

INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

POWDER DISSOLVER



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Introduction

Van der Meijden recommends reading all delivered manuals carefully. Make sure that the delivered manuals are available to personnel who operate or maintain the equipment.

It is important to keep this manual for the lifetime of the equipment and to pass the manual on to any subsequent holder or user.

Van der Meijden will not be held responsible for any damage to the equipment caused by not following the instructions given in this manual.

Delivered Manuals

The documentation for this equipment consists of the following parts:

- Installation, service and maintenance instruction manual
- Electrical drawing (if applicable)

Machine Introduction

Intended Use of the Equipment

This equipment is intended for use according to the specifications in technical data and related documents. All other use is prohibited. Van der Meijden will not be held responsible for injury or damage if the equipment is used for any other purpose.

Manufacturer

This Van der Meijden equipment was produced by:

Van der Meijden machines
Magazijnweg 3a
5071 NW Udenhout
The Netherlands

Support and Feedback

If you encounter problems when operating this equipment or have other inquiries, comments, or suggestions for improvement, contact Van der Meijden.

Declaration of Conformity

A signed Declaration of Conformity is delivered with this manual.

**EG-DECLARATION OF CONFORMITY FOR MACHINES
(According to appendix II.1.A of the Machinery Directive)**

Van der Meijden Engineering hereby declares the installation, concerned

Powder Dissolver

Comply with the provisions of the following directives:

Machinery Directive (2006/42 / EC)
EMC directive

And further declares that the following harmonized standards have been applied:

NEN EN IEC 60204-1: Safety of machinery - Electrical equipment of machines -
Part 1: General requirements.

NEN EN 12100: Safety of machines - Basic concepts for design - Risk
assessment and risk reduction.

NEN EN ISO 14120: 2015: Guards - General requirements for the design and
construction of fixed and movable guards.

NEN EN 809: 1998 + A1: 2009 and Pumps and pump units for liquids - General
safety requirements.

NEN EN 1672-1: 2014 and Food preparation machinery - General basic rules -
Part 1: Safety requirements.

The technical file is available within the EER and can be drawn up in the name
and address of the manufacturer by the undersigned of this declaration.

Manufacturer name : Van der Meijden Engineering
Address : Magazijnweg 3A, 5071NW Udenhout
Country : the Netherlands

Responsible :

Signature :

CE Compliance

This equipment complies with the basic health and safety regulations of the European Economic Area (EEA).

Structure of Manual

The manual consists of a number of chapters:

First, the safety precautions for the installation will be given.

Chapter 1 contains a general description of the installation.

Chapter 2 describes the installation process.

Chapter 3 contains a description of the start-up procedure.

Chapter 4 contains a description of the cleaning procedure.

Chapter 5 contains all information regarding maintenance.

Extra attention must always be paid to text in **bold and / or italics**. These can be **warnings**, but also indications that make it easier for the operator to operate the installation.

A number of appendices are included in this user manual. These appendices contain diagrams and tables. Always use the attachments in combination with the corresponding chapters.

Version changes:

Version 1;

Safety

Read all safety precaution instructions throughout this manual and on safety signs attached to this equipment. Failure to follow all safety precaution instructions could result in death or serious injury.

Liability

The stipulations of this manual have been done with the greatest possible care. However, Van der Meijden Machines accepts no liability for any omissions in the information provided in this operating manual. Therefore, no rights can be derived from the contents of this manual.

Personnel Requirements

Note! Personnel includes all persons performing work on or near the machine or equipment. Only skilled or instructed persons are allowed to work with the machine or equipment.

Skilled Person

A skilled person must have relevant education and experience to enable him or her to identify hazards, analyze risks, and avoid hazards which electricity, mechanics, chemicals, and supply systems can create. Skilled persons must meet local regulations, such as certifications and qualifications for working with electricity, mechanical systems, and so on.

Instructed Person

An instructed person must be adequately advised or supervised by a skilled person to enable him or her to identify hazards, analyze risks, and avoid hazards which electricity, mechanics, chemicals, and supply systems on the machine or equipment can create.

Hygiene

Food product

Avoid microbiological contamination of the food product:

- Never clean the floors or the equipment in the process room (area) when the equipment is in production.
- Compressed air used for cleaning purposes should only be used outside the process room (area).
- Disinfect your hands before touching anything that may come into contact with the product.
- Keep your hands and gloves clean.
- Always wear some type of hair protection (cap or hairnet) and clean clothes (preferably white).
- Do not wear a watch, ring, necklace, earrings, or any other exposed jewelry.

Checkpoints

To ensure a safe product, it is important that the following checkpoints during the processing of the product are confirmed:

- That the selected configuration (capacity, temperature...) is valid for the food product to be processed.
- That no open tanks etc. are exposed to foreign objects/contamination.
- That carry-over of potential allergens between products during product change and cleaning is considered. A close inspection of the equipment is of utmost importance if a possible risk occurs - refer to QA system.
- That ingredients are of the correct type and amount according to recipes.
- That the cleaning solutions are of correct type, concentration and amount according to recipes.
- That no food residue according to defined control points remains after finalized cleaning.
- That no residue of chemicals is present after cleaning the equipment.

Production

To ensure safety during production the following checkpoints must be confirmed:

- When using and maintaining the installation, wear protective clothing, safety footwear, hearing protection and goggles.
- Read the installation operating manual before use.
- The installation may only be operated by authorized and qualified personnel.
- Incorrect use or operation of the installation can cause injuries to both operator and bystanders.
- Incorrect use or operation of the installation can cause damage to the installation and / or parts thereof.
- Avoid contact with the installation (with the exception of the operating components) during and immediately after use. Burning / entrapment risk.
- Be extra careful near rotating parts. Entrapment risk.
- Incorrect operation of manually operated valves and motors and coupling pipes of the installation can cause damage to these components and installation.
- Always keep the doors of the field boxes closed while the system is in operation.
- If you have any questions regarding the operation of the installation, please contact the manufacturer of the installation.
- Never run the pumps and homogenizer without product or water. This can cause irreparable damage

Maintenance

To ensure safety whilst maintaining the installation the following checkpoints:

- Always consult the manufacturer of the installation for maintenance, repair or overhaul.
- Maintenance may only be performed by authorized and qualified personnel.
- If you have to carry out maintenance, repair or overhaul of the installation, please ensure that the installation is de-energized, pressure-free and sufficiently cooled and clean before you start.
- After switching off the power, wait at least 4 minutes before mounting / dismantling electrical parts.
- When mounting and / or dismantling pipes and / or pipe components, make sure that these pressures are empty, empty and cooled.
- Always replace defective and / or worn parts with original parts. Parts other than those specified by the manufacturer may cause damage to components and / or parts.
- Also observe the specific instructions and warnings of the various loose components when performing maintenance.
- When the installation is restarted, ensure that all parts have been properly replaced and secured.
- Make sure that the maintenance switch is turned off or the plug is disconnected during maintenance work on engines. **(Don't forget to put it back afterwards!)**

Cleaning

To ensure safety during cleaning the following checkpoints must be confirmed:

- Cleaning can be active in various places in the factory.
- Keep this in mind at all times.
- **NEVER** open an unconnected valve of the installation when cleaning is active.
- **NEVER** disconnect a swivel bend or coupling bend during cleaning.
- Cleaning agents such as lye, disinfectant and acid are used during the cleaning of the installation. Handle this with great care.
- Always observe the applicable safety regulations and the recommendations of the detergent manufacturer.
- Wear protective clothing, safety footwear, hearing protection and safety goggles when cleaning the installation.
- When changing concentrate vessels always wear protective clothing, protective gloves, safety footwear and a face shield.
- If you have any questions about cleaning, please contact the manufacturer of the installation.
- **NEVER** use disinfectants or cleaning agents with chlorine or peracetic acid. These can cause irreparable damage to the installation. If in doubt, always consult your supplier.

1. General description

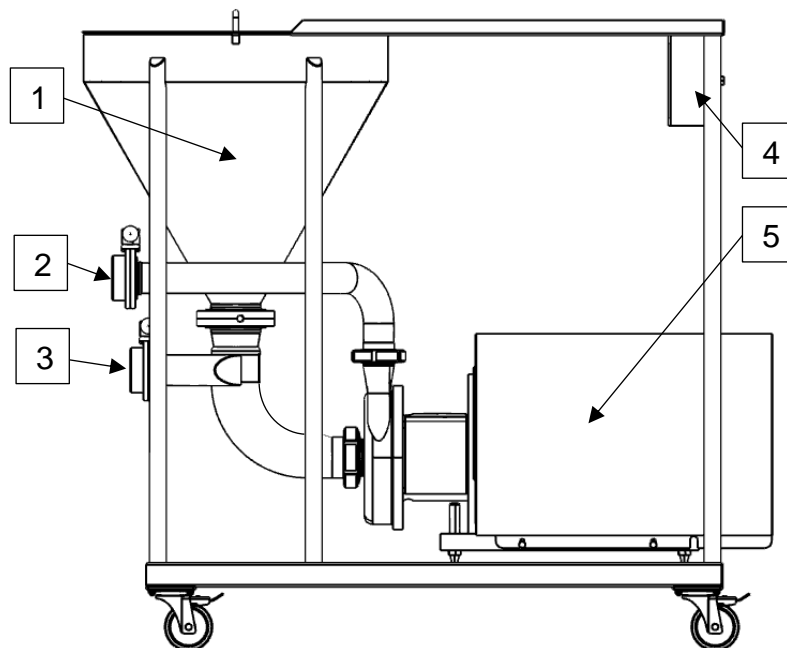
In the dissolvers design, it is possible to distinguish three parts or areas that define its build and operation.

- The hopper
- Venturi
- Pump

The top part consists of the hopper, solid-material area, and we can add powder using a butterfly valve with an adjustable handle. The middle area consists of the venturi, which is the dissolver's suction, and where the liquid is introduced. The pump used as a mixing chamber, located in the bottom part, is where the liquid and the powder mix. The powder dissolver is of a compact design, with the simple connection between the motor and hopper for easy maintenance. The end connectors are milk couplings. The standard motor complies with IEC standards, with IP-55 protection and class F insulation. On request, the motors can be supplied with other protections. All the parts entering into contact with the product are manufactured in AIS 304L. This equipment is suitable for his use in food process.

Main components

Below the main components of the powder dissolver are shown.



1. Powder hopper
2. Outlet
3. Inlet
4. On/off switch
5. Pump

Working principle

The dissolver basically consists of a hopper and a centrifugal-pump. The suction comes from the venture effect of the flow of the liquid. The suction created by the dissolver pump sucks the powder from the hopper through the internal venturi to the mixing chamber. The liquid is introduced tangentially into the mixing pipe where the pressure gradient of the dissolver is zero. The liquid enters the mixing chamber tangentially. In this way, the powder-inlet pipe remains dry while the dissolver is in operation.

If the inlet pipe appears to be blocked, firstly, check that the rotating direction of the motor is correct and then. In order to check the rotation of the pump check for the arrow on the pump. During normal operation, a vortex is formed in the center of the impeller, sucking the powder through the internal venturi and remaining dry. If the vortex is not formed, the powder might become damp and flocs may form in the mixture, the inlet pipe might even become blocked.

Here are the reasons why the powder may become damp or wet:

- **Incorrect liquid-intake flow rate:** A very high flow rate and/or pressure may destroy the dissolver vortex, and it would then not be able to pump the liquid with sufficient speed. This can also happen with a very low flow rate, as it causes powder to accumulate on the impeller, thus making it impossible to create the vortex in the center of the impeller.
- **Incorrect pressure:** The differential pressure of the dissolver must be low, the same as the pressure at the dissolver intake, which must be negative.
- **High viscosity:** A viscous product naturally causes counter pressure. Adding this to the counter pressure caused by the grille, leads to very high pressure. It is advisable to remove the grille, which is an optional part, when highly viscous products need to be mixed.
- **High delivery pressure:** If the delivery piping is too long or its diameter is too small, or viscosity is very high, a very high counter pressure will be caused.

In order to resolve these problems, the piping must be of correct dimensions, or if necessary, a pump must be fitted to the dissolver outlet. It may be a centrifugal pump, but its pumping capacity is limited if maximum mixture yield is required. If counter pressure increases in the dissolver, the vortex diminishes thus reducing the mixing capacity of the solid and liquid ingredients. It is also important to maintain negative pressure at the dissolver intake.

The amount of powder that can be added is very difficult to define, as a great number of variables are involved. Some of these variables are particularly important, such as:

- Dampness
- Fatty material content
- Microscopic texture (smooth, rough).

- Density
- Fluidity (air volume in the product)
- Powder type (granular, flaky, fines, etc.)

Products to avoid

- **Abrasives:** These products deteriorate the mechanical seals and impellers.
- **Effervescent:** The gas that these produce prevents the vacuum from forming and the powder from falling from the hopper.
- **High temperatures:** It is not advised to work at 65°C, as vapors may be given off that may cause the venturi to be blocked. This may also cause cavitation in the blender as it approaches boiling point.
- **Very high viscosities:** The blenders cannot pump highly viscous products.
- **Incompatible products:** Products incompatible with the various mechanical seals and elastomers.

Application

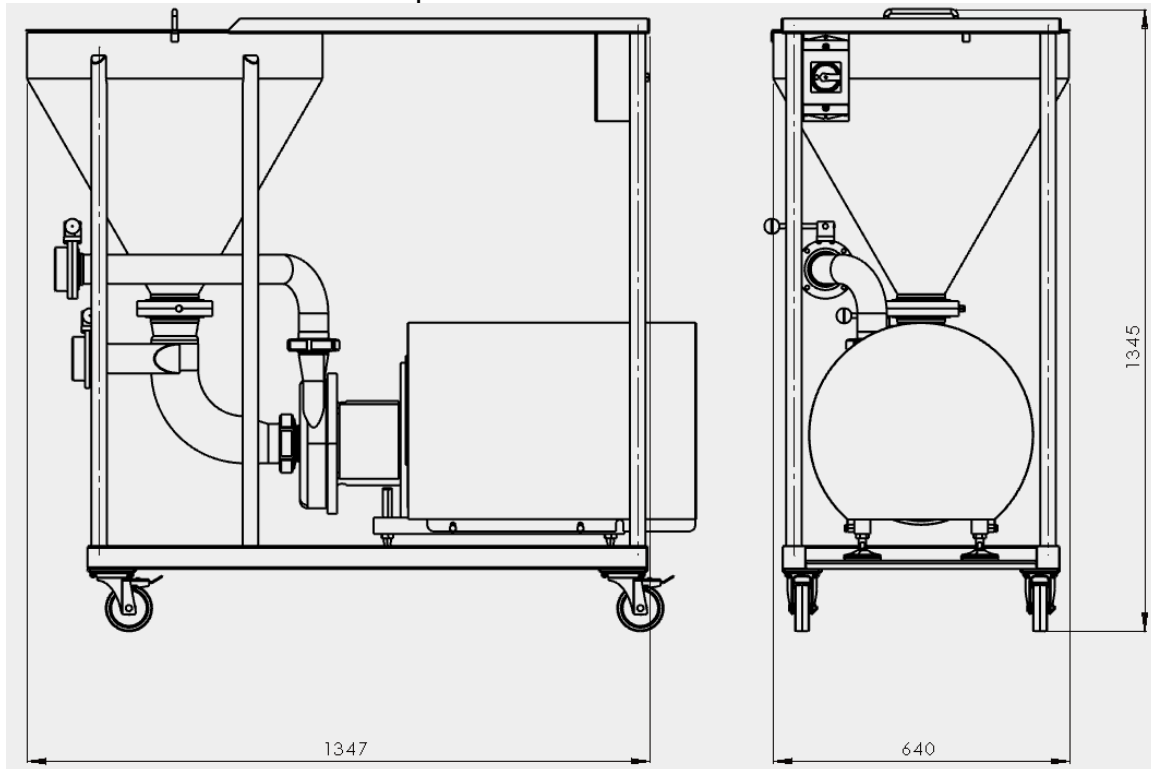
The powder dissolver can be used in any process where powder is added first and is then dissolved in liquid. Examples:

- Powdered milk.
- Whey.
- Chocolates.
- Sauces.
- Brines.
- Fertilizers.
- Lactose.
- Stabilizers, mixtures with milk.
- Pesticides, etc.

Technical specifications

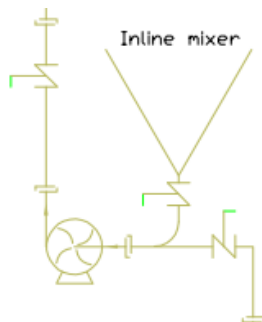
Dissolver model	Powder dissolver 7,5	Powder dissolver 11
Dissolver motor	7,5 kW	11 kW
Diameter	DN65 milk couplings	DN65 milk couplings
Liquid flow	up to 50,000 liters/hour	up to 65,000 liters/hour 9000 [kg/h]
Powder flow	up to 6500 kg/hour	up to 9000 kg/hour
Hopper capacity	90 liters	90 liters

Below the dimensions of the powder dissolver are shown:



2. Installation

This chapter describes the unpacking and installation of the powder dissolver. Each of these aspects are described. Below a schematic view of the powder mixer is shown. It will be helpful understanding the configuration.



Unpacking and transport

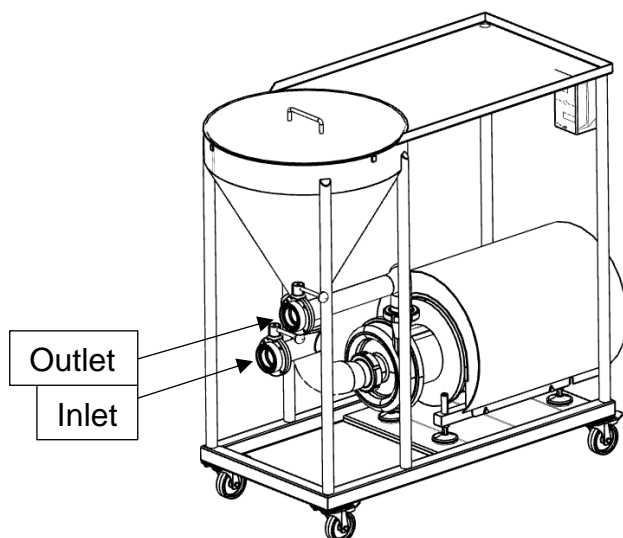
When unpacking, check all parts for damage in transit. Damaged parts must not be used. In the event of any damage, notify the transport company and relevant transport insurance company immediately. A suitably qualified member of staff must unpack, clean and assemble the machine in accordance with the installation instructions.

Goods must be stored and transported in the original packing. Avoid any loading or mechanical stress, in particular of housings, shafts, bearing points, through foreign objects or inadmissible vibration. Goods may only be transported on the load handling equipment provided for this purpose.

Installation of powder dissolver

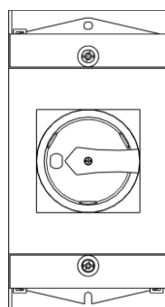
The machine must be set up safely on the floor so that it is easily accessible. The machine must not be exposed to any heat radiation or technical magnetic fields. No stands for people or other heavy objects may be attached to the machine. The machine must not be set up in traffic areas. It must be accessible for maintenance and operation at all times. Install the machine as near to the production tank as possible. *Lock the rollers to prevent uncontrolled movement of the machine.*

When connecting the product pipes consider the product inlet and outlet (shown below) must be firmly and tightly connected to the tank's circulation pipe. Keep the product inlet pipe (intake pipe) as short as possible and do not use a diameter smaller than the connection of the unit. Use bigger diameters for increased viscosity in order to reduce the pressure drop on the suction side. In order to effectually control the powder ingestion, install pressure indicators on the inlet and outlet. Adjust the valves in order to create a fitting pressure situation.



Electrical

Since no dangerous movements are accessible on the machine, no emergency stop has been provided. When the motor is connected to the power supply, check that the motor voltage corresponds. The motor voltage is indicated on the motor rating plate. **A soft starter is necessary to start and stop the pump.** Mainly because the start-up current is too high for the switch. The switch consists of a thermal switch, when the motor is being overloaded the pump will switch off automatically.



3. Start-up

A minimum fluid volume is required for the machine to function and this has to be introduced into the mixing tank. Please perform the following operations in the order listed when commissioning the machine:

- Close the ball valve underneath the funnel.
- Open all the valves in the circulation pipe.
- Check in the machine inlet whether the fluid is flowing into the machine automatically. If it is, wait until the pipe fills.
- Start the pump a **soft starter**.
- Control the pressures by closing or opening the in-and outlet valves and monitoring with the pressure indicator.
- Introduce powder into the funnel.
- Slowly open the ball valve underneath the funnel.
- With hardly soluble powders, the ball valve should only be opened 10%-15%.
- With easily soluble powders, the ball valve may be opened 100%.
- Make sure that during the powder intake, no air pockets form in the powder, as otherwise, air can be entrained into the system. Air pockets should be avoided and any that occur should be dislodged immediately (manually).
- After the powder has been drawn in, close the ball valve immediately and only open it again when powder is next added. **Never aspirate air into the system.**

4. Problem solving

The following table provides solutions to problems that might arise during blender operation. The blender is assumed to have been properly installed and correctly selected for the application. Please contact Van der Meijden if technical assistance is required.

Operating problems	Probable causes
No suction	1, 2, 3, 4, 5, 6, 7,8,9
Insufficient pressure on delivery	10, 11, 12
Motor overload	13, 14
Noise	15, 16, 17
Vibrations	17, 18, 19, 20
Leaks	6, 7, 21, 22, 23

Probable causes		
1	Pump supply incorrect.	Select the correct pump size for said application.
2	Wrong direction of rotation	Reverse the motor rotation direction.
3	Excessive temperature.	Reduce temperature
4	Leak in delivery pump suction.	Check the suction pipe and all its connections
5	Worn mechanical seal.	Replace the mechanical seal of the pump.
7	Differential pressure too high	Reduce pressure.
9	Suction pressure too high	Reduce suction pressure. It may be possible to stop using the delivery pump.
10	Insufficient liquid.	Check the delivery pump.
11	Highly viscous product or delivery height too high.	Fit an extraction pump
12	Worn motor bearings.	Replace the bearings as indicated in the manufacturer's instructions manual.
13	Foreign bodies inside the blender.	Disassemble the blender and remove the foreign bodies. Check the housing, impeller, and mechanical seal.
14	The blender is not at the right level.	Correct the blender level and alignment.
15	The impeller has been damaged.	Replace the impeller
16	O-rings unsuitable for the fluid.	Fit suitable O-rings after checking with the manufacturer.
17	Clamp is loose.	Tighten the clamp.

5. Cleaning and maintenance

In order for the powder dissolver to have a long life it's essential to clean and maintain it. In this chapter these aspects will be further elaborated.

CIP (Cleaning In Place)

The unit has to be cleaned regularly, depending on the type of operation. Dirt in the pipes and chambers can lead to contamination and therefore pollution of the product (when next commissioned). The cleaning (CIP) of the machine is carried out in combination with the cleaning of the tank or when cleaning the pipe system of the entire installation. The funnel and the ball valve, which should be cleaned manually. Make sure the lid is on the hopper whilst cleaning in order to make sure no lye escapes.

Preventive maintenance

Maintenance is an important aspect of the installation. Preventive maintenance will increase the life and stability of the installation and keep failure costs low. In addition to the scheduled maintenance work, daily and weekly checks are important to identify and anticipate problems. Always consult the manuals of the component manufacturer. If parts need to be replaced during maintenance work, use only original parts. Before starting maintenance work, the following measures must be observed:

1. The installation must have cooled down sufficiently
2. The supply voltage must be disconnected
3. If pipes or pipe components need to be dismantles, make sure that they are atmospheric before starting
4. Also observe the specific instructions and warnings of the various loose components when servicing them
5. When the installation is restarted, make sure that all parts have been properly replaced and secured.