MICRO THERMO TECHNOLOGIES

MT Alliance - Grafcet Sequencer User Manual

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Micro Thermo Technologies, 2584 Le Corbusier, Laval, QC, Canada, H7S 2K8. Phone: (450) 668-3033
Fax: (450)668-2695. Toll Free in Canada: 1-888-664-1406. Toll Free in the USA: 1-888-920-6284

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1. Preface

1.1 Using this manual

This manual is intended for technicians who install and configure an application with the **Grafcet Sequencer** software to control a special process that the other MT Alliance programs cannot control.

It requires knowledge of the basic tools in the MT Alliance system. For example, the technician must be familiar with the MT Alliance software (menus, views, toolbars, etc.) and the general use of a plug-in.

1.2 Conventions used in this manual

For your convenience, several screen captures have been added to describe the procedures. Certain images also contain numbered balloons referring to the procedure.

You will also come across certain terms in **bold** to help understand the text. These usually refer to the user interface.

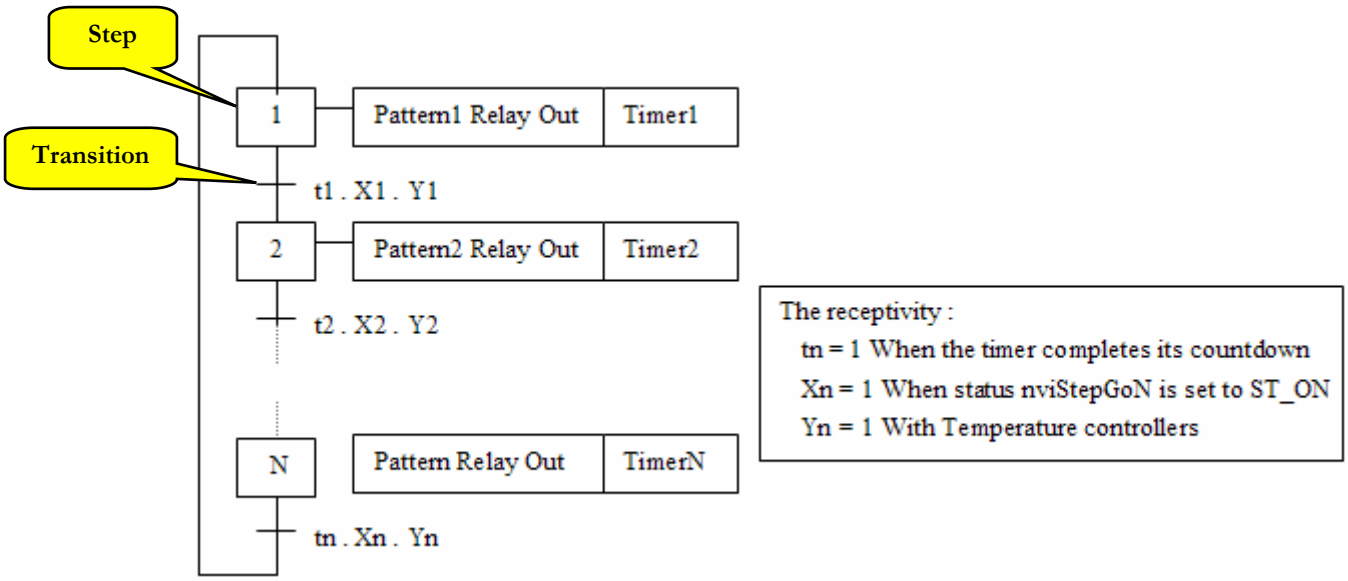
2. Grafcet Sequencer Operation

The Grafcet Sequencer program is designed to work in a MT-CKT node. It includes:

- A GRAFCET-type sequencer without divergence that has a potential **16** steps and can control up to **10** relays.
- **Four** temperature controllers with **Set Point** and **Dead Band**, whose output conditions can be routed in a versatile manner to meet various operating environments described in this document.

2.1 Description of the GRAFCET Sequencer

The GRAFCET-type sequencer without divergence is made up of **steps** and **transitions**. Only one step is active at a time, and you switch from one step to the next when the transition condition (also known as receptivity) is valid.



2.1.1 Steps

The pattern of relays (1-10) that must be enabled at each step can be configured (1 to 16 steps). In other words, you can enable any relay combination from those available in the MT-CKT module and for each of the available 16 steps.

Each step has its own configurable step timer. The step will be enabled during the period specified. Thus, the sequencer won't move to the next step before the countdown is completed.

With the last step (N) and valid receptivity (tn or Xn or Yn), the GRAFCET is returned to step 1 and a new cycle begins anew.

It is possible to specify a **Circular** mode. When it is enabled, this mode tells the system to continuously scan the steps at the rate set in the step timer. However, the system will still check the network binary states (nviStepGoN). It is therefore vital not to make any network

connections on these variables (nviStepGoN) to use the circular mode. This mode is mainly used autonomously, as a pattern sequencer for decorative units, for example.

2.1.2 Receptivities (or Transitions)

There are **three** possible conditions to complete each step:

2.1.2.1 Step Timers (tn), when the timer completes its countdown.

Description of the step timers

- Available for each step, timers are configured in the plug-in **Control** tab.
- Timers can be **enabled** by entering a time value ranging from 0 min. 1 sec. and 108 min. 59 sec.
- Timers can be **disabled** by entering a value of 0 min. 0 sec.

2.1.2.2 Network Binary Statuses (Xn), when the status is set to ST_ON

If no reception is registered when Step N is active for a period greater than the *ReceiveHeartBeat*, the GRAFCET will move on to the next step. (If the step timer has completed its countdown.)

Description of Network Binary Statuses

- Network binary statuses are network variables (nviStepGoX) available for each step. Once the connection to this variable is completed, the step receptivity is enabled.

2.1.2.3 Temperature Controllers (Yn)

An additional condition to reaching step N depends on the temperature controller operating conditions and the configuration specified by a set of parameters. Indeed, for each of the 4 temperature controllers, it is possible to specify, via a relay pattern (1-10) specifying to which steps the condition can be applied, that the controller output no longer be set to ST_OFF to move on to the next step.

Description of Temperature Controllers

- Each of the 4 temperature controllers operates based on the following conditions:
- One variable (nviStPtTempY (Y 1 to 4)) specifies the set point.
- The process measure comes from a variable (nviTempY (Y 1 to 4)).
- A hysteresis (deadband) is configured on the plug-in **Control** tab.

The equation for the controller is as follows:

If (nviTempY > nviStPtTempY + (Hysteresis / 2)) ; The controller = ST_ON;

Otherwise if (nviTempY > nviStPtTempY + (Hysteresis / 2)) ; The controller = ST_OFF;

Assigning a Relay to a Temperature Controller Output :

An output relay can be assigned to a Y controller (1 to 4) using a Combo Box in the plug-in **Control** tab where you can choose the desired relay (RO1 to RO10). By default, the value is set to **None**, meaning that no relay is assigned to the Y controller output.

Please note that if a relay already used in a GRAFCET output pattern at a given step is assigned as a temperature controller output, this relay will only be enabled if the step using it is enabled **AND** the temperature controller output is set to ST_ON.

Using a Temperature Controller Output as GRAFCET Receptivity:

As previously mentioned in the GRAFCET section, it is possible to specify, for each of the 4 temperature controllers, at which step they will be used as receptivity by the Grafcet.

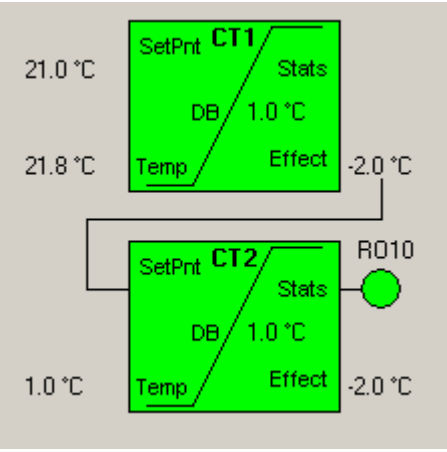
Using a Temperature Controller Output to Route Two Temperature CPs:

Using routed values as set point for the next controller.

The **Effective Setpoint from CTx** setting in the plug-in **Control** tab is used to create an internal binding that enables the Y temperature controller to use the temperature value routed by the previous controller as a temperature set point, instead of the set point specified by the **nviStPtTempY** variable.

In the case of the TP2 controller, we use the TP1 controller as previous one. This method avoids making a turnaround-type binding, which would not be desirable in this context. Indeed, the set point value received by the **nviStPtTemp** variable is transferred to an intermediate variable in eeprom (to properly manage a supply drop leg at the same time as a loss of communication with the MT Alliance). This approach is acceptable if the set point is not modified too frequently because the number of writes is limited in eeprom. Thus, it is preferable to use the internal binding mechanism, via the CP mentioned, to edit a controller set point if you know the operating condition will result in too frequent changes.

For example, if you select the **Effective Setpoint from CT1** box, the TP2 controller set point will be the **TempNC** field value if the TP1 controller output is disabled (ST_OFF) or the **TempNO** field value if the TP1 controller output is enabled (ST_ON).



3. The Equipment

3.1 GrafSeq Controller

The controller used for the GrafSeq software is a MT-CKT, which helps to control up to 10 different outputs. (Thanks to the 10 relays of the MT-CKT.)

3.2 I/O Connection

Since the MT-CKT controller has no physical input, you can only do network connections on the inputs. However, there are 10 relays available on the output side.

4. MT Alliance

After making the electrical connection for the supply and network connectors, you must:

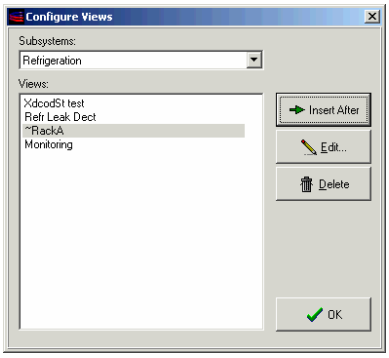
1. Add a view for the process.
2. Install (logically) the MT-CKT module.
3. Load the application program (GrafSeq).
4. Add the module plug-in.
5. Set up the plug-in and send it these configuration settings.
6. Make the network variable connections.

4.1 Adding the Process View

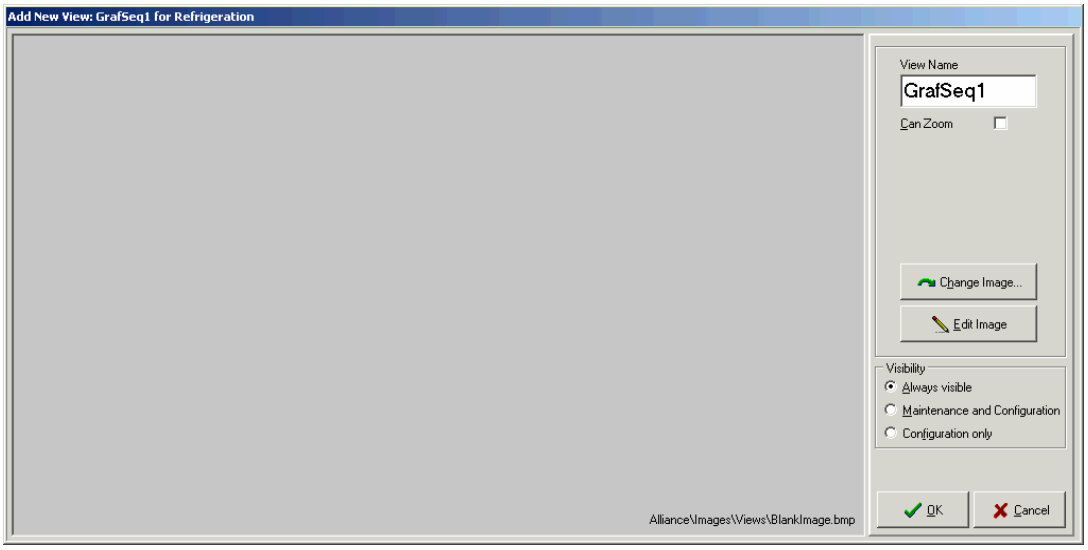
To drop the node, the plug-in and the various measure and command points connected to the GrafSeq node, we add a view for each module.

1. In the **Configure** menu, select **Views** to access the various views available.

2. In the **Subsystems** drop-down list, select **Refrigeration**. Select **~RackA** and click the **Insert After** button.



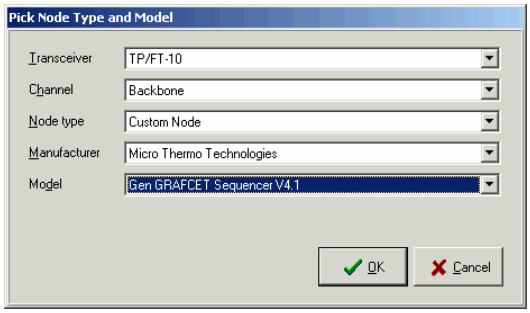
3. In the **View Name** field, type the view name (e.g. GrafSeq 1) and click the **Change Image…** button.



4. Select the **desired** file (e.g.. Process graph) and click the **Open** button.
5. Click **OK** to finish.

4.2 Adding the MT-CKT Node (GrafSeq)

1. In the **Subsystem** menu, select the **Refrigeration** subsystem or click the **Refrigeration** button. In the **Mode** menu, select **Configuration**. When entering this mode, a **Components** toolbox appears in the bottom right corner of the window. It contains all the items that can be placed in the view.
2. Select the view created at the 3.1 step (e.g. GrafSeq 1).
3. Drag and drop a **Node**-type icon from the toolbox into the view. Once the icon has been dropped, the **Pick Node Type and Model** window opens to allow you to define the node.
4. In the **Manufacturer** and **Model** drop-down lists, select the specific node to install. Click **OK** to finish or **Cancel** to clear the node.



Note: An icon can be moved using the left mouse button and holding the **Ctrl** key.

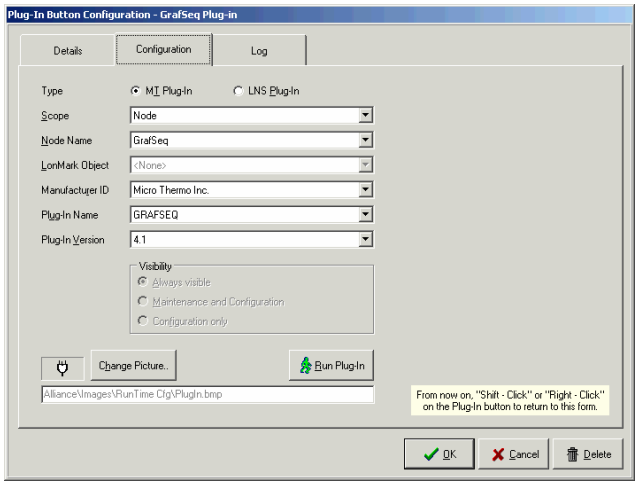
5. Once the node representation has been dropped, you must associate it to the physical module.
    1. Click the node icon to open the **Custom Node Information** dialog box.
    2. Select the **Details** tab.
    3. Type a descriptive and unique name for the node in the **Identification** field and, if you wish, in the **Notes** field.
    4. Select the **Commands/Status** tab.
    5. In the **Installation** group, click the **Install** button.
    6. The **Install Custom Node** dialog box opens and prompts you to select the GrafSeq node's ***Service Pin***[1]. The software takes a few minutes to load in the node. Once the software is loaded, the window buttons are activated.
    7. Click **OK** to close the window.
    8. Click to accept and save the changes.

[1] If the node is not accessible, it is possible to type the neuron identification number manually, as explained in the *Node Installation* manual.

4.3 Adding the Plug-in

At this stage, the MT-CKT module contains the software (GrafSeq) but no site-specific settings. To configure the settings, you must first install a plug-in.

1. Drag and drop a **Plug-in** icon from the toolbox to the desired location on the view created in step 3.1. Click on the plug-in icon to configure it.



The **Plug-In Button Configuration** dialog box opens.

2. Type the information as it is shown in the table below:

Details Tab – General Group	
Identification	Type a unique and descriptive name
Configuration Tab	
Type	**MT Plug-In**
Scope	**Node**
Node Name	Use the name that you gave to the node
Manufacturer ID	**Micro Thermo Inc.**
Plug-In Name	**GRAFSEQ**
Plug-In Version	4.1

3. Click **OK** to close the dialog box and save the settings.

4.4 Network Variable Connections

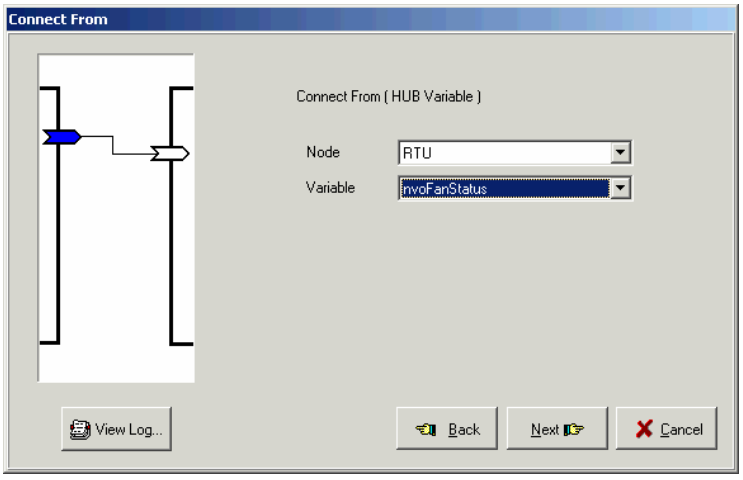
The MT-CKT (GrafSeq) module interacts with several other nodes: nodes providing temperatures (for example from *Univ Sen Node MT-500* nodes), nodes receiving output statuses for that node (they are not physically connected to the MT-CKT module relays) and nodes providing binary statuses (e.g. a RTU proof of operation).

The following table shows an example of connection:

Node	Source Nv	Node	Destination Nv
MT-500	nvoUniversal5	GrafSeq	nvitemp1
MT-500	nvoUniversal6	GrafSeq	nvitemp2
RTU	nvoFanStatus	GrafSeq	nviStepGo1
RTU	nvoHRStatus1	GrafSeq	nviGeneralFault

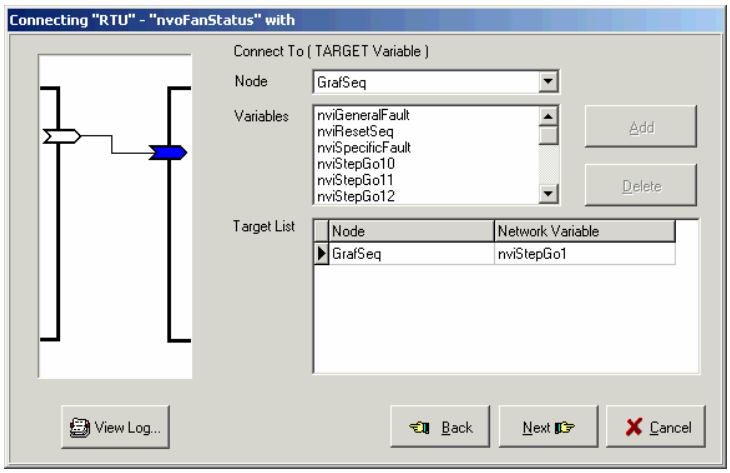
The procedure below allows you to make the connections:

1. Select **Network Connections…** in the **Network** Menu.
2. The **Network Variable Connections** window opens to configure these connections.
3. Click the **+Connect** button.
4. The **Connection Type** window opens to specify the type of connection.
5. Select **Connect one output to one input** because in this context, all the connections to be defined are usually one on one.
6. In the **Node** drop-down list of the **Connect From** box, select the **RTU** node.

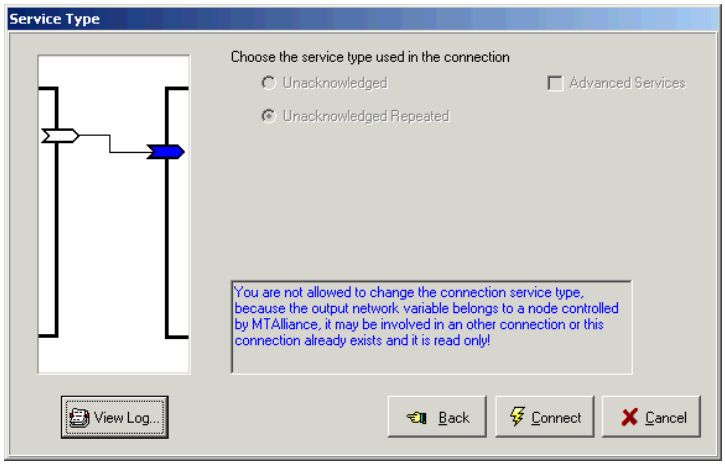


7. Select **nvoFanStatus** in the **Variables** drop-down list.
8. Click **Next**.

The window that opens allows you to choose the input variable to which you wish to connect the **nvoFanStatus** variable. Select the GrafSeq node (**GrafSeq** in this example) in the drop-down list.



9. Then select the relevant variable (**nviStepGo1**) in the list.
10. Click **Add**. The variable is moved to the **Target List** section.
11. Click **Next** to open the **Service Type** window.



12. Click **Connect** to establish the connection.
13. Repeat the procedure for all the connections to be made.
14. Connect the network variables of the other GrafSeq nodes, if applicable.

5. The Grafcet Sequencer Plug-In

5.1 General

The plug-in is designed so that technicians can glean a quick overview of the operation of the system through the **Grafcet Sequencer** software. For a quick analysis of the system status, the plug-in contains a Configuration tab, a Process tab and a Log.

5.1.1 Applying or Cancelling Changes

When changes are made in the plug-in, the **Apply** button is enabled. The possible operations are:

Apply – When clicking this button, a confirmation dialog box appears. When accepting to apply the changes, the plug-in saves values, adds them to the system log and attempts to send them to the node. Once the operation completed, the **Apply** button becomes greyed out and the plug-in remains open. However, if the technician doesn't agree to save the changes (by clicking **No** in the confirmation dialog box), the save operation will be interrupted and no action will be taken. It is critical to make sure that all settings have been transmitted to the node without any error messages, otherwise the node might not work properly.

OK – When clicking this button, a confirmation dialog box appears. When accepting to apply the changes, the plug-in saves values, adds them to the system log, attempts to send them to the node, and closes the plug-in. However, if the technician doesn't agree to save the changes (by clicking **No** in the confirmation dialog box), the save operation will be interrupted, no action will be taken with the node, and the plug-in will be closed.

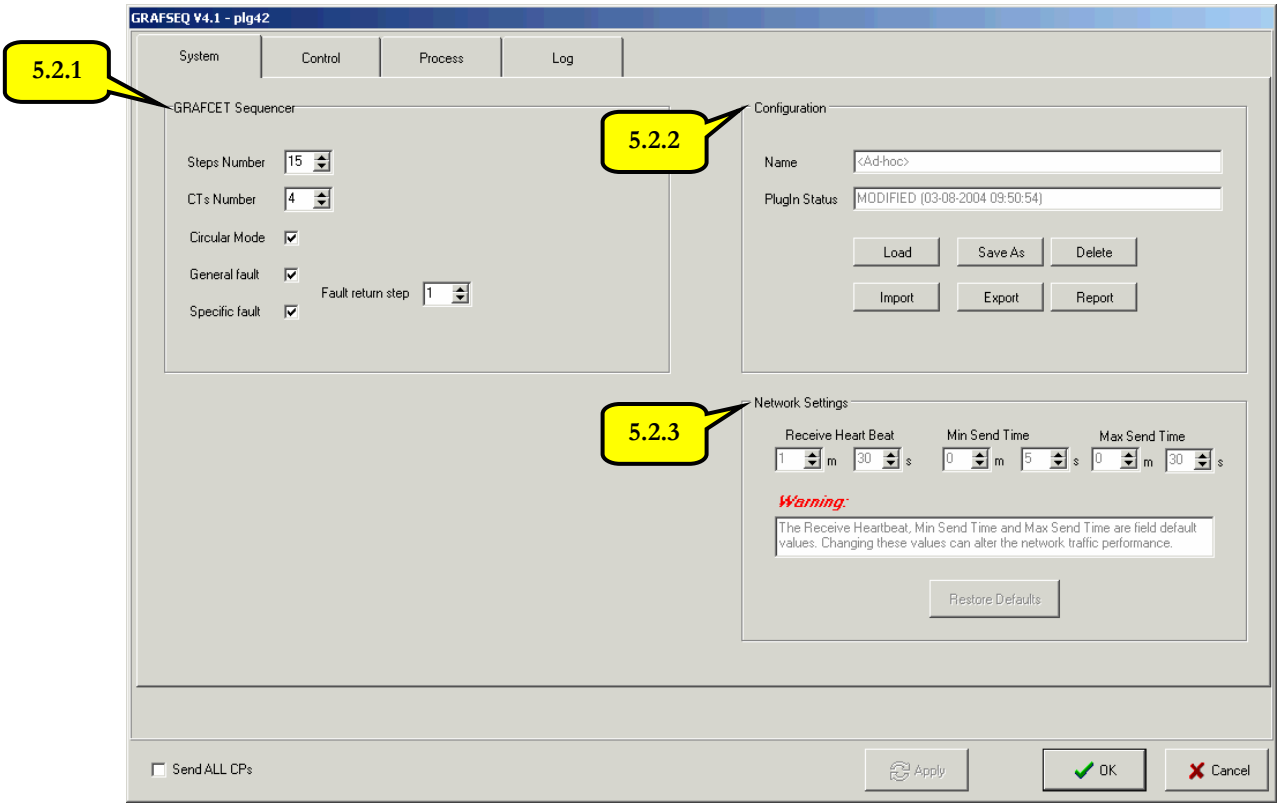
Cancel – When clicking this button, a confirmation dialog box appears and asks the user if he wants to cancel his changes. Clicking **Yes** will cancel all changes and close the plug-in. However, if the technician selects **No**, the cancel operation itself will be cancelled and the plug-in will not be closed.

Normally, when the technician clicks **Apply** or **OK** to confirm he wishes to keep the changes made, the software transfers only the edited settings to the node.

5.1.2 Send ALL CPs

This is an additional security. This option force sends all configuration settings to the node rather than only modified settings. We recommend selecting this radio button when you want the node to be perfectly synchronized with the plug-in.

5.2 System Tab



5.2.1 Grafcet Sequencer

Steps Number : Enter the number of steps (1-16) for the Grafcet.

CT'S Number : Enter the number of temperature controllers (1-4).

Circular Mode : To enable or disable the grafcet circular mode.

General Fault : To enable or disable the grafcet general fault.

Specific Fault : To enable or disable the grafcet specific fault.

Fault Return Step : Shows to which step to return after a grafcet fault.

5.2.2 Configuration

The group of settings required to configure a controller is called a configuration.

Name – The name of the current configuration. If no configuration was saved, it displays <Ad-hoc>.

Plug-in Status – The relationship between the stamp of the last plug-in save (shown in parentheses) and the stamp of the configuration.

If ConfigDateTime = PlugInDateTime : Status is 'SYNCHRONIZED'

If ConfigDateTime = PlugInDateTime : Status is 'MODIFIED'

If ConfigDateTime > PlugInDateTime: Status is 'OUT OF DATE'

An identical or slightly modified configuration can be useful to perform an installation on other controllers or on another site. Here are the possible options to user various configurations:

Load – Opens a dialog box to select a configuration in a list of previously saved or imported configurations. The list is empty if no configurations were saved or imported.

Save As – Opens a dialog box to save the current configuration and insert it in the current configuration list on the site. It is possible to create a new configuration or to overwrite an existing configuration by giving it the same name.

Delete – Opens a dialog box allowing the user to delete configurations included in the configuration list.

Import – Allows the user to transfer one or several configurations contained in a text file (created with the **Export** command) to the list of configurations available on the site. If a configuration with the same name already exists, the user can overwrite the existing version.

Export – Allows the user to transfer in a text file one or several configurations contained in the list of saved configurations. The possibility to export and import configurations allows the user to transfer configurations from one site to another. Since the size of the text file is very reasonable, it is possible to copy the file on a floppy or to send it via modem to another site.

Report – Generates a complete report on the screen of the active configuration. The report can be redirected to a Windows-defined printer. We recommend that you print a configuration report and keep it with the rest of the secondary cooling system documentation.

5.2.3 Network Settings

This group displays several settings that determine the **GrafSeq** module's performance as a component of the LonWorks network. These values are read-only (shaded fields), since a change without an extensive knowledge of the network and setting signification can lead to a degradation of the network performance. In order to change these settings, a Super Technician must open the session.

The descriptions below refer to the **System** tab in the **Network Settings** section shown on page 7.

Receive Heartbeat: if the module doesn't receive an update for an input network variable, it considers that the message sender is absent from the network; consequently, it is desirable for security reasons to choose a default value on the process level.

Min Send Time: this setting is used to reduce network traffic caused by network variables that are changed too frequently. It is the minimum period between two transmissions of one variable.

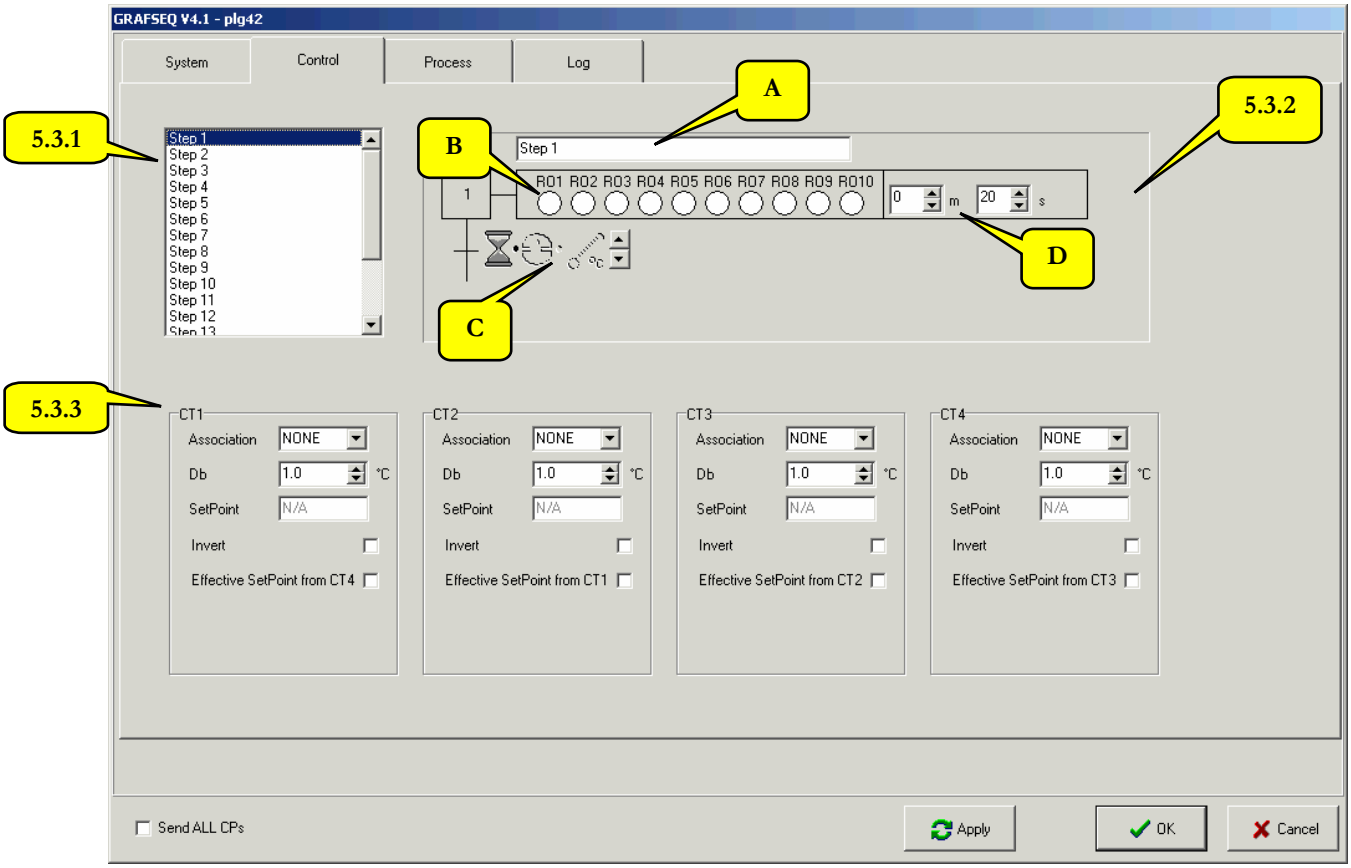
Max Send Time: if a network variable does not change during this period, the controller will send an update of the value to prevent the other nodes from considering the variable as out and using default values.

Restore Defaults: allows the user to bring back the default values of the three network settings used by the EEPR module.

There is a relation that must be respected between the **Max Send Time** of the sending node and the **Receive Heart Beat** of the receiving node, namely:

Max Send Time $\leq$ **Receive Heart Beat**/3.

5.3 Control Tab



5.3.1 Step List

This list allows the user to select the step to be configured. By clicking on the desired step, that step's configurations appear in the right-hand section (5.3.2).

5.3.2 Step Configuration

Once the step is selected in the list, the configuration is performed in the right-hand section.

A) Step Identification: This field allows the user to name the step.

B) Relays: Click on a circle (RO1 to RO10) to choose the relays that will be enabled when this step is activated. White circles become grey when they are selected.

C) Transitions (Receptivities): Each receptivity is activated differently. Here's how to proceed for each one:

- Timer: To enable this receptivity, enter a time value (minutes and seconds) in zone D. Once a period is entered (other than 0 min 0 sec), the hourglass symbol changes from light grey (disabled) to dark grey (enabled) to show that this transition has been enabled.

 = Disabled  = Enabled

- Network Binary Statuses: To enable this receptivity, make a network connection (nviStepGoX (X=1 to 16) from another module to the binary status of the desired step. Once the connection is made, the status symbol will change from light to dark grey to show that this transition has been enabled.

 = Disabled  = Enabled

- Temperature Controllers: To enable this receptivity, you must first enter **1** in the **CT's Number** section of the **System** tab. You must then select the controller number using the arrows at the right of the temperature symbol. Once these two actions are taken, the status symbol will change from light to dark grey to show that this transition has been enabled.

 = Disabled  = Enabled

D) Timer: Enter the period of the Timer receptivity.

5.3.3 Temperature Controller Configuration

Temperature controllers are configured in this section. Below, you will find an explanation for each of the settings to configure based on three different requirements:

5.3.3.1 Configuring a CT as Receptivity of a Grafcet Step:

1. In the **Association** combo box, leave in **None** because in this configuration the temperature controller status only serves to move to the next Grafcet step and must not enable other relays.
2. In the **Db** field, enter the desired hysteresis value for the temperature controller. Remember the following formula:

If (nviTempY > nviStPtTempY + Hysteresis / 2) ; The controller = ST_ON;

Otherwise if (nviTempY > nviStPtTempY - Hysteresis / 2) ; The controller = ST_OFF;

3. c) The **Setpoint** field diplays the controller set point once the connection (via a command point in MT-Alliance) has been made. Otherwise, the field displays *N/A*.
4. d) The **Invert** checkbox allows the user to invert the temperature controller result.
5. d) In the **Effective Setpoint from CTX** box, the box is disabled if only one temperature controller is enabled. We will look at this configuration in greater detail later in the configuration of a CT as a set point router.

5.3.3.2 Configuration of a CT as a Set Point Router:

The controller is configured the same as in the previous configuration, except for the **Effective Setpoint from CTX** section.

We need two enabled temperature controllers (enabled in the **System** tab).

In the **Effective Setpoint from CTX** box, you must select CT2 and enter the values of the two different set points for the CT1 in the TempNO and TempNC fields. NO means Normally Open and NC means Normally Close.

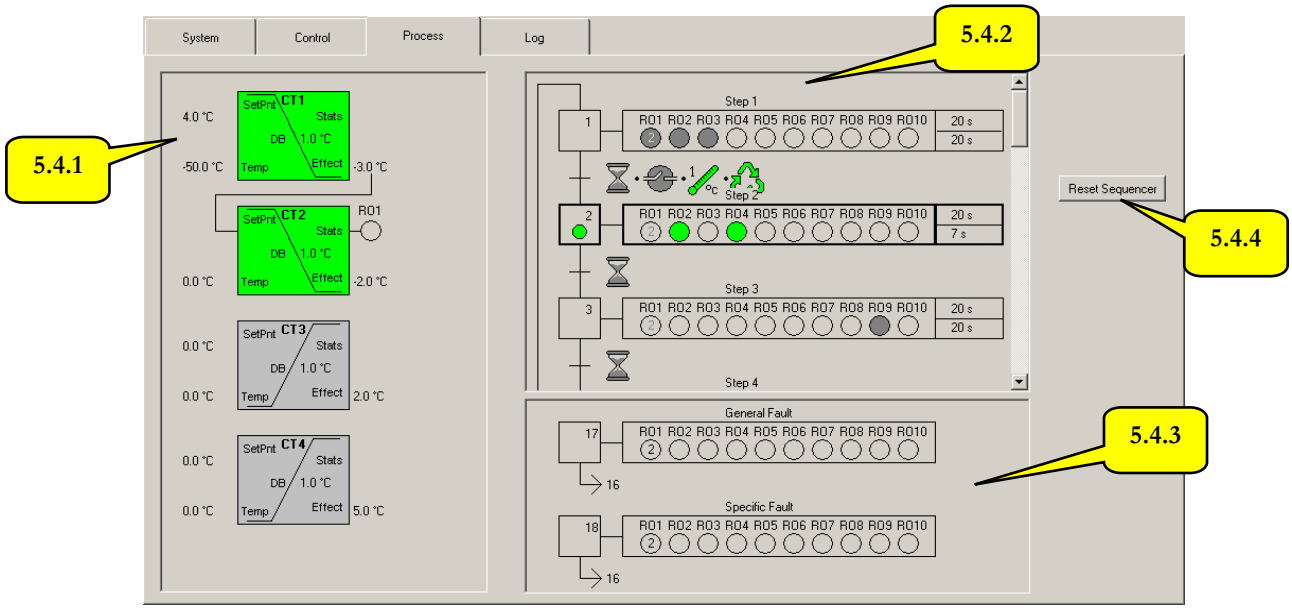
This operation is well illustrated on the plug-in **Process** tab.

5.3.3.3 Configuration of a CT as a Relay Actuator:

In the **Association** combo box, select the desired relay because the temperature controller status only serves to enable a relay in this configuration.

For the rest of the configuration, you can proceed as in 1 and 2.

5.4 Process Tab



The Process view allows the user to track the grafcet sequence step by step.

5.4.1 Temperature Controller Tracking

This section allows the user to track the temperature controller status. Green means the item is enabled. The symbol (diagonal line) inside the square shows the direction of the controller; if the **Invert** checkbox (in the **Control** tab) is not selected, the line goes from **Temp** to **Stats**; if the **Invert** (in the **Control** tab) is selected, the line goes from **Setpoint** to **Effect**.

The system traces a line from a CT's **Effect** to another CT's **SetPnt** if the **Effective Setpoint from CTX** box is selected.

When a relay is associated with a CT, it appears next to **Stats**.

5.4.2 Step Tracking

This section allows the user to track the status of each configured step via a small green circle inside the step square. It also tracks the status of each receptivity and relay.

5.4.3 Fault Step Tracking

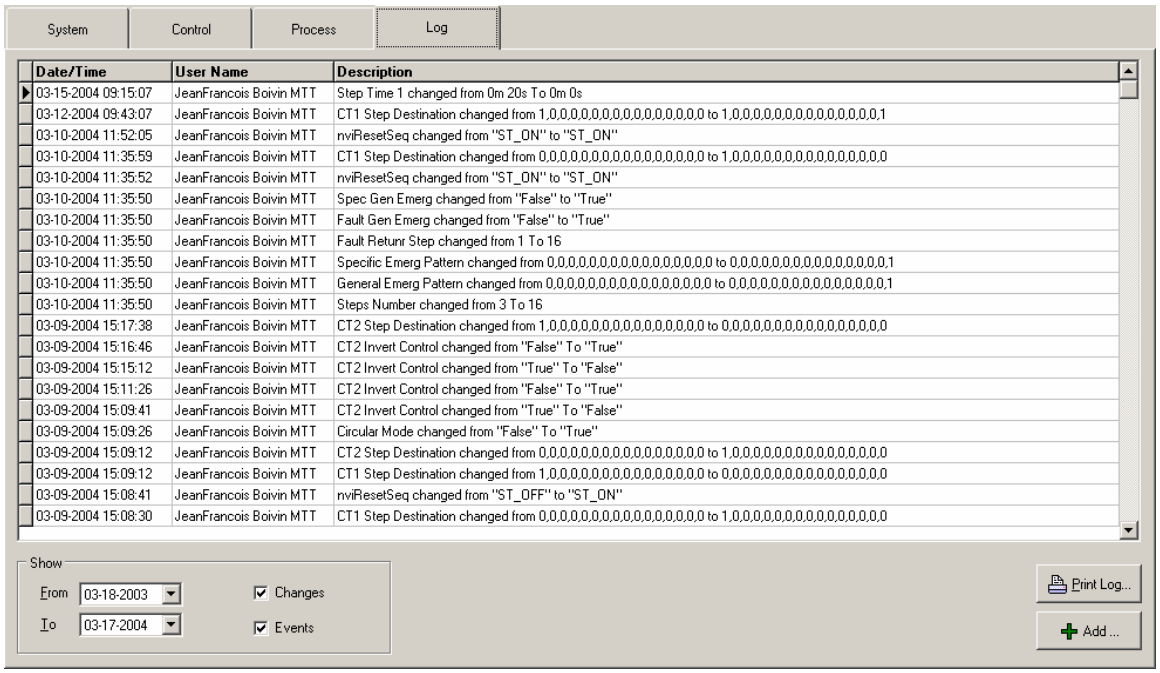
This section allows the user to track the status of each configured fault step via a small green circle inside the step square. In addition, it shows the fault return step and the status of each relay.

5.4.4 Reset Sequencer Button

This button (and the **nviResetSeq** variable) allows the user to restart from step 1 regardless of what step the Grafcet had reached.

5.5 Log Tab

Changes made with the plug-in are recorded in the log; as you can see in the example below. For each change, the log records the date and time, the name of the user who logged in and the description of the change.



To view the log, the user can select a time period, or different types of modifications (change or event type). He can also add an entry to the log. A report can be generated and printed for tracking purposes.

6. Network Variable List

The Grafcet Sequencer plug-in has a **Process** tab, which facilitates the addition of measure points to the interface. Here is the list of input and output network variables for this software to help remind you of the connection choices available with other modules:

6.2 Input Network Variable List (Nvi)

(Usually, these are **Command** type points in MT-Alliance.)

Alliance Type	*LNS Type*	*Descriptions*	*Variable Name*
Switch	Lev_Disc	Enabling General Fault.	nviGeneralFault
Percent - Switch	Switch	To switch directly to a Grafcet step.	nviOvrdGotoStep
Switch	Lev_Disc	To return the Grafcet to step 1.	nviResetSeq
Switch	Lev_Disc	Enabling Specific Fault.	nviSpecificFault
Switch	Lev_Disc	Enabling step 1 Receptivity	nviStepGo1
Switch	Lev_Disc	Enabling step 10 Receptivity	nviStepGo10
Switch	Lev_Disc	Enabling step 11 Receptivity	nviStepGo11
Switch	Lev_Disc	Enabling step 12 Receptivity	nviStepGo12
Switch	Lev_Disc	Enabling step 13 Receptivity	nviStepGo13
Switch	Lev_Disc	Enabling step 14 Receptivity	nviStepGo14
Switch	Lev_Disc	Enabling step 15 Receptivity	nviStepGo15
Switch	Lev_Disc	Enabling step 16 Receptivity	nviStepGo16
Switch	Lev_Disc	Enabling step 2 Receptivity	nviStepGo2
Switch	Lev_Disc	Enabling step 3 Receptivity	nviStepGo3
Switch	Lev_Disc	Enabling step 4 Receptivity	nviStepGo4

Alliance Type	*LNS Type*	*Descriptions*	*Variable Name*
Switch	Lev_Disc	Enabling step 5 Receptivity	nviStepGo5
Switch	Lev_Disc	Enabling step 6 Receptivity	nviStepGo6
Switch	Lev_Disc	Enabling step 7 Receptivity	nviStepGo7
Switch	Lev_Disc	Enabling step 8 Receptivity	nviStepGo8
Switch	Lev_Disc	Enabling step 9 Receptivity	nviStepGo9
Temperature	Temp_p	Temperature Controller Set Point 1	nviStPtTemp1
Temperature	Temp_p	Temperature Controller Set Point 2	nviStPtTemp2
Temperature	Temp_p	Temperature Controller Set Point 3	nviStPtTemp3
Temperature	Temp_p	Temperature Controller Set Point 4	nviStPtTemp4
Temperature	Temp_p	Temperature Controller Measure 1	nviTemp1
Temperature	Temp_p	Temperature Controller Measure 2	nviTemp2
Temperature	Temp_p	Temperature Controller Measure 3	nviTemp3
Temperature	Temp_p	Temperature Controller Measure 4	nviTemp4

6.3 Output Network Variable List

(Usually, these are **Measure** type points in MT-Alliance.)

Alliance Type	*LNS Type*	*Descriptions*	*Variable Name*
Switch	Lev_Disc	Relay 1 Status	nvo_RO1
Switch	Lev_Disc	Relay 10 Status	nvo_RO10
Switch	Lev_Disc	Relay 2 Status	nvo_RO2
Switch	Lev_Disc	Relay 3 Status	nvo_RO3
Switch	Lev_Disc	Relay 4 Status	nvo_RO4

Alliance Type	*LNS Type*	*Descriptions*	*Variable Name*
Switch	Lev_Disc	Relay 5 Status	nvo_RO5
Switch	Lev_Disc	Relay 6 Status	nvo_RO6
Switch	Lev_Disc	Relay 7 Status	nvo_RO7
Switch	Lev_Disc	Relay 8 Status	nvo_RO8
Switch	Lev_Disc	Relay 9 Status	nvo_RO9
Count_unsigned	Count	Displays the current Grafcet step	nvoGrafStep
Count_unsigned	Count	Displays the remaining time for the current step	nvoGrafTime
Switch	Lev_Disc	Temperature Controller 1 Status	nvo_Tp1CtrStat
Temperature	temp_p	Temperature Controller 1 Effective Setpoint Value	nvo_Tp1Effect
Switch	Lev_Disc	Temperature Controller 2 Status	nvo_Tp2CtrStat
Temperature	temp_p	Temperature Controller 2 Effective Setpoint Value	nvo_Tp2Effect
Switch	Lev_Disc	Temperature Controller 3 Status	nvo_Tp3CtrStat
Temperature	temp_p	Temperature Controller 3 Effective Setpoint Value	nvo_Tp3Effect
Switch	Lev_Disc	Temperature Controller 4 Status	nvo_Tp4CtrStat
Temperature	temp_p	Temperature Controller 4 Effective Setpoint Value	nvo_Tp4Effect

7. Revision History

REV	Description	Revised by	Date
0.1	Translation from 71-GEN-0102-R1.0	MAC	02-aug-04
0.2	Revision	JG	09-aug-04
1.0	Publication	JG,JFB	11-aug-04