

addTimer

Version 1.0

User Guide





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Chapter 1. Introduction

This manual details the use of Adcon's addTIMER extension, a new extension that is available with the addVANTAGE Pro software product, which is used in conjunction with most of Adcon's telemetry devices.

For information about the installation and use of the telemetry devices, refer to the respective device's manual. Also refer to the *addVANTAGE Pro 5.x User Guide* for complete information about the software addTIMER runs under.

What Can addTIMER Do for You?

Adcon recently introduced the A724 addSWITCH, a controller for two latching solenoids that can be integrated seamlessly into every Adcon radio network. It soon became apparent that a software component for addVANTAGE Professional 5.x that would allow the time-based operation of valves was urgently needed. This first release of the addTIMER extension meets this need.

Until now, valves could only be opened and closed by defining certain IF - THEN rules, leading to an action as soon as a condition was triggered. However, with the addTIMER extension, you can create an irrigation program that will turn irrigation valves on and off at set times each day.

But the addTIMER is certainly not limited to operating irrigation valves. You can also use it to turn pumps, motors, lights, and other devices on or off, if time is the only decisive parameter for their operation.

Some examples for using the addTIMER extension follow.

Irrigation Control

You can automate the application of your irrigation water via an irrigation schedule that best meets the needs of your crop and soil type. For example, in heavy soils you might give one deep water each week, while in sandy soils you might give the plants a short irrigation each day.

Optimizing Electricity Cost for Reservoir Pumps

Many utilities offer lower rates for their electricity at night and on weekends. You can use addTIMER to start your pumps automatically at midnight (or whenever the rates get cheaper) and turn them off again once your reservoir or storage dam is filled. You can use a level sensor in the tank to signal when it is full. Similarly, you could use a low-level threshold to start the pump during daylight hours.

Controlling Park or Garden Lights

At a certain time of day the lights in a park can be switched ON or OFF. While this is usually controlled by a light sensor, you can imagine many circumstances where light sensors might not be the best option (for example, for insurance reasons, where a light is simply required to be ON at a certain time of day).

In this first release, the addTIMER extension is limited to control based on start and run times. In future releases, additional conditions will be available, such as turning off the lights automatically when the level of sunlight reaches a threshold. Another example could involve stopping an irrigation cycle on the basis of soil moisture or rainfall, or if a pressure sensor signals low pressure in the irrigation mainline (indicating a leak or pipe burst).

System Requirements

This section describes the available platforms for the software and what your system needs to run the software.

Platforms

The addTIMER software is available only with addVANTAGE Pro, version 5.3 or higher, running on a Java 1.6 (or higher) platform. It was tested on Microsoft Windows 2000 and XP.

The client runs in a web browser. Microsoft Internet Explorer 6.0 and Mozilla Firefox 2.0 are currently supported.

Minimum Requirements

We recommend using a dual-core processor with at least 2GHz and 1GB of RAM, with sufficient hard disk space to allow for larger databases and backups (a backup required three times as much space as the “normal” version). For example, for one year with 100 RTUs, you would need approximately 4GB of disk space and another 16GB ($4 + 3 \times 4 = 16$) for backups.

Note: The hardware configurations above are truly for minimum systems. Don't expect to run a server with tens of clients and tens or hundreds of RTUs on such machines, which are more suited to a single-user system. In addition, it is assumed that no other applications are running except addVANTAGE Pro and the operating system software.

Telemetry Gateway Configuration

You can download data either from another addVANTAGE Pro server or directly from an Adcon Telemetry Gateway. If you have an A840 or A850 Gateway, you also need Sun Microsystem's latest Java Virtual Machine, as indicated for the addVANTAGE Pro server.

For more details about the Gateway's configuration, refer to the User Guides of the A840 and A850 Telemetry Gateway and the A440 Wireless Modem. If you are running an A840 Telemetry Gateway, you need to verify that you have the latest firmware installed. For your convenience, we have included a version of this firmware on the distribution CD. For more details about the Gateway's configuration, refer to the *Base Station—Telemetry Gateway A840 and Wireless Modem A440 User Guide*.

Note: addVANTAGE Pro is compatible only with the A840 Telemetry Gateway running the firmware release 3.8.0 or higher. However, addTIMER requires release 3.8.6 or higher to correctly support

the switching functions. You cannot use an A730SD receiver to retrieve data into addVANTAGE Pro 5.x.

Conventions and Terminology

This section explains standard terminology and usage for Adcon software and manuals.

Windows and Captions

Although you may not see a software window that looks exactly like the one shown in Figure 1, we have included it to illustrate the various items on a software window.

Most operations in addVANTAGE can be performed on a context-sensitive basis. That is, right-clicking an object displays a context-sensitive menu from which you select the desired operation.

This manual does not attempt to explain basic computer use. Therefore, you should be familiar with basic computer terminology and the use of typical computer interfaces such as the mouse and keyboard.

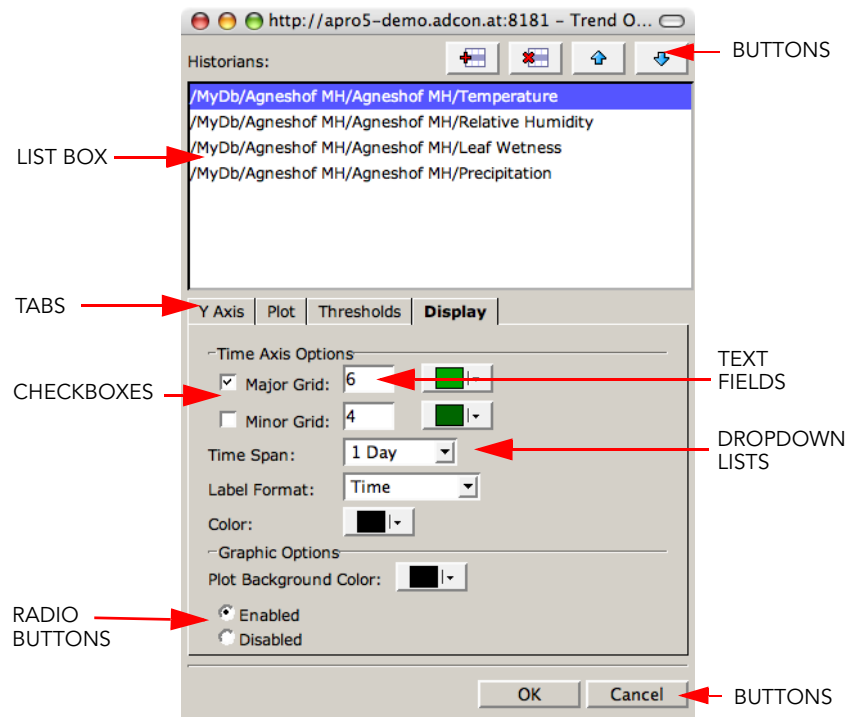


Figure 1. A Typical Software Window

Text Field	Type information here.
Checkbox	Select or deselect by clicking the box. A selected box has an X or a check mark in it, while a deselected box is empty.
Radio button	These round buttons come in multiples. You can select only one.
Listbox	This area shows a list of choices you can select by clicking.
Dropdown List	A box with a small down arrow (▾) you must click before you can see the list of choices to select from.
Button	These are rectangular shapes with a name. Select a button by clicking it.
Tab	Click to see another view of the window.

Documentation

Certain conventions apply in this documentation.

<i>Italics</i>	Indicate the text is variable and must be substituted for something specific, as indicated in the explanation. Italics can also be used to emphasize words as words or letters as letters, and for cross references to other books.
Bold	Indicates special emphasis of the text. Also indicates menu names and items in a window.
<code>fixed font</code>	Indicates characters you must type or system messages, as well as default values and file names.
File ▶ Save	Indicates menu selection. For example, select the File menu, then the Save option.
Note	Indicates information of interest. Notes appear after the information they apply to.
CAUTION	Indicates that you may get unexpected results if you don't follow the instructions.
WARNING	Indicates danger to yourself or damage to the device if you don't follow the instructions.

Tags

You'll see the term *tag* used throughout this manual. Tag is a generic term for something that pertains to data, regardless of whether it collects or controls that data. Tags can represent any of the following:

- Physical sensors, such as those for temperature, leaf wetness, or humidity.
- Actuators, such as switches, relays, or valves.
- Virtual sensors, which are the result of a computation, such as an average, a sum, or an E_t (evapo-transpiration reading). Virtual sensors are created with extensions. With some extensions, you can use a virtual sensor in combination with other sensors to create a new virtual sensor, which is itself another tag.

Chapter 2. Configuring the *addTIMER* Extension

About *addVANTAGE Pro* Extensions

As with previous versions, the *addVANTAGE Pro 5.x* software can be extended in functionality through additional software modules called *extensions*. Extensions can be added at any time to an *addVANTAGE Pro* system. The following two general purpose extensions are included in the basic package and installed automatically while installing the server:

- Main
- Statistic

Other extensions can be installed separately. For example, Adcon Telemetry provides a collection of Plant protection and Irrigation extensions in a package you can receive free of charge upon request from your Adcon distributor. These extensions are documented in a separate *addVANTAGE Pro 5.x, Plant Protection and Irrigation Extensions* manual. This manual is located on the software CD, which also contains these free extensions, or you can download it from Adcon Telemetry's website at <http://www.adcon.at>.

But the *addTIMER* extension is what we are concerned with here. You use the *addTIMER* extension to control valves connected to a number

of different RTUs for an irrigation program. Adcon recommends that you create a new area to house all of the RTUs used in irrigation control.

An irrigation program comprises a number of Shifts operating one after the other. Each shift contains one or more valves, which will open for the duration of the shift.

When the time comes for a program to start, addTIMER triggers the first shift. At the end of the run time for the first shift, all the valves in the shift will close again. The next shift then starts, and the process continues until all shifts have run. If a program is set to run more than once per day, the extension will wait for a time defined in the program and then run again.

Future versions will add the ability to end a shift (and hence start the next one) or stop the program altogether if certain alarm conditions occur.

This chapter deals with the basic operations required for setting up, configuring, and using the addTIMER extension.

Irrigating with a Controller

Irrigation controllers function using a number of common principles, as illustrated in Figure 2.

A controller executes an irrigation program. Some controllers support only a single program but more complex units such as addTIMER let you create and store multiple programs.

A program can be told to run immediately, or at different time intervals—for example every day, every second day.

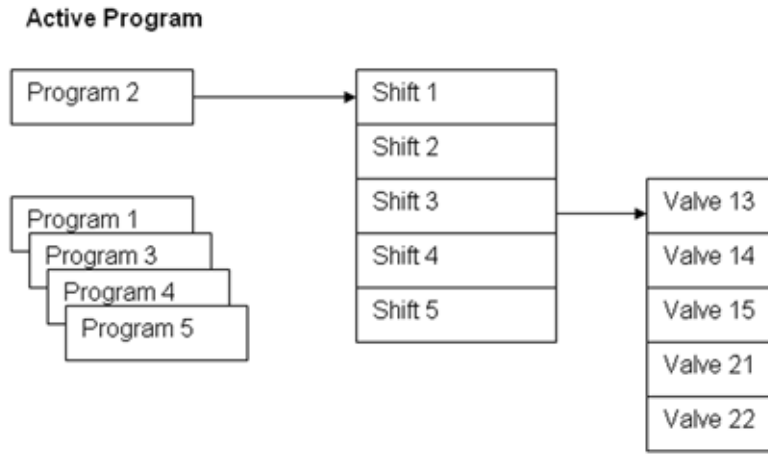


Figure 2. Structure of an Irrigation Control Program

The number of times a program runs each day can vary from once to continuously. If a program runs more than once, you can enter a delay before each repeat of the program.

A program consists of one or more shifts. The shifts run sequentially, meaning that as one finishes the next starts. Each shift will run for a nominated time period.

Each irrigation shift will control one or more valves: for the duration of the shift, all valves included in the shift will be opened (turned on).

Activating the addTIMER Extension

Extensions can be added only to an area. If you have not already added an area to house the extension, add one now by following these steps:

1. If the addVANTAGE Pro 5 server is not running, start it now.
2. Once the Server has started, log in with your allocated user name and password.
3. After logging in, you are presented with a hierarchical view of the areas and RTUs you have been given access to. Expand the tree by clicking the "+" sign to the left of an entry or node.
4. When you have reached the level where you want to add the addTIMER Extension, right-click the node and select **New Node ▶ Area**.
5. If the RTUs which you will be controlling have not been added to the system, you can add them to this area now as well.

To add the addTIMER extension to this area, do the following:

1. Select the area where you want the extension added.
2. Right-click the highlighted area and select **New Node ▶ Extension ▶ addTIMER**.

Note: Only one extension of each type is allowed per area.

Using the addTIMER Tabs

You use the tabs on the Properties dialog to configure the addTIMER extension's properties. To display an extension's properties (Figure 3), highlight it and select **Edit ▶ Properties...**, or right-click the extension and select **Properties**.

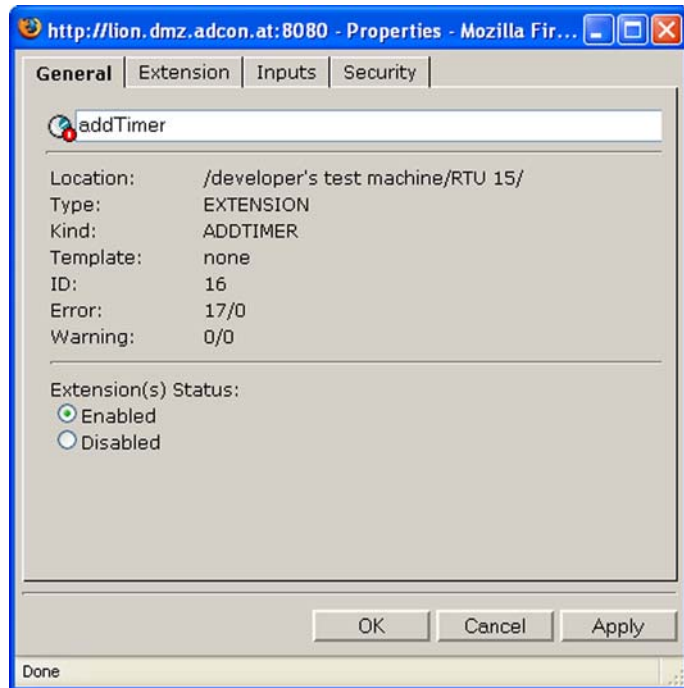


Figure 3. Extension Properties window, General tab

Figure 3 shows the general properties specific to the addTIMER extension. Note that the **General**, **Extension**, **Security**, and **Inputs** tab properties are found in all extensions.

The General Tab

The **General** tab displays general information about the extension and allows you to enable or disable the extension by clicking the appropriate radio button. Clicking the **Attributes** button displays a dialog you can use to view the node's attributes.

The Extension Tab

Figure 4 shows the tab you use to configure the addTIMER extension, the **Extension** tab.



Figure 4. Extension Properties window, Extension tab

The Programs table shows the existing programs. You can:

- Enable or disable a program by selecting or clearing the checkbox in the appropriate **Enabled** column.
- View details of a program by selecting it in the table. The **Description** box at the bottom of the dialog shows which shifts are actually running and when the next shift will be started. The details are automatically updated in frequent intervals.
- View the status of a program (also automatically updated).
- Manually **Start** or **Stop** a program by clicking the appropriate button.
- Add, edit, or delete a program as discussed later in this chapter.
- Refresh the **Programs** table.

The Inputs Tab

The **Inputs** tab (Figure 5) allows you to set the input tags (valves) for the extension. You can select tags wherever you want, as shown later in the tag chooser.

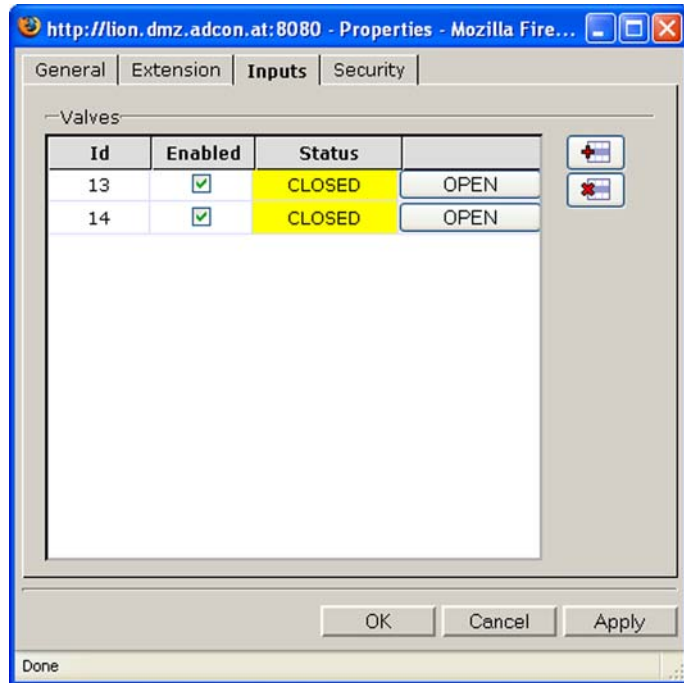


Figure 5. Extension Properties window, Inputs tab

You can add (delete) valves to this extension, see their status, and open or close a valve manually. If a valve is operated manually, the actions taken by addTIMER are ignored (manual actions have higher priority than automatic).

The Security Tab

Use the **Security** tab (Figure 6) to set the appropriate privileges on the extension for different users and groups.

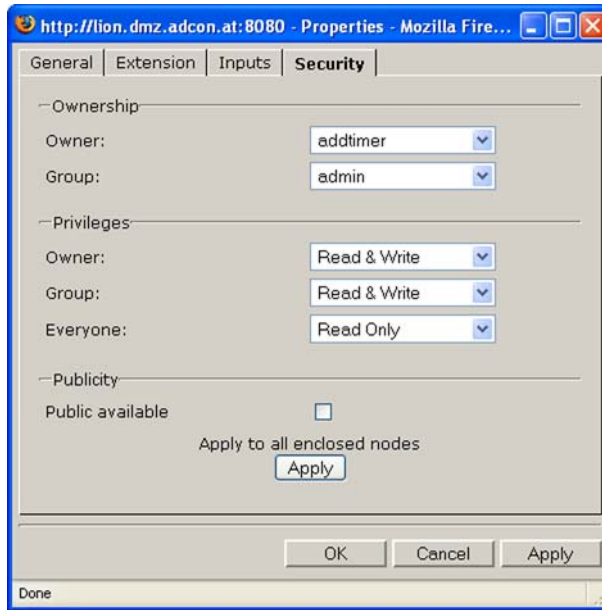


Figure 6. Extension Properties window, Security tab

Setting up the addTIMER Extension

The first step in setting up the extension is to choose the outputs (which are mapped to tags on an A723, A724, A732, A733 or A740) that will be used to control irrigation valves. The A724 has been custom designed to control two DC latching solenoids or DC latching relays. If you want to control an AC Solenoid or switch an AC or DC load using one of the other RTUs, you will need to add an external interface that adapts the 3.3V output from the RTU to the level needed to switch a solid state or mechanical relay.

After doing this, you can create an irrigation program consisting of a number of shifts. After creating the shifts, add the outputs or valves to each. All outputs in a shift turn on at the same time and for the same duration. If your irrigation system has a Main Valve (an output that, for example, turns on the pump or opens a primary valve when any valves or stations are on), you will need to add the Main valve to each shift. Later versions of addTIMER will allow you to automatically allocate an output as the Main Valve.

Setting up the RTU Outputs as Inputs to the Extension

This part of the setup procedure requires you to use some forethought and planning.

A map of your irrigation system provides a handy reference point for this step. The RTUs used to control irrigation will by necessity be installed adjacent to the valves they control. When you add these RTUs to the A840 or A850 Telemetry gateway and hence to addVANTAGE Pro 5.x, you should name them with the name of the irrigation block or valve, for example, Block 5.

When you add an RTU, the outputs are given a default name based on the information recorded for that type of RTU in the Gateway. Later, when you add the RTU to addVANTAGE Pro 5, the output is given the same name. So, after adding the RTU to addVANTAGE Pro 5.x, select the RTU and change the name of the output tag to something descriptive. For example, for an RTU that will control irrigation via Valve 5, you could use "Change Digital (direct, logic 0=0V)" to "V5." The tag will then be visible with this shorthand as a meaningful name in the addTIMER extension.

Adding RTU Tags

From the Explorer view in addVANTAGE Pro 5.x, right-click the addTIMER extension and select **Properties**. When the Properties dialog displays, click the Inputs tab.

If you have not added any Output tags, the list of Valves will be empty. Note that in this context, digital tags are the same as valves.

Follow these steps to add tags to the Inputs tab:

1. Click the **Add** button to display the Tag Chooser shown in Figure 7.

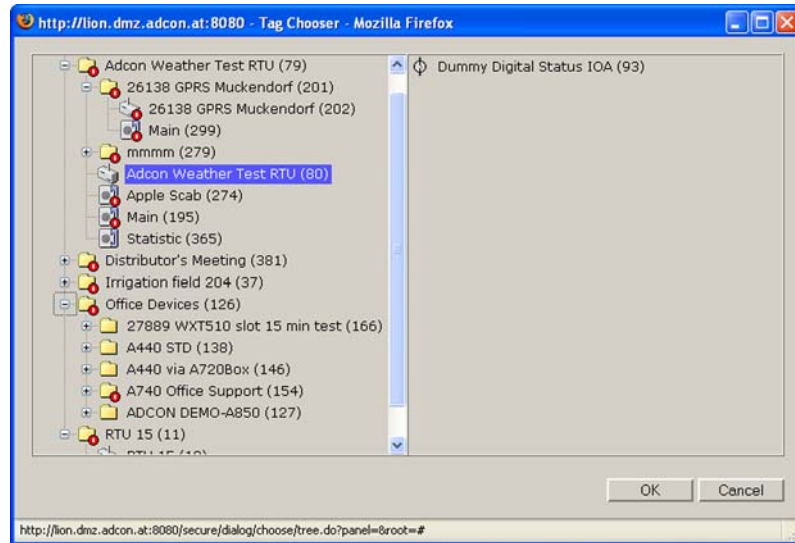


Figure 7. Tag Chooser Dialog

2. Click a device in the left panel to see its available tags in the right panel.

Note: Only digital tags are available as valves.

3. If the available tag is one you want to add, select it and click **OK**. You will easily be able to distinguish the tags you want if you named them appropriately, as mentioned above. You can select multiple tags with Ctrl-Click or Shift-Click.
4. Repeat steps 2 and 3 for each tag you need.

Note: The tags in the extension instances are not the same, even if they use the same node ID. For example, if you have two addTIMER extensions in two areas that use the same RTU and/or same digital tag as a valve, they won't show the same status if one switches and the other one doesn't.

If you need to remove a tag from the Valves list, select it and click the **Delete** button.

Adding Programs

After you have added the various outputs as input tags for the addTIMER Extension, you can create an Irrigation Program.

Creating a Program

Follow these steps to add a program to the extension:

1. If the addTIMER Extension is not currently open, right-click it in the Explorer, then select **Properties**.
2. On the **Extensions** tab, click the **Add** button. The New Program Setting dialog shown in Figure 8 is displayed.

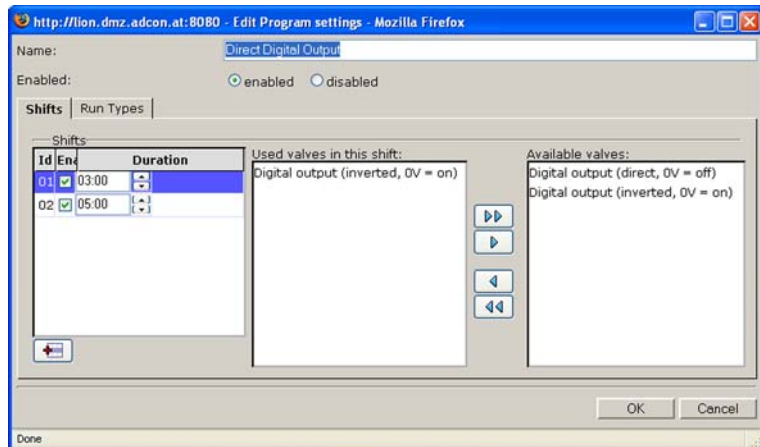




Figure 8. Shifts Tab in New Program Settings Dialog

This dialog has two tabs, **Shifts** and **Run Types**. Use the **Shifts** tab to establish the number and duration of the shifts and which valves to control. Use the **Run Types** tab to determine how often the program will run.

3. Click the **Add** button on the left side of the dialog to add a shift to the list box on the left, then select the duration of the shift in hours and minutes. The maximum is 18 hours.

The default setting is for the shift to be **Enabled**, but you can deselect the checkbox to disable the shift.

4. The list box on the right side shows the valves available in the extension. Select a valve and click  to move the valve to the middle list box, which shows the valves used in the current shift.

You can use Ctrl-Click to select more than one valve or click  to move all of the valves to the middle list box.

5. If you have a Main valve, you must add it to each shift.
6. Repeat steps 3 and 4 until you have added all of the shifts you need.
7. Verify that the **Enabled** radio button for the program is selected.

Controlling When a Program will Run

Using the Run Types tab, follow these steps to set up when and how often the program runs:

1. In the New Program Settings dialog, select the **Run Types** tab to display the dialog shown in Figure 9.

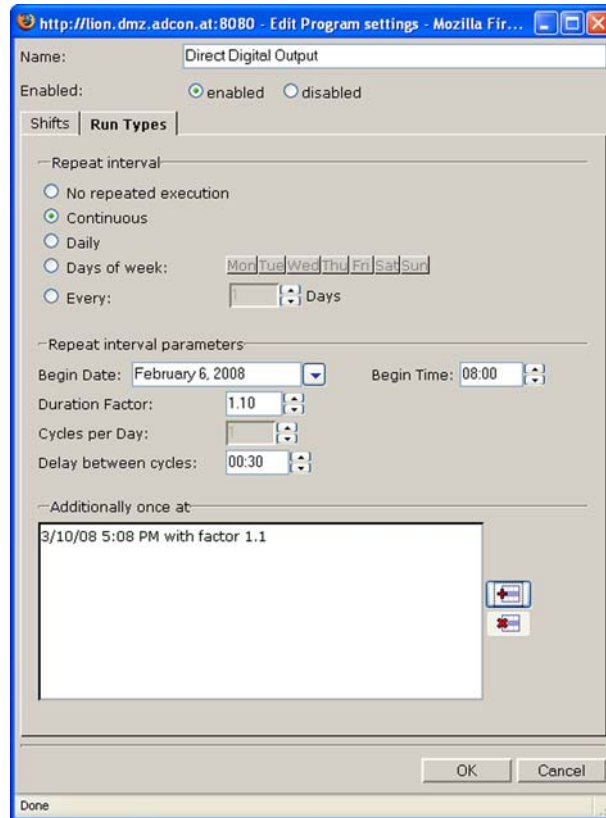


Figure 9. Run Types Tab in New Program Settings Dialog

2. You'll use the first pane on this dialog, **Repeat Interval**, to determine how often the program should run. Select one of the following choices

No repeated execution: No default program is running. Only the programs entered in "Additionally once at" are executed.

Continuous: The program runs continuously.

Daily: The program runs once each day. The total run time must be less than 24 hours.

Days of Week: The days of the week display as push buttons. By default no days are selected. The program runs each day you select. The total run time must be less than 24 hours.

Every x Days: The program runs after the number of days have elapsed. 1 = every day (same as selecting Daily, above), 2 = every second day, and so forth. The total run time must be less than 24 hours.

The total run time is calculated as follows:

$$(S * df * \text{cycles}) + ((\text{cycles} - 1) * \text{delay})$$

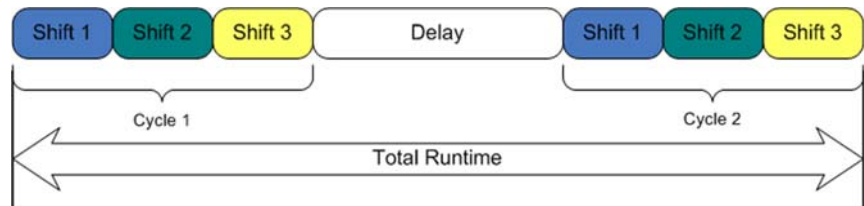
S = sum of all shift durations

df = duration factor

cycles = number of cycles per day

delay = delay between cycles

In other words, a run time consisting of two cycles with three shifts each and a delay between cycles could be represented like this:



3. The middle pane on the **Run Types** tab establishes the parameters for the repeat interval you selected in the first pane. The Repeat Interval you chose above determines whether the **Cycles per Day** and **Delay Between Cycles** fields are available.

- Enter a **Begin Date** and **Begin Time** for the program.
- Enter a **Duration Factor**.

Use the duration factor to increase or decrease the irrigation run times. The default value is 1.00 but you can lengthen or shorten the irrigation run times for all shifts in the program by changing the factor. For example, if a shift has a run time of 10 hours and you set a duration factor of 1.2, the shift will run for

- 12 hours. The factor does not influence the delay between cycles.
- c. Enter the number of **Cycles per day**.
This field determines how many times each day the program will run.
 - d. Select the **Delay between cycles**.
If you set the **Cycles per day** to a number greater than 1 or if the repeat interval is **Continuous**, you can enter a delay (in hours and minutes) between the completion of one cycle and the start of the next. The default value is 00:00 and the maximum value is 23:59.
4. The last pane on the **Run Types** tab, **Additionally Once at**, enables you to define run times that overrule the scheduled times. Click the **Add** button to display the dialog shown in Figure 10.

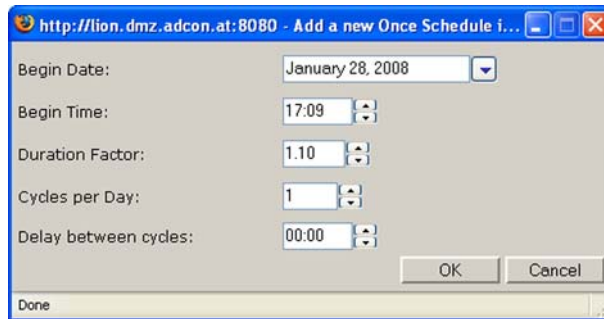


Figure 10. Add a New Once Schedule Item Dialog

The fields are the same as the ones in the **Repeat interval** parameters pane. An example of when you might use this feature would be that you created a daily runtime but on a certain day you'd like to irrigate either more or less. You would enter a date/time along with a factor, cycles per day, and delay between cycles.

Note: Runtimes set on a "Once Schedule" such as this have a higher priority than scheduled runtimes, which means that a Once could block a starting Schedule and it could interrupt an already running scheduled task.

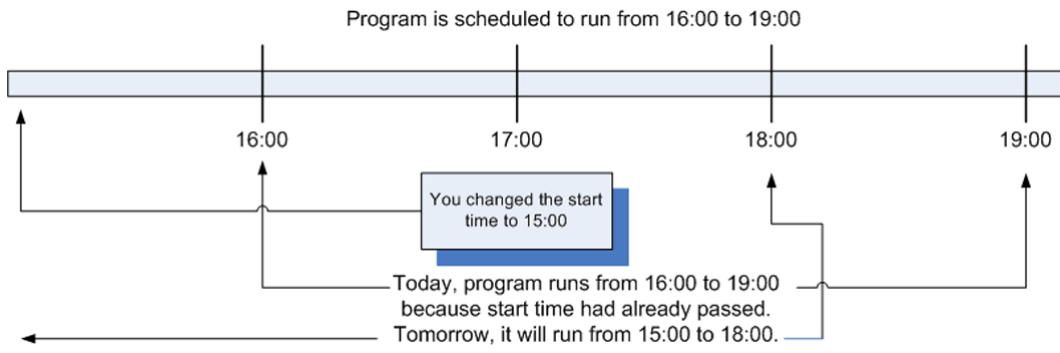
You can remove a Once by selecting it in the list and clicking the **Delete** button.

Editing Programs

Select **Edit** on the Extensions tab to display the Edit Program Settings dialog. You can change the fields and properties on this dialog the same way you did when you created the new program.

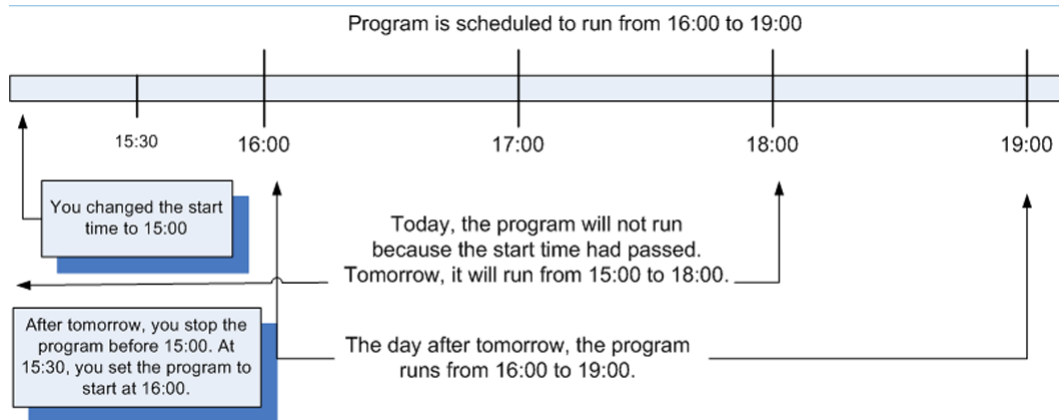
If you change the settings of a program while it is running, the program is stopped and restarted with the time that has already elapsed.

As an example, we'll use a program started at 16:00 with a duration of 3 hours, meaning it would normally run until 19:00. However, at 17:00, you change the start time to 15:00.



You might think that the program would run until 18:00, which it would with a duration of 3 hours. But since you changed to a start time that had already passed, the program will run until 19:00 as usual because otherwise the program would be an hour short. Tomorrow, the program will run from 15:00 to 18:00, but today the program will continue its original run from 16:00 to 19:00

What if a program is supposed to start at 16:00 for 3 hours (as above), but at 15:30 you set the program to start at 15:00? Since the program should have already run for 30 minutes, the time trigger that tells the program to start was missed (it was fired at 15:00, but now it already is 15:30). Therefore, the program will not start today at all, but will start tomorrow.



If, on the other hand, you stopped a program that should have started at 15:00, and then at 15:30 you set the start time to 16:00, the program will start at 16:00.

Activating/Deactivating a Program

The addTIMER extension allows you to create multiple irrigation programs. One or more of these programs can then be set to operate at any time. In smaller systems, however, you will typically have only one active program.

If you do want to have two or more programs running at the same time, make sure that you have given due consideration to the impact on water flow and pressure. Ideally, each program should be limited to stations or valves on a specific mainline. If two programs run together on a mainline, you could find that the flow through the valves is more than the pump can deliver, which will cause system pressure and therefore uniformity to fall.

To activate or deactivate a program:

1. Open the addTIMER Extension properties.
2. Click the **Extensions** tab to show a list of the available programs.
3. Click the **Enabled** checkbox to activate the program, or clear the checkbox to deactivate it.

Deleting Programs

You can delete a program by selecting it from the list on the Extensions tab and clicking the **Remove** button. This stops the program and closes all of its valves.




Refreshing the Programs Table

When you click **Refresh** on the **Extensions** tab, the Programs table is displayed again, but internally it is freshly rendered. For example, you might click Start on one of the programs, but the command for the valve to be opened takes some time to reach the RTU. If you need an immediate response, you can click **Refresh** to get all the actual statuses of the program.

Checking the Status of a Program

You can check the status of a program at any time from the **Extension** tab of the addTIMER Properties window.

To check a program's status:

1. Open the addTIMER extension's Properties window.
2. Click the Extensions tab to show a list of the available programs:
 -  **Green**: the program is active and a shift is running.
 -  **Yellow**: the program is active but no valves are running. The program typically shows that it's waiting for the next execution time.
 -  **Gray**: the program is disabled (no warning/alarm on valves).

Overriding the Programmed Times

Once a program is active, you can manually override the programmed settings using the **Start** and **Stop** buttons in the Extension Properties window. For example you can stop an operating program or start one that is waiting.

- If you click **Start** while a program is running, the operating program is cancelled and a new instance is started.
- If you click **Stop** when a program is running, the program will stop immediately.

- If you click **Stop** when a program is not running, no action is taken, but a message is written to the logs.

Manually Operating a Valve

You can open a closed valve, or close an open valve by using valve control from the Inputs tab on the addTIMER Extension.

With the extension's Properties window open, click the **Inputs** tab. A list of the valves added to the extension displays, along with the status of each.

- Click the **Open** button to open a valve.
A dialog displays, asking you to select the time you want the valve to be opened. If no programs are running, you might first have to open the Main Valve.
- Click the **Close** button to close a valve.
If the valve is open, it will be closed immediately.

If you send an **Open** command to a valve that is already open, the old settings for the valve (the time left to run) are dropped and the new run time is written to the valve. This allows you to override the automatic settings and force a valve to open if something went wrong or you want to irrigate for a longer or shorter time.

addTIMER Extension Error Messages

The addVANTAGE Pro 5 server generates error messages when necessary, perhaps because of radio communications problems or a valve that cannot be opened.

When an error condition has occurred, a red alarm dot displays next to the addTIMER extension (and all of its parent nodes).

To view the list of alarms:

1. Right-click the addTIMER extension and select **Show Alarms**.
2. When the events list displays, use the navigation buttons to select a time span that allows you to see the alarms.
Alarms that have not had any action taken against them display in red.

3. Review the list of alarms to identify the cause. For example, does an RTU have a flat battery, has a relay device failed, or has the RTU lost communication?
4. After reviewing the alarm, click the box next to the alarm to acknowledge it. If there are multiple alarms, click the **Acknowledge** button and select **Acknowledge All Alarms**.

