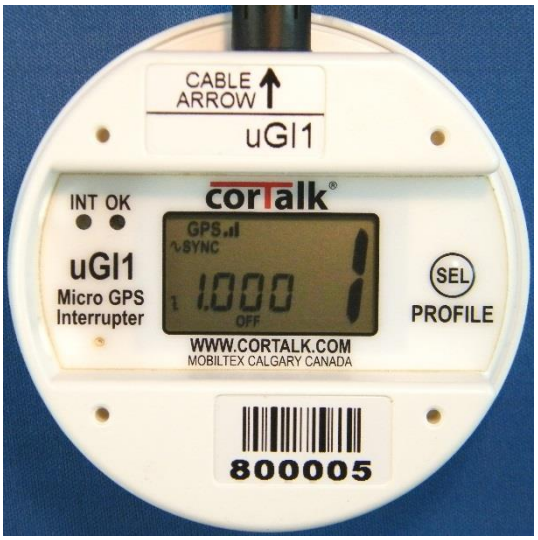
corTalk® by MOBILTEX®

uGI1 Micro GPS Interrupter

Configuration and Operation Guide



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RESTRICTED PROPRIETARY INFORMATION

CURRENT REVISION APPROVALS (Revision 1.00)

Name	Location	Job Function	Signature	Date
Tony da Costa	Calgary	Engineering Manager		
Jerry Chilibecki	Calgary	Director of Engineering		

REVISION HISTORY

Rev	Start Date	Approval Date	Description	Prepared By
Draft 0.01	Oct 15, 2015		First draft.	Tony da Costa
1.00	Oct 16, 2015		Original release.	Tony da Costa

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1 Introduction

The uGI1 is a reliable low cost interruption controller designed for use with cathodic protection rectifiers. Precise timing accuracy and repeatability is attained with GPS and microprocessor technology. Compact single package construction and a wide operating temperature range make this device ideally suited for corrosion field survey activities.

This document details the configuration and operation of the uGI1 product.

Figure 1 uGI1 Micro Data Logger

2 General Safety Information

The following safety precautions must be reviewed to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component's manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and Disconnect Properly. Do not connect or disconnect terminal wiring while the wires are connected to a voltage source.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product. Do not use an input marked with measurement category I for measurements within measurement categories II, III or IV. Do not connect category II inputs directly to mains—a Class 2 CSA/UL transformer must be used for isolation.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms on the Product. These terms may appear on the product:

DANGER. Danger indicates an injury hazard immediately accessible as you read the marking.

WARNING. Warning indicates an injury hazard not immediately accessible as you read the marking.

CAUTION. Caution indicates a hazard to property including the product.

3 uGI1 Kits and Parts

Kit A20A03UGI01 (Basic Version, No Relay):

	A1506031001 uGI1 Base Unit
	H20712UGI01 Black uGI1 Soft Case
	W16400UGI07 uGI1 External Relay Interface Cable

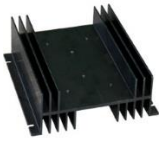
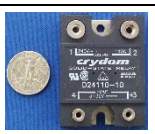
Kit A20A03UGI02 (c/w SRL1 Smart Relay Configuration):

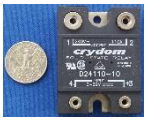
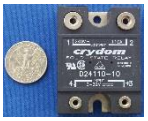
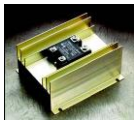
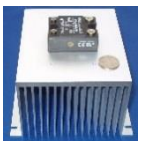
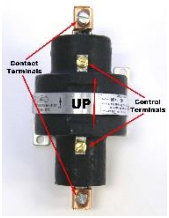
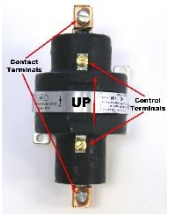
	A1506031001 uGI1 Base Unit
	H20712UGI01 Black uGI1 Soft Case
	A1506031501 SRL1 Smart Relay

Programming Kit A20A03UGI03

	W164DIUGI01 uGI1 USB Programming Cable
	U14971USB08 8GB USB Drive w/uGI1 Configuration Software

Additional Optional Accessories:

	W16400UGI02 3 Meter (10') Relay Extension Cable
	W16400UGI03 8 Meter (26') Relay Extension Cable
	A20A03UGI04 uGI1 to 5/6 pin SPI1 Relay Adapter Cable Includes Adapter Cable P/N W16400UGI05 and Power Injector Cable P/N W16400UGI06.
	W16400UGI07 uGI1 External Relay Interface Cable
	A1506031501 SRL1 Smart Relay
	X03912B150A Medium Heatsink to Increase SRL1 Capacity to 50A
	H00000LOCK1 30*30.5*13.5mm Brass Cylinder Padlock With 2 Keys
	T01A42TR201 Class II 20VA 12VAC Transformer for 120/230VAC Primary (Custom Lightning Immune Design)
	P10309A121A 12VA 12VAC Wall Plug-in Transformer for 120VAC
	T01A422512C Class II 20VA 12VAC Transformer for 120/240/277/480VAC Primary
	K0513245010 Solid State AC Relay - 24-280 VAC RMS 50 Amps max (0-8A=No Heatsink, 8-50A=Needs HE-54)

	K0513211010 Solid State AC Relay - 24-280 VAC RMS 110 Amps max (0-8A=No Heatsink, 8-60A=HE-54, 60-110A=HE-90)
	K0513285010 Solid State AC Relay - 48-530 VAC RMS 50 Amps max (0-8A=No Heatsink, 8-50A=Needs HE-54)
	K05232R5016 Solid State AC Relay - 3 phase, 48-530 VAC RMS 50 Amps max (0-4A=No Heatsink, 4-30A HE-90 & special holes)
	X0301292B80 Small Heatsink for Solid State Relay - HF92B-80 (Max 15 Amps with any of the above Solid State AC Relays)
	X03912P5400 Medium Heatsink for Solid State Relay - HE-54
	X030320HE90 Large Heatsink for Solid State Relay - HE-90
	A15060255C1 Solid State DC Relay - 0-60 VDC 50 Amps max (Complete unit including heatsink)
	K07111NC12D Mercury Relay - 240 VAC @ 100 A, 48 VDC @ 100 A, 125 VDC @ 50 A
	K07111060NC Mercury Relay - 480 VAC @ 60 A, 48 VDC @ 60 A, 125 VDC @ 40 A

4 Configuration

4.1 Configuration Equipment Requirements

The following items will be needed when configuring an uGI1 with a PC.

- uGI1 Programming Kit (A20A03UGI03) Includes USB cable P/N W164DIUGI01 and Programming Application and Driver Media (USB flash drive) P/N U14971USB08.

  To use a PC to communicate with the uGI1, you will require the media (USB flash drive) that shipped with the uGI1. The media contains drivers and the uGI1 configuration application. If you do not have the media, the contents can be downloaded from the Mobiltex web site at the following URL.

  http://www.mobiltex.com/cathodic/ugi1

- Personal Computer (PC)

  The application software and drivers require that the PC be running Windows 7 or higher for an operating system. The PC must have an available USB port.

4.2 Software Installation

To install the configuration application and driver software, insert the media (USB flash drive) that came with the configuration interface into a USB port on the PC. Use Windows Explorer to navigate to the media drive or the directory containing the installation software. Double-click on the "uGI1INSTALLER.exe" application. The dialog on Figure 2 will appear.

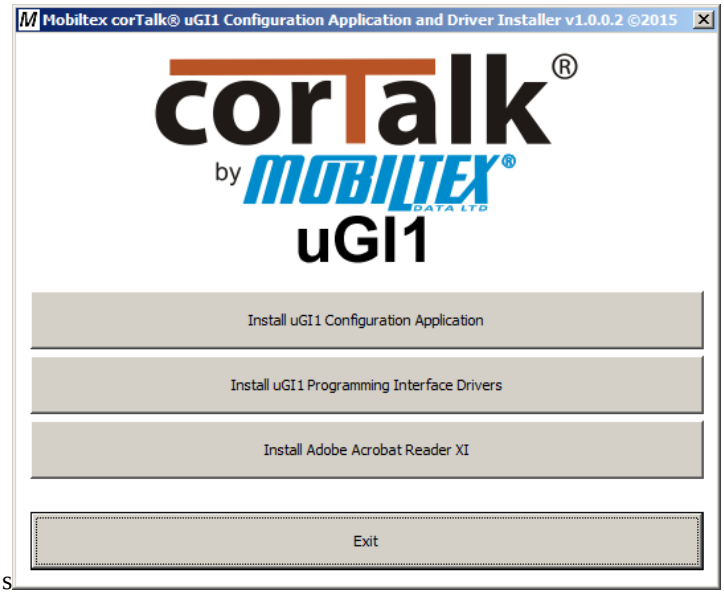


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Figure 2 uGIInstaller Dialog

4.2.1 Configuration Application Installation

Click on the "Install uGI1 Configuration Application" button to start the application installer. A security warning dialog may appear--click the "Run" button to continue.

The following dialog should now appear:

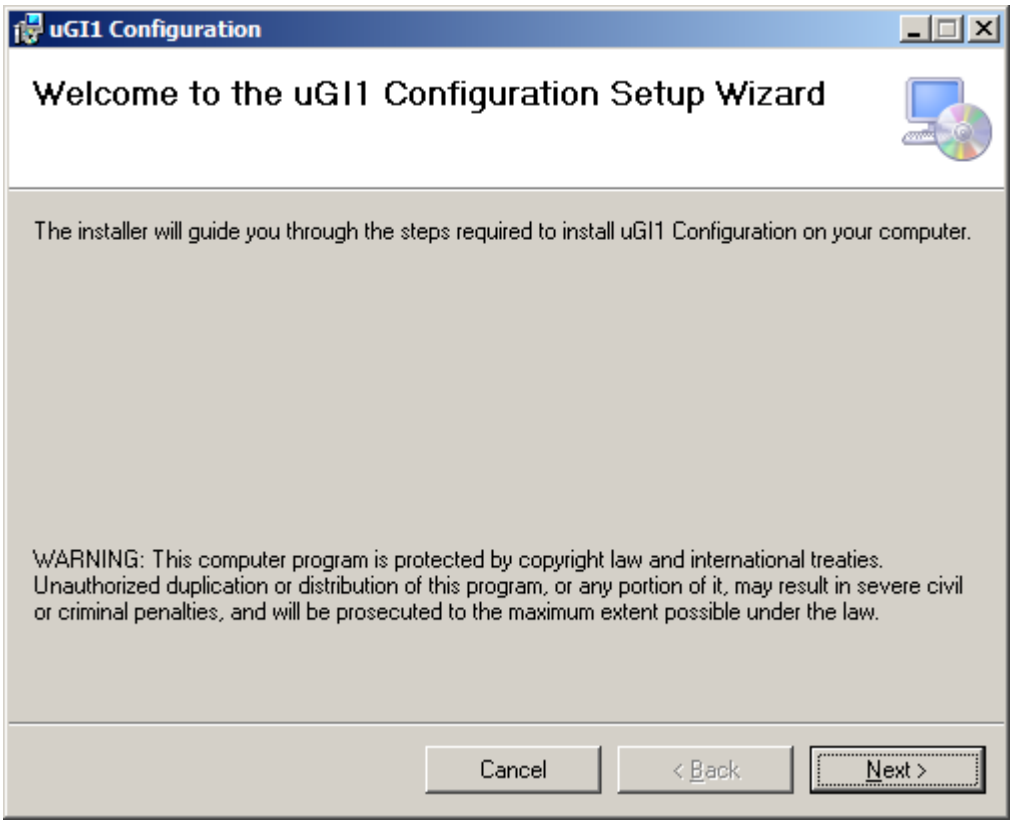

Figure 3 uGI1 Configuration Application Installation Dialog

Follow the instructions presented in the installation screens, clicking "Next" to move to the next screen each time. Some screens may pause for tens of seconds as the Windows installation procedure is processing. The final screen should show the dialog in Figure 4. Click "Close" to complete the installation.

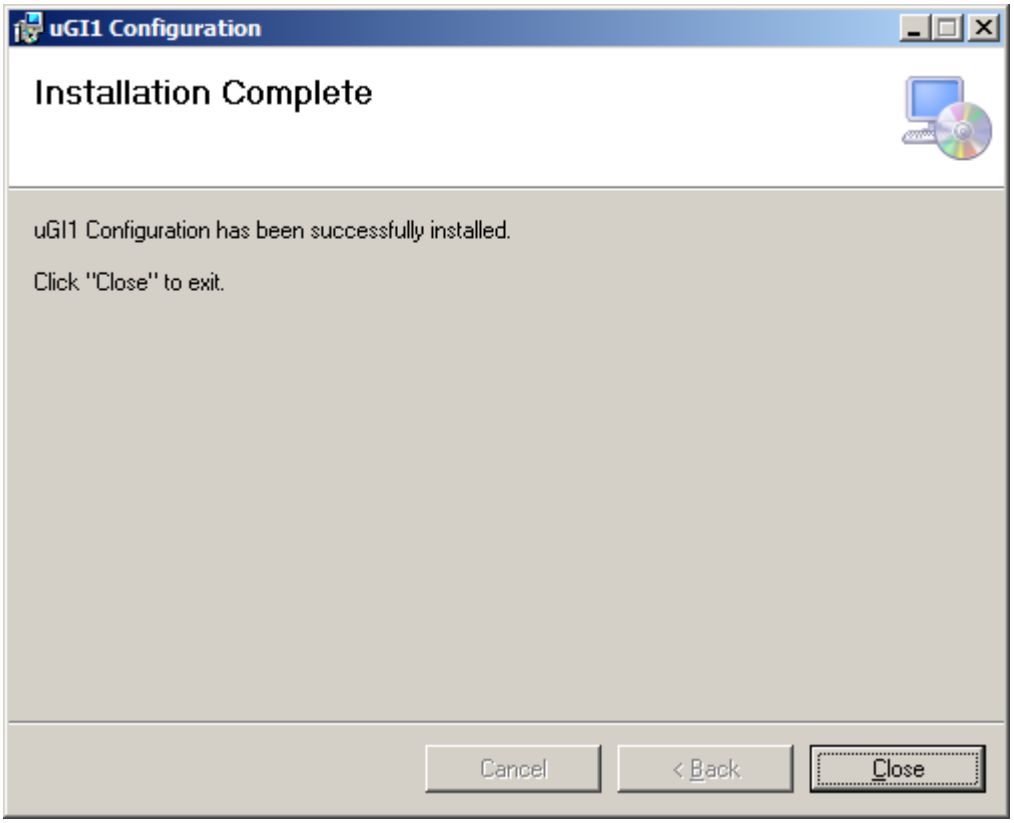

Figure 4 uGI1 Configuration Application Installation Complete

A shortcut to the configuration application and the uGI1 manual are created in the Windows start menu under the "uGI1 Configuration Application" folder.

4.2.2 Driver Installation

To prevent potential hardware driver issues in Windows, do not attach the uGI1 to the PC USB port before installing the device drivers.

From the uGI Installer screen, click the "Install uGI1 USB Interface Drivers" button. **Note that to install drivers, you must be logged into the PC with an account that has administrative privileges.** The following screen should display. Follow the installation instructions presented by the driver installer application.

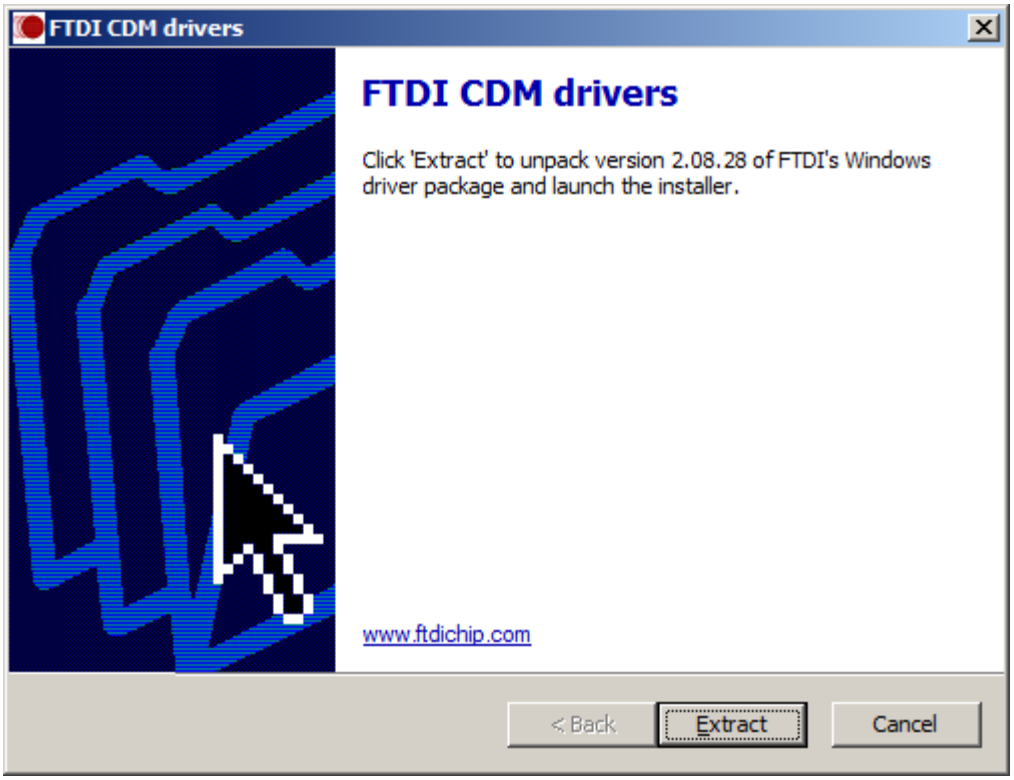

Figure 5 Driver Installation Screen

Once the driver installer completes, you may then plug in the uGI1 through the USB cable into an available USB port on the PC.

4.2.3 Adobe Acrobat Reader XI

Adobe Acrobat Reader XI is provided on the installation media to allow viewing of the PDF version of the uGI1 manual. If Acrobat Reader is already installed on the PC, it is not necessary to re-install it. To install Acrobat Reader, click on the "Install Adobe Acrobat Reader XI" button on the uGI Installer dialog, and follow the instructions provided by the Acrobat Reader installation application.

4.3 uGI1 Configuration and Extraction

Attach the supplied USB cable between the PC and the uGI1.

Start the configuration software by clicking on “uGI1 Configuration” shortcut in Windows start menu, under the “uGI1 Configuration Application” folder. The following screen will appear.

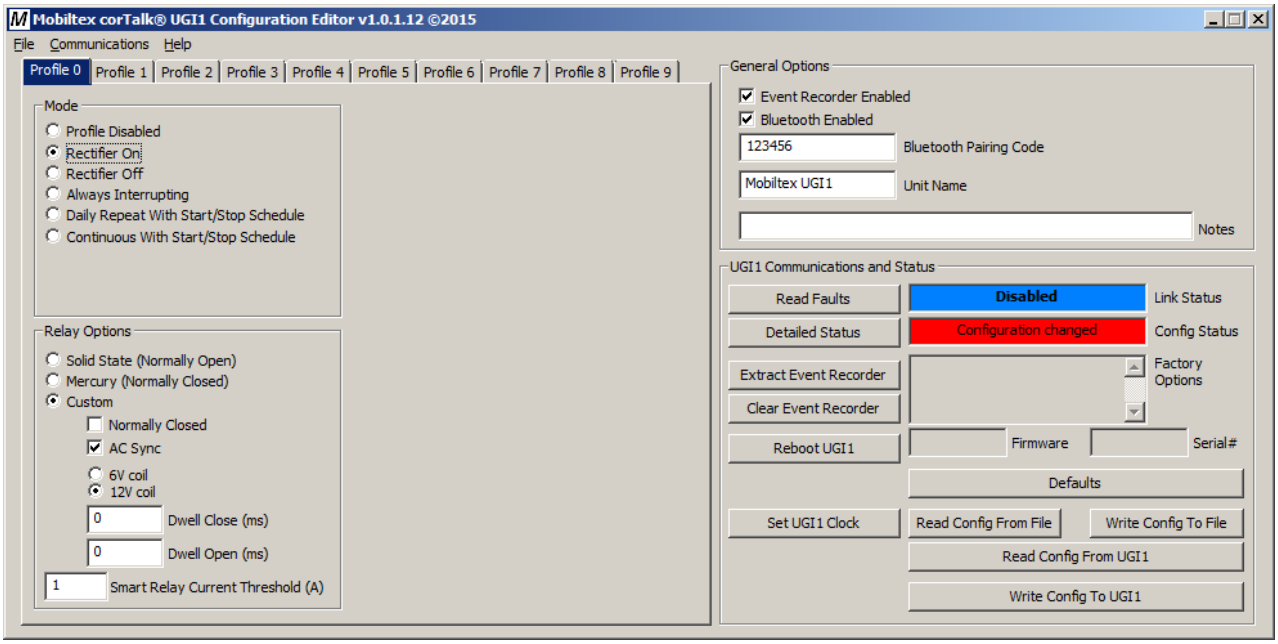

Figure 6 uGI1CONFIG Main Screen

The current settings can be exported to a human-readable text file by selecting the “Export Settings To Text Editor” menu item in the “File” menu.

4.3.1 uGI1 Communications and Status

4.3.1.1 Defaults

A factory defaults version of the uGI1 configuration can be loaded into the uGI1 by clicking on the “Defaults” button followed by clicking the “Write Config To UGI1” button.

4.3.1.2 Read Config From uGI1

The first step in configuring a device is to read in the current settings from the unit. Click on “Read Config From uGI1”. The “Link Status” field will briefly show “Busy” as the current configuration parameters are read from the uGI1. After the link status returns to “Idle”, you will see the configuration settings currently in the uGI1. If the uGI1 is not responding or not connected, an error dialog will pop up. If it is not connected, simply connect the USB cable to the computer and try again. If the uGI1 LCD display is showing ‘bUSY’, wait until the ‘bUSY’ indication goes away before attempting to read the configuration from the uGI1.

Once communications have been established with the uGI1, the operational parameters can be configured for the requirements of a particular measurement session.

4.3.1.3 Write Config To uGI1

Once all configuration items have been set as desired, click the “Write Config to uGI1” button to write the configuration to the uGI1 and activate it. Writing parameters to the uGI1 will cause the unit to reboot after completion of the write operation.

4.3.1.4 Link Status

The “Link Status” field will indicate “Disabled”, “Busy” or “Idle”. While “Busy” is shown, the application is actively communicating with the uGI1 hardware. The application will not respond to further actions while “Busy” is displayed.

The uGI1 can be unplugged at any time from the USB port. However if you have changed any parameters, be sure to write them to the uGI1 before unplugging the device.

4.3.1.5 Factory Options

The “Factory Options” box will display any factory configured options.

4.3.1.6 Firmware

The “Firmware” box will show the firmware version of the uGI1 that was last read.

4.3.1.7 Serial#

The “Serial#” box will show the electronic serial number of the uGI1 that was last read.

4.3.1.8 Read/Write Config File

The “Write Config To File” button may be used to store a copy of the current configuration to a file on the PC. The configuration may be retrieved by using the “Read Config From File” button. After loading the configuration from a file, it must still be written to the uGI1 before the changes become effective.

4.3.1.9 Read Faults

The “Read Faults” button is used to read out any faults that might be present within the uGI1. The information present in this box should be sent to Mobiltex for analysis when faults are encountered.

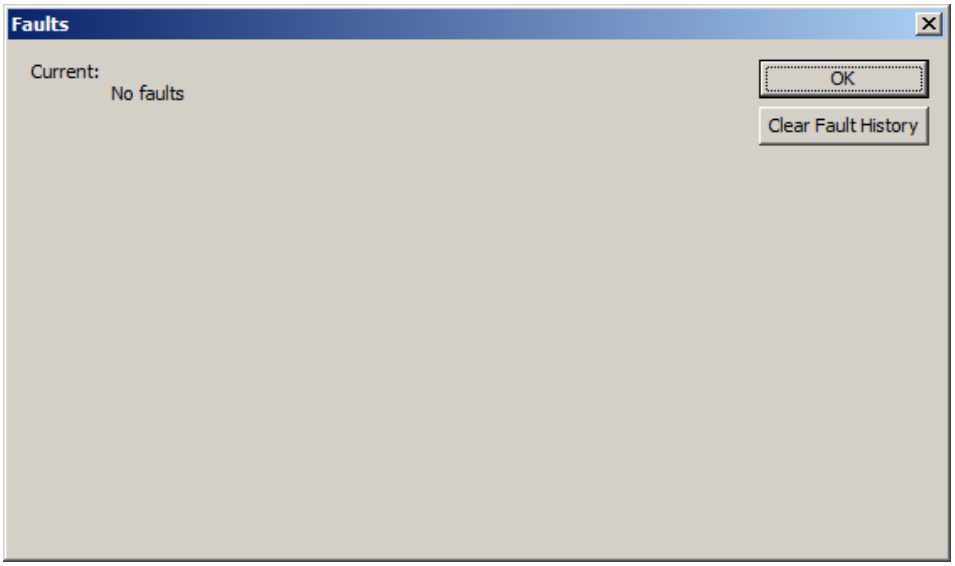

Figure 7 Faults Dialog

4.3.1.10 Detailed Status

The “Detailed Status” button causes a pop-up window to appear. The window includes detailed information about several items used by the uGI1.

The GPS Status information may be used to diagnose GPS satellite signal reception issues that may prevent time lock from occurring. Ideally, more than 3 satellites should be in the fix for a reliable lock.

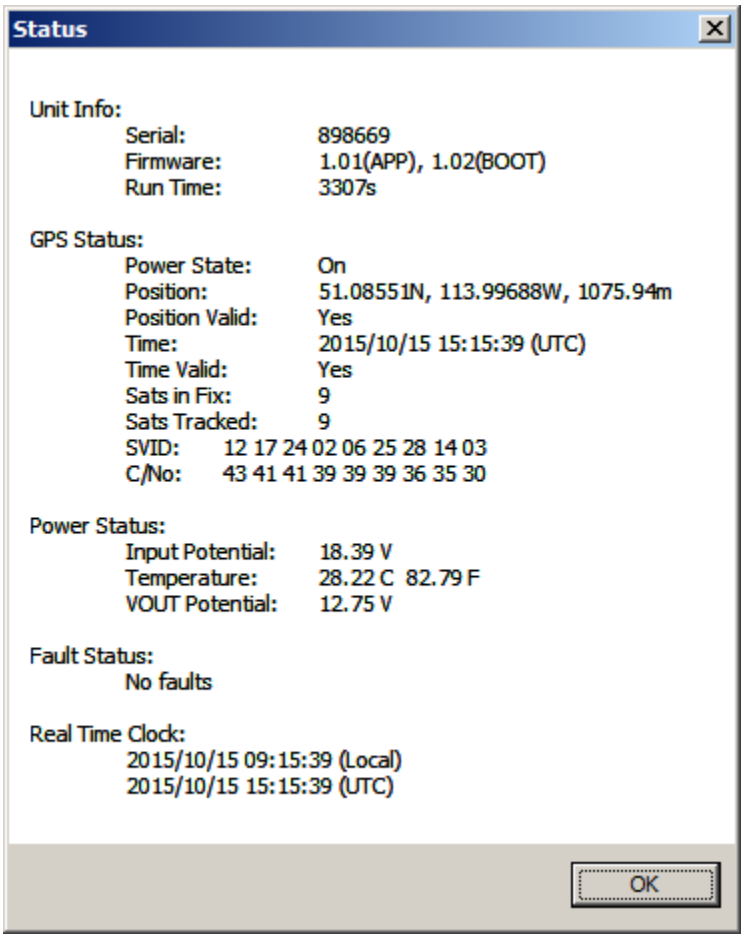

Figure 8 Detailed Status Dialog

4.3.1.11 Event Recorder

The "Extract Event Recorder" button allows extraction of the event data from the uGI1 into a CSV file. Data is extracted in UTC (GMT) time. When the "Extract Event Recorder" button is clicked the following save as screen will prompt the user for the storage filename.

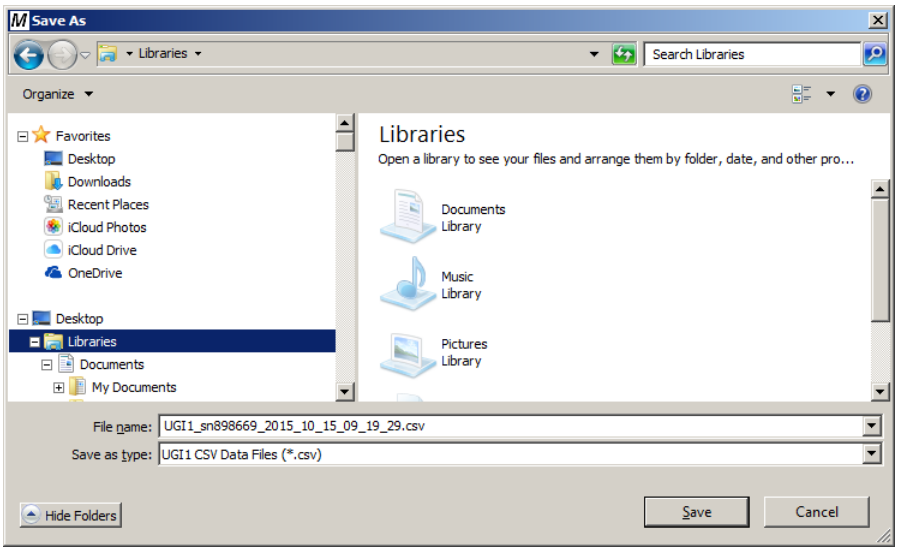

Figure 9 Extract Event Recorder File Dialog

The stored file is saved in a comma separated value (CSV) format that can be imported into spreadsheets (i.e. Excel) and other applications that support CSV import. Note that older versions of Excel support a maximum of 65,000 lines so large measurement files may not be completely displayed when using those Excel versions. Excel versions prior to and including version 2003 will have this limitation.

The CSV file is arranged as indicated in the following Excel screen capture. The first line contains header information which identifies the contents of each column.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Record Index	Record Category	Record Type	Date/Time(UTC)	Excel Time(UTC)	Input(Volts)	Profile Mode	On Time(ms)	Off Time(ms)	On First	No GPS	Relay Type	Interruption Status
2	1	Power	Power-up(898669,1.01)	10/15/2015 13:36:04	10/15/2015 13:36:04	19.2							
3	2	Notes	Notes	10/15/2015 13:36:04	10/15/2015 13:36:04								
4	3	Profile	Start	10/15/2015 13:36:04	10/15/2015 13:36:04		Always Interrupting	2000	1000	No	No	Solid State	Interrupt Waiting
5	4	GPS	Status	10/15/2015 13:36:04	10/15/2015 13:36:04								
6	5	GPS	Status	10/15/2015 13:36:06	10/15/2015 13:36:06								
7	6	Profile	Interrupter Change	10/15/2015 13:36:09	10/15/2015 13:36:09		Always Interrupting	2000	1000	No	No	Solid State	Interrupting
8	7	Profile	Change	10/15/2015 13:36:11	10/15/2015 13:36:11		Always Interrupting	2000	1000	No	No	Smart Relay SRL1	Interrupting
9	8	Smart Relay	Info(SRL1,850002,1.020,10-15-2015)	10/15/2015 13:36:11	10/15/2015 13:36:11								
10	9	Smart Relay	On Validation Failure	10/15/2015 13:36:22	10/15/2015 13:36:22								
11	10	Profile	Change	10/15/2015 13:36:48	10/15/2015 13:36:48		Always Interrupting	2000	1000	No	No	Solid State	Interrupting
12	11	Power	Power-up(898669,1.01)	10/15/2015 13:37:19	10/15/2015 13:37:19	19.5							
13	12	Notes	Notes	10/15/2015 13:37:19	10/15/2015 13:37:19								
14	13	Profile	Start	10/15/2015 13:37:19	10/15/2015 13:37:19		Always Interrupting	2000	1000	No	No	Solid State	Interrupt Waiting
15	14	GPS	Status	10/15/2015 13:37:19	10/15/2015 13:37:19								
16	15	GPS	Status	10/15/2015 13:37:21	10/15/2015 13:37:21								
17	16	Profile	Interrupter Change	10/15/2015 13:37:25	10/15/2015 13:37:25		Always Interrupting	2000	1000	No	No	Solid State	Interrupting
18	17	Profile	Change	10/15/2015 13:54:55	10/15/2015 13:54:55		Always Interrupting	2000	1000	No	No	Smart Relay SRL1	Interrupting
19	18	Smart Relay	Info(SRL1,850002,1.020,10-15-2015)	10/15/2015 13:54:55	10/15/2015 13:54:55								
20	19	Smart Relay	On Validation Failure	10/15/2015 13:54:55	10/15/2015 13:54:55								
21	20	Smart Relay	Periodic	10/15/2015 13:55:55	10/15/2015 13:55:55								

	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Latitude	Longitude	Sats Tracked	Sats In Solution	Position Valid	Time Valid	GPS C/NoAv4 (dB)	GPS EHPE(m)	Relay Closed Current (ARMS)	Relay Open Fault	Relay Temperature(C)	Notes
2												This is a test of the notes field. Testing 1,2,3.
3	0	0	0	0	No	No	0	0				
4	51.08554	-113.99695	2	11	Yes	Yes	37	18.6				
5												
6												
7									0	No	26	
8												
9												This is a test of the notes field. Testing 1,2,3.
10	0	0	0	0	No	No	0	0				
11	51.08551	-113.99689	0	11	Yes	Yes	0	21.8				
12												
13												
14									0	No	29	
15									0	No	28	

Figure 10 Sample Event Recorder File

After the data has been extracted from the uGI1, the data memory on the device may be cleared by clicking the "Clear Event Recorder" button. Note that clearing memory may take up to 60s to complete.

4.3.1.12 Reboot uGI1

The "Reboot uGI1" is used to restart the uGI1 application.

4.3.1.13 Set uGI1 Clock

The "Set uGI1 Clock" is used to set the clock of the uGI1 from the PC clock. Normally, the uGI1 clock will automatically be set from the GPS receiver as soon as a valid GPS time fix is detected.

If the "No GPS" mode is enabled in the configuration, the uGI1 clock should be set at least once before interruption is attempted to allow for proper time stamps in the internal event recorder. Beyond that, the clock should be updated periodically to resynchronize the clock to actual time. The internal clock of the uGI1 model can be expected to drift as much as +/-10s each month without GPS synchronization. The uGI1 will maintain the real time clock as long as the internal backup battery is not fully depleted.

4.3.2 Profile Tabs

All items in the "Profile" tabs may be reset back to factory defaults by clicking on the "Defaults" button. Each tab corresponds to a different selectable profile, each with independent configurable options.

4.3.2.1 Mode

The mode group allows the profile operational mode to be selected. Six types of profiles are available as shown in Table 1.

Mode	Description
Profile Disabled	Profile is disabled and cannot be selected when the profile select button is pressed on the unit.

Rectifier On	Interruption relay is always closed.
Rectifier Off	Interruption relay is always open.
Always Interrupting	The selected cycle parameters are used to drive the interruption relay as soon as the profile is selected. Schedule options are not used. Also allows for No-GPS mode of operation.
Daily Repeat with Start/Stop Schedule	The selected cycle parameters are used to drive the interruption relay as soon as the schedule conditions are met. The schedule start and stop date/times are selected and the uGI1 interrupts from the start date to the stop date, but only between the selected start and stop hours each day.
Continuous With Start/Stop Schedule	The selected cycle parameters are used to drive the interruption relay as soon as the schedule conditions are met. The schedule start and stop date/times are selected and uGI1 interrupts continuously between those two time points.

Table 1 Profile Operation Modes

Depending on the selected profile mode, additional groups will be displayed in the profile tab.

4.3.2.2 Relay Options

The relay used with the uGI1 must be defined so that it is driven correctly. Two pre-defined relay types are available, solid state normally open and Mercury normally closed. In addition, a custom relay type may be defined with individual adjustable parameters for contact type, synchronization to AC line waveform, coil voltage and contact open/close dwell times.

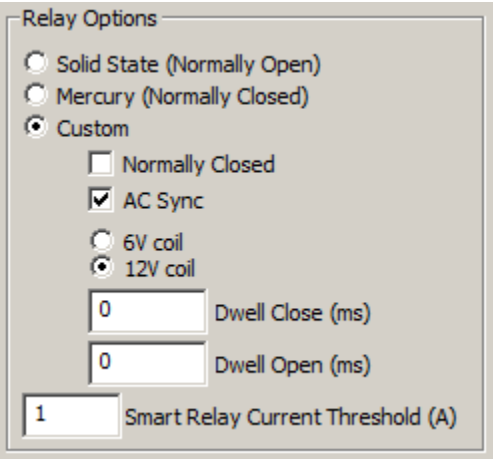

Figure 11 Relay Options

The Smart Relay Current Threshold option allows the unit to log and indicate correct operation of the relay when a Mobiltex Smart Relay (e.g. SRL1) is used with the uGI1. The uGI1 uses this parameter as the comparison value against the measured relay current to determine if correct current is being delivered during the on phase of interruption.

4.3.2.3 Cycle Parameters

The cycle parameters group defines the actual interruption waveform used and it synchronization to UTC time.

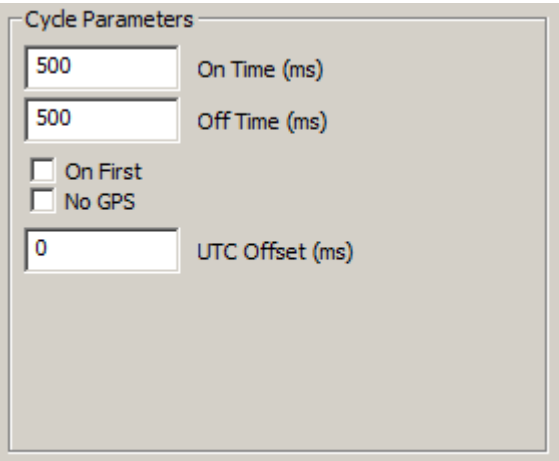

Figure 12 Cycle Parameters

"On Time (ms)" sets the duration of the on-phase of the waveform.

"Off Time (ms) sets the duration of the off-phase of the waveform. The sum of the off time and on time parameters must be less than or equal to 60,000ms.

The "On First" option selects the phasing of the waveform relative to the top of the minute. If left unchecked, the unit will transition to the off-phase at the top of the minute. Checked, the unit will transition to the on-phase at the top of the minute.

The 'No GPS" option is only available with the "Always Interrupting" mode of operation. When used, the unit will not use GPS information to synchronize the interruption waveform. This can be useful when interrupting a single rectifier in an area where GPS reception is not possible.

"UTC Offset (ms)" is used to slide the interruption waveform in time to align it with other manufacturers' equipment that may not align exactly with UTC time. Typically, this parameter is left at its default value of 0.

4.3.2.4 Schedule Options

The schedule options group is used to select start/stop times for the interruption profiles.

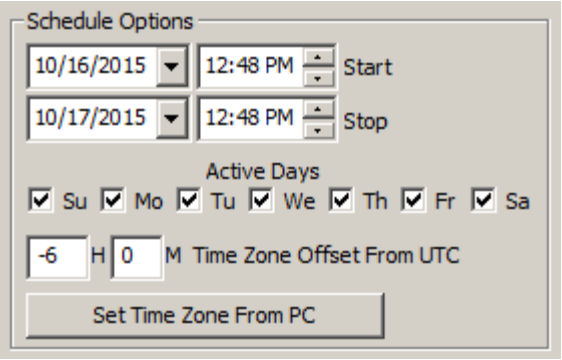

Figure 13 Schedule Options

"Start" selects the profile start date/time. "Stop" selects the profile stop date/time. When in "Continuous With Start/Stop Schedule" mode, the uGI1 will interrupt 24 hours per day between the start and stop dates when operation spans multiple days. When in "Daily Repeat With Start/Stop Schedule" mode, the uGI1 will interrupt between the start and stop time each day for the selected date range.

"Active Days" allows the schedule to be further controlled to only become active on certain days of the week. The selected days can be used with either schedule type of operation.

The "Time Zone Offset From UTC" option allows the local time zone offset to be specified. Start and stop date/times are specified in local time. To operate in UTC mode, set this to 0 hours 0 minutes. The "Set Time Zone From PC" button allows the time zone offset to be filled in from the current PC system settings.

4.3.3 General Options

All items in the "General Options" group may be reset back to factory defaults by clicking on the "Defaults" button. General options are common to all profiles.

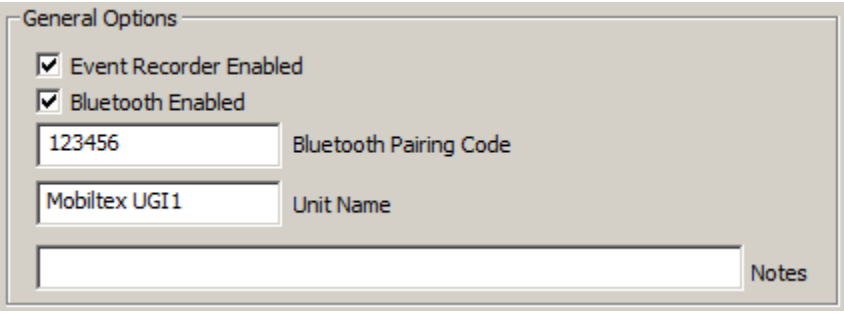

Figure 14 General Options

"Event Recorder Enabled" configures the unit to log events in internal memory for later retrieval. This can be useful to later validate that interruption was set correctly, and when using a Smart Relay also validate relay operation through the interruption activity.

"Bluetooth Enabled" allows the unit to be configured and queried using a compatible smart phone or tablet. This option is used in conjunction with the "Bluetooth Pairing Code"; the pairing code must be entered on the smart phone or tablet to allow for successful pairing of the devices. To initiate Bluetooth pairing mode on the uGI1, press and hold the SEL button for 5s until the Bluetooth icon lights up on the LCD screen.

The "Unit Name" parameter is a freeform text box used to identify the unit. This information is included when exporting the configuration information to a text file.

The "Notes" section allows the user to enter freeform text. This text is inserted into the event recorder memory when enabled. A maximum of 256 characters can be entered into this field.

5 Operation

The uGI1 can be powered from an AC or DC voltage source. The acceptable input range is: **8VDC to 52VDC** or **6VAC to 36VAC**. The current draw is dependent on the type of interruption relay and can range from under 1 watt to 6 watts.

The AC line synchronization function will only work when the uGI1 is powered by an AC power source. The uGI1 has internal transient protection and can be directly connected to a suitable location on the rectifier taps. Use a voltmeter to find a tap voltage between 6VAC and 36VAC. **Ensure that the tap voltage is within limits with the protected structure lead disconnected from the rectifier; unloaded transformers (i.e. during the interruption off phase) will output substantially higher voltages than loaded transformers.**

Connect the two yellow wires to the suitable voltage source. If a suitable tap voltage cannot be utilized, then an AC Class 2 transformer or DC voltage source can be used to power the uGI1. The uGI1 has an integral auto polarity feature so the polarity of the DC source is not important; simply connect the two yellow wires to the suitable DC source.

Figure 15 uGI1 Power Connections (AC voltage from rectifier taps or DC voltage connections)

The SRL1 smart relay or external relay cable connector end mates to the black side connector located on the uGI1. The white arrow on the cable side connector must point to the uGI1 bottom side in the location of the "CABLE ARROW" label. The cable snaps into place when installed and provides a waterproof connection. To remove the cable, simply pull the cable connector away from the uGI1 while grasping the cable over-molded end. The cable can be installed and removed with or without power present on the cable or SRL1.

Figure 16 uGI1 Connector Alignment Arrow

5.1 SRL1 Smart Relay Installation

The SRL1 smart solid state relay can interrupt up to 50 Amps AC or DC when mounted on an optional medium heatsink. If the SRL1 is not mounted on a heatsink it can interrupt up to 25 Amps AC or DC. The acceptable switching voltage is 0-90VDC or 0-70VRMS AC. The relay has an on resistance of 10 milliohms and there are no minimum switching voltage restrictions.

Determine if you wish to interrupt the rectifier DC output (90VDC max.) or a suitable transformer tap location (72VAC max.). Disconnect the primary AC line power from the rectifier and lockout the circuit breaker. If you wish to interrupt the DC rectifier output, then install the two black heavy gauge SRL1 wires in series between the rectifier and protected structure. The black wires are not polarity sensitive.

If you wish to interrupt using a transformer tap, then remove the rectifier tap bar and install the two black heavy gauge relay wires from the SRL1 in the removed tap bar location. Re-apply rectifier primary power after the connections have been completed and the installation has been inspected.

Figure 17 SRL1 Relay Contacts Installed In Series With Taps (Tap Bar Removed While In Use)

5.2 External Relay Installation

The uGI1 provides a 12VDC @ 0.5 Amp maximum for the interruption relay control signal output. The relay control signal is current limited and protected from external overvoltage and transient conditions. On the external relay cable, the black wire is the negative relay drive output and the red wire is the positive relay drive output. The relay dwell timing and contact type (NC or NO) is configurable in each of the 10 available interruption profiles.

An AC line sync feature is available for installations that switch the primary line signal with an AC solid state relay. AC line sync requires an AC power source (via the yellow power wires) and a random turn-on solid state AC relay. The AC line sync function switches the rectifier transformer on at the zero current crossing of the AC line in order to minimize high inrush currents as a result of constantly switching on an inductive transformer load.

Turn off the primary AC line power from the rectifier and lockout the circuit breaker. Install the user provided installation relay and connect the relay contacts to the appropriate interruption locations. Connect the red and black wires from the external relay cable to the coil or control signal of the relay. Re-apply rectifier primary power after the connections have been completed and the installation has been inspected.

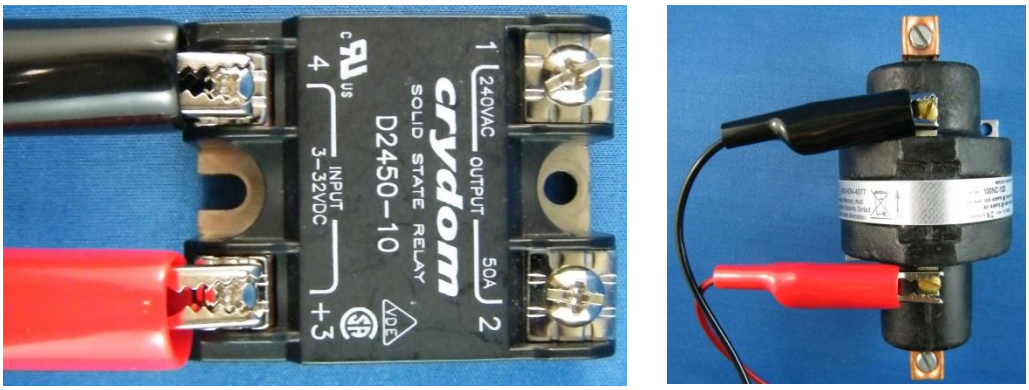

Figure 18 Connecting a Solid State Relay or a Mercury

5.3 uGI1 Mounting

The uGI1 is housed in a waterproof (non-submersible) enclosure intended to be placed outside of the rectifier enclosure. The relay/power cable connection is waterproof when mated to the uGI1. The device should be positioned outdoors and have a good view of the sky with the corTalk® logo pointing up to the sky. The bottom base of the uGI1 is magnetic to allow attachment to ferrous mounting surfaces. There are four self-tapping screw (special plastic tapping screws available from Mobiltex) locations on the bottom base that can be used for permanent attachment.

Figure 19 Mounted On Top of a Rectifier Cabinet (uGI1 LCD Display Facing Down)

An optional padlock for the uGI1 is available from Mobiltex. A Master Lock 130D padlock can also be utilized. Installing the padlock on the uGI1 requires the lock shank to be sequentially positioned in order to pass through the two lock holes on the uGI1.

Figure 20 Examples of Mobiltex padlock installation

A Master Lock Python 8417D cable can also be used to secure the uGI1.

Figure 21 Master Lock 8417D Installation (Cable Fits Through uGI1 Lock Holes)

5.4 uGI1 Operation

The bottom control panel of the uGI1 has two LED's, an LCD display and single pushbutton. Each time the "SEL" button is pressed, the next available profile will be selected. The large single LCD digit displays the selected profile number. The smaller digits and icons will cycle through the specific settings associated with the selected profile.

The red "INT" LED illuminates whenever the interruption relay has turned off the rectifier. The green "OK" LED illuminates when the uGI1 is ready for interruption or actively interrupting. An OK condition requires: GPS time & position lock, sufficient GPS signal level, proper supply voltage to the uGI1, and AC signal power present (only if AC line sync is selected).

A Windows PC running the uGI1 configuration application can edit and save profiles of the uGI1 using the uGI1 USB cable. The uGI1 will also support profile editing using short range wireless BLE communications with suitable iOS (Apple) devices. All factory default profiles assume a 12V, normally open, solid state relay with an open and close dwell of 0mS and the interruption cycle starting in an off phase. The factory default profiles are listed below.

Profile #	On (mS)	Off (mS)	Cycle Phase	Enabled	Relay	Coil Volts	Contacts	AC Sync	Open Dwell	Close Dwell	Schedule	Daily Repeat	UTC Offset
0	Rectifer always on		-	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
1	700	300	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
2	800	200	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
3	1500	500	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
4	3000	1000	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
5	4000	1000	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
6	4500	1500	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
7	9000	1000	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
8	12000	3000	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS
9	14000	1000	Off First	Yes	Solid State	12V	N/O	Yes	0 mS	0 mS	No	No	0mS

Table 2 uGI1 Factory Default Profiles

The uGI1 conducts the GPS synchronization at the top of the minute. In order to attain a consistent interruption pattern the user should utilize an interruption cycle that is a whole number divisible by 60 seconds.

A modern, high performance GPS receiver with a high gain antenna is integral to the uGI1. From a cold start condition the GPS receiver will attain a position lock within a minute or two. From a cold start condition it could take a maximum of 11 minutes to attain the exact GPS time including leap second offset. The uGI1with retain GPS information for approximately 1 month which speeds up GPS reacquisition after the initial cold startup.

5.5 LCD Display

A wide operating temperature range LCD provides the user with profile details and device operation.

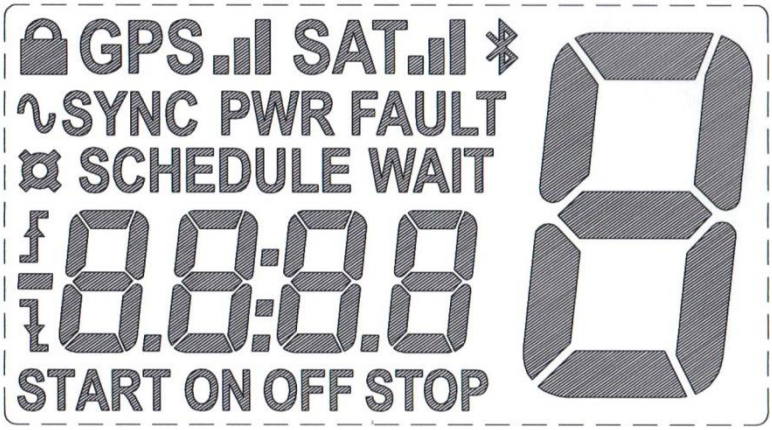

Figure 22 LCD display layout

	The large single digit displays the selected profile number (0-9).
8.8:8.8	The small digits display interruption timing, start / stop times and load current (when smart relay is used).
ON	Interruption On time.
OFF	Interruption Off time.
START	Interruption schedule start time.
STOP	Interruption schedule stop time.
SCHEDULE	Interruption schedule.
WAIT	Waiting for schedule to start.
	The interruption cycle phase starts in the ON state.
	The interruption cycle phase starts in the OFF state.
	Selected profile uses AC line sync.
SYNC	AC signal present and AC line sync is operational.
GPS	GPS receiver on and GPS signal strength.
	GPS time lock.
	Displayed when a smart relay is detected.
	Bluetooth connected or pairing mode enabled.
PWR SAT	These LCD features are not used in the present version of uGI1 firmware.

Table 3 uGI1 LCD Icons

6 Firmware Updates

As required, Mobiltex will periodically release firmware update packages for the uGI1. The firmware is included with the configuration application package. The uGI1 configuration application will warn the user if a firmware update is necessary on an attached uGI1.

To update the uGI1 firmware, exit the uGI1 configuration application and execute the uGI1 Firmware Update application from the Windows start menu. The dialog in Figure 23 will be shown.

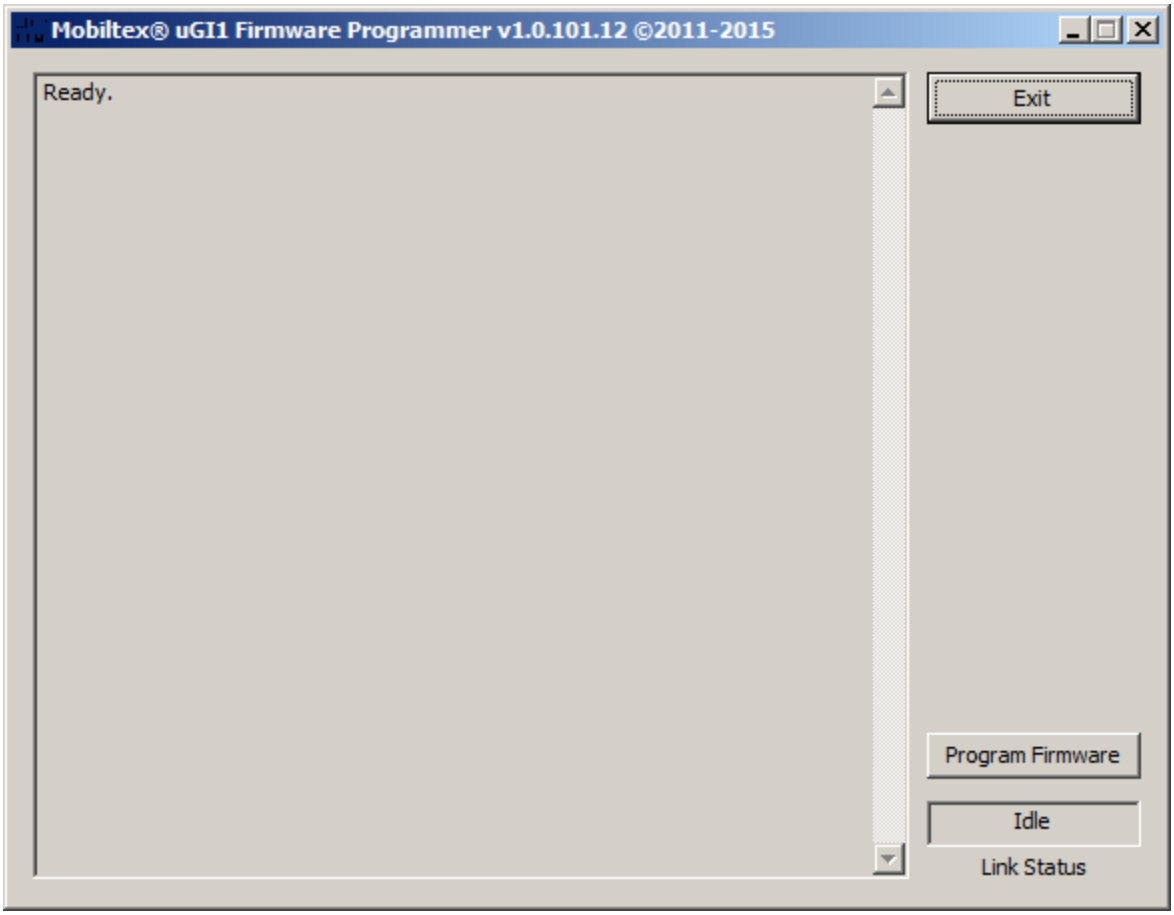

Figure 23 uGI1 Firmware Update Application Dialog

To start the firmware update process, first ensure that the uGI1 is connected to a USB port on the computer. Next, click on the 'Program Firmware' button. The application will indicate progress as the firmware is downloaded to the uGI1 (see Figure 24). Do not attempt to interrupt the firmware download process once it has started. Once the message 'uGI1 completed firmware programming' is display, exit the firmware update application. The uGI1 will reboot and can then be used immediately with the configuration application.

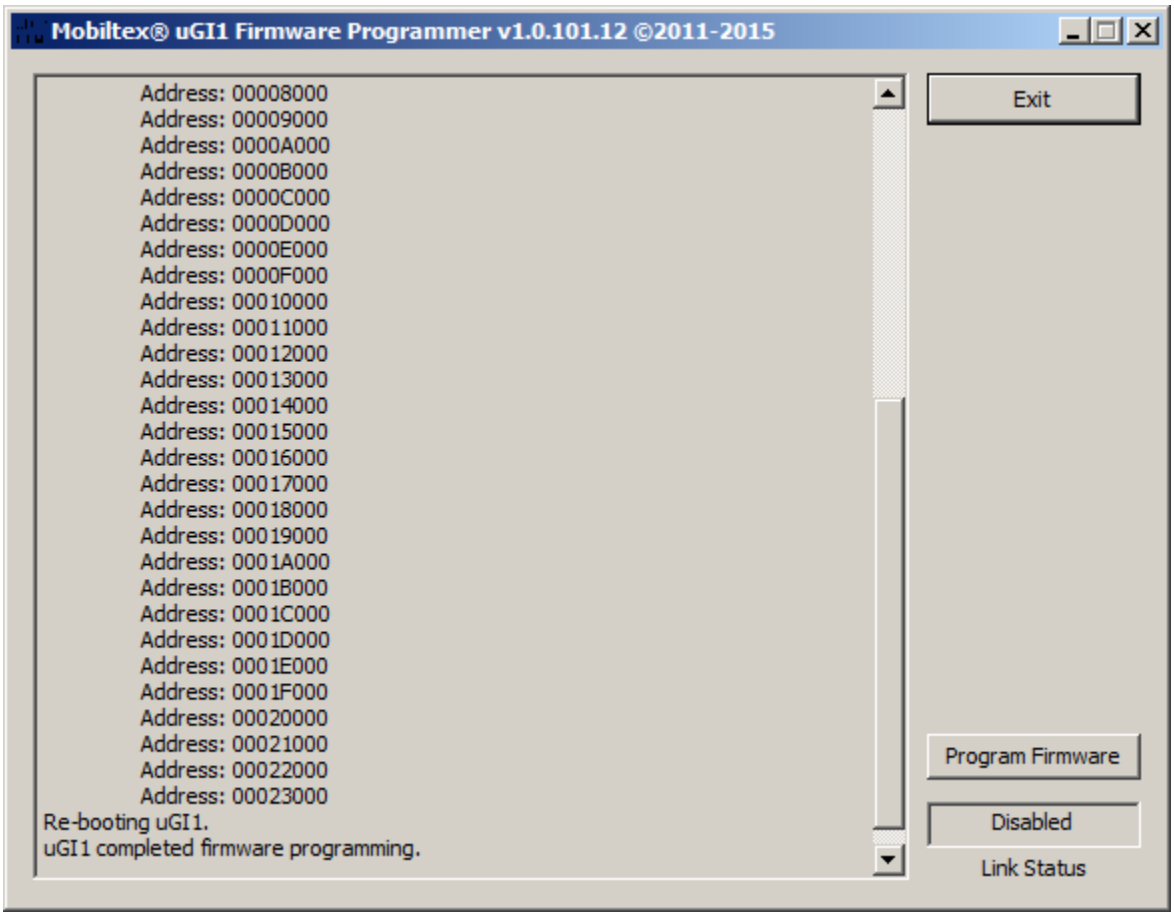

Figure 24 uGI1 Firmware Update Application Progress

The latest uGI1 software package may be downloaded from the Mobiltex web site at the following URL:

http://www.mobiltex.com/cathodic/ugi1

A. uGI1 Equipment Specifications

Operating Temperature	-22° to +70° C (-30° to +158° F)
Storage Temperature	-40° to +85° C (-40° to +185° F)
Humidity	0 to 100% RH non-condensing
Maximum Altitude	5000 meters above sea level
Pollution Degree	1
Size	83.5 x 79.5 x 30.6 mm (3.3 x 3.12 x 1.2”)
Weight	100g (0.22 lbs)
Enclosure	UV stable, wide temperature polycarbonate
Operating voltage range	8-52VDC or 6-36VAC
Power	10W watts maximum
Display	Fixed Segment LCD
Timing Accuracy (AC Line Sync Disabled)	+/-0.5 ms
Timing Accuracy (AC Line Sync Enabled)	+8.8/-0.5 ms
Relay Drive Voltage	6 or 12 volts DC
Relay Drive Current	0.5 Amp maximum
Relay Contact Close Dwell	0-255 ms
Relay Contact Open Dwell	0-255 ms
Relay Contact Type	NO or NC
Relay Type	Solid state or mechanical
Off Time	100 – 60,000ms in 1ms steps
On Time	100 – 60,000ms in 1ms steps
Cycle Phase Order	Programmable (off first, or on first)
GMT Time-zone Offset:	+/- 12 hours
UTC Reference Offset Adjustment:	+/-2500ms in 1ms steps
Interruption Profiles	10
Profile Memory	Non-volatile EEPROM
Event Log Memory Size	2,000,000 entries
GPS Receiver	56-channel u-blox
PC Connection	USB 2.0
Wireless Interface	Bluetooth Smart Ready 4.0

Technical assistance may be obtained from:

Attn: Service Department
Mobiltex Data Ltd.
3640-26th Street NE
Calgary, AB T1Y 4T7
Canada
Tel: (403)291-2770
Main Website: http://www.cortalk.com
Service Website: http://www.mobiltex.com/service