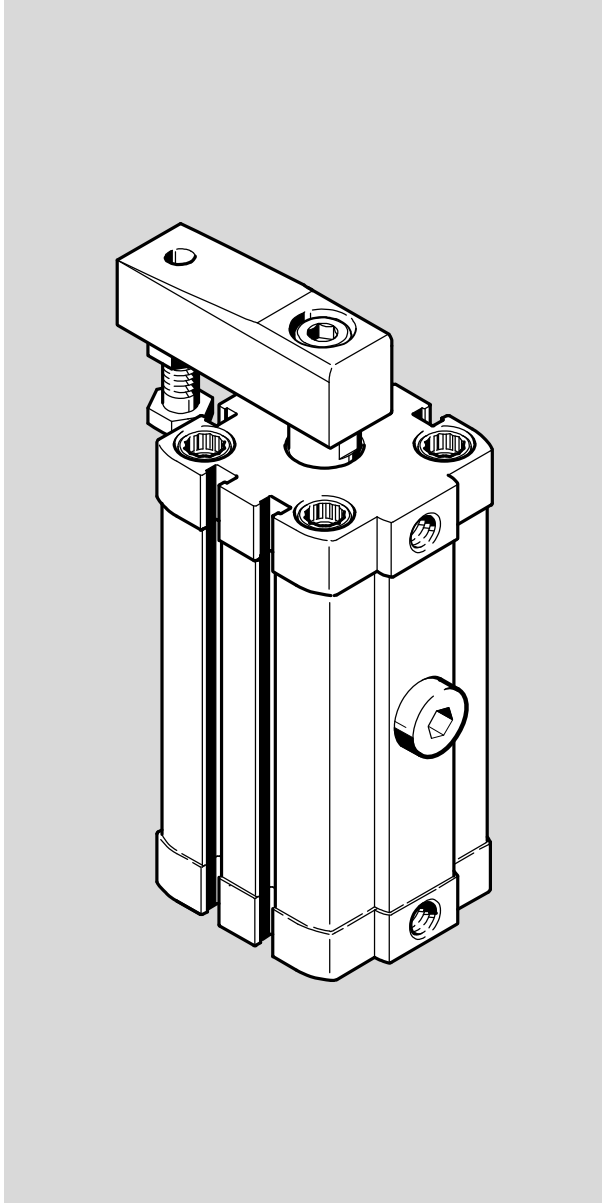


linear/swivel clamp

CLR



FESTO

en Operating
instructions

8072624
2017-05e
[8072626]

Translation of the original instructions

CLR-EN

Identification of hazards and instructions on how to prevent them:



Danger

Immediate dangers which can lead to death or serious injuries



Warning

Hazards that can cause death or serious injuries



Caution

Hazards that can cause minor injuries

Other symbols:



Note

Material damage or loss of function



Recommendations, tips, references to other documentation



Essential or useful accessories



Information on environmentally sound usage

Text designations:

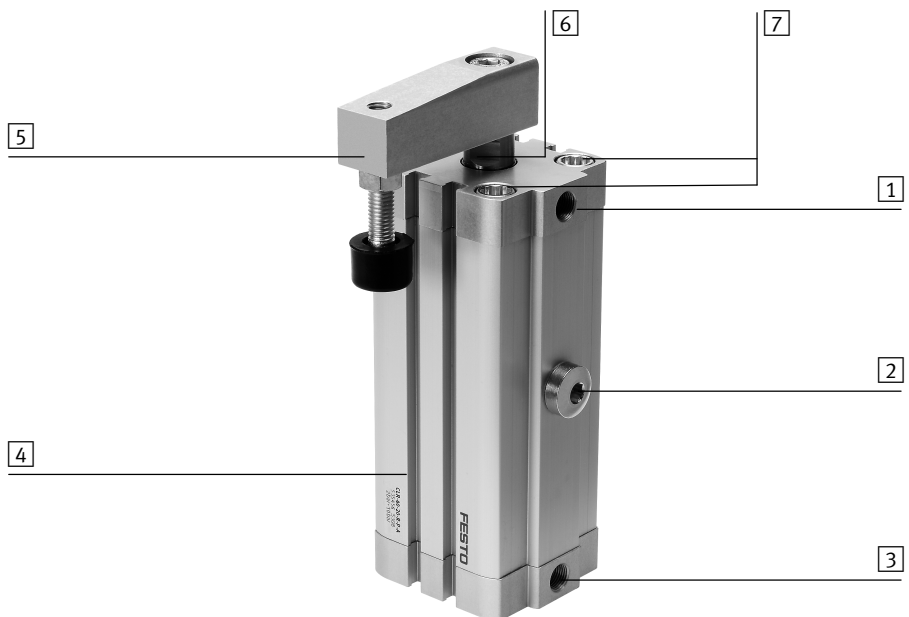
- Activities that may be carried out in any order
- 1. Activities that should be carried out in the order stated
 - General lists
- ➔ Result of an action/References to more detailed information

Linear swivel clamp type CLR-...

1 Operating elements and connections



For all available product documentation → www.festo.com/pk



- | | |
|---|---|
| 1 Compressed air connection for clamping | 5 Clamping finger set with clamping screw (not included in delivery) |
| 2 Guide bolt for motion control of the linear and swivel movements | 6 Spanner flat on the piston rod |
| 3 Compressed air connection for releasing | 7 Flange screws with threaded holes for fastening |
| 4 Groove for proximity switch | |

Bild 1

2 Function

When the compressed air connections are pressurized alternately, the piston rod of the linear-swivel clamp type CLR-... moves in and out. On the piston rod there is a guide sleeve with three different grooves. A guide bolt in the housing grips into the groove. By means of the special shape of the grooves, the bolt transfers the following movements to the piston rod:

- swivel-linear movement of 90° in a clockwise direction (Bild 2)
- swivel-linear movement of 90° in an anti-clockwise direction (Bild 3)
- linear movement (with CLR-40-... to CLR-63-..., see Bild 4).

The piston rod transfers the swivel and linear movements to the clamping finger. When the piston rod retracts, the clamping finger clamps material against a fixed stop. The end positions are scanned in the sensor grooves on the cylinder profile.

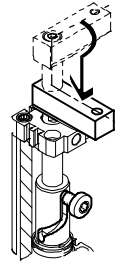


Bild 2

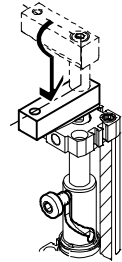


Bild 3

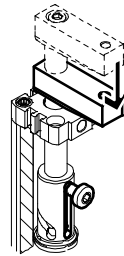


Bild 4

3 Application

The CLR-... has been designed for friction-locked clamping and holding of construction parts.



Please note

Torques which affect the internal guide sleeve will damage the CLR-...

- With all assembly work make sure that the maximum torque on the guide sleeve is not exceeded (see chapter “Mechanical installation”).

4 Transport and storage

- Take into account the weight of the product (plus clamping finger and fastening elements).
Depending on the design the CLR-... can weigh up to 2.7 kg.
- Ensure the following storage conditions:
 - short storage times and
 - cool, dry and shady storage locations to prevent corrosion.

5 Conditions of use



Please note

Incorrect handling can result in malfunctions.

- Ensure that the specifications in this chapter are always observed.

This is the only way to ensure correct and safe operation of the product.

- Compare the limit values specified in these operating instructions with your current application (e.g. pressures, forces, torques, temperatures, masses, speeds, clamping cycles).
Only if the loading limits are observed can the CLR-... be operated in accordance with the relevant safety guidelines.
- Observe the specifications applicable to your location, as well as all local and national laws and regulations.

- Remove the packing except for the adhesive labels on the compressed air connections (to prevent dirt).

It is intended that the packaging be recycled on the basis of its constituent materials (exception: oiled paper = other waste).

- Observe the ambient conditions at your location.
- Make sure there is a supply of correctly prepared compressed air (see chapter “Technical specifications”).
- Use the same medium composition throughout the service life of the product.

Example:

- selected: non-lubricated compressed air,
- continue to use: non-lubricated compressed air.

If switching from lubricated to non-lubricated compressed air:

- Observe the wear of the CLR-...
If the service life lubrication is washed out, the CLR-... will wear considerably.
- Gradually pressurise the entire system until the operating pressure is reached.
This ensures that all actuator movement is controlled.
The soft-start valve type HEL-... or HEM-.... can be used to build up the pressure gradually.
- Use the CLR-... in its original state without undertaking any modifications.

6 Installation

Mechanical installation



Please note

When the fastening screw of the clamping finger is clamped and released, high torques can damage the guide sleeve in the cylinder (e.g. by tightening or counter holding).

- When fitting or removing the clamping finger, always use a spanner wrench for counter holding (see “Fitting the clamping finger”).

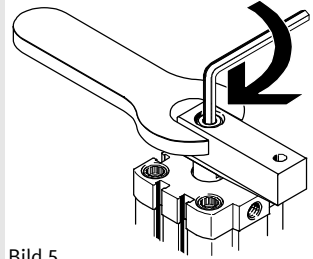


Bild 5

- Treat the clamping finger with great care.

The following loadings are not permitted:

- heavy loads with a long lever arm
- sudden knocks
- high torques (especially on the guide sleeve).

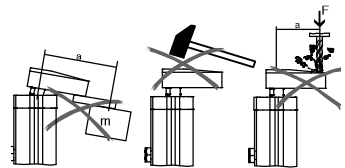


Bild 6

- Make sure that the maximum permitted loadings are observed during operation:
 - the tightening torques when fitting the clamping fingers
 - the values for force F and torque M (see chapter “Technical specifications”).

Fitting the clamping finger



Please note

Torques which affect the internal guide sleeve will damage the CLR-...

- Fit the clamping finger first, before fitting the clamping cylinder into the system. In this way you will prevent torques from affecting the internal guide sleeve.

1. Place the clamping finger on the cone of the piston rod.
2. Screw the fastening screw into the threaded hole of the piston rod until the clamping finger can still be turned.
3. Fix the piston rod at the spanner flat 6 with a spanner wrench (see Bild 8).
4. Turn the clamping finger with a second spanner wrench until the alignment corresponds to the individual application.
5. Tighten the fastening screw with the following torque:

For counter holding, the maximum permitted torque on the guide sleeve must **not** be exceeded.

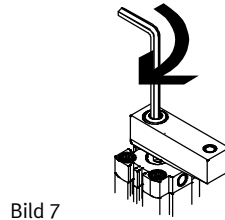


Bild 7

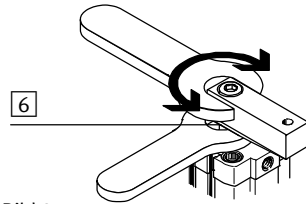


Bild 8

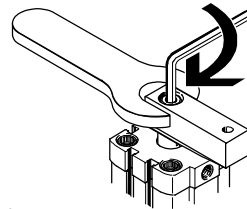


Bild 9

CLR-...	12	16	20	25	32	40	50	63
Thread	M3	M4	M6	M6	M8	M8	M10	M10
Width across flats (A/F)								
– clamping finger screw	2.5	3	5	5	6	6	8	8
– piston rod	5	7	10	10	13	13	17	17
Tightening torque of clamping finger screw [Nm]	1.2	3	12	12	24	24	47	47
Maximum permitted torque on the guide sleeve [Nm]	2	3	6	10	20	20	30	50

Bild 10

In order to modify the swivel movement:

1. Unscrew and remove completely the guide bolt from the cylinder housing of the CLR-... The piston rod can then be turned freely with the clamping finger.
2. Swivel the clamping finger to the desired groove in the guide sleeve.

The search for the groove is facilitated if a bolt is pushed into the threaded hole in the guide bolt at the same time. Please refer to the following table for the necessary bolt diameter.

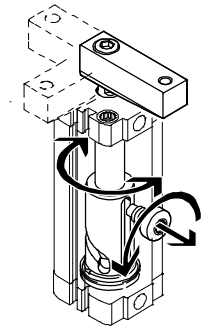


Bild 11

3. Screw the guide bolt in again completely. When doing this note the following points:
 - Check that the seal on the guide bolt is positioned correctly.
 - The guide bolt must be locked with Loctite 24333.
 - Observe the tightening torque as specified in the following table:

CLR-...	12	16	20	25	32	40	50	63
Bolt diameter [mm]	2.5	2.9	5.9	5.9	5.9	6.9	7.9	8.9
Thread	M4	M4	M8	M8	M10	M10	M12x1	M12x1
Width across flats (A/F) (guide bolt)	3	3	5	5	6	6	8	8
Tightening torque [Nm] (+20 %)	2.5	2.5	6	6	20	20	40	40

Bild 12

Fitting the CLR-...

- Place the CLR-... so that no objects project into the swivel range of the clamping finger.
- Select one of the fastening possibilities listed in the following table.

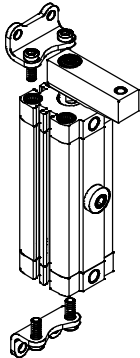
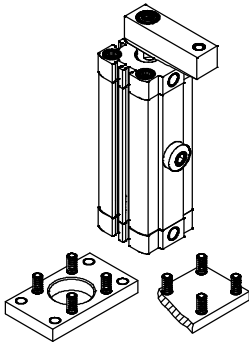
<p>Double screw connector with foot fastening type HNA-... in the threaded holes of the cover screws</p>	<p>With four screws in the threaded holes of the cover screws:</p> <ul style="list-style-type: none"> - with flange mounting type FNC-... - direct fastening
	

Bild 13

The different product sizes have connector threads of the following design and with the following tightening torques:

CLR-...	12	16	20	25	32	40	50	63
Connecting thread	M4	M4	M5	M5	M6	M6	M8	M8
Tightening torque [Nm]	3	3	5	5	8	8	23	23

Bild 14

- Tighten the screws evenly.

Pneumatic installation



Please note

The clamping finger from Festo matches optimally the CLR-... and does not require any air restriction.

- Note that if user-made clamping fingers are used, the mass moment of inertia must be calculated.

A higher mass moment of inertia than that specified for the clamping finger set from Festo requires a reduction in the stroke time of the CLR-... by the use of one-way flow control valves.

The dimensions of the cone and the diagrams for determining the stroke time as a factor of the mass moment of inertia can be found in the Festo catalogue.

- Remove the adhesive labels on the compressed air connections.
- Check to see if accessories are required as shown in the following table.

Type	Designation	Function
HGL-...	Non-return valves with closed-loop control	If there is a pressure failure, the pressure in the piston chamber will be retained.
GRLA-... / GRLZ-...	One-way flow control valves	The piston speed can be modified.
VZS-...	Compressed air reservoir	Fluctuations in pressure will be reduced in the downstream-switched compressed air string.

Bild 15

- Use short tubing lines for your application.
Short lines optimize the pressurisation time.
- Screw the one-way flow control valves of type GRLZ-... or GRLA-... into the compressed air connections.
- Connect the tubing of the CLR-... to the compressed air connections.

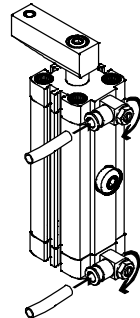


Bild 16

CLR-...	12	16	20	25	32	40	50	63
Connecting thread	M5				G1/8			
Tightening torque	1.5 Nm				6.0 Nm			

Bild 17

Electrical installation

- Avoid external influence caused by magnetic or ferritic parts in the vicinity of the proximity switches.
This ensures the proper functioning of the proximity sensors.
- Push the proximity switches into groove 4.

7 Commissioning



Warning

Uncontrolled moving masses can cause injury to people or damage to objects in the area of movement (squashed fingers, eye injuries).

- Make sure that nobody can place his/her hand in the operating range of the clamping finger and that there are no objects in this range, in order to avoid the risk of injury to human beings and damage to property (e.g. by providing a protective screen).



Please note

Transverse loadings during the swivel movement can damage the bearings.

- Make sure that the clamping finger clamps only level and resting parts in its end position.

The clamping procedures listed in the following table are **not** permitted:

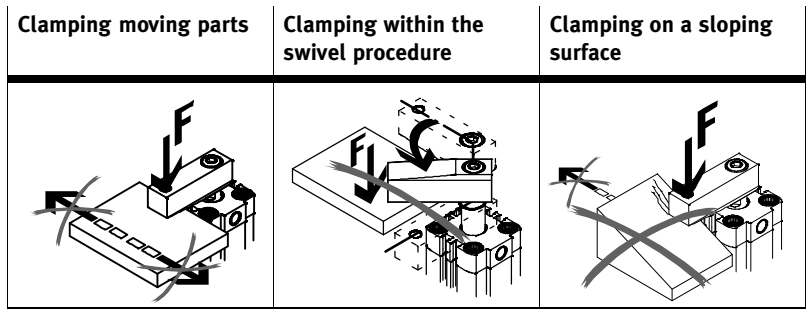



Bild 18

- Make sure that the maximum permitted loadings are not exceeded.
If set correctly, the clamping finger must reach the end position safely without knocking hard against it.

Commissioning – setting the clamping screw

- Adjust the clamping screw on the clamping finger. When doing this note the following points:

Relevant points	Explanation
Always counter hold on the clamping finger (e.g. with a spanner wrench at spanner flat ).	At no time may there be a torque on the guide sleeve (a spanner sliding from the spanner flat can, under circumstances, damage the internal guide contour of the guide sleeve).
Adjustments may only be undertaken when the device is at a stand.	

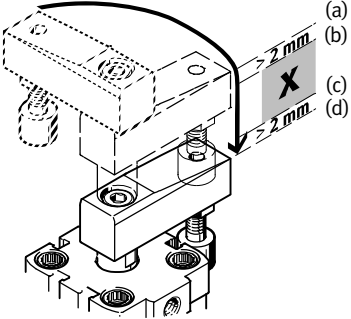
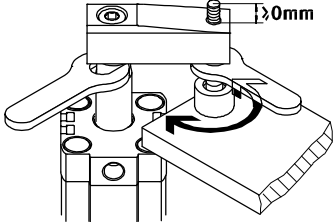
Relevant points	Explanation
<p>The permitted clamping range X is maintained. This includes a safety distance from the swivel movement and from the end of the stroke. The safety distance is in each case approx. 2 mm</p> <p>Key to the following diagram: a) end of swivel movement b) start of reliable clamping c) end of reliable clamping d) end position (no clamping)</p>	
<p>The maximum screw-out length is flush with the clamping finger.</p>	
<p>The lock nut of the clamping screw must be locked with Loctite 24333.</p>	
<p>The tightening torque of the locking nut is maintained (see following table).</p>	

Bild 19

CLR-...	12	16	20	25	32	40	50	63
Connecting thread	M4	M6	M6	M8	M8	M10	M10	M10
Tightening torque [Nm]	3	12	12	12	24	24	47	47

Bild 20

Commissioning – test run

- Start a test run as follows:
 - at first with slow positioning movements
 - then under conditions of use.
- During the test run check that the CLR-... clamps reliably.

If the test run is without faults:

- End the test run.

8 Operation



Warning

Uncontrolled moving masses can cause injury to people or damage to objects in the area of movement (squashed fingers, eye injuries).

- Make sure that nobody can place his/her hand in the positioning range of the moveable mass (e.g. by means of a protective screen). It must not be possible to touch the CLR-... until the mass has come to a complete stand.
- Make sure that the swivel frequencies in continuous operation do not exceed the specified values (see chapter “Technical specifications”).

9 Care and maintenance

Cleaning:


- If necessary, clean the exterior of the CLR-... with a soft cloth.
The following cleaning agents are permitted:
 - soap suds (max. +60 °C)
 - petroleum ether
 - any non-abrasive media.

10 Dismantling and repairs

For all dismantling and repair work:

- Exhaust the CLR...

Removing the clamping finger

1. Fix the piston rod at spanner flat  with a spanner wrench (note the maximum permitted torque on the guide sleeve, see chapter “Mechanical installation”).
2. Unscrew the fastening screw one turn out of the clamping finger.
3. Turn the clamping finger with a spanner wrench. The clamping finger will then be released from the piston rod.

For counter holding, the maximum permitted torque on the guide sleeve must **not** be exceeded (see chapter “Mechanical installation”).

A suitable pull-off device must be used if the clamping finger sticks.

- Order the wearing parts as specified.
- Always send the defective product to Festo.
- Make sure that the CLR-... is overhauled only by our repair service.

The repair process calls for delicate setting work.

Please describe the fault and the operating conditions in your correspondence.

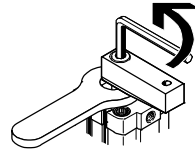


Bild 21

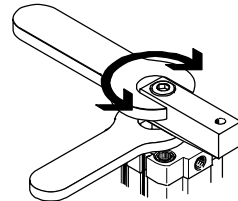


Bild 22

11 Accessories

Designation	Type
Foot mounting	HNA-...
Flange mounting	FNC-...
Start-up valve	HEL-.../HEM-...
One-way flow control valve	GRLA-...
Non-return valve	HGL-...
Compressed air reservoir	VZS-...
Proximity switch	SME-8-.../SMT-8-...
Clamping finger	CLR-...FS

Bild 23

12 Trouble-shooting

Fault	Cause	Possibilities
Swivel and clamping sequence not expected	Guide bolt in wrong groove	Modification to the swivel movement see chapter "Mechanical installation"
Proximity switch does not switch	Ferritic objects in vicinity (fastening elements)	Use non-ferritic materials or a different type of proximity switch (SMT-8-...)
Hard impact at the end positions	Mass on clamping finger too large / non-permitted parts used	Use clamping finger with unmodified clamping screw
	Excessive speed	Restrict swivel motion more
CLR-... cannot hold the part to be clamped	Insufficient operating pressure	Increase operating pressure to maximum permitted value

Bild 24

13 Technical specifications

CLR-...	12	16	20	25	32	40	50	63
Design	Double-acting pneumatic cylinder with swivel mechanism							
Mounting position	As desired							
Medium	Filtered compressed air, lubricated or non-lubricated (filter fineness 40 µm)							
Operating pressure range	2 ... max. 10 bar							
Connecting thread	M5				G 1/8			
Temperature range	-10 ... +80 °C (ambient) -10 ... +50 °C (storage)							
Theoretical tension force [N] Effective tension force [N] (at 6 bar returning)	51 34	90 53	121 109	227 188	362 313	633 536	990 716	1682 1386
Possible swivel direction	L/R				L/R/G			
	(L = left, R = right, G = straight)							
Max. perm. work frequency (at room temperature)	– Linear-swivel movement:					0.8 Hz		
	– Linear movement:					1 Hz		
Max. swivel angle tolerance	90° ±4°		90° ±3°		90° ±2°			
Stroke tolerance	0 mm /+2.5 mm							
Materials	Housing: Al Piston rod: St (coated with CLR-...-K11-R8) Collar screws, guide pin: St Bearings: CuSn Seals: NBR, TPR Wiper (with CLR-...-K11-R8): PPS							
Weight without clamping finger [kg] (approx.)								
– at 10 mm stroke	0.14	0.16	0.34	0.40	0.69	0.88	1.7	2.1
– at 20 mm stroke	0.16	0.19	0.39	0.46	0.77	0.99	2.1	2.7

Bild 25

CLR

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