Reliability at work

Operating Manual

Hydraulic Control Unit, 2 Functions

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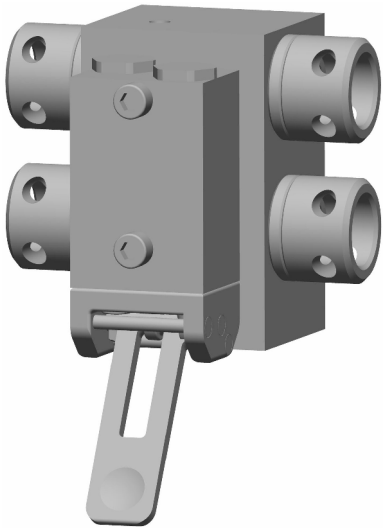

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Your safety

This chapter provides vital information for your safety.

Pay special attention to this chapter. The safety instructions and rules of procedure will help you to avoid hazardous situations and to perform the necessary work as safely as possible.

residual risk

The hydraulic control unit has been manufactured in accordance with the state of the art and generally recognized safety standards and regulations. However, a certain risk remains which might get you into hazardous situations when working with or on the hydraulic control unit. These may, for example, be caused by unforeseeable external influences, machine damage or operating errors.

supplementary regulations

In addition to this operating manual, also be sure to observe the respective legal provisions and regulations for accident prevention in your country.

Observe the safety and accident prevention regulations:

- of the mining company,
- of the mining authority, and
- of the miners' accident insurance association.

Personnel

Persons employed in the operation, repair, and overhaul of hydraulic and/or hydraulic control unit components must have special qualifications. In addition to having received training in mining skills the following minimum requirements shall be met.

Operation and maintenance

qualification

Operation and maintenance of the control is only allowed to be performed by trained personnel.
The training shall be matched to the type of control actually used.
The content of the operating manual, especially the chapter on safety, shall constitute a part of this training.

They shall possess and furnish proof of adequate familiarity with the

- mechanical,
- hydraulic, and
- control systems.

Storage and transport

This chapter contains important information on the correct storage and transport of the hydraulic control.
Observance of the instructions and tips will increase the service life of the hydraulic control. You will also be able to carry out the transport work quicker and more safely.
Careful attention to the points in this chapter will help you to simplify your day-to-day work.

Storage

Storage of new equipment

corrosion protection

The surfaces of the equipment are provided with a temporary corrosion protection. If stored properly, the equipment parts will be protected for six months referred to the date of delivery.

Prior to delivery the hydraulically operated equipment will be tested and operated at the Bucyrus site using the anti corrosive and anti freezing fluid HYDROCOR® CV50*). This fluid remains in the hydraulic system for transport and a following short-time storage period.
HYDROCOR® CV50 is freeze-proof down to - 40 degrees Celsius and protects the metallic materials against corrosion.
It is equipped with a color indicator, which is responsive on the pH-value of the fluid. The color of the fluid will change from ”red” to ”yellow” in case the pH-value drops. A yellow colored fluid indicates insufficient corrosion protection.

For further particulars on the properties of HYDROCOR® CV50 please refer to the respective data sheet of the manufacturer.

exposure to sunlight

Protect the equipment against direct exposure to sunlight.
Store the electrical equipment, electronic components, spare parts of rubber or plastic - such as seals and hoses - and hydraulic fluids only in closed rooms at temperatures of 15 ºC to 25 ºC.

natural ageing

Even with proper storage, seals and hoses are subject to natural ageing. A storage period of approx. two years is therefore recommended for these parts.

moisture and dirt

Protect all hydraulic elements during storage in a suitable manner against the ingress of dirt and moisture. The connecting surfaces of the hydraulic components must be protected against corrosion and closed with blind plates. Hydraulic plug-type connections and the connectors of the electric cables must be closed with suitable caps or plugs.

short-term storage

During short-term storage (approx. 4 weeks) of equipment outdoors, but at temperatures **above** freezing, electrical components need not be removed. Such components must, however, be particularly protected against environmental influences, including high temperatures, for example by suitable covers or sheathings for the controls and by additionally covering the equipment.

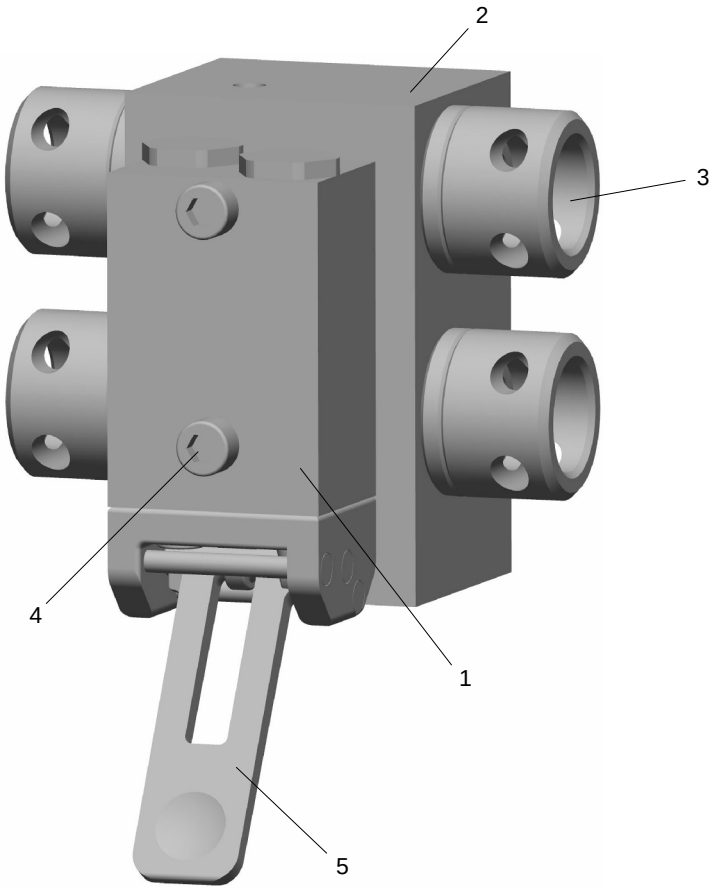
*) HYDROCOR® CV50 is a trade name of Theunissen, Chemische Fabriken GmbH, Wuppertal / Germany

Operation

This chapter contains information on the operation of the hydraulic control unit. It is imperative that you also observe the operating manuals of the machine into which the hydraulic control unit is incorporated.

Danger!
Safety hazard due to machine movements.
Persons may be severely injured or even killed, for example by unexpected movements of the machine, if the control unit is operated by somebody who does not have sufficient knowledge of how to perform this work.
Only operate the controls of the hydraulic control unit if you have the required knowledge.
Operate the lever of the control unit only if you have the required knowledge and skills.

Fig. 7: Hydraulic control unit, 2-functions



1 4/3 way valve
2 valve housing
3 screw plug
4 cylinder bolt M 6x40-A 4-80
5 operating lever

Hydraulic fluid maintenance

A consistent good quality of the hydraulic fluid is essential for the operational reliability of hydraulic systems. Therefore, maintenance of the hydraulic fluid must not be neglected but should be performed with special care. The most important properties of the hydraulic fluid should ideally be monitored automatically and recorded in order to be able to directly counter any harmful effects. These properties include: temperature, foaming, pH-value, concentrate ratio, and microbial load.

The operator of the equipment has to prepare a hydraulic fluid maintenance concept for any individual application. The maintenance concept should be prepared in close cooperation with the manufacturer of the concentrate and has to be applied consistently.

If it is not possible to monitor the hydraulic fluid continuously the properties listed in the following should be checked at least once every week:

- pH-value
  - Target value: 7.5 to 9.5
- Concentrate ratio
  - Target value: see certificate
- Microbial load
  - Target value: < 10^5 Kol/m

In addition, the electrical conductivity, foaming and the operating temperature of the hydraulic fluid should be monitored regularly.

The permissible max. temperature of the hydraulic fluid is 55 °C. During normal operation, however, an operating temperature of 45 °C should not be exceeded. A higher operating temperature will reduce the stability of the emulsion and shorten the life of the sealing material.

Quality of the process water

The quality of the water used for the preparation of the hydraulic fluid has an enormous influence on the properties of the hydraulic fluid. Accordingly, the requirements for monitoring the water quality are very high.

The following table 1 lists limit values for the essential properties and components of the water.

If the limit values shown are maintained it can be assumed that the water is basically suitable.

If one or several of the limit values mentioned are not met this should be taken into consideration when selecting a concentrate. Additional water treatment may also be required.

The customer shall in any case, however, provide a sample of the original water to permit performing the tests required for the issue of the certificate.

Changes in the composition of the water will also lead to the loss of the certificate even if they are within the limit values mentioned.