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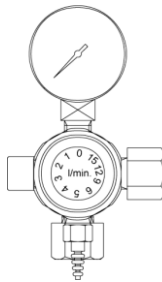
User manual

for

Pressure Reducer

“QualityReg”

D-QR-200- all types





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1. Introduction

1.1 Summary

Topic

This chapter includes

- General information about this user manual
- The defined use of the pressure regulator “QualityReg” D-QR-200 and
- The manufactures’ demands on employees.

1.2 General information

Validity

This user manual is valid for all types of the pressure regulator “QualityReg” D-QR-200.

Manufacturer

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Date of Issue

08/2022

Custody and integrity

- This manual is part of the pressure reducer D-QR-200 and has to be visible deposited for authorized persons.
- It is never allowed to remove part of the manual. Missing manual or missing parts – in particular the chapter „For your safety“ – has to be replaced.

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1. Introduction

1.3 Defined use and abuse

Change management

This documentation is not part of the change management from DEHAS. Changes are possible without announcement.

Defined use

The pressure regulator of the D-QR-200 series are designed for use on compressed gas cylinders for compressed and under pressure solute medical gas. They cut down the particular cylinder pressure on a continuous flow as possible. The approved gases are shown on the type label.

Abuse

The following operating conditions are classified as abuse:

- Using the pressure regulator with gases that are not listed on the type label.
- Using the pressure regulator for gases during the liquid phase.
- Using the pressure regulator beyond the allowed technical limiting values
- Manipulate the adjusted initial pressure or adjusted flow rate.
- The inobservance and noncompliance of the local regulations and appointments.

Abuse

All further categories of usage, which are not listed above are classified as device abuse.

1.4 Personnel requisition

Definition person in authority

A person is in authority, if he/she comes with an education as a medical-technical assistant, got an technical briefing and education about the whole system and the coherent hazards (compressed gas cylinder, medical gas, gas cylinder valve, pressure reducer) and successfully completed trainings about „Supply with compressed gases“ particularly oxygen-gases and their hazards.



1. Introduction

1.4 Personnel requisition

Tasks of persons in authority

Persons in authority have to recognize disturbances or rather abnormalities and - as possible and allowed - correct them.

Tasks of the user

To fulfill the tasks the user has to meet following demands:

- The user has to be briefed in using the pressure regulator by a person in authority.
- He/ she have to read and to understand the whole manual.



2. For your safety

2.1 Summary

Topic

This chapter includes

- The meaning of the use symbols.
- Essential information about the safe handling of the pressure regulator and
- The safety installations of the pressure regulator – their function and details

Important information!

The following safety instructions shall be deemed to be additional to the effective local accident prevention regulations.

Effective accident prevention regulations and laws have to be kept in all cases.

2.2 Used symbols



Danger!

This symbol points out that there is danger to life and health of persons. The word „**Danger to life**” is used separately to advert danger for life.

2.3 Essential safety information



Danger!

Adhere strictly the following safety instruction to avoid danger to life and health:

Possible Hazard	Abatement measures
Danger to life! Annotation: If Oxygen encounter oil or grease it is possible, that the device catches fire caused by a chemical reaction.	Keep all parts that encounter oxygen free of oil and free of grease.
Danger to life! Annotation: Effluent gas in the ambient air could catch fire. There is danger of fire and explosion.	Smoking or open fire (e.g. candles) around your oxygen device is strictly forbidden!



2. For your safety



Danger!

Possible Hazard	Abatement measures
<p>Danger to life! Annotation: The pressure reducer could be damaged by unauthorized changes or reconstructions so that it doesn't work intended. There is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.</p>	<p>Without an approval from the manufacturer it is not allowed to do change or reconstruct the pressure regulator.</p>
<p>Danger to life! Annotation: If you use gases which are not listed at the type label there is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.</p>	<p>Use it only for gases, whose label is shown at the pressure reducer.</p>
<p>Danger to life! Annotation: If a pressure reducer is connected to the gas cylinder while transport it could be damaged deformed or that it shear off. This could cause functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.</p>	<p>Disassemble the pressure reducer before you transport the gas cylinder.</p>



2. For your safety



Danger!

Possible Hazard	Abatement measures
Danger! Annotation: With faulty treatment and intended handling is it possible that there are hazards for user and other persons as well as damages of the device may appear.	Use and handle the device like described in the user manual.
Danger! Annotation: With use fluid gases there is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.	Do not use for fluid gases.
Danger! Annotation: With use beyond the allowed technical limiting temperatures it is possible that there is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.	Do not use in ambient temperatures under -20°C and over 60°C.
Danger! Annotation: A turning over gas cylinder is able to bring forth functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator and could catapult with high speed and power prefabricated parts of the system.	Assure gas cylinders always against tilting over.



3. Characterization

3.1 Summary

Topic

This chapter includes

- An overview about the most important elements of the pressure regulator,
- An functional description of the pressure regulator,
- An overview about the operation agents and their function and
- The technical data.

3.2 Summary pressure reducer D-QR-200

Pressure regulator with flow applications , no pressure outlet

(A L behind the order number add up an **high pressure adapter that is about 60 mm longer**)

D-QR-O2-200-0/15 (Variable Flow / Outlet always 9/16" UNF)

D-QR-O2-200-4 (Fixed flow / Outlet always 9/16" UNF)

D-QR-O2-200-5 (Fixed flow / Outlet always 9/16" UNF)

D-QR-O2-200-6 (Fixed flow / Outlet always 9/16" UNF)

D-QR-O2-200-8 (Fixed flow / Outlet always 9/16" UNF)

L = long adapter

S = Hose connector on 9/16"

Example short adapter:

D-QR-O2-200-4

Example long adapter:

D-QR-O2-200-4-L



3. Characterization

Pressure regulator with pressure outlet

(1 or 2 outlets, could be assembled various

A L behind the order number add up an **high pressure adapter that is about 60 mm longer**)

D-QR-O2-200

- **U = Downgrade outlet**
- **H = Reverse outlet**
- **A = DIN standard connector**
- **B = M 12 x 1 with RSV**
- **C = 3/8 " outside without RSV**
- **D = 9/16" UNF without RSV**
- **E = Closed**
- **L = Long adapter**

Example short adapter

D-QR-O2-200-UA-HE

Example long adapter

D-QR-O2-200-UA-HE-L

All pressure regulator of this type are also available for AIR (compressed air).



3. Characterization

Pressure regulator with pressure outlet and flow 0 -15

(1 or 2 outlets, could be assembled various

A L behind the order number add up an **high pressure adapter that is about 60 mm longer**)

D-QR-O2-200-15

- **U = Downgrade outlet**
- **H = Reverse outlet**
- **A = DIN standard connector**
- **B = M 12 x 1 with RSV**
- **C = 3/8 " outside without RSV**
- **D = 9/16" UNF without RSV**
- **E = Closed**
- **0-15 = staged flow 0-15 Liter**
(In dies case the outlet adapter is always 9/16" UNF with hose adapter)
- **L = Long adapter**

Example short adapter

D-QR-O2-200-15-UA-HE

Example long adapter

D-QR-O2-200-15-UA-HE-L

Other configurations and variations are available on request.



3. Characterization

Illustration pressure regulator D-QR-x-200-x-x

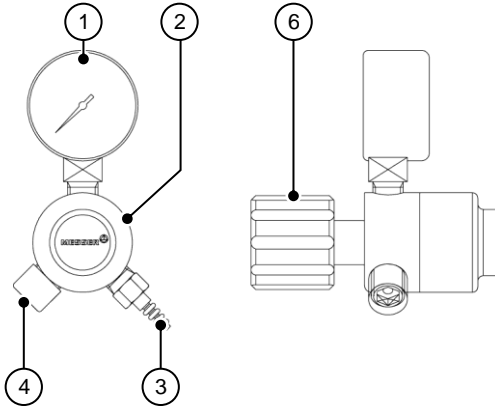
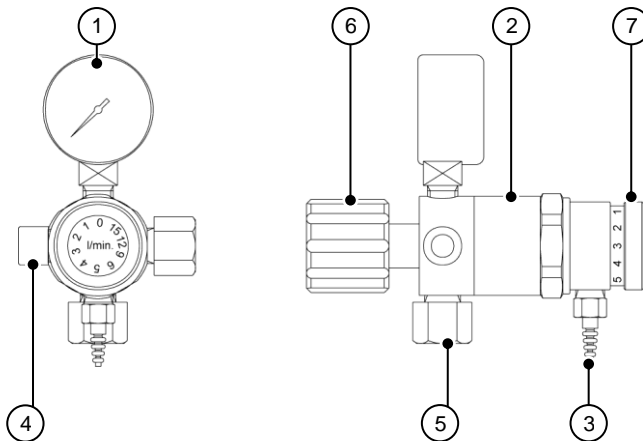


Illustration pressure regulator D-QR-x-200-15-x-x





3. Characterization

Element of the pressure regulator D-QR-x-200

The pressure regulator D-QR-x-200 consists in certain of the following parts:

Pos.	Notation	Exist in type	Function
1	Manometer	all	Indicates the pressure of the connected oxygen cylinder.
2	Pressure regulator case	all	Contains the virtual pressure regulator.
3	Hose connector	all	Adapter of a 6 mm \varnothing hose, a respiratory mask or a nasal cannula.
4	Safety valve	all	Defend the pressure regulator from excess pressure.
5	Pressure outlet		Have a look at the listed variants
6	Hand adapter	all	To connect the device with a gas cylinder use a similar to the type of gas coded screw thread and no tools.
7	Variable metering unit	200-15	To adjust the variable flow rate.

3.3 Characterization pressure regulator

Functional description of the pressure regulator

The pressure regulator is attributed to be connected directly with the gas cylinder valve. The cylinder pressure of at most 200 bar is to be reduced on a preferably constant initial pressure.

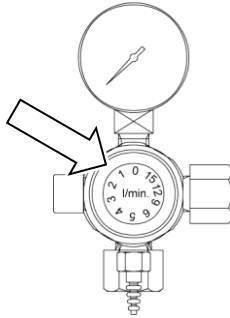
According to DIN-EN-ISO 13544 it is possible to connect the hose adapter with a respiratory mask or a nasal cannula. Thereby you have to pay attention to the compatibility of the used accessories with the used standard interface.



3. Characterization

3.4 Operating agents

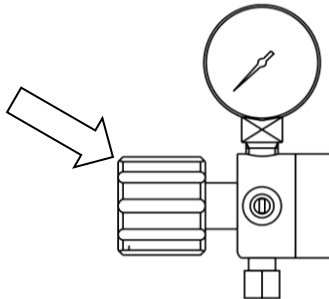
Variable metering unit at type D-QR-x-200-15



With the Variable metering unit the flow rate is adjusted at exact defined values between 0 l/min and 15 l/min. No gas flow at position „0“.

- Clockwise rotation: The flow becomes reduced respectively becomes zero.
- Anti-clockwise rotation: The flow gets raised.

Hand adapter – all types



Screw-thread-connection for connect with the cylinder valve without using tools.

- Clockwise rotation: The pressure regulator becomes bolted together with the cylinder valve.
- Anti-clockwise rotation: The pressure regulator detaches oneself from the cylinder valve.



3. Characterization

3.5 Technical data

Pressure regulator D-QR-x-200-15-x-x

Data	Value
Max. pressure on the input side	200 bar
Max. pressure on the output side	See type label
Max. outlet pressure of the separate pressure outlets:	4 bar–5 bar
Flow accuracy	Either $\pm 10\%$ or $\pm 0,5$ l/min (the higher value is valid)
Screw thread cylinder adapter	Similar to the type of gas and national standard.
Screw thread constant outlet	See list of variations
Screw thread variable outlet	9/16" UNF
Caliber hose connector adapter	6 mm according to DIN-EN-ISO 13544
Weight ; depending on type	560 g to 830 g
Allowed temperature range	-20–+60 °C
Type of gas	See type label



4. Operating

4.1 Summary

Topic

This chapter includes all information to connect the pressure regulator to gas cylinder valve and to handle it.



Danger!

Adhere strictly the following safety instruction to avoid danger to life and health:

Possible Hazard	Abatement measures
Danger to life! Annotation: If the gas cylinder valve is opened to fast there is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.	Always open the valve of the gas cylinder slowly!
Danger to life! Annotation: If accessories are used that are not adequate to the gas and the pressure range it is possible that a fire arises out of a possible reaction.	Accessories hast to adequate for the used gas and for the existing pressure range (up to 200 bar). If there are any doubts about the adequacy of the accessories contact our medical device consultants (call number and fax number are listed on the back).
Danger to life! Annotation: If there is used an adapter between gas cylinder valve and pressure regulator the risk to apply the wrong gas to the patient is prevalent.	It is not allowed to use an adapter between gas cylinder valve and pressure regulator.
Danger to life! Annotation: If the contact surface or the joints and gaskets on the gas cylinder valve / pressure regulator are damaged or missing the risk of uncontrolled escape of gas is prevalent.	Check the contact surfaces for damage before you assemble the pressure regulator. Do not assemble the pressure regulator if contact surfaces or joints and gaskets are damaged or missing.

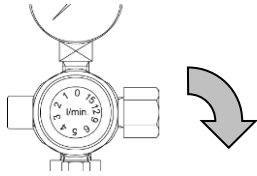


4. Operating

4.2 Assemble a pressure regulator

Connecting a pressure regulator with an gas cylinder valve

Act in the following way to connect a pressure regulator to a gas cylinder valve:

Step	Activity	Illustration
1	Make sure, that the flow be at-tuned to zero. Turn the hand adapter respec-tively the variable metering unit clock wise.	
2	Make sure, that the gas cylinder: <ul style="list-style-type: none">• stands vertical and• Is protected against falling over.	
3	Remove when indicated the cap on the gas cylinder valve.	
4	Screw the hand adapter of the pressure regulator with the screw thread of the gas cylinder valve. The hand adapter has to be turned clockwise. Never use tools to screw the hand adapter!	
5	Attract the hand adapter hand tight. Never use tools to screw the hand adapter! The pressure regulator is connected.	



4. Operating

Connecting the pressure outlet

Act in the following way to connect e.g. an airpack the pressure outlet of the pressure regulator:

Step	Activity
1	Make sure, that: <ul style="list-style-type: none">• The pressure regulator is connected and• The gas cylinder valve is closed.
2	Remove when indicated the cap on the pressure outlet of the pressure regulator.
3	<p>Screw the pressure adapter of the device that should be connected with the continuous outlet.</p> <p>Never use tools to screw the continuous outlet!</p> <p>The continuous outlet is connected.</p> <p>If you open the gas cylinder valve, the continuous pressure of 5 bar is available instantly.</p> <p>Monitor the manometer during the withdrawal of gas. If the pressure isn't within the green range anymore finish the withdrawal of gas. Close the gas cylinder valve, disassemble the pressure regulator and let the gas cylinder fill respectively change the gas cylinder against a filled one.</p>

Connect the hose with the hose connector

Act in the following way to connect a hose with the hose connector:

Step	Activity
1	Make sure, that the pressure regulator is connected to a gas cylinder valve.
2	Make sure, that the knurled nut of the hose connector is tightened.
3	<p>Put the end of the hose on the hose connector so that it surrounds the whole hose connector.</p> <p>The hose is connected to the hose connector.</p>



4. Operating

4.3 Operate the pressure regulator



Danger!

Adhere strictly the following safety instruction to avoid danger to life and health:

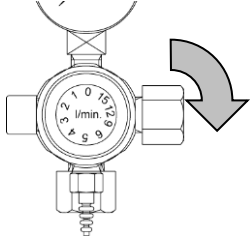
Possible Hazard	Abatement measures
<p>Danger to life!</p> <p>Annotation: If you adjust a dose that is too high, it is possible that a fire arises out of a possible chemical reaction or your health could be at risk.</p>	<p>Make sure that you adjust exclusively the flow value as prescribed by your attending doctor.</p>
<p>Danger!</p> <p>Annotation: Is there a fluctuating indication of the manometer or of the volume meter after the opening and adjusting of the flow, the risk of a too low or a too high dose is prevalent.</p>	<p>Do not use the system gas cylinder – gas cylinder valve – pressure regulator if it is not possible to adjust or metering the flow exactly.</p> <p>Close the gas cylinder valve and let the systems check by a service technician.</p>



4. Operating


Adjust the flow

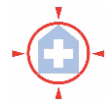
Act in the following way to adjust the on type D-QR-200-15-x-x:

Step	Activity	Illustration
1	Make sure, that: <ul style="list-style-type: none">• the pressure regulator is connected to a gas cylinder valve and• a hose is connected to the hose connector	
2	Make sure, that the flow be at-tuned to zero. Turn the hand adapter respec-tively the variable metering unit clock wise.	
3	Open the gas cylinder valve slowly: The manometer shows the pressure of the connected gas cylinder. If the pressure isn't within the green range anymore finish the withdrawal of gas. Close the gas cylinder valve, disassemble the pressure regulator and let the gas cylinder fill respectively change the gas cylinder against a filled one.	



4. Operating

Step	Activity	Illustration
4	<p>Adjust the flow slowly with the variable metering unit.</p> <ul style="list-style-type: none">• Clockwise rotation: The flow becomes reduced respectively be-comes zero. <p>The flow becomes reduced respectively becomes zero.</p> <ul style="list-style-type: none">• Anti-clockwise rotation: The flow gets raised. <p>The flow gets raised.</p> <p>The adjusted flow rate is shown in the window.</p> <p>Monitor the manometer during the withdrawal of gas. If the pressure isn't within the green range any-more finish the withdrawal of gas. Close the gas cylinder valve, dis-assemble the pressure regulator and let the gas cylinder fill respec-tively change the gas cylinder against a filled one.</p>	



4. Operating

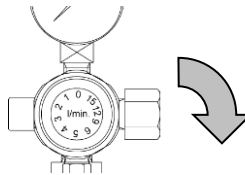
4.4 Decommissioning

Momentary decommissioning respectively interruption

Act in the following way to decommission the pressure regulator momentary:

Adjust the flow to zero:

Close the hand adapter respectively the metering unit clockwise.



Longer decommission respectively interruption

Act in the following way to decommission the pressure regulator for any length of time:

Step	Activity	Illustration
1	Close the gas cylinder valve. Wait until the remaining gas flowed out: The Manometer shows 0 bar.	
2	Adjust the flow on zero: Twist the hand adapter respectively the metering unit clockwise.	



4. Operating

Decommission or interruption

Act in the following way to decommission the pressure regulator:

Close the gas cylinder valve.

Wait until the remaining gas flowed out:

The Manometer shows 0 bar.

Disassembly the pressure regulator from the gas cylinder valve

Act in the following way to disassembly the pressure regulator from the gas cylinder valve:

Step	Activity
1	Make sure, that the valve is closed.
2	Disconnect the hand adapter: The hand adapter has to be turned anit-clockwise. Never use tools the screw the hand adapter!
3	Put the pressure regulator in a adequate container. The container has to be dry, clean and free of oil and grease. The pressure regulator has to be stored dust-free.
4	Screw when indicated the cap on the gas cylinder valve.



4. Operating

4.5 Expected useful life of the cylinder

This is an overview of the expected useful life of gas cylinders next to equal adjusted withdrawal.

The gas cylinder pressure is shown at the manometer.

Cylinder volume 2 Liter

withdrawal	1 l/min	3 l/min	5 l/min	9 l/min	15 l/min
cylinder pressure	Expected useful life [h:min]				
200 bar	6:38	2:13	1:20	0:44	0:26
150 bar	4:58	1:40	0:59	0:33	0:20
100 bar	3:18	1:06	0:40	0:22	0:13
50 bar	1:38	0:32	0:20	0:11	0:07

Cylinder volume 5 Liter

withdrawal	1 l/min	3 l/min	5 l/min	9 l/min	15 l/min
cylinder pressure	Expected useful life [h:min]				
200 bar	16:35	5:32	3:19	1:50	1:07
150 bar	12:25	4:08	2:29	1:23	0:50
100 bar	8:15	2:45	1:39	0:55	0:33
50 bar	4:05	1:22	0:49	0:27	0:16

Cylinder volume 10 Liter

withdrawal	1 l/min	3 l/min	5 l/min	9 l/min	15 l/min
cylinder pressure	Expected useful life [h:min]				
200 bar	33:10	11:04	6:38	3:41	2:13
150 bar	24:50	8:17	4:58	2:46	1:40
100 bar	16:30	5:30	3:18	1:50	1:06
50 bar	8:10	2:43	1:38	0:55	0:32



5. Disturbance

5.1 Disturbances

In any cases of disturbance close the gas cylinder valve immediately and disassembly the pressure regulator.

Disturbance / cause	Elimination
The safety valve blows gas out. Incorrect rising or falling of the outlet pressure.	Close the gas cylinder valve immediately. Let check the pressure regulator by the manufacturer or an authorized specialist.
The sinker shows other flow rate than adjusted. Incorrect rising or falling of the gas withdrawal.	Close the gas cylinder valve immediately. Let check the pressure regulator by the manufacturer or an authorized specialist
Humming noise come from the pressure regulator.	Probably the flow rate is too high. Reduce the flow rate. If there is still a humming noise, close the gas cylinder valve immediately. Let check the pressure regulator by the manufacturer or an authorized specialist prompt.

Closing the gas cylinder valve

Act in the following way to close the gas cylinder valve:

Turn off the gas cylinder valve clockwise.

The remaining gas flows out of the pressure regulator.

If manometer shows "Zero", the gas cylinder valve is closed.



6. Care and cleaning

6.1 Summary

Topic

The chapter includes information about how to service and clean the pressure regulator.

6.2 Regularly maintenance work und visual testing

Regularly maintenance

The pressure regulator has to be overhauled by the manufacturer or an authorized specialist every 6 years.

Regularly visual testing

Do the following visual tests regularly:

Visual test of	Clearance
Damage and fissures of <ul style="list-style-type: none">• manometer• measuring unit• case of the pressure regulator	Before every startup.

If you notice defect during the visual test don't use the pressure regulator! Let check the pressure regulator by the manufacturer or an authorized specialist prompt.



6. Care and cleaning

6.3 Regularly cleaning



Danger!

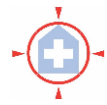
Adhere strictly the following safety instruction to avoid danger to life and health:

Possible Hazard	Abatement measures
Danger to life! Annotation: Get oxygen in touch with oil or grease a fire could occur.	Keep all part that could get in touch with oxygen free of oil and grease.
Danger to life! Annotation: Effluent gas in the ambient air may catch fire; there is danger of fire respectively of explosion.	Smoking or open fire (like candles) around an oxygen device is strictly forbidden!
Danger! Annotation: Cleansing agents or disinfectants could attack and destroy joints and gaskets in the pressure regulator. There is the hazard of functional disorder, overdose, fire or damage of the system cylinder – valve – pressure regulator.	For cleaning don't use cleansing agents or disinfectant.

Clean the pressure regulator

Strong contamination could cause disturbances.

Clean the pressure regulator exclusively with damp cloth.



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