Operating instructions

LinClamp

S

SK

SA

ENGLISH

HEMA

Operating instructions

Data last revised: 01/04/2021, Version 5.3
Language of original version: German

Subject to modifications. Errors excepted.

Contact

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Art-Nr 80-00-1040/EN 31052021

CONTENT

1. Important information

These operating instructions describe how to use the LinClamp S, SK, and SA properly. These instructions must be observed if any warranty claims are to be acknowledged. Before using the safety clamp and/or brake you must read these operating instructions carefully to the end.

- You must observe the tolerances and thresholds (e.g. for pressures, forces, torques, temperatures, etc.) specified in these instructions.
- Ensure a supply of properly conditioned compressed air.
- If necessary, take into account the prevailing ambient conditions.
- Observe the regulations issued by the professional associations and the safety inspectorate (TÜV), and the pertinent national, international, and European terms and conditions.
- Before first installation, remove all transport packaging like paper, films, etc.
  You must observe the legal provisions for the disposal of secondary resources (e. g. in recycling banks).
- The system may be installed and started up only by qualified technical personnel in accordance with these operating instructions.

Symbols used

⚠ Warning
☛ Note

2. General description

- The LinClamp S/SK clamping and braking systems open pneumatically and generate their force via a spring accumulator.
- The LinClamp SA clamping and braking systems close pneumatically and generate their force via a knee lever plate when pressurised.
- The retaining force is generated by the friction between the vertically engaged clamp or brake linings and their contact surfaces on the linear guide rail.
- Linings engaging on the linear guide rail do not affect its surfaces, measurements, precision, or service life.

LinClamp S/SK (opening with compressed air)

- Opening - The chamber between the two spring plates is pressurised with compressed air. The spring plates therefore flex and become shorter horizontally. In the process, the H shaped clamping body moves up to the spring plates and away from the linings below. The linings rise from the linear guide element, and the LinClamp can move freely.
- Closing - The chamber between the two spring steel diaphragms is vented. The spring plates relax, and they expand the top part of the clamping body. This top expansion, however, causes a simultaneous narrowing in the bottom section. This narrowing causes the linings to press against the linear guide element.

LinClamp SA (clamping/braking with compressed air)

- Closing - The clamp is engaged when the chamber under the spring plate is pressurised with compressed air. The prestressed spring plate is therefore pressed upwards and elongated. At the same time, the bottom part of the H shaped clamping body narrows at the cross web, which functions as a pivot. The linings are therefore pressed against the rail.
- Opening - Venting causes the prestressed plate to return to its initial position, allowing the previously flexed H shaped clamping body to return also. By doing so, it narrows above the cross web and expands below. The linings rise from the rail.

3. MODEL VARIANTS

- S, SK types as passive clamps (opening with compressed air)
- SA type as active version (clamping with compressed air)
- Operating pressure 4 or 6 bar (as wished). Other operating pressures on request.
- Clamping element: fitted with steel linings
- Braking element: fitted with sintered metal linings

4. ACTUATORS AND CONNECTIONS

- Fastening facilities on the top side of the retaining block, depending on the version:
  - two M4-M12 threaded holes - depending on the clamping element size - when version has a retaining block
  - four M4-M12 threaded holes - depending on the clamping element size - when version has two retaining blocks
- - M5 or G1/8" threaded connections for compressed air in the sides of the retaining block (optionally on the face or top), depending on the size
- - The two air connections on the LinClamp are fitted ex works with loosely fitting red plugs (transport protection). The red plug on the air supply side must be removed. The plug on the other side must be sealed. The clamping system can **function properly only when the plug is sealed correctly!** The recommended sealant is WEICON Lock AN 302-22.

5. USE

- LinClamp S/SK/SA clamping and braking systems are designed to brake and retain masses moving axially over linear guide rails and elements. Their design, surface quality, and dimensional, shape, and positional tolerances are equivalent to the commercially available linear guide rails.

6. Improper use / warnings

- LinClamp S/SK/SA clamping and braking systems are not designed to secure suspended loads in personnel danger areas when machinery and machine parts are being manufactured, transported, assembled, installed, started up, used, cleaned, subjected to troubleshooting, serviced, shut down, or disposed of without redundant safety systems.
- LinClamp S/SK/SA systems cannot be used as guides on linear guide rails or other linear guide elements.

7. Residual risks

LinClamp S/SK/SA clamping and braking systems are not fitted with a second safety circuit. When the system is actuated, either intentionally or accidentally, the LinClamp opens, the retaining force is no longer maintained on the linear guide element, and the retained mass is released. As a consequence, all operating modes and lifecycle phases without a redundant safety system pose mechanical risks in the form of:

- crushing, cutting, shearing, abrasion, or puncturing caused by:
  - unsecured connections, disruptions to the compressed air supply (e. g. pressure fluctuations)
  - human error (e.g. inadequate experience or qualifications, stress, fatigue, false sense of security)
  - failure to observe messages and warnings
  - incorrect use of the LinClamp (see Section 6)
- impacts, abrasions, or cutting caused by improperly connected or loose compressed air lines or screw fasteners

8. Warranty

This applies to the following conditions of use:

- Ambient temperature min 10 °C and max 45 °C
- Pneumatic operating pressure 4 bar or 6 bar; tolerance +0.5/-0.3 bar; higher pressures damage the spring plates and gaskets, lower pressures restrict dangerously the opening range for the clamping or braking linings (LinClamp S/SK) or the retaining force (LinClamp SA).
- Dried, filtered, oil free air (particulates: Class 4, condensate: Class 4, oil content: Class 3 according ISO 8573-1version 2010).
- LinClamp S and SK type clamping and braking elements are subject to a warranty of twelve months following delivery, but no later than a max number of 1,000,000 (one million) clamping cycles (excluding emergency brakings). When submitting a warranty claim, the customer must furnish suitable records verifying the actual number of clampings.
- LinClamp SA type clamping and braking elements are subject to a warranty of twelve months following delivery, but no later than a max number of 100,000 (one hundred thousand) clamping cycles (excluding emergency brakings). When submitting a warranty claim, the customer must furnish suitable records verifying the actual number of clampings.

- Assembly, conversion, maintenance, and repair - observe the assembly instructions, and use the requisite equipment and original accessories. All work on the clamping elements must observe the applicable safety and assembly instructions pertaining in each case.
- The clamping and braking elements are used as intended when their application complies with the technical specifications. All other use excludes any further services by HEMA Maschinen- und Apparateschutz GmbH.
- Only fully assembled LinClamp systems are covered by the warranty.
- Operating reliability is reduced and the warranty becomes void when the customer disassembles or otherwise separates the parts of the LinClamp or reworks these without prior approval issued in writing by HEMA.
- The internal measurement for the clamping or braking linings is an exact value set at the production plant. The greatest possible retaining force is the result of the smallest possible gap between the lining and the linear guide rail; less than optimal configurations can cause a loss in retaining force of up to 30%.
- Braking elements (brake linings) affected by grease (as on the linear guide) exert about 60% of the retaining forces.
- Clamping elements (steel linings) affected by grease (as on the linear guide) exert 100% of the retaining forces.
- Some materials may promote corrosion. Warranty claims on these grounds are not accepted.

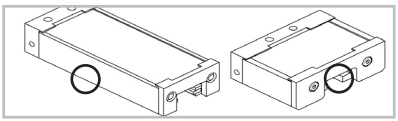
9. Transport/storage/intermediate storage

- Transport the clamping elements only when they are disengaged.
- Place the clamping elements in storage or intermediate storage only in the preserved state and in the packaging selected by HEMA.

10. Type designation

The engraved type designation and serial number (SN) serve the unique identification and traceability of the clamping element. It is unique for every clamping element and absolutely essential for traceability. For this reason, never obliterate these engravings with chemical and/or mechanical means. The type designation must remain legible at all times.
All warranty claims become void when the type designation is removed or otherwise obliterated. The type designation identifies the type and the size.
On the S types, the engraved type designation is found on the right longitudinal side of the clamping body; on the SK and SA types on the face of the end plate.

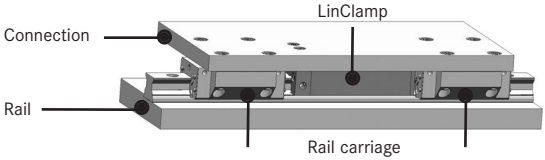
Engraved type designatiion (LinClamp SK)


Positions of type designation

11. Assembly information

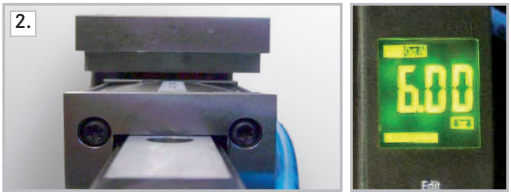
- Check that the engraved type designation on the LinClamp you are installing agrees with the LinClamp chosen for the application.
- Always handle the LinClamp with care. Damage can prove detrimental to the operating reliability and render void all warranty claims.
- Make sure that the installation is free of distortion and the max loads listed in the catalogue are not exceeded.
- IMPORTANT The specified retaining forces can be transferred to the optimal effect when the brake linings (sintered metal) or clamping linings (steel) are first cleaned thoroughly before they are installed. Soiling and other contamination can reduce the retaining force.

12. Installed state (example)

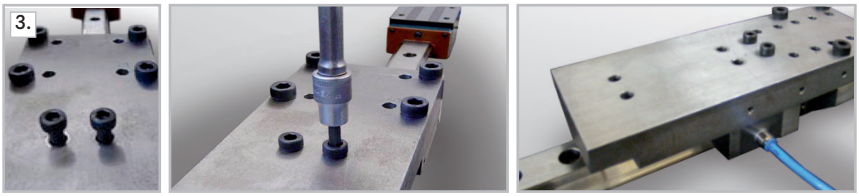


13. Installing the LinClamp S/SK

- Remove or seal the red plugs (note the provided information sheet), attach the air supply to the threaded hole, connect the compressed air.
- NOTE The LinClamp S/SK **cannot be installed without operating pressure!**



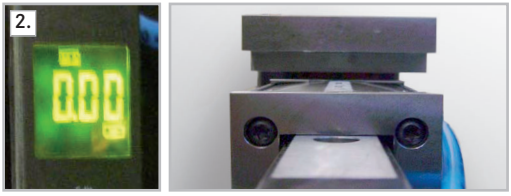
- NOTE The LinClamp S/SK **can be installed with the specified operating pressure only!**



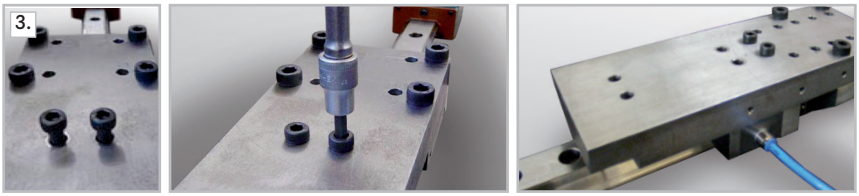
- Push the LinClamp over the linear guide rail to the provided installation holes in the connecting structure, engage the corresponding screws, and tighten them by hand.
- Reduce the air pressure to 0 bar: the LinClamp centres itself relative to the linear guide rail. At this position, tighten the screw fasteners over several stages until the defined tightening torque has been reached. Between each tightening procedure, raise the air pressure to the specified value and again reduce it to 0 bar.
- Apply the operating pressure, and check that the LinClamp can move freely over the linear guide rail. Only then can the LinClamp function properly.

14. INSTALLING THE LINCLAMP SA

- Remove or seal the red plugs (note the provided information sheet), attach the air supply to the threaded hole, connect the compressed air.
  NOTE: The LinClamp SA **cannot be installed when pressurised!**



- NOTE The LinClamp SA **can be installed only when it is unpressurised!**



- Push the LinClamp over the linear guide rail to the provided installation holes in the connecting structure, engage the corresponding screws, and tighten them by hand.
- Raise the air pressure to the specified value: the LinClamp centres itself relative to the linear guide rail. At this position, tighten the screw fasteners over several stages until the defined tightening torque has been reached. Between each tightening procedure, reduce the air pressure to 0 bar and again raise it to the specified value.
- Reduce the operating pressure to 0 bar, and check that the LinClamp can move freely over the linear guide rail. Only then can the LinClamp function properly.

15. Tightening torques for screws

These apply to bearing substrates of steel. When the connecting structures are of softer materials (e.g. aluminium), the screw tightening torque must be determined separately as a function of the max transferred force and the max permitted surface pressure under the bearing face.

Recommended tightening torque Property classes for srews ISO 4762, 12.9	Nm
M4	5.4
M5	10.7
M6	18.3
M8	44.1
M10	86.9
M12	151.0

Table 1 (with reference to VDI 2230, no liability accepted for correctness)

NOTE: Only screws of property class 12.9 may be used. Other property classes may prove detrimental to the clamping force and clamping properties.

16. STARTING UP

- Install the control valve(s) near the clamping element, and connect a suitable hose.
- IMPORTANT: The longer the line, the longer the response times.
- The LinClamp's response time can be reduced considerably when fast acting and fast venting valves are used!
- Once the LinClamp is properly installed, its standby state must be examined.
- Check its freedom of movement by displacing the linear unit manually.
- All pneumatic connections must be examined for leakage when the LinClamp is pressurised.
- All screw fasteners must be examined for their prescribed tightening torques.
- Once installed properly, the LinClamp does not require readjustment owing to the paired fits set at the factory between the clamping/brake linings and the linear guide rail.
- Initiate a test run in accordance with the applicable regulations.
- Actual B10d values:

LinClamp S / SK	1,250,000 cycles
LinClamp SA	125.000 cycles

17. MAINTENANCE AND CARE

As a rule, most linear guides carry greased or oiled guide carriages, i.e. the running and contact surfaces of the linear guide rail are always covered with a thin film of lubrication.

- Before installing, clean the linear guide rail's contact surfaces and/or the brake/clamping linings with a soft cloth. Approved cleaning agents are all media that do not attack the materials (recommended: Weicon spray cleaner »S«).
- Braking elements (brake linings) affected by grease (as on the linear guide) exert about 60% of the retaining forces.
- Clamping elements (steel linings) affected by grease (as on the linear guide) exert 100% of the retaining forces.

18. CE MARKING CE

When delivered, the clamping and braking element LinClamp S/SK/SA fulfils the requirements under the Machinery Directive 2006/42/EC and is marked with the CE symbol.

19. EC declaration of conformity

In accordance with Annex II A of the EC Machinery Directive 2006/42/EC of 17 May 2006:

We hereby declare that the concept behind and the configuration of the structurally identical safety components designated in the following and the version we market comply with the basic health and safety requirements under the Machinery Directive 2006/42/EC.

This declaration becomes void when any change is made to the safety components without our prior consent.

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Description of the machine
Function: clamping and/or braking on linear guide rails
Type/model: LinClamp S/SK/SA in the sizes 15, 20, 25, 30, 35, 45, 55, 65

Applied harmonized standards, in particular:

- DIN EN ISO 12100: 2011-03
  Safety of machinery - General principles of design - Risk assessment and risk reduction
  German version EN ISO 20100: 20100
- DIN EN ISO 12100: 2013-08
  Safety of machinery - General principles of design - Risk assessment and risk reduction,
  Corrigendum to DIN EN ISO 20100: 2011-03
  German version EN ISO 20100: 20100
- DIN EN ISO 13849-1: 2016-06
  Safety-related parts of control systems, Part 1: General principles of design
  German Version he Fassung EN ISO 13849-1: 2015
- DIN EN ISO 13849-2: 2013-02: Safety-related parts of control systems,
  Part 2: Validation
  German Version EN ISO 13849-1: 2015

Other technical standards and specifications applied:

- DIN ISO 8573-1 2010-04 Compressed air - Part 1: Impurities and purity classes

HEMA Maschinen- und Apparateschutz GmbH

Steffen Walter
Managing Director

Philipp Sendelbach
CE authorized person

Am Klinggraben 2, 63500 Seligenstadt
Seligenstadt, 1 April 2021

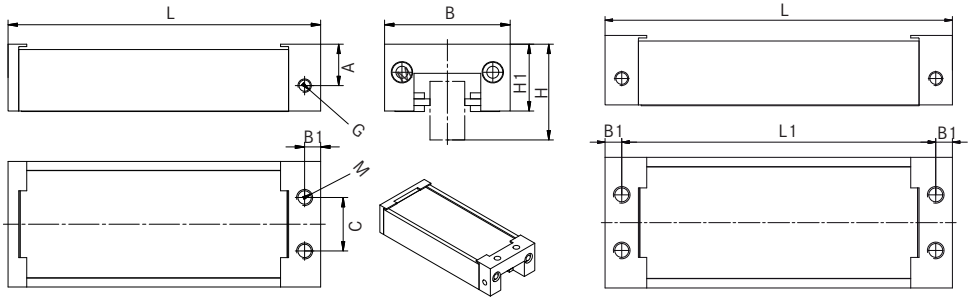
20. CAUSES OF ERRORS - APPROACHES TO SOLUTIONS

Malfunction	Possible cause	Remedy
LinClamp not opening	Air supply too low	Valve too small, supply line from valve to clamping element too long, maintenance unit too small
	Too little exhaust air	Connections and holes for exhaust air too small or clogged (LinClamp hole at the centre of the clamping body's bottom side)
	Too little pressure	Pressure in upstream pressure reducer too low
	Temperature exceeded specifications during storage and transport	Temperatures below 10 °C can affect the rubber diaphragm, which then becomes harder and less responsive and may leak for a time
	Connections inoperable	Check connections and supply lines
	Opening for spring plate too small	Check installation space, compare installed height with »H« in the measurements table
	Function of spring plate	Check tightness and function of the LinClamp, call HEMA Services, **order LinClamp removal kit with pin: fax: +49 (0)6182/773-35**
Response times too long	Air supply too low	Valve too small, supply line from valve to clamping element too long, maintenance unit too small
	Too little exhaust air	Connections and holes for exhaust air too small or clogged (LinClamp hole at the centre of the clamping body's bottom side)
	Too little pressure	Pressure in upstream pressure reducer too low
	Temperature exceeded specifications during storage and transport	Temperatures below 10 °C can affect the rubber diaphragm, which then becomes harder and less responsive and may leak for a time
	Check choice of valve	Recommended for short response times: for each air connection use a fast acting or fast venting valve
	Face side gasket for spring plates	Removed coarse soiling, clean top spring plate, and regrease this
Excessive air consumption	Tightness of spring plates	Pressure loss up to 0.5 bar per minute are not critical and system inherent; higher values measured: call HEMA Services
	Internal gaskets	Remove LinClamp, call HEMA Services
	Connections inoperable	Check connections and supply lines
Retaining force not reached	Clamping/brake linings soiled	Degrease and clean clamping/brake linings
	Linear guide rail soiled	Degrease and clean contact surfaces on rail
	Retained/braked mass too large	Check connecting structure, check LinClamp's retaining force, call HEMA Services
	Sintered lining on greased rails	Grease reduces retaining force; retrofit doctor and, if necessary, additional clamping bodies

2I. LinClamp S
Specifications and drawing

	2 Fixing holes	4 Fixing holes			Low carriage			High carriage									
Rail size	L	L	L1	B	H	H1	A	H	H1	A	B1	C	G	M	Holding force at 6 bar	Holding force bei 4 bar	Mass
Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]			[N]	[N]	[kg]
LC 20 S	97.2	105.2	93.2	43	30	19.5	13.5				6	15	M5	M5	900	540	0.32
LC 25 S	117	125	113	47	25	25	15.5	40	29	19.5	6	20	M5	M6	1200	780	0.5
LC 30 S	126	141	121	59	42	29.5	17	45	32.5	20	10	24	M5	M8	1800	1100	0.9
LC 35 S	156.2	171.2	151.2	69	48	35	22.5	55	42	29.5	10	24	G1/8"	M8	2800	1800	1.26
LC 45 S	176.2	191.2	171.2	80	60	42	26.5	70	52	36.5	10	26	G1/8"	M10	4000	2400	2.3
LC 55 S	202.2	221.2	196.2	98	70	49	28	80	59	38	12.5	30	G1/8"	M12	6000	3600	3.9
LC 65 S	259.2	281.2	251.2	120	90	64	38	100	74	48	15	40	G1/8"	M12	1000	6000	5
LC 25 S flat	117	125	113	47	25	20	15.5				6	20	M5	M6	1200	780	0.45
LC 20/40 S wide LC 27 S wide		159.2	145.2	69	27	23	18.5				7	24	M5	M8	1500	900	0.91
LC 25/27 S wide LC 35 S wide		221.2	196.2	98	35	31	23				12.5	30	G1/8"	M12	2000	1200	2.2

Subject to modifications. Errors excepted. Only the written order confirmation is valid.



22. LINCLAMP SK

Specifications and drawing

	2 Fixing holes	4 Fixing holes			Low carriage			High carriage									
Rail size	L	L	L1	B	H	H1	A	H	H1	A	B1	C	G	M	Holding force at 6 bar	Holding force at 4 bar	Mass
Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]			[N]	[N]	[kg]
LC 15 SK	55	61	51	45	24	18	14			14	5	15	M5	M4	450	300	0.5
LC 20 SK	55	61	51	54	30	22	16			16	5	20	M5	M6	650	430	0.6
LC 25 SK	55	61	51	75	36	25.5	16	40	29,5	20	5	20	M5	M6	800	530	0.7
LC 30 SK	66.5	76	58.5	89	42	30	21	45	33	24	8.75	22	M5	M8	1150	750	0.9
LC 35 SK	66.5	76	58.5	96	48	35	21.2	55	42	28.2	8.75	24	G1/8"	M8	1250	820	1.27
LC 45 SK	80	92	72	116	60	45	27.5	70	55	37.5	10	26	G1/8"	M10	1500	950	2
LC 55 SK	100	112	92	136	70	49	30.5	80	59	40.5	10	30	G1/8"	M10	2100	1300	2.8

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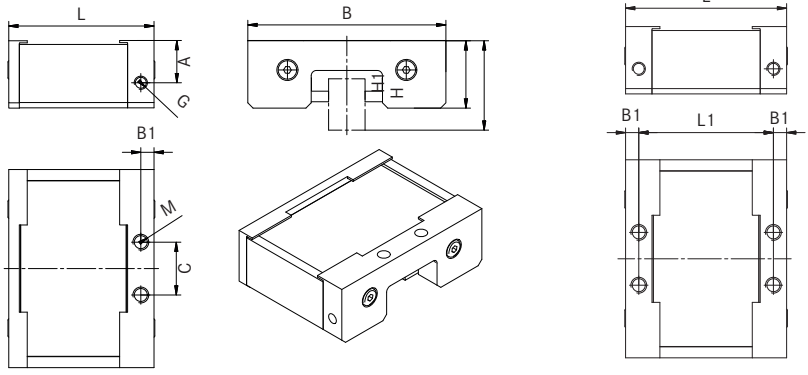

23. LinClamp SA

Specifications and drawing

	2 Fixing holes		Low carriage			High carriage									
Rail size	L	B	H	H1	A	H	H1	A	B1	C	G	M	Holding force at 6 bar	Holding force at 4 bar	Mass
Unit	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]			[N]	[N]	[kg]
LC 20 SA	40	75	30	23	15			15	5	20	M5	M6	650	390	0.53
LC 25 SA	40	75	36	23	15	40	27	15	5	20	M5	M6	800	480	0.53
LC 35 SA	67	96	48	35	20	55	42	20	9	20	G1/8"	M6	1250	750	1.14

Subject to modifications. Errors excepted. Only the written order confirmation is valid.