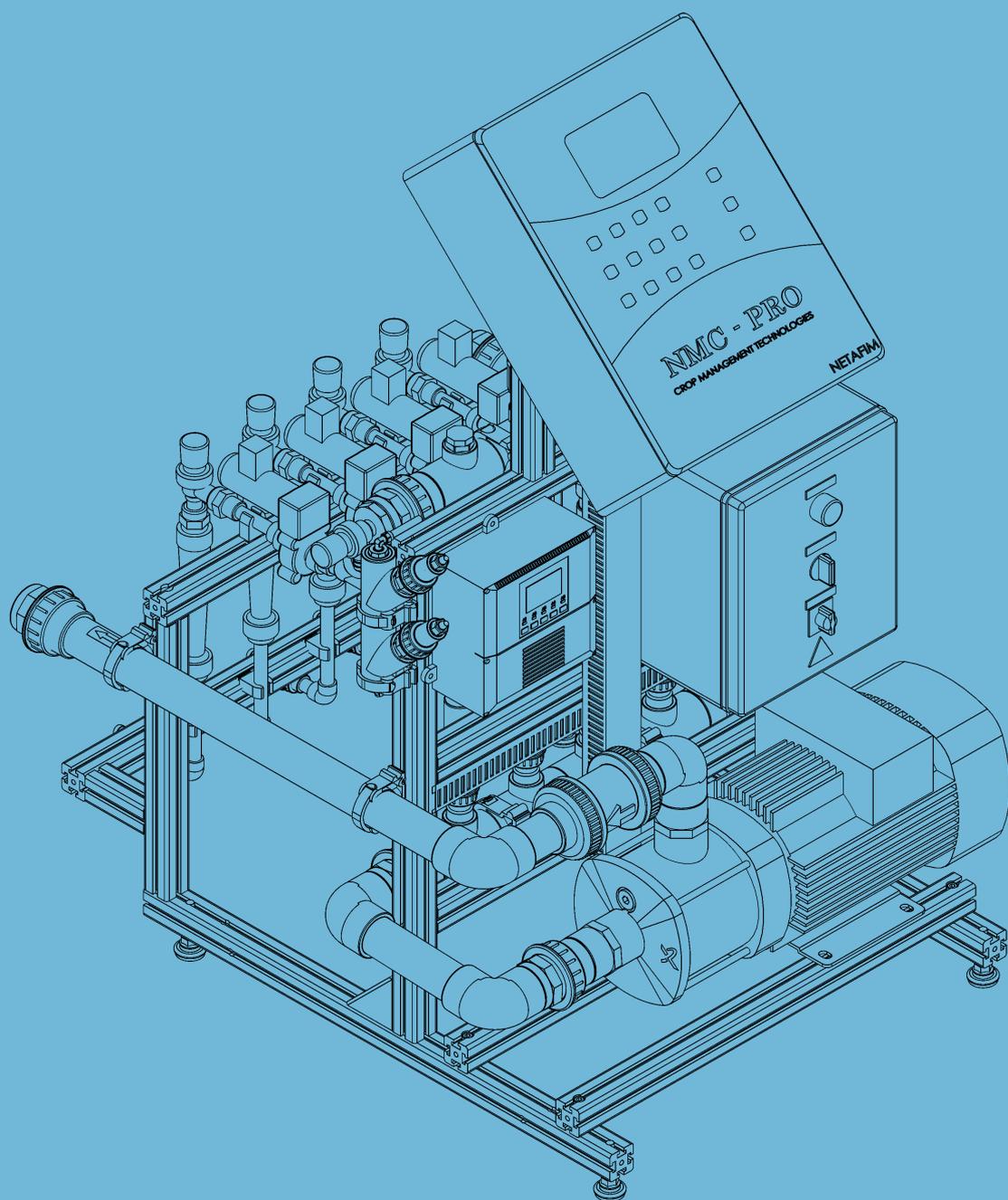


FERTIKIT™ 3G

INSTALLATION MANUAL



© COPYRIGHT 2020, NETAFIM™

NO PARTS OF THIS PUBLICATION MAY BE REPRODUCED, STORED IN AN AUTOMATED DATA FILE OR MADE PUBLIC IN ANY FORM OR BY ANY MEANS, WHETHER ELECTRONIC, MECHANICAL, BY PHOTOCOPYING, RECORDING OR IN ANY OTHER MANNER WITHOUT PRIOR WRITTEN PERMISSION OF THE PUBLISHER.

ALTHOUGH NETAFIM™ TAKES THE GREATEST POSSIBLE CARE IN DESIGNING AND PRODUCING BOTH ITS PRODUCTS AND THE ASSOCIATED DOCUMENTATION, THEY MAY STILL INCLUDE FAULTS.

NETAFIM™ WILL NOT ACCEPT RESPONSIBILITY FOR DAMAGE RESULTING FROM USE OF NETAFIM'S PRODUCTS OR USE OF THIS MANUAL.

NETAFIM™ RESERVES THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS TO ITS PRODUCTS AND/OR THE ASSOCIATED DOCUMENTATION WITHOUT PRIOR NOTICE.



FOREIGN LANGUAGES

In the event that you are reading this manual in a language other than the English language, you acknowledge and agree that the English language version shall prevail in case of inconsistency or contradiction in interpretation or translation.

SYMBOLS

The symbols used in this manual refer to the following:



WARNING

Contains instructions aimed at preventing bodily injury or direct damage to the crops, the FertiKit™ 3G and/or the infrastructure.



CAUTION

Contains instructions aimed at preventing unwanted system operation, installation or conditions that, if not followed, might void the warranty.



ATTENTION

Contains instructions aimed at enhancing the efficiency of usage of the instructions in the manual.



NOTE

Contains instructions aimed at emphasizing certain aspect of the operation of the system or installation.



ACID HAZARD

Contains instructions aimed at preventing bodily injury or direct damage to the crops, the product and/or the infrastructure in the presence of acid.



ELECTRICAL HAZARD

Contains instructions aimed at preventing bodily injury or direct damage to the FertiKit™ 3G and/or the infrastructure in the presence of electricity.



SAFETY FOOTWEAR

Contains instructions aimed at preventing foot injury.



PROTECTIVE EQUIPMENT

Contains instructions aimed at preventing damage to health or bodily injury in the presence of fertilizers, acid or other chemicals.



EXAMPLE

Provides an example to clarify the operation of the settings, method of operation or installation. The values used in the examples are hypothetical. Do not apply these values to your own situation.



TIP

Provides clarification, tips or useful information.

CONTENTS

Introduction

General instructions	6
Safety instructions	6
When using acid/chemicals	7

Description

Introduction	8
Advantages	8
Basic functions	8
Operating principle	9
Modularity	9
Compatibility	9
Service	9
Maintenance	9
The 8 modes	9
PL modes (PL/PS/PR/RL)	10
PB mode	12
SP mode	14
MS mode (MS/RS)	16
IL mode	18
ST mode	20
PD mode	22
MX mode	24
Dimensions and weighs	26

CONTENTS

On-site preparations

Hydraulic infrastructure preparation 28

Electrical preparation 33

Installation

Unpacking and placement 34

Hydraulic installation 34

Electrical installation 36

System operation

Preparations for running the FertiKit™ 37

Running the FertiKit™ 38

Calibration

Calculation of dosing channels opening percentage 40

Simulation with a 10 liter (2 US gal) bucket of water 40

Calibration of the FertiKit™ while irrigating 42

Commissioning 44

Warranty 45

Appendix

Dosing booster electrical data 46

INTRODUCTION



CAUTION

Read the Safety instructions chapter before beginning installation of the FertiKit™ 3G dosing unit.

General instructions

- Installation must be performed by authorized technicians only.
- Refer to your supervisor if problems occur during installation procedure.
- Installation should be performed on a hard, leveled floor or on a flat, hard, leveled plate.
- Do not apply force or pressure on components during the installation procedure.
- Verify that field components work properly.
- Make sure fertilizers and acid are on site at time of installation.

Electricity

- Ensure that suitable electrical power supply is available in the vicinity of the installation for the FertiKit™ electrical connection (see [Electrical preparation](#), page 33).
- Ensure an electrical socket available in the FertiKit™ vicinity, for installation and for service purposes.

Safety instructions

- All safety regulations must be applied.
- Ensure that the installation is carried out in a manner that prevents leaks from the FertiKit™, the fertilizer/acid tanks and lines, the peripherals and the accessories (contaminating the environment, soil or ambient area).
- When using acid always observe the acid manufacturer's safety instructions.
- Electrical installation should be performed by an authorized electrician only.
- The electrical installation must comply with the local safety standards and regulations.
- Installation should be performed by authorized technicians only.
- Protection provided by the equipment can be impaired if the equipment is used in a manner other than that specified by the manufacturer.



WARNING

In agricultural environment - always wear protective footwear.



WARNING

Always use protective equipment, gloves and goggles when handling fertilizers, acid and other chemicals!



WARNING

Measures must be taken to prevent fertilizer infiltration of the water source, to avoid water pollution.



CAUTION

When opening or closing any manual valve, always do it gradually, to prevent damage to the system by water hammer.



NOTE

The maximum sound level produced by the equipment does not exceed 70dB.

INTRODUCTION

When using acid/chemicals



ACID HAZARD

When using acid - always observe the acid manufacturer's safety instructions.



WARNING

Always use protective equipment, gloves and goggles when handling fertilizers, acid and other chemicals!



CAUTION

There are fertilizer combinations that at high concentration might induce crystallization in the FertiKit's lower manifold and cause clogging of the pipes.

Fertilizer combinations prone to induce crystallization:

- Calcium Nitrate + Ammonium Sulfate => Calcium Sulfate
- Calcium Nitrate + Potassium Sulfate => Calcium Sulfate
- MKP + Calcium Nitrate => Calcium Phosphate
- MAP + Calcium Nitrate => Calcium Phosphate
- Phosphoric acid + Calcium Nitrate => Calcium Phosphate

When injecting these fertilizer combinations:

- Make sure to dilute each fertilizer to the allowed concentration in the fertilizer tank prior to injection through the FertiKit™.
- Immediately after each injection of any of the fertilizer combinations above, flush the FertiKit™ with clean water for at least 2 minutes.

In case of doubt regarding the use of any combination of fertilizers, contact your Netafim™ local representative.



ATTENTION

When dosing acid, use a dosing channel fitted with the appropriate components according to the type and concentration of acid used*:

Type of dosing channel	Diaphragm and O-rings	For pH correction					For maintenance of drippers		
		Nitric acid (HNO ₃)	Phosphoric acid (H ₃ PO ₄)	Sulfuric acid (H ₂ SO ₄)	Potassium hydroxide (KOH)	Acetic acid (CH ₃ COOH)	Hydrochloric (HCl)	Hydrogen peroxide (H ₂ O ₂)	Chlorine (as hypochlorite)
For diluted acid	EPDM	<3%	<85%	<30%	<35%	<30%	<10%	<30%	<1%
For concentrated acid	Viton	<40%	<85%	<90%	<10%	<5%	<33%	<50%	<10%

% is by weight at 21°C (70°F)

*The table indicates the resistance of the dosing channel components to acid, and is not a recommendation to use the acids mentioned.



WARNING

Exceeding the recommended acid concentrations will damage the dosing channels.



WARNING

Substances such as chemicals for pest/disease control might be corrosive and damage the FertiKit™ 3G. When using any substance other than fertilizers or acids not exceeding the concentrations in the table above, always observe the manufacturer's instructions for corrosivity. In case of any doubt, contact your Netafim™ local representative.

DESCRIPTION

Introduction

The FertiKit™ 3G is a fully configurable fertilizer/acid dosing unit - a highly cost-effective solution for precise Nutrigation™.

Based on a standard platform, the FertiKit™ offers 7 different operation modes, selectable according to the site conditions, in order to maximize usage of available water flow rate and pressure on the main irrigation line, ensuring the highest efficiency with minimum investment.

The FertiKit™ can accommodate a variety of dosing channels, dosing boosters, controllers, peripherals and accessories to meet a vast range of applications and infrastructure constraints.

Capacity range

The FertiKit™ ensures a satisfactory mixture in an extremely vast range of flow capacities.

It will accommodate a 0.1 Ha (0.25 Acres) nursery or a 400 Ha (1000 Acres) sugar cane plantation.

Main line pressure range: up to 8.5 bars (123.0 PSI).

Main line flow rate range: from 1.0 to 700.0 m³/h (from 4.4 to 3000.0 GPM).

Advantages

- A modular Nutrigation™ system for soil or substrate applications with minimum investment
- Efficient usage of water, fertilizers and energy
- Unrivaled range of irrigation water capacities
- Designed for any application where quantitative or proportional Nutrigation™ is required
- Highly profitable price/performance ratio
- Venturi operating principle - no moving parts
- Fits easily into any existing irrigation system
- Precise Nutrigation™ based on high-accuracy dosing channels
- Quick action dosing valves
- Available with up to 6 fertilizer/acid dosing channels
- Nutrigation™ recipes can be changed quickly and efficiently
- Can be operated manually or fully computerized
- NMC and other controllers can be assembled on the FertiKit™ for advanced Nutrigation™ control
- A wide variety of accessories and peripherals can be integrated into the FertiKit™ to enhance its functions
- High-quality components and PVC pipe work
- Aluminum, corrosion-resistant frame with adjustable legs
- Easy to install and to maintain
- Made by Netafim™

Basic functions

The FertiKit™ supports the following Nutrigation™ functions:

- Fully controlled dosing and mixing of fertilizers/acid with source water into a homogenous nutrient solution.
- EC/pH correction of the nutrient solution.
- Water pre-treatment

DESCRIPTION

Operating principle

The FertiKit™ doses the various fertilizers and acid into a homogeneous solution and injects it into the irrigation water main line. The suction of the fertilizers and acid in the dosing channels is based on the Venturi principle. This requires a pressure differentiation - available on the main line or supplied by the main line pump or the FertiKit's dosing booster.

Modularity

The modular FertiKit™ 3G concept is based upon an array of interchangeable components that enables rapid assembly of a wide range of configurations.

Each FertiKit™ is delivered according to the precise customer's order, either fully factory assembled or assembled by the local dealer.

The dealer stocks the assortment of the FertiKit™ interchangeable components.

This concept enables the dealer to assemble any specific FertiKit™ according to the customer's order, saving the need to stock a large quantity of fully assembled FertiKit™ units of various common configurations.

The modular FertiKit™ 3G concept ensures prompt delivery schedules without delays!

Stock selection option

Enables the dosing of multiple fertilizers through a single dosing channel (in cases where simultaneous dosing is not required). Suits all modes of FertiKit™. Available in a wide variety of configurations, from a single dosing channel with 2 fertilizers to as many dosing channels and fertilizers as required. For further information, contact Netafim™.

Compatibility

The FertiKit™ 3G can be incorporated in an existing or a planned project; in either case it offers a highly cost-effective solution for Nutrigation™ by taking maximum advantage of the infrastructure conditions. Any available pressure surplus can be used for the FertiKit's operation. In order to configure the most cost-effective FertiKit™, making the maximum use of available pressure.



ATTENTION

Calculations are either in metric or in US units - consistency in the type of units used is essential.

Service

Servicing the FertiKit™ 3G is a prompt and simple process. The dealer keeps a small quantity of interchangeable components on hand, for replacement on site within a few minutes.

Maintenance

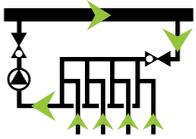
To prevent failures and extend the life cycle of the FertiKit™, regular maintenance must be carried out by the user, such as periodic rinsing of filters and calibration of the EC/pH sensors. For full maintenance instructions, see [Maintenance](#) in the [User Manual](#) (The User Manual is provided with the FertiKit™ and can be downloaded at <https://www.netafim.com/en/digital-farming/netbeat/Fertigation/fertikit/>).

The 8 modes

Each one of the FertiKit™ 3G 8 modes depicted on the following pages fits a specific infrastructure configuration.

DESCRIPTION

PL modes (PL/PS/PR/RL)



Operating principle: The pressure differential required to generate fertilizer suction via the Venturis is produced by a booster pump integrated in the FertiKit™.

These modes of operation, where the lower manifold is under low pressure (around 0 bars/PSI), permits the use of high-efficiency Venturis with high suction capacity and low motive flow consumption.

Flow rate: 20 - 700 m³/h (85 - 3000 GPM)

Suitable for main line pressure:

PL: 2.5 - 6.5 bars (36 - 94 PSI).

PR with PRV **27**: 6.5 - 8.5 bars (94 - 123 PSI)

PS with PSV **26**: Based on cavitation risk.

RL with PRV **27** and PSV **26**: 2.5 - 8.5 bars (36 - 123 PSI)

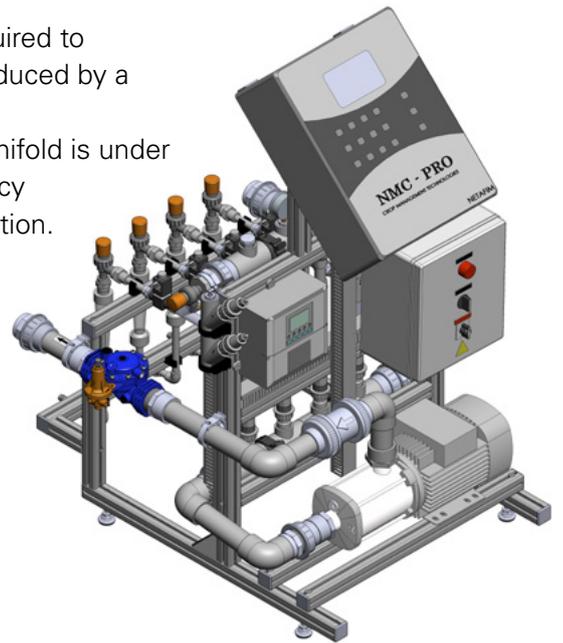
Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

- 50Hz: Up to 6 x 50 - 1000 l/h (13 - 265 GPH)
- 60Hz: Up to 5 x 50 - 1000 l/h (13 - 265 GPH)
- 60Hz: Includes compensation channel
- Optional - Concentrated acid channel, 50 l/h (13 GPH).

Total fertilizer/acid suction capacity:

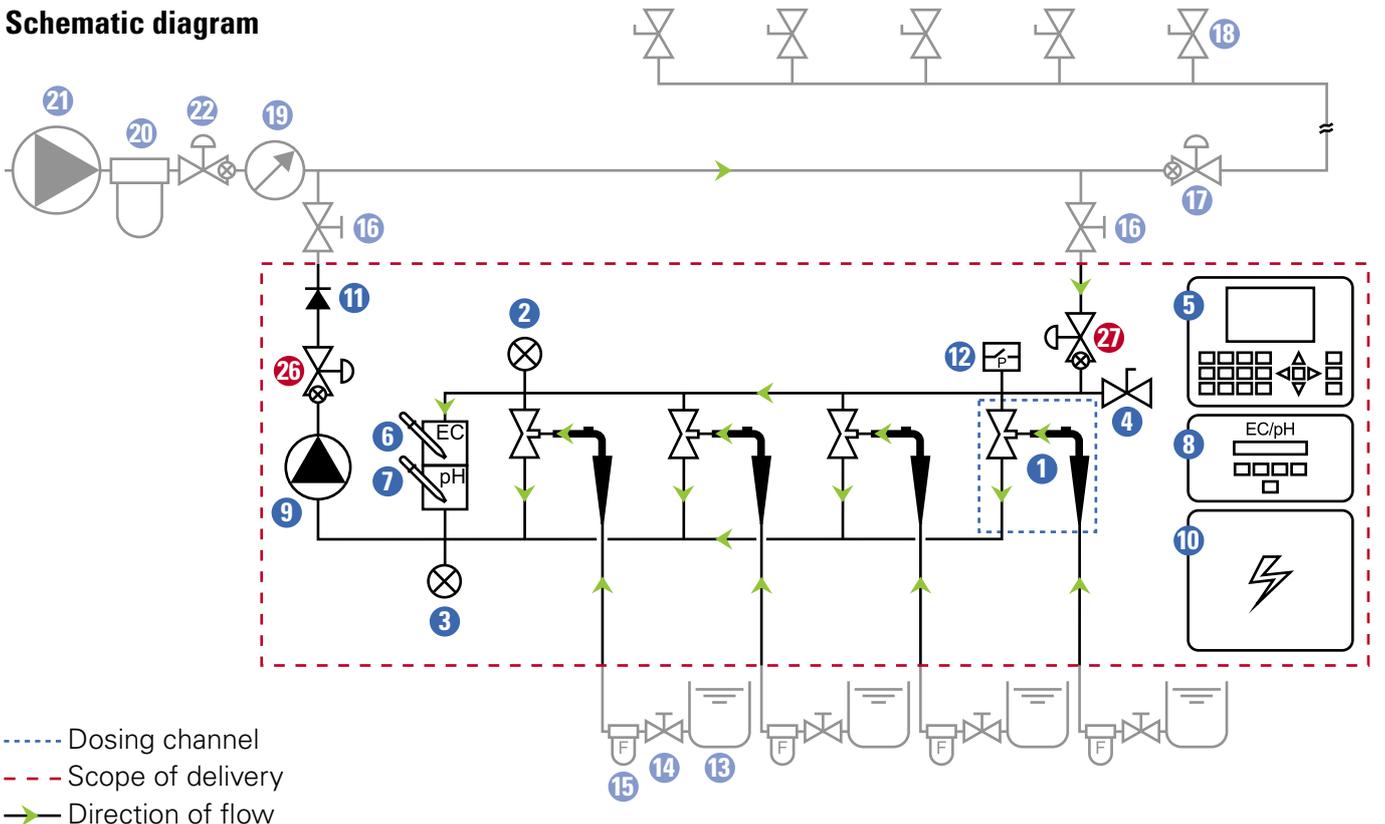
- 50Hz: up to 6000 l/h (1585 GPH).
- 50Hz: up to 5000 l/h (1320 GPH).



Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

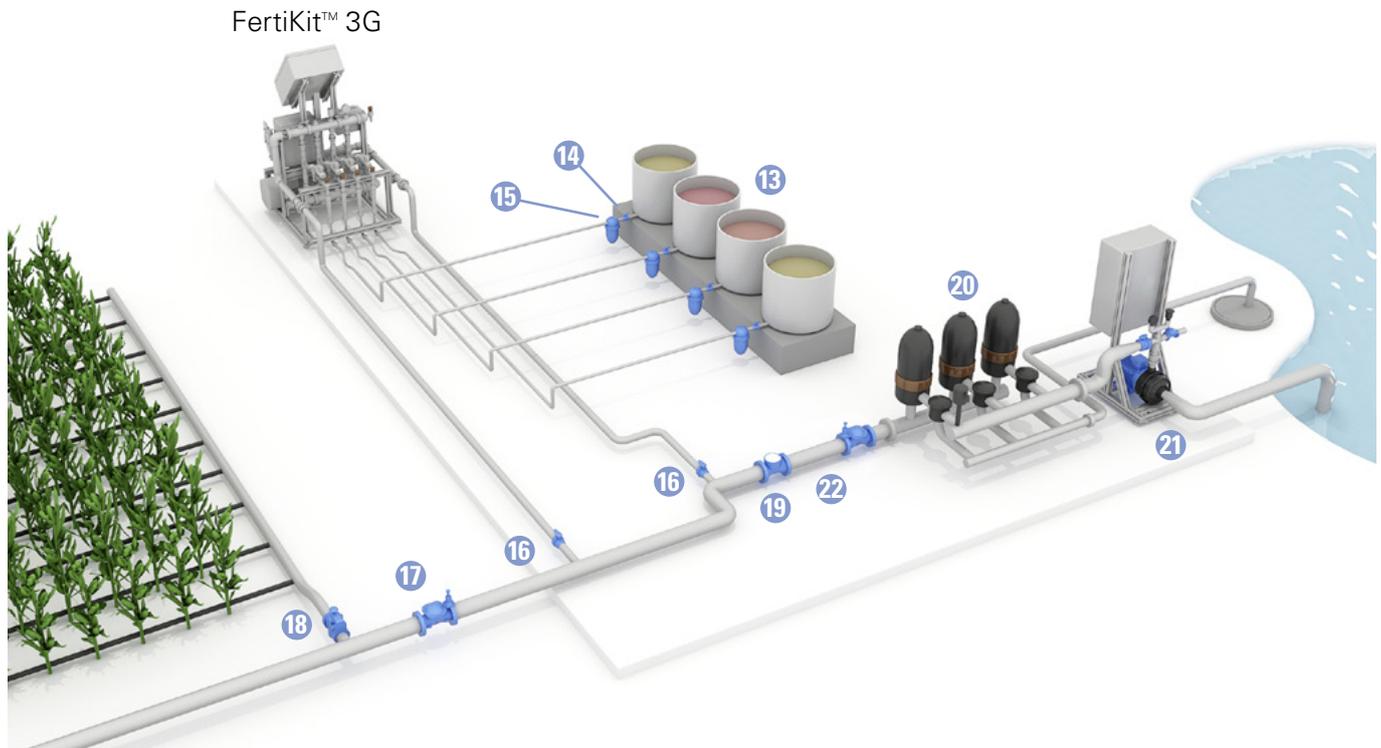
EC/pH: Single, monitoring and control.

Schematic diagram



DESCRIPTION

Typical setup of the PL modes (PL/PS/PR/RL)



Main parts of the PL modes (PL/PS/PR/RL) and infrastructure

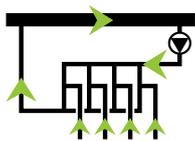
The list below presents the main parts of the FertiKit™ PL modes (PL/PS/PR/RL) and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|--|--|
| 1 Dosing channel + Venturi | 10 Dosing booster switchbox | 18 Irrigation valve |
| 2 Upper manifold pressure gauge | 11 Check valve | 19 Water meter |
| 3 Lower manifold pressure gauge | 12 Pressure switch | 20 Main line filter |
| 4 Sampling outlet | 13 Fertilizer/acid stock tank | 21 Main line pump |
| 5 Controller | 14 Manual valve (fertilizer) | 22 Main line pressure reducing valve (PRV) |
| 6 EC sensor | 15 Fertilizer/acid filter | 26 Pressure sustaining valve (PSV) |
| 7 pH sensor | 16 Manual valve (isolation) | 27 Pressure reducing valve (PRV) |
| 8 EC/pH transmitter | 17 Main line pressure sustaining valve (PSV) | |
| 9 Dosing booster | | |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure), ● Optional.

DESCRIPTION

PB mode



Operating principle: The pressure differential required to generate fertilizer suction via the Venturis is produced by a booster pump integrated in the FertiKit™. This mode of operation, where the smaller system pump

is installed upstream from the Venturis, permits the use of a small booster pump, reducing the investment required and saving energy. This mode is suitable for relatively low flow rates and pressures.

Flow rate: 5 - 70 m³/h (22 - 300 GPM)

Suitable for main line pressure: 1.5 - 2.5 bars (22 - 36 PSI)

Additional conditions:

The pressure supplied by the dosing booster is added to the main line pressure. Their sum (in the upper manifold) should not exceed 6.5 bars (94 PSI)

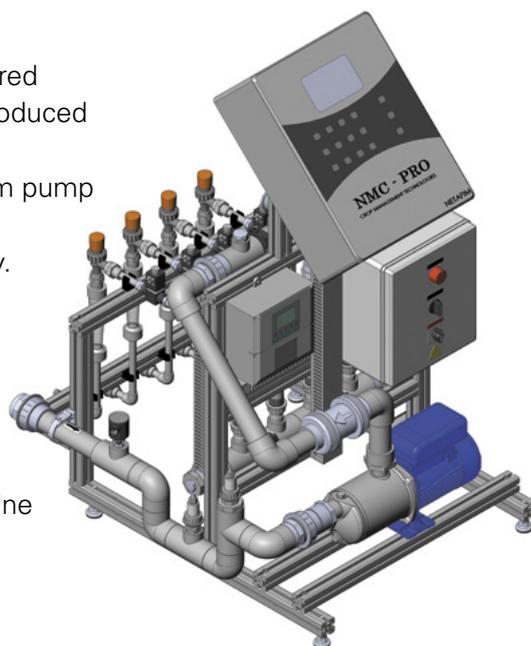
Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

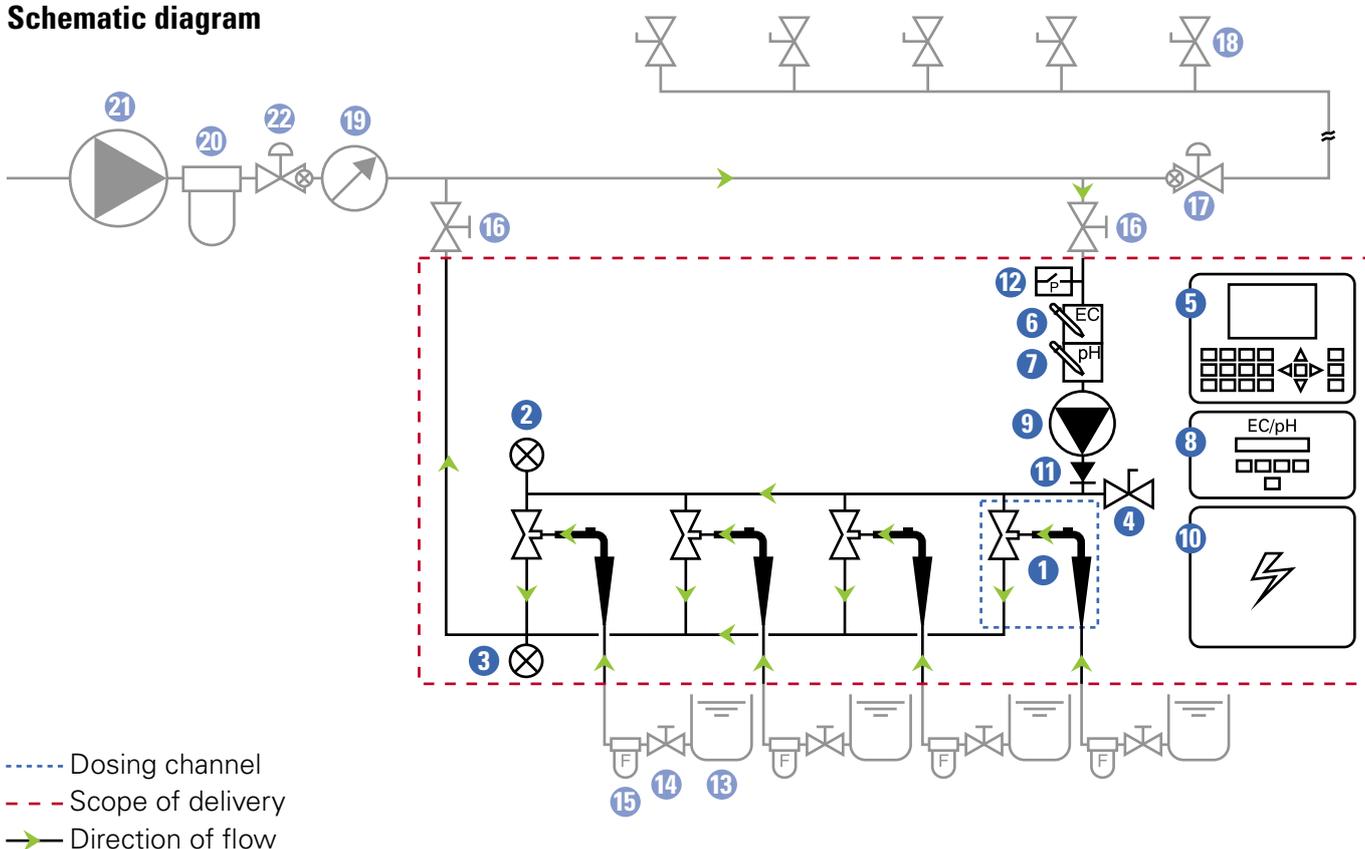
- Up to 4 x 50 - 370 l/h (13 - 100 GPH)
 - Optional - Concentrated acid channel, 50 l/h (13 GPH).
- Total fertilizer/acid suction capacity - up to 1480 l/h (390 GPH).

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

EC/pH: Single, monitoring and control.

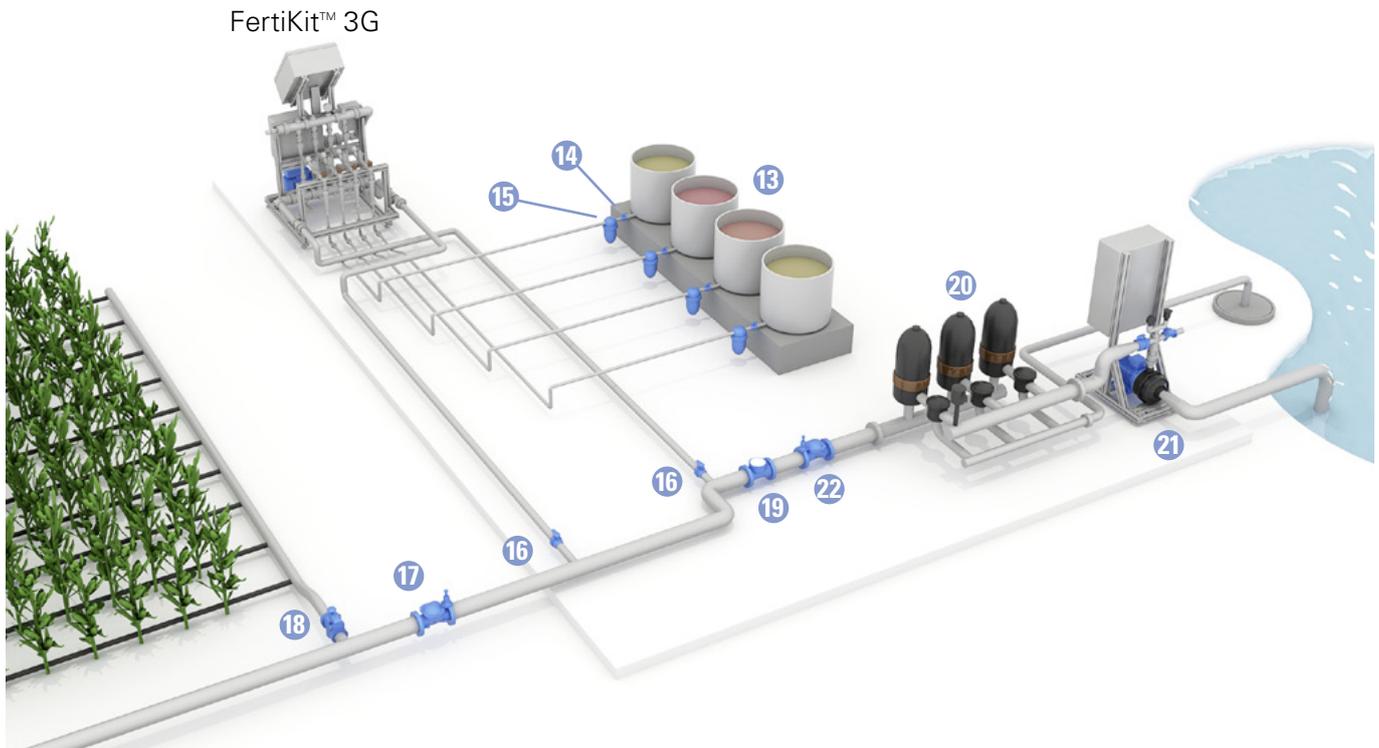


Schematic diagram



DESCRIPTION

Typical setup of the PB mode



Main parts of the PB mode and infrastructure

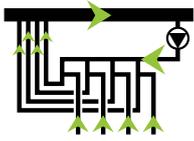
The list below presents the main parts of the FertiKit™ PB mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|-------------------------------|--|
| 1 Dosing channel + Venturi | 9 Dosing booster | 17 Main line pressure sustaining valve (PSV) |
| 2 Upper manifold pressure gauge | 10 Dosing booster switchbox | 18 Irrigation valve |
| 3 Lower manifold pressure gauge | 11 Check valve | 19 Water meter |
| 4 Sampling outlet | 12 Pressure switch | 20 Main line filter |
| 5 Controller | 13 Fertilizer/acid stock tank | 21 Main line pump |
| 6 EC sensor | 14 Manual valve (fertilizer) | 22 Main line pressure reducing valve (PRV) |
| 7 pH sensor | 15 Fertilizer/acid filter | |
| 8 EC/pH transmitter | 16 Manual valve (isolation) | |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

DESCRIPTION

SP mode



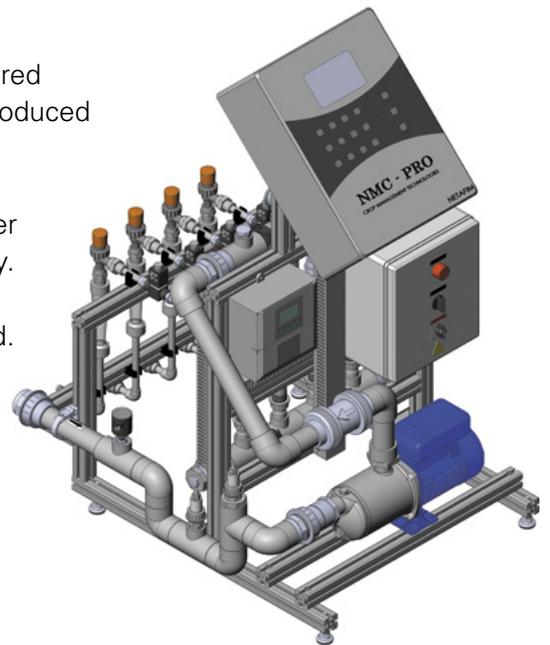
Operating principle: The pressure differential required to generate fertilizer suction via the Venturis is produced by a booster pump integrated in the FertiKit™.

This mode of operation, where the system pump is installed upstream from the Venturis, permits the use of a smaller booster pump, reducing the investment required and saving energy. This mode is suitable for relatively low flow rates and pressures.

For applications that use very high concentration fertilizers and acid. The solution has to be mixed in the main line.

SP mode is not equipped with a lower manifold.

(Can be supplied to the USA market with all parts inch-based to facilitate replacement using locally available spare parts).



Flow rate: 5 - 250 m³/h (22 - 1100 GPM)

Suitable for main line pressure: 1.5 - 3.5 bars (22 - 51 PSI)

Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

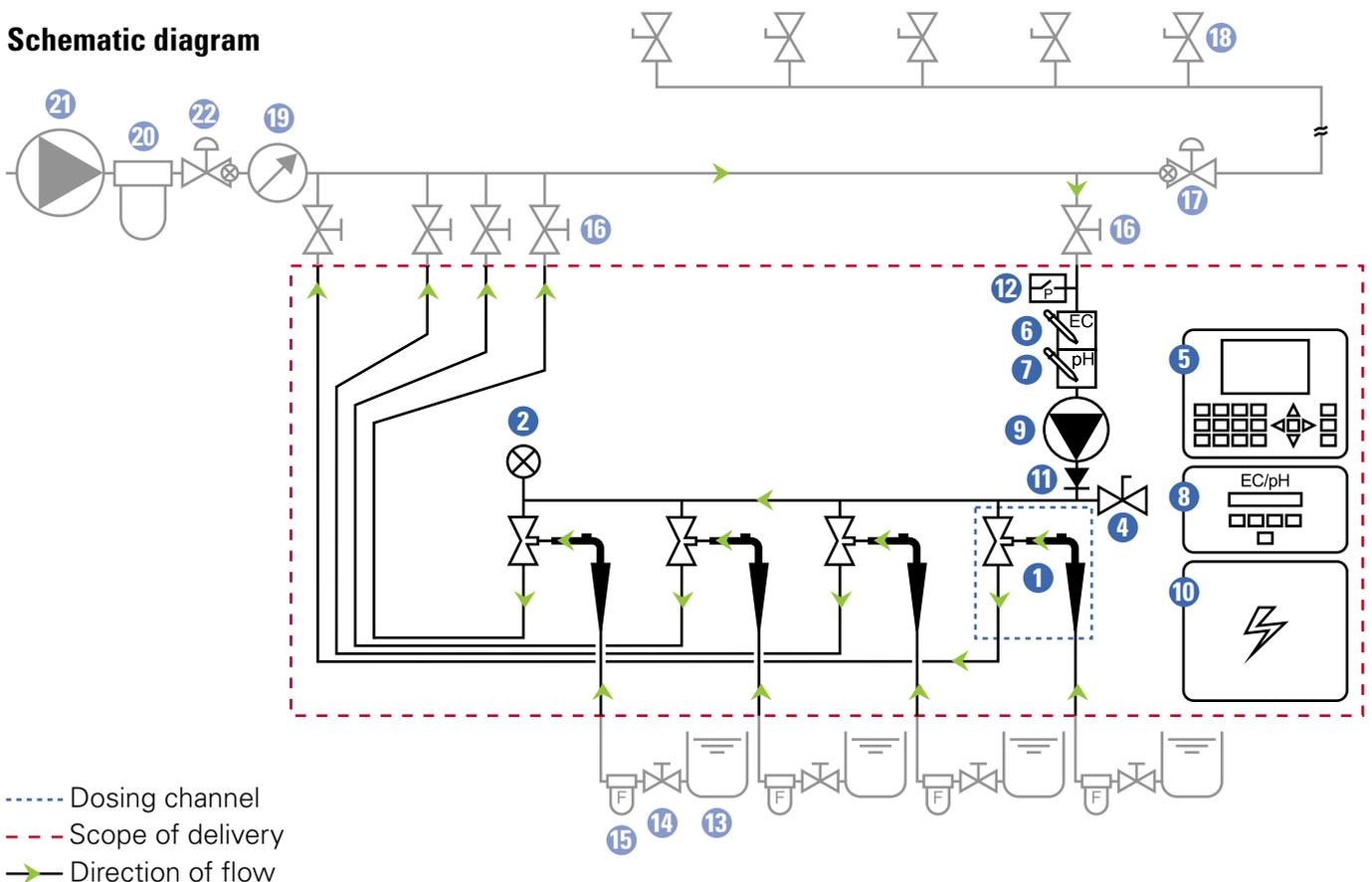
- Up to 4 x 50 - 370 l/h (13 - 100 GPH)
- Optional - Concentrated acid channel, 50 l/h (13 GPH).

Total fertilizer/acid suction capacity - up to 1480 l/h (400 GPH).

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

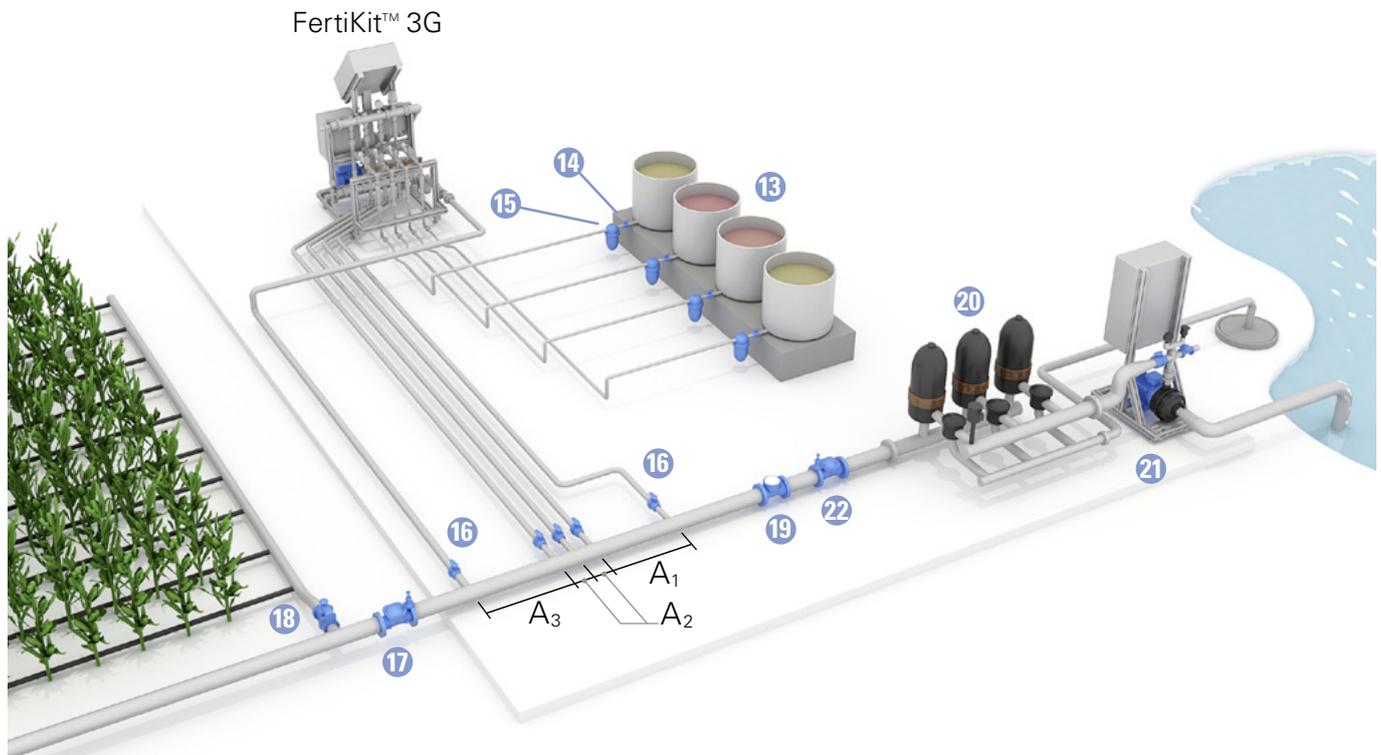
EC/pH: Single, monitoring and control.

Schematic diagram



DESCRIPTION

Typical setup of the SP mode



Minimum required distances between the inlet and the fertilizer/acid outlets on the main line

Description		Required proportions
A ₁	Distance between acid outlet and fertilizer outlet on the main line	Minimum 75 cm (2.5 feet)
A ₂	Distances between fertilizer outlets on the main line	Minimum 30 cm (1.0 feet)
A ₃	Distance between fertilizer outlet and FertiKit™ inlet on the main line	Minimum 90 cm (3.0 feet)

Main parts of the SP mode and infrastructure

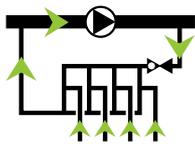
The list below presents the main parts of the FertiKit™ SP mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|-------------------------------|--|
| 1 Dosing channel + Venturi | 10 Dosing booster switchbox | 17 Main line pressure sustaining valve (PSV) |
| 2 Upper manifold pressure gauge | 11 Check valve | 18 Irrigation valve |
| 4 Sampling outlet | 12 Pressure switch | 19 Water meter |
| 5 Controller | 13 Fertilizer/acid stock tank | 20 Main line filter |
| 6 EC sensor | 14 Manual valve (fertilizer) | 21 Main line pump |
| 7 pH sensor | 15 Fertilizer/acid filter | 22 Main line pressure reducing valve (PRV) |
| 8 EC/pH transmitter | 16 Manual valve (isolation) | |
| 9 Dosing booster | | |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

DESCRIPTION

MS mode (MS/RS)



Operating principle: For systems operating under negative suction - from a reservoir or a tank [max. height: 6 meters (20 feet)] Utilizes the main line pump pressure. Saves the need for a dosing booster.

Flow rate: 20 - 700 m³/h (85 - 3000 GPM)

Suitable for main line pressure:

Upstream from the pump: -0.3 – +0.6 bar (-4 – +9 PSI)
At the outlet of the pump: 2.5 – 6.5 bars (36 – 94 PSI)

RS with PRV **21**:

6.5 – 8.5 bars (94 – 123 PSI) at the FertiKit™ inlet.

Additional conditions:

Requires the connection of the FertiKit's outlet to the main line upstream from the pump.

The main line pump should be able to deliver the flow rate required for the operation of the FertiKit™ + the field consumption.

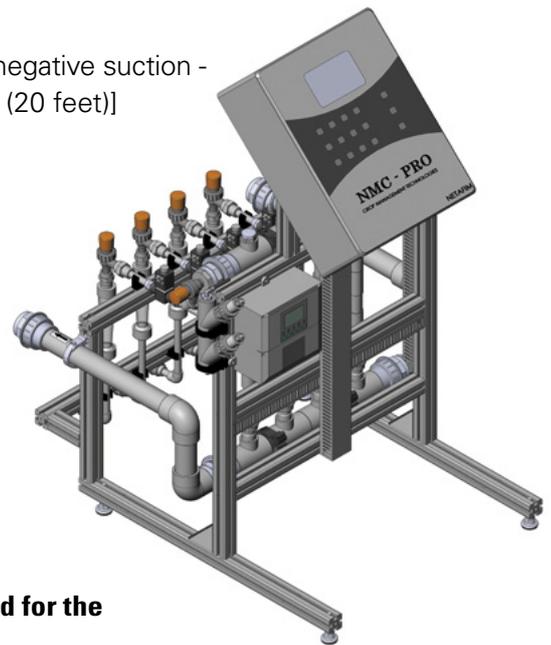
Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

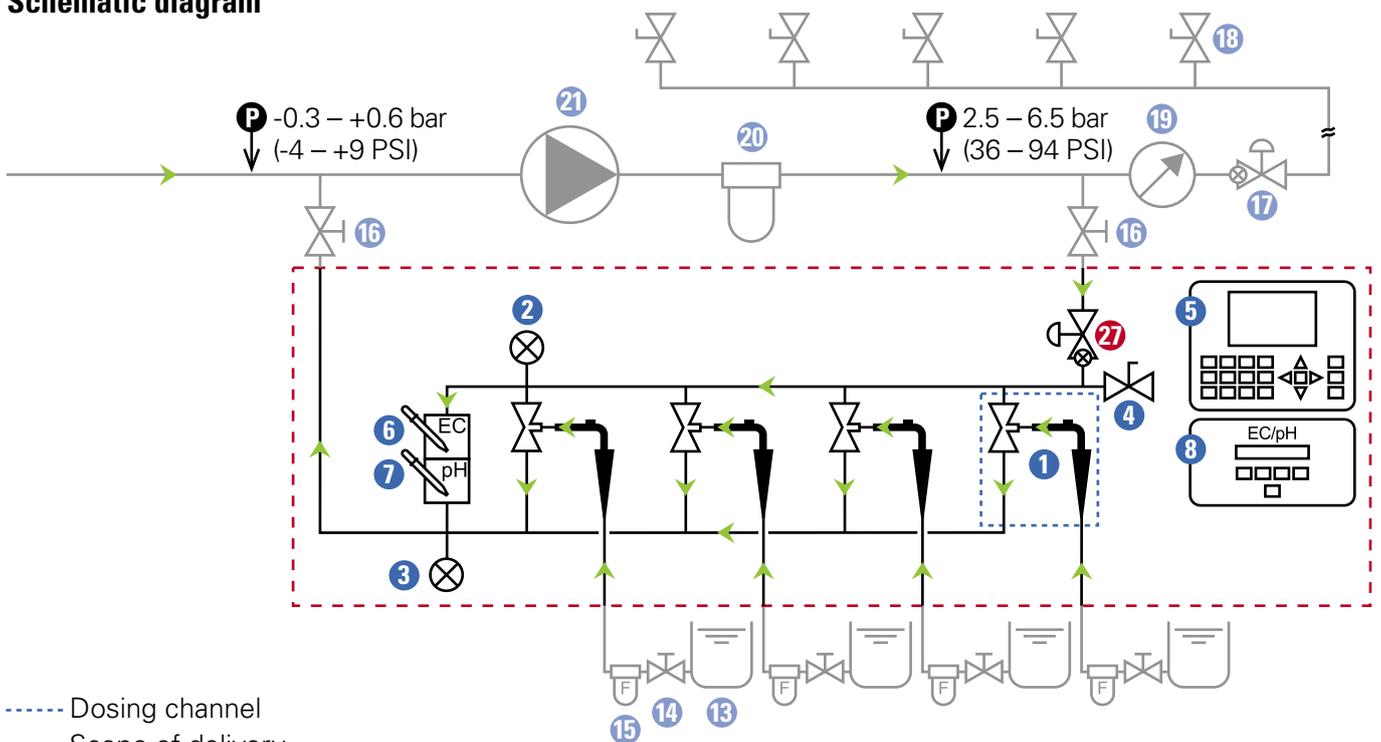
- Up to 6 x 50 - 1000 l/h (13 - 265 GPH)
 - Optional - Concentrated acid channel, 50 l/h (13 GPH).
- Total fertilizer/acid suction capacity - up to 6000 l/h (1585 GPH).

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

EC/pH: Single, monitoring and control.



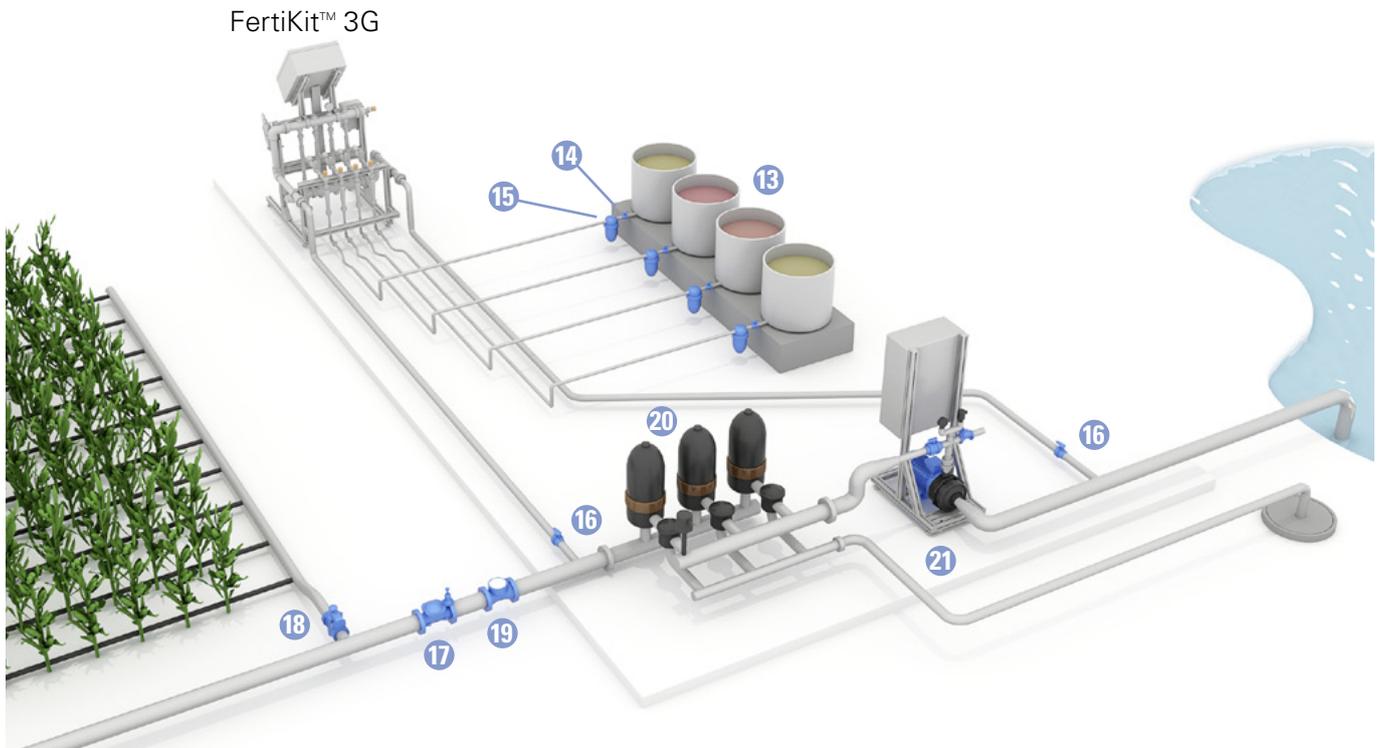
Schematic diagram



- Dosing channel
- - - - - Scope of delivery
- ➔ Direction of flow

DESCRIPTION

Typical setup of the MS mode (MS/RS)



Main parts of the MS mode (MS/RS) and infrastructure

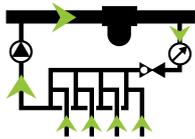
The list below presents the main parts of the FertiKit™ MS mode (MS/RS) and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|-------------------------------|--|
| 1 Dosing channel + Venturi | 7 pH sensor | 17 Main line pressure sustaining valve (PSV) |
| 2 Upper manifold pressure gauge | 8 EC/pH transmitter | 18 Irrigation valve |
| 3 Lower manifold pressure gauge | 13 Fertilizer/acid stock tank | 19 Water meter |
| 4 Sampling outlet | 14 Manual valve (fertilizer) | 20 Main line filter |
| 5 Controller | 15 Fertilizer/acid filter | 21 Main line pump |
| 6 EC sensor | 16 Manual valve (isolation) | 27 Pressure reducing valve (PRV) |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure), ● Optional.

DESCRIPTION

IL mode



Operating principle: The pressure differential required to generate fertilizer suction via the Venturis is produced by a booster pump integrated in the FertiKit™.

In this mode of operation, the lower manifold is at low pressure (around 0 bar/psi) this allows the use of high-efficiency Venturis with high suction capacity and low motive flow consumption. Since all the main line water flows through the system, slight pressure losses at the FertiKit™ outlet should be considered (see the table below).

Flow rate: 3 - 18 m³/h (13 - 85 GPM)

Suitable for main line pressure: 2.5 - 5.5 bars (36 - 79 PSI)

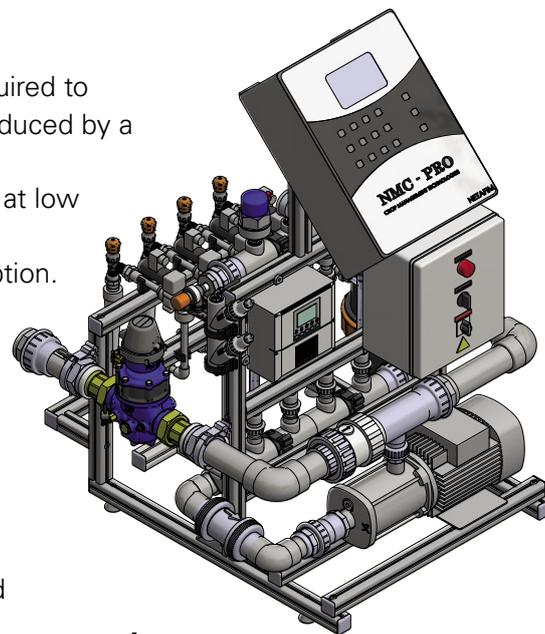
Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

- 50Hz: Up to 6 x 50 - 600 l/h (13 - 156 GPH)
- 60Hz: Up to 3 x 50 - 600 l/h (13 - 156 GPH)
- 60Hz: Includes compensation channel
- Optional - Concentrated acid channel, 50 l/h (13 GPH).

Total fertilizer/acid suction capacity:

- 50Hz: Up to 3600 l/h (950 GPH).
- 60Hz: Up to 1800 l/h (475 GPH).



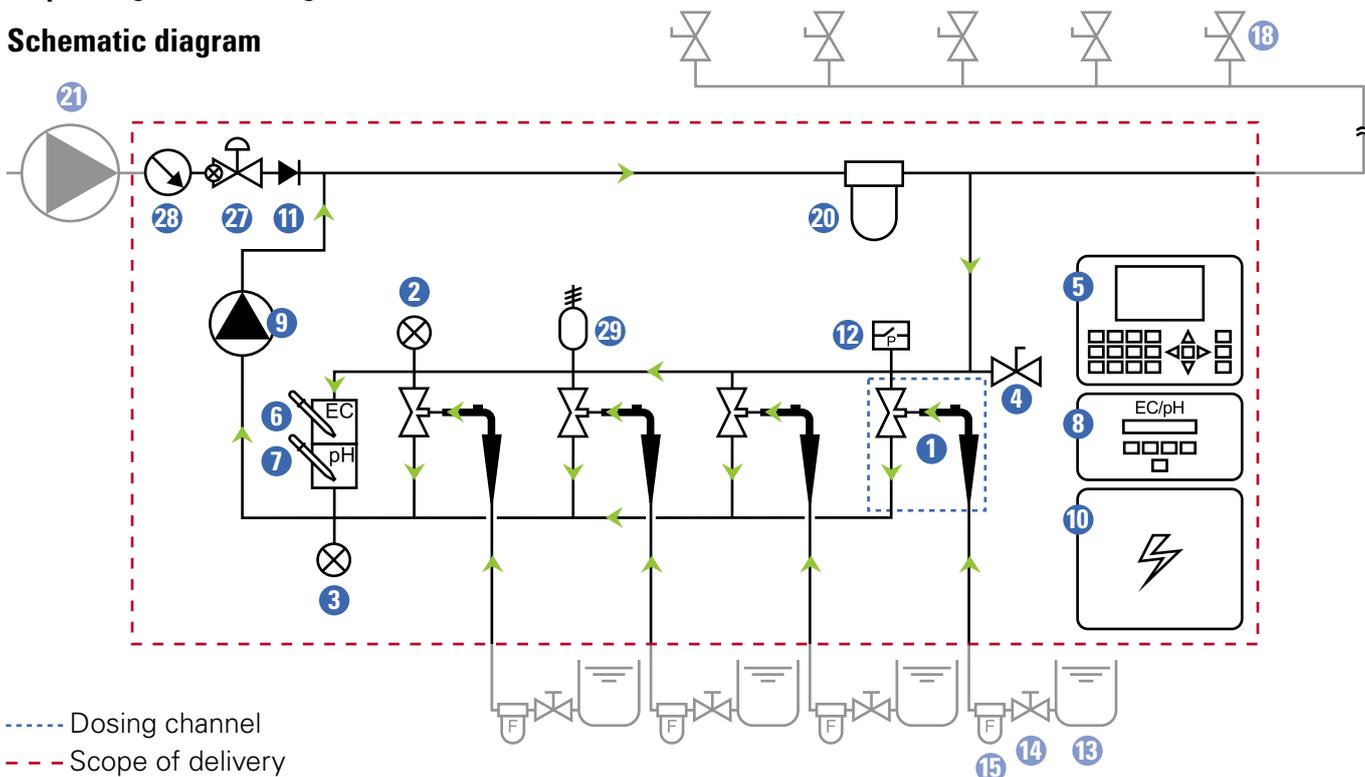
pressure losses

Flow rate m ³ /h (GPM)	Pressure losses bar (PSI)
5 (22)	0.1 (1.45)
10 (44)	0.3 (4.35)
15 (66)	0.6 (9.55)

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

EC/pH: Single, monitoring and control.

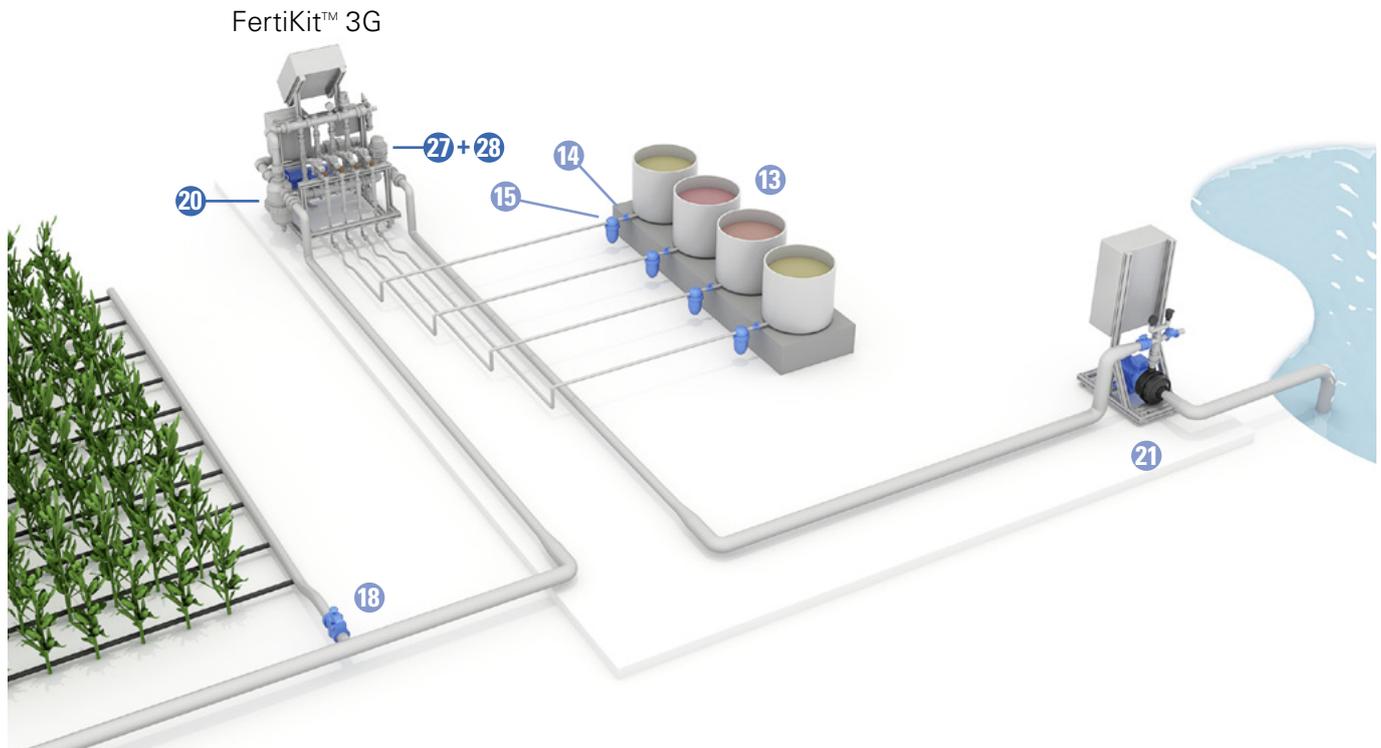
Schematic diagram



- Dosing channel
- - - Scope of delivery
- Direction of flow

DESCRIPTION

Typical setup of the IL mode



Main parts of the IL mode and infrastructure

The list below presents the main parts of the FertiKit™ IL mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

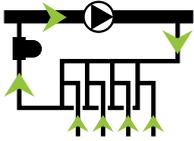
- | | | |
|---------------------------------|-------------------------------|-----------------------------------|
| 1 Dosing channel + Venturi | 8 EC/pH transmitter | 15 Fertilizer/acid filter |
| 2 Upper manifold pressure gauge | 9 Dosing booster | 18 Irrigation valve |
| 3 Lower manifold pressure gauge | 10 Dosing booster switchbox | 20 Main line filter |
| 4 Sampling outlet | 11 Check valve | 21 Main line pump |
| 5 Controller | 12 Pressure switch | 27 Pressure reducing valve (PRV)* |
| 6 EC sensor | 13 Fertilizer/acid stock tank | 28 Water meter* |
| 7 pH sensor | 14 Manual valve (fertilizer) | 29 Air release valve |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

*In the IL mode the pressure reducing valve (PRV) 27 and the water meter 28 are supplied as an integrated kit.

DESCRIPTION

ST mode



Operating principle: For systems operating at low pressure - from an on-ground reservoir or a tank [max. height: 6 meters (20 feet)]

The dosing booster pump also serves as main line pump.

Supplied with a manual or a semi-automatic filter.

Flow rate: 1 - 16 m³/h (4.4 - 70 GPM)

Suitable for main line pressure:

Upstream from the pump: -0.3 – +0.6 bar (-4 – +9 PSI)

At the outlet of the pump: 2.0 – 5.5 bars (29 – 80 PSI)

Additional conditions:

When selecting a dosing booster, consider the required field flow and the TC.

Dosing channels:

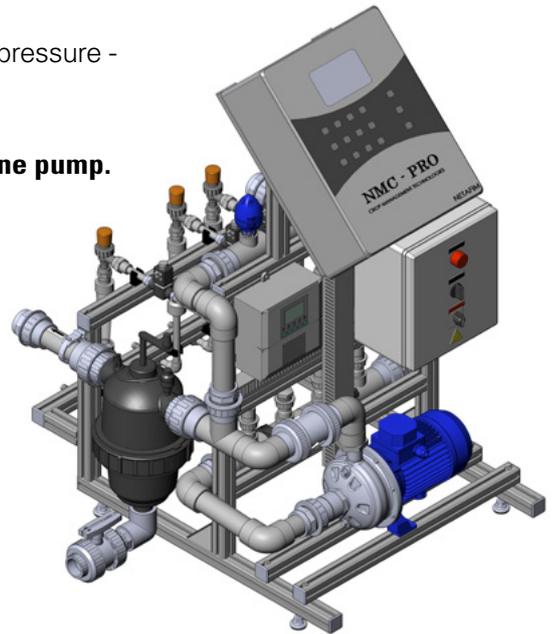
Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

- Up to 6 x 50 - 600 l/h (13 - 156 GPH)
- Optional - Concentrated acid channel, 50 l/h (13 GPH).

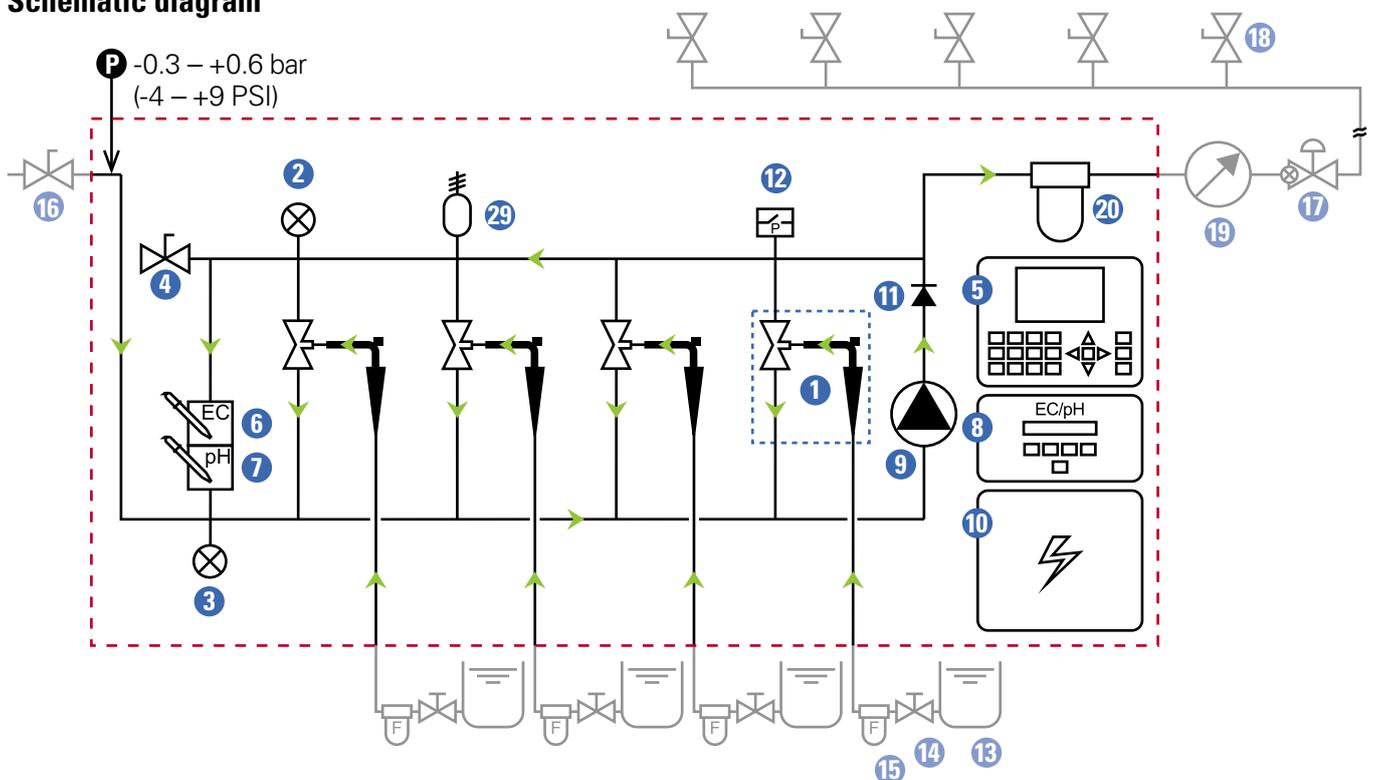
Total fertilizer/acid suction capacity - up to 3600 l/h (950 GPH).

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

EC/pH: Single, monitoring and control.



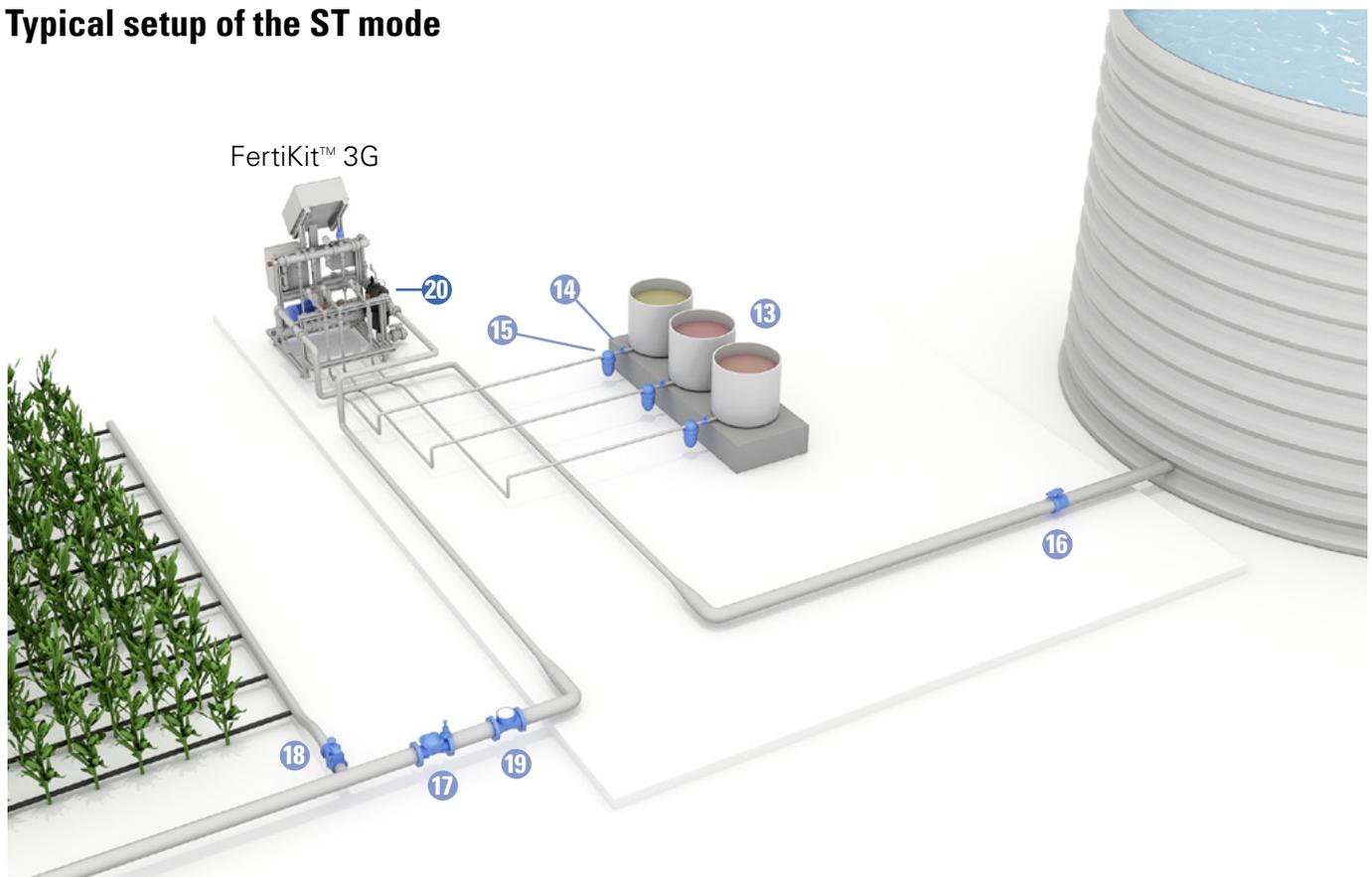
Schematic diagram



- Dosing channel
- - - - - Scope of delivery
- Direction of flow

DESCRIPTION

Typical setup of the ST mode



Main parts of the ST mode and infrastructure

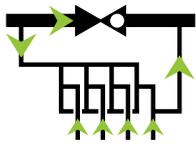
The list below presents the main parts of the FertiKit™ ST mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|-------------------------------|----------------------------------|
| 1 Dosing channel + Venturi | 8 EC/pH transmitter | 15 Fertilizer/acid filter |
| 2 Upper manifold pressure gauge | 9 Dosing booster | 18 Irrigation valve |
| 3 Lower manifold pressure gauge | 10 Dosing booster switchbox | 20 Main line filter |
| 4 Sampling outlet | 11 Check valve | 21 Main line pump |
| 5 Controller | 12 Pressure switch | 27 Pressure reducing valve (PRV) |
| 6 EC sensor | 13 Fertilizer/acid stock tank | 28 Water meter |
| 7 pH sensor | 14 Manual valve (fertilizer) | 29 Air release valve |

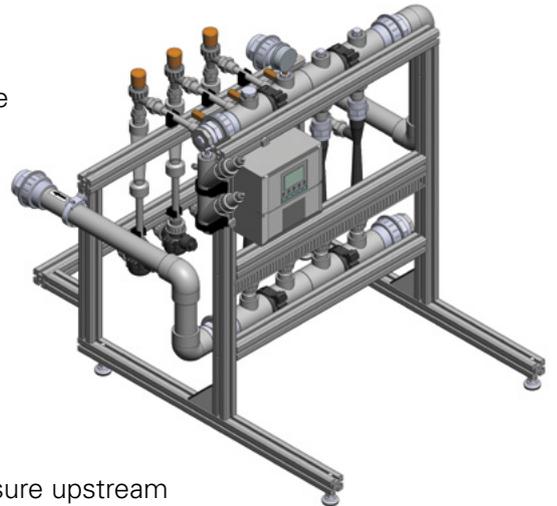
Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

DESCRIPTION

PD mode



Operating principle: Utilizes the main line pressure or gravity feed.
Saves the need for a dosing booster.
Also suitable for applications where there is no electricity on the site (contact Netafim™).



Flow rate: 10 - 200 m³/h (44 - 880 GPM)

Suitable for main line pressure: 4.5 - 8.0 Bars (65 - 116 PSI)

Additional conditions:

For the dosing channels to provide proper suction, the pressure downstream from the PRV should be at least 50% of the the pressure upstream from the PRV (The efficiency of the Venturis decreases if this condition is not met). In addition the system must supply sufficient pressure for the field demand.

Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

- Up to 4* x 50 - 370 l/h (13 - 100 GPH)
 - Optional - Concentrated acid channel, 50 l/h (13 GPH).
- Total fertilizer/acid suction capacity - up to 1480 l/h (390 GPH).

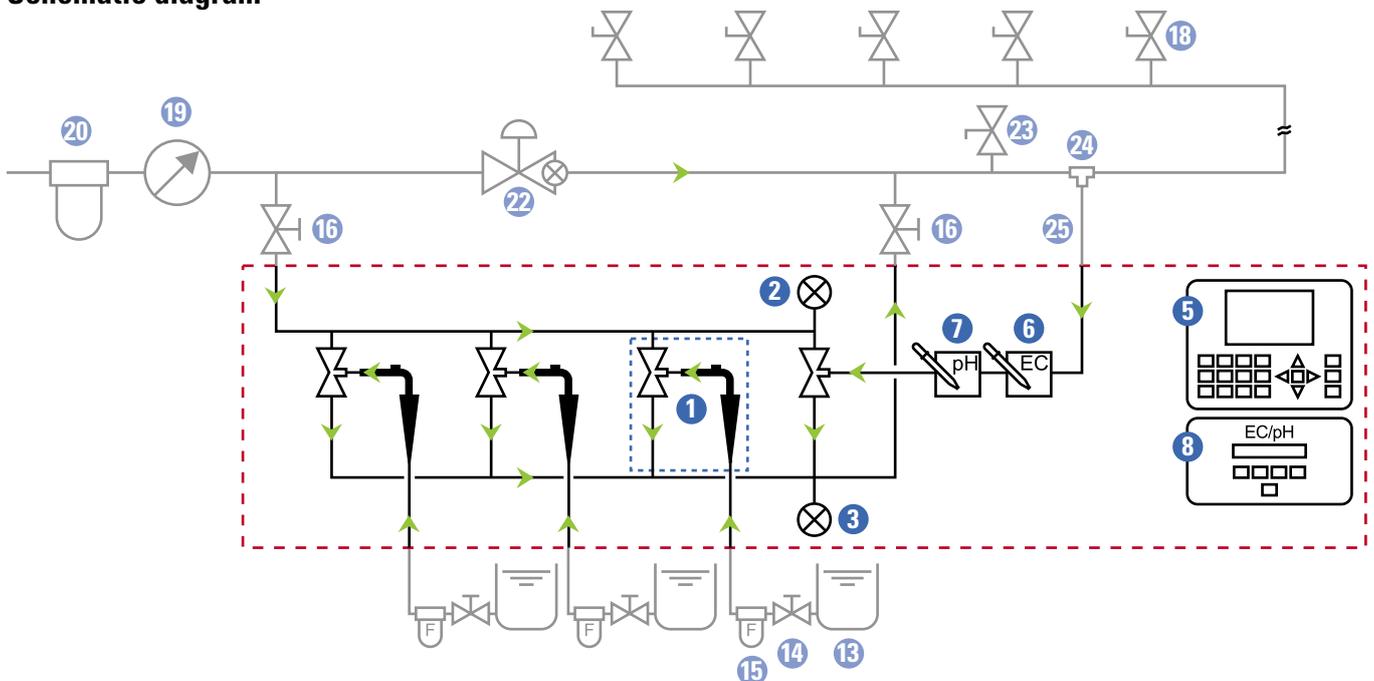
*If EC/pH is installed it occupies the location of one dosing channel (power required).

Controller: NMC-Pro, NMC-XL, NMC-Junior, NMC DC

(Other controllers or manual system without controller - optional).

EC/pH: None (Single monitoring only - optional)

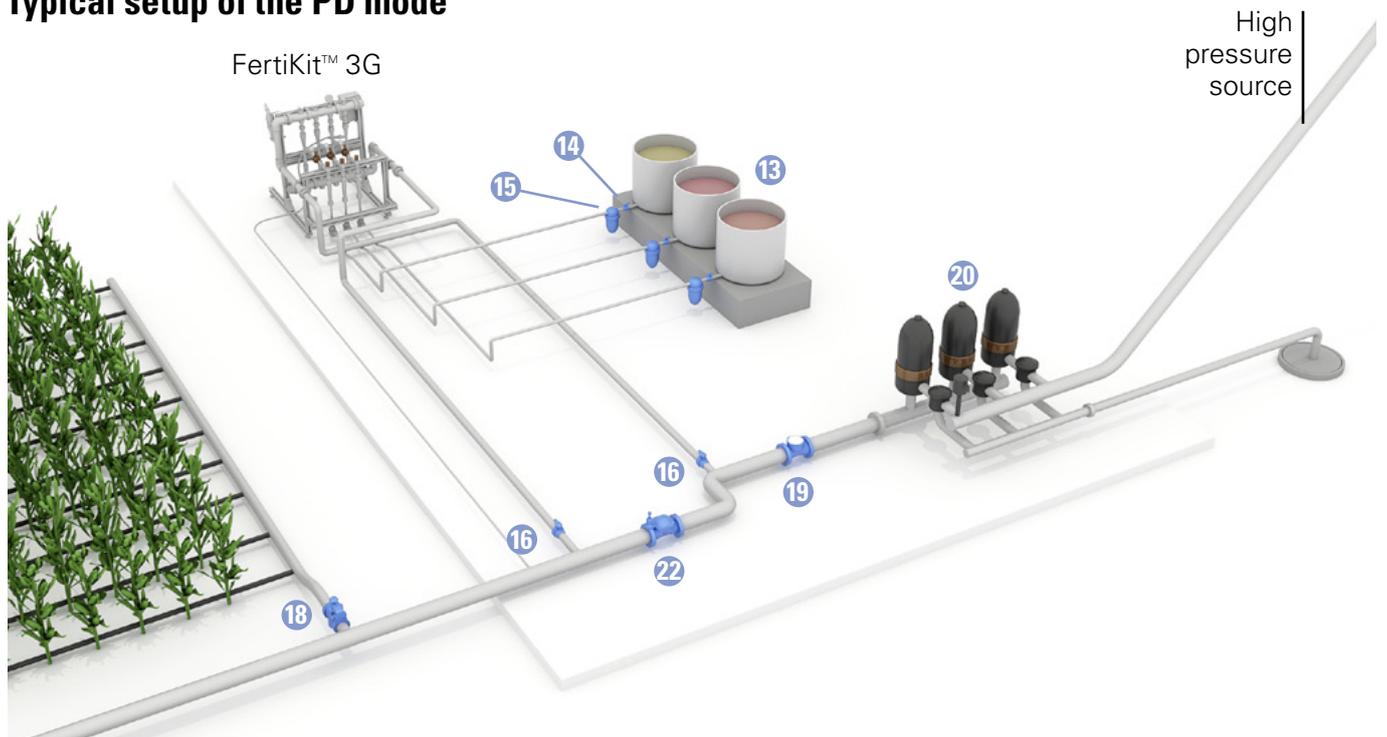
Schematic diagram



- Dosing channel
- - - - - Scope of delivery
- Direction of flow

DESCRIPTION

Typical setup of the PD mode



Main parts of the PD mode and infrastructure

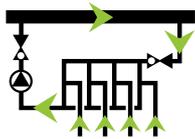
The list below presents the main parts of the FertiKit™ PD mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|-------------------------------|--|
| 1 Dosing channel + Venturi | 8 EC/pH transmitter | 19 Water meter |
| 2 Upper manifold pressure gauge | 13 Fertilizer/acid stock tank | 20 Main line filter |
| 3 Lower manifold pressure gauge | 14 Manual valve (fertilizer) | 22 Main line pressure reducing valve (PRV) |
| 5 Controller | 15 Fertilizer/acid filter | 23 Sampling outlet |
| 6 EC sensor | 16 Manual valve (isolation) | 24 Saddle fitting |
| 7 pH sensor | 18 Irrigation valve | 25 Command tube |

Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

DESCRIPTION

MX mode



Operating principle: The pressure differential required to generate fertilizer suction via the Venturis is produced by a booster pump integrated in the FertiKit™.

This mode of operation, where the lower manifold

is under low pressure (around 0 bars/PSI), permits the use of high-efficiency Venturis with high suction capacity and low motive flow consumption. PRV **27** and PSV **26** as standard.

Flow rate: 20 - 700 m³/h (85 - 3000 GPM)

Suitable for main line pressure: 2.5 - 8.5 bars (36 - 123 PSI)

Dosing channels:

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid:

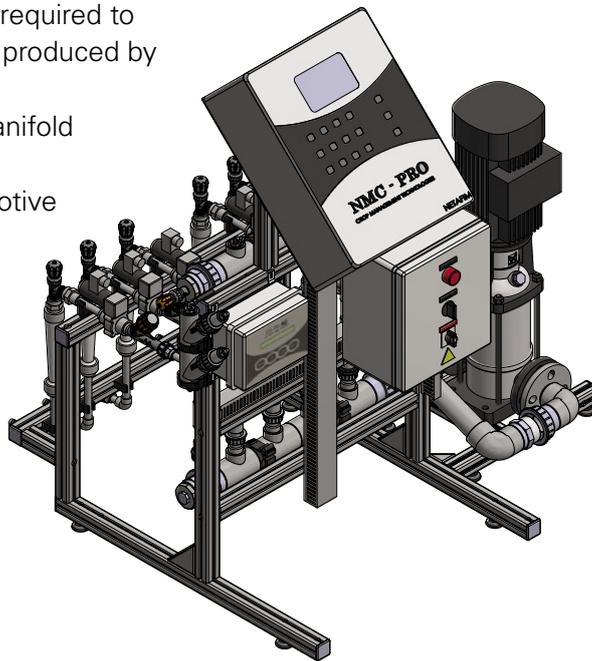
- Up to 5 x 50 - 1000 l/h (13 - 265 GPH)
- Includes compensation channel
- Optional - Concentrated acid channel, 50 l/h (13 GPH).

Total fertilizer/acid suction capacity:

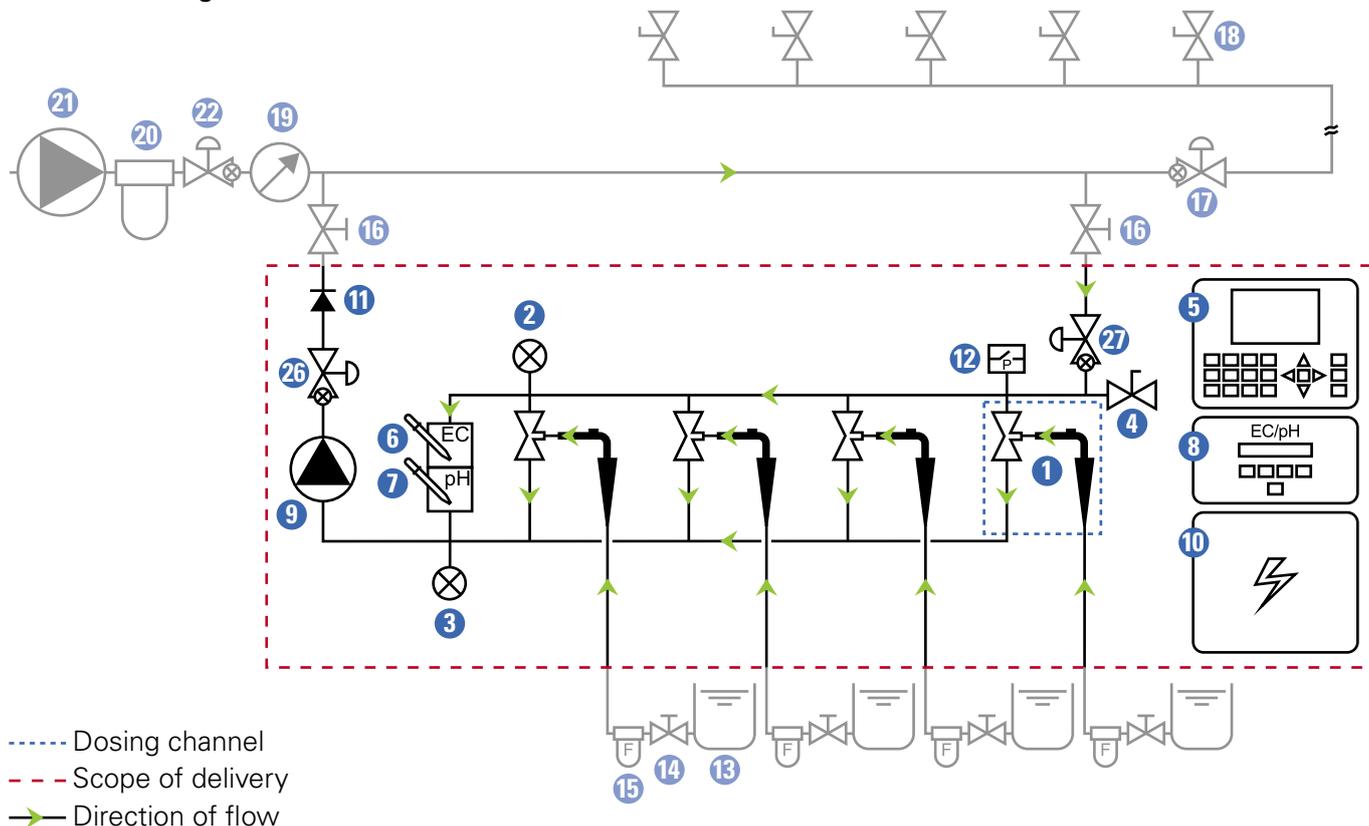
- Up to 5000 l/h (1320 GPH).

Controller: NMC-Pro, NMC-XL, NMC-Junior, (Other controllers or manual system without controller - optional).

EC/pH: Single, monitoring and control.



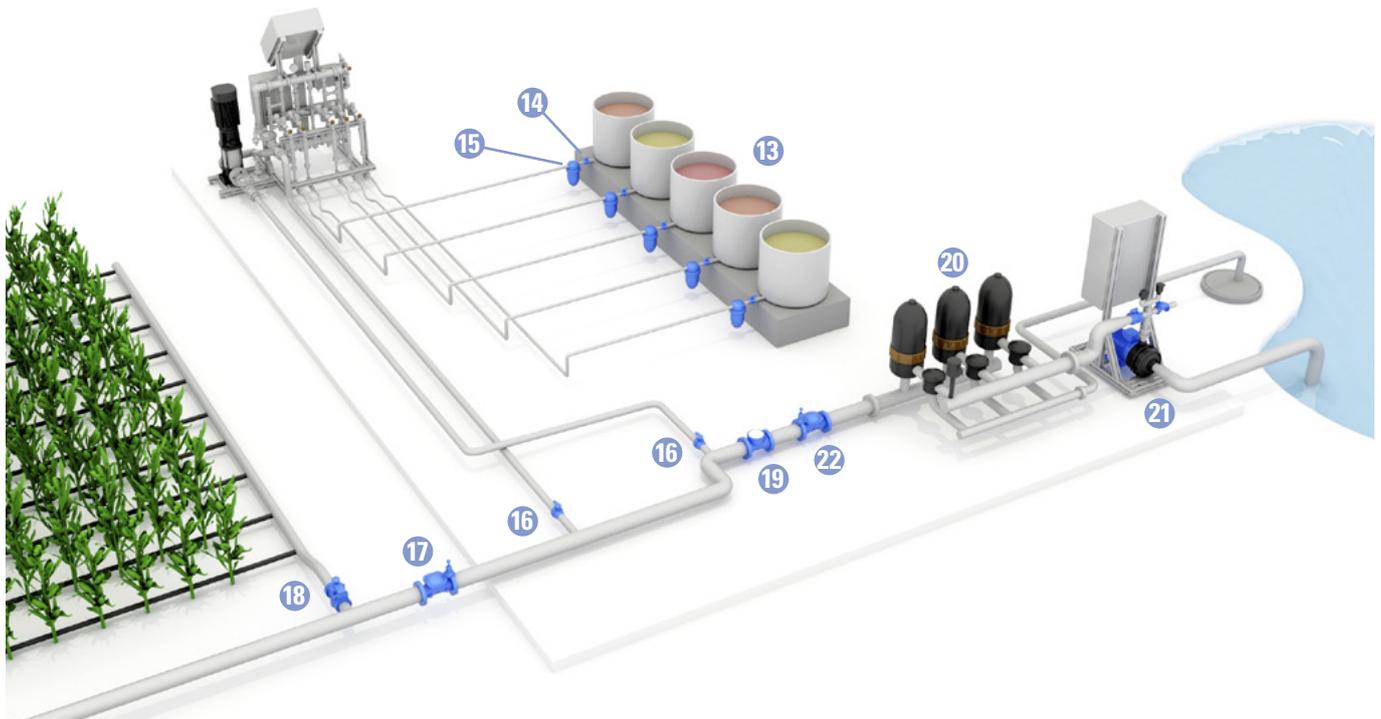
Schematic diagram



DESCRIPTION

Typical setup of the MX mode

FertiKit™ 3G



Main parts of the MX mode and infrastructure

The list below presents the main parts of the FertiKit™ MX mode and the infrastructure parts required for its operation as depicted in the Schematic diagram and the Typical setup drawing above.

- | | | |
|---------------------------------|--|--|
| 1 Dosing channel + Venturi | 10 Dosing booster switchbox | 18 Irrigation valve |
| 2 Upper manifold pressure gauge | 11 Check valve | 19 Water meter |
| 3 Lower manifold pressure gauge | 12 Pressure switch | 20 Main line filter |
| 4 Sampling outlet | 13 Fertilizer/acid stock tank | 21 Main line pump |
| 5 Controller | 14 Manual valve (fertilizer) | 22 Main line pressure reducing valve (PRV) |
| 6 EC sensor | 15 Fertilizer/acid filter | 26 Pressure sustaining valve (PSV) |
| 7 pH sensor | 16 Manual valve (isolation) | 27 Pressure reducing valve (PRV) |
| 8 EC/pH transmitter | 17 Main line pressure sustaining valve (PSV) | |
| 9 Dosing booster | | |

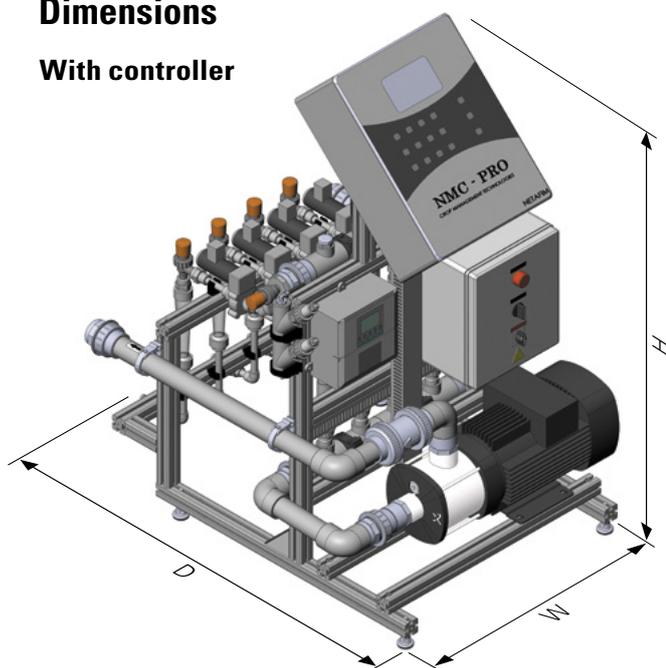
Color code: ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

DESCRIPTION

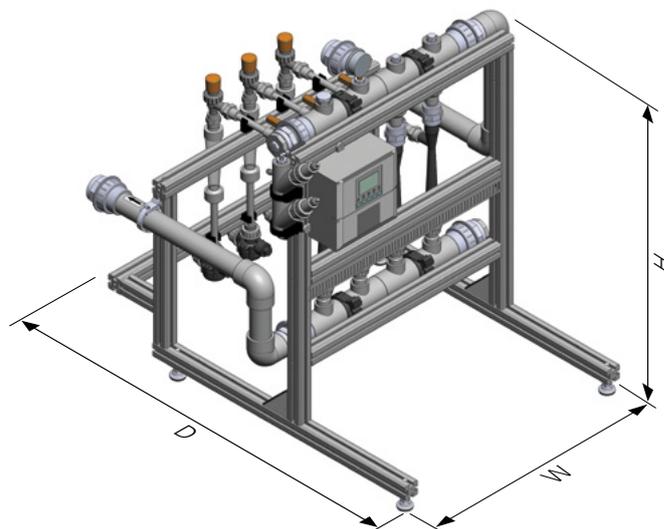
Dimensions and weights - All modes except MX

Dimensions

With controller



Without controller



Configuration	FertiKit™ external dimensions (W/D/H*)	Package dimensions (W/D/H**)
Without controller	84/103/92 cm (33/40.5/36")	103/117/100 cm (40.5/46/39.5")
With controller	84/103/134.5 cm (33/40.5/53")	103/117/154 cm (40.5/46/60.5")

*The height varies by ± 1 cm (± 0.5 " according to the adjustment of the legs.

**The package height includes the pallet height of 15 cm (6").

Weights

FertiKit™ with dosing booster

Controller	Matrix 5		CM5		CM15	
	Net weight	Packed weight	Net weight	Packed weight	Net weight	Packed weight
Without	60 kg. (132 lbs.)	85 kg. (187 lbs.)	73 kg. (161 lbs.)	98 kg. (216 lbs.)	100 kg. (220 lbs.)	125 kg. (276 lbs.)
With	70 kg. (154 lbs.)	98 kg. (216 lbs.)	83 kg. (183 lbs.)	111 kg. (245 lbs.)	110 kg. (243 lbs.)	138 kg. (304 lbs.)

For the weight of FertiKit™ units with other dosing boosters, contact Netafim™.

FertiKit™ without dosing booster

Controller	Net weight	Packed weight
Without	43 kg. (95 lbs.)	68 kg. (150 lbs.)
With	53 kg. (117 lbs.)	81 kg. (179 lbs.)

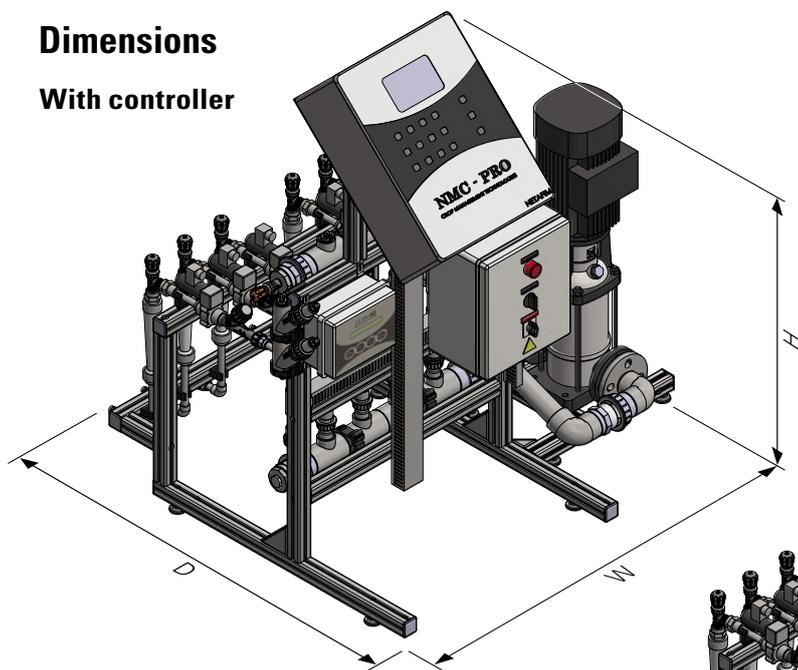
The weights in the tables above are order of magnitude only - final data are issued with the product order.

DESCRIPTION

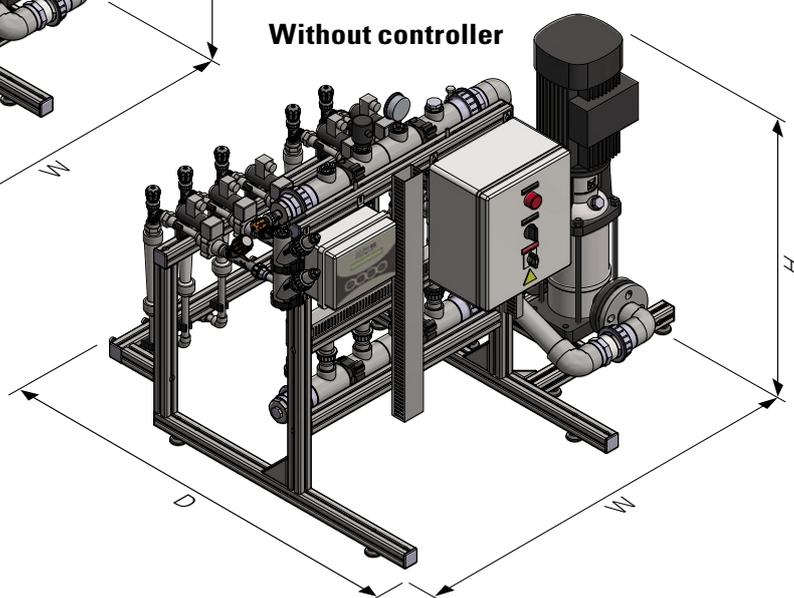
Dimensions and weights - MX mode

Dimensions

With controller



Without controller



Configuration	FertiKit™ external dimensions (W/D/H*)	Package dimensions (W/D/H**)
Without controller	119/97/105 cm (47/38/42")	131/112/158 cm (52/44/62")
With controller	119/97/131 cm (47/38/52")	131/112/158 cm (52/44/62")

*The height varies by ± 1 cm (± 0.5 " according to the adjustment of the legs.

**The package height includes the pallet height of 15 cm (6").

Weights

FertiKit™ with dosing booster

Controller	CR5		CR10		CR15		CR20	
	Net weight	Packed weight	Net weight	Packed weight	Net weight	Packed weight	Net weight	Packed weight
Without	81 kg. (179 lbs.)	131 kg. (289 lbs.)	102 kg. (225 lbs.)	152 kg. (335 lbs.)	124 kg. (273 lbs.)	174 kg. (384 lbs.)	144 kg. (317 lbs.)	194 kg. (428 lbs.)
With	91 kg. (201 lbs.)	141 kg. (311 lbs.)	112 kg. (247 lbs.)	162 kg. (357 lbs.)	134 kg. (295 lbs.)	184 kg. (406 lbs.)	154 kg. (340 lbs.)	204 kg. (404 lbs.)

For the weight of FertiKit™ units with other dosing boosters, contact Netafim™.

The weights in the tables above are order of magnitude only - final data are issued with the product order.

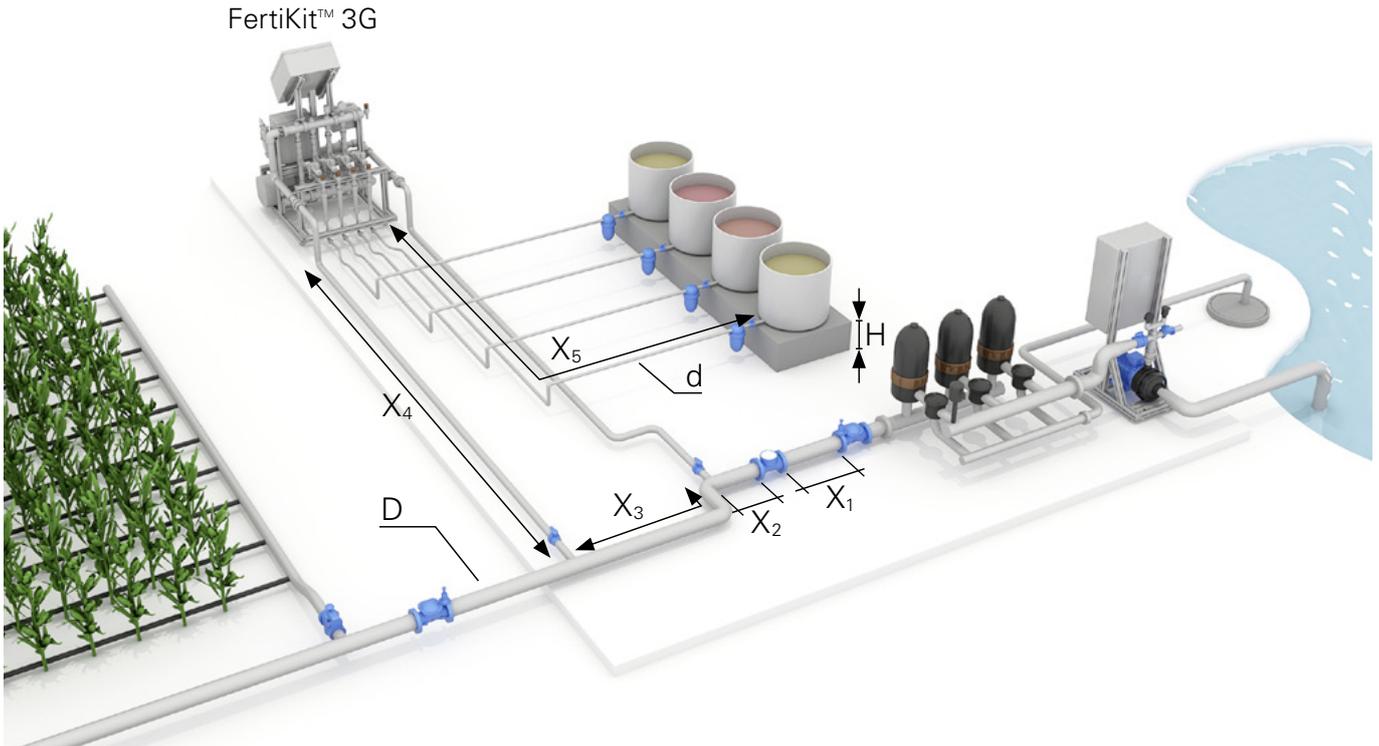
ON-SITE PREPARATIONS

Hydraulic infrastructure preparation

The hydraulic infrastructure preparations should be performed according to the mode of the FertiKit™ to be installed. Before performing the infrastructure installation, see the 'Typical setup' of the specific mode of the FertiKit™ to be installed (see [pages 10-25](#)).

Required proportions

To enable optimal operation of the FertiKit™, piping must be installed while maintaining the following proportions.



Infrastructure required proportions*

Description	Required proportions	
D	Main line - pipe diameter	
d	Fertilizer/acid lines - pipe diameter: <ul style="list-style-type: none"> • 32 mm (1¼") for dosing channels of up to 400 l/h (106 GPH) • 40 mm (1½") for dosing channels of over 400 l/h (106 GPH) 	
X ₁	Distance upstream from water meter <ul style="list-style-type: none"> • Pipe must be straight 	10 x D
X ₂	Distance downstream from water meter <ul style="list-style-type: none"> • Pipe must be straight 	5 x D
X ₃	Distance between inlet and outlet locations on the main line <ul style="list-style-type: none"> • "L" shape recommended for better mixing 	Minimum 2 meter (6.5 feet)
X ₄	Length of inlet and outlet pipes	Less than 3 meter (10 feet)
X ₅	Length of fertilizers or acid lines	Less than 10 meter (33 feet)
H	Elevation of the fertilizer/acid tanks	Higher than 30 cm (12")

*The minimum required distances between the inlet and the fertilizer/acid outlets of the **SP** mode on the main line are not described in this table (see [page 15](#)).

ON-SITE PREPARATIONS

Infrastructure requirements

In order to enable the FertiKit™ operation, requirements specific to each mode such as main line pressure and infrastructure conditions must be met. See the relevant mode description ([pages 10-25](#)).



NOTE

To ensure flow rate stability, the consumption of the individual irrigation shifts should be as equal as possible. Each changeover between shifts with different consumption will result in consumption fluctuation that will affect the EC and pH stability. The consumption of the smallest shift should not be less than 75% of the consumption of the largest shift.

Pump house (Filter house / Fertilizer house) requirements



CAUTION

The FertiKit™ should be:

- placed in a roofed building
- protected from direct sunlight
- kept at an ambient temperature between 10°C and 40°C (50°F and 104°F)
- kept at a maximum relative air humidity of 85%
- properly ventilated
- protected from dust
- protected from splashes or direct spraying with water or chemicals



NOTE

In order to prevent penetration of fertilizer or acid to the soil, it is recommended that the floor of the pump house have a slope of minimum 1% towards a gutter at its lower edge and an underground tank at the lower end of the gutter, enabling drainage of any spill or excess.

ON-SITE PREPARATIONS

The water distribution system

For the setup of the water distribution system the following components should be installed (according to the mode of the FertiKit™):

Components of the water distribution system

Item	Specifications
16 Manual valve (isolation)	To be installed at the inlet and at the outlet of the FertiKit™, for use during system maintenance.
17 Main line pressure sustaining valve (PSV)	To be installed on the main line downstream from the FertiKit™ and able to sustain a constant pressure at the outlet of the FertiKit™, regardless of pressure changes in the field. Should be calibrated to 3-4 bars (43-58 PSI) for most projects.
18 Irrigation valve	Controllable.
19 Water meter	With electrical pulses. The pulse should be as short as possible according to the main line diameter and the controller's limitations. (See Flow meter recommended pulse rate below)
20 Main line filter	≤ 130 μm (≥ 120 mesh).
21 Main line pump	Suitable for the required pressure and flow rate according to the mode of the FertiKit™ and the field requirements (Ensure stable pressure).
22 Main line pressure reducing valve (PRV)	In the PB , PL or MX mode - Should be installed on the main line, between the main line filters and the water meter and be able to reduce the main line pressure as specified for PL , PB or MX modes (pages 10/12/24). In PD mode only - Should be installed on the main line, between the inlet and the outlet of the FertiKit™ and be able to reduce the main line pressure as specified for the PD mode (page 22).
23 Sampling outlet	In PD mode only - Should be installed on the main line, downstream from the FertiKit's outlet (in all other modes the sampling outlet is built-in).
24 Saddle fitting	In PD mode only - Should be installed on the main line, downstream from the FertiKit's outlet, equipped with an outlet suitable for the EC/pH sampling tube.
25 Command tube	In PD mode only - Should connect the saddle fitting to the EC/pH sampling tube.



CAUTION

For **PL**, **MS** and **MX** modes only:

Since EC and pH sensors must never be exposed to pressure greater than 6 bars (87 PSI), if EC and pH sensors are present on the FertiKit™ and the main line pressure is higher than 5 bars (72 PSI), a 1½" PRV must be installed on the main line, upstream from the FertiKit™, reducing the pressure to 5 bars (72 PSI).

Flow meter recommended pulse rate for NMC Pro and Junior controllers*

Flow rate m³/h	Flow meter output l/pulse	Flow rate GPM	Flow meter output US gal/pulse
Up to 6	1	Up to 88	1
6 - 60	10	88 - 1000	10
60-600	100	1000-4500	100

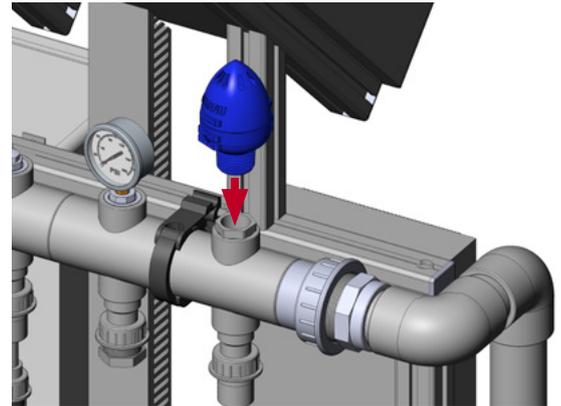
*Users of NMC XL controller and FertMaster, contact your Netafim™ local representative.

ON-SITE PREPARATIONS



ATTENTION

An air-release valve must be installed at the highest point of the water distribution system. If the highest point is the FertiKit™ upper manifold, install the air-release valve as shown.



The fertilizer/acid tanks and lines

For the setup of the fertilizer/acid tanks and lines, the following components should be installed:

Items of the fertilizer/acid tanks and lines

Component	Specifications
13 Fertilizer/acid stock tank	Between 1 and 6 fertilizer/acid solution stock tanks
14 Manual valve (fertilizer)	A manual ball valve on each fertilizer/acid line at the stock tank outlet
15 Fertilizer/acid filter	≤ 130 µm (≥ 120 mesh)

The following aspects should be taken into account:

- Ensure the stock tanks are of sufficient size for storage of at least one day's consumption .
- Sufficient space should be available between the fertilizer/acid tanks and the FertiKit™, to enable inspection and maintenance operations.
- Fertilizer/acid pipe diameter: 32 mm (1¼") for dosing channels of up to 400 l/h (106 GPH)
40 mm (1½") for dosing channels of over 400 l/h (106 GPH)
- For the connection of fertilizer supply lines to the FertiKit™, use a transparent, chemical-resistant, reinforced PVC water hose with an internal diameter of 16 mm that will not contract when there is a vacuum in the system.
- Use properly sealing stainless steel band clamps for the fertilizer/acid hose connection, type SS 316.



CAUTION

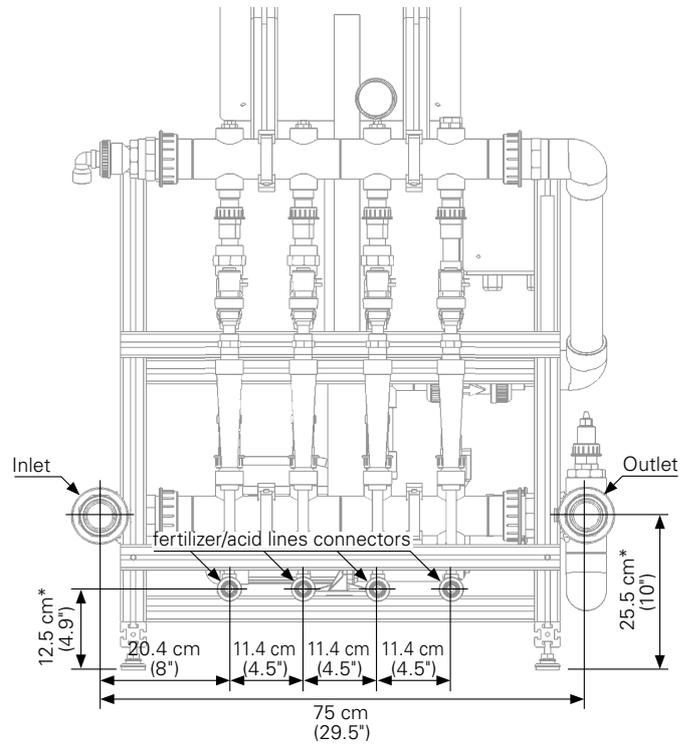
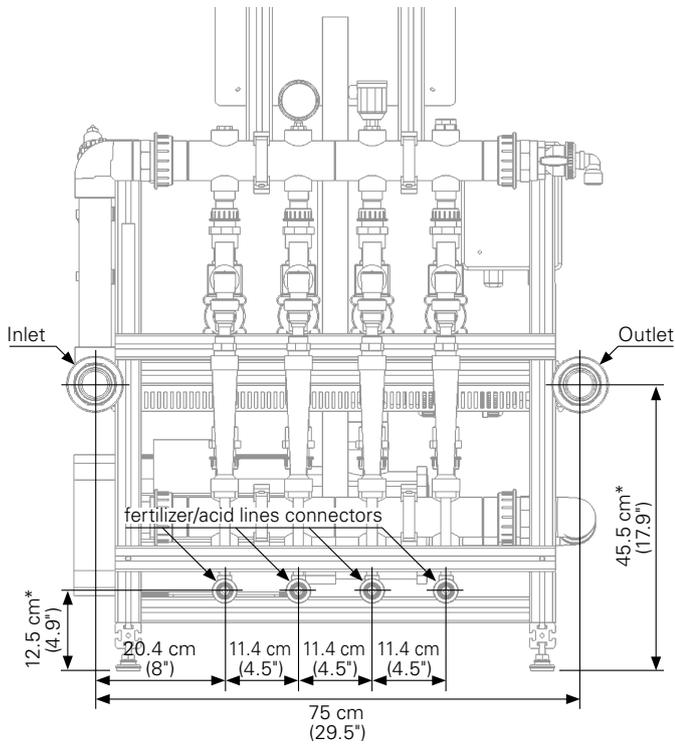
After completion of the hydraulic infrastructure, before the installation of the FertiKit™, rinse the hydraulic infrastructure and fertilizer/acid lines and tanks by running water through them in order to wash away any residues (chips, shavings, sawdust) due to the setup work.

ON-SITE PREPARATIONS

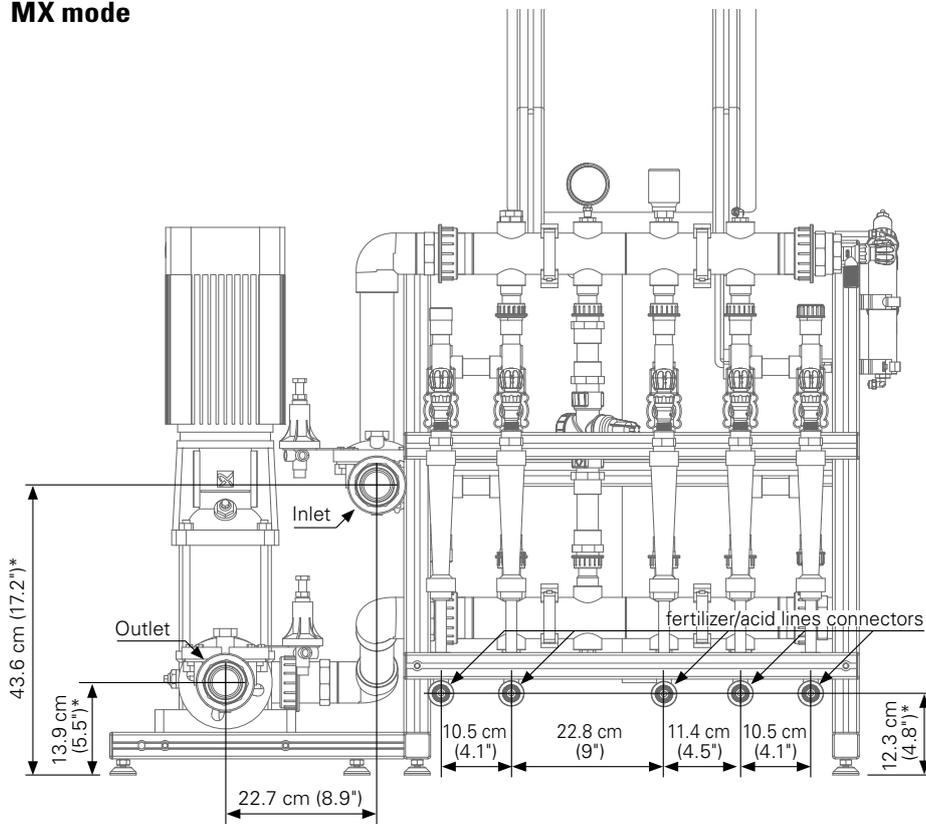
Location of inlet, outlet and fertilizer/acid line connectors

All modes except PB, SP and MX

PB mode (SP mode**)



MX mode



*The height varies by ± 1 cm (± 0.5 ") according to the adjustment of the legs.

**The SP mode is equipped with a separate outlet for each dosing channel (see [page 14](#)).

ON-SITE PREPARATIONS

Electrical preparation

Mains connection



CAUTION

Only qualified electricians are permitted to perform electrical installations!

The following components have to be provided in the installation:

- A readily accessible circuit breaker, rated according to the FertiKit™'s total rated power certified as a branch circuit over current protector (see [Appendix - Dosing booster electrical data](#), page 46), compliant with the national code and requirements.
- Grounding connection: $\leq 10 \Omega$.

For the selection of the wire size - consider (see [Appendix - Dosing booster electrical data](#), page 46):

- The FertiKit™'s total rated power.
- Whether the electricity supply is single-phase or three-phase.
(if a dosing booster is not present in the system, select the single-phase, up to 1.5 kWatt option).

Mains wire size for single-phase system

3 wires: GND, N, L

Power source required (kWatt)	1 X 100-115 VAC	1 X 200-250 VAC
Up to 1.5	$\geq 2.5 \text{ mm}^2 (\leq 13 \text{ awg})$	$\geq 2.5 \text{ mm}^2 (\leq 13 \text{ awg})$
1.5-2	$\geq 4 \text{ mm}^2 (\leq 11 \text{ awg})$	
2-3	$\geq 6 \text{ mm}^2 (\leq 9 \text{ awg})$	

Mains wire size for three-phase system

5 wires: GND, N, L1, L2, L3

Power source required (kWatt)	3 X 200-250 VAC	3 X 400-480 VAC
Up to 1.5	$\geq 2.5 \text{ mm}^2 (\leq 13 \text{ awg})$	$\geq 2.5 \text{ mm}^2 (\leq 13 \text{ awg})$
1.5-2		
2-3		
3-4		
4-6	$\geq 6 \text{ mm}^2 (\leq 9 \text{ awg})$	$\geq 4 \text{ mm}^2 (\leq 11 \text{ awg})$
6-8	$\geq 10 \text{ mm}^2 (\leq 7 \text{ awg})$	

INSTALLATION

Unpacking and placement

Check the ShockWatch label attached to the packaging and ensure the indicator is white. If the indicator is red - act according to the instruction on the ShockWatch label.

Place the FertiKit™ package close to the irrigation system using forklift.

Gently open the packaging.

Remove the 4 screws and bolts connecting the FertiKit™ to the wooden pallet.

Remove plastic cover from controller (if existing).

Place the FertiKit™ in its position.

Adjust the legs so that the FertiKit™ is steady.



Hydraulic installation



WARNING

Always use protective equipment, gloves and goggles when handling fertilizers, acid and other chemicals!

Main line inlet/outlet connection

Connect the appropriate pipes to the inlet and the outlet of the FertiKit™ according to the mode of the system (see [Location of inlet, outlet and fertilizer/acid line connectors](#), page 32).

Two types of connection are available

Fittings (interchangeable)	Diameter
PVC, adaptor union - glue connector (installed)	50 mm
PVC, BSP or NPT nipple - male thread connector (supplied)	1.5"

Stock tank connection

Connect the fertilizer lines to the FertiKit™ according to the mode of the system (see [Location of inlet, outlet and fertilizer/acid line connectors](#), page 32).

Three types of connection are available

Fittings (interchangeable)	Diameter
PVC, hose nozzle insert connector (installed)	16 mm
PVC, nipple - male thread connector (supplied)	1/2"
PVC, half union - female thread connector (supplied)	3/4"

INSTALLATION

Prior to flexi-tube connection, thread a stainless steel band clamp **A** on each flexi-tube hose.

Heat the tip of each Flexi tube hose in boiling water to make it flexible for insertion.

Connect flexi-tube hose from fertilizer lines to the hose-nozzle-insert connectors of dosing channels **B**, ensuring 1/2 meter (1.7 feet) of transparent, chemical-resistant, reinforced PVC water hose with an internal diameter of 16 mm that will not contract when there is a vacuum in the system.

Attach the stainless steel band clamp on each flexi-tube connection **C** and secure tightly.

Flexi-tube specification:

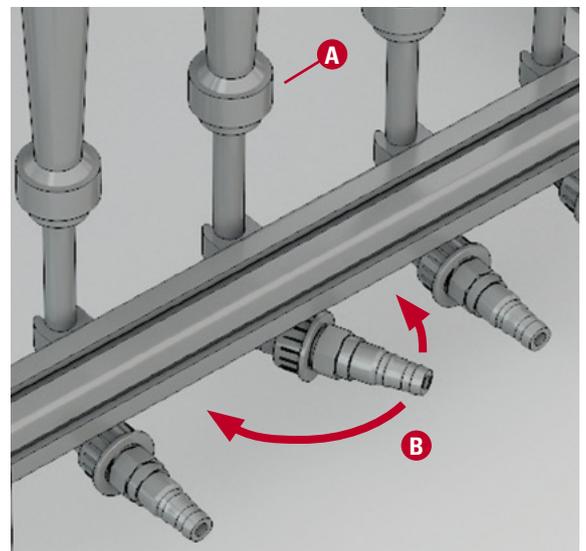
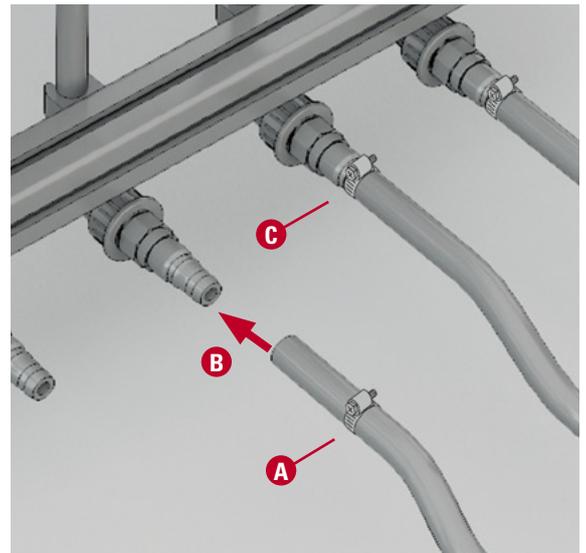
- 16 mm (½") reinforced EVA tubing.
- Material: EVA (ethylene vinyl acetate) tube compound specially formulated to meet USDA requirements.
- Polyester cord reinforcement with color tracer.
- Pressure: 18 to 20 Bar (250 to 300 PSI).
- Recommended temperature range: -23°C to +65°C (-10°F to +150°F).



TIP

You can rotate the hose connectors of the dosing channels to face the desired direction according to the location of the stock tanks.

Loosen the Rotameter's lower connector **A**, rotate the hose connector to the desired direction **B** and fasten the Rotameter's lower connector **A**.



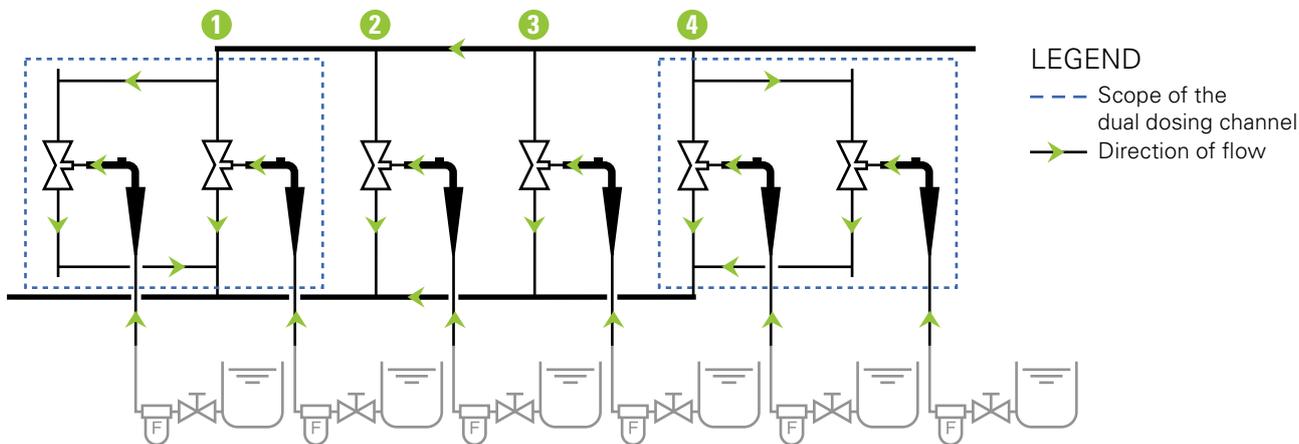
INSTALLATION

Dual dosing channel

If more than 4 dosing channels are required (up to 6), the dual dosing channel option is used.

- Up to 2 dual dosing channels are installed on the FertiKit™ 3G, at the ① and ④ manifold positions.
- The dual dosing channel option is applicable with 50-600 l/h (13-158 GPH) and 1000 l/h (265 GPH) Venturis only.

Dual dosing channel schematic diagram



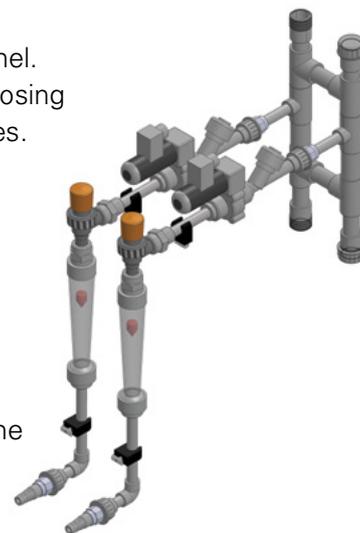
CAUTION

Only compatible products can be injected through the dual dosing channel. There are fertilizer combinations that should **never** be used in the dual dosing channel as they will induce crystallization and cause clogging of the pipes.

Fertilizer combinations prone to induce crystallization:

- Calcium Nitrate + Ammonium Sulfate => Calcium Sulfate
- Calcium Nitrate + Potassium Sulfate => Calcium Sulfate
- MKP + Calcium Nitrate => Calcium Phosphate
- MAP + Calcium Nitrate => Calcium Phosphate
- Phosphoric acid + Calcium Nitrate => Calcium Phosphate

In case of doubt regarding the use of any combination of fertilizers in the dual dosing channel, contact your Netafim™ local representative.



Electrical installation



CAUTION

Only qualified electricians are permitted to perform electrical installations!

Have a qualified electrician connect the FertiKit™ to the mains.

- All modes equipped with a dosing booster - follow the instructions in the enclosed Switchboard User Manual.
- PD or MS mode - follow the instructions in the enclosed Controller User Manual.

Options

- EC/pH only - follow the instructions in the [EC/pH Transmitter User Manual](#).
- No controller - follow the instructions in the [Switchboard User Manual](#).

SYSTEM OPERATION



NOTE

The following procedure describes the operations that should be performed, regardless of the type of controller in use. For the operation of the specific controller interface, see the [Controller Manual](#).



ATTENTION

Make sure all the wire connectors and terminals are tightened before switching on power!

Preparations for running the FertiKit™

For FertiKit™ with a controller (onboard or external):

Run the controller and enter preliminary general settings (see the [Controller Manual](#)).

Ensure that the INPUT for protection against lack of pressure in the system is connected to the controller and defined, set a delay of 15 seconds (see the [Controller Manual](#)).

Connect all the elements (valves, pumps, filters, sensors, etc.) to the controller (see the [Controller Manual](#)).

Manual test of controller outputs

Perform the test to make sure that all the elements (valves, pumps, filters, sensors, etc.) function properly upon command from the controller.

Run the test using the controller's TEST menu (see the [Controller Manual](#)).

Set the relay status of the dosing channels to MANUAL and make sure that the irrigation program is not defined (see the [Controller Manual](#)).



NOTE

When using a dosing valve with manual override (model: Fip S12 or S22), make sure the dosing valve selector is in the CLOSED position.

To check that the dosing channels are working:
When the OPEN command from the controller is given - the LED on the dosing valve is lit.

Calibration of EC and pH sensors

Calibrate the EC and pH sensors (see the enclosed EC/pH Transmitter Manual).



CAUTION

Do not operate the FertiKit™ if the manual isolation valves installed at the inlet and outlet of the system are closed!



ATTENTION

Unions tend to get loose during transit. Before operating the FertiKit™, tighten all the unions of the FertiKit™ by hand.

Check for leaks



CAUTION

When opening or closing any manual valve, always do it gradually, to prevent damage to the system by water hammer.



SYSTEM OPERATION

- Make sure all the field valves are closed.
- Gradually open the isolation valves installed at the inlet and outlet of the system until the required main line pressure is attained.
Keep the system under static pressure for 10 minutes and visually check for leaks.
- Perform a simulation test with a 10 liter (2 gallons) bucket of water. (see [page 40](#))

Check the dosing booster operation



CAUTION

If isolation valves are installed at the FertiKit™ inlet and outlet, ensure that they are open before running the dosing booster.

- Switch the dosing booster ON.
- Check that the dosing booster is rotating in the correct direction (see the enclosed Dosing Booster Manual).



HIGH VOLTAGE ELECTRICAL HAZARD

Before unplugging the system from the main power source, switch the unit and the main power source OFF!

Running the FertiKit™

- Define a program in the controller for one valve or multiple valves (SHIFT) as defined by the irrigation plan (see the enclosed Controller Manual).
- In the first stage it is recommended that you define a program with quantitative or proportional fertilization only, without EC/pH control (see the enclosed Controller Manual).
- Temporarily deactivate all alarms in the system - EC/pH, flow control, etc. (see the enclosed controller manual).
- Start the program and wait for the lines to be filled (this takes a few minutes, depending on the size of the installation).
- Check that the flow and the pressure on the main line are stabilized (see the enclosed Controller Manual).
- Activate the dosing booster and the dosing channels.
- See the main line flow meter and pressure gauge, the upper manifold and lower manifold pressure gauges and make sure all the hydraulic conditions are in range according to the main line pressure and flow conditions of the specific mode (see [pages 10-25](#)).
- If the system cannot reach the hydraulic conditions, it is possible that there is an air pocket in the dosing booster's impeller chamber (see the enclosed Dosing Booster Manual):
- Open the FertiKit™ sampling valve until a stable flow, free of air bubbles, is obtained.
- If the system still cannot reach the hydraulic conditions - loosen the dosing booster's bleeding screw and wait until a stable flow, free of air bubbles, is obtained, then retighten the bleeding screw (see the enclosed Dosing Booster Manual).
- Check the suction of the dosing channels from the stock tanks, and tune the desired flow rate for each dosing channel by adjusting the needle valve (see [Calibration of the FertiKit™ while irrigating](#), page 42).
- Let the system run for about ten minutes and see that it works properly.

SYSTEM OPERATION

- After tuning the flow rate for each dosing channel, adjust the cursors on each Rotameter.



NOTE

The Rotameter's scale is calibrated by the manufacturer for measurement of the flow rate of water (H₂O). Certain inaccuracies may be observed when the flow rate of liquids with different densities, such as fertilizers and acids, is measured.

- Measure the control cycle and enter the data into the controller - only if EC/pH measuring equipment is installed (see the enclosed Controller Manual).
- Stop the program.

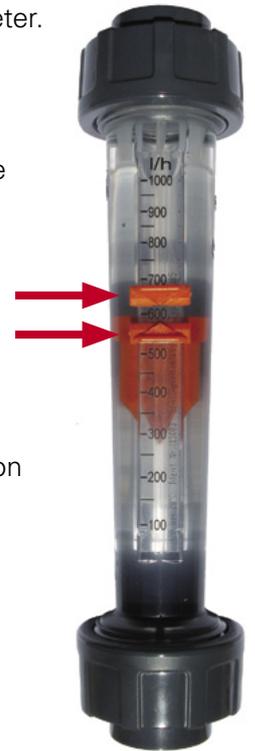


ATTENTION

Restore the settings of all the alarms back to the state where adequate protection to the system and the crop is provided (see the enclosed Controller Manual).

If there is any problem during the process, see Troubleshooting in the FertiKit™ User Manual

(The User Manual is provided with the FertiKit™ and can be downloaded at <https://www.netafim.com/en/digital-farming/netbeat/Fertigation/fertikit/>).



CALIBRATION

The process of calibrating the FertiKit™ is carried out in three stages:

1. Calculation of dosing channels opening percentage

To finely calibrate the FertiKit™ in order to achieve homogeneous and stable dosing, perform the following calculation for each dosing channel (fertilizers and acid) to determine the amount of suction reduction needed to attain the required fertilizer/acid flow rate.

Metric units

Flow rate of the largest irrigation shift m³/h
 X
 Dosing ratio of a single fertilizer/acid l/m³
 =
 Result: a single fertilizer/acid flow rate l/h
 X 1.25 =
 Result: target Rotameter reading l/h

EXAMPLE

m³/h
 X
 l/m³
 =
 l/h
 X 1.25 =
 l/h

DEFINITION

Dosing ratio = $\frac{\text{The quantity of fertilizer/acid (l)}}{1 \text{ m}^3 \text{ irrigation water}}$

US units

Flow rate of the largest irrigation shift GPM
 X
 Dosing ratio of a single fertilizer/acid US gal/1000 US gal
 X 0.06 =
 Result: a single fertilizer/acid flow rate GPH
 X 1.25 =
 Result: target Rotameter reading GPH

EXAMPLE

GPM
 X
 US gal/1000 US gal
 X 0.06 =
 GPH
 X 1.25 =
 GPH

DEFINITION

Dosing ratio = $\frac{\text{The quantity of fertilizer/acid (US gal)}}{1 \text{ THG (1000 US gal) irrigation water}}$



NOTE

The Rotameter's scale is calibrated by the manufacturer for measurement of the flow rate of water (H₂O). Certain inaccuracies may be observed when the flow rate of liquids with different densities, such as fertilizers and acids, is measured.

2. Simulation test with a 10 liter (2 US gal) bucket of water

Instruments needed

- Good-quality portable EC and pH sensors, finely calibrated
- Calibration solutions for EC and pH
- Bucket with a scale for up to 10 liters (2 US gallons)
- Measuring tube or syringe with a scale for up to 100 cc (1 oz)
- Clean (preferably distilled) water for cleaning sensors during calibration
- Blotting paper for cleaning and drying

The client prepares the fertilizer solutions and the acid solution (if required) in the stock tanks according to the recipe advised by the agronomist/consultant.



ATTENTION

Ensure the fertilizers and acid solutions in the stock tanks have been thoroughly agitated before starting the simulation.

CALIBRATION

Note the required dosing ratio of each fertilizer solution and the dosing ratio of the acid solution (if used).

Fill a bucket with 10 liters (2 US gallons) of the client's supply water (without fertilizer or acid).

Measure the EC and the pH levels of the water in the bucket using calibrated portable sensors.

EXAMPLE

	EC	pH
Supply water (without fertilizer or acid)	0.3	7.8

Using a measuring tube or a syringe, take a dose from each fertilizer solution and from the acid solution (if used) according to the proportions determined by the dosing ratio (see example below) and **mix thoroughly** with the water in the bucket.

EXAMPLE

Metric units

For a fertilizers dosing ratio of 5 l/m³ each and an acid dosing ratio of 2 l/m³ the quantities for 10 liters of water in the Bucket-simulation-test will be 50 cc of each fertilizer solution and 20 cc of the acid solution

US units

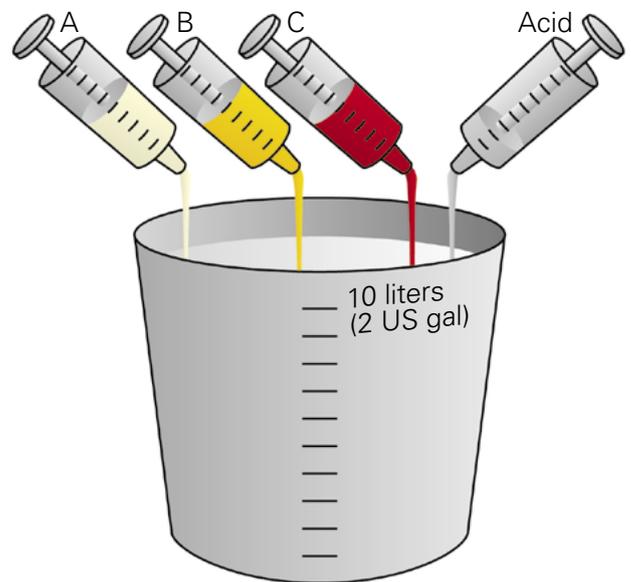
For a fertilizers dosing ratio of 1.5 US gal/THG each and an acid dosing ratio of 1.1 US gal/THG the quantities for 2 US gallons of water in the Bucket-simulation-test will be 0.38 oz* of each fertilizer solution and 0.28 oz** of the acid solution

DEFINITIONS

1 US gal = 128 oz

$$* \frac{1.5 \times 2}{1000} = 0.003 \text{ US gal} = 0.384 \text{ oz}$$

$$** \frac{1.1 \times 2}{1000} = 0.0022 \text{ US gal} = 0.28 \text{ oz}$$



Measure the EC and the pH levels of the mixture in the bucket using calibrated portable sensors.

Compare the measured EC and pH values to the target values set by the agronomist/consultant.

EXAMPLE

	EC	pH
After adding the fertilizers and acid	1.6	5.5
Target values	1.8	5.8
Deviation from target value	11%	5%



CALIBRATION

With the controller set to operate according to EC/pH values - if the EC and pH values measured in the bucket are within a range of $\pm 30\%$ deviation from the target values, the system will be able to correct them automatically.

If the values are out of the $\pm 30\%$ range, check the data and consult the agronomist/consultant.

3. Calibration of the FertiKit™ while irrigating



WARNING

Extreme EC or pH values may damage the crop.

Perform the following procedure only after completing stage 2 above (Simulation test with a 10 liter or 2 US gallon bucket of water) with satisfactory results.



NOTE

The following steps explain the operations to be performed, regardless of the type of controller used. For the operation of your controller's interface, see the enclosed Controller Manual.

However, since the NMC Pro controller is widely used - its interface screens for the execution of each step are noted.



NOTE

Before the calibration, confirm that the EC and the pH sensors of the FertiKit™ have been calibrated according to the instructions in the enclosed EC/pH Installation Manual.

Define the dosing configuration, while the EC and pH controls are in the OFF position (**NMC Pro - screen 7.7**).

In the EC and pH alarm definitions, set the EC and pH alarm to the OFF position (deactivated) (**NMC Pro - screen 3.6**).

Enter the data for the irrigation valves, and the dosing ratio for each dosing channel (**NMC Pro - screens 1.1-1.2-1.3**).

Run the program (**NMC Pro - screen 2.2**).

Allow a few minutes for the pipes to fill up and the flow rate to stabilize.

Reduce the suction of the dosing channels by adjusting the manual needle valve of each dosing channel until the "target Rotameter reading" calculated in stage 1 (page 40) is attained.



NOTE

The Rotameter's scale is calibrated by the manufacturer for measurement of the flow rate of water (H₂O). Certain inaccuracies may be observed when the flow rate of liquids with different densities, such as fertilizers and acids, is measured.

Check the appropriate controller screen for the measured EC and pH values (**NMC Pro - hot screen 4**).

If the desired values have been reached, check opening percentages of the dosing valves.

The EC and pH target values should be attained with the dosing valves opened to 50% - 80% of their capacity.

If the EC and pH target values are attained with the dosing valves opened less than 50%, reduce the dosing channel suction rate, until the EC and pH target values are reached.



NOTE

Every change in the flow rate of the needle valve must be updated afterwards in the controller (**NMC Pro - screen 7.6**).

CALIBRATION

If the EC and pH target values cannot be attained, and the dosing valves are opened more than 85%, measures should be taken to increase the dosing ratio - if feasible, slightly increase the concentration of the fertilizer solution and/or reduce the water flow rate to the field during irrigation.

If not - consult the agronomist/consultant.

In a field where the flow rate changes significantly from one irrigation shift to the next, try to be at a minimum of 50% dosing valve opening for the low flow rate shift, and a maximum of 80% for the high flow rate shift.

When the calibration process is completed, return to the EC and pH control screen in the controller, define the deviation in EC and pH values for the channels and switch the EC and pH control to ON

(NMC Pro - screen 7.7-7.6).

In the EC and pH alarm definitions, define the EC and pH deviation from the target values that, if attained, will trigger the alarm and set the EC and pH alarm to the ON position (activated) **(NMC Pro - screen 3.5-3.6).**



NOTE

EC and pH values must not exceed a $\pm 30\%$ deviation from the target values.



ATTENTION

Once a month, read the measured flow rates of the dosing channels and compare them with the flow rates defined in the controller, in order to check whether changes have occurred

(NMC Pro - screen 7.6).

After completing the calibration process, fill out the FertiKit™ Hydraulic Conditions Checklist (See the enclosed User Manual) in three copies. Make sure to fill out all the boxes of the reference row.

COMMISSIONING

After completing the calibration process, the FertiKit™ is ready for commissioning.

Familiarize the client with the FertiKit™, the user manual and the accompanying documents and emphasize the following points:

- The importance of following all the safety instructions (see the enclosed User Manual).
- The warranty and its restrictions (see the enclosed User Manual).
- Calibration - accompany the client through this chapter and emphasize the importance of thorough knowledge of the processes in it for the current operation of the FertiKit™ (see the enclosed User Manual, page 24).
- Proper dissolving of fertilizers for optimal utilization of the dosing channels' capacity (see the enclosed User Manual).
- The importance of regular maintenance and its impact on the warranty (see the enclosed User Manual).
- The importance of periodically comparing the hydraulic data with the references in the FertiKit™ Hydraulic Conditions Checklist (see the enclosed User Manual).
- Troubleshooting - accompany the client through this chapter (see the enclosed User Manual).
- Make sure the FertiKit™ Hydraulic Conditions Checklist has been properly filled.
- Fill out the enclosed FertiKit™ Commissioning Report.
- Keep one copy of both documents, give a copy to the client as reference for calibration of the FertiKit™ in the future and send a copy to cmt.support@netafim.com.

The User Manual is provided with the FertiKit™ and can be downloaded at <https://www.netafim.com/en/digital-farming/netbeat/Fertigation/fertikit/>.

WARRANTY

Netafim™ warrants all the components of the FertiKit™ to be free of defects in material and workmanship for 1 (one) year from the date of installation, provided the installation has been reported to Netafim™ within 30 days of installation.

If the installation was not reported or was reported later than 30 days from the date of installation, Netafim™ will warrant the FertiKit™ for a period of 18 months from the date of production, according to its serial number.

If a defect is discovered during the applicable warranty period, Netafim™ will repair or replace, at its discretion, the product or the defective part.

The above does not apply to EC and pH sensors, since they are wearable. Netafim™ will warrant these items to be free of defects in material and workmanship for 3 months from the date of installation, provided the installation has been reported to Netafim™ within 30 days, or 6 months from date of production if installation was not reported or was reported later than 30 days from the date of installation.



CAUTION

When not installed, the pH sensor must be immersed in KCL solution (supplied with the sensor) or in calibration buffer 4 at temperature 18-25°C (64-77°F), protected from freezing and not be exposed to pressure greater than 6 bars (87 PSI).

Damage due to these causes is not covered by warranty.

This warranty does not extend to repairs, adjustments or replacements of a FertiKit™ or part that results from misuse, negligence, alteration, force majeure, lightning, power surge, improper installation or improper maintenance.

If a defect arises in your Netafim™ product during the warranty period, contact your Netafim™ supplier.

Limited warranty

This warranty is subject to the conditions in Netafim's official warranty statement.

(For the full text of Netafim's official warranty statement, please contact Netafim™).

APPENDIX - DOSING BOOSTER ELECTRICAL DATA

Horizontal pumps (for all modes except MX)

For 50 Hz installations

Phases	Description	Pump electrical data			FertiKit™ total rated power (kW)
		Rated power (kW)	Mains / rated voltage (V)	Rated current (A)	
1	Matrix 5-5/1.3M	1.3	1 x 230	7.8	1.45
3	Grundfos CM5-7	1.55	3 x 220-240 / 380-415	5.55-5.38 / 3.25-3	1.70
	Grundfos CM5-9	2.2		8.05-7.5 / 6.75-6.4	2.35
	Grundfos CM5-12	3.2		8.05-7.5 / 6.75-6.4	3.35
	Grundfos CM10-3	2.2		8.05-7.5 / 6.75-6.4	2.35
	Grundfos CM10-4	3.2		11.8-11.0 / 6.75-6.4	3.35
	Grundfos CM10-5	3.2		11.8-11.0 / 6.75-6.4	3.35
	Grundfos CM10-6	4		14.0-13.2 / 8.2-7.8	4.15
	Grundfos CM10-8	5.8		20.4-19.0 / 11.8-11.0	5.95
	Grundfos CM15-3	4		14.0-13.2 / 8.2-7.8	4.15
	Grundfos CM15-4	4		14.0-13.2 / 8.2-7.8	4.15
	Grundfos CM25-3	5.8		20.4-19.0 / 11.8-11.0	5.95
Grundfos CM25-4	7.4	25.5-26.5 / 14.8-15.4	7.55		

For 60 Hz installations

Phases	Description	Pump electrical data			FertiKit™ total rated power (kW)
		Rated power (kW)	Mains / rated voltage (V)	Rated current (A)	
1	Matrix 5-3/1.3M	1.3	1 x 230	7.7	1.45
	CDXM 200/206	1.5		10.0	1.65
3	Grundfos CM5-4	1.7	3 x 208-230 / 440-480	6.25-5.85 / 2.98-2.85	1.85
	Grundfos CM5-5	2.5		8.95-8.5 / 4.3-4.0	2.65
	Grundfos CM5-6	2.5		8.95-8.5 / 4.3-4.0	2.65
	Grundfos CM5-8	4		14.8-14.2 / 7.2-7.0	4.15
	Grundfos CM10-2	2.5		8.95-8.5 / 4.3-4.0	2.65
	Grundfos CM10-3	4		14.8-14.2 / 7.2-7.0	4.15
	Grundfos CM10-4	6		21.0-20.4 / 10.5-10.2	6.15
	Grundfos CM10-5	6		21.0-20.4 / 10.5-10.2	6.15
	Grundfos CM15-2	4		14.8-14.2 / 7.2-7.0	4.15
	Grundfos CM15-3	6		21.0-20.4 / 10.5-10.2	6.15
	Grundfos CM25-2	6.2		21.0-20.4 / 10.5-10.2	6.35

APPENDIX - DOSING BOOSTER ELECTRICAL DATA

Vertical pumps (for MX mode)

For 50 Hz installations

Phases	Description	Pump electrical data			FertiKit™ total rated power (kW)
		Rated power (kW)	Mains / rated voltage (V)	Rated current (A)	
3	Grundfos CRI5-12	2.2	3 x 220-240 / 380-415	7,70 / 4,45	2.35
	Grundfos CRI5-18 HP	3.0		11,00 / 6,30	3.15
	Grundfos CRI10-8	3.0		11,00 / 6,30	3.15
	Grundfos CRI10-10 HP	4.0		13,60 / 7,90	4.15
	Grundfos CRI15-5	4.0		13,60 / 7,90	4.15
	Grundfos CRI15-7 HP	5.5		19,00 / 11,00	5.65
	Grundfos CRI20-5	5.5		19,00 / 11,00	5.65

For 60 Hz installations

Phases	Description	Pump electrical data			FertiKit™ total rated power (kW)
		Rated power (kW)	Mains / rated voltage (V)	Rated current (A)	
3	Grundfos CRI5-7	2.2	3 x 220-277 / 380-480	7,70-6,35 / 4,45-3,70	2.35
	Grundfos CRI5-11 HP	3.0		10,80-9,35 / 6,20-5,40	3.15
	Grundfos CRI10-5	3.0		10,80-9,35 / 6,20-5,40	3.15
	Grundfos CRI10-6 HP	4.0		13,60-11,80 / 7,80-6,80	4.15
	Grundfos CRI15-3	4.0		13,60-11,80 / 7,80-6,80	4.15
	Grundfos CRI15-4 HP	5.5		18,40-16,20 / 10,60-9,30	5.65
	Grundfos CRI20-3 HP	5.5		18,40-16,20 / 10,60-9,30	5.65

GROW MORE WITH LESS

WWW.NETAFIM.COM