SPIROTECH

Maximising Performance for You

INSTRUCTION MANUAL

Safety equipment

for systems above 110 °C
in accordance with EN 12953-6:2011



SPIROEXPAND®

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1. SAFETY

Symbols	
WARNING	This instruction manual is intended for trained qualified personnel! The activities described in it may be carried out only by qualified personnel with appropriate knowledge of electrical installations and of the hydraulic systems described. In high-temperature hot water systems with safety cut-out temperatures above 110 °C, the boiler attendant is normally the person responsible for this!
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2. GENERAL

2.1. Scope of delivery “Safety equipment for systems above 110 °C”

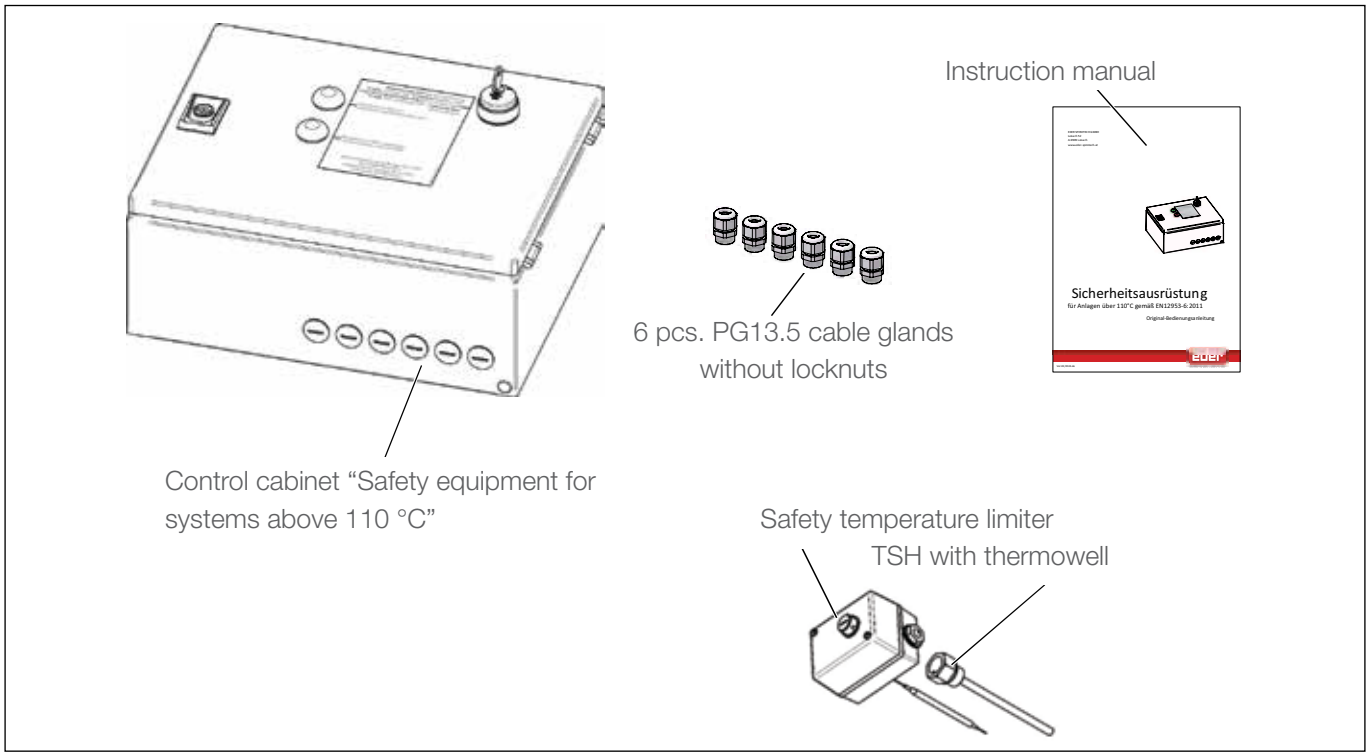


Figure 1: Scope of delivery

Minimum pressure limiter assembly PZA-: one of the versions listed below is included (type depends on the system). If not supplied separately, it is already fitted in the multicontrol / topcontrol control unit.

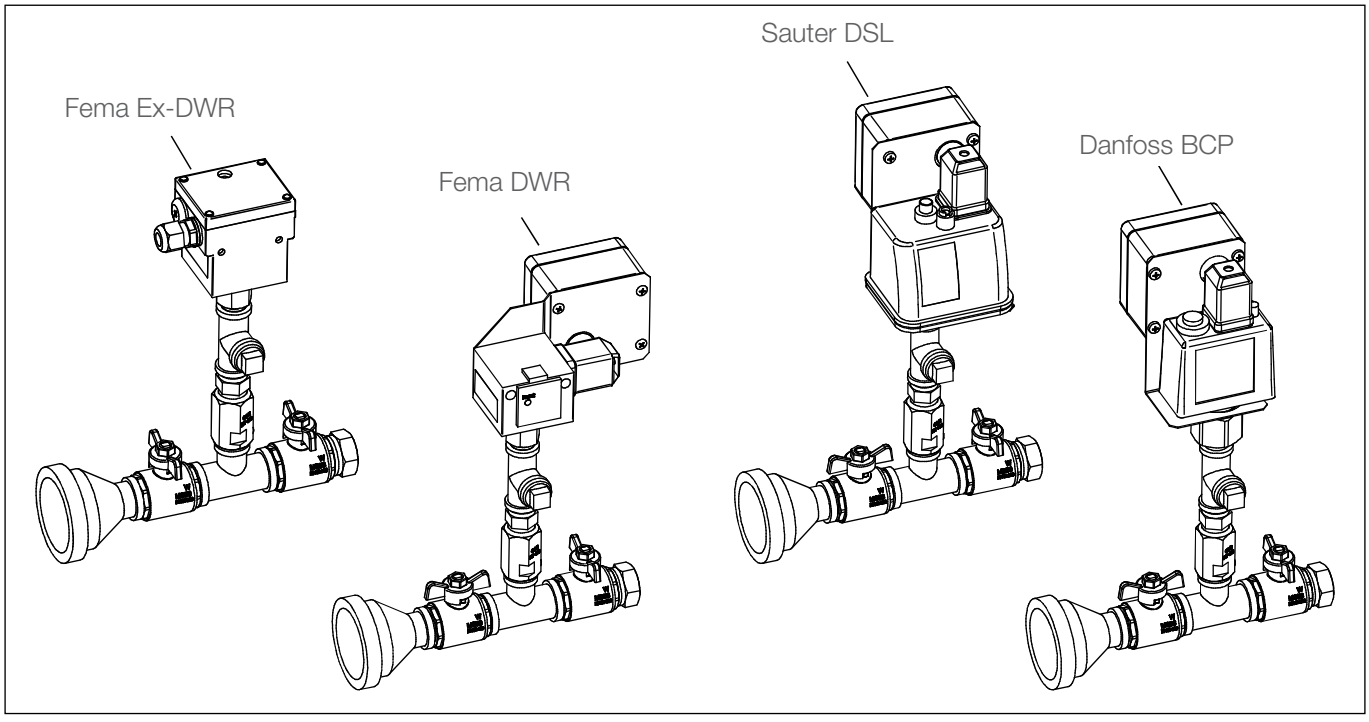


Figure 2: Possible versions of the minimum pressure limiter assembly PZA-

Shut-off valve SOV (closed when de-energised): one of the versions listed below (type depends on the system). If not supplied separately, it is already fitted in the multicontrol / topcontrol control unit, there upstream of each overflow valve.

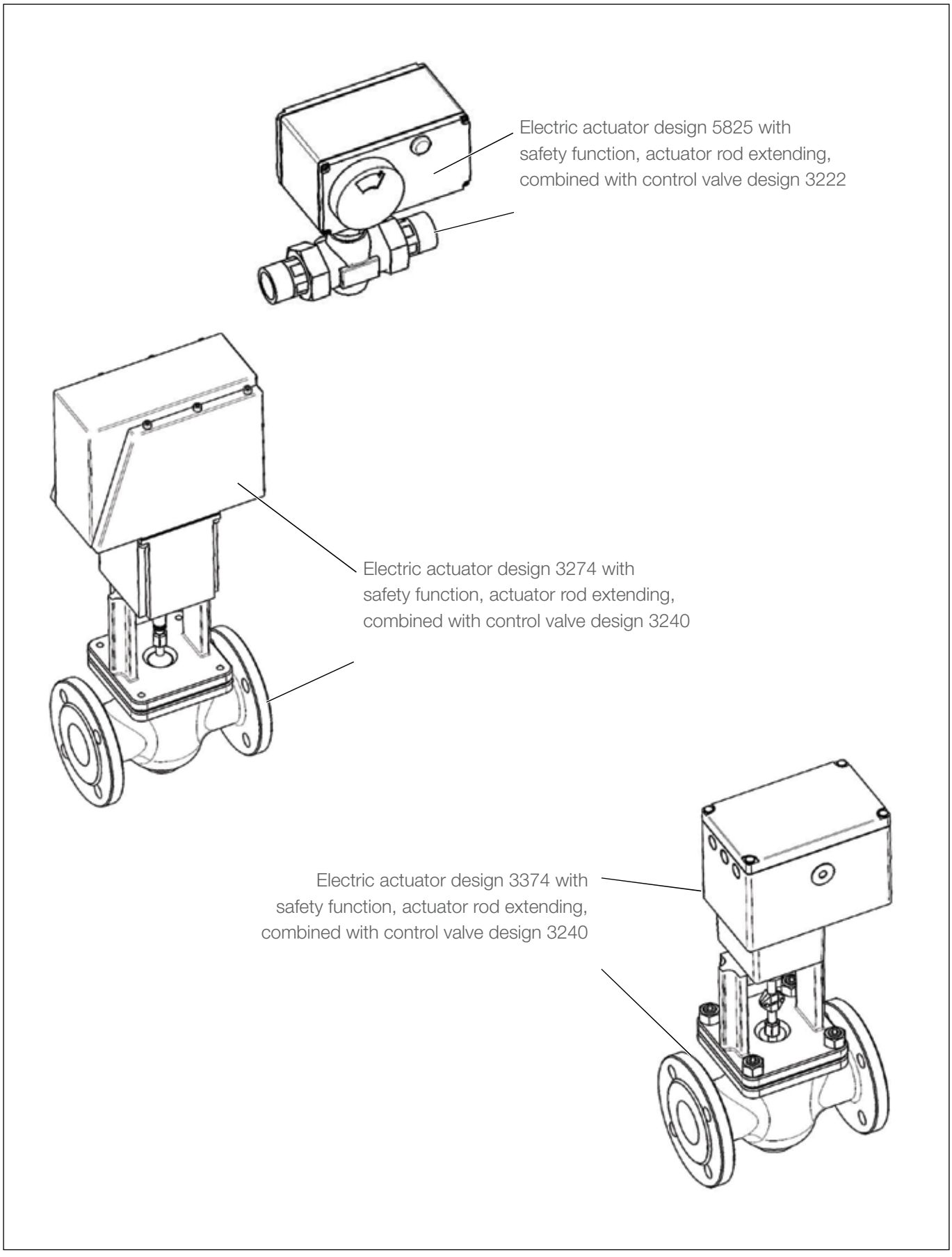


Figure 3: Possible versions of the shut-off valve SOV

2.2. Additionally required for systems above 110 °C

In addition to the scope of delivery of the “Safety equipment for systems above 110 °C”, further items of equipment are mandatory for the operation of such systems (see also the hydraulic connection diagram). The installer of the system must ensure that the following items of equipment are fitted before the system is commissioned:

- At least 1 pc. vessel safety valve PSV with a set pressure of 0.5 bar, sized for the maximum expansion volume flow rate
- At least 1 pc. cooling vessel (= intermediate vessel) if the temperature at the point where the pressurisation system is integrated into the system exceeds 70 °C at least intermittently. Size dimensioned to suit the expansion volume, and construction matched to the maximum operating pressure of the system as well as to the safety cut-out temperature of the system (the required cooling vessel volume may optionally be divided among several individual vessels connected in series)
- To provide the required alarm signalling at LSA+ and LSA-, one of the following communication modules must be fitted in the control unit:
  - Expansion module “binary remote signalling”
  - Expansion module “binary remote signalling & remote acknowledgement”
  - “multicontrol bus module”

2.3. Intended use

The safety equipment for systems above 110 °C, together with the previously listed additionally required items of equipment, extends a pressurisation system by the necessary safety equipment for use as a pump-controlled pressurisation system with an unpressurised expansion vessel in high-temperature hot water systems with safety cut-out temperatures above 110 °C in accordance with clause A.6.1 of EN 12953-6:2011, and for operation of the high-temperature hot water system with or without manual intervention. Pressurisation units of the multicontrol modular (MCM) and topcontrol modular (TCM) series can be used for this purpose.

Fresh water supply and make-up water:
If a make-up module is used for the automatic supply of make-up water, clause “4.8.4 Make-up water” of EN 12953-6:2011 must be observed without fail. Constant monitoring of certain make-up water parameters may in fact be required! Where necessary, this must be provided on site; otherwise automatic make-up may not be permitted!

3. ASSEMBLY

3.1. Hydraulic installation

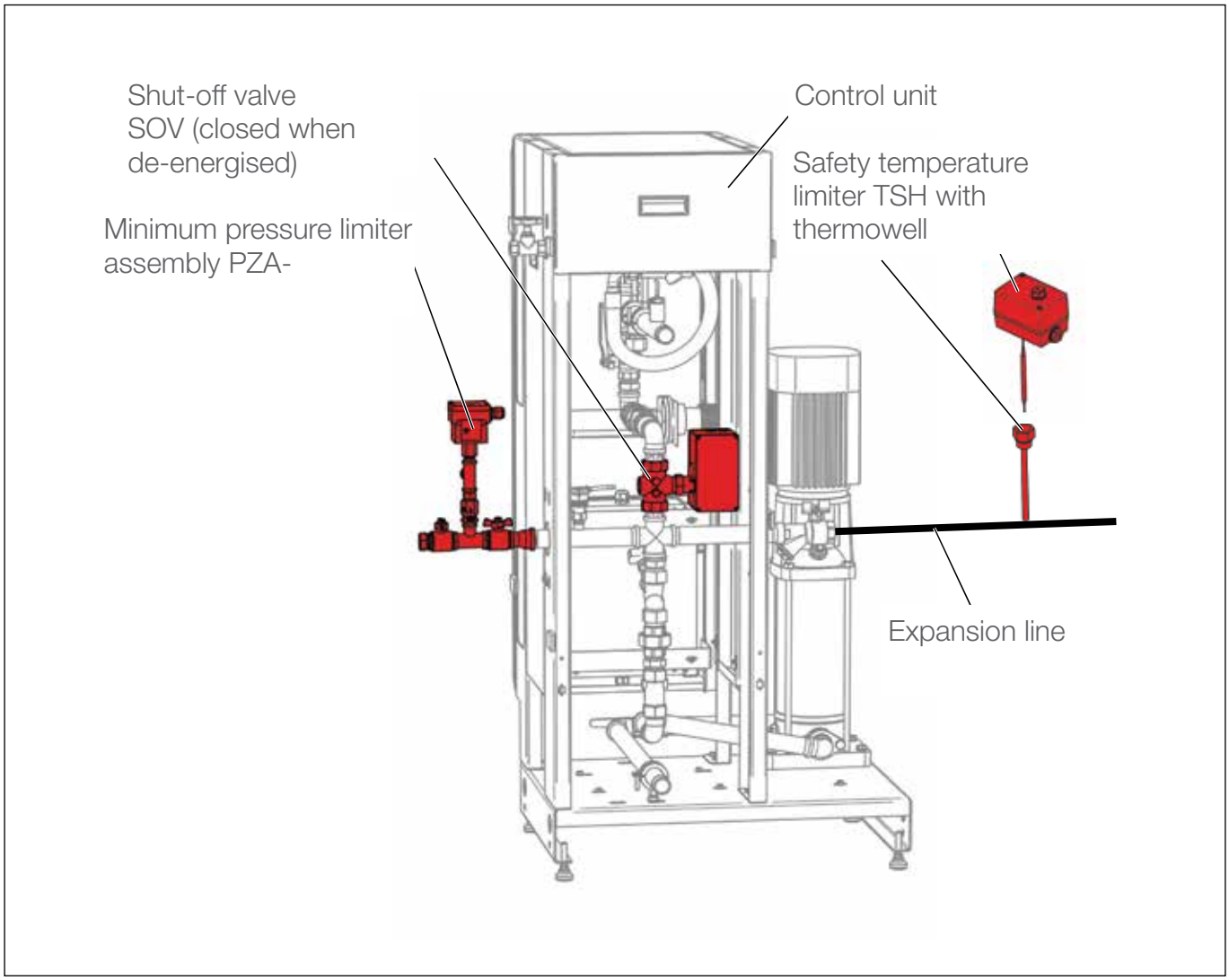


Figure 4: Hydraulic installation

The minimum pressure limiter assembly PZA- must be fitted at the free connection of the expansion line on the control unit. First remove the cap fitted there and screw the minimum pressure limiter assembly on in its place so that it seals.

The shut-off valve SOV is normally already fitted ex works in the control unit, upstream of each overflow valve. The design of the electric actuator with safety function and the design and size of the attached control valve are selected to match the type of control unit. On units of the multicontrol modular MCM-_1 series, the shut-off valve SOV is fitted immediately outside the unit, on its expansion overflow line.

The safety temperature limiter TSH must be integrated into the expansion line between the control unit and the cooling vessel (= intermediate vessel). To this end, its thermowell must be integrated into this line in such a way that the temperature of the medium in the expansion line can be sensed by the safety temperature limiter TSH.

It is recommended that the safety temperature limiter TSH be positioned physically close to the control unit.

On systems above 110 °C, at least one vessel safety valve PSV is mandatory accessory equipment required in addition to the safety equipment and to be ordered separately; it is normally packed with the control unit or with the safety equipment.

The design and size of the vessel safety valve PSV are selected to match the particular system.
This vessel safety valve PSV is sized for the maximum expected expansion volume flow rate with a set pressure of 0.5 bar. The setting is made by individual acceptance by a testing body, together with an individual setting certificate (“TÜV setting certificate”).

This vessel safety valve must be fitted on site in accordance with the following hydraulic diagram.

Important:
- Fit at the same height as the overpressure vent valve(s) on the expansion vessel(s)
- Integrate the vessel safety valve on the inlet side into the overflow line, as close as possible to the control unit (between the control unit and the first expansion vessel)
- Route the discharge on the outlet side of the vessel safety valve freely into a suitable funnel
- Provide the connecting line to the gas-side vessel connection line strictly in accordance with the hydraulic diagram

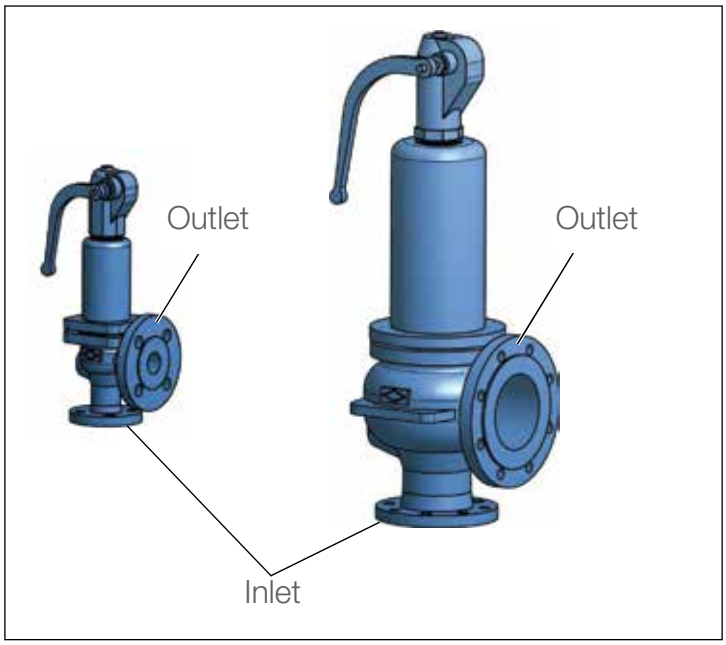
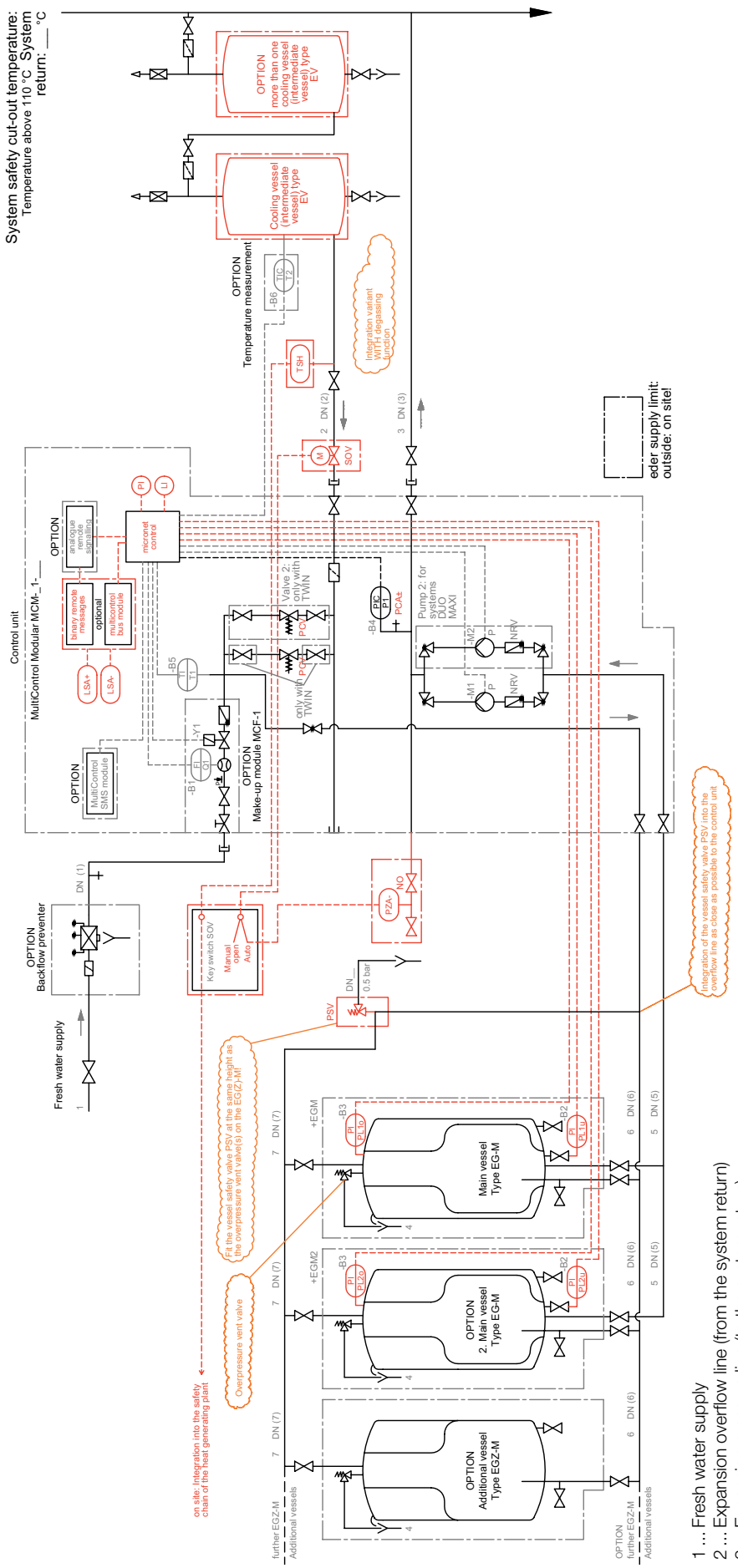


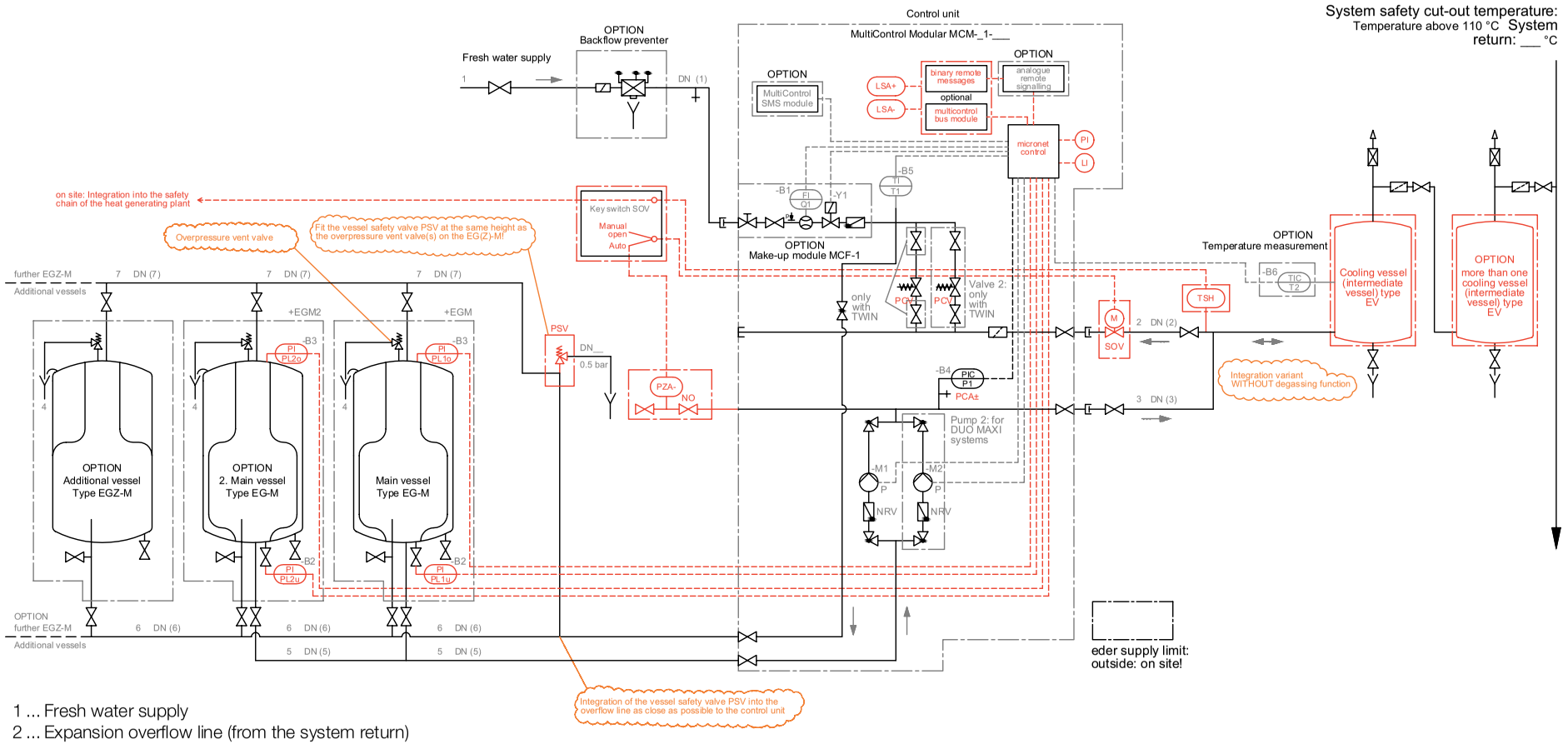
Figure 5: Design examples of the vessel safety valve PSV

3.2. Hydraulic connection diagrams

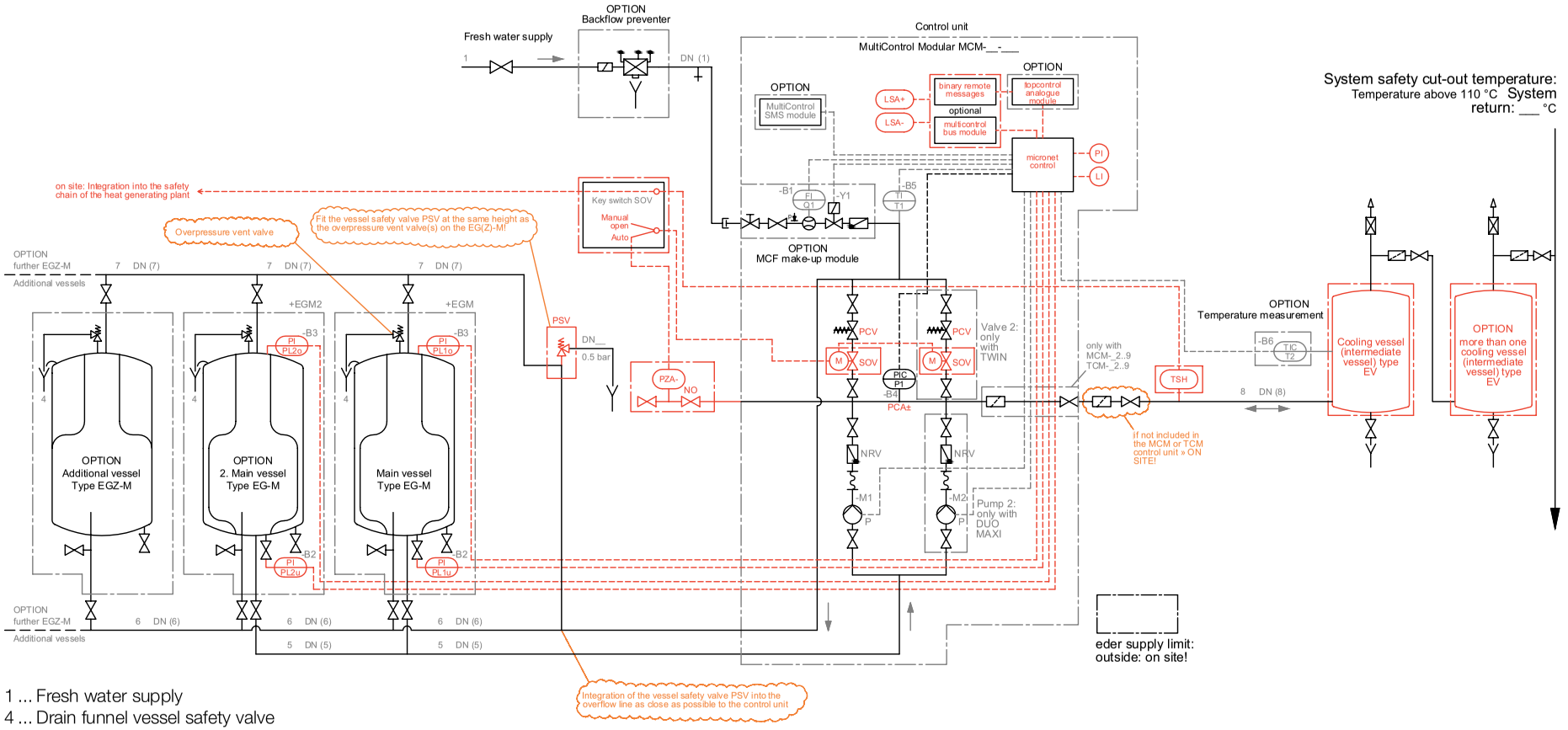


1 ... Fresh water supply
2 ... Expansion overflow line (from the system return)
3 ... Expansion pressure line (to the system return)
4 ... Drain funnel vessel safety valve
5 ... Suction line (from the expansion vessel)
6 ... Overflow line (to the expansion vessel)
7 ... Gas-side vessel connection

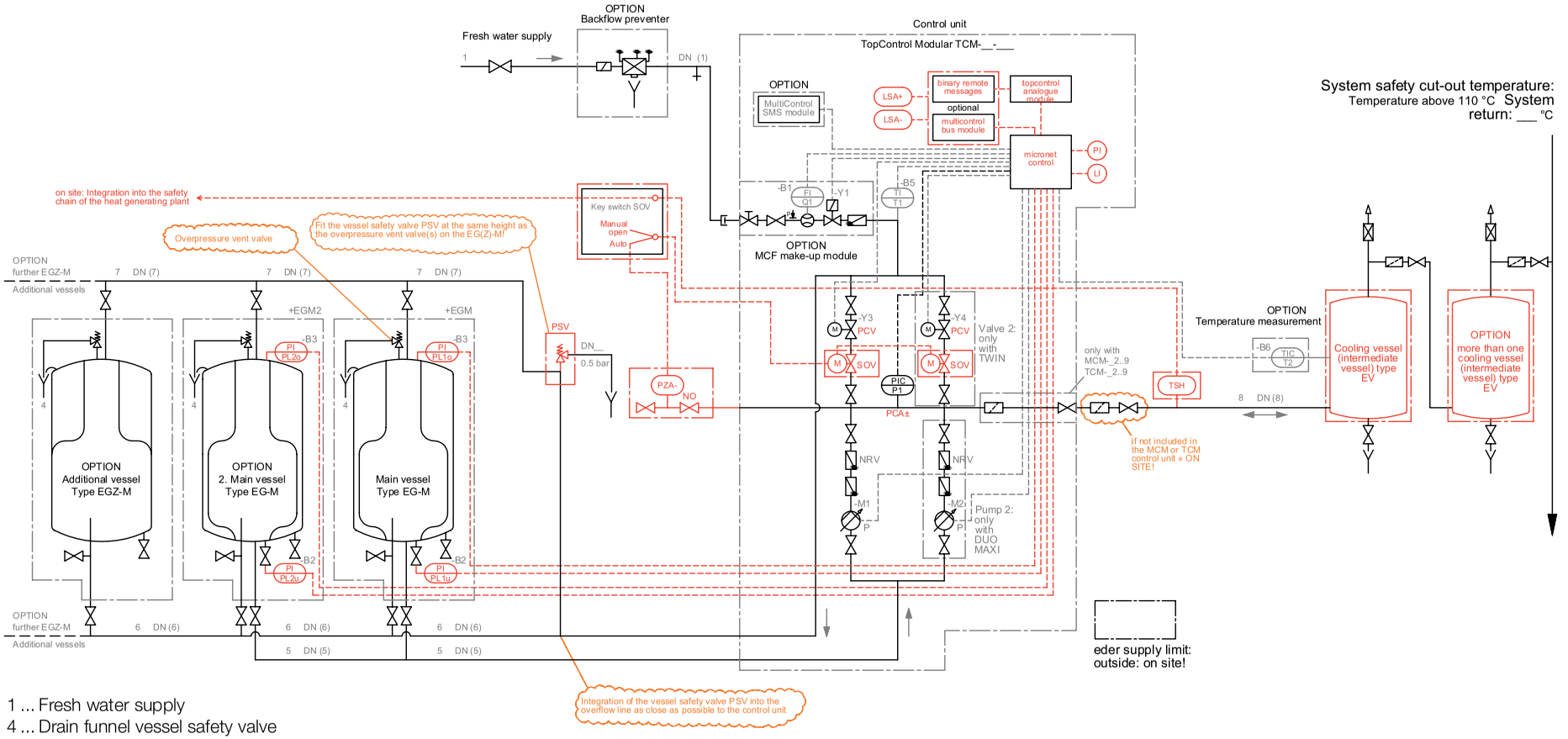
MCM-_1-_ without degassing function



1 ... Fresh water supply
2 ... Expansion overflow line (from the system return)
3 ... Expansion pressure line (to the system return)
4 ... Drain funnel vessel safety valve
5 ... Suction line (from the expansion vessel)
6 ... Overflow line (to the expansion vessel)
7 ... Gas-side vessel connection



1 ... Fresh water supply
4 ... Drain funnel vessel safety valve
5 ... Suction line (from the expansion vessel)
6 ... Overflow line (to the expansion vessel)
7 ... Gas-side vessel connection
8 ... Expansion line (from/to the system return)



1 ... Fresh water supply
4 ... Drain funnel vessel safety valve
5 ... Suction line (from the expansion vessel)
6 ... Overflow line (to the expansion vessel)
7 ... Gas-side vessel connection
8 ... Expansion line (from/to the system return)

3.3. Electrical connection

3.3.1. Control cabinet “Safety equipment for systems above 110 °C”

The control cabinet “Safety equipment for systems above 110 °C” contains the electrical components and must be mounted on site physically close to the control unit (e.g. wall mounting).

The control cabinet requires a suitable mains supply cable (see circuit diagram), and the electrical cables from the minimum pressure limiter PZA-, the shut-off valve(s) SOV and the safety temperature limiter TSH must be routed into the control cabinet and connected there to the corresponding terminals.

If more than one shut-off valve SOV is fitted in the control unit, all shut-off valves SOV must be wired electrically in parallel in the control cabinet.

The contact of the safety temperature limiter TSH is merely looped through in the control cabinet and provided for on-site integration into the safety chain of the heat generating plant.

When connecting at the safety temperature limiter TSH, please note that the cable at the TSH must be at least long enough for the TSH to be removed from its thermowell later, while still connected, for testing purposes, and for its sensing element to be heated!

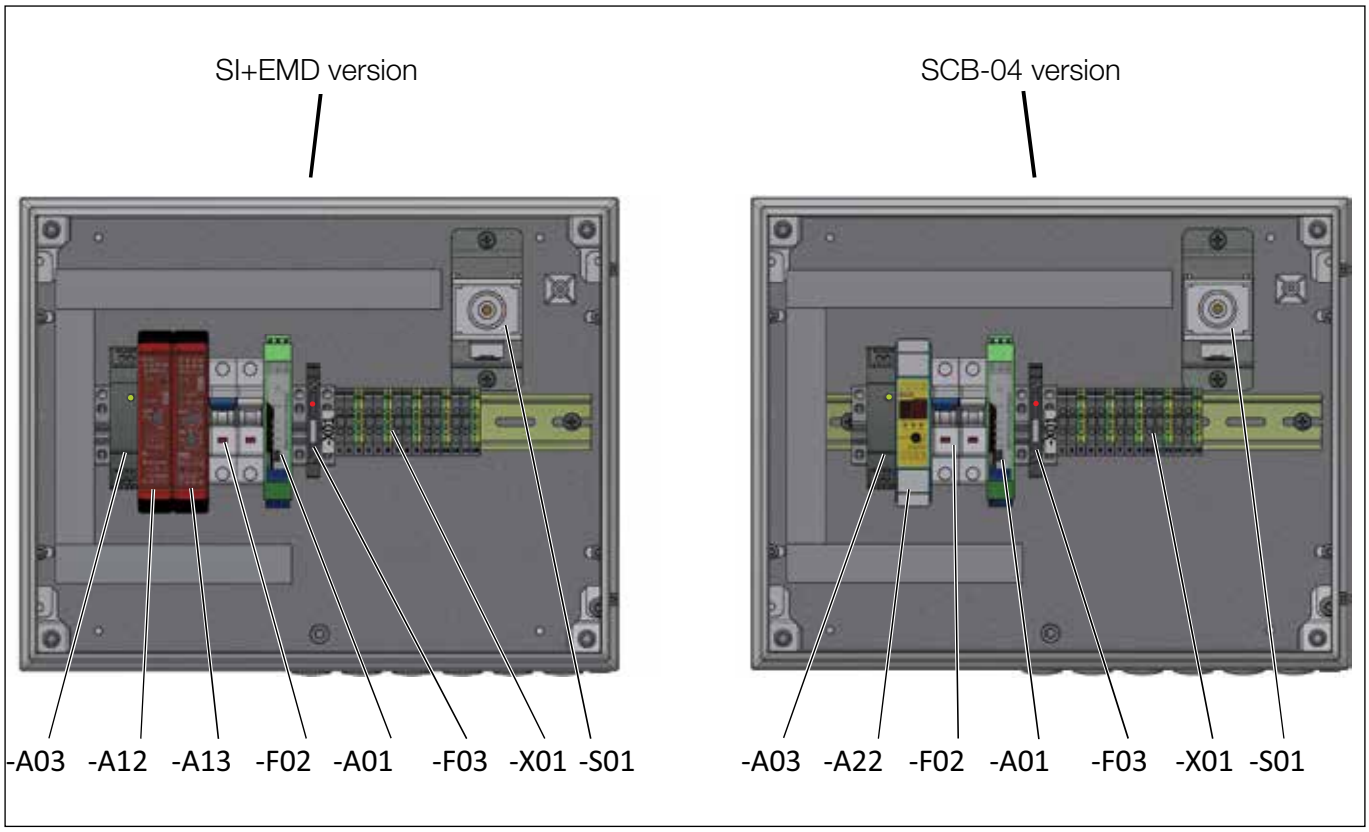
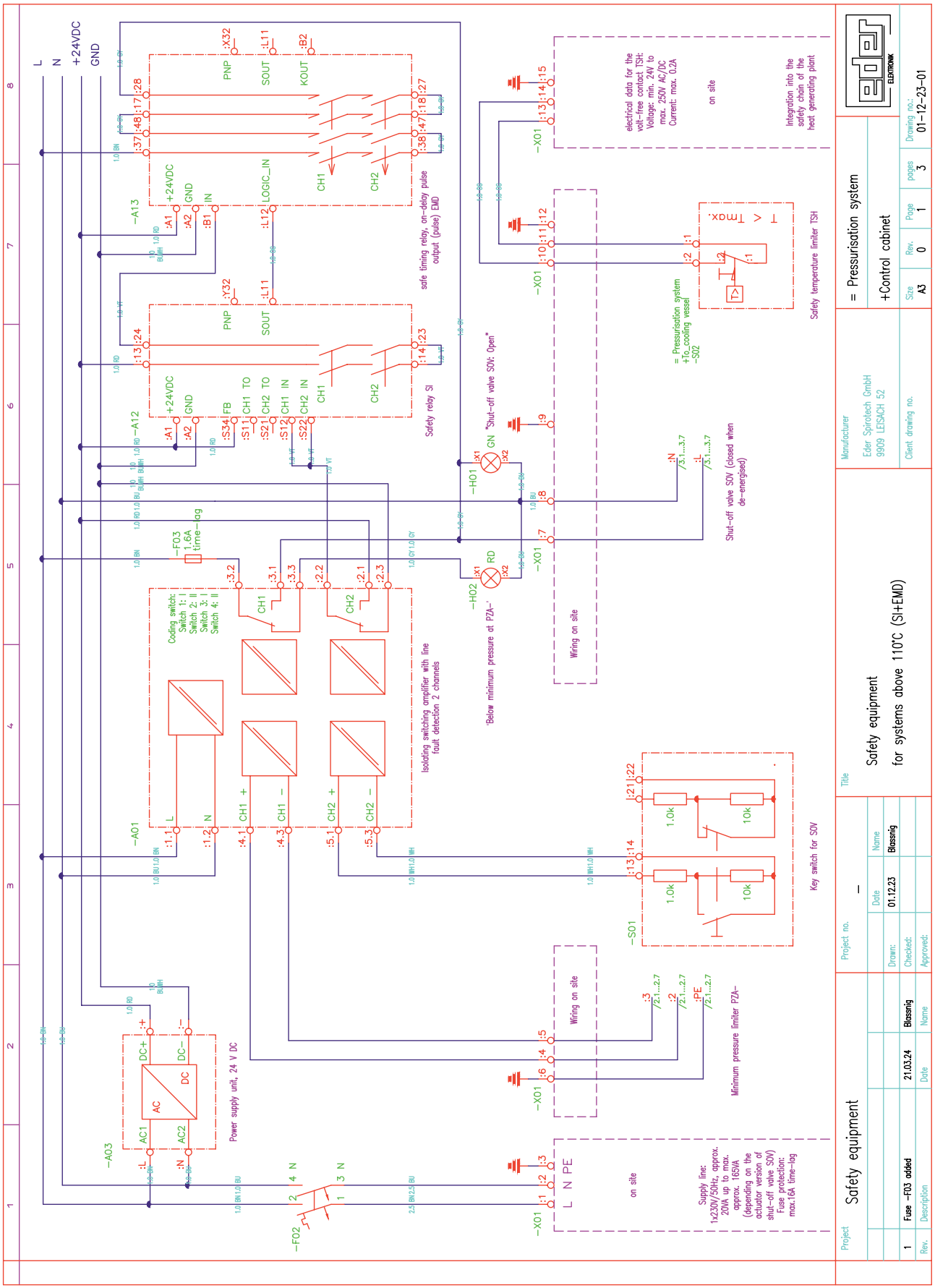
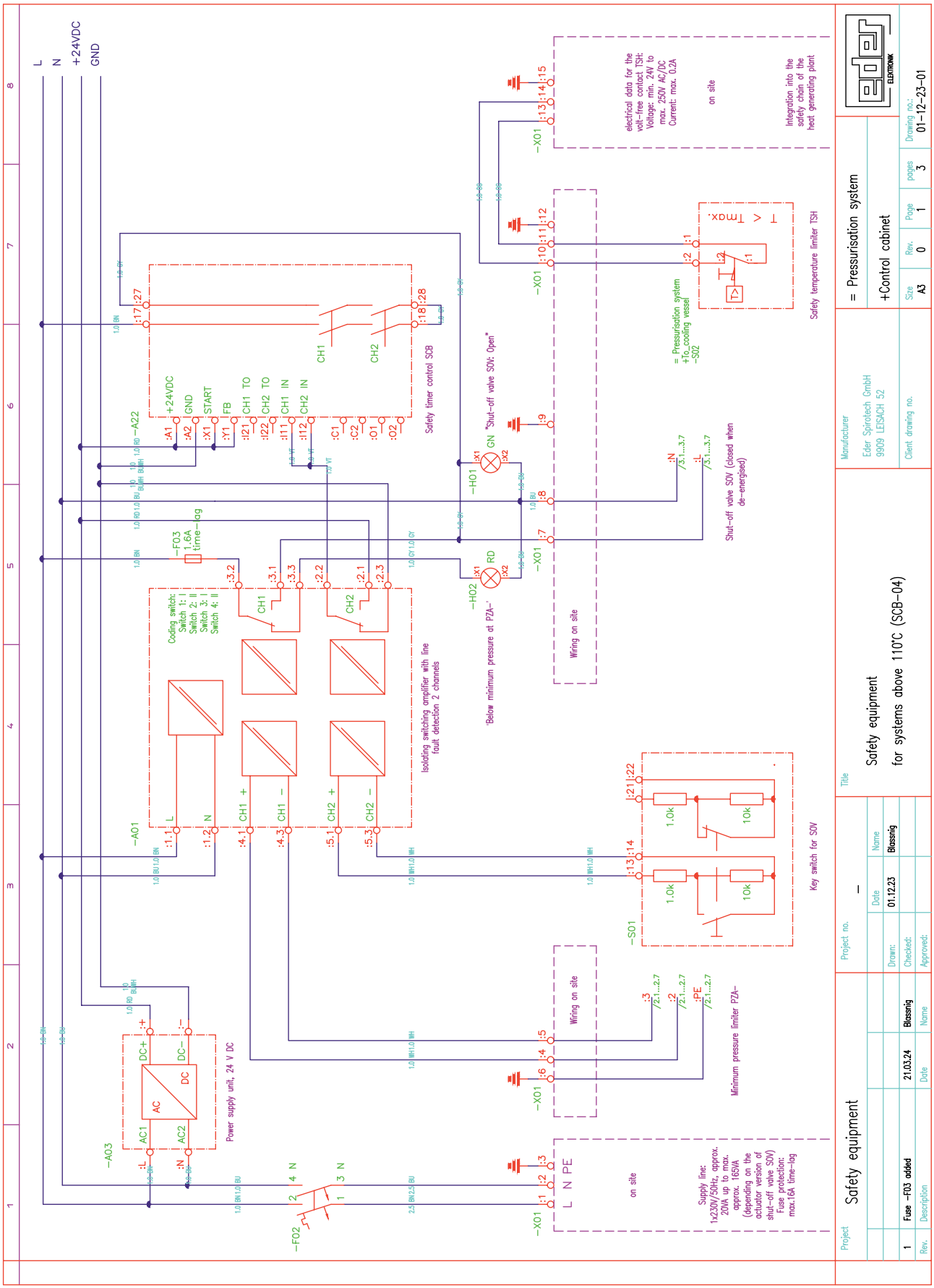


Figure 6: Possible control cabinet versions

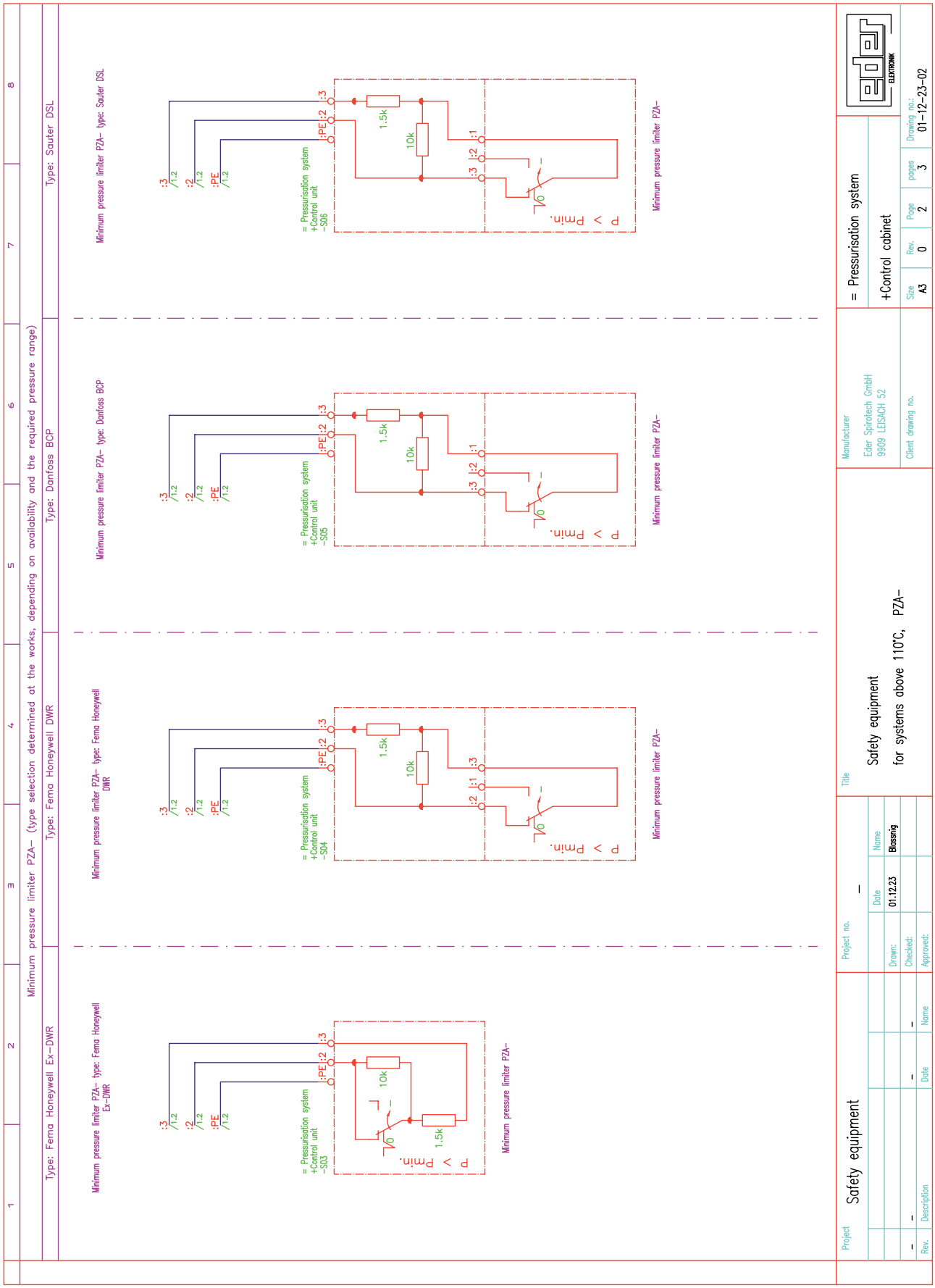
3.3.2. Control cabinet circuit diagram (SI+EMD version)



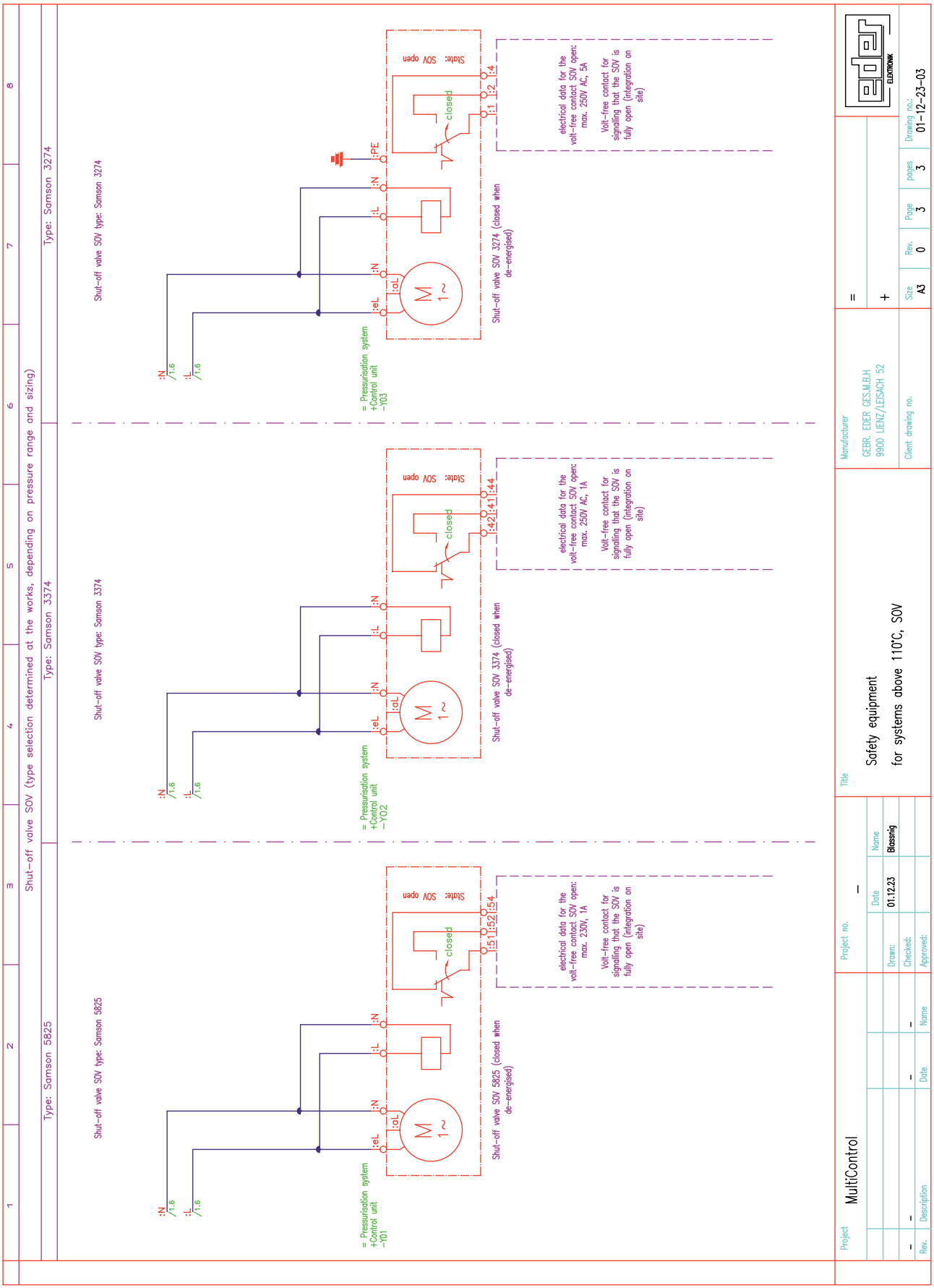
3.3.3. Control cabinet circuit diagram (SCB-04 version)



3.3.4. Control cabinet circuit diagram



3.3.5. Control cabinet circuit diagram



Equipment list	Drawn: 01.12.2023	Blassnig	
	Checked:		
	Approved:		
Safety equipment for systems above 110 °C	**=Expansion system**	**+Control cabinet**	
	Revision: 21.03.2024		

“Equipment as per circuit diagram”	**Designation**	**Make**	**Type**
-A01	Isolating switching amplifier, 2 channels	Phoenix Contact	MACX MCR-EX-SL-2NAM-R-UP - 2865984
-A03	Power supply unit, 230 V AC -> 24 V DC, 0.5 A	Phoenix Contact	STEP-PS-1AC-24DC-0.5 - 2868596
-A12	Safety relay SI, single-channel	Allen-Bradley	440R-S12R2
-A13	Safety expansion module EMD, delayed	Allen-Bradley	440R-EM4R2D
-A22	Safety timer control SCB	Zander	SCB-04
-S01	Key switch for SOV	Stahl	“Key switch: Key switch attachment MS01, 2 switch positions, vertical mounting, BG 008 Contact element series 8208, 1 NO/1 NC, positive opening, with wire-break and short-circuit monitoring, type: 8208/24-15-0001"
-X01	Terminal blocks	Phoenix Contact	
-F02	Miniature circuit breaker, 2 A, type B, switched neutral conductor	Schrack	B2/1N
-F03	Terminal block with fuse holder, 1.6 A	Weidmüller	WSI 4
-H01	Indicator light, green, LED lamp	Schrack	M22-LED230-G
-H02	Indicator light, red, LED lamp	Schrack	M22-LED230-R
“=Pressurisation system +After_cooling vessel -S02”	Safety temperature limiter TSH	Jumo	ATH-70 with screw-in protective sleeve, G1/2, CrNi (stainless steel), installed length 150 mm
“=Pressurisation system+Control unit -S03”	“Minimum pressure limiter PZA-, safety design with internal latching”	Fema	Ex-DWR
“=Pressurisation system+Control unit -S04”	“Minimum pressure limiter PZA-, safety design with internal latching”	Fema	DWR
“=Pressurisation system+Control unit -S05”	“Minimum pressure limiter PZA-, safety design with internal latching”	Danfoss	BCP
“=Pressurisation system+Control unit -S06”	“Minimum pressure limiter PZA-, safety design with internal latching”	Sauter	DSL
“=Pressurisation system+Control unit -Y01”	Shut-off valve SOV (closed when de-energised)	Samson	Electric actuator design 5825 with safety function, actuator rod extending, combined with control valve design 3222
“=Pressurisation system+Control unit -Y02”	Shut-off valve SOV (closed when de-energised)	Samson	Electric actuator design 3374 with safety function, actuator rod extending, combined with control valve design 3240
“=Pressurisation system+Control unit -Y03”	Shut-off valve SOV (closed when de-energised)	Samson	Electric actuator design 3274 with safety function, actuator rod extending, combined with control valve design 3240

3.3.7. Expansion module “Binary remote signalling”

A mounting position for expansion modules is provided in every control unit (see also the control unit instruction manual).

When a control unit is used for systems above 110 °C, it is mandatory that either the expansion module “binary remote signalling” or, alternatively, “binary remote signalling & remote acknowledgement”, or else a “multicontrol bus module”, is fitted in the control unit.

One of these communication modules provides the alarm signalling at LSA+ and LSA-:
Quotation from EN 12953-6:2011:
LSA+ high water level controller (may be integrated in the LI device, + alarm)
LSA- low water level controller (may be integrated in the LI device, - alarm)
It therefore follows from EN 12953-6 that an alarm is required at LSA+ and LSA-.

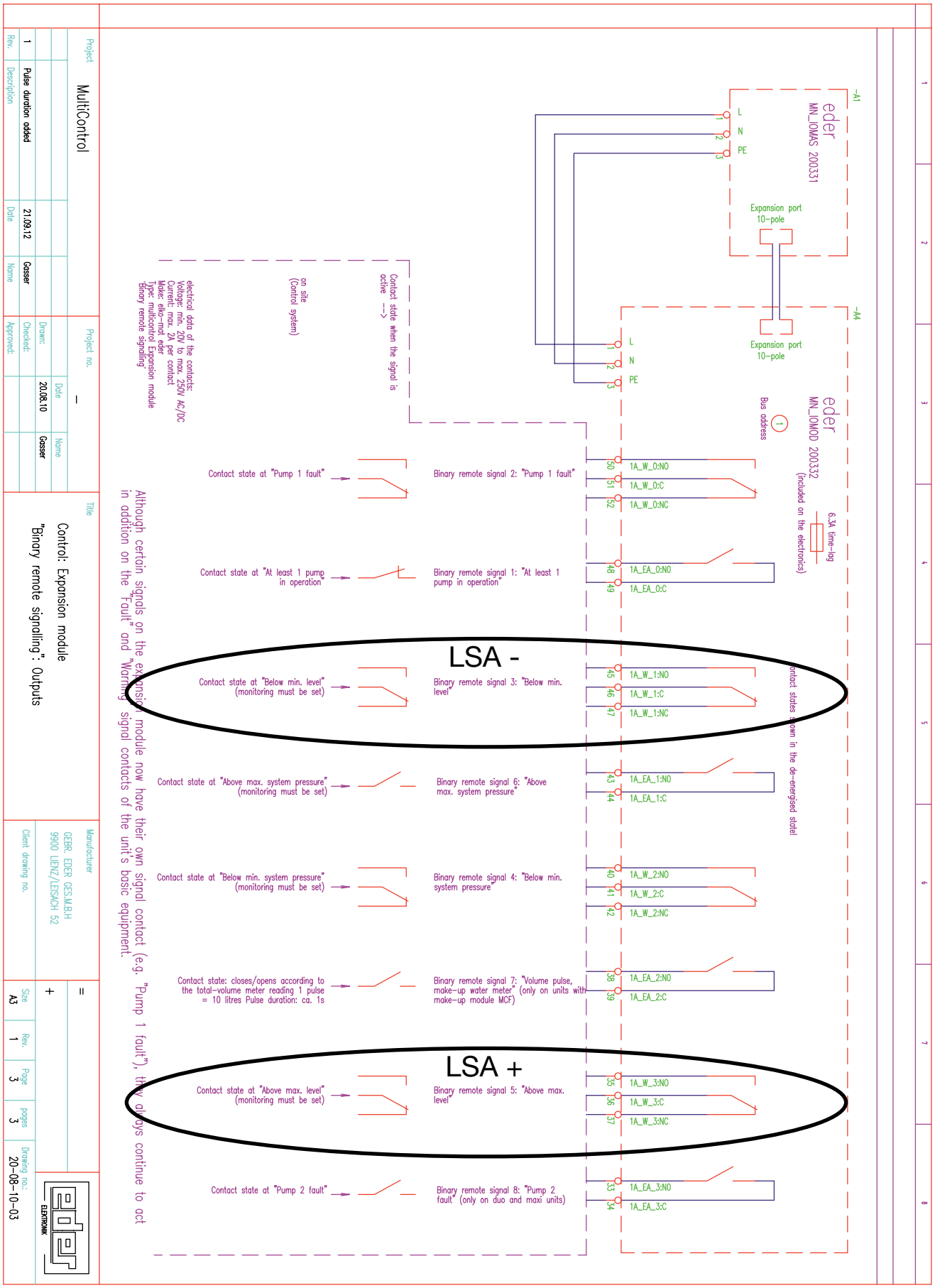
Assignment of the signal contacts LSA+ and LSA- on the expansion module “binary remote signalling”:
LSA+ signals a high water level in the expansion vessels to the control system of the overall plant, which is superordinate to all sub-trades.
corresponds on the expansion module “Binary remote signalling” to the signal contact:
Bin. remote signal 5 “max. level exceeded”
LSA- LSA- signals a low water level in the expansion vessels to the control system of the overall plant, which is superordinate to all sub-trades.
corresponds on the expansion module “Binary remote signalling” to the signal contact:
Bin. remote signal 3 “below min. level”

For the level monitoring, and hence as switching points for the signal contacts
LSA+ and LSA-, the following is recommended:
LSA+ switches when a level of 85% is exceeded
LSA- switches when the level falls below 15%

These values are to be set on the control unit electronics under:
Operating level 3, Settings, Monitoring
Min. level: Lmin Value: 015%
Operating level 3, Settings, Monitoring
Max. level: Lmax Value: 085%

Information on the assignment of the LSA+ and LSA- signals when a multicontrol bus module is used can be found in the corresponding instruction manual.

3.3.8. Circuit diagram “Binary remote signalling”



4. FUNCTION

4.1. Purpose of the individual components

4.1.1. Cooling vessel (= intermediate vessel)

Cooling vessels (= intermediate vessels) are integrated hydraulically between the point of integration into the system and the control unit. The cooling vessel must be constructed to suit the principal operating parameters of the system:

Nominal pressure: constructed at least for the set pressure of the system safety valves (maximum operating pressure of the system) or higher

Temperature: constructed at least for the safety cut-out temperature of the system or higher

Capacity: dimensioned for sufficient cooling depending on the expansion volume, optionally divided among several individual vessels connected in series

If on-site measures guarantee that temperatures above 70 °C can never occur at any time at the point where the pressurisation system is integrated into the system, and if this can be demonstrated on site, cooling vessels are not necessary!

In every case the safety temperature limiter TSH is necessary and must be fitted and connected, whether or not cooling vessels are present!

4.1.2. Safety temperature limiter TSH

The safety temperature limiter TSH senses the temperature of the cooled medium in the expansion line between the control unit and the nearest cooling vessel. If the switching temperature is exceeded at this point, the contact opens and remains open (internal latching).
This contact must be integrated on site into the safety chain of the heat generating plant and must ensure that, when the contact is open, the entire heat generation is shut down. This prevents further expansion volume and hence a further rise in temperature at point TSH.

4.1.3. Minimum pressure limiter PZA-

The minimum pressure limiter PZA- serves to prevent unintended evaporation of system water or the generation of steam; it must actuate a self-closing valve (= shut-off valve SOV) in the overpressure relief line (= overflow line) of the control unit.

On pump-controlled pressurisation systems, the minimum pressure limiter PZA- must be installed close to the pressure transducer PCA+- of the control unit; it closes the shut-off valve(s) SOV if the pressure falls below the minimum.

The standard setting range of the minimum pressure limiter is 3 .. 16 bar. On request, a version is available with setting ranges of 0.5 .. 6 bar or 5 .. 25 bar.

4.1.4. Shut-off valve SOV (closed when de-energised)

Mechanically self-closing valve, closed when de-energised, for shutting off the overflow line if the pressure falls below the minimum (where there are several overflow valves, one shut-off valve upstream of each overflow valve

4.1.5. Vessel safety valve PSV, set pressure 0.5 bar

A vessel safety valve PSV against overpressure is required because the safety cut-out pressure of the expansion vessels (= 0.5 bar) is lower than the safety cut-out pressure of the system (= set pressure of the system safety valves).

This vessel safety valve PSV is dimensioned at least for the maximum expected expansion volume flow rate (sized for thermal expansion) at a set pressure of 0.5 bar.

4.1.6. Control cabinet “Safety equipment for systems above 110 °C”

The control cabinet “Safety equipment for systems above 110 °C” contains the electrical components and is pre-wired ex works as far as possible, including the necessary terminal points, a built-in key switch with 2 switch positions and positive-opening contact elements with short-circuit and wire-break monitoring for opening the shut-off valve SOV by hand under constant supervision for commissioning and maintenance of the pressurisation system; a safety timing relay limits the time for which the shut-off valve SOV can be opened by hand via the key switch. Built-in indicator lamps for the operating states “Below minimum pressure at PZA-” and “Shut-off valve SOV: Open”

4.1.7. Communication modules for alarm signalling at LSA+ and LSA

When a control unit is used for systems above 110 °C, it is mandatory that either the expansion module “binary remote signalling” or, alternatively, “binary remote signalling & remote acknowledgement”, or else a “multicontrol bus module”, is fitted in the control unit.

These communication modules provide the alarm signalling at LSA+ and LSA-:
Quotation from EN 12953-6:2011:
LSA+ high water level controller (may be integrated in the LI device, + alarm)
LSA- low water level controller (may be integrated in the LI device, - alarm)
It therefore follows from EN 12953-6 that an alarm is required at LSA+ and LSA-.

The signal contacts LSA+ and LSA- are generated as switching points from the measured level LI.

4.1.8. Functional description

The minimum pressure limiter PZA- senses the system pressure and is of self-latching design. That is, after every drop below the pressure its electrical contact must be acknowledged directly at PZA- at its reset button as soon as the minimum pressure has been exceeded again. In addition, its electrical switching contact is designed with contact circuitry such that short circuits and open circuits can also be detected.

The contact of the minimum pressure limiter PZA- must therefore be evaluated by what is known as an isolating switching amplifier with line fault detection. This isolating switching amplifier -A01 ensures that a safe output state is established if PZA- is not correctly connected: namely the same contact state as when the pressure at PZA- falls below the minimum.

However, when the pressurisation system is commissioned, and also after the pressure at PZA- has fallen below the minimum, it is not certain that a reset at PZA- is already possible, since the minimum pressure may not yet have been reached stably. It is therefore necessary to have a means of opening the shut-off valve SOV by hand for such operating situations.

The key switch for SOV -S01 is provided for this purpose. In position “1” this key switch mechanically actuates a contact element located beneath it. The mechanical connection between the key switch and the contact element is possible only when the control cabinet is closed; with the control cabinet door open, the contact element behaves as it otherwise does in position “0”. The contact element -S01 is designed with contact circuitry such that short circuits and open circuits can also be detected.

The contact element of the key switch -S01 must therefore also be evaluated by the isolating switching amplifier with line fault detection. This isolating switching amplifier -A01 ensures that a safe output state is established if -S01 is not correctly connected: namely the same contact state as when the key switch is in position “0”, that is, with the shut-off valve SOV not opened by hand.

5. COMMISSIONING

5.1. Checking the electrical connection

The circuit breaker -F02 in the control cabinet is at the same time the main switch for all-pole isolation of the mains supply cable.

Before -F02 is switched on, the key switch -S01 must first be in position “0”. Switch on circuit breaker -F01; the electrical components are then supplied with voltage. The “DC OK” indicator lamp on power supply unit -A03 must be lit.

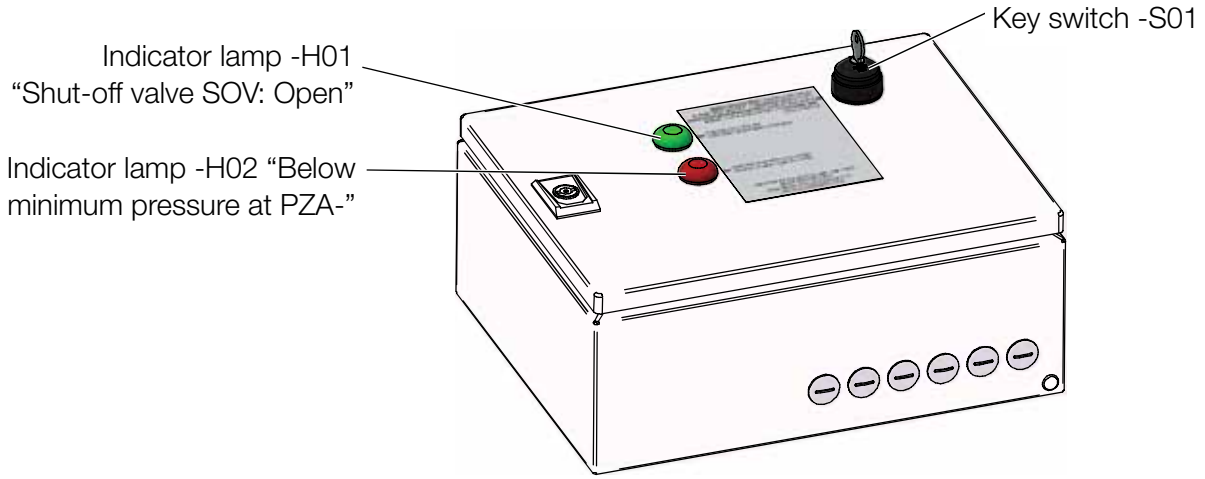


Figure 7: Control cabinet front view

5.1.1. Check the connection of the minimum pressure limiter PZA-

On the isolating switching amplifier -A01, indicator lamps LF1 and LF2 flashing red indicate a connection fault (either a short circuit or an open circuit).

LF1 flashing red:	Minimum pressure limiter PZA- (-S03) is not correctly connected electrically.
LF2 flashing red:	Key switch (-S01) is not correctly connected electrically.
OUT1 not lit:	Pressure at PZA- below the minimum, or PZA- not correctly connected.
OUT2 not lit:	Key switch in position 0 = “Auto” and pressure at PZA- also below the minimum, or key switch not correctly connected.

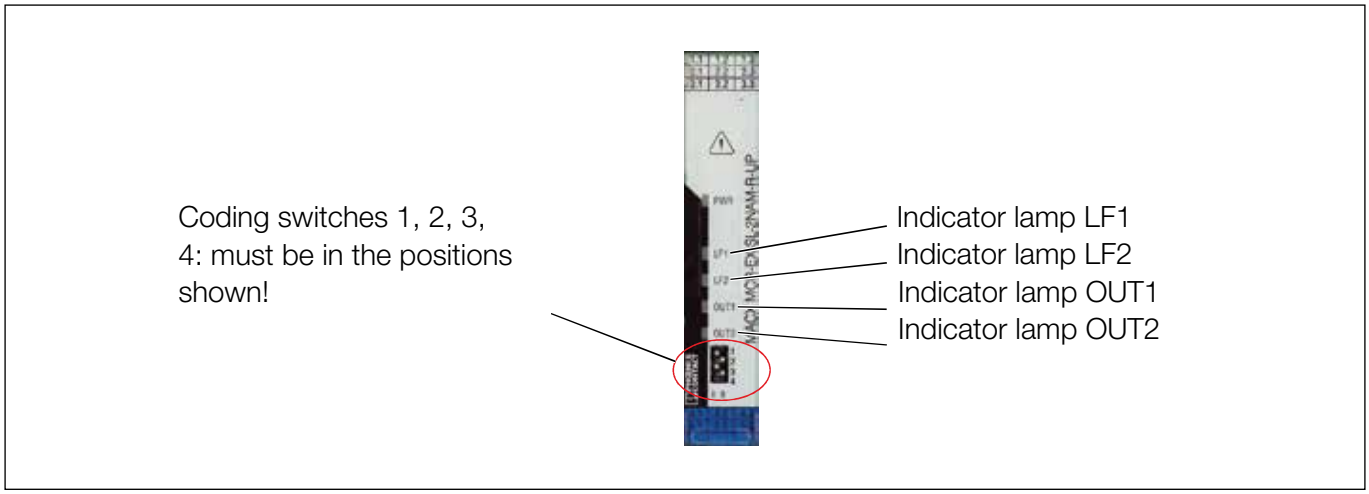


Figure 8: Isolating switching amplifier -A01 front view

5.1.2. Check the connection and function of the shut-off valve SOV

As soon as indicator lamp -H01 “Shut-off valve SOV: Open” lights up, the electric actuator of the shut-off valve SOV is driven in the “retracting” direction.
That is, the shut-off valve is opened by withdrawing the actuator rod from the control valve.

On the control valve design 3222 version, the actuator rod is not visible from outside. Opening of the shut-off valve design 3222 can nevertheless be recognised at the electric actuator design 5825, when the position indicator of the actuator (white disc with printed numbers) moves away from the value 0 (value 0 = shut-off valve closed)

Should indicator lamp -H01 “Shut-off valve SOV: Open” not light up, the cover of the control cabinet must be closed and the key switch set to position “1”. This drives the shut-off valve SOV in the open direction for a maximum of 15 min. Once the shut-off valve SOV has been checked successfully, the key switch must be returned to position “0”.

5.1.3. Check the connection and function of the safety temperature limiter TSH

The safety temperature limiter TSH (-S02) must be connected to terminals -X01:10 to -X01:12 of the control cabinet. In addition, its contact must be carried on to terminals -X01:13 to -X01:15 and integrated into the safety chain of the heat generating plant.

If, then, the contact of the safety temperature limiter TSH is opened by heating, or this state is simulated by disconnecting the TSH (-S02), the entire heat generating plant must shut down and no further heating may take place.

Commissioning may be continued only when all these requirements for the electrical connection have been met.

5.2. Settings

5.2.1. Minimum pressure limiter PZA-

The appropriate set value at the minimum pressure limiter depends on the static height of the system (= static pressure from the height difference between the mounting point of the minimum pressure limiter PZA- on the control unit and the highest point of the system) and on the evaporation pressure of the medium at the safety cut-out temperature of the system.

Both figures must already be taken into account when the system is designed; the set value at the minimum pressure limiter must therefore also be determined at that stage and must already be known at commissioning.

As a guide where the value is not known, we recommend the following set value p PZA- at the minimum pressure limiter:
p PZA- = static pressure from the height difference + evaporation pressure of the medium at the safety cut-out temperature + fixed safety allowance of 0.5 bar

5.2.2. Minimum pressure limiter PZA- Fema Honeywell Ex-DWR

The set value at the minimum pressure limiter is entered at an adjusting screw and indicated mechanically on the scale on the minimum pressure limiter. The adjusting screw is accessible only when the black cover on the minimum pressure limiter is removed; once the setting has been made, the cover must therefore be screwed back on without fail. Lead-sealing the cover once the setting has been made is recommended!

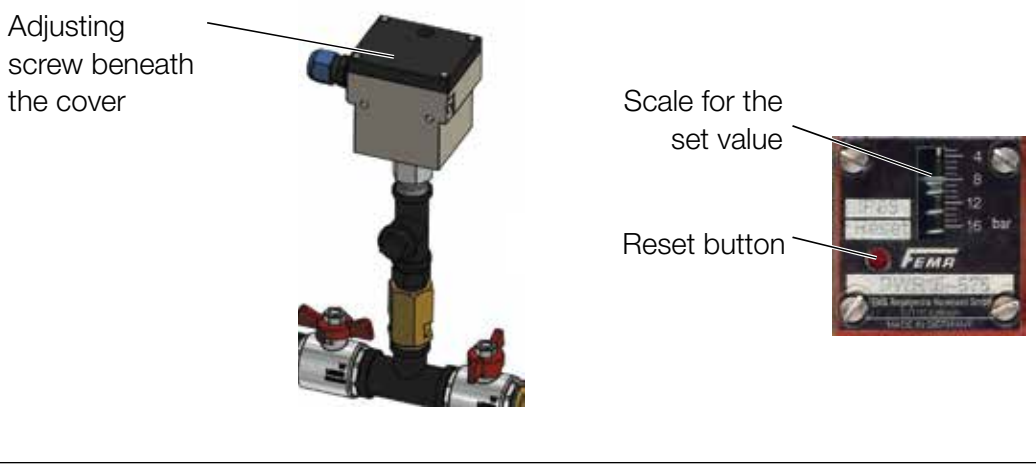


Figure 9: Minimum pressure limiter PZA- Fema Honeywell Ex-DWR

The electrical contact of the minimum pressure limiter PZA- is of self-latching design; every time the pressure falls below the set value, the contact must be reset at the reset button on the minimum pressure limiter. Beforehand, however, the pressure must have risen again above the set value of the minimum pressure limiter plus about 0.5 bar (switching differential), otherwise no reset is possible.

5.2.3. Minimum pressure limiter PZA-, type: Fema Honeywell DWR

The set value at the minimum pressure limiter is entered at an adjusting screw and indicated mechanically on the scale on the minimum pressure limiter. Before a value can be set at the adjusting screw, the locking screw must first be loosened by max. 2 turns.

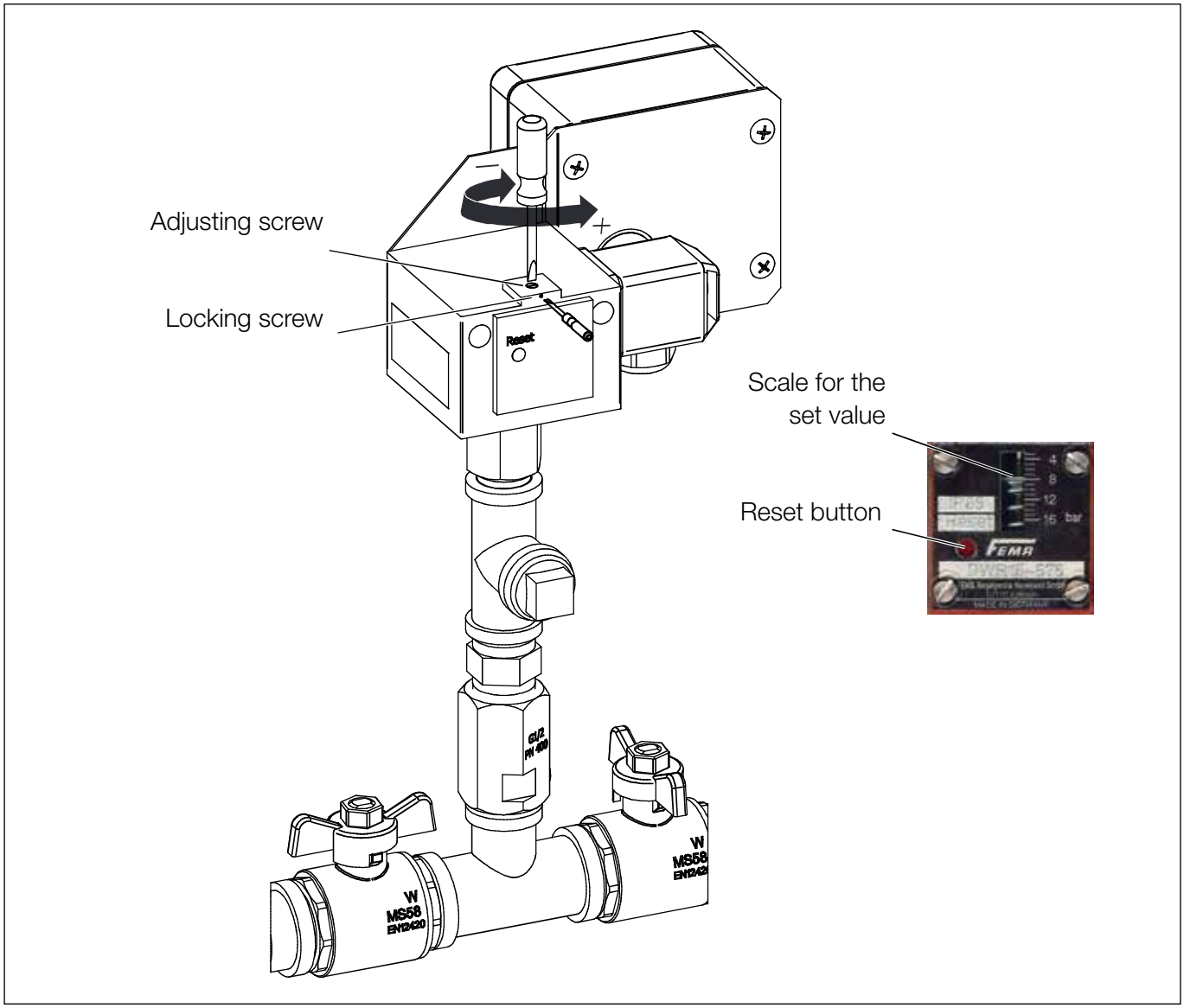


Figure 10: Minimum pressure limiter PZA-, type: Fema Honeywell DWR

The electrical contact of the minimum pressure limiter PZA- is of self-latching design; every time the pressure falls below the set value, the contact must be reset at the reset button on the minimum pressure limiter. Beforehand, however, the pressure must have risen again above the set value of the minimum pressure limiter plus about 0.5 bar (switching differential), otherwise no reset is possible.

5.2.4. Minimum pressure limiter PZA-, type: Sauter DSL

The set value at the minimum pressure limiter is entered at an adjusting screw (figure Pressure setting) and indicated mechanically on the scale on the minimum pressure limiter.

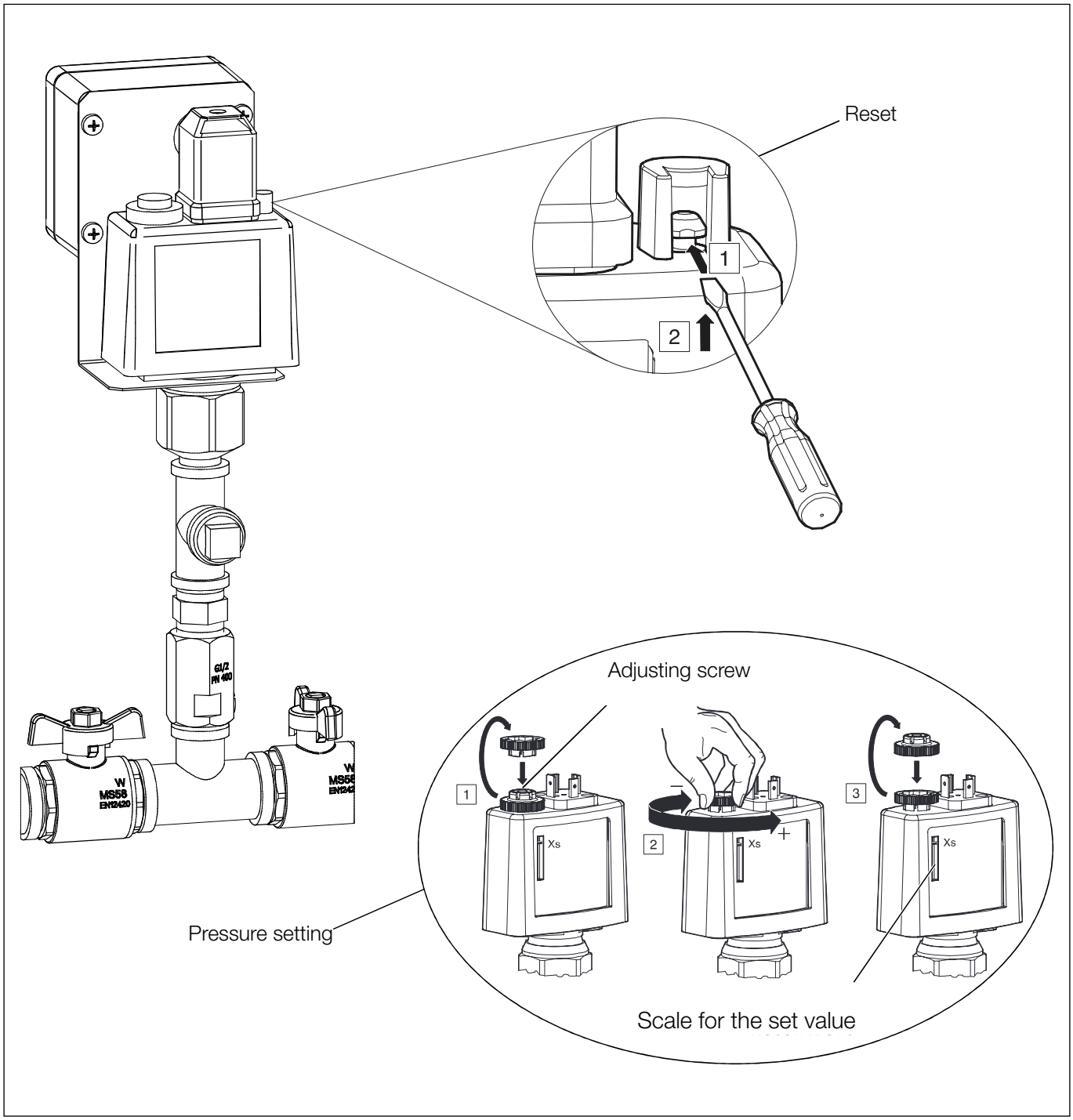


Figure 11: Minimum pressure limiter PZA-, type: Sauter DSL

The electrical contact of the minimum pressure limiter PZA- is of self-latching design; every time the pressure falls below the set value, the contact must be reset at the reset button (figure Reset) on the minimum pressure limiter. Beforehand, however, the pressure must have risen again above the set value of the minimum pressure limiter plus about 0.5 bar (switching differential), otherwise no reset is possible.

5.2.5. Minimum pressure limiter PZA-, type: Danfoss BCP

The set value at the minimum pressure limiter is entered at an adjusting screw (figure Pressure setting) and indicated mechanically on the scale on the minimum pressure limiter.

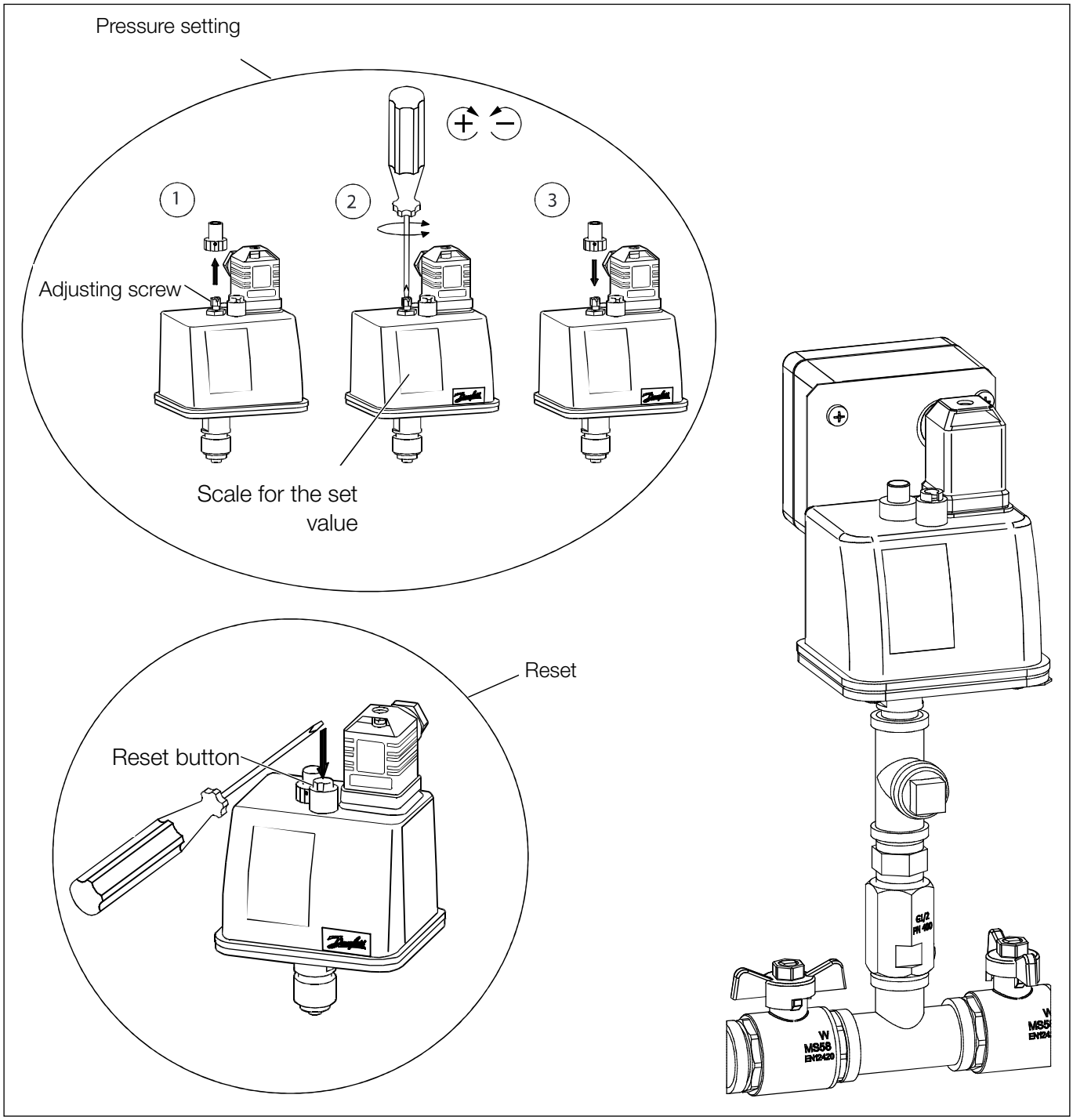


Figure 12: Minimum pressure limiter PZA-, type: Danfoss BCP

The electrical contact of the minimum pressure limiter PZA- is of self-latching design; every time the pressure falls below the set value, the contact must be reset by pressing the reset button (figure Reset) on the minimum pressure limiter. Beforehand, however, the pressure must have risen again above the set value of the minimum pressure limiter plus about 0.5 bar (switching differential), otherwise no reset is possible.

5.2.6. Safety temperature limiter TSH

The set value at the safety temperature limiter TSH is independent of the safety cut-out temperature of the system and is 70 °C.

It is entered at the adjusting screw on the safety temperature limiter and indicated mechanically on its scale. The adjusting screw is accessible only when the cover on the safety temperature limiter is removed; once the setting has been made, the cover must therefore be screwed back on without fail. Lead-sealing the cover afterwards is recommended.

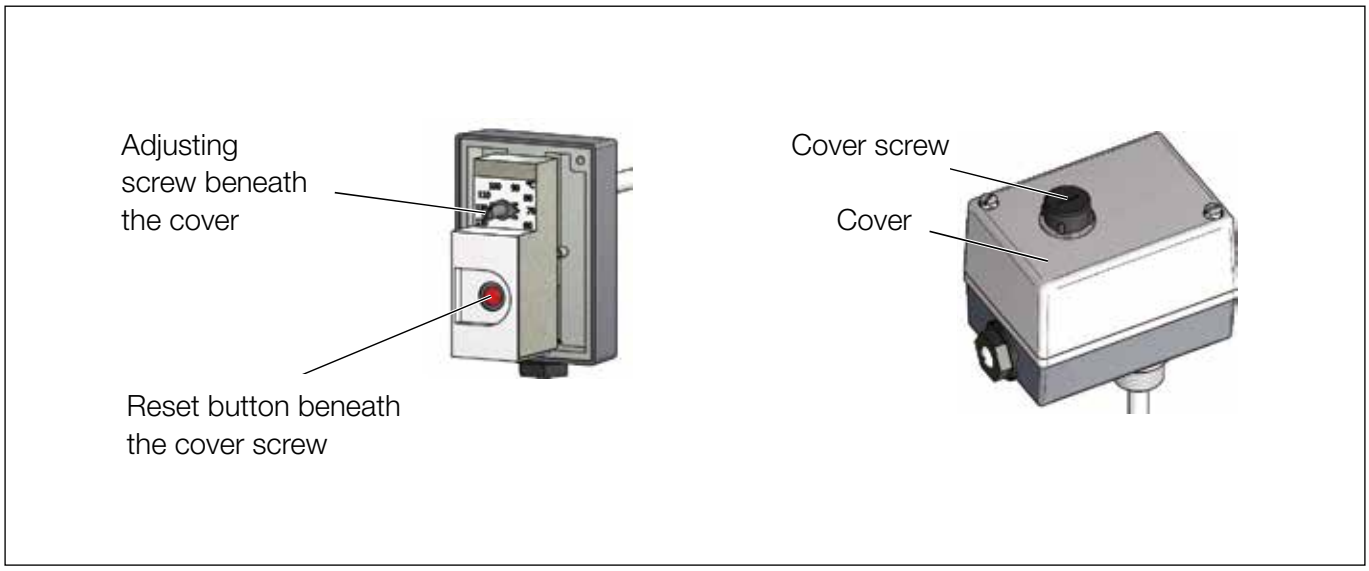


Figure 13: Safety temperature limiter TSH

The electrical contact of the safety temperature limiter TSH is of self-latching design; every time the set value is exceeded, the contact must be reset at the reset button on the TSH. Beforehand, however, the temperature must have fallen again below the set value of 70 °C minus about 5 °C (switching differential).

5.2.7. Working pressure of the control unit

The lower working pressure to be set at the control unit must be at least 0.5 bar above the set value of the minimum pressure limiter PZA-. If an even greater margin of pressure is possible, so much the better.
To set the working pressure at the control unit, the shut-off valve SOV must be open. This can be achieved even though the pressure at PZA- is below the minimum, by setting the key switch to position “1”.

In this position the shut-off valve SOV is opened, but after 15 min at the latest the switch position “1” is ignored and the SOV is controlled from PZA-.

An attempt should therefore be made to complete the pressure setting within these 15 minutes and then to press the reset button on the minimum pressure limiter PZA-.

Once commissioning has been completed, both wing handles of the minimum pressure limiter assembly must be removed (for the position of the shut-off valves before the wing handles are removed, see the figure in section 6.2.1). Keep the wing handles safe without fail! The key switch must likewise be in position “0”, and the key must be withdrawn and kept by the boiler attendant (the boiler attendant is responsible for keeping the key safe!)

6. OPERATION

6.1. Operation of the high-temperature hot water system

The safety equipment for systems above 110 °C extends a pressurisation system by the necessary safety equipment for use as a pump-controlled pressurisation system with an unpressurised expansion vessel in high-temperature hot water systems with safety cut-out temperatures above 110 °C in accordance with clause A.6.1 of EN 12953-6:2011.

The high-temperature hot water system may be operated with or without manual intervention. Operation without manual intervention is sometimes also referred to as “operation without constant supervision” or “BosB” operation.

Informative Annex C of EN 12953-6:2011 gives recommendations on the operation and inspection of the boiler plant with a maximum operating period without manual (human) intervention of no more than 72 hours.

6.2. Regular inspections

The regular inspections required for the high-temperature hot water system are governed by statutory regulations, and the boiler attendant of the high-temperature hot water system is responsible for carrying them out properly.

Informative Annex C of EN 12953-6:2011 provides a guide to the regular inspections to be carried out.

The results of monitoring measures, inspections and checks, as well as any faults, must be recorded in an operating logbook and kept available on site.

6.2.1. Inspection: Minimum pressure limiter PZA-

The minimum pressure limiter PZA- does not act directly on the heat generating plant and, as a limiter, is therefore not subject to continuous mandatory inspection (so it does not have to be inspected every 72 h even in operation without manual intervention!).

In every case, however, the proper functioning of the minimum pressure limiter must be checked at regular intervals (normally every three months). In doing so, the set value at the minimum pressure limiter must also be read off the scale visually and checked for agreement with the value determined at commissioning. Set it correctly if it deviates! (This may be omitted if the cover of the minimum pressure limiter was lead-sealed after setting and the seal is intact.)

The following procedure is recommended for the functional test of PZA- (see also the following figure):

- remove the cap on the outlet side of the minimum pressure limiter assembly, connect a suitable hose to it and route this to a drain (at most the contents of the minimum pressure limiter assembly will run out)
- refit the wing handles on the two shut-off valves on the inlet and outlet sides of the minimum pressure limiter assembly (these were removed in the course of commissioning).
- none of the pressurisation pumps in the control unit may be running at the time. If one is running: wait until it switches off again. Then close the shut-off valve on the inlet side of the pressure limiter assembly and open the shut-off valve on the outlet side.
- The minimum pressure limiter assembly is thereby unpressurised, so the shut-off valve SOV must close and the indicator lamp “Below minimum pressure at PZA-” on the control cabinet must light up.
- then reverse the steps in the opposite order and reset at PZA-.

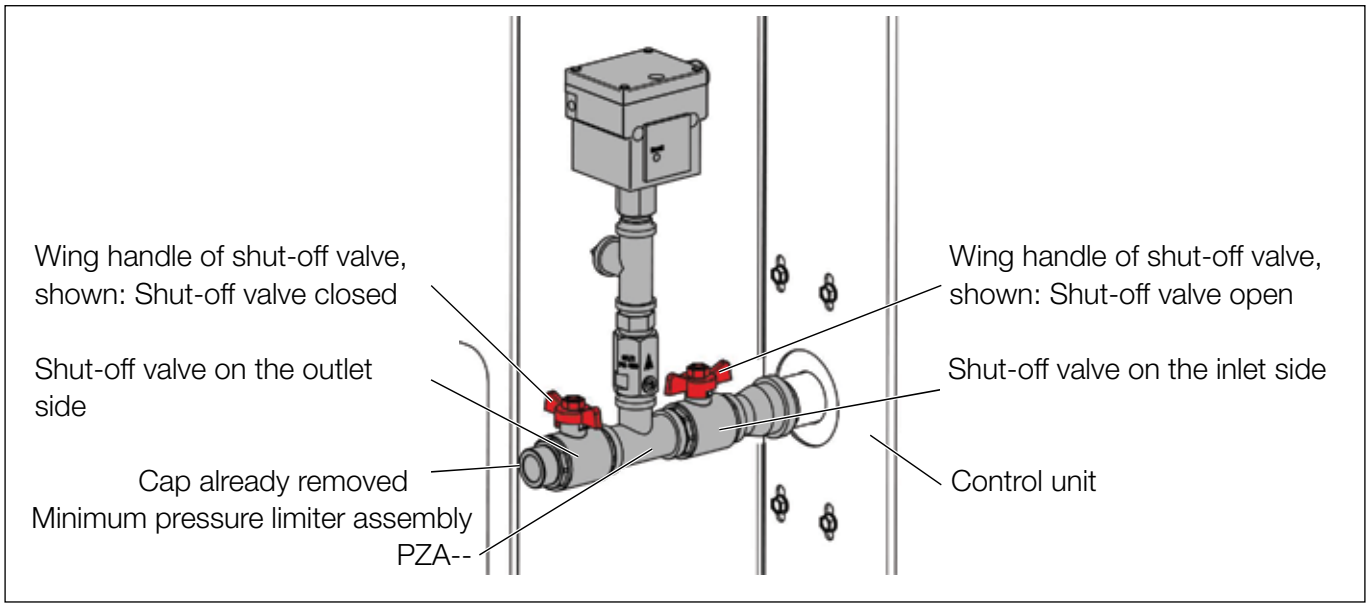


Figure 14: Inspection: Minimum pressure limiter PZA-

6.2.2. Inspection: Safety temperature limiter TSH

As a limiter, the safety temperature limiter TSH is not subject to continuous mandatory inspection (so it does not have to be inspected every 72 h even in operation without manual intervention!).

In every case, however, the proper functioning of the safety temperature limiter TSH and its action on the safety chain of the heat generation must be checked at regular intervals (normally annually).

The following procedure is recommended for the functional test of the TSH:

- remove the cover of the safety temperature limiter and check whether the set value = 70 °C (this may be omitted if the cover of the safety temperature limiter was lead-sealed after setting and the seal is intact.)
- release the safety temperature limiter mechanically from its thermowell and withdraw it
- place the sensing element of the TSH in water that has just been boiled; this will in any case produce a temperature above 70 °C (e.g. using a kettle)
- the safety temperature limiter TSH must then trip and cause the heat generation to shut down.
- refit the safety temperature limiter in its thermowell and, once it has cooled, reset it at its reset button

6.3. Regular inspections in operation without manual intervention

If the high-temperature hot water system is operated without manual intervention, regular inspections are necessary at intervals of no more than 72 hours.
The following inspections of the safety equipment are then necessary:

- Control cabinet: Indicator lamp “Shut-off valve SOV: Open” must be lit
- Control cabinet: Indicator lamp “Below minimum pressure at PZA-” must not be lit
- Key switch SOV must be in position “0” “Auto: SOV controlled from PZA-”, and the key must be withdrawn and kept by the boiler attendant
- Shut-off valve SOV must be open (visual check at the shut-off valve SOV)

6.4. Monitoring the current state of the safety equipment

Should the current state of the safety equipment need to be monitored (e.g. by integration into a control system present on site), a volt-free contact is optionally provided which is closed when the shut-off valve SOV is fully open and thus signals proper functioning.
The corresponding switching contact is contained directly in the electric actuator of the SOV.

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