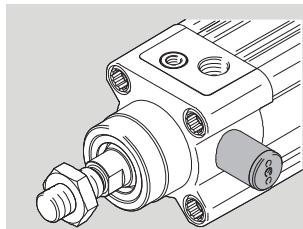


ADN-...-EL..., DNC-...-EL..., DSBC-...-E... End-position locking



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Operating instructions

8139809
2020-07f
[8139811]



Translation of the original instructions

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1 Applicable Documents

All available documents for the product → www.festo.com/sp

2 Training of qualified personnel

NOTICE!

Installation and commissioning by qualified personnel only.

- If used in safety-relevant applications, additional measures are necessary, e.g. in Europe the standards listed in the EC Machinery Directive must be observed. The product is not suitable as a safety-relevant component in control systems without additional measures in accordance with legally specified minimum requirements.
- Observe the specifications/information in the relevant documentation accompanying the product.

3 Operating elements and connections

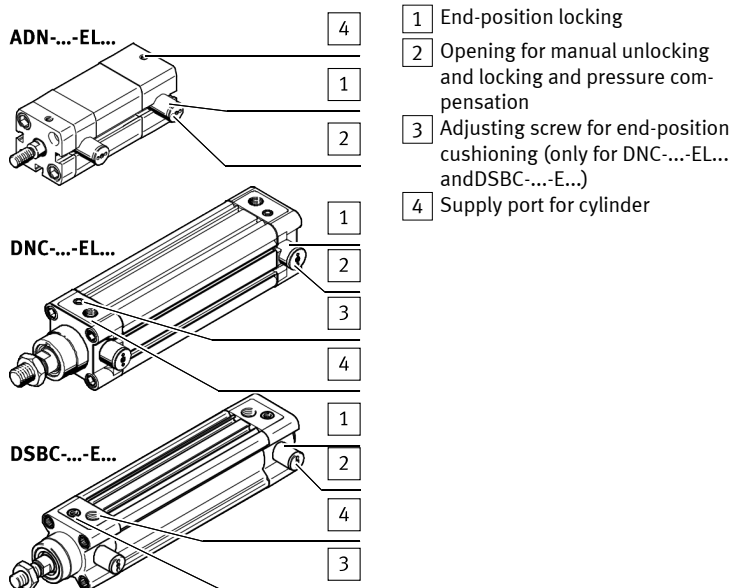


Fig. 1

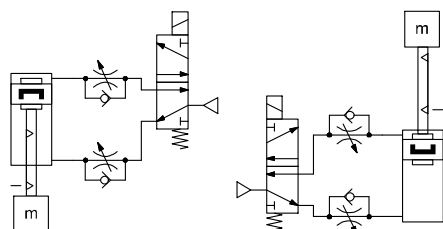


Fig. 2

4 Function and application

The bolt of the end-position locking with pre-stressed spring positively locks into a slot of the piston rod at the end position of the cylinder. The positive connection locks the piston rod.

To unlock the bolt, the cylinder chamber opposite the locked end position (opposite chamber) is first pressurised. The pressurisation of the cylinder chamber of the locked end position presses the bolt out of the slot, after which the piston rod can move freely. The cylinder can be traversed by exhausting the opposite chamber. It is locked after the cylinder has reached the end position when the pressure in the related cylinder chamber drops. As soon as the pressure force falls below the spring force of the end-position locking, the bolt is again gripped by the slot of the piston rod.

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Leakage may occur briefly at the orifice [2] during the locking and unlocking process.

The end-position locking is intended for holding a load in the event of a pressure failure (e.g. if the cylinder is mounted vertically).

5 Requirements for product use

- Compare the limit values in these operating instructions with your actual application (e.g. pressures, forces, torques, temperatures). Operation of the product in compliance with the relevant safety regulations depends on compliance with the load limits.
- Ensure a supply of correctly prepared compressed air.
- Make sure that the necessary operating pressure is maintained. (→ 9 Technical data).
- Pressurise the complete system slowly until the operating pressure is reached. Then movements of the actuator technology will be controlled.
- Use the soft start valve HEL for slow start-up pressurisation.
- Take into consideration the ambient conditions at the location of use.
- Observe the regulations of the workers' compensation trade association, the German Technical Control Board (TÜV) or relevant national regulations.
- Observe the warnings and notes on the product and in the relevant operating instructions.
- Use the product in its original status, without any unauthorised modifications.

5.1 Mechanical installation

NOTICE!

The unlocking function can be disabled

- Make sure that the orifice of the end-position locking:
 - is always open; otherwise, back pressure can build up and prevent unlocking.
 - is not pressurized with compressed air; otherwise, the bolt will no longer move out of the slot.

To prevent malfunctions:

- Do not use the head of a screw as a position indicator. If the head is flush with the edge of the housing, you cannot check that the bolt has actually completely locked into place.

When unlocking by hand:

1. Screw a screw (→ Tab. 1) through the orifice of the end-position locking into the thread of the bolt [3].
2. Pull the screw out and thus the bolt out of the slot. The piston rod is now unlocked. If the screw is released, the spring presses the bolt back into the slot. The piston rod is locked again.

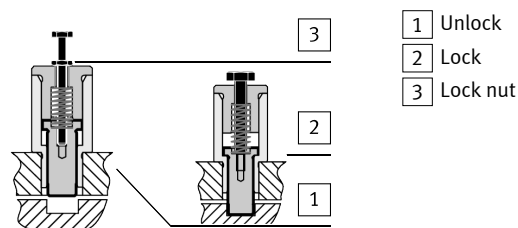


Fig. 3

For permanent unlocking [1] during adjustment:

- Use a screw with a lock nut [3] to fix the bolt in the unlocked position [1].

For permanent locking during adjustment:

1. Screw a screw (→ Tab. 1) into the thread of the orifice of the end-position locking until the bolt locks the piston rod [2].
2. Lock the screw with a lock nut (in case of vibrations).

ADN-/DNC-/DSBC-...-E...	20/25	32/40	50/63	80/100
To unlock:				
– Screw (minimum length)	M2x30	M2x30	M3x40	M3x50
– Tensile force [N]	4	4	10	25
– Stroke [mm]	2.7	3.5	4.7	6.0
To lock:				

ADN-/DNC-/DSBC-...-E...	20/25	32/40	50/63	80/100
- Screw with continuous thread (minimum length)	M3x20	M3x20	M5x35	M5x45

Tab. 1

5.2 Pneumatic installation

NOTICE!

The cylinder can move uncontrolled.

- Avoid 3-way valves for control of the cylinder, especially valves with the "mid-position closed" function and of the "metallic sealing" type.

Leakage air that flows over the 3-way valve into the cylinder may release the lock after a certain period.

- Use one-way flow control valves (exhaust air flow control) for regulating the speed of the cylinder (pneumatic control → Fig.2). Note the maximum permissible impact energy (→ www.festo.com/catalogue).

6 Commissioning

⚠ WARNING!

Injuries due to uncontrolled movements of moving parts in the area of the cylinder.

- Make sure that the cylinder is controlled by correct logic. The locking mechanism can be damaged as a result of incorrect control. Under certain circumstances this can lead to the piston rod suddenly extending or retracting.

NOTICE!

Damage to the end-position locking due to excessive piston rod forces.

- Make sure that the cylinder chamber opposite the end-position locking (opposite chamber) is pressurised with compressed air before every unlocking process. This relieves the locking mechanism of external forces. Pressurisation of the opposite chamber can be specified by evaluating the current cylinder position, e.g. by a higher-order controller.
- Make sure that the maximum holding force is not exceeded (→ 9 Technical data). An unpressurised opposite chamber impairs unlocking: even at low operating pressure, the locking mechanism may not unlock, may be overloaded or even destroyed.

To set the end-position cushioning (DNC and DSBC only with PPV variant):

NOTICE!

Wear of bolt and slot.

An adjusting screw [3] that is screwed in too far (strong end-position cushioning) may prevent the bolt from securely locking.

1. Find the number of revolutions required of the setting screw for end-position cushioning (by screwing in and out completely).
2. Turn the screw back by half that number of revolutions.
3. Unscrew the screw if necessary until the cylinder piston does not impact too hard.

In the case of an unpressurised cylinder (only with end-position locking ELB, ELV, E1 or E2):

- Make sure that the piston rod is not retracted or extended. Otherwise, the bolt will contact the end-position locking on the piston rod. This leads to premature wear and will adversely affect the function (→ 5.1 Mechanical installation, "For permanent unlocking during adjustment" section).

If several cylinders with end-position locking are used:

- Do not operate cylinders in parallel for movement of a single workpiece. Otherwise one of the end position locks may not unlock at the right moment.

7 Operation and use

NOTICE!

End position not locked.

- Make sure that the cylinder always reaches its internal end position. External stops may shift the end position. Potential consequences:
 - the internal end position is not reached
 - the end-position locking does not latch
 - the locking mechanism is wearing prematurely.

When used in a dirty environment (e.g. dust, water spray):

- Fasten a fitting (B) and a tube to the orifice [2] of the end-position locking (→ 9 Technical data).
- Remove the tube from the dirty area to prevent ingress of dust and water spray.

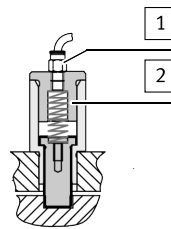


Fig. 4

These measures may result in an increase in the required operating pressure for unlocking. The unlocking and locking times will also be extended.

To check the end-position locking:

1. Exhaust the cylinder.
 2. Pressurise the cylinder at the application-specific load. Observe the max. holding force (→ 9 Technical data) during pressurisation.
- Make sure that damage cannot occur if the end-position locking does not catch.

8 Fault clearance

Malfunction	Possible cause	Remedy
End position is not locked	Wear	Send to Festo Service Order a new cylinder
	Excessive exhaust air flow control	Open flow control valve
	Permanent manual unlocking	Unscrew screw from orifice [2]
	Internal end position of the cylinder is not reached	Do not use external stops (internal end position must always be accessible)
	Too long and narrow connecting cables between valves and cylinder	Use short connecting cable with a cross section that is as large as possible
End position is not unlocked	Contaminated silencers	Replace silencers
	Permanent manual locking	Unscrew screw from orifice [2]
	Operating pressure at the cylinder too low	Increase operating pressure (→ 9 Technical data)
	Connection at the orifice [2] blocked	Clean end-position locking or connected tubing connection
	Unpressurised opposite chamber	Pressurise the opposite chamber every time before unlocking (→ 6 Commissioning)

Tab. 2

9 Technical data

ADN-/DNC-/DSBC-...-E...	20	25	32/40	50/63	80/100
Function	Double-acting cylinder with single-acting lock by spring force				
End-position locking					
ADN/DNC-...-ELB, DSBC-...-E1	both ends				
ADN/DNC-...-ELV, DSBC-...-E2	front				
ADN/DNC-...-ELH, DSBC-...-E3	rear				
Operating medium (at the cylinder)	Compressed air in accordance with ISO 85731: 2010 [7:4:4]				
Thread at orifice [2]	M3			M5	
Max. axial backlash with end position locked					
ADN/DNC ¹⁾	[mm]	1.3			2.1
DSBC ¹⁾	[mm]	1.3			1.5
Maximum holding force of the end-position locking ²⁾	[N]	250	500	2000	5000
Permissible temperature range	[°C]	-20 ... +80			
Operating pressure					
for unlocking		min. 0.25 MPa (36.25 psi; 2.5 bar)		min. 0.15 MPa (21.75 psi; 1.5 bar)	
for locking (residual pressure)		max. 0.05 MPa (7.25 psi; 0.5 bar)			
maximum at ADN-...-EL...		1 MPa (145 psi; 10 bar)			
maximum at DNC-...-EL...		1.2 MPa (174 psi; 12 bar)			
maximum at DSBC-...-E...		1.2 MPa (174 psi; 12 bar)			
Materials (end-position locking)					
Housing, cover, piston, spring		Steel			
Buffer seal		Polyurethane			
Guide ring		Polyacetal/polyethylene			

1) The specifications are calculated values - in the hold direction, without load.

2) However, not more than 50% of the theoretical cylinder force (recommended values → www.festo.com/catalogue).

Tab. 3