Manual

> NUTRIJET - USER

CREATING
A CLIMATE
FOR GROWTH
PRIVA

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Aim and scope

This manual contains all of the information required to safely and correctly operate, maintain and decommission the fertiliser dosing unit. This manual will also allow you to effectively observe and resolve any faults.

The data and the illustrations in this manual relate to the various models of the fertiliser dosing unit. In addition, each fertiliser dosing unit has customer-specific features, which may differ slightly from the description in this manual. You can find details about this in the project drawings and documents that have been created specifically for your delivery.

For the sake of simplicity this manual uses the term 'unit' to refer to 'fertiliser dosing unit'.

Target groups and required competencies

Target group	Tasks and responsibilities	Training, knowledge and experience required
User management	ability to do the following with the unit: • operate • check in the event of a malfunction and resolve simple malfunctions • maintain it in accordance with the maintenance schedule (simple maintenance only)	• general technical insight • knowledge of the crop's water requirement and fertiliser requirement • some knowledge of the characteristics and hazards of the chemical substances used in the water installations

Availability of the manual

This manual must be available in the workplace at all times for the personnel who operate and monitor the unit.

In addition to this manual, other relevant user manuals, such as the process computer software manual, must also be available.

Explanation of symbols in this document

DANGER
Instruction to prevent physical injury or damage to the product, the installation or the environment.

CAUTION
Instruction to prevent problems with the product or the service.

INFORMATION
Additional information.

TIP
A tip or other useful information.

Warranty

The warranty expires if the product is not installed, used and maintained in accordance with the instructions in the Priva manual. For more details refer to the general terms of delivery (Priva will supply these on request and refer to www.priva.com) and the specifically agreed terms of delivery.

Safety

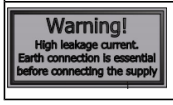
- Before starting to work with the product, read the entire manual so that you are familiar will all safety instructions and safety precautions.
- In addition, read any other manuals supplied with specific components.

Safety - general

- Only Priva approved installers/service engineers who have received product-specific training from Priva are allowed to install, configure, repair and, if necessary, alter the product.
- Making alterations to the safeguards and safety icons on the equipment is prohibited.
- The internal connections are made in the factory and are to a large extent customer-specific (refer to the supplied project drawings). Do not, therefore, alter the internal connections.
- External equipment or components that are connected to the unit, such as computers and networks, must comply with the relevant safety instructions for electrical isolation.
- Both the installer/service engineer and the user must regularly check and maintain the equipment (the safeguards in particular) in accordance with the instructions in the manual. Keep the equipment clean and the surroundings tidy.
- Report malfunctions or damage to your installer immediately. Take the equipment out of operation and do not use it if a defect is found.
- Only use original spare parts for repairs.
- After making repairs check the correct status and functioning of the equipment.
- If the user allows personnel to operate the equipment, he/she must adequately instruct this personnel. In particular this should cover the safety risks and safety instructions stated in this manual. He/she must also supervise correct compliance with the instructions.
- Ensure that the personal protective equipment prescribed in this manual is available and that it is used.
- Display the safety icons that are applicable in the room where the equipment is set up.
- Ensure that the safety icons on and around the unit are clearly legible at all times. Replace any stickers with the safety icons which have become illegible.

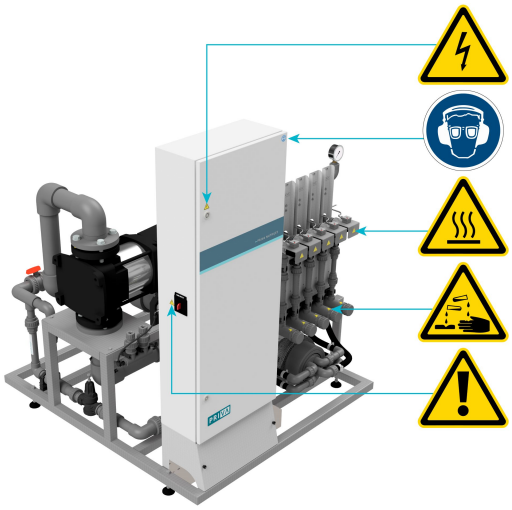
Meanings of safety icons

Below are the meanings of the general safety icons that may be found in, on or around the unit.

Warning symbols for specific hazards	
	Hazard: general warning
	Hazard: corrosive substances
	Hazard: hot surface
	Hazard: high voltage (danger of electrocution)
	Hazard: UV radiation
	Hazard: oxidising substances
	Hazard! High leakage current. Earthing required for the connection of the power supply.

Prescriptive symbols	
	Wear ear protection
	Wear safety glasses
	Wear ear protection and safety glasses
	Wear non-permeable gloves that are resistant to chemical substances
	Wear clean work clothes that cover as much of the skin as possible
	Wear (safety) boots
	Read the device manual

Safety icons on the unit



Personal protective equipment

When working on the unit, tanks and lines always wear the following protective equipment to prevent injury or damage to your health:

Safe handling of chemical substances

When working near or on equipment for chemical substances, there is a danger of contact with concentrated fertilisers, acid, lye or hydrogen peroxide. These chemical substances may be caustic and corrosive. Hydrogen peroxide is also caustic, is a strong oxidising agent and can react violently with certain other substances. This presents a risk of injury to the eyes and skin and of damage to the equipment.

Ask the supplier of the chemical substances for detailed safety information. Ensure that everyone working with or near the chemical substances is aware of the following:

- the names of the substances and the concentrations;
- the risks;
- the protective measures required;
- action to be taken in the event of contact with the skin or eyes or after inhalation or ingestion;
- action to be taken in the event of leaks.

The following safety precautions apply for working with chemical substances:

- Position the unit and tanks above a spill containment facility: a liquid-resistant floor or a liquid-tight drip tray. The floor, together with walls, barriers or raised edges, forms a spill containment facility. [1]
    - The spill containment facility must be of sufficient strength to withstand the liquid pressure arising from a leakage and must be resistant to the effects of the substances stored in the tanks. [1]
    - The spill containment facility must be able to contain the total volume of the tank. If several tanks are located above the spill containment facility, the collection capacity must be equal to the volume of the largest tank plus 10% of the combined volume of the other tanks. [1]
    - A tank for storing acid must be placed in a different spill containment facility from a tank for storing a basic substance. [1]

    [1] *Source: https://www.infomil.nl/*
- Make sure that hydrogen peroxide does not come into contact with other substances.
- Set the components up in such a way that they cannot easily be damaged.
- Ensure the dilutions are correct and use materials that are resistant to chemical substances.
- Clearly mark tanks and lines with the substances they contain.
- Ensure that the room is well-ventilated.
- Wear safety glasses, safety gloves and (safety) boots that are impervious to chemical substances. Wear clean work clothes that cover as much of the skin as possible.
- Ensure that there are facilities for showering and bathing the eyes near at hand. Ensure that everyone understands where these facilities are and how to use them. Ensure that the facilities are working at all times and are clean. Regularly rinse eyewash fountains in particular to prevent bacterial pollution.
- Remove clothing immediately if it has been contaminated with chemical substances. Wash the skin and the clothing with copious amounts of water.
- Ensure that the telephone number of professional emergency services is known in case that service is required. Notify the emergency services of which substance is involved in the event of a disaster.
- Ensure that facilities for collecting leaking chemical substances, cleaning them up, diluting them with water and rinsing them away are always close to hand.
- Never add water to concentrated substances – add the concentrated substance to the water! This keeps the consequences of the reactions (gas formation, heat generation, effervescence, splashing) to a minimum.
- Isolate the system from the main line and empty the equipment and lines and/or rinse them thoroughly with water before opening them for maintenance.
- Drain discharge water - if not reused - in accordance with the locally applicable environmental regulations.

Take the following preventative measures when working with acids:

- Never add water to acid but always acid to water. This is on account of the strong heat development and the risk of acid splash when you add water to acid.
- Always check first where the safety facilities (such as an eyewash fountain) are located in the operating area.
- When working with acid, always keep an eyewash fountain and a bucket of tap water within reach.
- Make sure that the stock of acid has been installed in accordance with the regional and relevant regulations.
- During maintenance work, remember that the water in the unit may be acidic. Before starting maintenance work, flush the system, e.g. with non-acidic rinse water.
- Concentrated acid is found in all the components of the acid dosing system. Always clean these components thoroughly before starting maintenance work on the acid dosing system.

Electrical safety

The unit is powered from the mains voltage. There is a potential hazard of electrocution or fire resulting from a short circuit. You must therefore adhere to the following safety instructions:

- Keep the housings of electrical components closed.
- Keep the electrical parts dry.

- Make sure that the earthing is connected correctly.
- Ensure that the unit is connected to its own fuse group with the correct fuses.
- The electrical connection must comply with the locally applicable regulations.

During installation, maintenance or while resolving faults it may be necessary to open the housing for the electrical components. In this case, adhere to the following safety instructions:

- Preferably, make the unit totally free of electricity by removing the plug from the socket outlet or by removing fuses from the fuse group.
- If the unit cannot be made free of electricity then take extreme care. Use well-insulated tools and do not touch the ends of wires, connections and electrical components with your bare hands. Keep the surroundings dry and ensure that there is someone close by to keep an eye on you.
- Wear an earthed wrist strap when working in the cabinet. Otherwise the electronic components may be damaged due to static electricity.
- Once the work has been completed, close the cabinet in the correct manner.

Safety with mechanical parts

Adhere to the following safety instructions to prevent injury from mechanical causes:

- Transport and position the unit in accordance with the instructions in the (installer) manual. The unit is heavy!
- Install lines/hoses in such a way that no one can trip over them. Keep the surroundings tidy and dry to prevent trips and slips.
- Keep the frequency controller, pumps and electrically operated valves closed in order to prevent water damage.

Take measures to prevent water hammer to avoid damage to equipment. Fill lines gradually and bleed them before switching the pumps to full operation or fully opening main valves.

Safety with hot parts

Parts of the unit that may become hot are equipped with this sticker and protected as much as possible.

Do not touch these parts during or shortly after operation.

Noise safety

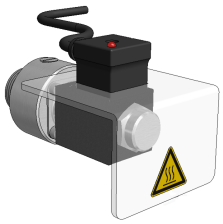
The emission sound pressure depends on the configuration selected. Wear ear protection when noise-producing equipment is present in the room.

Safeguards

The unit has the following safeguards:

- The cabinet containing electrical components is closed with a locked door.
- The fan of the electric motor on the system pump is protected by a cover.
- The motor protection switches the system pump off if it is consuming too much current due to overloading. The process computer detects this situation and then shuts down the entire unit.

- The power supply of the modules in the cabinet is connected to a circuit breaker that removes the power if overloading occurs.
- The hot parts of the dosage valves are protected by a transparent, L-shaped plastic sheet.



Shielding on a dosage valve

- Install and use the equipment in accordance with the instructions in the manual to ensure that the safeguards function correctly.
- Never bridge or remove the safeguards: this may lead to a serious accident.

Residual risks

The following risks could not be excluded in the design:

- If the unit is altered or is used in such a way that it becomes contrary to the instructions in this manual, unforeseen risks may occur.
- If the pump switch is set to *automatic*, the process computer can start the pump. Therefore, set the switch to *off* during maintenance when the process computer must remain on.
- Because the unit is usually connected to other external electrical equipment the unit has not been fitted with an emergency stop. The installer must install a separate emergency button near the unit which can be used to switch off the entire installation.

Product description

Functions and intended use

The unit belongs to the type of industrial equipment for controlling processes. The unit controls the fertigation process in the horticulture industry by measuring various output values and adjusting them to set values.

The function of the unit is to supply the desired irrigation water by suctioning in and mixing supply water and fertilisers, while at the same time measuring and adjusting:

- the electrical conductivity of the irrigation water;
- the pH value of the irrigation water;
- the pressure and capacity of the irrigation water (optional).

The unit adjusts these output values to values that have been set by programming from a local or remote process computer. For operation, a local process computer can be equipped with a local wireless network.

Suctioning and mixing of supply water and fertilisers

The unit draws in the diluted fertilisers that have been dissolved in water from several fertiliser tanks and mixes them with supply water to form homogeneous irrigation water.

Optionally, it is possible to select the pre-mixing of various water supply sources and/or filtration of the irrigation water.

Measuring and controlling the electrical conductivity of the irrigation water

The electrical conductivity of the irrigation water is a measure of the fertiliser concentration and is measured by the unit using EC sensors. Depending on the measured values and the programmed recipe, the process computer adjusts the quantity of suctioned-in fertilisers by controlling the fertiliser dosing channels.

Measuring and controlling the pH value of irrigation water

The unit brings the pH value of the irrigation water to the desired level. The pH value is measured by the unit using pH sensors. Depending on the measured values and the programmed recipe, the process computer controls the necessary pH correction. For the pH correction, one of the fertiliser dosing channels is used to dose acid or lye.

Measuring and controlling the pressure and capacity of the irrigation water (optional)

The pressure and capacity of the irrigation water supplied by the unit are dependent on the pump on the unit. Optionally, you can choose to regulate the pressure of the irrigation water with a frequency controller.

Structure

The structure of the unit, both the hydronic and the electrical part, is partly customer-specific and is determined during the purchasing process. These customer-specific features may differ in detail from the images shown in this chapter.

Structure - hydronic part

In essence, the structure of the unit can be divided into the groups that are explained in this chapter. The table gives an overview of the variants with references to the associated images and dimension tables.

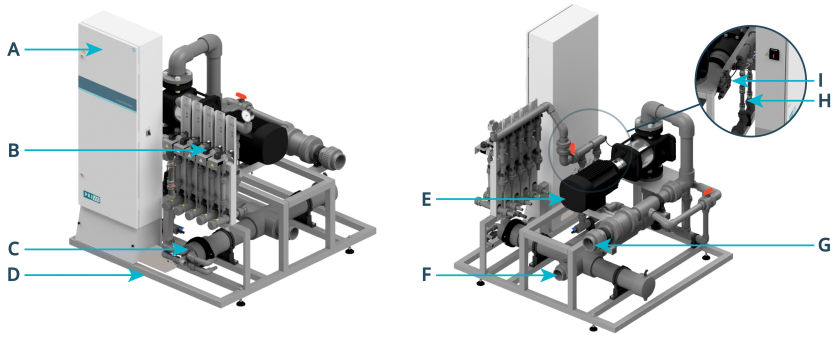
Explanation of the table
Use the table to find the correct image, technical drawing and dimension table for a variant of the NutriJet.
The basic variants (without post-filtration, without pre-mixing) of the NutriJet Inline are in row 1, the other variants of the NutriJet Inline are in rows 2 and 3.
The NutriJet Bypass is in row 4.

NutriJet variants in main groups

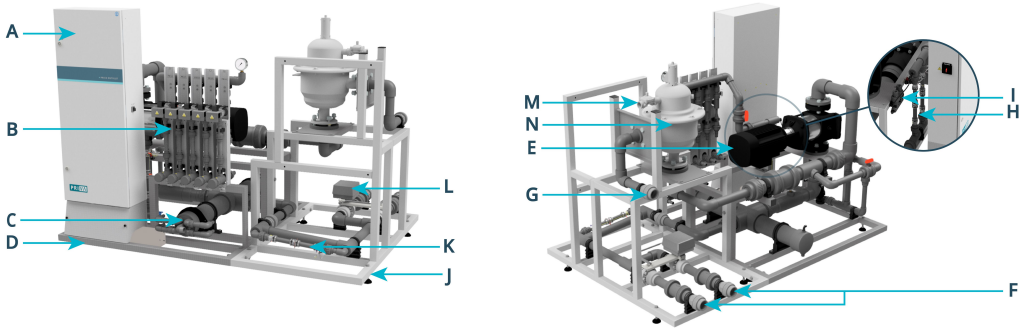
Max. dosage capacity (l/h)	Inline / Bypass	Number of mixing chambers	Post-filtration	Pre-mixing	Diagram	Technical drawing and dimension table
100, 300, 600	Inline	1 or 2	-	-	NutriJet 100/300/600 Inline (page 12)	Technical specifications - mechanical (page 47)
100, 300	Inline	1 or 2	√	√	NutriJet 100/300 Inline, with post-filtration and/or pre-mixing (page 12)	Technical specifications - mechanical (page 47)
			√	-		
			-	√		
600	Inline	1	√	√	NutriJet 600 Inline, 1 mixing chamber, with post-filtration and/or pre-mixing (page 12)	Technical specifications - mechanical (page 47)
			√	-		
			-	√		
		2	√	√	NutriJet 600 Inline, 2 mixing chambers, with post-filtration and/or pre-mixing (page 12)	Technical specifications - mechanical (page 47)
			√	-		
			-	√		
300, 600	Bypass	1 or 2	-	-	NutriJet 300/600 Bypass (page 13)	Technical specifications - mechanical (page 47)

Legend for the following 5 images

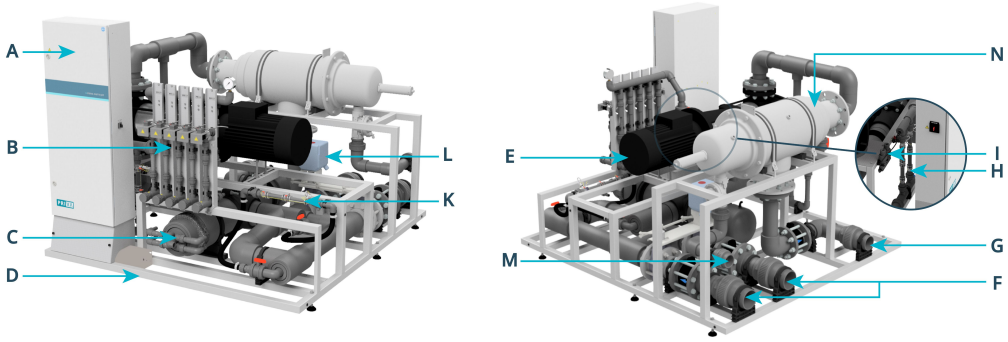
A	cabinet	H	EC sensors
B	dosing channels	I	holder for pH sensors
C	mixing chamber	J	*extra frame with adjustable legs (optional)*
D	frame with adjustable legs	K	*EC sensor for EC pre-control (optional)*
E	system pump	L	*pre-mix valve (optional)*
F	connection for supply line	M	*connection for drain line filter (optional)*
G	connection for main irrigation line (line to crop)	N	*filter for post-filtration (optional)*



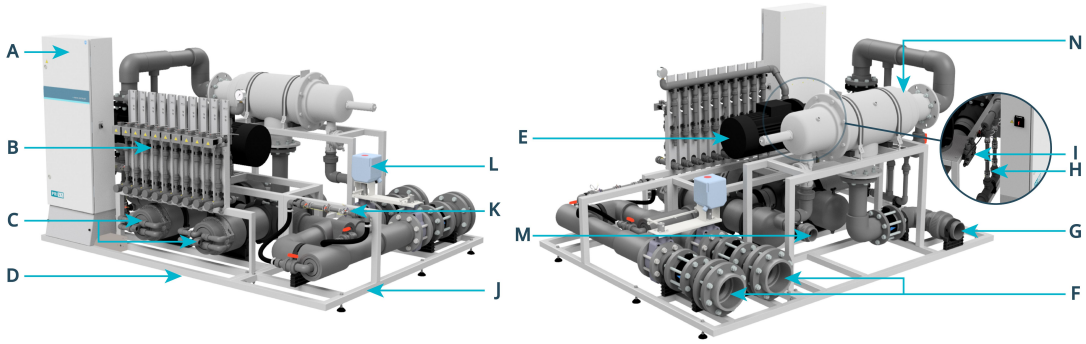
NutriJet 100/300/600 Inline



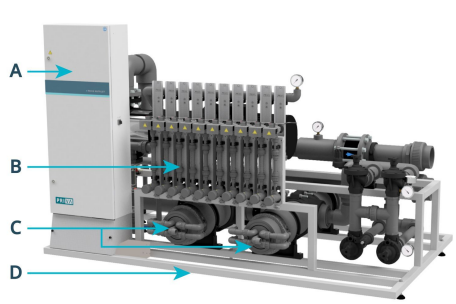
NutriJet 100/300 Inline, with post-filtration and/or pre-mixing

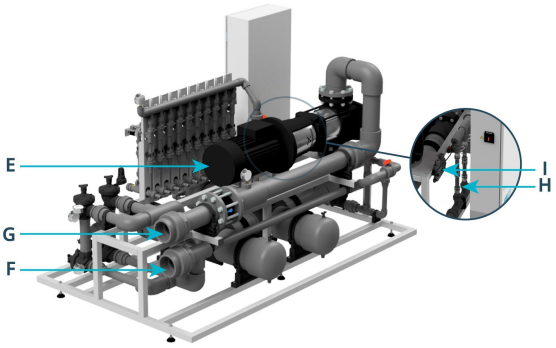


NutriJet 600 Inline, 1 mixing chamber, with post-filtration and/or pre-mixing



NutriJet 600 Inline, 2 mixing chambers, with post-filtration and/or pre-mixing



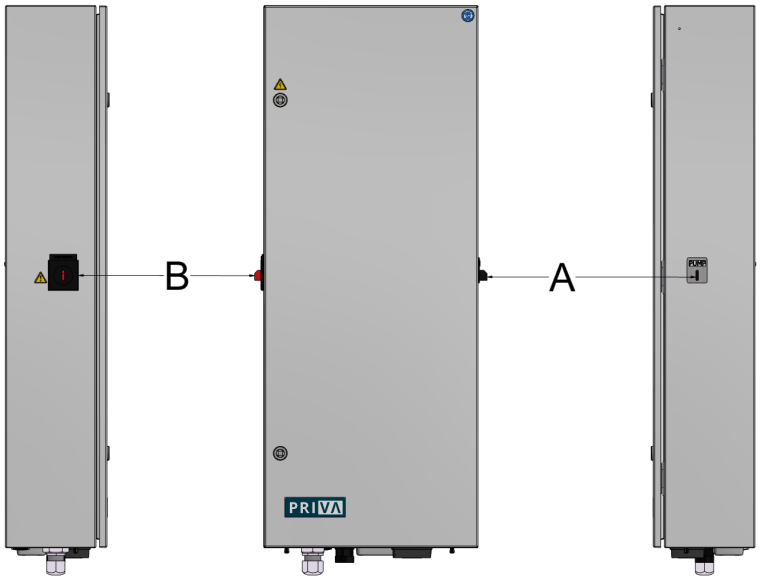


NutriJet 300/600 Bypass

Structure - electrical part

Controls

The cabinet can be operated from the outside with the switch of the system pump and the main switch.



A. system pump switch ('pump switch')
B. main switch

System pump switch:

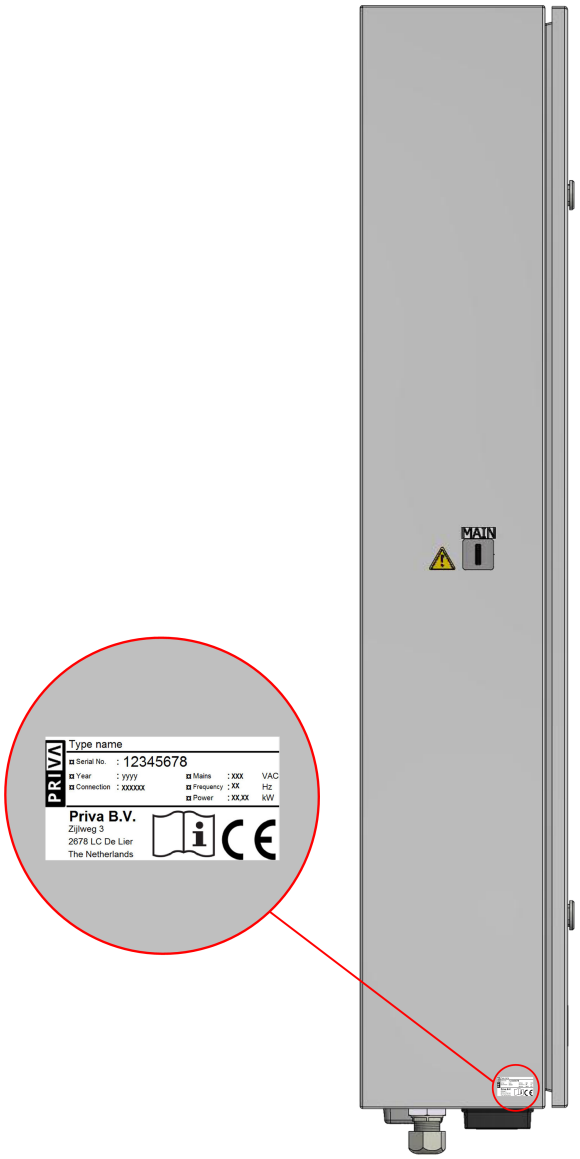
For convenience, the switch of the system pump is called the "pump switch" in this manual.

The pump switch has the following positions:
- *Off*: the pump is off and cannot be switched on by the process computer
- *Manual*: the pump is on and cannot be switched off by the process computer
- *Automatic*: the pump is controlled by the process computer

Main switch:

The main disconnect switch has the following positions:
- *Off*: no electrical power is being supplied to the unit
- *On*: electrical power is being supplied to the unit

Type plate



Location of the type plate

(the type plate shown here is for recognition purposes and its details may differ from the type plate on your product)

The type plate on the product contains the following information (form top to bottom and from left to right):

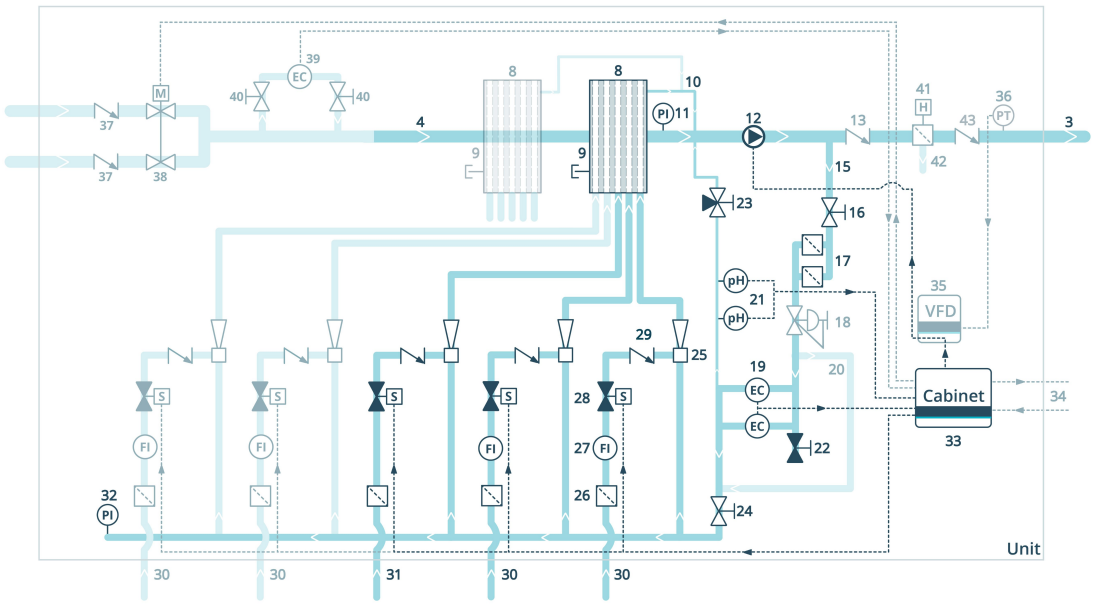
- Product name and type designation
- *Serial No*: serial number
- *Year*: year of construction
- *Connection*: specification of the connections to the mains voltage
- *Mains*: required mains voltage in VAC
- *Frequency*: required mains frequency in Hz
- *Power*: nominal power consumption in kW of system pump
- Name and address of the manufacturer (Priva B.V.)
- Manual icon
- CE mark

Operating principle

In terms of working principles, the NutriJet has two variants:

- NutriJet Inline: the unit is installed between the supply line and the main irrigation line, so that all the irrigation water flows through the unit
- NutriJet Bypass: the unit is installed next to the main line. Part of the water is guided out of the main line, via the unit, back to the main line. The unit delivers such a high dosage that the correct dosage is achieved after mixing in the main line.

NutriJet Inline



Graphic of NutriJet Inline fertiliser dosing unit

Not all components are supplied as standard. The components that are shown as transparent depend on the configuration.
The electrical cables are drawn with a dotted line.

Mixing chamber

The system pump (12) suctions the water out of the supply line (4) through the mixing chamber (8) and pumps it via a non-return valve (13) to the crop (3). Some of the pumped water goes to the branch (15). The water in the branch flows back into the mixing chamber via the dosing channels.

A mixing chamber has five connections for dosing channels. With an optional second mixing chamber in series, a maximum of ten connections in total is therefore possible. Not all of the connections have to be used.

To degas the mixing chamber, a degas line (10) has been made in the mixing chamber. Through the drain point (9) the mixing chamber can be emptied. A visual check of the suction pressure can be done by means of the pressure gauge (12) after the mixing chamber.

Dosing channels

The inline dirt filters (17) in the branch prevent clogging of the venturi nozzles in the dosing channels. The optional pressure reducing valve (18) reduces the pressure of the water to the dosing channels. A visual check of the pressure of the supply water upstream of the venturi is carried out using the manometer (32). The nozzles in the venturi (25) create a vacuum that draws in the fertilisers (30) and acid or lye (31).

A dirt filter (26) for filtering the fertiliser solution is located in the fertiliser line of a dosing channel. Using a rotameter (27), the fertiliser suction can be checked and the dosage valve adjusted. The adjusting of dosage valves is primarily of importance for fertiliser solutions, and not so much for acid or lye solutions. Partly for this reason, a dosing channel for acid or lye does not have a rotameter. A dosage valve (29) and a non-return valve (29) are installed in the fertiliser, acid or lye lines just before the venturi. The control software pulses the dosage valves to control the open time, based on a recipe and EC and pH measurements. The time that the dosage valves are open and closed determines the flow rate of fertiliser, acid or lye that is dosed on average.

Various types of dosing channels are available. The type and number of dosing channels on the unit is customer-specific and is determined during the purchasing process.

EC and pH sensors

The electrical conductivity of the irrigation water is a measure of the fertiliser concentration and is measured using EC sensors (19) on the branch. The optional line (20) serves to minimise the drop in pressure across the EC sensors. The pH sensors (21) measure the pH value of the irrigation water. The pH sensors are located in a sensor holder that is connected to the branch line with a thin line to eliminate the disruptive influence of the pump pressure.

By using two EC sensors and two pH sensors, the control software can compare the measured values of the two sensors. If the measured values differ excessively from one another, the control software signals that one of the two sensors is not working (correctly) and automatically stops the unit in order to prevent crop damage.

In order to remove the sensors safely, e.g. for maintenance purposes, the line between the manually operated valves (16 and 24) can be isolated with these valves and made pressureless via the drain taps (22 and 23) near the pH and EC sensors. These drain taps can also be used to empty the line, e.g. if the unit is taken out of operation for a longer period of time due to a period of freezing temperatures.

Cabinet

On a standalone system, the cabinet (33) on the unit contains the whole process computer. If the cabinet on the unit is a substation of a process computer, the process computer communicates with the electrical components in the cabinet via the network (Connext) or via direct I/O connections (Compass). Depending on the model, various other connections (34) are available in the cabinet, e.g. for the mains supply, irrigation valves, a flush valve or sensors.

Frequency controller

In order to guarantee constant pressure to the crop, a frequency controller (35) may be used. The frequency controller controls the speed of the pump based on the pressure at the outlet of the unit which is measured by a pressure transmitter (36). If a frequency controller is not used, the pump is only switched on or off by the process computer.

EC pre-control

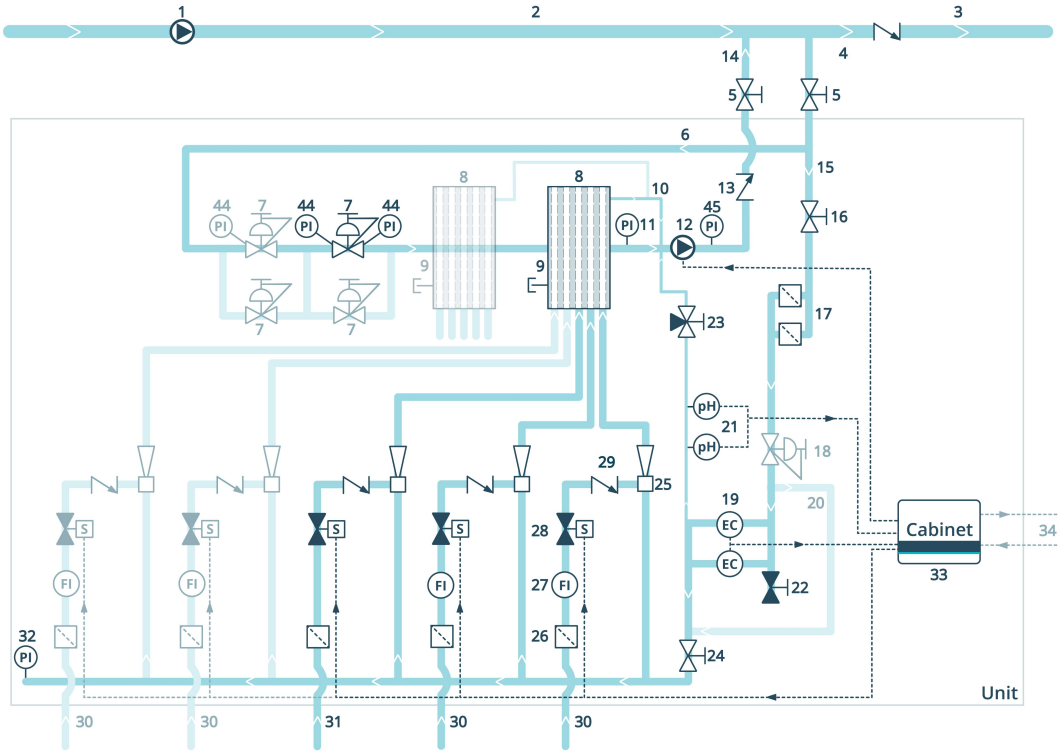
If drain water is reused, an EC pre-control can be used. The pre-control consists of two valves (38) that are contra-controlled by a common motor. The further one valve closes, the further the other opens and vice versa. In this respect, one valve allows drain water (with a high EC value) to pass and the other fresh water (with a low EC value). The EC value of the mixed water is measured by a separate EC sensor (39). The control software controls the motor on the valves so that the supply water has a constant, desired EC value. For effective control, the EC values of the drain water and clean water must differ by at least 0.5 mS/cm.

In order to disassemble the EC sensor safely, e.g. for maintenance, it can be isolated with the manually operated valves (40). To prevent the mixed water from flowing back into one of the supply lines, there is a non-return valve (37) in each supply line.

Post-filtration

To prevent blockages in the distribution system, an automatic self-cleaning filter (41) can be used after the unit. The self-cleaning filter suctions the deposited dirt out of the filter mesh, without the filtering process being interrupted. The rinse water is discharged via the drain line (42). If not already present on the unit, a non-return valve (43) must be installed behind the filter. If non-return valve (43) is present on the unit, non-return valve (13) is not required.

NutriJet Bypass



Graphic of NutriJet Bypass fertiliser dosing unit

Not all components are supplied as standard. The components that are shown as transparent depend on the configuration. The electrical cables are drawn with a dotted line.

An external pump (1) pumps the water through the main line (2) to the crop (3). Some of the water flows to the unit via the supply line (4). The system pump (12) suctions some of the water out of the supply line via the bypass line (6) and the mixing chamber (8) and pumps it back into the main line via a non-return valve (13) and the outlet line (14).

In the bypass line there are one or more pressure reducing valves (7) that control the suction pressure of the mixing chamber. These pressure reducing valves are necessary in order to guarantee the required minimum pressure difference across the venturis. The manometers (44 and 45) make it possible to visually check the inlet and outlet pressure of the unit.

In order to be able to stop the supply and discharge of water in an emergency or during maintenance, both the supply line (4) and the outlet line (14) must be equipped with a manually operated valve (5).

The operation of other components of the NutriJet Bypass and those of the NutriJet Inline are the same.

A frequency controller, EC pre-control or post-filtration cannot be used with the NutriJet Bypass.

Transport and storage

Only Priva approved installers/service engineers who have received product-specific training from Priva are allowed to transport and store the unit.

The work to be performed by the installer for transport and storage is described in the unit's installer manual.

Operation

- Make sure that you understand the Safety (page 4) instructions before operating the unit.
- Carry out periodic maintenance in accordance with the preventative maintenance schedule (see Maintenance and repair (page 25)).

Basic facility requirement

The installer must find the following basic facilities in the room before he positions the unit:
- a spill containment facility underneath the unit and tanks to collect chemical substances in the event of leaks;
- connection for supply water;
- electrical connection (separately fused);
- an emergency stop feature.

Additional facilities may be required, depending on the quality of the supply water:
- Mechanical pretreatment using a filter to prevent blockages due to the sedimentation of solid particles in the system.
- Thermal conditioning using a heat exchanger if the temperature of the supply water is too low. Heating the supply water prevents condensation from spreading to the electrical components (such as the EC sensor connections). Moreover, the less cold the supply water is the more accurately the unit will dose and mix.
- Chemical pretreatment by acidification of the supply water (Priva Neutralizer) if the water contains too much bicarbonate (see Supply water quality (page 40)).
- Disinfection using UV light, optionally combined with dosage of hydrogen peroxide (Priva Vialux Line). This is necessary in the event of the recycling of drain water and the use of dirty surface water.

The following facilities must be also be present before the system is allowed to be filled with fertilisers:
- personal protective equipment;
- a shower (preferably a special emergency shower to rinse-off leaked chemical substances);
- an eyewash fountain;
- a water hose to dilute and rinse away leaked chemical substances;
- safety icons on the access door(s) to the room.

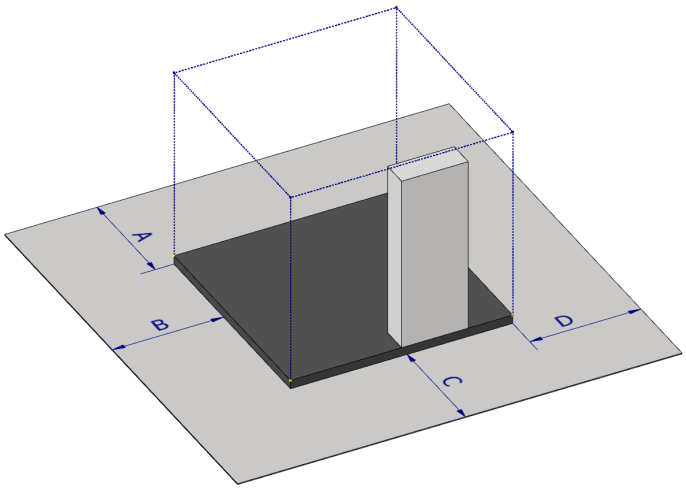
Workplace

Once the unit has been started up, it will operate autonomously. As a result, there is no specific work location.

Location and environmental conditions

Minimum free space around unit

For maintenance, inspections and changing settings (for a unit with a local operating panel), the unit must remain accessible on all sides.



Required minimum space around unit

A = minimum 50 cm
B, C, D = minimum 110 cm

Environmental requirements

The unit must not be in direct sunlight. Due to bright sunlight the temperature will become too high, causing plastic parts to deform, creating malfunctions in electrical components and shortening the service life of electrical components.
Always keep any cabinet ventilation grilles free and open, allowing the electrical components to be cooled.

General	Position the unit in an indoor, well-ventilated room, free from drips and splashes, with a stable temperature (no rapid temperature changes). Select a location where the unit cannot easily be damaged (e.g. by mobile equipment). The surface on which the unit will stand should be hard, flat and level.
Ambient temperature when not operating	0 – 35 °C As long as the unit contains water (residue) it must be kept frost-free.
Ambient temperature during operation	5 – 30 °C
Supply water temperature	5 – 30°C (the unit can still work at a maximum temperature of 30°C. However, with regard to the water quality and/or the operation of the unit, such a high water temperature is generally unacceptable.)
Relative air humidity	< 85% (this is lower than the maximum relative air humidity during transport because of the presence of chemical substances.) Condensation will form on the pipe-work, particularly when relatively cold supply water is used. This is very corrosive when combined with the vapours from the chemical substances. Hose clamps and other metal parts must therefore be of corrosion-resistant types of metals or must be well coated (and remain so). The cabinet contains sensitive electronic circuits and must definitely remain condensation-free.
Maximum installation height	1000 m above sea level (Cavitation may occur in the system pump when the ambient pressure is too low.)
Pollution factor (NEN-EN-IEC 61010-1)	maximum 2 (normal, non-conducting pollution)

Operating software

Refer to the relevant process computer software manual.

Process phases

The process computer recognises the following process phases (depending on the software used):

1. Rest: the pump(s) are at a standstill and the irrigation valves and flush valve are closed. The hydronic part of the system is filled with irrigation water. The process computer waits until a start condition is met.
2. Pre-purge: the system pump is running and the flush valve is open so that the contents of the main irrigation line are discharged. At the same time, the unit prepares irrigation water so that the old irrigation water in the system is replaced by new irrigation water. This phase can be gone through when changing the recipe or if the system has been idle for a long period as a result of which the quality of the irrigation water in the system is no longer clear.
3. Operation: the system pump is running and the fertiliser solution is being supplied to a stock tank (indirect distribution method) or to the valve sections (direct distribution method). In the latter case the irrigation valves are controlled open by or via the unit according to the set conditions. At the same time, the unit prepares new fertiliser solution.
4. Post-purge: the supply pump, if fitted, stops, the valves in the distribution system close (with the direct distribution method) and the dosage valves close. The system pump continues to run for 3 s to rinse the dosing channel. This prevents sediment forming in the dosing channel. After the post-purge the unit returns to the idle phase.

The pre-purge and post-purge phases can be skipped if desired.

Turning the unit on and off

The unit can be switched on and off electrically using the main disconnect switch. In principle, however, the unit must remain on constantly, unless there is a specific reason for switching the unit off. The running program can be interrupted via the operating software (see Setting the unit to maintenance mode (page 26)).

Power supply failure

In the event of an interruption to the power supply (or when switching off, using the emergency stop for instance) the software settings and date and time are retained: the settings are saved automatically.

After the loss of power, the process computer resumes the process at the point where it stopped when the power was lost.

- Because the system pump stops prematurely during a power supply failure, the dosing channels will not be post-purged and a sediment may be formed. When the power has been restored, check therefore that the dosing channels are still functioning correctly.
- When the power has been restored, check if there are any alarms.
- If the power is lost for too long, you must use an alternative method to irrigate the crop.

Topping-up fertilisers and acid or lye

If the system is equipped with low level switches on the fertiliser tanks, the unit generates an alarm if the fertiliser tank is in danger of becoming empty. However, it is best not to wait for this and to top-up the fertiliser tanks early:

1. If there is a single fertiliser tank for the fertiliser concerned: interrupt the program that is running (refer to Setting the unit to maintenance mode (page 26)).
   If there are two fertiliser tanks for the fertiliser concerned: open the valve on the full fertilizer tank that has already been prepared and close the valve on the fertiliser tank that is almost empty.
2. Fill the almost empty fertiliser tank with a known quantity of fresh water.
3. Add a quantity of solid or concentrated fertiliser(s) or acid or lye that is appropriate to the quantity of water.
4. Stir the contents of the fertiliser tank with an electric mixer until all solid matter has been dissolved and the solution is homogeneous.
5. If you interrupted the program in step 1: resume the program.

- If you change the concentration of a solution in a fertiliser tank, then also adjust the recipes for that fertiliser tank. It may also be necessary to readjust the EC control (for a different concentration of fertiliser) or the pH control (for a different concentration of acid or lye).
- If you are going to use higher concentrations, then take account of the highest concentration to which the equipment is resistant. This applies above all to the acid channel.

Adjusting the user settings

There is a large number of possible settings depending on the model, configuration and crop that have been selected. The software manual for the process computer concerned contains a comprehensive description of all possible user settings. Broadly speaking, it is a matter of:

- division of the irrigation valves and their linking to the start programs;
- recipes for the various irrigation valves (which fertiliser tanks are to be used for dosing and in what ratio, the EC value and pH value and the quantity of irrigation water per irrigation cycle);
- start programs (criteria for starting and stopping the irrigation cycle).

Operation is described in the software manual for the relevant process computer (Connext or Compass) and depends on the software version used. See chapter *Procedures* > *Operating the dosing unit*.

Make (or arrange to be made) a back-up of all settings before adjusting them.

The EC value and the concentration of fertilisers are directly related to each other. The EC value has nothing to do with the nature and mixing ratio of the fertilisers however. The recipe indicates which fertilisers should be dosed in what ratio. The EC setting determines the quantity of fertiliser to be dosed in total. If you use supply water with an EC value that is too high it is possible that no fertilisers or a very small quantity of fertilisers will be dosed.

Maintenance and repair

- Carry out periodic maintenance in accordance with the preventative maintenance schedule.
- Some maintenance activities may only be performed by authorised Priva installers/service engineers who have received product-specific training from Priva. This is indicated in the preventative maintenance schedule.
- Switch the unit off using the main disconnect switch before carrying out any maintenance work. If the unit has to remain on within the scope of the maintenance work take extra care.
- Only use original Priva spare parts.

Preventative maintenance schedule

To be carried out by: user

Minimum frequency	Action	Explanation
always	be alert for leaks and abnormal noises (from the system pump)	
weekly	check quantity of irrigation water to plants	1. For each irrigation valve, place a number of drippers in plastic beakers. 2. After the irrigation cycle, add the content of the beakers to a measuring beaker and read the volume. 3. Divide this volume by the number of beakers to determine the average volume per dripper.
	keep the unit and surrounding area clean	See Cleaning the exterior of the unit (page 26).
monthly	clean dirt filters and other filters	See Cleaning the inline dirt filter (page 27) and Cleaning the dirt filter of the dosing channel (page 27).
	check system pump pressure (via manometer on pipe-work to venturis)	Test with system pump running and normal consumption of irrigation water. See the pump documentation for the correct pressure.
	pH sensors: check operation and clean	See Cleaning the pH sensors (page 28).
annually	flow sensor: check operation and clean	See Cleaning the flow sensor (page 30).
dependent on equipment	maintenance of external equipment connected to the unit (e.g. a light sensor) *Whether this action must be performed by the user or installer/service engineer depends on the equipment.*	Refer to the documentation for the relevant equipment.

To be carried out by: installer / service engineer

Minimum frequency	Action	Explanation
annually	EC sensors: check operation and clean	See EC-sensoren reinigen.
	rotameters on dosing channels: check operation and clean	See Rotameter van doseerkanaal reinigen.
	dosing channels: check operation	See Meststofaanzuiging controleren.
	clean sprinkler pipes in mixing chamber	1. Close the manually operated valves in the supply line and main irrigation line. 2. Open the drain point of mixing chamber and let the unit run dry. 3. Open the mixing chamber and clean the sprinkler pipes.
dependent on equipment	maintenance of external equipment connected to the unit (e.g. a light sensor) *Whether this action must be performed by the user or installer/service engineer depends on the equipment.*	Refer to the documentation for the relevant equipment.

Setting the unit to maintenance mode

Levels of setting to maintenance mode

The unit has to be taken out of operation for maintenance. This can be done at three levels, depending on the nature of the maintenance:

1. Take the unit out of operation software-wise: this is necessary for maintenance where the software plays a role, such as calibrating sensors.
2. Take the system pump (and supply pump, if present) out of operation by switching off the pump switch(es): this is necessary for maintenance where the pumps absolutely must not start operating, such as when cleaning the dirt filter or calibrating the pH measurement.
3. Switch off the unit by setting the main switch to off: this is necessary for maintenance where the cabinet has to be open or where electrical parts may become wet, such as replacing electrical components and cleaning the exterior.

- Please note that switching off the unit leads to alarm messages and possible malfunctions of the external process computer.
- Set the unit to maintenance mode in ascending levels, not only the level concerned. For example, for level 2, first perform level 1 and then level 2.

Maintenance work

Cleaning the exterior of the unit

1. Turn off the main disconnect switch of the unit.
2. Clean the exterior of the unit:
   - Remove dust using a soft brush.
   - Wipe-down the surfaces with a damp cloth.

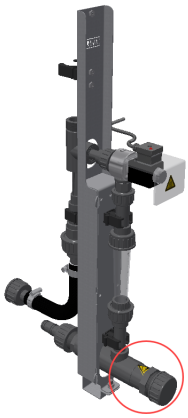
   - Do not use aggressive or abrasive cleaners: they may damage the plastic. Use warm water only, with a few drops of washing-up liquid if necessary.
   - Make sure that no water runs into the electrical components. For example, do not spray water onto the unit and thoroughly wring out the cleaning cloth before use.
   - Do not press too hard on the operating panel / display and the keyboard (if fitted) when removing dirt.

3. Put the unit back into operation.

Cleaning the inline dirt filter

1. Set the unit to maintenance mode (software-wise and pump switch(es) to *0* (off).
2. Loosen the coupling and remove the filter element from the housing.
3. Rinse the filter element underneath the tap until clean.
4. Replace the filter element and tighten the filter element.
5. Put the unit back into operation.

Cleaning the dirt filter of the dosing channel



Dirt filter of dosing channel

1. Set the unit to maintenance mode (software-wise and pump switch(es) off).
2. Close the valve on the fertiliser line concerned. If there are valves at the start and end of the fertiliser line then close the valve at the end (closest to the unit).
3. Place a plastic receptacle underneath the dirt filter.
4. Unscrew the cap from the dirt filter and remove the filter element from the housing.
5. Rinse the filter element underneath the tap until clean.
6. Replace the filter element and screw the cap back onto the dirt filter.
7. Open the valve on the fertiliser line concerned.
8. Check that the dirt filter is not leaking.
9. Empty the receptacle into the appropriate tank of fertiliser.
10. Put the unit back into operation.

Cleaning the pH sensors

The pH sensors have to be unscrewed from the pH sensor holder for cleaning (see also chapter Fitting the pH sensor (page 29)). Only do this when the unit is in maintenance mode (software-wise and pump switch(es) off). Check the screw coupling on the pH sensor holder for leaks after putting back into operation.

In principle, the sensor cables in the cabinet can remain connected during maintenance. However, the sensor cables must be disconnected if the current situation requires this so that cleaning can taken place elsewhere.

Cleaning the pH sensor normally

1. Clean the glass membrane and the housing of the sensor with a solution of liquid detergent in warm water. Use a soft brush or a clean cloth, dipped in the soap solution. Do not use a paper towel.

   Do not apply excessive pressure to the glass membrane as it is fragile.

2. Rinse the glass membrane well with distilled water. Then immerse the sensor for at least 30 minutes in a 50/50 mixture of pH 4 buffer and 4M KCl before using it again.

It is advisable to recalibrate the pH measurement after cleaning.

Cleaning the pH sensor thoroughly

If there is an anorganic deposit on the pH sensor then remove it as follows:

1. Make a homogeneous acid dilution of:
   - approximately 1 part drinking water and 1 part concentrated nitric acid (38% (by weight)) or
   - 4 parts drinking water and 1 part concentrated phosphoric acid (59% (by weight)).

   Add the acid to the water; never add water to acid.

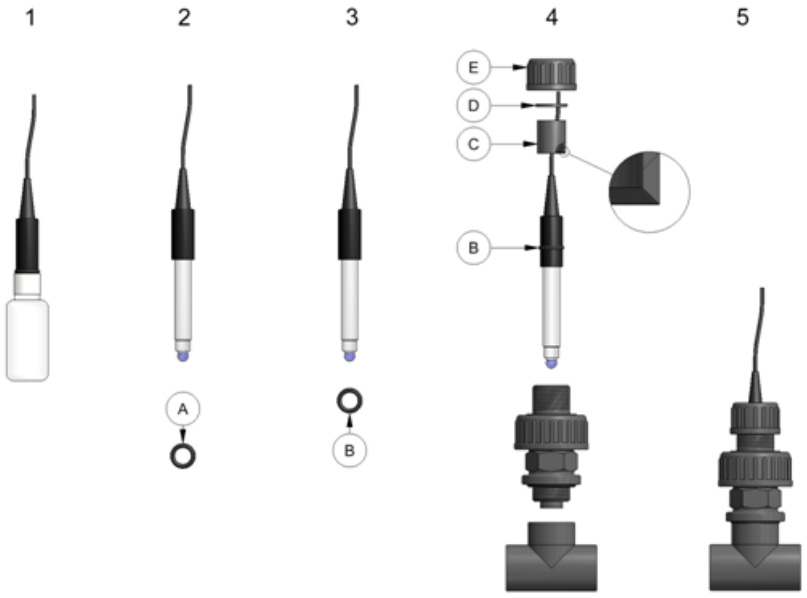
2. Immerse the glass membrane of the pH sensor in the acid solution for 5 minutes (no longer!).
3. Rinse the pH sensor with drinking water, and rinse the glass membrane with distilled water. Next, calibrate the pH measurement.
4. Dispose of the acid dilution in accordance with the locally applicable regulations.

Fitting the pH sensor

pH sensors ordered from Priva are supplied separately and still need to be connected to the unit. To do this, perform the following steps.

If you use pH sensors that were not ordered from Priva, these pH sensors must comply with the same specifications as the Priva pH sensors. See Technische specificaties - pH-sensor.

The pH sensors are a sensitive component of the unit. While a pH sensor is not in use, it must be stored in accordance with the supplier's instructions. See the manual for the pH sensor.



Fitting the pH sensor

1. Remove the pH sensor from the packaging containing storage liquid.
2. Remove the ring (A, if present) from the pH sensor.
3. Slide the O-ring (B) of the holder over the pH sensor.
4. Assemble the parts C, D and E in the order shown in the figure. For C, ensure that the bevel is on the underside.
   Pour water into the holder if it is still dry, so that the pH sensor does not dry out.
5. Screw the pH sensor onto the pH sensor holder.

Calibrating the pH sensor

Calibration is described in the software manual of the relevant process computer (Connext or Compass) and depends on the software version used. See chapter *Procedures* > *Maintaining, checking and calibrating*.

Cleaning the flow sensor

1. Set the unit to maintenance mode (software-wise and pump switch(es) off).
2. Make sure the main irrigation line is pressure-less and, if necessary, empty.
3. Unscrew the flow sensor from the T-piece.
4. Clean the paddle wheel of the flow sensor using a small, soft brush.
5. Apply a little acid-free grease to the rubber O-rings to prevent them from being damaged when placing the sensor back.
6. Screw the flow sensor back onto the T-piece: you can only do this one way.
7. Fill and bleed the main irrigation line to prevent water hammer.
8. Check that the flow sensor coupling is not leaking.

Troubleshooting

This chapter provides solutions to the most common problems. If you have a problem that you cannot solve using the information in this chapter, please contact your dealer.

Troubleshooting - general

Certain activities may only be performed by authorised installers/service engineers because they require specialist knowledge and skills. These activities are indicated by "Priva Partner" in the table below.

The unit does nothing (page 31)
The system pump does not start (page 31)
The system pump runs dry (page 32)
No water is entering the unit (page 32)
NutriJet Bypass: EC control is unstable (page 32)
NutriJet Bypass: The EC value deviates significantly (page 32)
NutriJet Bypass: The pressure on the pressure reducing valves in the incoming line is too low (page 32)
During the production of irrigation water, the pressure on the line to the venturis is too low (page 33)
NutriJet Bypass: The suction pressure on the line after the mixing chamber is too low or too high (page 33)
A fertiliser, acid or lye is not being dosed (page 33)
The desired EC value is not being achieved (page 34)
The EC value swings wildly and 'overshoots' (page 34)
The desired pH value is not being achieved (page 34)
The pH value swings wildly and 'overshoots' (page 35)
EC alarm or pH alarm (page 35)
Flow alarm (page 35)
The plants receive more water than is set (page 35)
Some irrigation valves no longer open (page 36)
The measured fertiliser concentrations do not match the recipe (page 36)

The unit does nothing

The unit is not doing anything (the display (if fitted) is also not functioning).

Possible cause	Solution
The electrical supply is off.	• Ensure that the unit is connected and the main switch is set to *On*. • Ensure that the external emergency stop (if fitted) is not depressed. • Ensure that the fuse group to which the unit is connected is switched on. • Priva Partner: reset the circuit breaker in the cabinet.
The power supply to the unit is defective.	• Priva Partner: check the internal fuses. • Priva Partner: replace the power supply.
An internal circuit is defective.	Priva Partner: determine which circuit is defective and replace it.

The system pump does not start

The system pump fails to start (the display - if fitted - is functioning).

Possible cause	Solution
The pump switch is off.	Ensure that the pump switch is set to *Automatic*.
The motor protection has been triggered.	Priva Partner: reset the motor protection in the cabinet.
An alarm has been activated.	Check which alarm is involved and take action accordingly.
There is a defect in the circuit that controls the pump motor.	Priva Partner: determine what is defective and replace the defective components.

The system pump runs dry

Possible cause	Solution
NutriJet Inline: the system pump has not been properly bled or there is no supply water. NutriJet Bypass: the external pump in the main line is switched off.	• Priva Partner: check that the pump has not been damaged by running dry. • NutriJet Inline: Bleed the system pump and check if there is sufficient supply water. • NutriJet Bypass: Check the external pump and switch it on if it is switched off.

No water is entering the unit

Possible cause	Solution
NutriJet Inline: the system pump has not been properly bled or there is no supply water. NutriJet Bypass: the external pump in the main line is switched off.	• Priva Partner: check the valves before and after the unit (if fitted). • Ensure that the filter in the supply line is clean. • NutriJet Inline: Bleed the system pump and check if there is sufficient supply water. • NutriJet Bypass: Check the external pump and switch it on if it is switched off.

NutriJet Bypass: EC control is unstable

Possible cause	Solution
The supply water does not mix well with the water in the main line.	Priva Partner: ensure a turbulent flow in the main line by: • placing injection tubes in the inlet and outlet of the supply line. This is only possible if the distance between the connections of the supply line and the return line in the main line is at least 1.5 m (see Wateraanvoer installeren (NutriJet)); • installing a static mixer.

NutriJet Bypass: The EC value deviates significantly

After a successful calibration procedure of the EC measurement, the EC value differs significantly when the water is checked further down the line or at the drippers. See NutriJet Bypass: EC control is unstable (page 32)

NutriJet Bypass: The pressure on the pressure reducing valves in the incoming line is too low

The first manometer on the pressure reducing valves in the incoming line indicates too low a pressure.

Possible cause	Solution
The pressure in the main line is too low.	Check the external pump in the main line.

During the production of irrigation water, the pressure on the line to the venturis is too low

While preparing irrigation water, the manometer on the line to the venturis indicates a pressure that is too low.

Possible cause	Solution
The discharge valve is open or there is a (major) leak in the main line or the distribution system.	• Ensure that the discharge valve is closed. • Priva Partner: check the main line and the distribution system for leaks, and repair them if necessary.
The system pump is turning in the wrong direction.	Priva Partner: swap 2 phases of the mains power supply (disconnect electrical power first!)
There is air is the system pump.	Bleed the system pump (refer to the documentation for the pump concerned).
The inline dirt filter on the unit is blocked.	Clean the dirt filter (see Cleaning the inline dirt filter (page 27)).

NutriJet Bypass: The suction pressure on the line after the mixing chamber is too low or too high

Possible cause	Solution
The pressure reducing valve or valves in the bypass line have not been adjusted correctly.	Priva Partner: adjust the pressure reducing valve or valves in the bypass line.

A fertiliser, acid or lye is not being dosed

Possible cause	Solution
The level in the tank or barrel is too low, causing air to be drawn in.	Ensure an adequate level in the tank or barrel. Then ensure that the air is bled from the line or hose.
A valve in the line (if fitted) is closed.	Check whether the valve or valves in the line are open.
There is an air bubble in the line.	Ensure that the air bubble is bled from the line.
The dosage valve does not open.	• Check the software settings (for instance whether the fertiliser is included in the recipe). • Priva Partner: check the circuit that controls the dosage valve. Replace any defective components. • Priva Partner: check the dosage valve. Replace it if necessary.
There is no flow, or an insufficient flow, of water through the venturi.	Priva Partner: Check whether there is indeed insufficient water flowing through the venturi by temporarily replacing the dosage valve with a vacuum gauge in order to measure the underpressure. Resolve the problem by disassembling the venturis and checking for blockages etc.
A filter in the dosing channel is blocked.	Clean the filter in the dosing channel.
A filter in the line is blocked.	Clean the filter.
There is a leak in the line or in the connection between the dosage valve and the venturi allowing air to be suctioned-in.	Priva Partner: check the pipe-work for leaks.

The desired EC value is not being achieved

Possible cause	Solution
The desired value is higher than the value that can be achieved with the fertiliser solutions.	• Correct the set value. • Increase the concentration of the fertiliser solutions.
The EC value of the nutrient recipe has been incorrectly set in the software.	Prepare the irrigation water manually according to the quantities in the nutrient recipe and measure the EC value of the mixture. Enter this value as the EC value for the nutrient recipe.
The set value and the nutrient recipe are correct, but the concentration of one or more fertiliser solutions is too low.	Ensure that the concentrations of the fertiliser solutions are correct.
In the software, the desired EC value is decreased by the measured radiation.	Adjust the influence of the measured radiation on the desired EC value.
The set value is correct, but is lower than the EC value of the supply water.	Increase the quantity of fresh water compared to drain water (if applicable).
A fertiliser is not being dosed.	See the solutions for the problem A fertiliser, acid or lye is not being dosed (page 33).
The EC sensors are dirty.	Priva Partner: clean the EC sensors.
The P/I-factors of the EC control are set to a value that is too low.	Priva Partner: reset the P/I-factors.

The EC value swings wildly and 'overshoots'

Possible cause	Solution
The P/I-factors of the EC control are set to a value that is too high.	Priva Partner: reset the P/I-factors.
The EC value of the nutrient recipe has been incorrectly set in the software.	Prepare the irrigation water manually according to the quantities in the nutrient recipe and measure the EC value of the mixture. Enter this value as the EC value for the nutrient recipe.
In the software, no influence has been set for the measured radiation on the desired EC value.	Apply radiation decrease of the desired EC value.

The desired pH value is not being achieved

Possible cause	Solution
The desired value is unattainable.	• Correct the set value. • Check if an incorrect tank or barrel has been connected, which is causing lye to be mistakenly dosed instead of acid or acid instead of lye. • Check in the software if lye is mistakenly being dosed instead of acid or acid instead of lye. • Increase the concentration of the acid or lye.
The supply water contains too much bicarbonate.	Priva Partner: install a pre-treatment system for the supply water.
The nutrient recipe has been set incorrectly.	Adjust the quantity of acid or lye in the nutrient recipe, taking into account the quantity of bicarbonate in the supply water.
The set value and the nutrient recipe are correct, but the concentration of the acid or lye solution is too low.	• Check if lye is mistakenly being dosed instead of acid or acid instead of lye. • Ensure that the concentration of the acid or lye solution is correct.
The acid or lye is not being dosed.	See the solutions for the problem A fertiliser, acid or lye is not being dosed (page 33).
The pH sensors are dirty or worn out.	• Clean the pH sensors. • Priva Partner: replace the pH sensors if cleaning does not resolve the problem.

The pH value swings wildly and 'overshoots'

Possible cause	Solution
The concentration of acid or lye in the acid or lye tank is too high.	Reduce the concentration in the acid or lye tank.
The quantity of acid or lye in the recipe is set too high.	Reduce the quantity of acid or lye in the recipe.
The supply water contains too little bicarbonate.	Priva Partner: install a flow rate ratio control to mix the supply water with another water source that contains the correct amount of bicarbonate.
The P/I-factors of the pH control are set to a value that is too high.	Priva Partner: reset the P/I-factors.
At least one of the pH sensors is not functioning (correctly).	Calibrate the pH measurement.

EC alarm or pH alarm

Possible cause	Solution
The alarm threshold has been set incorrectly.	Change the alarm threshold setting.
At least one of the two sensors is dirty or defective.	• Priva Partner: check the sensors. • Clean the pH sensors (if necessary) and perform a new calibration. (see Cleaning the pH sensors (page 28) and Calibrating the pH sensor (page 29)) • Priva Partner: clean the EC sensors (if necessary) and perform a new calibration. (see EC-sensoren reinigen and EC-meting kalibreren) • Priva Partner: replace the suspect sensor(s) if this does not resolve the problem. A measuring case with a reference pH meter and a reference EC-meter (the meters are also available separately) is available for checking pH sensors and EC sensors and for measurements outside of the unit. Calibration liquids and storage liquids are available separately.

Flow alarm

Possible cause	Solution
The alarm threshold has been set incorrectly.	Correct the alarm threshold setting.
The flow sensor is not correctly adjusted.	Priva Partner: check the flow sensor settings.
The flow sensor is dirty or defective.	• Clean the flow sensor (see Cleaning the flow sensor (page 30)). • Priva Partner: replace the flow sensor if cleaning does not resolve the problem.
There is a leak in the main irrigation line or in a valve section.	Priva Partner: trace the leak and fix it.

The plants receive more water than is set

Possible cause	Solution
The flow sensor (if present) is dirty or defective.	• Clean the flow sensor. • Priva Partner: replace the flow sensor if cleaning does not help.

Some irrigation valves no longer open

Possible cause	Solution
A fuse of the relevant fuse group on the I/O board has burned out.	Priva Partner: replace the defective fuse (see Zekeringen vervangen).

The measured fertiliser concentrations do not match the recipe

Possible cause	Solution
The dosage valves are supplying a flow rate that differs from that expected by the software.	Priva Partner: readjust the dosage valve(s).

Troubleshooting - process computer

Refer to the manual of the process computer concerned.

Taking out of operation

Only authorised Priva installers/service engineers who have received product-specific training from Priva may take the unit out of operation.

The work to be performed by the installer for taking the unit out of operation is described in the unit's installer manual.

Disposal of waste equipment

Only authorised Priva installers/service engineers who have received product-specific training from Priva may dispose of the unit.

The installer must dispose of the unit at the end of its service life. The procedure for this is described in the installer manual for the unit concerned.

The equipment is marked in accordance with European directive 2002/96/EC relating to waste electrical and electronic equipment (WEEE):

The mark indicates that the equipment cannot be disposed of with other household waste at the end of its service life. To prevent possible harm to the environment or to human health from uncontrolled waste disposal the equipment must be kept separate from other types of waste and be recycled in a responsible manner, so that the sustainable reuse of material sources is stimulated.

Appendices

EC Declaration of Conformity

The manufacturer:

Name of manufacturer	Priva B.V.
Manufacturer's address	Zijlweg 3 2679 LC De Lier P.O. Box 18 2679 ZG De Lier The Netherlands

declares the product:

Product name	NutriJet
Model/type	300/600 Substation
Function	Fertiliser dosing unit for the horticulture industry

is in conformity with the following European Directives:

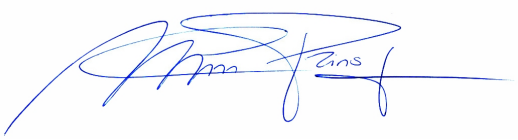
- Low Voltage Directive 2014/35/EU

and conforms to the following harmonised European standards:

NEN-EN-IEC 61010-1:2014	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
NEN-EN-IEC 62368-1	Audio/video, information and communication technology equipment - Part 1: Safety requirements

The technical file was compiled by the R&D department of Priva B.V.

The Netherlands, De Lier, February 2012



M. Prins
Managing Director

Supply water quality

Composition and pH value

The dosing unit adds acid or lye to the supply water to:
- regulate the pH value of the irrigation water;
- chemically mix (homogenise) the irrigation water in a optimum manner;

The pH value of the irrigation water must be between 5.2 and 6.2, depending on the crop and growing medium.

Supply water consists of (a combination of) rain water, drinking water, well water, downstream mill water, river water or reverse osmosis water, typically mixed with (disinfected) drain water. The variety of chemical elements in the supply water determine not only the composition and the pH value of the supply water but also whether or not the supply water can be used as irrigation water once fertiliser and acid or lye have been added using the dosing unit.

Influence of bicarbonate

It is important that the quantity of bicarbonate (HCO_3^-) in the supply water is established by means of water analysis. Bicarbonate has a buffering effect on the pH value and affects the operation of the acid dosing control in the dosing unit:

- An optimum quantity of HCO_3^- in the supply water helps to ensure that plants receive irrigation water with a reliable and accurate pH value via the dosing unit. The correct pH value of the irrigation water is necessary for the good take up of fertilisers by the plant.
- An excessively low quantity of HCO_3^- causes the pH control to become unstable.
- An excessively high quantity of HCO_3^- leads to the following problem: dosing acid neutralises HCO_3^-, with a quantity of carbon dioxide (CO_2) being generated. Because the system is closed, this CO_2 cannot escape from the irrigation water and therefore reaches the plants. There it will be released into the ambient air, causing the pH to rise. In this case, the pH at the plants will not therefore be the same as the pH that was set on the unit.

The table below shows the limit values for the quantity of HCO_3^- and the qualification of the supply water.

Bicarbonate limit values and supply water qualification

Quantity of bicarbonate (HCO_3^-)		**Quantity of bicarbonate expressed as calcium carbonate ($CaCO_3$)**		**Supply water qualification**
[mmol/l]	**[mg/l] or [ppm]**	**[mmol/l]**	**[mg/l] or [ppm]**	
< 0.10	< 6.1	< 0.050	< 5.0	Too low
0.10 – 0.50	6.1 – 30.5	0.050 – 0.250	5.0 – 25.0	Optimum
0.50 – 1.0	30.5 – 61.0	0.250 – 0.5	25.0 – 50	High
≥ 1.0	≥ 61.0	≥ 0.5	≥ 50	Too high

Pre-treat supply water

On the basis of the concentration of HCO_3^-, it must be determined which measures or combinations of measures should be taken to pre-treat the supply water.

Supply water with too low a concentration of bicarbonate:

When using reverse osmosis water, but in some cases rain water also, too low a quantity of HCO_3^- (< 0.10 mmol/l) may be deemed to exist in the supply water. Dosing acid may give rise to an unstable chemical reaction in the irrigation water.

This unstable reaction can be stabilised by taking one of the following measures, or a combination thereof:

- Add disinfected drain water, which typically contains bicarbonate, to the supply water (via an EC pre-control).
- Add a small amount of drinking water or spring water (1 – 2%) to the supply water by means of an electric valve with a low flow rate.
- Add a small quantity of bicarbonate to one of the fertiliser solutions. This can be done, for example, by replacing 1% of caustic potash with an equal quantity of potassium carbonate ($KHCO_3$) or calcium carbonate (K_2CO_3).

Supply water with too high a concentration of bicarbonate:

In many cases, too high a concentration of HCO_3^- (≥ 1.0 mmol/l) may be deemed to exist in the supply water when using well water, river water or drinking water. Dosing acid may then result in there being insufficient time to neutralise the bicarbonate.

Stabilisation is possible by pre-treating the supply water using a Priva Neutralizer with an acid injection and aeration system. The treated supply water is then stored in a stock tank.

Preparing an acid supply

Add the acid to the water; never add water to acid.

Determining the correct dilution

The dosing unit often has to dose acid to bring the irrigation water up to the correct pH value. The use of acid depends on:

- the pH of the supply water;
- the desired pH of the irrigation water;
- the nature and concentration of the acid neutralizing compounds in the supply water and in the fertiliser solutions.

In principle, very little acid is required for pH correction. In practice however, there are often substances in the supply water and in the fertiliser solutions which bind the acid (phosphate and bicarbonate). This results in a smaller change in the pH than would be expected based on the quantity of acid applied (this is known as 'buffering'). In order to achieve good pH-control it is therefore important that acid is used in a concentration that has been tailored to the concentration of buffer substances. After all:

- when the acid concentration is too low, even the maximum dosing flow rate will not be sufficient to achieve the desired pH value;
- when the acid concentration is too high, even the smallest possible dosing flow rate will swing the pH value severely and overshoot.

The best practice is to create an acid stock from a dilution of concentrated nitric acid. In order to achieve the optimum dilution, it is necessary to know the quantity of buffer substances in the supply water. Although most laboratory analyses reveal something about this, pre-calculating the precise dilution that is required continues to be problematical. Therefore, in practice the dilution required is determined by starting with a common concentration, for instance 3 % (weight percent). If it turns out that the pH is not corrected fully or quickly enough, the concentration must be increased. If it turns out that the pH overshoots and swings dramatically, the concentration must be decreased. In addition, if the quality of the supply water is not constant, the acid concentration must be adjusted every now and then. Always keep a record of which dilution is being used, so that a new acid stock can easily be prepared at the same dilution.

The maximum concentration of (nitric) acid depends on the type of dosing channel used. A higher concentration reduces the service life of the components.

Creating a standard dilution of 3%

Nitric acid is often supplied in 20 l barrels at a concentration of 38%, 53% or 68% (weight percent). To dilute this to 3% (weight percent), it is necessary to mix the contents of the barrel with 315, 470 or 640 l fresh water. Always pour the acid into the water instead of the water into the acid, and always stir the mixture thoroughly to homogenise it.

Example

Make a 3% dilution with a 20 litre barrel of 38% nitric acid:

1. Pour half of the required water into a barrel (e.g. one of 500 l) - in this case 147 litres of water.
2.  Use personal protective equipment to protect your skin and eyes.

   Carefully pour the 20 litre barrel of 38% nitric acid into the barrel of water (without splashing or spilling).
3. Also pour the rest of the water, 147 litres, into the barrel.
4. Stir gently with an acid-resistant stirrer so that the acid is mixed well.

With a 20 litre barrel of 38% nitric acid (24.8 kg), 312 litres of 3% nitric acid can be made by first pouring 146 litres of fresh water into a barrel containing sufficient volume, then the 20 litres of nitric acid and then the remaining 146 litres of water.

With a 20 litre barrel of 53% nitric acid (26.7 kg), 470 litres of 3% nitric acid can be made by first pouring 225 litres of fresh water into a barrel containing sufficient volume, then the 20 litres of nitric acid and then the remaining 225 litres of water.

With a 20 litre barrel of 68% nitric acid (28.2 kg), 640 litres of 3% nitric acid can be made by first pouring 310 litres of fresh water into a barrel containing sufficient volume, then the 20 litres of nitric acid and then the remaining 310 litres of water.

Technical specifications - Product options

Technical specifications – general

	NutriJet 100	NutriJet 300	NutriJet 600
Principle of operation	closed mixing chamber(s)		
Fertiliser mixing principles	A + B principle (equal quantities of fertilisers) ABC-principle (adjustable ratio of fertiliser quantities)		
Basic configurations	NutriJet Inline: All the water in the supply line flows through the unit.		
	NutriJet Bypass: Some of the water in the main line is directed via the unit and then injected back into the main line. The unit delivers a concentrated fertiliser solution that mixes in the main line with the other water in the main line.		
Pump capacity	NutriJet Inline: 3 - 26 m^3/h	NutriJet Inline: 8 - 41 m^3/h	NutriJet Inline: 22 - 79 m^3/h
		NutriJet Bypass: 8 - 26 m^3/h	NutriJet Bypass: 15 - 78 m^3/h
Irrigation capacity	The net irrigation capacity depends on the selected configuration. See configuration tooling.		
Permissible supply water pressure	NutriJet Inline: 0.1 - 0.4 bar above atmospheric pressure		
	NutriJet Bypass: 3 - 6.5 bar above atmospheric pressure		
Maximum permitted pressure in system	7 bar above atmospheric pressure		
Possible types of dosing channels	*EC dosing channels:*		
	• 100 l/h dosing channel • 100 l/h double dosing channel	• 300 l/h dosing channel • 300 l/h double dosing channel	• 600 l/h dosing channel • 600 l/h double dosing channel
	pH dosing channels:		
	• 100 l/h low acid up to 10% • 300 l/h low acid up to 10% • 50 l/h high acid up to 38% • 50 l/h lye KOH up to 50%		
	Low-volume dosing channels:		
	• 2 m³/h • 8 m³/h		
Maximum number of dosing channels	2x 5		
Diameter of mixing chamber	110 mm	160 mm	200 mm
System pump	In the configuration of the installation, the system pump is selected on the basis of various criteria. System pumps are available with various capacities and for various mains voltages and mains frequencies.[1)]		
System pump protection	• overload protection based on motor protection • softstarter on pump		
Manometers for visual pressure check	NutriJet Inline: • 1 manometer for drive water on venturis (discharge side of system pump) • 1 manometer for suction side of system pump		
	NutriJet Bypass: • 1 manometer for drive water on venturis (discharge side of external pump) • 2 or 3 manometers (depending on the number of pressure reducing valves) for checking the incoming pressure of the mixing chamber(s) • 1 manometer for suction side of system pump • 1 manometer for outgoing unit pressure (discharge side of system pump)		
Regulations and standards with which the unit complies	See the EC Declaration of Conformity.		

[1)]In order to make a choice, dealers can consult the configuration tooling. The configuration ultimately supplied and the associated most relevant specifications are summarised in the test report (“Product Delivery” form) that is supplied with the unit. The manuals of the selected components are also supplied with the unit.

Technical specifications - process computer

The process computer is described in detail in the hardware and software manuals of the relevant process computer. The table below only provides a summary of the aspects that are important for the fertiliser dosing unit.

	NutriJet with Connext	NutriJet with Compass
Process computer	Connext fertiliser dosing unit is a substation in the network of the process computer	Compass fertiliser dosing unit is connected to the I/Os of the process computer
Operation	remotely via external process computer	remotely via external process computer
Program cycle	day or week (other options depending on configuration, see software manual)	week with number of starts per day (see software manual for other options)
Number of valve groups or valves to be started independently of each other[1)]	equal to the number of set start programs	equal to the number of set start programs
Number of periods per 24-hour period in which a start for a valve group or valve[1)] can be defined	6	4
Start based on[2)]	among other things time, temperature, radiation level, radiation sum, external control and manually (see software manual for all options)	among other things time, radiation level, radiation sum, external control and manually (see software manual for all options)
Stop based on[2)]	duration, quantity of irrigation water, external control, manually and malfunction or alarm	duration, quantity of irrigation water, external control, manually and malfunction or alarm
Number of recipes (a recipe includes, among other things, the settings for the desired EC and pH values)	depending on the selected configuration (see software manual)	8
Selection of fertiliser tank (tanks A1, B1, C1, etc. or tanks A2, B2, C2, etc.) [2)]	yes	no (if the option for selecting a supply water source is not applied, that option can be used with a small adjustment of the internal wiring for the selection of fertiliser tanks)
Balance level control (with A+B principle)[2)]	yes	no
Selection of supply water tanks or day storage tanks[2]	yes	yes, maximum of 8 tanks
Irrigation water flow rate or volume measurement[2)]	yes	yes
Dosage can anticipate a change in irrigation water flow ('feed forward' control)	yes	no (there is a reaction to the change via 'feedback' control, but it is slower than via 'feed forward' control)
Control may take account of the number of irrigation valves that may be open at the same time	yes	yes
Drain measurement[2)]	yes, both volume and EC (and pH) of several drain measurements The actual moment of starting (after the start program has been launched) can be influenced based on the drain quantity.	no
Supply water from different sources can be mixed on the basis of EC or flow ratio[2)]	yes	yes

	NutriJet with Connext	NutriJet with Compass
EC correction based on light intensity[2] (lower EC value if there is a lot of sun and a large amount of evaporation)	yes	yes
Controlling flush valve from unit during recipe change	yes	no
Backwashing program for sand filter[2]	yes, up to 8 filters switched in parallel	yes, 1 filter
Registration of the measured values and settings	yes, with extensive reporting capabilities via Priva Office Direct (depending on selected configuration, see software manual)	yes, but without extensive reporting capabilities
Alarm functions and warning signal	various options (see software manual)	various options (see software manual)
Available languages for software operation	see price list	see price list

[1] In the Connext software, valve groups are linked to start programs, in the Compass software valves are linked to start programs.

[2] To make use of these options, sensors and other components (such as I/O expansions) that are not supplied as standard may be required.

Technical specifications - Mechanical

Technical specifications - mechanical

The illustrations and tables in this chapter show the dimensions of the NutriJet. Please read the explanation first:

General explanation:

- All dimensions in the tables are in millimetres unless specified otherwise.
- Dimensions of unions are measured up to the outside of the union.
  Dimensions of flanges are measured up to the gasket.
- W1.1 and W1.2 are the dimensions up to the two pre-mixing inlets.
- 1C stands for a single mixing chamber.
  2C stands for a double mixing chamber.

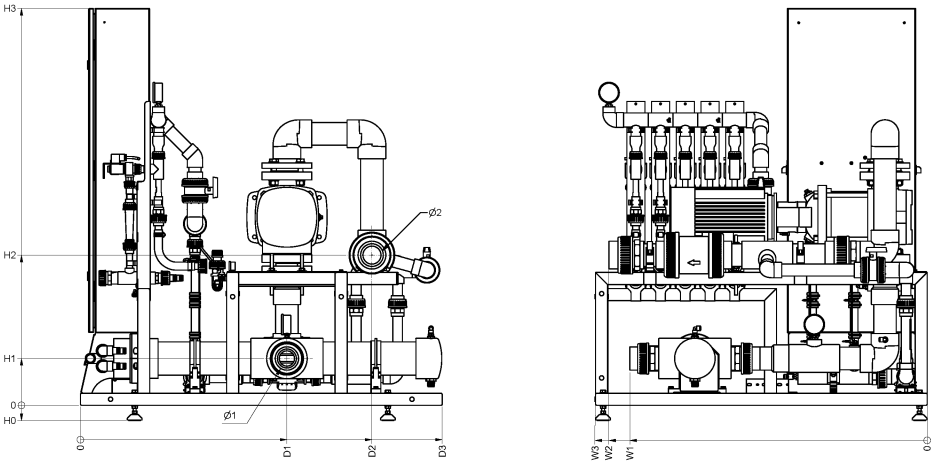
Explanation of letters in tables:

a. Metric inlets and outlets can be converted to nominal imperial sizes in accordance with table Inlets and outlets: metric > nominal imperial (page 47).
b. Dimensions of the frame
c. Height of the unit with CE cabinet is 1315 mm (unless H3 is higher). See also letter i.
   Height of the unit with CSA/UL cabinet 37" is 1180 mm (unless H3 is higher). See also letter i.
   Height of the unit with CSA/UL cabinet 49" is 1485 mm (unless H3 is higher). See also letter i.
d. If the unit has a double mixing chamber, then +500 mm
e. If the unit has a double mixing chamber, then +656 mm
f. If the unit has inlet valves, then +91.5 mm
g. If the unit has imperial unions, then +20 mm
h. If the unit has imperial unions, then +39 mm
i. The adjustable legs can be used to adjust the height of the unit by 41 to 51 mm (H0).
j. If the unit has imperial unions *and* a frequency controller, then +188 mm
   If the unit has imperial unions *and* no frequency controller, then +20 mm

Inlets and outlets: metric > nominal imperial

Ø (mm)	Nominal size of union (inches)	Nominal size BSP screw thread (inches)
50	1.5	1.5
63	2	2
75	3 *	2.5
90	3	3
110	4	4

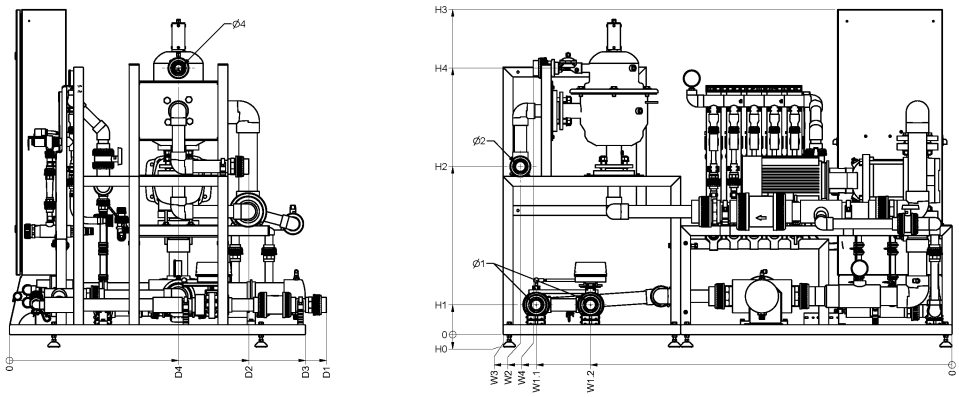
* Because a nominal size of 2.5 inches is not common with imperial piping, Ø 75 mm is converted to 3 inches nominal with a special adapter set. See also letters g and h in *Explanation of letters in tables*.



NutriJet 100/300/600 Inline

Type	Inlet				Outlet				Unit		
	Ø1	W1	D1	H1[i]	Ø2	W2	D2	H2[i]	W3[b]	D3[b]	H3[c,i]
NutriJet 100 Inline											
1C 5SV/CR5	63[a]	986	685	206	50[a]	1025	967	480	1100	1200	
2C 5SV/CR5	63[a]	1484	685	206	50[a]	1285	967	480	1600	1200	
1C 10SV/CR10	63[a]	986	685	206	50[a]	1025	967	480	1100	1200	
2C 10SV/CR10	63[a]	1484	685	206	50[a]	1285	967	480	1600	1200	
1C 15SV/CR15	63[a]	986	685	206	75[a]	1056[j]	967	498	1100	1200	
2C 15SV/CR15	63[a]	1484	685	206	75[a]	1318[g]	967	498	1600	1200	
NutriJet 300 Inline											
1C 15-22SV/CR15-20	75[a]	1025[h]	685	238	75[a]	1056[j]	967	498	1100	1200	
2C 15-22SV/CR15-20	75[a]	1523[h]	685	238	75[a]	1318[g]	967	498	1600	1200	
1C 33SV/CR32	75[a]	1025[h]	685	238	75[a]	1056[j]	967	498	1100	1200	
2C 33SV/CR32	75[a]	1523[h]	685	238	75[a]	1318[g]	967	498	1600	1200	
NutriJet 600 Inline											
1C 46SV/CR45	110[a]	1161	685	215	90[a]	1335	967	505	1600	1200	
2C 46SV/CR45	110[a]	1659	685	215	90[a]	1335	967	505	1600	1200	
1C 66SV/CR64 Metric	125	1078	685	215	110	1358	967	555	1600	1200	
2C 66SV/CR64 Metric	125	1575	685	215	110	1358	967	555	1600	1200	
1C 66SV/CR64 Imperial	6"	1078	685	215	4"	1358	967	555	1600	1200	
2C 66SV/CR64 Imperial	6"	1575	685	215	4"	1358	967	555	1600	1200	

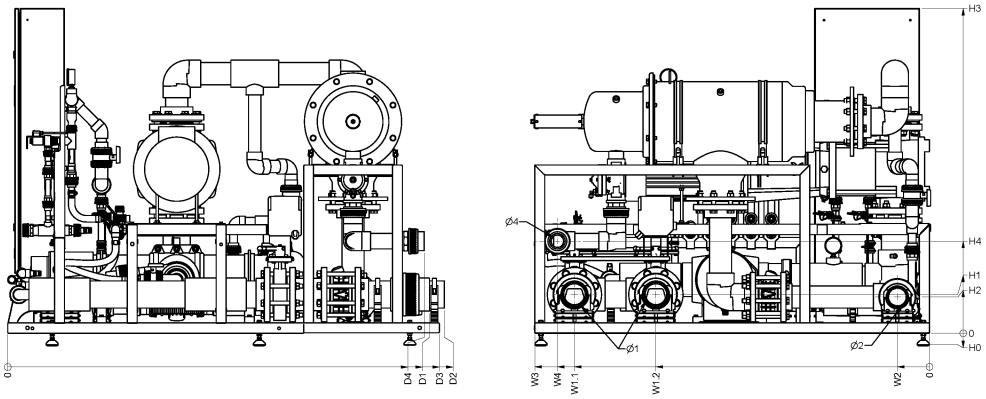
NutriJet 100/300/600 Inline



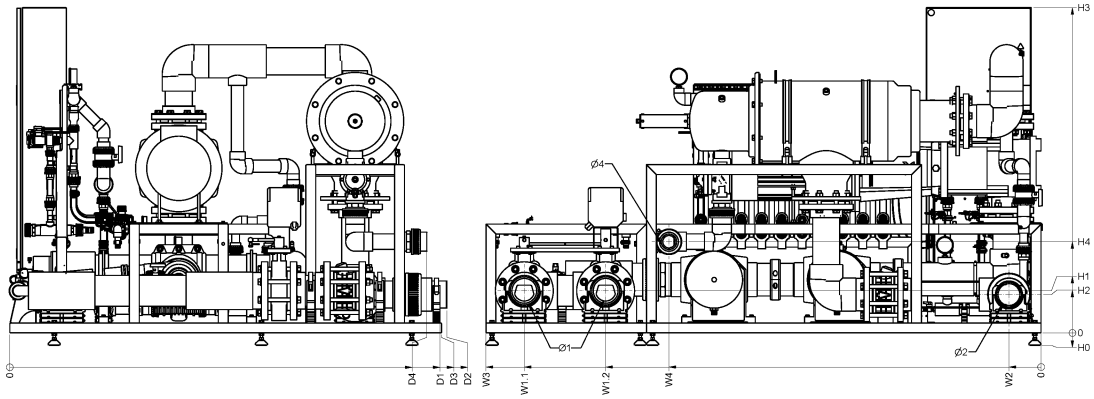
NutriJet 100/300 Inline, with post-filtration and/or pre-mixing

Type	Inlet				Outlet				Unit			Filter drain			
	Ø1	W1	D1	H1[i]	Ø2	W2	D2	H2[i]	W3[b]	D3[b]	H3[c,i]	Ø4	W4	D4	H4[i]
NutriJet 100/300 Inline															
									1820[d]	1200					
No pre-mixing 50 mm	50[a]	1686[d]	1160	120											
No pre-mixing 63 mm	63[a]	1686[d]	1160	132											
No pre-mixing 75 mm	75[a]	1686[d]	1160[g]	138											
No pre-mixing 90 mm	90[a]	1686[d]	1160	145											
Pre-mixing 50 mm	50[a]	1686/1465[d]	1285	120											
Pre-mixing 75 mm	75[a]	1686/1465[d]	1324[g]	138											
No filter					See NutriJet 100/300/600 Inline							n/a	n/a	n/a	n/a
UdiMatic filter 2"					50[a]	1750[d]	970[g]	680			1325	50[a]	1698	685	1078
UdiMatic filter 3"					75[a]	1750[d]	1004[g]	698			1494	50[a]	1697	685	1172
UdiMatic filter 4"					75[a]	1750[d]	1004[g]	698			1636	50[a]	1726	685	1314

NutriJet 100/300 Inline, with post-filtration and/or pre-mixing



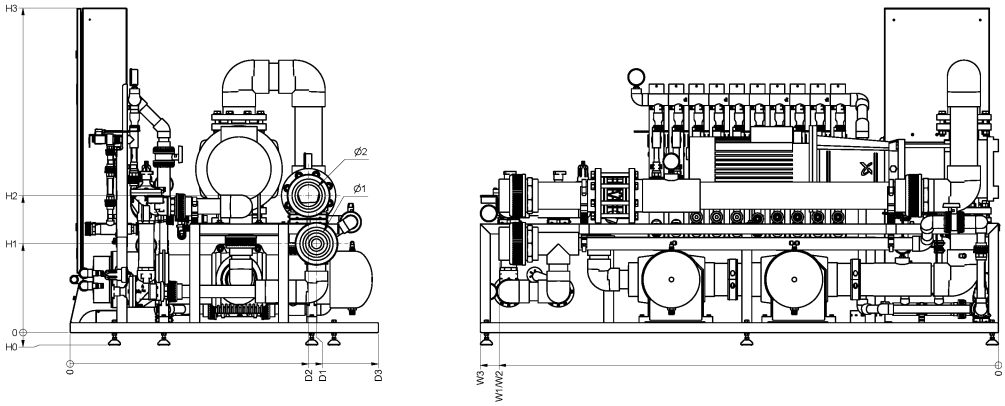
NutriJet 600 Inline, 1 mixing chamber, with post-filtration and/or pre-mixing



NutriJet 600 Inline, 2 mixing chambers, with post-filtration and/or pre-mixing

Type	Inlet				Outlet				Unit			Filter drain			
	Ø1	W1	D1	H1[i]	Ø2	W2	D2	H2[i]	W3[b]	D3[b]	H3[c,i]	Ø4	W4	D4	H4[i]
NutriJet 600 Inline															
No pre-mixing									1600	1750					
Pre-mixing + 1C									1600	1750					
Pre-mixing + 2C									2250	1750					
No pre-mixing	See NutriJet 100/300/600 Inline														
Pre-mixing 90 mm	90[a]	1439/1109[e]	1689	145											
Pre-mixing 110 mm	110[a]	1439/1109[e]	1710	155											
Pre-mixing 125 mm Metric	125	1439/1109[e]	1591	170											
Pre-mixing 125 mm Imp.	6"	1439/1109[e]	1608	170											
46SV/CR45 No filter					90[a]	140	1720	145							
46SV/CR45 UdiMatic 4"L					90[a]	130	1716	145				63[a]	1509[f]	1651	372
46SV/CR45 Amiad filter 4"					90[a]	366	1750	145				1.5"	1593	1400	630
66SV/CR64 No filter					110[a]	140	1720	155							
66SV/CR64 UdiMatic 4"L					110[a]	130	1711	155				63[a]	1509[f]	1651	372
66SV/CR64 Amiad filter 4"					110[a]	370	1750	155				1.5"	1593	1400	630

NutriJet 600 Inline, with post-filtration and/or pre-mixing



NutriJet 300/600 Bypass

Type	Inlet				Outlet				Unit		
	Ø1	W1	D1	H1[i]	Ø2	W2	D2	H2[i]	W3[b]	D3[b]	H3[c,i]
NutriJet 300 Bypass											
1C 15SV/CRI15	75[a]	1484[g]	935	360	75[a]	1484[g]	967	498	1600	1200	
2C 15SV/CRI15	75[a]	1984[g]	999	360	75[a]	1984[g]	967	498	2100	1200	
NutriJet 600 Bypass											
1C 15-22SV/CRI15-20	75[a]	1484[g]	935	360	75[a]	1484[g]	967	498	1600	1200	
2C 15-22SV/CRI15-20	75[a]	1984[g]	999	360	75[a]	1984[g]	967	498	2100	1200	
1C 33SV/CRN32	75[a]	1484[g]	935	360	75[a]	1484[g]	967	498	1600	1200	
2C 33SV/CRN32	75[a]	1984[g]	999	360	75[a]	1984[g]	967	498	2100	1200	
1C 46SV/CRN45	90[a]	2003	999	360	90[a]	1950	967	505	2100	1200	
2C 46SV/CRN45	90[a]	2003	999	360	90[a]	1950	967	505	2100	1200	
1C 66SV/CRN64	110[a]	2025	999	360	110[a]	2025	967	555	2100	1200	
2C 66SV/CRN64	110[a]	2025	999	360	110[a]	2025	967	555	2100	1200	

NutriJet 300/600 Bypass

Technical specifications - pumps

The technical specifications for the pump(s) may be found in the supplied pump manual.

Technical specifications - inline dirt filter

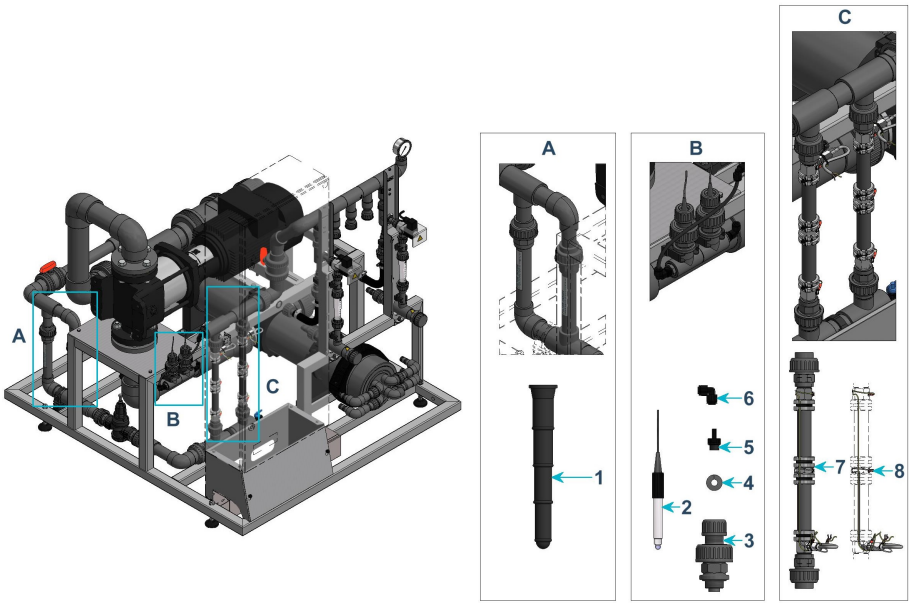
Article description	Inline dirt filter and corresponding PVC coupling 32 mm
Article number	630505
Housing	PVC
Interior	PE
Mesh opening	1.4 mm

Spare parts

The following tables show the spare parts.

- Only installers/service engineers approved by Priva who have received product-specific training from Priva are allowed to install, configure, repair and, if necessary, alter the product.
- Only use original Priva spare parts.

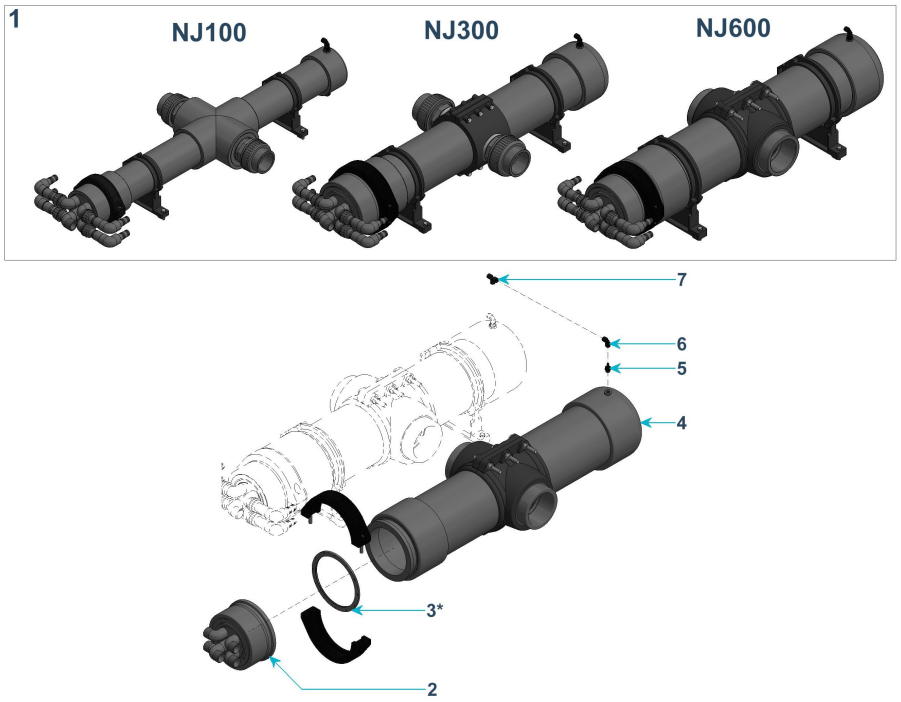
NutriJet



General

General

Pos. no.	Article description	Article number	
		Connext	Compass
1	Dirt filter	630502	630502
2	pH sensor	3779046	3779046
3	pH sensor holder	3770858	3770858
4	pH sensor holder ring	751074	751074
5	Push-in stem adaptor	751667	751667
6	Push-in elbow	751661	751661
7	EC sensor	752462	752463
8	EC sensor 3k NTC thermistor with cable	3476070	N/A
	EC sensor 1k NTC thermistor with cable	N/A	3476073



Mixing chamber

Mixing chamber

Pos. no.	Article description	Article number		
		NutriJet 100	NutriJet 300	NutriJet 600
1	Complete mixing chamber	730415	730412	730410
2	Entry collar	752441	752440	752440
3	Entry collar washer	751622*	751624*	751624*
4	Mixing chamber tube	752445	752442	752444
5	Push-in stem adaptor	751667	751667	751667
6	Push-in elbow	751661	751661	751661
7	Push-in tee	751664	751664	751664

*Must be replaced if the seal between the entry collar and the mixing chamber tube has been opened.

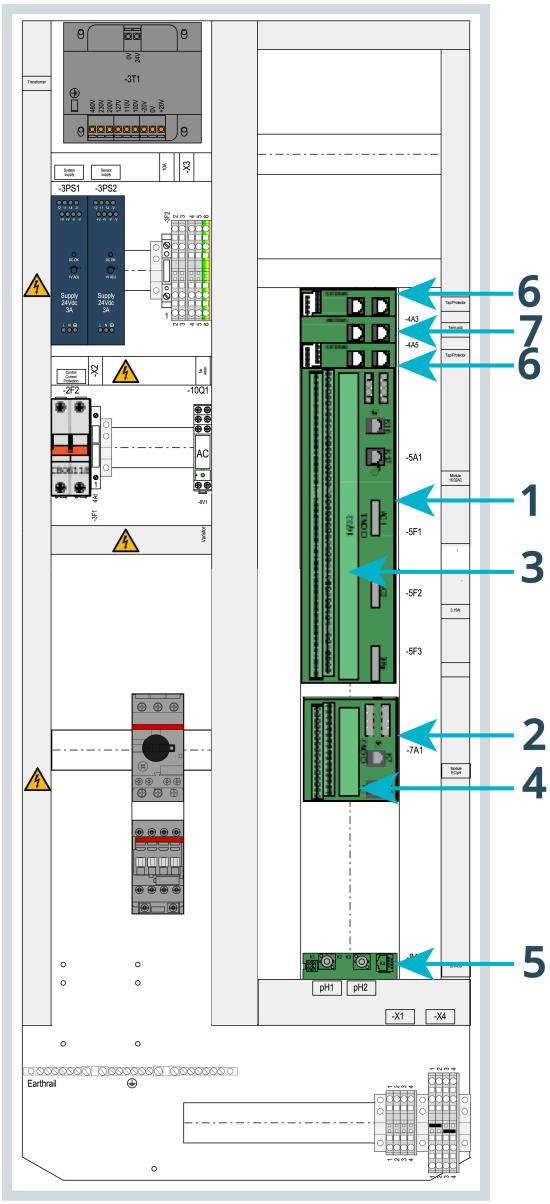
Hydraulic filter

Article description	Article number				
	UdiMatic 2" 850 cm²	UdiMatic 3" 1450 cm²	UdiMatic 4" 2360 cm²	UdiMatic 4" L 4500 cm²	Amiad M100-4500
Maintenance set (for use at least once every 2 years)	757551	757551	757551	757555	N/A
Seal set for hydraulic piston (for use at least once every 3 years)	757550	757550	757550	757556	N/A
Flushing valve	757558	757558	757558	757559	N/A
O-ring maintenance set	N/A	N/A	N/A	N/A	757709
Filter screen replacement kit	N/A	N/A	N/A	N/A	757710

Nutri-Line

Nutri-Line frequency controller

Article description	Article number	
	MR4	MR5
Fan for Vacon 100 frequency controller	756085	756086
Display for Vacon 100 frequency controller	756087	756087

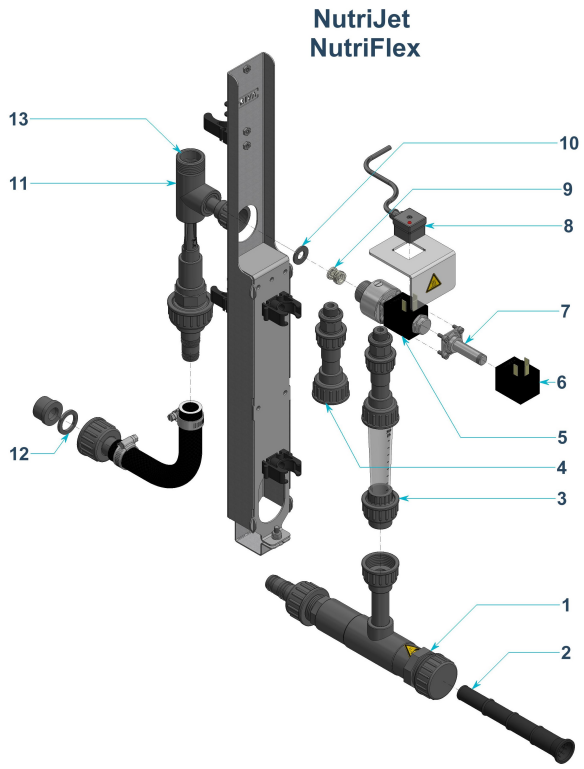


Nutri-Line Connext PCBAs

Nutri-Line Connext PCBAs

Pos. no.	Article description	Article number
1	I/O connection board large PCBA (VP9570)	3770970
2	I/O connection board small PCBA (VP9571)	3770971
3	I/O board AI16 / DO32 - AC PCBA (VP9530)	3770930
	I/O board DO64 - AC PCBA (VP9531)	3770931
4	I/O board for two EC/pH sensors PCBA (VP9533)	3770933
5	I/O connection board for two pH sensors PCBA (VP9572)	3770972
6	External connection board module (VP9552)	3771262
7	Internal connection board module (VP9550)	3771256

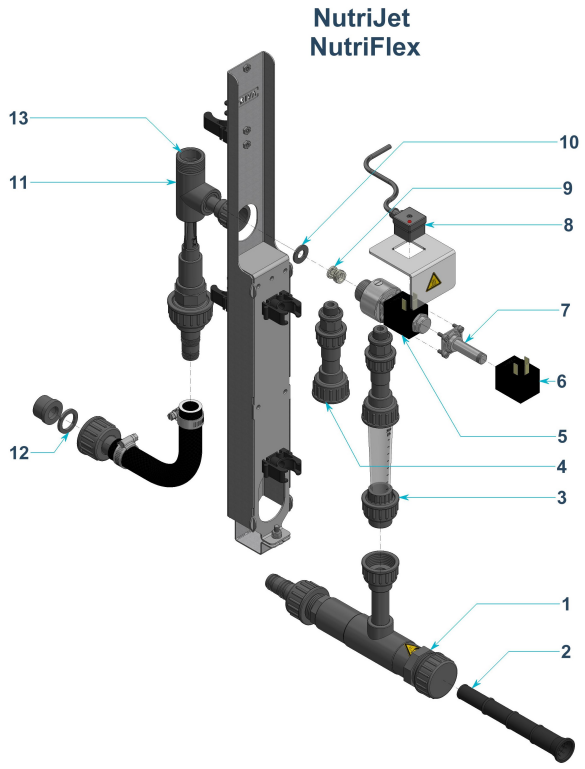
Dosing channels



Dosing channels - Fertiliser 100 l/h and 300 l/h

Dosing channels - Fertiliser 100 l/h and 300 l/h

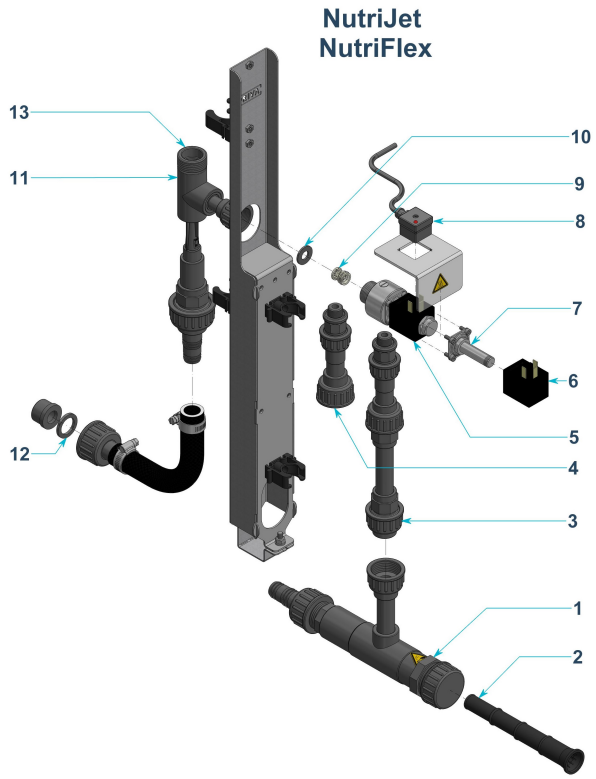
Pos. no.	Article description	Article number					
For the dosing of		Fertilisers	Fertilisers	Fertilisers	Fertilisers	Fertilisers	Fertilisers
Dosage capacity (l/h)		100	100	300	300	300	300
Tank selection		Single	Double	Single	Single	Double	Double
Frequency (Hz)		50, 60	50, 60	50	60	50	60
	Complete dosing channel	730363	730364	730310	730311	730312	730313
1	Filter assembly	752410	752410	752410	752410	752410	752410
2	Filter	630522	630522	630522	630522	630522	630522
3	Rotameter	752408	752408	752411	752411	752411	752411
4	Connection of rotameter to dosing valve	752407	752407	752407	752407	752407	752407
5	Dosing valve	750449	750449	750446	750454	750446	750454
6	Dosing valve coil	750991	750991	750993	750994	750993	750994
7	Dosing valve revision set	750990	750990	750455	750455	750455	750455
8	Dosing valve connector	750469	750469	750400	750400	750400	750400
9	Non-return valve	750416	750416	750416	750416	750416	750416
10	Seal dosing valve - venturi	752137	752137	752137	752137	752137	752137
11	Venturi	752450	N/A	752450	752450	N/A	N/A
12	Seal hose nozzle - mixing chamber/tank	754357	754357	754357	754357	754357	754357
13	Seal manifold - venturi	754357	754357	754357	754357	754357	754357



Dosing channels Fertilisers 600 l/h

Dosing channels Fertilisers 600 l/h

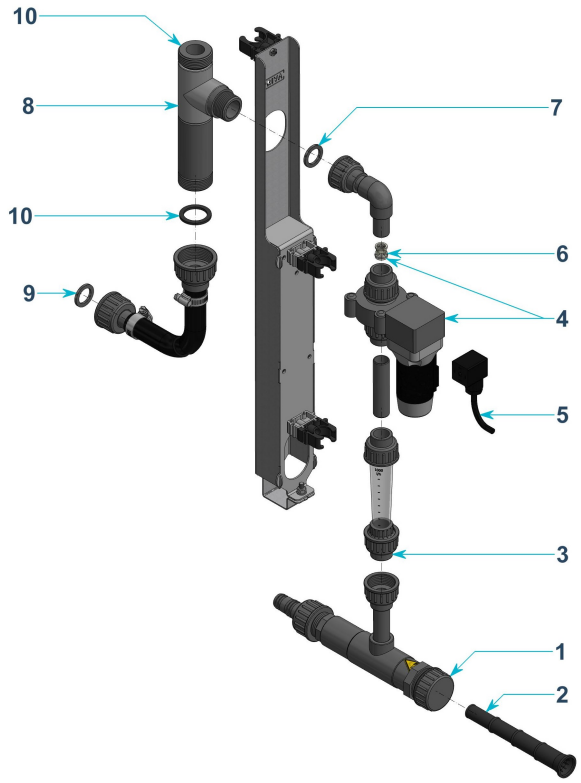
Pos. no.	Article description	Article number			
For the dosing of		Fertilisers	Fertilisers	Fertilisers	Fertilisers
Dosage capacity (l/h)		600	600	600	600
Tank selection		Single	Single	Double	Double
Frequency (Hz)		50	60	50	60
	Complete dosing channel	730320	730321	730322	730323
1	Filter assembly	752410	752410	752410	752410
2	Filter	630522	630522	630522	630522
3	Rotameter	752412	752412	752412	752412
4	Connection of rotameter to dosing valve	752407	752407	752407	752407
5	Dosing valve	750446	750454	750446	750454
6	Dosing valve coil	750993	750994	750993	750994
7	Dosing valve revision set	750455	750455	750455	750455
8	Dosing valve connector	750400	750400	750400	750400
9	Non-return valve	750416	750416	750416	750416
10	Seal dosing valve - venturi	752137	752137	752137	752137
11	Venturi	752451	752451	N/A	N/A
12	Seal hose nozzle - mixing chamber/tank	754357	754357	754357	754357
13	Seal manifold - venturi	754357	754357	754357	754357



Dosing channels - low-concentration acids 100 l/h and 300 l/h

Dosing channels - low-concentration acids 100 l/h and 300 l/h

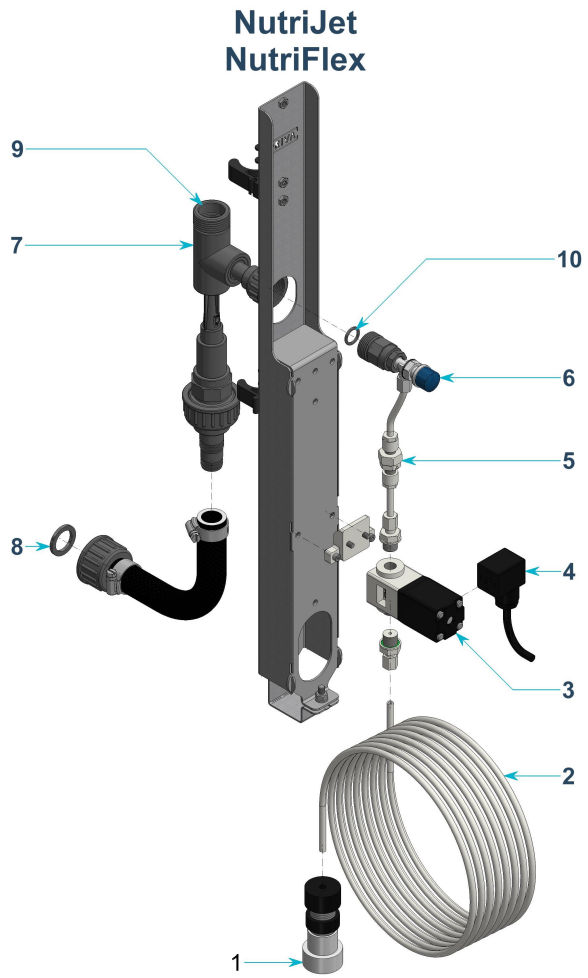
Pos. no.	Article description	Article number		
For the dosing of		Low-concentration acid	Low-concentration acid	Low-concentration acid
Dosage capacity (l/h)		100	300	300
Tank selection		Single	Single	Single
Frequency (Hz)		50, 60	50	60
	Complete dosing channel	730365	730330	730331
1	Filter assembly	752410	752410	752410
2	Filter	630522	630522	630522
3	Dummy rotameter	752415	752415	752415
4	Connection of dummy rotameter to dosing valve	752407	752407	752407
5	Dosing valve	750449	750446	750454
6	Dosing valve coil	750991	750993	750994
7	Dosing valve revision set	750990	750455	750455
8	Dosing valve connector	750469	750400	750400
9	Non-return valve	754581	754581	754581
10	Seal dosing valve - venturi	754582	754582	754582
11	Venturi	752450	752450	752450
12	Seal hose nozzle - mixing chamber/tank	754357	754357	754357
13	Seal manifold - venturi	754357	754357	754357



Dosing channels fertilisers 1000 l/h

Dosing channels fertilisers 1000 l/h

Pos. no.	Article description	Article number	
For the dosing of		Fertilisers	Fertilisers
Dosage capacity (l/h)		1000	1000
Tank selection		Single	Double
Frequency (Hz)		50, 60	50, 60
	Complete dosing channel	730360	N/A
1	Filter assembly	752410	752410
2	Filter	630522	630522
3	Rotameter	750499	750499
4	Dosing valve	750448	750448
5	Dosing valve connector	750469	750469
6	Non-return valve	750416	750416
7	Seal dosing valve - venturi	754357	754357
8	Venturi	755050	N/A
9	Seal nozzle hose - mixing chamber/tank	754357	754357
10	Seal venturi	751055	751055

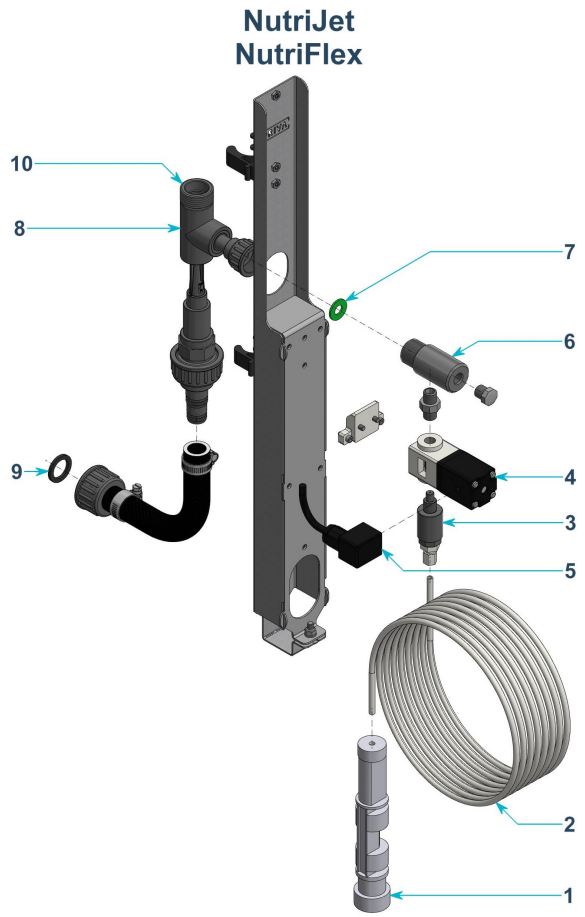


Dosing channels - highly concentrated acid and lye 50 l/h

Dosing channels - highly concentrated acid and lye 50 l/h

Pos. no.	Article description	Article number	
For the dosing of		Highly concentrated acid	Highly concentrated lye
Dosage capacity (l/h)		50	50
Tank selection		Single	Single
Frequency (Hz)		50, 60	50, 60
	Complete dosing channel	730361	730362
1	Foot valve	730393	730393*
2	Tube	752485	752485
3	Dosing valve	750468	750488
4	Dosing valve connector	750469	750469
5	Non-return valve	751360	750309
6	Control valve	750310	750310
7	Venturi	752450	752450
8	Seal hose nozzle - mixing chamber/tank	754357	754357
9	Seal manifold - venturi	754357	754357
10	Seal regulating valve - venturi	750690	754598

* Use EPDM seal foot valve kit



Low volume dosing channel 2 l/h and 8 l/h

Low volume dosing channel 2 l/h and 8 l/h

Pos. no.	Article description	Article number	
For the dosing of		Additives	Additives
Dosage capacity (l/h)		2	8
Tank selection		Single	Single
Frequency (Hz)		50, 60	50, 60
	Complete dosing channel	730351	730353
1	Foot valve	730350	730350
2	Tube	752485	752485
3	Micro-restriction	752432	752434
4	Dosing valve	750468	750468
5	Dosing valve connector	750469	750469
6	Connection dosing valve - venturi	754585	754585
7	Seal dosing valve - venturi	754582	754582
8	Venturi	752452	752452
9	Seal hose nozzle - mixing chamber/tank	754357	754357
10	Seal manifold - venturi	754357	754357

Terms and abbreviations

The list below states the abbreviations and terms relating to all disinfection units, purification units and fertiliser dosing units. Therefore, abbreviations and terms that do not apply to your specific unit and as a result are not used in this manual, may still be found in the list below.

Abbreviation / term	Explanation
A+B principle	A principle where fertiliser solutions are prepared manually in 2 (or possibly more) fertiliser tanks, in such concentrations that the unit has to mix them in equal quantities.
ABC principle	A principle where the unit mixes the fertiliser solutions from 3 (or possibly more) fertiliser tanks in the ratios as programmed in the recipe.
Anti-block	Chemical solution to clean the line walls of the distribution system periodically.
(to) Backwash a sand filter	Cleaning of a filter by flushing it with rinse water, against the normal direction of flow, with the dirty rinse water being discharged. Backwashing can periodically be performed automatically using electric valves and a rinse water pump controlled from the process computer.
(to) Backwash	Cleaning a filter by flushing it with rinse water, in counter flow, and draining away the dirty water. Backwashing can be done automatically using electric valves and a rinse water pump that are controlled by the process computer.
Balance level control	Control for the A+B principle that levels any differences in level in the emptying tanks over time. This allows to fill-up the tanks at the same time.
Change-over contact	Switch, switching sensor or relay with 2 positions: normally open (NO) and normally closed (NC). "Normally" refers to the idle position when the component has not been activated.
Direct distribution	The unit carries the irrigation water directly to the crop area and controls the irrigation valves.
Dirt filter	A wide mesh type of filter
(to) Discharge, discharge valve	Discharging irrigation water (e.g. to the sewer) via a (usually manually operated) discharge valve at the beginning of the main irrigation line. This can be necessary if the irrigation water is not of the desired quality (e.g. during the adjustment of the EC and pH controls).
Disinfect (disinfection)	Treating the water in such a way that the (pathogenic) micro-organisms can no longer reproduce. The micro-organisms are not necessarily killed. See also “sterilise”.
Disinfected water	Water that has been disinfected by the water disinfection unit.
Drain measurement	Measurement of the volume of drain water over a specific time and of the EC value of the drain water (or measurement of one of both).
Dose	For UV light: the average intensity of the active part of the light to which the water is exposed during the residence time, expressed in mJ/cm2 (intensity (W/cm2) x time (s) = energy (J/cm2). In order to produce more easily readable numbers, the figure for the energy is multiplied by 1000 and then expressed as mJ/cm2. The average intensity is calculated from the intensity measured with the UV sensor, the distance between the UV sensor and the quartz tube, the T10 value determined at the start of the production, the outside diameter of the quartz tube and the inside diameter of the chamber.
Drain water	Water that is not taken up by the plant and is then collected for reuse.
Drive water	Water that flows through the venturi's of the dosing channels to create a vacuum for suctioning fertiliser, or acid or lye solution.
EC	Electrical Conductivity, in the horticultural usually in terms of millisiemens per centimetre (mS/cm).
EC pre-control	Control to mix drain water and fresh water such that the supply water has the desired EC value. This EC value is a base for further increase of the EC value by fertiliser dosing.
Flowsensor	The flow sensor gives a number of pulses per unit of volume passed. The flow sensor is used to measure the volume passing through (flow).
Flash memory	Memory that retains data (such as settings), even after power switch-off or mains voltage failure.
Float switch	Switch installed in a water tank or silo. The float switch transmits a signal when the water reaches the same level as the float. (See also level sensor and level sensor)
(to) Flush, flush valve	Replacing the irrigation water in the main irrigation line by other/new irrigation water (e.g. after changing the recipe). Flushing takes place by opening the flush valve (usually controlled by the process computer) at the end of the main irrigation line and pumping the new irrigation water in the irrigation line.

Abbreviation / term	Explanation
Fresh water	Water having a relative low EC value (no or hardly any fertilisers), such as rain water, groundwater, drinking-water, well water and reversed osmosis water
HBC	High Breaking Capacity, a type of fuse
I/O	Input/Output
I/O module	Module with digital inputs, analogue inputs and/or digital outputs to which sensors, measuring equipment and actuators can be connected.
I/O net	Network where the Connext or Intégro process computer and the I/O modules exchange data.
Imperial	Refers to the British system of units, e.g. for dimensions (e.g. inches). This system is different from the metric system.
Indirect distribution	The unit supplies the irrigation water to a stock tank or silo. From there, a separate system handles the irrigation.
Irrigation water	Water to which fertilisers and acid or lye are added, so that it has the desired EC and pH value.
K-factor	Calibration parameter of a litre counter: the volume (in l) per pulse. This factor is not only determined by the design of the flow sensor, but also by the internal dimensions of the T-piece to which this sensor is screwed and the depth to which the sensor is inserted in the T-piece.
Level sensor	Sensor installed in a water tank or silo. The sensor provides an analogue signal, indicating the water level as a percentage. The level sensor must be calibrated on a regular basis. (See also level switch and float switch)
Level switch	Switch installed in a water tank or silo. The level switch transmits a digital signal when the water reaches a certain level. (See also level sensor and float switch)
Linear light sensor	A type of light sensor to measure sunlight in kilolux (klux) over the visible part of the spectrum (wave length 400 - 800 nm)
Litre counter	See "flowsensor".
Mixing tank level reduction	Anticipating by the process computer on a recipe change by stopping the preparation of new irrigation water on time. This causes the stock in the mixing tank to be used up to the minimum level and the new recipe being available within less time.
Motor protection	Electric protection, based on a thermal working principle, which switches off the (pump) motor when it consumes too much power. The motor protection can be reset after cooling down. The motor protection resides in the cabinet, not on the pump.
Nozzle	The part of a venturi or sprinkler that is responsible for the operation
NTC	Negative temperature coefficient, refers to a type of temperature sensor
P/I	Proportional/Integrating, refers to a type of control where the correction signal consists of a proportional component (correction signal directly proportional to the deviation) and an integrating component (correction signal increases the longer the deviation persists). The control is adjusted by the P and I factors.
pH	degree of acidity (negative logarithm of the concentration of acid particles (H^+))
PCB	Printed circuit board
PSD	Programmable system device, a chip into which system software is programmed, amongst other things
Radiation sum	Dose of sunlight (radiation intensity integrated over a period of time, in term of J/m²) that is received over a specific period of time.
Report alarm/stop alarm	With a report alarm, an alarm is only reported. With a stop alarm, the process is also aborted.
(to) Rinse (a sand filter)	To fill up the sand filter with water so that the sand bed becomes homogeneous and the filter ready for use.
Rotameter	A type of flow meter that is visually readable. A rotameter is based on a float body that is pushed up by the upwards flowing liquid in a transparent tapered pipe.
Sand bed	The layer of sand in a sand filter
Section	Menu or window with settings and/or reports within the use interface of the Connext and Intégro software. The sections are uniquely coded (e.g. *I420.5* and *M430*) and the data is arranged in tables with rows (lines) and one or more columns.
Selective disinfection	The reproductive capacity of only some of the types of micro-organisms is disabled (for instance, after selective disinfection fungi and nematodes can no longer multiply, but viruses may still be able to. As long as the corresponding viruses are not harmful to the crop, this is not a problem.) See also “total disinfection”.
Settlement of sand filter	Filling a sand filter with water in such a way that the bed of sand is even and the filter is ready for use. The dirt that has come from the bottom of the sand filter after the settlement is transported to the drain water tank.

Abbreviation / term	Explanation
Silo, tank	More or less exchangeable terms for a construction to store liquid or other substances. Silos are constructed from corrugated sheets and are often open at the top. Tanks have smooth walls and can be closed at the top. Silos are often larger than tanks.
Softstarter	Electronic module to run up a (pump) motor in a controlled way, so that electrical and mechanical overload are avoided.
Solarimeter	A type of light sensor to measure sun radiation in W/m² over a wide spectrum (wavelength 300 .. 2500 nm).
Sterilising	Treating the water in such a way that all micro-organisms are killed. See also “disinfection”.
Supply water	Water that flows to the unit. This water consists of fresh and/or drain water.
T10 value	UV permeability of the water to be disinfected over a distance of 10 mm, expressed in a percentage, compared to demineralised water, which is taken as a 100% reference.
Tank	Refer to "Silo, tank".
Total disinfection	The reproduction power of all types of micro-organisms is disabled (for instance, not just of fungi and nematodes but also of viruses). See also “selective disinfection”.
UV-C	Ultraviolet light of category C (wavelength 200 – 280 nm)
Valve group	A group of irrigation valves that software opens or closes simultaneous or after each other in an irrigation cycle.
Venturi	A channel with a nozzle that generates a vacuum if drive water flows through. The vacuum causes suctioning of fertiliser, acid or lye solution.
Watchdog	Circuit or software that has to be reset periodically by the running software. If it is not reset then the software 'hangs'. The watchdog then ensures that the software is restarted so the software runs again.
Water hammer	Peak load (by increased pressure) of components of a water system, caused by a sudden standstill or strong direction change of the water flow (e.g. after the fast closure of a valve or after the starting of a pump).

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