

# Application Note

## Ctek Irrigation Controller

APN008



*Ctek – Things That Move Data*

25 August 2011  
Table of Contents

<b>TABLE OF CONTENTS.....</b>	<b>I</b>
<b>TABLE OF FIGURES .....</b>	<b>II</b>
<b>PURPOSE.....</b>	<b>3</b>
<b>SCOPE.....</b>	<b>3</b>
<b>NAVIGATION AND TOP LEVEL FUNCTIONS .....</b>	<b>3</b>
<b>FLOW MONITORING CONFIGURATION .....</b>	<b>4</b>
<b>Configuration.....</b>	<b>4</b>
Location Parameters .....	4
Irrigation Clock Override .....	6
Schedule Selection.....	6
Alarm Selection and Configuration .....	6
SMS Alarm Parameters .....	6
Email Alarm Parameters.....	6
Report Delivery Parameters.....	6
Email Server Configuration.....	7
Gmail Set Up Example .....	7
<b>Flow Monitor Schedule .....</b>	<b>7</b>
Start Time .....	9
Sun, Mond, ... Sat .....	9
Enable.....	9
Minutes .....	9
<b>REPORTS, ALARMS, AND LOGS.....</b>	<b>9</b>
<b>Reports .....</b>	<b>9</b>
Column A .....	10
Column B.....	10
Column C.....	10
Column D .....	10

25 August 2011

Column E.....	10
Column F.....	10
Alarm Events.....	10
<b>Alarms .....</b>	<b>10</b>
Email or Text Alarm - Over.....	10
Email or Text Alarm - Under.....	10
Email or Text Alarm - Unscheduled Usage.....	10

### Table of Figures

FIGURE 1 - CONTROLLER IN AN EXISTING SYSTEM.....	3
FIGURE 2 - TOP LEVEL SCREEN.....	3
FIGURE 3 - FLOW MONITORING MENU.....	4
FIGURE 4 - CONFIGURATION SCREEN.....	5
FIGURE 5 - FLOW MONITOR SCHEDULE.....	8
FIGURE 6 - REPORT CSV DATA .....	9
FIGURE 7 - REPORT IN SPREADSHEET .....	9



## Application Note – Ctek Irrigation Controller APN008 25 August, 2011

### Purpose

Ctek's Irrigation Manager is a SkyRouter resident application program that controls the application of water through commercial and residential irrigation systems. The application maintains two daily schedules for up to 45 separate irrigation zones. The purpose of this Application Note (APN008) is to provide the information necessary to configure and operate the application and interpret the reports and alarms issued.

### Scope

Figure 1 shows a Ctek Irrigation Controller in the context of an existing irrigation installation.

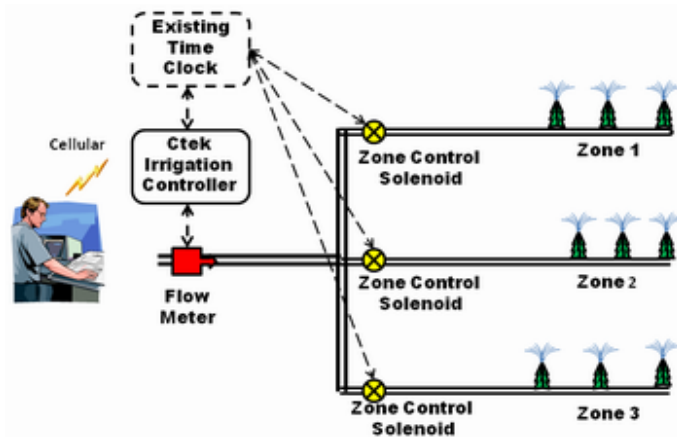


Figure 1 - Controller in an existing system

While all of the components of a complete irrigation system will be discussed for completeness the scope of APN008 is the theory and operation of the Irrigation Control software application.

### Navigation and Top Level Functions

When installed the Irrigation Controller Application is found under the applications selection on the top level SkyRouter administration screen. It may also be offered as a top level function immediately after login if the application advertising option is selected.

The SkyRouter presents the following navigation menu when application advertising is used.

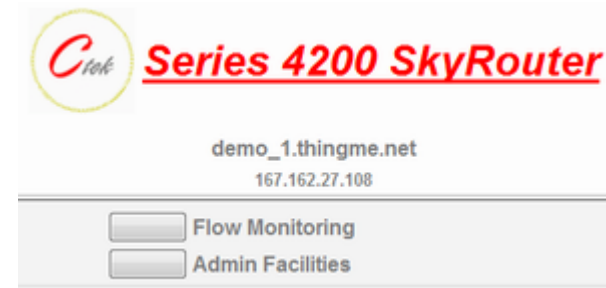


Figure 2 - Top Level Screen

This document will first cover the Flow Monitoring settings and then will address the portions of the Admin Facilities menu important to this application. Complete coverage of the Admin Facilities menu can



## Application Note – Ctek Irrigation Controller APN008 25 August, 2011

be found in the SkyRouter User manual for the specific SkyRouter model you are using.

### Flow Monitoring Configuration

Selecting the Flow Monitoring menu option presents the following screen which provides access to all of the Irrigation Controller features and functions.

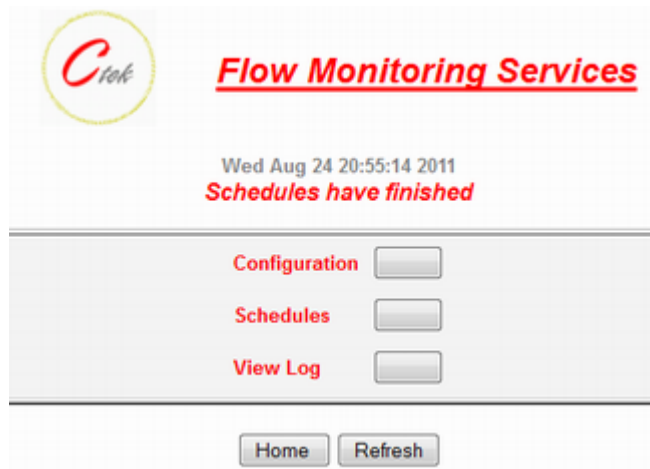


Figure 3 - Flow Monitoring Menu

### Configuration

The flow monitoring configuration screen is used to establish all of the operating parameters of the Irrigation application. The screen is divided into 8 panels, each of which configures a specific portion of the complete application. Individual parameters for each panel are discussed below and an image of the screen is provided in Figure 4 for reference.

**Location Parameters** - These settings establish a name for the irrigation site and create the assumptions that will be tuned as an operational baseline for the site is established

**Location Name** - A descriptive name that can be assigned to each irrigation controller/site. Will be used on reports and alarms.

**Number of Zones** - The number of sprinkler zones that will be managed from this controller. The number of zone slots allocated in the schedule page is a direct result of this setting.

**Gallons Per Minute** - This important setting is used in the calculation of the over/under thresholds. An initial estimate can be fine tuned over time using actual water usage information gathered by the controller.

**Percentage Over/Under** - Established the threshold for over/under reports and alarms. Make use of the Gallons Per Minute setting above. Example - a 10 minute schedule at 10 gallons per minute and a 20% over/under will alarm at below 80 gallons and above 120 gallons.



## Application Note – Ctek Irrigation Controller APN008 25 August, 2011

<b>Location Parameters</b>	
Location Name: <input type="text" value="Demo_1"/>	Number of Zones: <input type="text" value="7"/> (Max 45)
Gallons Per Minute: <input type="text" value="30"/>	Percentage Over/Under: <input type="text" value="15"/>
<b>Irrigation Clock Override</b>	
<input checked="" type="radio"/> Enable Clock <input type="radio"/> Disable Clock	
<b>Schedule Selection</b>	
Schedule 1: <input checked="" type="radio"/> On <input type="radio"/> Off	Schedule 2: <input checked="" type="radio"/> On <input type="radio"/> Off
<b>Alarm Selection and Configuration</b>	
Scheduled Usage Alarms: <input checked="" type="radio"/> On <input type="radio"/> Off	Unscheduled Usage Alarms: <input checked="" type="radio"/> On <input type="radio"/> Off
Alarm Delivery Method: <input type="radio"/> SMS <input type="radio"/> Email <input checked="" type="radio"/> Both	Unscheduled Alarm Volume: <input type="text" value="30"/>
<b>SMS Alarm Parameters</b>	
Destination Phone Number For Alarms: <input type="text" value="5555551212"/>	
<b>Email Alarm Parameters</b>	
Destination Email Address For Alarms: <input type="text" value="fieldalarms@ctekproducts.com"/>	
<b>Report Delivery Parameters</b>	
Deliver Reports Via Email: <input checked="" type="radio"/> On <input type="radio"/> Off	Deliver To Email Address: <input type="text" value="usagereports@ctekproducts.com"/>
Deliver reports on the following days after schedules run:	Sun <input type="checkbox"/> Mon <input checked="" type="checkbox"/> Tue <input type="checkbox"/> Wed <input checked="" type="checkbox"/> Thu <input type="checkbox"/> Fri <input checked="" type="checkbox"/> Sat <input type="checkbox"/>
<b>Email Server Configuration</b>	
Email Address For This Device: <input type="text" value="fieldsite@ctekproducts.com"/>	Email Password: <input type="password" value="••••••"/>
Email User Name: <input type="text" value="fieldsite@ctekproducts.com"/>	SMTP Server Port: <input type="text" value="465"/>
SMTP Server Address: <input type="text" value="smtp.gmail.com"/>	SSL Encryption: <input checked="" type="radio"/> On <input type="radio"/> Off
Authentication: <input checked="" type="radio"/> On <input type="radio"/> Off	
<input type="button" value="Update"/> <input type="button" value="Back"/>	

Figure 4 - Configuration Screen



## Application Note – Ctek Irrigation Controller

APN008 25 August, 2011

### **Irrigation Clock Override**

**Enable/Disable Clock** - Provides a mechanism to completely isolate the electro-mechanical sprinkler clock from control over the irrigation zones. The Disable setting means that the Ctek Irrigation controller will prevent the mechanical clock from ever turning water on to a zone.

**Note** - In the event of a hardware or power failure at the Ctek Irrigation controller control always reverts to the schedule of the installed electro-mechanical clock without regard to the enable/disable setting above.

### **Schedule Selection**

**Schedule 1 & 2 On/Off** - enable or disable the use of schedule 1 and/or schedule 2

### **Alarm Selection and Configuration**

**Scheduled Usage Alarms On/Off** - Enable or disable alarms resulting from over or under thresholds during the scheduled irrigation cycle for a particular zone.

**Unscheduled Usage Alarms On/Off** - Enable or disable alarms resulting from water usage above a prescribed threshold outside the time periods allocated to schedules.

**Alarm delivery Method** - Select the method(s) by which alarms will be sent to the user.

**Unscheduled Alarm Volume** - The threshold of water usage outside the time periods allocated to schedules above which an unscheduled alarm will be issued.

### **SMS Alarm Parameters**

**Note** - SMS (Short Message Service) is commonly referred to as a text message.

**Destination Phone Number** - The 10-digit phone numbers of the handset or SMS terminal to receive SMS alarms. Up to five phone numbers may be specified, each separated by a space.

### **Email Alarm Parameters**

**Destination Email Address** - The complete email address of the destination for email alarms. Multiple email addresses may be specified, each separated by a comma or space.

### **Report Delivery Parameters**

**Deliver Reports Via Email On/Off** - Enable/disable the email delivery of daily usage reports. Reports are also available online for viewing.

**Deliver To Email Address** - The complete email address of the destination for email reports. Multiple email addresses may be specified, each separated by a comma or space.

**Deliver Reports On The Following Days After Schedules Run** - Used to select the days upon which reports will be sent to a destination address.



## Application Note – Ctek Irrigation Controller APN008 25 August, 2011

### **Email Server Configuration**

In order to send email alarms and reports each Ctek Irrigation controller must be assigned an email address, an address from which the email alarms and reports will originate. The same email address can be assigned to all controllers but each controller must have an email address if email is to be used.

Ctek provides a POP3 email client to support email communications. While the settings may vary somewhat from one email service to another this section describes the most commonly used settings and also provides a set up example using Google's gmail service. All of these settings are available from your email provider or ISP.

**Email Address For This Device** - A complete email address that will be assigned to the POP3 client on this device. Again, this address and other account settings can be identical for any number of devices using the same email system.

**Email User Name** - The name used by the email client to log in to an email server and send email. Some services require that this name be the email address of the user, others will allow almost any name.

**SMTP Server Address** - An address specified by your email provider or ISP that will be used by the email client to reach the Simple Mail Transfer Protocol (SMTP) server. The SMTP server is responsible for sending outgoing emails.

**Authentication On/Off** - This setting is based on whether or not your email SMTP server requires authentication to log in to the SMTP server. Most do. Ctek's POP client uses SSL authentication.

**Email Password** - The password that was established when your email account was created.

**SMTP Server Port** - The port number that the SMTP server listens on. For SSL authentication this is usually Port 465. Consult your email providers set up instructions.

**SSL Authentication On/Off** - Again, consult your email provider, they will establish this requirement.

### **Gmail Set Up Example**

**User Name** - your\_gmail\_account@gmail.com

**Email address** - your\_gmail\_account @gmail.com

**Password** - Your\_Choice

**SMTP Server Address** - smtp.gmail.com

**Authentication required** - Yes

**SSL Encryption** - Yes

**SMTP Server Port** - 465 (normal for SSL)

### **Flow Monitor Schedule**

Figure 5 illustrates the two schedule capability of the Ctek Irrigation controller. Schedule 1 applies water to all seven zones seven days a weeks while schedule 2 applies additional water to zones three and four on Saturday and Sunday.





**Application Note – Ctek Irrigation Controller**  
 APN008 25 August, 2011

**SCHEDULE 1**

<i>Start Time</i>				
Hour	02	Minutes	0	0
Sun <input checked="" type="checkbox"/> Mon <input checked="" type="checkbox"/> Tue <input checked="" type="checkbox"/> Wed <input checked="" type="checkbox"/> Thu <input checked="" type="checkbox"/> Fri <input checked="" type="checkbox"/> Sat <input checked="" type="checkbox"/>				
<i>ZONE</i>	<i>ENABLE</i>	<i>MINUTES</i>	<i>MIN ALARM</i>	<i>MAX ALARM</i>
01	<input checked="" type="checkbox"/>	30	765	1035
02	<input checked="" type="checkbox"/>	30	765	1035
03	<input checked="" type="checkbox"/>	30	765	1035
04	<input checked="" type="checkbox"/>	30	765	1035
05	<input checked="" type="checkbox"/>	30	765	1035
06	<input checked="" type="checkbox"/>	30	765	1035
07	<input checked="" type="checkbox"/>	30	765	1035

**SCHEDULE 2**

<i>Start Time</i>				
Hour	08	Minutes	0	0
Sun <input checked="" type="checkbox"/> Mon <input type="checkbox"/> Tue <input type="checkbox"/> Wed <input type="checkbox"/> Thu <input type="checkbox"/> Fri <input type="checkbox"/> Sat <input checked="" type="checkbox"/>				
<i>ZONE</i>	<i>ENABLE</i>	<i>MINUTES</i>	<i>MIN ALARM</i>	<i>MAX ALARM</i>
01	<input type="checkbox"/>			
02	<input type="checkbox"/>			
03	<input checked="" type="checkbox"/>	30	765	1035
04	<input checked="" type="checkbox"/>	30	765	1035
05	<input type="checkbox"/>			
06	<input type="checkbox"/>			
07	<input type="checkbox"/>			

**Figure 5 - Flow Monitor Schedule**



## Application Note – Ctek Irrigation Controller APN008 25 August, 2011

**Start Time** - A 24 hour clock setting used to determine when the schedule will begin. Each active zone schedule will be executed upon the completion of the last.

**Sun, Mond, ... Sat** - Check boxes to select which days of the week the schedule will be applied.

**Enable** - Select the zones that will be irrigated under this schedule

**Minutes** - The length of time that a zone will be irrigated. You will want to tune this value once an operational baseline has been established. The percentage of Over/Under from the configuration screen is applied to the value of Gallons/Minute \* Minutes to arrive at over and under thresholds.

## Reports, Alarms, and Logs

Reports and alarms are delivered to the user via email, and in the case of alarms by SMS (text messaging) as an option. Logs are available online through the top level menu selection shown in Figure 3.

### Reports

Reports are delivered to the user via email in a comma separated (CSV) format. This format allows to report to be viewed and manipulated by most spreadsheet software packages and also makes it convenient to import the report content into many database

applications. When viewed in a conventional text editor the report displays the CSV format as shown in Figure 6.

```

Test location 1,Schedule 1,Fri Sep 2 10:40:00 2011,1,2,100,
,,2,5,0,**ALARM=Under**
Test location 1,Schedule 2,Fri Sep 2 10:55:01 2011,1,1,20,
**ALARM=Under**
,,2,3,70,**ALARM=Under**
,,3,4,510,**ALARM=Over**
Test location 1,Unscheduled,Fri Sep 2 11:03:31 2011,U,U,50,
**ALARM=Over**
  
```

**Figure 6 - Report CSV Data**

When viewed in a spreadsheet program the same report displays as shown in Figure 7. Using a spreadsheet program the data can be manipulated to produce custom reports and invoices.

	A	B	C	D	E	F	G
1	Test location 1	Schedule 1	Fri Sep 2 10:40:00 2011	1	2	100	
2				2	5	0	**ALARM=Under**
3	Test location 1	Schedule 2	Fri Sep 2 10:55:01 2011	1	1	20	**ALARM=Under**
4				2	3	70	**ALARM=Under**
5				3	4	510	**ALARM=Over**
6	Test location 1	Unscheduled	Fri Sep 2 11:03:31 2011	U	U	50	**ALARM=Over**

**Figure 7 - Report In Spreadsheet**



**Application Note – Ctek Irrigation Controller**  
**APN008 25 August, 2011**

Field definitions for the report are provided below and are referenced to the spreadsheet column designator.

**Column A** - The name assigned to this particular unit on the configuration screen.

**Column B** - The schedule (schedule 1 or schedule 2) being reported

**Column C** - The date and time of the schedule completion or event.

**Column D** - The Zone being reported on. U indicates unscheduled usage.

**Column E** - Reports the number of minutes that the schedule ran

**Column F** - The number of gallons applied during the scheduled interval

**Alarm Events** - Alarm Under indicates that less water was applied that would be expected to result from gallons per minute (GPM) multiplied by Scheduled Minutes within the plus or minus tolerances assigned as a percentage on the Configuration screen. In the case of Unscheduled Usage the Over/Under calculation is based solely on the Unscheduled Volume value on the Configuration Screen.

## Alarms

Alarms are transmitted to the specified destination addresses when events at the controller are outside of the parameters established on

the Configuration screen (Fig 4) and the Schedule (Fig 5). Alarms can be transmitted via email and/or by SMS to a cellular device.

The Alarm formats are as follows are shown in the following sections. Both email and text messaging formats may differ to some extent based on formatting performed by the receiving client application.

### **Email or Text Alarm - Over**

Fri Sep 2 11:03:01 2011  
Location Test location 1  
Schedule 2 Zone 3 Run Time 4  
Over maximum volume of 220  
Current volume is 510

### **Email or Text Alarm - Under**

Fri Sep 2 10:59:01 2011  
Location Test location 1  
Schedule 2 Zone 2 Run Time 3  
Under minimum volume of 135  
Current volume is 70

### **Email or Text Alarm - Unscheduled Usage**

Fri Sep 2 10:39:09 2011  
Location Test location 1  
Unscheduled Usage over maximum volume of 10 Current volume is 50



**Application Note – Ctek Irrigation Controller**  
APN008 25 August, 2011