MICRO THERMO TECHNOLOGIES

MT Alliance Energy Node User Manual

Document No.71-GEN-0133-R1.0   MTA V5.0

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1 Preface

1.1 Scope of this Manual

This manual is up-to-date for MT Alliance version 4.1.6. It is intended for integrators setting up controllers, like they did for the entire MT Alliance system.

Prerequisites include knowledge of HVAC subsystems and of the basic tools in the MT Alliance system. For example, the technician must know how to use the MT Alliance software (menus, views, toolbars, etc.), and a Micro Thermo plug-in, as well as how to setup various items. The *MT Alliance Functional Specifications of the Loadshed Controller Manuals (44-GEN-0003)* deal with these basic principles.

1.2 Conventions used in this manual

For your convenience, several screen captures have been added to illustrate the procedures. Certain images contain numbered balloons to help you locate the corresponding procedure more quickly.

Lastly, some terms are in bold to emphasize certain important points.

2   Various Modes of the Loadshed Controller

The **Energy Node** is an addition to the standard supermarket control system. In order to understand the principle of each possible configuration, it is important to understand the movement of the loadshed modes.

The following diagram illustrates the check sequence of the various modes of the loadshed controller.

nviTransfertSw
SNVT_switch
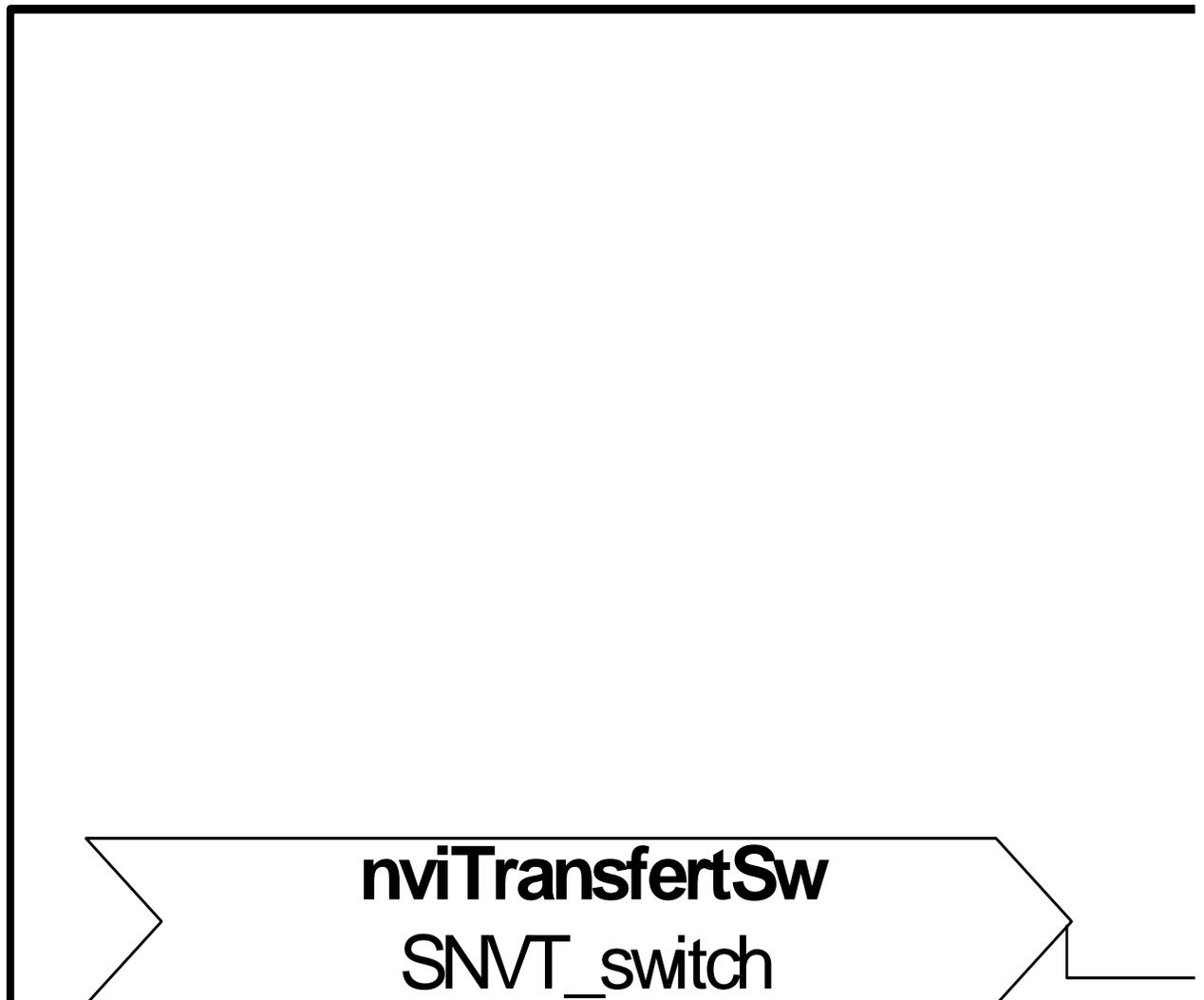
Figure 1 – Checking the various modes of the loadshed controller

2.1   Energy Node Process

The primary goal of an **Energy Node** is to load shed energy in the stores while making sure that food is preserved at the right temperature and while providing the required lighting that will highlight the different products and give the customers the feeling of prime quality lighting. Moreover, it is possible to conserve the energy needed for room temperature and anti-fog in the various refrigerated cases. To do so, let's follow the order of the different loadshed matrices of the **Energy Node**.

3   Setting Up Using MT Alliance

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

1- Install the Energy module logically.
2- Load the application program.
3- Make the network variable (software) connections.
4- Set up the node and transmit these configuration settings to it.
5- Set the various set points.

3.1   Adding the Energy Node View

In order to drop the node, the plug-in and the various measure and command points connected to the Energy Node, we need to add a view for each part that uses an Energy module.

1- In the Configure menu, select Loadshed to access the various available views.
2- In the Subsystems drop-down list, select Energy. Select Loadshed and click the Insert After button.
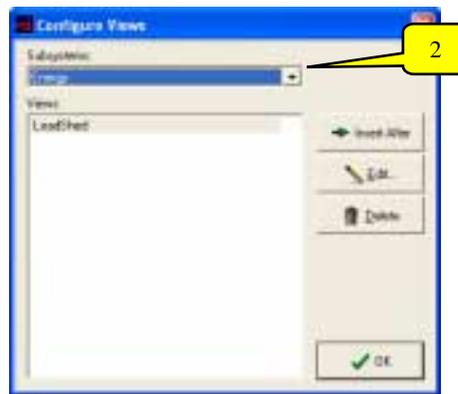
Figure 2 - Configure Views

3- In the View Name field, type the view name (e.g. Energy).

4- Click OK to finish.

Figure 3 - Add New View

3.2   Adding the Energy – Loadshed Node

1- In the **Subsystem** menu, select the **Energy** subsystem. 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. Energy).

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 the **OK** button to finish or **Cancel** to clear the node.

Note: an icon can be moved using the left mouse button and holding the **Ctrl** key of your keyboard.
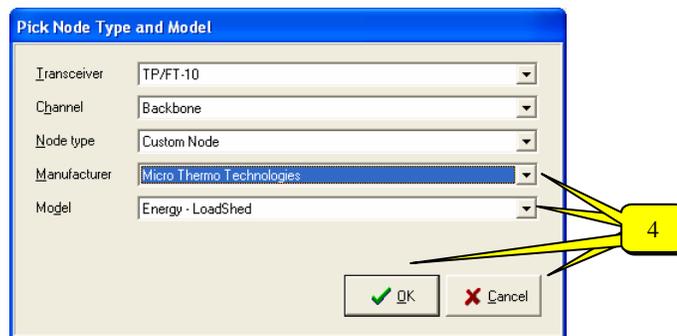
Figure 4 - Pick Node Type and Model

Once the node representation has been dropped, you must link 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 node's *Service Pin1* (Of the 500, 504, 508 or 512 family). The software takes a few minutes to load in the node. Once the software is loaded, the window buttons are enabled.
7- Click **OK** to close the window.
8- Click to accept and save the changes.

Figure 5 - Custom Node Information

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1 If the node is not accessible, it is possible to type the neuron identification number manually, as explained in the Node Installation manual (*71-GEN-0081*).

3.3 Network Variable Connections

The Energy module can interact with several other nodes: the suction pressure controller, the condenser controller, the MT-500 sensor nodes and an RTU node (or other) of the HVAC system.

Several network variables must be connected to bind the RTP module with the desired loads. The necessary connections (or bindings) are shown in the table below.

Loadshed Node		RTU Node	
Outputs	NV Source	Inputs	NV Destination
Energy-Loadshed	nvoLoad1	Load 1 (e.g.: RTU)	nviRtuLdShedReq
Energy-Loadshed	nvoLoad2	Load 2 (e.g.: Anti-Sweat)	nviLdShedReq
Energy-Loadshed	nvoLoad3	Load 3 (e.g.: Light)	nviLoadShed
Energy-Loadshed	nvoLoad4	Load 4 (e.g.: SPC)	nviSpcEcEnd
Energy-Loadshed	NvoLoad5	Load 5	If necessary
Energy-Loadshed	NvoLoad6	Load 6	If necessary
Energy-Loadshed	NvoLoad7	Load 7	If necessary
Energy-Loadshed	NvoLoad8	Load 8	If necessary

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- Click Next.

7- In the Node drop-down list of the Connect From box, select the node of the given module (Energy – Loadshed).
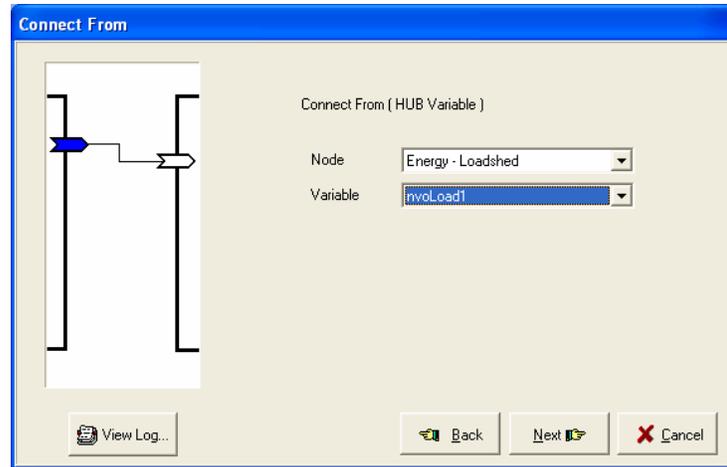
Figure 6 - Connect From

8- Select the desired variable (e.g.: **nvoLoad1)** in the **Variables** drop-down list.

9- Click **Next.**

10- The window that opens (Figure 7) allows you to choose the input variable to which you wish to connect the **previously selected** variable **(nvoLoad1).** Choose the node of the desired load (in this case **RTU**) in the drop-down list.
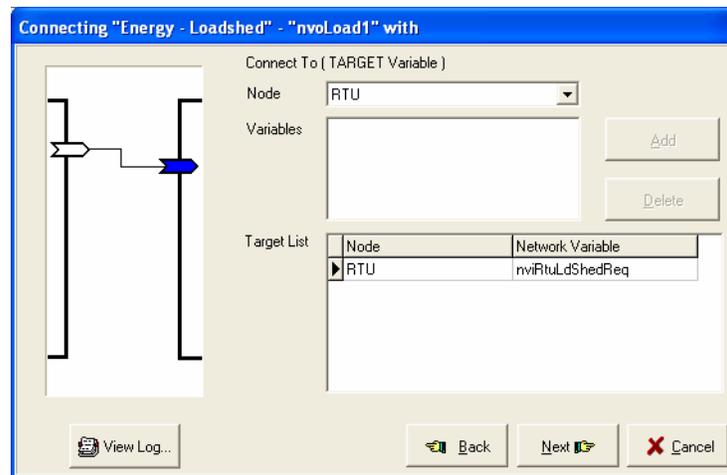
Figure 7 - Connecting with

11- Then select the relevant variable (**nviRtuLdShedReq**) in the list.

12- Click **Add.** The variable is moved to the **Target List** section.

13- Click **Next** to open the **Service Type** window.
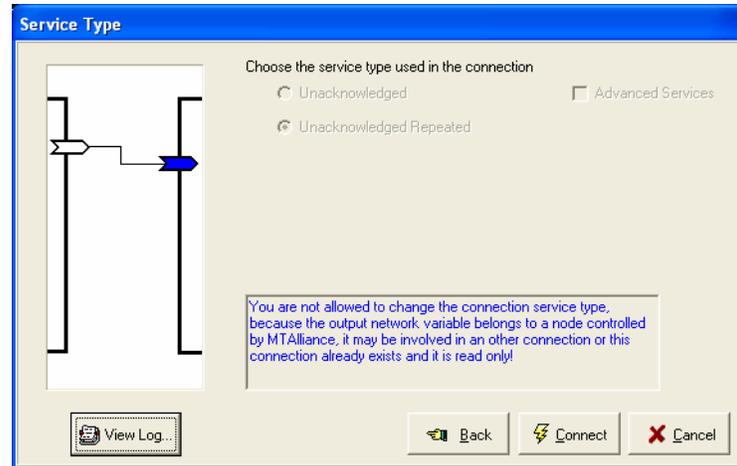
Figure 8 - Service Type

14- Click **Connect** to establish the connection.

15- Repeat the procedure for all the connections to be made.

16- Once all the connections have been made, select **Close**.
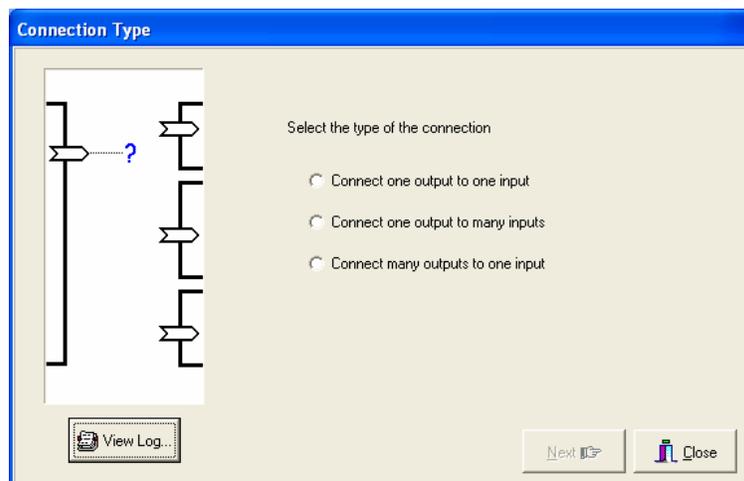
Figure 9 - Closing the connections system

3.4　Description of Processes

The process takes into consideration several settings for the loadshed control:

- The reading of the energy rate method;
- The (direct or calculated) reading of the instantaneous power method;
- The operation of the generator method;
- The sending of a loadshed level by Web services method.

The loadshed method is usually chosen according to the methods set up in the system and must allow for the most energy conservation (based on saved costs). On a site, it is possible to use only the direct reading of the instantaneous power method when the reading of the energy rate method is not available (in Quebec, for example). The operation of the generator method will always be considered in the determination of the loadshed (if a generator is on the site), as well as the sending of a loadshed level by Web services method.

3.4.1　Loadshed Methods (and the Corresponding Inputs)

3.4.1.1　*Reading of the energy rate method*

This method determines the required loadshed level by reading the rate via an Internet service that provides these rates (free service at www.IEMO.com, for the province of Ontario) (RTP). The rate that was read is then compared to a range of predetermined rates (CPs), which determines the required loadshed level ("RTP" input of the multi-level comparator). If this method is not used, the Gateway card may not be present on the MT-508 card.

3.4.1.2　*Reading of the instantaneous power method*

There are three (3) methods for determining the consumed energy. In the first method, an energy reading is taken on one, two or three inputs (nviKW1, nviKW2, nviKW3) via a reading module of the WattNode type (or other) and the sum is calculated. In the second method, a reading of the currents and the voltage is taken in strategic places (nviCurrentA, nviCurrentB, nviCurrentC, nviVoltage), and is then calculated. The choice between these two modes will be made with a CP. In the third method, the energy reading is taken by decoding powers via a SAM (Stand-Alone Meter). The values are either available via a SAM pulse output, or via a SAM RS-485 output (Modbus). The (calculated or measured) consumed energy is then compared to a range of predetermined power values (CPs), which determines the required loadshed level ("Energy" input of the multi-level comparator).

3.4.1.3　*Operation of the generator method*

In most targeted sites, a generator is present. Thus, we must take the loadshed into account when this generator is activated, either because of a power failure, or during the preventive maintenance of the generator. A signal is sent ten (10) seconds before the activation of the generator (nviTransfertStatus). When the generator is activated, its status is also available (nviGenStatus). The logical operation of these two signals is then read by the multi-level comparator ("GEN" input of the multi-level comparator).

When the generator is selected by the loadshed strategy via the multi-level comparator, a "soft start" sequence should be expected. This sequence will include eight (8) levels (like RTP and Energy), and a programmable delay should be expected between levels.

3.4.1.4   *Sending of a loadshed level by Web services method*

A loadshed command sent by Web services can be received (nviLdShedLevOvrd). The loadshed level predetermined by the multi-level comparator has priority over any other levels, if applicable ("Override" input of the multi-level comparator).

3.4.2   Outputs

3.4.2.1   *Outputs of the multi-level comparator*

Two types of output are available: physical (via relays) for loadsheds that are not controlled by the MT Alliance system (Relays 1-8), and logical (nvoLoadX, X=1 to 8). Outputs are determined by the required loadshed level, which is calculated by the multi-level comparator.

3.4.2.2   *Status Outputs (Measure Points)*

Outputs that indicate the current loadshed mode (nvoMode), the total of the loads shed (nvoTotalLoad) (tbd), and the total of kilowatts shed (nvoKWLoadSheded) are available.

An output that indicates the value calculated by the RTP component is available (nvoRTP).

Outputs that indicate the calculated values of the current (nvoAvgCurrent), the voltage (nvoVoltage), the power (nvoCalculatedKW) and, if applicable, the sum of the measured power (nvoSumKW) are available.

The reading of the input current taken (nvoCurrentA, nvoCurrentB et nvoCurrentC) are available, as well as the values of the instantaneous input power taken (nvoKW1, nvoKW2 and nvoKW3).

Also, the reading taken by the SAM is available via nvoSAMOutput, if applicable.

Finally, outputs that indicate the generator status (nvoTransfertStatus and nvoGenStatus) are available.

3.4.3   Multi-Level Comparator

As described in the inputs section, there are four (4) types of loadshed:

- The reading of the energy rate method ("RTP" input of the multi-level comparator);
- The (direct or calculated) reading of the instantaneous power method ("Energy" input of the multi-level comparator);
- The operation of the generator method ("GEN" input of the multi-level comparator)
- The sending of a loadshed level by Web services method ("Override" input of the multi-level comparator).

The "GEN", "Override" and "Energy" inputs are usually taken into consideration during the determination of the required loadshed. The RTP input will only be taken into consideration if necessary (according to the location of the site, for example, in Ontario).

The loadshed level does not necessarily correspond to the loads to shed. Level 1 of loadshed prescribed by the RTP input, for example, could correspond to loads 1, 2 and 8. Level 2 could correspond to loads 2, 4 and 5, and so forth. Level 1 of loadshed prescribed by the Energy input could correspond to loads 2 and 8 only, and level 1 prescribed by the GEN input (the only possible level for this input) could correspond to loads 5, 6, 7 and 8. Therefore, in a given level, the loads to shed may not be the same for each input (RTP, Energy, GEN and Override).

We must also take into consideration the internal loadshed level of each node that makes up the loadshed solution because this level is different from the level calculated by the loadshed node. For example, there are usually three (3) internal loadshed levels in each node; however, this number can reach eight (8) in certain nodes (for example, the lighting node). Therefore, in addition to the node to shed, we must specify the internal level of this node. See the example of a loadshed matrix on the next page.

To determine the power associated with a level, you must define (via the CPs) an approximation of the power shed by each load. If 20 kW correspond to load 1 when it is shed (internal level 1 of the node), and 30 kW correspond to load 2 (internal level 3 of the node) and 15 kW correspond to load 8 (internal level 2 of the node), then 65 kW will be shed for level 1 of the RTP input (loads 1, 2 and 8) and 45 kW will be shed for level 1 of the Energy input (loads 2 and 8).

The input chosen for loadshed will be the one that allows the most energy conservation at the time of the calculations. In the previous example, the level 1 of the RTP input will therefore be used, allowing optimal energy conservation.

These descriptions apply to RTP, Energy and GEN inputs. In the case of a level received via Web services, the Override input has priority over the other three inputs, unless the calculated power from the generator is higher than the power from the Web services (we must not under shed when the generator is operating).

A loadshed matrix can be constructed for each input, in this manner:

Table 5 – Example of a loadshed matrix

Level	Loads								
	1	2	3	4	5	6	7	8	kW
1			1 (10 kW)	1 (5 kW)					15 kW
2	2 (35 kW)								35 kW
3	1 (20 kW)	3 (30 kW)						2 (15 kW)	65 kW
4		4 (40 kW)		2 (15 kW)	1 (10 kW)				65 kW
5		5 (45 kW)			2 (10 kW)	1 (20 kW)		2 (20 kW)	95 kW
6				3 (25 kW)		3 (35 kW)	2 (15 kW)	3 (25 kW)	100 kW
7	2 (35 kW)	5 (45 kW)	3 (25 kW)		2 (10 kW)				115 kW
8	3 (40 kW)	7 (60 kW)		3 (25 kW)				3 (25 kW)	150 kW

3.4.4 Various Considerations

- In Canada, two (2) markets are available; - one in Ontario (www.IEMO.com), and another in Alberta (www.AESO.ca). The solution must be available in the Ontario markets;

- The Ontario energy Web site (www.IEMO.com) doesn't take into account the Eastern Daylight Saving Time when generating its files. During this period, files are therefore generated with a one-hour delay. We must consider this when calculating the file parameters;

- Current and voltage physical inputs: the variables are provisional, which means they will not be used during Phase I of the project. The same thing holds true for power physical inputs. Only the use of a WattNode type module will be allowed (or of photo-coupled inputs).

4   Configuration of the Energy Node Plug-In

The **Energy Node** plug-in allows the user to:

Configure the energy loadshed control process.

Load the configuration settings in the node.

Monitor the control process.

Perform several other operations related to the node operation.

The plug-in icon is visible in all modes (**Overview, Maintenance and Configuration**).

4.1   Basic Plug-In Operation

4.1.1 Statuses

The plug-in is designed for a quick overview of the operation of the Energy Node loadshed system. To enable a quick analysis of the system status, it uses geometric shapes with different colours to indicate the statuses. As a general rule, they indicate exceptions to regular situations.

■   Red indicates that one or several connections are missing.

●   Aqua indicates that a variable has been overridden.

◇   A yellow diamond indicates that a configuration is incomplete.

To help the technician locate the exception status, the colour symbol is added to the given tab.

4.1.2 Applying or Cancelling Changes

When changes are made in the plug-in, the **Apply** button is enabled. In this case, here are the operations you can perform:

Apply: when clicking this button, a confirmation dialog box appears. If you accept to apply the changes, the plug-in saves the values, adds them to the system log and attempts to send them to the node. Once the operation is 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 cancelled 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: this button launches the same sequence as **Apply**, except that the plug-in closes when completed.

Cancel: when this button is clicked, a confirmation dialog box appears asking the user if they want to cancel their changes. Select **Yes** to cancel all changes and close the plug-in. Click **No** to return to the previous screen.

Normally, when the technician clicks **Apply** or **OK** to confirm that they wish to keep the changes made, the software transmits to the node only the settings that have been modified since the last loading of the settings.

Figure 10 - Option Bar

4.1.3 Sending all CPs

This is an additional security measure. The **Send All CPs** box force sends all configuration settings to the node, rather than the usual procedure where only modified settings are sent. As usual, settings are sent when you click **Apply** or **OK**.

We recommend checking this box if you are unsure about the synchronisation of the node and the plug-in.

4.2 System Tab

The **System** tab shown below groups the settings that allow the user to choose the configuration which is closest to the Energy Node loadshed process.
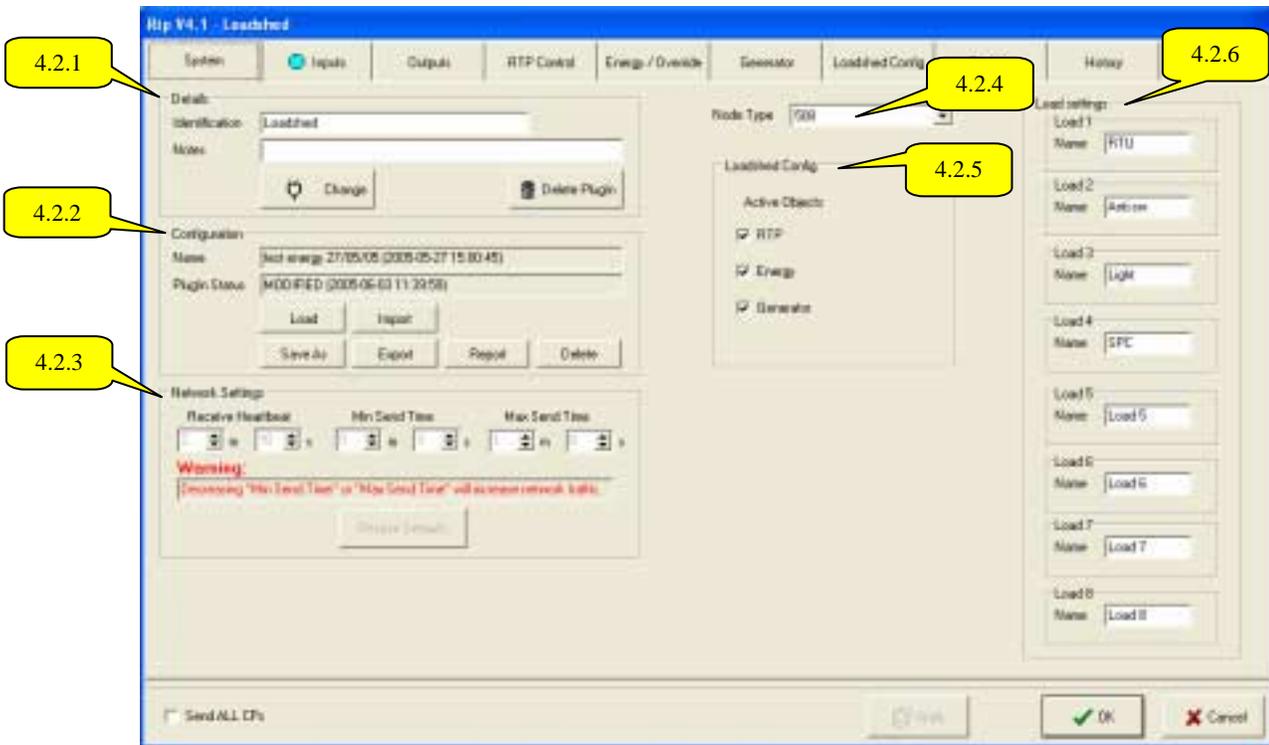

Figure 11 - System Tab

4.2.1 Details

- **Identification:** allows the user to identify the node.
- **Notes:** allows the user to type an important note.

- **Change:** allows the user to change the plug-in image.
- **Delete PlugIn:** allows the user to delete the plug-in.

4.2.2 Configurations

A **Configuration** represents the settings required for a module's operation.

- **Name:** indicates the name of the current configuration. If no configuration was saved, <Ad-hoc> is displayed.

- **PlugIn Status:** indicates 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 in order to perform an installation on other controllers or on another site. The configuration management options are described below.

- **Load:** opens a dialog box to select and load a configuration in a list of previously saved or imported configurations. The list is empty if no configurations were saved or imported.

- **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.

- **Save As:** opens a dialog box to save the current configuration and insert it in the site's current configuration list. It is possible to create a new configuration or to overwrite an existing configuration by giving it the same name.

- **Export:** allows the user to transfer one or several configurations contained in the list of saved configurations to a text file. The possibility to export and import configurations allows the user to transfer configurations from one site to another. Since the text file is rather small, it is possible to copy the file on a floppy disk or to send it via modem or e-mail to another site.

- **Report:** generates on screen a complete report 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 cooling system documentation.

- **Delete:** opens a dialog box allowing the user to delete configurations included in the configuration list.

4.2.3 Network Settings

This group displays several settings that determine the **Energy Node** module's performance as a component of the LonWorks network. These values are read-only (shaded fields), since

a change without 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 **Network Settings** section of the **System** tab shown on page 18 (Figure 14).

- **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 purposes 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 restore the default values.

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 ≤ Receive Heart Beat/3.

4.2.4 Node Configuration

- **Node Type**: allows the user to identify the type of module to be used. (MT-504, MT-508 and MT-512 are available.)

4.2.5 Loadshed Config

- **Active Objects**: allows the user to select the various energy node loadshed strategies.

4.2.6 Local settings

- **Load 1 to 8**: allows the user to associate a name to the various loads.

4.3 Inputs Tab

The following figure shows the **Inputs** tab, as it appears when it is time to configure the three inputs.
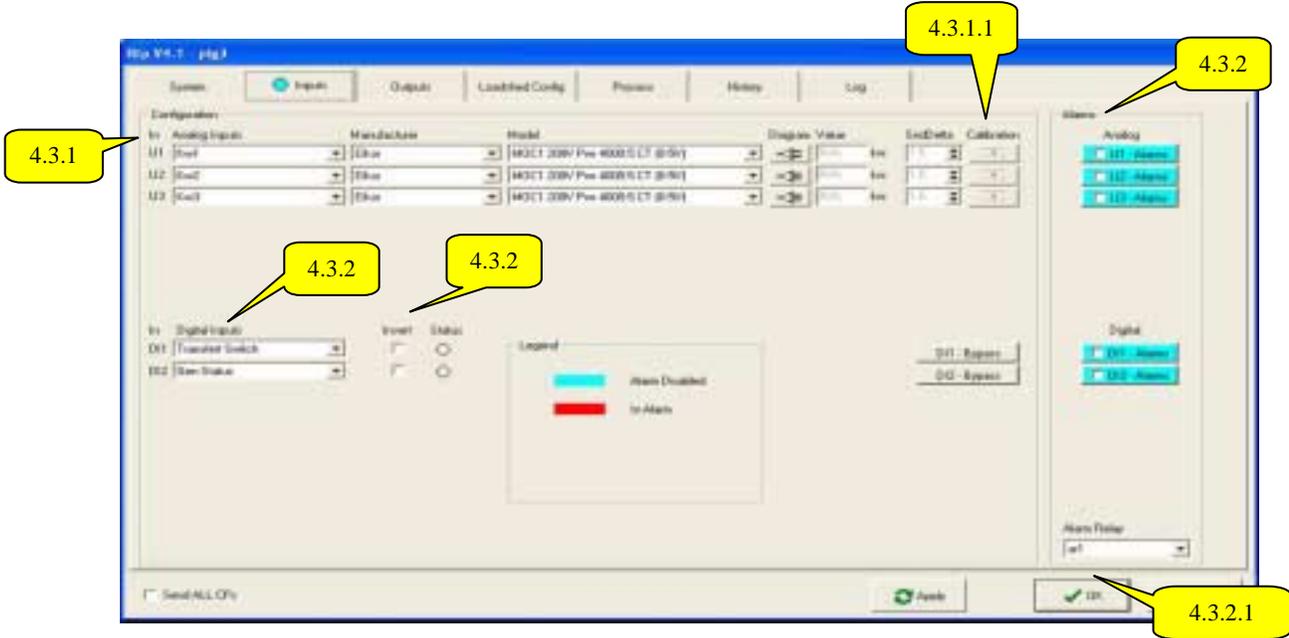

Figure 12 - Inputs tab

4.3.1 Analog Inputs Settings

- **Analog Inputs (U1 to U3):** any analog input can be configured as an analog sensor by selecting the corresponding sensor, or can remain unconfigured by selecting <None> in the **Analog Inputs** box. Certain inputs correspond to an input network variable on the node of the Energy Node, as shown in the following table:

U1 Kw1	nviKw1
U2 Kw2	nviKw2
U3 Kw3	nviKw3

If one of these network variables is connected to another node (a LNS connection exists), the corresponding input appears already configured, the word **bound** displays after the description and several fields in this line are disabled. In this case, the subcooling node uses the updates received by the input network variable instead of reading the local sensor.

- **Manufacturer:** once the user has selected a sensor for a specific input, the list of manufacturers displays the names of all the sensor manufacturers who produce a model compatible with the analog input.

- **Model**: once the user has selected a sensor and a manufacturer for a specific input, the list of models displays all the sensor models compatible with the analog input.

- **Diagram**: when this button is clicked, the user accesses a diagram showing the selected sensor and its electric connections.

- **Value**: once the user has selected a sensor for a specific input and the node has received all the configuration settings, the current value of the sensor displays in this field.

- **SndDelta**: the Energy Node does not send the value of the sensor to the network (to its corresponding output network variable) if the difference between this value and the one that was last sent to the network is not greater than the SndDelta variable. This setting is designed to control network traffic. It is not designed to disturb other nodes receiving updates from this network variable through a connection to the Energy Node.

4.3.1.1 Calibration

To correct an error between the actual value and the value read by the sensor, the installer can calibrate the sensor by changing its offset. Calibration is an iterative process, during which the installer must read the value of the sensor, compare it with a standard value and, if they are different, take one of the following steps:

- **Set Calibration Value**: the user types the actual value and clicks the Apply button. The plug-in calculates the offset between this value and the value of the sensor and sends it to the Energy Node. The node corrects the offset of the sensor by generating an update with the new value.

- **Set Offset**: sometimes the offset of the sensor is known after its manufacturing, so the installer can just type it to calibrate the sensor.

- After several iterations, the difference between the value of calibration and the value of the sensor is so small that the sensor is considered calibrated. Click the OK button to exit the calibration of the sensor and return to the Inputs tab.
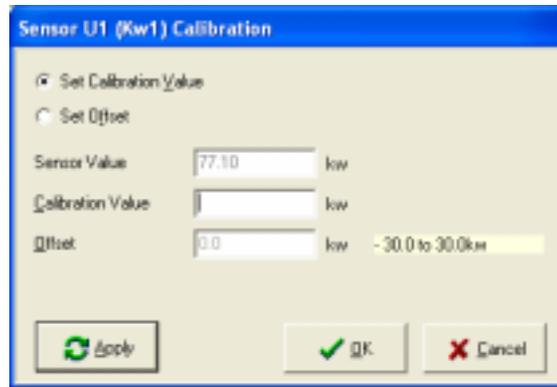
Figure 13 - Calibration

- **Sensor Value:** the value read by the sensor.

- **Calibration Value:** the measured value of calibration.

- **Offset:** the known value of calibration[2]

4.3.2   Digital Inputs Settings

Digital Inputs (DI1-n) – where "n" varies according to the Node Type setting in the System tab. Any digital input can be configured as a switch sensor by selecting the corresponding switch sensor, or can stay unconfigured by selecting <None> in the Digital input box. Remember that each digital input is designed to normalize the connections to theses sensors, as shown in the table.

Invert – when this box is checked, the switch's position is logically inverted; the sensor will consider it as if it was physically in the other position. This inversion affects the alarm logic, the output network variable containing the sensor value and all the internal calculations based on this sensor value.

Status – indicates the current position of the switch. The status can be affected by the *Invert* setting.

Any digital input can reflect the status of the switch or be forced to represent a specified value. The *Bypass Mode*, *Bypass Until* and *At* settings define if a bypass is active and the period during which it is active. After this period, the bypass mode is automatically disabled and the digital input reflects the status of its sensor. A bypass is shown in blue in the background of the DIx label and on the tab (if no alarms are active).

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[2] Warning: If a greater value of calibration or offset is necessary, it is probably caused by a sensor, sensor cable, or node problem. This must be corrected to avoid entering a value that is too high.

Bypass Mode - Any digital input can reflect the status of the switch or be overridden to represent a specified value:

- Auto – the position of the switch is the value of the digital input.
- On – the digital input is overridden to *ON* (enabled).
- Off – the digital input is overridden to *OFF* (disabled).

Bypass Until – specifies the date until which the bypass is in effect.
At – specifies the hour until which the bypass is in effect.

Digital input	Sensor	Network Variable
D1	Generator activation state switch	nvoTransfertStat
D2	Generator secondary activation state switch	nvoGenStatus

4.3.3 Analog Inputs Alarms

This group allows the user to set the alarm settings and to determine at a glance the alarm state of any configured input. For example: U1's alarm is enabled; U2's alarm is enabled and triggered; and U3's alarm is disabled. If an input is in an alarm state, a red square displays on the Inputs tab and is visible anywhere in the plug-in. If no alarms are enabled and at least one input has an alarm notice temporarily or permanently disabled, a blue circle displays on the Inputs tab.

Figure 14 – Alarms

- **Analog Inputs Alarms (**Ux Alarms): allows the user to configure the alarm settings for the analog input (sensor), where x represents the input number:

Figure 15 - Alarms Settings

- **Enable Alarm**: allows the user to permanently enable/disable the alarm notice for the selected input.

- **Disable Alarm Temporarily**: this option is available only if the alarm notice is enabled permanently. When this option is checked, the user can temporarily disable the alarm notice of the selected input for a specified period. Once the period is expired, the alarm notice status indicates ENABLED.

- **Disable Alarm Permanently:** indicates the time at which the period will end.

- **High Limit and Low Limit**: all sensor values inside these limits will be considered normal and will not generate an alarm.

- **Set Time**: if a sensor is not in an alarm state but its value is outside the interval delimited by the high and low limits settings, an alarm will be generated once this period is expired.

- **Recall Time**: once the sensor alarm is acknowledged, if its value remains outside the interval delimited by the high and low limits settings, a new alarm will be triggered.

- **Priority Level**: indicates the alarm priority:

    High: high alarm priority. Requires immediate attention.

    Medium: intermediate priority alarm.

    Low: low priority alarm.

    Notice: no relays will be enabled on the alarm node, even when specified in the loadshed plug-in.

4.3.4 Digital Inputs Alarms

Ux Alarms – allows the user to configure the alarm settings for the digital input (sensor), where x represents the input number:
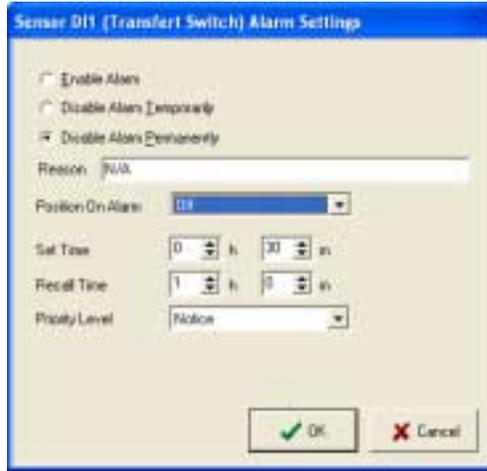

Figure 16 - Digital Inputs Alarm Settings

- The difference between digital and analog inputs alarm settings is the absence of *Low Limit* and *High Limit* settings; they are replaced by the *Position On Alarm* setting.

- *Position On Alarm* – the position of the switch in which the alarm will be generated.

4.3.4.1   Alarm Relay

This drop-down list allows the user to select the alarm node output that will be enabled when an alarm is triggered. You can select one or no output by selecting "None" if you don't want the alarms to be sent to your central.
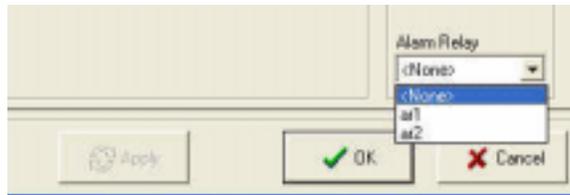

Figure 17 – Alarm Relay
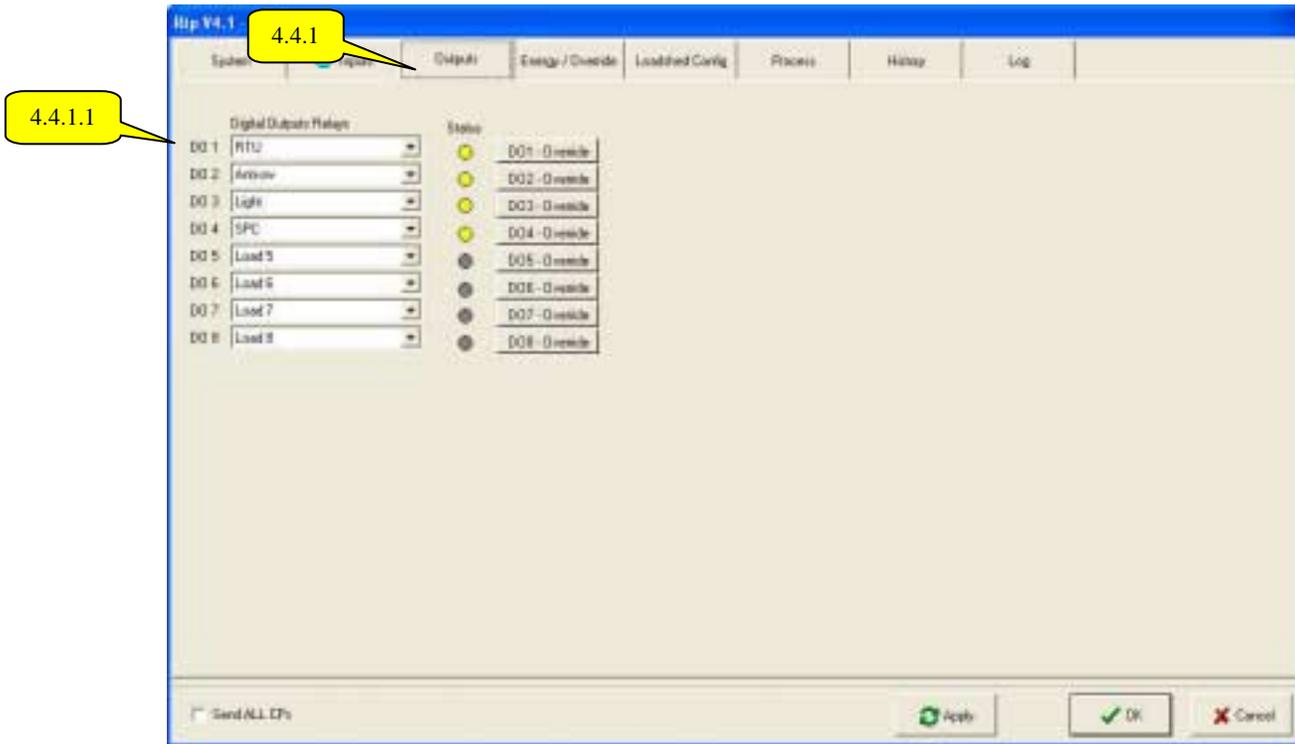
4.4   Outputs Tab

Figure 18 – Outputs Tab

4.4.1 Outputs Settings

- The **Outputs Tab** allows users to configure completely the digital outputs (DO) to display the current state of the configured outputs and to override them for a determined period.

4.4.1.1   *Digital Output Relay*

The user can choose any of the available digital outputs and assign it one of the following digital output sources:

- DO 1: Load 1 or <None>
- DO 2: Load 2 or <None>
- DO 3: Load 3 or <None>
- DO 4: Load 4 or <None>
- DO 5: Load 5 or <None>
- DO 6: Load 6 or <None>
- DO 7: Load 7 or <None>
- DO 8: Load 8 or <None>

> **Note**
>
> The digital and analog outputs of the loadshed node plug-in obey the rule according to which a stage with a higher index is not available for configuration if all other stages with a lower index are not configured.
>
> Note: It is impossible to implement *stage 2* before *stage 1*.

- **Status** (State of the digital output): once the loadshed node has received the configuration settings, the output states are presented as follows:

  Yellow: the output is ON (enabled)

  Grey: the output is OFF (disabled)

  Any digital output can be overridden for a determined period: the relay's state will be determined by the override command value, not by the loadshed strategy.

4.4.1.2 *Override*

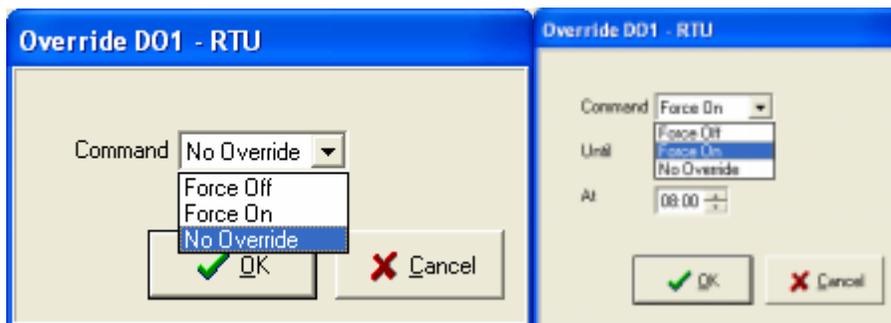Specifies the mode and the value of the override command.

Figure 19 – Override Command

- **Command**

  No override (Automatic): the digital output is controlled by the strategy (no override command).

  Force On: the digital output is overridden to ON (enabled) for the specified period.

  Force Off: the digital output is overridden to OFF (disabled) for the specified period.

- **Until**: indicates the date at which an override command is active.

- **At**: indicates the time at which an override command is active.

  Once the period has elapsed, the override command is automatically deleted and the corresponding PID controls the output again. If an override command is used

(sent to the loadshed node), the digital output label is blue and a blue circle displays on the **Outputs** tab.
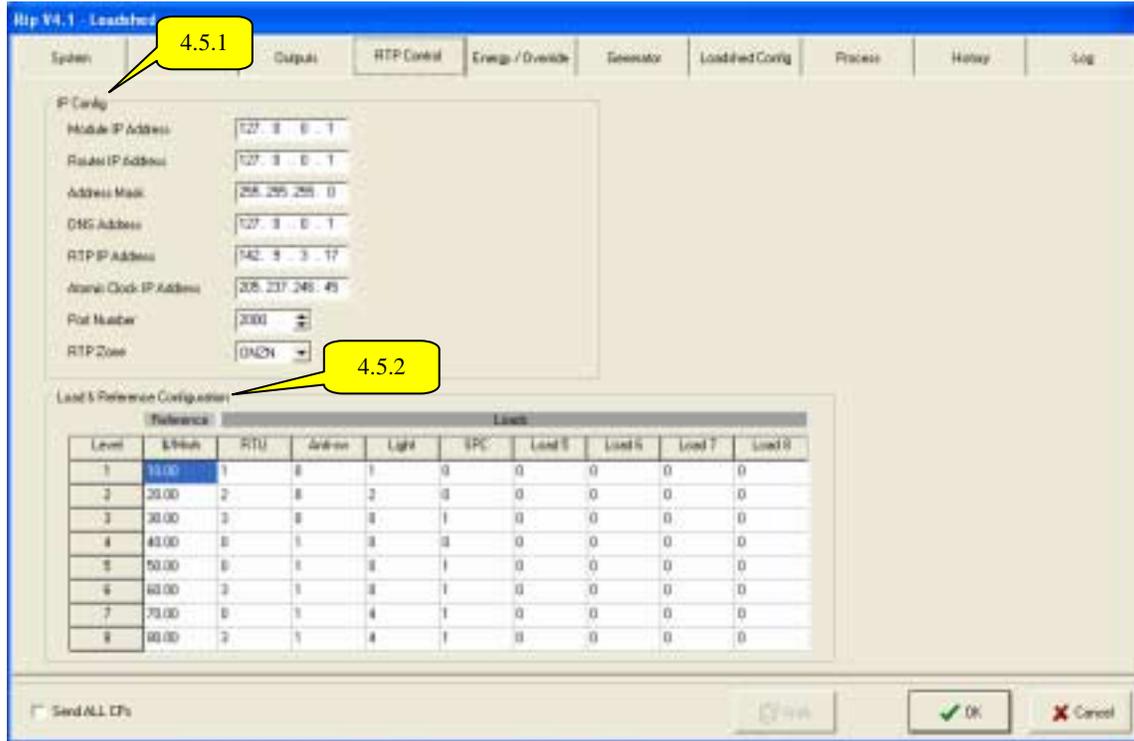
4.5 RTP Control Tab

Figure 20 - RTP Control Tab

4.5.1 IP Config

- **Module IP Address:** Address of the Gateway card (MT-560)
- **Router IP Address:** Communication Address of the Router
- **Address Mask:** Allows the user to screen the various addresses coming from the Router.
- **DNS Address:** Same address as the router
- **RTP IP Address:** FTP IEMO site
- **Atomic Clock IP Address:** Internet Clock
- **Port Number:** Be careful if there is a firewall (keep this port number open)
- **RTP Zone:** Area of the file received from IEMO to process

4.5.2 Load & Reference Configuration

- **Level:** Indicates the loadshed level.
- **Reference ($/Mwh):** indicates the amount of MegaWattHour of load-shedding.
- **Loads:** Indicates the representation of the load in question.
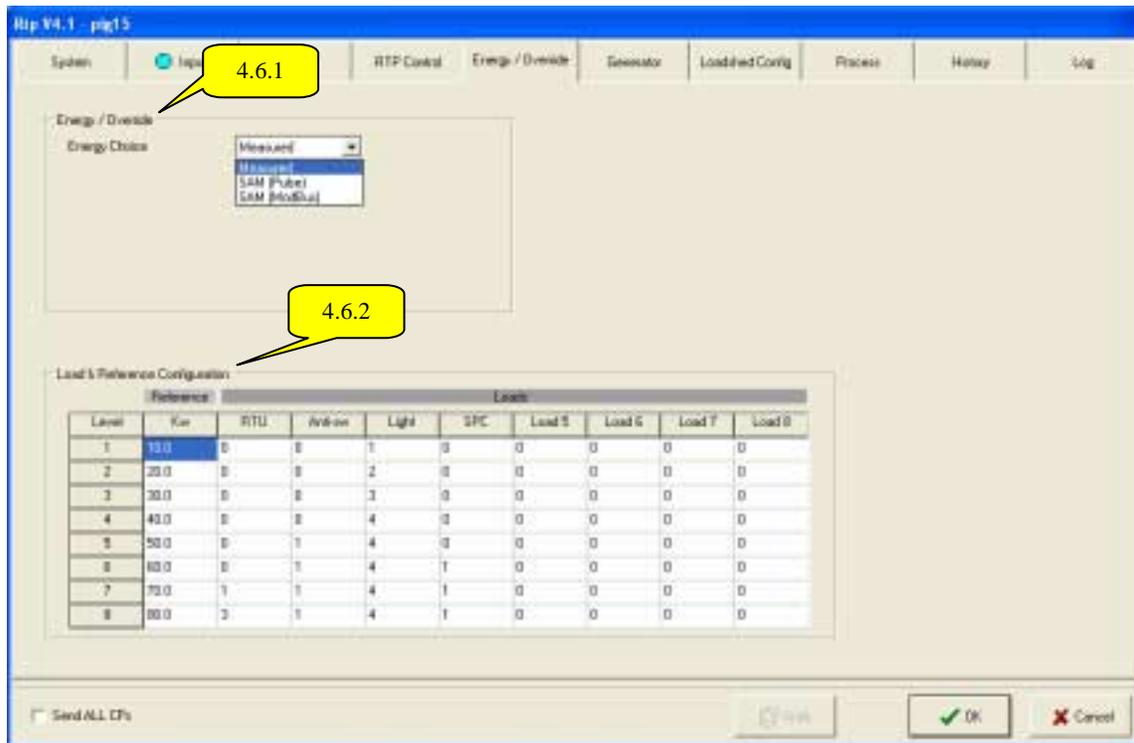
4.6 Energy / Override Tab

Figure 21 - Energy / Override Tab

4.6.1 Energy / Override

- **Energy Choice:** Communication mode of the SAM Meter
- **Measure:** Allows the user to enable physical and software reading.
- **SAM (Pulse):** Allows the user to enable the Pulse communication of a SAM Meter.
- **SAM (ModBus):** Allows the user to enable the ModBus communication of a SAM Meter.

4.6.2 Load & Reference Configuration

- **Level:** Indicates the loadshed level.
- **Reference ($/Kw):** indicates the amount of KiloWattHour of load-shedding.
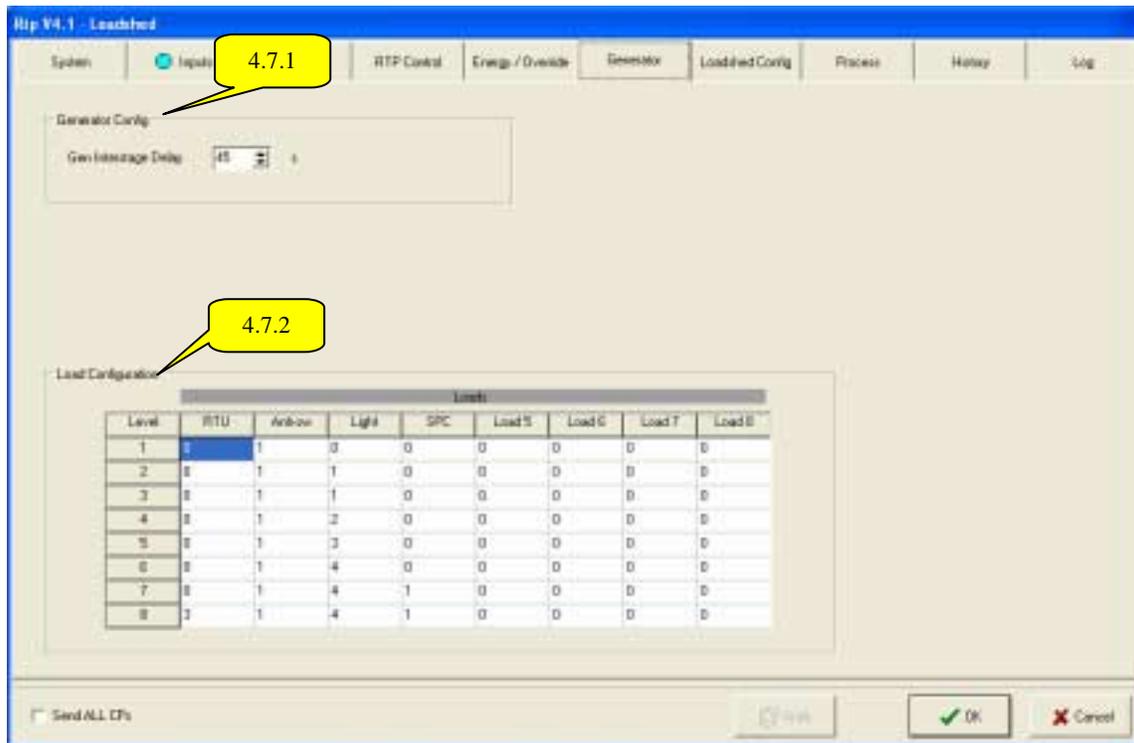- **Loads:** Indicates the representation of the load in question.

4.7 Generator Tab

Figure 22 - Generator Tab

4.7.1 Generator Config

- **Gen Interstage Delay:** Represents the time between the various loadshed levels of the *Generator* mode.

4.7.2 Load & Reference Configuration

- **Level:** Indicates the loadshed level.
- **Loads:** Indicates the representation of the load in question.
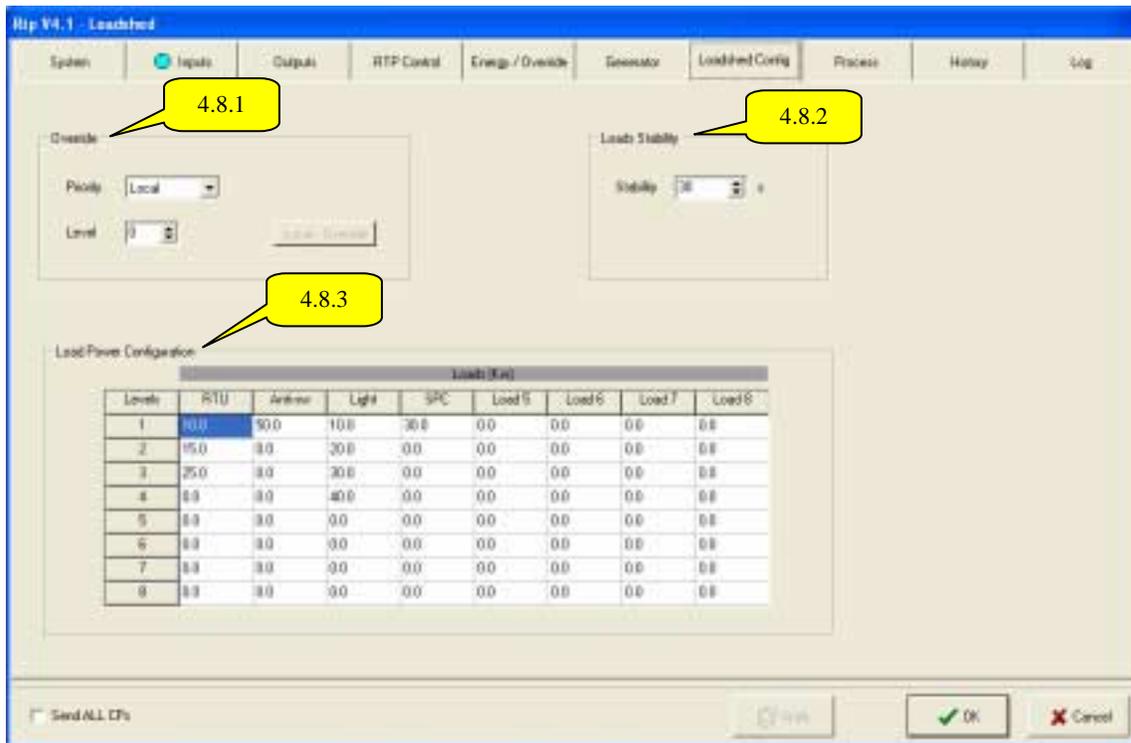
4.8 Loadshed Config Tab

Figure 23 - Loadshed Config Tab

4.8.1 Override

- • **Priority:** If the Corporative override is selected, it will supersede the Local override; conversely, if the Local override is selected, it will supersede the Corporative override.
- • **Level:** Indicates the desired loadshed level in Override mode.

4.8.2 Load Stability

- • **Stability:** Determines minimum time between loadshed mode transfers.

4.8.3 Load & Reference Configuration

- • **Level:** Indicates the loadshed level.
- • **Loads:** Indicates the representation of the load in question.

4.9   Process Tab

The **Process** tab illustrated below allows the user to view the process. It includes important visual indications and many hyperlinks that refer to different plug-in functions.
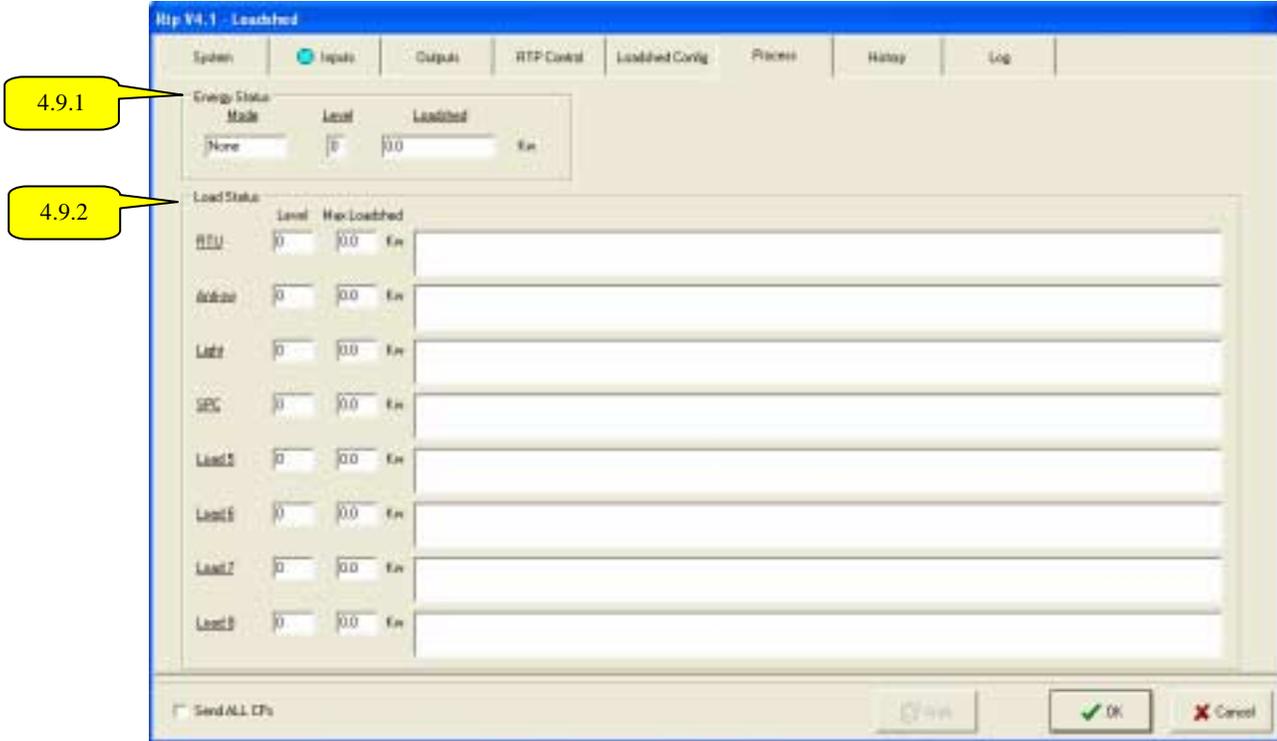

Figure 24 – Process Tab

4.9.1   ENERGY STATUS

- **Mode:** Indicates the loadshed mode in operation.
- **Level:** Indicates the loadshed level.
- **Loadshed:** Indicates the maximum value of energy for load-shedding.

4.9.2   Load Status

- **Load (x):** Indicates the representation of the load in question.
- **Level:** Indicates the loadshed level.
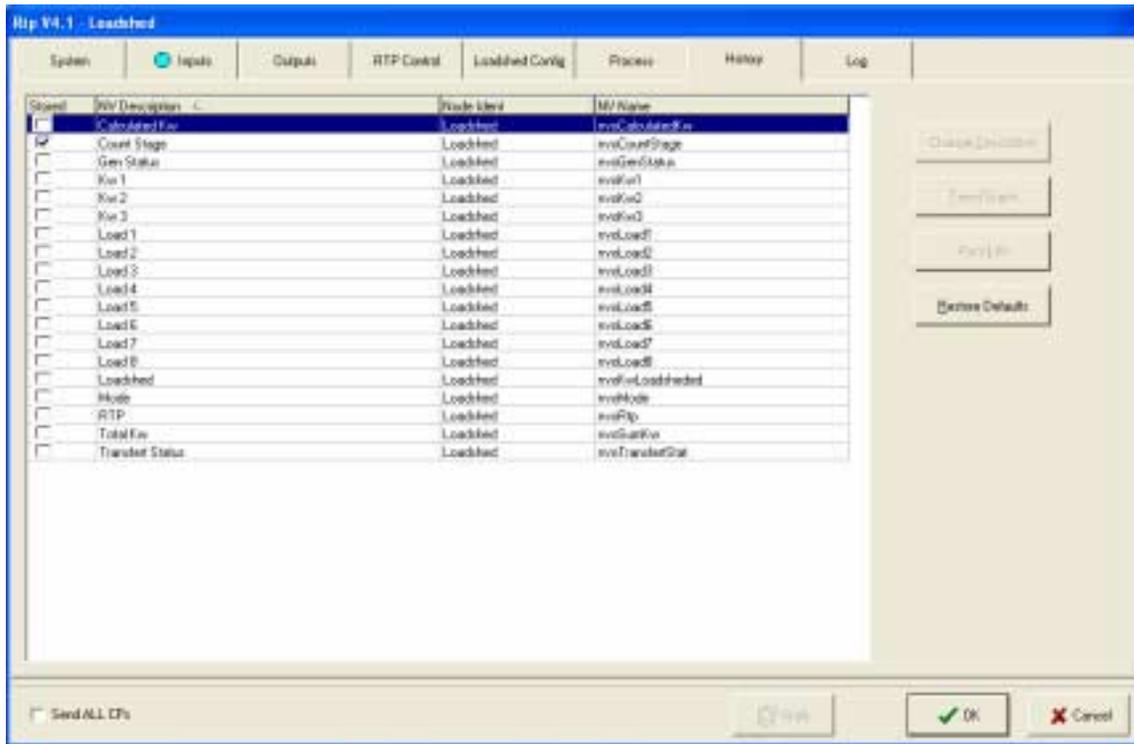- **Kw:** Indicates that the MaxLoadshed value is in Kw.

4.10   History Tab

Figure 25 - History Tab

Note: The user can select the desired NV, but the NV Count Stage must be enabled at all times.

4.11   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.
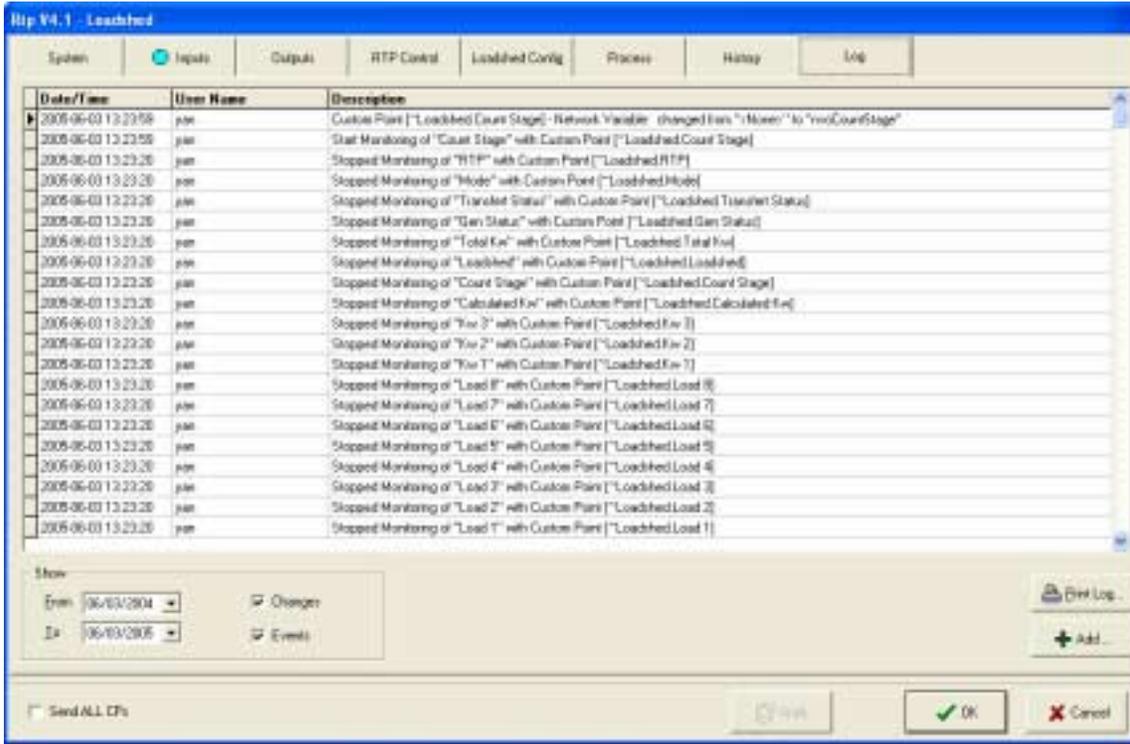

Figure 26 – Log Tab

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

5 Network Variable List

Since the **RTP** module is equipped with a plug-in that includes a process view, there are few measure points to configure on 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:

5.1 Network Variable Input List (nvi)

Alliance Type	LNS Type	Description	Variable Name	M: Measure C: Command
Count - float	count_f	Price per **Mwh** coming from another **Energy Node**.	nviRtp	C
Power - float	power_f	Instantaneous power coming from another node on the network (Watt Node)	nviKw1	C
Power - float	power_f	Instantaneous power coming from another node on the network (Watt Node)	nviKw2	C
Power - float	power_f	Instantaneous power coming from another node on the network (Watt Node)	nviKw3	C
Current - float	amp_f	Standby	nviCurrentA	
Current - float	amp_f	Standby	nviCurrentB	
Current - float	amp_f	Standby	nviCurrentC	
Voltage	volt_f	Standby	nviVoltage	
Switch	switch	Local override command.	nviLdShedLevOvrd	C
Switch	switch	Status of the Transfer switch of the generator coming from another node.	nviTransfertStat	C
Switch	switch	Status of the generator coming from another node.	nviGenStatus	C

5.2 Network Variable Output List (nvo)

Alliance Type	LNS Type	Description	Variable Name	M: Measure C: Command
Count - Unsigned	count_f	Current price in $ per Mwh	nvoRtp	M
Power - float	power_f	Value of instantaneous power at the energy node.	nvoKw1	M
Power - float	power_f	Value of instantaneous power at the energy node.	nvoKw2	M
Power - float	power_f	Value of instantaneous power at the energy node.	nvoKw3	M
Current - float	amp_f	Standby	nvoCurrentA	M
Current - float	amp_f	Standby	nvoCurrentB	M
Current - float	amp_f	Standby	nvoCurrentC	M
Voltage	volt_f	Standby	nvoVoltage	M
Power - float	power_f	Total value of accumulated power by Kw1, Kw2, and Kw3.	nvoSumKw	M
Current - float	amp_f	Standby	nvoAvgCurrent	M
Power - float	power_f	Standby	nvoCalculatedKw	M
Switch	switch	Load 1 level	nvoLoad1	M
Switch	switch	Load 2 level	nvoLoad2	M
Switch	Switch	Load 3 level	nvoLoad3	M
Switch	Switch	Load 4 level	nvoLoad4	M
Switch	Switch	Load 5 level	nvoLoad5	M
Switch	Switch	Load 6 level	nvoLoad6	M
Switch	switch	Load 7 level	nvoLoad7	M
Switch	switch	Load 8 level	nvoLoad8	M
Power	power_kilo	Total loadshed value	nvoKwLoadSheded	M
Count - Unsigned	count	Representative value of active loadshed mode.	nvoMode	M
Count - Unsigned	count	Desired loadshed level in active mode.	nvoCountStage	M
Switch	switch	State of Transfer switch.	nvoTransfertStat	M
Switch	switch	Generator state.	nvoGenStatus	M

6 Appendix - Functional Profile Diagram

Figure 27 - Functional Profile Diagram
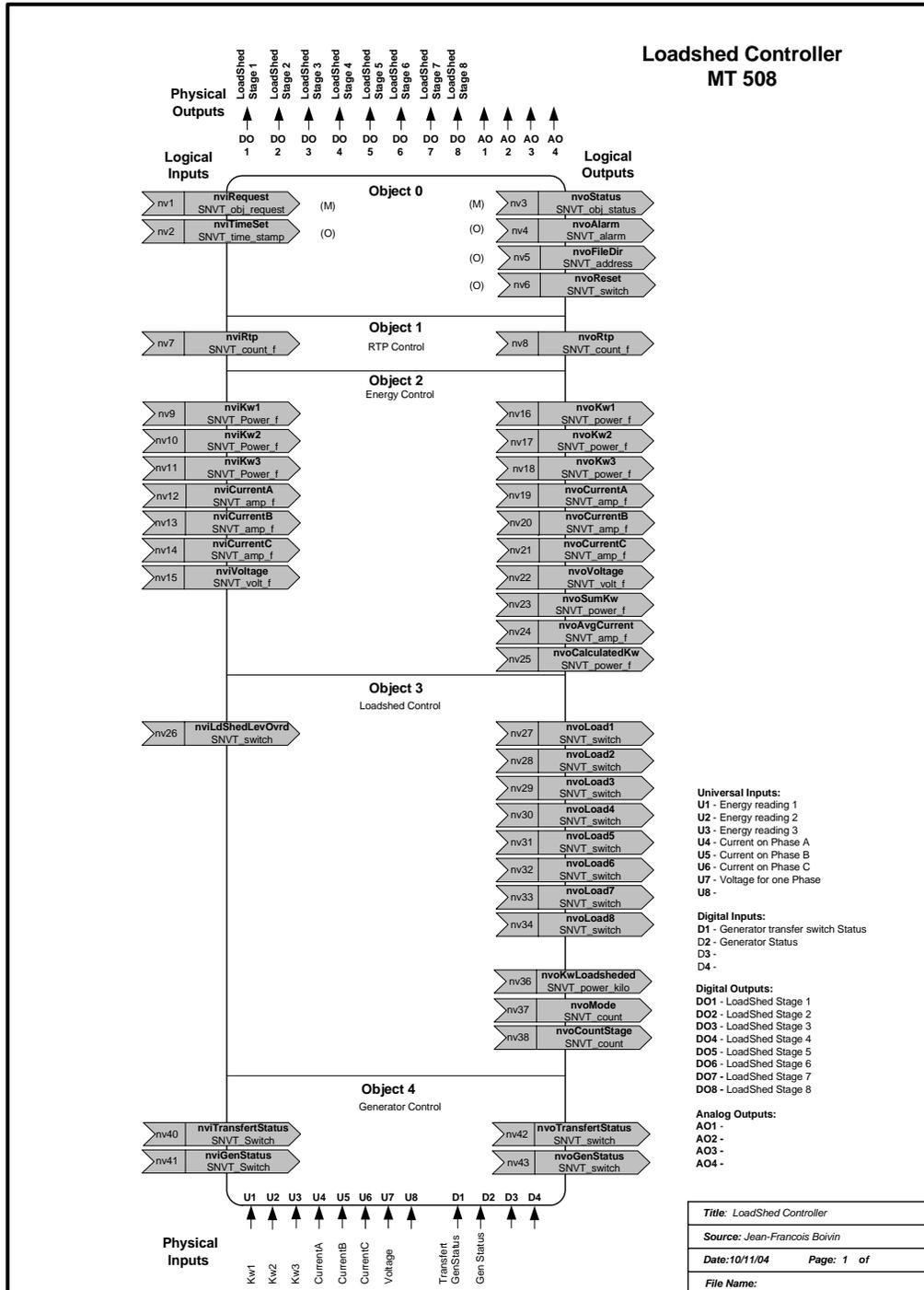
This diagram shows the various input and output variables by node object, and the physical inputs and outputs used by the Loadshed program.
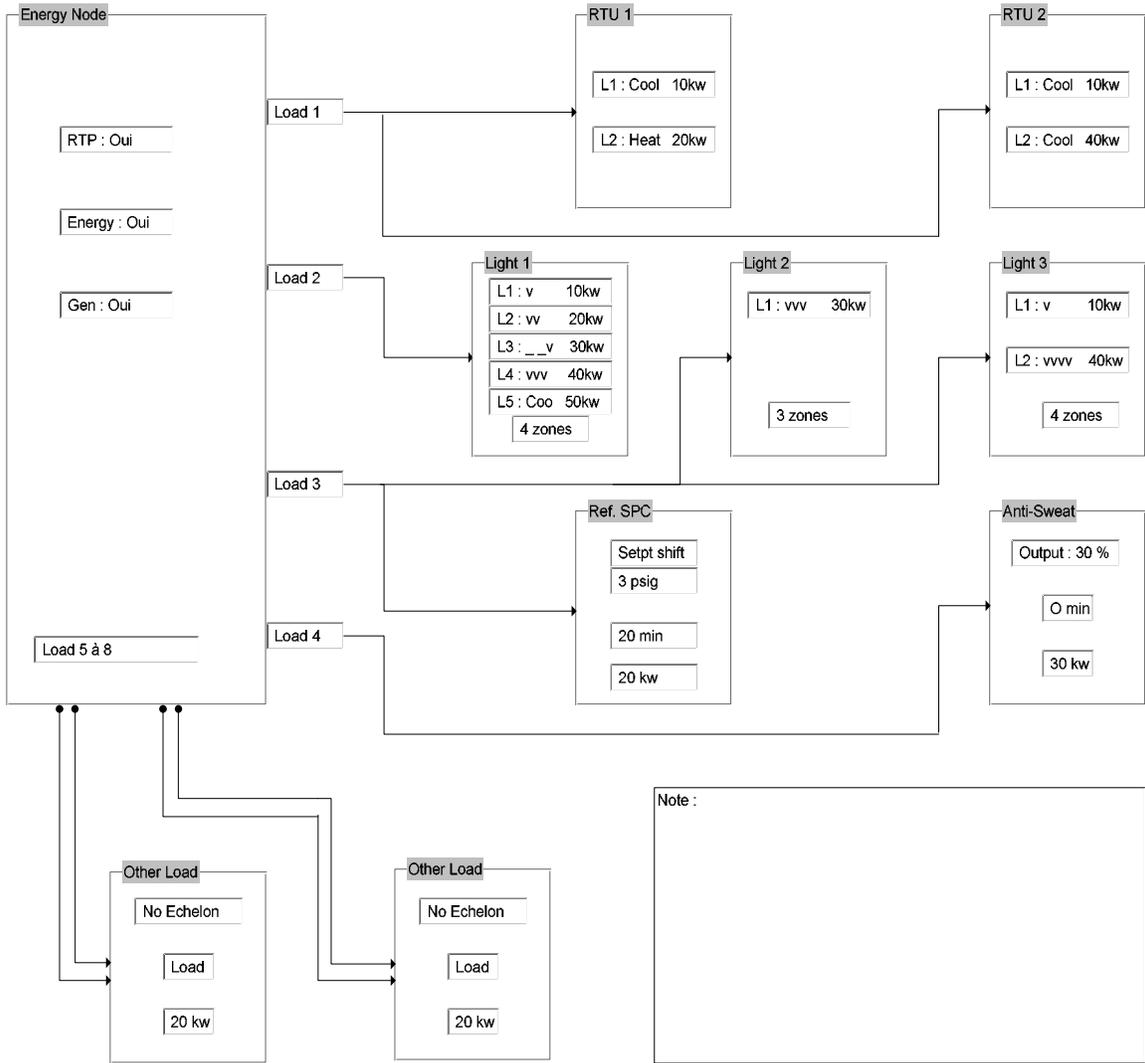
Example of a loadshed configuration:

Figure 28 - Loadshed Configuration

Revision History

REV	Description	Revised by	Date
0.1	Document translation from 71-GEN-0131-R0.5	MAC	13-Jun-05
0.2	Final Revision	JG	13-Jun-05
1.0	Official Release	JG	13-Jun-05