

Technical Data Sheet TI-F24

Locking Units, KFP series

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

Also observe the Operating Manual BA-F24.

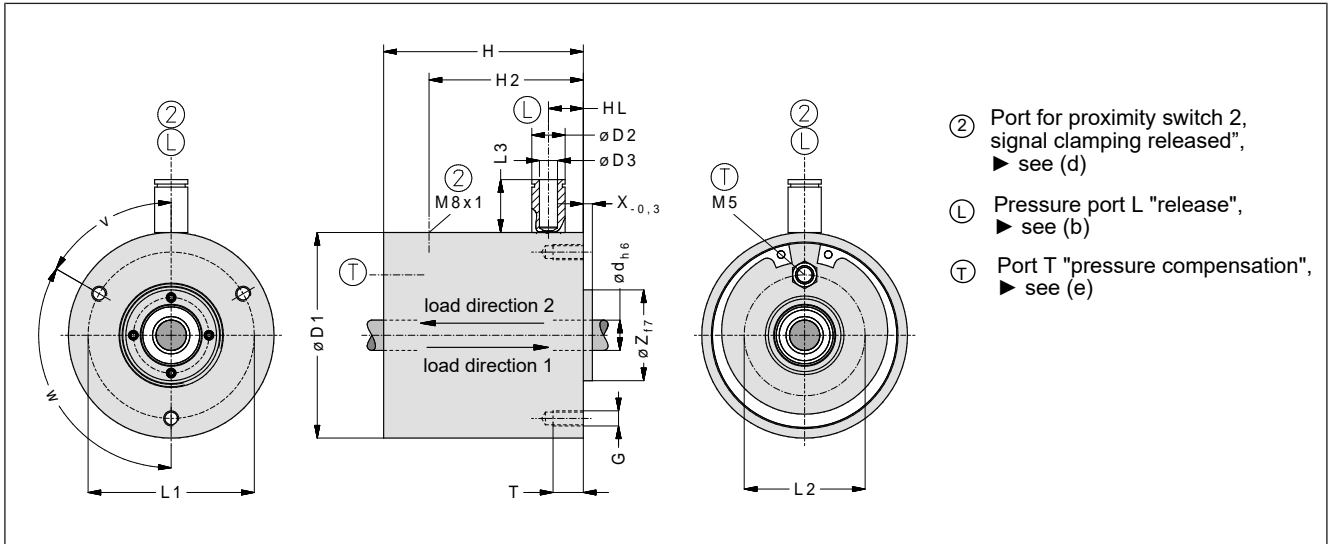


Fig. 1: Dimensions of the KFP Locking Unit (Download of CAD data from the Internet: www.sitema.com)

(a) (b) (c)

Type	ID no.	d	F	p	V	Z	D1	D2	D3	G	H	H2	HL	L1	L2	L3	T	X	v	w	Wt.
	(order no.)	mm	kN	bar	cm ³	mm					mm							Degree	kg		
KFP 10	KFP 010 01	10	1	5	8	30	68	11	6	M5	66	51	11.5	55	40	17.5	10	3	60°	3x120°	0.6

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. The pressure port has a push-in fitting for connecting the compressed air hose.

(c) V = Pneumatic operating volume.

(d) The proximity switch is screwed in directly in port 2. Port 2 is designed for a standard proximity switch: M8 x 1, nominal switching distance 1.5 mm, flush mountable, NO (normally open).

IMPORTANT: For the KFP 10 series the plug or the cable of the proximity switch must be routed vertically away from the unit. If the cable is routed by an angle of 90 degrees, when screwing in the cable or plug, it may collide with the pressure port.

The proximity switches are not included in the standard scope of delivery but are available as accessories.

(e) 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).

(f) 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

In both directions, the load is held without axial play.

3 Operating conditions

Condition	Value
Permissible surface temperature	0 to + 60 °C (32 to 140 °F)

Table 2: Operating conditions

The Locking Unit has been designed for use in dry and clean surroundings. Condensation water should be avoided.

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

A heavily contaminated operating location may require special protective measures. See Requirements of location and clamping rod.

4 Emergency braking

Emergency braking of a moving load is possible **once** only. For this purpose, the nominal holding force must be multiplied by a safety factor so that it is higher than the maximum static force acting on the rod. This safety factor has to be defined by the operator depending on the requirements, but should not be less than 1.5. In case of doubt, contact SITEMA.

After emergency braking, the rod must be examined for damages and if necessary, exchanged. The Locking Unit must be returned to SITEMA for professional servicing and acceptance testing.

5 Pressurizing medium (pneumatics)

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.

6 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.

F must be higher than the load to be secured by an appropriate safety factor if it is required to hold vertically moving masses or if any other dynamic impact forces occur. This safety factor has to be defined by the machinery manufacturer depending on the requirements. It should not be less than 1.5. SITEMA recommends the safety factor 2 if safety of persons must be guaranteed.

7 Clamping rod requirements

The Locking Unit functions correctly only if it is used together with a clamping rod that fulfills all requirements mentioned here:

Requirement	Diameter	Value
ISO tolerance zone	all	h6
Induction hardened	all	min. HRC 56
Surface hardening depth	ø up to 30 mm	min. 1 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. 3 x 20°

Table 3: Clamping rod requirements

IMPORTANT: The rod must not be greased.

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.

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

8 Actuation

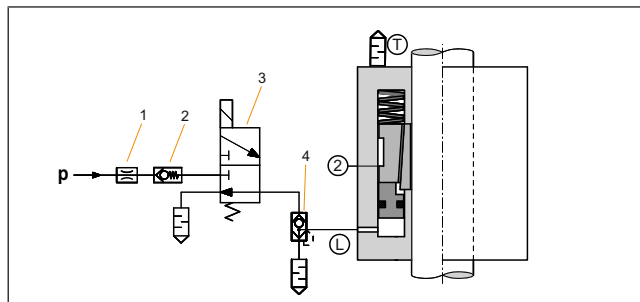


Fig. 2: Example for KFP actuation

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 of 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



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 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.

9 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.

10 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.

11 Maintenance

Maintenance is limited to a routine performance test. If the Locking Unit ceases to comply with the required characteristics, the machine or system may no longer be safe to work with. In this case the Locking Unit must be immediately and professionally repaired by SITEMA.

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

12 Information on product safety

Safety feature	Remarks
Safety features	Securing from standstill
Fail-Safe	Normally closed
Suitable for operator protection	Yes (if safety factor 2 is observed)
Proven component	yes*)
Traceability	100 % with serial number
Final product check	Carried out for all units by SITEMA, documented
CE marking	According to conformity assessment procedure
Safety component	According to EU Machinery Directive 2006/42/EG and Regulation (EU) on machinery products 2023/1230

Table 4: Safety feature

*) The product is a proven component for a safety-related application according to ISO 13849-1. The product fulfills the basic relevant and proven safety features according to ISO 13849-2.

13 Accessories

We recommend the following accessories: All these parts are available from SITEMA:

Accessories	Description
Rod Attachment STB	for securely attaching the rod to the machine part; already designed for the maximum force of the clamping head, see <i>TI-STB10</i>
Suitable proximity switches	as spare parts
Further accessories:	
Electropneumatic module EPM	for pneumatic units if no pneumatic system is present, see <i>TI-E10</i>