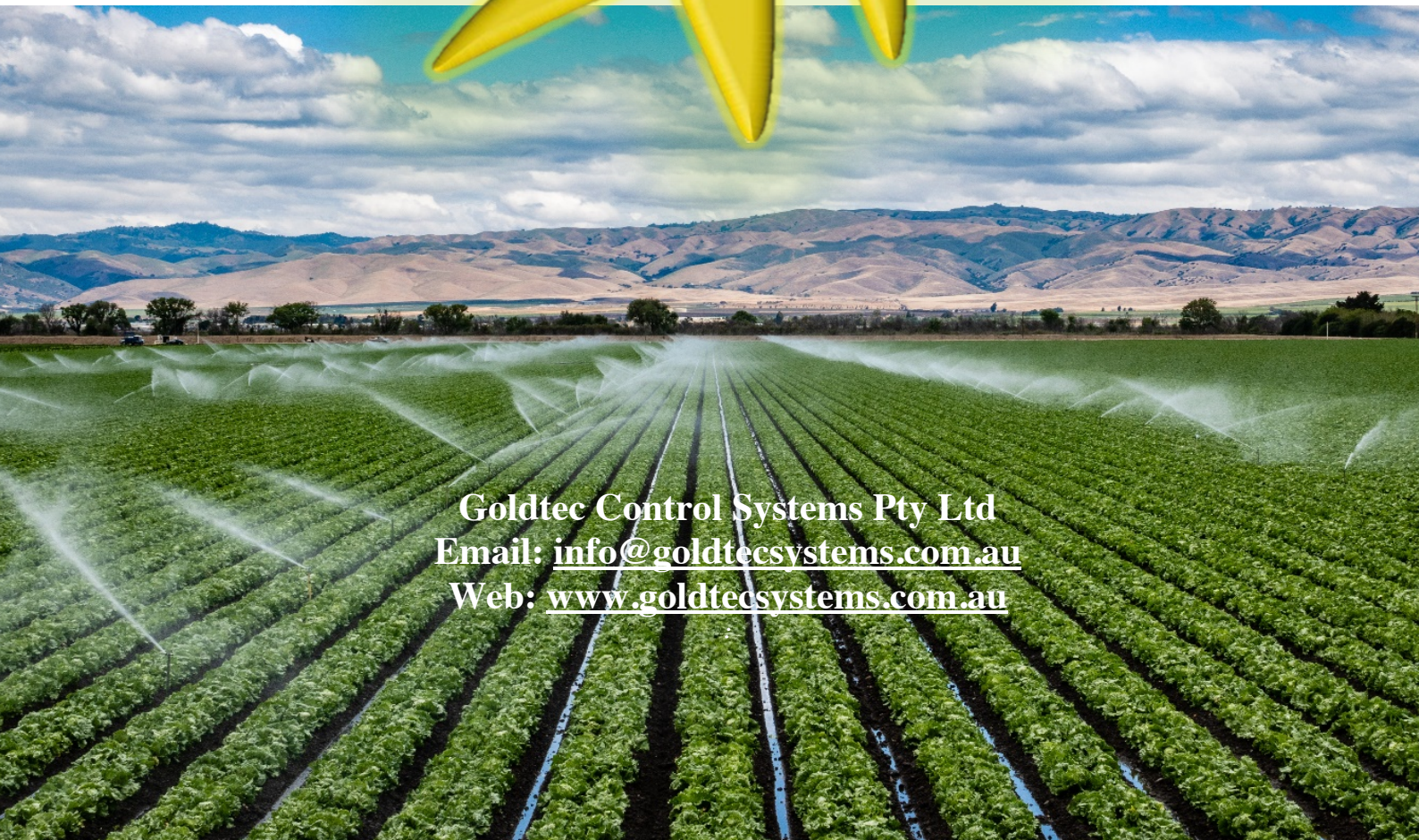




DREAM 2
Irrigation Control Systems
USER GUIDE



Goldtec Control Systems Pty Ltd
Email: info@goldtecsystems.com.au
Web: www.goldtecsystems.com.au

TABLE OF CONTENTS

TABLE OF CONTENTS	2 -
1. Introduction	4 -
1.1 The Key-board description	5 -
1.2 How to Switch-Up and Shut-Down the system	5 -
1.3 The Power Supply Board	7 -
1.4 The CPU board	8 -
1.5 The concept of the internet communication	9 -
1.6 Finding your way inside the DREAM	10 -
1.7 The “ABOUT” screen	14 -
2. Defining Irrigation Programs	14 -
2.1 The Irrigation Sequence definition	14 -
2.2 The Water Dosage definition	17 -
2.3 Special Dosage Modes	19 -
2.3.1 Dosage by Evaporation	19 -
2.3.2 Dosage by Volume Per Area	20 -
2.4 Local and Central fertilizer dosage	21 -
2.4.1 Global Accumulative fertilizers limit	22 -
2.4.2 Sequential fertilization	22 -
2.5 Irrigation Timing	22 -
2.5.1 Cyclic irrigation	24 -
2.5.2 Triggering irrigation cycles by accumulated light	24 -
3. Relating Conditions with Programs	25 -
4. Manual Start/Stop and Freeze/Release	26 -
5. Checking the System Status	26 -
6. Irrigation/Fertigation Parameters.....	29 -
6.1 Conditions Library	29 -
Contact	29 -
Satellite.....	29 -
Program	29 -
Combined	29 -
Flow	29 -
Analog	29 -
6.2 Groups Definition	30 -
6.3 Evaporation.....	31 -
6.4 Fertilizer Sets Library.....	32 -
7. RESULTS of the irrigation activity.....	33 -
7.1 Events Report	33 -
7.2 Accumulations	34 -
7.3 Sensors Logging results	34 -
8. Constants	35 -

8.1	System Constants	35 -
	System Reset Time	35 -
	Pressure delay	35 -
	Fertilizer leakage limit	35 -
	Water pulses before fert	35 -
	Common Scheduling params	35 -
	Common dosage coefficient	35 -
8.2	Main Valves' Constants	36 -
8.3	Irrigation lines constants	36 -
	High/ Low flow delay	36 -
	Water Leakage limit	36 -
	Line name	36 -
8.4	Valves' Constants	37 -
	The default dosage mode	37 -
	The Nominal, Minimal and Maximal flows	37 -
	The filling time	37 -
8.5	Water Meter Constants	38 -
	The water meters' ratio	38 -
8.6	Fertilizer Sites Constants	38 -
	When pulses fail to arrive	38 -
	The Fert. meter's ratio	39 -
	The pulse length	39 -
	Special case	39 -
8.7	Filter Sites Constants	39 -
	DP Delay	39 -
	Looping limit	39 -
8.7.1	What happens with the irrigation during backflushing?	39 -
9.	Utilities	40 -
9.1	Water Sources	40 -
9.2	Satellites	41 -
9.2.1	Associating Satellites with other outputs	41 -
9.2.2	Conditioned Satellites	42 -
9.2.3	Conditions depending on satellites	42 -
9.3	Virtual Water Meters	42 -
9.3.1	Virtual water meter for irrigation	44 -
9.3.2	Virtual water meter for network protection	44 -
9.3.3	Virtual water meter for water sources	45 -
9.4	Analog Sensors	45 -
9.5	Rain Shutdown	45 -
9.6	Frost protection	46 -
9.7	Sensors Logger setting	48 -
9.8	Alarms definition	48 -
9.9	Radiation sets definition	49 -
10.	Filtration	50 -
11.	System SETUP	51 -
11.1	DEALERS DEFINITIONS	51 -

1. Introduction

The **DREAM 2** irrigation control system is the second generation of the well-known **DREAM** family.

Additionally to the outstanding features of the **DREAM** system, the new generation now offers internet communication so that users of the **DREAM 2** system can access their controllers from everywhere, anytime.

** Please NOTE that this is not an included feature but an optional extra.

Users are offered two options for accessing the system: one known as the **CONSOLE** which is a software package that has to be installed on a **PC**, the other is just an internet site called the **SPOT** which does not need any loading and is meant to be used on **CELLULAR PHONES** and **TABLETS**.

Both options enable the users to login to the **SERVICE** which is a sophisticated software package located somewhere in the cloud acting like a mediator between users and their controllers.

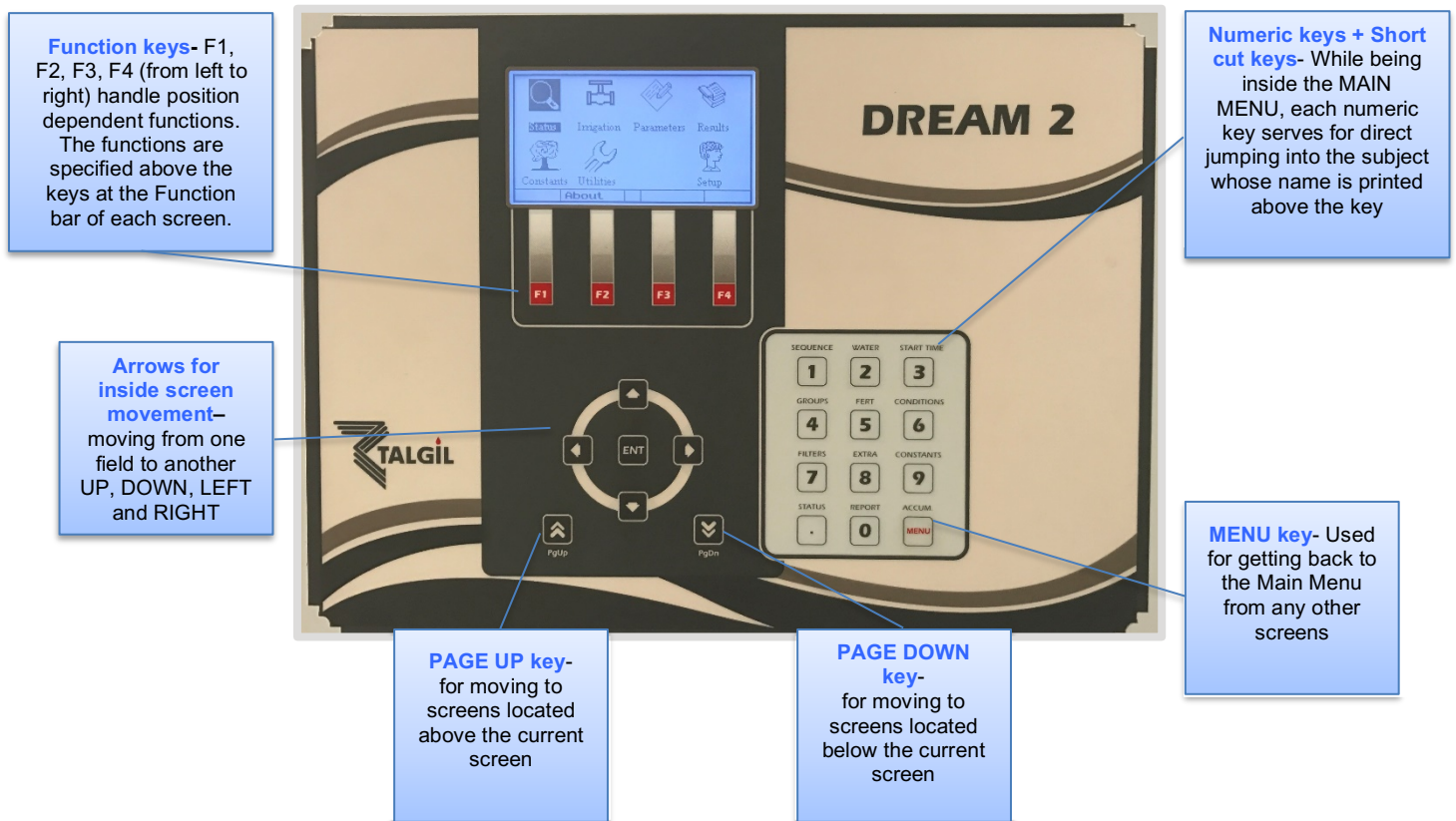
On the other end there are the controllers that also login to the **SERVICE** and stay online. The **SERVICE** will repeatedly interrogate all the online controllers in order to keep its **DATA BASE** up to date, so that users interested in some information about their controllers, can find it in the **DATA BASE**.

The aim of the following manual is to describe the features of the **DREAM 2** controllers and teach the users how to program it using the local **MMI** of the controller.

Prior to start using the controller in any specific facility, a configuration procedure must be executed in which the image of the controller is defined. In this manual we assume that the configuration procedure has been fully completed either by using the “**Image Maker**” of the **CONSOLE** or by the local **MMI** as explained at the "[DREAM installation guide](#)".

For learning how to use the **CONSOLE** software, see the "[DREAM 2 CONSOLE guide](#)".

1.1 The Key-board description



1.2 How to Switch-Up and Shut-Down the system

Switching up and shutting down the **DREAM 2** controller are activities that deserve some explanations:

Switching up the **DREAM 2** from a switched off state is done in 2 steps:

1. Turning ON the **Power Switch**
2. Pushing the **Start button**

About the **Power Switch** and **Start Button** see the paragraph of the [Power Supply Board](#) below.

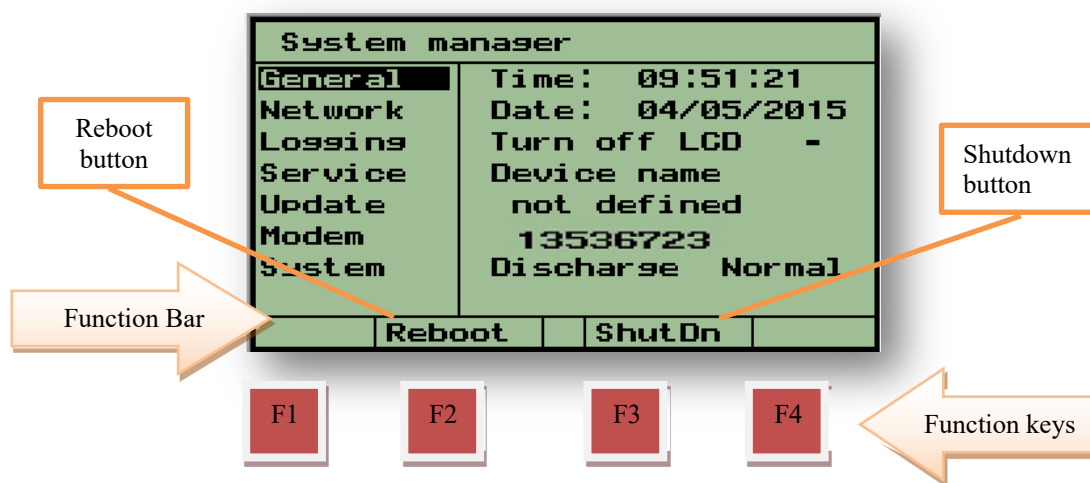
Each time the software is restarted there will be some introductory screens displayed, then the **System manager** screen (described below) will appear for a few seconds and eventually the **Main menu** of the DREAM application will be displayed. The user should wait patiently until this stage is reached.

The internal structure of the **DREAM 2** is very much like the structure of a desktop personal computer that has an operating system which handles multiple applications simultaneously.

This kind of activity is naturally involved with opening of multiple files as required by the active applications. **As in PCs, cutting the power before closing the open files may be a harmful action and therefore should be avoided.** For this reason we are not supposed to turn off the power switch of the controller before the software was commanded to shut down.

The software **Shutdown** button is located at the **Function Bar** of the **System Manager** screens, which can be reached from any of the **DREAM 2** application screens, by pushing simultaneously the **PgDn** (V) and **PgUp** (Λ) buttons.

! Important remark: Pushing the **F3=Shutdown** button is the only safe way for shutting down the **DREAM 2** controller. Shutting down takes time, it is necessary to wait until the lights on the CPU board turn off. Only after the lights on the CPU went off, it is safe to switch off the **Power Switch** (see below).

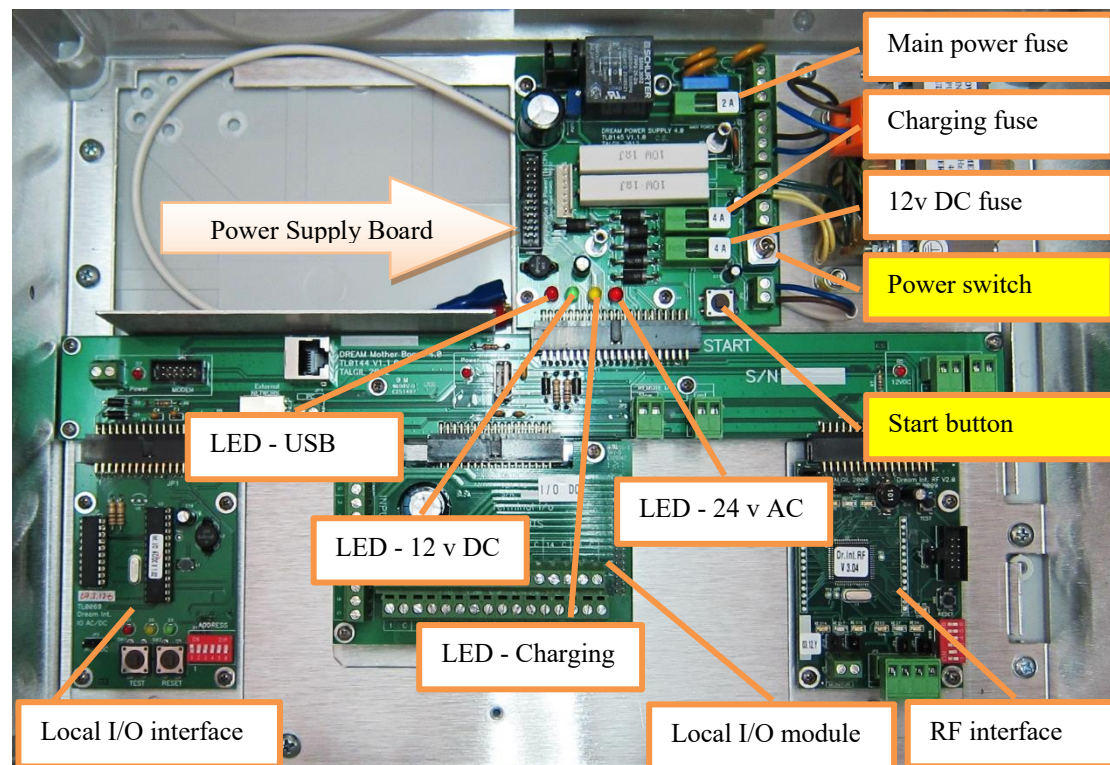


- The **Shutdown** software key turns the **DREAM 2** system OFF.
- The **Reboot** software key turns the **DREAM 2** system OFF and then ON again.

The **Reboot** and **Shutdown** functions are activated by pushing the red function keys located underneath the **Function Bar** of the screen. Both functions preserve all the data included in the controller except the statuses and left quantities of programs.

1.3 The Power Supply Board

In the following paragraphs we are going to have a look inside the box of the **DREAM-2** controller, although the information may seem to be a little technical, we think it can be useful if the user gets familiar with the functions of the switches, the LEDs, the fuses and some main components of his system.



When the **Power Switch** is off, only the yellow LED should keep on lighting, indicating that the charging of the backup battery continues.

When the **Power Switch** is turned on, some more LEDs of the power supply board will start lighting.


The red LED ● indicates that 24v AC arrives to the system from the transformer (in AC systems only). If this does not happen, the power from the mains and the **Main Power Fuse** have to be checked.




As mentioned above, the yellow LED ● indicates that the charging voltage (13.9v DC) for the backup battery is generated. If this LED does not light, check the **Charging Fuse**. The backup battery should never left to be deeply discharged, it may harm the battery, therefore if the charging source is expected to be disconnected for a long period, the backup battery has to be disconnected as well, otherwise when the charging is restarted, the deeply discharged battery may draw a high charging current that may blow the **Charging Fuse (F3)**.

The green LED ● indicates that the 12v DC arrives into the system. The 12v DC is used for feeding all the electronic boards of the system; it may be generated either from the charging device or from the backup battery, when the charging device is off. In case of AC systems the charging device is the transformer, while in DC systems it is the solar panel. The system is

protected from excess current consumption from the 12v DC source, by the **12v DC Fuse (F2)**.

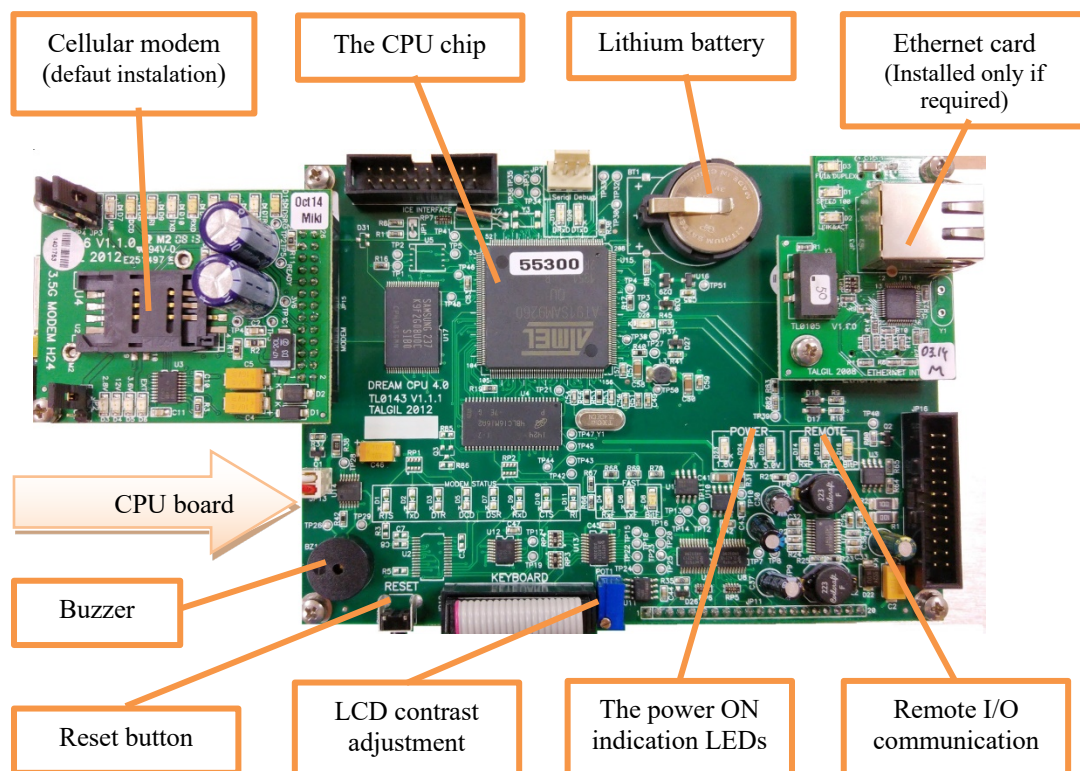


Important remark: The charging current passes through both the **Charging Fuse** and the **12v DC Fuse**, so if for some reason the **12v DC fuse** is blown there will be no battery charging, although the charging voltage exists (yellow LED  ON).

The red LED  of the USB will start lighting only after the **Start Button** is pushed, indicating that the system is now up and running. Together with the USB LED of the power supply board, the red LED  on the Mother Board and the three red **power LEDs** on the CPU Board  will start lighting as well.

1.4 The CPU board

Looking underneath the front panel, at the back of the **LCD display** we are going to find the **CPU Board** which is the brain behind all the activities of the controller. Let's get familiar with some of the components on the CPU board:



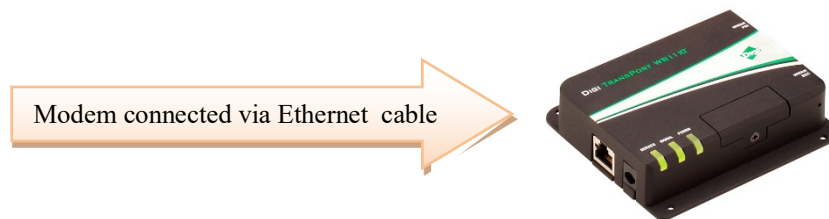
When the **DREAM 2** application starts running, a few activities start in parallel:

- The **LCD display** connected to the **CPU board** will start showing some introductory screens until arriving to the **Main Menu**.
- The **CPU** starts scanning all the **Interfaces** second by second, sending them the required status of the outputs receiving back the status of the inputs. This activity is indicated by blinking of the **REMOTE I/O** communication LEDs on the **CPU Board** and on each of the **Interfaces**.
- Right after starting up the **DREAM 2** application, the controller starts looking for its host server on the Internet, in order to login to the service.

1.5 The concept of the internet communication

The **DREAM 2** accesses the internet in the following ways:

- Using a **Cellular Modem** supplied by Talgil and plugged into the CPU board.
- Using an **Ethernet card** for connecting to a **Local Area Network**
 - Via a Goldtec supplied modem that utilizes a **SIM card**
 - Client supplied internet via ethernet cable to their own network



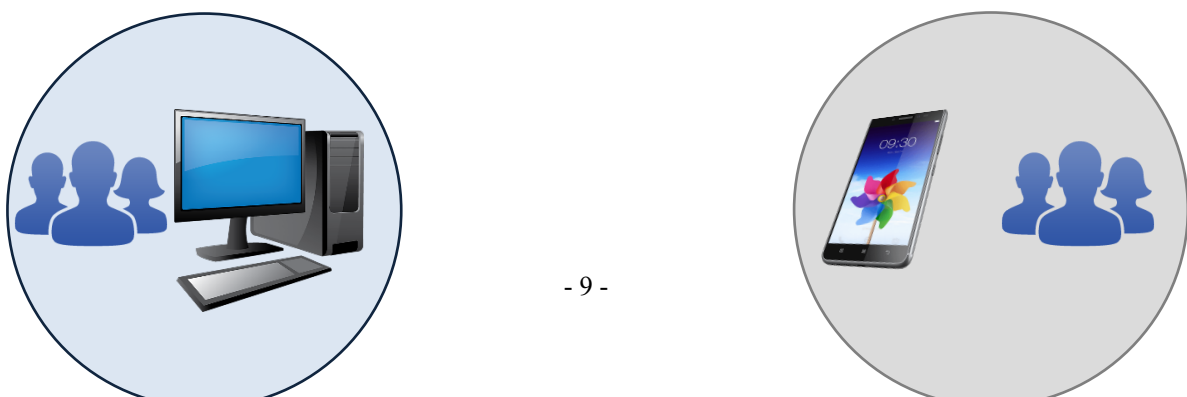
The controllers after power up use their internet link to login to the service and stay online.

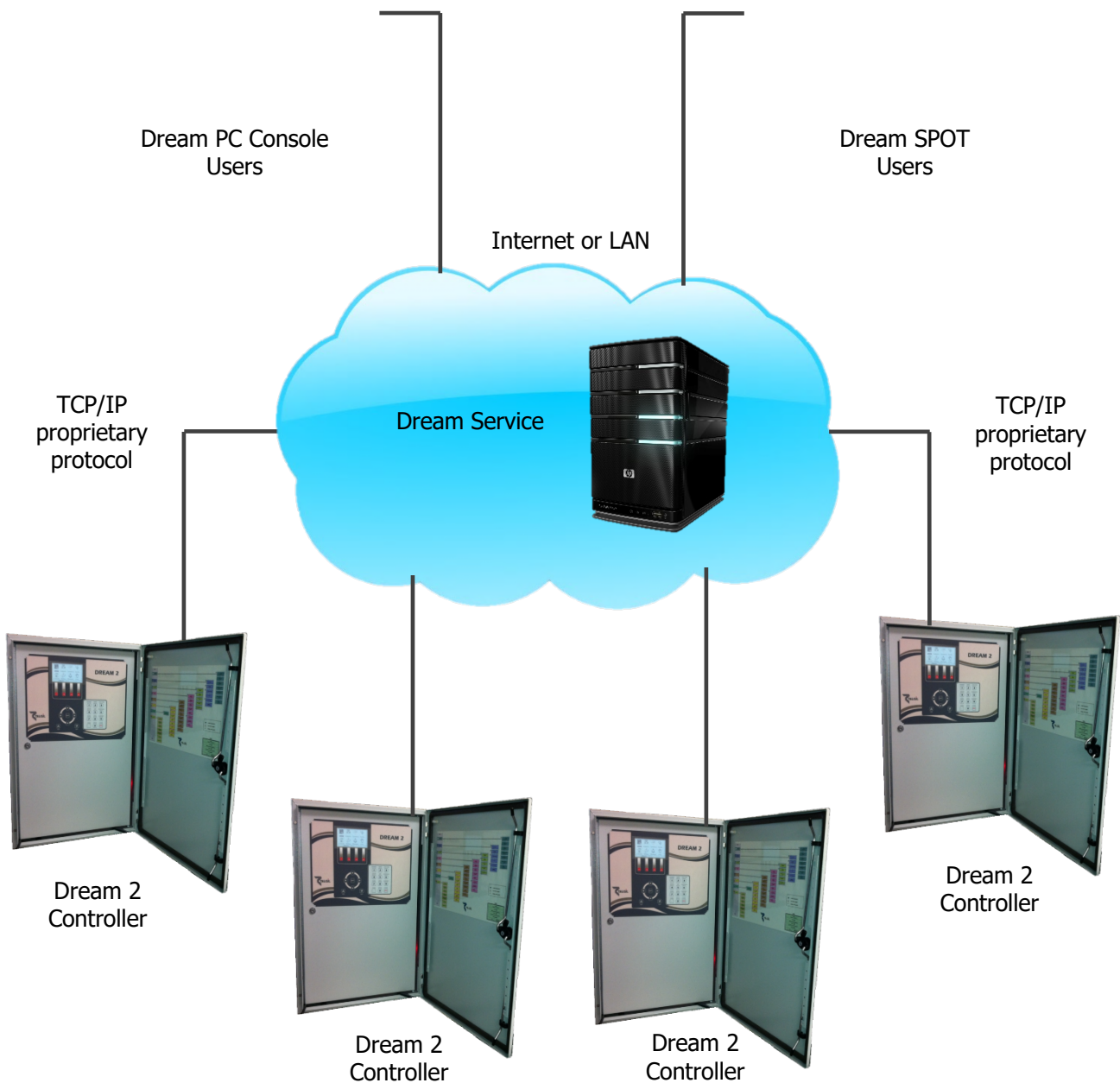
As mentioned above, users have two options for accessing the system: one option is the software package called **CONSOLE** and the other is the internet site called **SPOT**.

Both options enable the users to login to the **SERVICE** which will coordinate between users and their controllers. Additionally the **SERVICE** contains a large **DATA BASE** that stores all the information about all the controllers and the **ADMINISTRATION** software that decides about who is permitted to access which controller.

The **Server** will interrogate all the online controllers repeatedly in order to keep the **DATA BASE** up to date, so that users interested in some information about some controllers, can find it in the **DATA BASE**.

The drawing below demonstrates the physical layout of the communication between users and targets (controllers) in the **DREAM 2** system.

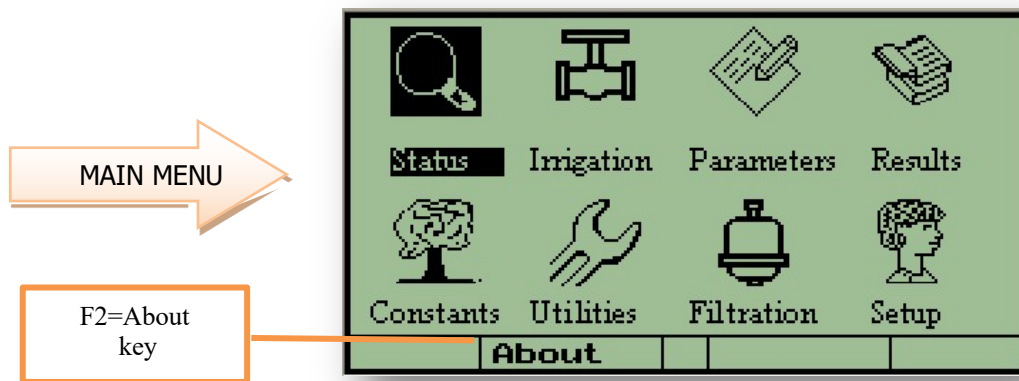




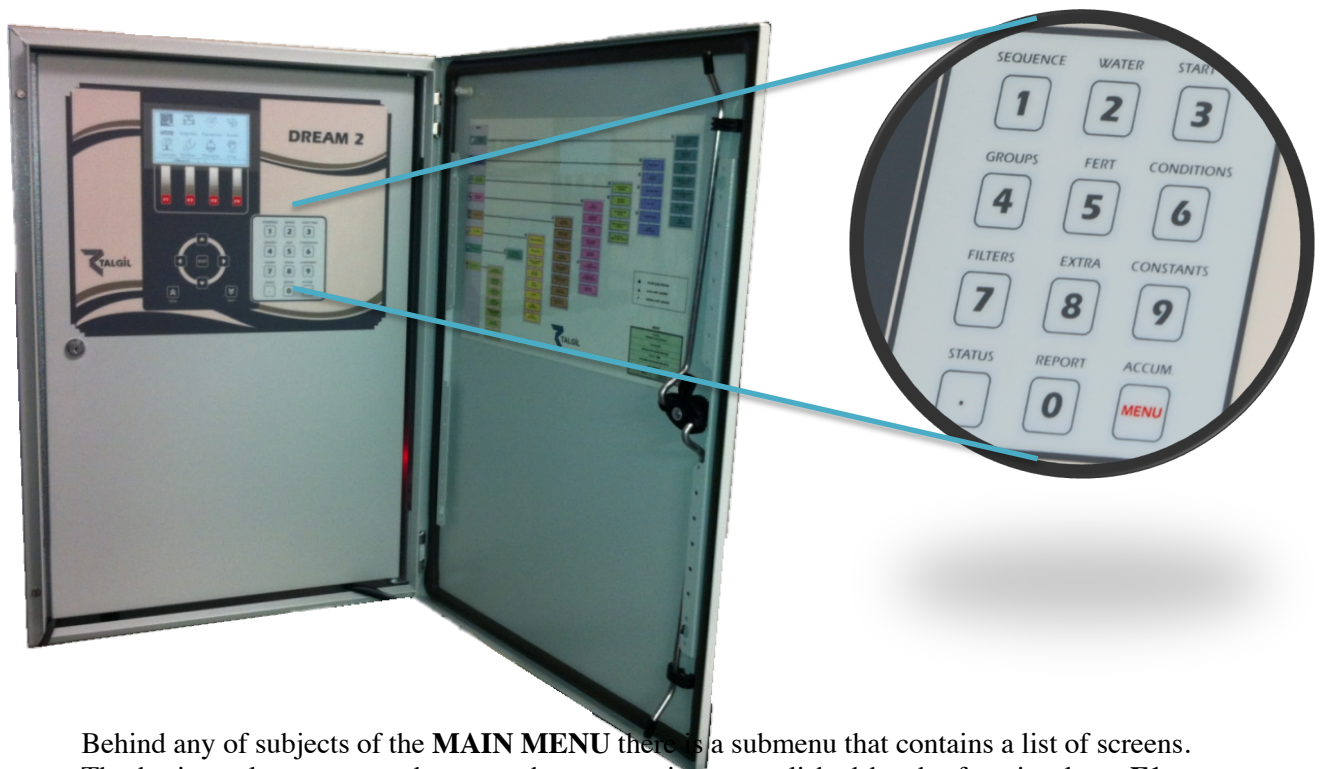
For setting up the internet communication there are some parameters to be defined. The setting of these parameters is the job of the technical person in charge of the system installation. Those who are interested can find information in the chapter dealing with the **SYSTEM MANAGER** screens in the [Installation Manual of the DREAM 2](#).



1.6 Finding your way inside the DREAM

The **MAIN MENU** of the **DREAM** includes 8 subjects represented by 8 icons as shown below. Underneath each icon there is a **SUBMENU** through which we can reach any of the screens included in that subject. Selecting any of the subjects is done by placing the cursor (black background) on the desired icon and hitting the **ENTER** key. For getting back to the **MAIN MENU** from any screen use the key at the bottom rightmost corner of the numeric keypad.



Having a closer look at the numeric keypad we shall see that above each key there is some additional printing, this is to indicate that each key while being in the **MAIN MENU** can act as a shortcut to the screen associated with it.



Behind any of subjects of the **MAIN MENU** there is a submenu that contains a list of screens. The horizontal movements between the screens is accomplished by the function keys **F1** =  and **F4** = . Generally, the horizontal layout of the screens resembles the order of the subjects included in the submenu, so the user can use the **F1** and **F4** to pass through the screens of a subject.

STATUS – showing current statuses of the system and its components.



STATUS	
CURRENT STATUS	
OUTPUT	
INPUTS	
WATER FLOW	
FERT.FLOW	
ANALOG VALUES	
RTU COMMUNICATION	
←	ENTER

IRRIGATION – supplying tools for defining irrigation programs, including tools for monitoring the irrigation process and tools for intervention when necessary.

IRRIGATION	
IRRIGATION SEQUENCE	
WATER DOSAGE	
FERTIGATION	
IRRIG.TIMING	
CONDITIONS	
←	ENTER

PARAMETERS – dealing with defining supplementary parameters related with the irrigation and fertigation processes.

PARAMETERS	
CONDITIONS LIBRARY	
GROUPS DEFINITION	
EVAPORATION	
FERTIGATION LIBRARY	
FERTILIZER LIMIT	
←	ENTER

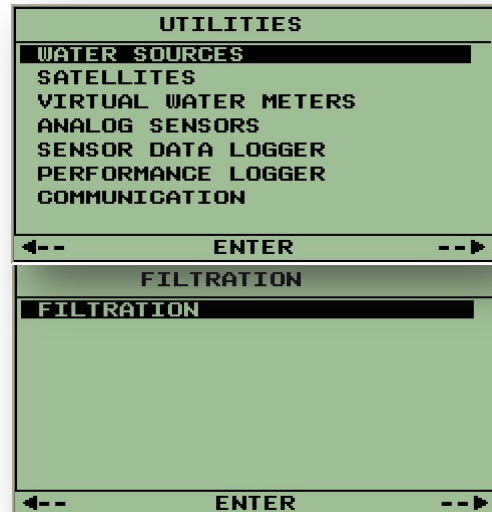
RESULTS – showing reports and accumulations resulting from the system's activity. The reports can be sorted and viewed in various contexts.

RESULTS	
ALL REPORTS	
PROGRAM REPORTS	
VALVE REPORTS	
FERTIGATION REPORTS	
FILTRATION REPORTS	
WATER ACCUMULATION	
FERT ACCUMULATION	
SENSOR DATA LOGGER	
←	ENTER

CONSTANTS – setting the constant parameters of all the system components.

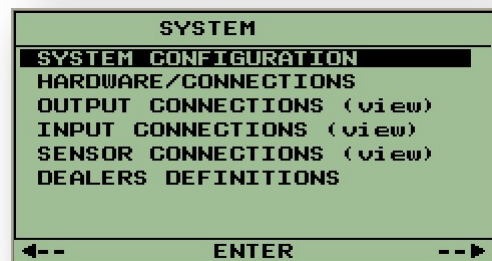
CONSTANTS	
SYSTEM	
MAIN VALVES	
IRRIGATION LINES	
VALVES	
WATERMETERS	
FERTIGATION	
FILTRATION	
←	ENTER

UTILITIES – dealing with special functions that support various system activities.



The screenshot shows a terminal window with a green background. At the top, the title "UTILITIES" is centered. Below it, a list of menu items is displayed: "WATER SOURCES", "SATELLITES", "VIRTUAL WATER METERS", "ANALOG SENSORS", "SENSOR DATA LOGGER", "PERFORMANCE LOGGER", and "COMMUNICATION". The first item, "WATER SOURCES", is highlighted with a black bar. At the bottom of the screen, there is a navigation bar with "← -" on the left, "ENTER" in the center, and "- - →" on the right.

FILTRATION – handling the filters flushing programs.



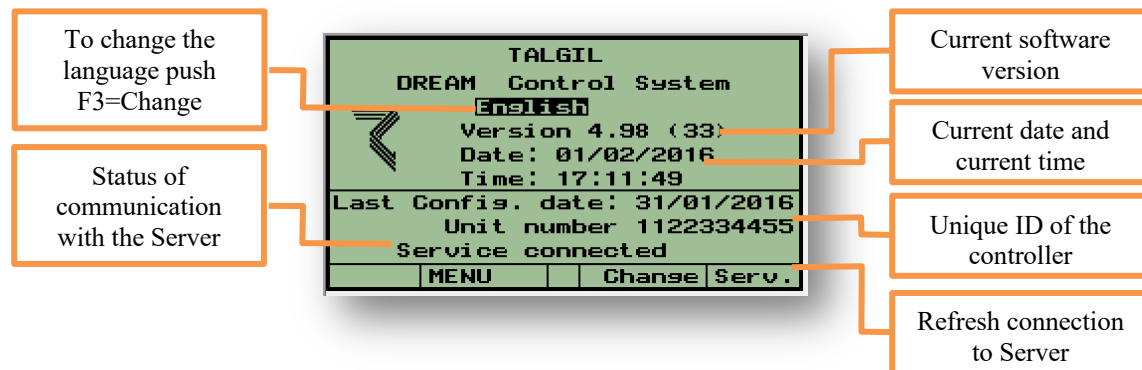
The screenshot shows a terminal window with a green background. At the top, the title "FILTRATION" is centered. Below it, a list of menu items is displayed: "SYSTEM CONFIGURATION", "HARDWARE/CONNECTIONS", "OUTPUT CONNECTIONS (view)", "INPUT CONNECTIONS (view)", "SENSOR CONNECTIONS (view)", and "DEALERS DEFINITIONS". The first item, "SYSTEM CONFIGURATION", is highlighted with a black bar. At the bottom of the screen, there is a navigation bar with "← -" on the left, "ENTER" in the center, and "- - →" on the right.

SETUP – contains all the necessary activities involved with the system configuration and setup.

The contents of the **MAIN MENU** and the **SUBMENU**s may vary according to the relevance. For example, if no filters are defined, the subject "FILTRATION" will not appear in the Main Menu.

1.7 The “ABOUT” screen

Being at the **MAIN MENU** we can use the **F2=About** key to reach the following screen:



The **About screen** contains some valuable information and enables executing some useful commands:

- This is the place where we can select the language we want to use. By hitting **F2=Change** key we shall get a window with a list of languages to select from.
- This is the place where we can try and refresh the communication with the Server in case it is lost. Use **F4=Serv.**
- This is where we can see the ID number of the controller.
- This is the place where we can check the status of communication with the server.
- This is where we can see the version of the software loaded into the controller.
- Additionally we can see the current date and current time and the date of last configuration.

2. Defining Irrigation Programs

Irrigation programs are defined in 3 steps:

1. Defining the **IRRIGATION SEQUENCE** which specifies the sequence of valves to be irrigated by the program.
2. Defining the **WATER DOSAGE** and **FERTILIZER DOSAGE** per each member of the sequence.
3. Defining the **IRRIGATION TIMING** of the program, when the program will be activated. Sometimes instead of irrigation timing programs will be activated by conditions.

When only the first step is defined the program is considered NOT READY, it cannot be activated, but after completing the second step, the program is considered INCOMPLETE, it will not start automatically, but it can be manually started. For a program to be ready for automatic start, step 3 must be completed as well.

2.1 The Irrigation Sequence definition

Any irrigation program's definition starts with defining the sequence of valves to be irrigated by the program. For a new program definition, the cursor must be located at the program number field and then, pushing the function key **F3 = "Progs"** enables execution of commands related with programs editing. Select the option **"New"**, the system will respond by suggesting the next free number for the new program, the suggested number can be accepted or changed.



The sequence of valves can now be inserted. To indicate the end of the sequence definition, use the **ENT** key.

When the system contains more than a single irrigation line, valves will be referred to by specifying both the line number and the valve number separated by a dot, as shown in the example below, otherwise, valves are referred to by their ordinal number only.

The sequence may include not only individual valves, but also predefined Groups of valves (G1, G2 etc...).

The Groups definition can be found under the subject

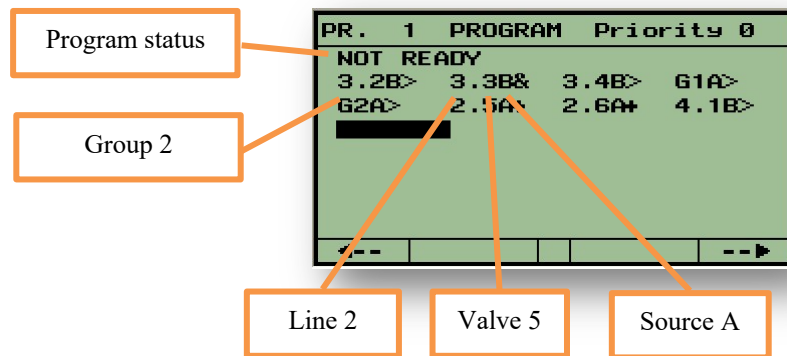


When the system contains several water sources (A,B,C,...F), the user may select the desired water source for each valve/Group by pushing **F4 = "Src"**, otherwise the system will select the default water source of the specified line.

The order by which the valves will be operated is defined by use of the following 3 symbols:

- - **SEQUENTIAL OPERATION** - one valve after the other.
- & - **TEMPORARY GROUPS** - valves of the same line to be irrigated together
and **CONSTANT GROUPS** with a common dosage.
(must be enabled at **DEALERS DEFINITIONS**)
- + - **STARTING TOGETHER** - coordinated start of valves with individual dosages.
The valves may belong to different irrigation lines.
This feature is especially useful when central fertilization is required. (must be enabled at **DEALERS DEFINITIONS**)

The following picture shows an example sequence.



3.2B> 3.3B& 3.4B> G1A> G2A> 2.5A+2.6A+4.1B

The sequence above should be interpreted as follows:

First, line 3 valve 2 (3.2B) will irrigate from source "B" and when finished, line 3 valves 3 and 4 (3.3B&3.4B) will irrigate from source "B", then Group 1 (G1A) from source "A" followed by Group 2 (G2A) from source A. Eventually line 2 valve 5, line 2 valve 6 from source "A" together with line 4 valve 1 (2.5A+2.6A+4.1B) will irrigate from source "B".



Notice that :

- Combining valves into temporary groups by "&" symbol can be done only when the valves belong to the same irrigation line. The valves of the temporary group will share the same water and fertilizer dosage.
- Constant Groups (G1, G2...) cannot be combined by "&" or "+".
- Valves combined by "+" will start together at the same time but each valve will have its own water dosage. As for fertilization, if the valves are of the same line, they will share the same local fertilizer dosage and if there is central fertilization, then the fertilizer dosage will be common to all the valves combined by "+".
- The sequence defined at the local **MMI** of the **DREAM 2** may contain 28 members at the most. However longer sequences can be defined through the **CONSOLE** or the **SPOT**, but then they will not be editable through the local **MMI**. Using long sequences must be enabled at the [DEALERS DEFINITIONS](#).

2.2 The Water Dosage definition

Each member of the sequence must have a water dosage defined in order to be able to irrigate. In the dosage definition screen the sequence members are arranged in a vertical order, the movement to the next or former member is done by the PAGE UP (▲) and PAGE DOWN (▼) keys.

The dosage definition process starts with the selection of the dosage mode. For selection of the water dosage mode place the cursor at the dosage units field. The following dosage modes are supported:

- hh:mm:ss** – by time
- m3** – by volume
- m3/area** – by volume of water per each unit of area
- evaporation** – by volume calculated from the accumulated evaporation since last irrigation
- evaporation time** – The volume calculated from the accumulated evaporation is divided by the nominal flow to obtain the needed irrigation time.

PR. 1 WATER DOSAGE 19:01:48 VALVE: CLOSED Line 3 3.2B <table border="1"> <tr> <td>WATER (m3)</td> <td>Plan 125.000</td> <td>Left 00.000</td> </tr> <tr> <td>Pre Centr.</td> <td>25.000</td> <td></td> </tr> <tr> <td>Pre Local</td> <td>50.000</td> <td></td> </tr> <tr> <td>Water After</td> <td>10.000</td> <td>LastFlow 0.00</td> </tr> </table>	WATER (m3)	Plan 125.000	Left 00.000	Pre Centr.	25.000		Pre Local	50.000		Water After	10.000	LastFlow 0.00	PR. 1 WATER DOSAGE 19:06:05 VALVE: CLOSED Line 3 3.3& 3.4B <table border="1"> <tr> <td>WATER (h:m:s)</td> <td>Plan 01:30:00</td> <td>Left 00:00:00</td> </tr> <tr> <td>Pre Centr.</td> <td>00:20:00</td> <td></td> </tr> <tr> <td>Pre Local</td> <td>00:30:00</td> <td></td> </tr> <tr> <td>Water After</td> <td>00:10:00</td> <td>LastFlow 0.00</td> </tr> </table>	WATER (h:m:s)	Plan 01:30:00	Left 00:00:00	Pre Centr.	00:20:00		Pre Local	00:30:00		Water After	00:10:00	LastFlow 0.00	PR. 1 WATER DOSAGE 19:20:18 VALVE: CLOSED Line 1 G1A <table border="1"> <tr> <td>WATER Evapor.</td> <td>Plan</td> <td>Left 00.000</td> </tr> <tr> <td>Pre Centr.</td> <td>00.000</td> <td>Calculat 45.000</td> </tr> <tr> <td>Water After</td> <td>00.000</td> <td>LastFlow 0.00</td> </tr> </table>	WATER Evapor.	Plan	Left 00.000	Pre Centr.	00.000	Calculat 45.000	Water After	00.000	LastFlow 0.00
WATER (m3)	Plan 125.000	Left 00.000																																	
Pre Centr.	25.000																																		
Pre Local	50.000																																		
Water After	10.000	LastFlow 0.00																																	
WATER (h:m:s)	Plan 01:30:00	Left 00:00:00																																	
Pre Centr.	00:20:00																																		
Pre Local	00:30:00																																		
Water After	00:10:00	LastFlow 0.00																																	
WATER Evapor.	Plan	Left 00.000																																	
Pre Centr.	00.000	Calculat 45.000																																	
Water After	00.000	LastFlow 0.00																																	
by volume	by time	by evaporation																																	

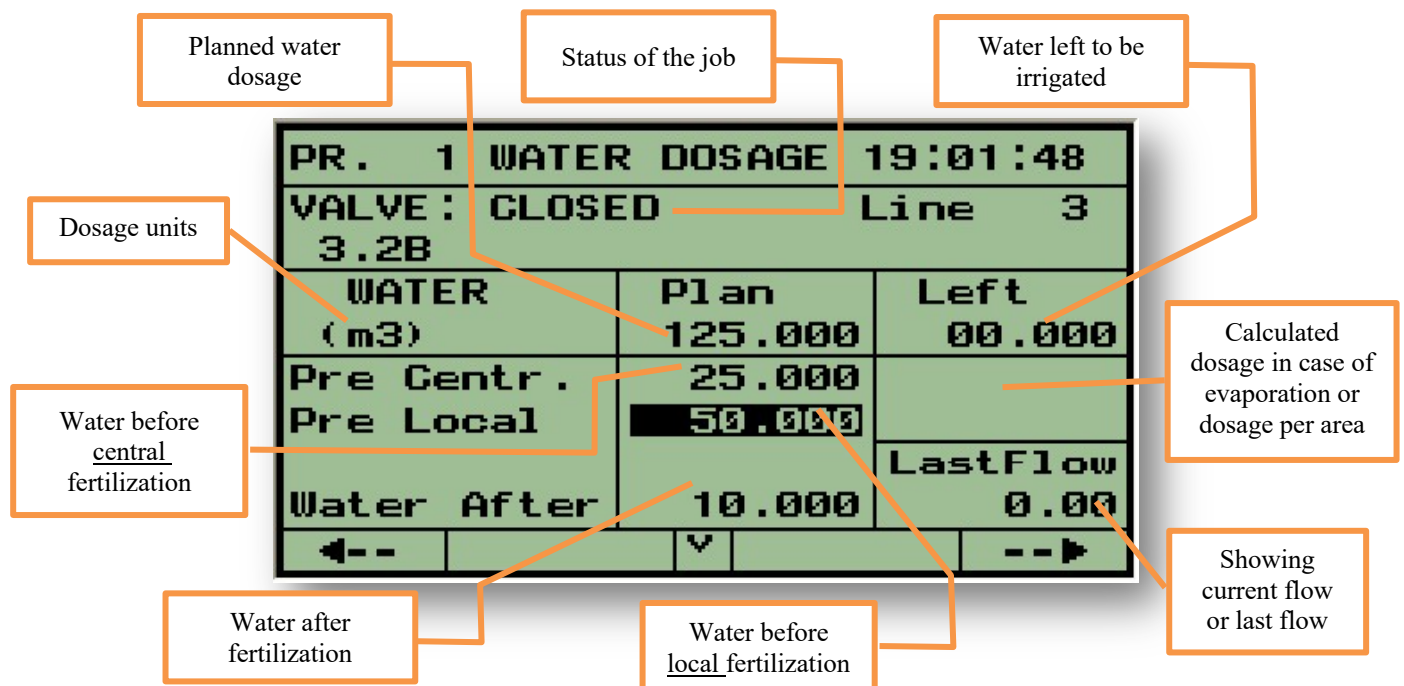
The dosage units field



Notice that :

- Dosage by volume will be available only if the irrigation line or the water source in use have got real or virtual water meters.
- When irrigating by evaporation there is no planned value to be inserted, and when working by m3/area the planned value actually contains the planned amount per area and not the total amount to be irrigated. However, in both cases, the total amount to be irrigated will appear as a calculated value. For detailed explanation of dosage by evaporation and dosage by volume per area, see the paragraph of [Special dosage modes](#) below.

The function of the various fields is as follows:



There is an option to define a special dosage of “water before” for the first Local fertilizer, to make it different from the others. This option must be enabled through the [DEALERS DEFINITIONS](#).

Coordinated start of members of a sequence using the “+” sign, is meant mainly for coordinating the fertigation of various valves in order to eliminate contradicting demands of water and fertilizers. In that case, the system does not permit individual central fertigation jobs but is dealing instead with a common fertilizing job shared by all the coordinated members. Therefore when the option of "starting together" of valves with the “+” sign is enabled, the definition of the water before will be made at the common fertilizer dosage screen instead of in the water dosage screen and hence the appearance of those screens will be slightly different.

2.3 Special Dosage Modes

Within this topic we shall explain the [Dosage by evaporation](#) and [Dosage by volume per area](#). In order to be able to use these special dosage modes, they must be enabled through the [DEALERS DEFINITIONS](#). Both of the two dosage modes are meant to save the calculation effort when defining the amount of water to irrigate.

Both methods are making use of the information about the area covered by each valve, which is part of the [VALVES' CONSTANTS](#).

MORE VALVES CONSTANTS		
Valve	Area	Factor %
1.1	1.2	100
1.2	1.6	105
1.3	2.3	103
1.4	2.4	110
1.5	1.2	108
1.6	2.2	108
1.7	1.0	95
←--	▼	--▶

The table contains both the area covered by each valve and a factor in % by which the calculated amount will be multiplied. The factor is meant to represent the special demand of the particular crop. The area is expressed in the units selected at the [DEALERS DEFINITION](#).

2.3.1 Dosage by Evaporation

When dosing by evaporation, the amount of water to be irrigated by each valve is calculated automatically, relieving the user from the necessity of calculating and defining the dosages per all the valves day by day.

The calculation takes into account the number of days since the last time the specific valve was irrigated. Summing up the total evaporation during the elapsed days, data taken from the evaporation table of the last 16 days (see the topic of [Evaporation](#) at the paragraph of **Irrigation/Fertigation Parameters**), the sum is then multiplied with the area covered by the specific valve, the result we get is the total amount of water lost by the specific area during the specified period. Finally the result is multiplied by the factor in % that represents the specific needs of the crop. This final result is the amount to be irrigated.

Notice that if the irrigation program is a cyclic program of "n" cycles, each cycle will irrigate the amount of the final result divided by "n".

EXAMPLE: let's assume that the specific valve was irrigated 3 days ago. The evaporation of the last 3 days was 1.2, 1.3 and 0.8 mm which results in a total of $1.2+1.3+0.8=3.3$ mm. let's assume that the area covered by the valve equals 50 Dunam ($50,000 \text{ m}^2$), therefore the amount of evaporated water is $3.3 \times 50 = 165 \text{ m}^3$. If the crop factor is 80 % the amount to be irrigated is $165 \times 0.8 = 132 \text{ m}^3$. If the irrigation has to be done in 2 cycles, each cycle will irrigate $132/2 = 66 \text{ m}^3$.

The system offers the option of dosage by “**Evaporation time**” which uses actually the same calculation method explained above but the final result is converted into time units by dividing the volumetric result with the nominal flow of the valve. The irrigation will be by time.

2.3.2 Dosage by Volume Per Area

PR. 3 WATER DOSAGE 18:31:42			
VALVE: CLOSED		Line 1	
1.2A			
WATER	Plan	Left	
m3/area	12.000	00.000	
		Calc. m3	
		180.000	
		LastFlow	
Water After	00.000	0.00	
←--	Actions	^	--▶

The desired volume per area

The calculated amount to be irrigated

The desired volume per area

The calculated amount to be irrigated

For those who are used to think about irrigation quantities in terms of volume of water per a unit of area, the DREAM offers the option of dosing the water by volume/ area. The units, by which the volume and the area are measured, can be selected at the [DEALERS DEFINITION](#). The system calculates the amount of water to be irrigated by multiplying the user's request with the predefined data of the area covered by the valve and multiplied by the crop factor in % as explained above.



Notice that :

- When irrigating by evaporation there is no planned value to be inserted, and when working by m3/area the planned value actually contains the planned amount per area and not the total amount to be irrigated. However, in both cases, the total amount to be irrigated will appear as a calculated value.

2.4 Local and Central fertilizer dosage

The **DREAM 2** recognizes central and local fertilization sites. The central fertilization enables a number of irrigation lines to share the same fertilizer site, while the local fertilization is intended to serve individual irrigation lines only. The screens used for defining the local and the central fertilizers dosage appear next to each other and the programming of these screens is done in a similar way.

The following dosing options are available:

- l/m3** – liters of fertilizer per each cubic meter of water
- sec/min** – seconds of injection per each minute of irrigation
- m:s/m3** – minutes and seconds of injection per each cubic meter of water
- l/min** – liters of fertilizer per each minute of irrigation
- Prop(L)** – the specified fertilizer quantity will be injected proportionally
- Bulk m:s** – continuous injection of the fertilizer quantity specified by time units
- Bulk(L)** – continuous injection of the fertilizer quantity specified in liters.

The screenshot shows the following screen layout:

PR. 1 FERT. Centr. 2 SET 0		
VALVE: 3.2		
F1 Bulk(L)	55.000	00.000
F2 sec/min	30	0
F3 l/m3	01.500	00.000

At the bottom, there are navigation buttons: ←, l/m3, X Change, →.

Callouts from the image:

- The number of the fertilizer injector in the "fertilizer site"**: Points to "PR. 1".
- The fertilizer site identity**: Points to "FERT. Centr. 2".
- For selecting a fertilizer set**: Points to "SET 0".
- Left dosage or actual value**: Points to the "55.000" value for F1.
- The selected dosage mode of fertilizer 3**: Points to "l/m3" for F3.
- Default dosage mode**: Points to the "l/m3" button at the bottom.
- The desired dosage**: Points to the "01.500" value for F3.
- Changing the desired dosage mode**: Points to the "X Change" button.

Locate the cursor at the dosage mode field next to the desired fertilizer number. Select the desired dosage mode either by using function key No. 2 for selecting the default mode, or by using function key No. 3 for opening all the dosing options. Define the desired fertilizer quantity or desired proportion.



Notice that :

- The values displayed at the column of the left dosage depend on the selected dosage mode: in case of proportional dosage it will show the actual proportion, in case of bulk dosage it will show the left quantity.
- The **DREAM 2** offers the convenience of using a library of predefined **FERTILIZER SETS** to be used by irrigation programs. For detailed explanation see the subject of [Fertilizer Sets Library](#) within the **PARAMETERS** submenu.

2.4.1 Global Accumulative fertilizers limit

There is an option to define global seasonal limits per each fertilizer type of each valve so that the system will protect us from fertilizing more than necessary. During each fertigation process, the quantity left to reaching the limit gets smaller and smaller and when becoming zero the injection of the particular fertilizer will not continue. The option of using the **GLOBAL FERTILIZERS LIMIT** must be enabled through the [DEALERS DEFINITION](#).

ACCUMULATIVE FERT LIMIT/VLV.	
Valve 4 Ln.1 (L)	
Centr. 1	Line 1
F1 010000.0	F1 010000.0
<div>←-- X --→</div>	

2.4.2 Sequential fertilization

As a default, when there are several fertilizer injectors at the fertilizer site, they will work in parallel, however when it is important not to let the fertilizers mix inside the irrigation line, there is an option to request the injection to be serial instead of parallel. In order to use this option it must be enabled at the [DEALERS DEFINITION](#).

In the sequential injection mode the fertilizers will be injected one after the other with some flushing of the fertilizer line taking place between the injections. For the purpose of flushing the last fertilizer injector will be used. The amount of fertilizer defined to be injected by the last injector will actually define the amount of water (or other liquid) to be used for cleaning the pipe.

In order to make sure that the fertilizer pipe is clean at the beginning of the injection process, we start by activating the last injector and flush the line, but this time it will inject only half of the amount defined for flushing.

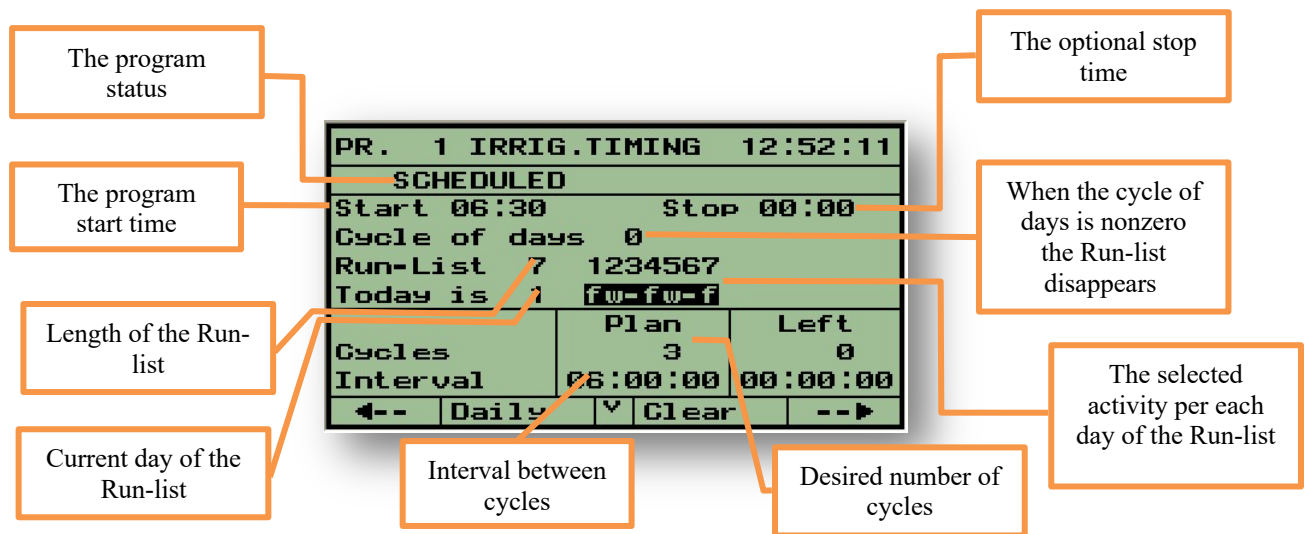


Notice that:

- In the sequential fertilization mode the dosing of fertilizers can be by volume or by time but Bulk only, no proportional fertilization is permitted.
- When the sequential fertilization mode is selected at the [DEALERS DEFINITION](#) the selection holds for all the fertilizer sites of the controller.

2.5 Irrigation Timing

In order for a program to be started at a desired time, it must have a start time and the days of operation defined. Such a program will be considered SCHEDULED. The scheduling is done by the following screen:



The days on which the irrigation will take place, can be specified either by defining a nonzero cycle of days or by setting up a "Run-List". The length of the "Run-List" can go up to 16 days, the user can mark each day with a letter that represents the desired activity of the specific day: **(f)** indicates fertigation, **(w)** indicates water only **(-)** indicates no activity and **(s)** indicates single time activation the program will be executed only once on that day (but including both irrigation and fertilization).



Notice that:

- The desired irrigation days can be specified only in one of the two possible ways, therefore when the cycle of days is nonzero; the "Run-List" disappears.
- Defining the stop time is optional. When defined, it can be used in two ways:
 1. By default it defines the time that when it arrives, the program is terminated.
 2. The second option depends on a selection made at the [DEALERS DEFINITIONS](#) and then, the stop time actually defines the maximal duration of the program.

2.5.1 Cyclic irrigation

The lower part of the **Irrigation Timing** screen deals with **Cyclic irrigation**. If a program has to be repeated several times a day, usually the numbers of cycles and the interval between the cycles will be defined. The interval is measured from beginning of the first cycle to beginning of the next cycle. When the interval between the cycles is 0, the second cycle starts right after termination of the previous cycle.

2.5.2 Triggering irrigation cycles by accumulated light

The previous paragraph explains how irrigation cycles work by default; however as a special case cycles can be triggered by accumulated light radiation. Instead of defining the desired number of cycles and desired interval, the user defines a threshold of accumulated light that when reached will cause the irrigation cycle to be executed. This option must be enabled at the **DEALERS DEFINITIONS**.

For defining the radiation thresholds along with some additional parameters the **Radiation sets** are used. How to define radiation sets is explained at the paragraph [Radiation sets definition](#) in the chapter dealing with **Utilities**.

How do we make a program work by accumulated radiation?

Assuming that radiation sets have already been defined, we need to tell the program that it depends on accumulated radiation and we have to select the **Radiation sets** to use. This is done at the same screen at which we [Relate Conditions with Programs](#), see next paragraph. The following steps need to be executed:

The image shows three sequential screenshots of the 'PR. 8 RELATING CONDITIONS' screen, illustrating the steps to change the program type from 'Irrigation' to 'Radiation Sum'.

Step 1: The first screenshot shows the 'PR. 8 RELATING CONDITIONS' screen with 'PROG STATE: SCHEDULED'. The 'Pros.Type' field is set to 'Irrigation'. An arrow points to this field with the instruction: '1. Bring the cursor to the field of program type'.

Step 2: The second screenshot shows the same screen, but the 'St Irrigation' and 'St Radiation Sum' fields are visible. The 'St Radiation Sum' field is highlighted. An arrow points to this field with the instruction: '2. Select "Radiation Sum"'. The 'Pros.Type' field remains 'Irrigation'.

Step 3: The third screenshot shows the 'PR. 8 RELATING CONDITIONS' screen with 'PROG STATE: SCHEDULED'. The 'Pros.Type' field is now 'Radiation Sum'. The 'SET' field is highlighted. An arrow points to this field with the instruction: '4. Define which radiation set to use'.

Step 4: The fourth screenshot shows the 'PR. 8 RELATING CONDITIONS' screen with 'PROG STATE: SCHEDULED'. The 'SET' field is now '1'. An arrow points to this field with the instruction: '3. Use F3 for changing the program type'.

3. Relating Conditions with Programs

Conditions can be used for causing programs to **start/ stop** or for **enabling / disabling** their operation.

In this chapter we shall explain how conditions can be related with irrigation programs, however prior to using the conditions they must first be defined. Conditions definition is done at the [CONDITIONS LIBRARY](#) (see below).



The **CONDITIONS LIBRARY** can be reached through the **Parameters** submenu, or by the shortcut **F3 = "Cond"** that is revealed when the cursor is located at the column of conditions number.

Possible actions on the program

Shortcut to Conditions Library

PR. 1 RELATING CONDITIONS				
PROG STATE: SCHEDULED				
	Num	Condition		St.
Start	1	Contact	1	0
Stop	3	Satellite	2	0
Enable	0			-
Disable	0			-

The current status of the condition is false

Condition No. 1 when becoming TRUE will cause the program to start

By specifying the ordinal number of the desired condition in the row of the desired action we create a relation that will cause the action to be executed when the condition becomes TRUE. For example in the above screen, program 1 will be started by condition 1 and will be stopped by condition 3 when they become TRUE.



Notice that:

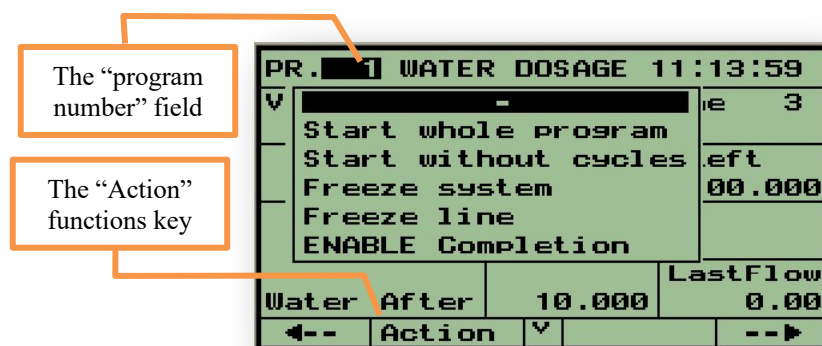
- The **Enable** action will not start the program; it will only permit the program to run as long as the condition is TRUE and make it wait as long as the condition is FALSE. Same way the **Disable** action will cause the program to wait as long as it is TRUE and let it run as long as it is FALSE.

4. Manual Start/Stop and Freeze/Release

All the screens dealing with the irrigation programs definition contain a function key that enables execution of manual **start/ stop** of programs and **freeze/ release** commands. When the cursor is placed at the “program number” field, then, the function key F2 turns into the “Action” functions key.

When a program was stopped before reaching its end, or when there are manually inserted “left quantities” of water, or “left cycles” to be executed, the list of actions will include the option to "Start with Left" in order to complete the left quantities.

Freezing means stopping activity until manually released. One can "Freeze" the whole system, freeze specific programs or individual lines. "Freezing" individual lines is enabled only in the **WATER DOSAGE** screen, where the line number is specified.



ENABLE COMPLETION – is an option that can be activated per each program individually. Once activated the option remains active until inverted. A program in which the “Enable completion” feature was turned on, when reaching its end, will check whether some of the included valves have uncompleted dosage (probably because of some malfunctions). The system will try to complete those leftovers.

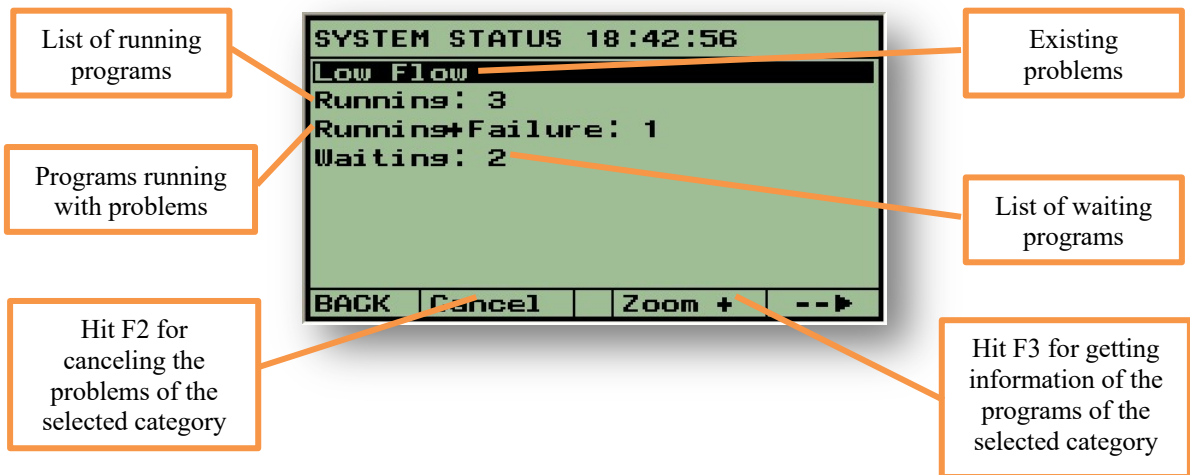
5. Checking the System Status

The information about what is going on in the system is presented in the **SUBMENU** that can be reached by using the icon.



The options are as follows:

The **CURRENT SYSTEM STATUS** supplies general information about activities in the system, listing out the existing problems, the currently running programs, the waiting programs, the programs that terminated normally or with problems and the programs that are still scheduled for today. In fact this would be the first place to visit when we want to get a general idea about what is going on.



The next screen deals with the **STATUS OF OUTPUTS**, it shows the status of all the outputs in the system, all activated outputs will be marked by (+) and all the others marked by (-).

The same screen can be used for manual activation of outputs. Use **F2 = "Manual"** and then locate the cursor at the desired output. Use F2 again for turning the output ON/OFF. A manually activated output is marked by (▲).

STATUS OF OUTPUTS 18:59:08			
Source	A	B	
	+++	++++	
Main Vlv	1234		
1-4	5-8		
Irr. Vlv	12345678	12345678	12
L1-3	++	-----	++
Irr. Vlv	34567890	1234567890	
L3-4	-----	-----	
◀-- Manual --▶			



The next two screens show the statuses of the digital and analog inputs. In the digital inputs screen each closed contact is marked with a (+) sign and an open contact with (-) sign.

STATUS OF INPUTS 19:30:43			
Src W.M	AB		
	--		
Irr. W.M	L1 L2 L3 L4		
	- - - -		
Free W.M	1234		
1-4	----		
Gent F.M	G1 G2		
	--- ---		
◀-- --▶			

Analog inputs will appear with their actual value. A (-) sign indicates that the sensor is disconnected.

ANALOG INPUTS			
1	Temperat .	-	
2	Pressure	-	
3	Humidity	-	
←--			--→

Following there are two screens showing the flow rates of all the water meters and all the fertilizer meters in the system.

WATER METERS FLOW		(m3/h)
Watermeter	Src.A	0000.0
Watermeter	Src.B	0000.0
Watermeter	Ln.1	0000.0
Watermeter	Ln.2	0000.0
Watermeter	Ln.3	0000.0
Watermeter	Ln.4	0000.0

FERTILIZERS FLOW		(L/h)
Fertilizer		

FERTILIZERS FLOW			
Fertilizer		(L/h)	
Fert. 1	Cent.1	0000.0	
Fert. 2	Cent.1	0000.0	
Fert. 3	Cent.1	0000.0	
Fert. 1	Cent.2	0000.0	
Fert. 2	Cent.2	0000.0	
Fert. 3	Cent.2	0000.0	
Fert. 1	Ln.3	0000.0	
←--		√	--→

2 wired
interface

The last status screen supplies information about the status of communication with all the RTUs used by the system. The type of the RTU channel can be recognized by the interface type appearing at the top left corner: Int2W is the interface of a 2 wired channel, IntRF is the interface for radio channel. The channel address appears at the top right corner.

The screenshot shows a terminal window with a green background. At the top, it says "Int2W" followed by a small box containing the number "2". Below this, it says "Sound OFF" and then a list of numbers "1 2 3 4 5 6 7". Two orange callout boxes are present: one pointing to the list of numbers with the text "List of RTUs", and another pointing to the box containing "2" with the text "The interface address is 2". At the bottom, there are labels "f--", "Sound", "Count", and "..." with corresponding input fields.

List of RTUs

The interface
address is 2

Switching ON/OFF the sound of the RTU

Switching ON/OFF the Error count

RTUs with communication problem will be underlined. RF RTUs which are powered by batteries may have a low battery status indicated by the letter "B" next to the RTU number. Pushing **F3=Count** will turn the screen into an error counting screen; instead of the RTU number we shall see the number of communication errors of each RTU. Use the (▼)(▲) keys for moving from one channel to the other.

6. Irrigation/Fertigation Parameters

The following paragraph describes some topics which are complimentary to the definition of irrigation and fertigation programs.

6.1 Conditions Library

Conditions are the tools by which the user can influence the operation of irrigation programs and satellites. By the conditions programs can be started/stopped/enabled or disabled (see above [RELATING CONDITIONS WITH PROGRAMS](#)) and satellites can be turned ON and OFF.

The conditions defined by the user are stored in the **CONDITIONS LIBRARY**, each condition with its own ordinal number. In order to become active, the condition must be enabled, and then it will start being checked repeatedly by the system whether it is **TRUE (1)** or **FALSE (0)**.

The conditions can refer to the following types of events:

- Contact** – depending on the status of a dry contact input whether it is OPEN or CLOSED, changing from OPEN to CLOSED (OP>CL) or from CLOSED to OPEN (CL>OP).
- Satellite** – depending on the status of a satellite output whether it is ON or OFF or changing from ON to OFF (ON>OFF) or from OFF to ON (OFF>ON).
- Program** – depending on the status of an irrigation program whether it is NOT RUNNING, RUNNING, ENDING or STARTING
- Combined** – depending on a combination of several conditions combined by OR/AND operators
- Flow** – depending on the flow of a real or virtual water meter whether the flow is above or below the set-point
- Analog** – depending on the value of an analog input whether it is above or below the set-point.

The screenshot shows the 'Conditions Library' menu with the following data:

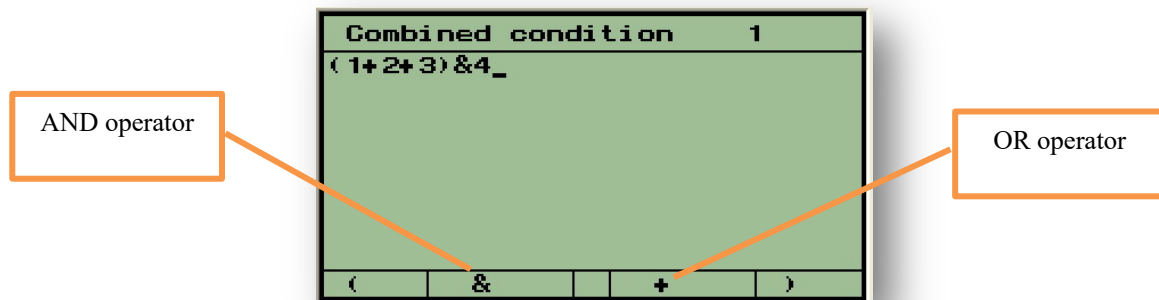
Numb of cond.	When	mm:ss	
1 Contact	1 CLOSE	00:30	0
2 Satellite	2 OFF>ON	00:00	0
3 Program	3 End	00:00	-
4 Combined	TRUE	00:00	-
5 Flow B	< 0180.0	01:00	1
6 Analog 2	> 0000.0	00:20	0
7 -			
8 -			

At the bottom of the screen are the options: ◀-- Enable ▽ Change --▶

Callouts from the image:

- The item referred to:** Points to the 'Contact' type in row 1.
- The value or the status referred to:** Points to the 'CLOSE' value in row 1.
- How long must the condition be TRUE before being considered as such:** Points to the '00:30' time in row 1.
- Ordinal No. of the condition:** Points to the '1' in the first column of row 1.
- Type of condition:** Points to the 'Contact' text in row 1.
- Enable Disable the condition:** Points to the 'Enable' button.
- Change the type of the condition:** Points to the 'Change' button.
- FALSE:** Points to the '0' in the last column of row 1.
- Disabled:** Points to the '-' in the last column of row 3.
- TRUE:** Points to the '1' in the last column of row 5.

Whenever a combined condition is being defined, an auxiliary screen appears in which the user may define the formula of the combination.



The formula $(1+2+3)\&4$ means that in order for the combined condition to become TRUE, condition No. 1 or No. 2 or No. 3 must be TRUE, AND conditions No. 4 must also be TRUE.

Whenever a flow condition is being defined, an auxiliary screen appears containing a list of all the water meters from which the user may select the water meter to refer to. The same way when defining conditions on analog sensors an auxiliary screen supplies the list of sensors from which the desired one can be selected.

Conditions can be limited within a time zone, so that only within the time zone will the condition be checked for being TRUE or FALSE. Additionally conditions may cause a message to be sent when becoming TRUE. The following screen that can be found to the right of the Conditions definition screen is used for defining time zones and for setting message requests.

Condition 1 will be checked between 09:00 and 15:00

Condition		Start	Stop	M
1	Contact 1	09:00	15:00	+
2	Satellite 2	16:00	21:00	-
3	Program 3	03:00	06:00	+
4	Combined	00:00	00:00	-
5	Flow W1 >	00:00	00:00	-
6	-			
7	-			
8	-			

Condition 1 will cause a message to be sent when becoming true.

←-- Disable v --→



Notice that:

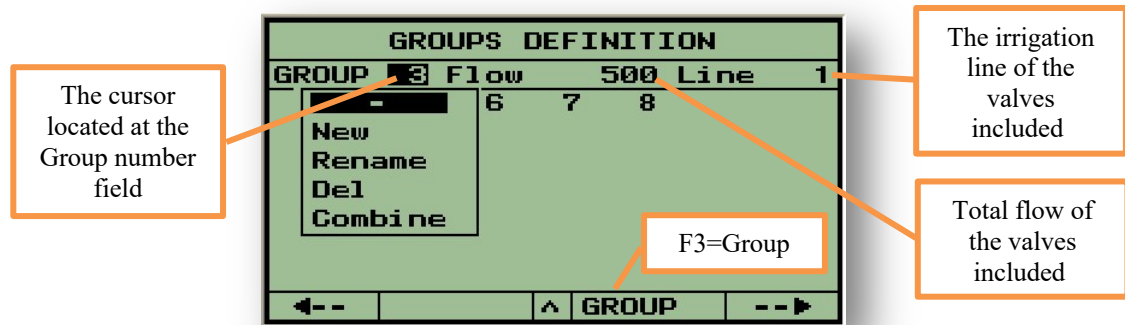
- Conditions referring to flow of some water-meter, will consider the nominal flow during the line filling delay and only after the filling delay is over it will refer to the actual flow.

6.2 Groups Definition

Valves which are usually irrigated together may be defined as a **GROUP** of valves. Such groups will be named as G1,G2,G3...and will be stored in a groups library for later use. The valves included in such a group must all belong to the same irrigation line.

In order to create a new group, place the cursor at the group number field, press **F3="GROUP"** and select **"New"**. The system will suggest a free group number which the user can accept or change.

The user will have to specify the line number of the valves to be included in the group and then specify the valves on. Each valve number will be followed by ENTER. Next to the Group No. the expected total flow of the group will be displayed.



6.3 Evaporation

For the purpose of dosing by evaporation, the system stores the data of the daily evaporation of the last 16 days as shown in the following table:

LAST 16 DAYS EVAPORATION (mm)			
1	1.2	9	0.7
2	1.3	10	0.6
3	0.8	11	0.7
4	0.7	12	0.8
5	0.7	13	0.6
6	0.9	14	1.2
7	1.1	15	1.1
8	1.3	16	1.5

When there is a weather station connected to the system the information of the daily ET is received from the weather station, however the table is editable and the values can be inserted manually if received from other sources.

Each midnight the whole table is shifted downward and location No 1 is updated from the weather station, otherwise when there is no weather station connected, location No 1 that contains the evaporation of the last 24 hours will be copied from the previous day, location No 2, and later on can be manually updated by the user.

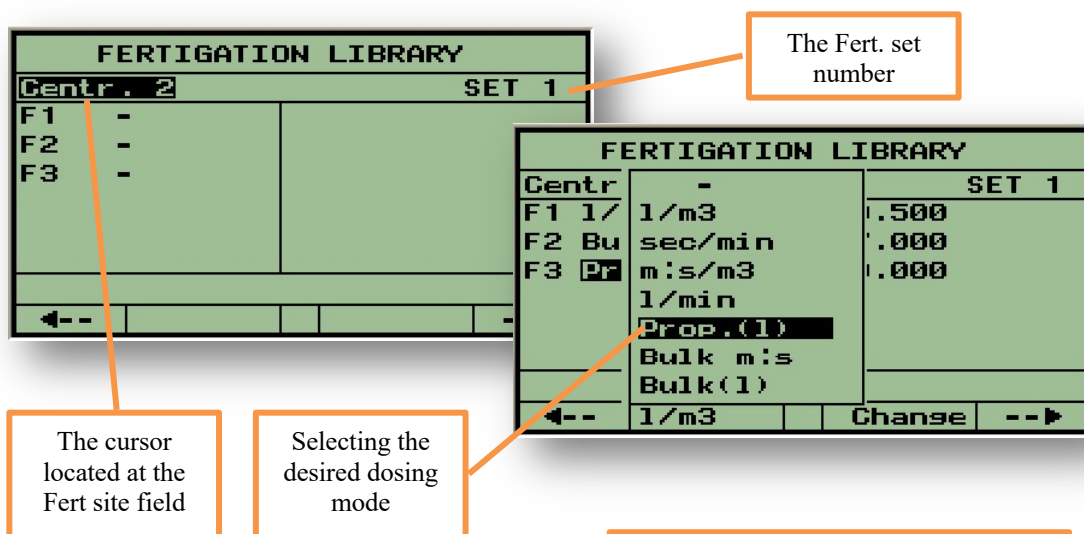
Location 2 contains the information of the day before etc..., so that at location 16 there will be the evaporation of 16 days ago. Each day at midnight all the table is shifted one position downward, so that the evaporation at location 15 takes the place of location 16, that of location 14 will be placed at location 15 etc. This way the table always contains the evaporation of the last 16 days.

For understanding the mode of dosage by evaporation see the topic [Dosage by evaporation](#) under the paragraph of **Special dosage modes**.

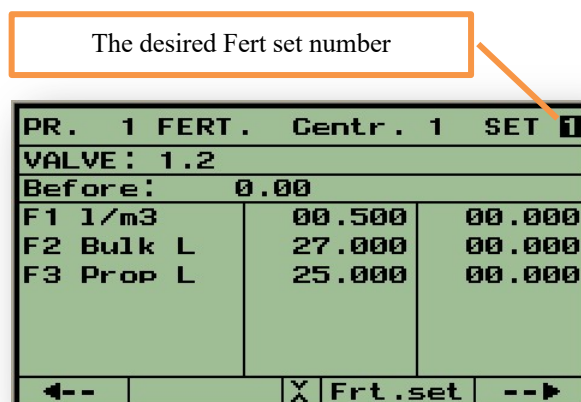
6.4 Fertilizer Sets Library

The **FERT SETS LIBRARY** stores predefined formulas of fertilization to be used by the irrigation programs. Up to 9 formulas can be stored per each fertilization site. In order to be able to use the Fertilizer Sets Library the option must first be enabled at the [DEALERS DEFINITIONS](#).

When the cursor is placed at the **Fertilizer Site** field use the (▼)(▲) keys to reach the desired site, then move the cursor to the **Fert. Set** number and use the (▼)(▲) keys again to reach the desired set. Now move the cursors next to the fertilizer injector number (F1,F2,F3,...) and select per each injector the desired dosing mode and finally insert the desired quantity or desired proportion per each injector.



How do we use the fertilizer sets? The picture to the right shows the fertilizer dosage screen which is part of the irrigation program definition screens. All we have to do is to define the number of the desired **Fertilizer Set** at the upper right corner of the fertilizer dosage screen; the predefined set will immediately pop up and fill the screen with the needed contents, saving us the labor of repeatedly defining the same dosages whenever the same recipe is needed.



7. RESULTS of the irrigation activity

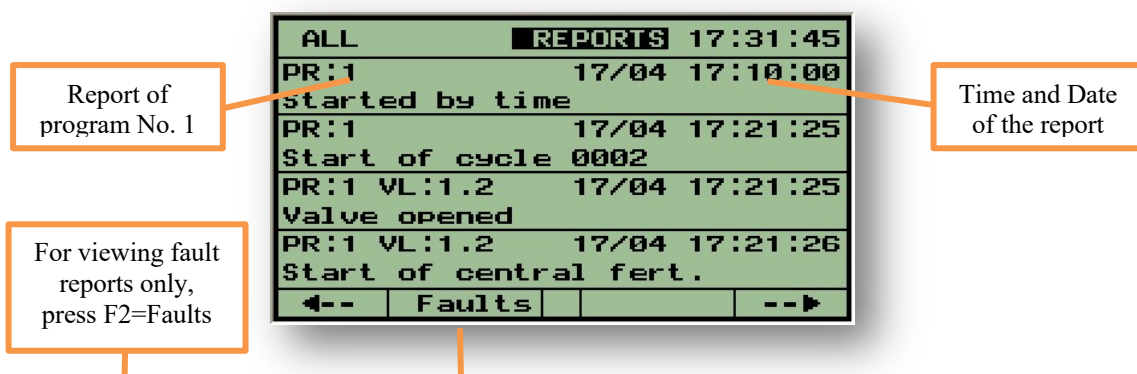
Under the title of **RESULTS** the **DREAM 2** supplies information resulting from the activities of the system. This is the place where you may find the **EVENTS REPORTS**, the **ACCUMULATORS** and the **SENSORS LOG RESULTS**.

7.1 Events Report

Events occurring in the system generate reports that can be viewed by various categories:

All reports
Reports of a particular program
Reports of a particular valve
Reports of fertilization
Reports of filtration

In each category there is an option of viewing only the fault reports. The events are arranged in a chronological order. When entering the reports display the latest 4 events will be shown. Use the (▲) key to view the earlier reports. The following picture shows an example screen of reports.



When the cursor is placed at the word **REPORTS** as shown above, pushing **F2="Faults"** will display only the fault reports.

Reports can be deleted as follows: if you wish all the reports to be deleted, move the cursor to any of the displayed reports and then push **F2="Del All"**. If you wish to delete a single report, place the cursor on the report and push **F3="Del Msg"**.

7.2 Accumulations

The system accumulates water and the fertilizer consumptions per each irrigation valve, per each water meter and fertilizer meter.

The accumulators of all the devices continue to accumulate from zero until they get cleared again. The irrigation valves have an additional accumulation that refers to the last irrigation only.

Irrigation valves connected to a water meter will accumulate volumetric accumulation as well as time accumulation when irrigating by time.

For viewing accumulation of last irrigation

Clearing the accumulation table

Line	Vlv.	(m3) Water	Water(h:m:s)
1	1	000235.0	12:25:00
1	2	00	
1	3	00	
1	4	00	
1	5	00	
1	6	00	
1	7	00	

←-- LAST

Water meter	Water(m3)
Watermeter Src.A	000589.0
Watermeter Src.B	000422.0
Watermeter Ln.1	
Watermeter Ln.2	
Watermeter Ln.3	
Watermeter Ln.4	
Free W.meter 1	

←--

Valve	Fertilizer	Fert(L)
1	Centr. 1	
F1	000038.2	
F2	000045.0	
F3	000024.6	

←-- LAST

Fertilizer	Fert(L)
Fert. 1 Centr.1	000064.4
Fert. 2 Centr.1	000091.8
Fert. 3 Centr.1	000091.8
Fert. 1 Centr.2	000000.0
Fert. 2 Centr.2	000000.0
Fert. 3 Centr.2	000000.0
Fert. 1 Ln.3	000000.0

←-- Clear -->

7.3 Sensors Logging results

When analog sensors are used with the **DREAM 2** control system, the values of the sensors can be sampled and logged as explained in the paragraph dealing with [Sensors Logger Settings](#).

The results of the logging can be inspected when selecting the **DATA LOGGER** from the submenu of **RESULTS**.

SENSORS LOG.RESULTS 17:03:26				
Barometer 1	732.0	16:30	02/02	
Battery	13.8	16:00	02/02	
Virtual WM 1	0.0	16:00	02/02	
Virtual WM 2	0.0	16:00	02/02	
Virtual WM 3	0.0	16:00	02/02	
Virtual WM 4	0.0	16:00	02/02	
WM Line 1	210.0	16:00	02/02	
WM Line 2	12.0	16:00	02/02	
←--		X		-->

8. Constants

The constant parameters that belong to a particular application are divided into categories as explained below:

8.1 System Constants

CONSTANT PARAMETERS			
System Reset time(h:m)	00:00		
Pressure delay(m:s)	01:00		
Fertilizer leakage limit	10		
defined in pulses/30 min			
Water pulse before fert	N		
Common scheduling params	Y		
Common dosage coef. %	100		
◀--			--▶

System Reset Time	–	When set to a nonzero value, will stop all active programs when the specified time arrives.
Pressure delay	–	Defines the delay before a change in a pressure sensor comes into effect.
Fertilizer leakage limit	–	Pulses received from a fertilizer meter while its associated injector is supposed to be closed, are considered illegal. When the number of pulses exceeds the specified limit, it indicates a fertilizer leakage that will be responded by stopping the irrigation of the related lines. When the limit is not reached, the illegal pulses counter is cleared every 30 minutes.
Water pulses before fert.	–	The user may request that starting fertilization will never happen before sensing flow of water.
Common Scheduling params	–	When set to YES, will force all the RUN LISTS of all the programs to be of the same length and to have the same "Current Day".
Common dosage coefficient	–	Enables changing all water dosages by percentage.

The screen to the right is a continuation of the **LINES' CONSTANTS**.

It enables selection of the desired reactions to high flow or low flow violations.

Ln.	ON Low Flow	ON High Flow
1	Skip to next	Skip to next
2	Skip to next	Skip to next
3	Skip to next	next
	Inform only	
	Wait	
<div> <div>←</div> <div>Change</div> <div>→</div> </div>		

Valve's Constants

CONSTANTS OF IRRIG. VALVES					
Dosage mode			Filling time		
Volume/Time			(min)		
Valve	V	Flow (m3/hour)			
	T	nom	min	max	
1.1	<input checked="" type="checkbox"/>	100.0	75.0	125.0	15
1.2	<input type="checkbox"/>	100.0	75.0	125.0	15
1.3	<input type="checkbox"/>	100.0	75.0	125.0	15
1.4	<input type="checkbox"/>	100.0	75.0	125.0	15
<div> <div>←</div> <div>V/T/A/E</div> <div>→</div> </div>					

The valves' constants include per each valve the following information:

The default dosage mode

– Defines the dosage mode that will appear at the water dosage screen when defining a new job of the specific valve. The possible options are:

- V – volumetric
- T – time based
- A – volume per area
- E – evaporation

The Nominal, Minimal and Maximal flows – the Nominal flow is the expected flow of the valve under normal conditions, the Minimal flow is the limit below which the flow will be considered LOW FLOW, the Maximal flow is the limit above which the flow will be considered HIGH FLOW.

The filling time

– Defines the time during which the line is getting filled with water. During this period, flow and pressure violations are ignored.

The table to the right is accessible only when “Dosage per area” or “Dosages by evaporation” are enabled. It contains the **Area** covered by each valve and the **CROP FACTOR** that represents in % the correction factor required by the specific crop irrigated by the valve.

VALVES CONSTANTS		
Valve	Area	Factor %
1.1	1.0	100
1.2	1.0	100
1.3	1.0	100
1.4	1.0	100
2.1	1.0	100
2.2	1.0	100
2.3	1.0	100
←--	∇	--▶

Water Meter Constants

The water meters' ratio – defines the amount of water represented by each pulse of the water meter.

WATER METERS RATIO	
Water meter	(m3/pulse)
Watermeter Ln.1	01.000
Watermeter Ln.2	01.000
Watermeter Ln.3	01.000
Free W.meter 1	01.000
←--	--▶

8.4 Fertilizer Sites Constants

When pulses fail to arrive – Fertilizer injectors equipped with fertilizer meters are expected to supply pulses when activated. If no pulses arrive within 2 minutes from activation, (4 minutes if the ratio is 10 L/pulse) then the system will declare a fertilizer failure and will react according to the selected action:

FERTILIZER SITES BEHAVIOR	
When pulses fail to arrive	
Centr. 1	Stop faulty F. pump
Lin	Stop faulty F. pump
	Stop fertis
	Stop irrig.
	Inform only
←--	Change --▶

- | | |
|-----------------------------|--|
| Stop faulty injector | – continue fertilization with the other fertilizers |
| Stop fertigation | – stop all fertilizers of the Fert. Site but continue irrigation |
| Stop irrigation | – both irrigation and fertilization will stop |
| Inform only | – report the problem but continue as usual |

The Fert. meter's ratio – defines the amount of fertilizer represented by each pulse of the fertilizer meter.

The pulse length – defines the length of the pulses which will be used when fertilizing proportionally sec/min or m:s/m3. If for example the required proportion will be 20 sec/min the system will inject each minute 4 pulses of 5 seconds with 10 seconds between the pulses.

FERTILIZER SITE - Centr. 1			
	Ratio (L/pulse)	Fert meter	Length of pulse(sec)
F1	00.100	+	5
F2	00.100	+	5
F3	00.100	+	5
←--		▼	--▶

Special case – when a fertilizer meter gets out of order and cannot be used for some time, the user should do the following steps:

STEP 1 - Delete the connection point of the fertilizer meter from the inputs connections list.

STEP 2 - Set the RATIO in the table to be equal to the amount of fertilizer injected by the specific injector within the specified pulse length. If for example the injector's flow is 100 liter/hour then for a pulse of 5 sec the injection will be $(5/3600) \times 100 = 0.138$ liters/pulse.

After having those steps done, the system will continue fertilizing as before (without having to change the volumetric fert dosages) but instead of waiting for pulses from the fertilizer meter it will generate the pulses itself based on the knowledge of the injectors flow as supplied in step 2 above.

8.5 Filter Sites Constants

Each filter site may have the following parameters defined:

DP Delay – defines the period the DP contact has to remain closed in order for it to cause a flushing cycle to be started.

Looping limit – defines the number of consecutive flushing cycles caused by the DP indication, after which an "Endless looping" problem is declared.

FILTER SITES CONSTANTS				
Filter	Delay DP(s)	Loop lim.	Irris.	
Gen	Continue	30	5	Continue
Lin	Wait	30	5	Continue
	HLT fert			
←--		Change	--▶	

8.5.1 What happens with the irrigation during backflushing?

This question is answered by the selection made in the last column. The options are:

Continue – irrigation continues
Wait – irrigation will be waiting
HLT fert – fertilization will be halted



Notice that:

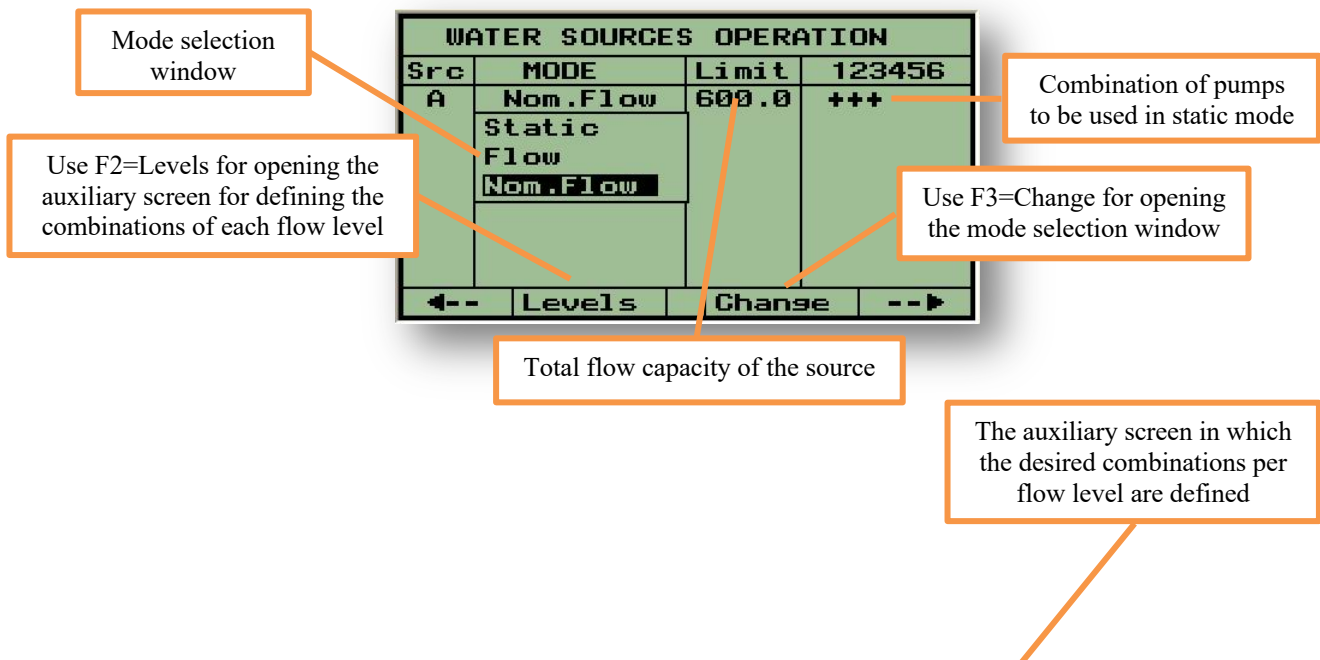
- By default backflushing will start always with the first filter station on site. However there is an option to request (through the [DEALERS DEFINITIONS](#)) that the flushing will start with the filter following the one that was the last to be flushed at the end of the previous cycle.
- At the [DEALERS DEFINITIONS](#) it can be decided whether the DP indication should be respected or ignored during the line filling delay.

9. Utilities

9.1 Water Sources

Water sources having several water pumps can be operated by the **DREAM 2** in various ways:

- Static** – In the static mode the combination of pumps to be activated is independent of the flow demand; it will always be the same static combination as specified in the last column.
- Flow** – the combination of pumps that will be activated depends on the actual flow demand, except during the line filling period in which the nominal flow will be used instead of the actual.
- Nom. Flow** – the combination of pumps that will be activated always depends on the nominal flow of the valves opened under the specific source.



When the selected mode of operation is by "Flow" or by "Nominal flow" the user must specify the various combinations of pumps to be used for each flow level. Each row of the table describes the flow and the combination that will be used, up to this flow.

SOURCE A			
No.	Flow up to (m3/h)	123456	
1	100.00	+	- -
2	200.00	-	+
3	300.00	- -	+
4	400.00	+	- +
5	500.00	-	+
6	600.00	+	+
DELAY	Up 00:00	Down 00:00	
BACK			

Delay Up – when the flow demand increases, the switching to the upper combination will take place after the specified delay.

Delay Down – when the flow demand decreases, the switching to the lower combination will take place after the specified delay.

When working by the actual flow (not by the nominal flow) there is only one delay to be defined. This delay specifies the time during which the flow is expected to remain within its new value before a combination change will take place.

The user may specify a Flow Limit, which represents the maximal capacity of the source, flow demand beyond this limit will not be granted. It will cause programs with excess demands to wait until earlier programs finish.

A water source may be associated with a real or virtual water meter measuring the water supplied by the source. The measured water is divided between the valves open under the source. Therefore, irrigation valves with no water meters can have their water measured by the meter of the water source.

9.2 Satellites

9.2.1 Associating Satellites with other outputs

Satellites are outputs that can be logically attached to other outputs so that whenever any of those outputs is activated, the satellite will also be activated and remain active as long as at least one of the leading outputs remains active.

SATELLITE OUTPUTS ->	1	2	3
W.pump 1 Src.A	+	-	
W.pump 2 Src.A	+	-	
W.pump 3 Src.A	+	-	
Main valve 1	-	-	
Main valve 2	-	-	
Main valve 3	-	-	
Valve 1 Ln.1	-	+	
Valve 2 Ln.1	-	+	
←--	+	▼	-
			--▶

In the screen above, satellite No. 1 is defined as satellite of the pumps 1, 2, and 3 of water source A, it will be active as long as any of those pumps are active.

Satellite No. 2 is defined as satellite of valves 1 and 2 of line 1, it will remain active as long as any of those valves is open. Notice that the table above may be longer than one screen, use the (▼)(▲) keys to see the rest of it.

9.2.2 Conditioned Satellites

Satellites may be condition dependent so that as long as any of the related conditions is TRUE, the satellite will remain active. For relating conditions with satellites the row of the condition has to be marked with a + at the column of the appropriate satellite. For example in the following table satellite No. 1 depends on conditions No. 1 and No. 2.

CONDITIONED SATEL.->	1	2	3
Condition 1	+	-	-
Condition 2	+	-	-
Condition 3	-	+	-
Condition 4	-	-	-
Condition 5	-	-	-
Condition 6	-	-	-
Condition 7	-	-	-
Condition 8	-	-	-
←--			--▶

9.2.3 Conditions depending on satellites

Among the other uses of satellites they can be used for defining conditions on their status. Now remember that satellites can be attached to other outputs, so combining the two features enables us actually to define conditions depending on the status of any output. See the explanation about the [CONDITIONS LIBRARY](#) above.

9.3 Virtual Water Meters

Virtual water meters are calculated water meters, which result from an arithmetic combination of real water meters. Prior to using virtual water meters, they must be allocated at the [DEALERS DEFINITIONS](#).

The **DREAM 2** recognizes three types of virtual water meters according to their uses:

For irrigation

– measuring the water used by an irrigation line.

For network protection

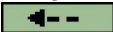
– measuring the balance between the water going into and exiting from a particular network.




For water sources

– measuring the amount of water supplied by a water source.

VIRTUAL WATER METER No. 2			
Defined as:			
Used for: Protection			
Alarm limit (m3) : 00.000			
-			
←--		X Def.	--▶




The first step in the definition of a virtual water meter is the definition of the arithmetic formula associated with it. Use **F3 = "Def."** for opening the screen (see below) in which all the water meters of the system are listed.

Any water meter can be included in the formula by marking it positive (+) or negative (-). After marking all the required water meters use F1=  to return to the former screen in order to complete the definition.

VIRTUAL W.METERS ->	1	2	3
Watermeter Ln.10	-	x	x
Watermeter Ln.11	-	x	x
Watermeter Ln.12	x	x	x
Free W.meter 1	+	x	x
Free W.meter 2	x	x	x
Free W.meter 3	x	x	x
Free W.meter 4	x	x	x
Free W.meter 5	x	x	x
	+		-
			

The next step will be the selection of the type of the water meter according to its use.

Use F3="Change" for selecting the desired type of virtual water meter

VIRTUAL WATER METER No. 1	
Defined as:	
W1 - 2 - 3 - 10 - 11	
Protection	
Irrigation	
Source	
Used for:	Irrigation
Ratio (m3) :	01.000
Irr.line No.:	1
	 Change 

The rest of the definition procedure depends on the selected type of the virtual water meter.

9.3.1 Virtual water meter for irrigation

Apart from the formula and the type, a virtual water meter used for irrigation will have a definition of its ratio and a definition of the associated irrigation line.

Each water meter included in the formula contributes to the resulting sum positively or negatively.

Only when the resulting sum is greater or equal to the ratio, an amount equal to the ratio will be considered as supplied to the irrigation line. It will be added to the accumulators and deducted from the amount left to be irrigated. When deciding about the ratio the user should take into consideration the ratios of the participating water meters.

VIRTUAL WATER METER No. 1			
Defined as:			
W1 - 2 - 3 - 10 - 11			
Used for: Irrigation			
Ratio (m3) :		01.000	
Irr.line No.:		1	
←		Def.	→

9.3.2 Virtual water meter for network protection

A virtual water meter used for network protection will have on the positive side of its formula all the water meters feeding the network, and on the negative side all the water meters consuming from the network. Under normal conditions the result should be zero, since all the water going into the system must equal the water going out of the system.

VIRTUAL WATER METER No. 2			
Defined as:			
W2 + W3 - 2 - 3 - 4 - 5 - 6			
7 - 8 - 9 - 10 - 11 - 12			
Used for: Protection			
Alarm limit (m3) :		10.000	
W.pump 1		CLOSE	
←		Def.	→

The output to be activated in case of leakage

The action to be taken with the output in case of leakage

If the result is not zero, it indicates leakage of the network. However, since there may be some delay between the sensing of the water meters feeding the system and the sensing of the consumer water meters, we may get temporary nonzero values, which may create false alarm situations. Alarm limit must be set so that only when the limit is exceeded, the network protection will start to be considered, and only if it remains out of the limit for 4 minutes, the alarm will be fired.

The user may define the preventive action to be taken when the network protection alarm is activated, he may select an output to be OPENED or CLOSED. The output can be selected from the list of main valves, pumps and satellites defined in the particular unit.

9.3.3 Virtual water meter for water sources

A virtual water meter associated with a water source is supposed to measure the water supplied by the source. The ratio definition serves the same function as explained above for virtual water meters used for irrigation.

VIRTUAL WATER METER No. 3			
Defined as: W8 + W9 + W10			
Used for:		Source	
Ratio (m3) :		10.000	
Source		<input type="checkbox"/>	
←--		X	Change --▶

9.4 Analog Sensors

The **DREAM 2** is capable of reading analog sensors in various ways. Analog sensors, located close to the controller can be hooked locally, and remote analog sensors can be read by the 2 wired RTU units and by the RF RTU units. The total number of analog sensors recognized by the system must be defined during the **SYSTEM CONFIGURATION**. However the type of each analog sensor and the range of its scale are defined in the following screen:

First select the sensor type and then define the minimal value at 4mA and the maximal value at 20mA columns.

ANALOG SENSORS DEFINITION			
N.	Type	4 ma	20 ma
1	-	0.00	0.00
2	Temperat.	0.00	0.00
3	Humidity	0.00	0.00
4	Tension.	0.00	0.00
	Pressure		
←--		Change	--▶

Next the output type of the sensor must be defined. Sensors whose signal is 4-20 mA will be categorized by "Current" and those whose signal is 0-5v will be categorized by "Voltage".

SENSOR OUTPUT TYPE		
1	Tension.	Current
2	Temperat.	Voltage
3	Tension.	Current
4	Temperat.	Voltage
5	Tension.	Current
6	Tension.	Current
7	-	Current
8	-	Current
←--		Change --▶

The analog sensors can be used for conditioning the system's operation and can be logged for analyzing the system's behavior.

Some analog sensors will be defined automatically while a special interface is declared. Interface pH/EC generates automatically 2 analog sensors, interface of a weather station generates 11 analog sensors and the THD interface generates 3 analog sensors. Details can be found in the Installation manual, in which the configuration procedure is explained.

9.5 Rain Shutdown

The Rain Shutdown is meant to delay irrigation programs when the amount of the daily accumulated rain reaches the user defined limit. The Programs affected by the Rain Delay will be those with priority less than 5.

RAIN SHUTDOWN NOT ACTIVE				
Daily rain limit		30.0		
Preset rain delay days		5		
Left rain delay days		0		
Measured daily rain		0.0		
Total rain delay days		0		
Rain detection contact		-		
←--				--→

The amount of rain fall that when reached will activate the delay

The number of days
the delay will last

The number of days
still left to delay



Notice that:

- When the Rain Delay left is manually set to a nonzero value, it will cause the rain delay to be started right away.
- Prior to using the Rain Shutdown option it must be enabled at the [**DEALERS DEFINITIONS**](#).

9.6 Frost protection

The Frost protection algorithm is taking into consideration the **Current temperature** and **Dew point** for calculating at which temperature the frost protection program should be started in order not to let the crop temperature drop to the Critical temperature defined by the user. The Dew point is calculated based on the ambient temperature and humidity. When the Frost protection program is activated, all irrigation programs with priority lower than 6 will be halted.

FROST PROTECTION NOT ACTIVE			
Critical plant temp.	5		
Temp. raise to stop	2		
Frost program to start	10		
Turn on temperature	0.0		
Current temperature	0		
Current dew point	0		
Frost detection contact	-		
←--	Start	Change	--→

The Critical temperature
that must not be reached

The frost protection will stop when the temperature rises above the critical temp by this value

The program number to be activated when the frost protection will start

Manual start
of the frost

The temperature at which the protection will start

The following table shows how the “Turn on temperature” is obtained.

Critical Plant Temperature C°	Dew Point Range C°	Turn On Temperature C°
0	-16 to -12	8.2
	-12 to -9	7.1
	-9 to -6	6.0
	-6 to -4	4.9
	-4 to -2	3.8
	-2 to -1	2.7
	-1 to 0	1.6
-1	-18 to -13	6.6
	-13 to -9	5.4
	-9 to -7	4.3
	-7 to -4	3.2
	-4 to -3	2.1
	-3 to -1	1.0
-2	-18 to -13	4.9
	-13 to -10	3.8
	-10 to -7	2.7
	-7 to -5	1.6
	-5 to -3	0.4
	-3 to -2	-0.7
-3	-18 to -12	2.7
	-12 to -9	1.6
	-9 to -7	-0.4
	-7 to -5	-0.7
	-5 to -4	-1.7



Notice that:

- Prior to using the Frost protection option it must be enabled at the [DEALERS DEFINITIONS](#).
- When the calculated Dew point is out of the range of the table the displayed turn on temperature will be 0.0.

9.7 Sensors Logger setting

The sampling rate of each sensor can be set at the following screen

SENSORS LOGGING RATE active		
1	Barometer	30 min
2	-	30 min
3	1 min	30 min
4	5 min	30 min
5	10 min	30 min
6	30 min	30 min
7	1 hour	30 min
8	Daily	30 min
<div> <div>←</div> <div>Change</div> <div>→</div> </div>		

When the storage allocated for the logger gets full, the new samples will replace the oldest ones. Users who need to keep track of the Analog sensors readings for longer periods can use the “Data Acquisition” feature of the **CONSOLE** and then the information will be kept at the Data Base of the **SERVER** up to the period defined at the administration software for analog sensors Data Retention.

9.8 Alarms definition

Alarm outputs can be allocated in the target’s image in order to be activated in various cases of alarm events. With the Alarm outputs various alarming devices can be activated. The table below can be used for marking for each Alarm output in which cases it should be activated and whether it will run continuously or in cycles.

DEFINITIONS OF ALARM No. 1			
Mode of operation		Continuous	
Causes of alarm activation:			
Wtr leakage	Y	Filt looping	<input checked="" type="checkbox"/>
High flow	Y	No pressure	N
Low flow	Y	Fert leakage	Y
Fert no flow	Y	Pump failure	N
No power	N	I/O commun.	N
Short circ.	Y	RTU commun.	N
←--		Y	--→

9.9 Radiation sets definition

When using the option of triggering irrigation cycles by accumulated light, users are required to define some parameters related with the light accumulation procedure. In this irrigation method, instead of defining the number of cycles and the interval between cycles, the user defines a threshold of accumulated light that whenever reached, an irrigation cycle will take place. The needed parameters are defined through the **Radiation sets**, including the minimal and maximal interval between the cycles as a protection against faulty light sensor.

For the sake of flexibility, the Radiation sets enable dividing the 24 hours of the day into three parts and each part may have its own definition of threshold and minimal/maximal intervals.

Beginning and ending of the 3 periods

Minimal and maximal interval

The radiation sensor to refer to

Radiation SET 1			
	1	2	3
Start h:m	06:00	11:30	16:00
Stop h:m	11:30	16:00	18:00
Mintime h:m	00:30	00:20	00:35
Maxtime h:m	01:00	00:40	01:20
Threshold	75.0	100.0	50.0
Sensor	An.6 * 100.00		

The radiation sensor's coefficient

The selection of the Radiation sensor to be referred to is done through an auxiliary screen containing all the analog sensors and the user has to mark the sensor to be used. The purpose of defining the sensor's coefficient is to enable using the same sensor in different sets, but being able to refer to it differently. The coefficient is expressed in %. When the coefficient equals 0 the radiation set is disabled.

ANALOG INPUTS			
Barometer 1	-		
Temperat. 2	-		
Humidity 3	-		
W. speed 4	-		
W.direct. 5	-		
Radiation 6	3		
Daily rain 7	-		
Rain rate 8	-		



Notice that:

- The same **Radiation set** can be used by several irrigation programs.

10. Filtration

The filtration program is defined per each filtration site independently. Each program contains the **Interval** between the flushing cycles, the **flushing time** per station, the **Dwell time** between the stations and in case there exists a Down Stream (pressure sustaining) valve, the **Pre Dwell time** between the opening of the Down-Stream valve and the first station.

FILTRATION		Line 1	
CLOSED			
DP OFF		Prog	Left
Interval	h:m	01:00	00:00:00
Flush time	m:s	00:30	00:00
Dwell time	m:s	00:05	00:00
Pre-Dwell	m:s	00:10	00:00
starts by Time:		0	DP: 0
Consecutive loops by DP:		0	
←-	Start		--▶

The system supplies information about the status of the Filter site, the status of the DP sensor and the time left to the next cycle. During operation the system shows the station which is currently being flushed, and the time left for flushing of that station.

Additional information shows the number of flushing cycles executed by time, by DP and the number of consecutive loops executed.



Notice that:

- When there is no irrigation in progress, the countdown of the interval to next flushing is halted.
- By default, backflushing will start always with the first filter station on site. However there is an option to request (through the [DEALERS DEFINITIONS](#)) that the flushing will start with the filter following the one that was the last to be flushed at the end of the previous cycle.
- During the [DEALERS DEFINITIONS](#), it can be decided whether or not to ignore the DP sensor during the line filling delay.
- Execution of any flushing cycle, no matter what caused it to start, will reset the left interval to its programmed value.
- The constants of the filter site define what will happen with the irrigation during the flushing process.

11. System SETUP

The setup process of a **DREAM 2** system consists of the following steps:

Step 1 - Network definition

– defining the hydraulic network to be controlled.

Step 2 - Hardware definition

– defining the hardware used for the control.

Step 3 - Connections definition

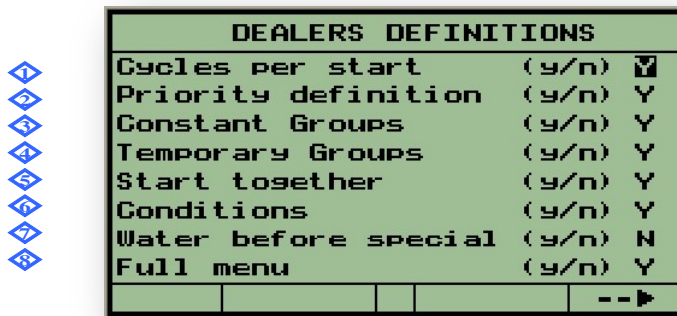
– defining where each of the network items are physically connected.

Those steps are meant to be executed by authorized technicians only. The detailed explanation about the system setup is out of the scope of this guide and can be found in the **INSTALLATION GUIDE** or at the **Image Maker of the DREAM2 CONSOLE guide**.

11.1 DEALERS DEFINITIONS

The person in charge of the system setup has been given some tools by which he can do some fine tuning of the system. He can decide to hide unnecessary features and reveal useful ones. He can dictate some global default parameters, he can decide about the system behavior in various aspects and he can make changes in the memory allocation. Because of the sensitivity of the data, changes will be permitted only after inserting a password (247) and only when the system is idle.

We think that familiarity of the user with the settings made at the Dealers Definitions may sometimes help him to understand the behavior of his controller, that's why we included this information herewith.



DEALERS DEFINITIONS		
1	Cycles per start	(y/n) <input checked="" type="checkbox"/>
2	Priority definition	(y/n) Y
3	Constant Groups	(y/n) Y
4	Temporary Groups	(y/n) Y
5	Start together	(y/n) Y
6	Conditions	(y/n) Y
7	Water before special	(y/n) N
8	Full menu	(y/n) Y
		--▶

❖ **Cycles per start** – enable irrigation in cycles, which means repeating the irrigation several times.

❖ **Priority definition** – enable prioritizing irrigation programs. In case of conflict, the program with the higher priority will irrigate and the other will wait. Higher number indicates higher priority.

❖ **Constant Groups** – enable defining groups of valves, G1, G2 etc... The groups will be remembered and will be usable by various programs. All the valves of the group will share a common dosage.

❖ **Temporary Groups** – enable grouping valves together by the “&” sign. The group created this way will have a common dosage and it is recognized only by the program in which it has been defined.

❖ **Start together** – enable synchronizing the opening of various valves by the “+” sign. The valves can be of different irrigation lines. The purpose of the synchronization is to enable central

fertilization of the valves. All the valves separated by the “+” sign, if requiring central fertilization, will share the same central fertilization job.

◆ **Conditions** – enable using conditions.

◆ **Water before special** – enable definition of a special amount of water before fertilization for the first fertilizer of each local fert. site. This special amount differs from the water before, used by the other fertilizers.

As a special case, when there is agitation in use, the “Water before Special” defines the time for starting the agitation after starting the irrigation program.

◆ **Full menu** – when full menu is enabled all the subjects are accessible by the user, otherwise some subjects of the **SETUP** menu will not be permitted.

FERTILIZER DOSAGE MODES			
THE MODE	LOCAL	CENTR	D
L/m3	<input checked="" type="checkbox"/>	Y	+
sec/min	N	Y	-
m:s/m3	N	Y	-
L/min	N	Y	-
Volumetric prop	Y	Y	-
By time(h:m:s)	Y	Y	-
Bulk(L)	Y	Y	-
◀--			--▶

The screen above is used for defining which of the fertilizer dosage modes will be revealed to the user and which will remain hidden. There can be a different definition for local and for central fertilization. The column marked “D” defines which mode will be the default mode.

- ◆ **L/m3** – liters of fertilizer per each cubic meter of water
- ◆ **sec/ min** – seconds of injection per each minute of irrigation
- ◆ **m:s/m3** – minutes and seconds of injection per each cubic meter of water
- ◆ **L/min** – liters of fertilizer per each minute of irrigation
- ◆ **Volumetric prop** – the specified fertilizer quantity will be injected proportionally to the water, the proportion will be calculated by dividing the amount of fertilizer with the amount of water.
- ◆ **By time(h:m:s)** – continuous injection of the fertilizer quantity specified by time units
- ◆ **Bulk(L)** – continuous injection of the fertilizer quantity specified in liters.

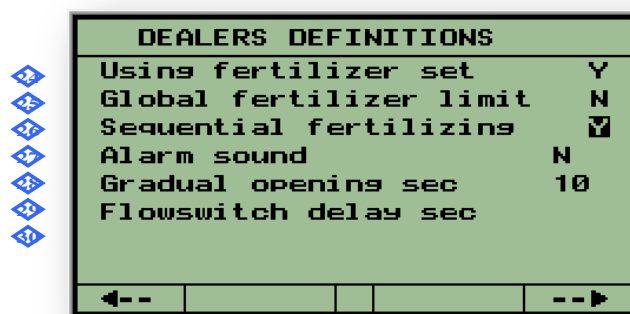
DEFAULT VALUES OF VALVES		
FLOW-nominal	10	(m3/h)
FLOW-minimal	-20	%
FLOW-maximal	+20	%
Filling time	15	(min)
Dosage per area	Y	
Dosage by evaporation	Y	
Default dosage mode	m3/area	
Area units	Dunam	
◀--		--▶

◆ **Flow nominal** – the value of the nominal flow that will be set by default to all the irrigation valves.

◆ **Flow minimal** – the percentage to be reduced from the nominal flow to obtain the value of the minimal flow that will be set as default to all the irrigation valves.

◆ **Flow maximal** – the percentage to be added to the nominal flow to obtain the value of the maximal flow that will be set as default to all the irrigation valves.

- ❖ **Filling time** – the value of the filling time that will be set by default to all the irrigation valves.
- ❖ **Dosage per area** – enable the option of dosing the water by volume/area. When this option is enabled, the valves constants will be added a table in which the area covered by each valve and the crop factor can be defined. See [Dosage by volume per area](#) included the paragraph of **Special dosage modes**.
- ❖ **Dosage by evaporation** – enable the option of dosing the water by evaporation. When this option is enabled, the valves constants will be added a table in which the area covered by each valve and the crop factor are defined. Additionally the **PARAMETERS** submenu will get a new subject called [Evaporation](#) in which the daily evaporation is defined. See [Dosage by evaporation](#) included the paragraph of **Special dosage modes**.
- ❖ **Default dosage mode** – defines the dosage mode that will be used as default whenever a new irrigation job is defined.
- ❖ **Area units** – The units that will be used for defining the area covered by each valve.



- ❖ **Using fertilizer sets** – enable using fertilizer sets. The fertilizer sets are predefined formulas of fertilization to be used by the irrigation programs. See the subject [Fertilizer sets library](#) in the submenu of **PARAMETERS**.
- ❖ **Global fertilizer limit** – when this option is enabled, the system will control the total amount of each type of fertilizer supplied by each valve in order not to exceed the predefined limits set by the user for the whole season. The seasonal limit setting is done through the subject [Global accumulative fertilizer limits](#) included in the paragraph of **Local and Central fertilizer dosage**.
- ❖ **Sequential fertilization** – enable using the sequential fertilization instead of the parallel fertilization. See the explanation about [Sequential fertilization](#) included in the paragraph of **Local and Central fertilizer dosage**.
- ❖ **Alarm sound** – enable sounding the buzzer while being in the main menu in case of problems existing in the system.
- ❖ **Gradual opening** – when irrigating in shifts, each shift may include a large number of valves and if one shift terminates and another shift starts, there might be significant variations in the pressure and the flow that can damage the system. To eliminate this kind of problems the **DREAM 2** offers the option of gradual opening/closing of valves. When this option is selected, then instead of closing simultaneously all the valves of the terminating shift and opening simultaneously all the valves of the starting shift, the opening/closing will be executed in a gradual mode: one valve will get closed and one valve will get opened and after a specified delay another pair of valves will follow. The delay is specified in seconds.
- ❖ **Flows-witch delay** – In order to being able to detect valves that failed to open or failed to close after being commanded to do so, there can be flow switches installed next to each valve, then whenever a command was issued to open/close a valve, its associated flow switch will be checked with a certain delay to see whether the command was really executed.

DEALERS DEFINITIONS		
DP act.during fill.delay	N	
Same valves in seq.	Y	
Repeated flow problem halt	N	
Stop time as max.duration	N	
Parallel programs in line	Y	
Rain/Frost detection	Y	
ET rain deduction	N	
Accumulated radiation	Y	
←-- --→		

◆ **DP act. during fill. delay** – this parameter defines whether during filling delay the DP contact will be referred to or ignored.

◆ **Same valves in seq.** – when this parameter is set to “Y”, it will be permitted to include the same valve, several times in the same sequence.

◆ **Repeated flow problem halt** – when this parameter is set to “Y” and the system detects high flow or low flow problems three times consecutively on the same line, it will react by freezing the line and unless released manually, the line will remain frozen.

◆ **Stop time as max. duration** – when this parameter is set to “Y” then the “stop time” parameter within each irrigation program defines the maximal duration of the program rather than the time at which the program must stop.

◆ **Parallel programs in line** – when this parameter is set to “Y” it is permitted for several programs defined on valves of the same irrigation line to run at the same time, provided that there are no conflicts between the programs. In case of conflict, the program with the lower priority or the one that is just about to start, will wait.

◆ **Rain/Frost detection** – when this parameter is set to “Y” the “Rain Shut down” and “Frost protection” options are enabled.

◆ **ET rain deduction** – Dealing with irrigation by Evaporation, when this parameter is set to “Y” the daily rain is deducted from the daily ET while calculating the amount to be irrigated.

◆ **Accumulated radiation** – When set, the system will enable triggering of irrigation cycles based on accumulated light.

The following screen can be used for notifying the **DREAM 2** system about **RTUs** which are temporarily disabled. Such RTUs will not be checked for having communication problems, will not be send commands for execution and will not be considered when reading inputs.

RTU DISABLE FLAG			
RF-2 rtu 1	-		
RF-2 rtu 2	-		
RF-2 rtu 4	-		
RF-2 rtu 6	-		
RF-2 rtu 7	+		
RF-2 rtu 8	+		
RF-2 rtu 10	-		
RF-2 rtu 11	-		
←-- --→			

The following screen deals with changing the memory allocations made by default for various uses. The last column shows the upper limit of each item.

DEALERS DEFINITIONS	
Num. of Sequences:	100
Num. of Groups:	200
Water dosage cells:	520
Fert. dosage cells:	520
Virtual w. meters:	4

Navigation buttons: <-- -- -- -->

- ◆ **Num. of Sequences** – defines the number of sequences that can be defined for being used in Irrigation programs.
- ◆ **Num. of Groups** – defines the number of groups that can be defined, including constant groups and temporary groups.
- ◆ **Water dosage cells** – defines the total number of irrigation jobs that can be defined in all the sequences together.
- ◆ **Fert. dosage cells** – defines the total number of fertilization jobs that can be defined in all the sequences together.
- ◆ **Virtual w. meters** – defines the number of virtual water meters that can be defined.

