

## **Technical Product Information No. 1071**

### **Hydraulic overload safety system**

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### To whom is this TPI addressed?

This technical product information note is addressed to the

- user's and/or reseller's methods engineers and fitters, and the
- final customer's works fitters and machine operators.

### What will you find in the TPI?

The TPI offers you all the important information needed for the installation and maintenance of the hydraulic overload safety system. The system is made up of the

Series 0-086-042-... overload valve

Series 0-086-070-... hydraulic unit

**To the TPI belong a hydraulic diagram, a parts list and a drawing of the unit.** You should have received these in the course of the processing of your order. If you have not, please request them from us quoting the article number stated in the order documentation.

### What will you not find in the TPI?

The TPI does not provide information to support you in the design work involved in integrating the hydraulic unit into machine systems or on the various devices to be actuated such as clutches, brakes and clutch/brake combined units. You will find references to clutches and brakes in separate product information notes.

### Significance of the symbols accompanying the text

The instructions given in the sections of this documentation marked with the symbol shown on the right must be observed without fail if danger to persons and damage to your plant is to be avoided.



The sections marked with the symbol shown on the right provide additional information or tips to facilitate you in your work with our hydraulic units. The recommendations in these should also be observed in order to avoid damage.



### Our recommendation

Please pass on this TPI to your customers!

You can order further copies of it from us for your customers.

You are also free to make copies of this TPI to pass on to your customers.

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The Ortlinghaus hydraulic overload safety system is in accordance with the state of the art. The relevant safety regulations for the hydraulic components as well as for the electromagnetic compatibility have been observed.

### Area of application

The hydraulic overload safety system is designed for use on presses and serves to safeguard these against mechanical overloading.

### Observe the following rules without fail when working with hydraulic units:

#### Handling oil

Remember that oil is easily inflammable and can be poisonous under certain circumstances. In addition oil must never be allowed to get into the ground or bodies of water.

For the above reasons please take the following precautions:

- Keep suitable extinguishing agents handy!
- Do not play around with naked flames!
- Do not allow oil to remain in contact with the skin for extended periods!
- Change clothing that has got soiled!
- Hang up appropriate warning notices if necessary!
- Collect any oil that escapes by, for example, having a tray under the hydraulic unit.



#### Disposing of oil

Oil may not be allowed to get into the environment! For this reason dispose of old oil, used filter cartridges and cleaning material soiled with oil only via the disposal centres provided for these!



#### Reciprocal action between hydraulic oil and other components

Inadequate compatibility of the hydraulic oil with seals, membranes, coats of paint etc. can impair the proper functioning of the system or lead to hazards. For this reason use only the hydraulic oils we recommend. Seek our advice before using other media or before operating the system under extraordinary operating conditions.



#### Avoidance of hazards:

Faults in the control system or in individual components can lead to hazards - e.g. through uncontrolled movements or jets of escaping fluids. Hot, pressurized media can cause fractures. For this reason:

- Keep away from parts that become hot as far as possible.
- Ensure if necessary that there is adequate cooling or screening.
- Set up the control in such a way that no hazardous movements are possible in the case of a failure or disruption or install appropriate screens.
- Attach warning notices to the machine if necessary.



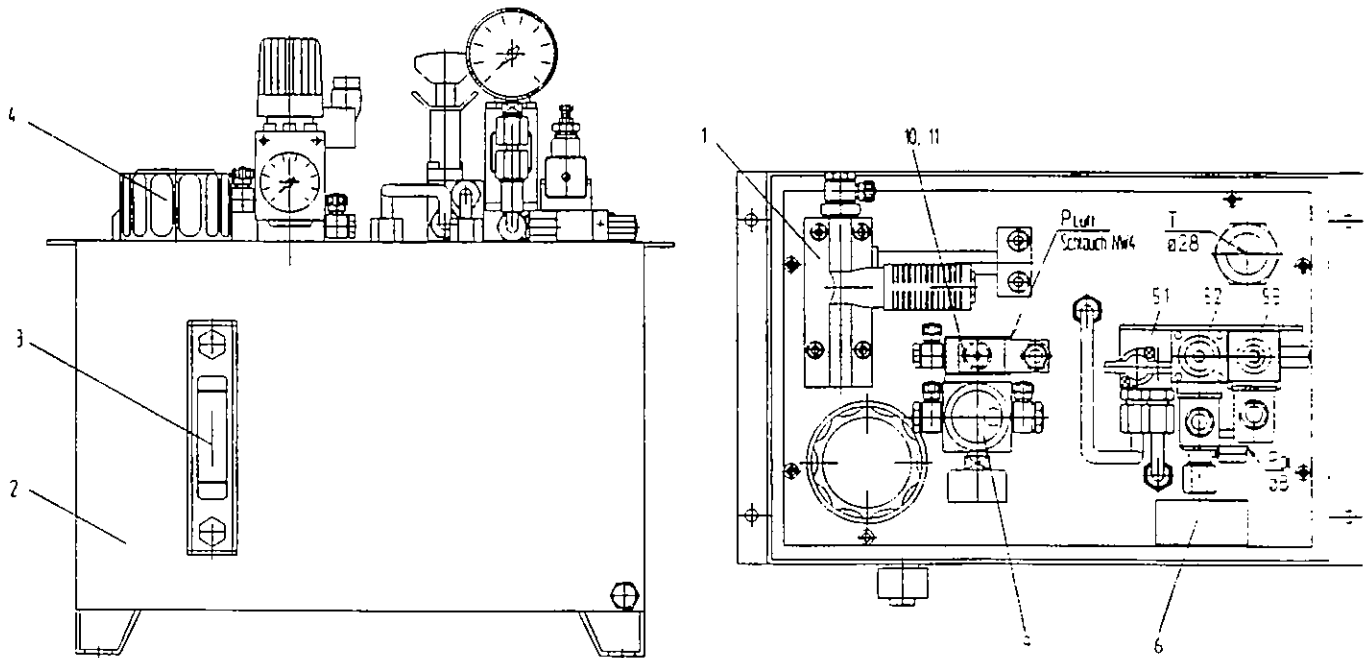
## Function

The hydraulic overload safety system consists of the overload valve and the related hydraulic unit.

There is an overload cylinder in the press ram. This is filled with oil via the overload valve by the hydraulic unit and pressurized up to a bias pressure. Each press cycle causes the pressure in the overload cylinder to increase. If its triggering pressure is exceeded, the overload valve opens the cylinder space so that the oil is depressurized and empties into the unit. The press can then move through its lower dead centre without resistance.

The hydraulic unit contains a reciprocating pump which is operated by compressed air and controlled by a slide valve. The pressure of the actuating compressed air is converted into a higher hydraulic pressure. The ratio of the two pressures is a function of the conversion ratio of the pump. When the final (bias) pressure is reached, the pump stops automatically. A fall in pressure on the hydraulic side causes the unit to start up again automatically.

The pressure at which the overload valve triggers (opens) is set by the overload valve. The triggering pressure is greater than the bias pressure generated by the unit by a factor in accordance with the conversion ratio of the valve.



- 1 Pump, immersion type
- 2 Oil tank
- 3 Level display
- 4 Degassing filter
- 5.1 Pressure relief valve
- 5.2 Hydraulic solenoid valve
- 5.3 Pressure switch
- 6 Pressure gauge for bias pressure
- 9 Pressure regulating valve
- 10, 11 Pneumatic solenoid valve

## Preparations

When transporting and installing a hydraulic unit you should observe a number of rules in order to avoid damage and to ensure that the unit will function properly.

Using the circuit diagrams, parts lists and type plates check whether the unit as supplied is in accordance with what was ordered!

Compare here, for example, the size, the equipment and the electrical connection data.

## Transport and installation

For transportation use if possible the ringbolts, welded-on eyes and openings in the feet provided. Protect sight glasses and flanged-devices against contact with chains and ropes during transportation.

Install the hydraulic unit horizontally.

Ensure that the important points are easily accessible and that there is good ventilation.

Protect the hydraulic unit against dirt, moisture and extreme temperatures (i.e. temperatures below 0°C and in excess of 60°C).

The floor on which the unit stands must be sealed to prevent any hydraulic oil that escapes seeping into it. If this is not possible, install the hydraulic unit in a collecting tray.

The valve is screwed directly on to the press ram. The preferred position of mounting is vertical.



## Installation

Proceed in the following order when connecting the unit:

1. Connect all hydraulic lines
2. Connect all pneumatic lines
3. Connect all electric lines

**Important:** All electrical installation work may only be carried out by qualified electricians in accordance with the particular applicable circuit diagram. Pay particular attention to the fact that the voltage, type of current and poling are correct.



## Connecting the hydraulic lines:

- For the hydraulic connections use only pressure pipes or ultrahigh pressure hoses of adequate dimensions. These must be compatible with the hydraulic fluid used.
- Use only pipes and hoses which have been properly cleaned (e.g. deburred and flushed out).
- Install the returnflow and leakage lines in such a way that there will be no build up of pressure in them and ensure that these lines are of adequate cross-section.
- Ensure that the lines are not subjected to oscillation, stresses and mechanical loading.



### Connecting the pneumatic lines

- For the pneumatic connection use only plastic hose of NW 6 (internal diameter of hose 6 mm).

A maintenance unit consisting of filter and water trap is to be fitted on the intake side. An oiler for the compressed air is only required when the air is very dry. If an oiler is fitted in the compressed air system, ensure that only oil which is free of silicon and acids is used. In addition a pump operated with oiled air may only be used in combination with compressed air systems with an oiler.

### Filling the unit with hydraulic oil

**Important:** Use only hydraulic oils in accordance with DIN 51524. The following table is designed to aid you in selecting the viscosity of the oil.



Operating temperature	up to 45 °C	45 to 55 °C	55 to 70 °C
ISO-VG class	22	32	46

Synthetic fluids must be compatible with the material of the seals, membranes and bags used. Before using synthetic fluids, ask us whether these can be used without danger.

Filling process:

- Close oil drain openings
- Remove cap of air filter
- Fill tank with hydraulic oil; oil from a drum **must be filtered**
- Fill the oil reservoir tank up to the „**Maximum**“ mark on the level indicator
- Insert the filter cartridge again and put on the cap.

**Important:** Transfer the hydraulic oil with the aid of a pump and a filter in accordance with purity class 16 / 13 (in accordance with ISO 4406). This purity class can be achieved with a filtration grade of  $\beta_{10} = 75$ .

### Degassing the hydraulic system

There can be oil in the hydraulic system. This fact can be detected by

- unusual noises
- low performance, or
- jerky movements of devices worked by the system.

In such cases degas the hydraulic circuit as follows:

- Slacken the pipe connections or, if present, the bleeding screws on the consumers or on the highest points of the system a little.
- Run the pump at a low pressure setting.
- Tighten the pipe connections / close the bleeding screws when the fluid emerging no longer has any bubbles in it.

The operating and maintaining of the hydraulic system may only be carried out by expert fitters who have been familiarized with the system.

Make yourself familiar above all with the mode of functioning and operating of the following operating elements:

**Hydraulic side**

- Drain valve
- Pressure relief valve
- Pressure switch

**Pneumatic side**

- Solenoid valve
- Pressure regulating valve / proportional valve

**Operating the unit****Hydraulic side****Drain valve**

The hydraulic circuit can be depressurized with the drain valve. This must be done when shutting down the system, prior to carrying out repair or maintenance work and each time when setting a lower bias pressure. The valve opens when a voltage signal is applied. When the valve is opened, the hydraulic oil flows back direct into the tank.

**Pressure relief valve**

The pressure relief valve serves to safeguard the complete hydraulic circuit and prevents an impermissibly high bias pressure being set. If the technical data of the press are known, the valve is set in our works to the maximum permissible bias pressure. In this case it does not require to be set.

**Pressure switch**

The pressure switch serves to monitor the bias pressure. In a case of overloading, the overload valve depressurizes the pressure circuit and the pressure switch is released. It is recommended that the signal that the pressure switch has been released is processed by the machine control in such a way that the press is stopped. Thereafter it should not be possible for the press to be started up again until the press has been checked or an appropriate release given.

The pressure switch has a setting screw on its upper side. A locking screw prevents the setting screw rotating. The point at which the pressure switch switches can be set with this setting screw as follows:

- Apply compressed air to the pump. The pressure should be approx. 1.5 bar.
- Slacken the locking screw of the setting screw.
- Increase the air pressure until the desired switching pressure is reached on the hydraulic side.
- Set the switching pressure on the setting screw. The pressure at which the switch switches can be set within the range 20 - 210 bar. The hysteresis of the pressure switch depends on the switching pressure which has been set. The lower switching point will be between 75 and 92 % of the upper switching point that has been set.
- Tighten up the locking screw.

## Pneumatic side

### Solenoid valve

The feeding of air to the hydraulic pump is switched with the solenoid valve. In the overload situation, the valve should be switched off to prevent the overload cylinder being filled again.

### Pressure regulating valve / proportional valve

The level of the hydraulic bias pressure is set via the pressure regulating valve / proportional valve. The pneumatic pressure that has been set acts on the hydraulic pump. This generates the hydraulic bias pressure which is greater than the pneumatic pressure by a ratio which is a function of the conversion ratio of the pump.

If a lower pneumatic pressure (= lower bias pressure) should be set, the hydraulic circuit must first be depressurized with the drain valve (see above).

The pressure is set manually with the pressure regulating valve. In the case of the proportional valve, the pressure is regulated in accordance with the control signal (0...10 V DC).

### Working steps for commissioning

- Close the hydraulic distributor valve.
- Open the pneumatic distributor valve.
- Increase the pneumatic pressure with the pressure regulating valve / proportional valve slowly until the desired bias pressure has been reached.

Check all lines and connections for tightness and tightness up unions if necessary.

Carry out regular checks particularly in the initial period after commissioning as to whether all lines and connections are tight. Tighten up any unions that are leaking.

### Checking the level of the hydraulic oil

At commissioning it is essential that you watch the level of the oil in the tank as shown on the level indicator!

The level of oil in the tank falls as the lines and oil consumers (overload cylinder etc.) are filled.

Top up the oil so that it becomes visible in the level indicator (approx. in the middle of the sight glass). Too much oil must not be added since this would lead to overflowing when the oil flows back to the tank when the system is shut down. The correct amount must be determined by experiment!

When topping up, use only the **same sort of oil** that is already in the system!

The regular maintenance of the hydraulic unit consists of the carrying out of the following operations:

- Changing the oil
- Visual checks for leaking
- Tightening up of unions if necessary

**Important:** The hydraulic system must always be depressurized before any work is carried out on the hydraulic unit. Take care that there are not any part circuits which are decoupled by, for example, non-return valves and which remain under pressure!

In case of doubt, check by loosening a union. If oil starts to flow out vigorously, there is still pressure in the system.



### Changing the oil

The intervals at which the oil should be changed depend on - among other things - the thermal loading, the quantity of oil in the circuit and the number of hours per week for which the unit is operated. Oil samples should be taken not later than 6 months after the initial commissioning and thereafter at intervals of not more than 3 months and the state of the oil checked. The degree of ageing can be checked in the laboratories of the coolant manufacturer or by a neutral testing institute. The interval for changing the oil can then be determined from the length of time between the initial commissioning and the observation of an advanced state of ageing.

### Procedure when changing the oil

Ensure that any oil spilt is disposed of in an environmentally friendly manner (absorbing granulate, cleaning cloths).

Dispose of the old oil as well as the soiled auxiliary material in accordance with the relevant regulations!

Proceed as follows:

- Switch off the unit
- Allow time for any oil in circulation to flow back to the reservoir tank
- Empty the tank with the aid of a drum pump
- Drain off the remaining quantity of oil through the oil drain plug
- Clean the inside of the tank if it is very dirty
- Screw in the drain plug again
- Fill up with fresh oil.