Technical Data Sheet TI-F23
Locking Units series KFPD

For a detailed functional description refer to *"Technical Information TI-F10"*.
Further important practical advice is given in *"Operating Manual BA-F23"*.

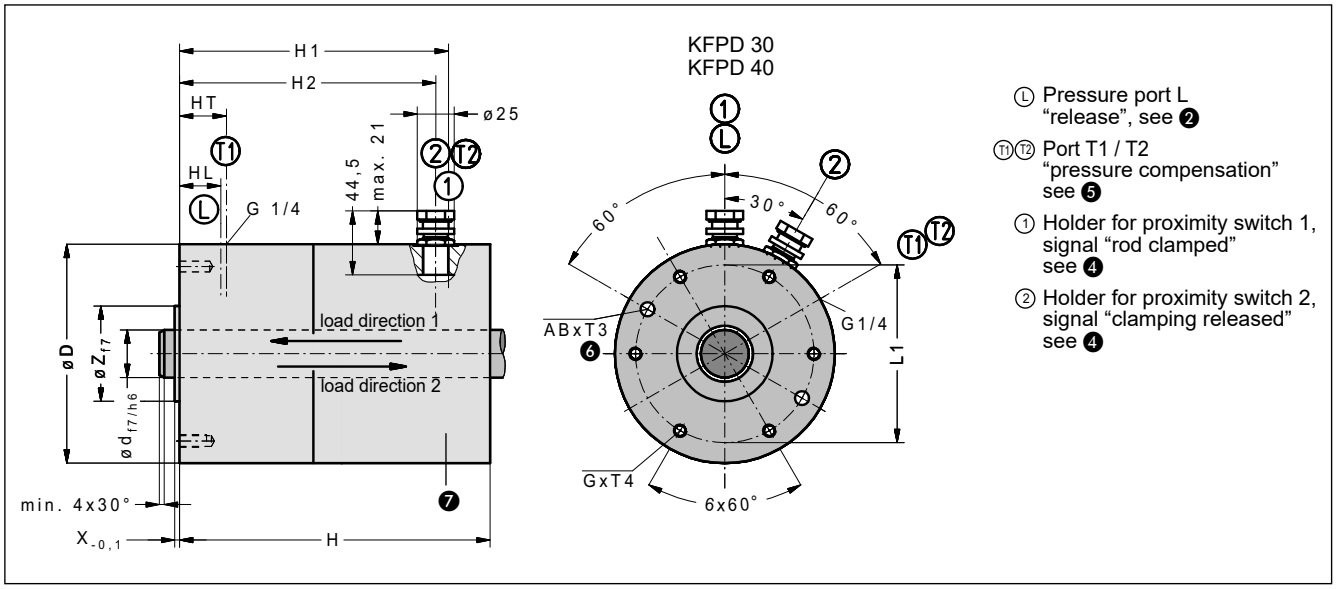

Fig. 1: Dimensions of Locking Unit KFPD (download CAD files from www.sitema.com)

			❶	❶	❷					❻					❸					
Typ	**ID no.**	**d**	**F**	**τ**	**p**	**D**	**Z**	**H**	**X**	**AB**	**T3**	**L1**	**G**	**T4**	**V**	**HL**	**HT**	**H1**	**H2**	**Wgt**
	(order no.)	*mm*	*kN*	*Nm*	*bar*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*		*mm*	*cm³*	*mm*	*mm*	*mm*	*mm*	*kg*
KFPD 30	KFPD 030 01	30	12	120	4.5	138	60	197	3	8^{H7}(2x180°)	10	110	M8	16	max.180	14.5	15.5	139.5	131.5	9
KFPD 40	KFPD 040 01	40	30	500	4.5	185	85	300	5	10^{H7}(2x180°)	12	145	M12	24	max.180	18	24	228	220	23

Subject to modification without prior notice

❶ F is the minimum holding force for purely axial loads on dry or hydraulic-oil wetted rods. **τ** is the minimum holding torque for a purely rotary movment on dry or hydraulic-oil wetted rods. Both load types must not be applied at the same time at full value.

❷ The pressure p is required to release the clamping. The admissible operating pressure is 8 bar.

❸ Pneumatic operating volume

❹ Proximity switch holders are provided for standard inductive proximity switches (M 12x1, nominal switching distance 2 mm, flush mountable, NO (normally open)).
For easier service, the proximity switch holders have a depth stop and are pre-adjusted when delivered from the factory.
The switches only need to be inserted to the stop and then clamped.
The proximity switches are not supplied in the standard scope of delivery, but are available as accessories.

❺ Internal volume changes during switching are compensated at ports T1 and T2. Air filters are fitted to the ports for "breathing". In a dry and clean factory environment, this offers sufficient protection against dust etc.
If, however, moisture or aggressive media are present (e. g. coolant spray), pressureless hoses instead of the filters must be installed to connect the Locking Unit KFPD with clean atmosphere (e. g. a clean pressureless container).

❻ The Locking Unit KFPD can be additionally fixed to the machine part thoroughly the holes AB for anti-rotation function fitted with a pin.

❼ The aluminum surfaces of the housing parts are anodized.

Purpose

The Locking Unit KFPD is used as an infinitely variable lock on piston rods for cylinders or other clamping rods. The Locking Unit KFPD holds static loads in both load directions or static torques in both rotation directions.
Holding of dynamic loads (emergency braking) is also allowed in both load directions (linear), provided that the nominal holding force F is higher than the load in operation. It must be ensured that the rod is **rotation free**.

Axial play

The load is held free from axial play in load direction 1.

In standard designs, the load is also free from axial play in load direction 2 as long as the load does not exceed 80 % of the nominal holding force (F). In the case of exceeding, the axial play in load direction 2 is about 0.1 - 0.3 mm.

Operating conditions

The Locking Unit KFPD is designed to operate in normal clean and dry workshop atmosphere.

In case of heavy soiling conditions (grinding dust, chips, other liquids, etc.), please contact SITEMA.

Viscous lubricants and grease may reduce the holding force.

The permitted surface temperature is 0°C to +60°C.

Required risk assessment

It must be ensured that the dimensions and arrangement of a Locking Unit KFPD used in safety-relevant applications meet the requirements of the risk evaluation EN ISO 12100:2010 and also comply with any further standards and regulations applicable for the intended use. The Locking Unit KFPD alone principally cannot form a complete safety solution. It is however suitable to be part of such a solution. Furthermore, all attachments and fixations have to be dimensioned correspondingly. This is generally the duty of the system manufacturer and the user.

Choosing the right type

The table shows the nominal holding force F / nominal holding torque F of the various types.

The nominal holding force / nominal holding torque must be higher than the maximum axial load / torque acting on the rod. An appropriate safety factor must be applied. This factor needs to be defined by the user depending on the requirements.

In case vertically moving masses shall be held, this factor should not be less than 1.5.

Pressure fluid

The compressed air must be dried and filtered. SITEMA recommends compressed air according to ISO 8573-1:2010 [7:4:4].

Design and attachment of the rod

The Locking Unit KFPD will operate correctly only if the rod has a suitable surface:

- ISO tolerance field f7 or h6
- induction hardened min. HRC 56, surface hardening depth:
  ø up to 30 mm: min. 1 mm
  ø over 30 mm: min. 1.5 mm
- surface roughness: Rz = 1 to 4 µm (Ra 0.15 - 0.3 µm)
- protection against corrosion, e.g. hard chromium plating: 20 ±10 µm, 800 – 1 000 HV
- lead-in chamfer, rounded:
  ø 18 mm up to ø 80 mm: min. 4 x 30 °
  ø over 80 mm up to ø 180 mm: min. 5 x 30 °
  ø over 180 mm up to ø 380 mm: min. 7 x 30 °

The rod may not be lubricated with grease.

Often, the following standard rods fulfill the above mentioned requirements and can then be used:

- piston rods (ISO tolerance field f7), hard chrome plated
- rods for linear ball bearings (ISO tolerance field h6)

Make sure the base material of the rod is of adequate strength. Ensure that there is no risk of pressurized rods being kinked.

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

⚠ Please note that at **linear dynamic** loads, the full holding force (2 x nominal holding force) can occur. It must be ensured that the rod is **rotation free**. In case of overload, the rod will slip. This does normally not cause any damage to the rod or the clamping unit.
In the **direction of rotation**, the Locking Unit KFPD is intended **only for static holding**. In case of overload, the rod and the clamping head can be damaged.

Control

In most applications, an actuation as suggested in the drawing *Fig. 2 on page 3* is used.

During every operational cycle, the 3/2-way valve is actuated electrically and releases the Locking Unit KFPD. In all other operational conditions including power failure, etc., the Locking Unit KFPD engages and holds the rod or brakes the load. Likewise, the load is secured when the pressure line breaks.

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⚠ **To prevent possible problems:**

- Only hold or break when the rod is rotation-free.
- Only actuate the drive when proximity switch 2 indicates signal “clamping released”.

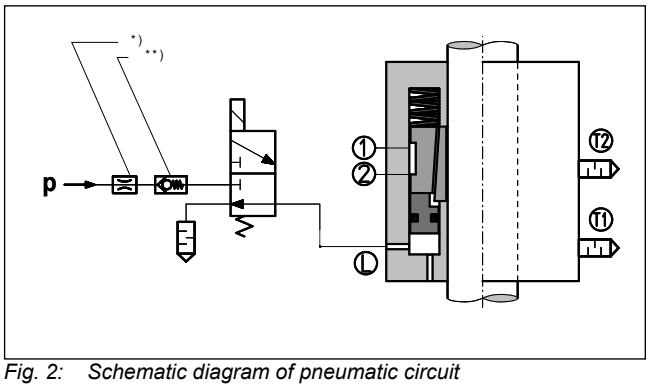

Fig. 2: Schematic diagram of pneumatic circuit

* In case impact noises due to excess pressure are audible when pressurizing the Locking Unit KFPD, these can be suppressed by means of a flow control valve (throttle) in the p-line.

** In case the pressure 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.

WARNING!
Risk due to slowed discharge of pressure medium!
Slowed discharge of the pressure medium may cause a dangerous situation. The clamping locks with a time delay.

- Make sure that the discharge of the pressure medium from pressure port L is **not** impaired by any additional components.
- Route all connection lines without any kinks.
- If there is any danger of kinking, take appropriate precautions (protective tube, thicker hose, etc.).

If a particular quick response time of the Locking Unit KFPD is required, the following preconditions must be met:

- installation of a dump valve at L
- short line distances
- fast valve response times
- appropriate control

Regular performance tests

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

Please see the *operating manual* for further details.

Maintenance

The maintenance is limited to the regular performance tests.

Should the Locking Units KFPD 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 Units KFPD must be immediately and professionally repaired by SITEMA.

The Locking Units KFPD are safety components. Any repair or refurbishing must be carried out by SITEMA. SITEMA cannot take any responsibility for repairs by another party.