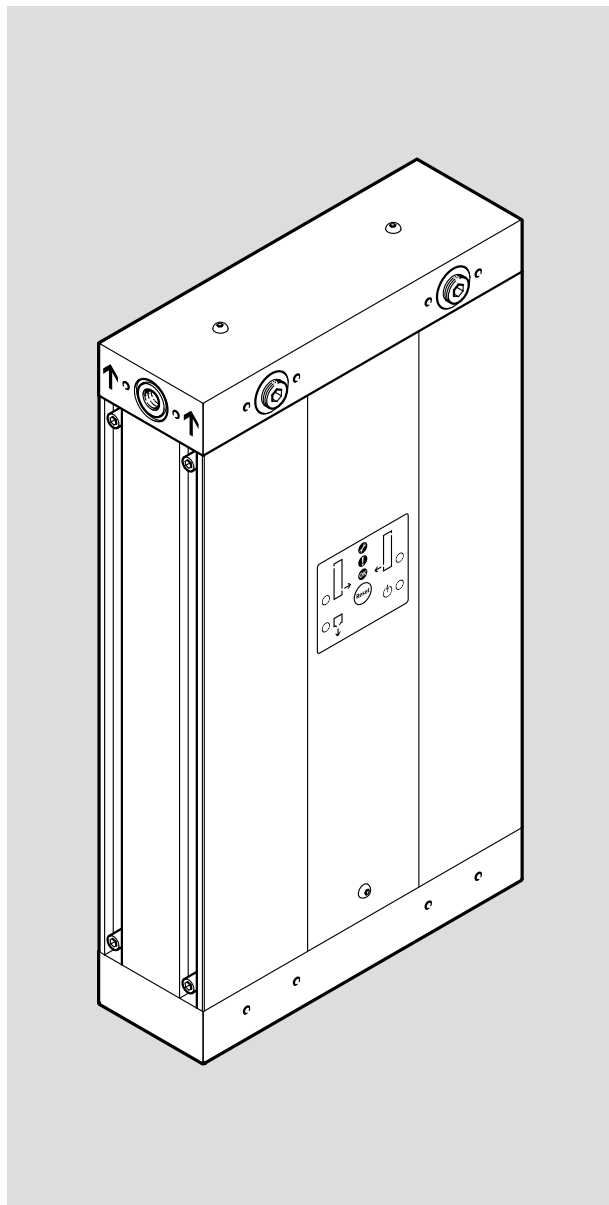


PDAD
Adsorption dryer



FESTO

Operating instruc-
tions



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Translation of the original instructions

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1 About this document

1.1 Applicable documents



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

Document	Product	Contents
Assembly instructions	Service kit PDAD-...-SP12000	Replacing the drying agent cartridges

Tab. 1: Applicable documents

1.2 Product labelling

- Observe the specifications on the product.

The product labelling is divided into the following 2 parts.

Product labelling part 1

The product labelling part 1 is located on the right side of the device. The product labelling part 1 enables the product to be identified.

Product labelling (example)	Meaning
PDAD-09-G3/8	Order code
552170	Part number
YYYY-MM	YYYY = year of manufacture, MM=month of manufacture
Pxxxxx	xxxxx = internal check number
X-X-XXX-KC-XXX-XXX	X = symbol of the KC-Mark Certificate (test mark for Korea)
p max: 16 bar	Max. input pressure
T _{max} : 50 °C	Max. ambient temperature
T _{min} : 2 °C	Min. ambient temperature
V: 4.2 l	XX = pressure equipment volume V in litres
Festo SE & Co. KG	Manufacturer
DE-73734 Esslingen	Manufacturer's address
Made in xxxxx	xxxxx = country of manufacture

Tab. 2: Product labelling part 1 (example)

Product labelling part 2

The product labelling part 2 is located on the power connection of the device. The product labelling part 2 contains information on the power connection of the device.

Power connection	Product labelling	Meaning
Top power connection (AC)	100 - 240 V AC	Voltage range when operating with alternating current (AC)
	~ 50 - 60 Hz	Required mains frequency
	0.14 A - 110 V AC	Current consumption when operating with 110 V AC
	0.07 A - 230 V AC	Current consumption when operating with 230 V AC
Bottom power connection (DC)	12 - 24 V	Voltage range when operating with direct current (DC)
	0.4 A - 24 V DC	Current consumption when operating with 24 V DC
	0.8 A - 12 V DC	Current consumption when operating with 12 V DC
	IP65	Degree of protection in accordance with EN 60529

Tab. 3: Product labelling part 2

Warning symbol	Meaning
	Attention! Dangerous voltage
	Risk of high pressure

Tab. 4: Warning symbol on product labelling part 2

Warnings on the product (de, en)	Meaning
Gefahr Auf korrekte Netzspannung achten. Nur eine einzige Spannungsquelle anschliessen.	Danger Make sure the mains voltage is correct. Only connect a single voltage source.
Danger Ensure correct power source is connected. Connect only one source.	

Tab. 5: Warnings on the product

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Take into account the ambient conditions at the location of use.
- Before working on the product, switch off the power supply and secure it against being switched on again.

Provide complete pressure reduction.

- For protection of the drying agent cartridges ensure that compressed air is not fed to the dryer if the power feed is interrupted.
- Protect the device and the mounting components from mechanical vibrations.
- Visually inspect the device regularly for damage. Replace damaged device.

2.2 Intended use

The cold-regenerating adsorption dryer is intended exclusively for drying compressed air under the specified operating conditions, e.g.:

- Install indoors, protected from the weather.
- Maximum relative humidity 80% at temperatures up to 31 °C, linear rise to 50% at 40 °C.
- Do not use at altitudes above 2000 m.
- Install vertically or horizontally → Tab. 10 Permitted mounting positions.
- The condensate input and the condensate output must be connected → 5.2.2 Condensate input and condensate output.

2.3 Training of qualified personnel

Installation, commissioning, maintenance and disassembly only by qualified personnel.

The qualified personnel must be familiar with the installation of electrical and pneumatic control systems.

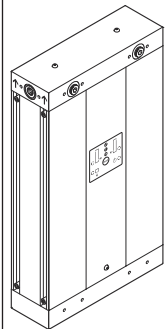
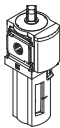
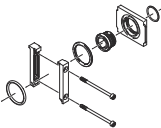
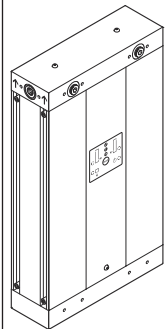
3 Additional information

- Contact the regional Festo contact if you have technical problems. → www.festo.com.
- Accessories and spare parts → www.festo.com/catalogue.

4 Product overview

4.1 Product Range Overview

4.1.1 Scope of delivery

Scope of delivery			
			
	Micro filter MS6-LFM	Connecting kit	AC power supply socket (black)
			
	Tubing	PDAD operating instructions	DC power supply socket (grey)

Tab. 6: Scope of delivery PDAD

The dryer is supplied in protective packaging.

4.1.2 Not in scope of delivery

Accessories

Type	Service kit with drying agent cartridges, O-rings, reset disc and instruction manual	Air gun nozzle set with 3 nozzles (PDAD-100: 6 air gun nozzles)
PDAD-09	PDAD-09-SP-12000	ADNA-PDAD-09
PDAD-13	PDAD-13-SP-12000	ADNA-PDAD-13
PDAD-22	PDAD-22-SP-12000	ADNA-PDAD-22
PDAD-51	PDAD-51-SP-12000	ADNA-PDAD-51
PDAD-73	PDAD-73-SP-12000	ADNA-PDAD-73
PDAD-100	PDAD-100-SP-12000	ADNA-PDAD-100

Tab. 7: PDAD accessories

 Up-to-date information on the accessories → www.festo.com/catalogue.

4.2 Function

4.2.1 Functional principle

The operation of the dryer is intended to ensure a uniform, uninterrupted supply of compressed air of the required specification.

The function is implemented with 2 or 4 air reservoirs that operate in alternating operating cycles. While air is being dried in one air reservoir or pair of air reservoirs, the drying agent can regenerate in the other air reservoir or pair of air reservoirs.

The air flow is routed through the drying agent cartridge of an air reservoir. This extracts moisture from the air flow. A small amount of the dry air is supplied to the other air reservoir as purge air. The purge air flows through the drying agent cartridge, escapes into the environment via a drain valve and thus regenerates the drying agent.

The regeneration cycle lasts 120 s. The associated drain valve is then closed. As a result, the regenerated air reservoir with purge air is brought to system pressure and can switch to the operating cycle. After a further 50 s, the regeneration cycle of the other air reservoir is started at the start of the new operating cycle.

4.3 Structure

4.3.1 Main components PDAD-09/-13/-22/-51/-73

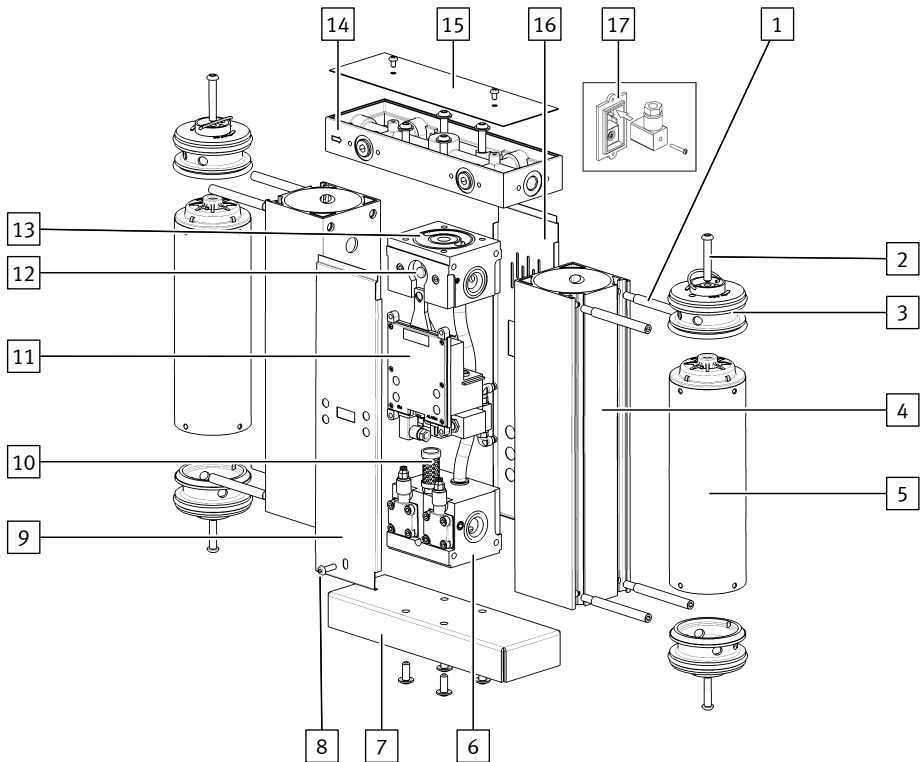


Fig. 1: Design PDAD-09/-13/-22/-51/-73

- | | |
|-------------------------------------|---|
| 1 Retaining screw for air reservoir | 10 Silencer |
| 2 Screw for container seal | 11 Electronic controller |
| 3 Air reservoir seal | 12 Air gun nozzle |
| 4 Air reservoir | 13 Upper valve block |
| 5 Drying agent cartridge | 14 Multi-way distributors |
| 6 Lower valve block | 15 Cover sheet |
| 7 Base plate | 16 Rear covering |
| 8 Covering retaining screw | 17 Mains connection on the back of the device |
| 9 Front covering | |

4.3.2 Main components PDAD-100

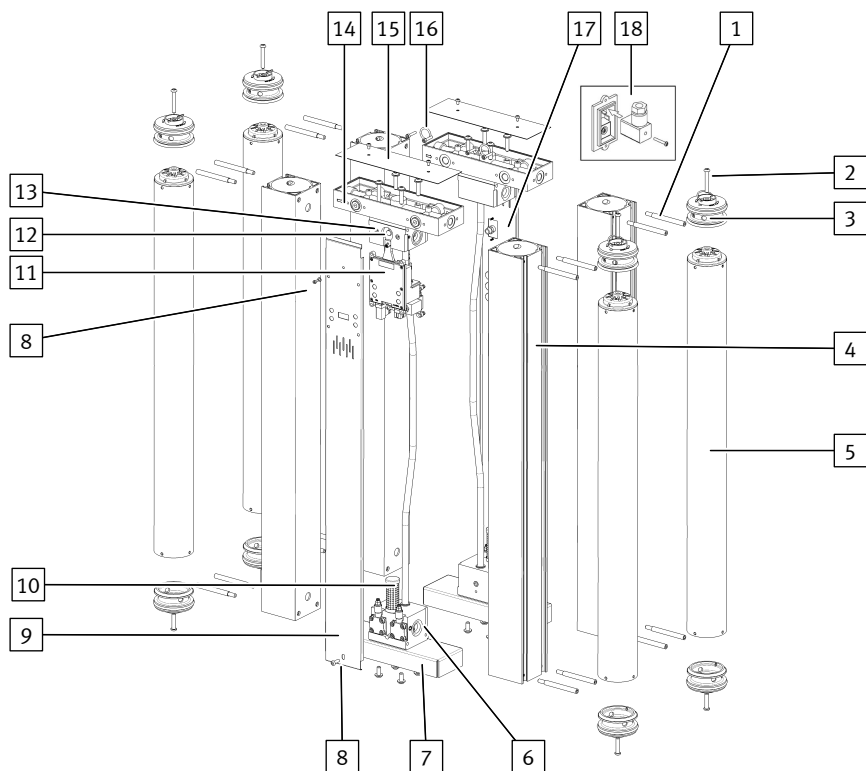


Fig. 2: Design PDAD-100

- | | |
|--|--|
| 1 Retaining screw for air reservoir | 10 Silencer |
| 2 Screw for container seal | 11 Electronic controller |
| 3 Air reservoir seal | 12 Air gun nozzle |
| 4 Air reservoir | 13 Upper valve block |
| 5 Drying agent cartridge | 14 Multi-way distributors |
| 6 Lower valve block | 15 Cover sheet |
| 7 Base plate | 16 Screw and seal for connection of multi-way distributor |
| 8 Covering retaining screw | 17 Rear covering |
| 9 Front covering | 18 Power connection inside the device |

4.3.3 Electronic controller

The valve blocks above and below are controlled by the controller via solenoid valves. The controller thus determines the pressure and the direction of the air flow in the drying agent cartridges.

4.3.4 Multi-way distributors

The multi-way distributor provides pneumatic connections on all sides of the device. The flow direction is indicated by arrows. The standard model of the dryer is configured with the 3 inputs on the left and the 3 outputs on the right viewed from the front of the device. Different arrangements of the openings are available by repositioning the opening sockets → 5.1 Ports for input and output.

4.3.5 Drying agent cartridge with integrated dust filter

The drying agent cartridges contain a drying agent for drying compressed air. The drying agent is in a transparent pipe with end pieces permeable to air at both ends. In the top part of each cartridge is a 1-micron filter for separation of residual dust from the drying agent. The cartridge length varies with the nominal power of the dryer.

4.3.6 Air reservoir

The drying agent cartridges are located in an air reservoir made of extruded aluminium. The air reservoir is equipped with pressure-resistant end caps. Operating pressure and flow rate through the cartridges are controlled by the valve blocks installed between the two air reservoirs. The regeneration air flow (purge air flow) is controlled with the air gun nozzle on the upper valve block.

4.3.7 Alarm relay

An alarm relay with a connection for an alarm device is installed on the electronic controller. A visual or audible remote alarm system can be connected at this connection.

The alarm relay switches in the event of a malfunction or if service is required. A red LED in the display signals an error.

When the error is cleared, the alarm relay is reset, but only after the current switching cycle has ended or the electronic controller has been reset.

4.3.8 Air gun nozzles

For proper and effective operation, a certain amount of purge air must be generated depending on the operating pressure. The volume of purge air is adjusted to the operating pressure by selection of the correct air gun nozzle.

As delivered, the adsorption dryer is configured with an air gun nozzle for an operating pressure of 0.7 ... 0.9 MPa (7 ... 9 bar, 101.5 ... 130.5 psi).

i

If the device is to be operated at a different operating pressure, the air gun nozzle must first be replaced with a suitable air gun nozzle from the air gun nozzle set → 8.4 Replacing air gun nozzle. The following table → Tab. 8 Required air gun nozzleshows the numbers of the required air gun nozzles for the possible operating pressures.

PDAD	-09	-13	-22	-51	-73	-100
Operating pressure	Number of the required air gun nozzle					
0.4 MPa (4 bar, 58 psi)	9	10	14	23	29	2 x 23
0.5 MPa (5 bar, 72.5 psi)						
0.6 MPa (6 bar, 87 psi)						
0.7 MPa (7 bar, 101.5 psi)	7 ¹⁾	8 ¹⁾	12 ¹⁾	17 ¹⁾	24 ¹⁾	2 x 17 ¹⁾
0.8 MPa (8 bar, 116 psi)						
0.9 MPa (9 bar, 130.5 psi)						
1.0 MPa (10 bar, 145 psi)	6	7	10	14	17	2 x 14
1.1 MPa (11 bar, 159.5 psi)						
1.2 MPa (12 bar, 174 psi)						
1.3 MPa (13 bar, 188.5 psi)	5	6	9	12	15	2 x 12
1.4 MPa (14 bar, 203 psi)						
1.5 MPa (15 bar, 217.5 psi)						
1.6 MPa (16 bar, 232 psi)						

1) Delivery status

Tab. 8: Required air gun nozzle

i

Which air gun nozzle set is required for the adsorption dryer used ➔ 4.1.2 Not in scope of delivery. Information on the resulting nominal flow rates depending on the operating pressure and the required air gun nozzle ➔ 10.1 Nominal flow rate.

4.3.9 Display components

Electronic control panel

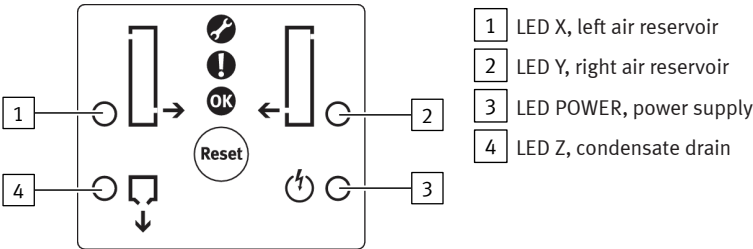
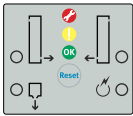
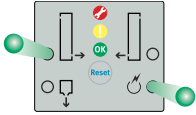
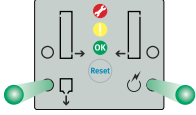
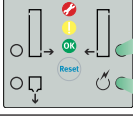
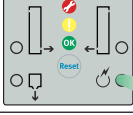
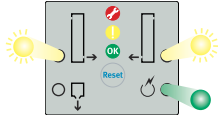
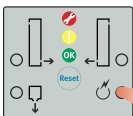


Fig. 3: Control panel LEDs

LED displays

Status	Display	Description	Meaning
		All LEDs off	Operating voltage off
		LED POWER green LED X green	Regeneration cycle left reservoir
		LED POWER green LED Z green	End of regeneration left reservoir and condensate drain
		LED POWER green LED Y green	Regeneration cycle right reservoir
		LED POWER green	End of regeneration right reservoir
		LED POWER green LED X flashes yellow LED Y flashes yellow	Message (pending servicing) after every 11500 operating hours Order service kit with new drying agent cartridges
		One or more LEDs flash red	Service required or error → 9 Mal- functions

Tab. 9: LED status indicator on the control panel

5 Assembly

5.1 Ports for input and output

Layout at delivery status

On delivery, the 3 input ports are on the left side of the dryer when viewed from the front of the unit. The 3 ports at the output are on the right.

Any one of the 3 input and output ports can be used. The ports that are not used must be closed with the supplied sealing plugs.

i

All 3 output openings can be used. Festo recommends connecting a check valve to every output in use. Only one input port may be used.

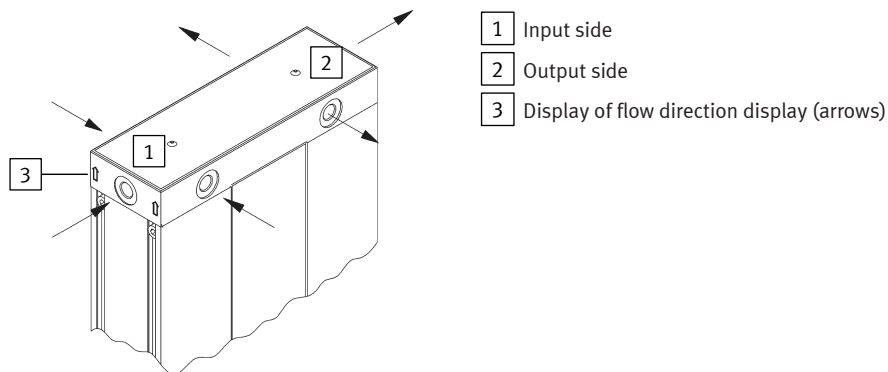


Fig. 4: Multi-way distributor - configuration of standard design

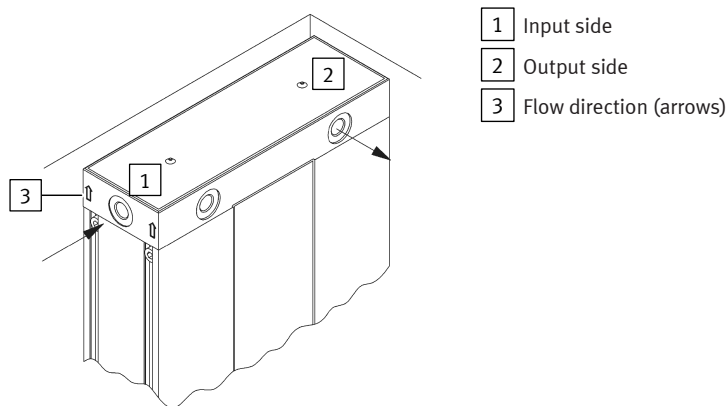


Fig. 5: Multi-way distributor - installation in corners

Changing connections for input and output

This arrangement of the connections can be reversed by moving the multi-way distributor in the cover of the adsorption dryer. If the input is required on the right side and the output on the left side, the multi-way distributor must be rotated.

Rotating multi-way distributor

1. Unscrew the cover retaining screws and remove the cover.



2. Unscrew the 4 retaining screws (A/F 5) of the multi-way distributor and remove it.



3. Rotate the multi-way distributor 180°. Check that the two O-rings in the valve block are correctly seated and position the multi-way distributor. Fasten the multi-way distributor with 4 retaining screws (A/F 5).

- Maximum tightening torque 20 Nm.



4. Position the cover and fasten with the 2 retaining screws.

- Maximum tightening torque 1 Nm.



Multi-way distributor after rotating

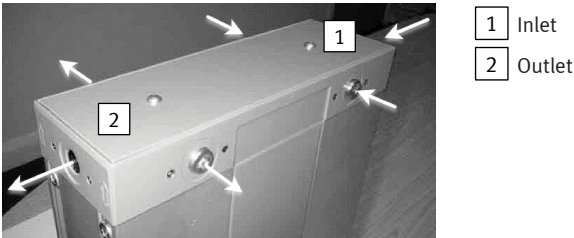


Fig. 6: Position of the connections after rotating the multi-way distributor

5.2 Assembly

5.2.1 Mount micro filter

The included MS6-LFM micro filter must be installed at the input of the dryer to protect the drying agent from contaminated compressed air. In the delivery status the three input ports are on the left side of the dryer. If the input is required on the right side, the multi-way distributor in the cover of the dryer must be rotated → 5.1 Ports for input and output.

Note on mounting position

The micro filter MS6-LFM must always be installed in a vertical position regardless of the mounting position of the dryer ($\pm 5^\circ$). There must be sufficient space under the filter bowl (≥ 100 mm). If installed in a horizontal position, the dryer must be supported with suitable material.

Vertical	Horizontal

Tab. 10: Permitted mounting positions

Mounting module connector plate

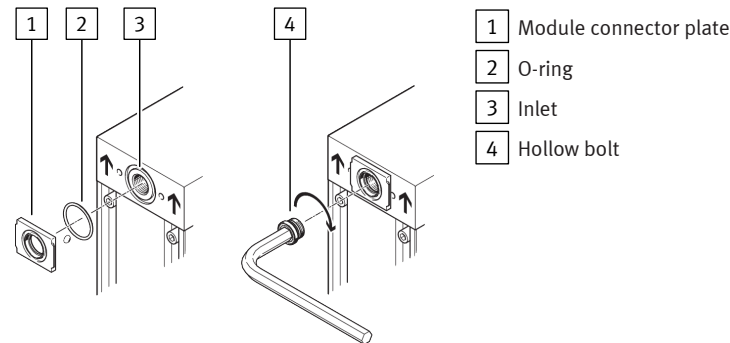


Fig. 7: Mounting of module connector plate

1. Select the input. Remove the sealing plug and place it on the unused input.
2. Lightly grease the O-ring [2] and insert it into the input slot [3].
3. Mount the module connector plate [1] on the input with the hollow bolt [4]. The module connector plate can offset 90° for installation of the dryer in a horizontal position.

Type	Pneumatic port	Width across flats	Tightening torque
PDAD-...-G3/8	G 3/8	10	Max. 15 Nm
PDAD-...-G1/2	G 1/2	14	Max. 18 Nm

Mount micro filter

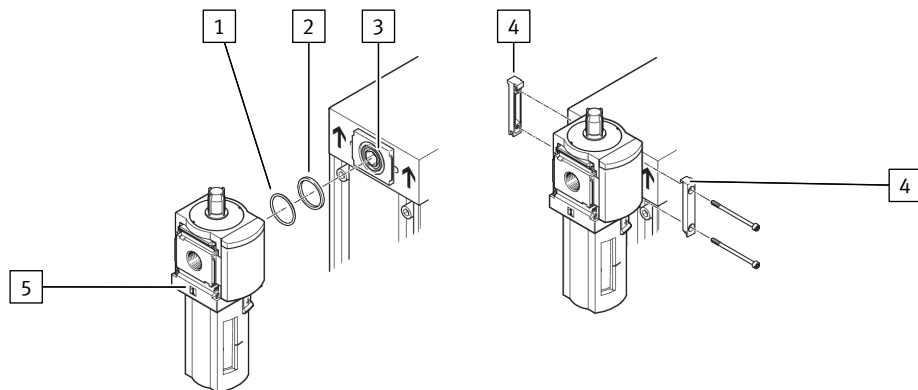


Fig. 8: Mount micro filter

- | | |
|---|---------------------------|
| 1 O-ring | 4 Module connector |
| 2 Flat seal | 5 Number |
| 3 Slot of the module connector plate | |

1. Insert the flat seal [2] into the slot of the module connector plate [3].
2. Insert the O-ring [1] into the slot of the micro filter.
3. Place the micro filter on the dryer. Observe the flow direction from 1 to 2 during this stage. The numbers [5] on the housing of the micro filter serve as orientation.
4. Mount the module connector [4] between the micro filter and the dryer.
 - The protruding edge of the module connector is located at the top.
 - Tightening torque of the screws: $1.2 \text{ Nm} \pm 10\%$.

5.2.2 Condensate input and condensate output

The ports for the condensate input and output are located at the rear of the adsorption dryer. Depending on the circumstances, it may make sense to make the connection before installing the adsorption dryer.

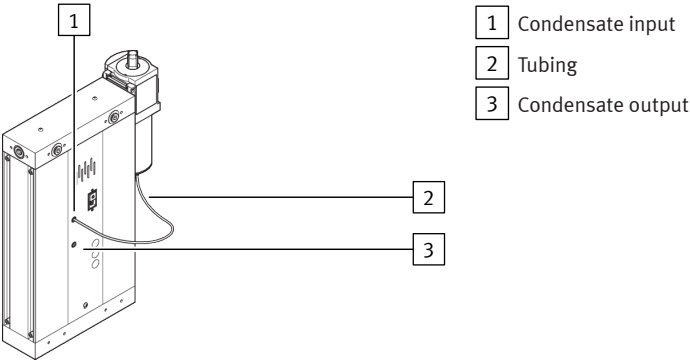


Fig. 9: Tubing on the condensate drain

Connect condensate input and condensate output

- 1. Connect tubing to the condensate drain of the micro filter (outside diameter 4 mm, included in the scope of delivery).
- 2. Connect the other end of the tubing to the adsorption dryer condensate input with fitting NPQH-L (port Kondensat Einlass/Drain inlet at rear).
- 3. Connect another tubing to the condensate drain of the adsorption dryer with the fitting NPQH-L (connection Kondensat Ablass/Drain outlet on the back).
- 4. Place the open end of the tubing in a bucket.
- 5. Fasten the tubing to the drain point to prevent the tubing from whipping during the drainage process.

5.3 Installing mounting accessories

The mounting accessories are not included in the scope of delivery of the adsorption dryer PDAD.

Wall mounting ABMW-PDAD	Foot mounting ABMF-PDAD
Tightening torque: max. 10 Nm	Tightening torque: max. 10 Nm

Tab. 11: Mounting options

6 Installation

6.1 Pneumatic installation

Connecting the dryer

Use only compressed air lines that are resistant to the diffusion of moisture from the environment, e.g. stainless steel tubing or hose type PEN, PLN or PFAN.

Requirements:

- The dryer is fully assembled and set up in compliance with the operating conditions.
 - The micro filter MS6-LFM is mounted.
 - The multi-way distributor is mounted with the input and output at the desired position.
1. Screw the connection fitting or piping into the threaded connection of the micro filter.
 - Maximum screw-in depth for thread in accordance with ISO 228: 12.0 mm
 - Maximum screw-in depth for NPT thread: 10.3 mm
 2. Only for PDAD-...-N:
 - Screw the included NPT adapter with sealing ring into the output of the dryer.
 - Tightening torque for NPT 3/8: maximum 15 Nm
 - Tightening torque for NPT 1/2: maximum 18 Nm
 3. Screw the connection fitting of the piping into the output of the dryer.

6.2 Power supply connection

The device can be operated with alternating current (AC) or direct current (DC). A separate, marked connection is available for both types of current. Only one power source may be connected.

NOTICE

Destruction of internal electronics

A supply voltage connected to the wrong connection can destroy the internal electronics.

- Connect the supply voltage to the specified connection only.
- Use only the correspondingly marked power supply socket from the scope of delivery.
- Cover the unused connection with the cover.

The device does not have an integrated fuse at the power input. An external fuse is required at the power connection of the device.

Supply voltage	12 V DC	24 V DC	100 V AC	115 V AC	230 V AC	240 V AC
Current consumption	0.8 A	0.4 A	0.16 A	0.14 A	0.07 A	0.067 A

Tab. 12: Current consumption depends on the supply voltage

- Protect the power supply with a suitable external fuse depending on the supply voltage and the current consumption of the device.

A suitable main switch or safety switch must be installed near the adsorption dryer. The switch must be easily accessible. The switch must be marked for the adsorption dryer and the on/off position must be stated. The cables must meet the requirements of EN 61010-1 for reinforced insulation.

A special power supply socket is supplied for each type of current. The power supply sockets have a different number of contacts for mechanical coding.

Characteristics	AC power supply socket	DC power supply socket
Identification (flag)	110-230 V AC	2-24 V DC
Colour	black	grey
Number of contacts	3	4

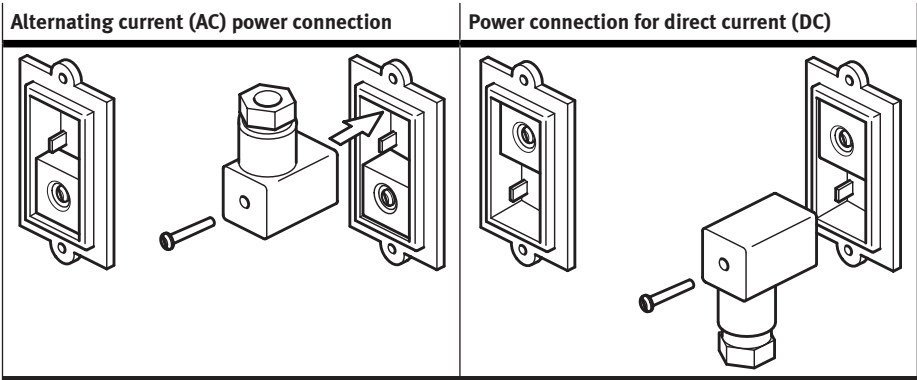
Tab. 13: Characteristics of the power supply socket

Requirement for the connecting cable	
Number of cores	2
Approved cable diameter	6 ... 8 mm
Cable shield	unshielded
Min. cable cross section	0.75 mm²
Max. conductor cross section	18 AWG
Max. length	3 metres

Tab. 14: Requirement for the connecting cable

Selecting the right power connection

Only one power source may be connected. The unused power connection must be closed with the cover.



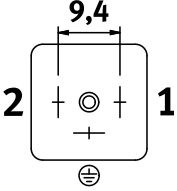
Tab. 15: Alternate power connections (use only one connection at a time)

The connection for the supply voltage on the PDAD-100 is located under the rear covering.

Top power connection, alternating current (AC)

The top plug on the device allows AC power to be supplied.

Voltage range: 100 ... 240 V AC

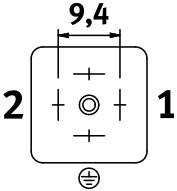
Power supply plug on the device	Pin	Function	Description
	1	Phase	Mains supply phase
	2	N	Mains supply neutral conductor
	PE	Not connected.	The device is double insulated and therefore does not require earthing (protection class II).

Tab. 16: Alternating current (AC) power connection on the device

Lower power connection, direct current (DC)

The lower plug on the device allows direct current to be supplied.

Voltage range: 12 ... 24 V DC

Power supply plug on the device	Pin	Function	Description
	1	+ 24 V DC	Positive potential power supply 12 ... 24 V DC
	2	0 V	Reference potential for the power supply
	3	–	reserved, do not connect
	PE	n. c.	Not connected. The device is double insulated and therefore does not require earthing (protection class II).

Tab. 17: Power connection for direct current (DC) on the device

Preparing for connection of the supply voltage to the device

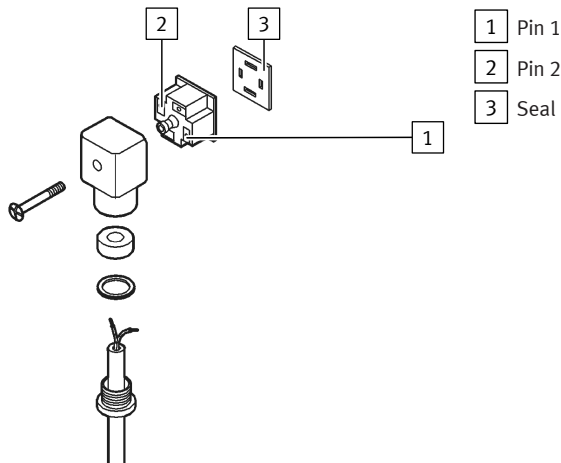


Fig. 10: Wiring of the power supply socket

The pin allocation depends on the type of current → Tab. 16 Alternating current (AC) power connection on the device and → Tab. 17 Power connection for direct current (DC) on the device.

6.3 Connection ALARM

An alarm device can be connected to the ALARM connection → 4.3.7 Alarm relay.

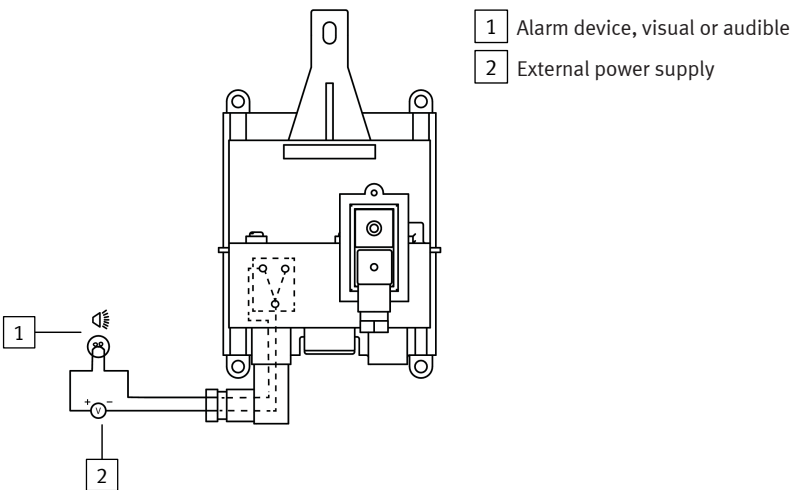


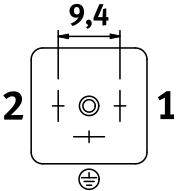
Fig. 11: Connection of an alarm device

Requirements	
Max voltage DC	28 V DC
Max. current rating	max. 3 A

Tab. 18: Requirements for the external power supply

Requirement for the connecting cable	
Connection socket	<ul style="list-style-type: none"> – Plug socket MSSD-E – Hirschmann GDS 207
Number of cores	2
Approved cable diameter	6 ... 8 mm
Min. cable cross section	0.75 mm ²
Max. conductor cross section	18 AWG

Tab. 19: Requirement for the connecting cable

ALARM connection on the device	Pin	Function	Description
	1	Switch pole 1	Switch pole 1 of the alarm relay
	2	Switch pole 2	Switch pole 2 of the alarm relay
	PE	n. c.	Not connected. The device is double insulated and therefore does not require earthing (protection class II).

Tab. 20: ALARM connection on the device

Connect alarm device with external power supply

1. Before starting work: switch off the power supply.
2. Insert a suitable cable through a rubber bushing in the backwall for the electronic controller.
3. Connect the switch poles of the alarm device to the external power supply at pin 1 and pin 2 of the junction box.
4. Remove the covering of the connection marked "ALARM" and connect the wired line.
5. Fasten the covering. Make sure the seal and screw are seated correctly.

6.4 EM connection

The EM connection is reserved for later extensions. The installed junction box is bridged internally. Do not remove the junction box.

7 Commissioning

7.1 Setting device for the pressure range

To ensure trouble-free and effective operation, a certain volume of purge air must be generated depending on the operating pressure. The volume of purge air is adjusted to the operating pressure by selecting the correct air gun nozzle.

As delivered, the dryer is configured with an air gun nozzle for an operating pressure of 0.7 ... 0.9 MPa (7 ... 9 bar, 101.5 ... 130.5 psi). The air gun nozzle must be replaced for a different pressure range.

1. Determine the suitable air gun nozzle → 4.3.8 Air gun nozzles.
2. Replace the air gun nozzle → 8.4 Replacing air gun nozzle.

7.1.1 Commissioning device

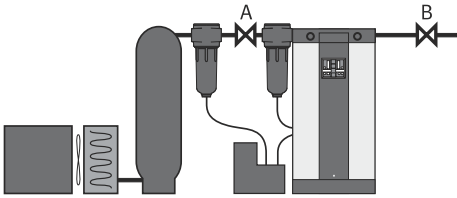
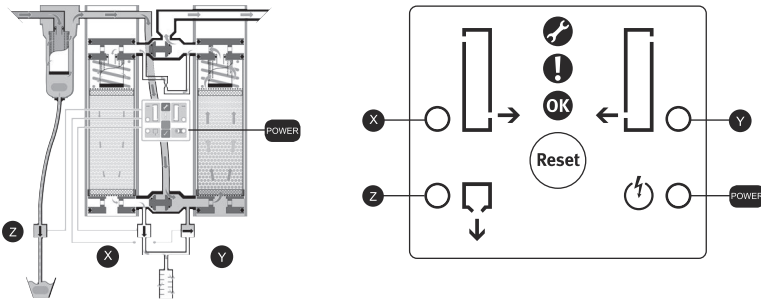


Fig. 12: Typical installation

1. Close valve A and valve B.
2. Switch on the compressor.
3. Slowly open valve A.
 - ✎ The compressed air flows through the drying agent cartridge and is dissipated into the environment through the silencer.
4. Check the dryer for leaks.
5. Switch on the power supply.



- ✎ The four LEDs on the display panel simultaneously flash green four times and then red four times. The device is ready for operation. The factory-set operating cycle starts automatically.

- 6. Watch the control panel throughout one complete operating cycle.
 - The LED POWER and the LED X are green.
 - After 120 s LED X switches off and LED Z is green. The condensate drain valve opens for approx. 2 s.
 - After 50 s LED Z switches off and LED Y is green.
 - After 120 s LED Y switches off.
 - After 50 s LED X is green. The cycle is repeated.
- 7. Run the dryer for at least 6 h to ensure that the correct pressure dew point is reached.
- 8. Slowly open valve B.

7.1.2 **Resetting the electronic controller**

If the dryer is restarted after a cartridge replacement, the electronic controller must be reset. The reset disc from the service kit must be used for this.

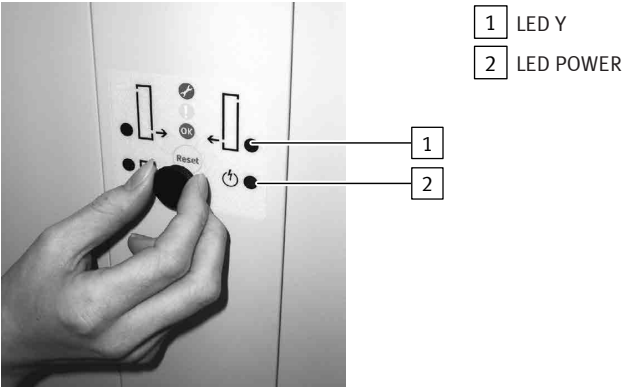


Fig. 13: Reset electronic control with reset disc

Reset electronic control with reset disc

- Hold the reset disc at the blue position on the display for 5 s.
 - ↳ The POWER LED (mains supply) flashes green.
 - ↳ On completion of the reset LED Y flashes red once for confirmation of the reset.

8 Maintenance

8.1 Maintenance work

Activities	Interval	Description
Clean or replace the air gun nozzle.	If required	➔ 8.4 Replacing air gun nozzle
Clean the silencer.		➔ 8.6 Cleaning the silencer
Replace the drying agent cartridge.	every 12000 operating hours	See assembly instructions for service kit ➔ 1.1 Applicable documents

Tab. 21: Overview of maintenance work

8.2 Shut down the device

The device must be shut down before any maintenance work.

NOTICE

Function of the drying agent cartridges can fail

If the power supply is interrupted, the regeneration cycle is switched off. Compressed air flowing through the adsorption dryer after the power supply has been switched off can permanently damage the drying agent cartridges.

- Ensure that compressed air is not fed to the dryer if the power feed is interrupted.

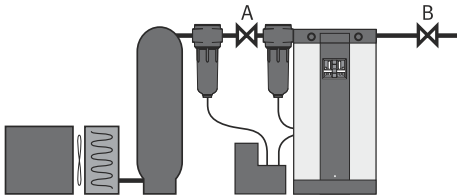


Fig. 14: Typical installation

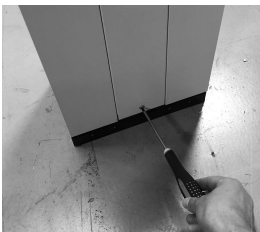
1. Close valve B.
2. Close valve A.
3. Run the dryer for 15 min to depressurise it completely.
4. Switch off the power supply.

8.3 Remove covering and mount

The covering must be removed for maintenance work on the air gun nozzle and silencer. The covering is fastened at the top with a spring insert and secured at the bottom with a screw. The PDAD-100 has an additional screw in the upper part.

Removing covering

1. Shut down the device → 8.2 Shut down the device.
2. Unscrew the bottom retaining screw.



3. PDAD-100: unscrew the top retaining screw.



4. Pull the covering outwards and remove it from below.

Mounting covering

1. Insert the covering with the connector spring into the slot of the dryer.



2. PDAD-100: tighten the top retaining screw.
 - Tightening torque: maximum 1 Nm
3. Tighten the bottom retaining screw.
 - Tightening torque: maximum 1 Nm

8.4 Replacing air gun nozzle

As delivered, the dryer is configured with an air gun nozzle for an operating pressure of 0.7 ... 0.9 MPa (7 ... 9 bar, 101.5 ... 130.5 psi). The air gun nozzle must be replaced for a different pressure range.

- To determine a suitable air gun nozzle, → 4.3.8 Air gun nozzles.

Removing air gun nozzle

1. Shut down the device → 8.2 Shut down the device.

2. PDAD-100 only: remove the front and rear covering → 8.3 Remove covering and mount. The air gun nozzle is located in the upper valve block.



3. Unscrew the retaining screw of the air gun nozzle.



4. Pull the air gun nozzle out of the opening in the top valve block.



Installing air gun nozzle

Requirement:

- A suitable air gun nozzle has been selected → 4.3.8 Air gun nozzles.
1. Check that the O-ring on the air gun nozzle is in good condition and in the correct position. Press the air gun nozzle into the valve block.



2. Insert and tighten the retaining screw of the air gun nozzle in the upper valve block
 - Tightening torque: 5 Nm

8.5 Cleaning the air gun nozzle

Cleaning the air gun nozzle



Fig. 15: Air gun nozzle (example)

Requirement:

- The device has been taken out of service → 8.2 Shut down the device.
1. Remove the air gun nozzle → 8.4 Replacing air gun nozzle.
 2. Clean the air gun nozzle with warm soapy water. Do not use any sharp aids or tools.
 3. Allow the air gun nozzle to dry completely.
 4. Reinstall the air gun nozzle → 8.4 Replacing air gun nozzle.

8.6 Cleaning the silencer

1. Shut down the device → 8.2 Shut down the device.
2. PDAD-100 only: remove the front and rear covering → 8.3 Remove covering and mount.



3. Disconnect the silencer from the bottom valve block and remove it from the dryer.



4. Clean the silencer thread.



5. Clean the silencer with warm water. Do not use any sharp aids or tools.



6. Let the silencer dry.
7. Install the clean and dry silencer in reverse order of removal.

9 Malfunctions

9.1 Diagnostics

General diagnostics

- Before carrying out specific troubleshooting, check:
 - Is the device externally damaged or are parts missing?
 - Is the device supplied with power?
 - Has the device been commissioned correctly?
 - Are all external valves set correctly?
 - Have the operating conditions been complied with?

Problem	Possible cause	Measures
Bad dew point	Water at the dryer input	<ul style="list-style-type: none">– Check the prefiltration.– Check the condensate drain.
	Air flow too high	<ul style="list-style-type: none">– Compare the actual air flow with the specified maximum air flow.
	Input pressure too low	<ul style="list-style-type: none">– Ensure the minimum pressure.
	Input temperature too high	<ul style="list-style-type: none">– Check the input temperature and ambient temperature, comply with the operating conditions.
	Silencer clogged or damaged	<ul style="list-style-type: none">– Clean or replace the silencer.

Problem	Possible cause	Measures
Bad dew point	Leakage	– Tighten the connections or replace the seals.
Functional fault	Jammed shuttle valves or faulty electronic components	→ 9.2 Diagnostics via LED

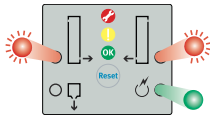
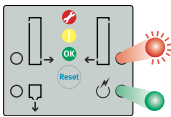
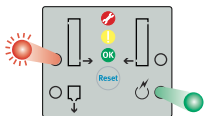
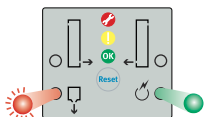
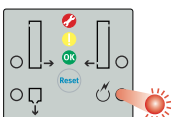
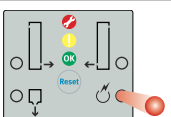
Tab. 22: General diagnostics

Electrical diagnostics

Problem	Display	Possible cause	Priority	Measures
No dryer operation	None	No power supply	–	– Check the power supply.
Dryer operation faulty	LED POWER red	Poor power supply	P1	– Check the power supply.
	LED POWER flashes red	Error in electronic controller	P2	– Shut down the device. – Contact Festo Service.
	LED X flashes red	Short circuit or open circuit, left solenoid valve	P1	
	LED Y flashes red	Short circuit or open circuit, right solenoid valve	P1	
Condensate drain does not switch	LED Z flashes red	Solenoid valve for condensate drain open or short circuit	P1	– Shut down the device.
	LED POWER flashes red	Error in electronic controller	P2	– Contact Festo Service.

Tab. 23: Electrical diagnostics

9.2 Diagnostics via LED

Status	Display	Description	Action
		Maintenance interval every 12000 operating hours	– Replace the drying agent cartridges.
		Fault in right solenoid valve	– Shut down the device. – Contact Festo Service.
		Fault in left solenoid valve	
		Condensate drain valve error	
		Error in control unit	
		Error in power supply	– Check the power supply.

Tab. 24: LED display of error messages

10 Technical data

PDAD	-09	-13	-22	-51	-73	-100
General						
Certificates, declarations of conformity	➔ www.festo.com/sp					
Mounting position	Vertical or horizontal ➔ Tab. 10 Permitted mounting positions					
Relative humidity, environment	80% at temperatures up to 31 °C, decreasing linearly to 50% at 40 °C.					
Max. setup altitude above IHRS ¹⁾	[m] 2000					

Technical data

PDAD		-09	-13	-22	-51	-73	-100
Ambient temperature	[°C]	+5 ... +50					
Temperature of medium	[°C]	+2 ... +50					
Storage temperature	[°C]	-20 ... +60					
Product weight	[kg]	13	14	16.5	24	31	47
Service life of drying agent		12000 operating hours					
Drying agent		Molecular sieve (zeolite), aluminium oxide (AL2O3), layered					
Housing material							
Profile tubes		Wrought aluminium alloy					
Sub-base, distributor plate		Die-cast aluminium					
Base plate, facings		Sheet steel					
Mechanical system							
Width ²⁾	[mm]	281	281	281	281	281	281
Depth ²⁾	[mm]	92	92	92	92	92	184
Height ²⁾	[mm]	445	504	635	1065	1460	1065
Pneumatic							
Input pressure p	[MPa]	0.4 ... 1.6					
	[bar]	4 ... 16					
	[psi]	58 ... 232					
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [6:-:4]					
Information on the operating medium		Lubricated operation not possible. Water not permitted at input.					
Pressure dew point	[°C]	-40, at nominal flow rate at output					
	[°C]	-70, at reduced flow rate					
Air purity class at the output		Compressed air in accordance with ISO 8573-1:2010 [2:1:2], pressure dew point -70 °C					
		Compressed air in accordance with ISO 8573-1:2010 [2:2:2], pressure dew point -40 °C					
Internal volume	[l]	4.2	4.6	6.0	11.0	15.8	22.0
Electrical - data of the integrated electrical controller							
Degree of protection		IP65 in accordance with EN 60529					
Protection class		II					
Pollution degree		2					

PDAD		-09	-13	-22	-51	-73	-100
Overvoltage category		II					
Operating voltage	[V DC]	8 ... 26.4					
	[V AC]	90 ... 264 (50 ... 60 Hz)					
Power consumption with DC	[W]	approx. 9.6 (24 V/0.4 A typ.)					
Power consumption with AC	[VA]	approx. 16 (230 V/0.07 A typ.)					

1) International Height Reference System

2) without prefilter

Tab. 25: Technical data

10.1 Nominal flow rate

Nominal flow rate –40 °C pressure dew point, input temperature 25 °C saturated

PDAD		-09	-13	-22	-51	-73	-100
Operating pressure 0.4 MPa, 4 bar, 58 psi							
Input	[l/min]	73.6	109.6	186.2	416.3	613.5	821.7
Purge air	[l/min]	33.0	42.0	76.0	166.0	233.0	332.0
Output	[l/min]	40.6	67.6	110.2	250.3	380.5	489.7
Operating pressure 0.5 MPa, 5 bar, 72.5 psi							
Input	[l/min]	88.3	132.5	225.3	503.6	742.1	993.9
Purge air	[l/min]	30.0	52.0	89.0	204.0	270.0	408.0
Output	[l/min]	58.3	80.5	136.3	299.6	472.1	585.9
Operating pressure 0.6 MPa, 6 bar, 87 psi							
Input	[l/min]	103.1	153.7	261.3	584.2	860.9	1153.0
Purge air	[l/min]	34.0	61.0	106.0	230.0	311.0	460.0
Output	[l/min]	69.1	92.7	155.3	354.2	549.9	693.0
Operating pressure 0.7 MPa, 7 bar, 101.5 psi							
Input	[l/min]	117.8	176.7	300.4	671.5	989.5	1325.3
Purge air	[l/min]	31.0	51.0	88.0	165.5	261.0	331.0
Output	[l/min]	86.8	125.7	212.4	506.0	728.5	994.3
Operating pressure 0.8 MPa, 8 bar, 116 psi							
Input	[l/min]	132.5	197.9	336.4	752.0	1108.3	1484.3
Purge air	[l/min]	36.0	54.0	97.0	194.5	302.0	389.0
Output	[l/min]	96.5	143.9	239.4	557.5	806.3	1095.3

PDAD		-09	-13	-22	-51	-73	-100
Operating pressure 0.9 MPa, 9 bar, 130.5 psi							
Input	[l/min]	147.2	220.9	375.5	839.3	1236.9	1656.6
Purge air	[l/min]	40.0	68.0	107.0	216.0	339.0	432.0
Output	[l/min]	107.2	152.9	268.5	623.3	897.9	1224.6
Operating pressure 1.0 MPa, 10 bar, 145 psi							
Input	[l/min]	162.0	242.1	411.5	919.9	1355.7	1815.6
Purge air	[l/min]	31.0	45.0	86.0	165.0	248.0	330.0
Output	[l/min]	131.0	197.1	325.5	754.9	1107.7	1485.6
Operating pressure 1.1 MPa, 11 bar, 159.5 psi							
Input	[l/min]	176.7	265.1	450.6	1007.2	1484.3	1987.9
Purge air	[l/min]	34.0	49.0	96.0	182.5	272.0	365.0
Output	[l/min]	142.7	216.1	354.6	824.7	1212.3	1622.9
Operating pressure 1.2 MPa, 12 bar, 174 psi							
Input	[l/min]	191.4	286.3	486.6	1087.8	1603.0	2146.9
Purge air	[l/min]	37.0	54.0	196.0	198.5	295.0	397.0
Output	[l/min]	154.4	232.3	380.6	889.3	1308.0	1749.9
Operating pressure 1.3 MPa, 13 bar, 188.5 psi							
Input	[l/min]	206.1	309.2	525.7	1175.1	1731.7	2319.2
Purge air	[l/min]	30.0	62.0	89.0	160.5	243.0	321.0
Output	[l/min]	176.1	247.2	436.7	1014.6	1788.7	1998.2
Operating pressure 1.4 MPa, 14 bar, 203 psi							
Input	[l/min]	220.9	330.4	561.7	1255.6	1850.4	2478.2
Purge air	[l/min]	32.0	67.0	96.0	176.0	261.0	352.0
Output	[l/min]	188.9	263.4	465.7	1079.6	1589.4	2126.2
Operating pressure 1.5 MPa, 15 bar, 217.5 psi							
Input	[l/min]	235.6	353.4	600.8	1342.9	1979.1	2650.5
Purge air	[l/min]	34.0	71.0	103.0	182.5	282.0	365.0
Output	[l/min]	201.6	282.4	497.8	1160.4	1697.1	2285.5

PDAD	-09	-13	-22	-51	-73	-100
Operating pressure 1.6 MPa, 16 bar, 232 psi						
Input [l/min]	250.3	374.6	636.8	1423.5	2097.8	2809.6
Purge air [l/min]	36.0	76.0	111.0	201.5	301.0	403.0
Output [l/min]	214.3	298.6	525.8	1222.0	1796.8	2406.6

Tab. 26: Nominal flow rate –40 °C pressure dew point, input temperature 25 °C saturated

Nominal flow rate –70 °C pressure dew point, input temperature 25 °C saturated

PDAD		-09	-13	-22	-51	-73	-100
Operating pressure 0.4 MPa, 4 bar, 58 psi							
Input	[l/min]	51.5	77.3	131.4	293.8	432.9	579.8
Purge air	[l/min]	33.0	42.0	76.0	166.0	233.0	332.0
Output	[l/min]	18.5	35.3	55.4	127.8	199.9	247.8
Operating pressure 0.5 MPa, 5 bar, 72.5 psi							
Input	[l/min]	61.8	92.8	157.7	352.5	519.5	695.8
Purge air	[l/min]	30.0	52.0	89.0	204.0	270.0	408.0
Output	[l/min]	31.8	40.8	68.7	148.5	249.5	287.8
Operating pressure 0.6 MPa, 6 bar, 87 psi							
Input	[l/min]	72.1	108.2	184.0	411.3	606.1	811.7
Purge air	[l/min]	34.0	61.0	106.0	230.0	311.0	460.0
Output	[l/min]	38.1	47.2	78.0	181.3	295.1	351.7
Operating pressure 0.7 MPa, 7 bar, 101.5 psi							
Input	[l/min]	82.5	123.7	210.3	470.0	692.7	927.7
Purge air	[l/min]	31.0	51.0	88.0	165.5	261.0	331.0
Output	[l/min]	51.5	72.7	122.3	304.5	431.7	596.7
Operating pressure 0.8 MPa, 8 bar, 116 psi							
Input	[l/min]	92.8	139.2	236.6	528.8	779.3	1043.6
Purge air	[l/min]	36.0	54.0	97.0	194.5	302.0	389.0
Output	[l/min]	56.8	85.2	139.6	334.3	477.3	654.6
Operating pressure 0.9 MPa, 9 bar, 130.5 psi							
Input	[l/min]	103.1	154.6	262.8	587.5	865.8	1159.6
Purge air	[l/min]	40.0	68.0	107.0	216.0	339.0	432.0
Output	[l/min]	63.1	86.6	155.8	371.5	526.8	727.6
Operating pressure 1.0 MPa, 10 bar, 145 psi							
Input	[l/min]	113.4	170.1	289.1	646.3	952.4	1275.6
Purge air	[l/min]	31.0	45.0	86.0	165.0	248.0	330.0
Output	[l/min]	82.4	125.1	203.1	481.3	704.4	945.6
Operating pressure 1.1 MPa, 11 bar, 159.5 psi							
Input	[l/min]	123.7	185.5	315.4	705.0	1039.0	1391.5
Purge air	[l/min]	34.0	49.0	96.0	182.5	272.0	365.0
Output	[l/min]	89.7	136.5	219.4	522.5	767.0	1026.5

PDAD	-09	-13	-22	-51	-73	-100
Operating pressure 1.2 MPa, 12 bar, 174 psi						
Input [l/min]	134.0	201.0	341.7	763.8	1125.6	1507.5
Purge air [l/min]	37.0	54.0	196.0	198.5	295.0	397.0
Output [l/min]	97.0	147.0	235.7	565.3	830.6	1110.5
Operating pressure 1.3 MPa, 13 bar, 188.5 psi						
Input [l/min]	144.3	216.5	368.0	822.5	1212.2	1623.4
Purge air [l/min]	30.0	62.0	89.0	160.5	243.0	321.0
Output [l/min]	114.3	154.5	279.0	662.0	969.2	1302.4
Operating pressure 1.4 MPa, 14 bar, 203 psi						
Input [l/min]	154.6	231.9	394.3	881.3	1298.8	1739.4
Purge air [l/min]	32.0	67.0	96.0	176.0	261.0	352.0
Output [l/min]	122.6	164.9	298.3	705.3	1037.8	1387.4
Operating pressure 1.5 MPa, 15 bar, 217.5 psi						
Input [l/min]	164.9	247.4	420.6	940.1	1385.3	1855.4
Purge air [l/min]	34.0	71.0	103.0	182.5	282.0	365.0
Output [l/min]	130.9	176.4	317.6	757.6	1103.3	1490.4
Operating pressure 1.6 MPa, 16 bar, 232 psi						
Input [l/min]	175.2	262.8	446.8	998.8	1471.9	1971.3
Purge air [l/min]	36.0	76.0	111.0	201.5	301.0	403.0
Output [l/min]	139.2	186.8	335.8	797.3	1170.9	1568.3

Tab. 27: Nominal flow rate –70 °C pressure dew point, input temperature 25 °C saturated

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