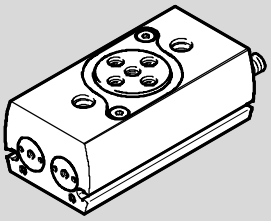
DRRD-08/10



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Operating instructions

8030937
1310NH
[8030939]

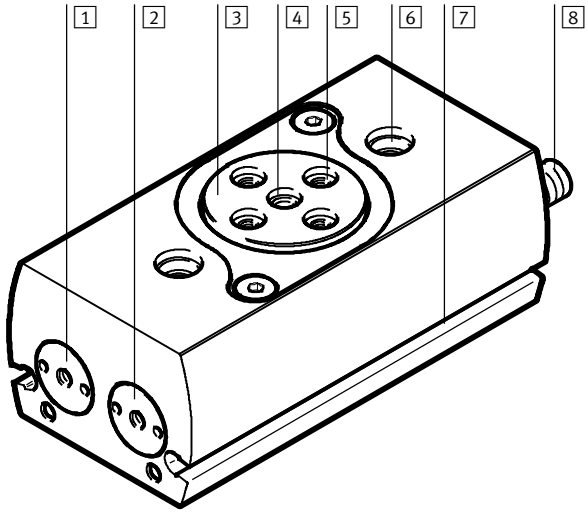
Original: de

Semi-rotary drive DRRD-8/10 ..... English

Note

Installation and commissioning may only be performed in accordance with these instructions by technicians with appropriate qualifications.

1 Control sections and connections



1 Supply port (swivel clockwise)
2 Supply port (swivel anti-clockwise)
3 Flanged shaft
4 Shaft opening with centring recess for through-feed of cables/compressed
5 Payload mounting interface (4x)
6 Mounting interface DRRD (2x)
7 Slot for cylinder switch (2x)
8 Shock absorber for swivel angle adjustment, secured with lock nut (2x)

Fig. 1

2 Function and application

The DRRD semi-rotary drive is a double-acting twin-piston drive. When the compressed air supply ports are pressurised reciprocally, two pistons arranged in parallel move in the opposite direction backwards and forwards. This linear motion is converted through pinions into a swivel motion of the flanged shaft. The DRRD has an elastic end-position cushioning.

The DRRD semi-rotary drive is intended for swivelling payloads which have to execute a defined angular movement.

3 Requirements for product use

Note

Malfunction and material damage due to incorrect handling.
- Always comply with the specifications of this chapter.
  Only in this way can you ensure that the product functions correctly and safely.

- Take into consideration the legal regulations applicable for the destination, as well as:
  – regulations and standards,
  – regulations of the testing organizations and insurers,
  – national specifications.
- Observe the warnings and notes on the product and in the relevant operating instructions.
- Remove all transport packaging, such as transparencies, caps and cartons (with the exception of any covers in the pneumatic ports).
  The packaging is intended for recycling
  (exception: oil paper = residual waste).
- Take into account the material specifications (➔ 11 Technical data).
- Use the product in its original status, without any unauthorised product modifications.
- Take into consideration the ambient conditions at the location of use.
  Corrosive elements in the environment (e.g. ozone) will reduce the service life of the product.
- Compare the limit values specified in these operating instructions with your actual application (e.g. pressures, forces, torques, temperatures, masses, speeds, etc.).
  Operation of the product in compliance with the relevant safety regulations is contingent on adherence to the load limits.
- Take the tolerance of the tightening torques into account. Unless otherwise specified, the tolerance is ± 20 %.
- Do not modify any screws or threaded pins unless this is requested in these instructions. For safety reasons, they are fixed with a screw locking agent.

For vertical installation:
- Make sure that the drive has reached a stable position when it comes to a stop (e.g. the lowest point or secured with external stops).
- Make sure there is a supply of correctly prepared compressed air (➔ 11 Technical data).
- Having selected a medium, stick with it for the entire life of the product (e.g. always use unlubricated compressed air).
- Pressurize your entire system slowly.
  There will then be no uncontrolled movements. For slow start-up pressurisation, use on-off valve HEL.

4 Installation

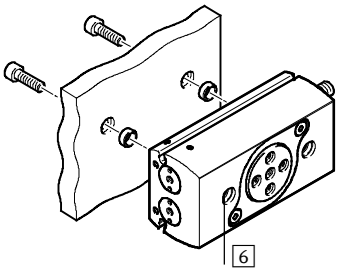
4.1 Mechanical installation

Note

- Handle the DRRD with care to prevent damage to the flanged shaft. This applies in particular to the following points:

1. Position the DRRD so that you can easily reach the control sections and connections.
2. Secure the DRRD at the mounting interface 6 by using two screws and two centring sleeves each.
   Observe the tightening torque (➔ Fig. 3).

Direct mounting



Through-hole fastening

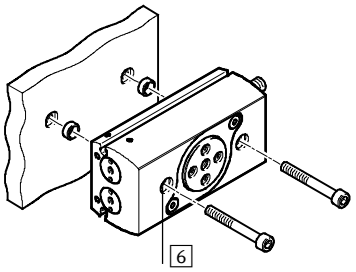


Fig. 2

Size		8	10
Screw (direct mounting)		M4	M4
Tightening torque	[Nm]	3	3
Screw (through-hole fastening)		M3	M3
Tightening torque	[Nm]	1.2	1.2
Centring sleeve ZBH	[mm]	7	7

Fig. 3

3. Pull tubing and cables through the hollow flanged shaft, if necessary. Diameter for wiring (➔ Fig. 6).
4. When mounting the payload, observe the following specifications:
   – installation without tilting
   – permissible radial force Fy
   – permissible axial force Fx
   – permissible mass moment of inertia
   – a structure that is as rotationally symmetrical as possible.

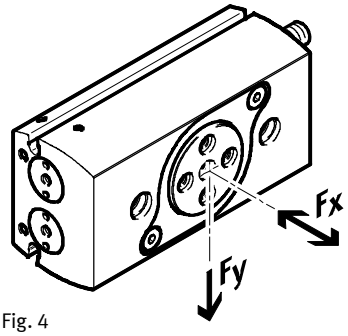


Fig. 4

The mass moment of inertia of the payload should be calculated. Lever arms, cantilevers and masses should be considered in the calculation (maximum permissible values ➔ www.festo.com/catalogue).

Note

If there are demanding requirements for concentricity of the components on the flanged shaft:
- Use the middle centring hole 4 as well as one of the 4 existing centring holes.

5. Secure the payload to the drive flange at the mounting interface 5 by using at least two screws positioned opposite one another and centring sleeves.
   Observe the tightening torque (➔ Fig. 6).

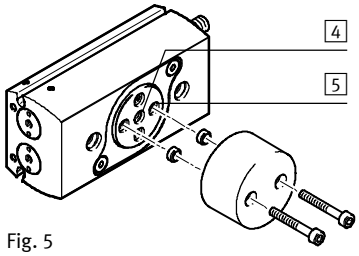


Fig. 5

Size		8	10
Shaft opening 4	[mm]	∅ 3	∅ 3
Centring sleeve ZBH for middle centring hole	[mm]	5	5
Screw for thread at 5		M3	M3
Centring sleeve ZBH	[mm]	5	5
Tightening torque	[Nm]	1.2	1.2

Fig. 6

4.2 Pneumatic installation

- If necessary, remove the covers in the pneumatic ports.

To adjust the swivel speed:
- Use the GRLA one-way flow control valves.
  These are screwed directly into the compressed air supply ports.

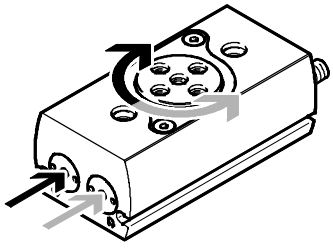


Fig. 7

For vertical installation and eccentric loads:
- Use the controlled check valve HGL or a compressed air spacer compensation reservoir VZS.
  In this way you can prevent the effective load from sliding down suddenly if there is a sudden pressure drop.

4.3 Electrical installation

Note

Multiple switching cycles of proximity sensors are possible, dependent on the design.
- Make sure the proximity sensors are always set to the first switching point.
  To do this, push the cylinder switch (A ➔ Fig. 8) in from the slot end where the piston to be sensed is located until the first switching occurs.

- Place the proximity sensors for sensing the end positions into the slots 7.

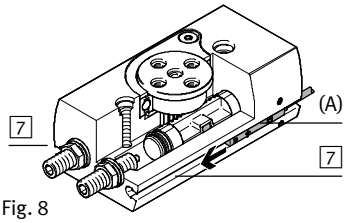


Fig. 8

5 Commissioning

Caution

Danger of injury from rotating loads.
- Make sure the DRRD is only set into motion with protective devices.
- Make sure that in the swivel angle of the DRRD
  – nobody can reach in
  – no foreign objects can enter
  (e.g. by means of an individual protective guard).

Note

- Comply with the following prerequisites:
  – the shock absorbers are secured with lock nuts
  – the operating conditions are within the permissible ranges.

5.1 Commissioning end-position adjustment

1. Rotate both upstream one-way flow control valves (B):
   – at first completely closed
   – then open them again approximately one turn.
2. Pressurize the drive optionally in one of the following ways:
   – slow pressurisation of one side
   – simultaneous pressurisation of both sides with subsequent exhausting of one side.

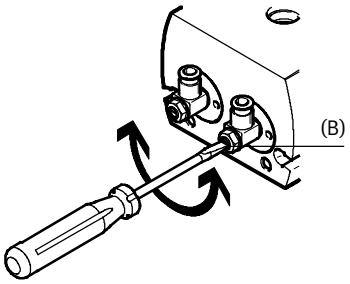


Fig. 9

Note

Risk of damage!
If the shock absorber is unscrewed too far, it will result in the piston colliding with the end cap with insufficient cushioning.
- Observe the permissible shock absorber settings (➔ Fig. 13).

3. Pressurize the corresponding port to swivel the DRRD into the desired end position.
4. Loosen the lock nut on the shock absorber.

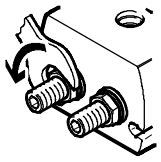


Fig. 10

5. Turn the corresponding shock absorber until the desired end position adjustment has been reached.

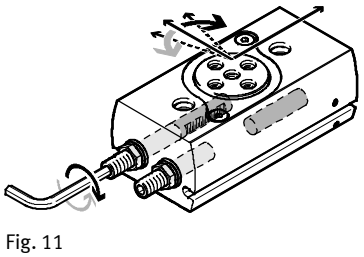


Fig. 11

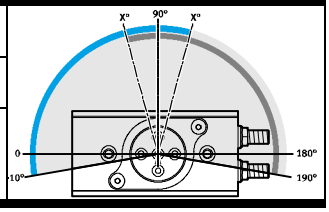
Angle setting	Reaction	Setting range related to the basic factory setting (example DRRD-...-180)
Turn the shock absorber clockwise	Reduce the swivel angle	
Turn the shock absorber anti-clockwise	Increase the swivel angle	

Fig. 12

The following settings are possible:

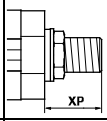
Size		8	10
			
Angle adjustment per rotation	[°]	8.2	6.8
Max. shock absorber setting XPmax	[mm]	11.9	13.8
Min. shock absorber setting XPmin	[mm]	5	5

Fig. 13

6. Tighten the locking nut of the shock absorber. Observe the tightening torque:

Size		8	10
⌭ Internal hexagon socket	[mm]	3	3
⌭ Lock nut	[mm]	8	8
Tightening torque	[Nm]	1	1

Fig. 14

7. Repeat the procedure to set the second end position.

5.2 Carrying out commissioning

1. Start a test run at low swivel speed.
2. When conducting the test run, check whether the DRRD settings need to be corrected. These could be:
   – swivel angle of the payload (➔ Fig. 12)
   – swivel speed of the payload.
3. Unscrew the one-way flow control valves (B) slowly again up to the desired swivel speed.
4. Interrupt the test run if the piston can be heard to strike hard.
   Causes of metallic striking may be:
   – mass moment of inertia of the payload too high
   – swivel speed of the payload too high
   – no compressed air cushion on the exhaust side
   – Shock absorber unscrewed too far (maximum values ➔ Fig. 13).
5. Make sure you remedy the above-named causes.
6. End the test run when all of the necessary corrections have been detected.

6 Operation

Caution

Danger of injury from moving masses.
- Make sure that in the swivel angle of the DRRD
  – nobody can reach in
  – no foreign objects can enter
  (e.g. by means of an individual protective guard).

In the case of several uninterrupted swivel cycles:

Note

Operational reliability can be impaired by an excessive temperature rise.
- Make sure that the following maximum swivel frequency is not exceeded.

Size		8	10
Maximum swivel frequency	[Hz]	2.2	2.1

Fig. 15

7 Maintenance and care

To check functioning of cushioning:
- Carry out the following steps:

DRRD-...	P
Test interval	2 million switching cycles
Procedure	1. Check the function of the shock absorbers. In case of audible bottoming out or rebounding: 2. Replace the cushioning components and seals (lubricate the cushioning components before installation with, for example, LUB-KC1).
Replacement interval	If there is evidence of wear (bottoming out)

Fig. 16

If the piston can be heard to strike hard in the end position:
- In case of wear, replace the internal cushioning components of the DRRD (➔ 8 Disassembly and repair).

- If the DRRD is contaminated, clean it with a soft cloth.
  Permissible cleaning agents include:
  – warm soap suds up to +60 °C
  – petroleum ether
  – all non-abrasive cleaning agents.

8 Disassembly and repair

For eccentric masses on the lever arm:

Caution

Danger of injury from masses dropping suddenly.
- Make sure the payload has reached a stable position before venting (e.g. the lowest point).
- Make sure that the semi-rotary drive is exhausted for disassembly.

- Recommendation: Send the product to our repair service.
  This way, the required fine tuning and tests will be taken into special consideration.
- Information about spare parts and accessories can be found at:
  ➔ www.festo.com/spareparts.

To replace the integrated cushioning components (➔ 9 Accessories):
- Carry out the following steps:

1. Vent the DRRD.
2. Measure the position of the shock absorber (dimension XP) and loosen the lock nut on the shock absorber 8.
3. Unscrew the shock absorber, lubricate the new cushioning component (e.g. with LUB-KC1) and assemble. Use new sealing discs (C ➔ Fig. 17) if required.
4. Screw in shock absorbers up to dimension XP (➔ point 2).
5. Check the angle adjustment and correct, if necessary.
6. Tighten the lock nut on the shock absorber 8 (tightening torque ➔ Fig. 14).

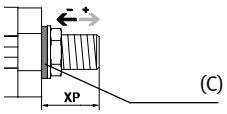


Fig. 17

9 Accessories

Note

- Select the corresponding accessories from our catalogue
  ➔ www.festo.com/catalogue.

10 Fault clearance

Malfunction	Possible cause	Remedy
Uneven movement of the payload	Flow control valves inserted incorrectly	Check the flow control function (supply or exhaust air flow control)
	Asymmetric angle setting	Symmetric setting preferred
	DRRD defective	Return to Festo
Hard metal impact at the end position Flanged shaft does not remain in the end position (rebounding)	Residual energy too high	Select a lower swivel speed
		Move only against residual air cushion on the exhaust side
		Select a lighter load
	Semi-rotary drive moves against an unpressurized chamber	Pressurize semi-rotary drive on both sides
	Shock absorber unscrewed too far	Observe the maximum permissible unscrewing length
	Cushioning component defective/worn	Replace cushioning component (➔ 8 Disassembly and repair)

Fig. 18

11 Technical data

Size		8	10
Design		Semi-rotary drive with twin pistons	
Cushioning		Elastic cushioning rings/plates at both ends	
Pneumatic port		M3	
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]	
Note on the operating medium		Lubricated operation possible (in which case lubricated operation will always be required)	
Operating pressure	[bar]	3 ... 8	
Mounting position		any	
Swivel angle	[°]	180	
Setting range on both sides	[°]	infinitely adjustable between –100 ... +10	
Cushioning angle (≙ minimum swivel angle)	[°]	38	37
Repetition accuracy	[°]	≤ 0.03	
Ambient temperature	[°C]	–10 ... +60	
Theoretical torque at 6 bar	[Nm]	0.2	0.4
Max. axial load (static)			
Tension	[kN]	0.26	
Pressure	[kN]	0.7	1.1
Max. permissible axial and radial force on flanged shaft		dependent on the distance of the force application point (➔ www.festo.com/catalogue)	
Max. permissible mass moment of inertia	[kgcm^2]	15	20
End-position adjustment		by turning the cushioning components	
Note on materials		Contains paint-wetting impairment substances (PWIS)	
Materials			
Housing		Anodised aluminum	
Flanged shaft, plug, shock absorber retaining plate, screws		Steel	
Seals		TPE-U (PU), NBR	
Product weight	[kg]	0.16	0.25

Fig. 19