

**ENGINEERING  
YOUR SPRAY SOLUTION**



## **Operating Instructions**

**DryMASTER  
Nozzles for Spray Drying  
2DM**



**READ THE OPERATING INSTRUCTIONS BEFORE PERFORMING ANY WORK.  
KEEP THE OPERATING INSTRUCTIONS FOR REFERENCE.**

<b>Title</b>	Operating Instructions
<b>Product</b>	DryMASTER Nozzles for Spray Drying 2DM
<b>Manufacturer</b>	Lechler GmbH Ulmer Straße 128 72555 Metzingen Germany Phone: +49 (0) 71 23 / 9 62 – 0 Fax: +49 (0) 71 23 / 9 62 – 444 Internet: <a href="http://www.lechler.com">http://www.lechler.com</a>
<b>Language version</b>	Translation of the original operating instructions
<b>Revision</b>	v0_2022-11-24
<b>Doc ID</b>	Lechler_Instructions_DryMASTER_EN_v0



## Contents

<b>General notices</b> .....	<b>4</b>
Information on these operating instructions .....	4
Further applicable documents .....	4
Warning notices .....	4
<b>Safety</b> .....	<b>5</b>
Intended use .....	5
Operator obligations .....	5
Staff qualifications .....	5
Personal protective equipment .....	5
Fundamental dangers when handling the product .....	5
Pressurized parts and medium .....	5
Hot parts and medium .....	6
Hazardous substances .....	6
<b>Product information</b> .....	<b>6</b>
Scope of supply .....	6
Product identification .....	6
Industry Compliance .....	7
<b>Design and functions</b> .....	<b>7</b>
Design .....	7
Function .....	9
Technical data .....	9
<b>Installation and removal</b> .....	<b>10</b>
Install the nozzle .....	10
Remove the nozzle .....	11
<b>Operation</b> .....	<b>11</b>
Regular checks .....	11
Clean the nozzle .....	11
<b>Maintenance and repairs</b> .....	<b>11</b>
Maintenance interval .....	12
Spare parts .....	12
Disassembling the nozzle .....	12
Disassembling the CheckValve nozzle .....	12
Assembling the nozzle .....	13
Assembling the CheckValve nozzle .....	13
<b>Operational malfunctions</b> .....	<b>14</b>
<b>Disposal</b> .....	<b>14</b>

## General notices

### Information on these operating instructions

These operating instructions are a part of the product. These operating instructions are intended for the operator and all those who work on the product.

Ensure that the operating instructions are always kept in a legible condition for staff. For further information, please contact Lechler GmbH. Pass the operating instructions on to subsequent users.

### Further applicable documents

DryMASTER brochure (Lechler.com).

### Warning notices

Warning notices help you to identify hazards and to avoid adverse consequences. The warning notices are introduced by signal words which indicate the severity of the hazard. The following warning notices are used in these operating instructions:

#### **⚠ DANGER**

This warning notice warns of a hazardous situation which will result in death or serious injuries if ignored.

→ Precautionary measures which must be taken to avoid the hazardous situation.

#### **⚠ WARNING**

This warning notice warns of a hazardous situation which may result in death or serious injuries if ignored.

→ Precautionary measures which must be taken to avoid the hazardous situation.

#### **⚠ CAUTION**

This warning notice warns of a hazardous situation which may result in minor injuries if ignored.

→ Precautionary measures which must be taken to avoid the hazardous situation.

#### **⚠ NOTICE**

This warning notice warns of a hazardous situation which may result in damage to property or the environment.

→ Precautionary measures which must be taken to avoid the hazardous situation.

## Safety

### Intended use

The DryMASTER nozzle series is designed for spraying fluids for spray drying. The nozzle adapters are used to attach the nozzles onto the existing spray lances. The products of the DryMASTER series may only be used under the conditions specified in the operating instructions (→ Technical data, p. 9) and by suitably qualified staff (→ Staff qualifications, p. 5).

If used in explosive atmosphere, the operator should make necessary arrangements.

### Operator obligations

The operator is bound by the statutory requirements of their applicable occupational health and safety act. In addition to the safety instructions within this document, regulations for safety, accident prevention and environmental protection that are applicable to the application environment must be observed.

### Staff qualifications

Anyone working with the products set out within this document must meet the following minimum qualifications:

- Knowledge of these operating instructions.
- Authorization to perform work with which the person is familiar.
- Knowledge of assembly and maintenance walk thru (e.g. using the YouTube video or brochure)



<https://www.youtube.com/user/LechlerNozzles>

### Personal protective equipment

Personal protective equipment protects against risks to your health and safety. Always wear suitable personal protective equipment when performing work

### Fundamental dangers when handling the product

#### Pressurized parts and medium

The nozzle is designed for the purpose of spraying medium at high pressure. In case of improper use, medium can escape in an uncontrolled manner thereby causing further dangers, such as ingestion, chemical burns, etc.

To avoid serious fatal injuries.

- Before opening or loosening any parts:
  - a. Flush the nozzle with a non-hazardous medium.
  - b. Stop the liquid supply to the nozzle.
  - c. Ensure that the liquid supply cannot be switched on accidentally.
  - d. Ensure that the system is depressurized.
- Only commission parts that are in perfect working order. Replace worn and/or damaged parts immediately. Use original Lechler parts only (→ Spare parts p.12).

## Hot parts and medium

The nozzle heats up during operation. Risk of burns!

- Allow the nozzle to cool down before disassembly.
- Always wear heat-resistant protective gloves.

## Hazardous substances

Leaking hazardous substances may result in poisoning, breathing difficulties, allergic reaction and other impacts to health. The severity of damage to your health depends on the applicable medium being used.

- Flush the nozzle with a non-hazardous medium before disassembly.
- Review the safety data sheets for the applicable medium and follow the instructions.
- Always wear suitable protective equipment.

## Product information

### Scope of supply

Individual parts according to the individual purchase order.

### Product identification

The product identification is used to uniquely identify the individual parts. The product identification is located on the nozzle housing, nozzle adapter, the orifice disc and the swirl chamber and contains the following data:

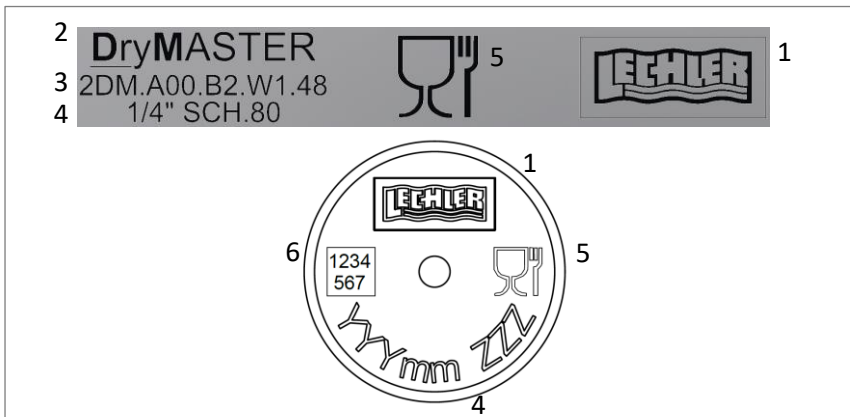


Fig. 1: Product identification (example)

Pos.	Designation
1	Manufacturer
2	Nozzle series name
3	Part numbers
4	Where necessary, model (thread, spray angle, performance → swirl chamber size or orifice disc diameter)
5	Food grade symbol (glass/fork) (for: adapter, orifice disc and swirl chamber)
6	Serial number (for: orifice disc and swirl chamber)

## Industry Compliance

FDA, EC1935/2004 and GB4806.

For details, please contact your local sales partner.

## Design and functions

### Design

#### DryMASTER nozzle

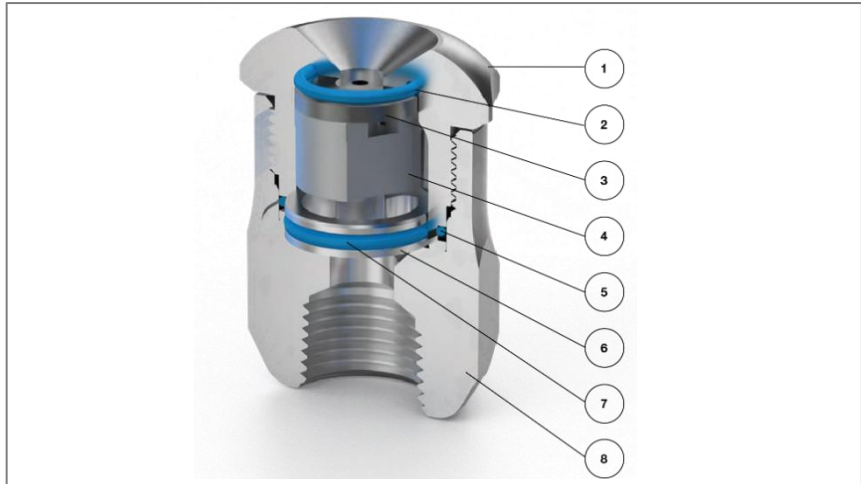


Fig. 2: Cross section of the DryMASTER nozzle (with standard housing)

Pos.	Designation
1	Housing (versions: standard housing, cone face housing, Multi Head housing)
2	O-ring (orifice disc)
3	Orifice disc
4	Swirl chamber
5	O-ring (housing)
6	Retainer ring
7	O-ring (retainer ring)
8	Adapter

## DryMASTER CheckValve nozzle



Fig. 3: Cross section of the DryMASTER CheckValve nozzle

Pos.	Designation
1	CheckValve housing
2	O-ring (orifice disc)
3	Orifice disc
4	Swirl chamber
5	Spring
6	Piston
7	O-ring (piston)
8	Retaining screw
9	O-ring (retaining screw)
10	O-ring (housing)
11	Adapter

### DryMASTER Low Flow

DryMASTER Low Flow is for use where smaller flow rates are applicable. For the Low Flow assembly, the orifice disc and swirl chamber of the standard assembly must simply be replaced.



## Function

### DryMASTER nozzle

The incoming fluid is set into rotation by the swirl chamber and emerges from the nozzle through the orifice disc as a hollow cone-shaped spray pattern.

### DryMASTER CheckValve nozzle

The CheckValve nozzle 'opens' when the atomizing pressure is reached. The incoming fluid is set into rotation by the swirl chamber and emerges from the nozzle through the orifice disc as a hollow cone-shaped spray pattern. The CheckValve 'shuts off' when the atomizing pressure is undercut. The CheckValve is to prevent dripping from the nozzle caused by latent line pressure.

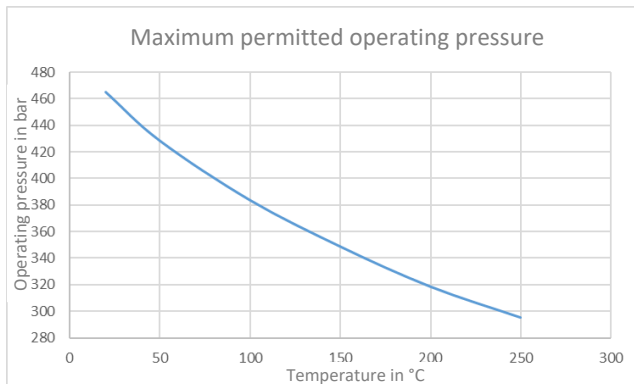
## Technical data

### General data

<b>Dimensions, connection</b>	For details, please refer to the data sheet
<b>Diameter</b>	42 mm
<b>Housing</b>	78 mm
<b>Multi Head Adapter</b>	
<b>Material of individual parts</b>	Stainless steel 1.4404, WNC carbide and 1.4462, 1.4310 (spring) O-rings: FKM
<b>Weight</b>	
<b>Single nozzle</b>	Depending on variant, max. < 0.5 kg)
<b>Multi Head Adapter</b>	Multi Head Adapter approx. 600 g

### Operating pressure depending on temperature

Operating pressure [bar]	Temperature [°C]
465	20
345	150
300	250



For more detailed information on the temperature-dependent maximum pressure, please contact your sales partner.

### DryMASTER nozzle and DryMASTER CheckValve nozzle

<b>Diameter</b>	42 mm
<b>Flow rate</b>	10 – 12,000 l/h
<b>Max. operating pressure</b>	465 bar at 20 °C (burst pressure 1,000 bar, calculated)
<b>Max. operating temperature</b>	max. 250 °C
<b>Spray angle</b>	50° – 110°
<b>Droplet size (water)</b>	30 – 220 µm
<b>Material</b>	1.4404, 1.4462, carbide WNC, FKM (& spring 1.4310)

### DryMASTER Low Flow nozzle

<b>Diameter</b>	42 mm
<b>Flow rate</b>	0.15 l/min – 4.20 l/min
<b>Max. operating pressure</b>	465 bar at 20 °C (burst pressure 1,000 bar, calculated)
<b>Max. operating temperature</b>	max. 250 °C
<b>Spray angle</b>	30° – 90°
<b>Material</b>	1.4404, 1.4462, carbide WNC, FKM (& spring 1.4310)

### DryMASTER Multi Head Adapter

<b>Diameter</b>	78 mm
<b>Housing</b>	Housing for 2 or 3-port adapters (2DM.BS0.1Y.00.00.0)
<b>Material</b>	1.4404, 1.4462, carbide WNC

## Installation and removal

This section explains how to mount the nozzle on the spray lance. The operator is responsible for the safe and correct assembly of the nozzle adapter onto the spray lance.

### **WARNING**

Risk of injury due to pressurized parts, media and temperature

- Wear protective equipment.
- Before opening or loosening any parts:
  - a. Flush the nozzle clean with a non-hazardous medium.
  - b. Stop the liquid supply.
  - c. Make sure that the liquid supply cannot be switched on accidentally.
  - d. Ensure that the system is depressurized.

### Install the nozzle

Prerequisites:

- 1x open-ended spanner 37 AF (for the threaded adapter)
- Grease, suitable for FKM O-rings and adapted to the application (included in the scope of supply of the seal kit)

Carry out the following steps:

- 1) Attach the adapter firmly and tightly to the spray lance.
  - The assembled DryMASTER Multi Head Adapter is screwed into a DryMASTER adapter. To do so, the Multi Head bodies are screwed into the Multi Head Adapter in advance according to steps 2) and 3) (→Assembling the nozzle, p.13).
- 2) Apply a "dot" of grease to the O-ring on the housing and spread the grease evenly.
- 3) Screw the nozzle housing hand tight into the nozzle adapter until it 'bottoms' on the internal face of the nozzle adapter. There should be a small gap between the adapter face and the underside of the nozzle housing 'hexagon' profile.

### Remove the nozzle

Carry out the following steps:

- Loosen the nozzle housing from the adapter by hand and remove the nozzle.

## Operation

### Regular checks

Check the following criteria once assembled, during use, and before disassembly:

- Proper attachment
- Externally visible damage, deposits, leakage
- Deformation of the spring, O-ring and wear to the carbide components
- Spray pattern and flow rate

Rectify any deviations from the intended function immediately if they could affect operational reliability.

### Clean the nozzle

Prerequisites:

- Soft brush (nonmetallic)
- O-rings
- Grease, suitable for FKM O-rings and adapted to the application (included in the scope of supply of the seal kit)

Carry out the following steps:

- 1) Disassemble the nozzle (→ Disassembling the nozzle, p. 12).
- 2) Remove the O-rings.
  - With the CheckValve nozzle, the O-rings of the retaining screw and piston (position 7 and 9 in Fig. 3) are removed and replaced only in case of a visible change or after five maintenance intervals at the latest.
- 3) Clean dirty areas with the brush.
- 4) Carefully clean all the parts, rinse them with clean water and allow them to dry.
- 5) Check all the parts for damage and wear. Replace damaged parts.  
O-rings must be replaced during each maintenance.

TIP:

To remove stubborn dirt, all stainless steel parts can also be soaked in a citric acid bath or ultrasonic bath.

## Maintenance and repairs

The nozzle must be cleaned thoroughly (→ Clean the nozzle, p. 11) and all O-rings must be replaced after each use. CheckValve nozzles: The O-rings of the piston and retaining screw (position 7 and 9 in Fig. 3) can be replaced at the fifth maintenance cycle unless a visible change in the appearance of the O-ring is noted, then they must be changed immediately. New O-rings must be greased during assembly.

The maintenance and repair procedure is explained in chapter 'Operational malfunctions', p.14 and also in the DryMASTER brochure and on YouTube.

## Maintenance interval

The maintenance interval must be determined by the operator on the basis of the operating conditions.

The nozzles are tested with water up to 3000 cycles. Depending on the application, the durability of the spring can be reduced. Regularly check the spring for deformation or damage and change it if needed (→ Regular checks, S. 11).

## Spare parts

All individual parts are available on request. The component part numbers can be found in the DryMASTER brochure ([www.lechler.com](http://www.lechler.com)).

O-rings and suitable grease are available through Lechler seal kits. Only use Lechler O-rings.

## Disassembling the nozzle

Prerequisites:

- Disassembly tool (not included in the scope of supply)



Carry out the following steps:

- 1) Insert the nozzle housing, threaded end, into the inner part of the disassembly tool.
- 2) Present the outer part of the disassembly tool to the front face of the nozzle housing, engaging the pin against the orifice.
- 3) Press the disassembly tool together until the retainer ring is released from the housing.
- 4) Remove the outer part of the disassembly tool and remove the nozzle housing.
- 5) Individual parts are located in the inner part of the disassembly tool.
- 6) Carefully remove the O-rings.

## Disassembling the CheckValve nozzle

Prerequisites:

- 1x hexagon key 10 AF

Carry out the following steps:

- 1) Use the hexagon key to unscrew the retaining screw until it is completely loose.

### **⚠ CAUTION**

Compressed spring force.

- 2) Remove the parts of the nozzle.
- 3) Carefully remove the O-rings.
  - The O-rings of the piston and retaining screw (position 7 and 9 in Fig. 3) can be replaced every fifth maintenance cycle, unless a defect is observed.

### Assembling the nozzle

The assembled nozzle is shown in Fig. 2.

Prerequisites:

- O-rings
- If necessary, spare parts
- Grease, suitable for FKM O-rings and adapted to the application (included in the scope of supply of the seal kit)

Carry out the following steps:

- 1) Place the smallest O-ring inside the housing within the O-ring groove around the orifice.
- 2) Place the orifice disc, plain bore (lettering) facing downward, on top of the O-ring.
- 3) Place the swirl chamber, swirl profile facing downward, on top of the orifice disc.
- 4) Assemble the middle-sized O-ring to the retainer ring. Apply a “dot” of grease to the O-ring and spread evenly around the circumference.
- 5) Insert the retainer ring into the housing. Ensure that the raised profile sits on the back of the swirl chamber.
- 6) Assemble the largest O-ring to the nozzle housing.
- 7) Apply a “dot” of grease to the O-ring and spread evenly around the circumference.
- 8) Insert (screw) the nozzle housing into the nozzle adapter. This may already be mounted on the spray lance.
- 9) Screw the nozzle housing hand tight until it bottoms on the internal face of the adapter. There should be a small gap between the nozzle adapter face and the underside of the nozzle housing ‘hexagon’ profile.
- 10) All parts have to be assembled. There is only a small internal movement (rattle) allowed when shaking the nozzle.

TIP:

See also the YouTube video and the brochure.

### Assembling the CheckValve nozzle

The assembled nozzle is shown in Fig. 3.

Prerequisites:

- 1x hexagon key 10 AF
- O-rings
- If necessary, spare parts
- Grease, suitable for FKM O-rings and adapted to the application (included in the scope of supply of the seal kit)

Carry out the following steps:

- 1) Place the second largest O-ring inside the housing within the O-ring groove around the orifice.
- 2) Place the third largest O-ring into the groove after the internal thread within the undercut.
- 3) Place the orifice disc, plain bore (lettering) facing downward, on top of the O-ring.
- 4) Place the swirl chamber, swirl profile facing downward, on top of the orifice disc.
- 5) Place the spring on the swirl chamber.
- 6) Assemble the smallest O-ring on the piston. Insert the piston into the nozzle housing, ensuring that the spring is seated in the piston recess.
- 7) Screw in the retaining screw with hexagon facing upward, once engaged use the hexagon key tool (10 AF) to continue screwing until stopping – do not over tighten!
- 8) Assemble the largest O-ring on the housing.
- 9) Apply a “dot” of grease to the O-ring and spread evenly around the circumference.
- 10) Insert (screw) the nozzle housing into the adapter. This may already be mounted on the spray lance.

- 11) Screw the nozzle housing hand tight until it bottoms on the internal face of the adapter. There should be a small gap between the nozzle adapter face and the underside of the nozzle housing plain diameter.
- 12) All parts have to be assembled. There is only a small internal movement (rattle) allowed when shaking the nozzle.

TIP:

See also the YouTube video.

## Operational malfunctions

The following malfunctions may occur during operation of the nozzles. If you cannot eliminate a malfunction, contact Lechler GmbH or your local sales partner.

Fault	Possible cause	Measures
Nozzle does not spray.	No liquid available.	Check supply line.
	Liquid cannot flow to the nozzle.	Check supply line.
	Swirl chamber is installed upside down.	Turn swirl chamber.
	Nozzle is clogged.	Clean nozzle.
Leakage at nozzle	Nozzle is dirty.	Clean nozzle.
	O-ring is damaged.	Replace O-ring.
	Spring is broken. (CheckValve)	Replace spring.
	Piston is stuck. (CheckValve)	Unscrew nozzles, check piston for damage.
	Sealing point is dirty. (CheckValve)	Clean nozzle.
Spray parameters are wrong	Orifice disc is installed upside down.	Turn orifice disc.
	Nozzle is worn.	Check orifice disc and swirl chamber; replace them if necessary.
	Nozzle is dirty.	Clean nozzle.
	Insufficient pressure	Check connection pressure.

## Disposal

Disposal must be carried out in accordance with the operator's internal agreement and nationally applicable regulations. The components may have to be cleaned. Contained material: Stainless steel, carbide, spring steel, FKM.

Depending on the region, the carbide parts can be returned to Lechler as part of the Lechler Carbide Recycling (CaRe) program. For more information, please contact your Lechler sales partner.