

**Operating Manual
DC-AG-12-M
Automatic Gasvent**

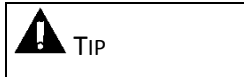
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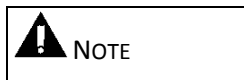
Operating Manual DC-AG-12-M Automatic gasvent

I. STRUCTURE OF THE MANUAL / CLARIFICATION

The various aspects of this manual are clearly listed here. Points of attention are marked throughout the entire manual in the following way (the interpretation is also given):



Offers suggestions and/or advice to the operator to perform specific tasks more easily.



Points out possible problems to the operator.



Indicates damage to the application or directly linked equipment when the operator does not carefully adhere to the procedures.



Warns the operator of possible injuries if the procedures are not adhered properly.



The life of the operator is directly threatened.

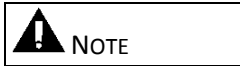
Demaco Holland bv considers the operator to be:

The one who operates the machine or equipment supplied by Demaco Holland bv.



The operator is responsible for the safety of any assisting employee. The operator must ensure, before starting the machine or installation, that no dangerous situation could occur for the assisting employee.

II. SAFETY AND HEALTH CONCERNS



This user manual must be read by the operator as soon as possible in order for him to become familiar with the operation of this equipment.

From the point of view of injuries to the operator, specific attention is given to the dangers that can occur when using liquid nitrogen. On Demaco Holland bv equipment, where the operator may come into contact with liquid nitrogen, you can find the label as shown below. It warns the operator of the presence of coldness and it is indicated that safety glasses and gloves with wrist protection should be worn.



Figure 1; Safety label on Demaco Holland bv products

This user manual should at least be available for consultation at the head of the department. We recommend that a copy be made of this manual inserted in plastic folders, or bound, and put on view at location with the DC-AG-12-M Automatic gasvent.

We also recommend to carefully read the Demaco safety instruction "Safety guidelines for working with cold media". Extensive information is provided in this manual about working with cryogenic media. A copy of the "safety instruction" is shipped with this delivery. Should you require more copies of this instruction in order to create a safe working environment for your operator(s), additional copies can be requested from Demaco Holland bv. Contact our sales department.

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1 INTRODUCTION

1.1 Use of the DC-AG-12-M Automatic gasvent

The DC-AG-12-M Automatic gasvent is designed to release gas from a cryogen line containing a mixture of liquid and gas. The mixture of liquid and gas may be formed by heat leak from the environment, pressure losses by friction or increased static height. Using a DC-AG-12-M Automatic gasvent prevents a cryogenic line from running dry and warming up in case no liquid is used for some time. As a result, liquid will be immediately available for use.

Please note that the gas inside a high velocity two phase flow may not always be completely vented. In this case, a phase separator may be required.

Inside the DC-AG-12-M Automatic gasvent a float type valve will open and close the vent line. When gas evolves the liquid level inside the DC-AG-12-M Automatic gasvent will descend and the float type valve opens, gas will be vented. The liquid level will rise again and the float type valve closes. The liquid level at which the float type valve will close is fixed and can not be adjusted.

The DC-AG-12-M Automatic gasvent interfaces:

Design pressure	12 bar(g)
LN ₂ supply	Demaco Johnston Coupling DN25 (Ø28x1)
GN ₂ discharge	½" BSP female
Weight empty	appr. 7 kg

Working area

For safe operation of the DC-AG-12-M Automatic gasvent the following points must be taken into consideration :

- Easy to access.
- Safe area because ice chunks of the DC-AG-12-M Automatic gasvent discharge can drop down.
- Adequate space to operate and maintain the DC-AG-12-M Automatic gasvent.
- In case of direct blow-off a safe and ventilated area.

Transport and lifting

In case of transport or lifting of the DC-AG-12-M Automatic gasvent the following points should be taken into consideration:

- Use a proper casing to protect the DC-AG-12-M Automatic gasvent from damage.
- Only lift the DC-AG-12-M Automatic gasvent when its empty.

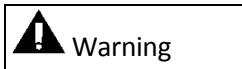
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Mounting

- The DC-AG-12-M Automatic gasvent is designed for outside air temperature between – 20°C and + 50°C.
- The DC-AG-12-M Automatic gasvent must be properly supported because the weight can significantly increase by ice accretion on the discharge.

Storage

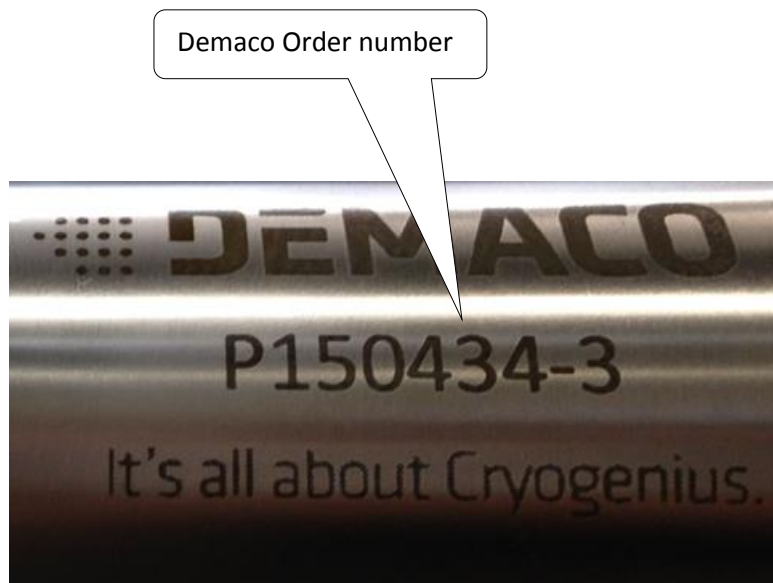
- Store the DC-AG-12-M Automatic gasvent dry and in packing. Prevent water and other pollutants from entering the pipes. Minimum storage temperature is 5°C. Maximum storage humidity is 75%.



Be careful that the protection cover, on the end of the Johnston Coupling, remains undamaged during handling and storage.

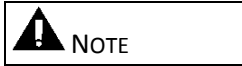
Identification

Information about the DC-AG-12-M Automatic gasvent is given near by the pump valve.



Example of identification

2 INSTALLATION OF A DC-AG-12-M AUTOMATIC GASVENT



When filling a DC-AG-12-M Automatic gasvent with liquid nitrogen, one has to realise that the DC-AD-12 Automatic degasser first has to be cooled down from room temperature to $-196\text{ }^{\circ}\text{C}$. This means that the first quantity of nitrogen will evaporate.

2.1 Inlet connection liquid



Always make sure that a safety-relief valve is installed between two shut-off valves when liquid is contained, otherwise it can result in the excessive increase of pressure, pressure above the allowable pressure of the DC-AG-12-M Automatic gasvent. This can result in cracking of the DC-AG-12-M Automatic gasvent. The DC-AG-12-M Automatic gasvent is not a replacement of a safety-relief valve.

The DC-AG-12-M Automatic gasvent should be vertically installed on a DN25 Demaco Johnston Coupling. Before installation, check the O-rings and the sealing surfaces for damage. For details about installing Demaco Johnston couplings, we refer to the instruction manual 'Johnston Coupling'.

2.2 Discharge connection gas

On the gas discharge of the DC-AG-12-M Automatic gasvent, a solenoid valve and a non-return valve are mounted as a standard. This non-return valve prevents atmospheric moisture entering into the DC-AG-12-M Automatic gasvent and should not be removed.

A degas line may be installed to release the gas to a safe area. This line may be connected onto the non-return valve of the discharge line and should have an internal diameter of at least the size of the non return valve. If the degas line is longer than 5 meter the non-return valve may be omitted.



The temperature of the gas blowing out of the DC-AG-12-M Automatic gasvent may be as low as $-196\text{ }^{\circ}\text{C}$. The position of the outlet and the direction of the gas flow should be chosen in such a way that there is no danger for people or vulnerable equipment. Secondly large ice build-ups are possible without proper insulation.

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When the outlet of the DC-AG-12-M Automatic gasvent is exhausting in a confined space, danger of suffocation exists. This being because the amount of nitrogen from the DC-AG-12-M Automatic gasvent can displace the air (oxygen) from the space. In this case exhausting the gas to a safe remote atmosphere is necessary.

2.3 Pump valve

On the front side of the DC-AG-12-M Automatic gasvent, a pump valve is located. This is used for evacuation and as a safety device for the vacuum jacket. It is sealed by a plug and protected from dust by a plastic cap. A security pin prevents the plug from causing danger or damage. Do not remove the cap, the safety pin or the plug, except for re-evacuation. For this, a dedicated pump-out tool is required and the re-evacuation should be carried out by authorized (Demaco Holland bv) personnel. It is not used in any way for the operation of the DC-AG-12-M Automatic gasvent.

3 START UP / SHUT DOWN

After installation the DC-AG-12-M Automatic gasvent is immediately ready for use. When the ball valve is opened the gas is automatically blown-off, until the float type valve will close the venting line due to a rising liquid level. Please note that during the first filling of the line, this may take some time, because a considerable amount of gas may be formed by cooling down the pipes.

The DC-AG-12-M Automatic gasvent can produce some noises when blowing off gas. Don't let this frighten you. As soon as the DC-AG-12-M Automatic gasvent is cold, the gas flow will reduce, and the noise will cease. The DC-AG-12-M Automatic gasvent may simply be closed by closing the ball valve.

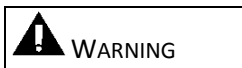


When the DC-AG-12-M Automatic gasvent is installed without exhaust piping, cold gas with a temperature as low as -196 °C will flow out of the DC-AG-12-M Automatic gasvent. Ensure that persons or vulnerable equipment cannot be injured/damaged by this cold gas flow.

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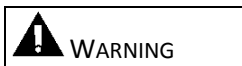
4 DISCONNECTING THE DC-AG-12-M AUTOMATIC GASVENT

Disconnection of the DC-AG-12-M Automatic gasvent is only possible when a part of the connecting VIP line is dismantled as well. You need at least 500 mm extraction length before you are able to disconnect the Demaco Johnston couplings. The VIP line should be warmed up to room temperature. This heating takes place unforced and under normal circumstances 24 hours. The heating process can be accelerated by purging the VIP line with gas at room temperature.



When disconnecting the DC-AG-12-M Automatic gasvent, always make sure that there is no liquid left inside the line. The line has to be discharged of the internal pressure by closing the valves at the tank and opening the release valves.

5 MAINTENANCE OF THE DC-AG-12-M AUTOMATIC GASVENT

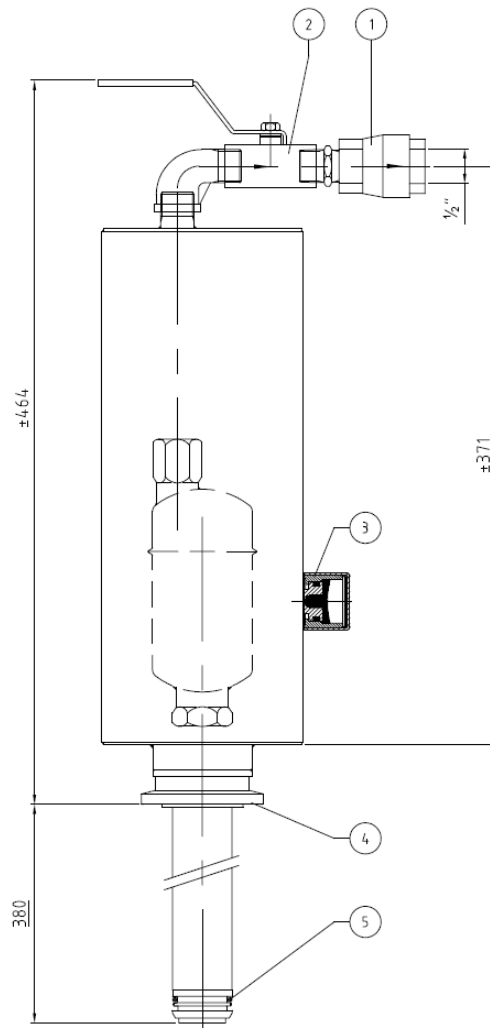


During some parts of this maintenance check the system must be operational. Therefore all safety requirements noted in this manual must be met.

A DC-AG-12-M Automatic gasvent is a maintenance free product. However, we recommend to periodically check a number of points in order to eliminate possible wear in the earliest possible stage.

Fully check the system at least once every six months by operating the equipment and checking the following:

1. If the outer jacket of the DC-AG-12-M Automatic gasvent shows severe condensation, it may indicate a high degree of humidity in the building. If this is not the case, then there is a possibility that the insulation vacuum in the DC-AG-12-M Automatic gasvent has degraded. Please contact Demaco Holland bv. Uninsulated parts of course always show condensation or ice forming.
2. Check for proper operation of the system. Check that the valves are working properly.
3. Check if the opening of the gas discharge is free of any ice or obstacles.

6 SURVEY SPARE PARTS


1. Check valve $\frac{1}{2}$ " BSP
2. Ball valve
3. Pump valve
4. O-ring \varnothing 55x5
5. O-ring \varnothing 30x4