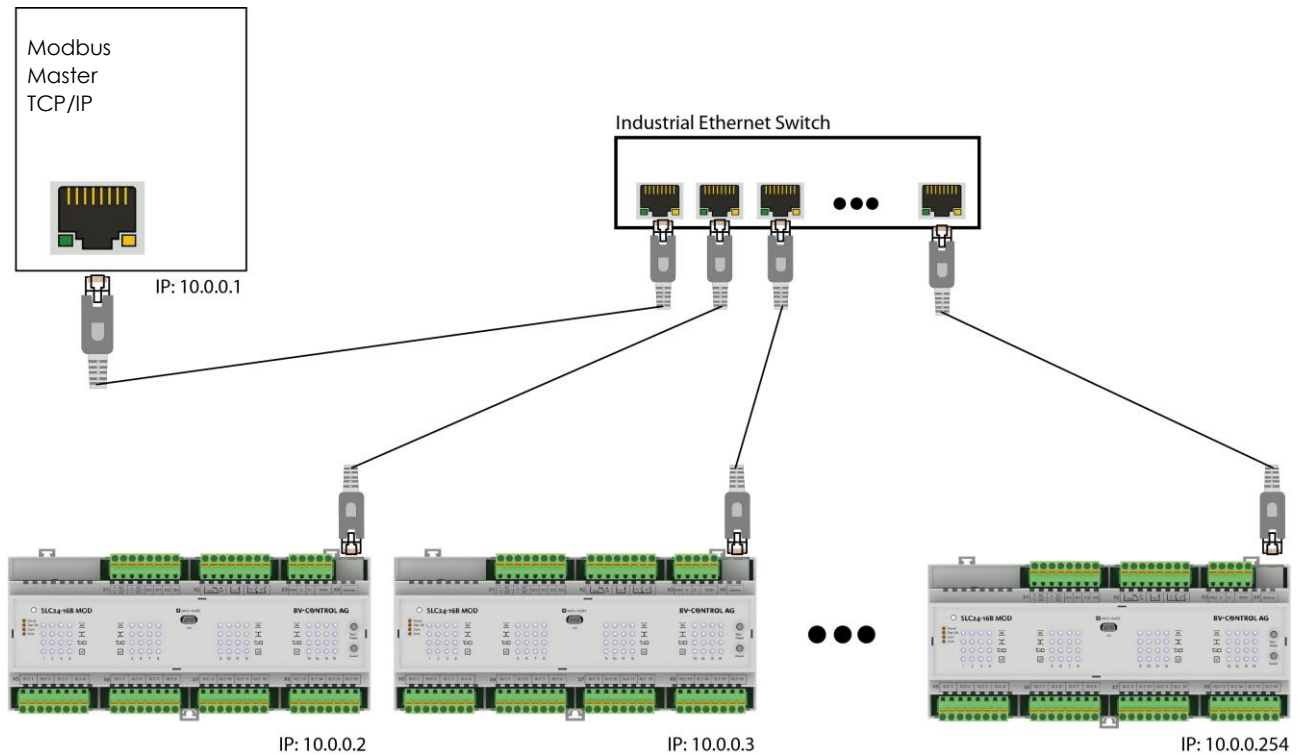
7.3.1 Wiring to a slave

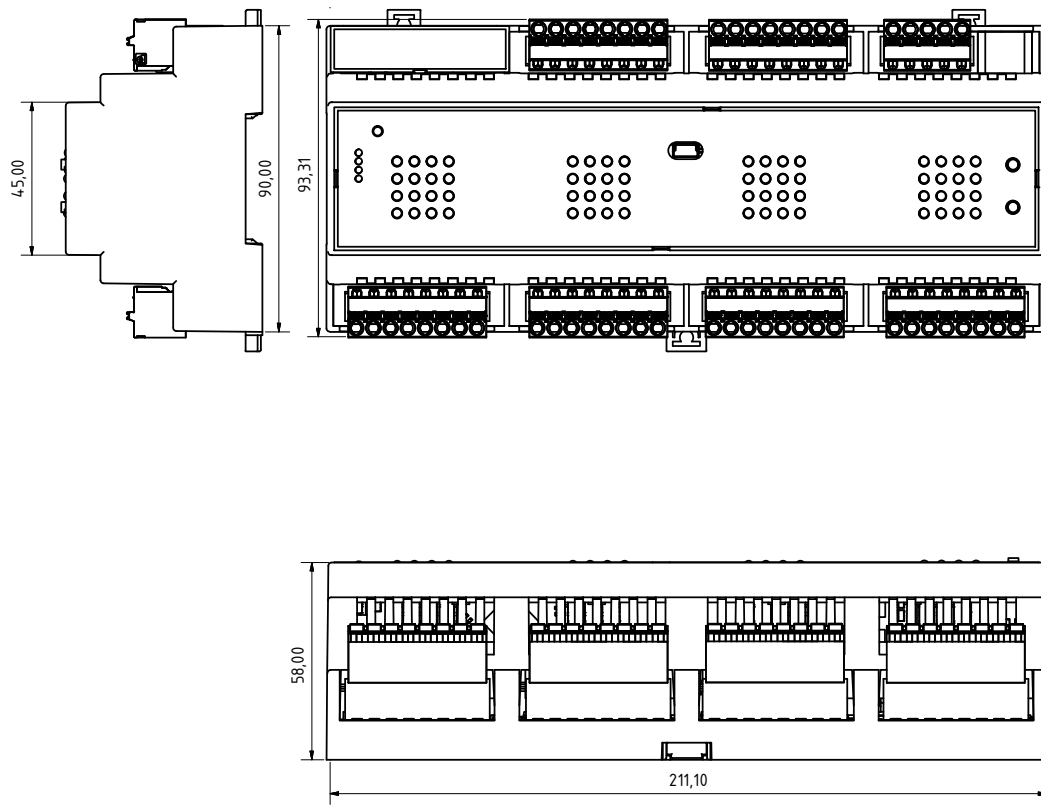### 7.3.2 Up to 64 slaves (1024 fire dampers)

7.4 MODBUS TCP/IP

The configuration tool can be used to set the IP addresses to static or activate assignment via DHCP.

8 DIMENSIONS

Dimensions in mm

45,00

90,00

93,31

58,00

211,10

A product from

BV-CONTROL AG
Elektronische Steuersysteme

Russikerstrasse 37

8320 Fehraltorf

www.bv-control.ch

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