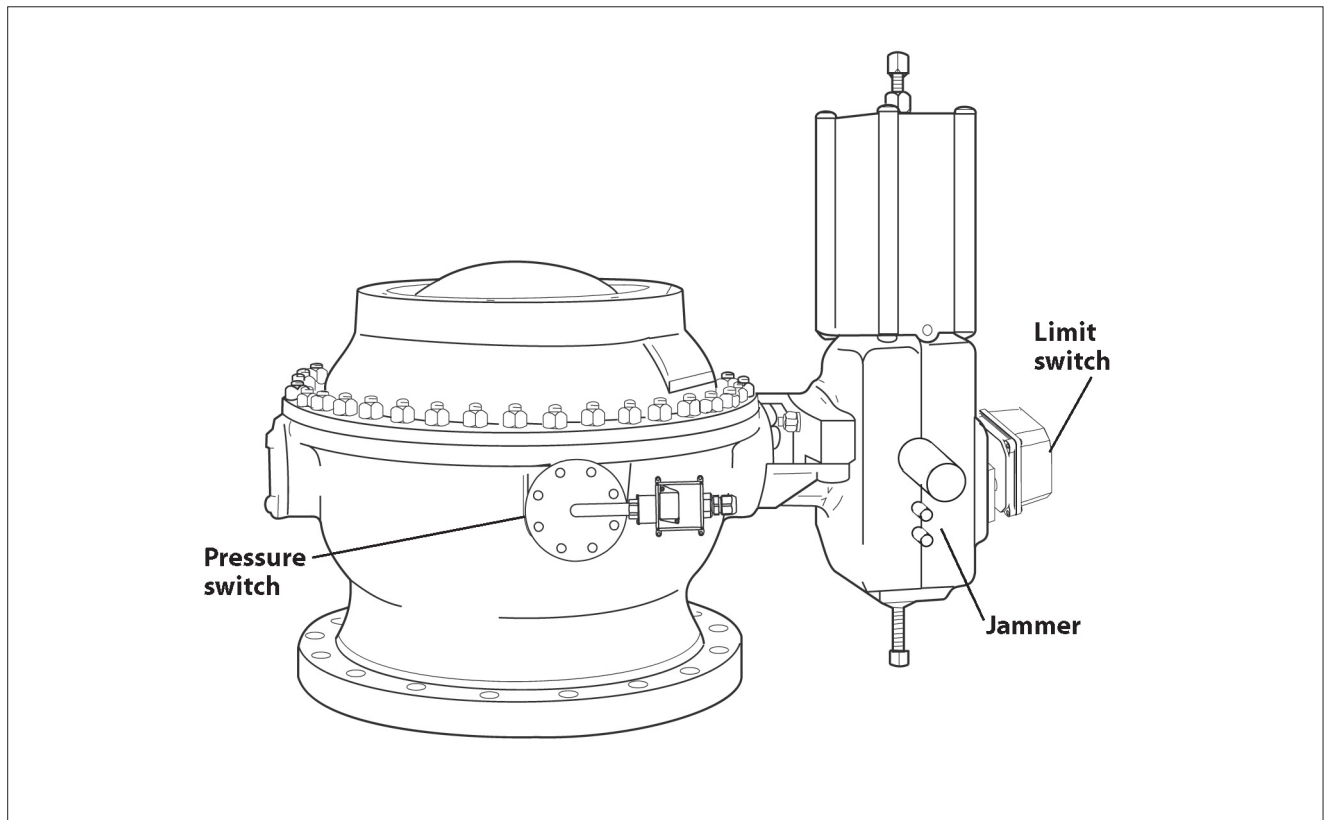


Automatic latching device “jammer”, capping valve safety locking system



General

When the batch digester is pressurized it would be dangerous if the capping valve could open during the cooking cycle. Therefore the capping valve must include at least two locking systems independent of each other.

One system includes a pressure switch where the pressure limit is set at 0.1 bar (1.45 psi). When the digester pressure is above that limit, the capping valve cannot be opened. The other locking system is the mechanical (“jammer”). Also this locking system keeps the capping valve closed during the cooking cycle.

These two locking systems independent of each other guarantee the run of the cooking process.

Type coding

The locking system of the capping valve is illustrated in attached drawings. The construction of the B1CP (P = “jammer”) actuator locking device is illustrated in Figure 1 (scheme C303944) on the next page.

Components – functions

Delivery includes:

1. 5/2-way (or 4/2-way) solenoid valve SV with double coil, SV-O/SV-C. This operates the capping valve open and closed.
2. 4/2-way spring-return solenoid valve SV-J, which operates the mechanical locking “jammer” on or off when the capping valve is closed.
3. Also included is a small spring return “jammer” cylinder, which is fixed permanently to mechanical locking lever in the actuator.
4. Limit switches LS with micro switches (4 x SPDT) indicate the open and closed positions of the capping valve. Two other switches are used to de-energize the solenoid valve which controls the actuator.
5. Limit switches JS-1 and JS-2 (2 x DPDT) indicate the position of the mechanical locking “jammer”: “JAM” - locked position or “UN-JAM” - unlocked position and lights L5 and L6 indicate whether the “jammer” is “JAM” or “UN-JAM”.
6. Speed control valves SC to limit the capping valve travel speed to 12 seconds open 12 seconds closed.
7. The control room must also have a three-position selector switch SW-O/OFF/SW-C, which operates the capping valve open or closed and a two-position switch SW-J, which turns the “jammer” locking device “JAM” and “UN-JAM”.
8. When needed the limit switches JS-1 and JS-2 transfer information to the sequence unit of the logic, lockings and interruptions.
9. Contacts C1-C4 are safety interlocks to open direction. The most important one is the contact of the digester pressure switch C4. This contact remains open as long as the digester pressure has dropped below the preset limit, which is normally
10. 0.1 bar (1.45 psi). Only then can the capping valve be opened. Other contacts could be the blow valve closed, steam valve shut, liquor pump off etc.

11. Contacts C5-C8 are safety interlocks to closed direction. The most important one is the chip conveyor contactor C5 preventing closing the capping valve if the ship feed is running. Other contacts could be a high chip level switch in the chute, digester low chip level indicator etc.
12. Contact C9 is also an interlock from the digester pressure switch. The “jammer” can’t be unlocked unless the digester pressure has dropped below the preset limit 0.1 bar (1.45 psi). Only then can the capping valve be opened.
13. If any of the above mentioned contacts are open, the capping valve can’t be opened or closed.

Operation

Opening the capping valve

Turn the switch SW-J to “UN-JAM” position. Now the solenoid valve SV-J becomes energized and the compressed air presses the spring of the locking cylinder de-jamming the “jammer” and lighting signal light L6.

After that operate the switch SW-O to the “open” position. Now the coil SV-O of the solenoid valve becomes energized provided that the contacts C1-C4 are closed. Compressed air runs to the top of the actuator cylinder opening the capping valve. As soon as the valve is fully open the contacts (1-2) of limit switch LS are switched open and voltage to coil SV-O is de-energized. After this turn the switch to the “OFF” position.

Closing the capping valve

Turn the switch SW-C to the “closed” position. The coil SV-C of the solenoid valve becomes energized provided that the contacts C5-C8 are closed. Compressed air runs to the lower end of the actuator cylinder closing the capping valve.

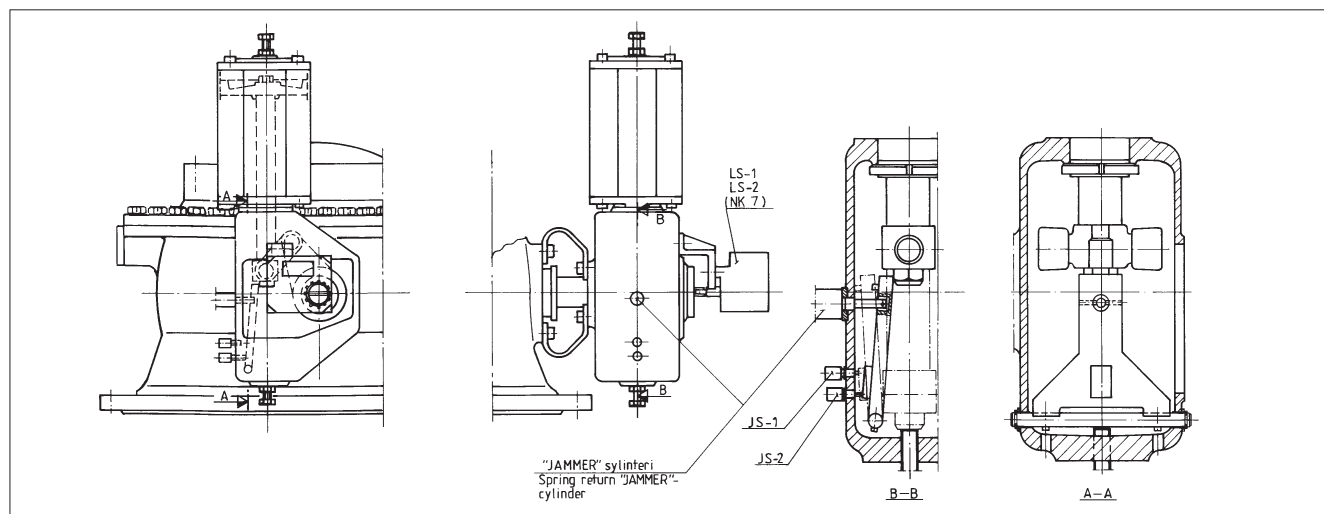


Fig. 1. The construction of the latching device “jammer”.

As soon as the capping valve is fully closed, the contacts (5-6) of limit switch LS are switched open and the voltage to SV-C is de-energized. After that turn the switch to “OFF” position.

Turn the switch SW-J to the “JAM” position. The solenoid valve SV-J becomes de-energized through contact C9. Now the spring of the mechanical locking cylinder pushes the mechanical locking on and lights signal light L5.

Summary

The system described above ensures that there are two independent locking systems in operation preventing the capping valve opening during the cooking cycle.

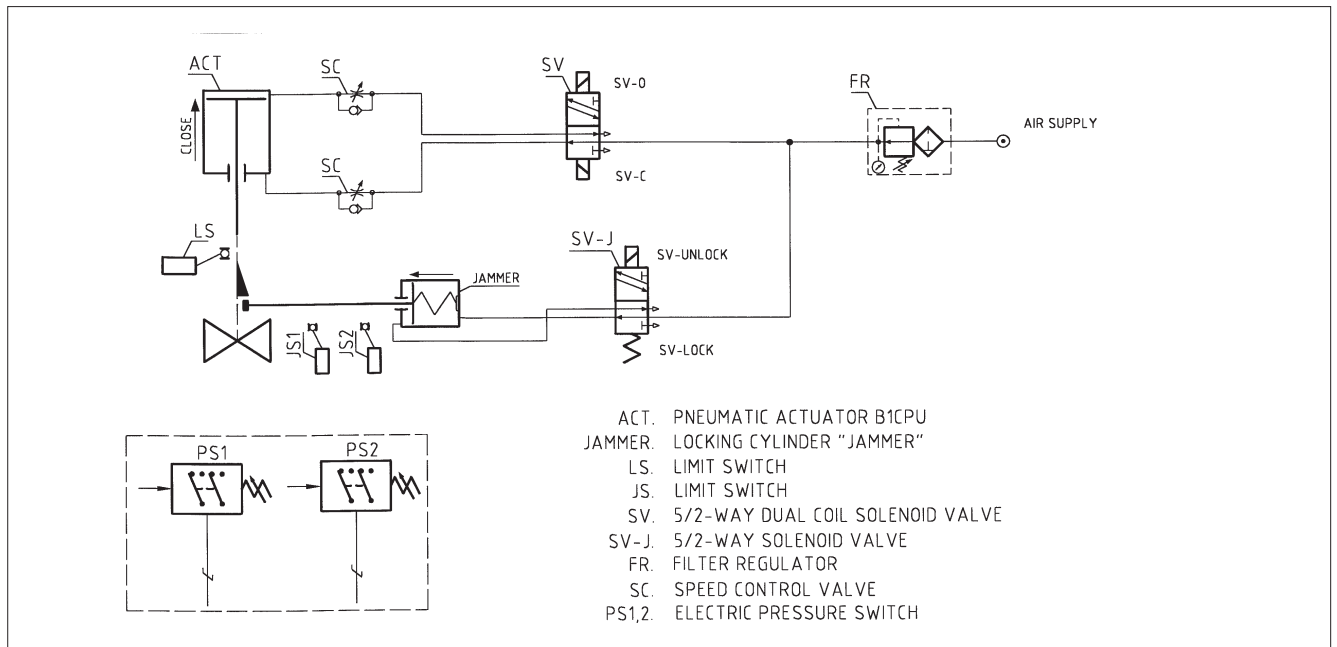


Fig. 2. Proposal for a capping valve with “jammer” actuator.

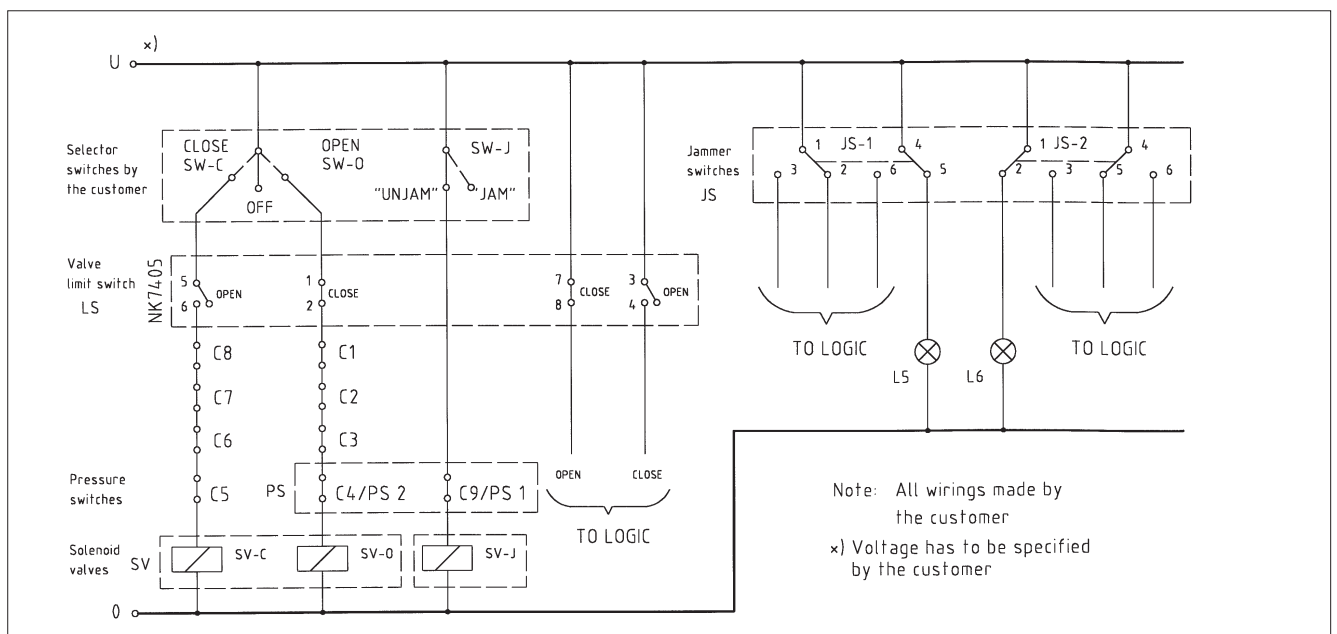


Fig. 3. Wiring proposal for a capping valve with “jammer” actuator.

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