

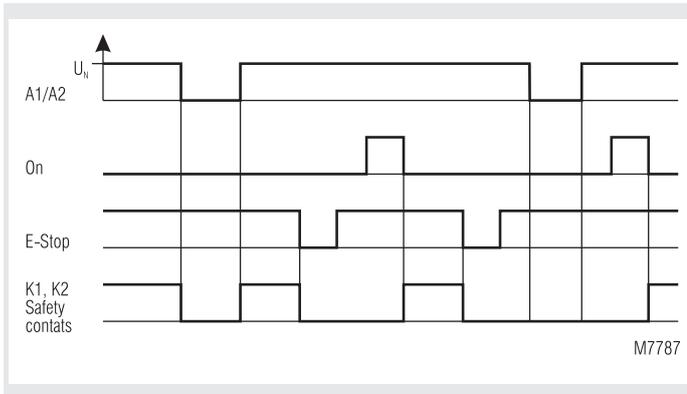
## Emergency Stop Module BH 5903, BL 5903 with voltage failure detection safemaster



0235200

- According to EU directive for machines 98/37/EG
- According to IEC/EN 60 204
- Safety category 4 according to EN 954-1
- **E-stop with latching function**
- **Automatic start when voltage returns after phase failure when no E-Stop was operated before phase failure.**
- Reset after E-stop with push button
- Output max. 3 NO contacts, see contacts
- BH 5903.\_\_\_/00000: 1 E-stop loop 2-channel operated
- B\_ 5903.\_\_\_/00020: 2 E-stop loops single channel operated
- Cross fault monitoring
- Short circuit and broken wire detection on all inputs
- LED indication for channel 1 and 2 and for diagnostics
- Removable terminal strips
- Wire connection: also 2 x 1,5 mm<sup>2</sup> stranded ferruled (isolated), DIN 46 228-1/-2/-3/-4 or 2 x 2,5 mm<sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3
- BH 5903: width 45 mm
- BL 5903: width 90 mm

### Funktionsdiagramm



### Approvals and marking



\* see variants

### Applications

- for plants, that should start automatically at return of voltage after phase failure. E.g. Compressor plants, water and sewage water plants.

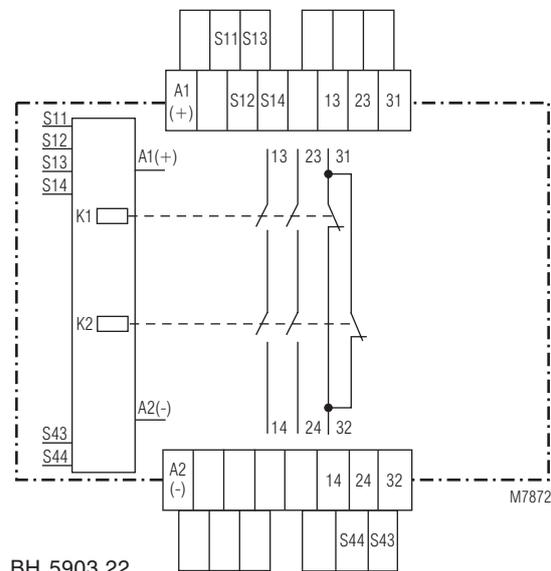
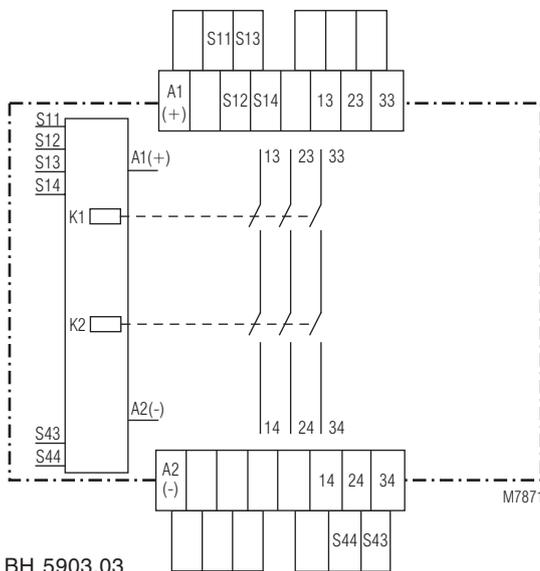
### Indication

- upper yellow LEDs  
run 1, run 2: on when unit works correct, fault signal via flashing code
- lower green LEDs  
K1, K2: on when K1, K2 energised

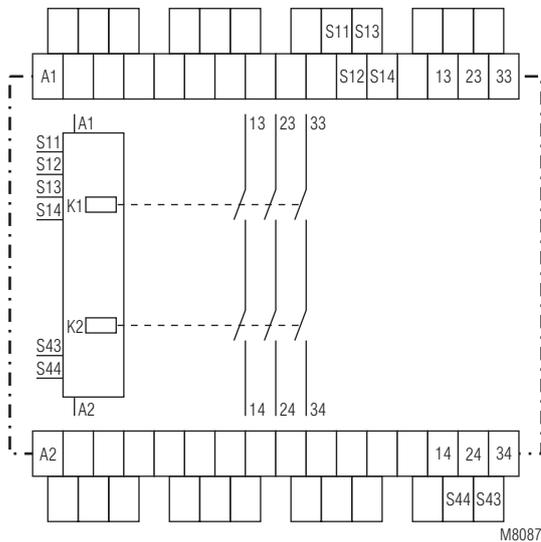
### Notes

- **The BH 5903 stores the state of emergency stop. After pressing and releasing the e-stop button the unit can only be reset by pressing the button. If the unit switches off because of phase failure it resets automatically when the voltage returns**
- The unit monitors how long the on button is pressed. Is the duration longer then 3 sec it does not switch on.
- The NC contact 31-32 (BH 5903.22) is only a monitoring contact.

### Circuit diagrams

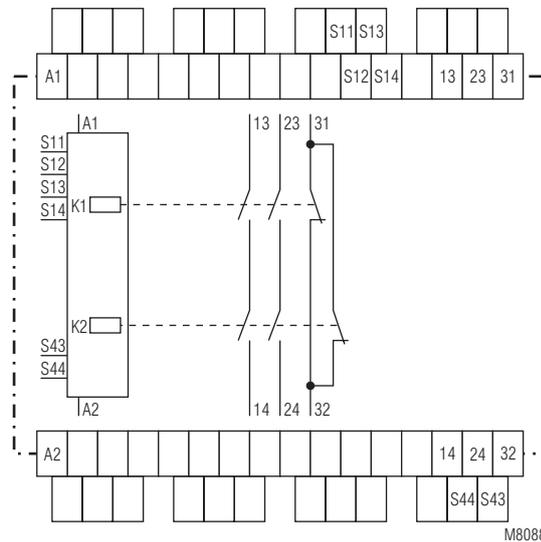


## Circuit diagrams



M8087

BL 5903.03



M8088

BL 5903.22

## Technical data

### Input

<b>Nominal voltage <math>U_N</math>:</b>	DC 24 V, AC 24, 110, 230 V AC-devices with width 90 mm
<b>Voltage range:</b> at max. 5 % residual ripple:	0,85 ... 1,15 $U_N$
<b>Nominal consumption:</b>	max. 170 mA
<b>Control voltage over S11, S13, S43:</b>	pulses max. 23 V at $U_N$
<b>Control current over S12, S14, S44:</b>	each 4,5 mA at $U_N$
<b>Min. voltage at terminals S12, S14, S42:</b>	DC 16 V
<b>Short circuit protection:</b>	internal with PTC

### Output

<b>Contact</b>	
BH 5903.03:	3 NO contacts
BH 5903.22:	2 NO, 1 NC contacts (only to be used as monitoring contact)
<b>Operate delay typ. at <math>U_N</math>:</b>	
Manual start:	max. 45 ms
Automatic start:	max. 800 ms, if voltage failure > approx. 150 ms max. 7 s, if voltage failure < approx. 150 ms
<b>Release delay typ. at <math>U_N</math>:</b>	
Disconnecting the supply:	max. 18 ms
Disconnecting S12, S22:	15 ms
<b>Contact type:</b>	Relay, positively driven
<b>Output rated voltage:</b>	AC 250 V DC: see continuous limit curve $\geq 100$ mV
<b>Switching of low loads:</b>	
<b>Thermal current <math>I_{th}</math>:</b>	5 A
<b>Switching capacity</b>	
to AC 15:	AC 3 A / 230 V IEC/EN 60 947-5-1 for NO contact AC 2 A / 230 V IEC/EN 60 947-5-1 for NC contact 8 A / DC 24 V IEC/EN 60 947-5-1
to DC 13 at 0,1 Hz:	
<b>Electrical life</b>	
to AC 15 at 2 A, AC 230 V:	$10^5$ switching cycles IEC/EN 60 947-5-1
<b>Permissible switching frequency:</b>	max. 1 200 switching cycles / h
<b>Short circuit strength</b>	
max. fuse rating:	6 A gL IEC/EN 60 947-5-1
line circuit breaker:	C 8 A
<b>Mechanical life:</b>	$10 \times 10^6$ switching cycles

### General data

<b>Operating mode:</b>	Continuous operation
<b>Temperature range:</b>	$\pm 0 \dots + 50$ °C
<b>Clearance and creepage distances</b>	
overvoltage category / contamination level:	4 kV / 2 IEC 60 664-1
<b>EMC</b>	
Electrostatic discharge:	8 kV (contact) IEC/EN 61 000-4-2
HF-irradiation:	10 V / m IEC/EN 61 000-4-3
Fast transients:	2 kV IEC/EN 61 000-4-4
Surge voltages	
between	
wires for power supply:	1 kV IEC/EN 61 000-4-5
between wire and ground:	2 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011
<b>Degree of protection:</b>	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
<b>Housing:</b>	Thermoplastic with V0 behaviour according to UL subject 94
<b>Vibration resistance:</b>	Amplitude 0,35 mm IEC/EN 60 068-2-6 frequency 10 ... 55 Hz
<b>Shock resistance:</b>	
Acceleration:	10 g
Duration of impuls:	16 ms
Number of shocks:	1000 per axis on all three axes
<b>Climate resistance:</b>	0 / 050 / 04 IEC/EN 60 068-1
<b>Terminal designation:</b>	EN 50 005
<b>Wire connection:</b>	1 x 4 mm <sup>2</sup> solid or 1 x 2,5 mm <sup>2</sup> stranded ferruled (isolated) or 2 x 1,5 mm <sup>2</sup> stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2,5 mm <sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3
<b>Wire fixing:</b>	Box terminal with wire protection, removable terminal strips
<b>Mounting:</b>	DIN rail IEC/EN 60 715
<b>Weight:</b>	320 g

### Dimensions

<b>Width x height x depth</b>	
BH 5903:	45 x 84 x 121 mm
BL 5903:	90 x 84 x 121 mm

## Standard type

BL 5903.03/00000 AC 230 V

Article number:

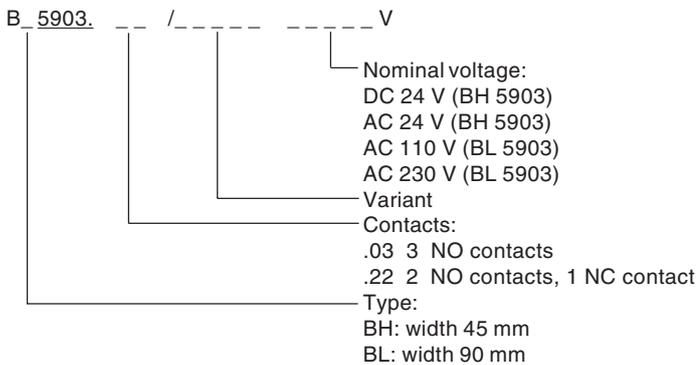
0053510

- Output: 3 NO contacts
- for 1 E-stop loop, 2 channel operated
- Nominal voltage  $U_N$ : AC 230 V
- Width: 45 mm

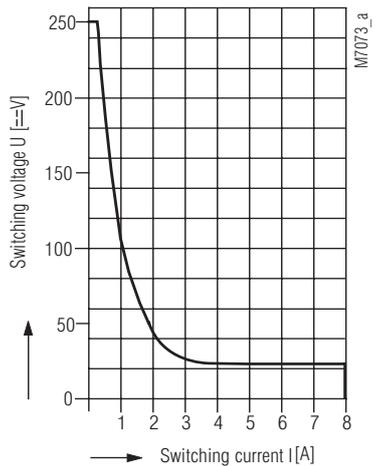
## Variants

- BH 5903.\_./00000: for 1 E-stop loop 2- channel operated
- B\_ 5903.\_./00020: for 2 E-Stop loops singel channel operated
- BH 5903.\_./61: with UL-approval

## Ordering example for variant



## Characteristics



safe breaking, no continuous arcing  
 under the curve, max. 1 switching cycle/s

Continuous limit curve

## Fault indication by flashing code

The failure codes are displayed by a flashing sequence of the upper yellow LEDs run 1, run 2. Flashing frequency: env. 0,5 s on, 0,05 s off, end of the sequence: env. 2 s off. It is possible that the two processors show different failure codes.

If a failure is displayed, the relays K1 and K2 are switched off.

The module BH 5904 shows 2 types of failure codes:

### 1. FAILURE type 1:

These failures are serious and do not allow further operation of the module. They are indicated only by the LEDs run 1 and / or run 2 of the module. The semiconductor outputs 48 and 58 are both switched off. The module can only be reset by switching the power supply off and on again.

### 2. FAILURE type 2:

This failure is concerning the function faults in conjunction with the safety controller and / or the monitored valve. The module can only be reset by switching the power supply off and on again or by pressing the reset button.

## Fault indication by flashing code

### Failure type 1

No. *)	Description	Measures and notes
0	Internal module failure (LEDs are continuously off)	If both LEDs stay off, the module is defective and has to be repaired.
5	Adjustment failure	1) The settings of the 2 channels are not identically. 2) The selected setting is not permitted.
6	Undervoltage detection  Overvoltage detection	Left LED is flashing: The supply voltage dropped below the permitted value (< approx. $0,85 U_N$ ) Right LED is flashing: The supply voltage went over the permitted value (> approx. $1,15 U_N + 5\%$ residual ripple)
7	Input failure	1) A short circuit has been detected on the inputs of the unit. 2) The 2 signals of a 2-channel sensor (feed back circuit, start signal of controller, valve) do not correspond (short circuit, broken wire or other fault)
8	Failure on relays K1 or K2	Check circuit and current. Module has to be repaired.
9	Internal module failure	Please try to evaluate the circumstances that lead to this fault and check with the supplier or manufacturer.
10		
11		
12	Internal module failure	The module has to be repaired.
13		

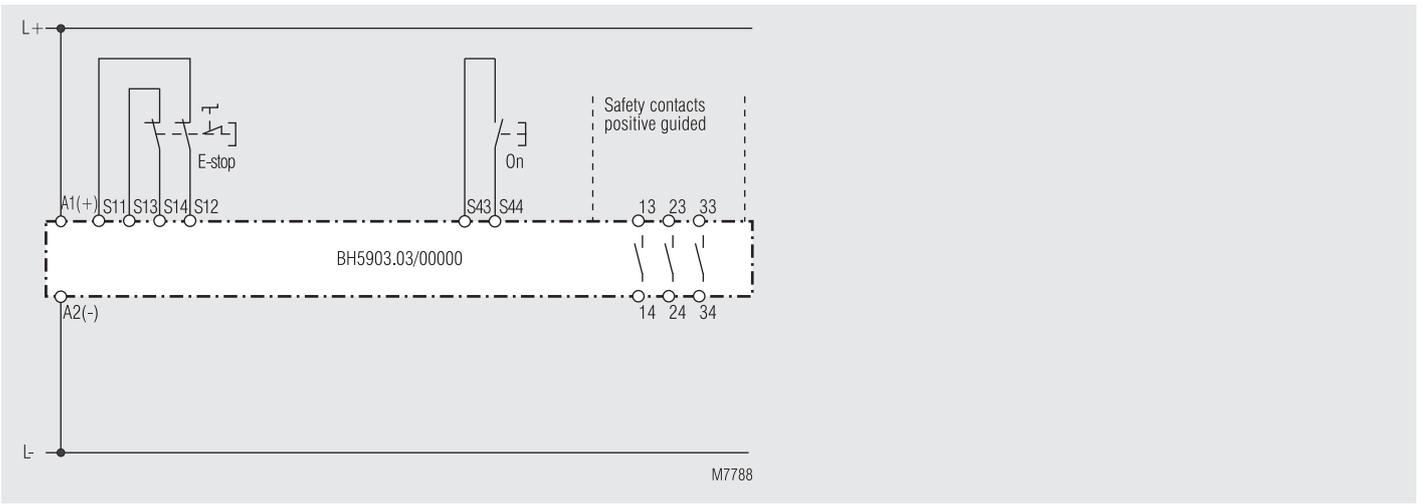
\*) No.: Number of flash pulses in series

### Failure type 2

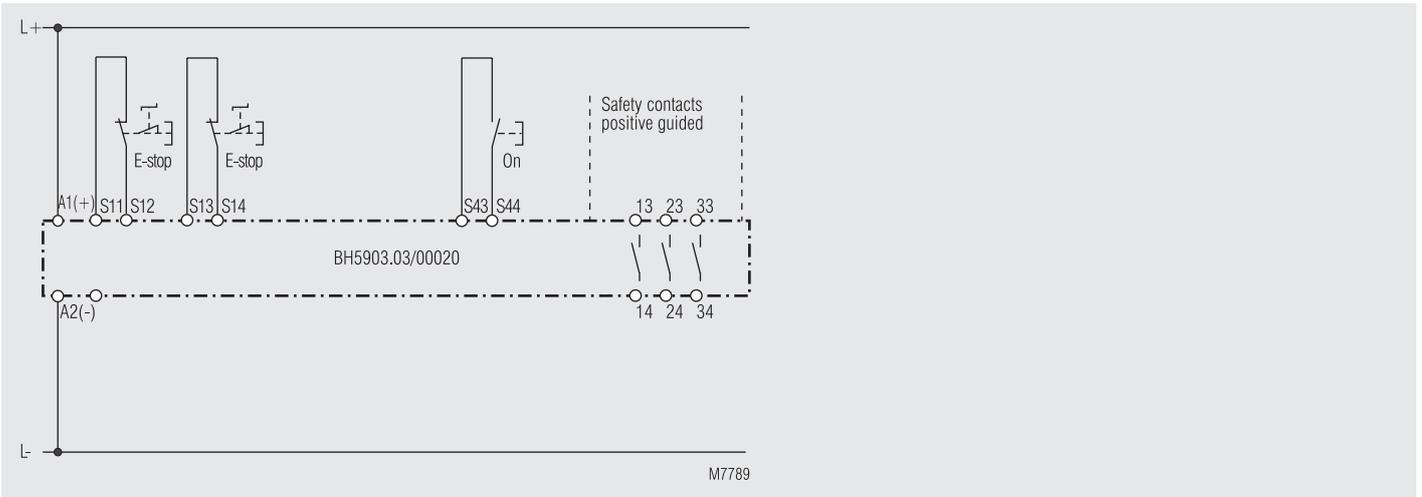
No. *)	Description	Measures and notes
1	E-stop acitvated	
2	Fault on reset button	1) The start button must no be pressed longer then 3 sec. 2) During start up of the unit and initialising the start button must not be pressed
4	Switch off fault	The unit showed already a fault before switching off

\*) No.: Number of flash pulses in a series

## Application examples



BH5903.03/00000 with one E-Stop loop (2-channel), automatic restart after phase failure and manual restart after E-stop. Automatic reset ist only active when no E-Stop was operated before phase failure.



BH5903.03/00020 with two E-Stop loops (single-channel), automatic restart after phase failure and manual restart after E-stop. Automatic reset ist only active when no E-Stop was operated before phase failure.