English translation of German original
TI-F17-EN-02/2011

Technical Data Sheet TI-F17
Locking Unit KFHC Special version for machine tools

For detailed functional description refer to *„Technical Information TI-F10“*. Furthermore important practical advices are given in the *„Operating Manual BA-F17“*.

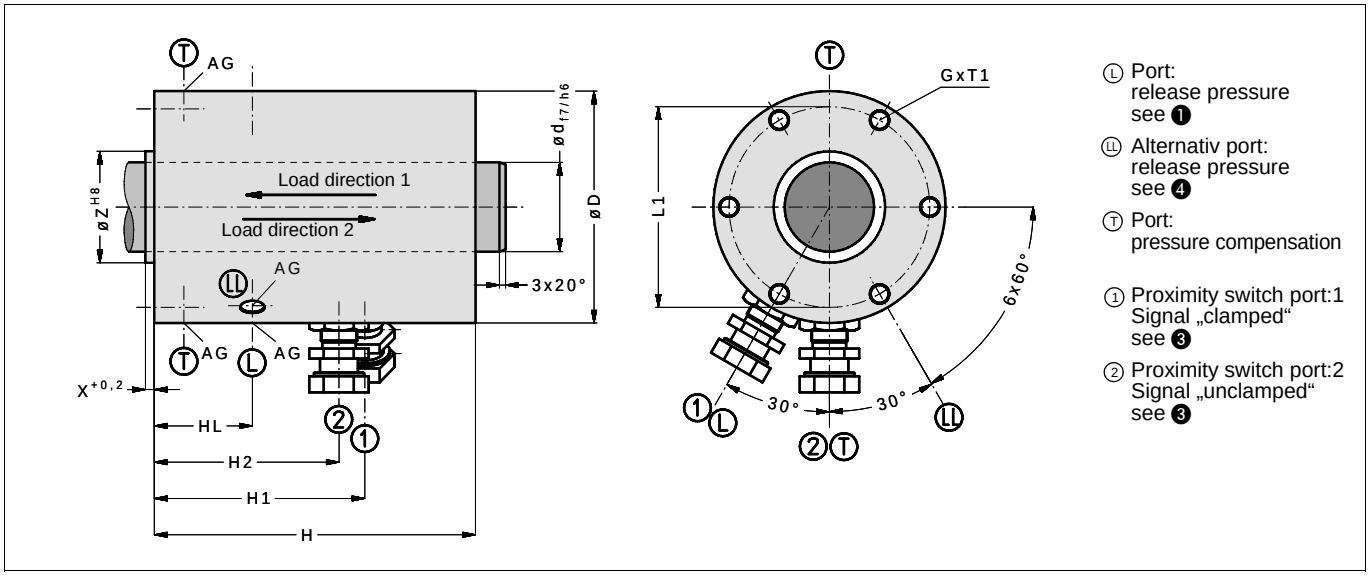

Fig. 1: Dimensions Locking Unit KFHC (CAD-Files download at www.sitema.com)

			❶	❶									❷				
Typ	**Ident.-No.**	**d**	**F**	**p**	**D**	**H**	**L1**	**T1**	**G**	**Z**	**X**	**AG**	**VL**	**HL**	**H1**	**H2**	**Weight**
		mm	*kN*	*bar*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*cm^3*	*mm*	*mm*	*mm*	*kg*
KFHC 30	KFHC 030 01	30	8	30	116	120	96	16	M8	60	3	G1/8	22	38	89	80,5	12
KFHC 30	KFHC 030 02	30	15	50	116	120	96	16	M8	60	3	G1/8	22	38	89	80,5	12

Subject to modification without prior notice

❶ F is guaranteed as nominal (minimum) holding force for dry or mineral oil wetted shafts.
p is the pressure required for releasing. The permissible working pressure is 100 bar.

❷ Hydraulic operating volume.

❸ Proximity switch holders are provided for standard proximity switches M12x1 shielded and with a nominal switching distance of 2 mm (flush-mounted).
For easier service, the proximity switch holders have a positive stop and are presetted when deliverd from the factory.

❹ Plugged hydraulic port LL alternative to L, also usefull for bleeding.

Operational purpose

The Locking Unit KFHC is applied as rod clamp as well as emergency brake for linear axes in machine tools.

Especially with vertical axes the risks of unintended lowering are to be considered as part of the general risk assessment.

Also horizontal axes may have to be arrested in accurate position or are to be safely stopped in case of emergency stop.

Correct choosing the right size

The table (*Page 1*) shows the nominal holding force of the various items.

In case of vertical axes the nominal force should be equal to twice the weight of the moving masses in order to achieve in case of emergency a deceleration as high as g (gravity = 10 m/s²). To be able to decelerate horizontal axes with same rate the nominal force has to be equal to the moving weight.

Other deceleration rates may be chosen, if required.

To guarantee the holding force during operation, even under unfavourable conditions, the actual holding force when new should be higher than the nominal holding force. It will not, however, exceed double the value. The fixing elements that absorb the force (e.g. articulations for the holding rod) must therefore be dimensioned for 2 x 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 KFHC 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 KFHC will operate correctly only if the rod has the correct surface:

- ISO tolerance field f7 or h6
- Surface roughness: Rz = 1 to 4 µm.
- Rod surface hardened (min HRC 56). If only static load is applied, hardening not necessary.
- Hardchrome plated surface recommended
- Lead-in chamfer 3x20°, 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.

Mounting information

As supplied the Locking Unit KFHC is in released condition as the internal clamping system is blocked by inserted (red painted) sticks. Thus it can be mounted over the clamping rod and fixed without any preliminary measures. After fitting and pressurizing the sticks must be removed. For more information please see operating instructions.

Control

In most applications the actuation suggested in *Abb.2* 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".

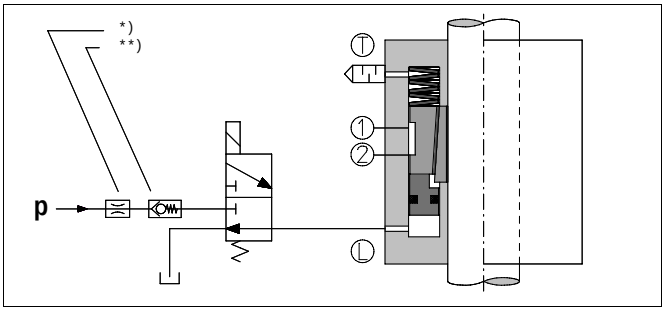

Fig. 2: Principle diagramm of hydraulic circuit

* If impact noises are audible when pressuring the Locking Unit KFHC 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 suficiently 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 KFHC is required, the following preconditions must be met:

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

Operating conditions

SITEMA Locking Unit KFHC are suitable not only for dry environment but also for operation in the presence of sprays of coolant/lubricant. For this reason, all the external parts and sealing surfaces are made of corrosion protected material.

Should heavy soiling conditions (grinding dust, chips, other liquids, etc.) exist, please contact SITEMA.

Grease on the rod may reduce the holding capacity.

Regular functional checks

The Locking Unit KFHC must be functionally checked at regular intervals. Regular checking is the only way to ensure that the unit will safely operate in the long term.

For applications in the field of personal safety (operater 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.

To check the locking effect in the case of vertical axes, a load made up of at least the maximal weight of the axle in question is applied to the rod. To demonstrate an excess braking force, an additional force of 50% - 100% of the weight must be applied.

In the case of horizontal axes, a test can only be carried out using the force of the drive. This should be set to 50% - 100% of the weight.

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 KFHC is a safety element. Any repair or refurbishing must be carried out by SITEMA. SITEMA cannot take any responsibility for repairs by another party.