
Hydraulic Installation Guidelines

Appendix I

Accessory Equipment

Section 1, Press Safety Valves

A press safety valve is used to actuate a clutch/brake or clutch or release a brake on a mechanical power press or a similar type of machine. The press safety valve is made up of two 3/2 valves operated in parallel with main stages that can be monitored by switches or electronic sensors. In use the press controls provide a signal to both valve coils of the press safety valve, and monitor the switches or sensors to verify that the main stages have properly shifted. This is necessary to comply with the applicable regulations that pertain to control and operation of mechanical power presses and similar equipment.

Ortlinghaus offers several series of hydraulic press safety valves that can be used with the Series 0123 and 0023 clutch/brakes as well as the Series 0224 clutches and Series 0225 brakes.

The 0086-076-01 Series (also called the PSV 18/2) is a press safety valve that has the main stages monitored by electrical limit switches. It is available with valve coils for 110/115 V AC 50/60 Hz and 24 V DC. The port (P, T, and A) connections are 1/2 BSPP. This series is suitable for use with sizes 63 through 90.

The 0086-096-12 Series (also called the PSV 12) is a press safety valve that has the main stages monitored by proximity switches. Valve coils are available for 110/115 V AC 50/60 Hz and 24 V DC. The P port is 1/2 BSPP and the A and T ports are 3/4 BSPP. This series is suitable for use with sizes 90 and larger, although it can be used on the smaller sizes if desired. This series is subplate mounted, and the required fixed orifice is mounted in the subplate.

The P port is the inlet port where the actuating, or pressure, oil connection is made; the T port is the connection to the tank or reservoir; and the A port is the connection to the clutch/brake, clutch, or brake.

Considerations for Interface Between Press Safety Valve and Press Controls

In applications where a press safety valve is required, care must be taken to properly integrate the press safety valve with the machine controls in order to comply with any and all necessary regulatory requirements.

In operation, all press safety valves are required to prevent clutch actuation or brake release in the event of a valve malfunction or misfire (signal to one side only). The Ortlinghaus press safety valves meet this requirement by way of their internal design and construction. If only one of the two valve coils is energized the "A" port (the port that is connected to the clutch/brake) will remain open to the tank port, preventing a buildup of pressure at the "A" port even when the "P" port (pressure inlet port) is opened to the "A" port by the energized valve coil. In the event that there is an internal failure in the Ortlinghaus press safety valve, such as a pilot stage or main stage failing to shift the same thing will happen, any pressure applied to the "A" port will be drained to the tank port

preventing brake release and/or clutch actuation. The only time there will be sufficient pressure applied to the clutch/brake for brake release and clutch actuation is when both valve coils are energized and both pilot stages and main stages shift properly and completely.

Another requirement is that the press safety valve be “monitored” or checked for proper operation and that the machine be inhibited from further operation if a fault (an incomplete shift of the press safety valve, or misfire of one of the valve coils) occurs until the fault is acknowledged and cleared by the machine operator or a supervisor. The fault may not be in the valve itself, it could be due to a broken wire or a control malfunction, but in any case the machine must be inhibited from initiating another cycle until the fault is acknowledged and cleared. With an externally monitored (or controls monitored) press safety valve there are switches that monitor the positions of the main stages of the press safety valve. The switch for each main stage changes state when that main stage shifts from rest to activated position. To fulfill the requirement the machine controls must monitor the switches. This requires that the machine control poll the monitor switch for each main stage for a change of state within a specified time limit of when a signal was issued to the valve coil that would activate that main stage. *Ortlinghaus* recommends a maximum time limit of 100 milliseconds. If both monitor switches do not change state within this time of a signal being issued to their respective valve coils the machine controls must issue a fault signal, stop machine operation, and inhibit further machine operation until the fault is acknowledged and the machine controls reset.

In operation the valve coils must be energized or de-energised simultaneously. If only one valve coil is energized, both the P and A ports will be connected to the T port, which will not allow the pressure at the A port to build high enough to release the brake or engage the clutch.

It is very important that proper filtration be used, and that foreign material be kept out of the fluid lines. Particulate matter and foreign materials will cause malfunction of any press safety valve, and that can result excessive valve faults and valve failure.

If you have any questions about the *Ortlinghaus* Press Safety Valves, or want more information on them please contact Orttech

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Section 2, MKB Valves

For installations on presses that require a controlled soft clutch engagement and/or a controlled soft brake engagement, the *Ortlinghaus* MCB Valve package is available. This is a package that includes the following functions:

- Rapid cylinder fill function to minimize clutch actuation time.
- Soft clutch function to give a smooth controlled clutch engagement.
- Verification that full actuating oil pressure is available for full clutch torque.
- Soft brake function to give a smooth controlled brake application.
- Hard (full) brake function for full brake torque stops when necessary.

The pressure setting for the soft clutch function is field adjustable, as is the pressure setting for the soft brake function so that they can be adjusted in the field to the specific needs of the installation. The *Ortlinghaus* MCB Valve includes a press safety valve that has its main stages monitored by electronic proximity switches. The soft brake control valve also has its main stages monitored by electronic proximity switches so that all applicable safety requirements may be complied with. The *Ortlinghaus* MCB Valve is available with valve coils for 110/115 V AC 50/60 Hz and 24 V DC. The MCB Valve also includes an electronic pressure switch that operates on a nominal 24 V DC.

The *Ortlinghaus* MCB Valve normally used with hydraulic clutch/brakes of size 86 or larger. Also available are the *Ortlinghaus* MC Valve which is the soft clutch only version which is used with separate clutches or with a clutch/brake when only the soft clutch feature is desired and the *Ortlinghaus* MB Valve which is the soft brake only version which is used with separate brakes or with a clutch/brake when only the soft brake function is desired.

The press controls must be capable of properly monitoring the proximity switches on the press safety valve section and the soft brake control valve section of the *Ortlinghaus* MCB Valve, be able to monitor the signal from the pressure switch, and be able to send the proper signals to the *Ortlinghaus* MCB Valve for the mode of operation desired.

If you have any questions, or want more information on the *Ortlinghaus* MCB Valve please contact Orttech.

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Section 3, ESK Electronic Slip Control

The *Ortlinghaus* ESK Electronic Slip Control unit is an *Ortlinghaus* exclusive device that will protect a wet running multi-plate clutch/brake or clutch from thermal overload. When press operation is such that excessive thermal energy is generated the ESK unit will first issue a warning signal at 75% of the allowable thermal limit, and if such operation continues it will issue an inhibit operation signal at 100% of the thermal limit.

In operation, there are several ways that a wet running clutch can be exposed to a thermal overload that can reduce the life of the plates or, in the worst case, cause immediate destruction of the plate stack. The first way is if the clutch is engaged just above contacting the work and slips, not fully engaged, while doing the work. This slipping produces excessive heat. Another way is if the press jams or becomes stuck in the work and the clutch slips for a time before a motion detect fault causes clutch disengagement. Another common cause of excessive thermal load is cycling (single stroking or rapid inching) a press at a rate faster than allowed.

The ESK Electronic Slip Control is preprogrammed with the relevant parameters of the application; and by monitoring the actuating oil pressure to the clutch/brake or clutch, the flywheel speed, and the speed of the shaft that the clutch/brake or clutch is mounted on it compares the thermal load produced with the maximum thermal load the clutch/brake or clutch can accept in that application.

When the thermal load produced reaches 75% of the maximum thermal load, a signal is sent to the press controls that is to trigger a warning to the operator that the clutch/brake or clutch is at 75% of the maximum thermal load. The ESK Electronic Slip Control will automatically reset when the thermal load falls to below 75%.

When the thermal load produced reaches or exceeds 100% of the maximum thermal load, a signal to a contactor is interrupted, so that the current to the coils of the press safety valve is interrupted, disengaging the clutch and applying the brake to prevent clutch damage due to thermal overload. When enough time passes to allow the cooling oil to remove the excess heat the ESK Electronic Slip Control will automatically reset and allow normal operation again. Additionally, if there is an unusually high thermal load spike (more than 50% above normal) the ESK Electronic Slip Control will issue a signal to a contactor to interrupt the current to the coils of the press safety valve, disengaging the clutch and applying the brake to prevent clutch damage due to thermal overload. When enough time passes to allow the cooling oil to remove the excess heat the ESK Electronic Slip Control will automatically reset and allow normal operation again.

The ESK Electronic Slip Control works in conjunction with the existing press controls and requires a 24 V DC supply. The ESK Electronic Slip Control as well as the required actuating oil pressure sensor, clutch input (flywheel) speed sensor, and clutch output (shaft) speed sensor are available from Orttech as a package. The programming of the ESK Electronic Slip Control is specific to each individual application, and the *Ortlinghaus* clutch/brake or clutch used on it, and because of this is not considered to be transferable from press to press.

This is just a general description of the *Ortlinghaus* ESK Electronic Slip Control, If you are interested and would like further information on it, or a more detailed description of its operation, please contact Orttech.