User Manual

Green Field ECO

Climate Controller

Munters

Green Field ECO

User Manual

Rev 1.2, 06/2024

This manual for use and maintenance is an integral part of the apparatus together with the attached technical documentation.

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1 Introduction

1.1   Disclaimer

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1.2   Introduction

Congratulations on your excellent choice of purchasing an Green Field ECO!

In order to realize the full benefit from this product it is important that it is installed, commissioned and operated correctly. Before installation or using the controller, this manual should be studied carefully. It is also recommended that it is kept safely for future reference. The manual is intended as a reference for installation, commissioning and day-to-day operation of the Munters Controllers.

1.3   Notes

Date of release: July 2019

Munters cannot guarantee to inform users about the changes or to distribute new manuals to them.

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2 General Information

- Keyboard
- Hot Screens
- Main Menu Icons
- Introduction to Irrigation Programs
- Operation Mode

2.1 Keyboard

- **Number keys**: Use these keys to enter values or quantities. In addition, they act as shortcuts to selections (see the following section).
- **+/- Key**: Toggles between positive and negative values and marks check boxes' option selection. In a History screen, use this key to toggle between quantities and time format.
    - **Arrows**: Scroll up, down, left, and right to select menus.
    - ☰: Press to get to the main menu; also acts as "ESC" and "Back" keys.
    - ↵: Enter menu, submenu, value, open window, and confirm a value or change.
    - ⓘ: Access Mode
    - ✖: Erases s typing mistake.
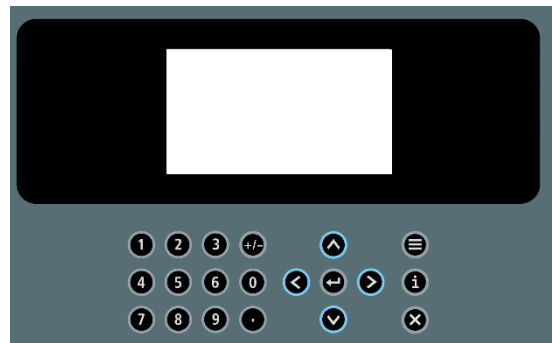
2.2 Hot Screens

Press ☰ from the Main Menu to see Read-Only overview running processes. Press ☰ again to return to the Main Menu. **There are 10** Hot Screens/Keys:

- **0**: Hot Key- Icon of active actions/processes
- 1: Main Screen/System Status
- 2: Irrigation Process
- 3: Irrigation Program Status

- 4: Water, EC/pH, Dosing
- 5: Filter Flushing Status
- 6: Temperature & Humidity measurement
- 7: Weather Station measurement

2.3 Main Menu Icons
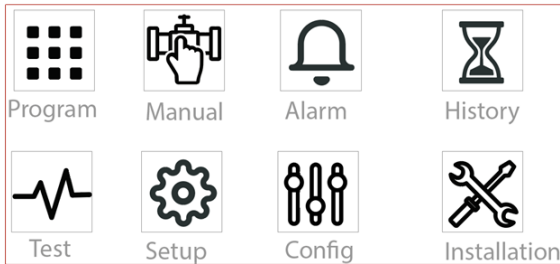
2.4 Introduction to Irrigation Programs

To set an irrigation program-regiment/strategy, the grower must select the necessary valves and set the Run Time and Dosing programs. The grower can define one or more programs for one or more valves. Refer to PROGRAM MENU, page 12 for detailed information on these programs.
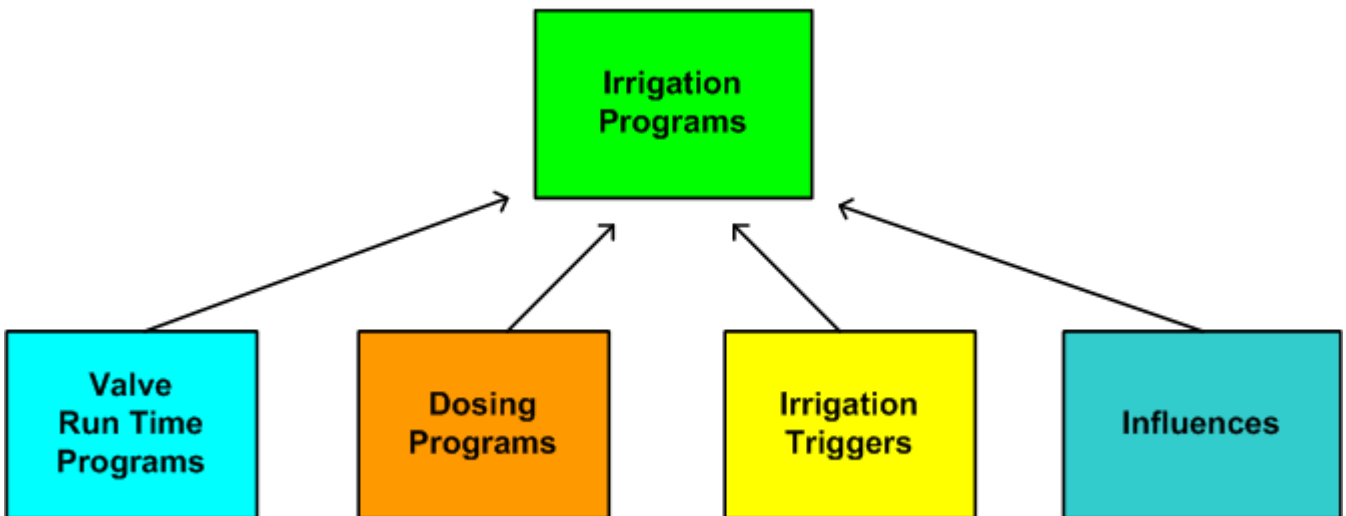
- **Run Time Programs**
  - ○ Based on Time or Quantity
  - ○ Set water *before* and *after* dosing process (fertilizer injection)
- **Dosing Programs (Fertilizer)**
  - ○ Up to eight dosing channels per program
  - ○ Each channel can be defined by:
    - ▪ Quantity
    - ▪ Proportional Quantity
    - ▪ Time
    - ▪ Proportional Time
- **Irrigation Timing Based on External Condition Programs**

- Supports up to 15 programs
- Each program defines:
  - Time frame
  - Trigger
  - Trigger Type (for example one time only or multiple shots)

2.5 Operation Mode

There are three operation levels:

- **Read Only (restricted):** All the parameters and menus are visible, but cannot be modified
- **User (partially restricted):** Menus 1-6 are fully accessible and can be modified. Menus 7 and 8 can be viewed but not modified
- **Technician (unrestricted):** All menus are fully accessible (no restrictions)

1. To change the operation mode, go to Install › any menu item.

2. Press **Help**.
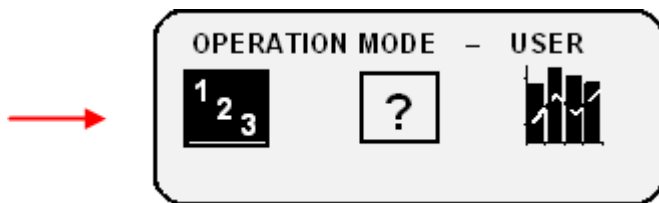
3. Click the **MODE** icon and insert the password
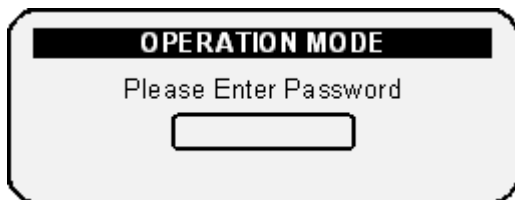
The controller recognizes the operation mode according to the password that is entered:

MODE	PASSWORD
Read Only	0000
User	9999
Technician	1948

If an incorrect password is entered, this screen appears.

The Operation mode can be configured to automatically return to the "Read-Only" mode after a certain amount of time.

NOTE   Refer to the SYSTEM SETUP section in the Installation Manual.

SYSTEM SETUP		
HISTORY		
History Resolution	►	1 HOUR
WEATHER STATION		
Controller Function	►	LOCAL
OPERATION MODE		
Automatic return to RO mode	►	NO
Return period to RO mode	►	00:10
COMMUNICATION		
Controller Number	►	1
Lower Port – Protocol	►	Green NET
Lower Port – BaudRate	►	9600
Upper Port – Protocol	►	NONE
Upper Port – BaudRate	►	9600

- To perform a **cold start** or **firmware upgrade**, the controller must be in the "**Technician**" mode.

- If there is a power failure, the controller powers up with the last used mode.

3 Program Menu

The Program Menu is used to configure the irrigation programs. Configuration is a multistep process consisting of setting the following:

- Run Time Program (length of irrigation time or quantity of water to be distributed), page 12
- Dosing Program (fertilizer distribution program), page 14
- Irrigation (time frame and other parameters), page 18

In addition (or as alternative) to starting the irrigation based on time, irrigation can be set to begin based on:

- Irrigation Based on External Conditions, page 24
- Irrigation Based on Radiation Sum, page 27
- Irrigation Based on VPD Sum, page 28

Furthermore, you can adjust the irrigation process based on environmental factors such as the amount of radiation, the temperature, or other factors. Refer to Introduction to the Influence Program and Introduction to the Influence Program, page 29 for more details.

Lastly, use this menu to configure the following functions:

- Agitator, page 36
- Selector, page 37
- Filter Flushing, page 37
- Cooling, page 40
- Misting, page 41
  Water Heating, page 41

3.1 Run Time Program

For every irrigation program, define a Run Time program, which defines the how much water to distribute. Run Time can be based on either length of time or quantity of water. You can define up to 60 Run Time programs.

As an option, you can configure irrigation to run for a certain amount of time or quantity before dosing begins and/or after dosing ends. This process rinses the irrigation pipes of any residual matter.

To set the irrigation Run Time:

1. Go to *Program > Water Run Time*.
2. Select **QTY** or **TIME**.
3. Enter the water quantity/total run time.
4. Enter the **Before** and/or **After** quantity/time (optional).

5. Repeat as required for each program.

SELECT → **1. Program** → 2. Water Run Time

SELECT → Qty. →

#	Method	Water	Before	After
	WATER RUN TIME PROGRAM			
1	QTY.	10.000	0.000	0.000
2	QTY.	25.000	0.000	0.000
3	QTY.	0.000	0.000	0.000
4	QTY.	0.000	0.000	0.000
5	QTY.	0.000	0.000	0.000
6	QTY.	0.000	0.000	0.000
7	QTY.	0.000	0.000	0.000
8	QTY.	0.000	0.000	0.000
9	QTY.	0.000	0.000	0.000
10	QTY.	0.000	0.000	0.000
11	QTY.	0.000	0.000	0.000

QTY. TIME

→ Define Time →

#	Method	Water	Before	After
	WATER RUN TIME PROGRAM			
1	TIME	00:15:00	00:00:00	00:00:00
2	QTY.	25.000	0.000	0.000
3	QTY.	0.000	0.000	0.000
4	QTY.	0.000	0.000	0.000
5	QTY.	0.000	0.000	0.000
6	QTY.	0.000	0.000	0.000
7	QTY.	0.000	0.000	0.000
8	QTY.	0.000	0.000	0.000
9	QTY.	0.000	0.000	0.000
10	QTY.	0.000	0.000	0.000
11	QTY.	0.000	0.000	0.000

▪ Define value for "before" and "after" time program

→

#	Method	Water	Before	After
	WATER RUN TIME PROGRAM			
1	TIME	00:15:00	00:0200	00:01:00
2	QTY.	25.000	5.000	5.000
3	QTY.	0.000	0.000	0.000
4	QTY.	0.000	0.000	0.000
5	QTY.	0.000	0.000	0.000
6	QTY.	0.000	0.000	0.000
7	QTY.	0.000	0.000	0.000
8	QTY.	0.000	0.000	0.000
9	QTY.	0.000	0.000	0.000
10	QTY.	0.000	0.000	0.000
11	QTY.	0.000	0.000	0.000

Water — 2 min | Water & Dosing — 12 min | Water — 1 min

Time
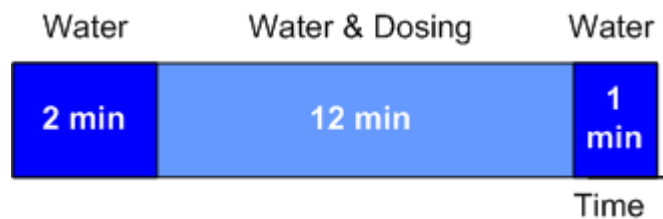
3.2   Dosing Program

For every irrigation program, define a Dosing Program that defines the quantity of fertilizer per channel and its delivery method. You can define up to 10 Dosing Programs.

1. Program

3. Dosing

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
5.00	5.00	5.00	---
EC Dosing Method	P.QTY		
PH Dosing Method	P.QTY		

Dosing can be according to one of the following:

- Proportional quantity
- Quantity

- Proportional time
- Time

3.2.1   PROPORTIONAL QUANTITY

Proportional Quantity is the quantity of fertilizer distributed per quantity of water. The proportion can be one of the following:

- Liters per cube of water
- Gallons per 1000 gallons of water

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
5:00	6:0		---
EC Dosing Meth	P. QTY	P. TIME	ME
PH Dosing Meth	P. TIME	TIME	TY
	TIME		
	QTY.		

5 liters (gallons) of fertilizer for every M³ (1000 gallons) of water
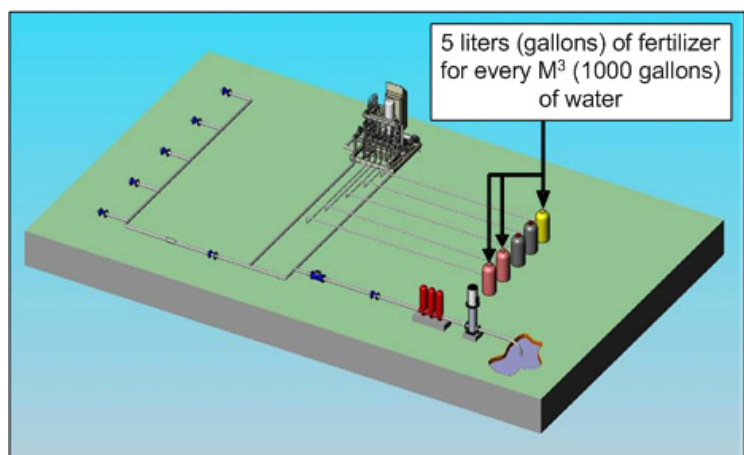
3.2.2 PROPORTIONAL TIME

Proportional Time takes the required dosing time and spreads out each dose over the irrigation program in open/close pulses per channel. The diagram below shows how each the fertilizer is distributed over the total run time; a dose (P) is injected during irrigation according to the calculated schedule.
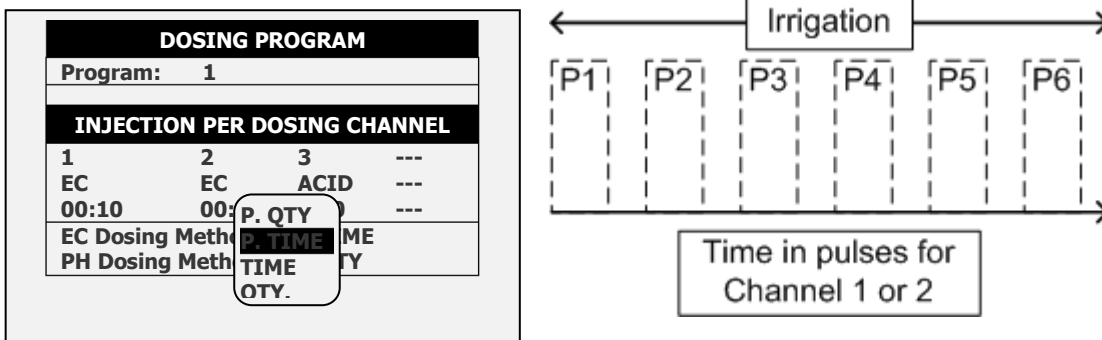
3.2.3 TIME

When using the Time delivery method, fertilizer is injected once, for the length of time defined in this screen.
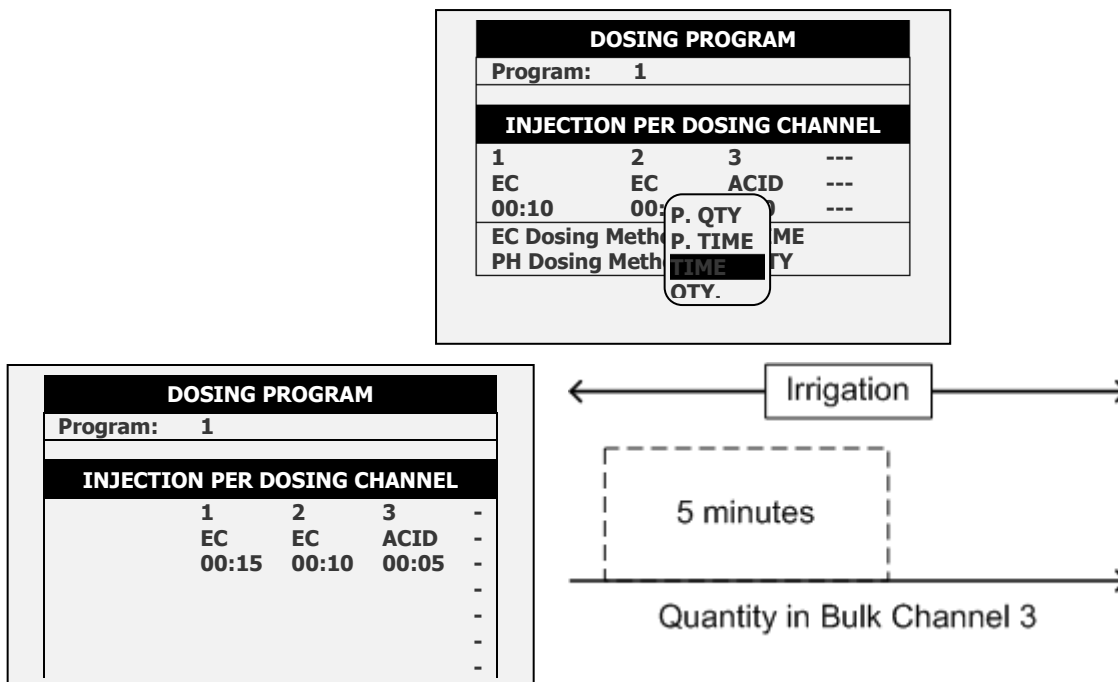
Example: In Channel 3, P1 = 5 minutes. (one pulse)

3.2.4 QUANTITY

The Quantity method injects a fixed amount of fertilizer in the irrigation water. When using the Quantity method, there are two options:

- **Option A:** Bulk (similar to Time method). In this option, fertilizer is injected once, with the quantity defined in this screen.
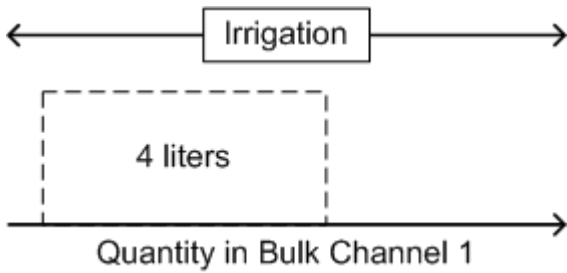
Example: Channel 1, P1 = four liters in one pulse

- **Option B**: Spread (according to dosing configuration set by a technician). Option B is similar to Proportional Time. In this method, fertilizer is spread out by quantity over the irrigation run time.
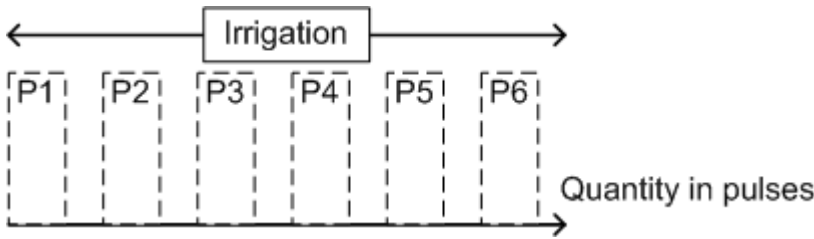
Example: Channel 1 = P1 + P2 + P3…+ Pn = 4 liters

NOTE   The example below shows liters; in the USA use gallons.

Qty.

DOSING PROGRAM			
Program:	1		
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
00:10	00:	P. TIME	---
EC Dosing Meth	TIME	ME	
PH Dosing Meth	QTY.	TY	

DOSING PROGRAM			
Program:	1		
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
4.00	5.00	2.00	---
EC Dosing Method		QTY.	
PH Dosing Method		QTY.	

When installing the Green Field ECO Controller, the installation technician selects the required option. The user defines the quantity in the above screen.

Main Menu ➡️ **7.Config** ➡️ **7. Dosing Configuration**

DOSING CONFIGURATION	
EC Control	YES
Ph Control	YES
EC Alarms	YES
pH Alarms	YES
Minimum On Time (sec)	0.8
Minimum Off Time (sec)	0.8
EC Coarse Tuning	5
EC Fine Tuning	5
pH Coarse Tuning	5
pH Fine Tuning	5
Control Cycle EC	4
Control Cycle pH	4
EC/pH Averaging (0-Low, 20-High)	3
Dosing Boost Off Delay (mm:ss)	00:02
Dosing by QTY. Method	SPREAD

Define according to Bulk or Spread

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
4.00	5.00	2.00	---
EC Dosing Method		QTY.	
PH Dosing Method		QTY.	

➡️ Back in Dosing Program menu, define Injection per Dosing Channel.

3.2.4.1 Example of Dosing by Quantity (Spread)

Using Quantity (Spread) is normally done in an open field. The following is an example of a Quantity (Spread) configuration.

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
PASSIV	PASSIV	ACID	---
4.00	5.00	2.00	---
Target PH		5.50	
Passive Method		QTY.	
PH Dosing Method		P.QTY.	
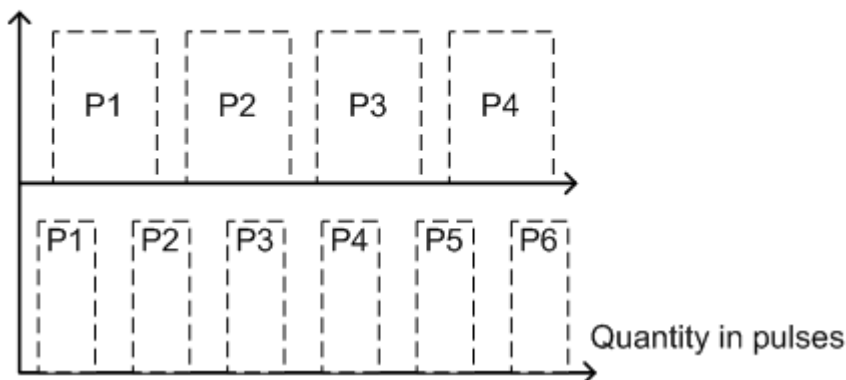
Ch. 1 ⇨ Spread Qty. = 4 liters
Ch. 2 ⇨ Spread Qty. = 5 liters

3.3 Irrigation Program

In the Irrigation Program screen, complete the irrigation setup.

In this screen define the following:

- **Start time**: This parameter defines the irrigation program time period. Each period begins at the defined time and runs until the next defined time. Define up to six periods for each irrigation program. For example:
  - If you enter one time, the time period is 24 hours, starting from the time entered.
  - If you enter two times, the first period goes from first time defined until the second time. The second period then starts and continues until the first time. For example in the screen below, the first period starts at 8:00 and continues until 10:00. The second period begins at 10:00 and continues until 8:00 (the next day).
- **Clock Start**: This parameter defines the number of irrigation cycles within each time period. In the example below, there are two cycles between 8:00 – 10:00 and three cycles from 10:00 – 8:00.
- **Min. Time**: The minimal amount of time between cycle starts

- **Valve #**: Select which irrigation valve(s) open(s) (refer to Setting Valve Sequence, page 19).
- Run Time #: Select the required Run Time Program (refer to Run Time Program, page 12).
- Dosing Prog: Select the required Dosing Program (refer to Dosing Program, page 14).
- Day: Type the current day/number of days in cycle (refer to Configuring the Irrigation Calendar, page 23).
- Dose/Water: For each day define the irrigation regime (refer to Configuring the Irrigation Calendar, page 23).
- Irrigation Adjustments: Along with irrigation programs based on time, Green Field ECO enables adjusting or running irrigation based on the following:
  - Adjusting the Water Quantity Based on Weather Conditions, page 22

3.3.1 SETTING VALVE SEQUENCE

The following section provides examples on how to set the valves' sequence.

Example 1: Cycling Irrigation Program for One Valve

In the following example, Irrigation Program 4 begins running at 8:00 AM. There are two cycles, with one hour in between each cycle. Irrigation is from one valve. Run Time program 1 and Dosing Program 1 are used.

DATE : 19-Apr-07	TIME : 16:12:32		
IRRIGATION PROGRAM			
Program: 4	**Priority:** --	**Const.**	**0%**
Start Time	08:00		
Clock Start	2		
Min. Time	01:00		
Valve #	001		
Run Time #	1		
Dosing Prog	1		
Day: 01/01	1		
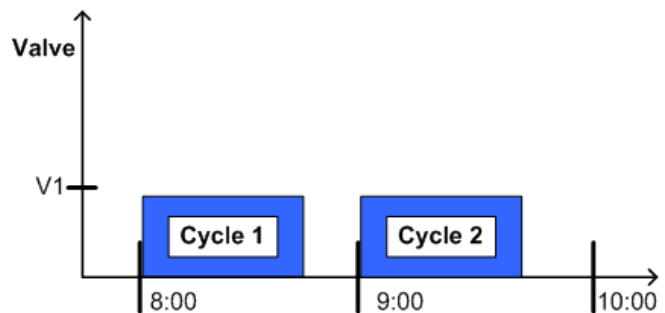
Valve 1 runs two cycles, one hour between start times on Run Time & Dosing Program 1
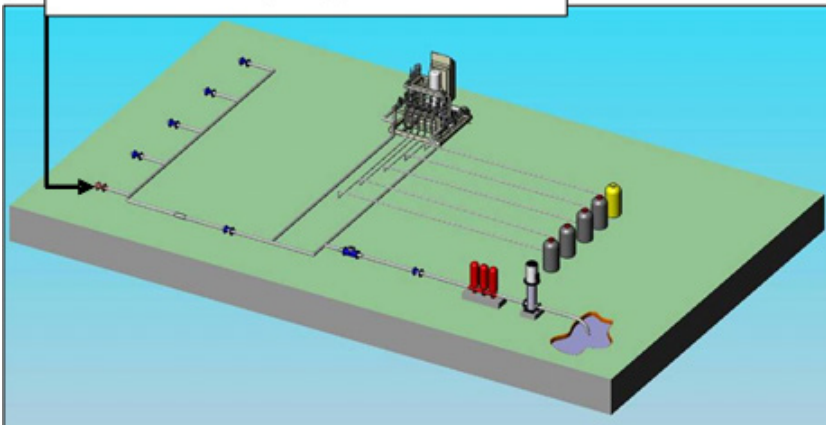
Example 2: Cycling Irrigation Program for Group of Two Valves

In this example, two valves operate simultaneously (valves operating together is a called a group). All other specifications are the same as those found in Example 1.

NOTE   Valves in the same group must have the same run time.

DATE : 19-Apr-07	TIME : 16:12:32	
IRRIGATION PROGRAM		
Program: 4	Priority: --	Const. 0%
Start Time Clock Start Min. Time	08:00 2 01:00	
Valve # Run Time # Dosing Prog	001 + 002 1 1 1 1	
Day: 01/01	1	

Valve 1 & 2 run two cycles, one hour between start times on Run Time & Dosing
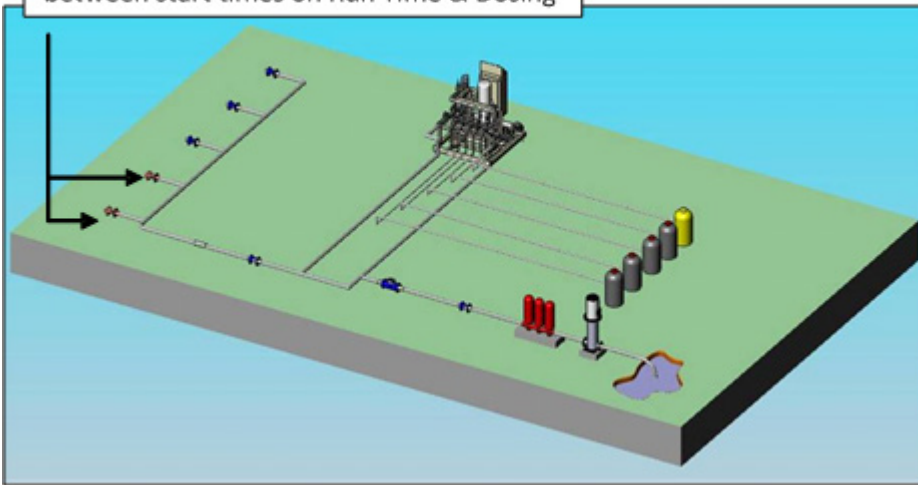
Example 3: Irrigation Program for a Group and Individual Valve

In this example, Valves 1 and 2 are designated as a group. Valve 3 is designated as an individual valve. There are different/interchangeable delays (multiple start time) dividing the day into periods.

The first cycle's (C1) run time begins at 8:00 (Valve 1 and 2). Valve 3 begins operating at its run time. In this example, Valve 3 begins operating after Valve 1 and 2 finishes. This process is repeated once (C2), with a break of one hour between cycle start times.

Cycle 3 (C3) begins at 10:30. In this cycle, there is a 30 minute break between cycles (C4). The process continues as shown in the graph below.

DATE : 19-Apr-07		TIME : 16:12:32
IRRIGATION PROGRAM		
Program: 4	Priority: --	Const. 0%
Start Time Clock Start Min. Time	08:00 10:30 12:30 2 2 2 01:00 00:30 01:00	
Valve # Run Time # Dosing Prog	001 + 002 003 1 1 2 1 1 2	
Day: 01/03	1 2 3	

Valve 1 & 2 run six cycles simultaneously on Run Time & Dosing Program 1, Valve 3 runs after Valves 1 & 2 on Run Time & Dosing Program 2, with different/interchangeable start times.
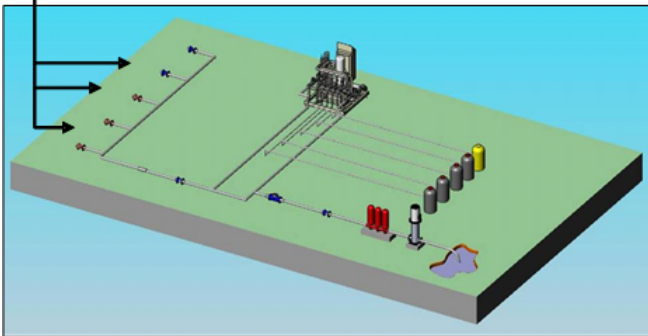
3.3.2 ADJUSTING THE WATER QUANTITY BASED ON WEATHER CONDITIONS

The Green Field ECO enables you to manually increase or decrease the quantity of water on any given day. Depending on the weather conditions, you can change the quantity of water emitted from valves without changing the program.

Example 4: Increasing Irrigation

In this example, water is supplemented by 20% to compensate for an increase in heat. If the regular run time is 10 minutes, the actual run time will be 12 minutes. All other specifications are the same as those found in Example 3.

NOTE   The change to the programs affects both Valves 1 and 2, and Valve 3.

NOTE   Dosing is not affected when using this function, only the quantity of water.

There are two options:

- **Daily**: Program adjustment is for one day only. Regular program resumes the following day.
- **Const**: Program adjustment continues until changed.

```
DATE : 19-Apr-07      TIME :  16:12:32
           IRRIGATION PROGRAM

Program:    4      Priority:   Daily   20%

                   --
Start Time         08:00 10:30
Clock Start        2        2
Min. Time          01:00 00:30
Valve #            001+002 003
Run Time #         1       1   2
Dosing Prog        1       1   2
Day: 01/01         1       2   3
Dose/Water         D       W   -
```

Example 5: Decreasing Irrigation

In this example, irrigation is decreased by 10% to compensate for a decrease in heat. If the regular run time is 10 minutes, the actual run time is nine minutes.

```
DATE : 19-Apr-07      TIME :  16:12:32
           IRRIGATION PROGRAM

Program:    4      Priority:   Daily   -10%

                   --
Start Time         08:00 10:30
Clock Start        2        2
Min. Time          01:00 00:30
Valve #            001+002 003
Run Time #         1       1   2
Dosing Prog        1       1   2
Day: 01/01         1
Dose/Water         D       -
```

3.3.3 CONFIGURING THE IRRIGATION CALENDAR

Green Field ECO enables scheduling irrigation programs by:

- Daily calendar
- Irrigation by dosing or water

When setting up a schedule, configure the following:

- **Day**: X/Y
    - X represents the first day that the cycle begins. For example, if you want to define the first day of the cycle as day 4, define X as 4.
    - Y represents the length of the cycle. If the length is 7 days, define Y as 7. You can schedule up to 14 days.
- **Dose/Water**: For each day, define what the regime type for each day:
    - Dose: Water and dosing
    - Water: Water only
    - None: No irrigation

DATE : 19-Apr-07		TIME : 16:12:32	

IRRIGATION PROGRAM

Program:	Priority:	Daily	20%
4	--		
Start Time	08:00	10:30	
Clock Start	2	2	
Min. Time	01:00	00:30	
Valve #	001+002 003		
Run Time #	1 1	2	
Dosing Prog	1 1	2	
Day: 04/07	1 2 3 4 5 6 7		
Dose/Water	D - D W D - D		

Select the daily calendar

and Irrigation by dosing or water

DATE : 19-Apr-07	TIME : 16:12:32		
IRRIGATION PROGRAM			
Program: 4	**Priority: --**	**Daily**	**20%**
Start Time	08:00 10:30		
Clock Start	2 2		
Min. Time	01:0 Dose 00:30		
Valve #	001 Water 3		
Run Time #	1 None 1		
Dosing Prog	1 1		
Day: 04/07	1 2 3 4 5 6 7		
Dose/Water	D - D W D - D		

In this example, the seven day cycle begins on the fourth day (04/07). On the fourth day, the irrigation is water only (no dosing).

1	2	3	4	5	6	7
D	-	D	W	D	-	D

3.4 Irrigation Based on External Conditions

Irrigation can be controlled by input from dry contact or analog sensor triggers.

- If the Irrigation Program is active, these programs can only function after the Irrigation Program is completed.
- If the Irrigation Program is inactive, these programs can function during the defined time frame.
- In both cases, irrigation begins only when external conditions meet the user-defined requirements.

Irrigation programs can be controlled via dry contact input or analog sensors from peripheral equipment (for example, filling a water tank according to level float switch). When using dry contacts or analog sensors, set the following:

- Time frame that the program can operation
- Which trigger input starts and stops irrigation
- The trigger type:
  - One Shot: Irrigation runs once
  - Multi Shot: Irrigation continues to run until a stop signal is received
  - Only If On: Used when there is one switch only. Irrigation continues as long as switch remains on
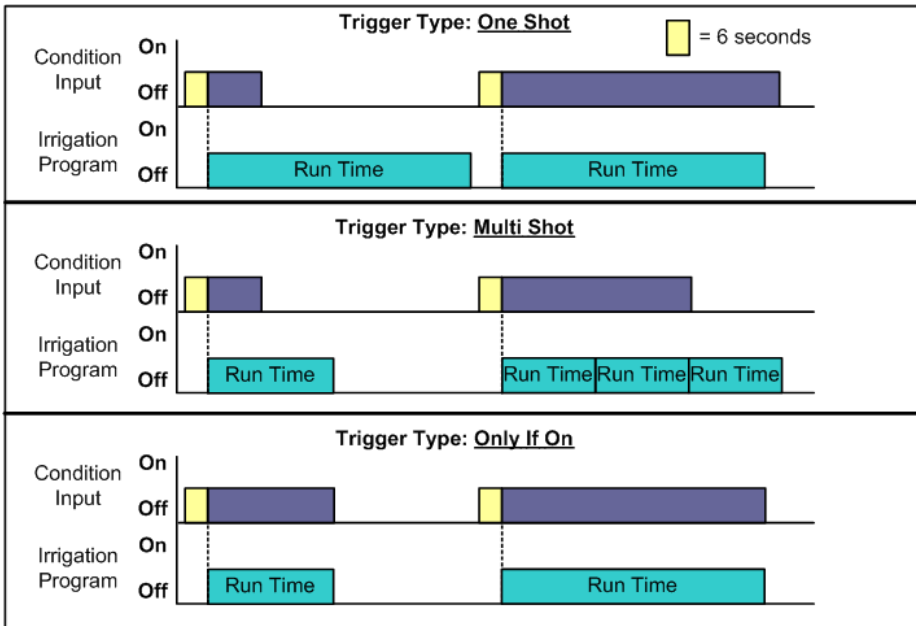
Green Field ECO supports up to 15 extension programs defining which trigger initiates irrigation. In each program, the start and stop trigger must be the same type (meaning both must be dry contact or analog sensor).

To configure an irrigation program triggered by external condition:

 ➡ 1. Irrigation ➡

DATE : 1-May-07		TIME : 10:12:09	
IRRIGATION PROGRAM			
Program: 1	**Priority:**	**--**	**Cond. 1**
Start Time	07:00	08:00	10:00
Clock Start	1	--	16:
Contact	ON	300	Const. 0
Min. Time	--:--	00:30	Daily
Max. Time	--:--	--:--	Cond. --
			Rad Sum :-
			--:- -
Valve #	001		
Run Time #	1		
Dosing Prog	1		
For Next Screen Press The DOWN Arrow			

The following sections detail how to set up the dry contact and analog sensor triggers.

3.4.1 SETTING THE DRY CONTACTS

The following section details how to set dry contact to control irrigation.

 ➡ 4. Ext. Condition ➡ This is the time frame in which the condition (if true) can operate

#	From hh:mm	To hh:mm	Start Dry Cont.
EXTERNAL CONDITION PROGRAM			
1	07:00	18:00	Dry Con 1
2	--:--	--:--	<NONE>
3	--:--	--:--	<NONE>
4	--:--	--:--	<NONE>
5	--:--	--:--	<NONE>
6	--:--	--:--	<NONE>
7	--:--	--:--	<NONE>
8	--:--	--:--	<NONE>
9	--:--	--:--	<NONE>
10	--:--	--:--	<NONE>

Select trigger type

#	Start Dry Cont.	Trigger Type	Stop Dry Cont.
EXTERNAL CONDITION PROGRAM			
1	Dry Con 1	One Shot	One Shot
2	<NONE>	One Shot	Multi Shot
3	<NONE>	One Shot	Only If O
4	<NONE>	One Shot	<NONE>
5	<NONE>	One Shot	<NONE>
6	<NONE>	One Shot	<NONE>
7	<NONE>	One Shot	<NONE>

Select dry contact to start and stop external condition program.

#	Start Dry Cont.	Trigger Type	Stop Dry Cont.
EXTERNAL CONDITION PROGRAM			
1	Dry Con 1	One Shot	Dry Con 2
2	<NONE>	One Shot	<NONE>
3	<NONE>	One Shot	<NONE>
4	<NONE>	One Shot	<NONE>
5	<NONE>	One Shot	<NONE>
6	<NONE>	One Shot	<NONE>
7	<NONE>	One Shot	<NONE>
8	<NONE>	One Shot	<NONE>
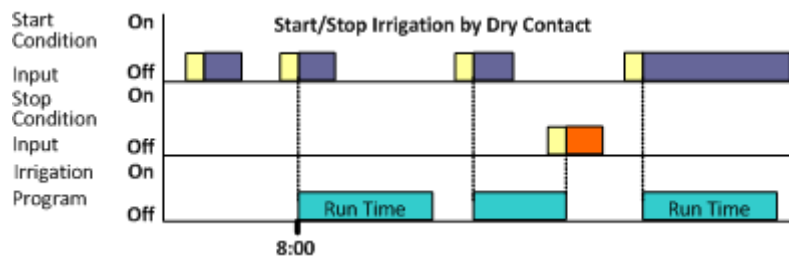
Example of Tank Filling:
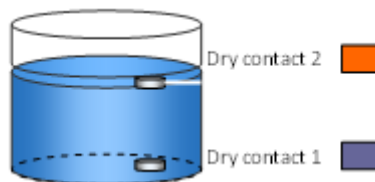
Water Tank with Floats

3.5 Irrigation Based on Radiation Sum

Green Field ECO enables setting an irrigation trigger based on a radiation sum limit (joul/cm² = energy). When using this option, set the following:

- **Start Time**: Start Time is when the unit begins measuring radiation levels to implement the irrigation program.
- **Clock Start**: Number of cycles. 0 (zero) means that this program is disabled. 1 (one) means that this program runs one time after time-based irrigation is completed. 2 (two) means that the program runs twice, and so on.
- **Radiation Sum Limit**: This parameter determines the minimal amount of accumulated radiation required for irrigation to start.
- **Minimum Time**: When irrigation begins, Green Field ECO erases the current radiation sum and restarts the count. Minimum time is the minimal amount of time between irrigation starts, even if the radiation sum has reached its limit.
- **Maximum Time**: This parameter determines the maximum amount of time between irrigation starts, even if the sum limit has not been reached.

DATE : 1-May-07		TIME : 10:12:09	
IRRIGATION PROGRAM			
Program: 1	**Priority:** --		**Rad Sum**
Start Time	07:00	08:00	10:00
Clock Start	1	--	Const. 6:
Rad Sum Li.	100	300	Daily 0
Min. Time	--:--	00:30	Cond.
Max. Time	--:30	--:--	Rad Sum --:--
			--:-- -
			--:-- -
Valve #	001		
Run Time #	1		
Dosing Prog	1		
For Next Screen Press The DOWN Arrow			

DATE : 1-May-07		TIME : 10:12:09	
IRRIGATION PROGRAM			
Program: 1	**Priority:** --		**Rad Sum**
Start Time	07:00	08:00	10:00- 16:00
Clock Start	1	--	- --
Rad Sum Li.	100	300	150 ----
Min. Time	--:--	00:30	00:20 --:--
Max. Time	--:30	01:00	01:00 --:--
Valve #	001		
Run Time #	1		
Dosing Prog	1		
For Next Screen Press The DOWN Arrow			

In the example below, between 8:00 – 10:00, the Radiation Sum Limit is 300; between 10:00 – 16:00 the limit is 150. Since during the afternoon hours there is a greater amount of

sunlight, the user lowered the limit to ensure that they receive sufficient amounts of irrigation.
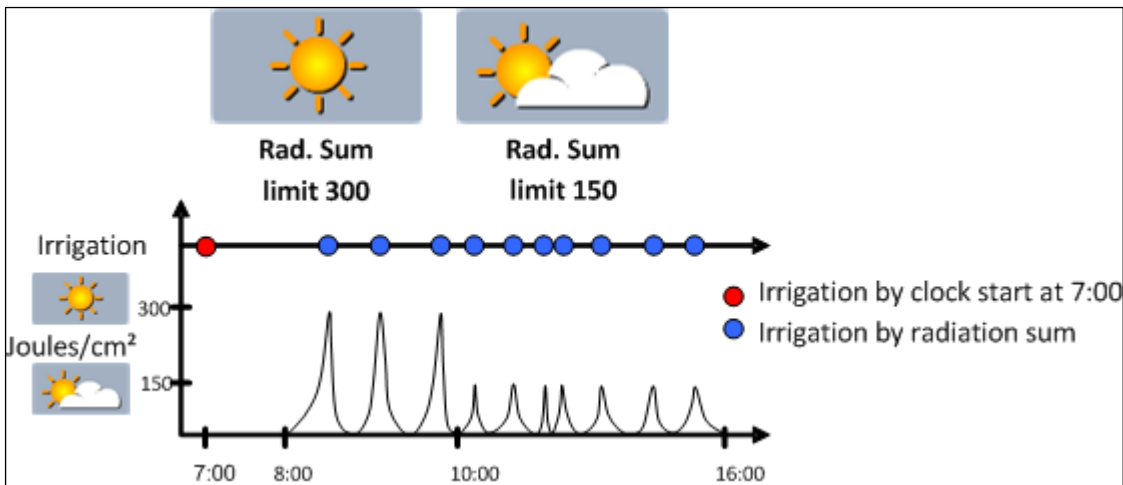
3.6 Irrigation Based on VPD Sum

Green Field ECO enables setting an irrigation trigger based on Vapor Pressure Deficit (kPa•min). The Vapor Pressure Deficit (VPD) is a measurement that incorporates both the relative humidity (RH) and the temperature. When the VPD is high, that means that the RH is low or the temperature is high. Irrigation begins when the VPD reaches the user-defined limit.

DATE : 1-May-07		TIME : 10:12:09	
IRRIGATION PROGRAM			
Program: 1	Priority: --	VPD Sum	
Start Time	07:00 08:00	10:00 16:00	
Clock Start	1 --	-- --	
VPD Sum Li.	---- 30	15 ----	
Min. Time	--:-- 00:30	00:20 --:--	
Max. Time	--:-- 01:00	01:00 --:--	
Valve #		001	
Run Time #	1		
Dosing Prog	1		
For Next Screen Press The DOWN Arrow			

Irrigation based on VPD Sum can take place only during the VPD time frame. Refer to *6.1 SETUP › TIME & DATE* to define the start and end time for VPD Sum. Normally, this parameter is defined during installation.

- **Start Time**: Start Time is when the unit begins measuring and calculating VPD levels to implement the irrigation program.

- **Clock Start**: Number of cycles. 0 (zero) means that this program is disabled. 1 (one) means that this program runs one time after time-based irrigation is completed. 2 (two) means that the program runs twice, and so on.
- **VPD Sum Limit**: This parameter determines the minimal (accumulated) VPD required for irrigation to start.
- **Minimum Time**: When irrigation begins, Green Field ECO erases the current VPD sum and restarts the count. Minimum time is the minimal amount of time between irrigation starts, even if the radiation sum has reached its limit.
- **Maximum Time**: This parameter determines the maximum amount of time between irrigation starts, even if the VPD limit has not been reached.

3.7 Introduction to the Influence Program

Green Field ECO enables adjusting irrigation settings according to the following factors (labeled "Influences" on the screen):

- Solar radiation
- Amount of drainage
- Amount of fertilizer present in the drainage
- VPD
- Temperature

These Influences can adjust the following irrigation settings:

- EC
- Radiation Sum (RadS)
- Minimum Rest Time (MinT)

For example, a grower may want to increase the EC based on the Solar Radiation. Alternatively, he may want to decrease the MinT based on the drainage.

3.8 Using the Influences

- Set an Influence to increase or decrease the setting.
- Changes to the setting are in percentages (for example, a 10% increase in the EC level).
- Several Influences adjust the EC setting. The final adjustment amount is based on the sum total of the different Influences.
- You enter up to three points for each Influence setting. Green Field ECO automatically calculates the curve based on these points.
- You can program up to 15 different programs (corresponding to the 15 irrigation programs)
- After configuring an Influence, you must enable it (under ACTIVE/SOURCE).

- Setting the Influences
- Radiation Influence on Target EC
- Drainage Influence on Target Radiation Sum
- Drain Influence on Minimum Time

- VPD Influence on Target EC
- Temperature Influence on Target EC

3.8.1 SETTING THE INFLUENCES

1. Go to *Install > Device Layout*.

2. Define relays as dosing channels, as required.

3. Go to *Program > Irrigation*.

4. Using the arrow keys, scroll down to Screen 2. The following screen appears.

DATE: 2 –Feb-12		TIME 12:52-08
IRRIGATION PROGRAM		
Program: 1	Priority: --	Const. 0%
INFLUENCE	TABLE	ACTIVE/SOURCE
Radia./EC	◹	NO
Drain/RadS	◹	NO
Drain/MinT	◹	NO
VPD/EC	◹	NO
Temp/EC	◹	NO
	Screen 2 of 2 – In order to view the	

5. Set the required Influences to YES.

The following sections detail each Influence.

NOTE   The following sections include examples. These examples are not meant to be actual numbers used in practice; they simply illustrate the operating principles. Consult with your local extension agent for actual specifications.

3.8.2 RADIATION INFLUENCE ON TARGET EC

This function enables adjusting the EC based on solar radiation. Solar radiation increases the greenhouse temperature. Adjust the EC according to your crops' requirements.

To set the Radiation Influence:

1. In *Installation > Analog Input*, define a sensor as EC.

2. In *Configuration > Dosing Channel Configuration*, set React to **EC**.

3. In *Configuration > Dosing Configuration > EC Control* to Yes.

4. In *Program > Irrigation*, select **Radia./EC**.

5. Define the Radiation set points (w/m2).

6. Define the EC change in percentages.

7. Set ACTIVE/SOURCE to Yes.

8. Press **Menu** and confirm changes.

9. In *Program > Dosing Program,* set:
   a. the Target EC
   b. EC Dosing Method to Qty

Example: As sunlight increases, a crop needs lower EC levels. The following screen illustrates increasing in the EC based on radiation. Since Green Field ECO calculates the decrease in EC proportionally, there will be a 15% decrease when the radiation reaches 600 w/m2.

DATE: 2 –Feb-12			TIME 12:52-08	
IRRIGATION PROGRAM				
Program: 1	Priority: --		Const. 0%	
INFLUENCE	TABLE		ACTIVE/SOURCE	
Radia./EC	▨	Radia.	EC	
Drain/RadS	▨	(w/m2)	(%)	
Drain/MinT	▨	200	0	
VPD/EC	▨	800	-20	
Temp/EC	▨			

`Screen 2 of 2 – In order to view the`
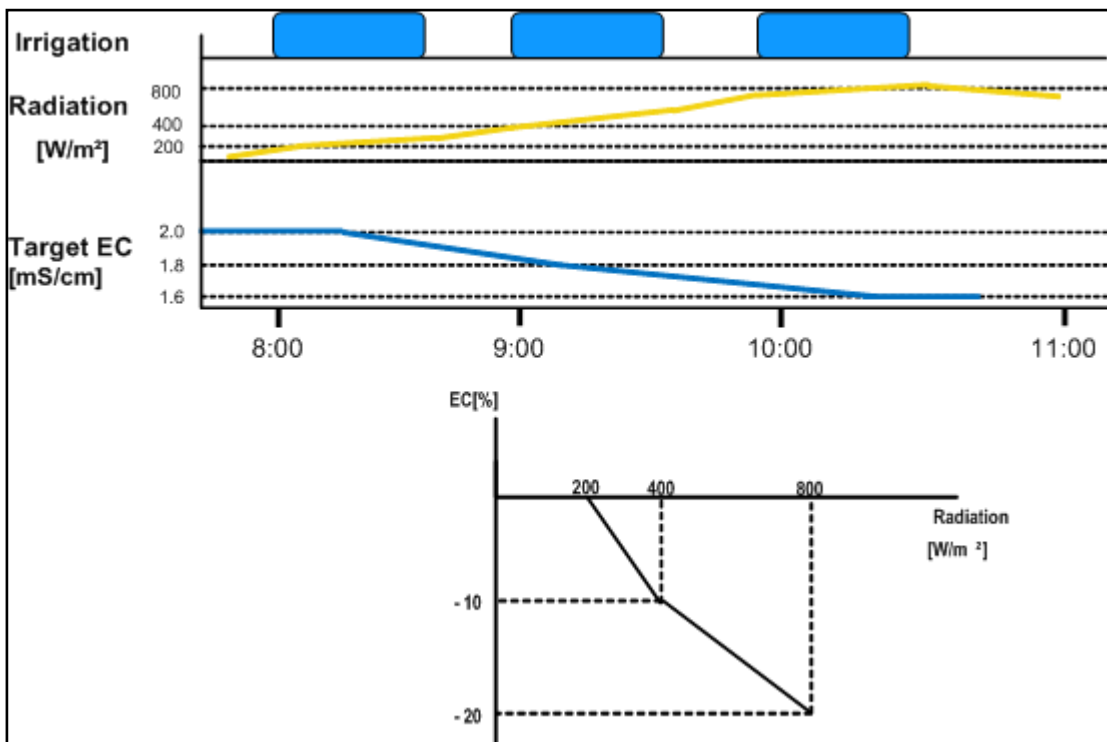
3.8.3 DRAINAGE INFLUENCE ON TARGET RADIATION SUM

Irrigation can be triggered by the Radiation Sum (Rad Sum). This Influence enables adjusting the Rad Sum based on the amount of drainage.

To set the Drainage Influence on Rad Sum:

1. In *Program › Irrigation*, set Contr. to Rad Sum.

2. In *Installation › Digital Input*, define which digital input is the drain meter.

NOTE   The drainage must be defined correctly! You can check the drainage meter status using Hot key 9.

3. In *Configuration › Valve Configuration* define which valve number corresponds to which drainage meter.

4. In *Configuration > Drainage Configuration*, define the drainage meter's Ratio Liter/Pulse.

5. In *Program > Irrigation*, select Drain/RadS.

    a. Define the Drainage percentage set points.

    b. Define the RadS percentage set points.

6. Set ACTIVE/SOURCE to Yes.

7. Press **Menu** and confirm changes.

Example: A user set irrigation to be triggered by the radiation sum. As can be seen, the increases are not proportional.

3.8.4 DRAIN INFLUENCE ON MINIMUM TIME

Minimum time defines the minimum break between irrigations. Even if the Rad/VPD sum limit / condition limit has been reached irrigation does not take place until this time has passed. This function enables adjusting the Minimum Time based on the drainage.

To set the Drainage Influence on the Minimum Time:

1. In *Installation > Digital Input*, define which digital input is the drain meter.

NOTE   The drainage must be defined correctly! You can check the drainage meter status using Hot key 9.

2. In *Configuration > Valve Configuration* define which valve number corresponds to which drainage meter.

3. In *Configuration > Drainage Configuration*, define the drainage meter's Ratio Liter/Pulse.

4. In *Program > Irrigation*, select Drain/MinT.

      a. Define the Drainage percentage set points.

      b. Define the MinT percentage set points.

5. Set ACTIVE/SOURCE to Yes.

6. Press **Menu** and confirm changes.

Example: When drainage is low, a user wants to decrease the Minimum Time. He sets 20% drainage to a MinT of –25%. As drainage increases, the time between irrigation increases. In this scenario, if the MinT is set to 60 minutes, 40% drainage adjusts the time to 75 minutes.

DATE: 2 –Feb-12		TIME 12:52-08
IRRIGATION PROGRAM		
Program: 1	**Priority: --**	**Const. 0%**
INFLUENCE	**TABLE**	**ACTIVE/SOURCE**

Radia./EC	◩	**DRAIN%**	**MinT**
Drain/RadS	◩	(%)	(%)
Drain/MinT	◩	20	-25
VPD/EC	◩		
Temp/EC	◩		
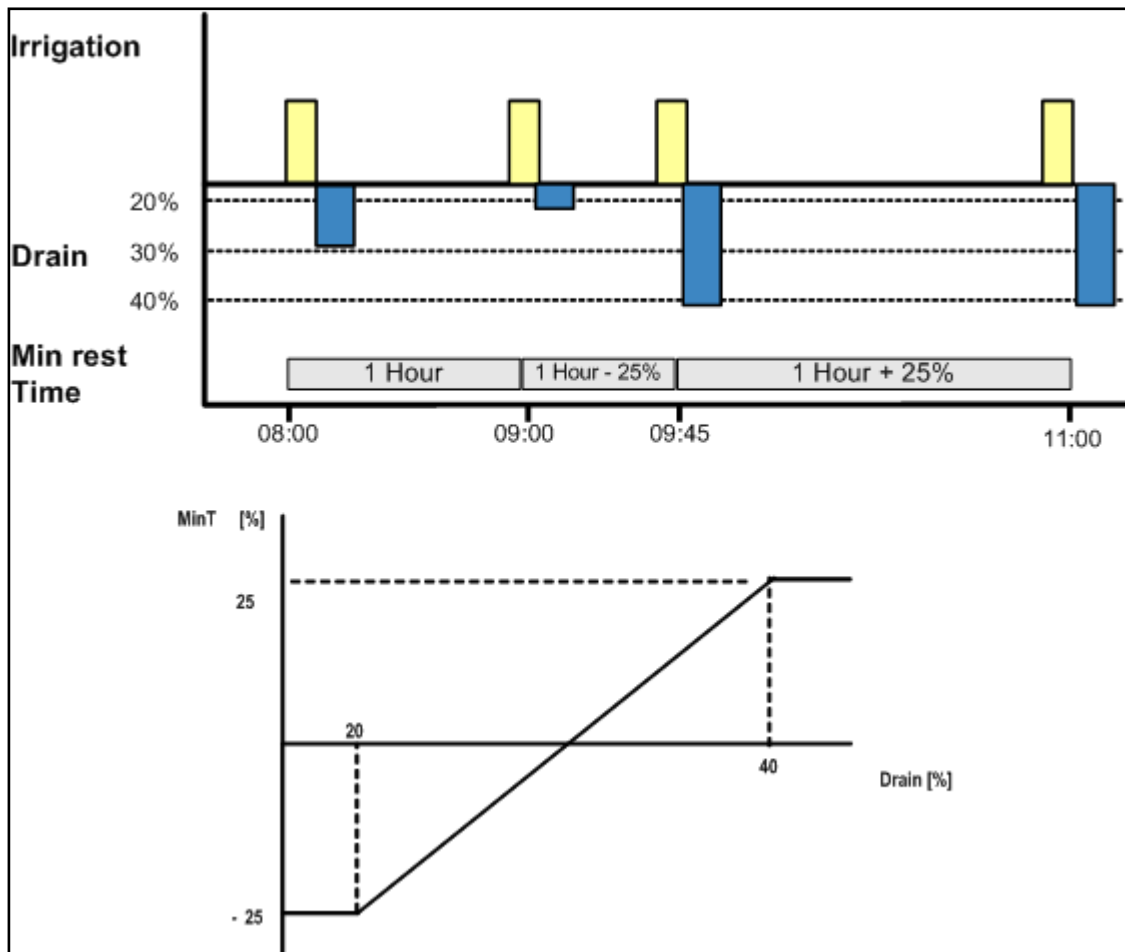
3.8.5 VPD INFLUENCE ON TARGET EC

You can adjust the EC based on the VPD Sum (air temperature and humidity). As the VPD rises or falls, the program can increase or decrease the EC level according to your requirements.

1. In *Installation > Analog Input* define:

   a. a sensor as EC.

   b. an air temperature sensor.

   c. a humidity sensor.

NOTE   You can verify the EC status using Hot Key Screen, the temperature and humidity sensors status using Hot Key Screen 6.

2. In *Setup > VPD Sensor Setup*, enable VPD Temperature and VPD Humidity sensors.

3. In *Configuration > Dosing Channel Configuration* set React to EC.

4. In *Configuration > Dosing Configuration > EC Control*, set EC Control to Yes.

5. In *Program > Irrigation*, select VPD/EC.

   a. Define the VPD sum points.

   b. Define the EC percentage set points.

6. Set ACTIVE/SOURCE to Yes.

7. In *Program > Dosing Program*:

       a. Set the Target EC.

       b. Set EC Dosing Method to Qty.

Example: A grower wants to lower the EC as the kPa decreases. He sets this screen to reduce the increase in EC to match the decreasing VPD levels.

```
DATE: 2 –Feb-12                    TIME 12:52-08
              IRRIGATION PROGRAM
Program:  1 │ Priority:  -- │ Const.        0%
INFLUENCE     │ TABLE       │ ACTIVE/SOURCE

Radia./EC     │ ▨ │ VPD      EC
Drain/RadS    │ ▨ │ (kPa)    (%)
Drain/MinT    │ ▨ │  15       7
VPD/EC        │ ▨ │   5       2
Temp/EC       │ ▨ │

        Screen 2 of 2 – In order to view the
```

3.8.6 TEMPERATURE INFLUENCE ON TARGET EC

You can adjust the EC based on the air temperature. As the temperature rises or falls, the program can increase or decrease the EC level according to your requirements.

    1. In *Installation > Analog Input* define:

       a. a sensor as EC

       b. an air temperature sensor

NOTE You can verify the EC status using Hot Key Screen 4, the temperature sensor status using Hot Key Screen 6.

    2. In *Configuration > Dosing Channel Configuration* set React to EC.

    3. In *Configuration > Dosing Configuration > EC Control*, set EC Control to Yes.

    4. In *Program > Irrigation, select Temp/EC*.

       a. Define the Temperature sum points.

       b. Define the EC percentage set points.

    5. Set ACTIVE/SOURCE, select the temperature sensor number.

```
DATE: 2 –Feb-12                    TIME 12:52-08
              IRRIGATION PROGRAM
Program:  1 │ Priority:  -- │ NO           0%
INFLUENCE     │ TABLE       │ OUT temp
              │             │ Temp 1
Radia./EC     │ ▨ │          Temp 2
Drain/RadS    │ ▨ │          Temp 3
Drain/MinT    │ ▨ │          Temp 4
VPD/EC        │ ▨ │          NO
Temp/EC       │ ▨ │          NO

        Screen 2 of 2 – In order to view the
```

    6. In *Program > Dosing Program*:

       a. set the Target EC.

       b. set EC Dosing Method to Qty.
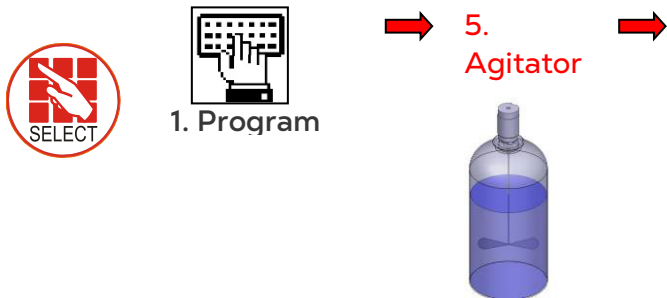
Example: A grower's flower crop requires higher EC levels when the temperature goes above room temperature 22° C). Using this screen, he can adjust the levels accordingly.

DATE: 2 –Feb-12		TIME 12:52-08
IRRIGATION PROGRAM		
Program: 1	**Priority: --**	**Const. 0%**
INFLUENCE	**PRIORITY**	**ACTIVE/SOURCE**
Radia./EC	◪ **Temp** **EC**	
Drain/RadS	◪ **(°C/F)) (%)**	
Drain/MinT	◪ **25 2**	
VPD/EC	◪ **30 7**	
Temp/EC	◪	**TEMP1**

Screen 2 of 2 – In order to view the

3.9   Agitator

Use this screen to operate fertilizer tanks equipped with mixing devices.

5. Agitator

1. Program

AGITATOR		
	On **mm:ss**	**Off** **mm:ss**
Dosing Active **Dosing Not Active**	--:-- --:--	--:-- --:--
Operation Mode	**Parallel**	

⇨ Define On/Off time during dosing and when system is idle

AGITATOR		
	On **mm:ss**	**Off** **mm:ss**
Dosing Active **Dosing Not Active**	01:00 05:00	05:00 60:00
Operation Mode	**Parallel**	

Parallel
Serial

- Select **Parallel** to operate more than one agitator simultaneously
- Select Serial if not enough power to operate more than one agitator at a time

AGITATOR		
	On **mm:ss**	**Off** **mm:ss**
Dosing Active **Dosing Not Active**	01:00 05:00	05:00 60:00
Operation Mode	**Serial**	

3.10 Selector

Use this screen to operate more than one fertilizer tank (containing different fertilizers) attached to a single dosing channel. The program enables taking fertilizer from different tanks (according to the dosing program).

Dosing Prog.	S1	S2
1	✓	▪
2	▪	✓
3	▪	▪
4	▪	▪
5	▪	▪
6	▪	▪
7	▪	▪
8	▪	▪
9	▪	▪

SELECTOR
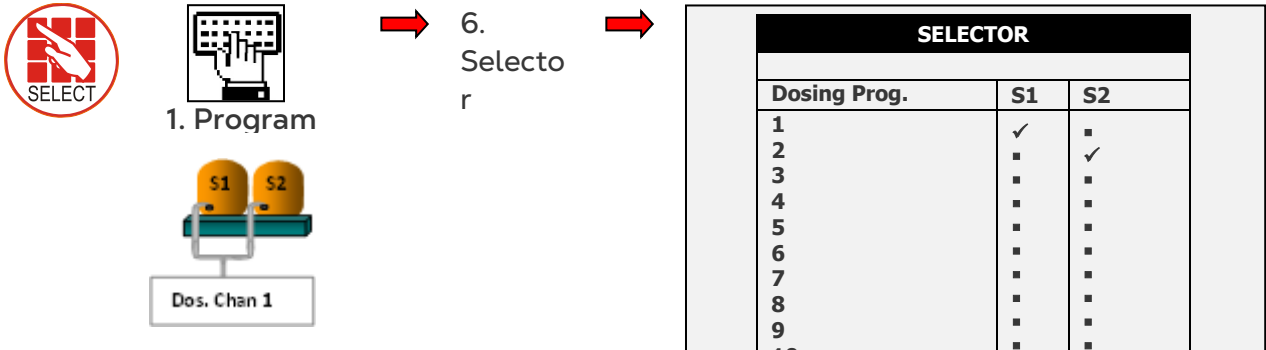
3.11 Filter Flushing

Use this screen to program filter flushing during irrigation.

FILTER FLUSHING PROGRAM

Time Between Flushing (hh:mm)	02:00
Flushing Time (mm:ss)	00:10
Delay Between Filters (mm:ss)	00:05
Delta Pressure (Digital)	YES
Delay Delta Pressure (mm:ss)	00:06
Delta Pressure Reiteration	3
Dwell Time Main (mm:ss)	00:10
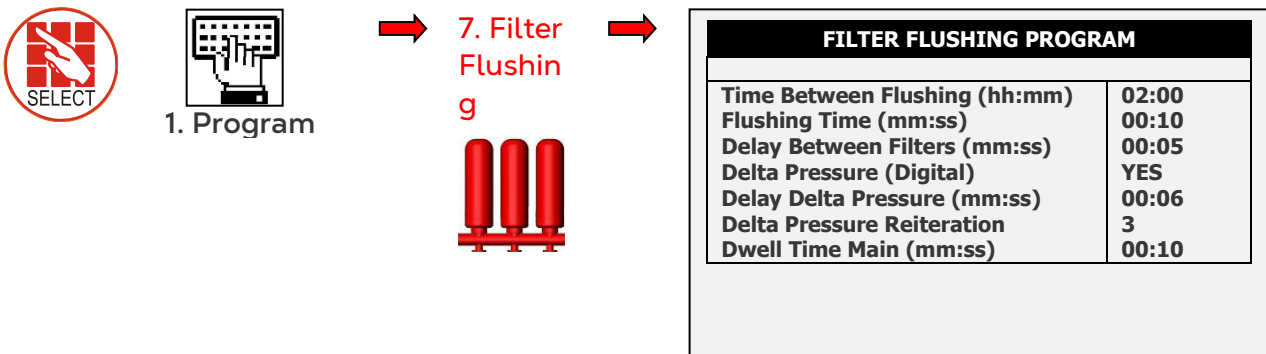
NOTE   Filter flush process can start only after main water line is full. The default time is one minute; see Menu 3.3.

ALARM DEFINITION

Water Fill Up (min)	1
Water Leak (m3)	1.000
Water Leak Period (hh:mm)	00:30
Dosing Channel Leak Delay(s)	3
Dosing Channel Leak (Pulse)	10
Dosing Flow Difference (%)	25
Missing Pulses For No Flow	10
Stop System Cons. Flow Alarms	--
# of Irrig. Without Drainage	3

NOTE   See graph on next page for further information on these fields.

Item	Description
Time Between Flushing	Flush occurs after the accumulated irrigation time (between all valves). Break time between irrigation are not included. Only one filter is cleaned at a time.
Flush Time	Flush time per filter.
Delay Between Filters	Set delay between the flushing of each filter (to build up pressure).
Delta Pressure Value (digital)	If there is a differential, (DP signal), a flush is needed.
Delta Pressure Delay	Set delay to verify if there is a definite blockage.
Delta Pressure Reiteration	Set to give signal after XX flushes. If Delta Pressure still indicates a blockage, an alarm will be raised.
Dwell Time Main	Open main filter valve before flush to balance pressure for a reliable flushing process.

Start Time

1 hr Irrigation · Delay · 1 hr Irrigation

8:00 · 9:00 · 10:00 · 11:00 · 3:00

Trigger

After two hours of water flowing through filters, flush every filter for 10 seconds.

Trigger

Flush Process

Flush Time/Delay Between Filters

Flush 1 · Flush 2 · Flush 3

5 sec. Delay · 10 sec. · 5 sec. Delay · 10 sec.

10 seconds of flushing with five second delay between flushes/filters.

Dwell Time Main

10 sec. Dwell Time · Flush 1...

Delta Pressure Reiteration

DP Signal · DP Signal · DP Signal · **Alarm/Stop Flushing**

Flush 1 · Flush 2 · Flush 3

After three flushes, if Delta Pressure shows a blockage, system will raise an alarm.

3.12 Cooling

This screen sets a cooling program for cooling/humidification process in greenhouses. This program operates according to temperature, humidity or time (to reduce temperature, increase humidity.)

1. Program

➡ 8. Cooling ➡ Set On/Off time and select sensors

Temp. Sens. 1
Hum. Sens. 1

+1 of each sensor: uses average of both

COOLING/HUMIDIFICATION PROGRAM			
Program: 1		Status: Cooling	
	Below RH	On	Off
1	80	00:00:10	00:00:10
2	---	--:--:--	--:--:--
Cool#	1 2 - - - - - - - -		
Temp. Sens.: 1 --		Hum. Sens.: 1 --	

OR

COOLING/HUMIDIFICATION PROGRAM			
Program: 1		Status: Cooling	
	Below RH	On	Off
1	80	00:00:10	00:00:10
2	---	--:--:--	--:--:--
Cool#	1 2 - - - - - - - -		
Temp. Sens.: 1 2		Hum. Sens.: 1	

Dynamic cooling: 2 temp. threshold, same Hum

COOLING/HUMIDIFICATION PROGRAM			
Program: 1		Status: Cooling	
	From	To	Above t°
1	80	16:00	25.0
2	80	16:00	35.0
Cool#	1 2 - - - - - - - -		
Temp. Sens.: 1 2--		Hum. Sens.: 1	

➡

COOLING/HUMIDIFICATION PROGRAM			
Program: 1		Status: Cooling	
	To	Above t°	Below RH
1	16:00	25.0	80
2	16:00	35.0	80
Cool#	1 2 - - - - - - - -		
Temp. Sens.: 1 2--		Hum. Sens.: 1	

On time is set.
Off time can be controlled according to temp.
High temp.= less off time
Low temp.= more off time

COOLING/HUMIDIFICATION PROGRAM			
Program: 1		Status: Cooling	
	Below RH	On	Off
1	80	00:00:10	00:00:10
2	80	00:00:10	00:00:10
Cool#	1 2 - - - - - - - -		
Temp. Sens.: 1 2--		Hum. Sens.: 1	
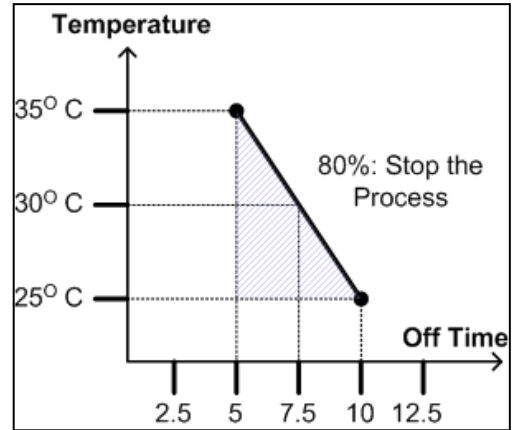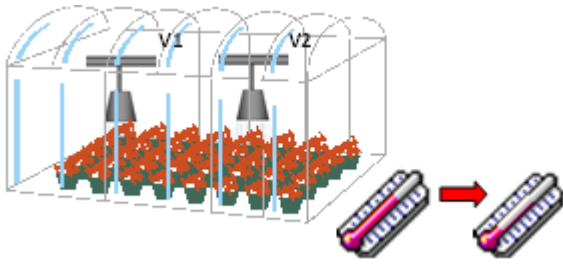
3.13 Misting

Use this screen to control misting in the greenhouse using a timer.

1. Program

⇨ Define Start/End time

⇨ Define Misting On/Off time

9. Misting

#	No.	Start hh:mm	End hh:mm	On hh:mm:ss	Off hh:mm:ss
1	1	08:00	16:00	00:00:10	00:00:05
2	--	--:--	--:--	--:--:--	--:--:--
3	--	--:--	--:--	--:--:--	--:--:--
4	--	--:--	--:--	--:--:--	--:--:--
5	--	--:--	--:--	--:--:--	--:--:--
6	--	--:--	--:--	--:--:--	--:--:--
7	--	--:--	--:--	--:--:--	--:--:--
8	--	--:--	--:--	--:--:--	--:--:--
9	--	--:--	--:--	--:--:--	--:--:--
10	--	--:--	--:--	--:--:--	--:--:--

MISTING PROGRAM

3.14 Water Heating

Use this screen to heat water in cold areas/seasons.

1. Program

⇨ Define Start/End time

⇨ Define Water Temp. ± Difference (dead band) to stop

⇨ Define sensors

10. Water Heating

WATER HEATING

From Time	08:00
To Time	16:00
Water Temperature	20.0
Difference	2.0
Temp. Sensor #1	1
Temp. Sensor #2	2
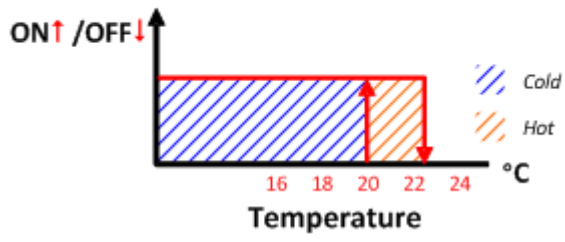
4 Manual Menu

This menu enables manual control over various functions.

- Irrigation Pause, page 43
- Start/Stop Program, page 43
- Start/Stop Valve, page 44
- Filter Flush, page 45

4.1 Irrigation Pause

Use this function to manually pause the system during an irrigation program; for example if you need to calibrate the EC/pH or fix the pipes.

IRRIGATION PAUSE

| Pause Irrigation? | NO |
| | YES |

1. Irrigation pause

2. Manual

IRRIGATION PAUSE

| Pause Irrigation? | YES |

Menu

To resume, reverse steps above and select NO

ACTIVE IRRIGATION

	SET	ACTUAL	LEFT
CYCLE	0	0	0
WATER	00:15:00	00:01:00	00:14:01
FLOW	100.000	0.000	
EC	1.5	4.5	
Ph	5.5	3.3	

STATUS	ACTIVE
PROGRAM: PAUSE	■
15:38:16	IRRIGATION
VALVE: 1 25-Apr-07	□ DOSING
	□ FILTER

4.2 Start/Stop Program

2. Manual

2. Start/Stop Program

Select Program

START/STOP PROGRAM

| Program: | 1 |

Yes

To resume, reverse steps above and select NO

NOTE   Start one cycle only
from Program 1.

```
DATE :  1-May-07        TIME :  10:12:09
           IRRIGATION PROGRAM

Program:  1 | Priority:      - | Rad Sum
                       -
Start Time    07:00    08:00    10:00    13:00
Clock Start   1        --       --       --
Rad Sum Li.   ----     300      150      300
Min. Time     --:--    00:30    00:20    00:30
Max. Time     --:--    01:00    01:00    01:00
Valve #       001
Run Time #    1
Dosing Prog   1
For Next Screen Press The DOWN Arrow
```

4.3 Start/Stop Valve

Use this screen to manually start/stop a valve.

SELECT

2. Manual

➡ 3. Start/Stop Valve ➡ Select Valve and corresponding Run Time/Dosing program

```
START/STOP VALVE

Valve            2
Run Time #       1
Dosing Program   1
```

➡ Menu ➡ Yes   To resume, reverse steps above and select NO

```
START/STOP VALVE

Valve            2
Run Time #       1
Dosing Program   1
```

```
              WATER RUN TIME PROGRAM
  #   Method   Water      Before     After
  1   TIME     00:10:00   00:00:00   00:00:00
  2   QTY.     0.000      0.000      0.000
  3   QTY.     0.000      0.000      0.000
  4   QTY.     0.000      0.000      0.000
  5   QTY.     0.000      0.000      0.000
  6   QTY.     0.000      0.000      0.000
  7   QTY.     0.000      0.000      0.000
  8   QTY.     0.000      0.000      0.000
  9   QTY.     0.000      0.000      0.000
 10   QTY.     0.000      0.000      0.000
 11   QTY.     0.000      0.000      0.000
```

Run Time Program (1)

```
              DOSING PROGRAM
Program:     1

        INJECTION PER DOSING CHANNEL
  1          2          3        4        5
  EC         EC         EC       EC       ACID
  5.00       5.00       5.00     5.00     3.00
Target EC                 1.60
Target PH                 5.50
EC Dosing Method          P.QTY
PH Dosing Method          P.QTY
```

Dosing Program (1)

4.4 Filter Flush

Use this screen to activate manual filter flush. Us this function only when the system is irrigating.

2. Manual → 4. Filter Flush → Select filters (usually all)

```
┌─────────────────────────────────────┐
│        MANUAL FILTER FLUSHING        │
├─────────────────────────────────────┤
│ Which Filter  <None>      <None>     │
│               All Filters            │
│               Filter 01              │
│               Filter 02              │
└─────────────────────────────────────┘
```

```
┌─────────────────────────────────────┐
│        MANUAL FILTER FLUSHING        │
├─────────────────────────────────────┤
│ Which Filter to Flush?   All Filters │
│                                      │
└─────────────────────────────────────┘
```

Yes → Menu   Hot Screen 5 to view flushing status

```
┌─────────────────────────────────────┐
│        FILTER FLUSHING STATUS        │
├─────────────────────────────────────┤
│ Item                │                │
│ Flush Status        │ ON             │
│ Time To Nest Flush  │ --:--:--       │
│ Delta Pressure (Digital) │ OFF       │
│ Flushing Filter No. │ 1              │
│ Remaining Filters Qty. │ 1           │
│ Flush Time          │ 00:07          │
│ Main Filter Delay   │ 00:00:00       │
└─────────────────────────────────────┘
```

NOTE "All Filters" means all filters; however one only one filter is flushed at a time.

NOTE Filter flush process can start only after main water line is full. Default time is one minute as shown in picture below (see Menu 3.3).

```
┌─────────────────────────────────────┐
│           ALARM DEFINITION           │
├─────────────────────────────────────┤
│ Water Fill Up (min)          │ 1     │
│ Water Leak (m3)              │ 1.000 │
│ Water Leak Period (hh:mm)   │ 00:30 │
│ Identify Leak-Subtr. Meter? │ NO    │
│            ▶                 │ 3     │
│ Dosing Channel Leak Delay(s) │ 10   │
│ Dosing Channel Leak (Pulse) │ 25    │
│ Dosing Flow Difference (%)  │ 10    │
│ Missing Pulses For No Flow  │ --    │
│ Stop System Cons.Flow Alarms │ 3    │
│ # of Irrig. Without Drainage │      │
└─────────────────────────────────────┘
```

5 Alarm Menu

The Alarm Menu is used to control the Green Field ECO alarm functions.

- Alarm Reset, page 46
- History, page 47
- Alarm Definition, page 47
- Alarm Setting, page 49
- EC/pH Alarm Definition, page 49
- EC/pH Alarm Setting, page 50

5.1 Alarm Reset

Use this function to reset the alarms in case of high flow, low flow, water leak, fertilizer leak, and so forth. Alarms can be reset manually or manually.

1. Alarm Reset

Option A: Reset manually

3. Alarm

ALARM RESET		
Reset Now? ▶		No
Period Of Automatic Reset▶		24 h
Complete Irrig. On Reset? ▶		YES

ACTIVE ALARMS			
No.	Message	Date	Time
1	High Flow Valve #1	25/Apr	15:49

ALARM RESET		
Reset Now? ▶		No
Period Of Automatic Reset ▶	NO	24 h
Complete Irrig. On Reset? ▶	YES	YES

ACTIVE ALARMS			
No.	Message	Date	Time
1	High Flow Valve #1	25/Apr	15:49

Yes

Option B: Automatic reset to check itself every so often as desired:
⇨ Select how often system should reset itself

ALARM RESET		
Reset Now? ▶		No
Period Of Automatic Reset ▶	24 h	24 h
Complete Irrig. On Reset? ▶	12 h	YES
	6 h	
ACTIVE ALARMS	4 h	
No.	Message	3 h	Time
		2 h	
		1 h	
		None	

➡️ "Complete Irrig. On Reset?" Select Yes or No

```
┌──────────────────────────────────────────┐
│              ALARM RESET                  │
├──────────────────────────────────────────┤
│ Reset Now?  ▶                      No     │
│ Period Of Automatic Reset ▶  ┌──┐  24 h   │
│ Complete Irrig. On Reset? ▶  │NO│  YES    │
│                              │YES│        │
│                              └──┘         │
├──────────────────────────────────────────┤
│              ACTIVE ALARMS                │
├──────────────────────────────────────────┤
│ No.         Message      Date    Time     │
│                                           │
│                                           │
└──────────────────────────────────────────┘
```

5.2 History

This is a read-only screen that displays the alarm history.

3. Alarm ➡️ 2. History ➡️

```
┌────────────────────────────────────────────────┐
│                 ALARM HISTORY                   │
├────────────────────────────────────────────────┤
│ No.    Message              Date      Time      │
│ 112    EC Low Valve # 1     25/Apr    13:43     │
│ 113    EC Low Valve # 1     25/Apr    13:44     │
│ 114    High Flow Valve # 4  25/Apr    14:26     │
│ 115    Emergency pH Low     25/Apr    14:44     │
│ 116    Emergency EC High    25/Apr    15:46     │
│ 117    High Flow Valve # 1  25/Apr    15:49     │
│ 118    High Flow Valve # 1  25/Apr    15:52     │
│ 119    High Flow Valve # 4  25/Apr    15:53     │
│ 120    High Flow Valve # 1  25/Apr    15:54     │
│ 121    High Flow Valve # 1  25/Apr    15:55     │
└────────────────────────────────────────────────┘
```

NOTE   The system logs up to 250 alarms.

5.3 Alarm Definition

Use this function to define the system alarm thresholds.

NOTE   EC/pH thresholds are defined in EC/pH Alarm Definition, page 49.

3. Alarm ➡️ 3. Alarm Definition ➡️ Define trigger: deviation from target pressure, flow…

```
┌──────────────────────────────────────────┐
│             ALARM DEFINITION              │
├──────────────────────────────────────────┤
│ Water Fill Up (min)              1        │
│ Water Leak (m3)                  1.000    │
│ Water Leak Period (hh:mm)        00:30    │
│ Identify Leak-Subtr. Meter?      NO       │
│                    ▶             3        │
│ Dosing Channel Leak Delay(s)     10       │
│ Dosing Channel Leak (Pulse)      25       │
│ Dosing Flow Difference (%)       10       │
│ Missing Pulses For No Flow       --       │
│ Stop System Cons. Flow Alarms    3        │
│ # of Irrig. Without Drainage              │
└──────────────────────────────────────────┘
```

➡️

```
┌──────────────────────────────────────────┐
│             ALARM DEFINITION              │
├──────────────────────────────────────────┤
│ Dosing Channel Leak Delay(s)     3        │
│ Dosing Channel Leak (Pulse)      10       │
│ Dosing Flow Difference (%)       25       │
│ Missing Pulses For No Flow       10       │
│ Stop System Cons. Flow Alarms    3        │
│ # of Irrig. Without Drainage     3        │
└──────────────────────────────────────────┘
```

Item	Description
Water Fill Up (min)	Time of filling the main irrigation line. In that time, the system will ignore high flow alarm and won't implement a filter flushing process.
Water Leak (m3 or Gal)	Quantity of water leaking while the system is in idle.
Water Leak Period (hh:mm)	Time frame to measure the water leak quantity Example: 1m^3 leaks in less than 30 minutes
Identify Leak-Subtr. Meter?	This setting is relevant only when working in "Water source" method. User can ignore or identify a water leak.
Dosing Channel Leak Delay (s)	Delay between switching off a dosing channel and generating dosing leak alarm.
Dosing Channel Leak (Pulse)	Number of pulses (by dosing meter) during the delay above to generate an alarm. Example: 10 pulses in 3 seconds generate an alarm.
Dosing Flow Difference (%)	Difference between calculated and measured dosing channel flow. Example: Dosing Channel 1 defined by technician as 100 liter/hour, but if the system measured less than 75 liter/hour or more than 125 liter/hour, an alarm will be generated.

```
        ALARM DEFINITION                           ALARM DEFINITION

Water Fill Up (min)          1            Dosing Channel Leak Delay(s)      3
Water Leak (m3)              1.000        Dosing Channel Leak (Pulse)       10
Water Leak Period (hh:mm)    00:30        Dosing Flow Difference (%)        25
Identify Leak-Subtr. Meter?  ▶ NO        Missing Pulses For No Flow        10
Dosing Channel Leak Delay(s) 3           Stop System Cons. Flow Alarms     3
Dosing Channel Leak (Pulse)  10          # of Irrig. Without Drainage      3
Dosing Flow Difference (%)   25
Missing Pulses For No Flow   10
Stop System Cons. Flow Alarms --
# of Irrig. Without Drainage  3
```

Table continued...

Item	Description
Missing Pulses For No Flow	Number of missing pulses before the system will generate a No Flow alarm. The system calculates the expected time between pulses of water meter and if a certain time elapsed without receiving the desired number of pulses, then generate an alarm.
Stop System Consecutive Flow Alarms	Number of consecutive flow alarms of the same type (high flow, low flow etc.) but different valves before the system is stopped. Example: High flow at valve 1 ->High flow at valve 2->High flow at valve 3 = 3 consecutive High flow, then system stops.

Item	Description
# of Irrigations Without Drainage	Number of irrigations given without measuring drainage, above which an alarm will be generated. Common reasons: Irrigation quantity is too small so there is not enough drain, or drain measurement malfunction because of technical problem.

5.4 Alarm Setting

Use this function to define what actions are taken in the event of an alarm.

NOTE   EC/pH settings are defined in EC/pH Alarm Setting, page 50.

SELECT → 3. Alarm → 4. Alarm Setting

ALARM SETTING				
Description	Irr.	Dose	Delay mm:ss	Alarm Active
High Flow	CONT.	STOP	01:00	NO
Low Flow	STOP	STOP	01:00	YES
No Flow	STOP	STOP	----	YES
D. Ch. Leak	STOP	STOP	30:00	YES
D. Ch. Fault	STOP	STOP	01:00	YES
Ext. Pause	PAUSE	IRRIG.	00:30	YES
D. Boos.Prot.	CONT.	STOP	01:00	YES

- Define alarm action: automatically stop or continue.
- Delay before generating alarm.
- Alarm output activation: YES/NO (siren, light).

5.5 EC/pH Alarm Definition

Use this function to define the EC/pH alarm thresholds.

SELECT → 3. Alarm → 5. EC/pH Alarm Definition

EC/pH ALARM DEFINITION	
Delta EC Low	0.5
Delta EC High	0.5
Delta pH Low	0.5
Delta pH High	0.5
Emergency EC High (1 Min.Dly)	5.0
Emergency pH Low (1 Min.Dly)	2.0

- Delta Low: Maximum differences below EC, pH and EC Pre-Control targets.
- Delta High: Maximum difference above EC, pH and EC Pre-Control targets.
- Emergency: Critical values of High EC and Low pH that stop the system after 1min.

5.6 EC/pH Alarm Setting

Use this function to set the EC/pH alarm and action definitions in the event of an EC/pH alarm.

SELECT

3. Alarm

➡ 6. EC/pH Alarm Setting

- ⇨ Define EC/pH alarm action: automatically stop or continue.
- ⇨ Delay before generating alarm.
- ⇨Alarm output activation: YES/NO (siren, light).

EC/pH ALARM SETTING				
Description	Irr.	Dose	Delay mm:ss	Alarm Active
EC High/Fail	STOP	STOP	01:00	YES
EC Low	STOP	STOP	01:00	YES
pH High	STOP	STOP	01:00	YES
pH Low/Fail	STOP	STOP	01:00	YES

6 History Menu

The History Menu consists of read-only screens detailing the system's history data (measurements, settings, processes, events, graphs and so forth). The History Menu provides extensive information regarding measurements and processes performed by the Green Field ECO.

- Irrigation Log
- RAD. & VPD Sum & Drain Log
- Uncompleted Irrigation
- Uncompleted Programs
- Daily Irrigation
- Irrigation Accumulation
- Water & Aux Meter Accumulation
- Accumulation Reset
- Filters
- Cooling
- Sensor Log
- Event Log
- System Log

 SELECT
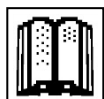
 4. History

➡ 11. Sensor Log ➡

Date	Time	Avg. Hum.	-EC-	-pH-
25/Apr	16:00	----	3.0	4.1
25/Apr	15:00	----	1.4	4.8
25/Apr	14:00	----	1.1	5.4
22/Apr	16:00	----	1.0	5.1
22/Apr	16:00	----	1.0	5.1
22/Apr	15:00	----	1.0	5.1
22/Apr	15:00	----	1.0	5.1
22/Apr	14:00	----	1.0	5.1
22/Apr	14:00	----	1.0	5.1
22/Apr	13:00	----	1.0	5.1

SENSORS LOG

➡ Select sensors using +/- key (no more than 3 per graph)

SENSORS LOG

Date	Time	Avg. Hum.	-EC-	-pH-
25/Ap	16:00		3.0	4.1
25/A			.4	4.8
25/A			.1	5.4
22/A			.0	5.1
22/A			.0	5.1
22/Apr	15:00	----	1.0	5.1
22/Apr	15:00	----	1.0	5.1

? Help   Graph

GRAPH SELECT

Option	Yes/No
Avg.	.
Temp	.
Avg.	√
Hum.	√
-EC-	
-pH-	

Menu

NOTE   Press the Mode/Zone Key to view the graphs.

-EC   -   -pH-

5.0
4.0
3.0
2.0
1.0

16:00   16:00   14:00   12:00   09:00
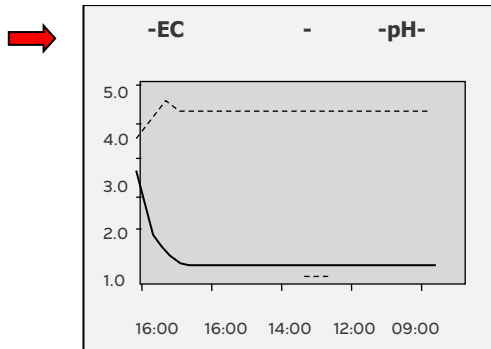
NOTE   Use ⇧⇩ arrow keys to zoom in/out.
Use ⇦⇨ arrow keys to scroll.

4. History

HISTROY

. IRRIGATION LOG
7. RAD. / VPD SUM & DRAIN LOG
8. UNCOMPLETED IRRIGATION
9. UNCOMPLETED PROGRAMS
10. DAILY IRRIGATION
11. IRRIGATION ACCUMULATION
12. WATER & AUX METER
ACCUMULATION
13. ACCUMULATION RESET
14. FILTERS
15. COOLING
16. SENSORS LOG
17. EVENT LOG
18. SYSTEM LOG

6.1   Irrigation Log

- The Irrigation Log table includes up to 200 rows of the last irrigations' data. Each row includes information regarding a specific irrigation.
  To view additional information, use the left/right arrow keys.
  To switch between dosing quantities or time simply press the '+/-' key.

```
DATE :  24-Dec-06        TIME :  17:17:20
                IRRIGATION LOG

Date     Time    V1     Reason     Water
23/Dec   17:21   255
23/Dec   17:32   254
23/Dec   17:42   217
23/Dec   17:52   115
23/Dec   18:02   219
24/Dec   14:50   255
24/Dec   15;00   254
24/Dec   15:10   217
24/Dec   15:20   115
24/Dec   15:30   219
```

NOTE   Water quantity is measured in m³ or gallons; duration is measured by time; flow is measured in m³/h or gallon/m; dosing quantity is measured in liters or gallons.

| Item	Description
Date	Date in which the irrigation started.
Time	Time in which the irrigation started.
Valve	Leading valve; the first valve set for the group of valves
Reason	Specification of the irrigation triggers; time, condition, Rad Sum, etc.
Water	Irrigation quantity (m³ or gallon) or irrigation time.
Duration	Irrigation duration (hh:mm:ss).
Flow	Average flow throughout the irrigation cycle.

6.2 RAD. & VPD Sum & Drain Log

```
DATE :  21-Dec-06      TIME :  14:51:18
            RAD. SUM & DRAIN LOG

Date     Time    V1    Reason     Water
20/Dec   17:26   254   Rad Sum    1.400
20/Dec   17:26   217   Rad Sum    1.400
20/Dec   17:27   115   Rad Sum    1.400
20/Dec   17:27   219   Rad Sum    1.400
20/Dec   17:27   255   Rad Sum    1.400
20/Dec   17:28   254   Rad Sum    0.800
20/Dec   17:28   217   Rad Sum    0.800
20/Dec   17:28   115   Rad Sum    0.800
20/Dec   17:29   219   Rad Sum    0.800
20/Dec   17:29   255   Rad Sum    0.800
```

```
DATE :  21-Dec-06      TIME :  14:51:33
                IRRIGATION LOG

Date     Time    V1    Drain %    Drain
20/Dec   17:26   254   100.00     1450
20/Dec   17:26   217   92.86      1300
20/Dec   17:27   115   78.57      1100
20/Dec   17:27   219   100.00     1400
20/Dec   17:27   255   -----      0
20/Dec   17:28   254   62.50      500
20/Dec   17;28   217   100.00     800
20/Dec   17:28   115   18.75      150
20/Dec   17:29   219   -----      0
20/Dec   17:29   255   100.00     850
```

```
DATE :  21-Dec-06        TIME :  14:51:45
                 IRRIGATION LOG

  Date      Time     V1    Rad Sum   Interval
  20/Dec    17:26    254   19            ----
  20/Dec    17:26    217   19            ----
  20/Dec    17:27    115   19               1
  20/Dec    17:27    219   19               1
  20/Dec    17:27    255   19               2
  20/Dec    17:28    254   19            ----
  20/Dec    17;28    217   19            ----
  20/Dec    17:28    115   19            ----
  20/Dec    17:29    219   19               1
  20/Dec    17:29    255   15               1
```

Item	Description
Time	Time irrigation started.
Valve	Leading valve.
Reason	Specification of the irrigation triggers; time, condition, Rad Sum, etc.
Water	Irrigation quantity (m³ or gallon) or irrigation time.
Drain %	Percentage of drain for relevant irrigation cycle.
Drain	Drain quantity related to relevant irrigation.
Rad /VPD	Accumulated radiation /VPD sum level when irrigation started.
Interval	Time (in minutes) since last irrigation cycle. Refers to the last irrigation of a specific valve.

6.3 Uncompleted Irrigation

The Uncompleted Irrigation table provides information of irrigations that were started but could not be completed due to a failure. To understand why irrigation was not completed, it is advisable to cross-reference between this table and the Alarm Definition in section 4.3. The Uncompleted Irrigation table consists of up to 200 lines. Note that if the letter 'C' appears, it refers to a program that was triggered by condition program.

```
                 UNCOMPLETED IRRIGATION

  No.   Date        Time     Prog      V1.No.   Run    Dose
                    hh:mm    No.                No.    Prog
  1     20-Dec-06   09:05    1         51+      1      1
  2     20-Dec-06   09:25    2         1        1      --
```

Each line includes information regarding when the irrigation was stopped and added to the uncompleted irrigations table.

Item	Description
Date	Date in which the current line was added to the uncompleted irrigation table.
Time	Time in which the current line was added to the uncompleted irrigation table
Prog. No.	92- The program that was added to the table was started manually. 93- The relevant irrigation was added to the uncompleted irrigations table for the second time (or more) consecutively.
Vl. No.	Indicates the associated valve. If a group of valves that is configured to irrigate together is stopped, only the first valve is written but a '+' sign is added next to it to indicate that more valves are associated.
	The Green Field ECO will attempt to complete the irrigations from the current day (until end day time) upon manual or automatic alarm reset. The valve column of irrigations that are to be completed will be highlighted. The valve column of irrigations that are currently being completed will blink.
Run No	Indicates the associated run time program.
Dose Prog.	Indicates the associated dosing program.
Prog. Qty.	Planned quantity according to the run time program.
Left Qty.	Uncompleted quantity.

In order to manually stop an uncompleted irrigation you must go to the START/STOP VALVE in section 3.3 because the activation is according to single valves.

6.4 Uncompleted Programs

The Uncompleted Programs table provides information on programs that could not be completed. It is important to understand the difference between this table and the Uncompleted Irrigations table; this table consists only of irrigation cycles that haven't been started and could not be completed during the current day. This can happen due to wrong system setup (more tasks than could be completed), or because the system was not active

for a long period of time, for example due to a power failure, and could not complete its tasks.

No.	Date	Time hh:mm	Prog No.	Start Time	Prog Cyc.	Left Cyc.
UNCOMPLETED PROGRAMS						
4	9/Aug	20:00	10	19:00	1	1
5	9/Aug	21:00	10	20:00	1	1
6	10/Aug	04:00	1	13:00	2	2
7	10/Aug	05:00	1	04:00	2	2
8	10/Aug	06:00	10	21:00	1	1
9	10/Aug	07:00	1	05:00	2	2
10	10/Aug	09:00	1	07:00	2	2
11	10/Aug	11:00	1	09:00	2	2
12	10/Aug	13:00	1	11:00	2	2
13	10/Aug	14:00	10	06:00	1	1

The uncompleted program table consists of 200 lines.

6.5 Daily Irrigation

This table enable viewing **the** history of irrigation quantities.

DAILY IRRIGATION

How Many Days Ago?	▶	1 Day Ago

Example: 1 day ago means you would like to view yesterday's history, and Today means you would like to view the accumulated history since the last End Day.

 To open the selection list

 Relevant day using arrow keys → ENTER   Current date viewed at top of screen.

DATE : 20-Dec-06
DAILY IRRIGATION

Valve	Water	Drain%	Dra. Q.
213	0.000	100	0.000
214	0.000	100	0.000
215	70.800	11	8.350
216	1.400	0	0.000
217	15.900	34	5.500
218	7.200	45	3.300
219	13.600	20	2.850
220	0.000	100	0.000
221	0.000	100	0.000

DATE : 20-Dec-06
DAILY IRRIGATION

Valve	Chan. 1	Chan. 2	Chan. 3
213	0.00	0.00	0.00
214	0.00	0.00	0.00
215	211.36	211.37	211.37
216	3.93	3.94	3.94
217	30.87	30.82	30.83
218	19.06	19.97	18.12
219	25.25	26.01	24.49
220	0.00	0.00	0.00
221	0.00	0.00	0.00

Press +/- to Toggle Quantity/Time

Daily Irrigation table contains all water (m3 or gallon) and dosing (liter or gallon). To toggle the view between quantities and time, press the '+/-' key.

6.6 Irrigation Accumulation

The Irrigation Accumulation table allows you to accumulate water and dosing quantities for the required periods. The accumulation of each valve can be reset separately in the ACCUMULATION RESET table.

DATE : 21-Dec-06		
IRRIGATION ACCUMULATION		
Valve	**Date**	**Water**
214	20-Dec-06	0.000
215	20-Dec-06	70.800
216	20-Dec-06	1.400
217	20-Dec-06	19.100
218	20-Dec-06	7.200
219	20-Dec-06	16.800
220	20-Dec-06	0.000
221	20-Dec-06	0.000
222	20-Dec-06	0.000

Press +/- to Toggle Quantity/Time

To toggle the view between quantities and time, press the '+/–' key

Water quantity is measured in cubic meter or gallons; dosing quantity is measured in liters or gallons

6.7 Water & Aux Meter Accumulation

The Auxiliary Meter Accumulation table allows you to accumulate quantities from meters that do not have designated software, for example, in order to measure the drain water quantity or to measure the cooling system's consumption.

| **WATER & AUX METER ACCUM.**		
Meter	**Quantity**	**Date**
1	4.600	20-Dec-06
2	3.500	20-Dec-06
3	2.200	20-Dec-06
4	2.500	20-Dec-06
5	3.450	20-Dec-06
6	3.600	20-Dec-06

NOTE   Water meters are accumulators only and are not a part of the irrigation control.

To reset an auxiliary meter refer to the ACCUMULATION {XE "Reset Total Quantity" } table below.

The quantities displayed are in liters (gallons) up to 9999.999.

6.8 Accumulation Reset

ACCUMULATION RESET	
Reset Valve Quantity For?	\<None\>
Reset Water Meter For?	\<None\>
Reset Aux. Meter For?	\<None\>

PRESS → ENTER to reset accumulation of a specific valve or all valves.

SELECT → Desired option using arrow keys

➡ ENTER

NOTE   When resetting a valve (or all valves), its history is erased from the Daily Irrigation and Irrigation Accumulation tables:

PRESS → ENTER to reset an individual auxiliary meter or all auxiliary meters

SELECT → Desired option using arrow keys

➡ ENTER

NOTE   When resetting an Aux meter (or all Aux meters), its history will be erased from the Aux Meter Accumulation table.

6.9 Filters

The filters history table provides daily information of the number and cause of flushing.

FILTERS			
Date	Delta P.	Time	Manual
10/Aug	0	44	0
9/Aug	0	0	0
8/Aug	0	0	0

6.10 Cooling

Viewing the history of cooling activities or time per valve is allowed.

COOLING		
How Many Days Ago? ▶		**1 Day Ago**

ENTER to open selection list

Relevant day using arrow keys

ENTER

COOLING			
Prog. No.	**From hh:mm**	**To hh:mm**	**Cycles**
1	13:10	18:14	60
2	13:13	18:14	9
3	--:--	--:--	-----
4	--:--	--:--	-----
5	--:--	--:--	-----
6	--:--	--:--	-----
7	--:--	--:--	-----
8	--:--	--:--	-----

For example, 1 day ago means you would like to view yesterday's history, and Today means you would like to view the accumulated history since the last End Day.

6.11 Sensor Log

The Sensors Log table includes history of average measurements of logged sensors. In order to define which sensor to log, the user should access menu 6.8 – Sensor Logging, and mark by +/- button the required sensor.

To define the measurement interval, go to menu 6.2 and choose the required History resolution.

SENSORS LOG				
Date	**Time**	**Avg. Hum.**	**EC**	**--pH--**
10/Aug	16:28	22.7	22.7	----
10/Aug	16:27	22.7	22.7	----
10/Aug	16:26	22.7	22.7	----
10/Aug	16:26	22.7	22.7	----
10/Aug	16:25	22.7	22.7	----
10/Aug	16:24	22.7	22.7	----
10/Aug	16:23	22.7	22.7	----
10/Aug	16:22	22.7	22.7	----
10/Aug	16:21	22.7	22.7	----
10/Aug	16:20	22.7	22.7	----

The Sensors Log table contains up to 10,000 data fields. Date and time are two fields per line and every sensor is an additional field. For example: logging of two sensors uses four data fields; two for time and date and one for each sensor. In this case, the table will consist of a maximum of 2,500 lines.

6.12 Event Log

The table provides information of all the processes performed by the Green Field ECO including their time and date.

No.	Event	Date	Time
	EVENT LOG		
1	Water Leak # 4	20/Dec	09:01
2	Program # 1 Manual On	20/Dec	09:03
3	Valve #51 Manual Off	20/Dec	09:04
4	Program # 1 Man. Off	20/Dec	09:04
5	Program # 1 Manual On	20/Dec	09:04
6	Valve #51 Low Flow	20/Dec	09:04
7	Program # 1 Man. Off	20/Dec	09:05
8	Program # 2 Rad. On	20/Dec	09:21
9	Valve # 1 High Flow	20/Dec	09:23
10	Program # 2 Rad. Off	20/Dec	09:25

6.13 System Log

This table provides information of all the system changes.

No.	Event	Date	Time
	SYSTEM LOG		
1	PC Irri. Prog #10 Ch.	20/Dec	09:01
2	Reset Alarm	20/Dec	09:03
3	PC Table #1.3 Change	20/Dec	09:04
4	PC Irri. Prog #1 Ch.	20/Dec	09:04
5	PC Irri. Prog #1 Ch.	20/Dec	09:04
6	Irrig. Prog #1 Ch.	20/Dec	09:04
7	Irrig. Prog #2 Ch.	20/Dec	09:05
8	Table #7.7 Change	20/Dec	09:21
9	Table #1.3 Change	20/Dec	09:23
10	Table #1.7 Change	20/Dec	09:25

The table consists of the last 999 events

Examples of system changes are changes triggered by the controller, the PC communication, a power off, etc.

7 Warranty

Warranty and technical assistance

Munters products are designed and built to provide reliable and satisfactory performance but cannot be guaranteed free of faults; although they are reliable products they can develop unforeseenable defects and the user must take this into account and arrange adequate emergency or alarm systems if failure to operate could cause damage to the articles for which the Munters plant was required: if this is not done, the user is fully responsible for the damage which they could suffer.

Munters extends this limited warranty to the first purchaser and guarantees its products to be free from defects originating in manufacture or materials for one year from the date of delivery, provided that suitable transport, storage, installation and maintenance terms are complied with. The warranty does not apply if the products have been repaired without express authorisation from Munters, or repaired in such a way that, in Munters' judgement, their performance and reliability have been impaired, or incorrectly installed, or subjected to improper use. The user accepts total responsibility for incorrect use of the products.

The warranty on products from outside suppliers fitted to Green Field ECO, (for example antennas, power supplies, cables, etc.) is limited to the conditions stated by the supplier: all claims must be made in writing within eight days of the discovery of the defect and within 12 months of the delivery of the defective product. Munters has thirty days from the date of receipt in which to take action, and has the right to examine the product at the customer's premises or at its own plant (carriage cost to be borne by the customer).

Munters at its sole discretion has the option of replacing or repairing, free of charge, products which it considers defective, and will arrange for their despatch back to the customer carriage paid. In the case of faulty parts of small commercial value which are widely available (such as bolts, etc.) for urgent despatch, where the cost of carriage would exceed the value of the parts, Munters may authorise the customer exclusively to purchase the replacement parts locally; Munters will reimburse the value of the product at its cost price.

Munters will not be liable for costs incurred in demounting the defective part, or the time required to travel to site and the associated travel costs. No agent, employee or dealer is authorised to give any further guarantees or to accept any other liability on Munters' behalf in connection with other Munters products, except in writing with the signature of one of the Company's Managers.

WARNING: In the interests of improving the quality of its products and services, Munters reserves the right at any time and without prior notice to alter the specifications in this manual.

The liability of the manufacturer Munters ceases in the event of:

- dismantling the safety devices;
- use of unauthorised materials;

- inadequate maintenance;
- use of non-original spare parts and accessories.

Barring specific contractual terms, the following are directly at the user's expense:

- preparing installation sites;
- providing an electricity supply (including the protective equipotential bonding (PE) conductor, in accordance with CEI EN 60204-1, paragraph 8.2), for correctly connecting the equipment to the mains electricity supply;
- providing ancillary services appropriate to the requirements of the plant on the basis of the information supplied with regard to installation;
- tools and consumables required for fitting and installation;
- lubricants necessary for commissioning and maintenance.

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.

Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

The use of non-original spare parts or incorrect assembly exonerates the manufacturer from all liability.

Requests for technical assistance and spare parts can be made directly to the nearest Munters office.