

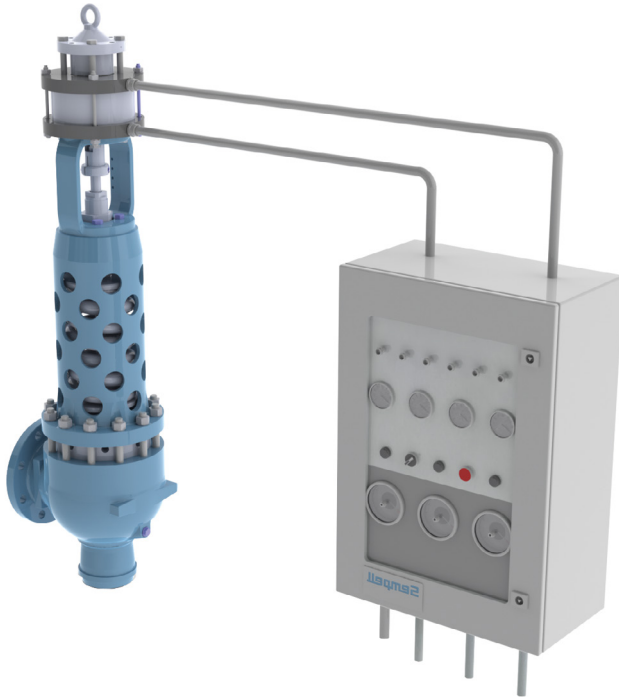


EMERSON™

SEMPPELL PNEUMATIC CONTROL UNIT FOR SAFETY VALVES

TYPE CSPRS

Pneumatic control unit to operate spring loaded safety valves as Controlled Safety Pressure Relief System (CSPRS), according to EN ISO 4126-5.



FEATURES

- All control paths are 3 times redundant and the unit works according to the fail-safe principle
- High tightness up to set pressure due to supplementary load
- Small opening and closing pressure differences
- Lifting of the safety valve even below set pressure
- Control function can be checked without operation of the safety valve
- No electrical energy supply necessary
- Ideally suitable for explosion protection
- System pressure shown at pressure switch
- One unit can operate more than one safety valve
- Compact
- Easy to operate

GENERAL APPLICATION

- Controlled Safety Pressure Relief System (CSPRS) with 3 times redundant control paths and fail-safe function
- Pneumatic assisted operation on safety valve helps to increase efficiency
- Advantages of direct-acting safety valve is combined with the advantages of controlled safety valves

TECHNICAL DATA

Qualification: TÜV type tested

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DESCRIPTION

Each operating component is installed in a control console. Thus, a compact control device is created.

The control device operates according to the closed-circuit principle, the safety valve to the relief principle.

Closed-circuit principle

In case of failure of the energy supply (compressed-air supply), the supplementary loading is removed.

Relief principle

For opening the safety valve, the supplementary loading is removed.

USE

The pneumatic safety device Model STE 5 serves to control the supplementary loading at direct-acting spring-loaded safety valves.

By means of the supplementary loading, the system to be protected, can be operated with a higher operating pressure. Thus, the efficiency is increased. At this, the margin between set pressure of the safety valve and operating pressure of the system can be less than 10% of the set pressure. As the supplementary loading normally is equivalent to at least 30% of the spring force of the safety valve, additional and increased tightness is reached at the valve seat (also close by the set pressure).

Lifting of the safety valve below the set pressure is also possible (sliding pressure operation). With one control device, several safety valves of a system can be controlled.

The pneumatic safety device, Model STE 5 in EX-design (ATEX), is suitable for use in ATEX zone 1.

INSTALLATION

Attach the control device free from vibrations. The connection between control device, pneumatic actuator and control air piping takes place free of stress through elastic compressed-air hoses. To minimize the regulating times of the safety valve, execute compressed-air lines between control device and safety valve as short as possible. The admissible control line lengths depend on the following factors: number and size of pneumatic cylinder; and admissible delay time or regulating time of the safety valve depending on the rate of pressure increase in the system to be protected.

Before assembling of the control air lines, clean these by discharging with compressed-air. For control air supply, filtered and dried compressed-air must be available.

Lay pressure tapping lines in such manner that a sufficiently large condenser to the control device (at least 1.5 m) is available for hot medium. On part of the customer, provide weather protection for outdoor systems.

Additionally, protect pressure tapping lines against freezing. Therefore, an electrical trace heating in the control device can be optionally provided.

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MODE OF OPERATION (Refer to schematic diagram on page 4.)

In working condition, prepared compressed-air stands in the loading air chamber B of the pneumatic cylinder and acts as additional closing force (supplementary loading) on the spindle of safety valve. The 3/2-way control valves (Y1-Y3) are opened and release the loading air to the pneumatic actuator. The 3/2-way control valve (Y4) is closed and blocks the lifting air supply. At the same time, the bottom side of piston (H) is connected with the atmosphere.

If the system pressure increases above the set pressure adjusted at the pressure switches, the control valves (Y1-Y3) are reversed. The loading air escapes into the atmosphere. At the same time, control valve (Y4) is actuated and opens the connection to chamber (H) below the pneumatic piston. Lifting air pressure is applied. The safety valve opens.

In case of failure of the lifting air, the safety valve operates as spring-loaded, direct-acting safety valve.

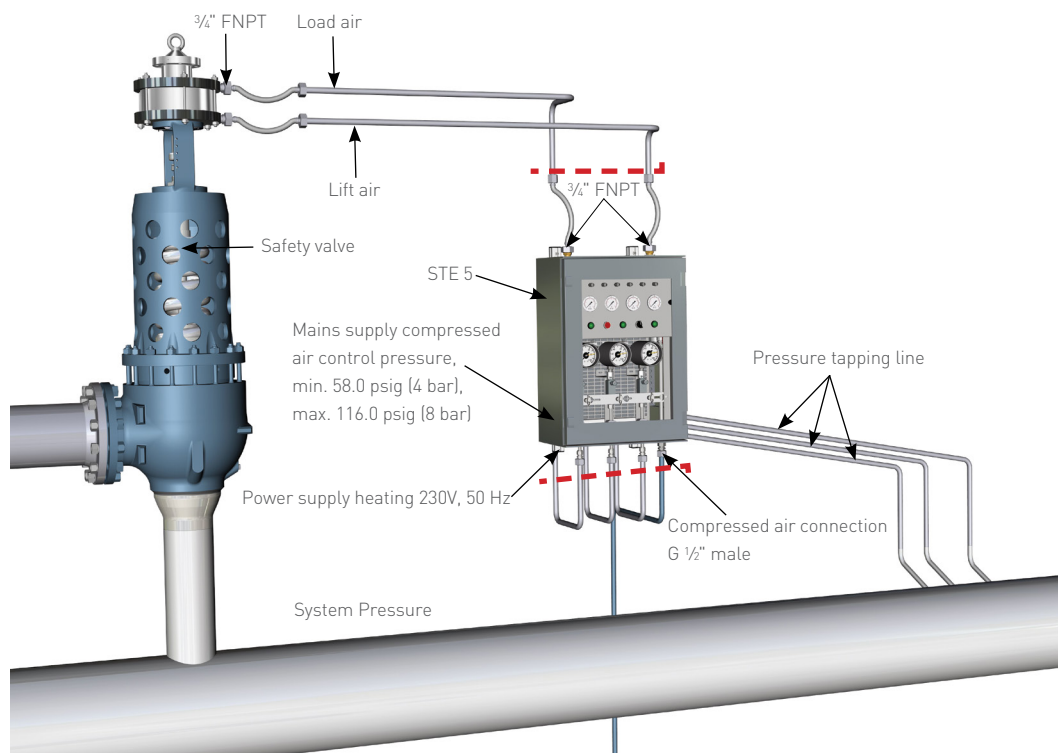
If the system pressure drops below the closing pressure of the pressure switches, each control valve (Y1-Y4) is switched down. The lifting air pressure to the atmosphere is decreased and the lifting air is applied again. The safety valve closes.

Each switch state and compressed-air value is signaled by corresponding indications.

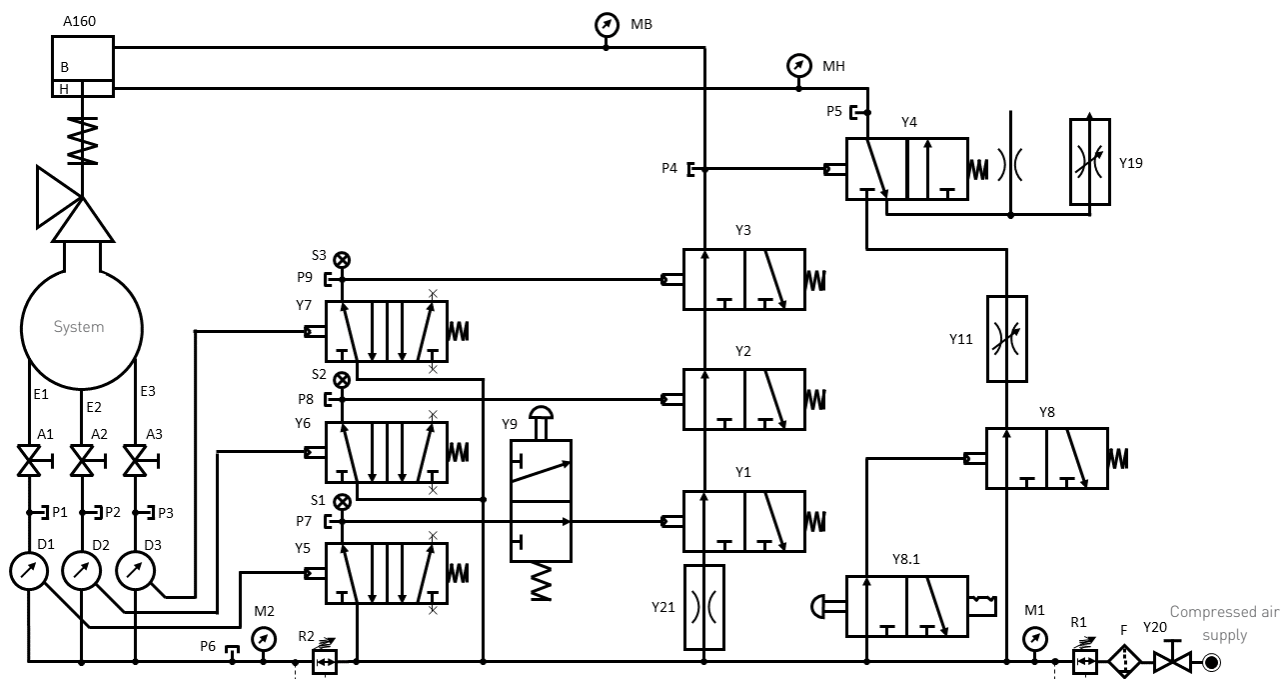
The safety valve can compulsorily be opened below the set pressure by a hand switch at the control device by means of lifting air. An actuation from the control room or a load-controlled control can also be provided (through solenoid valve Y10, option).

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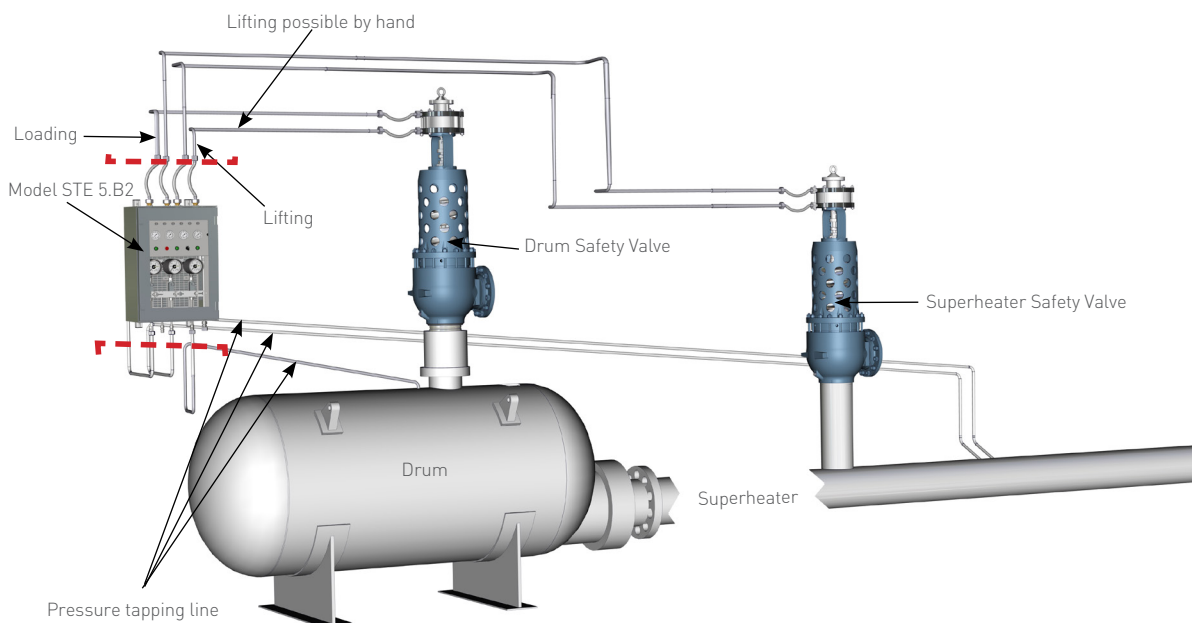
- - - Refer to schematic diagram below.



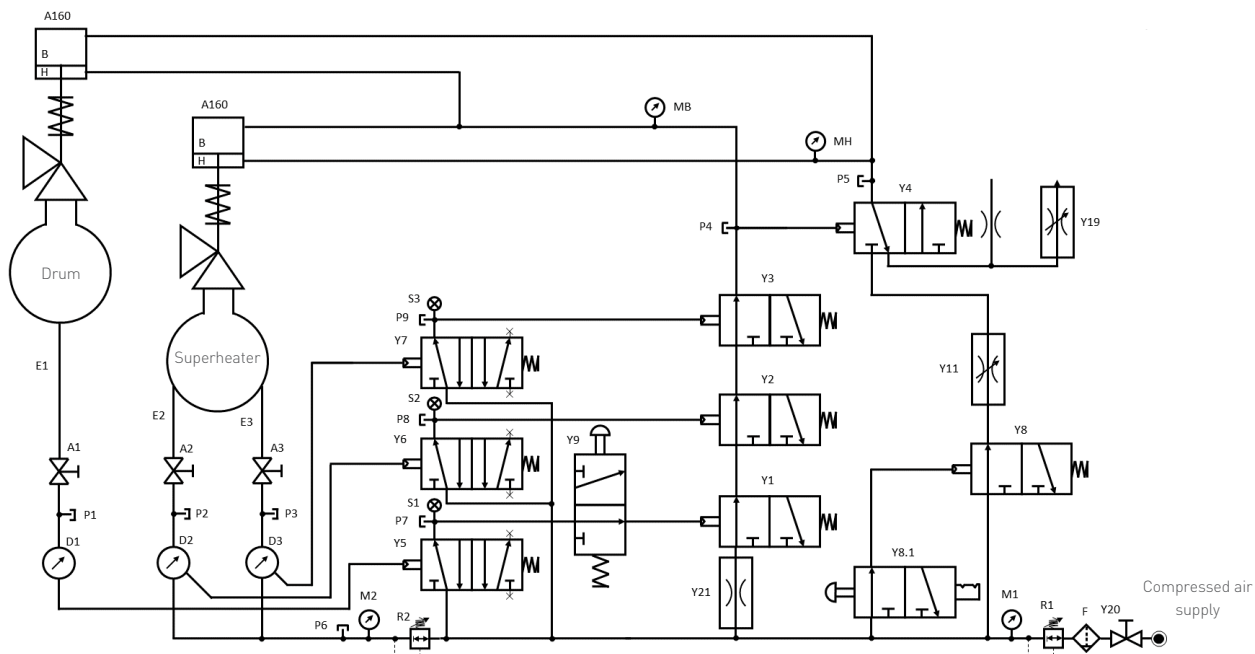
Operating condition,
72.5 psig (5 bar)

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- - - Refer to schematic diagram below.



Operating condition,
72.5 psig [5 bar]

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PARTS LIST

NO.	PART NAME	NOTES
A1	Stop valve	-
A2	Stop valve	-
A3	Stop valve	-
D1	Pressure switch	1
D2	Pressure switch	1
D3	Pressure switch	1
E1	Pressure tapping line	-
E2	Pressure tapping line	-
E3	Pressure tapping line	-
G	Valve interlock	-
F1	Fine filter	-
R1	Control valve	-
F2	Fine filter	-
M1	Gauge 0 - 10 bar	-
MH	Gauge 0 - 10 bar	-
MB	Gauge 0 - 10 bar	-
M2	Gauge 0 - 2.5 bar	-
P1	Test connection	-
P2	Test connection	-
P3	Test connection	-
P4	Test connection	-
P5	Test connection	-
P6	Test connection	-
P7	Test connection	-
P8	Test connection	-
P9	Test connection	-
R2	Control valve 0 - 2 bar	-
S1	Optical indication	-
S2	Optical indication	-
S3	Optical indication	-
Y1	3/2-way valve 1/2 inch	1
Y2	3/2-way valve 1/2 inch	1
Y3	3/2-way valve 1/2 inch	1
Y4	3/2-way valve 1/2 inch	1
Y5	3/2-way amplifier valve	1
Y6	3/2-way amplifier valve	1
Y7	3/2-way amplifier valve	1
Y8	3/2-way valve 1/2 inch	-
Y8.1	3/2-way valve	-
Y9	3/2-way valve	-
Y10 (option)	3/2-way solenoid valve	-
Y11	throttling valve 1/2 inch	-
Y18	3-way ball valve	-
Y20	ball valve	-

NOTE

1. Recommended spare parts.

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SELECTION GUIDE CONTROL UNIT STE5

Type	Example:	STE5	AP	APX	DA	DMK	F	ST	HY	H2	AM	AT	EX	M	PL	PLX	PS	RC	RCX	
Control type																				
Pressure tapping in line in austenite																				
Block and bleed shut-off valve																				
Double shut-off																				
Capillary line	DMK	= Diaphragm seal with capillary line; 3 pressure switches with capillary line; capillary and pressure switches inextricable connected																		
	DMKS	= Diaphragm seal with capillary line; 3 pressure switches with capillary line, capillary and pressure switches inextricable connected, sealing oil and grease free for oxygen application (oil and gas free)																		
Flange connection																				
Welding socket																				
Adjustable hysteresis	HY																			
Heating	H2	= 100 W																		
	H2.3	= 300 W																		
	H2.5	= 500 W																		
	H2-EX	= 100 W, EX protection																		
	H2.3-EX	= 300 W, EX protection																		
	H2.5-EX	= 500 W, EX protection																		
	HX	= 500 W, EX protection with weather protection																		
Failure indicator heating in EX protection																				
Temperature switch for heating in EX-type																				
EX-protection, All electrical parts in EX-protection																				
Monitoring	M	= Lift and load air pressure																		
Monitoring	PL	= Loading air pressure																		
Monitoring	PLX	= Instrument air pressure																		
Monitoring	PS	= Instrument air supply																		
Room	RC	= With solenoid valve Y10																		
Room	RCX	= With solenoid valve Y10 (control function NC)																		

SELECTION GUIDE CONTROL UNIT STE5 (continued)

Type	Example:	AS	B2	C	PH	R3	SE	E	OS	W	X
Control air ports in austenite											
Connection type	B2	= 2 x loading, 1 x lifting and 1 x lifting through ball valve									
	B2V	= 2 x loading, 1 x lifting and 1 x lifting through ball valve sealed in closed position									
Control unit for controlling a safety shut-off device (quick closing valve)	C										
Lifting air version	TH	= Lifting air only via manual switch Y8.1									
	PH	= Switch for permanent lifting air									
Pressure regulator for reducing the load air pressure											
Quick exhaust valves											
Control on standing frame											
Offshore shut-off valve unit	OS										
Weather protection	W	= Weather protection									
	WE	= Weather protection cabinet, double-walled insulated Intertec for temperature -58°F (-50°C), IP 65 with safety glasses									
Further options are added with variable X											

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