Tucor Cycle Manager

User Manual

(TWC Controllers)

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About this Manual

This manual describes the basic use of Cycle Manager and its tools for scheduling, maintaining and monitoring your irrigation systems via the web.

Target groups are both end users and service personnel. Certain functions are exclusively to be carried out by service personnel. These functions will be highlighted in the text.

Structure of the Manual

The manual is structured as follows:

- Chapter 1: Introducing Cycle Manager
- Chapter 2: Getting Started with Cycle Manager
- Chapter 3: Managing Programs
- Chapter 4: Managing Stations
- Chapter 5: Managing Sensors and Sensor Decoders
- Chapter 6: Managing Weather Stations
- Chapter 7: Data Monitoring

Chapter 1:
Introducing Cycle Manager

In this chapter:

- Introducing Cycle Manager
- The Cycle Manager Opening Window
- Navigating the Cycle Manager Interface
- Cycle Manager – How It Works

Introducing Cycle Manager

The Total Cycle Management concept of irrigation scheduling has been developed for easy web-based management of your irrigation system. With Cycle Manager you can manage flow, adjust programs, track alarms, review the entire network to spot leaks, breaks or plugged nozzles from any web-enabled PC or laptop.

Total Cycle Management integrates Tucor controllers with ET devices and various industrial standard sensors, ensuring timely access to accurate irrigation.

With Cycle Manager you'll have remote access to:

- Programs (10 available)
- Individual stations (up to 100 steps per program)
- Customizable steps (10-15 stations per step)
- Sensor setup (Rain, etc.)
- Flow rates and alarms (when using a flow sensor)

Other key features:

- Printouts of the system can provide you with hard-copy data.
- Extensive monitoring information confirms water savings and usage to the pertinent authorities.
- Alarms can be sent by email, notifying you of undesirable situations, which can be verified on-line and often resolved without anyone even having to visit the site.

Note: The controller's data is stored on a web server, so should some catastrophe or unwanted changes occur, you can easily return to the controller's original system state.

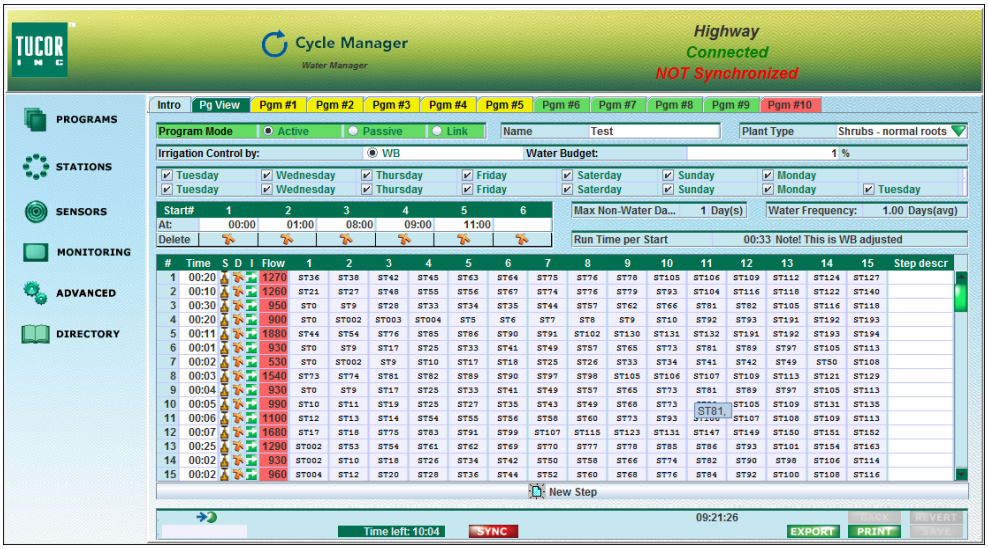


Figure 1: A typical Cycle Manager work space.

The Cycle Manager Opening Window

Once you log on to Cycle Manager using a web browser, the opening window appears, displaying the available devices for your site.

Devices in this connection are either *controllers*, *controllers with weather stations* or *stand-alone weather stations*. From this window, you connect to the device you wish to monitor and manage.

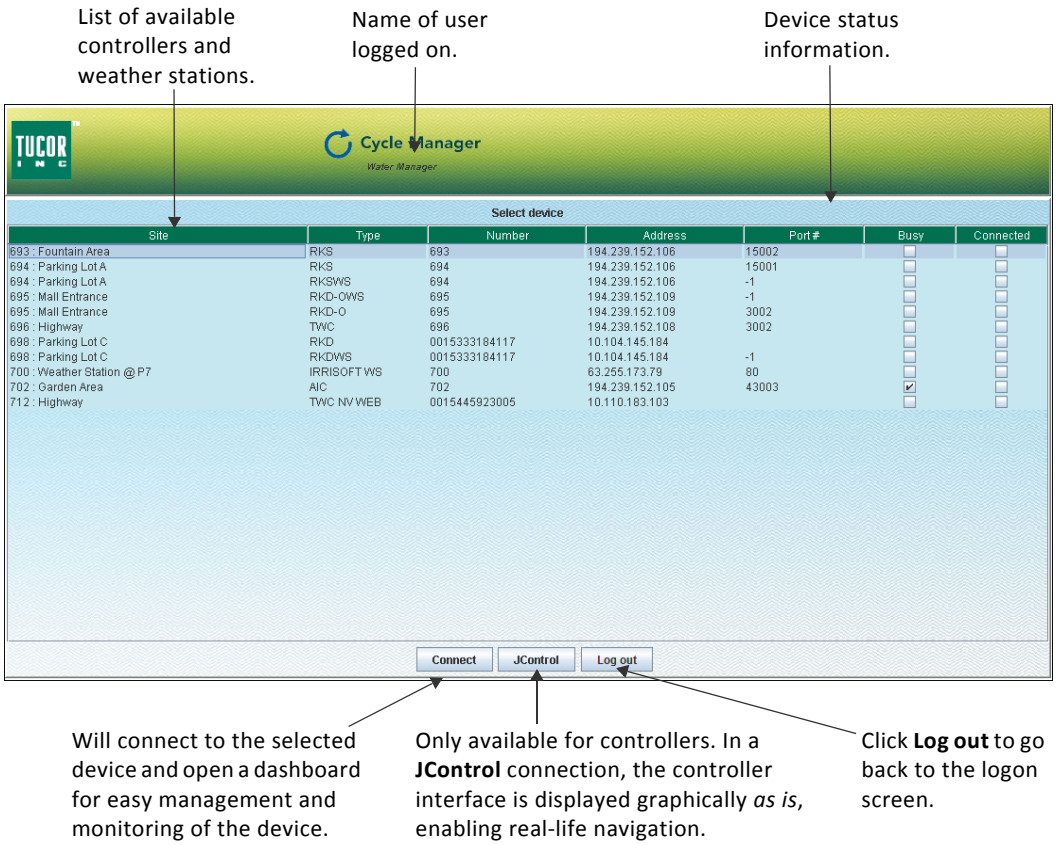


Figure 2: The Cycle Manager opening window.

In the Cycle Manager opening window, each device is represented by name, type and address information. Also, you can see whether your devices are currently connected to the server or not.

Note: Devices are set up for Cycle Manager by Tucor in coordination with key personnel at the client. End-users are not able to edit information in the opening window.

For each device the following information appears:

Site A unique name identifying the site. The site name is determined by Tucor and the client. For instance, the site name may indicate an area or the name of a building. This information can be useful when troubleshooting.

Type Indicates the type of device. Options are:

- **RKS** – a stand-alone, conventional controller designed for converting conventional systems to Tucor's remote management system.
- **RKD** – a stand-alone controller, using reliable decoder-based two-wire technology.
- **RKS WS** – an RKS controller used in combination with a standard weather station.
- **RKD WS** – an controller used in combination with a standard weather station.
- **Davis WS** – a Davis weather station connected directly to the server enabling serial communication. Both cellular and LAN are supported.
- **Irrisoft Weather Reach Direct** – a centralized network of CSI weather stations which enables transfer and distribution of advanced weather data through the Cycle Manager server.
- **TWC Family**– One of Tucor's flowmaster series of irrigation controllers which - depending on version - provides central control of 12 to 200 valves using reliable decoder-based two-wire technology.
  - *TWC*: Non-web enabled controller. Only operationable by JControl and RMS PC SW. Water budget may be adjusted by a weather station.
  - *AIC*: Fully web-enabled controller with up to 15 active stations and 5 pumps. Water budget may be adjusted by a weather station.
  - *TWI*: Fully web-enabled controller with up to 10 active stations and 10 pumps. Water budget may be adjusted by a weather station.

Number A unique, non-editable site number. If the current device is a cellular device, the field holds the phone number of the device. If the device is a LAN device, the field holds a unique number.

Address The IP-address of the current device.

Port The port number of the current device.

Busy Indicates whether the device is busy or not. A checkmark indicates that another user is currently working with the device. You are not able to connect to a device if it is busy, i.e. only *one* user is allowed to work with a device at a time.

Connected Indicates that the server is connected and is communicating with the device.

Navigating the Cycle Manager Interface

Below is an overview of the basic navigation options in the Cycle Manager interface. The screenshot is from the **PROGRAMS** area.

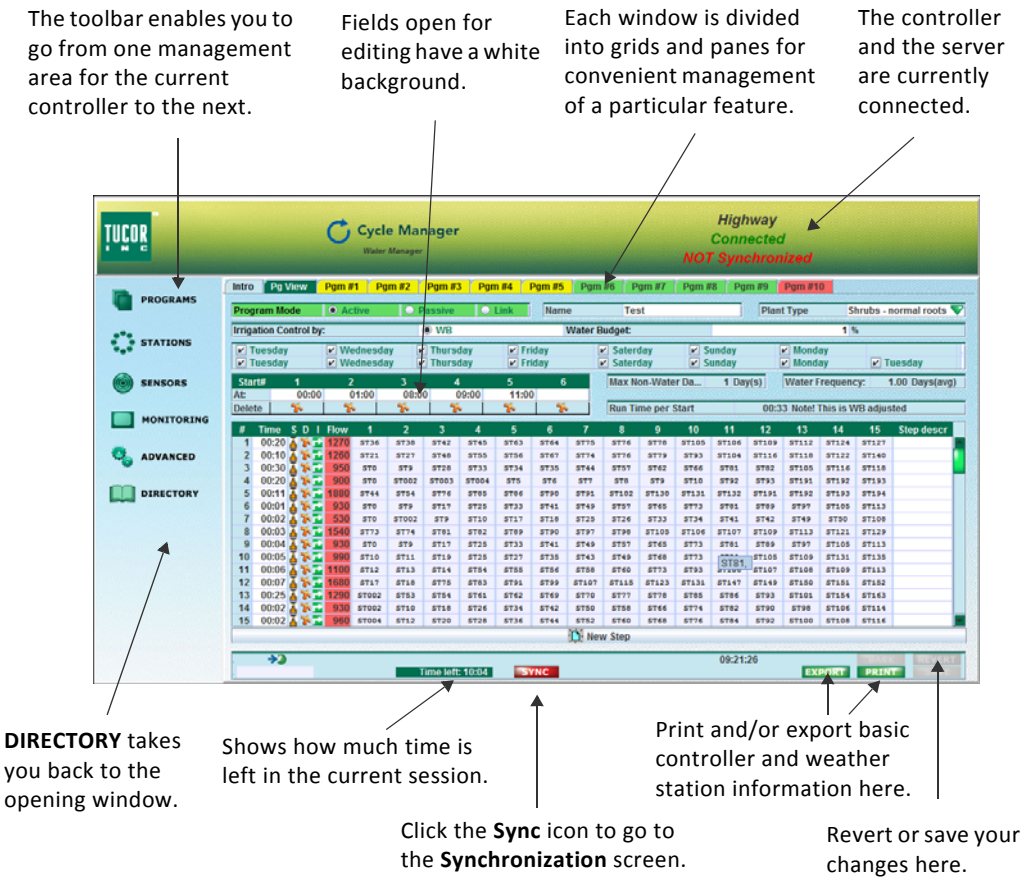


Figure 3: Basic navigation in the Cycle Manager Web interface.

Important! When your screen has been idle for 10 minutes, Cycle Manager displays a timeout-notification indicating that 2 minutes of your session remains. You prolong your session by clicking **Extend** in the dialog box. Alternatively, click **Save** or **Revert** – or navigate to another Cycle Manager area.

Intro Pages – Easy Access to User Assistance

Three of the programming areas in Cycle Manager provide easy access to specific user assistance. It concerns the **PROGRAMS** area, the **STATIONS** area, and the **SENSORS** area.

Select the **Intro** tab of these areas to access hyperlinks which lead to procedures instructing you how to perform a certain task in Cycle Manager. Each procedure will open a new tab in your browser window.

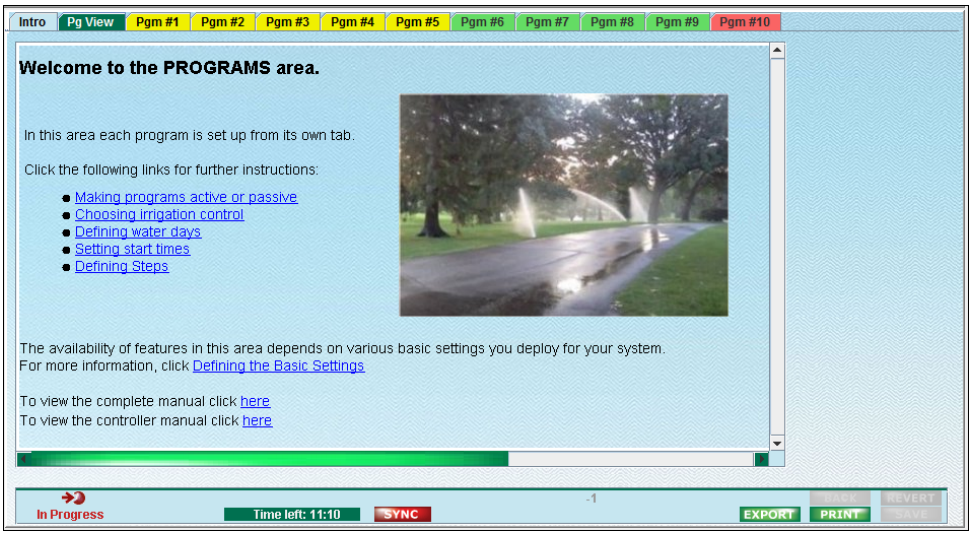


Figure 4: Use the links on the Intro page to access detailed instructions on specific topics.

Using the JControl Feature

Controllers may be managed using the so-called *JControl* feature, which will display the controller interface graphically *as is* enabling real-life navigation using the mouse.

To access a controller, click **JControl** in the Cycle Manager opening window.

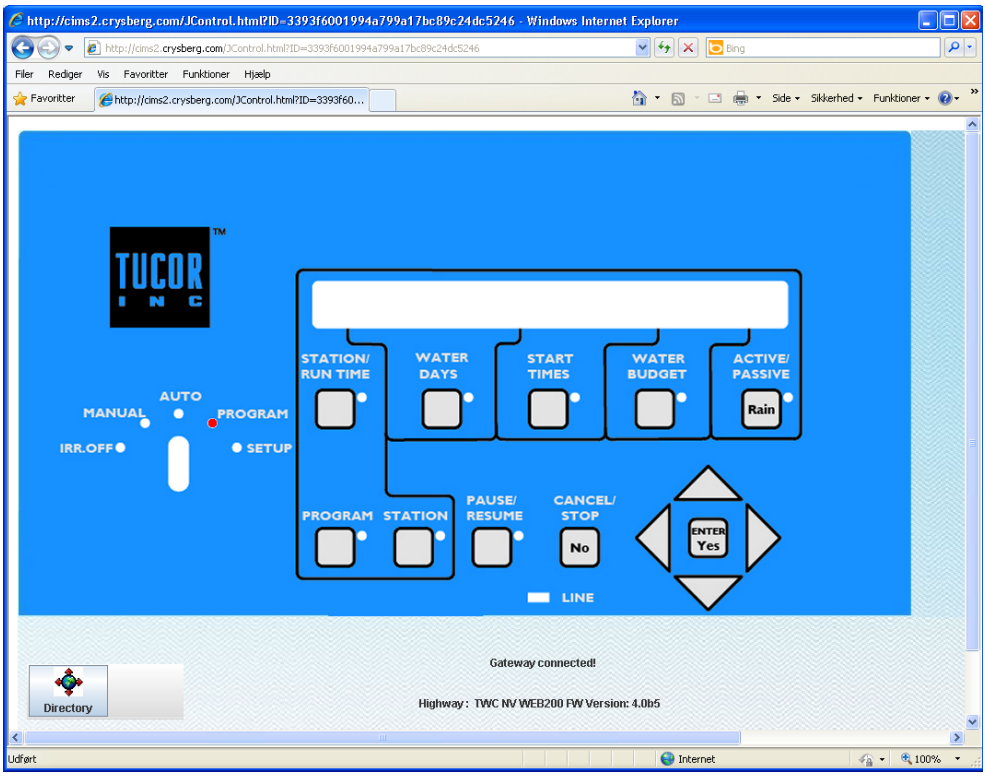


Figure 5: Controllers may be managed real-life – in real-time – using the JControl feature.

Cycle Manager – How It Works

The figure below depicts how a laptop logged on to the Cycle Manager server interacts via the web with controllers and ET devices in an irrigation system. As seen, the web connection may be either wireless or by cable.

Setting up programs and making adjustments can be done either from Cycle Manager on the server-side – or in the field at the controller. Thus, if you or your service personnel find it more convenient to perform certain changes directly at the controller you can to do so and subsequently update the server via Cycle Manager.

Changes are implemented *real-time*. So if you need to react fast to changes in irrigation demands, log on Cycle Manager, make the changes and have them implemented right away.

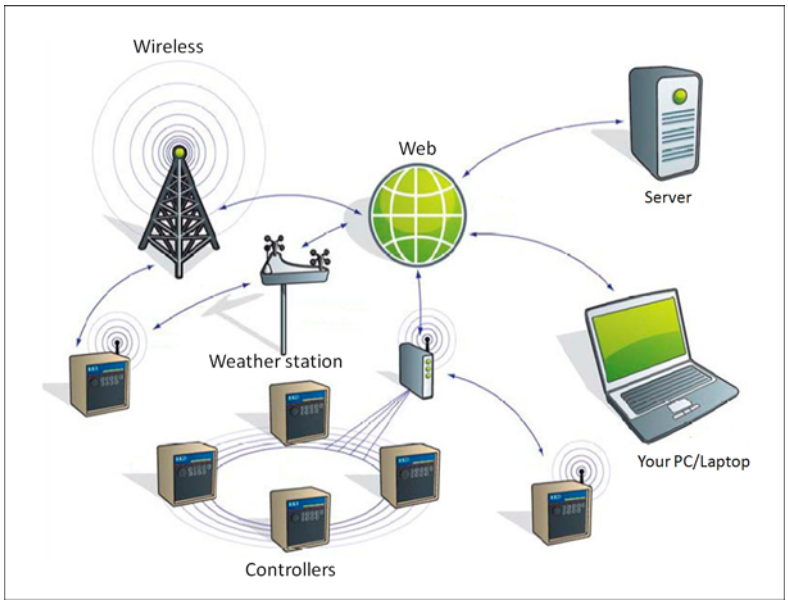


Figure 6: Overall flowchart of *Total Cycle Management*.

Principles of Synchronization

To have Cycle Manager run your irrigation system correctly, you need to make sure that the server has the most recent data at all times. To ensure this, you need to *synchronize data* whenever you have completed a round of changes. This applies regardless of *where* and *how* you have made the changes: Using Cycle Manager or directly at the controller.

During a synchronizaton, the most recent data are transferred to the chosen device – either the Cycle Manager server or to the controller – enabling that device to irrigate your site as intended.

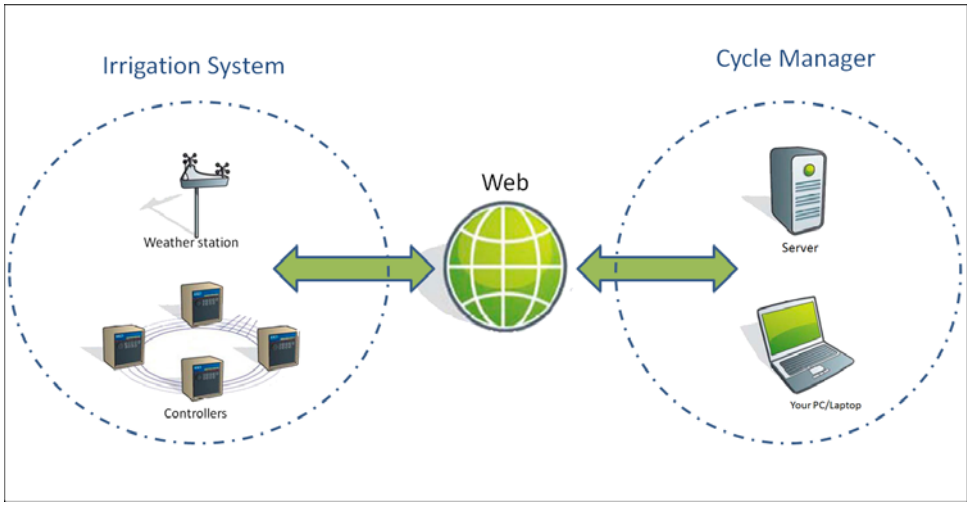


Figure 7: Data synchronization between Cycle Manager and controllers will ensure that your irrigation system uses the most recent data.

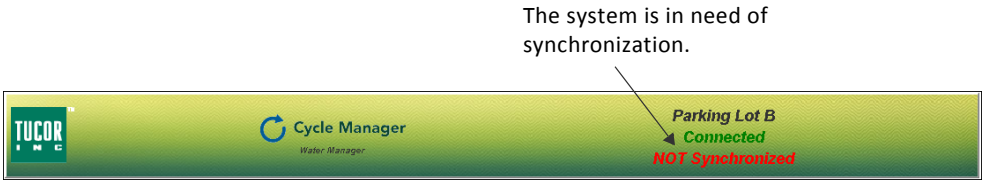


Figure 8: Look for the *NOT Synchronized* message.

The Cycle Manager tool cannot detect when changes are made on the controller. In case you make changes on the controller it is your responsibility to select the appropriate checkbox in the **Synchronization** screen to ensure that the server is updated during a synchronization. For instance, if you make a change to Program 4 in the field, you must select the checkbox related to Program 4 - on the controller-side - in the **Synchronization** screen.

If more people are involved in maintaining your irrigation system, make sure to keep track of what changes they make and where. Coordination is the key. If for instance one person makes station changes in the field and another make similar changes in Cycle Manager, you need to know what changes are valid before you synchronize.

How to Synchronize

When you are ready to synchronize, click the **SYNC** button next to the countdown timer in any window. This opens the **Synchronization** window.

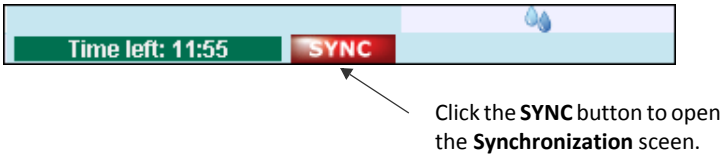


Figure 9: The first step of a data synchronization.

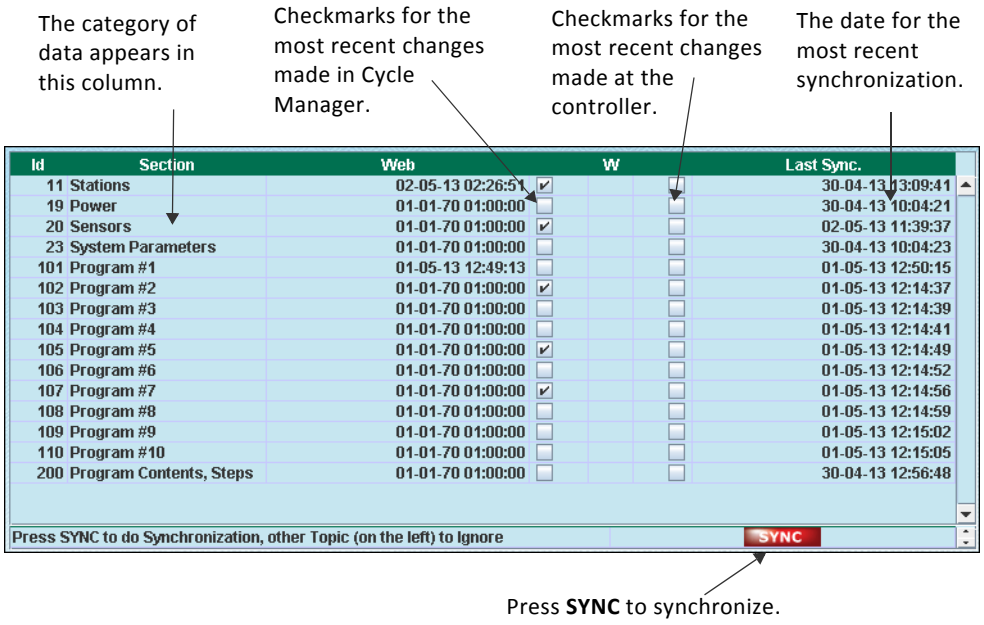


Figure 10: In the **Synchronization** window, verify the changes and press **SYNC** to synchronize.

In the **Synchronization** window, checkboxes are checked for those categories of data that have been subject to change since the last synchronization. If you want to discard a change, move the checkmark to the other side.In case you make changes on the controller it is your responsibility to select the appropriate checkbox in the **Synchronization** screen to ensure that the server is updated during a synchronization.

Once you have verified that checkmarks reflect the changes you want to implement, click the **SYNC** button to start the synchronization. This will transfer the data from the checked side to the unchecked side.

The process takes anywhere from a few seconds to a couple of minutes depending on the speed of your Internet connection.

Note: If you do not want to synchronize at this point, simply navigate to another area in Cycle Manager. The phrase *Not Synchronized* will remain at the top of the Cycle Manager window to remind you that synchronization is needed.

What Type of Data Will Be Synchronized

In the **Synchronization** window the following categories of data are available from the **Section** column.

Stations	A checkmark in this row reflects one or more changes made to any of the stations in the irrigation system.
Power	A checkmark in this row indicates that information about valve types and pumps will be synchronized.
Sensors	A checkmark in this row reflects one or more changes to made to one or more sensors in the irrigation system (rain sensors, flow sensors, etc.). As sensor data are transferred, a popup dialog will inform you how much data (in percentage) have been used of the area in Cycle Manager allocated for the sensor decoder setup. This value should be below 100%. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.
System Parameters	A checkmark in this row indicates that information about DIP switch settings will be synchronized.

Program1 – Program10	A checkmark in this row reflects one or more changes made to any of the up to 10 programs in the irrigation system.
Program Steps	A checkmark in this row indicates that information about the steps of each program will be synchronized.

If the Connection is Lost

If the connection to the server is lost, the word '*Disconnected*' appears at the top of the Cycle Manager window.

Even if the connection to the controller is lost, you can still continue to work with your programs in Cycle Manager. Once you have finished editing, save your work, return to the **Select Device** window by clicking **DIRECTORY**, and restore the connection by clicking **Connect**.

Chapter 2:
Getting Started with Cycle Manager

In this chapter:

- Setting Up a Controller for the First Time
- Defining the Basic Settings
- Exporting and Printing Data

Setting Up a Controller for the First Time

When you set up a controller for the first time, three alternative approaches are possible:

- Importing existing data from the controller to Cycle Manager.
- Entering new program information in Cycle Manager and then synchronize it with the empty controller.
- A combination of the two.

When you set up a new controller, always start out by retrieving the **Power** and **System Parameters** sections from the controller (i.e. synchronize *from* the controller). Data in these two sections are only editable on the controller, and when you synchronize you ensure that this information is transferred to Cycle Manager. This is vital for backup purposes in case the controller breaks down and needs to be changed. Then you can retreive the information from Cycle Manager.

Your choice of method depends on several factors (not neccesarily excluded to the following):

- If you are retrofitting an old system you may want to start out by reusing data form the controller and then adjust it in Cycle Manager.
- If you are setting up a new irrigation system, and the controllers are not yet ready for physical installation, you can save time by entering irrigation information in Cycle Manager and then transferring the data to the controller once it has been installed.
- If you are upgrading or expanding an existing site with new controllers you may want to combine the two approaches.

Re-using Controller Information

If the controller has already been physically installed and set up with program and station information, you have to perform a synchronization of data going from the controller to Cycle Manager.

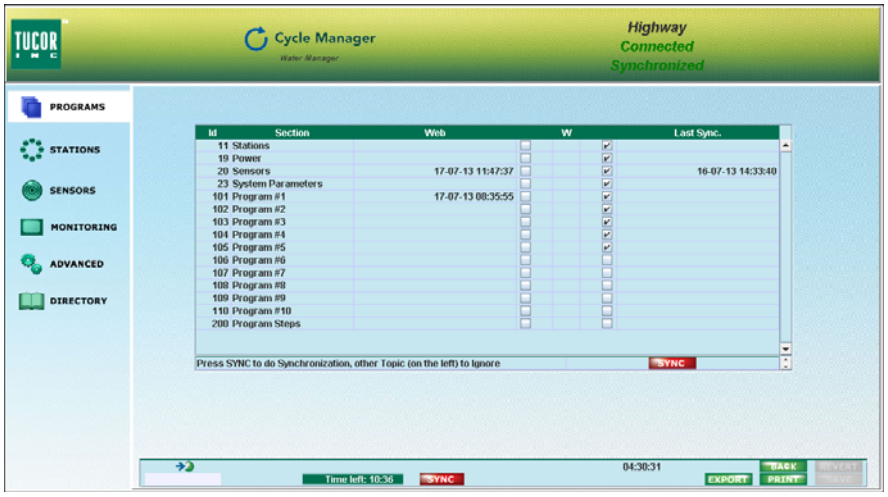
How to do this:

1 Log on to Cycle Manager.

2 Select the controller in the opening window, and click **Connect**. Cycle Manager opens. Notice the phrase **NOT Synchronized** appears at the top right corner of the Cycle Manager opening window.

3 Click the **SYNC** button to open the **Synchronization** screen.

4 Verify that all relevant sections have checkmarks in the **Controller** column.



5 Click the red **SYNC** button.

6 All data will be transferred from the controller to Cycle Manager.

7 Once controller data have been imported, you can proceed to the other areas in Cycle Manager and make any neccessary adjustments. **Defining the Basic Settings** on page **30** and the subsequent chapters. Save your work as you move from one area in Cycle Manager to the next.

8 Remember to synchronize with the controller when your work is complete.

Entering Information in Cycle Manager

In this scenario, you have all the program and station information available but the physical controller has not yet been installed. In order to save time, you may want to start out in Cycle Manager by setting up the programs, and then synchronize with the controller once it has been installed.

How to do this:

1 Log on to Cycle Manager.

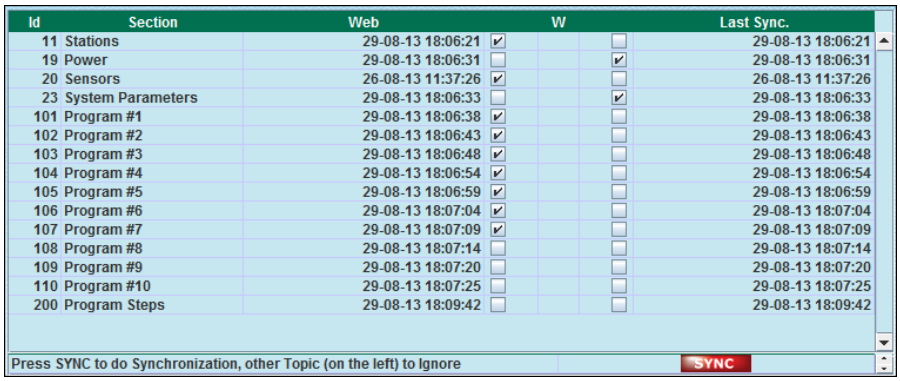
2 Select the controller in the opening window, and click **Connect**. Cycle Manager opens.

3 Since the controller is not yet physically installed, the phrase *Connecting* will appear across the top of the screen. Eventually, the phrase *Not Connected* will appear. (Note that the **SYNC** button will be dimmed or not clickable).

4 Proceed to the various areas in Cycle Manager to set up relevant data. **Defining the Basic Settings** on page **30** and the subsequent chapters. Save your work as you move from one area in Cycle Manager to the next.

> **Important!** It is vital that you place the checkmarks of the **Power** and **System Parameters** fields on the controller side, as these data are initially only resident on the controller (see screenshot next page). In Cycle Manager these fields contain empty values and if you place the checkmarks on the server sideby mistake and then synchronize, you will overwrite the existing, correct values on the controller.
>
> If this should happen to you, make an **ERASE ALL** on the controller, and synchronize once again.

5 When your work is complete - and the controller has been physically installed – click the **SYNC** button to open the **Synchronization** screen.



Id	Section	Web	W	Last Sync.
11	Stations	29-08-13 18:06:21		29-08-13 18:06:21
19	Power	29-08-13 18:06:31		29-08-13 18:06:31
20	Sensors	26-08-13 11:37:26		26-08-13 11:37:26
23	System Parameters	29-08-13 18:06:33		29-08-13 18:06:33
101	Program #1	29-08-13 18:06:38		29-08-13 18:06:38
102	Program #2	29-08-13 18:06:43		29-08-13 18:06:43
103	Program #3	29-08-13 18:06:48		29-08-13 18:06:48
104	Program #4	29-08-13 18:06:54		29-08-13 18:06:54
105	Program #5	29-08-13 18:06:59		29-08-13 18:06:59
106	Program #6	29-08-13 18:07:04		29-08-13 18:07:04
107	Program #7	29-08-13 18:07:09		29-08-13 18:07:09
108	Program #8	29-08-13 18:07:14		29-08-13 18:07:14
109	Program #9	29-08-13 18:07:20		29-08-13 18:07:20
110	Program #10	29-08-13 18:07:25		29-08-13 18:07:25
200	Program Steps	29-08-13 18:09:42		29-08-13 18:09:42

Press SYNC to do Synchronization, other Topic (on the left) to Ignore SYNC

6 Verify that all relevant sections have checkmarks in the **Web** column.

7 Click the red **SYNC** button.

8 All data will be transferred from Cycle Manager to the controller.

Defining the Basic Settings

Regardless of the starting point for your work with a new controller in Cycle Manager, you must make some initial selections and define some basic settings for your site. This is done in the **ADVANCED** area.

Note that the settings can be changed at a later stage as the requirements for your irrigation systems change.

The basic settings fall in the following catagories:

- Setting the water day cycle
- Enabling/disabling controller communication monitoring
- Configuring auto call for data monitoring
- Entering the total acres (AIC controllers only)
- Entering the system flow capacity

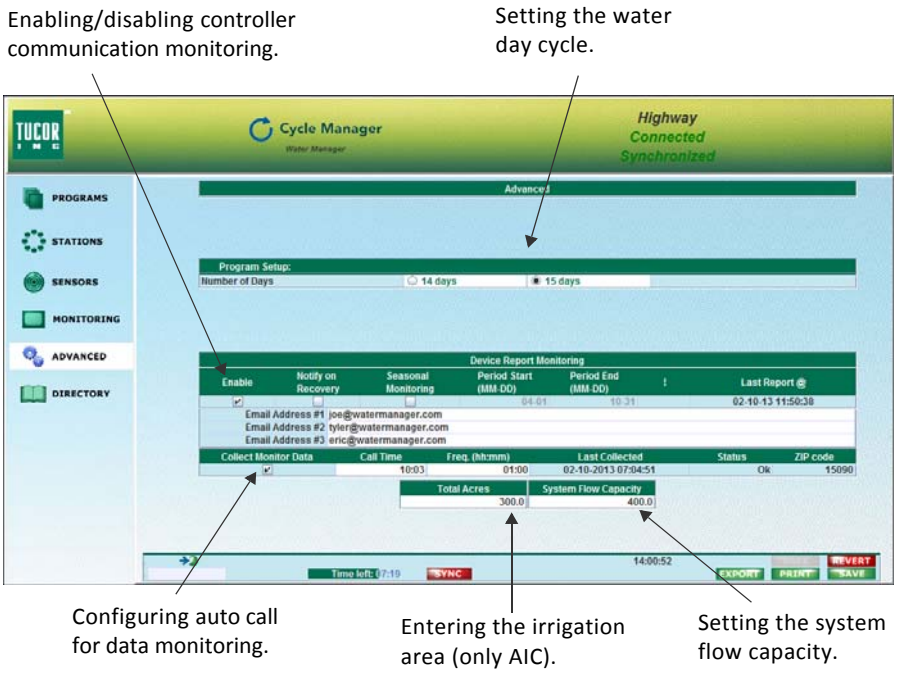


Figure 11: Defining the basic settings in the **ADVANCED** area.

Set the Water Day Cycle

The controller lets you define which days in a 14 or 15 day cycle your schedules should run. This enables you to flexibly set up your water days. For instance, a 14 day cycle enables you to run programs every other day or once a week. Choosing a 15 day cycle allows you to irrigate every third day, every fifth day, etc.

How to do this:

1 In the Program Setup grid set the **Number of days** field to either 14 days or 15 days depending on your preferred choice.

2 Click Save.

The cycle setting is reflected in the **PROGRAM** area by the days available for selection. For more information turn to **Defining Water Days** on page **43**.

Enable/Disable Controller Communication Monitoring

In the *Device Report Monitoring* grid you can enable and configure controller communication monitoring. This is used to give notice in the event communication is lost to the controller.

Every third hour the controller will send a keep-alive signal to the server. If the server has not received a signal within a period of 6 hours, a message will be sent to the three email addresses.

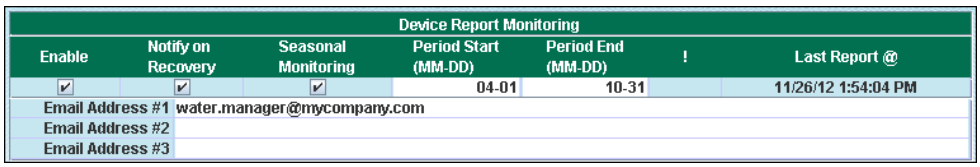


Figure 12: Customizing controller communication monitoring.

How to do this:

1. Select the **Enable** check box to enable controller communication monitoring for this controller.
2. Select **Notify on Recovery** to have Cycle Manager notify you when the connection to the server has been restored.
3. Select **Seasonal Monitoring** to enable monitoring for a specific period in the **Period Start** and **Period End** fields.
4. In the **Email Address** fields enter up to three email adresses that monitoring events should be sent to.
5. Click **Save**.

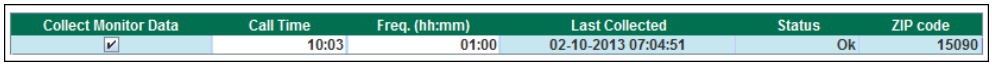
For related information on monitoring via Cycle Manager, turn to **Data Monitoring** on page **131**.

Configure Auto Call for Data Monitoring

The Cycle Manager server uses an auto call feature to collect monitor data from the controller and save them on the Cycle Manager server. Use the *Configure Auto Call for Data Monitoring* grid to set various parameters related to this feature.

The server will call the controller at the specified *call time* and then repeat the call with a specified frequency. The call time is set for the time zone defined by the ZIP code.

To optimize system performance and minimize the strain on the Internet connection (in particular a wireless connection (cellular)), we recommend you collect monitor data only twice a day. We also recommend that you set the call time in the morning when irrigation has completed. In that way you ensure the most recent and valid data are available in monitor data.



Collect Monitor Data	Call Time	Freq. (hh:mm)	Last Collected	Status	ZIP code
☑	10:03	01:00	02-10-2013 07:04:51	Ok	15090

Figure 13: Configuring the collection of monitor data.

How to do this:

1. Select the **Collect Monitor Data** check box to enable data monitoring for this controller.
2. In the **Call Time** field enter the time of day that monitor data should be collected. Enter a point of time in the morning when the

irrigation during the night is complete. This will ensure the most recent data.

3 In the **Freq (hh:mm)** field enter the frequency with which data should be transferred to the server. 12:00 corresponds to twice a day.

4 Click **Save**.

The remaining fields in *Configure Auto Call for Data Monitoring* grid includes:

- **Last Collected** - shows the time for the most recent retreival of monitor data.
- **Status** - indicates whether the transfer went well or not.
- **ZipCode** - indicates the geographical location of the controller being called.

For related information on monitoring via Cycle Manager, turn to **Data Monitoring** on page **131**.

Note: To avoid too much traffic, it is recommended you configure the system to collect monitor data on a regular basis, for instance twice a day. In situations where you have to convert and send a new sensor decoder setup, this will ensure that you have the most recent and correct data at hand. Part of the sensor decoder setup only resides on the server and is not sent along with the monitor record. This setup information, including units, alarm threshold, etc. must then be applied to the monitor records generated under the old setup before the new setup can be converted and sent to the controller. Since this information may change over time, a monitor record generated a month ago will not necessarily reflect the situation as it is today. Therefore you need to collect monitor data on a regular basis.

Set the Total Irrigation Area in Acres (AIC Controllers Only)

In the **Total Acres** field, enter the total size of your irrigation area in acres. This will enable Cycle Manager to report the water usage in acre/inches or acre foot. This information is primarily used in agriculture and relates to AIC controllers only.

See **Chapter 7: Data Monitoring** on page **131**.

Set the System Flow Capacity

In the **System Flow Capacity** field, enter the flow capacity for the entire system.

This information is useful when defining programs and steps. For each step you define, Cycle Manager will monitor and report how much of the flow capacity has been used. Entering the total system flow capacity in this field will help you create an irrigation system that runs with a stable flow without a sudden increase/decrease from one step to the next. For more information turn to **Entering Steps** on page **46**.

Exporting and Printing Data

Cycle Manager allows you to export and/or print the data of the current area, tab or subtab.

Clicking **PRINT** will send the data to any printer set up on your computer, or to a printer driver such as Adobe PDF.

Clicking **EXPORT** will open a dialog box in which you enter a filename. Data will be exported to a .CSV-file which may be opened for further processing in any spreadsheet application that supports the CSV-format.

Chapter 3:
Managing Programs

In this chapter:

- Program Tab Colors – What Do They Mean?
- Overview of Your Programs: The Pg View Tab
- Making Programs Active or Passive
- Linking Programs
- Defining Water Days
- Entering Start Times
- Adjusting the Water Budget
- Entering Steps

Click **PROGRAMS** on the toolbar to get to the area in Cycle Manager where you set up your programs. In the **PROGRAMS** area each of the 10 available programs may be managed from its own tab.

The illustration below shows what type of settings that may be managed for each program.

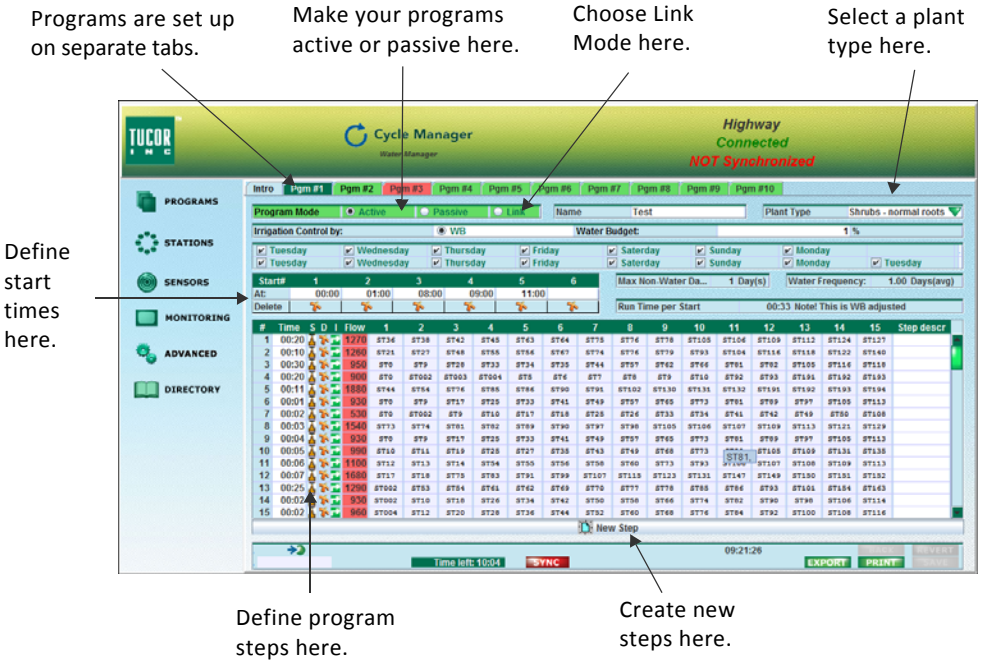


Figure 14: Defining programs and steps in Cycle Manager.

Program Tab Colors – What Do They Mean?

The 10 programs are represented on separate tabs with the tab color reflecting the program state:

- Green: The program is active.
- Red: The program is passive.
- Purple: The program is the link master (Program 1 only).
- Dark green: The program which you are currently editing.
- Yellow: The program is active but will not be able to run, e.g. due to missing runtimes.

Note: The state of the program (active, passive, error) is also reflected in the **Program Mode** section. This will further bring your attention to any problems.

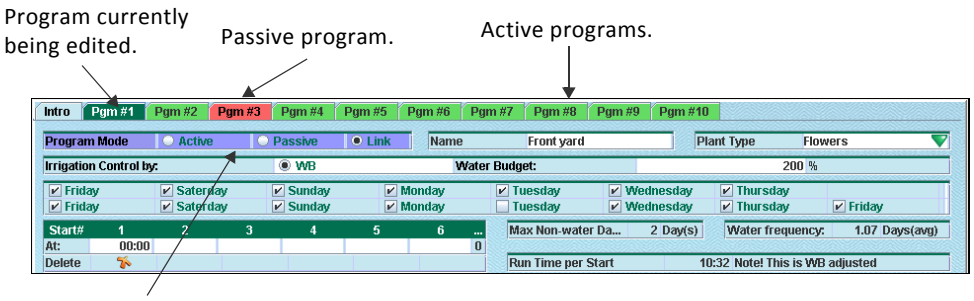


Figure 15: Color scheme of the program tabs.

Overview of Your Programs: The Pg View Tab

The **Pg View** tab in the **PROGRAMS** area provides a simplified graphic representation of all 10 programs, reflecting their starting times, runtimes and status (*Normal*, *Linked*, *Overlapping* and *Warning*). As you hover the mouse over the chart a small legend line will show you the information you need..

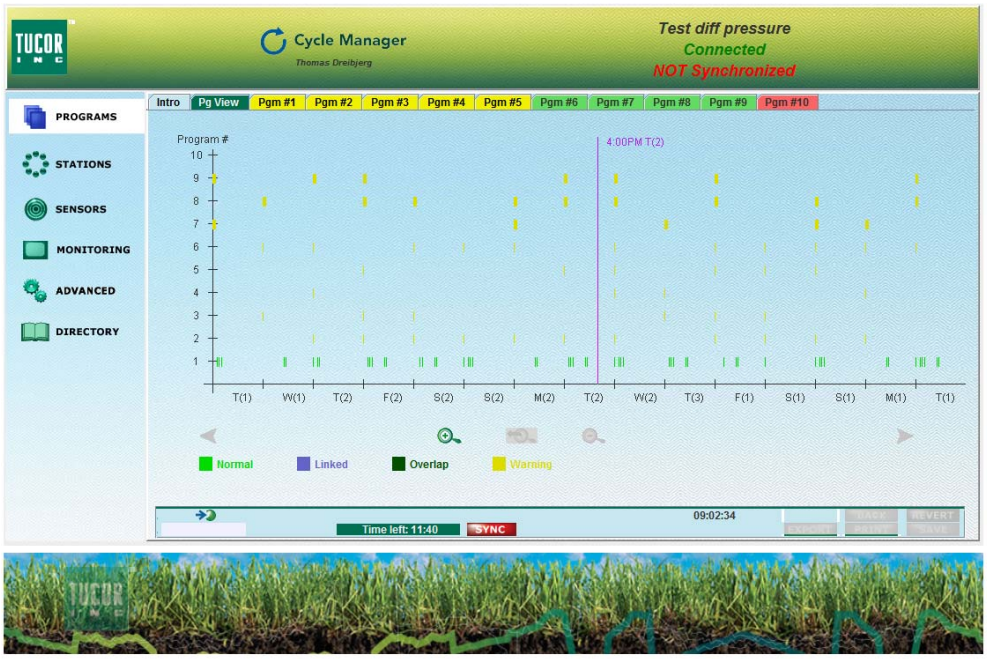


Figure 16: The **Pg View** tab provides a simplified graphics representation of all 10 programs.

Making Programs Active or Passive

On an overall level, you may set whether a program is active or not. By default all programs are passive.

How to do this:

1 In the **PROGRAMS** area, select the tab of the program you wish to work with.

2 Select the **Active** radio button to have Cycle Manager run the program by its defined run times.

3 Select the **Passive** radio button if you want the program to be excluded from irrigation.

4 Click **Save** and make sure to synchronize the Cycle Manager with the controller. For more information turn to **How to Synchronize** on page **22**.

Note: The state of the program (active, passive, error) is also reflected in the **Program Mode** section. This will further bring your attention to any problems.

Linking Programs

If you want to run all your programs stacked (i.e. in sequence from 1- 10) instead of running them at independent water days and start times, you can use the "linking" feature. Running your programs like this will also include the defined steps of each program.

Here's how it works:

- Program 1 is declared the link master schedule (see procedure below) and you set the water days and start times as you normally would for any other program.
- All other programs will now have their start times ignored, and you can not edit the start times at all. The remaining programs will run in sequence, following the start times of Program 1.

- Note that the water days setting of Programs 2-10 will not *add* days in relation to the setting of Program 1. If, for instance Program 1 have water days every other day Monday, Wednesday, Friday, etc., and Program 2 have water days on all days of the week, then the Tuesday and Thursday schedules of Program 2 will not run. Please refer to Figure 17 below for a detailed example.
- When linking is active, each program still has it own individual waterbudget.

How to do this:

1 In the **PROGRAMS** area, select the tab of Program 1.

2 Select the **Link** radio button to have Cycle Manager run the program by its defined run times. The color of the *Program Mode* grid turns purple.

3 Click **Save**.

Water days pattern

Program	S	M	T	W	T	F	S	S	M	T	W	T	F	S
1														
2		2)			1)						1)			2)
3	1)	2)	1)	2)	1)	2)	1)	2)	1)	2)	1)	2)	1)	2)
4														
5														
6	1)			2)							1)			
7		3)						3)	3)					
8														
9	1)				1)				1)			2)		
10														

	Will run on that day. Program 1 is the Master.
1	Will run on that day because Master runs.
2	Will not run on that day because the Master does not run.
3	Will not run because the program is passive.
	Programs without runtimes or water days.

Figure 17: This water days pattern shows how Program 1 as the link master includes and excludes the runtimes of other programs.

HINT! The linking feature is particularly suited for irrigation systems that include a weather station to control the water budget. In these cases, the end times of programs may be changed as a consequence of the transferred ET values. However, the controller does not allow that two programs start simultaneously. Only the first of two programs with identical start times will be executed. The same pertains to programs with conflicting start times and end times. If one program ends at 2 AM and the next program is scheduled to start at 2 AM, the second program will not be launched. If you implement the linking feature you can still take advantage of the ET values and avoid that start times and end times of programs conflict.

Defining Water Days

The controller lets you define which days in a 14 or 15 day cycle your schedules should run.

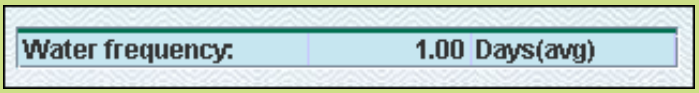
Note: The actual cycle (14 or 15 day cycle) is set in the **ADVANCED** Area. For more information turn to **Set the Water Day Cycle** on page **31**.

How to do this:

1 In the *Select Water Days* grid, select the checkbox next to the days on which irrigation should be performed. Remove a checkmark to exclude days from the schedule.

2 Click **Save**.

HINT! As a help for the constraints, a few imports summaries are display in the bottom of the grid:



Water Frequency The average water days frequency.

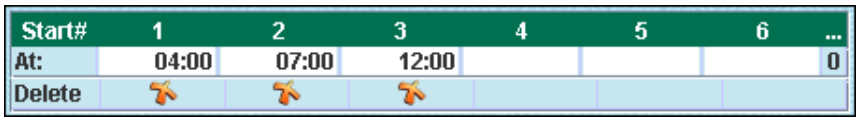
Max Non-Water Days The maximum number of days between water days.

Entering Start Times

The start times determine when in the selected water days your program should run. Each program runs up to six times per day.

How to do this:

1 In the *Start Time* grid, enter the start time in the **At** field.



2 Click **Save**.

Important! Two programs can not share the same start time.

If you have two programs with identical start times, only one of them will be run. Program start times can overlap, as long as the total number of running stations does not exceed 10 (that is 15 for AIC), but the controller will only start one program each minute. Thus, if you want to run two programs at the same time you have to run one of the programs just a minute later.

See **Chapter 3: Linking Programs** on page **41** for more information on how to avoid conflicting start and end times in case you use a weather station to adjust the water budget.

Adjusting the Water Budget

Water budget is a concept that allows you to increase or decrease the amount of water used for irrigation without having to re-configure your schedules.

If you experience a dry period you can increase the amount of water used by all stations in all steps in an entire program, simply by increasing the water budget. And of course the other way around: if you're getting a lot of rain, you can decrease the water usage by lowering the water budget.

You can adjust the water budget to a value between 0 and 250 percent with 100 percent representing a normal water consumption. When the water budget increases, the controller simply adds to the run time for each step in your program, so, if a step normally lasts half an hour on a 100 percent water budget and you increase the water budget to 110 percent, your step will run for 33 minutes.

Important! Keep in mind that increasing the water budget might lead to unexpected schedule overlaps as the total run time for a program will increase with the water budget.

How to do this:

1 In the *Water Budget* grid set the water budget value to the desired percentage.

2 Click **Save**.

Note: Irrigation with a TWC controller is exclusively water budget based. However you may add a weather station to your system enabling you to adjust irrigation according to compiled ET values. See **Chapter 6: Managing Weather Stations** on page **117**.

Entering Steps

An important part of your work with setting up programs involves creating and configuring a series of steps which will enable you to adjust irrigation to your particular needs.

For each new step you must:

- Set a duration time.
- Select the stations to include in the step.
- Keep an eye on the flow situation. Make sure that there are no sudden increase or decrease in the flow from one step to the next.
- Add a description.

Creating and maintaining steps is done in the *Define Steps* grid which is located in the lower part of each program tab.

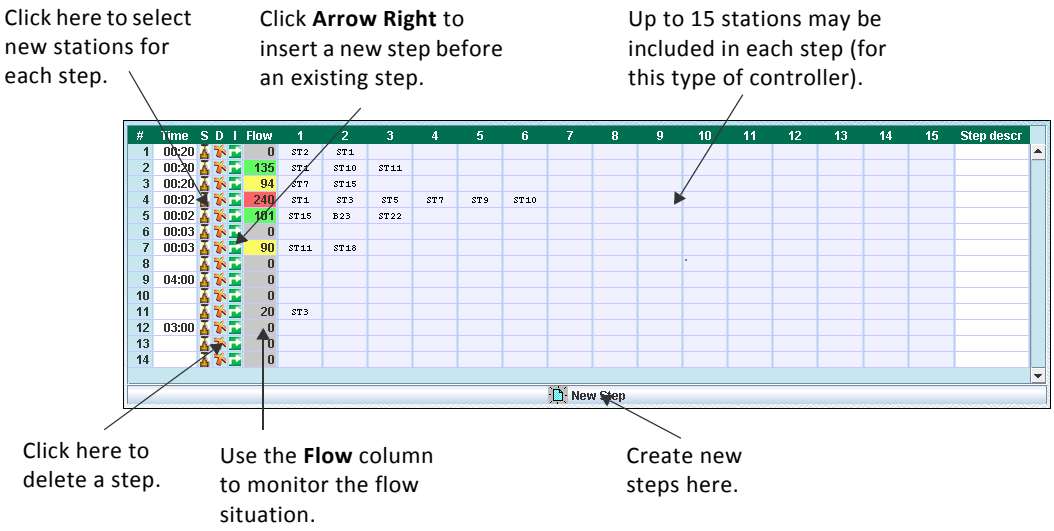


Figure 18: The **Define Steps** grid.

How to do this:

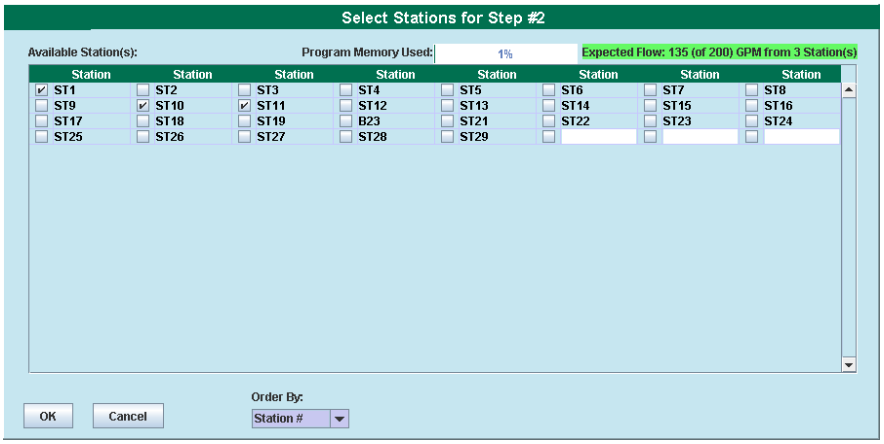
1 Click the **New Step** button. A new empty line is inserted at the bottom of the list of steps.

Cycle Manager allows you to insert a new step before an existing step. Click the **Arrow Right** button of the existing step. An empty

line will be inserted above this step allowing you to fill in data of the new step.

2 In the **Time** field enter the duration time of the step.

3 Click the **Select Stations** bottom to open the **Select Stations** dialog box.



4 Place a checkmark next to each station you wish to include in the step.

Cycle Manager will monitor the system capacity in terms of how many stations you can use. If you have used the number of allowed stations, an error message will display. You will not be able to add more stations.

5 For your convenience you may order the stations by name, number, flow increment or flow decrement. In this way you can easily get an overview of the available stations and identify those that are suited for specific irrigation purposes.

Note: Notice that the overall program memory is displayed at the top of this dialog. This value represents the total consumption of all 10 programs. The consumption depends on the total number of steps. For instance with 10 programs there will be room for 916 steps, or 91 per program.

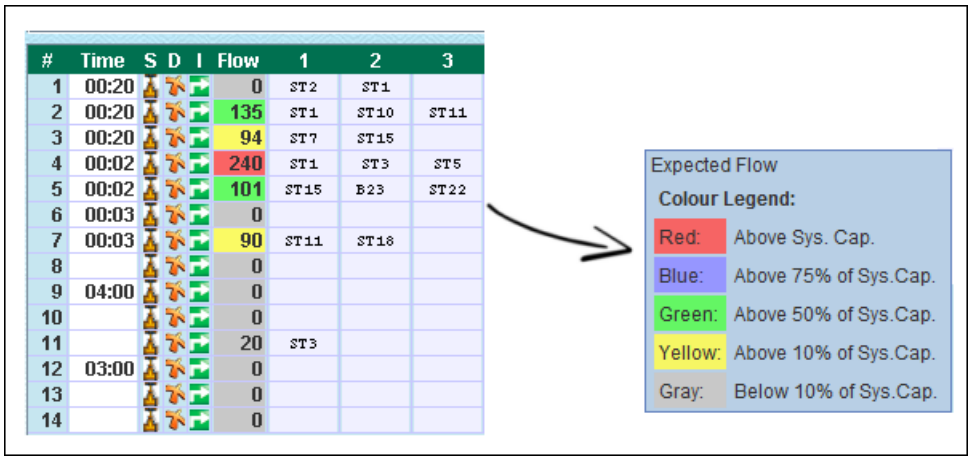
6 At the top right hand of the **Select Stations** dialog box, the accumulated expected flow of the selected stations will appear. Notice how this value changes as you select or deselect stations.

Use this figure to monitor the flow situation and ensure you do not exceed the flow capacity; or, mistakenly create a list of steps with an unstable flow. The expected flow is set for each station. For more information turn to **Setting the Expected Station Flow** on page **51**.

7 Click **OK**.

8 Back in the **Define Steps** grid enter a suitable description in the **Description** field.

9 Click **Save**.



#	Time	S	D	I	Flow	1	2	3
1	00:20				0	ST2	ST1	
2	00:20				135	ST1	ST10	ST11
3	00:20				94	ST7	ST15	
4	00:02				240	ST1	ST3	ST5
5	00:02				101	ST15	B23	ST22
6	00:03				0			
7	00:03				90	ST11	ST18	
8					0			
9	04:00				0			
10					0			
11					20	ST3		
12	03:00				0			
13					0			
14					0			

Use the colors in the **Flow** column to get an overview of the total flow used by each step. The color legend is shown when you hover the mouse of the **Flow** column.

Note: Note that the flow values displayed do not take into account the flow values of other programs. So in case you run programs in parallel (i.e. with overlapping start times), the overall flow may *not* represent the actual flow situation. You may solve this issue by running your programs in Link mode. For more information turn to **Linking Programs** on page **41**.

Chapter 4:
Managing Stations

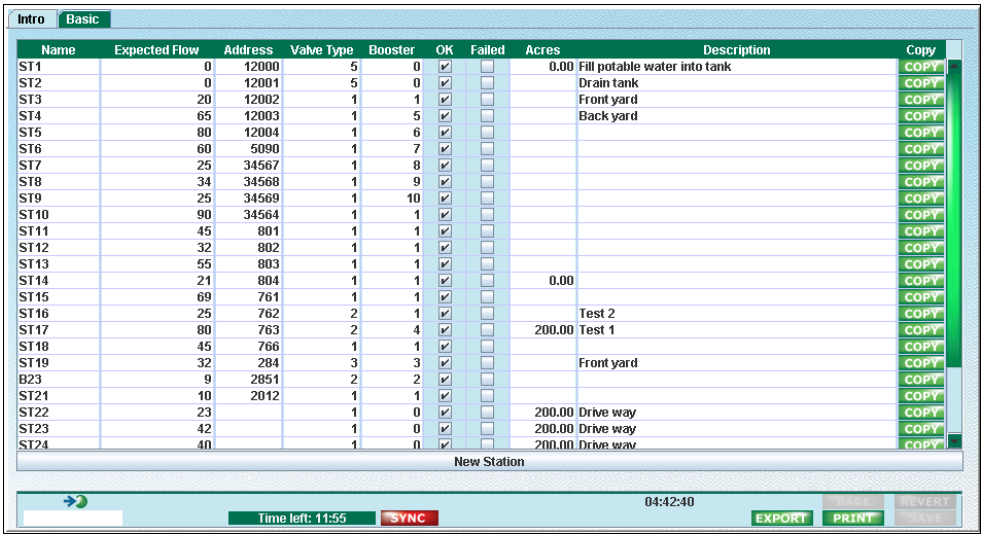
In this chapter:

- Setting Basic Station Information
- Copying an Existing Station

Click **STATIONS** on the toolbar to get to the **STATIONS** area in Cycle Manager. This area provides an easy and centralized way of defining station information.

Setting Basic Station Information

The **Basic** tab enables you to define and maintain features available for your stations.



The **Basic** tabs enables you to do the following:

- Setting the Expected Station Flow
- Checking Flow Deviation
- Entering the Station Address
- Choosing a Valve Type
- Adding a Booster Pump
- Setting the Irrigation Area
- Adding a Station Description

Setting the Expected Station Flow

Note: If you employ the “learn flow” principle for your station on the controller, setting the expected flow in Cycle Manager is not necessary. Remember to synchronize from the controller to the web subsequently.

How to do this:

1 The **Expected Flow** column shows the expected flow for the stations. This can be used to monitor the actual flow compared to the expected flow to generate alarms on a percentage deviation.

Checking Flow Deviation

How to do this:

1 If there is a checkmark in the **OK** column it indicates that the station works fine from a flow perspective.

If the checkmark is missing always make sure that the station has been synchronized. See **Chapter 1: How to Synchronize** on page **22**.

2 The **Failed** column indicates that the station has a flow failure. It could either be too much or too little flow compared to the expected flow. Stations marked *Failed* will be skipped when the controller runs the programs.

Important! The controller will stop irrigating if the number of failed stations reaches 10.

Entering the Station Address

How to do this:

1 In the **Address** field enter the address of the station.

This information is printed on the physical decoder and should of course be identical in Cycle Manager.
Note that Cycle Manager allows you to use the same decoder

address with two different stations. This allows two different stations to activate the same decoder.

Important! It is NOT recommended to install two decoders with the same address. The two decoders will activate simultaneously, consuming more power than expected. This may have the unintended side effect that the controller enters short finding mode.

Choosing a Valve Type

How to do this:

1 In the Valve Type field enter the valve type used with this station.

The valve type is represented by a number in your system and this number should of course be identical in Cycle Manager.

Note that you cannot edit any valve related information from Cycle Manager. Any changes must be made on the controller. Please refer to the controller manual.

Adding a Booster Pump

How to do this:

1 In the **Booster** field enter the booster pump used with this station.

Each booster pump is represented by a number in your system and this number should of course be identical in Cycle Manager.

Note that you cannot edit any valve related information from Cycle Manager. Any changes must be made on the controller. Please refer to the controller manual.

Setting the Irrigation Area

How to do this:

1 In the **Acres** field enter the amount of acres this station is intended to irrigate. This relates to AIC controllers only.

This information is typically available from specifications accompanying the valve (i.e. station).

Adding a Station Description

How to do this:

1 In the **Description** field provide a suitable description of the station. The description is also shown in the **PROGRAM** area so that you may easily identify the stations used in each program.

Copying an Existing Station

Cycle Manager enables you to create a new station by copying the information from an existing station. This will save you some time if you have multiple stations in your system.

How to do this:

1 Click the **COPY** button related to the station you wish to copy.

2 Click **OK** to confirm the copy.

3 The new station will be inserted as the last station on the list. All information but the station number and address and number will be re-used.

4 Enter the station address and proceed to make any necessary adjustments.

5 Click **Save**.

Chapter 5:
Managing Sensors and Sensor Decoders

In this chapter:

- About Sensors and Sensor Decoders
- Defining Sensors and Sensor Decoders
- About Alarms, Actions and Sub-actions
- Defining Alarms and Actions for Sensor Decoders
- Defining Alarms and Actions for Sensors
- Disabling Sensors and Sensor Decoders
- Greywater Recycle System - A real-life Example

Click **SENSORS** on the toolbar to get to the area in Cycle Manager where you set up sensors and sensor decoders and define their associated alarms and actions.

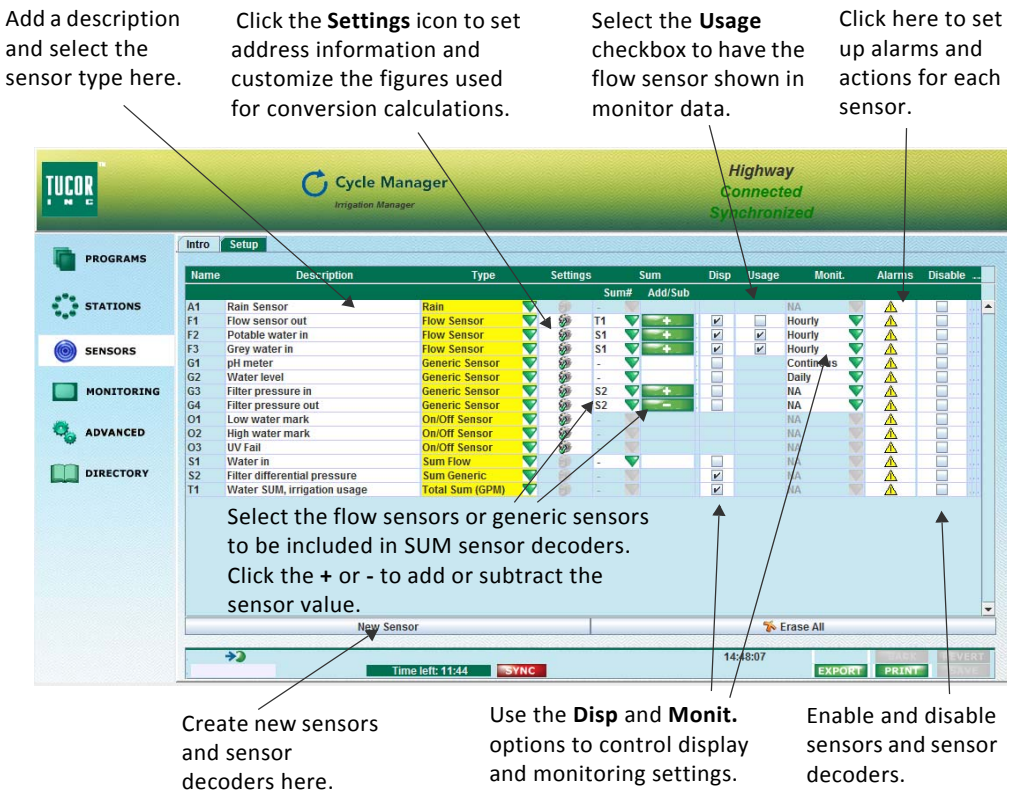


Figure 19: The Cycle Manager **SENSORS** area.

About Sensors and Sensor Decoders

Sensors and sensor decoders are designed to monitor, manage and optimize system performance. They do so in areas such as flow of water, pond levels, rainfall, temperatures, pressure levels, PH values and many more. The management mechanism of sensors and sensor decoders includes the following:

1. Monitoring predefined threshold values and conditions for the device.
2. An *alarm* is generated in case a threshold value is exceeded and predefined conditions are met.
3. The alarm may be set up to trigger one or several *actions* and/or *sub-actions* to be performed. If no actions are defined, the alarm will show on the controller display.

In Cycle Manager you can define and enable up to 10 different sensors decoders and the three onboard sensors. More of the same type of sensor (Rain, AUX and Short) can be defined, but only one can be enabled at a time. For instance you can define two Short sensors for different purposes, but you have to disable one of them at run time.

Sensors

Sensors are the onboard sensors such as Rain, AUX and the Short sensor. Onboard refers to the fact that they are physically located on the TWC controller.

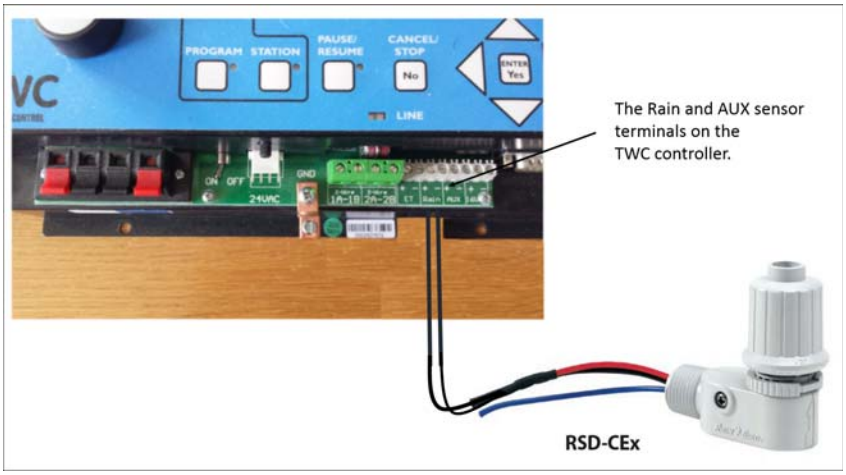


Figure 20: A rain sensor connected to the onboard Rain sensor terminal.

- The Rain sensor works as a switch, and when connected to a physical rain sensor it will cause the system to react in the event of rainfall.
- The AUX sensor typically accepts alarms from a pump sensor.
- The inbuilt Short sensor detects shorts on the 2-wire. Its location is on the CPU board and it constantly monitors the power level on the 2-wire. In case of too much or insufficient power, it will close down the 2-wire and send an alarm about a short on the 2-wire.

Sensor Decoders

Devices such as pH meters, flow meters, pressure meters, fertilizer meters, etc. all fall in the category of *sensor decoders*. Sensor decoders are physically installed in the system close to the device they are intended to monitor.

In addition to these you have two types of SUM sensor decoders: Sum Flow Sensor decoder and Sum Generic sensor decoders.

The *Sum Flow Sensor* decoder is a logical sensor decoder designed to monitor the accumulated flow of two or several flow sensor decoders.

The *Sum Generic Sensor* decoder is a logical sensor decoder that for instance can be used to monitor the pressure difference over a filter. When the pressure difference reach a preset value, an alarm indicates that the filter must be cleaned.

It is important that it is the same type sensor decoders that are used in a SUM, and not two different types. For instance it is not possible to use a pH meter together with a pressure meter.

Figure 21: pH meters and Pressure meters are examples of measuring devices that may be installed in the system via sensor decoders.

Defining Sensors and Sensor Decoders

This section will take you through the following:

- Defining a Rain Sensor
- Defining an AUX Sensor
- Defining a Short Sensor
- Defining a Flow Sensor Decoder
- Defining a Sum Flow Sensor Decoder
- Defining a Generic Sensor Decoder
- Defining af Sum Generic Sensor Decoder
- Defining an On/Off Sensor Decoder

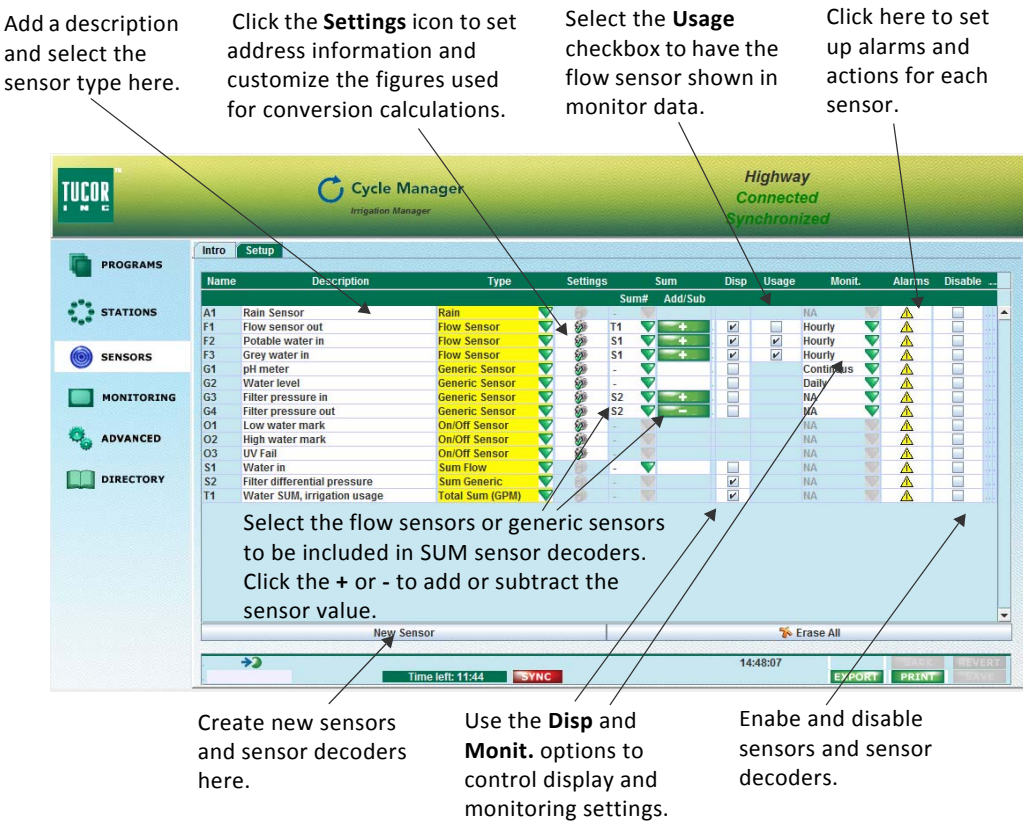


Figure 22: Defining sensors and sensor decoders.

Important! Use the small icon in the **Settings** column to set up *address* and *input type information* for sensor decoders.

A  indicates the setup is correct. A  indicates something is missing in the setup. The sensor decoder will not work until this is fixed.

Defining a Rain Sensor

The rain sensor is connected to the onboard rain contact input. When the rain sensor is active - and it starts to rain - it will stop all active decoders and prevent new ones from starting up. The programs will run, but no start or stop instructions will be sent on the 2-wire. Thus, all stations will be inactive. The reason we allow programs to run is to keep the ET balance up to date.

How to do this:

1. Click the **New Sensor** button.
2. In the **Type** dropdown list, select *Rain Sensor*.
3. In the **Description** field, type a suitable description for the sensor.
4. Click **Save**.
5. Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for a Rain Sensor** on page **96**.
6. Click **Save**.

Defining an AUX Sensor

The AUX sensor is for the on board AUX contact input. For instance this can be used to implement a pump alarm in your irrigation system. In case the alarm is triggered, it will stop all active decoders and prevent new ones from starting up. The programs will run, but no start or stop instructions will be sent on the 2-wire. Thus, all stations will be inactive.

How to do this:

1. Click the **New Sensor** button.
2. In the **Type** dropdown list, select *Rain Sensor*.
3. In the **Description** field, type a suitable description for the sensor.
4. Click **Save**.

5 Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for an AUX Sensor** on page **99**.

6 Click **Save**.

Defining a Short Sensor

The Short sensor is for the onboard 2-wire circuit input used to check for shorts on the 2-wire. In case the alarm is triggered, it will stop all active decoders and prevent new ones from starting up. The programs will run, but no start or stop instructions will be sent on the 2-wire. Thus, all stations will be inactive. By default, the system will enter short finding mode.

How to do this:

1 Click the **New Sensor** button.

2 In the **Type** dropdown list, select *Short*.

3 In the **Description** field, type a suitable description for the sensor decoder.

4 Click **Save**.

5 Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for a Short Sensor** on page **101**.

6 Click **Save**.

Defining a Flow Sensor Decoder

Flow sensor decoders are used for flow measuring. This will typically be a pulse device, but is not restricted to that. For flow sensors the behavior of the alarms is dependent on the irrigation status.

How to do this:

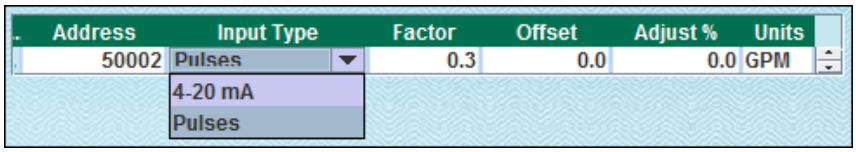
1 Click the **New Sensor** button.

2 In the **Type** dropdown list, select *Flow Sensor*.

3 In the **Description** field, type a suitable description for the sensor decoder.

4 Click **Save**.

5 Click the **Settings** button to open a new window and enter the physical *Address* of the sensor decoder, set the *Input Type* (*4-20mA* or *Pulses*) and set the associated *Unit*.



6 The **Factor** and **Offset** values are used for the conversion of *physical input values* of the flow meter into *logical values* that Cycle Manager can work with. The conversion depends on your selection of Input Type: *Pulses* or *mA*. Note that most flow meters use *Pulses*. For more information turn to **Explaining the Purpose of Factor and Offset Values** on page **69**. Here you wall also find an overview of the most common values for flow meters.

7 Use the **Adjust%** field to make minor adjustments if the **Factor** is selected for e.g. a standard flow sensor.

8 Click **Save** and then **Back** to return to the **SENSORS** area.

9 Select the **Sum** checkbox if the flow sensor shall be included in a SUM flow sensor decoder. Use the **+/-** button in the **Add/Sub** column to indicate whether the flow value should be added or subtracted in the associated SUM flow sensor decoder. For more information turn to **Defining a SUM Flow Sensor Decoder** on page **64**.

10 Select the **Disp** checkbox to have the values of the current sensor shown on the controller's display. By default, the expected flow will always be shown, but you can use this option to display the measured value of the sensor. The information will be shown on the right-hand side on the controller. Note that the more sensors you select for display, the longer the time you have to wait until the controller has toggled through all sensors. Use this option with consideration.

11 Select the **Usage** check box if you wish to log usage for this flow sensor. The water usage will appear as a separate item in monitor data.

Note: The **Usage** check box is only available if the feature has been set up by Tucor

12 In the **Monit.** dropdown list, select if and how often sensor decoder values should be registrered for monitoring data. Select between *Not in Use, Hourly, Daily and Continously.*

Continously implies that a monitor record will be generated every time the value changes. Note that this can be an expensive solution, if you are often using Cycle Manager via a cellular transmission so use this option with care. Also, the *Continously* option is only available if the feature has been set up by Tucor.

13 Click **Save**.

14 Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for a Flow Sensor Decoder** on page **83**.

15 Click **Save**.

Defining a SUM Flow Sensor Decoder

The SUM flow sensor decoder is *logical sensor decoder* not a *physical sensor*. In a SUM flow sensor the values of one or more flow sensors are summed up to present a resultative value that may then regulate a certain application.

If, for instance, your irrigation system pumps water from three different wells, you may connect a flow sensor to each well. In certain cases it may be useful to measure the combined flow of all three wells. For this purpose you may use a SUM flow sensor decoder.

Note that SUM flow sensors can only be defined for flow sensor that measures flow in GPM.

Cycle Manager allows you to create several SUM flow sensor decoders in a system. These SUM can be added to the total Sum (T1) together with other individual flows. In the example below, the SUM flow sensor, S1, includes the flow sensors, F2 and F3, but the total Sum (T1) only includes F1.

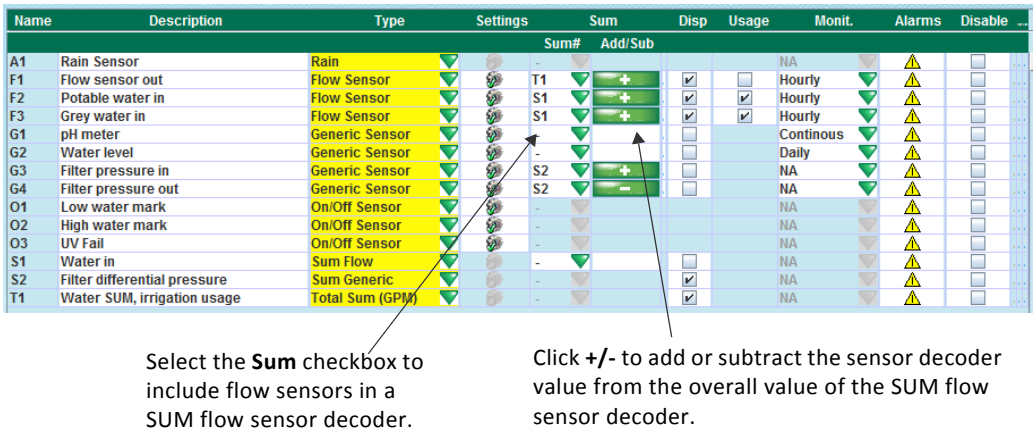


Figure 23: Defining a SUM flow sensor decoder.

How to do this:

1. Click the **New Sensor** button.
2. In the **Type** dropdown list, select *Sum Flow*.
3. Check the **Sum** checkmark next to the flow sensors you wish to include in the SUM flow sensor.
4. Select - *(minus)* or *+(plus)* in the Add/Sub column to subtract or add the sensor decoder value from the overall value of the SUM flow sensor decoder.
5. In the **Description** field, type a suitable description for the sum flow sensor decoder.
6. Select the **Disp** checkbox to have the values of the current sensor shown on the controller's display. By default, the expected flow will always be shown, but you can use this option to display the measured value of the sensor. The information will be shown on the right-hand side on the controller. Note that the more sensors you select for display, the longer the time you have to wait until the controller has toggled through all sensors. Use this option with consideration.
7. Click **Save**.

8 Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for a Sum Flow Sensor Decoder** on page **86**.

9 Click **Save**.

Defining a Generic Sensor Decoder

Generic sensor decoders are used for *generic measurements*. These sensors could typically be for temperature, pressure, and fertilizer levels etc. which are not directly related to the irrigation. An example of a generic sensor in an irrigation system is a temperature sensor set up to stop irrigation if the temperature is below e.g. 35 °F.

How to do this:

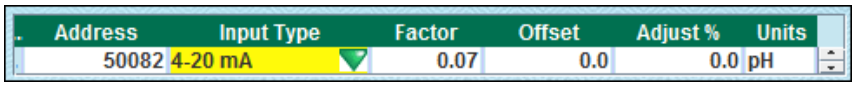
1 Click the **New Sensor** button.

2 In the **Type** dropdown list, select *Generic Sensor*.

3 In the **Description** field, type a suitable description for the sensor decoder.

4 Click **Save**.

5 Click the **Settings** button to open a new window and enter the physical *Address* of the sensor decoder, set the *Input Type* (*4-20mA* or *Pulses*) and set the associated *Unit*. The physical setup defines the address of the sensor decoder and the message type. Also, the unit can be entered. The unit will be shown in the monitor data but will not be sent to the controller.



The **Factor** and **Offset** values are used for the conversion of *physical input values* of the decoder into *logical values* that Cycle Manager can work with. The conversion depends on your selection of Input Type: *Pulses* or *mA*. For more information turn to **Explaining the Purpose of Factor and Offset Values** on page **69**.

6 Use the **Adjust%** field to make minor adjustments if the **Factor** is selected for e.g. a standard pH sensor.

7 Click **Save** and then **Back** to return to the **SENSORS** area.

8 Select the **Sum** checkbox if the generic sensor decoder shall be included in a SUM generic sensor decoder. Use the **+/-** button in the

Add/Sub column to indicate whether the value should be added or subtracted in the associated SUM generic sensor decoder. For more information turn to **Defining a Generic Sensor Decoder** on page **66**.

9 Select the **Disp** checkbox to have the values of the current sensor shown on the controller's display. By default, the expected flow will always be shown, but you can use this option to display the measured value of the sensor. The information will be shown on the right-hand side on the controller. Note that the more sensors you select for display, the longer the time you have to wait until the controller has toggled through all sensors. Use this option with consideration.

10 In the **Monit.** dropdown list, select if and how often sensor decoder values should be registrered for monitoring data. Select between *Not in Use, Hourly, Daily and Continously.*

Continously implies that a monitor record will be generated every time the value changes. Note that this can be an expensive solution, if you are often using Cycle Manager via a cellular transmission so use this option with care.

Note: The *Continously* option is only available if the feature has been set up by Tucor.

11 Click **Save**.

12 Click the **Alarms** icon to define the alarms and actions for this sensor decoder. For more information turn to **Defining Alarms and Actions for a Generic Sensor Decoder** on page **90**.

13 Click **Save**.

Defining af Sum Generic Sensor Decoder

The SUM generic sensor decoder is *logical sensor decoder* not a *physical sensor*. In a SUM generic sensor the values of one or more sensors are summed up to present a total value that may then regulate a certain application.

If, for instance, your irrigation system consists of two or more harvesting tanks, you can connect a water level sensor to each tank. It may be useful

to measure the combined water level in the tanks to get an idea of the total quantity of water available. For this purpose you may use a SUM water level sensor decoder.

Another application of a SUM generic sensor could be if you want to measure the differential pressure over a filter to determine if it clogged or not. For this purpose you may use a SUM pressure sensor decoder before and after the filter.

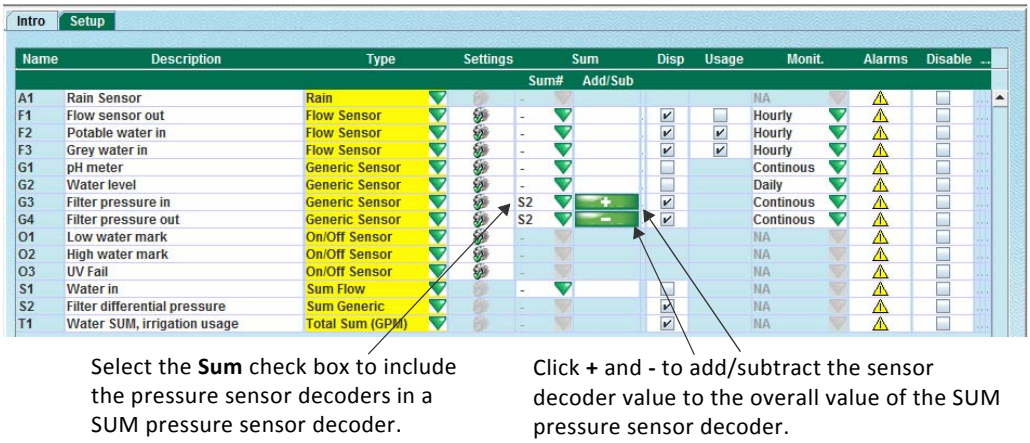


Figure 24: Defining a SUM pressure sensor decoder.

How to do this:

1. Click the **New Sensor** button twice to define two pressure sensor decoders.
2. In the **Type** dropdown list, select *Generic Sensor*.
3. Check the **Sum** checkmark next to the pressure sensors you wish to include in the SUM pressure sensor.
4. Select *+(plus)* in the Add/Sub column for the pressure sensor decoder before the filter, and - *(minus)* for the pressure sensor decoder after the filter. Doing this will result in a value for the pressure drop over the filter.
5. In the **Description** field, type a suitable description for the pressure flow sensor decoder.
6. Select the **Disp** checkbox to have the values of the current sensor shown on the controller's display. Click **Save**.

Explaining the Purpose of Factor and Offset Values

The **Factor** and **Offset** values are used for the conversion of *physical input values* of the decoder into *logical values* that Cycle Manager can work with. The conversion depends on your selection of Input Type: *Pulses* or *mA*. See screenshot below.

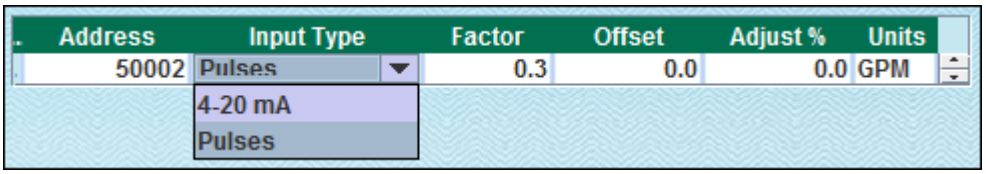


Figure 25: Your selection of Input Type (*Pulses* or *mA*)determines the conversion mechanism of physical input into logical values.

If you use Pulses as Input Type:

The sensor decoder counts pulses over 10 seconds and delivers the value to the controller. The range is 0 to 2000 pulses/10 sec. Before the Factor is taken into account the pulses are converted into pulses/second (Hz). (This is also referred to as the *Frequency*). The Factor then determines the conversion to a logical value in accordance with the following formula:

*Logical value = Factor * Pulses per second (Hz) + Offset.*

E.g.: Factor = 1 and Offset = 10, the logical values will be in range 10 to 210.

If you use mA as Input Type:

The mA is measured and delivered to the controller as 0 for 4mA and 200 for 20mA. The Factor then determines the conversion to a logical value in accordance with the following formula:

*Logical value = Factor * Measured value from sensor + Offset*

where:

- *Offset* = Sensor value @ 4mA
- *Factor* = ((Sensor value @ 20 mA) - (Sensor value @ 4 mA)) / 200
- The ((Sensor value @ 20 mA) - (Sensor value @ 4 mA)) is in general the range of the sensor.

Three relevant mA examples:

- *Flow sensor* with Factor = 5 and Offset = -40.

The logical values will be in range -40 to 960.

- *Temperature measurer* with 4mA = -40 deg F, 20mA = 250 deg F.

  Offset will be -40 and the factor = (250 - (-40))/200 = 1.45.

- *Generic sensor decoder (in this case pH sensor)* which gives 0 at 4mA and 14 at 20mA.

  In this example Offset = 0 and Factor = (14 - 0) / 200 = 0.07

Note: Both **Factor** and **Offset** can be set to negative values. This is useful for e.g. temperature sensors.

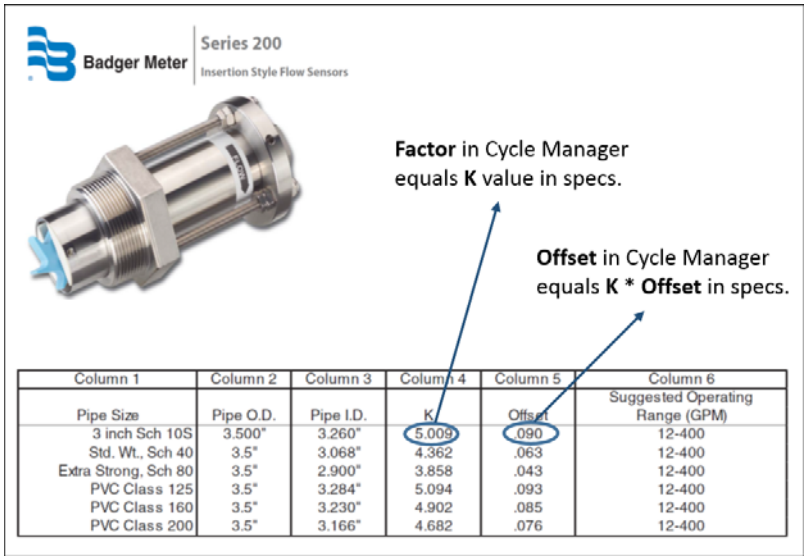
In case a flow sensor decoder is used as part of a SUM flow sensor decoder negative values can be used to make a differential flow.

Determining *Factor* and *Offset* Values - Flow Sensor Example

For flow sensors with puls interfaces, the *Factor* value in Cycle Manager corresponds to the *K* value listed in the specifications for your sensor. And the *Offset* value in Cycle Manager corresponds to *K * Offset* value in the specifications.

The example below is from a Badger Meter, *Series 200 Insertion Style Flow Sensor.* As you can see the K values are listed in Column 4 and the Offset values in Column 5.

In Cycle Manager, Factor = 5.009 and Offset = 5.009 * 0.090 = 0.451.



Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Pipe Size	Pipe O.D.	Pipe I.D.	K	Offset	Suggested Operating Range (GPM)
3 inch Sch 10S	3.500"	3.260"	5.009	.090	12-400
Std. Wt., Sch 40	3.5"	3.068"	4.362	.063	12-400
Extra Strong, Sch 80	3.5"	2.900"	3.858	.043	12-400
PVC Class 125	3.5"	3.284"	5.094	.093	12-400
PVC Class 160	3.5"	3.230"	4.902	.085	12-400
PVC Class 200	3.5"	3.166"	4.682	.076	12-400

Figure 26: Determining the Factor and Offset values from a Badger Meter, Series 200 Insertion Style Flow Sensor.

More Flow Sensor Examples - Tucor CST Series and FS Series

In the tables below you find the standard factor and offset values for the flow sensors, Tucor CST Series and FS Series (Data Industrial).

Table 1: Tucor CST Series

Type	Factor	Offset
TFSI-T10	0.322	0.064
T15	0.650	0.488
T20	1.192	1.120
T30	2.75	4.345
T40	4.53	5.028

Table 2: Tucor FS Series (Data Industrial)

Type	Factor	Offset
FS-100	0.397	0.104
FS-150	1.699	-0.537
FS-200	2.843	0.409
FS-300	8.309	1.886
FS-400	13.743	3.257

Defining an On/Off Sensor Decoder

The On/Off sensor decoder is used for an on/off switch. For instance to indicate that a water tank or a diesel tank is almost empty. It can also be a switch on the wall used to start/stop irrigation.

How to do this:

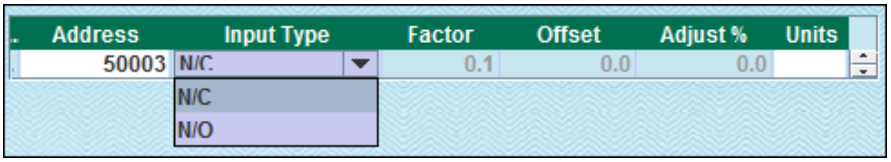
1 Click the **New Sensor** button.

2 In the **Type** dropdown list, select *On/Off Sensor*.

3 In the **Description** field, type a suitable description for the sensor decoder.

4 Click **Save**.

5 Click the **Settings** button to open a new window and enter the physical *Address* of the sensor decoder, set the *Input Type* (*N/C* or *N/O*) and set the associated *Unit*.



The physical setup defines the address of the sensor decoder and the message type. Also, the unit can be entered. The unit will be shown in the monitor data but will not be sent to the controller.

Click **Save** and then **Back** to return to the **SENSORS** area.

6 Click the **Alarms** icon to define the alarms and actions for this sensor. For more information turn to **Defining Alarms and Actions for an On/Off Sensor Decoder** on page **93**.

7 Click **Save**.

About Alarms, Actions and Sub-actions

As mentioned earlier the controlling mechanism of sensors and sensor decoders is based on the interaction between alarms, actions and sub-actions.

1. The sensor or sensor decoder monitors predefined threshold values and conditions for the device.
2. An *alarm* is generated in case a threshold value is exceeded and predefined conditions are met.
3. The alarm may be set up to trigger one or several *actions* and/or *sub-actions* to be performed. If no actions are defined, the alarm will show on the controller display.

Alarms

On a logical level, an *alarm* defines a certain *state* that is likely to be achieved for any given sensor or sensor decoder during irrigation.

Examples:

- Flow above 500 GPM (Flow sensor alarm)
- Flow below 100 GPM (Flow sensor alarm)
- Total flow above 2000 GPM (Sum flow sensor alarm)
- pH value in water below 6.5 (Generic sensor alarm)
- Rain detected (Rain alarm)

On an operational level, the alarm will draw the systems attention to a change of state either by displaying a message or by initiating one or more actions to regulate the system.

Actions and subactions

Actions and sub-actions are the *reaction(s)* defined for any given alarm. In case you have no action associated with an alarm, the alarm text will be shown on the display and in the monitor data.

A *sub-action* is an additional action performed as a result of a main action but it has no connection to the alarm that originally triggered the main action.

Examples:

- Send message
- Pause program
- Start program
- Stop decoder
- Stop pump

Each action or sub-action may be defined with a certain delay time.

The table below lists all the actions available in Cycle Manager. Any actions may also be defined as a sub-action.

Table 3: List of available actions and sub-actions in Cycle Manager.

Action	Type	#	All	Description
Activate	Decoder	1-200	No	Will activate the specified decoder for 999 minutes.
Activate	Program	1-10	No	Will start the specified program.
Deactivate	Decoder	1-200	Yes	Will stop the specified decoder or all decoders.
Deactivate	Pump	1-10/1-5	Yes	Will stop the specified pump or all pumps.
Deactivate	Program	1-10	Yes	Will stop the specified program or all programs.
Out of Irrigation	N/A	N/A	N/A	Will set the controller out of irrigation (program mode). **NOTE!** This action is comparable to an emergency brake.The entire sensor decoder system will stop, and an operator must restart the system by setting it in AUTO mode - either by JControl or in the field.
Pause Program	Program	1-10	Yes	Will pause the current program or all running programs. All inflicted decoders will stop within 10 seconds.Note that the Pause Program action will not prevent other scheduled programs from starting up.

Table 3: List of available actions and sub-actions in Cycle Manager.

Action	Type	#	All	Description
Resume Program	Program	1-10	Yes	Will resume the current program or all running programs. All decoders that were running up until the pause, will be restarted within 10 seconds.
Irr. Prevent Start	N/A	N/A	N/A	Will prevent the start of scheduled programs. Running programs will continue and finish. Also programs which are paused (i.e.idle) when the alarm occurs will continue and finish.
Irr. Allow Start	N/A	N/A	N/A	Will allow scheduled programs to start.
Send Message	N/A	N/A	N/A	Will send a message. Syntax: <email>|<message>. Up to 160 chars.
SEUF	N/A	N/A	N/A	Will start the SEUF routine (Seek & Eliminate Unexpected Flow). The SEUF function will stop all running decoders, wait for 4 minutes and then run the decoders - one at a time - for 3 minutes to check if each decoder behaves as expected. In those 4 minutes you should have a SUM Flow alarm above e.g. 10GPM to catch the leakage. The action response to a leakage is to perform a cancel SEUF, so that not all decoders will report a failure.
Cancel SEUF	N/A	N/A	N/A	Cancel SEUF must be used to stop SEUF, if it turns out there is a leakage. Will stop SEUF. SEUF normally stops when all decoders, which were active when the alarm occurred, have been checked.

An example of the relationship between Alarms, Actions and Sub-actions

To illustrate the relationship between alarms, actions and sub-actions take a look at the following example.

The illustration next page shows a Flow sensor decoder set up designed to monitor the flow situation.

- In case the flow is above 120 GPM, the alarm (F1a) triggers.

  The delay of the associated action (to deactivate the program) is 300 seconds so in case the flow is still above 120 GPM, Program 3 will be deactivated, and a message will be sent (the sub-action).
- The alarm has an additional action which occurs if the flow is still above 120 GPM after 600 seconds. In this case all programs will be stopped and two sub-actions will trigger: 1) Send a new message and 2) prevent new programs from starting up.

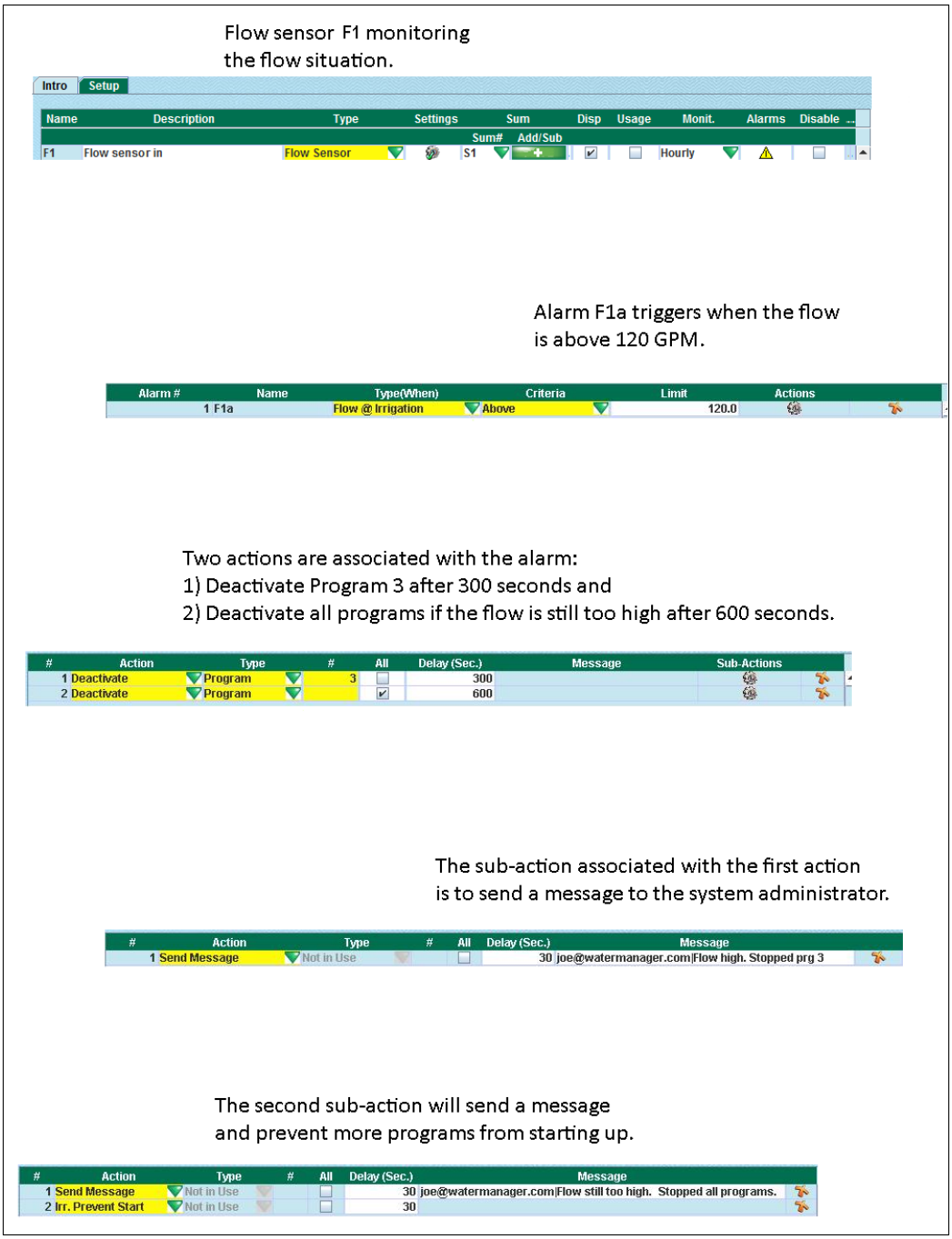


Figure 27: The relationship between and alarms, actions and sub-actions.

When and how to use actions and/or sub-actions

When you set up your sensor decoder system you need to consider the best way to have your alarms, actions and sub-actions interact so that the system runs as smoothly as possible.

- In some cases it is enough simply to have the alarm shown on the controller display or logged in monitor data.
- In other cases you may want the alarm to trigger that key personel is notified by an e-mail. You do so by setting up the action *Send Message* for a given alarm.
- In more complex situations you need to shut down a master pump or decoders for a specific amount of time, pause programs, to refill tanks to a certain level and then start programs again. You do this by defining string of actions and in some cases sub-actions to deal with the alarm situation at hand.

The use of actions and sub-actions is worth some discussion. In some advanced cases an alarm situation is best handled by the use of a sequence of actions, in other cases you may need to include sub-actions to break up a sequence of actions in order to ensure that the irrigation system works as expected.

The following example will illustrate the complications when using a string of sequentual actions rather than using sub-actions. In this case the irrigation systems actually stops:

A flow alarm (G1) is designed to trigger when the pond level drops to a level below 200 gallons. This is the lower limit when irrigation is no longer possible. Consequently, you need to fill up the tank again using potable water. Prior to this all programs should be paused. The influx of water will last for 10 seconds and then all programs should resume.

Alarm situation solved with a string of actions:

Flow alarm triggered: Pond level below 200.

Action 1: Delay 180 seconds. Pause all programs.

Action 2: Delay 180 seconds. Prevent irrigation.

Action 3: Delay 240 seconds. Start decoder PotIn

Action 4: Delay 840 seconds. Stop decoder PotIn

Action 5: Delay 900 seconds. Allow irrigation.

Action 6: Delay 900 seconds. Resume all programs.

The problem with this setup is that shortly after Action 3 has been completed, the water level will rise and the alarm condition (pond level < 200 gallons) will disappear. As a consequence, Action 4 and and Action 5 will never be completed.

You may solve this issue by instead creating sub-actions for Action 1. This will ensure that all sub-actions will be performed because they are not depending on the alarm condition still being active.

Alarm situation solved with one action and sub-actions:

Flow alarm triggered: Pond level below 200.

Action 1: Delay 180 seconds. Pause all programs.

Sub-action 1: Delay 0 seconds. Prevent irrigation.

Sub-action 2: Delay 60 seconds. Start decoder PotIn

Sub-action 3: Delay 660 seconds. Stop decoder PotIn

Sub-action 4: Delay 720 seconds. Allow irrigation

Sub-action 5: Delay 720 seconds. Resume all programs.

When to use actions/sub-actions rather than programs

In some cases, a sequence of actions and sub-actions may be executed by starting and eventually stopping a particular program. This is the case when that program includes the neccesary steps required to handle the alarm situation.

The advantage of performing the entire sequence of operation as actions and sub-actions is that it does not reserve programs and those programs may then be used for irrigation. However, the disadvantage is that actions and sub-actions in longer chains may take up data space in the sensor decoder system. Also, the programs can not be tested manually.

On the other hand, the advantage of using programs is that programs do not take up space in the sensor decoder system and may be tested.

For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

Data Limitations of the Sensor Decoder System

In Cycle Manager there are no limitations as to how *many* alarms, actions and subactions you may define for each sensor or sensor decoder. However, in terms of *data space*, there is an 'invisible' limit which it is not possible to exceed.

During a synchronization, Cycle Manager will monitor the amount of data used in the sensor decoder setup. This information will be presented as a percentage figure in a dialog box. If this value is above 100%, Cycle Manager will not perform the synchronization, and you need to check the sensor decoder setup for alarms, actions and sub-actions which are not neccesary. In particular actions such as *messages* will take up space. So please consider the number of messages in your system.

Defining Alarms and Actions for Sensor Decoders

The alarm and action setup depends on the actual sensor type:

- Defining Alarms and Actions for a Flow Sensor Decoder
- Defining Alarms and Actions for a Sum Flow Sensor Decoder
- Defining Alarms and Actions for Generic Sensor Decoder
- Defining Alarms and Actions for an On/Off Sensor Decoder

The Flow of Creating Alarms and Actions in Cycle Manager

The figure below depicts how you navigate through the Cycle Manager inteface when creating alarms, actions and subactions in the **SENSORS** area.

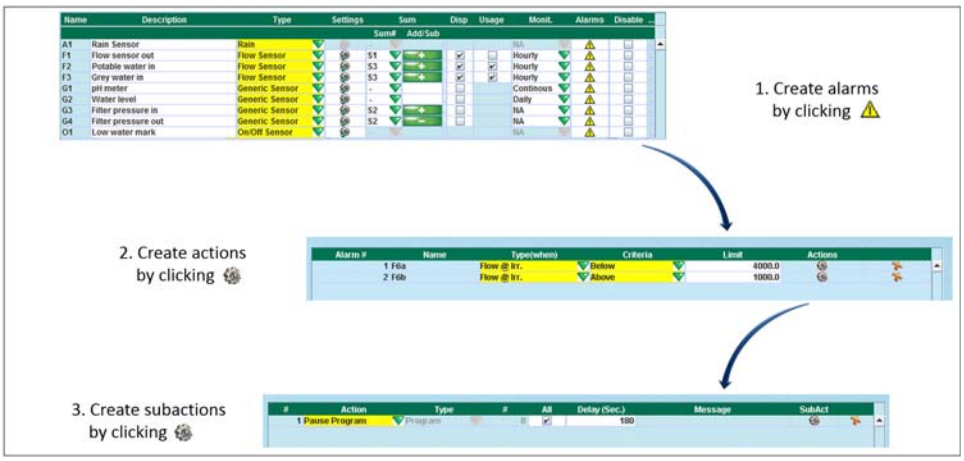


Figure 28: The flow of creating alarms, actions and subactions in Cycle Manager.

Defining Alarms and Actions for a Flow Sensor Decoder

How to do this:

1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Type (When)** dropdown list select *Flow@Irrigation* or *Flow@Non-Irrigation.* Use the *Flow@Irrigation* option to monitor the flow situation during irrigation. Use the *Flow@Non-Irrigation* option to monitor the flow situation when the system is not irrigating. The latter will be useful for discovering leaks in the systems.

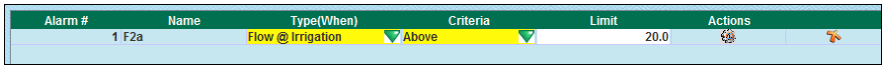
Flow@Irrigation implies that a pump or the master valve are active and that one or more decoders of valve type 1-4 are active.

Flow@Non-Irrigation implies that neither a pump, nor a master valve are active.

The option *Not in Use* may be used to disable an alarm temporarily, if for instance you wish to exclude the alarm from triggering while troubleshooting the alarm setup. The alarm information and any actions and subactions are stored in Cycle Manager and will be available when the alarm is enabled.

Important! An irrigation system may include up to 10 pumps and or master valves. In order for flow alarms to work you must ensure that Pump1/Master valve 1 is defined with an address different from 0. Normally the default address for Pump1/Master valve 1 is 0, but you must change this - either in the field or by using JControl.

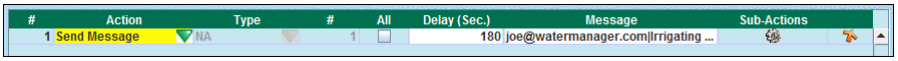
4 In the **Criteria** dropdown menu, select between *Above* and *Below*.



5 In the **Limit** field enter the threshold value in GPM for the alarm.

6 Click **Save**.

7 In the **Actions** column click the **Create/Edit Actions** button to open the **Define Actions** window.



8 Click the **New Action** button.

9 In the **Action** dropdown list select the action this alarm should trigger. For flow sensor alarms all actions may be assigned. For more information turn to **Alarms** on page **74**.

10 In the **Type** dropdown list select the type of action. The available options depends on your selection in the **Action** dropdown. For instance, if you select *Deactivate* or *Activate* from the **Action** dropdown, the **Type** dropdown will allow you to select *Program* or *Decoder* or *Pump*. Turn to table Table 3: **List of available actions and sub-actions in Cycle Manager.** on page 75 for a full list of actions and the device they control.

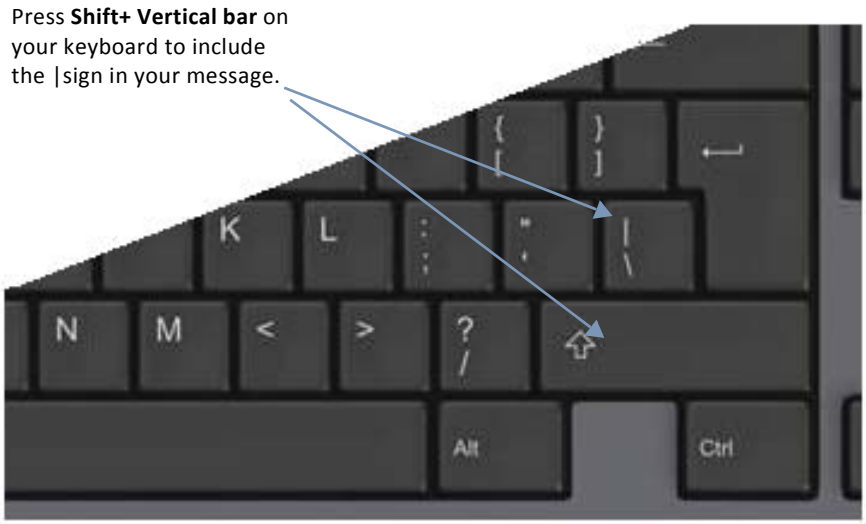
11 Use the **#** field to enter the number of the particular program, decoder or pump. This requires that you selected *Program*, *Decoder* or *Pump* in the **Type** dropdown.

12 Select the **All** checkbox if the action should be performed on all programs, decoders or pumps in the irrigation system.

13 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. If, for instance, a flow alarm is set to 200 GPM with a delay of 300 seconds, then the flow must be above 200 GPM for at least 300 seconds before the alarm triggers. If the flow drops below 200 GPM, say after 200 seconds, the alarm situation is considered as normal again.

Alarms will be registered in monitor data and shown in the display with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders.

14 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

Note that this field is only available if you've selected *Send Message* in the **Action** dropdown.

15 Click the **SubAct** button in case you want to define further actions to the current action. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

16 Click **Save** and then **Back** to exit the **Create Action** window(s).

17 Click **Save** and then **Back** to exit the **Defining Alarms and Actions** window.

Defining Alarms and Actions for a Sum Flow Sensor Decoder

How to do this:

1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Type (when)** dropdown list select between *Not in Use, Sum@Irrigation, Sum@Non-Irrigation*, *MPF(GPM)*, *seuf-Low (%)*, or *SEUF-High(%)*.

Sum@Irrigation will monitor the accumulated flow in GPM during irrigation.

Sum@Non-Irrigation will monitor the accumulated flow in GPM when the system is not irrigating. This will be useful for discovering leaks in the system.

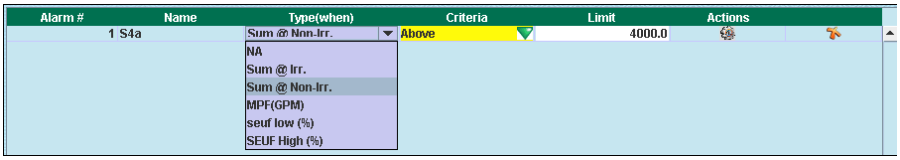
MPF(GPM) will monitor the accumulated flow from the master pump in GPM.

seuf-Low (%) will monitor the accumulated flow. This alarm type uses a % deviation to monitor the flow rather than GPM. The associated action is a 'Seek and Eliminate Unexpected Flow' routine.

SEUF-High(%) will monitor accumulated flow. This alarm type uses a % deviation to monitor the flow rather than GPM. The associated action is a 'Seek and Eliminate Unexpected Flow' routine.

The option *Not in Use* may be used to disable an existing alarm temporarily. The alarm information and any actions and subactions

will still be stored in Cycle Manager and may be available when the alarm is enabled.



4 The **Criteria** field reflects the criteria of the alarm which can either be *Above* or *Below*. For the alarm types *MPF(GPM)*, *seuf-Low (%)* and *SEUF-High(%)* the criteria will be fixed:

MPF(GPM): Below. To indicate that there is too little flow in the system.

seuf-Low (%): Above. To indicate that there is too little flow in the system.

SEUF-High(%): Above. To indicate that there is too much flow in the system.

For the alarm types *Sum@Irrigation* and *Sum@Non-Irrigation* you can select either *Above* or *Below* depending on whether the alarm should monitor values above or below a given threshold.

5 In the **Limit** field enter the threshold value for the alarm. The unit is either GPM or % depending on the alarm type.

For *Sum@Irrigation, Sum@Non-Irrigation* and *MPF(GPM)* the Limit is expressed in GPM.

For *seuf-Low (%)* and *SEUF-High(%)* you use a percentage figure.

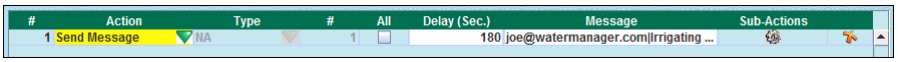
seuf-Low (%)
In this case, the % figure reflects the percentage deviation *below* the expected flow. If for instance the SUM flow is 15 % *below* the expected flow, a SEUF alarm will trigger. The associated action should be a SEUF routine which will perform the check but often this is not desirable as this 'insuficient flow' may be caused by a low pressure due to many valves running simultanously. In the latter case a relevant action is simply an e-mail.

SEUF-High(%)
In this case, the % figure reflects the percentage deviation *above*

the expected flow. If for instance the SUM flow is 5 % above the expected flow, a SEUF alarm will trigger. The associated action should be a SEUF routine that will perform the check.

6 Click **Save**.

7 In the **Actions** column click the **Create/Edit Actions** button to open the **Define Actions** window.



8 Click the **New Action** button.

9 In the **Action** dropdown list select the action this alarm should trigger. For SUM flow sensor alarms all actions may be assigned. For more information turn to **Alarms** on page **74**.

10 In the **Type** dropdown list select the type of action. The available options depends on your selection in the **Action** dropdown. For instance, if you select *Deactive* or *Active* from the **Action** dropdown, the **Type** dropdown will allow you to select *Program*, *Decoder* or *Pump*.

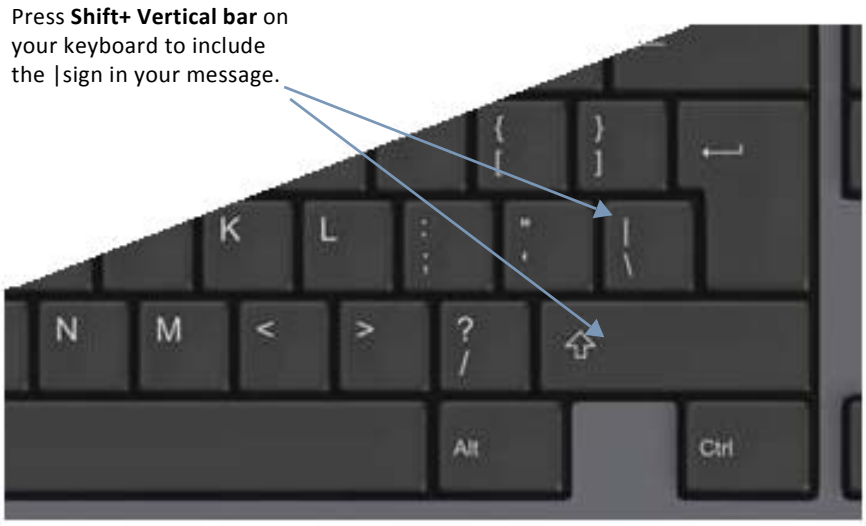
11 Use the **#** field to enter the number of the particular program, decoder or pump. This requires that you selected *Program*, *Decoder* or *Pump* in the **Type** dropdown.

12 Select the **All** checkbox if the action should be performed on all programs, decoders or pumps in the irrigation system.

13 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. If, for instance, a flow alarm is set to 200 GPM with a delay of 300 seconds, then the flow must be above 200 GPM for at least 300 seconds before the alarm triggers. If the flow drops below 200 GPM, say after 200 seconds, the alarm situation is considered as normal again.

Alarms will be registered in monitor data and shown in the display with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders).

14 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

Note that this field is only available if you've selected *Send Message* in the **Action** dropdown.

15 Click the **SubAct** button in case you want to define further actions to the current action. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

16 Click **Save** and then **Back** to exit the **Create Action** window(s).

17 Click **Save** and then **Back** to exit the **Defining Alarms and Actions** window.

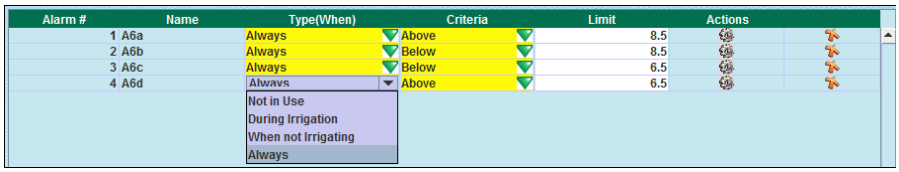
Defining Alarms and Actions for a Generic Sensor Decoder

How to do this:

1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Type** dropdown, select the type of alarm. Options are *During Irrigation*, *When not Irrigating* and *Always*.



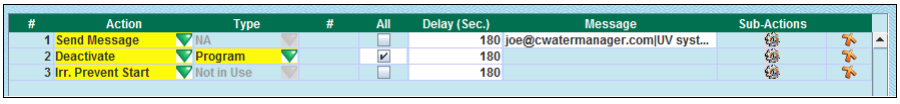
Important! If you set the alarm type to *During Irrigation*, an irrigation system may include up to 10 pumps. In order for flow alarms to work you must ensure that Pump1 is defined with an address different from 0. Normally the default address for Pump1 is 0, but you must change this - either in the field or by using JControl.

4 In the **Criteria** dropdown menu, select between *Above* and *Below*.

5 In the **Limit** field enter the threshold value for the alarm.

6 Click **Save**.

7 In the **Actions** column click the **Create/Edit Actions** button to open the **Define Actions** window.



8 Click the **New Action** button.

9 In the **Action** dropdown list select the action this alarm should trigger. For generic sensor alarms all actions may be assigned. For more information turn to **Alarms** on page **74**.

10 In the **Type** dropdown list select the type of action. The available options depends on your selection in the **Action** dropdown. For instance, if you select *Deactivate* or *Activate* from the **Action** dropdown, the **Type** dropdown will allow you to select *Program* or *Decoder* or *Pump*. Turn to table Table 3: **List of available actions and sub-actions in Cycle Manager.** on page 75 for a full list of actions and the device they control.

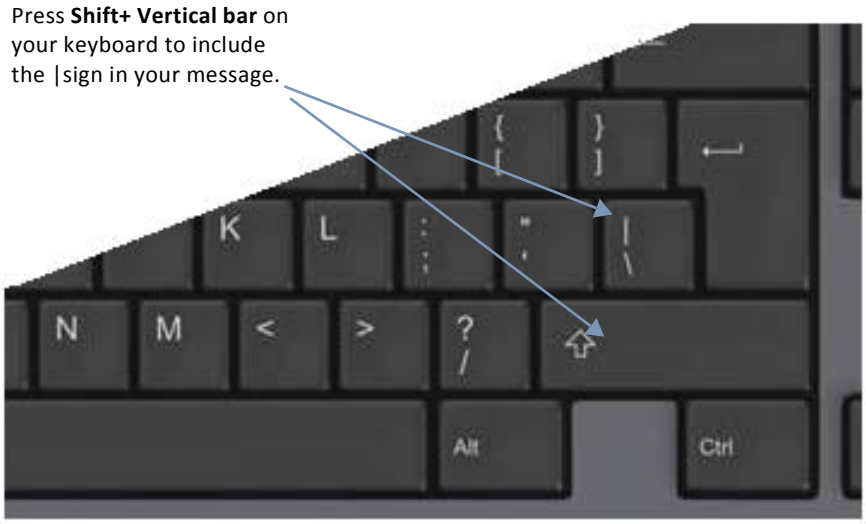
11 Use the **#** field to enter the number of the particular program, decoder or pump. This requires that you selected *Program*, *Decoder* or *Pump* in the **Type** dropdown.

12 Select the **All** checkbox if the action should be performed on all programs, decoders or pumps in the irrigation system.

13 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. If, for instance, a generic alarm is set to 35 °F with a delay of 300 seconds, then the temperature must be below 35 °F for at least 300 seconds before the alarm triggers. If the temperature rises above 35 °F, say after 200 seconds, the alarm situation is considered as normal again.

    Alarms will be registered in monitor data and shown in the display with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders).

14 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

Note that this field is only available if you've selected *Send Message* in the **Action** dropdown.

15 Click the **SubAct** button in case you want to define further actions to the current action. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

16 Click **Save** and then **Back** to exit the **Create Action** window(s).

17 Click **Save** and then **Back** to exit the **Defining Alarms and Actions** window.

Defining Alarms and Actions for an On/Off Sensor Decoder

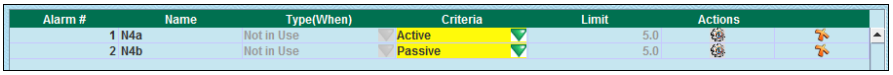
How to do this:

1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Criteria** dropdown menu, select between *Active* and *Passive*.

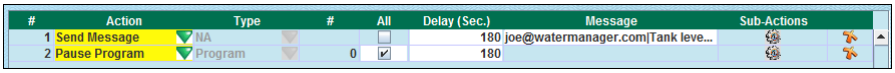
Active refers to the sensor's non-normal state; i.e. if a N/C type is open or N/O is closed. *Passive* is the normal state.



4 All other fields and dropdown lists are not available when creating on-off sensor decoders.

5 Click **Save**.

6 In the **Actions** column, click the **Create/Edit Actions** button to open the **Define Actions** window.



7 Click the **New Action** button.

8 In the **Action** dropdown list select the action this alarm should trigger. For on/off sensor alarms all actions may be assigned. For more information turn to **Alarms** on page **74**.

9 In the **Type** dropdown list select the type of action. The available options depends on your selection in the **Action** dropdown. For instance, if you select *Deactivate* or *Activate* from the **Action** dropdown, the **Type** dropdown will allow you to select *Program* or *Decoder* or *Pump*. Turn to table Table 3: **List of available actions and sub-actions in Cycle Manager.** on page 75 for a full list of actions and the device they control.

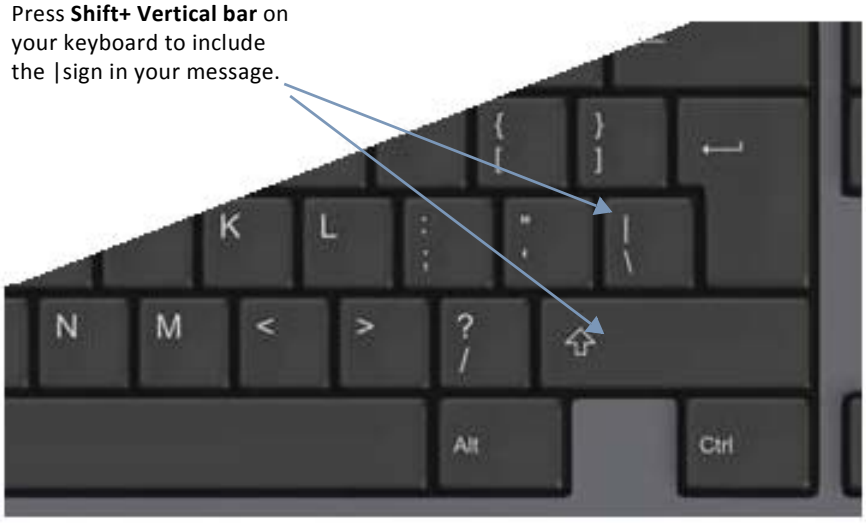
10 Use the **#** field to enter the number of the particular program, decoder or pump. This requires that you selected *Program*, *Decoder* or *Pump* in the **Type** dropdown.

11 Select the **All** checkbox if the action should be performed on all programs, decoders or pumps in the irrigation system.

12 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. If, for instance, an On/Off alarm is set to trigger with a delay of 60 seconds, then the contact must be active for more than 60 seconds before the alarm triggers. If the contact is passive, say after 10 seconds , the alarm situation is considered as normal again.

Alarms will be registered in monitor data and shown in the display with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders).

13 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

Note that this field is only available if you've selected *Send Message* in the **Action** dropdown.

14 Click the **SubAct** button in case you want to define further actions to the current action. The procedure for creating subactions is

identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

15 Click **Save** and then **Back** to exit the **Create Action** window(s).

16 Click **Save** and then **Back** to exit the **Defining Alarms and Actions** window.

Defining Alarms and Actions for Sensors

The alarm and action depends on the sensor type. Note that the only actions and sub-actions that can be defined for a sensor is *Send Message*.

- Defining Alarms and Actions for a Rain Sensor
- Defining Alarms and Actions for an AUX Sensor
- Defining Alarms and Actions for a Short Sensor

Important! When setting up alarms for onboard sensors such as AUX, Short and Rain sensors, note the following important implication: The sensor system, will not discover the current state of an alarm, when the controller system is set in Auto. This means that if a sensor already has a specific state intended to trigger an alarm, the alarm will not be discovered by the sensor system and hence not perform the action assigned. The alarm will still perform the core function; i.e. the rain sensor will prevent irrigation, but not send an email if that was set up in the sensor system. The alarm will only be triggered when the state of the alarm changes. If for instance an alarm is set up to always trigger when the alarm goes passive, then the alarm will not trigger if the state is passive when the controller system is activated.

Defining Alarms and Actions for a Rain Sensor

How to do this:

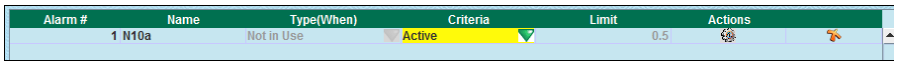
1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Criteria** dropdown list, select between *Active* and *Passive*.

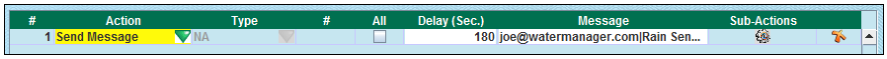
Active: All decoders will stop, but the program currently running will continue. No new programs will be launched during this state. In case the rain alarm changes to *Passive* while the current program is running, decoders will be re-activated at the time indicated by the next step in line.

Passive: Allow start of programs.



4 Click **Save**.

5 In the **Actions** column, click the **Create/Edit Actions** button to open the **Define Actions** window.



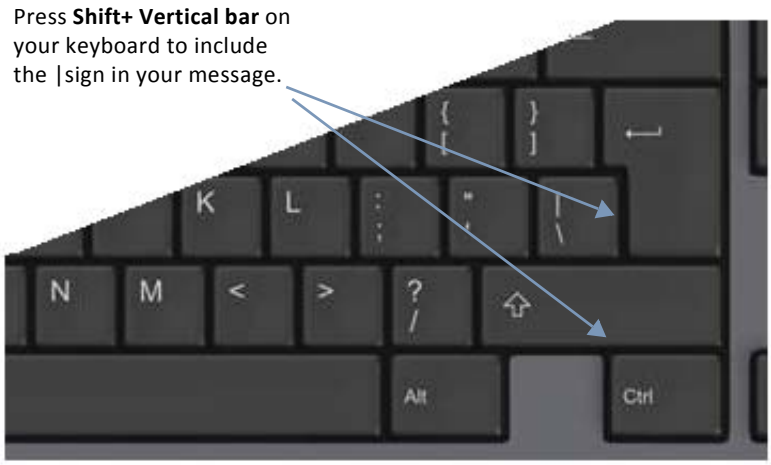
6 Click the **New Action** button.

7 In the **Action** column select the action this alarm should trigger. For rain sensor alarms the only actions to trigger are *Send Message*.

8 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. Note that the only action related to rain sensors is the *distribution of an e-mail*. Thus the delay value determines the time span from when the when an e-mail should be sent, in case a rain alarm is triggered.

Alarms will be registered in monitor data and shown in the display with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders).

9 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

10 Click the **SubAct** button in case you want to define further actions. For rain sensor alarms the only subactions to trigger are *Send Message*. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

11 Click **Save** and then **Back** to exit the **Define Actions** window(s).

12 Click **Save** and then **Back** to exit the **Define Alarms and Actions** window.

Defining Alarms and Actions for an AUX Sensor

How to do this:

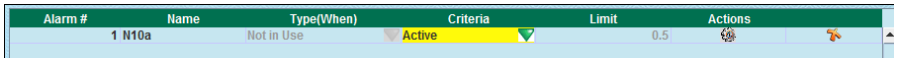
1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Criteria** dropdown list, select between *Active* and *Passive*.

Active: All decoders will stop, but the program currently running will continue. No new programs will be launched during this state. In case the rain alarm changes to *Passive* while the current program is running, decoders will be re-activated at the time indicated by the next step in line.

Passive: Allow start of programs.



4 Click **Save**.

5 In the **Actions** column, click the **Create/Edit Actions** button to open the **Define Actions** window.

6 Click the **Define a New Action** button.

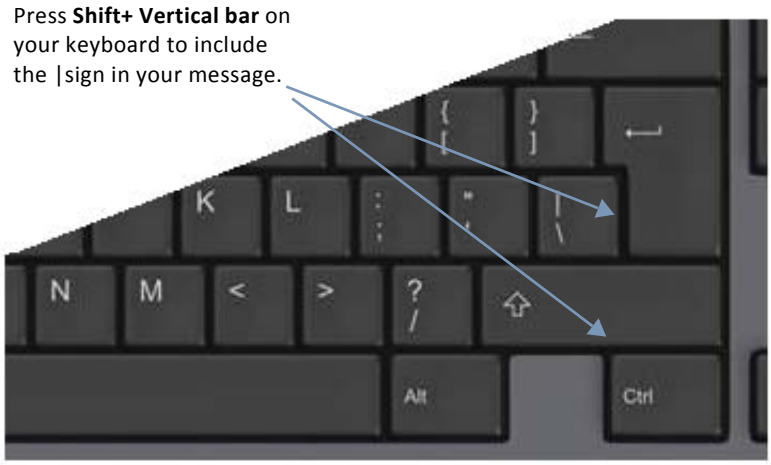
7 In the **Action** column select the action this alarm should trigger. For AUX sensor alarms the only actions to trigger are *Send Message*.

8 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. If, for instance, an AUX alarm (controlling a physical pump connected to the controller) is set to trigger with a delay of 300 seconds, then the AUX input must be active for more than 300 seconds before the alarm triggers. If the AUX input is passive, say after 200 seconds, the alarm situation is considered as normarlized.

Alarms will be registered in monitor data and shown in the display

with a delay value corresponding to the action with the lowest delay (in case the alarm has multiple actions attached). If there are no actions attached, the delay will be either 1,5 minute (in case the system has from 1 to 4 decoders) or 3 minutes (in systems with more than 4 decoders).

9 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

10 Click the **SubAct** button in case you want to define further actions. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

11 Click **Save** and then **Back** to exit the **Define Actions** window(s).

12 Click **Save** and then **Back** to exit the **Define Alarms and Actions** window.

Defining Alarms and Actions for a Short Sensor

How to do this:

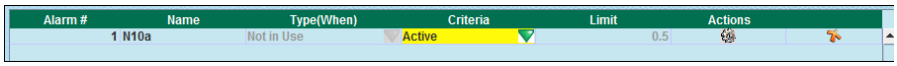
1 Click the **Alarms** button to open the **Defining Alarms and Actions** window.

2 Click the **New Alarm** button.

3 In the **Criteria** dropdown list, select between *Active* and *Passive*.

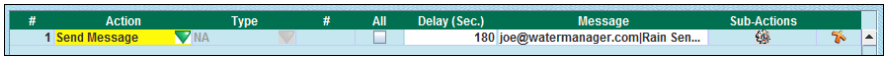
Active: All decoders will stop, but the program currently running will continue. No new programs will be launched during this state. In case the rain alarm changes to *Passive* while the current program is running, decoders will be re-activated at the time indicated by the next step in line.

Passive: Allow start of programs.



4 Click **Save**.

5 In the **Actions** column, click the **Create/Edit Actions** button to open the **Define Actions** window.

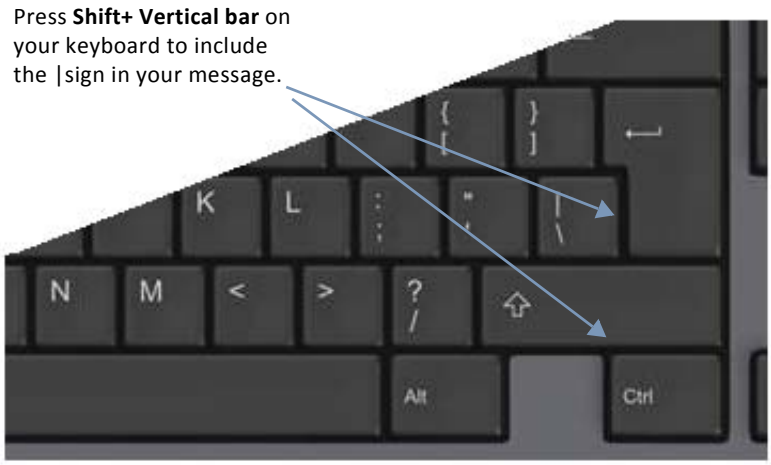


6 Click the **New Action** button.

7 In the **Action** column select the action this alarm should trigger. For short sensor alarms the only actions to trigger are *Send Message*.

8 In the **Delay (Sec)** column enter a delay value for the action. In other words, the delay value is the *time span* in which the criteria of the alarm must be fulfilled for the alarm to trigger. We recommend you set the delay to the lowest possible value, i.e. 30 seconds so that personel are alerted as soon as possible in case of a short.

9 In the **Message** field type the message and the recipient of the message. Use the following format: recipient@domain.com|text.



Only one recipient can be entered. It is not allowed to use the semi-colon sign in messages (;). Up to 160 characters are available for the e-mail-address *and* the message text. Any text beyond this limit will not be transmitted.

10 Click the **SubAct** button in case you want to define further actions. The procedure for creating subactions is identical to creating actions. For more information turn to **Data Limitations of the Sensor Decoder System** on page **81**.

11 Click **Save** and then **Back** to exit the **Define Actions** window(s).

12 Click **Save** and then **Back** to exit the **Define Alarms and Actions** window.

Disabling Sensors and Sensor Decoders

Use the **Disable** check box to disable/enable a sensor decoder. Disabling a sensor decoder temporarily is useful if for instance a physical sensor is defect and you need to install a new one in the field. Cycle Manager will store the alarm setup for the sensor and you may subsequently synchronize data one the new sensor has been installled.

Another scenario for enabling/disabling sensors is when the same sensor has two different setups for two different purposes. Then you define the two sensors in Cycle Manager with the same address and different alarm setup and then enable/disable them depending on the operation needed.

Important! Note that only enabled sensors are converted and sent to the controller during a synchronization. Remember to synchronize data in case you have enabled/disabled sensors or sensor decoders.

Greywater Recycle System - A real-life Example

To illustrate the concept of sensor decoders and give you an idea of the interelation between alarms, actions and subactions, please study this section.

The figure below depicts a greywater system set up with 2-wire decoders and sensor decoders. The system is connected to an irrigation facility.

The overall purpose of this system is to 1) re-use greywater for irrigation; 2) ensure that the quality of the greywater is OK; and 3) case it is not - take the neccessary actions to ensure that the greywater is not used - or that staff is alarted in case of irregularities. A UV system will make sure to balance the water in case of too high or too low pH values. Another part of the system will ensure to empty the tank in case the greywater is not suited for irrigation.

For a detailed description of each sensor decoder, see the table next page.

The flowchart of the sensor decoder system; its alarms, actions and subactions is described in the section Greywater System Flowchart.

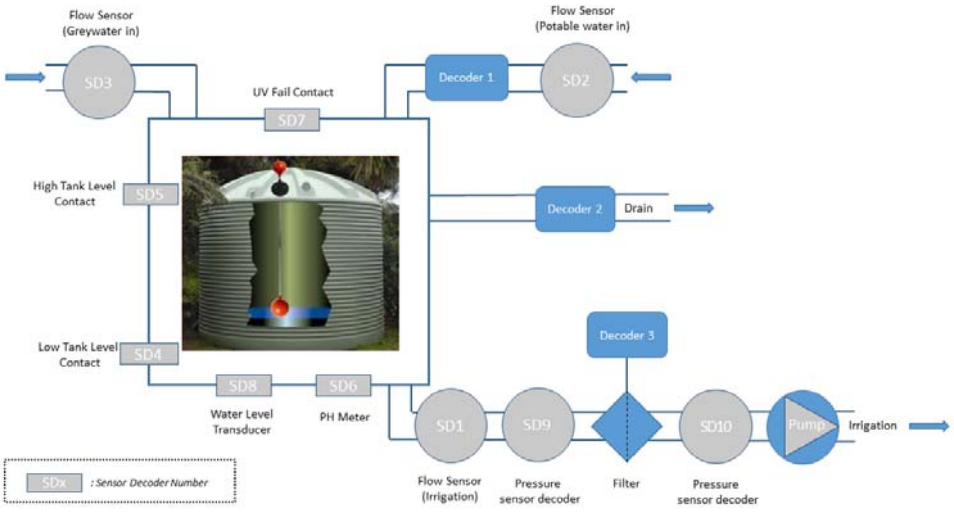


Figure 29: Greywater recycle system.

Presenting the Sensor Decoders and 2-wire Decoders

SD1	A *flow sensor* monitoring and controlling the flow of water from the tank, used for irrigation. This sensor is part of the irrigation system.
SD2	A *flow sensor* monitoring the influx of potable water into the tank. The influx is initiated by Decoder 1 when the sensor decoder system determines that the use of greywater is not possible due to either too high or low pH values (SD6) or the tank level is too low (SD4).
SD3	A *flow sensor* monitoring the amount of greywater flowing into the tank.
SD4	A *low tank level contact* inside the tank measuring the tank level. If the level is too low, irrigation will stop.
SD5	A *high tank level contact* inside the tank measuring the tank level. In case the level is too high, Decoder 2 will open the drain for 5 minutes.
SD6	A *pH meter* measuring the pH level in the water. If pH values are either too high or low, the water in the tank is not suitable for irrigation, irrigation will stop.
SD7	An *UV fail* contact monitoring the operation and functionality of the UV meter. If, for instance, the UV lamp is broken, staff will be alerted.
SD8	A *water level transducer* monitoring the water level in the tank on an ongoing basis. The function of this sensor decoder is comparable to SD4 and SD5. If the level is too low, Decoder 1 will initiate the influx of potable water.
SD9	A pressure sensor decoder measuring the water pressure before the filter.
SD10	A pressure sensor decoder measuring the water pressure after the filter.

Decoder 1	This decoder initiates the influx of potable water into the tank.
Decoder 2	This decoder initiates the drain in case the tank must be flushed empty, i.e. the water is not qualified for irrigation.
Decoder 3	This decoder initiates the flushing of the filter.
Pump	This pump is part of the irrigation system.

Greywater System Flowchart

The purpose of the Greywater System Flowchart is to illustrate how alarms of the sensor decoders will trigger the neccesary actions and subactions so the system is running smoothly - and ensure that the operation of the system is at all times under control.

In other words, the sensor decoder setup will: 1) make sure that irrigation takes place when there no alarms and the situation is normal; 2) manage the correction of the system in case of irregularities such as defects, wrong flow levels and water with damaging pH values.

Actions and subactions include:

- *sending messages*
- *pausing irrigation*
- *resuming programs*
- *irrigating*

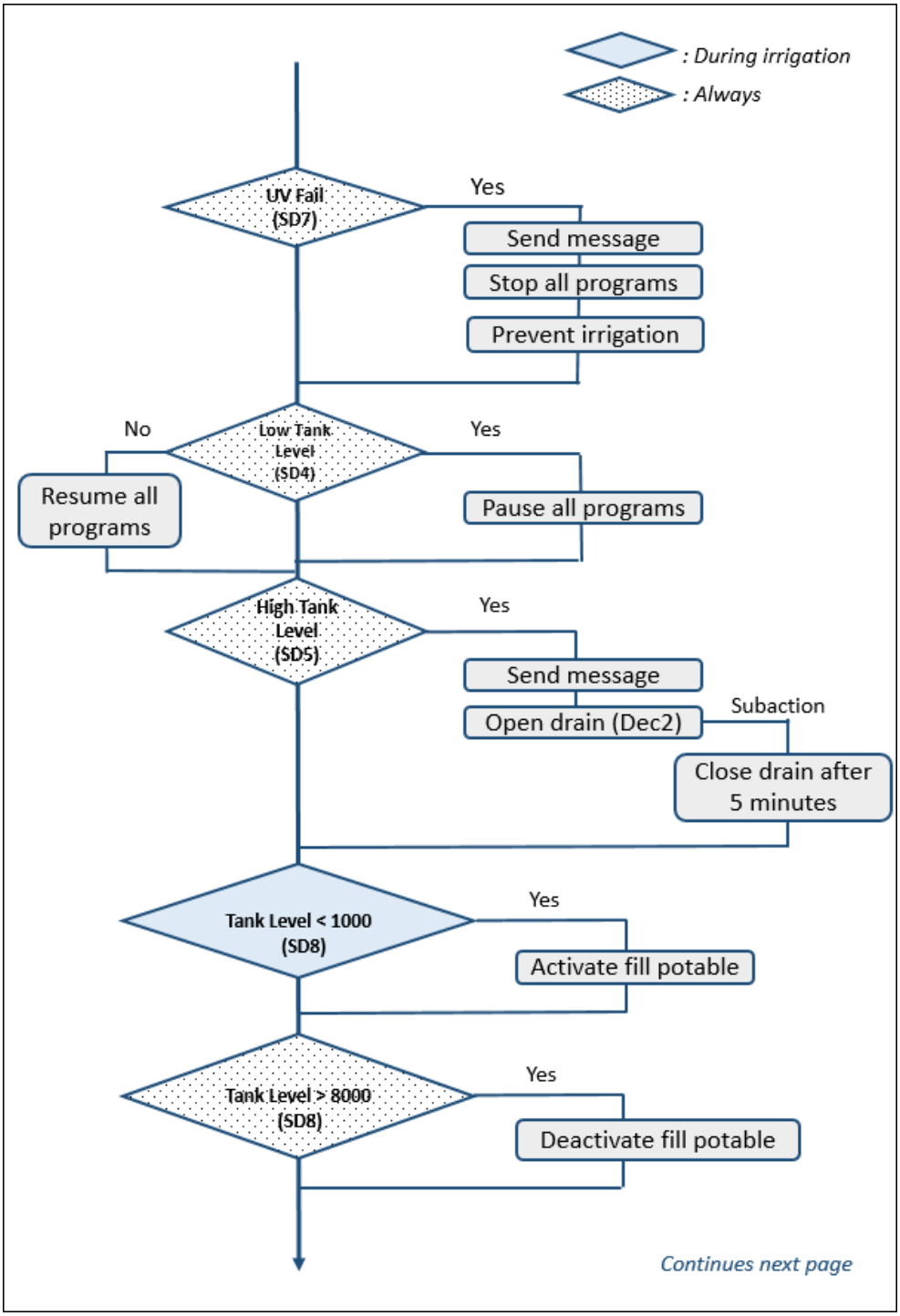


Figure 30: Greywater system flowchart (Part 1).

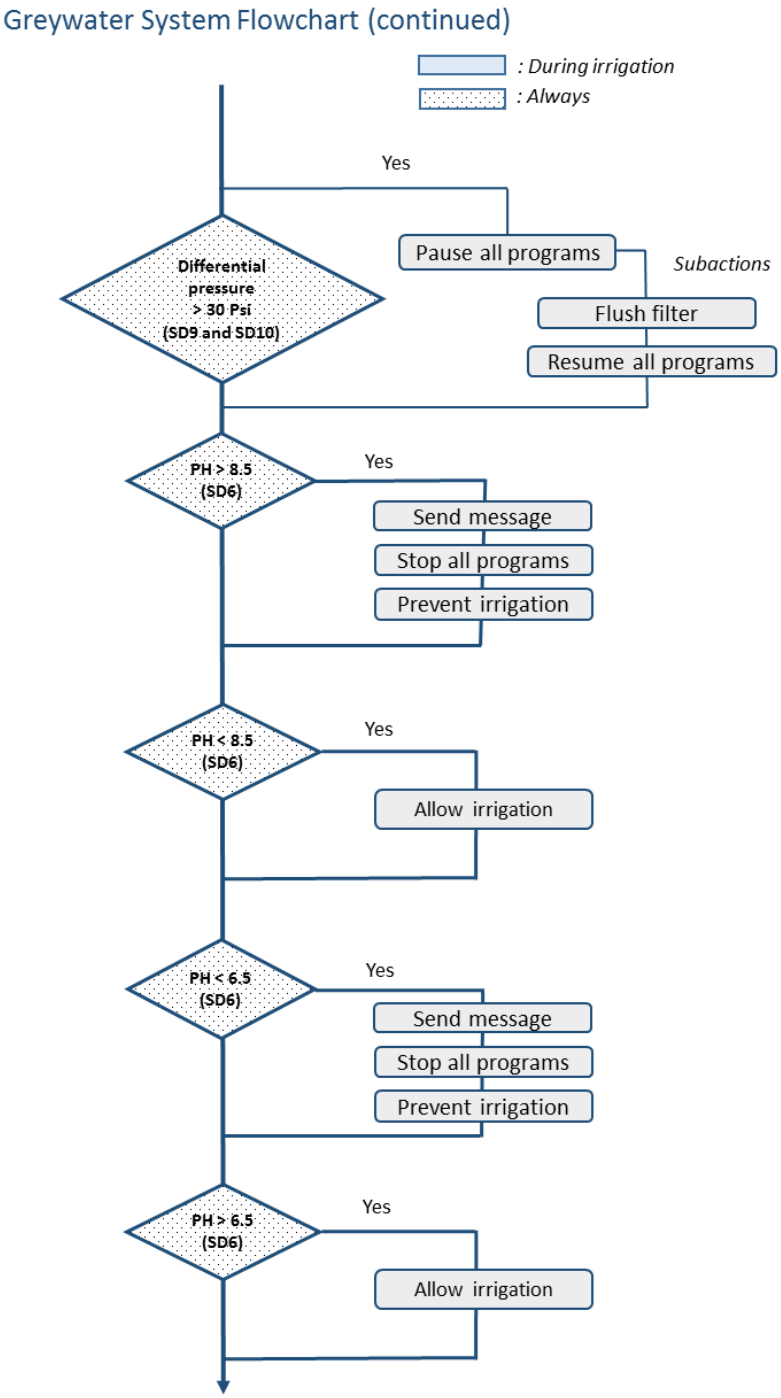


Figure 31: Greywater system flowchart (Part 2).

Configuring the Greywater Sensor Setup in Cycle Manager

The following sections will take you through the configuration of the alarms, actions and sub-actions of each sensor decoder in the Greywater system.

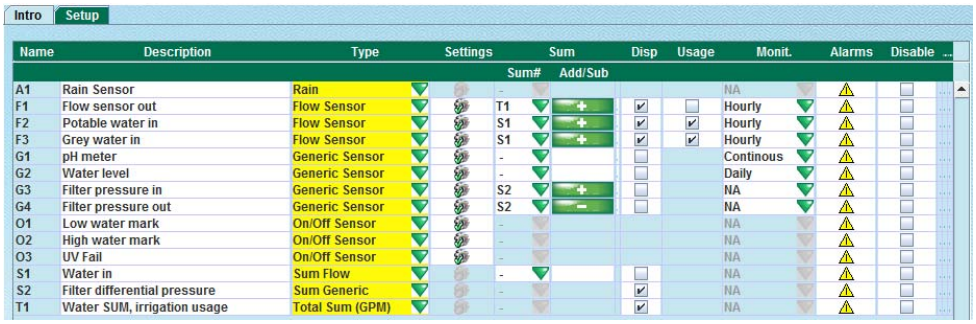


Figure 32: Overview of the sensor decoders in the Greywater system.

Configuring the UV Fail Sensor Decoder

The illustration below shows how the UV Fail sensor decoder is set up with 1 alarm and 3 actions to be performed in case the UV on/off sensor fails, e.g. if the UV lamp is not working:

- Staff will be alerted.
- The current program will stop.
- New programs will not be launched.

Each action has a delay of 180 seconds

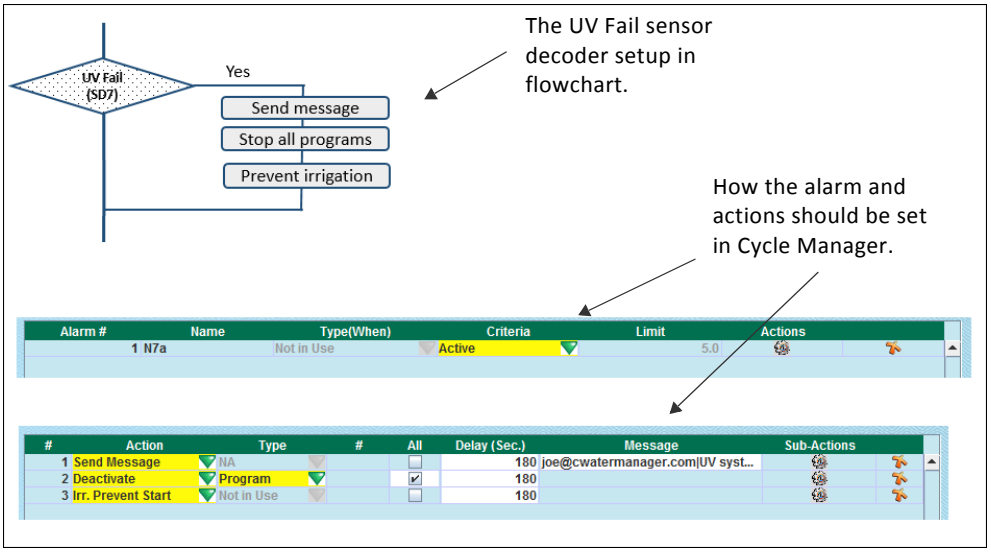


Figure 33: The alarm and actions of the UV Fail sensor decoder.

Configuring the Low Tank Level Contact

The illustration below shows how the Low Tank Contact is set up with two alarms that will trigger in case the tank level is either OK or too low during irrigation.

- If the level is too low, all programs will be stopped after 180 seconds.
- If the level is not to low, all programs will resume after 180 seconds.

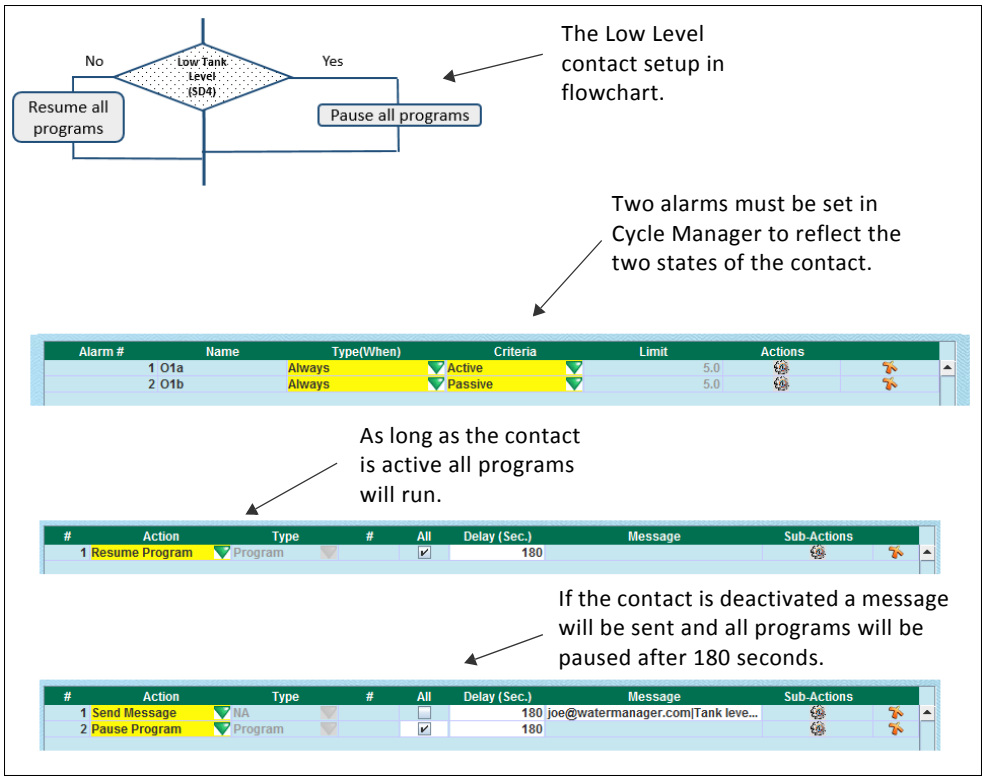


Figure 34: The alarm and actions of the Low Tank Contact.

Monitoring the High Tank Contact

The illustration below shows how the High Tank Contact is set up with 1 alarm and associated actions and sub-actions

- In case the level is too high, a message will be sent and Decoder 2 will open the drain for 5 minutes.

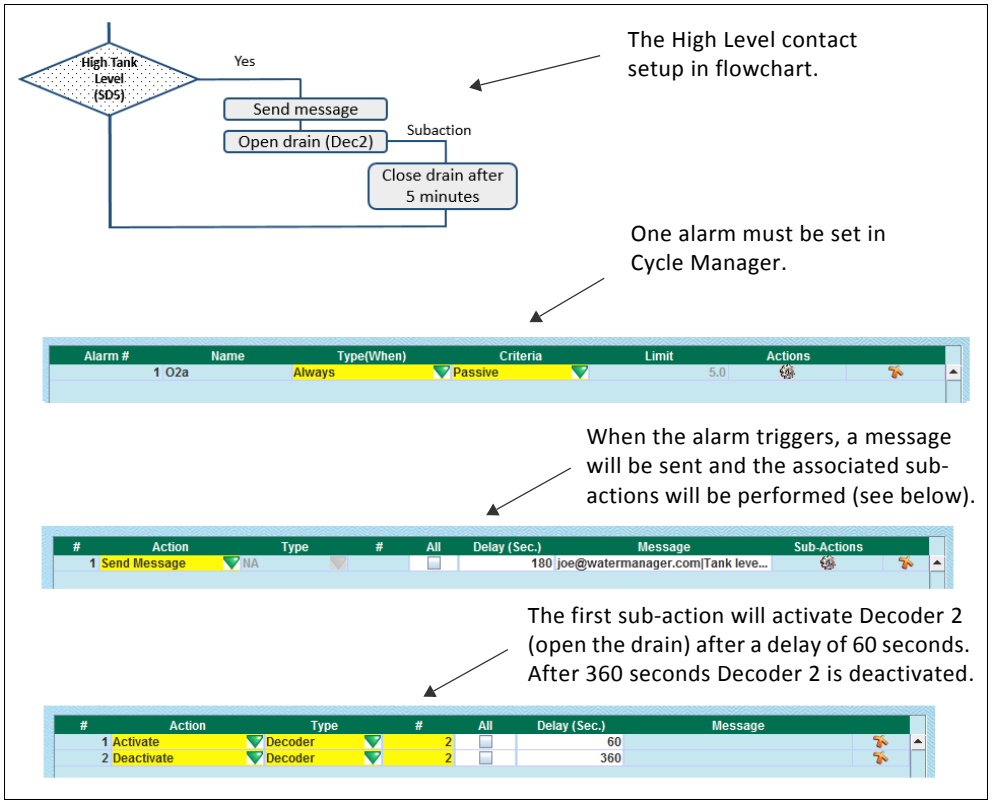


Figure 35: The alarm and actions of the High Tank Contact.

Monitoring the Overall Tank Level

The illustration below shows how the Water level transducer is set up with 2 alarms and associated actions.

- In case the water level is below 1000, a refill of potable water will be initiated after a delay of 180 seconds.
- In case the water level reaches 8000, the influx of potable water will will be stopped after a delay of 180 seconds.

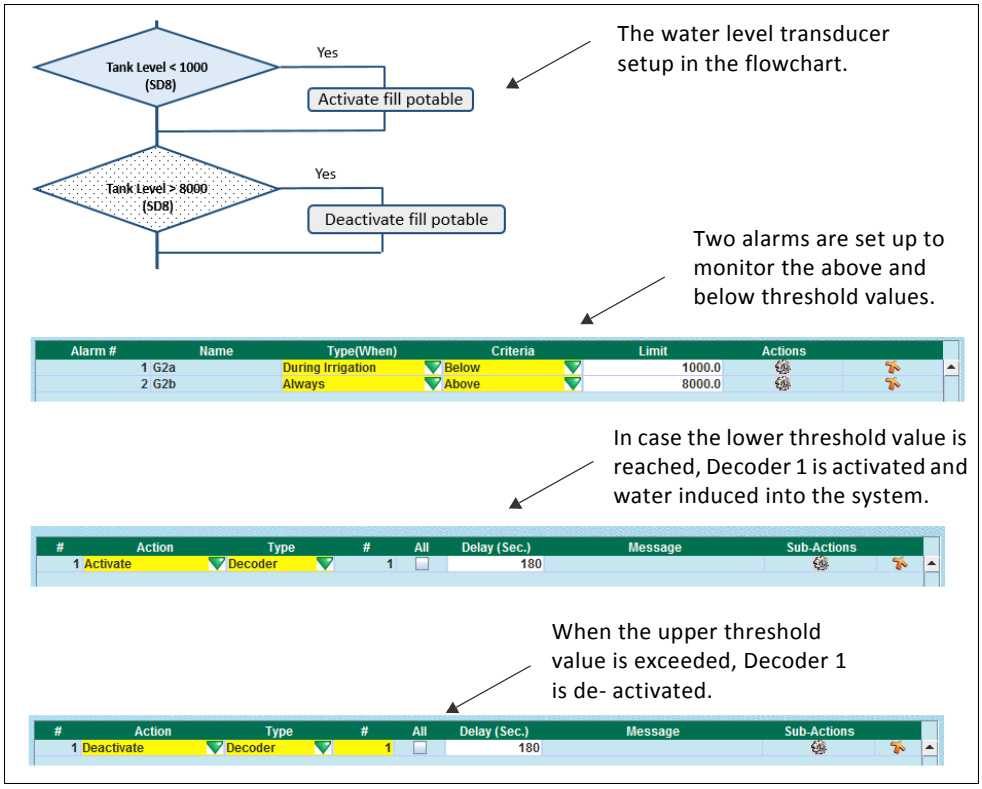


Figure 36: The alarm and actions of the water level transducer.

Monitoring the pH Values

The flow chart and the illustration on the next pages show how the pH meter is set up with 4 alarms and associated actions to monitor and respond to the pH values as they are continuously measured by the pH meter.

- When the pH level is above 8.5, a message will be sent, all programs are stopped and irrigation prevented.
- When the pH level is below 8.5, all programs will run.
- When the pH level is below 6.5, a message will be sent, all programs are stopped and irrigation prevented.
- When the pH level is above 6.5, all programs will run.

  Thus, irrigation is allowed when the pH values are between 6.5 and 8.5.

  All actions have a delay of 180 seconds.

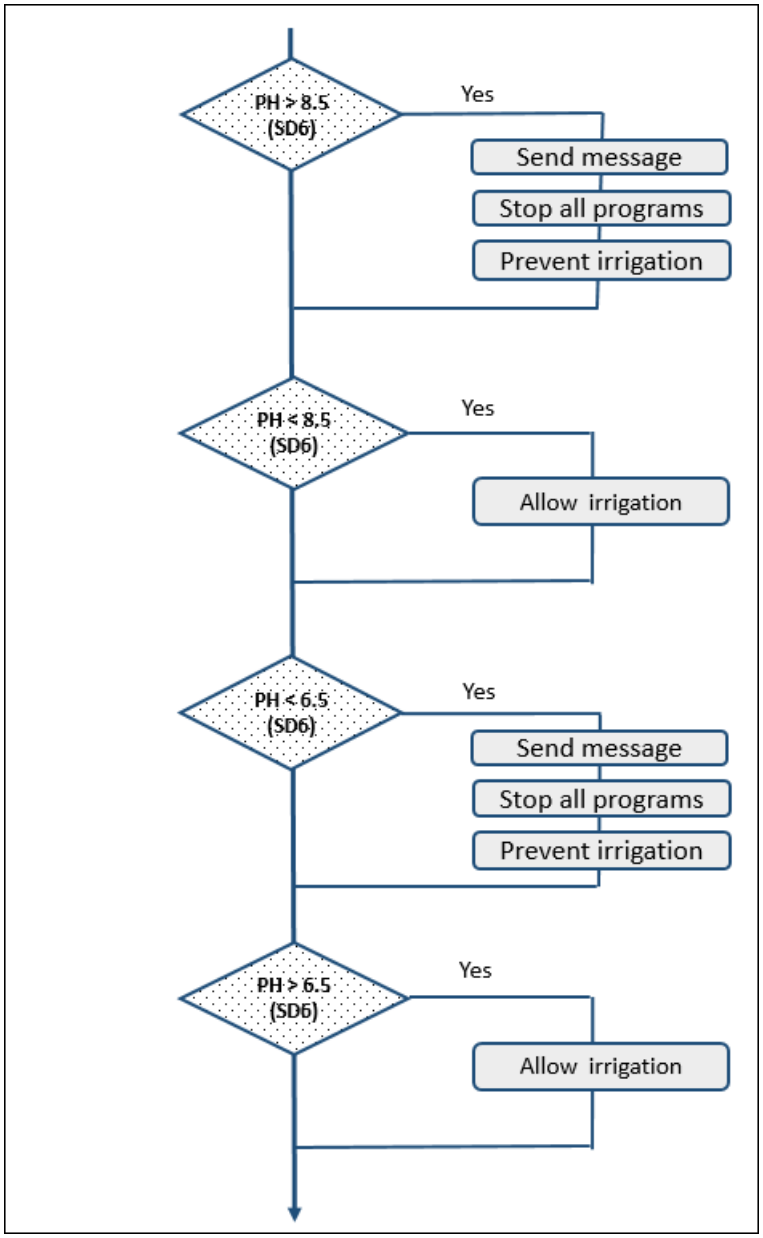


Figure 37: The pH Meter alarms and actions in the flowchart.

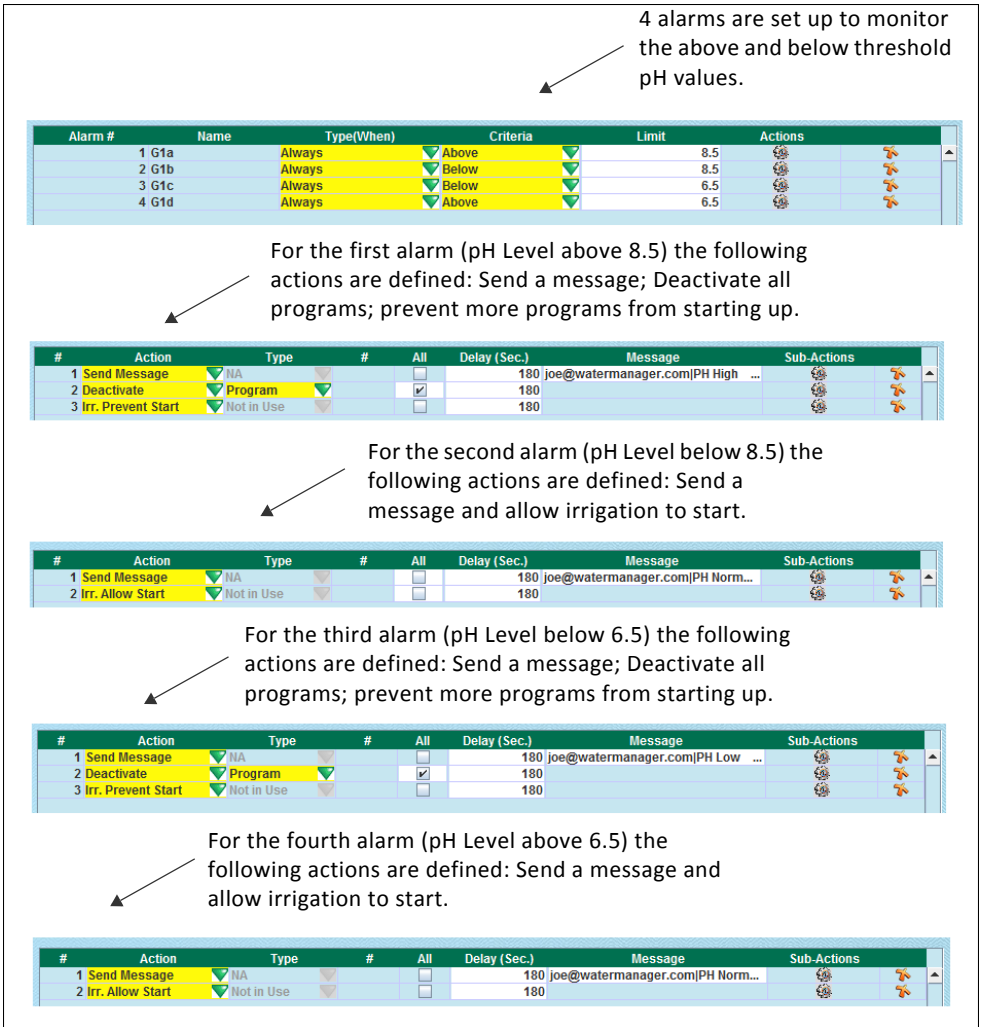
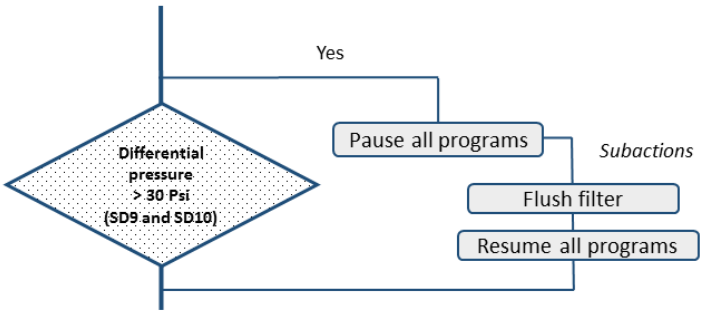
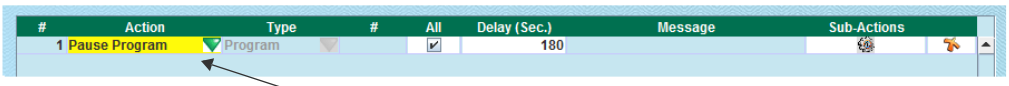


Figure 38: The alarm and actions of the pH meter in Cycle Manager.

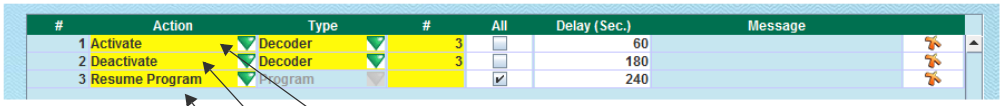
Monitoring the Pressure Values

The flow chart and the illustration on the next pages show how the differential pressure over the filter is measured by two pressure sensor decoders that are placed before and after the filter. If the difference in water pressure rises over a preset value, it indicates that the filter is clogged and must be cleansed. This can be done by an action that initiate flushing the system.





For the alarm (differential pressure above 30 Psi) the following actions are defined: Pause all programs.



The first sub-action is: Activate Decoder 3 after 60 seconds. This will initiate the flushing of the filter.

The second sub-action is: Deactivate the decoder after 180 seconds.

The third sub-action is: Resume all programs after 240 seconds.

Chapter 6:
Managing Weather Stations

In this chapter:

- Adding New Controllers to the Weather Station
- The Weather Station Pane – At a Glance
- The Controller Pane – At a Glance

Choosing a weather station in the opening window brings you to the weather station **INTELLISET** window, which is the main area for monitoring and managing the exchange of weather data between the weather station and the controller.

In the weather station **INTELLISET** window you may:

- Specify *when* the server will collect data from the weather stations.
- Specify *when* the server will distribute data to the irrigation system.
- *Add* or *remove* controllers for remote management.
- *Adjust* ET values to compensate for varying geographical conditions.
- *Adjust* the water budget.
- *Enable* and *disable* the transmission of rain alarms from the weather station to the controller.

Note: INTELLISET is short for *Intelligent Setting of Evaporation Transpiration*.

The weather station **INTELLISET** window is divided into the **Weather Station** pane and the **Controller** pane.

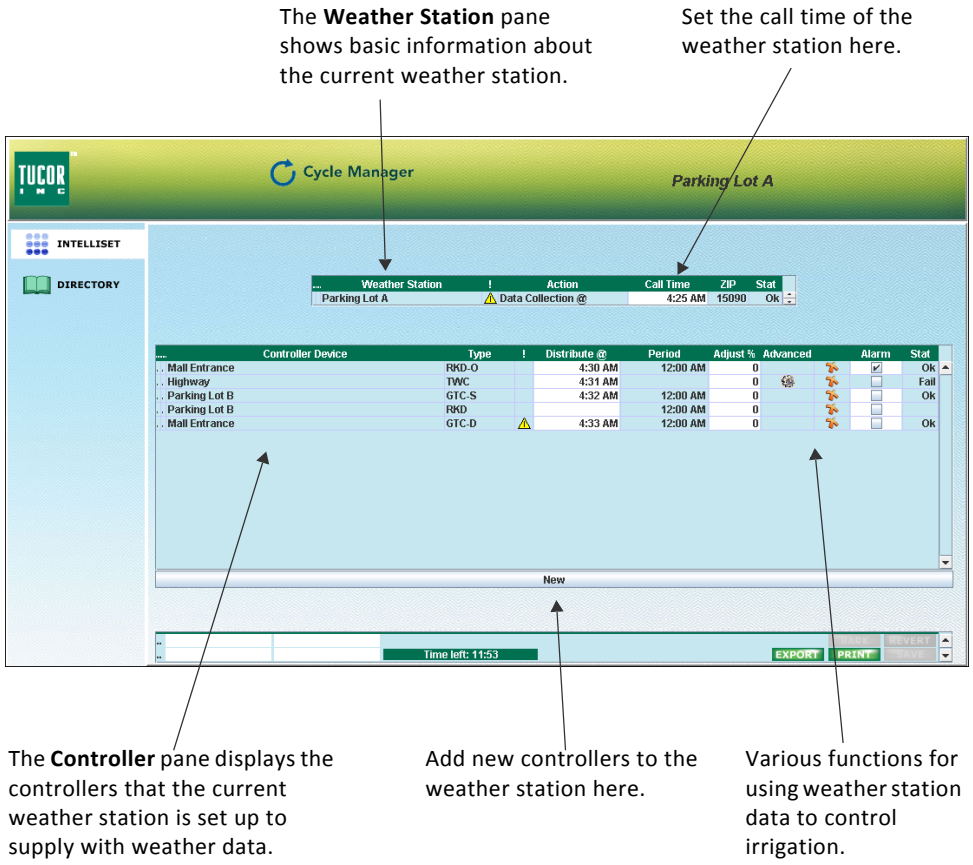


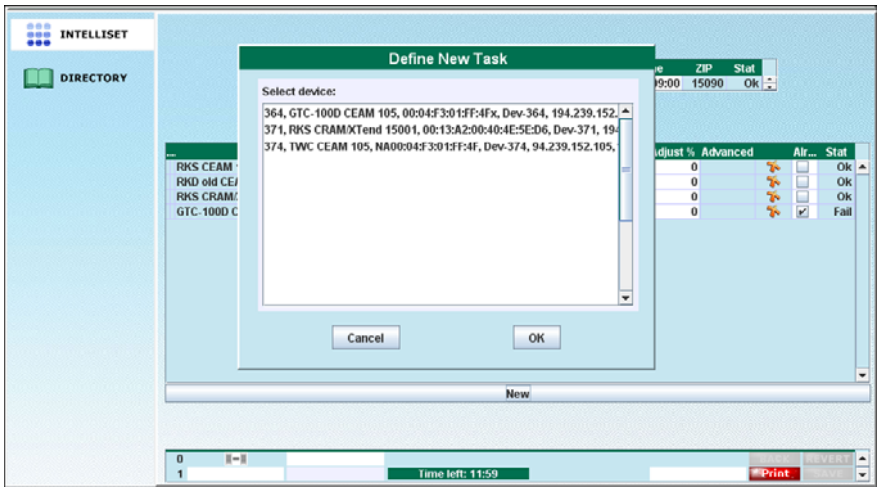
Figure 39: The weather station **INTELLISET** window.

Adding New Controllers to the Weather Station

The weather station **INTELLISET** window allows you to add new controllers.

How to do this:

1 Click the **New** button to open the **Define New Task** window.



2 Select the controller, and click **OK**. The controller is added to the **Controller** pane. You can only add one controller at a time.

Note that the listed controllers are defined by Tucor at the customer's request.

The Weather Station Pane – At a Glance

The **Weather Station** pane shows basic information about the current weather station, and allows you to:

- set the call time for the weather data, i.e. the time of day the server should retrieve data from the weather station.
- verify that the weather station is in the correct time zone.
- monitor the connection status.

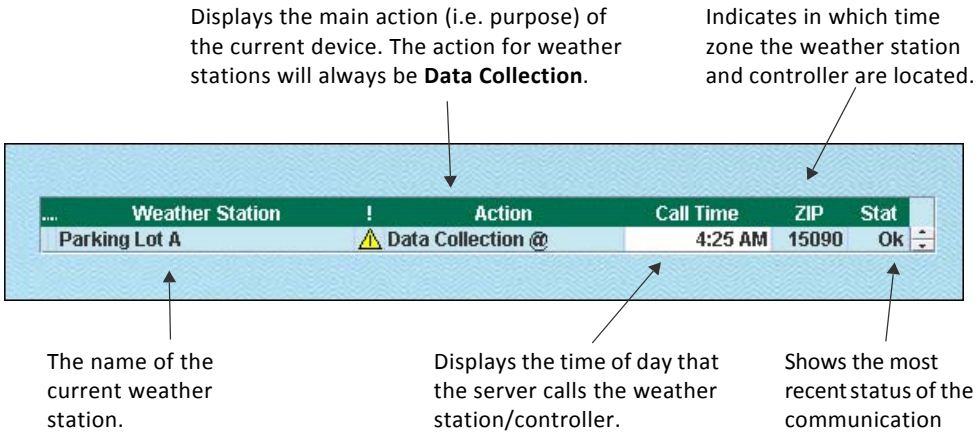


Figure 40: Contents of the **Weather Station** pane.

Setting the Call Time

This **Call Time** relates to the time set in the **Distribute** field for the controller. When entering distribution times it is highly recommended that you enter a minimum of 15 minutes between the call time and the distribution time. The distribution time should *always* be after the call time. See also For more information turn to **Adjusting the Distribution Time** on page **124**.

How to do this:

1 Place the mouse cursor in the **Call Time** field.

2 Use the *Up* and *Down* arrow keys on your keyboard to adjust the time, or assign the number by placing the cursor directly in the field and typing the number.

3 Press **Enter** to save any changes.

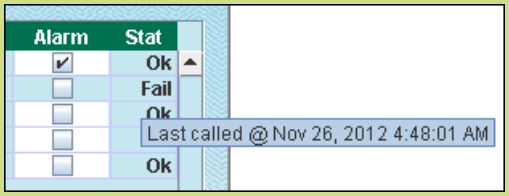
Interpreting Status Information

The **Stat** field shows the current status of the communication.

Options are:

- **Run** – Data is currently being retrieved from the weather station.
- **OK** – The last collection of weather data was successful.
- **Fail** – The connection to the weather station was not available.

HINT! Hover the mouse over the **Stat** field to get more detailed information about the recent transfer.



Verifying the Time Zone (For Tucor Administrators Only)

Use the **Zip** field to verify in which time zone the weather station and controller are located.

Important! The system expects that weather stations and controllers are located in the same time zone.

The Controller Pane – At a Glance

The **Controller** pane displays the controllers that the current weather station is set up to supply with weather data.

The **Controller** pane enables you to:

- adjust the distribution time.
- adjust the irrigation period.
- adjust ET values.
- adjust the water budget.
- activate/deactivate rain alarms.

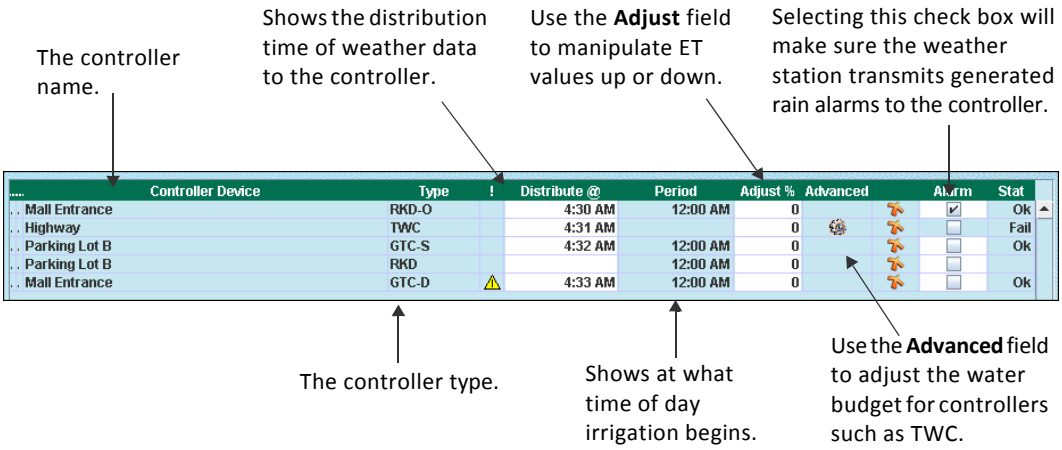


Figure 41: The **Controller** pane.

Adjusting the Distribution Time

How to do this:

1 Place the curser in the **Distribute** field.

2 Use the *Up* and *Down* arrow keys on your keyboard to adjust the time, or assign the number by placing the cursor directly in the field and typing the number.

3 Press **Enter** to save your changes.

This field relates to the time set in the **Call time** field for the weather station. When entering distribution times it is highly recommended that you enter a minimum of 15 minutes between the call time and the distribution time. The distribution time should *always* be after the call time.

Adjusting the ET Values

Use the **Adjust** field to manipulate ET values percentage-wise up or down. This may be relevant if your system spans a large area, and varying conditions are likely to influence ET values.

If, for instance, a controller maintains a sunny area you can choose to add 20% to the ET values received to compensate for faster evaporation in that area, thus making sure that irrigation is adjusted accordingly.

As a rule of thumb, +% will cause the controller to irrigate longer; –% will shorten the run times.

How to do this:

1 Place the curser in the **Adjust** field.

2 Type in the new percentage figure. Use a minus percentage (e.g. –10%) to adjust ET values down.

3 Press **Enter** to save your changes.

Important! For non-web-based TWC-controllers, all parameters must be set manually. For TWI and AIC controllers all parameters, except for the *Rain correction* values, are retreived from Cycle Manager.

Adjusting the Water Budget

TWC controllers do not contain the desired functionality to receive ET values and rain values, which means that they are not able to adjust the water budget prior to irrigation. However, the server recreates the necessary functionality in Cycle Manager, thereby enabling controllers to work with adjusted water budgets.

So instead of the controller handling the calculation, Cycle Manager performs the required math, based on ET values and rain values retrieved from the weather station. The result is communicated to the controller which will then run the programs based on the result. More precisely, Cycle Manager communicates to the controller whether the irrigation should be prolonged or shortened to make up for any changes in the water budget.

The water budget is calculated from the following formula:

$$Water\ budget = \frac{\text{ET Balance}}{\text{Base ET}} \text{ x } 100$$

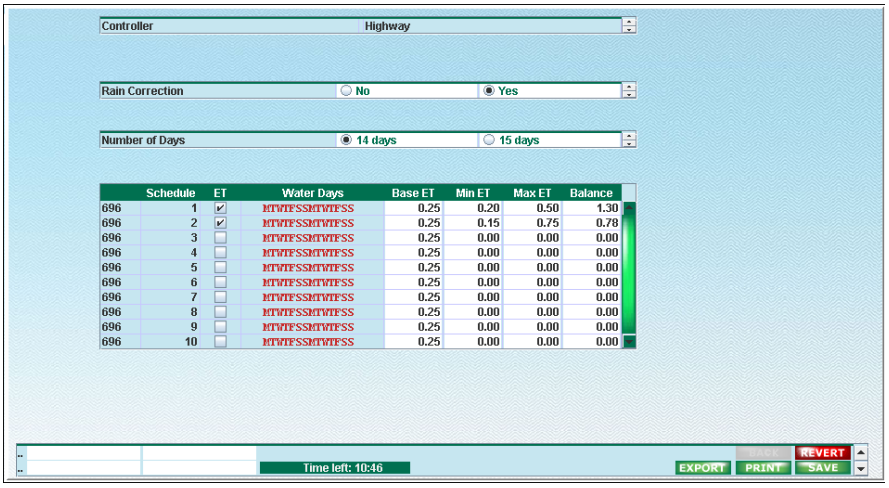
A calculated water budget below 100% will result in less water distributed than the program dictates (irrigation steps will be shortened). A calculated water budget above 100% will result in longer irrigation cycles. For instance, if the water budget is determined as 200%, irrigation times will be doubled. If the budget is 50%, irrigation times will be halved. In this way, ET values and rain values may be used to control the actual needs for irrigation.

Another example – if the programs are designed to apply 0.30" at 100%, then if the generated ET is 0.20", the water budget will be set at 67%. That is, 0.20/0.30.

How to do this:

1 To access water budget adjustment, click **Advanced** in the **Controller** pane. The **Advanced** window is displayed.

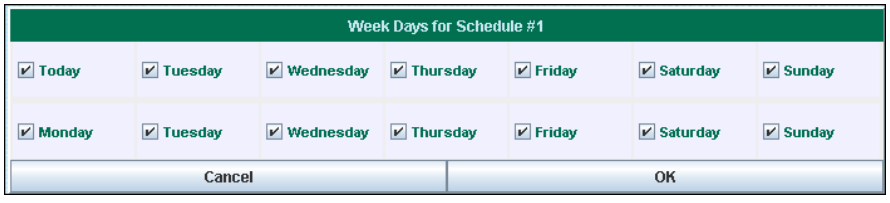
2 First you must indicate whether the collected rain value should be included as part of the water budget adjustment or not. Click **Yes** to include the rain value in the calculation, click **No** to exclude it.



3 Next, select the water day period in the **Number of Days** field. Many sites work with a 14 day period, but for those sites that irrigate in 3 days interval, it may be desirable to implement a 15 day water period. Note how the selected period is reflected in the **Water Days** field in the **Water Budget** grid.

4 In the grid at the bottom of this dialog you see the 10 available irrigation programs defined in the controller. Use the **ET** field to activate/deactivate water budget adjustment for a particular program. A checkmark indicates that the current program will be subject to water budget adjustment based on the ET values received.

5 The **Water Days** column displays the water days period. Each day of the week is represented by its initial letter. To exclude and include water days, click the mouse somewhere in the **Water Days** field, and select/deselect the desired days in the dialog box.



Important! The settings in the **Number of Days** and **Water Days** fields, must be identical to the same settings in the controller. If not, the system will not perform as expected.

6 The **Base ET** field displays the ET base setting, which is by default 0.25" for controllers. The ET Base corresponds to a water budget of 100%.

7 In the **Min ET** field set a minimum value to ensure your irrigation system does not irrigate too little water. If the calculated ET Balance turns out to be below the Min ET value, the water budget will be set to 0%, thus preventing inefficient irrigation. The server will then save the ET value, so that non-irrigated water will be used on the next calculated ET.

8 Use the **Max ET** to prevent your system from providing too much irrigation. If the ET Balance turns out to be *above* the Max ET value, the Max ET will be used to calculate the water budget, and the excessive ET will remain in the balance for the next irrigation period.

9 The **Balance** field holds the adjusted ET data, i.e. the adjusted water budget. If you have set the **Rain Correction** option to *Yes*, the calculation will also include the rain value which will then be subtracted.

Note: Minimum and Maximum ET.
Cycle Manager allows you to use minimum and maximum ET values to limit the adjustment.

If you set the **Max ET** and/or **Min ET** values to the default 0.00 value, it implies that they are not used for adjusting the water budget. In other words you should keep the default values if you have neither upper nor lower limits for your irrigation.

If the generated water budget is 0%, the current program will become passive until the next irrigation period. This will be the case when the ET Balance turns out to be less than the Minimum ET. Then the water budget will be set to 0%.

If the generated water budget is above 250% (e.g 300%), the water budget will be limited to 250% and the excessive ET (50%) will remain in the balance and be used for the next irrigation period.

10 If your system is set up to irrigate each day, you will most likely not see the content of the **Balance** field, as the field will be reset just after distribution has happened. If, on the other hand, you leave many days between each irrigation, the **Balance** figure will accumulate and you will be able to see the content the field.

Example:

Balance: 0.40
ET Base: 0.25
Water budget: (0.4/0.25) × 100 = 160%

In this case, the irrigation period will be prolonged by a total of 160%. Thus, if the controller has a normal budget (the ET Base) of 0.25" over a 30 minute period, then irrigation will run for 48 minutes to correct for the increased ET. The additional 18 minutes of irrigation make up for additional 60% in the adjusted budget.

Potential Pitfalls when Adjusting the Base ET

This section is particularly relevant if your system is set up to irrigate only once a week.

Important! Adjusting the Base ET is relevant for TWC controllers only.

Cycle Manager expects that the controller is set up with start times and steps per solenoid, so that 100% of the water indicated in ET Base will be delivered to the landscape. By default, ET Base holds 0.25", which indicates that the program will deliver 0.25"of water. This ET value is quite typical for July and corresponds to a water budget of 100%.

If you only irrigate once a week, you must set the ET Base equally higher so that the same amount of water is supplied. In this case 7 days of 0.25" equals 1.75" water. The 1.75 " still corresponds to a water budget of 100% – but seen over one week of irrigation. In other words, the program must supply one week's water in the irrigation period.

As described earlier, the water budget is calculated from the ET Base and the ET Balance. The ET Balance is generated from the ET and rain values collected by the weather station and transferred each day. If no irrigation takes place, the ET balance is assigned to the next day.

This is a potential problem, since only a maximum of 250% ET Balance is allowed. If the accumulated ET Balance exceeds the 250% limit, the remaining balance is not used but will be transferred to the next period – 7 days later. For instance, if the ET Balance is 400%, the 150% will be saved for the next round – but chances are that the next time ET Balance will be even higher. The result is that you may never use up the ET Balance.

To deal with this, make sure the ET Base is not set too low. As a rule of thumb set the ET Base so it corresponds as much to what you expect to use – this will make the balance sway around 100%.

Important! Do not set the ET Base too high either because then you risk a very low water budget adjustment of 5–10%. This may jeopardize the precision in your site's irrigation since irrigation cycles will be too short and the water supply consequently insufficient.

Chapter 7:
Data Monitoring

In this chapter:

- Monitoring Water Usage
- Monitoring Programs and Stations
- Monitoring Flow Sensors and Generic Sensors
- Monitoring Error and Status Events
- Monitoring All Data

Click MONITORING on the toolbar to open a selection of tabs and subtabs with useful site information about:

- Water usage
- Flow sensors and generic sensors
- Station and program behavior and status
- Various error and status events

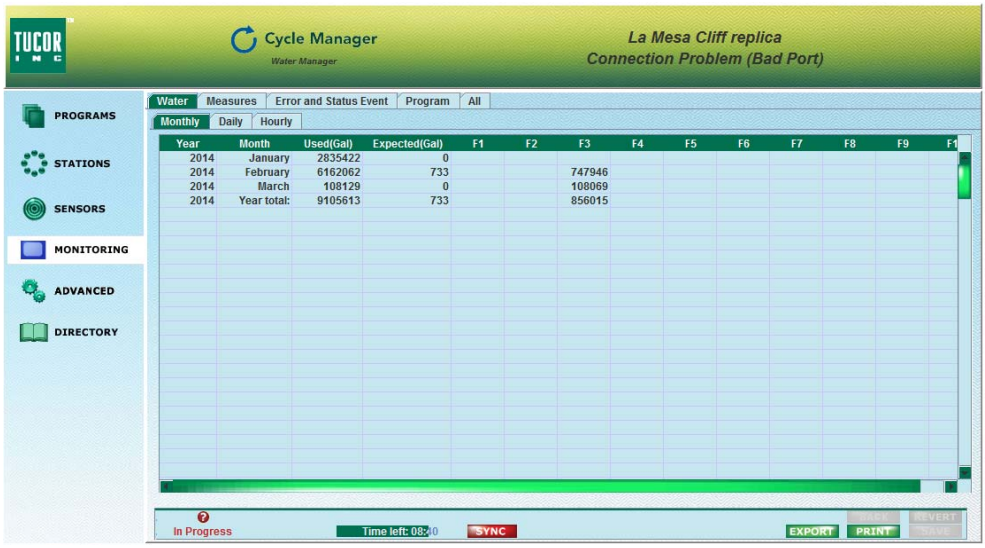


Figure 42: The opening tab of the **MONITORING** area shows the water usage.

Note: Whether or not your controller is set up to send monitor data to Cycle Manager depends on your communication.

Also note that the time to collect these data may take some time depending on your internet connection.

Monitoring Water Usage

The **Water** tab shows water usage information for your site in gallons on a *monthly*, *daily* and *hourly* basis. Click the relevant subtab (**Monthly**, **Daily**, **Hourly**) to get the information you want.

For each period, the actual, the expected and the unscheduled amount of water used will be listed. Also shown are the acre-inch value and accumulated values per year, month and day. Note that the acre-inch value relates to AIC controllers only.

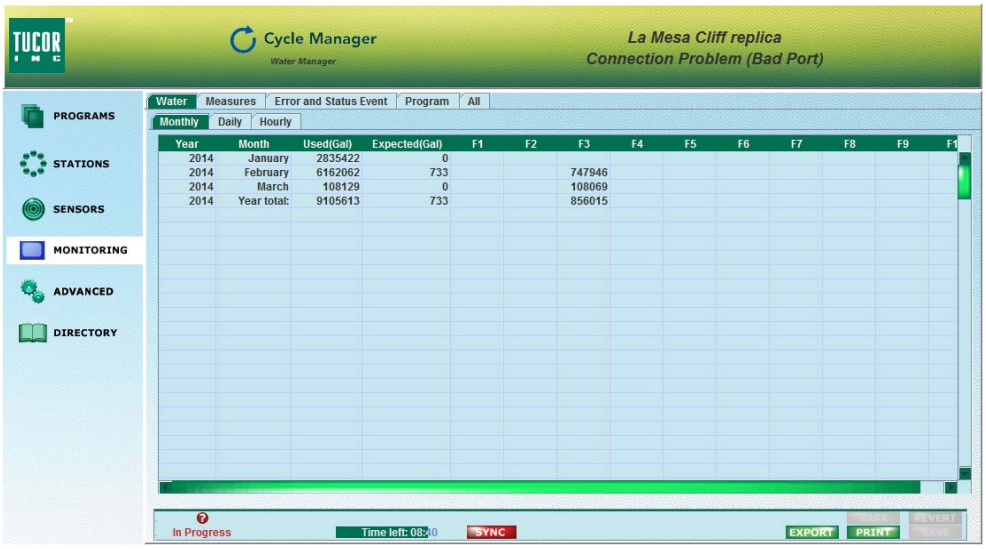


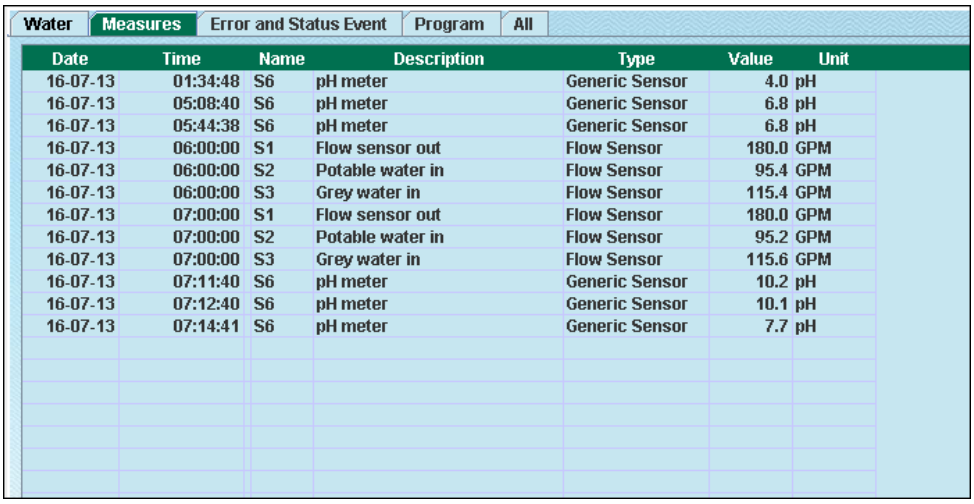
Figure 43: Water usage is monitored on a monthly, daily and hourly basis.

Used (Gal)	Shows the actual water usage as registered by the SUM flow sensor attached to your controller.
Acre-Inches	The inches are the actual gallons converted to inches for the given area defined in the **Advanced** area. This relates to AIC controllers only.
Expected (Gal)	Shows the accumulated expected water usage. Expected(Gals) are calculated by the controller based on the expected flow per valve (entered or learned).
F1 - F10	Shows the monthly accumulated water usage in gallons per flow sensor.

Monitoring Flow Sensors and Generic Sensors

This tab shows the individual flow and generic sensors which are setup for monitoring. The view above shows sensors with setup for continuously log of the value and with hourly log of the value.

Note that continuously defined sensors are only logged when they change value.



Date	Time	Name	Description	Type	Value	Unit
16-07-13	01:34:48	S6	pH meter	Generic Sensor	4.0	pH
16-07-13	05:08:40	S6	pH meter	Generic Sensor	6.8	pH
16-07-13	05:44:38	S6	pH meter	Generic Sensor	6.8	pH
16-07-13	06:00:00	S1	Flow sensor out	Flow Sensor	180.0	GPM
16-07-13	06:00:00	S2	Potable water in	Flow Sensor	95.4	GPM
16-07-13	06:00:00	S3	Grey water in	Flow Sensor	115.4	GPM
16-07-13	07:00:00	S1	Flow sensor out	Flow Sensor	180.0	GPM
16-07-13	07:00:00	S2	Potable water in	Flow Sensor	95.2	GPM
16-07-13	07:00:00	S3	Grey water in	Flow Sensor	115.6	GPM
16-07-13	07:11:40	S6	pH meter	Generic Sensor	10.2	pH
16-07-13	07:12:40	S6	pH meter	Generic Sensor	10.1	pH
16-07-13	07:14:41	S6	pH meter	Generic Sensor	7.7	pH

Figure 44: The **Measures** tab shows key monitor data for flow sensors and generic sensors

Date Shows the date on which data where logged.

Time Shows the time on which data where logged.

Name Shows the logical name of the sensor.

Description Shows a description of the sensor.

Type Shows the type of sensor.

Value Shows the value read from the sensor decoder and converted through the scaling in the sensor decoder setup. The unit reflects the sensor type.

Unit Shows the measurement unit of the current sensor. The Unit is defined as part of the sensor decoder setup.

Monitoring Programs and Stations

The **Program** tab shows key information about the irrigation programs and stations that have been running. Information dates back for a limited period of time.

The **Program** tab is divided into two subtabs: **Overview** and **Details**.

Use the **Overview** subtab to get a quick status, and then – in case of problems – consult the **Details** subtab to get specific information about station performance.

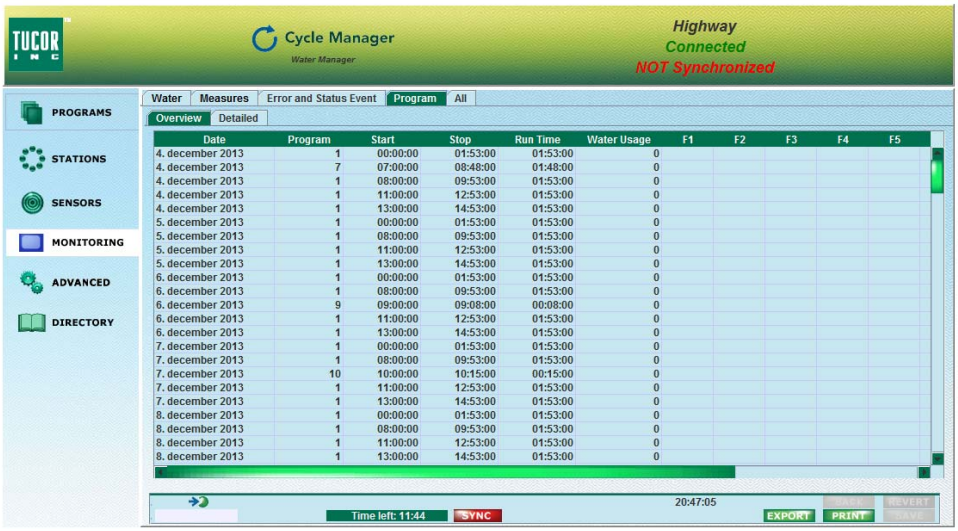


Figure 45: The **Overview** subtab of the **Programs** tab lists basic information about station and program performance.

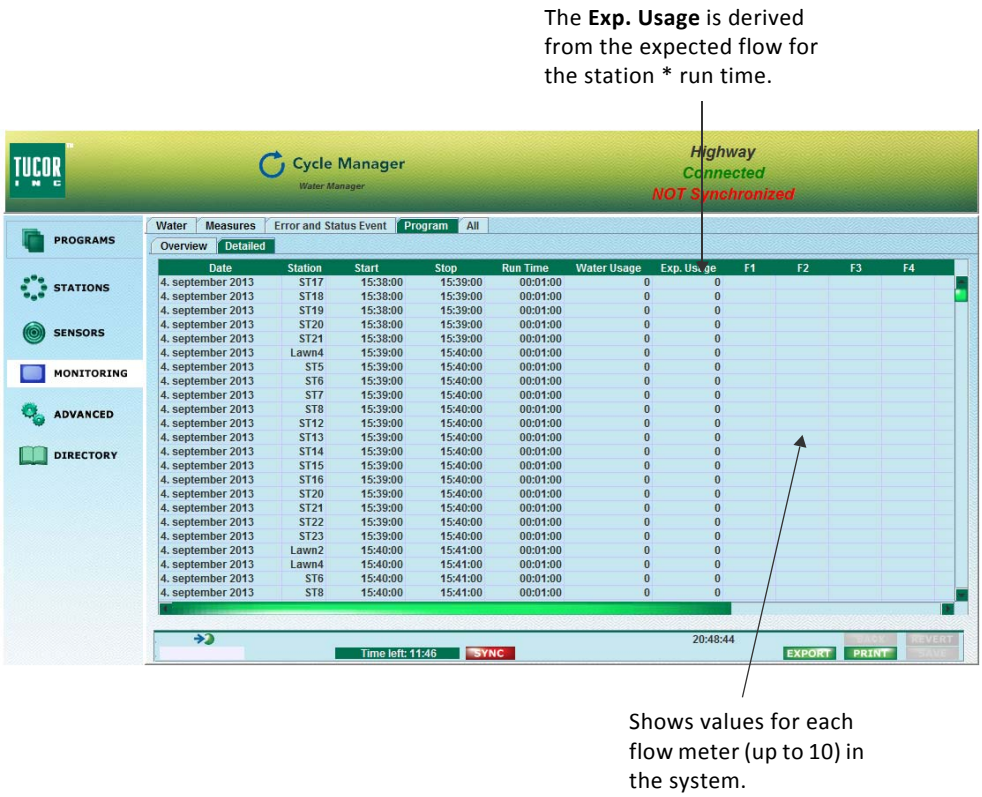


Figure 46: Consult the **Details** subtab to get specific information about station and program performance.

Monitoring Error and Status Events

The **Errors and Status Events** tab shows a wide variety of monitoring information relating to the performance of your system.

It is beyond the scope of this manual to present all errors and events possible. For a full list of event types and values, please contact your Tucor contact.

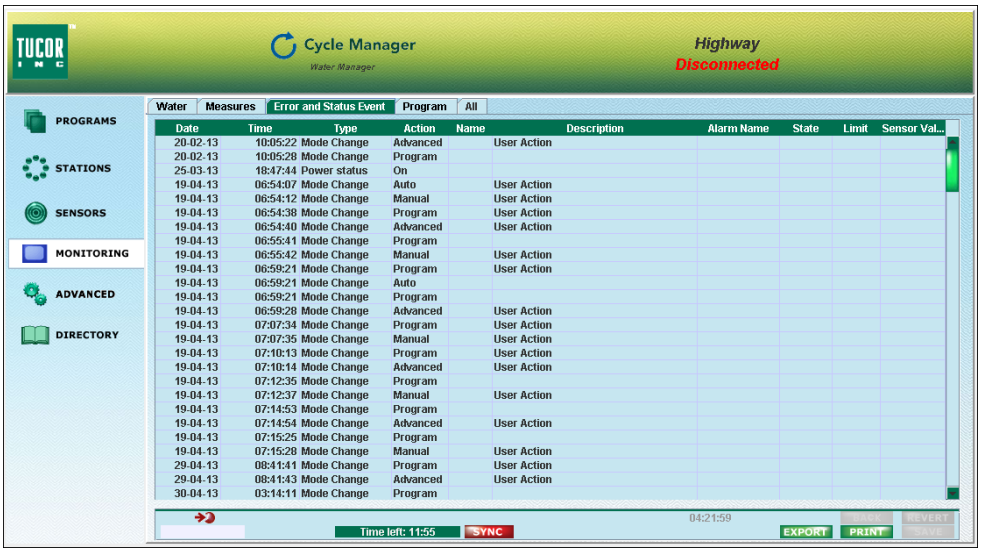


Figure 47: The **Error and Status Events** tab.

Monitoring All Data

The **All** tab provides access to a wide range of unfiltered controller and weather data.

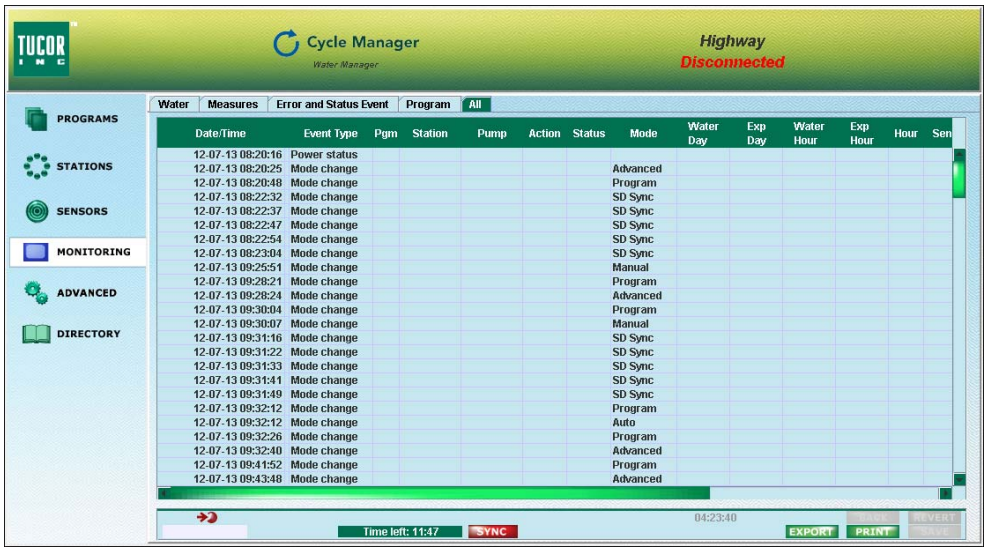


Figure 48: The **All** tab.