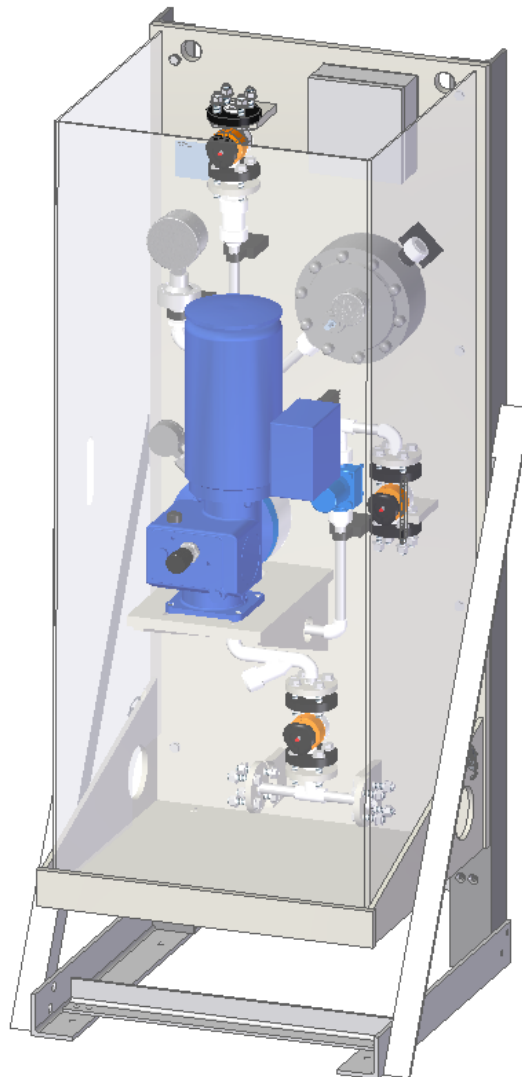


Product: Vertical Dosing Systems (DAV)

Type: DAV1-900.1-RF410.2-400ML

sera-drawing no.: A9443



Manufacturer: **sera GmbH**
sera-Straße 1
34376 Immenhausen (Germany)

Tel. +49 5673 999 00
Fax. +49 5673 999 01
e-mail: info@sera-web.com
Internet: www.sera-web.com

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1 General

CAUTION !



Operating instructions of the system subassemblies (pump, fittings etc.) included in the overall documentation must be observed by all means! (please see Chapter 15)

Pay attention to the general local instructions which apply for commissioning and operating **sera** products.

sera products are delivered ready for operation. Carefully read these instructions and especially the safety instructions herein contained before putting the system into operation.

When mounting the system the owner is responsible that the requirements according to the regulations on pressure vessels 97/23/EC as well as the valid regulations for prevention of accidents are observed.

2 Types

2.1 Type code

Example: Dosing system, vertical construction
DAV1-900.1

DAV	1	900.1	Construction
DAV	1	900.1	Number of pumps
DAV	1	900.1	Size

2.2 Type plate


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Typ Type	:	CVD1 - 60.1
Werk-Nr. Serial-No.	:	WD 00000
Baujahr Year of construction	:	2013
Fördermedium Medium	:	NaOH (example)

Fig. 01 Type plate (example)

2.3 Materials

The materials used are stated in the product description in the Appendix. The suitability of the materials for the pumped medium must be checked.

2.4 Design data

Medium	hydrochloric acid – solution max. 37% (HCl)
Viscosity	max. 100mPas
Working temperature	max. 20°C
Solids	Without
Assembly	indoor, frost proof
Design pressure	max. 10bar (tank pressureless)
Water quality, general	similar to drinking water, chemically neutral, free from solid and suspended matters and disturbing ion concentrations

2.5 Noise measurement

According to DIN 45635 the sound pressure level measured of the dosing system is between 50 and 70 dB (A).

2.6 Water quality

Water used for start-up, maintenance and closing down must be similar to drinking water, i.e. chemically neutral, free from solid and suspended matters and disturbing ion concentrations.

CAUTION !



**Note the compatibility of the chemical with water and take appropriate measures, if necessary.
Pay attention to the safety data sheet of the medium.**

3 Safety instructions

3.1 Note on quality

Read these operating instructions attentively before starting up or maintaining the system. Observance of these operating instructions and, in particular, safety instructions, helps to

- Avoid danger to staff, machines, and environment.
- Increase the reliability and service life of the equipment and the entire system.
- Reduce expenses for repairs and downtimes.

The **sera** quality management system is certified according to ISO 9001.

sera – products comply with the valid safety requirements and accident prevention regulations.

CAUTION !



Always keep these operating instructions within reach at the workplace!

CAUTION !



Pay attention to the safety data sheet of the pumped medium! The owner must take corresponding accident prevention measures to protect operating personnel from danger by the pumped media used!

3.2 Purpose of these operating instructions

These operating instructions contain basic notes which must be observed for installation, operation and maintenance work. Therefore, these operating instructions are to be read by the responsible fitter and the qualified personnel / operator before the system is installed and must be kept within reach at the place of installation of the machine/system.

The general safety instructions stated in this main section "Safety" and the special safety instructions given in the other sections must be observed.

3.3 Marking of notes

3.3.1 Marking of notes in these operating instructions

Special notes in these operating instructions are marked with the general danger symbol



(safety symbol in compliance with DIN 4844 – W9)

3.3.2 Marking of notes on the product

Symbols which are directly attached to the system, e.g. warning notes or symbols for fluid connections are to be observed and kept in a legible condition.

3.4 Personnel qualification and training

The personnel who operate, service, check and install the system must be suitably qualified. Range of responsibility, and supervision of the personnel are to be clearly defined by the owner. If the personnel do not have the knowledge required it is to be trained and instructed accordingly. If required such a training can be carried out by the manufacturer / supplier upon order of the owner. The owner must also ensure that the personnel have understood the operating instructions.

3.5 Dangers in case of inobservance of the safety instructions

Inobservance of these safety instructions can result in danger to persons, hazards to the environment and damage to the machine.

Inobservance can result in:

- Failure of important functions of the machine/system/unit
- Failure of prescribed methods regarding maintenance and service
- Danger to persons through electrical, mechanical and chemical influences
- Hazards to the environment through leaking dangerous media

3.6 Safety conscious working

The safety instructions specified in these operating instructions, the national regulations concerning accident prevention as well as internal working-, operating-, and safety instructions of the owner are to be observed.

3.7 Safety instructions for the owner / operator

The corresponding machine parts must be protected against contact if hot media are used.

Protective devices against accidental contact of moving parts (e.g. coupling) must not be removed during operation.

Leaking pumped media and utilities must be disposed off in such a way that any danger to persons and hazards to the environment are excluded. The legal regulations are to be observed.

Dangers through electric energy are to be ruled out.

3.8 Safety instructions for maintenance-, inspection- and installation work

The owner must ensure that all maintenance-, inspection- and installation work are exclusively carried out by authorized and qualified personnel who have read the operating instructions carefully. Only such work described in the operating instructions may be carried out.

The original spare parts and utilities used must comply with the requirements of the corresponding operating conditions.

CAUTION !



All screwed connections and connections may only be removed when the system is not under pressure. The notes in Chapter 8 must be observed!

Pumps, systems or units which are used for conveying hazardous media must be decontaminated before start of work.

All safety- and protective devices must be reinstalled or made operative immediately after the work was finished.

The instructions in the section "Commissioning" are to be observed before the system is restarted.

3.9 Arbitrary modification and spare parts production

Modification to and changes of the system are only permitted after previous consultation with **sera**. Original spare parts and accessories approved by the manufacturer increase safety.

Any guarantee claims against the manufacturer / supplier are nullified if non-authorised parts are used or if the system or system parts are modified arbitrarily.

Operating Instructions

3.10 Improper operation

Operational reliability of the supplied system or machine is only guaranteed if the product is used as intended, according to the descriptions in Chapter 3.11 of these operating instructions.

3.11 Proper use

sera products are exclusively to be deployed according to the intended use stated in the corresponding product description and the acceptance test certificate.

If the dosing system is to be used for other applications, then the suitability of the system for the new operating conditions must be discussed with **sera** beforehand!

Criteria for proper use:

- Observe characteristics of the pumped medium (please see safety- and product data sheet of the pumped medium used – the safety data sheet is to be provided by the supplier of the chemical / owner of the system)
- Stability of the materials which come into contact with the pumped medium
- Operating conditions at the place of installation
- Pressure and temperature of the pumped medium
- Place of installation (environmental conditions)

sera does not assume any responsibility if these criteria are not or only partly observed by the owner / operator.

3.12 Personal protection for maintenance and repair

In order to avoid risks to health, the provisions of the German Ordinance on Hazardous Substances (GefStoffV) (§14 Safety Data Sheet) and the relevant national safety regulations for the pumped medium and the operating conditions must strictly be adhered to.

In case of an incident pay attention to possibly leaking media.

Emissions are to be monitored by corresponding monitoring devices.

CAUTION !

Wear protective clothing, gloves, and a face protecting and breathing mask.



CAUTION !

Personal protective equipment must be provided by the owner of the system at all times!



3.13 Utilities

If not agreed otherwise in the contract conditions, **sera** products will always be supplied with the necessary utilities. (Type and quantity of the utilities / lubricants are stated in the operating instructions of the dosing pumps and valves).

3.14 Operating conditions

For the operating conditions, please see Chapter 2.4 Performance- and design data.

Different operating conditions must be agreed upon with **sera** beforehand.

The control system is not included in the scope of supply.

CAUTION !

Protective measures against unintentional start of the system due to changed operating modes, a voltage loss, shutdown, actuation of EMERGENCY STOP switches etc. must be defined by the owner!



Operating Instructions

4 Transport and storage

4.1 General

Before shipment **sera** products are checked for proper condition and functioning.

The products are packed according to the transport conditions. The system is transported vertically.

The customer has to check the product for transport damage immediately after receipt. Any damage detected is to be reported immediately to the responsible carrier and the supplier.

The unit should only be transported using suitable means of transport or hoists. Pay attention to the weight of the system and the carrying capacity of the means of transport.

4.2 Storage

An undamaged packaging protects the unit during subsequent storage and should only be opened just before the system is installed.

Proper storage increases the service life of the unit and protects from negative influences such as heat, humidity, dust, chemicals etc.

The following storage instructions are to be observed:

- Storage place: cool, dry, dust-free, no exposure to direct sunlight, and slightly ventilated
- Storage temperatures between +2°C and +25°C
- Relative air humidity not more than 50%.

If these values are exceeded, metal products should be air-sealed in foil and protected from condensation water with a suitable desiccant.

Do not store solvents, fuels, lubricants, chemicals, acids, disinfectants and similar in the storage room.

4.3 Transport

CAUTION !

The accident prevention regulations must be observed for transport!



CAUTION !

Keep a sufficient distance from high-tension lines when transporting the system



CAUTION !

Check the system for loose parts.
Secure loose parts for transport!



CAUTION !

Be careful when lifting the system. Pay attention to the center of gravity! Fasten the system sufficiently!



Operating Instructions

The unit should only be transported using suitable lifting gears.

Example:

Lift by means of a tie-bar (not included in the scope of supply).
Lead the carrying belts through the transport holes and lift.

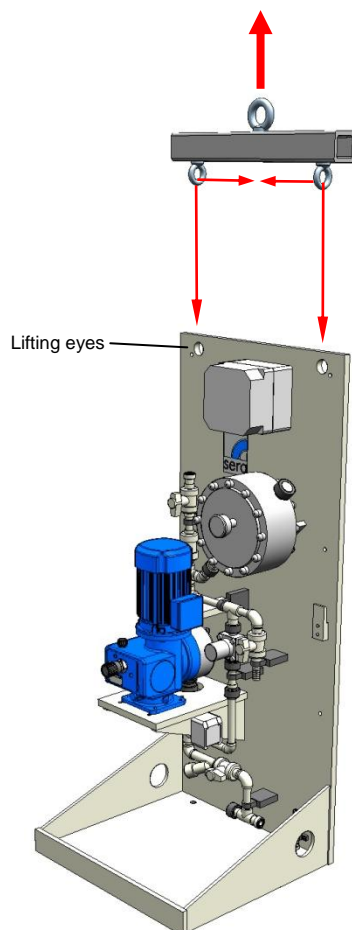


Fig. 02 Transport (e.g. with tie-bar)

CAUTION !



Do not place the system on the collecting basin while working!
If this note is not observed, the drain plug of the collecting basin may break off.

5 Technical specifications

DAV1-900.1					
Type	Flow rate [l/h]	Admissible backpressure [bar]	Admissible suction height mWC	Number of pumps	Pump series
DAV2-900.1	0 – 900	10	3	1	RF410.2-400ML



6 Dimensions

See dimensional drawing (drawing no.: A9443).

7 Description of the systems

The dosing unit was designed according drawing no. A9443 to dose HCl - solution. The chemical is dosed by a diaphragm pump. The conveying capacity of the pump can be set at the manual stroke length adjustment. Additionally an automatic dosing is possible via frequency converter on site.

The suction sided piping consists of the components:

- Diaphragm valve for shutoff
- Line strainer

The pressure sided piping consists of the components:

- Overflow valve: to protect pump and fittings against inadmissible overpressure, resulting from closed shutoff devices or blocked pipings.
- Diaphragm valve for emptying/flushing
- Pulsation damper: The chemical is dosed by means of an oscillating positive displacement pump. A pulsation damper can be integrated in the pressure pipe for smoothing the pulsating flow of the pump.
- Manometer with Diaphragm pressure transmitter
- Cone check valve.
- Diaphragm valve for shutoff

The pump and the corresponding fittings are mounted on a wall mounting plate with collecting basin and a frame work for ground installation. A detachable splash guard is attached to the mounting plate to protect the operating personnel from chemical splashes which may occur due to damage on the system.

The system is fitted with a terminal box/socket as transition points for power connections or a signal exchange.

CAUTION !



If the dosing unit is not equipped with an overflow valve, the plant operator has to ensure, that pumps and fittings are protected against inadmissible overpressure!

8 Installation and assembly

The following points must be observed when the dosing system is installed:

- Check the complete dosing system for damage (e.g. transport damage).
- The system is designed for indoor installation and must be protected from direct sunlight.
- Build in the dosing system and attach it with appropriate material.
- The pipings on the suction and pressure side must be sufficiently dimensioned.
- Connect all pipes and make sure that they are tension- and vibration-free. An offset of the pipes within the area of the screwed and flanged connections must be avoided by all means.
- Connect the return pipe from the overflow valve so that a free and unhindered backflow of the medium is guaranteed.
- Replace the transport closure (oil sight glass with seal) at the oil filler cap of the pump with the attached vent screw (**observe the notes on the pump!**).
- The electrical connections are to be made in accordance with the VDE (Association of German Electrotechnical Engineers) or the local electrical regulations applicable. Please see Chapter 8.3 *"Electrical connection"*.

8.1 Place of installation

- The place of installation must be frost resisting and ventilated.
- An installation in an aggressive or explosion-hazardous area is not permitted.
- The installation data according to the Appendix must be regarded.
- The installation site must be equipped with proper lighting for all works to be carried out (installation, operation, maintenance etc.).
- Leaking chemicals must be disposed off in a safe and secure manner at the installation site.

CAUTION !



Pay attention to the safety data sheet of the pumped medium! The instructions in the safety data sheet regarding handling of the medium must be observed!

8.2 Floor mounting

Fasten the unit to the floor. Place the system in such a way that operation and maintenance are possible at any time. The position of the bore holes is shown in the dimensional drawing (drawing no.: A9443).

CAUTION !



The fastening material is not included in the scope of supply and must be provided by the customer depending on the condition of the floor!

CAUTION !



**The mounting area must be flat.
Take appropriate measures in order to compensate for height differences so that the stand can be fastened without tension.**

8.3 Electrical connection

The electrical connection of the system is to be made depending on the system design (please see the product description in the Appendix) and according to the wiring diagrams on the data carrier supplied.

CAUTION !



The electrical connection must only be done by qualified personnel! The local safety regulations must be observed!

CAUTION !



The fuse protection and the characteristics of the electrical components are indicated in the separate manuals.

CAUTION !



Have the electrical installation checked by the responsible safety officer after the work was finished. Carry out an insulation measurement if necessary!

9 Commissioning

CAUTION !



Start the system only after it was released by the responsible safety officer!

CAUTION !



In principle the system is started up with water.

CAUTION !



It is the owner's task to ensure that the local regulations for prevention of accidents are observed!

Carry out the following steps to start the system:

- Before commissioning check all the pipe connections, screwed and flanged connections etc. for proper fit and retighten, if necessary.
- Before switching on the system for the first time, the following points should be checked:
 - Check the electrical connections and the terminal assignment.
 - Check the electrical excess-current cut-outs for proper operation and correct setting.
 - Check whether the local supply voltage and frequency correspond with the indications on the type plates.
 - Check proper function of the solenoid float switch by lifting the float switch (if existing).
- Carry out the first start-up with water. Pay attention to the water quality according to Chapter 2.4.
- Open all shut-off devices that are required for operation. Close the shut-off devices for emptying the pipes.
- Close the screw cap of the tank (if existing).
- Set the stroke adjustment and the stroke frequency adjustment (only for C-pumps) to values lower than 50% and start the pumps slowly.
- Preload the pulsation damper (if existing) to the pressure required for operation according to the separate operating instructions. This corresponds normally to 60% of the operating pressure.
- The overflow valves are factory set to the maximum admissible operating pressure of the dosing pump(s) (see product description).
- Commissioning of all other fittings according separate operating instructions.

CAUTION !



Check whether the set pressure of the overflow valves must be reduced in relation to other system parts installed which may only be submitted to a lower load.
Correct the settings according to the operating instructions "Diaphragm overflow valve" (TA 048, see data carrier enclosed).

- Have the pump(s) deliver against operating pressure and check the piping for leakage.
- After start-up drain off the water completely from all the pipes, tanks and pumps.
- Start the dosing system with the chemical reagent.

CAUTION !



Note the compatibility of the chemical with water and take appropriate measures, if necessary.
Pay attention to the safety data sheet of the medium.

Make sure that no exothermic reactions can occur which may lead to personal injury or damage to the system.

10 Maintenance

10.1 General

All maintenance work is to be documented carefully.

All technical devices must be serviced in order to guarantee proper function of the system. Generally valid statements cannot be made as the maintenance schedule depends on various factors.

- Maintain the pumps according to the separate instructions.
- Check the piping for tightness once a week, and repair, if necessary.
- Check the screwed connections for tightness every six months or before starting the system after a longer period of standstill.
- Check the system visually, and check the pressure every six months.
- Check proper function of the solenoid float switch every six months by lifting the float switch (if existing).
- Check the proper function of all fittings according separate operating instructions.
- Check the wires and electrical components for visual damage (loose connections, damaged cables, damaged devices etc.) every six months.

CAUTION !



Depressurize the system before starting maintenance work.

CAUTION !



Rinse the system with water (water quality according to Chapter 2.4) or a suitable medium until the system is free from any chemical residues before starting maintenance or repair work or replacing wearing parts.
Note the compatibility of the rinsing medium with the chemical according to the safety data sheet.

Exothermic reactions must be avoided by all means!

CAUTION !



Disconnect the system from the power supply and secure against being switched on again by appropriate measures, before starting maintenance and repair work or replacing wearing parts.
Consult a specialized electrician, if necessary.

10.2 Wearing parts

sera recommends to maintain the system twice a year to ensure proper operation.

Yearly maintenance comprises replacement of the gaskets that come into contact with the chemical, diaphragms (yearly or after 3,000 operating hours), suction and pressure valves of the dosing pumps. Please see also the separate instructions on the data carrier for maintenance of the parts.

Maintenance work which is carried out every six months comprises the checking of the complete dosing system.

- Check the overall function.
- Check the complete system for leakages.
- Check proper function of the fittings according separate operating instructions.
- Check the wires and electrical components for visual damage at regular intervals (loose connections, damaged cables, damaged devices etc.).
- Check the oil filling level of the dosing pumps.

11 Decommissioning

The following points must be observed when you decommission the system:

- Drain the chemical from the pipes.
- Rinse the pipes with water (water quality see Chapter 2.4) or a suitable medium and empty the pipes afterwards.
- Set the stroke length of the pumps to 50% to remove load from the diaphragm.
- Reduce preload pressure of the pulsation damper.
- Disconnect the system from the power supply.

CAUTION !



After the chemical was drained, rinse the system with water (water quality according to Chapter 2.4) or a suitable medium until there are no more chemical residues in the system!

Note the compatibility of the rinsing medium with the chemical according to the safety data sheet.

Exothermic reactions must be avoided by all means!

12 Fault analysis and corrective action

sera - products are sophisticated technical products which are only shipped after having been thoroughly tested and checked at our factory.

Should there be any faults, these can be detected and rectified easily and quickly according to the following instructions.

- For fault analysis and corrective action of the dosing pumps, please see the separate instructions on the data carrier.

13 Remaining risk / foreseeable faults

Transport of the system
Load is not sufficiently secured for transport.
Transport by untrained personnel.
Bistability during transport as well as loading and unloading not attended.
Underestimated the weight during hoisting.
Climbing on the unit.
Installation
Installation of the system at an improper site (outside, direct sunlight, explosion-hazardous area etc.)
Aeration closed.
Threads overturned/damaged
Contamination of the tank.
Piping bent when it was mechanically connected
Transport oil filler cap on the swap is not changed against the bleed screw.
Non-conforming electrical connection (without ground wire, mains not fuse-protected etc.)
Entering the tank.
Modification to another tank.
Installation on an unsuitable underground.
Unsuitable fastening.
Commissioning
Non-observance of the design data/operating conditions (medium, pressure, suction height, temperature etc.)
Incomplete removal of the test medium (water) before start-up with the chemical (dangerous reactions)
Non-observance of the electrical characteristics (motors, sensors)
Cover on vent openings.
Closed suction and pressure pipes
Incorrect settings of overflow valves
Dosing of the wrong medium.
Adjust / damage the level meter
To high pressure.
To high temperature → material failure
Overfilling of the tank.
Removing the sensor cable.
Dosing without assembled pressure piping.
Trial run without closed screw cap.
Operation
Operation of the pump with defective diaphragm
Ignoring a pump fault
Operation of the system beyond the limit values (nominal pressure exceeded, pressure peaks, contaminated medium (with particles))
Sudden closure of the pressure pipe
Closure of the suction lance.
Operation with opened screw cap.
Employees are not familiar with the handling of the pump
Dosing of the wrong medium.
Overfilling of the tank.
Dosing without assembled pressure piping.
Maintenance
Disregard of the maintenance schedule according to the operating instructions
Improper maintenance
Use of non-original spare parts
Insufficient rinsing before maintenance work
Further use of damaged cables.
Interchanging of the valves.
Not connecting the piping.
Cleaning
Protective clothing insufficient or missing
Wrong rinsing/cleaning agent
Use of unsuitable cleaning utensils
Rinsing/cleaning agent residues in the system
Inverting the container to empty
Blocking of the aeration.
Repair/corrective action
Repair work by untrained personnel
Improper execution of repair work
Decommissioning
Insufficient removal of the pumped medium from the pipes with subsequent rinsing
Disassembly of pipes with the pump running (residual pressure)
Disconnection from the power supply not ensured
Disposal
Improper disposal of the pumped medium, utilities and materials

Operating Instructions

14 Disposal

Shut-down the system. Please see "Decommissioning".

14.1 Disassembly and transport

Remove all fluid residues, clean thoroughly, neutralize and decontaminate.

Rinse the pipes with water (water quality see Chapter 2) or a suitable medium and empty the pipes afterwards.

Package the dosing system appropriately and ship.

If the system is shipped for repair the gearing must be filled with oil.

CAUTION !



Transport the system in a vertical position!

CAUTION !



Close the pipe openings for transport!

14.2 Complete disposal

Remove all fluid residues (incl. utilities) from the unit.

Drain lubricants and hydraulic fluids and dispose off according to the regulations!

Rinse the pipes with water (water quality see Chapter 2.4) or a suitable medium and empty the pipes afterwards.

CAUTION !



The consignor is responsible for damage caused by leaking lubricants and fluids!

15 Documentation of the system parts

Additionally to this operating instructions, the operating instructions of the complete documentation has to be considered:

- Operation instruction dosing pump
- Operating instruction pulsation damper
- Operating instruction overflow valve
- Data sheet Diaphragm valve
- Data sheet Cone check valve
- Data sheet Diaphragm pressure transmitter
- Data sheet Manometer

Notes

Notes