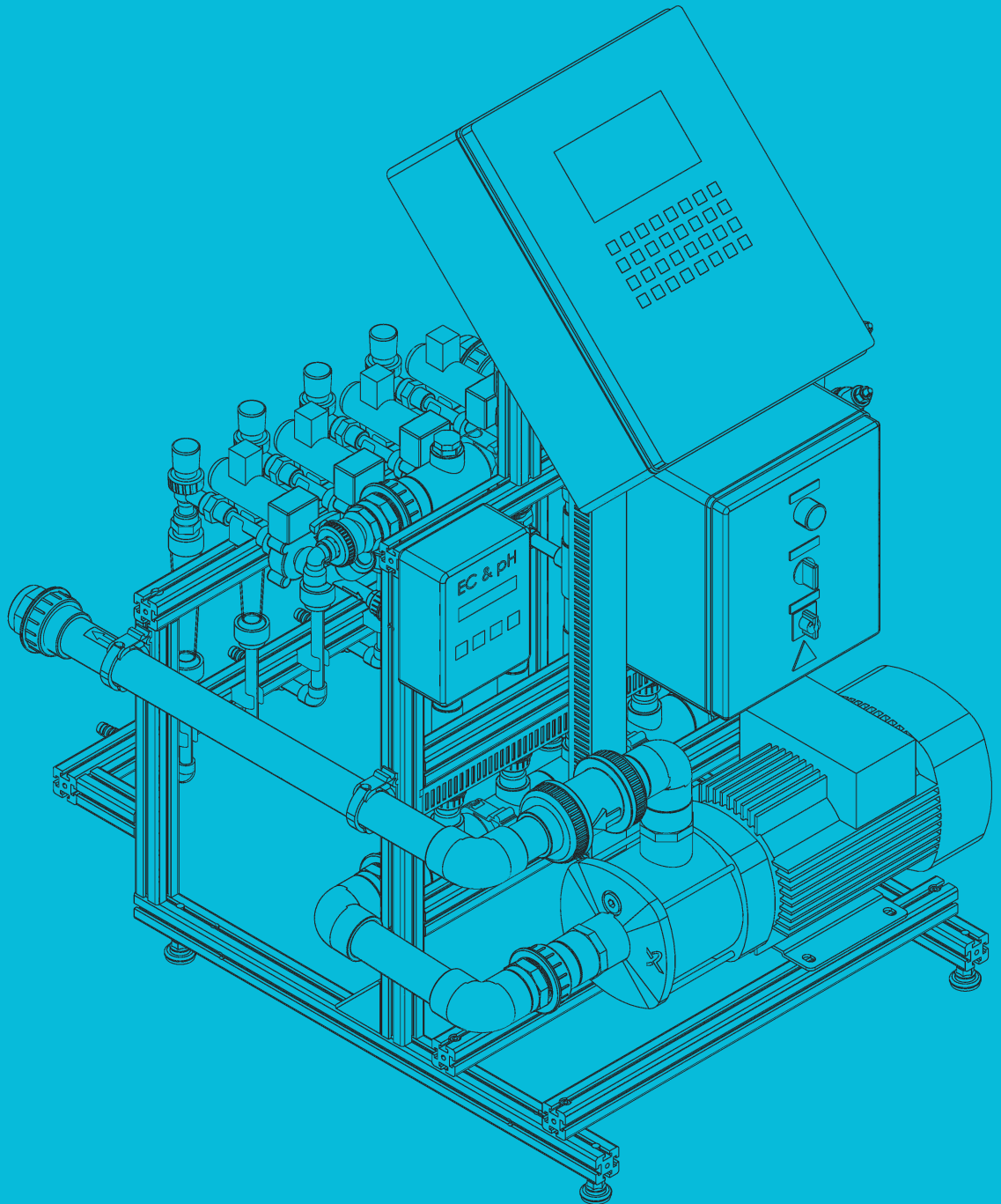



# FERTIKIT 3G SPLIT (SP) NPT

## INSTALLATION MANUAL





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# SYMBOLS

The symbols used in this manual refer to the following:



## **WARNING**

The following text contains instructions aimed at preventing bodily injury or direct damage to the crops, the FERTIKIT and/or the infrastructure.



## **CAUTION**

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



## **ATTENTION**

The following text contains instructions aimed at enhancing the efficiency of usage of the instructions in the manual.



## **NOTE**

The following text contains instructions aimed at emphasizing certain aspect of the operation of the system or installation.



## **EXAMPLE**

The following text 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.



## **ELECTRICAL HAZARD**

The following text contains instructions aimed at preventing bodily injury or direct damage to the FERTIKIT and/or the infrastructure in the presence of electricity.



## **ACID HAZARD**

The following text contains instructions aimed at preventing bodily injury or direct damage to the crops, the FERTIKIT and/or the infrastructure in the presence of acid.



## **SAFETY FOOTWEAR**

The following text contains instructions aimed at preventing foot injury.



## **TIP**

The following text provides clarification, tips or useful information.



## **PROTECTIVE EQUIPMENT**

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

# INTRODUCTION



## CAUTION

Read the Safety instructions chapter before beginning installation of the FERTIKIT 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 18).
- 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.
- Electrical installation must be performed by an authorized electrician only.
- The electrical installation must comply with the local safety standards and regulations.
- 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

When handling fertilizers, acid and other chemicals, always use protective equipment, gloves and goggles.



## WARNING

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



## CAUTION

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

# INTRODUCTION



## NOTE

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

## When Using Acid/Chemicals



## ACID HAZARD

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



## WARNING

When handling fertilizers, acid or other chemicals, always use protective equipment, gloves and goggles.



## ATTENTION

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

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

% is by weight at 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 above acid concentrations will damage the dosing channels.



## WARNING

Substances such as chemicals for pest/disease control might be corrosive and damage the FERTIKIT. 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, consult your Netafim representative.

# DESCRIPTION

## Introduction

The FERTIKIT 3G is a fully configurable, highly cost-effective solution for precise Nutrigation™. Based on a standard platform, the FERTIKIT 3G can operate under various modes and accommodate a variety of dosing channels, dosing boosters, controllers, peripherals and accessories to meet a vast range of applications and infrastructure constraints.

The aim of this manual is to enable installers to install and commission the FERTIKIT 3G dosing unit. The operating and maintenance instructions are described in the User Manual.

## 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 4 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

## Specifications

### Capacity Range

The FERTIKIT ensures a satisfactory mixture in an extremely vast range of flow capacities. It will accommodate a large range of applications.

### Fertilizer Dosing Capacity

The FERTIKIT 3G SP's basic platform accommodates up to 4 dosing channels of various types:

- 13 GPH
- 35 GPH
- 95 GPH

\* For applications requiring more than 4 dosing channels - consult Netafim.

### Mainline Pressure Range

Typical main line pressure ranges and conditions, by mode:

**SP** - For applications where the main line pressure is between 15 and 60 psi and sufficient for irrigation with no excess.



# DESCRIPTION

## Basic Functions

The FERTIKIT supports the following Nutrigration™ 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

## 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. The FERTIKIT booster pump creates the pressure differential to drive the dosing channels.

## 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.

## Add-ons

The FERTIKIT functionality can be extended by means of the many add-ons offering a wide variety of useful functions. All the add-ons are easy to connect to the FERTIKIT - here are a few examples:

### **Fertilizer Meter**

Enables continuous reading of fertilizer dosing. Useful in applications where EC/pH control is not performed.

### **Stock Selection**

Enables the dosing of multiple fertilizers through a single dosing channel (in cases they where simultaneous dosing is not required).

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 on the FERTIKIT add-ons, consult Netafim.

# DESCRIPTION

## SP

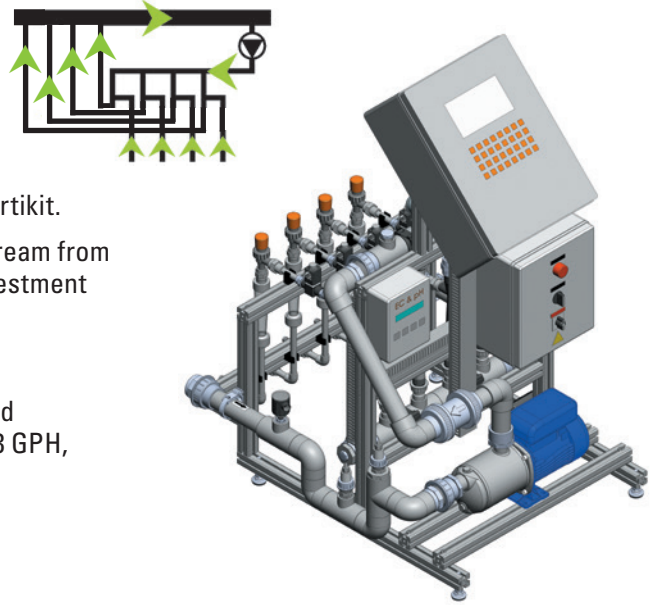
For applications where the main line pressure is between 15 and 60 psi and is sufficient for irrigation with no excess.

The pressure differential required to generate fertilizer suction via the Venturis is produced by a boost pump integrated in the Fertikit.

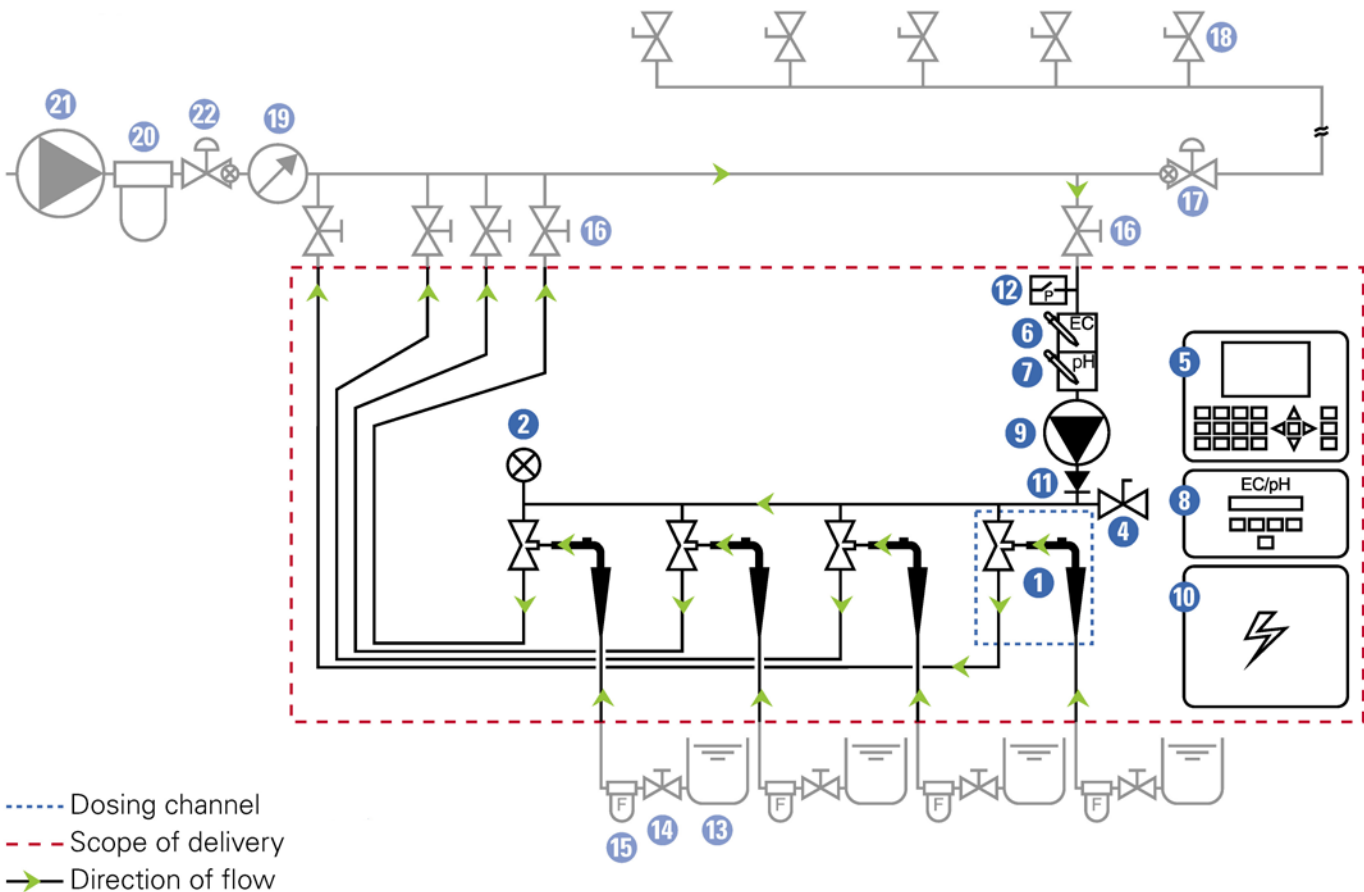
This mode of operation, where the system pump is installed upstream from the Venturis, permits the use of a smaller pump, reducing the investment required and saving energy.

Total fertilizer/acid suction capacity - up to 380 GPH.

Accommodates a wide variety of dosing channels for fertilizer and concentrated/diluted acid: Up to 4 dosing channels available in 13 GPH, 35 GPH, and 95 GPH each.

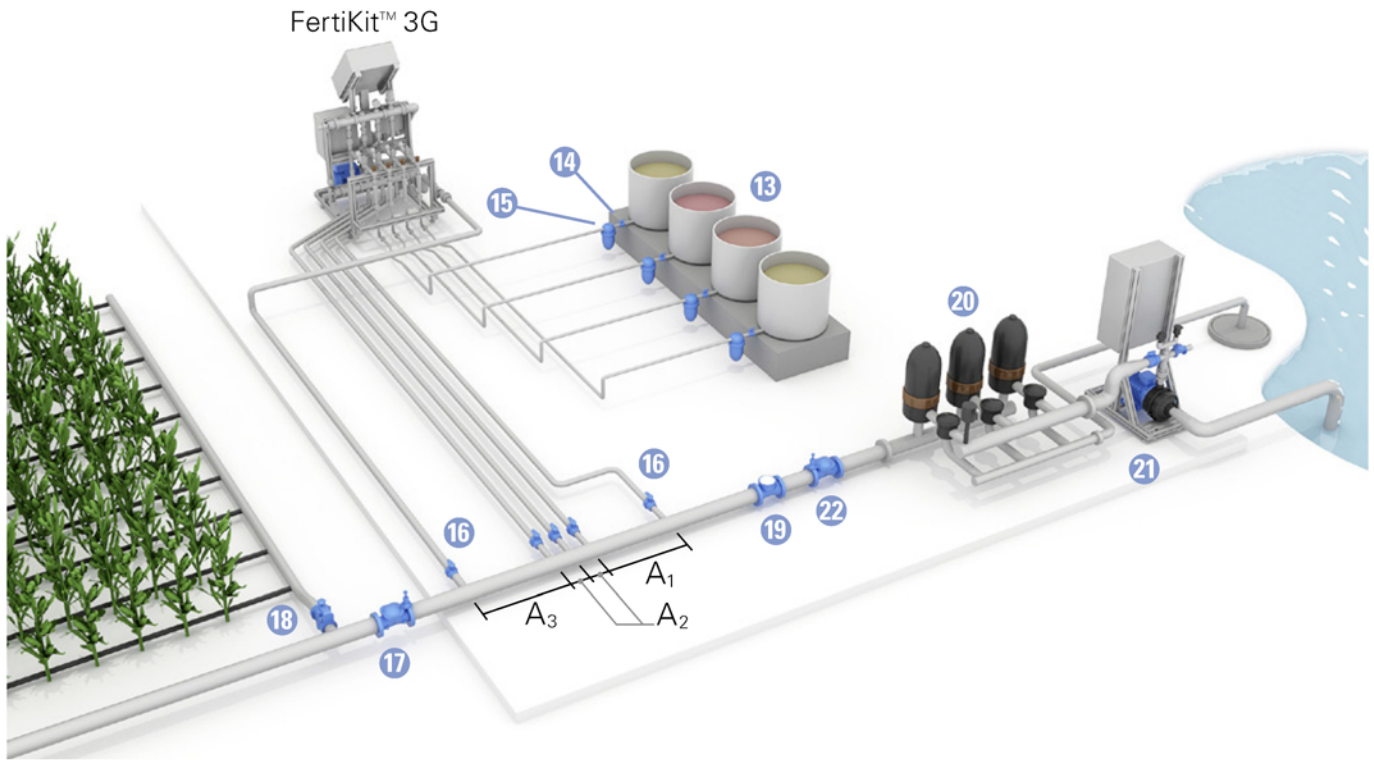


## Schematic Diagram



# DESCRIPTION

## Typical Setup



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

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

## 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 reducing valve (PRV)    |
| 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 sustaining valve (PSNO) |
| 8 EC/pH transducer              | 16 Manual valve (isolation)   |   |
| 9 Dosing booster                |                               |   |

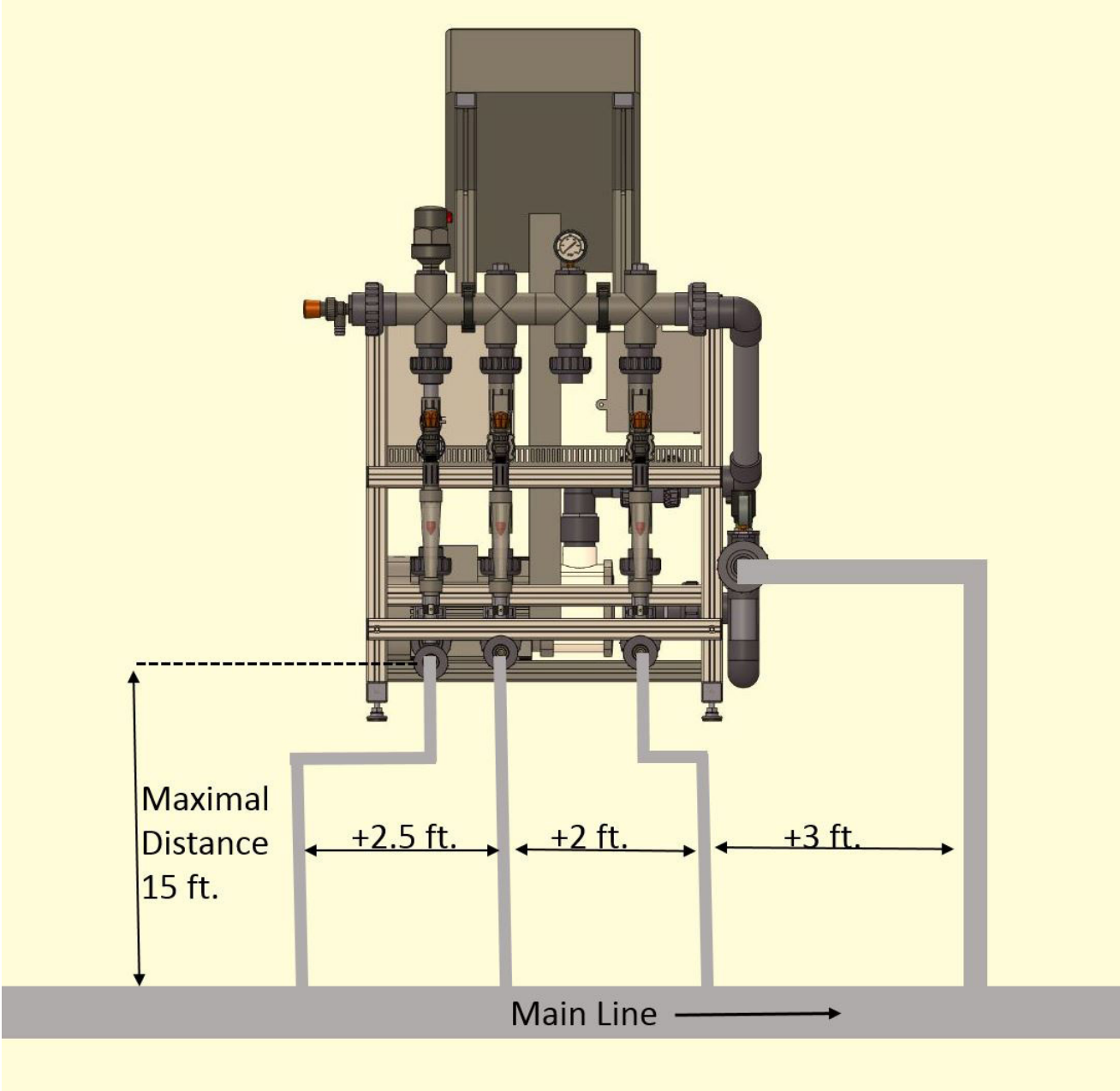
**Color code:** ● Supplied (part of the FertiKit™), ● Not supplied (part of infrastructure).

# DESCRIPTION

## SP - Typical Setup

### Required Proportions

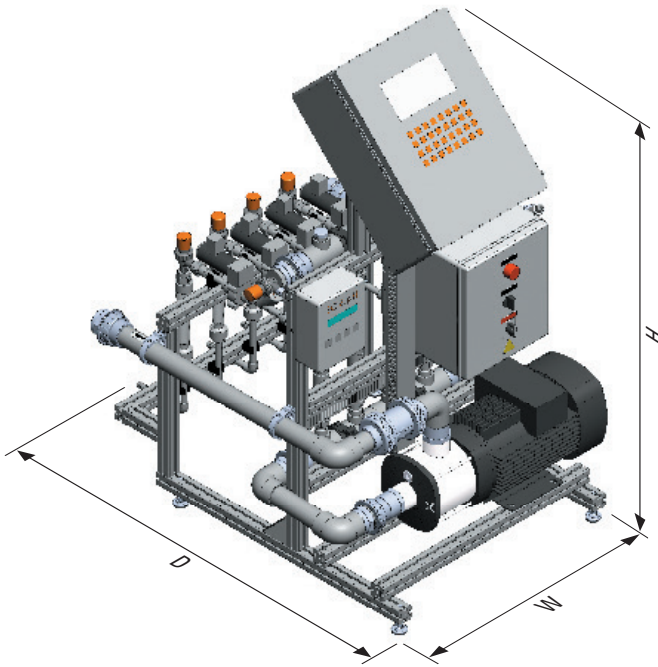
To enable optimal operation of the FERTIKIT, piping must be installed while maintaining the following proportions.



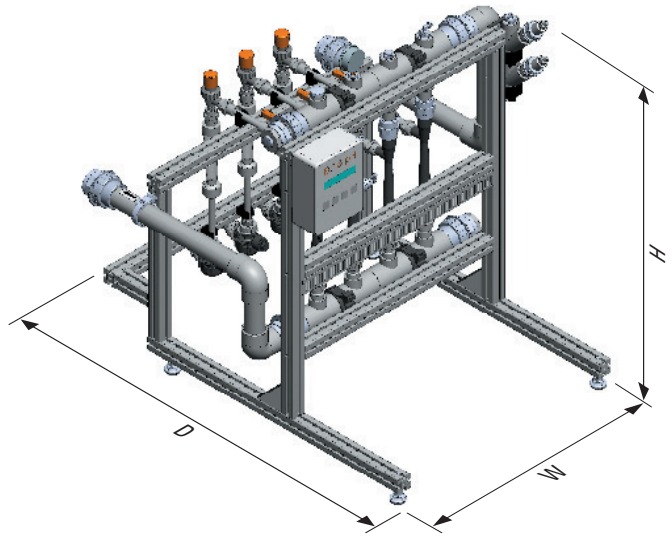
# DESCRIPTION

## Dimensions

**With Controller**



**Without Controller**



Configuration	FERTIKIT external dimensions (W/D/H*)	Package dimensions (W/D/H**)
Without controller	33/40.5/36"	39.5/45.5/39.5"
With controller	33/40.5/53"	39.5/45.5/63.5"

\*The height varies by  $\pm 0.5$ " according to the adjustment of the legs.

\*\*The package height includes the pallet height of 4".

## Weights

With dosing booster

Mode	Controller	4HM9		CM5		CM15	
		Net weight	Packed weight	Net weight	Packed weight	Net weight	Packed weight
SP	Without	110 lbs.	165 lbs.	139 lbs.	194 lbs.	198 lbs.	254 lbs.
	With	132 lbs.	194 lbs.	161 lbs.	223 lbs.	220 lbs.	282 lbs.

# ON-SITE PREPARATIONS

## Pump House (Filter House / Fertilizer House) Requirements



### CAUTION

The FERTIKIT should:

- be placed in a roofed building
- not be exposed to direct sunlight
- kept at an ambient temperature between 50°F and 104°F
- kept at a maximum relative air humidity of 85%
- be properly ventilated
- be protected from dust
- be protected from splashes or direct spraying with water or chemicals

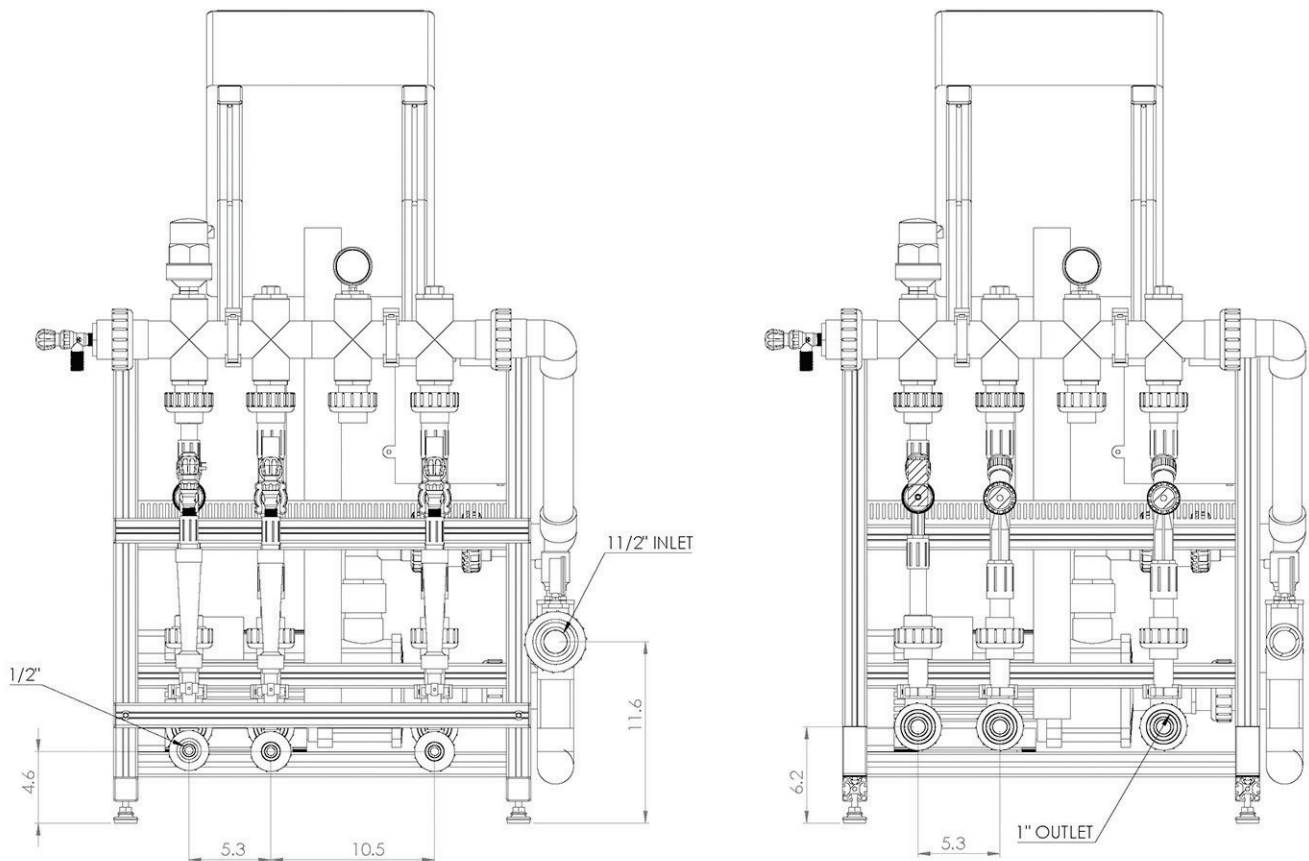


### NOTE

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.

## Location of Inlet, Outlet and Fertilizer/Acid Line Connectors

The height varies by  $\pm 0.5$ " according to the adjustment of the legs.



# 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

Component	Specifications
16 Manual valve (isolation)	To be installed at the inlet and at the outlets of the FERTIKIT, for use during system maintenance.
17 Pressure reducing valve (PRV)	To be installed on the main line downstream from the FERTIKIT
18 Irrigation valve	Remote controlled (recommended).
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 Recommended flow meter, table 8 below)
20 Main line filter	$\leq 130 \mu\text{m}$ ( $\geq 120$ 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).

# ON-SITE PREPARATIONS

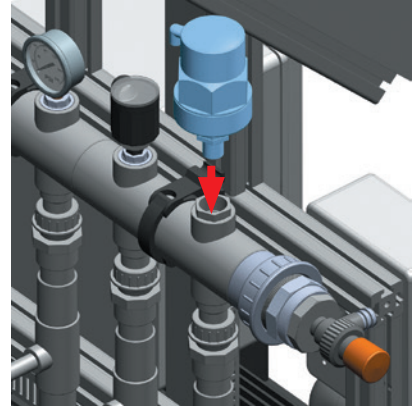
## Recommended Flow Meter

Flow rate GPM	Flow meter output US gal/pulse
Up to 88	1
88 - 1000	10
1000-4500	100



### 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, the air-release valve is included on the FertiKit SP models.





# ON-SITE PREPARATIONS

## 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 4 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	$\leq 130 \mu\text{m}$ ( $\geq 120$ 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: 1¼" for dosing channels of up to 95 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

## 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 Dosing Booster, page 32), compliant with the national code and requirements.
- Grounding connection:  $\leq 10 \Omega$ .

For the selection of the wire size - consider (see Dosing Booster, page 32):

- 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	$\leq 12$ awg	$\leq 12$ awg
1.5-2	$\leq 12$ awg	
2-3	$\leq 10$ 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	$\leq 12$ awg	$\leq 12$ awg
1.5-2		
2-3		
3-4		
4-6	$\leq 10$ awg	$\leq 12$ awg
6-8	$\leq 8$ 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

When handling fertilizers, acid and other chemicals, always use protective equipment, gloves and goggles.

### 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 14).

#### Connections

Connection	Diameter
Inlet	1.5"
Outlet - PVC, NPT nipple - male thread connector	1.0"

### 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 14).

#### Two Types of Connection are Available

Fittings (interchangeable)	Diameter
PVC, hose nozzle insert connector (installed)	16mm/.63"
PVC, nipple - male thread connector (supplied)	1/2"

# 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 1.7 feet of transparent, chemical-resistant, reinforced PVC water hose with an internal diameter of 1/2" (16mm) 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:

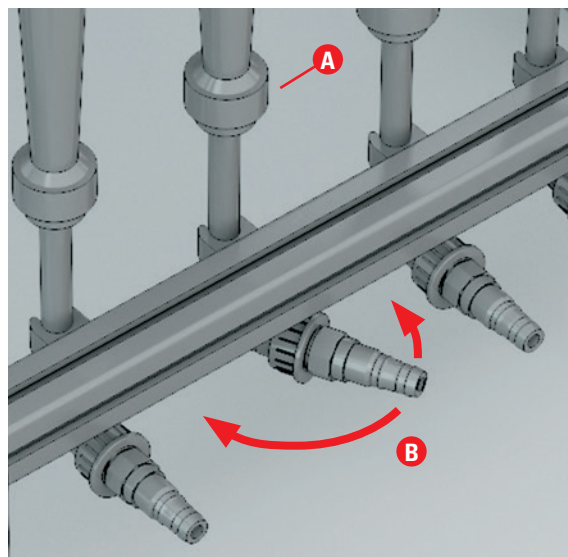
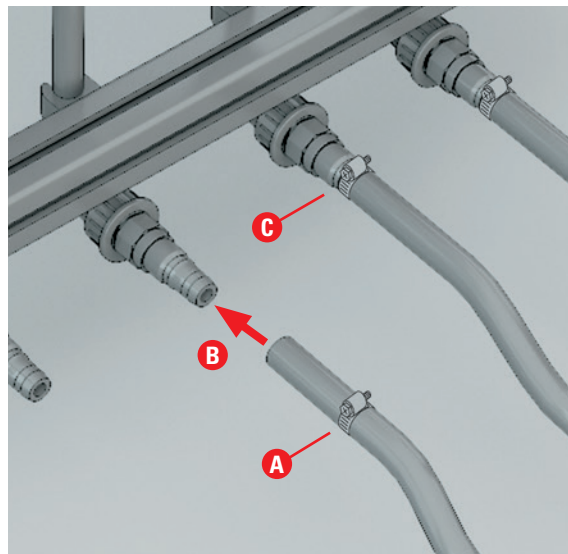
- 1/2" (16mm) reinforced EVA tubing.
- Material: EVA (ethylene vinyl acetate) tube compound specially formulated to meet USDA requirements.
- Polyester cord reinforcement with color tracer.
- Pressure: 250 to 300 psi.
- Recommended temperature range: -10°F to +150°F.



### 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 union connector **A**, rotate the hose connector to the desired direction **B** and fasten the union connector **A**.



## Electrical Installation



### CAUTION

Only qualified electricians are permitted to perform electrical installations!

Have a qualified electrician connect the FERTIKIT to the mains.

SP model - follow the instructions in the Switchboard User Manual.

EC/pH - follow the instructions in the EC/pH Transducer User Manual.



### 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, consult the Controller Manual.

# SYSTEM OPERATION

## Preparations for Running the FERTIKIT

For FERTIKITs 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

The fertilizer dosing channels have a dosing valve (model: Fip S12), make sure the dosing valve selector is in the CLOSED position (as shown at right).

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 Sensors

Calibrate the EC and pH sensors (see the EC/pH Transducer 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

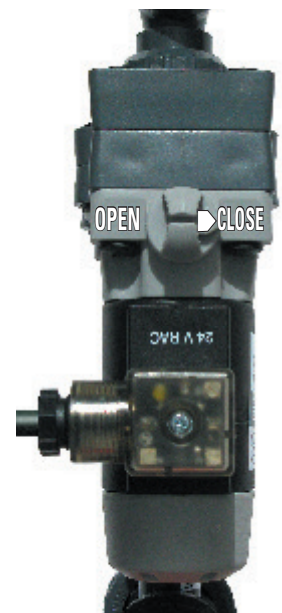


#### CAUTION

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

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.



# SYSTEM OPERATION

Keep the system under static pressure for 10 minutes and visually check for leaks.

Perform a simulation test with a 2 gallon bucket of water (see page 25)

## 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 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 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 Controller Manual).

Temporarily deactivate all alarms in the system - EC/pH, flow control, etc. (see the 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 Controller Manual).

Activate the dosing booster and the dosing channels.

Consult 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 following table:

### Hydraulic Conditions

Mode	Main line	Upper manifold	Lower manifold
<b>PB</b>	+15 to +60 psi	+58 to +94 psi	+14 to +36 psi

# SYSTEM OPERATION

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 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 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 Dosing Unit While Irrigating, page 26).

Let the system run for about ten minutes and see that it works properly.

After tuning the flow rate for each dosing channel, adjust the cursors on each visual fertilizer flow meter (as shown on right).



## NOTE

The visual flow meter scale is calibrated by the manufacturer for measurement of the flow rate of water (H<sub>2</sub>O). 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 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 Controller Manual).

If there is any problem during the process, see Troubleshooting in the FERTIKIT User Manual.



# 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.

### DEFINITION

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

### US units

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

### EXAMPLE

<input type="text"/>	GPM
X	
<input type="text"/>	US gal/1000 US gal
X 0.06 =	
<input type="text"/>	GPH
X 1.25 =	
<input type="text"/>	GPH

### DEFINITION

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



### NOTE

The Rotameter's scale is calibrated by the manufacturer for measurement of the flow rate of water (H<sub>2</sub>O). 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 2 Gallon 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 2 gallons
- Measuring tube or syringe with a scale for up to 1 ounce
- 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 2 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

### US units

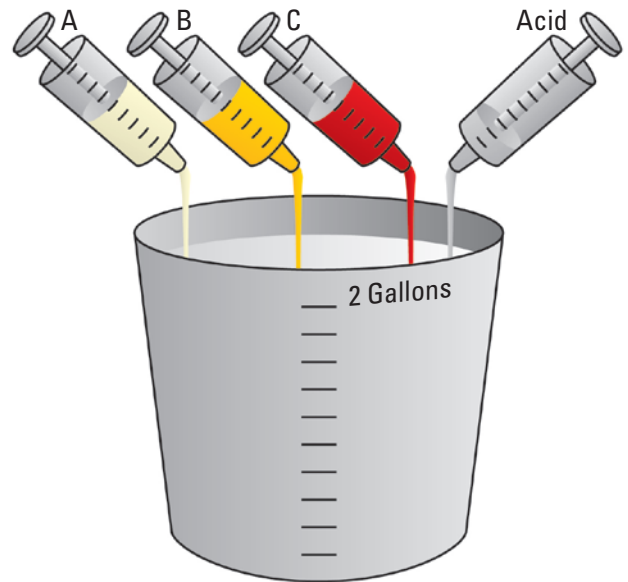
For a fertilizers dosing ratio of 1.5 US gal/THG each and an acid dosing ratio of 1.1 US gal/THG the quantities for 2 US gallons of water in the Bucket-simulation-test will be 0.38 oz\* of each fertilizer solution and 0.28 oz\*\* of the acid solution

### 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%



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.

# CALIBRATION

## 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 2 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, consult the 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 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 visual flow meter reading" calculated in stage 1 (page 23) is attained.



### NOTE

The visual flow meter's scale is calibrated by the manufacturer for measurement of the flow rate of water (H<sub>2</sub>O). 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 in three copies. Make sure to fill out all the boxes of the reference row. Keep one copy as reference for future calibration of the FERTIKIT and send one copy to your Netafim Dealer.

# 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 User Manual, page 6).
- The warranty and its restrictions (see User Manual, page 23).
- Calibration - accompany the client through this section and emphasize the importance of thorough knowledge of the processes in it for the current operation of the FERTIKIT (see User Manual, page 19).
- Proper dissolving of fertilizers for optimal utilization of the dosing channels' capacity (see User Manual, page 19).
- The importance of regular maintenance and its impact on the warranty (see User Manual, page 13).
- The importance of periodically comparing the hydraulic data with the references in the FERTIKIT Hydraulic Conditions Checklist (see User Manual, page 13).
- Troubleshooting - accompany the client through this section (see User Manual, page 15).
- Make sure the FERTIKIT Hydraulic Conditions Checklist has been properly completed.
- Fill out the 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 save a copy for your records.

# 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 64-77°F, protected from freezing and not be exposed to pressure greater than 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.

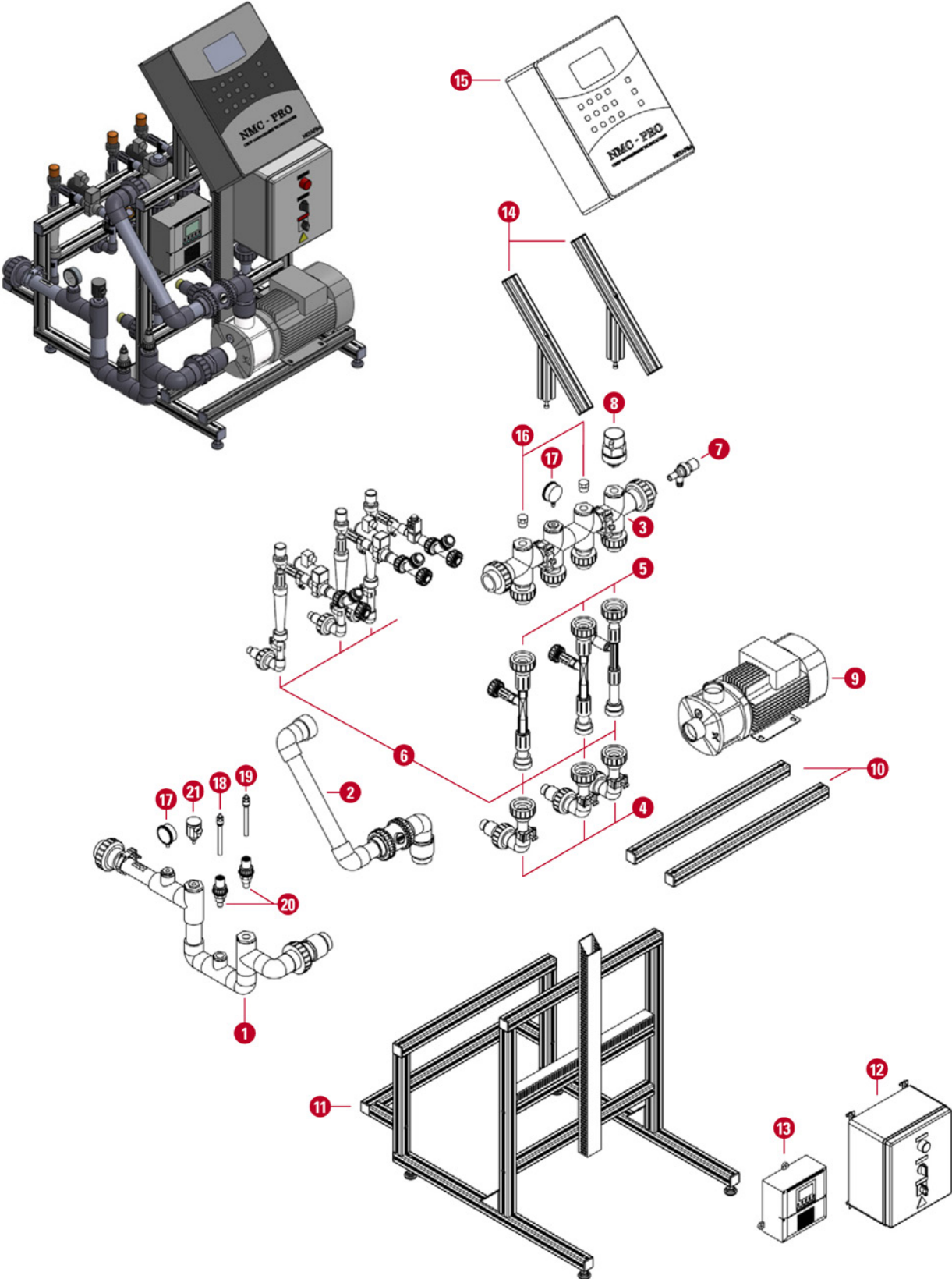
If a defect arises in your Netafim product during the warranty period, contact your Netafim supplier.

## 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).

# FERTIKIT PARTS

SP



# FERTIKIT PARTS

## FertiKit SP Parts

Part	Description	Notes	Item Number
1	Inlet to CM15-2 60Hz SCH80		33241-009030
	Inlet to MTX5-3 60Hz SCH80		33241-009040
2	Outlet from CM15-2 60Hz SCH80		33241-009050
	Outlet from MTX5-3 60Hz SCH80		33241-009060
3	Upper manifold SCH80		33241-009080
4	Outlet from Venturi		33241-009070
5	Venturi PP M100GPH SCH80		33241-009090
	Venturi PP N40GPH SCH80		33241-009100
	Venduri PVDF M13GPH SCH80		33241-009110
6	Complete Acid Dosing Channel 13 GPH Viton		33241-009210
	Complete Dosing Channel 35 GPH EPDM		33241-009200
	Complete Dosing Channel 95 GPH EPDM		33241-009220
	Dosing Channel Vertical part 1.3-13 GPH SCH80	For Acid	33241-009120
	Dosing Channel Vertical part 10-100 GPH SCH80	For Fertilizer	33241-009130
	Dosing Channel Vertical part 4-40 GPH SCH80	For Fertilizer	33241-009140
	Dosing Channel Horizontal part VITON Bacc. SCH80	For Acid	33241-009010
	Dosing Channel Horizontal part EPDM S.12 SCH80	For Fertilizer	33241-009020
7	Sampling Valve RPRV 1/2" FPM for flow up to 105 GPH		76400-011375
8	Air Valve - plastic grey 3/4" (DG-010) NPT		70561-003730
9	CM15-2 Pump - 3 Phase		77800-002996
	Matrix 5-3 Pump - Single Phase		77800-023250
10	Set - Aluminum frame for dosing booster		45000-008759
11	Basic Frame	Not available as spare part	-
12	Switchboard for CM15-2		33220-001450
	Switchboard for Matrix 5-3		33220-001300
13	EC/pH Transducer		74360-007700
14	Set - Aluminum frame for NMC Pro Controller		45000-008757
15	NMC Pro Controller		74340-013943
16	PVC Threaded Plug 3/4" M		77400-027100
17	Pressure Gauge - 250 GLZ 10 bar 1/4" BSP		77540-003400
18	pH Sensor, Jumo - 12mm, plastic, bared wires		45000-006701
19	EC Sensor, Jumo - 12mm, temperat comp, PT100		45000-006705
20	Set - EC/pH Adapter		33140-008500
21	Pressure Switch		77800-002180

# FERTIKIT PARTS

## Dosing Booster for 60 Hz Installations

	Mains Voltage	Description	Pump Electrical Data	Total Rated Power
1-Phase	1 x 230V	Matrix 5-3	Rated Power: P2: 1.1 kW Rated Voltage: 1 x 230V Rated Current: 4,93 A	1.25 kW
3-Phase	3 x 208-230/440/480V	Grundfos CM15-2	Rated Power: P2: 4 kW Rated Voltage: 3 x 208-230Y/440-480Y V Rated Current: 14,8-14,2/7,2-7,0 A	4.15 kW







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