MICRO THERMO TECHNOLOGIES

MT Alliance Node Installation Manual

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MICRO THERMO TECHNOLOGIES

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Introduction to Nodes

Nodes are distributed intelligent electronic modules that can talk to one another. Each node is made up of many components. For the purposes of installing, troubleshooting and maintaining nodes, only a few aspects of nodes will be discussed in this document. Each node has:

- A unique Neuron ID
- Network Configuration Information
- Application volatile memory
- Application code which can usually be changed
- A Program ID
- Node Configuration Properties specific to the application
- A Service LED

The Neuron ID

Each manufactured Neuron chip has a unique Neuron ID. Uniqueness is guaranteed across manufacturers: it does not matter if Motorola, Toshiba or Cypress made it. The Neuron ID is always unique. We can obtain the Neuron ID from a device by pressing the Service button. Once a unique Neuron ID has been obtained from a node, the MT Alliance will assign the node a network address. From here on, the Neuron ID will very seldom be used to access this device. A network address consist of a "domain/subnet/node id" very similar to a "city/street/door number" address. Do not confuse the "Node Id" which is part of the network address with the "Neuron Id".

Network Configuration Information

Network Configuration Information consists of the network address and binding information (which other nodes a node can talk to). Network Configuration Information is stored in the Neuron chip built-in EEPROM memory. Once MT Alliance has sent the Network Configuration Information to the node, it will be kept permanently even if the node is reset or powered down for an extended period. The process of updating the Network Configuration Information is called « Commissioning a node ».

Volatile Memory

Application volatile memory is stored in RAM. Whenever the node is reset or powered down, that information is lost. Most input and output network variables on a node is volatile information. Nodes can be reset by applying power, by pressing the reset button or by resetting the node from MT Alliance using a network command. The node can also reset itself if it detects an internal malfunction. This is called an « internal watchdog reset ».

The MT Alliance allows the definition of command points. Command points are used to transmit a value from the PC to an input network variable on a node which is normally volatile.

When you browse an input network on a node, the MT Alliance also allows you to "Save the Value" and apply a "Send Heartbeat". For the purpose of this document, this is just like a command point.

Application Code

Most nodes store their specific application code in Flash memory. This means that the MT Alliance can load the application into the node. This allows identical electronic modules to be programmed to do different things. A MT 500 series board can be used as a condenser controller, suction pressure controller or HVAC controller. The process of changing the application code is called « Loading software »

The Program ID

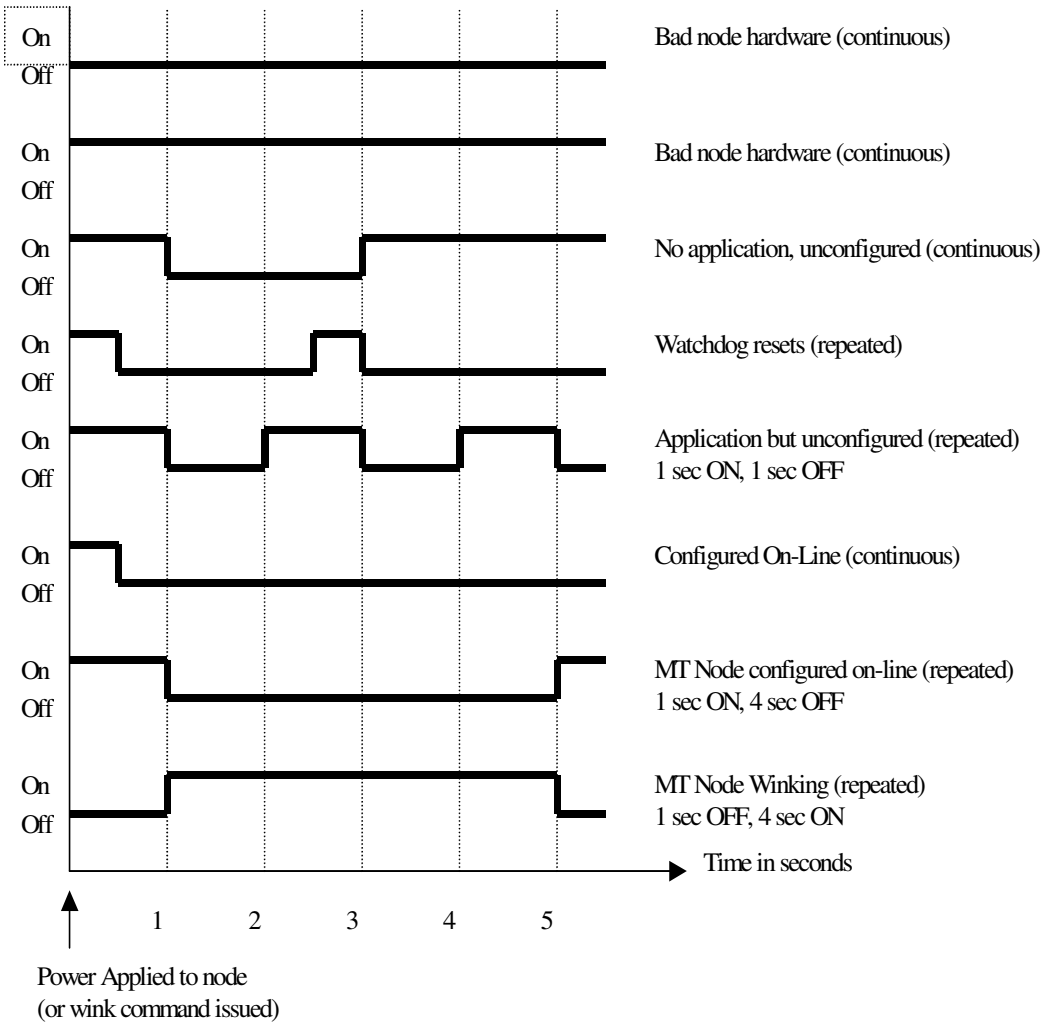
With each application code is associated a Program ID. When you press the Service button, the MT Alliance gets the Neuron ID and the Program ID from the node. In order for a node to do something useful it usually has input network variables, output network variables and configuration properties. The sum of these is called a program template. It is like a "black box". We only know what goes in and out, not how it is done inside.

Node Configuration Properties

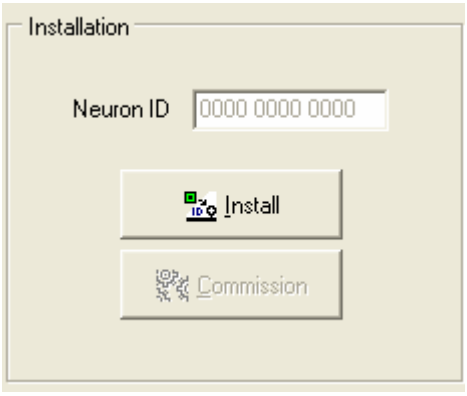
Node Configuration properties are specific to the application that was loaded (e.g.: the high alarm limit). These properties are stored in Flash and are therefore non-volatile. The node will keep them permanently even if it is reset or powered down for an extended period. The process of updating « Node Configuration Properties » is called « Send Config »

The Service LED

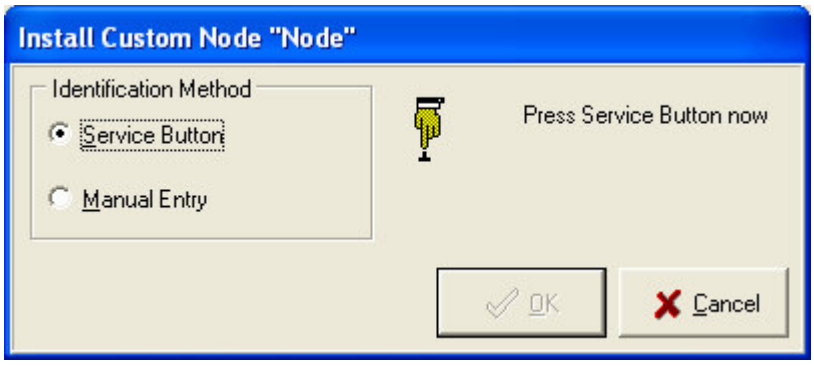
The Service LED of each node is used to visualize its current state. The state can also be obtained from the MT Alliance user interface.



Installing a node

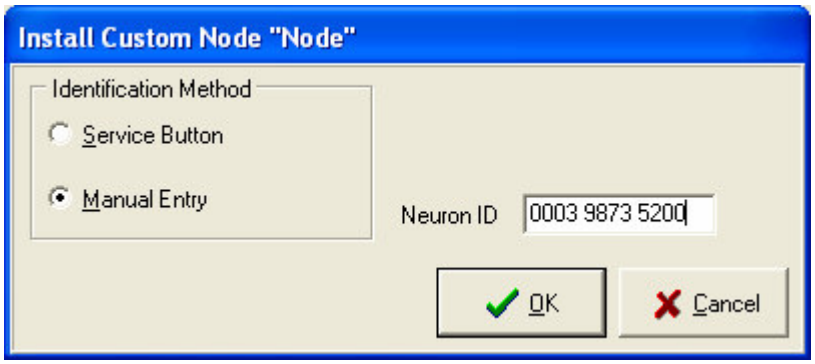


Installing a node is extremely easy. First, unconfigure the new node before putting it on the network. To do that, make sure that the data network cables are not connected to the node. Press and hold the service button apply power to the node; release the button after approximately 5 seconds. The Service LED should blink 1 second ON and 1 second OFF to indicate the node is not configured. Connect the data cable. Then click on the « Install » button.



Select the desired node identification method. The recommended method is to press the "Service Button" on the node. If the Neuron ID is received, it means the node is powered up and that the data cable is connected properly between the node and the PC. If the Neuron ID can not be received, check the node power and data cables.

Alternatively, if you are sure that the node is powered up and that the data cable is connected properly, you can manually enter the "Neuron Id". You would do that if the node is difficult to access (on the roof inside equipment, in the ceiling, etc).



The manual method is prone to human errors however. If you type a wrong "Neuron Id", you will get a message such as: « Cannot communicate with the node ». If you type the "Neuron Id" of an already installed node, you will get a message such as: « Attempt to assign a Neuron Id that is already in use by another device ». If you type the "Neuron Id" of another uninstalled node, it will be very difficult to know you have done something wrong until you finally install the other node. In this case, you would again get "Attempt to assign…already in use…".

Install performs the following operations:

- It remembers the Neuron Id of the node
- It loads the software into the node
- It commissions the node
- It resets the node
- It sends all configuration properties to the node
- It transmits any command point associated with the node.

Once a node has been installed, you usually never use any of the other buttons described in the rest of this document.

Commissioning a node

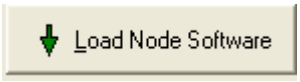
Once a node has been installed, it can be re-commissioned. This refreshes the network address and the node binding information. You only have to do this if you have just made a network binding between two nodes but one of the two nodes cannot be talked to. Maybe it is powered down or the data cable has been disconnected.

In this case you will get a message such as: "The operation completed successfully but the devices have not been updated yet". The MT alliance will periodically retry to commission the faulty node. If you fix the data cable or power up the node, the binding you just made may not work immediately. It may take a few minutes before MT Alliance commissions the previously faulty node. If you want that connection to take immediate effect, you can click on the "Commission button".

If for any reason you think that a node is not talking properly to another node, you can try re-commissioning one or both nodes.

Loading the node software

Normally you do not have to press "Load Node Software". There is one rare occasion where you may want to do this. Suppose an improvement was made to the application program of a node. Suppose this improvement does not involve a "Program ID" change. Suppose all input and output network variables are the same, and all Configuration properties are the same. Then you can load the new application program into the node. This is accomplished by copying the new file into the "c:\Alliance\Node Interface" directory (e.g. : "Comp.apb"). Then click on the "Load Node Software" for each node of that particular type in the system.



Loading the node software performs the following operations:

- It loads the software into the node
- It commissions the node
- It resets the node
- It sends all configuration properties to the node
- It transmits any command point associated with the node.

Testing Commands

Wink

Can't find which node is which? Use the Wink button to find out! Normally the Service LED blinks 1 second on, 4 seconds off to indicate that the node is configured and on-line. When you wink a Micro Thermo node, it will blink the service LED on for 4 seconds and off for 1 second repeatedly for one minute after pressing the wink button. Some nodes that have additional LED may blink them very rapidly to catch your attention.

If you want the node to stop winking immediately, simply reset it.

Test

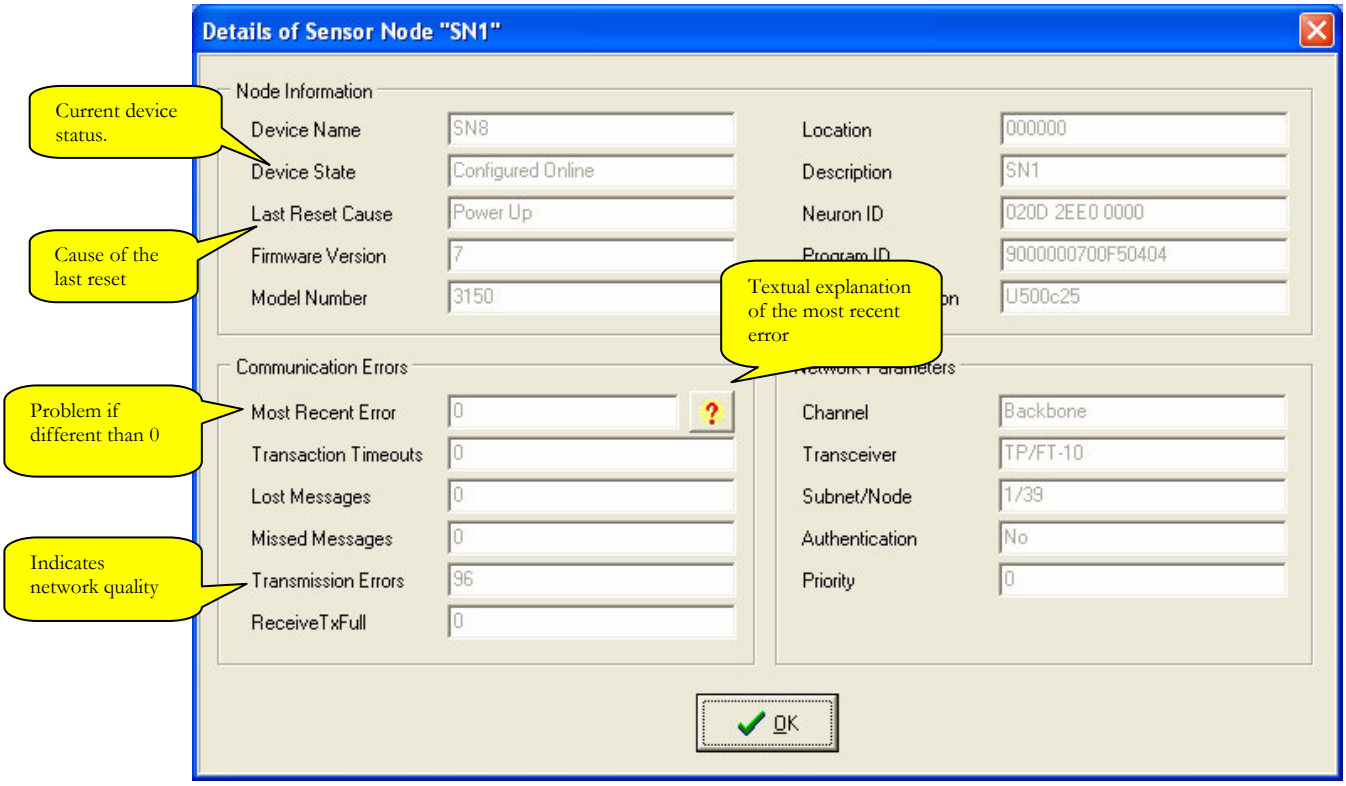
When you click on the Test button, the MT Alliance attempts to talk to the node using "Neuron ID addressing" and then by using the standard "Domain/Subnet/Node Id" addressing. If the node is powered down or the data cable disconnected (or shorted) between the PC and the node, the test will fail. When the test fails, carefully read the possible failure causes and take appropriate action.

If the test is intermittent (sometimes good, sometimes failed) then one cause may be borderline voltage conditions at the node power inputs. Another cause can be an uninstalled or defective network terminator. Too many network terminators may have the same effect. One little wire brand sticking out and shorting the data cable will also cause that. A loose wire will do just the same. Finally, if some nodes have not been configured properly, they may talk too much on the network and consume bandwidth. During temporary peaks, the node test can also fail. Make sure that all nodes Configuration Properties related to network bandwidth control have been set properly.

A node test can also fail consistently even if the node is working properly. A foreign node could cause this. A foreign node is a node that has not been installed in MT Alliance but that has been physically connected on the network. The node test will fail if the foreign node has the same "Domain/Subnet/Node ID" address as the node under test. Find and unconfigure the foreign node to fix the problem (hold service button for 5 seconds during power-up). How do you find the foreign node? Find the node where the service LED indicates it is configured and on-line and which is not in the MT Alliance.

Details

The Details button is used for advanced troubleshooting of the node. Since most of this information comes from the node itself, it has to be powered and connected to the PC via the data cable. We will highlight the most interesting information below:



Device state

The device state is reported by the node. The ones that you are most likely to see are:

- Unconfigured (Node has an application but has not been commissioned)
- Configured Online (Node commissioned and application running)

The device states that you should never see are:

- No Application Uncfg (not commissioned and no application loaded)
- Configured Offline (commissioned but application not running)
- Soft Offline (commissioned but application not running)
- Configured Bypass
- ERR (unknown state reported by the node)

Last Reset Cause

The "last reset cause" is reported by the node. The ones that you are most likely to see are:

- Power Up (power lost and re-applied)
- Reset Pin (a technician pressed the reset button)
- Software (a technician used MT Alliance to reset the node)

The Last Reset Causes that you should never see are:

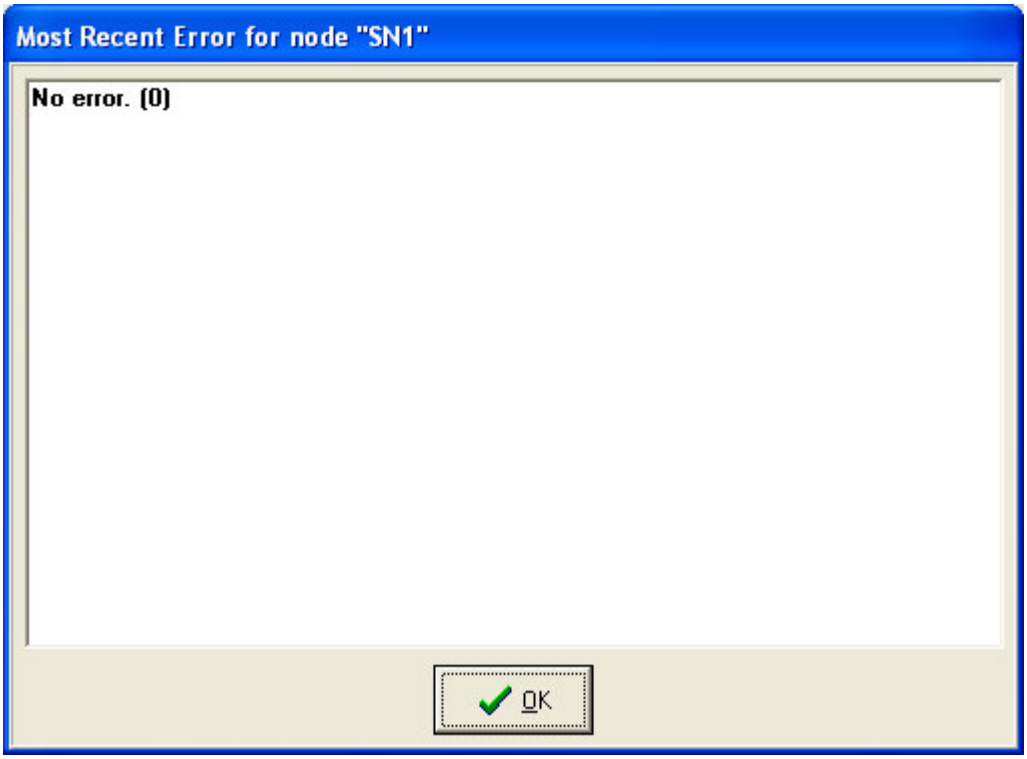
- WatchDog Timeout (node application was doing something for too long and the internal watchdog built-into the Neuron chip decided to reset the application; or you have created a data cable loop)
- None
- ERR (node reports an undefined reset cause)

Every time a MT Alliance compatible node is reset, it informs the MT Alliance immediately. The event goes into the node log. If you get intermittent "Node Test Failed" alarms on a node, check the log for "Reset received from node".

Most Recent Error

This value should always be 0 to indicate there was no error within the node. Contact Technical Support if it is not zero.

When clicking on this button  you get the following window that shows you the most recent error that occurs for the specified node.



Transmission Errors

Each Neuron remembers several statistics about network messages. Transmissions errors represent the number of times the device received a packet with an invalid CRC, received a packet that was too short, received a packet too long for the device's input buffer, or saw a timeout. The rate at which this number increments is a fairly good indicator of network transmission quality. Note that all statistic counters will eventually reach 65535 and stop counting. You must perform a software reset of the node to reset these counters.

Missed Messages

Each Neuron is in fact made up of 3 processors with shared memory areas called input and output buffers. A missed message indicates that the MAC processor in the Neuron is receiving messages faster than it can handle them. Other Neurons should send messages to this node at a slower rate. You can try adjusting the Network Bandwidth Control parameters (min send time, max send times, send on deltas) in the other nodes communicating with this node.

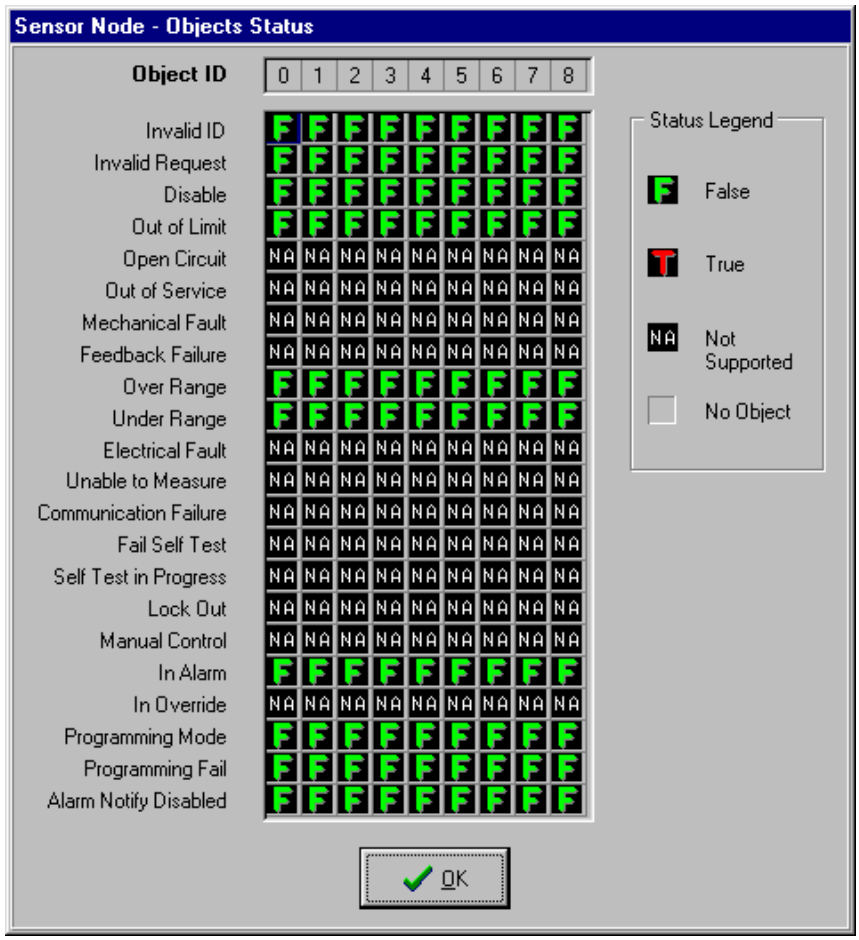
Lost Messages

The Application processor in the Neuron is receiving messages faster than it can handle them. Although the message is considered transmitted successfully by the sender node, the receiving node actually lost the message between the MAC processor and the application processor. If Lost Messages are greater than Missed Messages, this is an indication that the application code is not executing fast enough for all the things it does.

You can try increasing the Network Bandwidth Control parameters (min send time, max send times, send on deltas) in the other nodes communicating with this node.

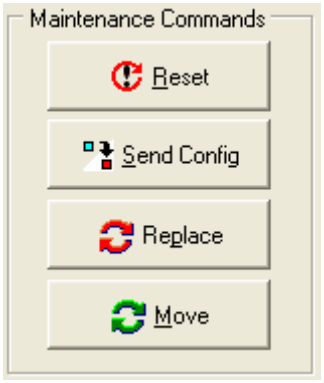
Object status

The object status information is also obtained from the node so it must be powered and connected on the network to get this information. The node application code can define one or more objects on the node. An object is nothing more than a collection of input network variables, output network variables, configuration properties and related I/O. For example on a Micro Thermo Alarm Sensor node, there are 8 Alarm Sensor Objects and a node object (ID = 0). The node object exists to receive the system time, send alarms, and respond to various queries from the MT Alliance.



For most items on the left, True means that there is a problem. False means there is no problem. "N/A" means that the item on the left (e.g.: Open Circuit) is not supported by the object.

Maintenance Commands



Reset

By clicking on the reset button, you can remotely reset a node just as if you had powered it down and back up again. When a node is reset, it looses all of its volatile memory. Use the software reset command if you think a node is not functioning properly. Resetting the node is also the only way of resetting the node error counters (see Node Details above).

After resetting the node, the MT Alliance will automatically retransmit any associated command points.

Send Config

The "Send Config" button will retransmit all configuration properties to all objects in the node. Use this button if you had error messages while sending configuration properties to the node.

Replace

To replace a faulty device, simply remove the old device physically and put the new device in its place. Press the "Replace" button and you will be asked to press the Service button or manually enter a Neuron ID.

Replace works just like "Install" except that you physically change the node for another one. When "Replace" is finished, the new node will be fully operational.

Move

When installing routers on your network, you have the possibility to move a device from one end or the other of the network. Press the "Move" button and you will be asked to specify the location and the destination of the device which you want to move.

If don't have any routers, even if you press the "Move" button you won't be able to change the location of the device since you won't have any destination choice.

Historique des révisions

REV	Description	Révisé Par	Date
1.1	Création et formatage document	CBC	16 Juin 2003
1.2	Poursuite du travail	CBC	18 Juin 2003
2.0	Création de la première version pour révision générale	CBC	19 Juin 2003
2.1	Modification après la révision de Yves Roy	CBC	19 Juin 2003
2.2	Création de la table des matières	CBC	16 Juillet 03
2.3	Révision du document	JG	30 Juillet 03
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4.0	Publication pour MT Alliance Version 4.1	CBC	5 Février 04