

Technical Data Sheet TI-F21

Locking Units, KFPC series

For a detailed functional description, see "Technical Information TI-F10".

For further information, see "Operating Manual BA-F21.1".

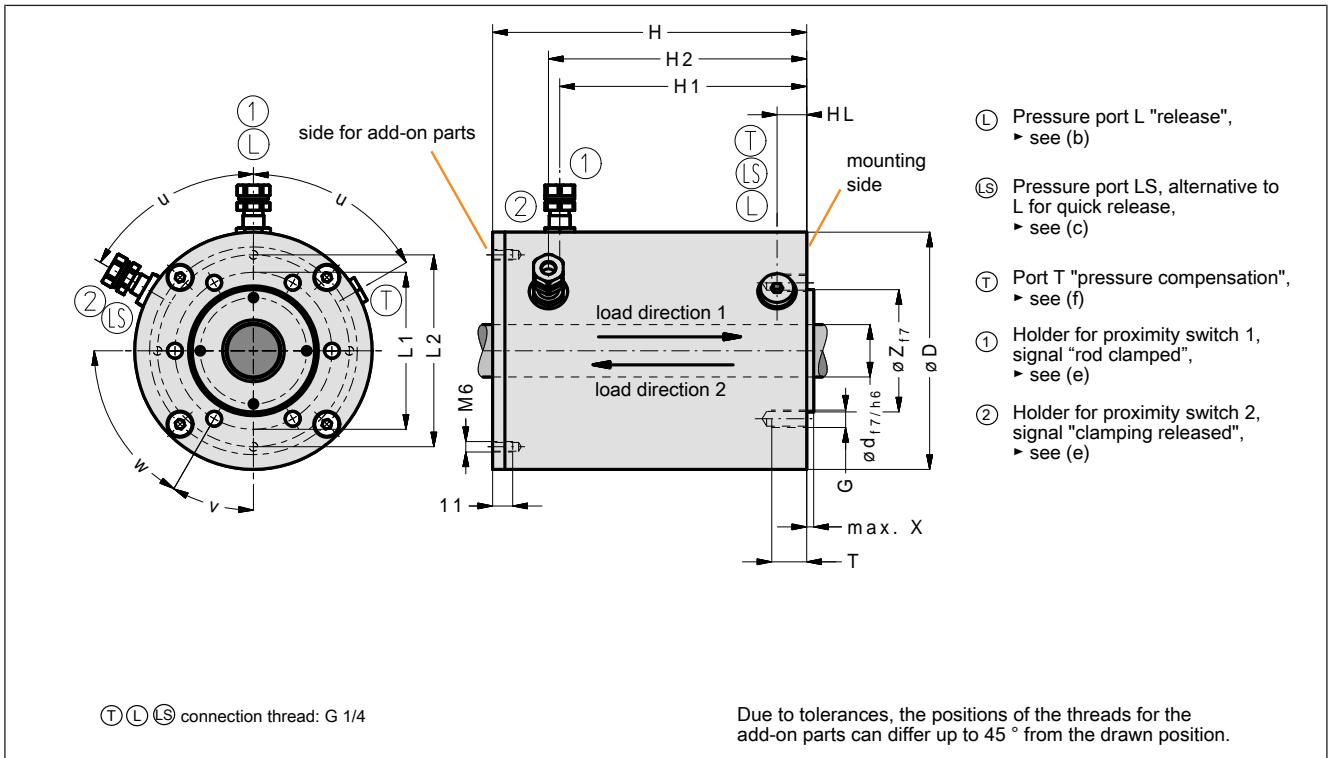


Fig. 1: Dimensions of the KFPC Locking Unit (Download of CAD data from the Internet: www.sitema.com)

(a) (b) (d)

Type	ID no. (order no.)	d mm	F kN	p bar	V cm ³	Z mm	D mm	H mm	H1 mm	H2 mm	HL mm	L1 mm	L2 mm	T mm	X mm	G	u	v	w	Wt. kg
KFPC 20	KFPC 020 20	20	11	5	150	52	112	140	106	111	15	70	90	16	3	M8	60°	30°	6x60°	3.9
KFPC 30	KFPC 030 20	30	22	5	270	70	136	180	141.5	148	17	90	110	20	4	M10	60°	30°	6x60°	7.8
KFPC 40	KFPC 040 20	40	44	5	510	70	205	235	168	175	20	130	169	24	4	M12	36°	18°	10x36°	23.6

Subject to modification without prior notice

- (a) The nominal holding force F is the minimum holding force for dry or hydraulic oil wetted rods.
- (b) Pressure p is required to release the clamping. The permissible maximum operating pressure is 8 bar.
- (c) On delivery, pressure port LS is plugged by a plug screw. LS may be used as an alternative to pressure port L if an especially short switching time is required. If pressure port LS is used, the Locking Unit will have a reduced service life. If you plan to use LS, please contact SITEMA.
- (d) Pneumatic operating volume.
- (e) Proximity switch holders are mounted for standard inductive proximity switches: M8 x 1, nominal switching distance 1.5 mm, flush mountable, NO (normally open). For easier mounting, the proximity switch holders have a depth stop and are preset to the correct depth at delivery. The proximity switches only need to be inserted to the stop and then clamped. The proximity switches are not included in the standard scope of delivery but are available as accessories.

- (f) Port T compensates internal volume changes during switching. At delivery, the port is plugged with an air filter which, in a dry and clean factory environment, offers sufficient protection against dust etc. If moisture or aggressive media may be sucked in, the air filter has to be replaced by an unpressurized line which leads to a clean atmosphere (e.g. a clean, unpressurized container).
- (g) The aluminum surfaces of the housing parts are anodized.

Technical Information

1 Purpose

The Locking Unit clamps a linear axis in any position. It absorbs axial forces in both load directions.

2 Axial play

The maximum axial play in both load directions is 0.08 mm.

3 Operating conditions

The immediate vicinity of the Locking Unit must be dry and clean.

Condition	Value
Permissible surface temperature	0 to + 60 °C (32 to 140 °F)
Relative humidity at 20 °C (68 °F), no condensation	20 to 75 %

Table 2: Operating conditions

Special protective measures are required in adverse environmental conditions (for example humidity or aggressive media in the environment):

- The air filter on port T has to be replaced with an unpressurized line routed to a clean environment.

Please contact SITEMA if you have an environment with heavy contamination (particles, grease, grinding dust, or chips) or extreme temperatures.

It must be avoided that viscous lubricants and grease enter the Locking Unit (for example via the rod). They may reduce the holding force.

4 Pressurizing medium

Use only dried and filtered compressed air according to ISO 8573-1:2010 [7:4:4]. Other pressurizing media may be used only in consultation with SITEMA.

5 Choosing the right type

The Technical Data Sheet specifies the nominal holding force F for each type available. The nominal holding force F must be higher than the maximum axial force (load to be secured) acting on the rod.

If it is required to hold or brake vertically moving masses or if any other dynamic impact forces occur, F must be higher than the load to be secured by an appropriate safety factor. This safety factor has to be defined by the machinery manufacturer depending on the requirements. It should not be less than 1.5.

6 Requirements of the clamping rod and fastening elements

The actual holding force of the KFPC Locking Unit is higher than the nominal holding force F indicated in the data sheets and dimensional drawings; but it will not be higher than twice this value. Therefore, all fastening elements carrying the load (rod, its attachment, etc.) have to be dimensioned for at least 2 x F.

Please note that during emergency braking of a moving load, the full holding force (2 x nominal holding force F) can occur. In case of overloads, the rod will slip. This usually causes no damages to the rod and Locking Unit.

Make sure the base material of the rod is of adequate strength. In the case of compression-loaded rods, the buckling resistance must be observed.

Clamping rod requirements

Requirement	Diameter	Value
ISO tolerance zone	all	f7 or h6
Induction hardened	all	min. HRC 56
Surface hardening depth	ø to 30 mm ø over 30 mm	min. 1 mm min. 1.5 mm
Surface roughness	all	Rz = 1 to 4 µm (Ra 0.15 to 0.3 µm)
Protection from corrosion	all	e.g. hard chromium plating: 20 ± 10 µm 800 - 1000 HV
Lead-in chamfer rounded	all	min. 4 x 30°

Table 3: Clamping rod requirements

i Manufacturers of piston rods for cylinders or rods for linear ball bearings usually offer suitable clamping rods.

IMPORTANT: The rod must not be greased.

7 Actuation

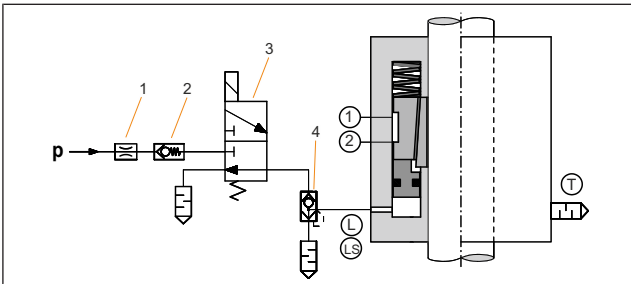


Fig. 2: Example for KFPC actuation

1	If impact noises due to excess pressure are audible when pressurizing the clamping unit (depending on the release pressure), these can be suppressed with a flow control valve (throttle) in the p-line.
2	If the pressure is not sufficiently constant (e.g. pressure drop at the beginning of a downward stroke), we recommend to install a check valve in the p-connection of the valve.
3	3/2-way valve
4	Dump valve

In most cases the actuation can be implemented as shown in the figure above.

In the above example, during every intended drive of the rod or Locking Unit in normal operation, the 3/2-way valve is actuated electrically to release the clamping.

In any other operating state, as well as in cases of a power failure, emergency stop, etc., the Locking Unit engages, holds the rod, or brakes the load. Likewise, the load is secured when the supply line breaks.

To prevent problems, a movement of the drive should only be permitted if proximity switch 2 signals "clamping released".

For quick response times, the following conditions must be met:

- quick controller
- short lines
- fast valve response times
- large valve and line cross-sections
- installation of a dump valve directly at port L or LS



The load may drop down if the pressurizing medium cannot flow off freely.

Make sure that the discharge of the pressurizing medium from pressure port L or LS is not impaired by any additional components. Make sure that all connection lines are installed free of kinks. If there is a danger of kinking, take protective measures: protective tubing, thicker tube walling, or similar.

Differences between pressure ports L and LS

By default, pressure port L should be used.

Pressure port LS can be used for applications which require fast response times of the Locking Unit.

If pressure port LS is used, the Locking Unit may have a reduced service life. For further information, please contact SITEMA.

8 Risk assessment

It must be ensured that the dimensions and arrangement of Locking Units used in safety-relevant applications meet the requirements of EN ISO 12100:2010 and also comply with any further standards and regulations applicable for the intended use. The Locking Unit alone principally cannot be a complete safety solution. It is however suitable to be part of such a solution. Furthermore, all attachments and connections have to be dimensioned correspondingly. This is the task of the machine manufacturer/operator.

9 Regular performance tests

A performance test of the Locking Unit must be carried out at regular intervals. Regular checking is the only way to ensure that it will operate safely in the long run.

Please see the Operating manual for further details.

10 Maintenance

Maintenance is limited to the regular performance tests. Should the Locking Unit cease to comply with the required characteristics, the safety for working with the machine or system may no longer be given. In this case the Locking Unit must be immediately and professionally repaired by SITEMA.

To ensure the function as safety-related component, any repair or refurbishing must be carried out by SITEMA. SITEMA cannot take any responsibility for repairs by another party.