SAPIR 2

Dealer installation manual

GOLDTEC
CONTROL SYSTEMS

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Contents

1. Introduction

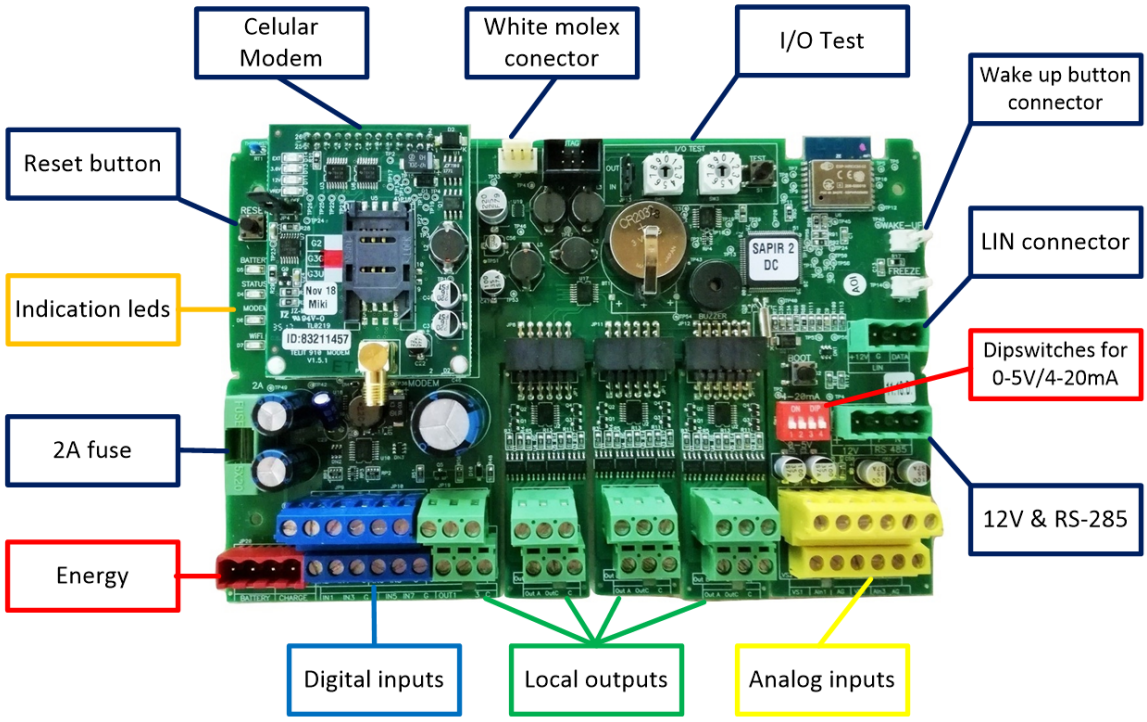
The SAPIR 2 is the next generation of central control irrigation systems. It allows combining various technologies to suit each project specific needs. It is an Internet enabled controller so the user can control and monitor everything from everywhere at any time using his PC or Smartphone.

The SAPIR 2 is the perfect solution for small to medium irrigation projects with a single irrigation head, suitable for both simple and most demanding applications.

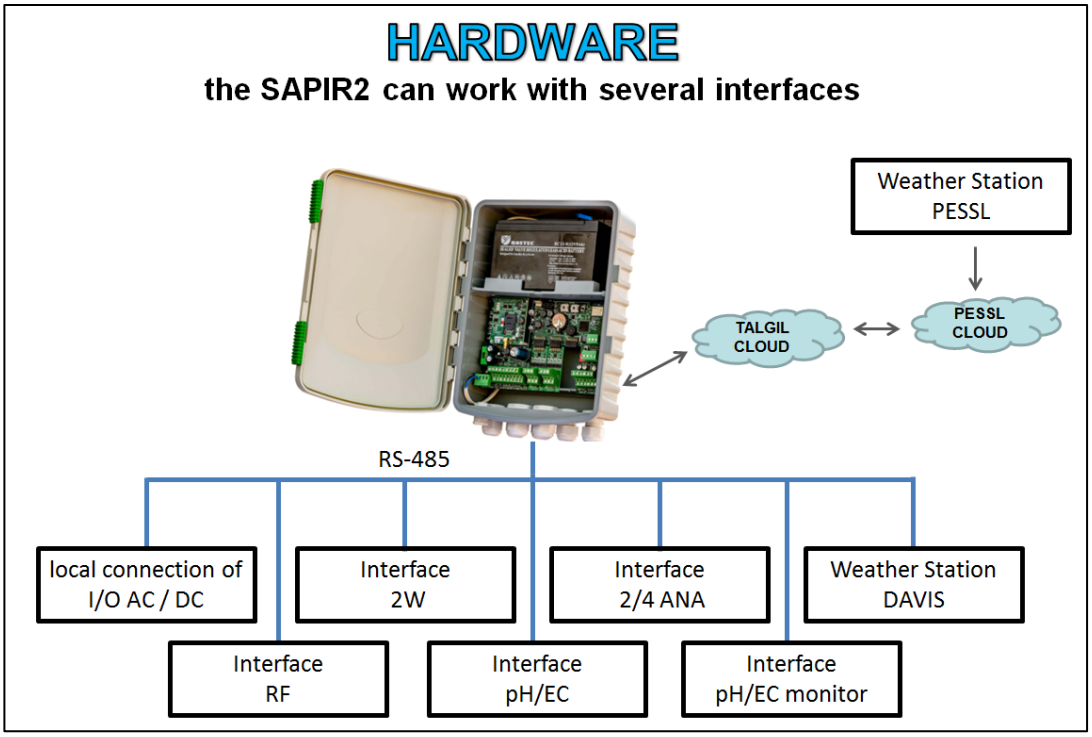
The SAPIR 2 has 16 local outputs + 16 in RTU's, 8 local digital inputs + 8 with RTU's and 4 analog inputs + 12 with RTU's / other interfaces.

2. The system structure.

2.1 Hardware



2.2 Interfaces - The following layout describes the principal structure of the SAPIR 2 interfaces system.



The interfaces function is to communicate between the external I/O devices such as – RTU's, analog sensors, weather station…. and the CPU.

Note – the on board local I/O's doesn't have an external interface, it's included in the SAPIR 2 board hardware and software.

For example – the steps of an opening command to valve number 3, which is connected to RTU RF number 2 in output 1:

1. The CPU will send the opening command to the interface / master RF.
2. The interface / master RF will send the command to RTU number 2.
3. RTU number 2 will open output 1.

When using digital or analog senores, the same logic works but the other way around, meaning that the sensor is connected to an input in the RTU and when the sensor sends a signal to the RTU, it sends it to the interface and the interface to the CPU.

Communication with the physically connected external interfaces is done by RS-485 communication protocol.

3. Mounting the controller

The SAPIR 2 can be installed indoor or outdoor:

- Make sure that the modem cable antenna is outside the box, and located in a high and visible place.
- Make sure to close the controller box when living the site.

4. Energizing the controller

The SAPIR 2 can work with both energy sources AC and DC, the decision if it will work with AC or DC should be taken before purchasing the controller and depends on the outputs (24VAC/ DC latch) and energy source on the installation site.

4.1 DC 10-Watt

Solar panel and 12V / 9 / 3.2Ah rechargeable battery (depends on the box).

Solar panel and rechargeable battery connections:

1. Connect the solar panel to the **CHARGE** input **– NOTE THE +/-**
2. Connect the rechargeable battery to the **BATTERY** input **– NOTE THE +/-**

18V Charger and rechargeable battery connections:

1. Connect the 18V charger to the **CHARGE** input **– NOTE THE +/-**
2. Connect the rechargeable battery to the **BATTERY** input **– NOTE THE +/-**

- **18V Charger –** in order to connect the SAPIR 2 DC to a the mains, a 18VDC charger is needed, the charger should be connected to the **CHARGE** input due to the controller special charging mechanism

4.2 AC (available Q3 2019)

220V / 110V AC directly from the mains and a 12 V / 9 / 3.3 Ah rechargeable battery 220.

220V / 110V AC directly from the mains connections:

1. Connect the socket to the mains
2. Connect the rechargeable battery to **BATTERY** input **– NOTE THE +/-**

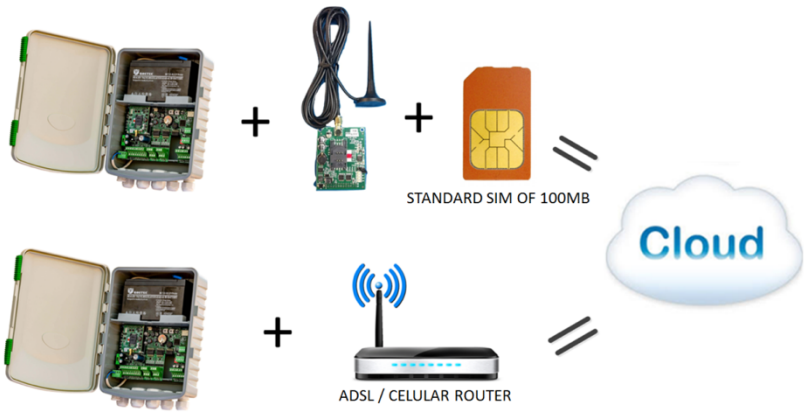
5. Communication

5.1 – Connection to the server

Connecting the controller to the server allows the user to program and monitor the controller from everywhere at any time, moreover, it allows to multiples users access to a certain controller and / or access with a certain user name to multiples controllers.

All the communication between the users pc / smartphone and the controller is happening in the server (except while using WIFI direct), for example, if a user changes a certain irrigation program from his computer using the CONSOLE, the changes are done in the server, and the information passes to the controller. In addition, all the information from the controller (online controller) saved in TALGIL's server (cloud).

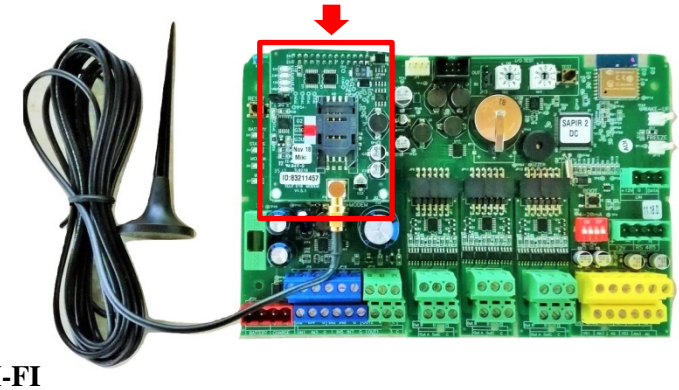
There are 2 ways to connect the SAPIR 2 to TALGIL server, first one is by cellular modem and a sim card with data package (at least 100Mb), and the second one is by connecting to the local Wi-Fi net.



5.1.1 – Cellular modem

In order to connect the controller to TALGIL's server, disconnect it from the power supply and rechargeable battery, open carefully the SIM card holder place it the right position and close the holder, to continue go to paragraph 6.

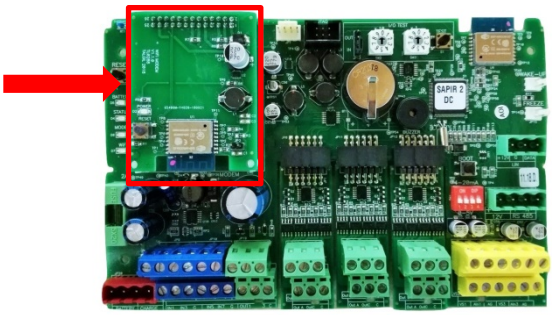
Cellular modem



5.1.2 – WI-FI

The Wi-fi modem connection will be ready in Q1 of 2019.

Wi-fi modem



6. Definitions for server connections

In order to connect the Sapir 2 to the internet, the installer supposed to send several commands to the Sapir 2 controller. The commands define the connection to the server and cellular company settings.

There are two ways to send these commands. The first option is by sending SMS to the sim card which is installed in the Sapir 2 Modem. (Note that the SIM will require SMS function)

The second option is by sending command via serial communication.

6.1 By SMS

Before sending SMS to the Sapir 2 controller, ensure that the SIM Card includes Internet and SMS package. Ask your cellular provider what is the Data APN, Data APN Username, and Data APN Password. In order to set the cellular provider settings, the installer need to send commands by SMS to the SIM card phone number. Every SMS command starts with the password **.1234.** Every command accompanied by SMS message back for approval or answer message.

Data APN command:

The Data APN SMS command is: **.1234.apn APN** for example, in order to set the timbrasil.br apn send the following SMS: **.1234.apn timbrasil.br** (Pointer 1)

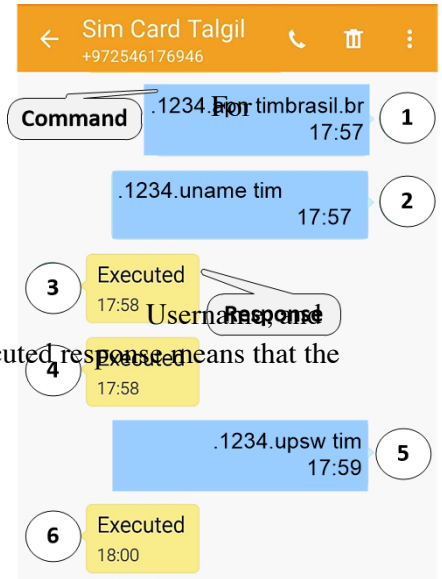
Data Settings	Value
Data APN	timbrasil.br
Data APN Username	tim
Data APN Password	tim

Data APN Username command:

The Data APN Username SMS command is: **.1234.uname UNAME** For example, in order to set the tim Data apn username send the following SMS: **.1234.uname tim** (Pointer 2)

Data APN Password command:

The Data APN Password SMS command is: **.1234.upsw UPSW**
example, in order to set the tim Data apn Password,
send the following SMS: **.1234.upsw tim** (Pointer 5)



Sapir 2 response to commands:

Pointers 3, 4, and 6 are the Sapir 2 response for the Data APN, Password commands. Executed response means that the command has been accepted.

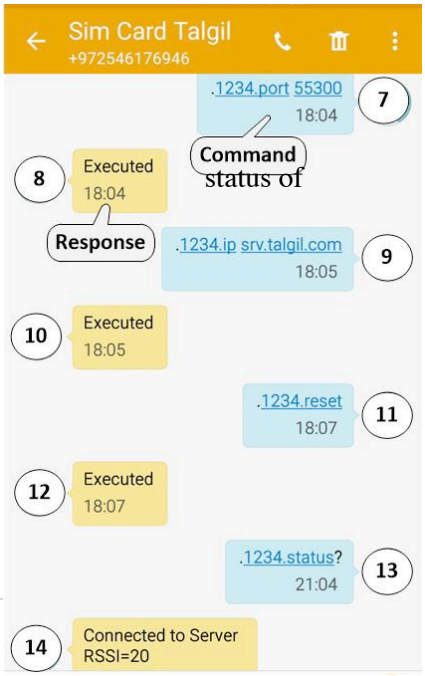
Set dealer name command:
The set dealer name SMS command is: **.1234.dealer DEALER_NAME**
For example, in order to set the **yaron** Dealer name, send the following SMS: **.1234.dealer yaron**

Reset command:
The reset SMS command is: **.1234.reset** (Pointer 11)

Controller connection to server status:
There is an option to ask the controller what is the Connection to the server.
For example, in order to check the Connection to server status, send the following SMS:

.1234.status? (Pointer 13)

The controller will send SMS back (Pointer 14)
With the current connection to server status
And the RSSI (Received signal strength indication) Level.
For example, pointer 14 is the controller response



Which display **Connected to Server** and **RSSI=20**

6.2 By serial connection

Preparing Serial communication with the Sapir 2 controller:

The second option is to send commands using the serial communication. The serial communication software is **Docklight**.

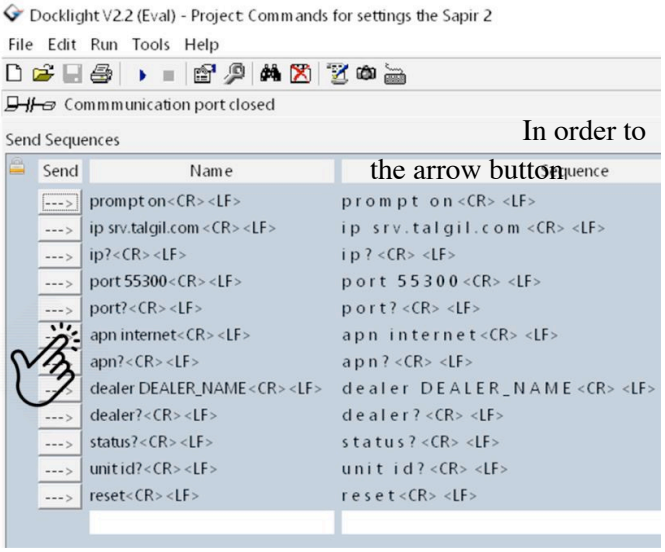
1. Download the **Docklight** software Version 2.2 here (https://drive.google.com/file/d/1UTAwq81QoalXOw4OHF00kPslX06sL6Ve/view?usp=sharing) And connect a **RF Programmer** device to the **PC** and to the **PC connector** on the **Sapir 2** hardware.
2. Download the Commands for settings the Sapir 2.ptp Dockilght project here (https://drive.google.com/file/d/1okS1ZDcNxgKLHprV2bdwE3Y81Q929f7w/view?usp=sharing)

   After downloading the ptp file, double click on it will open the Docklight project.

3. Select the appropriate com port on your **PC**.

Send commands to the Sapir 2

In order to send a command, press the arrow button



Commands list for settings the Sapir 2

Command	Description
.1234.prompt on	Turn on prompt.
.1234.password 4321	Change the password to “4321”.
.1234.password?	Return the current password.
.1234.ip srv.talgil.com	Set the server ip to “srv.talgil.com”.
.1234.ip?	Return the current server ip address.
.1234.port 55300	Set the server port to “55300”.
.1234.port?	Return the current server ip address.
.1234.apn internet	Change the apn to “internet”.
.1234.apn?	Return the current Data “apn”.
.1234.uname tim	Set the Data APN user name to “tim”
.1234.uname?	Return the current Data APN user name.
.1234.upsw tim	Set the Data APN password.
.1234.upsw?	Return the current Data APN password.
.1234.dealer dealer_name	Set the dealer name to dealer_name
.1234.dealer?	Return the dealer name.
.1234.unit id?	Return the Sapir 2 unit ID.
.1234.reset	Perform a reset to the Sapir 2 controller.
.1234.config init	Upload default image to the Sapir 2.

7. Communication with the controller

Communication with the controller is made by using 2 platforms, the first platform is the DREAM CONSOLE PC software (computers, laptops), and the second one is the SPOT app (smartphone, tablet).

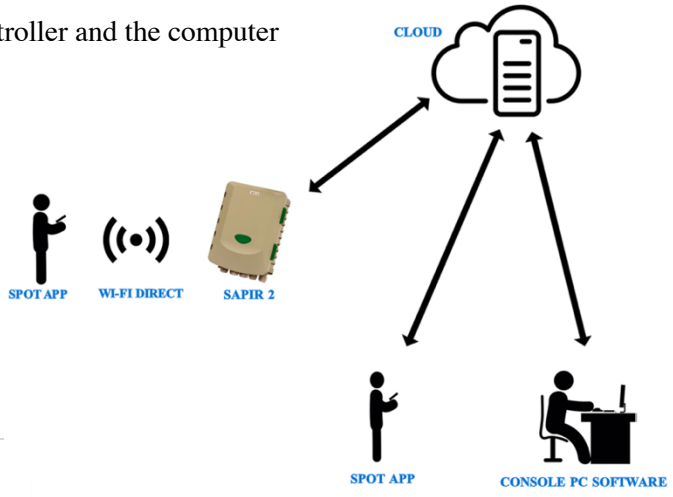
7.1 Available internet connection

When there is a solid internet connection both options (Console and Spot) are available, the installer MUST connect the controller to the internet in order to create the system configuration.

7.2 No internet connection

In case of no internet connection, only the SPOT app is available and will work only while the user is standing near the controller and the internal WIFI component is turned on.

Note – there is no physical connection between the controller and the computer



8. First introduction with the console

8.1 What is CONSOLE?

The DREAM CONSOLE pc software is a platform that allows programming and monitoring the SAPIR 2 from any pc or laptop, the only requirements are internet connection of the controller and the computer, user name and password and downloading the software.

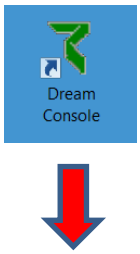
Using the software allows the user creating and editing irrigation programs, monitoring irrigation performance, graphical analyze of inputs (sensors water meters…), creating maps and so much more…..

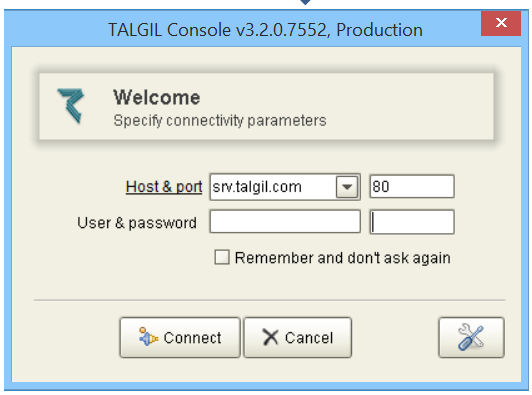
8.2 Downloading

For downloading the CONSOLE software click here, or enter our website **www.talgil.com**, after reaching to the home page, select: **Software** **Console Download** ➡ **sole 64 bit** ➡ **and follow the installation ins** ➡ **ions**.

8.3 logging in

After the downloading process, a shortcut with the icon of TALGIL Should appear on the computer desktop, Double click on the short cut will Bring you to the user name and Password window, insert your user name and Password in the Designated spots and click “connect”.



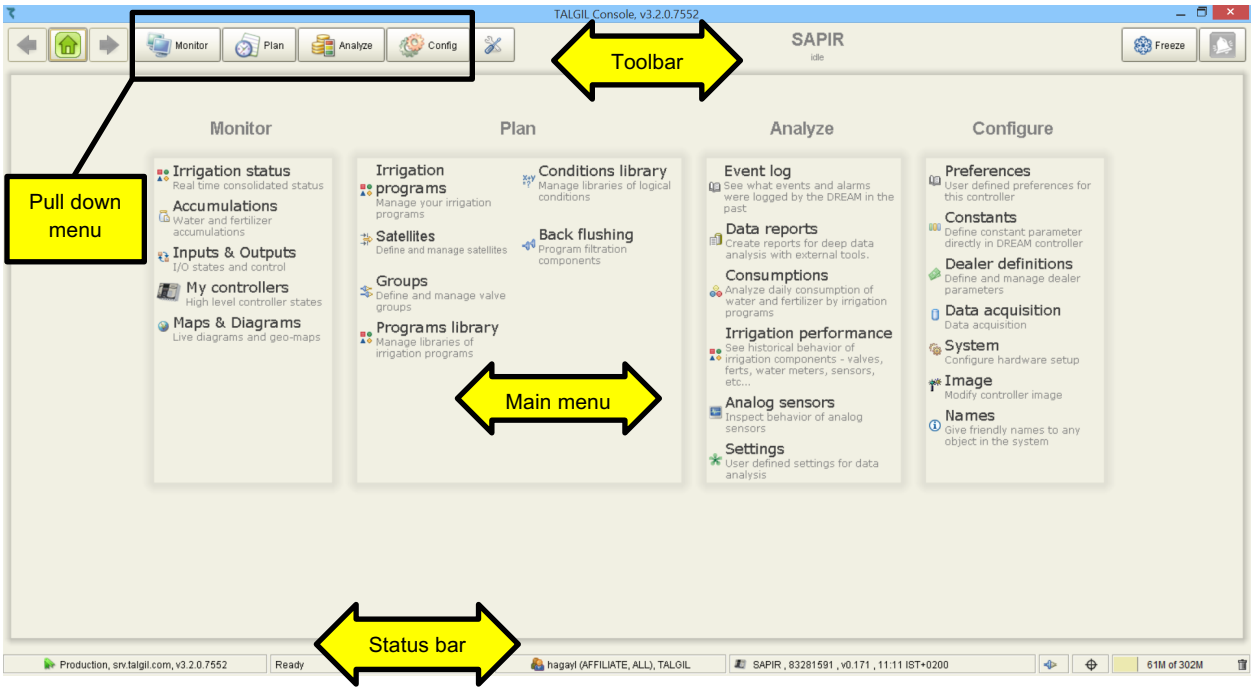


Note – before logging in make sure “Host” and “Port” are correct

- **Host –** srv.talgil.com
- **Port –** 80

8.4 Home page

the **Homepage** is the first screen you’ll see, it contains the menu of all the subjects covered by the **CONSOLE**, it is the place from where the user can reach all of those subjects, let’s have a closer look and see what else is there.



The Main Menu - The subjects of the **Main Menu** are grouped into meaningful groups, each group containing the relevant subjects. There are four groups:

Monitor – deals with monitoring the current activities
Plan – deals with the users irrigation planning.
Analyze – deals with analyzing accumulated historical information.
Configure – deals with all the information related with the system setup.

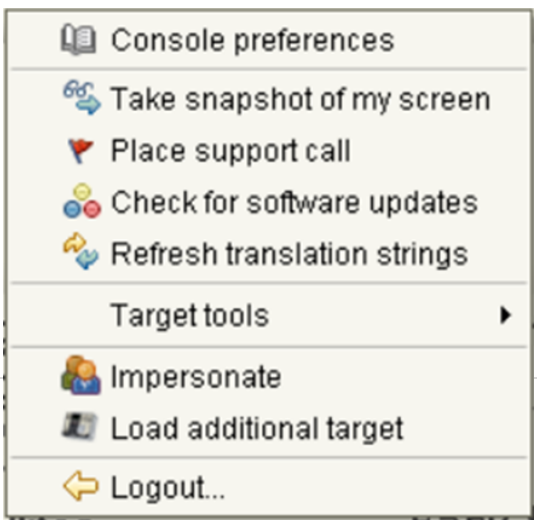
Depending on the configuration of the various targets there may be some differences in the list of subjects included in the menu.

The **pull-down** menu contains the same parameters as the main menu, and it's available all the time in all the screens.

9. System Configuration - Advanced tool menu

In this chapter we will define the CONSOLE preference and create the system configuration, to enter the advanced tool menu click on  in the upper center of the home page screen.

After clicking the icon, a small tools table will appear:

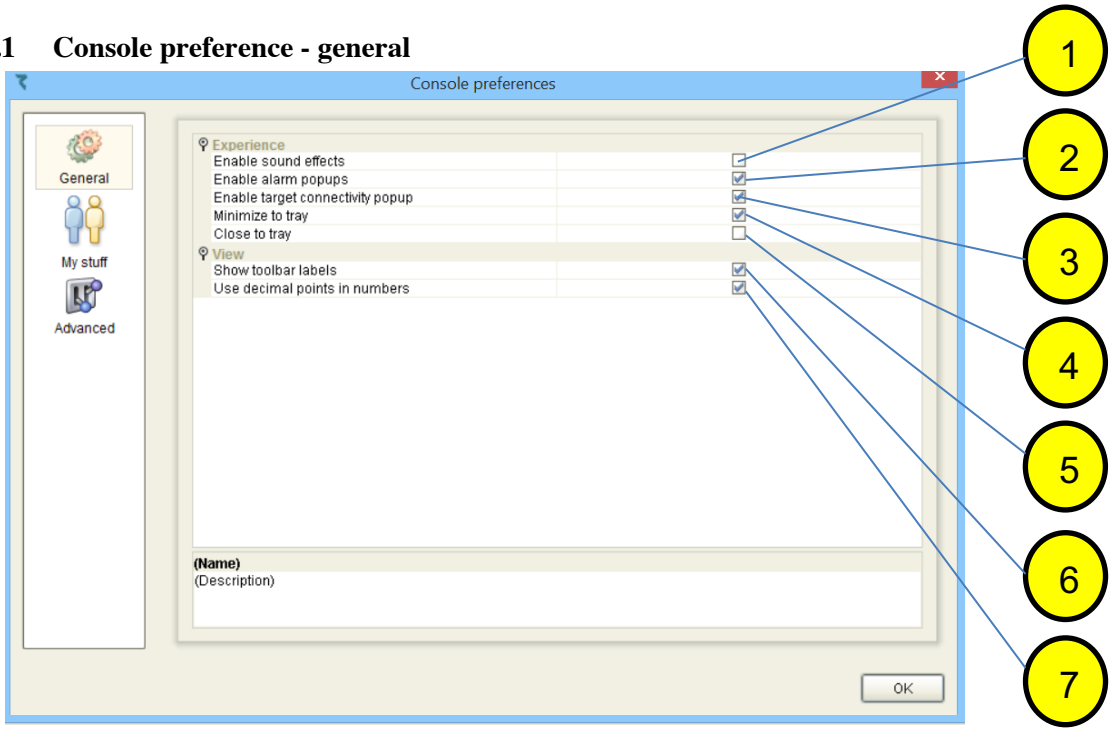


9.1 Console preferences

The **Console Preferences** perspective can be reached from the **Main menu** or the **Pull down menu** by selecting **Tools/ Console preferences**.

Obviously this section deals with setting some parameters that will affect the appearance and the behavior of the **Console.**

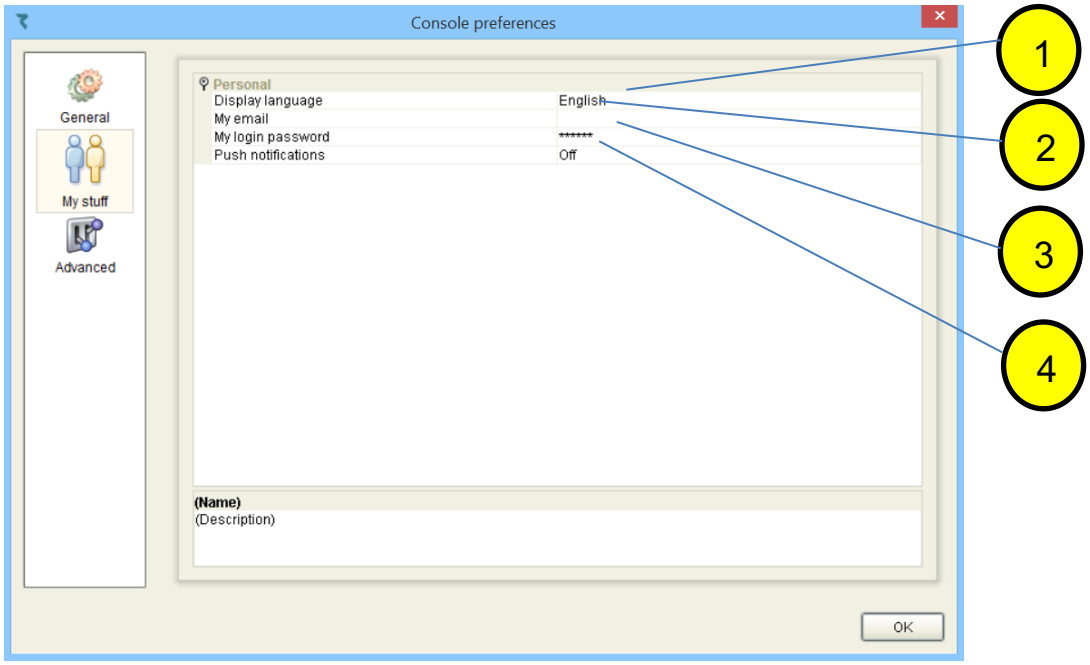
9.1.1 Console preference - general



Pointers

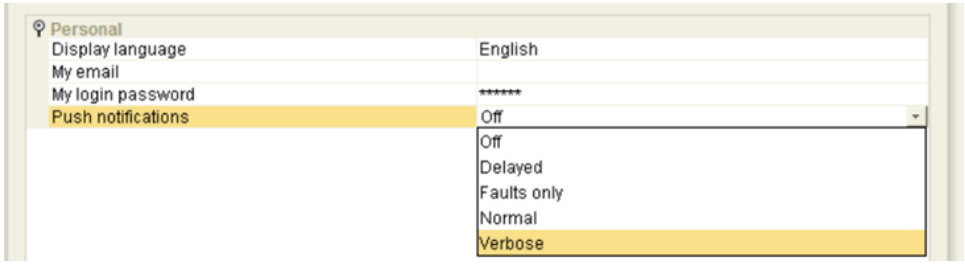
1. Enable sound effects for calling user attention.
2. Enable alarm popup windows.
3. Enable connectivity popup windows.
4. Show toolbar labels.
5. Place the icon in the tray when the Console is closed.
6. Place the icon in the tray when the Console is minimized.
7. Enable to use decimal points in numbers.

9.1.2 Console preference – my stuff



Pointers

1. Click to select the Console language.
2. Set your Email address, for receiving system reports and notifications.
3. Set your login password.
4. Enable / disable push notifications



Off – Push notifications will not be sent to this user, he will receive only emails according to the "**system events subscription**" list (paragraph 10.2).

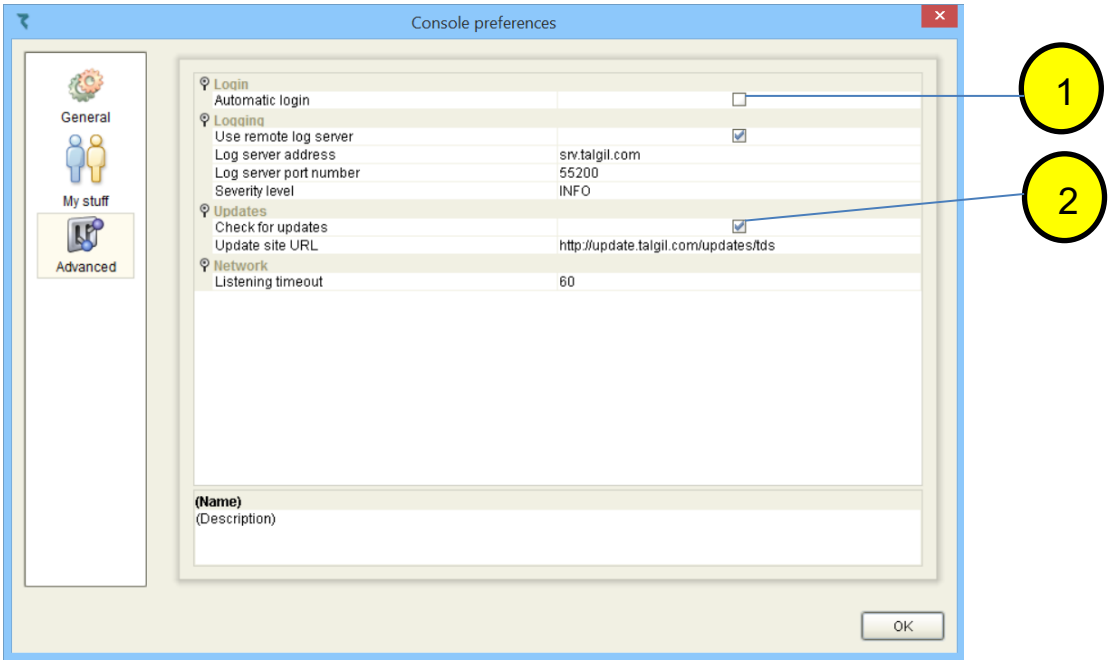
Delayed – Push notifications will be sent to the user in bulks aggregate every 1 hour.

Faults only – Faults will be sent instantly as push notifications, other events are ignored.

Normal – Faults will be sent instantly; other events will be aggregated and sent every 5 minutes, all the notification will be sent as push notifications.

Verbose – Everything is sent instantly (developers and affiliates only).

9.1.3 Console preference – Advanced



Pointers

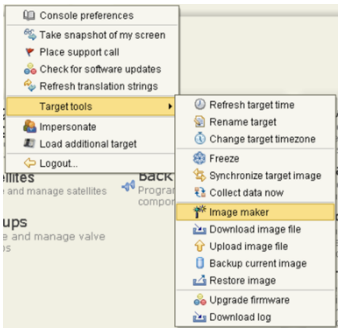
1. Automatically login on each system startup.
2. Automatically check for software updates.

9.2 Creating new configuration – target tools

The configuration / image of the controller is the definition of all the irrigation system components, hardware and the connections between them, for example:

- Pumps, irrigation lines, valves, fertilizer injectors, water meters, filters, sensors…..
- All the hardware used to control and monitor, for example: interfaces, RTU's.
- The outputs and inputs connections between the hardware and the irrigation components.
- And additional features such as satellites, virtual water meters…..

Every controller made by TALGIL has a basic configuration to be able to connect to the server, the installer should create a new configuration according to the system design.



To create new configuration (image) click on target tools,

And select **"image maker".**

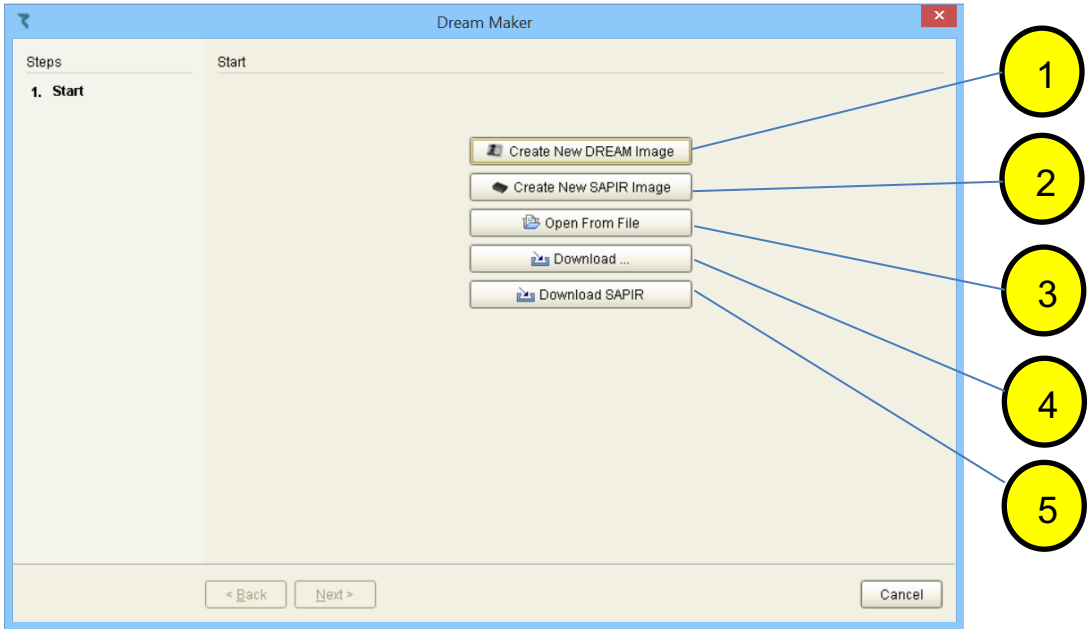
The procedure to create new configuration (image)

Contains 10 steps, to create new configuration / image

Follow the steps one by one.

Note – after creating a new image or adding new Components it's impossible to delete them.

9.2.1 step1 – start



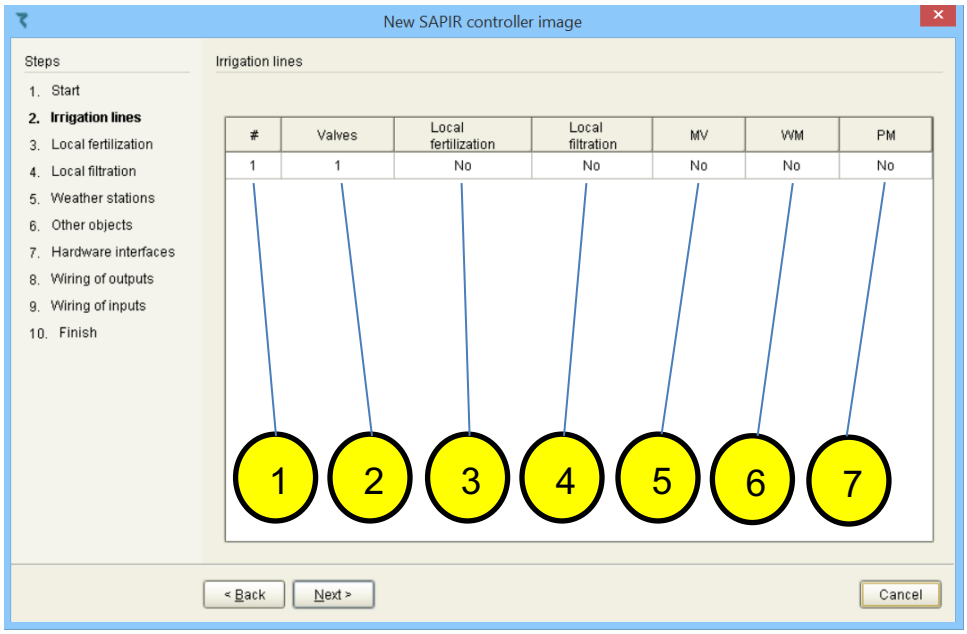
Pointers

1. creating new configuration for DREAM
2. creating new configuration for SAPIR2
3. Load a configuration file from the computer to the "image maker", in case you already have a file with a configuration.
4. download to the "image maker" of the current controller a configuration from a selected controller (in case you have more than one)
5. download the current configuration of the current controller to the "image maker"

In case it's a new controller select "create new SAPIR image", if you only want to make some modifications to the controller image select "Download SAPIR".

9.2.2 Step 2 – irrigation lines

In the following step we'll define the single irrigation line of the SAPIR 2, the meaning of a single line is that only one water meter can be connected and monitored by the SAPIR 2, and that's why fertilizer and filtration sites can by define only as local sites.



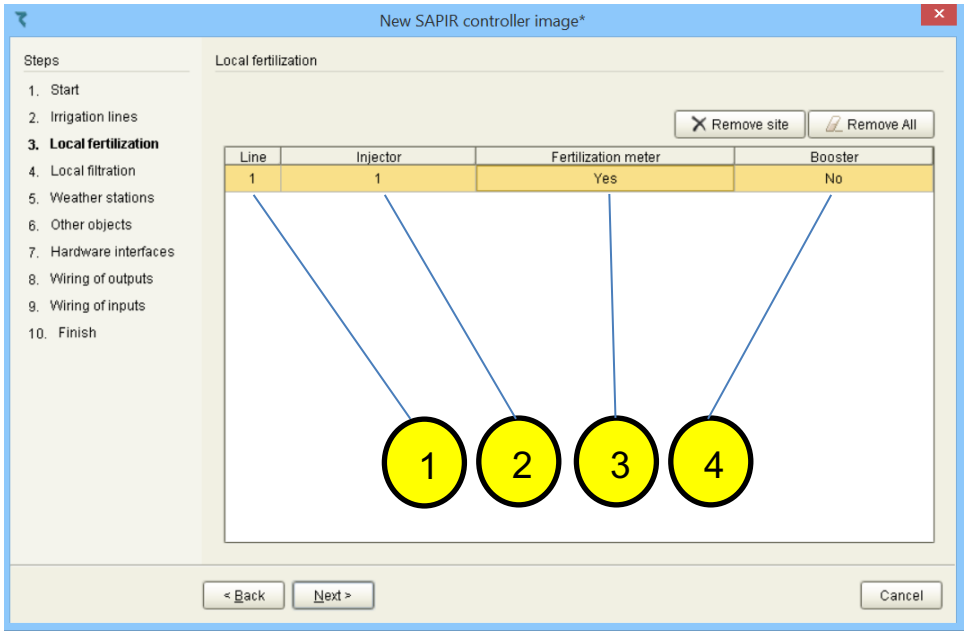
Pointers

1. ID number of the irrigation line, the SAPIR 2 is a controller for single irrigation line.
2. **Valves -** The total quantity of valves operating by the SAPIR 2, if a certain valve exists in the project but it's not connected to the controller / RTU it shouldn't be counted.
3. **Local fertilization -** Does the controller operates the fertilization process YES or NO.
4. **Local filtration -** Does the controller operates the filters YES or NO.
5. **MV -** Does the controller operates the main valve YES or NO, main valve can also be a pump.
6. **WM -** Is there a water meter connected YES or NO.
7. **PM -** Is there a presostate connected YES or NO.

In order to change from "**NO**" to "**YES**" double click on **NO**

9.2.3 Step 3 – local fertilization

In this step we'll define the number of injector's, fertilization meters and booster of the fertilization site.



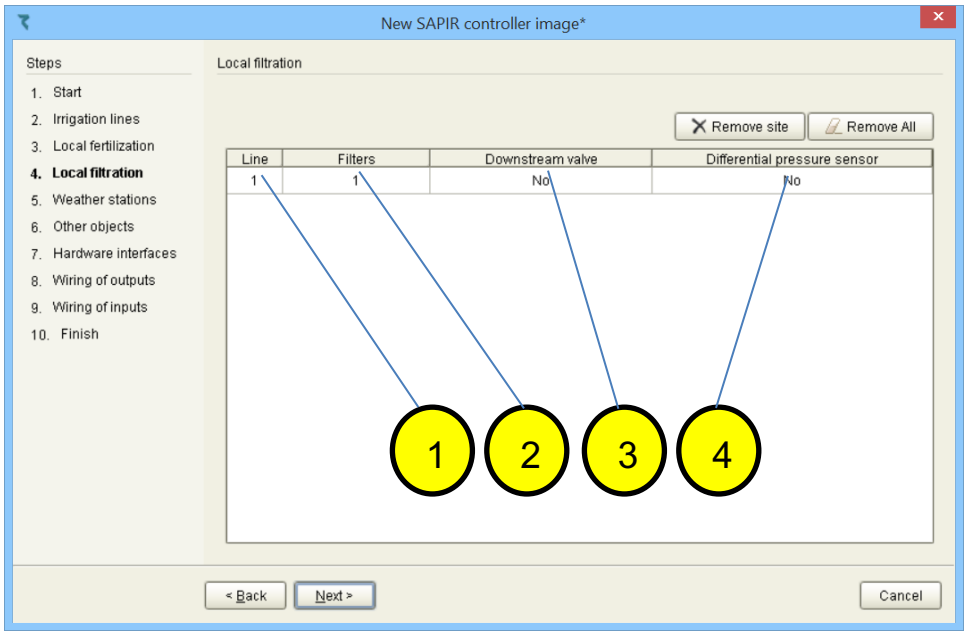
Pointers

1. ID number of the irrigation line.
2. **Injector -** The quantity of fertilizer injectors operated by the controller.
   To add / remove injectors click the mouse right button on the number of injectors and select **Add injector** or **Remove injector**, to remove the fertilization site select **Remove site** (removing is possible only before deploying to the controller).
3. **Fertilization meter -** Is there Fertilization meters connected YES or NO, if there are fertilization meters and they are connected to the controller / RTU select YES.
4. **Booster -** Does the controller operate the Booster YES or NO.
   It's one booster for fertilization site, in case the injectors are using the Booster, every time that one of injectors opens according to a program the booster will turn on.

Note - Complete this screen only if the controller operates the fertilization process, if not, skip it.

9.2.4 Step 4 – local filtration

This step is dedicated for definitions of the amount of filters, downstream valve and differential pressure sensor of the filter site.



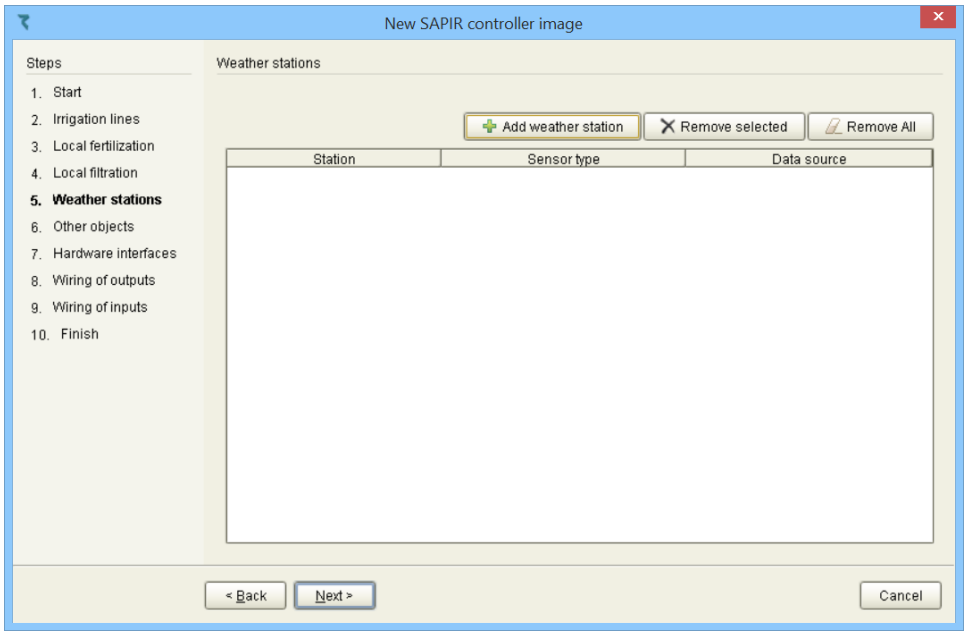
Pointers

1. ID number of the irrigation line.
2. **Filters -** The quantity of filters operated by the controller, to change it double click on the number of filters and type the new one.
3. **Downstream valve -** Does the controller operates a Downstream valve YES or NO. The downstream valve function is to ensure good water pressure for flushing.
4. **Differential pressure sensor -** Is there a Differential pressure sensor connected YES or NO. The DP sensor measures the differential pressure between the inlet and the outlet of the filters, and when it's higher from what it was set for, it will close contact and a flushing sequence will began.

Note - Complete this screen only if the controller operates the filters, if not, skip this step.

9.2.5 Step 5 – weather stations

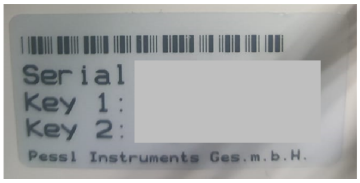
In this screen you can add **PESSL** or **DAVIS** weather station, if you don't have weather station in your project you can skip this Step.



Note – every **Sensor type** that you define in the system occupied an analog input.

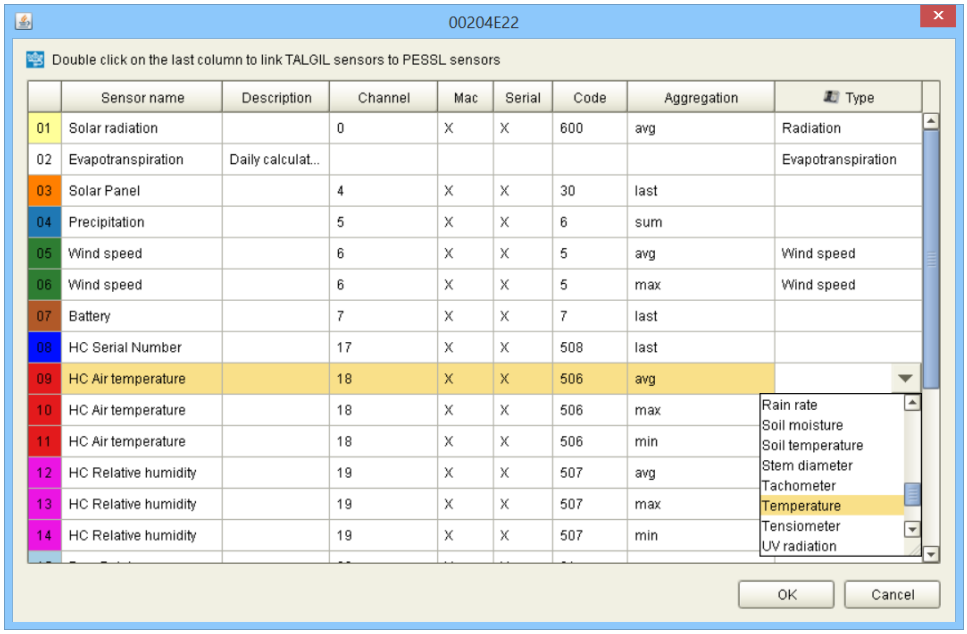
PESSL

- Make sure your PESSL weather station is online and registered in TALGIL's account,
  To register a new PESSL station, please take a picture of the following sticker (located on the inner side of the SIM card box) and contact us (http://talgil.com/Home):

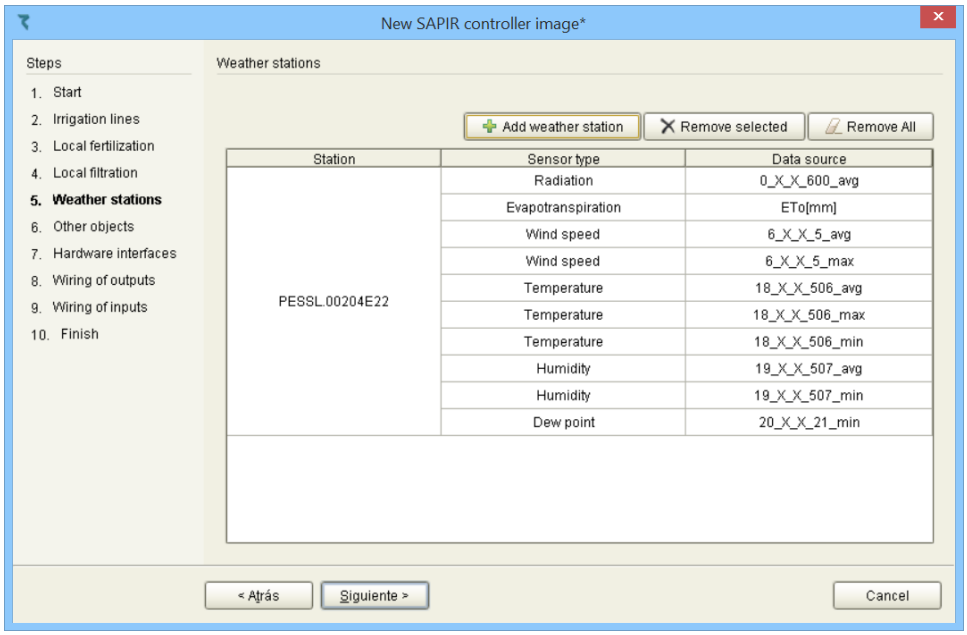


- Click on **Add weather station** and select **PESSL instruments.**
- Insert the station code and press **OK**.

In the following screen we assign the weather station sensors readings to the controller by selecting the readings that we would like to see on the **CONSOLE**, to do so, select one of the readings from the **Sensor name** column, and double click on the empty box under **Type** in the same line as the reading, than select the **Type**, for example – for "**HC Air temperature**" we will select "**Temperature**" as you can see in the following screen capture.

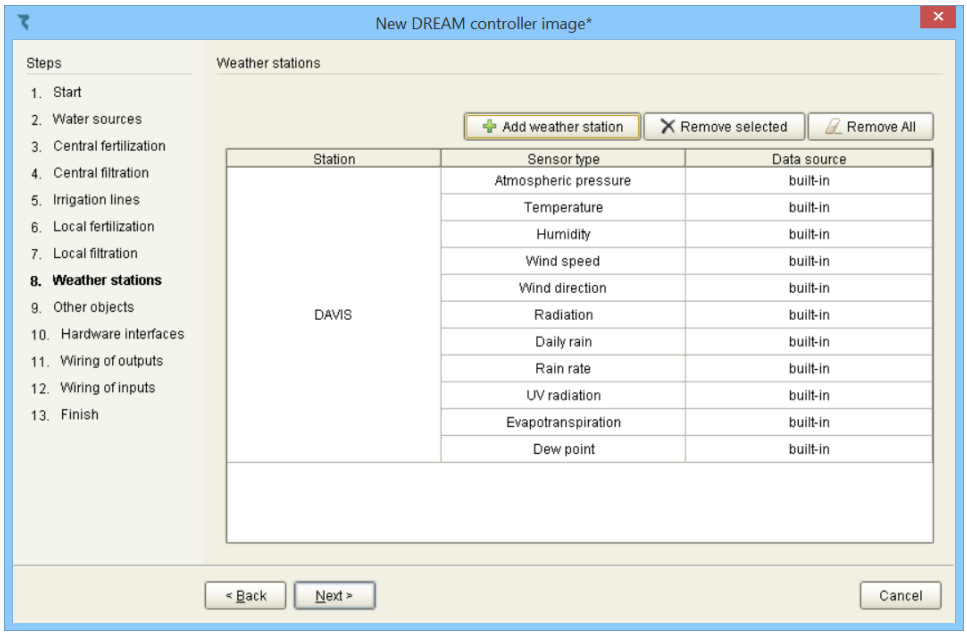


Some of the readings (sensors name) are similar, the difference between them is the **Aggregation**, it allows you to choose if you want to see the Average, minimum, maximum or last value. Pressing the **OK** button opens a table that contains your selections.

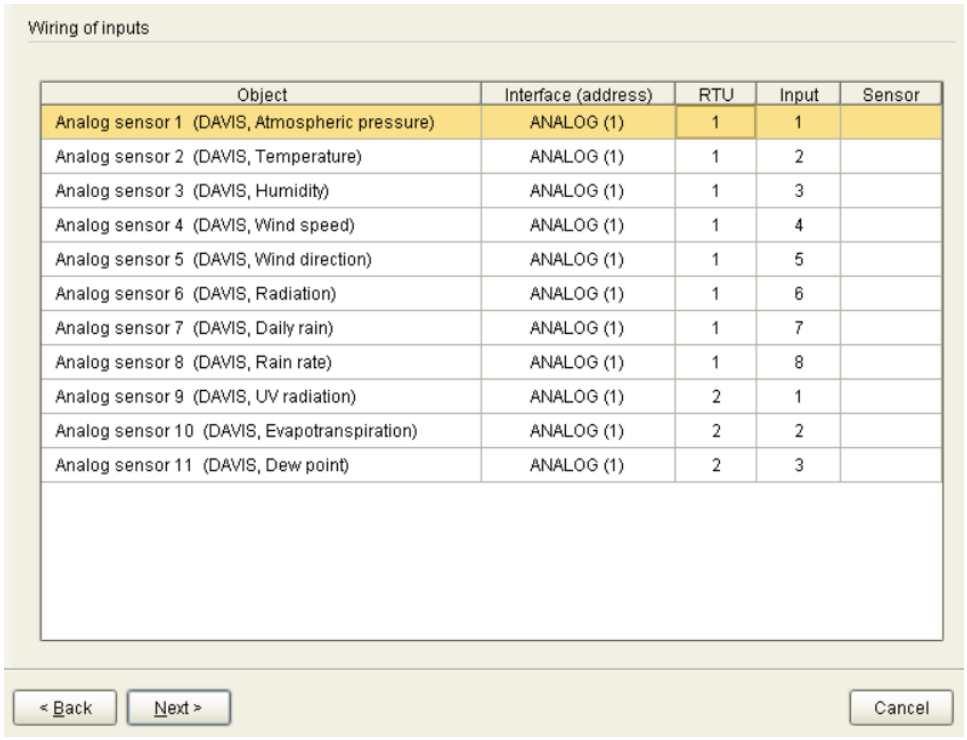


DAVIS

Click on **Add weather station** and select **DAVIS**, after doing so the following chart will appear:

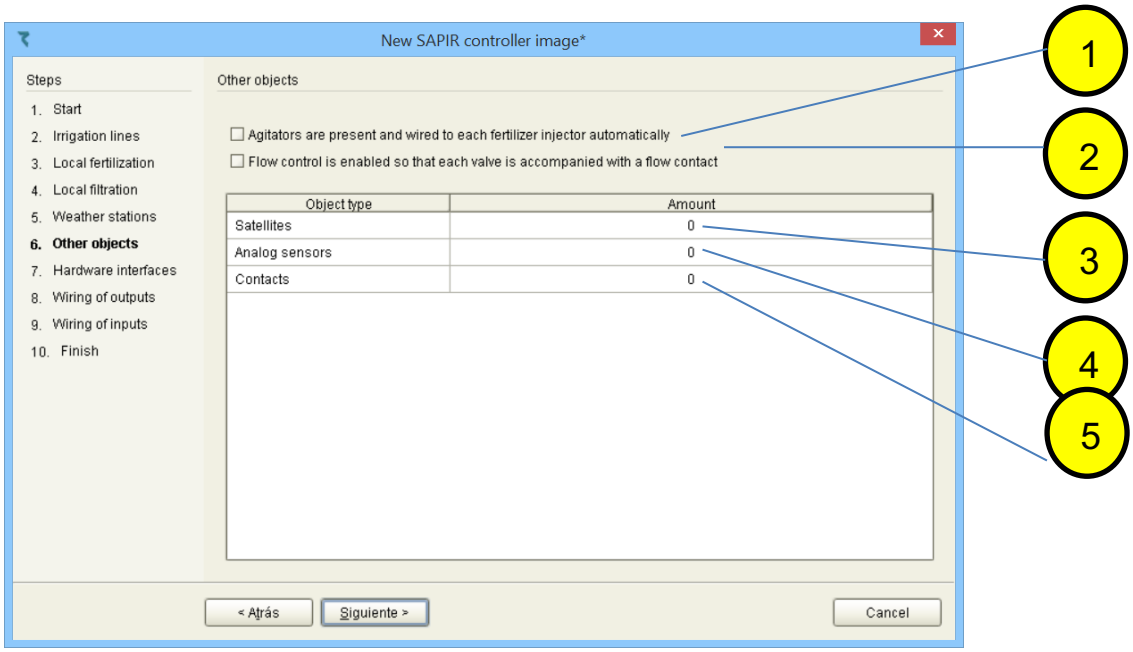


Note - the **DAVIS** inputs connections should be defined in **Wiring of inputs** screen as follow:



9.2.6 Step 6 – other objects

This step is dedicated for definitions of objects such as **satellites**, **analog sensors**, **contacts**, **agitators** and **flow control contacts**.

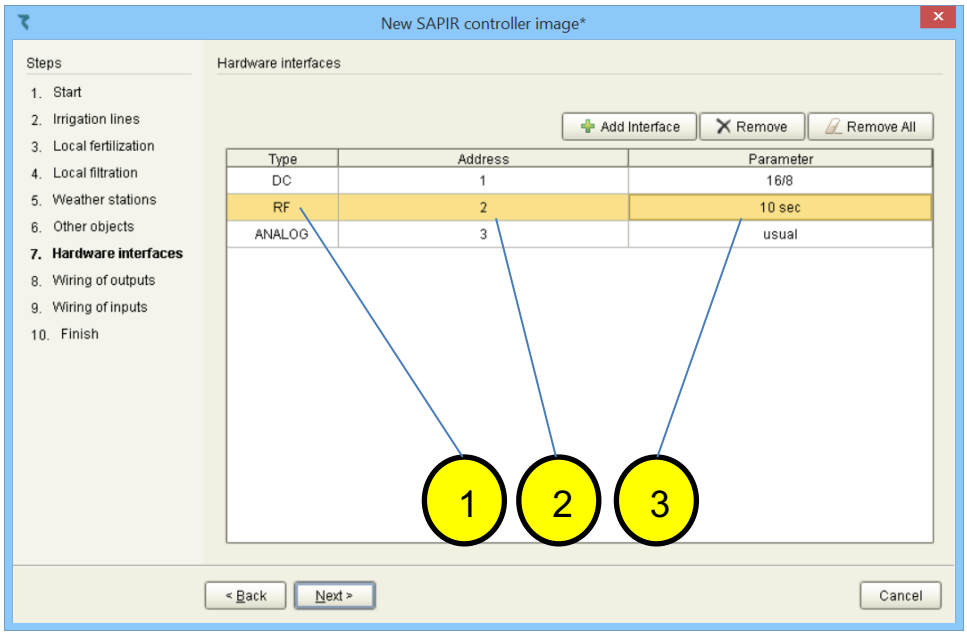


Pointers

1. When the checkbox of the agitators is checked, there will be an additional output allocated against each fertilizer injector for the purpose of agitating the fertilizers.
2. When the flow control checkbox is checked there will be an additional digital input allocated against each irrigation vale for connection of flow switches that will indicate whether the valve is open or closed.
3. **Satellites -** are outputs that can be attached to other outputs in order to work in parallel with them. Satellites can also be activated by conditions, and there can be conditions defined on the status of satellites.
4. **Analog sensors -** are inputs that supply a range of values, unlike the contacts that have two states only (open or closed). Examples for analog sensors: tensiometers, soil humidity, fruit diameter, temperature and more.
5. **Contacts -** are dry contact inputs for general use, for example – activation of conditions.

9.2.7 Step 7 – hardware interfaces

Step number 7 deals with selecting the type of interfaces of the system, their address and parameters. Interfaces are used for communication between the controller and other technologies such as RTU's, analog sensors, pH/EC, weather station…….



Each Interface must be given a unique address, the address appearing in the hardware interfaces list must be equally set at the DIP switches (the address switches) of each Interface, except in interfaces AC or DC which are an integral part of the controller board.

Pointers

1. **Type –** double click on the interface type name will open a list of the interfaces to select from.
2. **Address –** double click on the address number will open a list of numbers to select from.
3. **Parameter -** double click on the parameter name/number will open a list to select from (the parameter can be changed in some of the interfaces, in others not).

A short review of the type of interfaces:

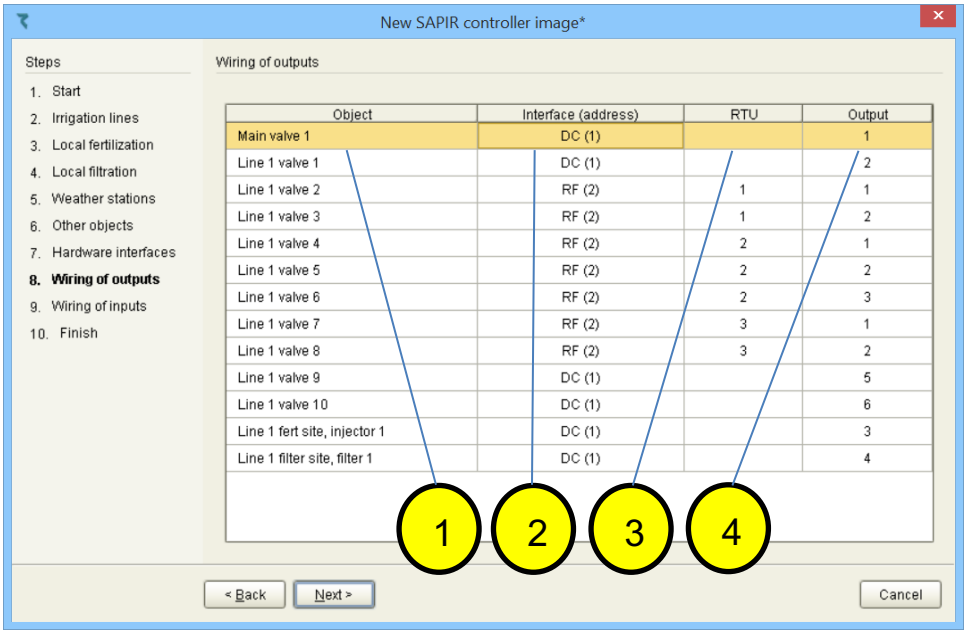
- **Interface DC –** on board interface (no DIP switches) that contain maximum 16 local outputs of 12V DC LATCH, 8 dry contact inputs and 4 analog inputs of 4-20 mA / 0-5V. The address will always be 1 and parameter 16/8.
- **Interface AC -** on board interface (no DIP switches) that contain maximum 16 local outputs of 24VAC, 8 dry contact inputs and 4 analog inputs of 4-20 mA / 0-5V. The address will always be 1 and parameter 16/8.
  Note – the SAPIR 2 has 2 basic models one that includes interface AC and one that includes DC.
- **Interface 2W** – external interface that communicate and energizing 2W RTU's by 2 wired cable to a distance of up to 10 Km and communicates with 60 RTU's.
  Select the interface type and address, the parameter doesn't changes.

- **Interface RF** – external interface that communicate with RTU's RF by radio to a distance of 30 Km (with repeaters and depends on the generation) and communicates with 32 RTU's.
  Select the interface type and address, the parameter doesn't changes (only in case it's G5).
- **ANALOG -** includes various interfaces such as:
  - **THD unit –** for measuring temperature, humidity and dew point.
  - **External –** not in use for the meantime.
  - **Usual –** includes: **pH / EC monitor –** for measuring pH EC values.
    Interface 2 / 4 ANA IN - for reading 2 to 4 analog sensors.
    Interface ADAM – for reading up to 48 analog sensors.

  Select the interface type, address and parameter.
- **pHEC –** external interface dedicated for fertigation, allows to fertigate with required pH/EC values or as a regular fertilizer injectors.
  Select the interface type and address, the parameter doesn't changes.

9.2.8 Step 8 – wiring of outputs

In step number 8 we'll define the wiring list of all the output devices declared above in the previous steps of the Image maker, it's the connection between the output devices and the Hardware.

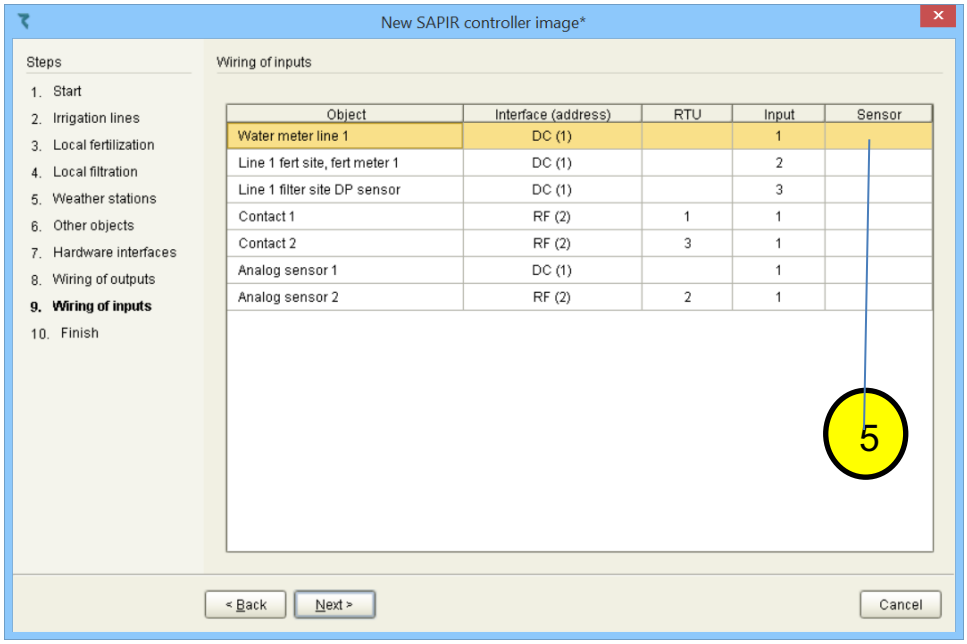


Pointers

1. **Object -** This column contains the list of all the outputs devices.
2. **Interface (address) -** In this column we define the interface for each output device, to do so double click on the empty spots in the column and select the required interface from the list.
3. **RTU -** This column is for selecting RTU number, to do so double click on the empty spots in the column and select the RTU number from the list.
4. **Output -** This column is for selecting the output which the object (output device) is connected to.

9.2.9 Step 9 – wiring of inputs

In step number 9 we'll define the wiring list of all the input devices declared above in the previous steps of the Image maker, it's the connection between the inputs devices and the Hardware.

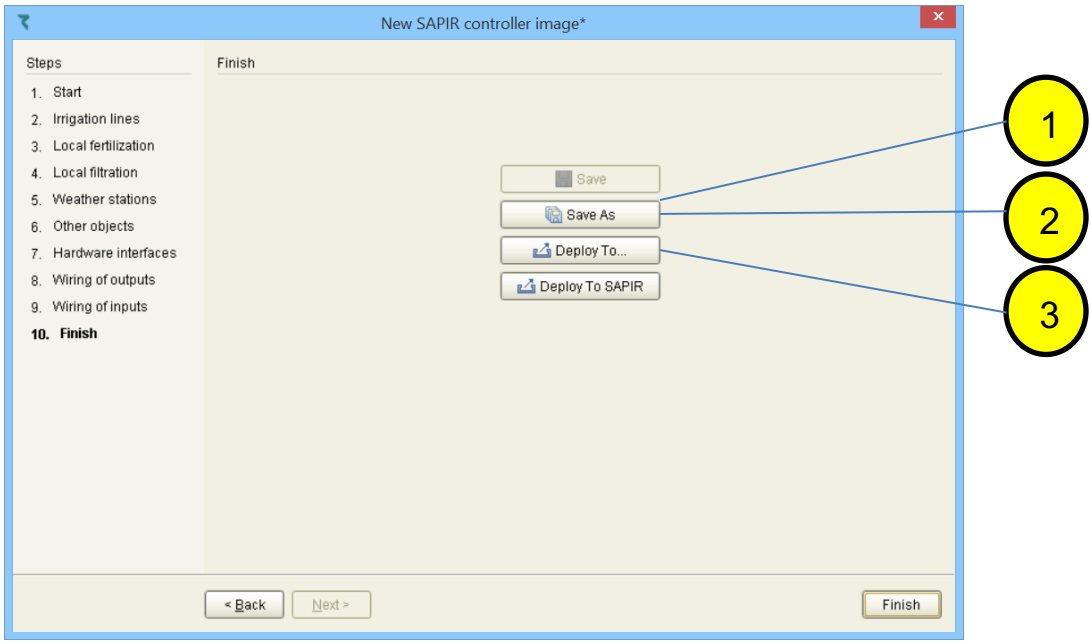


Pointers

1. **Object -** This column contains the list of all the outputs devices.
2. **Interface (address) -** In this column we define the interface for each output device, to do so double click on the empty spots in the column and select the required interface from the list.
3. **RTU -** This column is for selecting RTU number, to do so double click on the empty spots in the column and select the RTU number from the list.
4. **Input -** This column is for selecting the output which the object (output device) is connected to.
5. **Sensor -** Not in use for the moment.

9.2.10 Step 10 – finish

Step 10 is the last one in the image maker, in this screen we can save the configuration on the computer or deploy it to a certain controller.



Pointers

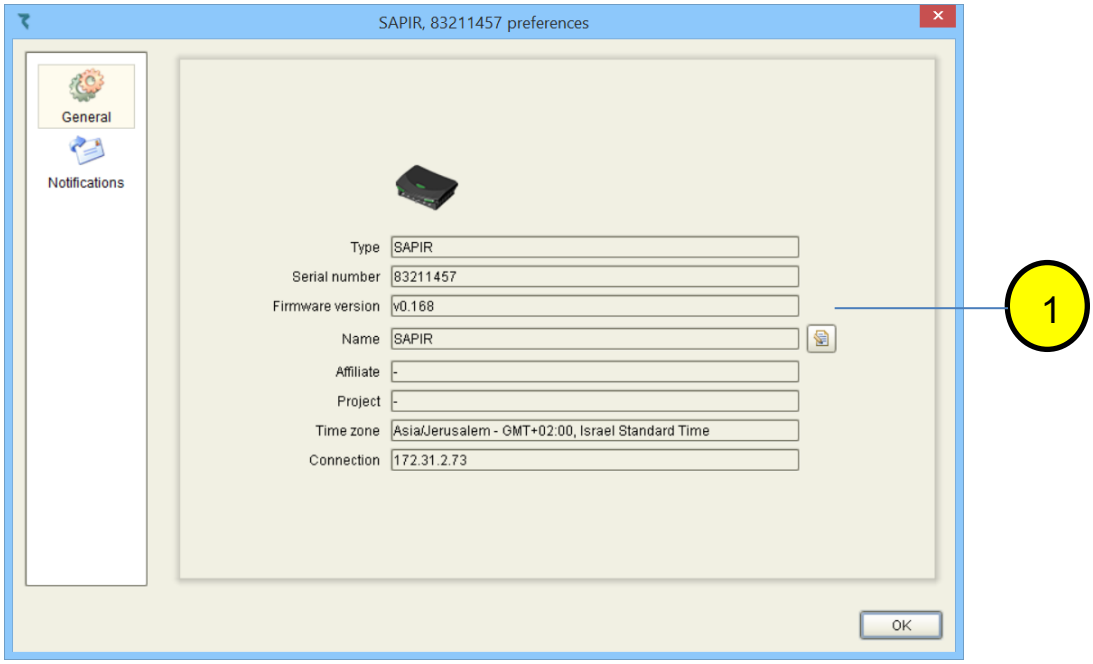
1. **Save as -**This option is used to save the configuration (image) in the computer.
2. **Deploy To… -** deploying the configuration to a selected controller.
3. **Deploy to SAPIR –** deploying the configuration to the current controller.

10. Characteristics of the irrigation system – Configure

The following chapter focuses on the data involved with the Configuration of the controller and with the process of adapting it to the specific application. This is the place to look for information about the system structure, the hardware in use, the connections list of all the accessories, the constant parameters, the user preferences and more.

10.1 Configure – preferences – General

The General preference screen demonstrates general information of the controller.

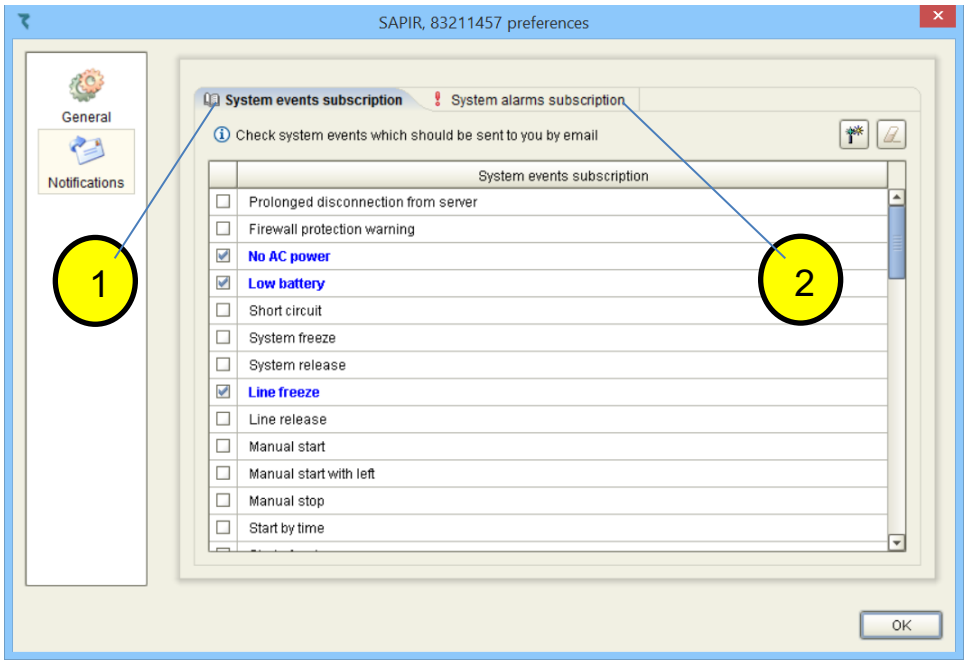


Pointers

1. Click on the icon to edit the controller name.

10.2 Configure – preferences – Notifications

The screen below is dedicated for selecting the Notifications the user would like to receive, there are two options of notifications the user may request.



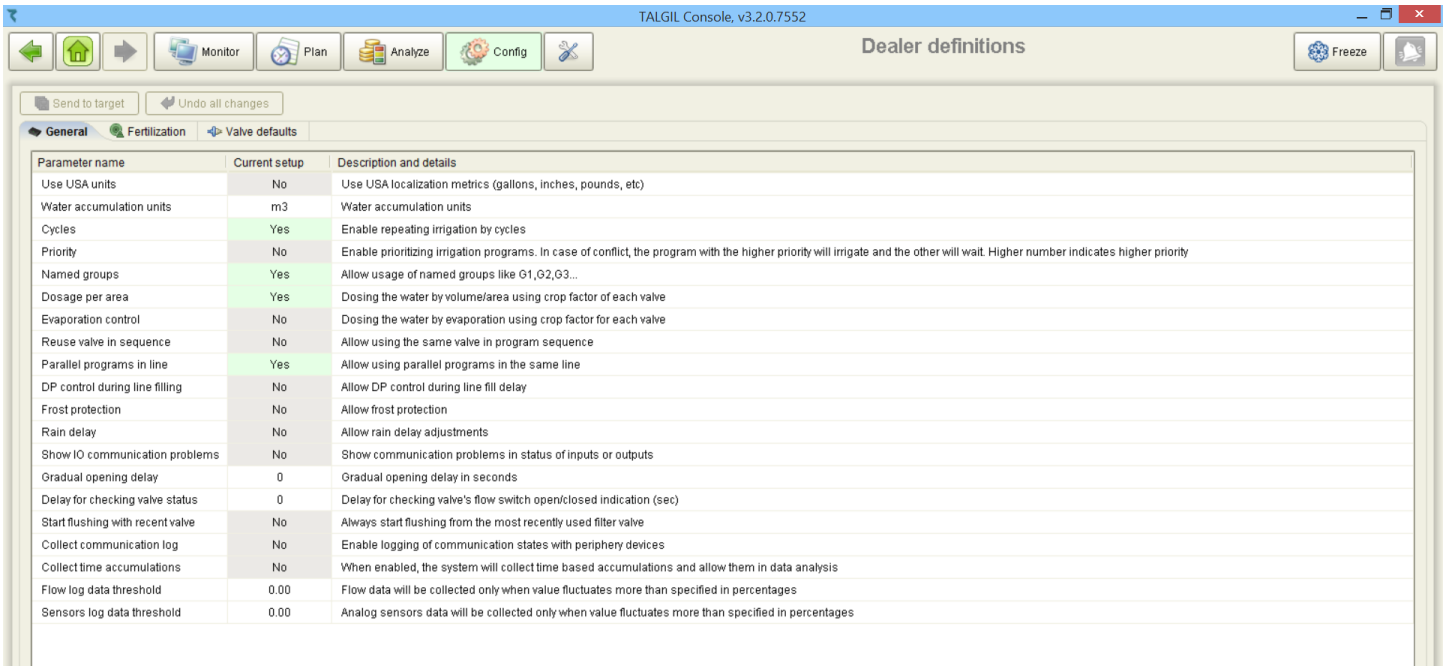
Pointers

1. **System events subscription -** Notifications by Emails or push notifications to the user smartphone, the user must have the "SPOT" app to receive push notifications.
2. **System alarms subscription -** Notifications by popup window will appear on the user computer screen while the CONSOLE software is open.

Note – the notifications are for each user of the controller, in case there is more than one user, each one of them can select the notifications that he would like to receive.

10.3Configure – Dealer definitions - Adjusting the controller to the project

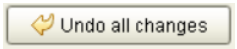
The following section contains numerous yes/no questions and a few numeric settings that influence the general appearance of the CONSOLE and some basic features of the controller.



Parameter name	Current setup	Description and details
Use USA units	No	Use USA localization metrics (gallons, inches, pounds, etc)
Water accumulation units	m3	Water accumulation units
Cycles	Yes	Enable repeating irrigation by cycles
Priority	No	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
Named groups	Yes	Allow usage of named groups like G1,G2,G3...
Dosage per area	Yes	Dosing the water by volume/area using crop factor of each valve
Evaporation control	No	Dosing the water by evaporation using crop factor for each valve
Reuse valve in sequence	No	Allow using the same valve in program sequence
Parallel programs in line	Yes	Allow using parallel programs in the same line
DP control during line filling	No	Allow DP control during line fill delay
Frost protection	No	Allow frost protection
Rain delay	No	Allow rain delay adjustments
Show IO communication problems	No	Show communication problems in status of inputs or outputs
Gradual opening delay	0	Gradual opening delay in seconds
Delay for checking valve status	0	Delay for checking valve's flow switch open/closed indication (sec)
Start flushing with recent valve	No	Always start flushing from the most recently used filter valve
Collect communication log	No	Enable logging of communication states with periphery devices
Collect time accumulations	No	When enabled, the system will collect time based accumulations and allow them in data analysis
Flow log data threshold	0.00	Flow data will be collected only when value fluctuates more than specified in percentages
Sensors log data threshold	0.00	Analog sensors data will be collected only when value fluctuates more than specified in percentages

- The dealer definitions are a tool that is made to adjust the controller to the user and project, it has 3 tabs – **General**, **fertilization** and **valve defaults**.
- The Dealer definitions screen is a necessary step for completing the controller installation.
- Review the list in each tab and adjust it according to your needs, in **Description and details** column you can find explanations regarding each parameter.
- Selecting **NO** will hide unnecessary features; selecting **YES** will reveal them.

Note – to confirm and send the changes you made, click on 

to cancel changes click on 

10.4Configure – constants

Under the Constants topic the user will find all the constant parameters of the items included in the system, review and modify the constants is necessary for completing the controller installation.

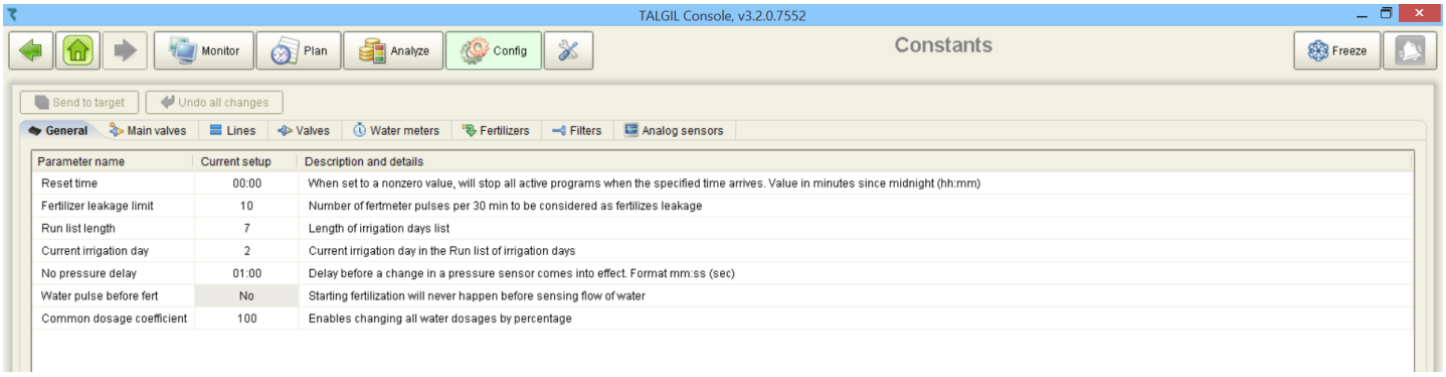
The Constants are divided into categories accessible through separate tabs and discussed below in the following sections:

a) General
b) Main valves
c) Lines
d) Valves
e) Water meters
f) Fertilizers
g) pH/EC
h) Filters
i) Analog sensors.

The following paragraphs present the various sections of the Constants definitions. Notice that some sections will not appear in case the specific item is not included in the image of the selected target.

10.4.1 Constants – general

The following screen deals with some general parameters of the system, note that in **Description and details** column you can find explanations regarding each parameter.



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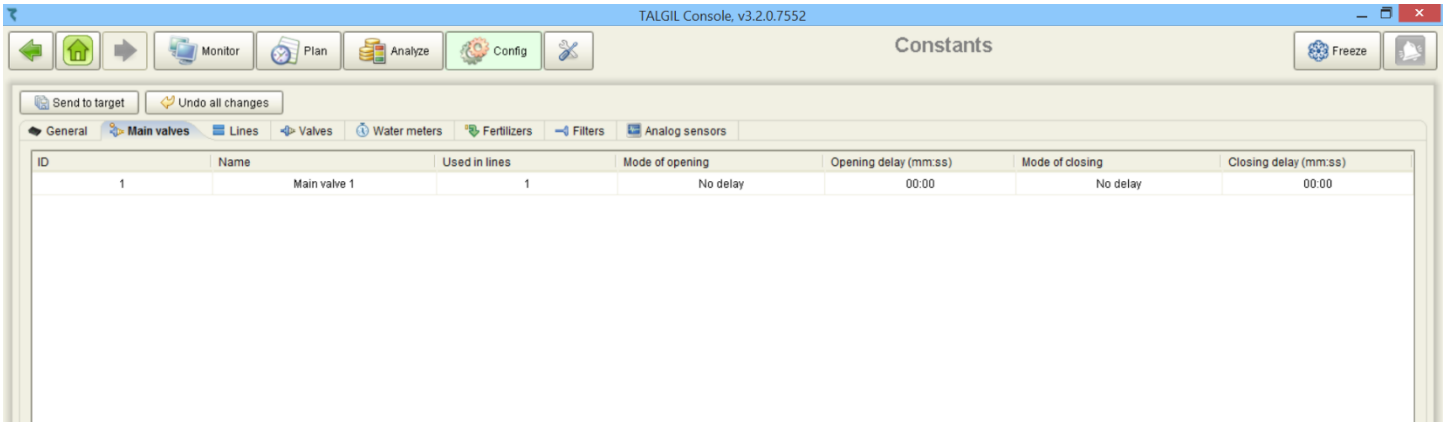
10.4.2 Constants – main valve

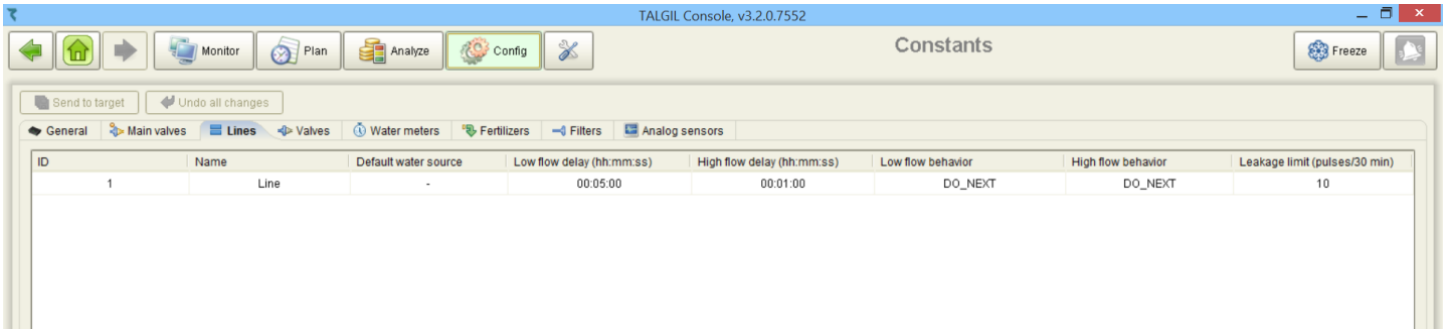
The screen below deals with the behavior of the main valve.



- Double click on the main valve **Mode of opening / closing** will determine if the main valve will open at the same time, before or after the valves.
- **Opening / closing Delay** determine the time between the opening / closing of the main valve and the irrigation valves.

10.4.3 Constants – Lines

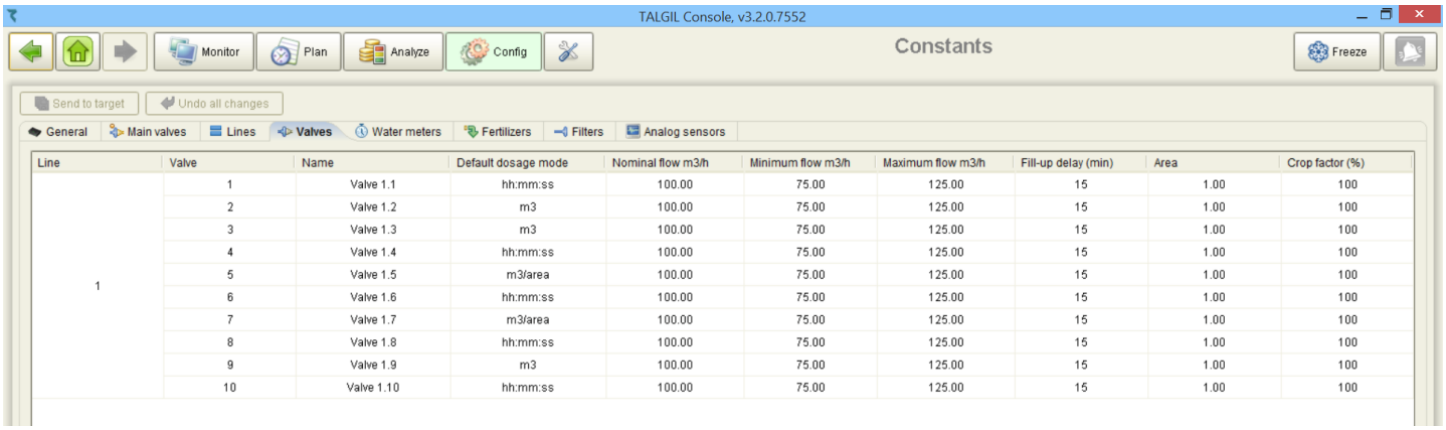
The screen below deals with the SAPIR 2 single irrigation line behavior.



- The **Low flow delay / High flow delay** define the time between the detection and the reaction to a High / Low flow event.
- Double click on line 1 **Low flow / High flow behavior** will open 3 options referring to a detection of low flow / high flow event:
    1. **DO_NEXT –** skip to the next valve / group in the program.
    2. **IGNORE –** continue the irrigation program.
    3. **WAIT –** suspending all the running programs on the line.
- The **Leakage limit** defines the number of pulses detected while the line is not supposed to irrigate, if the number of these illegal pulses surpasses the defined limit, a leakage alarm is raised.

10.4.4 Constants – valves

The screen below deals with the irrigation valves parameters.

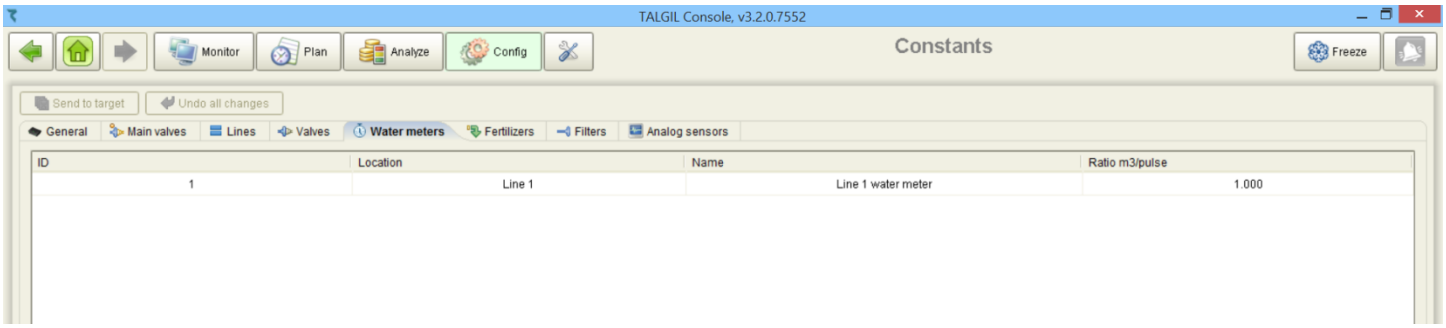


Line	Valve	Name	Default dosage mode	Nominal flow m3/h	Minimum flow m3/h	Maximum flow m3/h	Fill-up delay (min)	Area	Crop factor (%)
1	1	Valve 1.1	hh:mm:ss	100.00	75.00	125.00	15	1.00	100
	2	Valve 1.2	m3	100.00	75.00	125.00	15	1.00	100
	3	Valve 1.3	m3	100.00	75.00	125.00	15	1.00	100
	4	Valve 1.4	hh:mm:ss	100.00	75.00	125.00	15	1.00	100
	5	Valve 1.5	m3/area	100.00	75.00	125.00	15	1.00	100
	6	Valve 1.6	hh:mm:ss	100.00	75.00	125.00	15	1.00	100
	7	Valve 1.7	m3/area	100.00	75.00	125.00	15	1.00	100
	8	Valve 1.8	hh:mm:ss	100.00	75.00	125.00	15	1.00	100
	9	Valve 1.9	m3	100.00	75.00	125.00	15	1.00	100
	10	Valve 1.10	hh:mm:ss	100.00	75.00	125.00	15	1.00	100

- The **Default dosage mode** will be selected automatically whenever a new irrigation job is defined. It saves the need to select each time the desired dosing mode.
- The **Nominal flow** of the valve is the expected normal flow of the valve, it is of high importance, and must not be left undefined.
- The **Minimal flow/ Maximal flow** of the valve define the limits of flow below/above which the flow will be considered out of order. If the user wishes to ignore low flow detection the Minimum should be set to "0". For ignoring high flow violations the Maximum should be set to a very high flow like 9999.
- The **Fill-up delay** defines in minutes the delay from opening the valve until the line gets full of water and flow stabilizes. During the Fill-up delay the system ignores flow violations and low pressure indication on the line.
- The **Area** parameter defines the area covered by the valve and it is taken into consideration when the water dosage is defined by volume/area, or when Irrigation by evaporation is used. The units by which the area is measured, are defined at the Dealer definitions in paragraph 10.3.
- The **Crop factor** is expressed in % and it is a coefficient that multiplies the calculated dosage when Irrigation by evaporation or by volume/area are in use.

10.4.5 Constants – Water meter

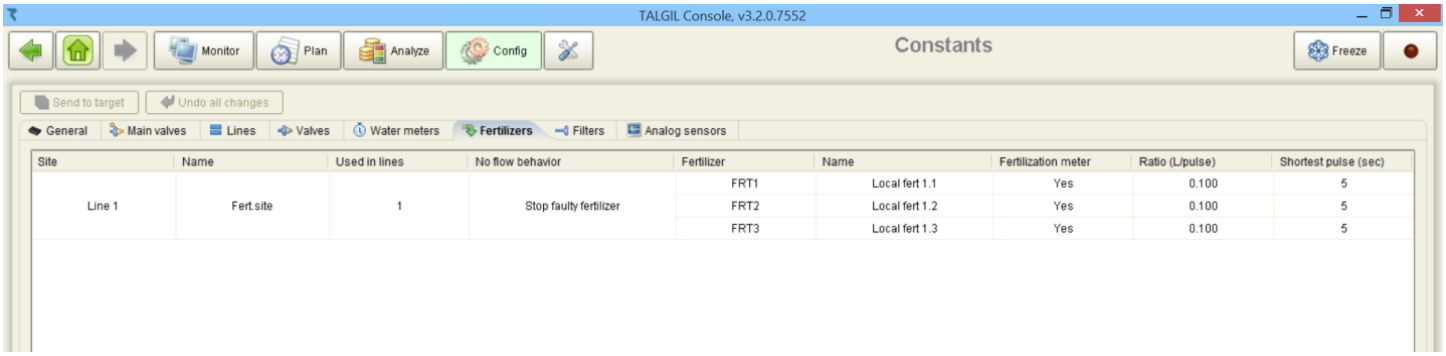
The following screen deals with defining the Ratio (volume/ pulse) of the Water meters.



- It's very important to define the correct **Ratio m3/pulse**, this definition determine the value of each pulse received from the water meter.

10.4.6 Constants – Fertilizers

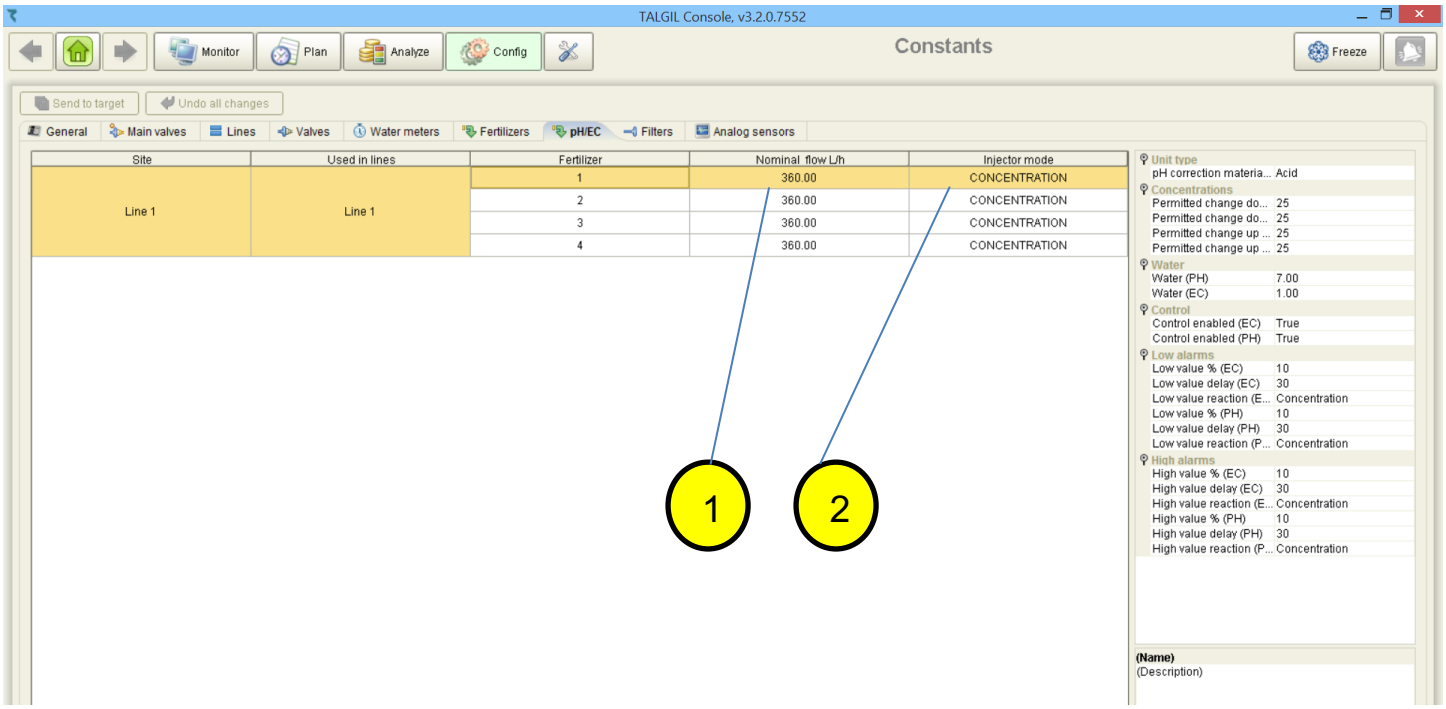
The screen below deals with the fertilizer site settings.



- Double click on line 1 **No flow behavior** will open 4 options referring to a detection of no flow behavior:
    1. **Stop faulty fertilizer –** this option will close only the injector related to the fertilization meter that has no flow.
    2. **Stop fertilization –** will stop all the fertilization process.
    3. **Stop irrigation –** will stop the irrigation program and fertilization.
    4. **Inform only –** will continue the irrigation program and fertilization.
- It's very important to define the correct **Ratio (L/pulse)**, this definition determine the value of each pulse received from the fertilizer meter.
- The **Shortest pulse** parameter defines in seconds the time slice by which the fertilizer pulse will be divided in case of time based proportional fertigation. The purpose is to get a better distribution of the fertilizer in the water.
- **A special case –** when the fertilizer meter gets damaged, then all the volumetric fertilizer dosages that were defined based on that meter, in all the programs, cannot be used anymore. In order to let the user keep working volumetrically until the fertilizer meter is repaired, he can go and erase the connection of the fertilizer meter from the connections list. This will notify the system that the fertilizer meter is not in use and instead the controller will use the Ratio and the shortest pulse parameters for converting the volumetric fertilizer dosages into time and thus save the need to redefine all the fertilizer dosages. This of course requires the user to set the Ratio and the Shortest pulse properly so that the Ratio will really indicate the amount of fertilizer that the injector will inject within the time expressed by the Shortest pulse.

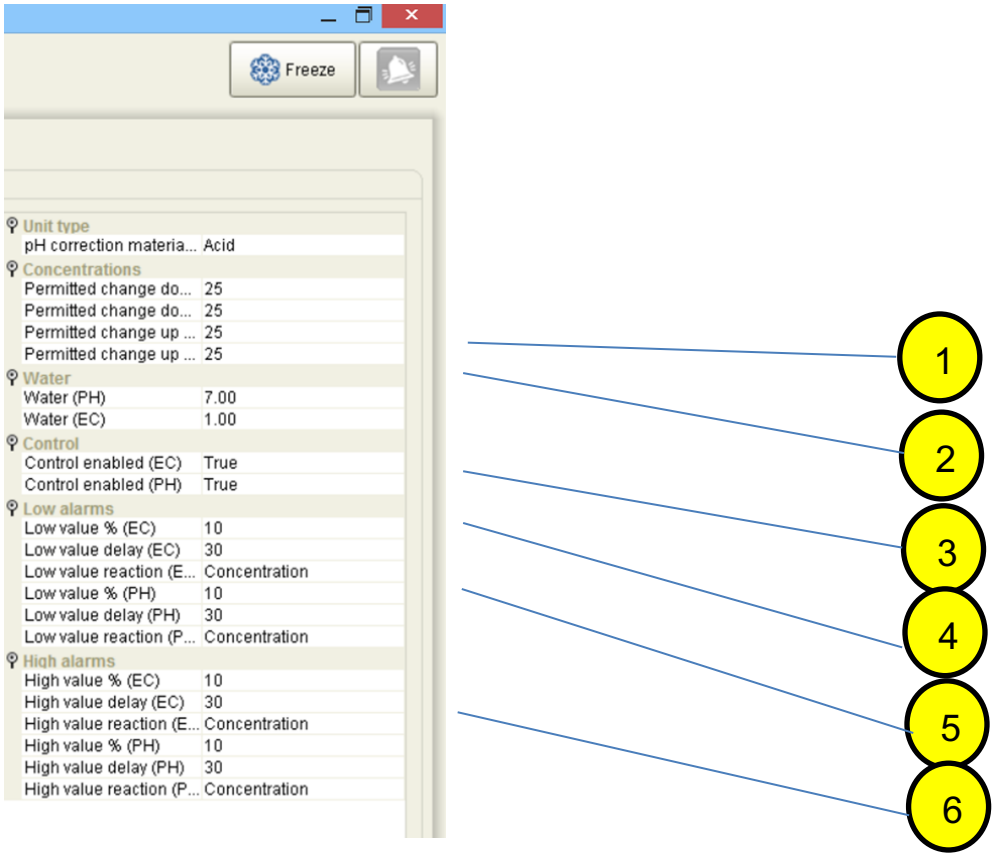
10.4.7 Constants – pH/EC

The screen above deals with the pH/EC settings.



Pointers

1. **Nominal flow L/h -** The accurate setting of the Nominal flow of each injector is highly important and directly affects the ability of the system to stabilize on the desired set-points. The values of the Nominal flow are obtained from the pH/EC interface by communication and they result of the fert flow calibration, it's not possible to edit these values from the CONSOLE.
2. **Injector mode -** Each injector connected to the pH/EC interface can function in one of the following modes:
    - **Regular** – in this mode the injector functions as any regular fertilizer injector.
    - **pH controlled** – in this mode the injector participates in the process of the pH control.
    - **EC controlled** – in this mode the injector participates in the process of the EC control.
    - **Concentration** – in this mode the injector will maintain the defined concentration as long as the vales of the pH/EC are within the permitted limits.

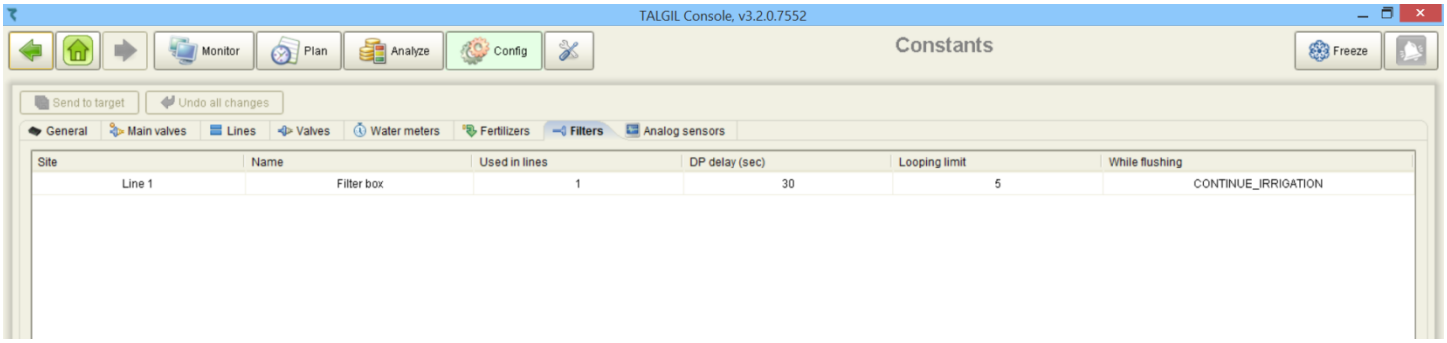


Pointers

1. **Unit type -** The type of material used for pH corrections: acid or base.
2. **Concentrations -** Permitted change in % of the concentration for correcting the pH/EC upward or downward.
3. **Water -** The pH and EC of the water source.
4. **Control -** Enable/Disable control of EC and pH.
5. **Low alarms -** Low limit of pH and EC for alarming, including the delay and the reaction.
6. **High alarms -** High limit of pH and EC for alarming, including the delay and the reaction.

10.4.8 Constants – Filters

The screen below deals with the Filters settings.

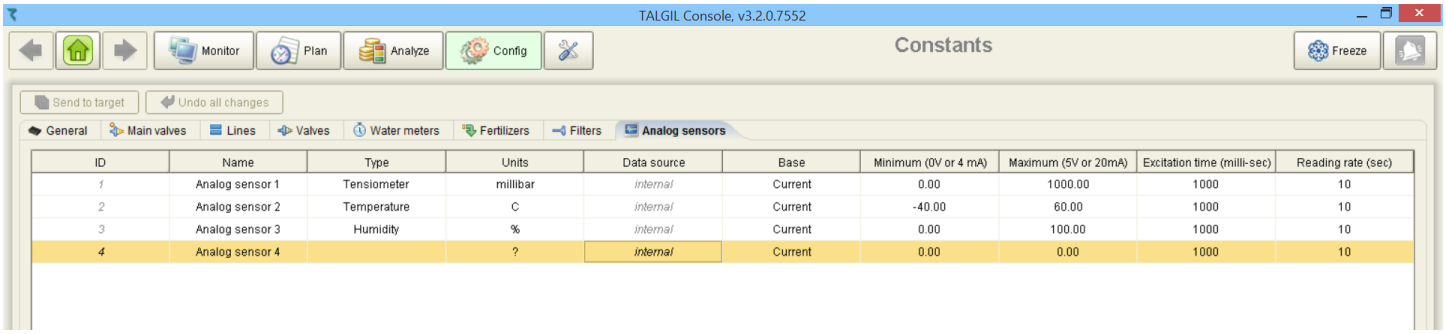


- **DP delay (sec) –** setting the reaction delay for a change in the DP status (open or close)

- **Lopping limit –** defining the number of consecutive cycles by DP considered as endless looping alarm.
- **While flushing -** What happens with the irrigation during the back flushing process?
  1. **CONTINUE_IRRIGATION –** while flushing the irrigation continues according to plan.
  2. **STOP_IRRIGATION –** the irrigation programs will pause when the flushing process starts, and will continue when flushing is over.
  3. **NO_FERTILIZATION –** the fertilization will pause when the flushing sequence starts, and will continue when flushing is over. The irrigation continues as normal.

10.4.9 Constants – Analog sensors

The screen above deals with the Analog sensors settings.

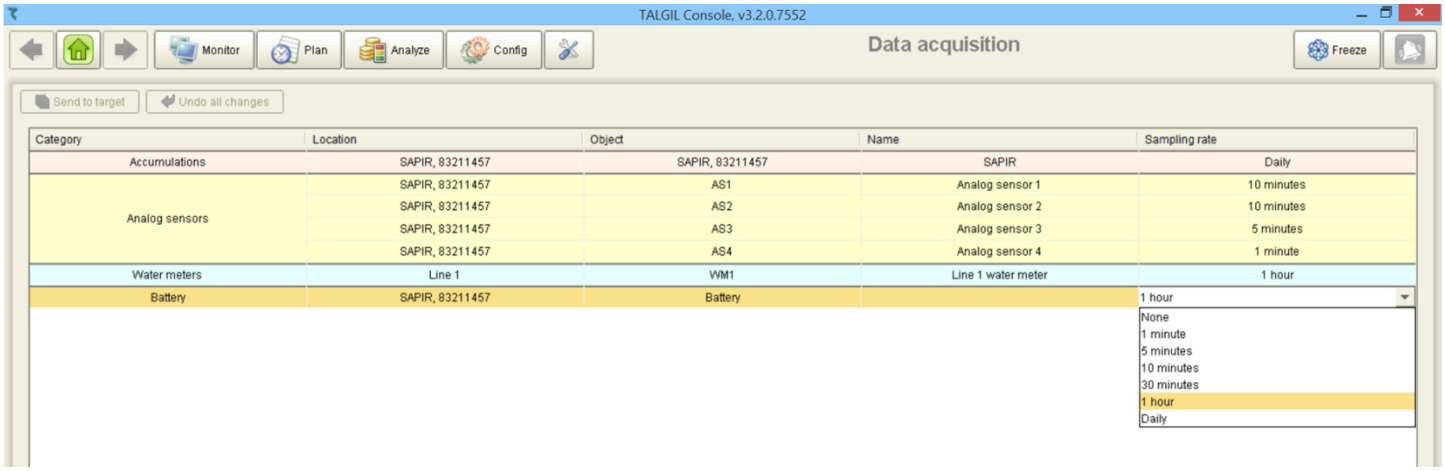


ID	Name	Type	Units	Data source	Base	Minimum (0V or 4 mA)	Maximum (5V or 20mA)	Excitation time (milli-sec)	Reading rate (sec)
1	Analog sensor 1	Tensiometer	millibar	internal	Current	0.00	1000.00	1000	10
2	Analog sensor 2	Temperature	C	internal	Current	-40.00	60.00	1000	10
3	Analog sensor 3	Humidity	%	internal	Current	0.00	100.00	1000	10
4	Analog sensor 4		?	internal	Current	0.00	0.00	1000	10

- Choose the sensor type by double clicking on the **Type** empty box and select from the list.
- Double click on the **Units** empty box and Select the sensor units from the list.
- Change the Data source from **Internal** to **External** only if the sensor is connected to a **Pessl** station.
- The **Base** column use for selecting the sensor signal type **Current** or **Voltage**.
- **Minimum (0V or 4mA) -** The minimal value of the sensor's range of values.
- **Maximum (5Vor 20mA) -** The maximal value of the sensor's range of values.
- **Excitation time (mili – sec) –** time of energy supply to the sensor before the sampling.
- **Reading rate (sec) –** the interval between each sampling.

Note – you can find the right parameters for each sensor in the sensor user manual.

10.5Data acquisition



- Varying data such as accumulations of water and fertilizers, flow rates of water meters, values of analog sensors, which are logged by the controllers and kept in their memory for a limited period, can be fetched into the data base of the server where they can be accumulated for longer periods. This perspective shows where we can define which types of data to be brought in and in which rate. The data can later be expected by the analytical tools supplied by the Console.
- Double click on each **"Category" "Sampling rate"** will open a small list to select the required interval for sampling

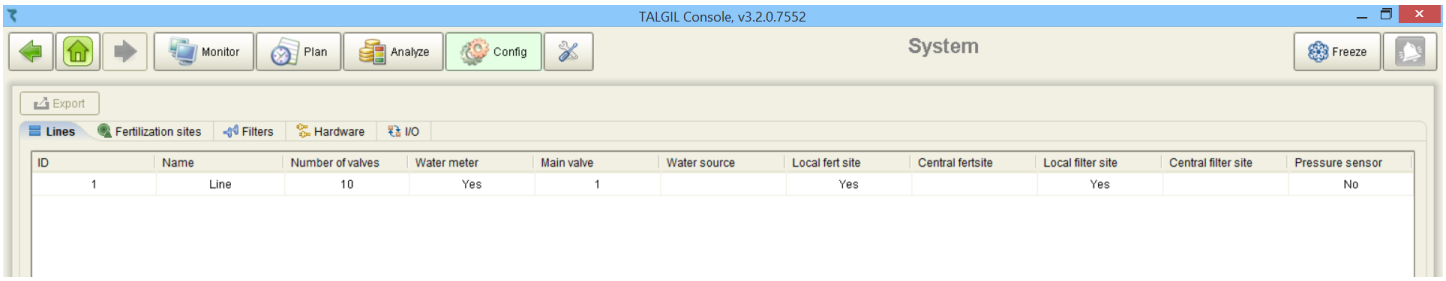
Note - How long will the Server keep the various types of logged information?
The answer depends on the Data retention settings done at the ADMINISTRATION software. Check with the person in charge of the system setup that the Data retention parameters were properly set.

10.6System

The following section is informative only; it contains information about the System configuration, including the contents of the hydraulic network to be controlled, the hardware used for setting up the system and a detailed list of where each item is physically connected.

10.6.1 System – Lines

This section supplies details about the contents of the **Irrigation line**

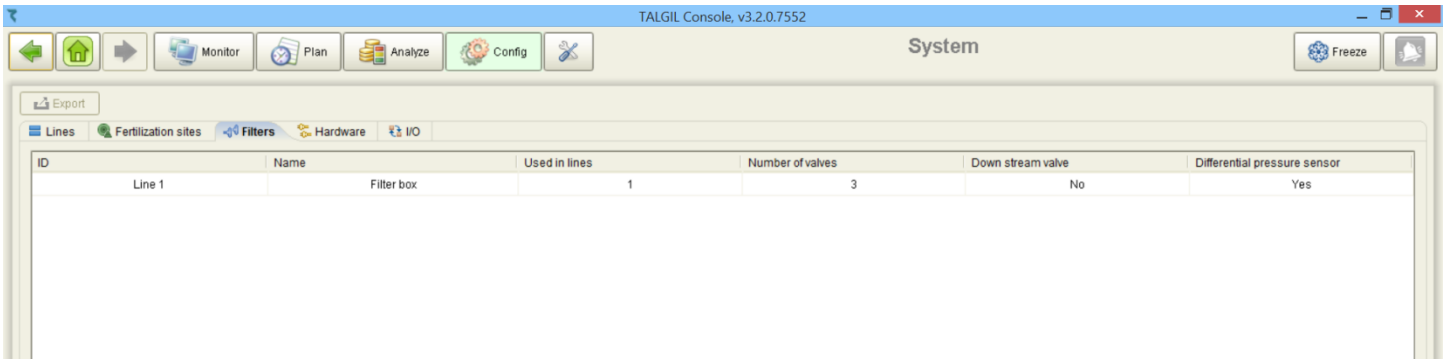


10.6.2 System – Fertilization sites

This section supplies information about the contents of the **local Fertilization site**.

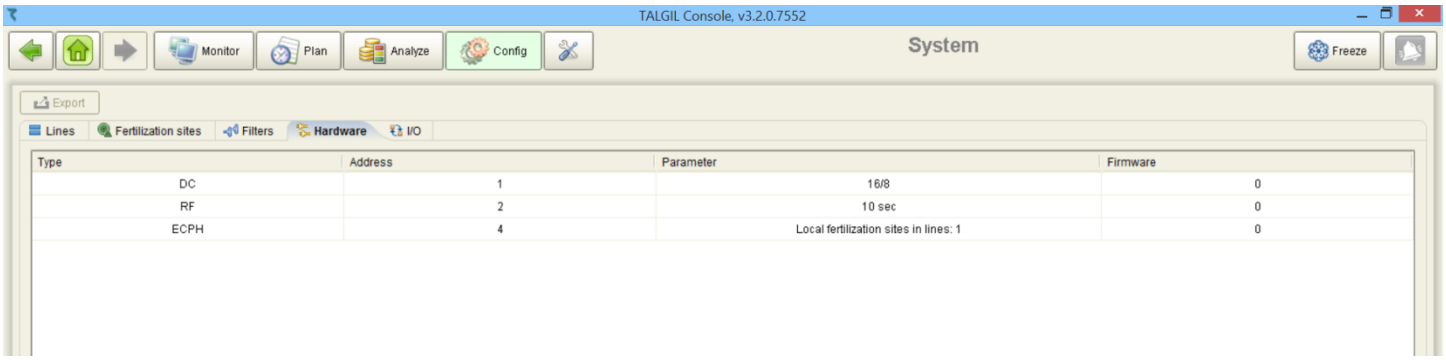
10.6.3 System – Filters

This section supplies information about the **local Filter site**.



10.6.4 System – Hardware

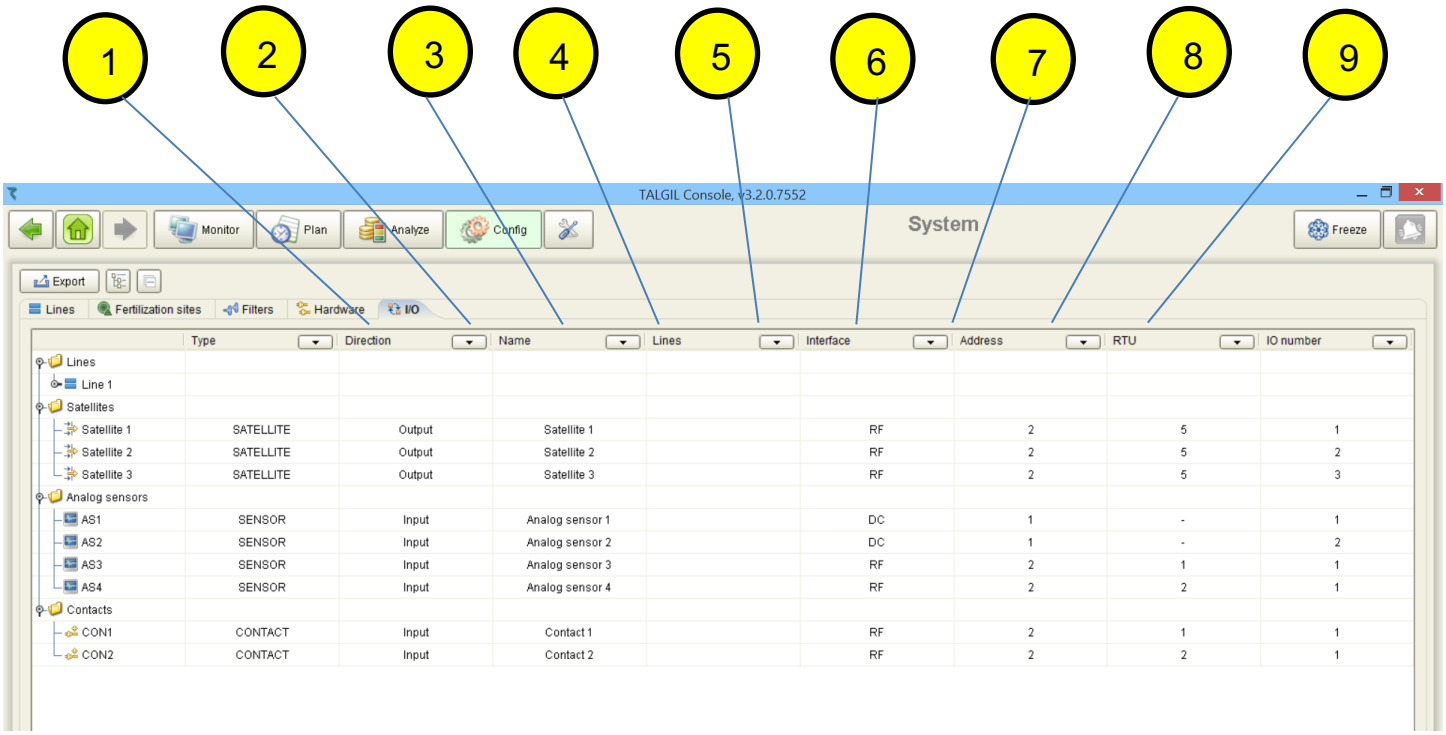
Supplies information about the Hardware used for building up the control system. When speaking about the Hardware of the SAPIR 2 we actually mean the ensemble of Interfaces through which



the Central Processing Unit communicates with the peripheral I/O boards, to which all the hydraulic accessories are connected.

10.6.5 System – I/O

The following section deals with the connections list of all the items included in the Hydraulic network definition, to the available Inputs and outputs (I/O) boards and the various RTUs. The connections list is arranged in a categorized structure, so that the user can decide to view only the categories he is interested in or the whole structure if he likes to.



Pointers

1. **Categorized structure -** to open or close, double click on the chosen item.
2. **Type –** type of device.
3. **Direction –** input or output device.
4. **Name –** name of the device.
5. **Lines –** belongs to which line.
6. **Interface –** Connected to which interface.

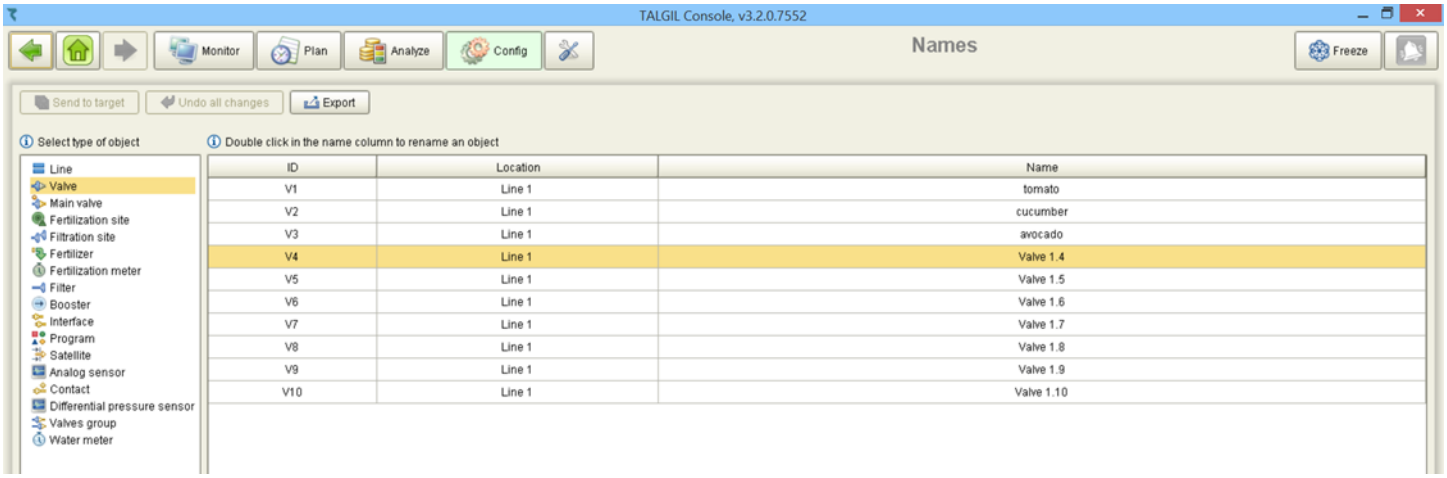
7. **Address –** Address of the interface.
8. **RTU –** number of RTU.
9. **I/O number –** the location of the Input or Output on the board.

Note –

- The list can be filtered by any category, so one can ask to see for example only the inputs connected to interface 1, or all the outputs belonging to RTU 8 etc…
- When more than one output or input is assigned to the same connection point, the items will be highlighted in red.
- The contents of the displayed part of the list can be exported into a "csv" (Excel) file, and then saved or printed as needed.

10.7Names

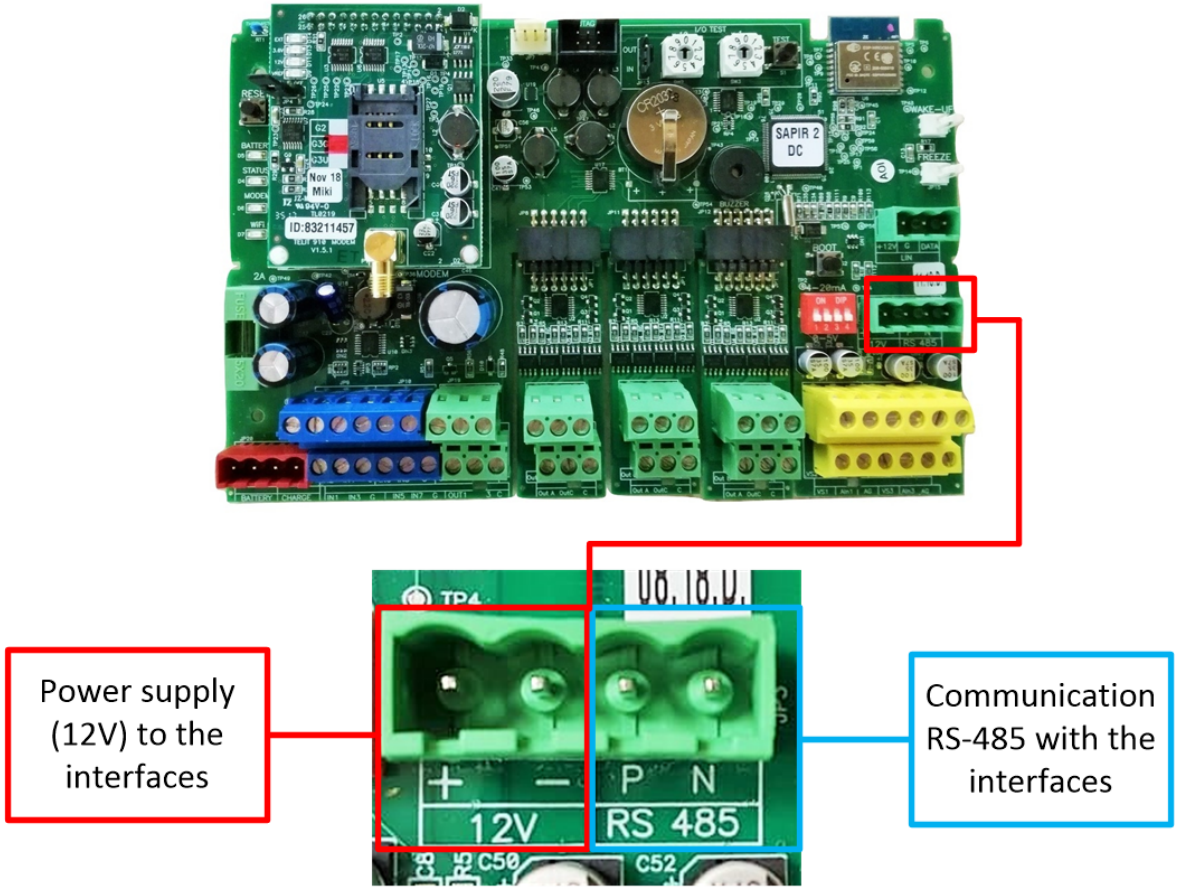
The Names perspective can be reached from the Main menu or the Pull down menu by selecting Configure/ Names.



- The Names section enables the user to define desired names to all the items included in the Target's image, including abstract items such as irrigation programs and conditions. All items are given default names by the system; however it makes it much friendlier when the user can define each item a name which is more descriptive and better suiting the particular case.

11. How to connect the interfaces

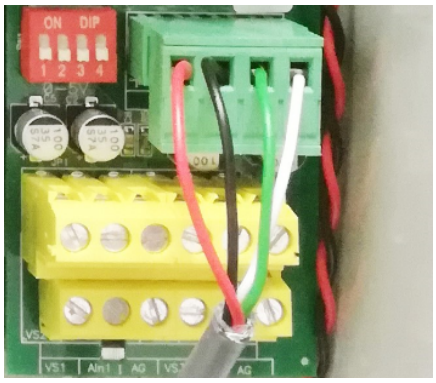
All the external interfaces will connect to the same terminal in the SAPIR2, the terminal is devided in two, the left part is made to supply energy (12V) to the interfaces and the right part is for communication (RS-485). Polarity is important when conecting energy and communicaation to the intrfaces.



all the interfaces (except **"PESSL"**) will be connected by communication (RS-485) cable to the SAPIR2, but **NOT** all of them will be energized from it, it's depend on the interface type and installation distances from the **SAPIR 2**. if the interface is installed near the controller it can be energized be the **SAPIR 2**, if not the interface should be energized from a local power supply such as charger or solar panel and rechargeable battery.

Note – interface **2 WIRE** will be powered always from an external power supply and never directly from the **SAPIR 2** 12V terminal.

Wiring the interfaces terminal in the SAPIR2:



Note –

- All wiring in the above terminal should be connected in the same way in the interfaces.
- Make sure to set the interface address number exactly like in the **SAPIR 2** image.

Additional Information as follows vis you tube links:

For direct Wi-Fi when internet not available

https://youtu.be/qNU3bWSTVjA

To create a program using single valves

https://youtu.be/XPjaH7djElU

To create a program using valve groups

https://youtu.be/tlqRmcPxIDM

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