

Operational purpose

The Locking Device KFH clamps a shaft in any position. It is commonly used on a cylinder rod DIN/ISO 24554 (160 bar) or another round shaft and holds axial forces in both axial directions.

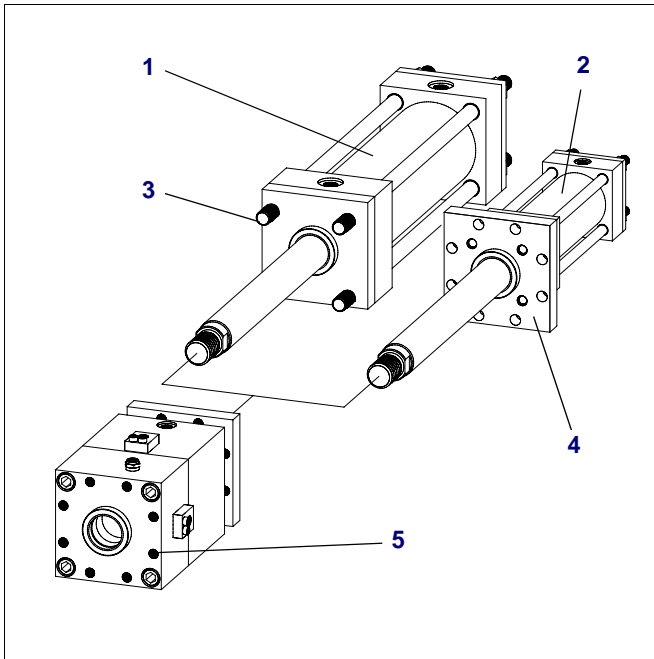


Fig. 2: Mounting to standard hydrocylinder

- 1 Cylinder with smallest rod diameters
- 2 Cylinder with bigger rod diameters
- 3 Extended tie-rods without nuts
- 4 Customer-supplied coupling flange
- 5 Vacant fastening threads at the front face

Load direction

A force in load direction 1 is always held without backlash. If the force acts in load direction 2 a backlash also does not occur, provided the force is not exceeding approx. 80% of the nominal holding force F . Otherwise the possible axial displacement is 0.1 - 0.3 mm.

Choosing the right size

The table (Page 1) shows the nominal holding force F of the various items. The value F must be higher than the static load in the particular application.

In case a vertically moved mass is to be secured, a reasonable safety factor must be applied by the designer. This factor depends on the kind of machinery, but shouldn't be less than 1.5. If people have to be secured against dangers of lifted static loads, the nominal holding capacity of the locking unit must at least be 2 times the static load. In this case, the necessary regular testing must be performed with at least 1.5 times the load.

To guarantee the holding force during service even under unfavourable conditions, the actual holding force when new has to be higher than the nominal holding force. It will not, however, exceed twice the value. The fixing elements that absorb the force (e.g. articulations for the holding rod) must therefore be dimensioned for $2 \times F$.

T- port

The tapped hole marked T (tank, oil leakage) is used for pressure compensation (breathing). It is plugged with a filter element when supplied from the factory.

In case the Locking Unit KFH/X is to work in corrosive environment, e.g. coolant spray, port T must be connected to clean atmosphere or hydraulic tank by a pipe or hose.

Rod material

The Locking Unit KFH/X will operate correctly only if the rod has the correct surface:

- ISO tolerance field f7 or h6
- Surface roughness: $R_z = 1$ to $4 \mu\text{m}$.
- Rod surface hardened (min HRC 56). If only static load is applied, hardening not necessary.
- Hardchrome plated surface recommended
- Lead-in chamfer $3 \times 20^\circ$, rounded.

As the actual holding force can be as high as two times the nominal holding force F (for F see data sheets or dimensional drawing), care must be taken to ensure that the strength of rod material is adequate. In the case of compression-loaded rods, sufficient buckling resistance must be assured.

In practice, suitable and commercially available rods are:

1. Piston rods, hard chrome plated (ISO tolerance f7)
 Basic material: Yield strength, min. 580 N/mm²
 Induction hardened HRC 56 - 64 / min. 1 mm deep
 Hard chrome plating: 800-1100 HV min. 13 μm deep
 Surface finish: RA 0,15 - 0,25
2. Shafts for linear ball bearings (ISO tolerance h6)
 Induction hardened HRC > 60
 Surface finish: RA 0,15 - 0,25

Pressure fluid

Hydraulic oil (HLP) in accordance with DIN 51524-2 must be used as pressure medium. Please consult us before using any other media.

Control

In most applications the actuation suggested in Abb.3 is used. During every operational cycle the 3/2-way valve is actuated electrically and releases the locking unit. In all other operational conditions, as well as in cases of power failure, emergency stop, etc. the locking unit becomes effective, secures the rod and stops the load. In case the pressure should fail, the load is secured in the same way.

To avoid possible problems, the shaft should not be driven unless the proximity switch 2 indicates "unclamped".

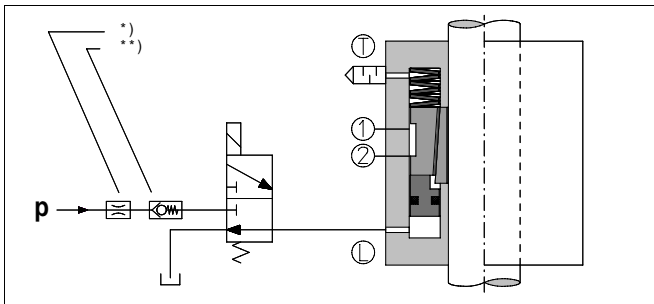


Fig. 3: Schematic diagram of hydraulic circuit

- * If impact noises are audible when pressuring the Locking Unit KFH/X due to excess pressure, they can be suppressed by means of a flow control valve in the p-line.
- ** If the pressure (p) is not sufficiently constant (e.g. pressure drop at the beginning of a downward stroke) we recommend a check valve in the p-connection of the valve.

Under no circumstances may the hydraulic flow between connection L and the tank be impaired by any additional components.

If a particular quick response of the Locking Unit KFH/X is required, the following preconditions must be met:

- Short piping distances
- large valve and pipe cross-sections
- fast valve response times

Operating conditions

The Locking Unit KFH/X is designed to operate in usual clean and dry shop atmosphere.

In case of other environments at least the T-port for breathing purposes is to be connected to a clean and dry volume (tank). Should heavy soiling conditions (grinding dust, chips, other liquids, etc.) exist, please contact SITEMA.

Grease on the rod may reduce the holding force. The permissible ambient temperature is 0 - 60°C.

Regular functional checks

The Locking Unit KFH/X must be functionally checked at regular intervals. Regular checking is the only way to ensure that the unit operate safely in the long run.

For applications in the field of personal safety (operator protection), testing must be carried out at least once every 6 months. Depending on the relevant application parameters (soiling level, cycle time, control), significantly more frequent checks may be advisable. In many cases, even (fully automatic) daily checks may be necessary.

For testing a force at least equal to the working force, but normally equal to the nominal holding force F is applied.

In every case the criteria is, that the test force is held without slipping.

Required risk assessment

If SITEMA - Safety Brakes are used in safety-relevant applications the following has to be carefully attended:

It must be ensured that the size, the dimensions and arrangement of SITEMA - Safety meet the requirements of the risk evaluation EN ISO 14121-1 for the complete machine and also comply with any further standards and regulations applying to the intended use. This is generally the duty of the system manufacturer/user.

Maintenance

Maintenance is limited to the regular test of the holding force as prescribed above.

The SITEMA - Locking Unit KFH/X is a safety element. Any repair or refurbishing must be carried out by SITEMA. SITEMA cannot take any responsibility for repairs by another party.