CROP MANAGEMENT TECHNOLOGIES

USER GUIDE

NMC-PRO IRRIGATION

NETAFIM™
GROW MORE WITH LESS

P/N: 110046

TABLE OF CONTENTS

1 GENERAL

1.1 Keyboard

Numeric: To enter values, quantities. Act as shortcuts to selections.

+/- Key: Toggles between positive and negative values and marks check boxes option selection. In a History screen, use to toggle between quantities and time format.

Arrows: Scroll up, down, left, and right to select menus.

MENU: To main menu, also acts as "ESC" and "Back" keys.

ENTER: Enter menu, submenu, value, open window, confirm a value or change.

ZONE LOG IN: Access Mode

DELETE: Erases typing mistake.

1.2 Hot Screens

Press **MENU** from Main Menu to see Read-Only overview running processes. Press MENU again to return to 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

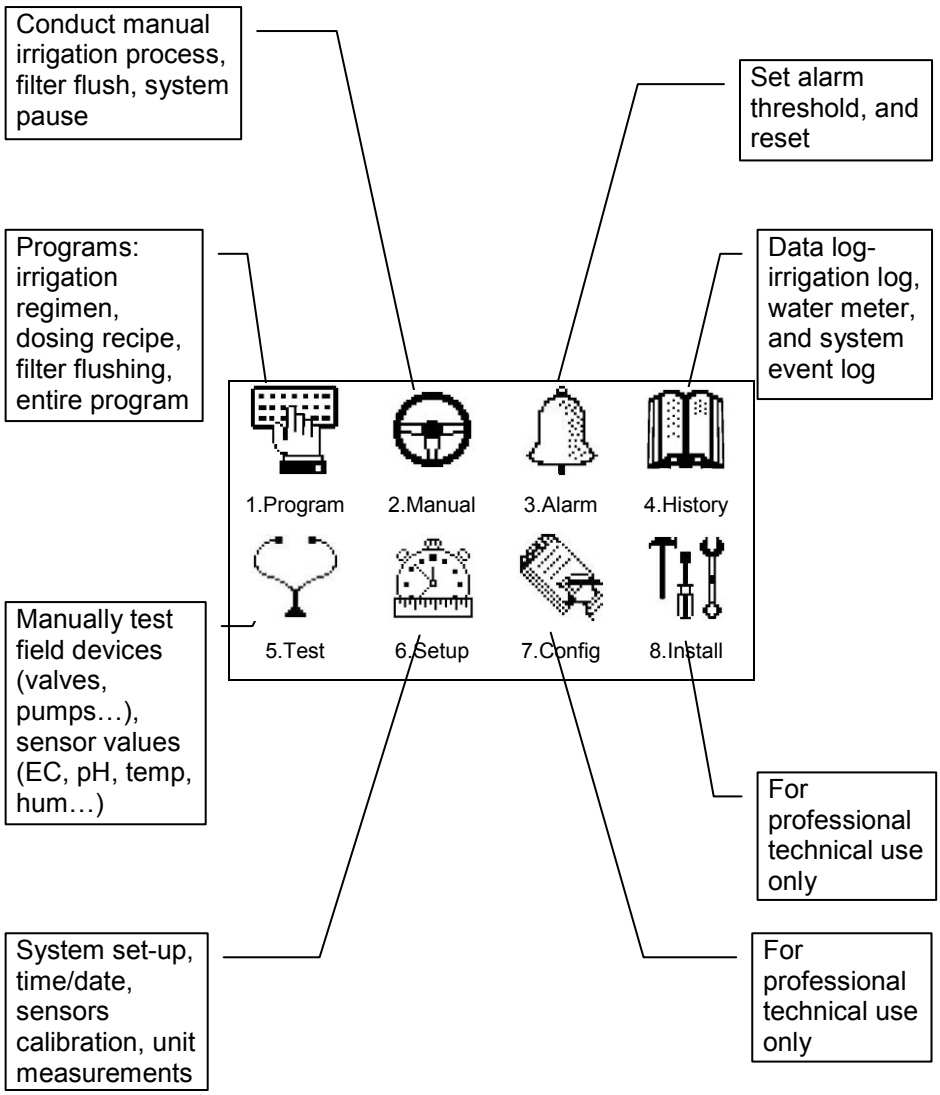
6: Temperature & Humidity measurement

7: Weather Station measurement

8: System Pressure

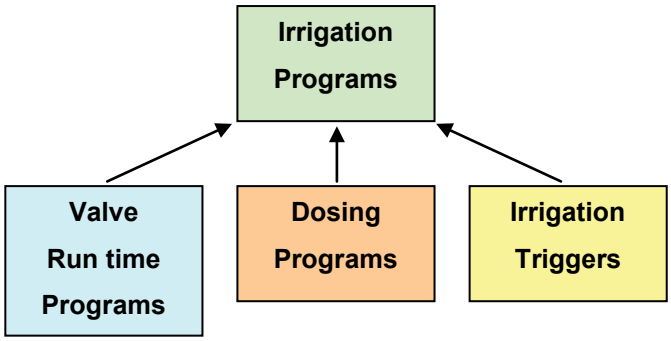
9: Drain Status

1.3 Main Menu Icons



1.4 Introduction

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.



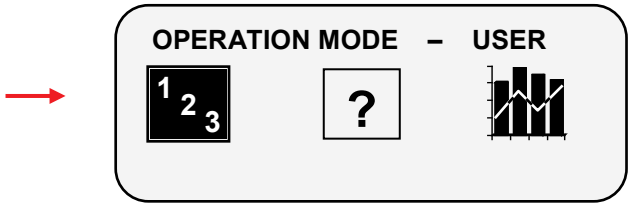
- **Run Time Programs**
  - Based on Time or Quantity
  - Set water *before* and *after* dosing process (fertilizer injection)
- **Dosing Programs (fertilization)**
  - Up to 8 dosing channels per program
  - Dosing method per channel (Time, Quantity, EC/pH)
- **Irrigation Timing based on External Conditions**
  - Start/ Stop up to 15 dry contacts
  - Start/End time for irrigation frametime
  - Trigger type

1.5 Operation Mode

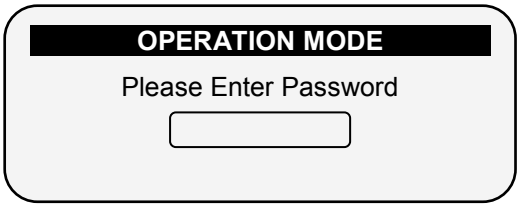
There are three levels of operation:

- **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)

To change the operation mode, press the **LOG IN** key



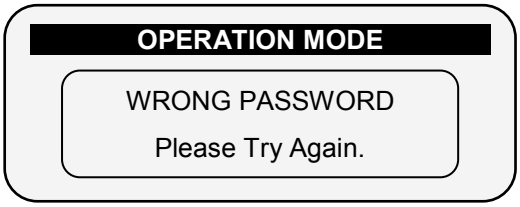
Enter the **MODE** icon and insert the password



The controller recognizes the operation mode according to the password that is entered:

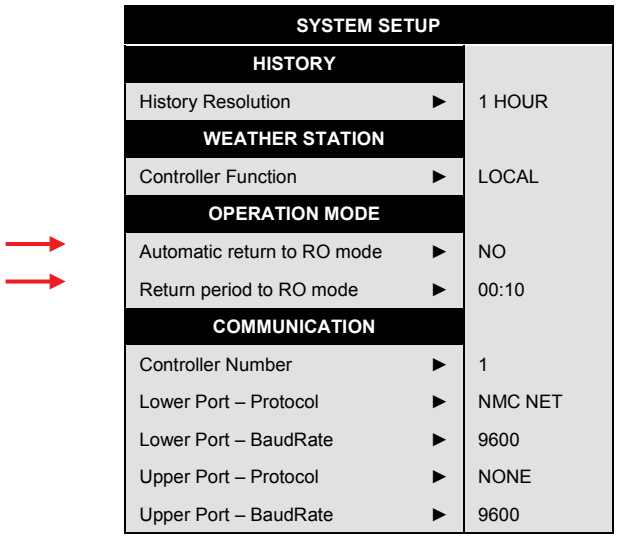
MODE	PASSWORD
Read Only	0000
User	9785 or 0101

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 ►	NMC 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 (refer to Operation Mode, page 7).
- If there is a power failure, the controller powers up with the last used mode.

2 PROGRAM

2.1 Run Time Program

For every irrigation program, define a Run Time recipe.

1. Program

➡ 2. Water Run Time

2.1.1 Based on Time/Qty

➡ Qty. ➡

WATER RUN TIME PROGRAM

#	Method	Water	Before	After
1	QTY.	10.000	0.000	0.000
2	QTY.	QTY. TIME	0.000	0.000
3	QTY.		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

➡ Define Time ➡

WATER RUN TIME PROGRAM

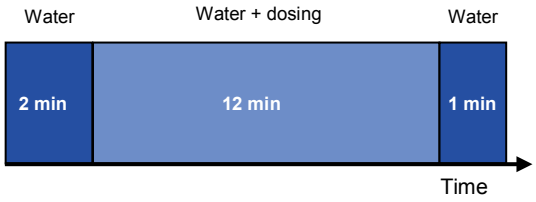
#	Method	Water	Before	After
1	TIME	00:15:00	00:00:00	00:00:00
2	QTY.	25.000	0.000	0.000
3	QTY.	0.000	0.000	0.000
4	QTY.	0.000	0.000	0.000
5	QTY.	0.000	0.000	0.000
6	QTY.	0.000	0.000	0.000
7	QTY.	0.000	0.000	0.000
8	QTY.	0.000	0.000	0.000

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

2.1.2 Water Before and After Dosing process

WATER RUN TIME PROGRAM

#	Method	Water	Before	After
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



△ **NOTE**: Define total Time/Qty. Before and after deducted from total Time/Qty.

2.2 Dosing Program

For every irrigation program, define a Dosing recipe.

1. Program

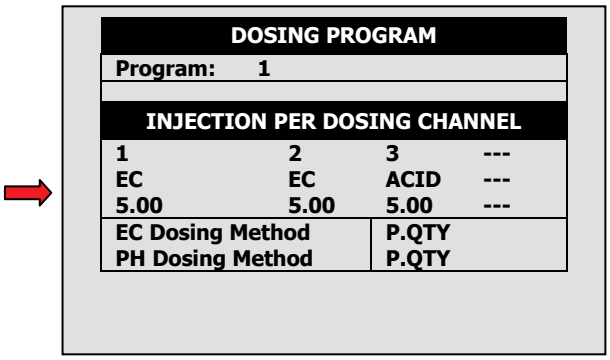
3. Dosing

2.2.1 Dosing Channel Definition (Channel mode pre-configured by technician)

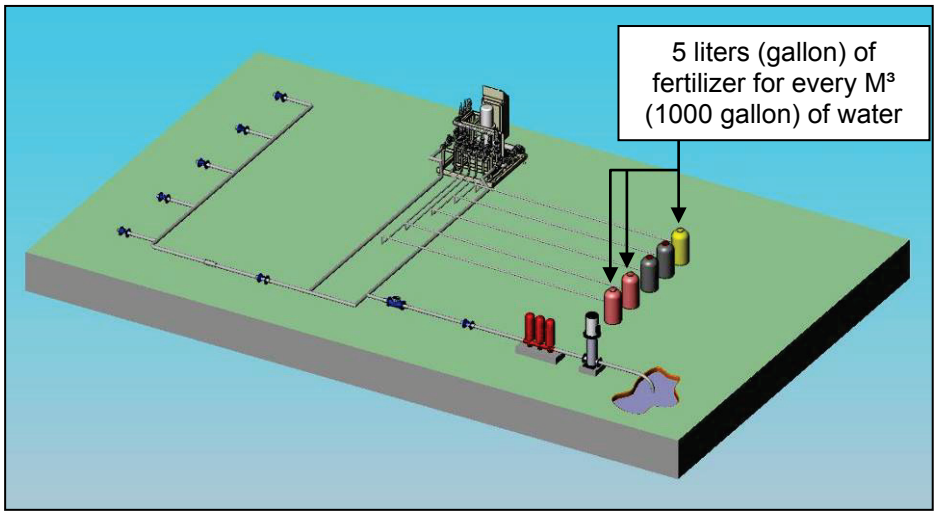
Channel

Define dosing method for specific channels (USA: Qty. = gallon)

2.2.2 Proportional Qty. (1/1000, Litre/m³, gallon/1000gallons)

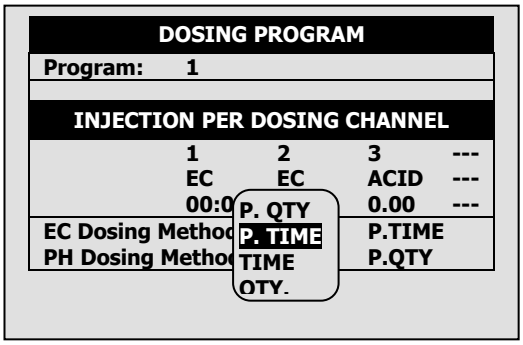


DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
5.00	5.00	5.00	---
EC Dosing Method		P.QTY	
PH Dosing Method		P.QTY	

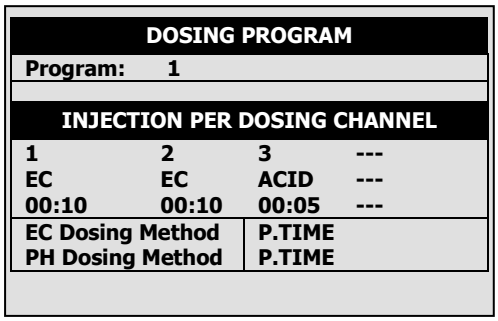


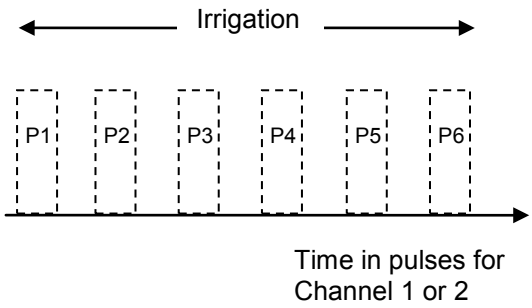
2.2.3 Proportional Time

P. Time



Define minimum dose for each channel



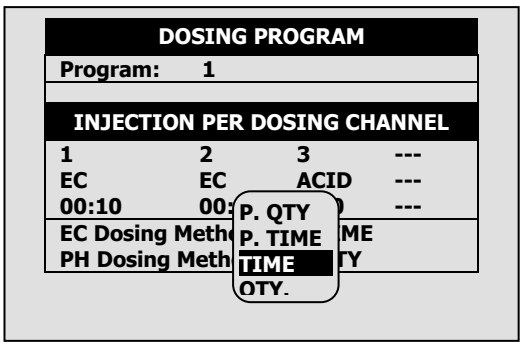


Ex: Ch 1= P1+P2+P3…+Pn= 10 min.

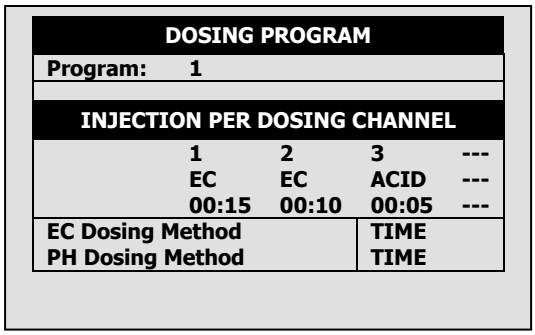
NOTE: Proportional Time= Take desired dosing time and spread out dose over irrigation program in open/close pulses per channel.

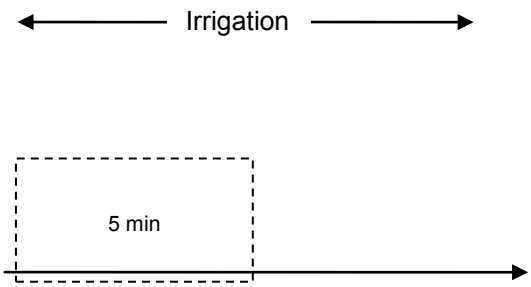
2.2.4 Time

Time



Define in 1 bulk: Open for a set time straight through, i.e. not spread out over a defined program.





Ex: Ch 3= P1= 5 min. (1 pulse)

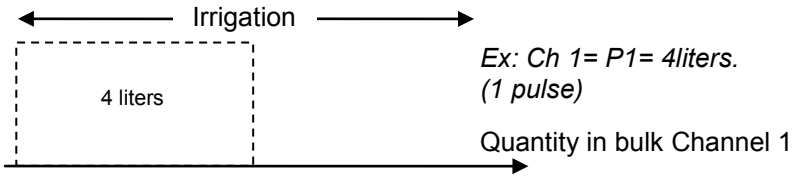
2.2.5 Quantity

(Example shows liters, in USA use gallons.)

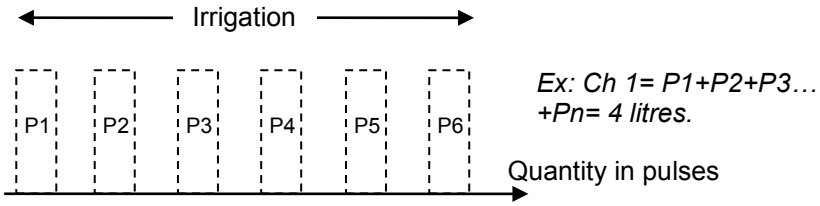
Qty.

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.		

- **Option A:** In Bulk (similar to Time above).



- **Option B**: Spread Out (According to dosing configuration done by technician).



Main Menu

7. Dosing Configuration

DOSING CONFIGURATION	
EC Alarms ▸	NO
pH Alarms ▸	NO
Minimum On Time (sec)	1.0
Minimum Off Time (sec)	1.0
EC Coarse Tuning (0-10)	5
EC Fine Tuning (0-10)	5
pH Coarse Tuning (0-10)	5
pH Fine Tuning (0-10)	5
Control Cycle (sec)	5
EC/pH Averaging (0-Low, 20-High)	6
Dosing Boost. Off Delay (mm:ss)	3
Dosing by QTY. Method ▸	00:10
	BULK

BULK
SPREAD

Define according to Bulk or Spread

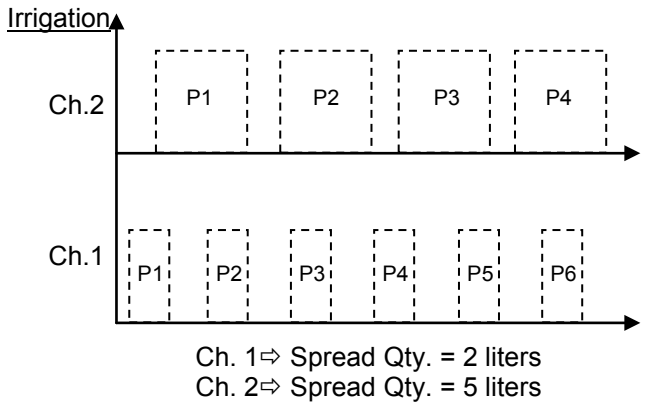
DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
4.00	5.00	2.00	---
EC Dosing Method	QTY.		
PH Dosing Method	QTY.		

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

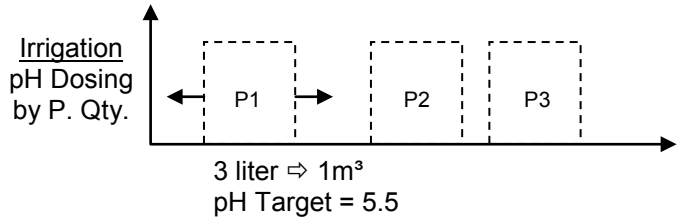
2.2.6 Common Dosing Program for Open Fields (example)

DOSING PROGRAM			
Program:	1		
INJECTION PER DOSING CHANNEL			
1	2	3	---
PASSIV	PASSIV	ACID	---
4.00	5.00	2.00	---
Target PH		5.50	
EC Dosing Method		QTY.	
PH Dosing Method		P.QTY.	

Fertilization (EC) amounts are fixed, no matter how much water goes through (channels 1 & 2 - Passive) pH is controlled at 5.50



**Channel 3 (Acid channel) - Pulse width fluctuates according to controller calculations depending on pH levels to keep it on target.



2.2.7 Controlled EC/pH based on P.Qty. (example)

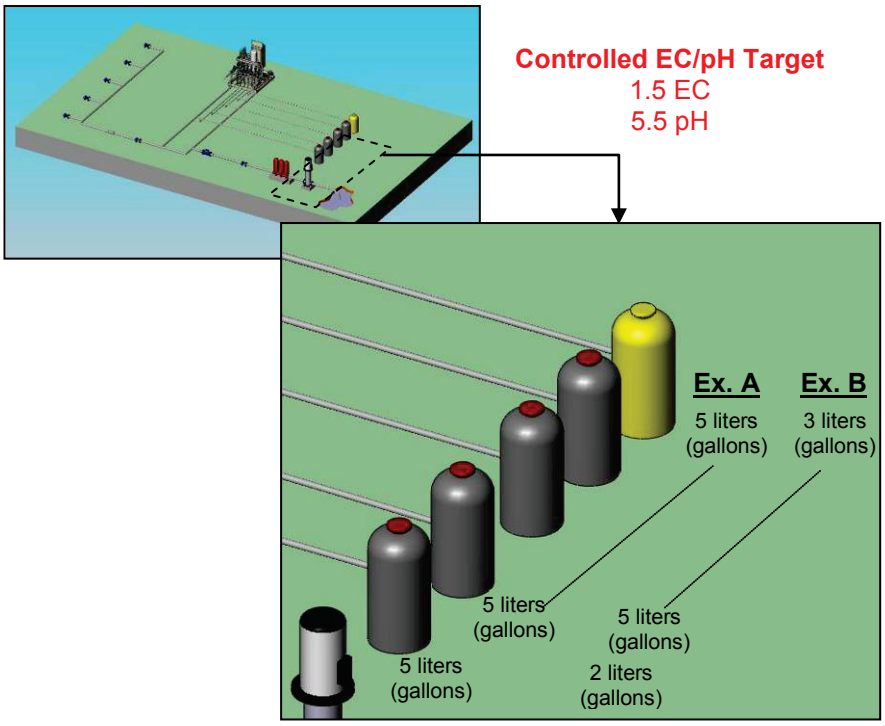
Example A

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
5.00	5.00	5.00	---
Target EC	1.50		
Target PH	5.50		
EC Dosing Method	P.QTY		
PH Dosing Method	P.QTY		

Example B

DOSING PROGRAM			
Program: 1			
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
2.00	5.00	3.00	---
Target EC	1.50		
Target PH	5.50		
EC Dosing Method	P.QTY		
PH Dosing Method	P.QTY		

Define dosing program: Nutrient amount and desired EC/pH levels



2.2.8 EC Pre-Control (example if previously defined by technician)

For hydraulic pre-control systems in greenhouses: When collecting excess water from drains, grower can set EC target before water goes through irrigation system. Discrepancies

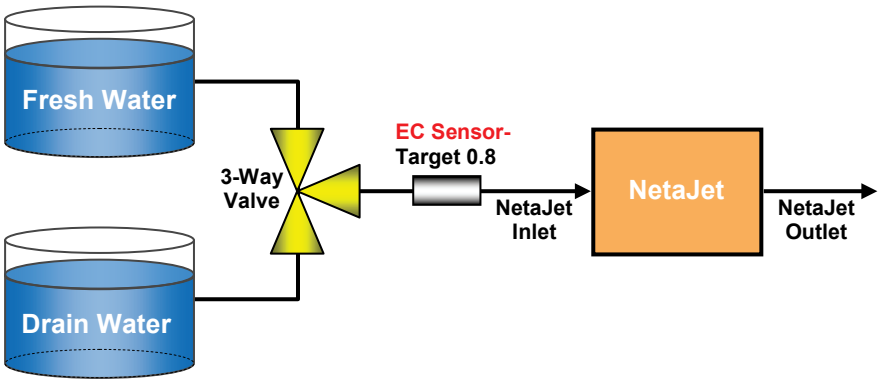
EC Pre-Control **ON**
*Only if this was pre-defined by technician during installation.

DOSING PROGRAM			
Program: 1		EC Pre-Control:	OFF
INJECTION PER DOSING CHANNEL			
1	2	3	OFF
EC	EC	ACID	ON
2.00	5.00	3.00	
Target EC		1.50	
Target PH		5.50	
EC Dosing Method		P.QTY	
PH Dosing Method		P.QTY	

DOSING PROGRAM			
Program: 1		EC Pre-Control:	
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
2.00	5.00	3.00	---
Target EC		1.50	
Target PH		5.50	
Target EC Pre-Control		-----	
EC Dosing Method		P.QTY	
PH Dosing Method		P.QTY	

Define pre-controlled EC target

DOSING PROGRAM			
Program: 1		EC Pre-Control:	
INJECTION PER DOSING CHANNEL			
1	2	3	---
EC	EC	ACID	---
2.00	5.00	3.00	---
Target EC		1.50	
Target PH		5.50	
Target EC Pre-Control		0.80	
EC Dosing Method		P.QTY	
PH Dosing Method		P.QTY	

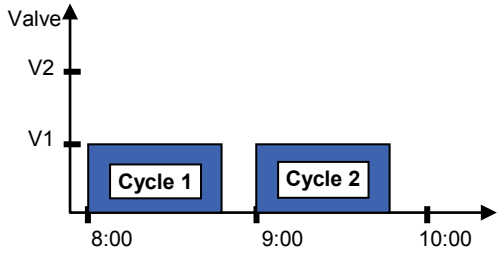


2.3 Irrigation Based on Time

1. Program → 1. Irrigation → Select program

Example 1

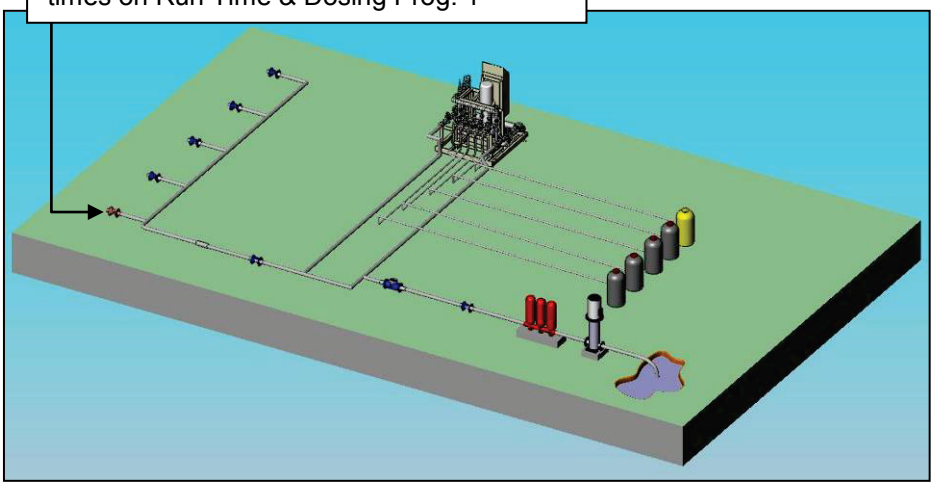
DATE : 19-Apr-07	TIME : 16:12:32	
IRRIGATION PROGRAM		
Program: 4	**Priority:**	**Const. 0%**
Start Time	**08:00**	
Clock Start	**2**	
Min. Time	**01:00**	
Valve #	**001**	
Run Time #	**1**	
Dosing Prog	**1**	
Day: 01/01	**1**	
Dose/Water	**D**	



Irrigation program for 1 valve 

NOTE: Min. Time= Delay between cycles from start time to start time Clock Start= Number of cycles

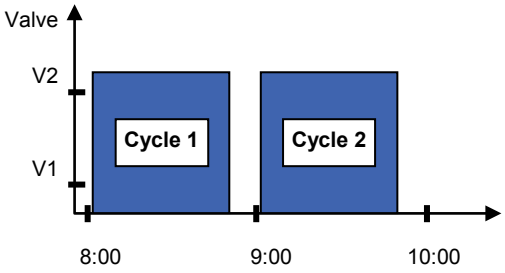
Valve 1 runs 2 cycles, 1 hour between start times on Run Time & Dosing Prog. 1



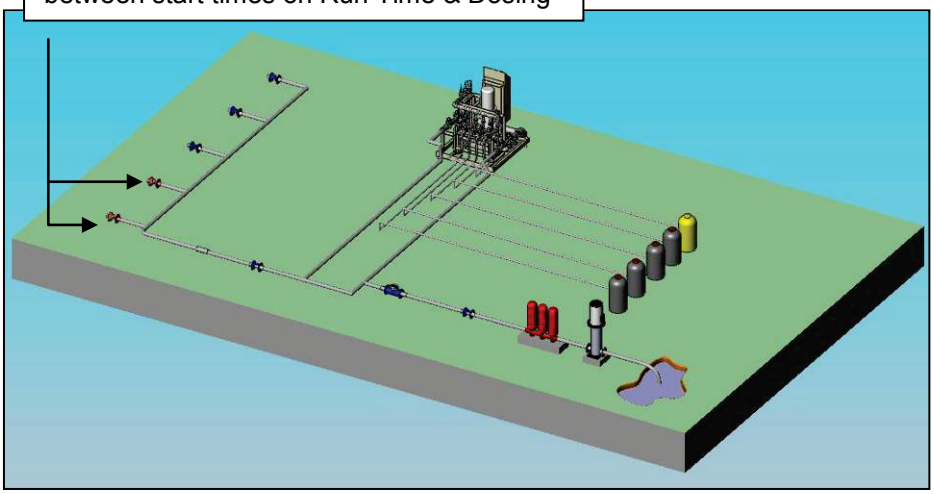
Example 2

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 + 002**	
Run Time #	**1 1**	
Dosing Prog	**1 1**	
Day: 01/01	**1**	
Dose/Water	**D**	

Irrigation program for a group of 2 valves



Valve 1 & 2 run two cycles, one hour between start times on Run Time & Dosing



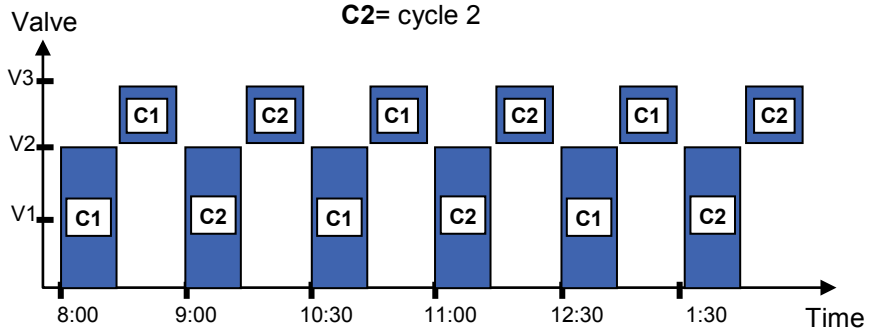
△ **NOTE**: Min. Time = Delay between cycles from start to start
Clock Start = Number of cycles

Example 3

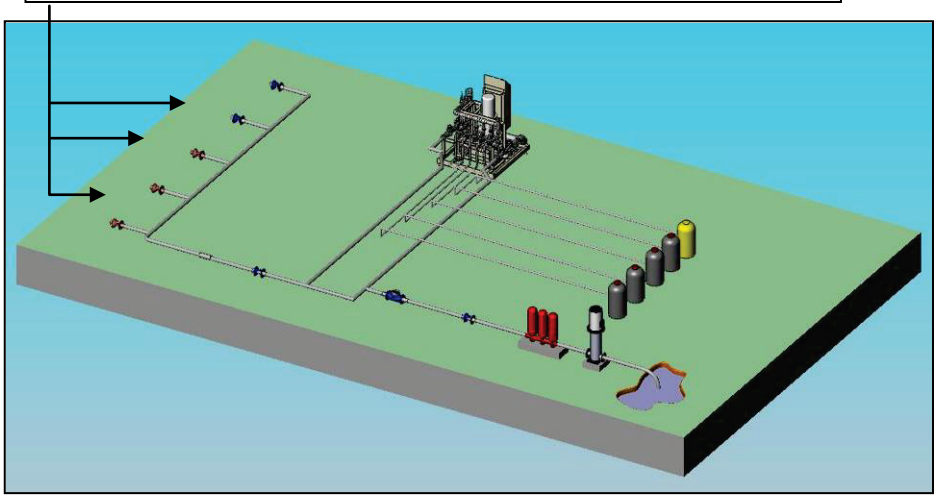
DATE : 19-Apr-07	TIME : 16:12:32	
IRRIGATION PROGRAM		
Program: 4	**Priority:**	**Const. 0%**
Start Time	**08:00 10:30 12:30**	
Clock Start	**2 2 2**	
Min. Time	**01:00 00:30 01:00**	
Valve #	**001 + 002 + 003**	
Run Time #	**1 1 2**	
Dosing Prog	**1 1 2**	
Day: 01/01	**1 2 3**	
Dose/Water	**D W D**	

Irrigation program for a group and individual valve

C1= cycle 1
C2= cycle 2



Valve 1 & 2 run six cycles simultaneously on Run Time & Dosing Program 1, Valve 3 run after valves 1& 2 on Run time & Dosing Program 2, different/interchangeable start times.



△ **NOTE**: Different/interchangeable delays (multiple start time) dividing the day into periods

△ **NOTE**: Min. Time= Delay between cycles from start to start Clock Start= Number of cycles in every period (start time)

Depending on weather conditions, increase/decrease the amount of water emitted from valves without changing the program.

Example 4

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 -

If there is a lot of radiation, irrigate more, +20%
(Regular 10 min. runtime⇨12 min.)

NOTE: Daily = Current day only. Regular program resumes the following day.

Example 5

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 -

If there is bad weather, irrigate less, -10%
(Regular 10 min. runtime⇨9 min.)

NOTE: Const.= Constant running of program on daily basis. May increase/decrease amount of water in this mode according to weather conditions.

Select water/dosing program by days of week

Example 6

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	4	5	6	7
Dose/Water	D	D	D	D	D	D	D

S	M	T	W	TH	F	ST
X		X		X		X

Select program by days of week

OR

Choose cycle of days

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: 01/01	1		2				

DATE : 19-Apr-07	TIME : 16:12:32						
IRRIGATION PROGRAM							
Program: 4	Priority:	Daily	20%				
Start Time	08:00	10:30	12:30	--:--			
Clock Start	2	2	2	--			
Min. Time	01:00	00:30	01:00				
Valve #	001+002	003					
Run Time #	1	1	2				
Dosing Prog	1	1	2				
Day: 01/01	1	2	3				
Dose/Water	D	W	-				

D = Dosing + Water
W = Just Water
- = Nothing

S	M	T	W	TH	F	ST
D	W	-	D	W	-	D

2.4 Irrigation Based on External Condition (Field)

To operate irrigation by peripheral equipment (i.e., filling a water tank according to level float switch)

1. Program → 4. Ext. Condition → Set start/end time

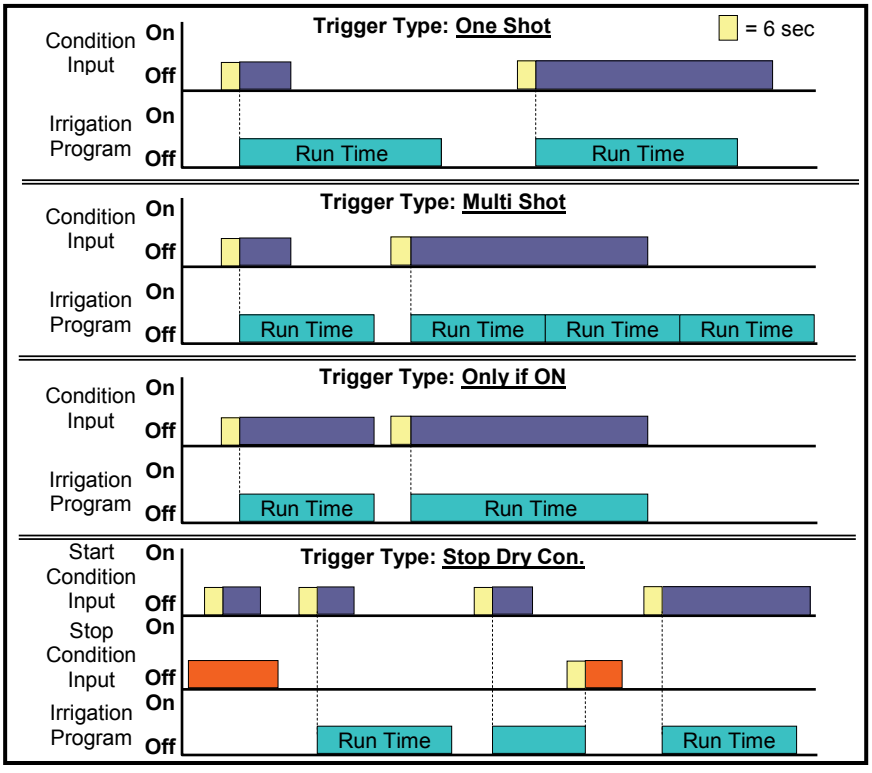
EXTERNAL CONDITION PROGRAM

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

Select trigger type

EXTERNAL CONDITION PROGRAM

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



Select dry contact (pre-defined by technician) to start/stop condition and set limit.

EXTERNAL CONDITION PROGRAM

#	Start Dry Cont.	Trigger Type	Stop Dry Cont.
1	Dry Con 1	One	Dry Con 2
2	<NONE>	Shot	<NONE>
3	<NONE>	One	<NONE>
4	<NONE>	Shot	<NONE>
5	<NONE>	One	<NONE>
6	<NONE>	Shot	<NONE>
7	<NONE>	One	<NONE>
8	<NONE>	Shot	<NONE>

SELECT

1. Program

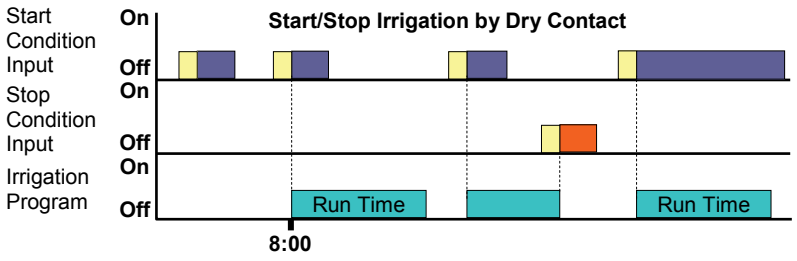
1. Irrigation

DATE : 1-May-07 TIME : 10:12:09

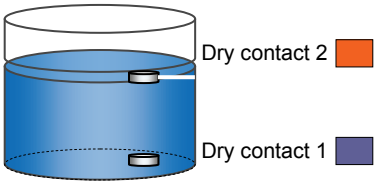
IRRIGATION PROGRAM

Program: 2	Priority: --	Cond. 1
Start Time	08:00	
Clock Start	--	
Con. Starts	ON	
Min. Time	--:--	
Max. Time	--:--	
Valve #	004	
Run Time #	2	
Dosing Prog	2	

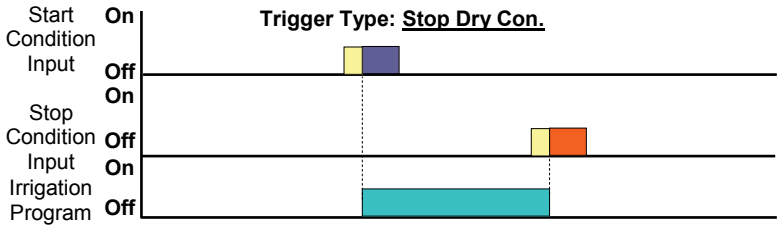
Reaching the bottom line...



Example of tank filling:



Water Tank with Floats



2.5 Irrigation Based on Radiation Sum (Greenhouses)

Set trigger based radiation sum limit Joul/cm²=Energy

1. Program → 1. Irrigation →

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	--	
Rad Sum Li.	----	300	
Min. Time	--:--	00:30	
Max. Time	--:--	--:--	
Valve #	001		
Run Time #	1		
Dosing Prog	1		

Const. / Daily / Cond. / Rad Sum

For Next Screen Press The DOWN Arrow

→ Set start/end time
→ Rad. Sum limit
→ Set min./max. resting time
→ Select program

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.	----	300	150 ----
Min. Time	--:--	00:30	00:20 --:--
Max. Time	--:--	01:00	01:00 --:--
Valve #	001		
Run Time #	1		
Dosing Prog	1		

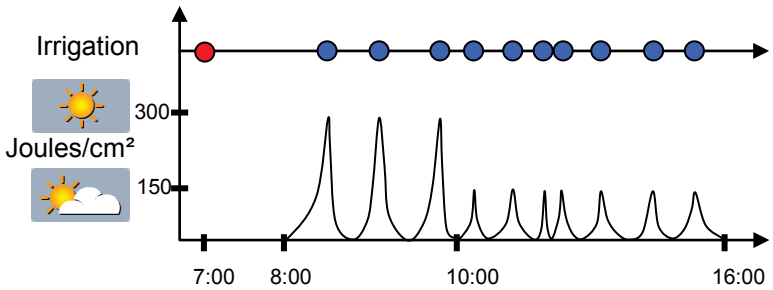
For Next Screen Press The DOWN Arrow

△ **Note**: Start Time is when the the unit begins measuring radiation levels to implement the irrigation program.

△ Minimum rest time most important so as to not irrigate too often when radiation levels fluctuate. In this example, 8:00-10:00 irrigation should occur at most every 30 minutes when radiation hits 300joules/cm². Maximum rest time here indicates that irrigation must occur at least every hour if there is less radiation.

Rad. Sum limit 300

Rad. Sum limit 150



● Irrigation by clock start at 7:00
● Irrigation by radiation sum

2.6 Irrigation Based on External Conditions

1. In *Setup* > *Analog Conversion Table*:

   a. Select the sensor type. Each sensor has default values assigned to it.

   - Netasense: 7 – 45
   - ECH20: 0 – 60
   - General Sensor: 0.2 - 10

   b. If required, edit the values.

ANALOG CONVERSION TABLE			
Num.	Sensor Type	Min Value	Max Value
1	<->	<->	<->
2	<->	<->	<->
3	<->	<->	<->
4	<->	<->	<->

ANALOG CONVERSION TABLE			
Num.	Sensor Type	Min Value	Max Value
1		7	45
2	<NONE>	7	45
3	ECh20	7	45
4	Netasense	7	45
	Gen. Sensor		
	Temperature		

2. In *Test* > *Analog Sensor*, view the actual sensor values.

ANALOG SENSOR		
No.	Type	Value
1	Netasense	11
2	Netasense	22
3	Netasense	33
4	Gen. Sensor	7
5	Gen. Sensor	3
6	ECh20	25
7	ECh20	32
8	ECh20	51
9	Temperature	21
10	Temperature	21

3. In *Program* > *Ext Condition*, configure the External Condition Program for the analog sensors.

   a. Enter the beginning and ending time for each program

   b. Under Start An. Dry Cont., define the input type.

EXTERNAL CONDITION PROGRAM			
#	From hh:mm	To hh:mm	Start An. Dry Cont.
1	10:00	12:00	Ana. Sen 1
2	11:00	12:00	Dry Con 1
3	12:00	13:00	Dry Con 1
4	--:--	--:--	<NONE>
5	--:--	--:--	<NONE>
6	--:--	--:--	<NONE>
7	--:--	--:--	<NONE>
8	--:--	--:--	<NONE>

EXTERNAL CONDITION PROGRAM			
#	From hh:mm	To hh:mm	Start An. Dry Cont.
1		12:00	Ana. Sen 1
2	Ana. Sen 1	12:00	Dry Con 1
3	Ana. Sen 2	13:00	Dry Con 1
4	Ana. Sen 3	--:--	<NONE>
5	Ana. Sen 4	--:--	<NONE>
6	Ana. Sen 5	--:--	<NONE>
7	Ana. Sen 6	--:--	<NONE>
8		--:--	<NONE>

c. Define The Trigger Type

EXTERNAL CONDITION PROGRAM			
#	Trigger Type	Stop An Dry Cont.	Oper. to Start
1	Multi Shot	Ana. Sen 2	---
2	Multi Shot	Dry Con 2	One Shot
3	One Shot	Dry Con 14	Multi Shot
4	One Shot	<NONE>	Only If On
5	One Shot	<NONE>	---
6	One Shot	<NONE>	---
7	One Shot	<NONE>	---
8	One Shot	<NONE>	---

d. Under Stop An. Dry Con., define the input type.

EXTERNAL CONDITION PROGRAM			
#	Trigger Type	Stop An Dry Cont.	Oper. to Start
1		Ana. Sen 2	---
2	Ana. Sen 1	Dry Con 2	---
3	Ana. Sen 2	Dry Con 14	---
4	Ana. Sen 3	<NONE>	---
5	Ana. Sen 4	<NONE>	---
6	Ana. Sen 5	<NONE>	---
7	Ana. Sen 6	<NONE>	---
8		<NONE>	---

e. Under Oper. to Start, choose the required symbol.

EXTERNAL CONDITION PROGRAM			
#	Stop An Dry Cont.	Oper. to Start	Start Value
1	Ana. Sen 2	>	
2	Dry Con 2	---	---
3	Dry Con 14	---	<
4	<NONE>	---	<=
5	<NONE>	---	=
6	<NONE>	---	>
7	<NONE>	---	>=
8	<NONE>	---	

f. Under Oper. To Stop, choose the required symbol.

EXTERNAL CONDITION PROGRAM			
#	Oper. to Start	Start Value	Oper. to Stop
1		25	=
2	---	---	---
3	<	---	---
4	<=	---	---
5	=	---	---
6	>	---	---
7	>=	---	---
8	---	---	---

g. Under Start Value, enter the required value to start the analog sensor. Under Stop Value, entered the required value to stop the analog sensor.

EXTERNAL CONDITION PROGRAM			
#	Start Value	Oper. to Stop	Stop Value
1	25	=	20
2	---	---	---
3	---	---	---
4	---	---	---
5	---	---	---
6	---	---	---
7	---	---	---
8	---	---	---

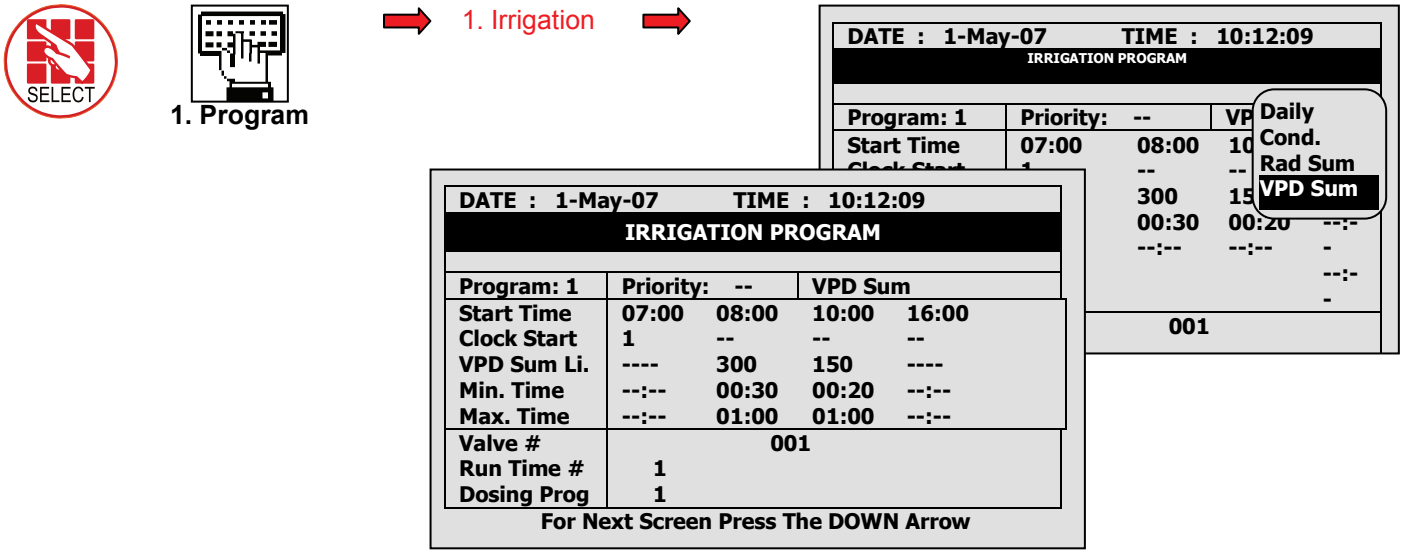
In the examples given above, irrigation has been set to start when the analog input is greater than 25 and irrigation stops when the input is 20.

Oper. to Start and Oper. to Stop require a logical operation. The following table defines these symbols:

Symbol	Definition
---	No operation
<, <=	The analog sensor function value is less than/less than or equal to the start/stop value.
=	The analog sensor function value is equal to the start/stop value. There is a ± 1% allowable deviation.
>, >=	The analog sensor function value is greater than/greater than or equal to the start/stop value.

2.7 Irrigation Based on VPD Sum (Field)

Set trigger based VPD sum limit kPa•min. The VPD behavior throughout the daytime is similar to the behavior of ET, therefore using the VPD Sum will allow for irrigation as if ET calculations were being used.

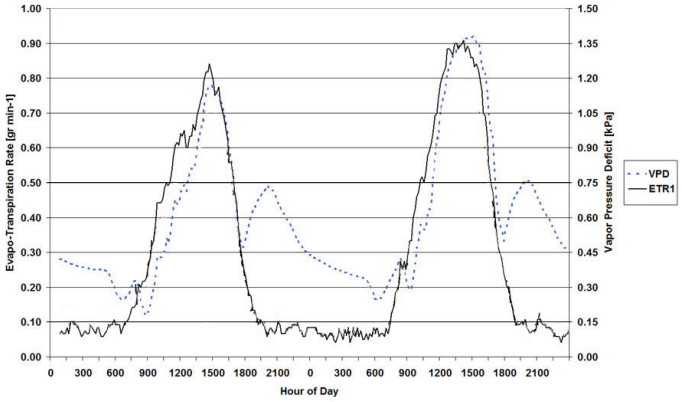


Irrigation based on VPD Sum is available for operation only during the VPD time frame. Refer to the **6.1 SETUP – TIME & DATE** for defining the start and end time for VPD Sum.

- **Start Time:** Define the time of day in which the irrigation based on VPD Sum should begin for the period (next period overrides the previous)
- **Clock Start:** Define the number of cycles per **Start Time** (period)

△ **VPD Sum Limit**: Define the VPD Sum trigger for irrigation to begin
NOTE: After irrigation, the VPD Sum counter will reset. In cases where the limit was achieved but the minimum time between irrigation was not, the counter continues summing until irrigation and will re-calculate after the irrigation in this manner:
VPD SUM counter = VPD SUM counter – VPD SUM LIMIT

- **Minimum Time:** Define the minimum amount of time between cycles
- **Maximum Time:** Define the maximum amount of time without an irrigation cycle



EXAMPLE ONLY

IMPORTANT: Each Climate zone has different VPD values. It is critical for the grower to learn the VPD values of their specific area in order to properly use the Irrigation Program based on the VPD Sum

2.8 Influence Program

Irrigation Pro enables adjusting irrigation settings according 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)

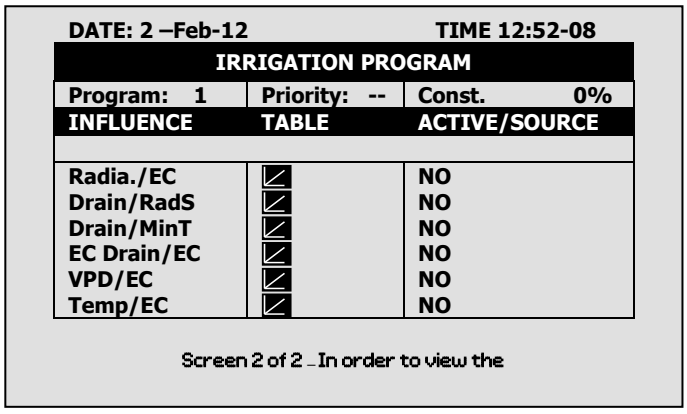
For example, a grower may want to increase the EC based on the Solar Radiation. Alternatively, he may want to decrease the MinT based on the drainage.

2.9 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. Irrigation Pro 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).

2.9.1 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.



5. Select an Influence.

The following sections detail each Influence.

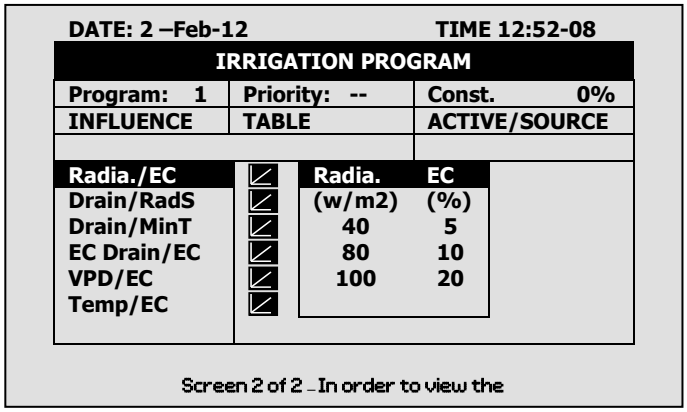
2.9.2 Radiation Influence on Target EC

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*:
   a. set the Target EC
   b. set EC Dosing Method to Qty.

Example: As sunlight increases, a crop requires higher EC levels. The following screen illustrates increasing in the EC based on radiation. Since Irrigation Pro calculates the increase in EC proportionally, there will be a 7.5% increase when the radiation reaches 60 w/m2.



2.9.3 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.

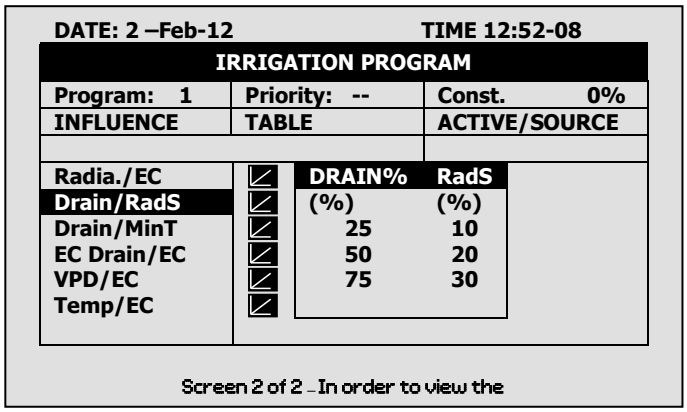
To set the Drainage Influence on Rad Sum:

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. However, he wants to increase the gap between irrigations as drainage increases. The following illustration demonstrates how Rad Sum can increase. When drainage reaches 75%, the Rad Sum increases by 30%. If the Rad Sum Limit were set to 100, than at 75% drainage, it would increase to 130.



2.9.4 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.

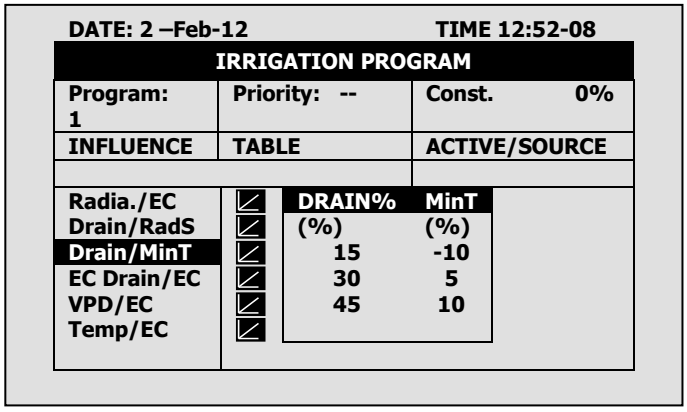
To set the Drainage Influence on the Minimum Time:

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 15% drainage to a MinT of -10%. As drainage increases, the time between irrigation increases. In this scenario, if the MinT is set to 60 minutes, 15% drainage adjusts the time to 54 minutes.



2.9.5 Drainage EC Level Influence on Target EC

If you have installed an EC sensor in the drainage, you can adjust the Target EC level based on the drainage EC level. This can be used, for example, to lower the EC input if EC levels in the drainage are above specifications.

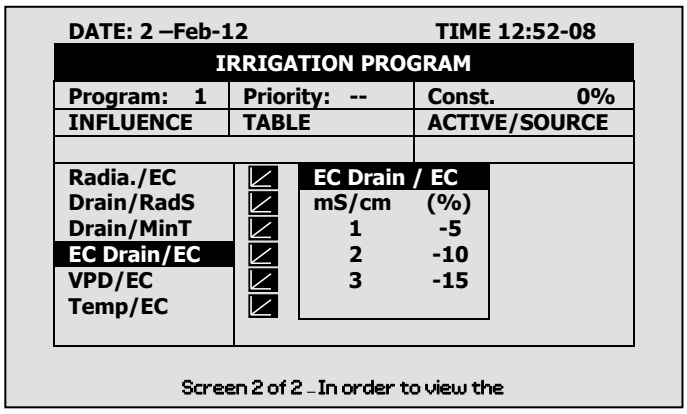
To set the EC Drainage Influence on the EC:

1. In *Installation* > *Analog* Input:
   a. define a sensor as EC
   b. define a sensor as EC drain
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* > *Dosing Channel Configuration* set React to EC.
5. In *Configuration* > *Dosing Configuration* > *EC Control* to Yes.
6. In *Configuration* > *Drainage Configuration*, define the drainage meter's Ratio Liter/Pulse.
7. In *Program* > *Irrigation*, select EC Drain/EC.
   a. Define the EC Drain percentage set points.
   b. Define the EC percentage set points.
8. Set ACTIVE/SOURCE to Yes.
9. Press **Menu** and confirm changes.
10. In *Program* > *Dosing Program* set the Target EC.

△ **Note**: You can disable this function by disabling EC Control (Configuration > Dosing Configuration).



Example: A user wants to maintain an EC level of 1.5. To this end, he measures the drainage EC. When the drainage EC falls below 1.5, he increases the EC input. As it rises above 1.5 ms/cm, he decreases the input.

2.9.6 VPD Influence on Target EC

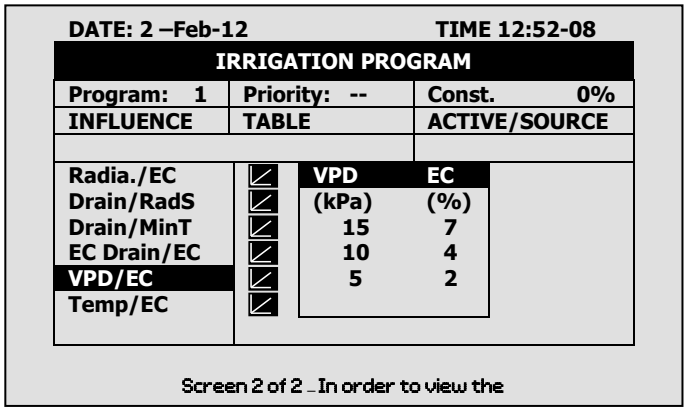
You can adjust the EC based on the VPD Sum (air temperature and humidty). As the VPD rises or falls, the program can increase or decrease the EC level according to your requirements.

1. In *Installation* > *Analog Input*:
   a. define a sensor as EC
   b. define an air temperature sensor
   c. define 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.



2.9.7 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*:

   a. define a sensor as EC

   b. define an air temperature sensor

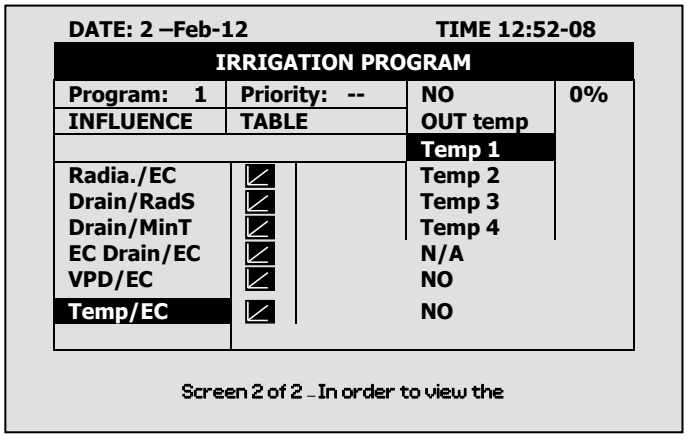
Note: You can verify the EC status using Hot Key Screen 4, the temperature sensor status using Hot Key Screen 6.

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.

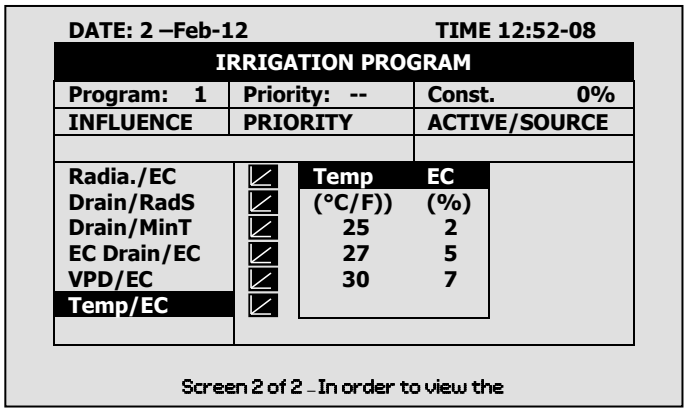


6. In *Program* > *Dosing Program*:

   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 roon temperature 22° C). Using this screen, he can adjust the levels accordingly.



2.10 Agitator

To operate fertilizer tanks with mixing devices

1. Program

➡ 5. Agitator ➡

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
⇨ Select Parallel to operate +1 Agitator simultaneously
⇨ Select Serial if not enough power to operate +1 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	Parallel	

➡

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

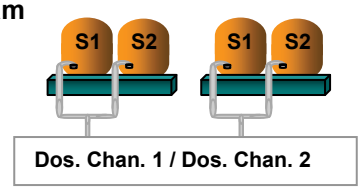
AGITATOR		
	On mm:ss	Off mm:ss
Dosing Active Dosing Not Active	01:00 05:00	05:00 60:00
Operation Mode	Serial	

2.11 Selector

+1 fertilizer tank (with different fertilizers) attached to a single dosing channel

1. Program

➡ 6. Selector ➡



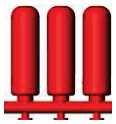
SELECTOR		
Dosing Prog.	S1	S2
1	✓	▪
2	▪	✓
3	▪	▪
4	▪	▪
5	▪	▪
6	▪	▪
7	▪	▪
8	▪	▪
9	▪	▪
10	▪	▪

2.12 Filter Flushing

Program filter flushing during irrigation process

1. Program

7. Filter Flushing



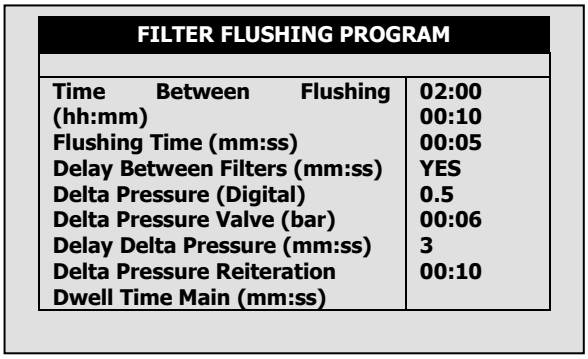
FILTER FLUSHING PROGRAM	
Time Between Flushing	02:00
(hh:mm)	00:10
Flushing Time (mm:ss)	00:05
Delay Between Filters (mm:ss)	YES
Delta Pressure (Digital)	0.5
Delta Pressure Valve (bar)	00:06
Delay Delta Pressure (mm:ss)	3
Delta Pressure Reiteration	00:10
Dwell Time Main (mm:ss)	

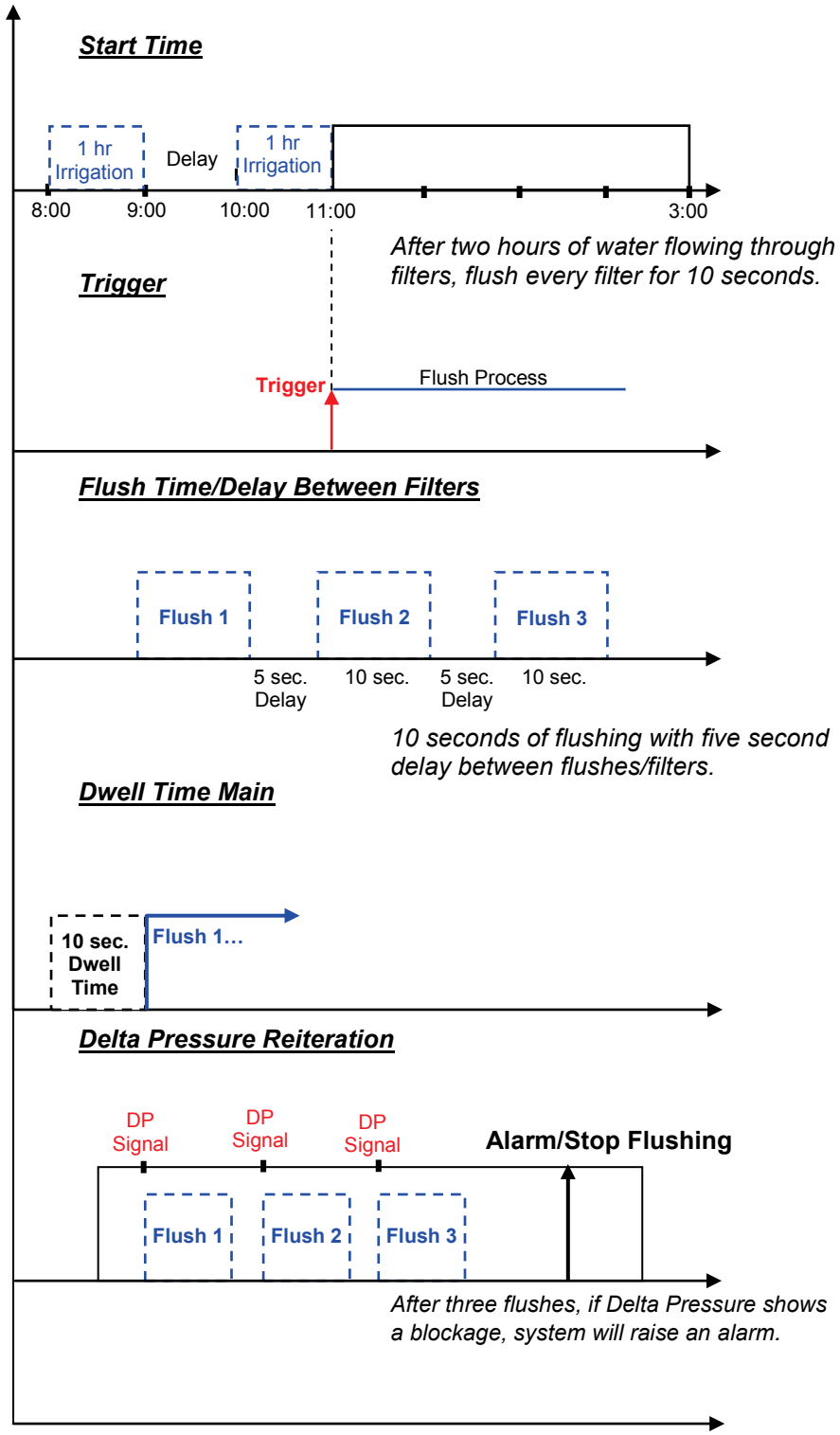
Note: Filter flush process can start only after main water line is full. Default set at 1 minute; see menu 3.3.

ALARM DEFINITION	
Water Fill Up (min)	1
Water Leak (m3)	1.000
Water Leak Period (hh:mm)	00:30
Identify Leak-Subtr. Meter?	NO
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.

Item	Description
Time Between Flushing	Time between flushes accumulated during set irrigation time (one filter flush a time).
Flush Time	Flush time per filter.
Delay Between Filters	Set delay between flushes to build up pressure.
Delta Pressure	Set flush by pressure sensor. Pressure at filter inlet/outlet, if there is a significant difference, a filter may be blocked.
Delta Pressure Value (sensor)	If there is a differential, (DP signal or Analog DP value), 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
After two hours of water flowing through filters, flush every filter for 10 seconds.
Trigger
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.

2.13 Cooling

Set cooling program for cooling/humidification process in greenhouses. This program will operate according to temperature, humidity or time (to reduce temp, increase hum.)

SELECT → 1. Program → 8. Cooling → Set On/Off time and select sensors

Temp. Sens. 1
Hum. Sens. 1

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

+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 2		Hum. Sens.: 1 2	

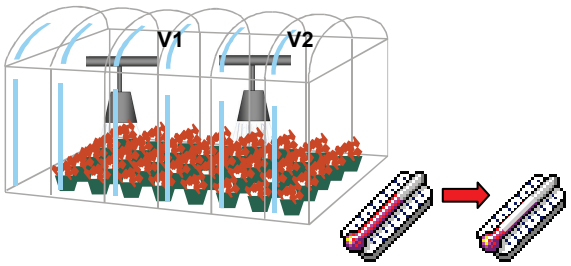
Dynamic cooling: 2 temp. threshold, same Hum

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 2	

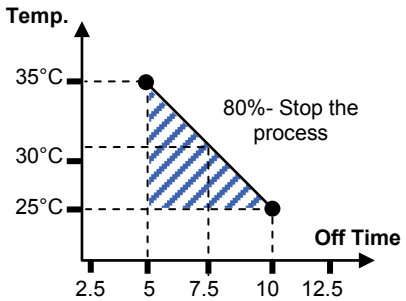
→

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 2	

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 2	



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



2.14 Misting

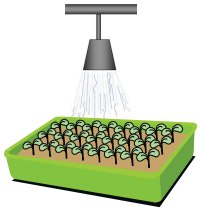
General program using a timer

1. Program

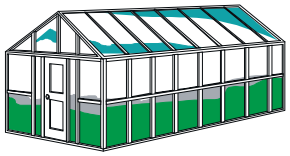
⇨ Define Start/End time

⇨ Define Misting On/Off time

➡ 9. Misting ➡



MISTING PROGRAM					
#	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	--	--:--	--:--	--:--:--	--:--:--



2.15 Water Heating

Heat water in cold areas/seasons

1. Program

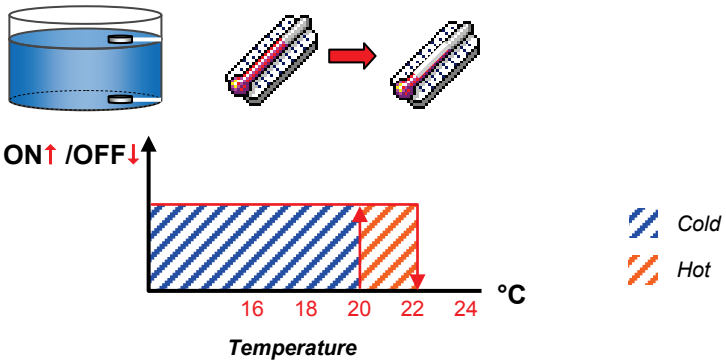
⇨ Define Start/End time

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

⇨ Define sensors

➡ 10. Water Heating ➡

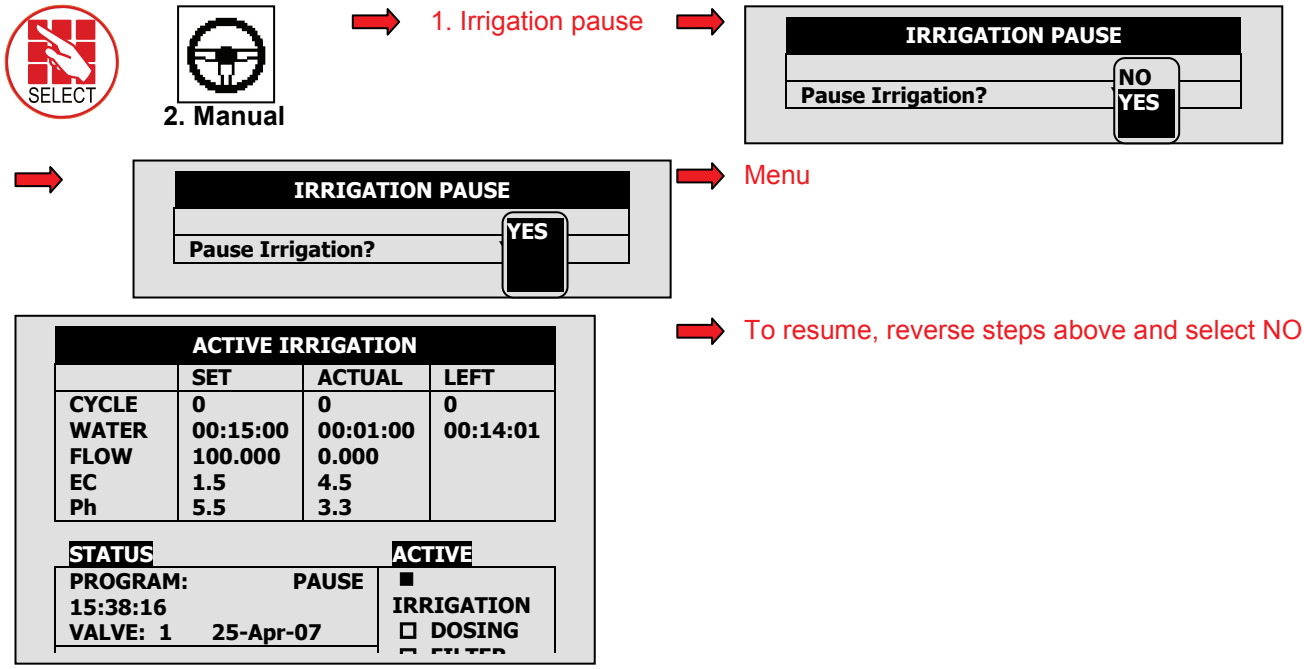
WATER HEATING	
From Time	08:00
To Time	16:00
Water Temperature	20.0
Difference	2.0
Temp. Sensor #1	1
Temp. Sensor #2	2



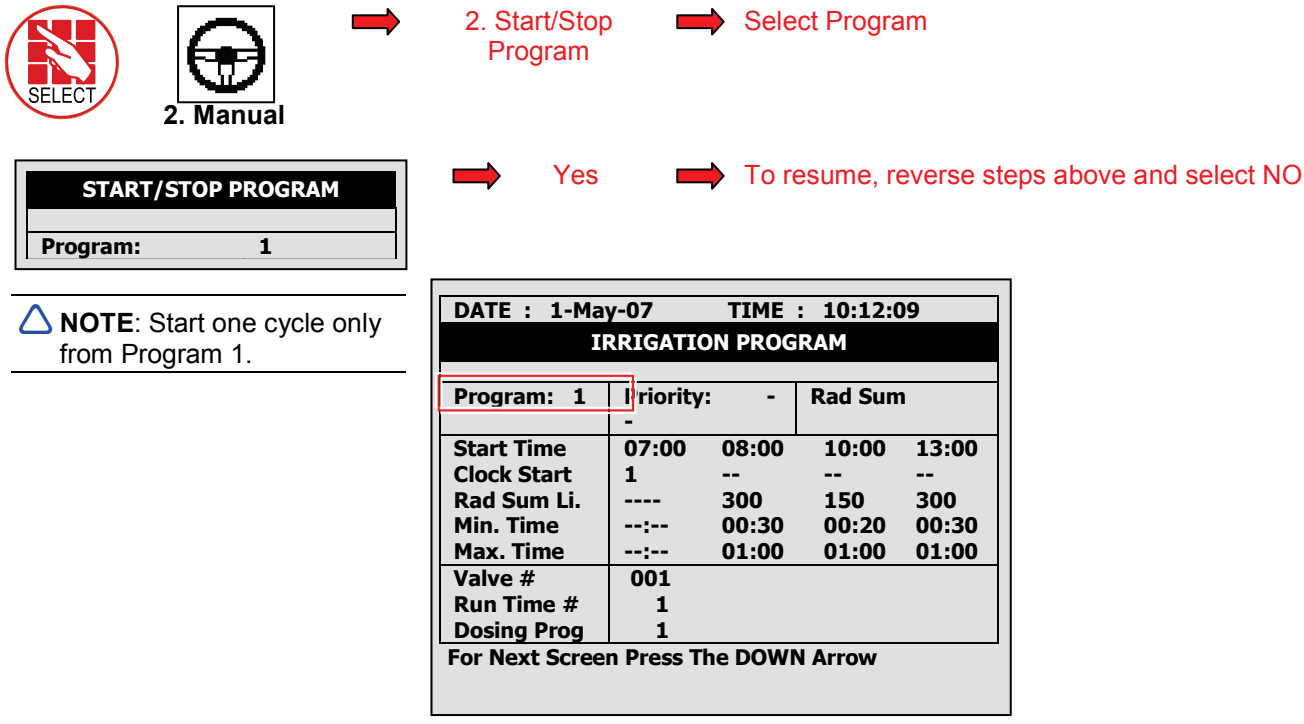
3 MANUAL

3.1 System Pause

Manually pause system during an irrigation program (EC/pH calibration, fix pipes…)



3.2 Start/Stop Program



△ **NOTE**: Start one cycle only from Program 1.

3.3 Start/Stop Valve

Manually start/stop a valve

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

Run Time Program (1)

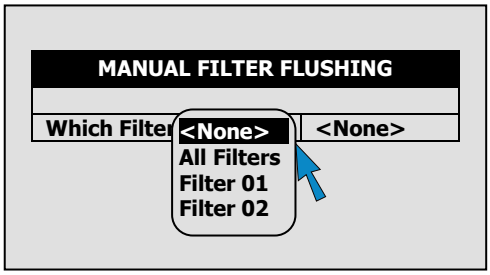
DOSING PROGRAM					
Program: 1					
INJECTION PER DOSING CHANNEL					
1	2	3	4	5	
EC	EC	EC	EC	ACID	
5.00	5.00	5.00	5.00	3.00	
Target EC			1.60		
Target PH			5.50		
EC Dosing Method			P.QTY		
PH Dosing Method			P.QTY		

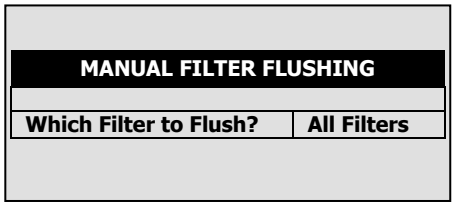
Dosing Program (1)

3.4 Manual Filter Flush

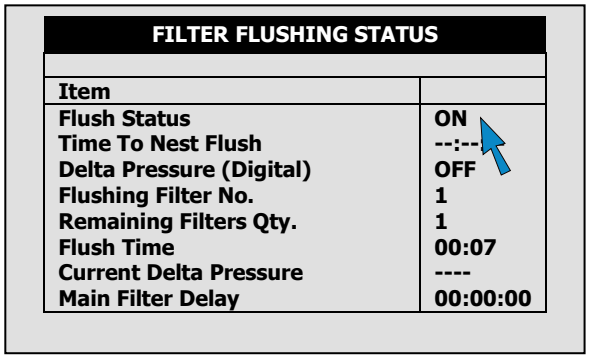
Manual filter flush only when system is irrigating

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



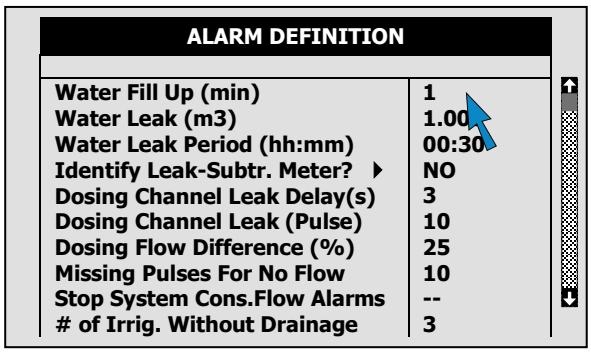


→ Yes → Menu → Hot Screen 5 to view flushing status



NOTE: "All Filters" means all filters, but one at a time. No more than one filter can be flushed at a time.

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

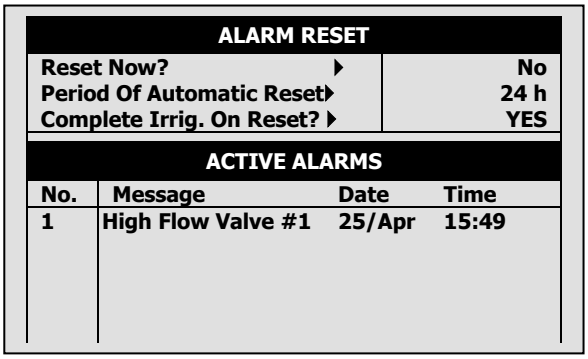


4 ALARM

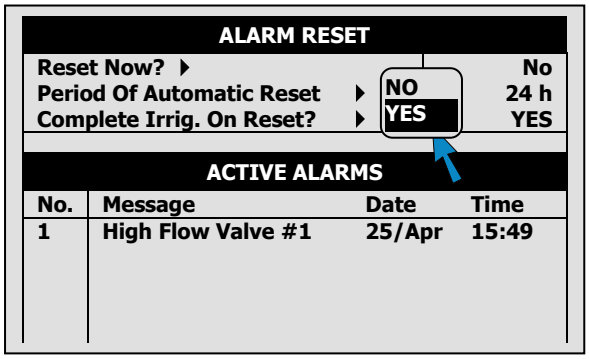
4.1 Reset

Reset alarm (in case of high flow, low flow, water leak, fertilizer leak…)

➡ 1. Alarm Reset ➡ Option A: Reset manually



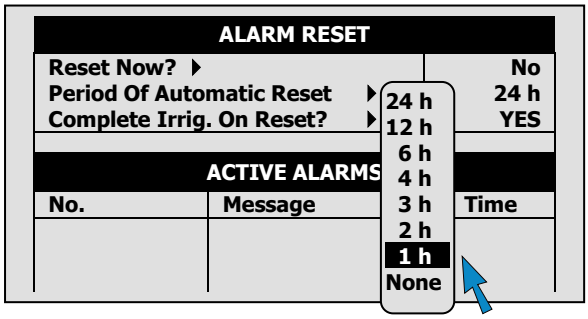
➡



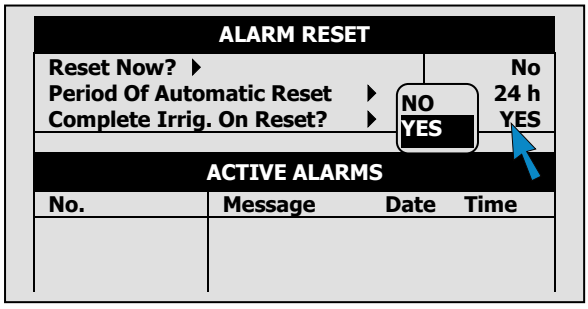
➡ Yes

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

➡



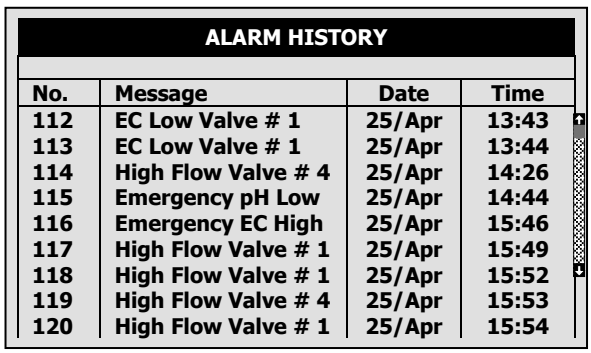
➡"Complete Irrig. On Reset?" Select Yes or No



4.2 Alarm History

View alarm history (Read-Only)

➡ 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

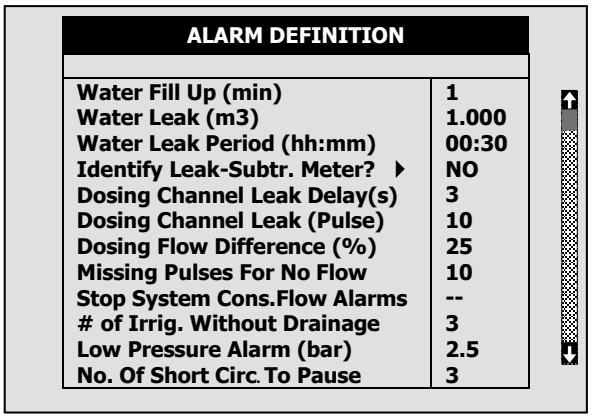
△ **NOTE**: Logs up to 250 alarms.

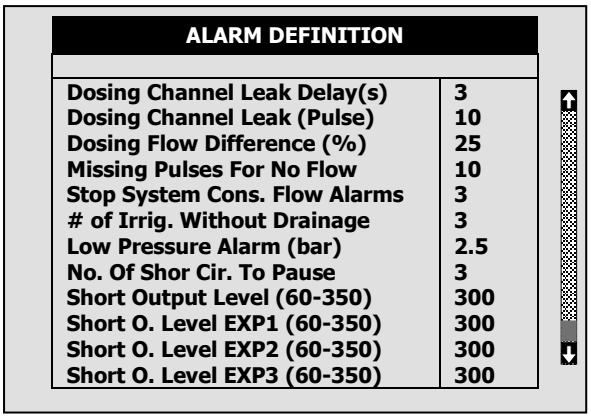
4.3 Alarm Definition

Define system threshold

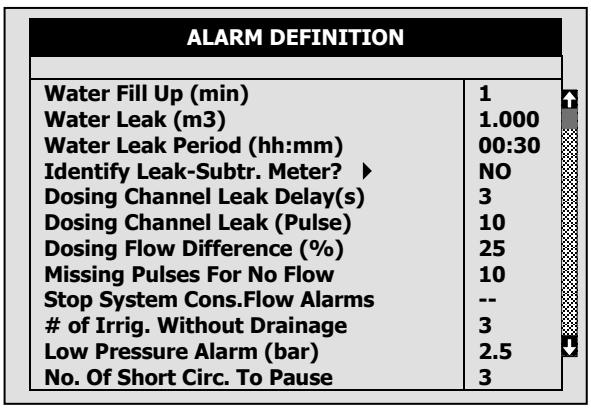
3. Alarm

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





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 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 generates 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.



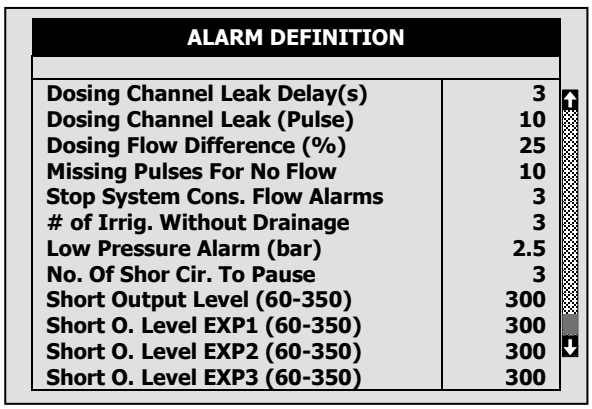


Table continued…

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.
# 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.
Low Pressure Alarm (bar/psi)	Minimum system pressure before generate an alarm.
Num. Of Short Circ. To Pause	Number of short circuit (in field device) alarms measured before the system is paused.
Short Output Level (60-350)	Define the A/D threshold value to be considered as a short circuit (For technician use only).
Short O. Level EXT1 (60 – 350)	Define the A/D threshold value to be considered as a short circuit for Extension box no. 1 (For technician use only)
Short O. Level EXT2 (60 – 350)	Define the A/D threshold value to be considered as a short circuit for Extension box no. 2 (For technician use only)
Short O. Level EXT3 (60 – 350)	Define the A/D threshold value to be considered as a short circuit for Extension box no. 3 (For technician use only)

4.4 Alarm Setting

Set alarms and define action in event of an alarm

3. Alarm

➡ 4. Alarm Setting

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

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
Low Pressure	STOP	STOP	01:00	YES
R.U. Error	STOP	STOP	01:00	YES
Host Error	STOP	STOP	01:00	YES

4.5 EC/pH Alarm Definition

Define EC/pH threshold

3. Alarm

➡ 5. EC/pH Alarm Definition

⇨ 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.

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

4.6 EC/pH Alarm Setting

Set EC/pH alarm and define action in event of an EC/pH alarm

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
EC-P. Hi/Fail	STOP	STOP	01:00	YES
EC-Pre. Low	STOP	STOP	01:00	YES
E. Tank Fresh	STOP	STOP	01:00	YES
E. Tank Drain	STOP	STOP	01:00	YES
EC Sen. Dif.	STOP	STOP	01:00	YES
pH Sen Dif.	STOP	STOP	01:00	YES

4.7 Radio System Alarm Definition

MPORTANT: For Radio System to work properly, you MUST define in the 6.2 SYSTEM SETUP menu – *Remote Unit type* parameter SN/RF Net.

Define Radio Systems alarm activity and notification.

3. Alarm

➡ 7. Radio Sys Alarm Definitio

RADIO SYS. ALARM DEFINITION			
Alarm Type	Delay mm:ss	Active	Inform
RTU			
Vbatt failure	00:00	YES	YES
Vbatt low	00:00	NO	YES
Vbatt warn	00:00	NO	YES
Cap failure	00:00	NO	YES
Card failure	00:00	NO	YES
I/O Open	00:00	NO	YES
I/O Shor	00:00	NO	YES
HOST			
Over current	00:00	NO	YES

The **ACTIVE** column defines whether the alarm is used in making decision regarding the irrigation program (YES / NO)

The **INFORM** column defines whether the system will notify the user of the alarm occurrence (YES / NO)

4.8 Radio System Alarm View

View the current alarm status of the Radio System.

→ 8. Radio Sys Alarm View

RADIO SYS. Alarm view

Unit	S/N	Comm	Vin state	Card
HOST	0128	OK	-	-
BASE	0117	FAIL	-	-
RTU	0236	OK	-	3.1
RTU	0115.3.4	-	OK	
RTU	0513.4.1	-	FAIL	
RTU	0198	-	WARN	
RTU	0555.3.1	-	LOW	
RTU	----	-	-	
RTU	----	-	-	
RTU	----	-	-	

The **S/N** column is the number of the unit. When an *Open Circuit* ***or*** *Short Circuit* alarm is detected, the system in addition will also present the card number and the input/output number that is problematic.

For Example: **RTU – 0555.3.1**

UNIT # | CARD # | INPUT/OUTPUT#

Exiting and re-entering refreshes the alarm status screen.

4.9 SMS Subscription

Define which alarms to send for each subscriber. Subscribers need to be defined in the 6.11 EDIT SMS PHONEBOOK menu.

→ 9. SMS Subscription

SMS SUBSCRIPTION

Alarm/Group	ADAM	JAKE
*Hardware	PRIORITY	YES
*System #	PRIORITY	YES
*Hydraulic#	PRIORITY	YES
*Dosing #	PRIORITY	YES
HIGH FLOW	YES	NO
VALVE#	YES	NO
LOW FLOW VAVLE#	YES	NO
WATER LEAK	YES	NO
LOW PRES	NO	NO

Define which subscriber will receive an SMS if there is an active alarm within the listed alarms or group of alarms according to:

- **NO:** Do not send an SMS for this alarm
- **YES:** Send an SMS for this alarm according to the "**Send period**" parameter defined in the SMS SETUP menu
- **PRIORITY:** Send an SMS for this alarm as soon as it appears regardless of "**Send Period**" time constraints

△ *__NOTE__: Refer to the **SETUP** section (Menus 6.11-6.13) in the **Installation manual** for more information on the SMS feature.

5 HISTORY

5.1 System History

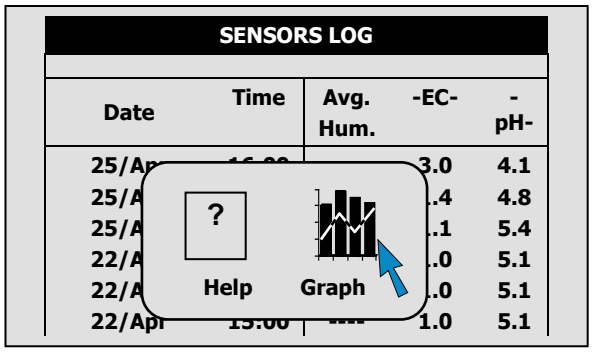
Read-Only screens of system's history (measurements, settings, processes, events, graphs…)

4. History

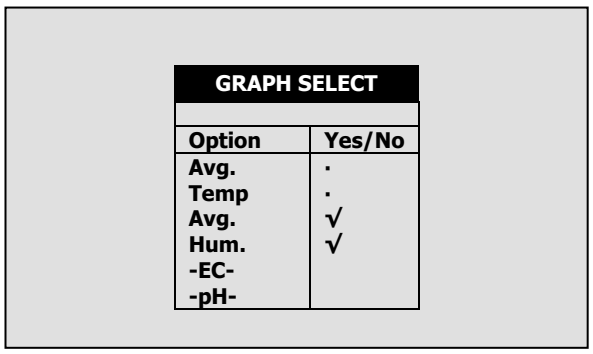
➡ 11. Sensor Log ➡

SENSORS 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



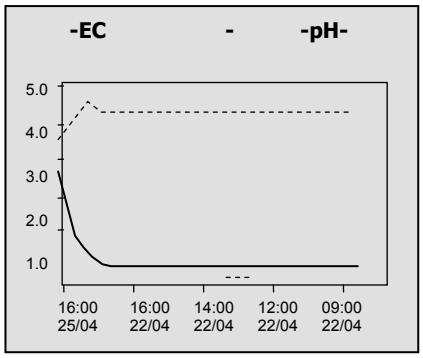
➡ Select sensors using +/- key (no more than 3 per graph)



➡ 

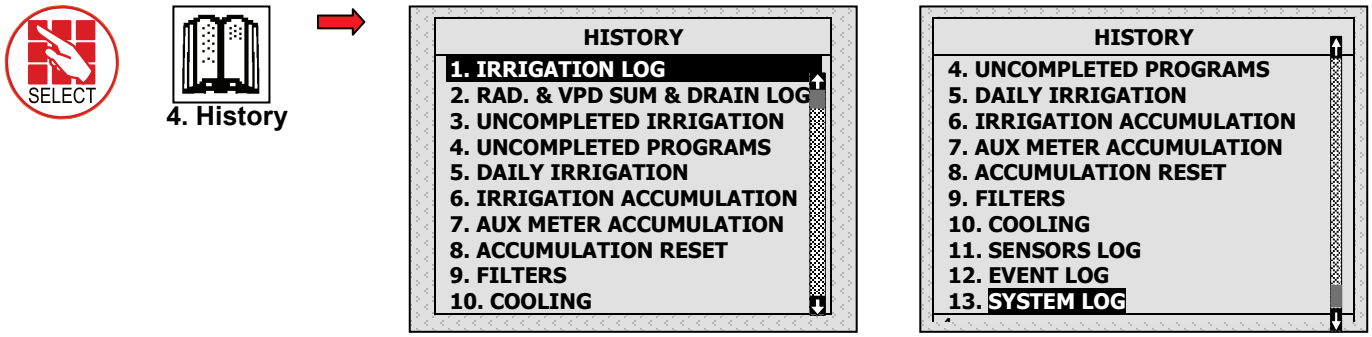
Menu

△ **NOTE**: Press the Mode/Zone Key to view the graphs.

➡ 

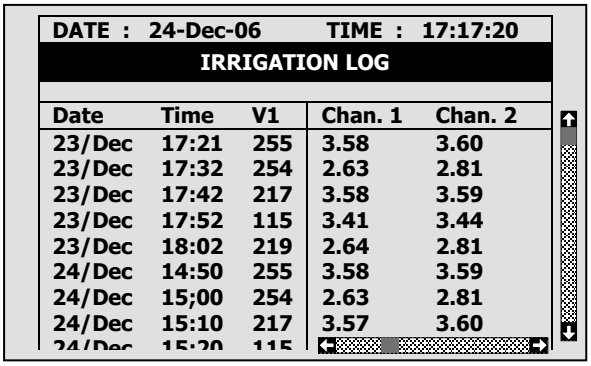
△ **NOTE**: Use ⇧⇩ arrow keys to zoom in/out. Use ⇦⇨ arrow keys to scroll.

The history menu provides extensive information regarding measurements and processes performed by the NMC-Pro.



IRRIGATION LOG

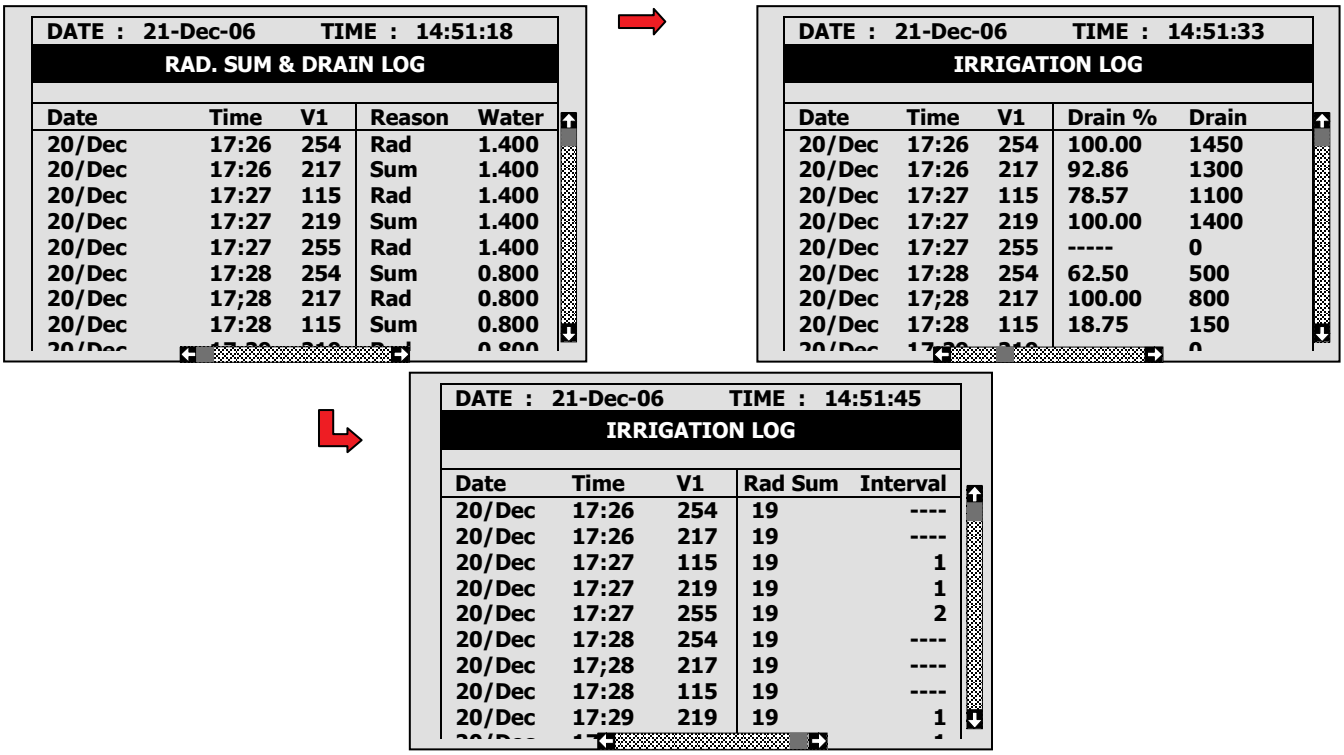
- The Irrigation Log table includes up to 200 rows of the last irrigations' data. Each row includes information regarding a specific irrigation.
  To view additional information, use the left/right arrow keys.
  To switch between dosing quantities or time simply press the '+/-' key.



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.
Chan. #	Dosing quantities per channel (liter or gallon) or dosing time.
EC Low	Lowest EC value recorded during irrigation.
EC Avg.	Average EC value recorded during irrigation.
EC High	Highest EC value recorded during irrigation.
pH Low	Lowest pH value recorded during irrigation.
pH Avg.	Average pH value recorded during irrigation.
pH High	Highest pH value recorded during irrigation.

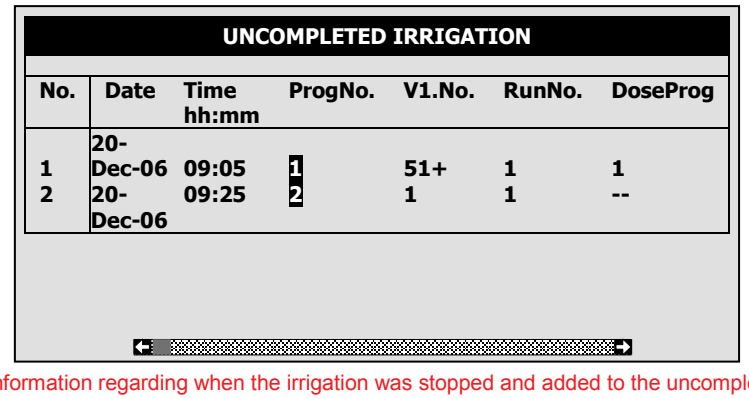
RAD. & VPD SUM & DRAIN LOG



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 Sum	Accumulated radiation sum level when irrigation started.
Interval	Time (in minutes) since last irrigation cycle. Refers to the last irrigation of a specific valve.

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.



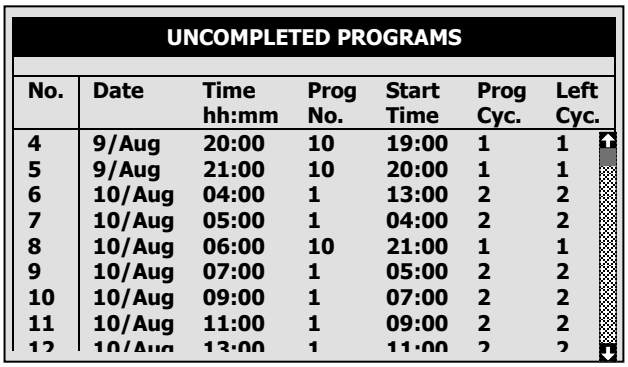
Each line includes information regarding when the irrigation was stopped and added to the uncompleted irrigations table.

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 NMC-Pro 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.

UNCOMPLETED PROGRAMS

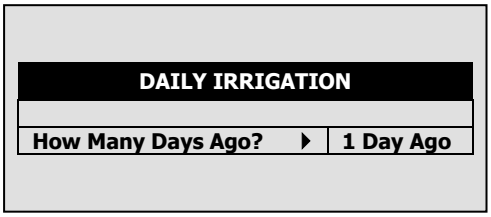
The Uncompleted Programs table provides information on programs that could not be completed. It is important to understand the difference between this table and the Uncompleted Irrigations table; this table consists only of irrigation cycles that haven't been started and could not be completed during 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.



The uncompleted program table consists of 200 lines.

DAILY IRRIGATION

This table allows you to view history of irrigation quantities or



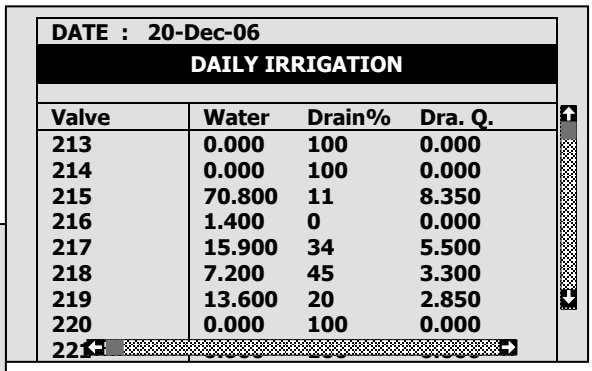
Example: 1 day ago means you would like to view yesterday's history, and Today means you would like to view the accumulated history since the last End Day.

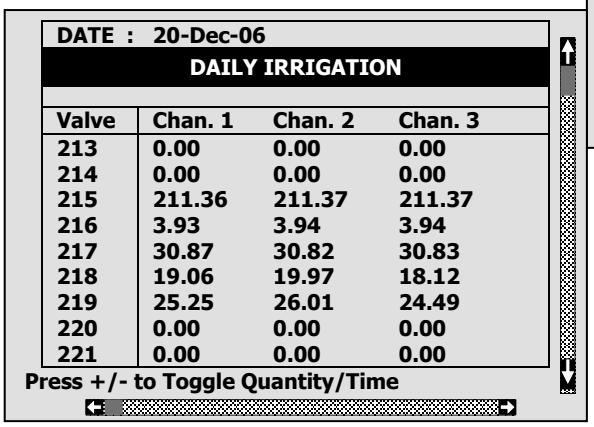
To open the selection list

Relevant day using arrow keys

ENTER

Current date viewed at top of screen.

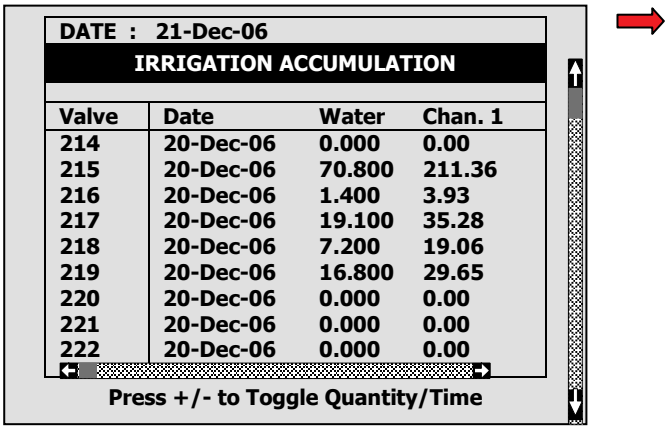


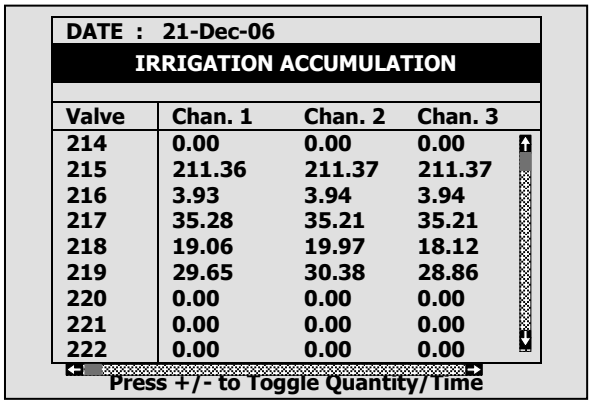


Daily Irrigation table contains all water (m3 or gallon) and dosing (liter or gallon). To toggle the view between quantities and time, press the '+/-' key.

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.





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

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.

AUX METER ACCUMULATION

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
7	5.700	20-Dec-06
8	4.200	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.

ACCUMULATION RESET

ACCUMULATION RESET

Reset Valve Quantity For?	<None>
Reset Aux. Meter For?	<None>

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

Desired option using arrow keys

ENTER

△ **NOTE**: When resetting a valve (or all valves), its history will be erased from the following tables:
Daily Irrigation
Irrigation Accumulation

ENTER to reset an individual auxiliary meter or all auxiliary meters

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.

FILTERS

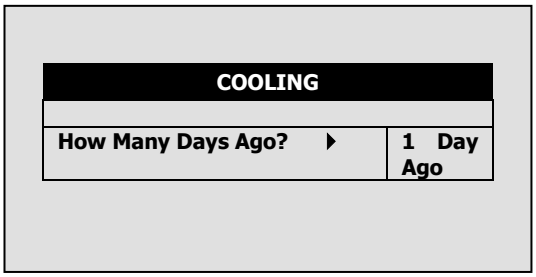
The filters history table provides daily information of the number and cause of flushing.

FILTERS

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

COOLING

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

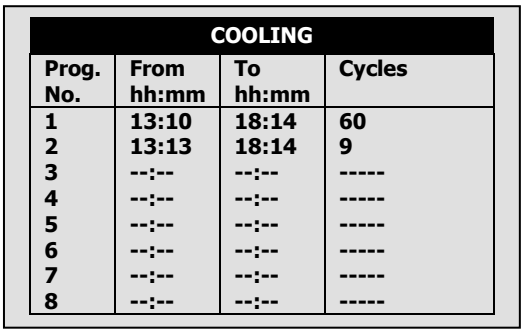


ENTER to open selection list

Relevant day using arrow keys

ENTER

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.



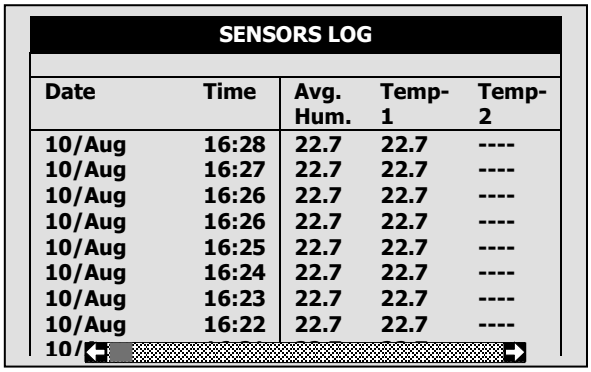
COOLING

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	--:--	--:--	-----

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.

In order to define the measurement interval, the user should go to menu 6.2 and choose the required History resolution.



SENSORS LOG

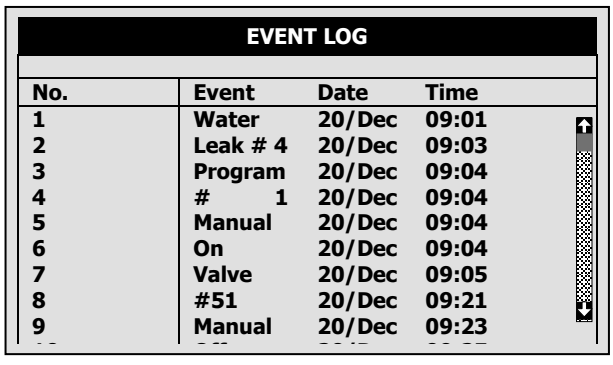
Date	Time	Avg. Hum.	Temp-1	Temp-2
10/Aug	16:28	22.7	22.7	----
10/Aug	16:27	22.7	22.7	----
10/Aug	16:26	22.7	22.7	----
10/Aug	16:26	22.7	22.7	----
10/Aug	16:25	22.7	22.7	----
10/Aug	16:24	22.7	22.7	----
10/Aug	16:23	22.7	22.7	----
10/Aug	16:22	22.7	22.7	----
10/				

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.

EVENT LOG

The table provides information of all the processes performed by the NMC-Pro including their time and date.

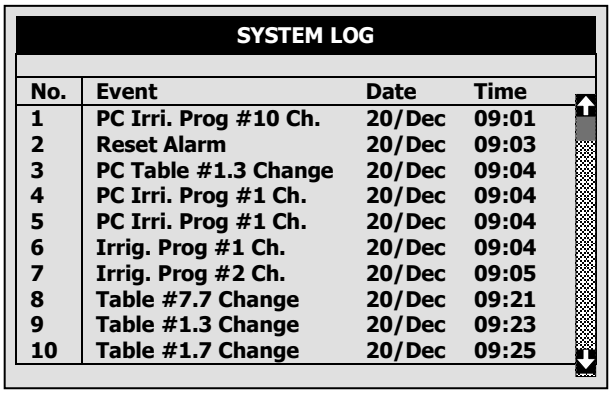


EVENT LOG

No.	Event	Date	Time
1	Water	20/Dec	09:01
2	Leak # 4	20/Dec	09:03
3	Program	20/Dec	09:04
4	# 1	20/Dec	09:04
5	Manual	20/Dec	09:04
6	On	20/Dec	09:04
7	Valve	20/Dec	09:05
8	#51	20/Dec	09:21
9	Manual	20/Dec	09:23

SYSTEM LOG

This table provides information of all the system changes.



The table consists of the last 999 events

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

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