

Technical Data Sheet TI-F57

Locking Units, KFHSR series 18 to 50 mm

Sealed for humid conditions. With DGUV Test certificate.

For a detailed functional description, see "Technical Information TI-F10".
Also observe the "Operating Manual BA-F57".

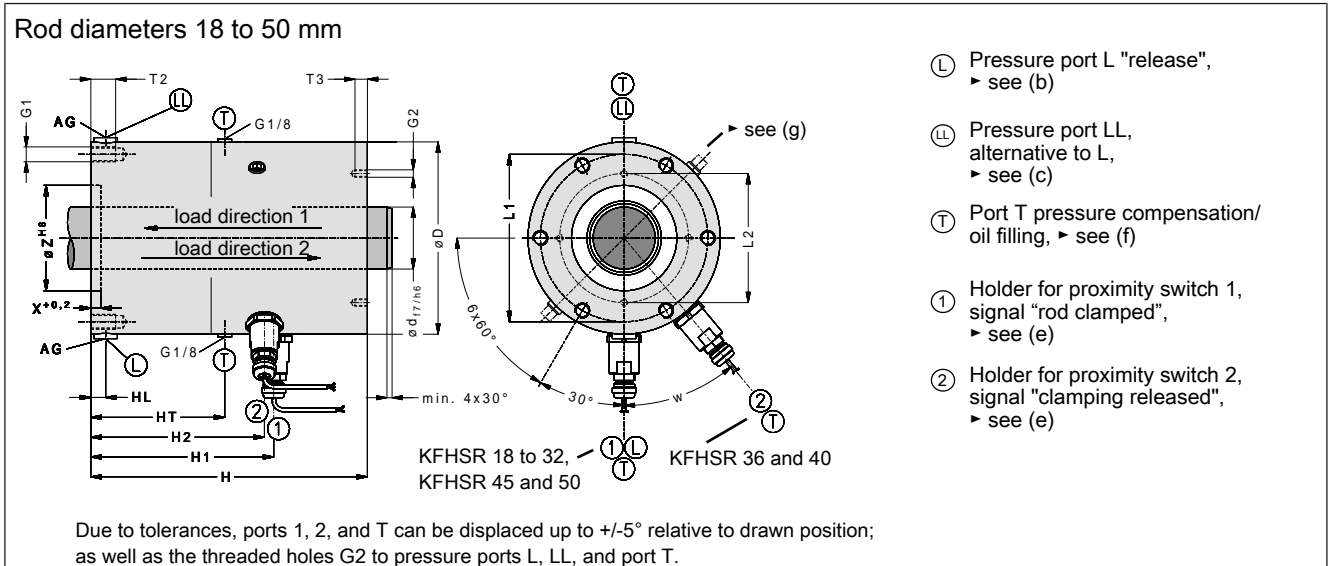


Fig. 1: Dimensions of the KFHSR Locking Unit (download of CAD data: www.sitema.com)

Type	ID no. (order no.)	(a) (b)		(d)																		
		d mm	M kN	p bar	D	H	L1	L2	T2	T3	G1	G2	Z	X	AG	V cm ³	HL	H1	H2	HT	w	Wt. kg
KFHSR 18	KFHSR 018 70	18	5	70	71	137	60	34	12	8	6xM6	4xM4	30	4	G1/8	6	29	105	98	68	45°	4
KFHSR 25	KFHSR 025 70	25	10	100	95	140	82	44	15	10	6xM8	4x M6	50	6	G1/8	11	19	89.5	83	62	35°	6
KFHSR 28	KFHSR 028 70	28	17	100	115	178	96	63	18	10	6xM10	4xM6	60	6	G1/4	18	20	118	112	94	30°	12
KFHSR 32	KFHSR 032 70	32																				
KFHSR 36	KFHSR 036 70	36	25	100	138	200	115	80	18	14	6xM10	4xM6	70	6	G1/4	28	19	109.5	119	96	30°	19
KFHSR 40	KFHSR 040 70	40																				
KFHSR 45	KFHSR 045 70	45	37.5	100	155	223	135	96	20	14	6xM12	4xM6	85	8	G1/4	39	20	147.5	140	108	30°	26
KFHSR 50	KFHSR 050 70	50																				

Subject to modification without prior notice

- (a) M is the admissible load the mass to be secured exerts on the KFHSR Locking Unit. The holding force with a dry or hydraulic-oil wetted rod is at least $2 \times M$ but does not exceed $4 \times M$.
- (b) Pressure p is required to release the clamping. The permissible operating pressure is 160 bar.
- (c) On delivery, pressure port LL is plugged by a plug screw. It may be used as an alternative to pressure port L and is useful for filling or air bleeding the pressure chamber. We recommend connecting an auto-bleeder to the free port (see *Technical Information TI-Z10*).
- (d) V = hydraulic operating volume
- (e) The KFHSR Locking Unit is equipped with inductive proximity switches: M8 x 1, flush mountable, NO (normally open). The proximity switches are pressure-resistant up to 5 bar and have a cast-on cable of 5 m length.
- (f) The T ports compensate internal volume changes during switching. For use in humid conditions, the KFHSR Locking Unit must be filled or flushed with hydraulic fluid to prevent corrosion.

- (g) The lock plates keep the clamping system open if the unit is not yet mounted. They have to be removed after mounting.
- (h) The surface of the housing parts is ZnNi coated.

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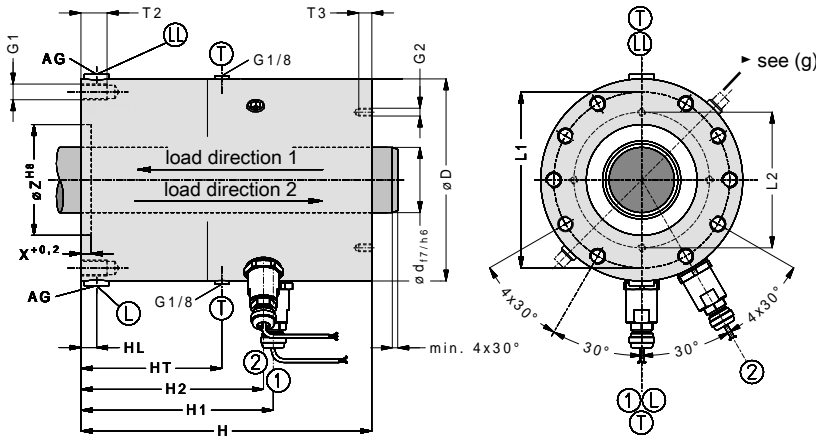
Locking Units, KFHSR series 56 and 60 mm

Sealed for humid conditions. With DGUV Test certificate.

For a detailed functional description, see "Technical Information TI-F10".
 Also observe the "Operating Manual BA-F57".



Rod diameters 56 to 60 mm



- Ⓛ Pressure port L "release",
 ▶ see (b)
- ⓁⓁ Pressure port LL,
 alternative to L,
 ▶ see (c)
- Ⓣ Port T pressure compensation/
 oil filling ▶ see (f)
- ① Holder for proximity switch 1,
 signal "rod clamped",
 ▶ see (e)
- ② Holder for proximity switch 2,
 signal "clamping released",
 ▶ see (e)

Due to tolerances, ports 1, 2, and T can be displaced up to +/-5° relative to drawn position;
 as well as the threaded holes G2 to pressure ports L, LL, and port T.

Fig. 2: Dimensions of the KFHSR Locking Unit (download of CAD data: www.sitema.com)

Type	ID no. (order no.)	(a) (b)			(d)																
		d mm	M kN	p bar	D	H	L1	L2	T2	T3	G1	G2	Z	X	AG	V cm ³	HL	H1	H2	HT	Wt. kg
KFHSR 56	KFHSR 056 70	56	50	100	180	252	160	172	20	13	10x M12	4xM6	95	10	G1/4	47	22	151.5	144	105	40
KFHSR 60	KFHSR 060 70	60	50	100																	

Subject to modification without prior notice

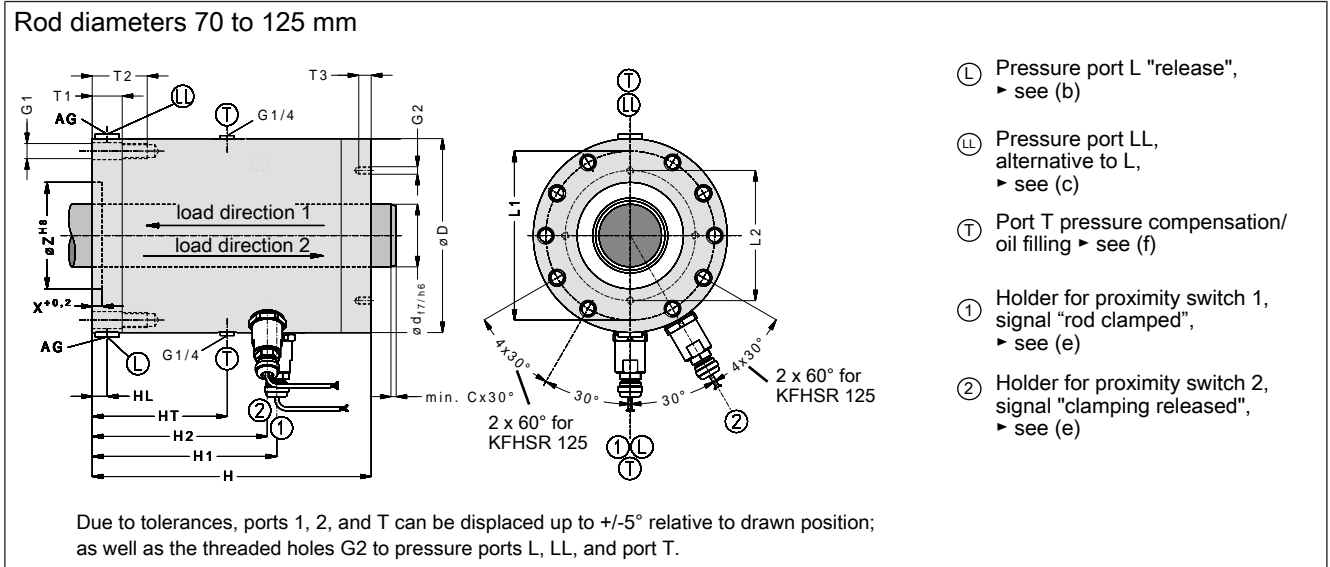
- (a) M is the admissible load the mass to be secured exerts on the KFHSR Locking Unit. The holding force with a dry or hydraulic-oil wetted rod is at least 2 x M but does not exceed 4 x M.
- (b) Pressure p is required to release the clamping. The permissible operating pressure is 160 bar.
- (c) On delivery, pressure port LL is plugged by a plug screw. It may be used as an alternative to pressure port L and is useful for filling or air bleeding the pressure chamber. We recommend connecting an auto-bleeder to the free port (see *Technical Information TI-Z10*).
- (d) V = hydraulic operating volume
- (e) The KFHSR Locking Unit is equipped with inductive proximity switches: M8 x 1, flush mountable, NO (normally open). The proximity switches are pressure-resistant up to 5 bar and have a cast-on cable of 5 m length.
- (f) The T ports compensate internal volume changes during switching. For use in humid conditions, the KFHSR Locking Unit must be filled or flushed with hydraulic fluid to prevent corrosion.
- (g) The lock plates keep the clamping system open if the unit is not yet mounted. They have to be removed after mounting.
- (h) The surface of the housing parts is ZnNi coated.

Technical Data Sheet TI-F57

Locking Units, KFHSR series 70 to 125 mm

Sealed for humid conditions. With DGUV Test certificate.

For a detailed functional description, see "Technical Information TI-F10".
 Also observe the "Operating Manual BA-F58".



- Ⓛ Pressure port L "release", ▶ see (b)
- Ⓛ Pressure port LL, alternative to L, ▶ see (c)
- Ⓣ Port T pressure compensation/ oil filling ▶ see (f)
- ① Holder for proximity switch 1, signal "rod clamped", ▶ see (e)
- ② Holder for proximity switch 2, signal "clamping released", ▶ see (e)

Fig. 3: Dimensions of the KFHSR Locking Unit (download of CAD data: www.sitema.com)

Type	ID no. (order no.)	d mm	(a)		p bar	D	H	L1	L2	T1	T2	T3	G1	G2	Z	X	AG	(d)					Wt. kg
			C kN	M bar														V cm ³	HL	H1	H2	HT	
KFHSR 70	KFHSR 070 70	70	4	75	100	225	315	195	160	26	56	16	10x M16	4x M8	110	10	G1/4	68	13	192	185	236	80
KFHSR 80	KFHSR 080 70	80																					
KFHSR 90	KFHSR 090 70	90	5	125	130	260	393	225	175	30	65	20	10x M20	4x M10	125	10	G3/8	95	15	221	214	283	127
KFHSR 100	KFHSR 100 70	100																					
KFHSR 125	KFHSR 125 70	125	5	165	100	350	416	300	250	40	90	20	6x M30	4x M12	230	10	G3/8	150	24	244.5	235	336	240

Subject to modification without prior notice

- (a) M is the admissible load the mass to be secured exerts on the KFHSR Locking Unit. The holding force with a dry or hydraulic-oil wetted rod is at least 2 x M but does not exceed 4 x M.
- (b) Pressure p is required to release the clamping. The permissible operating pressure is 160 bar.
- (c) On delivery, pressure port LL is plugged by a plug screw. It may be used as an alternative to pressure port L and is useful for filling or air bleeding the pressure chamber. We recommend connecting an auto-bleeder to the free port (see *Technical Information TI-Z10*).
- (d) V = hydraulic operating volume
- (e) The KFHSR Locking Unit is equipped with inductive proximity switches: M8 x 1, flush mountable, NO (normally open). The proximity switches are pressure-resistant up to 5 bar and have a cast-on cable of 5 m length.
- (f) The T ports compensate internal volume changes during switching. For use in humid conditions, the KFHSR Locking Unit must be filled or flushed with hydraulic fluid to prevent corrosion.
- (g) The surface of the housing parts is ZnNi coated.

Technical Information

1 Purpose

The KFHSR Locking Unit has been designed to hold static loads.

It can be used in humid conditions.

The Locking Unit is certified for the static holding in accordance with testing principle GS-HSM-02 of the DGUV (German Statutory Accident Insurance Association).

2 Axial play

The admissible load M is held free from axial play in load directions 1 and 2.

3 Operating conditions

The KFHSR Locking Unit is sealed for operation in humid conditions.

If port T is connected to a line and the unit is filled or flushed with hydraulic fluid, the unit can be operated in a humid environment. Please contact SITEMA if you have an environment with heavy contamination or extreme temperatures.

The permitted surface temperature is -20°C to +60 °C.

Viscous lubricants and grease may not enter the Locking Unit. They may reduce the holding force. Therefore, it is important to make sure that the rod does not get into contact with these substances.

4 Choosing the right type

In the Technical Data Sheets, you find the values of the admissible load M for the different types. M must be higher than the static weight force acting on the rod.

The certification bodies request that the holding force of the Locking Unit is at least 2 times the admissible load M.

5 Requirements of the clamping rod and fastening elements

The Locking Unit will only operate correctly if the clamping rod has a suitable design.

Requirement	Diameter	Value
ISO tolerance zone	all	f7 or h6
Induction hardened	all	min. HRC 56
Surface hardening depth	ø to 30 mm	min. 1 mm
	ø over 30 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	ø 18 to 80 mm	min. 4 x 30°
	ø over 80 to 180 mm	min. 5 x 30°
	ø over 180 to 380 mm	min. 7 x 30°

Table 4: Clamping rod requirements

The rod may never be lubricated with grease.

In any case, the basic rod material needs to have sufficient strength. In the case of compression-loaded rods, the buckling resistance must be observed.

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

Fastening elements

The actual holding force of the Locking Unit is higher than the admissible load (M) indicated on the data sheets and dimensional drawings. It will not be higher than 4 times this value, however.

Accordingly, the fastening elements taking over the load (rod and its linkage, etc.) have to be dimensioned for at least 4 x M. This maximum force can occur when braking during a motion.

In case of overloads, the rod will slip. This slipping usually causes no damages to the rod or Locking Unit.

6 Important information for mounting the KFHSR types 18 to 60

The types 18 to 60 of the KFHSR Locking Units are delivered with lock plates. The lock plates keep the clamping system open. For mounting, it is possible to slide the Locking Unit directly over the rod.

The lock plates have to be removed after mounting.

Also observe the information in the operating manual.

7 Pressure fluid - hydraulic fluid

Use high-quality HM hydraulic fluid according to ISO 11158 (or HLP hydraulic fluid according to DIN 51524-2). Other pressure fluids may be used only in consultation with SITEMA.

8 Oil filling and oil circulation

If used in a humid environment, the Locking Unit must be filled or permanently flushed with hydraulic fluid. A permanently depressurized line to the tank compensates volume changes during switching.

To fill the unit, one of the T ports is used for filling and then plugged with a plug screw.

As an alternative, this port can also be permanently connected to an oil circuit.

The other T port needs to be connected permanently to the tank with a depressurized line.

i A maximum of 1 bar back pressure is allowed. It can be caused by a difference in height between the tank and the Locking Unit. Higher pressure on the T ports is not allowed, as this may lead to malfunctioning of the clamping system and leakages.

9 Actuation

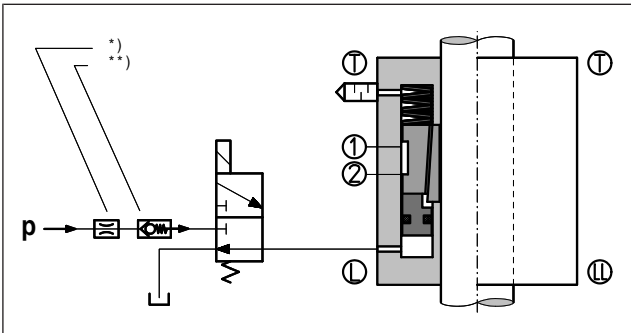


Fig. 4: Schematic actuation diagram

*	If impact noises are audible when pressurizing the unit, these can be suppressed by installing a throttle in the p-line.
**	If the pressure is not sufficiently constant (e.g. pressure drop at the beginning of a downward stroke), we recommend a check valve in the pressure connection.

i Impairing the free discharge of the pressurizing medium can lead to a dangerous situation as the clamping will then only close after a delay. Make sure that the discharge of the pressurizing medium from the pressure port 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.

In most cases it is recommended to implement the actuation as shown in the figure above.

During every operational cycle, the 3/2-way valve which releases the clamping is actuated electrically.

In any other operational condition, as well as in cases of power failure, the Locking Unit engages, holds the rod and/or brakes the load. Likewise, the load is secured when the supply line breaks.

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

For a quick response time, the following preconditions must be met:

- quick controller
- short line distances
- quick valve response times
- large valve and line cross-sections

10 Status monitoring by proximity switches

The proximity switches monitor the Locking Unit operating state. The proximity switches send the following signals to the machine control system:

Proximity switch	Signal	Purpose
1	Load secured	Enabling access to the danger zone.
2	Clamping released	Enabling drive movement in load direction.

To check the correct functioning of the proximity switches, the switching of the signals has to be tested. There is an error if both proximity switches indicate a signal or no signal at the same time (apart from short overlapping periods during switching).

The machine control system must process the signals from the proximity switches correctly.

10.1 Integration of the Locking Unit into the machine control system

Here is an example for integrating the Locking Unit into the machine control.

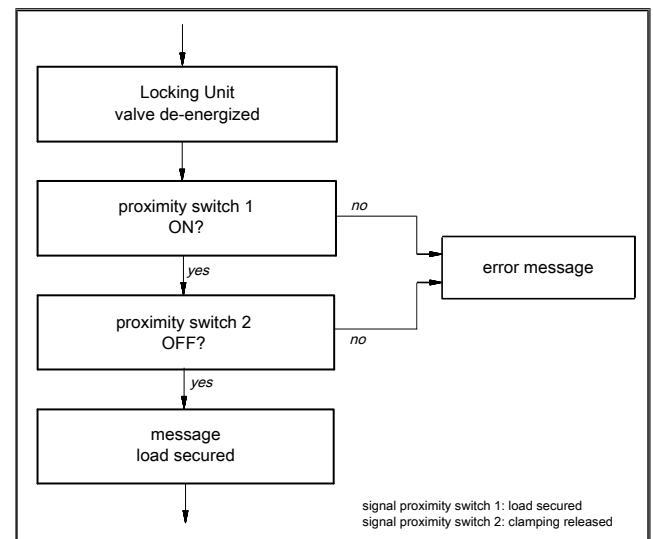


Fig. 5: Securing the load

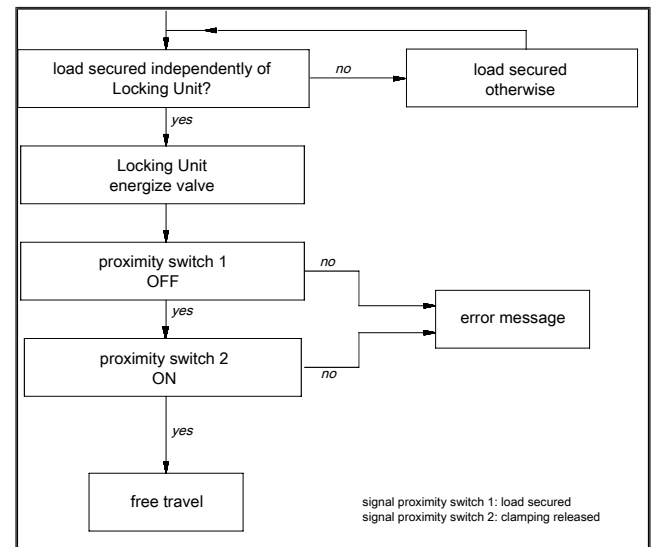


Fig. 6: Releasing the clamping

11 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.

12 Regular performance tests

A performance test must be carried out on the Locking Unit at regular intervals. This periodic testing is the only way to ensure that the unit will operate safely in the long run.

For further details, see the following operating manuals: BA-F57 (KFHSR 18 to 60) or BA-F58 (KFHSR 70 to 126).

13 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.