GC-10 Wireless Control Box

User Guide

1. Introduction

This GC-10 Installation and User Guide will assist you in installing and configuring the Brodersen GC-10 Wireless Control Box. The guide covers installation of the configuration software and gives detailed descriptions of all the setup features of the GC-10.

The guide is divided into sections of which the main parts are Software installation and a User Guide describing the setup possibilities for the GC-10 and options for each variable.

Wiring and installation details are found in the GC-10 Installation Guide. Further information can be found on Brodersen¥s homepage www.brodersencontrols.com, where you will find the latest news including programming examples and application notes.

Questions can also be addressed to your local distributor.

Index

3. General Information

3.1 Deliverables

The GC-10 is delivered in a box containing all that is needed for you to start using the GC-10 Wireless Control Box:

GC-10 Wireless Control Box.
Power Cable.
Configuration Cable.
GSM Antenna.
A CD with GC-10 Configuration Coftware.
GC-10 User Guide.
GC-10 Installation Guide.

3.2 GC-10 Basic Functionality

The GC-10 Wireless Control Box performs simple remote control functions, data logging and communication via SMS messages using the integrated modem. The main features are:

- Sending of SMS messages prompted by:
  - Change of digital input.
  - Reaching a predefined setpoint on an analogue value ñ such as temperature, level and flow.
  - Cyclic.
- Remotely setting of On and Off by controlling outputs via SMS messages from your mobile telephone.
- Reporting in and output status on SMS request.
- Real time alarm scheduling with sets of profiles.
- Simple control functions including a timer.
- Local data logging with time stamp.

4. Getting Started

Before starting we recommend that you read the User Guide and the Installation Guide. Please pay special attention to the section describing the details of electrical safety when working with the GC-10.

The User and Installation Guide will take you through the installation and configuration of the GC-10 step by step to ensure a trouble free operation:

- Place a SIM card in the SIM cardholder. *Make sure that the PIN code is disabled*.
- Fit the GSM antenna to the antenna plug.
- Connect the power cable to the power supply terminals. Please take note of the power supply voltage printed on the label next to the power supply terminal.
- Plug the configuration cable into the programming port available on the GC-10 (top right corner). Plug the Sub-D 9 pole into a free COM port on your PC (if you have no COM port on your PC, you should use a USB-to-RS232 converter, and use your USB port instead).
- Install the GC-10 configuration software on your PC according to the instructions in the Software Installation Section (see page 26).
- Apply power to your GC-10 and wait for it to get connected to the GSM network (the modem LED on the GC-10 front should start flashing slowly). If the modem LED is ON all the time, the GSM is not connecting to the GSM network. Check that you have disabled the PIN code and that the SIM card works satisfactorily in a mobile telephone.

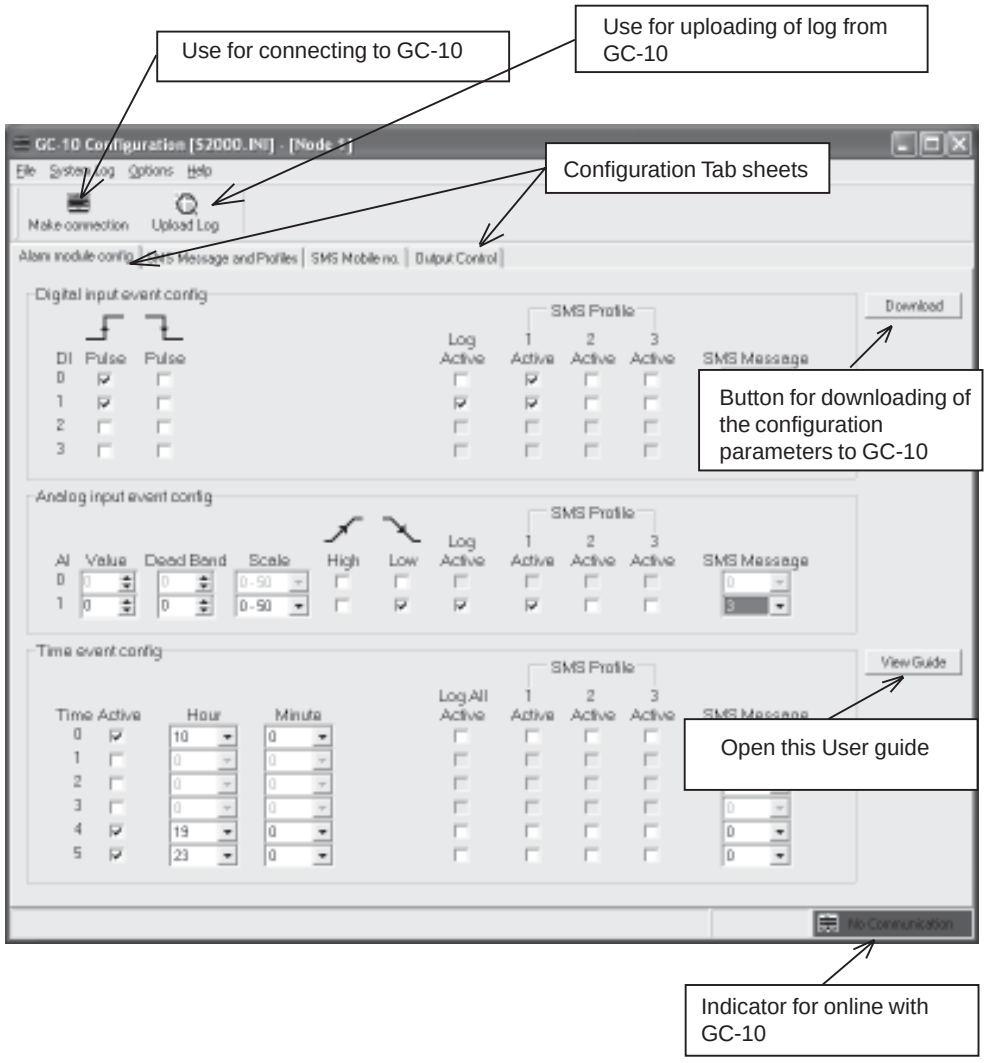
You are now ready to start configuring the GC-10.

5. User Guide

5.1 Starting GC-10 Configuration Tool.

On your desktop you will find a GC-10 **Config icon**. Start the configuration tool by double clicking on this icon.

During start up the drivers will be initiated. You will see it as small pop-up boxes with progress bars appearing and disappearing. Finally the configuration tool will start the main user interface:



5.2 Procedure for Setting Up the GC-10

Please make sure that the GC-10 is powered.

Read the module data by clicking on **Make Connections**.

When the Rescan pop-up menu appears, you select the COM port used. no. other settings are needed. Select OK and the configuration software scans the module i.e. connects to and recognises that the GC-10 is present.

After the rescan procedure is finished the module is on-line. You can check the status in the field in the low right corner. If it has turned green, it indicates that GC-10 is on-line. If it has not turned green, check that the cable is correct, the module is powered and try to connect to the module again.

The GC-10 is now ready for setting up. All the adjustable parameters can be configured according to the section *Setup and Configuration Parameters* (see page 8).

When all settings are done as required in the actual application the settings can be downloaded to the GC-10 unit by clicking the **Download** button.

5.3 Saving and Restoring Configuration Data Files

Saving the settings in the configuration tool is done by selecting **File and Save as**Ö . The settings are saved in a project file (*.ini). Use a filename which can be recognised when you later want to use it again. The project (*.ini) file contains all settings and can be copied and used on other PCs.

When you want to download the data from a saved project file, just connect the GC-10, open the file and make sure that the GC-10 is on-line. Click **Download** and all the settings from the file are downloaded to the GC-10. If you want to store the settings to more GC-10ís, just connect a new GC-10, apply power and click the **Download** button again. Each time you should make sure that the module is on-line before downloading.

5.4 Closing the GC-10 Configuration Tool and the Drivers.

Important note: When you are running the configuration tool, the communication driver requires full service from the COM port and it does not accept any other programs using the COM port. After closing the software, you must close the basic driver. You will find the **driver icon** on the bottom right side of your screen. Point at the icon, right click your mouse and select ë**close**ë to close driver ñ now your COM port is cleared for use by other programs.

6. Setup and Configuration Parameters

6.1 General About Configuration

The configuration tool is designed to provide you with easy and simple configuration features. It is important that you get familiar with the basic configuration strategy. (See page 6)

- Start with the *'**Alarm Module Config**'* tab sheet. Define which events should activate which actions.

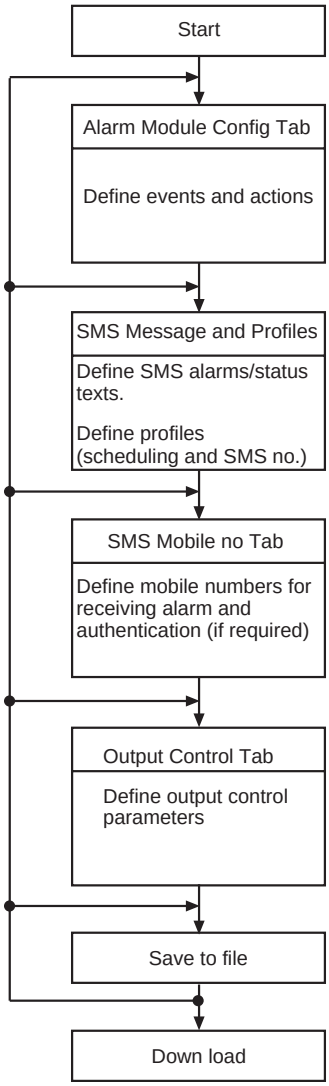
- Next you enter the *'**SMS Message and Profiles'*** tab sheet. Enter SMS Message texts and setup profiles of the SMS alarm message recipients.

- Third step is to enter the *'**SMS Mobile No**'* tab sheet and enter all the mobile nos. for receiving SMS alarm messages. Authentication for receiving status messages and changing outputs are also provided here.

- Finally you enter the *'**Output Control**'* tab sheet. This is for configuring simple control functions i.e. type of input event controlling which output.

After setting up the parameters according to your application and functions, you save the configuration in a project file (*.ini) and download the settings into the GC-10 by pressing the **Download** button.

We recommend that the first time you follow the described configuration flow - see page 9 - as the selection options in a previous tab sheet may disable or enable the parameter settings on the following tab sheets.



The procedure for remotely controlling outputs is described in section **Controlling output with SMS from mobile phone**. (See 6.6 page 18)

6.2 Configuration – Alarm Module Config Tab Sheet (See fig. page 6)

Digital input Event Config
For each of the 4 digital inputs you can define what a pulse-up and/or pulse-down event should do. The possibilities are:

- Activate SMS profile 1-3: Define which SMS profile an event should activate (see page 15).

- SMS Message: Defines the SMS message no. to send. SMS no. refers to the SMS message defined in the next tab sheet.

- Log active: logs the event in the GC-10 with a time stamp.

NOTE: When applying power, the GC-10 will see an active input as a pulse-up event (if only ‘**pulse-up**ë box is ticked). If both ë**pulse-up**ë and ë**pulse-down**ë boxes are ticked, no event is activated at power up until there is a change in the input.

Analogue Input Event Config

The analogue inputs are 12-bit resolution (0-4095 bits). This means that minimum input equals the value 0 and maximum input equals 4095. For each of the 2 analogue inputs you can define:

- Value = setpoint value in bits. If the analogue input value passes a defined setpoint an event is activated. You can calculate the bit value from the following formula:

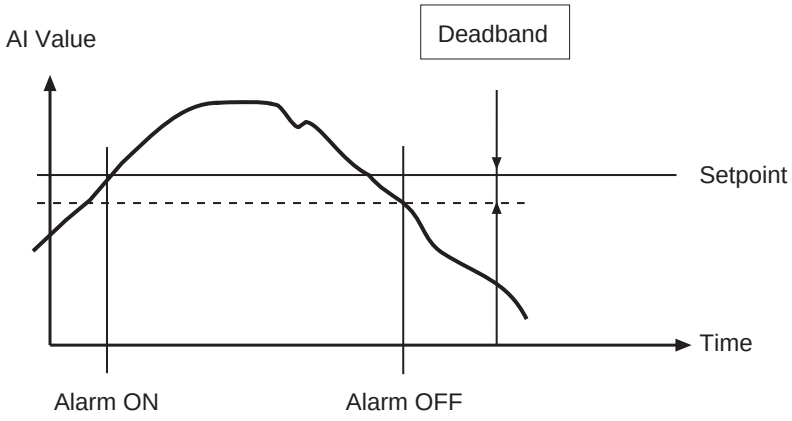
  $$\text{Setpoint value} = \frac{4096 \times (\text{setpoint} - \text{min. Input})}{\text{Max. value} - \text{min. value}}$$

  Example: Input range is 4-20mA, setpoint wanted is 10mA.

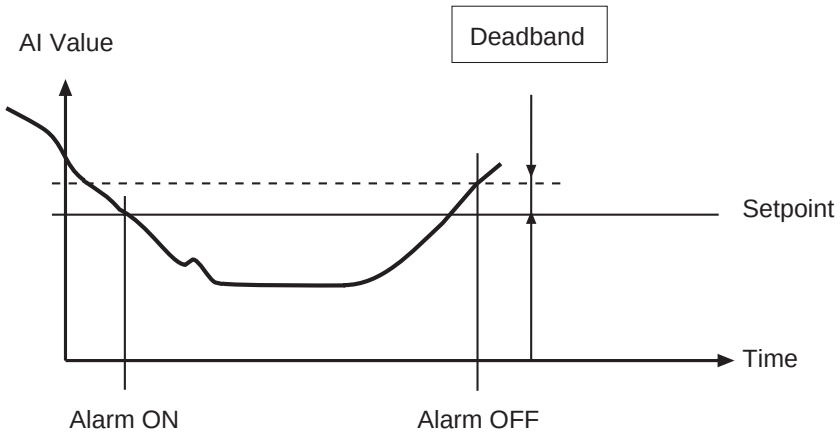
  $$\text{Setpoint value} = \frac{4095 \times (10\text{mA} - 4\text{mA})}{20\text{mA} - 4\text{mA}} = 1535 \text{ bits}$$

- Deadband: Define deadband (Hysteresis/window) in number of bits.

High Activated



LOW Activated



- Scale: Define scaling of analogue input to be reported in SMS. Only the values in the drop-down menu are possible.
- High/Low: Activate when setpoint is reached up and/or down.
- Log: logs event with time stamp in GC-10.
- SMS profile: Activate SMS profile 1-3. Define which SMS profile an event should activate.
- SMS Message: Defines the SMS message phone no. to send.

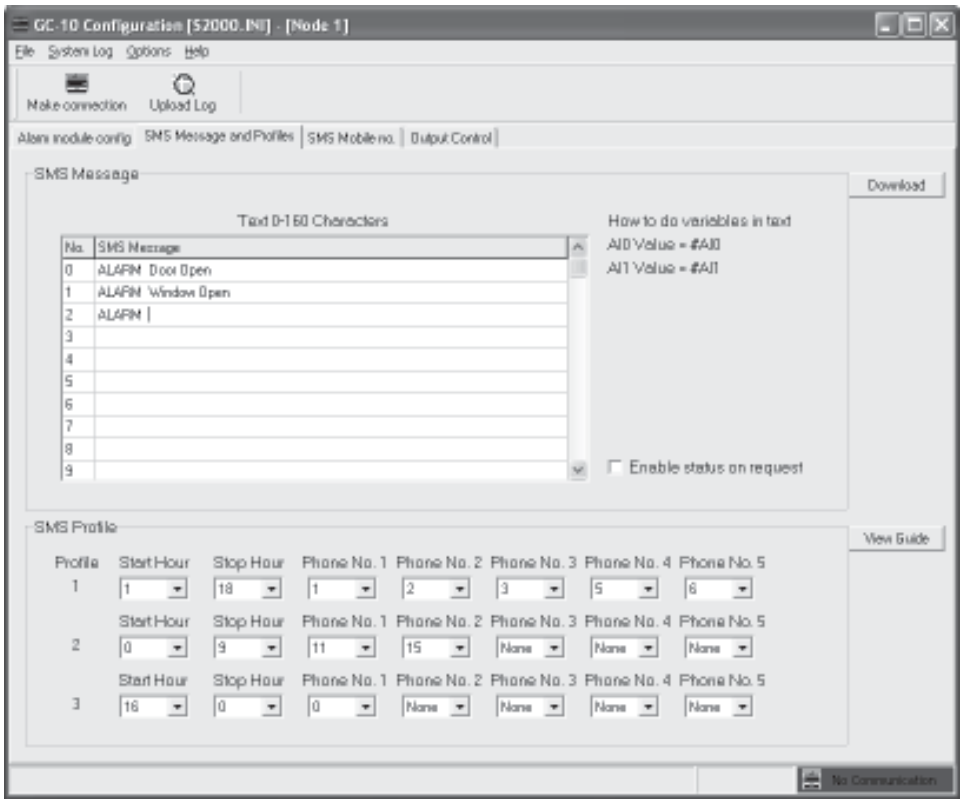
Time Event Config

Defines up to 6 cyclic activities for sending SMS and/or logging all in and outputs in GC-10 log. The options are:

- Active: Defines if a cyclic time event should be enabled.
- Hour & minutes (time settings): Select at which time every day the cyclic event should be performed.
- Log All: Activates that the I/O values will be logged cyclic as defined in the time setting
- SMS profile: Activates SMS profile 1-3: Define which cyclic SMS profile should be activated.
- SMS Message: Define the SMS message no. to send.

6.3 Configuration - SMS Message and Profiles Tab Sheet

Layout



SMS Message
Up to 20 SMS texts can be entered in the SMS message chart. You can send an actual analogue value by using the syntax #AI0 for the first analogue value and #AI1 for the second analogue value. SMS texts nos. 16-19 are default entered for status request messages. If NOT used they are available for other purposes.

The setting options are:

- SMS Messages: Enter SMS messages. Can contain analogue values.

- Enable status on request: Enable the possibility to get an I/O status SMS from the GC-10 by sending a pre-defined SMS message from your mobile. See section **Status on request** on following page.

SMS Profile
Define the 3 SMS profiles. SMS profiles can be used for scheduling alarm messages to different users (mobile nos.) at different times of the day.

Each profile contains 5 different numbers selectable from the Phone no. list. The adjustments are:

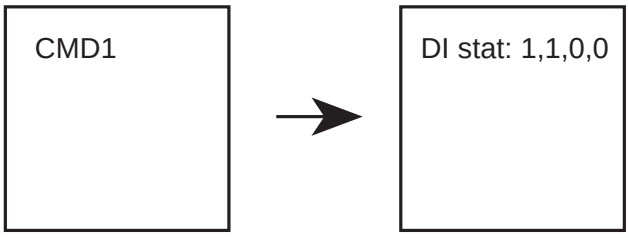
- Start hour: Define from when the profile is active
- Stop hour: Define when profile is de-activated.
- Phone nos.: Define the Phone nos. to be in the profile.

Status on Request

- When ticking on the **Enable** box, you will enable the SMS request function. The function makes it possible to send an SMS request to the GC-10 and ask for an I/O status to be sent by SMS. 4 different options are available:
  - ìDI stat: 0,0,0,0î ñ report status of digital inputs
  - ìDO stat: 0,0,0,0î ñ report status of digital outputs
  - ìAI1 stat: 0î ñ report value of first analogue input as scaled.
  - ìAI2 stat: 0î ñ report value of second analogue input as scaled.

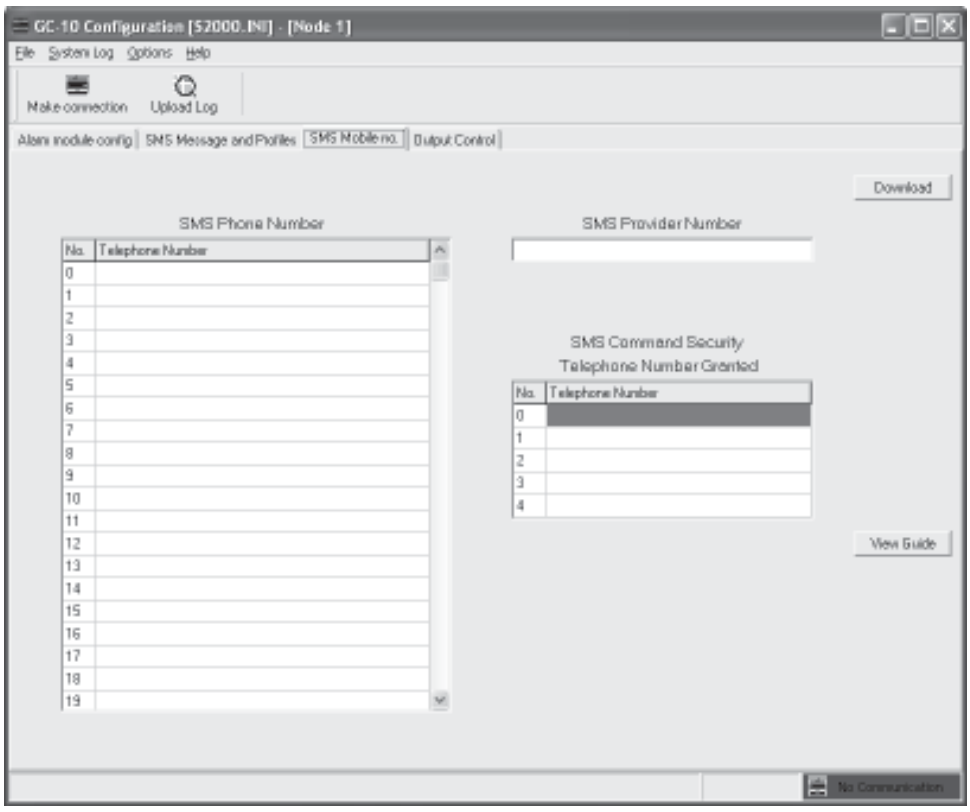
- It will automatically put in fixed texts in the last 4 SMS texts (16-19).

- Sending SMS message ìCmdxî to the GC-10 will return a status SMS from the GC-10.
  - x = 1 reports DI status
  - x = 2 reports DO status
  - x = 3 reports first AI value
  - x = 4 reports second AI value



6.4 Configuration – SMS Mobile No Tab sheet

Layout



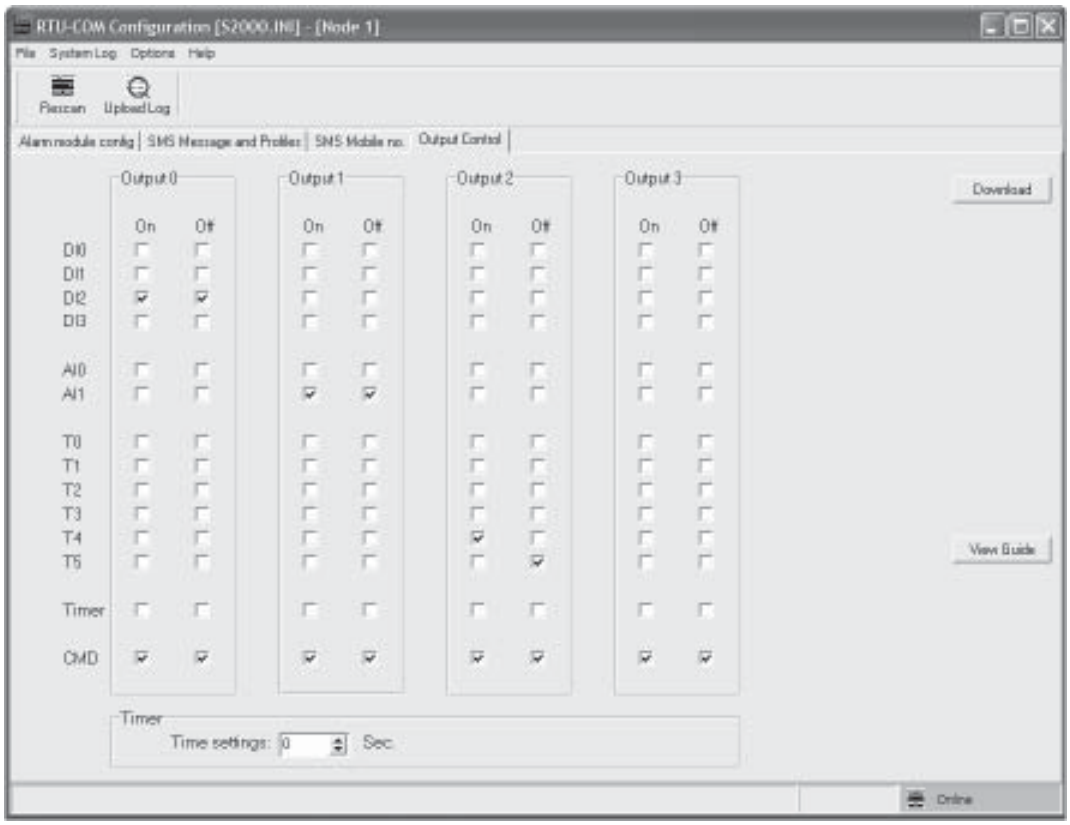
SMS Phone No. list
SMS Mobile No.: Enter the list of mobile phone nos. to which SMS alarms are to be sent.

GSM Providers Short Message Service Centre No. (SMSC)
Provider SMS Service Centre No. can be found in documentation from the GSM provider used. Some providers do not need SMSC no. as they can automatically route SMS messages to the SMS Service center.

SMS Command Security
Defines the phone no. authorised to get status messages from the GC-10 and to control output with SMS messages. If no phone no. is entered, no authentication is activated and all valid messages are accepted.

6.5 Configuration – Output Control Tab sheet

Layout



Controlling Output

Each output can be controlled by event and cyclic activities of DI and AI. A timer function is possible for output 0 (first output). The timer is started whenever a control event is activated for output 0.

5 different events can control the outputs:

- DIx: Digital input change.
- AIx: Analogue value reaching a setpoint.
- Tx: Cyclic time event.
- Timer: On-delay or off-delay timer function.
- CMD: Command SMS from mobile phone. As default all outputs can be controlled from an SMS command message. If an output is not allowed to be controlled from an SMS command the box should be left blank.

The ìOnî and ìOffî tick boxes provide the following functions:

- Ticking the ìOnî box will activate the output at the specific event.
- Ticking the ìOffî box will de-activate the output at the specific event.
- Ticking both the ìOnî and ìOffî boxes will activate the output when ñ and only when the specific event is activated.

Note: an output can be controlled by more than one input event. E.g. an output can be activated by input 0 and de-activated by input 1.

Timer settings:

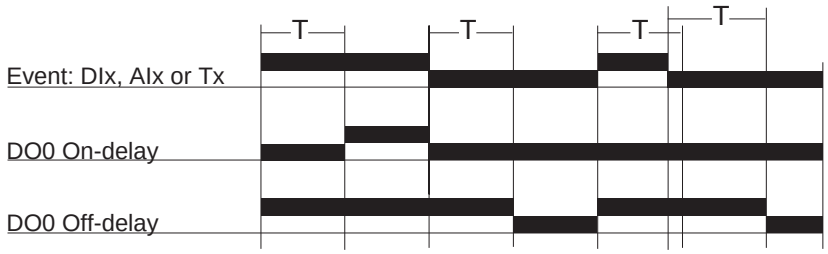
- When ticking the ìOnî box an On-delay function is provided for output 0.
- When ticking the ìOffî box an Off-delay function is provided for output 0.

When you enable a timer function it is linked in between the event that control output 0 and output 0. Enabling the timer alone gives no function.

Ticking in Timer ON makes simply a delay in the output going ON and ticking in Timer OFF makes a delay in the output going OFF. And it makes no difference in weather it is input event activation or a cyclic event that is set to activate the output.

Example:
If an input event (alarm sensor set input ON) should activate the output (e.g. alarm horn) and the input event (alarm goes OFF) should deactivate the output, and you activate Timer ON ñ the function will be as shown in Fig. 1. I.e the alarm has to be ON for a while before the alarm horn is activated.

Fig. 1



T= Time Setting

CMD settings:
Only if the CMD (Command) box is ticked, is it possible to control it with a Control SMS message from a mobile phone.

Time settings:
Timing period is defined in seconds.

6.6 Control Output with SMS from Mobile Phone

Outputs can be controlled remotely with an SMS message.

By sending an SMS message to the GC-10 you can activate or de-activate an output. Sending an SMS message ìCmdxxî to the GC-10, where ìxxî define the action, will activate or de-activate the outputs. Sending an SMS message ÑAckCmdxxì will do the same but this time you will get a reply from GC-10 indicating the status of success. Action is defined by ìxxî from the following list:í

- xx = 10 De-activate output 0 (1st output)
- xx = 11 Activate output 0 (1st output)
- xx = 20 De-activate output 1 (2nd output)
- xx = 21 Activate output 0 (2nd output)
- xx = 30 De-activate output 3 (3rd output)
- xx = 31 Activate output 2 (3rd output)
- xx = 40 De-activate output 3 (4th output)
- xx = 41 Activate output 3 (4th output)

Note: text is not case sensitive.

7 General Program Options

7.1 Selecting Language

In the Option menu you are able to change language. After changing language the program must be re-started to use the selected language. At present only English and German languages are supported, but other languages will be added as and when required.

7.2 Special Program Options

The configuration tool has some helpful options, which you will find in the System Log drop-down menu. The options are listed below.

7.2.1 View System Log

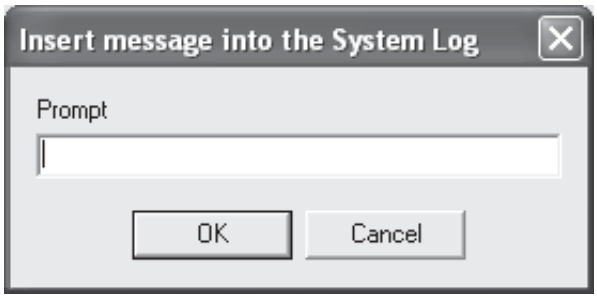
If you activate view system log you will get an extra window at the bottom of your configuration tool. It is a system log which reports all events and activities performed by the driver communicating with the GC-10.

7.2.2 Locking at Last Log

Default activated means that the configuration tool will scroll the system log so the last log line is always viewable in the system log window.

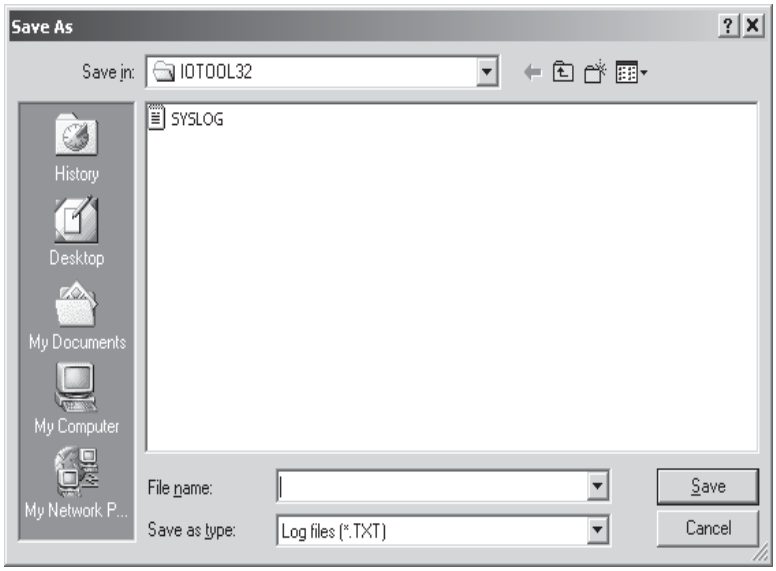
7.2.3 Clear the System Log
Clears the system log.

7.2.4 Add Msg to System Log
This feature allows you to add comments to the System Log by prompting the dialogue box below.



7.2.5 Saving System Log
Saves the System Log in a file.

7.2.6 Print System Log
Prints the System Log on the printer.

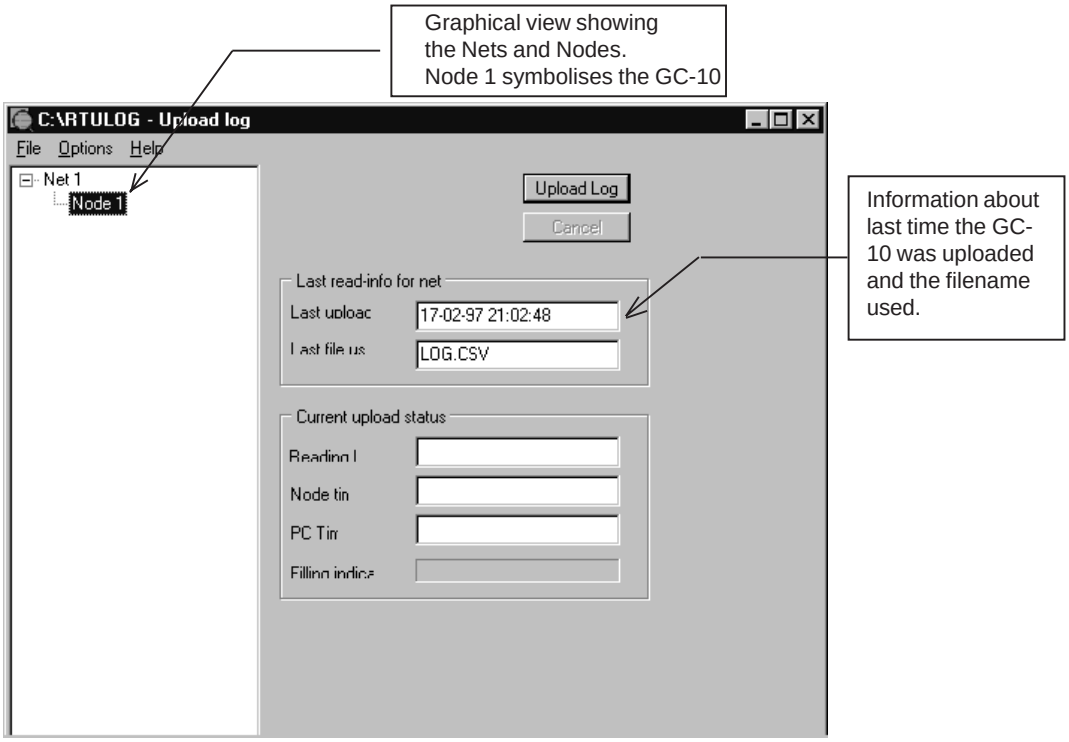


7.3 Help Options
Under the Help drop-down menu you will find the software information and version. Help for using the program is basically only in this document and in the help and information line at the bottom of the screen.

8. How to Upload Saved Data from the GC-10

To upload the data from your GC-10, it should be connected to the serial port of your PC.

After communication has been established you are able to empty the GC-10 Log Buffer using the upload facility.
When clicking the Upload Log Icon the following menu appears:

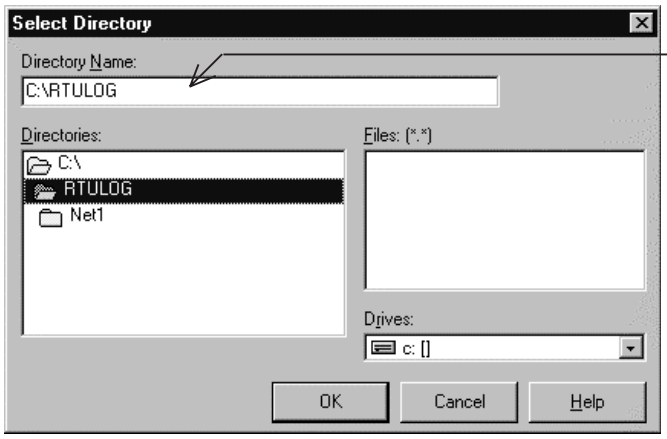


This is the Upload Log Main Menu, where you can set the parameters for the upload routine.

8.1 Setting Upload Options

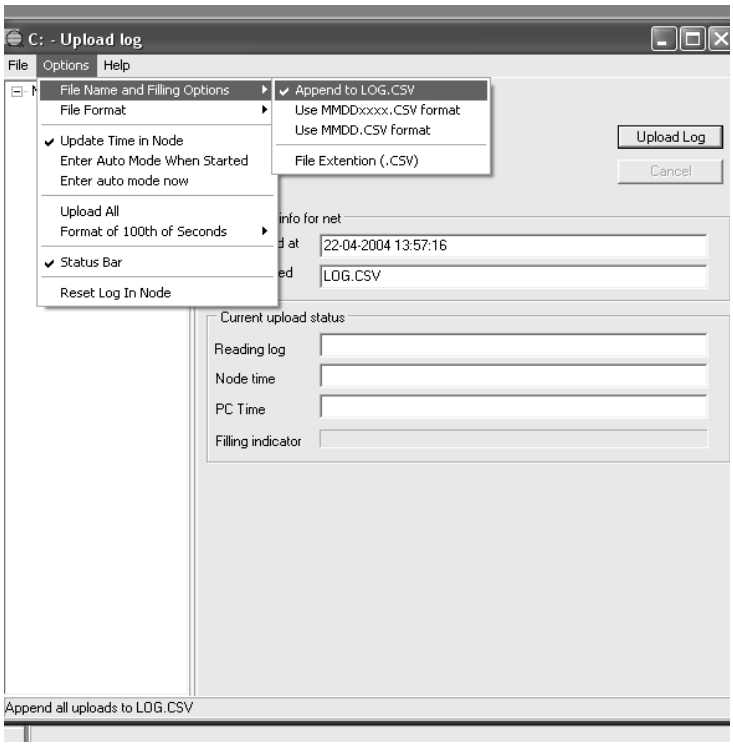
Before you start uploading a log file you must define the log upload options.
First entry is to specify the directory in which to place the logged data after it has been uploaded.
This is done by choosing the **Select Directory** command in the **File** Menu.

The following dialogue box appears. Select the required directory and press OK.



In this example the C:\RTULOG directory has been selected.

The **Option** Menu gives you a number of choices of how to save your uploaded data, and a number of parameter settings of the upload format.



File name and filing options

3 options are available:

- Save Log in LOG.CSV (use same file for log uploads).
- Save Log in MMDDxxxx.CSV format (month, day, no. of upload).
- Save Log in MMDD.CSV format (month, day).

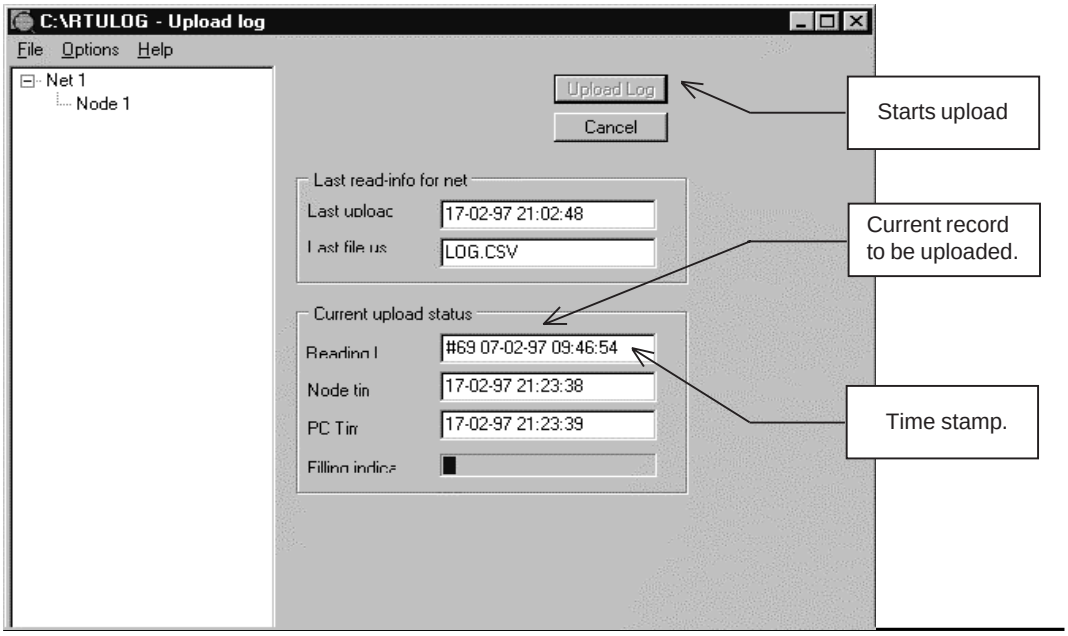
File format
Always use CSV format which is pure text file

Update time in node
Tick if you want the GC-10 internal clock to be adjusted according to the PC time at every log upload.

Enter automode options
Not used.

Upload all
Tick if you want a full upload of all data from the GC-10. If not ticked only logged data since last log upload will be uploaded.

Format of 100th of second
Enable or disable use of 100th of a second in the log time stamp.



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If you have ticked off the **Use MMDDxxxx.CSV format in the Options; File Name and Filing Options Menu,** the uploaded files will be saved in the following way.

The first uploaded file on the 18 of February will be named 02180000.CSV, the second upload 02180001.CSV and so on.

8.2 Structure and Format of Uploaded Data

After uploading of data you can see the comma separated ASCII log file using an editor or import into a spreadsheet e.g. Microsoft Excel. Each log data is defined by an id. Below is a table showing the data types, corresponding id and example of how the data is structured in the log file:

		Log file structure			
Log id	**I/O**	**Date**	**Time**	**Log id**	**I/O data**
0	DI 0	18-02-04	10:09:10;	0;	;1
1	DI 1	18-02-04	10:09:25;	1;	;1
2	DI 2	18-02-04	10:09:45;	2;	;0
3	DI 3	18-02-04	10:09:55;	3;	;0
4	AI 0	18-02-04	10:10:13;	4;	;50
5	AI 1	18-02-04	10:10:35;	5;	;100
6	T0	18-02-04	10:10:51;	6;	;1;1;0;0;0;0;1;1;50;100
7	T1	18-02-04	10:11:16;	7;	;1;1;0;0;0;0;1;1;50;100
8	T2	18-02-04	10:11:32;	8;	;1;1;0;0;0;0;1;1;50;100
9	T3	18-02-04	10:11:13;	9;	;1;1;0;0;0;0;1;1;50;100
10	T4	18-02-04	10:12:13;	10;	;1;1;0;0;0;0;1;1;50;100
11	T5	18-02-04	10:12:13;	11;	;1;1;0;0;0;0;1;1;50;100
> 130	Status loggs - see next page.				

The I/O data in the T0..T5 logs is structured as:

; DI0 ; DI1 ; DI2 ; DI3 ; DO0 ; DO1 ; DO2 ; DO3 ; AI0 ; AI1

Digital inputs and digital outputs is logged as the value 0 or 1, where 0 = OFF and 1 = ON.

Analogue input values are logged as the chosen scaled value. If you have selected the scale to be 0-4095, a maximum input will be logged as the decimal value 4095.

In case the analogue inputs are logged as decimal values 0-4095 (0 = min. input and 4095 = max. input) you often has to calculate the real value (e.g. a temperature or another signal input level.

Example: If the analogue input is a temperature Pt100 input with a range of -50 - 100 degrees Celsius, the logged value 1051 equals the temperature of:

((100-(-50)) / 4095 x 1051) + (-50) = -11,5 degrees Celsius.

If you use MS Excel you can make the calculations there and get the real readings reported directly.

Upload of log data is in the file started with:

Station number;1
Up-load start;18-02-04 10:20:39

and ended with:

Station number;1
Up-load end;18-02-04 10:20:39

8.3 Logged GC-10 Status Data
Below is a list covering the pre-defined log IDs used.

Event	Log ID
Power ON and/or micro processor reset	130
Program download or change of set-up	131
Errors detected by the controller. (Status error/communication error, etc.)	150
The log memory has been up-loaded (the PC will request this log to take place)	170
Log buffer overflow	171
Log ID in application out of range	172
Clock has been updated	180

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9. System Requirements

Minimum requirements for running the GC-10 configuration software:

Hardware:
IBM compatible PC with a Pentium Processor
32 MB RAM
30 MB free hard disk space
Mouse and keyboard
SVGA monitor (minimum display resolution: 768 x 1024, Small Fonts)
CD-ROM or DVD drive.
1 serial RS232 COM port.

Software:
32 bit operating system
MS Windows2000, NT4.0 or WindowsXP.

10. Software Installation Guide

Before you start installation of the software, please make sure that you do not have any prior versions of GC-10 configuration software or IOTOOL32Pro installed. If you have, you should un-install by using the **Add** or **Remove Program** option in the Control Panel.

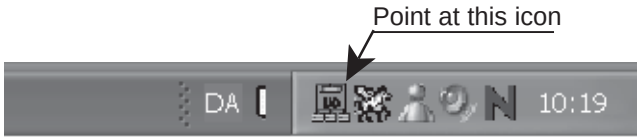
Place the installation CD in your CD drive and if autorun is enabled on your PC the installation will start automatically. If not you should type D:\setup in the **Run** windows located under the Start button on your MS Windows desktop.

Now the installation of the software is in progress. In general you just enter **Next** at every installation screen.

When the GC-10 configuration software is installed on your PC and ready to use an icon will appear on the disktop.

When using the GC-10 configuration software to generate a configuration file, the GC-10 must be connected to the PC. Some parts of the setup require direct reading in the GC-10 for showing the setup options. When you have made a configuration setup on one unit you will be able to store the settings in a project file. The project file will contain all settings and you can easily copy the project file to other computers for downloading the GC-10 setting into other GC-10ís.

Important note: When you are running the GC-10 configuration software, you are using a serial driver on the COM port. The driver requires full service from the COM port and it does not accept any other programs using the COM port. After closing the GC-10 configuration software, you must close the basic driver. You find the driver icon on the bottom right side of your screen. Point at the icon, right click your mouse and close the driver - now your COM port is free for use by other programs.



11. Un-installing the Software.

The software is un-installed by entering the Add or Remove program facility in the Control Panel and un-install GC-10 configuration software.
If during un-installation you see the message ìYou must close all drivers before un-installingì, please refer to Section 10 above- ìImportant Noteì

Note: This document is subject to changes without notice.