

VAG DUOJET[®] Automatic Air Valve



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1 General

1.1 Safety



These Operation and Maintenance Instructions must be observed and applied at all times along with the general "VAG Installation and Operation Instructions for Valves" (see www.vag-group.com / Category: Installation and Operation Instructions).

When using this valve, the generally acknowledged rules of technology have to be observed (e.g. international standards, etc.) The installation must only be carried out by qualified staff (see also Section 7.1 General safety instructions). For further technical information such as dimensions, materials or applications, please refer to the respective documentation (KAT-A 1912).

VAG valves are designed and manufactured to the highest standards and their safety of operation is generally ensured. However, valves may be potentially dangerous if they are operated improperly or are not installed for their intended use.

Everyone dealing with the assembly, disassembly, operation, maintenance and repair of the valves must have read and understood the complete Operating and Maintenance Instructions (and also Accident Prevention Regulations and ANSI Z535).

Before removing any protective devices and/or performing any work on the valves, depressurise the pipeline section and ensure it is free of hazards. Unauthorised, unintentional and unexpected actuation as well as any hazardous movements caused by stored energy (pressurised air, water under pressure) must be prevented.

In case of equipment that must be monitored and inspected, all relevant laws and regulations, such as the Industrial Code, the Accident Prevention Regulations, the Ordinance of Steam Boilers and instructional pamphlets issued by the Pressure Vessels Study Group must be complied with. In addition, the local accident prevention regulations must be observed.

1.2 Proper use

The VAG DUOJET® Automatic Air Valve is a valve for flanging to the pipeline.

The standard type is suitable for the automatic aeration and venting of water supply systems.

For the respective technical application ranges (e.g. operating pressure, medium, temperature) please refer to the product-related documentation (KAT 1912-A).

For any alternative operating conditions and applications, the manufacturer's written approval must be obtained!

These Operation and Maintenance Instructions contain important information on the safe and reliable operation of the VAG DUOJET® Automatic Air Valve.

Observing these Operation and Maintenance Instructions helps you to:

- Prevent hazards
- Reduce repair costs and down-time of the valve and/or the entire equipment
- Improve the operational safety and useful life of the equipment.

1.3 Identification

According to DIN EN 19 all valves bear an identification label specifying the nominal diameter (DN), nominal pressure (PN), body material and the manufacturer's logo.

A rating plate is attached to the body and contains at least the following information:

VAG	Manufacturer's name Valve type
DN	Nominal diameter of the valve
PN	Nominal pressure of the valve Body material EN-JS 1030 (GGG-40) Date of manufacture

2 Transport and Storage

2.1 Transport



For transportation to its installation site, the valve must be packed in stable packaging material suitable for the size of the valve. It must be ensured that the valve is protected against atmospheric influences and external damage. When the valve is shipped under specific climatic conditions (e.g. overseas transport), it must be specially protected and wrapped in plastic film and a desiccant must be added.

The factory-applied corrosion protection and any assemblies must be protected against damage by external influences during transport and storage.

The VAG DUOJET® Automatic Air Valve must be transported and stored in a secure transport position. It is recommended to affix retaining bolts to the flange base for transport, if required.



Picture 1: Transport position (top view)

2.2 Storage

The elastomeric parts (seals) must be protected against direct sunlight and/or UV light as otherwise their long-term sealing function cannot be guaranteed. Store the valve in a dry and well-aerated place and avoid direct heat. Protect any assembly components necessary for the satisfactory function of the valve such as the ball and the small orifice for air release during operation against dust and other dirt by adequate covering.

Do not remove the protective caps of the connections / flanges and the packaging materials until immediately prior to assembly into the pipeline.

The valve can be stored in ambient temperatures ranging from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ (protected by adequate covers). If the valve is stored at temperatures below $0\text{ }^{\circ}\text{C}$, it should be warmed up to at least $+5\text{ }^{\circ}\text{C}$ before installation and before it is put into operation.

3 Product features

3.1 Features and function description

The VAG DUOJET® Automatic Air Valve is a two-stage single-chamber air valve for the automatic aeration and venting of pipelines.

The standard version is delivered with (cf. Picture 2):

- Inner parts made of stainless steel 1.4571 (Except DN 50/PN 16: float made of plastic)
- Screw connection in the outlet (possible to mount to fittings, elbows, insect protection)



Picture 2: VAG DUOJET® standard version

As an alternative, a version with gate valve (VAG DUOJET® S) as well as with an individually calculated orifice plate (VAG DUOJET® Anti-Surge) is available (cf. Picture 3).



Picture 3: VAG DUOJET®-S and VAG DUOJET® Anti-Surge Automatic Air Valve

3.2 Applications

The VAG DUOJET® Automatic Air Valve can be used with the following media:

- Water
- Raw and cooling water



The VAG DUOJET® Automatic Air Valve is not suitable for seawater, sewage or waste water.

For information about the corresponding temperature limits, please refer to the product-related technical documentation (KAT-A 1912).

In case of alternative operating conditions and applications, please consult the manufacturer.

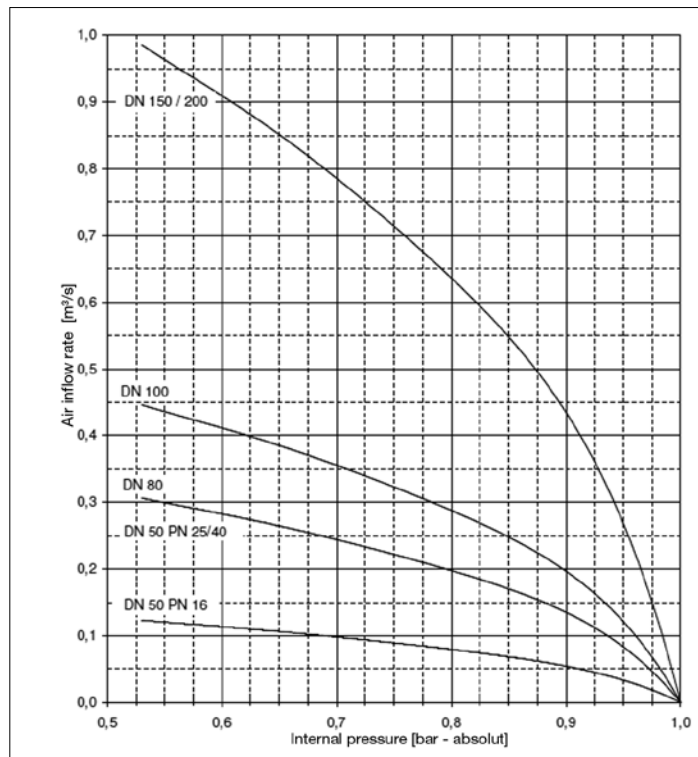
3.3 Performance limits

3.3.1 Minimum pressure

The minimum pressure for sealing the venting cross-sections is 0.3 bar.

3.3.2 Air inflow performance data

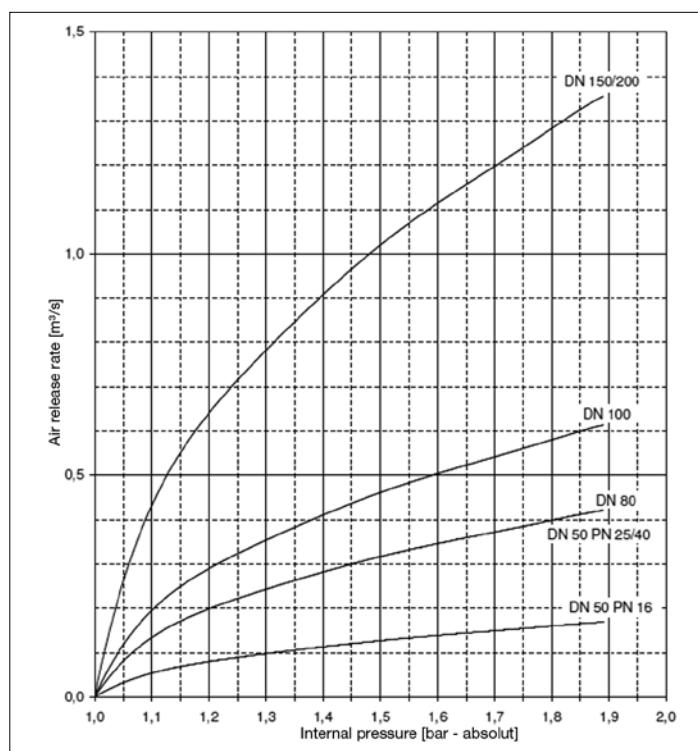
The large aeration cross-section is for aerating with large amounts of air when switching off the pumping station.



Picture 4: Air inflow - large cross-section

3.3.3 Venting performance data

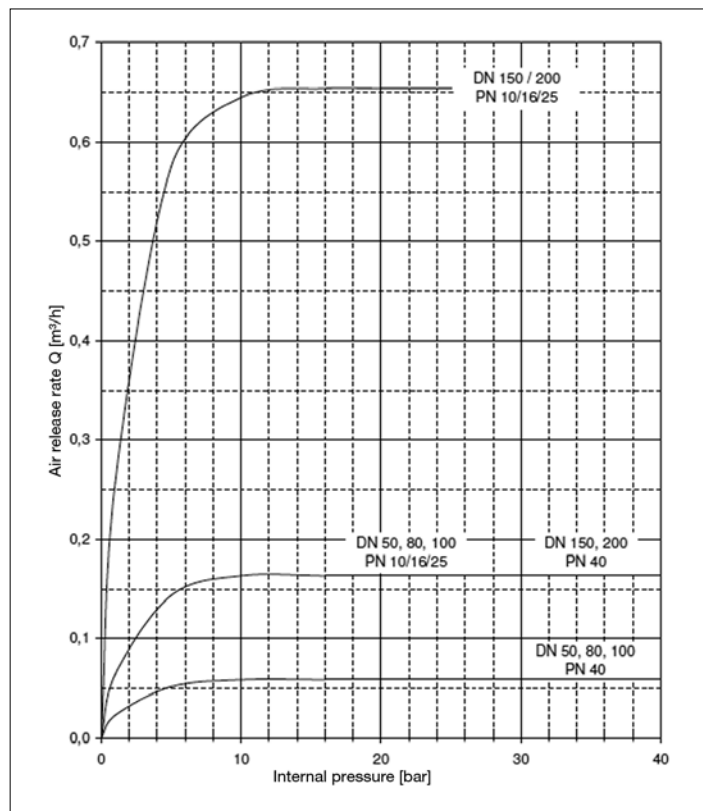
The large venting cross-section is for venting large amounts of air when starting up the pumping station.



Picture 5: Air release - large cross-section

3.3.4 Air release valve performance data

The small venting cross-section is for venting small amounts of air during operation under full internal overpressure.



Picture 6: Air release – small cross-section

4 Installation into the pipeline

4.1 Conditions required on site

When installing the pipeline flange it must be horizontal, plane parallel and flush.



Aeration and venting valves should be installed as close as possible to the pipe being vented to avoid long supply lines from collecting stagnating water (hygienic problems, higher costs, regular flushing). In addition, long supply lines may result in limited venting function as well as be associated with the risk of freezing (the supply line or the air valve itself).

In case of mechanical works around the valve causing dirt (e.g. painting, working with concrete etc.), the valve must be protected by adequate covering.

For assembly in drinking water pipelines, suitable sealing materials, lubricants and process materials must be used which are approved for use in drinking water pipelines.

Before putting the valve into operation, clean and purge the corresponding pipeline sections.



4.2 Installation location

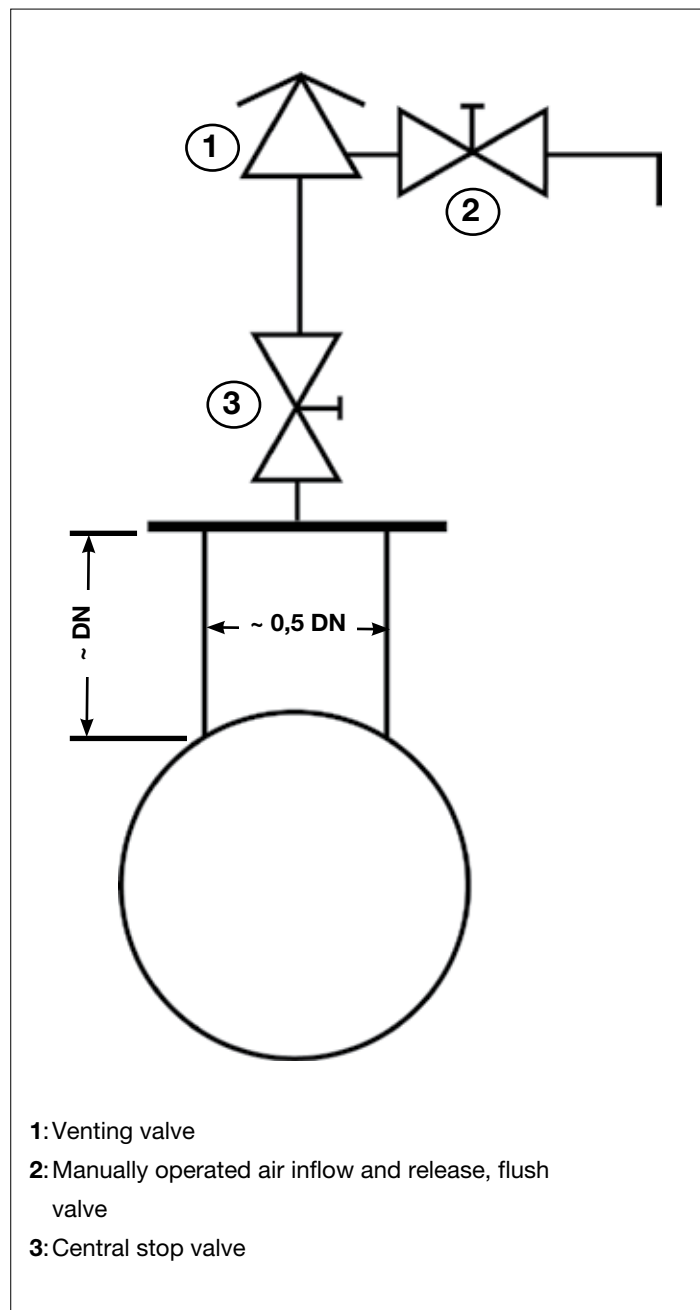
To ensure the trouble-free function and long service life of the valve, several factors have to be taken into account when positioning the valve.

The VAG DUOJET® Automatic Air Valve can be installed in stations, in the open or in chambers.

Installation should take place at the high points of the pipeline. For direct installation of the VAG DUOJET® Automatic Air Valve on a standpipe we recommend the use of an orifice plate upstream of the valve. Chamber structures must be built and equipped in accordance with DVGW data sheet W 358.

4.2.1 Installation in pipeline < DN 600

For pipelines < DN 600 it is wise to use a sufficiently dimensioned venting dome. If not verified in detail, the venting dome can be considered sufficiently dimensioned if its construction height matches the diameter of the pipeline and has the diameter of approximately half the diameter of the pipeline. A central stop valve, an air valve and, if required, a device for manually activated aerating and venting or flushing are required. The central stop valve upstream from the air valve allows it to be installed or dismantled without interrupting operations. Because the air valve stopped by the stop valve is under pressure a vent plug is provided on the air valve to release pressure. In place of a plug, an installed valve operated manually simplifies aeration and venting and can also be used as a flush valve.



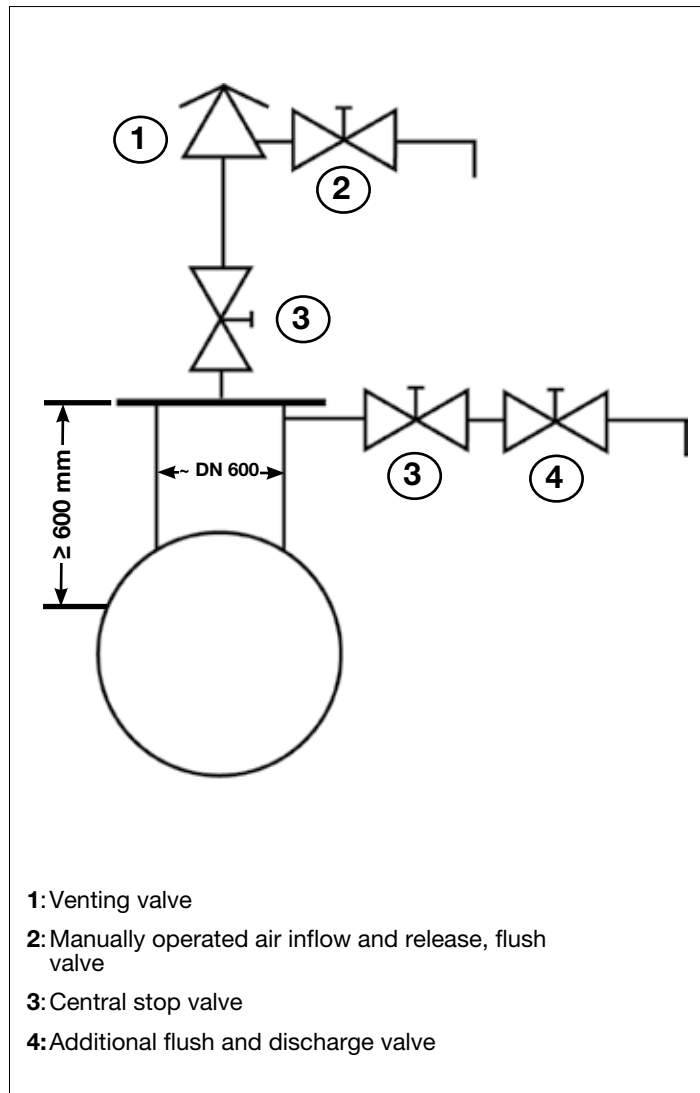
- 1: Venting valve
- 2: Manually operated air inflow and release, flush valve
- 3: Central stop valve

Picture 7: Pipeline < DN 600

4.2.2 Installation for pipelines \geq DN 600

For pipelines \geq DN 600 the venting dome should not fall below nominal size DN 600 and a height of $h = 600$ mm. In this case a sufficiently dimensioned venting dome is provided.

To avoid a large installation height, manual venting can also be attached laterally to the air dome. Here, however, a second central stop valve upstream from manual venting is necessary.



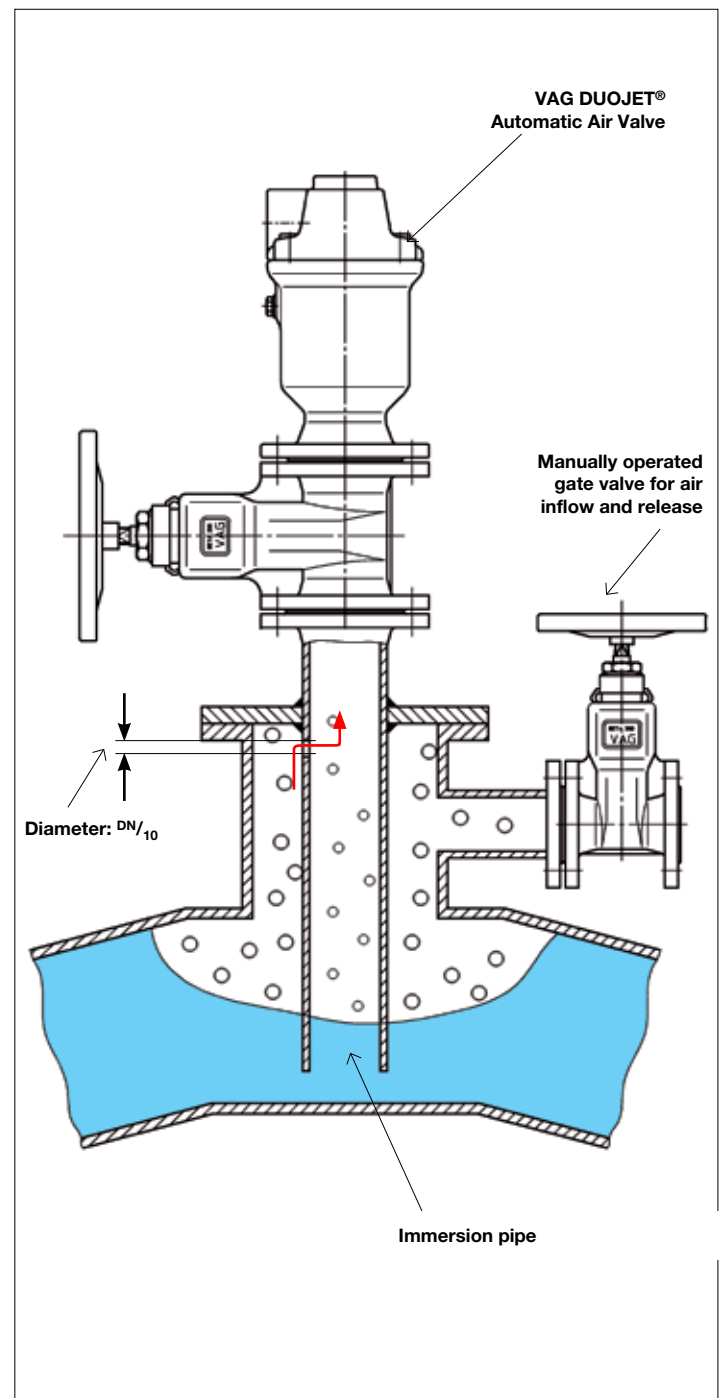
Picture 8: Pipeline \geq DN 600

4.2.3 Water flow rate

The water flow rate ascertained to fill a pipeline is equivalent to the volume of air to be released. In this case venting should take place at an overpressure of a maximum of 0.3 bar. In doing so, a change in the density of the air can still be accommodated.

If when filling the rate in the pipeline exceeds 0.25 m/s, a dome construction with an immersion pipe is recommended to reduce pressure surges (Picture 9).

The water flow rate ascertained to empty a pipeline is equivalent to the volume of air to be fed. In this case aeration should take place at an underpressure of a maximum of 0.4 bar relative pressure. In doing so, a change in the density of the air can still be disregarded.



Picture 9: Dome construction with immersion pipe

4.3 Installation position

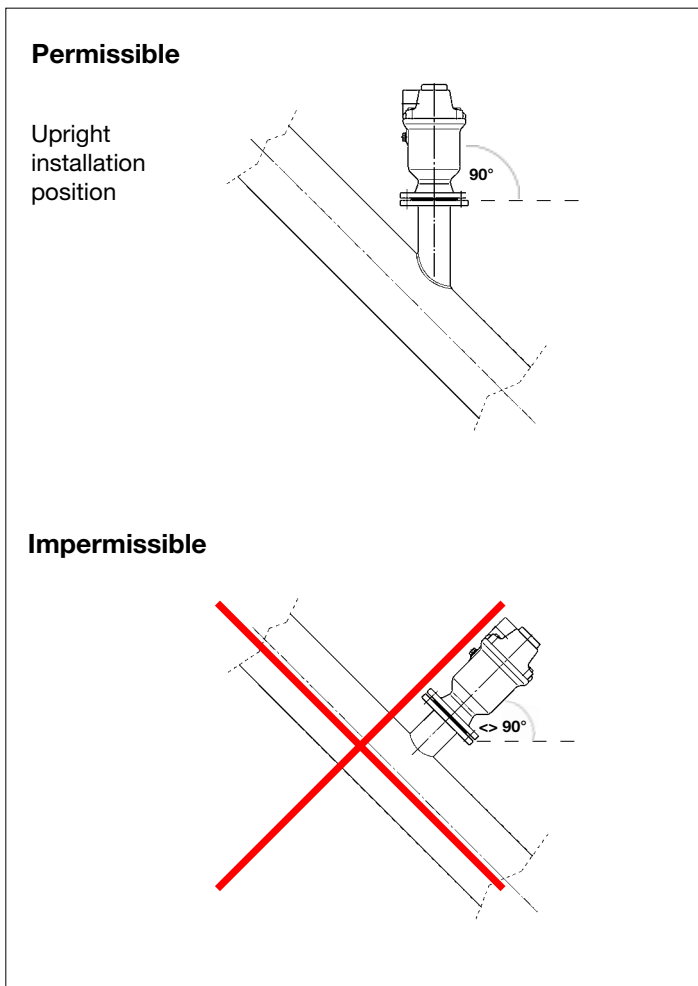


The VAG DUOJET® Automatic Air Valve must always be installed in an upright position. If installed in any other position, the manufacturer cannot ensure the trouble free functioning of the valve or station (see Picture 10 - following page).

4.4 Installation note



Observe the following special installation notes in accordance with the specified hydraulic conditions and installation positions.

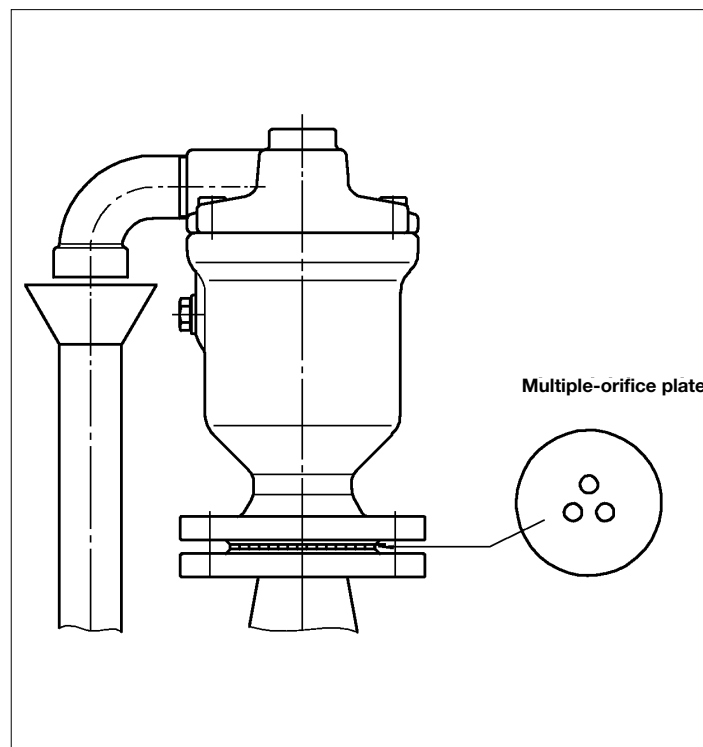


Picture 10: Installation position of the Automatic Air Valve

4.4.2 Installation in standpipes

Standpipes result in high flow velocities during the filling process. If the VAG DUOJET® Automatic Air Valve is installed directly on the standpipe there is a risk of the ball closing prematurely.

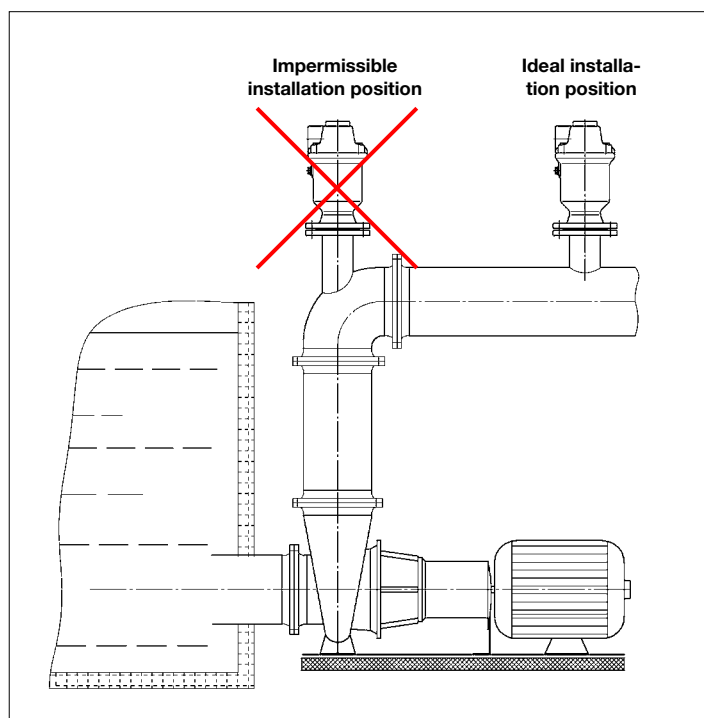
To prevent premature closing we recommend the installation of a multiple-orifice plate in front of the valve (cf. Picture 12).



Picture 12: Installation position in standpipe

4.4.1 Installation position downstream from pumps

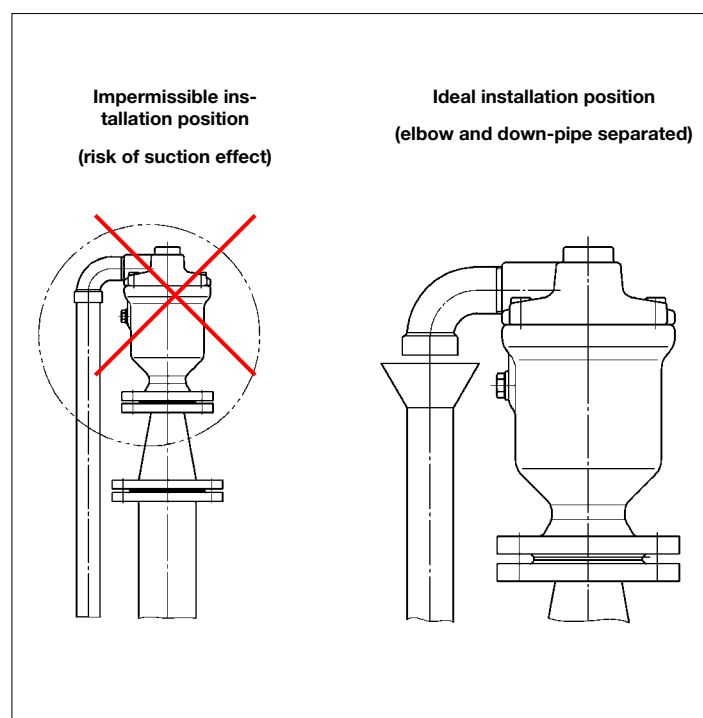
If the VAG DUOJET® Automatic Air Valve has to be installed downstream from pumping stations, positioning must take place according to the “ideal” installation position shown in Picture 11.



Picture 11: Installation position downstream from pumps

4.4.3 Discharging splashing or surge water

When intentionally discharging splashing or surge water via the pipeline it should be cut off slowly downstream of the valve so that no improper suction effect impacts the VAG DUOJET® Automatic Air Valve (cf. Picture 13).



Picture 13: Installation position for splashing or surge water

4.5 Assembly instructions and fittings

Check the valve for possible damage that it may have suffered during transport and storage. Protect the valve against dirt caused on the construction site by adequate covering until installation. Thoroughly clean the surface of the flange gasket prior to installation.

VAG does not assume any liability for consequential damage caused by dirt, shot-blasting gravel residue etc.

The functional parts should be checked for proper operation prior to installation.

Should the valves be repainted later on, it must be ensured that no paint is applied to the functional parts. The identification plates must not be painted over either. If the equipment is sand-blasted for cleaning prior to installation, these parts must be adequately covered. If solvents are used for cleaning, it must be ensured that the solvents do not destroy the seals of the pipeline or the valve.

For the assembly of the VAG DUOJET® Automatic Air Valve it must be ensured that proper load suspension devices as well as means of transport and lifting devices are available.

When connecting the valve with the pipeline flanges, hexagon bolts and nuts with washers from flange to flange must be used in the through holes.

The bolts and nuts selected by the operator must be appropriate for the pressure, temperature, flange material and the gasket. For connections that contain at least one cast-iron flange it is recommended to use bolts with a yield strength not exceeding 240 N/mm².

Fasten the bolts evenly and diagonally to prevent unnecessary tension and the resulting cracks or breaks.

We recommend using steel-reinforced rubber seals to DIN EN 1514-1 Shape IBC. If you use raised face flanges, these seals are mandatory.

5 Set-up and operation of the valve

5.1 Visual inspection and preparation

Before putting the valve and the equipment into operation, perform a visual inspection of all functional parts. Check whether all bolted connections have been properly fastened.

If there is an upstream stop valve this must be set to the open position so that the VAG DUOJET® Automatic Air Valve can function satisfactorily.

5.2 Function check and pressure test



Warning: The pressure exerted on the closed valve must not exceed its nominal pressure (see technical data sheet KAT 1912-A).

Newly installed pipeline systems should first be thoroughly purged to remove all foreign particles. If residue or dirt particles are present in the pipeline, they may clog the installation while the

pipeline is being purged. This may impair the function of the valve or even block it.

In particular after repair work or upon the commissioning of new equipment, the pipeline system is to be purged again with the valve being fully open. If detergents or disinfectants are used it must be ensured they do not attack the valve materials.

6 Maintenance and repair

6.1 General safety instructions



Prior to beginning inspection and maintenance work on the valve, the connection to the pressure carrying pipeline must be shut off and depressurized via the plug on the valve. Only afterwards may maintenance work on the valve be performed.

After completing the maintenance works and before resuming operation, check all connections for proper fastening and tightness. Perform the steps described for initial set-up as described under Section 5 “Set-up and operation”.

Statutory and local provisions as well as the safety and accident prevention regulations must be observed and complied with at all times.

Servicing, maintenance and inspection work as well as the replacement of spare parts must only be carried out by qualified staff. The plant operator is responsible for determining the suitability of the staff or for ensuring the relevant qualifications.

In case the operator's employees do not have the qualifications required, they need to attend a training course. This training course can e.g. be held by VAG Service employees.

In addition to this, the plant operator needs to ensure that all employees have understood these Operation and Maintenance Instructions as well as all further instructions referred to in them.

Protective equipment such as safety boots, safety helmets, goggles, protective gloves etc. must be worn during all work requiring such protective equipment or for which such protective equipment is prescribed.

Improper or wrong use of the valve should be avoided. Prior to the performance of any work on the valve and equipment it must be ensured that the relevant pipeline section has been depressurized and/or de-energised.

6.2 Inspection and operation intervals

The VAG DUOJET® Automatic Air Valve is virtually maintenance-free.

The valve should however be inspected within a period of one year (DVGW data sheet W 392).

Under extreme conditions of use this inspection interval should be carried out more frequently.

Before any maintenance work is performed on the VAG DUOJET® Automatic Air Valve, the valve must be shut off by an inspection valve and must be depressurized using the threaded plug 11 (see Section 6.3.1. “Design”).



Warning: Open the threaded plug part 11 only by 3 turns maximum. The pressure is relieved via the drainage groove in the thread. Maintenance work must not be performed before this has been done.

6.3 Maintenance work and replacement of parts

Maintenance activities are:

- Cleaning
- Removing deposits
- Reapplying a coating of corrosion protection (when necessary)
- Gasket replacement (when necessary)
- Air release orifice replacement (when necessary)

Inspection should include examination of:

- Damage and corrosion
- Movability of the float in the shut-off device
- Tightness
- Function
- Nozzle bores free from obstruction
- Visible deposits on floats and guide components

For shaft installation the following additional inspections are required:

- Proper condition and cleanliness of the shaft structure
- Working order of the intake and outlet air of the shaft as well as drain
- Condition of measures for thermal insulation
- Condition of additional protective measures against infiltration of dirt, microbes and rain water in the shaft

6.3.1 Design

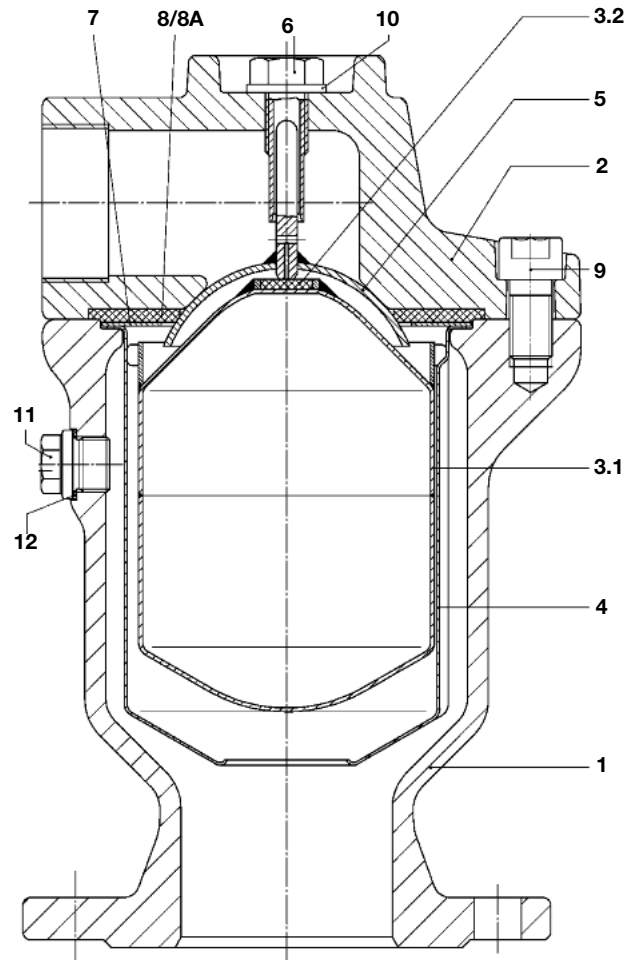
The design view in Picture 14 is a partial overview of the following descriptions of the work procedures. Spare parts with associated part numbers are available in our document VAG KAT-E 1912.

6.3.2 Recommendations for the replacement of parts

All parts should be changed as needed. The interval is oriented towards servicing requirements.

For the sealings (part 3.2 and 8) replacement is recommended every 5 years.

Replace the sealing ring (part 12) each time you open the threaded plug.



Item	Name	Material
1	Body	EN-JS 1030
2	Cover	EN-JS 1030
3.1	Float	DN 50 / PN 16 plastic > DN 50 stainless steel 1.4571
3.2	Sealing	EPDM
4	Shell body	1.4541
5	Shut-off device	1.4541
6	Lead srew	1.4305
7	Supporting Disc	1.4541
8 8A	Flatsealing Gasket p=0,1 - 1 bar	EPDM
9	Cylinder Head Screw	A4-70
10	Disc	A4
11	Plug Screw	A4
12	Sealing ring	Centellen

Picture 14: Design

6.3.3 Replacement of the seals (3.2 and 8)

- Unfasten the cylindrical screws (9) crosswise
- Lift off cover (2) of the valve
- The seals, float, shell and shut-off device can now be removed
- The seal (3.2) is attached to the float (part 3.1) by cyanoacrylate adhesive (rapid set adhesive). When replacing the seal, pull it off the float and then glue the new seal to the float.
- For subsequent reassembly, place the shell into the body. Place the float into the shell, insert the seal (part 8) as well as the retaining washer (part 7) into the cover and centre it. Insert the shut-off device into the guide screw (part 6) and place the cover onto the body. Fasten the hexagon socket screws crosswise.

6.3.4 Bolt tightening torques

Cylinder screw (9)		
M 12	M 16	M 20
30 Nm	10 Nm	20 Nm

Table 1: Cylinder screw tightening torques

Plug (11)
G1/2"
30 Nm

Table 2: Plug tightening torques

7 Trouble-shooting



For all repair and maintenance work, please observe the general safety instructions described in Section 6.1!

Problem	Cause	Remedial action
Leaking main air valve	Foreign matter stuck in seat area	Flush valve, possibly disassemble and remove foreign matter
	Internal pressure too low	To achieve tightness internal pressure must be at least 3 m water column. Replace gasket with a low pressure gasket (0.1 - 1 bar)
	Deposits from medium on the seat	Open cover, clean seat section
	Sealing damaged	Replace sealing (recommendation: replacement after a maximum of 5 years) see 6.3.3
	Improper installation position	Change installation position
Leaky air release orifice	Foreign matter stuck in air release orifice	Flush valve, possibly disassemble and remove foreign matter
	Sealing defective	Replace sealing (recommendation: replacement after a maximum of 5 years) see 6.3.3
Air release orifice rate too small	Operational characteristics were changed	Check layout and operational characteristics, if necessary, install special air release orifice with larger release bore
Outlet clogged	Insect infestation	Clean valve and attach insect protection

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