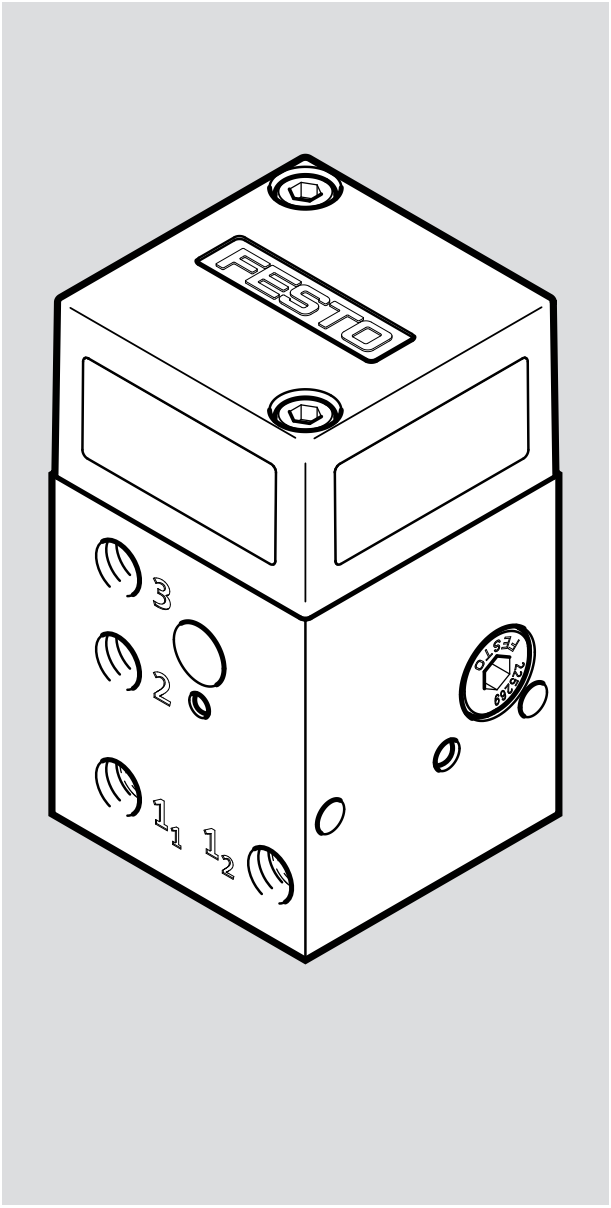
ZSB-1/8-B

Control block for two-hand start



FESTO

Operating instruction

8166273
8166273
2022-08c
[8166275]

Translation of the original instructions

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1 About this document

1.1 Applicable Documents

All available documents for the product ➔ www.festo.com/sp.

1.2 Product labelling

- Observe the specifications on the product.

The product labelling is located on the right side of the device. The product labelling enables identification of the product and shows the following information, for example:

Product labelling (example)	Meaning
ZSB-1/8-B	Order code
576656	Part number
MM-YYYY : XX	MM = manufacturing month YYYY = manufacturing year XX = plant number
ISO 13851: TYPE III A	Standard designation
0.4 – 0.8 MPa (58 –120 psi)	Operating pressure
CE, UKCA	Identification

Tab. 1: Product labelling (example)

1.3 Specified standards

Version	
ISO 8573-1:2010-04	EN ISO 13849-1:2015-12
EN ISO 13851:2019-04	EN ISO 13849-2:2012-10
EN 60068-2-27:2009-05	

Tab. 2: Specified standards

2 Safety

2.1 Safety instructions

– Only use the product in its original condition without unauthorised modifications.
– Only use the product if it is in perfect technical condition.
– Observe the identifications on the product.

2.2 Safety function in accordance with ISO 13851

The control block for two-hand start is a Type III A two-hand control system according to ISO 13851. It has been developed and manufactured according to the pertinent fundamental and proven safety principles of EN ISO 13849-2. The control block for two-hand start has structural properties that enable Performance Level c / Category 1 to be achieved for implementation of the safety function.

The control block for two-hand start is not a complete safety solution. It can be used as part of a safety solution. The achievable safety level of the system depends on the other components used to implement the safety function. The operator is responsible for specification of the safety function.

2.3 Intended use

The control block for two-hand start is intended only for the manual triggering of a control signal by a simultaneous activation of two actuators.
The control block for two-hand start is intended for installation in machines or automation systems.
The control block for two-hand start can only be used in standard operation. This also includes downtime, setup mode, service mode and emergency mode.

2.4 Foreseeable misuse

The following are examples of foreseeable misuse and are not approved as intended use:
- Outdoor use
- Bypass of the safety function

2.5 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with pneumatic (open-loop) control technology.
The qualified personnel must be familiar with the following information:
- Applicable instructions for operating safety engineering systems.
- Applicable instructions for accident prevention and occupational safety.

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Only authorised and appropriately trained personnel are permitted to work on safety-related systems.

2.6 Product conformity

The product-relevant directives are listed in the declaration of conformity ➔ www.festo.com/sp.

Product conformity	
CE	in accordance with EU Machinery Directive
UK CA	to UK Supply of Machinery Regulations

Tab. 3: Product conformity

2.7 Safety engineering approval

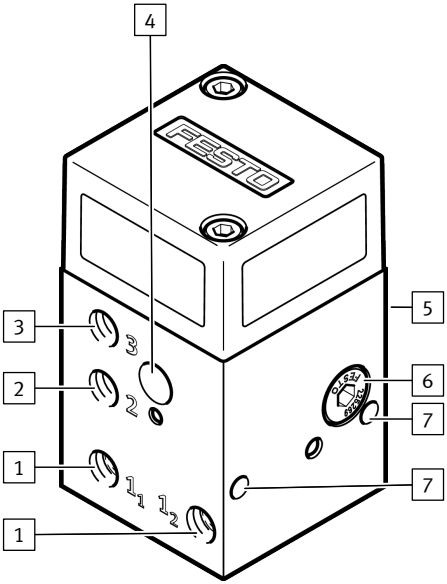
The product is a safety device in accordance with the Machinery Directive. For details of the safety-oriented standards and test values that the product complies with and fulfils, see ➔ 2.2 Safety function in accordance with ISO 13851.

3 Additional information

- Contact the regional Festo contact if you have technical problems ➔ www.festo.com.
- Accessories ➔ www.festo.com/catalogue.

4 Product overview

4.1 Product design



1 Port for inlets (1.1) and (1.2), size G 1/8
2 Port for outlet (2), size G 1/8
3 Port for exhaust (3), size G 1/8
4 Filter for venting hole
5 Blind holes with mounting thread (rear)
6 Screw with filter element
7 Through-holes for mounting

Fig. 1: Product design

4.2 Function

The control block for two-hand start is a pneumatic AND gate. If pneumatic signals are sent to the inputs (1_1) and (1_2) with a maximum time delay of 0.5 seconds, an output signal is sent at the outlet (2).

The control block for two-hand start is controlled via 2 external, manually operated pushbutton valves.

- The outlet port (2) is pressurised while both pushbutton valves are actuated.
- If one or both external pushbutton valves are released, the outlet (2) is depressurised. The system is exhausted from outlet (2) to exhaust (3).

To trigger another output signal, release both pushbutton valves and press them again.

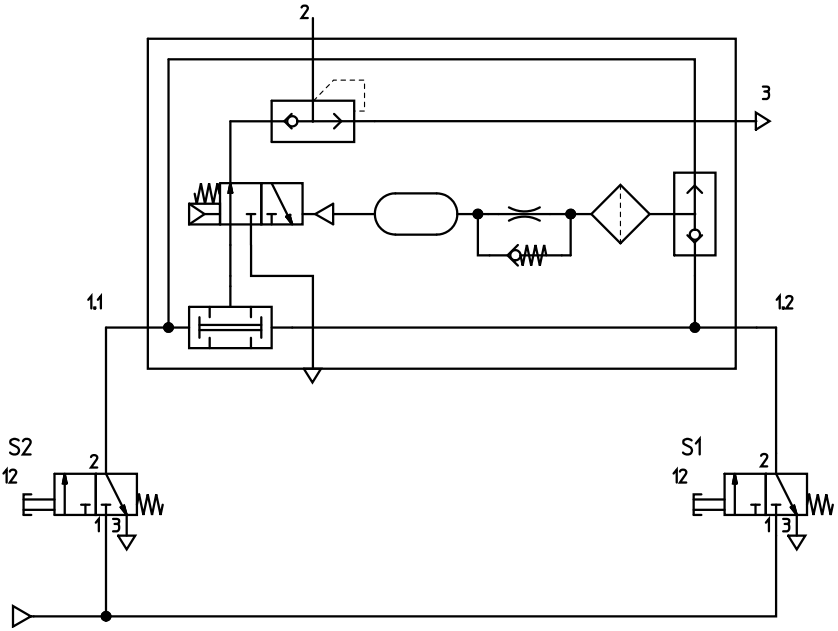


Fig. 2: Example of a simple actuation

5 Assembly

5.1 Mounting

1. Place the control block for two-hand start in such a way that the filter of the venting hole is not covered.
2. Mount the control block for two-hand start with 2 M5 retaining screws:
   – via the through holes, hole spacing 40 mm or
   – via the fastening threads, hole spacing 38 mm
3. Install two 3/2-way pushbutton valves ➔ Fig. 2.

6 Installation

6.1 Pneumatic installation

Requirement: Use hoses with the same nominal width and length between the pushbutton valves and control block for two-hand start.

1. Connect the pneumatic ports according to the system's pneumatic circuit diagram.
2. If necessary, screw in a silencer on the exhaust (3).

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   Suitable silencer ➔ 3 Additional information.

3. Clamp the hoses to the system.

7 Commissioning

7.1 Preparing commissioning

1. Pressurise the system.
2. Set an operating pressure of at least 0.4 MPa (4 bar, 58 psi).
3. Perform a functional test ➔ 7.2 Performing functional test.

7.2 Performing functional test

1. Make sure that there is an operating pressure of at least 0.4 MPa (4 bar, 58 psi) at the two pushbutton valves.
2. Pressurise the inlets (1_1) and (1_2) according to the signal sequence shown in the figure below ➔ Fig. 3.
3. At each step, check whether the outlet (2) responds as in the following figure ➔ Fig. 3.

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The time offset between the inlet signals (steps 7 and 8) must be no more than 0.5 s.

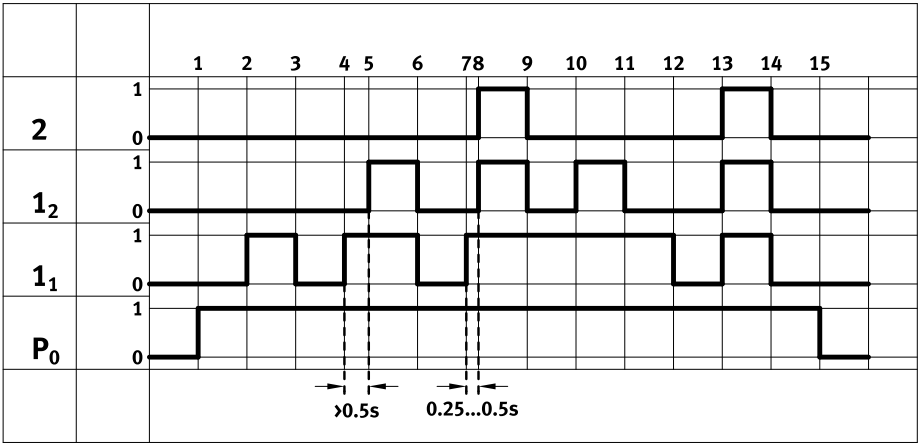


Fig. 3: Functional test, step 1 ... 15

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The maximum permissible time offset between the inlet signals (1_1) and (1_2) (step 7 and 8) depends on the operating pressure and the ambient temperature. The higher the operating pressure and ambient temperature, the smaller the time offset needs to be.

8 Operation

8.1 Checking operational reliability

1. Perform the functional test monthly ➔ 7.2 Performing functional test.
2. Keep a record of the results of the functional tests.

9 Maintenance

9.1 Disassembly

1. Exhaust the entire system and control block for two-hand start.
2. Remove the control block for two-hand start from the system.

9.2 Cleaning

1. Depressurise the control block for two-hand start.
2. Unscrew the screw with the filter element.

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   Do not lose the seal.

3. Clean the components of the control block for two-hand start only with the following cleaning agents ➔ Tab. 4 Overview of cleaning agents and cleaning intervals.
4. Replace the screw with the filter element.
   – Tightening torque: 0.3 Nm ± 40%
5. Perform a functional test ➔ 7.2 Performing functional test.

Component	Cleaning supplies	Cleaning interval
Housing	Water, maximum 60 °C	If required
Screw with filter element	– Compressed air – Water, maximum 60 °C – Petroleum ether	– every six months or – after 100,000 switching cycles
Silencers		

Tab. 4: Overview of cleaning agents and cleaning intervals

10 Malfunctions

10.1 Fault clearance

Malfunction	Possible cause	Remedy
Outlet (2) is depressurised although both inlets are simultaneously pressurised (t ≤ 0.5 s).	Input pressure too high	– Reduce the pressure at the inlet (1_1) and inlet (1_2).
Pressure reduction at outlet (2) takes too long.	Hose connection fault	– Use short hose assembly. – Avoid angle fittings.
	Silencer dirty	– Clean or replace silencer.
Air exit at exhaust (3) if both inlets are pressurised at the same time (t ≤ 0.5 s).	Functional fault	➔ 11 Disposal

Tab. 5: Malfunction table

11 Disposal

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For the purpose of quality assurance, Festo is interested in the return of replaced control blocks for two-hand start.

- Please get in touch with your regional Festo contact person for the conditions for the return shipment.

When the end of the service life has been reached, disassemble and dispose of the control block for two-hand start. Observe the local regulations when disposing of the control block for two-hand start and the packaging.

12 Technical data

12.1 General technical characteristics

ZSB		
Product weight	[g]	420
Operating pressure[1)]	[MPa]	0.4 ... 0.8
	[bar]	4 ... 8
	[psi]	58 ... 120
Standard nominal flow rate	[l/min]	50
Ambient temperature [2)]	[°C]	0 ... 60
Nominal width	[mm]	4
Actuation type		Pneumatic
Mounting position		Any
Type of mounting		– with through-hole – with female thread
Information on materials: Seals		NBR
Information on housing materials		Anodised wrought aluminium alloy

1) At ambient temperatures below 10 °C, an operating pressure of at least 0.6 MPa (6 bar, 87 psi) must be maintained.
2) Use suitable compressed air if the minimum temperature is below 1 °C. This prevents condensation from freezing.

Tab. 6: General technical characteristics

Shock resistance according to IEC 60068: Part 2-27		
Acceleration [m/s²]	Duration [ms]	Shocks per direction
±300	11	5

Tab. 7: Shock resistance

12.2 Characteristic pneumatic values

ZSB	
Operating medium[1)]	Compressed air to ISO 8573-1:2010 [7:4:4]
Residual oil content with use of ester oils [mg/m³]	< 0.1, corresponds to ISO 8573:2010 [–:–:2]
Information on the operating medium	Lubricated operation possible, in which case lubricated operation will always be required.
Pneumatic connection	G 1/8
Corrosion resistance class	1
Internal exhaust	unmounted
quick exhaust	Available
Permissible leakage after mounting under nominal conditions at port (2) [l/h]	0.5
Switching operation: maximum offset of the pilot signals[2)] [s]	0.5

1) The pressure dew point must be at least 10 K lower than the temperature of the medium, otherwise moisture in the expanded compressed air will freeze.
2) The higher the operating pressure the lower the maximum offset time.

Tab. 8: Characteristic pneumatic values

12.3 Safety engineering characteristics

Approval information, safety engineering	
CE	
Type-examination	The functional safety engineering of the product has been certified by an independent testing body, see EC-type examination certificate ➔ www.festo.com/sp
Certificate issuing authority	IFA, Certification Body of Machinery, NB 0121
Certificate no.	IFA 1201046
UKCA	
Type-examination	The functional safety engineering of the product has been certified by an independent body, see UK-type examination certificate ➔ www.festo.com/sp
Certificate issuing authority	Intertek Testing & Certification LTD, Approved Body for Machinery, No. 0359
Certificate no.	UK-MCR-0080

Tab. 9: Approval information, safety engineering

General safety reference data	
Safety level	In accordance with EN ISO 13849
Maximum achievable category	1
Maximum achievable performance level	PL-c
Service life value B_{10}	1 million switching cycles
Probability of failure per hour (PFH_D) [1/h]	≤ 200,000 actuations/year: 1.14 x 10-6 > 200,000 actuations/year ➔ Fig. 4
Duration of use T_M	20 a
Well-tried component	Yes
Fault exclusion[1)]	– Deformation due to overloading – Automatic change of the initial switching position without inlet signal – Rupture of the valve housing – Breakage of moving component
Type of two-hand control	Type III A according to EN ISO 13851
Design features	– Overlap – Mechanical spring return – Poppet valve with spring return

1) Faults that do not need to be taken into consideration by the user when analysing possible faults of a safety-related part of a control system.

Tab. 10: General safety reference data

PFH_D value

The PFH_D value of the subsystem can, for example, be calculated with SISTEMA using the following values:

– Service-life value B_{10D} = 2 x B10 in accordance with EN ISO 13849-1, Table C.1, Note 1
– Average annual number of actuations (n_{op})

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SISTEMA: software wizard for “Evaluation of safety-related machine applications according to EN ISO 13849.

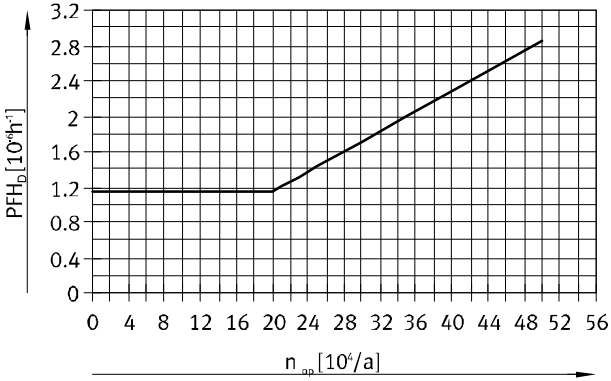


Fig. 4: PFH_D value as a function of the average number of actuations per year (n_{op})

The PFH_D value was calculated with SISTEMA in expert setting with limitation of the $MTTF_D$ value to 100 years.

Operating time

Observe the operating time (T_{10D} in accordance with EN ISO 13849-1, C.3) of the control block for two-hand start. The operating time is a function of the service life characteristic (B_{10D}) and the average number of annual actuations (n_{op}). The operating time can be shorter than the specified duration of use depending on the application. The control block for two-hand start must be replaced by the end of the duration of use at the latest.

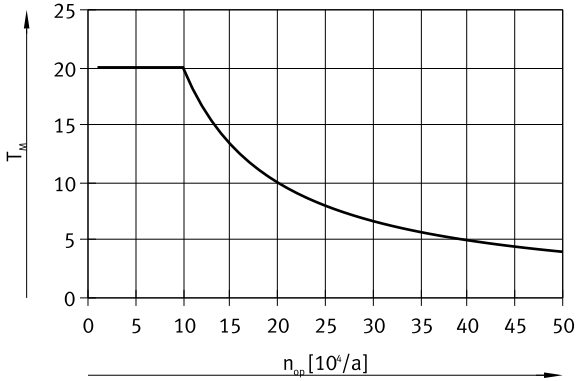


Fig. 5: Operating time T_{10D}

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